Sylvania News

JANUARY-FEBRUARY, 1942 EMPORIUM, PENNA. Vol. 9, No. 6 & 7

YOU ALSO SERVE—

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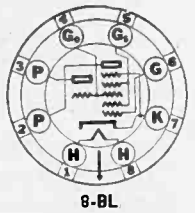
TUBE DATA

Sylvania Type 7S7 Triode Heptode Converter



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It will be noted that the two plates and the heptode screen-grids are operated at the same d-c potential when using 100 volts. Thus, the screen grid dropping resistor required with previous converters may be eliminated.

CHARACTERISTICS

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.32	Ampere
Bulb		T9-G
Base—Lock-In 8-Pin		8-BL
Mounting Position		Any
Direct Interlectrode Capacitances:*		
Grid G to Heptode Plate	0.02	μμf Max.
Grid G to Oscillator Plate	0.10	μμf Max.
Grid G to Grid Go	0.35	μμf Max.
Grid Go to Oscillator Plate	1.0	μμf
Grid G to all other Electrodes (r-f Input)	5.0	μμf
Oscillator Plate to all Electrodes Except Grid Go (Oscillator Output)	3.5	μμf
Oscillator Grid to all Electrodes Except Oscillator Plate (Oscillator Input)	7.0	μμf
Heptode Plate to all Electrodes (Mixer Output)	8.0	μμf

*With RMA tube shield M8-308 connected to cathode.

(Continted on page 2)

THE CAUSE AND CURE OF FILAMENT FAILURES

(Continued from page 2)

FRANK D. LANGSTROTH, Comm. Eng. Dept. Sylvania Tube Division

If we visualize each filament as being a resistor, we can better understand the functions of this circuit. In other words, the filaments of the first, second, third, and fourth tubes act as a resistor to cut the voltage down to its proper value for the fifth tube, while the first, second, third and fifth filament is the dropping resistor for the fourth tube, and so on. We always have four filaments acting as the ballast resistor for the fifth as shown in Figure 2.

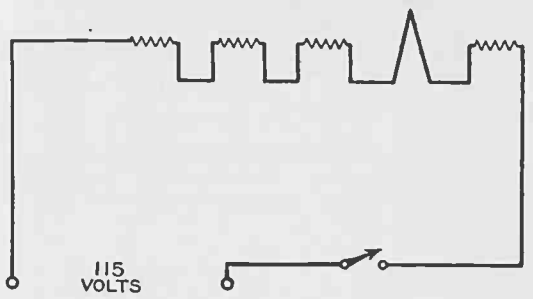

FIGURE 2

According to Ohm's Law everything should work fine with this circuit, and it would if it were not for one condition. The resistance of the filaments which we are using as dropping resistors is variable—it varies with temperature.

When the filaments are first turned on the resistance is low because the tubes are cold and as they become hot, the resistances increases to a steady value.

This would not be a bad condition at all, providing all the filaments reached their steady value at the same time; but we have tubes of various voltages in the series string, and the higher voltage filaments have a greater mass to heat, thus causing them to have a slower heating time than the low voltage filaments.

The result is that we do not have sufficient ballast for the low voltage tubes which have already reached their operating temperature. This causes a higher voltage to appear across their filaments until the resistance of the high voltage filaments have reached their steady or high value. The heating time of the high voltage filaments is further reduced because the high resistance of the now too hot low voltage filaments reduces the voltage applied to the higher voltage tubes.

It can be seen, therefore, that something is necessary to keep the line voltage reduced until the tubes are warmed up. This can be easily done by inserting a small resistor in series with the line voltage and the filament string.

This protective resistor tends to function automatically. As the resistance of the series filament string is very low when the receiver is first turned on, there will be a high current drain through the resistor which will cause a large voltage drop, thereby reducing the voltage applied across the filaments. When the tubes are hot the resistance of the filaments increases, thus reducing the current through the resistor and allowing more voltage for the series filaments.

The application of this protective resistor will naturally drop the filament voltage a few volts, but this should in no way affect the functioning of the receiver, as the loss of voltage will be distributed amongst the five filaments.

The increasing popularity of the battery-operated receiver has no doubt caused you numerous headaches.

We often find open filament tubes and continue to wonder why, especially when some of these tubes have been replaced two or three times.

In sets designed for both battery and ac-dc operation, it is usually necessary that the filaments of the tubes be operated in series during operation from the power line. Series operation is also frequently employed for battery operation to simplify switching.

There appears to be nothing wrong with this type of circuit. We see no reason why we cannot series operate tube filaments providing, of course, their currents are the same. Here again, however, there exists a condition which was not always taken into consideration in early receiver designs of this kind. The fact that the tubes have plate and screen voltages applied to them was often ignored. The total "B" current consumed by the tubes must return to "B"—and the only way that it can take place is by passing through the filament string, thus adding additional current, which at times is sufficient to cause the tube filaments to open.

In series connected filaments, therefore, the difference between the filament current at each end of the string must be the total "B" current, most of which is contributed by the power output tube which is placed at the positive end of the string so that its bias may be obtained by returning the grid to the negative end of the filament string.

The way the "B" current divides between the "A+" and the "A−" circuits depends upon the resistance of these circuits.

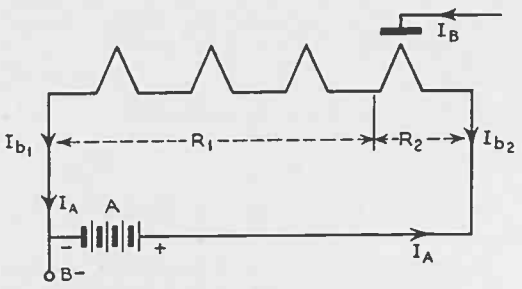

FIGURE 3

For the circuit in Figure 3, this division of the "B" current can be expressed as:

$$\text{Percent } I_b \text{ in A+ circuit} = I_b \frac{(R_1)}{R_1+R_2}$$

$$\text{Percent } I_b \text{ in A− circuit} = I_b \frac{(R_2)}{R_1+R_2}$$

It is apparent that in a-c operation where "A+" is connected through a large dropping resistor, practically all of the current flows out of the negative end of the filament string.

Therefore, during a-c operation it is desirable to shunt the "B" current of the power tube around the other tube filaments, especially if a tube of high "B" current is used.

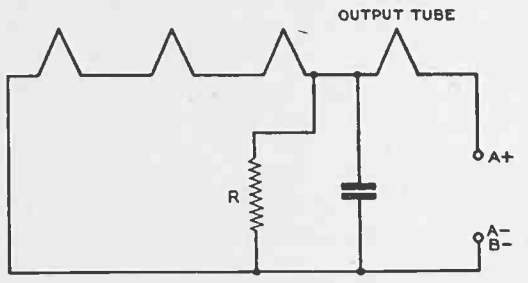

FIGURE 4

This may be done by a suitable resistor "R" as shown in Figure 4. This shunting resistor will equalize the current in the tube filaments for both line and battery operation.

To provide complete protection, the last "A" filter condenser should be placed directly across the shunting resistor. Thus the resistor also serves as a "bleeder" upon the last filter condenser in the "A" filter circuit and prevents this condenser from being subjected to excessive voltage when a tube is removed from the set while operating on a-c for, if the condenser is not damaged, the charge accumulated is sometimes sufficient to burn out several tubes when the filament circuit is again established upon the insertion of a tube. Although this connection allows some a-c ripple to flow through the output tube filament, the amplification is not high enough to render it objectionable.

The filter condenser serves two purposes when used in this position, one as the "A" filter and the other to prevent modulation currents of the output tube from passing through the filament string into the r-f tubes. This condenser must be of high capacity, from 100 to 200 mfd. in order to effectively by-pass the audio component of the total plate, screen and filament current of the output tube.

In receiver designs where the output tube is of the double filament type, extreme care should be taken to see that each 1.4 volt section carries an equal share of the total cathode current. Generally the negative section receives the greatest amount. This will necessitate the use of a resistor of approximately 250 ohms parallel with the negative section or a suitable resistor may be used between the filament center tap and −A to secure equalization.

In order to provide more power output when a-c operated, a separate output tube is sometimes used whose cathode current is returned through the remaining 1.4 volt tubes and thus provides their filament current. Some of these sets subject the 1.4 volt tubes to a severe surge of filament current if the set is switched suddenly from a-c to battery operation. This results from the fact that the cathode of the a-c power output tube remains hot long enough to provide additional current from the "B" battery to flow through the 1.4 volt filaments which are now being supplied from the "A" battery.

Although the 1.4 volt tubes will operate over a wide range of filament voltages, care should be exercised to see that the filament circuits are equalized in order to prevent excessive surges.

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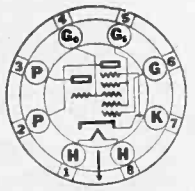

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CHARACTERISTICS

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.32	Ampere
Bulb		T9-G
Base—Lock-In 8-Pin		8-BL
Mounting Position		Any
Direct Interlectrode Capacitances:*		
Grid G to Heptode Plate	0.02	μμf Max.
Grid G to Oscillator Plate	0.10	μμf Max.
Grid G to Grid Go	0.35	μμf Max.
Grid Go to Oscillator Plate	1.0	μμf
Grid G to all other Electrodes (r-f Input)	5.0	μμf
Oscillator Plate to all Electrodes Except Grid Go (Oscillator Output)	3.5	μμf
Oscillator Grid to all Electrodes Except Oscillator Plate (Oscillator Input)	7.0	μμf
Heptode Plate to all Electrodes (Mixer Output)	8.0	μμf

*With RMA tube shield M8-308 connected to cathode.

(Continted on page 2)

SYLVANIA TYPE 7S7

(Continued)

RATINGS:

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.320	Ampere
Heptode Plate Voltage	300	Volts Max.
Heptode Screen Voltage	100	Volts Max.
Heptode Screen Supply Voltage	300	Volts Max.
Heptode Control Grid (G) Voltage	0	Volt Min.
Heptode Plate Dissipation	.6	Watt Max.
Heptode Screen Dissipation	.4	Watt Max.
Triode Plate Voltage	175	Volts Max.
Triode Plate Supply Voltage	300	Volts Max.
Triode Plate Dissipation	1.0	Watt Max.
Total Cathode Current	14	Ma. Max.

Operating Conditions and Characteristics

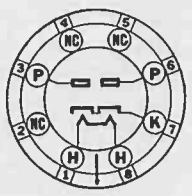
Heater Voltage	6.3	6.3	Volts
Heater Current	0.30	0.30	Ampere
Plate Voltage (Heptode)	100	250	Volts
Oscillator Plate Voltage (Triode)	100	250**	Volts
Screen Voltage (Heptode)	100	100	Volts
Control Grid Voltage (Heptode Grid G)	−2.0	−2.0	Volts
Oscillator Grid Resistor (Triode)	50,000	50,000	Ohms
Plate Current (Heptode)	1.9	1.8	Ma.
Screen Current (Heptode)	3.0	3.0	Ma.
Oscillator Plate Current (Triode)	3.0	5.0	Ma.
Oscillator Grid Current (Triode)	0.3	0.4	Ma.
Plate Resistance (Heptode) Approx.	0.5	1.25	Megohm
Conversion Conductance	500	525	μmhos
Conversion Conductance (Ecl = −21)	2	2	μmhos
Total Cathode Current	8.2	10.2	Ma.

**Applied through 20,000 ohms series resistance properly by-passed.

Triode Characteristics

Heater Voltage	6.3	Volts
Plate Voltage	100	Volts
Grid Voltage	0	Volt
Plate Current	6.5	Ma.
Plate Resistance	11,000	Ohms
Mutual Conductance (Approx.)	1,650	μmhos
Amplification Factor (Approx.)	18	

Sylvania Type 7Z4 Full-Wave Rectifier



5AB

Sylvania Type 7Z4 is a heater cathode, high vacuum rectifier tube of Lock-In design for full-wave circuit applications. This tube is similar to Type 7Y4 but differs in filament rating which is 7.0 volts at 0.96 amperes and d-c output current which is 100 Ma. as compared to 60 Ma. for the 7Y4. The conventional full-wave circuit may be used while for half-wave service the two plates may be tied together at the socket.

CHARACTERISTICS

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.96	Ampere
Bulb		T9-F
Base—Lock-In 8-Pin		5-AB
Mounting Position		Any

RATINGS:

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.96	Ampere
A-C Voltage per Plate (RMS) Condenser Input	325	Volts Max.
A-C Voltage per Plate (RMS) Choke Input	450	Volts Max.
Peak Inverse Voltage	1250	Volts Max.
D-C Heater to Cathode Voltage	450	Volts Max.
Steady-State Peak Plate Current per Plate	300	Ma. Max.
D-C Voltage Drop at 60 Ma. per Plate	40	Volts

Operating Conditions and Characteristics: Full Wave Rectifier

Condenser Input to Filter

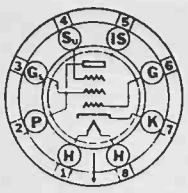
Heater Voltage	6.3	Volts
Heater Current	0.9	Ampere
A-C Plate Voltage per Plate (RMS)	325	Volts
D-C Output Current	100	Ma. Max.
Plate Supply Impedance per Plate#	75	Ohms Min.

Choke Input to Filter

Heater Voltage	6.3	Volts
Heater Current	0.9	Ampere
A-C Plate Voltage per Plate (RMS)	450	Volts
D-C Output Current	100	Ma. Max.
Minimum Value of Input Choke	6	Henrys

#When filter condenser larger than 40 mfds. are used.

Sylvania Type 7V7 Triple Grid Amplifier



8-V

Sylvania Type 7V7 is a triple grid amplifier of the Lock-In style having an exceptionally high value of mutual conductance. As an amplifier it is especially useful in r-f and i-f stages of high frequency circuits.

For maximum results it is preferable to operate the 7V7 with a bias resistor in the cathode lead in order to secure uniformity and to minimize changes in output capacitance and input conductance. The d-c resistance of the grid circuit should not exceed 0.25 megohm when operated with fixed screen voltage source, (Condition I). When a series screen resistance is used and the full cathode bias, the d-c resistance in the grid circuit may be as high as 0.5 megohm (Condition II).

CHARACTERISTICS

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.480	Ampere
Bulb		T9-G
Base—Lock-In 8-Pin		8-V
Mounting Position		Any
Direct Interelectrode Capacitances:*		
Grid to Plate	0.004	μμf Max.
Input	9.5	μμf
Output	6.5	μμf

*With standard RMA tube shield connected to cathode.

RATINGS:

Heater Voltage (Nominal) AC or DC	7.0	Volts
Heater Current (Nominal)	0.480	Ampere
Plate Voltage	300	Volts Max.
Screen Voltage	150	Volts Max.
Plate and Screen Dissipation	3.5	Watts
Screen Dissipation	0.6	Watts

Operating Conditions and Characteristics

	Condition I**	Condition II**	
Heater Voltage	6.3	6.3	Volts
Heater Current	0.450	0.450	Ampere
Plate Voltage	300	300	Volts
Screen Supply Voltage#	150	300	Volts
Screen Series Resistor	....	40,000	Ohms
Suppressor	0.0	0.0	Volts
Cathode Bias Resistor (Min.)	160	160	Ohms
Plate Current	10.0	10.0	Ma.
Screen Current	3.9	3.9	Ma.
Plate Resistance	0.3	0.3	Megohms
Mutual Conductance	5,800	5,800	μmhos
Grid Voltage for Cathode Current Cutoff	−6	−14	Volts

**Conditions I and II represent operation with fixed screen supply and with series screen resistor, respectively. Condition II gives an extended cut-off characteristic.

#When a screen supply voltage in excess of 150 volts is used, a series screen resistor must be used to eliminate the voltage at the screen to 150 volts when the plate current is at its rated value of 10.0 Ma.

NEW OPPORTUNITY FOR SERVICE JOBS

Serves National Interest. Keeps Foreigners In Contact With United States Broadcasts

By O. H. Caldwell, Editor Radio Retailing Today.

The Attorney General of the United States, Francis Biddle, has just issued a circular letter to local and state police authorities, ordering that all enemy aliens in the United States turn in to the nearest police station all short-wave sets and cameras in their posession.

Any radio set in the hands of an enemy alien, which is capable of receiving radio signals other than those of the standard broadcast band, must by this order be immediately surrendered to the police, "unless the set is so altered or modified" that such signals cannot be received. Police are further instructed by the Attorney General to use every consideration to make this regulation impose as little hardship or inconvenience on well-intentioned aliens as possible.

The Department of Justice order thus seems to open the way for radio servicemen to render a useful service of eliminating shortwave reception from aliens' sets, —and get paid for it. In this way, the alien may keep his set for regular broadcast listening to U. S. stations, while the police authorities are spared the storage of hundreds of radio sets which they are poorly equipped to handle.

Radio men who perform this service of altering aliens' receivers, should make sure that the changes they make are completely effective, so that under no circumstances can short-wave reception be restored without the addition of new parts. Vital circuits or parts should be completely removed and retained by the serviceman with his complete record of the job.

In addition, the serviceman undertaking such alteration work on short-wave sets of enemy aliens, should keep a log book or record of all sets so altered. In this log book he should enter:

Name and address of owner of set, (verifying identification carefully). Date alteration was made. Number of persons in owners family or household. Other radios in use in that household.

Name and model of set altered. Year. Circuit employed.

What changes made to make set comply with regulations.

Does serviceman suspect alien owner of possessing or using another short-wave set which has not been altered.

Such a record of facts in connection with the alteration is necessary if the serviceman is afterwards approached by government agents and asked to make a statement concerning the work he performed, and the circumstances surrounding the alteration.

With over a million enemy aliens now in the United States, and with nearly two thirds of all home radios equipped for short-wave reception, it is apparent that a tremendous number of radio receivers are involved under the Attorney General's order.

By setting himself up to make alterations completely and effectively, meanwhile keeping a complete record of all such work done, the radio craftsman will be doing a job in the public interest and helping both the alien and the police.

THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.

AC-DC Receivers. When an outside antenna is used with an AC-DC set and the customer complains of interference, the trouble may be due to an accumulation of static, caused by snow, steam and even smoke. This condition can be eliminated by putting the antenna to ground potential. To do this connect a one megohm resistor in parallel with the isolating condenser that is used in series with the antenna lead-in connection. This isolating condenser is normally used in AC-DC sets, but if it is not present, simply add one, the value of which is about .001 mfd.—James R. Limbeck, Glendale, Calif.

* * *

Flash Test for Radios. It is a good idea to have a final test for radios just repaired so that weak parts such as condensers, resistors, I-F transformers, etc. are found before the set is placed in the customer's home. Especially in these times of war, a customer wants to be sure that nothing will go wrong when his radio is needed. After a set has been tested and proven OK it assures both customer and serviceman that peace of mind which results from a job well done. Therefore I would appreciate hearing from fellow radio men who have a sure-fire test of this sort. Here is one way of doing it:

A heavy-duty flasher is used in series with the 115 volt a-c line to the radio for an hour; sometimes even longer. This idea is based on the theory that most set breakdowns occur either when opening or closing the power switch, the resulting surge causing the failure of weak parts within the radio. The flasher will supply intermittent current for the set testing and will many times locate the cause of those "awful intermittents".

So here's a little tip to think about fellows! What way would you do it. I would like to hear about it either direct or through Sylvania News.—James R. Limbeck, 337 N. Adams, Glendale, Calif.

* * *

Kadette Model 36. Weak reception. Look for a leaky .02 mfd., 400 volt condenser between the plate of the 75 tube and the grid of the 41 tube. Use a .02 mfd. 600 volt unit for replacement.—Arnold Lien, McVille, N. D.

* * *

Motorola Model 75. Here is a tip for this set which many a serviceman has encountered. Complaint: much noise like something loose. You will find that part of the a-v-c network is mounted on the side of the first i-f shield-can. These cans are mounted to the chassis by self-threading screws which become loose, losing the ground point of the a-v-c load resistor.—C. A. Vaughn, Los Angeles, Calif.

* * *

Portable Receivers. Many three-way portables use a line cord dropping resistor to heat the rectifier tube when used on 110 a.c. or d.c. These cords are hard to get now, but you can substitute a Sylvania 117Z6GT/G for the original rectifier and then omit the dropping resistor. Follow the socket diagram in the Sylvania Technical manual for wiring the connections to the new tube.—J. W. Brewer, Sinton, Texas.

* * *

RCA 1939 Automatic Phono. If this set does not complete changing the record after playing several of them, just bend the clutch out slightly with the pressure of the fingers. Also see that the radio cabinet stands level on the floor.—Geo. Baer, Roslindale, Mass.

