# THORDARSON

## AMPLIFIER GUIDE 346-D

Price 15c

# Building Modern Amplifiers

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THE development of amplifiers is steadily progressing. Today the average builder can turn out a unit capable of results which a few years back could be obtained only in the laboratory. Improvements in tubes, transformers, and circuits make it possible to obtain higher power output from a comparatively small amplifier. Good frequency response is easily obtained and harmonic distortion can be held to the point where it is negligible.

The modern amplifier for Public Address must be entirely self contained. The gain must be high to accommodate low level microphones, and the hum level should be low especially where speakers with good low frequency response are used. The power output rating must be actual undistorted watts at all frequencies, and not just nominal or the tube manufacturers maximum output rating of the tubes used. The amplifiers described in this booklet are modern in these respects and incorporate numerous other improvements.

Thordarson engineers produced these amplifiers strictly for the Sound man and amplifier builder, taking into consideration the high standard of results which are always expected of custom built apparatus. Frequency response, power output, and distortion measurements were made periodically throughout their development on expensive laboratory equipment, thus insuring the most out of each amplifier complement. The final construction of the amplifier is reached only when each part is aiding in the superior performance of the unit.

Inverse feedback is used in most of the amplifiers because of the numerous advantages it offers. Distortion is reduced to minimum, frequency response is made more linear and the overall stability of the amplifier is improved. The constructor is urged to read each and every article. The suggestions offered in the different models will aid in building any amplifier.

In order to facilitate construction, standard sized chassis are used wherever possible. These are nationally available from parts suppliers. Complete mechanical drawings showing socket and mounting holes make cut and try layout unnecessary and save considerable time in building an amplifier. If drills and punches are not available your local parts supplier may be able to do the necessary work for you.

Full size chassis templates for any amplifier are available from the factory for 15c postpaid. By using a full size drawing the chassis can be marked directly without measurement.

All parts listed are nationally advertised brands and are readily available. Substitution is recommended only when they are of equal quality and the electrical and physical characteristics are the same. Small hardware, etc., is not listed inasmuch as the builder usually has this material on hand.

Assembly of the amplifier is usually started by mounting tube sockets, controls, transformers, and chokes on the chassis. The bottom view photos are marked to indicate the placement of the more important parts used in the amplifier. Small bakelite strips with solder lugs were used in some cases to support small resistors and condensers. If the strips are not available, these parts may be self supported by their leads. The use of the strips, however, tend to make a neater and more rigid wiring job and are recommended.

Proceed to wire the amplifier by starting with the filament or heater circuits. No. 18 stranded pushback wire is suitable. Wire the power supply next and finally the small resistors, condensers, and controls. It is quite important to use shielded wire as indicated in the circuit diagrams since hum and feedback is liable to result otherwise. Where the schematic diagrams show shielded resistors and condensers this is accomplished by first inserting the part in a piece of spaghetti tubing or wrapping with insulating material such as varnished cambric and then covering with shielding braid. The shielding of the parts so indicated is important in the reduction of hum.

After the assembly and wiring is completed recheck carefully before installing tubes and applying power. When certain that the wiring is correct the power can be applied and voltages checked carefully. It is advisable to measure all voltages and power output before the amplifier is placed in service. This will prevent overloading of tubes or parts due to improper adjustments, bad connections or oscillation.

Due to the high power sensitivity of beam power tubes they sometimes oscillate at a high inaudible frequency if placement of leads is not correct or shielding and grounds are insufficient. Oscillation can also be caused by improper phasing of the inverse feedback circuit. Reversal of the leads, connecting the feedback winding of the output transformer to the grid returns of the input transformer, will change the phase relationship of the feedback voltage. The use of an oscilloscope is recommended in determining when these conditions take place and in correcting same. The article on page 31 will be helpful in the proper testing of an amplifier with the oscilloscope.

Correspondence is invited to aid in the solution of your amplifier problems.

## TABLE OF CONTENTS

| | |
|---|---|
| Building Modern Amplifiers | 2 |
| Advantages of Inverse Feedback | 3 |
| 8 Watt Amplifier | 4 |
| 15 Watt Amplifier | 6 |
| 25 Watt Amplifier | 8 |
| 40 Watt Amplifier | 10 |
| 60 Watt Amplifier | 12 |
| 120 Watt Amplifier | 14 |
| 2A3 Phono Amplifier | 16 |
| 6 Volt DC, 115 Volt AC, Mobile Amplifier | 18 |
| Single Channel Pre-Amplifier | 20 |
| Four Channel Pre-Amplifier | 22 |
| Dual Tone Control | 24 |
| Matching Speaker Loads | 26 |
| Chassis Drawing, 6 V. D.C. Amplifier | 27 |
| Chassis Drawing, 2A3 and 15 Watt Amplifier | 28 |
| Chassis Drawing, 25 and 40 Watt Amplifier | 29 |
| Chassis Drawing, 60 and 120 Watt Amplifier | 30 |
| Testing Amplifiers | 31 |
| Factory Built Amplifiers | 32 |

# ADVANTAGES OF INVERSE FEEDBACK

A beam power amplifier to be truly modern should incorporate inverse feedback. It is a commonly recognized fact that low plate resistance tubes such as the 2A3 are superior from the standpoint of low distortion and good quality. With inverse feedback the high plate resistance beam power tube may be made to take on the characteristics of the low-mu triode, yet retain most of its high power sensitivity. The important advantages obtained by the use of inverse feedback are fourfold: first, reduction of wave form distortion; second, improvement of frequency response; third, reduction of hum; and fourth, reduction of "hangover" effect. The only disadvantage of inverse feedback lies in the fact that the gain is considerably reduced.

## EXPLANATION OF INVERSE FEEDBACK

In the circuit of Fig. 1, a certain amount of the voltage developed in the plate circuit is fed back out of phase with the signal in the grid circuit. If without inverse feedback a certain voltage $E_0$ is developed across the output circuit with an input voltage $E_1$ the gain of the stage is $E_0$ divided by $E_1$. If now a certain percentage N of the voltage $E_0$ is fed back to the grid circuit in such a way that the voltage is out of phase with the input voltage $E_1$ the total input voltage to obtain an output voltage of $E_0$ is $(N\,E_0 + E_1)$ and the gain of the stage is $\frac{E_0}{(N\,E_0 + E_1)}$. The ratio N is the percentage of the output voltage which is fed back to the input circuit. It may be readily seen that if N is large the gain of the stage depends more upon N than upon the circuit constants. The ratio reduction in gain by the addition of inverse feedback may be readily determined by dividing the gain without feedback by the gain with feedback.

## REDUCTION OF DISTORTION

As was pointed out in the above paragraph, an inverse feedback circuit feeds back a certain portion of the output voltage to the grid circuit. If distortion is introduced in the amplifier stage a certain amount of the distorted voltage will be fed back into the grid circuit and this will tend to cancel out the distortion developed in the amplifier stage. If in the circuit of Fig. 1 a certain amount of distortion voltage B is present in the output circuit the distortion voltage fed into the grid circuit

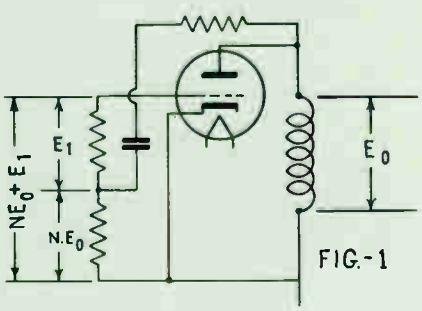


FIG.-1

will be N x B and this quantity multiplied by the gain of the stage will give the cancelling effect of the inverse feedback. The total distortion present in the output is then equal to the sum of the distortion without inverse feedback and the distortion cancelled by the inverse feedback. In other words, if b is the distortion without inverse feedback, the total distortion, B, with inverse feedback is equal to $(b + B) \times N \times A$, where A is the gain of the stage. Evaluating B gives the quantity $\frac{b}{1 + NA}$. In other words the distortion is reduced by the ratio of $\frac{1}{1 + NA}$.

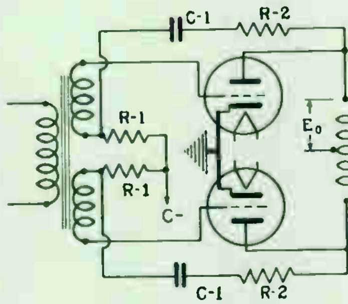


FIG. 2

Fig. 2 shows the ordinary method of obtaining inverse feedback with the resistor-condenser method. The amount of inverse feedback is equal to $\frac{R_1}{R_1 + R_2}$ assuming that the reactance of the condenser $C_1$ is negligible over the operating frequencies. However, this assumption is not necessarily true especially at the lower frequencies and the circuit of Fig. 3 is much more efficient from this standpoint. In Fig. 3 the feedback voltage is obtained from a tertiary winding on the output transformer. This method also provides a much better overload characteristic since the resistance in the grid circuit is negligible and it is quite possible to operate the tubes in the grid current region.

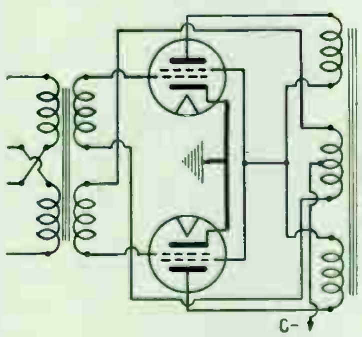


FIG. 3

## REDUCTION OF PLATE RESISTANCE

In addition to the reduction in distortion obtained by inverse feedback, there is also a reduction in the plate resistance of the tubes. A high plate resistance is a definite disadvantage in the case of a power tube which operates into a speaker load which is more or less variable depending upon the impedance of the voice coil. In the circuit of Fig. 4, it may be easily seen that the voltage E developed across the load depends a great deal upon the actual value of $R_L$ which is the reflected impedance of the voice coil. This is due to the fact that the signal current depends almost entirely upon the high plate resistance of the tube. Since the load resistance is low in comparison to the plate resistance, the voltage developed across the load is almost directly proportional to the impedance of the load which varies appreciably with change in frequency. In Fig. 5 it may be seen that the voltage across the load does not vary so much since the signal current depends both upon the load and upon the plate resistance of the tube. If the voice coil has an appreciable amount of reactance the impedance rises with the frequency causing distortion and giving an unnatural amount of "highs." The high plate resistance is unsuitable from another view point, that of the amount of low frequency distortion which may be tolerated. This low frequency distortion is not

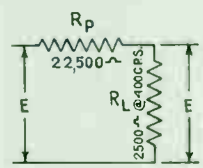


FIG. 4

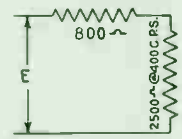


FIG 5

due to the characteristics of the tubes which remain unchanged regardless of the frequency, but depends upon the magnetizing current in the output transformer. The magnetizing current is a distorted nonsinusoidal wave and this current, on flowing through the high plate resistance of the tube, develops a nonsinusoidal voltage drop across the tube which, when subtracted from the input signal, results in a distorted wave across the output. Unfortunately, most amplifiers today are measured for distortion at 400 c.p.s. where the magnetizing current is practically negligible. It is not uncommon to find beam power amplifiers without inverse feedback which have only 25 per cent of the rated power at 40 or 50 cycles. This low frequency distortion is particularly objectionable since all harmonics fall within the audible range. Inverse feedback effectively reduces the plate resistance so that the distorted voltage drop caused by the magnetizing current is exceedingly small with the result that there is very little distortion across the output circuit. With a poor output transformer it is quite possible for the distortion to be as high as 30 per cent at 40 cycles without inverse feedback.

## "HANGOVER" EFFECT

"Hangover effects," or transients caused by the loud speaker cone vibrating at its natural period when shock excited, are greatly reduced by the use of inverse feedback. The lower plate resistance provides a considerable amount of damping so that the oscillations or transients are reduced. With regular beam power tubes the shunt-

*(Continued on page 27)*

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# 8 WATT AMPLIFIER

TOP VIEW

THIS small amplifier is useful in many everyday applications especially for voice amplification. Political meetings, Ballyhoo, etc., usually can be handled successfully with a small amplifier system capable of delivering about 8 watts of audio power.

Three high gain resistance coupled stages will accommodate even the lowest level high impedance microphones. The phono pick-up signal is mixed into the second stage through a resistance network, providing independent control of microphone and phono without one affecting the other. A good selection of output impedances make it easy to match any P.M. or electro-dynamic loud speaker. The amplifier supplies 6 watts of field power which is sufficient for an 8 or 10 inch loud speaker (5000 ohm field). One or more additional P.M. speakers may be connected if desired.

The construction of the amplifier is comparatively simple, especially since the chassis layout is shown. A full size drawing is also available making it possible to spot the hole centers on the chassis with a punch if this method of construction is preferred. After all holes have been drilled or punched, mount all the parts, starting with tube sockets, controls and transformers.

Wire the tube heaters first and then proceed with common ground connections. After wiring the "B" supply, install and wire the small resistors, condensers, etc. Use shielded wire as indicated in the diagram and shield resistors R-1, R-6 and R-8 by inserting in spaghetti tubing and covering with a shielded braid. This shielding aids in eliminating annoying hum and cross talk, ordinarily encountered in high gain amplifiers.

The wiring of the speaker socket is such that either an electro dynamic or P.M. speaker may be used without altering connections in the amplifier. This is accomplished by properly wiring the speaker plug. If a 5000 ohm field is used, connect the field to the plug prongs corresponding to socket contacts "G" and "A". If a P.M. speaker is used a jumper wire must be connected in the plug to prongs "G" and "B". Do not operate the amplifier unless a 5000 ohm speaker field is connected or the plug inserted with the jumper wire.

Make voice coil connections to contacts "G" (common) and either 2, 4, 8 or 500 whichever matches the speaker impedance. The output terminals marked 500 ohms facilitate connecting to a line in portable set-ups. However, be sure a jumper plug from "G" to "B" is inserted when this is used.

It is recommended that the tubes be inserted and speaker and other accessories connected before the amplifier is turned on. Voltages are given on the schematic diagram. All voltages should be checked with a good volt-meter before the amplifier is allowed to operate for any length of time. 10% tolerance is permissible in voltage measurements.

## TECHNICAL DATA

***Power Output:*** 8 watts or + 31.25 db.

***Coverage:*** 100,000 to 200,000 cu. ft. indoors; 6,000 to 10,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic, or velocity microphone, and one channel for high impedance crystal or magnetic pick-up. The two channels may be mixed.

***Field Supply:*** 6 watts available for 5000 ohm speaker field.

***Output Impedances:*** 2, 4, 8, and 500 ohms.

***Frequency Response:*** Within ± 1 db from 45 c.p.s. to 6000 c.p.s.

***Tone Control:*** Maximum position attenuates 1000 c.p.s. 5 db, 5000 c.p.s. 17 db, and 10,000 c.p.s. 23 db.

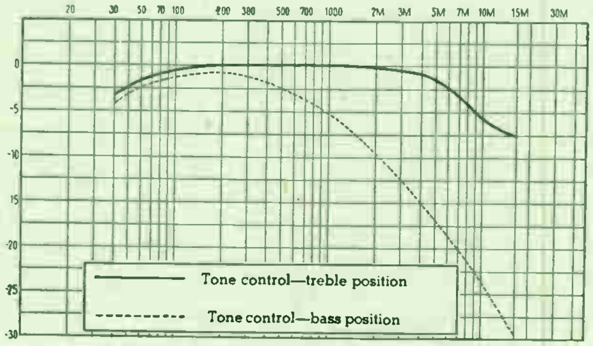
***Gain:*** Microphone input 111 db; phono input 66 db (based on 100,000 ohms input impedance).

***Hum:*** 61.5 db below maximum output.

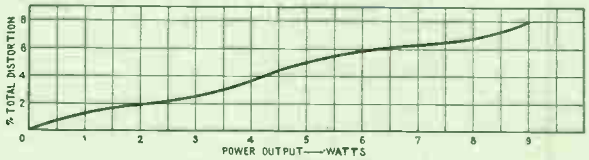
***Tubes:*** 1-6J7, 1-6F5, 1-6L6G, 1-80.

***Power Consumption:*** 85 watts, 115 volts, 50-60 cycles.

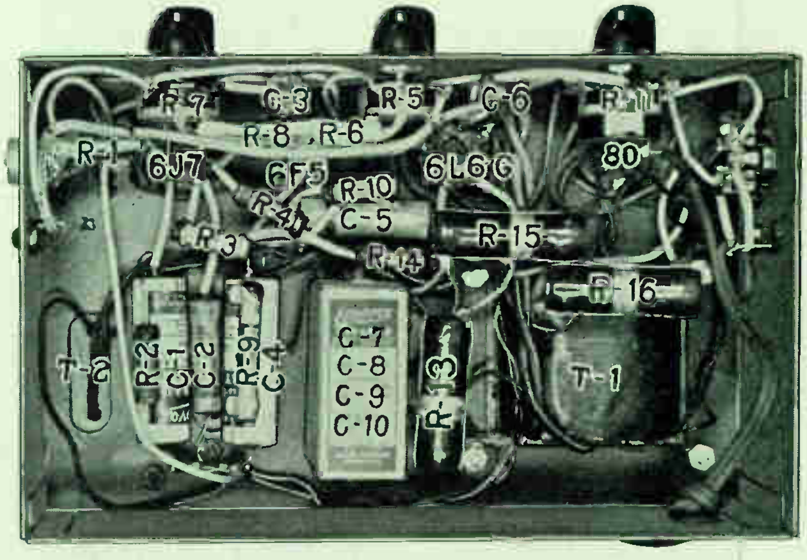
***Dimensions:*** 10″ long, 5″ deep, 9″ high.




FREQUENCY-RESPONSE CURVE




DISTORTION CURVE




BOTTOM VIEW

# 8 WATT AMPLIFIER

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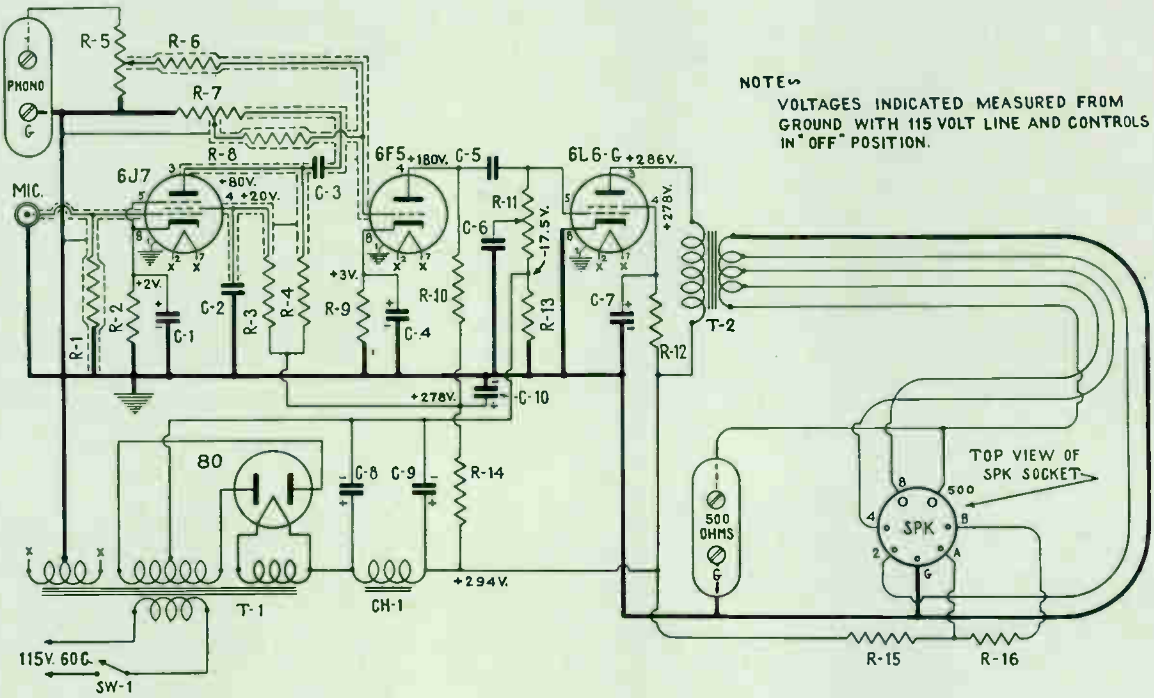



## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| | |
|---|---|
| T-1 | T-75R47 Power Transformer |
| T-2 | T-17S10 Output Transformer |
| CH-1 | T-57C54 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5,000 | 1 | IRC BT-1 |
| R-3 | 3 MEG. | 1 | IRC BT-1 |
| R-4 | 500,000 | 1 | IRC BT-1 |
| R-5 | 250,000 | Volume Control | Yaxley type "M" |
| R-6 | 500,000 | ½ | IRC BT-½ |
| R-7 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-8 | 500,000 | ½ | IRC BT-½ |
| R-9 | 3,000 | 1 | IRC BT-1 |
| R-10 | 100,000 | 1 | IRC BT-1 |
| R-11 | 500,000 | Tone Control | Yaxley type "M" with switch |
| R-12 | 5,000 | 1 | IRC BT-1 |
| R-13 | 150 | 25 | Ohmite—Wire wound |
| R-14 | 50,000 | 1 | IRC BT-1 |
| R-15 | 3,500 | 25 | Ohmite—Wire wound |
| R-16 | 5,000 | 25 | Ohmite—Wire wound |

### CONDENSERS

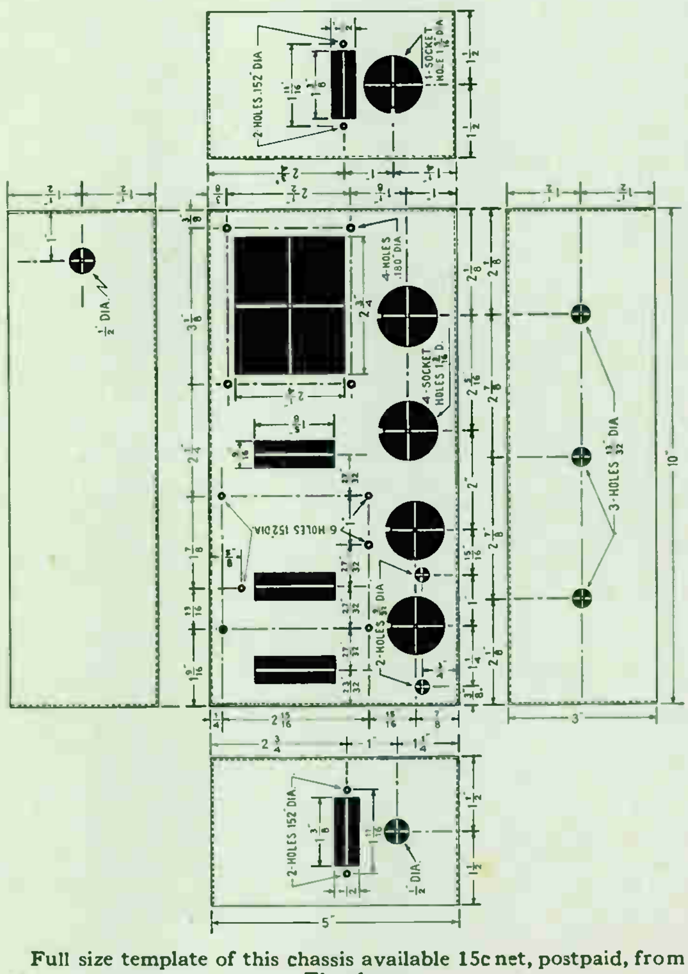
| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25V Elect. | Aerovox PR25 |
| C-2 | .04 | 400V Paper | Aerovox 484 |
| C-3 | .1 | 400V Paper | Aerovox 484 |
| C-4 | 10 | 25V Elect. | Aerovox PR25 |
| C-5 | .1 | 400V Paper | Aerovox 484 |
| C-6 | .005 | 400V Paper | Aerovox 484 |
| C-7, C-10 | 8-8 | 450 W.V. Elect. | Aerovox PBS450 |
| C-8, C-9 | 8-8 | 450 W.V. Elect. | Aerovox PBS450 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x10x3" Chassis & Cover — Par-Metal AF-510 |
| 1 | 5x10" Chassis bottom plate — Par-Metal BP-4508 |
| 3 | Octal sockets — Amphenol S8 |
| 1 | 4-Contact socket — Amphenol S4 |
| 1 | 7-Contact socket — Amphenol S7 |
| 1 | 7 Prong speaker plug — Amphenol PM7 |
| 1 | Mic. Connector — Amphenol PC1M |
| 1 | Mic. Connector — Amphenol MC1F |
| 2 | Two screw terminal boards |
| 1 | Line cord and plug — Belden No. 1725 |
| 3 | Control knobs |
| 2 | Metal tube grid caps |
| 2 | Metal grid cap shields |
| 1 | "MIC" Control dial plate |
| 1 | "PHONO" Control dial plate |
| 1 | "TONE" Control dial plate |

Tubes, 1-6J7, 1-6F5, 1-6L6G, 1-80

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.



Full size template of this chassis available 15c net, postpaid, from Thordarson.

# 15 WATT AMPLIFIER

TOP VIEW

THE output power of this amplifier is sufficient to satisfy the requirements of a large number of installations. This is especially true since the distortion present at full output is low, being less than 5% total. This percentage is generally accepted as undistorted and permits operating at full output with high quality reproduction.

Thordarson CHT transformers are used in this model and are recommended for best results, appearance, etc. Regular types may be substituted as indicated in the parts list but it will be necessary to locate the mounting holes when drilling the chassis since the drawing is based on the use of CHT units. An added advantage is the better selection of output impedances available with the CHT output transformer.

Beam power 6V6-G output tubes are operated in a class A1 circuit employing inverse feedback. The output transformer contains a separate feedback winding which produces a voltage 10% of that developed in the primary. The voltage is fed out of phase into the grid returns of the input transformer secondary. This method of feedback is superior to the resistor-capacity method inasmuch as there is no frequency discrimination, and any distortion that might develop in the output is corrected. It should be noted that the input transformer has a split secondary winding which is essential when this method of feedback is used.

A high impedance microphone and high impedance phono channel with independent controls accommodate any type of microphone and crystal or magnetic pick-up. Amplifier gain is sufficient to obtain full output from microphone and pick-up under normal operating conditions.

The circuit diagram shows two speaker sockets which are used for making speaker voice-coil and field connections. If electro-dynamic speakers are used, ten watts of field excitation is available for one 5,000 ohm, or one or two 2,500 ohm fields. The table below indicates how the connections are made to the speaker sockets. Note that a jumper wire is used on the speaker field terminal board for some condition of operation.

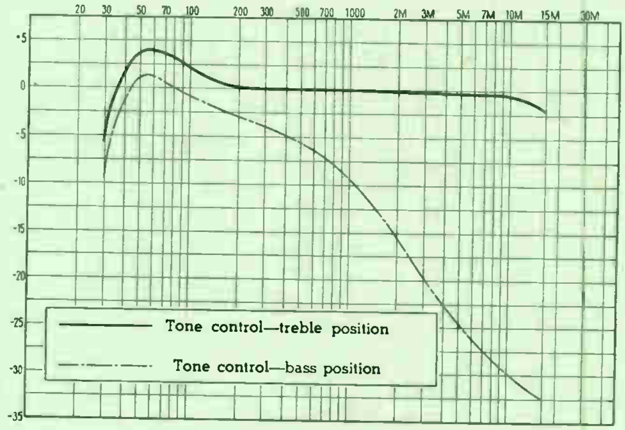
| | *Jumper* | *Connect to Prongs* |
|---|---|---|
| 1-5000 ohm field | remove | 1-5 |
| 1-2500 ohm field | C-2 | 2-5 |
| 2-2500 ohm fields | remove | B-E and 2-5 |
| Field Supply not used | 1-C | |

Speaker voice coil or line connections are made at 3, 4, and C, D of the speaker sockets or the output terminal board. The CHT output transformer, T-2, incorporates a terminal board with jacks and a plug for selecting the proper output impedance.

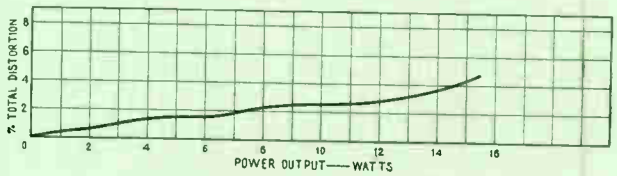
Terminal board marked POL. V. is provided to supply a polarizing voltage for static types of microphones or a photo electric cell. When the static microphone is used connect a jumper wire to terminals 1 and 2 which completes the circuit. Under no condition should this jumper be left in place when a crystal, dynamic, or velocity microphone is connected to the amplifier.

Photo electric cells of the gas filled type usually require 90 volts operating voltage. Since the normal voltage applied to the input plug is approximately 270 volts, this should be reduced to 90 volts by connecting a 5 megohm 1 watt resistor from the junction of C-1 and R-2 to ground. In the event that a static microphone or photo electric cell is never to be used R-1, R-2, and C-1 may be eliminated.

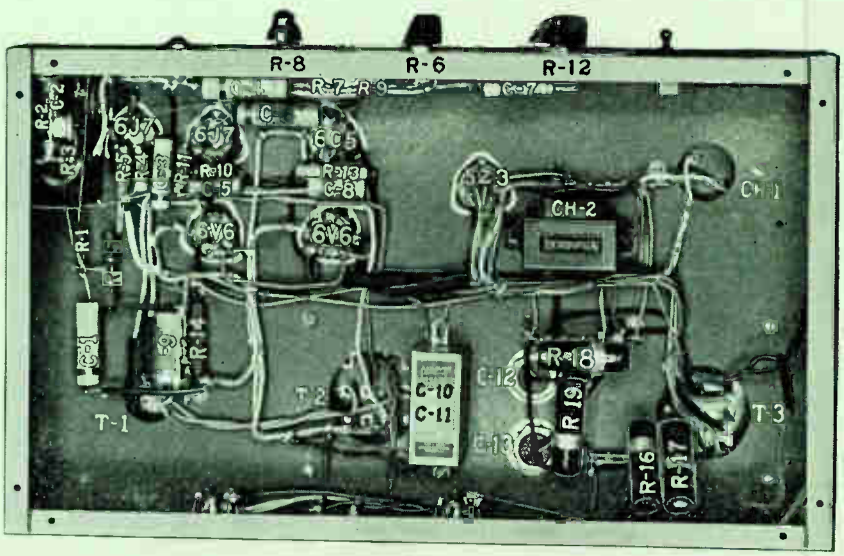
It is important to employ the shielding of wires and parts as shown in the diagram if hum, noise, and oscillation are to be eliminated. Enclose R-1, R-3, and C-2 in a metal container for minimum hum. The constructor is advised to read the article on page 31 if any difficulty is experienced in adjusting the amplifier.




FREQUENCY-RESPONSE CURVE




DISTORTION CURVE




BOTTOM VIEW

# 15 WATT AMPLIFIER

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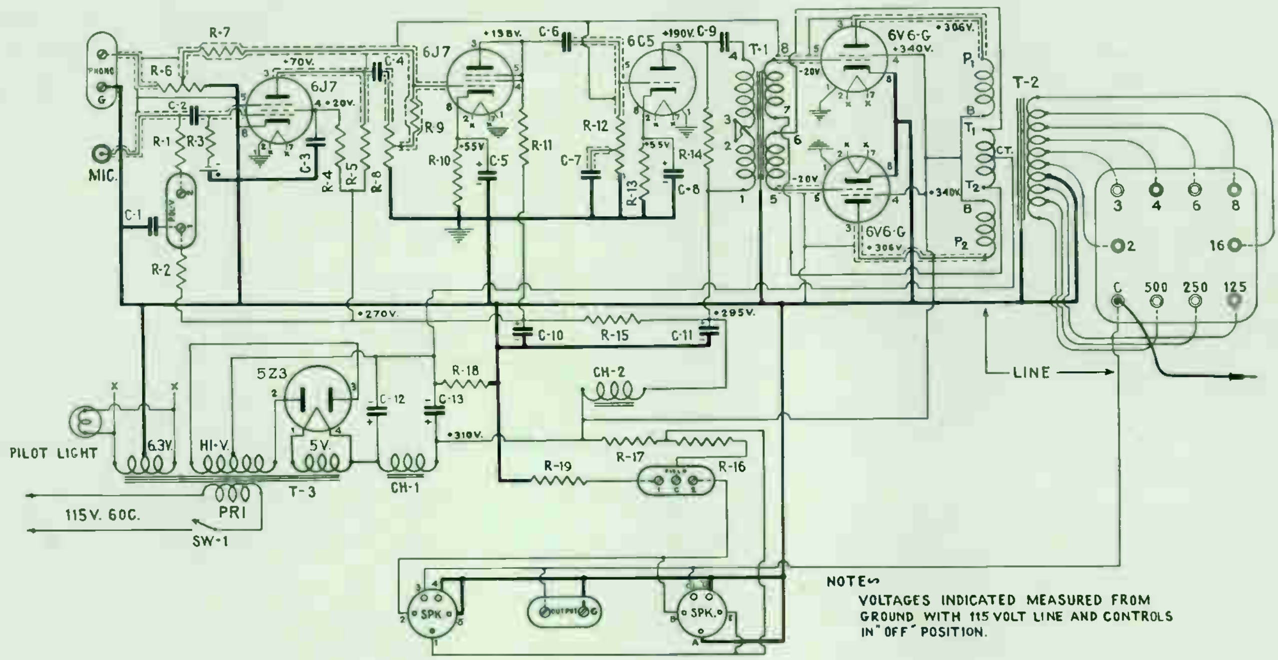



NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## TECHNICAL DATA

***Power Output:*** 15 watts undistorted or + 34 db (less than 5% distortion).

***Coverage:*** 200,000 to 500,000 cu. ft. indoors; 10,000 to 20,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic, or velocity microphone, and one channel for high impedance crystal, or magnetic pick-up. The two channels may be mixed. Polarizing voltage is provided for static microphone or photo electric cell.

***Field Supply:*** 10 watts available for one 5000 ohm field, or one or two 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer, or 4, 8, 15, 250, or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 1 db from 40 c.p.s. to 15,000 c.p.s. with bass boost of 3.5 db below 100 c.p.s.

***Tone Control:*** Maximum position attenuates 10,000 c.p.s. 28 db.

***Gain:*** Microphone input 113 db; phono input 72 db (based on 100,000 ohms input impedance).

***Hum:*** 74 db below maximum output.

***Tubes:*** 2-6J7, 1-6C5, 2-6V6G, 1-5Z3.

***Power Consumption:*** 112 Watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | |
|---|---|---|---|
| T-1 | T-15A74 | T-15A74 | Input Transformer |
| T-2 | T-15S90 | T-17S11 | Output Transformer |
| T-3 | T-15R06 | T-70R62 | Power Transformer |
| CH-1 | T-15C54* | T-57C54 | First Choke |
| CH-2 | T-67C46 | T-67C46 | Second Choke |

*Windings in parallel.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 10 MEG. | ½ | IRC BT-½ |
| R-2 | 10 MEG. | ½ | IRC BT-½ |
| R-3 | 5 MEG. | ½ | IRC BT-½ |
| R-4 | 3 MEG. | 1 | IRC BT-1 |
| R-5 | 500,000 | 1 | IRC BT-1 |
| R-6 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-7 | 500,000 | ½ | IRC BT-½ |
| R-8 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-9 | 500,000 | ½ | IRC BT-½ |
| R-10 | 5,000 | 1 | IRC BT-1 |
| R-11 | 100,000 | 1 | IRC BT-1 |
| R-12 | 500,000 | Tone Control | Yaxley type "M" |
| R-13 | 1,000 | 1 | IRC BT-1 |
| R-14 | 20,000 | 1 | IRC BT-1 |
| R-15 | 20,000 | 1 | IRC BT-1 |
| R-16 | 2,500 | 25 | Ohmite, Wirewound |
| R-17 | 1,500 | 25 | Ohmite, Wirewound |
| R-18 | 125 | 25 | Ohmite, Wirewound, Tolerance + 10%, −0% |
| R-19 | 2,500 | 25 | Ohmite, Wirewound |

### TUBES

| | |
|---|---|
| 2 | 6J7 |
| 1 | 6C5 |
| 2 | 6V6-G |
| 1 | 5Z3 |

For complete mechanical drawing of chassis see page 28. Full size template of chassis available from Thordarson 15c net, postpaid.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400V Paper | Aerovox #484 |
| C-2 | .03 | 400V Paper | Aerovox #484 |
| C-3 | .04 | 400V Paper | Aerovox #484 |
| C-4 | .1 | 400V-Paper | Aerovox #484 |
| C-5 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | .03 | 400V Paper | Aerovox #484 |
| C-8 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-9 | .1 | 400V Paper | Aerovox #484 |
| C-10, C-11 | 8-8 | 450 W. V. Elect. | Aerovox PBS-450 |
| C-12 | 8 | 600V Elect. | Aerovox GL600 |
| C-13 | 8 | 600V Elect. | Aerovox GL600 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" chassis and cover—Par-Metal AF 1017 |
| 1 | 10x17" chassis bottom plate—Par-Metal BP 4526 |
| 1 | 4-contact socket — Amphenol S4 |
| 5 | Octal sockets — Amphenol S8 |
| 2 | 5-contact sockets — Amphenol S5 |
| 2 | 5-prong speaker plugs — Amphenol PM5 |
| 1 | Mic. connector — Amphenol PC1M |
| 1 | Mic. connector — Amphenol MC1F |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | 6.3V Pilot light — Mazda #40 |
| 2 | Metal tube grid caps |
| 2 | Metal grid cap shields |
| 1 | "Microphone" control plate |
| 1 | "Phono" control plate |
| 1 | "Tone" control plate |
| 3 | Control knobs |
| 1 | AC line cord & plug |
| 1 | Mallory bias cell — 1.5 V. — #F7 |
| 1 | Mallory bias cell holder — #GB-1A |
| 1 | SPST switch — Arrow H & H #20992 |
| 3 | Two screw terminal boards |
| 1 | Three screw terminal board |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

# 25 WATT AMPLIFIER

THE use of inverse feedback makes it possible to obtain 25 watts of undistorted output from this amplifier with only 300 volts applied to the plates and screens of the power tubes. These low voltages increase tube and condenser life considerably which is a decided advantage. The output tubes are operated in a class AB1 circuit, under which condition no driving power is required; a single 6C5 tube supplies sufficient grid excitation through a C.H.T. input transformer. The windings of this transformer are balanced so that there is a cancelling effect for any hum that might be picked up. Degeneration or inverse feedback is obtained by coupling the tertiary winding of the output transformer to the secondary of the input transformer.

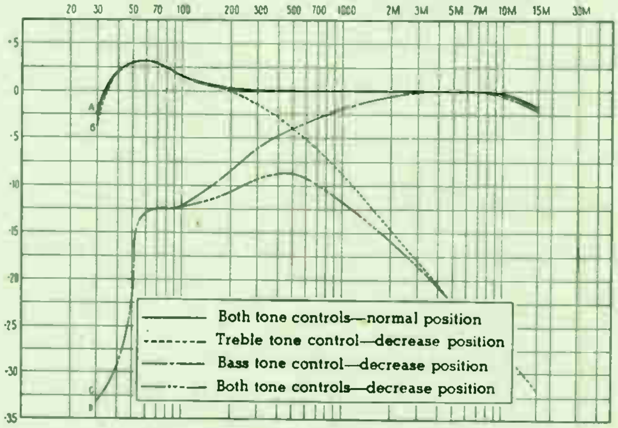
The input circuits are arranged to handle two high impedance microphones and a phono pick-up. Mixing takes place in the second stage in a resistor network that is more simple and economical than electronic mixing. Control action is smooth, and the changing of one control setting does not affect another. It is important, however, to shield resistors R-11, R-12, and R-13, and the leads as shown in the diagram. The impedance of these circuits is high, making them susceptible to hum pick-up and cross-talk unless adequately isolated.

Frequency response is adjusted with two tone controls — one for bass and one for treble. With the tone controls in the normal position, the response of the amplifier is decidedly flat—from 30 to 15,000 cycles per second. There is approximately 3 db accentuation at 60 c.p.s. which is purposely brought about by resonating the primary of the input transformer with condenser C-13. This boost is desirable in radio and record reproduction and can be eliminated with the bass tone control for voice work if necessary. The adjustment of both controls helps eliminate feedback when bad acoustical conditions exist.

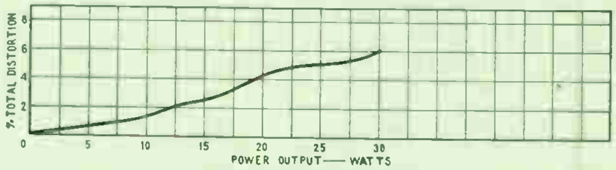
To insure good quality, loud speakers with a diameter of at least 12 inches are recommended. They should be capable of efficiently handling 15 watts of audio power each if the full 25 watt output of the amplifier is to be utilized. Either P M or electro-dynamic speakers are suitable since the amplifier will supply 18 watts for field excitation. This is adequate for one large speaker with a 5000 ohm field, or one or two smaller speakers with 2500 fields. A three-screw terminal board is provided for connecting a jumper wire in the event that P M speakers are used. Use table below in wiring the speaker plugs.

| | *Jumper* | *Connect to Prongs* |
|---|---|---|
| 1-5000 ohm field | none | 1-5 |
| 1-2500 ohm field | C-2 | 2-5 |
| 2-2500 ohm field | none | B-E and 2-5 |
| Field supply not used | 1-C | |

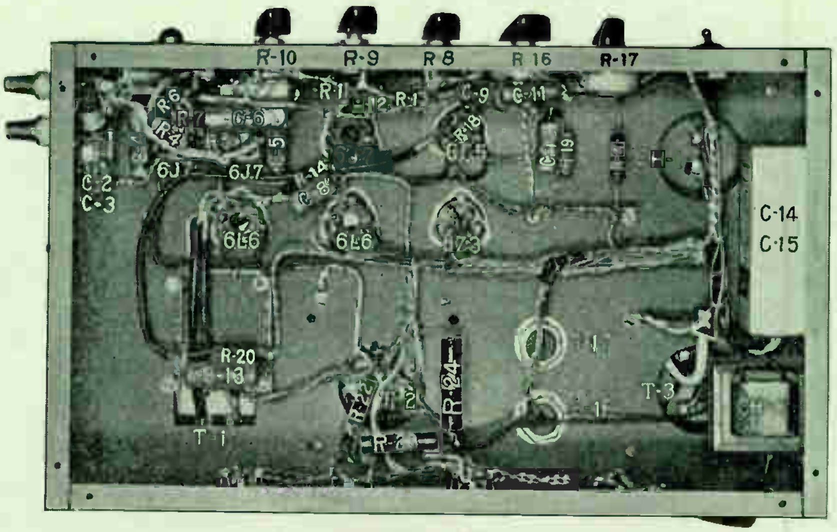
A polarizing voltage may be applied to the input connectors by connecting jumper wires on terminal board marked "POL. V." Refer to the 15 watt amplifier for further details on polarizing voltage for static microphones and photo electric cells.




FREQUENCY-RESPONSE CURVE



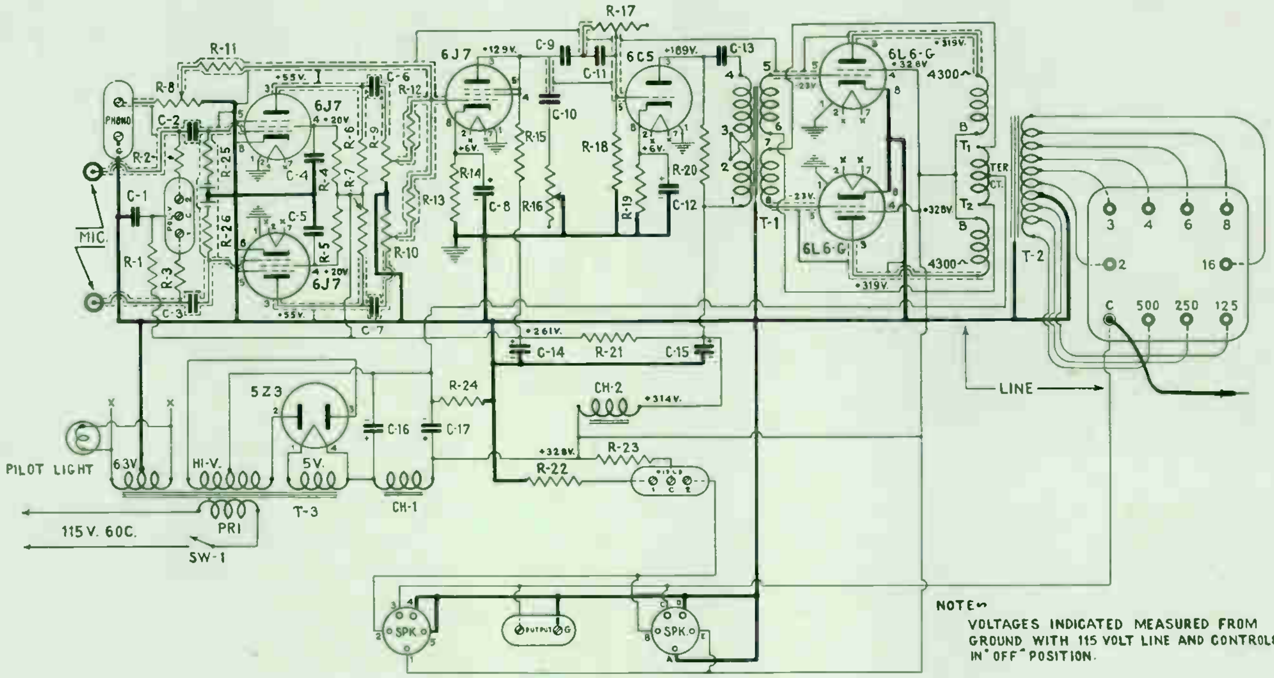

DISTORTION CURVE




BOTTOM VIEW

# 25 WATT AMPLIFIER

THORDARSON




NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## TECHNICAL DATA

***Power Output:*** 25 watts undistorted or + 36.2 db (less than 5% distortion).

***Coverage:*** 500,000 to 1,000,000 cu. ft. indoors; 20,000 to 30,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** Two 5 megohm channels for high impedance crystal, dynamic, or velocity microphones, and one channel for high impedance crystal or magnetic pick-up. All channels can be mixed. Polarizing voltage is available for static microphone or photo electric cell.

***Field Supply:*** 18 watts for one 5000 ohm field, or one or two 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer or 4, 8, 15, 250, or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 1 db from 35 c.p.s. to 15,000 c.p.s. with bass boost of 3.5 db below 100 c.p.s.

***Tone Controls:*** Two: bass control attenuates 12 db at 60 c.p.s.; treble control attenuates 27 db at 10,000 c.p.s.

***Gain:*** Microphone input, 113 db; phono input 72 db (based on 100,000 ohms input impedance).

***Hum:*** 74.5 db below maximum output.

***Tubes:*** 3-6J7, 1-6C5, 2-6L6G, 1-5Z3.

***Power Consumption:*** 180 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | |
|---|---|---|---|
| T-1 | T-15A74 | T-15A74 | Input Transformer |
| T-2 | T-15S91 | T-17S12 | Output Transformer |
| T-3 | T-15R07 | T-17R30 | Power Transformer |
| CH-1 | T-15C55* | T-67C49 | First Choke |
| CH-2 | T-67C46 | T-67C46 | Second Choke |

*Windings in series.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 10 MEG. | ½ | IRC BT-½ |
| R-2 | 10 MEG. | ½ | IRC BT-½ |
| R-3 | 10 MEG. | ½ | IRC BT-½ |
| R-4 | 3 MEG. | 1 | IRC BT-1 |
| R-5 | 3 MEG. | 1 | IRC BT-1 |
| R-6 | 500,000 | 1 | IRC BT-1 |
| R-7 | 500,000 | 1 | IRC BT-1 |
| R-8 | 250,000 | Volume Control | Yaxley type "M" |
| R-9 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-10 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-11 | 500,000 | ½ | IRC BT-½ |
| R-12 | 500,000 | ½ | IRC BT-½ |
| R-13 | 500,000 | ½ | IRC BT-½ |
| R-14 | 5,000 | 1 | IRC BT-1 |
| R-15 | 100,000 | 1 | IRC BT-1 |
| R-16 | 500,000 | Tone Control | Yaxley UC-513 |
| R-17 | 9 MEG. | Tone Control | Yaxley UC-508 |
| R-18 | 250,000 | ½ | IRC BT-½ |
| R-19 | 1,000 | 1 | IRC BT-1 |
| R-20 | 20,000 | 1 | IRC BT-1 |
| R-21 | 20,000 | 1 | IRC BT-1 |
| R-22 | 2,500 | 25 | Ohmite Wire Wound |
| R-23 | 2,500 | 25 | Ohmite Wire Wound |
| R-24 | 100 | 25 | Ohmite Wire Wound, Tolerance +10% −0% |
| R-25 | 5 MEG. | ½ | IRC BT-½ |
| R-26 | 5 MEG. | ½ | IRC BT-½ |

### TUBES

| | |
|---|---|
| 3 | Type 6J7 |
| 1 | Type 6C5 |
| 2 | Type 6L6-G |
| 1 | Type 5Z3 |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-2 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-3 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-4 | .04 | 400V Paper | Cornell-Dubilier DT-4S4 |
| C-5 | .04 | 400V Paper | Cornell-Dubilier DT-4S4 |
| C-6 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-7 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-8 | 10 | 25 V Elect. | Cornell-Dubilier BR-102 |
| C-9 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-10 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-11 | .001 | 600V Paper | Cornell-Dubilier DT-6D1 |
| C-12 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-13 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-14, C-15 | 8-8 | 450 WV Elect. | Cornell-Dubilier EH-9808SL |
| C-16 | 8 | 600V Elect. | Aerovox GL600 |
| C-17 | 8 | 600V Elect. | Aerovox GL600 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 6 | Octal sockets — Amphenol S8 |
| 1 | 4-contact socket — Amphenol S4 |
| 2 | 5-contact sockets — Amphenol S5 |
| 2 | 5-prong speaker plugs — Amphenol PM5 |
| 2 | Mic. input connectors — Amphenol PC1M |
| 2 | Mic. input connectors — Amphenol MC1F |
| 2 | Three screw terminal boards |
| 2 | Two screw terminal boards |
| 1 | Pilot light socket and jewel — Yaxley 310R |
| 1 | 6. 3V Pilot light bulb — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 5 | Control knobs |
| 3 | Metal tube grid caps |
| 3 | Metal grid cap shields |
| 1 | AC line cord and plug — Belden #1725 |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |
| 2 | "Mic" control plates |
| 1 | "Phono" control plate |
| 2 | "Tone" control plates (bass and treble) |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

For complete mechanical drawing of chassis see page 29. Full size template of chassis available from Thordarson. 15c net, postpaid.

THORDARSON

# 40 WATT AMPLIFIER

THE characteristics of 6L6 beam power tubes are such that they may be used in the construction of amplifiers ranging from 5 to 60 watts output. Their power output depends on the class of operation employed, such as $A_1$, $AB_1$, $AB_2$. This is determined by the applied plate, screen and grid voltages, the plate load and driving power.

This 40 watt amplifier uses two 6L6-G tubes operating in class $AB_2$ with approximately 400 volts on the plates and 250 volts on the screens. Adequate driving power is supplied by a triode connected 6F6 tube through a CHT driver transformer. The use of inverse feedback and ample driving power make it possible to obtain 40 watts output without using fixed bias. This simplifies the construction of the amplifier considerably.

Two microphones and two phono pick-ups may be connected to the amplifier at one time. The two phono channels are especially desirable where dual turn-tables are employed for continuous record reproduction. Also a suitable radio tuner can be connected to one of the phono channels for broadcast reception in conjunction with one phono pick-up. Complete mixing makes possible the selection of one or more input channels for reproduction at the same time.

A dual tone control circuit recently developed in Thordarson's laboratory operates in the cathode circuit of the 6C5 tube. One control affects only the low or bass frequencies, and the other controls the high or treble frequencies. Operation is such that with the controls in the center or vertical position the frequency response is normal, as illustrated by the frequency response curve. Turning the bass control to the left increases the bass response and to the right reduces it. The treble control functions in the same manner. More detailed description of this type of control and its effect on the amplifier frequency response is given on page 24.

Two 5Z3 rectifier tubes connected in a parallel circuit provide excellent power supply regulation. The additional tube also allows higher total current which is desirable for speaker field excitation. The amplifier supplies 25 watts for speaker fields, (250 volts at 100 MA) which is adequate for one large auditorium speaker or for two to four smaller speakers. The following table indicates how speaker field connections are made to the speaker sockets and the proper position of the field supply jumper wire.

| | *Jumper* | *Connect to prongs* |
|---|---|---|
| 1 - 2500 ohm field | 1-C | 1-2 |
| 2 - 1250 ohm field | 1-C | 2-5 and A-E |
| 2 - 5000 ohm field | 1-C | 1-2 and A-B |
| 4 - 2500 ohm field | 1-C | 2-5 and A-E* |
| Field supply not used | C-2 | |

*Connect two fields in parallel to each plug.

Make speaker voice-coil or line connections to contacts 3-4 and C-D of the speaker sockets or to the output terminal board. Impedance matching is accomplished by inserting the plug into the proper jack on the CHT output transformer terminal board.

## TECHNICAL DATA

***Power Output:*** 40 watts undistorted or +38.25 db (Less than 5% distortion).

***Coverage:*** 1,000,000 to 2,000,000 cu. ft. indoors; 30,000 to 50,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** Two high impedance channels for crystal, dynamic, or velocity microphones, and two high impedance phono channels for crystal or magnetic pick-ups. All four channels may be mixed.

***Field Supply:*** 25 watts are available for one 2500 ohm, two 1250 ohm, two 5000 ohm, or four 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250 or 500 ohms with CHT output transformer or 4, 8, 15, 250 or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 2 db, 30 to 15,000 c.p.s. (Tone controls in normal position).

***Tone Controls:*** Two; Bass control varies response from + 12 db to —35 db at 40 c.p.s. and treble control varies response from + 8 db to —35 db at 7,000 c.p.s. from normal. It is possible to obtain practically any desired frequency response.

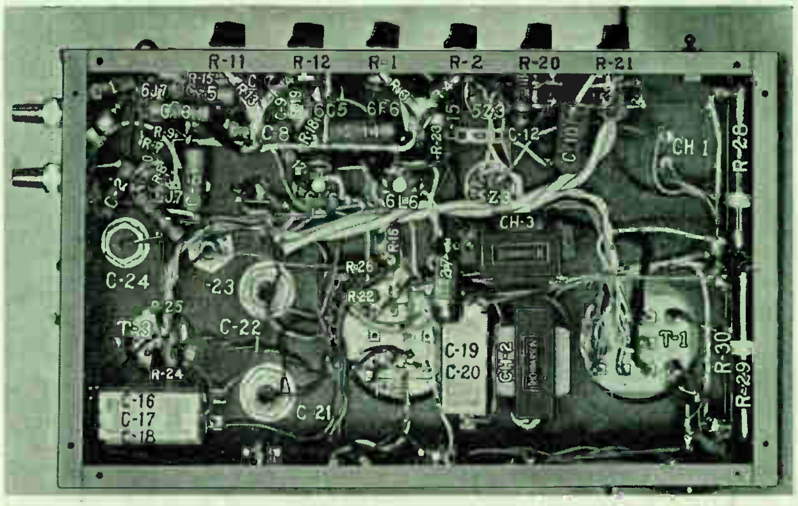
***Gain:*** Microphone inputs, 118.5 db; phono inputs, 74 db (based on 100,000 ohms input impedance).

***Hum:*** 75 db below maximum output.

***Tubes:*** 2-6J7, 1-6F5, 1-6C5, 1-6F6, 2-6L6G, 2-5Z3.

***Power Consumption:*** 220 watts, 115 volts, 50-60 cycles.

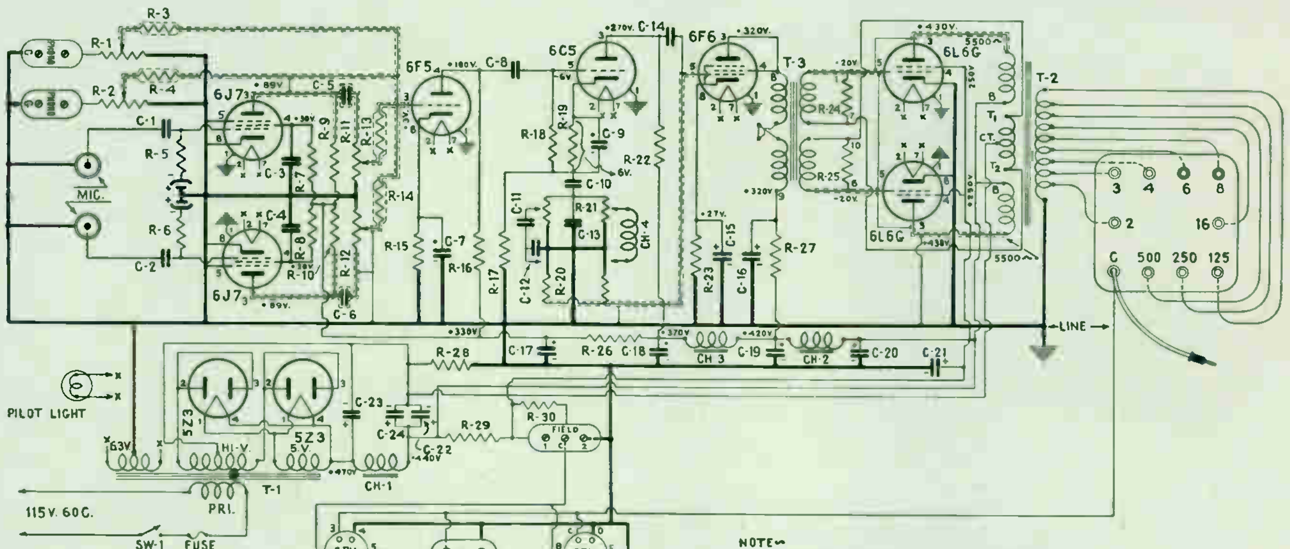
***Dimensions:*** 17" long, 10" deep, 9" high.




BOTTOM VIEW

# 40 WATT AMPLIFIER

THORDARSON




NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | Type |
|---|---|---|---|
| T-1 | T-15R08 | T-17R31 | Power Transformer |
| T-2 | T-15S92 | T-17S14 | Output Transformer |
| T-3 | T-15D85 | T-15D85 | Driver Transformer |
| CH-1 | T-15C56* | T-75C51 | First Choke |
| CH-2 | T-18C92 | T-18C92 | Second Choke |
| CH-3 | T-67C46 | T-67C46 | Third Choke |
| CH-4 | T-14C70 | T-14C70 | Tone Control Choke |

* Windings in series.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Aerovox #484 |
| C-2 | .03 | 400V Paper | Aerovox #484 |
| C-3 | .04 | 400V Paper | Aerovox #484 |
| C-4 | .04 | 400V Paper | Aerovox #484 |
| C-5 | .1 | 400V Paper | Aerovox #484 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | 10 | 25V Elect. | Aerovox PR25 |
| C-8 | .1 | 400V Paper | Aerovox #484 |
| C-9 | 10 | 25V Elect. | Aerovox PR25 |
| C-10 | .5 | 400V Paper | Aerovox #484 |
| C-11 | .01 | 400V Paper | Aerovox #484 |
| C-12 | .01 | 400V Paper | Aerovox #484 |
| C-13 | .003 | 400V Paper | Aerovox #484 |
| C-14 | .1 | 400V Paper | Aerovox #484 |
| C-15 | 10 | 25V Elect. | Aerovox PR25 |
| C-16, C-17 | 8-8 | 450V Elect. | Aerovox PBS450 |
| C-18, | 8 | 450V Elect. | Aerovox PBS450 |
| C-19 | 8 | 600V Elect. | Aerovox PBS600 |
| C-20 | 8 | 600V Elect. | Aerovox PBS600 |
| C-21 | 8 | 600V Elect | Aerovox GL600 |
| C-22 | 8 | 600V Elect. | Aerovox GL600 |
| C-23 | 8 | 600V Elect. | Aerovox GL600 |
| C-24 | 8 | 600V Elect. | Aerovox GL600 |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 500,000 | Volume Control | Centralab N-103 |
| R-2 | 500,000 | Volume Control | Centralab N-103 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 5 Megohms | ½ | Centralab #310 |
| R-6 | 5 Megohms | ½ | Centralab #310 |
| R-7 | 3 Megohms | ½ | Centralab #310 |
| R-8 | 3 Megohms | ½ | Centralab #310 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 500,000 | ½ | Centralab #310 |
| R-11 | 1 Megohm | Volume Control | Centralab N-104 |
| R-12 | 1 Megohm | Volume Control | Centralab N-104 |
| R-13 | 500,000 | ½ | Centralab #310 |
| R-14 | 500,000 | ½ | Centralab #310 |
| R-15 | 5,000 | 1 | Centralab #314 |
| R-16 | 250,000 | ½ | Centralab #310 |
| R-17 | 20,000 | ½ | Centralab #310 |
| R-18 | 250,000 | ½ | Centralab #310 |
| R-19 | 1,000 | 1 | Centralab #314 |
| R-20 | Special Dual Tone Control | | Thordarson R-1068 |
| R-21 | Special Dual Tone Control | | Thordarson R-1068 |
| R-22 | 20,000 | 1 | Centralab #314 |
| R-23 | 900 | 10 | Ohmite, Wirewound |
| R-24 | 10,000 | ½ | Centralab #310 |
| R-25 | 10,000 | ½ | Centralab #310 |
| R-26 | 20,000 | 1 | Centralab #314 |
| R-27 | 2,500 | 25 | Ohmite, Wirewound |
| R-28 | 80 | 50 | Ohmite, Wirewound |
| R-29 | 1,800 | 50 | Ohmite, Wirewound |
| R-30 | 2,500 | 50 | Ohmite, Wirewound |

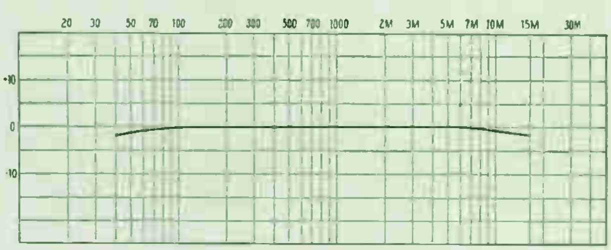
### TUBES

| | |
|---|---|
| 2 | Type 6J7 |
| 1 | Type 6F5 |
| 1 | Type 6C5 |
| 1 | Type 6F6 |
| 2 | Type 6L6-G |
| 2 | Type 5Z3 |

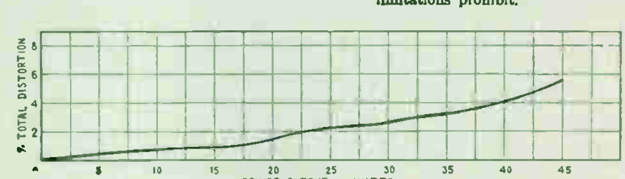
### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 2 | 5-Contact sockets — Amphenol S5 |
| 2 | 4-Contact sockets — Amphenol S4 |
| 7 | Octal sockets — Amphenol S8 |
| 2 | 5-Prong speaker plugs — Amphenol PM5 |
| 3 | Metal tube grid caps |
| 3 | Metal tube grid cap shields |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | 6.3V Pilot light bulb — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 2 | Mic. input connectors — Amphenol #PC1M |
| 2 | Mic. input connectors — Amphenol #MC1F |
| 1 | Primary line cord and plug — Belden #1725 |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |
| 2 | "Mic." control plates |
| 2 | "Phono" control plates |
| 2 | "Tone" control plates |
| 6 | Volume control knobs |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 5 amp. |
| 1 | 2-Screw terminal board, output |
| 2 | 2-Screw terminal boards, phono input |
| 1 | 3-Screw terminal board, field supply |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




FREQUENCY RESPONSE CURVE




DISTORTION CURVE

**For complete mechanical drawing of chassis see page 29. Full size template of chassis available from THORDARSON 15c net, postpaid.**

# 60 WATT AMPLIFIER

TOP VIEW

THIS 60 watt amplifier has sufficient undistorted power output for practically any loud speaker installation. Four type 6L6-G output tubes operate in a push-pull parallel class AB1 circuit. Under these conditions no driving power is required making it possible to use a single 6C5 tube for excitation of the power stage. Distortion in the power stage is reduced to a minimum by the use of inverse feedback. Laboratory tests of amplifiers without inverse feedback indicate that distortion at full output may be less than 5% at 400 c.p.s., however it may increase to as much as 30 to 40% at bass and treble frequencies. This peculiarity of pentode and tetrode power tubes is quite easily corrected by the use of inverse feedback. The output of this amplifier has less than 6% distortion at all frequencies between 30 and 10,000 c.p.s.

In wiring the amplifier, shield all leads in the grid and plate circuits of the output tubes. The schematic diagram indicates clearly where shielding is necessary. This should not be overlooked since shielding is important in modern amplifiers employing tubes with high power sensitivity. Connect the colored leads of the output transformer to the numbered terminals of T-3 as indicated in the diagram. If the leads of the tertiary winding are reversed oscillation is sure to result in the output stage.

Two rectifier tubes are used; one for the plate and bias voltages of the output stage; the other for the screens of the output tubes and the balance of the amplifier. The effect of this circuit is similar to fixed bias and also provides excellent screen voltage regulation which is essential for maximum undistorted output. Interstage coupling through the B supply is also eliminated, since the plate circuit of the 6L6-G tubes is supplied from a separate rectifier.

The amplifier as illustrated is constructed with regular Thordarson transformers and chokes except T-15A74. This is a Thordarson CHT input transformer which incorporates hum balancing construction, and a split secondary winding. The use of this transformer is essential since hum pick-up must be held to a minimum, and a split secondary is required for the inverse feedback connection. A CHT output transformer is also available as given in the parts list. In addition to having a better selection of secondary impedances the CHT output transformer is more efficient and has better frequency characteristics. Both the CHT and the regular output transformer have the 10% feedback winding.

A dual tone control circuit is used in the cathode circuit of the 6C5 tube. Since the control of frequencies is accomplished by means of degeneration, this stage provides very little gain. This stage therefore is strictly for tone control purposes. Refer to page 24 for more detailed information on this circuit and sketch showing connections to the special tone controls.

Both microphone circuits are susceptible to hum pick-up and "cross-talk" unless properly shielded. A box may be formed from thin metal and placed as illustrated in the bottom view. Mount the bias cells, C-1, C-2, R-5, and R-6 on the inside wall of the chassis before fastening the metal box in place. Resistors R-3, R-4, R-13 and R-14 must also be shielded individually, as shown in the schematic drawing, to prevent hum and "cross-talk" from developing at this point.

## TECHNICAL DATA

***Power Output:*** 60 watts undistorted or +40 db (less than 6% distortion).

***Coverage:*** 2,000,000 to 3,000,000 cu. ft. indoors, 50,000 to 75,000 sq. ft. outdoors, (depending on speaker efficiency and noise level).

***Input Circuits:*** Two high impedance channels for crystal, dynamic, or velocity microphones, and two high impedance phono channels for crystal, or magnetic pick-ups. All channels may be mixed.

***Output Impedances:*** 4, 8, 15, 250, or 500 ohms with regular output transformer as shown or 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer.

***Frequency Response:*** Within ± 2 db from 40 to 15,000 c.p.s. (tone controls in normal position).

***Tone Controls:*** Two; bass control varies response from + 8 db at 70 c.p.s. to — 30 db at 40 c.p.s., and treble control varies response from + 9 db to — 27 db at 7000 c.p.s. from normal. Practically any desired frequency response may be obtained.

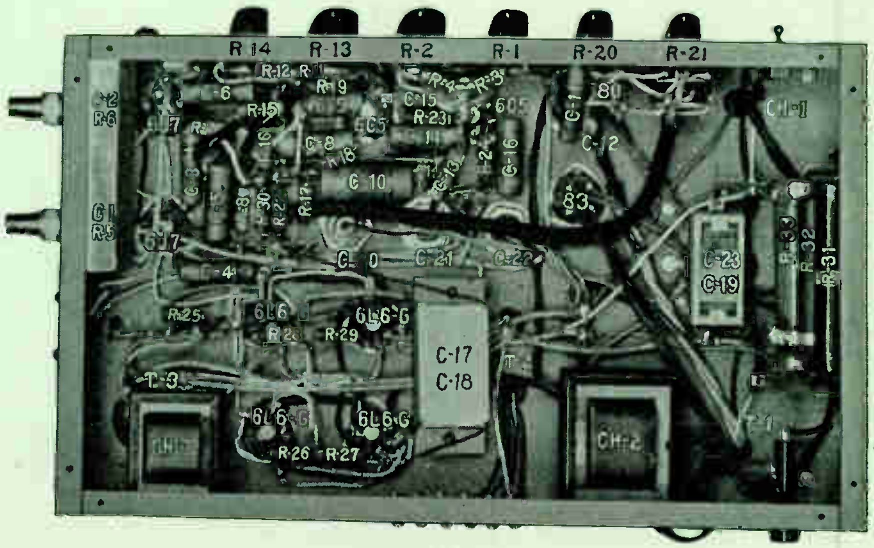
***Gain:*** Microphone inputs, 112 db; phono inputs, 73 db (based on 100,000 ohms input impedance).

***Hum:*** 75 db below maximum output.

***Tubes:*** 3-6J7, 2-6C5, 4-6L6-G, 1-80, 1-83.

***Power Consumption:*** 225 watts, 115 volts, 50-60 cycles.

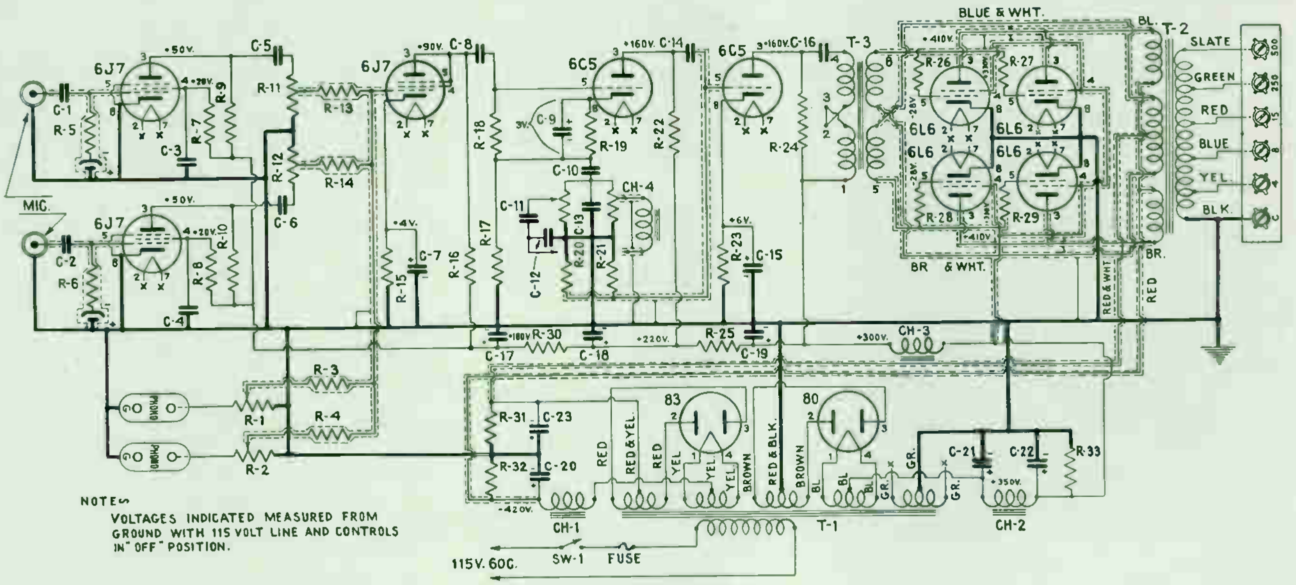
***Dimensions:*** 17" long, 10" deep, 9" high.




BOTTOM VIEW

# 60 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-89R28 Power Transformer |
| T-2 | T-17S15 or T-15S93 Output Transformer |
| T-3 | T-15A74 Input Transformer |
| CH-1 | T-75C51 Choke |
| CH-2 | T-68C07 Choke |
| CH-3 | T-67C46 Choke |
| CH-4 | T-14C70 Tone Control Choke |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Cornell-Dubilier #DT-4S3 |
| C-2 | .03 | 400V Paper | Cornell-Dubilier #DT-4S3 |
| C-3 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-4 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-5 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-6 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-7 | 10 | 25V Elect. | Cornell-Dubilier #BR-102 |
| C-8 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-9 | 10 | 25V Elect. | Cornell-Dubilier #BR-102 |
| C-10 | .5 | 400V Paper | Cornell-Dubilier #DT-4P5 |
| C-11 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-12 | .003 | 600V Paper | Cornell-Dubilier #DT-6D3 |
| C-13 | .001 | 600V Paper | Cornell-Dubilier #DT-6D1 |
| C-14 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-15 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-16 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-17 } C-18 } | 8-8 | 450V Elect. | Aerovox PBS 450 |
| C-19 | 8 | 450V Elect. | Aerovox PBS 450 |
| C-20 | 8 | 600V Elect. | Aerovox GL600 |
| C-21 | 8 | 450V Elect. | Aerovox GLS450 |
| C-22 | 8 | 450V Elect. | Aerovox GLS450 |
| C-23 | 8 | 450V Elect. | Aerovox PBS 450 |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 1 MEG. | Volume Control | Centralab N-104 |
| R-2 | 1 MEG. | Volume Control | Centralab N-104 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 5 MEG. | ½ | Centralab #310 |
| R-6 | 5 MEG. | ½ | Centralab #310 |
| R-7 | 3 MEG. | 1 | Centralab #314 |
| R-8 | 3 MEG. | 1 | Centralab #314 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 500,000 | ½ | Centralab #310 |
| R-11 | 1 MEG. | Volume Control | Centralab N-104 |
| R-12 | 1 MEG. | Volume Control | Centralab N-104 |
| R-13 | 500,000 | ½ | Centralab #310 |
| R-14 | 500,000 | ½ | Centralab #310 |
| R-15 | 1,000 | 1 | Centralab #314 |
| R-16 | 100,000 | 1 | Centralab #314 |
| R-17 | 20,000 | 1 | Centralab #314 |
| R-18 | 250,000 | ½ | Centralab #310 |
| R-19 | 2,000 | 1 | Centralab #314 |
| R-20 | Dual Tone Control | | Thordarson R-1068 |
| R-21 | Dual Tone Control | | Thordarson R-1068 |
| R-22 | 20,000 | 1 | Centralab #314 |
| R-23 | 1,000 | 1 | Centralab #314 |
| R-24 | 50,000 | 1 | Centralab #314 |
| R-25 | 20,000 | 1 | Centralab #314 |
| R-26 | 200 | 1 | Centralab #314 |
| R-27 | 200 | 1 | Centralab #314 |
| R-28 | 200 | 1 | Centralab #314 |
| R-29 | 200 | 1 | Centralab #314 |
| R-30 | 20,000 | 1 | Centralab #314 |
| R-31 | 125 | 50 | Ohmite, Wirewound, +10%, −0% |
| R-32 | 40,000 | 50 | Ohmite, Wirewound |
| R-33 | 10,000 | 25 | Ohmite, Wirewound |

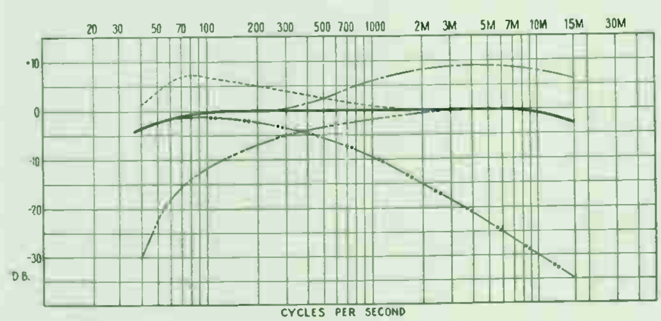
### TUBES

| | |
|---|---|
| 3 | Type 6J7 |
| 2 | Type 6C5 |
| 4 | Type 6L6-G |
| 1 | Type 80 |
| 1 | Type 83 |

### MISCELLANEOUS PARTS

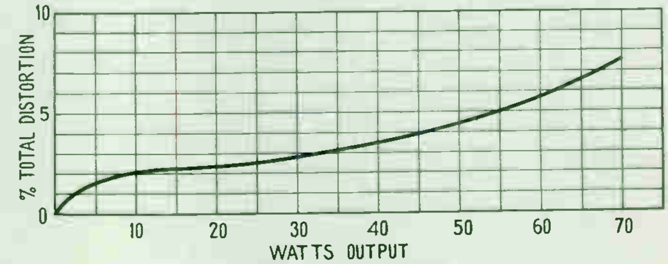
| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — Bud #1127 |
| 1 | 10x17" Chassis bottom plate — Bud #689 |
| 9 | Octal sockets — Amphenol S8 |
| 2 | 4-Contact sockets — Amphenol S4 |
| 2 | Mic. input connectors — Amphenol PC1M |
| 2 | Mic. input connectors — Amphenol MC1F |
| 1 | 6-Screw output terminal board |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 5 amp. |
| 1 | AC line cord and plug — Belden #1725 |
| 2 | 2-Screw terminal boards |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | Pilot light, 6.3 volts — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 3 | Metal tube grid caps |
| 3 | Metal tube grid cap shields |
| 2 | "Mic" control plates |
| 2 | "Phono" control plates |
| 2 | "Tone" control plates |
| 6 | Control knobs |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




———————— Tone controls normal
– – – – – – – Bass increase — Treble normal
— – — – — Bass normal — Treble increase
— ·· — ·· — Bass normal — Treble decrease
——— – ——— Bass decrease — Treble normal

**FREQUENCY RESPONSE CURVE**

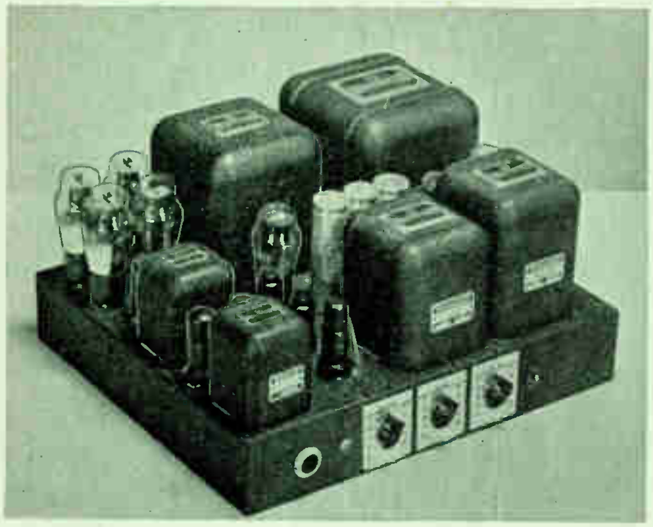



**DISTORTION CURVE**

**For complete mechanical drawing of chassis see page 30. Full size template of chassis available from THORDARSON 15c net, postpaid.**

THORDARSON

# 120 WATT AMPLIFIER



TOP VIEW

THE power output of this amplifier is adequate for the largest installations either indoors or out. The input circuit is arranged to operate from a pre-amplifier such as those described on pages 20 and 22. These pre-amplifiers have low impedance output transformers, making it possible to operate them several hundred feet from the 120 watt unit. A 500 ohm resistor (R-1) is connected across the input circuit of the 120 watt amplifier to match the 500 ohm output impedance of the pre-amplifier. This method is satisfactory since the 6J7 input tube provides approximately the same voltage gain as would be obtained from a line to grid transformer. Should it be desired to operate from a single high impedance pick-up without a pre-amplifier, resistor R-1 can be disconnected from the circuit. Under these conditions the amplifier gain is 90 db which is sufficient for full power output.

The second stage is the tone control and contributes very little to the overall gain of the amplifier. An article describing this tone control circuit may be found on page 24. If the tone control is not required, the 6C5 stage and associate parts can be eliminated without seriously affecting the gain of the amplifier.

A dotted line "A......A" is shown on the circuit diagram just before the 6F6 driver tube grids. If the unit is to be used only as a booster amplifier, eliminate all those parts ahead of the dotted line. For connection to a 500 ohm line use a line to P-P grid transformer such as T-15A67 instead of T-15A74 as shown. The overall gain of the booster with this transformer is about 43 db. Therefore, full output will be obtained when a 0 db signal is fed to the unit (1.73 volts across 500 ohms.)

Four type 6L6-G tubes operate in a push-pull parallel class AB2 circuit with inverse feedback. With this set-up it is possible to obtain maximum undistorted power output from beam power tubes. The driver stage consists of two 6F6 tubes connected as triodes. These provide excellent regulation which is essential when the output tube grids are driven positive.

It is necessary to shield the entire wiring of the final stage. This is easily done by using single shielded wire similar to that used for antenna lead in. Take care that the shielding does not come in contact with the tube socket contacts and other terminals. Ground all shielding carefully. If the amplifier oscillates interchange the leads connecting to terminals 7 and 6 on driver transformer T-4. This reverses the phase relationship of the feedback voltage with respect to the input voltage.

Two power supplies, entirely independent of one another, make it possible to obtain excellent regulation of the bias and screen voltages. The plate supply of the output stage uses two type 83 rectifier tubes. An 80 is used to supply fixed bias and screen voltage to the output stage as well as plate voltage for the balance of the amplifier. A separate filter system for each supply isolates the output stage and insures stability. Resistors in series with the 83 tube plates help distribute the current evenly. These resistors are necessary when mercury vapor rectifier tubes are wired parallel.

Before operating the amplifier insert all tubes except the 83's and adjust R-26 until 24.5 volts are measured at the 6L6 grids. After the 83's are placed in the sockets turn the amplifier on and measure the bias voltage again. If any change is noted correct by adjusting R-26.

## TECHNICAL DATA

***Power Output:*** 120 watts or + 43 db (less than 8% distortion).

***Coverage:*** Up to 5,000,000 cu. ft. indoors; 100,000 to 150,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuit:*** Single channel; may be adapted to low or high impedance.

***Output Impedances:*** 84, 100, 125, 166, 250 or 500 ohms; selected by plug and jacks on terminal board of CHT output transformer.

***Frequency Response:*** Within ±1 db from 40 to 15,000 c.p.s. (tone controls in normal position).

***Tone Controls:*** Two; bass control varies response from + 7 db at 60 c.p.s. to —20 db at 30 c.p.s., and treble control varies response from +7.5 db to —20 db at 10,000 c.p.s. from normal. Practically any desired frequency response may be obtained.

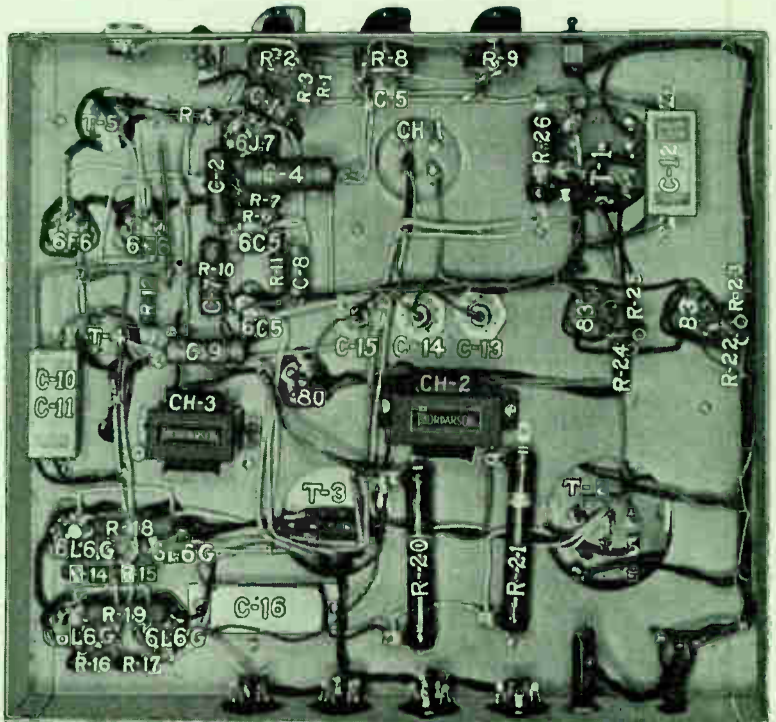
***Gain:*** 90 db with high impedance input resistor (based on 100,000 ohms input impedance); 72.5 db with 500 ohm input resistor. (If line to grid transformer is used, gain is approximately 90 db.)

***Hum:*** 73 db below maximum output.

***Tubes:*** 1-6J7, 2-6C5, 2-6F6, 4-6L6-G, 1-80, 2-83.

***Power Consumption:*** 570 watts with no signal; 720 watts at maximum output.

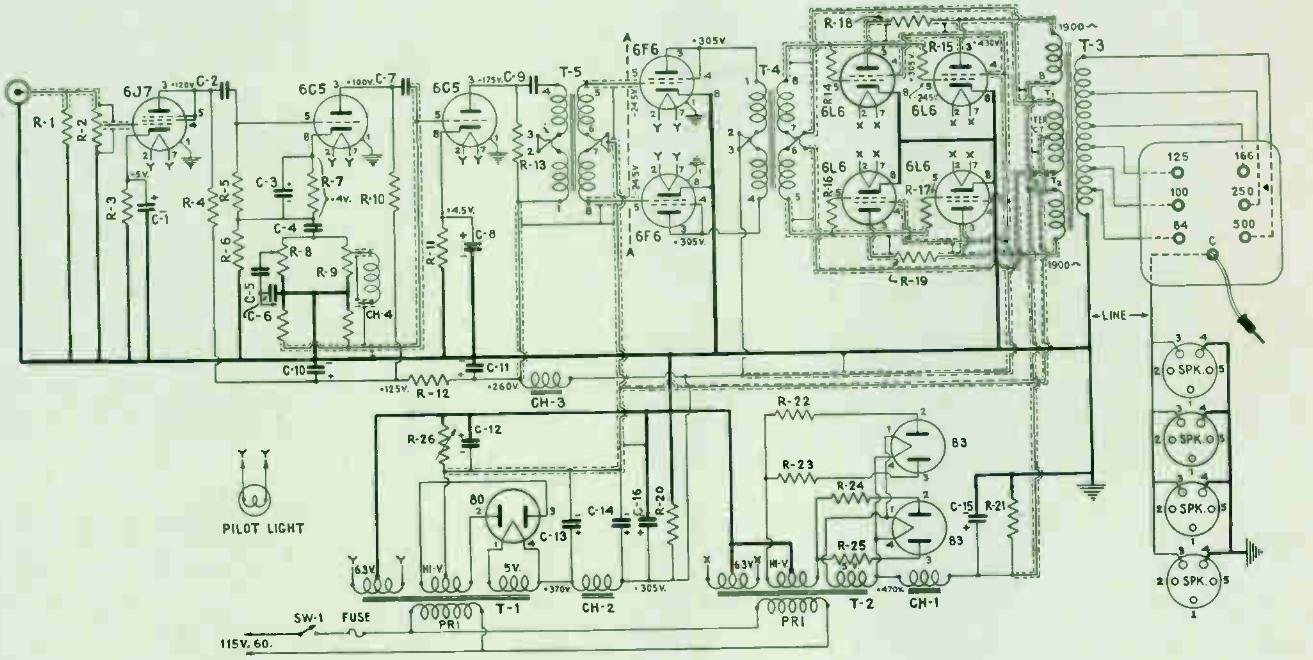
***Dimensions:*** 17" long, 15" deep, 9" high.




BOTTOM VIEW

# 120 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R06 Power Transformer |
| T-2 | T-15R01 Power Transformer |
| T-3 | T-15S94 Output Transformer |
| T-4 | T-15D86 Driver Transformer |
| T-5 | T-15A74 Input Transformer |
| CH-1 | T-15C56 Choke* |
| CH-2 | T-68C07 Choke |
| CH-3 | T-67C46 Choke |
| CH-4 | T-14C70 Tone Control Choke |

*Winding in Series.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25 V. Elect. | Cor.-Dub. #BR-102 |
| C-2 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-3 | 10 | 25 V. Elect. | Cor.-Dub. BR-102 |
| C-4 | .5 | 400 V. Paper | Cor.-Dub. #DT-4P5 |
| C-5 | .04 | 400 V. Paper | Cor.-Dub. #DT-4S4 |
| C-6 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-7 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-8 | 10 | 25 V. Elect. | Cor.-Dub. #BR-102 |
| C-9 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-10, C-11 | 8-8 | 450 V. Elect. | Cor.-Dub. #JR-588 |
| C-12 | 16 | 200 V. Elect. | Cor.-Dub. #JR-216 |
| C-13 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-14 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-15 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-16 | 8 | 450 V. Elect. | Cor.-Dub. #JR-508 |

### RESISTORS

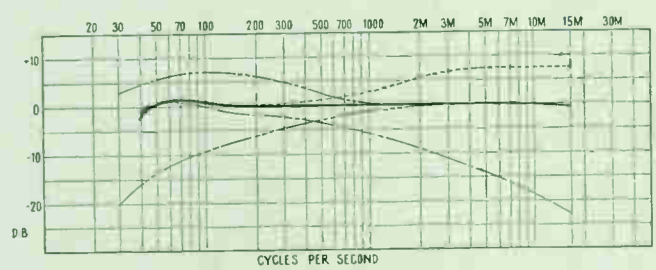
| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 500 | 1 | Centralab #314 |
| R-2 | 1 MEG. | Volume Control | Centralab N-104 |
| R-3 | 5,000 | 1 | Centralab #314 |
| R-4 | 50,000 | 1 | Centralab #314 |
| R-5 | 250,000 | ½ | Centralab #310 |
| R-6 | 20,000 | 1 | Centralab #314 |
| R-7 | 1,000 | 1 | Centralab 314 |
| R-8 | Dual Tone Control | | Thordarson R-1068 |
| R-9 | Dual Tone Control | | Thordarson R-1068 |
| R-10 | 20,000 | 1 | Centralab #314 |
| R-11 | 1,000 | 1 | Centralab #314 |
| R-12 | 50,000 | 1 | Centralab #314 |
| R-13 | 20,000 | 1 | Centralab #314 |
| R-14 | 200 | 1 | Centralab #314 |
| R-15 | 200 | 1 | Centralab #314 |
| R-16 | 200 | 1 | Centralab #314 |
| R-17 | 200 | 1 | Centralab #314 |
| R-18 | 25 | 10 | Ohmite, Wirewound |
| R-19 | 25 | 10 | Ohmite, Wirewound |
| R-20 | 10,000 | 50 | Ohmite, Wirewound |
| R-21 | 10,000 | 50 | Ohmite, Wirewound |
| R-22 | 50 | 10 | Ohmite, Wirewound |
| R-23 | 50 | 10 | Ohmite, Wirewound |
| R-24 | 50 | 10 | Ohmite, Wirewound |
| R-25 | 50 | 10 | Ohmite, Wirewound |
| R-26 | 300 | 25 | Ohmite, Semi-Var. |

TUBES: 1-6J7, 2-6C5, 2-6F6, 4-6L6G, 1-80, 2-83

### MISCELLANEOUS PARTS

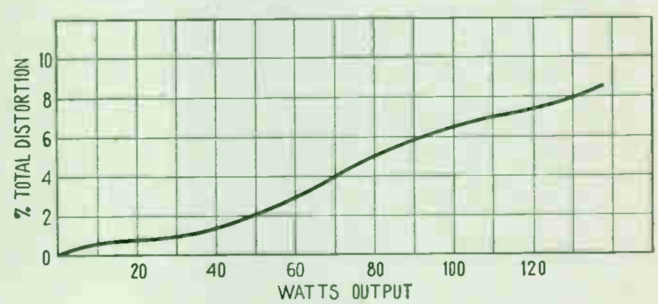
| | |
|---|---|
| 1 | 17x15x3" Chassis with bottom plate |
| 1 | "Gain" control plate |
| 2 | "Tone" control plates |
| 3 | Volume control knobs |
| 1 | AC line cord and plug — Belden #1725 |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 10 ampere |
| 9 | Octal Sockets — Amphenol S8 |
| 3 | 4-Contact sockets — Amphenol S4 |
| 4 | 5-Contact sockets — Amphenol S5 |
| 4 | 5-Prong speaker plugs — Amphenol PM5 |
| 1 | Input connector — Amphenol PC3F |
| 1 | Input connector — Amphenol MC3M |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | Pilot light bulb, 6.3 volts — Mazda #40 |
| 1 | Metal tube grid cap |
| 1 | Metal tube grid cap shield |
| 1 | SPST toggle switch — Arrow H&H #20992 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




Tone controls normal
Bass increase — Treble normal
Bass normal — Treble increase
Bass normal — Treble decrease
Bass decrease — Treble normal

FREQUENCY RESPONSE CURVE




DISTORTION CURVE

For complete mechanical drawing of chassis see page 30. Full size template of chassis available from THORDARSON, 15c net, postpaid.

THORDARSON

# 2A3 PHONO AMPLIFIER

THIS 10-watt Tru-Fidelity audio amplifier, with volume expansion and dual tone control, will meet the requirements of the most discriminating listener. It is an improved version of the Thordarson 10-watt Tru-Fidelity unit, specially adapted to meet phonograph and radio tuner requirements. The amplifier features an unusually flexible tone control and volume expansion, making it possible to reproduce recordings with a high degree of naturalness. The volume expander is especially useful in restoring the range of symphonic renditions. No pre-amplifier stages are included as they are not needed and would materially increase the cost of construction.

With the bass and treble tone controls in "normal" position, the frequency response is flat. Through the use of the dual tone controls the bass may be boosted 7 db between 50 and 200 cycles or dropped 30 db from normal at 30 cycles. The treble may be boosted 9 db at 7000 or dropped 30 db at 10,000 cycles. These controls are independent, so any acoustical condition may be satisfied.

At the rated output of 10 watts, the distortion is but 3.7% and at 16 watts only 4.8%, which is still within high fidelity specifications.

The amplifier consists of five stages giving a gain of 70 db from either phono input (measured across a 100,000 ohm input). This gain is with the volume expansion off. When the expander is at maximum the volume level may be increased 11 db making a total overall gain of 81 db available. This is more than sufficient for any phono or tuner application.

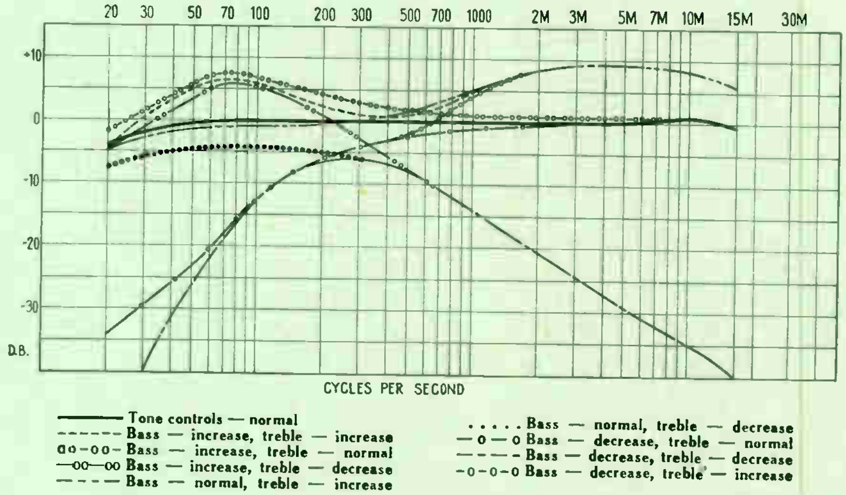
Two phono inputs are mixed and fed into a 6C5 stage with a gain of 10. The output of this stage is fed into a 6L7, the gain of which varies according to the expansion voltage fed into it by the action of the 6C5-6H6 volume expansion stage. The energy for the expander stage is taken from the grid of the fourth stage 6C5.

The output of the 6L7 is fed into a 6C5 tone control tube which has a gain of 1.4 with the controls in "normal" position. This in turn is fed into another 6C5 and then, through a T-90A04 Tru-Fidelity transformer, to two 2A3's or 6A3's in push pull. (The power transformer has filament voltage available for either type tubes.) A Tru-Fidelity output transformer, T-90S13, makes voice coil or line impedances of 1.25, 3.75, 5, 7.5, 10, 15, 50, 125, 200, 250, 333 or 500 ohms available.

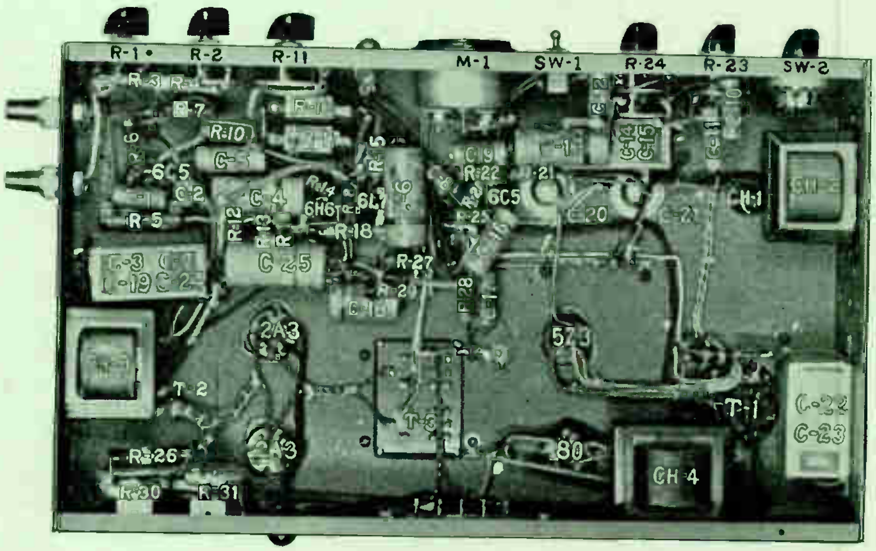
A form of degeneration is used in a new way to provide the unusually flexible tone compensating circuit shown. This circuit is so important and interesting that it is described in detail on page 24.

On the front panel are the two gain controls, near the input jacks; the expander control; a pilot light; the meter, with a switch at the far end of the chassis to measure the plate current of either or both output tubes; the on-off switch; the two tone controls and the plate current switch just mentioned.

In the photograph is shown the special shielding around the two small resistors from the gain controls. The circuit used results in a minimum of cross-talk, shielding them as shown removes the last possibility of it. Cover the resistors with cambric sleeving, then enclose them in a braid shield.




FREQUENCY-RESPONSE CURVE

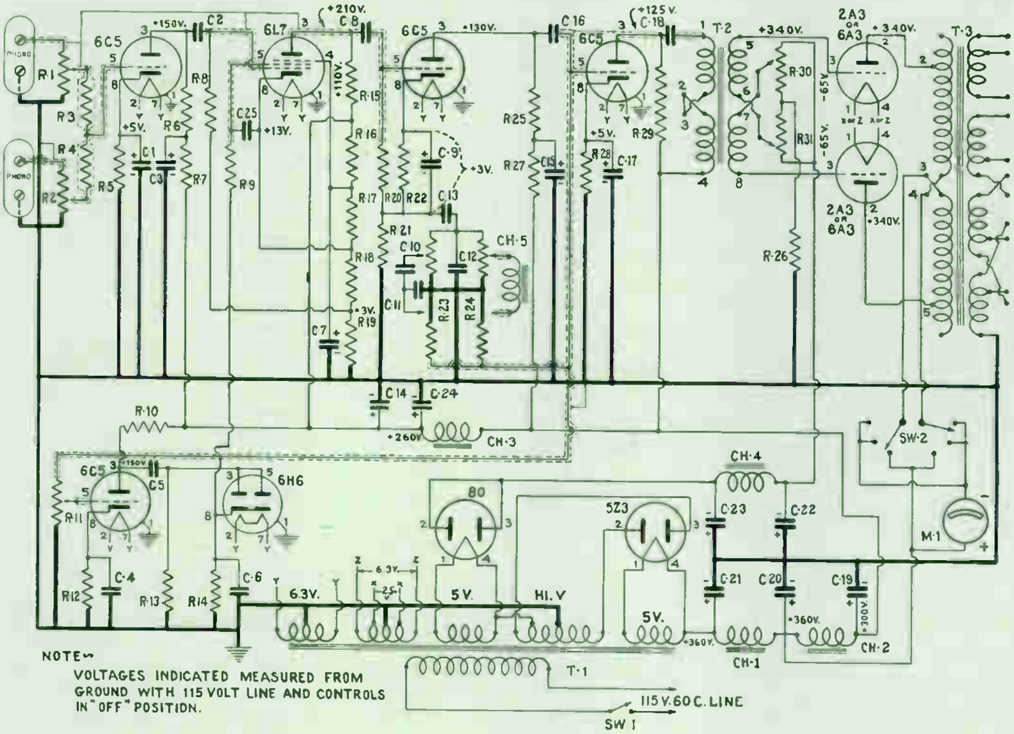



BOTTOM VIEW

For complete mechanical drawing of chassis see page 28, also, full size template available from Thordarson 15c net postpaid.

# 2A3 PHONO AMPLIFIER

THORDARSON




NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## TECHNICAL DATA

***Power Output:*** 10 watts or + 32.2 db with 3.7% distortion; 16 watts or + 34.1 db with 4.8% distoriton.

***Input Circuits:*** Two high impedance phono channels for crystal or magnetic pick-up or radio tuner. Individual controls for mixing or fading.

***Output Impedances:*** 1.25, 3.75, 5, 7.5, 10, 15, 50, 125, 200, 250, 333 or 500 ohms — selected by connecting output terminals to desired impedance of transformer.

***Frequency Response:*** Within ± 1 db from 30 to 15,000 c.p.s. (tone controls in normal position).

***Tone Controls:*** Two: bass control varies response from + 7 db at 70 c.p.s. to —30 db at 30 c.p.s.; treble control varies response from + 9 db to —30 db at 7,000 c.p.s.

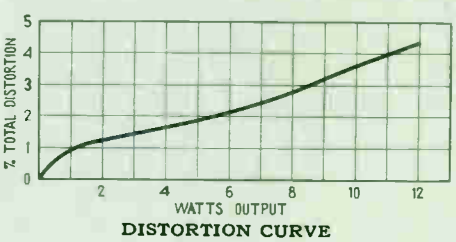
***Gain:*** 70 db with volume expander "OFF"; 81 db with volume expander "ON".

***Hum:*** 64 db below maximum output.

***Tubes:*** 4-6C5, 1-6L7, 1-6H6, 2-2A3 or 6A3, 1-80, 1-5Z3.

***Power Consumption:*** 140 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.




DISTORTION CURVE

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R05 Power Transformer |
| T-2 | T-90A04 Audio Transformer |
| T-3 | T-90S13 Output Transformer |
| CH-1 | T-15C54* First Choke |
| CH-2 | T-74C30 Second Choke |
| CH-3 | T-67C46 Third Choke |
| CH-4 | T-18C92 Bias Choke |
| CH-5 | T-14C70 Tone Control Choke |

*Winding in parallel.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 1 MEG. | Volume Control | Centralab N-104 |
| R-2 | 1 MEG. | Volume Contro | Centralab N-104 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 2,000 | 1 | Centralab #314 |
| R-6 | 20,000 | 1 | Centralab #314 |
| R-7 | 20,000 | 1 | Centralab #314 |
| R-8 | 1 MEG. | ½ | Centralab #310 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 100,000 | 1 | Centralab #314 |
| R-11 | 1 MEG. | Volume Control | Centralab N-104 |
| R-12 | 10,000 | ½ | Centralab #310 |
| R-13 | 100,000 | ½ | Centralab #310 |
| R-14 | 250,000 | ½ | Centralab #310 |
| R-15 | 100,000 | 1 | Centralab #314 |
| R-16 | 10,000 | 10 | Ohmite Brown Devil |
| R-17 | 10,000 | 10 | Ohmite Brown Devil |
| R-18 | 800 | 1 | Centralab #314 |
| R-19 | 200 | 1 | Centralab #314 |
| R-20 | 250,000 | ½ | Centralab #310 |
| R-21 | 20,000 | 1 | Centralab #314 |
| R-22 | 1,000 | 1 | Centralab #314 |
| R-23 | Dual Tone Control | | Thordarson R1068 |
| R-24 | Dual Tone Control | | Thordarson R1068 |
| R-25 | 20,000 | 1 | Centralab #314 |
| R-26 | 3,500 | 10 | Ohmite Brown Devil |
| R-27 | 50,000 | 1 | Centralab #314 |
| R-28 | 1,000 | 1 | Centralab #314 |
| R-29 | 50,000 | 1 | Centralab #314 |
| R-30 | 3,000 | Potentiometer | Yaxley #C3MP |
| R-31 | 3,000 | Potentiometer | Yaxley #C3MP |

### TUBES

| | |
|---|---|
| 4 | Type 6C5 |
| 1 | Type 6L7 |
| 1 | Type 6H6 |
| 2 | Type 2A3 or 6A3 |
| 1 | Type 80 |
| 1 | Type 5Z3 |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-2 | .1 | 400 V Paper | Aerovox #484 |
| C-3, C-7 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-4 | .5 | 400 V Paper | Aerovox #484 |
| C-5 | .1 | 400 V Paper | Aerovox #484 |
| C-6 | .5 | 400 V Paper | Aerovox #484 |
| C-8 | .1 | 400 V Paper | Aerovox #484 |
| C-9 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-10 | .03 | 400 V Paper | Aerovox #484 |
| C-11 | .03 | 400 V Paper | Aerovox #484 |
| C-12 | .002 | 400 V Paper | Aerovox #484 |
| C-13 | .5 | 400 V Paper | Aerovox #484 |
| C-14, C-15 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-16 | .1 | 400 V Paper | Aerovox #484 |
| C-17 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-18 | .25 | 400 V Paper | Aerovox #484 |
| C-19, C-24 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-20 | 8 | 450 V Elect. | Aerovox G 450 |
| C-21 | 8 | 450 V Elect. | Aerovox G 450 |
| C-22, C-23 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-25 | .5 | 400 V Paper | Aerovox #484 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chas. and screen cover—Par-Metal #AF1017 |
| 1 | 10x17" Chas. bottom plate—Par-Metal #BP4526 |
| 1 | 0-150 MA DC meter — Triplett #223 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 1 | Two gang three position switch — Yaxley #3223-J |
| 6 | Octal sockets — Amphenol S8 |
| 4 | 4-Contact sockets — Amphenol S4 |
| 1 | Metal tube grid cap |
| 1 | Metal tube grid cap shield |
| 2 | "Volume" control plates |
| 2 | "Tone" control plates |
| 1 | "Expansion" control plate |
| 1 | Three position meter switch plate |
| 6 | Control knobs |
| 2 | Mic. connectors — Amphenol PC1M |
| 2 | Mic. connectors — Amphenol MC1F |
| 1 | AC line cord and plug — Belden #1725 |
| 1 | Pilot light socket and jewel — Yaxley 310R |
| 1 | Pilot light bulb, 6.3 volts — Mazda #40 |
| 2 | Brackets—Yaxley RB #248 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

# 6 Volt DC – 115 Volt AC AMPLIFIER

TOP VIEW

The combination 6 volt D.C., 115 volt A.C. amplifier has become very popular, especially in mobile public address work. Its flexibility permits operation almost anywhere that a 6 volt storage battery can be placed, such as rural gatherings, picnics, beach parties, motor boats, barn dances, etc. It is the ideal unit for portable and rental work since the undistorted power output of 20 watts is sufficient for most installations. Results are alike on both battery and 115 volt A.C. supplies with no sacrifice in the quality of reproduction.

The amplifier is similar to the 25 watt unit described on page 8; two 6L6-G's operate in a class $AB_1$ circuit with approximately 300 volts applied to the plates and screens. Inverse feedback reduces the distortion which is lower than ordinarily encountered in 6 volt amplifiers of this type. Two input channels accommodate a low level high impedance microphone and high impedance phono pick-up. The gain of the amplifier is more than adequate for full output with either "Mic" or "Phono".

Operation from 6 volts D.C. is made possible by incorporating a heavy duty vibrator to convert the D.C. into alternating current. Dual operation is accomplished by having both a 6 voltvibrator primary and a 115 volt primary on one and the same transformer. Two 6W5-G tubes rectify the high voltage for both battery and A.C. operation. A 6.3 volt secondary on the transformer supplies the heater current for A.C. operation only. The heaters are switched to the battery automatically for 6 volt operation by inserting the proper power supply plug. Two plugs are used, one being wired for 115 volt and the other for 6 volt operation. These plugs are wired as indicated on the schematic diagram.

Three switches are required. Two are used for 6 volt operation, one being a heavy duty type which controls the total 6 volt supply and the other is connected in the vibrator circuit and provides standby operation. The third is the "On" and "Off" switch for operation from 115 volts A.C.

When operating from a 6 volt battery, turn the main heavy duty switch "On" first and wait a minute or so for the tube heaters to warm up before turning on the vibrator switch. The vibrator switch controls the "B" supply and when turned "On" the battery drain increases from 4.5 amperes (which is the heater current) to about 19 amperes. This switch is a desirable feature since the battery can be conserved without waiting for the heaters to warm up when operation is desired.

All converters, whether rotary or the vibrator type, develop a certain amount of high frequency hash. This disturbance is easily picked up in the amplifier circuit unless proper isolation and shielding is employed. Therefore, it is advisable to construct the amplifier as closely as possible to the illustrations and diagram. All shielding should be incorporated where shown. A small metal box is formed and fastened in place by the Amphenol connector PC1M. One side of the box is left open to tighten the connector and insert C1, R1, and the bias cell and holder. Pass a shielded lead through the small hole for the 6J7 grid connection. Wire the lead and parts and test the amplifier before soldering the box side in place.

## TECHNICAL DATA

***Power Output:*** 20 watts undistorted or 35.5 db (less than 5% distortion).

***Coverage:*** 500,000 to 1,000,000 cu. ft. indoors; 15,000 to 25,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic or velocity microphone, and one channel for high impedance crystal or magnetic pick-up. Channels may be mixed and faded.

***Output Impedances:*** 4, 8, 15, 250, or 500 ohms with regular transformer, or 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer.

***Frequency Response:*** Within ± 2 db from 50 to 8,000 c.p.s. with bass boost of 5 db at 70 c.p.s.

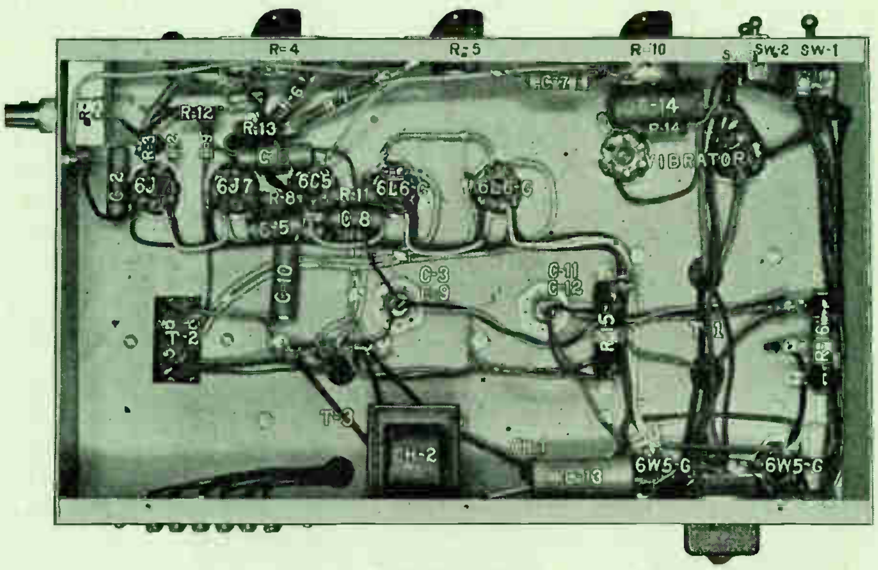
***Gain:*** Microphone input, 114 db; phono input, 75 db (based on 100,000 ohms input impedance).

***Hum:*** 70 db below maximum output.

***Tubes:*** 2-6J7, 1-6C5, 2-6L6-G, 2-6W5-G.

***Power Consumption:*** 100 watts at 115 volts, 50-60 cycles, or 19 amps. at 6V. D.C. (4.5 amperes on standby position).

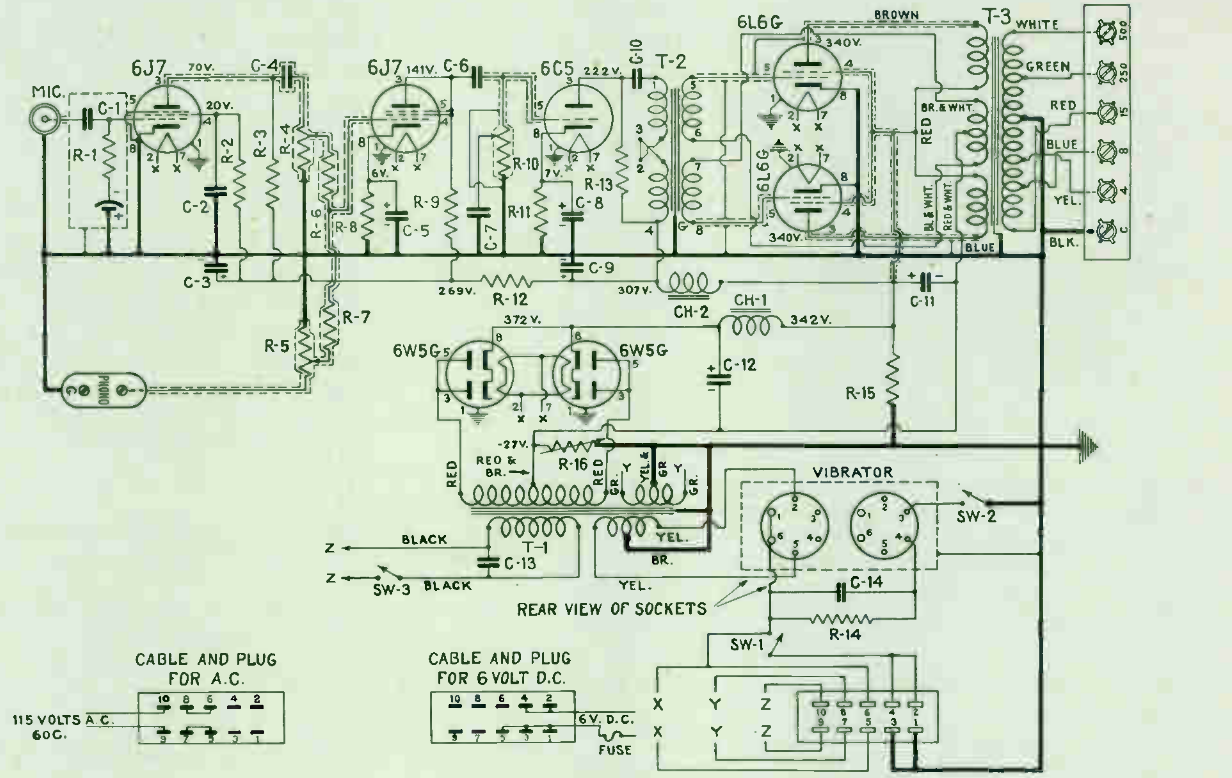
***Dimensions:*** 17″ long, 10″ deep, 9″ high.




BOTTOM VIEW

# 6 Volt DC – 115 Volt AC AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | | |
|---|---|---|
| T-1 | T-14R40 | Power Transformer |
| T-2 | T-15A74 | Input Transformer |
| T-3 | T-17S12 or T-15S91 | Output Transformer |
| CH-1 | T-17C00-B | First Choke |
| CH-2 | T-37C36 | Second Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | Centralab #310 |
| R-2 | 3 MEG. | ½ | Centralab #310 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 1 MEG. | Volume Control | Centralab #N-104 |
| R-5 | 1 MEG. | Volume Control | Centralab #N-104 |
| R-6 | 500,000 | ½ | Centralab #310 |
| R-7 | 500,000 | ½ | Centralab #310 |
| R-8 | 5,000 | 1 | Centralab #314 |
| R-9 | 100,000 | ½ | Centralab #310 |
| R-10 | 500,000 | Tone Control | Centralab #N-103 |
| R-11 | 1500 | 1 | Centralab #314 |
| R-12 | 20,000 | 1 | Centralab #314 |
| R-13 | 20,000 | 1 | Centralab #314 |
| R-14 | 200 | 1 | Centralab #314 |
| R-15 | 25,000 | 25 | Ohmite Wire Wound |
| R-16 | 300 | 25 | Ohmite Semi-Variable |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Aerovox #484 |
| C-2 | .04 | 400V Paper | Aerovox #484 |
| C-3 } C-9 | 8-8 | 450V Dual Elect. | Aerovox #2GL450 |
| C-4 | .1 | 400V Paper | Aerovox #484 |
| C-5 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | .01 | 400V Paper | Aerovox #484 |
| C-8 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-10 | .1 | 400V Paper | Aerovox #484 |
| C-11 } C-12 | 8-8 | 450V Dual Elect. | Aerovox #2GL450 |
| C-13 | .5 | 400V Paper | Aerovox #484 |
| C-14 | .5 | 200V Paper | Aerovox #284 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 7 | Octal sockets — Amphenol S8 |
| 2 | 6-contact socket — Amphenol S6 |
| 1 | Mic. input connector — Amphenol PC1M |
| 1 | Mic. input connector — Amphenol MC1F |
| 1 | Six screw output terminal board |
| 1 | Two screw phono input terminal board |

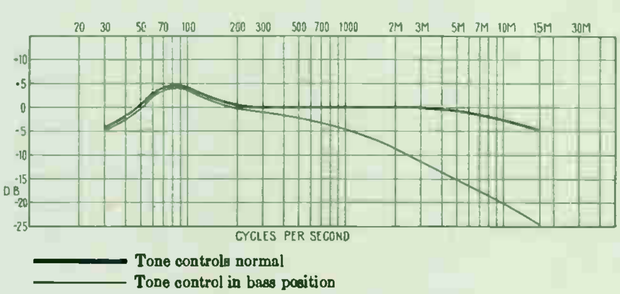
### MISCELLANEOUS PARTS (Continued)

| | |
|---|---|
| 1 | AC line cord and plug |
| 1 | Jewel and Bracket — Yaxley #310R |
| 1 | 6.3 volt pilot light — Mazda #40 |
| 2 | SPST Toggle switches — Arrow H&H #20992 |
| 1 | DPST Toggle switch — 6 v 25 amp. — C-H #8244 |
| 2 | Metal tube grid caps |
| 2 | Metal tube grid shields |
| 3 | Control knobs |
| 3 | Control plates |
| 2 | 10-contact power plugs — H. B. Jones #S-310-FHT |
| 1 | 10-contact power plug — H. B. Jones #P-310-CB |
| 1 | Vibrator — Electronics #490 |
| 1 | Bias cell — 1.5 volts — Mallory #F7 |
| 1 | Bias cell holder — Mallory #GB-1A |
| 1 | pc. tinned copper — 6x5x.010" |
| 1 | 30 amp fuse |
| 1 | Fuse holder for 30 amp fuse |
| 2 | Battery clips 50 amp capacity |

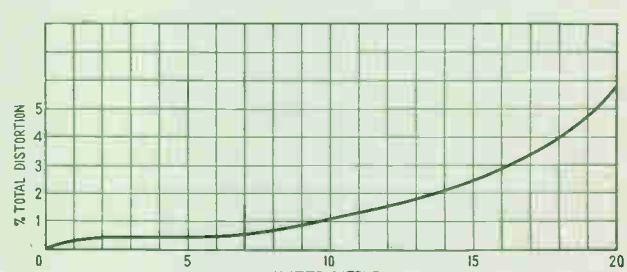
Battery Cable: #10 stranded wire, rubber covered.
Tube Complement: 2-6J7, 1-6C5, 2-6L6-G, 2-6W5-G

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

FOR MECHANICAL DRAWING OF CHASSIS SEE PAGE 27




FREQUENCY-RESPONE CURVE




DISTORTION CURVE

# SINGLE CHANNEL PRE-AMPLIFIER

TOP VIEW

ALTHOUGH pre-amplifiers are not as popular as they were some years back, there are cases where their use is recommended or necessary. The sound installation which requires that the microphone be located several hundred feet or more from the main power amplifier, can make good use of a pre-amplifier of the type shown on these pages. The gain is about 60 db, which will raise the level of the average low level microphone to approximately 0 db. Its output impedances are 500, 333, 250, 200, 125 or 50 ohms. The 500 or 200 ohm impedances are most commonly used. When a line operates under these conditions, any hum or disturbance which is picked up is so far below the signal level that it is not objectionable in the output of the loud speakers. High impedance microphones, such as the crystal, velocity and dynamic, should not be used at distances greater than 50 to 100 feet without such a pre-amplifier. When this distance is exceeded, losses occur either in signal level or frequency response.

This single channel amplifier is entirely self-contained, and operates from 115 volts 60 cycle current. It can be used in conjunction with the 120 watt amplifier described on page 14 or any of the amplifiers described in the Amplifier Guide, if the proper input impedance is built into the amplifier. Best results are obtained when a high quality hum balancing transformer having a 200 or 500 ohm primary is placed in the phono circuit of the amplifier. Thordarson T-90A00 or T-15A66 is suitable for this purpose. Best results are obtained when the gain control on the pre-amplifier is almost all the way on and that on the main amplifier cut down to control the output of the system.

The assembly and wiring of the pre-amplifier is quite simple; however, care should be taken in placeing and wiring those parts enclosed in the dotted line on the schematic diagram. Condenser C-1 and resistors R-1 and R-2 may require shielding if hum is to be cut to a minimum. It is recommended that the chassis be provided with a base to fully enclose the bottom of the pre-amplifier. Where no base is used, it may be necessary to shield all those parts included in the above mentioned dotted line.

The output transformer T-2 is shown connected to a five-contact socket. The connections indicated provide coupling to either a 200 or 500 ohm line. The additional impedances are obtainable by properly connecting the secondary of the transformer. Full instructions are supplied with each transformer for obtaining these other impedances.

## TECHNICAL DATA

***Output Level:*** 0 db or .006 watts (less than 1% distortion).

***Gain:*** 59.9 db (based on 100,000 ohm input impedance).

***Frequency Response:*** Within ± 1 db from 30 to 15,000 c.p.s.

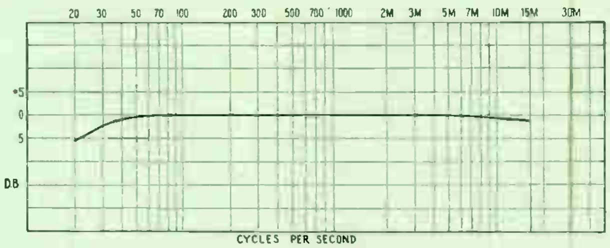
***Input:*** 5 megohms for one high impedance crystal, dynamic, or velocity microphone.

***Output:*** Low impedance line — 500, 333, 250, 200, 125, or 50 ohms.

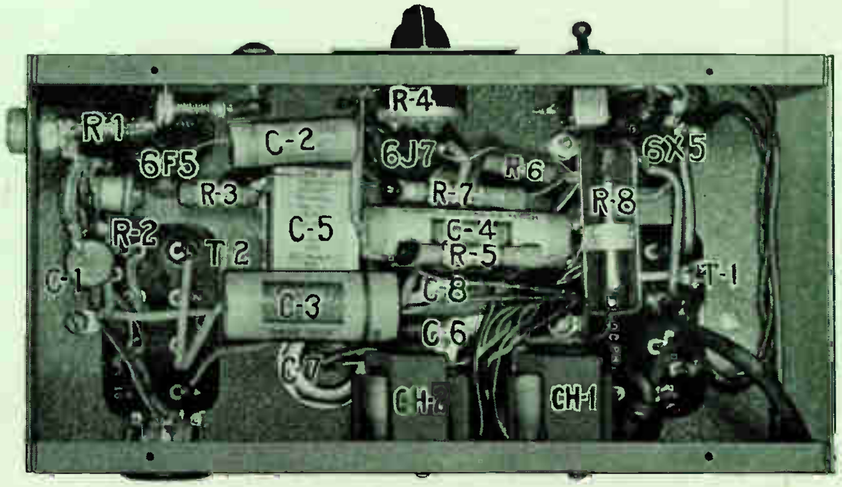
***Tubes:*** 1-6F5, 1-6J7, 1-6X5.

***Power Consumption:*** 17.5 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 9½″ long, 5″ deep, 6″ high — with cover 8½″ high.



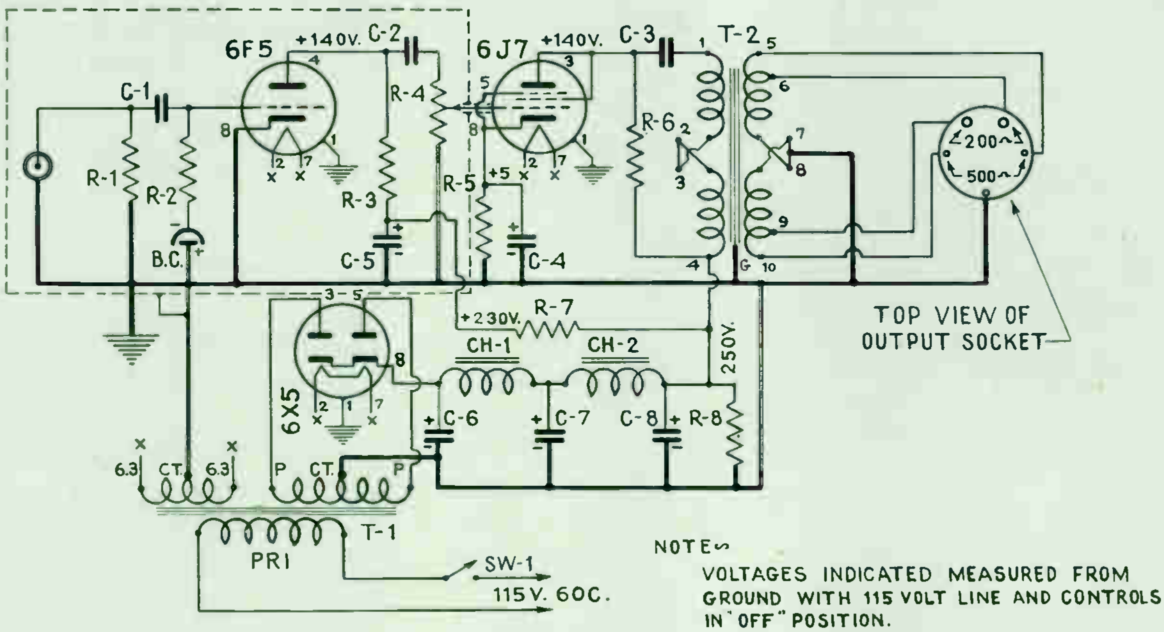

FREQUENCY-RESPONSE CURVE




BOTTOM VIEW

# SINGLE CHANNEL PRE-AMPLIFIER

THORDARSON




NOTE:
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R04 Plate and Filament Transformer |
| T-2 | T-15A71 Tube to Line Transformer |
| CH-1 | T-13C26 Choke |
| CH-2 | T-13C26 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5 MEG. | ½ | IRC BT-½ |
| R-3 | 100,000 | 1 | IRC BT-1 |
| R-4 | 250,000 | Volume Control | Yaxley type "M" |
| R-5 | 2,000 | 1 | IRC BT-1 |
| R-6 | 50,000 | 1 | IRC BT-1 |
| R-7 | 20,000 | 1 | IRC BT-1 |
| R-8 | 50,000 | 10 | Ohmite Brown Devil |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 V Paper | Cornell-Dubilier #DT-4P1 |
| C-2 | .1 | 400 V Paper | Cornell-Dubilier #DT-4P1 |
| C-3 | .5 | 400 V Paper | Cornell-Dubilier #DT-4P5 |
| C-4 | 10 | 25 V Elect. | Cornell-Dubilier #ED-2100 |
| C-5 | 8 | 450 V Elect. | Cornell-Dubilier #JR-508 |
| C-6 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |
| C-7 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |
| C-8 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |

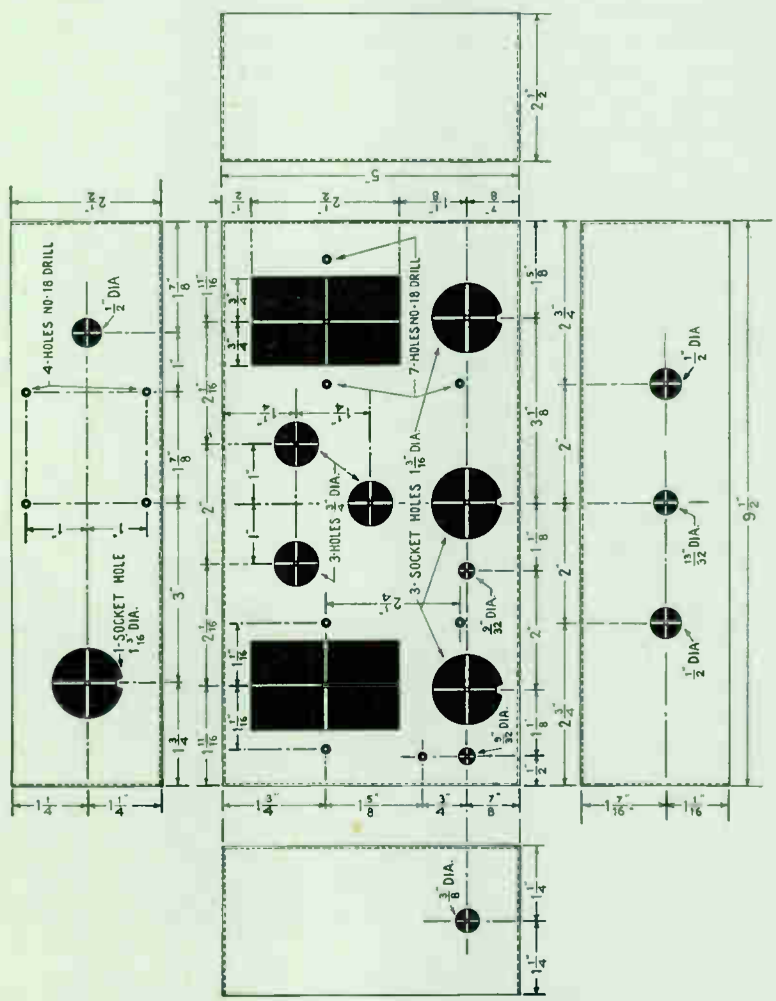
### TUBES

| | |
|---|---|
| 1 | Type 6F5 |
| 1 | Type 6J7 |
| 1 | Type 6X5 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x9½x2½" Chassis and cover — Bud No. 699 |
| 1 | 5x9½" Chassis bottom plate — Bud No. 680 |
| 3 | Octal sockets — Amphenol S8 |
| 1 | Output socket — Amphenol S5 |
| 1 | Output plug — Amphenol PM5 |
| 1 | Mic. input connector — Amphenol MC1F |
| 1 | Mic. input connector — Amphenol PC1M |
| 2 | Metal tube grid caps |
| 2 | Metal tube grid cap shields |
| 1 | AC line cord & plug — Belden No. 1725 |
| 1 | SPST switch — Arrow H&H No. 20992 |
| 1 | Volume control knob, black |
| 1 | Volume control dial plate |
| 1 | Pilot light bracket and jewel — Yaxley No. 310R |
| 1 | Bias cell, 1.5 Volts — Mallory No. F7 |
| 1 | Bias cell holder — Mallory No. GB-1A |
| 1 | Pilot light bulb, 6.3 volts — Mazda No. 40 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




**Chassis drawing of Single Channel Pre-Amplifier. Full size template available from THORDARSON, 15c net, postpaid.**

# FOUR CHANNEL PRE-AMPLIFIER

TOP VIEW

THE multiple channel pre-amplifier and mixer is useful where more input circuits must be accommodated than the regular amplifier will handle. Most main amplifiers accommodate only one or two microphones. Like the single channel pre-amplifier on the previous page, this unit may be operated several hundred feet from the main amplifier if necessary without serious loss of volume level or frequency response. The main amplifier should be equipped with a 200 ohm or 500 ohm input transformer to match the output impedance of the pre-amplifier. Thordarson transformers T-90A00 or T-15A66 are suitable for this use. The 120 watt amplifier on page 14 is designed to operate with a pre-amplifier and mixer of this type.

The circuit diagram as shown will accommodate four low level high impedance microphones. If it is preferable to handle only three low level microphones and a phono pick-up, one of the 6F5 pre-amplifier tubes and associated parts can be eliminated. The phono pick-up will then operate directly into volume control R-16. Likewise, two pre-amplifier tubes can be eliminated if two phono pick-up channels are more desirable.

Dotted lines are shown on the circuit diagram indicating that portion of the circuit which is susceptible to hum and noise pick-up. In the laboratory model, it was necessary to shield resistors R-17, R-18, R-19, and R-20 and all the leads connecting to them as well as the grid leads to the 6F5 tubes. Additional shielding should not be necessary if the chassis is fully enclosed with a chassis bottom plate. Bias cells provide bias for the 6F5 input tubes, thus eliminating any disturbance that might develop in the cathode circuit of these tubes.

## TECHNICAL DATA

***Output Level:*** 0 db or .006 watts (less than 1% distortion).

***Gain:*** 55 db (based on 100,000 ohm input impedance).

***Frequency Response:*** Within ± 2 db from 20 to 15,000 c.p.s.

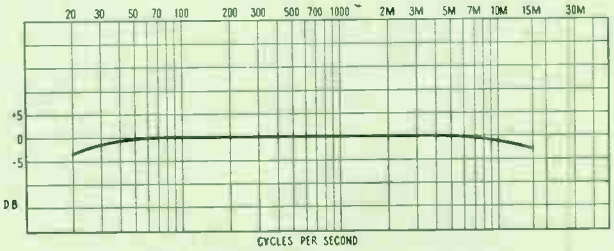
***Input Circuits:*** Four 5 megohm channels for high impedance crystal, dynamic or velocity microphones.

***Output:*** Low impedance line — 500, 333, 250, 200, 166, 125, or 50 ohms.

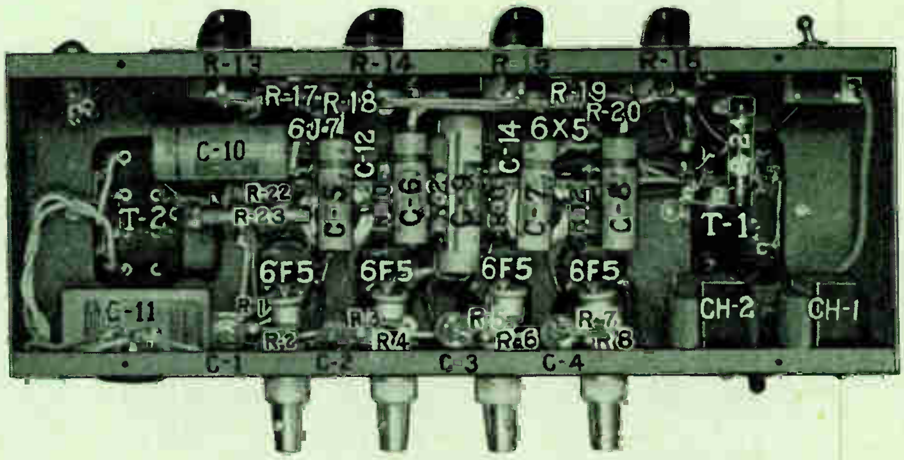
***Tubes:*** 4-6F5, 1-6J7, 1-6X5.

***Power Consumption:*** 25 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 13½″ long, 5″ deep, 6″ high — with cover 8½″ high.




FREQUENCY-RESPONSE CURVE




BOTTOM VIEW

# FOUR CHANNEL PRE-AMPLIFIER

THORDARSON

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R04 Power Transformer |
| T-2 | T-15A71 Tube to Line Output Transformer |
| CH-1 | T-13C26 Choke |
| CH-2 | T-13C26 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5 MEG. | ½ | IRC BT-½ |
| R-3 | 5 MEG. | ½ | IRC BT-½ |
| R-4 | 5 MEG. | ½ | IRC BT-½ |
| R-5 | 5 MEG. | ½ | IRC BT-½ |
| R-6 | 5 MEG. | ½ | IRC BT-½ |
| R-7 | 5 MEG. | ½ | IRC BT-½ |
| R-8 | 5 MEG. | ½ | IRC BT-½ |
| R-9 | 100,000 | 1 | IRC BT-1 |
| R-10 | 100,000 | 1 | IRC BT-1 |
| R-11 | 100,000 | 1 | IRC BT-1 |
| R-12 | 100,000 | 1 | IRC BT-1 |
| R-13 | 500,000 | Volume Control | Yaxley type "N" |
| R-14 | 500,000 | Volume Control | Yaxley type "N" |
| R-15 | 500,000 | Volume Control | Yaxley type "N" |
| R-16 | 500,000 | Volume Control | Yaxley type "N" |
| R-17 | 500,000 | ½ | IRC BT-½ |
| R-18 | 500,000 | ½ | IRC BT-½ |
| R-19 | 500,000 | ½ | IRC BT-½ |
| R-20 | 500,000 | ½ | IRC BT-½ |
| R-21 | 2,000 | 1 | IRC BT-1 |
| R-22 | 50,000 | 1 | IRC BT-1 |
| R-23 | 20,000 | 1 | IRC BT-1 |
| R-24 | 50,000 | 10 | Ohmite Brown Devil |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 V Paper | Aerovox #484 |
| C-2 | .1 | 400 V Paper | Aerovox #484 |
| C-3 | .1 | 400 V Paper | Aerovox #484 |
| C-4 | .1 | 400 V Paper | Aerovox #484 |
| C-5 | .1 | 400 V Paper | Aerovox #484 |
| C-6 | .1 | 400 V Paper | Aerovox #484 |
| C-7 | .1 | 400 V Paper | Aerovox #484 |
| C-8 | .1 | 400 V Paper | Aerovox #484 |
| C-9 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-10 | .5 | 400 V Paper | Cor.-Dub. DT-4P5 |
| C-11 | 8 | 450 V Elect. | Aerovox #PBS5 |
| C-12 | 8 | 450 V Elect. | Aerovox #GLS450 |
| C-13 | 8 | 450 V Elect. | Aerovox #GLS450 |
| C-14 | 8 | 450 V Elect. | Aerovox #GLS450 |

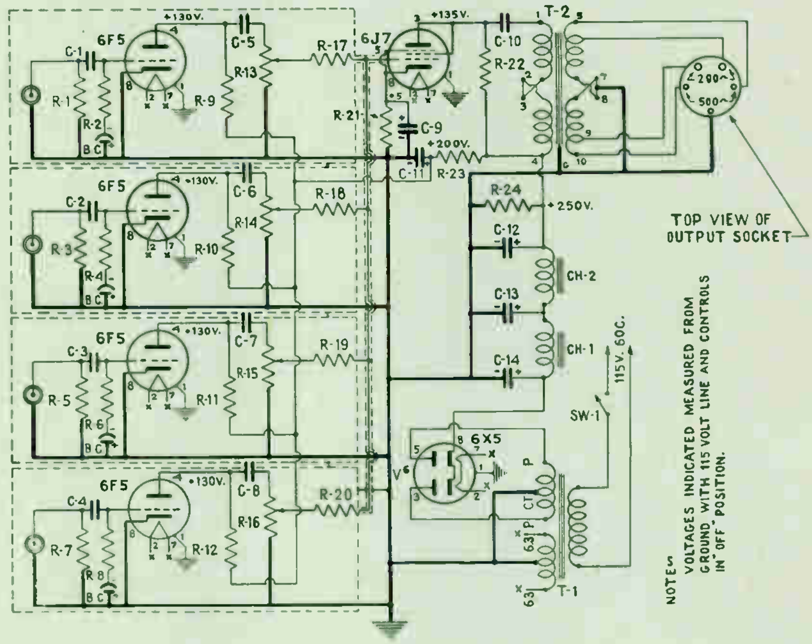
### TUBES

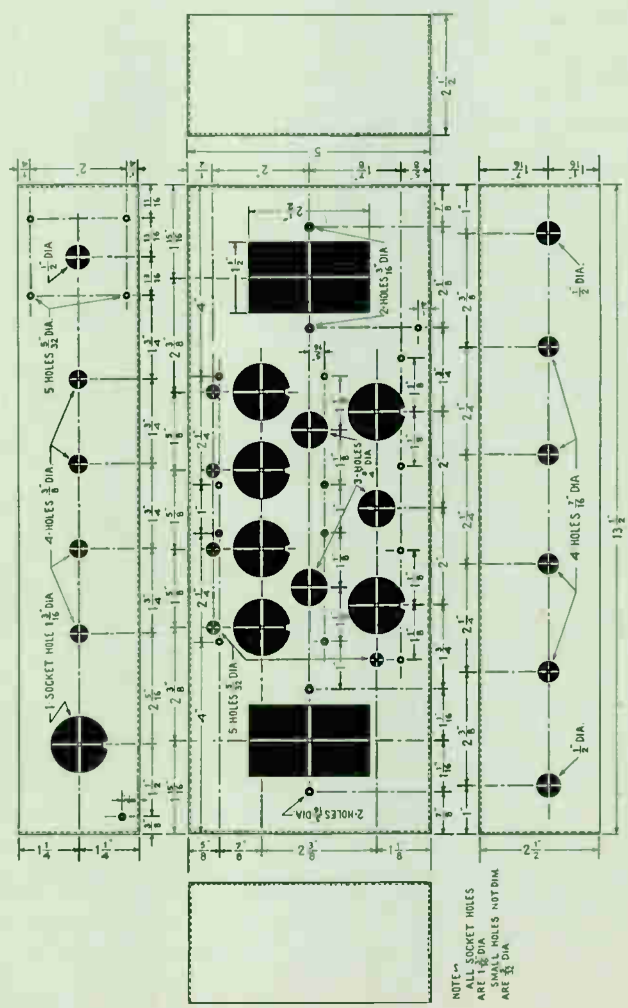
| | |
|---|---|
| 4 | Type 6F5 |
| 1 | Type 6J7 |
| 1 | Type 6X5 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x13½x2½" Chassis and screen cover—Bud No. 1125 |
| 1 | 5x13½" Chassis bottom cover — Bud No. 685 |
| 6 | Octal sockets — Amphenol S8 |
| 1 | 5-contact socket — Amphenol S5 |
| 1 | 5-prong output plug — Amphenol PM5 |
| 4 | Mic. connectors — Amphenol PC1M |
| 4 | Mic. connectors — Amphenol MC1F |
| 5 | Metal tube grid caps |
| 5 | Metal grid cap shields |
| 1 | AC line cord and plug — Belden No. 1725 |
| 1 | SPST Toggle Switch — Arrow H & H No. 20992 |
| 4 | Control knobs |
| 4 | "Volume" control plates |
| 1 | Pilot light bracket and jewel — Yaxley No. 310R |
| 4 | Bias cells 1.5 volts — Mallory No. F7 |
| 4 | Bias cell holders — Mallory No. GB-1A |
| 1 | 6.3V Pilot light — Mazda No. 40 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




Chassis drawing of Four Channel Pre-Amplifier. Full size template of chassis for drilling, showing all mechanical dimensions available from THORDARSON, 15c net postpaid.

# DUAL TONE CONTROL

TOP VIEW
DUAL TONE CONTROL

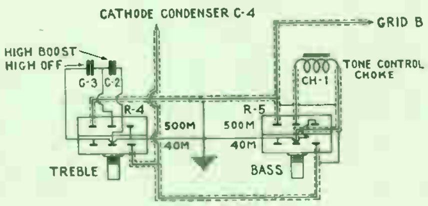
Thordarson's development of this "Dual Tone Control" was prompted by the many requests of sound men for an effective tone compensating system to boost or attenuate the bass or treble frequencies independently of each other. Examination of the schematic diagram will show that the final circuit is simple and not at all complicated to construct. The unit described here is identical in circuit details to the tone compensation employed in the amplifiers shown elsewhere in this "Amplifier Guide." It is constructed on a small chassis, making it adaptable to practically any existing amplifier.

Operation is based on degeneration in the cathode circuit of a 6C5 or equivalent tube. If resistance is introduced in the cathode circuit, any signal developed by the tube will also appear across the resistance. This signal voltage is opposite in phase and in series with the voltage impressed on the grid and cathode of the tube. Degeneration takes place and the amplification of the tube is reduced. In this application the plate loading resistor R-6 is made small and the cathode resistor R-3 large so that a greater part of the voltage developed by the tube appears in the cathode circuit.

Since the circuit is resistive there is little or no frequency discrimination at audio frequencies, and all frequencies are degenerated an equal amount. If the cathode resistance is shunted with an inductance (of the proper value) the resistance at low frequencies is practically shorted out due to the low impedance of the choke at low frequencies. Therefore degeneration of the low frequencies is eliminated and the greater part of the signal developed by the tube appears across the load resistor R-6. The result is an increase in the low frequency response of the circuit. Likewise if a condenser (of the proper value) is shunted across the cathode resistor, the low impedance of the condenser at high frequencies reduces the impedance of the circuit and degeneration of the higher frequencies is reduced. The high frequency response of the circuit is thus increased.

Attenuation of the low frequencies can be accomplished by shunting the grid circuit of the following stage with a choke or inductance. It so happens that the value of the choke (described above) used in the bass boost circuit also has the correct value for an attenuation circuit. The high frequencies can be attenuated by shunting the same grid circuit with a suitable condenser.

The function of control R-5 is to introduce the choke CH-1 into either the cathode circuit for bass boost or the grid circuit for bass decrease. Control R-4 applies condenser C-2 to the cathode circuit for treble increase, or C-3 to the grid circuit for




treble decrease. The controls are coupled to the cathode through condenser C-4 and to the following grid by a shielded lead. The small pictorial drawing illustrates clearly how connections are made to the controls.

To install the tone control unit into an existing amplifier, locate the coupling condenser in a resistance coupled stage (preferably the plate circuit of the second stage of the amplifier). Remove the condenser from the circuit and connect the shielded lead of condenser C-1 and the shielded lead of C-5 in its place. Make sure that the lead from C-1 connects to the plate of the tube preceding the tone control unit. Ground the shields of these leads to the amplifier to complete the ground circuit. Connect the unshielded lead to a well filtered point of the amplifier B supply circuit. A pair of twisted wires not over 3 feet long may be used for the filament supply. No difficulty should be experienced with hum or other disturbance since the unit can be placed several feet from the amplifier. It is also possible to build the tone control into an amplifier if there is adequate room and care is taken not to mount the choke and controls near the power transformer.

## PARTS LIST FOR THE DUAL TONE CONTROL

| Diagram No. | THORDARSON |
|---|---|
| CH-1 | Tone Control Choke, T-14C70 |
| R-4 | Dual Tone Control, Thordarson R-1068 |
| R-5 | Dual Tone Control, Thordarson R-1068 |

### RESISTORS

| | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 250,000 | ½ | Centralab #310 |
| R-2 | 1,000 | 1 | Centralab #314 |
| R-3 | 20,000 | 1 | Centralab #314 |
| R-6 | 20,000 | 1 | Centralab #314 |

### CONDENSERS

| | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 | Cornell-Dubilier #DT-4P1 |
| C-2 | .04 | 400 | Cornell-Dubilier #DT-4S4 |
| C-3 | .01 | 400 | Cornell-Dubilier #DT-4S1 |
| C-4 | 10 | 200 | Aerovox #PR-200 |
| C-5 | .1 | 400 | Cornell-Dubilier #DT-4P1 |

### TUBE

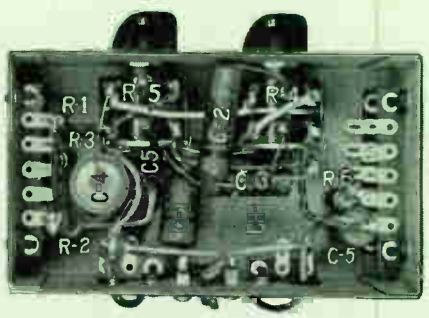
| | |
|---|---|
| 1 | Type 6C5 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | Chassis 6" long, 3½" wide, 3" high |
| 1 | Chassis bottom plate |
| 4 | 5-lug resistor mtg. strips |
| 2 | 2-lug resistor mtg. strips |
| 1 | 2-screw terminal board |
| 1 | Octal socket Amphenol S8 |
| 2 | Control knobs |
| 2 | "Tone" control plates |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

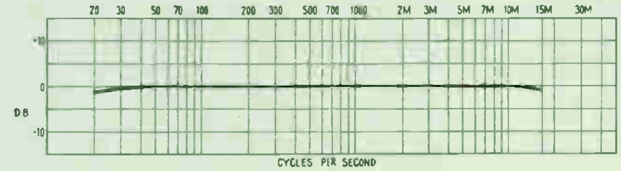
Curves are shown on opposite page illustrating tone controls in various positions. Full size template of the chassis drawing also shown on opposite page available from THORDARSON, 15c net, postpaid.



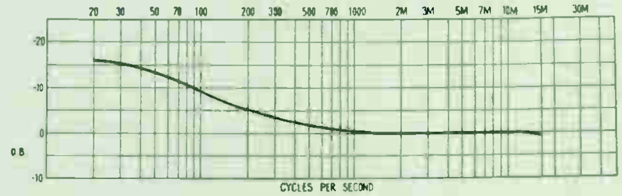

BOTTOM VIEW

# DUAL TONE CONTROL

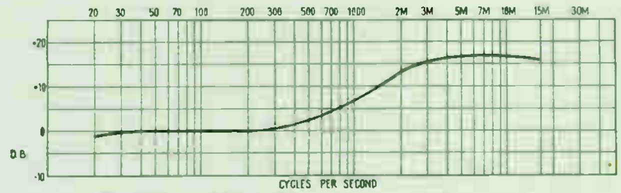
THORDARSON



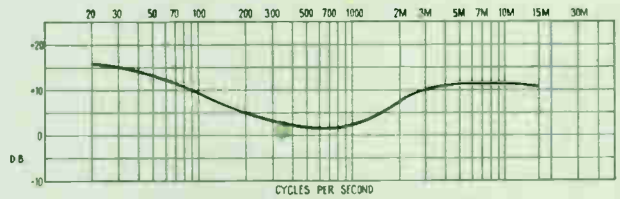

**Bass Control normal — Treble Control normal**



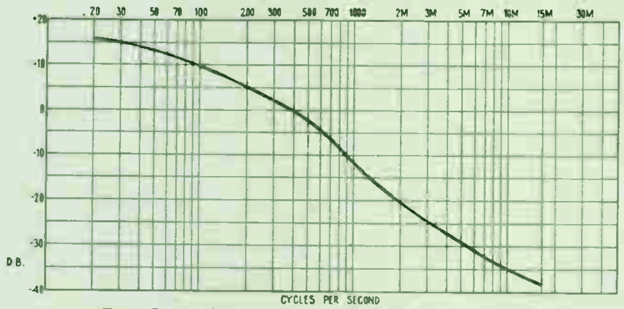

**Bass Control increase — Treble Control normal**



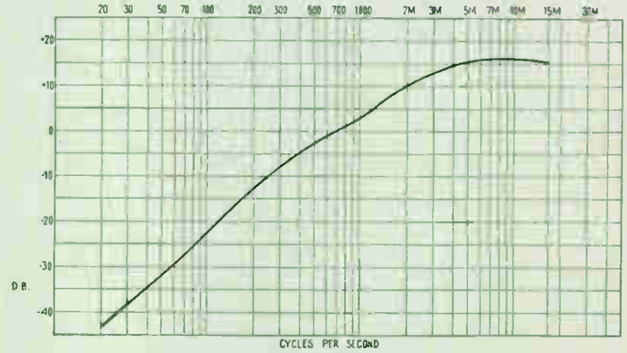

**Bass Control normal — Treble Control increase**



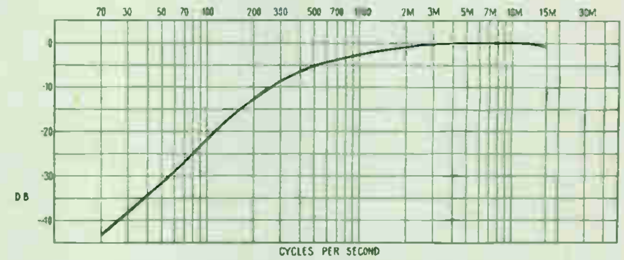

**Bass Control increase — Treble Control increase**



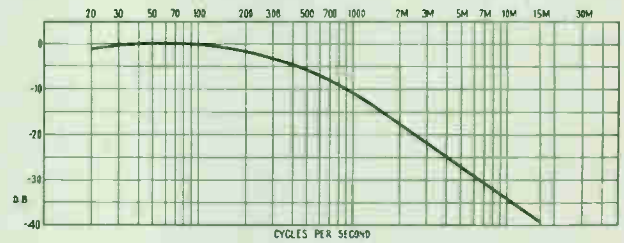

**Bass Control increase — Treble Control decrease**



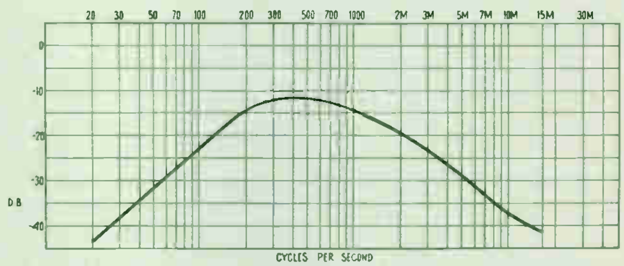

**Bass Control decrease — Treble Control increase**



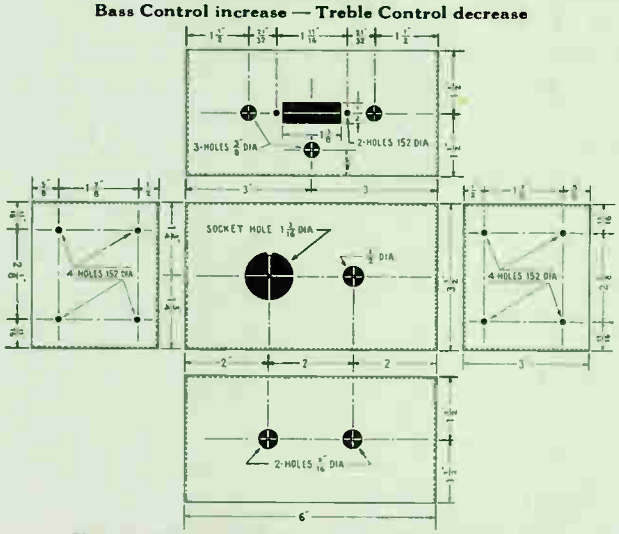

**Bass Control decrease — Treble Control normal**



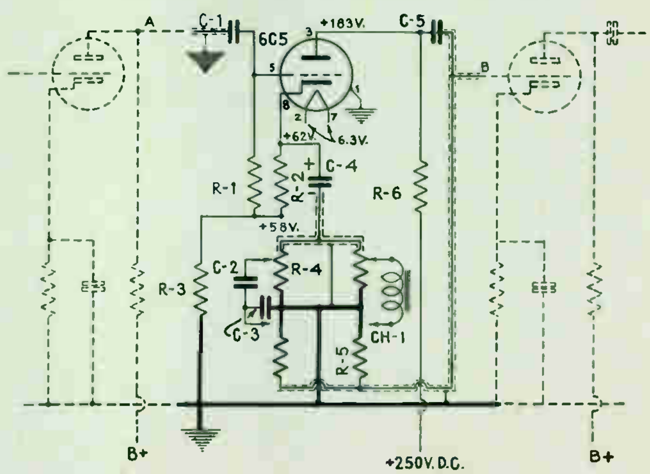

**Bass Control normal — Treble Control decrease**




**Bass Control decrease — Treble Control decrease**




**Chassis drawing of Dual Tone Control Unit. Full size template available from Thordarson, 15c net, postpaid.**




Dual Tone Control. Schematic Diagram.

# MATCHING SPEAKER LOADS

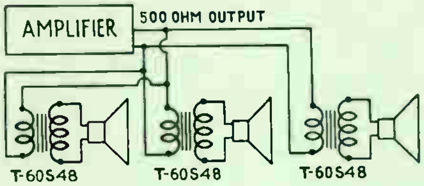



Fig. 1

It is frequently necessary to match a number of speakers to a 500 ohm line in such a way that the speakers take unequal power. It is an easy matter to connect a number of speakers to a 500 ohm line so that each speaker takes the same amount of power and it is also an easy matter to determine the correct impedance ratio of each line to speaker transformer. In Fig. 1, if each of the speakers has a voice coil impedance of 10 ohms, the impedance ratio of the transformers should be 1500:10 so that the three 1500 ohm impedances in parallel will give an impedance of 500 ohms, which is the correct value for the 500 ohm line. In this case, if the total power supplied to the 500 ohm line is 30 watts, each speaker will take one-third of this or ten watts. If this power is to be divided so one speaker receives 15 watts, one 10 watts and one 5 watts, one must make a change in the ratio of the three transformers.

The voltage developed across the 500 ohm line is 122 volts. ($W = \frac{E^2}{R}$; $W = 30$, $R = 500$, $E = \sqrt{15{,}000}$ or 122 volts). Given the voltage across the 500 ohm line and the voltage required across each voice coil for the desired amount of power, it is an easy matter to determine the turns ratio and the impedance ratio necessary in the various transformers.

For the first speaker, requiring 15 watts of audio, the voltage across the voice coil is 12.25 volts; ($W = \frac{E^2}{R}$; $W = 15$, $R = 10$, $E = \sqrt{10 \times 15} = 12.25$ volts). Similarly, the voltage across the speaker requiring 10 watts is 10 volts and the voltage across the speaker requiring 5 watts is 7 volts. The turns ratio of the various transformers is $\frac{122}{12.25}$ or 10:1. Also $\frac{122}{10}$ or 12.2:1, and also $\frac{122}{7}$ or 17.5:1. The impedance ratio of the transformer is the turns ratio squared and the actual primary impedance is equal to the turns ratio squared, multiplied by the voice coil impedance of 10 ohms. The reflected primary impedances are all different. However, when the three are paralleled, they result in an impedance of 500 ohms, which is the correct value for the 500 ohm line. In this case, the power delivered to each of the speakers is entirely different from the condition under Fig. 1.

It must be remembered when using this method of calculation the total power in the individual voice coils must total the power in the primary from which the value of primary voltage was computed.

Frequently it is not possible to match the impedance of the speaker exactly. Whenever this is not possible and whenever there is a sufficient number of taps on the output of the amplifier, it should be connected in such a way that a lower plate to plate load than normal is reflected. In other words, if it is necessary to match a 15 ohm speaker to an output transformer which has a 16 ohm tap and a 14 ohm tap, the 15 ohm speaker should be connected to the 16 ohm tap. This will reflect a somewhat lower value of plate to plate load so that it is possible to obtain slightly more power from the amplifier although the distortion will be somewhat greater at the peak output. This is much better than connecting the 15 ohm speaker to the 14 ohm tap, thus reflecting a higher plate to plate load and causing the amplifier to overload at a much lower value of power output. This is especially true of pentode and beam power tubes, where the higher value of plate to plate load will result in a flat top wave and severe distortion will result.

## IMPEDANCE RATIO

The transformer is an impedance changer and as such it is not necessarily associated with any one value of impedance. In other words, if a transformer is designed to couple a 500 ohm line to a 10 ohm voice coil, the impedance ratio of the transformer is 50:1, and the same transformer for all practical purposes will just as effectively couple a 1000 ohm line to a 20 ohm coil or a 250 ohm line to a 5 ohm voice coil, provided, of course, that the power handling ability of the transformer is not exceeded. The only serious result of using the primary of a transformer for an impedance other than that for which it was designed is the changing of the frequency response of the transformer and its operating efficiency. In other words, a transformer designed for 500 ohms operation has a certain amount of inductance, which, when used with a 1000 ohm line, will give poorer low frequency response and better high frequency response. On the other hand, a transformer designed for 500 ohm operation when used on a 250 ohm line, will provide better low frequency response but the high frequency response will drop off considerably.

Thordarson line to voice coil transformer, T-60S48, may be used to reflect a primary impedance from 500 to 3000 ohms. It has been designed with high primary inductance and low leakage so that the frequency response is good over this range. The secondary has a number of taps making it possible to match practically any voice coil impedance or obtain any desired turns ratio. The accompanying table indicates what turns and impedance ratios may be obtained as well as the voice coil impedances when one to six transformers are connected in parallel to a 500 ohm line. The table will aid in connecting voice coils of the same or different impedance where the distribution of power is equal, without the above computation. Only one speaker should be connected to each transformer.

Where there are a number of speakers which already have 500 ohm input transformers to be connected to a 500 ohm line a matching transformer must be used. A number of 500 ohm speakers connected in parallel may be matched to the 500 ohm amplifier output with T-76S74 matching autotransformer. This unit provides five impedances in addition to the original 500 ohms — 250, 166, 125, 100, and 84 ohms. These values are the result of connecting 2, 3, 4, 5, or 6, 500 ohm speakers in parallel.

Two 500 ohm speakers connected in parallel will reflect an impedance of 250 ohms. Connections are made to the common terminal No. 7 and terminal No. 5. If three speakers are used, the reflected impedance will be 166 ohms, in which case the common terminal and terminal No. 4 are used.

THORDARSON transformer T-53S81 will couple a 500 or 250 ohm line to voice coils having 4, 8, or 15 ohms impedance. If desired, two of these transformers may be connected to a 500 ohm line by using a series connection and the 250 ohm tap. It is also possible to connect several speaker voice coils to one of the T-53S81 transformers. If the voice coils have 15 ohms impedance each, two of them could be connected in parallel to the 8 ohm tap. Four 15 ohm voice coils can be wired in series parallel to the 15 ohm tap or in parallel to the 4 ohm tap.

The wires connecting the transformer to the speaker coil should not be any longer than necessary. Long voice coil leads result in loss of power and low frequencies. Heavy wire should be used if the transformer is separated from the speaker more than a foot or so.

## Table for Connecting Dynamic Speakers of Various Impedances in Same Output System

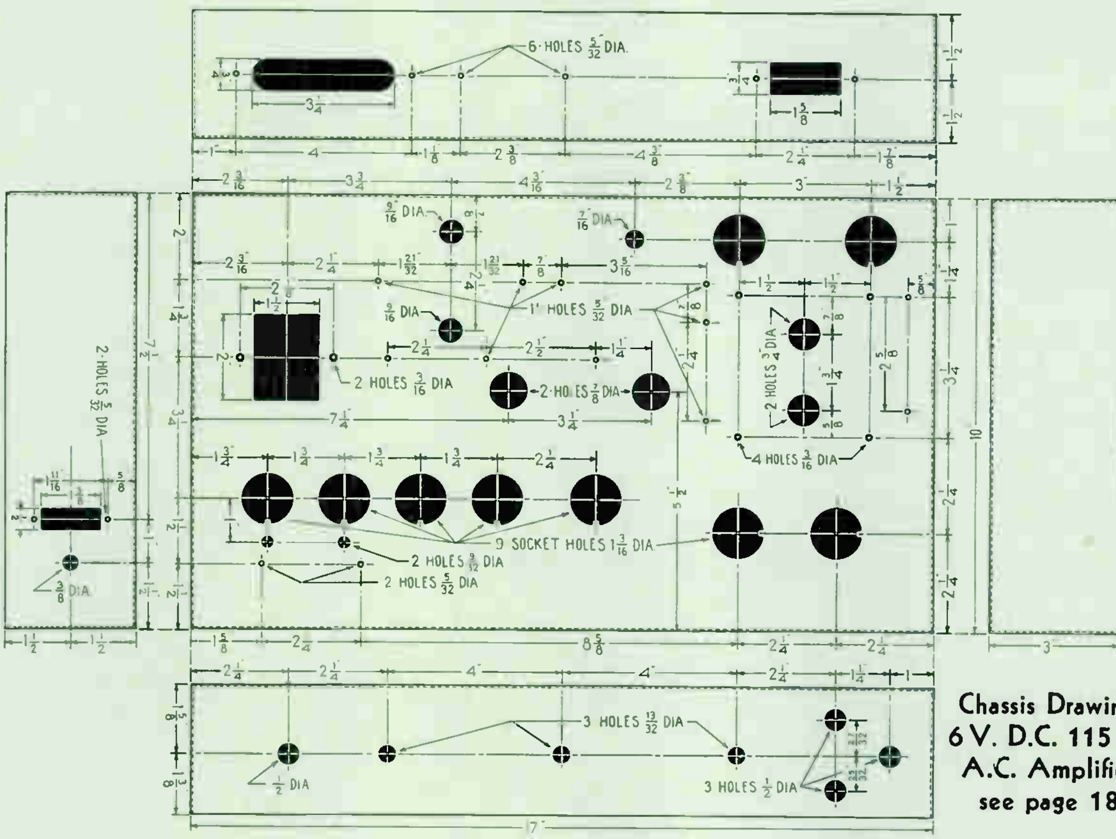
| | | | Secondary Matching Impedance T-60S48 Transformer | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | No. of Transformers in Parallel Across 500-ohm Line | | | | | |
| Secondary Terminals | Turns Ratio | Imped. Ratio | 1 | 2 | 3 | 4 | 5 | 6 |
| 2 - 4 | 89:1 | 7950 | .06 | .1 | .2 | .2 | .3 | .4 |
| 5 - 6 | 65:1 | 4200 | .1 | .2 | .4 | .5 | .6 | .7 |
| 2 - 5 | 47:1 | 2200 | .2 | .4 | .7 | .9 | 1.1 | 1.3 |
| 4 - 6 | 39:1 | 1500 | .3 | .6 | 1.0 | 1.3 | 1.6 | 1.9 |
| 3 - 6 | 32:1 | 1000 | .4 | .7 | 1.1 | 1.4 | 1.8 | 2.1 |
| 2 - 6 | 27:1 | 730 | .6 | 1.2 | 2.0 | 2.7 | 3.4 | 4.0 |
| 6 - 7 | 26:1 | 670 | .7 | 1.4 | 2.2 | 2.9 | 3.6 | 4.3 |
| 1 - 2 | 19:1 | 360 | 1.3 | 2.7 | 4. | 5.4 | 6.8 | 8.1 |
| 1 - 3 | 17:1 | 290 | 1.7 | 3.3 | 5. | 6.7 | 8.4 | 10. |
| 1 - 4 | 16:1 | 250 | 2. | 4.0 | 6. | 8. | 10. | 12. |
| 3 - 7 | 14½:1 | 210 | 2.4 | 4.8 | 7.2 | 9.6 | 12. | 14.4 |
| 1 - 5 | 13¾:1 | 190 | 2.6 | 5.3 | 8. | 10.6 | 13.3 | 16. |
| 2 - 7 | 13¼:1 | 175 | 2.8 | 5.6 | 8.4 | 11.2 | 14. | 16.8 |
| 1 - 6 | 11¼:1 | 125 | 4. | 8. | 12. | 16. | 20. | 24. |
| 1 - 7 | 7.9:1 | 62 | 8. | 16. | 24. | 32. | 40. | 48. |

*(Continued from page 3)*

ing effect of the tube is exceedingly small with the result that the damping is negligible. As a result, unnatural "boominess" may result when the speaker is shock excited and the cone vibrates at its own natural period. The natural period depends upon the physical construction of the speaker and is usually in the neighborhood of 50 to 150 cycles.