* * *

Stromberg Record Changer. When the arm and needle scratches across a record at the beginning of the rejection cycle, the trouble is due to a stiff piece of spaghetti covering a lead coming out of the pickup arm. This lead wire is twisted 3 or 4 times and the tension causes the trouble. Untwist this wire and allow it to hang loosely.—Geo. Baer, Roslindale, Mass.

Zenith Model 5G500. If this set plays on batteries and when switched to AC or DC develops distortion, check the mica mold resistor part #62-1096, 140 ohms and the wire wound resistor, or the 2 section candohm part #62-1120, 1060 ohms on each side.

These resistors usually check OK but fail to deliver proper voltage to the tubes.—P. F. Adams, Cleveland, Ohio.

* * *

Zenith Ford Model 6MF490, 6MF590. To prevent variation in reception and severe noise when tuned to a station, bond all r-f and i-f transformer cans to ground. The rivets on the grounding lugs become loose and cause a variety of noises and whistles.—J. W. Brewer, Sinton, Texas

IF YOU'RE IN THE ARMY NOW

Servicemen who are drafted for army duty, or who join any branch of Government service, may continue to receive Sylvania News during enlistment. Drop us a post card giving both your old and new address.

CASH IN ON SET MODERNIZATION

Servicemen, what have you done in the way of re-vamping receivers for the more efficient and more popular types of tubes and parts?

Naturally sales of new radios are always of prime importance to servicemen and dealers, but with the government curtailment of receivers, and the public interest in radio today, there is a market for the modernizing of radios so that they are kept at top performance. You will not only be performing a service to your customers, but you will also be aiding in filling the gap created by the curtailment of radio sales. The modernizing may be a minor change or it may be a complete re-building job.

With so many different types of tubes available today, servicemen will find many opportunities to change over receivers for those customers who, until recently, paid little attention to their old radios.

It is not practical to publish modernizing data that will cover all circuits because each change-over presents an individual problem. However, we are always anxious to help servicemen in every way possible with their problems and will be glad to publish the findings of those who have successfully modernized any receivers.

In addition to our offer to publish such material, we will give the author his choice of any two Sylvania receiving tubes for the use of material of average Service Hint length on minor changes. Major or more detailed change-overs entitles the contributor to one Sylvania Panel Lamp Kit (an assortment of sixty Panel Lamps—list value $5.40). Whether the change-over involves the use of new sockets, adaptors, the re-vamping of one section, or whether it involves complete re-wiring and other major changes, give us full details. Address the Technical Editor, Sylvania News, Emporium, Pa.

SIMPLIFICATION OF TUBE STOCKS

During the past year the Sylvania line of tubes has been streamlined to include several multiple-etched types ("GT/G" tubes). This program has been for the purpose of eliminating tube types where there would be no trouble encountered with interchangeability. An example of this is the 6X5 metal, 6X5G and 6X5GT. These three types are now combined into one multiple-etched glass type "6X5GT/G" which can be used as a direct replacement for all three previous tubes.

In some instances, the multiple-etched type had only two original equivalent types, such as types 1A5G and 1A5GT. In other instances, the multiple-etched type serves by replacing the Metal, "G" and "GT" style such as the 6X5 example above. The physical size of the "GT/G" tube is the same as the original equivalent "GT" type and the electrical characteristics have been standardized by RMA so that complete interchangeability is possible.

The advantages of this multiple-etched program are apparent to the serviceman and dealer in that the number of tube types will be reduced. Thus, the tube stock turn-over will be improved, since only one type will be required to replace two or three types, as the case may be. The introduction of these multiple-etched types also simplifies the service problem by making it necessary to have only one type available for a service job where it was previously necessary to have two or three types.

In addition to the Sylvania multiple-etched tubes there are several other types for which substitution can be used to simplify tube stocks. These are types that can be replaced by more popular, faster moving, or more easily obtainable types. These tubes, together with the multiple-etched types, are listed below with any exceptions to their interchangeability shown under the column "Remarks."

To help you in your Stock Simplification program we are enclosing with this issue of the News, a Tube Simplification Chart. We suggest that you put this to use immediately. Obviously it will be wise to regulate your inventory so that your stock will be standardized on the multiple-etched types. In other words, any Metal "G" or "GT" tube now on your shelves should first be sold before stocking the equivalent "GT/G" types. If additional copies of the Tube Simplification Chart are needed, you can obtain them from your Sylvania Jobber.

Type	REPLACE WITH SYLVANIA TYPE	Remarks
OZ4G	**0Z4**	Type OZ4 may be used as a direct replacement.
1A5G 1A5GT	**1A5GT/G**	Type 1A5GT/G may be used as a direct replacement.
1C5G 1C5GT	**1C5GT/G**	Type 1C5GT/G may be used as a direct replacement.
1G4G 1G4GT	**1G4GT/G**	Type 1G4GT/G may be used as a direct replacement.
1G6G 1G6GT	**1G6GT/G**	Type 1G6GT/G may be used as a direct replacement.
1Q5G 1Q5GT	**1Q5GT/G**	Type 1Q5GT/G may be used as a direct replacement.
3Q5G 3Q5GT	**3Q5GT/G**	Type 3Q5GT/G may be used as a direct replacement.
5T4	**5U4G**	Type 5U4G may be used for replacement where space permits and power transformer will stand one ampere additional current.
5W4 5W4G 5W4GT/G	**5W4GT/G**	Type 5W4GT/G may be used as a direct replacement.
5Z4	**5Y3G**	Type 5Y3G will replace, except where space does not permit.
6A8	**6A8GT**	Type 6A8GT may be used. An external shield and realignment may be necessary.
6AC5G 6AC5GT	**6AC5GT/G**	Type 6AC5GT/G may be used as a direct replacement.
6B6G	**6Q7G**	Type 6Q7G may be used as a direct replacement.
6B8	**6B8G**	Type 6B8G may be used, except where space does not permit. An external shield and realignment may be necessary.
6C5 6C5G 6C5GT	**6C5GT/G**	Type 6C5GT/G will replace. In some cases an external shield and realignment may be necessary.
6C6	**77**	Type 77 will replace in most cases.
6D6	**78**	Type 78 will replace in most cases.
6F5	**6F5GT**	Type 6F5GT will replace. In some cases an external shield and realignment may be necessary.
6F6	**6F6G**	Type 6F6G may be used, except where space does not permit or where coupling between tubes is a problem.
6H6 6H6G 6H6GT	**6H6GT/G**	Type 6H6GT/G may be used as a direct replacement.
6J5 6J5G 6J5GT/G	**6J5GT/G**	Type 6J5GT/G may be used as a direct replacement.
6J7	**6J7GT**	Type 6J7GT may be used. An external shield and realignment may be necessary.
6K6G 6K6GT	**6K6GT/G**	Type 6K6GT/G may be used as a direct replacement.
6K7	**6K7GT**	Type 6K7GT may be used. An external shield and realignment may be necessary.
6K8	**6K8GT**	Type 6K8GT may be used. An external shield and realignment may be necessary.
6L6	**6L6G**	Type 6L6G may be used, except where space does not permit or where coupling between tubes is a problem.
6L7	**6L7G**	Type 6L7G may be used, except where space does not permit. An external shield and realignment may be necessary.
6N7	**6N7G**	Type 6N7G may be used, except where space does not permit. An external shield and realignment may be necessary.
6P5G 6P5GT	**6P5GT/G**	Type 6P5GT/G may be used as a direct replacement.
6Q7	**6Q7GT**	Type 6Q7GT may be used. An external shield and realignment may be necessary.
6R7	**6R7GT**	Type 6R7GT may be used. An external shield and realignment may be necessary.
6S7	**6S7G**	Type 6S7G may be used, except where space does not permit. An external shield and realignment may be necessary.
6SA7	**6SA7GT/G**	Type 6SA7GT/G will replace. In a few cases an external shield and realignment may be required.
6SA7GT	**6SA7GT/G**	Type 6SA7GT/G may be used as a direct replacement.
6SF5	**6SF5GT**	Type 6SF5GT may be used. An external shield and realignment may be necessary.
6SJ7	**6SJ7GT**	Type 6SJ7GT may be used. An external shield and realignment may be necessary.
6SK7	**6SK7GT/G**	Type 6SK7GT/G will replace. In a few cases an external shield and realignment may be necessary.
6SK7GT	**6SK7GT/G**	Type 6SK7GT/G may be used as a direct replacement.
6SQ7	**6SQ7GT/G**	Type 6SQ7GT/G will replace. In a few cases an external shield and realignment may be necessary.
6SQ7GT	**6SQ7GT/G**	Type 6SQ7GT/G may be used as a direct replacement.
6V6 6V6G 6V6GT	**6V6GT/G**	Type 6V6GT/G may be used as a direct replacement.
6W5G	**6X5GT/G**	Type 6X5GT/G may be used where output current drain is not greater than 70 ma.
6X5 6X5G 6X5GT	**6X5GT/G**	Type 6X5GT/G may be used as a direct replacement.
7A7LM	**7A7**	Type 7A7 is preferable.
7B5LT	**7B5**	Type 7B5 is preferable.
7B6LM	**7B6**	Type 7B6 is preferable.
7B8LM	**7B8**	Type 7B8 is preferable.
7C5LT	**7C5**	Type 7C5 is preferable.
12B7	**14A7/12B7**	Type 14A7/12B7 may be used as a direct replacement.
12K8	**12K8GT**	Type 12K8GT will replace. In a few cases an external shield may be necessary.
12SA7	**12SA7GT/G**	Type 12SA7GT/G will replace. In a few cases an external shield and realignment may be necessary.
12SA7GT	**12SA7GT/G**	Type 12SA7GT/G may be used as a direct replacement.
12SF5	**12SF5GT**	Type 12SF5GT will replace. In some cases an external shield and realignment may be necessary.
12SJ7	**12SJ7GT**	Type 12SJ7GT will replace. An external shield and realignment may be necessary.
12SK7	**12SK7GT/G**	Type 12SK7GT/G will replace. In a few cases an external shield and realignment may be necessary.
12SK7GT	**12SK7GT/G**	Type 12SK7GT/G may be used as a direct replacement.
12SQ7	**12SQ7GT/G**	Type 12SQ7GT/G will replace. In a few cases an external shield and realignment may be necessary.
12SQ7GT	**12SQ7GT/G**	Type 12SQ7GT/G may be used as a direct replacement.
25A6 25A6G 25A6GT	**25A6GT/G**	Type 25A6GT/G may be used as a direct replacement.
25A7G 25A7GT	**25A7GT/G**	Type 25A7GT/G may be used as a direct replacement.
25AC5G 25AC5GT	**25AC5GT/G**	Type 25AC5GT/G may be used as a direct replacement.
25L6 25L6G 25L6GT	**25L6GT/G**	Type 25L6GT/G may be used as a direct replacement.
25Z6 25Z6G 25Z6GT	**25Z6GT/G**	Type 25Z6GT/G may be used as a direct replacement.
35A5LT	**35A5**	Type 35A5 is preferable.
35L6G 35L6GT	**35L6GT/G**	Type 35L6GT/G may be used as a direct replacement.
35Z3LT	**35Z3**	Type 35Z3 is preferable.
35Z5G 35Z5G	**35Z5GT/G**	Type 35Z5GT/G may be used as a direct replacement.
50Y6G 50Y6GT	**50Y6GT/G**	Type 50Y6GT/G may be used as a direct replacement.
117L7GT 117M7GT	**117L7/M7GT**	Type 117L7/M7GT may be used as a direct replacement.
117Z6G 117Z6GT	**117Z6GT/G**	Type 117Z6GT/G may be used as a direct replacement.

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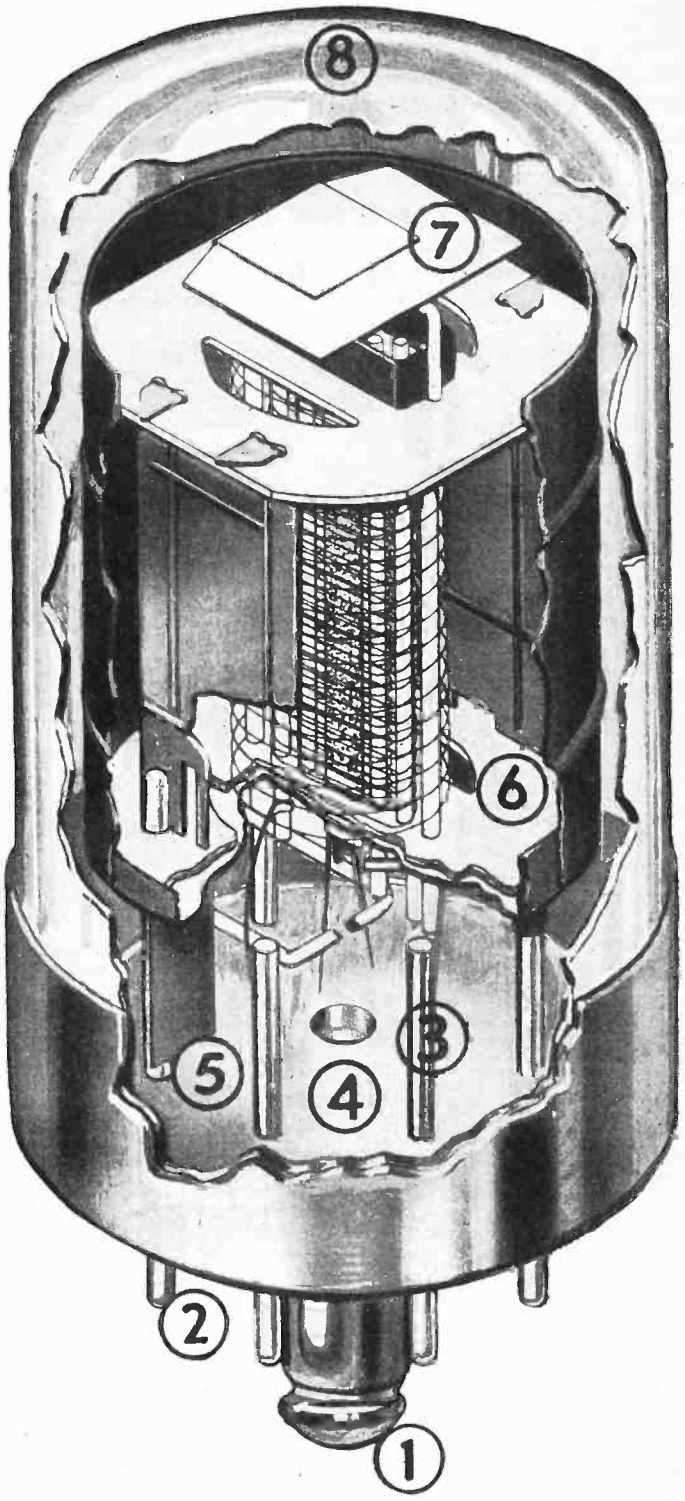


CUTAWAY VIEW OF SYLVANIA LOCK-IN PENTODE

LOCK-IN—A STUDY IN RADIO TUBE QUALITY

9 POINTS OF MERIT

1. Lock-In Locating Lug... also acts as shield between pins.

2. No Soldered Connections... all welded for greater durability.

3. Short, Direct Connections . . . fewer welded joints—less loss.

4. All-Glass Base. . . low loss and better spacing of lead wires.

5. No Glass Flare. . . unobstructed space for internal shielding.

6. Improved Mount Support.... ruggedly mount-on all sides.

7. Getter Located on Top . . . shorts eliminated by separation of getter material from leads.

8. No Top Cap Connection. . . overhead wires eliminated.

9. Reduced Overall Height . . . space saving.

Lock-In, the radio tube that incorporates basic improvements of class tube design and construction, is now doing a high quality radio reception job in millions of home and automobile radios. We want you to know about the nine special points of radio tube improvement found in Lock-In because every day you will encounter more of these tubes in your radio set servicing work.

With set curtailment now a reality, you'll soon start getting the newer models in your shop along with the older ones and that's your opportunity to show your stuff. Let customers know that you're hep to the latest radio tube developments by showing them the difference between old style glass and the new improved Lock-In radio tubes.

Millions of sets in all categories are Lock-In equipped. This new tube design is found in low-drain battery portable sets, automobile sets and in AC-DC home radio sets. In television and frequency modulation you'll find Lock-In proudly doing the finest job possible. Its electrical advantages were worked out with expert engineering eyes focused on high frequency applications. The result of these farsighted efforts (design for Lock-In was initiated as far back as 1936) is the appearance of Lock-In in the fore-front of high and ultra-high frequency applications. Lock-In is a mechanically stronger tube; electrically more efficient. Its name emphasizes one feature which is of increasing importance in modern radio design and particularly in automotive and acronautical sets—a method of locking tube to socket so solidly that heavy shocks and jars won't separate them. Yet, an easy tilt of the tube with the hand, or using the Sylvania Lock-In Tube Puller, removes the tube as easy as tipping your hat.

More important than the lock-in feature, however, is the real advantage—greater mechanical strength. Support rods are made stronger and thicker. There are fewer welded joints and no soldered connections. Elements are locked in a new, stronger mount assembly that reduces warping and weaving of the elements when the going gets tough. Besides these notable mechanical merits are the improved electrical characteristics. Bringing element leads directly down through the low-loss glass header to become sturdy socket pins accomplishes a much desired reduction in lead inductance and inter-element capacity. Study the illustration on left. Familiarize yourself with the *9 points of merit* that have estabished the success of this tube so that you can tell your customers about them.

SERVICING RECORD PLAYERS*

Over Six Million Units in Use

With more than 6 million units for playing records in this country, servicemen now have a large block of equipment which demands a more specialized type of repair technique. We have designed a postal card for use in contacting your record-player customers. A complete description of it is given on Page 3 of Main Section.

Along with the electrical and circuit problems which are much the same as those found in standard sets, the mechanical and acoustical problems also enter. These are very important to high quality reproduction of records.

The mechanical problems include the servicing of record changers, motor repair, pickup service and replacement. Record changer service is a matter of understanding the basic mechanism and applying the specific adjustment instructions recommended by the manufacturer.

Mechanical Problems

The mechanical problems need not cause the serviceman to stay away from handling them. All the actions take place with mechanical parts that are visible, and careful observation of their movement during a cycle of the mechanism will generally show where the trouble is.

If the mechanism is binding, look for excessive wear at points where cams and push rods make contact and examine for bent parts, and misalignment. See that levers and other parts are not too loose at pivot points and that jamming does not occur because of this. If the mechanism runs hard, check the lubrication and friction between gears and large sliding surfaces. The teeth of gears should be fully meshed but not so tightly that there is a binding action when turned by hand. If lubrication has been long neglected, there may be a galling of the metal surfaces in contact. These parts will have to be replaced or re-surfaced.

Lubrication for the cams and other levers, etc., is usually a light grease, while the motor is usually lubricated with oil. The exact recommendations of the manufacturer should be followed.

Effect of Records

When the changer does not handle the records properly, always be sure that the fault is not with the records. Occasionally the records are just a shade too thick, warped, or the edges are in such a condition that the separating knives (on those types) will not do the job. Have enough records on hand to give the machine a fair test and don't condemn the changer if it balks on one or two records. Some of the early models are critical.

When testing the mechanism keep the changer in its normal upright position, since in most types the correct action depends upon the downward weight of pickup, etc. Never force the mechanism through a cycle. Find out what is causing the trouble and correct it.

If the mechanism has been over lubricated, the collection of dust on the parts will slow-up and possibly stall the operations. Clean with kerosene being sure to prevent any from getting on rubber surfaces and into the motor windings. Dry thoroughly and coat lightly with specified greases.

Motor troubles are usually due to mechanical faults, binding of the bearings, too much load, loose parts, etc. Overheating of the motor due to excessive mechanical load may burn up the insulation and cause electrical failure. Badly worn bearings and burned-out windings usually mean a new motor. In these days of shortages in metals for domestic uses, be sure to exhaust the possibilities of repairing damaged units.

Needle Scratch, Rumble

Acoustic problems, are those of needle scratch, rumble, feedback, and similar troubles which disturb your hearing.

Needle scratch depends upon a number of factors, the type of needle, pressure on the record, the record itself, type of pickup arm, etc. In the changers of the older type the pickups are not of the low pressure design and in order to get the needle to last through a stack, the harder needles are used—steel, alloys, sapphire. Scratch will be heard if the audio system reproduces the highs well. Tone controls and scratch filters will cut the scratch and the highs. More expensive and new records have less scratch than cheaper and old records.