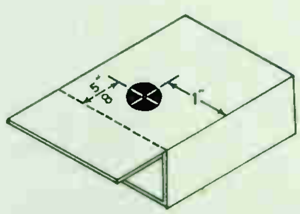
### HUM

Hum in the output stage is cancelled out in much the same way as distortion, since the hum developed in the stage and the voltage fed into the grid circuit are out of phase and tend to cancel. It must be remembered, however, that distortion not appearing in the stage or hum from a previous stage will not be cancelled by inverse feedback in the output stage. Great reductions in plate circuit distortion and plate resistance may be obtained by the use of large amounts of inverse feedback. However, the limiting factor in inverse feedback is the amount of desired gain from the stage in question. In actual design the amount of inverse feedback is a compromise between the gain and the desired reduction in distortion. If there is enough gain in the previous stages and if the driver tube can supply the necessary peak voltage, it will be advisable to increase the amount of inverse feedback in order to reduce the plate resistance and the plate circuit distortion. However, if the plate resistance is fairly low and if the plate circuit distortion is a reasonable value, there is not much advantage gained in further reducing the gain by the addition of more inverse feedback.

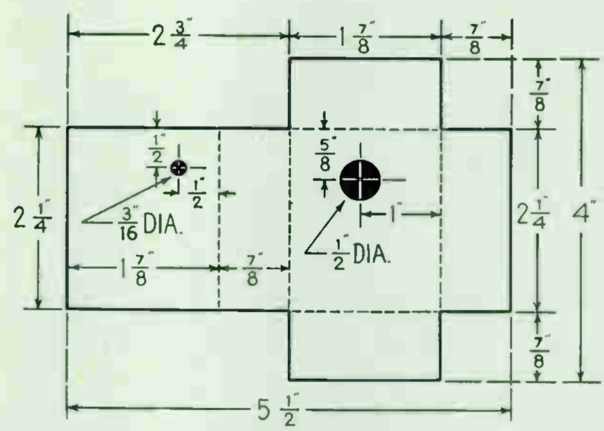


**Chassis Drawing 6 V. D.C. 115 V. A.C. Amplifier**
**see page 18**

**Input Circuit Shield Can**



**Cut shield from metal and bend to form a can as above, solder together leaving one side open until mounted, and small parts are installed and wired.**

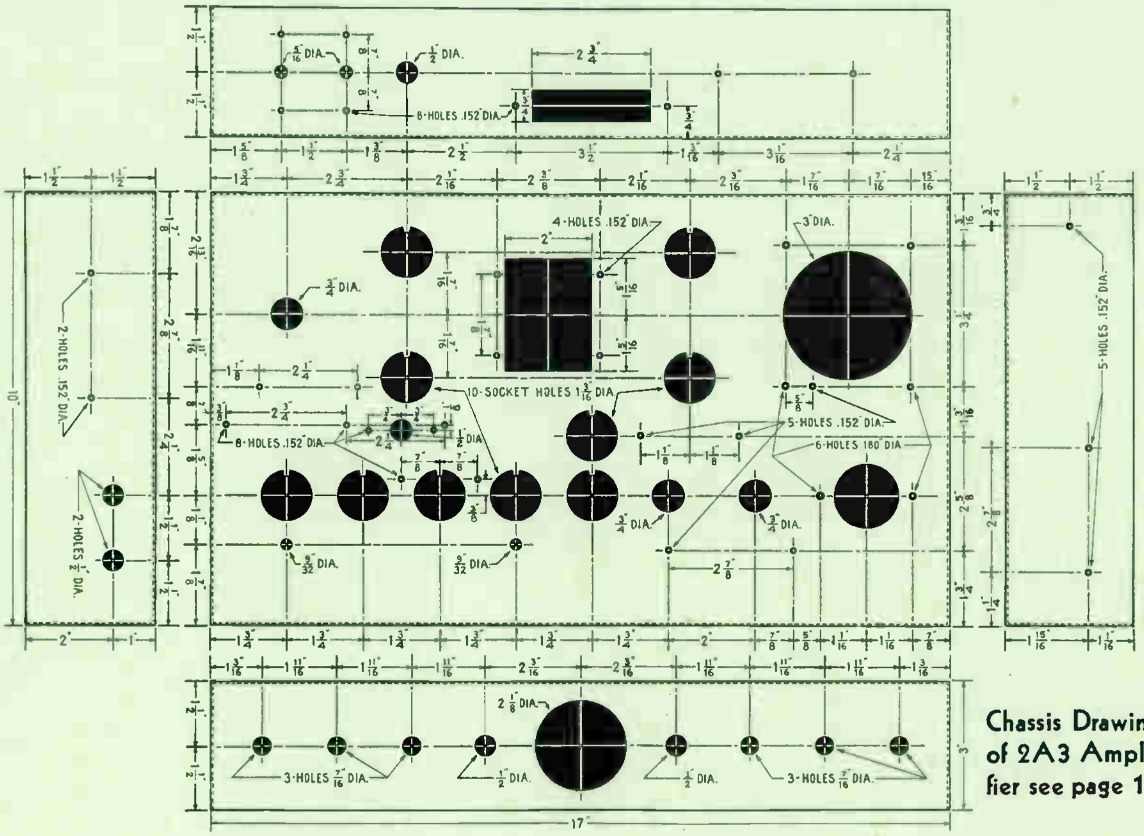


**Full size template of Chassis available from Thordarson, 15c net, postpaid**

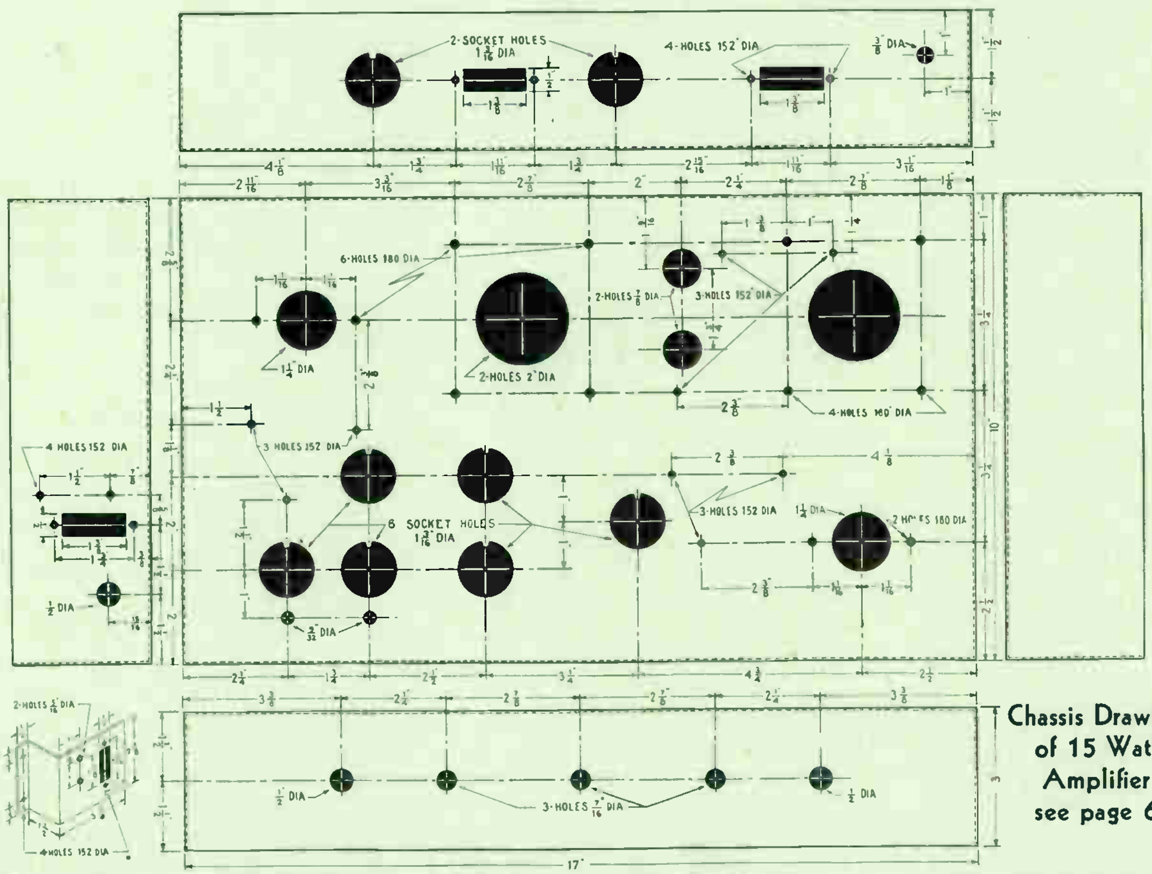
THORDARSON

# CHASSIS DRAWINGS—2A3 and 15 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**




Chassis Drawing of 2A3 Amplifier see page 16

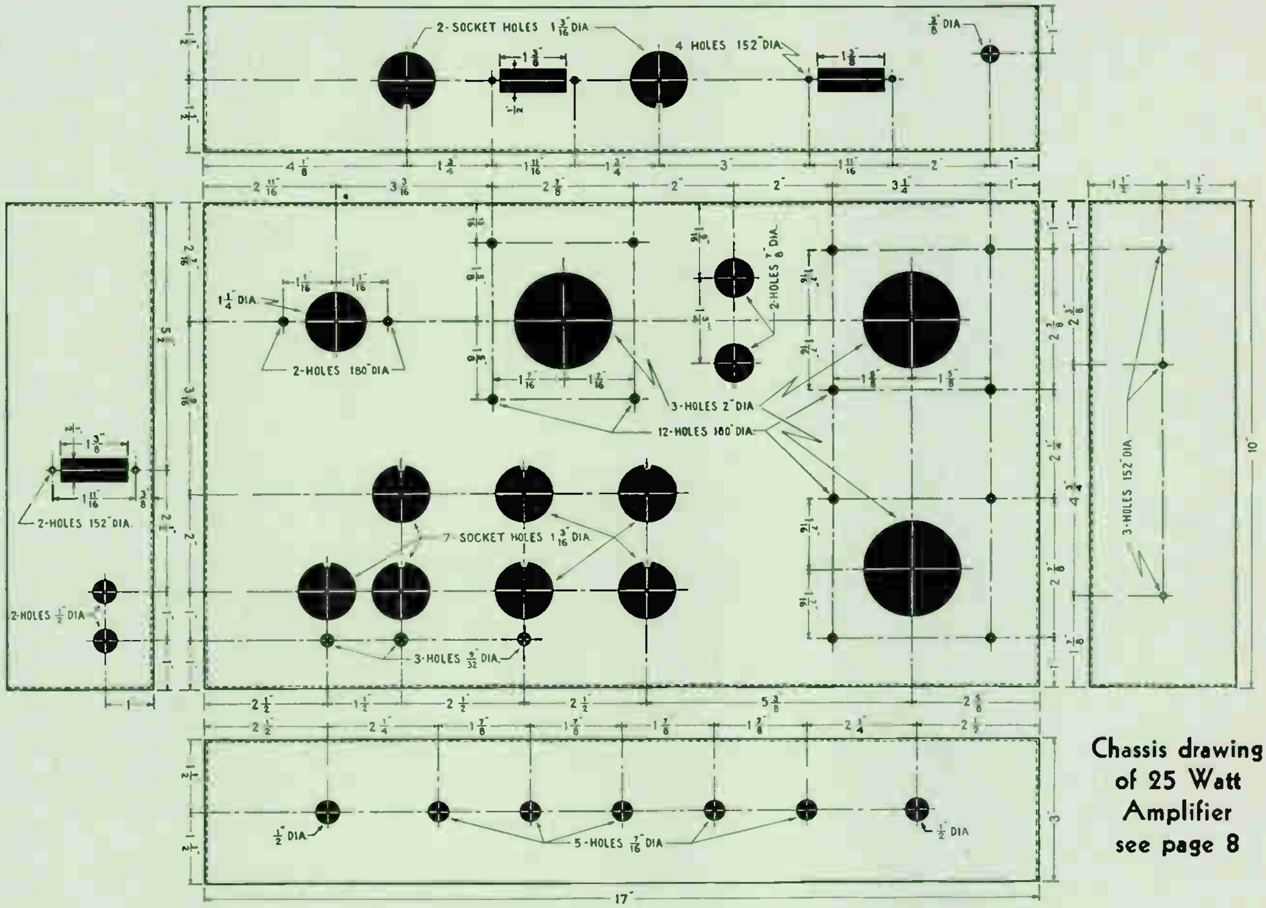



Chassis Drawing of 15 Watt Amplifier see page 6

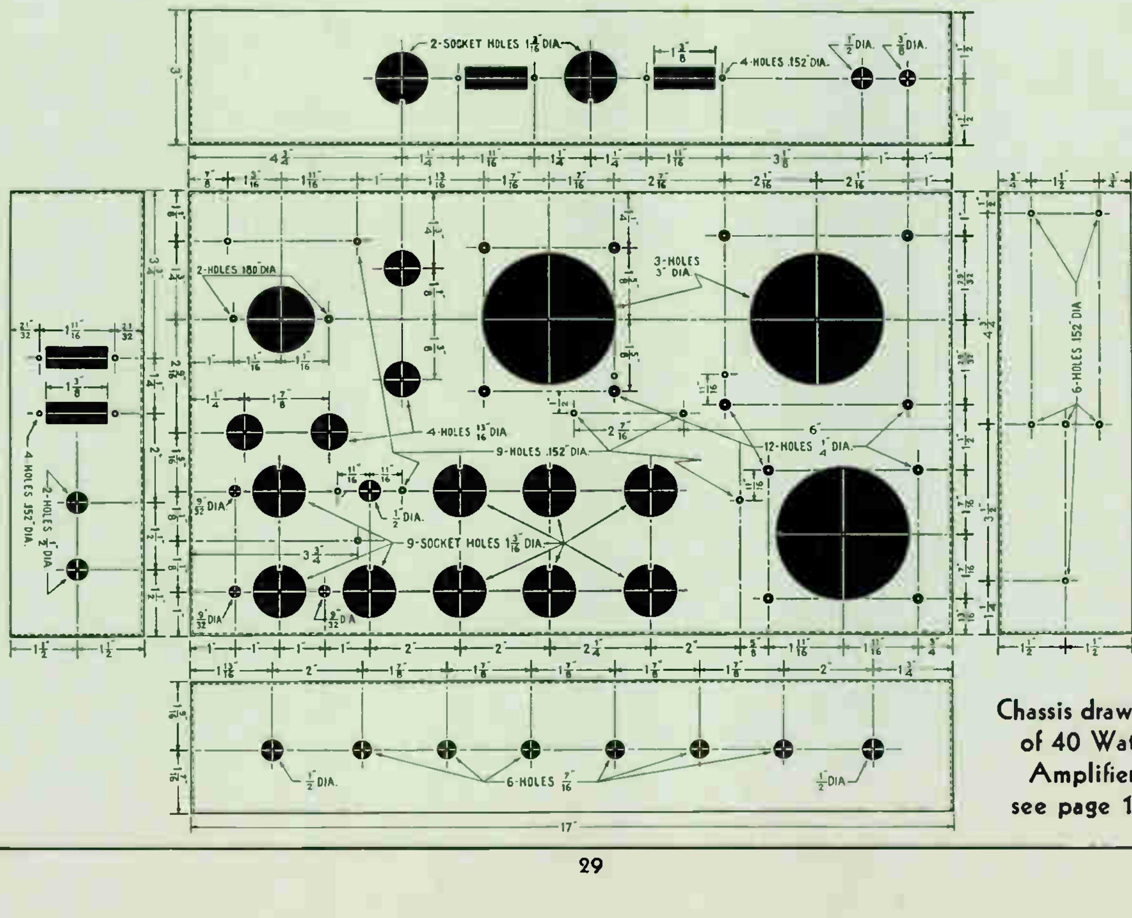
# CHASSIS DRAWINGS — 25 and 40 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**

THORDARSON



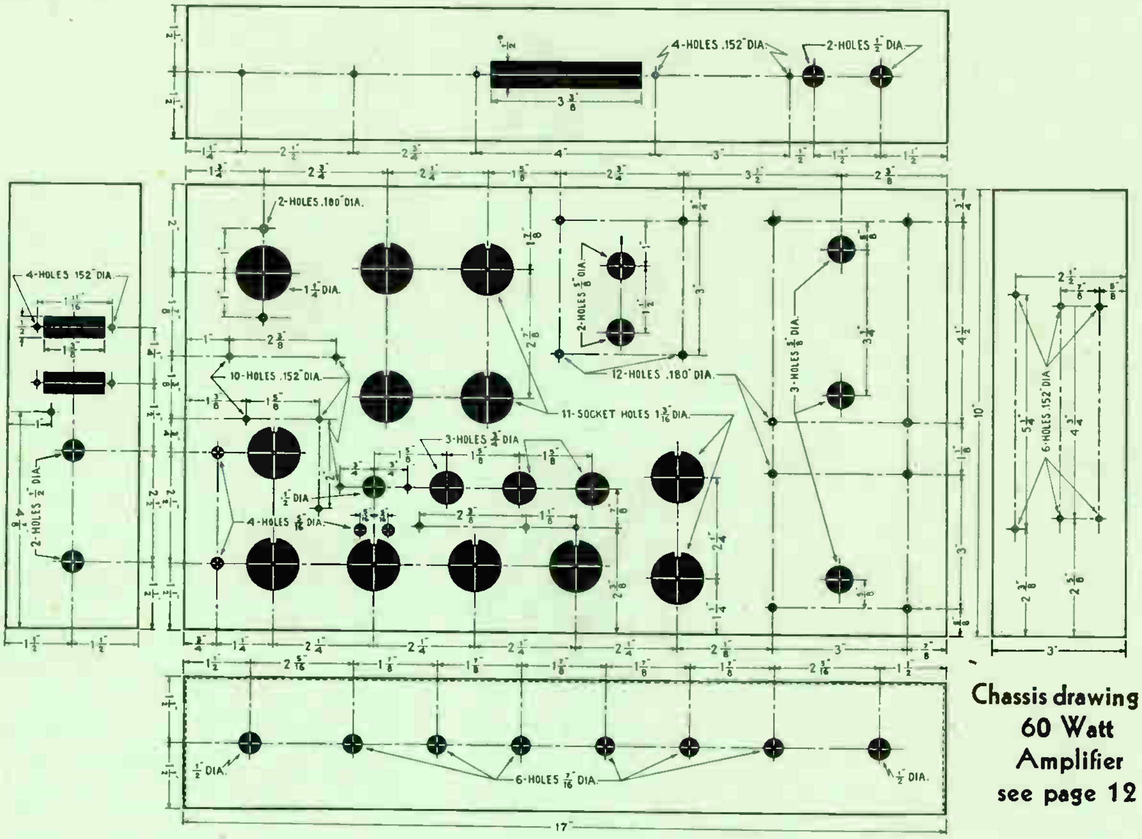

Chassis drawing of 25 Watt Amplifier see page 8



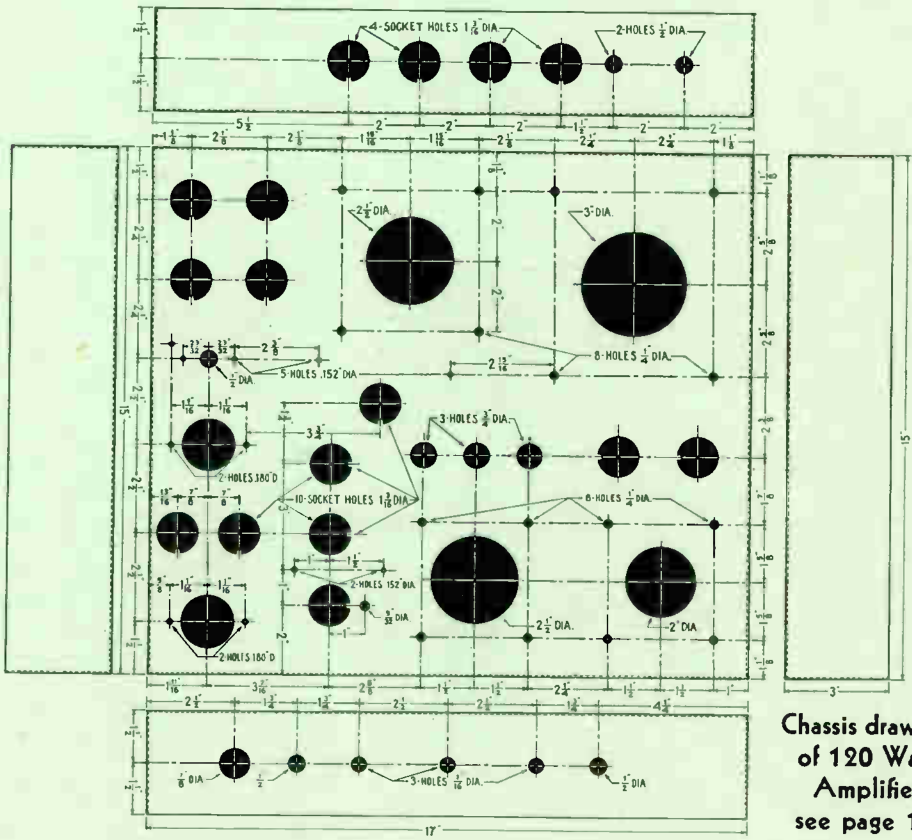

Chassis drawing of 40 Watt Amplifier see page 10

# CHASSIS DRAWINGS — 60 and 120 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**




Chassis drawing of 60 Watt Amplifier see page 12




Chassis drawing of 120 Watt Amplifier see page 14

# TESTING AMPLIFIERS

Practically nothing is said concerning the testing of amplifiers in the constructional articles in this guide. This subject is too broad to be covered in such limited space. The following ideas and suggestions will be of great help to the Sound Man who builds or repairs his own amplifiers. They are the results of long experience in the laboratory and in answering letters on this subject from our many friends and customers.

There are certain basic test instruments that should be available to every sound man and certain routines in their use that should be known and followed, if the full benefit is to be secured from them. These instruments include a good audio oscillator, a cathode ray oscilloscope, a selection of 50 or 75 watt resistors with values of 500 ohms or equal to output impedances to be used (these are to be used as substitute voice coil and line loads when measuring the output of an amplifier), and a vacuum tube voltmeter with a high range. For accurate overall gain measurements an accurate micro-volt meter is needed to measure the audio voltage applied to the input of the amplifier, and an output meter with no frequency discrimination.

## CHECKING HUM

One of the first problems encountered by the constructor is the elimination of Hum from an amplifier. The oscilloscope is very useful in determining the frequency of the Hum, its location, and when it has been reduced to a negligible quantity.


FIG.-1

To determine the frequency of HUM, feed a portion of the output of the amplifier to the vertical input of the oscilloscope. Turn the sweep selector switch to "60 cycle". A 120 cycle HUM will produce some form of a figure eight on the screen of the cathode ray tube as shown in Fig. 1. This indicates that the hum is coming through the power supply circuit, and is caused by lack of filtering or isolation of the different stages. On the other hand, a 60 cycle HUM, usually picked up by induction in the wiring, transformers or chokes will produce some form of circle — no crossing of lines. (Fig. 1).

The best procedure in checking HUM is to pull all tubes but the outputs and clear up any HUM that originates in that stage. Next insert the correct tubes and proceed to the driver stage, the interstage and the inputs successively. It will usually be found that HUM is picked up most often in the input stages. For this reason they must be well shielded. Notice that the resistors and leads associated with this portion of the circuit are always shown as being shielded in the diagrams. This is important in the elimination of HUM and cross talk between inputs. Such simple things as the placement of leads, transformers, tone control chokes, etc., will affect the amount of HUM present in the amplifier. Any defective condensers in the filter circuit will usually be shown at the first of the test and of course should be replaced with perfect units.

On the oscilloscope the height of the image on the screen is a measure of the amount of HUM. This is shown in Fig. 1 as the distance "a" — "b". Note: This height is affected by the voice coil impedance across which the tests are made. The greater the impedance, the easier it is to detect HUM on the oscilloscope. The ear will of course tell when HUM is no longer noticeable, but will not aid sufficiently in the location and elimination of the source. Tube hiss, which will appear after a gain of approximately 100 db has been reached, should not be confused with HUM.

## OSCILLATION

Another source of trouble, especially in modern high gain amplifiers and those using an inverse feedback circuit, is parasitic oscillation.

If the transformers shown on the parts lists in this guide are used, and the circuit diagrams and various constants are followed, there can be but one main reason for oscillations. This is the reversal of the tertiary winding of the output transformers. All other sources of oscillation have been carefully eliminated.

The following suggestions for the curing of oscillation are given for the benefit of those building their own amplifiers from parts other than those recommended in this guide.

1. Complete shielding of the entire wiring of the final stage including the tertiary center tap.
2. Insert a 200 ohm ½ watt resistor in each output tube grid lead.
3. Connect .001 Mfd., or smaller, condensers from the output stage grid leads to ground, or the junction of the above mentioned 200 ohm resistors to ground.

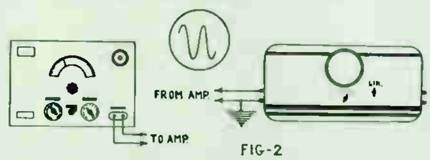



FIG-2

4. Connect a by-bass condenser across the self bias resistor.
5. Connect a 25 ohm 10 watt resistor in series with each plate of push-pull parallel output tubes.
6. Insert 10,000 ohm or larger resistors across each half of the secondary of the driver transformer.
7. Connect a resistor across the total secondary of the driver transformer, the value to be as high as possible and still stop the oscillations.

A simple test procedure for the source of oscillation is as follows: First, reverse the tertiary winding of the output transformer. Second, remove the inverse feedback system entirely to make certain this part of the circuit is or is not responsible. Third, try the various circuit changes as previously outlined.

## DISTORTION MEASUREMENTS

The most popular way to check the distortion in an amplifier is shown in Fig. 2. The output of the amplifier is fed to the vertical input of the scope and an audio signal with a sine wave characteristic is fed to the input of the amplifier. Since a sine wave is uniform, any deviation from it is easily recognized.

It is not possible to distinguish distortion on the oscilloscope below 5 or 6 per cent. The only distortion which may be readily seen with this method is the flat top wave. This flat top may be caused by operating into the curved portion of the tube characteristic in the case of triodes or by using too high a plate load in the case of a pentode. Driving a class A or AB power stage so heavily as to draw grid current will also cause this form of distortion.

Where distortion is present the leads from the vertical input of the oscilloscope should be moved to the output and input of each successive stage, beginning with the final, until the defective one is located.

## OUTPUT MEASUREMENTS

Output measurements are usually taken across a resistor, substituted for the impedance which would usually be connected to the secondary. Use an accurate output meter when making these measurements. From the formula Power (Watts) equals $\frac{E^2}{R}$, it is then easy to compute the output of the amplifier.

An oscilloscope is almost a necessity in measuring power output if usable output is to be considered. Most amplifiers are capable of considerably higher output than their usual rating but with high distortion. An output with a maximum distortion of less than 8% is all that is really useful.

Connect the vertical input of the oscilloscope across the same load resistor that is used for the output voltage measurements. Increase the output, through the use of the gain control, until the sine wave form begins to distort. Back the gain down until no noticeable distortion is present, then take the output voltage reading. The oscilloscope will begin to show distortion when about 6% is present.

A point often forgotten is that an amplifier passes many frequencies, thus the watts output should be fairly constant over the entire frequency range if the amplifier has any quality at all. An amplifier with 25 watts output at 400 cycles should also deliver 25 watts with no noticeable distortion at 50 c.p.s. and to at least 8,000 c.p.s. These measurements are not possible unless the laboratory equipment previously mentioned is available.

## OVERALL GAIN

No rating can be so abused as the db gain of an amplifier. This is true because of the nature of the measurements involved. The decibel is a unit of power measurement so the resistance across which the voltage measurements are computed will influence the mathematical, not the actual, result.

To compute the overall gain, a carefully measured input voltage is applied to the input of the amplifier and the output voltage measured. The gain is figured in decibels through the use of the formula db = 10 log. $\frac{Po}{Pi}$, where Po is the power output and Pi is the power input.

The output voltage is usually read across the load resistor mentioned at the beginning of this article. The input voltage is fed into the regular input, which is usually a 5 megohm resistor.

It is this input resistor that can play havoc with the gain measurements. Although its value is 5 megohm, purposely a large value to prevent loading of the microphone, such a value is never encountered as an actual grid load. When shunted by the microphone or other input source the resultant impedance is much less. For this reason the secondary impedance of the usual transformer, 100,000 ohms, is the generally accepted figure used in gain computations. An actual input impedance of 5 megohms would obviously ruin the high frequency response of the stage involved. The calculated db gain will be less with 100,000 ohms but it will be more indicative of the usable gain. You will notice that in the technical data on each amplifier in this guide the figure of 100,000 ohms is given as the value used. Without this statement the db value would be meaningless. ***Always state the constants used when speaking of db gain.*** Although a higher db gain will be shown by using a value of 5 megohms rather than 100,000 ohms in the computations, the actual gain from microphone to speaker will be the same under either condition.

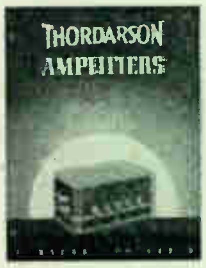
# THORDARSON AMPLIFIERS

*Factory Built — Laboratory Tested*

Model T-25W30

**"Built for Audio Experts by Audio Experts"**

Model T-25W28

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The finest amplifiers are built by Thordarson — pioneers in producing quality audio components. Absolute fidelity is insured by accurate laboratory design and rigid inspection during production. New models from 8 to 75 watts undistorted output satisfy practically every sound requirement. A 28 watt universal amplifier with built-in record-player operates from either 6 volt battery or 115 volts a.c.

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## GUIDES AND MANUALS


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***Replacement Transformer Encyclopedia, No. 243, and Supplement, No. 243-S. Free*** — Complete information regarding correct choke, audio and power transformer replacements. Covers almost 6000 receivers as listed in Rider's Manuals, Volumes I to VIII. Includes data on AC, AC-DC and battery models. This is the only complete listing available and will save valuable time for the serviceman. You cannot afford to be without a copy. Ask your distributor for a copy.

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# THORDARSON ELECTRIC MFG. CO.

**500 W. Huron Street** **Chicago, Illinois**

39725

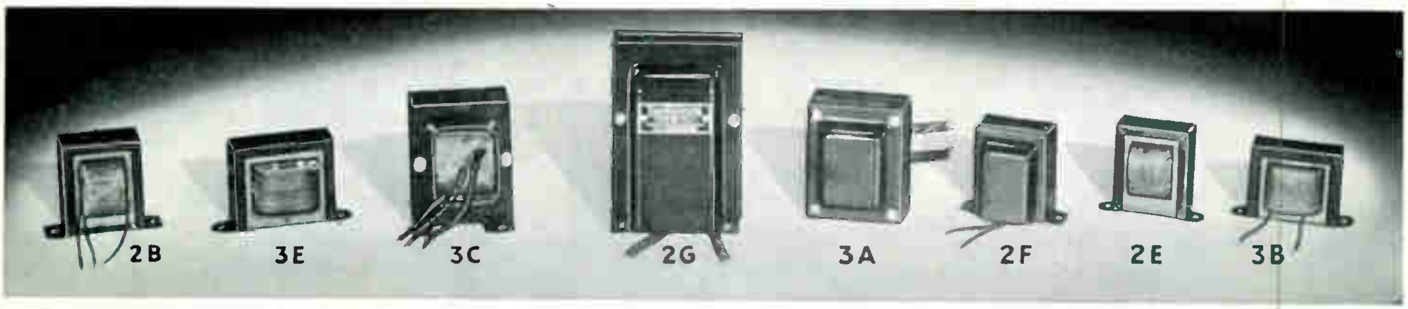
Printed in U. S. A.

# REPLACEMENT TRANSFORMER ENCYCLOPEDIA

## for Service Engineers

**THORDARSON ELECTRIC MFG. CO.**
**500 W. HURON ST., CHICAGO, ILL.**
*Transformer Specialists Since 1895*

No. 352 F




MODERN conditions call for fast and accurate service. Your time and your customer's convenience and good will are valuable. The successful radio service engineer keeps a small stock of replacement transformers on hand to meet his requirements without delay. Thordarson does its part by having a complete line of replacement types for practically all receivers. The most popular types are listed below with full electrical and physical characteristics for your convenience. These transformers are recommended in the pages of this encyclopedia which has been compiled by Thordarson engineers to assist you in the proper selection of Power Transformers, Filter Chokes, Audio and Output Transformers. Types are listed below in numerical order for easy reference.

The Encyclopedia is larger than ever before and the receiver types have been carefully arranged to enable you to quickly find your model. KEEP THIS BOOK IN A HANDY REFERENCE SPOT — you will find it invaluable.

## AUDIO TRANSFORMERS

For coupling the plate or plates of an amplifier stage to the grid or grids of the next stage where grid current is not drawn.

| Type No. | Classification | Turns Ratio | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13A34 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2⅜ | | 2 13/16 | 1⅝ | 1⅝ | ¾ |
| T-13A35 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2⅜ | | 2 13/16 | 1⅝ | 1⅝ | ¾ |
| T-13A36 | RECEIVER (midget) | 1:1 | 20,000 | 20,000 | 8† | 3B | 2 11/16 | | 3 | 1¾ | 2 | 1 |
| T-29A99 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2⅜ | | 2⅞ | 2 | 2⅜ | 1¼ |
| T-33A91 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2⅜ | | 2⅞ | 2 | 2⅜ | 1¼ |
| T-57A38 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |
| T-57A41 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |
| T-57A42 | RECEIVER (large) | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 15/16 | | 3⅜ | 2⅛ | 3 | 2 |
| For coupling screen grid or power detector (Clarion AC-60). | | | | | | | | | | | | |
| T-58A70 | AMPLIFIER Has split Secondary. | 1.5:1 | 20,000 | 45,000 | 10† | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |
| T-67A91 | AMPLIFIER | 1.5:1 | 20,000 | 45,000 | 10† | 2B | 2 15/16 | | 3⅜ | 2⅛ | 3 | 2 |
| T-74A31 | AMPLIFIER | 1:1 | 10,000 | 10,000 | 8 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |

## DRIVER TRANSFORMERS

For coupling the plate or plates to the grids of an amplifier stage in which grid current is drawn during a part of the audio cycle.

| Type No. | Driver Tubes | Output Tubes | Class | Ratio Pri. to ½ Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-17D01 | 1-6F6 Triode<br>1-42 Triode, 1-2A5 Triode | 2-6F6, 6L6, etc. | AB | 1.7:1<br>1.5:1, 1.3:1 | 31 | 3B | 2⅞ | | 3 3/16 | 2 | 2 | 1½ |
| T-67D47 | 1-6N7, 6A6, 53 | 1-6N7, 6A6, 53 | B | 5.25:1 | 10 | 2F | 2⅜ | | 2¾ | 2⅛ | 2⅜ | 1½ |
| T-67D50 | 1-89 Triode | 1-79 | B | 2:1 | 32 | 2F | 2⅜ | | 2¾ | 2⅛ | 2⅜ | 1½ |
| T-67D78 | 1-46. 59. 6F6,<br>42, 2A5 Triode | 2-46, 59<br>2-6L6 | B<br>AB2 | 2.2:1 | 32 | 2F | 2 15/16 | | 3⅛ | 2½ | 3 | 2¼ |
| T-74D32 | 2-6C5, 76, 56 | 2-6F6, 42, 2A5<br>4-2A3, 6B4G | AB2<br>AB | 3:1 | 10 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |
| T-78D46 | 1-30 | 1-1J6G, 19<br>2-30 | B<br>B | 2.4:1 | 7 | 2B | 2⅛ | | 2 9/16 | 1⅝ | 2 | ¾ |
| T-81D42 | 1-6F6 Triode<br>1-42 Triode<br>1-2A5 Triode | 2-6F6 Triode<br>2-42 or<br>2-2A5 Pentode | AB2<br>AB2<br>AB2 | 1.7:1<br>1.5:1<br>1.3:1 | 31 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |
| T-81D52 | 1-6C5, 76<br>1-56 | 2-6F6 Triode<br>2-42, 2A5 Triode | AB<br>AB | 1.82:1<br>1.67:1 | 8 | 2F | 2 15/16 | | 3⅜ | 2½ | 3 | 2¼ |

## OUTPUT TRANSFORMERS

| Type No. | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13S37 | 1-6F6, 42, 2A5, 47 | A | 7,000 | 1/2/4 | 36 | 5 | 3E | 2 | | 2⅜ | 1⅜ | 1⅜ | ½ |
| T-13S38 | Universal<br>Single or<br>P-P Tubes | A | 4,000/7,000<br>8,000/10,000<br>14,000 Ct. | Adjustable<br>.1 to 29 | 36 | 8 | 3E | 2⅜ | | 2 13/16 | 1⅝ | 1⅝ | ¾ |
| T-13S40 | 2-6F6, 42 P-P 2-2A5, 47 P-P | A.A | 14,000 Ct. | 1/2/4 | 40 | 10 | 3E | 2⅜ | | 2 13/16 | 1⅝ | 1⅝ | ¾ |
| T-13S41 | Universal<br>P-P<br>Tubes | A | 3,000/5,000<br>6,600/7,000<br>8,000/10,000 | Adjustable<br>.1 to 29 | 60 | 20 | 2E | 2 15/16 | | 3⅜ | 2⅛ | 3 | 2¼ |

## OUTPUT TRANSFORMERS (Continued)

| Type No. | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13S42 | Universal Single Tube | A | 1,500/2,000 4,000/5,000 7,000 | Adjustable .1 to 29 | 55 | 10 | 3E | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13S43 | 1-1F4, 1D4, 1F5G | A | 16,000 | 1/2/4 | 10 | 5 | 3E | 2 | | 2 3/8 | 1 1/4 | 1 3/8 | 1/2 |
| T-14S81 | 1-42, 2A5, 6F6 or P-P 45, 71 | A | 7,000 Ct. | 3 to 6 | 40 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S82 | 1-25L6 | A | 1,500 | 3 to 6 | 55 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S83 | 1A5-G, 1E7-G | A | 25,000 Ct. | 3 to 6 | 8 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S84 | 1-1C5G, 1Q5G | A | 8,000 | 3 to 6 | 10 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S85 | Universal Single or P-P Tubes | A | 4,000/7,000 8,000/10,000 14,000 Ct. | Adjustable .1 to 29 | 36 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-17S10 | 1-6LG | A | 2,500 | 2/4/8/500 | 80 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-17S12 | 2-6L6 P-P (with 300V on plate and screen) | AB1 | 4,300* | 4/8/15/250/500 | 95 | 25 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-17S13 | 2-6L6 P-P | AB1 | 6,600* | 4/8/15/250/500 | 80 | 34 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/2 |
| T-17S14 | 2-6L6 P-P | AB2 | 5,500* | 4/8/15/250/500 | 90 | 40 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/4 |
| T-17S15 | 4-6L6 P-P Par. | AB1 | 3,300* | 4/8/15/250/500 | 155 | 60 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-17S16 | 4-6L6 P-P Par. | AB2 | 1,900* | 84/100/125/166/ 250/500 | 230 | 120 | 2G | 3 | 4 1/4 | 3 3/4 | 5 | 4 15/16 | 14 1/4 |
| T-57S01* T-57S02† | Universal Single or P-P Tubes | A | 4,000/7,000 8,000/10,000 14,000 Ct. | Adjustable .1 to 29 | 36 | 8 | 2E 2B | 2 3/8 2 3/8 | | 2 7/8 2 7/8 | 2 2 | 2 3/8 2 3/8 | 1 1/4 1 1/4 |
| T-58S72 | 2-2A3, 6B4G P-P 2-48, 25L6 P-P | AB A | 3,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/4 |
| T-65S94 | 2-50 P-P 2-6F6, 42, 2A5 P-P | A AB2 | 8,000 | 4/8/15/500 | 55 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S48 | 2-45, 71, 43, 25A6 P-P 1-6N7, 6A6, 53 P-P | A B | 8,000 | 4/8/15/500 | 36 | 25 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S51 | 2-6F6, 42, 2A5, 47 P-P | A | 14,000 | 4/8/15/500 | 40 | 20 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S52 | 2-46, 59 P-P 2-6F6, 42, 2A5 P-P 2-6N7, 6A6, 53 P-P Par. | B AB2 B | 5,800 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S54 | 2-6L6 P-P 2-2A3, 6B4G, 45 P-P | A AB | 5,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S92 | 4-2A3, 6B4G, 45 P-P Par. 4-48, 25L6, P-P Par. | AB A | 1,500 | 4/8/15/500 | 80 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-75S75 | 2-6F6, 42 or 2A5 1-6N7, 6A6, 53 P-P 2-6N6G, 6B5, 2B6, 6AC5 P-P | AB2 B A | 10,000 | 4/8/15/500 | 45 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-81S01 | 1-19, 1J6G, 1G6G P-P 2-30, 49 P-P | B B | 10,000 Ct. | 2/4/8 | 15 | 8 | 2B | 2 1/8 | | 2 9/16 | 1 5/8 | 2 | 3/4 |

* 10% Feedback Winding

## CHOKES

| Type No. | Inductance At Zero D.C. | Inductance At Rated D.C. | Current Rating M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13C26 | 21 | 8 | 40 | 530 | 1600 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-13C27 | 22 | 10 | 40 | 475 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13C28 | 20 | 10 | 65 | 460 | 1600 | 3B | 2 11/16 | | 3 | 1 3/4 | 2 | 1 |
| T-13C29 | 20 | 9 | 85 | 250 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-13C30 | 25 | 8 | 150 | 200 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 1/4 |
| T-14C61 | 14 | 7 | 55 | 200 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-14C62 | 16 | 8 | 55 | 250 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-14C63 | 19 | 8 | 55 | 300 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-18C92 | 37.8 | 18 | 35 | 405 | 1100 | 3B | 2 7/8 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-29C27 | 800 | 500 | .5 | 6150 | 1600 | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| T-44C02 | 31 | 12 | 80 | 405 | 1600 | 3B | 2 7/8 | | 3 3/16 | 2 | 2 | 1 1/4 |
| T-47C07 | 20 | 12 | 75 | 410 | 1600 | 3B | 3 1/8 | | 3 5/8 | 1 7/8 | 2 1/4 | 1 1/4 |
| T-52C98 | | | .5 | 6150 | 1600 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| T-57C54 | 27 | 10 | 110 | 200 | 1600 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67C49 | 12 | 5 | 200 | 80 | 1600 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 3/4 |
| T-68C08 | | | 35 | 405 | 1600 | 2F | 2 3/8 | | 2 3/4 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-74C29 | 29 | 15 | 150 | 200 | 2000 | 2G | 2 11/16 | 2 9/16 | 3 3/8 | 3 3/8 | 4 5/8 | 5 1/4 |
| T-74C30 | | | 15 | 2100 | | 3B | 2 11/16 | | 2 | 1 1/2 | 2 3/8 | 1 |
| T-75C49 | 22 | 8 | 120 | 290 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-75C51 | 24 | 13 | 250 | 121 | 1600 | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 15/16 | 8 |

POWER TRANSFORMERS LISTED ON PAGE 29.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **AIRLINE** (See Montgomery Ward) | | | | | | |
| **ALL AMERICAN MOHAWK CORP.** (See also Wurlitzer) | | | | | | |
| D, K | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| J | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C-6, Studio | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | §Special |
| S-6 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-7, S-8*, SW-8 | T-13R04 | ☆ | ☆ | ☆ | *T-33A91 | T-57S01 |
| S-10 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| S-40 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-50, S-63, SA-65, SW-80 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60, 61, 62, 65, 66 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| 80, 83, 84, 85, 86, 88 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| S-80 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| SA-90, SA-91, | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| SA-110 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-13S41 |
| SA-130 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 226, 227 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-57S01 |
| **ANDREA** | | | | | | |
| 1C5, 2C5, 510, 511, C5L, C5S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1D7, 2D7, 3D7, 4D7, 5D7, 6D7, 7D7, 8D7, ch. D7L, D7S | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1D8, 2D8, 3D8, 4D8, 5D8, 6D8, 7D8, 8D8, D8L, D8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1D10, 2D10, 3D10, 4D10, 5D10, 6D10, 7D10, 8D10, 9D10, 10D10, D10L, D10S | T-13R14 | T-75C49 | ☆ | ☆ | ☆ | T-57S01 |
| 1E6, 2E6, PE6L, PE6S, PE66L, PE66S, 11E6, 12E6, 14E6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1E8, 2E8, 3E8, 4E8, 5E8, 6E8, 7E8, 8E8, 9E8, 10E8, PE8L, PE8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 2A5, 5A5, 6A5, ch. A5L, A5S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2B6, 3B6, 4B6, ch. B6L, B6S | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2B8, B8L, B8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2D5, 3D5, 4D5, 6D5, 8D5, D5L, D5S, PD5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3A7, ch. A7L | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3E11, 4E11, 5E11, 6E11, 7E11, 8E11, 9E11, 10E11, PE11L PE11S | T-13R14 | T-75C49 | ☆ | ☆ | ☆ | T-57S01 |
| B4, B4L, 400, 401 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C6B | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| E6B, 626, 627, 628 | T-14R35 | T-14C63 | ☆ | ☆ | ☆ | T-14S82 |
| **APEX** (See U. S. Radio and Television) | | | | | | |
| **ATWATER KENT MFG. CO.** | | | | | | |
| 43 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 55, 55C Early | T-13R05 | T-13C29 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 55 Late, 60, 60C, 70, 74, 76, L-1, L-2, F, P | T-13R04 | T-13C29 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| **ATWATER KENT MFG. CO.** (Contd) | | | | | | |
| 72, H-1 | T-13R06 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 80 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 83, 84 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85, 86, 87 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 89, 89P | T-56R05 | T-13C30 | T-13C27 | ☆ | §Special | T-57S01 |
| 90, 92, 94 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96 | T-13R04 | T-13C30 | §Special | ☆ | ☆ | T-57S01 |
| 99, 99P | T-56R05 | T-13C30 | T-13C27 | ☆ | §Special | T-57S01 |
| 145, 165 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 168 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 184, 184X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 185, 185A, 186 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 188, 228 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206, 217, 236, 246, 266, 286, 356, 376 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 208 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| P216, P236 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E248 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 255 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 310 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 312 | T-13R09 | T-74C29 | ☆ | T-33A91 | T-13A36 | T-13S41 |
| 317 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 325 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 328, 337 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E412, E412X, P412, P412X | T-13R09 | T-74C29 | ☆ | T-33A91 | T-13A36 | T-13S41 |
| 427 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 435 1st and 2nd | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 447 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 448 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 475 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 487 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 509 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 525 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 545 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 558 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 559 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 567 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-608 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 627 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E648, 649 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 667, 708, 788, 808, 808A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 710 | T-13R09 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 725, P755 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 735 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810 | T-13R14 | T-13C30 | ☆ | ☆ | T-81D42 | T-13S41 |
| 856, P875, 976 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 944 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**For complete description of these and other Thordarson transformers and chokes see catalog No. 400.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **AUDIOLA RADIO CO. (See also Fairbanks, Morse)** | | | | | | |
| 4T-31, 4T-32 6T Jr., 6T-31...... | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7T, 8T, 9T........ | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9T-45............ | T-13R06 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 10T Super......... | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 13T-5............ | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 13S-9............ | T-13R06 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 23T-5, 23T-5-SW 23S-8............ | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-8Q........... | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-10........... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-12........... | T-13R04 | T-75C51 | ☆ | ☆ | T-67D47 | T-57S01 |
| 30B, 31 Super...... | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 33S-10........... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 889.............. | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 7330............. | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 8430............. | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| **BALKEIT RADIO CO.** | | | | | | |
| A-3, A-5, A-7...... | T-13R00 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| C................ | T-13R06 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| D-5.............. | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E................ | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| F................ | T-13R06 | T-13C30 | ☆ | ☆ | T-29A99 | §Special |
| KP............... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-7.............. | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-8, Windsor 70.... | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| G-18A, G-19B..... | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| GT-20........... | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 41A.............. | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 42-E, 42-G........ | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60, 70........... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100.............. | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| GT-200-X......... | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| **BELMONT RADIO CORP.** | | | | | | |
| 40, 50, 50A-B-C, 60 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40A.............. | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70............... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70A.............. | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71C.............. | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100.............. | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 401.............. | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 401B............. | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 408A............. | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 504A............. | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 517A, 526, 529..... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 489A-B........... | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 527, 529.......... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550.............. | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555, 556, 578....... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575.............. | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 577.............. | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **BELMONT RADIO CORP. (Contd)** | | | | | | |
| 582 A & B, 583, 585 A-B-C, 586, 587, 588A, 589A........ | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 611.............. | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 629.............. | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640.............. | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 665.............. | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675.............. | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 685, 686.......... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 708.............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 740, 777 B-C....... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 746, 755, 777A..... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750.............. | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 761.............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 775.............. | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 778.............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 786.............. | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 787A............. | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 823.............. | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 840, 842, 860....... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 867.............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 878A............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 879A............. | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 888, 889.......... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 890A............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050............. | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1070, 1170, 1171, 1172, 1174, 1175.... | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1075............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **BOSCH (See United American Bosch)** | | | | | | |
| **BRETING RADIO MFG. CO.** | | | | | | |
| Breting 14 ........ | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-75S75 |
| **BRUNSWICK RADIO CORP.** | | | | | | |
| D................ | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-1.............. | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 2-KRO, 3-KRO, 3-KR6, 5-KR, 5-KRO, 5-KR6..... | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 3-NC8, 5-NC8..... | T-13R00 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 10............... | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 11, 12, 16, 18, 33... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14, 21, 31.......... | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| S-14, S-21, S-31.... | T-13R06 | §Special | ☆ | ☆ | T-33A91 | T-57S01 |
| 15, 22, 32, 42...... | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 17, 24, 25.......... | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| PR17-8........... | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| S-81, S-82......... | T-13R06 | §Special | ☆ | ☆ | T-33A91 | T-57S01 |
| **BULOVA WATCH CO.** | | | | | | |
| M-501........... | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 600, 601, 605, 610.. | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| M-701........... | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-751............ | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **BUSH AND LANE PIANO COMPANY** | | | | | | |
| 10 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 12 SG | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| **CLARION (See Transformer Corp. of America)** | | | | | | |
| **COLONIAL RADIO CORPORATION** | | | | | | |
| 31AC | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 32AC | T-13R06 | T-13C30 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| 32DC, 33DC | ☆ | T-18C92 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 33, 34 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36, 36P | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 37, 37P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38 | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 39 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 41, 42 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 44 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47, 48 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 49 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 52 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 114, 117 | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 125 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250AC, 300AC, T345 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T397 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C399 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C495 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C595 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600, 600A, 603 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 601 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 604, 605 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650, 653 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 652 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 656 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 658 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 662 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C695 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **COLUMBIA PHONOGRAPH COMPANY** | | | | | | |
| C-1, C-2, C-4 | T-56R01 | T-13C29 | T-13C28 | T-29A99 | T-29A99 | T-18C92 |
| C-25-31, C-25-32 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-31, C-32 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 31, 33 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 32, 34 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| C-80 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| C-101 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-102 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-800 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 920 | T-13R06 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 930 | T-13R07 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 990 | T-13R06 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **CONTINENTAL RADIO & TELEVISION CORP.** | | | | | | |
| AM4 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| AM7 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AM8-RF | T-13R19 | T-13C26 | ☆ | ☆ | ☆ | ☆ |
| M1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L2 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| Z2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L4, ML4, L5 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 5A, 5AZ, 5B, 5F, 5G, 5M, 5VU, 5X, 5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6G, 6K, 6W | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L6 | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 6PU | T-14R33 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| 7C, 7H, 7C-PH, 7H-PH | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7G | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7M, 7MU, X8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8G | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8K, 9G | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 11B, 11B-PH | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16R | T-13R14 | §Special | ☆ | ☆ | ☆ | T-13S41 |
| A31 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 137X, 150X, 171X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150-5Z, 155-5Z, Chassis 5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ML-156 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 160-5X, 165-6W | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ML-266 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 975-6W, 980-5X | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 985-5Z, 990-5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **CROSLEY RADIO CORP.** | | | | | | |
| 5M3, 5V2 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6H3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 30S, 31S, 33S, 34S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 40S, 41S, 42S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 41, 41A, 42 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 48 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50, 50LB, (5H1) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53, 54, 57, 58, 59AC | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72, 72LB, (7H2) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72, 72LB, (7H3) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 77-1, 77A-B-L | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80AW, 8H1 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 82S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 84C, 84D | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 120 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 121 A-B | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 122 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 123, 124, 124-1 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **CROSLEY RADIO CORP.** (Contd) | | | | | | |
| 125 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 127, 127-1 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 129, 129-1 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 130, 130-1 | T-13R18 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 131 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 133, 134 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 134-1 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 135 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 136-1 | T-13R09 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 137, 141 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 147 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 148, 150, 154 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 157 | T-13R18 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 158 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 160, 161, 164 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 167 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 167 series 2, 168 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 169 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 170, 171 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 175 | T-13R07 | T-13C30 | ☆ | ☆ | ☆ | §Special |
| 179 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 180 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 181 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 184 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 438 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 505, 515, 516 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 507 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 517 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 525 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 526 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 534 | T-13R12 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 537 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 547 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555 | T-13R12 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 567 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 614, 616, 626 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 628 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 635, 636 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 637, 638 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 639 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 646 | ☆ | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 655, 656, 666 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 668 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 704, 706 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | ☆ |
| 714, 715, 716 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 718 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 725 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 726, 736 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 758 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 804 | T-13R00 | T-13C30 | ☆ | T-29A99 | T-33A91 | ☆ |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **CROSLEY RADIO CORP.** (Contd) | | | | | | |
| 814 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 815 | ☆ | ☆ | ☆ | T-29A99 | T-78D46 | T-81S01 |
| 816 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| 817 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 818 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 828 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T 57S01 |
| 855, 865 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 915 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 916 | T-13R13 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 926 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 955 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1014 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1016, 1026 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1055 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 1117 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1126 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1155 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 1216, 1336 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| 5515, 5516, 5526 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5555, 5556, 5656 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5628 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5666, 6516, 6625 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **DELCO RADIO** (See United Motors Service) | | | | | | |
| **DETROLA RADIO & TELEVISION CORP.** | | | | | | |
| 4J | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5B, 5D, 5W, 5X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6ZM | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7A, 7ZM | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 10ZM | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 106 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 108, 146 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 147 series | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 155X, 165 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 163 | T-13R15 | ☆ | ☆ | ☆ | ☆ | §Special |
| 178 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 184 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 258, 259 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 276 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 315, 325 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 326 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 503 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1900 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **THOMAS A. EDISON, INC.** | | | | | | |
| C4, R4, R5 | T-56R05 | T-13C30 | ☆ | T-29A99 | T-58A70 | T-57S01 |
| R6, R7 | T-56R05 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| E-175, Abbey Jr. | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29A99 | §Special |
| **EMERSON RADIO & PHONOGRAPH CORP.** | | | | | | |
| CS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F | T-13R06 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| JS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **EMERSON RADIO & PHONOGRAPH CORP. (Contd)** | | | | | | |
| KS | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T, TS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-AC-4 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-AC-5, M-AC-7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW7 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 23 (4B) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 26 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 28 (5J) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 34C (C6), 36 (B5) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39 (DS-5) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 45 (6-BD) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50L, 50M, S-50, D55 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW-55 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 65 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | §Special |
| 71 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 77 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 101 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 102 (A8), 102LW (B8), 104, 104LW | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 105 | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| K116 (K) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 116 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 117, L117, 117LW, Z117, (KS, Z) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 121, K121 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L122, L122LW, Z122 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K123 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L133, L133LW, Z133 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C134, C136, C138, C139, C140, D134, D136, D138, D139, D140, D142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D134LW, D136LW, D138LW, D139LW, D140LW, D142LW, D146LW | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| L135, L135LW, Z135 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L141, L141LW, Z141 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L143 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X143(X), X146 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S147, Z150, S151(S) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D146 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R152, R153, R156, R158 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Z159, Z160, AT170, (AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR171, AR172, AR173 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR174, AR176, AR180 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW171, AW173, AW174, AW176, AW180 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X175, X178, X183 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AB178, AB182, AB183, AB184 (AB) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **EMERSON RADIO & PHONOGRAPH CORP. (Contd)** | | | | | | |
| AT181, AR185 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW185 (AW) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R189 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AZ196 (AZ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BE198 (BE) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BL200, BL210 BL214(BL) AC202 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BL218, BL220 (BL) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BQ223 (BQ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BR224 (BR) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| BQ225, BQ228 (BQ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BR226, BS227, BR, BS | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| BU229, BU230, BU | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BW231 (BW) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| CB243 (CB) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 287 (DA) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| L755, M755, S755 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 770 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| **ERLA (See also Sentinel)** | | | | | | |
| Erla | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | ☆ |
| S. W. Converter | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR3 | T-13R07 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| A13 Amp. | T-13R05 | T-13C29 | T-74C30 | ☆ | T-29A99 | T-57S01 |
| 30 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 31, 32 | T-13R07 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 35, 37, 38, 39 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 61, 62, 63 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 75 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 77 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 81P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 224AC, 224B | T-13R06 | T-13C30 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 231 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 245 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 248K | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 271, 271A | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| 335 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5700, 5721 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6300, 6315, 6317, 6323 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **FADA RADIO & ELEC. CORP.** | | | | | | |
| 6A51 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6A65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6A80 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10, 11 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 16, 17, 20 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-33A91 | §Special |
| 25 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 30, 31 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 32 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-33A91 | §Special |
| 35 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 40 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |

**Thordarson Transformers for all applications are listed in catalog 400. Ask for your free copy.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **FADA RADIO & ELEC. CORP. (Contd)** | | | | | | |
| 41, 42, 43, 44 (KF) | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 45KU | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 46, 47, 48, 49KW | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 50 | T-13R00 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 51(KO), 53-55(RG) | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57(KOC), 61, 66, KX | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 64APC, 65PC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| A66T, A66PC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 66KY | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73 | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74, 76, 78 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 78-10 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 79 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 79 RC | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 79-10 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 83 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 85RE, 85RX | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 88, 89 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 97-10 (RW) | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 122 Batt. (KE) | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 126, 127, 128 NK | ☆ | ☆ | ☆ | T-29A99 | T-78D46 | T-81S01 |
| 133, 134, 135, 136 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 141 (NA) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150, 151, 152, 160 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 170 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| E180 | T-13R00 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 190 | T-13R13 | ☆ | ☆ | ☆ | §Special | ☆ |
| 211 AC | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 212 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 250 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 255, 265 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 270, 271(NF) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 290, 291, 312 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 365, 366, 366PT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 380 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 410 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 413 | T-13R14 | T-13C28 | ☆ | ☆ | ☆ | T-13S41 |
| 451, 454 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 465 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 472-CA, 472-UA | T-56R02 | ☆ | ☆ | T-29A99 | T-29A99 | ☆ |
| 475-CA, 475-UA | T-56R02 | ☆ | ☆ | T-29A99 | T-29A99 | ☆ |
| 761(KG), 762, 764, 766, 767 | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | ☆ |
| 1255, 1265 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1582, 1583 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| **FAIRBANKS MORSE & COMPANY** | | | | | | |
| 4A, 4B | T-14R39 | T-14C61 | ☆ | ☆ | ☆ | T-13S43 |
| 5A, 5B | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5C, 6A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C | §Special | T-13C27 | ☆ | ☆ | T-78D46 | T-81S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **FAIRBANKS MORSE & COMPANY (Contd)** | | | | | | |
| 7A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A, 9A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 9C | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12A, 12B | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 40 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 52, 53 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 54, 56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57, 57T0 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58(T1), 58(T2) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63, 66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70, 71 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72-C-2, 72-C-3, 72-T-3 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 73, 73C3B, 73T3B | §Special | T-13C27 | ☆ | ☆ | T-78D46 | T-81S01 |
| 82, 83, 84, 85 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 91, 91C4, 91C5, 91T4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 100, 110 | T-13R09 | T-13C30 | T-13C29 | ☆ | T-67D78 | T-13S41 |
| 5106, 5107, 5108 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5109, 5111, 5112 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5141, 5143 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5212, 5212A, 5241, 5312, 5312A, 5341 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6010, 6044, 7014 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7040, 7052 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **FREED RADIO & TELEVISION CORP.** | | | | | | |
| MB5 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| MB7 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| MB9 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 54 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 55NR | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | ☆ |
| 56 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 57NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 58–59 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 60NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 66 (NR) | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | ☆ |
| 72–74 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78NR, 79NR | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 80 NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | §Special |
| 90 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| NR90S | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 92 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 95NR | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 96DC | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 98FE | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 346-4 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 354-360-360X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **GALVIN MFG. CO. (MOTOROLA)** | | | | | | |
| 5T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-1, 5T-2, 5Y | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GALVIN MFG. CO. (MOTOROLA) (Contd)** | | | | | | |
| 5-1 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6-1, 6-A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T, 6Y, 6-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10-1, 10Y | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 59F1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 59K1, 59R2 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59R4 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59T2, 59T4, 59T5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61C, 61D | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61CA, 61DA | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 69K1 early & late | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 81C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **GAMBLE-SKOGMO, INC.** | | | | | | |
| 07A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2-ODM-578 | T-13R09 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 7J512-7J574 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20C7, 20C8 | T-13R09 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 30A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47LL, 47R, 47RL | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51C | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71C | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72 (CH, 8, 8X) 85 | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 425, 457 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510-511 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521Z | T-56R05 | T-57C54 | ☆ | ☆ | T-67D78 | T-13S41 |
| 525 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 527A, 527C | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550AC | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 578 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 585, 586A, 587A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600, 623, 645 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 648 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 665, 765 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675A, 685B | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 690B | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 735 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 740 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 761A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 762 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 767 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 770, 774 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 777C, 777L, 778A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GAMBLE-SKOGMO, INC. (Contd)** | | | | | | |
| 787 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 864, 867A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 907 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 908 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 970 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050 | T-13R07 | ☆ | ☆ | ☆ | T-81D52 | T-13S41 |
| 1070 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 2078D | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2516 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4954 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GAROD RADIO CORP.** | | | | | | |
| 2B2, 2B2-1 | T-14R39 | T-14C61 | ☆ | ☆ | T-78D46 | T-81S01 |
| 2B6, 2B6-1 | T-14R39 | T-14C61 | ☆ | ☆ | T-78D46 | T-81S01 |
| 25, 26, 27 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 49, 49M | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 73, 73LW | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205C, 205L | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205-1 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206C, 206L, 206P4 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206-1, 250 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 307, 307E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 309 series, 380 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 380D, 380KC | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 381, 381D | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 381KC | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 389 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 399 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 511A | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 511G, 511P | T-13R09 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 930 series | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 931 series | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1540 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3012 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 3016 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3109 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4012 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4016-4 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 4110 series | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5140 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GENERAL ELECTRIC CO.** | | | | | | |
| T-12, T-12E | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-22, S-22A, S-22X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-31 | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| H-32, T-41 | T-13R07 | ☆ | ☆ | ☆ | T-13A36 | T-57S01 |
| F-40 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-42, SZ-42P | T-13R07 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| G-50 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-50, K-50P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-50 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

Tropex transformers will stay put on those tough replacement jobs. See page 32.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL ELECTRIC CO. (Contd)** | | | | | | |
| H-51, H-51R | T-13R06 | ☆ | ☆ | ☆ | §Special | §Special |
| K-51, K-51P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-51, M-51A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-52, E-52, M-52 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-52 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-53, F-53, G-53 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-53, K-53M | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-54, K-54P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-55 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-55 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-55, M-56 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-56, G-57 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-60, K-60P | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-61 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-61, E-62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-62, KZ-62P | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-62 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-63, F-63 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-63 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-64 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-64 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-64 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-65, F-65 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-65, K-65P | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-65 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-66, F-66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-66 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-66, K-66M | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-66 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-67, M-67 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-68 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-68 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-68 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-69 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-69 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-70 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F-70 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-70 | T-13R04 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-71, E-72 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-71 | T-13R06 | ☆ | ☆ | ☆ | §Special | §Special |
| H-72 | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-72 | T-13R05 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| H73, H77, H78 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| F-74, A-75, F-75 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-75 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-75 | T-13R04 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-76 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-76 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F-77 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL ELECTRIC CO. (Contd)** | | | | | | |
| H-77, G-78 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-79 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-79 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-79 | T-13R04 | T-13C29 | ☆ | ☆ | §Special | T-13S41 |
| F-80 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| HM80 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| J-80, K-80, K-80X | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-81, F-81 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-81 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-82 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-82 | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| A-83 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| J-83, J-83A | T-13R05 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-85 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-85 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-85 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-85 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| M-85 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-86, F-86 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-86 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-86 | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| M-86 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-87 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| J-87, J-87A | T-13R05 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-88 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-88, K-88X | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| M-89 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-91 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| H-91, H-91R | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-96 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-99 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-100 | T-56R05 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| E-101, E-105 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| G-105, G-106 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| K-105 | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-106 | T-41187† | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| M-106 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| J-107, J-109 | T-56R05 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| K-107 | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-13S41 |
| H-116, H-118 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| A-125 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| GM-125 | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| M-125 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| M-128, M-128HR | T-13R07 | T-13C30 | ☆ | T-33A91 | §Special | T-13S41 |
| M-129 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| S-132 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| HM136 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GENERAL HOUSEHOLD UTILITIES CO.** | | | | | | |
| 450, (4A) 451 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460 (4B) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99. †$10.00 List. Order only from your distributor.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL HOUSEHOLD UTILITIES CO. (Contd)** | | | | | | |
| 461, 461X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470 (4C) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500 (5A) | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 532 (5H) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 542 (5J) 551 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 553, 555 (5L) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 560 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 564 (5R), 566 (5S) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570, 571 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 572, 573 (5Q) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 576 (5T), 578 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 580, 581 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 583 (5W), 585, 586 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 587 (5U), 589 (5P) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 599, 639 (6m) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 632 (6H) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640 (6J), 641 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 643 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650 (6A), 651 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 661, 662 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 663 (6E) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 664 (6N), 660 (6C) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 670 (6D), 671 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 680, 681 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 700 (7A), 701 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 723 (7M), 731 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 733, 735 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750, 751 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 752, 753 (7B), 755 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 760, 761 (7C) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 801 (8A) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 821 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 823 (8H), 831 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 833, 835 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 861 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 871 (8E) | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 901 (9A), 902 | T-13R08 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 941 (9E) | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1067 (10D) | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1091 (10G) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1151 (11A, 11B) 11 2 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1162 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1171 | T-13R15 | ☆ | ☆ | ☆ | T-81D52 | T-13S41 |
| 1191 (11G), 1191B | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1181 (11H), 1183, 1185 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1241 | T-13R15 | ☆ | ☆ | ☆ | T-81D52 | §Special |
| 1291, 1297 (12B) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1541 | T-13R16 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| **GENERAL MOTORS RADIO CORP.** | | | | | | |
| A | T-13R06 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| **GENERAL MOTORS RADIO CORP. (Contd)** | | | | | | |
| 25, 26, 27, 28, 43, 48 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 110 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 120, 130, 140 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| 180, 190, 211 (S9A, S9B) MA | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 216, 217, 219 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 220, (S10A, S10B) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251, (A2A, S2B) | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 252 (S3A, S3B) | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 253, 254, 255 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 257, 258 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 292, 293 (S4A, S4B) | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| A5003 | T-56R03 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| A5005 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 5065AC | T-56R01 | T-13C28 | T-13C28 | T-29A99 | T-29A99 | T-18C92 |
| 5069, 5080 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 5091 | T-56R03 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| **GILFILLAN BROS.** | | | | | | |
| 5B8, 5G8, 5S8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5SJ | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C, 6T | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6X8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7T8 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8C, 8T | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 8C8, 8T8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 33, 35 | T-13R00 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43A | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47, 50 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 52A, 54A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56S | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62BX, 63, 63BX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78B, 78X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R04 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 105, 106 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 116B, 116X, 117B | T-13R15 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 117X | T-13R15 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 402T | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 410, 412T | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 501T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 515 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 520 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521TC, 525 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 615, 625 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 711T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715, 725 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 731TC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 815, 825 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 831TC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GILFILLAN BROS. (Contd)** | | | | | | |
| 1131C | T-13R15 | ☆ | ☆ | §Special | T-13A36 | T-57S01 |
| 1331C | T-13R14 | ☆ | ☆ | ☆ | T-13A36 | T-57S01 |
| **A. H. GREBE & CO.** | | | | | | |
| AH1 | T-56R05 | T-13C28 | ☆ | ☆ | T-57A42 | T-57S01 |
| HS3 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| HS4, (1 pentode) | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| HS4 (pp 45 or 47) | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SK4 | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| AC7 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29A99 | ☆ |
| HS7, HS8 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| HS11, HS12 | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 89 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111B | T-13R07 | T-67C49 | ☆ | ☆ | T-67D78 | T-13S41 |
| **GRIGSBY-GRUNOW CO. (See also Majestic)** | | | | | | |
| 15, 15B | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20, 21, 22, 23 | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 25, 25B | T-56R05 | T-13C30 | T-74C30 | ☆ | T-74A31 T-74C30 | T-57S01 |
| 30 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 31 | T-13R05 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 35 | T-56R05 | T-13C30 | ☆ | ☆ | T-57A42 T-74C30 | T-57S01 |
| 44, 49 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 51 | T-13R04 | T-13C28 | ☆ | ☆ | T-57A42 | T-57S01 |
| 52 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56, 57, 58 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 | T-56R05 | T-13C30 | T-13C29 | ☆ | T-57A42 | T-57S01 |
| 70 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 71, 72 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 75 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 77 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 85, 86 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| 90, 90B | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 91, 92, 93 | T-13R04 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| 100B | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 101, 102, 103 | T-13R04 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| 130A, 131, 132 | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 150, 151, 153, 154, 155, 156 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 159 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 160 | T-56R05 | T-13C30 | T-13C29 | ☆ | T-57A42 | T-57S01 |
| 194 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 195 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 200, 201, 203, 204 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 210, 211, 214, 215 | T-13R06 | T-13C30 | ☆ | ☆ | T-74A31 | T-57S01 |
| 230, 233 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 251, 251B, 253, 253B, 254, 254B | T-13R04 | T-13C30 | ☆ | ☆ | T-13A35 | T-57S01 |
| 310A, 310B, 311, 314, 315 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GRIGSBY-GRUNOW CO. (Contd)** | | | | | | |
| 330, 331, 336 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 351, 352, 353 | T-13R04 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| 360, 363 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 370, 371, 373 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 390, 393 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| 440 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460, 461, 463 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 560, 566 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 800, 998 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| **GULBRANSEN CO.** | | | | | | |
| 10, 13 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 60 Champion Jr., 63 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 160, 161 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 200, 291, 292, 295... | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 352 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 872 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9950 | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **THE HALLICRAFTERS, INC.** | | | | | | |
| 5T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H8PA | T-13R19 | ☆ | ☆ | ☆ | ☆ | §Special |
| S8A, S9, SK9 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| S10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S11 Super Sky Rider | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| S12 Comm. Sky | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| S14 Sky Chief, Sky Buddy | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S15 Sky Challenger | T-13R13 | T-13C28 | ☆ | ☆ | ☆ | ☆ |
| SX16 Super Sky Rider 38 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| SX17 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| S19R Sky Buddy | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SX23, SX24 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **HAMMARLUND MFG. CO.** | | | | | | |
| Comet Pro st'd Xtal | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| Comet Pro Dec. '31 | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| **HOWARD RADIO CO.** | | | | | | |
| AVH, EX (Dual Range) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D, F Radio D, F Audio Amp. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| SG "A" | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SG "B," O | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| SG "C" | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SG "T" | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X2, X3 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| Z4 | T-13R09 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 6B, 6BA, 7BT | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| Green Diamond "8" (71's) | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **HOWARD RADIO CO. (Contd)** | | | | | | |
| Green Diamond (45's) | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| X8 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| R9 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 20, 25, 32 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 35, 40 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 67C, 67T, 68 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 77C, 77T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 99C, 99T | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 118, 218 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 218 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 220, 225, 225S | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 240-1, 240-2 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, S250 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 256, S256 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| E256, 260, S260 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 266 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 268, 275C, 275T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 280 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 300 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 301, 303 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 302S, 302APC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 305, 306, 307 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 318 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 318D | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 325 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 325D | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 368 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 375 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 377 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 400 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 400X | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 425 | T-13R15 | ☆ | ☆ | ☆ | T-74C30 | T-13S41 |
| 430 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 438 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 468 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 520 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 525 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 568 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1626 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| **COLIN B. KENNEDY CORP.** | | | | | | |
| 10 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 20 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 26 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 30, 32 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42, 42B | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 52 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 55 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **COLIN B. KENNEDY CORP. (Contd)** | | | | | | |
| 60 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 62, 62A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 63, 63A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 80 | T-56R01 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 563A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 826B | T-13R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 882-62D | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 882-64C | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| **KOLSTER RADIO INC. (Brandes)** | | | | | | |
| A-1 | T-13R05 | ☆ | ☆ | ☆ | ☆ | ☆ |
| 6J, 6K, 6L, 6M, 6R | T-56R01 | T-13C29 | T-13C28 | ☆ | T-29A99 | T-18C92 |
| B10, B11, B12 | T-13R09 | §Special | T-13C28 | T-29A99 | T-33A91 | ☆ |
| B15, B16 | T-13R09 | T-13C29 | ☆ | T-33A91 | T-33A91 | T-57S01 |
| K20, K21, K22, K23 | T-56R01 | T-13C29 | T-18C92 | T-29A99 | T-29A99 | T-18C92 |
| K25, K27, K37 | T-56R01 | T-13C29 | T-18C92 | T-29A99 | T-29A99 | T-18C92 |
| K43, K43A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| K60 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| K70 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| K73 | ☆ | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 80 | T-13R07 | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| K83 | ☆ | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R07 | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| K93 | ☆ | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| K110, K120, K122 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K130, K132 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| K140, K142 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| **MAJESTIC RADIO & TELEVISION CO.** | | | | | | |
| 1A50 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1A59, 1A59B, P1A59 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1B59, P1B59B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2A50 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3C70, 3C80 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3SC80 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3C90 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BDA, 5BEA | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56, 62A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 65, 66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 67, 68 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 75, 76 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85, 86 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 511, 511A, 519P | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 551, 620 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 639, 639B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 739, 750 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 850 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 939 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1056X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1058X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1250 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |

**Complete instructions and diagrams for building amplifiers. Thordarson Amplifier guide No. 346, post-paid 15 cents.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MAJESTIC RADIO & TELEVISION CO. (Contd)** | | | | | | |
| 1356X | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1870 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **MONTGOMERY WARD & CO.** | | | | | | |
| 04WG-725 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 11 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 15, 16 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 17 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 21, 22 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-010 | T-13R03 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-020 | T-13R06 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 62-030, 62-040 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-060, 62-070 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 62-7, 62-8 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-9 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-14 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 62-20 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-25 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-26 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-29 | T-56R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-30 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-34 | T-13R03 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 62-38, 62-40 | T-56R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-PC43 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-50 | T-56R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-70, 62-70X | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-72X | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-97, 62-97X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-99, 62-99X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-101, 62-101X | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-103, 62-105 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-106, 62-107 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-121 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-131 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-132 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-133 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-135 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-140, 62-140X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-144 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-147 | T-13R12 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-148, 62-148X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-150 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-152 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-154 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-156 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-164 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-173, 62-175 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-176 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-177 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-179 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-181 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MONTGOMERY WARD & CO. (Contd)** | | | | | | |
| 62-185, 62-187, 62-190 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-193 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-194 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-196 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-206, 62-216 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-218 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-226, 62-228 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-232 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-233, 62-235 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-248, 62-259 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-261 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-267 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-274, 62-276 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-277 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-280 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-288 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-290 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-297 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-301, 62-301X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-304 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-306 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-307 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-308 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-309 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-311 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-315 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-316 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-318 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-321, 62-451 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-323 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-324 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-345 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-346, 62-350 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-347 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-351, 62-352 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-357 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-361, 62-362 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-367 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-370 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-372 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-380 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-390 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-401, 62-402 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-403 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-404 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-406 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-407 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-408 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-411 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-415 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MONTGOMERY WARD & CO. (Contd)** | | | | | | |
| 62-416 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-418 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-425 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-445, 62-455 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-449 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-457 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-465 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-467 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-471, 62-472 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-473 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 62-475, 62-476 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-479 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-490 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-497 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-500, 62-601 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-606, 62-616 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-700 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-701, 62-702, 62-703 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-704 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-712 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-900 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1100, 62-1101 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-1611 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1711 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1838 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-711HB | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-391A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-714A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-715B, 93BR-716A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-717A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-1201A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93WG-382 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 93WG-800, 93WG-801, 93WG-802, 93WG-805, | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93WG-1000, 93WG-1001 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 93WG-1103, 93WG-1104 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 811, 1111, 1238 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1355 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1800 | T-56R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 1955 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 2822, 2827, 2895, 2897 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 2955X, 2957X | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 3035, 3037, 3065, 3067 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 10,000 | T-13R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 11,000, 14,000 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62,000 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **MOTOROLA (See Galvin Mfg. Co.)** | | | | | | |
| **PHILCO RADIO & TELEVISION CORP.** | | | | | | |
| 5 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 12TP | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14, 15 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 16, 17 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 18 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 19 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20, 20A | T-13R00 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 21 | T-13R04 | T-13C30 | ☆ | ☆ | §Special | §Special |
| 22L | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23X, 29 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 37-62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-84 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-93 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-600 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-7, 38-8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-9, 38-10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-15 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-22, 38-23 | ☆ | T-14C63 | ☆ | ☆ | T-33A91 | T-13S41 |
| 39-55 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-116 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-117 | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-119 | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-770 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-130, 40 135 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-140, 40-145 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-165 | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-205 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-216 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-503, 40-506 | T-13R12* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-507 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-510 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-516 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-525 | T-13R12* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43 | T-13R13 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 47 | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 49 | ☆ | T-13C28 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| 50, 50A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 51A, 52 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57, 58, 59 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 65 | T-13R06 | T-13C29 | T-74C30 | ☆ | T-57A42 | T-57S01 |
| 66 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 70, 70A | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 71 | T-13R13 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 76, 77 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 77A, 78 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80, 81 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 84 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |

**End your transformer troubles by using Tropex Transformers. See page 32.**

*Disregard 5 volt winding.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **PHILCO RADIO & TELEVISION CORP. (Contd)** | | | | | | |
| 87 | T-56R03 | T-13C30 | T-13C28 | T-29A99 | T-33A91 | T-57S01 |
| 89 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 90, 90A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 91 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 95, 96, 96A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 97, 98 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 107 | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111, 111A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 112, 112A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 116B | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 118 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 144 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 200X, 201 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 211, 211A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 212, 212A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 220, 220A | T-13R00 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 245 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 264, 265 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 270, 270A | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 296, 296A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 370, 470, 470A | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 503 | T-13R14 | T-13C30 | ☆ | ☆ | T-17D01 | T-57S01 |
| 504, 505 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 507 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 509 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 511 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| 570 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 600, 610 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 620, 625 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 630, 635 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 641 | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 645 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 650 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 651 | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 655, 660, 665 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| **PILOT RADIO & TUBE** | | | | | | |
| PE6SG | T-13R00 | T-13C29 | T-13C27 | T-29A99 | T-33A91 | T-57S01 |
| 7, 8, L8 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10, 12, 20 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 31 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 41 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X41 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 45 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53, 55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63, X63, X65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 81, 84 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-102 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 103, 105, X105 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **PILOT RADIO & TUBE (Contd)** | | | | | | |
| T-122 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K111, Power Pack | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 114, 115 | T-13R16 | T-75C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| K122 | T-13R00 | T-13C39 | T-13C27 | T-29A99 | T-33A91 | T-57S01 |
| K126, K128 | T-13R06 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| K136 | T-13R05 | T-13C29 | T-13C29 | T-29C27 | T-33A91 | T-57S01 |
| S148 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S155, S155A, S155B, S155F, C157, C157A, C157B, C157F | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| S162, S164 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C165 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 183, 185 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 193, 195 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 213, 215 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 293, 295, S295 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 364, 365 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S393, 395 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 403, 405 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H554, H555 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BG562, BG563 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G576, G577 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G584, G585 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| H664, H665 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G752, G753 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1010 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-1664, T-1764 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-1854 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **R. C. A. MFG. CO., INC.** | | | | | | |
| AVR-1 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| HF-1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R4 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 5Q1, 5Q2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5Q4, 5Q5 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-5, R-5X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T, 5T-1, T5-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-4, 5T-5, 5T-6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-7, 5T-8, 5U | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C6-2, C6-12 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6K, 6K-2, 6K-3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6Q1, 6Q4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6Q8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R6 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 6T, T6-1, 6T-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T5, T6-9, T6-11 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C7-6, C7-14 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D7-7, 7K, 7K1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R7A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| R7DC | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 7T, 7T1, T7-5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7-11, 7-26 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| T7-12, 7U, 7U2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.
*Disregard 5V winding.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| C8-15, C8-17 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C8-19, C8-20 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D8-28, 8K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8K11 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8Q2, 8QU5C, 8QU5M | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8Q4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8T2, 8T11 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T8-14, T8-16 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8U, 8U2 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C9-4, C9-6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| CRD 9 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| D9-19 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K1 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K3 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 9Q4 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9T | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T9-9, T9-10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9 tube AW | T-13R06 | T-13C28 | ☆ | ☆ | T-67D47 | T-57S01 |
| R9DC | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 9U, 9U2 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10K | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-13S42 |
| 10K1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10T | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-13S42 |
| T10-1, T10-3 | T-13R14 | ☆ | ☆ | ☆ | T-81D52 | T-57S01 |
| U10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U12, U20 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D11-12 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| R11 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| C13-2 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| C15-3 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 15U | T-13R09 | T-67C49 | ☆ | ☆ | T-33A91 | T-57S01 |
| 16K, 16T3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16T2 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16T4 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE 16A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 17K, 18T | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R17 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| Radiola 17 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| Radiola 18DC | ☆ | T-13C28 | §Special | T-29A99 | T-29A99 | §Special |
| R18 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| RE-18 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 19K | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-19 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| Q20 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE-20 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D-22 | T-13R13 | T-68C08 | ☆ | T-52C98 | T-57A41 | §Special |
| PK23A1 Amp. | T-13R01 | T-13C27 | T-13C27 | ☆ | ☆ | ☆ |
| R23 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| TB-28-M1 | T-13R06 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 25-DC | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| U25, U26 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-28-P | T-13R02 | ☆ | ☆ | ☆ | ☆ | ☆ |
| R-28 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-28-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-32 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 33AC | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| R-35 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| R-37 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-37-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-38, R-38-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-39 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| RE-40, RE-40-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 42, R-43 | T-13R07 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| U42 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U43 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U44, U45 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 44 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-18C92 |
| RE-45 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 46 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-18C92 |
| 47 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-57S01 |
| 48 | T-13R07 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| R50 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| K50, T55, T56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE52 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| R55 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| RE57 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| K60, K62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T60, T62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Radiola-62 | T-13R00 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01<br>T-18C92 |
| PG63 | T-13R04 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| T63, T64, T65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 66 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| R70 | T-13R03 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| R71, R72 | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| R73 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| R73A | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| R75 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| RAE-79 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| K80, K81, K82 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T80 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Radiola 80 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| RE80 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 82 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| 84BT6 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| 85E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85T1, 85T5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| 86 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| 86E, 86K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86K7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T, 86T-1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T-3, 86T-4 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T6, 86T44 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 87K1, 87T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 87T1, 88K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R90 | T-13R04 | T-18C92 | ☆ | ☆ | T-57A42 T-29C27 | T-57S01 |
| R90P | T-13R06 | T-13C27 | ☆ | T-29C27 | T-33A91 | T-57S01 |
| 94BT6 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| 95T | T-13R11 | T-13C30 | ☆ | ☆ | T-81D52 | T-13S41 |
| 95T5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 95T5LW | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96E, 96K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96K2, R96 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96T, 96T1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96T2, 96T3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 97E, 97KG | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R97, 97T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R99 | T-13R09 | T-13C30 | ☆ | ☆ | T-81D52 | T-13S41 |
| U101, U102E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U103 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K105 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U105, U106 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U107 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U109 | T-13R16 | T-67C49 | ☆ | ☆ | T-81D52 | T-13S41 |
| RCA 110, 111 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| ACR111 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U111 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 115 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 117, 118 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 120 | T-13R04 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 121 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 122 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| U122E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 124 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U124, 128E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ARC 136 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 140, 141 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 141E | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 143 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| ACR 175 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 210 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-75S01 |
| 211 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 214 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 221 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 220, 222 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 224, 224E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| 240 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 242, 243 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 260, 261 | T-13R06 | T-13C27 | ☆ | T-29C27 | T-33A91 | T-57S01 |
| 262, 263 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 281 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 310 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| DUO 320, 321 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 322 DUO | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 330, 331 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 332E DUO | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340 DUO, 340E | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 341 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 381 DUO | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 810K, 810K1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810T, 810T4 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 813K | §Special | T-13C30 | ☆ | ☆ | T-17D01 | T-57S01 |
| **SEARS ROEBUCK & CO.** | | | | | | |
| FF, J | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 49-50 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 52, 53, 54 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | §Special |
| 56 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 92, 93 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 94, 95, 99, 100 | T-13R04 | T-13C30 | ☆ | T-29A99 | T-33A91 | §Special |
| 108 | T-56R01 | T-47C07 | ☆ | T-29A99 | T-33A91 | §Special |
| 109 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 110, 111, 112, 114, 116 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 388, 388X | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 709, 719 (International) | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 802, 812 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1130, 1132 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1150 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1152 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1170 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1174 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1250, 1252 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1260 early | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1260 late | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1280, 1282 | T-13R03 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 1310, 1311, 1312 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 1320, 1322, 1324 1326 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 1370 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1390, 1400, 1402 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1404, 1406 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1420 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1430 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1506 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 1580, 1582, 1584 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1590, 1592 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1597, 1598 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 1600 Converter | T-13R01 | T-74C30 | ☆ | ☆ | ☆ | ☆ |
| 1660 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1708 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1708A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1709 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1720 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1721, 1722, 1722X | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1725 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1726 | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54<br>T-57S01 |
| 1729 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1731 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1732X | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54<br>T-57S01 |
| 1743, 1743A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1760 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1800 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1802, 1803, 1803A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1804, 1805 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1805A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1806 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1807 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1808A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1809 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1811 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1820 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1821 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1823 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1826 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1826A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1827 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1829 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1832, 1832A | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54<br>T-57S01 |
| 1833, 1835 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1840 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1841, 1845 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1900 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1904, 1904A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1905 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1906 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1909 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1912 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1914 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1915, 1917 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1918, 1918A | T-13R09 | ☆ | T-47C07 | ☆ | ☆ | T-57S01 |
| 1930, 1940 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1941 | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1942, 1944, 1945 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1946 | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1954, 1954X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1955 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 1956 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1962 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1964, 1964A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1965 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1967, 1967A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1968, 1968A | T-13R09 | ☆ | T-47C07 | ☆ | ☆ | T-57S01 |
| 1970A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1972 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1981, 1981C | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1986, 1987 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1988 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1994, 1998 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3972 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4401, 4402 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4403 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4405A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4428A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4431, 4432 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4433 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R4433 | T-56R01 | T-47C07 | ☆ | T-29A99 | T-33A91 | §Special |
| 4435, 4436 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4448A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4453 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4461, 4462 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4463, 4464 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4465 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4466, 4467 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4469 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4472, 4473 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4484, 4485 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4486, 4488 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4488A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4488B | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4528A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4531, 4533 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4548A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4563 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4564, 4565 (Dup.) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4566, 4567 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4569 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4586, 4586A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4587, 4588 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4588A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4589 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4610 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4613 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4622, 4623 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4640 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4643 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4650 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4664 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 4667 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4668 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4469 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S43 |
| 4677 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4684 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4688 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 4722, 4723 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4740 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4743 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4750 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4764 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4769 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4776 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4784 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4788 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 4789 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S43 |
| 4796 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4799 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 5710, 5711 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6002 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6003, 6004 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6021 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6024 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6028 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6031 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6034 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6036 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6038 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6121 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6124 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6131 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6136 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6138 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6140 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6155, 6156, 6254 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6157 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6337, 6437 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 7043, 7044 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 7049 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7050 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7065 | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-13S41 |
| 7121 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7124 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7136, 7137 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7140 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7143 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7144, 7150 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7153 | T-13R01 | ☆ | ☆ | ☆ | ☆ | §Special |
| 7154, 7155 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7158 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7170, 7170A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 7171 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7172 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7181, 7182 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7221 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7230 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7234 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7807 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **SENTINEL RADIO CORP. (See also Erla)** | | | | | | |
| 6A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8, 9, 11, 12 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 14, 14A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 15, 16 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 19A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 30A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40B, 44A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47A | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 48A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 52A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 54A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72A, 72AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74A, 74AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 76A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82A, 82AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 92AE, 98AE | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 99AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 103A | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 104 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 106A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 106B | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 108, 108A | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 109, 110 | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 110A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 114, 115 | T-13R04 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 116 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 118 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 125 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 125AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 138AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 141AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 142A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 142AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 145AE | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 148A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 149A, 149AE, 159AE | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 158AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 185A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SENTINEL RADIO CORP. (Contd)** | | | | | | |
| 198A, 198AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 199A, 199AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 440, 444 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 513 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 622, 623, | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 634, 635 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660AC, 666, 666C | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 4500 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5700, 5700B | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5721 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5800 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6315, 6317 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6321 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7100, 7100B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7200 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7200B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8100B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8200B | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| **SILVER-MARSHALL, INC.** | | | | | | |
| A | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A31 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| B | T-13R03 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| C, CW (AVC) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D, E, F | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| G | T-13R06 | T-13C29 | T-74C30 | T-29A99 | T-33A91 | T-57S01 |
| J | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| Q, R | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Z deluxe, Z10 | T-13R07 | T-13C30 | ☆ | ☆ | T-81D52 | T-57S01 |
| Z13 | T-13R07 | T-13C30 | ☆ | ☆ | T-67D78 | T-13S41 |
| 30 series, 30B | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 33A, 34A, 35A | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36A, 37 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 38, 39 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 60B, 75, 75B, 90B | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 683 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| SM684 | T-13R04 | T-13C30 | T-13C30 | ☆ | T-33A91 | T-57S01 |
| 716 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 722AC | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 724 | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 726 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 727SW | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 729SW | T-13R07 | T-13C30 | ☆ | ☆ | T-81D52 | T-57S01 |
| 737 | T-13R02 | T-13C28 | T-13C28 | ☆ | ☆ | §Special |
| 773, 782 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **SONORA ELEC. PHONOGRAPH CO.** | | | | | | |
| A31, A33, A35 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 64 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 70 | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 74 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SPARKS-WITHINGTON CO. (SPARTON)** | | | | | | |
| 5, 9 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10, 12 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 15 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16, 16AW | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 17, 18 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 25, 26, 26AW | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 27, 27A, 27X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 28, 28X | T-13R07 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 30, 45 | T-13R07 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 46P | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 Super Converter | T-13R01 | T-13C26 | ☆ | ☆ | ☆ | ☆ |
| 67, 68, 68XS | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71, 71B, 72 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73, 73AX, 73BX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91- | T-57S01 |
| 75A, 75AX | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 80, 83, 84 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85-X, 86-X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 104, 105, 105XS | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 111X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 135 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 235 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 417X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 420 DC, JR Jewel | ☆ | T-18C92 | ☆ | ☆ | T-33A91 | T-57S01 |
| 427X, 437X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 457X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 475A, 478A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 516, 516X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 517 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518, 518X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 530X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 536, 536X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 537, 538, 538X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 540LX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 546X, 548X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550M | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 557, 558B, 558C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 567, 568 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 577 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 580X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 591, 593 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 616, 616M | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 616MX, 616X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 617, 617X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 620 | T-37R70C | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 628, 636MX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640LX, 740LX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660M | T 13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**For complete description of these and other Thordarson transformers and chokes see catalog No. 400.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SPARKS-WITHINGTON CO. (Contd)** | | | | | | |
| 666, 666M......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 666MX, 666X..... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 667, 667X......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 668, 678........... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 685, 686, 691....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 716............... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 727X, 727XD...... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 728X............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 737............... | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 738............... | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 740............... | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 748X............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750 all DC......... | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 750A, 750X ....... | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 760PS............. | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 766, 766X......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 766XP, 766XS..... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 768, 768X......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 770, 880A......... | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 778, 778X......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 827X, 827XD...... | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 867............... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 870A, 870X........ | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 877X............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 880............... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 928X............. | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 930, 931........... | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 940LX, 940SX..... | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 966, 966X......... | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 968, 968X......... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 977............... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 987, 997X......... | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1068, 1068X....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1078, 1078X....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1089............. | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1116X, 1166....... | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1160............. | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1166XP, 1166XS... | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1167............. | T-13R09 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| 1176, 1176XP...... | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1176XS, 1186...... | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1196............. | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1268, 1288P....... | T-13R09 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 1567............. | T-13R04 | T-13C30 | T-74C30 | T-29A99 | §Special | T-13S41 |
| **STEINITE RADIO CO.** | | | | | | |
| 8 Tube Pentode.... | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 40C, 45, 45A, 50A.. | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 60C............. | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 70, 80, 95.......... | T-13R05 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 102C............... | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 102SPU........... | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STEINITE RADIO CO. (Contd)** | | | | | | |
| 203............... | T-13R04 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 210, 230........... | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 261, 262, 263, 264, 265........... | T-56R01 | T-13C28 | T-13C28 | T-29A99 | T-33A91 | T-57S01 |
| 420 (15)........... | T-13R00 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 420 (17)........... | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | ☆ |
| 421, 425........... | T-56R05 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 423............... | T-13R03 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 450 (15)........... | T-13R00 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 450 (17)........... | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | ☆ |
| 642B............. | T-13R04 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 700, 701........... | T-13R03 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 705, 706, 725....... | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **STEWART-WARNER CORP.** | | | | | | |
| 01-5H1 to 01-5H9 (01-5H)........... | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6D, 01-6DX, 01-6A, 01-6B, 01-6AX, 01-6BX | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6C9, 010-6C9X. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6E1 to 01-6E9 (01-6E)........... | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-8A1 to 01-8A9 (01-8A)........... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 01-8C7 (01-8C)..... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-9A7 (01-9A)..... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-8B1 to 01-8B9 (01-8B)........... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 01-521 to 01-529 (01-52)........... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-531 to 01-539 (01-53)........... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-541 to 01-549 (01-54)........... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-611 to 01-619 (01-61)........... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-811 to 01-819 (01-81)........... | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-510 to 91-519 (91-51)........... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-611 to 91-619 (91-61)........... | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 910-621 to 910-629 (91-62)........... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-641 to 91-649 (91-64)........... | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-648 (91-64)..... | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-711 to 91-719 (91-71)........... | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-811 to 91-819 (91-81)........... | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-821 to 91-829 (91-82)........... | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| R100, A, B, E..... | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| R101A, R101B..... | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 102A, B, E,........ | T-13R03 | T-44C02 | ☆ | ☆ | T-33A91 | T-57S01 |
| R104A, B, E....... | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 106............... | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| R110............. | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STEWART-WARNER CORP. (Contd)** | | | | | | |
| R116 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R120 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 530, 535 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 715, 720, 750 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 801, 802, 811 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 901, 902, 903 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 911, 912, 913 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 951. 952, 953 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 1090, 1099 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1201-1209 (R120) | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1231-1239 (R123) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1251-1259 (R125) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1261-1269 (R126) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1271-1279 (R127) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1301-1309 (R130) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1341-1349 (R134) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1361-1369 (R136) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1371-1379 (R137) | T-13R09 | ☆ | T-47C07 | ☆ | T-57A41 | T-13S41 |
| 1381-1389 (R138) | T-13R09 | ☆ | T-47C07 | ☆ | T-57A41 | T-13S41 |
| 1401-1409 (R140) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1451-1459 (R145) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1461-1469 (R146) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1471-1479 (R147) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1481-1489 (R148) | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| 1491-1499 (R149) | T-13R15 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 1631D-1639D (R163D) | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 1671-1679 (R167S) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1691-1695 (R169) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1721-1729 (R172) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1731-1739 (R173) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1801-1809 (R180) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1811-1819 (R181) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1821-1829 (R182) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1831-1839 (R183) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1841-1849 (R184) | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1851-1859 (R185) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1861-1869 (R186) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3041-3049 (R304) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **STROMBERG-CARLSON TEL. MFG. CO.** | | | | | | |
| 10, 11 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 19, 20 | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 22, 22A | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 25, 26 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 29 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 37, 38, 39 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 40, 41 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 52, 54 | T-13R07 | T-75C51 | ☆ | T-33A91 | T-58A70 | T-13S41 |
| 58-L, 58-LB, 58-T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58-TB, 58-W, 58-WB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STROMBERG-CARLSON TEL. MFG. CO. (Contd)** | | | | | | |
| 60 | T-13R13 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 61-L, 61-LB, 61-T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61-TB, 61-W, 61-WB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62, 63 | T-13R15 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 64 | T-13R15 | T-13C30 | ☆ | T-29A99 | T-17D01 | T-13S41 |
| 70, 72 | T-13R08 | T-67C49 | ☆ | ☆ | T-67D78 | T-67S92 |
| 80 | T-13R16 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| 82, 82B, 83, 83B | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 84, 84B | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 130 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 140H, 140HB | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 140K, 140KB | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 140-L, 140-P | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 145-L, 145-LB | T-13R16 | T-67C49 | ☆ | ☆ | §Special | T-13S42 |
| 145-P, 145-PB | T-13R16 | T-67C49 | ☆ | ☆ | §Special | T-13S42 |
| 150-L, 150-LB | T-13R15 | T-67C49 | ☆ | ☆ | §Special | T-13S41 |
| 160-L, 160-LB | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 180-L, 180-LB | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 228 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 229P | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 230 series, 231 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 235H, 235HB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 235-L, 235-LB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 240 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 245 series | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 250-L, 250-LB | T-13R16 | T-67C49 | ☆ | ☆ | ☆ | T-13S41 |
| 255-L | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 260 series | T-13R16 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| 320-H, 320-T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 325-J. 325-M, 325-S | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 335-L, 336-P | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 337-H, 337-L | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340-F, 340-H, 340-M, 340-V, 340-P | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 341-P, 341-R | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 345-F, 345-M | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 350-M, 350-P, 350-R, 350-V | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 400 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 410, 411, 412, 420 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 430 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 435 (AM) | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 435 (FM) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 455 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 635, 636 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29A99 | T-18C92 |
| 638-AC | T-13R05 | T-13C29 | ☆ | T-29A99 | T-29A99 | T-18C92 |
| 641, 642 | T-13R05 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 652, 654 | T-13R05 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 846. 848 | T-56R05 | T-13C30 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| **TRANSFORMER CORP. OF AMERICA (CLARION)** | | | | | | |
| TC1, TC2, TC6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| TC20, TC21 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **TRANSFORMER CORP. OF AMERICA (Contd)** | | | | | | |
| TC22, TC23 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 25-220 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| TC39, TC39A, TC39LW | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40 | T-13R04 | T-13C29 | T-18C92 | ☆ | §Special | T-57S01 |
| TC40 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| TC42, TC43, TC44 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 51, 53 | T-13R07 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| TC53A | T-13R08 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 55 | T-13R07 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 60 Jr. | T-13R04 | T-13C29 | T-18C92 | ☆ | §Special | T-57S01 |
| 61, 70 | T-13R04 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 80, 84, 85 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 94 | T-56R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 160 | §Special | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 220 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 241 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| AC-260 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| AC-280 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| AC-320 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-67S52 |
| 490 | T-13R06 | T-13C29 | ☆ | ☆ | T-67D47 | T-57S01 |
| **UNITED AMERICAN BOSCH CORP. (BOSCH)** | | | | | | |
| 4 Essex | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10 Essex | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 20J, 20K, 20L | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 28 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | §Special |
| 36, 37 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40, 41AC | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 48 | T-13R06 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 54DC | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 56 Batt. | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 58, 60 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62DC, 63DC | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 66, 96 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 107 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| 116, 126, 136 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 146, 166, 176 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 200, 201 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205, 206, 211 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 236, 237 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 242, 243 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 260, 261 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 305 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 306 | T-13R14 | §Special | ☆ | ☆ | T-74A31 | T-57S01 |
| **UNITED AMERICAN BOSCH CORP. (Contd)** | | | | | | |
| 307 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 310A | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 352 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 360 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 370 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 420, 421 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 430, 430J, 430T | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 440C, 440T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 450H, 450L | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460, 460A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460B, 460R | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R15 | T-13C30 | T-13C28 | ☆ | §Special | T-13S41 |
| 505, 510, 510E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 515 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 565K, 565W | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570G, 570U | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575F, 575Q | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 585, 585Y, 585Z | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 595M, 595P | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 605, 605C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640, 650 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660C, 660T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 812 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1350 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **UNITED MOTORS SERVICE (DELCO)** | | | | | | |
| 1102, 1103, 1104 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1105, 1106, 1107 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1108 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1109 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1110 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| R1115 early-late | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1116, R1117 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1118 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1119 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| R1120 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1125 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1126, R1127 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1128 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1129 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1130, R1131 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| R1132 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| R1140, R1141 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1142 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1143 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1144 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1145 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R6011, R6012 | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| R6015 | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| **U. S. RADIO & TELEVISION CORP. (APEX)** | | | | | | |
| 5A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7AC, 7D (700) | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **U. S. RADIO & TELEVISION CORP. (Contd)** | | | | | | |
| 8 | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 10, 10C (1000-1001) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 24 (400) | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 25 (500) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 26, 26P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 27, 27P | T-13R03 | T-13C28 | ☆ | ☆ | T-29A99 | T-57S01 |
| 28 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 29, 31, 32 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36, 37 apex | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 41-60 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42-60 | T-13R06 | T-13C30 | T-18C92 | T-29A99 | T-33A91 | T-57S01 |
| 43-25, 44-25 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 46, 46A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 47, 47A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 48, 48A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 80 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 99, 99X | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 112A | T-13R01 | T-13C27 | ☆ | ☆ | ☆ | ☆ |
| 160, 250 (90) | T-13R06 | T-13C29 | T-74C30 | T-29A99 | T-33A91 | T-57S01 |
| 3040, 3050 (507) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3070 (1009) | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **WELLS-GARDNER & CO.** | | | | | | |
| C, CG | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 0DM | T-13R08 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 0EL | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 02A | §Special | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 07A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 073DC | ☆ | T-13C29 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| A1 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A2 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A4 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A5 series, 5D series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5F, 5FL, 5K, 5KL | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6D series, 6K | ☆ | T-13C28 | ☆ | ☆ | T-67D50 | T-57S01 |
| 7D series (27D1, 27D5) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7F, 7FL | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7GM series (37G-508, 37G-566) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7J, 7K series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A8 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A10 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A12 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A14 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A15 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 40A | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 72 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80, 82A | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 502 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 572AC | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **WESTINGHOUSE ELECTRIC SUPPLY CO., INC.** | | | | | | |
| WR-4, WR-5 | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-6, WR-6-R | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-7, WR-7-R | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-10 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-10-A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-12, WR-13 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-14, WR-14-CR | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-15 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-15-A, WR-16 | T-13R07 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-17 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-18, WR-19 | T-13R07 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-20 | T-56R05 | T-13C30 | ☆ | ☆ | T-78D46 | T-57S01 |
| WR-21 | T-13R05 | ☆ | ☆ | ☆ | §Special | §Special |
| WR-22 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-23, WR-24 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-27 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-28, WR-29 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-30, WR-31 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| WR-35 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-36 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-37 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-38, WR-39 | T-13R07 | T-13C29 | ☆ | ☆ | §Special | T-13S41 |
| WR-45, WR-45-A | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-46, WR-46-A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-48, WR-48-A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-49, WR-50 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-53 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-201 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-203, WR-204 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-205, WR-208 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-209, WR-210 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-211, WR-211-A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-211U, WR-211X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-212, WR-212X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-214 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-222 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR224 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-226 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-228 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-256 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR258 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR260 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-264 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR270 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-303, WR-304 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-305 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-306 | T-13R14 | T-67C49 | ☆ | ☆ | §Special | T-13S41 |
| WR-310, WR-311 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-311X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-312 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Thordarson Transformers for all applications are listed in catalog 400. Ask for your free copy.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **WESTINGHOUSE ELECTRIC SUPPLY CO., INC. (Contd)** | | | | | | |
| WR-312X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-314 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-315 | T-13R16 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| **WESTONE RADIO CORP.** | | | | | | |
| 11, 12, 70, 70C | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **WILCOX-GAY CORP.** | | | | | | |
| 2S5, 2T5 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2VA7, 2VB7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3D5, 3F7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3S5-66, 3SB5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3V6, 3VA6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3VB6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4C5, 4CA5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4CB5, 4CD5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4D10, 4DB10 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-58S72 |
| 4E6, 4G7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4H11 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-67S92 |
| 5B5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BA5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BC5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BE6 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5E7, 5EA7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5E8, 5E9 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B5 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B8, 6F6 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6FB6 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T11 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7E5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7G5, 7GB5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7J7, 7K7 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A69 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A70, A81, A82 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A78, A79 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **RUDOLPH WURLITZER CO. (Also see All-American Mohawk)** | | | | | | |
| SA5 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SA6 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SW88 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SA91-A, SA120 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 450 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 454 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470, 471 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **ZENITH RADIO CORP.** | | | | | | |
| A, B, C, D | T-13R03 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| BH(202) | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| CH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L | T-13R01 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| LH, MH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WH (2022) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 4B313 (5410) 4B314 (5411) | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4B317, 4B355 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4D26 (5401) 4P51 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4T26, 4T51 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A119 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A126 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A127 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A151 (CH5517A) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A313B(CH5535BT) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A318, 5A325 (5532A) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R123 (5519) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R135, 5R165 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R216 (5526) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R226, 5R236 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R303 (5528) 5R312 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R316, 5R317 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R337 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S29 (5513A) 5S56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S126, 5S127, 5S150 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S151, 5S161 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S201 (5521) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S218 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S218AT (5521AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S220, 5S228, 5S228AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S237, 5S237AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S250, 5S252 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S319 (5529) 5S327 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S330, 5S338 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S339 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A203 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A223 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A229 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A239 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A241 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B321 (5653) | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S27 (5619) 6S28 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S52, 6S53 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S128 (5634), 6S137 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S147, 6S152, 6S157 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S203 (5638), 6S222 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S223, 6S229 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S239, 6S241 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S254 (5644) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S254AT (5644AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S256, 6S256AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S301 (5651) 6S306 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S321, 6S322 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S330, 6S340 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes. T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 6S341 (5649)....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S361............. | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S362............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S439, 6S469....... | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S28, 7S53 (5704)... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S232AT (5709AT). | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S240............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S242............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S258............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S260............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S261............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S323 (5714) 7S342. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S343............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S363, 7S364....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S366............. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S432, 7S433, 7S434, 7S449....... | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S450, 7S458 to 7S462..... | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S487, 7S488, 7S490 (5725)....... | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A129............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A147............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A154............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A157............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A232............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A242............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A244............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A262............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8S129 (5801) 8S154. | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8S359............. | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S30, 9S54......... | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 9S55.............. | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 9S203 (5905)....... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S204AT (5905AT). | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S232............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S232AT.......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S242............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S244............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S244AT.......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S262, 9S263....... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S264............. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S264AT.......... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S307 (5907)....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S324, 9S344....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S365 (5906)....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S367, 9S369....... | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10................ | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10S130 (1004)...... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S147, 10S153..... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S155, 10S156..... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S157, 10S160..... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 10S443, 10S452, 10S464, 10S470, 10S491 10S492 (1005) | T-17R34 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 11, 12............ | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 12S205, 12S232..... | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S245, 12S265..... | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S266, 12S267..... | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S268........... | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S345 (1206)...... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 12S370, 12S371..... | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 12U158 (1203)..... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 12U159........... | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 50, 52, 53, 54...... | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 60, 61, 62......... | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 64, 67............ | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 70, 71, 72, 73, 77... | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 80............... | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 91, 92, 103........ | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 210, 211.......... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 215, 216, 217...... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 220, 221.......... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 225.............. | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 230, 240.......... | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 241, 244.......... | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 245.............. | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251, 252...... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 258, 259.......... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 260, 261.......... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 262.............. | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 268, 269.......... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 272.............. | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 273.............. | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 278, 280, 281...... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 288, 289.......... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 291, 292.......... | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 410, 411, 412, 414.. | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 420.............. | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 443, 444.......... | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 472.............. | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 473.............. | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 474, 475.......... | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 476.............. | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 476B............. | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 478.............. | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500, 501, 502, 503.. | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 514, 515, 516....... | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 520 (2035), 521..... | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 558, 568, 578....... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589, 590.......... | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600.............. | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| M601............ | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Tropex transformers will stay put on those tough replacement jobs.** **See page 32.**

*Disregard 5 Volt Winding

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 602, 605, 608 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 611, 612 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 615 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 616, 618 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 622, 642 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 705, 706, 707 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 711, 712 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 722, 725, 732 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 750 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 755, 756 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 760, 765, 767 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 770, 770B, 775, 775B | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 777, 780, 788 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 805, 806 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 807, 808 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 809, 814 (5611) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 815 (5612) 825 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 827, S827 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 829, S829 (5701R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 835 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-65S94 |
| 845 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S847, 850 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 860, 861, 864 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S870, (5702R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S871 (5703R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 880 (1001) (1001A) | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-65S94 |
| 908, 909 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 935 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 945, 950 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 960, 961 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 970, 975 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 980, 985, 990 (1201) | T-13R15 | T-13C30 | ☆ | T-29A99 | T-74D32 | T-13S41 |
| 1105 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1117, 1161 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1167, 1170 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2038 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-67S52 |
| 2056, 2056-1 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

## POWER TRANSFORMERS

3A

3C

The choice of servicemen in all parts of the world because of the universal adaptability to receiver replacement, from both electrical and mechanical considerations. Designed to furnish plate and filament voltage requirements of amplifiers, receivers and exciter stages of transmitters. Adjustable mounting brackets Fig. 3A permit flush, vertical or horizontal mounting.

2B

2G

| Type No. | Pri. V.A. | Secondary A.C. Load Volts | Secondary D.C. M.A. | Filament Windings: Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Mtg. Centers: Width | Depth | Dimensions: W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T-13R00** | 70 | 275-0-275 | 70 | 5V—3A | 5V—.5A Ct. | 2.5V—10.5 ACt. | | 3A | 2¼ | 2 13/16 | 2 13/16 | 3 3/16 | 3⅜ | 4 |
| **T-13R01** | 60 | 325-0-325 | 40 | 5V—3A | 2.5V—4A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 2¾ | 3 | 3¼ |
| **T-13R02** | 60 | 350-0-350 | 50 | 5V—3A | 2.5V—7.25A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 2 15/16 | 3 | 3¼ |
| **T-13R03** | 75 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | | | 3A | 2¼ | 2 13/16 | 2 13/16 | 3 3/16 | 3⅜ | 4 |
| **T-13R04** | 115 | 350-0-350 | 100 | 5V—3A | 2.5V—12.5A Ct. | | | 3A | 2½ | 3⅛ | 3⅛ | 3¾ | 3¾ | 5¼ |
| **T-13R05** | 110 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | 2.5V—3.5A Ct. | | 3A | 2½ | 3⅛ | 3⅛ | 3½ | 3¾ | 5¼ |
| **T-13R06** | 130 | 350-0-350 | 120 | 5V—3A | 2.5V—12.5A Ct. | 2.5V—3.5A Ct. | | 3A | 3 | 3¾ | 3¾ | 3⅜ | 4½ | 6½ |
| **T-13R07** | 140 | 400-0-400 | 110 | 5V—3A | 2.5V—15A Ct. | 2.5V—3.5A Ct. | | 3A | 3 | 3¾ | 3¾ | 3½ | 4½ | 6¾ |
| **T-13R08** | 105 | 350-0-350 | 90 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 2½ | 3⅛ | 3⅛ | 3½ | 3¾ | 5¼ |
| **T-13R09** | 160 | 375-0-375 | 180 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 3 | 3¾ | 3¾ | 3 9/16 | 4½ | 7½ |
| **T-13R11** | 60 | 290-0-290 | 50 | 5V—3A | 6.3V—2A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 2¾ | 3 | 3¼ |
| **T-13R12** | 65 | 350-0-350 | 70 | 5V—3A | 6.3V—2.5A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 3 5/16 | 3 | 3¼ |
| **T-13R13** | 90 | 350-0-350 | 90 | 5V—3A | 6.3V—3.5A Ct. | | | 3A | 2½ | 3⅛ | 3⅛ | 3⅜ | 3¾ | 5¼ |
| **T-13R14** | 115 | 350-0-350 | 120 | 5V—4A | 6.3V—4.7A Ct. | | | 3A | 2½ | 3⅛ | 3⅛ | 3½ | 3¾ | 5¼ |
| **T-13R15** | 140 | 375-0-375 | 150 | 5V—4A | 6.3V—5A Ct. | | | 3A | 3 | 3¾ | 3¾ | 3⅜ | 4½ | 6½ |
| **T-13R16** | 180 | 400-0-400 | 200 | 5V—4A | 6.3V—5.14A Ct. | | | 3A | 3 | 3¾ | 3¾ | 3 11/16 | 4½ | 7¾ |
| **T-13R17** | 85 | 300-0-300 | 60 | 5V—3A | 6.3V—2.5A Ct. | 2.5V—7.5A Ct. | | 3A | 2¼ | 2 13/16 | 2 13/16 | 3⅜ | 3⅜ | 4½ |
| **T-13R18** | 115 | 350-0-350 | 90 | 5V—3A | 6.3/2.5—3.5A Ct. | 2.5V—9A Ct. | | 3A | 3 | 3¾ | 3¾ | 3¼ | 4½ | 5¾ |
| **T-13R19** | 45 | 240-0-240 | 40 | 5V—2A | 6.3V—2A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 2½ | 3 | 2½ |
| **T-13R20** | 60 | 305-0-305 | 70 | 5V—2A | 6.3V—3.5A Ct. | | | 3A | 2 1/16 | 2½ | 2½ | 3 5/16 | 3 | 3¼ |
| **T-14R35** | | 260* | 60 | For use with vibrator operating from 6V battery. | | | | 3C | 2 1/16 | 2 1/16 | 2½ | 2⅞ | 3⅛ | 2½ |
| **T-14R39** | | 150* | 40 | For use with vibrator operating from 6V battery. | | | | 2B | 2⅜ | | 2⅞ | 2 | 2⅜ | 1¼ |
| **T-17R34** | 90 | 300-0-300 | 125 | 5V—2A | 6.3V—4.8A Ct. | | | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3⅜ | 4⅝ | 4¾ |
| **T-37R70-C** | 95 | 350-0-350 | 80 | 5V—2A Ct. | 3V—10A Ct. | 5V—2.5A Ct. | | 2G | 2 11/16 | 3 1/16 | 3 5/16 | 3⅞ | 4⅝ | 6¾ |
| For Sparton Models 235, 589, 593, 600 Series, 737, 931 and other receivers using Kellogg and other 3V tubes. | | | | | | | | | | | | | | |
| **T-56R01** | 60 | 325-0-325 | 70 | 5V—2A | 2.5V—3A Ct. | 1.5V—1A<br>1.5V—4A | 5V—.5A Ct. | 2G | 2 11/16 | 3 | 3 5/16 | 3⅝ | 4⅝ | 5¾ |
| **T-56R02–** | 70 | 350-0-350 | 70 | 5V—2A | 2.5V—9A Ct. | 2.5V—1.5A Ct. | | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3⅝ | 4⅝ | 6 |
| **T-56R03** | 85 | 350-0-350 | 105 | 5V—3A | 2.5V—3A Ct. | 2.5V—1.75A Ct. | 1.5V—5A<br>1.5V—1A | 2G | 3 | 2 13/16 | 3¾ | 3 9/16 | 4 15/16 | 7¼ |
| **T-56R05** | 115 | 350-0-350 | 110 | 5V—3A | 2.5V—9A Ct. | 2.5V—3A Ct. | 2.5V—3A Ct. | 2G | 3 | 2 15/16 | 3¾ | 3 11/16 | 4 15/16 | 7¾ |

* D.C. volts to filter

**AUDIO TRANSFORMERS AND CHOKES LISTED ON PAGES 2 AND 3.**

This accurate and convenient table has been compiled to facilitate choosing the correct output transformer. Two types are offered for most tubes: the universal type, which is designed to accommodate a wide range of tube and voice coil impedances, and the specific duty type.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms | Watts Output | Universal Type Transformer | Specific Duty Transformer |
|---|---|---|---|---|---|---|---|
| 1A5G | 90 | –4.5 | 4.0 | 25,000 | .115 | | T-14S83 |
| 1C5G | 90 | –7.5 | 7.5 | 8,000 | .240 | T-13S38† | T-14S84 |
| 1D8GT | 90 | –9.0 | 5.0 | 12,000 | .200 | T-13S38† | |
| 1E7G (1 section) | 135 | –4.5 | 7.5 | 16,000 | .290 | T-13S38† | T-13S43 |
| (2 sections, P-P) | 135 | –7.5 | *3.5 | 24,000 | .575 | | T-14S83 |
| 1F4, 1F5G | 135 | –4.5 | 8.0 | 16,000 | .310 | T-13S38† | T-13S43 |
| 1G5G | 90 | –6.0 | 8.5 | 8,500 | .250 | T-13S38† | T-14S84 |
| 1G6G | 90 | 0 | *1.0 | 12,000 | .675 | T-13S38† | |
| 1J5G | 135 | –16.5 | 7.0 | 13,500 | .450 | T-13S38† | |
| 1J6G | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 1N6G | 90 | –4.5 | 3.1 | 25,000 | .100 | | T-14S83 |
| 1Q5G, 1Q5GT | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| 1S4 | 45 | –4.5 | 3.8 | 8,000 | .065 | T-13S38† | T-14S84 |
| 1T5GT | 90 | –6.0 | 6.5 | 14,000 | .170 | T-13S38† | T-13S43 |
| 2A3 (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.5 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 300 | –62.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 300 | –62.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 2A5 (Single Cl. A) | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| (Single Cl. A) | 285 | –20.0 | 38.0 | 7,000 | 4.5 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | –16.5 | *34.0 | 14,000 | 6.2 | T-57S01§ | T-67S51 |
| (P-P Cl. $AB_1$) | 315 | –24.0 | *31.0 | 10,000 | 11.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_2$) | 375 | –21.0 | *27.0 | 10,000 | 19.0 | T-13S41 | T-75S75 |
| 3Q5GT (Fil. par.) | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| (Fil. series) | 90 | –4.5 | 7.5 | 8,000 | .230 | T-13S38† | T-14S84 |
| 4A6G | 90 | –1.5 | *1.1 | 8,000 | 1.0 | T-13S38† | T-14S81 |
| 6A3 | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A4 | 180 | –12.0 | 22.0 | 8,000 | 1.4 | T-13S38† | T-13S37 |
| 6A5G | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A6 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6AC5G | 250 | self | 32.0 | 7,000 | 3.7 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 250 | 0 | *2.5 | 10,000 | 8.0 | T-13S41 | T-75S75 |
| 6AL6G | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| 6B4G (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 325 | –68.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 325 | –68.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 6B5 | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6E6 | 250 | –27.5 | *18.0 | 14,000 | 1.6 | T-57S01§ | T-13S40 |
| 6F6 | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 6G6G | 180 | –9.0 | 15.0 | 10,000 | 1.1 | T-13S38† | |
| 6G6G | 135 | –6.0 | 11.5 | 12,000 | .6 | T-13S38† | |
| 6K6G | 315 | –21.0 | 25.5 | 9,000 | 4.5 | T-57S01§ | |
| 6K6G | 250 | –18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 6L6 (Single Cl. A) | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| (Single Cl. A) | 320 | –20.0 | 76.0 | 2,500 | 8.0 | | T-17S10 |
| (P-P Cl. $A_1$) | 270 | –16.5 | *67.5 | 5,000 | 18.5 | | T-67S54 (C.H.T., T-15S90) |
| (P-P Cl. $AB_1$) | 319 | –23.0 | *50.0 | 4,300 | 25.0 | | T-17S12 (C.H.T., T-15S91) |
| (P-P Cl. $AB_1$) | 400 | –25.0 | *51.0 | 6,600 | 34.0 | | T-17S13 (C.H T., T-15S92) |
| (P-P Cl. $AB_2$) | 430 | –20.0 | *47.0 | 5,500 | 40.0 | | T-17S14 (C.H.T., T-15S92) |
| (P-P-Par. Cl. $AB_1$) | 410 | –28.0 | *50.0 | 3,300 | 60.0 | | T-17S15 (C.H.T., T-15S93) |
| (P-P-Par. Cl. $AB_2$) | 430 | –24.5 | *52.0 | 1,900 | 120.0 | | T-17S16 (C.H.T., T-15S94) |

* Zero signal per plate. † T-14S85 may be used when a transformer with leads is preferred to one with lugs. § T-57S02 may be used when a transformer with leads is preferred to one with lugs.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms | Watts Output | Universal Type Transformer | Specific Duty Transformer |
|---|---|---|---|---|---|---|---|
| 6N6G | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6N7 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6V6 (Single Cl. A) | 250 | -12.5 | 44.5 | 5,000 | 4.5 | T-13S42 | |
| (Single Cl. $A_1$) | 315 | -13.0 | 34.0 | 8,500 | 5.5 | T-57S01§ | |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_1$) | 306 | -20.0 | *50.0 | 8,000 | 15.0 | T-13S41 | T-17S11 (C.H.T., T-15S90) |
| 6Y6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 6Y6G | 200 | -14.0 | 61.0 | 2,600 | 6.0 | T-13S42 | T-17S10 |
| 6Y7G | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 6Y7G | 250 | 0 | *5.3 | 14,000 | 8.0 | T-57S01§ | T-13S40 |
| 6Z7G | 135 | 0 | *3.0 | 9,000 | 2.5 | T-13S38† | T-81S01 |
| 6Z7G | 180 | 0 | *4.2 | 12,000 | 4.2 | T-13S38† | T-13S40 |
| 7A5 | 110 | -7.5 | 35.0 | 2,500 | 1.4 | T-13S42 | T-17S10 |
| 7B5 | 100 | -7.0 | 9.0 | 12,000 | .35 | T-13S38† | |
| 7B5 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 7C5 | 250 | -12.5 | 45.0 | 5,000 | 4.5 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| 10 | 425 | -50.0 | 18.0 | 10,000 | 1.6 | T-57S01§ | |
| 12A5 | 100 | -15.0 | 17.0 | 4,500 | .8 | T-13S42 | T-13S39 |
| 12A5 | 180 | -25.0 | 45.0 | 3,300 | 3.4 | T-13S42 | T-13S39 |
| 12A7 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | T-13S43 |
| 18 | 250 | -16.5 | 34.0 | 7,000 | 3.0 | T-13S42 | T-13S37 |
| 19 | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 25A6 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 25A7G | 100 | -15.0 | 20.5 | 4,500 | .770 | T-13S42 | T-13S39 |
| 25AC5GT | 180 | 0 | 27.0 | 8,000 | 2.0 | T-13S38† | T-13S37 |
| (P-P Cl. B) | 180 | 0 | *2.0 | 4,800 | 6.0 | T-13S41 | T-67S54 |
| 25B6G | 105 | -16.0 | 48.0 | 1,700 | 2.4 | T-13S42 | T-14S82 |
| 25L6 | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 31 | 135 | -22.5 | 8.0 | 7,000 | .185 | T-13S42 | T-13S37 |
| 32L7GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 33 | 135 | -13.5 | 14.5 | 7,000 | .7 | T-13S42 | T-13S37 |
| 35A5-LT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 35L6GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 38 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | |
| 38 | 250 | -25.0 | 22.0 | 10,000 | 2.5 | T-13S38† | |
| 41 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 42 | 250 | -16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 43 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 45 (Single Cl. A) | 250 | -50.0 | 34.0 | 3,900 | 1.6 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_2$) | 275 | -56.0 | *36.0 | 5,060 | 12.0 | T-13S41 | T-67S54 |
| 46 (Single Cl. A Triode) | 250 | -33.0 | 22.0 | 6,400 | 1.25 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *6.0 | 5,800 | 20.0 | T-13S41 | T-67S52 |
| 47 | 250 | -16.5 | 31.0 | 7,000 | 2.7 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | -16.5 | *31.0 | 14,000 | 5.4 | T-57S01§ | T-67S51 |
| 48 | 96 | -19.0 | 52.0 | 1,500 | 2.0 | T-13S42 | T-14S82 |
| (P-P Cl. $A_1$ Pent.) | 125 | -20.0 | *50.0 | 3,000 | 5.0 | T-13S41 | T-58S72 |
| 49 (P-P Cl. B) | 135 | 0 | *1.3 | 8,000 | 2.3 | T-13S38† | T-14S81 |
| 50 (P-P Cl. A) | 450 | -84.0 | *55.0 | 8,000 | 9.2 | T-13S41 | T-65S94 |
| 50C6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 50L6GT | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 52 | 110 | 0 | 43.0 | 2,000 | 1.5 | T-13S42 | T-17S10 |
| (P-P Cl. B) | 180 | 0 | *1.5 | 10,000 | 5.0 | T-57S01§ | T-81S01 |
| 53 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 59 (Single Cl. A Triode) | 250 | -28.0 | 26.0 | 5,000 | 1.25 | T-13S42 | T-13S39 |
| (Single Cl. A Pent.) | 250 | -18.0 | 35.0 | 6,000 | 3.0 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *13.0 | 6,000 | 20.0 | T-13S41 | T-67S52 |
| 70L7-GT | 110 | -7.5 | 40.0 | 2,000 | 1.8 | T-13S42 | T-17S10 |
| 71-A | 180 | -40.5 | 20.0 | 4,800 | .79 | T-13S42 | T-13S39 |
| (P-P Cl. A.) | 180 | -40.5 | *20.0 | 8,000 | 1.6 | T-13S38† | T-33S99 |
| 79 | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 89 | 250 | -25.0 | 32.0 | 6,750 | 3.4 | T-13S42 | T-13S37 |
| 182B/482B | 250 | -35.0 | 20.0 | 4,500 | 1.35 | T-13S42 | T-13S39 |
| 183/483 | 250 | -65.0 | 20.0 | 4,500 | 1.8 | T-13S42 | T-13S39 |
| 950 | 135 | -16.5 | 7.0 | 13,500 | .450 | T-13S38† | |

* Zero signal per plate. † T-14S85 may be used when a transformer with leads is preferred to one with lugs. § T-57S02 may be used when a transformer with leads is preferred to one with lugs.


# YOU MAY NOT WORK UNDER *these conditions* BUT---

. . . even if you did, THORDARSON TROPEX transformers would give you complete protection against moisture, high humidity and salt air.

The TROPEX process was perfected for just that purpose. It thoroughly impregnates the coil against the corrosive effects of adverse weather conditions.

TROPEX is a special process which may be applied to any Thordarson open mounting type transformer or choke. It is especially adaptable to fine wire audio transformers and chokes but is not ordinarily recommended for power transformers nor for encased types.

The additional cost for THORDARSON TROPEX transformers is surprisingly small. The following table has been compiled to enable you to easily determine this price increase by referring to the weight of the transformer as listed.

When ordering TROPEX add an "X" to the regular type number. For example, T-13S38-X is the TROPEX equivalent of T-13S38.

| WEIGHT OF TRANSFORMER | ADD TO LIST PRICE |
|---|---|
| Up to 7/8 lb. | 25c |
| From 1 lb. to 1 7/8 lbs. | 30c |
| From 2 lbs. to 2 7/8 lbs. | 50c |
| From 3 lbs. to 4 7/8 lbs. | 65c |
| From 5 lbs. to 6 7/8 lbs. | 75c |
| Over 7 lbs. | 13c per lb. |

## TROPEX REPLACEMENT AUDIO TRANSFORMERS

| Type No. | Application |
|---|---|
| T-13A34-X | 10,000 ohm plate to single grid |
| T-29A99-X | 10,000 ohm plate to single grid |
| T-13A35-X | 10,000 ohm plate to P.P. grids |
| T-33A91-X | 10,000 ohm plate to P.P. grids |
| T-13A36-X | P.P. 10,000 ohm plates to P.P. grids |
| T-78D46-X | Single 30 to Class B 19, 1J6G, or 30's |
| T-17D01-X | Single 6F6 etc., to 2-6F6, etc. |

## TROPEX FILTER CHOKES

| | |
|---|---|
| T-13C26-X | 8 Hy at 40 M.A. 530 ohms D.C. |
| T-13C27-X | 10 Hy at 40 M.A. 475 ohms D.C. |
| T-13C28-X | 10 Hy at 65 M.A. 460 ohms D.C. |
| T-13C29-X | 9 Hy at 85 M.A. 250 ohms D.C. |
| T-13C30-X | 8 Hy at 150 M.A. 200 ohms D.C. |
| T-18C92-X | 22 Hy at 35 M.A. 405 ohms D.C. |
| T-14C61-X | 7 Hy at 55 M.A. 200 ohms D.C. |
| T-14C62-X | 8 Hy at 55 M.A. 250 ohms D.C. |
| T-14C63-X | 8 Hy at 55 M.A. 300 ohms D.C. |
| T-14C64-X | 10 Hy at 55 M.A. 350 ohms D.C. |

## TROPEX OUTPUT TRANSFORMERS

| | |
|---|---|
| T-13S37-X | Single 6F6, 42. 2A5 etc. to voice coil |
| T-13S39-X | Single 45, 1-2A5 etc. to voice coil |
| T-13S40-X | P.P. 6F6, 42, 2A5 etc. to voice coil |
| T-33S99-X | P.P. 45, 71A, 43 etc. to voice coil |
| T-81S01-X | Class B 19, 1J6G, 30's etc. to voice coil |
| T-13S43-X | Single 1F4, 1D4, 1F5G etc. to voice coil |
| T-14S81-X | Single 6F6, 2A5 etc. or P.P. 45, 71A etc. to voice coil |
| T-14S82-X | Single 25L6 etc. to voice coil |

## TROPEX UNIVERSAL OUTPUT TRANSFORMERS

| | |
|---|---|
| T-13S38-X<br>T-57S01-X<br>T-57S02-X | Any single tube or P.P. tubes to voice coil |
| T-13S41-X | Any P.P. tubes to voice coil |
| T-13S42-X | Any single tube to voice coil |

**THORDARSON ELECTRIC MFG. COMPANY**
**500 West Huron Street, Chicago**
*Distributed by*

15¢

# THORDARSON

## Transmitter Guide

No. 344-E

# *Since 1895—*

*Since 1895 the Thordarson organization has pioneered in the development and manufacture of quality transformers in the progressive electrical world. The policy of the company — to engineer the best product for the application — is consistently maintained. Small wonder that Thordarson is the recipient of both national and international awards for outstanding contributions to better engineering.*

*From the earliest spark coil days Thordarson has devoted the major part of its engineering and laboratory resources to the development of Amateur Radio. Today, the Amateur Radio fraternity is the training ground for broadcast, communications and government engineers.*

*To further promote the interest and pleasure of this worthy hobby, Thordarson presents this latest Transmitter Guide. This guide offers you a wide choice of units from the smallest transmitter for the beginner to the larger and more elaborate rigs for the advanced amateur. These transmitters are conservatively rated and employ the latest technical developments for efficient and economical operation. The cabinets and panels are beautifully designed and the circuits are adaptable to a multitude of amateur applications. Simplified construction methods are employed throughout the guide and the use of Thordarson transformers and chokes will insure perfect performance for many years.*

*Our sincere wish is that this guide will enable you to find many hours of enjoyment in contacting old friends and making new ones on the amateur bands.*

☆

## *Contents*


20 Watt CW Transmitter .... ..................3

35 Watt Phone-CW Transmitter ...............4, 5

50 Watt 5 & 10 Meter Phone Transmitter .......6, 7

55 Watt Phone, 80 Watt CW Transmitter..8, 9, 10, 11

12 Watt Mobile Transmitter, 5 & 10 Meters ....12, 13

12 Watt Universal Transmitter for Portable and Emergency Service ......................14, 15

40 Watt Band-Switch Exciter Unit ...........16, 17

120 Watt Band-Switch Exciter Unit ..........18, 19

100 Watt Band-Switch Transmitter ...........20, 21

Amateur Speech Amplifier .....................22

250 Watt Phone, 450 Watt CW Transmitter.23, 24, 25

400 Watt Transmitter....................26, 27, 28

600 Watt Transmitter ................29, 30, 31, 32

1000 Watt Transmitter ...............33, 34, 35, 36

Transmitter Pre-Amplifier ..... ...............37

Thordarson Technical Literature ...............37

Class B Output Calculations .................38, 39

Driver Transformer Ratios .... ...............40

Matching Class C Loads.........................41

Multi-Match Modulation Transformer Ratios..41, 42

Matched Power Supplies ........................43

# 20 Watt CW Transmitter

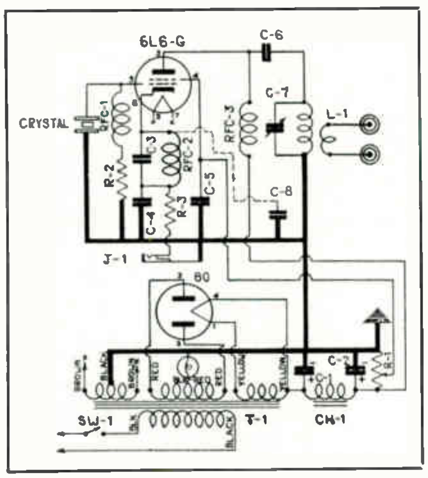
FOR the newcomer in amateur radio desiring a simple yet reliable transmitter, this transmitter with metal chassis has been designed. Its crystal controlled circuit is of such a type that operation is possible on five amateur bands. If higher power is desired at some later date this transmitter may also be used as the crystal oscillator stage of a larger multi-stage transmitter.

### Circuit Operation

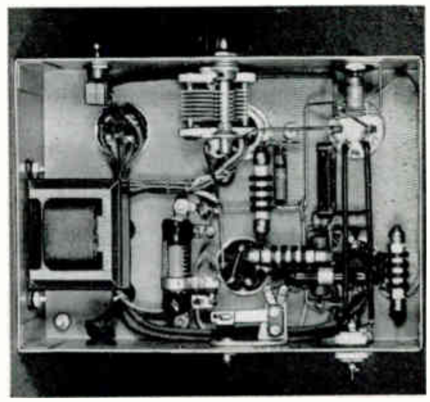
Operation on the five amateur bands from 160 to 10 meters is possible. On all of these five bands the oscillator will work "straight through"; that is, the crystal frequency and the output frequency are the same. In addition, the oscillator will give good outputs when doubling, using 160, 80 and 40 meter crystals.

The plug-in coils on this transmitter are of a type having a built-in link on the "cold" end of the coil. If used as the exciter for a larger transmitter this unit may be link-coupled or capacity-coupled to the succeeding stage.

Successful operation of this type oscillator on the five amateur bands is made possible by including condenser C-8 in the 40 meter coil base. Since the capacity, C-3, which gives adequate performance with 10 and 20 meter crystals results in excessive crystal current with a 40 meter crystal, the 0.00025 Mfd. condenser, C-8, is mounted on the 40 meter coil base in such a manner that it is paralleled with the cathode-to-ground circuit of the 6L6G when the 40 meter coil is used. This minimizes the likelihood of high crystal current in the 40 meter crystal, yet it permits the 20 and 10 meter crystals to oscillate with highest efficiency.




Chassis View



Bottom View

A pilot lamp in the negative high voltage lead makes an inexpensive yet effective tuning indicator. For best results in tuning it is recommended that the operator start to tune from minimum capacity toward maximum capacity, until the lamp passes through its first minimum in brilliancy. The condenser should then be tuned back a slight amount toward minimum capacity to maintain good oscillator stability and ease of starting when keying. A flashlight bulb connected to a two or three turn wire loop placed over the tank coil is a handy indicator of circuit conditions when tuning.

The parts layout shown in the above photograph should be closely followed for best results. The position of the power supply leads is not critical, but all connections in the RF circuit should be made as shown.

The keying jack is mounted on the rear apron of the chassis. It is of the circuit closing type so that the removal of the keying plug closes the circuit.

When properly loaded the input to the 6L6-G plate is about 20 watts. At slightly greater antenna loading, the change in "B" current when tuning through resonance is barely noticeable.

The screen voltage may be adjusted by moving the tap on the bleeder resistor R-1. The recommended setting for this tap is approximately one-fifth of the distance from the B+ end. The position of this tap has been selected as being optimum for reasonable output on all five bands without exceeding the rated crystal current of any crystal, or the rated dissipation of the tube in any condition of loading. With the 160 or 80 meter crystals the moving of this tap closer to the B+ end of the bleeder will result in greater output without damage to the crystal or without exceeding the rated dissipation of the tube.

## Parts Required

**THORDARSON TRANSFORMER and CHOKE**

- T-1 T-70R61 Power Transformer
- CH-1 T-44C02 Filter Choke

**Resistors:**

- R-1 20,000 Ohm 25 Watt Wirewound Resistor, Semi-Variable
- R-2 20,000 Ohm 1 Watt Resistor
- R-3 300 Ohm 10 Watt Resistor

**Condensers:**

- C-1, C-2 Double 8 Mfd. 450 Volt Condenser
- C-3 .0001 Mfd. Mica Condenser
- C-4 .01 Mfd. 400 Volt Condenser
- C-5 .01 Mfd. 400 Volt Condenser
- C-6 .002 Mfd. 1,000 Volt Mica Condenser
- C-7 100 Mmfd. Variable Condenser
- C-8 .00025 Mfd. Mica Condenser

**RF Chokes:**

- RFC-1 RF Choke
- RFC-2 RF Choke
- RFC-3 RF Choke

**Miscellaneous Parts:**

- 1 Chassis 8½" x 6" x 2½" (Punched and Drilled)
- 2 Feed-thru Insulators
- 1 Name Plate
- 1 Dial Plate
- 1 Octal Socket
- 1 4-Contact Socket
- 1 5-Contact Socket
- 1 5-Contact Socket, Steatite
- 1 Pilot Lamp Socket
- 1 Line Cord and Plug
- 1 SPST Switch
- 1 Knob

**Misc. Parts: (Cont'd)**

- 1 Closed Circuit Jack
- 1 6.3 Volt Pilot Light

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

**Accessories:**

- 1 160 Meter RF Coil, End Linked, Bud OEL-160 or Equivalent
- 1 80 Meter RF Coil, End Linked, Bud OEL-80 or Equivalent
- 1 40 Meter RF Coil, End Linked, Bud OEL-40 or Equivalent
- 1 20 Meter RF Coil, End Linked, Bud OEL-20 or Equivalent
- 1 10 Meter RF Coil, End Linked, Bud OEL-10 or Equivalent
- 1 Phone Plug Yaxley No. 75 or Equivalent
- 1 Crystal
- 1 80 Tube
- 1 6L6-G or 6L6 GX Tube

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 35 Watt Phone-CW Transmitter

Cabinet View

Chassis View

THIS compact transmitter is capable of 35 watts input on CW and phone. Its power supply and its Class B audio amplifier are included on the same chassis as the RF section, and its flexibility makes it a desirable transmitter for those wishing low power on the five amateur bands from 160 to 10 meters. The complete transmitter is built upon a rectangular chassis and is housed in an attractive cabinet with a curved panel of modern design. The cabinet, panel and chassis are finished in gray flat enamel. All controls are mounted on the front panel.

The 6V6-G crystal oscillator circuit easily provides enough driving power for the 6L6-G final amp'ifier. The oscillator and amplifier plate voltage is 315 V. and the oscillator screen voltage is 210V. Harmonic operation of the crystal oscillator may be obtained when using 160, 80 and 40 meter crystals.

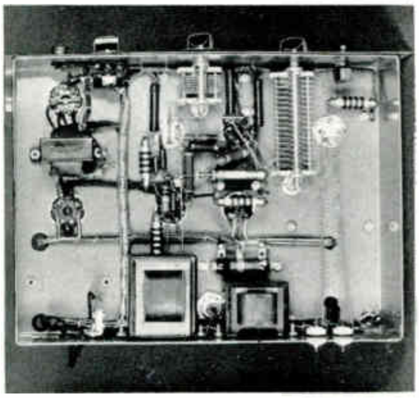
There is a condition of optimum excitation for the beam power final amplifier. In some cases it may be desirable to reduce the output of the oscillator stage so that the final stage will not be overdriven. To do this the oscillator tank is detuned by turning the tank condenser toward its minimum capacity setting.

The final amplifier may be worked "straight through," or it may be used for doubling. It delivers good power outputs when doubling to 80, 40, 20 and 10 meters. The final amplifier stage uses plate neutralization so that even on the highest frequencies no difficulty is experienced with self-oscillation. Cathode bias is used on the final amplifier; this aids in limiting the plate current when the final tank is not tuned to resonance or when there is no excitation on the final grid.

The plate tank coils for both stages are of the plug-in type. Although the crystal oscillator stage is capacity coupled to the final amplifier stage, the plug-in coil used is a Bud type OEL having a link on one end so that the coil may be used in other applications. The final tank coil is of the center-taped, center-linked type with a semi-fixed link. For the amateur who changes bands often, this provides the advantage of being able to change coils without changing the loading adjustment for each band.

Both the oscillator and final stage are keyed. The keying jack is of the closed circuit type so that no change in connections is necessary for changing quickly from CW to phone operation.

When properly loaded, the plate current in the final amplifier stage is



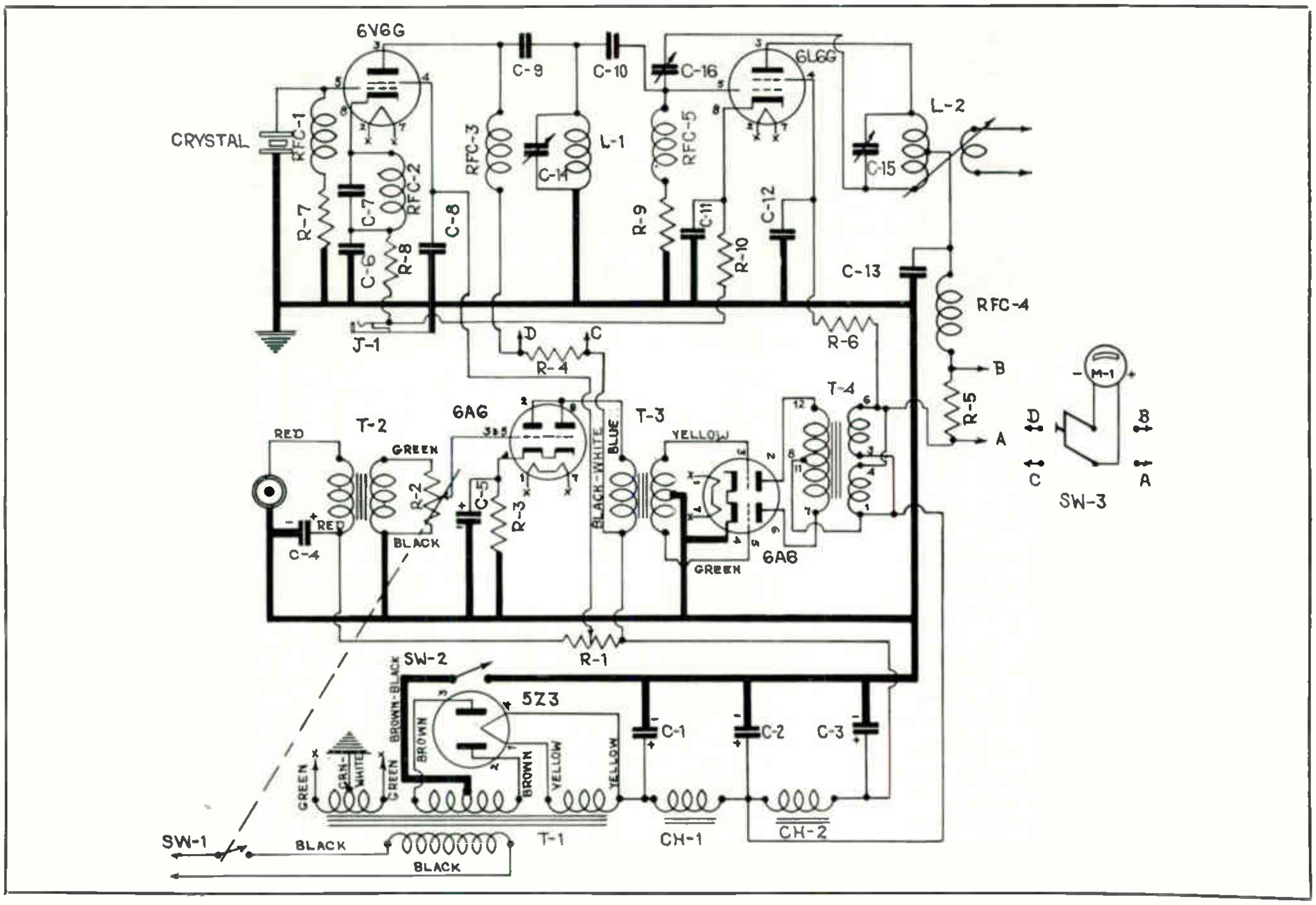
Bottom View

110 MA; and the current in the crystal oscillator plate is 25 to 30 MA. The modulator is a Class B 6A6 operating with 255 volts on the plate. Despite the high plate voltage, operation is very satisfactory in intermittent service.

The 6A6 operates at zero bias, and it is driven by another 6A6 triode with its two sections in parallel. The plates of the driver are also operated at 325 volts. The cathode bias on the driver is of the order of 5 to 6 volts. High gain is realized in this stage so that no additional amplification is needed to obtain 100% modulation when using a carbon microphone.

The current for the carbon microphone is obtained by passing the bleeder current through the microphone circuit. Adequate filtering is provided so that no hum enters the audio circuit at this point. In order that the removal of the microphone plug from the chassis will not place a high voltage across C-4, the microphone connector is of the shorting type which closes the microphone circuit even when the microphone has been removed. With such a feature the operator can never inadvertently place high voltage on the condenser, C-4.

The power supply uses a 5Z3 rectifier tube. Separate switches are provided for the plate and filament supplies. A filament switch is mounted on the volume control. A handy toggle-switch on the panel controls the plate supply. A single meter is provided with switching which permits the reading of either the final plate or the oscillator plate current.




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

T-1 T-92R21 Power Transformer
T-2 T-86A02 Microphone Transformer
T-3 T-19D06 Driver Transformer
T-4 T-19M13 Modulation Transformer
CH-1 T-13C30 Filter Choke
CH-2 T-74C30 Filter Choke

**Resistors:**

R-1 20,000 Ohm 25 Watt Semi-Variable Resistor
R-2 500,000 Ohm Volume Control with Switch
R-3 1,000 Ohm 1 Watt Resistor
R-4 50 Ohm 10 Watt Resistor
R-5 50 Ohm 10 Watt Resistor
R-6 3,500 Ohm 10 Watt Resistor
R-7 50,000 Ohm 1 Watt Resistor
R-8 200 Ohm 10 Watt Resistor
R-9 20,000 Ohm 1 Watt Resistor
R-10 200 Ohm 10 Watt Resistor

**Condensers:**

C-1 8 Mfd. 600 Volt Condenser
C-2} C-3} Double 8 Mfd. 450 Volt Condenser
C-4 10 Mfd. 25 Volt Electrolytic Condenser
C-5 10 Mfd. 25 Volt Electrolytic Condenser
C-6 .002 Mfd. 500 Volt Mica Condenser
C-7 .0001 Mfd. 500 Volt Mica Condenser
C-8 .002 Mfd. 500 Volt Mica Condenser
C-9 .002 Mfd. 1,000 Volt Mica Condenser
C-10 .0001 Mfd. 1,000 Volt Mica Condenser
C-11 .002 Mfd. 1,000 Volt Mica Condenser
C-12 .002 Mfd. 1,000 Volt Mica Condenser
C-13 .002 Mfd. 1,000 Volt Mica Condenser
C-14 100 Mmfd. Variable Condenser

**Condensers: (Cont.)**

C-15 100 Mmfd. Variable Condenser
C-16 Neutralizing Condenser

**RF Chokes:**

RFC-1 RF Choke
RFC-2 RF Choke
RFC-3 RF Choke
RFC-4 RF Choke
RFC-5 RF Choke

**Miscellaneous Parts:**

1 Chassis 14" x 10" x 3" (Punched and Drilled)
1 Panel (Punched and Drilled)
1 Cabinet
4 Feed-thru Insulators
2 5-Contact Sockets, Steatite
2 7-Contact Sockets, Large
2 Octal Sockets
1 4-Contact Socket
1 5-Contact Socket
1 Switch Plate
1 SPST Switch
1 DPDT Toggle Switch
1 Mic. Input Plug
1 Input Plug Shield
3 Knobs
2 Name Plates Marked "CRYSTAL OSC. PLATE"
2 Name Plates Marked "POWER AMP. PLATE"
1 Name Plate Marked "A.F. GAIN"
1 Name Plate Marked "PLATE VOLTAGE"
1 Name Plate Marked "MICROPHONE"

**Miscellaneous Parts: (Cont.)**

1 Circuit Closing Jack
1 Line Cord and Plug

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

**Accessories:**

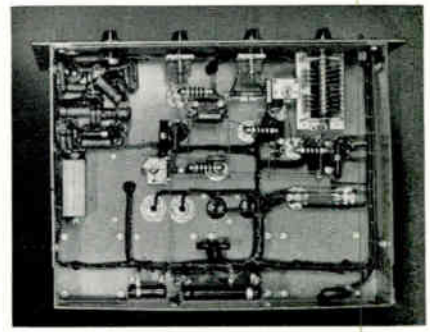
1 L-1 160 Meter RF Coil, End Linked, Bud Type OEL-160 or Equivalent
1 L-1 80 Meter RF Coil, End Linked, Bud Type OEL-80 or Equivalent
1 L-1 40 Meter RF Coil, End Linked, Bud Type OEL-40 or Equivalent
1 L-1 20 Meter RF Coil, End Linked, Bud Type OEL-20 or Equivalent
1 L-1 10 Meter RF Coil, End Linked, No Tap Bud Type OEL-10 or Equivalent
1 L-2 160 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-160 or Equivalent
1 L-2 80 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-80 or Equivalent
1 L-2 40 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-40 or Equivalent
1 L-2 20 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-20 or Equivalent
1 L-2 10 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-10 or Equivalent
1 0-150 MA DC Meter, 2" Square Case, No Illumination Triplett 227-A or Equivalent
1 Crystal
1 6V6G Tube
1 6L6-G or 6L6GX Tube
1 5Z3 Tube
2 6A6 Tubes

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 50 Watt 5 and 10 Meter Phone Transmitter

Cabinet View

Chassis View



Bottom View

THIS transmitter, designed especially for operation on the 5 and 10 meter bands, includes on one chassis a 50 watt RF section, a 25 watt modulator and the power supplies for both the RF section and modulator.

The tube line-up for the RF section is a 6L6-G tri-tet oscillator, an HK-24 doubler and an HK-24 final amplifier.

The 6L6-G oscillator uses 40 and 20 meter crystals for transmitter outputs on 10 and 5 meters respectively. The plate tank of the tri-tet is always to be tuned to a frequency double that of the crystal, and in this condition good outputs are obtained. Attempts to operate the oscillator plate tank at the crystal frequency when using a 6L6-G are likely to damage the crystal. The coil and condenser combination, L-1 and C-1, has been chosen to give a good oscillator output with reasonably low crystal current.

The HK-24 driven by the oscillator is not neutralized and is always used as a doubler stage delivering power on 10 and 5 meters. The crystal oscillator and doubler stages operate at a plate voltage of 400 volts, and the voltage on the screen-grid of the oscillator is 250.

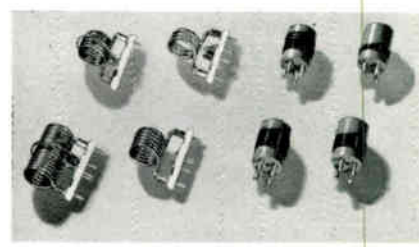
The HK-24 final amplifier is a conventional Class C stage using a split-stator tank condenser with plate neutralization. Neutralization is accomplished as easily as in transmitters operated at lower frequencies. The neutralizing condenser, C-15, is located on the under side of the chassis and is supported by the large wire connected to its terminals. It should always be adjusted with a non-metallic screw driver.

The oscillator cathode and plate tank coils are wound on 1" forms, and the doubler and final amplifier coils are self-supporting coils wound with large copper wire and mounted on National type PB-16 plugs. The doubler plate tank is capacity coupled to the final amplifier grid, and power is taken from the final amplifier plate coil by means of a link which is supported on the coil base terminals. When properly loaded, the final amplifier plate current is 60 MA at 800 volts. The plate transformer has a nominal rating of 750 volts DC, but because of the light loading the higher plate voltage is obtained. The excitation of the final amplifier tube is such that 25 to 30 MA grid current is obtained. The cathode tank of the tri-tet oscillator should be adjusted for the maximum output consistent with good oscillator stability. It will be found that this occurs with the 100 mmfd. cathode condenser, C-1, at about one-half of its maximum capacity.

A meter, M-1, and meter switch, SW-3, are provided for metering the current to the oscillator plate, the doubler plate, the final amplifier grid and the final amplifier plate.

The modulator uses two 6L6-G tubes in push-pull and operates at a plate voltage of 400 and a screen-grid voltage of 260, operating in Class $AB_1$. The audio amplifier tube line-up is one 6J7 pentode, one 6J7 triode and one 6N7 phase invertor. This arrangement provides high gain for use with crystal microphones.

The power supply uses a single transformer to supply all filaments and a dual plate transformer to supply two separate rectifiers. These transformers are controlled by separate

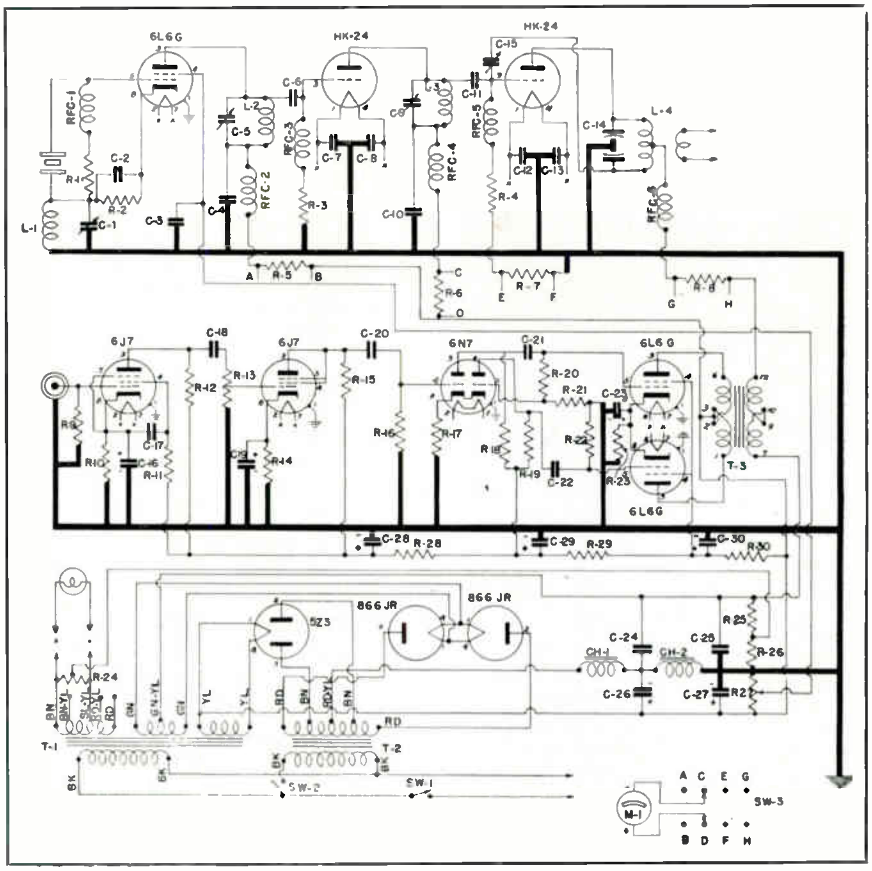


| Coil | 10 Meter Operation: Turns | Wire Size | Diam. of Winding | Winding Length | 5 Meter Operation: Turns | Wire Size | Diam. of Winding | Winding Length |
|---|---|---|---|---|---|---|---|---|
| L-1 | 10 | No. 16 Enam. | 1" | Close Wound | 4 | No. 16 Enam. | 1" | Close Wound |
| L-2 | 11 | No. 16 Enam. | 1" | 7/8" | 6 | No. 16 Enam. | 1" | 3/4" |
| L-3 | 7 | No. 10 Bare | 1" | 1" | 3 | No. 8 Bare | 1" | 3/4" |
| L-4 | 16 Center-Tapped | No. 10 Bare | 1" | 2" | 6 Center-Tapped | No. 8 Bare | 1" | 1" |

*Link coupled to L-4 is of No. 14 bare copper wire 1½" in diam. wound over the center of the plate tank coil and supported by the lugs attached to the pins on the PB-16 base. For 10 meters a 2 turn link is used: for 5 meters, a 1 turn link. Coils L-1 and L-2 are wound on 1" forms, Millen No. 45004. Coils L-3 and L-4 are self-supporting on National PB-16 plugs.*

switches on the panel. The filament switch, SW-1, is associated with the audio amplifier gain control, and the plate switch, SW-2, is of the toggle type placed in a position for convenient operation. The 400 volt supply delivers the current required by the oscillator, doubler, modulator and audio stages. It uses a type 5Z3 rectifier tube. The 800 volt supply handles the final plate power only. Although this transformer is rated at 400 and 750 volts, it is being operated at less than full load so that advantage may be taken of the higher-than-normal voltage available. Economy in the filtering of the two high voltage power supplies is obtained by using the same chokes for filtering the output of both rectifier systems. These chokes are in series with the center tap of the dual plate transformer.

The complete unit is contained on a chassis 17″ x 13″ x 3″ and is attached to a panel 19″ x 10½″ with the conventional type of chassis mounting brackets. The chassis, panel and chassis mounting brackets are finished in gray flat enamel, giving an unusually attractive appearance with the chromium dial plates. The transmitter may be enclosed in a cabinet or mounted in a rack with other equipment.




## Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-19F77 | Filament Transformer |
| T-2 | T-19P70 | Plate Transformer |
| T-3 | T-19M14 | Modulation Transformer |
| CH-1 | T-75C51 | Choke |
| CH-2 | T-75C51 | Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 50,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor |
| R-3 | 10,000 Ohm 10 Watt Resistor |
| R-4 | 2,500 Ohm 10 Watt Resistor |
| R-5 | 50 Ohm 10 Watt Resistor |
| R-6 | 50 Ohm 10 Watt Resistor |
| R-7 | 50 Ohm 10 Watt Resistor |
| R-8 | 50 Ohm 10 Watt Resistor |
| R-9 | 5 Megohm ½ Watt Resistor |
| R-10 | 5,000 Ohm 1 Watt Resistor |
| R-11 | 3 Megohm ½ Watt Resistor |
| R-12 | 500,000 Ohm ½ Watt Resistor |
| R-13 | 1 Megohm Volume Control with Switch |
| R-14 | 5,000 Ohm 1 Watt Resistor |
| R-15 | 100,000 Ohm 1 Watt Resistor |
| R-16 | 250,000 Ohm ½ Watt Resistor |
| R-17 | 2,000 Ohm ½ Watt Resistor |
| R-18 | 100,000 Ohm 1 Watt Resistor |
| R-19 | 100,000 Ohm 1 Watt Resistor |
| R-20 | 250,000 Ohm ½ Watt Resistor |
| R-21 | 12,000 Ohm ½ Watt Resistor |
| R-22 | 250,000 Ohm ½ Watt Resistor |
| R-23 | 250 Ohm 10 Watt Resistor |
| R-24 | 20 Ohm 10 Watt Center Tapped Resistor |
| R-25 | 40,000 Ohm 50 Watt Resistor |
| R-26 | 300 Ohm 10 Watt Resistor |
| R-27 | 20,000 Ohm 50 Watt Semi-Variable Resistor |
| R-28 | 20,000 Ohm 1 Watt Resistor |
| R-29 | 20,000 Ohm 1 Watt Resistor |
| R-30 | 7,500 Ohm 25 Watt Semi-Variable Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | 100 Mmfd. Variable Condenser |
| C-2 | .01 Mfd. 400 Volt Condenser |
| C-3 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-5 | 35 Mmfd. Variable Condenser |
| C-6 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-7 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-9 | 35 Mmfd. Variable Condenser |
| C-10 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-11 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-13 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-14 | 35-35 Mmfd. Variable Condenser |
| C-15 | Neutralizing Condenser |
| C-16 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-17 | .04 Mfd. 400 Volt Condenser |
| C-18 | .04 Mfd. 400 Volt Condenser |
| C-19 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-20 | .1 Mfd. 400 Volt Condenser |
| C-21 | .1 Mfd. 400 Volt Condenser |
| C-22 | .1 Mfd. 400 Volt Condenser |
| C-23 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-24 | 2 Mfd. 1,000 Volt Condenser |
| C-25 | 2 Mfd. 1,000 Volt Condenser |
| C-26 | 8 Mfd. 600 Volt Electrolytic Condenser |
| C-27 | 8 Mfd. 600 Volt Electrolytic Condenser |
| C-28, C-29, C-30 | Triple 8 Mfd. 450 V Electrolytic Condenser |

**RF Chokes:**

| | |
|---|---|
| RFC-1 | RF Choke |
| RFC-2 | RF Choke |
| RFC-3 | RF Choke |
| RFC-4 | RF Choke |
| RFC-5 | RF Choke |
| RFC-6 | RF Choke |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17″ x 13″ x 3″ (Punched and Drilled) |
| 1 | Panel 19″ x 12¼″ (Punched and Drilled) |
| 1 | Pr. Chassis Mounting Brackets |
| 6 | Octal Sockets |
| 1 | 4-Contact Socket |
| 6 | 4-Contact Sockets, Isolantite |
| 2 | Plug-in Sockets |
| 4 | Plug-in Bases |
| 4 | Coil Forms |
| 1 | Crystal Socket |
| 4 | Knobs |
| 1 | Pointer Knob |
| 1 | SPST Switch, N. P. |
| 1 | Double-Pole, 4-Throw Switch, Isolantite |
| 1 | Input Plug |
| 1 | Input Shield |
| 2 | Metal Tube Grid Caps |
| 2 | Metal Tube Grid Cap Shields |
| 2 | Name Plates Marked "POWER AMP. PLATE" |
| 1 | Name Plate Marked "POWER AMP. GRID" |
| 2 | Name Plates Marked "BUFFER PLATE GRID" |
| 2 | Name Plates Marked "CRYSTAL OSC. PLATE" |
| 1 | Name Plate Marked "AF GAIN" |
| 1 | Line Cord and Plug |

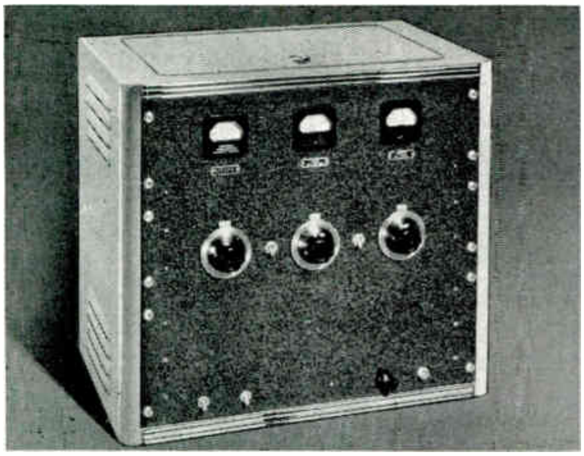
Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

**Accessories:**

| | |
|---|---|
| 1 | 0-150 MA DC Meter 3″ Square Case, Rear Illumination, Triplett 327A or Equivalent |
| 1 | Cabinet |
| 1 | Crystal |
| 2 | 6J7 Tubes |
| 1 | 6N7 Tube |
| 3 | 6L6-G or 6L6GX Tubes |
| 1 | 5Z3 Tube |
| 2 | 866-JR Tubes |
| 2 | HK-24 Tubes |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

## 55 Watt Phone, 80 Watt CW Transmitter



Cabinet View

Rear View

COMPACTNESS, reliability, ease of operation and neatness of appearance are salient features of this 55 watt phone and 80 watt CW transmitter. Designed with entirely separate audio and RF sections and each having its own power supply, either of these two matched units may be used separately. For the CW operator the compact and neat appearing RF section is a pleasure to have on the operating table or in the rack. Operating with 80 watts input, the high plate efficiency of the final stage not only makes it an outstanding transmitter but also a highly desirable exciter unit for transmitters having inputs as high as 500 watts. Circuits are strictly conventional, and components are conservatively chosen.

The modulator, with an output of 30 watts, easily modulates the 55 watt Class C input of the RF amplifier. The high gain (122 db) enables it to modulate the transmitter 100% with very weak audio signals. With the Multi-Match modulation transformer the amateur may use it to modulate any transmitter requiring 30 watts of audio power.

The RF line-up is as follows: a 6F6-G crystal oscillator stage, a 6L6-G buffer-doubler stage, and an 809 final amplifier stage. The 6F6-G operates with 320 volts on the plate and 270 volts on the screen-grid. The 6L6-G operates with a plate voltage of 340 volts and a screen-grid voltage of 250. For phone operation the voltage on the 809 plate is 625 volts, and for CW operation this voltage is raised to 785.

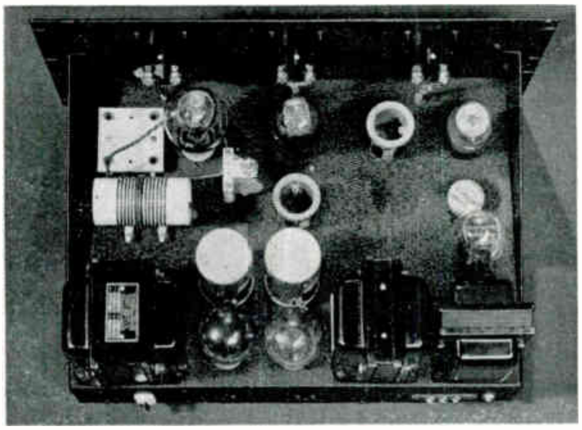
The oscillator stage operates with all crystals from 160 to 10 meters, but for best stability and freedom from "chirps" it is recommended that for 10 meter operation a 20 meter crystal be used and doubling be carried on in the buffer-doubler stage. When the crystal stage is in an oscillating condition and is loaded by the grid of the next stage, the oscillator plate current is approximately 30 to 40 MA. The buffer-doubler stage is neutralized and may be used with excellent results either for frequency multiplying or as a regular buffer. When using 160 and 80 meter crystals, not only is doubling easily accomplished in the second stage but enough output can be obtained by quadrupling to give good excitation to the 809 grid on 40 and 20 meters. When the 6L6-G is driving the 809 grid to 30 MA of grid current, the plate current of the 6L6-G is on the order of 70 MA. The antenna loading should be adjusted so that the final amplifier plate current is 88 MA for a 55 watt phone input. For an 80 watt CW input the loading is adjusted so that the final amplifier plate current is 102 MA. The secondary of the plate transformer supplying energy to the final amplifier is equipped with taps so that by merely changing these taps the change from 625 volts for phone operation to 785 volts for CW operation may be made. Correct tuning of the buffer-doubler plate circuit is accomplished by noting the grid current reading of the final amplifier stage. Care should be taken that the 6L6-G plate circuit is not tuned to some undesired harmonic of the crystal frequency.

The same final tank coil is used for operation on 80 and 160 meters. For 160 meter operation a fixed air condenser is plugged into the jack-base which is shown in the top view of the RF section on page 9. If the amateur does not desire operation on 160 meters, it is unnecessary to have the Cardwell JB base or the Cardwell JD-80-OS condenser. The spacing of the final tank condenser is 0.070", which is greater than is usually found for use with the voltages encountered in this circuit. However, such spacing permits grounding of the rotor. Should the amateur wish to build for CW operation only, a spacing of 0.050" is satisfactory.

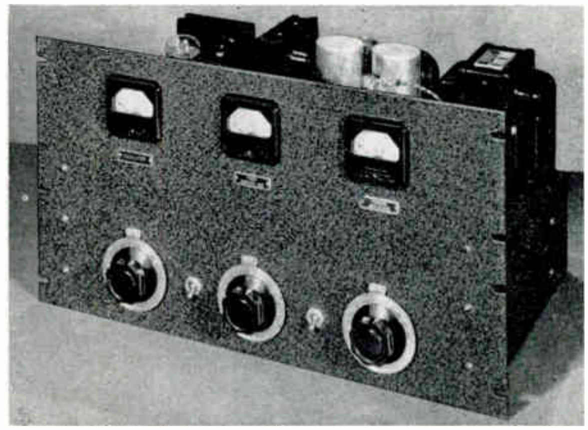
The modulator has for its output stage two 6L6-G's operating in Class AB₁. At no-signal the plate-to-ground (-B) voltage is 390 volts. The screen-grid voltage to ground should be adjusted by means of R-14 to a value of 310 volts. In this condition the voltage measured from cathode to ground across R-13 is 20 volts.

The three stages before the output stage provide adequate gain for the use of this modulator with all types of microphones. The input to the first stage, a pentode-connected 6J7, is shielded to avoid hum pick-up and to prevent pick-up of RF energy. As a further precaution against the entrance of RF energy to the grid of this stage, a filter consisting of C-1, RFC-1 and C-2 is installed in the input circuit. These elements, in addition to the grid lead and R-1, are carefully shielded with pieces of tinned copper. The result is that with the volume control wide open, the amplifier operates perfectly; and the residual hum is 45 to 50 db below the full output power.

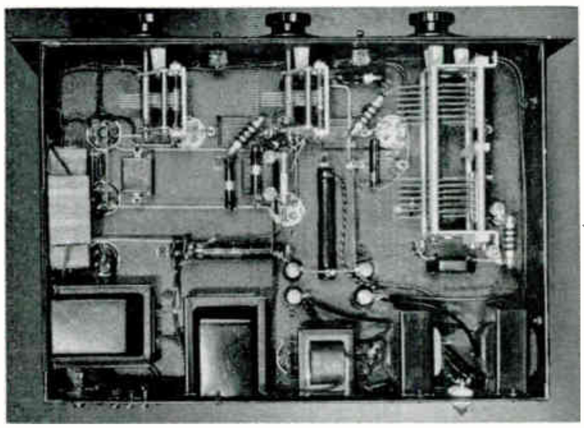
(Continued on Page 10)



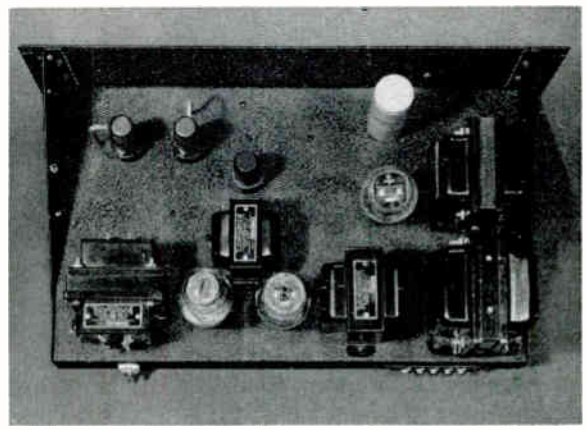
Top View of RF Section



Front View of RF Section



Bottom View of RF Section

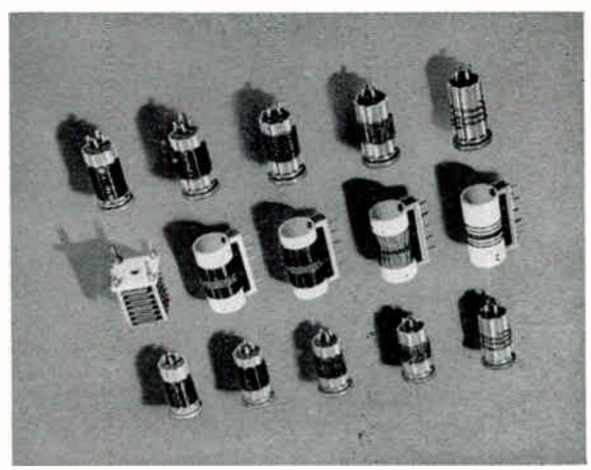


Top View of Modulator

**COIL DATA — 55 or 80 WATT TRANS.**

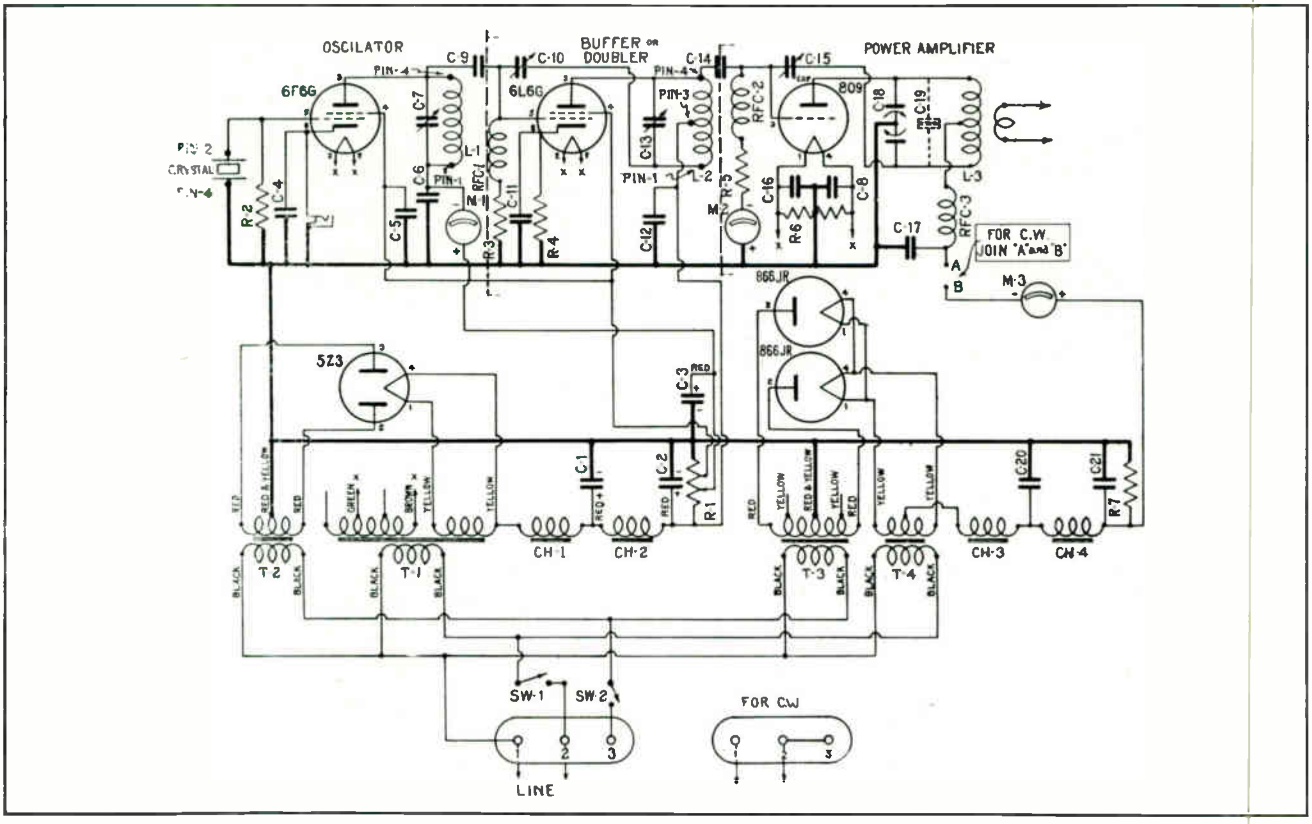
| | L-1 and L-2 | | | L-3 | | | |
|---|---|---|---|---|---|---|---|
| Band | Turns | Winding Length | Wire Size | Turns | Winding Length | Wire Size | Link Turns |
| 160 | 58 | 1 9/16" | #22 | 42 | 1 3/4" | #18 | 4 |
| 80 | 30 | 1 3/8" | #18 | 42 | 1 3/4" | #18 | 4 |
| 40 | 16 | 1 3/8" | #18 | 32 | 2 3/8" | #18 | 4 |
| 20 | 8 | 1 1/4" | #18 | 14 | 2" | #16 | 2 |
| 10 | 4 | 1 1/4" | #18 | 6 | 1 1/4" | #16 | 1 |

*L-1 and L-2 are wound on Hammarlund XP-53 Coil Forms. The coil ends are connected to No. 1 and No. 4 pins. L-2 is center-tapped, the tap being brought out on pin No. 3. L-3 is wound on National XR-13 Coil Forms attached to a PB-5 plug. Link is wound with insulated wire directly over bare wire of plate coil.*



Plug-In Coils

## RF Section




(Continued from Page 8)

The power supply for the RF unit consists of two rectifier systems, one using a 5Z3 to supply the plates and screen-grids of the two low power stages and the other using a pair of 866-JR's to supply the plate of the final amplifier. The power supply on the modulator chassis uses a 5Z3. On each chassis there is a separate filament supply. On the RF chassis and on the modulator chassis there are two switches, one for the filament supply and one for the plate supply. Thus, one unit can be operated independently of the other. When using the RF unit alone for CW operation, join terminals No. 2 and No. 3 and connect the 115 volt supply line to terminals No. 1 and No. 2. In this condition of operation SW-1 controls the filaments and SW-2 controls the plate supplies. For phone operation, in which it is desired that a single switch operate all plate supplies, connect the 115 volt supply line to terminals No. 4 and No. 5 on the modulator chassis; then connect terminals No. 1, No. 2 and No. 3 on the modulator to their respectively numbered terminals on the RF chassis. On the RF chassis, close SW-1 and SW-2. Then, on the modulator chassis, SW-1 controls all the filaments and SW-2 controls all the plate supplies.

## Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-19F76 | Filament Transformer |
| T-2 | T-19P54 | Plate Transformer |
| T-3 | T-19P56 | Plate Transformer |
| T-4 | T-19F88 | Filament Transformer |
| CH-1 | T-19C39 | Input Choke |
| CH-2 | T-19C46 | Smoothing Choke |
| CH-3 | T-57C53 | Filter Choke |
| CH-4 | T-57C53 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 7,500 Ohm 50 Watt Resistor |
| R-2 | 50,000 Ohm 1 Watt Resistor |
| R-3 | 50,000 Ohm 10 Watt Wirewound Resistor |
| R-4 | 350 Ohm 10 Watt Wirewound Resistor |
| R-5 | 3,500 Ohm 10 Watt Wirewound Resistor |
| R-6 | 20 Ohm 10 Watt Center Tapped Resistor |
| R-7 | 20,000 Ohm 50 Watt Wirewound Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | 4 Mfd. 600 Volt Condenser |
| C-2 | 4 Mfd. 475 Volt Condenser |
| C-3 | 4 Mfd. 475 Volt Condenser |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-5 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-6 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-7 | 100 Mmfd. Variable Condenser |
| C-8 | .001 Mfd. 1,000 Volt Mica Condenser |
| C-9 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-10 | Neutralizing Condenser |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-13 | 100 Mmfd. Variable Condenser |
| C-14 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-15 | Neutralizing Condenser |
| C-16 | .001 Mfd. 1,000 Volt Mica Condenser |
| C-17 | .001 Mfd. 2,500 Volt Mica Condenser. |
| C-18 | 100-100 Mmfd. Variable Condenser |
| C-20 | 2 Mfd. 1,000 Volt Oil Filled Condenser |
| C-21 | 2 Mfd. 1,000 Volt Oil Filled Condenser |

**RF CHOKES:**

| | |
|---|---|
| 3 | RF Chokes |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17" x 12" x 4" (Punched & Drilled) |
| 1 | Panel 10½" x 19" (Punched & Drilled) |
| 1 Pr. | Chassis Mounting Brackets |
| 1 | 5-Contact Socket |
| 2 | Octal Sockets |
| 3 | 4-Contact Isolantite Sockets |
| 3 | 4-Contact Sockets |
| 2 | Feed-thru Bushings |
| 10 | Stand-off Insulators |
| 2 | Coil Forms, 4-Prong |
| 1 | Phone Jack, Circuit Closing |
| 2 | SPST Switches |
| 1 | Grid Grip |
| 3 | Dials, 2¼" Diameter |
| 1 | Coil Form |
| 1 | Coil Form Plug |
| 1 | Base for PB-5 Plug |
| 1 | Name Plate Marked "OSCILLATOR" |
| 1 | Name Plate Marked "POWER AMP. GRID" |
| 1 | Name Plate Marked "POWER AMP. PLATE" |

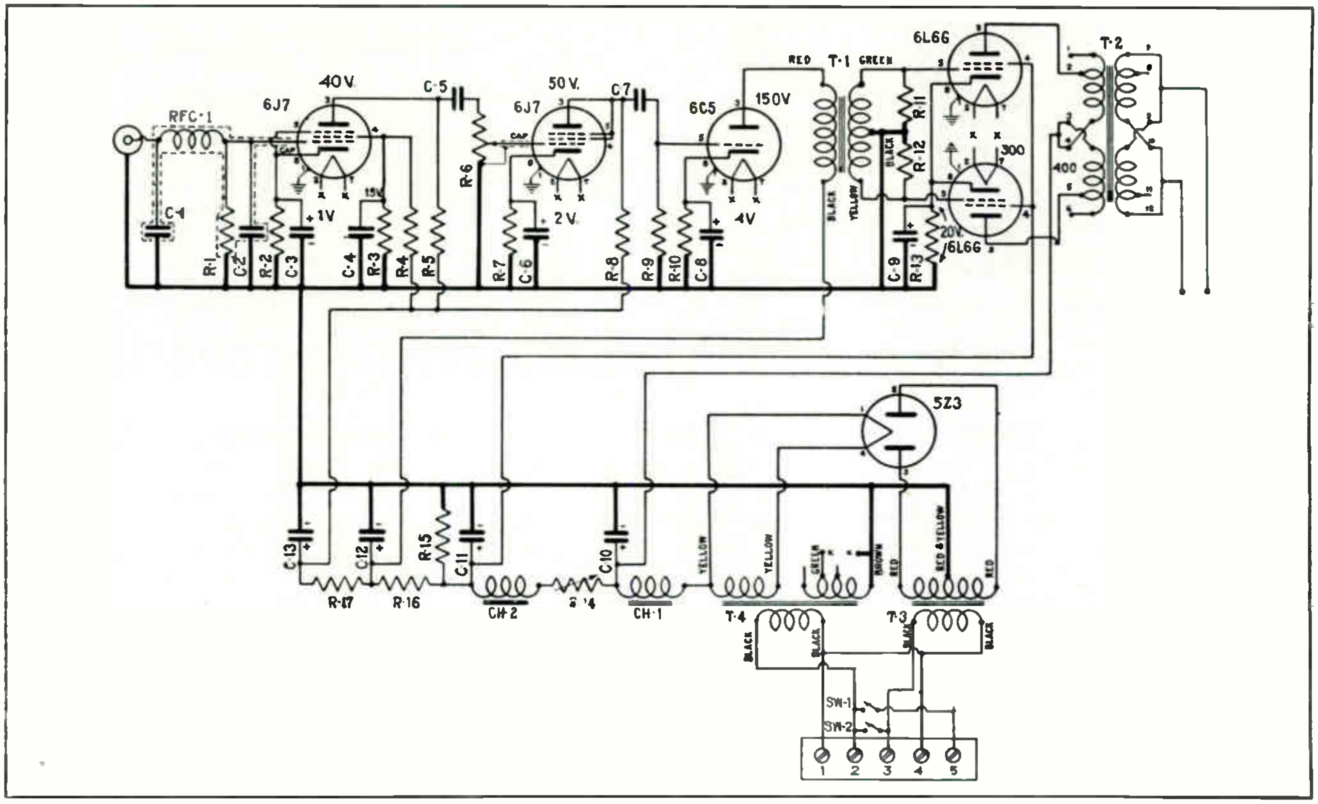
Miscellaneous nuts, bolts, solder and mounting lugs, lock-washers and other hardware.

**Accessories:**

| | |
|---|---|
| 1 | Coil Form per band National XR13 or Equiv. |
| 1 | Coil Form Plug per band National PB-5 or Equivalent |
| 2 | Coil Forms per Band Hammarlund XP-53 or Equivalent |
| 1 | 150 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | 100 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | 250 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | Cabinet |
| 1 | Crystal |
| 1 | 6F6-G Tube |
| 1 | 6L6-G or 6L6 GX Tube |
| 1 | 809 Tube |
| 1 | 5Z3 Tube |
| 2 | 866-JR Tubes |
| 1 | Jack Base Cardwell JB |
| 1 | 80 Mmfd. Fixed Air Condenser (C-19) Cardwell JD-80-OS (Used only on 160 Meters) |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

## Modulator Section




## Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-74A31 | Push-pull Input Transformer |
| T-2 | T-19M14 | Modulation Transformer |
| T-3 | T-19P54 | Plate Transformer |
| T-4 | T-19F76 | Filament Transformer |
| CH-1 | T-17C00-B | Filter Choke |
| CH-2 | T-13C27 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 5 Megohm ¼ Watt Resistor |
| R-2 | 5,000 Ohm ¼ Watt Resistor |
| R-3 | 25,000 Ohm 1 Watt Resistor |
| R-4 | 250,000 Ohm ½ Watt Resistor |
| R-5 | 500,000 Ohm ½ Watt Resistor |
| R-6 | 1 Megohm Volume Control |
| R-7 | 2,500 Ohm 1 Watt Resistor |
| R-8 | 100,000 Ohm 1 Watt Resistor |
| R-9 | 250,000 Ohm ¼ Watt Resistor |
| R-10 | 1,000 Ohm 1 Watt Resistor |
| R-11 | 50,000 Ohm 1 Watt Resistor |
| R-12 | 50,000 Ohm 1 Watt Resistor |
| R-13 | 150 Ohm 25 Watt Resistor |
| R-14 | 2,500 Ohm 25 Watt Semi-Variable Resistor |
| R-15 | 12,000 Ohm 25 Watt Resistor |
| R-16 | 20,000 Ohm 1 Watt Resistor |
| R-17 | 20,000 Ohm 1 Watt Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | .0001 Mfd. 500 Volt Mica Condenser |
| C-2 | .0001 Mfd. 500 Volt Mica Condenser |
| C-3 | 10 Mfd. 25 Volt Condenser |
| C-4 | .03 Mfd. 400 Volt Condenser |
| C-5 | .1 Mfd. 400 Volt Paper Condenser |
| C-6 | 10 Mfd. 25 Volt Condenser |
| C-7 | .1 Mfd. 400 Volt Condenser |
| C-8 | 10 Mfd 25 Volt Condenser |
| C-9 | 10 Mfd. 50 Volt Condenser |
| C-10 | 8 Mfd. 600 Volt Condenser |
| C-11, C-12, C-13 | Triple 8 Mfd. 450 Volt Condenser |

**RF Choke:**

RFC-1 RF Choke

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17" x 10" x 2" (Punched and Drilled) |
| 1 | Panel 19" x 7" (Punched and Drilled) |
| 1 | 5-Lug Terminal Board |
| 1 Pr. | Chassis Mounting Brackets |
| 2 | Feed-thru Bushings |
| 5 | Octal Sockets |
| 1 | 4-Contact Socket |
| 1 | Dial Plate Marked "GAIN" |
| 1 | Microphone Input Plug |
| 1 | Microphone Input Plug Shield |

**Miscellaneous Parts: (Cont.)**

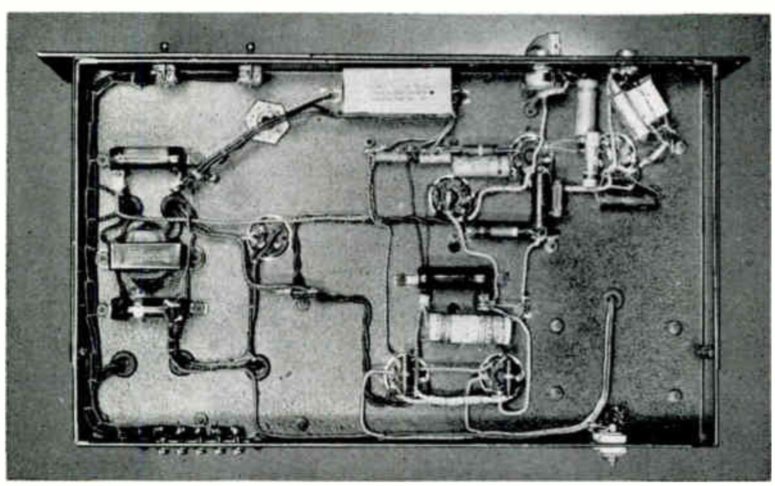
| | |
|---|---|
| 2 | SPST Switches |
| 2 | Metal Tube Grid Caps |

Miscellaneous nuts, bolts, resistor and mounting lugs, lock-washers, and other hardware.

**Accessories:**

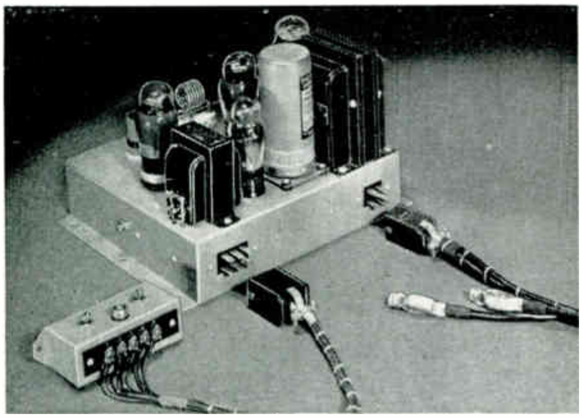
| | | | |
|---|---|---|---|
| 1 | Cabinet | | |
| 1 | Crystal | | |
| 2 | 6J7 Tubes | 2 | 6L6-G Tubes |
| 1 | 6C5 Tube | 1 | 5Z3 Tube |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

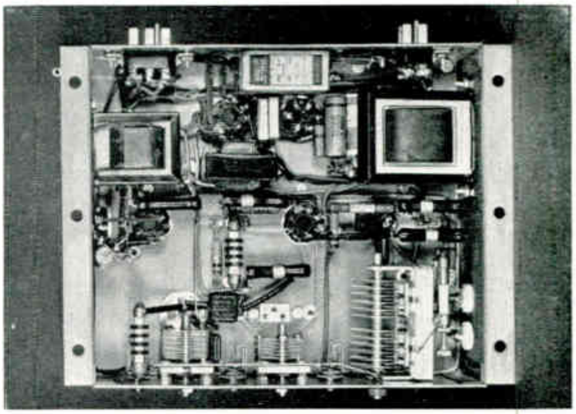


Bottom View of Modulator

# 12 Watt Mobile Transmitter for 5-10 Meters



Chassis View



Bottom View

PORTABLE mobile operation on 5 and 10 meters is the distinctive feature of this unit. It is of a rugged chassis type construction especially planned to be used in automobiles. It operates from a 6 volt storage battery using a vibrator power supply which may be remotely controlled from a point several feet away, as for example, a driver's seat.

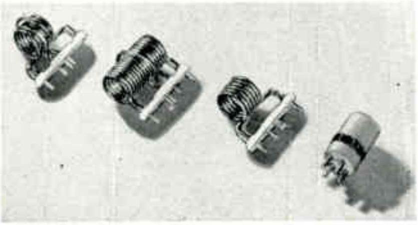
The RF tube line-up is as follows: a 6V6-G tri-tet crystal oscillator, and a T-21 final amplifier. The oscillator stage operates with a 20 meter crystal, and doubling is carried on in the plate circuit. At no time is operation of the crystal stage "straight through" recommended. The oscillator plate tank is capacity-coupled to the T-21 grid. The T-21 operates "straight through" on 10 meters, and for 5 meter operation doubling in the final is accomplished. The final tank condenser is of the split-stator type. The final amplifier is neutralized in a conventional manner. The cathode tank coil is wound on a 1″ form, and the oscillator plate and final plate tank coils are wound on National PB-16 bases with heavy copper wire. Power is taken from the final tank by means of a link.

The power input to the final amplifier plate when it is properly loaded is of the order of 10-12 watts. The final stage cathode current should be between 50 and 55 MA.

Since the transmitter will be operated in an unattended condition, the three variable condenser adjustments are made with a screw driver and then locked with special nuts. The metering of the oscillator cathode current, the final grid current and the final cathode current is done by plugging in an external meter in the jacks provided.

A single 6V6-G tube operates as a Class A amplifier to modulate the T-21 tube. Provision is made for remotely connecting a carbon microphone to the primary of the microphone transformer which is installed on the under side of the chassis. A control with a screw driver adjustment permits the adjustment of the gain of the audio system to the desired amount.

The power supply uses a vibrator having accessible actuating coil terminals. With such a vibrator it is possible to avoid switching the high current which flows in the primary of the vibrator transformer, and consequently, the control of this vibrator may be done at a distance without the necessity of using connections of high current carrying capacity. The rectifier tube is a 6W5-G. Connections made through socket S-2 to the control box, which may be located at any given convenient place, are such that the closing of switch SW-1 causes the filaments to heat and the current to flow in the microphone circuit. The closing of SW-2 starts the vibrator. Consequently, SW-2 may be used as a stand-by switch. The operator is cautioned against closing SW-2 before the filaments have had time to heat, for the premature closing is likely to damage the 6W5-G.



Separate plugs and sockets are provided for the entrance to the chassis of the power supply and the control wiring. This also aids in keeping vibrator noises out of the microphone circuit. As a further precaution against

(Continued on following page)

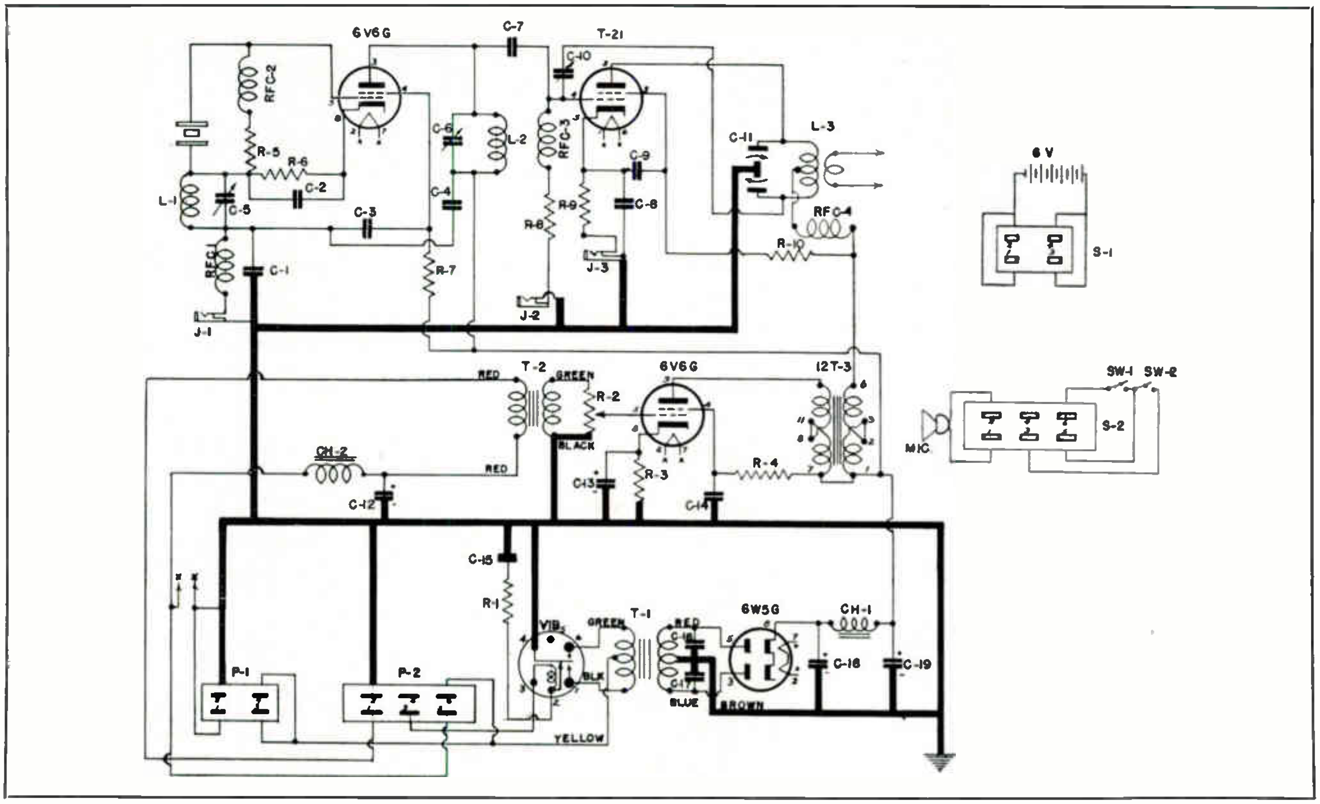
| Coil | Turns | Wire Size | Diam. of Winding | Winding Length | Supporting Form |
|---|---|---|---|---|---|
| L-1 | 5 | No. 16 Enameled | 1″ | Close Wound | Millen No. 45004 Coil Form |
| L-2 | 6 | No. 10 Bare | 1″ | 1″ | Self-Supporting on National PB-16 Plug |
| L-3 10 Meters | 16 Center-Tapped | No. 10 Bare | 1″ | 2″ | Self-Supporting on National PB-16 Plug |
| L-3 5 Meters | 6 Center-Tapped | No. 10 Bare | 1″ | 1″ | Self-Supporting on National PB-16 Plug |

*The link on L-3 is made of 1 turn of No. 14 bare copper wire about 1½″ in diameter looped around the center portion of L-3 and supported by the terminal lugs on the PB-16 plug.*

having any vibrator interference in the microphone circuit, any ripple which is superimposed on the leads from SW-1 is effectively filtered out by the CH-2—C-12 filter. All leads carrying current to the 6V primary of the power transformer should be of heavy wire, No. 16 or larger. This measure must be taken so that the full battery voltage is available at the transformer. Similarly, the wire in the power cable from S-1 to the battery should be large. This precaution also tends to minimize vibrator noise.

The polarity of the battery when connected to the transmitter is not important. However, when installed in an automobile in which one battery serves both the transmitter and the car electrical system, some attention should be given to the polarity. This is especially necessary if the transmitter chassis is in contact with the frame of the car.

In wiring, careful attention should be given to the placement of leads and chassis connections. Wherever possible the leads carrying vibrator current should not be common with those carrying signal currents.




## Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-14R38 | Power Transformer |
| T-2 | T-86A02 | Microphone Transformer |
| T-3 | T-19M13 | Modulation Transformer |
| CH-1 | T-57C53 | Filter Choke |
| CH-2 | T-14C61 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 200 Ohm 1 Watt Resistor |
| R-2 | 500,000 Ohm Volume Control |
| R-3 | 300 Ohm 10 Watt Resistor |
| R-4 | 20,000 Ohm 10 Watt Resistor |
| R-5 | 50,000 Ohm 1 Watt Resistor |
| R-6 | 350 Ohm 10 Watt Resistor |
| R-7 | 12,000 Ohm 10 Watt Resistor |
| R-8 | 50,000 Ohm 1 Watt Resistor |
| R-9 | 350 Ohm 10 Watt Resistor |
| R-10 | 10,000 Ohm 10 Watt Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | .002 Mfd. 500 Volt Mica Condenser |
| C-2 | .01 Mfd. 400 Volt Condenser |
| C-3 | .002 Mfd. 500 Volt Mica Condenser |
| C-4 | .002 Mfd. 500 Volt Mica Condenser |
| C-5 | 100 Mmfd. Variable Condenser |

**Condensers: (Cont.)**

| | |
|---|---|
| C-6 | 35 Mmfd. Variable Condenser |
| C-7 | .0001 Mfd. 500 Volt Condenser |
| C-8 | .002 Mfd. 500 Volt Mica Condenser |
| C-9 | .002 Mfd. 500 Volt Mica Condenser |
| C-10 | Neutralizing Condenser |
| C-11 | 35-35 Mmfd. Variable Condenser |
| C-12 | 100 Mfd. 25 Volt Electrolytic Condenser |
| C-13 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-14 | .1 Mfd. 400 Volt Condenser |
| C-15 | .1 Mfd. 400 Volt Condenser |
| C-16 | .05 Mfd. Oil Impregnated Condenser |
| C-17 | .05 Mfd. Oil Impregnated Condenser |
| C-18, C-19 | Double 8 Mfd. 450 Volt Condenser |

**RF Chokes:**

| | |
|---|---|
| RFC-1 | RF Choke |
| RFC-2 | RF Choke |
| RFC-3 | RF Choke |
| RFC-4 | RF Choke |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 11" x 8" x 3" (Punched and Drilled) |
| 1 | Vibrator Mounting Plate |
| 1 | Bottom Plate |

**Miscellaneous Parts: (Cont.)**

| | |
|---|---|
| 1 | Control Box |
| 3 | Octal Sockets |
| 1 | 4-Contact Socket, Steatite |
| 1 | 6-Contact Socket, Steatite |
| 1 | 6-Contact Socket |
| 1 | 6-Prong Plug |
| 1 | 4-Prong Plug |
| 1 | 6-Contact Socket |
| 1 | 4-Contact Socket |
| 2 | Feed-thru Insulators |
| 2 | Coil Sockets |
| 3 | Coil Base Plugs |
| 3 | Circuit Closing Jacks |
| 1 | Crystal Socket |
| 2 | 4-Prong Coil Forms |
| 6 | Resistor Mounting Strips |

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

**Accessories:**

| | |
|---|---|
| 1 | Vibrator, Electronics #427 or Equivalent |
| 1 | Crystal |
| 1 | T-21 Tube |
| 1 | 6W5-G Tube |
| 2 | 6V6-G Tubes |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 12 Watt Universal Transmitter

**FOR PORTABLE AND EMERGENCY SERVICE**

**Cabinet View**

**Chassis View**

OPERATING on either 115 volts AC or 6 volts DC, this unit not only provides the amateur with an emergency transmitter for battery operation but also may be used as the regular transmitter in the "shack" when so desired. No changes of parts or wiring are necessary for conversion from AC to DC — only the insertion of the proper power plug is required.

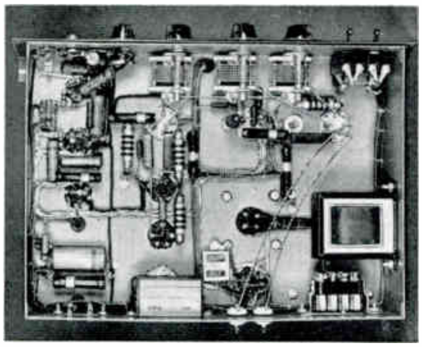
On battery operation 10 to 12 watts input may be obtained, and on AC operation, slightly more than 12 watts input may be expected.

The oscillator tube is a 6V6-G used in a regenerative type circuit having an RF choke in the cathode circuit. The final stage uses an 807 tube.

The final tank circuit consists of two condensers, C-10 and C-11, and a coil, L-2. This tank circuit may be used in the conventional manner by turning C-11 to maximum capacity, in which position a bent rotor plate shorts it out and grounds one side of the link. For settings of C-11 less than full capacity, the 807 is working into a pi network having for its elements C-10, C-11 and L-2. A single-wire antenna may then be connected to the high side of C-11, and the degree of loading may be adjusted by varying C-11 and retuning C-10. In all cases C-10 should be tuned for the minimum plate current, and each readjustment of C-11 will require a change of C-10. This provides an easy method of connecting a wide variety of types of single-wire antennas to the transmitter and quickly adjusting to the proper degree of loading. The loading is made greater as the capacity of C-11 is decreased.

A single meter is provided with a switch which permits reading plate current in either the oscillator or the final stage. Because of the excellent shielding and the good circuit layout it was unnecessary to neutralize the 807 tube.

The transmitter may be used on all bands from 160 to 10 meters, and doubling may be accomplished in the crystal stage when using 160, 80 and 40 meter crystals. A closed circuit jack is provided which permits keying the oscillator and amplifier stages simultaneously. Too much grid excitation on the 807 final causes the screen-grid current to become too high. Because the screen-grid voltage is obtained through a dropping resister, this increase in screen current causes the screen-grid voltage to become low enough that the power output capability of the 807 is reduced. In cases where less excitation is desired, the oscillator tank condenser C-6 may be turned toward its minimum capacity setting.



**Bottom View**

The modulator is a 6V6-G operating Class A, and the audio amplifier section consists of two 6J7 tubes, pentode connected, providing enough gain for operation with a crystal microphone.

The power supply uses a special vibrator transformer which may be used on either 6 volts DC or 115 volts AC. For AC operation the heater voltage for the tubes is obtained from a transformer winding; and for DC operation the heater voltage is obtained directly from the battery.

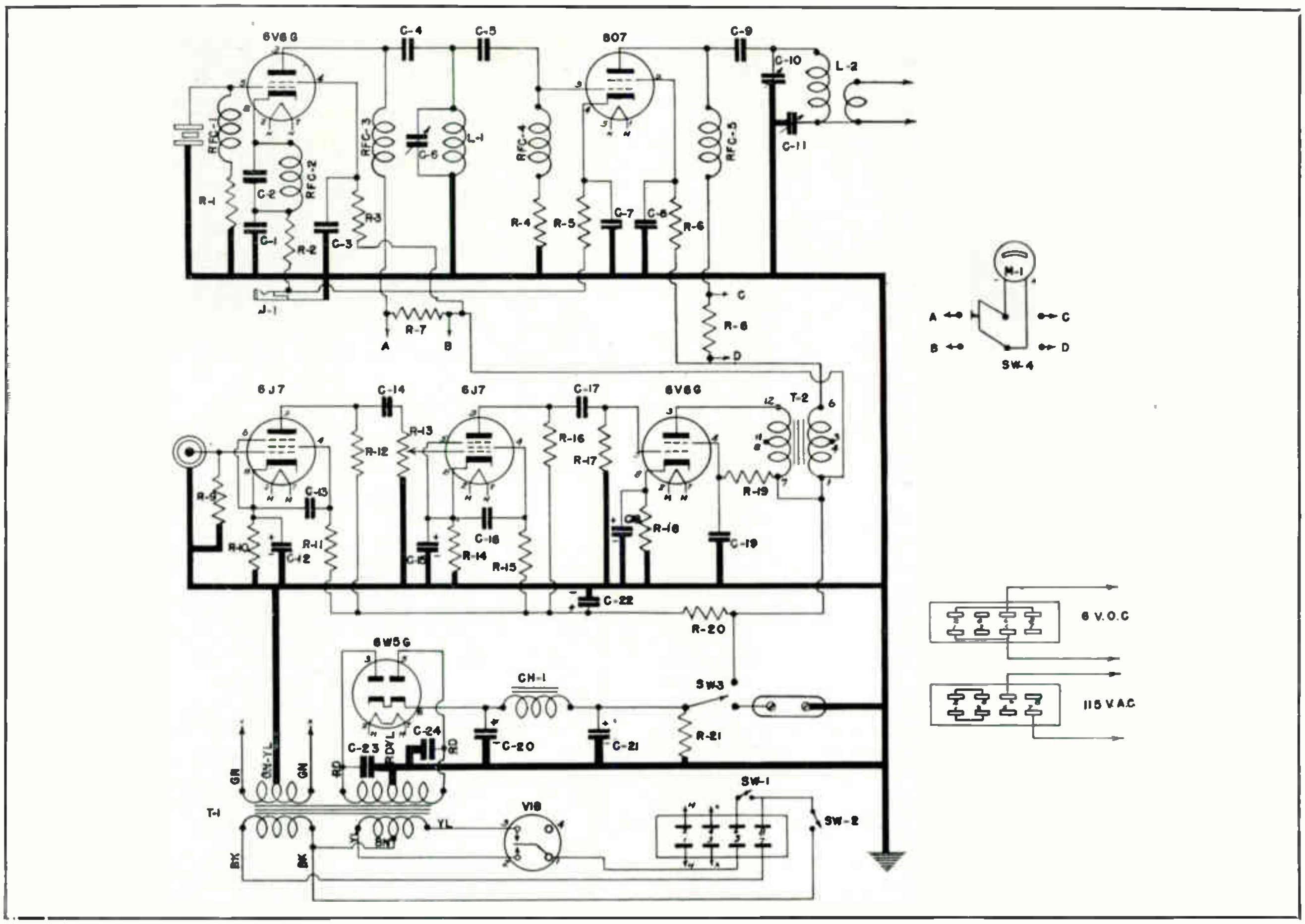
In DC operation the closing of SW-1 causes the filaments to be heated, and the closing of SW-2 causes the vibrator to operate. A short time should be allowed for the heaters to warm up before closing SW-2. Unless such a precaution is taken, there is possibility of damaging the 6W5-G tube.

In AC operation SW-1 should be closed, and the complete power supply is then controlled by SW-2. To provide a source of high voltage DC for the operation of receivers or any other auxiliary equipment, a switch is provided on the meter panel which removes the plate voltage from the tubes in the transmitter and makes it available at a terminal board to which may be connected any other equipment. This switch, SW-3, can then be used as a stand-by switch between transmissions. This source of voltage is available in either AC or DC operation. It is an extremely handy way of supplying the high voltage required for a receiver. Currents up to 100 MA may be drawn from the supply for use on external equipment.

The complete transmitter is mounted in a small metal cabinet and the entire unit, including the cabinet, is finished in gray flat enamel.

# 12 Watt Universal Transmitter

FOR PORTABLE AND EMERGENCY SERVICE




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-14R40 | Power Transformer |
| T-2 | T-19M13 | Modulation Transformer |
| CH-1 | T-57C53 | Filter Choke |

### Resistors:

R-1 20,000 Ohm 1 Watt Resistor
R-2 350 Ohm 10 Watt Resistor
R-3 15,000 Ohm 10 Watt Resistor
R-4 100,000 Ohm 1 Watt Resistor
R-5 300 Ohm 10 Watt Resistor
R-6 15,000 Ohm 10 Watt Resistor
R-7 50 Ohm 10 Watt Resistor
R-8 50 Ohm 10 Watt Resistor
R-9 5 Megohm ½ Watt Resistor
R-10 5,000 Ohm 1 Watt Resistor
R-11 3 Megohm ½ Watt Resistor
R-12 500,000 Ohm ½ Watt Resistor
R-13 1 Megohm Volume Control
R-14 5,000 Ohm 1 Watt Resistor
R-15 3 Megohm ½ Watt Resistor
R-16 500,000 Ohm ½ Watt Resistor
R-17 500,000 Ohm ½ Watt Resistor
R-18 300 Ohm 10 Watt Resistor
R-19 20,000 Ohm 1 Watt Resistor
R-20 20,000 Ohm 1 Watt Resistor
R-21 30,000 Ohm 20 Watt Resistor

### Condensers:

C-1 .01 Mfd. 400 Volt Condenser
C-2 .0001 Mfd. 500 Volt Mica Condenser
C-3 .01 Mfd. 400 Volt Condenser
C-4 .002 Mfd. 1,000 Volt Mica Condenser
C-5 .0001 Mfd. 500 Volt Mica Condenser
C-6 100 Mmfd. Variable Condenser
C-7 .002 Mfd. 500 Volt Mica Condenser
C-8 .002 Mfd. 500 Volt Mica Condenser

### Condensers: (Cont.)

C-9 .002 Mfd. 1,000 Volt Mica Condenser
C-10 100 Mmfd. Variable Condenser
C-11 100 Mmfd. Variable Condenser
C-12 10 Mfd. 25 Volt Electrolytic Condenser
C-13 .04 Mfd. 400 Volt Condenser
C-14 .04 Mfd. 400 Volt Condenser
C-15 10 Mfd. 25 Volt Electrolytic Condenser
C-16 .04 Mfd. 400 Volt Condenser
C-17 .04 Mfd. 400 Volt Condenser
C-18 10 Mfd. 25 Volt Electrolytic Condenser
C-19 .5 Mfd. 400 Volt Condenser
C-20 4 Mfd. 600 Volt Condenser
C-21, C-22 Double 8 Mfd. 450 Volt Condenser
C-23 .05 Mfd. 1,600 Volt Condenser
C-24 .05 Mfd. 1,600 Volt Condenser

### RF Chokes:

RFC-1 RF Choke
RFC-2 RF Choke
RFC-3 RF Choke
RFC-4 RF Choke
RFC-5 RF Choke

### Miscellaneous Parts:

1 Chassis 10" x 14" x 3" (Punched and Drilled)
1 Panel (Punched and Drilled)
1 Cabinet
1 Vibrator Mounting Plate
3 Feed-thru Insulators
3 5-Contact Sockets
5 Octal Sockets
1 4-Contact Socket
1 5-Contact Socket
2 DPST Switches
1 SPDT Switch
1 DPDT Switch
1 Phone Jack, Circuit Closing

### Miscellaneous Parts: (Cont.)

1 Plug
2 Sockets
1 Mic. Plug
1 Mic. Plug Shield
4 Knobs
1 Name Plate Marked "A.F. GAIN"
1 Name Plate Marked "CRYSTAL OSC. PLATE"
2 Name Plates Marked "POWER AMP. PLATE"
1 Name Plate Marked "SEND-RECEIVER"
1 Name Plate Marked "PLATE VOLTS"
1 Name Plate Marked "KEY"
1 Name Plate Marked "PLATE CURRENT"

Miscellaneous nuts, bolts, soldering lugs, lock-washers, grommets and other hardware.

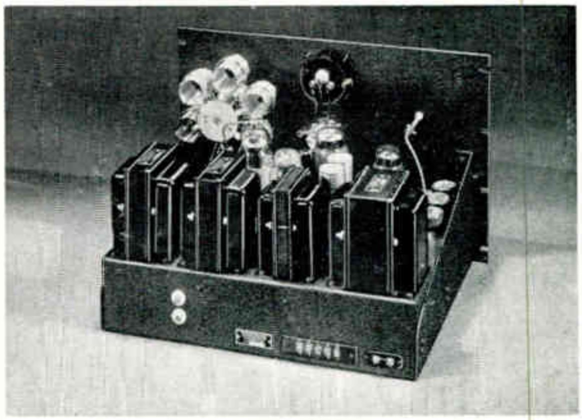
### Accessories:

1 Vibrator Mallory 825 or Equivalent
1 0-100 MA DC Meter 2" Square Case Triplett 227A or Equivalent
1 Crystal
1 6W5-G Tube
2 6V6-G Tubes
2 6J7 Tubes
1 807 or HY61/807 Tube
2 160 Meter RF Coils, End Linked, No Tap, Bud OEL-160, or Equivalent
2 80 Meter RF Coils, End Linked, No Tap, Bud OEL-80, or Equivalent
2 40 Meter RF Coils, End Linked, No Tap, Bud, OEL-40, or Equivalent
2 20 Meter RF Coils, End Linked, No Tap, Bud OEL-20, or Equivalent
2 10 Meter RF Coils, End Linked, No Tap, Bud OEL-10, or Equivalent

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 40 Watt Band-Switch Exciter

Panel View



Chassis View

THIS 40 watt exciter operates on the five amateur bands from 160 to 10 meters, all bands being selected by switches on the panel. The operator has the choice of three crystal frequencies, which may provide operation on all bands or at slightly different points in the same band.

The exciter is a three-stage unit using a 6V6-G crystal oscillator, a 6L6-G buffer-doubler and an 807 final amplifier. The exciter is built on a 17" x 13" x 4" chassis, complete with its filament and high voltage power supplies. It is supplied with a specially prepared 19" x 12¼" panel designed to harmonize with the many high power units with which it may be associated. The panel is finished in black with white lettering opposite all switches and dials. No additional markings or lettering are necessary. The position of each coil switch is clearly shown. The chassis is equipped with a five-lug terminal board so that connections can be made for controlling high voltage power supplies and filament supplies for other units by means of the switches on this chassis.

### Circuit Details

The 6V6-G crystal oscillator is of the regenerative type having an RF choke in its cathode circuit. The oscillator plate tank coil is a Barker and Williamson type 2AB, which may be tuned with one condenser to all five frequency bands. This tank coil is divided into five sections, and the switching is such that all five sections are used for 160 meters; and only one section for 10 meters. The shorting switch on this coil is such that not only are the unused portions of the coil shorted out, but the unused portion adjacent to the one in operation is independently and directly shorted out. This feature reduces the losses due to shorted turns.

The oscillator stage operates with a plate voltage of 350 volts and a screen voltage of 180 volts. When loaded by the buffer-doubler stage, the oscillator plate current is about 20 to 25 MA. For 10 meter operation best results are obtained by using a 20 meter crystal, although quadrupling from 40 meters may also be easily carried out in the buffer-doubler. The crystals are mounted on the chassis with very short leads to the grid circuit. Crystal switching is accomplished by means of a flexible shaft connected to the crystal switch on the panel. This allows the crystal to be well placed to avoid undesirable electrical effects and also permits the crystal switch to be placed in a position on the panel which makes operation most convenient.

The buffer-doubler stage uses a 6L6-G with a plate voltage of 400 V. and a screen voltage of 180 V. This stage also has for its plate tank coil a type 2AB coil which covers five bands with one condenser. When loaded down by the grid of the final stage, the buffer-doubler plate current is 35 to 40 MA. With excitation on any band from 160 to 20 meters the buffer-doubler stage very efficiently doubles. With excitation on 160, 80 and 40 meters, quadrupling may be accomplished in this stage. Although the 6L6-G is not neutralized, the amount of feedback is so low that the stage may be worked "straight through" on 160 meters.

The final amplifier stage uses an 807 and operates with 400 volts on the plate and 270 volts on the screen. A power input of 40 watts may be obtained under such conditions, and the power output is of the order of 25 watts. The excitation to this stage should be adjusted so that the grid current is 5 to 10 MA. Care should be taken not to overdrive this beam power tube, for in such a case the plate efficiency decreases. Usually more than enough excitation is obtainable, and the reduction of excitation to this stage may be accomplished by slightly detuning the buffer-doubler tank. The cathode bias on the buffer-doubler stage prevents the current from rising to abnormal values when detuning. The final plate coil is of turret type construction; and the turret has mounted upon it a coil for each of the five bands, each coil with its associated link. Provision is made for shorting out the four unused coils and their links. The final tank condenser is of the split-stator type with the rotor grounded. It was not found necessary to neutralize the final amplifier.

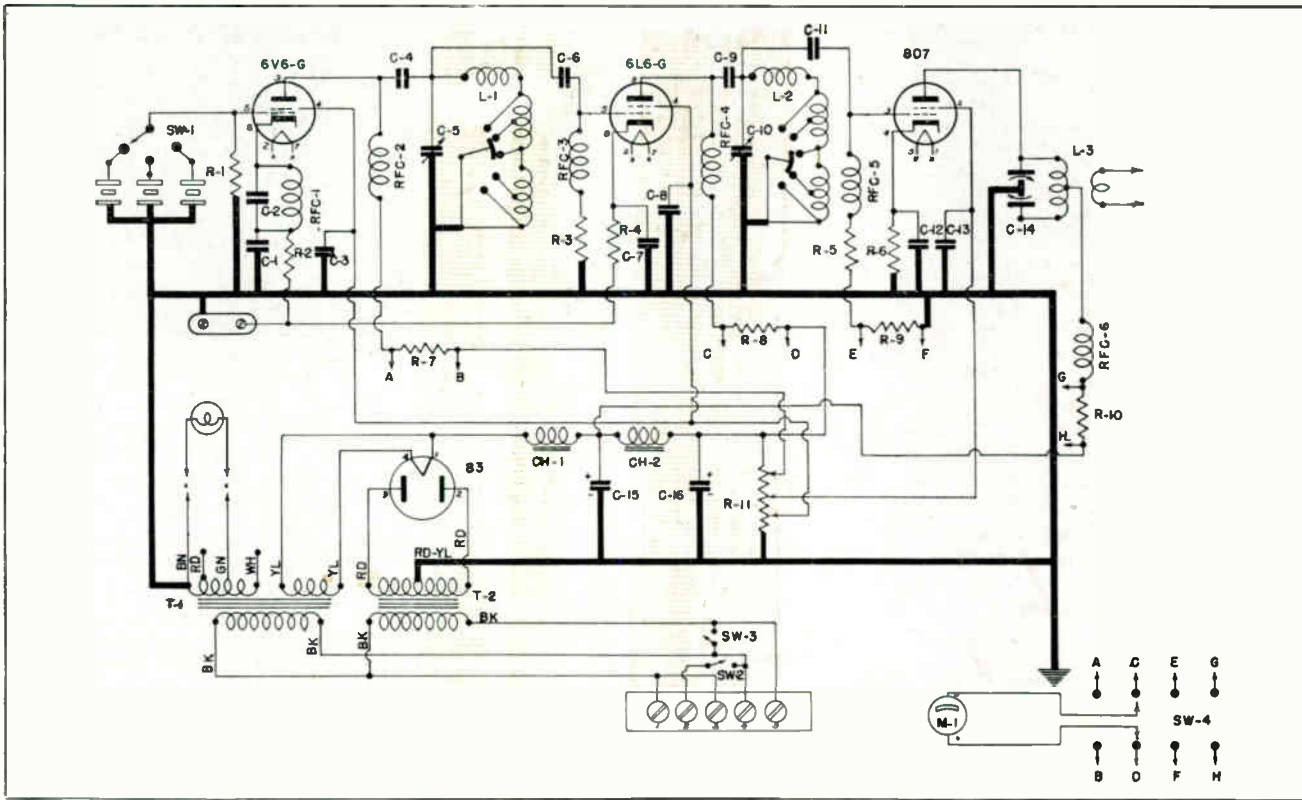
The power supply uses an 83 rectifier, and the power transformer is conservatively rated. Filament and plate supplies may be switched separately from the front of the panel. The switches are plainly marked on each panel.

The oscillator tank and buffer tank coils are mounted with their axes at right angles to each other to avoid any interaction. The final tank coil is mounted above the chassis, and no coupling exists from the final coil to any of the low power stages.

The power output is sufficient to excite Class C stages having inputs as high as 250 to 400 watts. A single meter on the panel and its associated switch provide current readings in the following circuits: crystal oscillator plate, buffer-doubler plate, final amplifier grid and final amplifier plate.

The chassis construction is so arranged as to provide for an increase in power output by changing to the circuit shown for the 120 watt band switching exciter. Knock-out holes are made for the addition of rectifier tube sockets, and extra holes are drilled in the chassis to accommodate the dual plate transformer and the T-19F77 filament transformer required because of the additional 866-JR filament load. Space is provided on the under side of the chassis for the mounting of the high voltage condensers used to filter the output of the 866-JR's.

## 40 Watt Band-Switch Exciter



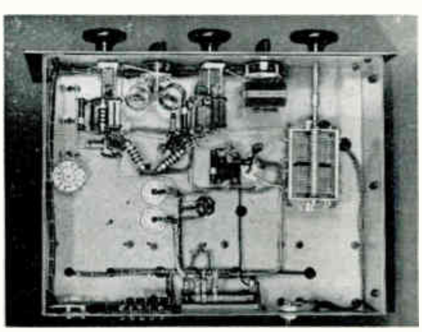

# Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-19F76 | Filament Transformer |
| T-2 | T-94P60 | Plate Transformer |
| CH-1 | T-75C51 | Filter Choke |
| CH-2 | T-75C51 | Filter Choke |

### Resistors:

| | |
|---|---|
| R-1 | 20,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor |
| R-3 | 100,000 Ohm 1 Watt Resistor |
| R-4 | 350 Ohm 10 Watt Resistor |
| R-5 | 10,000 Ohm 10 Watt Resistor |
| R-6 | 350 Ohm 10 Watt Resistor |
| R-7 | 50 Ohm 10 Watt Resistor |
| R-8 | 50 Ohm 10 Watt Resistor |
| R-9 | 50 Ohm 10 Watt Resistor |
| R-10 | 50 Ohm 10 Watt Resistor |
| R-11 | 25,000 Ohm 50 Watt Semi-Variable Resistor, Ohmite or Equivalent |



Bottom View

### Condensers:

| | |
|---|---|
| C-1 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-2 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-3 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-4 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-5 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-6 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-7 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-8 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-10 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-11 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-12 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-14 | 260-260 Mfd. Variable Condenser, Cardwell MR-260-BD or Equivalent |
| C-15 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-16 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |

### Tubes:

| | | |
|---|---|---|
| 1 | 6V6-G | Tube |
| 1 | 6L6-G or 6L6 GX | Tube |
| 1 | 807 or HY61/807 | Tube |
| 1 | 83 | Tube |

### RF Chokes:

| | |
|---|---|
| RFC-1 | RF Choke, Millen #34101 or Equiv. |
| RFC-2 | RF Choke, Millen #34101 or Equiv. |
| RFC-3 | RF Choke, Millen #34100 or Equiv. |
| RFC-4 | RF Choke, Millen #34101 or Equiv. |
| RFC-5 | RF Choke, Millen #34100 or Equiv. |
| RFC-6 | RF Choke, Millen #34100 or Equiv. |

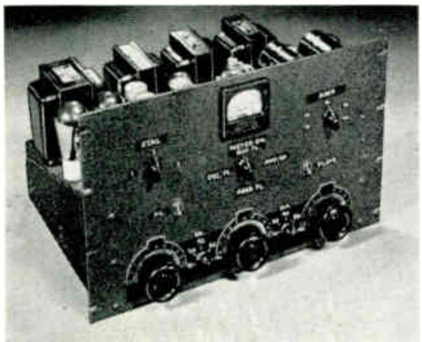
### Miscellaneous Parts:

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 4" |
| 1 | | Panel 19" x 12¼" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Condenser Mounting Bracket |
| 2 | | Bushings |
| 2 | | Octal Sockets |
| 1 | | 4-Contact Socket |
| 1 | | 5-Contact Socket, Steatite |
| 3 | | 4-Contact Sockets, Steatite |
| 2 | | Feed-thru Insulators |
| 1 | | Grid Grip |
| 3 | | Crystal Sockets, Millen #33002 or Equiv. |
| 1 | SW-1 | Single Pole 4-Throw Switch, Isolantite, Centralab 2542 or Equivalent |
| 1 | SW-2 | SPST Switch, Arrow H & H #20994 |
| 1 | SW-3 | SPST Switch, Arrow H & H #20994 or Equivalent |
| 1 | SW-4 | 2-Pole 4-Throw Switch, Isolantite, Centralab 2543 or Equivalent |
| 1 | L-1 | Band Switch Coil, B-W Type 2AB or Equivalent |
| 1 | L-2 | Band Switch Coil, B-W Type 2AB or Equivalent |
| 1 | L-3 | Baby Turret, B-W Type BTCL |
| 1 | M-1 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | | Grid Grip, National Type 24 or Equiv. |
| 3 | | Control Wheels 2¼" Diameter, Coto CI-45 or Equivalent |
| 5 | | Knobs, Crowe #588 or Equivalent |
| 1 | | Tube Shield, Hammarlund Type PTS or Equivalent |
| 1 | | Shaft Extension, Yaxley #RS-242 |
| 1 | | Panel Bearing Assembly, Johnson #256 or Equivalent |
| 1 | | Shaft Coupling, National TX-11 |

Miscellaneous screws, nuts, bolts, lock-washers required hook-up wire and other hardware.

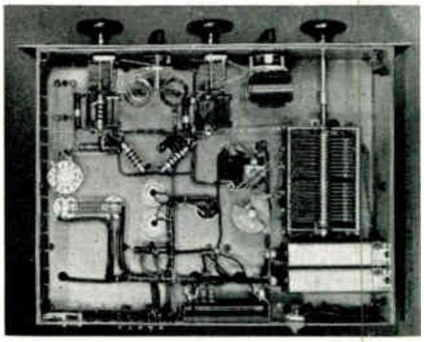
*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 120 Watt Band-Switch Exciter



Panel View

Chassis View



Bottom View

FOR transmitters having inputs as high as 700 or 800 watts this exciter provides adequate excitation on all bands from 160 to 10 meters without the necessity of plugging in different coils. Three crystal frequencies and five operating bands may be selected at will by means of controls on the panel.

The exciter uses for its final amplifier an 811 tube operating at a plate voltage of 1000 volts. The power input to the final stage is 120 watts, and power outputs of over 70 watts may be realized on all bands.

The panel is an especially designed unit requiring no additional name plates or markings. It is finished in black with white lettering, and the position of each control is clearly indicated.

The chassis and panel are the same as those used on the 40 watt band switching exciter. For converting the 40 watt unit to this 120 watt unit it is necessary only to replace the filament plate transformers, to add two filter condensers, a neutralizing condenser and a bleeder resistor; and to replace the final tank circuit with a larger unit. The same convenience of operation and attractive appearance will be retained by the amateur who wishes to increase the power output of his exciter without obsoleting the smaller equipment.

The crystal oscillator stage uses a 6V6-G tube operating with a plate voltage of 350V. and a screen-grid voltage of 190V. This stage drives a buffer-doubler stage with a 6L6-G tube operating at a plate voltage of 400V. and a screen-grid voltage of 275V. This buffer-doubler stage provides adequate excitation to the 811 grid on all bands.

The crystal oscillator stage operates with crystals in any band from 160 to 10 meters. When using crystals in the 160, 80 and 40 meter bands, doubling may be accomplished in the oscillator; and enough output is available from it to drive the 6L6-G buffer-doubler stage easily. When working "straight through" in the crystal oscillator stage, the plate current is of the order of 20 to 25 MA when loaded with the grid of the buffer-doubler stage. The buffer-doubler stage may be operated "straight through," or it may be used to double. With grid excitation on 160, 80, 40 and 20 meters, doubling is easily accomplished in this stage with enough power output to excite the 811 final stage easily. With excitation on 160, 80 and 40 meters, quadrupling can be carried on to give good outputs on 40, 20 and 10 meters.

Although the buffer-doubler stage is not neutralized, no difficulties will be encountered when operating "straight through." However, for best results, it is recommended that wherever possible frequency multiplication be accomplished in this stage.

The oscillator and buffer-doubler plate tank coils are sectionalized and mounted on a switch so that the amount of the coil being used can be easily controlled from the panel. It is thus possible to tune to all five bands with a single condenser. These tank coils are of the type in which the unused winding is short circuited.

The buffer-doubler stage is capacity coupled to the 811 grid. At resonance, and when loaded by the final grid, the plate current in the buffer-doubler stage is of the order of 55 to 60 MA.

The final tank circuit consists of a split-stator condenser and a Barker-Williamson type BCL turret assembly. This coil assembly consists of five coils, one for each frequency band. The coil which is desired may be selected from the panel, and the other four coils with their links shorted out.

The 811 tube is neutralized in a conventional manner, and no difficulty is encountered in obtaining perfect neutralization.

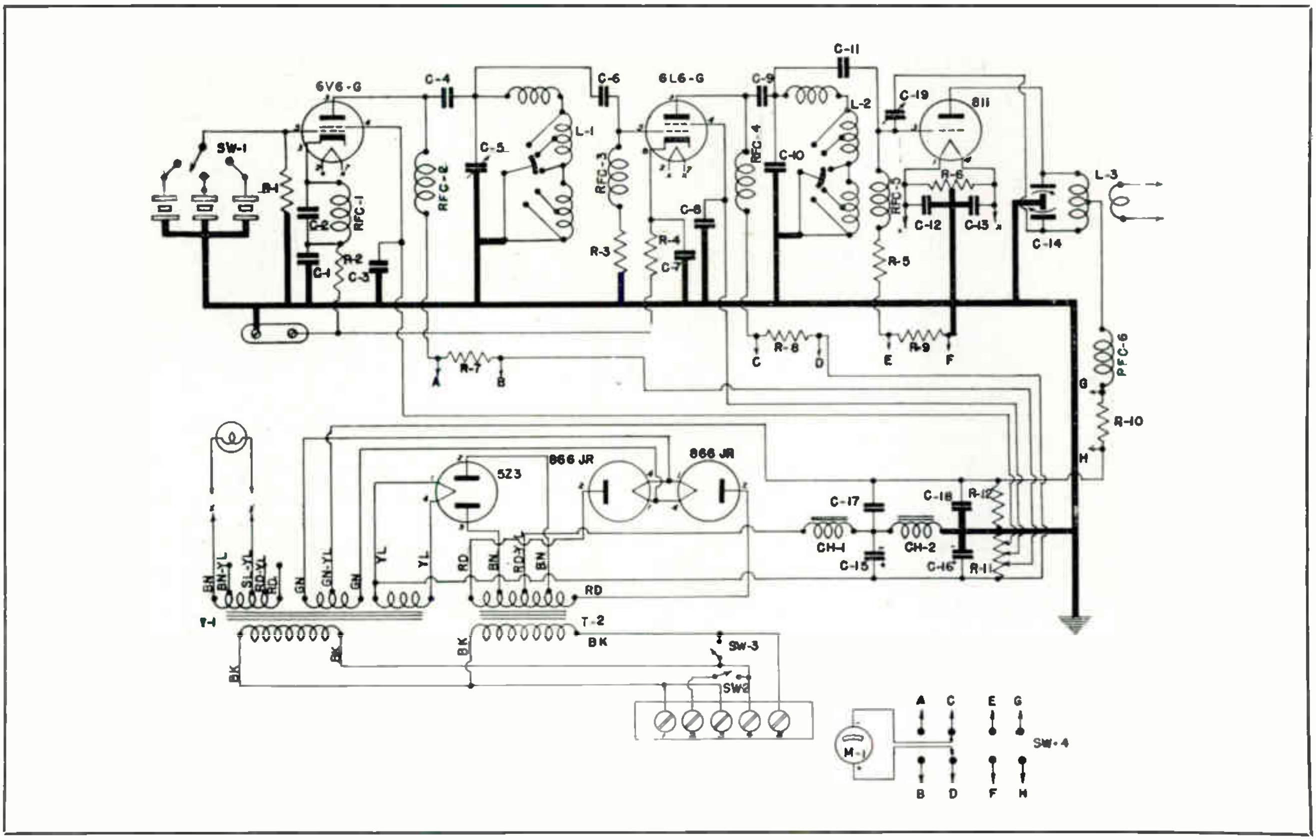
Since it is a high mu tube, the 811 requires no bias to protect it in the event of failure of excitation. In this exciter grid leak bias is used. With proper excitation the grid current should be 30 to 35 MA.

Two DC power supplies are mounted upon this chassis, one delivering 400 volts to supply the oscillator and buffer-doubler stages and the other delivering 1000 volts to the 811 tube. The low voltage rectifier uses a 5Z3 tube, and the high voltage rectifier uses two 866-JR tubes. These power supplies are filtered with the same chokes.

Filament supplies for the RF tubes and for the rectifier tubes are controlled by a single switch on the panel, and the two high voltage supplies by another switch. The terminal board on the rear of the chassis has three extra terminals so that other units associated with this exciter may be controlled by the exciter switches.

A single meter is mounted upon the panel, and under it a four-position switch permits the reading of the oscillator plate current, the buffer-doubler plate current, the final amplifier grid current and the final amplifier plate current.

The three crystal sockets are mounted on the chassis base. The selector switch is coupled to the panel switch by means of a flexible shaft, thus permitting the crystals to be located for best performance and retaining a convenient switch position on the panel.




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-19F77 | Filament Transformer |
| T-2 | T-19P57 | Plate Transformer |
| CH-1 | T-75C51 | Filter Choke |
| CH-2 | T-75C51 | Filter Choke |

### Resistors:

| | |
|---|---|
| R-1 | 20,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-3 | 100,000 Ohm 1 Watt Resistor |
| R-4 | 350 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-5 | 2,500 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-6 | 20 Ohm 10 Watt Center Tapped Resistor, Ohmite Brown Devil or Equivalent |
| R-7 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-8 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-9 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-10 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-11 | 25,000 Ohm 50 Watt Semi-Variable Resistor, Ohmite #0585 or Equivalent |
| R-12 | 100,000 Ohm 50 Watt Resistor, Ohmite or Equivalent |

### Condensers:

| | |
|---|---|
| C-1 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-2 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-3 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-5 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |

### Condensers: (Cont.)

| | |
|---|---|
| C-6 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-7 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-10 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-11 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-14 | 210-210 Mmfd. Variable Condenser, Cardwell XT-210-PD or Equivalent |
| C-15 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-16 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-17 | 2 Mfd. 1,500 Volt Condenser, Mallory TX-808 or Equivalent |
| C-18 | 2 Mfd. 1,500 Volt Condenser, Mallory TX-808 or Equivalent |
| C-19 | Neutralizing Condenser, E. F. Johnson #13G45 or Equivalent |

### Tubes:

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6V6-G | Tube | 1 | 811 | Tube |
| 1 | 6L6-G or 6L6GX | Tube | 1 | 5Z3 | Tube |
| | | | 2 | 866-Jr. | Tubes |

### RF Chokes:

| | |
|---|---|
| RFC-1 | RF Choke, Millen #34101 or Equiv. |
| RFC-2 | RF Choke, Millen #34101 or Equiv. |
| RFC-3 | RF Choke, Millen #34101 or Equiv. |
| RFC-4 | RF Choke, Millen #34101 or Equiv. |
| RFC-5 | RF Choke, Millen #34101 or Equiv. |
| RFC-6 | RF Choke, Millen #34101 or Equiv. |

### Miscellaneous Parts:

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 4" |
| 1 | | Panel 19" x 12¼" |
| 1 | Pr. | Chassis Mounting Brackets |
| 1 | | Condenser Mounting Bracket |
| 2 | | Bushings |
| 2 | | Octal Sockets |
| 1 | | 4-Contact Socket |
| 1 | | 5-Contact Socket, Steatite |
| 3 | | 4-Contact Sockets, Steatite |
| 2 | | Feed-thru Insulators |
| 1 | | Grid Grip |
| 3 | | Crystal Sockets, Millen #33002 or Equiv. |
| 1 | SW-1 | Single-Pole, 4-Throw Switch, Isolantite, Centralab #2543 or Equivalent |
| 1 | SW-2 | SPST Switch, Arrow H & H #20992 (Nickel Plated) or Equivalent |
| 1 | SW-3 | SPST Switch, Arrow H & H #20992 (Nickel Plated) or Equivalent |
| 1 | SW-4 | 2-Pole, 4-Throw Switch, Isolantite, Centralab #2543 or Equivalent |
| 1 | L-1 | Band Switch Coil, Barker-Williamson Type 2AB or Equivalent |
| 1 | L-2 | Band Switch Coil, Barker-Williamson Type 2AB or Equivalent |
| 1 | L-3 | Coil Turret Assembly, Barker-Williamson Type BCL or Equivalent |
| 1 | M-1 | 0-200 MA DC Meter, 2" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 3 | | Control Wheels, 2¼" Diameter, Coto CI-45 or Equivalent |
| 5 | | Knobs, Crowe #588 or Equivalent |
| 1 | | Shaft Extension, Yaxley #RS-242 or Equivalent |
| 1 | | Panel Bearing Assembly, Johnson #256 or Equivalent |
| 1 | | Shaft Coupling, National TX-11 |

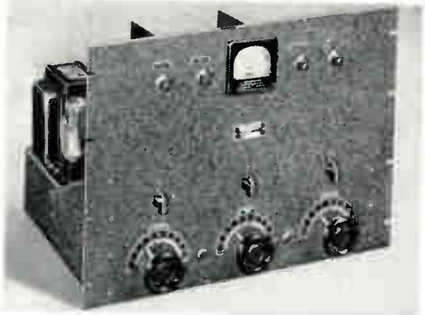
Miscellaneous nuts, bolts, soldering lugs, lock-washers, varnished tubing, cable and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# Band-Switch Transmitter

100 WATT MULTI-BAND

Complete Transmitter



RF Section

Modulator

THIS complete 100 watt transmitter consists of two units, each having its own power supply. The RF section may be modulated or may be used for CW only. Its final stage operates at 1000 volts with 100 watts input. The modulator provides sufficient power output to modulate 100% the RF section, and the speech amplifier is incorporated in the modulator chassis.

Any three pre-selected amateur bands in the range from 160 to 10 meters may be selected with panel switches.

The RF section is a three-stage circuit using a 6L6-G oscillator, a 6L6-G buffer-doubler stage and a TZ-40 final stage.

The oscillator stage has provision for switching in its plate tank circuit any one of three coils, and the same switching operation which selects the coils also selects the proper crystal. With 160 and 80 meter crystals, doubling can be accomplished in the oscillator stage, but crystals in the range from 160 to 20 meters may be used in the oscillator stage when working "straight through."

In the buffer stage provision is made for switching to any one of three tank coils. Because the 6L6-G buffer-doubler tube is not neutralized and since, when the second stage is used in frequency multiplying service, adequate drive is obtained on the TZ-40, it is recommended that doubling be carried on in this stage whenever possible. However, on the lower frequency bands, there is no tendency toward trouble when operating "straight through." In all cases the final stage is operated "straight through." For 10 meter output it is recommended that a 20 meter crystal be used and that doubling be carried on in the second stage.

The oscillator stage is capacity coupled to the buffer-doubler stage, and the latter is capacity coupled to the final grid.

Three Barker-Williamson center linked, center tapped tank coils, mounted in a type B coil turret, permit the selection of any one of these coils for use in the final tank. With this arrangement the link around the coil in use is connected to the antenna or to an antenna matching network.

With one meter and four meter switches provision is made for reading the oscillator cathode current, the buffer-doubler cathode current, the final grid current and the final plate current. The meter switches are of such a type that the circuit controlled by each switch may be opened by placing the switch in its "half way" position.

Two direct current supplies are installed in this chassis, one of which delivers approximately 400 volts to supply the plates of the 6L6-G's and the other which delivers 1000 volts to supply the plate of the TZ-40. The screen supply for the 6L6-G's is taken from taps on the 400 volt bleeder R-5, these taps being adjusted so that the voltage on the oscillator screen-grid is about 150 to 200 volts and on the buffer-doubler screen-grid it is about 200 to 250 volts. When the oscillator tube is operating properly, the cathode current should dip to a value of 50 MA or less, and the cathode current in the buffer-doubler stage at resonance, should be about 75 MA. The grid current on the final should be 25 MA or more; and for a 100 watt input to the final stage, the TZ-40 plate current should be 100 MA.

The removal of the high voltage for neutralizing the final stage may be done easily by removing the 866-JR tubes from their sockets and then making the neutralizing adjustment in the conventional manner with the antenna or antenna matching network connected to the link on the final tank coil.

For CW operation the key is connected between terminals 1 and 2 on the five-screw terminal board on the back apron of the chassis, the 115 volt line is connected to terminals 3 and 4 and the plate voltage is controlled by a switch connected between terminals 4 and 5. The terminals of the two No. 55 feed-thru insulators on the rear apron of the chassis are connected together.

### Modulator Unit:

The modulator tubes are 6L6-G's in push-pull, Class $AB_2$. These tubes are connected to the Class C load through a Multi-Match modulation transformer. The connections to the modulation transformer are as follows: One 6L6-G plate is connected to terminal 1, and the other plate to 6. Terminals 2 and 5 are joined and connected to the plate supply. Terminals 9 and 10 are also joined, but no connection is made to them. The Class C load is connected to terminals 8 and 12.

The speech amplifier tube line-up is as follows: a pentode connected 6J7, a 6F5 and a 6F6, triode connected.

The power supply uses an 83 to supply high voltage to all tubes and an 82 in the bias supply for the 6L6-G's.

In preparing the modulator unit for operation, an adjustment must be made of the bias and the screen voltage on the 6L6-G's. For obtaining the correct bias adjust R-11 until the voltage across it is 25 volts. Then adjust R-12 until the screen voltage is 310 volts. It may be necessary to readjust R-11 to maintain the 25 volts of bias. The modulator plate current should be about 115 MA for two tubes, and with a sine wave signal of sufficient magnitude to modulate 100% the RF section the plate current will rise to approximately 225 MA. For speech waves having the same peak power plate current will kick up to about 170 MA.

To connect the modulator to the RF section terminals 3, 4 and 5 on the RF

T40
Grid drive Last Night BXW Leo

Phone 7½ W Drive

CW 5 W.

BFO
Bcrev.

Dig good for Dual

Leo not getting me.

W9BXW.

BXW WFD W9BXW.

Coleman So. D. Back Ground.

Stomach Ray. Leo Dig

9VIZ Hammond Ind. Alkaseltzer Barn Dance

8' Wire on rec.

in front of big cold tea & they missed up

hum W9KEX

Personal stuff Ray

W9PRI I IRR

Bookworm

Tues Grm.

1250
125
6250
2500
1250
15625

14.500

65
100
4000

Kenney

n y

n bnl.

NFB

154
KGY

2- 57 - 57 - 55 - 46 - 44

Frank Cline

Glen and jig [illegible]

Hans Hansen

3139-15

test.

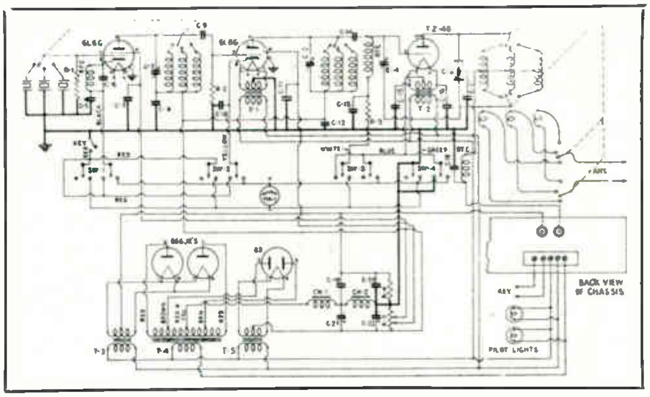
Ca'

1111

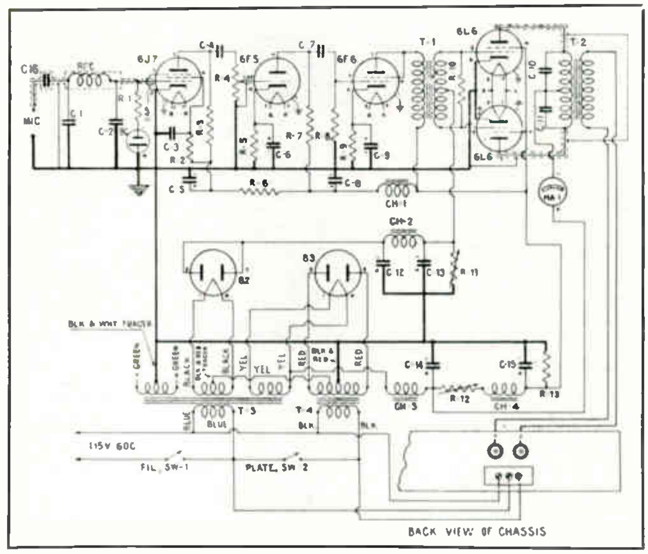
2175
3.00
12.50
1.25

# Band-Switch Transmitter

### 100 WATT MULTI-BAND



RF Unit




Modulator Unit

section should be connected to terminals 1, 2 and 3 on the modulator. Connection should be made from the terminals of the No. 55 feed-thru insulators on the modulator chassis to the corresponding insulators on the RF chassis. With the two chasses so interconnected the filament switch on the modulator chassis controls all the filaments, and the plate switch controls all plate supplies.

The RF section may be used alone as an exciter for transmitters having power inputs of almost one kilowatt.

| BAND | TURNS | WINDING LENGTH |
|---|---|---|
| 160 | 40 | Close wound |
| 80 | 22 | Close wound |
| 40 | 12 | 1⅝" |
| 20 | 6 | 1⅝" |
| 10 | ¾ | |
| Osc. & Buf. coils are identical. Use No. 18E wire on 1½" Diam. form. | | |

## RF Unit

### Parts Required

#### THORDARSON PARTS

| | | |
|---|---|---|
| 1 | T-17K21 | Foundation Unit |
| T-1 | T-19F97 | Filament Transformer |
| T-2 | T-19F93 | Filament Transformer |
| T-3 | T-19F88 | Filament Transformer |
| T-4 | T-19P57 | Plate Transformer |
| T-5 | T-19F91 | Filament Transformer |
| CH-1 | T-75C51 | First Choke |
| CH-2 | T-75C51 | Second Choke |

**Tubes:**

2 6L6-G or 6L6-GX Tubes
2 866-JR Tubes
1 TZ-40 Tube
1 83 Tube

**Resistors:**

R-1 50,000 Ohm 1 Watt Resistor, IRC BT-1
R-2 50,000 Ohm 10 Watt, Ohmite Red Devil
R-3 2,500 Ohm 25 Watt, Ohmite, Wirewound
R-4 100,000 Ohm 50 Watt, Ohmite Wirewound
R-5 20,000 Ohm 50 Watt, Ohmite Semi-Variable

**Condensers:**

C-1, C-2 Variable Condenser, National TMS-250
C-3 Variable Condenser, National TMC-200D
C-4 Neutralizing Condenser, Johnson 13G45
C-5, C-7, C-8, C-9, C-10, C-11, C-13, C-14, C-15, C-16 .001 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6D1
C-6 .0001 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6T1

## RF Unit

**Condensers: (Cont'd)**

C-12 .005 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6D5
C-17, C-18 .001 Mfd. 5000 Volt Mica Condenser, Aerovox #1457 or C-D 4-25D1
C-19, C-20 2 Mfd. 1500 Volt Oil Filled Condenser, Aerovox #1505 (2" Can)
C-21 4 Mfd. 600 V. Electrolytic, Aerovox GL-600
C-22 4 Mfd. 600 V. Electrolytic, Aerovox GL-600

**Miscellaneous Parts:**

3 5-Contact Sockets, Amphenol S5
5 4-Contact Sockets, Amphenol S4
2 Octal Sockets, Amphenol S8
5 4-Contact Isolantite Sockets, Amphenol SS4
8 Feed-thru Insulators, Johnson #55
4 Feed-thru Insulators, Johnson #42
3 RF Chokes, National R-100
1 4" Shaft Extension, Yaxley #RS243
1 2-Gang Band Switch, Centralab #2543
1 1-Gang Band Switch, Centralab #2542
1 Coil Turret, Barker-Williamson Model "B"
1 160 Meter Coil, Barker-Williamson 160BL — Center Linked
1 80 Meter Coil, B-W 80BL, Center Linked
1 40 Meter Coil, B-W 40BL, Center Linked
1 20 Meter Coil, B-W 20BL, Center Linked
1 10 Meter Coil, B-W 10BL, Center Linked
3 2¼" Coto-Coil Wheels CI-45 With Indicator Plates CI-47 Marked "OSC. PLATE," "BUFFER PLATE," "PWR. AMP. PLATE."
4 Indicator Plates, Marked "OSC. PLATE," "BUFFER PLATE," "PWR. AMP. PLATE," "PWR. AMP. GRID," Coto-Coil CI-47.
4 Meter Switches, Yaxley #762
1 0-200 MA Meter, Simpson #27S or Triplett #327-A (Illum.)
3 1¼" Bar Knobs, Black
1 Grid Cap, Large, National Type 12
2 SPST 6 Ampere Toggle Switches, H & H #26993
6 Coil Forms, National XR-4
1 Cone Insulator, Johnson #601
1 Cabinet, Bud #697 or Par Metal #SC2613
1 Variable Resistor Lug, Ohmite #0358

## Modulator Unit

### Parts Required

#### THORDARSON PARTS

| | | |
|---|---|---|
| 1 | T-17K22 | Foundation Unit |
| T-1 | T-67D78 | Driver Transformer |
| T-2 | T-11M75 | CHT Modulation Transformer |
| T-3 | T-79F84 | Filament Transformer |
| T-4 | T-84P60 | Plate Transformer |
| CH-1 | T-74C30 | Third Choke |
| CH-2 | T-75C49 | Bias Choke |
| CH-3 | T-75C51 | First Choke |
| CH-4 | T-68C07 | Second Choke |

## Modulator Unit

**Tubes:**

1 6J7 Tube
1 6F5 Tube
1 6F6 Tube
2 6L6-G or 6L6-GX Tubes
1 82 Tube
1 83 Tube

**Resistors:**

R-1 5 Megohm ½ Watt Resistor, IRC BT-½
R-2 3 Megohm 1 Watt Resistor, IRC BT-1
R-3, R-8 250,000 Ohm 1 Watt Resistor, IRC BT-1
R-4 500,000 Ohm Volume Control, IRC 13-133
R-5 2000 Ohm 1 Watt Resistor, IRC BT-1
R-6 20,000 Ohm 1 Watt Resistor, IRC BT-1
R-7 100,000 Ohm 1 Watt Resistor, IRC BT-1
R-9 750 Ohm 10 Watt Resistor, IRC Type AB
R-10 10,000 Ohm 2 Watt Resistor, IRC BT-2
R-11 1500 Ohm 25 Watt Semi-Variable, Ohmite
R-12 2500 Ohm 25 Watt Semi-Variable, Ohmite
R-13 25,000 Ohm 50 Watt Wirewound, Ohmite

**Condensers:**

C-1, C-2 .0001 Mfd. 500 Volt Mica Condenser, Aerovox #1467 or C-D 5W-5T1
C-3 .04 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4S4
C-4, C-7 .1 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4P1
C-5 8 Mfd. 450 Volt Electrolytic Condenser, Aerovox PBS-450 or C-D JR508
C-6 10 Mfd. 25 Volt Electrolytic Condenser, Aerovox PR-25 or C-D ED-2100
C-8, C-15 8-8 Mfd. 450 V. Dual Elect., Aerovox 2G
C-9 10 Mfd. 50 V. Elect., Aerovox PR-50
C-10, C-11 0.002 Mfd. 1000 Volt Mica Condenser Aerovox #1455 or C-D 4-6D2
C-12, C-13 8 Mfd. 200 Volt Electrolytic Condenser, Aerovox PBS-200 or C-D JR208
C-14 8 Mfd. 600 V. Elect., Aerovox GL-600
C-16 0.01 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4S1

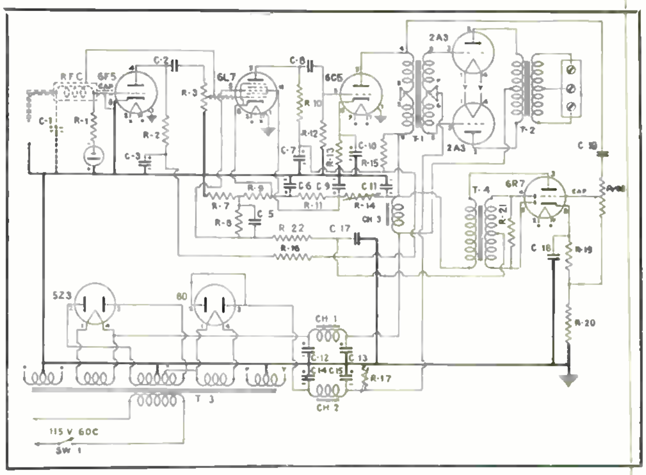
**Miscellaneous Parts:**

1 RF Choke, National R-100
1 Mic. Connector, Amphenol MC-1F
1 Mic. Connector, Amphenol PC-1M
1 Bias Cell, Mallory #F7
1 Bias Cell Holder, Mallory #GB-1A
1 1¼" Bar Knob, Black Streamlined
1 AC Line Cord and Plug, Belden #1725
5 Octal Sockets, Amphenol S8
2 4-Contact Sockets, Amphenol S4
2 Metal Tube Grid Caps
1 Dial Plate, Crowe #566
2 Feed-thru Insulators, Johnson #55
1 0-300 MA Meter, Simpson #27S or Triplett #827-A (Illuminated)
2 Metal Tube Shields, ARHCO #92
1 Red Jewel and Candelabra Bracket, ARHCO #93 or Drake Mfg. Co. #10C
1 Green Jewel and Candelabra Bracket, ARHCO #93 or Drake Mfg. Co. #10C
2 110 Volt Carbon Lamps Type G6

*Complete Instruction Book SD-386-A giving full details of building data, photos, diagrams and layout available at 25 cents postpaid.*

# Amateur Speech Amplifier

Chassis View




USING low plate resistance output tubes, this amplifier is capable of easily delivering 10 watts of audio power for driving the largest modulators used by amateurs. Its low internal output impedance provides the excellent regulation required in Class B driver service, and its high gain makes it usable with crystal microphones.

The circuit shown is that incorporating the peak limiting feature, but this amplifier is also available with a circuit for overmodulation control or as a conventional amplifier. The punched chassis is designed to fit either the regular type amateur transformers or the C.H.T. Series of transformers, which give better frequency response and less distortion. The amplifier may be adapted to rack and panel mounting, or a cover may be obtained for use on an operating table.

For T-2, a driver transformer may be used to couple the 2A3 plates directly to the Class B grids; or, if it is desired to locate the amplifier remotely from the modulator, an output transformer may be installed to couple the 2A3 plates to a 500 ohm line.

Specifications showing the different circuits, together with a complete parts list, are shown on the Thordarson SD-389 bulletin, available at all jobbers.

**Thordarson Parts**

| | |
|---|---|
| 1 | T-17K20 Foundation Unit |
| T-1 | T-15A74 |
| T-2 | T-15S90 or T-67S54 for 500 ohm output or T-15D76, T-15D77, T-15D78 or T-15D79 or T-19D01, T-19D02, T-19D03 or T-19D04 |
| T-3 | T-15R05 or T-87R85 |
| T-4 | T-78D46 |
| CH-1 | T-15C54 or T-74C29 |
| CH-2 | T-75C49 |
| CH-3 | T-74C30 |

**Tubes:**

1—6F5 1—6C5 1—5Z3 1—6R7 1—6L7 2—2A3 1—80

**Resistors:**

| | |
|---|---|
| R-1 | 5 Megohm, ½ Watt, IRC BT-½ |
| R-2 | 250,000 Ohms, 1 Watt, IRC BT-1 |
| R-3 | 500,000 Ohms, Volume Control, IRC 13-133 |
| R-7 | 350 Ohms, 10 Watts, Ohmite Brown Devil |
| R-8 | 500,000 Ohms 1 Watt, IRC BT-1 |
| R-9 | 150 Ohms, 10 Watts, Ohmite Brown Devil |
| R-10 | 100,000 Ohms, 1 Watt, IRC BT-1 |
| R-11 | 4,000 Ohms 10 Watts, Ohmite Brown Devil |
| R-12 | 250,000 Ohms 1 Watt, IRC BT-1 |
| R-13 | 500 Ohms, 1 Watt, IRC BT-1 |
| R-14 | 12,000 Ohms, 25 Watts, Ohmite Semi-Variable |
| R-15 | 20,000 Ohms, 1 Watt, IRC BT-1 |
| R-16 | 20,000 Ohms, 1 Watt, IRC BT-1 |
| R-17 | 2,500 Ohms, 25 Watts, Ohmite Semi-Variable |
| R-18 | 500,000 Ohms, Volume Control, IRC 13-133 |
| R-19 | 1,000 Ohms, 1 Watt, IRC BT-1 |
| R-20 | 2,500 Ohms, 1 Watt, IRC BT-1 |
| R-21 | 10,000 Ohms, 1 Watt, IRC BT-1 |
| R-22 | 100,000 Ohms, 1 Watt, IRC BT-1 |

**Condensers:**

| | |
|---|---|
| C-1 | 0.0001 Mfd., 500 V Mica Aerovox 1467 or C-D 5W-5T1 |
| C-2 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-3 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-5 | 0.5 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P5 |
| C-6 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-7, C-11 | 8-8 Mfd., 450 V Dual Elect. Aerovox 2G |
| C-8 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-9 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-10 | 10 Mfd., 25 V Elect. Aerovox PR-25 or C-D ED-2100 |
| C-12, C-13 | 8-8 Mfd., 450 V Dual Elect. Aerovox 2G |
| C-14 | 8 Mfd., 200 V Elect. Aerovox PBS-200 or C-D JR208 |
| C-15 | 8 Mfd., 200 V Elect. Aerovox PBS-200 or C-D JR208 |
| C-17 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-18 | 10 Mfd., 25 V Elect. Aerovox PB-25 or C-D ED-2100 |
| C-19 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |

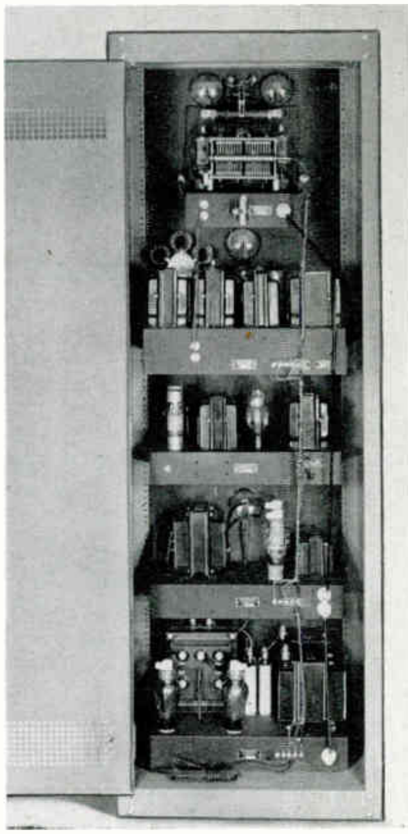
**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Mic. Input Connector, Amphenol MC1F |
| 1 | Mic. Input Connector, Amphenol PC1M |
| 1 | Red Jewel and Bracket, Yaxley No. 310R |
| 1 | Bias Cell, Mallory No. F7 |
| 1 | Bias Cell Holder, Mallory No. GB-1A |
| 1 | 1¼" Bar Knob, Black Streamlined |
| 1 | SPST Toggle Switch, H & H No. 20992 |
| 1 | AC Line Cord and Plug, Belden No. 1725 |
| 3 | Metal Tube Grid Caps |
| 2 | Metal Tube Shields, ARHCO No. 92 |
| 1 | Dial Plate, Crowe No. 566 |
| 1 | RF Choke, National R-100 |
| 4 | Octal Sockets, Amphenol S8 |
| 4 | 4-Contact Sockets, Amphenol S-4 |
| 1 | 6.3 Volt Pilot Light, Mazda No. 40 |

*The parts list shown is for the amplifier with either the over-modulation control or the peak limiting circuits; complete drawings, photos, parts lists and instructions for easy assembly of either of the above circuits are contained in Instruction Book SD-387, 15 cents postpaid.*

# 250 Watt Phone Transmitter

**450 WATT CW — 160 TO 10 METERS**



***High Efficiency Final Stage***

★

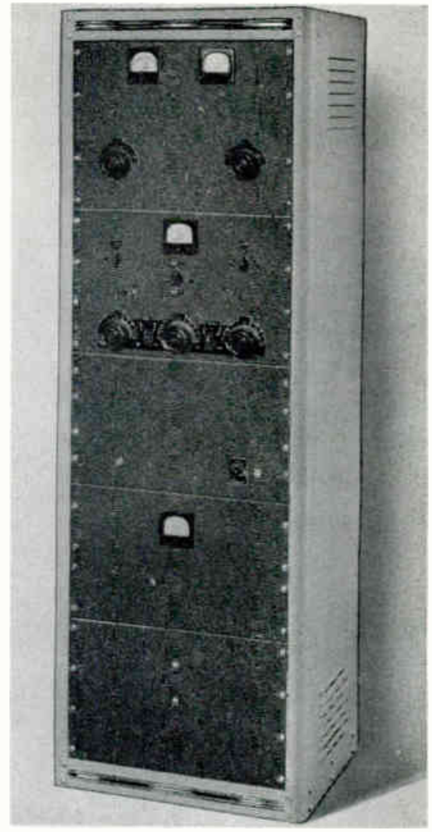
***Multi-Match Modulator***

★

***1250 and 1500 Volt Power Supply***

★

***Up to 150 Watts Modulator Output***



PARTICULARLY designed for use with the new RCA-811 and 812 tubes, this transmitter, with its unusual mechanical layout and carefully planned wiring, gives superior performance on the five amateur bands from 160 to 10 meters. With an input of 250 watts for phone operation, a carrier output of 190 watts is easily obtained; and with 450 watts input for CW, 350 watts may be delivered to the antenna. Higher than usual plate efficiencies are obtained by careful attention to mechanical layout and by the selection of high quality parts.

In addition to the RCA-812 the transmitter will also operate satisfactorily with other tubes such as the Taylor TZ-40, Taylor T-55, or the Eimac 35T. It is only necessary to use the correct filament transformer and to adjust the grid bias resistor.

A semi-fixed swinging link grid tank coil of the plug-in type is used in the grid circuit. This allows not only close adjustment for optimum excitation but also permits the coil to be removed without changing the link setting. This latter feature is particularly desirable for the amateur who wishes to avoid time-consuming operations when changing bands. The plate tank coil is also of the swinging link type, which permits quick adjustment of the amplifier loading. The Class C amplifier is easily driven by the Thordarson 40 watt Band-Switch Exciter unit, this combination affording the advantage of quick band changing without involving costly coil switching parts in the high power stage.

The Class C amplifier requires 200 MA at 1250 volts for a phone input of 250 watts. For a 450 watt CW input the plate current is 300 MA at 1500 volts. The grid current for the Class C tubes depends upon the choice of tubes and whether CW or phone operation is desired. For 812's it is 50 MA for two tubes. To meet the various bias requirements of the different tube types, an adjustable grid resistor is provided.

Should the amateur wish to install an external fixed bias supply for CW, provision has been made for its easy connection. If external bias is used, the negative of the bias supply connects to terminal No. 1 and the positive to No. 2. If external bias is not desired terminals No. 1 and No. 2 on the Class C amplifier chassis are connected together. About 30 volts of fixed bias are required to maintain the tubes within their rated plate dissipation without excitation.

Both the grid and the plate currents are metered, the meters being in the cathode return leads. This places both meters at a low DC potential with respect to the chassis, thus eliminating any tendency toward deflection of the needle due to electrostatic effects and removing the possibility of flash-over from the meter terminals to the pilot lamp mounting.

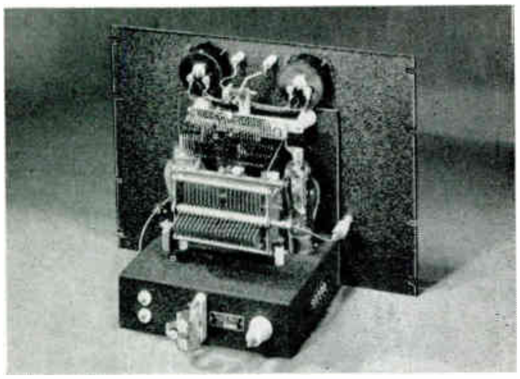
The modulator uses the new 811 tubes and easily delivers the required 125 watts of audio frequency power with very little distortion. It is designed to operate from a "500 ohm" line. The modulation transformer is of the Multi-Match type so that it may be used to modulate any Class C stage of 300 watts input power. The no-signal plate current of the 811's is 60 MA, and the current with a 125 watt sine wave output is 177 MA. For speech signals having the same peak power the plate current should swing to about 90 or 100 MA.

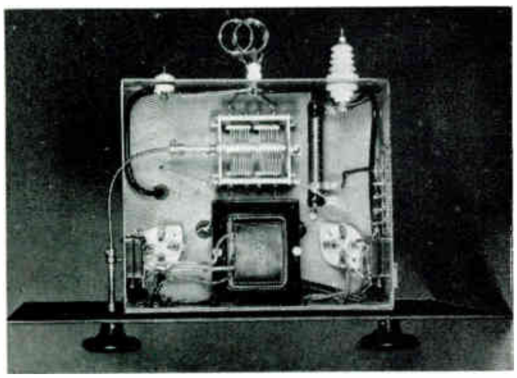
The required driving power is very small, being on the order of 4 peak

450 WATT CW — 160 TO 10 METERS

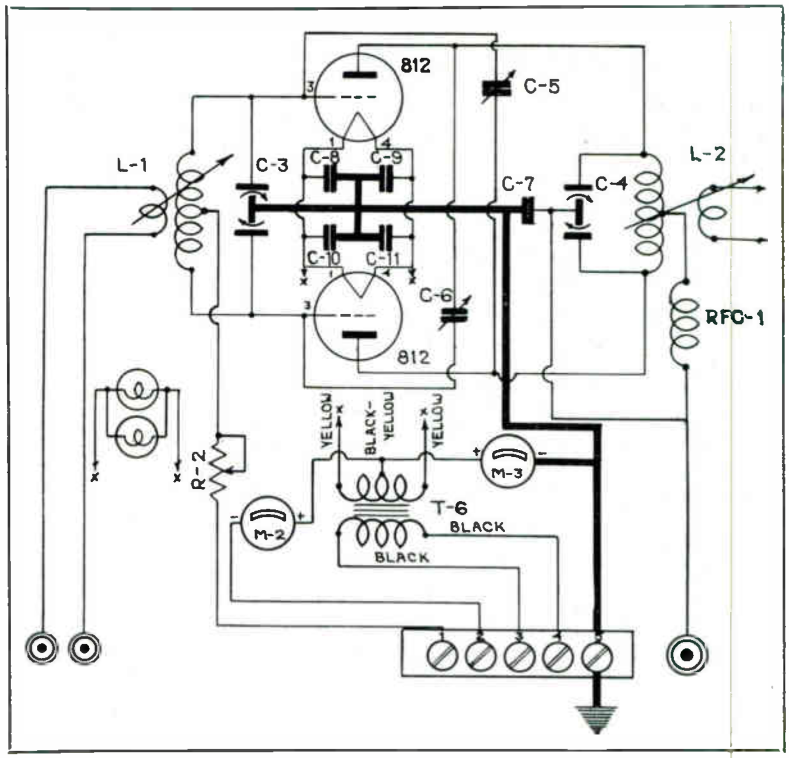
watts. If 2A3's are used as the driver tubes, an unusually high step-down ratio from the plates of the 2A3's to the grids of the 811's may be used to obtain excellent driving regulation. The Thordarson Amateur Speech Amplifier is an excellent unit to furnish the driving power required by this modulator.

The power supply, with its tapped plate transformer, is rated at 300 MA at 1250 or 1500 volts. The load requirements of the Class C amplifier and the modulator are such that the power supply is fully loaded for both phone and CW so that regardless of the type of operation the amateur chooses, he is not investing in a power supply which is not being loaded up to its rating at all times. The power supply is entirely self-contained with separate plate and filament switches, making it an ideal power supply for other equipment of similar load requirements.


RF Chassis View


RF Bottom View

## RF Section




## Parts Required

**THORDARSON TRANSFORMER**

| | | |
|---|---|---|
| T-6 | T-19F85 | Filament Transformer |

**Resistor:**

| | |
|---|---|
| R-2 | 4,000 Ohm 50 Watt Wirewound Ohmite Semi-Variable or Equivalent |

**Condensers:**

| | |
|---|---|
| C-3 | Variable Air Condenser, Cardwell MR-150-BD or Equivalent |
| C-4 | Variable Air Condenser, Cardwell XP-165-KD or Equivalent |
| C-5 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-6 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-7 | .001 Mfd. 3,500 Volt Mica Condenser Aerovox 1653 or Equivalent |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455 |
| C-10 | .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455 |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455 |

**Tubes:**

| | |
|---|---|
| 2 | 812 Tubes |

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 8½" x 10" x 3" |
| 1 | | Panel 19" x 14" |
| 1 | | Sub-Panel |
| 1 | | Terminal Board |
| 4 | | Bushings |
| 3 | | Feed-thru Insulators |
| 2 | | 4-Contact Isolantite Sockets |
| 2 | | Stand-off Insulators |
| 2 | | Shaft Couplings, National TX-11 or Equivalent |
| 1 | | Shaft Coupling, Johnson No. 252 or Equivalent |
| 2 | | Panel Bearing Assemblies, Johnson No. 256 or Equivalent |
| 1 | M-2 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett No. 327-A or Equivalent |
| 1 | M-3 | 0-300 MA DC Meter, 3" Square Case, Rear Illumination, Triplett No. 327-A or Equivalent |
| 2 | | Control Wheels, Complete, Coto CI-45 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP GRID" Coto CI-47 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP PLATE" Coto CI-47 or Equivalent |

**Misc. Parts: (Cont'd)**

| | | |
|---|---|---|
| 1 | | Coil Socket, National Type XB-16 or Equivalent |
| 1 | L-1 | 160 Meter Coil, National Type AR16-160C or Equivalent |
| 1 | L-1 | 80 Meter Coil, National Type AR16-80S or Equivalent |
| 1 | L-1 | 40 Meter Coil, National Type AR16-40S or Equivalent |
| 1 | L-1 | 20 Meter Coil, National Type AR16-20S or Equivalent |
| 1 | L-1 | 10 Meter Coil, National Type AR16-10S or Equivalent |
| 1 | L-2 | Swinging Link & Jack Bar Assembly, B-W Type TV or Equivalent |
| 1 | L-2 | 160 Meter Coil, B-W 160 TVL or Equivalent |
| 1 | L-2 | 80 Meter Coil, B-W 80 TVL or Equivalent |
| 1 | L-2 | 40 Meter Coil, B-W 40 TVL or Equivalent |
| 1 | L-2 | 20 Meter Coil, B-W 20 TVL or Equivalent |
| 1 | L-2 | 10 Meter Coil, B-W 10 TVL or Equivalent |
| 2 | | Grid Grips, National Type 12 or Equivalent |
| 1 | RFC-1 | RF Choke, National Type R-154U or Equivalent |

Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

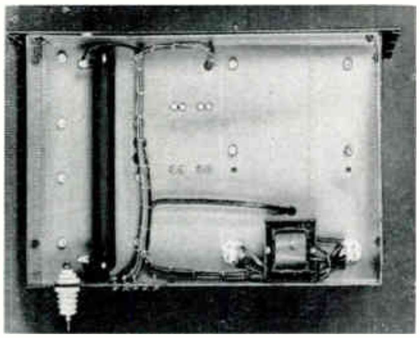
*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 250 Watt Phone Transmitter

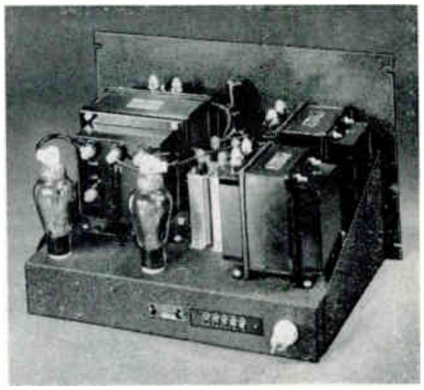
**450 WATT CW — 160 TO 10 METERS**

## Modulator and Power Supply

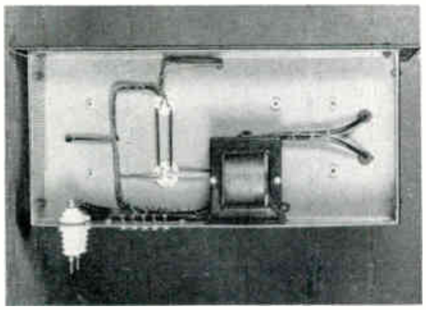
Modulator



Bottom View of Power Supply



Power Supply



Bottom View of Modulator

### Modulator Parts Required

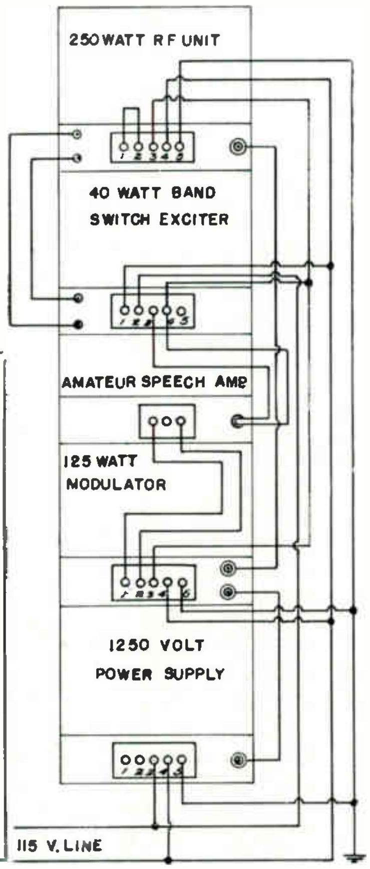
**THORDARSON TRANSFORMERS and CHOKES**

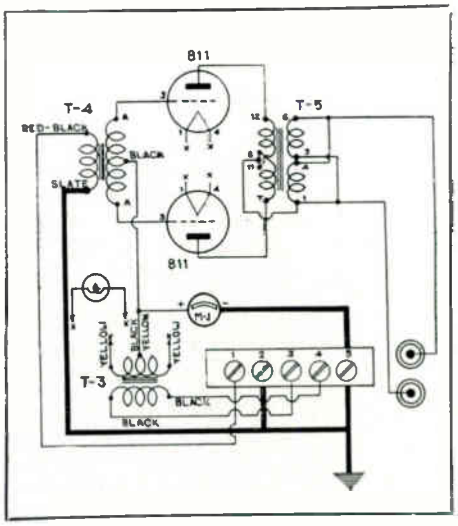
| | | |
|---|---|---|
| T-3 | T-19F99 | Filament Transformer |
| T-4 | T-19D05 | Driver Transformer |
| T-5 | T-19M16 | Modulation Transformer |

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 2 | | 811 Tubes |
| 1 | M-1 | 0-200 MA DC Meter. 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | | Punched Chassis 17" x 8" x 3" |
| 1 | | Panel 19" x 10½" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | 5-Lug Terminal Board |
| 2 | | Feed-thru Insulators |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers, grommets, soldering lugs and other hardware.




### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P60 | Plate Transformer |
| CH-1 | T-19C37 | Input Choke |
| CH-2 | T-19C44 | Smoothing Choke |

**Resistor:**

R-1 40,000 Ohm 200 Watt Wirewound Resistor, Ohmite 1370 or Equivalent

**Condensers:**

C-1 2 Mfd. 1,500 Volt Condenser, GE #23F21 or Equivalent

C-2 2 Mfd. 1,500 Volt Condenser, GE #23F21 or Equivalent

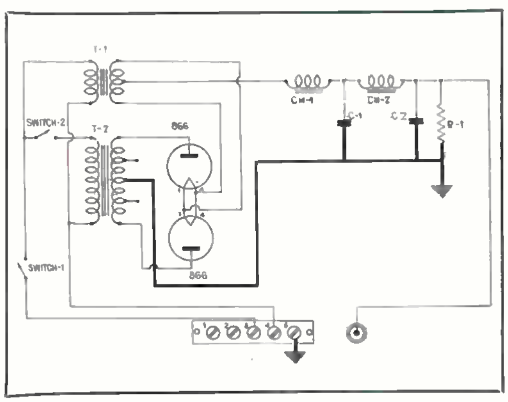
**Tubes:**

2 866 Tubes

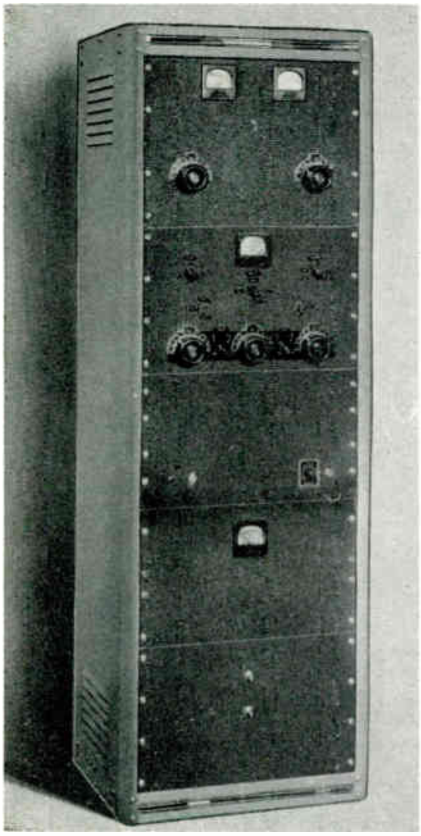
**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 12" x 3" |
| 1 | | Panel 19" x 12¼" |
| 1 Pr. | | Chassis Mounting Brackets |
| 2 | | 4-Contact Sockets, Steatite |
| 1 | | Feed-thru Insulator |
| 2 | | Isolantite Plate Caps |
| 1 | SW-1 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 | SW-2 | Switch, Arrow H & H Type HDT or Equivalent |

Miscellaneous nuts, bolts, lock-washers, soldering lugs and other hardware.




*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*



*Wide Choice of Class C Tubes*

★

*Adjustable Excitation*

★

*Adjustable Loading*

★

*Multi-Match Modulator*

## High Efficiency with Adjustable Loading

THIS 400 watt phone transmitter has the same construction and superior features of the transmitter shown on pages 24, 25 and 26. It is suitable for operation on all bands from 160 to 10 meters. It is easily driven by any exciter having an output of 20 watts; an ideal exciter for this transmitter is the Thordarson 40 Watt Band-Switch Exciter.

The transmitter is supplied with panels finished in black wrinkle, and the chassis and chassis mounting brackets are in gray flat enamel.

**RF Section:**

The unusual mechanical construction of the RF Section results in improved electrical performance. Flexible shafts are used to couple the grid and plate tuning condensers to the panel controls. The tubes used in the RF section are Heintz and Kaufman HK-54's or Taylor T-55's. The HK-54's require a T-19F85 filament transformer, and the T-55's, a T-19F94 filament transformer. Holes are provided on the chassis for either of these types.

A swinging link which couples the plate tank coil to the antenna, permits the amateur to adjust the loading of the final stage to the desired power input. For 400 watts input, the Class C plate current is 267 MA at 1500 volts. A plate efficiency of between 75% and 80% may be obtained when the transmitter is in proper adjustment.

The grid tank coils are the plug-in type, having link coupling to the exciter. The coils for the 80, 40, 20 and 10 meter bands have semi-fixed swinging links, and the 160 meter coil has a fixed link. Excitation should be adjusted so that the total grid current for both Class C tubes is 40 MA. The value of the grid resistor used with the HK-54's is 3750 ohms; with the T-55's, 5000 ohms.

Since the RF unit was designed primarily for phone operation, no attempt was made to install a fixed bias supply on the RF chassis. However, for CW, provision has been made on the terminal board for the connection of an external bias supply. About 45 volts of bias is required to hold the tubes at their rated dissipation with no excitation. When external bias is not used terminals No. 1 and No. 2 are connected together. If external bias is used, the negative of the bias supply connects to terminal No. 1 and the positive to No. 2.

Both the grid and the plate currents are metered. The meters are in the cathode return leads, thus placing both meters at a low DC potential with respect to the chassis, and thereby avoiding any possibility of flash-overs from the meter terminals to the pilot lamp mounting and any likelihood of deflection of the movements due to electrostatic effects.

**Modulator:**

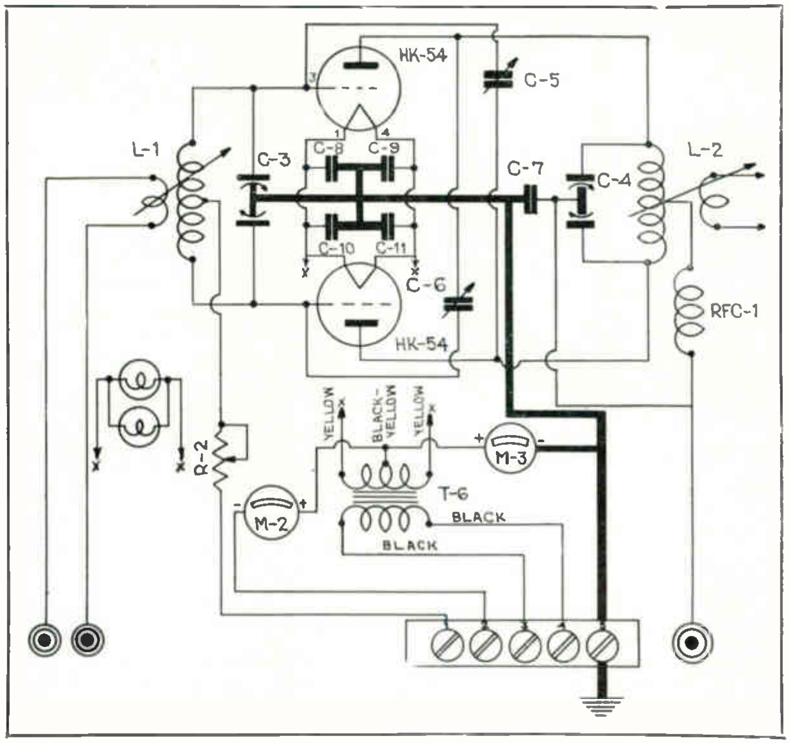
The modulator, using 811's with 1500 volts on the plates, has a power output of 200 watts. The no-signal plate current for two tubes is about 70 MA. With a 200 watt sine-wave output the plate current rises to 217 MA. For speech signals of sufficient magnitude to modulate the Class C stage 100%, the average plate current is about 125 MA. The modulation transformer, as well as the driver transformer, is of the Multi-Match type so that a large variety of Class C loads and sources of driving power may be accommodated. The primary of the driver transformer is designed to couple from a "500 ohm" line. Very little driving power (3.5 watts) is needed to obtain

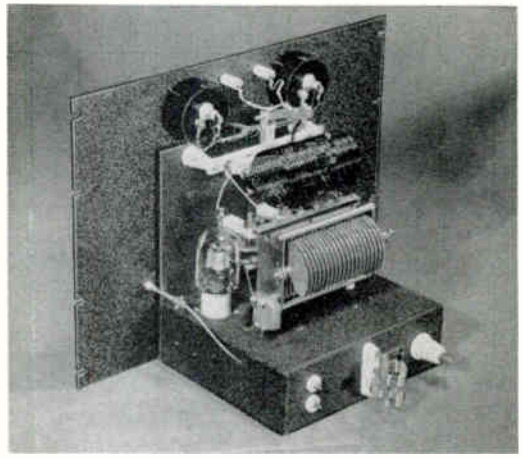
200 watts output; thus the large excess of power output capability of the usually chosen pair of 2A3's serving as driver tubes can be turned to good advantage in obtaining a driving voltage of exceptionally good regulation. The plate-to-plate load on the modulator tubes is 15,500 ohms.

**Power Supply:**

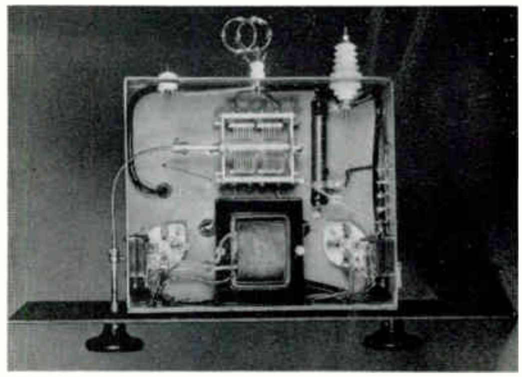
The power supply for this transmitter uses two 866's and has a rating of 500 MA at 1500 volts DC. On its 14" panel are mounted two switches: one for controlling filaments and the other for controlling the plate transformer. Having well insulated line terminals and high voltage terminals mounted on the rear apron of the chassis, the power supply matches in appearance and construction the modulator and RF units with which it was designed to operate. Its simplicity and completeness make it an excellent general purpose power supply.

## RF Section



RF Chassis View



RF Bottom View

## RF Section Parts Required

**THORDARSON TRANSFORMER**

| | | |
|---|---|---|
| T-6 | T-19F99 | Filament Transformer |

**Resistor:**

| | |
|---|---|
| R-2 | 4,000 Ohm 50 Watt Wirewound Ohmite Semi-Variable or Equivalent |

**Condensers:**

| | |
|---|---|
| C-3 | 150-150 Mmfd. Variable Condenser, Cardwell MR-150-BD or Equivalent |
| C-4 | 165-165 Mmfd. Variable Condenser, Cardwell XP-165-KD or Equivalent |
| C-5 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-6 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-7 | .001 Mfd. 3,500 Volt Mica Condenser Aerovox 1653 or Equivalent |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-10 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |

**Tubes:**

| | |
|---|---|
| 2 | HK-54 Tubes |

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 8½" x 10" x 3" |
| 1 | | Panel 19" x 14" |
| 1 | | Sub-Panel |
| 1 | | Terminal Board |
| 4 | | Bushings |
| 3 | | Feed-thru Insulators |
| 2 | | 4-Contact Isolantite Sockets |
| 2 | | Stand-off Insulators |
| 2 | | Shaft Couplings, National TX-11 or Equivalent |
| 1 | | Shaft Coupling, Johnson #252 or Equiv. |
| 2 | | Panel Bearing Assemblies, Johnson #256 or Equivalent |
| 1 | M-2 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 1 | M-3 | 0-300 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 2 | | Control Wheels, Complete, Coto CI-45 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP GRID" Coto CI-47 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP PLATE" Coto CI-47 or Equivalent |

**Misc. Parts: (Cont'd)**

| | | |
|---|---|---|
| 1 | | Coil Socket, National Type XB-16 or Equivalent |
| 1 | L-1 | 160 Meter Coil, National Type AR16-160C or Equivalent |
| 1 | L-1 | 80 Meter Coil, National Type AR16-80S or Equivalent |
| 1 | L-1 | 40 Meter Coil, National Type AR16-40S or Equivalent |
| 1 | L-1 | 20 Meter Coil, National Type AR16-20S or Equivalent |
| 1 | L-1 | 10 Meter Coil, National Type AR16-10S or Equivalent |
| 1 | L-2 | Swinging Link & Jack Bar Assembly, B-W Type TV or Equivalent |
| 1 | L-2 | 160 Meter Coil, B-W 160 TVL or Equiv. |
| 1 | L-2 | 80 Meter Coil, B-W 80 TVL or Equiv. |
| 1 | L-2 | 40 Meter Coil, B-W 40 TVL or Equiv. |
| 1 | L-2 | 20 Meter Coil, B-W 20 TVL or Equiv. |
| 1 | L-2 | 10 Meter Coil, B-W 10 TVL or Equiv. |
| 2 | | Grid Grips, National Type 12 or Equiv. |
| 1 | RFC-1 | RF Choke, National Type R-154U or Equivalent |

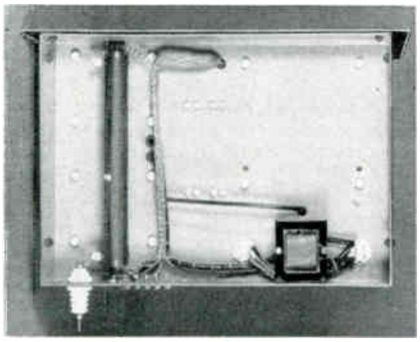
Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 400 Watt Transmitter

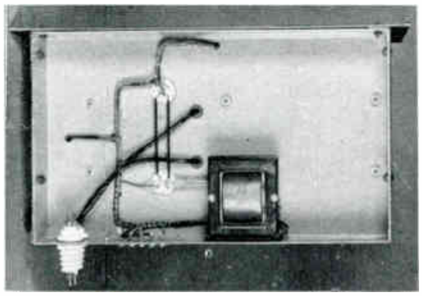
## Modulator and Power Supply

Modulator



Bottom View of Power Supply

Power Supply



Bottom View of Modulator

### Modulator Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-3 | T-19F99 | Filament Transformer |
| T-4 | T-19D05 | Driver Transformer |
| T-5 | T-19M17 | Modulation Transformer |

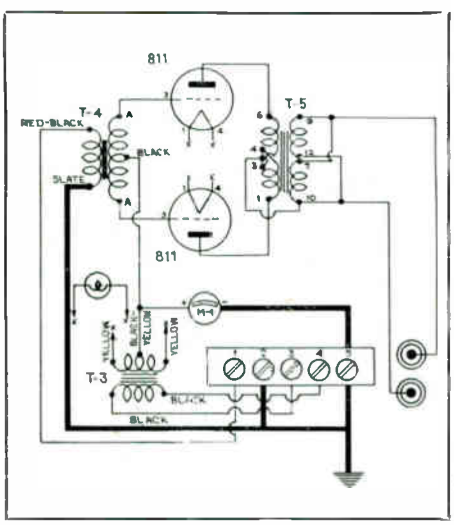
**Tubes:**

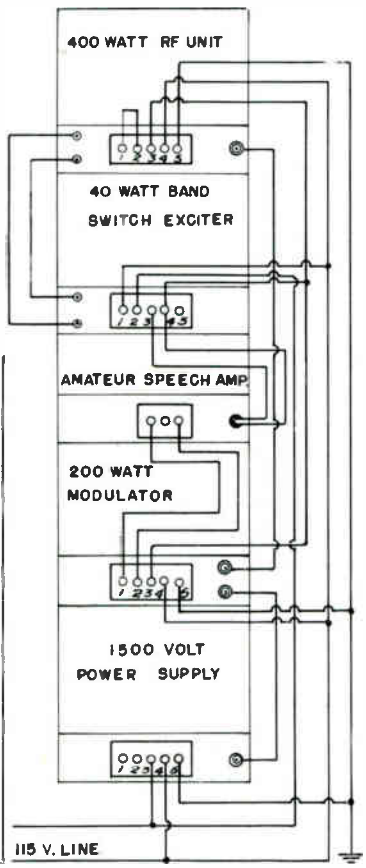
2 811 Tubes

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | M-1 | 0-300 MA DC Meter, 3″ Square Case Triplett 327-A or Equivalent |
| 1 | | Punched Chassis 17″ x 10″ x 3″ |
| 1 | | Panel 19″ x 10½″ |
| 1 Pr. | | Chassis Mounting Brackets |
| 2 | | Feed-thru Insulators |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers, grommets and other hardware.




### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P64 | Plate Transformer |
| CH-1 | T-19C37 | Input Choke |
| CH-2 | T-19C44 | Smoothing Choke |

**Resistor:**

R-1 40,000 Ohm 200 Watt Wirewound Resistor, Ohmite 1370 or Equivalent

**Condensers:**

C-1 2 Mfd. 2,000 Volt Condenser GE #23F31 or Equivalent
C-2 2 Mfd. 2,000 Volt Condenser GE #23F31 or Equivalent

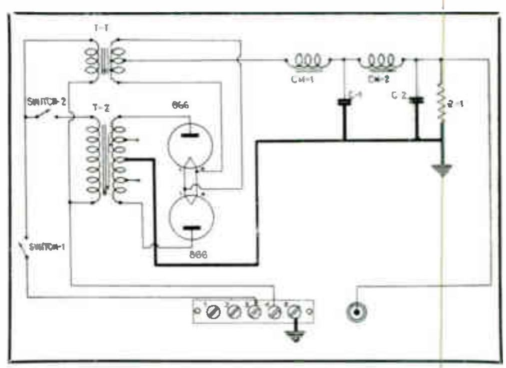
**Tubes:**

2 866 Tubes

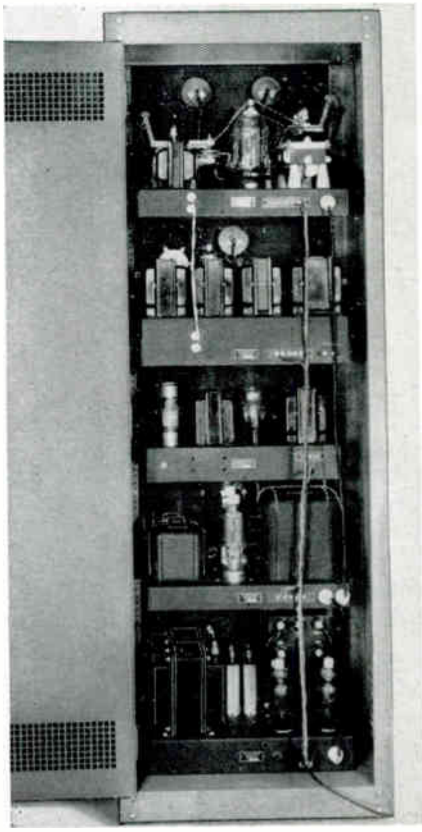
**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | SW-1 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 | SW-2 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 | | Punched Chassis 17″ x 12″ x 3″ |
| 1 | | Panel 19″ x 14¾″ |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Terminal Board |
| 2 | | 4-Contact Sockets, Steatite |
| 1 | | Feed-thru Insulator |
| 2 | | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers and other hardware.




*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*



**Completely Relay Controlled**

★

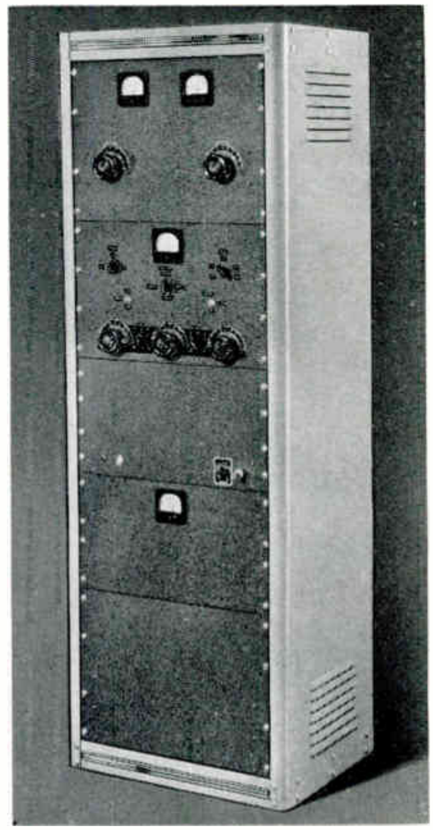
**Under Excitation Protection**

★

**High Quality Audio System**

★

**Multi-Match Modulator**



THIS transmitter consists of a Class C amplifier of 600 watts input, a modulator capable of delivering 300 watts of audio frequency power and a 1750 volt power supply of sufficient capacity to furnish the current required by both the RF stage and the modulator. Operation may be obtained on all five amateur bands from 160 to 10 meters. Relay switching is incorporated in this transmitter, thus not only permitting complete control of the transmitter with a single switch but also protecting the Class C amplifier from under-excitation and preventing the possibility of abuse to the modulation transformer by underloading it.

The Class C amplifier may be operated with any one of three types of tubes, namely Taylor TW-150's, Eimac 100TH's or Heintz and Kaufman HK-254's. The modulator tubes are Taylor 805's, and the rectifier tubes are 866's.

The panels are supplied in a black wrinkle finish; and the chassis, chassis mounting brackets and other small metal fixtures in a gray flat enamel.

**RF Unit:**

The Class C amplifier circuit is of the conventional push-pull type operating with 600 watts input at 1750 volts. It requires from 30 to 40 watts of driving power. The Thordarson 120 watt Band-Switch Exciter or the Thordarson 100 Watt Multi-Band Transmitter are ideal exciters. These units are described on pages 18 and 20. Plate and grid coils are of the plug-in type with a swinging link and jack bar assembly, thus permitting close adjustment of grid excitation and plate loading. Provision is made on the chassis for using either the UX sockets required by the TW-150's and the 100TH's, or the 50 watt sockets needed for use with HK-254's. The grid resistor is of the semi-variable type so that the correct bias requirements for various tubes may be met. The plate tuning condenser is of the split-stator type, having each stator section divided into two parts. This permits a very favorable L/C ratio to be obtained on all bands. The coils specified for the plate tank circuit have such a base construction that the correct stator combination is automatically obtained on each band when the coil is plugged in.

With 600 watts input the Class C plate current is 343 MA at 1750 volts. Plate efficiencies on the order of 75% are easily obtainable. When the amplifier is unloaded the plate current at resonance dips to about 25 MA on the 160, 80 and 40 meter bands; and to about 40 and 50 MA when operation is on the 20 and 10 meter bands respectively. The grid current is about 100 MA (for two tubes), and the grid resistor should be adjusted to about 1200 ohms.

**Modulator:**

The modulator has a "500 ohm" input and can be easily driven by the Thordarson Amateur Speech Amplifier. A rectified AC bias supply is installed on the modulator chassis. It uses a type 83 tube, which furnishes 20 volts of bias. This bias not only prevents the plate dissipation of the 805's from rising to an abnormal value during periods of no-signal but also tends to reduce distortion in the output of the modulator.

With no-signal on the grids of the 805's the plate current (two tubes) is about 80 MA. This current rises to 345 MA with a sine wave signal of magnitude sufficient to cause 100%

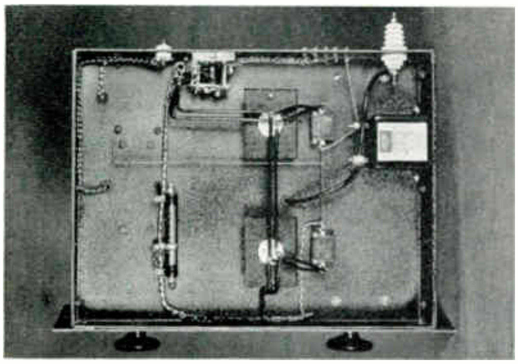
modulation, but for speech the same degree of modulation can be obtained when the modulator current rises to about 150 MA.

When the "500 ohm" input to the modulator grids is supplied by a Thordarson Amateur Speech Amplifier, the driver transformer ratio should be 1 to 1.4, primary to half the secondary. The turns ratio of the modulation transformer is 1.4 to 1, and the plate-to-plate load on the modulators is 10,000 ohms.

The driver and modulation transformers are of the Multi-Match type so that not only may a variety of Class C loads be accommodated but also different driving tubes may be used.

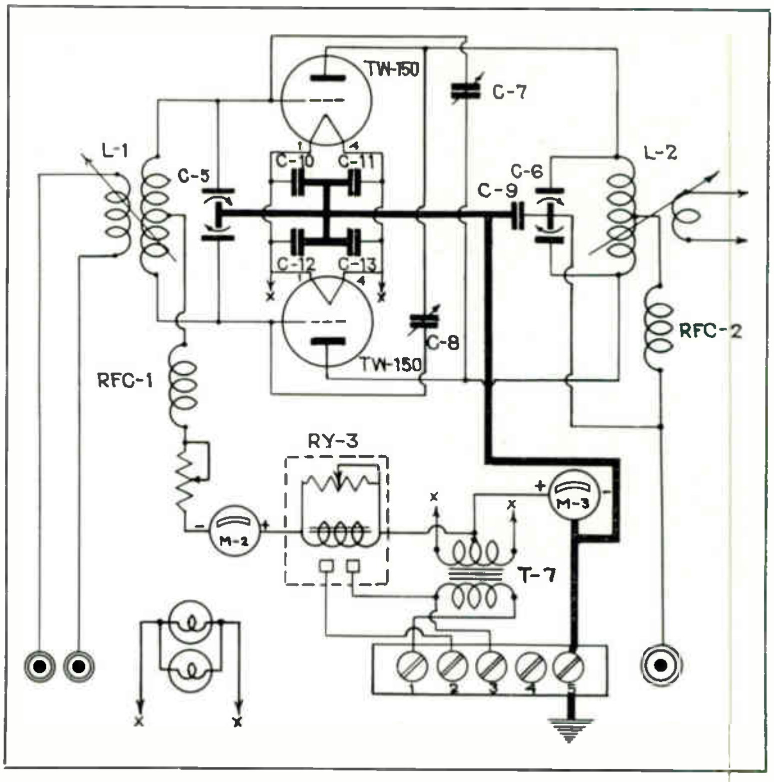
(Continued on Page 31)

RF Chassis View



RF Bottom View

## RF Section




## RF Section Parts Required

**THORDARSON TRANSFORMER**

| | | |
|---|---|---|
| T-7 | T-74F23 | Filament Transformer |

**Resistor:**

| | |
|---|---|
| R-3 | 2,500 Ohm 50 Watt Semi-Variable Resistor, Ohmite or Equivalent |

**Condensers:**

| | |
|---|---|
| C-5 | 260-260 Mmfd. Variable Condenser, Cardwell MR-260-BD or Equivalent |
| C-6 | 160-160 Mmfd. Variable Condenser, Cardwell XE-160-70-XQ or Equivalent |
| C-7 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-8 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-9 | .001 Mfd. Mica Condenser, CD-21C-86 or Equivalent |
| C-10 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-11 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-12 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |

**Tubes:**

| | |
|---|---|
| 2 | TW-150 or HK-254 or 100TH |

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 2½" |
| 1 | | Panel 19" x 14" |
| 1 | Pr. | Chassis Mounting Brackets |
| 2 | | Socket Mounting Plates |
| 4 | | Condenser Mounting Brackets |
| 2 | | Coil Mounting Brackets |
| 8 | | Bushings |
| 1 | | Feed-thru Bushing |
| 2 | | Feed-thru Insulators |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | 50 Watt Sockets |
| 4 | | Grid Grips |
| 4 | | Cone Insulators |
| 1 | RY-3 | SPST Underload Relay, Ward-Leonard 507-514A or Equivalent |
| 1 | M-2 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | M-3 | 0-500 MA DC Meter, 3" Square Case Rear Illumination, Triplett #327A or Equivalent |
| 1 | L-1 | Swinging Link & Jack Bar Assembly, B-W Type BVL or Equivalent |
| 1 | L-1 | 160 Meter Coil, B-W Type 160 BVL or Equivalent |
| 1 | L-1 | 80 Meter Coil, B-W Type 80 BVL or Equivalent |
| 1 | L-1 | 40 Meter Coil, B-W Type 40 BVL or Equivalent |

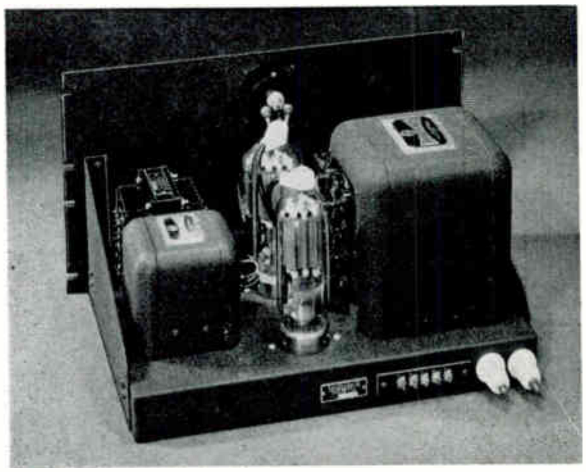
**Miscellaneous Parts: (Cont.)**

| | | |
|---|---|---|
| 1 | L-1 | 20 Meter Coil, B-W Type 20 BVL or Equivalent |
| 1 | L-1 | 10 Meter Coil, B-W Type 10 BVL or Equivalent |
| 1 | L-2 | 160 Meter Coil, B-W Type 160 TVH or Equivalent |
| 1 | L-2 | 80 Meter Coil, B-W Type 80 TVH or Equivalent |
| 1 | L-2 | 40 Meter Coil, B-W Type 40 TVH or Equivalent |
| 1 | L-2 | 20 Meter Coil, B-W Type 20 TVH or Equivalent |
| 1 | L-2 | 10 Meter Coil, B-W Type 10 TVH or Equivalent |
| 1 | L-2 | Swinging Link & Jack Bar Assembly, B-W Type TVH or Equivalent |
| 1 | RFC-1 | RF Choke, National Type R-100-U or Equivalent |
| 1 | RFC-2 | RF Choke, National Type R-154 or Equivalent |
| 2 | | 4" Shaft Extensions, Yaxley RS-242 or Equivalent |
| 2 | | 2¼" Control Wheels, Coto CI-45 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP GRID," Coto CI-47 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP PLATE," Coto CI-47 or Equivalent |

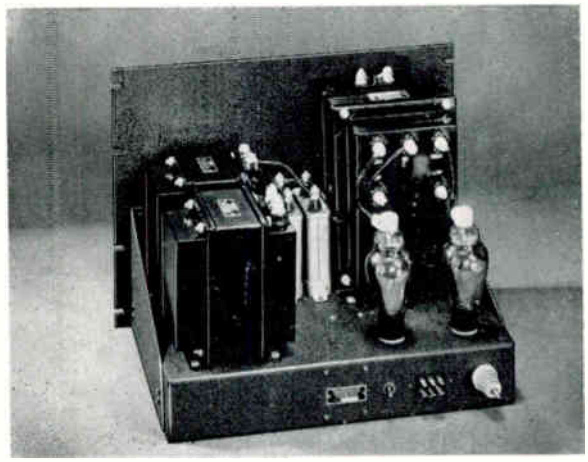
Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

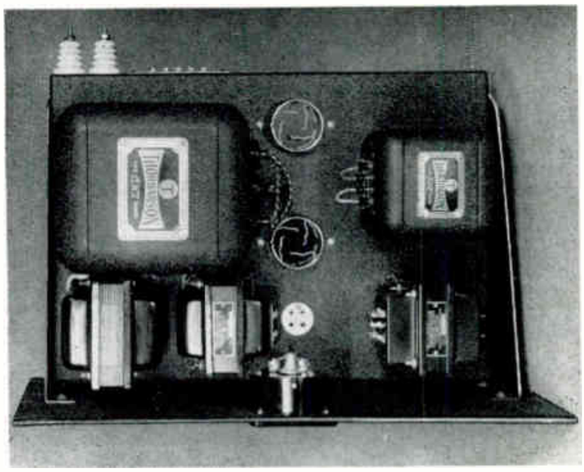
## Modulator and Power Supply



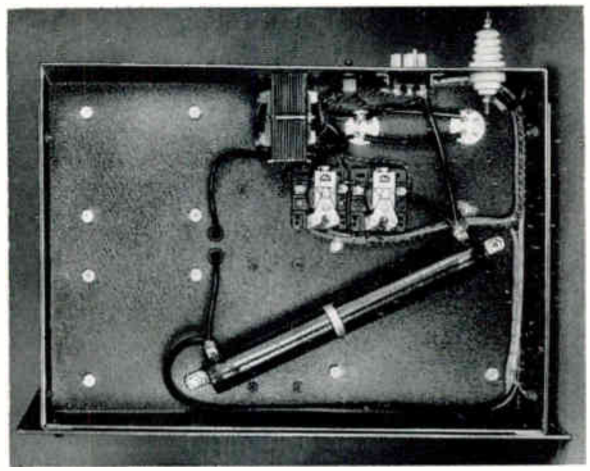
Modulator



Power Supply



Top View of Modulator



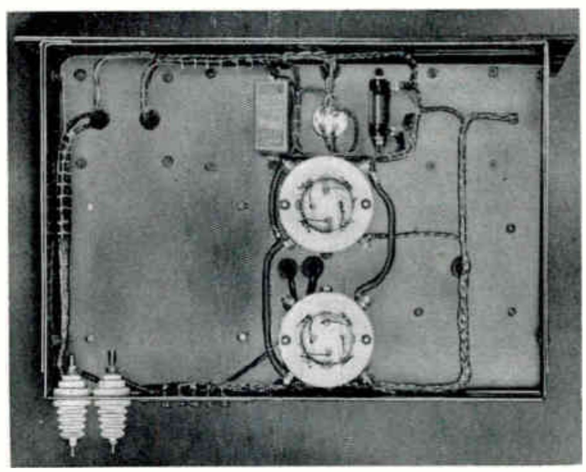
Bottom View of Power Supply

**Power Supply:**

FOR BOTH the convenience of the operator and the protection of the equipment, relay switching was chosen. When the filament switch on the exciter is closed, RY-1 closes, causing the application of voltage to the speech amplifier and the filaments of the rectifiers, modulator tubes and Class C amplifier tube. In addition, this operation places bias voltage on the modulator grids and prepares RY-2 for closing. Turning on the plate switch of the exciter results in the grid current in the Class C amplifier closing RY-3, which in turn causes RY-2 to apply primary voltage to the plate transformer. The opening of SW-1 prevents the operation of RY-2 even though RY-3 may be closed. This feature makes neutralizing convenient, and in addition affords more protection to the operator.

For CW operation it is only necessary to place a jumper between terminals 2 and 3 at the back of the RF chassis and insert a 22.5 volt battery at point A.

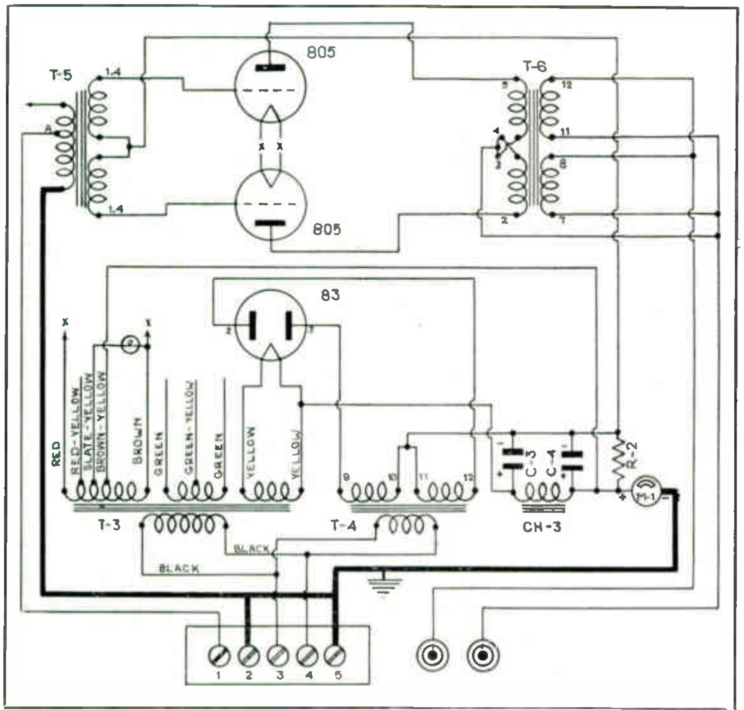
Since the power supply is rated at 1750 volts at 500 MA, 700 watts CW operation may be carried on by operating with a Class C plate current of 400 MA.

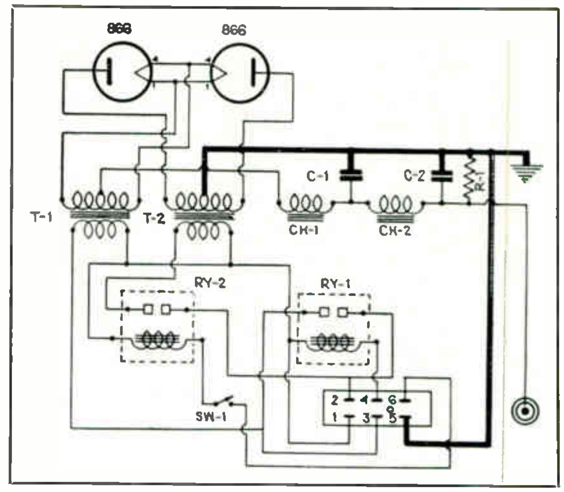


Bottom View of Modulator

# 600 Watt Transmitter

## Modulator and Power Supply




### Modulator Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-3 | T-19F77 | Filament Transformer |
| T-4 | T-19R31 | Bias Transformer |
| T-5 | T-15D82 | Driver Transformer |
| T-6 | T-11M77 | Modulation Transformer |
| CH-3 | T-19C42 | Filter Choke |

**Resistor:**

R-2 100 Ohm 25 Watt Semi-Variable Resistor Ohmite #0368 or Equivalent

**Condensers:**

C-3, C-4 Double 16 Mfd. 250 Volt Condenser, Aerovox Type PBS or Equivalent

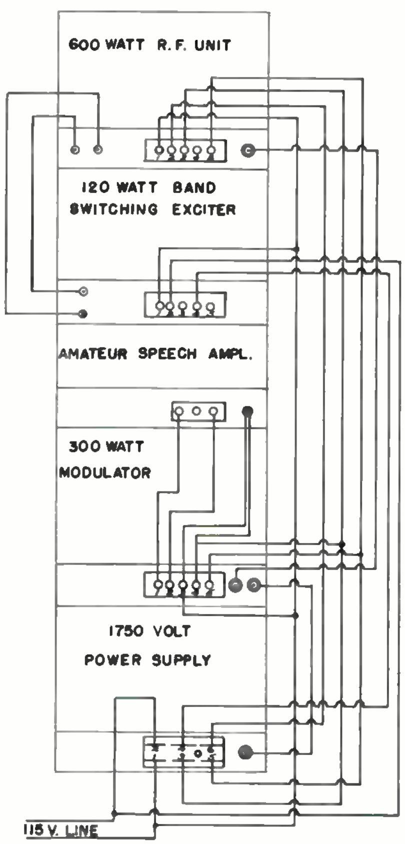
**Tubes:**

| | | |
|---|---|---|
| 1 | 83 | Tube |
| 2 | 805 | Tubes, Taylor or Equivalent |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | 0-500 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 1 | Punched Chassis 17" x 12" x 2½" |
| 1 | Panel 19" x 10½" |
| 1 Pr. | Chassis Mounting Brackets |
| 4 | Bushings |
| 1 | Terminal Board |
| 2 | 50 Watt Sockets |
| 1 | 4-Contact Socket, Steatite |
| 2 | Lead-in Bushings |
| 2 | Grid Grips |

Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.




### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P66 | Plate Transformer |
| CH-1 | T-19C38 | Choke |
| CH-2 | T-19C45 | Choke |

**Resistor:**

R-1 75,000 Ohm 200 Watt Wirewound Resistor, Ohmite No. 0924 or Equivalent

**Condensers:**

C-1 2 Mfd. 2000 Volt Condenser, Mallory TX-811 or Equivalent

C-2 2 Mfd. 2000 Volt Condenser, Mallory TX-811 or Equivalent

**Tubes:**

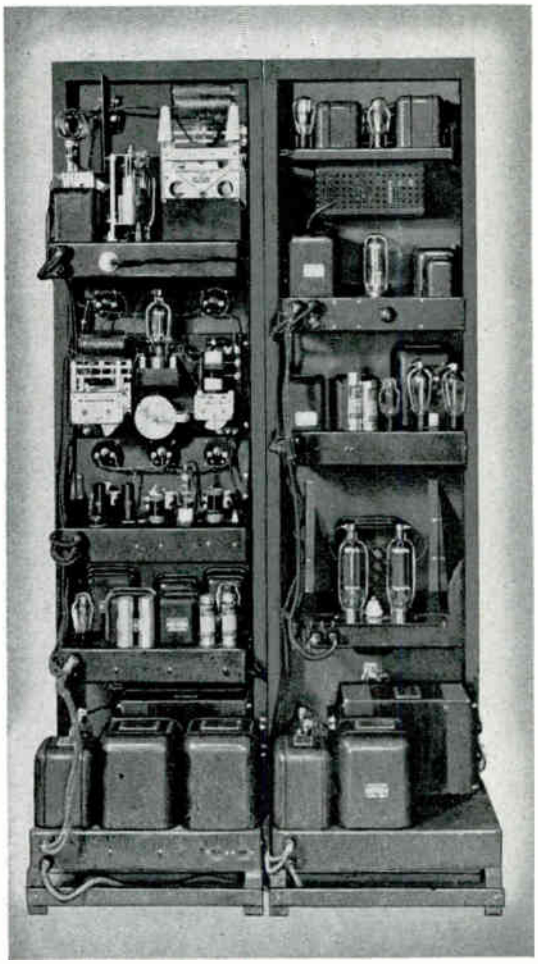
| | | |
|---|---|---|
| 2 | 866 | Tubes |

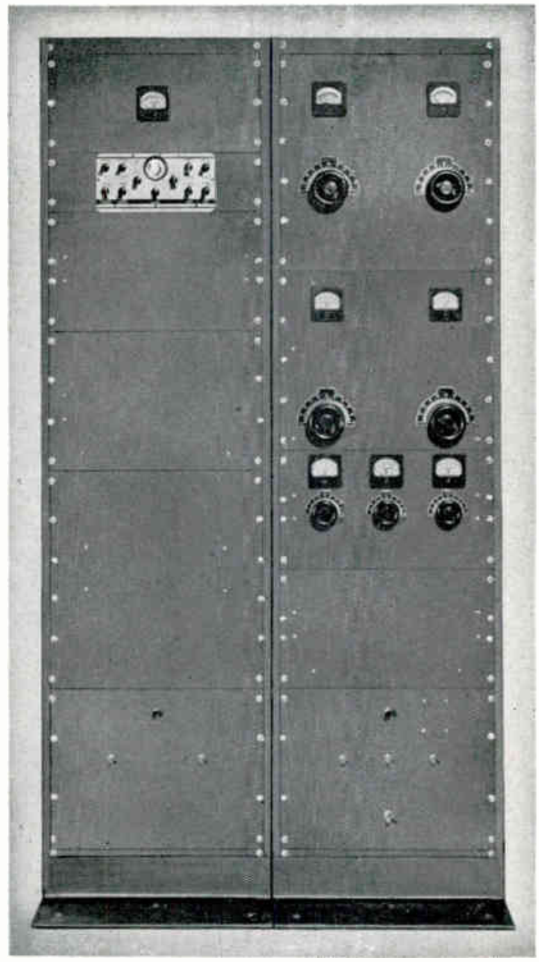
**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | RY-1 | Relay, SPST, Ward-Leonard No. 507-510 or Equivalent |
| 1 | RY-2 | Relay, SPST, Ward-Leonard No. 507-518 or Equivalent |
| 1 | SW-1 | SPST Switch N.P., Arrow H and H No. 20992 or Equivalent |
| 1 | | Punched Chassis 17" x 13" x 2½" |
| 1 | | Panel 19" x 14" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Switch Plate |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | Isolantite Plate Caps |
| 1 | | Lead-in Bushing |
| 1 | | 6-Contact Socket |
| 1 | | 6-Prong Plug |

Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*





HERE is a conservatively rated transmitter which is designed to handle the maximum allowable input of 1 kilowatt. The transmitter is built up in two racks, one containing the R.F. section with associated power supplies and the other the speech equipment, drivers, modulators, and necessary power equipment.

The exciter unit is built up on a separate chassis. Three stages are provided so that there is ample excitation on all bands. It may be found necessary to neutralize the 6L6 and the RK-39, especially if they are operated as straight buffers on the higher frequencies. These neutralizing condensers (NC-1, NC-2) may consist simply of a few turns of twisted wire. The RK-39 is link coupled to the T125 buffer; this stage should always be operated as a straight amplifier and all doubling should be done in the preceeding low power stages. The buffer in turn is link coupled to the final stage, which consists of a pair of T-200's in push-pull. The plate voltage is 2500 volts and the plate current 400 M.A.; the grid current should be 125 M.A.

No pre-amplifier is incorporated in the transmitter proper. It is far more desirable, both from the standpoint of convenience and performance, to place the low level speech stages some distance from the transmitter. The impedance of the speech input is 500 ohms and the level appriximately zero db. The first stage consists of a pair of 6F6's, triode connected, which provide ample grid swing for the 845's. The 845 drivers operate at 1250 volts, and the necessary bias is obtained from a resistor in the filament return. The 822 modulators operate at 2000 volts and provide ample power to modulate the 1 kilowatt input.

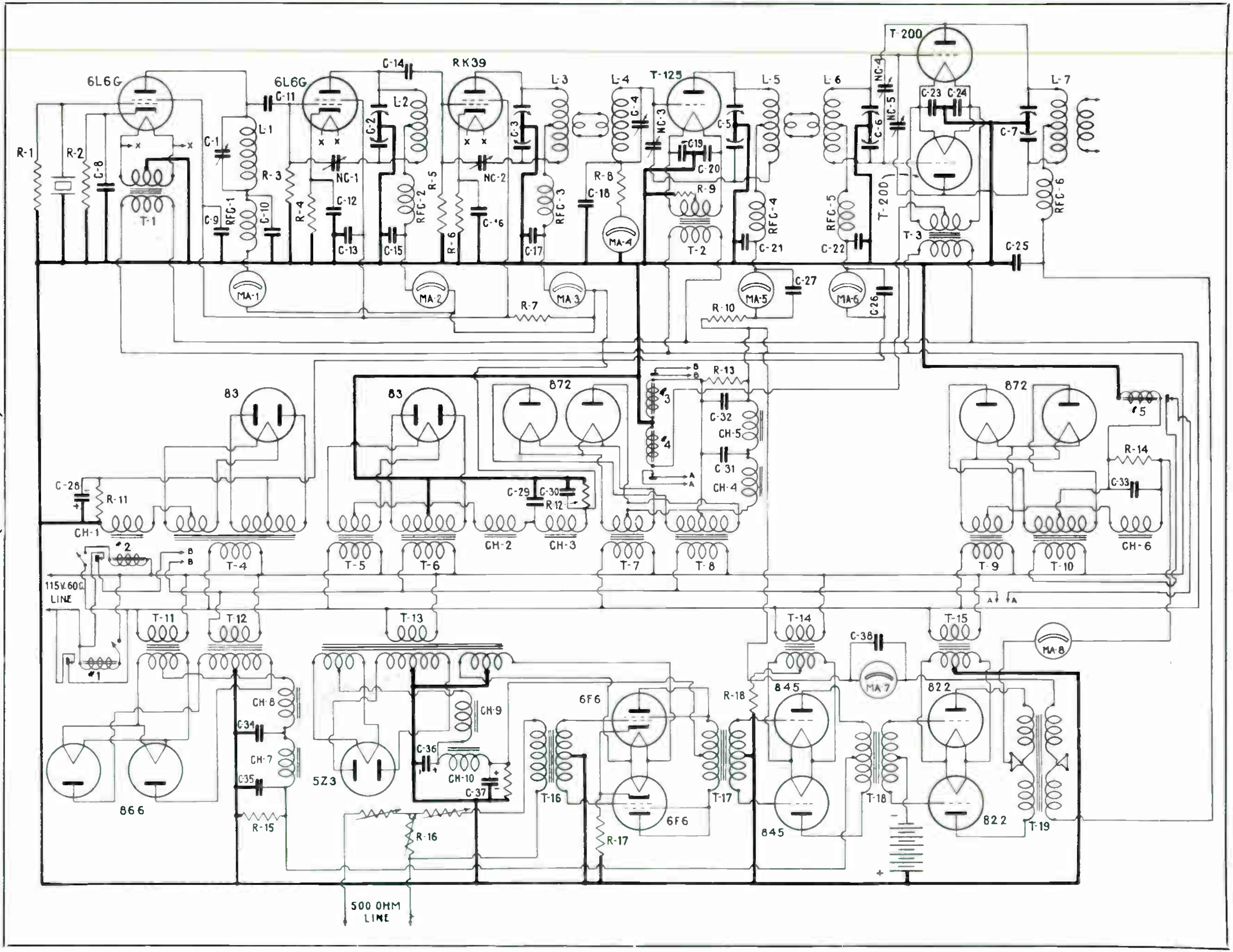
An important feature of high power equipment which has not been overlooked is the installation of an underload and two overload relays.

The underload relay is so connected that the Class C current must be 250 M.A. before the modulator plate supply is turned on. Possible damage to the modulation transformer is avoided in the event that excitation to the final fails with a signal applied to the modulators. If the current of either the Class C stage or the buffer should become excessive, the overload relay will automatically turn off all plate supplies. Another overload relay is installed in the modulator plate supply, however this relay controls only the modulators. In order to simplify operation, relays are also used to control the filaments and plate supplies. The wiring is so arranged that it is impossible to turn on the plate supplies without having the filament relay closed. This relay operation of both filament and plate supplies enables the transmitter to be controlled from the operating table simply by extending the light leads connected to the relay switches.

The correct bias for the 822 modulators is —67.5, and this is shown as battery bias in the diagram, although in the photograph an experimental bias supply is shown. This bias supply has not yet been fully developed and it is felt that it should be with-held until its performance is proven satisfactory.

The pre-amplifier is shown on page 37. It is mounted in a metal cabinet and if remote control is desired the filament and plate relay switches may be mounted on this panel.