Rumble is usually due to mechanical coupling between the motor and turntable mechanism and the pickup, or the motor and the high gain, low level audio tubes. These problems are usually solved in the design of the mechanism by shock absorbing mountings, etc. Where rubber is used, age can ruin its effectiveness.

**Radio Retailing—Today.*

DISCONTINUED TUBE TYPES

Listed below are tubes which have been withdrawn from the Sylvania Tube List. Information is shown for each type as to whether or not an interchangeable tube is available, or if a type can be substituted by some small change. Although these tubes have been withdrawn from regular factory stocks, your Sylvania Jobber may have them in his stock and they should be used until substitutions are needed.

Type 1F6. There is no direct interchangeable type, but Sylvania type 1F7G can be used by removing the 1F6 socket and installing an octal socket, following the 1F7G base diagram for wiring connections. In some cases it may be necessary to reverse the filament connection for satisfactory performance.

Type 1T1G. No available tube can be used as a direct replacement, but the type 1R1G can be used by shunting a 50 ohm resistor across the filament at the socket.

Type 4A6G. No available tube can be used as a direct replacement, but type 1J6G can be substituted provided the tube is used for operation on a filament voltage of 2.0 volts. This substitution does not require any socket or wiring changes. If a ballast tube or resistor is used in the set it should be changed to accommodate the additional 120 ma. filament drain of the 1J6G.

Type 6A4/LA. No available tube can be used as a direct replacement.

Type 6AB7/1853 (Metal). This tube has no directly interchangeable type. The Lock-In type 7H7 can be used in most cases by changing the socket and rewiring to accomodate the 7H7.

Type 6AE5GT/G. No available tube can be used as a direct replacement.

Type 6AF6G. No available tube can be used as a direct replacement.

Type 6AG7 (Metal). No available tube can be used as a direct replacement.

Type 6L6 (Metal). This tube can be directly replaced by the 6L6G where space permits and where external coupling is not a factor.

Type 6SK7 (Metal). Type 6SK7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 6SQ7 (Metal). Type 6SQ7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 12SK7 (Met). Type 12SK-7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 12SQ7 (Met). Type 12SQ-7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 25B6G. No available tube can be used as a direct replacement.

Type 40Z5/45Z5GT. Has no direct interchangeable type, but the 35Z5GT can be used without any changes in the socket provided a resistor is placed in the power line to increase the voltage drop 10 volts. The resistor should be a 68 ohm, 2 watt unit.

Type 45Z3. No available tube can be used as a direct replacement.

Type 884, 885. No available tube can be used as a direct replacement.

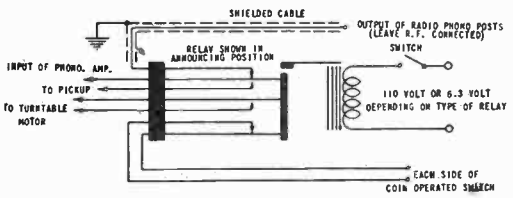
THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.

Automatic Jr. Model TS-60. To increase volume on this model change antenna connection from tap on antenna choke to control grid of 6D6 mixer. Align the r-f stage.—Kenneth A. Trites, Melrose, Massachusetts.

* * *

Coin Operated Phonographs for Radio. In all places using coin operated phonographs, or when new coin operated phonographs are installed, an added installation can be easily made which is very important at this war time, by connecting the output of the small radio generally found in these places to the amplifier of the coin operated phonograph, with a switch at the radio so that News Bulletins, Air Raid warnings, and important addresses can be given to the customers through the full clear coverage of the phonograph amplifier and speaker. Thus saving both the cost of an expensive radio and the necessity of stopping and starting separately the coin operated phonograph when a war announcement is wanted.

A switching-relay arrangement is used to cut in on the music if the coin operated phonograph is operating and to restore operation where it left off when announcement is finished, or turn it on if not operating. This arrangement is shown on the schematic below:



When the switch is closed the relay throws connecting radio to coin operated amplifier input, disconnecting pickup and stopping phono turntable motor. With switch open the relay opens reconnecting the pickup and restoring normal operation where it was interrupted.—Robert Murray, L. I., N. Y.

* * *

General Electric Model A-85. If the tone goes bad on these sets sounding like a speaker out of alignment, check the volume control and tone clarifier network, C31, C30, R11, etc. You may find a bad volume control, or it may be in one of the condensers.—Jack Darr, Mena, Arkansas.

* * *

Hum in Philco Model 17. If hum develops, check for leakage between the filter condenser cans and the chassis. Carefully clean the insulation, then apply Russian mineral oil to complete the job. The purpose of the oil is to prevent further formation of oxides at the base of the condensers.—James Green, Duluth, Minn.

* * *

Philco Model 38-4. Hum—when tuned to strong local. Tighten ground lug at transformer mounting bolt nearest tone control.—C. Edward Weigel, Louisville, Ky.

* * *

Radio Road Sign. Don't throw those old radio tubes away after burnouts. I put them to use for a road sign. The regular billboard type of sign or a hanging style of sign, advertising your radio service can be made attractive by installing those defective tubes around the edges of the sign and post. This makes a very effective reflecting night sign. Drill small holes in the sign. Cut all but one or two prongs from the tubes, leaving these for inserting in the sign.—B. Waters, Oneida, Tenn.

* * *

RCA Victor Model T-55. In some of these radios a small hum may be present which can be eliminated by reversing the two leads to the hum bucking coil in the speaker. Evidently this is an oversight on someone's part because it is a characteristic of only a few receivers of this model.—Victor Roszhart, Gridley, Ill.

REACTANCE FORMULAE

The formulae for reactance of a capacitance or inductance is given below. This is the formulae referred to in the discussion of REACTANCE CHARTS on Page 4.

The reactance of an inductance (X_L) is given by the expression $X_L = 2\pi fL$ where X_L is the inductive reactance in ohms

$2\pi = 6.28$
f = the frequency in cycles per second
L = the inductance in henries

The reactance of a condenser is given by the expression

$$Xc = \frac{1}{2\pi fc}$$

where Xc is the capacitative reactance in ohms

$2\pi = 6.28$
f = the frequency in cycles per second.
c = equals the capacity in farads.

The equations given above show that inductive reactance is directly proportional to the frequency and inductance while capacitative reactance is indirectly proportional to the frequency and capacity.

If the frequency is doubled, the inductive reactance of a coil is doubled while if the frequency remains fixed and the inductance is doubled, then the inductive reactance will be doubled. If the frequency is doubled, the capacity reactance of a condenser is halved; while if the frequency remains constant and the capacity is doubled, the capacity reactance will be halved.

V-C Extension Shaft. How many times have you wanted an extension for a volume control and couldn't get one quickly? I have found a simple way to make an extension that is ideal and can be made for nothing. Take the shaft bearing from a discarded volume control which acts as a collar over the end of the new control shaft. Insert the correct length of shaft taken from the discarded control and sweat the shafts and collar together with solder.—C. A. Vaughn, Los Angeles, Calif.

* * *

War Time Emergency Repair of Open Electro-Dynamic Speaker Field Coils. Field coils which are open and for which replacements can not be secured, due to National defense restrictions, can in most cases be repaired by simply connecting an auto spark coil across the open field coil, and leave on until the field shorts closed. This sparking burns across the open break inside the coil so the wire closes again. The heat from the spark is so intense it tends to fuse the wire together and forms a fairly permanent war-time repair. This is also effective for the repairs of open power transformers and power chokes.—Robert Murray, L. I., N. Y.

Editors Note: Here are two servicemen who have shown ingenuity in using discarded material. No doubt there are many other servicemen who have done similar jobs. Let's hear of them.

SELL AND SWAP SERVICE

At one time we ran a Sell and Swap Service in Sylvania News, but discontinued it for more interesting material. Now because of the difficulty in obtaining material and equipment for service work, we feel that a Sell and Swap column will be a great help to servicemen. Beginning with the next issue of Sylvania News, we will publish Sell and Swap ads free of charge provided you feel this is a valuable service.

Ads will be run in the order of their receipt and we reserve the right to refuse any that may prove detrimental to the service profession. State clearly what you have to sell or swap, your complete name and address. Sylvania News will not undertake to handle inquiries on advertisements or assume responsibility for transactions. The following rules are to be followed:

1. **Ads must not be over thirty-five words, exclusive of name and address.**
2. **Ads must be in connection with selling or swapping of radio merchandise only.**
3. **The advertiser agrees to acknowledge all inquiries.**
4. **State plainly and briefly your ad on a separate paper and give complete address.**
5. **Address ads to Department SS, Sylvania News, Emporium, Pa.**

Let us hear from you if you have any comments to make on this new service.

SERVICING RECORD PLAYERS*

Over Six Million Units in Use

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If the mechanism is binding, look for excessive wear at points where cams and push rods make contact and examine for bent parts, and misalignment. See that levers and other parts are not too loose at pivot points and that jamming does not occur because of this. If the mechanism runs hard, check the lubrication and friction between gears and large sliding surfaces. The teeth of gears should be fully meshed but not so tightly that there is a binding action when turned by hand. If lubrication has been long neglected, there may be a galling of the metal surfaces in contact. These parts will have to be replaced or re-surfaced.

Lubrication for the cams and other levers, etc., is usually a light grease, while the motor is usually lubricated with oil. The exact recommendations of the manufacturer should be followed.

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When the changer does not handle the records properly, always be sure that the fault is not with the records. Occasionally the records are just a shade too thick, warped, or the edges are in such a condition that the separating knives (on those types) will not do the job. Have enough records on hand to give the machine a fair test and don't condemn the changer if it balks on one or two records. Some of the early models are critical.

When testing the mechanism keep the changer in its normal upright position, since in most types the correct action depends upon the downward weight of pickup, etc. Never force the mechanism through a cycle. Find out what is causing the trouble and correct it.

If the mechanism has been over lubricated, the collection of dust on the parts will slow-up and possibly stall the operations. Clean with kerosene being sure to prevent any from getting on rubber surfaces and into the motor windings. Dry thoroughly and coat lightly with specified greases.

Motor troubles are usually due to mechanical faults, binding of the bearings, too much load, loose parts, etc. Overheating of the motor due to excessive mechanical load may burn up the insulation and cause electrical failure. Badly worn bearings and burned-out windings usually mean a new motor. In these days of shortages in metals for domestic uses, be sure to exhaust the possibilities of repairing damaged units.

Needle Scratch, Rumble

Acoustic problems, are those of needle scratch, rumble, feedback, and similar troubles which disturb your hearing.

Needle scratch depends upon a number of factors, the type of needle, pressure on the record, the record itself, type of pickup arm, etc. In the changers of the older type the pickups are not of the low pressure design and in order to get the needle to last through a stack, the harder needles are used—steel, alloys, sapphire. Scratch will be heard if the audio system reproduces the highs well. Tone controls and scratch filters will cut the scratch and the highs. More expensive and new records have less scratch than cheaper and old records.

Rumble is usually due to mechanical coupling between the motor and turntable mechanism and the pickup, or the motor and the high gain, low level audio tubes. These problems are usually solved in the design of the mechanism by shock absorbing mountings, etc. Where rubber is used, age can ruin its effectiveness.

**Radio Retailing—Today.*

DISCONTINUED TUBE TYPES

Listed below are tubes which have been withdrawn from the Sylvania Tube List. Information is shown for each type as to whether or not an interchangeable tube is available, or if a type can be substituted by some small change. Although these tubes have been withdrawn from regular factory stocks, your Sylvania Jobber may have them in his stock and they should be used until substitutions are needed.

Type 1F6. There is no direct interchangeable type, but Sylvania type 1F7G can be used by removing the 1F6 socket and installing an octal socket, following the 1F7G base diagram for wiring connections. In some cases it may be necessary to reverse the filament connection for satisfactory performance.

Type 1T1G. No available tube can be used as a direct replacement, but the type 1R1G can be used by shunting a 50 ohm resistor across the filament at the socket.

Type 4A6G. No available tube can be used as a direct replacement, but type 1J6G can be substituted provided the tube is used for operation on a filament voltage of 2.0 volts. This substitution does not require any socket or wiring changes. If a ballast tube or resistor is used in the set it should be changed to accommodate the additional 120 ma. filament drain of the 1J6G.

Type 6A4/LA. No available tube can be used as a direct replacement.

Type 6AB7/1853 (Metal). This tube has no directly interchangeable type. The Lock-In type 7H7 can be used in most cases by changing the socket and rewiring to accomodate the 7H7.

Type 6AE5GT/G. No available tube can be used as a direct replacement.

Type 6AF6G. No available tube can be used as a direct replacement.

Type 6AG7 (Metal). No available tube can be used as a direct replacement.

Type 6L6 (Metal). This tube can be directly replaced by the 6L6G where space permits and where external coupling is not a factor.

Type 6SK7 (Metal). Type 6SK7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 6SQ7 (Metal). Type 6SQ7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 12SK7 (Met). Type 12SK-7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

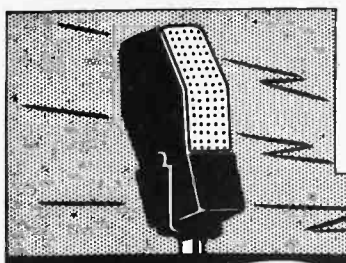
Type 12SQ7 (Met). Type 12SQ-7GT/G can be used as a direct replacement. In some cases an external shield, properly grounded, may be necessary.

Type 25B6G. No available tube can be used as a direct replacement.

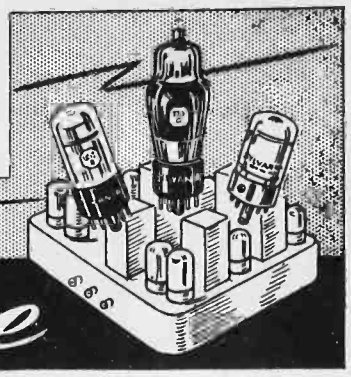
Type 40Z5/45Z5GT. Has no direct interchangeable type, but the 35Z5GT can be used without any changes in the socket provided a resistor is placed in the power line to increase the voltage drop 10 volts. The resistor should be a 68 ohm, 2 watt unit.

Type 45Z3. No available tube can be used as a direct replacement.

Type 884, 885. No available tube can be used as a direct replacement.



THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.



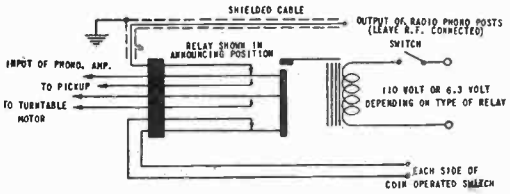
THE Service Exchange

Automatic Jr. Model TS-60. To increase volume on this model change antenna connection from tap on antenna choke to control grid of 6D6 mixer. Align the r-f stage.—Kenneth A. Trites, Melrose. Massachusetts.

* * *

Coin Operated Phonographs for Radio. In all places using coin operated phonographs, or when new coin operated phonographs are installed, an added installation can be easily made which is very important at this war time, by connecting the output of the small radio generally found in these places to the amplifier of the coin operated phonograph, with a switch at the radio so that News Bulletins, Air Raid warnings, and important addresses can be given to the customers through the full clear coverage of the phonograph amplifier and speaker. Thus saving both the cost of an expensive radio and the necessity of stopping and starting separately the coin operated phonograph when a war announcement is wanted.

A switching-relay arrangement is used to cut in on the music if the coin operated phonograph is operating and to restore operation where it left off when announcement is finished, or turn it on if not operating. This arrangement is shown on the schematic below:



When the switch is closed the relay throws connecting radio to coin operated amplifier input, disconnecting pickup and stopping phono turntable motor. With switch open the relay opens reconnecting the pickup and restoring normal operation where it was interrupted.—Robert Murray, L. I., N. Y.

* * *

General Electric Model A-85. If the tone goes bad on these sets sounding like a speaker out of alignment, check the volume control and tone clarifier network, C31, C30, R11, etc. You may find a bad volume control, or it may be in one of the condensers.—Jack Darr, Mena, Arkansas.

* * *

Hum in Philco Model 17. If hum develops, check for leakage between the filter condenser cans and the chassis. Carefully clean the insulation, then apply Russian mineral oil to complete the job. The purpose of the oil is to prevent further formation of oxides at the base of the condensers.—James Green, Duluth, Minn.

* * *

Philco Model 38-4. Hum—when tuned to strong local. Tighten ground lug at transformer mounting bolt nearest tone control.—C. Edward Weigel, Louisville, Ky.

* * *

Radio Road Sign. Don't throw those old radio tubes away after burnouts. I put them to use for a road sign. The regular billboard type of sign or a hanging style of sign, advertising your radio service can be made attractive by installing those defective tubes around the edges of the sign and post. This makes a very effective reflecting night sign. Drill small holes in the sign. Cut all but one or two prongs from the tubes, leaving these for inserting in the sign.—B. Waters, Oneida, Tenn.

* * *

RCA Victor Model T-55. In some of these radios a small hum may be present which can be eliminated by reversing the two leads to the hum bucking coil in the speaker. Evidently this is an oversight on someone's part because it is a characteristic of only a few receivers of this model.—Victor Roszhart, Gridley, Ill.

REACTANCE FORMULAE

The formulae for reactance of a capacitance or inductance is given below. This is the formulae referred to in the discussion of REACTANCE CHARTS on Page 4.

The reactance of an inductance (X_L) is given by the expression $X_L = 2\pi fL$ where X_L is the inductive reactance in ohms

$2\pi = 6.28$
f = the frequency in cycles per second
L = the inductance in henries

The reactance of a condenser is given by the expression

$$Xc = \frac{1}{2\pi fc}$$

where Xc is the capacitative reactance in ohms

$2\pi = 6.28$
f = the frequency in cycles per second.
c = equals the capacity in farads.

The equations given above show that inductive reactance is directly proportional to the frequency and inductance while capacitative reactance is indirectly proportional to the frequency and capacity.

If the frequency is doubled, the inductive reactance of a coil is doubled while if the frequency remains fixed and the inductance is doubled, then the inductive reactance will be doubled. If the frequency is doubled, the capacity reactance of a condenser is halved; while if the frequency remains constant and the capacity is doubled, the capacity reactance will be halved.

V-C Extension Shaft. How many times have you wanted an extension for a volume control and couldn't get one quickly? I have found a simple way to make an extension that is ideal and can be made for nothing. Take the shaft bearing from a discarded volume control which acts as a collar over the end of the new control shaft. Insert the correct length of shaft taken from the discarded control and sweat the shafts and collar together with solder.—C. A. Vaughn, Los Angeles, Calif.

* * *

War Time Emergency Repair of Open Electro-Dynamic Speaker Field Coils. Field coils which are open and for which replacements can not be secured, due to National defense restrictions, can in most cases be repaired by simply connecting an auto spark coil across the open field coil, and leave on until the field shorts closed. This sparking burns across the open break inside the coil so the wire closes again. The heat from the spark is so intense it tends to fuse the wire together and forms a fairly permanent war-time repair. This is also effective for the repairs of open power transformers and power chokes.—Robert Murray, L. I., N. Y.

Editors Note: Here are two servicemen who have shown ingenuity in using discarded material. No doubt there are many other servicemen who have done similar jobs. Let's hear of them.

SELL AND SWAP SERVICE

At one time we ran a Sell and Swap Service in Sylvania News, but discontinued it for more interesting material. Now because of the difficulty in obtaining material and equipment for service work, we feel that a Sell and Swap column will be a great help to servicemen. Beginning with the next issue of Sylvania News, we will publish Sell and Swap ads free of charge provided you feel this is a valuable service.

Ads will be run in the order of their receipt and we reserve the right to refuse any that may prove detrimental to the service profession. State clearly what you have to sell or swap, your complete name and address. Sylvania News will not undertake to handle inquiries on advertisements or assume responsibility for transactions. The following rules are to be followed:

1. Ads must not be over thirty-five words, exclusive of name and address.
2. Ads must be in connection with selling or swapping of radio merchandise only.
3. The advertiser agrees to acknowledge all inquiries.
4. State plainly and briefly your ad on a separate paper and give complete address.
5. Address ads to Department SS, Sylvania News, Emporium, Pa.

Let us hear from you if you have any comments to make on this new service.