# 1000 Watt Transmitter
(CONTINUED)



(CONTINUED)

## Parts Required

### Thordarson Transformers and Chokes

| | | | |
|---|---|---|---|
| T-1 | T-19F97 | CH-1 | T-15C36 |
| T-2 | T-19F95 | CH-2 | T-15C36 |
| T-3 | T-11F51 | CH-3 | T-15C45 |
| T-4 | T-15R60 | CH-4 | T-15C39 |
| T-5 | T-19F91 | CH-5 | T-15C48 |
| T-6 | T-15P11 | CH-6 | T-15C39 |
| T-7 | T-11F54 | CH-7 | T-15C45 |
| T-8 | T-15P21 | CH-8 | T-15C36 |
| T-9 | T-11F54 | CH-9 | T-15C36 |
| T-10 | T-15P21 | CH-10 | T-15C45 |
| T-11 | T-19F89 | | |
| T-12 | T-15P15 | | |
| T-13 | T-15R03 | | |
| T-14 | T-19F96 | | |
| T-15 | T-11F51 | | |
| T-16 | T-15A67 | | |
| T-17 | T-15D76 | | |
| T-18 | T-18D19 | | |
| T-19 | T-11M78 | | |

### Resistors:

| | |
|---|---|
| R-1 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-2 | 200 Ohm 10 Watt Ohmite or Equiv. |
| R-3 | 10,000 Ohm 10 Watt Ohmite or Equiv. |
| R-4 | 200 Ohm 10 Watt Ohmite or Equiv. |
| R-5 | 10,000 Ohm 10 Watt Ohmite or Equiv. |
| R-6 | 50 Ohm 10 Watt Ohmite or Equiv. |
| R-7 | 5,000 Ohm 25 Watt Ohmite or Equiv. |
| R-8 | 2,000 Ohm 25 Watt Ohmite or Equiv. |
| R-9 | 2,000 Ohm 50 Watt Ohmite or Equiv. |
| R-10 | 10,000 Ohm 50 Watt Ohmite or Equiv. |
| R-11 | 1,000 Ohm 75 Watt Ohmite or Equiv. |
| R-12 | 25,000 Ohm 50 Watt Ohmite or Equiv. |
| R-13, R-14 | 100,000 Ohm 200 Watt Ohmite or Equiv. |
| R-15 | 50,000 Ohm 100 Watt Ohmite or Equiv. |
| R-16 | 500 Ohm 25 Watt T Pad Utah or Equiv. |
| R-17 | 750 Ohm 10 Watt Ohmite or Equiv. |
| R-18 | 2,000 Ohm 50 Watt Ohmite or Equiv. |

### CONDENSERS

#### Variable Condensers

| | |
|---|---|
| C-1 | 150 Mmfd. Cardwell MR150BS or Equiv. |
| C-2, C-3 | 260 Mmfd. Cardwell MR260BD or Equiv. |
| C-4 | 150 Mmfd. National TMC150 or Equiv. |
| C-5 | 100 Mmfd. National TMA100DA or Equiv. |
| C-6 | 200 Mmfd. National TMC200D or Equiv. |
| C-7 | 200 Mmfd. National TMC200DA or Equiv. |

### Fixed Condensers:

| | |
|---|---|
| C-8 to C-10 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-11 | .0001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-12, C-13 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-14 | .0001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-15 to C-20 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-21 | .001 Mfd. 5000 Volt Mica Aerovox 1652 or Equiv. |
| C-22 to C-24 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-25 | .001 Mfd. 10,000 Volt Mica Aerovox 1654 or Equiv. |
| C-26, C-27 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-28 | 16 Mfd. 450 Volt Elec. Aerovox G475 or Equiv. |
| C-29, C-30 | 2 Mfd. 1000 Volt Aerovox 1010 or Equiv. |
| C-31 to C-33 | 2 Mfd. 3000 Volt Aerovox 3009 or Equiv. |
| C-34, C-35 | 2 Mfd. 2000 Volt Aerovox 2009 or Equiv. |
| C-36, C-37 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |
| C-38 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |

### Neutralizing Condensers:

| | |
|---|---|
| NC-1 | See note in copy |
| NC-2 | See note in copy |
| NC-3 | 12 Mmfd. 8000 Volt National NC-150 or Equiv. |
| NC-4, NC-5 | 13 Mmfd. 12,000 Volt Johnson N375 or. Equiv. |

### Meters:

| | |
|---|---|
| MA-1 | 0-100 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-2, MA-3 | 0-150 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-4 | 0-100 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-5 | 0-500 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-6 | 0-250 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-7, MA-8 | 0-750 M.A. Simpson 27S (Illum.) or Equiv. |

### RF Chokes:

| | |
|---|---|
| RFC-1 to RFC-3 | 125 M.A. National R100 or Equiv. |
| RFC-4 | 600 M.A. National R154U or Equiv. |
| RFC-5 | 125 M.A. National R100 or Equiv. |
| RFC-6 | 600 M.A. National R154U or Equiv. |

### Relays:

| | |
|---|---|
| #1, #2 | Guardian B100 or Equiv. |
| #3 | Guardian L500 or Equiv. |
| #4 | Guardian (special) or Equiv. |
| #5 | Guardian L500 or Equiv. |

### Miscellaneous Parts:

| | |
|---|---|
| 5 Pr. | Chassis Mounting Brackets |
| 4 | 3¼" Wheels Coto or Equiv. |
| 3 | 2¼" Wheels Coto or Equiv. |
| 3 | Coil Forms National XR-4 or Equiv. |
| 1 | Coil Assembly National UR-13 or Equiv. |
| 2 | Coils Coto-Coil 80 BTVL or Equiv. |
| 1 | Coil Coto-Coil 80 TVL or Equiv. |
| 11 | Sockets Johnson type 211 or Equiv. |
| 2 | C-1 Bases Coto-Coil 6BTLM or Equiv. |
| 1 | C-1 Base Coto-Coil 8TLM or Equiv. |
| 2 | Cone Insulators Johnson #604 or Equiv. |
| 4 | Bee Hive insulators Johnson #45 or Equiv. |
| 8 | Feed-thru insulators Johnson #42 or Equiv. |
| 4 | 1" Cone insulators Johnson #601 or Equiv. |
| 2 | Insulators National #GS-2 or Equiv. |
| 3 | Insulators National #GS-1 or Equiv. |
| 6 | SPST Toggle Switches H & H or Equiv. |
| 4 | Steatite Sockets Amphenol or Equiv. |
| 2 | Steatite Octal Sockets Amphenol or Equiv. |
| 23 | Bakelite Sockets Amphenol or Equiv. |
| 2 | Bakelite Octal Sockets Amphenol or Equiv. |
| 18 | Plugs Amphenol or Equiv. |
| 1 | Bakelite Knob |
| 14 | Large Grid Grips |

### Tubes:

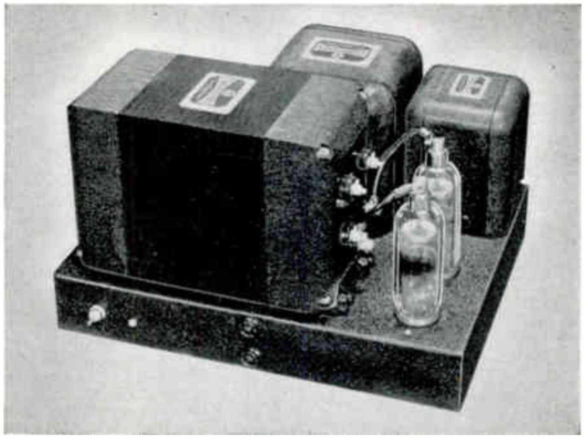
| | | | |
|---|---|---|---|
| 1 | RK39 | 1 | T-125 |
| 2 | T-200 | 4 | 872 |
| 2 | 866 | 2 | 83 |
| 1 | 5Z3 | 2 | 6F6 |
| 2 | 845 | 2 | 822 |
| 2 | 6L6-G or 6L6GX | | |

*See page 37 for Pre-Amplifier*

**COIL DATA**

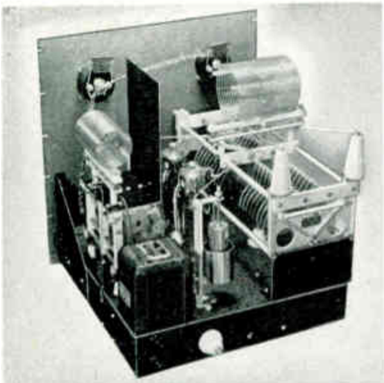
| BAND | 160 | 80 | 40 | 20 | 10 |
|---|---|---|---|---|---|
| L1, L2, L3, L4 | 40T #18 | 26T #16 | 12T #16 | 8T #16 | 3T #16 |
| L5, L6 | 36T #16 4⅛" Diam. | 34T #16 2⅞" Diam. | 22T #16 2⅞" Diam. | 16T #14 2⅞" Diam. | 4T #14 2⅞" Diam. |
| L7 | 42T #14 5⅛" Diam. | 30T #10 4⅛" Diam. | 20T #10 3¼" Diam. | 10T #10 3¼" Diam. | 4T #10 3¼" Diam. |
| Link for L3, L4, L5, L6 | 4T #18C.C. | 3T #18C.C. | 2T #18C.C. | 2T #18C.C. | 2T #18C.C. |

L1, L2, L3 wound on 1½" Diam. winding length 1¾". L4 wound on 1¾" Diam. winding length 2". Winding length of L5, L6, 4½". Winding length of L7, 6½".

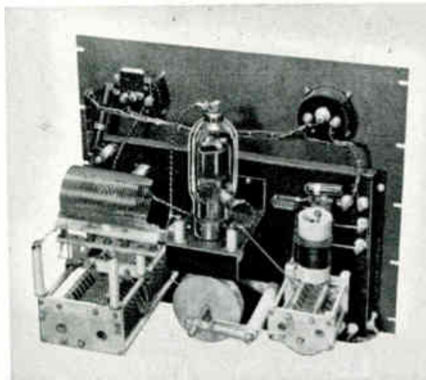


MODULATOR POWER SUPPLY
Chassis: 20" x 15" x 3¼"; Panel: 14"

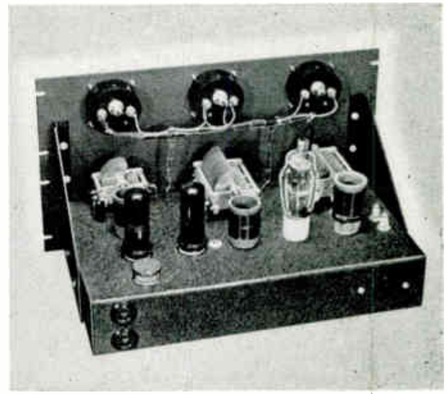
*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*



R. F. POWER AMPLIFIER
Chassis: 17" x 17" x 3"; Panel: 19¼"

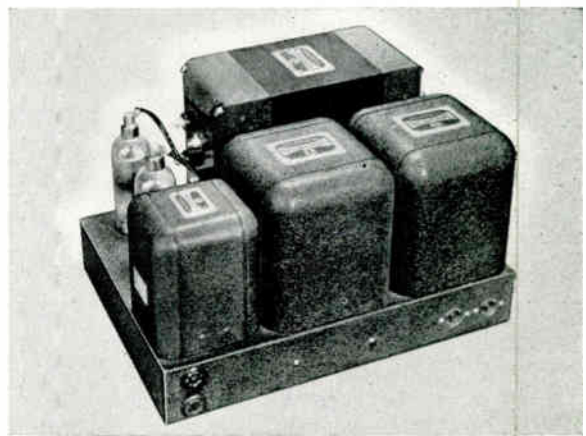


BUFFER
Chassis: 17" x 10" x 1"; Panel: 15¾"

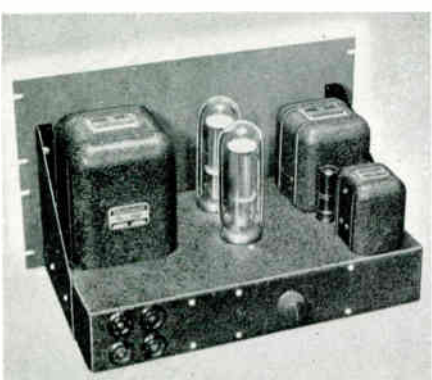


EXCITER UNIT
Chassis: 17" x 10" x 3"; Panel: 10½"

BIAS AND EXCITER POWER SUPPLIES
Chassis: 17" x 13" x 3"; Panel: 10½"

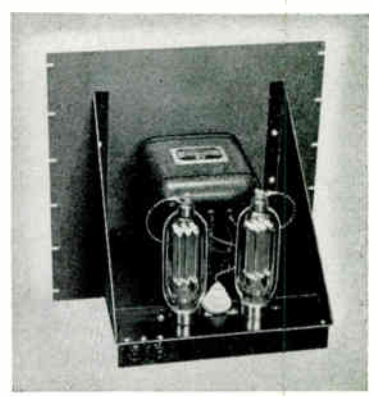


R.F. POWER SUPPLY
Chassis: 20" x 15" x 3¼"; Panel: 14"



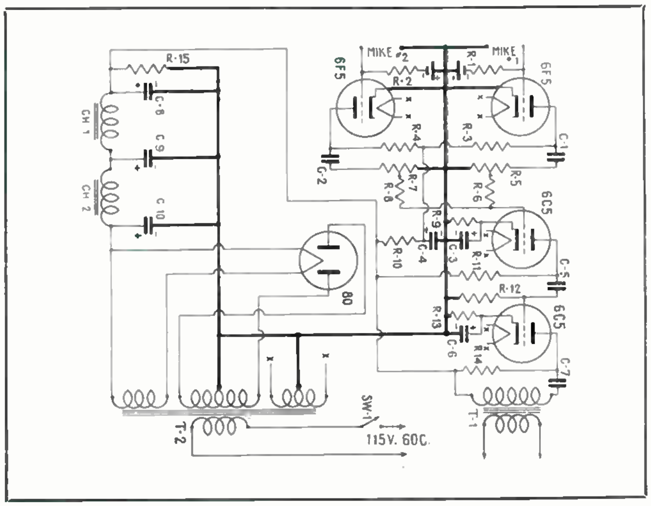
DRIVER AND SPEECH AMPLIFIER
Chassis: 17" x 10" x 3"; Panel: 10½"

DRIVER AND SPEECH POWER SUPPLY
Chassis: 17" x 12" x 3"; Panel: 12¼"



CLASS B MODULATOR
Chassis: 13" w. x 13½" d.; Panel: 19¼"

# Transmitter Pre-Amplifier




PRE-AMPLIFIER CHASSIS AND ASSEMBLY
Chassis: 17" x 10" x 3"; Case: 19" x 13" x 8¾"

## PRE-AMPLIFIER PARTS REQUIRED

**Thordarson Transformers and Chokes:**

| | | | |
|---|---|---|---|
| T-1 | T-15A71 | CH-1 | T-13C26 |
| T-2 | T-70R78 | CH-2 | T-13C26 |

**Resistors:**

| | |
|---|---|
| R-1, R-2 | 5 Meg. ½ Watt IRC BT½ or Equiv. |
| R-3 | 100,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-4 | 100,000 Ohm 1 Watt Ohmite or Equiv. |
| R-5 | 500,000 Ohm Volume Control IRC or Equiv. |
| R-6 | 500,000 Ohm ½ Watt IRC BT½ or Equiv. |
| R-7 | 500,000 Ohm Volume Control IRC or Equiv. |
| R-8 | 500,000 Ohm ½ Watt IRC BT½ or Equiv. |
| R-9 | 2,000 Ohm 1 Watt Ohmite or Equiv. |

**Resistors: (Cont'd)**

| | |
|---|---|
| R-10 | 20,000 Ohm 1 Watt Ohmite or Equiv. |
| R-11 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-12 | 250,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-13 | 2,000 Ohm 1 Watt Ohmite or Equiv. |
| R-14 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-15 | 10,000 Ohm 25 Watt Ohmite or Equiv. |

**Condensers:**

| | |
|---|---|
| C-1, C-2 | .1 Mfd. 400 Volt paper Aerovox 484 or Equiv. |
| C-3 | 10 Mfd. 25 Volt Elect. Aerovox PB25 or Equiv. |
| C-4 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |
| C-5 | .1 Mfd. 400 Volt paper Aerovox 484 or Equiv. |

**Condensers: (Cont'd.)**

| | |
|---|---|
| C-6 | 10 Mfd. 25 Volt Elect. Aerovox PB25 or Equiv. |
| C-7 | .1 Mfd. 400 Volt Paper Aerovox 484 or Equiv. |
| C-8 to C-10 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |

**Miscellaneous Parts:**

| | |
|---|---|
| 2 | Mike Connectors Amphenol or Equiv. |
| 1 | Bakelite Socket Amphenol or Equiv. |
| 4 | Bakelite Octal Sockets Amphenol or Equiv. |
| 2 | Bakelite Knobs |
| 1 | Terminal Strip |

**Tubes:** 1-80, 2-6F5, 2-6C5

# Thordarson Technical Literature

**No. 333 — Amateur Radio . . . . . . . .75c Postpaid**

Mr. Fortune, Thordarson engineer and a prominent amateur radio enthusiast, spent over twelve months in preparing this text-book. There are approximately 160 pages, and matters covered include Learning the Code, Receiver Theory and Construction, Crystal Oscillator Transmitter, Two-stage Transmitter, Three-stage Transmitter, Construction of the Modulator and reference notes on receivers, inductance, capacity and many other electrical and radio terms. It is a book recommended to all experimenters, beginning amateurs and even to amateurs of long experience. Amateur net price 75c. Profusely illustrated with over 100 comprehensive photographs and drawings. Heavy cover finished in wear-resistant blue cloth, with attractive gold stamping. This is a cloth covered case bound text-book.

**No. 340 — Complete Transformer Manual 35c Postpaid**

The Thordarson Transformer Manual is a complete book, containing the Replacement Transformer Encyclopedia and Servicing Guide, the Transmitter Guide, and the Sound Amplifier Guide, plus current Thordarson catalogs. It is bound in a strong attractive blue and orange cover with loose-leaf arrangement, giving the user opportunity to keep the Manual up-to-date by adding later Thordarson releases. A book that has proven to be most popular in the technical library.

**No. 352—Replacement Encyclopedia, Service Guide, Free**

Thordarson Replacement Transformer Encyclopedia and Service Guide No. 352 recommends proper transformer and choke replacement for receivers listed in Rider's Manuals. This handy, useful time-saver, originated by Thordarson is now used by good service engineers the world over. In addition, it contains a new edition of the popular Service Guide giving practical solutions to everyday service problems, including useful charts and tables.

**No. 346 — Amplifier Guide . . . . . 15c Postpaid**

P. A. men and experimenters interested in building high quality amplifiers find the Thordarson Amplifier Guide No. 346 a worthwhile source of information. It contains laboratory designed and tested circuits of amplifiers from 8 to 120 watts output. Complete parts list, mechanical chassis drawings, and comprehensive illustrations enable the constructor to obtain superior results with matched transformer and choke components. Data is included for pre-amplifiers, dual tone controls, speaker impedance matching and testing.

**No. 500 — Broadcast Components Catalog . . . Free**

Thordarson offers a complete line of transformers and chokes for broadcast use, each capable of meeting and surpassing the most rigid broadcast tolerances. These transformers are listed and described in the new Broadcast Catalog, No. 500. Broadcast stations, experimenters, laboratories or air craft stations are urged to secure a copy of this valuable listing.

**No. 600 — Amplifier Catalog . . . . . . . . . . Free**

The finest amplifiers are built by Thordarson — pioneers in producing quality audio components. Absolute fidelity is assured by accurate laboratory design and rigid inspection during production. New models from 8 to 900 watts satisfy practically every sound requirement. Pre-amplifiers and boosters round out a truly complete line of equipment for sound technicians. Fully described in Catalog 600.

**No. 400 — Complete Transformer Catalog . . . Free**

A catalog of transformers and reactors for every radio use. Contains full physical and electrical descriptions.

*Obtainable from your radio parts distributors or direct from factory.*

### Class B Audio Frequency Amplifiers

CLASS B modulators are usually used in transmitters having plate modulated Class C inputs of more than 50 or 60 watts. For audio frequency power outputs of more than 30 watts, the increased cost and size of tubes which can be used in Class A amplifiers, and the power supply components used to supply these tubes make Class B systems economically justifiable.

The principal differences between Class A and Class B audio amplifiers are as follows:

1. The plate dissipation of the tubes in a Class B amplifier increases with increasing signals and is a maximum at some level near full power output. In a Class A amplifier the plate loss of the tubes is a maximum at no-signal.
2. The excitation of a Class B amplifier is carried into the positive grid region of the tube characteristics, causing grid current to flow, with the resultant requirement that the source of audio frequency excitation is called upon to de'iver an appreciable amount of power. Class A amplifiers, in general, are not designed to operate with a positive grid in any condition of normal excitation.
3. In a Class B amplifier the changing plate current requires better regulation of the power supply than does the Class A amplifier.
4. Class A amplifiers usually require negative bias on the grids. In many Class B amplifiers there are conditions of operation in which no bias is required.
5. Class B audio frequency amplification requires the use of two tubes, whereas Class A amplification can be obtained with one tube.

### Class B Audio Frequency Output Calculations

The amateur has many occasions in which it is desirab'e to have more data concerning the operation of given tubes in Class B service than are given by the tube manufacturers. The data which are given usually show typical operating characteristics at a given plate voltage, showing the plate load which delivers a given amount of power with nominal distortion, driving power, and tube losses.

In a particular installation there often arise circumstances in which operation in some condition other than the "typical" case is desirable. For example: (1) the plate supply voltage may be other than that listed; (2) more or less distortion may be tolerated; (3) greater tube losses may be permissible at full-signal or at no-signal; (4) the regulation of the source of driving voltage may be poor; (5) the voltage or power output capabilities of the driving source may be limited; (6) the output power requirements may be different; (7) the wave form of the signal may be unusual; (8) the operation may be intermittent; and (9) space and weight requirements may justify overloading.

So that the amateur may take full advantage of the possibilities of varying the plate load on his Class B tubes by changing connections on the Multi-Match modulation transformers, an example of Class B output calculations is shown below:

Suppose that a Class C amplifier of 330 watts input is to be 100% modulated by the tubes having the characteristics shown in Fig. 1. The plate

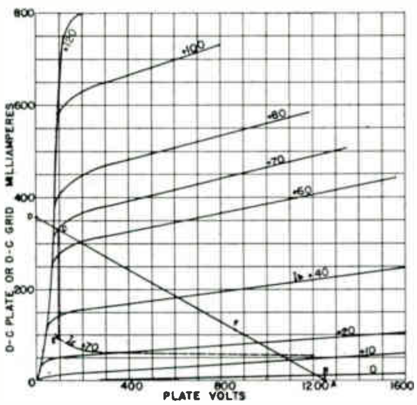



Fig. 1

supply voltage is 1250 V., the rated maximum tube dissipation is 40 watts, and the maximum plate current is 125 MA.

The audio frequency requirement is that 165 average watts of output power be delivered to the Class C stage. This figure is based on a sine wave signal. The maximum allowable power input to the modulator (two tubes) is 1250 x 0.125 x 2 = 312.5 watts. Thus an overall efficiency of at least

$$100 \times \frac{165}{312}$$

or 52.5% is required. This is not at all unreasonable for a Class B audio frequency stage; in an amplifier of power output capabilities of 150 watts an overall efficiency of 60 to 65% is easily obtainable.

Practice has shown that to allow for transformer losses and the deviation of tube characteristics from average values, the value of power delivered by the tubes as calculated from their average characteristics should be, for outputs of this order of magnitude, about 16% higher than the power required to be delivered from the secondary of the modulation transformer. In this case, the calculations should be based on a power output from the tubes of 165 x 1.16 or 192 watts output.

Since the maximum plate loss in a Class B amplifier occurs at a level slightly below maximum power output, an allowance of 35 average watts loss per tube at full signal is reasonable in this example. Considerable leeway may be taken with this in cases where speech waves of 330 watts peak power are required at the output of the modulation transformer. However, in this example, it is assumed that sine wave modulation will occur.

The power input to the two tubes at full-signal will then be the sum of power output and tube losses. This is 192 + (2 x 35) or 262 watts. A check now shows that the Class B plate efficiency, that is, the efficiency of conversion from DC energy supplied to the plate to audio frequency energy, is

$$100 \times \frac{192}{262} \text{ or } 73\%.$$

This is a reasonable value, for the maximum possible efficiency of a Class B stage is 78.5%.

For a power input of 262 watts at 1250 volts the direct current supplied is $\frac{\text{watts}}{\text{volts}}$ or $\frac{262}{1250}$ or 210 MA. The average current in each tube is half of this amount, or 105 MA. With the tubes biased to a value near cut-off, the shape of the current wave in each tube very nearly approximates that of a half-sine wave.

The average value of current in a series of half-sine wave pulses is 31.8% of the peak value of the current. Therefore, the peak value of the current in the tube is $\frac{105}{0.318}$ or 330 MA.

At the time the peak power occurs, only one of the two modulator tubes is working, and, therefore, it alone is delivering this power. The peak power is twice the average AC power developed or 2 x 192 or 384 watts. The peak AC voltage across the load is

$$\frac{\text{peak watts}}{\text{peak current}} = \frac{384}{0.330} = 1160 \text{ volts.}$$

The AC load on the tube is the peak voltage divided by the peak current or $\frac{1160}{0.330} = 3500$ ohms. On the family of curves shown in figure 1, the oblique straight line AD is known as the load line. It is a plot of the instantaneous voltage and current relations for one Class B tube when working into a resistive load of 3500 ohms. The location of the line is found by locating any two sets of simultaneous values of plate voltage and plate current. The value of 1160 peak volts across the load and 330 MA in the tube corresponds to a value of 1250 — 1160 or 90 volts across the tube. Thus e = 90 volts and i = 330 MA is one set of points. It is located at point C. Then, knowing the load, any other set of points can be found. At one-ninth power output the peak current and the peak voltage are one-third of that occurring at full power output. At this power level, then, the peak current is 110 MA, and the peak voltage across the load is $\frac{1160}{3}$ or 387. This corresponds to a peak voltage across the tube of 1250 — 387 or 863 V. Thus another point on the load line is e = 863 volts and i = 110 MA. This point is shown at F. A straight line through C and F locates the load line.

A simpler way of locating the load line is to draw a line through the point 1250 volts on the abscissae axis, which is shown at point A, and the point $\frac{1250}{R}$ or $\frac{1250}{3500}$ or 0.357 ampere on the ordinate axis. This latter point is designated as D. Then the points A, C, D and F are on the load line, and any two of them might have been used to obtain its position on the family of curves shown.

It will be seen that the point C falls on the curve corresponding to a grid voltage of +70 V. This voltage of +70 is the voltage on the grid at the instant of minimum plate voltage and peak power output. It (+70 volts) is the most positive value of grid voltage required for this condition of operation. It is to be noted that the maximum grid voltage and the minimum plate voltage occur at the same instant; furthermore, the minimum plate voltage of 90 V. is only slightly greater than the maximum grid voltage of 70 V.

The load of 3500 ohms on the plate of one audio tube represents a plate-to-plate load of four times this or 4 x 3500 = 14,000 ohms. This plate-to-plate impedance is of no particular value in the calculation of Class B performance by the method outlined above, but it is useful in describing the characteristics of the required Class B output transformer.

The calculation shown has been that for the solution of the operating characteristics for a given power output with a given tube loss. Where it is desired to find operating conditions to meet other requirements, such as a specified plate load or a specified peak driving voltage, a different order of procedure must be used. A study of the above example will be a guide in other solutions.

Whether or not the tubes are to be operated at zero bias involves the consideration of the plate loss at no-signal and the tolerable distortion. In the example given the value of no-signal plate current for zero bias voltage may be found at the intersection of the 1250 volt ordinate and the curve for $E_c = 0$. This is shown at the point B. Here the current for one tube is 10 MA, and the plate loss per tube is 1250 x 0.010 or 12.5 watts, well below the allowable limit.

The dotted curve represents the relation of grid current to plate voltage for a grid voltage of +70 volts. If from the coordinates $E_p = 90$, $I_p = 330$, a vertical line is passed which intersects the dotted line at E, the ordinate (90 MA) at this point represents the peak value of grid current. The peak grid driving power required to obtain full output under the conditions specified may now be obtained. It is $E_g \times I_g = 70 \times 0.090 = 6.3$ watts. The ratio of peak driving power to average driving power depends mainly upon the plate load, the type of tube, and the peak grid voltage and its relation to the minimum plate voltage. For some conditions of operation the average power is one-half the peak power, and for other conditions it may be only one-third or one-fourth the peak power.

The following characteristics have thus been obtained for two tubes in a Class B stage:

- Plate voltage — 1250 volts
- Average no-signal plate current — 20 MA
- Average full-signal plate current — 210 MA.
- DC grid volts — 0
- Peak grid-to-grid voltage — 140 volts
- No-signal plate loss — 25 watts
- Full-signal plate loss — 70 watts
- Load resistance (per tube) — 3500 ohms
- Plate-to-plate load — 14,000 ohms
- Peak driving power — 6.3 watts
- Plate efficiency — 73%
- Stage efficiency — 65%
- Power output — 165 watts

The maximum efficiency of a Class B amplifier is 78.5%. This value is realized only when the instantaneous plate voltage swings to zero and the half-sine wave shape of current in each tube is retained.

In the example given, if such a condition could be obtained, the average plate current (two tubes) would be 0.357 x 0.318 x 2 = 0.227 ampere. The power output would be $0.357 \times \frac{1250}{2} = 223$ watts, and the power input would be 1250 x 0.227 = 284 watts for an efficiency of $100 \times \frac{223}{284}$ or 78.5%.

### Considerations in Selecting Driver Transformer Ratios

Although the driving power for a Class B stage is usually obtained from a Class A amplifier, ordinary Class A amplifier design for maximum power output does not suffice. Most Class A amplifiers not intended for driver service are planned to deliver the maximum possible undistorted power into a given fixed load.

Unfortunately, the load on Class A tubes in driver service is not constant throughout the cycle. This is due to the fact that the grids of the modulator tubes do not have a constant resistance over the audio cycle. In the positive grid region the grid current increases more rapidly than the grid voltage, thus exhibiting the characteristic of a decreasing grid resistance with increasing voltage. The degree to which the resistance changes depends mainly upon the relation between minimum plate voltage and maximum grid voltage. For tubes operated with zero bias the resistance change in most cases is, fortunately, not large. In a Class B stage working into a resistance load, the maximum instantaneous grid voltage and the minimum instantaneous plate voltage occur at the same time. During the part of the cycle that the minimum plate voltage and the maximum grid voltage are not greatly different, the change in grid-to-cathode resistance is most apparent. It is well to plan to have the ratio of minimum plate voltage to maximum grid voltage exceed two in cases where low driver distortion is desired. In instances where more driver distortion can be tolerated, or in cases where the apparent internal-output impedance of the driver is very low, as compared with the minimum Class B grid resistance, this ratio may be reduced to 1.0 or 1.5. With tubes having negative grid bias the resistance changes from a very high value to a very low value within a small per cent of the time required for a complete cycle.

If a driving voltage of perfect regulation were available, this change in resistance would not be of such serious consequence. However, all practical drivers have some internal impedance, and in delivering energy to a varying load, harmonic distortion will occur. If the internal output impedance of the driver has an appreciable reactance, extremely disagreeable distortion can result. This is especially true if the Class B grids are biased. It is important to have a driver transformer having a low leakage reactance.

# Driver Transformer Ratios

AN IMPORTANT problem in the selection of a driver is to obtain a source of adequate voltage of good regulation without prohibitive amounts of driver tube capacity. Fortunately, there are receiving tubes (2A3's) which will supply driving power for most modulators having power outputs up to several hundred watts.

In general, for amateur work, the amateur should use tubes which in normal Class A amplifier service will deliver an average power output of at least one-half as much as the peak power required to supply the Class B grids. It is preferable in nearly all cases to have the average power output capabilities of the driver be one to two times as great as the peak power requirements of the Class B grids. This corresponds to peak power capabilities of two to four times the peak power which is required at the driver grids. The ratio of average power capacity of driver to peak power required at the Class B grids may approach the lower value when the Class B tubes are operated at zero bias and the ratio of minimum plate voltage to maximum grid voltage is large (two or more). In such a case, the grid resistance is substantially constant during the cycle.

The installation of driving tubes having power output capabilities greater than required allows the changing of the plate load from that which is optimum for maximum undistorted output to a higher value which delivers less power, but which lowers the internal impedance of the driving source as seen from the Class B grids.

In selecting the turns ratio of a driver transformer, it is desirable to make the step-down ratio as high as possible from the driver plates to the Class B grids and yet be able to develop the required peak driving voltage on the Class B grids without overloading the driver tube.

The determination of the correct driver transformer ratio can be studied by reference to the following discussion. In figure 2, Eg is the peak value of the AC voltage required on the Class B grid. Rg is the grid resistance at this value of voltage. (This is the lowest value of grid resistance.) $R_D$ is the internal resistance of the source of

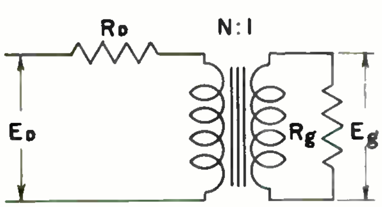



Fig. 2

driving energy, and $E_D$ is the peak open circuit voltage developed by the driver source. The transformer ratio is N to 1, primary to secondary. Figure 3 is a simplified version in which the secondary voltage and resistance are

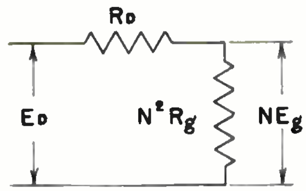



Fig. 3

reflected to the primary side of the transformer. The secondary voltage is stepped up N times and appears across the primary as NEg. The secondary load, in accordance with regular transformer theory, is stepped up $N^2$ times and appears to the primary as $N^2Rg$.

At all instants the ratio of the voltages is equal to the ratio of the resistances across which they occur. Thus:

$$\frac{E_D}{NE_g} = \frac{R_D + N^2R_g}{N^2R_g}$$

There are two solutions, one giving a turns ratio which gives relatively good regulation and the other giving a turns ratio with poor regulation. For either solution there is adequate driving voltage. The desired solution is given by the formula:

$$N = \frac{E_DR_g + \sqrt{E_D^2R_g^2 - E_g^2R_gR_D}}{2E_gR_g}$$

Example:

Assume a pair of push-pull 2A3's with 300 volts on the plates, 60 volts bias and an available signal of 53 peak volts on each 2A3 grid. The Class B grid minimum resistance is 780 ohms at +70 volts. The Class B tubes are at zero bias. The 2A3 tubes have a mu of 4.2 and a plate resistance of 1050 ohms.

Solution:

The open circuit driving voltage of two 2A3's in series is 2 x 4.2 x 53 or 445 volts. This voltage may be considered as that in a generator of internal resistance Rp x 2 or 1050 x 2 or 2100 ohms. Then:

$$N = \frac{445 \times 780 + \sqrt{(445)^2(780)^2 - (70)^2(780)(2100)}}{2 \times 70 \times 780}$$

Solving:

N=6.25, which is the turns ratio from the total primary to one-half the secondary. In this case, the 780 ohm grid load is reflected as a 30,500 ohm plate-to-plate load on the 2A3's, much higher than the 5000 ohm plate-to-plate load often encountered.

**Line to Class B Grid Driver Ratio**

In selecting the driver transformer to transfer energy from a so-called "500 ohm" line to Class B grids, the fact is often overlooked that the "500 ohm" line is usually not of 500 ohms internal output resistance. Its internal output resistance (when the source of energy to it is not "padded down") is usually far from being 500 ohms. This is of considerable consequence in calculating driver transformer ratios.

Suppose, for example, that the "500 ohm" line had been fed from two 2A3's having an amplification factor of 4.2, a plate resistance of 1050 ohms and a maximum available signal voltage on their grids of 53 peak volts. If the 2A3 output transformer was designed to place a 5000 ohm plate-to-plate load on the tubes when a 500 ohm load was connected to the secondary, the turns ratio of total primary to total secondary would be 3.16 to 1. The 500 ohm line would then have an internal impedance of $\frac{2 \times 1050}{(3.16)^2}$

or 210 ohms, and the maximum available open circuit voltage on the line side of the transformer would be $2 \times 53 \times \frac{4.2}{3.16}$ or 140 peak volts. This voltage and the source resistance of 210 ohms should be used in calculating the line to Class B grid ratio.

For the Class B grid condition previously given, the solution yields:

$$N = \frac{140 \times 780 + \sqrt{(140)^2(780)^2 - (70)^2(210)(780)}}{2 \times 70 \times 780}$$

which gives N = 1.97 as the ratio from the line to one grid (that is, the primary to one-half the secondary). It is to be noted that this ratio (1.97) multiplied by the ratio of the transformer with which it is associated (3.16) gives 1.97 x 3.16 = 6.25, which is the ratio obtained for the solution of turns ratio for a driver transformer coupling the 2A3 plates directly to the grids.

In the calculation of driver ratio shown, no allowance has been made for transformer losses or for deviations of the driver tube characteristics from the average values given by tube manufacturers. Furthermore, it is not well to have a peak signal on the driver tube grids which reduces that grid voltage to zero. It is better to limit the maximum peak grid voltage on the driver to about 95% of the bias voltage. Allowance for these three factors can be made by reducing the step-down ratio of the driver transformer 10 to 15%.

# Matching Class C Loads to Modulators

HAVING selected the proper load resistance into which the modulator should deliver energy it is necessary to couple the modulator to its Class C load through a transformer of the proper turns ratio.

It is characteristic of a transformer that the resistance to which the secondary delivers energy can appear as a different value of resistance at the primary terminals. The degree to which this actual load resistance and the reflected load resistance differ depends upon the turns ratio of the transformer. Of the total energy supplied to the primary of a transformer almost all is available for delivery to the load on the secondary. Thus, the actual load resistance presented by the Class C amplifier may be made to appear as the desired load on the modulator tubes, and all of the alternating current energy developed in the modulator stage can be delivered to the Class C amplifier and its load. In general, then, a transformer may be thought of as an impedance changing device in which very little of the energy supplied to it is lost. In amateur work, the transformers are of such size and construction that the efficiency is good enough that little attention need be given to the losses; that is, for most calculations it may be assumed to behave as an ideal transformer.

To show how a transformer acts as an impedance changing device the following demonstration is given:

Referring to Figure 4 a transformer is shown having a turns ratio of primary to secondary of 1 to N. The load

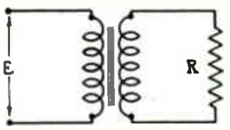



Fig. 4

on the secondary is R ohms, and the voltage impressed on the primary is E.

Ordinary transformer theory indicates that the voltage across each winding is proportional to the number of turns on the winding. Thus, with E volts across the primary, the voltage across the secondary is N times as much, or NE. The power at the load resistance R is equal to the square of the voltage across it divided by the resistance. Thus, in this case the power at the secondary load is $\frac{(NE)^2}{R}$. With a perfect transformer the power at the primary is the same value as it is at the secondary. Thus, the power at the primary is also $\frac{(NE)^2}{R}$.

For the moment, assume the secondary load resistance, R, appears at the primary terminals as another resistance, $R_1$. It is desired to find the value of the turns ratio of secondary to primary in terms of these resistances, R and $R_1$. The power at the primary of the transformer is $\frac{E^2}{R_1}$. But this value is also equal to $\frac{(NE)^2}{R}$. Therefore, $\frac{E^2}{R_1} = \frac{(NE)^2}{R}$ or $\frac{1}{R_1} = \frac{N^2}{R}$ and $N^2 = \frac{R}{R_1}$.

Thus, it is to be seen that the reflected resistance is equal to the secondary resistance divided by the square of the turns ratio from secondary to primary. Stated in another manner, the reflected resistance is equal to the secondary resistance multiplied by the square of the turns ratio from primary to secondary. It is important not to become confused by the indiscriminate use of the terms "turns ratio," "step-up ratio" and the like. These terms are used interchangeably, but they are not necessarily equal to each other.

Suppose, for example, that it is desired to calculate the turns ratio of the full primary to the full secondary of a modulation transformer used under the following conditions:

Power input to Class C amplifier — 330 watts.

Plate voltage on Class C amplifier — 1250 volts.

Modulator plate-to-plate load desired — 14000 ohms.

The Class C plate current is $\frac{W}{E}$ or $\frac{330}{1250}$ or 0.264 amperes. The Class C load on the secondary of the modulation transformer is then $\frac{E}{I}$ or $\frac{1250}{0.264}$ or 4740 ohms. This is equal to R.

Then, if $N^2 = \frac{R}{R_1}$, $N^2 = \frac{4740}{14000} =$ 0.338 and N is equal to the square root of this value, or 0.58. In this case N is the ratio of secondary turns to primary turns. The value of 0.58, being less than unity, indicates that the secondary has less turns than the primary. This is as it should be when a given Class C load is less than the plate-to-plate load which it is desired be reflected on the primary side of the modulation transformer. The amateur may avoid making the mistake of obtaining a turns ratio which is the inverse of the proper value by always making an estimate of which winding, primary or secondary, has the greater number of turns, this estimate to be made before the start of calculations.

## MULTI-MATCH MODULATION TRANSFORMER RATIOS

Tapped double winding coils as used in Multi-Match modulation transformers make possible a large number of impedance ratios, so many in fact that it is not practical to list in table form all the combinations possible. However, there are occasions when the modulator plate-to-plate load, or the Class C load, are of values not shown in the table and yet are within the range covered by the transformer. The chart shown on the opposite page may be used to determine the correct modulation transformer connections when the desired turns ratio is known. The transformer connections may then be found from the list of ratios in the adjoining table. As an example, to match a 10,000 ohm plate-to-plate load to a Class C load of 5000 ohms, a turns ratio of $\sqrt{\frac{10{,}000}{5{,}000}}$ or 1.41 is necessary. The connections shown in the table should be used to secure this ratio. In this particular case these connections are:

For the primary, connect the modulator plates to terminals 2 and 5; 3 and 4 are joined and connected to the modulator plate supply. For the secondary, join terminals 7-11 and 8-12. Connect the Class C load to terminals 7 and 8.

Since only part of the winding is used for some combinations, the maximum allowable value of plate-to-plate load is necessarily variable. This maximum value is shown in the last column of the table and should not be exceeded.

Care should be taken that the DC secondary current does not exceed the maximum rating of the transformer. A parallel connected secondary will carry twice the current of a series connection, and in the event that the Class C current is greater than the allowable current of the series connection, a parallel connection must be used.

# —Connections for Matching Multi-Match and Universal Transformers—

| Turns Ratio Primary to Secondary | PRIMARY | | | SECONDARY | | | | Maximum Allowable Plate to Plate Load |
|---|---|---|---|---|---|---|---|---|
| | | | | SERIES | | PARALLEL | | |
| | Plate | B + | Plate | Join Together | Connect Class "C" Load To | Join Together | Connect Class "C" Load To | |
| 3.14 | 2 | 3–4 | 5 | | | 8–9<br>10–11 | 8–10<br>— | 12000 Ohms |
| 2.88 | 7 | 8–11 | 12 | | | 2–3<br>4–5 | 2–4<br>— | 16000 Ohms |
| 2.8 | 1 | 3–4 | 6 | 9–10 | 8–11 | | | 20000 Ohms |
| 2.61 | 7 | 9–10 | 12 | 2–5 | 1–6 | | | 20000 Ohms |
| 2.5 | 1 | 2–5 | 6 | | | 8–9<br>10–11 | 8–10<br>— | 10000 Ohms |
| 2.5 | 1 | 3–4 | 6 | | | 7–11<br>8–12 | 7–8<br>— | 20000 Ohms |
| 2.32 | 7 | 9–10 | 12 | | | 1–3<br>4–6 | 1–4<br>— | 20000 Ohms |
| 2.07 | 7 | 9–10 | 12 | 3–4 | 2–5 | | | 20000 Ohms |
| 1.8 | 7 | 8–11 | 12 | 2–5 | 1–6 | | | 16000 Ohms |
| 1.73 | 1 | 3–4 | 6 | | | 7–9<br>10–12 | 7–10<br>— | 20000 Ohms |
| 1.61 | 8 | 9–10 | 11 | | | 2–6<br>1–5 | 1–2<br>— | 8000 Ohms |
| 1.60 | 7 | 8–11 | 12 | | | 1–3<br>4–6 | 1–4<br>— | 16000 Ohms |
| 1.59 | 7 | 9–10 | 12 | 2–3 | 1–6 | | | 20000 Ohms |
| 1.57 | 2 | 3–4 | 5 | 9–10 | 8–11 | | | 12000 Ohms |
| 1.49 | 7 | 9–10 | 12 | 3–4 | 2–6 | | | 20000 Ohms |
| 1.44 | 7 | 8–11 | 12 | 3–4 | 2–5 | | | 16000 Ohms |
| 1.4 | 2 | 3–4 | 5 | | | 7–11<br>8–12 | 7–8<br>— | 12000 Ohms |
| 1.32 | 1 | 3–4 | 6 | 9–10 | 8–12 | | | 20000 Ohms |
| 1.28 | 8 | 9–10 | 11 | | | 2–3<br>4–5 | 2–4<br>— | 8000 Ohms |
| 1.25 | 1 | 3–4 | 6 | 8–11 | 7–12 | | | 20000 Ohms |
| 1.25 | 1 | 2–5 | 6 | 9–10 | 8–11 | | | 10000 Ohms |
| 1.15 | 7 | 9–10 | 12 | 3–4 | 1–6 | | | 20000 Ohms |
| 1.11 | 1 | 2–5 | 6 | | | 7–11<br>8–12 | 7–8<br>— | 10000 Ohms |
| 1.1 | 7 | 8–11 | 12 | 2–3 | 1–6 | | | 16000 Ohms |
| 1.03 | 7 | 8–11 | 12 | 3–4 | 2–6 | | | 16000 Ohms |
| 1.02 | 1 | 3–4 | 6 | 8–9 | 7–12 | | | 20000 Ohms |
| .967 | 2 | 3–4 | 5 | | | 7–9<br>10–12 | 7–10 | 12000 Ohms |
| .866 | 1 | 3–4 | 6 | 9–10 | 7–12 | | | 20000 Ohms |
| .8 | 7 | 8–11 | 12 | 3–4 | 1–6 | | | 16000 Ohms |
| .77 | 1 | 2–5 | 6 | | | 7–9<br>10–12 | 7–10<br>— | 10000 Ohms |
| .742 | 2 | 3–4 | 5 | 9–10 | 8–12 | | | 12000 Ohms |
| .714 | 8 | 9–10 | 11 | | | 1–3<br>4–6 | 1–4<br>— | 8000 Ohms |
| .7 | 2 | 3–4 | 5 | 8–11 | 7–12 | | | 12000 Ohms |
| .639 | 8 | 9–10 | 11 | 3–4 | 2–5 | | | 8000 Ohms |
| .588 | 1 | 2–5 | 6 | 9–10 | 8–12 | | | 10000 Ohms |
| .575 | 2 | 3–4 | 5 | 8–9 | 7–12 | | | 12000 Ohms |
| .555 | 1 | 2–5 | 6 | 8–11 | 7–12 | | | 10000 Ohms |
| .495 | 8 | 9–10 | 11 | 2–3 | 1–6 | | | 8000 Ohms |
| .483 | 2 | 3–4 | 5 | 9–10 | 7–12 | | | 12000 Ohms |
| .458 | 8 | 9–10 | 11 | 3–4 | 2–6 | | | 8000 Ohms |
| .455 | 1 | 2–5 | 6 | 8–9 | 7–12 | | | 10000 Ohms |
| .385 | 1 | 2–5 | 6 | 9–10 | 7–12 | | | 10000 Ohms |
| .357 | 8 | 9–10 | 11 | 3–4 | 1–6 | | | 8000 Ohms |

## Thordarson Multi-Match Transformer Ratings

| Type No. | Max. Audio Watts | Max. Pri. M.A. Each Side | Max. Sec. M.A. Series | Max. Sec. M.A. Parallel |
|---|---|---|---|---|
| T-11M74 | 40 | 100 | 80 | 160 |
| T-11M75 | 75 | 145 | 145 | 290 |
| T-11M76 | 125 | 210 | 160 | 320 |
| T-11M77 | 300 | 250 | 250 | 500 |
| T-11M78 | 500 | 320 | 320 | 640 |
| T-19M13 | 15 | 50 | 50 | 100 |
| T-19M14 | 30 | 75 | 75 | 150 |
| T-19M15 | 60 | 125 | 125 | 250 |
| T-19M16 | 100 | 175 | 175 | 350 |
| T-19M17 | 250 | 225 | 225 | 450 |

# Matched Power Supplies

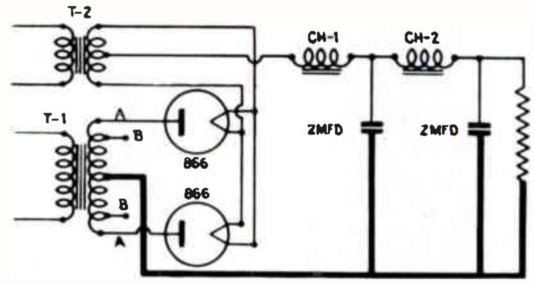
THESE matched power supplies provide the amateur with any of the direct current voltages ordinarily encountered in amateur radio work. The dual transformers T-19P57, T-19P70 and T-19P71 are especially useful for transmitters having low voltage exciter and high voltage final amplifier stages on the same chassis. The transformer T-19P58 is especially useful in transmitters with a Class B modulator and Class C amplifier having slightly different plate voltage requirements. All of them may be depended upon to give the rated direct current voltage and current when using the prescribed chokes.

For CW work or for use in transmitters where the Class B modulator and Class C amplifier plate voltage are to be taken from one supply, the excellent regulation of these matched units is desirable. When the bleeder, R, is of such magnitude as to drain approximately 10% of the rated current, the regulation of these supplies is approximately 15% and the ripple is approximately 1%.

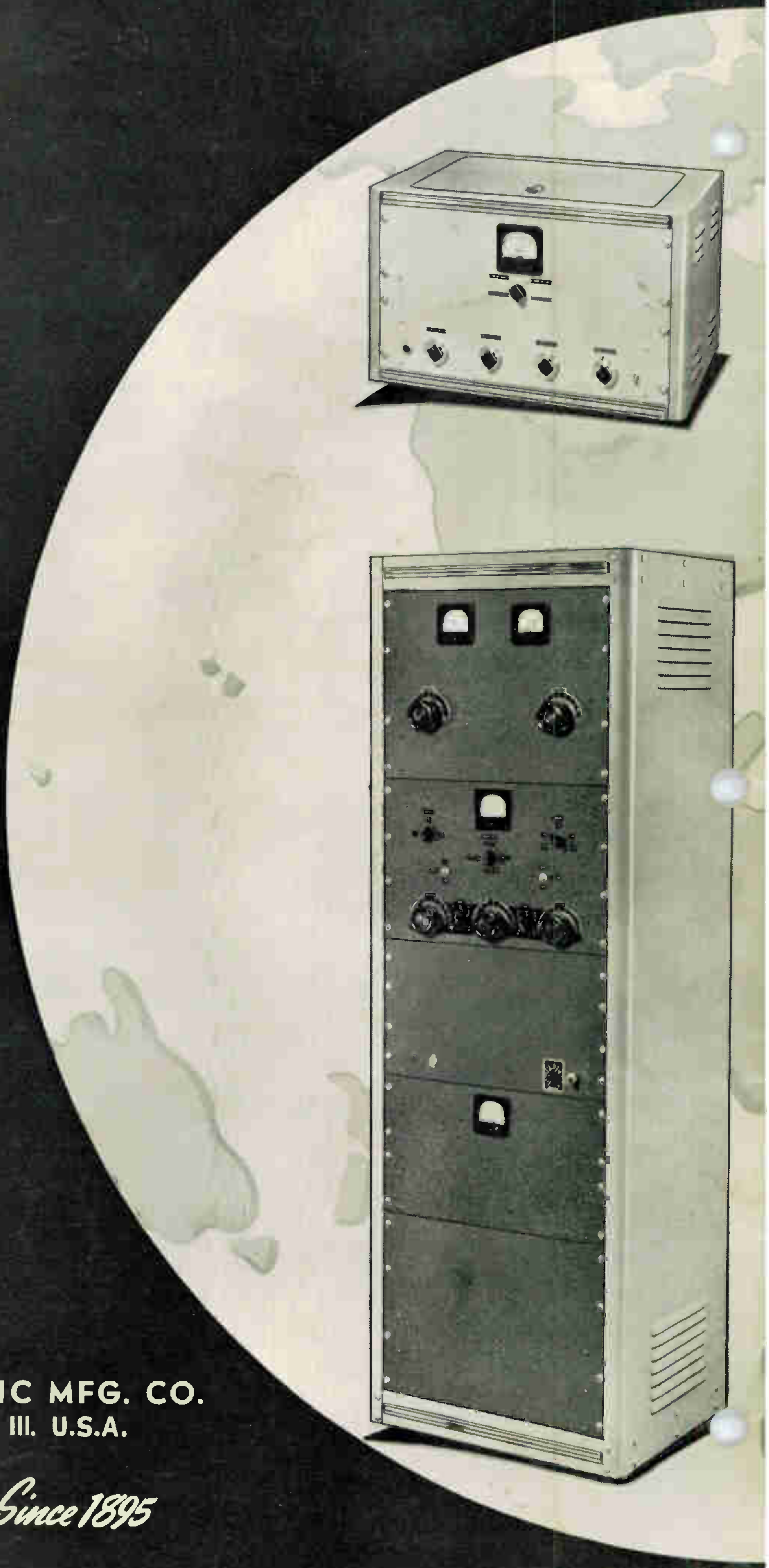
The power supplies using the transformer T-1, marked with an asterisk, are dual supplies; that is, power is supplied at two direct current voltages simultaneously. The dual supplies using the transformers T-19P58 and T-19P71 use two chokes in each B+ lead, and the proper chokes are specified opposite these transformers. For the dual supplies using the transformers T-19P57 and T-19P70, two chokes in the high voltage center tap connection provide filtering for both the direct current voltages obtainable. The rated secondary load currents of each of these four dual plate transformers may be delivered simultaneously. But, when it is desired to use only the low voltage tap on any one of these dual units, the current rating of this tap is then equal to the sum of the current ratings of the two sections.

The filament transformer chosen for each plate supply is designed for mounting underneath the chassis. The plate transformers and chokes are supplied with black cases to provide not only matched electrical performance but also matched appearance in the rig.

The T-19F83 filament transformer supplies the filament of a 5Z3, the T-19F88 is for 866JR's and the T-19F90 is for 866's. The T-19F78 filament transformer is to be used with a 5Z3 and 866JR's.




| Power Trans. T-1 | DC Volts from Tap A | DC Volts from Tap B | DC MA | Input Choke CH-1 | Smoothing Choke CH-2 | Fil. Trans. T-2 |
|---|---|---|---|---|---|---|
| T-19P54 | 400 | | 150 | T-19C39 | T-19C46 | T-19F83 |
| T-19P55 | 500 | 400 | 250 | T-19C36 | T-19C43 | T-19F88 |
| T-19P70* | 750 | <br>400 | 100<br>225 | T-19C36 | T-19C43 | T-19F88<br>T-19F83 |
| T-19P56 | 750 | 600 | 225 | T-19C36 | T-19C43 | T-19F88 |
| T-19P57* | 1000 | <br>400 | 125<br>150 | T-75C51 | T-75C51 | T-19F78 |
| T-19P58* | 1000 | <br>750 | 200<br>150 | T-19C35<br>T-19C39 | T-19C42<br>T-19C46 | T-19F90<br>T-19F88 |
| T-19P69 | 1000 | 750 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P71* | 1250 | <br>400 | 125<br>200 | T-19C39<br>T-19C35 | T-19C46<br>T-19C42 | T-19F90<br>T-19F83 |
| T-19P59 | 1250 | 1000 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P60 | 1500 | 1250 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P61 | 1750 | 1500 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P62 | 2000 | 1750 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P63 | 1250 | 1000 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P64 | 1500 | 1250 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P65 | 2500 | 2000 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P66 | 1750 | 1500 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P67 | 2000 | 1750 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P68 | 2500 | 2000 | 500 | T-19C38 | T-19C45 | T-19F90 |



**THORDARSON ELECTRIC MFG. CO.**
**500 W. Huron St. Chicago, Ill. U.S.A.**

*Transformer Specialists Since 1895*

15¢

# THORDARSON

## Transmitter Guide

No. 344-E

# Since 1895—

*Since 1895 the Thordarson organization has pioneered in the development and manufacture of quality transformers in the progressive electrical world. The policy of the company — to engineer the best product for the application — is consistently maintained. Small wonder that Thordarson is the recipient of both national and international awards for outstanding contributions to better engineering.*

*From the earliest spark coil days Thordarson has devoted an important part of its engineering and laboratory resources to the development of Amateur Radio. Today, the Amateur Radio fraternity is the training ground for broadcast, communications and government engineers.*

*To further promote the interest and pleasure of this worthy hobby, Thordarson presents this latest Transmitter Guide. This guide offers you a wide choice of units from the smallest transmitter for the beginner to the larger and more elaborate rigs for the advanced amateur. These transmitters are conservatively rated and employ the latest technical developments for efficient and economical operation. The cabinets and panels are beautifully designed and the circuits are adaptable to a multitude of amateur applications. Simplified construction methods are employed throughout the guide and the use of Thordarson transformers and chokes will insure perfect performance for many years.*

*Our sincere wish is that this guide will enable you to find many hours of enjoyment in contacting old friends and making new ones on the amateur bands.*

☆

## Contents


20 Watt CW Transmitter .... 3
35 Watt Phone-CW Transmitter .... 4, 5
50 Watt 5 & 10 Meter Phone Transmitter .... 6, 7
55 Watt Phone, 80 Watt CW Transmitter .. 8, 9, 10, 11
12 Watt Mobile Transmitter, 5 & 10 Meters .... 12, 13
12 Watt Universal Transmitter for Portable and Emergency Service .... 14, 15
40 Watt Band-Switch Exciter Unit .... 16, 17
120 Watt Band-Switch Exciter Unit .... 18, 19
100 Watt Band-Switch Transmitter .... 20, 21
Amateur Speech Amplifier .... 22
250 Watt Phone, 450 Watt CW Transmitter . 23, 24, 25
400 Watt Transmitter .... 26, 27, 28
600 Watt Transmitter .... 29, 30, 31, 32
1000 Watt Transmitter .... 33, 34, 35, 36
Transmitter Pre-Amplifier .... 37
Thordarson Technical Literature .... 37
Class B Output Calculations .... 38, 39
Driver Transformer Ratios .... 40
Matching Class C Loads .... 41
Multi-Match Modulation Transformer Ratios .. 41, 42
Matched Power Supplies .... 43




Printed in U. S. A.

# 20 Watt CW Transmitter

FOR the newcomer in amateur radio desiring a simple yet reliable transmitter, this transmitter with metal chassis has been designed. Its crystal controlled circuit is of such a type that operation is possible on five amateur bands. If higher power is desired at some later date this transmitter may also be used as the crystal oscillator stage of a larger multi-stage transmitter.

**Circuit Operation**

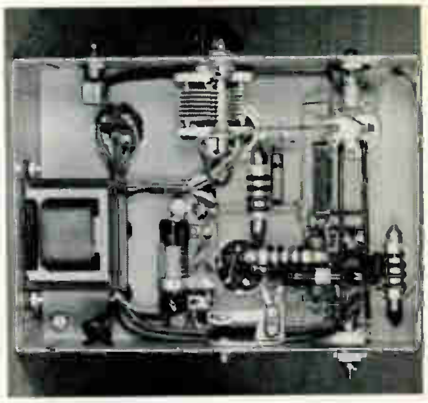
Operation on the five amateur bands from 160 to 10 meters is possible. On all of these five bands the oscillator will work "straight through"; that is, the crystal frequency and the output frequency are the same. In addition, the oscillator will give good outputs when doubling, using 160, 80 and 40 meter crystals.

The plug-in coils on this transmitter are of a type having a built-in link on the "cold" end of the coil. If used as the exciter for a larger transmitter this unit may be link-coupled or capacity-coupled to the succeeding stage.

Successful operation of this type oscillator on the five amateur bands is made possible by including condenser C-8 in the 40 meter coil base. Since the capacity, C-3, which gives adequate performance with 10 and 20 meter crystals results in excessive crystal current with a 40 meter crystal, the 0.00025 Mfd. condenser, C-8, is mounted on the 40 meter coil base in such a manner that it is paralleled with the cathode-to-ground circuit of the 6L6G when the 40 meter coil is used. This minimizes the likelihood of high crystal current in the 40 meter crystal, yet it permits the 20 and 10 meter crystals to oscillate with highest efficiency.

A pilot lamp in the negative high voltage lead makes an inexpensive yet effective tuning indicator. For best results in tuning it is recommended that the operator start to tune from minimum capacity toward maximum capacity, until the lamp passes through its first minimum in brilliancy. The condenser should then be tuned back a slight amount toward minimum capacity to maintain good oscillator stability and ease of starting when keying. A flashlight bulb connected to a two or three turn wire loop placed over the tank coil is a handy indicator of circuit conditions when tuning.

Chassis View



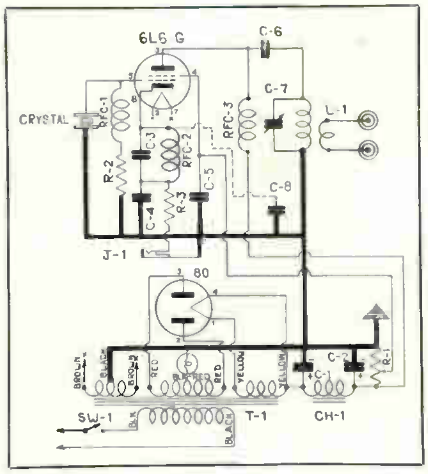
Bottom View

The parts layout shown in the above photograph should be closely followed for best results. The position of the power supply leads is not critical, but all connections in the RF circuit should be made as shown.

The keying jack is mounted on the rear apron of the chassis. It is of the circuit closing type so that the removal of the keying plug closes the circuit.

When properly loaded the input to the 6L6-G plate is about 20 watts. At slightly greater antenna loading, the change in "B" current when tuning through resonance is barely noticeable.

The screen voltage may be adjusted by moving the tap on the bleeder resistor R-1. The recommended setting for this tap is approximately one-fifth of the distance from the B+ end. The position of this tap has been selected as being optimum for reasonable output on all five bands without exceeding the rated crystal current of any crystal, or the rated dissipation of the tube in any condition of loading. With the 160 or 80 meter crystals the moving of this tap closer to the B+ end of the bleeder will result in greater output without damage to the crystal or without exceeding the rated dissipation of the tube.




## Parts Required

**THORDARSON TRANSFORMER and CHOKE**

| | | |
|---|---|---|
| T-1 | T-70R61 | Power Transformer |
| CH-1 | T-44C02 | Filter Choke |

**Resistors:**

- R-1 20,000 Ohm 25 Watt Wirewound Resistor, Semi-Variable
- R-2 20,000 Ohm 1 Watt Resistor
- R-3 300 Ohm 10 Watt Resistor

**Condensers:**

- C-1, C-2 Double 8 Mfd. 450 Volt Condenser
- C-3 .0001 Mfd. Mica Condenser
- C-4 .01 Mfd. 400 Volt Condenser
- C-5 .01 Mfd. 400 Volt Condenser
- C-6 .002 Mfd. 1,000 Volt Mica Condenser
- C-7 100 Mmfd. Variable Condenser
- C-8 .00025 Mfd. Mica Condenser

**RF Chokes:**

- RFC-1 RF Choke
- RFC-2 RF Choke
- RFC-3 RF Choke

**Miscellaneous Parts:**

- 1 Chassis 8½" x 6" x 2½" (Punched and Drilled)
- 2 Feed-thru Insulators
- 1 Name Plate
- 1 Dial Plate
- 1 Octal Socket
- 1 4-Contact Socket
- 1 5-Contact Socket
- 1 5-Contact Socket, Steatite
- 1 Pilot Lamp Socket
- 1 Line Cord and Plug
- 1 SPST Switch
- 1 Knob

**Misc. Parts: (Cont'd)**

- 1 Closed Circuit Jack
- 1 6.3 Volt Pilot Light

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

**Accessories:**

- 1 160 Meter RF Coil, End Linked, Bud OEL-160 or Equivalent
- 1 80 Meter RF Coil, End Linked, Bud OEL-80 or Equivalent
- 1 40 Meter RF Coil, End Linked, Bud OEL-40 or Equivalent
- 1 20 Meter RF Coil, End Linked, Bud OEL-20 or Equivalent
- 1 10 Meter RF Coil, End Linked, Bud OEL-10 or Equivalent
- 1 Phone Plug Yaxley No. 75 or Equivalent
- 1 Crystal
- 1 80 Tube
- 1 6L6-G or 6L6 GX Tube

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 35 Watt Phone-CW Transmitter

Cabinet View

Chassis View

THIS compact transmitter is capable of 35 watts input on CW and phone. Its power supply and its Class B audio amplifier are included on the same chassis as the RF section, and its flexibility makes it a desirable transmitter for those wishing low power on the five amateur bands from 160 to 10 meters. The complete transmitter is built upon a rectangular chassis and is housed in an attractive cabinet with a curved panel of modern design. The cabinet, panel and chassis are finished in gray flat enamel. All controls are mounted on the front panel.

The 6V6-G crystal oscillator circuit easily provides enough driving power for the 6L6-G final amplifier. The oscillator and amplifier plate voltage is 315 V. and the oscillator screen voltage is 210V. Harmonic operation of the crystal oscillator may be obtained when using 160, 80 and 40 meter crystals.

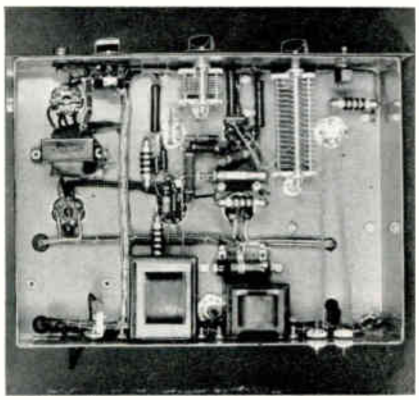
There is a condition of optimum excitation for the beam power final amplifier. In some cases it may be desirable to reduce the output of the oscillator stage so that the final stage will not be overdriven. To do this the oscillator tank is detuned by turning the tank condenser toward its minimum capacity setting.

The final amplifier may be worked "straight through," or it may be used for doubling. It delivers good power outputs when doubling to 80, 40, 20 and 10 meters. The final amplifier stage uses plate neutralization so that even on the highest frequencies no difficulty is experienced with self-oscillation. Cathode bias is used on the final amplifier; this aids in limiting the plate current when the final tank is not tuned to resonance or when there is no excitation on the final grid.

The plate tank coils for both stages are of the plug-in type. Although the crystal oscillator stage is capacity coupled to the final amplifier stage, the plug-in coil used is a Bud type OEL having a link on one end so that the coil may be used in other applications. The final tank coil is of the center-taped, center-linked type with a semi-fixed link. For the amateur who changes bands often, this provides the advantage of being able to change coils without changing the loading adjustment for each band.

Both the oscillator and final stage are keyed. The keying jack is of the closed circuit type so that no change in connections is necessary for changing quickly from CW to phone operation.

When properly loaded, the plate current in the final amplifier stage is 110 MA; and the current in the crystal oscillator plate is 25 to 30 MA. The modulator is a Class B 6A6 operating with 255 volts on the plate. Despite the high plate voltage, operation is very satisfactory in intermittent service.



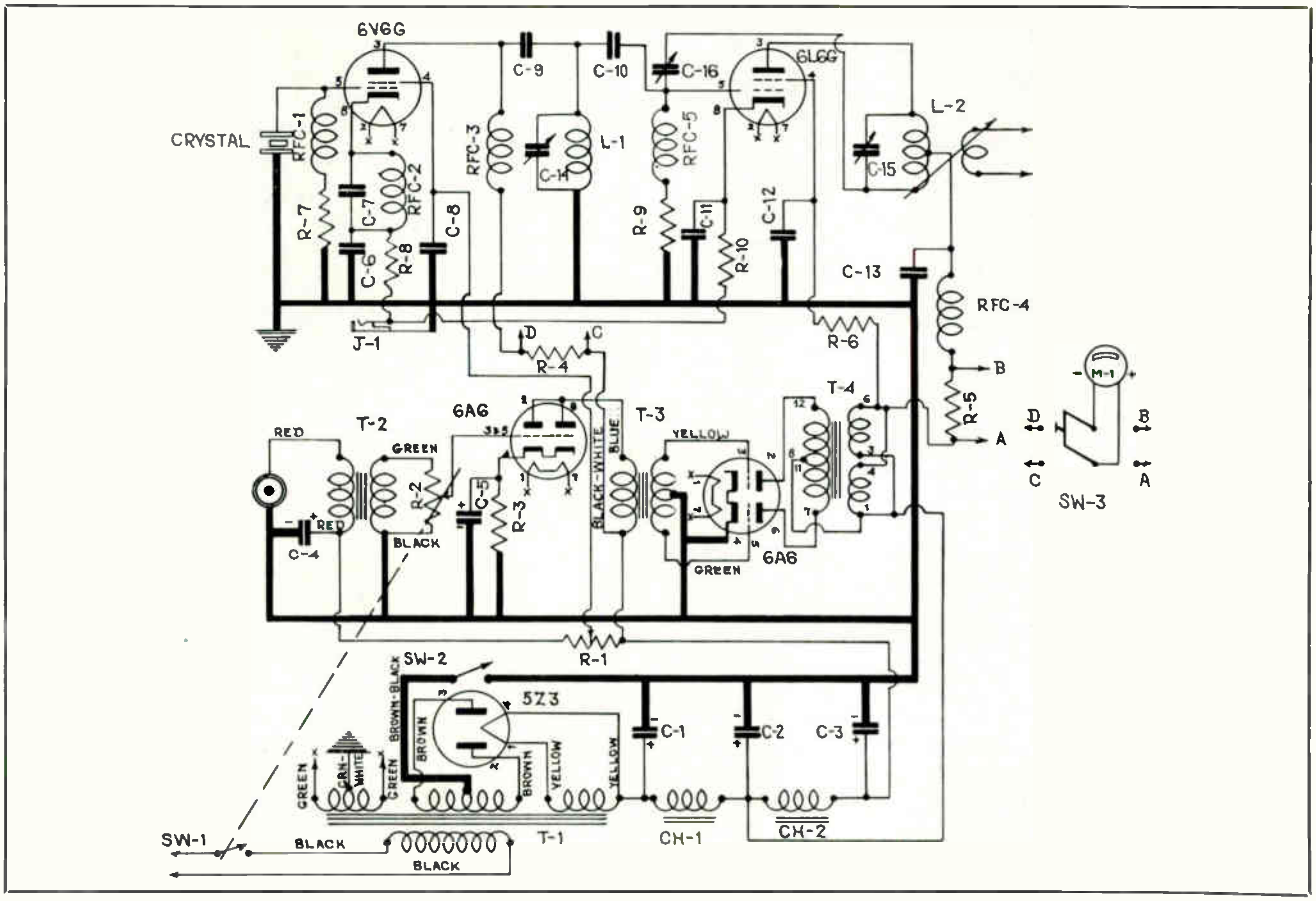
Bottom View

The 6A6 operates at zero bias, and it is driven by another 6A6 triode with its two sections in parallel. The plates of the driver are also operated at 325 volts. The cathode bias on the driver is of the order of 5 to 6 volts. High gain is realized in this stage so that no additional amplification is needed to obtain 100% modulation when using a carbon microphone.

The current for the carbon microphone is obtained by passing the bleeder current through the microphone circuit. Adequate filtering is provided so that no hum enters the audio circuit at this point. In order that the removal of the microphone plug from the chassis will not place a high voltage across C-4, the microphone connector is of the shorting type which closes the microphone circuit even when the microphone has been removed. With such a feature the operator can never inadvertently place high voltage on the condenser, C-4.

The power supply uses a 5Z3 rectifier tube. Separate switches are provided for the plate and filament supplies. A filament switch is mounted on the volume control. A handy toggle-switch on the panel controls the plate supply. A single meter is provided with switching which permits the reading of either the final plate or the oscillator plate current.

# 35 Watt Phone-CW Transmitter




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-92R21 | Power Transformer |
| T-2 | T-86A02 | Microphone Transformer |
| T-3 | T-19D06 | Driver Transformer |
| T-4 | T-19M13 | Modulation Transformer |
| CH-1 | T-13C30 | Filter Choke |
| CH-2 | T-74C30 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 20,000 Ohm 25 Watt Semi-Variable Resistor |
| R-2 | 500,000 Ohm Volume Control with Switch |
| R-3 | 1,000 Ohm 1 Watt Resistor |
| R-4 | 50 Ohm 10 Watt Resistor |
| R-5 | 50 Ohm 10 Watt Resistor |
| R-6 | 3,500 Ohm 10 Watt Resistor |
| R-7 | 50,000 Ohm 1 Watt Resistor |
| R-8 | 200 Ohm 10 Watt Resistor |
| R-9 | 20,000 Ohm 1 Watt Resistor |
| R-10 | 200 Ohm 10 Watt Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | 8 Mfd. 600 Volt Condenser |
| C-2, C-3 | Double 8 Mfd. 450 Volt Condenser |
| C-4 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-5 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-6 | .002 Mfd. 500 Volt Mica Condenser |
| C-7 | .0001 Mfd. 500 Volt Mica Condenser |
| C-8 | .002 Mfd. 500 Volt Mica Condenser |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-10 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-13 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-14 | 100 Mmfd. Variable Condenser |

**Condensers: (Cont.)**

| | |
|---|---|
| C-15 | 100 Mmfd. Variable Condenser |
| C-16 | Neutralizing Condenser |

**RF Chokes:**

| | |
|---|---|
| RFC-1 | RF Choke |
| RFC-2 | RF Choke |
| RFC-3 | RF Choke |
| RFC-4 | RF Choke |
| RFC-5 | RF Choke |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 14" x 10" x 3" (Punched and Drilled) |
| 1 | Panel (Punched and Drilled) |
| 1 | Cabinet |
| 4 | Feed-thru Insulators |
| 2 | 5-Contact Sockets, Steatite |
| 2 | 7-Contact Sockets, Large |
| 2 | Octal Sockets |
| 1 | 4-Contact Socket |
| 1 | 5-Contact Socket |
| 1 | Switch Plate |
| 1 | SPST Switch |
| 1 | DPDT Toggle Switch |
| 1 | Mic. Input Plug |
| 1 | Input Plug Shield |
| 3 | Knobs |
| 2 | Name Plates Marked "CRYSTAL OSC. PLATE" |
| 2 | Name Plates Marked "POWER AMP. PLATE" |
| 1 | Name Plate Marked "A.F. GAIN" |
| 1 | Name Plate Marked "PLATE VOLTAGE" |
| 1 | Name Plate Marked "MICROPHONE" |

**Miscellaneous Parts: (Cont.)**

| | |
|---|---|
| 1 | Circuit Closing Jack |
| 1 | Line Cord and Plug |

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

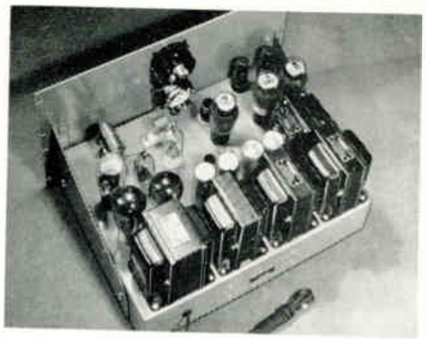
**Accessories:**

| | | |
|---|---|---|
| 1 | L-1 | 160 Meter RF Coil, End Linked, Bud Type OEL-160 or Equivalent |
| 1 | L-1 | 80 Meter RF Coil, End Linked, Bud Type OEL-80 or Equivalent |
| 1 | L-1 | 40 Meter RF Coil, End Linked, Bud Type OEL-40 or Equivalent |
| 1 | L-1 | 20 Meter RF Coil, End Linked, Bud Type OEL-20 or Equivalent |
| 1 | L-1 | 10 Meter RF Coil, End Linked, No Tap Bud Type OEL-10 or Equivalent |
| 1 | L-2 | 160 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-160 or Equivalent |
| 1 | L-2 | 80 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-80 or Equivalent |
| 1 | L-2 | 40 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-40 or Equivalent |
| 1 | L-2 | 20 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-20 or Equivalent |
| 1 | L-2 | 10 Meter RF Coil, Center Linked, Center Tapped, Bud Type OLS-10 or Equivalent |
| 1 | | 0-150 MA DC Meter, 2" Square Case, No Illumination Triplett 227-A or Equivalent |
| 1 | | Crystal |
| 1 | | 6V6G Tube |
| 1 | | 6L6-G or 6L6GX Tube |
| 1 | | 5Z3 Tube |
| 2 | | 6A6 Tubes |

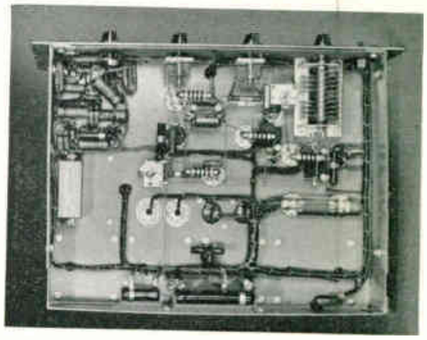
*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 50 Watt 5 and 10 Meter Phone Transmitter

Cabinet View



Chassis View



Bottom View

THIS transmitter, designed especially for operation on the 5 and 10 meter bands, includes on one chassis a 50 watt RF section, a 25 watt modulator and the power supplies for both the RF section and modulator.

The tube line-up for the RF section is a 6L6-G tri-tet oscillator, an HK-24 doubler and an HK-24 final amplifier.

The 6L6-G oscillator uses 40 and 20 meter crystals for transmitter outputs on 10 and 5 meters respectively. The plate tank of the tri-tet is always to be tuned to a frequency double that of the crystal, and in this condition good outputs are obtained. Attempts to operate the oscillator plate tank at the crystal frequency when using a 6L6-G are likely to damage the crystal. The coil and condenser combination, L-1 and C-1, has been chosen to give a good oscillator output with reasonably low crystal current.

The HK-24 driven by the oscillator is not neutralized and is always used as a doubler stage delivering power on 10 and 5 meters. The crystal oscillator and doubler stages operate at a plate voltage of 400 volts, and the voltage on the screen-grid of the oscillator is 250.

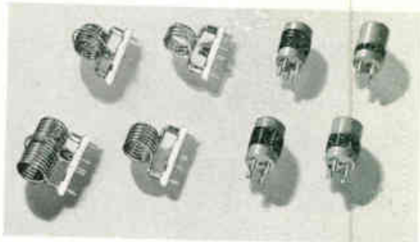
The HK-24 final amplifier is a conventional Class C stage using a split-stator tank condenser with plate neutralization. Neutralization is accomplished as easily as in transmitters operated at lower frequencies. The neutralizing condenser, C-15, is located on the under side of the chassis and is supported by the large wire connected to its terminals. It should always be adjusted with a non-metallic screw driver.

The oscillator cathode and plate tank coils are wound on 1" forms, and the doubler and final amplifier coils are self-supporting coils wound with large copper wire and mounted on National type PB-16 plugs. The doubler plate tank is capacity coupled to the final amplifier grid, and power is taken from the final amplifier plate coil by means of a link which is supported on the coil base terminals. When properly loaded, the final amplifier plate current is 60 MA at 800 volts. The plate transformer has a nominal rating of 750 volts DC, but because of the light loading the higher plate voltage is obtained. The excitation of the final amplifier tube is such that 25 to 30 MA grid current is obtained. The cathode tank of the tri-tet oscillator should be adjusted for the maximum output consistent with good oscillator stability. It will be found that this occurs with the 100 mmfd. cathode condenser, C-1, at about one-half of its maximum capacity.

A meter, M-1, and meter switch, SW-3, are provided for metering the current to the oscillator plate, the doubler plate, the final amplifier grid and the final amplifier plate.

The modulator uses two 6L6-G tubes in push-pull and operates at a plate voltage of 400 and a screen-grid voltage of 260, operating in Class $AB_1$. The audio amplifier tube line-up is one 6J7 pentode, one 6J7 triode and one 6N7 phase invertor. This arrangement provides high gain for use with crystal microphones.

The power supply uses a single transformer to supply all filaments and a dual plate transformer to supply two separate rectifiers. These transformers are controlled by separate



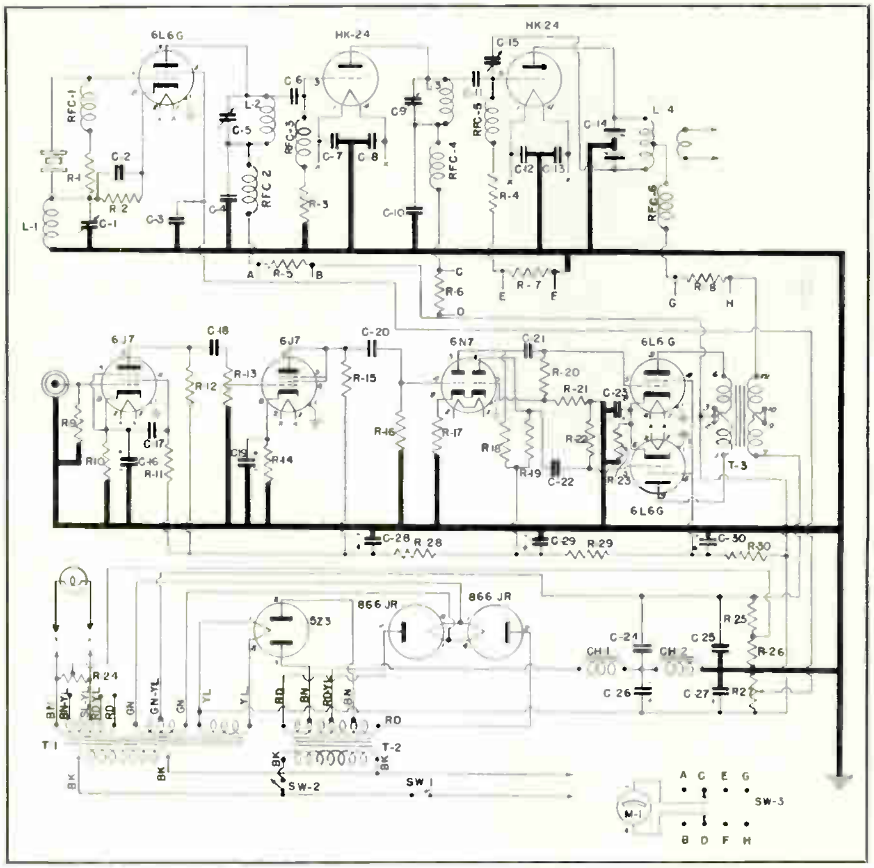
| Coil | 10 Meter Operation: Turns | Wire Size | Diam. of Winding | Winding Length | 5 Meter Operation: Turns | Wire Size | Diam. of Winding | Winding Length |
|---|---|---|---|---|---|---|---|---|
| L-1 | 10 | No. 16 Enam. | 1" | Close Wound | 4 | No. 16 Enam. | 1" | Close Wound |
| L-2 | 11 | No. 16 Enam. | 1" | ⅞" | 6 | No. 16 Enam. | 1" | ¾" |
| L-3 | 7 | No. 10 Bare | 1" | 1" | 3 | No. 8 Bare | 1" | ¾" |
| L-4 | 16 Center-Tapped | No. 10 Bare | 1" | 2" | 6 Center-Tapped | No. 8 Bare | 1" | 1" |

*Link coupled to L-4 is of No. 14 bare copper wire 1½" in diam. wound over the center of the plate tank coil and supported by the lugs attached to the pins on the PB-16 base. For 10 meters a 2 turn link is used; for 5 meters, a 1 turn link. Coils L-1 and L-2 are wound on 1" forms. Millen No. 45004. Coils L-3 and L-4 are self-supporting on National PB-16 plugs.*

## 50 Watt 5 and 10 Meter Phone Transmitter

switches on the panel. The filament switch, SW-1, is associated with the audio amplifier gain control, and the plate switch, SW-2, is of the toggle type placed in a position for convenient operation. The 400 volt supply delivers the current required by the oscillator, doubler, modulator and audio stages. It uses a type 5Z3 rectifier tube. The 800 volt supply handles the final plate power only. Although this transformer is rated at 400 and 750 volts, it is being operated at less than full load so that advantage may be taken of the higher-than-normal voltage available. Economy in the filtering of the two high voltage power supplies is obtained by using the same chokes for filtering the output of both rectifier systems. These chokes are in series with the center tap of the dual plate transformer.

The complete unit is contained on a chassis 17″ x 13″ x 3″ and is attached to a panel 19″ x 12¼″ with the conventional type of chassis mounting brackets. The chassis, panel and chassis mounting brackets are finished in gray flat enamel, giving an unusually attractive appearance with the chromium dial plates. The transmitter may be enclosed in a cabinet or mounted in a rack with other equipment.




### Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-19F77 | Filament Transformer |
| T-2 | T-19P70 | Plate Transformer |
| T-3 | T-19M14 | Modulation Transformer |
| CH-1 | T-75C51 | Choke |
| CH-2 | T-75C51 | Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 50,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor |
| R-3 | 10,000 Ohm 10 Watt Resistor |
| R-4 | 2,500 Ohm 10 Watt Resistor |
| R-5 | 50 Ohm 10 Watt Resistor |
| R-6 | 50 Ohm 10 Watt Resistor |
| R-7 | 50 Ohm 10 Watt Resistor |
| R-8 | 50 Ohm 10 Watt Resistor |
| R-9 | 5 Megohm ½ Watt Resistor |
| R-10 | 5,000 Ohm 1 Watt Resistor |
| R-11 | 3 Megohm ½ Watt Resistor |
| R-12 | 500,000 Ohm ½ Watt Resistor |
| R-13 | 1 Megohm Volume Control with Switch |
| R-14 | 5,000 Ohm 1 Watt Resistor |
| R-15 | 100,000 Ohm 1 Watt Resistor |
| R-16 | 250,000 Ohm ½ Watt Resistor |
| R-17 | 2,000 Ohm ½ Watt Resistor |
| R-18 | 100,000 Ohm 1 Watt Resistor |
| R-19 | 100,000 Ohm 1 Watt Resistor |
| R-20 | 250,000 Ohm ½ Watt Resistor |
| R-21 | 12,000 Ohm ½ Watt Resistor |
| R-22 | 250,000 Ohm ½ Watt Resistor |
| R-23 | 250 Ohm 10 Watt Resistor |
| R-24 | 20 Ohm 10 Watt Center Tapped Resistor |
| R-25 | 40,000 Ohm 50 Watt Resistor |
| R-26 | 300 Ohm 10 Watt Resistor |
| R-27 | 20,000 Ohm 50 Watt Semi-Variable Resistor |
| R-28 | 20,000 Ohm 1 Watt Resistor |
| R-29 | 20,000 Ohm 1 Watt Resistor |
| R-30 | 7,500 Ohm 25 Watt Semi-Variable Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | 100 Mmfd. Variable Condenser |
| C-2 | .01 Mfd. 400 Volt Condenser |
| C-3 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-5 | 35 Mmfd. Variable Condenser |
| C-6 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-7 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-9 | 35 Mmfd. Variable Condenser |
| C-10 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-11 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-13 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-14 | 35-35 Mmfd. Variable Condenser |
| C-15 | Neutralizing Condenser |
| C-16 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-17 | .04 Mfd. 400 Volt Condenser |
| C-18 | .04 Mfd. 400 Volt Condenser |
| C-19 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-20 | .1 Mfd. 400 Volt Condenser |
| C-21 | .1 Mfd. 400 Volt Condenser |
| C-22 | .1 Mfd. 400 Volt Condenser |
| C-23 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-24 | 2 Mfd. 1,000 Volt Condenser |
| C-25 | 2 Mfd. 1,000 Volt Condenser |
| C-26 | 8 Mfd. 600 Volt Electrolytic Condenser |
| C-27 | 8 Mfd. 600 Volt Electrolytic Condenser |
| C-28, C-29, C-30 | Triple 8 Mfd. 450 V Electrolytic Condenser |

**RF Chokes:**

| | |
|---|---|
| RFC-1 | RF Choke |
| RFC-2 | RF Choke |
| RFC-3 | RF Choke |
| RFC-4 | RF Choke |
| RFC-5 | RF Choke |
| RFC-6 | RF Choke |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17″ x 13″ x 3″ (Punched and Drilled) |
| 1 | Panel 19″ x 12¼″ (Punched and Drilled) |
| 1 | Pr. Chassis Mounting Brackets |
| 6 | Octal Sockets |
| 1 | 4-Contact Socket |
| 6 | 4-Contact Sockets, Isolantite |
| 2 | Plug-in Sockets |
| 4 | Plug-in Bases |
| 4 | Coil Forms |
| 1 | Crystal Socket |
| 4 | Knobs |
| 1 | Pointer Knob |
| 1 | SPST Switch, N. P. |
| 1 | Double-Pole, 4-Throw Switch, Isolantite |
| 1 | Input Plug |
| 1 | Input Shield |
| 2 | Metal Tube Grid Caps |
| 2 | Metal Tube Grid Cap Shields |
| 2 | Name Plates Marked "POWER AMP. PLATE" |
| 1 | Name Plate Marked "POWER AMP. GRID" |
| 2 | Name Plates Marked "BUFFER PLATE GRID" |
| 2 | Name Plates Marked "CRYSTAL OSC. PLATE" |
| 1 | Name Plate Marked "AF GAIN" |
| 1 | Line Cord and Plug |

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

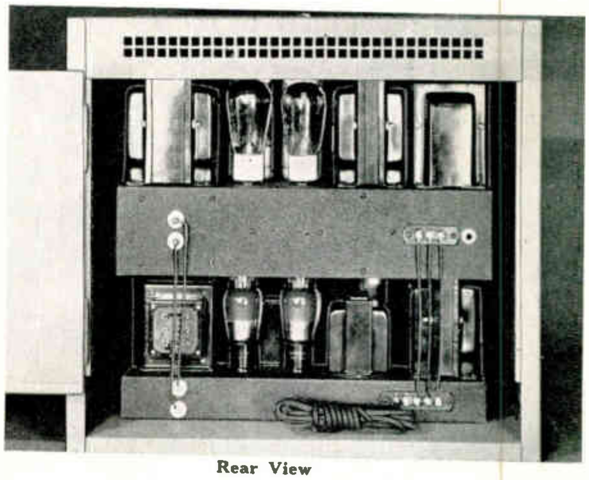
**Accessories:**

| | | | |
|---|---|---|---|
| 1 | 0-150 MA DC Meter 3″ Square Case, Rear Illumination, Triplett 327A or Equivalent | | |
| 1 | Cabinet | 3 | 6L6-G or 6L6GX Tubes |
| 1 | Crystal | 1 | 5Z3 Tube |
| 2 | 6J7 Tubes | 2 | 866-JR Tubes |
| 1 | 6N7 Tube | 2 | HK-24 Tubes |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 55 Watt Phone, 80 Watt CW Transmitter

Cabinet View



Rear View

COMPACTNESS, reliability, ease of operation and neatness of appearance are salient features of this 55 watt phone and 80 watt CW transmitter. Designed with entirely separate audio and RF sections and each having its own power supply, either of these two matched units may be used separately. For the CW operator the compact and neat appearing RF section is a pleasure to have on the operating table or in the rack. Operating with 80 watts input, the high plate efficiency of the final stage not only makes it an outstanding transmitter but also a highly desirable exciter unit for transmitters having inputs as high as 500 watts. Circuits are strictly conventional, and components are conservatively chosen.

The modulator, with an output of 30 watts, easily modulates the 55 watt Class C input of the RF amplifier. The high gain (122 db) enables it to modulate the transmitter 100% with very weak audio signals. With the Multi-Match modulation transformer the amateur may use it to modulate any transmitter requiring 30 watts of audio power.

The RF line-up is as follows: a 6F6-G crystal oscillator stage, a 6L6-G buffer-doubler stage, and an 809 final amplifier stage. The 6F6-G operates with 320 volts on the plate and 270 volts on the screen-grid. The 6L6-G operates with a plate voltage of 340 volts and a screen-grid voltage of 250. For phone operation the voltage on the 809 plate is 625 volts, and for CW operation this voltage is raised to 785.

The oscillator stage operates with all crystals from 160 to 10 meters, but for best stability and freedom from "chirps" it is recommended that for 10 meter operation a 20 meter crystal be used and doubling be carried on in the buffer-doubler stage. When the crystal stage is in an oscillating condition and is loaded by the grid of the next stage, the oscillator plate current is approximately 30 to 40 MA. The buffer-doubler stage is neutralized and may be used with excellent results either for frequency multiplying or as a regular buffer. When using 160 and 80 meter crystals, not only is doubling easily accomplished in the second stage but enough output can be obtained by quadrupling to give good excitation to the 809 grid on 40 and 20 meters. When the 6L6-G is driving the 809 grid to 30 MA of grid current, the plate current of the 6L6-G is on the order of 70 MA. The antenna loading should be adjusted so that the final amplifier plate current is 88 MA for a 55 watt phone input. For an 80 watt CW input the loading is adjusted so that the final amplifier plate current is 102 MA. The secondary of the plate transformer supplying energy to the final amplifier is equipped with taps so that by merely changing these taps the change from 625 volts for phone operation to 785 volts for CW operation may be made. Correct tuning of the buffer-doubler plate circuit is accomplished by noting the grid current reading of the final amplifier stage. Care should be taken that the 6L6-G plate circuit is not tuned to some undesired harmonic of the crystal frequency.

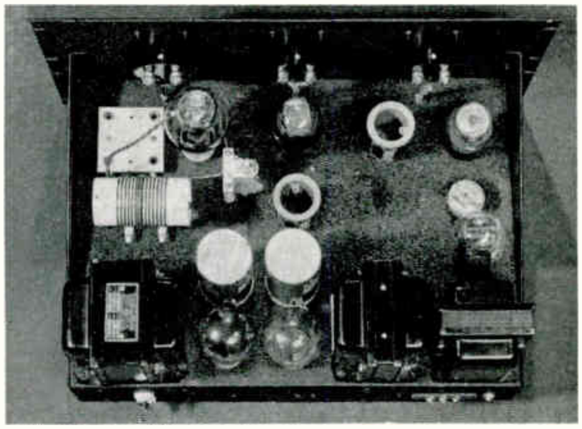
The same final tank coil is used for operation on 80 and 160 meters. For 160 meter operation a fixed air condenser is plugged into the jack-base which is shown in the top view of the RF section on page 9. If the amateur does not desire operation on 160 meters, it is unnecessary to have the Cardwell JB base or the Cardwell JD-80-OS condenser. The spacing of the final tank condenser is 0.070″, which is greater than is usually found for use with the voltages encountered in this circuit. However, such spacing permits grounding of the rotor. Should the amateur wish to build for CW operation only, a spacing of 0.050″ is satisfactory.

The modulator has for its output stage two 6L6-G's operating in Class $AB_1$. At no-signal the plate-to-ground (-B) voltage is 390 volts. The screen-grid voltage to ground should be adjusted by means of R-14 to a value of 310 volts. In this condition the voltage measured from cathode to ground across R-13 is 20 volts.

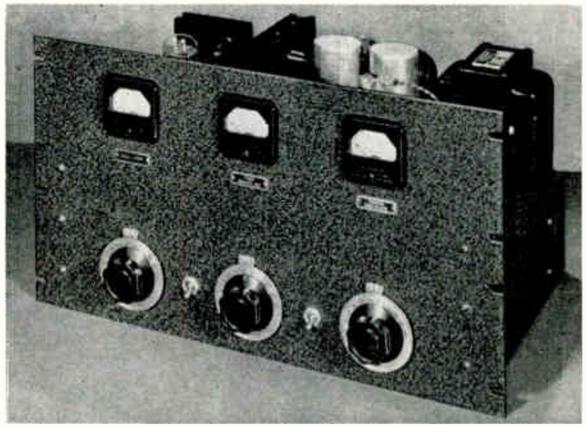
The three stages before the output stage provide adequate gain for the use of this modulator with all types of microphones. The input to the first stage, a pentode-connected 6J7, is shielded to avoid hum pick-up and to prevent pick-up of RF energy. As a further precaution against the entrance of RF energy to the grid of this stage, a filter consisting of C-1, RFC-1 and C-2 is installed in the input circuit. These elements, in addition to the grid lead and R-1, are carefully shielded with pieces of tinned copper. The result is that with the volume control wide open, the amplifier operates perfectly; and the residual hum is 45 to 50 db below the full output power.

(Continued on Page 10)

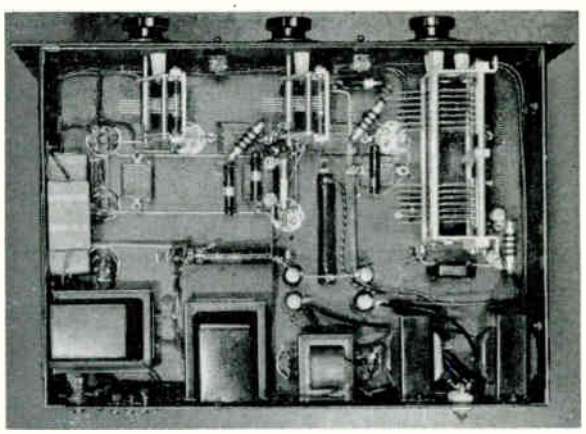
## 55 Watt Phone, 80 Watt CW Transmitter



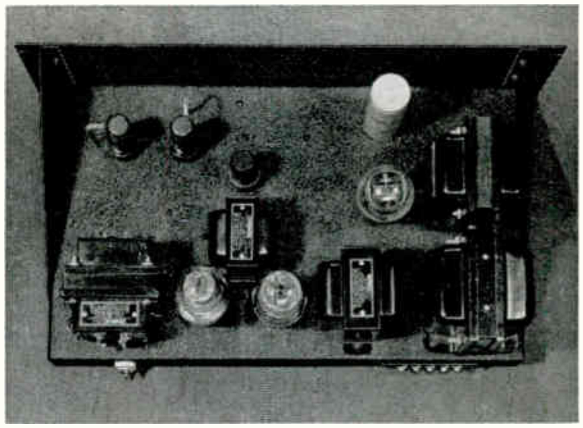
Top View of RF Section



Front View of RF Section



Bottom View of RF Section

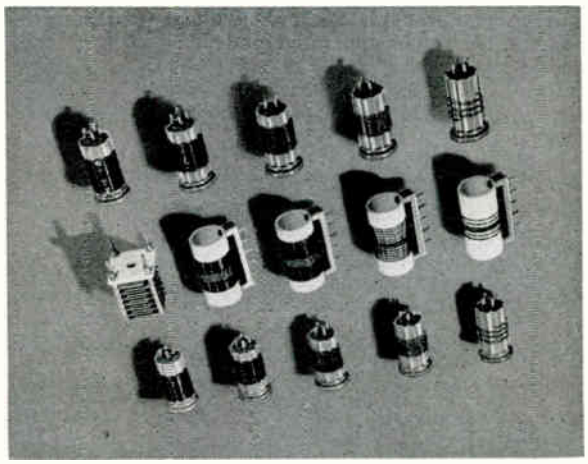


Top View of Modulator

**COIL DATA — 55 or 80 WATT TRANS.**

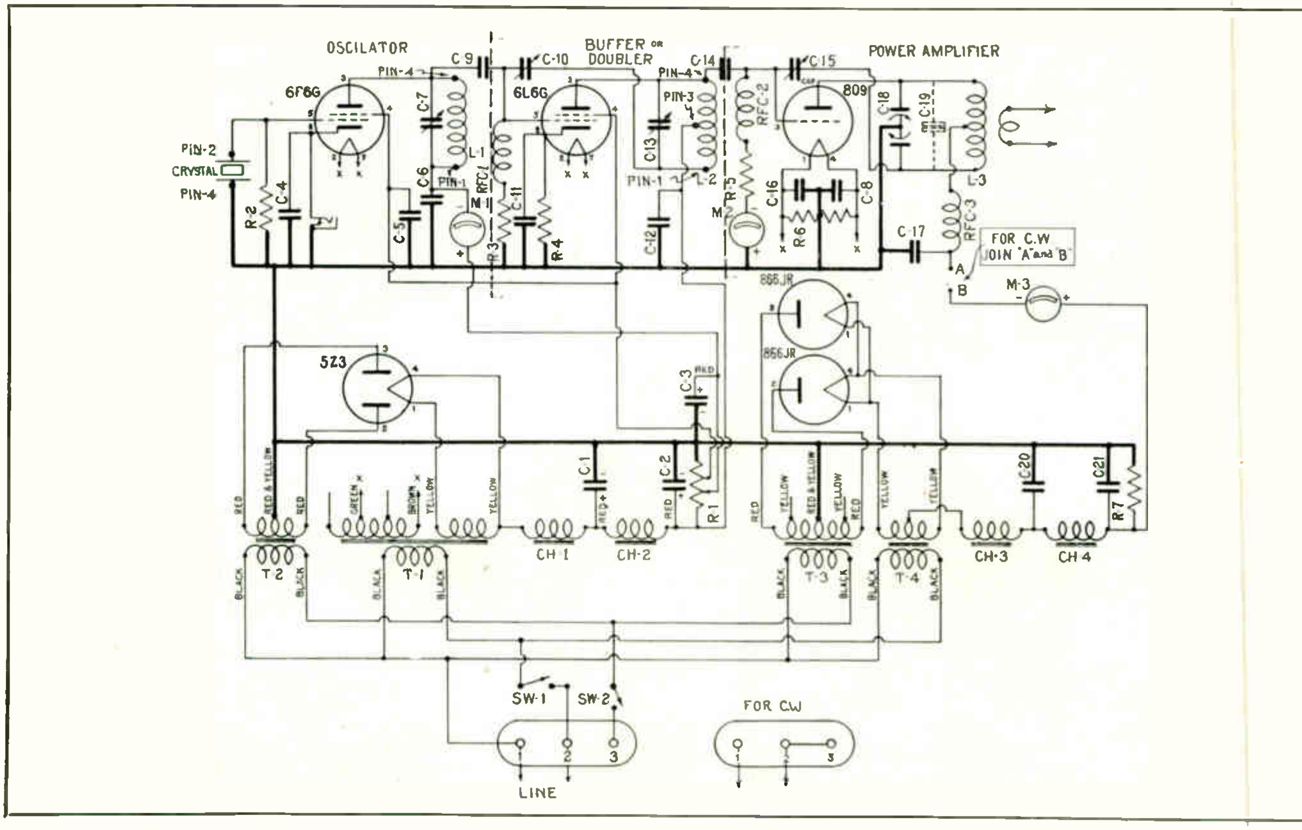
| Band | L-1 and L-2 Turns | L-1 and L-2 Winding Length | L-1 and L-2 Wire Size | L-3 Turns | L-3 Winding Length | L-3 Wire Size | L-3 Link Turns |
|---|---|---|---|---|---|---|---|
| 160 | 58 | 1 9/16″ | #22 | 42 | 1¾″ | #18 | 4 |
| 80 | 30 | 1⅜″ | #18 | 42 | 1¾″ | #18 | 4 |
| 40 | 16 | 1⅜″ | #18 | 32 | 2⅜″ | #18 | 4 |
| 20 | 8 | 1¼″ | #18 | 14 | 2″ | #16 | 2 |
| 10 | 4 | 1¼″ | #18 | 6 | 1¼″ | #16 | 1 |

*L-1 and L-2 are wound on Hammarlund XP-53 Coil Forms. The coil ends are connected to No. 1 and No. 4 pins. L-2 is center-tapped, the tap being brought out on pin No. 3. L-3 is wound on National XR-13 Coil Forms attached to a PB-5 plug. Link is wound with insulated wire directly over bare wire of plate coil.*



Plug-In Coils

## RF Section




(Continued from Page 8)

The power supply for the RF unit consists of two rectifier systems, one using a 5Z3 to supply the plates and screen-grids of the two low power stages and the other using a pair of 866-JR's to supply the plate of the final amplifier. The power supply on the modulator chassis uses a 5Z3. On each chassis there is a separate filament supply. On the RF chassis and on the modulator chassis there are two switches, one for the filament supply and one for the plate supply. Thus, one unit can be operated independently of the other. When using the RF unit alone for CW operation, join terminals No. 2 and No. 3 and connect the 115 volt supply line to terminals No. 1 and No. 2. In this condition of operation SW-1 controls the filaments and SW-2 controls the plate supplies. For phone operation, in which it is desired that a single switch operate all plate supplies, connect the 115 volt supply line to terminals No. 4 and No. 5 on the modulator chassis; then connect terminals No. 1, No. 2 and No. 3 on the modulator to their respectively numbered terminals on the RF chassis. On the RF chassis, close SW-1 and SW-2. Then, on the modulator chassis, SW-1 controls all the filaments and SW-2 controls all the plate supplies.

## Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-19F76 | Filament Transformer |
| T-2 | T-19P54 | Plate Transformer |
| T-3 | T-19P56 | Plate Transformer |
| T-4 | T-19F88 | Filament Transformer |
| CH-1 | T-19C39 | Input Choke |
| CH-2 | T-19C46 | Smoothing Choke |
| CH-3 | T-57C53 | Filter Choke |
| CH-4 | T-57C53 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 7,500 Ohm 50 Watt Resistor |
| R-2 | 50,000 Ohm 1 Watt Resistor |
| R-3 | 50,000 Ohm 10 Watt Wirewound Resistor |
| R-4 | 350 Ohm 10 Watt Wirewound Resistor |
| R-5 | 3,500 Ohm 10 Watt Wirewound Resistor |
| R-6 | 20 Ohm 10 Watt Center Tapped Resistor |
| R-7 | 20,000 Ohm 50 Watt Wirewound Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | 4 Mfd. 600 Volt Condenser |
| C-2 | 4 Mfd. 475 Volt Condenser |
| C-3 | 4 Mfd. 475 Volt Condenser |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-5 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-6 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-7 | 100 Mmfd. Variable Condenser |
| C-8 | .001 Mfd. 1,000 Volt Mica Condenser |
| C-9 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-10 | Neutralizing Condenser |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-13 | 100 Mmfd. Variable Condenser |
| C-14 | .0001 Mfd. 1,000 Volt Mica Condenser |
| C-15 | Neutralizing Condenser |
| C-16 | .001 Mfd. 1,000 Volt Mica Condenser |
| C-17 | .001 Mfd. 2,500 Volt Mica Condenser |
| C-18 | 100-100 Mmfd. Variable Condenser |
| C-20 | 2 Mfd. 1,000 Volt Oil Filled Condenser |
| C-21 | 2 Mfd. 1,000 Volt Oil Filled Condenser |

**RF CHOKES:**

| | |
|---|---|
| 3 | RF Chokes |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17" x 12" x 4" (Punched & Drilled) |
| 1 | Panel 10½" x 19" (Punched & Drilled) |
| 1 Pr. | Chassis Mounting Brackets |
| 1 | 5-Contact Socket |
| 2 | Octal Sockets |
| 3 | 4-Contact Isolantite Sockets |
| 3 | 4-Contact Sockets |
| 2 | Feed-thru Bushings |
| 10 | Stand-off Insulators |
| 2 | Coil Forms, 4-Prong |
| 1 | Phone Jack, Circuit Closing |
| 2 | SPST Switches |
| 1 | Grid Grip |
| 3 | Dials, 2¼" Diameter |
| 1 | Coil Form |
| 1 | Coil Form Plug |
| 1 | Base for PB-5 Plug |
| 1 | Name Plate Marked "OSCILLATOR" |
| 1 | Name Plate Marked "POWER AMP. GRID" |
| 1 | Name Plate Marked "POWER AMP. PLATE" |

Miscellaneous nuts, bolts, solder and mounting lugs, lock-washers and other hardware.

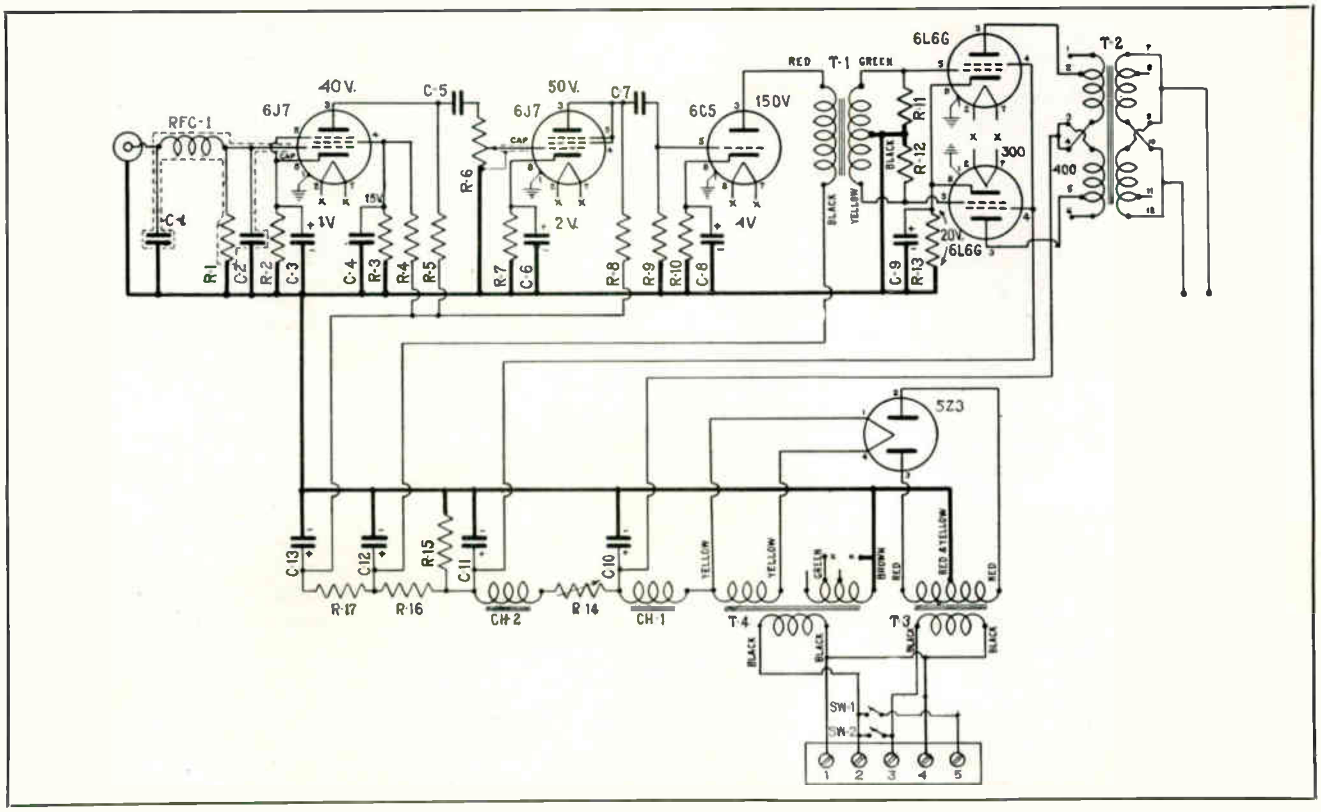
**Accessories:**

| | |
|---|---|
| 1 | Coil Form per band National XR13 or Equiv. |
| 1 | Coil Form Plug per band National PB-5 or Equivalent |
| 2 | Coil Forms per Band Hammarlund XP-53 or Equivalent |
| 1 | 150 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | 100 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | 250 MA DC Meter, 2" Square Case, No Illumination, Triplett 227-A or Equivalent |
| 1 | Cabinet |
| 1 | Crystal |
| 1 | 6F6-G Tube |
| 1 | 6L6-G or 6L6 GX Tube |
| 1 | 809 Tube |
| 1 | 5Z3 Tube |
| 2 | 866-JR Tubes |
| 1 | Jack Base Cardwell JB |
| 1 | 80 Mmfd. Fixed Air Condenser (C-19) Cardwell JD-80-OS (Used only on 160 Meters) |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 55 Watt Phone, 80 Watt CW Transmitter

## Modulator Section




## Parts Required

**THORDARSON TRANSFORMERS and CHOKES:**

| | | |
|---|---|---|
| T-1 | T-74A31 | Push-pull Input Transformer |
| T-2 | T-19M14 | Modulation Transformer |
| T-3 | T-19P54 | Plate Transformer |
| T-4 | T-19F76 | Filament Transformer |
| CH-1 | T-17C00-B | Filter Choke |
| CH-2 | T-13C27 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 5 Megohm ¼ Watt Resistor |
| R-2 | 5,000 Ohm ¼ Watt Resistor |
| R-3 | 25,000 Ohm 1 Watt Resistor |
| R-4 | 250,000 Ohm ½ Watt Resistor |
| R-5 | 500,000 Ohm ½ Watt Resistor |
| R-6 | 1 Megohm Volume Control |
| R-7 | 2,500 Ohm 1 Watt Resistor |
| R-8 | 100,000 Ohm 1 Watt Resistor |
| R-9 | 250,000 Ohm ¼ Watt Resistor |
| R-10 | 1,000 Ohm 1 Watt Resistor |
| R-11 | 50,000 Ohm 1 Watt Resistor |
| R-12 | 50,000 Ohm 1 Watt Resistor |
| R-13 | 150 Ohm 25 Watt Resistor |
| R-14 | 2,500 Ohm 25 Watt Semi-Variable Resistor |
| R-15 | 12,000 Ohm 25 Watt Resistor |
| R-16 | 20,000 Ohm 1 Watt Resistor |
| R-17 | 20,000 Ohm 1 Watt Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | .0001 Mfd. 500 Volt Mica Condenser |
| C-2 | .0001 Mfd. 500 Volt Mica Condenser |
| C-3 | 10 Mfd. 25 Volt Condenser |
| C-4 | .03 Mfd. 400 Volt Condenser |
| C-5 | .1 Mfd. 400 Volt Paper Condenser |
| C-6 | 10 Mfd. 25 Volt Condenser |
| C-7 | .1 Mfd. 400 Volt Condenser |
| C-8 | 10 Mfd 25 Volt Condenser |
| C-9 | 10 Mfd. 50 Volt Condenser |
| C-10 | 8 Mfd. 600 Volt Condenser |
| C-11, C-12, C-13 | Triple 8 Mfd. 450 Volt Condenser |

**RF Choke:**

RFC-1 RF Choke

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 17" x 10" x 2" (Punched and Drilled) |
| 1 | Panel 19" x 7" (Punched and Drilled) |
| 1 | 5-Lug Terminal Board |
| 1 Pr. | Chassis Mounting Brackets |
| 2 | Feed-thru Bushings |
| 5 | Octal Sockets |
| 1 | 4-Contact Socket |
| 1 | Dial Plate Marked "GAIN" |
| 1 | Microphone Input Plug |
| 1 | Microphone Input Plug Shield |

**Miscellaneous Parts: (Cont.)**

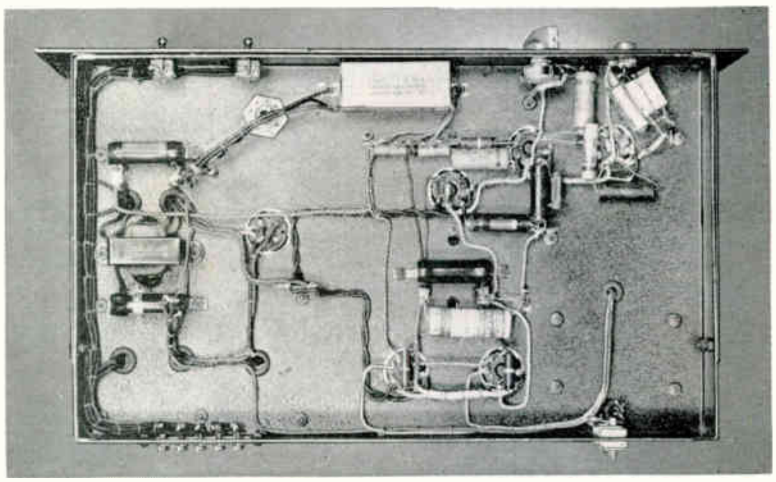
| | |
|---|---|
| 2 | SPST Switches |
| 2 | Metal Tube Grid Caps |

Miscellaneous nuts, bolts, resistor and mounting lugs, lock-washers, and other hardware.

**Accessories:**

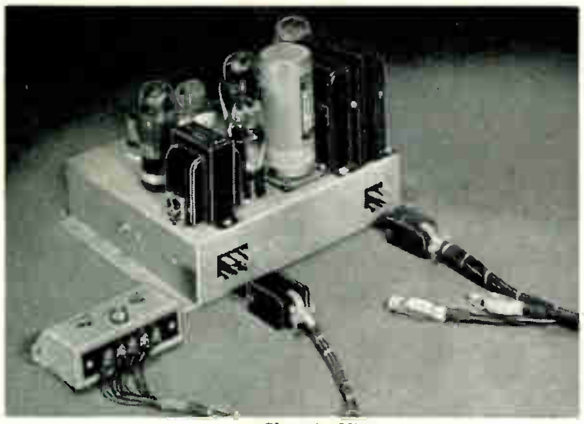
| | | | |
|---|---|---|---|
| 1 | Cabinet | | |
| 1 | Crystal | | |
| 2 | 6J7 Tubes | 2 | 6L6-G Tubes |
| 1 | 6C5 Tube | 1 | 5Z3 Tube |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

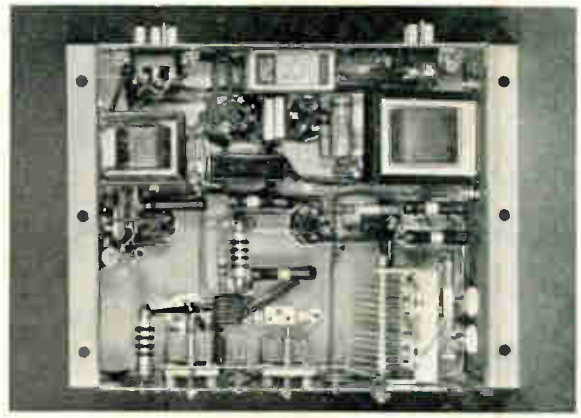


**Bottom View of Modulator**

# 12 Watt Mobile Transmitter for 5-10 Meters



Chassis View



Bottom View

PORTABLE mobile operation on 5 and 10 meters is the distinctive feature of this unit. It is of a rugged chassis type construction especially planned to be used in automobiles. It operates from a 6 volt storage battery using a vibrator power supply which may be remotely controlled from a point several feet away, as for example, a driver's seat.

The RF tube line-up is as follows: a 6V6-G tri-tet crystal oscillator, and a T-21 final amplifier. The oscillator stage operates with a 20 meter crystal, and doubling is carried on in the plate circuit. At no time is operation of the crystal stage "straight through" recommended. The oscillator plate tank is capacity-coupled to the T-21 grid. The T-21 operates "straight through" on 10 meters, and for 5 meter operation doubling in the final is accomplished. The final tank condenser is of the split-stator type. The final amplifier is neutralized in a conventional manner. The cathode tank coil is wound on a 1" form, and the oscillator plate and final plate tank coils are wound on National PB-16 bases with heavy copper wire. Power is taken from the final tank by means of a link.

The power input to the final amplifier plate when it is properly loaded is of the order of 10-12 watts. The final stage cathode current should be between 50 and 55 MA.

Since the transmitter will be operated in an unattended condition, the three variable condenser adjustments are made with a screw driver and then locked with special nuts. The metering of the oscillator cathode current, the final grid current and the final cathode current is done by plugging in an external meter in the jacks provided.

A single 6V6-G tube operates as a Class A amplifier to modulate the T-21 tube. Provision is made for remotely connecting a carbon microphone to the primary of the microphone transformer which is installed on the under side of the chassis. A control with a screw driver adjustment permits the adjustment of the gain of the audio system to the desired amount.

The power supply uses a vibrator having accessible actuating coil terminals. With such a vibrator it is possible to avoid switching the high current which flows in the primary of the vibrator transformer, and consequently, the control of this vibrator may be done at a distance without the necessity of using connections of high current carrying capacity. The rectifier tube is a 6W5-G. Connections made through socket S-2 to the control box, which may be located at any given convenient place, are such that the closing of switch SW-1 causes the filaments to heat and the current to flow in the microphone circuit. The closing of SW-2 starts the vibrator. Consequently, SW-2 may be used as a stand-by switch. The operator is cautioned against closing SW-2 before the filaments have had time to heat, for the premature closing is likely to damage the 6W5-G.

Separate plugs and sockets are provided for the entrance to the chassis of the power supply and the control wiring. This also aids in keeping vibrator noises out of the microphone circuit. As a further precaution against

(Continued on following page)

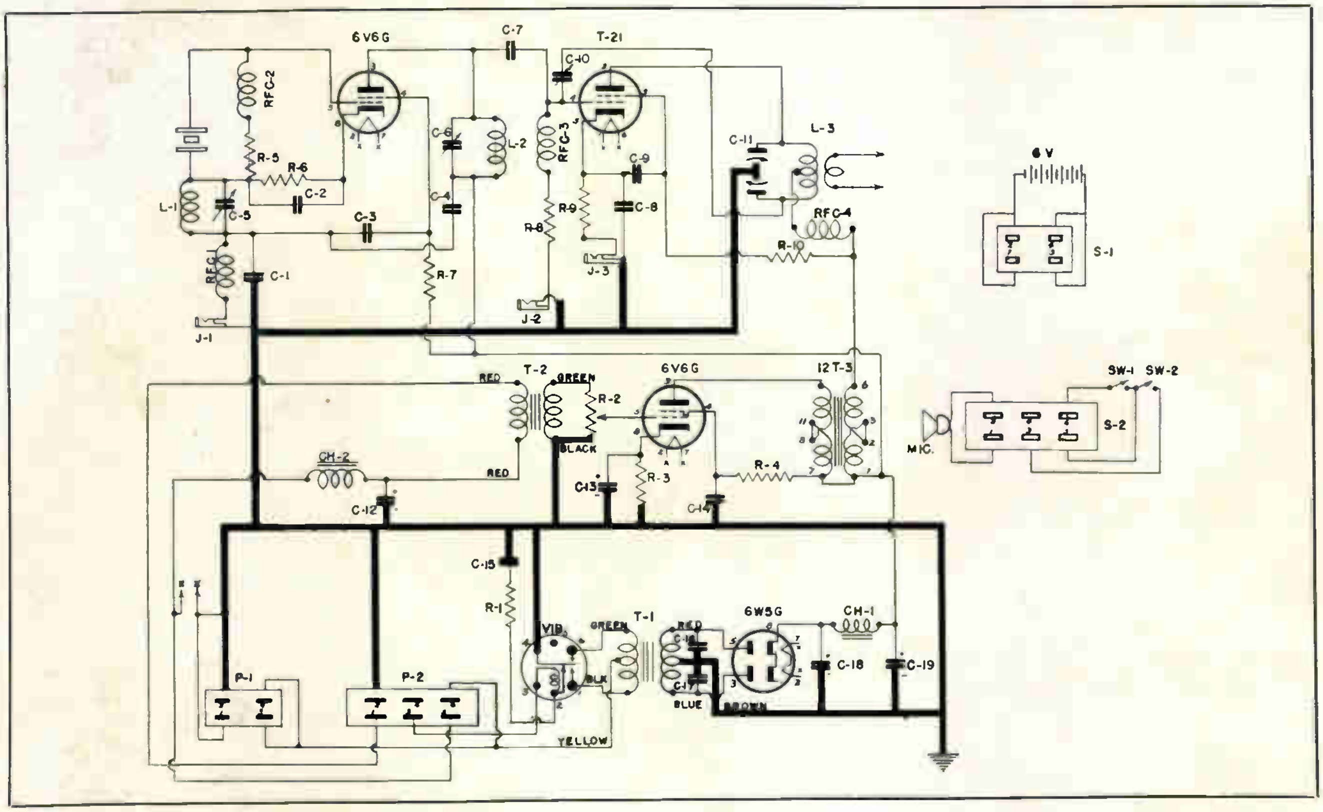
| Coil | Turns | Wire Size | Diam. of Winding | Winding Length | Supporting Form |
|---|---|---|---|---|---|
| L-1 | 5 | No. 16 Enameled | 1" | Close Wound | Millen No. 45004 Coil Form |
| L-2 | 6 | No. 10 Bare | 1" | 1" | Self-Supporting on National PB-16 Plug |
| L-3 10 Meters | 16 Center-Tapped | No. 10 Bare | 1" | 2" | Self-Supporting on National PB-16 Plug |
| L-3 5 Meters | 6 Center-Tapped | No. 10 Bare | 1" | 1" | Self-Supporting on National PB-16 Plug |

*The link on L-3 is made of 1 turn of No. 14 bare copper wire about 1½" in diameter looped around the center portion of L-3 and supported by the terminal lugs on the PB-16 plug.*

having any vibrator interference in the microphone circuit, any ripple which is superimposed on the leads from SW-1 is effectively filtered out by the CH-2—C-12 filter. All leads carrying current to the 6V primary of the power transformer should be of heavy wire, No. 16 or larger. This measure must be taken so that the full battery voltage is available at the transformer. Similarly, the wire in the power cable from S-1 to the battery should be large. This precaution also tends to minimize vibrator noise.

The polarity of the battery when connected to the transmitter is not important. However, when installed in an automobile in which one battery serves both the transmitter and the car electrical system, some attention should be given to the polarity. This is especially necessary if the transmitter chassis is in contact with the frame of the car.

In wiring, careful attention should be given to the placement of leads and chassis connections. Wherever possible the leads carrying vibrator current should not be common with those carrying signal currents.




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

T-1 T-14R38 Power Transformer
T-2 T-86A02 Microphone Transformer
T-3 T-19M13 Modulation Transformer
CH-1 T-57C53 Filter Choke
CH-2 T-14C61 Filter Choke

### Resistors:

R-1 200 Ohm 1 Watt Resistor
R-2 500,000 Ohm Volume Control
R-3 300 Ohm 10 Watt Resistor
R-4 20,000 Ohm 10 Watt Resistor
R-5 50,000 Ohm 1 Watt Resistor
R-6 350 Ohm 10 Watt Resistor
R-7 12,000 Ohm 10 Watt Resistor
R-8 50,000 Ohm 1 Watt Resistor
R-9 350 Ohm 10 Watt Resistor
R-10 10,000 Ohm 10 Watt Resistor

### Condensers:

C-1 .002 Mfd. 500 Volt Mica Condenser
C-2 .01 Mfd. 400 Volt Condenser
C-3 .002 Mfd. 500 Volt Mica Condenser
C-4 .002 Mfd. 500 Volt Mica Condenser
C-5 100 Mmfd. Variable Condenser

### Condensers: (Cont.)

C-6 35 Mmfd. Variable Condenser
C-7 .0001 Mfd. 500 Volt Condenser
C-8 .002 Mfd. 500 Volt Mica Condenser
C-9 .002 Mfd. 500 Volt Mica Condenser
C-10 Neutralizing Condenser
C-11 35-35 Mmfd. Variable Condenser
C-12 100 Mfd. 25 Volt Electrolytic Condenser
C-13 10 Mfd. 25 Volt Electrolytic Condenser
C-14 .1 Mfd. 400 Volt Condenser
C-15 .1 Mfd. 400 Volt Condenser
C-16 .05 Mfd. Oil Impregnated Condenser
C-17 .05 Mfd. Oil Impregnated Condenser
C-18, C-19 Double 8 Mfd. 450 Volt Condenser

### RF Chokes:

RFC-1 RF Choke
RFC-2 RF Choke
RFC-3 RF Choke
RFC-4 RF Choke

### Miscellaneous Parts:

1 Chassis 11" x 8" x 3" (Punched and Drilled)
1 Vibrator Mounting Plate
1 Bottom Plate

### Miscellaneous Parts: (Cont.)

1 Control Box
3 Octal Sockets
1 4-Contact Socket, Steatite
1 6-Contact Socket, Steatite
1 6-Contact Socket
1 6-Prong Plug
1 4-Prong Plug
1 6-Contact Socket
1 4-Contact Socket
2 Feed-thru Insulators
2 Coil Sockets
3 Coil Base Plugs
3 Circuit Closing Jacks
1 Crystal Socket
2 4-Prong Coil Forms
6 Resistor Mounting Strips

Miscellaneous nuts, bolts, soldering and mounting lugs, lock-washers and other hardware.

### Accessories:

1 Vibrator, Electronics #427 or Equivalent
1 Crystal
1 T-21 Tube
1 6W5-G Tube
2 6V6-G Tubes

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

# 12 Watt Universal Transmitter

FOR PORTABLE AND EMERGENCY SERVICE


Cabinet View


Chassis View

OPERATING on either 115 volts AC or 6 volts DC, this unit not only provides the amateur with an emergency transmitter for battery operation but also may be used as the regular transmitter in the "shack" when so desired. No changes of parts or wiring are necessary for conversion from AC to DC — only the insertion of the proper power plug is required.

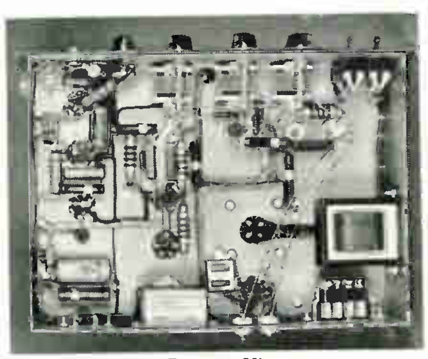
On battery operation 10 to 12 watts input may be obtained, and on AC operation, slightly more than 12 watts input may be expected.

The oscillator tube is a 6V6-G used in a regenerative type circuit having an RF choke in the cathode circuit. The final stage uses an 807 tube.

The final tank circuit consists of two condensers, C-10 and C-11, and a coil, L-2. This tank circuit may be used in the conventional manner by turning C-11 to maximum capacity, in which position a bent rotor plate shorts it out and grounds one side of the link. For settings of C-11 less than full capacity, the 807 is working into a pi network having for its elements C-10, C-11 and L-2. A single-wire antenna may then be connected to the high side of C-11, and the degree of loading may be adjusted by varying C-11 and retuning C-10. In all cases C-10 should be tuned for the minimum plate current, and each readjustment of C-11 will require a change of C-10. This provides an easy method of connecting a wide variety of types of single-wire antennas to the transmitter and quickly adjusting to the proper degree of loading. The loading is made greater as the capacity of C-11 is decreased.

A single meter is provided with a switch which permits reading plate current in either the oscillator or the final stage. Because of the excellent shielding and the good circuit layout it was unnecessary to neutralize the 807 tube.

The transmitter may be used on all bands from 160 to 10 meters, and doubling may be accomplished in the crystal stage when using 160, 80 and 40 meter crystals. A closed circuit jack is provided which permits keying the oscillator and amplifier stages simultaneously. Too much grid excitation on the 807 final causes the screen-grid current to become too high. Because the screen-grid voltage is obtained through a dropping resister, this increase in screen current causes the screen-grid voltage to become low enough that the power output capability of the 807 is reduced. In cases where less excitation is desired, the oscillator tank condenser C-6 may be turned toward its minimum capacity setting.


Bottom View

The modulator is a 6V6-G operating Class A, and the audio amplifier section consists of two 6J7 tubes, pentode connected, providing enough gain for operation with a crystal microphone.

The power supply uses a special vibrator transformer which may be used on either 6 volts DC or 115 volts AC. For AC operation the heater voltage for the tubes is obtained from a transformer winding; and for DC operation the heater voltage is obtained directly from the battery.

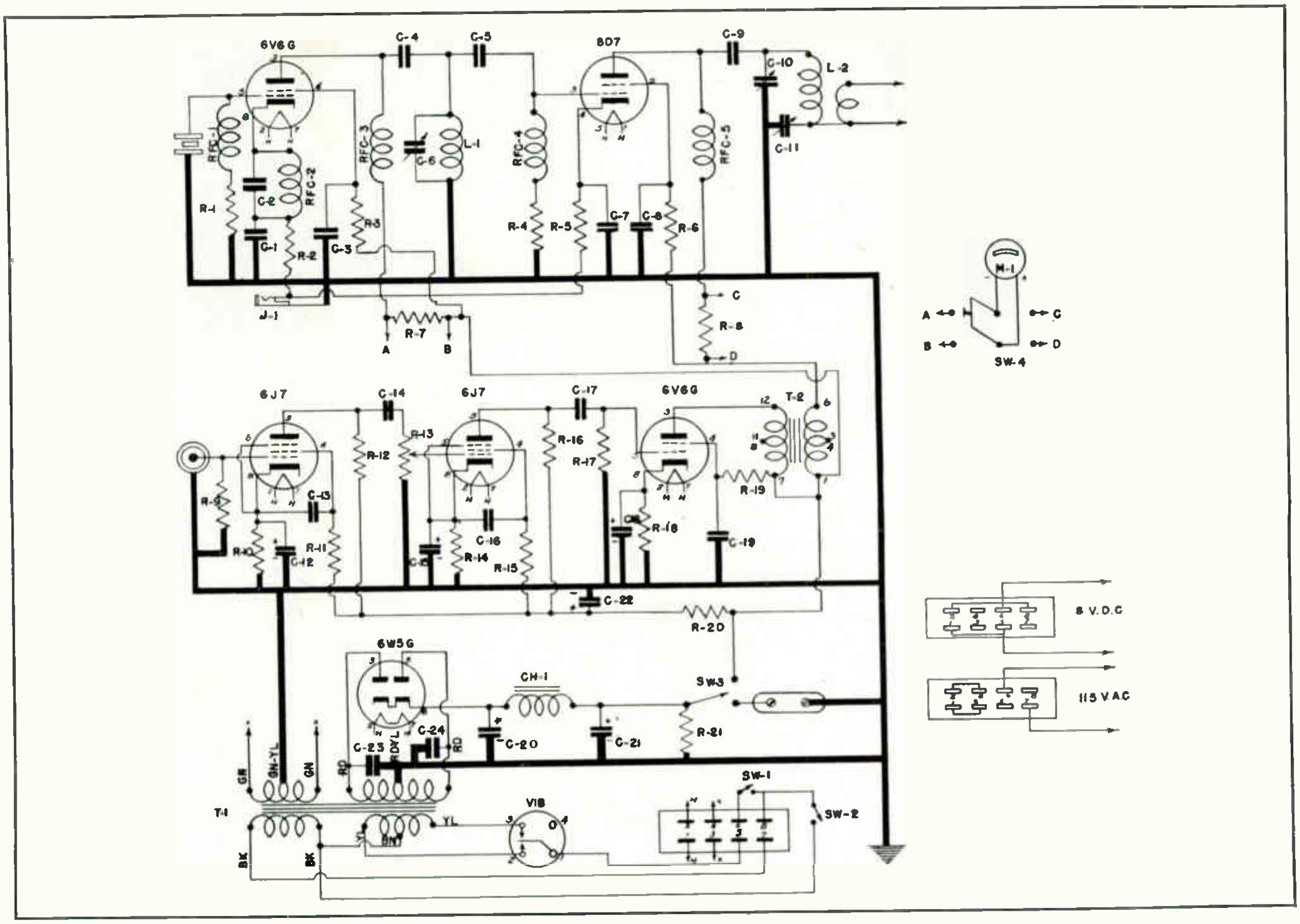
In DC operation the closing of SW-1 causes the filaments to be heated, and the closing of SW-2 causes the vibrator to operate. A short time should be allowed for the heaters to warm up before closing SW-2. Unless such a precaution is taken, there is possibility of damaging the 6W5-G tube.

In AC operation SW-1 should be closed, and the complete power supply is then controlled by SW-2. To provide a source of high voltage DC for the operation of receivers or any other auxiliary equipment, a switch is provided on the meter panel which removes the plate voltage from the tubes in the transmitter and makes it available at a terminal board to which may be connected any other equipment. This switch, SW-3, can then be used as a stand-by switch between transmissions. This source of voltage is available in either AC or DC operation. It is an extremely handy way of supplying the high voltage required for a receiver. Currents up to 100 MA may be drawn from the supply for use on external equipment.

The complete transmitter is mounted in a small metal cabinet and the entire unit, including the cabinet, is finished in gray flat enamel.

# 12 Watt Universal Transmitter

FOR PORTABLE AND EMERGENCY SERVICE




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-14R40 | Power Transformer |
| T-2 | T-19M13 | Modulation Transformer |
| CH-1 | T-57C53 | Filter Choke |

**Resistors:**

| | |
|---|---|
| R-1 | 20,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor |
| R-3 | 15,000 Ohm 10 Watt Resistor |
| R-4 | 100,000 Ohm 1 Watt Resistor |
| R-5 | 300 Ohm 10 Watt Resistor |
| R-6 | 15,000 Ohm 10 Watt Resistor |
| R-7 | 50 Ohm 10 Watt Resistor |
| R-8 | 50 Ohm 10 Watt Resistor |
| R-9 | 5 Megohm ½ Watt Resistor |
| R-10 | 5,000 Ohm 1 Watt Resistor |
| R-11 | 3 Megohm ½ Watt Resistor |
| R-12 | 500,000 Ohm ½ Watt Resistor |
| R-13 | 1 Megohm Volume Control |
| R-14 | 5,000 Ohm 1 Watt Resistor |
| R-15 | 3 Megohm ½ Watt Resistor |
| R-16 | 500,000 Ohm ½ Watt Resistor |
| R-17 | 500,000 Ohm ½ Watt Resistor |
| R-18 | 300 Ohm 10 Watt Resistor |
| R-19 | 20,000 Ohm 1 Watt Resistor |
| R-20 | 20,000 Ohm 1 Watt Resistor |
| R-21 | 30,000 Ohm 20 Watt Resistor |

**Condensers:**

| | |
|---|---|
| C-1 | .01 Mfd. 400 Volt Condenser |
| C-2 | .0001 Mfd. 500 Volt Mica Condenser |
| C-3 | .01 Mfd. 400 Volt Condenser |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-5 | .0001 Mfd. 500 Volt Mica Condenser |
| C-6 | 100 Mmfd. Variable Condenser |
| C-7 | .002 Mfd. 500 Volt Mica Condenser |
| C-8 | .002 Mfd. 500 Volt Mica Condenser |

**Condensers: (Cont.)**

| | |
|---|---|
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser |
| C-10 | 100 Mmfd. Variable Condenser |
| C-11 | 100 Mmfd. Variable Condenser |
| C-12 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-13 | .04 Mfd. 400 Volt Condenser |
| C-14 | .04 Mfd. 400 Volt Condenser |
| C-15 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-16 | .04 Mfd. 400 Volt Condenser |
| C-17 | .04 Mfd. 400 Volt Condenser |
| C-18 | 10 Mfd. 25 Volt Electrolytic Condenser |
| C-19 | .5 Mfd. 400 Volt Condenser |
| C-20 | 4 Mfd. 600 Volt Condenser |
| C-21 }<br>C-22 } | Double 8 Mfd. 450 Volt Condenser |
| C-23 | .05 Mfd. 1,600 Volt Condenser |
| C-24 | .05 Mfd. 1,600 Volt Condenser |

**RF Chokes:**

| | | | |
|---|---|---|---|
| RFC-1 | RF Choke | RFC-4 | RF Choke |
| RFC-2 | RF Choke | RFC-5 | RF Choke |
| RFC-3 | RF Choke | | |

**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Chassis 10" x 14" x 3" (Punched and Drilled) |
| 1 | Panel (Punched and Drilled) |
| 1 | Cabinet |
| 1 | Vibrator Mounting Plate |
| 3 | Feed-thru Insulators |
| 3 | 5-Contact Sockets |
| 5 | Octal Sockets |
| 1 | 4-Contact Socket |
| 1 | 5-Contact Socket |
| 2 | DPST Switches |
| 1 | SPDT Switch |
| 1 | DPDT Switch |
| 1 | Phone Jack, Circuit Closing |

**Miscellaneous Parts: (Cont.)**

| | |
|---|---|
| 1 | Plug |
| 2 | Sockets |
| 1 | Mic. Plug |
| 1 | Mic. Plug Shield |
| 4 | Knobs |
| 1 | Name Plate Marked "A.F. GAIN" |
| 1 | Name Plate Marked "CRYSTAL OSC. PLATE" |
| 2 | Name Plates Marked "POWER AMP. PLATE" |
| 1 | Name Plate Marked "SEND-RECEIVER" |
| 1 | Name Plate Marked "PLATE VOLTS" |
| 1 | Name Plate Marked "KEY" |
| 1 | Name Plate Marked "PLATE CURRENT" |

Miscellaneous nuts, bolts, soldering lugs, lock-washers, grommets and other hardware.

**Accessories:**

| | |
|---|---|
| 1 | Vibrator Mallory 825 or Equivalent |
| 1 | 0-100 MA DC Meter 2" Square Case Triplett 227A or Equivalent |
| 1 | Crystal |
| 1 | 6W5-G Tube |
| 2 | 6V6-G Tubes |
| 2 | 6J7 Tubes |
| 1 | 807 or HY61/807 Tube |
| 2 | 160 Meter RF Coils, End Linked, No Tap, Bud OEL-160, or Equivalent |
| 2 | 80 Meter RF Coils, End Linked, No Tap, Bud OEL-80, or Equivalent |
| 2 | 40 Meter RF Coils, End Linked, No Tap, Bud, OEL-40, or Equivalent |
| 2 | 20 Meter RF Coils, End Linked, No Tap, Bud OEL-20, or Equivalent |
| 2 | 10 Meter RF Coils, End Linked, No Tap, Bud OEL-10, or Equivalent |

*Complete kit of the above parts with large size circuit diagram available from your local Thordarson distributor. (Accessories not included in kit).*

Panel View

Chassis View

THIS 40 watt exciter operates on the five amateur bands from 160 to 10 meters, all bands being selected by switches on the panel. The operator has the choice of three crystal frequencies, which may provide operation on all bands or at slightly different points in the same band.

The exciter is a three-stage unit using a 6V6-G crystal oscillator, a 6L6-G buffer-doubler and an 807 final amplifier. The exciter is built on a 17" x 13" x 4" chassis, complete with its filament and high voltage power supplies. It is supplied with a specially prepared 19" x 12¼" panel designed to harmonize with the many high power units with which it may be associated. The panel is finished in black with white lettering opposite all switches and dials. No additional markings or lettering are necessary. The position of each coil switch is clearly shown. The chassis is equipped with a five-lug terminal board so that connections can be made for controlling high voltage power supplies and filament supplies for other units by means of the switches on this chassis.

### Circuit Details

The 6V6-G crystal oscillator is of the regenerative type having an RF choke in its cathode circuit. The oscillator plate tank coil is a Barker and Williamson type 2AB, which may be tuned with one condenser to all five frequency bands. This tank coil is divided into five sections, and the switching is such that all five sections are used for 160 meters; and only one section for 10 meters. The shorting switch on this coil is such that not only are the unused portions of the coil shorted out, but the unused portion adjacent to the one in operation is independently and directly shorted out. This feature reduces the losses due to shorted turns.

The oscillator stage operates with a plate voltage of 350 volts and a screen voltage of 180 volts. When loaded by the buffer-doubler stage, the oscillator plate current is about 20 to 25 MA. For 10 meter operation best results are obtained by using a 20 meter crystal, although quadrupling from 40 meters may also be easily carried out in the buffer-doubler. The crystals are mounted on the chassis with very short leads to the grid circuit. Crystal switching is accomplished by means of a flexible shaft connected to the crystal switch on the panel. This allows the crystal to be well placed to avoid undesirable electrical effects and also permits the crystal switch to be placed in a position on the panel which makes operation most convenient.

The buffer-doubler stage uses a 6L6-G with a plate voltage of 400 V. and a screen voltage of 180 V. This stage also has for its plate tank coil a type 2AB coil which covers five bands with one condenser. When loaded down by the grid of the final stage, the buffer-doubler plate current is 35 to 40 MA. With excitation on any band from 160 to 20 meters the buffer-doubler stage very efficiently doubles. With excitation on 160, 80 and 40 meters, quadrupling may be accomplished in this stage. Although the 6L6-G is not neutralized, the amount of feedback is so low that the stage may be worked "straight through" on 160 meters.

The final amplifier stage uses an 807 and operates with 400 volts on the plate and 270 volts on the screen. A power input of 40 watts may be obtained under such conditions, and the power output is of the order of 25 watts. The excitation to this stage should be adjusted so that the grid current is 5 to 10 MA. Care should be taken not to overdrive this beam power tube, for in such a case the plate efficiency decreases. Usually more than enough excitation is obtainable, and the reduction of excitation to this stage may be accomplished by slightly detuning the buffer-doubler tank. The cathode bias on the buffer-doubler stage prevents the current from rising to abnormal values when detuning. The final plate coil is of turret type construction; and the turret has mounted upon it a coil for each of the five bands, each coil with its associated link. Provision is made for shorting out the four unused coils and their links. The final tank condenser is of the split-stator type with the rotor grounded. It was not found necessary to neutralize the final amplifier.

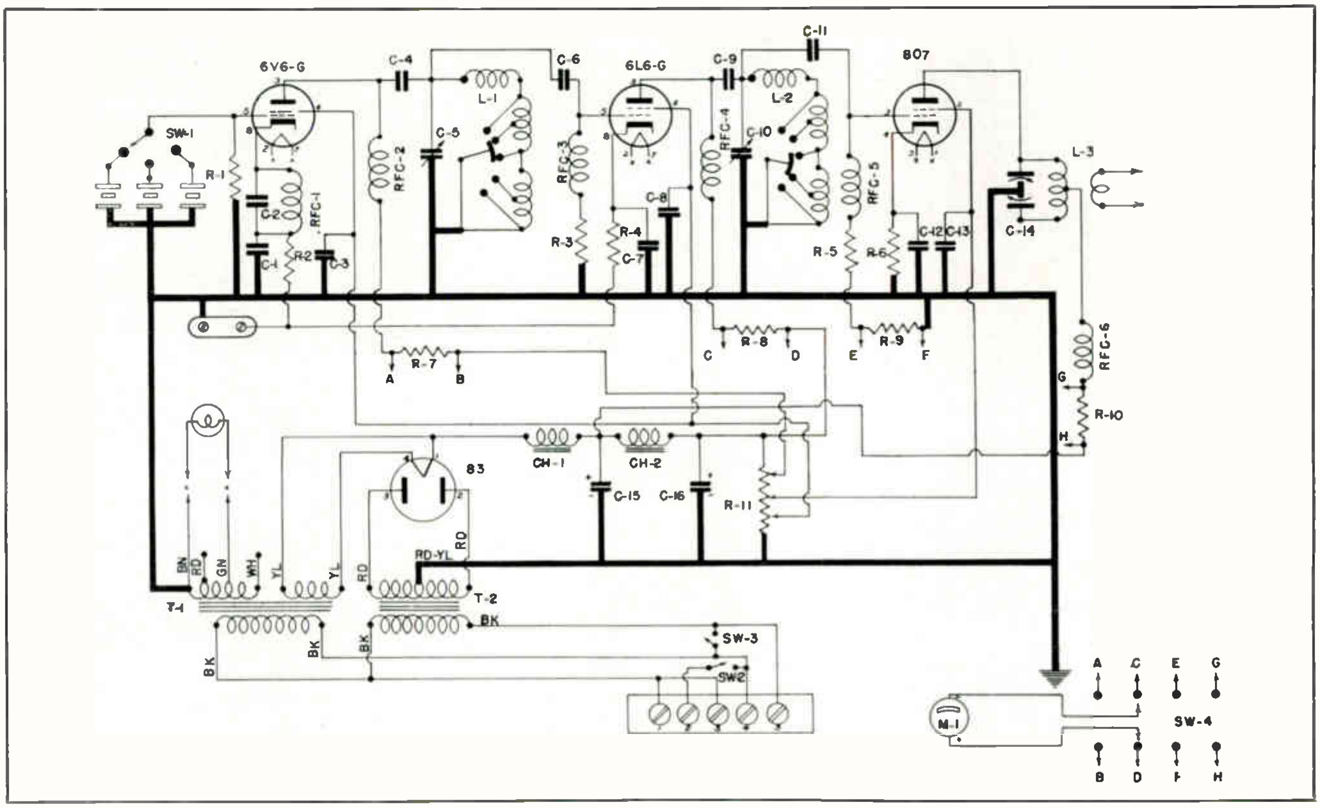
The power supply uses an 83 rectifier, and the power transformer is conservatively rated. Filament and plate supplies may be switched separately from the front of the panel. The switches are plainly marked on each panel.

The oscillator tank and buffer tank coils are mounted with their axes at right angles to each other to avoid any interaction. The final tank coil is mounted above the chassis, and no coupling exists from the final coil to any of the low power stages.

The power output is sufficient to excite Class C stages having inputs as high as 250 to 400 watts. A single meter on the panel and its associated switch provide current readings in the following circuits: crystal oscillator plate, buffer-doubler plate, final amplifier grid and final amplifier plate.

The chassis construction is so arranged as to provide for an increase in power output by changing to the circuit shown for the 120 watt band switching exciter. Knock-out holes are made for the addition of rectifier tube sockets, and extra holes are drilled in the chassis to accommodate the dual plate transformer and the T-19F77 filament transformer required because of the additional 866-JR filament load. Space is provided on the under side of the chassis for the mounting of the high voltage condensers used to filter the output of the 866-JR's.

# 40 Watt Band-Switch Exciter



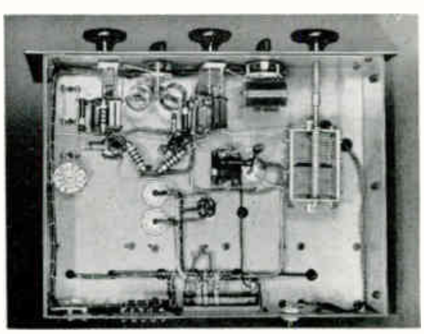

## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-19F76 | Filament Transformer |
| T-2 | T-84P60 | Plate Transformer |
| CH-1 | T-75C51 | Filter Choke |
| CH-2 | T-75C51 | Filter Choke |

### Resistors:

| | |
|---|---|
| R-1 | 20,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor |
| R-3 | 100,000 Ohm 1 Watt Resistor |
| R-4 | 350 Ohm 10 Watt Resistor |
| R-5 | 10,000 Ohm 10 Watt Resistor |
| R-6 | 350 Ohm 10 Watt Resistor |
| R-7 | 50 Ohm 10 Watt Resistor |
| R-8 | 50 Ohm 10 Watt Resistor |
| R-9 | 50 Ohm 10 Watt Resistor |
| R-10 | 50 Ohm 10 Watt Resistor |
| R-11 | 25,000 Ohm 50 Watt Semi-Variable Resistor, Ohmite or Equivalent |



Bottom View

### Condensers:

| | |
|---|---|
| C-1 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-2 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-3 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-4 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-5 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-6 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-7 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-8 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-10 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-11 | .0001 Mfd. 1000 Volt Mica Condenser, CD-4-6T1 or Aerovox 1455 |
| C-12 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. 1000 Volt Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-14 | 260-260 Mfd. Variable Condenser, Cardwell MR-260-BD or Equivalent |
| C-15 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-16 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |

### Tubes:

| | | |
|---|---|---|
| 1 | 6V6-G | Tube |
| 1 | 6L6-G or 6L6 GX | Tube |
| 1 | 807 or HY61/807 | Tube |
| 1 | 83 | Tube |

### RF Chokes:

| | |
|---|---|
| RFC-1 | RF Choke, Millen #34101 or Equiv. |
| RFC-2 | RF Choke, Millen #34101 or Equiv. |
| RFC-3 | RF Choke, Millen #34100 or Equiv. |
| RFC-4 | RF Choke, Millen #34101 or Equiv. |
| RFC-5 | RF Choke, Millen #34100 or Equiv. |
| RFC-6 | RF Choke, Millen #34100 or Equiv. |

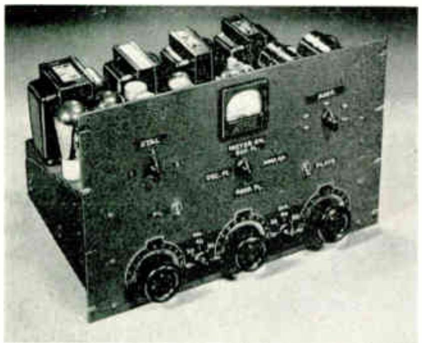
### Miscellaneous Parts:

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 4" |
| 1 | | Panel 19" x 12¼" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Condenser Mounting Bracket |
| 2 | | Bushings |
| 2 | | Octal Sockets |
| 1 | | 4-Contact Socket |
| 1 | | 5-Contact Socket, Steatite |
| 2 | | Feed-thru Insulators |
| 1 | | Grid Grip |
| 3 | | Crystal Sockets, Millen #33002 or Equiv. |
| 1 | SW-1 | Single Pole 4-Throw Switch, Isolantite, Centralab 2542 or Equivalent |
| 1 | SW-2 | SPST Switch, Arrow H & H #20994 |
| 1 | SW-3 | SPST Switch, Arrow H & H #20994 or Equivalent |
| 1 | SW-4 | 2-Pole 4-Throw Switch, Isolantite, Centralab 2543 or Equivalent |
| 1 | L-1 | Band Switch Coil, B-W Type 2AB or Equivalent |
| 1 | L-2 | Band Switch Coil, B-W Type 2AB or Equivalent |
| 1 | L-3 | Baby Turret, B-W Type BTCL |
| 1 | M-1 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | | Grid Grip, National Type 24 or Equiv. |
| 3 | | Control Wheels 2¼" Diameter, Coto CI-45 or Equivalent |
| 5 | | Knobs, Crowe #588 or Equivalent |
| 1 | | Tube Shield, Hammarlund Type PTS or Equivalent |
| 1 | | Shaft Extension, Yaxley #RS-242 |
| 1 | | Panel Bearing Assembly, Johnson #256 or Equivalent |
| 1 | | Shaft Coupling, National TX-11 |

Miscellaneous screws, nuts, bolts, lock-washers required hook-up wire and other hardware.

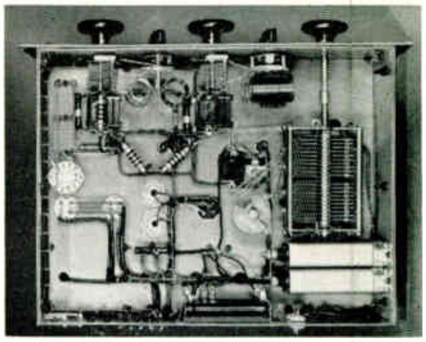
*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 120 Watt Band-Switch Exciter



Panel View

Chassis View



Bottom View

FOR transmitters having inputs as high as 700 or 800 watts this exciter provides adequate excitation on all bands from 160 to 10 meters without the necessity of plugging in different coils. Three crystal frequencies and five operating bands may be selected at will by means of controls on the panel.

The exciter uses for its final amplifier an 811 tube operating at a plate voltage of 1000 volts. The power input to the final stage is 120 watts, and power outputs of over 70 watts may be realized on all bands.

The panel is an especially designed unit requiring no additional name plates or markings. It is finished in black with white lettering, and the position of each control is clearly indicated.

The chassis and panel are the same as those used on the 40 watt band switching exciter. For converting the 40 watt unit to this 120 watt unit it is necessary only to replace the filament plate transformers, to add two filter condensers, a neutralizing condenser and a bleeder resistor; and to replace the final tank circuit with a larger unit. The same convenience of operation and attractive appearance will be retained by the amateur who wishes to increase the power output of his exciter without obsoleting the smaller equipment.

The crystal oscillator stage uses a 6V6-G tube operating with a plate voltage of 350V. and a screen-grid voltage of 190V. This stage drives a buffer-doubler stage with a 6L6-G tube operating at a plate voltage of 400V. and a screen-grid voltage of 275V. This buffer-doubler stage provides adequate excitation to the 811 grid on all bands.

The crystal oscillator stage operates with crystals in any band from 160 to 10 meters. When using crystals in the 160, 80 and 40 meter bands, doubling may be accomplished in the oscillator; and enough output is available from it to drive the 6L6-G buffer-doubler stage easily. When working "straight through" in the crystal oscillator stage, the plate current is of the order of 20 to 25 MA when loaded with the grid of the buffer-doubler stage. The buffer-doubler stage may be operated "straight through," or it may be used to double. With grid excitation on 160, 80, 40 and 20 meters, doubling is easily accomplished in this stage with enough power output to excite the 811 final stage easily. With excitation on 160, 80 and 40 meters, quadrupling can be carried on to give good outputs on 40, 20 and 10 meters.

Although the buffer-doubler stage is not neutralized, no difficulties will be encountered when operating "straight through." However, for best results, it is recommended that wherever possible frequency multiplication be accomplished in this stage.

The oscillator and buffer-doubler plate tank coils are sectionalized and mounted on a switch so that the amount of the coil being used can be easily controlled from the panel. It is thus possible to tune to all five bands with a single condenser. These tank coils are of the type in which the unused winding is short circuited.

The buffer-doubler stage is capacity coupled to the 811 grid. At resonance, and when loaded by the final grid, the plate current in the buffer-doubler stage is of the order of 55 to 60 MA.

The final tank circuit consists of a split-stator condenser and a Barker-Williamson type BCL turret assembly. This coil assembly consists of five coils, one for each frequency band. The coil which is desired may be selected from the panel, and the other four coils with their links shorted out.

The 811 tube is neutralized in a conventional manner, and no difficulty is encountered in obtaining perfect neutralization.

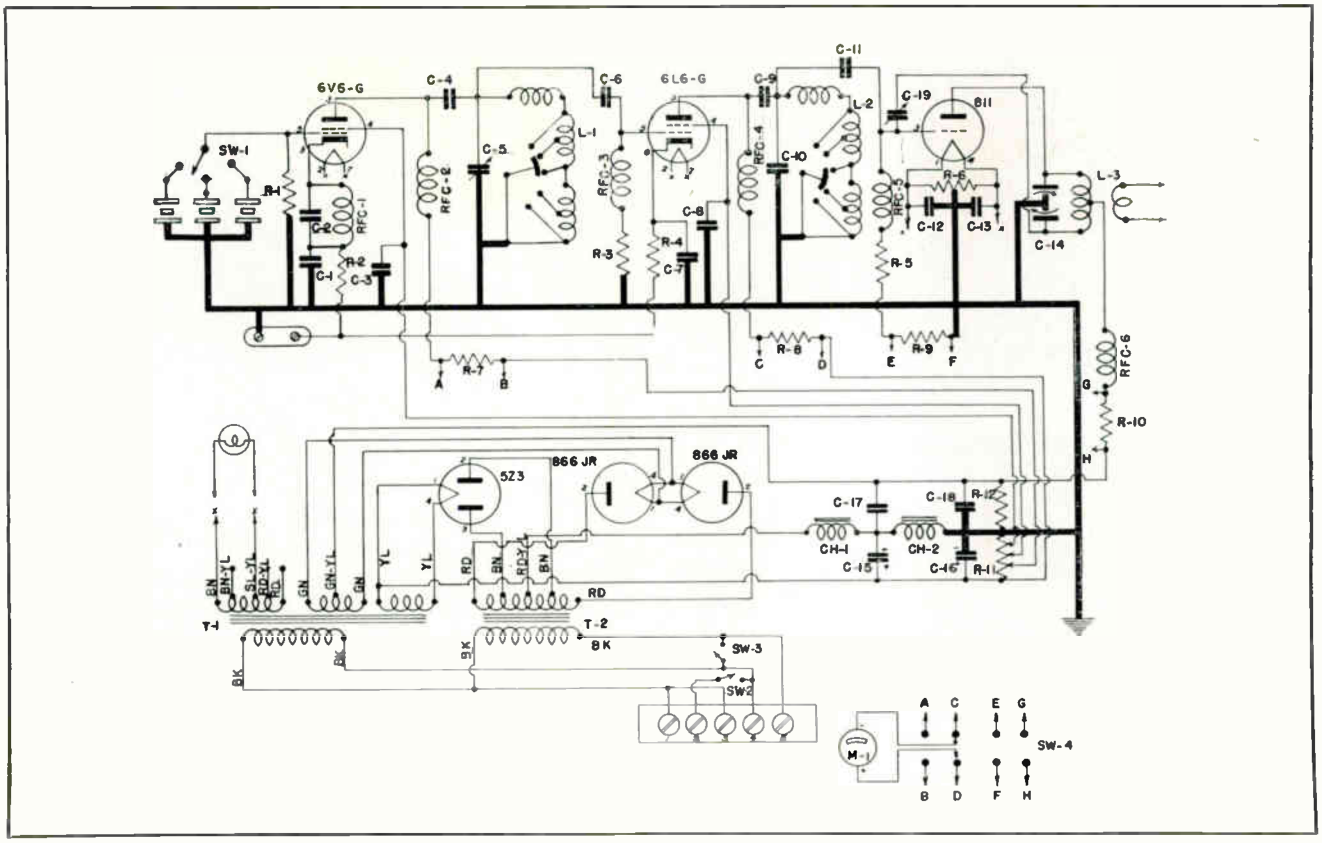
Since it is a high mu tube, the 811 requires no bias to protect it in the event of failure of excitation. In this exciter grid leak bias is used. With proper excitation the grid current should be 30 to 35 MA.

Two DC power supplies are mounted upon this chassis, one delivering 400 volts to supply the oscillator and buffer-doubler stages and the other delivering 1000 volts to the 811 tube. The low voltage rectifier uses a 5Z3 tube, and the high voltage rectifier uses two 866-JR tubes. These power supplies are filtered with the same chokes.

Filament supplies for the RF tubes and for the rectifier tubes are controlled by a single switch on the panel, and the two high voltage supplies by another switch. The terminal board on the rear of the chassis has three extra terminals so that other units associated with this exciter may be controlled by the exciter switches.

A single meter is mounted upon the panel, and under it a four-position switch permits the reading of the oscillator plate current, the buffer-doubler plate current, the final amplifier grid current and the final amplifier plate current.

The three crystal sockets are mounted on the chassis base. The selector switch is coupled to the panel switch by means of a flexible shaft, thus permitting the crystals to be located for best performance and retaining a convenient switch position on the panel.




## Parts Required

### THORDARSON TRANSFORMERS and CHOKES

| | | |
|---|---|---|
| T-1 | T-19F77 | Filament Transformer |
| T-2 | T-19P57 | Plate Transformer |
| CH-1 | T-75C51 | Filter Choke |
| CH-2 | T-75C51 | Filter Choke |

### Resistors:

| | |
|---|---|
| R-1 | 20,000 Ohm 1 Watt Resistor |
| R-2 | 350 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-3 | 100,000 Ohm 1 Watt Resistor |
| R-4 | 350 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-5 | 2,500 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-6 | 20 Ohm 10 Watt Center Tapped Resistor, Ohmite Brown Devil or Equivalent |
| R-7 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-8 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-9 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-10 | 50 Ohm 10 Watt Resistor, Ohmite Brown Devil or Equivalent |
| R-11 | 25,000 Ohm 50 Watt Semi-Variable Resistor, Ohmite #0585 or Equivalent |
| R-12 | 100,000 Ohm 50 Watt Resistor, Ohmite or Equivalent |

### Condensers:

| | |
|---|---|
| C-1 | .002 Mfd. 1,000 Volt Mica Condenser C-D 4-6D2 or Aerovox 1455 |
| C-2 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-3 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-4 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-5 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |

### Condensers: (Cont.)

| | |
|---|---|
| C-6 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-7 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-10 | 100 Mmfd. Variable Condenser, Cardwell ZU-100-AS or Equivalent |
| C-11 | .0001 Mfd. 1,000 Volt Mica Condenser, C-D 4-6T1 or Aerovox 1455 |
| C-12 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. 1,000 Volt Mica Condenser, C-D 4-6D2 or Aerovox 1455 |
| C-14 | 210-210 Mmfd. Variable Condenser, Cardwell XT-210-PD or Equivalent |
| C-15 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-16 | 8 Mfd. 600 Volt Electrolytic Condenser, Mallory HS-693 or Equivalent |
| C-17 | 2 Mfd. 1,500 Volt Condenser, Mallory TX-808 or Equivalent |
| C-18 | 2 Mfd. 1,500 Volt Condenser, Mallory TX-808 or Equivalent |
| C-19 | Neutralizing Condenser, E. F. Johnson #13G45 or Equivalent |

### Tubes:

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6V6-G | Tube | 1 | 811 | Tube |
| 1 | 6L6-G or 6L6GX | Tube | 1 | 5Z3 | Tube |
| | | | 2 | 866-Jr. | Tubes |

### RF Chokes:

| | |
|---|---|
| RFC-1 | RF Choke, Millen #34101 or Equiv. |
| RFC-2 | RF Choke, Millen #34101 or Equiv. |
| RFC-3 | RF Choke, Millen #34101 or Equiv. |
| RFC-4 | RF Choke, Millen #34101 or Equiv. |
| RFC-5 | RF Choke, Millen #34101 or Equiv. |
| RFC-6 | RF Choke, Millen #34101 or Equiv. |

### Miscellaneous Parts:

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 4" |
| 1 | | Panel 19" x 12¼" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Condenser Mounting Bracket |
| 2 | | Bushings |
| 2 | | Octal Sockets |
| 1 | | 4-Contact Socket |
| 3 | | 4-Contact Sockets, Steatite |
| 2 | | Feed-thru Insulators |
| 1 | | Grid Grip |
| 3 | | Crystal Sockets, Millen #33002 or Equiv. |
| 1 | SW-1 | Single-Pole, 4-Throw Switch, Isolantite, Centralab #2543 or Equivalent |
| 1 | SW-2 | SPST Switch, Arrow H & H #20992 (Nickel Plated) or Equivalent |
| 1 | SW-3 | SPST Switch, Arrow H & H #20992 (Nickel Plated) or Equivalent |
| 1 | SW-4 | 2-Pole, 4-Throw Switch, Isolantite, Centralab #2543 or Equivalent |
| 1 | L-1 | Band Switch Coil, Barker-Williamson Type 2AB or Equivalent |
| 1 | L-2 | Band Switch Coil, Barker-Williamson Type 2AB or Equivalent |
| 1 | L-3 | Coil Turret Assembly, Barker-Williamson Type BCL or Equivalent |
| 1 | M-1 | 0-200 MA DC Meter, 2" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 3 | | Control Wheels, 2¼" Diameter, Coto CI-45 or Equivalent |
| 5 | | Knobs, Crowe #588 or Equivalent |
| 1 | | Shaft Extension, Yaxley #RS-242 or Equivalent |
| 1 | | Panel Bearing Assembly, Johnson #256 or Equivalent |
| 1 | | Shaft Coupling, National TX-11 |

Miscellaneous nuts, bolts, soldering lugs, lockwashers, varnished tubing, cable and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

## 100 WATT MULTI-BAND

Complete Transmitter

RF Section

Modulator

THIS complete 100 watt transmitter consists of two units, each having its own power supply. The RF section may be modulated or may be used for CW only. Its final stage operates at 1000 volts with 100 watts input. The modulator provides sufficient power output to modulate 100% the RF section, and the speech amplifier is incorporated in the modulator chassis.

Any three pre-selected amateur bands in the range from 160 to 10 meters may be selected with panel switches.

The RF section is a three-stage circuit using a 6L6-G oscillator, a 6L6-G buffer-doubler stage and a TZ-40 final stage.

The oscillator stage has provision for switching in its plate tank circuit any one of three coils, and the same switching operation which selects the coils also selects the proper crystal. With 160 and 80 meter crystals, doubling can be accomplished in the oscillator stage, but crystals in the range from 160 to 20 meters may be used in the oscillator stage when working "straight through."

In the buffer stage provision is made for switching to any one of three tank coils. Because the 6L6-G buffer-doubler tube is not neutralized and since, when the second stage is used in frequency multiplying service, adequate drive is obtained on the TZ-40, it is recommended that doubling be carried on in this stage whenever possible. However, on the lower frequency bands, there is no tendency toward trouble when operating "straight through." In all cases the final stage is operated "straight through." For 10 meter output it is recommended that a 20 meter crystal be used and that doubling be carried on in the second stage.

The oscillator stage is capacity coupled to the buffer-doubler stage, and the latter is capacity coupled to the final grid.

Three Barker-Williamson center linked, center tapped tank coils, mounted in a type B coil turret, permit the selection of any one of these coils for use in the final tank. With this arrangement the link around the coil in use is connected to the antenna or to an antenna matching network.

With one meter and four meter switches provision is made for reading the oscillator cathode current, the buffer-doubler cathode current, the final grid current and the final plate current. The meter switches are of such a type that the circuit controlled by each switch may be opened by placing the switch in its "half way" position.

Two direct current supplies are installed in this chassis, one of which delivers approximately 400 volts to supply the plates of the 6L6-G's and the other which delivers 1000 volts to supply the plate of the TZ-40. The screen supply for the 6L6-G's is taken from taps on the 400 volt bleeder R-5, these taps being adjusted so that the voltage on the oscillator screen-grid is about 150 to 200 volts and on the buffer-doubler screen-grid it is about 200 to 250 volts. When the oscillator tube is operating properly, the cathode current should dip to a value of 50 MA or less, and the cathode current in the buffer-doubler stage at resonance, should be about 75 MA. The grid current on the final should be 25 MA or more; and for a 100 watt input to the final stage, the TZ-40 plate current should be 100 MA.

The removal of the high voltage for neutralizing the final stage may be done easily by removing the 866-JR tubes from their sockets and then making the neutralizing adjustment in the conventional manner with the antenna or antenna matching network connected to the link on the final tank coil.

For CW operation the key is connected between terminals 1 and 2 on the five-screw terminal board on the back apron of the chassis, the 115 volt line is connected to terminals 3 and 4 and the plate voltage is controlled by a switch connected between terminals 4 and 5. The terminals of the two No. 55 feed-thru insulators on the rear apron of the chassis are connected together.

### Modulator Unit:

The modulator tubes are 6L6-G's in push-pull, Class $AB_2$. These tubes are connected to the Class C load through a Multi-Match modulation transformer. The connections to the modulation transformer are as follows: One 6L6-G plate is connected to terminal 1, and the other plate to 6. Terminals 2 and 5 are joined and connected to the plate supply. Terminals 9 and 10 are also joined, but no connection is made to them. The Class C load is connected to terminals 8 and 12.

The speech amplifier tube line-up is as follows: a pentode connected 6J7, a 6F5 and a 6F6, triode connected.

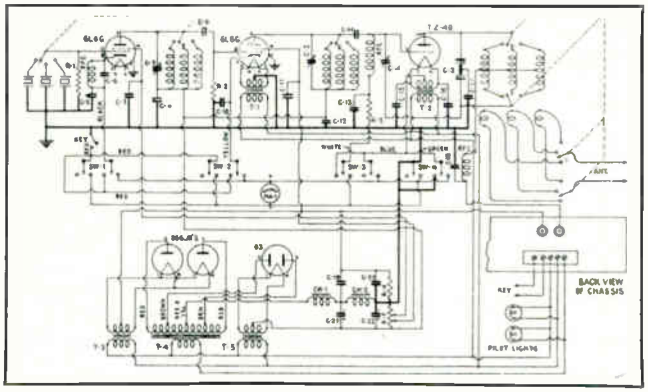
The power supply uses an 83 to supply high voltage to all tubes and an 82 in the bias supply for the 6L6-G's.

In preparing the modulator unit for operation, an adjustment must be made of the bias and the screen voltage on the 6L6-G's. For obtaining the correct bias adjust R-11 until the voltage across it is 25 volts. Then adjust R-12 until the screen voltage is 310 volts. It may be necessary to readjust R-11 to maintain the 25 volts of bias. The modulator plate current should be about 115 MA for two tubes, and with a sine wave signal of sufficient magnitude to modulate 100% the RF section the plate current will rise to approximately 225 MA. For speech waves having the same peak power plate current will kick up to about 170 MA.

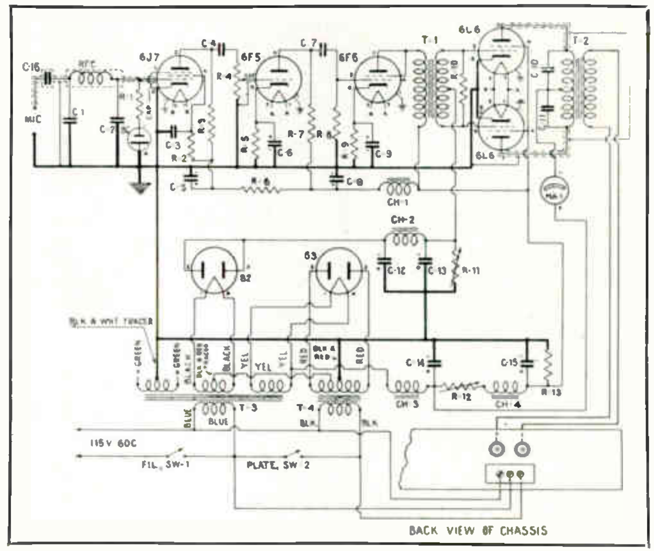
To connect the modulator to the RF section terminals 3, 4 and 5 on the RF

# Band-Switch Transmitter

**100 WATT MULTI-BAND**



**RF Unit**




**Modulator Unit**

section should be connected to terminals 1, 2 and 3 on the modulator. Connection should be made from the terminals of the No. 55 feed-thru insulators on the modulator chassis to the corresponding insulators on the RF chassis. With the two chassis so interconnected the filament switch on the modulator chassis controls all the filaments, and the plate switch controls all plate supplies.

The RF section may be used alone as an exciter for transmitters having power inputs of almost one kilowatt.

| BAND | TURNS | WINDING LENGTH |
|---|---|---|
| 160 | 40 | Close wound |
| 80 | 22 | Close wound |
| 40 | 12 | 1⅜" |
| 20 | 6 | 1⅜" |
| 10 | ¾ | |

Osc. & Buf. coils are identical. Use No. 18E wire on 1½" Diam. form.

## RF Unit

### Parts Required

**THORDARSON PARTS**

| | | |
|---|---|---|
| 1 | T-17K21 | Foundation Unit |
| T-1 | T-19F97 | Filament Transformer |
| T-2 | T-19F93 | Filament Transformer |
| T-3 | T-19F88 | Filament Transformer |
| T-4 | T-19P57 | Plate Transformer |
| T-5 | T-19F91 | Filament Transformer |
| CH-1 | T-75C51 | First Choke |
| CH-2 | T-75C51 | Second Choke |

**Tubes:**

2 6L6-G or 6L6-GX Tubes
2 866-JR Tubes
1 TZ-40 Tube
1 83 Tube

**Resistors:**

R-1 50,000 Ohm 1 Watt Resistor, IRC BT-1
R-2 50,000 Ohm 10 Watt, Ohmite Red Devil
R-3 2,500 Ohm 25 Watt, Ohmite, Wirewound
R-4 100,000 Ohm 50 Watt, Ohmite Wirewound
R-5 20,000 Ohm 50 Watt, Ohmite Semi-Variable

**Condensers:**

C-1, C-2 Variable Condenser, National TMS-250
C-3 Variable Condenser, National TMC-200D
C-4 Neutralizing Condenser, Johnson 13G45
C-5, C-7, C-8, C-9, C-10, C-11, C-13, C-14, C-15, C-16 .001 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6D1
C-6 .0001 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6T1

## RF Unit

**Condensers: (Cont'd)**

C-12 .005 Mfd. 1000 Volt Mica Condenser, Aerovox #1455 or C-D 4-6D5
C-17, C-18 .001 Mfd. 5000 Volt Mica Condenser, Aerovox #1457 or C-D 4-25D1
C-19, C-20 2 Mfd. 1500 Volt Oil Filled Condenser Aerovox #1505 (2" Can)
C-21 4 Mfd. 600 V. Electrolytic, Aerovox GL-600
C-22 4 Mfd. 600 V. Electrolytic, Aerovox GL-600

**Miscellaneous Parts:**

3 5-Contact Sockets, Amphenol S5
5 4-Contact Sockets, Amphenol S4
2 Octal Sockets, Amphenol S8
5 4-Contact Isolantite Sockets, Amphenol SS4
8 Feed-thru Insulators, Johnson #55
4 Feed-thru Insulators, Johnson #42
3 RF Chokes, National R-100
1 4" Shaft Extension, Yaxley #RS243
1 2-Gang Band Switch, Centralab #2543
1 1-Gang Band Switch, Centralab #2542
1 Coil Turret, Barker-Williamson Model "B"
1 160 Meter Coil, Barker-Williamson 160BL — Center Linked
1 80 Meter Coil, B-W 80BL, Center Linked
1 40 Meter Coil, B-W 40BL, Center Linked
1 20 Meter Coil, B-W 20BL, Center Linked
1 10 Meter Coil, B-W 10BL, Center Linked
3 2¼" Coto-Coil Wheels CI-45 With Indicator Plates CI-47 Marked "OSC. PLATE," "BUFFER PLATE," "PWR. AMP. PLATE."
4 Indicator Plates, Marked "OSC. PLATE," "BUFFER PLATE," "PWR. AMP. PLATE," "PWR. AMP. GRID," Coto-Coil CI-47.
4 Meter Switches, Yaxley #762
1 0-200 MA Meter, Simpson #27S or Triplett #327-A (Illum.)
3 1¼" Bar Knobs, Black
1 Grid Cap, Large, National Type 12
2 SPST 6 Ampere Toggle Switches, H & H #26993
6 Coil Forms, National XR-4
1 Cone Insulator, Johnson #601
1 Cabinet, Bud #697 or Par Metal #SC2613
1 Variable Resistor Lug, Ohmite #0358

## Modulator Unit

### Parts Required

**THORDARSON PARTS**

| | | |
|---|---|---|
| 1 | T-17K22 | Foundation Unit |
| T-1 | T-67D78 | Driver Transformer |
| T-2 | T-11M75 | CHT Modulation Transformer |
| T-3 | T-79F84 | Filament Transformer |
| T-4 | T-84P60 | Plate Transformer |
| CH-1 | T-74C30 | Third Choke |
| CH-2 | T-75C49 | Bias Choke |
| CH-3 | T-75C51 | First Choke |
| CH-4 | T-68C07 | Second Choke |

## Modulator Unit

**Tubes:**

1 6J7 Tube
1 6F5 Tube
1 6F6 Tube
2 6L6-G or 6L6-GX Tubes
1 82 Tube
1 83 Tube

**Resistors:**

R-1 5 Megohm ½ Watt Resistor, IRC BT-½
R-2 3 Megohm 1 Watt Resistor, IRC BT-1
R-3, R-8 250,000 Ohm 1 Watt Resistor, IRC BT-1
R-4 500,000 Ohm Volume Control, IRC 13-133
R-5 2000 Ohm 1 Watt Resistor, IRC BT-1
R-6 20,000 Ohm 1 Watt Resistor, IRC BT-1
R-7 100,000 Ohm 1 Watt Resistor, IRC BT-1
R-9 750 Ohm 10 Watt Resistor, IRC Type AB
R-10 10,000 Ohm 2 Watt Resistor, IRC BT-2
R-11 1500 Ohm 25 Watt Semi-Variable, Ohmite
R-12 2500 Ohm 25 Watt Semi-Variable, Ohmite
R-13 25,000 Ohm 50 Watt Wirewound, Ohmite

**Condensers:**

C-1, C-2 .0001 Mfd. 500 Volt Mica Condenser, Aerovox #1467 or C-D 5W-5T1
C-3 .04 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4S4
C-4, C-7 .1 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4P1
C-5 8 Mfd. 450 Volt Electrolytic Condenser, Aerovox PBS-450 or C-D JR508
C-6 10 Mfd. 25 Volt Electrolytic Condenser, Aerovox PR-25 or C-D ED-2100
C-8, C-15 8-8 Mfd. 450 V. Dual Elect., Aerovox 2G
C-9 10 Mfd. 50 V. Elect., Aerovox PR-50
C-10, C-11 0.002 Mfd. 1000 Volt Mica Condenser Aerovox #1455 or C-D 4-6D2
C-12, C-13 8 Mfd. 200 Volt Electrolytic Condenser, Aerovox PBS-200 or C-D JR208
C-14 8 Mfd. 600 V. Elect., Aerovox GL-600
C-16 0.01 Mfd. 400 Volt Paper Condenser, Aerovox #484 or C-D DT-4S1

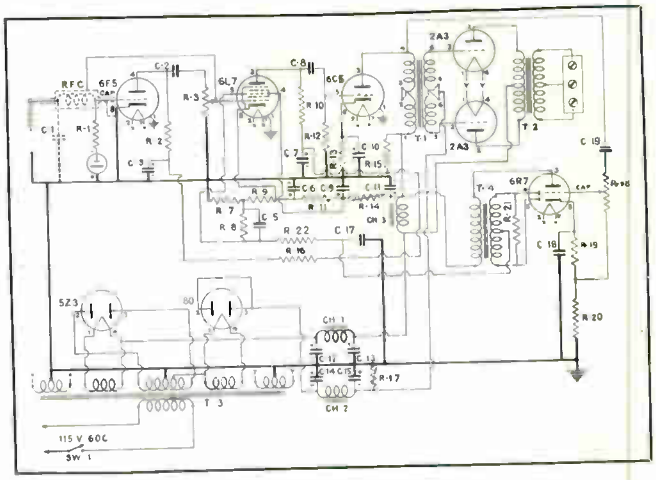
**Miscellaneous Parts:**

1 RF Choke, National R-100
1 Mic. Connector, Amphenol MC-1F
1 Mic. Connector, Amphenol PC-1M
1 Bias Cell, Mallory #F7
1 Bias Cell Holder, Mallory #GB-1A
1 1¼" Bar Knob, Black Streamlined
1 AC Line Cord and Plug, Belden #1725
5 Octal Sockets, Amphenol S8
2 4-Contact Sockets, Amphenol S4
2 Metal Tube Grid Caps
1 Dial Plate, Crowe #566
2 Feed-thru Insulators, Johnson #55
1 0-300 MA Meter, Simpson #27S or Triplett #327-A (Illuminated)
2 Metal Tube Shields, ARHCO #92
1 Red Jewel and Candelabra Bracket, ARHCO #93 or Drake Mfg. Co. #10C
1 Green Jewel and Candelabra Bracket, ARHCO #93 or Drake Mfg. Co. #10C
2 110 Volt Carbon Lamps Type G6

*Complete Instruction Book SD-386-A giving full details of building data, photos, diagrams and layout available at 25 cents postpaid.*

# Amateur Speech Amplifier

Chassis View




USING low plate resistance output tubes, this amplifier is capable of easily delivering 10 watts of audio power for driving the largest modulators used by amateurs. Its low internal output impedance provides the excellent regulation required in Class B driver service, and its high gain makes it usable with crystal microphones.

The circuit shown is that incorporating the peak limiting feature, but this amplifier is also available with a circuit for overmodulation control or as a conventional amplifier. The punched chassis is designed to fit either the regular type amateur transformers or the C.H.T. Series of transformers, which give better frequency response and less distortion. The amplifier may be adapted to rack and panel mounting, or a cover may be obtained for use on an operating table.

For T-2, a driver transformer may be used to couple the 2A3 plates directly to the Class B grids; or, if it is desired to locate the amplifier remotely from the modulator, an output transformer may be installed to couple the 2A3 plates to a 500 ohm line.

Specifications showing the different circuits, together with a complete parts list, are shown on the Thordarson SD-389 bulletin, available at all jobbers.

### Thordarson Parts

| | | |
|---|---|---|
| 1 | T-17K20 | Foundation Unit |
| T-1 | T-15A74 | |
| T-2 | T-15S90 or T-67S54 for 500 ohm output or T-15D76, T-15D77, T-15D78 or T-15D79 or T-19D01, T-19D02, T-19D03 or T-19D04 | |
| T-3 | T-15R05 or T-87R85 | |
| T-4 | T-78D46 | |
| CH-1 | T-15C54 or T-74C29 | |
| CH-2 | T-75C49 | |
| CH-3 | T-74C30 | |

### Tubes:

1—6F5 1—6C5 1—5Z3 1—6R7 1—6L7 2—2A3 1—80

### Resistors:

| | |
|---|---|
| R-1 | 5 Megohm, ½ Watt, IRC BT-½ |
| R-2 | 250,000 Ohms, 1 Watt, IRC BT-1 |
| R-3 | 500,000 Ohms, Volume Control, IRC 13-133 |
| R-7 | 350 Ohms, 10 Watts, Ohmite Brown Devil |
| R-8 | 500,000 Ohms 1 Watt, IRC BT-1 |
| R-9 | 150 Ohms, 10 Watts, Ohmite Brown Devil |
| R-10 | 100,000 Ohms, 1 Watt, IRC BT-1 |
| R-11 | 4,000 Ohms 10 Watts, Ohmite Brown Devil |
| R-12 | 250,000 Ohms 1 Watt, IRC BT-1 |
| R-13 | 500 Ohms, 1 Watt, IRC BT-1 |
| R-14 | 12,000 Ohms, 25 Watts, Ohmite Semi-Variable |
| R-15 | 20,000 Ohms, 1 Watt, IRC BT-1 |
| R-16 | 20,000 Ohms, 1 Watt, IRC BT-1 |
| R-17 | 2,500 Ohms, 25 Watts, Ohmite Semi-Variable |
| R-18 | 500,000 Ohms, Volume Control, IRC 13-133 |
| R-19 | 1,000 Ohms, 1 Watt, IRC BT-1 |
| R-20 | 2,500 Ohms, 1 Watt, IRC BT-1 |
| R-21 | 10,000 Ohms, 1 Watt, IRC BT-1 |
| R-22 | 100,000 Ohms, 1 Watt, IRC BT-1 |

### Condensers:

| | |
|---|---|
| C-1 | 0.0001 Mfd., 500 V Mica Aerovox 1467 or C-D 5W-5T1 |
| C-2 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-3 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-5 | 0.5 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P5 |
| C-6 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-7, C-11 | 8-8 Mfd., 450 V Dual Elect. Aerovox 2G |
| C-8 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-9 | 8 Mfd., 450 V Elect. Aerovox PBS-450 or C-D JR508 |
| C-10 | 10 Mfd., 25 V Elect. Aerovox PR-25 or C-D ED-2100 |
| C-12, C-13 | 8-8 Mfd., 450 V Dual Elect. Aerovox 2G |
| C-14 | 8 Mfd., 200 V Elect. Aerovox PBS-200 or C-D JR208 |
| C-15 | 8 Mfd., 200 V Elect. Aerovox PBS-200 or C-D JR208 |
| C-17 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |
| C-18 | 10 Mfd., 25 V Elect. Aerovox PB-25 or C-D ED-2100 |
| C-19 | 0.1 Mfd., 400 V Paper Aerovox 484 or C-D DT-4P1 |

### Miscellaneous Parts:

| | | | |
|---|---|---|---|
| 1 | Mic. Input Connector, Amphenol MC1F | 1 | SPST Toggle Switch, H & H No. 20992 |
| 1 | Mic. Input Connector, Amphenol PC1M | 1 | AC Line Cord and Plug, Belden No. 1725 |
| 1 | Red Jewe and Bracket, Yaxley No. 310R | 3 | Metal Tube Grid Caps |
| 1 | Bias Cell, Mallory No. F7 | 2 | Metal Tube Shields, ARHCO No. 92 |
| 1 | Bias Cell Holder, Mallory No. GB-1A | 1 | Dial Plate, Crowe No. 566 |
| 1 | 1¼" Bar Knob, Black Streamlined | 1 | RF Choke, National R-100 |
| | | 4 | Octal Sockets, Amphenol S8 |
| | | 4 | 4-Contact Sockets, Amphenol S-4 |
| | | 1 | 6.3 Volt Pilot Light, Mazda No. 40 |

*The parts list shown is for the amplifier with either the over-modulation control or the peak limiting circuits; complete drawings, photos, parts lists and instructions for easy assembly of either of the above circuits are contained in Instruction Book SD-387, 15 cents postpaid.*

# 250 Watt Phone Transmitter

**450 WATT CW — 160 TO 10 METERS**

*High Efficiency Final Stage*

★

*Multi-Match Modulator*

★

*1250 and 1500 Volt Power Supply*

★

*Up to 150 Watts Modulator Output*

PARTICULARLY designed for use with the new RCA-811 and 812 tubes, this transmitter, with its unusual mechanical layout and carefully planned wiring, gives superior performance on the five amateur bands from 160 to 10 meters. With an input of 250 watts for phone operation, a carrier output of 190 watts is easily obtained; and with 450 watts input for CW, 350 watts may be delivered to the antenna. Higher than usual plate efficiencies are obtained by careful attention to mechanical layout and by the selection of high quality parts.

In addition to the RCA-812 the transmitter will also operate satisfactorily with other tubes such as the Taylor TZ-40, Taylor T-55, or the Eimac 35T. It is only necessary to use the correct filament transformer and to adjust the grid bias resistor.

A semi-fixed swinging link grid tank coil of the plug-in type is used in the grid circuit. This allows not only close adjustment for optimum excitation but also permits the coil to be removed without changing the link setting. This latter feature is particularly desirable for the amateur who wishes to avoid time-consuming operations when changing bands. The plate tank coil is also of the swinging link type, which permits quick adjustment of the amplifier loading. The Class C amplifier is easily driven by the Thordarson 40 watt Band-Switch Exciter unit, this combination affording the advantage of quick band changing without involving costly coil switching parts in the high power stage.

The Class C amplifier requires 200 MA at 1250 volts for a phone input of 250 watts. For a 450 watt CW input the plate current is 300 MA at 1500 volts. The grid current for the Class C tubes depends upon the choice of tubes and whether CW or phone operation is desired. For 812's it is 50 MA for two tubes. To meet the various bias requirements of the different tube types, an adjustable grid resistor is provided.

Should the amateur wish to install an external fixed bias supply for CW, provision has been made for its easy connection. If external bias is used, the negative of the bias supply connects to terminal No. 1 and the positive to No. 2. If external bias is not desired terminals No. 1 and No. 2 on the Class C amplifier chassis are connected together. About 30 volts of fixed bias are required to maintain the tubes within their rated plate dissipation without excitation.

Both the grid and the plate currents are metered, the meters being in the cathode return leads. This places both meters at a low DC potential with respect to the chassis, thus eliminating any tendency toward deflection of the needle due to electrostatic effects and removing the possibility of flash-over from the meter terminals to the pilot lamp mounting.

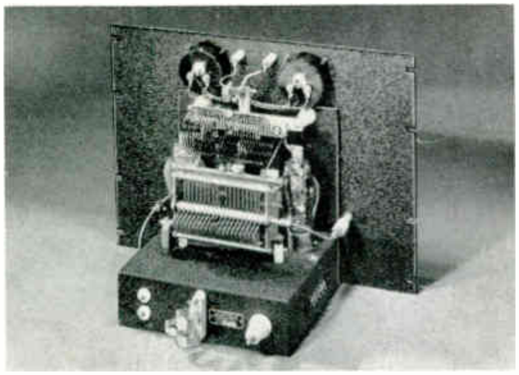
The modulator uses the new 811 tubes and easily delivers the required 125 watts of audio frequency power with very little distortion. It is designed to operate from a "500 ohm" line. The modulation transformer is of the Multi-Match type so that it may be used to modulate any Class C stage of 300 watts input power. The no-signal plate current of the 811's is 60 MA, and the current with a 125 watt sine wave output is 177 MA. For speech signals having the same peak power the plate current should swing to about 90 or 100 MA.

The required driving power is very small, being on the order of 4 peak

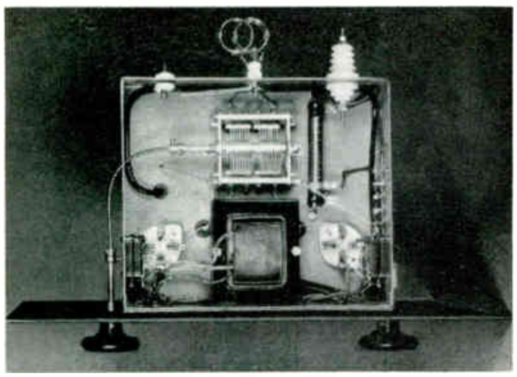
**450 WATT CW — 160 TO 10 METERS**

watts. If 2A3's are used as the driver tubes, an unusually high step-down ratio from the plates of the 2A3's to the grids of the 811's may be used to obtain excellent driving regulation. The Thordarson Amateur Speech Amplifier is an excellent unit to furnish the driving power required by this modulator.

The power supply, with its tapped plate transformer, is rated at 300 MA at 1250 or 1500 volts. The load requirements of the Class C amplifier and the modulator are such that the power supply is fully loaded for both phone and CW so that regard'ess of the type of operation the amateur chooses, he is not investing in a power supply which is not being loaded up to its rating at all times. The power supply is entirely self-contained with separate plate and filament switches, making it an ideal power supply for other equipment of similar load requirements.

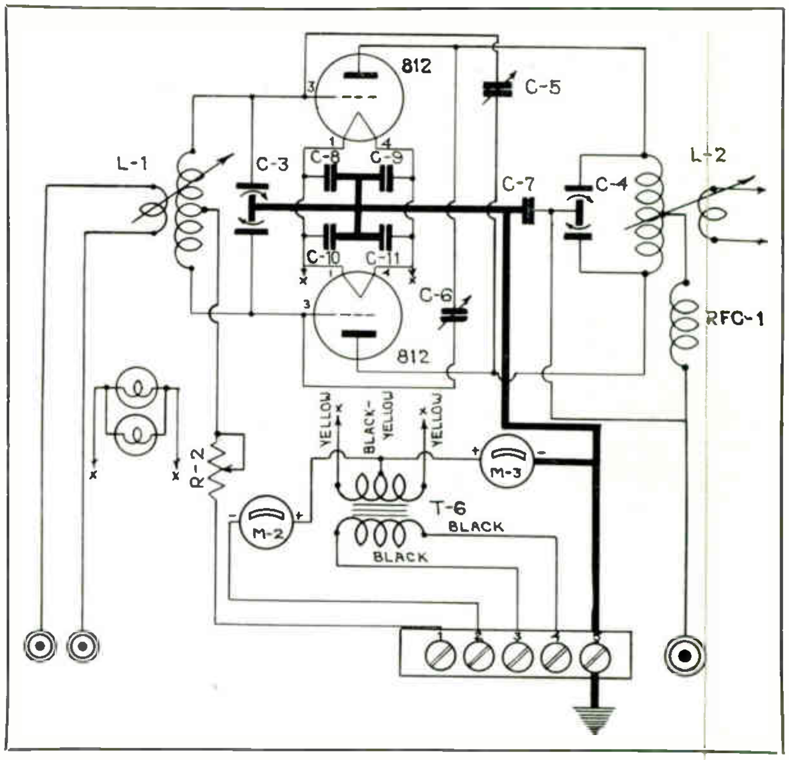


RF Chassis View



RF Bottom View

## RF Section




## Parts Required

**THORDARSON TRANSFORMER**

T-6 T-19F85 Filament Transformer

**Resistor:**

R-2 4,000 Ohm 50 Watt Wirewound Ohmite Semi-Variable or Equivalent

**Condensers:**

C-3 Variable Air Condenser, Cardwell MR-150-BD or Equivalent
C-4 Variable Air Condenser, Cardwell XP-165-KD or Equivalent
C-5 Neutralizing Condenser, Hammarlund N-10 or Equivalent
C-6 Neutralizing Condenser, Hammarlund N-10 or Equivalent
C-7 .001 Mfd. 3,500 Volt Mica Condenser Aerovox 1653 or Equivalent
C-8 .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455
C-9 .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455
C-1. .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455
C-11 .002 Mfd. 1,000 Volt Mica Condenser CD-4-6D2 or Aerovox 1455

**Tubes:**

2 812 Tubes

**Miscellaneous Parts:**

1 Punched Chassis 8½" x 10" x 3"
1 Panel 19" x 14"
1 Sub-Panel
1 Terminal Board
4 Bushings
3 Feed-thru Insulators
2 4-Contact Isolantite Sockets
2 Stand-off Insulators
2 Shaft Couplings, National TX-11 or Equivalent
1 Shaft Coupling, Johnson No. 252 or Equivalent
2 Panel Bearing Assemblies, Johnson No. 256 or Equivalent
1 M-2 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett No. 327-A or Equivalent
1 M-3 0-300 MA DC Meter, 3" Square Case, Rear Illumination, Triplett No. 327-A or Equivalent
2 Control Wheels, Complete, Coto CI-45 or Equivalent
1 Indicator Plate Marked "PWR AMP GRID" Coto CI-47 or Equivalent
1 Indicator Plate Marked "PWR AMP PLATE" Coto CI-47 or Equivalent

**Misc. Parts: (Cont'd)**

1 Coil Socket, National Type XB-16 or Equivalent
1 L-1 160 Meter Coil, National Type AR16-160C or Equivalent
1 L-1 80 Meter Coil, National Type AR16-80S or Equivalent
1 L-1 40 Meter Coil, National Type AR16-40S or Equivalent
1 L-1 20 Meter Coil, National Type AR16-20S or Equivalent
1 L-1 10 Meter Coil, National Type AR16-10S or Equivalent
1 L-2 Swinging Link & Jack Bar Assembly, B-W Type TV or Equivalent
1 L-2 160 Meter Coil, B-W 160 TVL or Equivalent
1 L-2 80 Meter Coil, B-W 80 TVL or Equivalent
1 L-2 40 Meter Coil, B-W 40 TVL or Equivalent
1 L-2 20 Meter Coil, B-W 20 TVL or Equivalent
1 L-2 10 Meter Coil, B-W 10 TVL or Equivalent
2 Grid Grips, National Type 12 or Equivalent
1 RFC-1 RF Choke, National Type R-154U or Equivalent

Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

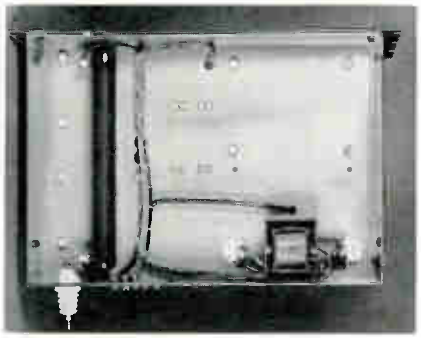
*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 250 Watt Phone Transmitter

**450 WATT CW — 160 TO 10 METERS**

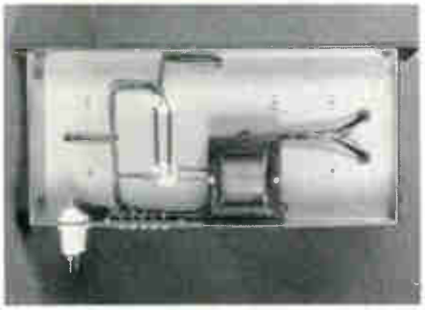
## Modulator and Power Supply

Modulator



Bottom View of Power Supply

Power Supply



Bottom View of Modulator

### Modulator Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-3 | T-19F99 | Filament Transformer |
| T-4 | T-19D05 | Driver Transformer |
| T-5 | T-19M16 | Modulation Transformer |

**Miscellaneous Parts:**

| | |
|---|---|
| 2 | 811 Tubes |
| 1 M-1 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | Punched Chassis 17" x 8" x 3" |
| 1 | Panel 19" x 10½" |
| 1 Pr. | Chassis Mounting Brackets |
| 1 | 5-Lug Terminal Board |
| 2 | Feed-thru Insulators |
| 2 | 4-Contact Sockets, Steatite |
| 2 | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers, grommets, soldering lugs and other hardware.

### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P60 | Plate Transformer |
| CH-1 | T-19C37 | Input Choke |
| CH-2 | T-19C44 | Smoothing Choke |

**Resistor:**

R-1 40,000 Ohm 200 Watt Wirewound Resistor, Ohmite 1370 or Equivalent

**Condensers:**

C-1 2 Mfd. 1,500 Volt Condenser, GE #23F21 or Equivalent
C-2 2 Mfd. 1,500 Volt Condenser, GE #23F21 or Equivalent

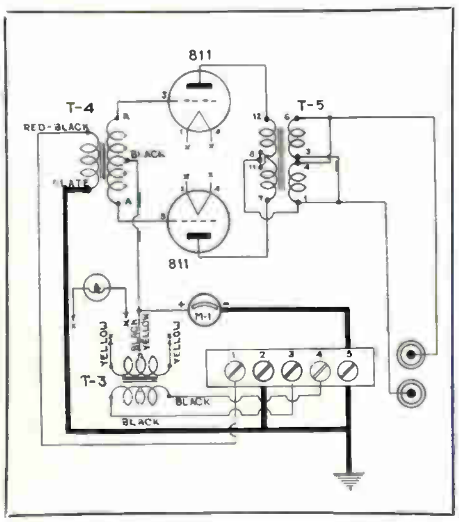
**Tubes:**

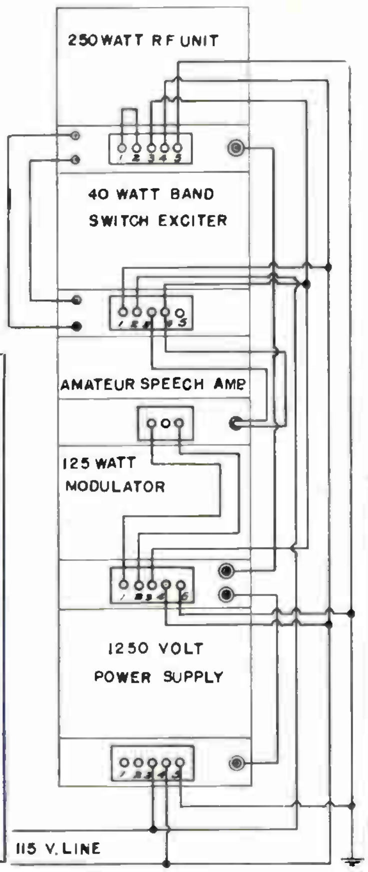
2 866 Tubes

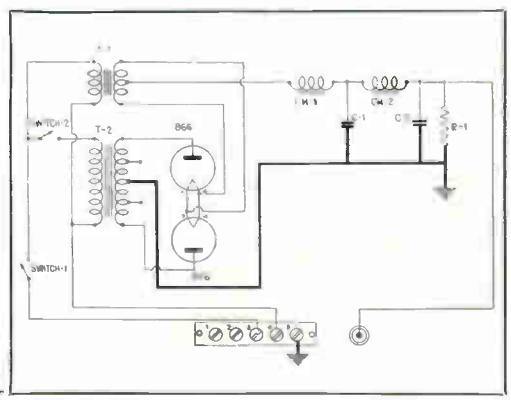
**Miscellaneous Parts:**

| | |
|---|---|
| 1 | Punched Chassis 17" x 12" x 3" |
| 1 | Panel 19" x 12¼" |
| 1 Pr. | Chassis Mounting Brackets |
| 2 | 4-Contact Sockets, Steatite |
| 1 | Feed-thru Insulator |
| 2 | Isolantite Plate Caps |
| 1 SW-1 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 SW-2 | Switch, Arrow H & H Type HDT or Equivalent |

Miscellaneous nuts, bolts, lock-washers, soldering lugs and other hardware.




*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

Wide Choice of Class C Tubes

★

Adjustable Excitation

★

Adjustable Loading

★

Multi-Match Modulator

## High Efficiency with Adjustable Loading

THIS 400 watt phone transmitter has the same construction and superior features of the transmitter shown on pages 24, 25 and 26. It is suitable for operation on all bands from 160 to 10 meters. It is easily driven by any exciter having an output of 20 watts; an ideal exciter for this transmitter is the Thordarson 40 Watt Band-Switch Exciter.

The transmitter is supplied with panels finished in black wrinkle, and the chassis and chassis mounting brackets are in gray flat enamel.

### RF Section:

The unusual mechanical construction of the RF Section results in improved electrical performance. Flexible shafts are used to couple the grid and plate tuning condensers to the panel controls. The tubes used in the RF section are Heintz and Kaufman HK-54's or Taylor T-55's. The HK-54's require a T-19F85 filament transformer, and the T-55's, a T-19F94 filament transformer. Holes are provided on the chassis for either of these types.

A swinging link which couples the plate tank coil to the antenna, permits the amateur to adjust the loading of the final stage to the desired power input. For 400 watts input, the Class C plate current is 267 MA at 1500 volts. A plate efficiency of between 75% and 80% may be obtained when the transmitter is in proper adjustment.

The grid tank coils are the plug-in type, having link coupling to the exciter. The coils for the 80, 40, 20 and 10 meter bands have semi-fixed swinging links, and the 160 meter coil has a fixed link. Excitation should be adjusted so that the total grid current for both Class C tubes is 40 MA. The value of the grid resistor used with the HK-54's is 3750 ohms; with the T-55's, 5000 ohms.

Since the RF unit was designed primarily for phone operation, no attempt was made to install a fixed bias supply on the RF chassis. However, for CW, provision has been made on the terminal board for the connection of an external bias supply. About 45 volts of bias is required to hold the tubes at their rated dissipation with no excitation. When external bias is not used terminals No. 1 and No. 2 are connected together. If external bias is used, the negative of the bias supply connects to terminal No. 1 and the positive to No. 2.

Both the grid and the plate currents are metered. The meters are in the cathode return leads, thus placing both meters at a low DC potential with respect to the chassis, and thereby avoiding any possibility of flash-overs from the meter terminals to the pilot lamp mounting and any likelihood of deflection of the movements due to electrostatic effects.

### Modulator:

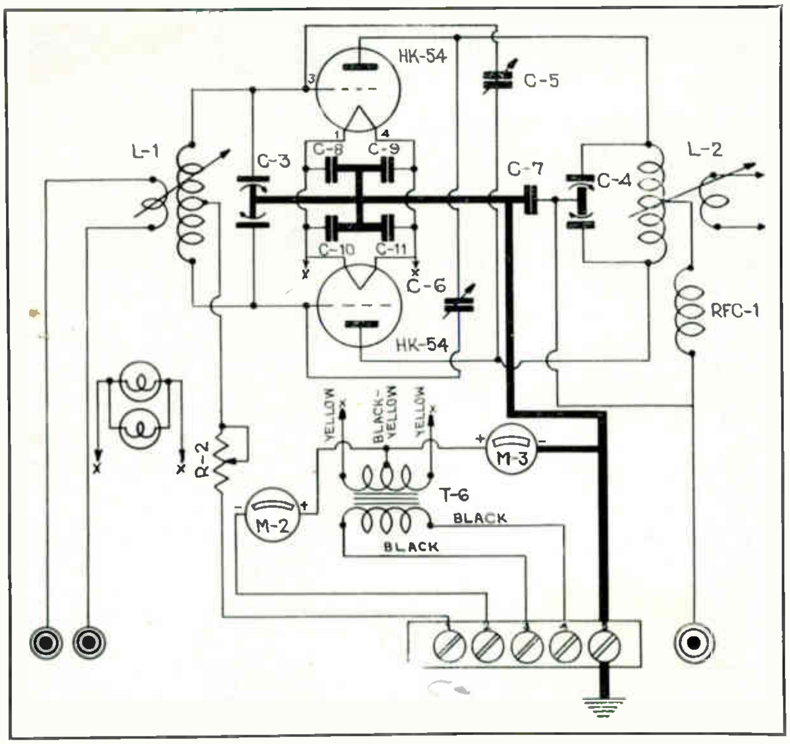
The modulator, using 811's with 1500 volts on the plates, has a power output of 200 watts. The no-signal plate current for two tubes is about 70 MA. With a 200 watt sine-wave output the plate current rises to 217 MA. For speech signals of sufficient magnitude to modulate the Class C stage 100%, the average plate current is about 125 MA. The modulation transformer, as well as the driver transformer, is of the Multi-Match type so that a large variety of Class C loads and sources of driving power may be accommodated. The primary of the driver transformer is designed to couple from a "500 ohm" line. Very little driving power (3.5 watts) is needed to obtain

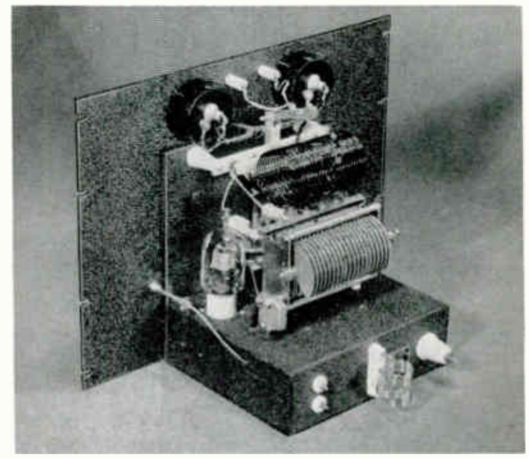
200 watts output; thus the large excess of power output capability of the usually chosen pair of 2A3's serving as driver tubes can be turned to good advantage in obtaining a driving voltage of exceptionally good regulation. The plate-to-plate load on the modulator tubes is 15,500 ohms.

**Power Supply:**

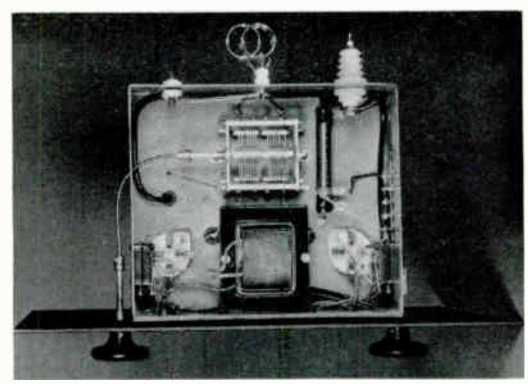
The power supply for this transmitter uses two 866's and has a rating of 500 MA at 1500 volts DC. On its 14" panel are mounted two switches: one for controlling filaments and the other for controlling the plate transformer. Having well insulated line terminals and high voltage terminals mounted on the rear apron of the chassis, the power supply matches in appearance and construction the modulator and RF units with which it was designed to operate. Its simplicity and completeness make it an excellent general purpose power supply.

## RF Section



RF Chassis View



RF Bottom View

## RF Section Parts Required

**THORDARSON TRANSFORMER**

| | | |
|---|---|---|
| T-6 | T-19F99 | Filament Transformer |

**Resistor:**

| | |
|---|---|
| R-2 | 4,000 Ohm 50 Watt Wirewound Ohmite Semi-Variable or Equivalent |

**Condensers:**

| | |
|---|---|
| C-3 | 150-150 Mmfd. Variable Condenser, Cardwell MR-150-BD or Equivalent |
| C-4 | 165-165 Mmfd. Variable Condenser, Cardwell XP-165-KD or Equivalent |
| C-5 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-6 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-7 | .001 Mfd. 3,500 Volt Mica Condenser Aerovox 1653 or Equivalent |
| C-8 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-9 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-10 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |
| C-11 | .002 Mfd. 1,000 Volt Mica Condenser CD4-6D2 or Aerovox 1455 |

**Tubes:**

| | |
|---|---|
| 2 | HK-54 Tubes |

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 8½" x 10" x 3" |
| 1 | | Panel 19" x 14" |
| 1 | | Sub-Panel |
| 1 | | Terminal Board |
| 4 | | Bushings |
| 3 | | Feed-thru Insulators |
| 2 | | 4-Contact Isolantite Sockets |
| 2 | | Stand-off Insulators |
| 2 | | Shaft Couplings, National TX-11 or Equivalent |
| 1 | | Shaft Coupling, Johnson #252 or Equiv. |
| 2 | | Panel Bearing Assemblies, Johnson #256 or Equivalent |
| 1 | M-2 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 1 | M-3 | 0-300 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 2 | | Control Wheels, Complete, Coto CI-45 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP GRID" Coto CI-47 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP PLATE" Coto CI-47 or Equivalent |

**Misc. Parts: (Cont'd)**

| | | |
|---|---|---|
| 1 | | Coil Socket, National Type XB-16 or Equivalent |
| 1 | L-1 | 160 Meter Coil, National Type AR16-160C or Equivalent |
| 1 | L-1 | 80 Meter Coil, National Type AR16-80S or Equivalent |
| 1 | L-1 | 40 Meter Coil, National Type AR16-40S or Equivalent |
| 1 | L-1 | 20 Meter Coil, National Type AR16-20S or Equivalent |
| 1 | L-1 | 10 Meter Coil, National Type AR16-10S or Equivalent |
| 1 | L-2 | Swinging Link & Jack Bar Assembly, B-W Type TV or Equivalent |
| 1 | L-2 | 160 Meter Coil, B-W 160 TVL or Equiv. |
| 1 | L-2 | 80 Meter Coil, B-W 80 TVL or Equiv. |
| 1 | L-2 | 40 Meter Coil, B-W 40 TVL or Equiv. |
| 1 | L-2 | 20 Meter Coil, B-W 20 TVL or Equiv. |
| 1 | L-2 | 10 Meter Coil, B-W 10 TVL or Equiv. |
| 2 | | Grid Grips, National Type 12 or Equiv. |
| 1 | RFC-1 | RF Choke, National Type R-154U or Equivalent |

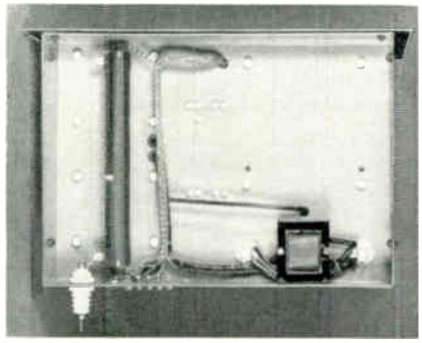
Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 400 Watt Transmitter

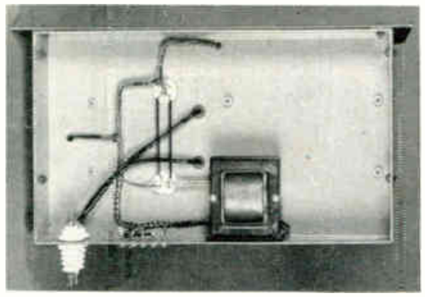
## Modulator and Power Supply

Modulator



Bottom View of Power Supply

Power Supply



Bottom View of Modulator

### Modulator Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-3 | T-19F99 | Filament Transformer |
| T-4 | T-19D05 | Driver Transformer |
| T-5 | T-19M17 | Modulation Transformer |

**Tubes:**

2 811 Tubes

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | M-1 | 0-300 MA DC Meter, 3" Square Case Triplett 327-A or Equivalent |
| 1 | | Punched Chassis 17" x 10" x 3" |
| 1 | | Panel 19" x 10½" |
| 1 Pr. | | Chassis Mounting Brackets |
| 2 | | Feed-thru Insulators |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers, grommets and other hardware.

### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P64 | Plate Transformer |
| CH-1 | T-19C37 | Input Choke |
| CH-2 | T-19C44 | Smoothing Choke |

**Resistor:**

R-1 40,000 Ohm 200 Watt Wirewound Resistor, Ohmite 1370 or Equivalent

**Condensers:**

C-1 2 Mfd. 2,000 Volt Condenser GE #23F31 or Equivalent
C-2 2 Mfd. 2,000 Volt Condenser GE #23F31 or Equivalent

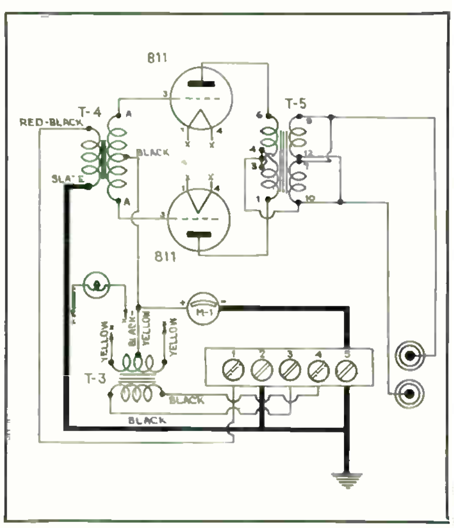
**Tubes:**

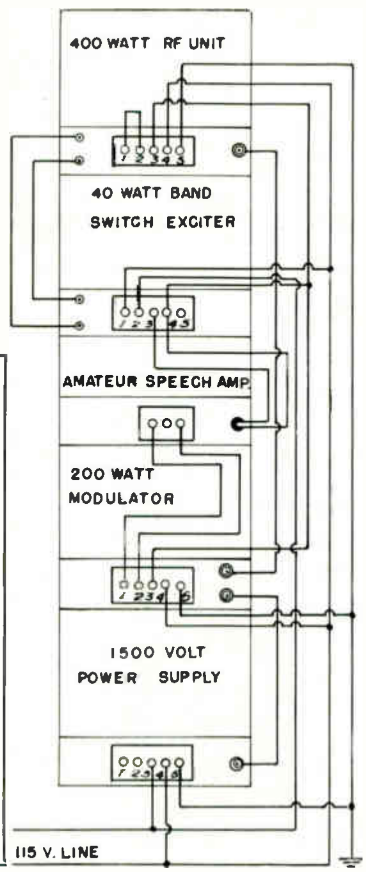
2 866 Tubes

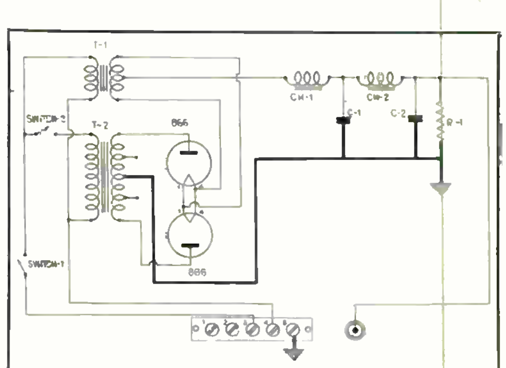
**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | SW-1 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 | SW-2 | Switch, Arrow H & H Type HDT or Equivalent |
| 1 | | Punched Chassis 17" x 12" x 3" |
| 1 | | Panel 19" x 12¼" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Terminal Board |
| 2 | | 4-Contact Sockets, Steatite |
| 1 | | Feed-thru Insulator |
| 2 | | Isolantite Plate Caps |

Miscellaneous nuts, bolts, lock-washers and other hardware.




*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

# 600 Watt Transmitter

Completely Relay Controlled

★

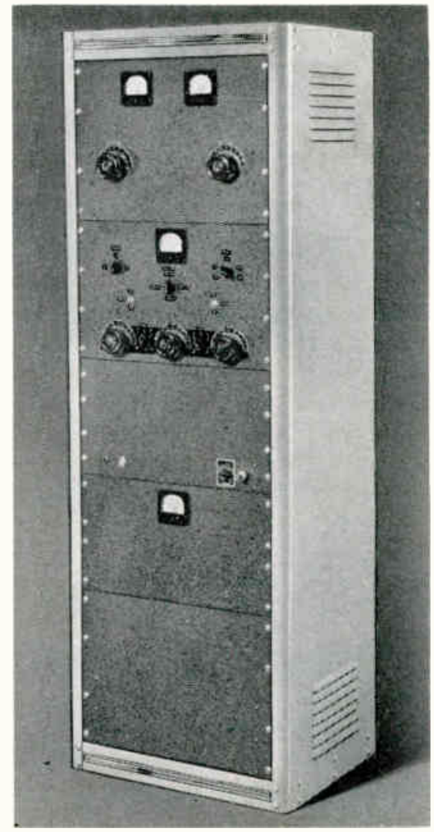
Under Excitation Protection

★

High Quality Audio System

★

Multi-Match Modulator



THIS transmitter consists of a Class C amplifier of 600 watts input, a modulator capable of delivering 300 watts of audio frequency power and a 1750 volt power supply of sufficient capacity to furnish the current required by both the RF stage and the modulator. Operation may be obtained on all five amateur bands from 160 to 10 meters. Relay switching is incorporated in this transmitter, thus not only permitting complete control of the transmitter with a single switch but also protecting the Class C amplifier from underexcitation and preventing the possibility of abuse to the modulation transformer by underloading it.

The Class C amplifier may be operated with any one of three types of tubes, namely Taylor TW-150's, Eimac 100TH's or Heintz and Kaufman HK-254's. The modulator tubes are Taylor 805's, and the rectifier tubes are 866's.

The panels are supplied in a black wrinkle finish; and the chassis, chassis mounting brackets and other small metal fixtures in a gray flat enamel.

**RF Unit:**

The Class C amplifier circuit is of the conventional push-pull type operating with 600 watts input at 1750 volts. It requires from 30 to 40 watts of driving power. The Thordarson 120 watt Band-Switch Exciter or the Thordarson 100 Watt Multi-Band Transmitter are ideal exciters. These units are described on pages 18 and 20. Plate and grid coils are of the plug-in type with a swinging link and jack bar assembly, thus permitting close adjustment of grid excitation and plate loading. Provision is made on the chassis for using either the UX sockets required by the TW-150's and the 100TH's, or the 50 watt sockets needed for use with HK-254's. The grid resistor is of the semi-variable type so that the correct bias requirements for various tubes may be met. The plate tuning condenser is of the split-stator type, having each stator section divided into two parts. This permits a very favorable L/C ratio to be obtained on all bands. The coils specified for the plate tank circuit have such a base construction that the correct stator combination is automatically obtained on each band when the coil is plugged in.

With 600 watts input the Class C plate current is 343 MA at 1750 volts. Plate efficiencies on the order of 75% are easily obtainable. When the amplifier is unloaded the plate current at resonance dips to about 25 MA on the 160, 80 and 40 meter bands; and to about 40 and 50 MA when operation is on the 20 and 10 meter bands respectively. The grid current is about 100 MA (for two tubes), and the grid resistor should be adjusted to about 1200 ohms.

**Modulator:**

The modulator has a "500 ohm" input and can be easily driven by the Thordarson Amateur Speech Amplifier. A rectified AC bias supply is installed on the modulator chassis. It uses a type 83 tube, which furnishes 20 volts of bias. This bias not only prevents the plate dissipation of the 805's from rising to an abnormal value during periods of no-signal but also tends to reduce distortion in the output of the modulator.

With no-signal on the grids of the 805's the plate current (two tubes) is about 80 MA. This current rises to 345 MA with a sine wave signal of magnitude sufficient to cause 100%

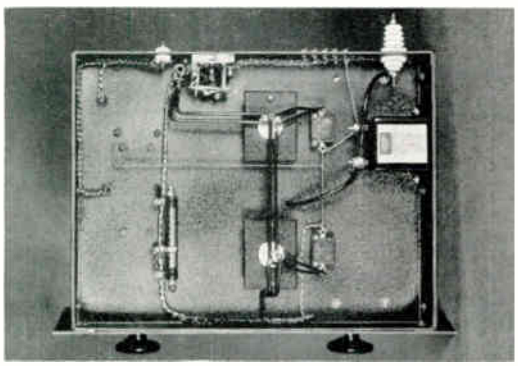
modulation, but for speech the same degree of modulation can be obtained when the modulator current rises to about 150 MA.

When the "500 ohm" input to the modulator grids is supplied by a Thordarson Amateur Speech Amplifier, the driver transformer ratio should be 1 to 1.4, primary to half the secondary. The turns ratio of the modulation transformer is 1.4 to 1, and the plate-to-plate load on the modulators is 10,000 ohms.

The driver and modulation transformers are of the Multi-Match type so that not only may a variety of Class C loads be accommodated but also different driving tubes may be used.

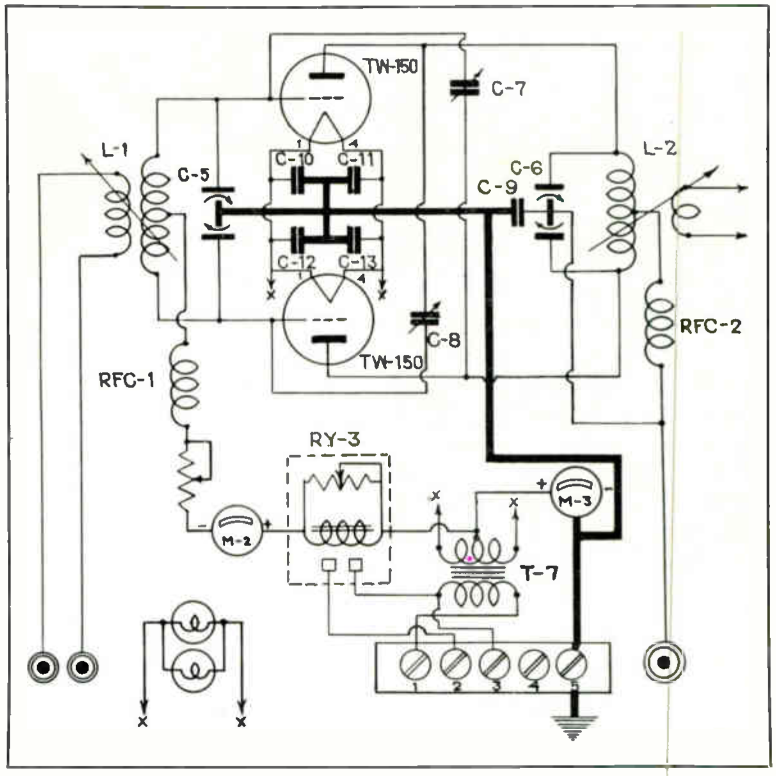
*(Continued on Page 31)*

RF Chassis View



RF Bottom View

## RF Section




## RF Section Parts Required

**THORDARSON TRANSFORMER**

| | | |
|---|---|---|
| T-7 | T-74F23 | Filament Transformer |

**Resistor:**

| | |
|---|---|
| R-3 | 2,500 Ohm 50 Watt Semi-Variable Resistor, Ohmite or Equivalent |

**Condensers:**

| | |
|---|---|
| C-5 | 260-260 Mmfd. Variable Condenser, Cardwell MR-260-BD or Equivalent |
| C-6 | 160-160 Mmfd. Variable Condenser, Cardwell XE-160-70-XQ or Equivalent |
| C-7 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-8 | Neutralizing Condenser, Hammarlund N-10 or Equivalent |
| C-9 | .001 Mfd. Mica Condenser, CD-21C-86 or Equivalent |
| C-10 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-11 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-12 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |
| C-13 | .002 Mfd. Mica Condenser, CD-4-6D2 or Aerovox 1455 |

**Tubes:**

TW-150 or HK-254 or 100TH

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | | Punched Chassis 17" x 13" x 2½" |
| 1 | | Panel 19" x 14" |
| 1 | Pr. | Chassis Mounting Brackets |
| 2 | | Socket Mounting Plates |
| 4 | | Condenser Mounting Brackets |
| 2 | | Coil Mounting Brackets |
| 8 | | Bushings |
| 1 | | Feed-thru Bushing |
| 2 | | Feed-thru Insulators |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | 50 Watt Sockets |
| 4 | | Grid Grips |
| 4 | | Cone Insulators |
| 1 | RY-3 | SPST Underload Relay, Ward-Leonard 507-514A or Equivalent |
| 1 | M-2 | 0-200 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327A or Equivalent |
| 1 | M-3 | 0-500 MA DC Meter, 3" Square Case Rear Illumination, Triplett #327A or Equivalent |
| 1 | L-1 | Swinging Link & Jack Bar Assembly, B-W Type BVL or Equivalent |
| 1 | L-1 | 160 Meter Coil, B-W Type 160 BVL or Equivalent |
| 1 | L-1 | 80 Meter Coil, B-W Type 80 BVL or Equivalent |
| 1 | L-1 | 40 Meter Coil, B-W Type 40 BVL or Equivalent |

**Miscellaneous Parts: (Cont.)**

| | | |
|---|---|---|
| 1 | L-1 | 20 Meter Coil, B-W Type 20 BVL or Equivalent |
| 1 | L-1 | 10 Meter Coil, B-W Type 10 BVL or Equivalent |
| 1 | L-2 | 160 Meter Coil, B-W Type 160 TVH or Equivalent |
| 1 | L-2 | 80 Meter Coil, B-W Type 80 TVH or Equivalent |
| 1 | L-2 | 40 Meter Coil, B-W Type 40 TVH or Equivalent |
| 1 | L-2 | 20 Meter Coil, B-W Type 20 TVH or Equivalent |
| 1 | L-2 | 10 Meter Coil, B-W Type 10 TVH or Equivalent |
| 1 | L-2 | Swinging Link & Jack Bar Assembly, B-W Type TVH or Equivalent |
| 1 | RFC-1 | RF Choke, National Type R-100-U or Equivalent |
| 1 | RFC-2 | RF Choke, National Type R-154 or Equivalent |
| 2 | | 4" Shaft Extensions, Yaxley RS-242 or Equivalent |
| 2 | | 2¼" Control Wheels, Coto CI-45 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP GRID," Coto CI-47 or Equivalent |
| 1 | | Indicator Plate Marked "PWR AMP PLATE," Coto CI-47 or Equivalent |

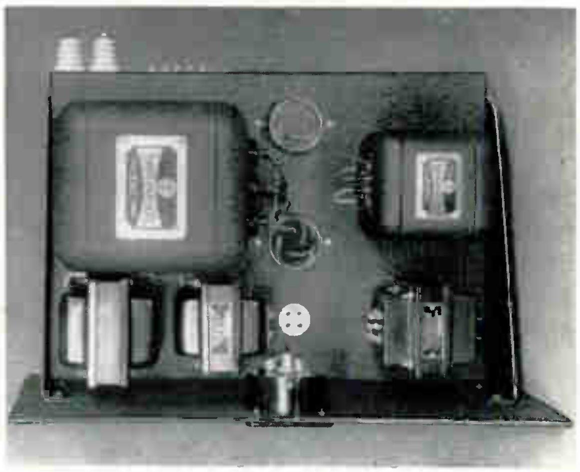
Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.

*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*

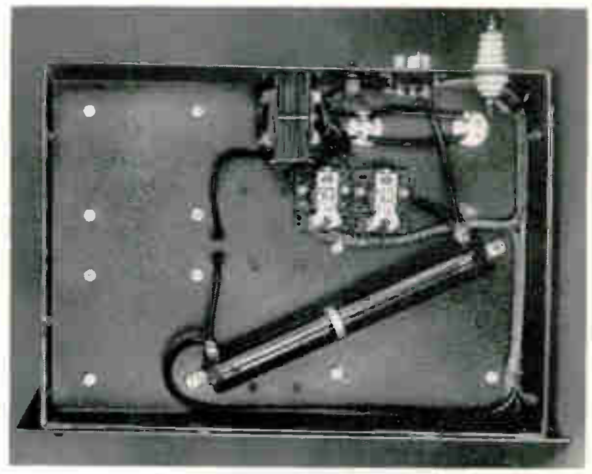
## Modulator and Power Supply

Modulator

Power Supply



Top View of Modulator



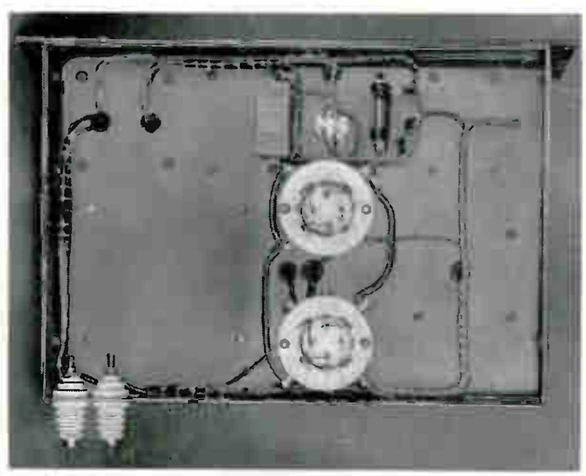
Bottom View of Power Supply

**Power Supply:**

FOR BOTH the convenience of the operator and the protection of the equipment, relay switching was chosen. When the filament switch on the exciter is closed, RY-1 closes, causing the application of voltage to the speech amplifier and the filaments of the rectifiers, modulator tubes and Class C amplifier tube. In addition, this operation places bias voltage on the modulator grids and prepares RY-2 for closing. Turning on the plate switch of the exciter results in the grid current in the Class C amplifier closing RY-3, which in turn causes RY-2 to apply primary voltage to the plate transformer. The opening of SW-1 prevents the operation of RY-2 even though RY-3 may be closed. This feature makes neutralizing convenient, and in addition affords more protection to the operator.

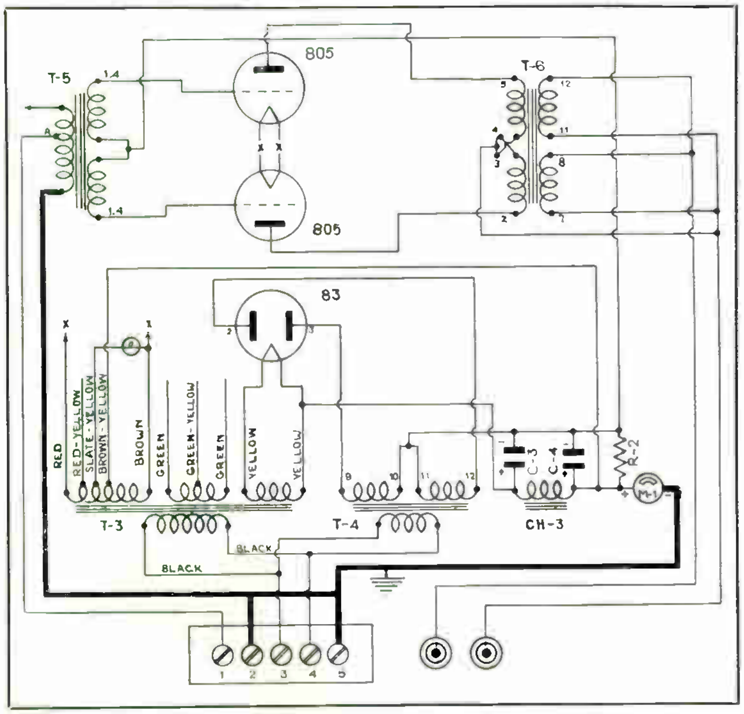
For CW operation it is only necessary to place a jumper between terminals 2 and 3 at the back of the RF chassis and insert a 22.5 volt battery at point A.

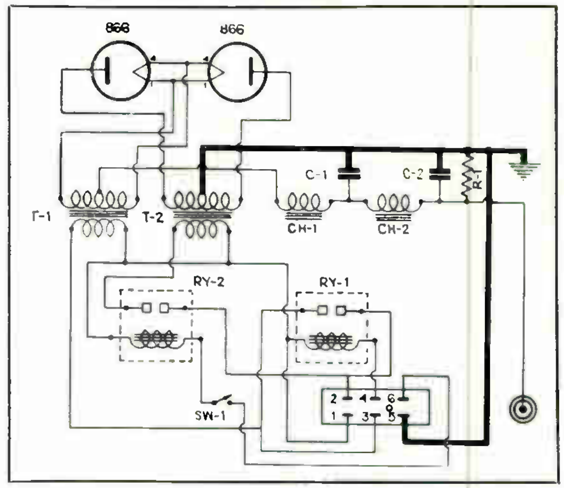
Since the power supply is rated at 1750 volts at 500 MA, 700 watts CW operation may be carried on by operating with a Class C plate current of 400 MA.



Bottom View of Modulator

## Modulator and Power Supply




### Power Supply Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-1 | T-19F90 | Filament Transformer |
| T-2 | T-19P66 | Plate Transformer |
| CH-1 | T-19C38 | Choke |
| CH-2 | T-19C45 | Choke |

**Resistor:**

R-1 75,000 Ohm 200 Watt Wirewound Resistor, Ohmite No. 0924 or Equivalent

**Condensers:**

C-1 2 Mfd. 2000 Volt Condenser, Mallory TX-811 or Equivalent

C-2 2 Mfd. 2000 Volt Condenser, Mallory TX-811 or Equivalent

**Tubes:**

2 866 Tubes

**Miscellaneous Parts:**

| | | |
|---|---|---|
| 1 | RY-1 | Relay, SPST, Ward-Leonard No. 507-510 or Equivalent |
| 1 | RY-2 | Relay, SPST, Ward-Leonard No. 507-518 or Equivalent |
| 1 | SW-1 | SPST Switch N.P., Arrow H and H No. 20992 or Equivalent |
| 1 | | Punched Chassis 17" x 13" x 2½" |
| 1 | | Panel 19" x 14" |
| 1 Pr. | | Chassis Mounting Brackets |
| 1 | | Switch Plate |
| 2 | | 4-Contact Sockets, Steatite |
| 2 | | Isolantite Plate Caps |
| 1 | | Lead-in Bushing |
| 1 | | 6-Contact Socket |
| 1 | | 6-Prong Plug |

Miscellaneous screws, nuts, bolts, lock-washers required hook-up wire and other hardware.

### Modulator Parts Required

**THORDARSON TRANSFORMERS and CHOKES**

| | | |
|---|---|---|
| T-3 | T-19F77 | Filament Transformer |
| T-4 | T-19R31 | Bias Transformer |
| T-5 | T-15D82 | Driver Transformer |
| T-6 | T-11M77 | Modulation Transformer |
| CH-3 | T-19C42 | Filter Choke |

**Resistor:**

R-2 100 Ohm 25 Watt Semi-Variable Resistor Ohmite #0368 or Equivalent

**Condensers:**

C-3, C-4 Double 16 Mfd. 250 Volt Condenser Aerovox Type PBS or Equivalent

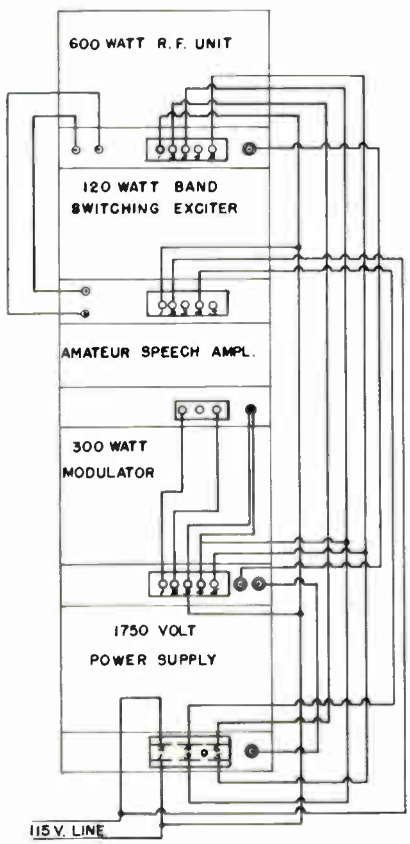
**Tubes:**

| | | |
|---|---|---|
| 1 | 83 | Tube |
| 2 | 805 | Tubes, Taylor or Equivalent |

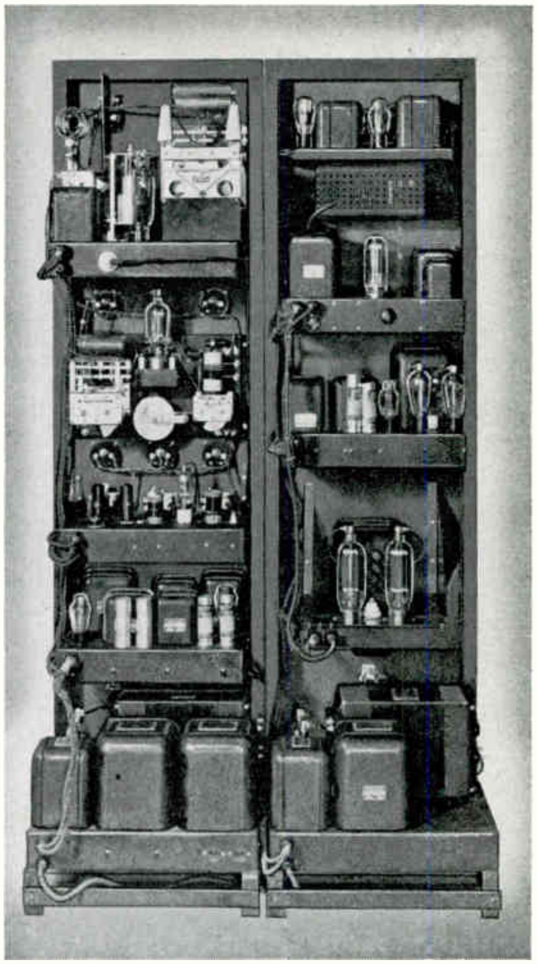
**Miscellaneous Parts:**

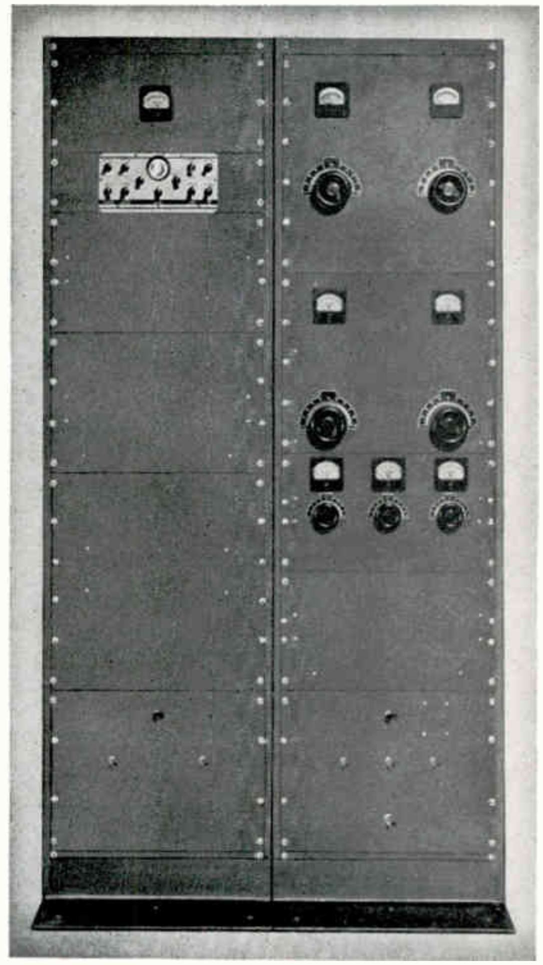
| | |
|---|---|
| 1 | 0-500 MA DC Meter, 3" Square Case, Rear Illumination, Triplett #327-A or Equivalent |
| 1 | Punched Chassis 17" x 12" x 2½" |
| 1 | Panel 19" x 10½" |
| 1 Pr. | Chassis Mounting Brackets |
| 4 | Bushings |
| 1 | Terminal Board |
| 2 | 50 Watt Sockets |
| 1 | 4-Contact Socket, Steatite |
| 2 | Lead-in Bushings |
| 2 | Grid Grips |

Miscellaneous screws, nuts, bolts, lock-washers, required hook-up wire and other hardware.




*Circuit diagram, drawings and full size template of chassis available from Thordarson 15 cents net each, postpaid.*





HERE is a conservatively rated transmitter which is designed to handle the maximum allowable input of 1 kilowatt. The transmitter is built up in two racks, one containing the R.F. section with associated power supplies and the other the speech equipment, drivers, modulators, and necessary power equipment.

The exciter unit is built up on a separate chassis. Three stages are provided so that there is ample excitation on all bands. It may be found necessary to neutralize the 6L6 and the RK-39, especially if they are operated as straight buffers on the higher frequencies. These neutralizing condensers (NC-1, NC-2) may consist simply of a few turns of twisted wire. The RK-39 is link coupled to the T125 buffer; this stage should always be operated as a straight amplifier and all doubling should be done in the preceeding low power stages. The buffer in turn is link coupled to the final stage, which consists of a pair of T-200's in push-pull. The plate voltage is 2500 volts and the plate current 400 M.A.; the grid current should be 125 M.A.

No pre-amplifier is incorporated in the transmitter proper. It is far more desirable, both from the standpoint of convenience and performance, to place the low level speech stages some distance from the transmitter. The impedance of the speech input is 500 ohms and the level appriximately zero db. The first stage consists of a pair of 6F6's, triode connected, which provide ample grid swing for the 845's. The 845 drivers operate at 1250 volts, and the necessary bias is obtained from a resistor in the filament return. The 822 modulators operate at 2000 volts and provide ample power to modulate the 1 kilowatt input.

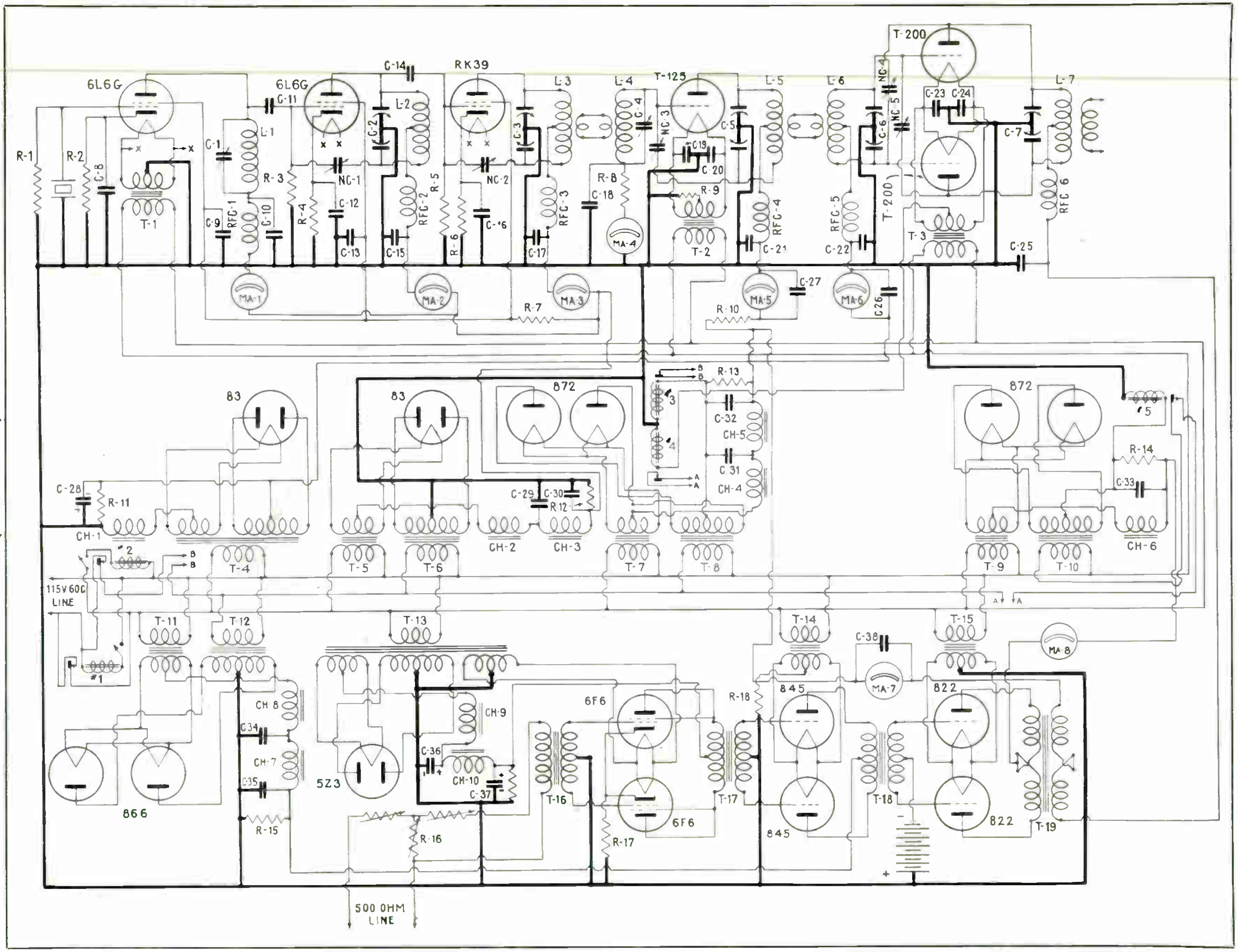
An important feature of high power equipment which has not been overlooked is the installation of an underload and two overload relays.

The underload relay is so connected that the Class C current must be 250 M.A. before the modulator plate supply is turned on. Possible damage to the modulation transformer is avoided in the event that excitation to the final fails with a signal applied to the modulators. If the current of either the Class C stage or the buffer should become excessive, the overload relay will automatically turn off all plate supplies. Another overload relay is installed in the modulator plate supply, however this relay controls only the modulators. In order to simplify operation, relays are also used to control the filaments and plate supplies. The wiring is so arranged that it is impossible to turn on the plate supplies without having the filament relay closed. This relay operation of both filament and plate supplies enables the transmitter to be controlled from the operating table simply by extending the light leads connected to the relay switches.

The correct bias for the 822 modulators is —67.5, and this is shown as battery bias in the diagram, although in the photograph an experimental bias supply is shown. This bias supply has not yet been fully developed and it is felt that it should be with-held until its performance is proven satisfactory.

The pre-amplifier is shown on page 37. It is mounted in a metal cabinet and if remote control is desired the filament and plate relay switches may be mounted on this panel.

# 1000 Watt Transmitter
(CONTINUED)




TRANSFORMER SPECIALISTS SINCE 1895

THORDARSON

# 1000 Watt Transmitter

(CONTINUED)

## Parts Required

**Thordarson Transformers and Chokes**

| | | | |
|---|---|---|---|
| T-1 | T-19F97 | CH-1 | T-15C36 |
| T-2 | T-19F95 | CH-2 | T-15C36 |
| T-3 | T-11F51 | CH-3 | T-15C45 |
| T-4 | T-15R60 | CH-4 | T-15C39 |
| T-5 | T-19F91 | CH-5 | T-15C48 |
| T-6 | T-15P11 | CH-6 | T-15C39 |
| T-7 | T-11F54 | CH-7 | T-15C45 |
| T-8 | T-15P21 | CH-8 | T-15C36 |
| T-9 | T-11F54 | CH-9 | T-15C36 |
| T-10 | T-15P21 | CH-10 | T-15C45 |
| T-11 | T-19F89 | | |
| T-12 | T-15P15 | | |
| T-13 | T-15R03 | | |
| T-14 | T-19F96 | | |
| T-15 | T-11F51 | | |
| T-16 | T-15A67 | | |
| T-17 | T-15D76 | | |
| T-18 | T-18D19 | | |
| T-19 | T-11M78 | | |

**Resistors:**

| | |
|---|---|
| R-1 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-2 | 200 Ohm 10 Watt Ohmite or Equiv. |
| R-3 | 10,000 Ohm 10 Watt Ohmite or Equiv. |
| R-4 | 200 Ohm 10 Watt Ohmite or Equiv. |
| R-5 | 10,000 Ohm 10 Watt Ohmite or Equiv. |
| R-6 | 50 Ohm 10 Watt Ohmite or Equiv. |
| R-7 | 5,000 Ohm 25 Watt Ohmite or Equiv. |
| R-8 | 2,000 Ohm 25 Watt Ohmite or Equiv. |
| R-9 | 2,000 Ohm 50 Watt Ohmite or Equiv. |
| R-10 | 10,000 Ohm 50 Watt Ohmite or Equiv. |
| R-11 | 1,000 Ohm 75 Watt Ohmite or Equiv. |
| R-12 | 25,000 Ohm 50 Watt Ohmite or Equiv. |
| R-13, R-14 | 100,000 Ohm 200 Watt Ohmite or Equiv. |
| R-15 | 50,000 Ohm 100 Watt Ohmite or Equiv. |
| R-16 | 500 Ohm 25 Watt T Pad Utah or Equiv. |
| R-17 | 750 Ohm 10 Watt Ohmite or Equiv. |
| R-18 | 2,000 Ohm 50 Watt Ohmite or Equiv. |

**CONDENSERS**

**Variable Condensers**

| | |
|---|---|
| C-1 | 150 Mmfd. Cardwell MR150BS or Equiv. |
| C-2, C-3 | 260 Mmfd. Cardwell MR260BD or Equiv. |
| C-4 | 150 Mmfd. National TMC150 or Equiv. |
| C-5 | 100 Mmfd. National TMA100DA or Equiv. |
| C-6 | 200 Mmfd. National TMC200D or Equiv. |
| C-7 | 200 Mmfd. National TMC200DA or Equiv. |

**Fixed Condensers:**

| | |
|---|---|
| C-8 to C-10 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-11 | .0001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-12, C-13 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-14 | .0001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-15 to C-20 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-21 | .001 Mfd. 5000 Volt Mica Aerovox 1652 or Equiv. |
| C-22 to C-24 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-25 | .001 Mfd. 10,000 Volt Mica Aerovox 1654 or Equiv. |
| C-26, C-27 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |
| C-28 | 16 Mfd. 450 Volt Elec. Aerovox G475 or Equiv. |
| C-29, C-30 | 2 Mfd. 1000 Volt Aerovox 1010 or Equiv. |
| C-31 to C-33 | 2 Mfd. 3000 Volt Aerovox 3009 or Equiv. |
| C-34, C-35 | 2 Mfd. 2000 Volt Aerovox 2009 or Equiv. |
| C-36, C-37 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |
| C-38 | .001 Mfd. 1000 Volt Mica Aerovox 1450 or Equiv. |

**Neutralizing Condensers:**

| | |
|---|---|
| NC-1 | See note in copy |
| NC-2 | See note in copy |
| NC-3 | 12 Mmfd. 8000 Volt National NC-150 or Equiv. |
| NC-4, NC-5 | 13 Mmfd. 12,000 Volt Johnson N375 or. Equiv. |

**Meters:**

| | |
|---|---|
| MA-1 | 0-100 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-2, MA-3 | 0-150 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-4 | 0-100 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-5 | 0-500 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-6 | 0-250 M.A. Simpson 27S (Illum.) or Equiv. |
| MA-7, MA-8 | 0-750 M.A. Simpson 27S (Illum.) or Equiv. |

**RF Chokes:**

| | |
|---|---|
| RFC-1 to RFC-3 | 125 M.A. National R100 or Equiv. |
| RFC-4 | 600 M.A. National R154U or Equiv. |
| RFC-5 | 125 M.A. National R100 or Equiv. |
| RFC-6 | 600 M.A. National R154U or Equiv. |

**Relays:**

| | |
|---|---|
| #1, #2 | Guardian B100 or Equiv. |
| #3 | Guardian L500 or Equiv. |
| #4 | Guardian (special) or Equiv. |
| #5 | Guardian L500 or Equiv. |

**Miscellaneous Parts:**

| | |
|---|---|
| 5 Pr. | Chassis Mounting Brackets |
| 4 | 3¼" Wheels Coto or Equiv. |
| 3 | 2¼" Wheels Coto or Equiv. |
| 3 | Coil Forms National XR-4 or Equiv. |
| 1 | Coil Assembly National UR-13 or Equiv. |
| 2 | Coils Coto-Coil 80 BTVL or Equiv. |
| 1 | Coil Coto-Coil 80 TVL or Equiv. |
| 11 | Sockets Johnson type 211 or Equiv. |
| 2 | C-1 Bases Coto-Coil 6BTLM or Equiv. |
| 1 | C-1 Base Coto-Coil 8TLM or Equiv. |
| 2 | Cone Insulators Johnson #604 or Equiv. |
| 4 | Bee Hive insulators Johnson #45 or Equiv. |
| 8 | Feed-thru insulators Johnson #42 or Equiv. |
| 4 | 1" Cone insulators Johnson #601 or Equiv. |
| 2 | Insulators National #GS-2 or Equiv. |
| 3 | Insulators National #GS-1 or Equiv. |
| 6 | SPST Toggle Switches H & H or Equiv. |
| 4 | Steatite Sockets Amphenol or Equiv. |
| 2 | Steatite Octal Sockets Amphenol or Equiv. |
| 23 | Bakelite Sockets Amphenol or Equiv. |
| 2 | Bakelite Octal Sockets Amphenol or Equiv. |
| 18 | Plugs Amphenol or Equiv. |
| 1 | Bakelite Knob |
| 14 | Large Grid Grips |

**Tubes:**

| | | | |
|---|---|---|---|
| 1 | RK39 | 1 | T-125 |
| 2 | T-200 | 4 | 872 |
| 2 | 866 | 2 | 83 |
| 1 | 5Z3 | 2 | 6F6 |
| 2 | 845 | 2 | 822 |

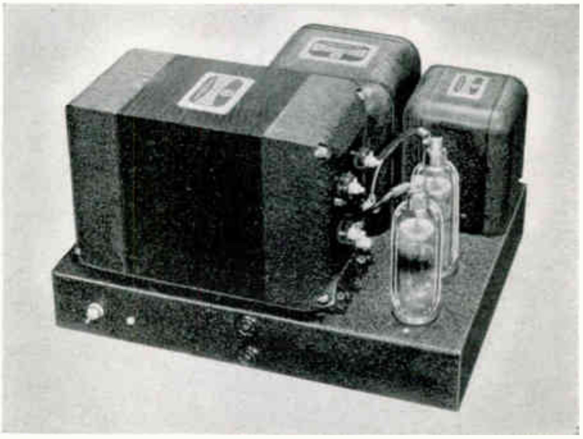
2 6L6-G or 6L6GX

*See page 37 for Pre-Amplifier*

**COIL DATA**

| BAND | 160 | 80 | 40 | 20 | 10 |
|---|---|---|---|---|---|
| L1, L2, L3, L4 | 40T #18 | 26T #16 | 12T #16 | 8T #16 | 3T #16 |
| L5, L6 | 36T #16 4⅛" Diam. | 34T #16 2⅞" Diam. | 22T #16 2⅞" Diam. | 16T #14 2⅞" Diam. | 4T #14 2⅞" Diam. |
| L7 | 42T #14 5⅛" Diam. | 30T #10 4⅛" Diam. | 20T #10 3¼" Diam. | 10T #10 3¼" Diam. | 4T #10 3¼" Diam. |
| Link for L3, L4, L5, L6 | 4T #18C.C. | 3T #18C.C. | 2T #18C.C. | 2T #18C.C. | 2T #18C.C. |

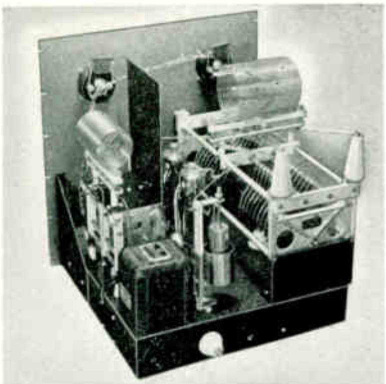
L1, L2, L3 wound on 1½" Diam. winding length 1¾". L4 wound on 1¾" Diam. winding length 2". Winding length of L5, L6, 4½". Winding length of L7, 6½".



MODULATOR POWER SUPPLY
Chassis: 20" x 15" x 3¼"; Panel: 14"

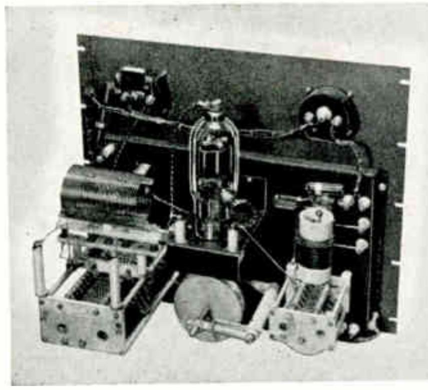
# 1000 Watt Transmitter

(CONTINUED)



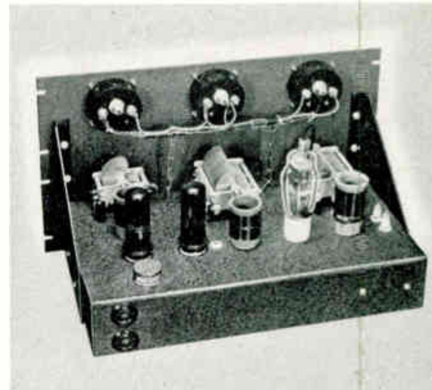
R. F. POWER AMPLIFIER

Chassis: 17" x 17" x 3"; Panel: 19¼"



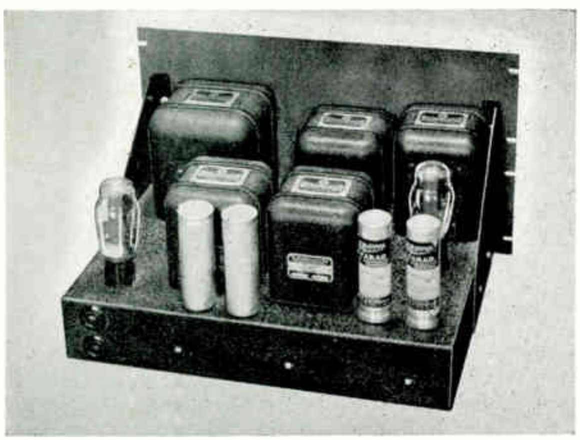
BUFFER

Chassis: 17" x 10" x 1"; Panel: 15¾"



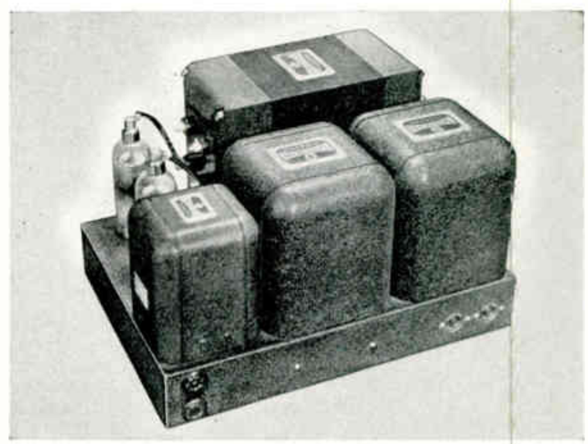
EXCITER UNIT

Chassis: 17" x 10" x 3"; Panel: 10½"



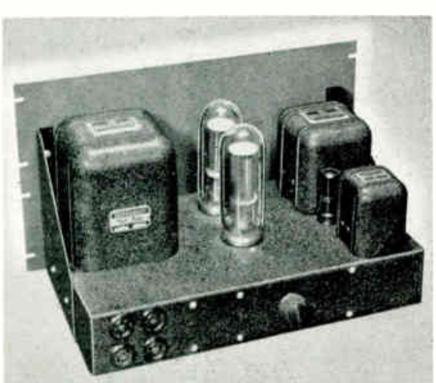
BIAS AND EXCITER POWER SUPPLIES

Chassis: 17" x 13" x 3"; Panel: 10½"



R.F. POWER SUPPLY

Chassis: 20" x 15" x 3¼"; Panel: 14"



DRIVER AND SPEECH AMPLIFIER

Chassis: 17" x 10" x 3"; Panel: 10½"

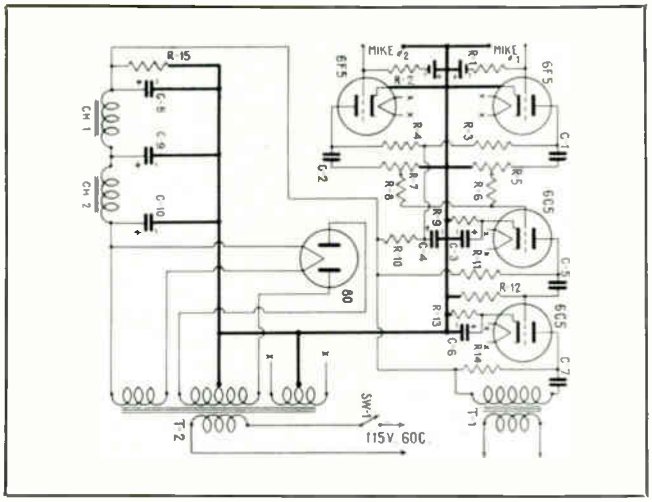
DRIVER AND SPEECH POWER SUPPLY

Chassis: 17" x 12" x 3"; Panel: 12¼"

CLASS B MODULATOR

Chassis: 13" w. x 13½" d.; Panel: 19¼"

# Transmitter Pre-Amplifier




**PRE-AMPLIFIER CHASSIS AND ASSEMBLY**
**Chassis: 17" x 10" x 3"; Case: 19" x 13" x 8¾"**

## PRE-AMPLIFIER PARTS REQUIRED

**Thordarson Transformers and Chokes:**

| | | | |
|---|---|---|---|
| T-1 | T-15A71 | CH-1 | T-13C26 |
| T-2 | T-70R78 | CH-2 | T-13C26 |

**Resistors:**

| | |
|---|---|
| R-1, R-2 | 5 Meg. ½ Watt IRC BT½ or Equiv. |
| R-3 | 100,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-4 | 100,000 Ohm 1 Watt Ohmite or Equiv. |
| R-5 | 500,000 Ohm Volume Control IRC or Equiv. |
| R-6 | 500,000 Ohm ½ Watt IRC BT½ or Equiv. |
| R-7 | 500,000 Ohm Volume Control IRC or Equiv. |
| R-8 | 500,000 Ohm ½ Watt IRC BT½ or Equiv. |
| R-9 | 2,000 Ohm 1 Watt Ohmite or Equiv. |

**Resistors: (Cont'd)**

| | |
|---|---|
| R-10 | 20,000 Ohm 1 Watt Ohmite or Equiv. |
| R-11 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-12 | 250,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-13 | 2,000 Ohm 1 Watt Ohmite or Equiv. |
| R-14 | 50,000 Ohm 1 Watt IRC BT1 or Equiv. |
| R-15 | 10,000 Ohm 25 Watt Ohmite or Equiv. |

**Condensers:**

| | |
|---|---|
| C-1, C-2 | .1 Mfd. 400 Volt paper Aerovox 484 or Equiv. |
| C-3 | 10 Mfd. 25 Volt Elect. Aerovox PB25 or Equiv. |
| C-4 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |
| C-5 | .1 Mfd. 400 Volt paper Aerovox 484 or Equiv. |

**Condensers: (Cont'd.)**

| | |
|---|---|
| C-6 | 10 Mfd. 25 Volt Elect. Aerovox PB25 or Equiv. |
| C-7 | .1 Mfd. 400 Volt Paper Aerovox 484 or Equiv. |
| C-8 to C-10 | 8 Mfd. 450 Volt Elect. Aerovox G475 or Equiv. |

**Miscellaneous Parts:**

| | |
|---|---|
| 2 | Mike Connectors Amphenol or Equiv. |
| 1 | Bakelite Socket Amphenol or Equiv. |
| 4 | Bakelite Octal Sockets Amphenol or Equiv. |
| 2 | Bakelite Knobs |
| 1 | Terminal Strip |

**Tubes:** 1-80, 2-6F5, 2-6C5

# Thordarson Technical Literature

**No. 333 — Amateur Radio . . . . . . . .75c Postpaid**
Mr. Fortune, Thordarson engineer and a prominent amateur radio enthusiast, spent over twelve months in preparing this text-book. There are approximately 160 pages, and matters covered include Learning the Code, Receiver Theory and Construction, Crystal Oscillator Transmitter, Two-stage Transmitter, Three-stage Transmitter, Construction of the Modulator and reference notes on receivers, inductance, capacity and many other electrical and radio terms. It is a book recommended to all experimenters, beginning amateurs and even to amateurs of long experience. Amateur net price 75c. Profusely illustrated with over 100 comprehensive photographs and drawings. Heavy cover finished in wear-resistant blue cloth, with attractive gold stamping. This is a cloth covered case bound text-book.

**No. 340 — Complete Transformer Manual 35c Postpaid**
The Thordarson Transformer Manual is a complete book, containing the Replacement Transformer Encyclopedia and Servicing Guide, the Transmitter Guide, and the Sound Amplifier Guide, plus current Thordarson catalogs. It is bound in a strong attractive blue and orange cover with loose-leaf arrangement, giving the user opportunity to keep the Manual up-to-date by adding later Thordarson releases. A book that has proven to be most popular in the technical library.

**No. 352—Replacement Encyclopedia, Service Guide, Free**
Thordarson Replacement Transformer Encyclopedia and Service Guide No. 352 recommends proper transformer and choke replacement for receivers listed in Rider's Manuals. This handy, useful time-saver, originated by Thordarson is now used by good service engineers the world over. In addition, it contains a new edition of the popular Service Guide giving practical solutions to everyday service problems, including useful charts and tables.

**No. 346 — Amplifier Guide . . . . 15c Postpaid**
P. A. men and experimenters interested in building high quality amplifiers find the Thordarson Amplifier Guide No. 346 a worthwhile source of information. It contains laboratory designed and tested circuits of amplifiers from 8 to 120 watts output. Complete parts list, mechanical chassis drawings, and comprehensive illustrations enable the constructor to obtain superior results with matched transformer and choke components. Data is included for pre-amplifiers, dual tone controls, speaker impedance matching and testing.

**No. 500 — Broadcast Components Catalog . . . Free**
Thordarson offers a complete line of transformers and chokes for broadcast use, each capable of meeting and surpassing the most rigid broadcast tolerances. These transformers are listed and described in the new Broadcast Catalog, No. 500. Broadcast stations, experimenters, laboratories or air craft stations are urged to secure a copy of this valuable listing.

**No. 600 — Amplifier Catalog . . . . . . . . . . Free**
The finest amplifiers are built by Thordarson — pioneers in producing quality audio components. Absolute fidelity is assured by accurate laboratory design and rigid inspection during production. New models from 8 to 900 watts satisfy practically every sound requirement. Pre-amplifiers and boosters round out a truly complete line of equipment for sound technicians. Fully described in Catalog 600.

**No. 400 — Complete Transformer Catalog . . . Free**
A catalog of transformers and reactors for every radio use. Contains full physical and electrical descriptions.

*Obtainable from your radio parts distributors or direct from factory.*

### Class B Audio Frequency Amplifiers

CLASS B modulators are usually used in transmitters having plate modulated Class C inputs of more than 50 or 60 watts. For audio frequency power outputs of more than 30 watts, the increased cost and size of tubes which can be used in Class A amplifiers, and the power supply components used to supply these tubes make Class B systems economically justifiable.

The principal differences between Class A and Class B audio amplifiers are as follows:

1. The plate dissipation of the tubes in a Class B amplifier increases with increasing signals and is a maximum at some level near full power output. In a Class A amplifier the plate loss of the tubes is a maximum at no-signal.
2. The excitation of a Class B amplifier is carried into the positive grid region of the tube characteristics, causing grid current to flow, with the resultant requirement that the source of audio frequency excitation is called upon to deliver an appreciable amount of power. Class A amplifiers, in general, are not designed to operate with a positive grid in any condition of normal excitation.
3. In a Class B amplifier the changing plate current requires better regulation of the power supply than does the Class A amplifier.
4. Class A amplifiers usually require negative bias on the grids. In many Class B amplifiers there are conditions of operation in which no bias is required.
5. Class B audio frequency amplification requires the use of two tubes, whereas Class A amplification can be obtained with one tube.

### Class B Audio Frequency Output Calculations

The amateur has many occasions in which it is desirable to have more data concerning the operation of given tubes in Class B service than are given by the tube manufacturers. The data which are given usually show typical operating characteristics at a given plate voltage, showing the plate load which delivers a given amount of power with nominal distortion, driving power, and tube losses.

In a particular installation there often arise circumstances in which operation in some condition other than the "typical" case is desirable. For example: (1) the plate supply voltage may be other than that listed; (2) more or less distortion may be tolerated; (3) greater tube losses may be permissible at full-signal or at no-signal; (4) the regulation of the source of driving voltage may be poor; (5) the voltage or power output capabilities of the driving source may be limited; (6) the output power requirements may be different; (7) the wave form of the signal may be unusual; (8) the operation may be intermittent; and (9) space and weight requirements may justify overloading.

So that the amateur may take full advantage of the possibilities of varying the plate load on his Class B tubes by changing connections on the Multi-Match modulation transformers, an example of Class B output calculations is shown below:

Suppose that a Class C amplifier of 330 watts input is to be 100% modulated by the tubes having the characteristics shown in Fig. 1. The plate

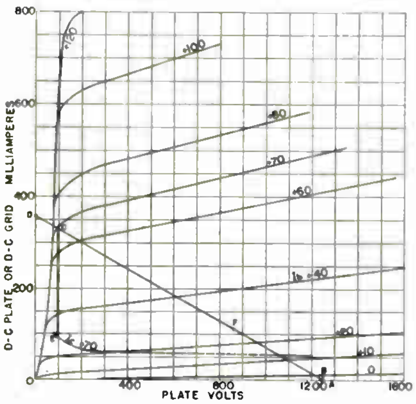



**Fig. 1**

supply voltage is 1250 V., the rated maximum tube dissipation is 40 watts, and the maximum plate current is 125 MA.

The audio frequency requirement is that 165 average watts of output power be delivered to the Class C stage. This figure is based on a sine wave signal. The maximum allowable power input to the modulator (two tubes) is 1250 x 0.125 x 2 = 312.5 watts. Thus an overall efficiency of at least

$$100 \times \frac{165}{312}$$

or 52.5% is required. This is not at all unreasonable for a Class B audio frequency stage; in an amplifier of power output capabilities of 150 watts an overall efficiency of 60 to 65% is easily obtainable.

Practice has shown that to allow for transformer losses and the deviation of tube characteristics from average values, the value of power delivered by the tubes as calculated from their average characteristics should be, for outputs of this order of magnitude, about 16% higher than the power required to be delivered from the secondary of the modulation transformer. In this case, the calculations should be based on a power output from the tubes of 165 x 1.16 or 192 watts output.

Since the maximum plate loss in a Class B amplifier occurs at a level slightly below maximum power output, an allowance of 35 average watts loss per tube at full signal is reasonable in this example. Considerable leeway may be taken with this in cases where speech waves of 330 watts peak power are required at the output of the modulation transformer. However, in this example, it is assumed that sine wave modulation will occur.

The power input to the two tubes at full-signal will then be the sum of power output and tube losses. This is 192 + (2 x 35) or 262 watts. A check now shows that the Class B plate efficiency, that is, the efficiency of conversion from DC energy supplied to the plate to audio frequency energy, is

$$100 \times \frac{192}{262} \text{ or } 73\%.$$

This is a reasonable value, for the maximum possible efficiency of a Class B stage is 78.5%.

For a power input of 262 watts at 1250 volts the direct current supplied is $\frac{\text{watts}}{\text{volts}}$ or $\frac{262}{1250}$ or 210 MA. The average current in each tube is half of this amount, or 105 MA. With the tubes biased to a value near cut-off, the shape of the current wave in each tube very nearly approximates that of a half-sine wave.

The average value of current in a series of half-sine wave pulses is 31.8% of the peak value of the current. Therefore, the peak value of the current in the tube is $\frac{105}{0.318}$ or 330 MA.

At the time the peak power occurs, only one of the two modulator tubes is working, and, therefore, it alone is delivering this power. The peak power is twice the average AC power developed or 2 x 192 or 384 watts. The peak AC voltage across the load is

$$\frac{\text{peak watts}}{\text{peak current}} = \frac{384}{0.330} = 1160 \text{ volts.}$$

The AC load on the tube is the peak voltage divided by the peak current or $\frac{1160}{0.330} = 3500$ ohms. On the family of curves shown in figure 1, the oblique straight line AD is known as the load line. It is a plot of the instantaneous voltage and current relations for one Class B tube when working into a resistive load of 3500 ohms. The location of the line is found by locating any two sets of simultaneous values of plate voltage and plate current. The value of 1160 peak volts across the load and 330 MA in the tube corresponds to a value of 1250 — 1160 or 90 volts across the tube. Thus $e = 90$ volts and $i = 330$ MA is one set of points. It is located at point C. Then, knowing the load, any other set of points can be found. At one-ninth power output the peak current and the peak voltage are one-third of that occurring at full power output. At this power level, then, the peak current is 110 MA, and the peak voltage across the load is $\frac{1160}{3}$ or 387. This corresponds to a peak voltage across the tube of 1250 — 387 or 863 V. Thus another point on the load line is $e = 863$ volts and $i = 110$ MA. This point is shown at F. A straight line through C and F locates the load line.

A simpler way of locating the load line is to draw a line through the point 1250 volts on the abscissae axis, which is shown at point A, and the point $\frac{1250}{R}$ or $\frac{1250}{3500}$ or 0.357 ampere on the ordinate axis. This latter point is designated as D. Then the points A, C, D and F are on the load line, and any two of them might have been used to obtain its position on the family of curves shown.

It will be seen that the point C falls on the curve corresponding to a grid voltage of +70 V. This voltage of +70 is the voltage on the grid at the instant of minimum plate voltage and peak power output. It (+70 volts) is the most positive value of grid voltage required for this condition of operation. It is to be noted that the maximum grid voltage and the minimum plate voltage occur at the same instant; furthermore, the minimum plate voltage of 90 V. is only slightly greater than the maximum grid voltage of 70 V.

The load of 3500 ohms on the plate of one audio tube represents a plate-to-plate load of four times this or 4 x 3500 = 14,000 ohms. This plate-to-plate impedance is of no particular value in the calculation of Class B performance by the method outlined above, but it is useful in describing the characteristics of the required Class B output transformer.

The calculation shown has been that for the solution of the operating characteristics for a given power output with a given tube loss. Where it is desired to find operating conditions to meet other requirements, such as a specified plate load or a specified peak driving voltage, a different order of procedure must be used. A study of the above example will be a guide in other solutions.

Whether or not the tubes are to be operated at zero bias involves the consideration of the plate loss at no-signal and the tolerable distortion. In the example given the value of no-signal plate current for zero bias voltage may be found at the intersection of the 1250 volt ordinate and the curve for $Ec = 0$. This is shown at the point B. Here the current for one tube is 10 MA, and the plate loss per tube is 1250 x 0.010 or 12.5 watts, well below the allowable limit.

The dotted curve represents the relation of grid current to plate voltage for a grid voltage of +70 volts. If from the coordinates $Ep = 90$, $Ip = 330$, a vertical line is passed which intersects the dotted line at E, the ordinate (90 MA) at this point represents the peak value of grid current. The peak grid driving power required to obtain full output under the conditions specified may now be obtained. It is $Eg \times Ig = 70 \times 0.090 = 6.3$ watts. The ratio of peak driving power to average driving power depends mainly upon the plate load, the type of tube, and the peak grid voltage and its relation to the minimum plate voltage. For some conditions of operation the average power is one-half the peak power, and for other conditions it may be only one-third or one-fourth the peak power.

The following characteristics have thus been obtained for two tubes in a Class B stage:

Plate voltage — 1250 volts
Average no-signal plate current — 20 MA
Average full-signal plate current — 210 MA.
DC grid volts — 0
Peak grid-to-grid voltage — 140 volts
No-signal plate loss — 25 watts
Full-signal plate loss — 70 watts
Load resistance (per tube) — 3500 ohms
Plate-to-plate load — 14,000 ohms
Peak driving power — 6.3 watts
Plate efficiency — 73%
Stage efficiency — 65%
Power output — 165 watts

The maximum efficiency of a Class B amplifier is 78.5%. This value is realized only when the instantaneous plate voltage swings to zero and the half-sine wave shape of current in each tube is retained.

In the example given, if such a condition could be obtained, the average plate current (two tubes) would be $0.357 \times 0.318 \times 2 = 0.227$ ampere. The power output would be $0.357 \times \frac{1250}{2} = 223$ watts, and the power input would be $1250 \times 0.227 = 284$ watts for an efficiency of $100 \times \frac{223}{284}$ or 78.5%.

### Considerations in Selecting Driver Transformer Ratios

Although the driving power for a Class B stage is usually obtained from a Class A amplifier, ordinary Class A amplifier design for maximum power output does not suffice. Most Class A amplifiers not intended for driver service are planned to deliver the maximum possible undistorted power into a given fixed load.

Unfortunately, the load on Class A tubes in driver service is not constant throughout the cycle. This is due to the fact that the grids of the modulator tubes do not have a constant resistance over the audio cycle. In the positive grid region the grid current increases more rapidly than the grid voltage, thus exhibiting the characteristic of a decreasing grid resistance with increasing voltage. The degree to which the resistance changes depends mainly upon the relation between minimum plate voltage and maximum grid voltage. For tubes operated with zero bias the resistance change in most cases is, fortunately, not large. In a Class B stage working into a resistance load, the maximum instantaneous grid voltage and the minimum instantaneous plate voltage occur at the same time. During the part of the cycle that the minimum plate voltage and the maximum grid voltage are not greatly different, the change in grid-to-cathode resistance is most apparent. It is well to plan to have the ratio of minimum plate voltage to maximum grid voltage exceed two in cases where low driver distortion is desired. In instances where more driver distortion can be tolerated, or in cases where the apparent internal-output impedance of the driver is very low, as compared with the minimum Class B grid resistance, this ratio may be reduced to 1.0 or 1.5. With tubes having negative grid bias the resistance changes from a very high value to a very low value within a small per cent of the time required for a complete cycle.

If a driving voltage of perfect regulation were available, this change in resistance would not be of such serious consequence. However, all practical drivers have some internal impedance, and in delivering energy to a varying load, harmonic distortion will occur. If the internal output impedance of the driver has an appreciable reactance, extremely disagreeable distortion can result. This is especially true if the Class B grids are biased. It is important to have a driver transformer having a low leakage reactance.

# Driver Transformer Ratios

AN IMPORTANT problem in the selection of a driver is to obtain a source of adequate voltage of good regulation without prohibitive amounts of driver tube capacity. Fortunately, there are receiving tubes (2A3's) which will supply driving power for most modulators having power outputs up to several hundred watts.

In general, for amateur work, the amateur should use tubes which in normal Class A amplifier service will deliver an average power output of at least one-half as much as the peak power required to supply the Class B grids. It is preferable in nearly all cases to have the average power output capabilities of the driver be one to two times as great as the peak power requirements of the Class B grids. This corresponds to peak power capabilities of two to four times the peak power which is required at the driver grids. The ratio of average power capacity of driver to peak power required at the Class B grids may approach the lower value when the Class B tubes are operated at zero bias and the ratio of minimum plate voltage to maximum grid voltage is large (two or more). In such a case, the grid resistance is substantially constant during the cycle.

The installation of driving tubes having power output capabilities greater than required allows the changing of the plate load from that which is optimum for maximum undistorted output to a higher value which delivers less power, but which lowers the internal impedance of the driving source as seen from the Class B grids.

In selecting the turns ratio of a driver transformer, it is desirable to make the step-down ratio as high as possible from the driver plates to the Class B grids and yet be able to develop the required peak driving voltage on the Class B grids without overloading the driver tube.

The determination of the correct driver transformer ratio can be studied by reference to the following discussion. In figure 2, Eg is the peak value of the AC voltage required on the Class B grid. Rg is the grid resistance at this value of voltage. (This is the lowest value of grid resistance.) $R_D$ is the internal resistance of the source of driving energy, and $E_D$ is the peak open circuit voltage developed by the driver source. The transformer ratio is N to 1, primary to secondary. Figure 3 is a simplified version in which the secondary voltage and resistance are reflected to the primary side of the transformer. The secondary voltage is stepped up N times and appears across the primary as NEg. The secondary load, in accordance with regular transformer theory, is stepped up $N^2$ times and appears to the primary as $N^2Rg$.

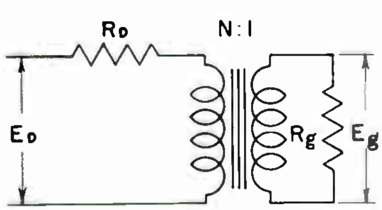



Fig. 2

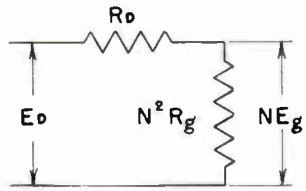



Fig. 3

At all instants the ratio of the voltages is equal to the ratio of the resistances across which they occur. Thus:

$$\frac{E_D}{NE_g} = \frac{R_D + N^2R_g}{N^2R_g}$$

There are two solutions, one giving a turns ratio which gives relatively good regulation and the other giving a turns ratio with poor regulation. For either solution there is adequate driving voltage. The desired solution is given by the formula:

$$N = \frac{E_DR_g + \sqrt{E_D^2R_g^2 - E_g^2R_gR_D}}{2E_gR_g}$$

Example:

Assume a pair of push-pull 2A3's with 300 volts on the plates, 60 volts bias and an available signal of 53 peak volts on each 2A3 grid. The Class B grid minimum resistance is 780 ohms at +70 volts. The Class B tubes are at zero bias. The 2A3 tubes have a mu of 4.2 and a plate resistance of 1050 ohms.

Solution:

The open circuit driving voltage of two 2A3's in series is 2 x 4.2 x 53 or 445 volts. This voltage may be considered as that in a generator of internal resistance Rp x 2 or 1050 x 2 or 2100 ohms. Then:

$$N = \frac{445 \times 780 + \sqrt{(445)^2(780)^2 - (70)^2(780)(2100)}}{2 \times 70 \times 780}$$

Solving:

N = 6.25, which is the turns ratio from the total primary to one-half the secondary. In this case, the 780 ohm grid load is reflected as a 30,500 ohm plate-to-plate load on the 2A3's, much higher than the 5000 ohm plate-to-plate load often encountered.

### Line to Class B Grid Driver Ratio

In selecting the driver transformer to transfer energy from a so-called "500 ohm" line to Class B grids, the fact is often overlooked that the "500 ohm" line is usually not of 500 ohms internal output resistance. Its internal output resistance (when the source of energy to it is not "padded down") is usually far from being 500 ohms. This is of considerable consequence in calculating driver transformer ratios.

Suppose, for example, that the "500 ohm" line had been fed from two 2A3's having an amplification factor of 4.2, a plate resistance of 1050 ohms and a maximum available signal voltage on their grids of 53 peak volts. If the 2A3 output transformer was designed to place a 5000 ohm plate-to-plate load on the tubes when a 500 ohm load was connected to the secondary, the turns ratio of total primary to total secondary would be 3.16 to 1. The 500 ohm line would then have an internal impedance of $\frac{2 \times 1050}{(3.16)^2}$ or 210 ohms, and the maximum available open circuit voltage on the line side of the transformer would be $2 \times 53 \times \frac{4.2}{3.16}$ or 140 peak volts. This voltage and the source resistance of 210 ohms should be used in calculating the line to Class B grid ratio.

For the Class B grid condition previously given, the solution yields:

$$N = \frac{140 \times 780 + \sqrt{(140)^2(780)^2 - (70)^2(210)(780)}}{2 \times 70 \times 780}$$

which gives N = 1.97 as the ratio from the line to one grid (that is, the primary to one-half the secondary). It is to be noted that this ratio (1.97) multiplied by the ratio of the transformer with which it is associated (3.16) gives 1.97 x 3.16 = 6.25, which is the ratio obtained for the solution of turns ratio for a driver transformer coupling the 2A3 plates directly to the grids.

In the calculation of driver ratio shown, no allowance has been made for transformer losses or for deviations of the driver tube characteristics from the average values given by tube manufacturers. Furthermore, it is not well to have a peak signal on the driver tube grids which reduces that grid voltage to zero. It is better to limit the maximum peak grid voltage on the driver to about 95% of the bias voltage. Allowance for these three factors can be made by reducing the step-down ratio of the driver transformer 10 to 15%.

# Matching Class C Loads to Modulators

HAVING selected the proper load resistance into which the modulator should deliver energy it is necessary to couple the modulator to its Class C load through a transformer of the proper turns ratio.

It is characteristic of a transformer that the resistance to which the secondary delivers energy can appear as a different value of resistance at the primary terminals. The degree to which this actual load resistance and the reflected load resistance differ depends upon the turns ratio of the transformer. Of the total energy supplied to the primary of a transformer almost all is available for delivery to the load on the secondary. Thus, the actual load resistance presented by the Class C amplifier may be made to appear as the desired load on the modulator tubes, and all of the alternating current energy developed in the modulator stage can be delivered to the Class C amplifier and its load. In general, then, a transformer may be thought of as an impedance changing device in which very little of the energy supplied to it is lost. In amateur work, the transformers are of such size and construction that the efficiency is good enough that little attention need be given to the losses; that is, for most calculations it may be assumed to behave as an ideal transformer.

To show how a transformer acts as an impedance changing device the following demonstration is given:

Referring to Figure 4 a transformer is shown having a turns ratio of primary to secondary of 1 to N. The load

1:N

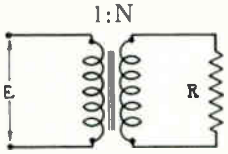



**Fig. 4**

on the secondary is R ohms, and the voltage impressed on the primary is E.

Ordinary transformer theory indicates that the voltage across each winding is proportional to the number of turns on the winding. Thus, with E volts across the primary, the voltage across the secondary is N times as much, or NE. The power at the load resistance R is equal to the square of the voltage across it divided by the resistance. Thus, in this case the power at the secondary load is $\frac{(NE)^2}{R}$. With a perfect transformer the power at the primary is the same value as it is at the secondary. Thus, the power at the primary is also $\frac{(NE)^2}{R}$.

For the moment, assume the secondary load resistance, R, appears at the primary terminals as another resistance, $R_1$. It is desired to find the value of the turns ratio of secondary to primary in terms of these resistances, R and $R_1$. The power at the primary of the transformer is $\frac{E^2}{R_1}$. But this value is also equal to $\frac{(NE)^2}{R}$. Therefore,

$$\frac{E^2}{R_1} = \frac{(NE)^2}{R} \text{ or } \frac{1}{R_1} = \frac{N^2}{R} \text{ and } N^2 = \frac{R}{R_1}.$$

Thus, it is to be seen that the reflected resistance is equal to the secondary resistance divided by the square of the turns ratio from secondary to primary. Stated in another manner, the reflected resistance is equal to the secondary resistance multiplied by the square of the turns ratio from primary to secondary. It is important not to become confused by the indiscriminate use of the terms "turns ratio," "step-up ratio" and the like. These terms are used interchangeably, but they are not necessarily equal to each other.

Suppose, for example, that it is desired to calculate the turns ratio of the full primary to the full secondary of a modulation transformer used under the following conditions:

Power input to Class C amplifier — 330 watts.

Plate voltage on Class C amplifier — 1250 volts.

Modulator plate-to-plate load desired — 14000 ohms.

The Class C plate current is $\frac{W}{E}$ or $\frac{330}{1250}$ or 0.264 amperes. The Class C load on the secondary of the modulation transformer is then $\frac{E}{I}$ or $\frac{1250}{0.264}$ or 4740 ohms. This is equal to R.

Then, if $N^2 = \frac{R}{R_1}$, $N^2 = \frac{4740}{14000} =$ 0.338 and N is equal to the square root of this value, or 0.58. In this case N is the ratio of secondary turns to primary turns. The value of 0.58, being less than unity, indicates that the secondary has less turns than the primary. This is as it should be when a given Class C load is less than the plate-to-plate load which it is desired be reflected on the primary side of the modulation transformer. The amateur may avoid making the mistake of obtaining a turns ratio which is the inverse of the proper value by always making an estimate of which winding, primary or secondary, has the greater number of turns, this estimate to be made before the start of calculations.

15
10
√1.55

## MULTI-MATCH MODULATION TRANSFORMER RATIOS

Tapped double winding coils as used in Multi-Match modulation transformers make possible a large number of impedance ratios, so many in fact that it is not practical to list in table form all the combinations possible. However, there are occasions when the modulator plate-to-plate load, or the Class C load, are of values not shown in the table and yet are within the range covered by the transformer. The chart shown on the opposite page may be used to determine the correct modulation transformer connections when the desired turns ratio is known. The transformer connections may then be found from the list of ratios in the adjoining table. As an example, to match a 10,000 ohm plate-to-plate load to a Class C load of 5000 ohms, a turns ratio of $\sqrt{\frac{10{,}000}{5{,}000}}$ or 1.41 is necessary. The connections shown in the table should be used to secure this ratio. In this particular case these connections are:

For the primary, connect the modulator plates to terminals 2 and 5; 3 and 4 are joined and connected to the modulator plate supply. For the secondary, join terminals 7-11 and 8-12. Connect the Class C load to terminals 7 and 8.

Since only part of the winding is used for some combinations, the maximum allowable value of plate-to-plate load is necessarily variable. This maximum value is shown in the last column of the table and should not be exceeded.

Care should be taken that the DC secondary current does not exceed the maximum rating of the transformer. A parallel connected secondary will carry twice the current of a series connection, and in the event that the Class C current is greater than the allowable current of the series connection, a parallel connection must be used.

## —Connections for Matching Multi-Match and Universal Transformers—

| Turns Ratio Primary to Secondary | PRIMARY | | | SECONDARY | | | | Maximum Allowable Plate to Plate Load |
|---|---|---|---|---|---|---|---|---|
| | | | | SERIES | | PARALLEL | | |
| | Plate | B + | Plate | Join Together | Connect Class "C" Load To | Join Together | Connect Class "C" Load To | |
| 3.14 | 2 | 3-4 | 5 | | | 8-9<br>10-11 | 8-10 | 12000 Ohms |
| 2.88 | 7 | 8-11 | 12 | | | 2-3<br>4-5 | 2-4 | 16000 Ohms |
| 2.8 | 1 | 3-4 | 6 | 9-10 | 8-11 | | | 20000 Ohms |
| 2.61 | 7 | 9-10 | 12 | 2-5 | 1-6 | | | 20000 Ohms |
| 2.5 | 1 | 2-5 | 6 | | | 8-9<br>10-11 | 8-10 | 10000 Ohms |
| 2.5 | 1 | 3-4 | 6 | | | 7-11<br>8-12 | 7-8 | 20000 Ohms |
| 2.32 | 7 | 9-10 | 12 | | | 1-3<br>4-6 | 1-4 | 20000 Ohms |
| 2.07 | 7 | 9-10 | 12 | 3-4 | 2-5 | | | 20000 Ohms |
| 1.8 | 7 | 8-11 | 12 | 2-5 | 1-6 | | | 16000 Ohms |
| 1.73 | 1 | 3-4 | 6 | | | 7-9<br>10-12 | 7-10 | 20000 Ohms |
| 1.61 | 8 | 9-10 | 11 | | | 2-6<br>1-5 | 1-2 | 8000 Ohms |
| 1.60 | 7 | 8-11 | 12 | | | 1-3<br>4-6 | 1-4 | 16000 Ohms |
| 1.59 | 7 | 9-10 | 12 | 2-3 | 1-6 | | | 20000 Ohms |
| 1.57 | 2 | 3-4 | 5 | 9-10 | 8-11 | | | 12000 Ohms |
| 1.49 | 7 | 9-10 | 12 | 3-4 | 2-6 | | | 20000 Ohms |
| 1.44 | 7 | 8-11 | 12 | 3-4 | 2-5 | | | 16000 Ohms |
| 1.4 | 2 | 3-4 | 5 | | | 7-11<br>8-12 | 7-8 | 12000 Ohms |
| 1.32 | 1 | 3-4 | 6 | 9-10 | 8-12 | | | 20000 Ohms |
| 1.28 | 8 | 9-10 | 11 | | | 2-3<br>4-5 | 2-4 | 8000 Ohms |
| 1.25 | 1 | 3-4 | 6 | 8-11 | 7-12 | | | 20000 Ohms |
| 1.25 | 1 | 2-5 | 6 | 9-10 | 8-11 | | | 10000 Ohms |
| 1.15 | 7 | 9-10 | 12 | 3-4 | 1-6 | | | 20000 Ohms |
| 1.11 | 1 | 2-5 | 6 | | | 7-11<br>8-12 | 7-8 | 10000 Ohms |
| 1.1 | 7 | 8-11 | 12 | 2-3 | 1-6 | | | 16000 Ohms |
| 1.03 | 7 | 8-11 | 12 | 3-4 | 2-6 | | | 16000 Ohms |
| 1.02 | 1 | 3-4 | 6 | 8-9 | 7-12 | | | 20000 Ohms |
| .967 | 2 | 3-4 | 5 | | | 7-9<br>10-12 | 7-10 | 12000 Ohms |
| .866 | 1 | 3-4 | 6 | 9-10 | 7-12 | | | 20000 Ohms |
| .8 | 7 | 8-11 | 12 | 3-4 | 1-6 | | | 16000 Ohms |
| .77 | 1 | 2-5 | 6 | | | 7-9<br>10-12 | 7-10 | 10000 Ohms |
| .742 | 2 | 3-4 | 5 | 9-10 | 8-12 | | | 12000 Ohms |
| .714 | 8 | 9-10 | 11 | | | 1-3<br>4-6 | 1-4 | 8000 Ohms |
| .7 | 2 | 3-4 | 5 | 8-11 | 7-12 | | | 12000 Ohms |
| .639 | 8 | 9-10 | 11 | 3-4 | 2-5 | | | 8000 Ohms |
| .588 | 1 | 2-5 | 6 | 9-10 | 8-12 | | | 10000 Ohms |
| .575 | 2 | 3-4 | 5 | 8-9 | 7-12 | | | 12000 Ohms |
| .555 | 1 | 2-5 | 6 | 8-11 | 7-12 | | | 10000 Ohms |
| .495 | 8 | 9-10 | 11 | 2-3 | 1-6 | | | 8000 Ohms |
| .483 | 2 | 3-4 | 5 | 9-10 | 7-12 | | | 12000 Ohms |
| .458 | 8 | 9-10 | 11 | 3-4 | 2-6 | | | 8000 Ohms |
| .455 | 1 | 2-5 | 6 | 8-9 | 7-12 | | | 10000 Ohms |
| .385 | 1 | 2-5 | 6 | 9-10 | 7-12 | | | 10000 Ohms |
| .357 | 8 | 9-10 | 11 | 3-4 | 1-6 | | | 8000 Ohms |

## Thordarson Multi-Match Transformer Ratings

| Type No. | Max. Audio Watts | Max. Pri. M.A. Each Side | Max. Sec. M.A. Series | Max. Sec. M.A. Parallel |
|---|---|---|---|---|
| T-11M74 | 40 | 100 | 80 | 160 |
| T-11M75 | 75 | 145 | 145 | 290 |
| T-11M76 | 125 | 210 | 160 | 320 |
| T-11M77 | 300 | 250 | 250 | 500 |
| T-11M78 | 500 | 320 | 320 | 640 |
| T-19M13 | 15 | 50 | 50 | 100 |
| T-19M14 | 30 | 75 | 75 | 150 |
| T-19M15 | 60 | 125 | 125 | 250 |
| T-19M16 | 100 | 175 | 175 | 350 |
| T-19M17 | 250 | 225 | 225 | 450 |

# Matched Power Supplies

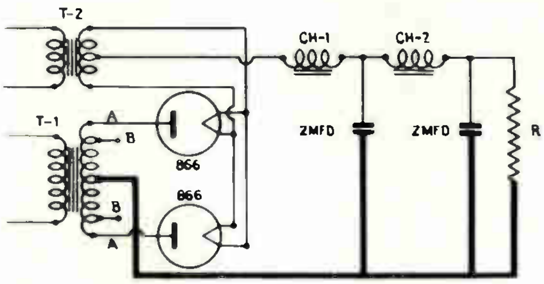
THESE matched power supplies provide the amateur with any of the direct current voltages ordinarily encountered in amateur radio work. The dual transformers T-19P57, T-19P70 and T-19P71 are especially useful for transmitters having low voltage exciter and high voltage final amplifier stages on the same chassis. The transformer T-19P58 is especially useful in transmitters with a Class B modulator and Class C amplifier having slightly different plate voltage requirements. All of them may be depended upon to give the rated direct current voltage and current when using the prescribed chokes.

For CW work or for use in transmitters where the Class B modulator and Class C amplifier plate voltage are to be taken from one supply, the excellent regulation of these matched units is desirable. When the bleeder, R, is of such magnitude as to drain approximately 10% of the rated current, the regulation of these supplies is approximately 15% and the ripple is approximately 1%.

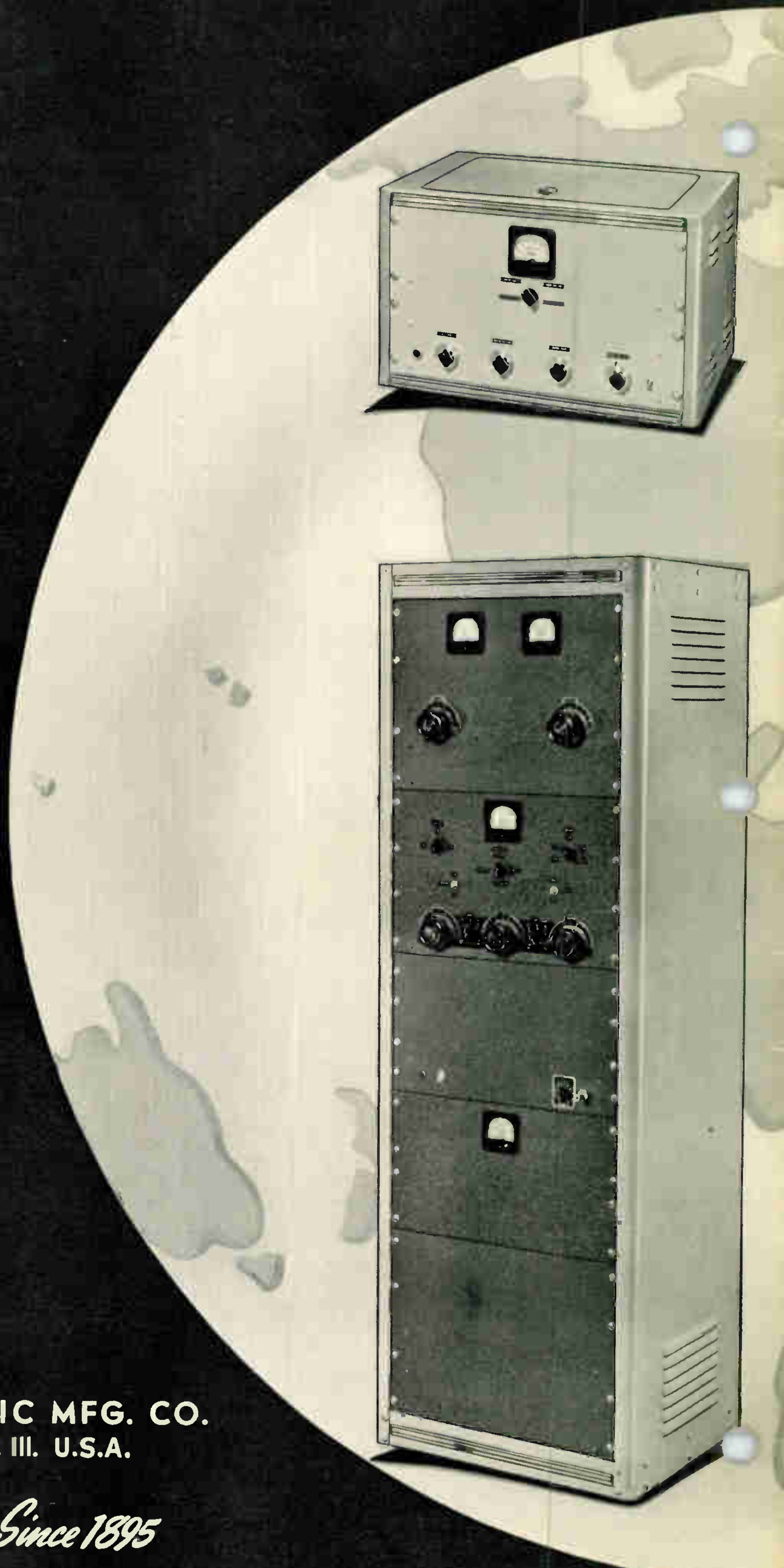
The power supplies using the transformer T-1, marked with an asterisk, are dual supplies; that is, power is supplied at two direct current voltages simultaneously. The dual supplies using the transformers T-19P58 and T-19P71 use two chokes in each B+ lead, and the proper chokes are specified opposite these transformers. For the dual supplies using the transformers T-19P57 and T-19P70, two chokes in the high voltage center tap connection provide filtering for both the direct current voltages obtainable. The rated secondary load currents of each of these four dual plate transformers may be delivered simultaneously. But, when it is desired to use only the low voltage tap on any one of these dual units, the current rating of this tap is then equal to the sum of the current ratings of the two sections.

The filament transformer chosen for each plate supply is designed for mounting underneath the chassis. The plate transformers and chokes are supplied with black cases to provide not only matched electrical performance but also matched appearance in the rig.

The T-19F83 filament transformer supplies the filament of a 5Z3, the T-19F88 is for 866JR's and the T-19F90 is for 866's. The T-19F78 filament transformer is to be used with a 5Z3 and 866JR's.




| Power Trans. T-1 | DC Volts from Tap A | DC Volts from Tap B | DC MA | Input Choke CH-1 | Smoothing Choke CH-2 | Fil. Trans. T-2 |
|---|---|---|---|---|---|---|
| T-19P54 | 400 | | 150 | T-19C39 | T-19C46 | T-19F83 |
| T-19P55 | 500 | 400 | 250 | T-19C36 | T-19C43 | T-19F88 |
| T-19P70* | 750 | | 100 | T-19C36 | T-19C43 | T-19F88 |
| | | 400 | 225 | | | T-19F83 |
| T-19P56 | 750 | 600 | 225 | T-19C36 | T-19C43 | T-19F88 |
| T-19P57* | 1000 | | 125 | T-75C51 | T-75C51 | T-19F78 |
| | | 400 | 150 | | | |
| T-19P58* | 1000 | | 200 | T-19C35 | T-19C42 | T-19F90 |
| | | 750 | 150 | T-19C39 | T-19C46 | T-19F88 |
| T-19P69 | 1000 | 750 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P71* | 1250 | | 125 | T-19C39 | T-19C46 | T-19F90 |
| | | 400 | 200 | T-19C35 | T-19C42 | T-19F83 |
| T-19P59 | 1250 | 1000 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P60 | 1500 | 1250 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P61 | 1750 | 1500 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P62 | 2000 | 1750 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P63 | 1250 | 1000 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P64 | 1500 | 1250 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P65 | 2500 | 2000 | 300 | T-19C36 | T-19C43 | T-19F90 |
| T-19P66 | 1750 | 1500 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P67 | 2000 | 1750 | 500 | T-19C38 | T-19C45 | T-19F90 |
| T-19P68 | 2500 | 2000 | 500 | T-19C38 | T-19C45 | T-19F90 |



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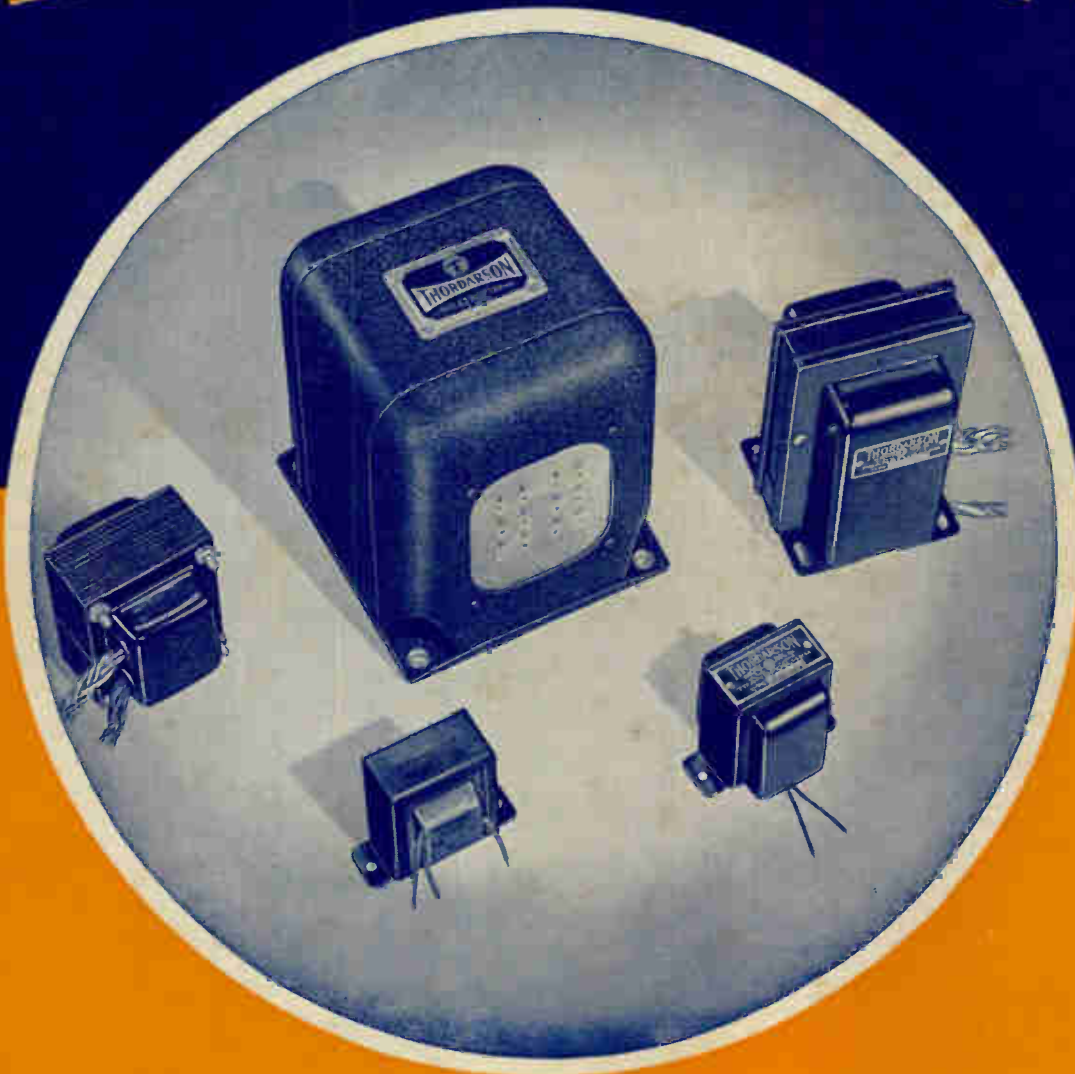


## COMPLETE TRANSFORMER CATALOG

No. 400-FX 1942

**THORDARSON ELECTRIC MFG. CO., CHICAGO, ILL., U. S. A.**

# INDEX

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A = Audio, D = Driver, K = Foundation Unit, P = Plate, S = Output or Speaker, W = Wired Amplifier.
C = Choke, F = Filament, M = Modulation, R = Power, V = Voltage Changer.


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| T-1A52 | 6 | 18.60 | T-13R17 | 20 | 5.10 | T-15C39 | 9 | 27.00 | T-18V05 | 27 | 16.20 | T-19F94* | 14 | 3.60 | T-67A91 | 4 | 4.20 |
| T-1A53 | 6 | 18.60 | T-13R18 | 20 | 6.00 | T-15C41 | 9 | 33.00 | T-18V06* | 27 | 7.50 | T-19F95 | 14 | 3.30 | T-67S92 | 24 | 4.80 |
| T-1A54 | 6 | 16.80 | T-13R19* | 20 | 3.60 | T-15C45 | 9 | 10.80 | T-18V07 | 27 | 16.20 | T-19F96* | 14 | 4.20 | T-67R97* | 21 | 5.10 |
| T-1A55 | 6 | 17.40 | T-13R20 | 20 | 4.50 | T-15C46 | 9 | 15.00 | T-18V10— | 26 | 3.60 | T-19F97* | 14 | 2.10 | T-68S06 | 24 | 3.00 |
| T-1A56 | 6 | 18.00 | T-13C26* | 9 | 1.10 | T-15C47 | 9 | 18.00 | T-18V20 | 27 | 7.20 | T-19F98* | 14 | 3.30 | T-68C07* | 9 | 2.40 |
| T-1A57 | 6 | 16.80 | T-13C27* | 9 | 1.30 | T-15C48 | 9 | 27.00 | T-18V21 | 27 | 8.40 | T-19F99* | 14 | 4.20 | T-68C08 | 8 | 2.10 |
| T-1A59 | 6 | 16.80 | T-13C28* | 9 | 1.45 | T-15C50 | 9 | 33.00 | T-18V22 | 27 | 10.80 | T-26V04* | 27 | 5.70 | T-68R26 | 21 | 8.70 |
| T-1A60 | 6 | 16.80 | T-13C29* | 9 | 1.90 | T-15C52* | 8 | 6.60 | T-18V23 | 27 | 15.00 | T-29C27* | 8 | 2.10 | T-69R35 | 21 | 8.10 |
| T-1C62 | 6 | 12.00 | T-13C30* | 9 | 2.40 | T-15C53 | 8 | 6.90 | T-18V24 | 15 | 2.70 | T-29A99* | 4 | 2.40 | T-70R20* | 20 | 3.90 |
| T-1C63 | 6 | 12.00 | T-13A34* | 4 | 1.60 | T-15C54* | 8 | 7.50 | T-18V25 | 15 | 4.80 | T-33A91* | 4 | 2.40 | T-70R21 | 20 | 5.40 |
| T-2A36 | 7 | 21.00 | T-13A35* | 4 | 1.80 | T-15C55 | 8 | 9.00 | T-18V26 | 27 | 6.90 | T-33S99 | 24 | 1.80 | T-70R61* | 21 | 5.70 |
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| T-2A68 | 7 | 22.80 | T-13S37* | 24 | 1.50 | T-15R60 | 19 | 23.40 | T-19D01 | 10 | 7.50 | T-37R70-C— | 21 | 9.00 | T-70R78* | 21 | 5.10 |
| T-3S16 | 26 | 45.00 | T-13S38* | 25 | 1.80 | T-15R61 | 19 | 21.00 | T-19D02 | 10 | 7.50 | T-43C92* | 9 | 2.00 | T-70A82 | 5 | 4.20 |
| T-3S17 | 26 | 54.00 | T-13S39 | 24 | 1.50 | T-15R62 | 19 | 23.40 | T-19D03 | 10 | 7.50 | T-44C02* | 9 | 1.80 | T-70A83 | 5 | 4.20 |
| T-3S21 | 26 | 21.60 | T-13S40 | 24 | 1.80 | T-15A66 | 5 | 9.60 | T-19D04* | 10 | 7.50 | T-47V01* | 27 | 9.00 | T-72S58 | 24 | 2.00 |
| T-3S22* | 26 | 22.80 | T-13S41* | 25 | 3.30 | T-15A67 | 5 | 9.60 | T-19D05* | 10 | 7.50 | T-47V02* | 27 | 13.20 | T-72A59* | 5 | 2.00 |
| T-3S23 | 26 | 45.00 | T-13S42* | 25 | 1.80 | T-15A68 | 5 | 9.60 | T-19D06* | 11 | 3.30 | T-47V03 | 27 | 26.10 | T-73M52 | 16 | 27.00 |
| T-3A32 | 7 | 21.00 | T-13S43 | 24 | 1.60 | T-15A69 | 5 | 9.60 | T-19M13* | 17 | 5.70 | T-47V04 | 27 | 42.00 | T-73F60 | 14 | 4.80 |
| T-5A1 | 7 | 12.60 | T-14A29 | 4 | 3.00 | T-15A70 | 5 | 9.60 | T-19M14* | 17 | 9.90 | T-47C07* | 9 | 2.00 | T-74F23 | 14 | 6.00 |
| T-5A2 | 7 | 13.20 | T-14R32— | 19 | 9.00 | T-15A71 | 5 | 9.60 | T-19M15 | 17 | 14.40 | T-47A25 | 4 | 2.70 | T-74F24* | 14 | 10.20 |
| T-5A3 | 7 | 11.40 | T-14R33* | 20 | 3.60 | T-15A72 | 5 | 9.60 | T-19M16 | 17 | 20.40 | T-49C91 | 9 | 2.10 | T-74R28 | 21 | 8.10 |
| T-5A4 | 7 | 10.50 | T-14R34* | 20 | 4.20 | T-15A73— | 4 | 9.00 | T-19M17 | 17 | 33.00 | T-50R03— | 20 | 3.90 | T-74C29* | 9 | 4.80 |
| T-5A5 | 7 | 9.60 | T-14R35* | 20 | 4.50 | T-15A74* | 4 | 8.40 | T-19M21— | 16 | 8.40 | T-50V11* | 27 | 9.00 | T-74C30* | 8 | 1.80 |
| T-5A7 | 7 | 12.00 | T-14R36 | 20 | 5.70 | T-15A75 | 4 | 8.70 | T-19M22— | 16 | 12.00 | T-50F61 | 14 | 2.10 | T-74A31 | 4 | 4.20 |
| T-5A8 | 7 | 12.60 | T-14R37 | 20 | 6.00 | T-15D76— | 10 | 10.80 | T-19R30 | 21 | 9.60 | T-52C98 | 8 | 2.40 | T-74D32* | 11 | 3.90 |
| T-5A9 | 7 | 12.60 | T-14R38 | 20 | 6.90 | T-15D77— | 10 | 10.80 | T-19R31 | 19 | 11.40 | T-53C19 | 9 | 1.80 | T-75R47* | 20 | 5.70 |
| T-6A0 | 7 | 12.60 | T-14R39* | 20 | 3.30 | T-15D78 | 10 | 10.80 | T-19R32 | 19 | 15.00 | T-53S81* | 25 | 5.70 | T-75C49* | 9 | 1.80 |
| T-6A1 | 7 | 12.60 | T-14R40* | 20 | 9.00 | T-15D79 | 10 | 10.80 | T-19C35* | 9 | 4.80 | T-54D63 | 11 | 2.70 | T-75R50* | 21 | 9.30 |
| T-6A3 | 7 | 11.40 | T-14M49 | 16 | 21.60 | T-15D82 | 10 | 10.80 | T-19C36* | 9 | 8.40 | T-55A16* | 5 | 3.30 | T-75C51* | 9 | 6.00 |
| T-6A4 | 7 | 12.00 | T-14C61 | 9 | 1.20 | T-15D83 | 10 | 18.00 | T-19C37 | 9 | 15.00 | T-56R01 | 21 | 6.90 | T-75A74 | 4 | 3.30 |
| T-9V30* | 26 | 51.00 | T-14C62* | 9 | 1.20 | T-15D85 | 11 | 9.60 | T-19C38* | 9 | 18.00 | T-56R02— | 21 | 5.10 | T-75S75* | 24 | 4.80 |
| T-9V31* | 26 | 78.00 | T-14C63 | 9 | 1.20 | T-15D86 | 11 | 10.80 | T-19C39* | 9 | 3.90 | T-56R03 | 21 | 8.10 | T-76S74 | 25 | 4.50 |
| T-9V32* | 26 | 120.00 | T-14C64* | 9 | 1.20 | T-15S90 | 25 | 12.00 | T-19C42* | 9 | 4.80 | T-56R05 | 21 | 8.10 | T-78D46* | 11 | 1.80 |
| T-9V33* | 26 | 210.00 | T-14C70* | 8 | 3.00 | T-15S91 | 25 | 15.00 | T-19C43* | 9 | 8.40 | T-57S01* | 25 | 2.40 | T-79F84 | 15 | 5.70 |
| R-1068* | 8 | 3.00 | T-14A75 | 4 | 17.40 | T-15S92 | 25 | 18.00 | T-19C44 | 9 | 15.00 | T-57S02 | 25 | 2.40 | T-81S01* | 24 | 1.80 |
| T-11F50 | 15 | 10.80 | T-14A76 | 4 | 17.40 | T-15S93 | 25 | 21.00 | T-19C45* | 9 | 18.00 | T-57A36 | 4 | 2.70 | T-81C15 | 8 | 2.40 |
| T-11F51 | 15 | 13.20 | T-14S80* | 25 | 2.40 | T-15S94 | 25 | 24.00 | T-19C46* | 9 | 3.90 | T-57A38 | 4 | 3.60 | T-81D42* | 11 | 3.90 |
| T-11F52 | 15 | 15.90 | T-14S81 | 24 | 1.50 | T-15S96 | 25 | 15.00 | T-19P54 | 18 | 7.20 | T-57A39 | 4 | 3.00 | T-81D52 | 11 | 3.90 |
| T-11F53 | 14 | 10.20 | T-14S82 | 24 | 1.50 | T-15S97 | 25 | 19.20 | T-19P55* | 18 | 7.80 | T-57A40 | 4 | 3.90 | T-82V11 | 27 | 18.00 |
| T-11F54 | 14 | 24.00 | T-14S83* | 24 | 1.50 | T-15S98 | 25 | 12.00 | T-19P56* | 18 | 8.40 | T-57A41* | 4 | 4.20 | T-82V12 | 27 | 24.00 |
| T-11F55 | 14 | 15.00 | T-14S84* | 24 | 1.50 | T-15S99 | 25 | 12.00 | T-19P57* | 18 | 10.20 | T-57A42 | 4 | 4.20 | T-82V13 | 27 | 36.00 |
| T-11F57— | 15 | 16.50 | T-14S85 | 25 | 1.80 | T-16C07* | 9 | 2.70 | T-19P58* | 18 | 18.00 | T-57C51* | 9 | 1.80 | T-82M25 | 16 | 51.00 |
| T-11F58— | 15 | 18.00 | T-14A90* | 5 | 3.00 | T-17C00-B* | 9 | 3.30 | T-19P59* | 18 | 21.00 | T-57C52 | 9 | 2.10 | T-83D21 | 11 | 4.20 |
| T-11F59 | 14 | 9.00 | T-14A91* | 5 | 3.00 | T-17D01* | 11 | 2.40 | T-19P60* | 18 | 25.20 | T-57C53* | 9 | 2.40 | T-83M22 | 16 | 13.80 |
| T-11F60 | 14 | 9.60 | T-14A92 | 4 | 1.60 | T-17A02* | 4 | 3.00 | T-19P61 | 18 | 27.00 | T-57C54* | 9 | 2.70 | T-83A78* | 5 | 2.70 |
| T-11F61 | 14 | 27.00 | T-14D93 | 11 | 2.10 | T-17D03* | 11 | 5.40 | T-19P62* | 18 | 32.10 | T-58A37 | 5 | 2.70 | T-83R82— | 21 | 12.00 |
| T-11F62 | 14 | 10.20 | T-14A94 | 5 | 3.00 | T-17D04* | 11 | 5.40 | T-19P63* | 18 | 30.90 | T-58A70* | 4 | 4.50 | T-83R85 | 21 | 15.00 |
| T-11F63 | 14 | 11.40 | T-15R00 | 21 | 15.00 | T-17S10* | 24 | 3.60 | T-19P64* | 18 | 35.70 | T-58S72 | 24 | 4.50 | T-83S87— | 24 | 10.80 |
| T-11F64 | 14 | 12.00 | T-15R01 | 21 | 21.00 | T-17S11* | 24 | 5.40 | T-19P65 | 18 | 37.20 | T-60S48* | 25 | 3.60 | T-84S58 | 24 | 7.20 |
| T-11M69 | 17 | 10.80 | T-15R02 | 21 | 15.90 | T-17S12* | 24 | 5.40 | T-19P66 | 18 | 49.80 | T-60R49 | 20 | 3.60 | T-84D59* | 11 | 3.90 |
| T-11M70 | 17 | 15.00 | T-15R03 | 21 | 16 50 | T-17S13* | 24 | 7.20 | T-19P67 | 18 | 60.00 | T-61S25* | 25 | 3.90 | T-84P60 | 18 | 9.00 |
| T-11M71 | 17 | 18.00 | T-15R04 | 21 | 9.00 | T-17S14 | 24 | 7.20 | T-19P68 | 18 | 70.20 | T-61S26* | 25 | 4.20 | T-84M70 | 16 | 12.00 |
| T-11M74 | 17 | 13.20 | T-15R05 | 21 | 15.90 | T-17S15 | 24 | 7.80 | T-19P69 | 18 | 18.00 | T-61F85 | 14 | 2.70 | T-86A02 | 5 | 2.70 |
| T-11M75* | 17 | 15.30 | T-15R06 | 21 | 14.70 | T-17S16 | 24 | 18.00 | T-19P70 | 18 | 13.80 | T-61A94* | 5 | 3.90 | T-86A03 | 4 | 2.70 |
| T-11M76* | 17 | 27.00 | T-15R07 | 21 | 15.90 | T-17S17 | 25 | 7.80 | T-19P71 | 18 | 16.80 | T-63R63— | 20 | 3.90 | T-87R85* | 21 | 9.00 |
| T-11M77* | 17 | 36.00 | T-15R08 | 21 | 19.20 | T-17S18 | 25 | 4.50 | T-19F75 | 14 | 2.70 | T-63F99 | 14 | 3.90 | T-89R28* | 21 | 13.80 |
| T-11M78* | 17 | 72.00 | T-15P11 | 19 | 16.80 | T-17R30* | 21 | 10.20 | T-19F76 | 15 | 5.70 | T-64F14 | 14 | 6.00 | T-89S68 | 24 | 7.80 |
| T-11K99 | 16 | 18.00 | T-15P12 | 19 | 19.20 | T-17R31 | 21 | 15.00 | T-19F77 | 15 | 9.90 | T-64M26 | 16 | 7.20 | T-89S74 | 24 | 4.50 |
| T-13R00 | 20 | 5.40 | T-15P13 | 19 | 28.80 | T-17R32 | 18 | 12.30 | T-19F78 | 15 | 6.90 | T-64F33 | 14 | 7.20 | T-89S75 | 24 | 4.80 |
| T-13R01* | 20 | 4.20 | T-15P14 | 19 | 36.00 | T-17R33 | 18 | 20.40 | T-19F79 | 15 | 8.10 | T-64F38 | 14 | 7.20 | T-90A02— | 7 | 20.40 |
| T-13R02* | 20 | 4.50 | T-15P15 | 19 | 42.00 | T-17R34 | 21 | 6.30 | T-19F80* | 14 | 1.60 | T-65A73 | 5 | 3.60 | T-90A03— | 7 | 20.40 |
| T-13R03* | 20 | 5.10 | T-15P16 | 19 | 63.00 | T-17R35 | 21 | 4.20 | T-19F81* | 14 | 1.80 | T-65S94 | 24 | 4.80 | T-90A05— | 7 | 20.40 |
| T-13R04 | 20 | 6.00 | T-15P17 | 19 | 45.00 | T-17R36 | 21 | 4.80 | T-19F82 | 14 | 6.00 | T-67C46* | 8 | 2.10 | T-90A06— | 7 | 20.40 |
| T-13R05* | 20 | 6.00 | T-15P18 | 19 | 84.00 | T-17R37 | 21 | 5.70 | T-19F83* | 14 | 2.70 | T-67D47 | 11 | 3.00 | T-90S07— | 26 | 21.60 |
| T-13R06* | 20 | 6.90 | T-15P19* | 19 | 81.00 | T-17R38 | 21 | 6.30 | T-19F84 | 14 | 3.30 | T-67S48 | 24 | 4.20 | T-90C09— | 7 | 15.00 |
| T-13R07 | 20 | 7.20 | T-15P20 | 19 | 120.00 | T-17C40 | 8 | 6.60 | T-19F85* | 14 | 4.80 | T-67C49* | 9 | 3.30 | T-90A10— | 7 | 20.40 |
| T-13R08 | 20 | 6.00 | T-15P21* | 19 | 114.00 | T-17A42 | 5 | 12.00 | T-19F86 | 14 | 6.60 | T-67D50 | 11 | 3.30 | T-90S12— | 26 | 20.40 |
| T-13R09 | 20 | 7.50 | T-15C30 | 8 | 6.00 | T-17A43 | 5 | 12.00 | T-19F87 | 14 | 7.50 | T-67S51* | 24 | 4.20 | T-92F20— | 14 | 6.30 |
| T-13R11* | 20 | 3.90 | T-15C31 | 8 | 7.20 | T-17S57 | 25 | 2.70 | T-19F88* | 14 | 2.40 | T-67S52 | 24 | 4.80 | T-92R21* | 21 | 9.00 |
| T-13R12* | 20 | 4.50 | T-15C32 | 8 | 9.60 | T-17M59* | 16 | 3.30 | T-19F89 | 14 | 2.70 | T-67S54* | 24 | 4.80 | T-92R33 | 19 | 5.40 |
| T-13R13* | 20 | 5.40 | T-15C34 | 8 | 10.80 | T-18V00* | 27 | 12.60 | T-19F90* | 14 | 3.60 | T-67M69 | 16 | 3.30 | T-92R53 | 21 | 6.90 |
| T-13R14* | 20 | 6.00 | T-15C36 | 9 | 10.80 | T-18V01* | 27 | 23.40 | T-19F91 | 14 | 3.00 | T-67M73— | 16 | 4.20 | T-93C20 | 8 | 3.30 |

THIS catalog presents the complete Thordarson line of transformers and chokes for radio replacement, amplifier, amateur transmitter, commercial laboratory and experimental use. Several choices are offered in mounting style, coil impregnation and electrical characteristics. Each unit, is built by highly skilled Thordarson craftsmen, and of finest quality materials is the result of experience gained in over 46 years of transformer design and manufacture.

### THORDARSON AIR COOLED TRANSFORMERS AND CHOKES

These units are compact and comparatively light in weight. They are designed for consistent performance at rated characteristics. Open frame styles are 2B, 3B, 2C, 3C, 2E, and 3E. Mounting styles 3A, 2D, 4D, 4E, 2F, 2G, 4G, 2H, 2J, 2K, 2M, 2N, 2V, and 2W are mechanically shielded. Cases 2Q and 3V are compound filled for complete coil protection.

### THORDARSON C.H.T. TRANSFORMERS AND CHOKES

A premium quality line offering these outstanding advantages: *Uniform case design, conservative ratings, extended frequency range, humbucking coils in audio and driver types, plug-in jack terminal board, compound filled cases for complete coil protection against humidity.*

### THORDARSON TRU-FIDELITY TRANSFORMERS

Tru-Fidelity transformers, as the name implies, make possible better audio response. Superior coil and core materials, the result of metallurgical research, are used throughout. Every Tru-Fidelity unit is engineered and manufactured to precision standards. A representative listing of Incher, Bantam and Major types is included in the Audio listing. Major output units are catalogued in the Output transformer section. For information on the complete line of Thordarson Tru-Fidelity components see Catalog No. 500.

### COIL IMPREGNATION

Salt air and high humidity are formidable enemies of transformer life. A very minute absorption of salt laden moisture by a fine wire audio coil may result in fatal electrolytic action and corrosion. This is especially true of fine wire audio coils which operate with direct current voltage above ground, since this polarizing voltage in combination with an extremely minute salt concentration will drive electrolytic currents from the copper wire to ground. While this current may be much less than a microampere it will, over a period of time, take enough copper from the fine wire to cause an open circuit.

Radio receiver power transformers and the larger amateur type transformers are not nearly so subject to the electrolytic and corrosive action as the small fine wire audio transformers. This is due partly to the fact that the coils on these transformers do not have a direct current voltage applied between them and the ground. The alternating current voltage present is not nearly as effective in driving electrolytic current as a direct current potential. The wire sizes used on these transformers are ordinarily so large that even though a minute electrolytic current might be present it would take a very long time (years in most cases) for enough copper to be taken to open the coil or cause trouble. Then, too, there is usually enough heat generated in these transformers, since they are power operating units, to drive out moisture which might otherwise be absorbed.

It has been found that many common impregnating compounds, while for most purposes considered waterproof, are yet hydroscopic enough to permit a fatal amount of moisture absorption if it is accompanied with salt. Complete enclosure of the core and coil in cases filled with moisture-proof high melting compounds as used in Thordarson C.H.T. and Tru-Fidelity components is the best protection against such action.

### TROPEX

Space and weight considerations are often as important as coil protection; here an open frame mounting is most desirable. Thordarson Tropex coating was developed for full protection on such mountings. The Tropex coating is *entirely* impervious to moisture and fully protects the coil against salt moisture conditions. Tropex is a special process which may be applied to any Thordarson open mounting type transformer or choke. It is especially adaptable to fine wire audio transformers and chokes and is not ordinarily recommended for power transformers nor for encased types.

The additional cost for Thordarson Tropex transformers is surprisingly small. The following table has been compiled to enable you to easily determine this price increase by referring to the weight of the transformer as listed. When ordering Tropex add an "X" to the regular type number. For example, T-13S38-X is the Tropex equivalent of T-13S38.

| WEIGHT OF TRANSFORMER | ADD TO LIST PRICE |
|---|---|
| Up to 7/8 lb. | $ .40 |
| From 1 lb. to 1 7/8 lbs. | .50 |
| From 2 lbs. to 2 7/8 lbs. | .70 |
| From 3 lbs. to 4 7/8 lbs. | .85 |
| From 5 lbs. to 6 7/8 lbs. | 1.00 |
| Over 7 lbs. | 18c per lb. |



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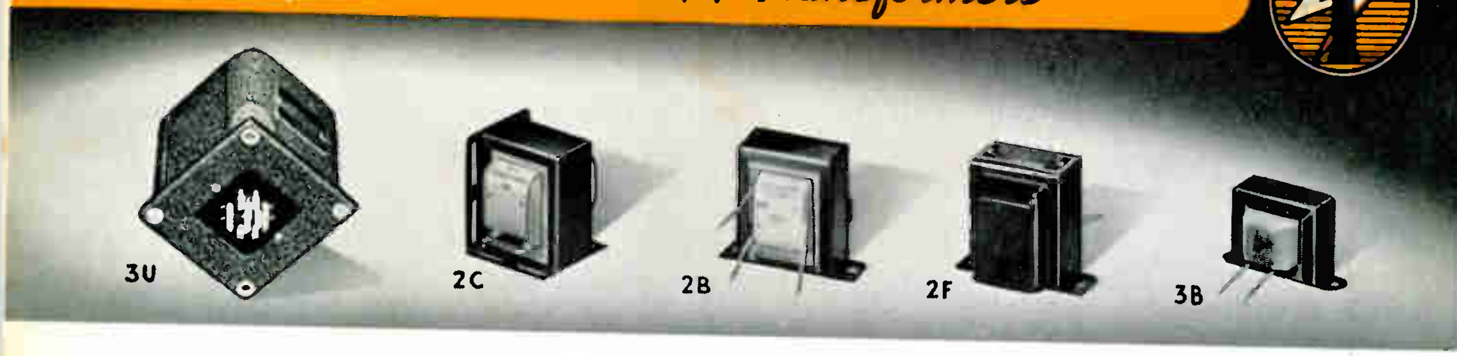
# THORDARSON Audio (A) Transformers




## AUDIO (A) INTERSTAGE TRANSFORMERS

For coupling the plate or plates of an amplifier stage to the grid or grids of the next stage where grid current is not drawn. C. H. T. interstage audio transformers have hum-bucking coil construction and balanced windings. Frequency response, using parallel feed in the primary winding, is flat within ± 1½ db from 60 to 8,000 c.p.s.