REACTANCE CHARTS

Calculations Simplified for Reactance of Inductances and Capacitances

Everyone is reading and hearing on all sides that the Radio Serviceman is going to have his hands full keeping old receivers in operating condition. He must, in fact, become a "Radio Service Engineer" instead of just a "Radio Serviceman" as in the past. It may be necessary in many cases to adapt parts to be used in specific receivers. The clever adaptation of such parts requires both ingenuity and skill. In line with the Sylvania policy of providing the Service Engineer with the maximum amount of help, we are presenting our "Reactance Chart" which will simplify calculations necessary in any conversion work which may be necessarily done by the Service Engineer. Reactances of coils and condensers are commonly required in radio design work.

The form in which these charts are presented is quite simplified and hence more useful than forms usually used.

The frequency range covered comprises the frequency spectrum from 1 cycle per second up to 1000 megacycles per second and all of the scales involved are plotted in actual magnitudes so that no computations are required to determine the location of the decimal point in the final result.

In order to make these conditions possible, the frequency spectrum has been divided into three parts. Chart A covers the range from 1 cycle to 1000 cycles, Chart B from 1 kilocycle to 1000 kilocycles, and Chart C from 1 megacycle to 1000 megacycles.

Inductance, capacitance, reactance and frequency have been plotted so that the reactance offered by an inductance or capacitance at any frequency may be readily determined by placing a straight-edge across the proper chart so as to connect the known quantities. Since $X_L = X_C$ at resonance in most radio circuits, the charts may also be used to find the resonant frequency of any combination of L and C. The formulae for reactance of a capacitance or inductance is given on Page 3.

PRACTICAL APPLICATIONS

To illustrate with a simple example, suppose the reactance of a 0.01 mfd. condenser is desired at a frequency of 400 cycles. Place a straight-edge across the proper chart so as to connect the points 0.01 mfd. and 400 cycles per sec. The quantity desired is the point of intersection with the reactance scale which is 40,000 ohms. The straight-edge also intersects the inductance scale at 15.8 henries indicating that this value of inductance likewise has a reactance of 40,000 ohms at 400 cycles per sec. and furthermore, that these values of L and C produce resonance at this frequency

A practical example of how this chart may be used would arise in connection with the following problem: Supposing the Serviceman was called upon to replace an i-f transformer in a receiver where the i-f frequency is 260 kilocycles. Supposing that no such i-f transformer is available but that he can obtain one designed for 456 kilocycles. If the inductance of the 456 kilocycle transformer is known, a straight line drawn from 260 kilocycles to the inductance of the coil in question on Chart B will show the capacity required for resonating the coil. A fixed condenser in shunt with the i-f trimmer condenser will provide the necessary capacity so that the coil will resonate at the i-f frequency of the receiver. This coil may not be quite as satisfactory as the original coil supplied with the receiver but will permit the receiver to give quite satisfactory performance.

This is only one of the many such examples where these charts will be especially valuable for service.

Chart A

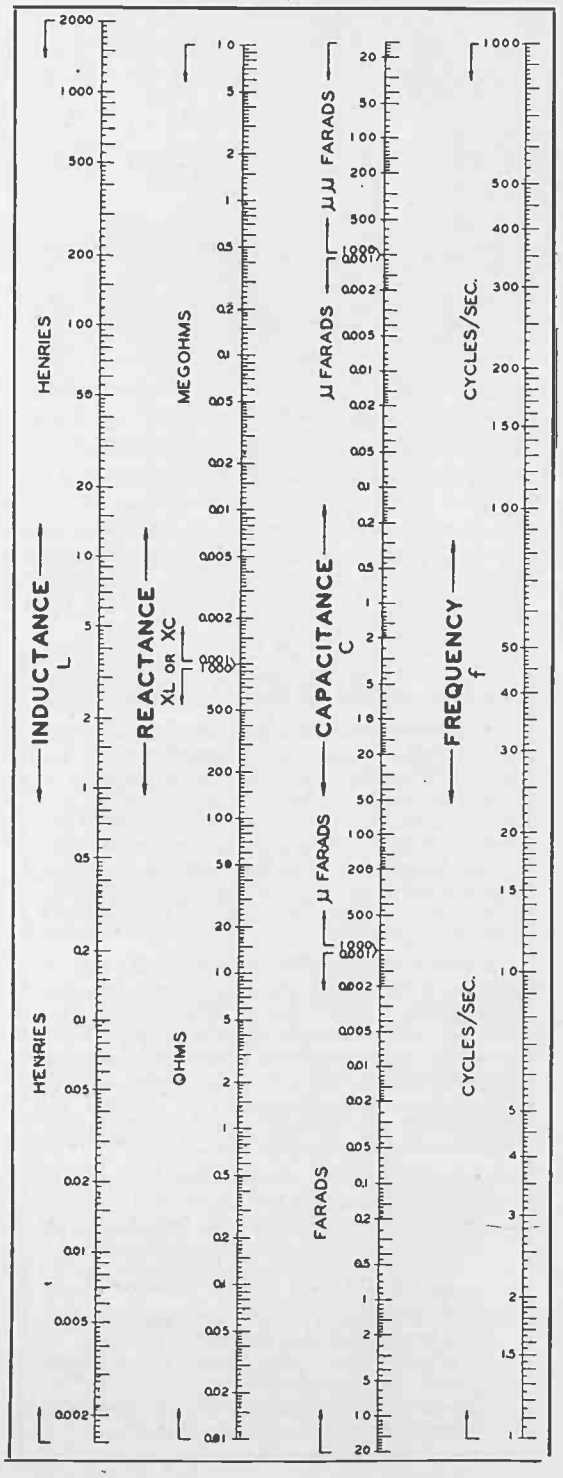


Chart B

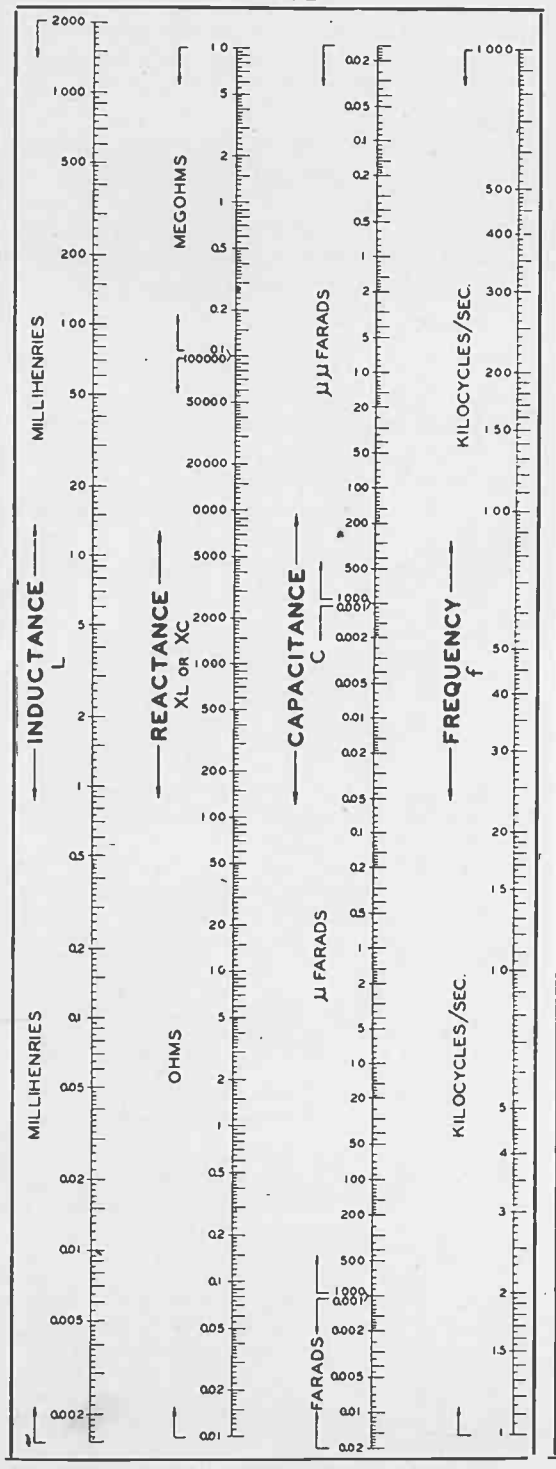
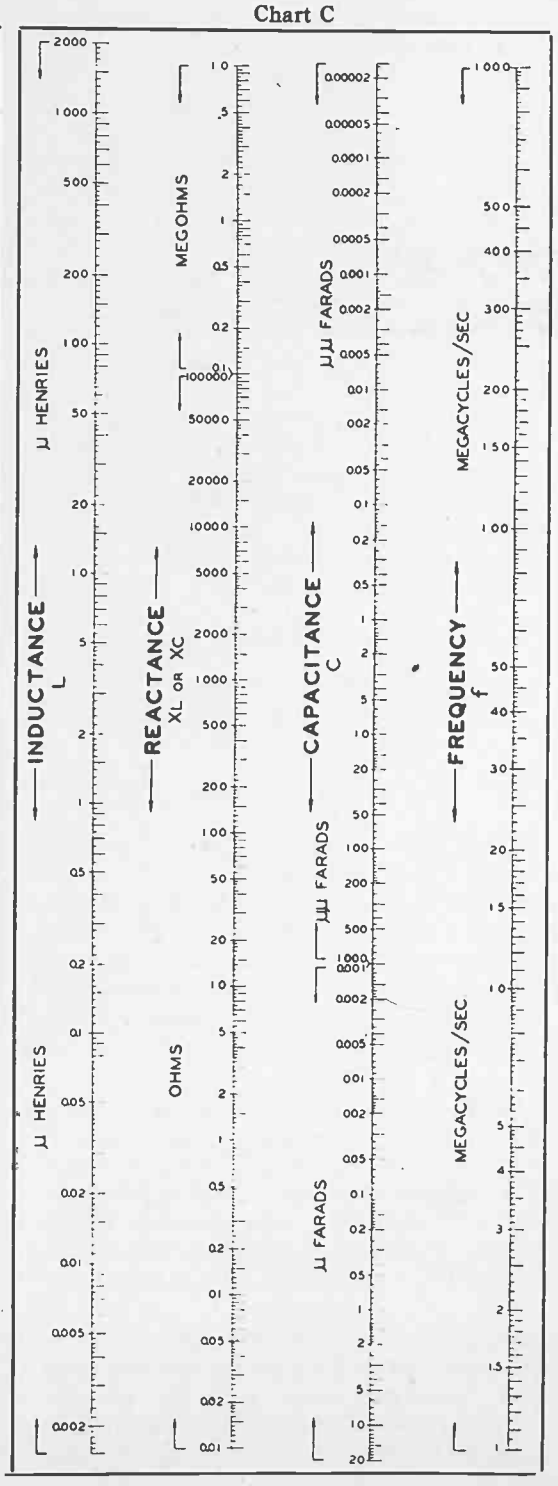


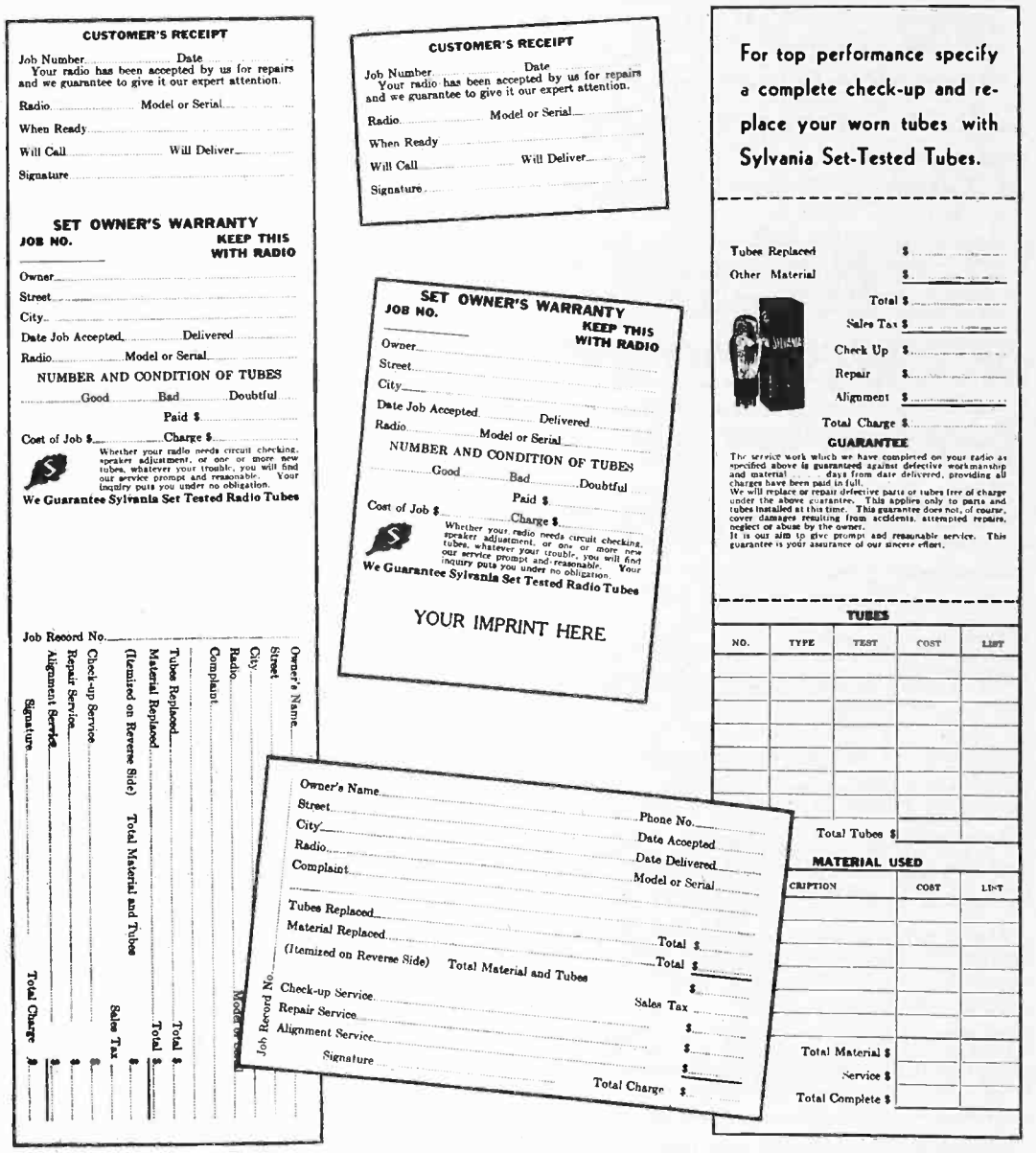
Chart C



Sylvania News

MAY, 1942 EMPORIUM, PENNA. Vol. 9, No. 9

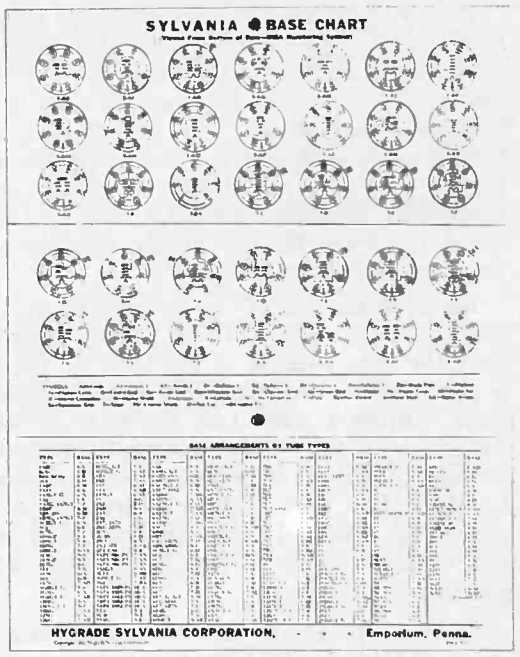
USE JOB RECORD CARDS FOR COMPLETE RECORDS



You don't leave your watch to be repaired or your suit to be cleaned without getting a receipt to prove your ownership. Don't you think your customers feel the same about the radios they leave with you? The Customer's Receipt Stub—feature of the Job Record Card—protects you and your customer when he brings a portable or a midget to your shop for repair. The lawsuit story on Page 2 of the Main Section points out the advantages of having complete records.

We hardly need to remind you of the value of the Job Record Cards. If you are one of the few servicemen who are not using them, you can see for yourself how much valuable information you can put on the 3x5 card that you keep for your record, and what your customer gets. Price, including imprint: 100, $1.00; 250, $1.75; 500, $3.00. Order now and give complete imprint instructions.

NEW BASE CHART



The Sylvania Base Chart which has always been a popular item with servicemen, amateurs and engineers, has been completely revised with a new layout that should be even more popular.

The new Chart has been designed for use as a Wall Chart, Pocket Booklet, or for the Service Kit. It is made in a convenient sized booklet with twelve pages. For wall use it can be hung like a calendar the pages leafed over and fastened at the top. Cross indexing of all tube types and bases are shown on this Chart the same as on the previous style. For pocket service kit or work bench use, it closes to a convenient size, 4 x 9 inches.

The base views show all internal tube elements and all pin connections and numbering. A total of 136 views cover 403 tube types. The views are done in the same easy-to-read style as the views used in other Sylvania tube literature such as the Technical Manual and Characteristic sheet.

This new Sylvania Chart is free to all who have use for it. Obtain one from your Sylvania Jobber or write directly to Hygrade Sylvania Corporation, Emporium, Pa.

MODERNIZATION

GE Model J-125A

These are large receivers which are capable of excellent performance. When properly operated, they are able to produce an exceptionally large volume of good fidelity, due to the use of two type 46 tubes in Class B with push-pull type 56 tubes as drivers. Their operation may be simplified and the results obtained by the average user improved by a few simple changes, as follows:

The noise suppressor control, which seldom requires adjustment, should be removed from the front panel and mounted on a small bracket attached to a convenient place on the rear of the chassis. This can be done without cutting or soldering any leads.

Removal of the noise suppressor control from the front panel provides ample room for mounting a Sylvania type 2E5 electron-ray tube to be used as a visual resonance indicator. The use of such a tube greatly increases the ease of properly tuning the receiver, which is otherwise somewhat difficult to adjust due to the excellent characteristic of the automatic volume control system.

An examination of the circuit diagram (Rider, Vol. VII, p. RCA 7-166) shows that the upper diode of the type 55 tube is supplied with a relatively broad signal from untuned coil L-9 through series capacitor C-38. The rectified output voltage of this diode, which appears across resistors R-2 and R-3 in series, is employed for AVC. In the usual case, this is the voltage which would be utilized to actuate the type 2E5.

In these receivers, however, the lower diode of the type 55 tube is supplied with a relatively sharp signal from the sharply tuned circuit consisting of coil L-10 and capacitor C-37. The rectified output voltage of this diode appears across resistor R-26, and is used to operate the noise suppression system of the receiver. By using the latter voltage to actuate the type 2E5 tube, it is possible to secure a much more precise indication of exact resonance than would otherwise be possible.

Since a very large rectified voltage is developed across resistor R-26 during the reception of strong signals, it is necessary to employ a voltage divider network to prevent the type 2E5 tube from overclosing under these conditions. For use near powerful stations, a network consisting of a 2.0 megohm resistor and a 0.1 megohm resistor in series (with the latter connected to the cathode of the type 55 tube) was found to be satisfactory. The grid of the type 2E5 is connected through a 1.0 megohm resistor to the junction of the divider resistors, and the grid is bypassed to the cathode of the type 55 with a 0.1 μf capacitor. The cathode of the type 2E5 is connected to the cathode of the type 55, instead of to ground. This connection is very important, since in these receivers the type 55 cathode does not remain at substantially fixed potential relative to ground, but fluctuates over a wide range.

In aligning this receiver, the i-f and r-f trimmers are adjusted for maximum readings in the usual manner, with the noise suppressor rendered inoperative. Then, with the noise suppressor still inoperative, adjust capacitor C-37 for maximum deflection of the type 2E5 when feeding a 175 kc signal to the control-grid of the mixer tube. It is highly important to follow this procedure exactly as outlined for best results.

Incidentally, be sure that the green and black leads to the control-grid caps of the two type 58 i-f amplifiers are not reversed. Viewed from the back, the green lead should be at the right and the black lead at the left. This is one of the few receivers which will operate fairly well with these leads reversed, the principal symptoms being a tendency to overload on strong local stations with serious distortion.

ALBERT R. HODGES.

SELL AND SWAP SERVICE

This service is offered without charge for the purpose of helping jobbers and servicemen in the exchange of needed radio parts and equipment that are hard to obtain due to war conditions. We reserve the right to refuse any ads that do not serve this purpose. Sylvania News will not undertake to answer inquiries or assume responsibility for transactions and reserves the right to refuse ads that prove detrimental to the service profession.