### Single Plate To Single Grid

*Maximum Signal Level + 15 db. †Parallel feed recommended.

| Type No. | List Price | Classification | Turns Ratio | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-13A34 | $1.60 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ T-29A99 | 2.40 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| T-57A36 | 2.70 | | | | | | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-47A25 | 2.70 | | | | | | 2C | 1 9/16 | 1 1/2 | 2 1/8 | 2 1/4 | 2 3/8 | 1 |
| T-75A74 | 3.30 | RECEIVER | 2:1 | 10,000 | 40,000 | 8 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| For super-regenervative detector; has static shield between windings. | | | | | | | | | | | | | |
| T-57A38 | 3.60 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-15A73–* | 9.00 | C.H.T. | 2:1 | 10000/2500 | 40000/10000 | 10† | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |

### Single Plate To Push-Pull Grids

*Max. signal level + 15 db. †Parallel feed recommended.

| Type No. | List Price | Classification | Turns Ratio | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-14A92 | $1.60 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| ★ T-13A35 | 1.80 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ T-33A91 | 2.40 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 3/8 | | 2 7/8 | 2 1/16 | 2 3/8 | 1 1/4 |
| T-86A03 | 2.70 | | | | | | 3B | 2 3/4 | | 3 3/16 | 2 1/16 | 2 | 1 1/2 |
| T-14A29 | 3.00 | | | | | | 2C | 1 1/2 | 1 1/2 | 2 | 1 15/16 | 2 3/8 | 1 1/4 |
| T-57A39 | 3.00 | | | | | | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-57A40 | 3.90 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| ★ T-57A41 | 4.20 | | | | | | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-74A31 | 4.20 | AMPLIFIER | 1:1 | 10,000 | 10,000 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-57A42 | 4.20 | RECEIVER (large) | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| For coupling screen grid or power detector (Clarion AC-60). | | | | | | | | | | | | | |
| ★ T-15A74* | 8.40 | C.H.T. | 2:1 | 10,000/2,500 | 40,000/10,000 | 10† | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |

### Push-Pull Plates To Push-Pull Grids

*Maximum signal level + 15 db. †Each side.

| Type No. | List Price | Classification | Turns Ratio | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13A36 | $2.40 | RECEIVER (midget) | 1:1 | 20,000 | 20,000 | 8† | 3B | 2 11/16 | | 3 1/16 | 1 3/4 | 2 | 1 |
| T-67A91 | 4.20 | AMPLIFIER | 1.5:1 | 20,000 | 45,000 | 10† | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| ★ T-58A70 | 4.50 | Has split Secondary. | | | | | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-15A75* | 8.70 | C.H.T. | 1.5:1 | 20,000/5,000 | 45.000/11,250 | 10† | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |

### Universal Interstage Replacement Transformer

Will couple single plate to single grid, single plate to push-pull grids or push-pull plates to push-pull grids. Has split secondary.

| Type No. | List Price | Classification | Turns Ratio | Ohms Impedance | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-17A02 | $3.00 | RECEIVER | 3:1 | Universal | 10 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |

## MICROPHONE CABLE TRANSFORMERS

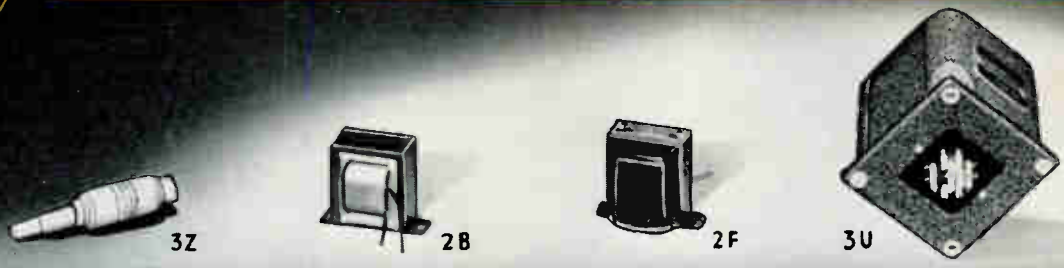
Permit quick and efficient change from high to low impedance microphone input on any amplifier. Hum pick-up is reduced to a minimum through the use of magnetic shielding. As the illustration shows, these Microphone Cable transformers, exclusively Thordarson, are connected in series with the microphone cable and the amplifier input connector and are small and inconspicuous. Frequency Response ±1½ db from 30 to 15,000 c.p.s.

| Type No. | List Price | Ohms Impedance Pri. | Ohms Impedance Sec. | Turns Ratio | Mtg. Fig. | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs |
|---|---|---|---|---|---|---|---|---|---|
| T-14A75 | $17.40 | 30–50 | 50,000 | 1:31.6 | 3Z | 1 | 1 | 2 11/16 | 3/4 |
| T-14A76 | 17.40 | 200–250 | 50,000 | 1:14.14 | 3Z | 1 | 1 | 2 11/16 | 3/4 |



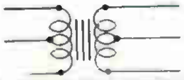
*Prices subject to change without notice.*

# *Audio (A) Transformers* — THORDARSON




## AUDIO (A) INPUT TRANSFORMERS

For coupling a signal source to the grid or grids of a Class A amplifier stage. Frequency range of C. H. T. types is flat within ± 1½ db from 60 to 8,000 c.p.s. Other features include hum-bucking coil construction and balanced windings.



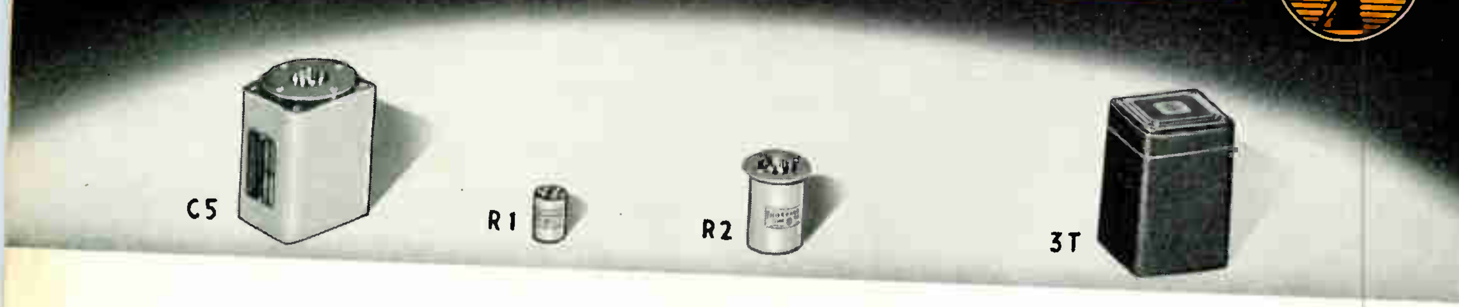
| Type No. | List Price | Application | Ohms Impedance Pri. | Ohms Impedance Sec. | Turns Ratio | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Low Impedance Source (Microphone, Line or Mixer) to Grid** | | | | | | | | | | |
| T-65A73 | $3.60 | DB mike to grid | 200/50 | 100,000 | 1:22.2 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 |
| T-58A37 | 2.70 | DB mike to grid | 200/50 | 100,000 | 1:22.2 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ T-83A78 | 2.70 | Single button mike to single or P-P grids | 100 | 400,000 Ct. | 1:64 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| T-86A02 | 2.70 | | | | | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| ★ T-55A16 | 3.30 | Dyn. mike, line or mixer to single or P-P grids | 200/50 | 100,000 Ct. | 1:22.3 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ T-61A94 | 3.90 | Line to single or P-P Cl.A grids | 500/125 | 100,000 Ct. | 1:14.1 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-72A59 | 2.00 | Plate and Single Button microphone to grid | 5,000<br>200 | 100,000 | 1:3.25<br>1:35 | 2B | 2 1/8 | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| T-14A94 | 3.00 | Voice Coil to grid | 4-8 | 100,000 | 1:112 | 2B | 2 3/8 | | 2 7/8 | 2 1/16 | 2 3/8 | 1 |
| T-15A66 | 9.60 | C.H.T. Low Impedance to grid | 500/333/250/200/125/50 | 60,000/15,000 Single Grid | 1:10.95 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/4 |
| T-15A67 | 9.60 | C.H.T. Low Impedance P-P grids | 500/333/250/200/125/50 | 120,000/30,000 P-P Grids | 1:15.5 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/4 |
| T-15A68 | 9.60 | C.H.T. Low Impedance to single grid | 60/38/30/22/15/10/5.5/2.5 | 60,000/15,000 Single Grid | 1:31.6 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |
| T-17A42 | 12.00 | C.H.T. With Triple Telescopic High-Permeability Magnetic Shields | 500†/333/250/200†/125/50 | 50,000 Single Grid | 1:10 | 3U | 2 3/8<br>Min. level —20 db. | 1 7/8 | 3 | 2 1/2 | 3 1/8 | 1 1/4 |
| | | **Microphone or Line to Mixer or Line** | | | | | | | | | | |
| T-70A82 | $4.20 | DB mike to line | 200/50 | 500/125 | 1:1.68 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-70A83 | 4.20 | Crystal mike to line or mixer | 100,000 | 200/50 | 1:22.4 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-15A69 | 9.60 | C.H.T. Low Impedance to mixer or line | 500/333/250/200/125/50 | 500/333/250/200/125/50 | 1:1 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 |
| T-15A70 | 9.60 | C.H.T. Dyn. mike to mixer or line | 60/38/30/22/15/10/5.5/2.5 | 500/333/250/200/125/50 | 1:2.88 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 |
| | | **Tube to Line or Mixer (Low Level)** | | | | | | | | | | |
| ★ T-14A90 | $3.00 | Sgl. or P-P Plates to line or mixer | 20,000 Ct. | 500/125 | 8* | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ T-14A91 | 3.00 | Sgl. or P-P Plates to line or mixer | 20,000 Ct. | 200/50 | 8* | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-72A59 | 2.00 | Plate and sgl. button mike to grid | 5,000 and 200 | 100,000 | 10* | 2B | 2 1/8 | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| T-15A71 | 9.60 | C.H.T. single plate to line or mixer. | 20,000/5,000 Single Plate | 500/333/250/200/125/50 | 8* | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 1 3/4 |
| T-15A72 | 9.60 | C.H.T. P-P plates to line or mixer. | 20,000/5,000 P-P Plates | 500/333/250/200/125/50 | 0* | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 1 3/4 |
| T-17A43 | 12.00 | C.H.T. With Triple Telescopic High-Permeability Magnetic Shields | 10,000 to 15,000 | 500†/333/250/200†/125/50 | 0* | 3U | 2 3/8 | 1 7/8 | 3 | 2 1/2 | 3 1/8 | 1 1/4 |

†Indicates balanced center tap. *Indicates Primary M.A.

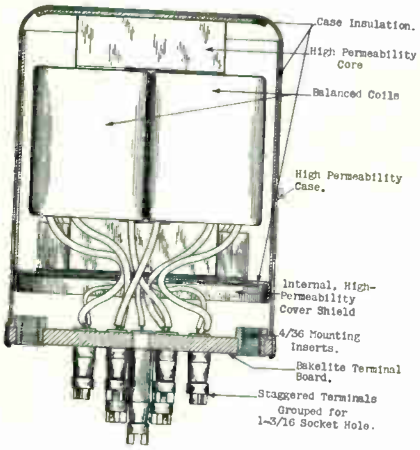


*Prices subject to change without notice.*

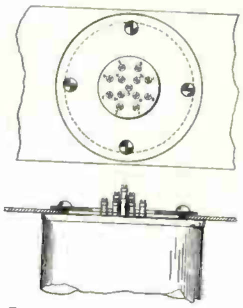
# Audio (A) Transformers




## TRU-FIDELITY BANTAM SERIES




*Cross sectional view, Bantam Transformer*



*Bottom view, illustrating ring mounting as used in Bantam and Major Series Transformers*

- One piece drawn high permeability alloy case. Case style R2.
- Maximum operating level + 10 db.
- Uniform frequency response ± 1 db from 30 to 15,000 c.p.s. (Except where otherwise noted).
- Balanced (humbucking) coil construction.
- Electrostatic shields. (Except Interstage types.)
- Relative hum reduction 67 db.
- High permeability alloy laminations.
- Moisture-proof compound filled case.
- One-hole ring mounting, permitting rotation of transformers for maximum hum reduction.
- Grey enamel finish. (Chrome plated case $1.25 list extra.)
- Sturdy solder lugs, machined from solid brass and tinned for quick soldering.
- Terminals arranged circularly to fit within standard tube socket hole.

**R2 CASE DIMENSION—BANTAM**

| | |
|---|---|
| Diameter | 1 9/16 |
| Height (Including lugs) | 2 9/16 |
| Height (Case alone) | 2 |
| Mounting centers | 1 5/16 x 1 5/16 |

| Type No. | List Price | Application | Ohms Impedance Primary | Ohms Impedance Secondary | Primary Max. D.C. Per Side | M.A. Un-balance |
|---|---|---|---|---|---|---|
| T-1A50 | $17.40 | Low impedance mixer, pick-up or multiple line | 50/125/200*/250 333/500* | 50,000 | 75 | .5 |
| T-1A51 | 17.40 | Low impedance mixer, pick-up or multiple line | 2.5/5.5/10*/22*/30 38/60* | 50,000 | 75 | .5 |
| T-1A52 | 18.60 | Dynamic Microphone | 30*/7.5 | 50,000 overall in two sections | 0 | 0 |
| T-1A53 | 18.60 | Low impedance pick-up, microphone or line | 50/125/200*/250 333/500* | 80,000 overall in two sections | 75 | .5 |
| T-1A54 | 16.80 | Single plate to multiple line No D.C. in primary | 10,000 to 15,000 | 50/125/200*/250 333/500* | 0 | 0 |
| T-1A55 | 17.40 | Single plate to multiple line D.C. in primary † | 10,000 | 50/125/200*/250 333/500* | 4 | 4 |
| T-1A56 | 18.00 | Single triode 6F6 etc. to line D.C. in primary §† | 4,000 | 50/125/200*/250 333/500* | 25 | 25 |
| T-1A57 | 16.80 | PP low level plates to multiple line | 10,000 to 15,000 each side | 50/125/200*/250 333/500* | 8 | 0 |
| T-1A59 | 16.80 | Single plate to single grid Ratio 1:2 | 10,000 to 15,000 | 60,000 | 0 | 0 |
| T-1A60 | 16.80 | Single plate to push-pull grids Ratio 1:2.31 | 10,000 to 15,000 | 80,000* overall in 2 sections | 0 | 0 |

* Indicates balanced c.t. §Max. + 22 db. †60 to 15,000 c.p.s.

## TRU-FIDELITY BANTAM AUDIO REACTORS

| Type No. | List Price | Application | Inductance No D.C. | Inductance Rated D.C. | M.A. D.C. | Ohms Res. D.C. |
|---|---|---|---|---|---|---|
| T-1C62 | $12.00 | Parallel feed | 475 | 320/80 | 2/4 | 6,000/1,500 |
| T-1C63 | 12.00 | Parallel feed | 450 | 200/50 | 4/8 | 5,000/1,250 |





Prices subject to change without notice.

## TRU-FIDELITY INCHER SERIES

- Especially small and lightweight — 15/16" diameter, 1 1/8" high and wt. 1 1/4 oz. Case style R1.
- Maximum operating level 0 db (6 milliwatts).
- Uniform frequency response ± 1 1/2 db from 30 to 15,000 c.p.s. (Except where otherwise noted.)
- Single coil shell type construction.
- Electrostatic shields. (Except Interstage types.)
- Minimum hum pick-up.
- High permeability alloy laminations.
- Moisture-proof compound filled case.
- Grey enamel finish. (Chrome plated case 75c list extra.)
- Sturdy solder lugs machined from solid brass and tinned for quick soldering.

**CASE DIMENSIONS**

| | R1 | 3T | C5 |
|---|---|---|---|
| Diameter | 15/16 | | |
| Width | | 3 1/16 | 3 1/8 |
| Depth | | 2 9/16 | 2 5/8 |
| Height | 1 1/8 | | 3 5/8 |
| Height (Including lugs) | 1 1/4 | 4 1/8 | 4 5/16 |
| Mounting Centers (Width) | 23/32 | 2 3/8 | 2 1/8 |
| Mounting Centers (Depth) | | 1 7/8 | 2 1/8 |
| Weight | 1 1/4 oz. | 4 3/4 | 4 3/4 |

| Type No. | List Price | Application | Ohms Impedance Primary | Ohms Impedance Secondary | Primary Max. D.C. Per Side | M.A. Un-balance |
|---|---|---|---|---|---|---|
| T-5A1 | $12.60 | Mike, Line or Pick-up to Single Grid | 50/200*/500* | 50,000 | 25 | .5 |
| T-5A2 | 13.20 | Mike, Line or Pick-up to P-P Grids | 50/200*/500* | 80,000* | 25 | .5 |
| T-5A3 | 11.40 | Dynamic Microphone to Single Grid | 7.5/30* | 50,000 | 0 | 0 |
| T-5A4 | 10.50 | Single Plate to Single Grid Ratio 1:2 | 10,000 to 15,000 | 60,000 | 0 | 0 |
| T-5A5 | 9.60 | ★Single Plate to Single Grid, D.C. in Primary, Ratio 1 to 2 | 10,000 to 15,000 | 60,000 | 2 | 2 |
| T-5A7 | 12.00 | ★Single Plate to P-P Grids, D.C. in Primary, Ratio 1 to 2.5 | 10,000 to 15,000 | 95,000* | 2 | 2 |
| T-5A8 | 12.60 | P-P Plates to P-P Grids, Ratio 1 to 1.5 | 10,000 to 15,000 each side | 67,500* | 2 | .25 |
| T-5A9 | 12.60 | Single Plate to Line | 10,000 to 15,000 | 50/200*/500* | 0 | 0 |
| T-6A0 | 12.60 | ★Single Plate to Line, D.C. in Primary | 10,000 to 15,000 | 50/200*/500* | 2 | 2 |
| T-6A1 | 12.60 | Push-pull Plates to Line | 10,000 to 15,000 each side | 50/200*/500* | 2 | .25 |
| T-6A3 | 11.40 | Matching and Mixing | 50/200*/500* | 50/200* | 25 | .5 |
| T-6A4 | 12.00 | ★50:1 Mike or Line to Single Grid | 200 | 500,000 | 10 | 10 |

★ Voice Frequencies Only, 150 to 6000 cycles. *Center tapped.

## TRU-FIDELITY MAJOR SERIES

- High operating level.
- Uniform frequency response ± 1/2 db from 30 to 15,000 c.p.s.
- Balanced (hum-bucking) coil construction.
- Electrostatic shields. (Except Interstage Types.)
- High permeability alloy laminations.
- Moisture-proof compound filled case.
- One-hole ring mounting, permitting rotation of transformers for maximum hum reduction.
- Grey enamel finish cast case.
- Sturdy solder lugs machined from solid brass and tinned for quick soldering.
- Terminals circularly arranged to fit within standard socket hole.

Special Major transformers to meet other audio requirements will be quoted on application.

| Type No. | List Price | Ohms Impedance Primary | Ohms Impedance Secondary | Primary Max. D.C. Per Side | M.A. Un-balance | Max. Sig. Level DB | Case Style |
|---|---|---|---|---|---|---|---|
| **CRYSTAL MICROPHONE OR PHOTO CELL TO LINE** | | | | | | | |
| T-90A06- | $20.40 | 250,000/62,500 | 500*/125/200*/50 | 0 | 0 | +10 | 3T |
| **PLATE TO LINE (LOW LEVEL)** | | | | | | | |
| T-90A02- | 20.40 | 20,000/5000 Single Plate | 500*/125/200*/50 | 8 | 8 | +15 | 3T |
| T-3A32 | 21.00 | 20,000/5000 Single† or P-P Plates | 500*/125/200*/50 | 10 | 0 | +20 | C5 |
| **MIXER** | | | | | | | |
| T-90A10- | 20.40 | 500*/125/200*/50 | 500*/125/200*/50 | 100 | .5 | +10 | 3T |
| **LINE TO GRID** | | | | | | | |
| T-2A66 | 21.60 | 500*/125/200*/50 | 75,000/18,750 Single Grid | 100 | .5 | +10 | C5 |
| T-2A68 | 22.80 | 500*/125/200*/50 | 100,000*/25,000 P-P Grids | 100 | .5 | +20 | C5 |
| **INTERSTAGE** | | | | | | | |
| T-90A03- | 20.40 | 10,000/2500 Ratio overall Single Plate 1 to 2 | 40,000/10,000 Single Grid | 0 | 0 | +15 | 3T |
| T-2A36 | 21.00 | 10,000/2500 Ratio overall Single Plate 1 to 2 | 40,000/10,000 P-P Grids | 0 | 0 | +15 | C5 |
| T-90A05- | 20.40 | 20,000/5000 Ratio overall P-P Plates 1 to 1.5 | 45,000/11,250 P-P Grids | 10 | 0 | +20 | 3T |

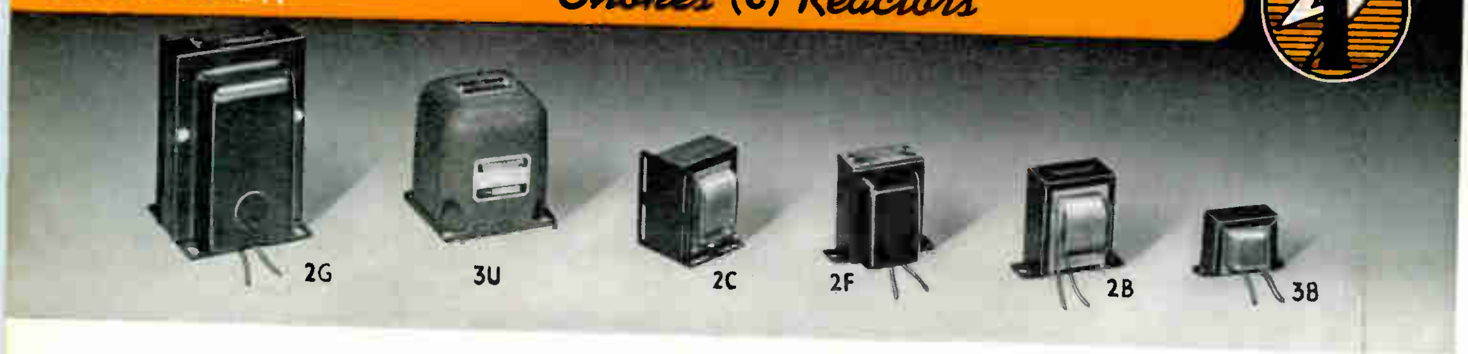
**PLATE REACTOR**

| Type No. | List | Connection | Henries | M.A. | D.C. Ohms | Case Style |
|---|---|---|---|---|---|---|
| T-90C09- | $15.00 | Series<br>Parallel | 300<br>75 | 8<br>16 | 4,000<br>1,000 | 3T |

* Indicates inductive and capacitive balance to center tap for use on balanced transmission lines.
† With single tube use parallel feed with resistor or T-90C09.



Prices subject to change without notice.




## CHOKES AND REACTORS (C)

It is well known that as the D.C. current in a choke increases, there is a corresponding decrease in inductance. Thordarson chokes are rated at actual inductance, measured under full operating load conditions.
R. M. S. test volts rating as shown is approximately 2 times the operating D.C. voltage recommended.

### Parallel Feed Audio Reactors

For supplying plate current to a vacuum tube where it is desirable to isolate plate current from the transformer primary or where the voltage drop caused by a resistor load is objectionable.

| Type No. | List Price | Application | Typical Tubes | Induct. Hen. | Cur. M.A. | D.C. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-37C36 | $2.40 | Plate Impedance | 56-30-76-6C5-55-85, etc. | 300 | 5 | 6470 | 1600 | 2F | 2 3/8 | | 2 7/8 | 2 1/16 | 2 3/8 | 1 1/2 |
| ★ T-67C46 | 2.10 | | | | | | | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| T-52C98 | 2.40 | Plate Impedance for screen Grid detector or as grid impedance | 24-57-56-76-6C5-6F5-6J7 | 500 | .5 | 6150 | 1600 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| ★ T-29C27 | 2.10 | | | | | | | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| T-68C08 | 2.10 | Plate Impedance or Filter | 45-46-10, etc. | 22 | 35 | 405 | 1600 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ T-18C92 | 1.80 | | | | | | 1100 | 3B | 2 3/4 | | 3 3/16 | 2 1/8 | 2 | 1 1/2 |

### Tuned Audio Circuit Reactors

| Type No. | List Price | Application | Typical Tubes | Induct. Hen. | Cur. M.A. | D.C. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-81C15 | $2.40 | Tuned Audio Circuits | | .75 | .5 | 30 | | 2B | 2 1/8 | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| T-93C20 | 3.30 | Tuned Audio Circuits | | 250 | .5 | 6400 | | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| ★ T-74C30 | 1.80 | Tuned Audio Circuits or Filter | | 42 | 15 | 2100 | | 3B | 2 11/16 | | 3 1/16 | 1 3/4 | 2 | 1 |

## DUAL TONE CONTROL COMPONENTS

As illustrated and described in Amplifier Guide 346D

| Type No. | List Price | Application | Typical Tubes | Induct. Hen. | Cur. M.A. | D.C. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-14C70 | $3.00 | Tone Control, hum-bucking type | | 22 | 0 | 220 | | 3Y | 1 7/16 | | 1 9/16 | 1 9/16 | 2 1/4 | 1/2 |
| ★ R-1068 | 3.00 | Dual tone control potentiometer | | | | | | | | | | | | |

## C. H. T. SPEECH FILTER

This hi-pass filter with a cut-off below 200 c.p.s. provides a definite increase in effective side band power and corresponding reduction of hum pick-up. It may be used instead of an interstage audio transformer to couple a single plate to single or push-pull grids.

| Type No. | List Price | Application | Typical Tubes | Induct. Hen. | Cur. M.A. | D.C. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15C34 | $10.80 | Plate to Single or P.P. tubes | | | | | | 3U | 2 3/8 | 2 1/8 | 3 | 2 3/4 | 4 | 3 |

## C. H. T. SPLATTER CHOKES

These tapped chokes are used between any Class B modulator and any Class C stage for eliminating objectionable side band splatter due to excessive audio distortion. Full instructions for operation are furnished.

| Type No. | List Price | Application | Typical Tubes | Induct. Hen. | Cur. M.A. | D.C. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15C30 | $6.00 | Elimination of side band Splatter | | .025 to .8 | 150 | 54 | 3000 | 3U | 2 3/8 | 1 7/8 | 3 | 2 1/2 | 3 1/8 | 2 1/4 |
| T-15C31 | 7.20 | | | .025 to .8 | 300 | 20 | 5000 | 3U | 2 3/8 | 2 3/4 | 3 | 3 3/8 | 4 5/16 | 4 1/2 |
| T-15C32 | 9.60 | | | .025 to .8 | 500 | 14 | 7500 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 5 3/4 |

## C.H.T. AMPLIFIER CHOKES

Two inductance ratings are shown, one for parallel connection of the two windings and the other for series connection. Cases are compound filled for complete coil protection.

| Type No. | List Price | Inductance Henries | Current M.A. | D.C. Res. | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-15C52 | $6.60 | 30 Parallel<br>120 Series | 35<br>17 | 675<br>2700 | 1,600 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 3 |
| T-15C53 | 6.90 | 12 Parallel<br>50 Series | 100<br>50 | 272<br>1090 | 1,600 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 3 1/4 |
| ★ T-15C54 | 7.50 | 8 Parallel<br>32 Series | 150<br>75 | 184<br>735 | 1,600 | 3U | 2 3/8 | 2 3/4 | 3 | 3 3/8 | 4 5/16 | 3 1/2 |
| T-15C55 | 9.00 | 2 Parallel<br>8 Series | 500<br>250 | 32<br>130 | 1,600 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 7 1/2 |
| T-15C56 | 12.00 | 2 Parallel<br>8 Series | 700<br>350 | 27<br>107 | 1,600 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 9 3/4 |

### Television Filter Reactor

| Type No. | List Price | Inductance Henries | Current M.A. | D.C. Res. | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-17C40 | $6.60 | 1500 | 3 | 12,000 | 10,000 | 2F | 3 3/8 | | 3 13/16 | 3 1/16 | 3 1/2 | 2 1/4 |



Prices subject to change without notice.

## FILTER AND INPUT CHOKES

### Replacement Filter Chokes

| | Type No. | List Price | Inductance At Zero D.C. | Inductance At Rated D.C. | Current Rating M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ | T-13C26 | $1.10 | 21 | 8 | 40 | 530 | 1600 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| ★ | T-13C27 | 1.30 | 22 | 10 | 40 | 475 | 1600 | 3B | 2 3/8 | | 2 15/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ | T-13C28 | 1.45 | 20 | 10 | 65 | 460 | 1600 | 3B | 2 11/16 | | 3 1/16 | 1 3/4 | 2 | 1 |
| ★ | T-43C92 | 2.00 | 24 | 10 | 75 | 260 | 1600 | 2C | 1 9/16 | 1 1/2 | 2 1/8 | 2 | 2 3/8 | 1 1/4 |
| ★ | T-47C07 | 2.00 | 20 | 12 | 75 | 410 | 1600 | 3B | 3 1/8 | | 3 9/16 | 2 | 2 1/4 | 1 1/4 |
| ★ | T-44C02 | 1.80 | 31 | 12 | 80 | 405 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 1/8 | 2 | 1 1/4 |
| ★ | T-57C51 | 1.80 | 15 | 6 | 80 | 138 | 1600 | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| ★ | T-13C29 | 1.90 | 20 | 9 | 85 | 250 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 1/8 | 2 | 1 1/2 |
| ★ | T-68C07 | 2.40 | 32 | 15 | 85 | 375 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 |
| ★ | T-57C53 | 2.40 | 27 | 10 | 110 | 200 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ | T-75C49 | 1.80 | 22 | 8 | 120 | 290 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 1/8 | 2 | 1 1/2 |
| | T-53C19 | 1.80 | | | | | | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ | T-13C30 | 2.40 | 25 | 8 | 150 | 200 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 1/4 |

### Filter Chokes for Replacement in AC-DC Receivers

| | Type No. | List Price | Inductance At Zero D.C. | Inductance At Rated D.C. | Current Rating M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T-14C61 | $1.20 | 14 | 7 | 55 | 200 | 1600 | 3B | 2 3/8 | | 2 15/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ | T-14C62 | 1.20 | 16 | 8 | 55 | 250 | 1600 | 3B | 2 3/8 | | 2 15/16 | 1 5/8 | 1 5/8 | 3/4 |
| | T-14C63 | 1.20 | 19 | 8 | 55 | 300 | 1600 | 3B | 2 3/8 | | 2 15/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ | T-14C64 | 1.20 | 21 | 10 | 55 | 350 | 1600 | 3B | 2 3/8 | | 2 15/16 | 1 5/8 | 1 5/8 | 3/4 |

### Filter Chokes for Amplifiers and Small Transmitters

| | Type No. | List Price | Inductance At Zero D.C. | Inductance At Rated D.C. | Current Rating M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T-57C52 | $2.10 | 15 | 5 | 80 | 138 | 1600 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ | T-16C07 | 2.70 | 32 | 15 | 85 | 375 | 1600 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ | T-57C54 | 2.70 | 27 | 10 | 110 | 200 | 1600 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| | T-49C91 | 2.10 | 12 | 4 | 120 | 160 | 1600 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| ★ | T-17C00-B | 3.30 | 28 | 12 | 150 | 231 | 1600 | 2F | 3 3/8 | | 3 15/16 | 3 | 3 1/2 | 3 3/4 |
| ★ | T-74C29 | 4.80 | 29 | 15 | 150 | 200 | 2000 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/4 |
| ★ | T-67C49 | 3.30 | 12 | 5 | 200 | 80 | 1600 | 2F | 3 11/32 | | 3 15/16 | 3 1/16 | 3 1/2 | 3 3/4 |
| ★ | T-75C51 | 6.00 | 24 | 13 | 250 | 121 | 1600 | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 7/8 | 8 |

## TRANSMITTER INPUT AND FILTER CHOKES

Matched input and smoothing chokes for amateur, amplifier or experimental applications.

### Input Chokes "19" Series

| | Type No. | List Price | Inductance Henries | Current D.C. M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ | T-19C39 | $3.90 | 5-20 | 150 | 215 | 3000 | 2F | 3 3/8 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 3/4 |
| ★ | T-19C35 | 4.80 | 5-20 | 200 | 130 | 3000 | 2D | 3 1/4 | 2 1/16 | 3 3/4 | 3 3/8 | 4 | 5 1/2 |
| ★ | T-19C36 | 8.40 | 5-20 | 300 | 105 | 5000 | 2D | 2 3/4 | 3 1/16 | 3 15/16 | 4 7/8 | 4 5/8 | 10 3/4 |
| | T-19C37 | 15.00 | 5-20 | 400 | 90 | 5000 | 2J | 3 1/4 | 3 7/8 | 4 1/4 | 5 1/2 | 6 | 19 1/2 |
| ★ | T-19C38 | 18.00 | 5-20 | 500 | 75 | 5000 | 2J | 3 7/8 | 3 3/4 | 5 | 5 1/2 | 6 5/8 | 25 1/4 |

### Smoothing Chokes "19" Series

| | Type No. | List Price | Inductance Henries | Current D.C. M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ | T-19C46 | $3.90 | 12 | 150 | 215 | 3000 | 2F | 3 3/8 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 3/4 |
| ★ | T-19C42 | 4.80 | 12 | 200 | 130 | 3000 | 2D | 3 1/4 | 2 1/16 | 3 3/4 | 3 3/8 | 4 | 5 1/2 |
| ★ | T-19C43 | 8.40 | 12 | 300 | 105 | 5000 | 2D | 2 3/4 | 3 1/16 | 3 15/16 | 4 7/8 | 4 5/8 | 10 3/4 |
| | T-19C44 | 15.00 | 12 | 400 | 90 | 5000 | 2J | 3 1/4 | 3 7/8 | 4 1/4 | 5 1/2 | 6 | 19 3/4 |
| ★ | T-19C45 | 18.00 | 12 | 500 | 75 | 5000 | 2J | 3 7/8 | 3 3/4 | 5 | 5 1/2 | 6 5/8 | 25 1/4 |

### C.H.T. Input Chokes

Conservatively designed for continuous and quiet operation. Cases are compound filled for complete coil protection.

| Type No. | List Price | Inductance Henries | Current D.C. M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15C36 | $10.80 | 5-25 | 200-20 | 105 | 4,000 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 10 |
| T-15C37 | 15.00 | 5-25 | 300-30 | 78 | 4,000 | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 15/16 | 6 3/8 | 22 |
| T-15C38 | 18.00 | 5-25 | 400-30 | 95 | 4,000 | 3U | 4 9/16 | 4 3/4 | 5 3/8 | 5 1/2 | 6 3/8 | 24 |
| T-15C39 | 27.00 | 5-25 | 500-30 | 86 | 10,000 | 3U | 6 5/16 | 5 7/16 | 7 5/16 | 6 7/16 | 8 | 38 1/2 |
| T-15C41 | 33.00 | 5-25 | 650-50 | 46 | 10,000 | 3U | 6 5/16 | 5 7/16 | 7 5/16 | 6 7/16 | 8 | 51 |

### C.H.T. Smoothing Chokes

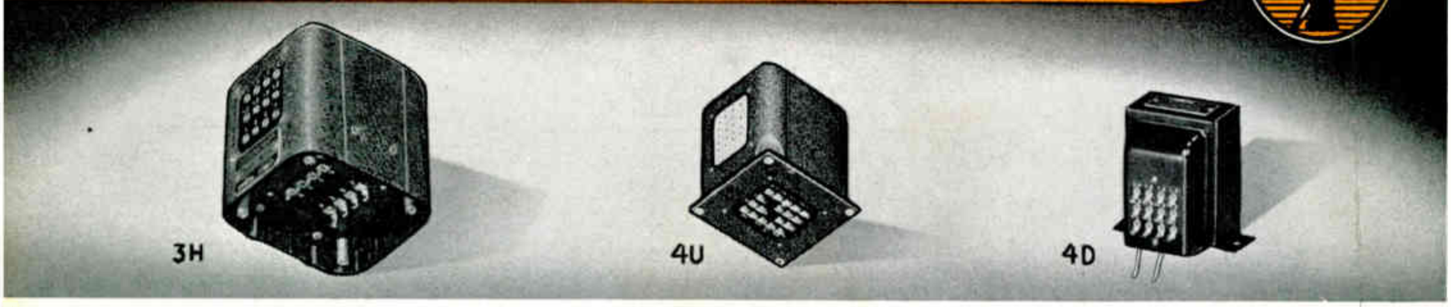
| Type No. | List Price | Inductance Henries | Current D.C. M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15C45 | $10.80 | 12 | 200 | 105 | 4,000 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 10 |
| T-15C46 | 15.00 | 12 | 300 | 78 | 4,000 | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 15/16 | 6 3/8 | 22 |
| T-15C47 | 18.00 | 12 | 400 | 95 | 4,000 | 3U | 4 9/16 | 4 3/4 | 5 3/8 | 5 1/2 | 6 3/8 | 24 |
| T-15C48 | 27.00 | 12 | 500 | 86 | 10,000 | 3U | 6 5/16 | 5 7/16 | 7 5/16 | 6 7/16 | 8 | 38 1/2 |
| T-15C50 | 33.00 | 12 | 650 | 46 | 10,000 | 3U | 6 5/16 | 5 7/16 | 7 5/16 | 6 7/16 | 8 | 51 |



*Prices subject to change without notice.*

THORDARSON

# Driver (D) Transformers



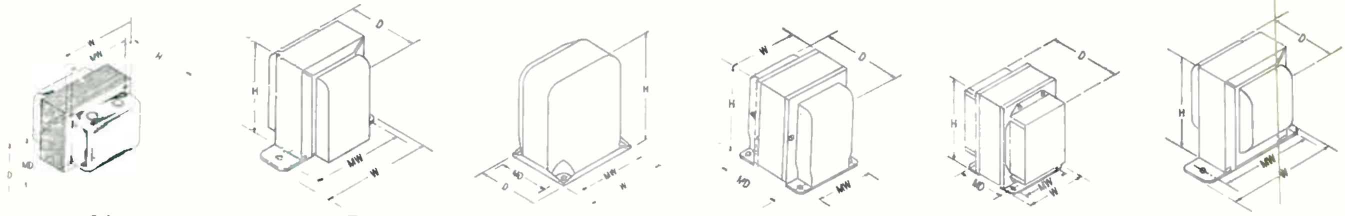

## UNIVERSAL AND MULTI-MATCH DRIVER (D) TRANSFORMERS

Through the use of five or ten ratios on each transformer, these transformers will handle all driver requirements usually encountered in amateur transmitter circuits. See complete table of Driver and Modulator combinations on pages 12 and 13.

| Type No. | List Price | Cap. Watts | Max. Pri. M.A. Per Side | Ratio Pri. to ½ Sec. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Universal Driver Transformers "19" Series** | | | | | | | | | | | |
| T-19D01 | $7.50 | 15 | 60 | 1:1, 1.2:1, 1.4:1, 1.6:1, 1.8:1 | 4D | 3⅜ | | 3 13/16 | 3⅜ | 3½ | 3½ |
| T-19D02 | 7.50 | 15 | 60 | 2:1, 2.2:1, 2.4:1, 2.6:1, 2.8:1 | 4D | 3⅜ | | 3 13/16 | 3⅜ | 3½ | 3½ |
| T-19D03 | 7.50 | 15 | 60 | 3:1, 3.2:1, 3.4:1, 3.6:1, 3.8:1 | 4D | 3⅜ | | 3 13/16 | 3⅜ | 3½ | 3½ |
| ★ T-19D04 | 7.50 | 15 | 60 | 4:1, 4.5:1, 5:1, 5.5:1, 6:1 | 4D | 3⅜ | | 3 13/16 | 3⅜ | 3½ | 3½ |
| ★ T-19D05 | 7.50 | 15 | Primary for 500 ohm line | 1:3.15, 1:2.75, 1:2.5, 1:2.25, 1:2, 1:1.75, 1:1.4, 1:1.25, 1:.85, 1:.75 | 4D | 3⅜ | | 3 13/16 | 3⅜ | 3½ | 3½ |
| **C.H.T. Multi-Match Driver Transformers — Feature Convenient Switchboard Plug-In Terminal Board and Compound Filled Cases** | | | | | | | | | | | |
| T-15D76*† | $10.80 | 15 | 60 | 1:1, 1.2:1, 1.4:1, 1.6:1, 1.8:1 | 3H | 3⅝ | 3 13/16 | 4⅛ | 4⅜ | 4¾ | 7½ |
| T-15D77*† | 10.80 | 15 | 60 | 2:1, 2.2:1, 2.4:1, 2.6:1, 2.8:1 | 3H | 3⅝ | 3 13/16 | 4⅛ | 4⅜ | 4¾ | 6 |
| T-15D78* | 10.80 | 15 | 60 | 3:1, 3.2:1, 3.4:1. 3.6:1, 3.8:1 | 4U | 3⅝ | 3 13/16 | 4 5/16 | 4⅜ | 4¾ | 6 |
| T-15D79* | 10.80 | 15 | 60 | 4:1, 4.5:1, 5:1, 5.5:1, 6:1 | 4U | 3⅝ | 3 13/16 | 4 5/16 | 4⅜ | 4¾ | 6 |
| T-15D82 | 10.80 | 15 | Primary for 500 ohm line | 1:3.15, 1:2.75, 1:2.5, 1:2.25, 1:2, 1:1.75, 1:1.4, 1:1.25, 1:.85, 1:.75 | 4U | 3⅝ | 3 13/16 | 4 5/16 | 4⅜ | 4¾ | 5¾ |
| T-15D83 | 18.00 | 30 | Primary for 500 ohm line | 1:3.15, 1:2.75, 1:2.5, 1:2.25, 1:2, 1:1.75, 1:1.4, 1:1.25, 1:.85, 1:.75 | 4U | 3⅝ | 3 13/16 | 4 5/16 | 4⅜ | 4¾ | 8½ |

*P.P. 45 or 2A3, 6B4G. †P.P. Par. 2A3 or 6B4G.

## Chart for Determining Overall Physical Dimensions and Mounting Centers



3A — 2F, 4D — 3U, 4U — 2G — 2J — All Open Frame Types

These drawings illustrate the method of determining overall dimensions and mounting centers. MD indicates mounting centers depth, MW indicates mounting centers width. Characteristics are similar wherever mounting styles are somewhat similar.

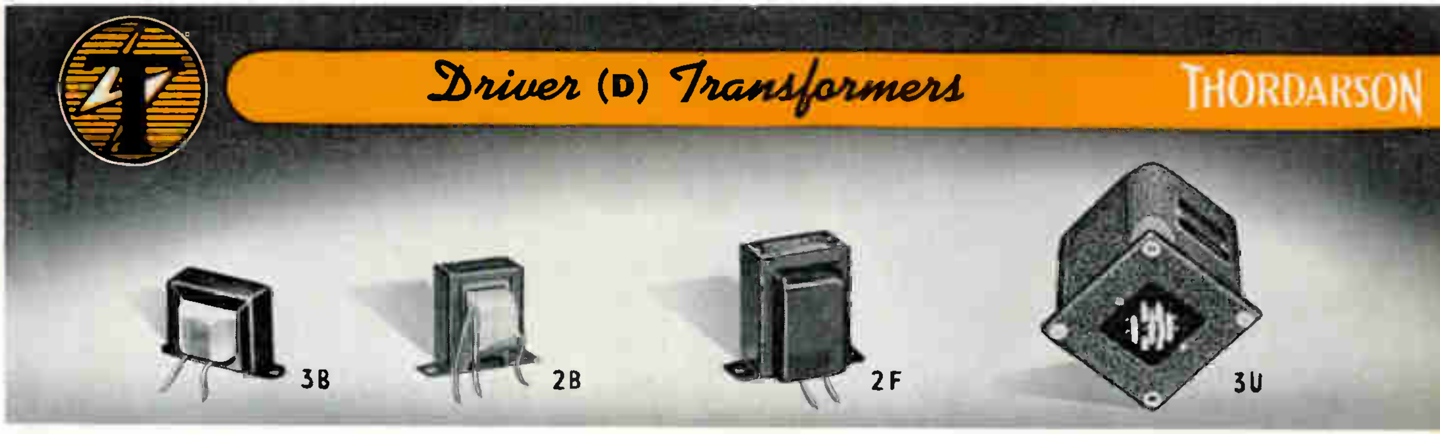
## Beginners Hand Book and Guide—Amateur Radio

AMATEUR RADIO
A Beginners Guide
By J. Douglas Fortune


This text-book was carefully prepared and edited to make learning of radio by all beginners easy and interesting. In addition to presenting fundamental theory, instructions are given for constructing and operating oscillators, receivers and transmitters. The subjects covered include: Learning the Code, Receiver Theory and Construction, Crystal Oscillator Transmitter, Two-stage Transmitter, Three-Stage Transmitter, Construction of the Modulator, and reference notes on receivers, inductance, capacity and many other electrical and radio terms. It is a book recommended to all experimenters, beginning amateurs and even to amateurs of long experience. Profusely illustrated with over 100 comprehensive photographs and drawings. Heavy cover finished in wear-resistant blue cloth, with attractive gold stamping. This is a cloth cover, case bound text-book of approximately 160 pages. Amateur net price 75c.

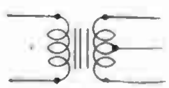


Prices subject to change without notice.




## DRIVER (D) TRANSFORMERS

For coupling single or push-pull plates to the grids of an amplifier stage in which grid current is drawn during a part of the audio cycle.



### DRIVER TRANSFORMERS FOR SPECIFIC APPLICATIONS

These driver transformers have the correct primary to secondary ratio for the tubes specified, which assures good regulation and minimum driver distortion on the positive grid peaks. The first three types are specifically designed for replacement requirements.

| Type No. | List Price | Driver Tubes | Output Tubes | Class | Ratio Pri. to ½ Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-78D46 | $1.80 | 1-30 | 1-1J6G, 19<br>2-30 | B<br>B | 2.4:1 | 7 | 2B | 2 1/8 | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| ★ T-17D01 | 2.40 | 1-6F6 Triode<br>1-42 Triode, 1-2A5 Triode | 2-6F6, 6L6, etc. | AB | 1.7:1<br>1.5:1, 1.3:1 | 31 | 3B | 2 3/4 | | 3 3/16 | 2 1/8 | 2 | 1 1/2 |
| T-14D93 | 2.10 | 1-76 Triode | 1-6A6, 6N7 | B | 4:1 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ T-19D06 | 3.30 | 1-6A6, 1-6N7, 1-6C5 | 1-6A6, 6N7 | B | 5:1,4:1,3:1,2.5:1 | 10 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-54D63 | 2.70 | 1-30, 1-49, 1-6C5 | 1-1J6G, 19, 2-49, 2-6V6 | B, AB2 | 2.4:1 | 7 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| T-67D50 | 3.30 | 1-89 Triode | 1-79 | B | 2:1 | 32 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-67D47 | 3.00 | 1-6N7, 6A6, 53 | 1-6N7, 6A6, 53 | B | 5.25:1 | 10 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-81D52 | 3.90 | 1-6C5, 76<br>1-56 | 2-6F6 Triode<br>2-42, 2A5 Triode | AB<br>AB | 1.82:1<br>1.67:1 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-84D59* | 3.90 | 2-6C5, 6N7<br>2-6A6, 53 | 2-6L6, 6V6<br>2-6N7, 6A6, 53 | AB2<br>B | 5:1 | 10 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-74D32 | 3.90 | 2-6C5, 76, 56 | 2-6F6, 42, 2A5<br>4-2A3, 6B4G | AB2<br>AB | 3:1 | 10 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-81D42 | 3.90 | 1-6F6 Triode<br>1-42 Triode<br>1-2A5 Triode | 2-6F6 Triode<br>2-42 or<br>2-2A5 Pentode | AB2<br>AB2<br>AB2 | 1.7:1<br>1.5:1<br>1.3:1 | 31 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-17D03* | 5.40 | 1-6F6 Triode | 2-6L6 | AB2 | 1.4:1 | 40 | 2F | 3 3/8 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| ★ T-17D04* | 5.40 | 2-6F6 | 4-6L6 | AB2 | 2.6:1 | 32 | 2F | 3 3/8 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| ★ T-67D78 | 3.60 | 1-46, 59, 6F6,<br>42, 2A5 Triode | 2-46, 59<br>2-6L6 | B<br>AB2 | 2.2:1 | 32 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-15D85 | 9.60 | Sgl. 6F6, 42,<br>2A5 Triode | P.P. 6L6<br>C. H. T. hum-bucking coils | AB2 | 1.4:1, 1.3:1<br>1.2:1 | 40 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |
| T-15D86 | 10.80 | P.P. 6F6, 42,<br>2A5 Triode | P.P. Par. 6L6<br>C. H. T. hum-bucking coils | AB2 | 2.6:1 | 32 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 2 1/2 |

### Line-to-Grid Driver Transformers (High Level)

| Type No. | List Price | Driver Tubes | Output Tubes | Class | Ratio Pri. to ½ Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-83D21 | $4.20 | Line<br>500 ohms | 2-6L6, 50<br>12,500/5,100 Ohms | AB | 1:3.2, 1:5 | | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |

*Split secondary as required for inverse feedback and separate power tube bias.





*Prices subject to change without notice.*

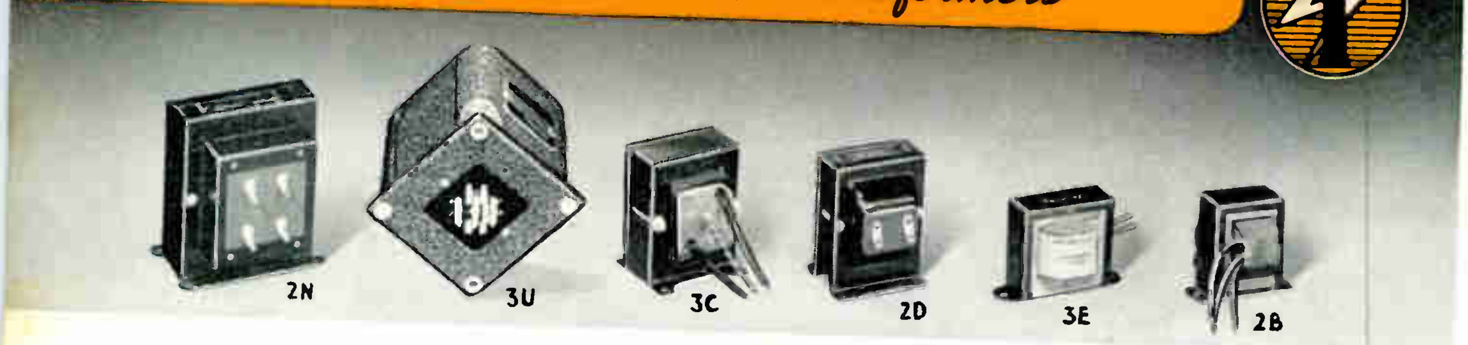
# Driver and Modulator Combinations

| | MODULATOR STAGE | | | | | | DRIVER STAGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | P-P Tube Class B Type Tubes | Power Output Watts | Plate Volts | Bias Volts | Pl. to Pl. Load Ohms | Use Mod. Trans. No. | P-P Driver Tubes | Trans. Ratio, Pri. to ½ Sec. | Use Driver Trans. No. | Trans. for 500 Ohm Line | §Ratio 500 Ohm Line to ½ Sec. |
| | | | | | | | | | | Where T-15D82 appears T-19D05 may also be used. | |
| R. C. A. | 46 | 30 | 400 | 0 | 5,600 | T-11M74 or T-19M14 | *45 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 46 | 40 | 500 | 0 | 8,000 | T-11M75 or T-19M14 | *45 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 46 | 50 | 600 | 0 | 9,600 | T-11M75 or T-19M15 | *45 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 4-46 | 56 | 400 | 0 | 2,800 | T-11M75 or T-19M15 | *45 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 4-46 | 96 | 600 | 0 | 4,800 | T-11M76 or T-19M16 | *45 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 203A | 200 | 1000 | −35 | 6,900 | T-11M77 or T-19M17 | †2A3 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.5 |
| | 203A | 200 | 1000 | −35 | 6,900 | T-11M77 or T-19M17 | **6L6 | 3.5:1 | T-15D84 | T-15D82 | 1:1.25 |
| | 203A | 260 | 1250 | −45 | 9,000 | T-11M77 or T-19M17 | †2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.5 |
| | 203A | 260 | 1250 | −45 | 9,000 | T-11M77 or T-19M17 | **6L6 | 3.5:1 | T-15D84 | T-15D82 | 1:1.25 |
| | 4-203A | 400 | 1000 | −35 | 3,450 | T-11M78 | †4-2A3 | 2.25:1 | T-15D81 | T-15D83 | 1:1.25 |
| | 4-203A | 400 | 1000 | −35 | 4,500 | T-11M78 | **6L6 | 3:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 4-203A | 520 | 1250 | −45 | 3,450 | T-11M78 | †4-2A3 | 2:1 | T-15D80 | T-15D83 | 1:1.25 |
| | 4-203A | 520 | 1250 | −45 | 4,500 | T-11M78 | **6L6 | 3:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 211 | 200 | 1000 | −77 | 6,900 | T-11M77 or T-19M17 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | 211 | 260 | 1250 | −100 | 9,000 | T-11M77 or T-19M17 | 2A3 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:2 |
| | 800 | 90 | 750 | −40 | 6,400 | T-11M76 or T-19M16 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | 800 | 100 | 1000 | −55 | 12,500 | T-11M76 or T-19M16 | 2A3 | 2.8:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | 800 | 100 | 1000 | −55 | 12,500 | T-11M76 or T-19M16 | 45 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.2 |
| | 801 | 45 | 600 | −75 | 10,000 | T-11M74 or T-19M14 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | 801 | 45 | 600 | −75 | 10,000 | T-11M74 or T-19M14 | 45 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:2.25 |
| | 801 | 75 | 750 | −80 | 11,000 | T-11M75 or T-19M16 | 45 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:2.25 |
| | 801 | 75 | 750 | −80 | 11,000 | T-11M75 or T-19M16 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | 805 | 300 | 1250 | 0 | 6,700 | T-11M77 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 805 | 370 | 1500 | −16 | 8,200 | T-11M78 | 2A3 | 3:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 806 | 500 | 2000 | −150 | 11,500 | T-11M78 | 4-2A3 | 1.25:1 | T-15D80 | T-15D83 | 1:2 |
| | 806 | 500 | 2000 | −150 | 11,500 | T-11M78 | **6L6 | 1.5:1 | T-15D84 | T-15D83 | 1:2.5 |
| | 808 | 190 | 1250 | −15 | 12,700 | T-11M77 or T-19M17 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 809 | 60 | 500 | 0 | 5,200 | T-11M75 or T-19M15 | 2A3 | 6:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | 809 | 60 | 500 | 0 | 5,200 | T-11M75 or T-19M15 | 45 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| | 809 | 100 | 750 | −5 | 8,400 | T-11M76 or T-19M16 | 2A3 | 6:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | 809 | 100 | 750 | −5 | 8,400 | T-11M76 or T-19M16 | 45 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| | 810 | 510 | 1500 | −30 | 6,600 | T-11M78 | 4-2A3 | 2.25:1 | T-15D81 | T-15D83 | 1:1.25 |
| | 811 | 175 | 1250 | 0 | 15,000 | T-11M77 or T-19M17 | 2A3 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | 811 | 225 | 1500 | −9 | 18,000 | T-11M77 or T-19M17 | 2A3 | 4.5:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| | 830B | 175 | 1000 | −35 | 7,600 | T-11M77 or T-19M17 | 2A3 | 3:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 838 | 200 | 1000 | 0 | 6,900 | T-11M77 or T-19M17 | 2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | 838 | 260 | 1250 | 0 | 9,000 | T-11M77 or T-19M17 | 2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | 4-838 | 400 | 1000 | 0 | 3,450 | T-11M78 | 4-2A3 | 3.25:1 | T-15D81 | T-15D83 | 1:.75 |
| | 4-838 | 400 | 1000 | 0 | 3,450 | T-11M78 | **6L6 | 3.5:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 4-838 | 520 | 1250 | 0 | 4,500 | T-11M78 | 4-2A3 | 3.25:1 | T-15D81 | T-15D83 | 1:.75 |
| | 4-838 | 520 | 1250 | 0 | 4,500 | T-11M78 | **6L6 | 3.5:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 1608 | 50 | 425 | −15 | 4,800 | T-11M75 or T-19M15 | *45 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| TAYLOR | T-20 | 50 | 600 | −30 | 8,100 | T-11M75 or T-19M15 | *45 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:2 |
| | T-20 | 70 | 800 | −40 | 12,000 | T-11M75 or T-19M16 | *45 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:2.25 |
| | TZ-20 | 70 | 800 | 0 | 12,000 | T-11M75 or T-19M16 | *45 | 3.2:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.4 |
| | TZ-40 | 175 | 1000 | 0 | 6,800 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | TZ-40 | 175 | 1000 | 0 | 6,800 | T-11M77 or T-19M17 | 45 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.5 |
| | TZ-40 | 100 | 750 | 0 | 6,000 | T-11M76 or T-19M16 | 2A3 | 4.5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | TZ-40 | 100 | 750 | 0 | 6,000 | T-11M76 or T-19M16 | 45 | 3:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.4 |
| | T-55 | 175 | 1000 | −40 | 6,900 | T-11M77 or T-19M17 | 2A3 | 2.8:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | T-55 | 225 | 1250 | −50 | 9,400 | T-11M77 or T-19M17 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | T-55 | 275 | 1500 | −60 | 12,000 | T-11M77 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | T-155 | Same as HD-203A | | | | | | | | | |
| | 203-A<br>4-203A | Same as RCA 203A | | | | | | | | | |
| | HD-203A | 300 | 1500 | −50 | 9,600 | T-11M77 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | HD-203A | 300 | 1750 | −67.5 | 13,000 | T-11M77 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | HD-203A | 400 | 1750 | −67.5 | 10,000 | T-11M78 | 2A3 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HD-203A | 400 | 2000 | −75 | 12,500 | T-11M78 | 2A3 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HD-203A | 500 | 2000 | −75 | 10,000 | T-11M78 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HD-203A | 500 | 1500 | −50 | 6,400 | T-11M78 | 4-2A3 | 2:1 | T-15D80 | T-15D83 | 1:1.25 |
| | HD-203A | 500 | 1500 | −50 | 6,400 | T-11M78 | **6L6 | 3:1 | T-15D84 | T-15D83 | 1:1.4 |
| | HD-203A | 600 | 1750 | −67.5 | 7,600 | T-11M78 | 4-2A3 | 1.75:1 | T-15D80 | T-15D83 | 1:1.4 |
| | HD-203A | 600 | 1750 | −67.5 | 7,600 | T-11M78 | **6L6 | 2.5:1 | T-15D84 | T-15D83 | 1:1.75 |
| | 203B | 300 | 1250 | −45 | 7,900 | T-11M77 | †2A3 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:2 |
| | 4-203B | 600 | 1250 | −45 | 3,900 | T-11M78 | †4-2A3 | 1.75:1 | T-15D80 | T-15D83 | 1:1.4 |
| | 4-203B | 600 | 1250 | −45 | 3,900 | T-11M78 | **6L6 | 2.5:1 | T-15D84 | T-15D83 | 1:1.75 |
| | 203Z | 200 | 1000 | 0 | 6,900 | T-11M77 or T-19M17 | 2A3 | 4.5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | 203Z | 260 | 1100 | 0 | 6,700 | T-11M77 | †2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | 203Z | 300 | 1250 | 0 | 7,900 | T-11M77 | †2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | 211 | Same as RCA 211 | | | | | | | | | |
| | T-756 | 100 | 850 | −25 | 9,400 | T-11M76 or T-19M16 | 2A3 | 3:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | T-756 | 125 | 850 | −25 | 7,500 | T-11M76 or T-19M17 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | T-814 | 500 | 2000 | −150 | 11,500 | T-11M78 | 4-2A3 | 1.25:1 | T-15D80 | T-15D83 | 1:2 |
| | T-814 | 500 | 2000 | −150 | 11,500 | T-11M78 | **6L6 | 1.5:1 | T-15D80 | T-15D82 | 1:3.15 |
| | T-822 | Same as HD-203A | | | | | | | | | |

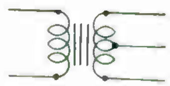
| | MODULATOR STAGE | | | | | | DRIVER STAGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Make | P-P Tube Class B Type Tubes | Power Output Watts | Plate Volts | Bias Volts | Pl. to Pl. Load Ohms | Use Mod. Trans. No. | P-P Driver Tubes | Trans. Ratio, Pri. to ½ Sec. | Use Driver Trans. No. | Trans. for 500 Ohm Line | §Ratio 500 Ohm Line to ½ Sec. |
| EIMAC | 35T | 150 | 1000 | -22 | 7,200 | T-11M77 or T-19M17 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | 35T | 200 | 1250 | -30 | 9,600 | T-11M77 or T-19M17 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.5 |
| | 100TH | 210 | 1000 | 0 | 5,200 | T-11M77 or T-19M17 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 100TH | 260 | 1250 | 0 | 7,200 | T-11M77 | 2A3 | 3.6:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 100TH | 300 | 1500 | -10 | 9,600 | T-11M77 | 2A3 | 3.6:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | 100TH | 380 | 2000 | -20 | 16,000 | T-11M78 | 2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | 100TL | 170 | 1000 | -90 | 5,200 | T-11M77 or T-19M17 | **6L6 | 2:1 | T-15D84 | T-15D82 | 1:2 |
| | 100TL | 230 | 1250 | -112 | 7,200 | T-11M77 | **6L6 | 1.5:1 | T-15D84 | T-15D82 | 1:2.5 |
| | 100TL | 270 | 1500 | -140 | 9,600 | T-11M77 | **6L6 | 1.5:1 | T-15D84 | T-15D82 | 1:2.5 |
| | 100TL | 350 | 2000 | -185 | 16,000 | T-11M78 | **6L6 | 1.5:1 | T-15D84 | T-15D82 | 1:2.5 |
| | 150T | 500 | 2000 | -150 | 11,500 | T-11M78 | 4-2A3 | 1.25:1 | T-15D80 | T-15D83 | 1:2 |
| | 150T | 600 | 2500 | -195 | 14,000 | T-11M78 | 4-2A3 | 1.25:1 | T-15D80 | T-15D83 | 1:2 |
| | 150T | 500 | 2000 | -150 | 11,500 | T-11M78 | **6L6 | 1.5:1 | T-15D84 | T-15D83 | 1:2.5 |
| | 150T | 600 | 2500 | -195 | 14,000 | T-11M78 | **6L6 | 1.5:1 | T-15D84 | T-15D83 | 1:2.5 |
| | 250TH | 300 | 1000 | 0 | 4,000 | T-11M77 | **6L6 | 3.5:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 250TH | 400 | 1250 | 0 | 5,200 | T-11M78 | **6L6 | 3.5:1 | T-15D84 | T-15D83 | 1:1.25 |
| | 250TH | 500 | 1500 | -22.5 | 6,400 | T-11M78 | **6L6 | 3:1 | T-15D84 | T-15D83 | 1:1.4 |
| RAYTHEON | RK-12 | 100 | 750 | 0 | 8,700 | T-11M76 or T-19M16 | 2A3 | 6:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | RK-18 | 100 | 1000 | -50 | 12,000 | T-11M76 or T-19M16 | *45 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | RK-18 | 100 | 1000 | -50 | 12,000 | T-11M76 or T-19M16 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | RK-31 | 110 | 1000 | 0 | 13,600 | T-11M76 or T-19M17 | *45 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| | RK-31 | 140 | 1250 | 0 | 17,000 | T-11M77 or T-19M17 | *45 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:1.25 |
| | RK-31 | 110 | 1000 | 0 | 13,600 | T-11M76 or T-19M17 | 2A3 | 6:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | RK-31 | 140 | 1250 | 0 | 17,000 | T-11M77 or T-19M17 | 2A3 | 6:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | RK-52 | 200 | 1000 | 0 | 7,200 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | RK-52 | 250 | 1250 | 0 | 10,000 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | RK-57 | 300 | 1250 | 0 | 6,700 | T-11M77 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | RK-57 | 370 | 1500 | -16 | 8,200 | T-11M78 | 2A3 | 3:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | RK-58 | 200 | 1000 | 0 | 6,900 | T-11M77 or T-19M17 | 2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| | RK-58 | 260 | 1250 | 0 | 9,000 | T-11M77 or T-19M17 | 2A3 | 3.8:1 | T-15D78 or T-19D03 | T-15D82 | 1:.85 |
| HYTRON | HY-25 | 75 | 800 | -9 | 9,000 | T-11M75 or T-19M16 | 2A3 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | HY-40 | 140 | 800 | -28 | 5,800 | T-11M77 or T-19M17 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | HY-40 | 175 | 1000 | -37.5 | 7,000 | T-11M77 or T-19M17 | 2A3 | 3.4:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | HY-57 | 110 | 800 | -9 | 9,000 | T-11M76 or T-19M17 | 2A3 | 5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | HY-51A | 180 | 1000 | -35 | 7,000 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | HY-51B | 180 | 1000 | -35 | 7,000 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| AMPEREX | HF-100 | 260 | 1500 | -52 | 12,000 | T-11M77 | 2A3 | 3.2:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | HF-100 | 350 | 1750 | -62 | 16,000 | T-11M78 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | ZB-120 | 150 | 750 | 0 | 4,800 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | ZB-120 | 200 | 1000 | 0 | 6,900 | T-11M77 or T-19M17 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | ZB-120 | 245 | 1250 | 0 | 9,000 | T-11M77 or T-19M17 | 2A3 | 4.5:1 | T-15D79 or T 19D04 | T-15D82 | 1:.75 |
| | ZB-120 | 300 | 1500 | -9 | 11,200 | T-11M77 | 2A3 | 4:1 | T-15D79 or T-19D04 | T-15D82 | 1:.85 |
| | HF-200 | 500 | 2000 | -100 | 11,200 | T-11M78 | 2A3 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:1.75 |
| | HF-200 | 500 | 2500 | -130 | 16,000 | T-11M78 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HF-200 | 600 | 2500 | -130 | 16,000 | T-11M78 | 2A3 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:1.75 |
| | HF-200 | 500 | 2000 | -100 | 11,200 | T-11M78 | **6L6 | 2.5:1 | T-15D84 | T-15D82 | 1:1.75 |
| | HF-200 | 600 | 2500 | -130 | 16,000 | T-11M78 | **6L6 | 2.5:1 | T-15D84 | T-15D82 | 1:1.75 |
| HEINTZ & KAUFMAN | HK-24 | 45 | 500 | 0 | 6,400 | T-11M75 or T-19M15 | 2A3 | 4.5:1 | T-15D79 or T-19D04 | T-15D82 | 1:.75 |
| | HK-24 | 105 | 1000 | -29 | 15,000 | T-11M76 or T-19M16 | 2A3 | 3.2:1 | T-15D78 or T-19D03 | T-15D82 | 1:1.25 |
| | HK-54 | 170 | 1250 | -35 | 12,500 | T-11M77 or T-19M17 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | HK 54 | 200 | 1500 | -45 | 16,800 | T-11M77 or T-19M17 | 2A3 | 2.4:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.4 |
| | HK-154 | 200 | 1000 | -155 | 7,500 | T-11M77 or T-19M17 | 2A3 | 1.4:1 | T-15D76 or T-19D01 | T-15D82 | 1:2.25 |
| | HK-154 | 223 | 1250 | -210 | 11,400 | T-11M77 or T-19M17 | 2A3 | 1.2:1 | T-15D76 or T-19D01 | T-15D82 | 1:2.75 |
| | HK-254 | 240 | 1500 | -40 | 10,000 | T-11M77 or T-19M17 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HK-254 | 328 | 2000 | -65 | 16,000 | T-11M78 | 2A3 | 2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HK-254 | 418 | 2500 | -80 | 22,000 | T-11M78 | 2A3 | 1.8:1 | T-15D76 or T-19D01 | T-15D82 | 1:1.75 |
| | HK-354 | 100 | 1000 | -60 | 15,000 | T-11M76 or T-19M16 | 2A3 | 2.6:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.25 |
| | HK-354 | 220 | 1500 | -100 | 15,000 | T-11M77 or T-19M17 | 2A3 | 2.2:1 | T-15D77 or T-19D02 | T-15D82 | 1:1.75 |
| | HK-354 | 400 | 2000 | -150 | 15,000 | T-11M78 | 2A3 | 1.4:1 | T-15D76 or T-19D01 | T-15D82 | 1:2.25 |
| | 354E | 319 | 1500 | -25 | 10,000 | T-11M77 | 4-2A3 | 2.25:1 | T-15D81 | T-15D83 | 1:1.25 |
| | 354E | 472 | 2000 | -37.5 | 11,000 | T-11M78 | 4-2A3 | 2:1 | T-15D80 | T-15D83 | 1:1.25 |
| | 354E | 595 | 2500 | -50 | 16,000 | T-11M78 | 4-2A3 | 1.75:1 | T-15D80 | T-15D83 | 1:1.4 |
| | 354F | 290 | 1500 | -15 | 12,000 | T-11M77 | 4-2A3 | 2.75:1 | T-15D81 | T-15D83 | 1:.85 |
| | 354F | 445 | 2000 | -22.5 | 12,000 | T-11M78 | 4-2A3 | 2.5:1 | T-15D81 | T-15D83 | 1:.85 |
| W-E | 242A, 261A, 276A | Same as R.C.A. 211 | | | | | | | | | |

Where T-15D82 appears T-19D05 may also be used.

§NOTE: This ratio is correct only when the tubes supplying power to the 500 ohm line are of the same type and operated under the same conditions as the driver tubes listed under "P-P Driver Tubes." 2A3 driver tubes are operated with 300 plate volts, self biased, unless preceded by †. 45 driver tubes are operated with 275 plate volts, self biased, unless preceded by *. †2A3 driver tubes are operated with 300 plate volts, fixed bias. *45 driver tubes are operated with 250 plate volts, self biased. **6L6's with 16.6% feed-back, 400 volts plate, 300 volts screen.




## FILAMENT (F) TRANSFORMERS



### SINGLE SECONDARY

Improved voltage regulation and minimum heat rise have been given prime consideration in the design of these units. Ratings given are for continuous operation at full load.

| Type No. | List Price | Primary Volts | Secondary Volts | Sec. Amps. | Pri. V.A. | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-50F61 | $2.10 | 115 | 2.5 Ct. | 3.5 | 10 | 1600 | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| ★ T-19F88 | 2.40 | 115 | 2.5 Ct. | 5.25 | 15 | 1600 | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| T-19F75 | 2.70 | 115 | 2.5 Ct. | 5 | 12.5 | 7500 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| T-19F89 | 2.70 | 115 | 2.5 Ct. | 10 | 25 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| ★ T-19F90 | 3.60 | 115 | 2.5 Ct. | 10 | 25 | 7500 | 3C | 2 | 1 3/4 | 2 9/16 | 2 1/4 | 3 1/4 | 2 1/4 |
| T-64F33 | 7.20 | 105/110/115 | 2.5 Ct. | 10 | 25 | 7500 | 2N | 3 1/4 | 2 1/16 | 3 3/4 | 3 1/4 | 4 | 4 1/2 |
| T-19F82 | 6.00 | 115 | 2.5 Ct. | 15 | 45 | 10000 | 3C | 3 1/4 | 1 15/16 | 3 3/4 | 2 7/16 | 4 | 4 |
| T-63F99 | 3.90 | 115 | 5 Ct. | 4 | 20 | 1600 | 2D | 2 1/8 | 1 9/16 | 2 7/16 | 3 | 3 1/8 | 2 1/4 |
| ★ T-19F83 | 2.70 | 115 | 5 Ct. | 5 | 30 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| T-19F84 | 3.30 | 115 | 5 Ct. | 8 | 45 | 1600 | 3C | 2 | 1 3/4 | 2 9/16 | 2 1/4 | 3 1/4 | 2 3/4 |
| ★ T-19F85 | 4.80 | 115 | 5 Ct. | 13 | 75 | 1600 | 3C | 3 1/4 | 1 15/16 | 3 3/4 | 2 7/16 | 4 | 4 |
| T-19F86 | 6.60 | 115 | 5 Ct. | 21 | 120 | 1600 | 3C | 3 1/4 | 2 7/16 | 3 3/4 | 2 15/16 | 4 | 4 1/2 |
| T-74F23 | 6.00 | 105/110/115 | 5 Ct. | 13 | 75 | 1600 | 2D | 3 1/4 | 1 7/8 | 3 3/4 | 3 1/4 | 4 | 4 1/4 |
| ★ T-74F24 | 10.20 | 105/110/115 | 5 Ct. | 21 | 125 | 1600 | 2D | 2 3/4 | 1 13/16 | 3 7/8 | 3 5/8 | 4 9/16 | 5 1/4 |
| T-19F91 | 3.00 | 115 | 5.25 Ct. | 4 | 25 | 1600 | 3C | 2 | 1 3/4 | 2 9/16 | 2 1/4 | 3 1/4 | 2 1/4 |
| T-19F92 | 4.20 | 115 | 5.25 Ct. | 13 | 75 | 1600 | 3C | 3 1/4 | 1 15/16 | 3 3/4 | 2 7/16 | 4 | 4 |
| ★ T-19F80 | 1.60 | 115 | 6.3 Ct. | 1 | 7 | 1600 | 2B | 2 | | 2 5/16 | 1 3/4 | 1 15/16 | 3/4 |
| ★ T-19F81 | 1.80 | 115 | 6.3 Ct. | 2 | 14 | 1600 | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| ★ T-19F97 | 2.10 | 115 | 6.3 Ct. | 3 | 21 | 1600 | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-61F85 | 2.70 | 115 | 6.3, 5, 2.5 | 2.5 | 18 | 1600 | 3E | 3 1/8 | | 3 5/8 | 2 3/8 | 2 1/4 | 1 1/2 |
| T-73F60 | 4.80 | 105/110/115 | 6.3 Ct. | 5 | 36 | 1600 | 2D | 2 1/8 | 1 3/4 | 2 7/8 | 2 13/16 | 3 11/16 | 3 1/4 |
| ★ T-19F98 | 3.30 | 115 | 6.3 Ct. | 6 | 47 | 1600 | 3C | 2 | 1 7/8 | 2 9/16 | 2 3/8 | 3 1/4 | 2 3/4 |
| ★ T-19F99 | 4.20 | 115 | 6.3 Ct. | 10 | 73 | 1600 | 3C | 3 1/4 | 1 15/16 | 3 3/4 | 2 7/16 | 4 | 4 |
| ★ T-19F93 | 3.00 | 115 | 7.5 Ct. | 4 | 34 | 1600 | 3C | 2 | 1 3/4 | 2 9/16 | 2 1/4 | 3 1/4 | 2 1/4 |
| ★ T-19F94 | 3.60 | 115 | 7.5 Ct. | 8 | 67 | 1600 | 3C | 2 1/4 | 2 1/4 | 3 | 2 7/8 | 3 11/16 | 4 |
| T-92F20 | 6.30 | 115 | 7.5 Ct. | 8 | 68 | 1600 | 2D | 3 1/4 | 2 | 3 3/4 | 3 3/8 | 4 | 4 3/4 |
| T-19F95 | 3.30 | 115 | 10 Ct. | 4 | 48 | 1600 | 3C | 2 | 1 3/4 | 2 9/16 | 2 1/4 | 3 1/4 | 2 3/4 |
| ★ T-19F96 | 4.20 | 115 | 10 Ct. | 8 | 92 | 1600 | 3C | 2 1/4 | 2 1/4 | 2 11/16 | 2 7/8 | 3 11/16 | 4 |
| T-64F14 | 6.00 | 105/110/115 | 10 Ct. | 8 | 90 | 1600 | 2D | 3 1/4 | 2 | 3 3/4 | 3 3/8 | 4 | 5 |
| T-19F87 | 7.50 | 115 | 10 Ct. | 12 | 140 | 1600 | 3C | 3 1/4 | 2 11/16 | 3 3/4 | 3 3/16 | 4 | 6 3/4 |
| **FOR EXCITER LAMP** | | | | | | | | | | | | | |
| T-64F38 | $7.20 | 110/115/120 | 8.5 | 4 | 35 | 1600 | 3C | 2 1/4 | 1 7/8 | 3 | 2 1/2 | 3 11/16 | 3 1/2 |

### SINGLE SECONDARY—C.H.T. SERIES

C.H.T. filament transformers are conservatively designed to operate continuously at full rated load with superior voltage regulation and minimum temperature rise.

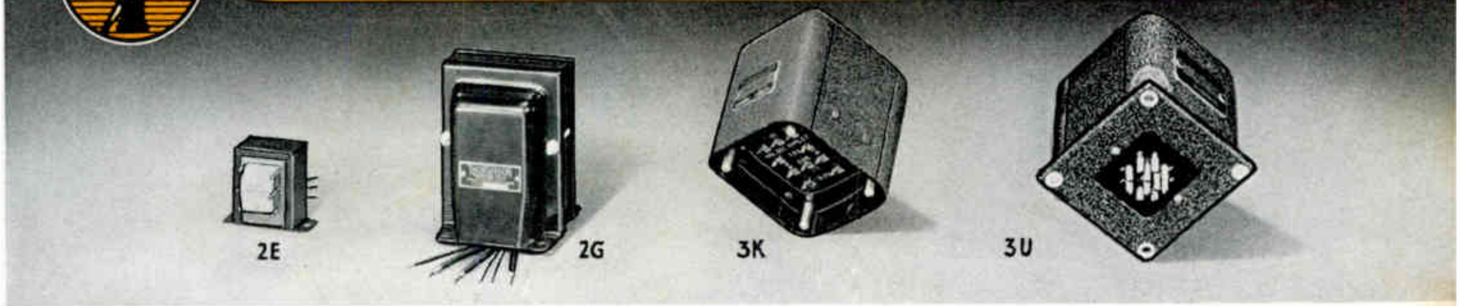
| Type No. | List Price | Primary Volts | Secondary Volts | Sec. Amps. | Pri. V.A. | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-11F59 | $9.00 | 105/115 | 5 Ct. | 5 | 30 | 2000 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 5 |
| T-11F63 | 11.40 | 105/115 | 5 Ct. | 13 | 70 | 2000 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 7 1/2 |
| T-11F55 | 15.00 | 105/115 | 5.25 Ct. | 22 | 130 | 2000 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 14 |
| T-11F60 | 9.60 | 105/115 | 6.3 Ct. | 5 | 35 | 2000 | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 5 3/4 |
| T-11F62 | 10.20 | 105/115 | 7.5 Ct. | 8 | 65 | 2000 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 6 1/2 |
| T-11F64 | 12.00 | 105/115 | 10 Ct. | 10 | 110 | 2000 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 9 3/4 |
| T-11F53 | 10.20 | 105/115 | 2.5 Ct. | 10 | 25 | 7500 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 8 1/2 |
| T-11F61 | 27.00 | 105/115 | 2.5 Ct. | 20 | 55 | 15,000 | 3U | 4 9/16 | 4 3/4 | 5 3/8 | 6 1/2 | 6 3/8 | 14 |
| T-11F54 | 24.00 | 105/115 | 5 Ct. | 20 | 110 | 10,000 | 3U | 4 9/16 | 4 3/4 | 5 3/8 | 6 5/8 | 6 3/8 | 15 |

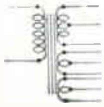


*Prices subject to change without notice.*

# Filament (F) Transformers

THORDARSON



## FILAMENT (F) TRANSFORMERS

Recommended for complete filament requirements of transmitters or amplifiers. Improved appearance and protection of coils from mechanical injury are afforded by mechanical shields.

| Type No. | List Price | Primary Volts | Sec. Volts | Sec. Amps. | Pri. V.A. | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **MULTIPLE SECONDARIES — "19" SERIES** | | | | | | | | | | |
| **T-19F76** | **$5.70** | 115 | Sec. 1-5 V.<br>Sec. 2-7.5/6.3/5 | 3<br>6 | 67 | 1600<br>1600 | 2G | 2 11/16 | 2 5/16 | 3 5/16 | 3 1/8 | 4 5/8 | 4 3/4 |
| **T-19F77** | **9.90** | 115 | Sec. 1-5 V.<br>Sec. 2-2.5 V. Ct.<br>Sec. 3-10/7.5/6.3/5 | 3<br>10<br>8 | 133 | 1600<br>7500<br>1600 | 2G | 3 | 2 7/8 | 3 3/4 | 3 5/8 | 4 7/8 | 7 |
| **T-19F78** | **6.90** | 115 | Sec. 1-2.5 V. Ct.<br>Sec. 2-5 V. | 10<br>3 | 45 | 7500<br>1600 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 |
| **T-19F79** | **8.10** | 115 | Sec. 1-6.3 V. Ct.<br>Sec. 2-10/7.5/6.3/5 | 3<br>10 | 133 | 1600<br>1600 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 6 |
| **T-79F84** | **5.70** | 115 | Sec. 1-2.5 V. Ct.<br>Sec. 2-5 V. Ct.<br>Sec. 3-6.3 V. Ct. | 3.5<br>3<br>3 | 48 | 1600<br>1600<br>1600 | 2G | 2 11/16 | 2 5/16 | 3 5/16 | 3 1/8 | 4 5/8 | 4 3/4 |
| | | | **MULTIPLE SECONDARIES—C. H. T. SERIES** | | | | | | | | | | |
| **T-11F57** | **$16.50** | 105/115 | Sec. 1-10 Ct.<br>Sec. 2-10 Ct.<br>Sec. 3-6.3 Ct.<br>Sec. 4-5 Ct. | 8<br>4<br>3<br>3 | 170 | 2000 | 3K | 3 13/16 | 4 1/8 | 5 3/16 | 5 9/16 | 6 3/4 | 15 |
| **T-11F58** | **18.00** | 105/115 | Sec. 1-7.5 Ct.<br>Sec. 2-7.5 Ct.<br>Sec. 3-6.3 Ct.<br>Sec. 4-5 Ct. | 6.5<br>3.25<br>3<br>3 | 120 | 2000 | 3K | 3 13/16 | 4 1/8 | 5 3/16 | 5 9/16 | 6 3/4 | 13 1/4 |
| | | | **TAPPED SECONDARIES — C. H. T. SERIES** | | | | | | | | | | |
| **T-11F50** | **$10.80** | 105/115 | 7.5/6.3/5*/2.5 Ct. | 6.5 | 55 | 2000 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 6 1/4 |
| **T-11F51** | **13.20** | 105/115 | 10/7.5/6.3 Ct. | 8 | 90 | 2000 | 3U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 4 13/16 | 7 3/4 |
| **T-11F52** | **15.90** | 105/115 | 11/10/7.5 Ct. | 10 | 125 | 2000 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 13 1/2 |

*Not center tapped.

## FILAMENT CORRECTOR AUTOTRANSFORMERS

To compensate for variations in line voltage or for drop in filament leads. Correct filament voltage at the tube is made possible.

| Type No. | List Price | Capacity Filament Power Watts | Primary Taps | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| **T-18V24** | **$2.70** | 60 | 105/110/115/120/125V. | 2E | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 |
| **T-18V25** | **4.80** | 150 | 105/110/115/120/125V. | 2E | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 1 3/4 |

### No. 344E—Transmitter Guide 15c Postpaid

Another Thordarson publication produced for the amateur operator. Complete description and details on practical types of transmitters and short wave apparatus. Schematic diagrams, pictures and parts lists of 12 new, modern transmitters from 10 to 1000 watts including an all-band A.C.-battery, emergency portable unit and a 5–10 meter mobile transmitter. Also ask for free catalog sheet SD464 describing 6 new, modern and economical to build, transmitter kits.

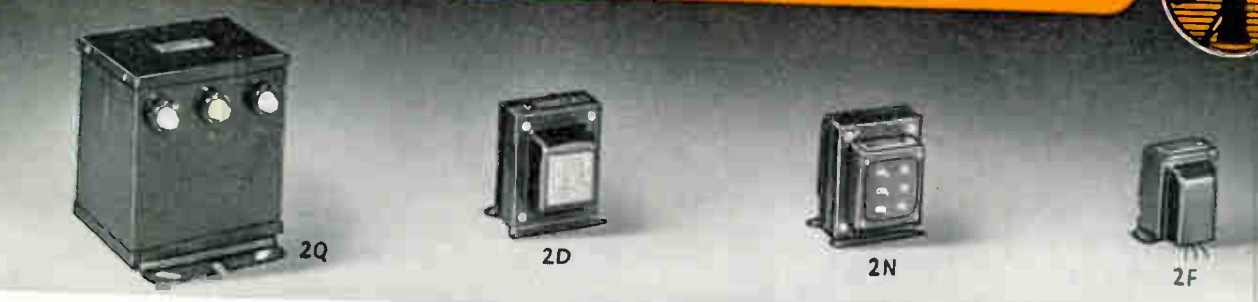
### No. 340 — Complete Transformer Manual . . . 35c Postpaid

The Thordarson Transformer Manual is a complete book, containing the Replacement Transformer Encyclopedia and Servicing Guide, the Transmitter Guide, and the Sound Amplifier Guide, plus current Thordarson catalogs. It is bound in a strong, attractive blue and orange cover with loose leaf arrangement, giving the user opportunity to keep the Manual up-to-date by adding later Thordarson releases. This book has proven to be most popular in the technical library.




*Prices subject to change without notice.*

# THORDARSON *Modulation (M) Transformers*




## MODULATION (M) TRANSFORMERS

To couple the plate or plates of an audio output stage to a Class C R.F. load.

| Type No. | List Price | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Max. D.C. Sec. M.A. | Max. Audio Pwr. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MODULATION TRANSFORMERS FOR SPECIFIC APPLICATIONS** | | | | | | | | | | | | | | |
| T-67M69 | $3.30 | 1-19 | B | 10,000 | 2,700 | 50 | 10 | 2F | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/2 |
| ★ T-17M59 | 3.30 | 1-6A6, 6N7 or 53 | B | 10,000 | 3,000 3,750/4,500 | 100 | 10 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 |
| T-64M26 | 7.20 | 2-46 or 59<br>2-250 | B<br>AB | 5,800 | 5,000<br>10,000 | 100 | 40 | 2D | 3 1/4 | 2 | 3 3/4 | 3 3/8 | 4 | 5 |
| T-19M21 | 8.40 | 2-TZ-20 | B | 10,000 | 3,750<br>6,600 | 200<br>150 | 75 | 2N | 3 1/4 | 2 13/16 | 3 3/4 | 3 5/16 | 4 | 7 |
| T-19M22 | 12.00 | 2-809<br>2-RK-12 | B<br>B | 8,400 | 5,000<br>7,850 | 200<br>160 | 100 | 2N | 3 1/4 | 2 3/4 | 4 3/8 | 4 1/2 | 6 1/16 | 13 1/4 |
| T-84M70 | 12.00 | 2-6L6<br>2-35T<br>4-210 | AB<br>B<br>B | 3,800 | 2,500<br>5,000<br>7,500 | 250<br>200<br>150 | 75 | 2D | 2 3/4 | 2 13/16 | 3 7/8 | 4 5/8 | 4 9/16 | 10 |
| T-14M49 | 21.60 | 2-TZ-40 | B | 6,900 | 2,850<br>4,500<br>6,500 | 350<br>300<br>235 | 175 | 2Q | 6 3/4 | 3 3/16 | 7 1/2 | 5 5/8 | 6 3/8 | 20 |
| T-82M25 | 51.00 | 2-805, HD-203A, 822 | B | 9,000 | 4,000<br>6,000/8,000 | 500 | 650 | 2Q | 8 5/16 | 4 1/16 | 9 1/16 | 7 1/2 | 7 3/4 | 47 |
| **GRID MODULATION TRANSFORMERS** | | | | | | | | | | | | | | |
| T-67M73 | $4.20 | 1-42, 46, 6F6, Triode | A | 6,300 | 5,400 | 32 | 10 | 2D | 2 1/8 | 1 9/16 | 2 7/16 | 2 15/16 | 3 1/8 | 2 1/4 |
| T-67M74 | 5.40 | P.P. 45-2A3 | AB | 5,000 | 5,000 | 60 | 20 | 2D | 2 1/8 | 1 21/32 | 2 7/8 | 2 13/16 | 3 11/16 | 3 1/2 |

Notes to the specific-applications section: High efficiency, quiet operation and good frequency characteristics have been attained in this series of transformers by thorough engineering and careful construction. These units are designed for specific tube types. Larger modulation transformers are available on special order. Please consult the Thordarson Sales Engineering Department concerning special requirements.

### MATCHING LINE TO R. F. LOAD MODULATION TRANSFORMERS

This popular series is designed for direct connection to 500 ohm output terminals of a receiver or amplifier. 200 ohm tap is also provided on type T-83M22.

| Type No. | List Price | Pri. Ohms | Secondary Ohms Load | Max. D.C. Sec. M.A. | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-73M52 | $27.00 | 500 | 5,000/6,000/7,000/8,000/9,000/10,000 | 215 | 80 | 2Q | 6 3/4 | 3 3/16 | 7 1/2 | 5 5/8 | 6 3/8 | 21 |
| T-83M22 | 13.80 | 500/200 | 5,000/6,000/7,000/8,000/9,000/10,000 | 150 | 30 | 2N | 2 3/4 | 2 3/8 | 3 7/8 | 3 13/16 | 4 11/16 | 8 |

## THORDARSON OSCILLOSCOPE KIT

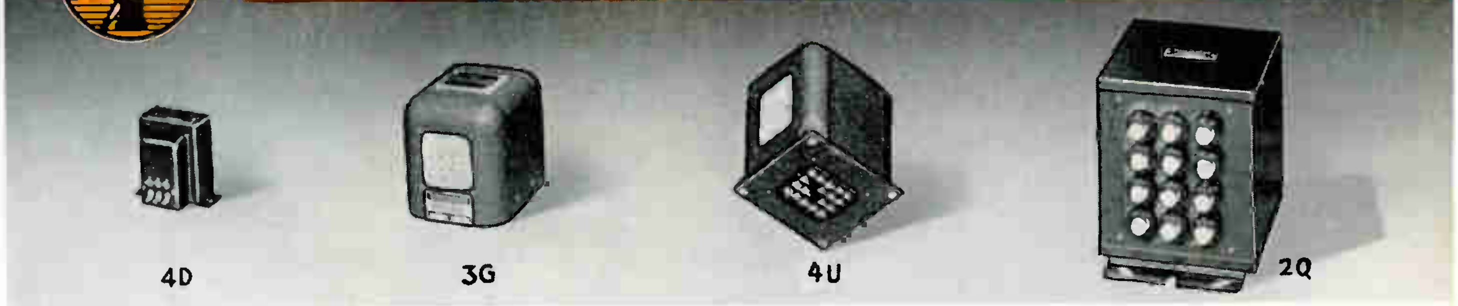
Accurately designed circuit uses a 913 tube. Magnifying lens gives clear 2″ image and small over all size of unit makes it ideal for relay rack of servicemen and for amateur and experimental uses. Circuit diagram, description and complete parts list given in catalog bulletin SD-266.

| Type No. | List Price | Description |
|---|---|---|
| T-11K99 | $18.00 | Foundation Unit (Consists of punched chassis, panel, light shield, etched panel, ventilated cabinet and 2″ magnifying lens with retainer ring, also complete circuit, constructional and operating data.) In addition to the foundation unit, one T-92R33 power transformer (see page 19) and one T-74C30 filter choke (see page 8) are required. |



*Prices subject to change without notice.*

# *Modulation* (M) *Transformers* — THORDARSON




## UNIVERSAL AND MULTI-MATCH MODULATION (M) TRANSFORMERS

The radio amateur or experimenter regularly makes changes in equipment to take advantage of new circuits and tubes. To enable quick and accurate matching of various tube loads without changing transformers, and to assure peak transformer performance while testing new tubes or making circuit changes, these Universal and Multi-Match transformers are made available. A complete table of driver and modulator combinations on pages 12 and 13 makes easy the selection of the proper driver or modulation transformer. Larger modulation transformers are available on special order. Please consult the Thordarson Sales Engineering Department concerning special requirements.

### "19" SERIES UNIVERSAL MODULATION TRANSFORMERS

| Type No. | List Price | Capacity Watts | Pri. M.A. Each Side | Secondary M.A. Series | Secondary M.A. Parallel | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-19M13 | $5.70 | 15 | 50 | 50 | 100 | 4D | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 |
| ★ T-19M14 | 9.90 | 30 | 75 | 75 | 150 | 2N | 3 1/4 | 1 13/16 | 3 3/4 | 3 1/8 | 4 | 4 1/2 |
| T-19M15 | 14.40 | 60 | 125 | 125 | 250 | 2N | 3 1/4 | 2 9/16 | 3 3/4 | 3 7/8 | 4 | 6 1/2 |
| T-19M16 | 20.40 | 100 | 175 | 175 | 350 | 2N | 3 1/4 | 2 3/4 | 4 1/4 | 4 1/4 | 6 1/16 | 12 1/2 |
| T-19M17 | 33.00 | 250 | 225 | 225 | 450 | 2Q | 7 3/4 | 3 3/16 | 8 1/2 | 5 3/4 | 6 7/8 | 30 3/4 |

### C. H. T. MULTI-MATCH MODULATION TRANSFORMERS

*Feature Thordarson Switchboard Plug-in terminal board for quick and accurate matching of tube loads.

| Type No. | List Price | Capacity Watts | Pri. M.A. Each Side | Secondary M.A. Series | Secondary M.A. Parallel | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-11M74 | $13.20 | 40 | 100 | 80 | 160 | 4U* | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 7 3/4 |
| ★ T-11M75 | 15.30 | 75 | 145 | 145 | 290 | 4U* | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 9 |
| ★ T-11M76 | 27.00 | 125 | 210 | 160 | 320 | 4U* | 4 9/16 | 4 3/4 | 5 3/8 | 5 1/2 | 6 3/8 | 18 |
| ★ T-11M77 | 36.00 | 300 | 250 | 250 | 500 | 4U* | 5 3/8 | 6 1/8 | 6 3/16 | 7 5/8 | 7 7/16 | 30 |
| ★ T-11M78 | 72.00 | 500 | 320 | 320 | 640 | 3P | 3 1/16 | 10 3/8 | 5 3/8 | 13 1/4 | 6 7/8 | 54 |

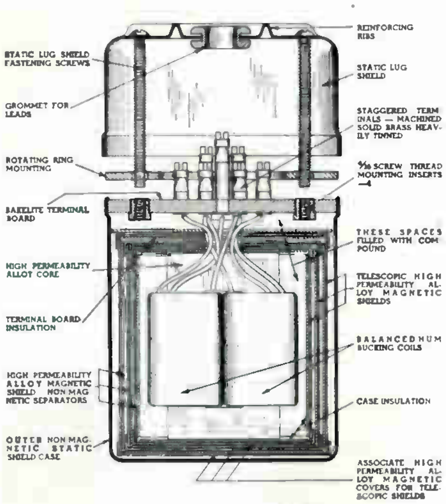
### C. H. T. MULTI-MATCH CATHODE MODULATION TRANSFORMERS

Audio power is 10% of the Class C input. R. F. efficiency is 44%. With the exclusive Thordarson Switchboard Plug-in Terminal Board.

| Type No. | List Price | Capacity Watts | | | | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-11M69 | $10.80 | 15 | 5,000, 7,000, 10,000 | 80 to 2,000 | 300 | 4U | 3 5/8 | 3 1/8 | 4 5/16 | 3 3/4 | 3 5/8 | 3 |
| T-11M70 | 15.00 | 40 | 3,000, 6,600, 10,000 | 80 to 2,000 | 400 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 13/16 | 5 7/16 | 7 |
| T-11M71 | 18.00 | 100 | 6,000, 8,000, 10,000 | 80 to 2,000 | 600 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 10 |

## THORDARSON BROADCAST UNITS

### CATALOG No. 500-F




*Cross section view*
*Multi-shield Audio Transformer*

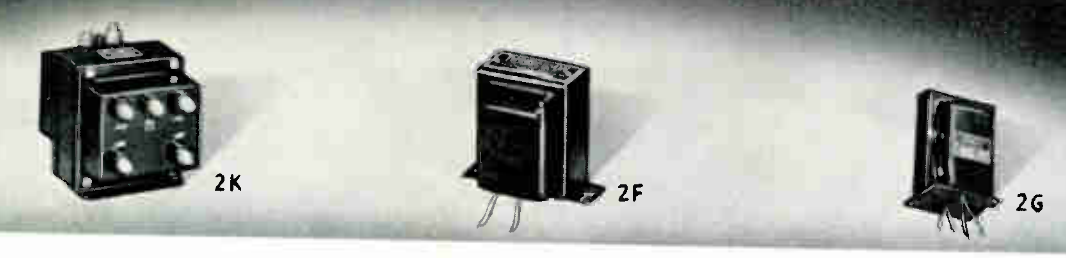
See Bantam, Incher and Major Series listed on pages 6 and 7.

The same high quality transformers that have been made to the special requirements of discriminating engineers, broadcast stations and laboratories are now available as stock catalog items. Thordarson offers a complete line of transformers and chokes for broadcast use, each capable of meeting and surpassing the most rigid broadcast tolerances. Audio transformers perfectly designed and manufactured to assure uniform frequency response are listed. Filters, line equalizers, many types of filament transformers and filter reactors, plate transformers, modulation transformers and reactors round out an unusually complete line of broadcast components. Station engineers, experimentors, laboratories or air-craft equipment manufacturers and engineers are urged to secure a copy of catalog 500-F — FREE.



*Prices subject to change without notice.*

# THORDARSON — *Plate (P) Transformers*




## PLATE SUPPLY (P) TRANSFORMERS—"19" SERIES

Supply the voltage potential between cathode and anodes of vacuum tubes in a rectifier circuit. Thordarson plate transformers are rated in D.C. voltages from a two section filter which includes the voltage drop through the rectifier tubes. Designed especially for Amateur Short Wave or experimental equipment. Electrostatic shielding is provided between primary and secondary windings.

| Type No. | List Price | Primary Volts | Sec. A.C. Load Volts | D.C. Volts | Bias Tap | D.C. M.A. | Pri. V.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-19P54 | $7.20 | 115 | 560-0-560 | 400 | | 150 | 115 | 2G | 3 | 2 5/8 | 3 3/4 | 3 3/8 | 4 7/8 | 7 |
| ★ T-19P55 | 7.80 | 115 | 660-0-660<br>550-0-550 | 500<br>400 | 30 V. | 250 | 200 | 2G | 3 | 3 7/16 | 3 3/4 | 4 3/16 | 4 7/8 | 8 |
| T-84P60 | 9.00 | 115 | 515-0-515 | 400 | 30 V. | 250 | 190 | 2G | 3 | 4 | 3 3/4 | 4 3/4 | 4 7/8 | 11 3/4 |
| T-19P70 | 13.80 | 115 | 900-0-900<br>605-0-605 | 750*<br>400 | | 100<br>225 | 260 | 2G | 3 | 3 7/8 | 3 3/4 | 4 5/8 | 4 7/8 | 11 1/2 |
| ★ T-19P57 | 10.20 | 115 | 1075-0-1075<br>500-0-500 | 1000*<br>400 | | 125<br>150 | 245 | 2G | 3 | 3 3/4 | 3 3/4 | 4 1/2 | 4 7/8 | 10 1/2 |
| ★ T-19P58 | 18.00 | 115 | 1200-0-1200<br>900-0-900 | 1000*<br>750 | | 200<br>150 | 500 | 2G | 3 1/4 | 3 11/16 | 4 3/8 | 5 5/8 | 6 1/8 | 19 |
| T-19P71 | 16.80 | 115 | 1325-0-1325<br>595-0-595 | 1250*<br>400 | | 125<br>200 | 320 | 2G | 3 | 4 1/16 | 3 7/8 | 5 1/8 | 4 5/8 | 13 |
| ★ T-19P56 | 8.40 | 115 | 900-0-900<br>800-0-800 | 750<br>600 | | 225 | 260 | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 7/8 | 10 |
| T-19P69 | 18.00 | 115 | 1180-0-1180<br>900-0-900 | 1000<br>750 | | 300 | 430 | 2G | 3 3/4 | 3 5/8 | 5 1/16 | 6 1/4 | 6 3/4 | 20 |
| ★ T-19P59 | 21.00 | 115 | 1560-0-1560<br>1250-0-1250 | 1250<br>1000 | | 300 | 550 | 2K | 4 3/16 | 3 5/16 | 5 7/8 | 7 5/8 | 6 1/16 | 26 1/2 |
| ★ T-19P60 | 25.20 | 115 | 1875-0-1875<br>1560-0-1560 | 1500<br>1250 | | 300 | 620 | 2K | 5 3/4 | 4 3/8 | 6 11/16 | 7 1/8 | 6 3/4 | 29 1/4 |
| T-19P61 | 27.00 | 115 | 2125-0-2125<br>1875-0-1875 | 1750<br>1500 | | 300 | 745 | 2K | 5 3/4 | 4 5/8 | 6 11/16 | 7 3/8 | 6 3/4 | 31 1/2 |
| ★ T-19P62 | 32.10 | 115 | 2420-0-2420<br>2125-0-2125 | 2000<br>1750 | | 300 | 860 | 2K | 5 3/4 | 5 | 6 11/16 | 7 3/4 | 6 3/4 | 34 1/2 |
| T-19P65 | 37.20 | 115 | 3000-0-3000<br>2420-0-2420 | 2500<br>2000 | | 300 | 1195 | 2K | 5 3/4 | 6 | 6 11/16 | 9 1/8 | 6 3/4 | 44 |
| ★ T-19P63 | 30.90 | 115 | 1560-0-1560<br>1265-0-1265 | 1250<br>1000 | | 500 | 925 | 2K | 5 3/4 | 5 1/4 | 6 11/16 | 8 5/8 | 6 3/4 | 38 |
| ★ T-19P64 | 35.70 | 115 | 1875-0-1875<br>1560-0-1560 | 1500<br>1250 | | 500 | 1130 | 2K | 5 3/4 | 6 | 6 11/16 | 9 1/8 | 6 3/4 | 43 1/4 |
| T-19P66 | 49.80 | 115 | 2125-0-2125<br>1875-0-1875 | 1750<br>1500 | | 500 | 1185 | 2K | 5 3/4 | 4 3/8 | 6 11/16 | 7 1/4 | 9 13/16 | 45 1/2 |
| T-19P67 | 60.00 | 115 | 2450-0-2450<br>2125-0-2125 | 2000<br>1750 | | 500 | 1380 | 2K | 5 3/4 | 4 5/8 | 6 11/16 | 7 1/2 | 9 13/16 | 51 |
| T-19P68 | 70.20 | 115 | 3000-0-3000<br>2450-0-2450 | 2500<br>2000 | | 500 | 1760 | 2K | 5 3/4 | 5 5/8 | 6 11/16 | 8 1/2 | 9 13/16 | 61 |

*These transformers designed for double rectifiers and will deliver both secondary ratings simultaneously. If only the lower voltage taps are used the current rating is equal to the current rating of both windings.

## POWER (R) TRANSFORMERS

### TELEVISION POWER TRANSFORMERS

| Type No. | List Price | Kinescope Tubes | Secondary | | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-17R32 | $12.30 | 5" | No. 1 — 2300V AC<br>No. 2 — 2.5V at 2A<br>No. 3 — 2.5V at 2A | 3000V DC | 7500 | 2G | 2 11/16 | 2 5/16 | 3 5/16 | 3 1/8 | 4 5/8 | 4 1/2 |
| T-17R33 | 20.40 | 9" | No. 1 — 4500V AC<br>No. 2 — 2.5V at 5A<br>No. 3 — 2.5V at 2A | 6000V DC | 10,000 | 2G | 2 11/16 | 3 1/16 | 3 5/16 | 3 7/8 | 4 5/8 | 6 1/2 |

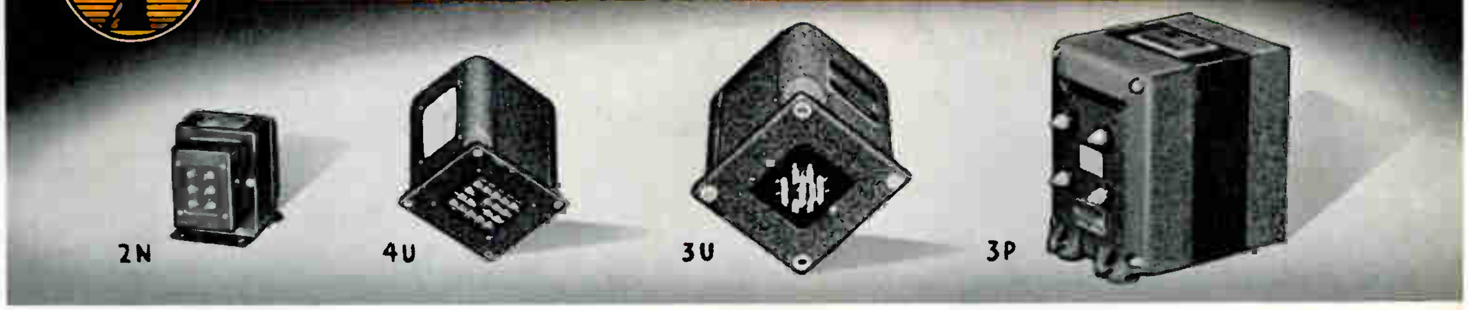
For suitable filter reactor, see listing of chokes on page 8. (See T-17C40)

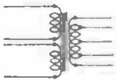


Prices subject to change without notice.

# *Plate* (P) — *Power* (R) *Transformers*

THORDARSON



## PLATE SUPPLY (P) TRANSFORMERS — C. H. T. SERIES

Will operate continuously under full rated load conditions with excellent regulation and with minimum temperature rise. Cases are compound filled for complete coil protection.

| Type No. | List Price | Primary Volts | Sec. A.C. Load Volts | D.C. Volts | D.C. M.A. | Pri. V.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15P11 | $16.80 | 115-230 | 665-0-665<br>535-0-535 | 500<br>400 | 200 | 160 | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 15 3/4 |
| T-15P12 | 19.20 | 115-230 | 835-0-835<br>655-0-655 | 650<br>500 | 200 | 200 | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 13/16 | 6 3/8 | 19 1/2 |
| T-15P13 | 28.80 | 115-230 | 945-0-945<br>770-0-770 | 750<br>600 | 300 | 315 | 3U | 5 3/8 | 5 15/16 | 6 3/16 | 7 5/8 | 7 7/16 | 31 3/4 |
| T-15P14 | 36.00 | 115-230 | 1225-0-1225<br>945-0-945 | 1000<br>750 | 300 | 427 | 3U | 5 3/8 | 5 15/16 | 6 3/16 | 6 5/8 | 7 7/16 | 41 |
| T-15P15 | 42.00 | 115-230 | 1450-0-1450<br>1190-0-1190 | 1250<br>1000 | 300 | 520 | 3U | 6 5/16 | 6 1/4 | 7 5/16 | 7 1/8 | 8 | 51 1/4 |
| T-15P17 | 45.00 | 115-230 | 1815-0-1815<br>1535-0-1535 | 1500<br>1250 | 300 | 665 | 3U | 6 5/16 | 6 1/4 | 7 5/16 | 8 1/8 | 8 | 55 |
| ★ T-15P19 | 81.00 | 115-230 | 2950-0-2950<br>2365-0-2365 | 2500<br>2000 | 300 | 1160 | 3P | 3 1/4 | 10 1/8 | 6 3/8 | 12 3/4 | 9 | 85 |
| T-15P16 | 63.00 | 115-230 | 1540-0-1540<br>1255-0-1255 | 1250<br>1000 | 500 | 875 | 3P | 3 1/4 | 9 5/8 | 6 3/8 | 12 1/4 | 9 | 81 |
| T-15P18 | 84.00 | 115-230 | 2130-0-2130<br>1845-0-1845 | 1750<br>1500 | 500 | 1210 | 3P | 3 1/4 | 10 7/8 | 6 3/8 | 13 1/2 | 9 | 96 |
| ★ T-15P21 | 114.00 | 115-230 | 3440-0-3440<br>2980-0-2980<br>2340-0-2340<br>1815-0-1815 | 3000<br>2500<br>2000<br>1500 | 500 | 2180 | 3P | 4 1/4 | 11 1/8 | 7 9/16 | 11 7/8 | 9 5/8 | 129 |
| T-15P20 | 120.00 | 115-230 | 2960-0-2960<br>2390-0-2390 | 2500<br>2000 | 650 | 2380 | 3P | 4 1/4 | 11 7/8 | 7 9/16 | 14 5/8 | 9 5/8 | 140 |

## POWER (R) TRANSFORMERS

### Universal Bias Transformers — "19" Series

| Type No. | List Price | Pri. V.A. | Secondary D.C. Volts | Secondary M.A. | Filament V. | Filament A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-19R31 | $11.40 | | 10 to 100 in app. 5 volt steps | 200 | | | 2N | 3 1/4 | 2 1/16 | 3 3/4 | 3 3/8 | 4 | 4 |
| T-19R32 | 15.00 | | 100 to 400 in app. 15 volt steps | 200 | | | 2N | 2 3/4 | 2 11/16 | 3 13/16 | 4 1/8 | 4 5/8 | 9 1/4 |

### C. H. T. Multi-Volt Bias Transformers

Have the convenient feature of Switchboard plug-in terminal board facilitating changes of voltage.

| Type No. | List Price | Pri. V.A. | Secondary D.C. Volts | Secondary M.A. | Filament V. | Filament A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15R60 | $23.40 | 65 | 150/135/120/110/100/90 | 200 | 5 | 3 | 4U | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 6 3/4 |
| T-15R61 | 21.00 | 100 | 275/250/225/200/175/150 | 200 | 5 | 3 | 4U | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 8 1/2 |
| T-15R62 | 23.40 | 155 | 500/450/400/350/300/275 | 200 | 5 | 3 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 15 1/4 |

### POWER TRANSFORMERS FOR CATHODE RAY TUBES

| Type No. | List Price | Volts D.C. | M.A. | Filament Windings Rect. Fil. | Filament Windings Fil. No. 1 | Filament Windings Fil. No. 2 | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-92R33<br>For 913 tube | $5.40 | **500<br>tap—400 | 3<br>15 | 6.3V—.9A | 6.3V—.6A | 6.3V—.6A<br>(No. 3 2.5V—1.4A) | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/4 |
| T-14R32– | 9.00 | 400 | 15 | 5V—2A<br>5V—2A Ct. | 6.3V—.6A | 2.5V—2A<br>(No. 3 6.3V—.6A) | 2G | 2 1/8 | 2 1/8 | 2 7/8 | 3 3/8 | 3 11/16 | 4 |

For Dumont 24-XH; RCA 902, 913; National 2002 Tubes.

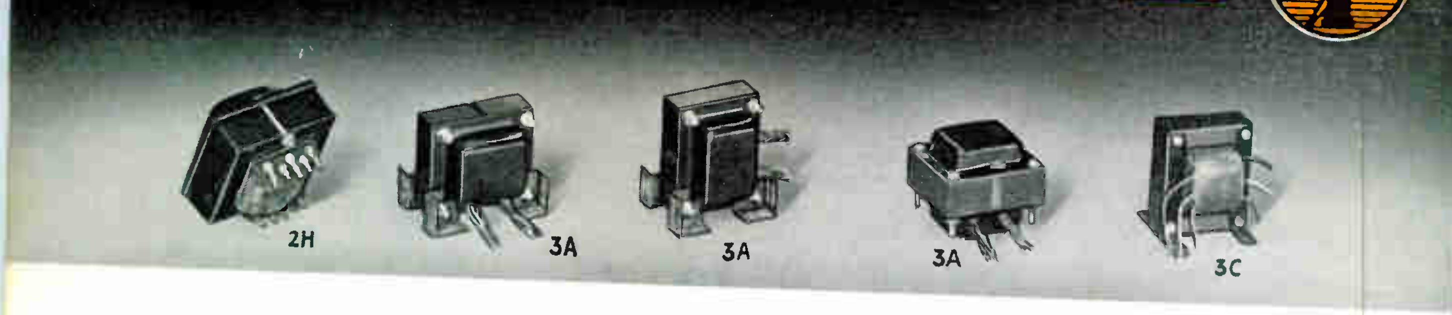
**With half wave rectification.

### No. 352 — Replacement Transformer Encyclopedia. Free

Thordarson Replacement Transformer Encyclopedia No. 352 indicates proper transformer and choke replacement for receivers listed in Rider's Manuals. This handy, useful time-saver, originated by Thordarson, is now used by good service engineers the world over. In addition, it contains electrical and physical characteristics of all transformers and chokes listed in the Guide. Also included is a convenient table for choosing the correct output transformer for each application.



Prices subject to change without notice.




## POWER (R) TRANSFORMERS

**To furnish plate and filament voltage requirements of amplifiers, receivers and exciter stages of transmitters.**

### UNIVERSAL REPLACEMENT POWER TRANSFORMERS — "13R" SERIES

The choice of servicemen in all parts of the world because of the universal adaptability to receiver replacement, both electrically and mechanically. Adjustable mounting brackets permit flush, vertical or horizontal mounting. Replacement recommendations are given in Thordarson Replacement Transformer Encyclopedia No. 352.

| Type No. | List Price | Pri. V.A. | Secondary A.C. Load Volts | Secondary D.C. M.A. | Filament Windings Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-13R19 | $3.60 | 45 | 240-0-240 | 40 | 5V—2A | 6.3V—2A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 2½ | 2½ |
| ★ T-13R11 | 3.90 | 60 | 290-0-290 | 50 | 5V—3A | 6.3V—2A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 2¾ | 3¼ |
| T-13R20 | 4.50 | 60 | 305-0-305 | 70 | 5V—2A | 6.3V—3.5A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 3 5/16 | 3¼ |
| ★ T-13R12 | 4.50 | 65 | 350-0-350 | 70 | 5V—3A | 6.3V—2.5A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 3 5/16 | 3¼ |
| ★ T-13R13 | 5.40 | 90 | 350-0-350 | 90 | 5V—3A | 6.3V—3.5A Ct. | | | 3A | 3⅛ | 2½ | 3¾ | 3⅛ | 3½ | 5¼ |
| ★ T-13R14 | 6.00 | 115 | 350-0-350 | 120 | 5V—4A | 6.3V—4.7A Ct. | | | 3A | 3⅛ | 2½ | 3¾ | 3⅛ | 3⅝ | 5¼ |
| ★ T-13R15 | 6.90 | 140 | 375-0-375 | 150 | 5V—4A | 6.3V—5A Ct. | | | 3A | 3¾ | 3 | 4½ | 3¾ | 3 7/16 | 6½ |
| ★ T-13R16 | 7.80 | 180 | 400-0-400 | 200 | 5V—4A | 6.3V—5.14A Ct. | | | 3A | 3¾ | 3 | 4½ | 3¾ | 3¾ | 7¾ |
| T-13R17 | 5.10 | 85 | 300-0-300 | 60 | 5V—3A | 6.3V—2.5A Ct. | 2.5V—7.5A Ct. | | 3A | 2 13/16 | 2¼ | 3⅜ | 2 13/16 | 3 1/16 | 4½ |
| T-13R18 | 6.00 | 115 | 350-0-350 | 90 | 5V—3A | 6.3/2.5 3.5A Ct. | 2.5V—9A Ct. | | 3A | 3¾ | 3 | 4½ | 3¾ | 3 5/16 | 5¾ |
| T-13R08 | 6.00 | 105 | 350-0-350 | 90 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 3⅛ | 2½ | 3¾ | 3⅛ | 3⅝ | 5¼ |
| T-13R09 | 7.50 | 160 | 375-0-375 | 180 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 3¾ | 3 | 4½ | 3¾ | 3⅝ | 7½ |
| T-13R00 | 5.40 | 70 | 275-0-275 | 70 | 5V—3A | 5V—.5A Ct. | 2.5V—10.5A Ct. | | 3A | 2 13/16 | 2¼ | 3⅜ | 2 13/16 | 3¼ | 4 |
| ★ T-13R01 | 4.20 | 60 | 325-0-325 | 40 | 5V—3A | 2.5V—4A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 2¾ | 3¼ |
| ★ T-13R02 | 4.50 | 60 | 350-0-350 | 50 | 5V—3A | 2.5V—7.25A Ct. | | | 3A | 2½ | 2 1/16 | 3 | 2½ | 2 15/16 | 3¼ |
| ★ T-13R03 | 5.10 | 75 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | | | 3A | 2 13/16 | 2¼ | 3⅜ | 2 13/16 | 3¼ | 4 |
| T-13R04 | 6.00 | 115 | 350-0-350 | 100 | 5V—3A | 2.5V—12.5A Ct. | | | 3A | 3⅛ | 2½ | 3¾ | 3⅛ | 3⅞ | 5¼ |
| ★ T-13R05 | 6.00 | 110 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | 2.5V—3.5A Ct. | | 3A | 3⅛ | 2½ | 3¾ | 3⅛ | 3⅝ | 5¼ |
| ★ T-13R06 | 6.90 | 130 | 350-0-350 | 120 | 5V—3A | 2.5V—12.5A Ct. | 2.5V—3.5A Ct. | | 3A | 3¾ | 3 | 4½ | 3¾ | 3⅛ | 6½ |
| T-13R07 | 7.20 | 140 | 400-0-400 | 110 | 5V—3A | 2.5V—15A Ct. | 2.5V—3.5A Ct. | | 3A | 3¾ | 3 | 4½ | 3¾ | 3 7/16 | 6¾ |

### AMPLIFIER, TRANSMITTER AND REPLACEMENT — Half Shell or Flush Mounting

Lugs are brought out through solder terminals facilitating circuit changes for the experimenter.

| Type No. | List Price | Pri. V.A. | A.C. Load Volts | D.C. M.A. | Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-60R49 | $3.60 | 30 | 280-0-280 | 30 | 5V—2A | 2.5V—3.5A Ct. | | | 2H | | 2 3/16 | 2⅞ | 2½ | 2 | 2 |
| T-50R03- | 3.90 | 75 | 350-0-350 | 80 | 5V—2A | 2.5V—12A Ct. | | | 2H | 3⅛ | 2½ | 3 5/16 | 3 15/16 | 3 1/16 | 5½ |
| T-63R63- | 3.90 | 75 | 350-0-350 | 80 | 5V—2A | 2.5V—9A Ct. | 2.5V—3A Ct. | | 2H | 3⅛ | 2½ | 3 5/16 | 3 15/16 | 3 1/16 | 5½ |
| ★ T-70R20 | 3.90 | 45 | 300-0-300 | 50 | 5V—2A | 6.3V—2A Ct. | | | 2H | | 2½ | 3 7/16 | 2 15/16 | 2 | 3 |
| T-70R21 | 5.40 | 70 | 350-0-350 | 70 | 5V—2A | 2.5V—4A Ct. | 6.3V—3A Ct. | | 2H | | 2⅞ | 4 | 3⅜ | 2 5/16 | 4¼ |
| ★ T-75R47 | 5.70 | 85 | 340-0-340 | 125 | 5V—2A | 6.3V—2A Ct. | | | 2H | | 2⅞ | 4 | 3⅜ | 2 13/16 | 6 |

### VIBRATOR POWER TRANSFORMERS

For operation with a vibrator from a six volt battery source.

| Type No. | List Price | Secondary D.C. Volts to Filter | Secondary M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-14R33 | $3.60 | 225 | 40 | 3C | 2 1/16 | 1 15/16 | 2½ | 2⅝ | 3⅛ | 2 |
| ★ T-14R34 | 4.20 | 250 | 50 | 3C | 2 1/16 | 2 1/16 | 2½ | 2¾ | 3¼ | 2¼ |
| ★ T-14R35 | 4.50 | 260 | 60 | 3C | 2 | 2 1/16 | 2½ | 2⅞ | 3⅛ | 2½ |
| T-14R36 | 5.70 | 285 | 75 | 3C | 2 | 2 1/16 | 2½ | 3⅛ | 3⅛ | 3 |
| T-14R37 | 6.00 | 350 | 75 | 3C | 2 | 2 1/16 | 2½ | 3⅜ | 3⅛ | 3½ |
| T-14R38 | 6.90 | 320 | 100 | 2G | 2 11/16 | 2 5/16 | 3 5/16 | 3⅛ | 4⅝ | 5 |
| ★ T-14R39 | 3.30 | 150 | 40 | 2B | 2⅜ | | 2⅞ | 2⅛ | 2⅜ | 1¼ |

### UNIVERSAL 115 VOLT A. C. OR 6 VOLT D. C. VIBRATOR POWER TRANSFORMER

| Type No. | List Price | Rating | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|
| ★ T-14R40 | $9.00 | 350 D. C. @ 1.35 Ma. Fil. 6.3 @ 4.75 Amp. | 2G | 3 | 3¼ | 3¾ | 4 | 4⅞ | 8½ |

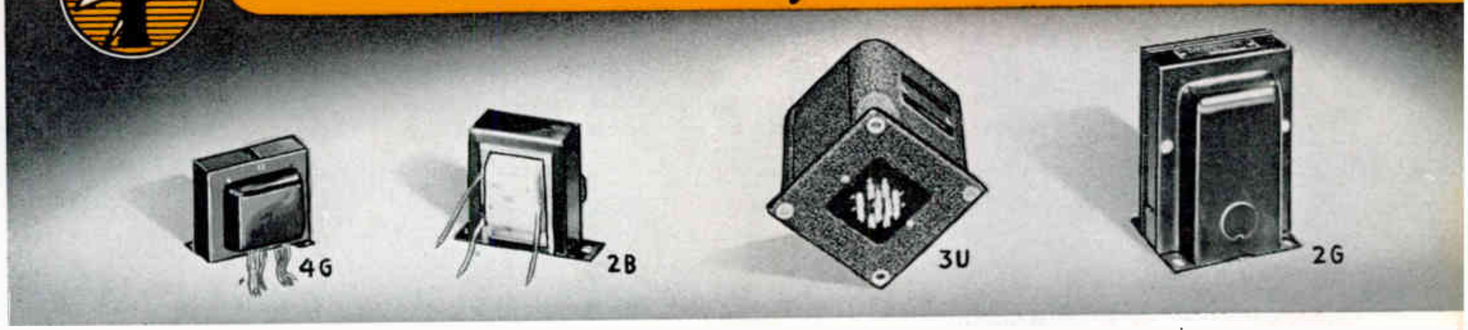




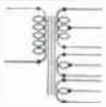
*Prices subject to change without notice.*

# Power (R) Transformers

THORDARSON




## POWER (R) TRANSFORMERS — Amplifier, Transmitter and Replacement



### FULLY SHIELDED — UPRIGHT MOUNTING

Leads are brought out through an opening in the base.

| Type No. | List Price | Pri. V.A. | Secondary A.C. Load Volts | Secondary D.C. M.A. | Bias Tap | Filament Windings: Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-56R01 | $6.90 | 60 | 325-0-325 | 70 | | 5V—2A | 2.5V—3A Ct. | 1.5V—1A<br>1.5V—4A | 5V—.5A Ct. | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-56R02– | 5.10 | 70 | 350-0-350 | 70 | | 5V—2A | 2.5V—9A Ct. | 2.5V—1.5A Ct. | | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 6 |
| T-56R03 | 8.10 | 85 | 350-0-350 | 105 | | 5V—3A | 2.5V—3A Ct. | 2.5V—1.75A Ct. | 1.5V—5A<br>1.5V—1A | 2G | 3 | 2 13/16 | 3 3/4 | 3 9/16 | 4 7/8 | 7 1/4 |
| T-56R05 | 8.10 | 115 | 350-0-350 | 110 | | 5V—3A | 2.5V—9A Ct. | 2.5V—3A Ct. | 2.5V—3A Ct. | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 7/8 | 7 3/4 |
| T-37R70-C- | 9.00 | 95 | 350-0-350 | 80 | | 5V—2A Ct. | 3V—10A Ct. | 5V—2.5A Ct. | | 2G | 2 11/16 | 3 1/16 | 3 5/16 | 3 7/8 | 4 5/8 | 6 3/4 |
| For Sparton Models 235, 589, 593, 600 Series, 737, 931 and other receivers using Kellogg and other 3V tubes. | | | | | | | | | | | | | | | | |
| ★ T-70R78 | 5.10 | 60 | 340-0-340 | 55 | | 5V—2A | 6.3V—1.5A Ct. | | | 2G | 2 11/16 | 2 1/8 | 3 5/16 | 2 3/4 | 4 5/8 | 4 |
| T-17R34 | 6.30 | 90 | 300-0-300 | 125 | | 5V—2A | 6.3V—4.8A Ct. | | | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-17R35 | 4.20 | 60 | 290-0-290 | 50 | | 5V—3A | 6.3V—2A Ct. | | | 4G | 2 | 1 15/16 | 2 5/8 | 3 | 3 1/8 | 3 1/2 |
| T-17R36 | 4.80 | 65 | 350-0-350 | 70 | | 5V—3A | 6.3V—2.5A Ct. | | | 4G | 2 | 2 1/2 | 2 5/8 | 3 9/16 | 3 1/8 | 3 1/2 |
| T-17R37 | 5.70 | 90 | 350-0-350 | 90 | | 5V—3A | 6.3V—3.5A Ct. | | | 2G | 2 11/16 | 2 11/16 | 3 5/16 | 3 1/2 | 4 5/8 | 5 1/2 |
| T-17R38 | 6.30 | 115 | 350-0-350 | 120 | | 5V—4A | 6.3V—4.7A Ct. | | | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 1/2 |
| ★ T-70R61 | 5.70 | 60 | 385-0-385 | 70 | | 5V—2A | 6.3V—2.5A Ct. | | | 2G | 2 11/16 | 2 5/16 | 3 5/16 | 3 1/8 | 4 5/8 | 4 3/4 |
| ★ T-70R62 | 7.50 | 110 | 350-0-350 | 145 | | 5V—3A | 6.3V—4.5A Ct. | | | 2G | 3 | 3 1/8 | 3 3/4 | 3 7/8 | 4 15/16 | 8 1/2 |
| ★ T-92R21 | 9.00 | 150 | 389-0-389 | 200 | | 5V—3A | 6.3V—5A Ct. | | | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 7/16 | 9 |
| ★ T-17R30 | 10.20 | 200 | 370-0-370 | 280 | | 5V—3A | 6.3V—7A Ct. | | | 2G | 3 | 3 5/8 | 3 3/4 | 4 3/8 | 4 7/8 | 9 1/2 |
| T-17R31 | 15.00 | 300 | 430-0-430 | 325 | | 5V—6A | 6.3V—8A Ct. | | | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 7/8 | 13 1/2 |
| T-74R28 | 8 10 | 105 | 440-0-440 | 125 | 38V | 5V—3A<br>2.5V—3A | 6.3V—3.3A Ct. | | | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 7/8 | 8 |
| ★ T-87R85 | 9.00 | 145 | 330-0-330 | 160 | 77V | 5V—3A<br>5V—2A | 6.3V—2A Ct. | 2.5V—5A Ct. | | 2G | 3 | 3 1/8 | 3 3/4 | 3 7/8 | 4 7/8 | 8 1/2 |
| T-68R26 | 8.70 | 160 | 550-0-550 | 150 | | 5V—3A | 7.5V—2.5A Ct. | 2.5V—5A Ct. | | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 15/16 | 10 1/8 |
| T-69R35 | 8.10 | 135 | 390-0-390 | 200 | | 5V—3A | 6.3V—3A Ct. | | | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 15/16 | 9 1/2 |
| ★ T-75R50 | 9.30 | 160 | 435-0-435 | 250 | 80V | 5V—3A<br>2.5V—3A | 6.3V—1.5A Ct. | 2.5V—10A Ct. | | 2G | 3 | 3 1/2 | 3 3/4 | 4 1/4 | 4 15/16 | 10 1/2 |
| T-83R82– | 12.00 | 200 | 740-0-740 | 140 | 150V | 5V—3A<br>2.5V—3A | 7.5V—2.5A Ct. | | | 2G | 3 | 4 | 3 3/4 | 4 3/4 | 4 15/16 | 11 1/2 |
| T-83R85 | 15.00 | 290 | 740-0-740<br>325-0-325 | 200 | 150V | 5V—3A<br>2.5V—3A | 7.5V—5A Ct. | | | 2G | 3 | 4 1/2 | 3 3/4 | 5 1/4 | 4 7/8 | 13 1/2 |
| ★ T-89R28 | 13.80 | 250 | 550-0-550 | 275<br>75 | | 5V—3A Ct.<br>5V—2A Ct. | 6.3V—6A Ct. | | | 2G | 3 | 4 1/2 | 3 3/4 | 5 1/4 | 4 7/8 | 15 |
| T-19R30 | 9.60 | 170 | 560-0-560 | 150 | | 5V—3A | 6.3V—3A Ct. | 7.5V—2.5A Ct. | | 2G | 3 | 3 1/4 | 3 3/4 | 4 | 4 7/8 | 8 3/4 |

### C. H. T. POWER TRANSFORMERS

For amplifiers, transmitters, or deluxe receivers. Designed to operate continuously at full rated load. Cases compound filled for complete coil protection.

| Type No. | List Price | Pri. V.A. | Secondary A.C. Load Volts | Secondary D.C. M.A. | Bias Tap | Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15R00 | $15.00 | 140 | 500-0-500 | 150 | | 5V—3A | 7.5V/6.3—5A | | | 3U | 4 9/16 | 3 3/4 | 5 3/8 | 4 9/16 | 5 3/4 | 15 |
| T-15R01 | 21.00 | 310 | 500-0-500 | 400 | | 5V—6A | 6.3V—6A | | | 3U | 5 3/8 | 4 9/16 | 6 3/16 | 5 3/8 | 6 11/16 | 24 1/2 |
| T-15R02 | 15.90 | 220 | 750-0-750 | 200 | | 2.5V—10A | 7.5V/6.3—3A | | | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 13/16 | 6 3/8 | 17 |
| T-15R03 | 16.50 | 205 | 400-0-400 | 200 | | 5.V—3A | 6.3V—3A | 2.5V—4A | | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 13/16 | 6 3/8 | 19 |
| T-15R04 | 9.00 | 30 | 255-0-255 | 25 | | | 6.3V—2.1A Ct. | | | 3U | 2 3/8 | 2 1/2 | 3 | 3 | 3 5/16 | 3 |
| T-15R05 | 15.90 | 150 | 340-0-340 | 135 | 77V | 5V—3A<br>5V—2A | 6.3V—4A Ct. | *6.3V—2A Ct.<br>*2.5V—5A Ct. | | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 10 |
| T-15R06 | 14.70 | 155 | 360-0-360 | 175 | | 5V—3A | 6.3V—5A Ct. | | | 3U | 3 5/8 | 3 7/16 | 4 5/16 | 4 1/8 | 5 7/16 | 11 |
| T-15R07 | 15.90 | 238 | 380-0-380 | 280 | | 5V—3A | 6.3V—7A Ct. | | | 3U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 12 |
| T-15R08 | 19.20 | 253 | 450-0-450 | 325 | | 5V—6A | 6.3V—8A Ct. | | | 3U | 4 9/16 | 4 1/16 | 5 3/8 | 4 13/16 | 6 3/8 | 22 |

### SPEAKER FIELD SUPPLY TRANSFORMERS

| Type No. | List Price | Pri. V.A. | Secondary | Rect. Fil. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-67R97 | $5.10 | 55 | 115 V.D.C. @ 50 to 250 | 5V—3A | 4G | 3 1/4 | 1 11/16 | 3 15/16 | 3 3/16 | 3 5/16 | 4 3/4 |
| T-92R53 | 6.90 | 120 | 300 V.D.C. @ 200 | 5V—3A | 4G | 3 1/4 | 2 3/8 | 3 15/16 | 3 7/8 | 3 5/16 | 6 1/4 |

*Not simultaneous—for 2A3's or 6A3's Fil.



*Prices subject to change without notice.*

# Choosing Output Transformers

This accurate and convenient table has been compiled to facilitate choosing the correct output transformer. Two types are offered for most tubes: the universal type, which is designed to accommodate a wide range of tube and voice coil impedances, and the specific duty type.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms | Watts Output | Universal Type Transformer | Specific Duty Transformer |
|---|---|---|---|---|---|---|---|
| 1A5G | 90 | –4.5 | 4.0 | 25,000 | .115 | | T-14S83 |
| 1C5G | 90 | –7.5 | 7.5 | 8,000 | .240 | T-13S38† | T-14S84 |
| 1D8GT | 90 | –9.0 | 5.0 | 12,000 | .200 | T-13S38† | |
| 1E7G (1 section) | 135 | –4.5 | 7.5 | 16,000 | .290 | T-13S38† | T-13S43 |
| (2 sections, P-P) | 135 | –7.5 | *3.5 | 24,000 | .575 | | T-14S83 |
| 1F4, 1F5G | 135 | –4.5 | 8.0 | 16,000 | .310 | T-13S38† | T-13S43 |
| 1G5G | 90 | –6.0 | 8.5 | 8,500 | .250 | T-13S38† | T-14S84 |
| 1G6G | 90 | 0 | *1.0 | 12,000 | .675 | T-13S38† | |
| 1J5G | 135 | –16.5 | 7.0 | 13,500 | .450 | T-13S38† | |
| 1J6G | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 1N6G | 90 | –4.5 | 3.1 | 25,000 | .100 | | T-14S83 |
| 1Q5G, 1Q5GT | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| 1S4 | 45 | –4.5 | 3.8 | 8,000 | .065 | T-13S38† | T-14S84 |
| 1T5GT | 90 | –6.0 | 6.5 | 14,000 | .170 | T-13S38† | T-13S43 |
| 2A3 (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.5 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 300 | –62.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 300 | –62.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 2A5 (Single Cl. A) | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| (Single Cl. A) | 285 | –20.0 | 38.0 | 7,000 | 4.5 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | –16.5 | *34.0 | 14,000 | 6.2 | T-57S01§ | T-67S51 |
| (P-P Cl. $AB_1$) | 315 | –24.0 | *31.0 | 10,000 | 11.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_2$) | 375 | –21.0 | *27.0 | 10,000 | 19.0 | T-13S41 | T-75S75 |
| 3Q5GT (Fil. par.) | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| (Fil. series) | 90 | –4.5 | 7.5 | 8,000 | .230 | T-13S38† | T-14S84 |
| 4A6G | 90 | –1.5 | *1.1 | 8,000 | 1.0 | T-13S38† | T-14S81 |
| 6A3 | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A4 | 180 | –12.0 | 22.0 | 8,000 | 1.4 | T-13S38† | T-13S37 |
| 6A5G | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A6 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6AC5G | 250 | self | 32.0 | 7,000 | 3.7 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 250 | 0 | *2.5 | 10,000 | 8.0 | T-13S41 | T-75S75 |
| 6AL6G | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| 6B4G (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 325 | –68.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 325 | –68.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 6B5 | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6E6 | 250 | –27.5 | *18.0 | 14,000 | 1.6 | T-57S01§ | T-13S40 |
| 6F6 | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 6G6G | 180 | –9.0 | 15.0 | 10,000 | 1.1 | T-13S38† | |
| 6G6G | 135 | –6.0 | 11.5 | 12,000 | .6 | T-13S38† | |
| 6K6G | 315 | –21.0 | 25.5 | 9,000 | 4.5 | T-57S01§ | |
| 6K6G | 250 | –18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 6L6 (Single Cl. A) | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| (Single Cl. A) | 320 | –20.0 | 76.0 | 2,500 | 8.0 | | T-17S10 |
| (P-P Cl. $A_1$) | 270 | –16.5 | *67.5 | 5,000 | 18.5 | | T-67S54 (C.H.T., T-15S90) |
| (P-P Cl. $AB_1$) | 319 | –23.0 | *50.0 | 4,300 | 25.0 | | T-17S12 (C.H.T., T-15S91) |
| (P-P Cl. $AB_1$) | 400 | –25.0 | *51.0 | 6,600 | 34.0 | | T-17S13 (C.H.T., T-15S92) |
| (P-P Cl. $AB_2$) | 430 | –20.0 | *47.0 | 5,500 | 40.0 | | T-17S14 (C.H.T., T-15S92) |
| (P-P-Par. Cl. $AB_1$) | 410 | –28.0 | *50.0 | 3,300 | 60.0 | | T-17S15 (C.H.T., T-15S93) |
| (P-P-Par. Cl. $AB_2$) | 430 | –24.5 | *52.0 | 1,900 | 120.0 | | T-17S16 (C.H.T., T-15S94) |

* Zero signal per plate. † T-14S85 may be used when a transformer with lugs is preferred to one with leads.
§ T-57S02 may be used when a transformer with leads is preferred to one with lugs.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms. | Watts Output | Universal Type Trans-former | Specific Duty Trans-former |
|---|---|---|---|---|---|---|---|
| 6N6G | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6N7 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6V6 (Single Cl. A) | 250 | -12.5 | 44.5 | 5,000 | 4.5 | T-13S42 | |
| (Single Cl. $A_1$) | 315 | -13.0 | 34.0 | 8,500 | 5.5 | T-57S01§ | |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_1$) | 306 | -20.0 | *50.0 | 8,000 | 15.0 | T-13S41 | T-17S11 |
| | | | | | | | (C.H.T., T-15S90) |
| 6Y6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 6Y6G | 200 | -14.0 | 61.0 | 2,600 | 6.0 | T-13S42 | T-17S10 |
| 6Y7G | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 6Y7G | 250 | 0 | *5.3 | 14,000 | 8.0 | T-57S01§ | T-13S40 |
| 6Z7G | 135 | 0 | *3.0 | 9,000 | 2.5 | T-13S38† | T-81S01 |
| 6Z7G | 180 | 0 | *4.2 | 12,000 | 4.2 | T-13S38† | T-13S40 |
| 7A5 | 110 | -7.5 | 35.0 | 2,500 | 1.4 | T-13S42 | T-17S10 |
| 7B5 | 100 | -7.0 | 9.0 | 12,000 | .35 | T-13S38† | |
| 7B5 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 7C5 | 250 | -12.5 | 45.0 | 5,000 | 4.5 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| 10 | 425 | -50.0 | 18.0 | 10,000 | 1.6 | T-57S01§ | |
| 12A5 | 100 | -15.0 | 17.0 | 4,500 | .8 | T-13S42 | T-13S39 |
| 12A5 | 180 | -25.0 | 45.0 | 3,300 | 3.4 | T-13S42 | T-13S39 |
| 12A7 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | T-13S43 |
| 18 | 250 | -16.5 | 34.0 | 7,000 | 3.0 | T-13S42 | T-13S37 |
| 19 | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 25A6 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 25A7G | 100 | -15.0 | 20.5 | 4,500 | .770 | T-13S42 | T-13S39 |
| 25AC5GT | 180 | 0 | 27.0 | 8,000 | 2.0 | T-13S38† | T-13S37 |
| (P-P Cl. B) | 180 | 0 | *2.0 | 4,800 | 6.0 | T-13S41 | T-67S54 |
| 25B6G | 105 | -16.0 | 48.0 | 1,700 | 2.4 | T-13S42 | T-14S82 |
| 25L6 | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 31 | 135 | -22.5 | 8.0 | 7,000 | .185 | T-13S42 | T-13S37 |
| 32L7GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 33 | 135 | -13.5 | 14.5 | 7,000 | .7 | T-13S42 | T-13S37 |
| 35A5-LT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 35L6GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 38 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | |
| 38 | 250 | -25.0 | 22.0 | 10,000 | 2.5 | T-13S38† | |
| 41 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 42 | 250 | -16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 43 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 45 (Single Cl. A) | 250 | -50.0 | 34.0 | 3,900 | 1.6 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_2$) | 275 | -56.0 | *36.0 | 5,060 | 12.0 | T-13S41 | T-67S54 |
| 46 (Single Cl. A Triode) | 250 | -33.0 | 22.0 | 6,400 | 1.25 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *6.0 | 5,800 | 20.0 | T-13S41 | T-67S52 |
| 47 | 250 | -16.5 | 31.0 | 7,000 | 2.7 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | -16.5 | *31.0 | 14,000 | 5.4 | T-57S01§ | T-67S51 |
| 48 | 96 | -19.0 | 52.0 | 1,500 | 2.0 | T-13S42 | T-14S82 |
| (P-P Cl. $A_1$ Pent.) | 125 | -20.0 | *50.0 | 3,000 | 5.0 | T-13S41 | T-58S72 |
| 49 (P-P Cl. B) | 135 | 0 | *1.3 | 8,000 | 2.3 | T-13S38† | T-14S81 |
| 50 (P-P Cl. A) | 450 | -84.0 | *55.0 | 8,000 | 9.2 | T-13S41 | T-65S94 |
| 50C6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 50L6GT | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 52 | 110 | 0 | 43.0 | 2,000 | 1.5 | T-13S42 | T-17S10 |
| (P-P Cl. B) | 180 | 0 | *1.5 | 10,000 | 5.0 | T-57S01§ | T-81S01 |
| 53 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 59 (Single Cl. A Triode) | 250 | -28.0 | 26.0 | 5,000 | 1.25 | T-13S42 | T-13S39 |
| (Single Cl. A Pent.) | 250 | -18.0 | 35.0 | 6,000 | 3.0 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *13.0 | 6,000 | 20.0 | T-13S41 | T-67S52 |
| 70L7-GT | 110 | -7.5 | 40.0 | 2,000 | 1.8 | T-13S42 | T-17S10 |
| 71-A | 180 | -40.5 | 20.0 | 4,800 | .79 | T-13S42 | T-13S39 |
| (P-P Cl. A.) | 180 | -40.5 | *20.0 | 8,000 | 1.6 | T-13S38† | T-33S99 |
| 79 | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 89 | 250 | -25.0 | 32.0 | 6,750 | 3.4 | T-13S42 | T-13S37 |
| 182B/482B | 250 | -35.0 | 20.0 | 4,500 | 1.35 | T-13S42 | T-13S39 |
| 183/483 | 250 | -65.0 | 20.0 | 4,500 | 1.8 | T-13S42 | T-13S39 |
| 950 | 135 | -16.5 | 7.0 | 13,500 | .450 | T-13S38† | |

See footnote page 22.

# Output (S) Transformers


## OUTPUT (S) TRANSFORMERS

For coupling audio power amplifier tubes to a loud speaker voice coil or line. Correctly matching the output tubes to a speaker load is important. Efficiency, frequency response and distortion are affected by this matching. Small, unshielded types are listed for use with receivers where the transformer is usually mounted on the loud speaker frame. Larger shielded types have multiple secondary impedances as required in sound amplifiers. C.H.T. output transformers have a greater selection of output impedances, meeting practically all speaker requirements. These units are compound filled and are provided with jacks and plugs to facilitate speaker matching. Tertiary winding included on some types for inverse feed-back connections. Refer to pages 22-23 for complete listing of tubes with recommended output transformers.

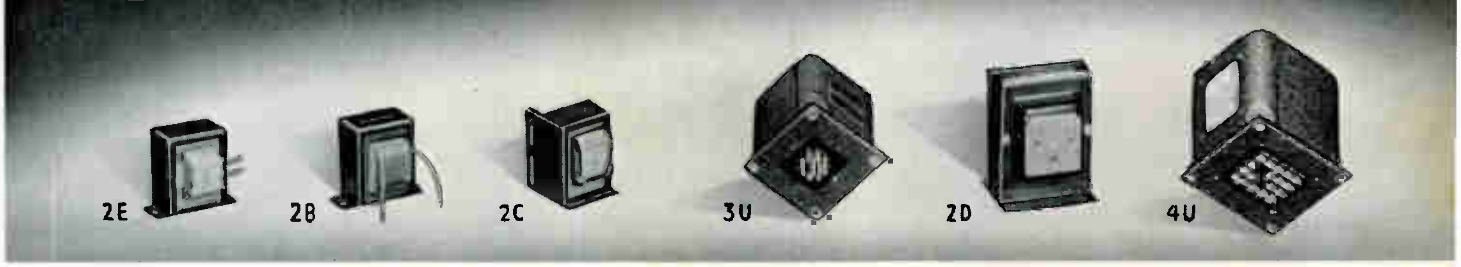
| Type No. | List Price | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **REPLACEMENT OUTPUT TRANSFORMERS** | | | | | | | | | | | | | | |
| T-14S81 | $1.50 | 1-42, 2A5, 6F6 or P-P45, 71 | A | 7,000 Ct. | 3 to 6 | 40 | 5 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| T-14S82 | 1.50 | 1-25L6 | A | 1,500 | 3 to 6 | 55 | 5 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| ★ T-14S83 | 1.50 | 1A5-G, 1E7-G | A | 25,000 Ct. | 3 to 6 | 8 | 5 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| ★ T-14S84 | 1.50 | 1-1C5G, 1Q5G | A | 8,000 | 3 to 6 | 10 | 5 | 3B | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| ★ T-13S37 | 1.50 | 1-6F6, 42, 2A5, 47 | A | 7,000 | 1/2/4 | 36 | 5 | 3E | 2 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| T-13S39 | 1.50 | 1-45, 12A5, 43, 71A | A | 4,000 | 1/2/4 | 36 | 5 | 3E | 2 | | 2 3/8 | 2 | 1 3/8 | 1/2 |
| T-13S43 | 1.60 | 1-1F4, 1D4, 1F5G | A | 16,000 | 1/2/4 | 10 | 5 | 3E | 2 | | 2 3/8 | 2 | 1 3/8 | 1/2 |
| T-33S99 | 1.80 | 2-45, 71, 43, 25A6 P-P | A | 8,000 Ct. | 6 to 12 | 36 | 10 | 2B | 2 3/8 | | 2 3/8 | 1 5/8 | 1 3/8 | 1/2 |
| T-13S40 | 1.80 | 2-6F6, 42 P-P, 2-2A5, 47 P-P | A | 14,000 Ct. | 1/2/4 | 40 | 10 | 3E | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| ★ T-81S01 | 1.80 | 1-19, 1J6G, 1G6G P-P<br>2-30, 49 P-P | B<br>B | 10,000 Ct. | 2/4/8 | 15 | 8 | 2B | 2 1/8 | | 2 13/16 | 2 | 1 5/8 | 3/4 |
| | | | | | | | | | | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| **HEAVY DUTY OUTPUT TRANSFORMERS TO LINE OR SPEAKER (High Level)** | | | | | | | | | | | | | | |
| T-72S58 | $2.00 | Pentode Plate to phones or oscillator. | A | 10,000 | 2,000<br>50 | 30 | 5 | 2B | 2 1/8 | | 2 5/8 | 1 5/8 | 2 | 3/4 |
| ★ T-17S10 | 3.60 | 1-6L6 | A | 2,500 | 2/4/8/500 | 80 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-17S11 | 5.40 | 2-6V6 P-P | AB1 | 8,000* | 4/8/15/250/500 | 52 | 15 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| ★ T-17S12 | 5.40 | 2-6L6 P-P | AB1<br>(with 300 V. on plate and screen) | 4,300* | 4/8/15/250/500 | 95 | 25 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| ★ T-17S13 | 7.20 | 2-6L6 P-P | AB1 | 6,600* | 4/8/15/250/500 | 80 | 34 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/2 |
| T-17S14 | 7.20 | 2-6L6 P-P | AB2 | 5,500* | 4/8/15/250/500 | 90 | 40 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/4 |
| T-17S15 | 7.80 | 4-6L6 P-P Par. | AB1 | 3,300* | 4/8/15/250/500 | 155 | 60 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-17S16 | 18.00 | 4-6L6 P-P Par. | AB2 | 1,900* | 84/100/125/<br>166/250/500 | 230 | 120 | 2G | 3 | 4 1/4 | 3 3/4 | 5 | 4 7/8 | 14 1/4 |
| T-68S06 | 3.00 | 1-6F6, 42, 2A5, 1-47 | A | 7,000 | 10 or 2,000 | 36 | 5 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 |
| ★ T-67S51 | 4.20 | 2-6F6, 42, 2A5, 47 P-P | A | 14,000 | 4/8/15/500 | 40 | 20 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S48 | 4.20 | 2-45, 71, 43, 25A6 P-P<br>1-6N7, 6A6, 53 P-P | A<br>B | 8,000 | 4/8/15/500 | 36 | 25 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S52 | 4.80 | 2-46, 59 P-P<br>2-6F6, 42, 2A5 P-P<br>2-6N7, 6A6, 53 P-P Par. | B<br>AB2<br>B | 5,800 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-58S72 | 4.50 | 2-2A3, 6B4G P-P<br>2-48, 25L6 P-P | AB<br>A | 3,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/4 |
| ★ T-67S54 | 4.80 | 2-6L6 P-P<br>2-2A3, 6B4G, 45 P-P | A<br>AB | 5,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S92 | 4.80 | 4-2A3, 6B4G, 45 P-P Par.<br>4-48, 25L6, P-P Par. | AB<br>A | 1,500 | 4/8/15/500 | 80 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-65S94 | 4.80 | 2-50 P-P<br>2-6F6, 42, 2A5 P-P | A<br>AB2 | 8,000 | 4/8/15/500 | 55 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| ★ T-75S75 | 4.80 | 2-6F6, 42 or 2A5<br>1-6N7, 6A6, 53 P-P<br>2-6N6G, 6B5, 2B6, 6AC5 P-P | AB2<br>B<br>A | 10,000 | 4/8/15/500 | 45 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-84S58 | 7.20 | 2-6L6 P-P | AB2 | 3,800 | 4/8/15/500 | 115 | 60 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 6 |
| T-89S75 | 4.80 | 2-6L6 P-P | AB1 | 6,600 | 4/8/15/500 | 80 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-89S74 | 4.50 | 1-6L6 | A | 4,000 | 4/8/15/500 | 70 | 15 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-89S68 | 7.80 | 4-6L6 P-P Par. | AB1 | 3,300 | 50/125/200/<br>250/333/500 | 150 | 75 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-83S87– | 10.80 | 4-50 P-P Par. | AB2 | 3,000 | 4/8/15/500 | 160 | 90 | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 7/8 | 7 3/4 |

*10% feed-back winding.





*Prices subject to change without notice.*




## UNIVERSAL REPLACEMENT TUBE TO VOICE COIL

Preferred by many because of wide plate impedance and voice coil coverage. Proper matching of load impedances to speaker voice coils is accomplished by using taps as specified in the instruction sheets.

| Type No. | List Price | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-13S38 | $1.80 | Universal Single or P-P Tubes | A | 4,000/7,000 8,000/10,000 14,000 Ct. | Ajustable .1 to 29 | 36 | 8 | 3E | 2 3/8 | | 2 13/16 | 2 | 1 5/8 | 3/4 |
| T-14S85† | 1.80 | | | | | | | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| ★ T-57S01 | 2.40 | | | | | | | 2E | 2 3/8 | | 2 7/8 | 2 1/2 | 2 3/8 | 1 1/4 |
| T-57S02† | 2.40 | | | | | | | 2B | 2 3/8 | | 2 7/8 | 2 1/8 | 2 3/8 | 1 1/4 |
| T-17S57 | 2.70 | | | | | | | 2C | 1 9/16 | 1 1/2 | 2 | 1 7/8 | 2 3/8 | 1 1/4 |
| ★ T-13S42 | 1.80 | Universal Single Tube | A | 1,500/2,000 4,000/5,000 7,000 | Ajustable .1 to 29 | 55 | 10 | 3E | 2 3/8 | | 2 13/16 | 2 | 1 3/8 | 3/4 |
| ★ T-13S41 | 3.30 | Universal P-P Tubes | A | 3,000/5,000 6,600/7,000 8,000/10,000 | Ajustable .1 to 29 | 60 | 20 | 2E | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |

†Color coded leads for voice coil connections. Unused leads may be clipped off at coil.

## UNIVERSAL TUBE TO LINE

| Type No. | List Price | Tube Type | Class | Pri. | Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-61S25 | $3.90 | Univ. Single Tube | A | 2,500/4,000 5,000/6,000/7,000 | 500 | 60 | 10 | 2E | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| ★ T-61S26 | 4.20 | Univ. P-P Tubes | A | 8,000/10,000 12,000/14,000 Ct. | 500 | 55 | 10 | 2E | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |

## C. H. T. MULTIPLE TAP OUTPUT TRANSFORMERS

Switchboard plug-in terminal board for quick and accurate selection of secondary impedances. Tertiary winding provides feedback voltage 10% of full primary. Split Primaries.

| Type No. | List Price | Tube Type | Class | Pri. | Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15S90 | $12.00 | 2-6V6 P-P<br>2-6L6 P-P<br>2-2A3 P-P (self bias) | AB1<br>AB1<br>AB | 8,000<br>5,000<br>5,000 | 2/3/4/6/-8/16/125/-250/500 | 70 | 15 | 4U | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 7 1/4 |
| T-15S91 | 15.00 | 2-6L6 P-P(300 V. P. & Sc.)<br>2-2A3 P-P (fixed bias) | AB<br>AB | 4,300<br>3,000 | Same as above | 95 | 25 | 4U | 3 5/8 | 3 13/16 | 4 5/16 | 4 3/8 | 4 3/4 | 8 |
| T-15S92 | 18.00 | 2-6L6 P-P<br>2-6L6 P-P | AB1<br>AB2 | 6,600<br>5,500 | Same as above | 90 | 40 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 8 3/4 |
| T-15S93 | 21.00 | 2-6L6 P-P<br>4-6L6 P-P Par. | AB1<br>AB2 | 3,300<br>3,800 | Same as above | 155 | 60 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 15 1/2 |
| T-15S94 | 24.00 | 4-6L6 P-P Par. | AB2 | 1,900 | 500/250/166/125/100/84 | 230 | 120 | 4U | 4 9/16 | 4 3/4 | 5 3/8 | 5 1/2 | 6 3/8 | 18 |

## UNIVERSAL LINE TO VOICE COIL

| Type No. | List Price | Type | Pri. | Sec. | Max. Watts | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★ T-53S81 | $5.70 | Line to Voice Coil | 500/250 | 4-8-15 | 35 | 2D | 2 1/8 | 1 3/4 | 2 7/8 | 2 13/16 | 3 11/16 | 3 1/2 |
| ★ T-60S48 | 3.60 | Line to Voice Coil 1-6 may be con. in par. to 500 ohm line | 500/1,000 1,500/2,000 2,500/3,000 | Pri. as 500 ohm-.06 to 8.; Pri. as 1000 ohm .12 to 16, etc. | 10 | 2E | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 |
| T-17S18 | 4.50 | | | | | 2D | 2 1/16 | 1 11/16 | 3 | 2 3/4 | 2 5/8 | 2 1/4 |
| ★ T-14S80 | 2.40 | Line to Voice Coil | 500 | 2/4/6/8 | 12 | 2E | 2 3/8 | | 2 7/8 | 2 1/2 | 2 3/8 | 1 1/2 |
| T-17S17 | 7.80 | Line to Voice Coil | 500 | 4/8/16/25/50 | 75 | 3C | 3 1/4 | 2 11/16 | 3 3/4 | 3 3/16 | 4 | 6 1/2 |
| T-76S74 | 4.50 | Line to multiple spkrs. (autotransformer) | 500 | 250/166/125/100/84 | 30 | 4C | 2 1/16 | 1 15/16 | 3 | 2 1/2 | 2 5/8 | 2 1/2 |

## C. H. T. MULTIPLE LINE TO VOICE COIL

With Switchboard plug-in terminal board.

| Type No. | List Price | Type | Pri. | Sec. | Max. Watts | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15S96 | $15.00 | Line to Voice Coil | 1000/500 | 50/24/16/8/6/4/3/2 | 25 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 7 1/4 |
| T-15S97 | 19.20 | Line to Voice Coil | 1000/500 | 50/24/16/8/6/4/3/2 | 60 | 4U | 3 5/8 | 4 1/4 | 4 5/16 | 4 7/8 | 5 3/8 | 9 |

## C. H. T. CRYSTAL RECORDER TRANSFORMERS

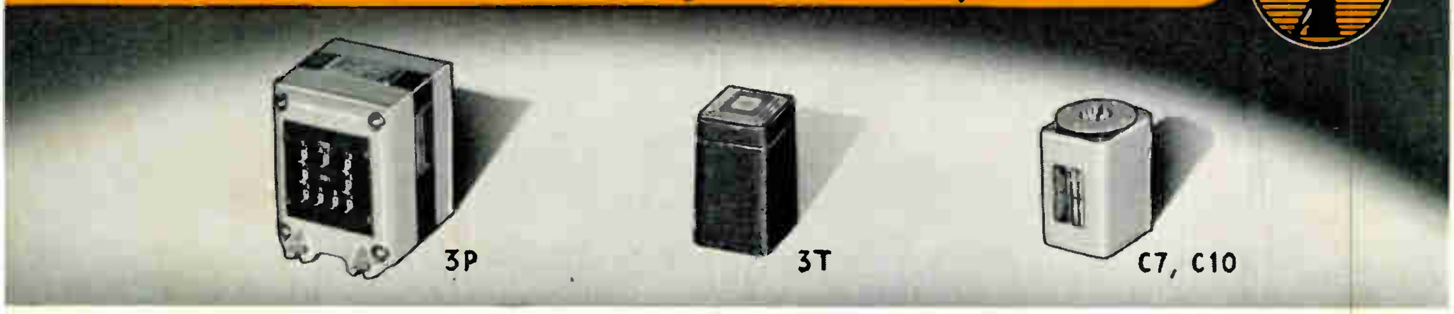
The wave of interest in recording radio programs, speech and other audio happenings has created the desire to build recording equipment. These two transformers are offered to meet the requirements for coupling to a crystal recording head. Secondary designed for constant velocity recording (series connection), and constant amplitude recording (parallel connection).

| Type No. | List Price | Type | Pri. | Sec. | Max. Watts | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-15S98 | $12.00 | Line to crystal cutting head | 500 | Series 16,000 Par. 4,000 | 10 | 3U | 2 3/8 | 2 1/8 | 3 | 2 3/4 | 4 | 5 |
| T-15S99 | 12.00 | Push-pull 2A3, 6B4G etc. to crystal cutting head | 1600 | Series 16,000 Par. 4,000 | 10 | 3U | 2 3/8 | 2 1/8 | 3 | 2 3/4 | 4 | 5 |



*Prices subject to change without notice.*

# THORDARSON *Output (S) Transformers — Regulators (V)*

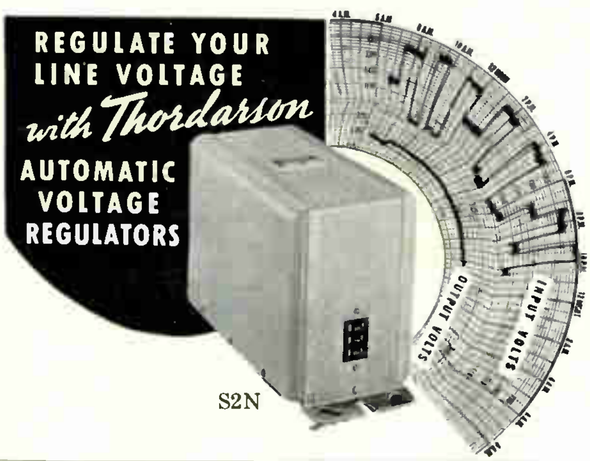



## TRU-FIDELITY HIGH LEVEL OUTPUT TO LINE OR VOICE COIL TRANSFORMERS

| Type No. | List Price | Ohms Impedance Primary | Ohms Impedance Secondary | Max. D.C. per side M.A. | Max. D.C. un-balance M.A. | Max. Sig. Level db | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-90S07- | $21.60 | 1250/5000* 750/3000* | 50/200* 125/500* | 60 | 5 | +32 | 3T | 2⅜ | 1⅞ | 3 1/16 | 2 9/16 | 4⅛ | 4¾ |
| T-3S21 | 21.60 | 1250/5000* 750/3000* | 1.25/5* 3.75/15* | 60 | 5 | +32 | C7 | 1⅞ | 2⅜ | 3¼ | 3⅝ | 4⅝ | 4¾ |
| ★ T-3S22† | 22.80 | 1250/5000* 750/3000* | 50/200*/125/500* 1.25/5*/3.75/15* | 60 | 5 | +34 | C10 | 1⅞ | 2⅜ | 3⅞ | 4 | 5 7/16 | 4¾ |
| T-3S16† | 45.00 | 6600* P-P 6L6§ 6000* | 62.5/250*/125/500* 1.25/5*/7.5/10 3.75/15* | 84 | 7 | +37.5 | 3P | 2 3/16 | 6⅛ | 4⅛ | 6⅝ | 5¼ | 4¾ |
| T-3S17† | 54.00 | 3800* P-P Par. 6L6§ 3300* or P-P 6L6 | 62.5/250*/125/500* 1.25/5*/7.5/10 3.75/15* | 152 | 7 | +40 | 3P | 2 3/16 | 7⅝ | 4⅛ | 8⅛ | 5¼ | 4¾ |
| T-3S23† | 45.00 | 2500*/1500* P-P Par. 2A3, 6B4, 6L6's etc. § | 62.5/250*/125/500* 1.25/5*/7.5/10 3.75/15* | 140 | 7 | +37 | 3P | 2 3/16 | 5⅞ | 4⅛ | 6⅜ | 5¼ | 4¾ |
| T-90S12- | 20.40 | 50/200*/125/500* | 1.25/5*/3.75/7.5/ 10/15* | 100 | .5 | +30 | 3T | 2⅜ | 1⅞ | 3 1/16 | 2 9/16 | 4⅛ | 4¾ |

*Indicates inductive and capacitive balance to center tap for use on balanced transmission lines.
† ± 1db 30 to 15,000 c.p.s. § Tertiary winding is 10% of full primary.

## AUTOMATIC VOLTAGE REGULATORS




Will deliver a constant voltage (within ± 1%) despite line fluctuations from 95 to 130 volts and/or secondary loads from no load to full load rating. Operation is fully automatic and instantaneous. Once installed no further adjustment is necessary. Supplies optional output voltages of 110, 115 or 120 volts — 60 cycles. Cases are compound filled for coil protection and to minimize operating noise.

The ideal voltage regulator for oscillators, speech amplifiers, monitoring equipment, signal generators, metering equipment, recording equipment — *wherever constant voltages are required.*

Special units can be furnished incorporating various types of transformer windings.

For details on the complete line of Thordarson Automatic Voltage Regulators write for Catalog SD-422.

Chart shows actual line voltage fluctuations over 14 hour period and corresponding regulated output delivered by a Thordarson Automatic Voltage Regulator.

| Type No. | List Price | Capacity V.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|
| ★ T-9V30 | $ 51.00 | 100 | S2N | 11⅝ | 2⅝ | 12⅞ | 5¼ | 6¾ | 48 |
| ★ T-9V31 | 78.00 | 250 | S2N | 11⅝ | 3⅛ | 12⅞ | 6⅛ | 8½ | 68 |
| ★ T-9V32 | 120.00 | 500 | S2N | 16 | 4 | 17 | 6⅛ | 7⅝ | 76 |
| ★ T-9V33 | 210.00 | 1000 | S2N | 19 | 4 | 20 | 7⅛ | 10¼ | 150 |

## FENCE CONTROLLER TRANSFORMER

For 6 volt D.C. operation, with suitable relays. Open horizontal mounting.

| Type No. | List Price | Primary | Sec. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs |
|---|---|---|---|---|---|---|---|---|---|
| T-18V10- | $3.60 | 6 V. D.C. | 8,000 V. (37 M.A. Peak) Open circuit 9,000 V. (25 M.A. Peak) Open circuit | 2 15/16 | 1 1/16 | 3⅜ | 1⅞ | 3 | 1 |



*Prices subject to change without notice.*

# Voltage Changer (V) Transformers THORDARSON


## VOLTAGE CHANGER (V) TRANSFORMERS

### AUTOTRANSFORMERS

Autotransformers consist of a single winding on an iron core. Voltage variation is accomplished by means of taps.

**Step Down — Convenience Outlet Type**

Input side equipped with cord and plug. Output side has standard receptacle.

| Type No. | List Price | Input Volts | Output Volts | Output Load V.A. | Output Load Amps. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★T-26V04 | $ 5.70 | 220–250 | 110–125 | 80 | 0.725 | 2V | 2 11/16 | 2 1/16 | 3 3/8 | 2 7/8 | 4 5/8 | 4 1/2 |
| ★T-18V06 | 7.50 | 220–250 | 110–125 | 150 | 1.35 | 2V | 2 11/16 | 2 13/16 | 3 3/8 | 3 5/8 | 4 5/8 | 6 1/4 |
| ★T-50V11 | 9.00 | 220–250 | 110–125 | 250 | 2.25 | 2V | 3 | 3 1/2 | 3 13/16 | 4 1/4 | 4 15/16 | 10 1/4 |
| T-18V07 | 16.20 | 220–250 | 110–125 | 500 | 4.5 | 2V | 3 | 4 1/8 | 3 3/4 | 4 7/8 | 4 15/16 | 13 |

**Line Voltage Adjusting — Convenience Outlet Type**

For boosting or lowering line voltage. Input taps may be selected by means of a convenient plug arrangement as illustrated (Fig. 4E).

| Type No. | List Price | Input Volts | Output Volts | V.A. | Amps. | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-18V20 | $ 7.20 | 95/105/125 | 115 | 100 | 0.9 | 2V | 2 11/16 | 2 1/16 | 3 3/8 | 2 7/8 | 4 5/8 | 4 1/2 |
| T-18V21 | 8.40 | 95/105/125 | 115 | 150 | 1.3 | 2V | 2 11/16 | 2 5/16 | 3 3/8 | 3 1/8 | 4 5/8 | 5 |
| T-18V22 | 10.80 | 95/105/125 | 115 | 250 | 2.2 | 2V | 3 | 2 5/8 | 3 13/16 | 3 3/8 | 4 15/16 | 6 1/2 |
| T-18V23 | 15.00 | 95/105/125 | 115 | 500 | 4.5 | 2V | 3 | 3 1/8 | 3 13/16 | 3 7/8 | 4 15/16 | 9 |

**Primary Regulating Types**

For increasing or decreasing line voltage. Taps for 60, 80, 90, 100, 110, 120, and 125 volts. 50-60 cycles. Complete with instructions.

| Type No. | List Price | Input Volts | Output Volts | V.A. | Amps. | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-82V11 | $18.00 | 60/80/90/100/ 110/120/125 | Variable | 500 | 4.5 | 2W | 3 1/4 | 3 1/16 | 4 1/4 | 4 5/8 | 6 1/16 | 16 3/4 |
| T-82V12 | 24.00 | 60/80/90/100/ 110/120/125 | Variable | 1000 | 9.0 | 2W | 3 7/8 | 3 | 5 | 4 3/4 | 6 5/8 | 22 1/2 |
| T-82V13 | 36.00 | 60/80/90/100/ 110/120/125 | Variable | 2000 | 18.0 | 2M | 5 3/4 | 5 3/4 | 6 9/16 | 7 1/2 | 6 3/4 | 39 1/2 |

**Line Voltage — Solder Lug Taps**

Provide means of increasing or decreasing line voltages from 0 to 135 volts in 5 volt steps, when operated from 100 to 135 volt line.

| Type No. | List Price | Input Volts | Output Volts | V.A. | Amps. | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-18V03 | $ 8.70 | 0–135 | Variable | 150 | 1.35 | 3C | 2 1/4 | 1 7/8 | 2 31/32 | 2 1/2 | 3 3/4 | 3 1/2 |
| T-18V04 | 10.80 | 0–135 | Variable | 250 | 2.25 | 3C | 3 1/4 | 2 3/16 | 3 3/4 | 2 11/16 | 4 | 5 1/4 |
| T-18V05 | 16.20 | 0–135 | Variable | 500 | 4.5 | 3C | 3 1/4 | 2 7/8 | 4 1/4 | 3 3/4 | 6 1/16 | 14 1/4 |

## LINE REGULATING AUTOTRANSFORMER

Provides for an increase or decrease of 7.5 volts. May be used on any A.C. line of 50-60 cycle frequency from 90V to 125V as a step-up or step-down transformer. Especially suitable for boosting line voltage for fluorescent lighting units. Fully enclosed (similar to 2H) and mounted on a 4" outlet box cover, allowing for complete enclosure of all wiring in a conduit or BX system.

| Type No. | List Price | Input Volts | Output Volts | V.A. | Amps. | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-18V26 | $ 6.90 | 90–125 | 7.5 Variation | 1150 | 10 | 4L | 3 5/8 | | 4 1/8 | 3 1/2 | 4 1/8 | 5 |

## ISOLATION TRANSFORMERS

Electrostatic shield between primary and secondary. Feature unique plug-in primary voltage adjustment — no changing of connections.

| Type No. | List Price | Input Volts | Output Volts | V.A. | Amps. | Mtg. Fig. | Width | Depth | W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ★T-18V00 | $12.60 | 105/115/125 | 115 | 100 | | 2V | 3 | 2 7/8 | 3 7/8 | 3 5/8 | 4 15/16 | 8 |
| ★T-18V01 | 23.40 | 105/115/125 | 115 | 250 | | 4E | 4 3/16 | 2 9/16 | 5 7/8 | 5 7/8 | 6 1/16 | 20 |

## SIGNALING TRANSFORMERS — Listed by Underwriters' Laboratories

Cases are compound filled and have separate primary and secondary wiring compartments. Knock-outs permit attachment of rigid or flexible conduit without exposing the wiring. Four secondary leads provide these output voltages — 4, 8, 12, 16, 20 and 24 volts.

| Type No. | List Price | Intermittent Duty | Constant Duty | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| ★T-47V01 | $ 9.00 | 50 V. A. | 35 V. A. | 3V | 3 3/4 | 6 1/4 | 4 1/2 | 7 | 4 1/4 | 6 1/4 |
| ★T-47V02 | 13.20 | 100 V. A. | 85 V. A. | 3V | 3 3/4 | 6 1/4 | 4 1/2 | 7 3/4 | 4 1/4 | 8 |
| T-47V03 | 26.10 | 250 V. A. | 190 V. A. | 3V | 3 3/4 | 8 1/4 | 4 1/2 | 9 | 4 1/4 | 14 1/4 |
| T-47V04 | 42.00 | 500 V. A. | 475 V. A. | 3V | 3 3/4 | 9 3/16 | 5 1/4 | 10 | 5 3/4 | 22 1/2 |



*Prices subject to change without notice.*

# *Classified Index*

(See Page 2 for Index by Type No.)


| CLASSIFICATION | PAGE NO. |
|---|---|
| Amplifiers | 11 |
| Audio Transformers | 4, 5, 6, 7 |
| Audio Reactors | 6, 7, 8 |
| Autotransformers | 15, 27 |
| Automatic Voltage Regulators | 26 |
| Bias (Power) Transformers | 19 |
| Cathode Modulation Transformers | 17 |
| Cathode Ray Power Transformers | 19 |
| Chokes | 6, 7, 8, 9 |
| Choosing Output Transformers | 22, 23 |
| Crystal Recorder Transformers | 25 |
| Driver Transformers | 10, 11 |
| Driver and Modulator Combinations | 12, 13 |
| Dual Tone Control Choke and Potentiometer | 8 |
| Fence Controller Transformer | 26 |
| Field Supply Transformer | 21 |
| Filament Transformers | 14, 15 |
| Isolation Transformers | 27 |
| Line Regulating Autotransformer | 27 |
| Magnetically Shielded Audio Transformers | 5, 6, 7 |
| Microphone Cable Transformers | 4 |
| Modulation Transformers | 16, 17 |

| CLASSIFICATION | PAGE NO |
|---|---|
| Mounting Characteristics Chart | 10 |
| Oscilloscope | 16 |
| Output Transformers | 24, 25, 26 |
| Plate Supply Transformers | 18, 19 |
| Power Transformers | 18, 19, 20, 21 |
| Power Transformers for Cathode Ray Tubes | 19 |
| Signalling Transformers | 27 |
| Splatter Chokes | 8 |
| Television Filter Reactor | 8 |
| Television Power Transformers | 18 |
| Tropex Transformers | 3 |
| Tru-Fidelity Broadcast Transformers | 6, 7, 17, 26 |
| Vibrator Power Transformers | 20 |
| Voltage Changers | 27 |

LITERATURE

| | |
|---|---|
| Amateur Radio (A Beginners Guide) | 10 |
| Amplifier Catalog | 11 |
| Amplifier Guide | 11 |
| Broadcast Catalog | 17 |
| Replacement Transformer Encyclopedia | 19 |
| Transformer Manual | 15 |
| Transmitter Guide | 15 |



**THORDARSON ELECTRIC MFG. CO.**

500 W. HURON STREET . . . CHICAGO, ILLINOIS, U. S. A.

# THORDARSON

## AMPLIFIER GUIDE 346-D

Price 1

# Building Modern Amplifiers


By JEROME H. KLEKER

*Chief Sales Engineer, Thordarson Electric Manufacturing Company*


THE development of amplifiers is steadily progressing. Today the average builder can turn out a unit capable of results which a few years back could be obtained only in the laboratory. Improvements in tubes, transformers, and circuits make it possible to obtain higher power output from a comparatively small amplifier. Good frequency response is easily obtained and harmonic distortion can be held to the point where it is negligible.

The modern amplifier for Public Address must be entirely self contained. The gain must be high to accommodate low level microphones, and the hum level should be low especially where speakers with good low frequency response are used. The power output rating must be actual undistorted watts at all frequencies, and not just nominal or the tube manufacturers maximum output rating of the tubes used. The amplifiers described in this booklet are modern in these respects and incorporate numerous other improvements.

Thordarson engineers produced these amplifiers strictly for the Sound man and amplifier builder, taking into consideration the high standard of results which are always expected of custom built apparatus. Frequency response, power output, and distortion measurements were made periodically throughout their development on expensive laboratory equipment, thus insuring the most out of each amplifier complement. The final construction of the amplifier is reached only when each part is aiding in the superior performance of the unit.

Inverse feedback is used in most of the amplifiers because of the numerous advantages it offers. Distortion is reduced to minimum, frequency response is made more linear and the overall stability of the amplifier is improved. The constructor is urged to read each and every article. The suggestions offered in the different models will aid in building any amplifier.

In order to facilitate construction, standard sized chassis are used wherever possible. These are nationally available from parts suppliers. Complete mechanical drawings showing socket and mounting holes make cut and try layout unnecessary and save considerable time in building an amplifier. If drills and punches are not available your local parts supplier may be able to do the necessary work for you.

Full size chassis templates for any amplifier are available from the factory for 15c postpaid. By using a full size drawing the chassis can be marked directly without measurement.

All parts listed are nationally advertised brands and are readily available. Substitution is recommended only when they are of equal quality and the electrical and physical characteristics are the same. Small hardware, etc., is not listed inasmuch as the builder usually has this material on hand.

Assembly of the amplifier is usually started by mounting tube sockets, controls, transformers, and chokes on the chassis. The bottom view photos are marked to indicate the placement of the more important parts used in the amplifier. Small bakelite strips with solder lugs were used in some cases to support small resistors and condensers. If the strips are not available, these parts may be self supported by their leads. The use of the strips, however, tend to make a neater and more rigid wiring job and are recommended.

Proceed to wire the amplifier by starting with the filament or heater circuits. No. 18 stranded pushback wire is suitable. Wire the power supply next and finally the small resistors, condensers, and controls. It is quite important to use shielded wire as indicated in the circuit diagrams since hum and feedback is liable to result otherwise. Where the schematic diagrams show shielded resistors and condensers this is accomplished by first inserting the part in a piece of spaghetti tubing or wrapping with insulating material such as varnished cambric and then covering with shielding braid. The shielding of the parts so indicated is important in the reduction of hum.

After the assembly and wiring is completed recheck carefully before installing tubes and applying power. When certain that the wiring is correct the power can be applied and voltages checked carefully. It is advisable to measure all voltages and power output before the amplifier is placed in service. This will prevent overloading of tubes or parts due to improper adjustments, bad connections or oscillation.

Due to the high power sensitivity of beam power tubes they sometimes oscillate at a high inaudible frequency if placement of leads is not correct or shielding and grounds are insufficient. Oscillation can also be caused by improper phasing of the inverse feedback circuit. Reversal of the leads, connecting the feedback winding of the output transformer to the grid returns of the input transformer, will change the phase relationship of the feedback voltage. The use of an oscilloscope is recommended in determining when these conditions take place and in correcting same. The article on page 31 will be helpful in the proper testing of an amplifier with the oscilloscope.

Correspondence is invited to aid in the solution of your amplifier problems.

## TABLE OF CONTENTS


Building Modern Amplifiers ..... 2
Advantages of Inverse Feedback ..... 3
8 Watt Amplifier ..... 4
15 Watt Amplifier ..... 6
25 Watt Amplifier ..... 8
40 Watt Amplifier ..... 10
60 Watt Amplifier ..... 12
120 Watt Amplifier ..... 14
2A3 Phono Amplifier ..... 16
6 Volt DC, 115 Volt AC, Mobile Amplifier ..... 18
Single Channel Pre-Amplifier ..... 20
Four Channel Pre-Amplifier ..... 22
Dual Tone Control ..... 24
Matching Speaker Loads ..... 26
Chassis Drawing, 6 V. D.C. Amplifier ..... 27
Chassis Drawing, 2A3 and 15 Watt Amplifier 28
Chassis Drawing, 25 and 40 Watt Amplifier. 29
Chassis Drawing, 60 and 120 Watt Amplifier 30
Testing Amplifiers ..... 31
Factory Built Amplifiers ..... 32

# ADVANTAGES OF INVERSE FEEDBACK

A beam power amplifier to be truly modern should incorporate inverse feedback. It is a commonly recognized fact that low plate resistance tubes such as the 2A3 are superior from the standpoint of low distortion and good quality. With inverse feedback the high plate resistance beam power tube may be made to take on the characteristics of the low-mu triode, yet retain most of its high power sensitivity. The important advantages obtained by the use of inverse feedback are fourfold: first, reduction of wave form distortion; second, improvement of frequency response; third, reduction of hum; and fourth, reduction of "hangover" effect. The only disadvantage of inverse feedback lies in the fact that the gain is considerably reduced.

## EXPLANATION OF INVERSE FEEDBACK

In the circuit of Fig. 1, a certain amount of the voltage developed in the plate circuit is fed back out of phase with the signal in the grid circuit. If without inverse feedback a certain voltage $E_0$ is developed across the output circuit with an input voltage $E_1$ the gain of the stage is $E_0$ divided by $E_1$. If now a certain percentage N of the voltage $E_0$ is fed back to the grid circuit in such a way that the voltage is out of phase with the input voltage $E_1$ the total input voltage to obtain an output voltage of $E_0$ is $(N\,E_0 + E_1)$ and the gain of the stage is $\dfrac{E_0}{(N\,E_0 + E_1)}$. The ratio N is the percentage of the output voltage which is fed back to the input circuit. It may be readily seen that if N is large the gain of the stage depends more upon N than upon the circuit constants.

The ratio reduction in gain by the addition of inverse feedback may be readily determined by dividing the gain without feedback by the gain with feedback.

## REDUCTION OF DISTORTION

As was pointed out in the above paragraph, an inverse feedback circuit feeds back a certain portion of the output voltage to the grid circuit. If distortion is introduced in the amplifier stage a certain amount of the distorted voltage will be fed back into the grid circuit and this will tend to cancel out the distortion developed in the amplifier stage. If in the circuit of Fig. 1 a certain amount of distortion voltage B is present in the output circuit the distortion voltage fed into the grid circuit will be N x B and this quantity multiplied by the gain of the stage will give the cancelling effect of the inverse feedback. The total distortion present in the output is then equal to the sum of the distortion without inverse feedback and the distortion cancelled by the inverse feedback. In other words, if b is the distortion without inverse feedback, the total distortion, B, with inverse feedback is equal to $(b + B) \times N \times A$, where A is the gain of the stage. Evaluating B gives the quantity $\dfrac{b}{1 + N A}$. In other words the distortion is reduced by the ratio of $\dfrac{1}{1 + N A}$.

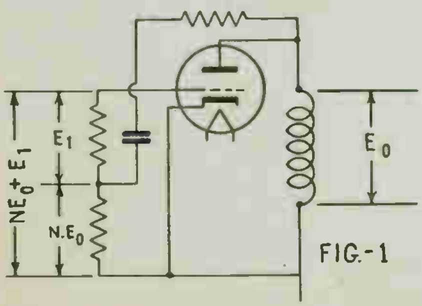


FIG.-1

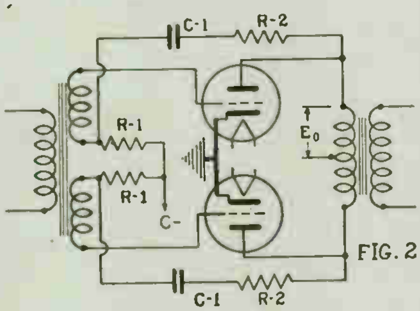


FIG. 2

Fig. 2 shows the ordinary method of obtaining inverse feedback with the resistor-condenser method. The amount of inverse feedback is equal to $\dfrac{R_1}{R_1 + R_2}$ assuming that the reactance of the condenser $C_1$ is negligible over the operating frequencies. However, this assumption is not necessarily true especially at the lower frequencies and the circuit of Fig. 3 is much more efficient from this standpoint. In Fig. 3 the feedback voltage is obtained from a tertiary winding on the output transformer. This method also provides a much better overload characteristic since the resistance in the grid circuit is negligible and it is quite possible to operate the tubes in the grid current region.

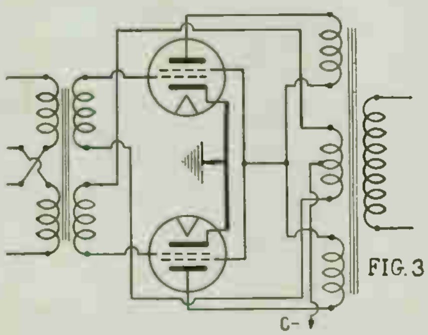


FIG. 3

## REDUCTION OF PLATE RESISTANCE

In addition to the reduction in distortion obtained by inverse feedback, there is also a reduction in the plate resistance of the tubes. A high plate resistance is a definite disadvantage in the case of a power tube which operates into a speaker load which is more or less variable depending upon the impedance of the voice coil. In the circuit of Fig. 4, it may be easily seen that the voltage E developed across the load depends a great deal upon the actual value of $R_L$ which is the reflected impedance of the voice coil. This is due to the fact that the signal current depends almost entirely upon the high plate resistance of the tube. Since the load resistance is low in comparison to the plate resistance, the voltage developed across the load is almost directly proportional to the impedance of the load which varies appreciably with change in frequency. In Fig. 5 it may be seen that the voltage across the load does not vary so much since the signal current depends both upon the load and upon the plate resistance of the tube. If the voice coil has an appreciable amount of reactance the impedance rises with the frequency causing distortion and giving an unnatural amount of "highs." The high plate resistance is unsuitable from another view point, that of the amount of low frequency distortion which may be tolerated. This low frequency distortion is not

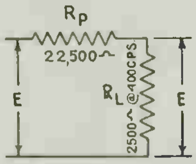


FIG. 4

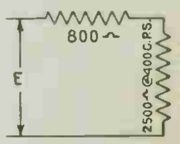


FIG 5

due to the characteristics of the tubes which remain unchanged regardless of the frequency, but depends upon the magnetizing current in the output transformer. The magnetizing current is a distorted nonsinusoidal wave and this current, on flowing through the high plate resistance of the tube, develops a nonsinusoidal voltage drop across the tube which, when subtracted from the input signal, results in a distorted wave across the output. Unfortunately, most amplifiers today are measured for distortion at 400 c.p.s. where the magnetizing current is practically negligible. It is not uncommon to find beam power amplifiers without inverse feedback which have only 25 per cent of the rated power at 40 or 50 cycles. This low frequency distortion is particularly objectionable since all harmonics fall within the audible range. Inverse feedback effectively reduces the plate resistance so that the distorted voltage drop caused by the magnetizing current is exceedingly small with the result that there is very little distortion across the output circuit. With a poor output transformer it is quite possible for the distortion to be as high as 30 per cent at 40 cycles without inverse feedback.

## "HANGOVER" EFFECT

"Hangover effects," or transients caused by the loud speaker cone vibrating at its natural period when shock excited, are greatly reduced by the use of inverse feedback. The lower plate resistance provides a considerable amount of damping so that the oscillations or transients are reduced. With regular beam power tubes the shunt-

*(Continued on page 27)*

# 8 WATT AMPLIFIER

TOP VIEW

THIS small amplifier is useful in many everyday applications especially for voice amplification. Political meetings, Ballyhoo, etc., usually can be handled successfully with a small amplifier system capable of delivering about 8 watts of audio power.

Three high gain resistance coupled stages will accommodate even the lowest level high impedance microphones. The phono pick-up signal is mixed into the second stage through a resistance network, providing independent control of microphone and phono without one affecting the other. A good selection of output impedances make it easy to match any P.M. or electro-dynamic loud speaker. The amplifier supplies 6 watts of field power which is sufficient for an 8 or 10 inch loud speaker (5000 ohm field). One or more additional P.M. speakers may be connected if desired.

The construction of the amplifier is comparatively simple, especially since the chassis layout is shown. A full size drawing is also available making it possible to spot the hole centers on the chassis with a punch if this method of construction is preferred. After all holes have been drilled or punched, mount all the parts, starting with tube sockets, controls and transformers.

Wire the tube heaters first and then proceed with common ground connections. After wiring the "B" supply, install and wire the small resistors, condensers, etc. Use shielded wire as indicated in the diagram and shield resistors R-1, R-6 and R-8 by inserting in spaghetti tubing and covering with a shielded braid. This shielding aids in eliminating annoying hum and cross talk, ordinarily encountered in high gain amplifiers.

The wiring of the speaker socket is such that either an electro dynamic or P.M. speaker may be used without altering connections in the amplifier. This is accomplished by properly wiring the speaker plug. If a 5000 ohm field is used, connect the field to the plug prongs corresponding to socket contacts "G" and "A". If a P.M. speaker is used a jumper wire must be connected in the plug to prongs "G" and "B". Do not operate the amplifier unless a 5000 ohm speaker field is connected or the plug inserted with the jumper wire.

Make voice coil connections to contacts "G" (common) and either 2, 4, 8 or 500 whichever matches the speaker impedance. The output terminals marked 500 ohms facilitate connecting to a line in portable set-ups. However, be sure a jumper plug from "G" to "B" is inserted when this is used.

It is recommended that the tubes be inserted and speaker and other accessories connected before the amplifier is turned on. Voltages are given on the schematic diagram. All voltages should be checked with a good volt-meter before the amplifier is allowed to operate for any length of time. 10% tolerance is permissible in voltage measurements.

## TECHNICAL DATA

***Power Output:*** 8 watts or + 31.25 db.

***Coverage:*** 100,000 to 200,000 cu. ft. indoors; 6,000 to 10,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic, or velocity microphone, and one channel for high impedance crystal or magnetic pick-up. The two channels may be mixed.

***Field Supply:*** 6 watts available for 5000 ohm speaker field.

***Output Impedances:*** 2, 4, 8, and 500 ohms.

***Frequency Response:*** Within ± 1 db from 45 c.p.s. to 6000 c.p.s.

***Tone Control:*** Maximum position attenuates 1000 c.p.s. 5 db, 5000 c.p.s. 17 db, and 10,000 c.p.s. 23 db.

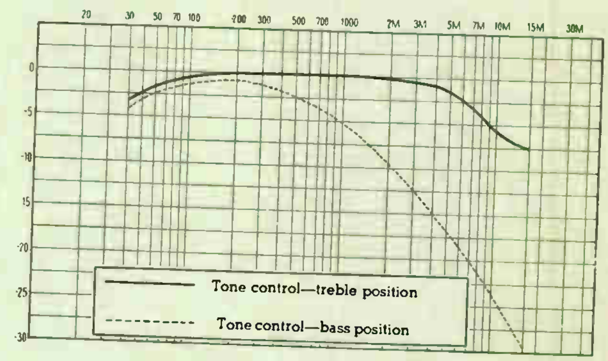
***Gain:*** Microphone input 111 db; phono input 66 db (based on 100,000 ohms input impedance).

***Hum:*** 61.5 db below maximum output.

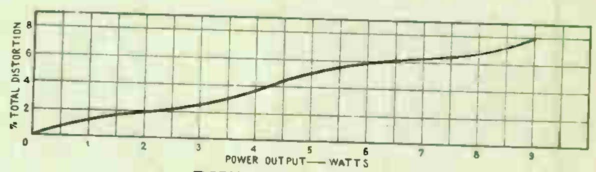
***Tubes:*** 1-6J7, 1-6F5, 1-6L6G, 1-80.

***Power Consumption:*** 85 watts, 115 volts, 50-60 cycles.

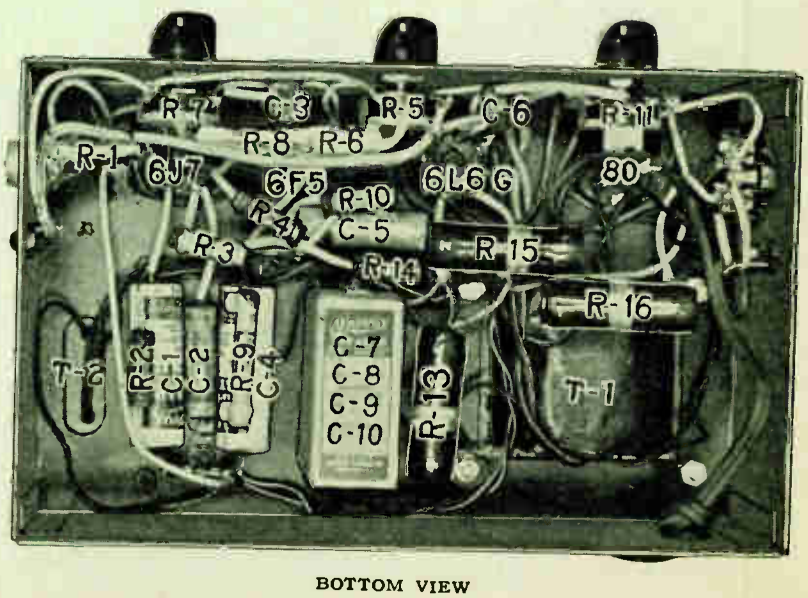
***Dimensions:*** 10″ long, 5″ deep, 9″ high.




FREQUENCY-RESPONSE CURVE



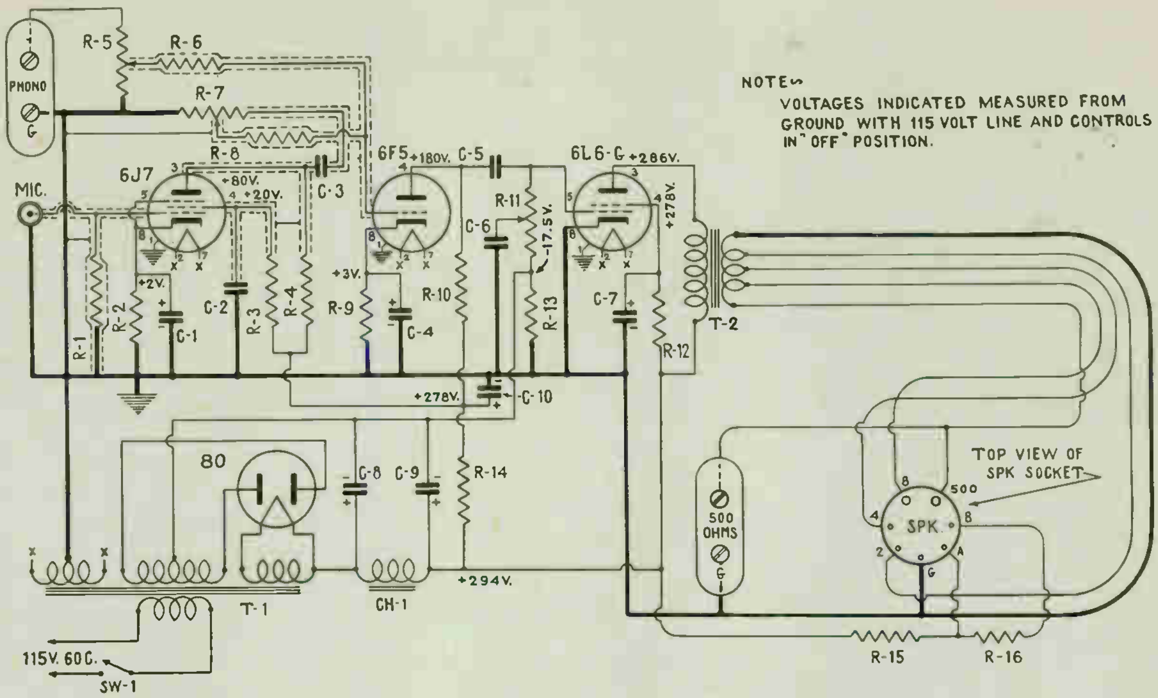

DISTORTION CURVE




BOTTOM VIEW

# 8 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| | |
|---|---|
| T-1 | T-75R47 Power Transformer |
| T-2 | T-17S10 Output Transformer |
| CH-1 | T-57C54 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5,000 | 1 | IRC BT-1 |
| R-3 | 3 MEG. | 1 | IRC BT-1 |
| R-4 | 500,000 | 1 | IRC BT-1 |
| R-5 | 250,000 | Volume Control | Yaxley type "M" |
| R-6 | 500,000 | ½ | IRC BT-½ |
| R-7 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-8 | 500,000 | ½ | IRC BT-½ |
| R-9 | 3,000 | 1 | IRC BT-1 |
| R-10 | 100,000 | 1 | IRC BT-1 |
| R-11 | 500,000 | Tone Control | Yaxley type "M" with switch |
| R-12 | 5,000 | 1 | IRC BT-1 |
| R-13 | 150 | 25 | Ohmite—Wire wound |
| R-14 | 50,000 | 1 | IRC BT-1 |
| R-15 | 3,500 | 25 | Ohmite—Wire wound |
| R-16 | 5,000 | 25 | Ohmite—Wire wound |

### CONDENSERS

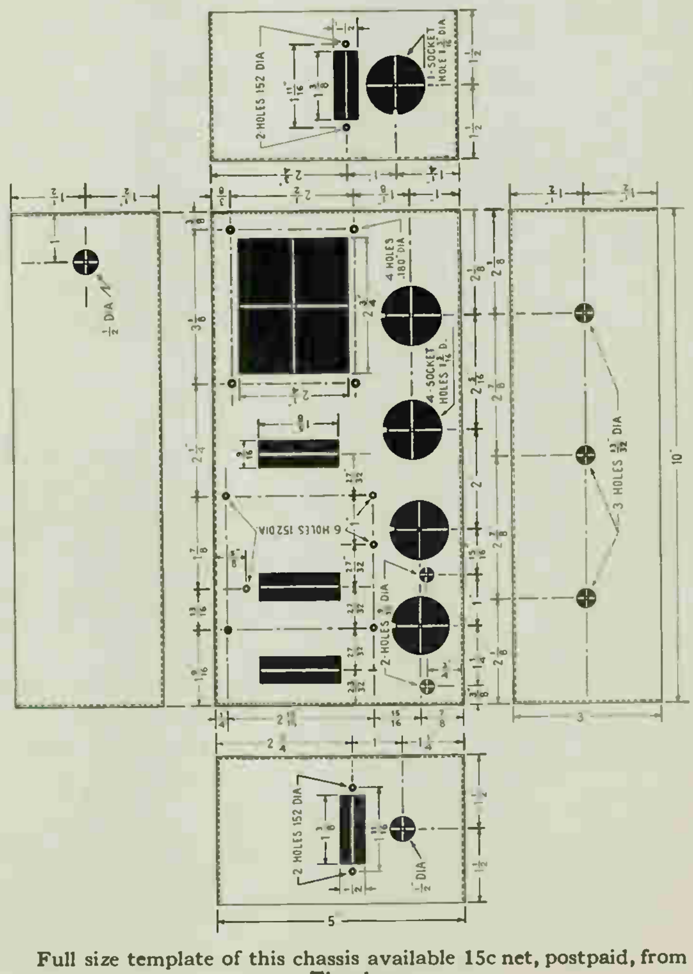
| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25V Elect. | Aerovox PR25 |
| C-2 | .04 | 400V Paper | Aerovox 484 |
| C-3 | .1 | 400V Paper | Aerovox 484 |
| C-4 | 10 | 25V Elect. | Aerovox PR25 |
| C-5 | .1 | 400V Paper | Aerovox 484 |
| C-6 | .005 | 400V Paper | Aerovox 484 |
| C-7, C-10 | 8-8 | 450 W.V. Elect. | Aerovox PBS450 |
| C-8, C-9 | 8-8 | 450 W.V. Elect. | Aerovox PBS450 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x10x3" Chassis & Cover — Par-Metal AF-510 |
| 1 | 5x10" Chassis bottom plate — Par-Metal BP-4508 |
| 3 | Octal sockets — Amphenol S8 |
| 1 | 4-Contact socket — Amphenol S4 |
| 1 | 7-Contact socket — Amphenol S7 |
| 1 | 7 Prong speaker plug — Amphenol PM7 |
| 1 | Mic. Connector — Amphenol PC1M |
| 1 | Mic. Connector — Amphenol MC1F |
| 2 | Two screw terminal boards |
| 1 | Line cord and plug — Belden No. 1725 |
| 3 | Control knobs |
| 2 | Metal tube grid caps |
| 2 | Metal grid cap shields |
| 1 | "MIC" Control dial plate |
| 1 | "PHONO" Control dial plate |
| 1 | "TONE" Control dial plate |

Tubes, 1-6J7, 1-6F5, 1-6L6G, 1-80

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.



Full size template of this chassis available 15c net, postpaid, from Thordarson.

# 15 WATT AMPLIFIER

THORDARSON

TOP VIEW

THE output power of this amplifier is sufficient to satisfy the requirements of a large number of installations. This is especially true since the distortion present at full output is low, being less than 5% total. This percentage is generally accepted as undistorted and permits operating at full output with high quality reproduction.

Thordarson CHT transformers are used in this model and are recommended for best results, appearance, etc. Regular types may be substituted as indicated in the parts list but it will be necessary to locate the mounting holes when drilling the chassis since the drawing is based on the use of CHT units. An added advantage is the better selection of output impedances available with the CHT output transformer.

Beam power 6V6-G output tubes are operated in a class A1 circuit employing inverse feedback. The output transformer contains a separate feedback winding which produces a voltage 10% of that developed in the primary. The voltage is fed out of phase into the grid returns of the input transformer secondary. This method of feedback is superior to the resistor-capacity method inasmuch as there is no frequency discrimination, and any distortion that might develop in the output is corrected. It should be noted that the input transformer has a split secondary winding which is essential when this method of feedback is used.

A high impedance microphone and high impedance phono channel with independent controls accommodate any type of microphone and crystal or magnetic pick-up. Amplifier gain is sufficient to obtain full output from microphone and pick-up under normal operating conditions.

The circuit diagram shows two speaker sockets which are used for making speaker voice-coil and field connections. If electro-dynamic speakers are used, ten watts of field excitation is available for one 5,000 ohm, or one or two 2,500 ohm fields. The table below indicates how the connections are made to the speaker sockets. Note that a jumper wire is used on the speaker field terminal board for some condition of operation.

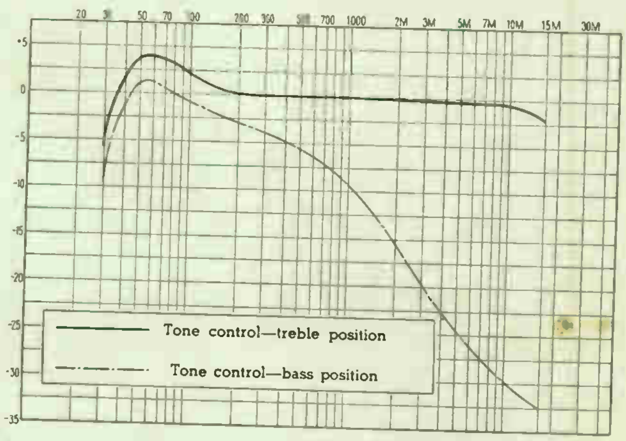
| | *Jumper* | *Connect to Prongs* |
|---|---|---|
| 1-5000 ohm field | remove | 1-5 |
| 1-2500 ohm field | C-2 | 2-5 |
| 2-2500 ohm fields | remove | B-E and 2-5 |
| Field Supply not used | 1-C | |

Speaker voice coil or line connections are made at 3, 4, and C, D of the speaker sockets or the output terminal board. The CHT output transformer, T-2, incorporates a terminal board with jacks and a plug for selecting the proper output impedance.

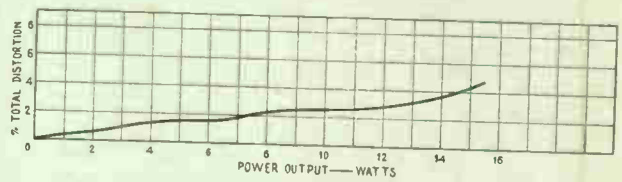
Terminal board marked POL. V. is provided to supply a polarizing voltage for static types of microphones or a photo electric cell. When the static microphone is used connect a jumper wire to terminals 1 and 2 which completes the circuit. Under no condition should this jumper be left in place when a crystal, dynamic, or velocity microphone is connected to the amplifier.

Photo electric cells of the gas filled type usually require 90 volts operating voltage. Since the normal voltage applied to the input plug is approximately 270 volts, this should be reduced to 90 volts by connecting a 5 megohm 1 watt resistor from the junction of C-1 and R-2 to ground. In the event that a static microphone or photo electric cell is never to be used R-1, R-2, and C-1 may be eliminated.

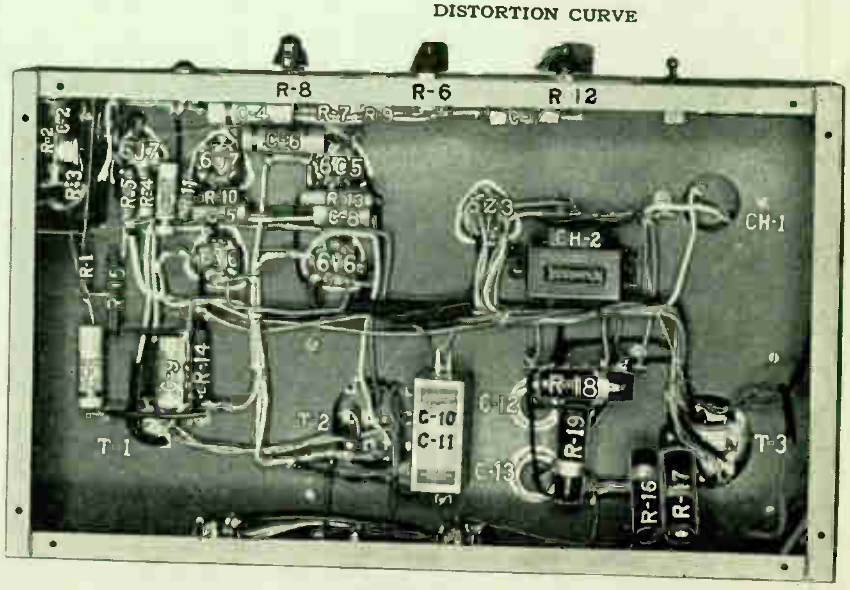
It is important to employ the shielding of wires and parts as shown in the diagram if hum, noise, and oscillation are to be eliminated. Enclose R-1, R-3, and C-2 in a metal container for minimum hum. The constructor is advised to read the article on page 31 if any difficulty is experienced in adjusting the amplifier.




FREQUENCY-RESPONSE CURVE



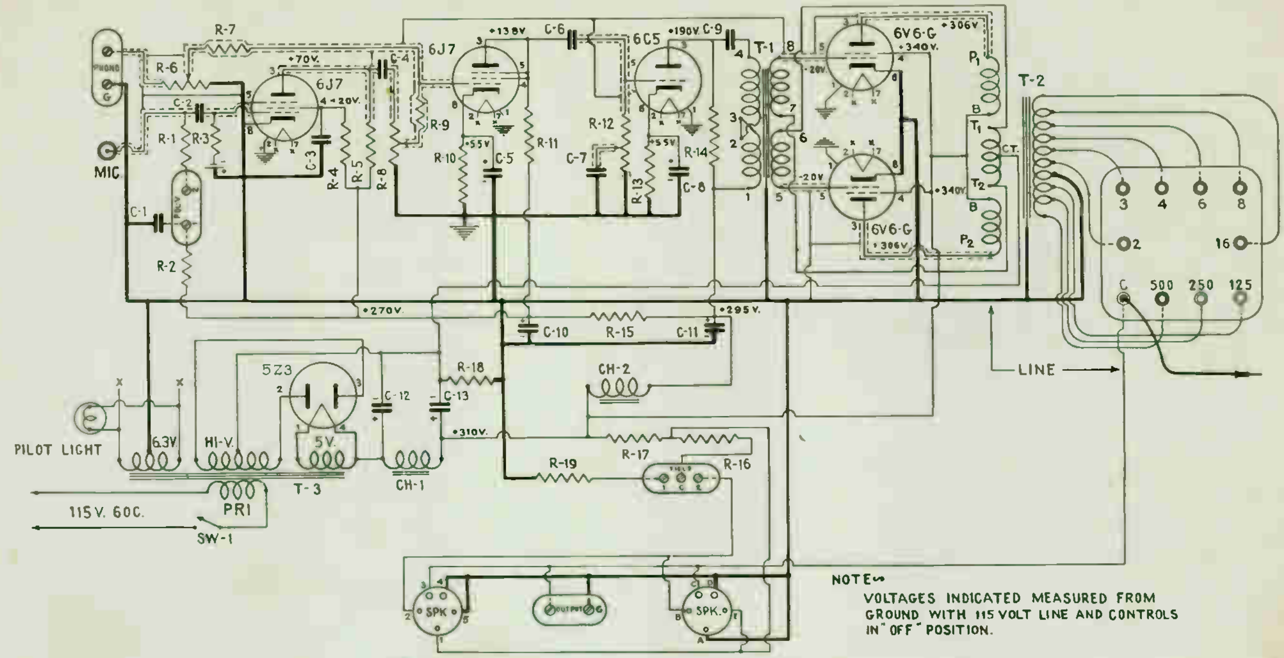

DISTORTION CURVE




BOTTOM VIEW

# 15 WATT AMPLIFIER

THORDARSON




## TECHNICAL DATA

***Power Output:*** 15 watts undistorted or + 34 db (less than 5% distortion).

***Coverage:*** 200,000 to 500,000 cu. ft. indoors; 10,000 to 20,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic, or velocity microphone, and one channel for high impedance crystal, or magnetic pick-up. The two channels may be mixed. Polarizing voltage is provided for static microphone or photo electric cell.

***Field Supply:*** 10 watts available for one 5000 ohm field, or one or two 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer, or 4, 8, 15, 250, or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 1 db from 40 c.p.s. to 15,000 c.p.s. with bass boost of 3.5 db below 100 c.p.s.

***Tone Control:*** Maximum position attenuates 10,000 c.p.s. 28 db.

***Gain:*** Microphone input 113 db; phono input 72 db (based on 100,000 ohms input impedance).

***Hum:*** 74 db below maximum output.

***Tubes:*** 2-6J7, 1-6C5, 2-6V6G, 1-5Z3.

***Power Consumption:*** 112 Watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | |
|---|---|---|---|
| T-1 | T-15A74 | T-15A74 | Input Transformer |
| T-2 | T-15S90 | T-17S11 | Output Transformer |
| T-3 | T-15R06 | T-70R62 | Power Transformer |
| CH-1 | T-15C54* | T-57C54 | First Choke |
| CH-2 | T-67C46 | T-67C46 | Second Choke |

*Windings in parallel.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 10 MEG. | ½ | IRC BT-½ |
| R-2 | 10 MEG. | ½ | IRC BT-½ |
| R-3 | 5 MEG. | ½ | IRC BT-½ |
| R-4 | 3 MEG. | 1 | IRC BT-1 |
| R-5 | 500,000 | 1 | IRC BT-1 |
| R-6 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-7 | 500,000 | ½ | IRC BT-½ |
| R-8 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-9 | 500,000 | ½ | IRC BT-½ |
| R-10 | 5,000 | 1 | IRC BT-1 |
| R-11 | 100,000 | 1 | IRC BT-1 |
| R-12 | 500,000 | Tone Control | Yaxley type "M" |
| R-13 | 1,000 | 1 | IRC BT-1 |
| R-14 | 20,000 | 1 | IRC BT-1 |
| R-15 | 20,000 | 1 | IRC BT-1 |
| R-16 | 2,500 | 25 | Ohmite, Wirewound |
| R-17 | 1,500 | 25 | Ohmite, Wirewound |
| R-18 | 125 | 25 | Ohmite, Wirewound, Tolerance + 10%, —0% |
| R-19 | 2,500 | 25 | Ohmite, Wirewound |

### TUBES

| | |
|---|---|
| 2 | 6J7 |
| 1 | 6C5 |
| 2 | 6V6-G |
| 1 | 5Z3 |

For complete mechanical drawing of chassis see page 28
Full size template of chassis available from Thordarson 15c net, postpaid.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400V Paper | Aerovox #484 |
| C-2 | .03 | 400V Paper | Aerovox #484 |
| C-3 | .04 | 400V Paper | Aerovox #484 |
| C-4 | .1 | 400V-Paper | Aerovox #484 |
| C-5 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | .03 | 400V Paper | Aerovox #484 |
| C-8 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-9 | .1 | 400V Paper | Aerovox #484 |
| C-10, C-11 | 8-8 | 450 W. V. Elect. | Aerovox PBS-450 |
| C-12 | 8 | 600V Elect. | Aerovox GL600 |
| C-13 | 8 | 600V Elect. | Aerovox GL600 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" chassis and cover—Par-Metal AF 1017 |
| 1 | 10x17" chassis bottom plate—Par-Metal BP 4526 |
| 1 | 4-contact socket — Amphenol S4 |
| 5 | Octal sockets — Amphenol S8 |
| 2 | 5-contact sockets — Amphenol S5 |
| 2 | 5-prong speaker plugs — Amphenol PM5 |
| 1 | Mic. connector — Amphenol PC1M |
| 1 | Mic. connector — Amphenol MC1F |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | 6.3V Pilot light — Mazda #40 |
| 2 | Metal tube grid caps |
| 2 | Metal grid cap shields |
| 1 | "Microphone" control plate |
| 1 | "Phono" control plate |
| 1 | "Tone" control plate |
| 3 | Control knobs |
| 1 | AC line cord & plug |
| 1 | Mallory bias cell — 1.5 V. — #F7 |
| 1 | Mallory bias cell holder — #GB-1A |
| 1 | SPST switch — Arrow H & H #20992 |
| 3 | Two screw terminal boards |
| 1 | Three screw terminal board |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

# THORDARSON 25 WATT AMPLIFIER

THE use of inverse feedback makes it possible to obtain 25 watts of undistorted output from this amplifier with only 300 volts applied to the plates and screens of the power tubes. These low voltages increase tube and condenser life considerably which is a decided advantage. The output tubes are operated in a class AB1 circuit, under which condition no driving power is required; a single 6C5 tube supplies sufficient grid excitation through a C.H.T. input transformer. The windings of this transformer are balanced so that there is a cancelling effect for any hum that might be picked up. Degeneration or inverse feedback is obtained by coupling the tertiary winding of the output transformer to the secondary of the input transformer.

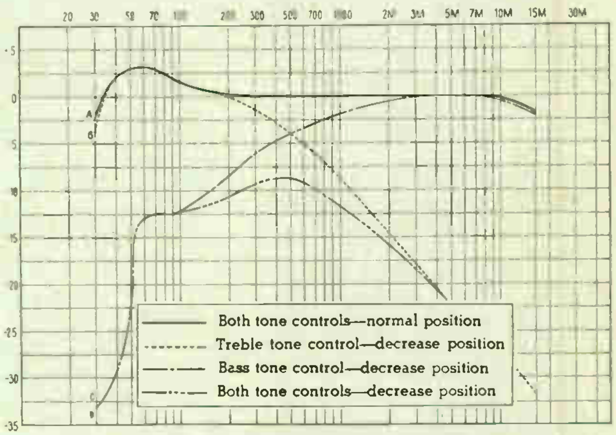
The input circuits are arranged to handle two high impedance microphones and a phono pick-up. Mixing takes place in the second stage in a resistor network that is more simple and economical than electronic mixing. Control action is smooth, and the changing of one control setting does not affect another. It is important, however, to shield resistors R-11, R-12, and R-13, and the leads as shown in the diagram. The impedance of these circuits is high, making them susceptible to hum pick-up and cross-talk unless adequately isolated.

Frequency response is adjusted with two tone controls — one for bass and one for treble. With the tone controls in the normal position, the response of the amplifier is decidedly flat—from 30 to 15,000 cycles per second. There is approximately 3 db accentuation at 60 c.p.s. which is purposely brought about by resonating the primary of the input transformer with condenser C-13. This boost is desirable in radio and record reproduction and can be eliminated with the bass tone control for voice work if necessary. The adjustment of both controls helps eliminate feedback when bad acoustical conditions exist.

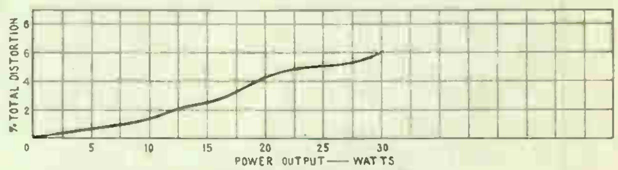
To insure good quality, loud speakers with a diameter of at least 12 inches are recommended. They should be capable of efficiently handling 15 watts of audio power each if the full 25 watt output of the amplifier is to be utilized. Either PM or electro-dynamic speakers are suitable since the amplifier will supply 18 watts for field excitation. This is adequate for one large speaker with a 5000 ohm field, or one or two smaller speakers with 2500 fields. A three-screw terminal board is provided for connecting a jumper wire in the event that P M speakers are used. Use table below in wiring the speaker plugs.

| | *Jumper* | *Connect to Prongs* |
|---|---|---|
| 1-5000 ohm field | none | 1-5 |
| 1-2500 ohm field | C-2 | 2-5 |
| 2-2500 ohm field | none | B-E and 2-5 |
| Field supply not used | 1-C | |

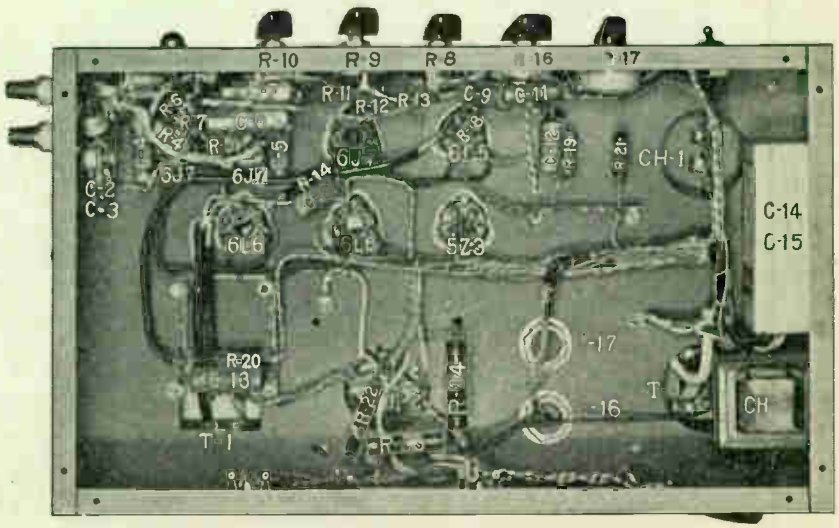
A polarizing voltage may be applied to the input connectors by connecting jumper wires on terminal board marked "POL. V." Refer to the 15 watt amplifier for further details on polarizing voltage for static microphones and photo electric cells.




FREQUENCY-RESPONSE CURVE



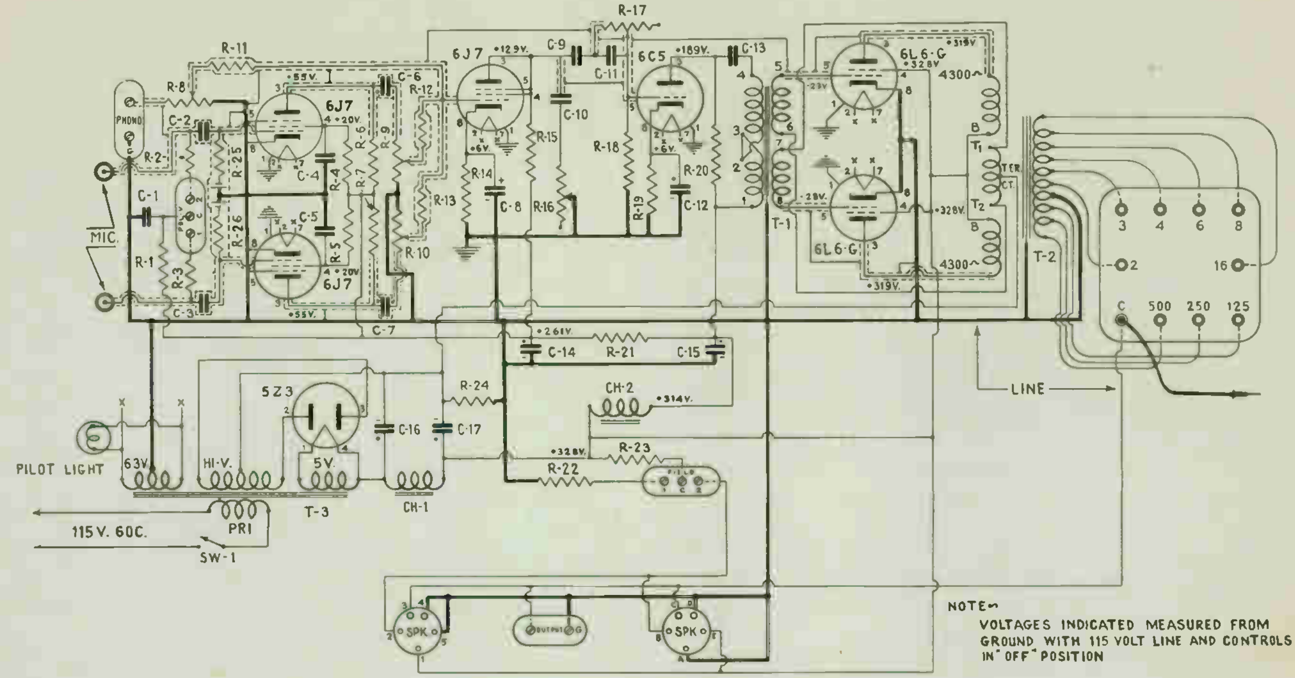

DISTORTION CURVE




BOTTOM VIEW

# 25 WATT AMPLIFIER

THORDARSON




NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION

## TECHNICAL DATA

***Power Output:*** 25 watts undistorted or + 36.2 db (less than 5% distortion).

***Coverage:*** 500,000 to 1,000,000 cu. ft. indoors; 20,000 to 30,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** Two 5 megohm channels for high impedance crystal, dynamic, or velocity microphones, and one channel for high impedance crystal or magnetic pick-up. All channels can be mixed. Polarizing voltage is available for static microphone or photo electric cell.

***Field Supply:*** 18 watts for one 5000 ohm field, or one or two 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer or 4, 8, 15, 250, or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 1 db from 35 c.p.s. to 15,000 c.p.s. with bass boost of 3.5 db below 100 c.p.s.

***Tone Controls:*** Two: bass control attenuates 12 db at 60 c.p.s.; treble control attenuates 27 db at 10,000 c.p.s.

***Gain:*** Microphone input, 113 db; phono input 72 db (based on 100,000 ohms input impedance).

***Hum:*** 74.5 db below maximum output.

***Tubes:*** 3-6J7, 1-6C5, 2-6L6G, 1-5Z3.

***Power Consumption:*** 180 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | |
|---|---|---|---|
| T-1 | T-15A74 | T-15A74 | Input Transformer |
| T-2 | T-15S91 | T-17S12 | Output Transformer |
| T-3 | T-15R07 | T-17R30 | Power Transformer |
| CH-1 | T-15C55* | T-67C49 | First Choke |
| CH-2 | T-67C46 | T-67C46 | Second Choke |

*Windings in series.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 10 MEG. | ½ | IRC BT-½ |
| R-2 | 10 MEG. | ½ | IRC BT-½ |
| R-3 | 10 MEG. | ½ | IRC BT-½ |
| R-4 | 3 MEG. | 1 | IRC BT-1 |
| R-5 | 3 MEG. | 1 | IRC BT-1 |
| R-6 | 500,000 | 1 | IRC BT-1 |
| R-7 | 500,000 | 1 | IRC BT-1 |
| R-8 | 250,000 | Volume Control | Yaxley type "M" |
| R-9 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-10 | 1 MEG. | Volume Control | Yaxley type "O" |
| R-11 | 500,000 | ½ | IRC BT-½ |
| R-12 | 500,000 | ½ | IRC BT-½ |
| R-13 | 500,000 | ½ | IRC BT-½ |
| R-14 | 5,000 | 1 | IRC BT-1 |
| R-15 | 100,000 | 1 | IRC BT-1 |
| R-16 | 500,000 | Tone Control | Yaxley UC-513 |
| R-17 | 9 MEG. | Tone Control | Yaxley UC-508 |
| R-18 | 250,000 | ½ | IRC BT-½ |
| R-19 | 1,000 | 1 | IRC BT-1 |
| R-20 | 20,000 | 1 | IRC BT-1 |
| R-21 | 20,000 | 1 | IRC BT-1 |
| R-22 | 2,500 | 25 | Ohmite Wire Wound |
| R-23 | 2,500 | 25 | Ohmite Wire Wound |
| R-24 | 100 | 25 | Ohmite Wire Wound, Tolerance +10% − 0% |
| R-25 | 5 MEG. | ½ | IRC BT-½ |
| R-26 | 5 MEG. | ½ | IRC BT-½ |

### TUBES

| | |
|---|---|
| 3 | Type 6J7 |
| 1 | Type 6C5 |
| 2 | Type 6L6-G |
| 1 | Type 5Z3 |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-2 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-3 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-4 | .04 | 400V Paper | Cornell-Dubilier DT-4S4 |
| C-5 | .04 | 400V Paper | Cornell-Dubilier DT-4S4 |
| C-6 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-7 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-8 | 10 | 25 V Elect. | Cornell-Dubilier BR-102 |
| C-9 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-10 | .03 | 400V Paper | Cornell-Dubilier DT-4S3 |
| C-11 | .001 | 600V Paper | Cornell-Dubilier DT-6D1 |
| C-12 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-13 | .1 | 400V Paper | Cornell-Dubilier DT-4P1 |
| C-14 / C-15 | 8-8 | 450 WV Elect. | Cornell-Dubilier EH-9808SL |
| C-16 | 8 | 600V Elect. | Aerovox GL600 |
| C-17 | 8 | 600V Elect. | Aerovox GL600 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 6 | Octal sockets — Amphenol S8 |
| 1 | 4-contact socket — Amphenol S4 |
| 2 | 5-contact sockets — Amphenol S5 |
| 2 | 5-prong speaker plugs — Amphenol PM5 |
| 2 | Mic. input connectors — Amphenol PC1M |
| 2 | Mic. input connectors — Amphenol MC1F |
| 2 | Three screw terminal boards |
| 2 | Two screw terminal boards |
| 1 | Pilot light socket and jewel — Yaxley 310R |
| 1 | 6. 3V Pilot light bulb — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 5 | Control knobs |
| 3 | Metal tube grid caps |
| 3 | Metal grid cap shields |
| 1 | AC line cord and plug — Belden #1725 |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |
| 2 | "Mic" control plates |
| 1 | "Phono" control plate |
| 2 | "Tone" control plates (bass and treble) |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

For complete mechanical drawing of chassis see page 29. Full size template of chassis available from Thordarson. 15c net, postpaid.

THORDARSON

# 40 WATT AMPLIFIER

THE characteristics of 6L6 beam power tubes are such that they may be used in the construction of amplifiers ranging from 5 to 60 watts output. Their power output depends on the class of operation employed, such as $A_1$, $AB_1$, $AB_2$. This is determined by the applied plate, screen and grid voltages, the plate load and driving power.

This 40 watt amplifier uses two 6L6-G tubes operating in class $AB_2$ with approximately 400 volts on the plates and 250 volts on the screens. Adequate driving power is supplied by a triode connected 6F6 tube through a CHT driver transformer. The use of inverse feedback and ample driving power make it possible to obtain 40 watts output without using fixed bias. This simplifies the construction of the amplifier considerably.

Two microphones and two phono pick-ups may be connected to the amplifier at one time. The two phono channels are especially desirable where dual turn-tables are employed for continuous record reproduction. Also a suitable radio tuner can be connected to one of the phono channels for broadcast reception in conjunction with one phono pick-up. Complete mixing makes possible the selection of one or more input channels for reproduction at the same time.

A dual tone control circuit recently developed in Thordarson's laboratory operates in the cathode circuit of the 6C5 tube. One control affects only the low or bass frequencies, and the other controls the high or treble frequencies. Operation is such that with the controls in the center or vertical position the frequency response is normal, as illustrated by the frequency response curve. Turning the bass control to the left increases the bass response and to the right reduces it. The treble control functions in the same manner. More detailed description of this type of control and its effect on the amplifier frequency response is given on page 24.

Two 5Z3 rectifier tubes connected in a parallel circuit provide excellent power supply regulation. The additional tube also allows higher total current which is desirable for speaker field excitation. The amplifier supplies 25 watts for speaker fields, (250 volts at 100 MA) which is adequate for one large auditorium speaker or for two to four smaller speakers. The following table indicates how speaker field connections are made to the speaker sockets and the proper position of the field supply jumper wire.

| | *Jumper* | *Connect to prongs* |
|---|---|---|
| 1 - 2500 ohm field | 1-C | 1-2 |
| 2 - 1250 ohm field | 1-C | 2-5 and A-E |
| 2 - 5000 ohm field | 1-C | 1-2 and A-B |
| 4 - 2500 ohm field | 1-C | 2-5 and A-E* |
| Field supply not used | C-2 | |

*Connect two fields in parallel to each plug.

Make speaker voice-coil or line connections to contacts 3-4 and C-D of the speaker sockets or to the output terminal board. Impedance matching is accomplished by inserting the plug into the proper jack on the CHT output transformer terminal board.

## TECHNICAL DATA

***Power Output:*** 40 watts undistorted or +38.25 db (Less than 5% distortion).

***Coverage:*** 1,000,000 to 2,000,000 cu. ft. indoors; 30,000 to 50,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** Two high impedance channels for crystal, dynamic, or velocity microphones, and two high impedance phono channels for crystal or magnetic pick-ups. All four channels may be mixed.

***Field Supply:*** 25 watts are available for one 2500 ohm, two 1250 ohm, two 5000 ohm, or four 2500 ohm fields.

***Output Impedances:*** 2, 3, 4, 6, 8, 16, 125, 250 or 500 ohms with CHT output transformer or 4, 8, 15, 250 or 500 ohms with regular output transformer.

***Frequency Response:*** Within ± 2 db, 30 to 15,000 c.p.s. (Tone controls in normal position).

***Tone Controls:*** Two; Bass control varies response from + 12 db to —35 db at 40 c.p.s. and treble control varies response from + 8 db to —35 db at 7,000 c.p.s. from normal. It is possible to obtain practically any desired frequency response.

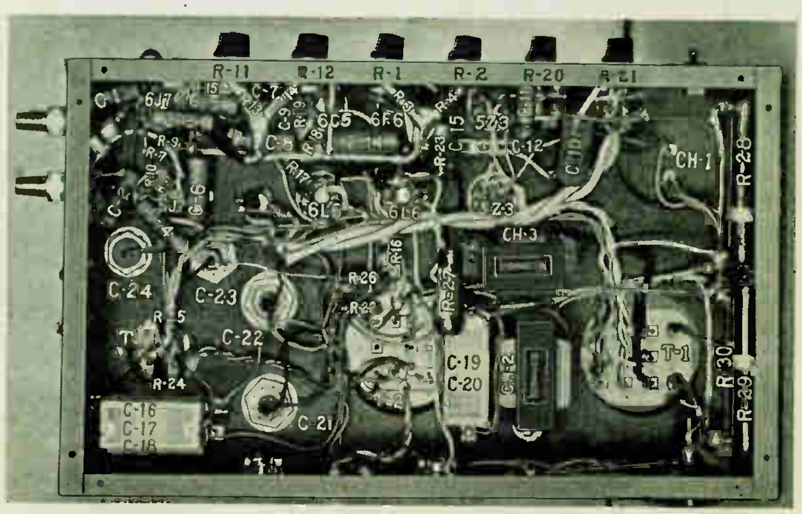
***Gain:*** Microphone inputs, 118.5 db; phono inputs, 74 db (based on 100,000 ohms input impedance).

***Hum:*** 75 db below maximum output.

***Tubes:*** 2-6J7, 1-6F5, 1-6C5, 1-6F6, 2-6L6G, 2-5Z3.

***Power Consumption:*** 220 watts, 115 volts, 50-60 cycles.

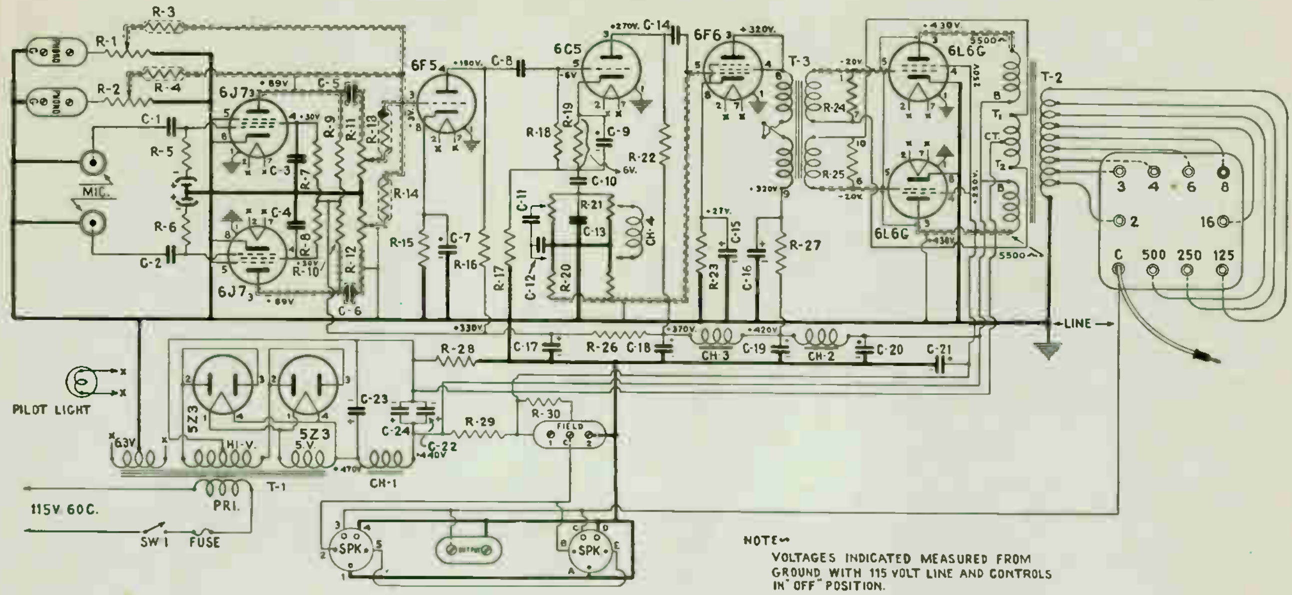
***Dimensions:*** 17" long, 10" deep, 9" high.




BOTTOM VIEW

# 40 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### TRANSFORMERS AND CHOKES

| Diagram No. | CHT | REG. | Type |
|---|---|---|---|
| T-1 | T-15R08 | T-17R31 | Power Transformer |
| T-2 | T-15S92 | T-17S14 | Output Transformer OK |
| T-3 | T-15D85 | T-15D85 | Driver Transformer |
| CH-1 | T-15C56* | T-75C51 | First Choke |
| CH-2 | T-18C92 | T-18C92 | Second Choke |
| CH-3 | T-67C46 | T-67C46 | Third Choke |
| CH-4 | T-14C70 | T-14C70 | Tone Control Choke |

* Windings in series.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Aerovox #484 |
| C-2 | .03 | 400V Paper | Aerovox #484 |
| C-3 | .04 | 400V Paper | Aerovox #484 |
| C-4 | .04 | 400V Paper | Aerovox #484 |
| C-5 | .1 | 400V Paper | Aerovox #484 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | 10 | 25V Elect. | Aerovox PR25 |
| C-8 | .1 | 400V Paper | Aerovox #484 |
| C-9 | 10 | 25V Elect. | Aerovox PR25 |
| C-10 | .5 | 400V Paper | Aerovox #484 |
| C-11 | .01 | 400V Paper | Aerovox #484 |
| C-12 | .01 | 400V Paper | Aerovox #484 |
| C-13 | .003 | 400V Paper | Aerovox #484 |
| C-14 | .1 | 400V Paper | Aerovox #484 |
| C-15 | 10 | 25V Elect. | Aerovox PR25 |
| C-16, C-17 | 8-8 | 450V Elect. | Aerovox PBS450 |
| C-18, | 8 | 450V Elect. | Aerovox PBS450 |
| C-19 | 8 | 600V Elect. | Aerovox PBS600 |
| C-20 | 8 | 600V Elect. | Aerovox PBS600 |
| C-21 | 8 | 600V Elect | Aerovox GL600 |
| C-22 | 8 | 600V Elect. | Aerovox GL600 |
| C-23 | 8 | 600V Elect. | Aerovox GL600 |
| C-24 | 8 | 600V Elect. | Aerovox GL600 |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 500,000 | Volume Control | Centralab N-103 |
| R-2 | 500,000 | Volume Control | Centralab N-103 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 5 Megohms | ½ | Centralab #310 |
| R-6 | 5 Megohms | ½ | Centralab #310 |
| R-7 | 3 Megohms | ½ | Centralab #310 |
| R-8 | 3 Megohms | ½ | Centralab #310 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 500,000 | ½ | Centralab #310 |
| R-11 | 1 Megohm | Volume Control | Centralab N-104 |
| R-12 | 1 Megohm | Volume Control | Centralab N-104 |
| R-13 | 500,000 | ½ | Centralab #310 |
| R-14 | 500,000 | ½ | Centralab #310 |
| R-15 | 5,000 | 1 | Centralab #314 |
| R-16 | 250,000 | ½ | Centralab #310 |
| R-17 | 20,000 | ½ | Centralab #310 |
| R-18 | 250,000 | ½ | Centralab #310 |
| R-19 | 1,000 | 1 | Centralab #314 |
| R-20 | Special Dual Tone Control | | Thordarson R-1068 |
| R-21 | Special Dual Tone Control | | Thordarson R-1068 |
| R-22 | 20,000 | 1 | Centralab #314 |
| R-23 | 900 | 10 | Ohmite, Wirewound |
| R-24 | 10,000 | ½ | Centralab #310 |
| R-25 | 10,000 | ½ | Centralab #310 |
| R-26 | 20,000 | 1 | Centralab #314 |
| R-27 | 2,500 | 25 | Ohmite, Wirewound |
| R-28 | 80 | 50 | Ohmite, Wirewound |
| R-29 | 1,800 | 50 | Ohmite, Wirewound |
| R-30 | 2,500 | 50 | Ohmite, Wirewound |

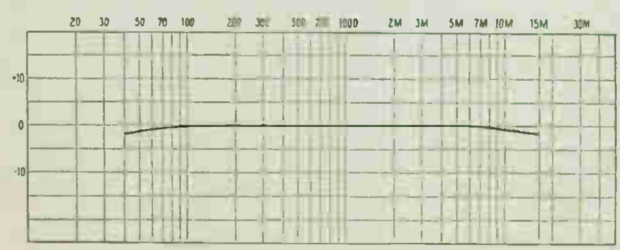
### TUBES

| | |
|---|---|
| 2 | Type 6J7 |
| 1 | Type 6F5 |
| 1 | Type 6C5 |
| 1 | Type 6F6 |
| 2 | Type 6L6-G |
| 2 | Type 5Z3 |

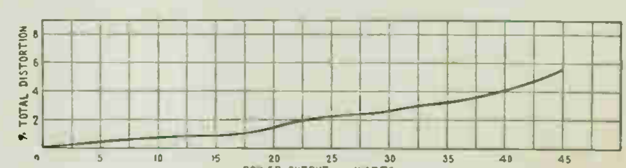
### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 2 | 5-Contact sockets — Amphenol S5 |
| 2 | 4-Contact sockets — Amphenol S4 |
| 7 | Octal sockets — Amphenol S8 |
| 2 | 5-Prong speaker plugs — Amphenol PM5 |
| 3 | Metal tube grid caps |
| 3 | Metal tube grid cap shields |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | 6.3V Pilot light bulb — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 2 | Mic. input connectors — Amphenol #PC1M |
| 2 | Mic. input connectors — Amphenol #MC1F |
| 1 | Primary line cord and plug — Belden #1725 |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |
| 2 | "Mic." control plates |
| 2 | "Phono" control plates |
| 2 | "Tone" control plates |
| 6 | Volume control knobs |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 5 amp. |
| 1 | 2-Screw terminal board, output |
| 2 | 2-Screw terminal boards, phono input |
| 1 | 3-Screw terminal board, field supply |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




FREQUENCY RESPONSE CURVE




DISTORTION CURVE

**For complete mechanical drawing of chassis see page 29. Full size template of chassis available from THORDARSON 15c net, postpaid.**

THORDARSON

# 60 WATT AMPLIFIER

TOP VIEW

THIS 60 watt amplifier has sufficient undistorted power output for practically any loud speaker installation. Four type 6L6-G output tubes operate in a push-pull parallel class AB1 circuit. Under these conditions no driving power is required making it possible to use a single 6C5 tube for excitation of the power stage. Distortion in the power stage is reduced to a minimum by the use of inverse feedback. Laboratory tests of amplifiers without inverse feedback indicate that distortion at full output may be less than 5% at 400 c.p.s., however it may increase to as much as 30 to 40% at bass and treble frequencies. This peculiarity of pentode and tetrode power tubes is quite easily corrected by the use of inverse feedback. The output of this amplifier has less than 6% distortion at all frequencies between 30 and 10,000 c.p.s.

In wiring the amplifier, shield all leads in the grid and plate circuits of the output tubes. The schematic diagram indicates clearly where shielding is necessary. This should not be overlooked since shielding is important in modern amplifiers employing tubes with high power sensitivity. Connect the colored leads of the output transformer to the numbered terminals of T-3 as indicated in the diagram. If the leads of the tertiary winding are reversed oscillation is sure to result in the output stage.

Two rectifier tubes are used; one for the plate and bias voltages of the output stage; the other for the screens of the output tubes and the balance of the amplifier. The effect of this circuit is similar to fixed bias and also provides excellent screen voltage regulation which is essential for maximum undistorted output. Interstage coupling through the B supply is also eliminated, since the plate circuit of the 6L6-G tubes is supplied from a separate rectifier.

The amplifier as illustrated is constructed with regular Thordarson transformers and chokes except T-15A74. This is a Thordarson CHT input transformer which incorporates hum balancing construction, and a split secondary winding. The use of this transformer is essential since hum pick-up must be held to a minimum, and a split secondary is required for the inverse feedback connection. A CHT output transformer is also available as given in the parts list. In addition to having a better selection of secondary impedances the CHT output transformer is more efficient and has better frequency characteristics. Both the CHT and the regular output transformer have the 10% feedback winding.

A dual tone control circuit is used in the cathode circuit of the 6C5 tube. Since the control of frequencies is accomplished by means of degeneration, this stage provides very little gain. This stage therefore is strictly for tone control purposes. Refer to page 24 for more detailed information on this circuit and sketch showing connections to the special tone controls.

Both microphone circuits are susceptible to hum pick-up and "cross-talk" unless properly shielded. A box may be formed from thin metal and placed as illustrated in the bottom view. Mount the bias cells, C-1, C-2, R-5, and R-6 on the inside wall of the chassis before fastening the metal box in place. Resistors R-3, R-4, R-13 and R-14 must also be shielded individually, as shown in the schematic drawing, to prevent hum and "cross-talk" from developing at this point.

## TECHNICAL DATA

*Power Output:* 60 watts undistorted or +40 db (less than 6% distortion).

*Coverage:* 2,000,000 to 3,000,000 cu. ft. indoors, 50,000 to 75,000 sq. ft. outdoors, (depending on speaker efficiency and noise level).

*Input Circuits:* Two high impedance channels for crystal, dynamic, or velocity microphones, and two high impedance phono channels for crystal, or magnetic pick-ups. All channels may be mixed.

*Output Impedances:* 4, 8, 15, 250, or 500 ohms with regular output transformer as shown or 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer.

*Frequency Response:* Within ± 2 db from 40 to 15,000 c.p.s. (tone controls in normal position).

*Tone Controls:* Two; bass control varies response from + 8 db at 70 c.p.s. to — 30 db at 40 c.p.s., and treble control varies response from + 9 db to — 27 db at 7000 c.p.s. from normal. Practically any desired frequency response may be obtained.

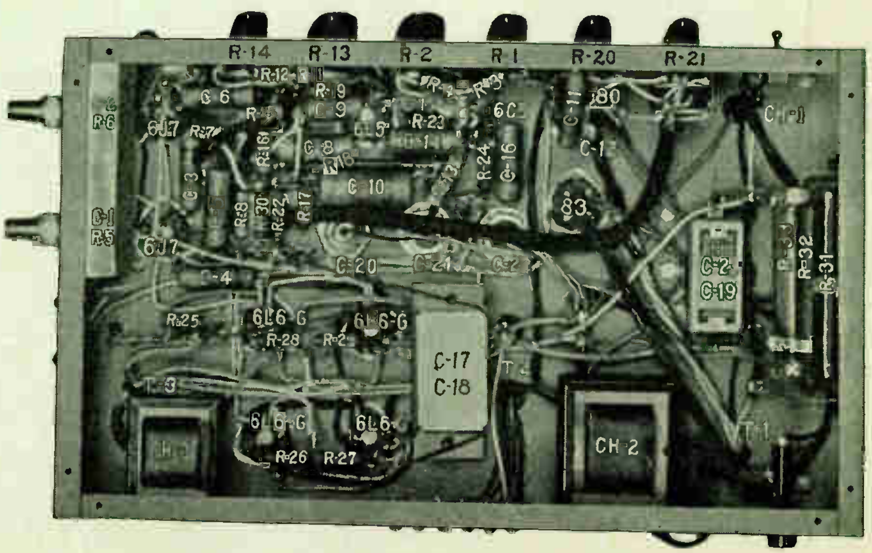
*Gain:* Microphone inputs, 112 db; phono inputs, 73 db (based on 100,000 ohms input impedance).

*Hum:* 75 db below maximum output.

*Tubes:* 3-6J7, 2-6C5, 4-6L6-G, 1-80, 1-83.

*Power Consumption:* 225 watts, 115 volts, 50-60 cycles.

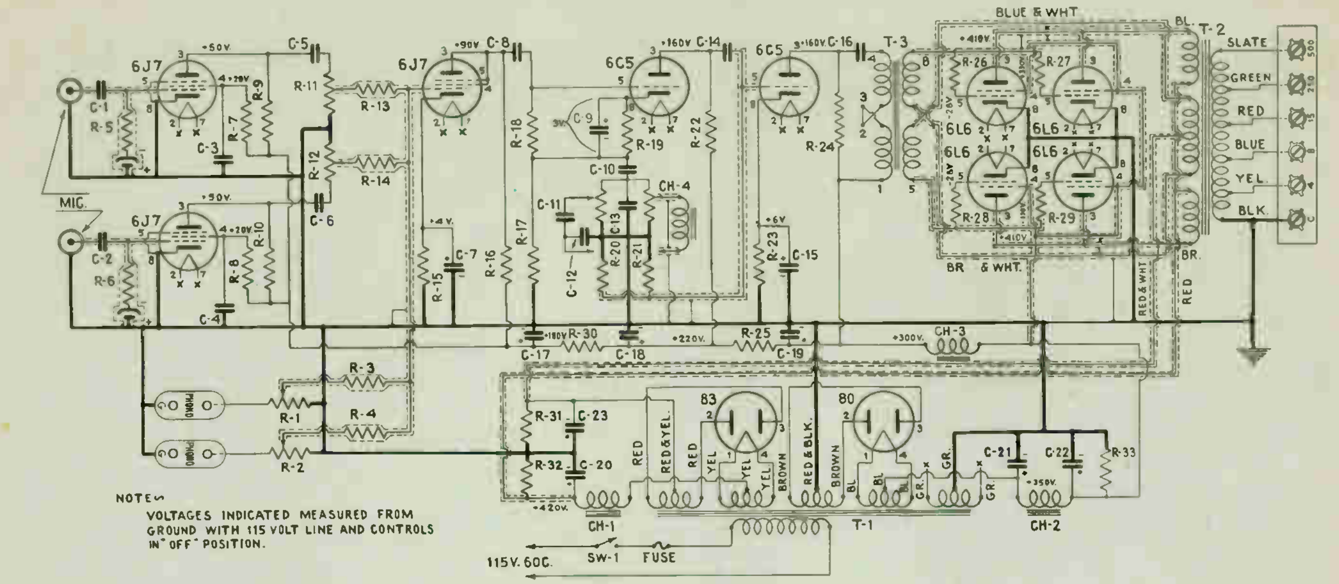
*Dimensions:* 17″ long, 10″ deep, 9″ high.




BOTTOM VIEW

# 60 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-89R28 Power Transformer |
| T-2 | T-17S15 or T-15S93 Output Transformer |
| T-3 | T-15A74 Input Transformer |
| CH-1 | T-75C51 Choke |
| CH-2 | T-68C07 Choke |
| CH-3 | T-67C46 Choke |
| CH-4 | T-14C70 Tone Control Choke |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Cornell-Dubilier #DT-4S3 |
| C-2 | .03 | 400V Paper | Cornell-Dubilier #DT-4S3 |
| C-3 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-4 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-5 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-6 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-7 | 10 | 25V Elect. | Cornell-Dubilier #BR-102 |
| C-8 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-9 | 10 | 25V Elect. | Cornell-Dubilier #BR-102 |
| C-10 | .5 | 400V Paper | Cornell-Dubilier #DT-4P5 |
| C-11 | .04 | 400V Paper | Cornell-Dubilier #DT-4S4 |
| C-12 | .003 | 600V Paper | Cornell-Dubilier #DT-6D3 |
| C-13 | .001 | 600V Paper | Cornell-Dubilier #DT-6D1 |
| C-14 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-15 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-16 | .1 | 400V Paper | Cornell-Dubilier #DT-4P1 |
| C-17 } C-18 } | 8-8 | 450V Elect. | Aerovox PBS 450 |
| C-19 | 8 | 450V Elect. | Aerovox PBS 450 |
| C-20 | 8 | 600V Elect. | Aerovox GL600 |
| C-21 | 8 | 450V Elect. | Aerovox GLS450 |
| C-22 | 8 | 450V Elect. | Aerovox GLS450 |
| C-23 | 8 | 450V Elect. | Aerovox PBS 450 |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 1 MEG. | Volume Control | Centralab N-104 |
| R-2 | 1 MEG. | Volume Control | Centralab N-104 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 5 MEG. | ½ | Centralab #310 |
| R-6 | 5 MEG. | ½ | Centralab #310 |
| R-7 | 3 MEG. | 1 | Centralab #314 |
| R-8 | 3 MEG. | 1 | Centralab #314 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 500,000 | ½ | Centralab #310 |
| R-11 | 1 MEG. | Volume Control | Centralab N-104 |
| R-12 | 1 MEG. | Volume Control | Centralab N-104 |
| R-13 | 500,000 | ½ | Centralab #310 |
| R-14 | 500,000 | ½ | Centralab #310 |
| R-15 | 1,000 | 1 | Centralab #314 |
| R-16 | 100,000 | 1 | Centralab #314 |
| R-17 | 20,000 | 1 | Centralab #314 |
| R-18 | 250,000 | ½ | Centralab #310 |
| R-19 | 2,000 | 1 | Centralab #314 |
| R-20 | Dual Tone Control | | Thordarson R-1068 |
| R-21 | Dual Tone Control | | Thordarson R-1068 |
| R-22 | 20,000 | 1 | Centralab #314 |
| R-23 | 1,000 | 1 | Centralab #314 |
| R-24 | 50,000 | 1 | Centralab #314 |
| R-25 | 20,000 | 1 | Centralab #314 |
| R-26 | 200 | 1 | Centralab #314 |
| R-27 | 200 | 1 | Centralab #314 |
| R-28 | 200 | 1 | Centralab #314 |
| R-29 | 200 | 1 | Centralab #314 |
| R-30 | 20,000 | 1 | Centralab #314 |
| R-31 | 125 | 50 | Ohmite, Wirewound, +10%, —0% |
| R-32 | 40,000 | 50 | Ohmite, Wirewound |
| R-33 | 10,000 | 25 | Ohmite, Wirewound |

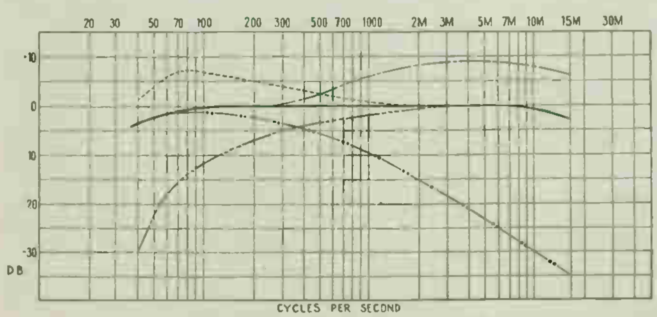
### TUBES

| | |
|---|---|
| 3 | Type 6J7 |
| 2 | Type 6C5 |
| 4 | Type 6L6-G |
| 1 | Type 80 |
| 1 | Type 83 |

### MISCELLANEOUS PARTS

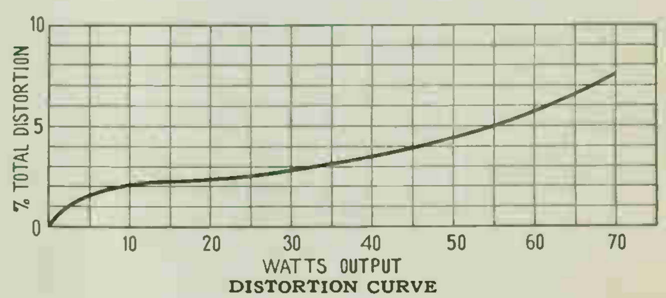
| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — Bud #1127 |
| 1 | 10x17" Chassis bottom plate — Bud #689 |
| 9 | Octal sockets — Amphenol S8 |
| 2 | 4-Contact sockets — Amphenol S4 |
| 2 | Mic. input connectors — Amphenol PC1M |
| 2 | Mic. input connectors — Amphenol MC1F |
| 1 | 6-Screw output terminal board |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 5 amp. |
| 1 | AC line cord and plug — Belden #1725 |
| 2 | 2-Screw terminal boards |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | Pilot light, 6.3 volts — Mazda #40 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 3 | Metal tube grid caps |
| 3 | Metal tube grid cap shields |
| 2 | "Mic" control plates |
| 2 | "Phono" control plates |
| 2 | "Tone" control plates |
| 6 | Control knobs |
| 2 | Bias cells, 1.5 volts — Mallory #F7 |
| 2 | Bias cell holders — Mallory #GB-1A |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




**FREQUENCY RESPONSE CURVE**

———————— Tone controls normal
- - - - - - - - - - Bass increase — Treble normal
— — — — — Bass normal — Treble increase
— . — . . — . — Bass normal — Treble decrease
— - — - — - — Bass decrease — Treble normal

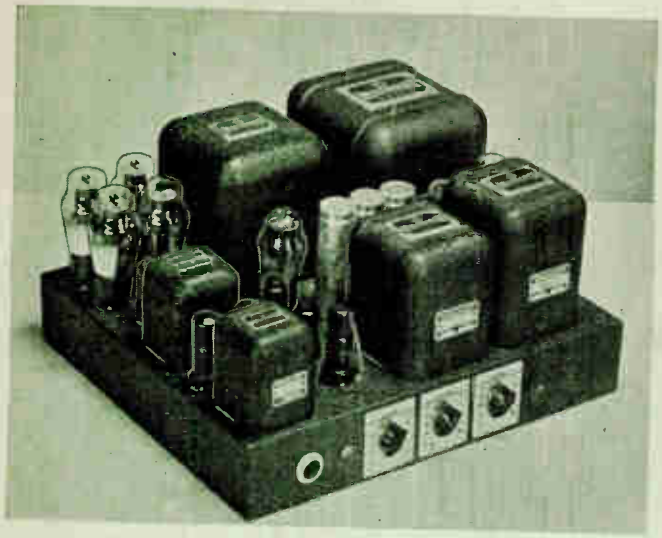



**DISTORTION CURVE**

**For complete mechanical drawing of chassis see page 30. Full size template of chassis available from THORDARSON 15c net, postpaid.**

THORDARSON

# 120 WATT AMPLIFIER



TOP VIEW

THE power output of this amplifier is adequate for the largest installations either indoors or out. The input circuit is arranged to operate from a pre-amplifier such as those described on pages 20 and 22. These pre-amplifiers have low impedance output transformers, making it possible to operate them several hundred feet from the 120 watt unit. A 500 ohm resistor (R-1) is connected across the input circuit of the 120 watt amplifier to match the 500 ohm output impedance of the pre-amplifier. This method is satisfactory since the 6J7 input tube provides approximately the same voltage gain as would be obtained from a line to grid transformer. Should it be desired to operate from a single high impedance pick-up without a pre-amplifier, resistor R-1 can be disconnected from the circuit. Under these conditions the amplifier gain is 90 db which is sufficient for full power output.

The second stage is the tone control and contributes very little to the overall gain of the amplifier. An article describing this tone control circuit may be found on page 24. If the tone control is not required, the 6C5 stage and associate parts can be eliminated without seriously affecting the gain of the amplifier.

A dotted line "A......A" is shown on the circuit diagram just before the 6F6 driver tube grids. If the unit is to be used only as a booster amplifier, eliminate all those parts ahead of the dotted line. For connection to a 500 ohm line use a line to P-P grid transformer such as T-15A67 instead of T-15A74 as shown. The overall gain of the booster with this transformer is about 43 db. Therefore, full output will be obtained when a 0 db signal is fed to the unit (1.73 volts across 500 ohms.)

Four type 6L6-G tubes operate in a push-pull parallel class AB2 circuit with inverse feedback. With this set-up it is possible to obtain maximum undistorted power output from beam power tubes. The driver stage consists of two 6F6 tubes connected as triodes. These provide excellent regulation which is essential when the output tube grids are driven positive.

It is necessary to shield the entire wiring of the final stage. This is easily done by using single shielded wire similar to that used for antenna lead in. Take care that the shielding does not come in contact with the tube socket contacts and other terminals. Ground all shielding carefully. If the amplifier oscillates interchange the leads connecting to terminals 7 and 6 on driver transformer T-4. This reverses the phase relationship of the feedback voltage with respect to the input voltage.

Two power supplies, entirely independent of one another, make it possible to obtain excellent regulation of the bias and screen voltages. The plate supply of the output stage uses two type 83 rectifier tubes. An 80 is used to supply fixed bias and screen voltage to the output stage as well as plate voltage for the balance of the amplifier. A separate filter system for each supply isolates the output stage and insures stability. Resistors in series with the 83 tube plates help distribute the current evenly. These resistors are necessary when mercury vapor rectifier tubes are wired parallel.

Before operating the amplifier insert all tubes except the 83's and adjust R-26 until 24.5 volts are measured at the 6L6 grids. After the 83's are placed in the sockets turn the amplifier on and measure the bias voltage again. If any change is noted correct by_adjusting R-26.

## TECHNICAL DATA

***Power Output:*** 120 watts or + 43 db (less than 8% distortion).

***Coverage:*** Up to 5,000,000 cu. ft. indoors; 100,000 to 150,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuit:*** Single channel; may be adapted to low or high impedance.

***Output Impedances:*** 84, 100, 125, 166, 250 or 500 ohms; selected by plug and jacks on terminal board of CHT output transformer.

***Frequency Response:*** Within ±1 db from 40 to 15,000 c.p.s. (tone controls in normal position).

***Tone Controls:*** Two; bass control varies response from + 7 db at 60 c.p.s. to —20 db at 30 c.p.s., and treble control varies response from +7.5 db to —20 db at 10,000 c.p.s. from normal. Practically any desired frequency response may be obtained.

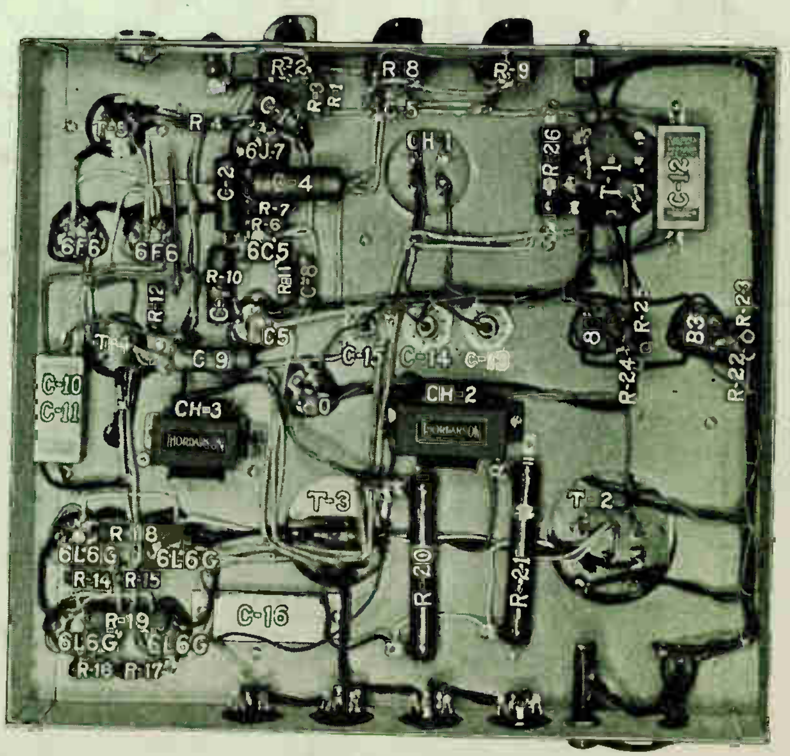
***Gain:*** 90 db with high impedance input resistor (based on 100,000 ohms input impedance); 72.5 db with 500 ohm input resistor. (If line to grid transformer is used, gain is approximately 90 db.)

***Hum:*** 73 db below maximum output.

***Tubes:*** 1-6J7, 2-6C5, 2-6F6, 4-6L6-G, 1-80, 2-83.

***Power Consumption:*** 570 watts with no signal; 720 watts at maximum output.

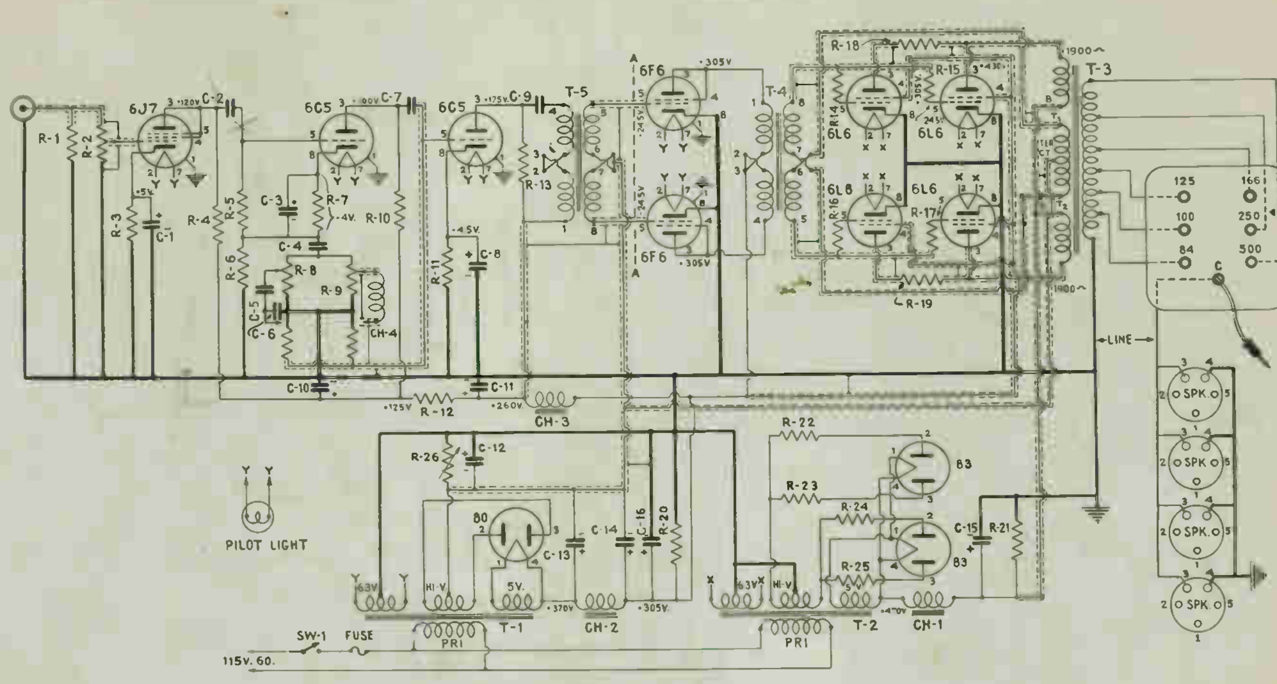
***Dimensions:*** 17" long, 15" deep, 9" high.




BOTTOM VIEW

# 120 WATT AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R06 Power Transformer |
| T-2 | T-15R01 Power Transformer |
| T-3 | T-15S94 Output Transformer |
| T-4 | T-15D86 Driver Transformer |
| T-5 | T-15A74 Input Transformer |
| CH-1 | T-15C56 Choke* |
| CH-2 | T-68C07 Choke |
| CH-3 | T-67C46 Choke |
| CH-4 | T-14C70 Tone Control Choke |

*Winding in Series.

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25 V. Elect. | Cor.-Dub. #BR-102 |
| C-2 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-3 | 10 | 25 V. Elect. | Cor.-Dub. BR-102 |
| C-4 | .5 | 400 V. Paper | Cor.-Dub. #DT-4P5 |
| C-5 | .04 | 400 V. Paper | Cor.-Dub. #DT-4S4 |
| C-6 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-7 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-8 | 10 | 25 V. Elect. | Cor.-Dub. #BR-102 |
| C-9 | .1 | 400 V. Paper | Cor.-Dub. #DT-4P1 |
| C-10, C-11 | 8-8 | 450 V. Elect. | Cor.-Dub. #JR-588 |
| C-12 | 16 | 200 V. Elect. | Cor.-Dub. #JR-216 |
| C-13 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-14 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-15 | 8 | 600 V. Elect. | Aerovox #GL600 |
| C-16 | 8 | 450 V. Elect. | Cor.-Dub. #JR-508 |

### RESISTORS

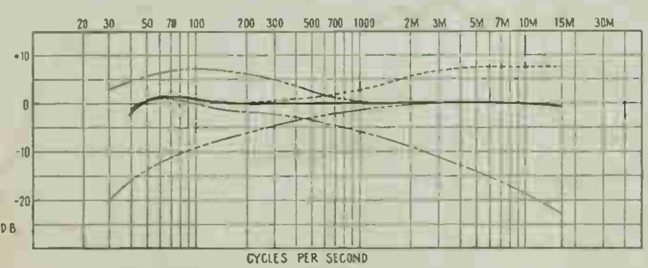
| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 500 | 1 | Centralab #314 |
| R-2 | 1 MEG. | Volume Control | Centralab N-104 |
| R-3 | 5,000 | 1 | Centralab #314 |
| R-4 | 50,000 | 1 | Centralab #314 |
| R-5 | 250,000 | ½ | Centralab #310 |
| R-6 | 20,000 | 1 | Centralab #314 |
| R-7 | 1,000 | 1 | Centralab 314 |
| R-8 | Dual Tone Control | | Thordarson R-1068 |
| R-9 | Dual Tone Control | | Thordarson R-1068 |
| R-10 | 20,000 | 1 | Centralab #314 |
| R-11 | 1,000 | 1 | Centralab #314 |
| R-12 | 50,000 | 1 | Centralab #314 |
| R-13 | 20,000 | 1 | Centralab #314 |
| R-14 | 200 | 1 | Centralab #314 |
| R-15 | 200 | 1 | Centralab #314 |
| R-16 | 200 | 1 | Centralab #314 |
| R-17 | 200 | 1 | Centralab #314 |
| R-18 | 25 | 10 | Ohmite, Wirewound |
| R-19 | 25 | 10 | Ohmite, Wirewound |
| R-20 | 10,000 | 50 | Ohmite, Wirewound |
| R-21 | 10,000 | 50 | Ohmite, Wirewound |
| R-22 | 50 | 10 | Ohmite, Wirewound |
| R-23 | 50 | 10 | Ohmite, Wirewound |
| R-24 | 50 | 10 | Ohmite, Wirewound |
| R-25 | 50 | 10 | Ohmite, Wirewound |
| R-26 | 300 | 25 | Ohmite, Semi-Var. |

TUBES: 1-6J7, 2-6C5, 2-6F6, 4-6L6G, 1-80, 2-83

### MISCELLANEOUS PARTS

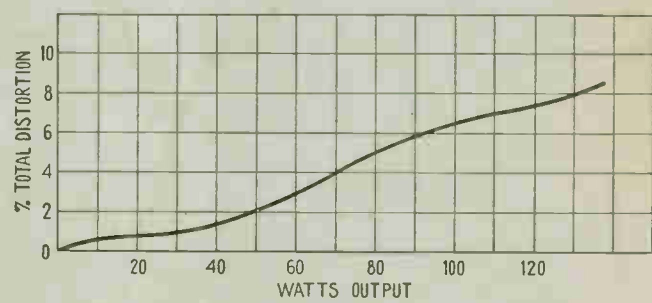
| | |
|---|---|
| 1 | 17x15x3" Chassis with bottom plate |
| 1 | "Gain" control plate |
| 2 | "Tone" control plates |
| 3 | Volume control knobs |
| 1 | AC line cord and plug — Belden #1725 |
| 1 | Fuse mounting — Littlefuse #1075 |
| 1 | Fuse, 10 ampere |
| 9 | Octal Sockets — Amphenol S8 |
| 3 | 4-Contact sockets — Amphenol S4 |
| 4 | 5-Contact sockets — Amphenol S5 |
| 4 | 5-Prong speaker plugs — Amphenol PM5 |
| 1 | Input connector — Amphenol PC3F |
| 1 | Input connector — Amphenol MC3M |
| 1 | Pilot light socket and jewel — Yaxley #310R |
| 1 | Pilot light bulb, 6.3 volts — Mazda #40 |
| 1 | Metal tube grid cap |
| 1 | Metal tube grid cap shield |
| 1 | SPST toggle switch — Arrow H&H #20992 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




Tone controls normal
Bass increase — Treble normal
Bass normal — Treble increase
Bass normal — Treble decrease
Bass decrease — Treble normal

**FREQUENCY RESPONSE CURVE**




**DISTORTION CURVE**

**For complete mechanical drawing of chassis see page 30. Full size template of chassis available from THORDARSON, 15c net, postpaid.**

# 2A3 PHONO AMPLIFIER

transformer has filament voltage available for either type tubes.) A Tru-Fidelity output transformer, T-90S13, makes voice coil or line impedances of 1.25, 3.75, 5, 7.5, 10, 15, 50, 125, 200, 250, 333 or 500 ohms available.

A form of degeneration is used in a new way to provide the unusually flexible tone compensating circuit shown. This circuit is so important and interesting that it is described in detail on page 24.

On the front panel are the two gain controls, near the input jacks; the expander control; a pilot light; the meter, with a switch at the far end of the chassis to measure the plate current of either or both output tubes; the on-off switch; the two tone controls and the plate current switch just mentioned.

In the photograph is shown the special shielding around the two small resistors from the gain controls. The circuit used results in a minimum of cross-talk, shielding them as shown removes the last possibility of it. Cover the resistors with cambric sleeving, then enclose them in a braid shield.

THIS 10-watt Tru-Fidelity audio amplifier, with volume expansion and dual tone control, will meet the requirements of the most discriminating listener. It is an improved version of the Thordarson 10-watt Tru-Fidelity unit, specially adapted to meet phonograph and radio tuner requirements. The amplifier features an unusually flexible tone control and volume expansion, making it possible to reproduce recordings with a high degree of naturalness. The volume expander is especially useful in restoring the range of symphonic renditions. No pre-amplifier stages are included as they are not needed and would materially increase the cost of construction.

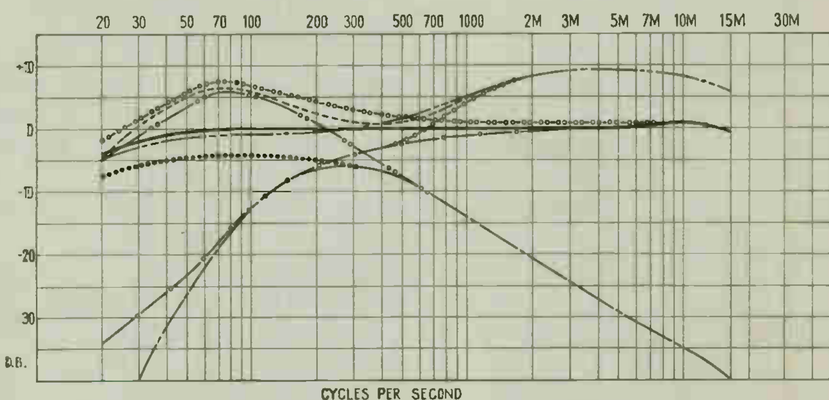
With the bass and treble tone controls in "normal" position, the frequency response is flat. Through the use of the dual tone controls the bass may be boosted 7 db between 50 and 200 cycles or dropped 30 db from normal at 30 cycles The treble may be boosted 9 db at 7000 or dropped 30 db at 10,000 cycles. These controls are independent, so any acoustical condition may be satisfied.

At the rated output of 10 watts, the distortion is but 3.7% and at 16 watts only 4.8%, which is still within high fidelity specifications.

The amplifier consists of five stages giving a gain of 70 db from either phono input (measured across a 100,000 ohm input). This gain is with the volume expansion off. When the expander is at maximum the volume level may be increased 11 db making a total overall gain of 81 db available. This is more than sufficient for any phono or tuner application.

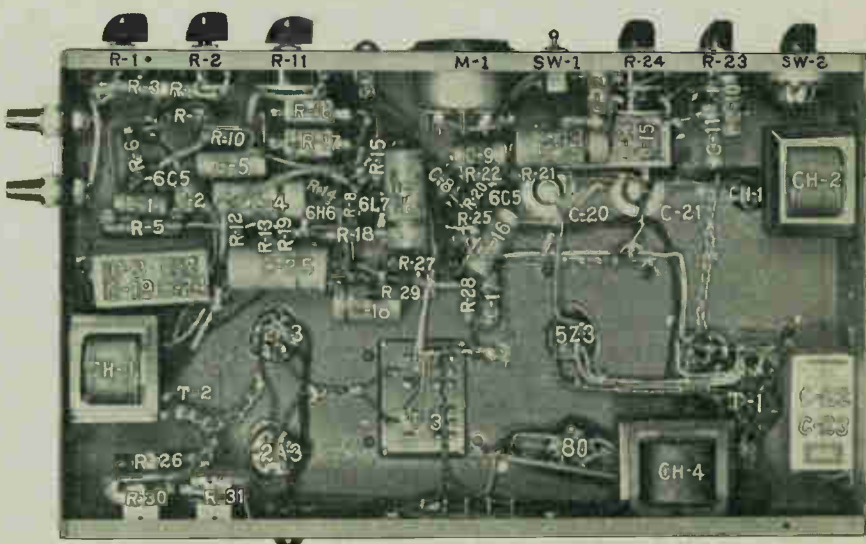
Two phono inputs are mixed and fed into a 6C5 stage with a gain of 10. The output of this stage is fed into a 6L7, the gain of which varies according to the expansion voltage fed into it by the action of the 6C5-6H6 volume expansion stage. The energy for the expander stage is taken from the grid of the fourth stage 6C5.

The output of the 6L7 is fed into a 6C5 tone control tube which has a gain of 1.4 with the controls in "normal" position. This in turn is fed into another 6C5 and then, through a T-90A04 Tru-Fidelity transformer, to two 2A3's or 6A3's in push pull. (The power




——— Tone controls — normal
- - - - - - Bass — increase, treble — increase
oo-oo- Bass — increase, treble — normal
--oo--oo Bass — increase, treble — decrease
— — — — Bass — normal, treble — increase
. . . . . . Bass — normal, treble — decrease
—o—o Bass — decrease, treble — normal
— — — — Bass — decrease, treble — decrease
-o-o-o Bass — decrease, treble — increase

FREQUENCY-RESPONSE CURVE

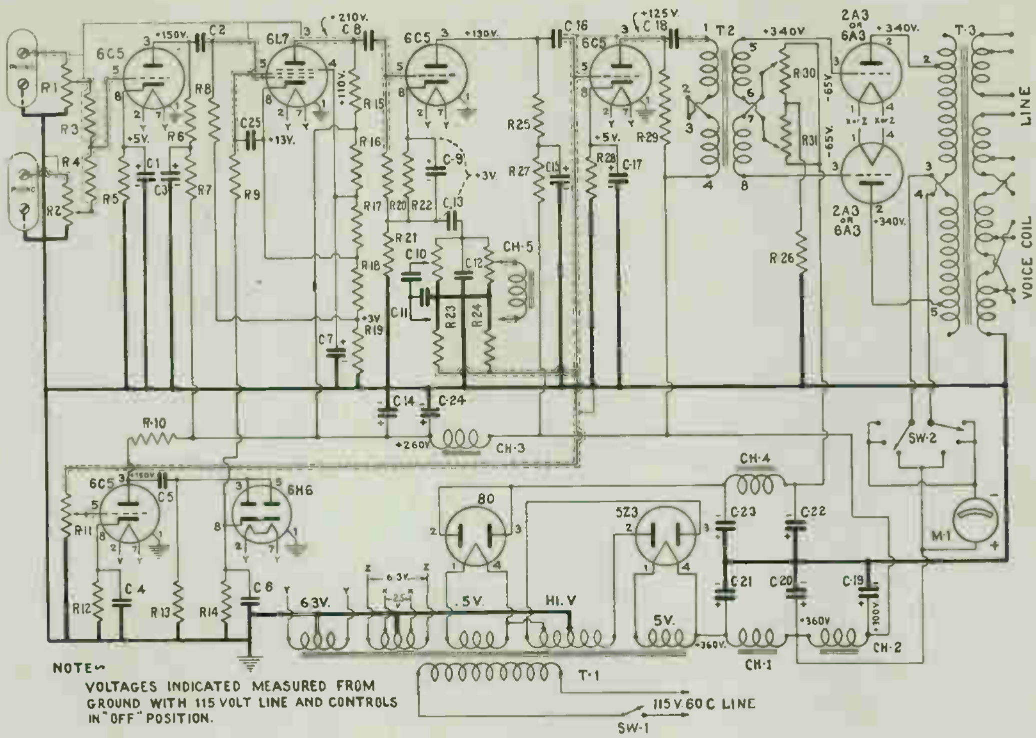



BOTTOM VIEW

For complete mechanical drawing of chassis see page 28, also, full size template available from Thordarson 15c net postpaid.

# 2A3 PHONO AMPLIFIER

THORDARSON




## TECHNICAL DATA

***Power Output:*** 10 watts or + 32.2 db with 3.7% distortion; 16 watts or + 34.1 db with 4.8% distoriton.

***Input Circuits:*** Two high impedance phono channels for crystal or magnetic pick-up or radio tuner. Individual controls for mixing or fading.

***Output Impedances:*** 1.25, 3.75, 5, 7.5, 10, 15, 50, 125, 200, 250, 333 or 500 ohms — selected by connecting output terminals to desired impedance of transformer.

***Frequency Response:*** Within ± 1 db from 30 to 15,000 c.p.s. (tone controls in normal position).

***Tone Controls:*** Two: bass control varies response from + 7 db at 70 c.p.s. to —30 db at 30 c.p.s.; treble control varies response from + 9 db to —30 db at 7,000 c.p.s.

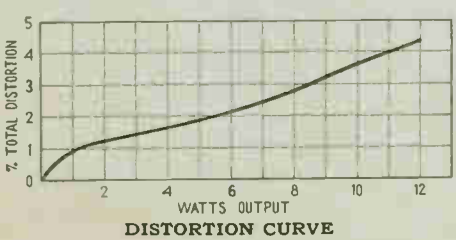
***Gain:*** 70 db with volume expander "OFF"; 81 db with volume expander "ON".

***Hum:*** 64 db below maximum output.

***Tubes:*** 4-6C5, 1-6L7, 1-6H6, 2-2A3 or 6A3, 1-80, 1-5Z3.

***Power Consumption:*** 235 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 17" long, 10" deep, 9" high.




DISTORTION CURVE

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R05 Power Transformer |
| T-2 | T-90A04 Audio Transformer |
| T-3 | T-90S13 Output Transformer |
| CH-1 | T-15C54* First Choke |
| CH-2 | T-74C30 Second Choke |
| CH-3 | T-67C46 Third Choke |
| CH-4 | T-18C92 Bias Choke |
| CH-5 | T-14C70 Tone Control Choke |

*Winding in parallel.

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 1 MEG. | Volume Control | Centralab N-104 |
| R-2 | 1 MEG. | Volume Contro | Centralab N-104 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 500,000 | ½ | Centralab #310 |
| R-5 | 2,000 | 1 | Centralab #314 |
| R-6 | 20,000 | 1 | Centralab #314 |
| R-7 | 20,000 | 1 | Centralab #314 |
| R-8 | 1 MEG. | ½ | Centralab #310 |
| R-9 | 500,000 | ½ | Centralab #310 |
| R-10 | 100,000 | 1 | Centralab #314 |
| R-11 | 1 MEG. | Volume Control | Centralab N-104 |
| R-12 | 10,000 | ½ | Centralab #310 |
| R-13 | 100,000 | ½ | Centralab #310 |
| R-14 | 250,000 | ½ | Centralab #310 |
| R-15 | 100,000 | 1 | Centralab #314 |
| R-16 | 10,000 | 10 | Ohmite Brown Devil |
| R-17 | 10,000 | 10 | Ohmite Brown Devil |
| R-18 | 800 | 1 | Centralab #314 |
| R-19 | 200 | 1 | Centralab #314 |
| R-20 | 250,000 | ½ | Centralab #310 |
| R-21 | 20,000 | 1 | Centralab #314 |
| R-22 | 1,000 | 1 | Centralab #314 |
| R-23 | Dual Tone Control | | Thordarson R1068 |
| R-24 | Dual Tone Control | | Thordarson R1068 |
| R-25 | 20,000 | 1 | Centralab #314 |
| R-26 | 3,500 | 10 | Ohmite Brown Devil |
| R-27 | 50,000 | 1 | Centralab #314 |
| R-28 | 1,000 | 1 | Centralab #314 |
| R-29 | 50,000 | 1 | Centralab #314 |
| R-30 | 3,000 | Potentiometer | Yaxley #C3MP |
| R-31 | 3,000 | Potentiometer | Yaxley #C3MP |

### TUBES

| | |
|---|---|
| 4 | Type 6C5 |
| 1 | Type 6L7 |
| 1 | Type 6H6 |
| 2 | Type 2A3 or 6A3 |
| 1 | Type 80 |
| 1 | Type 5Z3 |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-2 | .1 | 400 V Paper | Aerovox #484 |
| C-3, C-7 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-4 | .5 | 400 V Paper | Aerovox #484 |
| C-5 | .1 | 400 V Paper | Aerovox #484 |
| C-6 | .5 | 400 V Paper | Aerovox #484 |
| C-8 | .1 | 400 V Paper | Aerovox #484 |
| C-9 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-10 | .03 | 400 V Paper | Aerovox #484 |
| C-11 | .03 | 400 V Paper | Aerovox #484 |
| C-12 | .002 | 400 V Paper | Aerovox #484 |
| C-13 | .5 | 400 V Paper | Aerovox #484 |
| C-14, C-15 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-16 | .1 | 400 V Paper | Aerovox #484 |
| C-17 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-18 | .25 | 400 V Paper | Aerovox #484 |
| C-19, C-24 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-20 | 8 | 450 V Elect. | Aerovox G 450 |
| C-21 | 8 | 450 V Elect. | Aerovox G 450 |
| C-22, C-23 | 8-8 | 450 WV Elect. | Aerovox PBS 450 |
| C-25 | .5 | 400 V Paper | Aerovox #484 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chas. and screen cover—Par-Metal #AF1017 |
| 1 | 10x17" Chas. bottom plate—Par-Metal #BP4526 |
| 1 | 0-150 MA DC meter — Triplett #223 |
| 1 | SPST toggle switch — Arrow H&H #20992 |
| 1 | Two gang three position switch — Yaxley #3223-J |
| 6 | Octal sockets — Amphenol S8 |
| 4 | 4-Contact sockets — Amphenol S4 |
| 1 | Metal tube grid cap |
| 1 | Metal tube grid cap shield |
| 2 | "Volume" control plates |
| 2 | "Tone" control plates |
| 1 | "Expansion" control plate |
| 1 | Three position meter switch plate |
| 6 | Control knobs |
| 2 | Mic. connectors — Amphenol PC1M |
| 2 | Mic. connectors — Amphenol MC1F |
| 1 | AC line cord and plug — Belden #1725 |
| 1 | Pilot light socket and jewel — Yaxley 310R |
| 1 | Pilot light bulb, 6.3 volts — Mazda #40 |
| 2 | Brackets—Yaxley RB #248 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

# THORDARSON 6 Volt DC - 115 Volt AC AMPLIFIER

TOP VIEW

The combination 6 volt D.C., 115 volt A.C. amplifier has become very popular, especially in mobile public address work. Its flexibility permits operation almost anywhere that a 6 volt storage battery can be placed, such as rural gatherings, picnics, beach parties, motor boats, barn dances, etc. It is the ideal unit for portable and rental work since the undistorted power output of 20 watts is sufficient for most installations. Results are alike on both battery and 115 volt A.C. supplies with no sacrifice in the quality of reproduction.

The amplifier is similar to the 25 watt unit described on page 8; two 6L6-G's operate in a class $AB_1$ circuit with approximately 300 volts applied to the plates and screens. Inverse feedback reduces the distortion which is lower than ordinarily encountered in 6 volt amplifiers of this type. Two input channels accommodate a low level high impedance microphone and high impedance phono pick-up. The gain of the amplifier is more than adequate for full output with either "Mic" or "Phono".

Operation from 6 volts D.C. is made possible by incorporating a heavy duty vibrator to convert the D.C. into alternating current. Dual operation is accomplished by having both a 6 volt vibrator primary and a 115 volt primary on one and the same transformer. Two 6W5-G tubes rectify the high voltage for both battery and A.C. operation. A 6.3 volt secondary on the transformer supplies the heater current for A.C. operation only. The heaters are switched to the battery automatically for 6 volt operation by inserting the proper power supply plug. Two plugs are used, one being wired for 115 volt and the other for 6 volt operation. These plugs are wired as indicated on the schematic diagram.

Three switches are required. Two are used for 6 volt operation, one being a heavy duty type which controls the total 6 volt supply and the other is connected in the vibrator circuit and provides standby operation. The third is the "On" and "Off" switch for operation from 115 volts A.C.

When operating from a 6 volt battery, turn the main heavy duty switch "On" first and wait a minute or so for the tube heaters to warm up before turning on the vibrator switch. The vibrator switch controls the "B" supply and when turned "On" the battery drain increases from 4.5 amperes (which is the heater current) to about 19 amperes. This switch is a desirable feature since the battery can be conserved without waiting for the heaters to warm up when operation is desired.

All converters, whether rotary or the vibrator type, develop a certain amount of high frequency hash. This disturbance is easily picked up in the amplifier circuit unless proper isolation and shielding is employed. Therefore, it is advisable to construct the amplifier as closely as possible to the illustrations and diagram. All shielding should be incorporated where shown. A small metal box is formed and fastened in place by the Amphenol connector PC1M. One side of the box is left open to tighten the connector and insert C1, R1, and the bias cell and holder. Pass a shielded lead through the small hole for the 6J7 grid connection. Wire the lead and parts and test the amplifier before soldering the box side in place.

## TECHNICAL DATA

***Power Output:*** 20 watts undistorted or 35.5 db (less than 5% distortion).

***Coverage:*** 500,000 to 1,000,000 cu. ft. indoors; 15,000 to 25,000 sq. ft. outdoors (depending on speaker efficiency and noise level).

***Input Circuits:*** One 5 megohm channel for high impedance crystal, dynamic or velocity microphone, and one channel for high impedance crystal or magnetic pick-up. Channels may be mixed and faded.

***Output Impedances:*** 4, 8, 15, 250, or 500 ohms with regular transformer, or 2, 3, 4, 6, 8, 16, 125, 250, or 500 ohms with CHT output transformer.

***Frequency Response:*** Within ± 2 db from 50 to 8,000 c.p.s. with bass boost of 5 db at 70 c.p.s.

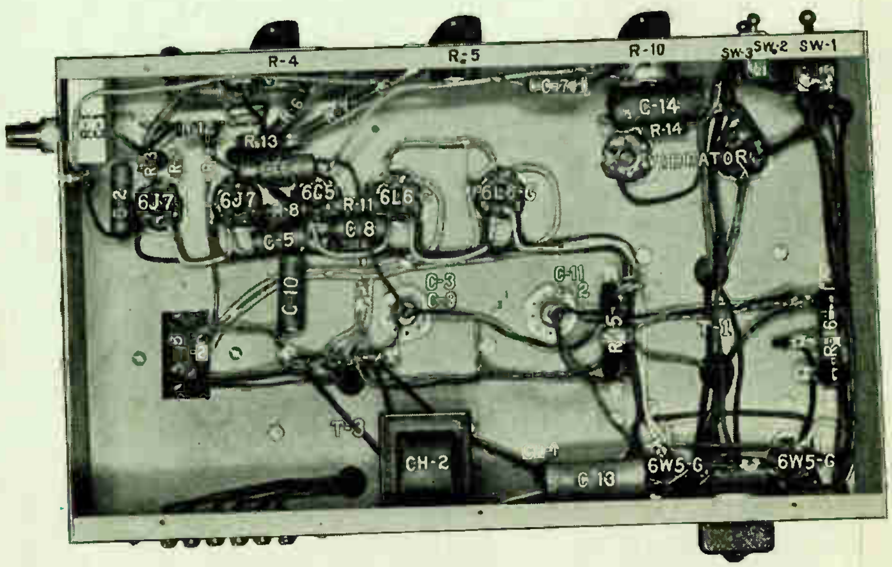
***Gain:*** Microphone input, 114 db; phono input, 75 db (based on 100,000 ohms input impedance).

***Hum:*** 70 db below maximum output.

***Tubes:*** 2-6J7, 1-6C5, 2-6L6-G, 2-6W5-G.

***Power Consumption:*** 100 watts at 115 volts, 50-60 cycles, or 19 amps. at 6V. D.C. (4.5 amperes on standby position).

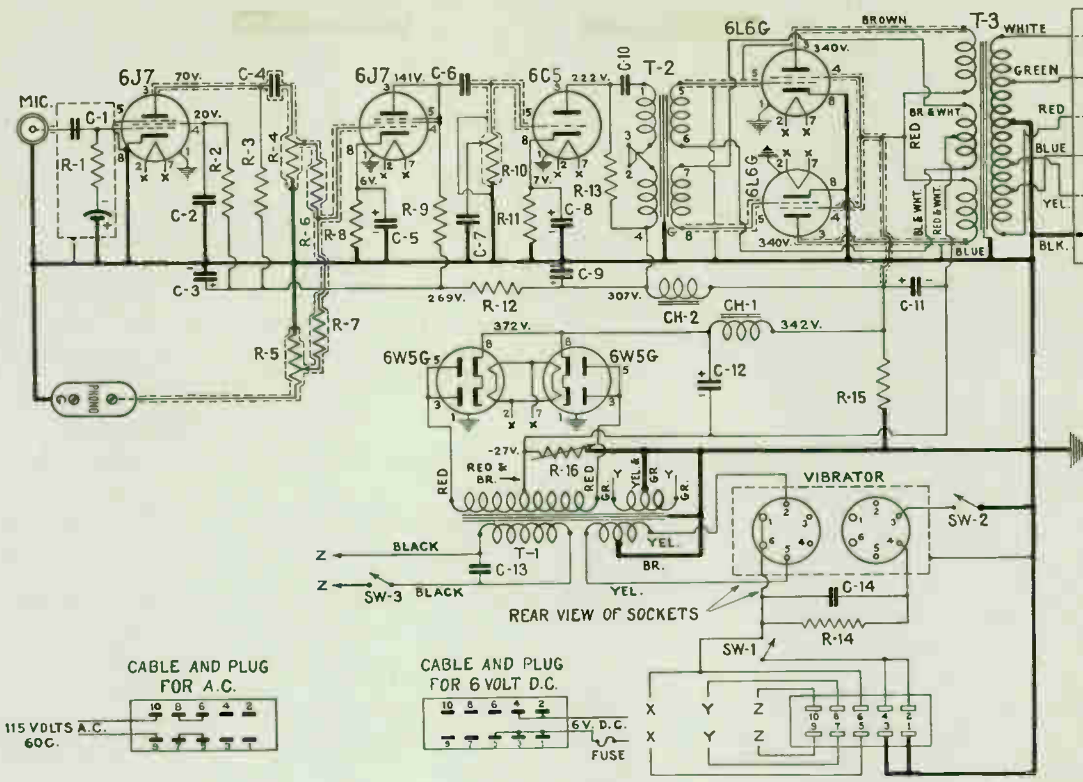
***Dimensions:*** 17" long, 10" deep, 9" high.




BOTTOM VIEW

# 6 Volt DC – 115 Volt AC AMPLIFIER

THORDARSON




## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | | |
|---|---|---|
| T-1 | T-14R40 | Power Transformer |
| T-2 | T-15A74 | Input Transformer |
| T-3 | T-17S12 or T-15S91 | Output Transformer |
| CH-1 | T-17C00-B | First Choke |
| CH-2 | T-37C36 | Second Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | Centralab #310 |
| R-2 | 3 MEG. | ½ | Centralab #310 |
| R-3 | 500,000 | ½ | Centralab #310 |
| R-4 | 1 MEG. | Volume Control | Centralab #N-104 |
| R-5 | 1 MEG. | Volume Control | Centralab #N-104 |
| R-6 | 500,000 | ½ | Centralab #310 |
| R-7 | 500,000 | ½ | Centralab #310 |
| R-8 | 5,000 | 1 | Centralab #314 |
| R-9 | 100,000 | ½ | Centralab #310 |
| R-10 | 500,000 | Tone Control | Centralab #N-103 |
| R-11 | 1500 | 1 | Centralab #314 |
| R-12 | 20,000 | 1 | Centralab #314 |
| R-13 | 20,000 | 1 | Centralab #314 |
| R-14 | 200 | 1 | Centralab #314 |
| R-15 | 25,000 | 25 | Ohmite Wire Wound |
| R-16 | 300 | 25 | Ohmite Semi-Variable |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .03 | 400V Paper | Aerovox #484 |
| C-2 | .04 | 400V Paper | Aerovox #484 |
| C-3 / C-9 | 8-8 | 450V Dual Elect. | Aerovox #2GL450 |
| C-4 | .1 | 400V Paper | Aerovox #484 |
| C-5 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-6 | .1 | 400V Paper | Aerovox #484 |
| C-7 | .01 | 400V Paper | Aerovox #484 |
| C-8 | 10 | 25V Elect. | Cornell-Dubilier BR-102 |
| C-10 | .1 | 400V Paper | Aerovox #484 |
| C-11 / C-12 | 8-8 | 450V Dual Elect. | Aerovox #2GL450 |
| C-13 | .5 | 400V Paper | Aerovox #484 |
| C-14 | .5 | 200V Paper | Aerovox #284 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 10x17x3" Chassis and cover — ICA #3875 |
| 1 | 10x17" Chassis bottom plate — ICA #4067 |
| 7 | Octal sockets — Amphenol S8 |
| 2 | 6-contact socket — Amphenol S6 |
| 1 | Mic. input connector — Amphenol PC1M |
| 1 | Mic. input connector — Amphenol MC1F |
| 1 | Six screw output terminal board |
| 1 | Two screw phono input terminal board |

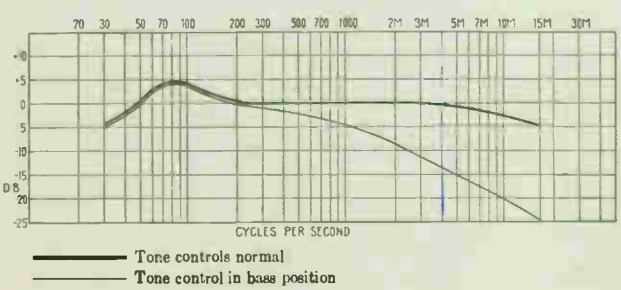
### MISCELLANEOUS PARTS (Continued)

| | |
|---|---|
| 1 | AC line cord and plug |
| 1 | Jewel and Bracket — Yaxley #310R |
| 1 | 6.3 volt pilot light — Mazda #40 |
| 2 | SPST Toggle switches — Arrow H&H #20992 |
| 1 | DPST Toggle switch — 6 v 25 amp. — C-H #8244 |
| 2 | Metal tube grid caps |
| 2 | Metal tube grid shields |
| 3 | Control knobs |
| 3 | Control plates |
| 2 | 10-contact power plugs — H. B. Jones #S-310-FHT |
| 1 | 10-contact power plug — H. B. Jones #P-310-CB |
| 1 | Vibrator — Electronics #490 |
| 1 | Bias cell — 1.5 volts — Mallory #F7 |
| 1 | Bias cell holder — Mallory #GB-1A |
| 1 | pc. tinned copper — 6x5x.010" |
| 1 | 30 amp fuse |
| 1 | Fuse holder for 30 amp fuse |
| 2 | Battery clips 50 amp capacity |

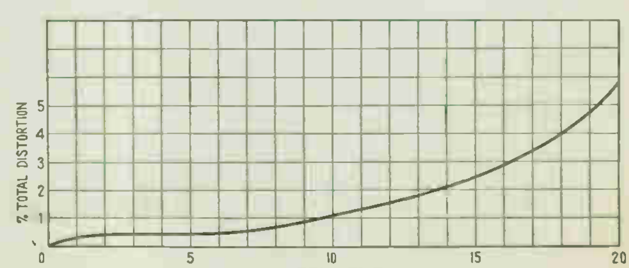
Battery Cable: #10 stranded wire, rubber covered.
Tube Complement: 2-6J7, 1-6C5, 2-6L6-G, 2-6W5-G

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

FOR MECHANICAL DRAWING OF CHASSIS SEE PAGE 27




FREQUENCY-RESPONE CURVE




DISTORTION CURVE

THORDARSON

# SINGLE CHANNEL PRE-AMPLIFIER

TOP VIEW

ALTHOUGH pre-amplifiers are not as popular as they were some years back, there are cases where their use is recommended or necessary. The sound installation which requires that the microphone be located several hundred feet or more from the main power amplifier, can make good use of a pre-amplifier of the type shown on these pages. The gain is about 60 db, which will raise the level of the average low level microphone to approximately 0 db. Its output impedances are 500, 333, 250, 200, 125 or 50 ohms. The 500 or 200 ohm impedances are most commonly used. When a line operates under these conditions, any hum or disturbance which is picked up is so far below the signal level that it is not objectionable in the output of the loud speakers. High impedance microphones, such as the crystal, velocity and dynamic, should not be used at distances greater than 50 to 100 feet without such a pre-amplifier. When this distance is exceeded, losses occur either in signal level or frequency response.

This single channel amplifier is entirely self-contained, and operates from 115 volts 60 cycle current. It can be used in conjunction with the 120 watt amplifier described on page 14 or any of the amplifiers described in the Amplifier Guide, if the proper input impedance is built into the amplifier. Best results are obtained when a high quality hum balancing transformer having a 200 or 500 ohm primary is placed in the phono circuit of the amplifier. Thordarson T-90A00 or T-15A66 is suitable for this purpose. Best results are obtained when the gain control on the pre-amplifier is almost all the way on and that on the main amplifier cut down to control the output of the system.

The assembly and wiring of the pre-amplifier is quite simple; however, care should be taken in placeing and wiring those parts enclosed in the dotted line on the schematic diagram. Condenser C-1 and resistors R-1 and R-2 may require shielding if hum is to be cut to a minimum. It is recommended that the chassis be provided with a base to fully enclose the bottom of the pre-amplifier. Where no base is used, it may be necessary to shield all those parts included in the above mentioned dotted line.

The output transformer T-2 is shown connected to a five-contact socket. The connections indicated provide coupling to either a 200 or 500 ohm line. The additional impedances are obtainable by properly connecting the secondary of the transformer. Full instructions are supplied with each transformer for obtaining these other impedances.

## TECHNICAL DATA

***Output Level:*** 0 db or .006 watts (less than 1% distortion).

***Gain:*** 59.9 db (based on 100,000 ohm input impedance).

***Frequency Response:*** Within ± 1 db from 30 to 15,000 c.p.s.

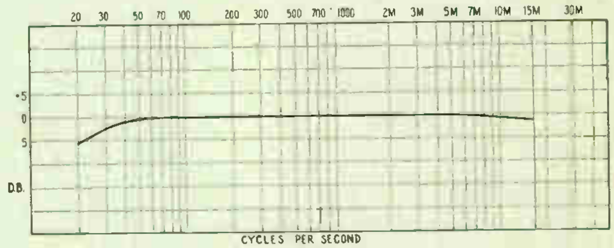
***Input:*** 5 megohms for one high impedance crystal, dynamic, or velocity microphone.

***Output:*** Low impedance line — 500, 333, 250, 200, 125, or 50 ohms.

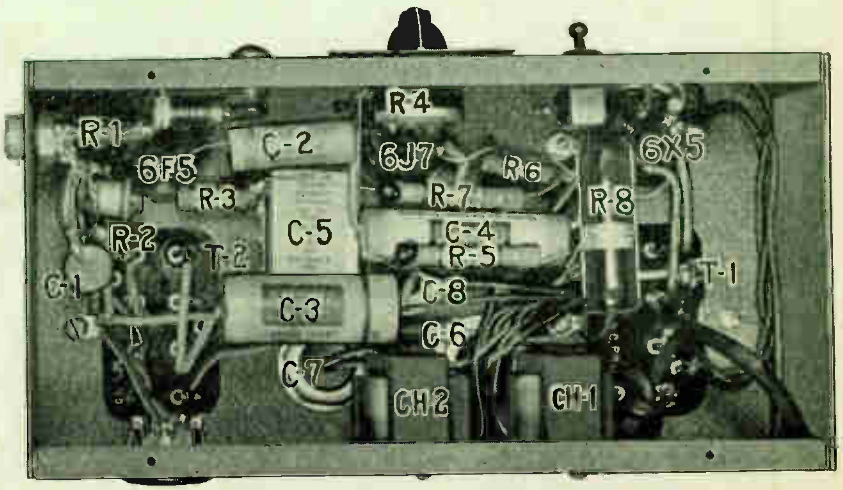
***Tubes:*** 1-6F5, 1-6J7, 1-6X5.

***Power Consumption:*** 17.5 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 9½" long, 5" deep, 6" high — with cover 8½" high.



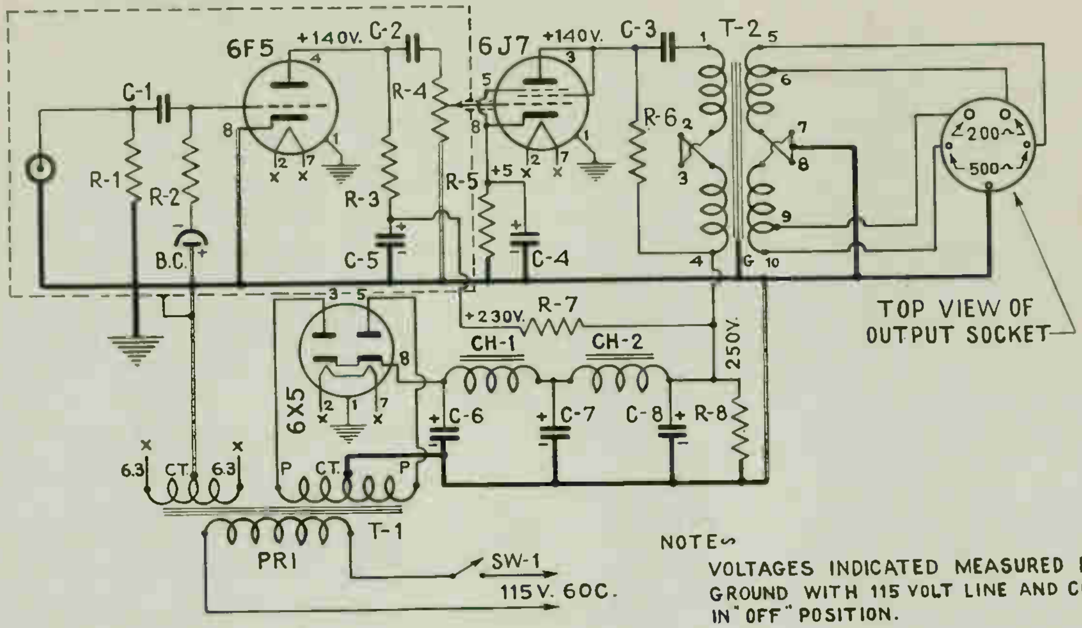

FREQUENCY-RESPONSE CURVE




BOTTOM VIEW

# SINGLE CHANNEL PRE-AMPLIFIER

THORDARSON




NOTE—
VOLTAGES INDICATED MEASURED FROM GROUND WITH 115 VOLT LINE AND CONTROLS IN "OFF" POSITION.

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R04 Plate and Filament Transformer |
| T-2 | T-15A71 Tube to Line Transformer |
| CH-1 | T-13C26 Choke |
| CH-2 | T-13C26 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5 MEG. | ½ | IRC BT-½ |
| R-3 | 100,000 | 1 | IRC BT-1 |
| R-4 | 250,000 | Volume Control | Yaxley type "M" |
| R-5 | 2,000 | 1 | IRC BT-1 |
| R-6 | 50,000 | 1 | IRC BT-1 |
| R-7 | 20,000 | 1 | IRC BT-1 |
| R-8 | 50,000 | 10 | Ohmite Brown Devil |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 V Paper | Cornell-Dubilier #DT-4P1 |
| C-2 | .1 | 400 V Paper | Cornell-Dubilier #DT-4P1 |
| C-3 | .5 | 400 V Paper | Cornell-Dubilier #DT-4P5 |
| C-4 | 10 | 25 V Elect. | Cornell-Dubilier #ED-2100 |
| C-5 | 8 | 450 V Elect. | Cornell-Dubilier #JR-508 |
| C-6 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |
| C-7 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |
| C-8 | 8 | 450 V Elect. | Cornell-Dubilier #KR-508 |

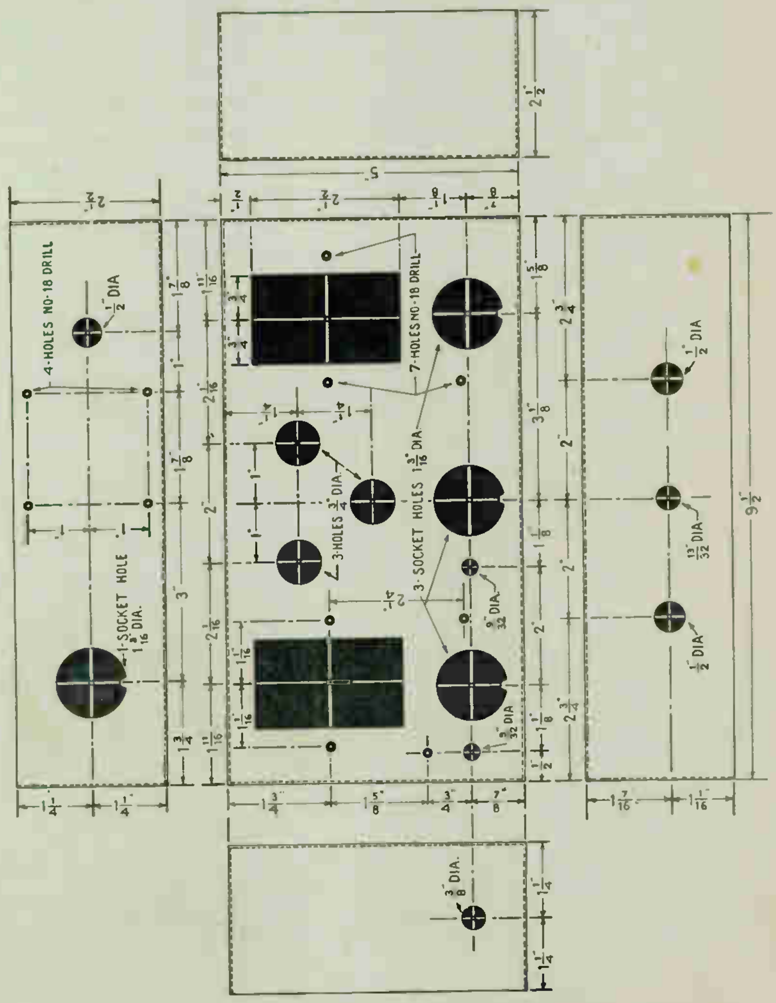
### TUBES

| | |
|---|---|
| 1 | Type 6F5 |
| 1 | Type 6J7 |
| 1 | Type 6X5 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x9½x2½" Chassis and cover — Bud No. 699 |
| 1 | 5x9½" Chassis bottom plate — Bud No. 680 |
| 3 | Octal sockets — Amphenol S8 |
| 1 | Output socket — Amphenol S5 |
| 1 | Output plug — Amphenol PM5 |
| 1 | Mic. input connector — Amphenol MC1F |
| 1 | Mic. input connector — Amphenol PC1M |
| 2 | Metal tube grid caps |
| 2 | Metal tube grid cap shields |
| 1 | AC line cord & plug — Belden No. 1725 |
| 1 | SPST switch — Arrow H&H No. 20992 |
| 1 | Volume control knob, black |
| 1 | Volume control dial plate |
| 1 | Pilot light bracket and jewel — Yaxley No. 310R |
| 1 | Bias cell, 1.5 Volts — Mallory No. F7 |
| 1 | Bias cell holder — Mallory No. GB-1A |
| 1 | Pilot light bulb, 6.3 volts — Mazda No. 40 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




**Chassis drawing of Single Channel Pre-Amplifier. Full size template available from THORDARSON, 15c net, postpaid.**

THORDARSON

# FOUR CHANNEL PRE-AMPLIFIER

TOP VIEW

THE multiple channel pre-amplifier and mixer is useful where more input circuits must be accommodated than the regular amplifier will handle. Most main amplifiers accommodate only one or two microphones. Like the single channel pre-amplifier on the previous page, this unit may be operated several hundred feet from the main amplifier if necessary without serious loss of volume level or frequency response. The main amplifier should be equipped with a 200 ohm or 500 ohm input transformer to match the output impedance of the pre-amplifier. Thordarson transformers T-90A00 or T-15A66 are suitable for this use. The 120 watt amplifier on page 14 is designed to operate with a pre-amplifier and mixer of this type.

The circuit diagram as shown will accommodate four low level high impedance microphones. If it is preferable to handle only three low level microphones and a phono pick-up, one of the 6F5 pre-amplifier tubes and associated parts can be eliminated. The phono pick-up will then operate directly into volume control R-16. Likewise, two pre-amplifier tubes can be eliminated if two phono pick-up channels are more desirable.

Dotted lines are shown on the circuit diagram indicating that portion of the circuit which is susceptible to hum and noise pick-up. In the laboratory model, it was necessary to shield resistors R-17, R-18, R-19, and R-20 and all the leads connecting to them as well as the grid leads to the 6F5 tubes. Additional shielding should not be necessary if the chassis is fully enclosed with a chassis bottom plate. Bias cells provide bias for the 6F5 input tubes, thus eliminating any disturbance that might develop in the cathode circuit of these tubes.

## TECHNICAL DATA

***Output Level:*** 0 db or .006 watts (less than 1% distortion).

***Gain:*** 55 db (based on 100,000 ohm input impedance).

***Frequency Response:*** Within ± 2 db from 20 to 15,000 c.p.s.

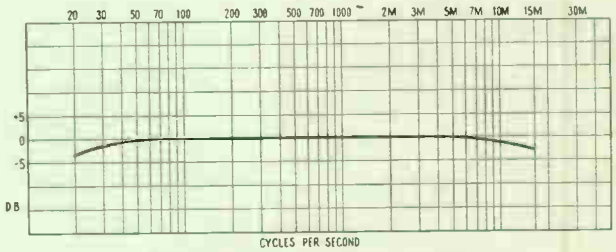
***Input Circuits:*** Four 5 megohm channels for high impedance crystal, dynamic or velocity microphones.

***Output:*** Low impedance line — 500, 333, 250, 200, 166, 125, or 50 ohms.

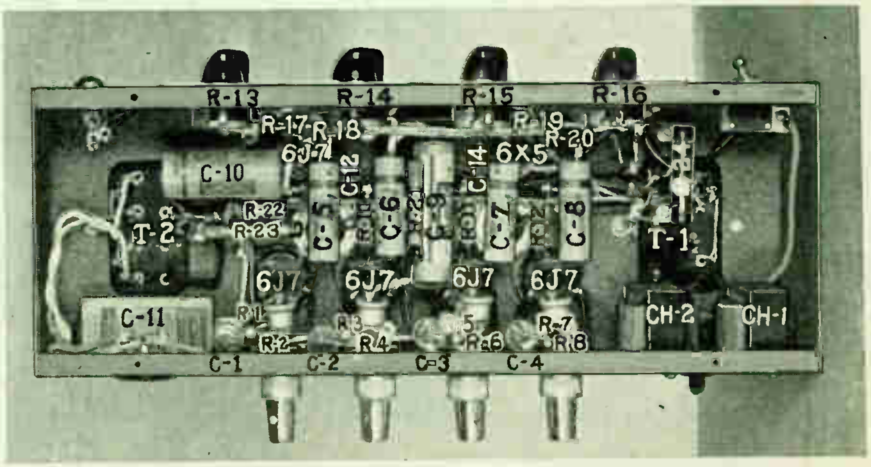
***Tubes:*** 4-6F5, 1-6J7, 1-6X5.

***Power Consumption:*** 25 watts, 115 volts, 50-60 cycles.

***Dimensions:*** 13½″ long, 5″ deep, 6″ high — with cover 8½″ high.




FREQUENCY-RESPONSE CURVE




BOTTOM VIEW

# FOUR CHANNEL PRE-AMPLIFIER

THORDARSON

## PARTS LIST

### THORDARSON TRANSFORMERS AND CHOKES

| Diagram No. | |
|---|---|
| T-1 | T-15R04 Power Transformer |
| T-2 | T-15A71 Tube to Line Output Transformer |
| CH-1 | T-13C26 Choke |
| CH-2 | T-13C26 Choke |

### RESISTORS

| Diagram No. | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 5 MEG. | ½ | IRC BT-½ |
| R-2 | 5 MEG. | ½ | IRC BT-½ |
| R-3 | 5 MEG. | ½ | IRC BT-½ |
| R-4 | 5 MEG. | ½ | IRC BT-½ |
| R-5 | 5 MEG. | ½ | IRC BT-½ |
| R-6 | 5 MEG. | ½ | IRC BT-½ |
| R-7 | 5 MEG. | ½ | IRC BT-½ |
| R-8 | 5 MEG. | ½ | IRC BT-½ |
| R-9 | 100,000 | 1 | IRC BT-1 |
| R-10 | 100,000 | 1 | IRC BT-1 |
| R-11 | 100,000 | 1 | IRC BT-1 |
| R-12 | 100,000 | 1 | IRC BT-1 |
| R-13 | 500,000 | Volume Control | Yaxley type "O" |
| R-14 | 500,000 | Volume Control | Yaxley type "O" |
| R-15 | 500,000 | Volume Control | Yaxley type "O" |
| R-16 | 500,000 | Volume Control | Yaxley type "O" |
| R-17 | 500,000 | ½ | IRC BT-½ |
| R-18 | 500,000 | ½ | IRC BT-½ |
| R-19 | 500,000 | ½ | IRC BT-½ |
| R-20 | 500,000 | ½ | IRC BT-½ |
| R-21 | 2,000 | 1 | IRC BT-1 |
| R-22 | 50,000 | 1 | IRC BT-1 |
| R-23 | 20,000 | 1 | IRC BT-1 |
| R-24 | 50,000 | 10 | Ohmite Brown Devil |

### CONDENSERS

| Diagram No. | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 V Paper | Aerovox #484 |
| C-2 | .1 | 400 V Paper | Aerovox #484 |
| C-3 | .1 | 400 V Paper | Aerovox #484 |
| C-4 | .1 | 400 V Paper | Aerovox #484 |
| C-5 | .1 | 400 V Paper | Aerovox #484 |
| C-6 | .1 | 400 V Paper | Aerovox #484 |
| C-7 | .1 | 400 V Paper | Aerovox #484 |
| C-8 | .1 | 400 V Paper | Aerovox #484 |
| C-9 | 10 | 25 V Elect. | Cor.-Dub. #BR-102 |
| C-10 | .5 | 400 V Paper | Cor. Dub. DT-4P5 |
| C-11 | 8 | 450 V Elect. | Aerovox #PBS5 |
| C-12 | 8 | 450 V Elect. | Aerovox #GLS450 |
| C-13 | 8 | 450 V Elect. | Aerovox #GLS450 |
| C-14 | 8 | 450 V Elect. | Aerovox #GLS450 |

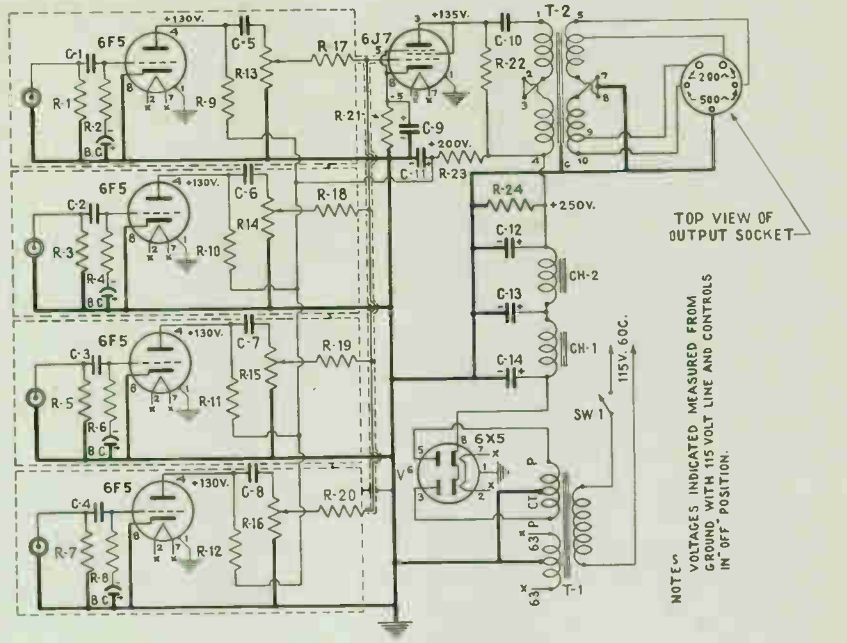
### TUBES

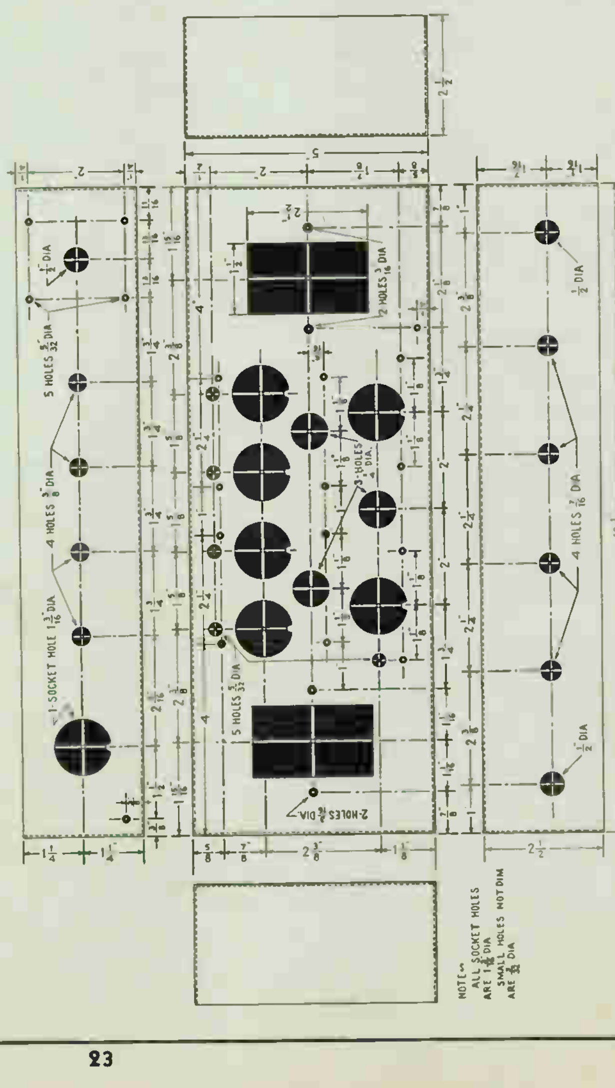
| | |
|---|---|
| 4 | Type 6F5 |
| 1 | Type 6J7 |
| 1 | Type 6X5 |

### MISCELLANEOUS PARTS

| | |
|---|---|
| 1 | 5x13½x2½" Chassis and screen cover—Bud No. 1125 |
| 1 | 5x13½" Chassis bottom cover — Bud No. 685 |
| 6 | Octal sockets — Amphenol S8 |
| 1 | 5-contact socket — Amphenol S5 |
| 1 | 5-prong output plug — Amphenol PM5 |
| 4 | Mic. connectors — Amphenol PC1M |
| 4 | Mic. connectors — Amphenol MC1F |
| 5 | Metal tube grid caps |
| 5 | Metal grid cap shields |
| 1 | AC line cord and plug — Belden No. 1725 |
| 1 | SPST Toggle Switch — Arrow H & H No. 20992 |
| 4 | Control knobs |
| 4 | "Volume" control plates |
| 1 | Pilot light bracket and jewel — Yaxley No. 310R |
| 4 | Bias cells 1.5 volts — Mallory No. F7 |
| 4 | Bias cell holders — Mallory No. GB-1A |
| 1 | 6.3V Pilot light — Mazda No. 40 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.



**Chassis drawing of Four Channel Pre-Amplifier. Full size template of chassis for drilling, showing all mechanical dimensions available from THORDARSON, 15c net postpaid.**

# THORDARSON DUAL TONE CONTROL

TOP VIEW
DUAL TONE CONTROL

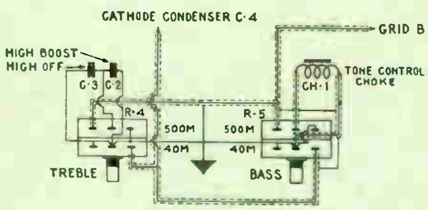
Thordarson's development of this "Dual Tone Control" was prompted by the many requests of sound men for an effective tone compensating system to boost or attenuate the bass or treble frequencies independently of each other. Examination of the schematic diagram will show that the final circuit is simple and not at all complicated to construct. The unit described here is identical in circuit details to the tone compensation employed in the amplifiers shown elsewhere in this "Amplifier Guide." It is constructed on a small chassis, making it adaptable to practically any existing amplifier.

Operation is based on degeneration in the cathode circuit of a 6C5 or equivalent tube. If resistance is introduced in the cathode circuit, any signal developed by the tube will also appear across the resistance. This signal voltage is opposite in phase and in series with the voltage impressed on the grid and cathode of the tube. Degeneration takes place and the amplification of the tube is reduced. In this application the plate loading resistor R-6 is made small and the cathode resistor R-3 large so that a greater part of the voltage developed by the tube appears in the cathode circuit.

Since the circuit is resistive there is little or no frequency discrimination at audio frequencies, and all frequencies are degenerated an equal amount. If the cathode resistance is shunted with an inductance (of the proper value) the resistance at low frequencies is practically shorted out due to the low impedance of the choke at low frequencies. Therefore degeneration of the low frequencies is eliminated and the greater part of the signal developed by the tube appears across the load resistor R-6. The result is an increase in the low frequency response of the circuit. Likewise if a condenser (of the proper value) is shunted across the cathode resistor, the low impedance of the condenser at high frequencies reduces the impedance of the circuit and degeneration of the higher frequencies is reduced. The high frequency response of the circuit is thus increased.

Attenuation of the low frequencies can be accomplished by shunting the grid circuit of the following stage with a choke or inductance. It so happens that the value of the choke (described above) used in the bass boost circuit also has the correct value for an attenuation circuit. The high frequencies can be attenuated by shunting the same grid circuit with a suitable condenser.

The function of control R-5 is to introduce the choke CH-1 into either the cathode circuit for bass boost or the grid circuit for bass decrease. Control R-4 applies condenser C-2 to the cathode circuit for treble increase, or C-3 to the grid circuit for




treble decrease. The controls are coupled to the cathode through condenser C-4 and to the following grid by a shielded lead. The small pictorial drawing illustrates clearly how connections are made to the controls.

To install the tone control unit into an existing amplifier, locate the coupling condenser in a resistance coupled stage (preferably the plate circuit of the second stage of the amplifier). Remove the condenser from the circuit and connect the shielded lead of condenser C-1 and the shielded lead of C-5 in its place. Make sure that the lead from C-1 connects to the plate of the tube preceding the tone control unit. Ground the shields of these leads to the amplifier to complete the ground circuit. Connect the unshielded lead to a well filtered point of the amplifier B supply circuit. A pair of twisted wires not over 3 feet long may be used for the filament supply. No difficulty should be experienced with hum or other disturbance since the unit can be placed several feet from the amplifier. It is also possible to build the tone control into an amplifier if there is adequate room and care is taken not to mount the choke and controls near the power transformer.

## PARTS LIST FOR THE DUAL TONE CONTROL

| Diagram No. | THORDARSON |
|---|---|
| CH-1 | Tone Control Choke, T-14C70 |
| R-4 | Dual Tone Control, Thordarson R-1068 |
| R-5 | Dual Tone Control, Thordarson R-1068 |

**RESISTORS**

| | Ohms | Watts | Type |
|---|---|---|---|
| R-1 | 250,000 | ½ | Centralab #310 |
| R-2 | 1,000 | 1 | Centralab #314 |
| R-3 | 20,000 | 1 | Centralab #314 |
| R-6 | 20,000 | 1 | Centralab #314 |

**CONDENSERS**

| | Mfd. | Voltage | Type |
|---|---|---|---|
| C-1 | .1 | 400 | Cornell-Dubilier #DT-4P1 |
| C-2 | .04 | 400 | Cornell-Dubilier #DT-4S4 |
| C-3 | .01 | 400 | Cornell-Dubilier #DT-4S1 |
| C-4 | 10 | 200 | Aerovox #PR-200 |
| C-5 | .1 | 400 | Cornell-Dubilier #DT-4P1 |

**TUBE**

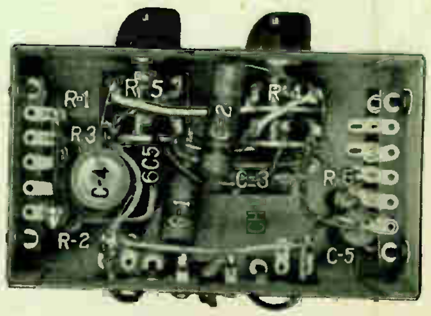
| | |
|---|---|
| 1 | Type 6C5 |

**MISCELLANEOUS PARTS**

| | |
|---|---|
| 1 | Chassis 6" long, 3½" wide, 3" high |
| 1 | Chassis bottom plate |
| 4 | 5-lug resistor mtg. strips |
| 2 | 2-lug resistor mtg. strips |
| 1 | 2-screw terminal board |
| 1 | Octal socket Amphenol S8 |
| 2 | Control knobs |
| 2 | "Tone" control plates |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

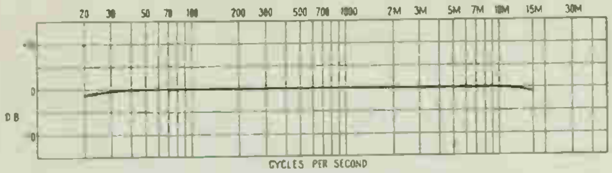
Curves are shown on opposite page illustrating tone controls in various positions. Full size template of the chassis drawing also shown on opposite page available from THORDARSON, 15c net, postpaid.



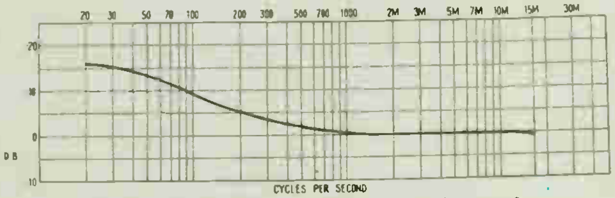

BOTTOM VIEW

# DUAL TONE CONTROL

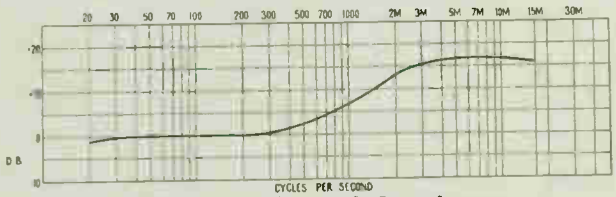
THORDARSON



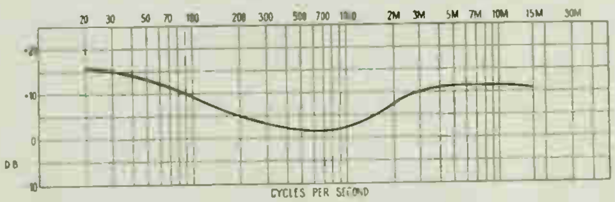
**Bass Control normal — Treble Control normal**



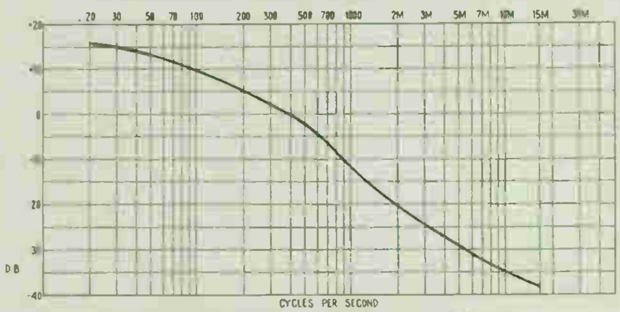
**Bass Control increase — Treble Control normal**



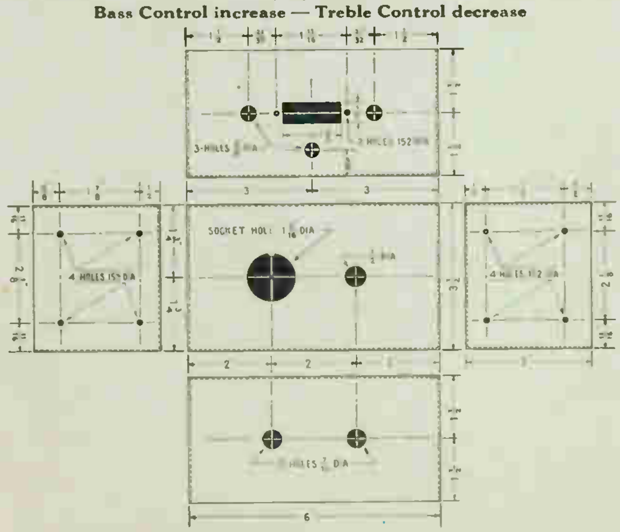
**Bass Control normal — Treble Control increase**



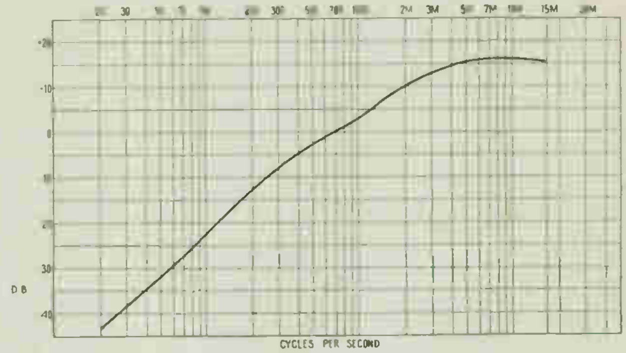
**Bass Control increase — Treble Control increase**



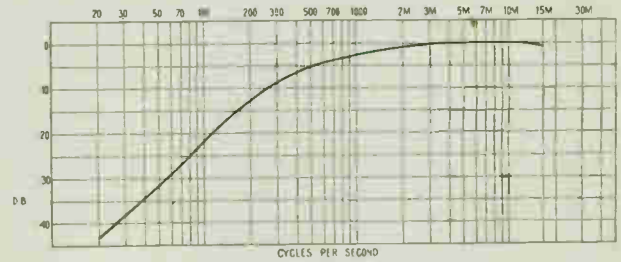
**Bass Control increase — Treble Control decrease**



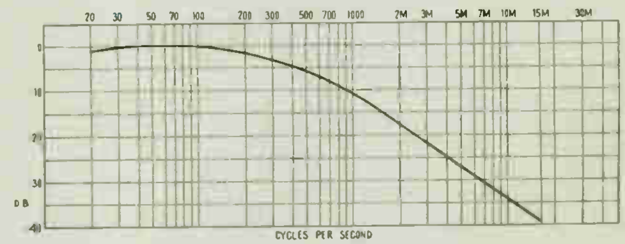
**Chassis drawing of Dual Tone Control Unit. Full size template available from Thordarson, 15c net, postpaid.**



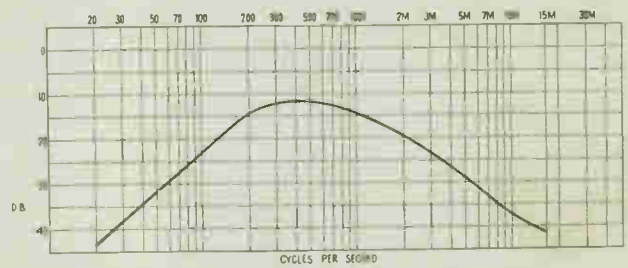
**Bass Control decrease — Treble Control increase**



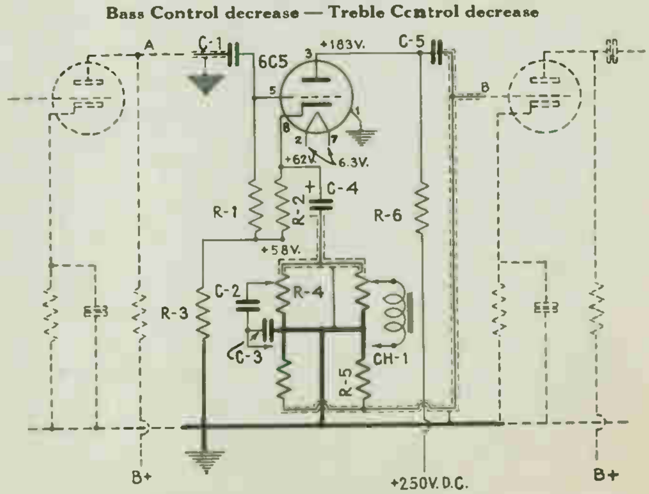
**Bass Control decrease — Treble Control normal**



**Bass Control normal — Treble Control decrease**



**Bass Control decrease — Treble Control decrease**



Dual Tone Control. Schematic Diagram.