RULES

1. Ads must not be over thirty-five words, exclusive of name and address.
2. Ads must deal with radio merchandise only.
3. The advertiser agrees to answer all inquiries, and to be fair and honest in completing transactions.
4. Ads must be submitted on a separate sheet (preferably a business letter-head) with complete address.
5. Address ads to Department SS, Sylvania News, Emporium, Pa.
6. Ads will be run in the order of their receipt.

For Sale—New Jackson Signal Analyzer, New Aerovox Capacity-resistance bridge. Triplett volt-ohm-milliameter. Wright-De Coster Multi-test speaker. Eight Rider Manuals. Stancor 6 volt power-pack. Supreme tube checker. Hickok Oscillator—All in good condition.—W. J. Goettings, 2851 S. Conger Place, Broson Manor, West Allis, Wisc.

* * *

Will Swap—Power transformers, I-F coils, loud speakers for test instruments, etc.—W. L. Block, Electric Shop, Hartwick, N. Y.

* * *

Wanted—Rider's Manuals 1 to 12 and Index. Also late Model Signal Generator. State lowest price.—W. Kalemkiewicz, 2322 Geimer, Hamtramck, Mich.

* * *

For Sale—Five Gernsback Radio Service Manuals, first one, '32, '33, '34, '35 like new and complete with supplements, postpaid for $5.00.—Frank Riese, Bloomington, Wisc.

* * *

For Sale—Supreme Vedolyzer Model 560, also Supreme Signal Generator combination RF and AF model 561. Price $200.00 f. o. b.—W. E. Gentry, Radio Station WSB, Atlanta, Ga.

* * *

Wanted—Factory built all-wave receiver, prefer larger communication type Hammarlund, National, Scott or similar. Age, condition or cabinet no object. Also interested in equipment, manuals, books. Send list. All correspondence answered.—Glenn Watt, Chanute, Kans.

* * *

Wanted—100 Watt Fluorescent fixture (commercial type). 1 Rider-Volt Ohmist.—J. Leo Phelan, R. F. D. No. 3, Waterbury, Conn.

* * *

Wanted—Used Riders Manuals will Sell or Swap 1/20 H. P. 115 volt D. C. Ventilating Fan, Check Protector, Ledger Binders, Legal Forms.—G. Reis, 333 E. Saratoga, Ferndale, Mich.

* * *

Wanted—177 or 188 Hickok or similar oscillator, also a good "Scope" complete and in good condition. Will trade radio parts or pay cash.—Radio Electric Labs., Hudson, Wisconsin.

* * *

Wanted—One or two 884 Gas Triode tubes. Must be new—never used, will pay list price.—George C. Anderson, 2236 Indiana Avenue, St. Louis, Mo.

* * *

Wanted—Good shortwave receiver, mechanical drawing set or drafting set, slide rule, binoculars. Describe fully. State best cash price and what you can use in exchange.
Sell or Swap—Service Manuals, radio magazines, new tubes, large quantity of new resistors, etc.—Oliver F. Klein, 2235 N. 39th St., Milwaukee, Wis.

* * *

Wanted—Used communication Rcvr. must be in very good working order. State make, conditions, and price. What do you want in exchange? Have many parts to trade. —Anthony Pusateri, 1101 Fleming St., Coraopolis, Pa.

* * *

Wanted—Will pay cash (or exchange) for Rider's Manuals 1, 2, 4, 5, 7, 8, 12, condenser tester ohmmeter, 20,000 ohm per voltmeter, tube tester (not emission type). Write for my list.—Kay Radio Service, 319 Main St., Niagara Falls, New York.

* * *

Wanted—Weston 30-0-30 microammeter galvanometer, sensitivity approx. 2 microamperes per division. HAVE Weston model 301 0-3 ampere DC ammeter, perfect condition.—Bates Laboratories, 33 Sunset Drive, White Plains, New York.

* * *

For Sale or Trade—1 N.R.I. Triplett Professional set Analyzer, 1 Supreme Oscillator Model No. 189, 1 RCA Volt-Ohmist, Jr., Volumes 1, 2, 3 Rider Manuals.—Smith's Radio Shop, P. O. Box 398, Leaksville, N. C.

For Sale or Trade—Shop built condenser tester measures electrolytic. Condensers ½ to 40 mfd. in perfect condition, $8.50 in carrying case. 1 RCA electro dynamic 11 inch speaker 1000 ohm field, complete with P. P. O. P. transformer for 2-45 tubes P.P. I need 2 0-1 Ma. meters.—Jim's Radio Shop, Mankato, Kans.

* * *

For Sale—Used radio parts of all types, including late model parts. Obsolete types. Order by part number. Set make and Model number.—Martin L. Pitts, 1000 E. College St., Terrell, Texas.

* * *

Swap—National FBXA Peak Preselector—4 sets coils—Rola 8 inch PM speaker—Tubes—Good Pack—Swell ten tube receiver with xtal—cost net $97.50. Sell or want test equipment, camera, projector, electric drill, etc.—Bob Eubank, 1227 Windsor Avenue, Richmond, Va.

* * *

Will Swap or Sell—National SW3, coils 20, 40 and 80 meters with power supply. Also 600 v. power-supply and transmitter parts, key, monitor—what have you?—Francisco Bou, 1714 N. Front St., Philadelphia, Pa.

* * *

Swap—Dumont Type 164 Cathode-Ray Oscillograph for a Hickok Model R. FO-5 Oscillograph, also want to buy a Hickok Model 155 traceometer in good condition.—Midland Radio Service, 184 Midland Ave., Garfield, N. J.

* * *

Swap—brand new 1942 5-tube Arvin table model radio in ivory color, to trade for a late model tube tester. Must be in good condition.—Harold Wurm, 1009 W. Barnes Ave., Appleton, Wis.

* * *

Swap—Clough Brengle Model 88A V.T.V.M. perfect condition, cost $54.00. Will trade it for Triplett Modulation Monitor, Oscilloscope, Hallicrafters Ht-7, R.M.E. LF 90 Freq. Inverter, Gasoline driven Generator, Browning Freq. Meter, Abbott TR-4 or Amateur receiver.—Walter Kryger, 912 W. 151st St., East Chicago, Ind.

* * *

Swap or Sell—One 1500-1501 Triplett Comb. tester, needs remodeling, meter and everything in A-1 shape. Make offer in money, tubes, condensers or what have you.—Fulton Radio Service, Kurt P. Kuenzel, Mgr., 2107 West Lexington St., Baltimore, Md.

* * *

Swap—Philco Test Equipment for sound equipment made by Webster, old or new.—Shines Radio Shack, 69 West 23rd St., Chattanooga, Tenn.

* * *

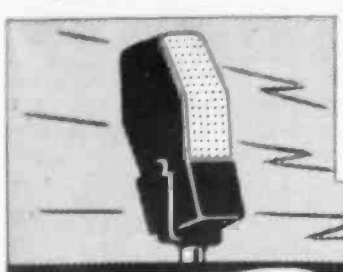
Aircraft Industry Wants Meters—A plan suggested by D. E. Gaskill, purchasing department, Lockheed Aircraft Corp., Burbank, Calif., gives all amateurs, experimenters, dealers, and Jobbers the opportunity to help the aircraft industry "Get 'em Flying."

All aircraft engineering departments need electric meters for design and test work, but with meter manufacturers overloaded with orders, even the aircraft industries' A-1-a rating can't get deliveries quick enough to permit this vital part of our war effort to speed ahead.

Mr. Gaskill suggests that all owners of electric meters of all kinds, submit lists of such equipment, giving complete details such as make, model, range, case, style, and condition. The aircraft producers are willing to pay fair market prices on any such requisitioned meters.

After the war, when amateur radio and private activity can be resumed, plenty of new instruments of improved design will be available. Thus, meters may be turned in, the extra cash used to purchase war bonds and a double blow dealt the Axis.

Lists may be sent to R. V. Weatherford, in care of Radio Specialties Co., 1956 S. Figueroa St., Los Angeles, Calif., who will make them available to all Western aircraft manufacturers. This will be handled on a non-profit basis as a contribution toward Victory. "Get 'em Flying."



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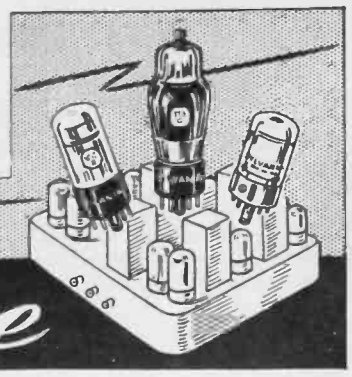

THE Service Exchange

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The WPB Radio Tube Unit explains that the 349 discontinued types represent duplicate, obsolete and slow moving types of tubes. They also stated that the present industry inventories of the discontinued types will be sufficient for civilian needs for at least two years. This industry stock will be added to by rejects from military production of the same types.

The obsolete and small-sales categories represent 289 types of tubes, or approximately 41 per cent of the total number of types produced. However, sales in 1941 of these types amounted to only 6/10ths of one percent of the total number of radio tubes sold last year—780,000 tubes out of a total of 135,600,000 tubes sold in 1941. Nevertheless, as long as these types were produced they had to be carried in stock, tying up critical materials in inventory, and their production resulted in loss of man hours, machine hours and materials.

Robert C. Berner, Chief of the Radio Section, estimated that 156,000 man hours and 80,000 machine hours will be released annually by the elimination of these tube types. In addition, critical materials will be used more efficiently by long production runs of the tube types not eliminated by the Order.

The Order applies only to the manufacturing of tubes for civilian use and does not apply when the tubes are needed for the Army, Navy, Maritime Commission, Panama Canal, Coast and Geodetic Survey, Coast Guard, Civil Aeronautics Scientific Research and Development, and Lease-Lend.

The list of discontinued type numbers is shown below. Opposite each type number are shown comments which will be helpful in analyzing this list. There has been some misunderstanding as to certain type numbers being discontinued. For example, the discontinuance of type 7G7 does not mean that Sylvania type 7G7/1232 has been withdrawn. The withdrawal of type number 1232 also does not indicate that Sylvania type 7G7/1232 has been withdrawn. The withdrawn type numbers listed below apply only to the etched number of the tube. Present tubes of duplicate characteristics but etched differently, such as the examples above, are not withdrawn.

Type	Comment
00A	Obsolete type
0Z3	Obsolete type
01A	Slow moving type
01AA	Slow moving type
1A1	Slow moving type
1A1/5E1	Slow moving type
1A5G	1A5GT/G replaces
1A7G	1A7GT replaces
1B1	Slow moving type
1B4	Obsolete type
1B4P	Slow moving type
1B4P/951	Slow moving type
1B7G	1B7GT replaces
1B8GT	Slow moving type
1C1	Slow moving type
1C4	Australian type
1C5G	1C5GT/G replaces
1D1	Slow moving type
1D2	Obsolete type
1D4	Australian type
1D7G	Slow moving type
1E1	Slow moving type
1E2	Obsolete type
1E4G	Slow moving type
1E5G	Obsolete type
1E5GP	Slow moving type
1E5GT	Slow moving type
1E7G	Slow moving type
1F1	Slow moving type
1F7GH	1F7G replaces
1F7GV	1F7G replaces
1G1	Slow moving type
1G4G	1G4GT/G replaces
1G5GT/G	Slow moving type
1G6G	1G6GT/G replaces
1G6GT	1G6GT/G replaces
1G7GT/G	Never released
1H5G	1H5GT replaces
1J1	Slow moving type
1J5G	Slow moving type
1K1	Slow moving type
1K4	Australian type
1K5G	Australian type
1K6	Australian type
1K7G	Australian type
1L1	Obsolete type
1L5G	Australian type
1L5GT	Never released
1LB6	Slow moving type
1LC5	Slow moving type
1M5G	Australian type
1N1	Obsolete type
1N5G	1N5GT replaces
1N6G	Slow moving type
1N6GT	Slow moving type
1P1	Obsolete type
1P5G	1P5GT replaces
1Q1	Obsolete type
1Q5G	1Q5GT/G replaces
1R1G	Slow moving type
1R4	Never released
1S1G	Obsolete type
1T1G	Slow moving type
1T4GT	Never released
1T5G	Never released
1U1	Obsolete type
1W1	Obsolete type
1Y1	Slow moving type
1Z1	Slow moving type
2	Slow moving type
2A3H	Obsolete type
2A7S	Maj.—Slow moving
2B6	Obsolete type
2B7	Slow moving type
2B7S	Maj.—Slow moving
2E5	Slow moving type
2G5	Obsolete type
2S/4S	Maj.—Slow moving
2W3	Slow moving type
2W3GT	Slow moving type
2X3G	Never released
2Y2	Obsolete type
2Y3	Canadian type
2Y4	Canadian type
2Z2	Obsolete type
2Z2/G84	Maj.—Slow moving
3	Slow moving type

Type	Comment
3B8GT	Never released
3C5GT	Slow moving type
3LE1	Withdrawn type
3Q5G	3Q5GT/G replaces
3S5	Never released
4	Slow moving type
4A1	Slow moving type
4A6G	Slow moving type
5	Slow moving type
5T4	Withdrawn type
5V3G	Never released
5W4	5W4GT/G replaces
5W4G	5W4GT/G replaces
5X3	Special—Obsolete
5Y3G	5Y3GT/G replaces
5Z4G	Obsolete type
5Z4MG	Obsolete type
6	Slow moving type
6A4	Obsolete type
6A4/LA	Slow moving type
6A5G	Slow moving type
6A6X	Ceramic based 6A6
6A7S	Maj.—Slow moving
6A8MG	Obsolete type
6AB5	6AB5/6N5 replaces
6AB6G	Slow moving type
6AC5G	6AC5GT/G replaces
6AC6G	Slow moving type
6AC6GT	Slow moving type
6AD5G	Obsolete type
6AD5GT	Never released
6AD6G	Slow moving type
6AE5G	6AE5GT/G replaces
6AE5GT	6AE5GT/G replaces
6AE6G	Slow moving type
6AE7GT	Slow moving type
6AF5G	Slow moving type
6AF6GT	Slow moving type
6AF7G	French type
6AG5GT	Never released
6AG6G	Never released
6AH5G	Never released
6AL6G	Slow moving type
6B6	Obsolete type
6B7S	Maj.—Slow moving
6B8GT	Slow moving type
6C5G	6C5GT/G replaces
6C5MG	Obsolete type
6C7	Maj.—Slow moving
6C8GT	Never released
6D5G	Obsolete type
6D5MG	Obsolete type
6D6G	Never released
6D7	Maj.—Slow moving
6D8	Never released
6E4GT	Never released
6E6	Slow moving type
6E7	Maj.—Slow moving
6E8G	French type
6F5MG	Obsolete type
6F7S	Maj.—Slow moving
6G5	6U5/6G5 replaces
6G7	Canadian type
6G7S	Canadian type
6H4G	Never released
6H5	Withdrawn,6U5/6G5 replaces
6H6G	6H6GT/G replaces
6H6MG	Obsolete type
6H7S	Canadian type
6H8G	French type
6J5G	6J5GT/G replaces
6J5GX	Ceramic based 6J5G
6J6GT	Never released
6J7MG	Obsolete type
6K6G	6K6GT/G replaces
6K6MG	Obsolete type
6K7MG	Obsolete type
6L6GT	Never released
6L6GX	Ceramic based 6L6G
6M6G	French type
6M7G	French type
6M8GT	Slow moving type
6N5	6AB5/6N5 replaces
6N5G	Never released
6N6	Slow moving type
6N6GT	Never released
6N6MG	Obsolete type

Type	Comment
6N7G	Slow moving type
6N7GT	Never released
6P5G	6P5GT/G replaces
6P6	Australian type
6P7G	Slow moving type
6P8G	English type
6Q6	Never released
6Q6G	Withdrawn, 6T7G replaces
6Q7MG	Obsolete type
6R6G	Slow moving type
6S5	Canadian type
6S6GT	Slow moving type
6SE7GT	Slow moving type
6T5	Withdrawn,6U5/6G5 replaces
6T6	Canadian type
6T7G/6Q6G	6T7G replaces
6U5	Withdrawn,6U5/6G5 replaces
6V4G	Never released
6V5G	Never released
6V6G	6V6GT/G replaces
6V6GX	Ceramic based 6V6G
6V7G	Slow moving type
6W5G	Slow moving type
6W6GT	Slow moving type
6X5	6X5GT/G replaces
6X5G	6X5GT/G replaces
6X6G	Canadian type
6Y3G	Special slow moving
6Y5	Maj.—Slow moving
6Y5G	Never released
6Y5GT	Slow moving type
6Y5S	Obsolete type
6Y5V	Obsolete type
6Y6	Never released
6Y6GT	Never released
6Y7G	Slow moving type
6Z3	Withdrawn, 1V replaces
6Z4	84/6Z4 replaces
6Z5	Maj.—Slow moving
6Z5/12Z5	Obsolete type
6Z6MG	Obsolete type
6Z7G	Slow moving type
7	Slow moving type
7A7LM	7A7 replaces
7B5LT	7B5 replaces
7B6LM	7B6 replaces
7B8LM	7B8 replaces
7C5LT	7C5 replaces
7D7	Slow moving type
7G7	7G7/1232 replaces
7N5	Never released
7R7	Slow moving type
8	Slow moving type
9	Slow moving type
WD11	Obsolete type
WD12	Obsolete type
WX12	Obsolete type
12A	Slow moving type
12A5	Slow moving type
12A8G	12A8GT replaces
12B6	Canadian type
12B7	14A7/12B7 replaces
12C8GT	Never released
12E5GT	Slow moving type
12J5G	Never released
12J7G	12J7GT replaces
12K7G	12K7GT replaces
12K8GT	Slow moving type
12Q7G	12Q7GT replaces
12S7G1	Never released
12SA7G	12SA7GT/G replaces
12SC7GT	Never released
12SK7G	12SK7GT/G replaces
12Z5	Obsolete—6Z5 replaces
14	Slow moving type
14A4	Slow moving type
14A7	14A7/12B7 replaces
14B6	Slow moving type
14B8	Slow moving type
14C5	Slow moving type
14E6	Slow moving type
14E7	Slow moving type
14F7	Slow moving type
14N7	Slow moving type
14Y4	Slow moving type
15	Slow moving type
17	Slow moving type

Type	Comment
18	Slow moving type
20	Slow moving type
22	Slow moving type
24	Obsolete—24A replaces
24S	Maj.—Slow moving
25A6	25A6GT/G replaces
25A6G	25A6GT/G replaces
25A7G	25A7GT/G replaces
25AC5G	25AC5GT/G replaces
25B5	Slow moving type
25B6G	Slow moving type
25B8GT	Slow moving type
25D8GT	Slow moving type
25L6	25L6GT/G replaces
25L6G	25L6GT/G replaces
25N6G	Slow moving type
25RE	Export type
25S	Obsolete, 1B5/25S replaces
25X6GT	Slow moving type
25Y4GT	Slow moving type
25Y5	Heavy duty 25Z5 for Export
25Z3	Never released
25Z4	Slow moving type
25Z4GT	Slow moving type
25Z5MG	Obsolete type
25Z6G	25Z6GT/G replaces
27S	Maj.—Slow moving
29	Obsolete type
31	Slow moving type
35A5LT	35A5 replaces
35L6G	35L6GT/G replaces
35RE	Export type
35S/51S	Maj.—Slow moving
35Z3LT	35Z3 replaces
35Z5G	35Z5GT/G replaces
35Z6GT	Slow moving type
40	Slow moving type
45A	Obsolete—45 replaces
46A1	Slow moving type
46B1	Slow moving type
48	Slow moving type
49	Slow moving type
50C6G	Slow moving type
50L6G	Never released
50Y6G	50Y6GT/G replaces
50Z6G	Slow moving type
50Z6GT	Never released
50Z7G	Slow moving type
51	Obsolete—35/51 replaces
52	Slow moving type
55	Slow moving type
55S	Maj.—Slow moving
56AS	Maj.—Slow moving
56S	Maj.—Slow moving
57AS	Maj.—Slow moving
57S	Maj.—Slow moving
58AS	Maj.—Slow moving
58S	Maj.—Slow moving
64	Obsolete type
65	Obsolete type
68	Obsolete type
69	Obsolete type
70	Obsolete type
70A7GT	Slow moving type
70L6GT	Slow moving type
75S	Maj.—Slow moving
79	Slow moving type
82V	Never released
85AS	Maj.—Slow moving
87S	Canadian type
88S	Canadian type
89	Slow moving type
95	Obsolete type
V99	Slow moving type
X99	Slow moving type
117E4GT	Never released
117L7GT	117L7/M7GT replaces
117M7GT	117L7/M7GT replaces
117Z6G	117Z6GT/G replaces
117Z6GC	117Z6GT/G replaces
182B/482B	Slow moving type
183/483	Slow moving type
401	Obsolete type
485	Slow moving type
950	Slow moving type
1232	7G7/1232 replaces
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The obsolete and small-sales categories represent 289 types of tubes, or approximately 41 per cent of the total number of types produced. However, sales in 1941 of these types amounted to only 6/10ths of one percent of the total number of radio tubes sold last year—780,000 tubes out of a total of 135,600,000 tubes sold in 1941. Nevertheless, as long as these types were produced they had to be carried in stock, tying up critical materials in inventory, and their production resulted in loss of man hours, machine hours and materials.

Robert C. Berner, Chief of the Radio Section, estimated that 156,000 man hours and 80,000 machine hours will be released annually by the elimination of these tube types. In addition, critical materials will be used more efficiently by long production runs of the tube types not eliminated by the Order.

The Order applies only to the manufacturing of tubes for civilian use and does not apply when the tubes are needed for the Army, Navy, Maritime Commission, Panama Canal, Coast and Geodetic Survey, Coast Guard, Civil Aeronautics Scientific Research and Development, and Lease-Lend.

The list of discontinued type numbers is shown below. Opposite each type number are shown comments which will be helpful in analyzing this list. There has been some misunderstanding as to certain type numbers being discontinued. For example, the discontinuance of type 7G7 does not mean that Sylvania type 7G7/1232 has been withdrawn. The withdrawal of type number 1232 also does not indicate that Sylvania type 7G7/1232 has been withdrawn. The withdrawn type numbers listed below apply only to the etched number of the tube. Present tubes of duplicate characteristics but etched differently, such as the examples above, are not withdrawn.

Type	Comment
00A	Obsolete type
0Z3	Obsolete type
01A	Slow moving type
01AA	Slow moving type
1A1	Slow moving type
1A1/5E1	Slow moving type
1A5G	1A5GT/G replaces
1A7G	1A7GT replaces
1B1	Slow moving type
1B4	Obsolete type
1B4P	Slow moving type
1B4P/951	Slow moving type
1B7G	1B7GT replaces
1B8GT	Slow moving type
1C1	Slow moving type
1C4	Australian type
1C5G	1C5GT/G replaces
1D1	Slow moving type
1D2	Obsolete type
1D4	Australian type
1D7G	Slow moving type
1E1	Slow moving type
1E2	Obsolete type
1E4G	Slow moving type
1E5G	Obsolete type
1E5GP	Slow moving type
1E5GT	Slow moving type
1E7G	Slow moving type
1F1	Slow moving type
1F7GH	1F7G replaces
1F7GV	1F7G replaces
1G1	Slow moving type
1G4G	1G4GT/G replaces
1G5GT/G	Slow moving type
1G6G	1G6GT/G replaces
1G6GT	1G6GT/G replaces
1G7GT/G	Never released
1H5G	1H5GT replaces
1J1	Slow moving type
1J5G	Slow moving type
1K1	Slow moving type
1K4	Australian type
1K5G	Australian type
1K6	Australian type
1K7G	Australian type
1L1	Obsolete type
1L5G	Australian type
1L5GT	Never released
1LB6	Slow moving type
1LC5	Slow moving type
1M5G	Australian type
1N1	Obsolete type
1N5G	1N5GT replaces
1N6G	Slow moving type
1N6GT	Slow moving type
1P1	Obsolete type
1P5G	1P5GT replaces
1Q1	Obsolete type
1Q5G	1Q5GT/G replaces
1R1G	Slow moving type
1R4	Never released
1S1G	Obsolete type
1T1G	Slow moving type
1T4GT	Never released
1T5G	Never released
1U1	Obsolete type
1W1	Obsolete type
1Y1	Slow moving type
1Z1	Slow moving type
2	Slow moving type
2A3H	Obsolete type
2A7S	Maj.—Slow moving
2B6	Obsolete type
2B7	Slow moving type
2B7S	Maj.—Slow moving
2E5	Slow moving type
2G5	Obsolete type
2S/4S	Maj.—Slow moving
2W3	Slow moving type
2W3GT	Slow moving type
2X3G	Never released
2Y2	Obsolete type
2Y3	Canadian type
2Y4	Canadian type
2Z2	Obsolete type
2Z2/G84	Maj.—Slow moving
3	Slow moving type

Type	Comment
3B8GT	Never released
3C5GT	Slow moving type
3LE4	Withdrawn type
3Q5G	3Q5GT/G replaces
3S5	Never released
4	Slow moving type
4A1	Slow moving type
4A6G	Slow moving type
5	Slow moving type
5T4	Withdrawn type
5V3G	Never released
5W4	5W4GT/G replaces
5W4G	5W4GT/G replaces
5X3	Special—Obsolete
5Y3G	5Y3GT/G replaces
5Z4G	Obsolete type
5Z4MG	Obsolete type
6	Slow moving type
6A4	Obsolete type
6A4/LA	Slow moving type
6A5G	Slow moving type
6A6X	Ceramic based 6A6
6A7S	Maj.—Slow moving
6A8MG	Obsolete type
6AB5	6AB5/6N5 replaces
6AB6G	Slow moving type
6AC5G	6AC5GT/G replaces
6AC6G	Slow moving type
6AC6GT	Slow moving type
6AD5G	Obsolete type
6AD5GT	Never released
6AD6G	Slow moving type
6AE5G	6AE5GT/G replaces
6AE5GT	6AE5GT/G replaces
6AE6G	Slow moving type
6AE7GT	Slow moving type
6AF5G	Slow moving type
6AF6GT	Slow moving type
6AF7G	French type
6AG5GT	Never released
6AG6G	Never released
6AH5G	Never released
6AL6G	Slow moving type
6B6	Obsolete type
6B7S	Maj.—Slow moving
6B8GT	Slow moving type
6C5G	6C5GT/G replaces
6C5MG	Obsolete type
6C7	Maj.—Slow moving
6C8GT	Never released
6D5G	Obsolete type
6D5MG	Obsolete type
6D6G	Never released
6D7	Maj.—Slow moving
6D8	Never released
6E4GT	Never released
6E6	Slow moving type
6E7	Maj.—Slow moving
6E8G	French type
6F5MG	Obsolete type
6F7S	Maj.—Slow moving
6G5	6U5/6G5 replaces
6G7	Canadian type
6G7S	Canadian type
6H4G	Never released
6H5	Withdrawn,6U5/6G5 replaces
6H6G	6H6GT/G replaces
6H6MG	Obsolete type
6H7S	Canadian type
6H8G	French type
6J5G	6J5GT/G replaces
6J5GX	Ceramic based 6J5G
6J6GT	Never released
6J7MG	Obsolete type
6K6G	6K6GT/G replaces
6K6MG	Obsolete type
6K7MG	Obsolete type
6L6GT	Never released
6L6GX	Ceramic based 6L6G
6M6G	French type
6M7G	French type
6M8GT	Slow moving type
6N5	6AB5/6N5 replaces
6N5G	Never released
6N6	Slow moving type
6N6GT	Never released
6N6MG	Obsolete type

Type	Comment
6N7G	Slow moving type
6N7GT	Never released
6P5G	6P5GT/G replaces
6P6	Australian type
6P7G	Slow moving type
6P8G	English type
6Q6	Never released
6Q6G	Withdrawn, 6T7G replaces
6Q7MG	Obsolete type
6R6G	Slow moving type
6S5	Canadian type
6S6GT	Slow moving type
6SE7GT	Slow moving type
6T5	Withdrawn,6U5/6G5 replaces
6T6	Canadian type
6T7G/6Q6G	6T7G replaces
6U5	Withdrawn,6U5/6G5 replaces
6V4G	Never released
6V5G	Never released
6V6G	6V6GT/G replaces
6V6GX	Ceramic based 6V6G
6V7G	Slow moving type
6W5G	Slow moving type
6W6GT	Slow moving type
6X5	6X5GT/G replaces
6X5G	6X5GT/G replaces
6X6G	Canadian type
6Y3G	Special slow moving
6Y5	Maj.—Slow moving
6Y5G	Never released
6Y5GT	Slow moving type
6Y5S	Obsolete type
6Y5V	Obsolete type
6Y6	Never released
6Y6GT	Never released
6Y7G	Slow moving type
6Z3	Withdrawn, 1V replaces
6Z4	84/6Z4 replaces
6Z5	Maj.—Slow moving
6Z5/12Z5	Obsolete type
6Z6MG	Obsolete type
6Z7G	Slow moving type
7	Slow moving type
7A7LM	7A7 replaces
7B5LT	7B5 replaces
7B6LM	7B6 replaces
7B8LM	7B8 replaces
7C5LT	7C5 replaces
7D7	Slow moving type
7G7	7G7/1232 replaces
7N5	Never released
7R7	Slow moving type
8	Slow moving type
9	Slow moving type
WD11	Obsolete type
WD12	Obsolete type
WX12	Obsolete type
12A	Slow moving type
12A5	Slow moving type
12A8G	12A8GT replaces
12B6	Canadian type
12B7	14A7/12B7 replaces
12C8GT	Never released
12E5GT	Slow moving type
12J5G	Never released
12J7G	12J7GT replaces
12K7G	12K7GT replaces
12K8GT	Slow moving type
12Q7G	12Q7GT replaces
12S7GT	Never released
12SA7G	12SA7GT/G replaces
12SC7GT	Never released
12SK7G	12SK7GT/G replaces
12Z5	Obsolete—6Z5 replaces
14	Slow moving type
14A4	Slow moving type
14A7	14A7/12B7 replaces
14B6	Slow moving type
14B8	Slow moving type
14C5	Slow moving type
14E6	Slow moving type
14E7	Slow moving type
14F7	Slow moving type
14N7	Slow moving type
14Y4	Slow moving type
15	Slow moving type
17	Slow moving type

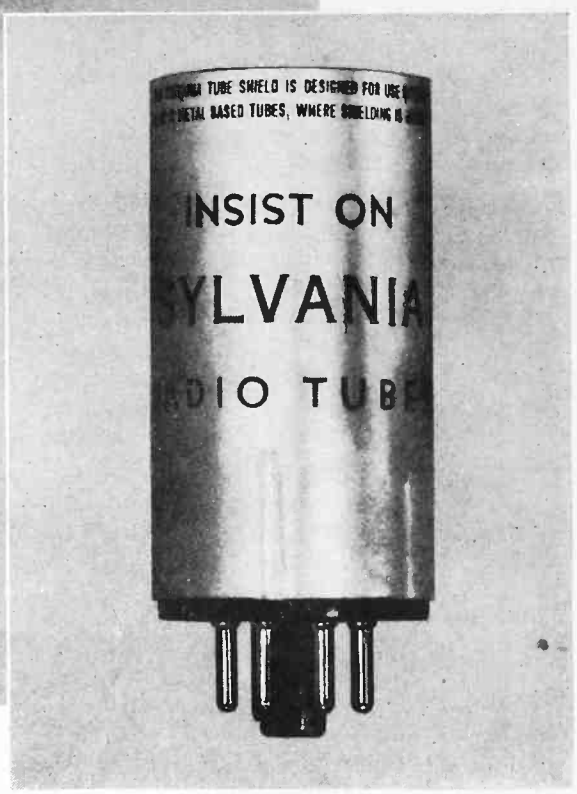
Type	Comment
18	Slow moving type
20	Slow moving type
22	Slow moving type
24	Obsolete—24A replaces
24S	Maj.—Slow moving
25A6	25A6GT/G replaces
25A6G	25A6GT/G replaces
25A7G	25A7GT/G replaces
25AC5G	25AC5GT/G replaces
25B5	Slow moving type
25B6G	Slow moving type
25B8GT	Slow moving type
25D8GT	Slow moving type
25L6	25L6GT/G replaces
25L6G	25L6GT/G replaces
25N6G	Slow moving type
25RE	Export type
25S	Obsolete, 1B5/25S replaces
25X6GT	Slow moving type
25Y4GT	Slow moving type
25Y5	Heavy duty 25Z5 for Export
25Z3	Never released
25Z4	Slow moving type
25Z4GT	Slow moving type
25Z5MG	Obsolete type
25Z6G	25Z6GT/G replaces
27S	Maj.—Slow moving
29	Obsolete type
31	Slow moving type
35A5LT	35A5 replaces
35L6G	35L6GT/G replaces
35RE	Export type
35S/51S	Maj.—Slow moving
35Z3LT	35Z3 replaces
35Z5G	35Z5GT/G replaces
35Z6GT	Slow moving type
40	Slow moving type
45A	Obsolete—45 replaces
46A1	Slow moving type
46B1	Slow moving type
48	Slow moving type
49	Slow moving type
50C6G	Slow moving type
50L6G	Never released
50Y6G	50Y6GT/G replaces
50Z6G	Slow moving type
50Z6GT	Never released
50Z7G	Slow moving type
51	Obsolete—35/51 replaces
52	Slow moving type
55	Slow moving type
55S	Maj.—Slow moving
56AS	Maj.—Slow moving
56S	Maj.—Slow moving
57AS	Maj.—Slow moving
57S	Maj.—Slow moving
58AS	Maj.—Slow moving
58S	Maj.—Slow moving
64	Obsolete type
65	Obsolete type
68	Obsolete type
69	Obsolete type
70	Obsolete type
70A7GT	Slow moving type
70L6GT	Slow moving type
75S	Maj.—Slow moving
79	Slow moving type
82V	Never released
85AS	Maj.—Slow moving
87S	Canadian type
88S	Canadian type
89	Slow moving type
95	Obsolete type
V99	Slow moving type
X99	Slow moving type
117E4GT	Never released
117L7GT	117L7/M7GT replaces
117M7GT	117L7/M7GT replaces
117Z6G	117Z6GT/G replaces
117Z6GC	117Z6GT/G replaces
182B/482B	Slow moving type
183/483	Slow moving type
401	Obsolete type
485	Slow moving type
950	Slow moving type
1232	7G7/1232 replaces
1852	6AC7/1852 replaces
1853	6AB7/1853 replaces

Sylvania News

JUNE, 1942 EMPORIUM, PENNA. Vol. 9, No. 10

SHIELDS FOR GT TUBES

Foil-Lined Cardboard does the job OK.



Since priorities on metals, S. O. S. signals have been received by us for tube shields that will substitute for metal shields. Now we have a real unit to offer as shown above. This new Sylvania shield is of sturdy cardboard tubing, foil lined, with six debossings at the bottom for good contact. It is designed for use with GT or GT/G tubes having metal base shells.

The replacement of metal tubes with GT or GT/G types as recommended on the Sylvania Simplification Chart, in some cases requires the use of external shields. The new Sylvania shield answers the purpose and in turn has patriotic appeal from the angle of metal conservation. The shields carry an appropriate message printed on the outside to help you promote future tube sales.

ORDER FROM YOUR SYLVANIA JOBBER

HOME REPAIRS VERSUS SHOP SERVICE

A recent list of suggestions issued by OPA for radio owners will be found on page 4 of the Main Section. While these are in most respects excellent, and right down the serviceman's alley, there is one exception. W. R. Jones, Director of the Sylvania Commercial Engineering Department, points out some serious complications that may arise if the suggestion regarding having all radio repairs made in home is taken too literally by radio owners.

In outlining radio repair procedure Mr. Jones give three important steps to be followed. 1. Diagnosis of difficulty; 2. Repair or replacement of defective parts; 3. Testing the set to make certain that repairs are satisfactory.

Adequate diagnosis takes time and involves the use of cathode-ray oscillograph, tube tester, volt-meter, and other equipment. Few housewives would welcome operations in her living room which required the use of all this equipment, plus a tool kit and spare parts.

After diagnosis, a specific replacement part is needed for the particular job. To have the exact part on the spot would require a very large assortment to be brought along on each job. Therefore the serviceman must go to his shop, or to his jobber, to get the needed part, leaving his equipment in the living room.

On completion of the repair work a signal generator, an output meter, and similar equipment must be brought for final checking. To avoid ear-spliting noises that would drive the housewife to frenzy, the loudspeaker must be disconnected while aligning the receiver.

Home repair, except in case of minor troubles, contributes to waste of precious gas and tires, since two extra trips may be necessary. Wear and tear on testing equipment is increased. Double the time is required to do the job. All of this, when emphasis is on extreme efficiency and utmost conservation of materials and equipment.

Another point for consideration is the obvious fact that as tubes and parts become scarcer, alterations will have to be made in the set so that replacements can be properly made with substitute parts. Such work will require all the equipment in the service shop, as well as considerable time and study.

TRACKING DOWN GRID EMISSION

CAUSES AND CURES FOR TROUBLE-MAKING "BUG"

Among the many "bugs" that find their way into a radio circuit, there is one that has caused untold grief and confusion to the serviceman. Its common name is GRID EMISSION.

Although it starts life as a tiny electron, it soon grows to huge proportions. It is elusive in its ways, and much valuable time may be lost merely in determining its presence. After that, more time is consumed in solving the serious problems that it creates. No doubt, you are familiar with some of the following complaints: blocking, loss of sensitivity, lack of selectivity, distortion, burned out plate and screen resistors, low emission rectifier and power tubes, and hum. These are a few of the problems of grid emission and they are generally reported to take place after the receiver has been in operation long enough to become overheated.

Perhaps you have tested tubes, condensers and resistors, yet you found everything to be normal. Try though you may, you have never located the cause of these complaints, although you may have effected a cure by the cut and try method. Of course, you know that the cathode of a radio tube is designed to emit electrons; but this is not true of the grid. Grid emission, as the name implies, means that the GRID gives off or emits electrons. When electrons flow there is also a flow of current, (as can be seen if we place a milliameter in series with the cathode) and current flowing through coils and high value resistors in the grid return circuit, will produce a voltage drop detrimental to good circuit performance.

Why do we have grid emission? Well, during the process of evacuation of a radio tube a small portion of the cathode emitting material is sometimes unavoidably splashed on to the grid with the result that should the grid become sufficiently heated during operation, it will emit electrons.

To reduce this disturbing effect every precaution is taken in the design of Sylvania radio tubes to keep the grid as cool as possible. Copper grid supports are used because copper, being a good heat conductor, carries the heat away from the grid. Grid radiators are attached to the grid to give a greater heat radiation area. Colloidal graphite is sprayed on plates and bulbs to increase the heat radiation to the outside away from the grid,—all to keep the internal tube structure cool.

We conclude, therefore, that excessive heat is the factor that must be avoided if we are to keep away from grid emission.

More recent tube types are of higher mutual conductance than those of the earlier days and in order to obtain this increase in mutual, the spacing between the grid and cathode has been greatly reduced. As a result, the grid is close enough to the cathode so that excessive heater voltage, or cathode current will heat the grid to the emission point.

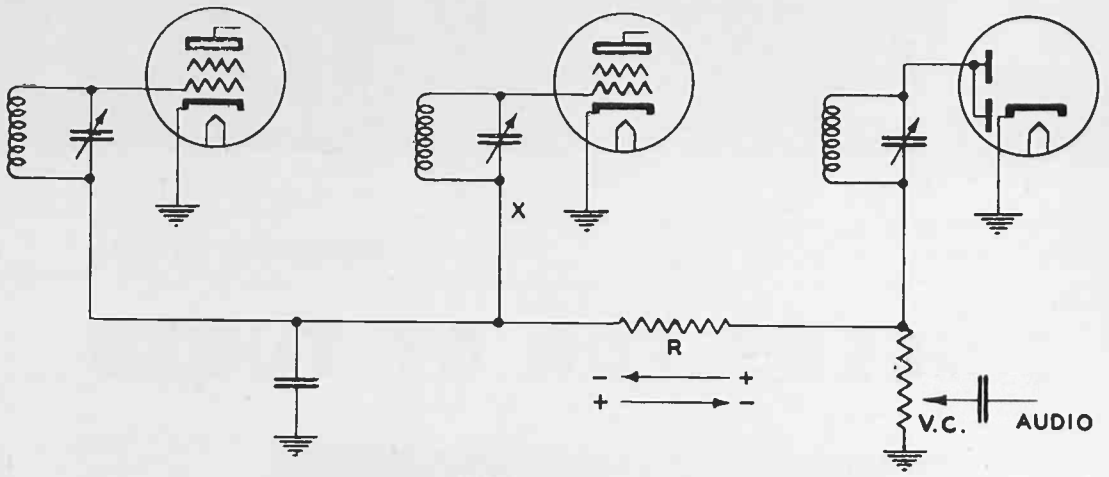


FIG. 1

Another recent factor aiding the evil of grid emission is the trend toward the zero-bias type of receiver operation. In this type of circuit the DC resistance in the grid returns are generally very high. This results in a higher disturbing-voltage drop, and at the same time fails to produce a negative bias voltage which would be helpful in opposing the disturbing voltage.