# MATCHING SPEAKER LOADS

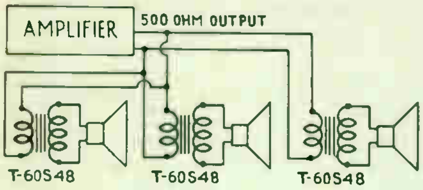



Fig. 1

It is frequently necessary to match a number of speakers to a 500 ohm line in such a way that the speakers take unequal power. It is an easy matter to connect a number of speakers to a 500 ohm line so that each speaker takes the same amount of power and it is also an easy matter to determine the correct impedance ratio of each line to speaker transformer. In Fig. 1, if each of the speakers has a voice coil impedance of 10 ohms, the impedance ratio of the transformers should be 1500:10 so that the three 1500 ohm impedances in parallel will give an impedance of 500 ohms, which is the correct value for the 500 ohm line. In this case, if the total power supplied to the 500 ohm line is 30 watts, each speaker will take one-third of this or ten watts. If this power is to be divided so one speaker receives 15 watts, one 10 watts and one 5 watts, one must make a change in the ratio of the three transformers.

The voltage developed across the 500 ohm line is 122 volts. ($W = \frac{E^2}{R}$; W = 30, R = 500, $E = \sqrt{15{,}000}$ or 122 volts). Given the voltage across the 500 ohm line and the voltage required across each voice coil for the desired amount of power, it is an easy matter to determine the turns ratio and the impedance ratio necessary in the various transformers.

For the first speaker, requiring 15 watts of audio, the voltage across the voice coil is 12.25 volts; ($W = \frac{E^2}{R}$; W = 15, R = 10, $E = \sqrt{10 x 15} = 12.25$ volts). Similarly, the voltage across the speaker requiring 10 watts is 10 volts and the voltage across the speaker requiring 5 watts is 7 volts. The turns ratio of the various transformers is $\frac{122}{12.25}$ or 10:1. Also $\frac{122}{10}$ or 12.2:1, and also $\frac{122}{7}$ or 17.5:1. The impedance ratio of the transformer is the turns ratio squared and the actual primary impedance is equal to the turns ratio squared, multiplied by the voice coil impedance of 10 ohms. The reflected primary impedances are all different. However, when the three are paralleled, they result in an impedance of 500 ohms, which is the correct value for the 500 ohm line. In this case, the power delivered to each of the speakers is entirely different from the condition under Fig. 1.

It must be remembered when using this method of calculation the total power in the individual voice coils must total the power in the primary from which the value of primary voltage was computed.

Frequently it is not possible to match the impedance of the speaker exactly. Whenever this is not possible and whenever there is a sufficient number of taps on the output of the amplifier, it should be connected in such a way that a lower plate to plate load than normal is reflected. In other words, if it is necessary to match a 15 ohm speaker to an output transformer which has a 16 ohm tap and a 14 ohm tap, the 15 ohm speaker should be connected to the 16 ohm tap. This will reflect a somewhat lower value of plate to plate load so that it is possible to obtain slightly more power from the amplifier although the distortion will be somewhat greater at the peak output. This is much better than connecting the 15 ohm speaker to the 14 ohm tap, thus reflecting a higher plate to plate load and causing the amplifier to overload at a much lower value of power output. This is especially true of pentode and beam power tubes, where the higher value of plate to plate load will result in a flat top wave and severe distortion will result.

## IMPEDANCE RATIO

The transformer is an impedance changer and as such it is not necessarily associated with any one value of impedance. In other words, if a transformer is designed to couple a 500 ohm line to a 10 ohm voice coil, the impedance ratio of the transformer is 50:1, and the same transformer for all practical purposes will just as effectively couple a 1000 ohm line to a 20 ohm coil or a 250 ohm line to a 5 ohm voice coil, provided, of course, that the power handling ability of the transformer is not exceeded. The only serious result of using the primary of a transformer for an impedance other than that for which it was designed is the changing of the frequency response of the transformer and its operating efficiency. In other words, a transformer designed for 500 ohms operation has a certain amount of inductance, which, when used with a 1000 ohm line, will give poorer low frequency response and better high frequency response. On the other hand, a transformer designed for 500 ohm operation when used on a 250 ohm line, will provide better low frequency response but the high frequency response will drop off considerably.

Thordarson line to voice coil transformer, T-60S48, may be used to reflect a primary impedance from 500 to 3000 ohms. It has been designed with high primary inductance and low leakage so that the frequency response is good over this range. The secondary has a number of taps making it possible to match practically any voice coil impedance or obtain any desired turns ratio. The accompanying table indicates what turns and impedance ratios may be obtained as well as the voice coil impedances when one to six transformers are connected in parallel to a 500 ohm line. The table will aid in connecting voice coils of the same or different impedance where the distribution of power is equal, without the above computation. Only one speaker should be connected to each transformer.

Where there are a number of speakers which already have 500 ohm input transformers to be connected to a 500 ohm line a matching transformer must be used. A number of 500 ohm speakers connected in parallel may be matched to the 500 ohm amplifier output with T-76S74 matching autotransformer. This unit provides five impedances in addition to the original 500 ohms — 250, 166, 125, 100, and 84 ohms. These values are the result of connecting 2, 3, 4, 5, or 6, 500 ohm speakers in parallel.

Two 500 ohm speakers connected in parallel will reflect an impedance of 250 ohms. Connections are made to the common terminal No. 7 and terminal No. 5. If three speakers are used, the reflected impedance will be 166 ohms, in which case the common terminal and terminal No. 4 are used.

**THORDARSON** transformer T-53S81 will couple a 500 or 250 ohm line to voice coils having 4, 8, or 15 ohms impedance. If desired, two of these transformers may be connected to a 500 ohm line by using a series connection and the 250 ohm tap. It is also possible to connect several speaker voice coils to one of the T-53S81 transformers. If the voice coils have 15 ohms impedance each, two of them could be connected in parallel to the 8 ohm tap. Four 15 ohm voice coils can be wired in series parallel to the 15 ohm tap or in parallel to the 4 ohm tap.

The wires connecting the transformer to the speaker coil should not be any longer than necessary. Long voice coil leads result in loss of power and low frequencies. Heavy wire should be used if the transformer is separated from the speaker more than a foot or so.

## Table for Connecting Dynamic Speakers of Various Impedances in Same Output System

| | | | Secondary Matching Impedance T-60S48 Transformer | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | No. of Transformers in Parallel Across 500-ohm Line | | | | | |
| Secondary Terminals | Turns Ratio | Imped. Ratio | 1 | 2 | 3 | 4 | 5 | 6 |
| 2 - 4 | 89:1 | 7950 | .06 | .1 | .2 | .2 | .3 | .4 |
| 5 - 6 | 65:1 | 4200 | .1 | .2 | .4 | .5 | .6 | .7 |
| 2 - 5 | 47:1 | 2200 | .2 | .4 | .7 | .9 | 1.1 | 1.3 |
| 4 - 6 | 39:1 | 1500 | .3 | .6 | 1.0 | 1.3 | 1.6 | 1.9 |
| 3 - 6 | 32:1 | 1000 | .4 | .7 | 1.1 | 1.4 | 1.8 | 2.1 |
| 2 - 6 | 27:1 | 730 | .6 | 1.2 | 2.0 | 2.7 | 3.4 | 4.0 |
| 6 - 7 | 26:1 | 670 | .7 | 1.4 | 2.2 | 2.9 | 3.6 | 4.3 |
| 1 - 2 | 19:1 | 360 | 1.3 | 2.7 | 4. | 5.4 | 6.8 | 8.1 |
| 1 - 3 | 17:1 | 290 | 1.7 | 3.3 | 5. | 6.7 | 8.4 | 10. |
| 1 - 4 | 16:1 | 250 | 2. | 4.0 | 6. | 8. | 10. | 12. |
| 3 - 7 | 14½:1 | 210 | 2.4 | 4.8 | 7.2 | 9.6 | 12. | 14.4 |
| 1 - 5 | 13¾:1 | 190 | 2.6 | 5.3 | 8. | 10.6 | 13.3 | 16. |
| 2 - 7 | 13¼:1 | 175 | 2.8 | 5.6 | 8.4 | 11.2 | 14. | 16.8 |
| 1 - 6 | 11¼:1 | 125 | 4. | 8. | 12. | 16. | 20. | 24. |
| 1 - 7 | 7.9:1 | 62 | 8. | 16. | 24. | 32. | 40. | 48. |

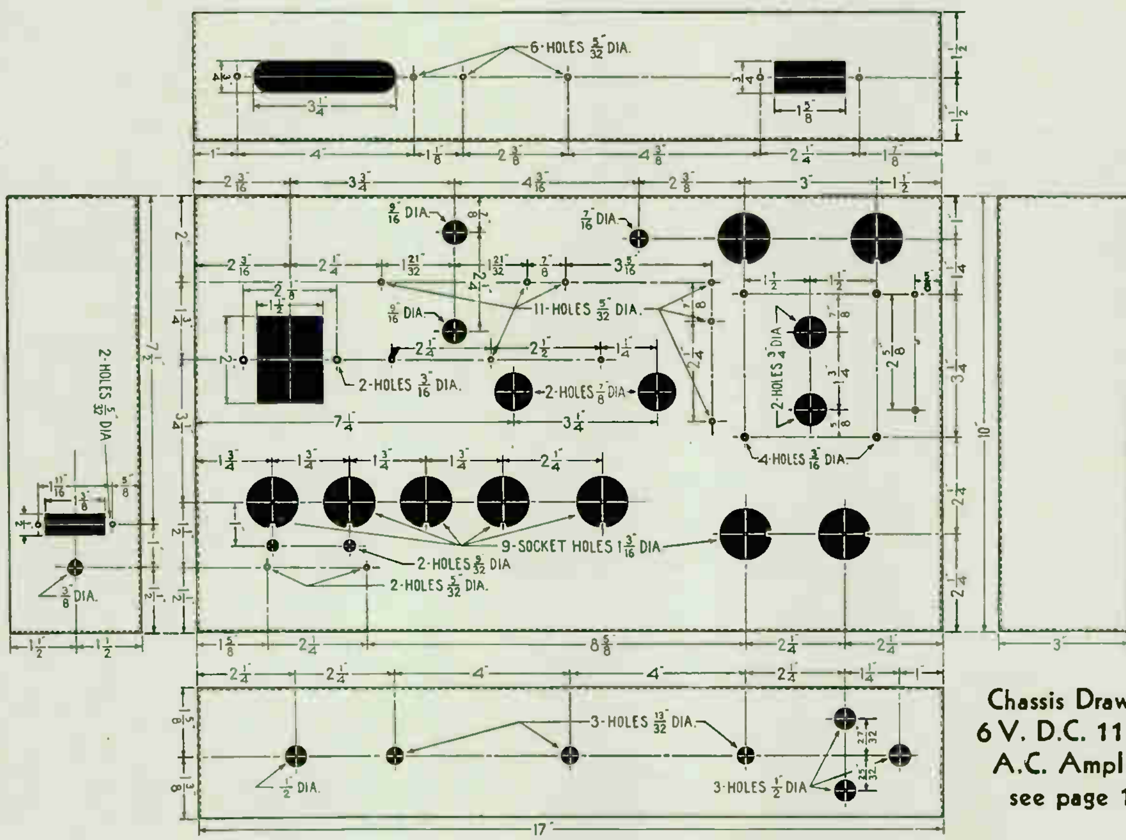
# ADVANTAGES OF INVERSE FEEDBACK *(Continued)*
## CHASSIS DRAWING—6V. D.C. 115V. A.C. AMPLIFIER

*(Continued from page 3)*

ing effect of the tube is exceedingly small with the result that the damping is negligible. As a result, unnatural "boominess" may result when the speaker is shock excited and the cone vibrates at its own natural period. The natural period depends upon the physical construction of the speaker and is usually in the neighborhood of 50 to 150 cycles.

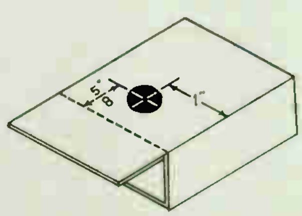
### HUM

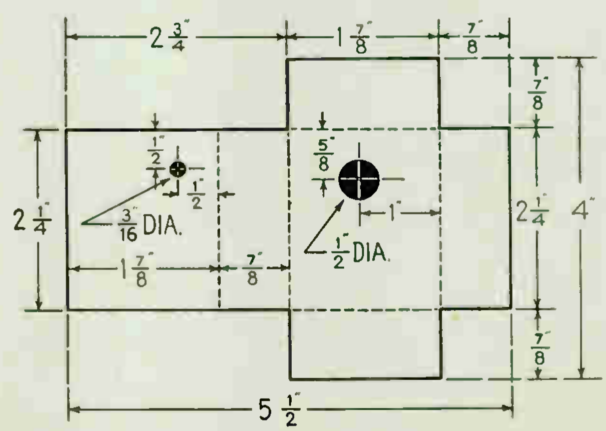
Hum in the output stage is cancelled out in much the same way as distortion, since the hum developed in the stage and the voltage fed into the grid circuit are out of phase and tend to cancel. It must be remembered, however, that distortion not appearing in the stage or hum from a previous stage will not be cancelled by inverse feedback in the output stage. Great reductions in plate circuit distortion and plate resistance may be obtained by the use of large amounts of inverse feedback. However, the limiting factor in inverse feedback is the amount of desired gain from the stage in question. In actual design the amount of inverse feedback is a compromise between the gain and the desired reduction in distortion. If there is enough gain in the previous stages and if the driver tube can supply the necessary peak voltage, it will be advisable to increase the amount of inverse feedback in order to reduce the plate resistance and the plate circuit distortion. However, if the plate resistance is fairly low and if the plate circuit distortion is a reasonable value, there is not much advantage gained in further reducing the gain by the addition of more inverse feedback.




Chassis Drawing
6 V. D.C. 115 V.
A.C. Amplifier
see page 18

Input Circuit Shield Can



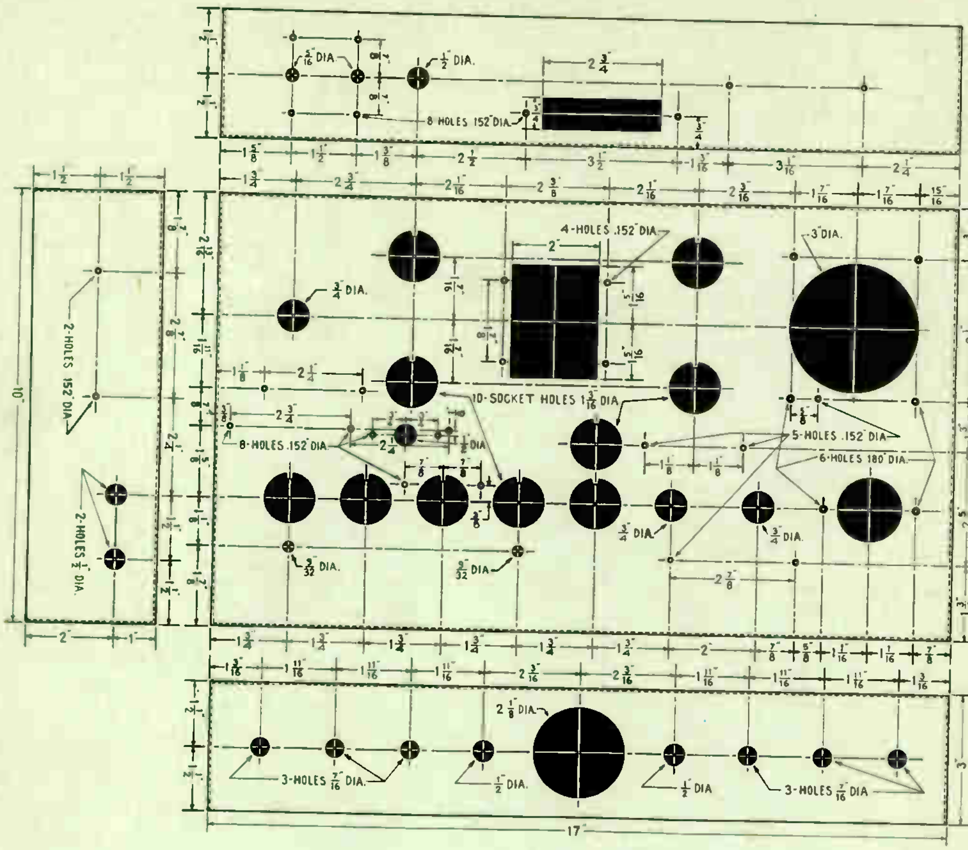



Cut shield from metal and bend to form a can as above, solder together leaving one side open until mounted, and small parts are installed and wired.

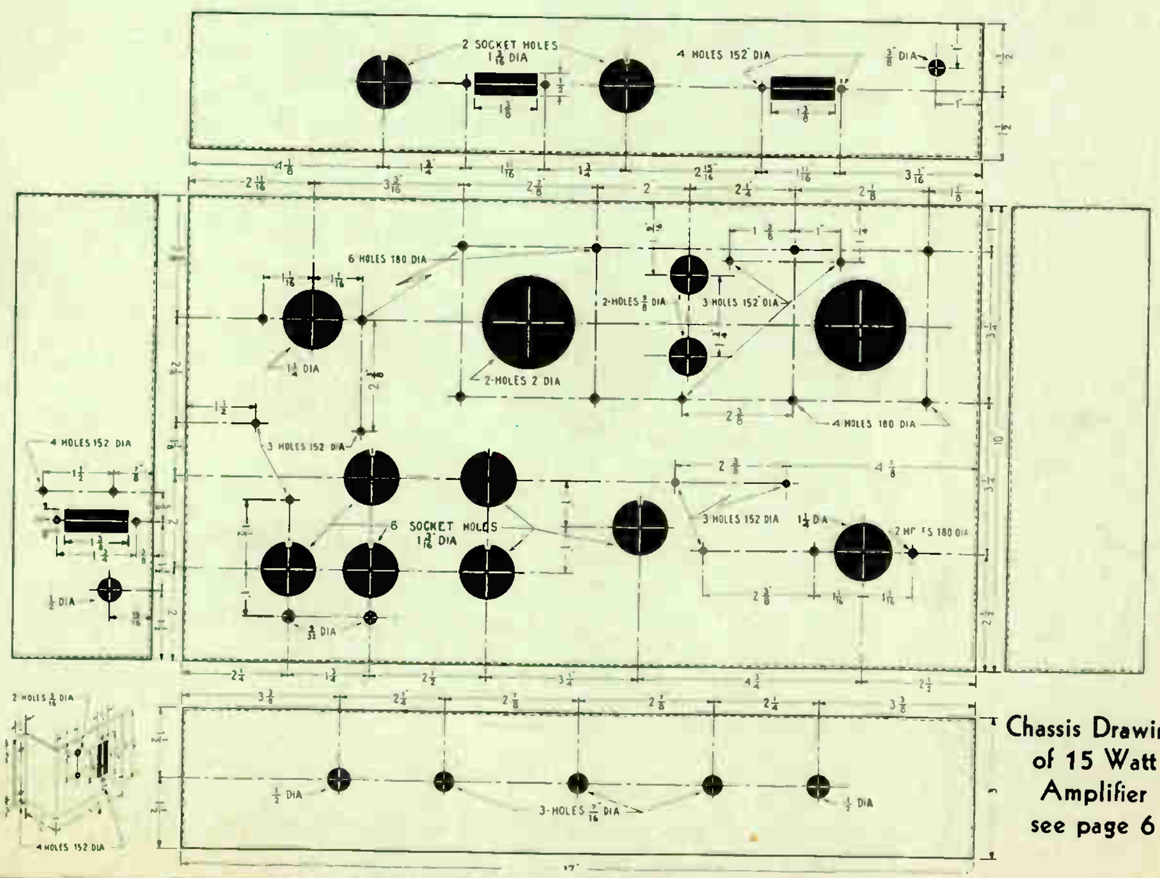
Full size template of Chassis available from Thordarson, 15c net, postpaid

# CHASSIS DRAWINGS—2A3 and 15 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**




Chassis Drawing of 2A3 Amplifier see page 16

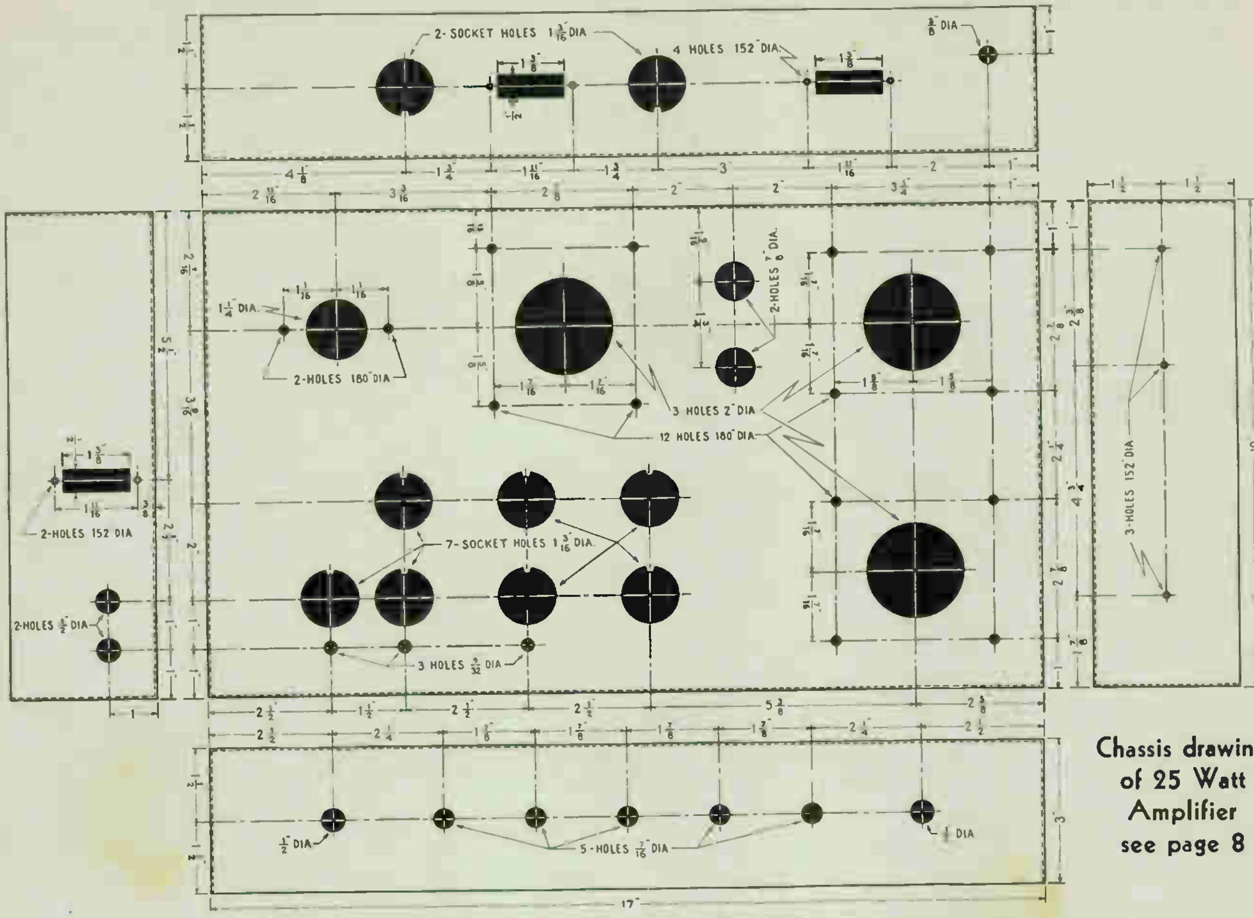



Chassis Drawing of 15 Watt Amplifier see page 6

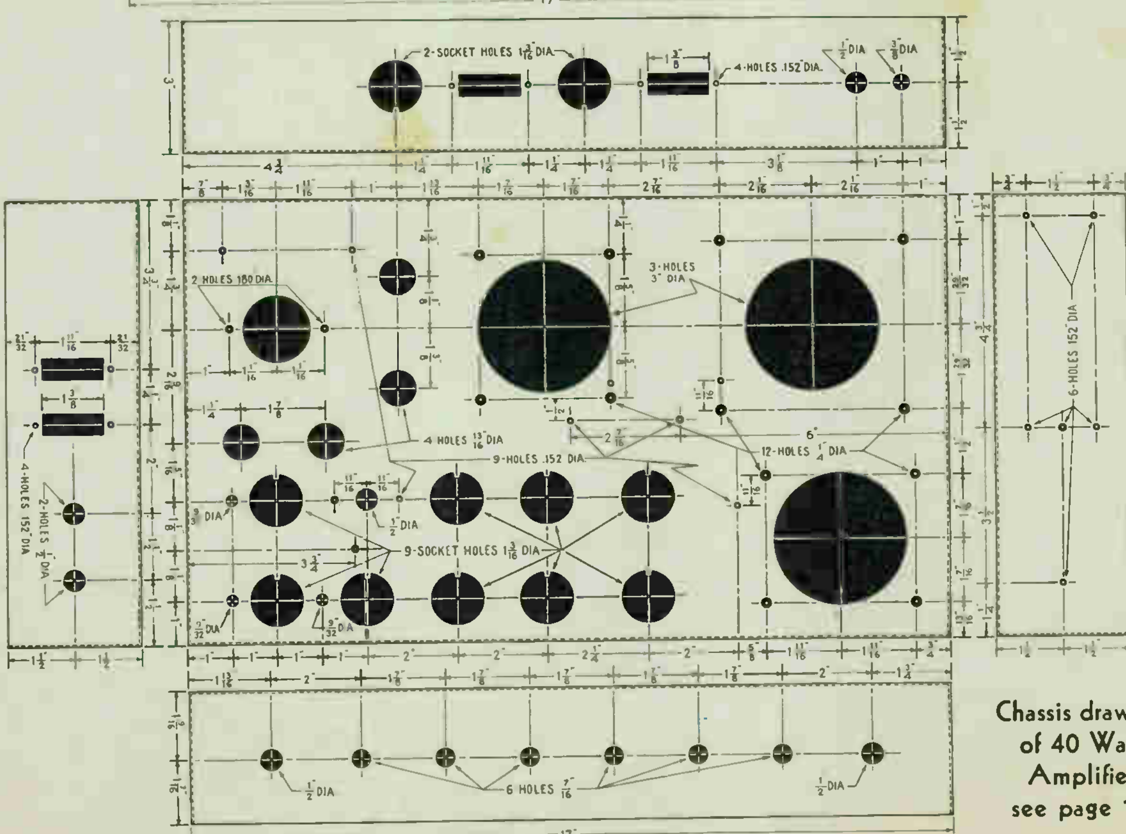
# CHASSIS DRAWINGS — 25 and 40 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**

THORDARSON




Chassis drawing of 25 Watt Amplifier see page 8




Chassis drawing of 40 Watt Amplifier see page 10

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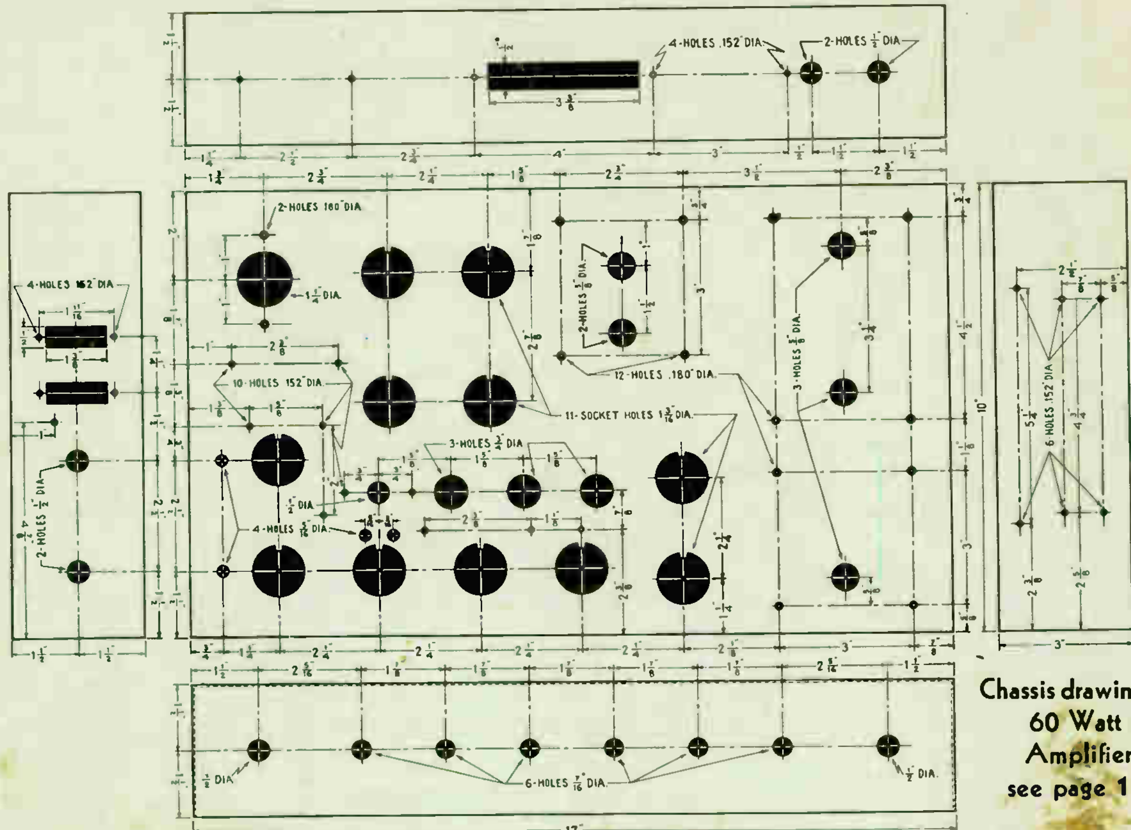
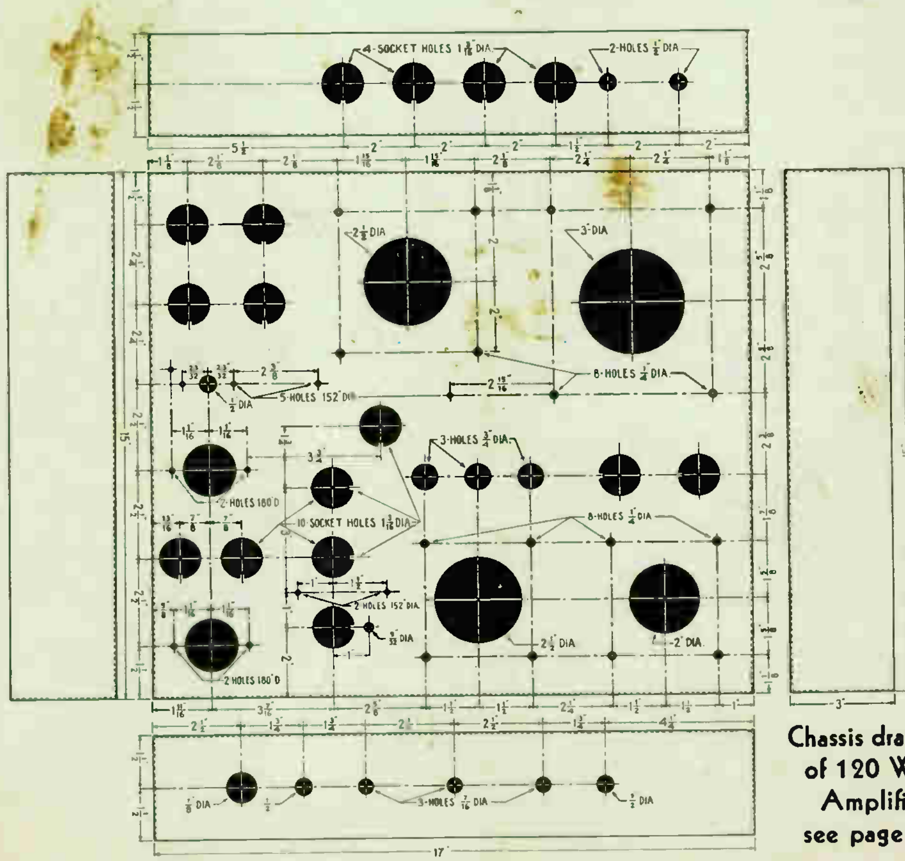
# CHASSIS DRAWINGS — 60 and 120 WATT AMPLIFIERS

**Full Size Templates of Chassis Drawings Available from THORDARSON, 15c net postpaid**




Chassis drawing of 60 Watt Amplifier see page 12




Chassis drawing of 120 Watt Amplifier see page 14

# TESTING AMPLIFIERS

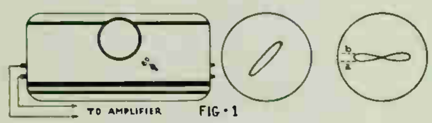


Practically nothing is said concerning the testing of amplifiers in the constructional articles in this guide. This subject is too broad to be covered in such limited space. The following ideas and suggestions will be of great help to the Sound Man who builds or repairs his own amplifiers. They are the results of long experience in the laboratory and in answering letters on this subject from our many friends and customers.

There are certain basic test instruments that should be available to every sound man and certain routines in their use that should be known and followed, if the full benefit is to be secured from them. These instruments include a good audio oscillator, a cathode ray oscilloscope, a selection of 50 or 75 watt resistors with values of 500 ohms or equal to output impedances to be used (these are to be used as substitute voice coil and line loads when measuring the output of an amplifier), and a vacuum tube voltmeter with a high range. For accurate overall gain measurements an accurate micro-volt meter is needed to measure the audio voltage applied to the input of the amplifier, and an output meter with no frequency discrimination.

## CHECKING HUM

One of the first problems encountered by the constructor is the elimination of Hum from an amplifier. The oscilloscope is very useful in determining the frequency of the Hum, its location, and when it has been reduced to a negligible quantity.




FIG·1

To determine the frequency of HUM, feed a portion of the output of the amplifier to the vertical input of the oscilloscope. Turn the sweep selector switch to "60 cycle". A 120 cycle HUM will produce some form of a figure eight on the screen of the cathode ray tube as shown in Fig. 1. This indicates that the hum is coming through the power supply circuit, and is caused by lack of filtering or isolation of the different stages. On the other hand, a 60 cycle HUM, usually picked up by induction in the wiring, transformers or chokes will produce some form of circle — no crossing of lines. (Fig. 1).

The best procedure in checking HUM is to pull all tubes but the outputs and clear up any HUM that originates in that stage. Next insert the correct tubes and proceed to the driver stage, the interstage and the inputs successively. It will usually be found that HUM is picked up most often in the input stages. For this reason they must be well shielded. Notice that the resistors and leads associated with this portion of the circuit are always shown as being shielded in the diagrams. This is important in the elimination of HUM and cross talk between inputs. Such simple things as the placement of leads, transformers, tone control chokes, etc., will affect the amount of HUM present in the amplifier. Any defective condensers in the filter circuit will usually be shown at the first of the test and of course should be replaced with perfect units.

On the oscilloscope the height of the image on the screen is a measure of the amount of HUM. This is shown in Fig. 1 as the distance "a" — "b". Note: This height is affected by the voice coil impedance across which the tests are made. The greater the impedance, the easier it is to detect HUM on the oscilloscope. The ear will of course tell when HUM is no longer noticeable, but will not aid sufficiently in the location and elimination of the source. Tube hiss, which will appear after a gain of approximately 100 db has been reached, should not be confused with HUM.

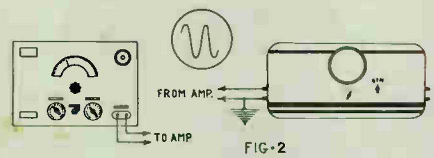
## OSCILLATION

Another source of trouble, especially in modern high gain amplifiers and those using an inverse feedback circuit, is parasitic oscillation.

If the transformers shown on the parts lists in this guide are used, and the circuit diagrams and various constants are followed, there can be but one main reason for oscillations. This is the reversal of the tertiary winding of the output transformers. All other sources of oscillation have been carefully eliminated.

The following suggestions for the curing of oscillation are given for the benefit of those building their own amplifiers from parts other than those recommended in this guide.

1. Complete shielding of the entire wiring of the final stage including the tertiary center tap.
2. Insert a 200 ohm ½ watt resistor in each output tube grid lead.
3. Connect .001 Mfd., or smaller, condensers from the output stage grid leads to ground, or the junction of the above mentioned 200 ohm resistors to ground.




FIG·2

4. Connect a by-bass condenser across the self bias resistor.
5. Connect a 25 ohm 10 watt resistor in series with each plate of push-pull parallel output tubes.
6. Insert 10,000 ohm or larger resistors across each half of the secondary of the driver transformer.
7. Connect a resistor across the total secondary of the driver transformer, the value to be as high as possible and still stop the oscillations.

A simple test procedure for the source of oscillation is as follows: First, reverse the tertiary winding of the output transformer. Second, remove the inverse feedback system entirely to make certain this part of the circuit is or is not responsible. Third, try the various circuit changes as previously outlined.

## DISTORTION MEASUREMENTS

The most popular way to check the distortion in an amplifier is shown in Fig. 2. The output of the amplifier is fed to the vertical input of the scope and an audio signal with a sine wave characteristic is fed to the input of the amplifier. Since a sine wave is uniform, any deviation from it is easily recognized.

It is not possible to distinguish distortion on the oscilloscope below 5 or 6 per cent. The only distortion which may be readily seen with this method is the flat top wave. This flat top may be caused by operating into the curved portion of the tube characteristic in the case of triodes or by using too high a plate load in the case of a pentode. Driving a class A or AB power stage so heavily as to draw grid current will also cause this form of distortion.

Where distortion is present the leads from the vertical input of the oscilloscope should be moved to the output and input of each successive stage, beginning with the final, until the defective one is located.

## OUTPUT MEASUREMENTS

Output measurements are usually taken across a resistor, substituted for the impedance which would usually be connected to the secondary. Use an accurate output meter when making these measurements. From the formula Power (Watts) equals $\frac{E^2}{R}$, it is then easy to compute the output of the amplifier.

An oscilloscope is almost a necessity in measuring power output if usable output is to be considered. Most amplifiers are capable of considerably higher output than their usual rating but with high distortion. An output with a maximum distortion of less than 8% is all that is really useful.

Connect the vertical input of the oscilloscope across the same load resistor that is used for the output voltage measurements. Increase the output, through the use of the gain control, until the sine wave form begins to distort. Back the gain down until no noticeable distortion is present, then take the output voltage reading. The oscilloscope will begin to show distortion when about 6% is present.

A point often forgotten is that an amplifier passes many frequencies, thus the watts output should be fairly constant over the entire frequency range if the amplifier has any quality at all. An amplifier with 25 watts output at 400 cycles should also deliver 25 watts with no noticeable distortion at 50 c.p.s. and to at least 8,000 c.p.s. These measurements are not possible unless the laboratory equipment previously mentioned is available.

## OVERALL GAIN

No rating can be so abused as the db gain of an amplifier. This is true because of the nature of the measurements involved. The decibel is a unit of power measurement so the resistance across which the voltage measurements are computed will influence the mathematical, not the actual, result.

To compute the overall gain, a carefully measured input voltage is applied to the input of the amplifier and the output voltage measured. The gain is figured in decibels through the use of the formula $db = 10 \log. \frac{Po}{Pi}$, where Po is the power output and Pi is the power input.

The output voltage is usually read across the load resistor mentioned at the beginning of this article. The input voltage is fed into the regular input, which is usually a 5 megohm resistor.

It is this input resistor that can play havoc with the gain measurements. Although its value is 5 megohm, purposely a large value to prevent loading of the microphone, such a value is never encountered as an actual grid load. When shunted by the microphone or other input source the resultant impedance is much less. For this reason the secondary impedance of the usual transformer, 100,000 ohms, is the generally accepted figure used in gain computations. An actual input impedance of 5 megohms would obviously ruin the high frequency response of the stage involved. The calculated db gain will be less with 100,000 ohms but it will be more indicative of the usable gain. You will notice that in the technical data on each amplifier in this guide the figure of 100,000 ohms is given as the value used. Without this statement the db value would be meaningless. ***Always state the constants used when speaking of db gain.*** Although a higher db gain will be shown by usi[ng] a value of 5 megohms rather than 100,000 ohm[s in] the computations, the actual gain from m[icro]phone to speaker will be the same under [either] condition.

# THORDARSON AMPLIFIERS

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## GUIDES AND MANUALS


***Radio Service Guide* — No. 342, 15c.** Constructional data on improved condenser analyzer and impedance bridge, 32 volt DC power supply, two high fidelity phono amplifiers and adding an extra speaker to a receiver. Full of information you will use every day in the year.

***Transmitter Guide* — No. 344, 15c.** Fifty-two pages of up-to-the-minute data on transmitter design and operation. Portable units, beginners transmitters, and larger rigs up to 1000 watts are fully described. Circuit diagrams, parts lists, and photographs illustrate each article.



***Replacement Transformer Encyclopedia*, No. 243, and Supplement, No. 243-S. Free** — Complete information regarding correct choke, audio and power transformer replacements. Covers almost 6000 receivers as listed in Rider's Manuals, Volumes I to VIII. Includes data on AC, AC-DC and battery models. This is the only complete listing available and will save valuable time for the serviceman. You cannot afford to be without a copy. Ask your distributor for a copy.

***Complete Transformer Manual* — No. 340, 50c** — The Thordarson Transformer Manual is a complete book, containing the Radio Servicing Guide, the Replacement Transformer Encyclopedia, the Transmitter Guide, and the Sound Amplifier Guide, plus Thordarson catalogs and prices. It is bound in an attractive blue and orange cover with looseleaf arrangement, giving the user opportunity to keep the Manual up-to-date by adding the latest Thordarson releases.


***Transformer Catalog* — No. 400.** Free. Descriptions and prices of the complete line of Thordarson Chokes, Audios and Power Transformers. The most comprehensive listing available to meet the needs of the Sound Man, Amateur, Service Man and Experimenter. May be obtained from your Parts Distributor or direct from the Factory.

## THORDARSON ELECTRIC MFG. CO.

**500 W. Huron Street** **Chicago, Illinois**

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Printed in U. S. A.

# REPLACEMENT TRANSFORMER ENCYCLOPEDIA

for Service Engineers

THORDARSON ELECTRIC MFG. CO.
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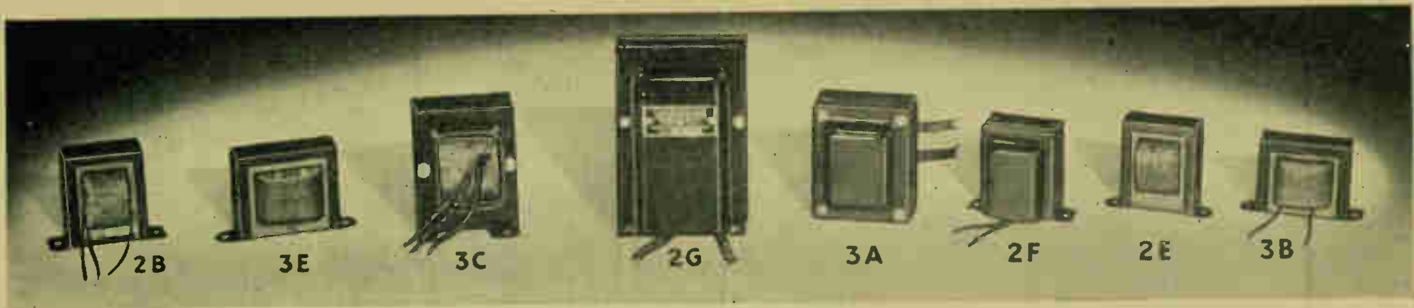
*Transformer Specialists Since 1895*

No. 352 F




MODERN conditions call for fast and accurate service. Your time and your customer's convenience and good will are valuable. The successful radio service engineer keeps a small stock of replacement transformers on hand to meet his requirements without delay. Thordarson does its part by having a complete line of replacement types for practically all receivers. The most popular types are listed below with full electrical and physical characteristics for your convenience. These transformers are recommended in the pages of this encyclopedia which has been compiled by Thordarson engineers to assist you in the proper selection of Power Transformers, Filter Chokes, Audio and Output Transformers. Types are listed below in numerical order for easy reference.

The Encyclopedia is larger than ever before and the receiver types have been carefully arranged to enable you to quickly find your model. KEEP THIS BOOK IN A HANDY REFERENCE SPOT — you will find it invaluable.

## AUDIO TRANSFORMERS

For coupling the plate or plates of an amplifier stage to the grid or grids of the next stage where grid current is not drawn.

| Type No. | Classification | Turns Ratio | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13A34 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13A35 | RECEIVER (midget) | 3:1 | 10,000 | 90,000 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13A36 | RECEIVER (midget) | 1:1 | 20,000 | 20,000 | 8† | 3B | 2 11/16 | | 3 | 1 3/4 | 2 | 1 |
| T-29A99 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 3/8 | | 2 7/8 | 2 | 2 3/8 | 1 1/4 |
| T-33A91 | RECEIVER | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 3/8 | | 2 7/8 | 2 | 2 3/8 | 1 1/4 |
| T-57A38 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-57A41 | AMPLIFIER | 3:1 | 10,000 | 90,000 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-57A42 | RECEIVER (large) | 3:1 | 10,000 | 90,000 | 8 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| For coupling screen grid or power detector (Clarion AC-60). | | | | | | | | | | | | |
| T-58A70 | AMPLIFIER Has split Secondary. | 1.5:1 | 20,000 | 45,000 | 10† | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67A91 | AMPLIFIER | 1.5:1 | 20,000 | 45,000 | 10† | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 |
| T-74A31 | AMPLIFIER | 1:1 | 10,000 | 10,000 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |

## DRIVER TRANSFORMERS

For coupling the plate or plates to the grids of an amplifier stage in which grid current is drawn during a part of the audio cycle.

| Type No. | Driver Tubes | Output Tubes | Class | Ratio Pri. to 1/2 Sec. | Pri. M.A. | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-17D01 | 1-6F6 Triode<br>1-42 Triode, 1-2A5 Triode | 2-6F6, 6L6, etc. | AB | 1.7:1<br>1.5:1, 1.3:1 | 31 | 3B | 2 7/8 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-67D47 | 1-6N7, 6A6, 53 | 1-6N7, 6A6, 53 | B | 5.25:1 | 10 | 2F | 2 3/8 | | 2 3/4 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-67D50 | 1-89 Triode | 1-79 | B | 2:1 | 32 | 2F | 2 3/8 | | 2 3/4 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-67D78 | 1-46, 59, 6F6,<br>42, 2A5 Triode | 2-46, 59<br>2-6L6 | B<br>AB2 | 2.2:1 | 32 | 2F | 2 15/16 | | 3 1/8 | 2 1/2 | 3 | 2 1/4 |
| T-74D32 | 2-6C5, 76, 56 | 2-6F6, 42, 2A5<br>4-2A3, 6B4G | AB2<br>AB | 3:1 | 10 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-78D46 | 1-30 | 1-1J6G, 19<br>2-30 | B<br>B | 2.4:1 | 7 | 2B | 2 1/8 | | 2 9/16 | 1 5/8 | 2 | 3/4 |
| T-81D42 | 1-6F6 Triode<br>1-42 Triode<br>1-2A5 Triode | 2-6F6 Triode<br>2-42 or<br>2-2A5 Pentode | AB2<br>AB2<br>AB2 | 1.7:1<br>1.5:1<br>1.3:1 | 31 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-81D52 | 1-6C5, 76<br>1-56 | 2-6F6 Triode<br>2-42, 2A5 Triode | AB<br>AB | 1.82:1<br>1.67:1 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |

## OUTPUT TRANSFORMERS

| Type No. | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13S37 | 1-6F6, 42, 2A5, 47 | A | 7,000 | 1/2/4 | 36 | 5 | 3E | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-13S38 | Universal<br>Single or<br>P-P Tubes | A | 4,000/7,000<br>8,000/10,000<br>14,000 Ct. | Adjustable<br>.1 to 29 | 36 | 8 | 3E | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13S40 | 2-6F6, 42 P-P 2-2A5, 47 P-P | A,A | 14,000 Ct. | 1/2/4 | 40 | 10 | 3E | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13S41 | Universal<br>P-P<br>Tubes | A | 3,000/5,000<br>6,600/7,000<br>8,000/10,000 | Adjustable<br>.1 to 29 | 60 | 20 | 2E | 2 15/16 | | 3 3/8 | 2 1/[illegible] | 3 | 2 1/4 |

## OUTPUT TRANSFORMERS (Continued)

| Type No. | Tube Type | Class | Ohms Impedance Pri. | Ohms Impedance Sec. | Pri. M.A. Per Side | Max. Watts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13S42 | Universal<br>Single<br>Tube | A | 1,500/2,000<br>4,000 5,000<br>7,000 | Adjustable<br>.1 to 29 | 55 | 10 | 3E | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13S43 | 1-1F4, 1D4, 1F5G | A | 16 000 | 1/2/4 | 10 | 5 | 3E | 2 | | 2 3/8 | 1 1/4 | 1 3/8 | 1/2 |
| T-14S81 | 1-42, 2A5, 6F6 or P-P 45, 71 | A | 7,000 Ct. | 3 to 6 | 40 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S82 | 1-25L6 | A | 1,500 | 3 to 6 | 55 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S83 | 1A5-G, 1E7-G | A | 25,000 Ct. | 3 to 6 | 8 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S84 | 1-1C5G, 1Q5G | A | 8,000 | 3 to 6 | 10 | 5 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-14S85 | Universal Single or P-P Tubes | A | 4,000/7,000<br>8,000 10,000<br>14 000 Ct. | Adjustable .1 to 29 | 36 | 8 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-17S10 | 1-6LG | A | 2,500 | 2/4/8/500 | 80 | 8 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-17S12 | 2-6L6 P-P<br>(with 300V on plate and screen) | AB1 | 4,300* | 4/8/15/250/500 | 95 | 25 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-17S13 | 2-6L6 P-P | AB1 | 6,600* | 4/8/15/250/500 | 80 | 34 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/2 |
| T-17S14 | 2-6L6 P-P | AB2 | 5,500* | 4/8/15/250/500 | 90 | 40 | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 5 1/4 |
| T-17S15 | 4-6L6 P-P Par. | AB1 | 3,300* | 4/8/15/250/500 | 155 | 60 | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-17S16 | 4-6L6 P-P Par. | AB2 | 1,900* | 84/100/125/166/<br>250/500 | 230 | 120 | 2G | 3 | 4 1/4 | 3 3/4 | 5 | 4 15/16 | 14 1/4 |
| T-57S01*<br>T-57S02† | Universal Single or<br>P-P Tubes | A | 4,000 7,000<br>8,000/10,000<br>14,000 Ct. | Adjustable<br>.1 to 29 | 36 | 8 | 2E<br>2B | 2 3/8<br>2 3/8 | | 2 7/8<br>2 7/8 | 2<br>2 | 2 3/8<br>2 3/8 | 1 1/4<br>1 1/4 |
| T-58S72 | 2-2A3, 6B4G P-P<br>2-48, 25L6 P-P | AB<br>A | 3,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/4 |
| T-65S94 | 2-50 P-P<br>2-6F6, 42, 2A5 P-P | A<br>AB2 | 8,000 | 4/8/15/500 | 55 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S48 | 2-45, 71, 43, 25A6 P-P<br>1-6N7, 6A6, 53 P-P | A<br>B | 8,000 | 4/8/15/500 | 36 | 25 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S51 | 2-6F6, 42, 2A5, 47 P-P | A | 14,000 | 4/8/15/500 | 40 | 20 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67S52 | 2-46, 59 P-P<br>2-6F6, 42, 2A5 P-P<br>2-6N7, 6A6, 53 P-P Par. | B<br>AB2<br>B | 5,800 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S54 | 2-6L6 P-P<br>2-2A3, 6B4G, 45 P-P | A<br>AB | 5,000 | 4/8/15/500 | 60 | 30 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-67S92 | 4-2A3, 6B4G, 45 P-P Par.<br>4-48, 25L6, P-P Par. | AB<br>A | 1,500 | 4/8/15/500 | 80 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-75S75 | 2-6F6, 42 or 2A5<br>1-6N7, 6A6, 53 P-P<br>2-6N6G, 6B5, 2B6, 6AC5 P-P | AB2<br>B<br>A | 10,000 | 4/8/15/500 | 45 | 40 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 1/2 |
| T-81S01 | 1-19, 1J6G, 1G6G P-P<br>2 30, 49 P-P | B<br>B | 10,000 Ct. | 2/4/8 | 15 | 8 | 2B | 2 1/8 | | 2 9/16 | 1 5/8 | 2 | 3/4 |

* 10% Feedback Winding

## CHOKES

| Type No. | Inductance At Zero D.C. | Inductance At Rated D.C. | Current Rating M.A. | D.C. Res. Ohms | R.M.S. Test Volts | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | Dimensions D. | Dimensions H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13C26 | 21 | 8 | 40 | 530 | 1600 | 3B | 2 | | 2 3/8 | 1 3/8 | 1 3/8 | 1/2 |
| T-13C27 | 22 | 10 | 40 | 475 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-13C28 | 20 | 10 | 65 | 460 | 1600 | 3B | 2 11/16 | | 3 | 1 3/4 | 2 | 1 |
| T-13C29 | 20 | 9 | 85 | 250 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-13C30 | 25 | 8 | 150 | 200 | 1600 | 2B | 2 15/16 | | 3 3/8 | 2 1/8 | 3 | 2 1/4 |
| T-14C61 | 14 | 7 | 55 | 200 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-14C62 | 16 | 8 | 55 | 250 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-14C63 | 19 | 8 | 55 | 300 | 1600 | 3B | 2 3/8 | | 2 13/16 | 1 5/8 | 1 5/8 | 3/4 |
| T-18C92 | 37.8 | 18 | 35 | 405 | 1100 | 3B | 2 7/8 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-29C27 | 800 | 500 | .5 | 6150 | 1600 | 2B | 2 3/8 | | 2 7/8 | 1 3/4 | 2 3/8 | 1 |
| T-44C02 | 31 | 12 | 80 | 405 | 1600 | 3B | 2 7/8 | | 3 3/16 | 2 | 2 | 1 1/4 |
| T-47C07 | 20 | 12 | 75 | 410 | 1600 | 3B | 3 1/8 | | 3 5/8 | 1 7/8 | 2 1/4 | 1 1/4 |
| T-52C98 | | | .5 | 6150 | 1600 | 2F | 2 3/8 | | 2 7/8 | 1 7/8 | 2 3/8 | 1 1/4 |
| T-57C54 | 27 | 10 | 110 | 200 | 1600 | 2F | 2 15/16 | | 3 3/8 | 2 1/2 | 3 | 2 1/4 |
| T-67C49 | 12 | 5 | 200 | 80 | 1600 | 2F | 3 11/32 | | 3 13/16 | 3 1/16 | 3 1/2 | 3 3/4 |
| T-68C08 | | | 35 | 405 | 1600 | 2F | 2 3/8 | | 2 3/4 | 2 1/8 | 2 3/8 | 1 1/2 |
| T-74C29 | 29 | 15 | 150 | 200 | 2000 | 2G | 2 11/16 | 2 9/16 | 3 3/8 | 3 3/8 | 4 5/8 | 5 1/4 |
| T-74C30 | | | 15 | 2100 | | 3B | 2 11/16 | | 2 | 1 1/2 | 2 3/8 | 1 |
| T-75C49 | 22 | 8 | 120 | 290 | 1600 | 3B | 2 3/4 | | 3 3/16 | 2 | 2 | 1 1/2 |
| T-75C51 | 24 | 13 | 250 | 121 | 1600 | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 15/16 | 8 |

POWER TRANSFORMERS LISTED ON PAGE 29.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **AIRLINE (See Montgomery Ward)** | | | | | | |
| **ALL AMERICAN MOHAWK CORP. (See also Wurlitzer)** | | | | | | |
| D, K | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| J | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C-6, Studio | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | §Special |
| S-6 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-7, S-8*, SW-8 | T-13R04 | ☆ | ☆ | ☆ | *T-33A91 | T-57S01 |
| S-10 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| S-40 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-50, S-63, SA-65, SW-80 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60, 61, 62, 65, 66 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| 80, 83, 84, 85, 86, 88 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| S-80 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| SA-90, SA-91, | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| SA-110 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-13S41 |
| SA-130 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 226, 227 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-57S01 |
| **ANDREA** | | | | | | |
| 1C5, 2C5, 510, 511, C5L, C5S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1D7, 2D7, 3D7, 4D7, 5D7, 6D7, 7D7, 8D7, ch. D7L, D7S | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1D8, 2D8, 3D8, 4D8, 5D8, 6D8, 7D8, 8D8, D8L, D8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1D10, 2D10, 3D10, 4D10, 5D10, 6D10, 7D10, 8D10, 9D10, 10D10, D10L, D10S | T-13R14 | T-75C49 | ☆ | ☆ | ☆ | T-57S01 |
| 1E6, 2E6, PE6L, PE6S, PE66L, PE66S, 11E6, 12E6, 14E6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1E8, 2E8, 3E8, 4E8, 5E8, 6E8, 7E8, 8E8, 9E8, 10E8, PE8L, PE8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 2A5, 5A5, 6A5, ch. A5L, A5S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2B6, 3B6, 4B6, ch. B6L, B6S | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2B8, B8L, B8S | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2D5, 3D5, 4D5, 6D5, 8D5, D5L, D5S, PD5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3A7, ch. A7L | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3E11, 4E11, 5E11, 6E11, 7E11, 8E11, 9E11, 10E11, PE11L, PE11S | T-13R14 | T-75C49 | ☆ | ☆ | ☆ | T-57S01 |
| B4, B4L, 400, 401 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C6B | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| E6B, 626, 627, 628 | T-14R35 | T-14C63 | ☆ | ☆ | ☆ | T-14S82 |
| **APEX (See U. S. Radio and Television)** | | | | | | |
| **ATWATER KENT MFG. CO.** | | | | | | |
| 43 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 55, 55C Early | T-13R05 | T-13C29 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 55 Late, 60, 60C, 70, 74, 76, L-1, L-2, F, P | T-13R04 | T-13C29 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| **ATWATER KENT MFG. CO. (Contd)** | | | | | | |
| 72, H-1 | T-13R06 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 80 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 83, 84 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85, 86, 87 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 89, 89P | T-56R05 | T-13C30 | T-13C27 | ☆ | §Special | T-57S01 |
| 90, 92, 94 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96 | T-13R04 | T-13C30 | §Special | ☆ | ☆ | T-57S01 |
| 99, 99P | T-56R05 | T-13C30 | T-13C27 | ☆ | §Special | T-57S01 |
| 145, 165 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 168 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 184, 184X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 185, 185A, 186 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 188, 228 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206, 217, 236, 246, 266, 286, 356, 376 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 208 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| P216, P236 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E248 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 255 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 310 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 312 | T-13R09 | T-74C29 | ☆ | T-33A91 | T-13A36 | T-13S41 |
| 317 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 325 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 328, 337 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E412, E412X, P412, P412X | T-13R09 | T-74C29 | ☆ | T-33A91 | T-13A36 | T-13S41 |
| 427 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 435 1st and 2nd | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 447 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 448 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 475 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 487 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 509 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 525 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 545 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 558 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 559 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 567 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-608 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 627 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E648, 649 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 667, 708, 788, 808, 808A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 710 | T-13R09 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 725, P755 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 735 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810 | T-13R14 | T-13C30 | ☆ | ☆ | T-81D42 | T-13S41 |
| 856, P875, 976 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 944 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**For complete description of these and other Thordarson transformers and chokes see catalog No. 400.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **AUDIOLA RADIO CO. (See also Fairbanks, Morse)** | | | | | | |
| 4T-31, 4T-32 6T Jr., 6T-31 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7T, 8T, 9T | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9T-45 | T-13R06 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 10T Super | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 13T-5 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 13S-9 | T-13R06 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 23T-5, 23T-5-SW 23S-8 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-8Q | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-10 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23S-12 | T-13R04 | T-75C51 | ☆ | ☆ | T-67D47 | T-57S01 |
| 30B, 31 Super | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 33S-10 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 889 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 7330 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 8430 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| **BALKEIT RADIO CO.** | | | | | | |
| A-3, A-5, A-7 | T-13R00 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| C | T-13R06 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| D-5 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| F | T-13R06 | T-13C30 | ☆ | ☆ | T-29A99 | §Special |
| KP | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-7 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-8, Windsor 70 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| G-18A, G-19B | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| GT-20 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 41A | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 42-E, 42-G | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60, 70 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| GT-200-X | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| **BELMONT RADIO CORP.** | | | | | | |
| 40, 50, 50A-B-C, 60 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40A | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70A | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71C | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 401 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 401B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 408A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 504A | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 517A, 526, 529 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 489A-B | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 527, 529 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555, 556, 578 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 577 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **BELMONT RADIO CORP. (Contd)** | | | | | | |
| 582 A & B, 583, 585 A-B-C, 586, 587, 588A, 589A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 611 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 629 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 665 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 685, 686 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 708 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 740, 777 B-C | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 746, 755, 777A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 761 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 775 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 778 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 786 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 787A | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 823 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 840, 842, 860 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 867 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 878A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 879A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 888, 889 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 890A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1070, 1170, 1171, 1172, 1174, 1175 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1075 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **BOSCH (See United American Bosch)** | | | | | | |
| **BRETING RADIO MFG. CO.** | | | | | | |
| Breting 14 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-75S75 |
| **BRUNSWICK RADIO CORP.** | | | | | | |
| D | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-1 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 2-KRO, 3-KRO, 3-KR6, 5-KR, 5-KRO, 5-KR6 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 3-NC8, 5-NC8 | T-13R00 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 10 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 11, 12, 16, 18, 33 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14, 21, 31 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| S-14, S-21, S-31 | T-13R06 | §Special | ☆ | ☆ | T-33A91 | T-57S01 |
| 15, 22, 32, 42 | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 17, 24, 25 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| PR17-8 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| S-81, S-82 | T-13R06 | §Special | ☆ | ☆ | T-33A91 | T-57S01 |
| **BULOVA WATCH CO.** | | | | | | |
| M-501 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 600, 601, 605, 610 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| M-701 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-751 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **BUSH AND LANE PIANO COMPANY** | | | | | | |
| 10 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 12 SG | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| **CLARION (See Transformer Corp. of America)** | | | | | | |
| **COLONIAL RADIO CORPORATION** | | | | | | |
| 31AC | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 32AC | T-13R06 | T-13C30 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| 32DC, 33DC | ☆ | T-18C92 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 33, 34 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36, 36P | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 37, 37P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38 | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 39 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 41, 42 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 44 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47, 48 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 49 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 52 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 114, 117 | T-13R06 | T-74C30 | ☆ | ☆ | §Special | T-57S01 |
| 125 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250AC, 300AC, T345 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T397 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C399 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C495 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C595 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600, 600A, 603 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 601 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 604, 605 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650, 653 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 652 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 656 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 658 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 662 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C695 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **COLUMBIA PHONOGRAPH COMPANY** | | | | | | |
| C-1, C-2, C-4 | T-56R01 | T-13C29 | T-13C28 | T-29A99 | T-29A99 | T-18C92 |
| C-25-31, C-25-32 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-31, C-32 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 31, 33 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 32, 34 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| C-80 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| C-101 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-102 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| C-800 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 920 | T-13R06 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 930 | T-13R07 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 990 | T-13R06 | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **CONTINENTAL RADIO & TELEVISION CORP.** | | | | | | |
| AM4 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| AM7 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AM8-RF | T-13R19 | T-13C26 | ☆ | ☆ | ☆ | ☆ |
| M1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L2 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| Z2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L4, ML4, L5 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 5A, 5AZ, 5B, 5F, 5G, 5M, 5VU, 5X, 5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6G, 6K, 6W | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L6 | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 6PU | T-14R33 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| 7C, 7H, 7C-PH, 7H-PH | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7G | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7M, 7MU, X8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8G | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8K, 9G | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 11B, 11B-PH | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16R | T-13R14 | §Special | ☆ | ☆ | ☆ | T-13S41 |
| A31 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 137X, 150X, 171X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150-5Z, 155-5Z, Chassis 5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ML-156 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 160-5X, 165-6W | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ML-266 | T-13R12 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 975-6W, 980-5X | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 985-5Z, 990-5Z | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **CROSLEY RADIO CORP.** | | | | | | |
| 5M3, 5V2 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6H3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 30S, 31S, 33S, 34S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 40S, 41S, 42S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 41, 41A, 42 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 48 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50, 50LB, (5H1) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53, 54, 57, 58, 59AC | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72, 72LB, (7H2) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72, 72LB, (7H3) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 77-1, 77A-B-L | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80AW, 8H1 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 82S | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 84C, 84D | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 120 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 121 A-B | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 122 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 123, 124, 124-1 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **CROSLEY RADIO CORP. (Contd)** | | | | | | |
| 125 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 127, 127-1 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 129, 129-1 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 130, 130-1 | T-13R18 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 131 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 133, 134 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 134-1 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 135 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 136-1 | T-13R09 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 137, 141 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 147 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 148, 150, 154 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 157 | T-13R18 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 158 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 160, 161, 164 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 167 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 167 series 2, 168 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 169 | T-13R17 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 170, 171 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 175 | T-13R07 | T-13C30 | ☆ | ☆ | ☆ | §Special |
| 179 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 180 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 181 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 184 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 438 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 505, 515, 516 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 507 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 517 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 525 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 526 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 534 | T-13R12 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 537 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 547 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 555 | T-13R12 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 567 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 614, 616, 626 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 628 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 635, 636 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 637, 638 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 639 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 646 | ☆ | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 655, 656, 666 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 668 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 704, 706 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | ☆ |
| 714, 715, 716 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 718 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 725 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 726, 736 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 758 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 804 | T-13R00 | T-13C30 | ☆ | T-29A99 | T-33A91 | ☆ |
| **CROSLEY RADIO CORP. (Contd)** | | | | | | |
| 814 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 815 | ☆ | ☆ | ☆ | T-29A99 | T-78D46 | T-81S01 |
| 816 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| 817 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 818 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 828 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T 57S01 |
| 855, 865 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 915 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 916 | T-13R13 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 926 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 955 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1014 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1016, 1026 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1055 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 1117 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1126 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1135 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 1216, 1336 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| 5515, 5516, 5526 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5555, 5556, 5656 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5628 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5666, 6516, 6625 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **DELCO RADIO (See United Motors Service)** | | | | | | |
| **DETROLA RADIO & TELEVISION CORP.** | | | | | | |
| 4J | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5B, 5D, 5W, 5X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6ZM | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7A, 7ZM | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 10ZM | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 106 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 108, 146 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 147 series | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 155X, 165 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 163 | T-13R15 | ☆ | ☆ | ☆ | ☆ | §Special |
| 178 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 184 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 258, 259 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 276 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 315, 325 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 326 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 503 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1900 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **THOMAS A. EDISON, INC.** | | | | | | |
| C4, R4, R5 | T-56R05 | T-13C30 | ☆ | T-29A99 | T-58A70 | T-57S01 |
| R6, R7 | T-56R05 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| E-175, Abbey Jr. | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29A99 | §Special |
| **EMERSON RADIO & PHONOGRAPH CORP.** | | | | | | |
| CS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F | T-13R06 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| JS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **EMERSON RADIO & PHONOGRAPH CORP. (Contd)** | | | | | | |
| KS | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T, TS | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-AC-4 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L-AC-5, M-AC-7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW7 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 23 (4B) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 26 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 28 (5J) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 34C (C6), 36 (B5) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39 (DS-5) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 45 (6-BD) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50L, 50M, S-50, D55 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW-55 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 65 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | §Special |
| 71 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 77 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 101 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 102 (A8), 102LW (B8), 104, 104LW | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 105 | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| K116 (K) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 116 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 117, L117, 117LW, Z117, (KS, Z) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 121, K121 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L122, L122LW, Z122 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K123 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L133, L133LW, Z133 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C134, C136, C138, C139, C140, D134, D136, D138, D139, D140, D142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D134LW, D136LW, D138LW, D139LW, D140LW, D142LW, D146LW | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| L135, L135LW, Z135 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L141, L141LW, Z141 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L143 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X143(X), X146 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S147, Z150, S151(S) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D146 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R152, R153, R156, R158 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Z159, Z160, AT170, (AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR171, AR172, AR173 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR174, AR176, AR180 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW171, AW173, AW174, AW176, AW180 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X175, X178, X183 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AB178, AB182, AB183, AB184 (AB) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **EMERSON RADIO & PHONOGRAPH CORP. (Contd)** | | | | | | |
| AT181, AR185 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AW185 (AW) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R189 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AZ196 (AZ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BE198 (BE) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BL200, BL210 BL214(BL) AC202 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BL218, BL220 (BL) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BQ223 (BQ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BR224 (BR) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| BQ225, BQ228 (BQ) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BR226, BS227, BR, BS | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| BU229, BU230, BU | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BW231 (BW) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| CB243 (CB) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 287 (DA) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| L755, M755, S755 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 770 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| **ERLA (See also Sentinel)** | | | | | | |
| Erla | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | ☆ |
| S. W. Converter | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| AR3 | T-13R07 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| A13 Amp. | T-13R05 | T-13C29 | T-74C30 | ☆ | T-29A99 | T-57S01 |
| 30 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 31, 32 | T-13R07 | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 35, 37, 38, 39 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 61, 62, 63 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 75 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 77 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 81P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 224AC, 224B | T-13R06 | T-13C30 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 231 | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 245 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 248K | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 271, 271A | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| 335 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5700, 5721 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6300, 6315, 6317, 6323 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **FADA RADIO & ELEC. CORP.** | | | | | | |
| 6A51 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6A65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6A80 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10, 11 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 16, 17, 20 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-33A91 | §Special |
| 25 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 30, 31 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 32 | T-13R00 | T-13C27 | T-13C27 | T-29A99 | T-33A91 | §Special |
| 35 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 40 | T-13R06 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |

**Thordarson Transformers for all applications are listed in catalog 400. Ask for your free copy.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **FADA RADIO & ELEC. CORP. (Contd)** | | | | | | |
| 41, 42, 43, 44 (KF) | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 45KU | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 46, 47, 48, 49KW | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 50 | T-13R00 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 51(KO), 53-55(RG) | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57(KOC), 61, 66, KX | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 64APC, 65PC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| A66T, A66PC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 66KY | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73 | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74, 76, 78 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 78-10 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 79 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 79 RC | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 79-10 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 83 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 85RE, 85RX | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 88, 89 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 97-10 (RW) | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 122 Batt. (KE) | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 126, 127, 128 NK | ☆ | ☆ | ☆ | T-29A99 | T-78D46 | T-81S01 |
| 133, 134, 135, 136 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 141 (NA) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150, 151, 152, 160 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 170 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| E180 | T-13R00 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 190 | T-13R13 | ☆ | ☆ | ☆ | §Special | ☆ |
| 211 AC | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 212 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 250 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 255, 265 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 270, 271(NF) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 290, 291, 312 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 365, 366, 366PT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 380 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 410 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 413 | T-13R14 | T-13C28 | ☆ | ☆ | ☆ | T-13S41 |
| 451, 454 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 465 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 472-CA, 472-UA | T-56R02 | ☆ | ☆ | T-29A99 | T-29A99 | ☆ |
| 475-CA, 475-UA | T-56R02 | ☆ | ☆ | T-29A99 | T-29A99 | ☆ |
| 761(KG), 762, 764, 766, 767 | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | ☆ |
| 1255, 1265 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1582, 1583 | T-13R13 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| **FAIRBANKS MORSE & COMPANY** | | | | | | |
| 4A, 4B | T-14R39 | T-14C61 | ☆ | ☆ | ☆ | T-13S43 |
| 5A, 5B | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5C, 6A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C | §Special | T-13C27 | ☆ | ☆ | T-78D46 | T-81S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **FAIRBANKS MORSE & COMPANY (Contd)** | | | | | | |
| 7A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A, 9A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 9C | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12A, 12B | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 40 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 52, 53 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 54, 56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57, 57T0 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58(T1), 58(T2) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63, 66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70, 71 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72-C-2, 72-C-3, 72-T-3 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 73, 73C3B, 73T3B | §Special | T-13C27 | ☆ | ☆ | T-78D46 | T-81S01 |
| 82, 83, 84, 85 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 91, 91C4, 91C5, 91T4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 100, 110 | T-13R09 | T-13C30 | T-13C29 | ☆ | T-67D78 | T-13S41 |
| 5106, 5107, 5108 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5109, 5111, 5112 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5141, 5143 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5212, 5212A, 5241, 5312, 5312A, 5341 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6010, 6044, 7014 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7040, 7052 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **FREED RADIO & TELEVISION CORP.** | | | | | | |
| MB5 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| MB7 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| MB9 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 54 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 55NR | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | ☆ |
| 56 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 57NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 58-59 | T-13R02 | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 60NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | ☆ |
| 66 (NR) | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | ☆ |
| 72-74 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78NR, 79NR | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 80 NR | T-56R01 | T-13C27 | T-13C27 | T-29A99 | T-29A99 | §Special |
| 90 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| NR90S | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 92 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 95NR | T-13R06 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 96DC | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 98FE | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 346-4 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 354-360-360X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **GALVIN MFG. CO. (MOTOROLA)** | | | | | | |
| 5T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-1, 5T-2, 5Y | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GALVIN MFG. CO. (MOTOROLA) (Contd)** | | | | | | |
| 5-1 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6-1, 6-A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T, 6Y, 6-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10-1, 10Y | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 59F1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 59K1, 59R2 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59R4 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59T2, 59T4, 59T5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61C, 61D | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61CA, 61DA | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 69K1 early & late | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 81C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **GAMBLE-SKOGMO, INC.** | | | | | | |
| 07A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2-ODM-578 | T-13R09 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 7J512-7J574 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20C7, 20C8 | T-13R09 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 30A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47LL, 47R, 47RL | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51C | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71C | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72 (CH, 8, 8X) 85 | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 425, 457 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510-511 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521Z | T-56R05 | T-57C54 | ☆ | ☆ | T-67D78 | T-13S41 |
| 525 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 527A, 527C | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550AC | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 578 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 585, 586A, 587A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600, 623, 645 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 648 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 665, 765 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 675A, 685B | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 690B | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 735 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 740 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 761A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 762 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 767 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 770, 774 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 777C, 777L, 778A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GAMBLE-SKOGMO, INC. (Contd)** | | | | | | |
| 787 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 864, 867A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 907 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 908 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 970 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050 | T-13R07 | ☆ | ☆ | ☆ | T-81D52 | T-13S41 |
| 1070 | T-13R14 | ☆ | ☆ | ☆ | T-17D01 | T-57S01 |
| 2078D | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2516 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4954 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GAROD RADIO CORP.** | | | | | | |
| 2B2, 2B2-1 | T-14R39 | T-14C61 | ☆ | ☆ | T-78D46 | T-81S01 |
| 2B6, 2B6-1 | T-14R39 | T-14C61 | ☆ | ☆ | T-78D46 | T-81S01 |
| 25, 26, 27 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 49, 49M | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 73, 73LW | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 150 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205C, 205L | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205-1 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206C, 206L, 206P4 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206-1, 250 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 307, 307E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 309 series, 380 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 380D, 380KC | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 381, 381D | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 381KC | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 389 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 399 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 511A | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 511G, 511P | T-13R09 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 930 series | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 931 series | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1540 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3012 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 3016 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3109 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4012 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4016-4 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 4110 series | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5140 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GENERAL ELECTRIC CO.** | | | | | | |
| T-12, T-12E | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-22, S-22A, S-22X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-31 | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| H-32, T-41 | T-13R07 | ☆ | ☆ | ☆ | T-13A36 | T-57S01 |
| F-40 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S-42, SZ-42P | T-13R07 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| G-50 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-50, K-50P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-50 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

 See page 32.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL ELECTRIC CO. (Contd)** | | | | | | |
| H-51, H-51R | T-13R06 | ☆ | ☆ | ☆ | §Special | §Special |
| K-51, K-51P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-51, M-51A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-52, E-52, M-52 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-52 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-53, F-53, G-53 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-53, K-53M | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-54, K-54P | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-55 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-55 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-55, M-56 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-56, G-57 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-60, K-60P | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-61 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-61, E-62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-62, KZ-62P | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-62 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-63, F-63 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-63 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-64 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-64 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-64 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-65, F-65 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-65, K-65P | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-65 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-66, F-66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-66 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-66, K-66M | T 13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-66 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-67, M-67 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-68 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-68 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-68 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-69 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-69 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-70 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F-70 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-70 | T-13R04 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-71, E-72 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-71 | T-13R06 | ☆ | ☆ | ☆ | §Special | §Special |
| H-72 | T-13R07 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-72 | T-13R05 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| H73, H77, H78 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| F-74, A-75, F-75 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-75 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-75 | T-13R04 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-76 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-76 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| F-77 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL ELECTRIC CO. (Contd)** | | | | | | |
| H-77, G-78 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| E-79 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H-79 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-79 | T-13R04 | T-13C29 | ☆ | ☆ | §Special | T-13S41 |
| F-80 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| HM80 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| J-80, K-80, K-80X | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| E-81, F-81 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| M-81 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-82 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-82 | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| A-83 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| J-83, J-83A | T-13R05 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-85 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-85 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-85 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-85 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| M-85 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-86, F-86 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-86 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-86 | T-13R07 | ☆ | ☆ | ☆ | T-13A34 | T-57S01 |
| M-86 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| A-87 | T-13R13 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| J-87, J-87A | T-13R05 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-88 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K-88, K-88X | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| M-89 | T-13R15 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-91 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| H-91, H-91R | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| F-96 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G-99 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| J-100 | T-56R05 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| E-101, E-105 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| G-105, G-106 | T-41187 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| K-105 | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| E-106 | T-41187† | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| M-106 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| J-107, J-109 | T-56R05 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| K-107 | T-13R06 | ☆ | ☆ | ☆ | T-13A35 | T-13S41 |
| H-116, H-118 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| A-125 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| GM-125 | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| M-125 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| M-128, M-128HR | T-13R07 | T-13C30 | ☆ | T-33A91 | §Special | T-13S41 |
| M-129 | T-13R15 | ☆ | ☆ | T-33A91 | T-13A36 | T-57S01 |
| S-132 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| HM136 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| **GENERAL HOUSEHOLD UTILITIES CO.** | | | | | | |
| 450, (4A) 451 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460 (4B) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99. †$10.00 List. Order only from your distributor.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL HOUSEHOLD UTILITIES CO. (Contd)** | | | | | | |
| 461, 461X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470 (4C) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500 (5A) | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 532 (5H) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 542 (5J) 551 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 553, 555 (5L) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 560 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 564 (5R), 566 (5S) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570, 571 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 572, 573 (5Q) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 576 (5T), 578 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 580, 581 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 583 (5W), 585, 586 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 587 (5U), 589 (5P) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 599, 639 (6m) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 632 (6H) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640 (6J), 641 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 643 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650 (6A), 651 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 661, 662 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 663 (6E) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 664 (6N), 660 (6C) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 670 (6D), 671 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 680, 681 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 700 (7A), 701 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 723 (7M), 731 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 733, 735 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750, 751 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 752, 753 (7B), 755 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 760, 761 (7C) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 801 (8A) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 821 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 823 (8H), 831 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 833, 835 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 861 | T-13R13 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 871 (8E) | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 901 (9A), 902 | T-13R08 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 941 (9E) | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1067 (10D) | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1091 (10G) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1151 (11A, 11B, 11 2 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1162 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1171 | T-13R15 | ☆ | ☆ | ☆ | T-81D52 | T-13S41 |
| 1191 (11G), 1191B | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1181 (11H), 1183, 1185 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1241 | T-13R15 | ☆ | ☆ | ☆ | T-81D52 | §Special |
| 1291, 1297 (12B) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1541 | T-13R16 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| **GENERAL MOTORS RADIO CORP.** | | | | | | |
| A | T-13R06 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GENERAL MOTORS RADIO CORP. (Contd)** | | | | | | |
| 25, 26, 27, 28, 43, 48 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| 110 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 120, 130, 140 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-33A91 | T-57S01 |
| 180, 190, 211 (S9A, S9B) MA | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 216, 217, 219 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 220, (S10A, S10B) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251, (A2A, S2B) | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 252 (S3A, S3B) | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 253, 254, 255 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 257, 258 | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| 292, 293 (S4A, S4B) | T-13R06 | T-13C30 | T-13C27 | ☆ | T-57A42 | T-57S01 |
| A5003 | T-56R03 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| A5005 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 5065AC | T-56R01 | T-13C28 | T-13C28 | T-29A99 | T-29A99 | T-18C92 |
| 5069, 5080 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 5091 | T-56R03 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| **GILFILLAN BROS.** | | | | | | |
| 5B8, 5G8, 5S8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5SJ | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C, 6T | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6X8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7T8 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8C, 8T | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 8C8, 8T8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 33, 35 | T-13R00 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43A | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47, 50 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 52A, 54A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56S | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62BX, 63, 63BX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78B, 78X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R04 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 105, 106 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 116B, 116X, 117B | T-13R15 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 117X | T-13R15 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 402T | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 410, 412T | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 501T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 510 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 515 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 520 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 521TC, 525 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 615, 625 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 711T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715, 725 | T-13R13 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 731TC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 815, 825 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 831TC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Dual Tone Control permits changing audio frequencies to suit every requirement. Fully described in Thordarson Amplifier Guide No. 346. Postpaid 15 cents.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GILFILLAN BROS. (Contd)** | | | | | | |
| 1131C | T-13R15 | ☆ | ☆ | §Special | T-13A36 | T-57S01 |
| 1331C | T-13R14 | ☆ | ☆ | ☆ | T-13A36 | T-57S01 |
| **A. H. GREBE & CO.** | | | | | | |
| AH1 | T-56R05 | T-13C28 | ☆ | ☆ | T-57A42 | T-57S01 |
| HS3 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| HS4, (1 pentode) | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| HS4 (pp 45 or 47) | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SK4 | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| AC7 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29 99 | ☆ |
| HS7, HS8 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| HS11, HS12 | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 89 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111B | T-13R07 | T-67C49 | ☆ | ☆ | T-67D78 | T-13S41 |
| **GRIGSBY-GRUNOW CO. (See also Majestic)** | | | | | | |
| 15, 15B | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20, 21, 22, 23 | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 25, 25B | T-56R05 | T-13C30 | T-74C30 | ☆ | T-74A31 T-74C30 | T-57S01 |
| 30 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 31 | T-13R05 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 35 | T-56R05 | T-13C30 | ☆ | ☆ | T-57A42 T-74C30 | T-57S01 |
| 44, 49 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 51 | T-13R04 | T-13C28 | ☆ | ☆ | T-57A42 | T-57S01 |
| 52 | T-13R06 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56, 57, 58 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 59 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 | T-56R05 | T-13C30 | T-13C29 | ☆ | T-57A42 | T-57S01 |
| 70 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 71, 72 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 75 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 77 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 85, 86 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| 90, 90B | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 91, 92, 93 | T-13R04 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| 100B | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 101, 102, 103 | T-13R04 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| 130A, 131, 132 | T-13R07 | T-13C30 | T-13C30 | ☆ | T-57A42 | T-57S01 |
| 150, 151, 153, 154, 155, 156 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 159 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 160 | T-56R05 | T-13C30 | T-13C29 | ☆ | T-57A42 | T-57S01 |
| 194 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 195 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 200, 201, 203, 204 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 210, 211, 214, 215 | T-13R06 | T-13C30 | ☆ | ☆ | T-74A31 | T-57S01 |
| 230, 233 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 251, 251B, 253, 253B, 254, 254B | T-13R04 | T-13C30 | ☆ | ☆ | T-13A35 | T-57S01 |
| 310A, 310B, 311, 314, 315 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **GRIGSBY-GRUNOW CO. (Contd)** | | | | | | |
| 330, 331, 336 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 351, 352, 353 | T-13R04 | ☆ | ☆ | ☆ | T-13A35 | T-57S01 |
| 360, 363 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 370, 371, 373 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 390, 393 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| 440 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460, 461, 463 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 560, 566 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 800, 998 | T-13R04 | ☆ | ☆ | ☆ | T-67D47 | T-57S01 |
| **GULBRANSEN CO.** | | | | | | |
| 10, 13 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 60 Champion Jr., 63 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 160, 161 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 200, 291, 292, 295 | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 352 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 872 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9950 | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **THE HALLICRAFTERS, INC.** | | | | | | |
| 5T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H8PA | T-13R19 | ☆ | ☆ | ☆ | ☆ | §Special |
| S8A, S9, SK9 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| S10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S11 Super Sky Rider | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| S12 Comm. Sky | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| S14 Sky Chief, Sky Buddy | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S15 Sky Challenger | T-13R13 | T-13C28 | ☆ | ☆ | ☆ | ☆ |
| SX16 Super Sky Rider 38 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | ☆ |
| SX17 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| S19R Sky Buddy | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SX23, SX24 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **HAMMARLUND MFG. CO.** | | | | | | |
| Comet Pro st'd Xtal | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| Comet Pro Dec. '31 | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| **HOWARD RADIO CO.** | | | | | | |
| AVH, EX (Dual Range) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D, F Radio D, F Audio Amp. | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| SG "A" | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SG "B," O | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| SG "C" | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | T-57S01 |
| SG "T" | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X2, X3 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| Z4 | T-13R09 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 6B, 6BA, 7BT | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| Green Diamond "8" (71's) | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **HOWARD RADIO CO. (Contd)** | | | | | | |
| Green Diamond (45's) | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| X8 | T-13R12 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| R9 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 20, 25, 32 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 35, 40 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 67C, 67T, 68 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 77C, 77T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 99C, 99T | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 118, 218 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 218 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 220, 225, 225S | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 240-1, 240-2 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, S250 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 256, S256 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| E256, 260, S260 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 266 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 268, 275C, 275T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 280 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 300 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 301, 303 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 302S, 302APC | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 305, 306, 307 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 318 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 318D | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 325 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 325D | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 368 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 375 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 377 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 400 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 400X | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 425 | T-13R15 | ☆ | ☆ | ☆ | T-74C30 | T-13S41 |
| 430 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 438 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 468 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 520 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 525 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 568 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1626 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| **COLIN B. KENNEDY CORP.** | | | | | | |
| 10 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 20 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 26 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 30, 32 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42, 42B | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 50 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 52 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 55 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| **COLIN B. KENNEDY CORP. (Contd)** | | | | | | |
| 60 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 62, 62A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 63, 63A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 80 | T-56R01 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 563A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 826B | T-13R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 882-62D | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 882-64C | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| **KOLSTER RADIO INC. (Brandes)** | | | | | | |
| A-1 | T-13R05 | ☆ | ☆ | ☆ | ☆ | ☆ |
| 6J, 6K, 6L, 6M, 6R | T-56R01 | T-13C29 | T-13C28 | ☆ | T-29A99 | T-18C92 |
| B10, B11, B12 | T-13R09 | §Special | T-13C28 | T-29A99 | T-33A91 | ☆ |
| B15, B16 | T-13R09 | T-13C29 | ☆ | T-33A91 | T-33A91 | T-57S01 |
| K20, K21, K22, K23 | T-56R01 | T-13C29 | T-18C92 | T-29A99 | T-29A99 | T-18C92 |
| K25, K27, K37 | T-56R01 | T-13C29 | T-18C92 | T-29A99 | T-29A99 | T-18C92 |
| K43, K43A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| K60 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| K70 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| K73 | ☆ | T-13C27 | ☆ | ☆ | ☆ | T-57S01 |
| 80 | T-13R07 | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| K83 | ☆ | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| 90 | T-13R07 | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| K93 | ☆ | T-13C30 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| K110, K120, K122 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K130, K132 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| K140, K142 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| **MAJESTIC RADIO & TELEVISION CO.** | | | | | | |
| 1A50 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1A59, 1A59B, P1A59 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1B59, P1B59B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2A50 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3C70, 3C80 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3SC80 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3C90 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BDA, 5BEA | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 56, 62A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 65, 66 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 67, 68 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 75, 76 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85, 86 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 511, 511A, 519P | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 551, 620 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 639, 639B | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 650 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 739, 750 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 850 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 939 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1050 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1056X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1058X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1250 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MAJESTIC RADIO & TELEVISION CO. (Contd)** | | | | | | |
| 1356X | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1870 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **MONTGOMERY WARD & CO.** | | | | | | |
| 04WG-725 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 11 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 15, 16 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 17 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 21, 22 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-010 | T-13R03 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-020 | T-13R06 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 62-030, 62-040 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-060, 62-070 | T-13R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 62-7, 62-8 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-9 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-14 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 62-20 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-25 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-26 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-29 | T-56R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-30 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-34 | T-13R03 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 62-38, 62-40 | T-56R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-PC43 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-50 | T-56R05 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-70, 62-70X | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-72X | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-97, 62-97X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-99, 62-99X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-101, 62-101X | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-103, 62-105 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-106, 62-107 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-121 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-131 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-132 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-133 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-135 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-140, 62-140X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-142 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-144 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-147 | T-13R12 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-148, 62-148X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-150 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-152 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-154 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-156 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-164 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-173, 62-175 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-176 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-177 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-179 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-181 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **MONTGOMERY WARD & CO. (Contd)** | | | | | | |
| 62-185, 62-187, 62-190 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-193 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-194 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-196 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-206, 62-216 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-218 | T-13R09 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-226, 62-228 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-232 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62-233, 62-235 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-248, 62-259 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-261 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-267 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-274, 62-276 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-277 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-280 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-288 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-290 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-297 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-301, 62-301X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-304 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-306 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-307 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-308 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-309 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-311 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-315 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-316 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-318 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-321, 62-451 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-323 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-324 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-345 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-346, 62-350 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-347 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-351, 62-352 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-357 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-361, 62-362 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-367 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-370 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-372 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-380 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-390 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-401, 62-402 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-403 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-404 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-406 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-407 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-408 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-411 | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 62-415 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MONTGOMERY WARD & CO. (Contd)** | | | | | | |
| 62-416 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-418 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-425 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-445, 62-455 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-449 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-457 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-465 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-13S43 |
| 62-467 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-471, 62-472 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-473 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 62-475, 62-476 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-479 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-490 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-497 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-500, 62-601 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-606, 62-616 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-700 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-701, 62-702, 62-703 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-704 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-712 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-900 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1100, 62-1101 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 62-1611 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1711 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62-1838 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-711IB | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-391A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-714A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-715B 93BR-716A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-717A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93BR-1201A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93WG-382 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 93WG-800, 93WG-801, 93WG-802, 93WG-805, | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 93WG-1000, 93WG-1001 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 93WG-1103, 93WG-1104 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 811, 1111, 1238 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1355 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1800 | T-56R02 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 1955 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 2822, 2827, 2895 2897 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 2955X, 2957X | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 3035, 3037, 3065, 3067 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 10,000 | T-13R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 11,000, 14,000 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62,000 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **MOTOROLA (See Galvin Mfg. Co.)** | | | | | | |
| **PHILCO RADIO & TELEVISION CORP.** | | | | | | |
| 5 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | T-18C92 |
| 12TP | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14, 15 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 16, 17 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 18 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 19 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20, 20A | T-13R00 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 21 | T-13R04 | T-13C30 | ☆ | ☆ | §Special | §Special |
| 22L | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 23X, 29 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 37-62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-84 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-93 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 37-600 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-7, 38-8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-9, 38-10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-15 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 38-22, 38-23 | ☆ | T-14C63 | ☆ | ☆ | T-33A91 | T-13S41 |
| 39-55 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-116 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-117 | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-119 | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39-770 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-130, 40 135 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-140, 40-145 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-165 | T-13R11* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-205 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-216 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-503, 40-506 | T-13R12* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-507 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-510 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-516 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40-525 | T-13R12* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43 | T-13R13 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 47 | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 49 | ☆ | T-13C28 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| 50, 50A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 51, 51A, 52 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 57, 58, 59 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 65 | T-13R06 | T-13C29 | T-74C30 | ☆ | T-57A42 | T-57S01 |
| 66 | T-13R13 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 70, 70A | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 71 | T-13R13 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 76, 77 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 77A, 78 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80, 81 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 84 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | T-57S01 |

**End your transformer troubles by using Tropex Transformers.** **See page 32.**

*Disregard 5 volt winding.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **PHILCO RADIO & TELEVISION CORP. (Contd)** | | | | | | |
| 87 | T-56R03 | T-13C30 | T-13C28 | T-29A99 | T-33A91 | T-57S01 |
| 89 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 90, 90A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 91 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 95, 96, 96A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 97, 98 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 107 | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111, 111A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 112, 112A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 116B | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 118 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 144 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 200X, 201 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 211, 211A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 212, 212A | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 220, 220A | T-13R00 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 245 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 264, 265 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 270, 270A | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 296, 296A | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 370, 470, 470A | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 503 | T-13R14 | T-13C30 | ☆ | ☆ | T-17D01 | T-57S01 |
| 504, 505 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 507 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 509 | T-13R16 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 511 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-33A91 | §Special |
| 570 | T-13R07 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 600, 610 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 620, 625 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 630, 635 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 641 | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 645 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 650 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 651 | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 655, 660, 665 | T-13R15 | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| **PILOT RADIO & TUBE** | | | | | | |
| PE6SG | T-13R00 | T-13C29 | T-13C27 | T-29A99 | T-33A91 | T-57S01 |
| 7, 8, L8 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10, 12, 20 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 31 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 39 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 41 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| X41 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 43 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 45 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53, 55 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 63, X63, X65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 81, 84 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-102 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 103, 105, X105 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **PILOT RADIO & TUBE (Contd)** | | | | | | |
| T-122 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K111, Power Pack | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 114, 115 | T-13R16 | T-75C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| K122 | T-13R00 | T-13C39 | T-13C27 | T-29A99 | T-33A91 | T-57S01 |
| K126, K128 | T-13R06 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| K136 | T-13R05 | T-13C29 | T-13C29 | T-29C27 | T-33A91 | T-57S01 |
| S148 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S155, S155A, S155B, S155F, C157, C157A, C157B, C157F | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| S162, S164 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C165 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 183, 185 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 193, 195 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 213, 215 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 293, 295, S295 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 364, 365 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S393, 395 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 403, 405 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| H554, H555 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| BG562, BG563 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G576, G577 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G584, G585 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| H664, H665 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| G752, G753 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1010 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-1664, T-1764 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T-1854 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **R. C. A. MFG. CO., INC.** | | | | | | |
| AVR-1 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| HF-1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R4 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 5Q1, 5Q2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5Q4, 5Q5 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-5, R-5X | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T, 5T-1, T5-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-4, 5T-5, 5T-6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5T-7, 5T-8, 5U | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C6-2, C6-12 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6K, 6K-2, 6K-3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6Q1, 6Q4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6Q8 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R6 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 6T, T6-1, 6T-2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T5, T6-9, T6-11 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C7-6, C7-14 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D7-7, 7K, 7K1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R7A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| R7DC | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 7T, 7T1, T7-5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7-11, 7-26 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| T7-12, 7U, 7U2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.
*Disregard 5V winding.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| C8-15, C8-17 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C8-19, C8-20 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D8-28, 8K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8K11 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8Q2, 8QU5C, 8QU5M | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8Q4 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8T2, 8T11 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T8-14, T8-16 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8U, 8U2 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| C9-4, C9-6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| CRD 9 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| D9-19 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K1 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K2 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9K3 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 9Q4 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9T | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T9-9, T9-10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9 tube AW | T-13R06 | T-13C28 | ☆ | ☆ | T-67D47 | T-57S01 |
| R9DC | ☆ | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 9U, 9U2 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10K | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-13S42 |
| 10K1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 10T | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-13S42 |
| T10-1, T10-3 | T-13R14 | ☆ | ☆ | ☆ | T-81D52 | T-57S01 |
| U10 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U12, U20 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| D11-12 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| R11 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| C13-2 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| C15-3 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 15U | T-13R09 | T-67C49 | ☆ | ☆ | T-33A91 | T-57S01 |
| 16K, 16T3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16T2 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16T4 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE 16A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 17K, 18T | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R17 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| Radiola 17 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| Radiola 18DC | ☆ | T-13C28 | §Special | T-29A99 | T-29A99 | §Special |
| R18 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| RE-18 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 19K | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R-19 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| Q20 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE-20 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D-22 | T-13R13 | T-68C08 | ☆ | T-52C98 | T-57A41 | §Special |
| PK23A1 Amp. | T-13R01 | T-13C27 | T-13C27 | ☆ | ☆ | ☆ |
| R23 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| TB-28-M1 | T-13R06 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 25-DC | ☆ | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| U25, U26 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A-28-P | T-13R02 | ☆ | ☆ | ☆ | ☆ | ☆ |
| R-28 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-28-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-32 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 33AC | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| R-35 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| R-37 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-37-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-38, R-38-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| R-39 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| RE-40, RE-40-P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 42, R-43 | T-13R07 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| U42 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U43 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U44, U45 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 44 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-18C92 |
| RE-45 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 46 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-18C92 |
| 47 | T-13R06 | T-13C29 | T-13C28 | ☆ | ☆ | T-57S01 |
| 48 | T-13R07 | T-13C30 | ☆ | ☆ | T-29A99 | T-57S01 |
| R50 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| K50, T55, T56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RE52 | T-56R03 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| R55 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| RE57 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| K60, K62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T60, T62 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K61 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Radiola-62 | T-13R00 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01<br>T-18C92 |
| PG63 | T-13R04 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| T63, T64, T65 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 66 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| R70 | T-13R03 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| R71, R72 | T-13R05 | T-13C29 | ☆ | ☆ | T-29A99 | T-57S01 |
| R73 | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| R73A | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| R75 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| RAE-79 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| K80, K81, K82 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| T80 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Radiola 80 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| RE80 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 82 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| 84BT6 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| 85E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85T1, 85T5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Interested in building amateur radio receivers or transmitters? Full instructions and diagrams in Thordarson Transmitter Guide No. 344, post-paid 15 cents.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| 86 | T-13R04 | §Special | ☆ | ☆ | T-57A42 | T-57S01 |
| 86E, 86K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86K7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T, 86T-1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T-3, 86T-4 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 86T6, 86T44 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 87K1, 87T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 87T1, 88K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R90 | T-13R04 | T-18C92 | ☆ | ☆ | T-57A42 T-29C27 | T-57S01 |
| R90P | T-13R06 | T-13C27 | ☆ | T-29C27 | T-33A91 | T-57S01 |
| 94BT6 | T-14R39 | T-14C63 | ☆ | ☆ | ☆ | T-57S01 |
| 95T | T-13R11 | T-13C30 | ☆ | ☆ | T-81D52 | T-13S41 |
| 95T5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 95T5LW | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96E, 96K | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96K2, R96 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96T, 96T1 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 96T2, 96T3 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 97E, 97KG | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R97, 97T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R99 | T-13R09 | T-13C30 | ☆ | ☆ | T-81D52 | T-13S41 |
| U101, U102E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U103 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| K105 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U105, U106 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U107 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U109 | T-13R16 | T-67C49 | ☆ | ☆ | T-81D52 | T-13S41 |
| RCA 110, 111 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| ACR111 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U111 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 115 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 117, 118 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 120 | T-13R04 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 121 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 122 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| U122E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 124 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| U124, 128E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| ARC 136 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 140, 141 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 141E | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 143 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| ACR 175 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 210 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-75S01 |
| 211 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 214 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 221 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 220, 222 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 224, 224E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **R. C. A. MFG. CO., INC. (Contd)** | | | | | | |
| 240 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 242, 243 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 260, 261 | T-13R06 | T-13C27 | ☆ | T-29C27 | T-33A91 | T-57S01 |
| 262, 263 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 281 | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 310 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| DUO 320, 321 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 322 DUO | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 330, 331 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 332E DUO | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340 DUO, 340E | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 341 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 381 DUO | T-13R15 | ☆ | ☆ | T-57A41 | T-74D32 | T-13S41 |
| 810K, 810K1 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 810T, 810T4 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 813K | §Special | T-13C30 | ☆ | ☆ | T-17D01 | T-57S01 |
| **SEARS ROEBUCK & CO.** | | | | | | |
| FF, J | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 49-50 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 52, 53, 54 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | §Special |
| 56 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 92, 93 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-29A99 | ☆ |
| 94, 95, 99, 100 | T-13R04 | T-13C30 | ☆ | T-29A99 | T-33A91 | §Special |
| 108 | T-56R01 | T-47C07 | ☆ | T-29A99 | T-33A91 | §Special |
| 109 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 110, 111, 112, 114, 116 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 388, 388X | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 709, 719 (International) | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 802, 812 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 1130, 1132 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1150 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1152 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1170 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1174 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1250, 1252 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1260 early | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 1260 late | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1280, 1282 | T-13R03 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 1310, 1311, 1312 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 1320, 1322, 1324 1326 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 1370 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1390, 1400, 1402 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1404, 1406 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1420 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1430 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1506 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 1580, 1582, 1584 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1590, 1592 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1597, 1598 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 1600 Converter | T-13R01 | T-74C30 | ☆ | ☆ | ☆ | ☆ |
| 1660 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1708 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1708A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1709 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1720 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1721, 1722, 1722X | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1725 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1726 | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54 T-57S01 |
| 1729 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1731 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1732X | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54 T-57S01 |
| 1743, 1743A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1760 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1800 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1802, 1803, 1803A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1804, 1805 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1805A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1806 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1807 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1808A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1809 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1811 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1820 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1821 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1823 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1826 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1826A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1827 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1829 | T-13R08 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1832, 1832A | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-67S54 T-57S01 |
| 1833, 1835 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1840 | T-13R04 | ☆ | ☆ | ☆ | ☆ | §Special |
| 1841, 1845 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1900 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1904, 1904A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1905 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1906 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1909 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1912 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1914 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1915, 1917 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1918, 1918A | T-13R09 | ☆ | T-47C07 | ☆ | ☆ | T-57S01 |
| 1930, 1940 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1941 | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1942, 1944, 1945 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1946 | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1954, 1954X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1955 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 1956 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1962 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1964, 1964A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1965 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1967, 1967A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1968, 1968A | T-13R09 | ☆ | T-47C07 | ☆ | ☆ | T-57S01 |
| 1970A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1972 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1981, 1981C | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 1986, 1987 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1988 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1994, 1998 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3972 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4401, 4402 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4403 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4405A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4428A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4431, 4432 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4433 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R4433 | T-56R01 | T-47C07 | ☆ | T-29A99 | T-33A91 | §Special |
| 4435, 4436 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4448A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4453 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4461, 4462 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4463, 4464 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4465 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4466, 4467 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4469 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4472, 4473 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4484, 4485 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4486, 4488 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4488A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4488B | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4528A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4531, 4533 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4548A | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4563 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4564, 4565 (Dup.) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4566, 4567 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4569 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4586, 4586A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4587, 4588 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4588A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4589 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4610 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4613 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4622, 4623 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4640 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4643 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4650 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4664 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 4667 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4668 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4469 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S43 |
| 4677 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4684 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4688 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 4722, 4723 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4740 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4743 | T-14R39 | T-14C62 | ☆ | ☆ | ☆ | T-13S43 |
| 4750 | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 4764 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4769 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4776 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4784 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 4788 | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 4789 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S43 |
| 4796 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4799 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 5710, 5711 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6002 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6003, 6004 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6021 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6024 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6028 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6031 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6034 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6036 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6038 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6121 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6124 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 6131 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6136 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6138 | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6140 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6155, 6156, 6254 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6157 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 6337, 6437 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 7043, 7044 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 7049 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7050 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7065 | T-13R09 | ☆ | ☆ | ☆ | T-67A91 | T-13S41 |
| 7121 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7124 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7136, 7137 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7140 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7143 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7144, 7150 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7153 | T-13R01 | ☆ | ☆ | ☆ | ☆ | §Special |
| 7154, 7155 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7158 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7170, 7170A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **SEARS ROEBUCK & CO. (Contd)** | | | | | | |
| 7171 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7172 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7181, 7182 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7221 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7230 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7234 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7807 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **SENTINEL RADIO CORP. (See also Erla)** | | | | | | |
| 6A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8, 9, 11, 12 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 14, 14A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 15, 16 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 19A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 20A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 30A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40B, 44A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 47A | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 48A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 52A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 53A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 54A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 70A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 72A, 72AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74A, 74AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 76A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 82A, 82AE | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 92AE, 98AE | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 99AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 103A | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 104 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 106A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 106B | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 108, 108A | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 109, 110 | T-13R04 | T-13C29 | T-13C29 | ☆ | ☆ | T-57S01 |
| 110A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 111 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 114, 115 | T-13R04 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 116 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 118 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 125 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 125AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 138AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 141AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 142A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 142AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 145AE | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 148A | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 149A, 149AE, 159AE | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 158AE | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 185A | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SENTINEL RADIO CORP. (Contd)** | | | | | | |
| 198A, 198AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 199A, 199AE | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 206A | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 440, 444 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 513 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 622, 623 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 634, 635 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660AC, 666, 666C | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 4500 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5700, 5700B | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5721 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5800 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6315, 6317 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6321 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7100, 7100B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7200 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7200B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8100B | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8200B | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| **SILVER-MARSHALL, INC.** | | | | | | |
| A | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A31 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| B | T-13R03 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| C, CW (AVC) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| D, E, F | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| G | T-13R06 | T-13C29 | T-74C30 | T-29A99 | T-33A91 | T-57S01 |
| J | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| Q, R | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| Z deluxe, Z10 | T-13R07 | T-13C30 | ☆ | ☆ | T-81D52 | T-57S01 |
| Z13 | T-13R07 | T-13C30 | ☆ | ☆ | T-67D78 | T-13S41 |
| 30 series, 30B | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 33A, 34A, 35A | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36A, 37 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 38, 39 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 60B, 75, 75B, 90B | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 683 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| SM684 | T-13R04 | T-13C30 | T-13C30 | ☆ | T-33A91 | T-57S01 |
| 716 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 722AC | T-13R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 724 | T-13R06 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 726 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 727SW | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 729SW | T-13R07 | T-13C30 | ☆ | ☆ | T-81D52 | T-57S01 |
| 737 | T-13R02 | T-13C28 | T-13C28 | ☆ | ☆ | §Special |
| 773, 782 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **SONORA ELEC. PHONOGRAPH CO.** | | | | | | |
| A31, A33, A35 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 64 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 70 | T-13R06 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 74 | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SPARKS-WITHINGTON CO. (SPARTON)** | | | | | | |
| 5, 9 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10, 12 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 14 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 15 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 16, 16AW | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 17, 18 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 25, 26, 26AW | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 27, 27A, 27X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 28, 28X | T-13R07 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 30, 45 | T-13R07 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 46P | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 60 Super Converter | T-13R01 | T-13C26 | ☆ | ☆ | ☆ | ☆ |
| 67, 68, 68XS | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 71, 71B, 72 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 73, 73AX, 73BX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 74 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 75A, 75AX | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 78 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 80, 83, 84 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 85-X, 86-X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 104, 105, 105XS | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 111X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 135 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 235 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 417X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 420 DC, JR Jewel | ☆ | T-18C92 | ☆ | ☆ | T-33A91 | T-57S01 |
| 427X, 437X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 457X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 475A, 478A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 516, 516X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 517 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 518, 518X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 530X | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 536, 536X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 537, 538, 538X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 540LX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 546X, 548X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 550M | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 557, 558B, 558C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 567, 568 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 577 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 580X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 591, 593 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 616, 616M | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 616MX, 616X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 617, 617X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 620 | T-37R70C | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 628, 636MX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640LX, 740LX | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660M | T 13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**For complete description of these and other Thordarson transformers and chokes see catalog No. 400.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **SPARKS-WITHINGTON CO. (Contd)** | | | | | | |
| 666, 666M | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 666MX, 666X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 667, 667X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 668, 678 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 685, 686, 691 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 716 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 727X, 727XD | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 728X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 737 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 738 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 740 | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 748X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 750 all DC | ☆ | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 750A, 750X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 760PS | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 766, 766X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 766XP, 766XS | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 768, 768X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 770, 880A | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 778, 778X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 827X, 827XD | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 867 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 870A, 870X | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 877X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 880 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 928X | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 930, 931 | T-37R70C | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 940LX, 940SX | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 966, 966X | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 968, 968X | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 977 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 987, 997X | T-13R16 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1068, 1068X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1078, 1078X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1089 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1116X, 1166 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1160 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1166XP, 1166XS | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1167 | T-13R09 | T-13C30 | T-13C28 | ☆ | T-33A91 | T-57S01 |
| 1176, 1176XP | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1176XS, 1186 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1196 | T-13R14 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 1268, 1288P | T-13R09 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 1567 | T-13R04 | T-13C30 | T-74C30 | T-29A99 | §Special | T-13S41 |
| **STEINITE RADIO CO.** | | | | | | |
| 8 Tube Pentode | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 40C, 45, 45A, 50A | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 60C | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 70, 80, 95 | T-13R05 | T-13C28 | ☆ | ☆ | T-33A91 | T-57S01 |
| 102C | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 102SPU | T-56R05 | T-13C29 | ☆ | T-29A99 | T-33A91 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STEINITE RADIO CO. (Contd)** | | | | | | |
| 203 | T-13R04 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 210, 230 | T-13R05 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 261, 262, 263, 264, 265 | T-56R01 | T-13C28 | T-13C28 | T-29A99 | T-33A91 | T-57S01 |
| 420 (15) | T-13R00 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 420 (17) | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | ☆ |
| 421, 425 | T-56R05 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 423 | T-13R03 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 450 (15) | T-13R00 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| 450 (17) | T-13R06 | T-13C30 | ☆ | ☆ | T-57A42 | ☆ |
| 642B | T-13R04 | T-13C29 | ☆ | ☆ | T-57A42 | T-57S01 |
| 700, 701 | T-13R03 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 705, 706, 725 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **STEWART-WARNER CORP.** | | | | | | |
| 01-5H1 to 01-5H9 (01-5H) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6D, 01-6DX, 01-6A, 01-6B, 01-6AX, 01-6BX | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6C9, 010-6C9X | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-6E1 to 01-6E9 (01-6E) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-8A1 to 01-8A9 (01-8A) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 01-8C7 (01-8C) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-9A7 (01-9A) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-8B1 to 01-8B9 (01-8B) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 01-521 to 01-529 (01-52) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-531 to 01-539 (01-53) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-541 to 01-549 (01-54) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-611 to 01-619 (01-61) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 01-811 to 01-819 (01-81) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-510 to 91-519 (91-51) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-611 to 91-619 (91-61) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 910-621 to 910-629 (91-62) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-641 to 91-649 (91-64) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-648 (91-64) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-711 to 91-719 (91-71) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-811 to 91-819 (91-81) | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 91-821 to 91-829 (91-82) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| R100, A, B, E | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| R101A, R101B | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 102A, B, E, | T-13R03 | T-44C02 | ☆ | ☆ | T-33A91 | T-57S01 |
| R104A, B, E | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 106 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| R110 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STEWART-WARNER CORP. (Contd)** | | | | | | |
| R116 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R120 | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 530, 535 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 715, 720, 750 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 801, 802, 811 | T-56R01 | T-13C29 | T-13C29 | ☆ | ☆ | ☆ |
| 901, 902, 903 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 911, 912, 913 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 951, 952, 953 | T-13R06 | T-13C30 | T-13C30 | T-29A99 | T-33A91 | T-57S01 |
| 1090, 1099 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1201-1209 (R120) | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1231-1239 (R123) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1251-1259 (R125) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1261-1269 (R126) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1271-1279 (R127) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1301-1309 (R130) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1341-1349 (R134) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1361-1369 (R136) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1371-1379 (R137) | T-13R09 | ☆ | T-47C07 | ☆ | T-57A41 | T-13S41 |
| 1381-1389 (R138) | T-13R09 | ☆ | T-47C07 | ☆ | T-57A41 | T-13S41 |
| 1401-1409 (R140) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1451-1459 (R145) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1461-1469 (R146) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1471-1479 (R147) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1481-1489 (R148) | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| 1491-1499 (R149) | T-13R15 | ☆ | ☆ | ☆ | T-57A41 | T-13S41 |
| 1631D-1639D (R163D) | T-14R39 | ☆ | ☆ | ☆ | T-78D46 | T-81S01 |
| 1671-1679 (R167S) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1691-1695 (R169) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1721-1729 (R172) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1731-1739 (R173) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1801-1809 (R180) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1811-1819 (R181) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1821-1829 (R182) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1831-1839 (R183) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1841-1849 (R184) | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 1851-1859 (R185) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 1861-1869 (R186) | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 3041-3049 (R304) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **STROMBERG-CARLSON TEL. MFG. CO.** | | | | | | |
| 10, 11 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 19, 20 | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 22, 22A | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 25, 26 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 29 | T-13R06 | T-13C29 | T-13C29 | ☆ | §Special | T-57S01 |
| 37, 38, 39 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 40, 41 | T-13R06 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 52, 54 | T-13R07 | T-75C51 | ☆ | T-33A91 | T-58A70 | T-13S41 |
| 58-L, 58-LB, 58-T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 58-TB, 58-W, 58-WB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **STROMBERG-CARLSON TEL. MFG. CO. (Contd)** | | | | | | |
| 60 | T-13R13 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 61-L, 61-LB, 61-T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 61-TB, 61-W, 61-WB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 62, 63 | T-13R15 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 64 | T-13R15 | T-13C30 | ☆ | T-29A99 | T-17D0 | T-13S41 |
| 70, 72 | T-13R08 | T-67C49 | ☆ | ☆ | T-67D78 | T-67S92 |
| 80 | T-13R16 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| 82, 82B, 83, 83B | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 84, 84B | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 130 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 140H, 140HB | T-13R14 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 140K, 140KB | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 140-L, 140-P | T-13R14 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 145-L, 145-LB | T-13R16 | T-67C49 | ☆ | ☆ | §Special | T-13S42 |
| 145-P, 145-PB | T-13R16 | T-67C49 | ☆ | ☆ | §Special | T-13S42 |
| 150-L, 150-LB | T-13R15 | T-67C49 | ☆ | ☆ | §Special | T-13S41 |
| 160-L, 160-LB | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 180-L, 180-LB | T-13R16 | T-67C49 | ☆ | ☆ | T-17D01 | T-13S41 |
| 228 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 229P | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 230 series, 231 series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 235H, 235HB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 235-L, 235-LB | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 240 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 245 series | T-13R15 | ☆ | ☆ | ☆ | T-17D01 | T-13S41 |
| 250-L, 250-LB | T-13R16 | T-67C49 | ☆ | ☆ | ☆ | T-13S41 |
| 255-L | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 260 series | T-13R16 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| 320-H, 320-T | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 325-J, 325-M, 325-S | T-13B19 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 335-L, 336-P | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 337-H, 337-L | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340-F, 340-H, 340-M, 340-V, 340-P | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 341-P, 341-R | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 345-F, 345-M | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 350-M, 350-P, 350-R, 350-V | T-13R16 | T-13C30 | ☆ | ☆ | ☆ | T-13S41 |
| 400 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 410, 411, 412, 420 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 430 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 435 (AM) | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 435 (FM) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 455 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 635, 636 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-29A99 | T-18C92 |
| 638-AC | T-13R05 | T-13C29 | ☆ | T-29A99 | T-29A99 | T-18C92 |
| 641, 642 | T-13R05 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 652, 654 | T-13R05 | T-13C29 | T-13C29 | ☆ | T-29A99 | T-57S01 |
| 846, 848 | T-56R05 | T-13C30 | T-13C29 | T-29A99 | T-33A91 | T-57S01 |
| **TRANSFORMER CORP. OF AMERICA (CLARION)** | | | | | | |
| TC1, TC2, TC6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| TC20, TC21 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Prices and dimensions for all transformers and chokes shown herein listed on page 3.**

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **TRANSFORMER CORP. OF AMERICA (Contd)** | | | | | | |
| TC22, TC23 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 25-220 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| TC39, TC39A, TC39LW | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40 | T-13R04 | T-13C29 | T-18C92 | ☆ | §Special | T-57S01 |
| TC40 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| TC42, TC43, TC44 | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 51, 53 | T-13R07 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| TC53A | T-13R08 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 55 | T-13R07 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 60 Jr. | T-13R04 | T-13C29 | T-18C92 | ☆ | §Special | T-57S01 |
| 61, 70 | T-13R04 | T-13C29 | T-18C92 | ☆ | T-33A91 | T-57S01 |
| 80, 84, 85 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 94 | T-56R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 100 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 160 | §Special | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 220 | T-13R03 | T-13C28 | T-13C28 | ☆ | ☆ | T-57S01 |
| 241 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| AC-260 | T-13R06 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| AC-280 | T-13R07 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| AC-320 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 340 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-67S52 |
| 490 | T-13R06 | T-13C29 | ☆ | ☆ | T-67D47 | T-57S01 |
| **UNITED AMERICAN BOSCH CORP. (BOSCH)** | | | | | | |
| 4 Essex | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10 Essex | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 20J, 20K, 20L | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 28 | T-56R01 | T-13C28 | ☆ | T-29A99 | T-33A91 | §Special |
| 36, 37 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40, 41AC | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 46 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 48 | T-13R06 | T-13C30 | T-74C30 | ☆ | T-33A91 | T-57S01 |
| 54DC | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 56 Batt. | ☆ | ☆ | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 58, 60 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 62DC, 63DC | ☆ | T-13C27 | ☆ | ☆ | T-33A91 | T-57S01 |
| 66, 96 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 107 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | §Special |
| 116, 126, 136 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 146, 166, 176 | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 200, 201 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 205, 206, 211 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 236, 237 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 242, 243 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 260, 261 | T-56R05 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 305 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 306 | T-13R14 | §Special | ☆ | ☆ | T-74A31 | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **UNITED AMERICAN BOSCH CORP. (Contd)** | | | | | | |
| 307 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 310A | T-13R06 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 352 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 360 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 370 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D47 | T-13S41 |
| 420, 421 | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 430, 430J, 430T | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 440C, 440T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 450H, 450L | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460, 460A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 460B, 460R | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R15 | T-13C30 | T-13C28 | ☆ | §Special | T-13S41 |
| 505, 510, 510E | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 515 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 565K, 565W | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 570G, 570U | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 575F, 575Q | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 585, 585Y, 585Z | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 595M, 595P | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 605, 605C | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 640, 650 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 660C, 660T | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 812 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1350 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **UNITED MOTORS SERVICE (DELCO)** | | | | | | |
| 1102, 1103, 1104 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1105, 1106, 1107 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1108 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1109 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 1110 | T-13R09 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| R1115 early-late | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1116, R1117 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1118 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1119 | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-13S41 |
| R1120 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1125 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1126, R1127 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1128 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1129 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1130, R1131 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| R1132 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| R1140, R1141 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1142 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1143 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1144 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R1145 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| R6011, R6012 | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| R6015 | T-14R39 | T-14C63 | ☆ | ☆ | T-78D46 | T-81S01 |
| **U. S. RADIO & TELEVISION CORP. (APEX)** | | | | | | |
| 5A | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7AC, 7D (700) | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes: T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-29A99.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **U. S. RADIO & TELEVISION CORP. (Contd)** | | | | | | |
| 8 | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 10, 10C (1000-1001) | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 24 (400) | T-13R01 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 25 (500) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 26, 26P | T-13R03 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| 27, 27P | T-13R03 | T-13C28 | ☆ | ☆ | T-29A99 | T-57S01 |
| 28 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 29, 31, 32 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 36, 37 apex | T-56R01 | T-13C29 | T-13C29 | T-29A99 | T-29A99 | ☆ |
| 41-60 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 42-60 | T-13R06 | T-13C30 | T-18C92 | T-29A99 | T-33A91 | T-57S01 |
| 43-25, 44-25 | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 46, 46A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 47, 47A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 48, 48A | T-13R06 | T-13C30 | ☆ | T-29A99 | T-33A91 | T-57S01 |
| 80 | T-56R01 | T-13C29 | ☆ | T-29A99 | T-33A91 | §Special |
| 99, 99X | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 112A | T-13R01 | T-13C27 | ☆ | ☆ | ☆ | ☆ |
| 160, 250 (90) | T-13R06 | T-13C29 | T-74C30 | T-29A99 | T-33A91 | T-57S01 |
| 3040, 3056 (507) | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3070 (1009) | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| **WELLS-GARDNER & CO.** | | | | | | |
| C, CG | T-56R03 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 0DM | T-13R08 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 0EL | T-13R14 | ☆ | ☆ | ☆ | §Special | T-57S01 |
| 02A | §Special | T-13C30 | ☆ | ☆ | T-81D42 | T-57S01 |
| 07A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 073DC | ☆ | T-13C29 | T-13C29 | ☆ | T-33A91 | T-57S01 |
| A1 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A2 series | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A4 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A5 series, 5D series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5F, 5FL, 5K, 5KL | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6C series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6D series, 6K | ☆ | T-13C28 | ☆ | ☆ | T-67D50 | T-57S01 |
| 7D series (27D1, 27D5) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7F, 7FL | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7GM series (37G-508, 37G-566) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7J, 7K series | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A8 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A10 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A12 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A14 series | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A15 series | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 40 | T-13R04 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| 40A | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-57S01 |
| 72 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 80, 82A | T-13R06 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 502 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 572AC | T-56R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **WESTINGHOUSE ELECTRIC SUPPLY CO., INC.** | | | | | | |
| WR-4, WR-5 | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-6, WR-6-R | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-7, WR-7-R | T-13R07 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-10 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-10-A | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-12, WR-13 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-14, WR-14-CR | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-15 | T-13R07 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-15-A, WR-16 | T-13R07 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-17 | T-13R04 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-18, WR-19 | T-13R07 | ☆ | ☆ | ☆ | T-29A99 | T-57S01 |
| WR-20 | T-56R05 | T-13C30 | ☆ | ☆ | T-78D46 | T-57S01 |
| WR-21 | T-13R05 | ☆ | ☆ | ☆ | §Special | §Special |
| WR-22 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-23, WR-24 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-27 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-28, WR-29 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-30, WR-31 | T-13R07 | T-13C30 | ☆ | ☆ | §Special | T-13S41 |
| WR-35 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-36 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-37 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-38, WR-39 | T-13R07 | T-13C29 | ☆ | ☆ | §Special | T-13S41 |
| WR-45, WR-45-A | T-13R15 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| WR-46, WR-46-A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-48, WR-48-A | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-49, WR-50 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-53 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-201 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-203, WR-204 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-205, WR-208 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-209, WR-210 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-211, WR-211-A | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-211U, WR-211X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-212, WR-212X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-214 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-222 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR224 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-226 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-228 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-256 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR258 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR260 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-264 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR270 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-303, WR-304 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-305 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-306 | T-13R14 | T-67C49 | ☆ | ☆ | §Special | T-13S41 |
| WR-310, WR-311 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-311X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-312 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **WESTINGHOUSE ELECTRIC SUPPLY CO., INC. (Contd)** | | | | | | |
| WR-312X | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-314 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WR-315 | T-13R16 | ☆ | ☆ | ☆ | §Special | T-13S41 |
| **WESTONE RADIO CORP.** | | | | | | |
| 11, 12, 70, 70C | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **WILCOX-GAY CORP.** | | | | | | |
| 2S5, 2T5 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2VA7, 2VB7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3D5, 3F7 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3S5-66, 3SB5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3V6, 3VA6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 3VB6 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4C5, 4CA5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4CB5, 4CD5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4D10, 4DB10 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-58S72 |
| 4E6, 4G7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4H11 | T-13R09 | ☆ | ☆ | ☆ | ☆ | T-67S92 |
| 5B5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BA5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BC5 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5BE6 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5E7, 5EA7 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5E8, 5E9 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A5 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B5 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B8, 6F6 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6FB6 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6T11 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7E5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7G5, 7GB5 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7J7, 7K7 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A69 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A70, A81, A82 | T-13R14 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| A78, A79 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **RUDOLPH WURLITZER CO.** (Also see All-American Mohawk) | | | | | | |
| SA5 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SA6 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SW88 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| SA91-A, SA120 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 450 | T-13R02 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 454 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 470, 471 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 480 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| **ZENITH RADIO CORP.** | | | | | | |
| A, B, C, D | T-13R03 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| BH(202) | T-13R05 | T-13C29 | ☆ | ☆ | ☆ | T-57S01 |
| CH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| L | T-13R01 | T-13C28 | ☆ | ☆ | ☆ | T-57S01 |
| LH, MH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| RH | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| WH (2022) | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 4B313 (5410) 4B314 (5411) | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4B317, 4B355 | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4D26 (5401) 4P51 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 4T26, 4T51 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A119 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A126 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A127 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A151 (CH5517A) | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A313B(CH5535BT) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5A318, 5A325 (5532A) | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R123 (5519) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R135, 5R165 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R216 (5526) | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R226, 5R236 | T-13R19 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R303 (5528) 5R312 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R316, 5R317 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5R337 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S29 (5513A) 5S56 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S119 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S126, 5S127, 5S150 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S151, 5S161 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S201 (5521) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S218 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S218AT (5521AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S220, 5S228, 5S228AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S237, 5S237AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S250, 5S252 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S319 (5529) 5S327 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S330, 5S338 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 5S339 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A203 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A223 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A229 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A239 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6A241 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6B321 (5653) | T-14R39 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S27 (5619) 6S28 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S52, 6S53 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S128 (5634), 6S137 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S147, 6S152, 6S157 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S203 (5638), 6S222 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S223, 6S229 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S239, 6S241 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S254 (5644) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S254AT (5644AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S256, 6S256AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S301 (5651) 6S306 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S321, 6S322 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S330, 6S340 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

☆ None required. § Available upon special order from your distributor. Special Note: The following substitutions are made by many service engineers because of preferences in mountings and sizes. T-57S02, T-13S38, T-14S85 in place of T-57S01; T-57A41, T-13A35 in place of T-33A91; T-57A38, T-13A34 in place of T-20A90.

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 6S341 (5649) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S361 | T-13R11 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S362 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 6S439, 6S469 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S28, 7S53 (5704) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S232AT (5709AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S240 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S242 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S258 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S260 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S261 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S323 (5714) 7S342 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S343 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S363, 7S364 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S366 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S432, 7S433, 7S434, 7S449 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S450, 7S458 to 7S462 | T-13R20* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 7S487, 7S488, 7S490 (5725) | T-13R19* | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A129 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A147 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A154 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A157 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A232 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A242 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A244 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8A262 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8S129 (5801) 8S154 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 8S359 | T-13R20 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S30, 9S54 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 9S55 | T-13R14 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 9S203 (5905) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S204AT (5905AT) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S232 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S232AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S242 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S244 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S244AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S262, 9S263 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S264 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S264AT | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S307 (5907) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S324, 9S344 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S365 (5906) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 9S367, 9S369 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 10S130 (1004) | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S147, 10S153 | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S155, 10S156 | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 10S157, 10S160 | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 10S443, 10S452, 10S464, 10S470, 10S491 10S492 (1005) | T-17R34 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 11, 12 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 12S205, 12S232 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S245, 12S265 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S266, 12S267 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S268 | T-13R15 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 12S345 (1206) | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 12S370, 12S371 | T-13R13 | ☆ | ☆ | ☆ | ☆ | T-13S42 |
| 12U158 (1203) | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 12U159 | T-13R15 | T-13C30 | ☆ | ☆ | T-33A91 | T-13S41 |
| 50, 52, 53, 54 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 60, 61, 62 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 64, 67 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 70, 71, 72, 73, 77 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 80 | T-13R06 | T-13C30 | ☆ | T-33A91 | T-13A36 | T-57S01 |
| 91, 92, 103 | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 210, 211 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 215, 216, 217 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 220, 221 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 225 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 230, 240 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 241, 244 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 245 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 250, 251, 252 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 258, 259 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 260, 261 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 262 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 268, 269 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 272 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 273 | T-13R06 | T-13C30 | ☆ | ☆ | §Special | T-57S01 |
| 278, 280, 281 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 288, 289 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 291, 292 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 410, 411, 412, 414 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 420 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 443, 444 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D91 | T-13S41 |
| 472 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 473 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 474, 475 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 476 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 476B | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 478 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 500, 501, 502, 503 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 514, 515, 516 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 520 (2035), 521 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 558, 568, 578 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 589, 590 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 600 | T-13R05 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| M601 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

**Tropex transformers will stay put on those tough replacement jobs.** **See page 32.**

*Disregard 5 Volt Winding

| MODEL | Power Trans. | First Filter Choke | Second Filter Choke | First Audio Trans. | Second Audio Trans. | Output Trans. |
|---|---|---|---|---|---|---|
| **ZENITH RADIO CORP. (Contd)** | | | | | | |
| 602, 605, 608 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 611, 612 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 615 | T-13R06 | T-13C30 | ☆ | ☆ | T-67D78 | T-67S52 |
| 616, 618 | T-13R06 | ☆ | ☆ | ☆ | ☆ | T-13S41 |
| 622, 642 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 705, 706, 707 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 711, 712 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 715 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 722, 725, 732 | T-13R04 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 750 | T-13R03 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 755, 756 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 760, 765, 767 | T-13R04 | ☆ | ☆ | ☆ | T-33A91 | T-57S01 |
| 770, 770B, 775, 775B | T-13R06 | T-13C30 | ☆ | ☆ | T-33A91 | T-57S01 |
| 777, 780, 788 | T-13R06 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 805, 806 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 807, 808 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 809, 814 (5611) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 815 (5612) 825 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 827, S827 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 829, S829 (5701R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 835 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-65S94 |
| 845 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S847, 850 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 860, 861, 864 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S870, (5702R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| S871 (5703R) | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 880 (1001) (1001A) | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-65S94 |
| 908, 909 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 935 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 945, 950 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 960, 961 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 970, 975 | T-13R04 | T-13C29 | ☆ | ☆ | T-33A91 | T-57S01 |
| 980, 985, 990 (1201) | T-13R15 | T-13C30 | ☆ | T-29A99 | T-74D32 | T-13S41 |
| 1105 | T-13R15 | T-13C30 | ☆ | ☆ | T-17D01 | T-13S41 |
| 1117, 1161 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 1167, 1170 | T-13R12 | ☆ | ☆ | ☆ | ☆ | T-57S01 |
| 2038 | T-56R05 | T-13C30 | ☆ | ☆ | ☆ | T-67S52 |
| 2056, 2056-1 | T-13R04 | ☆ | ☆ | ☆ | ☆ | T-57S01 |

# POWER TRANSFORMERS


3A


3C

The choice of servicemen in all parts of the world because of the universal adaptability to receiver replacement, from both electrical and mechanical considerations. Designed to furnish plate and filament voltage requirements of amplifiers, receivers and exciter stages of transmitters. Adjustable mounting brackets Fig. 3A permit flush, vertical or horizontal mounting.


2B


2G

| Type No. | Pri. V.A. | Secondary A.C. Load Volts | Secondary D.C. M.A. | Filament Windings Rect. Fil. | Fil. No. 1 | Fil. No. 2 | Fil. No. 3 | Mtg. Fig. | Mtg. Centers Width | Mtg. Centers Depth | Dimensions W. | D. | H. | Wt. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-13R00 | 70 | 275-0-275 | 70 | 5V—3A | 5V—.5A Ct. | 2.5V—10.5 ACt. | | 3A | 2 1/4 | 2 13/16 | 2 13/16 | 3 3/16 | 3 3/8 | 4 |
| T-13R01 | 60 | 325-0-325 | 40 | 5V—3A | 2.5V—4A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 2 3/4 | 3 | 3 1/4 |
| T-13R02 | 60 | 350-0-350 | 50 | 5V—3A | 2.5V—7.25A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 2 15/16 | 3 | 3 1/4 |
| T-13R03 | 75 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | | | 3A | 2 1/4 | 2 13/16 | 2 13/16 | 3 3/16 | 3 3/8 | 4 |
| T-13R04 | 115 | 350-0-350 | 100 | 5V—3A | 2.5V—12.5A Ct. | | | 3A | 2 1/2 | 3 1/8 | 3 1/8 | 3 3/4 | 3 3/4 | 5 1/4 |
| T-13R05 | 110 | 350-0-350 | 70 | 5V—3A | 2.5V—9A Ct. | 2.5V—3.5A Ct. | | 3A | 2 1/2 | 3 1/8 | 3 1/8 | 3 1/2 | 3 3/4 | 5 1/4 |
| T-13R06 | 130 | 350-0-350 | 120 | 5V—3A | 2.5V—12.5A Ct. | 2.5V—3.5A Ct. | | 3A | 3 | 3 3/4 | 3 3/4 | 3 3/8 | 4 1/2 | 6 1/2 |
| T-13R07 | 140 | 400-0-400 | 110 | 5V—3A | 2.5V—15A Ct. | 2.5V—3.5A Ct. | | 3A | 3 | 3 3/4 | 3 3/4 | 3 1/2 | 4 1/2 | 6 3/4 |
| T-13R08 | 105 | 350-0-350 | 90 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 2 1/2 | 3 1/8 | 3 1/8 | 3 1/2 | 3 3/4 | 5 1/4 |
| T-13R09 | 160 | 375-0-375 | 180 | 5V—3A | 6.3V—3.3A Ct. | 2.5V—6A Ct. | | 3A | 3 | 3 3/4 | 3 3/4 | 3 9/16 | 4 1/2 | 7 1/2 |
| T-13R11 | 60 | 290-0-290 | 50 | 5V—3A | 6.3V—2A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 2 3/4 | 3 | 3 1/4 |
| T-13R12 | 65 | 350-0-350 | 70 | 5V—3A | 6.3V—2.5A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 3 5/16 | 3 | 3 1/4 |
| T-13R13 | 90 | 350-0-350 | 90 | 5V—3A | 6.3V—3.5A Ct. | | | 3A | 2 1/2 | 3 1/8 | 3 1/8 | 3 3/8 | 3 3/4 | 5 1/4 |
| T-13R14 | 115 | 350-0-350 | 120 | 5V—4A | 6.3V—4.7A Ct. | | | 3A | 2 1/2 | 3 1/8 | 3 1/8 | 3 1/2 | 3 3/4 | 5 1/4 |
| T-13R15 | 140 | 375-0-375 | 150 | 5V—4A | 6.3V—5A Ct. | | | 3A | 3 | 3 3/4 | 3 3/4 | 3 3/8 | 4 1/2 | 6 1/2 |
| T-13R16 | 180 | 400-0-400 | 200 | 5V—4A | 6.3V—5.14A Ct. | | | 3A | 3 | 3 3/4 | 3 3/4 | 3 11/16 | 4 1/2 | 7 3/4 |
| T-13R17 | 85 | 300-0-300 | 60 | 5V—3A | 6.3V—2.5A Ct. | 2.5V—7.5A Ct. | | 3A | 2 1/4 | 2 13/16 | 2 13/16 | 3 3/8 | 3 3/8 | 4 1/2 |
| T-13R18 | 115 | 350-0-350 | 90 | 5V—3A | 6.3/2.5—3.5A Ct. | 2.5V—9A Ct. | | 3A | 3 | 3 3/4 | 3 3/4 | 3 1/4 | 4 1/2 | 5 3/4 |
| T-13R19 | 45 | 240-0-240 | 40 | 5V—2A | 6.3V—2A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 2 1/2 | 3 | 2 1/2 |
| T-13R20 | 60 | 305-0-305 | 70 | 5V—2A | 6.3V—3.5A Ct. | | | 3A | 2 1/16 | 2 1/2 | 2 1/2 | 3 5/16 | 3 | 3 1/4 |
| T-14R35 | | 260* | 60 | For use with vibrator operating from 6V battery. | | | | 3C | 2 1/16 | 2 1/16 | 2 1/2 | 2 7/8 | 3 1/8 | 2 1/2 |
| T-14R39 | | 150* | 40 | For use with vibrator operating from 6V battery. | | | | 2B | 2 3/8 | | 2 7/8 | 2 | 2 3/8 | 1 1/4 |
| T-17R34 | 90 | 300-0-300 | 125 | 5V—2A | 6.3V—4.8A Ct. | | | 2G | 2 11/16 | 2 9/16 | 3 5/16 | 3 3/8 | 4 5/8 | 4 3/4 |
| T-37R70-C | 95 | 350-0-350 | 80 | 5V—2A Ct. | 3V—10A Ct. | 5V—2.5A Ct. | | 2G | 2 11/16 | 3 1/16 | 3 5/16 | 3 7/8 | 4 5/8 | 6 3/4 |
| For Sparton Models 235, 589, 593, 600 Series, 737, 931 and other receivers using Kellogg and other 3V tubes. | | | | | | | | | | | | | | |
| T-56R01 | 60 | 325-0-325 | 70 | 5V—2A | 2.5V—3A Ct. | 1.5V—1A<br>1.5V—4A | 5V—.5A Ct. | 2G | 2 11/16 | 3 | 3 5/16 | 3 5/8 | 4 5/8 | 5 3/4 |
| T-56R02 | 70 | 350-0-350 | 70 | 5V—2A | 2.5V—9A Ct. | 2.5V—1.5A Ct. | | 2G | 2 11/16 | 2 13/16 | 3 5/16 | 3 5/8 | 4 5/8 | 6 |
| T-56R03 | 85 | 350-0-350 | 105 | 5V—3A | 2.5V—3A Ct. | 2.5V—1.75A Ct. | 1.5V—5A<br>1.5V—1A | 2G | 3 | 2 13/16 | 3 3/4 | 3 9/16 | 4 15/16 | 7 1/4 |
| T-56R05 | 115 | 350-0-350 | 110 | 5V—3A | 2.5V—9A Ct. | 2.5V—3A Ct. | 2.5V—3A Ct. | 2G | 3 | 2 15/16 | 3 3/4 | 3 11/16 | 4 15/16 | 7 3/4 |

* D.C. volts to filter

**AUDIO TRANSFORMERS AND CHOKES LISTED ON PAGES 2 AND 3.**

This accurate and convenient table has been compiled to facilitate choosing the correct output transformer. Two types are offered for most tubes: the universal type, which is designed to accommodate a wide range of tube and voice coil impedances, and the specific duty type.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms | Watts Output | Universal Type Transformer | Specific Duty Transformer |
|---|---|---|---|---|---|---|---|
| 1A5G | 90 | –4.5 | 4.0 | 25,000 | .115 | | T-14S83 |
| 1C5G | 90 | –7.5 | 7.5 | 8,000 | .240 | T-13S38† | T-14S84 |
| 1D8GT | 90 | –9.0 | 5.0 | 12,000 | .200 | T-13S38† | |
| 1E7G (1 section) | 135 | –4.5 | 7.5 | 16,000 | .290 | T-13S38† | T-13S43 |
| (2 sections, P-P) | 135 | –7.5 | *3.5 | 24,000 | .575 | | T-14S83 |
| 1F4, 1F5G | 135 | –4.5 | 8.0 | 16,000 | .310 | T-13S38† | T-13S43 |
| 1G5G | 90 | –6.0 | 8.5 | 8,500 | .250 | T-13S38† | T-14S84 |
| 1G6G | 90 | 0 | *1.0 | 12,000 | .675 | T-13S38† | |
| 1J5G | 135 | –16.5 | 7.0 | 13,500 | .450 | T-13S38† | |
| 1J6G | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 1N6G | 90 | –4.5 | 3.1 | 25,000 | .100 | | T-14S83 |
| 1Q5G, 1Q5GT | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| 1S4 | 45 | –4.5 | 3.8 | 8,000 | .065 | T-13S38† | T-14S84 |
| 1T5GT | 90 | –6.0 | 6.5 | 14,000 | .170 | T-13S38† | T-13S43 |
| 2A3 (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.5 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 300 | –62.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 300 | –62.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 2A5 (Single Cl. A) | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| (Single Cl. A) | 285 | –20.0 | 38.0 | 7,000 | 4.5 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | –16.5 | *34.0 | 14,000 | 6.2 | T-57S01§ | T-67S51 |
| (P-P Cl. $AB_1$) | 315 | –24.0 | *31.0 | 10,000 | 11.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_2$) | 375 | –21.0 | *27.0 | 10,000 | 19.0 | T-13S41 | T-75S75 |
| 3Q5GT (Fil. par.) | 90 | –4.5 | 9.5 | 8,000 | .270 | T-13S38† | T-14S84 |
| (Fil. series) | 90 | –4.5 | 7.5 | 8,000 | .230 | T-13S38† | T-14S84 |
| 4A6G | 90 | –1.5 | *1.1 | 8,000 | 1.0 | T-13S38† | T-14S81 |
| 6A3 | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A4 | 180 | –12.0 | 22.0 | 8,000 | 1.4 | T-13S38† | T-13S37 |
| 6A5G | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| 6A6 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6AC5G | 250 | self | 32.0 | 7,000 | 3.7 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 250 | 0 | *2.5 | 10,000 | 8.0 | T-13S41 | T-75S75 |
| 6AL6G | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| 6B4G (Single Cl. A) | 250 | –45.0 | 60.0 | 2,500 | 3.2 | T-13S42 | T-17S10 |
| (P-P AB fixed bias) | 325 | –68.0 | *40.0 | 3,000 | 15.0 | T-13S41 | T-58S72 (C.H.T., T-15S91) |
| (P-P AB self bias) | 325 | –68.0 | *40.0 | 5,000 | 10.0 | T-13S41 | T-67S54 (C.H.T., T-15S90) |
| 6B5 | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6E6 | 250 | –27.5 | *18.0 | 14,000 | 1.6 | T-57S01§ | T-13S40 |
| 6F6 | 250 | –16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 6G6G | 180 | –9.0 | 15.0 | 10,000 | 1.1 | T-13S38† | |
| 6G6G | 135 | –6.0 | 11.5 | 12,000 | .6 | T-13S38† | |
| 6K6G | 315 | –21.0 | 25.5 | 9,000 | 4.5 | T-57S01§ | |
| 6K6G | 250 | –18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 6L6 (Single Cl. A) | 250 | –14.0 | 72.0 | 2,500 | 6.5 | T-13S42 | T-17S10 |
| (Single Cl. A) | 320 | –20.0 | 76.0 | 2,500 | 8.0 | | T-17S10 |
| (P-P Cl. $A_1$) | 270 | –16.5 | *67.5 | 5,000 | 18.5 | | T-67S54 (C.H.T., T-15S90) |
| (P-P Cl. $AB_1$) | 319 | –23.0 | *50.0 | 4,300 | 25.0 | | T-17S12 (C.H.T., T-15S91) |
| (P-P Cl. $AB_1$) | 400 | –25.0 | *51.0 | 6,600 | 34.0 | | T-17S13 (C.H T., T-15S92) |
| (P-P Cl. $AB_2$) | 430 | –20.0 | *47.0 | 5,500 | 40.0 | | T-17S14 (C.H.T., T-15S92) |
| (P-P-Par. Cl. $AB_1$) | 410 | –28.0 | *50.0 | 3,300 | 60.0 | | T-17S15 (C.H.T., T-15S93) |
| (P-P-Par. Cl. $AB_2$) | 430 | –24.5 | *52.0 | 1,900 | 120.0 | | T-17S16 (C.H.T., T-15S94) |

* Zero signal per plate. † T-14S85 may be used when a transformer with leads is preferred to one with lugs. § T-57S02 may be used when a transformer with leads is preferred to one with lugs.

| Tube | Plate Volts | Bias Volts | Plate M. A. | Plate Load Ohms | Watts Output | Universal Type Trans-former | Specific Duty Trans-former |
|---|---|---|---|---|---|---|---|
| 6N6G | 300 | 0 | 42.0 | 7,000 | 4.0 | T-13S42 | T-13S37 |
| 6N7 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 6V6 (Single Cl. A) | 250 | -12.5 | 44.5 | 5,000 | 4.5 | T-13S42 | |
| (Single Cl. $A_1$) | 315 | -13.0 | 34.0 | 8,500 | 5.5 | T-57S01§ | |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| (P-P Cl. $AB_1$) | 306 | -20.0 | *50.0 | 8,000 | 15.0 | T-13S41 | T-17S11 (C.H.T., T-15S90) |
| 6Y6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 6Y6G | 200 | -14.0 | 61.0 | 2,600 | 6.0 | T-13S42 | T-17S10 |
| 6Y7G | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 6Y7G | 250 | 0 | *5.3 | 14,000 | 8.0 | T-57S01§ | T-13S40 |
| 6Z7G | 135 | 0 | *3.0 | 9,000 | 2.5 | T-13S38† | T-81S01 |
| 6Z7G | 180 | 0 | *4.2 | 12,000 | 4.2 | T-13S38† | T-13S40 |
| 7A5 | 110 | -7.5 | 35.0 | 2,500 | 1.4 | T-13S42 | T-17S10 |
| 7B5 | 100 | -7.0 | 9.0 | 12,000 | .35 | T-13S38† | |
| 7B5 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 7C5 | 250 | -12.5 | 45.0 | 5,000 | 4.5 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_1$) | 250 | -15.0 | *35.0 | 10,000 | 10.0 | T-13S41 | T-75S75 |
| 10 | 425 | -50.0 | 18.0 | 10,000 | 1.6 | T-57S01§ | |
| 12A5 | 100 | -15.0 | 17.0 | 4,500 | .8 | T-13S42 | T-13S39 |
| 12A5 | 180 | -25.0 | 45.0 | 3,300 | 3.4 | T-13S42 | T-13S39 |
| 12A7 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | T-13S43 |
| 18 | 250 | -16.5 | 34.0 | 7,000 | 3.0 | T-13S42 | T-13S37 |
| 19 | 135 | 0 | *5.0 | 10,000 | 2.1 | T-13S38† | T-81S01 |
| 25A6 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 25A7G | 100 | -15.0 | 20.5 | 4,500 | .770 | T-13S42 | T-13S39 |
| 25AC5GT | 180 | 0 | 27.0 | 8,000 | 2.0 | T-13S38† | T-13S37 |
| (P-P Cl. B) | 180 | 0 | *2.0 | 4,800 | 6.0 | T-13S41 | T-67S54 |
| 25B6G | 105 | -16.0 | 48.0 | 1,700 | 2.4 | T-13S42 | T-14S82 |
| 25L6 | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 31 | 135 | -22.5 | 8.0 | 7,000 | .185 | T-13S42 | T-13S37 |
| 32L7GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 33 | 135 | -13.5 | 14.5 | 7,000 | .7 | T-13S42 | T-13S37 |
| 35A5-LT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 35L6GT | 110 | -7.5 | 40.0 | 2,500 | 1.5 | T-13S42 | T-17S10 |
| 38 | 135 | -13.5 | 9.0 | 13,500 | .55 | T-13S38† | |
| 38 | 250 | -25.0 | 22.0 | 10,000 | 2.5 | T-13S38† | |
| 41 | 250 | -18.0 | 32.0 | 7,600 | 3.4 | T-13S42 | T-13S37 |
| 42 | 250 | -16.5 | 34.0 | 7,000 | 3.1 | T-13S42 | T-13S37 |
| 43 | 95 | -15.0 | 20.0 | 4,500 | .9 | T-13S42 | T-13S39 |
| 45 (Single Cl. A) | 250 | -50.0 | 34.0 | 3,900 | 1.6 | T-13S42 | T-89S74 |
| (P-P Cl. $AB_2$) | 275 | -56.0 | *36.0 | 5,060 | 12.0 | T-13S41 | T-67S54 |
| 46 (Single Cl. A Triode) | 250 | -33.0 | 22.0 | 6,400 | 1.25 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *6.0 | 5,800 | 20.0 | T-13S41 | T-67S52 |
| 47 | 250 | -16.5 | 31.0 | 7,000 | 2.7 | T-13S42 | T-13S37 |
| (P-P Cl. A) | 250 | -16.5 | *31.0 | 14,000 | 5.4 | T-57S01§ | T-67S51 |
| 48 | 96 | -19.0 | 52.0 | 1,500 | 2.0 | T-13S42 | T-14S82 |
| (P-P Cl. $A_1$ Pent.) | 125 | -20.0 | *50.0 | 3,000 | 5.0 | T-13S41 | T-58S72 |
| 49 (P-P Cl. B) | 135 | 0 | *1.3 | 8,000 | 2.3 | T-13S38† | T-14S81 |
| 50 (P-P Cl. A) | 450 | -84.0 | *55.0 | 8,000 | 9.2 | T-13S41 | T-65S94 |
| 50C6G | 135 | -13.5 | 58.0 | 2,000 | 3.6 | T-13S42 | T-17S10 |
| 50L6GT | 110 | -7.5 | 49.0 | 1,500 | 2.1 | T-13S42 | T-14S82 |
| 52 | 110 | 0 | 43.0 | 2,000 | 1.5 | T-13S42 | T-17S10 |
| (P-P Cl. B) | 180 | 0 | *1.5 | 10,000 | 5.0 | T-57S01§ | T-81S01 |
| 53 | 300 | 0 | *17.5 | 8,000 | 10.0 | T-13S41 | T-67S48 |
| 59 (Single Cl. A Triode) | 250 | -28.0 | 26.0 | 5,000 | 1.25 | T-13S42 | T-13S39 |
| (Single Cl. A Pent.) | 250 | -18.0 | 35.0 | 6,000 | 3.0 | T-13S42 | T-13S37 |
| (P-P Cl. B) | 400 | 0 | *13.0 | 6,000 | 20.0 | T-13S41 | T-67S52 |
| 70L7-GT | 110 | -7.5 | 40.0 | 2,000 | 1.8 | T-13S42 | T-17S10 |
| 71-A | 180 | -40.5 | 20.0 | 4,800 | .79 | T-13S42 | T-13S39 |
| (P-P Cl. A.) | 180 | -40.5 | *20.0 | 8,000 | 1.6 | T-13S38† | T-33S99 |
| 79 | 180 | 0 | *3.8 | 7,000 | 5.5 | T-13S42 | T-67S48 |
| 89 | 250 | -25.0 | 32.0 | 6,750 | 3.4 | T-13S42 | T-13S37 |
| 182B 482B | 250 | -35.0 | 20.0 | 4,500 | 1.35 | T-13S42 | T-13S39 |
| 183 483 | 250 | -65.0 | 20.0 | 4,500 | 1.8 | T-13S42 | T-13S39 |
| 950 | 135 | -16.5 | 7.0 | 13,500 | .450 | T-13S38† | |

* Zero signal per plate. † T-14S85 may be used when a transformer with leads is preferred to one with lugs. § T-57S02 may be used when a transformer with leads is preferred to one with lugs.

# YOU MAY NOT WORK UNDER *these conditions* BUT---


. . . even if you did, THORDARSON TROPEX transformers would give you complete protection against moisture, high humidity and salt air.

The TROPEX process was perfected for just that purpose. It thoroughly impregnates the coil against the corrosive effects of adverse weather conditions.

TROPEX is a special process which may be applied to any Thordarson open mounting type transformer or choke. It is especially adaptable to fine wire audio transformers and chokes but is not ordinarily recommended for power transformers nor for encased types.

The additional cost for THORDARSON TROPEX transformers is surprisingly small. The following table has been compiled to enable you to easily determine this price increase by referring to the weight of the transformer as listed.

When ordering TROPEX add an "X" to the regular type number. For example, T-13S38-X is the TROPEX equivalent of T-13S38.

| WEIGHT OF TRANSFORMER | ADD TO LIST PRICE |
|---|---|
| Up to 7/8 lb. | 25c |
| From 1 lb. to 1 7/8 lbs. | 30c |
| From 2 lbs. to 2 7/8 lbs. | 50c |
| From 3 lbs. to 4 7/8 lbs. | 65c |
| From 5 lbs. to 6 7/8 lbs. | 75c |
| Over 7 lbs. | 13c per lb. |

## TROPEX REPLACEMENT AUDIO TRANSFORMERS

| Type No. | Application |
|---|---|
| T-13A34-X | 10,000 ohm plate to single grid |
| T-29A99-X | 10,000 ohm plate to single grid |
| T-13A35-X | 10,000 ohm plate to P.P. grids |
| T-33A91-X | 10,000 ohm plate to P.P. grids |
| T-13A36-X | P.P. 10,000 ohm plates to P.P. grids |
| T-78D46-X | Single 30 to Class B 19, 1J6G, or 30's |
| T-17D01-X | Single 6F6 etc., to 2-6F6, etc. |

## TROPEX FILTER CHOKES

| | |
|---|---|
| T-13C26-X | 8 Hy at 40 M.A. 530 ohms D.C. |
| T-13C27-X | 10 Hy at 40 M.A. 475 ohms D.C. |
| T-13C28-X | 10 Hy at 65 M.A. 460 ohms D.C. |
| T-13C29-X | 9 Hy at 85 M.A. 250 ohms D.C. |
| T-13C30-X | 8 Hy at 150 M.A. 200 ohms D.C. |
| T-18C92-X | 22 Hy at 35 M.A. 405 ohms D.C. |
| T-14C61-X | 7 Hy at 55 M.A. 200 ohms D.C. |
| T-14C62-X | 8 Hy at 55 M.A. 250 ohms D.C. |
| T-14C63-X | 8 Hy at 55 M.A. 300 ohms D.C. |
| T-14C64-X | 10 Hy at 55 M.A. 350 ohms D.C. |

## TROPEX OUTPUT TRANSFORMERS

| | |
|---|---|
| T-13S37-X | Single 6F6, 42, 2A5 etc. to voice coil |
| T-13S39-X | Single 45, 1-2A5 etc. to voice coil |
| T-13S40-X | P.P. 6F6, 42, 2A5 etc. to voice coil |
| T-33S99-X | P.P. 45, 71A, 43 etc. to voice coil |
| T-81S01-X | Class B 19, 1J6G, 30's etc. to voice coil |
| T-13S43-X | Single 1F4, 1D4, 1F5G etc. to voice coil |
| T-14S81-X | Single 6F6, 2A5 etc. or P.P. 45, 71A etc. to voice coil |
| T-14S82-X | Single 25L6 etc. to voice coil |

## TROPEX UNIVERSAL OUTPUT TRANSFORMERS

| | |
|---|---|
| T-13S38-X, T-57S01-X, T-57S02-X | Any single tube or P.P. tubes to voice coil |
| T-13S41-X | Any P.P. tubes to voice coil |
| T-13S42-X | Any single tube to voice coil |

## THORDARSON ELECTRIC MFG. COMPANY

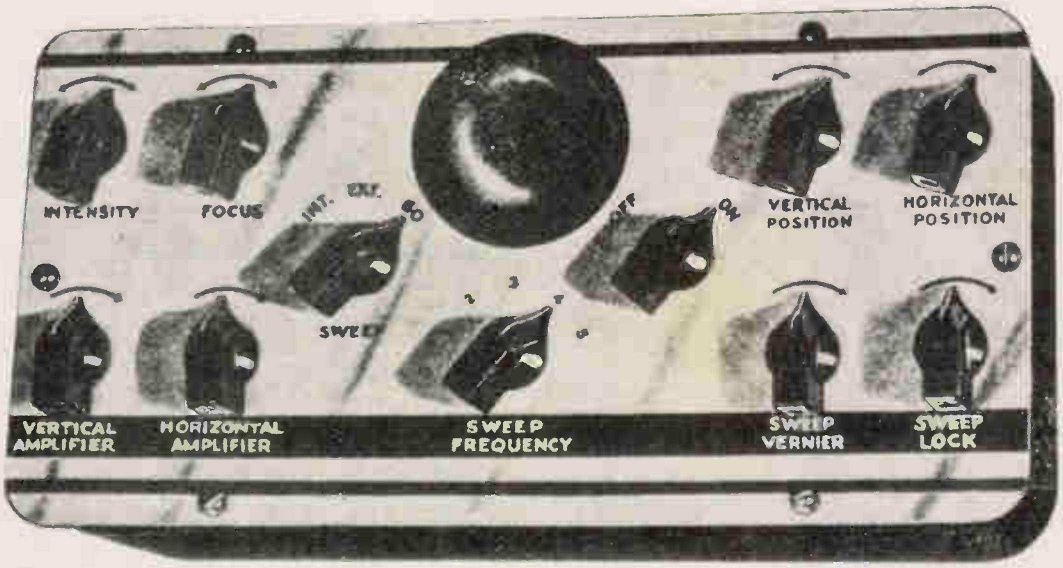
**500 West Huron Street, Chicago**

*Distributed by*

# THORDARSON Oscilloscope

*"Build It Yourself"*

## Using the NEW 913 CATHODE-RAY tube




## A Complete Quality Instrument at Surprisingly Low Cost

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### *All the Features Found in Higher Priced and Larger Oscilloscopes*

1—Intensity control.

2—Focus control.

3—Horizontal centering control.

4—Vertical centering control.

5—Self-contained linear sweep covering frequencies from 20 to 12,000 cycles in 5 ranges.

6—Vernier control of sweep frequency.

7—Sweep lock-in control for absolute synchronization of sweep frequency with signal frequency.

8—Sweep amplifier stage.

9—Signal amplifier stage.

10—60 cycle and external sweep.

11—Provides for "Single" or "Double image" R. F. alignment.

12—Panel selector switch for linear, 60 cycle or external sweep.

13—On and off panel switch for vertical amplifier.

14—Optional Thordarson panel with all control positions marked.

15—Optional lens for magnification of figure.

# THORDARSON OSCILLOSCOPE "Build It Yourself" • PARTS LIST

### THORDARSON FOUNDATION UNIT AND ACCESSORIES

| | | List Price |
|---|---|---|
| T-11K99 | Foundation Unit (Consists of punched chassis, panel, light shield, etched panel, ventilated cabinet and 2" magnifying lens with retainer ring, and complete circuit with constructional and operating data). In addition to the foundation unit, one T-92R33 power transformer (see below) and one T-74C30 filter choke are required. | $12.50 |

### THORDARSON TRANSFORMERS AND CHOKES

| | | | List Price |
|---|---|---|---|
| 1 | T-92R33 | Power Transformer | 4.00 |
| 1 | T-74C30 | Choke | 1.50 |

### 913 CATHODE RAY OSCILLOSCOPE CONTROLS

| Number | Ohms | Type | List Price |
|---|---|---|---|
| R-1 | 500,000 | Potentiometer (Centralab #70203 or equivalent) | $1.00 |
| R-22 | 500,000 | Potentiometer (Centralab #70203 or equivalent) | 1.00 |
| R-2 | 1,000,000 | Potentiometer (Centralab #72116 or equivalent) | 1.00 |
| R-10 | 100,000 | Potentiometer (Centralab #72104 or equivalent) | 1.00 |
| R-11 | 100,000 | Potentiometer (Centralab #72104 or equivalent) | 1.00 |
| R-12 | 50,000 | Potentiometer (Centralab #72103 or equivalent) | 1.00 |
| R-13 | 25,000 | Potentiometer with switch (Centralab #62111 or equivalent) | 1.50 |
| R-14 | 3,000,000 | Potentiometer (Centralab #72132 or equivalent) | 1.00 |
| S-1 | | 2-pole, 2-position switch (Centralab #1405 or equivalent) | 1.15 |
| S-2 | | 2-pole, 3-position switch (Centralab #1405 or equivalent) | 1.15 |
| S-3 | | 1-pole, 5-position switch (Centralab #1401 or equivalent) | 1.15 |

### RESISTORS

| Number | Ohms | Watts | Type | List Price |
|---|---|---|---|---|
| R-3 | 5,000 | 1 | I.R.C. or equivalent | .20 |
| R-4 | 5,000 | 1 | I.R.C. or equivalent | .20 |
| R-20 | 5,000 | 1 | I.R.C. or equivalent | .20 |
| R-5 | 500,000 | 1 | I.R.C. or equivalent | .20 |
| R-6 | 500,000 | 1 | I.R.C. or equivalent | .20 |
| R-7 | 2,000,000 | 1 | I.R.C. or equivalent | .20 |
| R-8 | 2,000,000 | 1 | I.R.C. or equivalent | .20 |
| R-9 | 75,000 | 1 | I.R.C. or equivalent | .20 |
| R-15 | 50,000 | 1 | I.R.C. or equivalent | .20 |
| R-16 | 750,000 | 1 | I.R.C. or equivalent tolerance 5% | .75 |
| R-17 | 40,000 | 20 | I.R.C. or equivalent | .20 |
| R-18 | 8,000 | 1 | I.R.C. or equivalent | .50 |
| R-19 | 800 | | Electrad A8 or equivalent | .50 |
| R-21 | 200 | 1 | I.R.C. or equivalent | .20 |

### TUBES

| | | Net Price |
|---|---|---|
| 1 | Type 913 Tube | $4.00 |
| 1 | Type 1-V Tube | .54 |
| 2 | Type 6J7 Tubes @ 72c each | 1.44 |
| 1 | Type 885 Tube | 2.00 |
| 1 | Type 6X5 Tube | .90 |

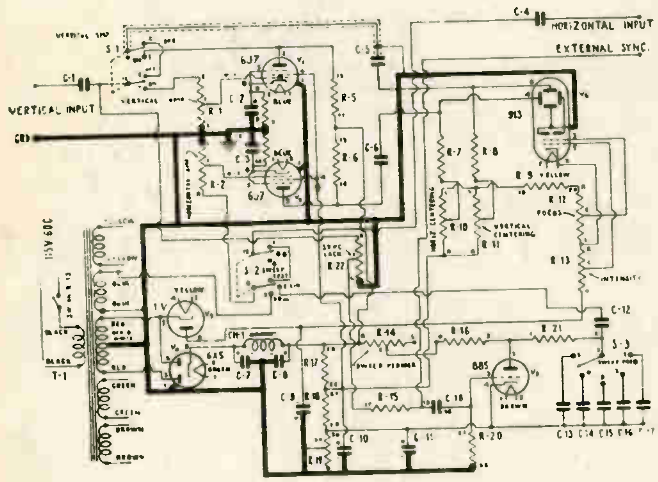
### CONDENSERS

| Number | Mfds. | Voltage | Type | List Price |
|---|---|---|---|---|
| C-1 | .1 | 400 | Aerovox 484 or equivalent | .20 |
| C-4 | .1 | 400 | Aerovox 484 or equivalent | .20 |
| C-5 | .1 | 400 | Aerovox 484 or equivalent | .20 |
| C-6 | .1 | 400 | Aerovox 484 or equivalent | .20 |
| C-18 | .1 | 400 | Aerovox 484 or equivalent | .20 |
| C-2 | .003 | 200 | Aerovox 284 or equivalent | .14 |
| C-3 | .003 | 200 | Aerovox 284 or equivalent | .14 |
| C-7 | 8 | 525 | Electrolytic (Aerovox GLS5 or equivalent) | 1.05 |
| C-8 | 8 | 525 | Electrolytic (Aerovox GLS5 or equivalent) | 1.05 |
| C-9 | 8 | 525 | Electrolytic (Aerovox GLS5 or equivalent) | 1.05 |
| C-10 | 8 | 250 | Electrolytic (Aerovox GLS250 or equivalent) | .95 |
| C-11 | 25 | 25 | (Aerovox PB25 or equivalent) | .65 |
| C-12 | .5 | 400 | (Aerovox 484 or equivalent) | .35 |
| C-13 | .5 | 400 | Maximum Tolerance ± 10% (Aerovox or equivalent) | .35 |
| C-14 | .13 | 400 | Maximum Tolerance ± 10% (Aerovox or equivalent) | .25 |
| C-15 | .04 | 400 | Maximum Tolerance ± 10% (Aerovox or equivalent) | .15 |
| C-16 | .007 | 400 | Maximum Tolerance ± 10% (Aerovox or equivalent) | .60 |
| C-17 | .0014 | 400 | Maximum Tolerance ± 10% (Aerovox or equivalent) | .30 |

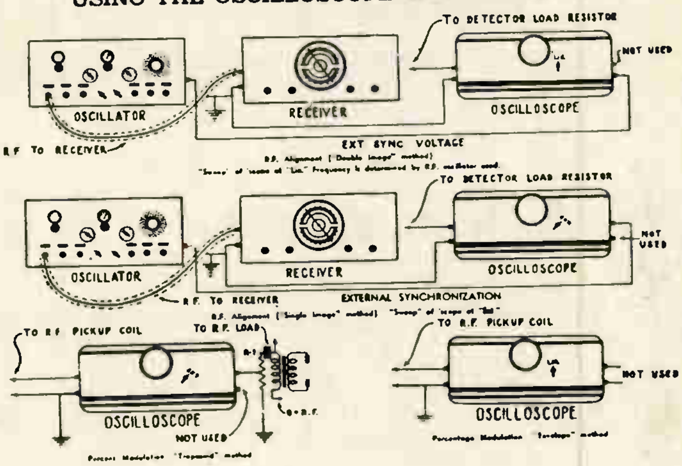
### MISCELLANEOUS PARTS

| | | List Price |
|---|---|---|
| 2 | Metal tube grid caps @ 2c each | .04 |
| 1 | 4-prong Socket (for 1-V tube) (American Phenolic or equivalent) | .11 |
| 1 | 5-prong Socket (for 885 tube) (American Phenolic or equivalent) | .11 |
| 4 | Octal Sockets (for 2-6J7, 6X5, 913 tubes (American Phenolic or equivalent) @ 14c each | .56 |
| 11 | 1¼" bar knobs @ 15c each | 1.65 |
| 9 | 5-lug resistor mounting strips @ 8c each (Cinch #1550) | .72 |
| 1 | 2-lug resistor mounting strip @ 4c each (Cinch #1520) | .04 |
| 24 | ⅜" 6-32 nuts, screws, and lockwashers | .10 |
| 1 | A.C. line cord and plug | .35 |
| 4 | Pin jacks @ 9c each | .36 |
| 4 | Pin jack plugs @ 9c each | .36 |
| 3 | ⅜" Grommets @ 3c each | .09 |
| 1 | ¼" Grommet | .03 |

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.




### USING THE OSCILLOSCOPE




Highest quality standard parts are used throughout. An accurately planned foundation unit with explicit instructions enable the builder to complete a perfectly engineered instrument, a professional job, at a surprisingly low cost. Small overall size—6¾ x 10½ x 5$\frac{3}{16}$ makes it a handy portable unit for the serviceman. It fits neatly into the amateur station cabinet or 5¼" x 19 relay rack. Large panel opening with a funnel shaped shield tapering off to the tube, and a 2" magnifying lens produces a large, clear image. These practical features together with important technical advantages rate the Thordarson oscilloscope high in quality, dependable in performance and low in cost. Be satisfied with only the best. Get a Thordarson foundation unit and "build your own."

**THORDARSON ELECTRIC MFG. CO.**
**500 W. HURON ST., CHICAGO, ILL.**


SD-266--4M--8-43

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