The r-f circuit shown in Fig. 1 represents a typical zero-bias arrangement which we will use to follow the actions of grid emission.

Let us assume that the initial bias on the tubes derived from the contact potential of the diode is −1 volt. We will also assume that the receiver has been in operation long enough to become sufficiently over-heated to stimulate grid emission. The excessive heat may be caused by improper ventilation, high line voltage, or the exceeding of the voltage ratings of the tubes.

The grid of any one of the tubes, being overheated, will now give off electrons and current will flow. To start with, this current is very very small, being only about one microampere. However small though it may be, it must return to ground. Therefore, it flows through the r-f coil, through the A.V.C. resistor R, on through the volume control to ground. During its course to ground the current had to pass through the A.V.C. resistor R whose value is three megohms, and, according to Ohms Law, current flowing through a resistance must produce a voltage drop. As E=IR we then have a voltage developed across R equal to 3 volts. The polarity of this voltage drop is the HARMFUL factor. Current flowing from the diode to the grid produces a negative voltage at point X, but current going from the grid to ground produces a positive voltage. Therefore, at point X we have +3 volts developed by the grid current flow, minus the −1 volt of bias caused by contact potential, leaving a +2 volts. This means that at the grid of each tube on the A.V.C. string, there are 2 volts of positive voltage[1]. You and I know that we cannot use positive voltage on control grids. It must be negative!

With positive voltage on the grid, the plate current increases, causing more heat within the tube, thus liberating more electrons from the grid. This continues in a vicious circle until the positive voltage at the grid becomes high enough to block the tube. Plate and screen resistors may burn out, rectifier tubes are overloaded, and sensitivity falls off, due to the change of characteristics brought about by grid emission.

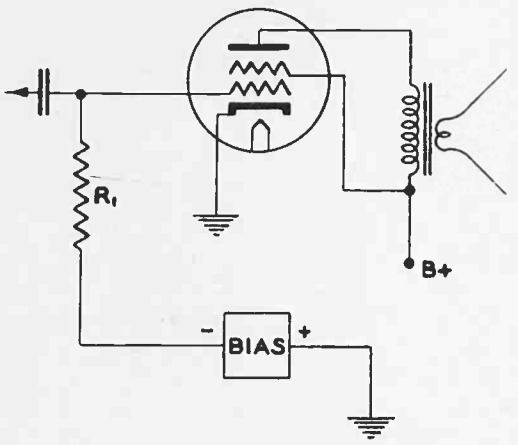
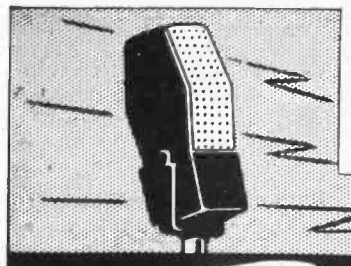


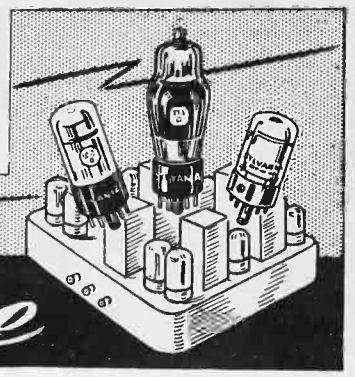
FIG. 2

Fig. 2 represents a typical power output stage. Here grid emission is more troublesome, due to the greater amount of heat generated within the power tube. The grid current flowing in R_1 can become sufficiently high to cause enough positive voltage to cancel out the negative bias thereby producing bad distortion. At the same time the resultant heavy plate current will in a short time liberate gases from the over-heated elements. With the ionization of the gas the cathode is bombarded by positive ions and its emission is destroyed.

(Continued on page 4)



THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.



THE Service Exchange

Admiral Model P5. This receiver often develops an objectionable noise best described as a "buzz" when used on a-c. The remedy is to place a shield between the 117Z6GT and 1H5GT tubes and ground shield to chassis.—Jack Irish, West Hartford, Conn.

* * *

Coin Operated Phonographs. On busy coin operated phonographs using heater type tubes with a quick heating 9.8 volt to 6.3 volt relay, more satisfactory operation and longer tube life will be secured by eliminating shock of excess quick heater voltages and difficulty of replacing worn defective relays. And in cases of burned out transformers, a standard transformer can be used for replacement.

Disconnect tube heaters from the amplifier's transformer and relay, connect them to a separate standard filament transformer. This transformer is connected to the line through a switch mounted on the back of the coin operated phonograph. The switch is turned on in the morning when opening and left on until closing. The extra current consumed, is practically nil and the tubes will last much longer.—Robert Murray, L. I., N. Y.

* * *

Farnsworth Model CT-54, CT-64, CT-51, CT-61. On these sets quite often the pilot lights burn out. This is often due to the fact that solder may be shorting the filament circuit to ground, shorting out a part of the resistance. If this pilot light burns out it must be replaced immediately or the tubes may be damaged and have to be replaced. Always check the 35Z5GT as it may have been damaged too.—Marvin Jones Radio Service, Kitts Hill, Ohio.

* * *

Firestone Auto S-7350-1 Code Pm7. Weak or no reception on this model when on manual tuning can usually be traced to a shorted i-f transformer. The shield may be removed and the short repaired. In many of these sets I found that where the leads are soldered they cut through the insulating paper in the can and short out the transformer. This may be found in 1st and 2nd i-f transformers.—Marvin Jones Radio Service, Kitts Hill, Ohio.

* * *

G. E. Model LB-530. Often this set is found with a choky condition. This condition continues for a minute and then the set goes dead. The trouble can usually be traced to a defective grid-bias cell on the output tube. Replace cells and put in a new Sylvania 1Q5GT/G.—Edward Christner, Middletown, Ohio.

Lock-In Tube Puller. In a few cases we have found that the Lock-In Tube Puller does not work too satisfactorily because there is not enough room to rock the tube as per instructions. To change the puller simply drill a small hole in the side, back from the gap and make a groove on the inside of the puller from the gap to the hole. Or, a slot can be made from the gap to the hole. With this slight change you can turn the puller to where the hole fits over the small knob on the Lock-In base. This permits a direct pull on the tube since the puller will not slide off the base.—R. C. Parsons.

* * *

Philco Model 37-650. When replacing the 6K7 in this set and some later models, use Sylvania tubes as some other makes throw this set out of alignment.

Distortion when the set warms up. On some of these models the suppressor grid of the 78 r-f tube goes to ten ohm tap on wire wound resistor (part #66) located on the left end of the chassis. Move the suppressor grid lead from this tap to the ground end of the resistor.—Kenneth A. Trites, Melrose, Massachusetts.

* * *

Philco Model 38-7. On a complaint of an intermittent or continuous whistle, which can be stopped by touching the 6A8G control grid cap, check and replace the 0.05 mfd. a-v-c filter located at the wave band switch. (When the above mentioned whistle is of a continuous nature, no stations can be heard.)—J. S. Napora, Uniontown, Pa.

* * *

Slipping Dial Cords. On many of the nameless variety of receivers using cloth dial cords driven by two or three turns around a quarter inch drive shaft, a great deal of trouble has been experienced—namely slippage on this drive shaft as well as slipping off of the large pulley when the large pulley is near it, stops at either end.

A good permanent remedy is to remove the old cable and then install a three-quarter inch outside diameter by one-quarter inside diameter idler pulley (with a narrow groove) on the one-quarter inch drive shaft by soldering. Take care to properly line up the two pulleys so that the cord runs true. Rewind with large dial cord using same method as originally used, but make only half turn around new driving surface. Pull cord fairly tight and cover with resin. Obviously the knob to dial ratio is about three times faster, but is acceptable.—Badger & Caskey, Indianapolis, Ind.

Simplex Model DA. I have found quite a few of these sets with an open driver transformer. If the plate side only is open, a 22,000 ohm resistor across the input side will make the set OK as the tone control will take the place of a coupling condenser, or a coupling condenser may be used across the transformer.—Marvin Jones Radio Service. Kitts Hill, Ohio.

* * *

Useful hint to dealers. When unpacking small sets, fasten the instruction sheet and call letter tabs to the rear of the cabinet with scotch tape.

You will agree that this is better than stuffing the sheets into the cabinet as is so often done.—J. S. Napora, Uniontown, Pa.

* * *

Wurlitzer Model 24 Phonograph. When this model goes dead and a test indicates a dead 5Z3 rectifier, the trouble is usually traced to the condensers coming off the plates of the 6L6's in the final output stage. You will find them shorted. These condensers, 350 mmfd. are difficult to obtain for replacement, therefore it is best to eliminate them entirely.

When this model is troubled with fading, check the filament voltage of the tubes. If it varies from about 10 volts down to zero and then up to 10 volts again, the trouble is in the quick-heater relay. The contact between the armature and 6.3 volt winding fails to operate properly. After the tubes are warmed up for a short period of time the relay should change to the 6.3 volt winding from the 10 volt winding.

Some servicemen may be in the habit of simply replacing the relay to correct the trouble, but a good job of repairing the original relay is possible. Carefully clean the unit and readjust the points, it will then work as good as ever.—James Limbeck, Glendale, Calif.

* * *

Zenith 1203 Chassis. A complaint on this set of no reception with local-distance switch in local position and very poor reception in distance position, may be caused by a positive voltage from B plus leaking to the a-v-c resistor through insulation on the band switch. This resistor is located on the third wafer from the front of the set.

I have found this where the customer was not interested in foreign reception, so I disconnected the defective section and wired up the circuit so that it would operate normally on the broadcast band. —E. N. Meinert, Sharpsburg, Penna.

TRACKING DOWN GRID EMISSION

(Continued from page 2)

To prevent the possibility of such destructive effects, tube manufacturers issue specifications as to the maximum permissable voltage ratings that may be applied to each tube; also the values of permissable DC resistance in the grid-cathode circuit. These values must be adhered to at all times for satisfactory tube operation.

The effects of grid emission are to some extent minimized by the employment of automatic or self-bias in which grid bias is derived from a resistance in the cathode or filament return. An increase in plate current tends to increase the effective negative bias applied to the grid, thus opposing the cumulative effects of the positive voltage caused by grid emission.

The presence of grid emission is usually indicated by distortion, increase in hum, and excessive plate current. It is sometimes difficult to detect the presence of excessive plate current unless the meter is permanently in the circuit during tests, as the switching-off of the tube may allow it to cool sufficiently to restore normal operation. For this same reason grid emission cannot be detected on tube checkers.

In performing tests to determine grid emission the receiver should be thoroughly heated, not by applying excessive line voltage which might damage condensers and other parts, but by placing a box over the chassis so that ventilation is cut off.

A microamcter, having a 0-10 scale, connected in series with the grid return circuit is the most practical method of measurement. However, this instrument is expensive and delicate and is not easily obtainable.

A milliameter, which we all have, permanently connected in the plate circuit will show a rise in current after the receiver is sufficiently heated if grid emission is present.

Practical cures for this ailment may be effected by a diode gate, a resistor in series with the filament to slightly reduce the filament voltage, proper ventilation, automatic bias. Above all, make sure that the values of voltages and grid resistors arc within the ratings of the tubes.

W. R. JONES TAKES OVER

During Lieutenant Merkle's absence on duty, Walter R. Jones, Director of the Sylvania Commercial Engineering Department, will act as Associate Technical Editor. As a frequent speaker at service meetings, and as author of many Sylvania News technical articles, Mr. Jones is equally well-known to servicemen. Under his direction the Technical Section will continue to supply authentic, up-to-date information to its readers.

SELL AND SWAP SERVICE

This service is offered without charge for the purpose of helping jobbers and servicemen in the exchange of needed radio parts and equipment that are hard to obtain due to war conditions. We reserve the right to refuse any ads that do not serve this purpose. Sylvania News will not undertake to answer inquiries or assume responsibility for transactions.

RULES

1. **Ads must not be over thirty-five words, exclusive of name and address.**
2. **Ads must deal with radio merchandise only.**
3. **The advertiser agrees to answer all inquiries, and to be fair and honest in completing transactions.**
4. **Ads must be submitted on a separate sheet (preferably a business letter-head) with complete address.**
5. **Address ads to Department SS, Sylvania News, Emporium, Pa.**
6. **Ads must be in by the 25th of the month preceding issue. Those received later will be published the following month.**

Wanted—Data and prices on Neobeamo'scope parts, tubes, motors, mirrors for late models. Please write us if you have parts and data for sale, stating condition of items.—Mesmer Radio Service, 544 W. 4th St., Ottumwa, Iowa.

* * *

Wanted—R. C. A. Chanalyst, Rider Manuals, "A" eliminator, modern test equipment and tools.—Metairie Radio Shop, 341 Metairie Road, New Orleans, La.

* * *

Wanted—Short-wave factory built receiver, age or condition not important. Prefer communication type Hammarlund, National, Patterson, Scott, or similar. Also interested in test apparatus, books, manuals.—Glenn Watt, Chanute, Kansas.

* * *

Wanted—Used refrigeration manuals and Rider Manuals 4 to 12.—G.Reis, 333 E. Saratoga, Ferndale, Mich.

* * *

Will Sell or Swap—16 inch D. C. ventilating fan with 1/20 H. P. motor, $5.00; Superior VTVM signal tracer, $20.00; check protector, $5.00.—G. Reis, 333 E. Saratoga, Ferndale, Mich.

* * *

Swap or Sell—Portable CW-Phone 6 volt transmitter, parmetal case, sce photo page 371, 1939 handbook. Hammarlund; National, 160 coil; Thordarson T19-M-13: Bliley LD-2; Triplett. Low Power osc. 6F6, PA6F6, SA6J7, 6C5, 6F6 small genemotor. High power 6F6, 807, 6L6 or 6N7, 250V, 100MA genemotor. Both genemotors fully filtered. Other tubes may be used.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Want—Test equipment, audio oscillator, VTVM, etc.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Wanted—Good factory built short wave or all wave receiver. State model, condition and best cash price.—Oliver F. Klein, 2235 N. 39th St., Milwaukee, Wisc.

* * *

Sell or Swap—Remington 10 Shot Automatic .22 rifle, Model 24, and double barrel shotgun both in excellent condition like new, Service Manuals, etc.—Oliver F. Klein, 2235 N 39th St., Milwaukee, Wisc.

* * *

Swap—One new Triplett Model A Volt-Ohm Milliameter set tester never used will trade for late model tube tester, must be in good shape. This cost (and is new) $28.00. Have no use for it, was given as present.—M. E. Kilpatrick & Son, 3434-36 Penn. Ave., Indiana Harbor, Indiana.

* * *

Sell or Swap—One 250 volt d. c. to 110 volt a. c. Rotary Converter, 200 watts output. One 088 Philco Signal Generator, Philco 048 Set Tester. One 250 volt d. c. Watthour Meter. All types of parts, battery sets, etc. One 250 volt d. c. soldering iron.—Alvin Walker, R. F D. #1, Ashland, Ky.

* * *

For Sale—Will sell cheap, 60 watt Webster sound system, complete with 4 speakers with baffles, 2 microphoncs, 2 speed turn table. Also 110 volt a. c. power plant all in A-1 shape. Used very little.—Adolph E. Johnson, Warren Radio Service, Warren, Minn.

Wanted—Factory built television receiver. Prefer large screen. State lowest cash price.—Jacks' Electric Radio Ser., 296 Wainwright St., Newark, N. Jersey.

* * *

For Sale—New and used receiving and transmitting parts and equipment. What can you use? Send stamp for list.—Herman Yellin, 351 New Lots Ave., Brooklyn, N. Y.

* * *

Wanted—Good photo enlarger.—Herman Yellin, 351 New Lots Ave., Brooklyn, N. Y.

* * *

Wanted—Rider's Manuals, 1 to 12, with index and supplements; all or part. State lowest cash price.—Forest Park Radio Service 12½ S. Euclid Avenue, St. Louis, Missouri.

* * *

For Sale—Rider's Manuals, No. 1 (old edition), 3, 4, 5, 6, 7, 8 with Index. One 189 Supreme Signal Generator, one 385 combination tube checker and diagnometer. All in first class condition. What is offered?—Arthur R. Weaver, 907 E. Main St., Morristown, Tenn.

* * *

Swap or Sell—Dependable 305 tube and condenser tester. Norge panel mounting 8 inch electric test clock calibrated 0-660 minutes. Fine for checking intermittent jobs and enhances any test panel.—R. R. Nichols, Nichols Radio & Elec. Co., Hamilton, Missouri.

* * *

Cash—For Supreme 561 Signal Generator, LCR bridge, resistance boxes, C-D condenser decade box CDB-3 or 5, General Radio Experimenter Aug. 1935 and Sept. 1936, Aerovox Research Worker, Jan., Feb., March, 1928.—J T Lipani, 157 Leverett St., Boston, Mass.

* * *

For Sale—First 8 Vol. Rider's Manuals, like new. $5.00 for 1-6 and $7.50 each for 7-8. Half cash with order, balance after examining.—Henry Benner, RFD #1, Cowiche, Wash.

* * *

Will Sell or Exchange—Radio Course, Rider's Manuals, Meissner Analyst, Multitester, Tube Tester, C-B Signal Generator, Radio Books, etc.—Kay Radio Service, 319 Main St., Niagara Falls, N. Y

* * *

For Sale—Readrite Model 430 tube tester, Electrovoice (Airline) Velocity mike, Jewell Model 199 Analyzer, Western Electric telephone handset, also desk stand. Large radio transmitting tubes, various types; also various types meters. Cash only—make offer.—E. D. Nuttall, Box 215, Overton, Texas

* * *

Swap or Sell—$97 Rembler broadcast station condenser microphone with 2-stage 864 preamplifier built into standard floor stand. Complete with 25 feet heavy shielded cable. Use on batteries or power supply of amplifier. Sell $15, or trade. Make offer.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

For Sale—50 assorted speakers, 5 to 15 inch, P-M and Electro Dynamics. Mostly brand new. Send stamp and state type wanted. Prices will be forwarded.—Ideal Radio Shop, 1713 Larrabee St., Chicago, Ill.

TECHNICAL SECTION

Sylvania News

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JULY, 1942 EMPORIUM, PENNA. Vol. 9, No. 11

SERVICING THE SOLOVOX

By G. A. HODSON,
Hammond Instrument Co.

Newest and most widely distributed of the true electronic musical instruments is the Solovox, made by the makers of the Hammond Organ and Novachord. The Solovox ("solo" meaning single; "vox" meaning voice) is a melody instrument made as a piano attachment. This unique instrument is designed so only one note sounds at one time. The pianist uses it to play the melody with the right hand while bass accompaniment is played on the piano with the left hand. A wide variety of simple or complex sustained tones are available. The Solovox is easy to play, low in cost. It has been marketed for less than two years, yet many thousands are already in use.

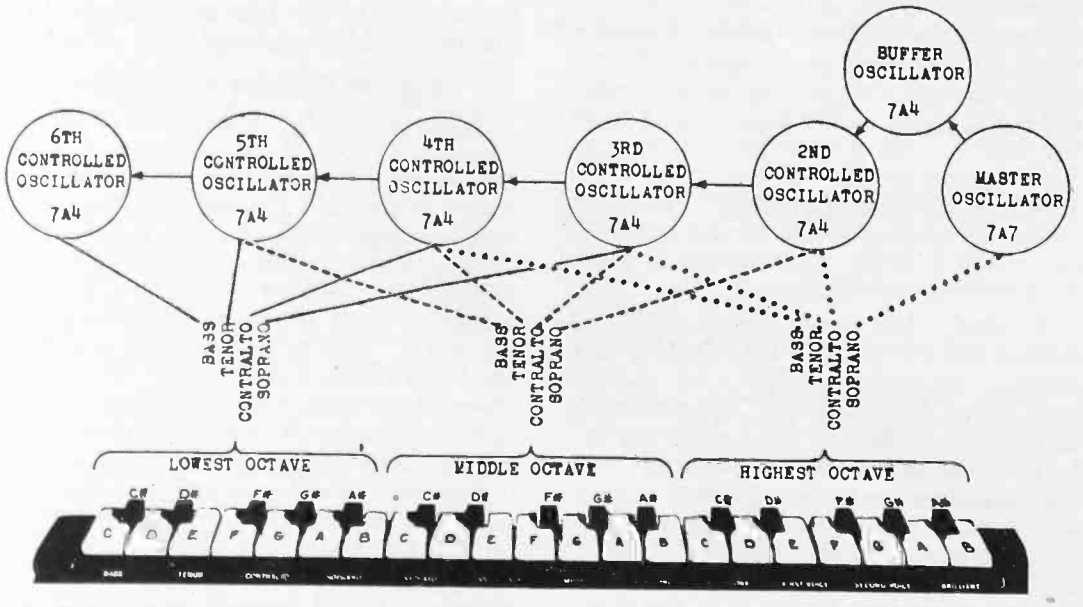
The Solovox consists of two units-keyboard and tone cabinet with interconnecting cables. The keyboard contains 36 playing keys with associated electrical contacts, control switches operated by tilting tablets, a group of tuning condensers and resistors, vibrato mechanism, and knee operated volume control. Tone cabinet contains vacuum tube oscillators, relays, power supply, audio amplifier and loud speaker. A total of fourteen tubes are employed, thirteen Sylvania "lock-in" type used in oscillater, amplifier and "control" applications, and one 5Y3 rectifier.

Solovoxes are sold by music dealers everywhere. Some dealers have full time radio servicemen who handle Solovox installation and repair work. Others call upon independent radio men. Customers, too, frequently call the local radio man for routine adjustments and repairs. Thus this fascinating new instument opens a new and promising field to the technician who wants to expand his work. Servicemen interested in learning the Solovox should visit the nearest dealer and get full information.

Notes and Octaves

You don't have to know how to play "My Old Kentucky Home" to get your share of this work, but you should learn to distinguish one note from another and you ought to know about "octave intervals". So look at the three octave keyboard of the Solovox, Figure 1, and observe carefully the regular pattern of notes.

Keyboard instruments are divided into octaves of 12 notes each with 7 naturals (white keys) and 5 sharps or flats (black keys) in a definite sequence. Each note has a frequency of exactly one half that of the corresponding note in the next higher octave. Technically there is no difference between a black key and a white one since each progressive note is 1.059 times the frequency of the one below it. Black keys occur in groups of two and three in each octave for musical reasons and for the sake of convenience. Referring to the Solovox keyboard in attached illustration, the lowest black key is properly called C# (sharp) or D^b (flat) and the next one is D# or E^b.



Note:—Solovox has 3 octaves of keys, tonal range of 6 octaves. When installed in normal position Solovox will sound at same pitch as adjacent piano keys when the CONTRALTO tablet is pushed in. Changing to SOPRANO will raise all notes one octave. TENOR tablet will lower pitch one octave; BASS lowers pitch two octaves.

Referring again to Figure 1 note that each of the 12 keys (C to B inclusive) appears three times, so that there are three octaves of keys. Actually, however, the Solovox has a range of six octaves. When the "CONTRALTO" register control tablet is pushed in the Solovox will sound at the same pitch as corresponding notes on the piano. Pitch may be raised one octave by pushing in "SOPRANO" tablet, or it can be lowered one octave with "TENOR" or two octaves with "BASS" tablet.

Frequency doubles for each octave of 12 notes. Thus, middle C on a piano has a fundamental frequency of 261+ cycles per second (c.p.s.) (same as low C on Solovox keyboard with CONTRALTO tablet pushed in) and the next higher C note, or the octave interval, sounds at exactly twice this frequency or 523 c. p. s. Similarly, C below middle C on the piano (and low C on Solovox keyboard with TENOR tablet pushed in) sounds 130 c. p. s. exactly half the frequency of the next higher C note. This octave relationship is true of all other notes on the Solovox or any other keyboard instrument.

How it Works

In studying the operation of the Solovox, refer first to the block diagram (Figure 2), and second to the more detailed schematic circuit (Figure 3). Note

(Continued on page 2)

SERVICING THE SOLOVOX

(Continued from page 1)

that arrangement of elements is exactly the same in these two drawings.

The Oscillators

All the tones of the Solovox are controlled by a single vacuum tube oscillator called the "MASTER OSCILLATOR" (VI, Figure 1). This oscillator operates at any one of the twelve audio frequencies comprising the twelve notes of the highest octave range of the instrument (2093 cycles to 3951 cycles). Each time a key is depressed, a contact under it closes to tune this oscillator to the pitch associated with that key. For instance, whenever any C key is depressed (there are three C keys on the keyboard), this master oscillator is tuned to 2093 cycles, its lowest frequency. If, on the other hand, any one of the three B keys is depressed, the master oscillator will operate at 3951 cycles, its highest frequency.

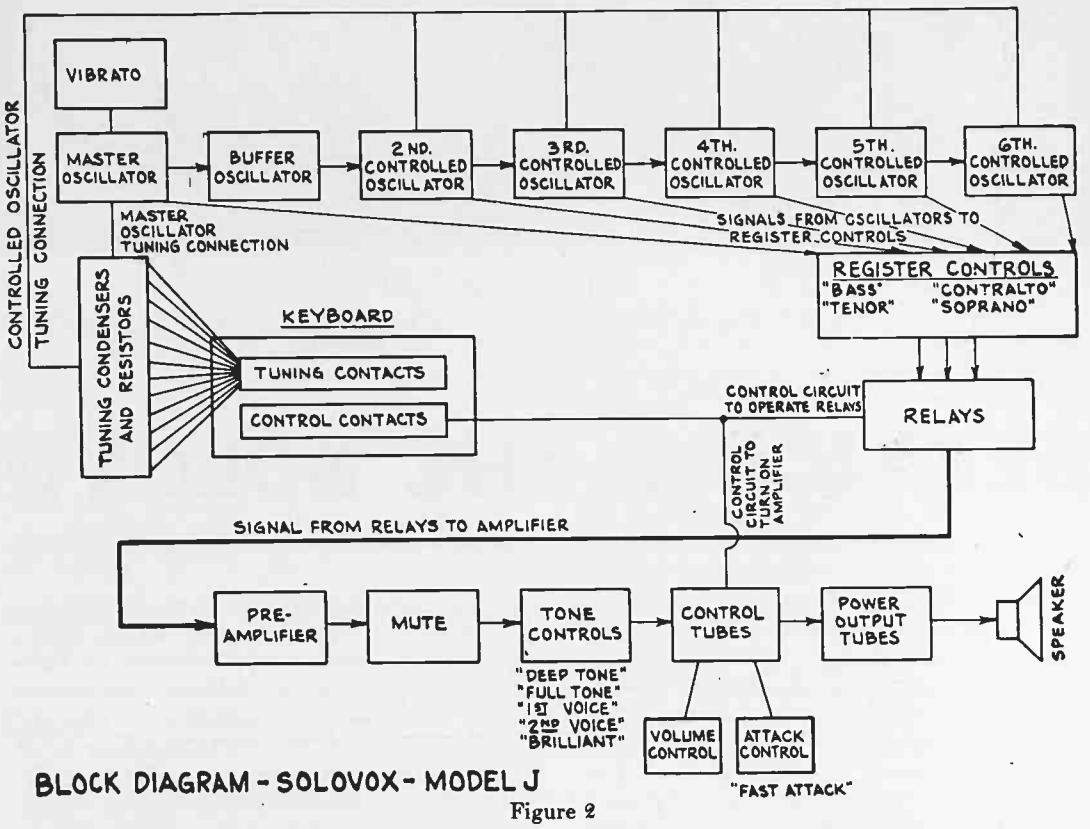
The condensers which tune the master oscillator are shown at the left of Figure 1, and are located in the vibrato box fastened to the Solovox keyboard.

The output of this master oscillator controls the frequency of the first controlled oscillator, called the "BUFFER OSCILLATOR" (VII, Figure 1,) which operates at the same frequency as the master oscillator.

Following this buffer oscillator is the SECOND CONTROLLED OSCILLATOR, whose frequency is tuned to approximately one-half that of the frequency of the buffer oscillator. Furthermore, its frequency is stabilized to be exactly one-half that of the buffer oscillator by applying a "locking" signal from the buffer oscillator to its grid circuit. The amount of this locking signal is regulated by a potentiometer, Thus, the output frequency of the second controlled oscillator is an octave lower in pitch than the master oscillator.

Similarly, the third, fourth, fifth and sixth CONTROLLED OSCILLATORS provide respective outputs of exactly two, three, four, and five octaves lower in pitch than that of the master oscillator. A potentiometer associated with each provides the correct amount of locking signal. It is to be noted that these controlled oscillators (being of the relaxation type), are readily tuned by altering their grid bias. It is the function of the tuning resistors in parallel with the tuning condensers to apply the appropriate grid bias to tune all of the controlled oscillators simultaneously to their approximate sub-octave frequencies. The amount of bias varies, depending upon which tuning contact is connected by a playing key, and the frequencies of the controlled oscillators shift correspondingly.

When no key is depressed, all the oscillators operate at their highest pitches ("B" notes). Thus, whenever a key other than "B" is depressed, all oscillators shift simultaneously from their "B" frequencies to the frequencies corresponding to the key depressed. The tuning condensers accurately tune the master oscillator and the tuning resistors tune the controlled oscillators. By interconnecting the controlled oscillators in cascaded arrangement to the master oscillator, an exact series of five sub-octave frequencies of the master oscillator frequency is obtained.



BLOCK DIAGRAM - SOLOVOX - MODEL J

Figure 2

Register Controls and Relays

From the above, we see that whenever any one of the three G# keys, for instance, is depressed, the oscillators are tuned to provide a series of G# notes in exact octave relations. The selection of the particular oscillator output to sound through the speaker is determined by a second contact under each of the playing keys. This second contact is called the CONTROL CONTACT. There are three relays connected to the control contacts—one relay is operated any time a key in the lowest octave of playing keys is depressed, another relay for the middle octave of playing keys, and a third relay for the highest octave of playing keys.

Also, whenever a control contact is closed, a cutoff bias is removed from push-pull control tubes V11 and V12 causing them to transmit the signal with a smoth rate of tonal attack to the power output tubes and speaker. This function of the control tubes will be explained subsequently.

Each of the three relays has a contact to connect the grid of the preamplifier tube V9 to the desired oscillator through the register controls ("BASS-TENOR-CONTRALTO-SOPRANO"). For example, if we push in the "SOPRANO" control and depress the G key in the middle of the keyboard, the tuning contact will tune all the oscillators to the G notes of the respective octaves, and the control contact will operate the middle octave relay. This relay completes a circuit from the output of the second controlled oscillator, whose wire is numbered 2-5, through a 50,000 ohm register control resistor to the middle octave relay contact, and then to the preamplifier tube V9. Thus, the register controls function to shift the pitch range of the Solovox keyboard as a whole to four different positions. By simultaneously depressing two or more of these controls, a composite tone will be heard, consisting of the outputs of several oscillators simultaneously sounding in their octave relations to each other.

Other contacts associated with each of the relays serve to prevent undesirable tones from occurring when two keys are simultaneously depressed in adjoining octave groups through a legato style of playing on the part of the musician. If two keys are depressed within one of the three octave groups, the lowest pitched of the two will be automatically selected for sounding through the speaker.

The "Mute"

The signal from the plate of the preamplifier tube V9 is fed to the grid of the "MUTE" tube. This tube operates nonlinearly to suppress the sharp curvature of the input signal wave form, and thus renders the tone more mellow. When this muted effect is not desired, the mute switch is used to by-pass this portion of the circuit.

"Deep Tone," "Full Tone," "First Voice," "Second Voice" and "Brilliant" Controls

Following the "mute" is a series of tone controlling circuits arranged to alter the frequency characteristic of the amplifier in a manner similar to radio

(Continued on page 4)

THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.

Replacing the BH Rectifier Tube. The BH rectifier tube in some of the old-timer radios, can be replaced by changing the socket and using the OZ4 or OZ4G. The voltage and current conditions will nearly always be within the limits of the 0Z4, however these operating conditions should be checked to make sure that there will not be an overload on the tube. The large pins are the plates on the BH and No. 2 pin is the cathode. By referring to the OZ4 base diagram you should have no trouble in making the proper socket connections.—John S. Christilaw, Montrose, Calif.

* * *

Coin Operated Phonographs or Radio Receivers. Coin operated phonographs that have resistance coupled amplifiers that lack power usually have the output tube bias resistor showing excess heat, or when resistor is new it will overheat.

The cause is leakage in one or both of the coupling condensers feeding the output tube grids, thus causing excess plate current to flow through the bias resistor causing overheating and burnouts. Replace both coupling condensers feeding the output tube grids. Excess distortion may not show up, just lack of power and overheating of bias resistor, due to amplifier acting as a single sided amplifier with the other side dead.—Robert Murray, L. I., N. Y.

* * *

Intermittent Operation. In following several complaints of cut-off and drift, I have found that the sets come from families that only play their radios at times and heat their houses with gas. Excess moisture gets into the radio and I have wasted plenty of time thinking it to be moisture in the oscillator coil, or that the oscillator tube was not working right. In checking the mica in the tuning condensers I found moisture between the mica leaves. This moisture is not noticed until the mica is held up to a light. By twisting it the moisture moves around in between the mica. Install new mica and the set plays OK.—Oliver Nicholas, Olean, New York.

* * *

Silvertone Model 4563. A 60 cycle hum appears when a very strong station is tuned in "on the nose". This can be cured by connecting a .01 mfd. (600 v.) condenser from the transformer side of the a-c switch to ground.—Bud Nastoff, Gary, Indiana.

Pilot Light Trouble. Watch the pilot lights in the midget sets. Sets using a 35Z5 rectifier have a pilot light with a brown bead (type 40 or 47 lamp) connected across one section of the filament of the rectifier. Sometimes a customer will replace a burned-out bulb with the wrong panel lamp, or even with a Xmas tree lamp. This pulls too much current through the tube and it burns out. Remedy is to replace with a new Sylvania 35Z5GT/G and a type 40 or 47 lamp.—Edward Christner, Middletown, Ohio.

* * *

RCA Model 15K. Loud hum and low plate voltage in this fifteen-tube all-wave job will commonly be found in an open 10 mfd. filter C-88 or C-87, parallel as input filter condensers. I replaced one with a 16 mfd. and the results were excellent. Replace the 6L6's with Sylvania 6L6G tubes and listen to the tone perk up.—Jack Darr, Mena, Arkansas.

* * *

Slipping Dial Drives. For slipping dial cords and belts, use a saturated solution of resin and alcohol. A nickels worth of resin in four ounces of rubbing alcohol (70% grain), wood or denatured alcohol will do. Saturate cord or belt and put some on drive pulley.

For mechanical drives, clean with turpentine, by turning dial and applying with small brush to the friction drive surfaces. Dial need not be disassembled. —Tom Llewellyn, Tupelo, Miss.

* * *

Type 2051 for Type 2A4G. To change '40 and '41 Seeburg R.C.E.S. Symphonolas to use new Sylvania 2051 tube in place of the 2A4G, you begin by disconnecting the filament leads from the 2A4G socket, being careful to mark the grounded side of the filament. Tape the 2.5 volt leads. Using No. 18 or larger wire run filament leads to the 2A4G from the 6X5G socket, being careful to connect the grounded lead from one socket to the other. The other filament lead is tied to the No. 2 lug on the former 2A4G socket. Leave the plate and grid connections as they were. Tie numbers one, six, seven, and eight lugs together and ground solidly. You can then put the 2051 in the former 2A4G socket and have trouble-free operation. The 2051 will stand a much heavier and longer overload than the 2A4G would.—J. W. Brewer, Sinton, Texas.

Stewart Warner 1942 Models—Speaker Parts. Due to the parts shortage, it has been necessary to obtain speakers for Stewart-Warner 1942 Radio Receivers from several companies. Speakers bearing the same part number are directly interchangeable, regardless of supplier, but the service parts such as cones and output transformers for a given speaker are not interchangeable with those for a similar speaker obtained from a different manufacturer. Some changes of this kind were made after the Service Manuals were printed, thus all the correct speaker parts are not listed in the parts lists.

Before ordering cone and voice coils or output transformers for the Models listed below, check the prefix letter before the number stamped on the speaker frame. The prefixes commonly used are "R," "M," "U," "C," and "CR," If in doubt as to the proper part number for a cone or output transformer, include the part number of the speaker on the other and

Be Sure To Show The Prefix.

The following table shows the receiver models which used more than one type of speaker and the service parts for the various speakers:

Receiver Model	Speaker Number	Order Cone And Voice Coil Number	Order Output Number
206DAS	/ R-500918		
206DBS	/ or	R-500331	R-500921
206DCS	/ R-500920		
206EAS	/ O-500918		
206EBS	/ or	O-501475	O-501474
206ECS	/ O-500920		
208BK	/ M-501245	M-501305	M-501304
208CK	/*CR-501245	CR-501247	CR-501246
12-4D1	R-500886	R-500913	R-500912
	*CR-500886	CR-502011	CR-502012

* On some "CR" speakers the prefix is not shown, but the speaker can be identified as such by the distinctive olive-gray color of the frame.

Stewart Warner Service Dept.

* * *

Philco Model 76. To eliminate hiss, increase the value of the detector cathode resistor.—James Green, Duluth, Minn.

* * *

Zenith Model 6M-192, -193, -194, These sets are very noisy when jarred. Check the i-f shields which are grounded through an eye bolt on the can. Solder the ground lead to the cross bar, on top of the can, making sure the nuts holding this are tight. Also check the soldering lugs on the tuning gang stator for good contact. — Geo. Baer, 498 Beech St., Roslindale, Mass.

SERVICING THE SOLOVOX

(Continued from page 2)

tone controls. For instance, with "DEEP TONE" the signal develops across a condenser which emphasizes the low frequencies; with "FULL TONE" the signal develops across a resistor with a small condenser in shunt, which leaves the frequency characteristic essentially flat except for the very high frequencies; "FIRST VOICE" puts a resonance in the 500 cycle zone; "SECOND VOICE" puts a resonance near 1000 cycles; and with "BRILLIANT" the signal develops across an inductance, L10, emphasizing the higher frequencies. It is to be noted that these tone control circuits are connected in series, and may be used singly or in groups.

Control Tubes V11 and V12

As mentioned before, the control contacts under the playing keys serve to remove the cutoff bias from control tubes V11 and V12, as well as to operate one of the three relays. This is explained by considering that the cathodes of tubes V11 and V12 are connected to the midpoint of the voltage divider shown to the left of the control tubes in Figure 1. When no playing key is down, this voltage is about 165 volts positive with respect to ground, and therefore, these tubes are cut off. When any playing key control contact is closed, the resistance of the relay coil is put in parallel with the 6000 ohm resistor and this causes the cathode voltage to drop to 50 volts. This removes the cutoff bias from tubes V11 and V12, which are of the remote cutoff type. The 16 mfd. condenser across the 6000 ohm resistor serves to make the tonal attack and decay rate smooth. A .1 mfd. condenser connected between the control tube cathodes and the center tap of transformer T9 produces a slow rate of attack but can be disconnected if desired by operating the "fast attack" switch.

(To be continued)

Many servicemen have requested data on the operation and servicing of the Solovox. We are pleased to be able to present this authentic information direct from the manufacturer. Part two, with data on adjustments and repairs, will be published in the next issue of Sylvania News.

FLUORESCENT HANDBOOK

For jobbers, dealers, servicemen and engineers interested in fluorescent lighting—a complete technical manual containing information necessary for selling and servicing fluorescent installation. It covers everything from an explanation of the operating principles of lamps and equipment to details of design and installation of fluorescent systems in factories, offices and homes. One section covers auxiliary equipment—starters and ballasts. Another offers suggestions for "trouble shooting" and how to judge lamp performance and illumination characteristics. The price is $1.00. Send cash or money order to Hygrade Sylvania Corporation, Fluorescent Lighting Division, Salem, Mass.

SELL AND SWAP SERVICE

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5. Address ads to Department SS, Sylvania News, Emporium, Pa.
6. Ads must be in by the 25th of the month preceding issue. Those received later will be published the following month.

Wanted—Power supply for National SW-3. State best price.—T. J. Geisilhart, 64 Clinton Place, E. Rutherford, N. J.

* * *

Wanted—Hickok Trace-o-meter; Hickok #210S V. T. V. M.; Voltohmyst; Late model Capacitor Analyzer. Condition of above testers immaterial. RIDER'S Manuals from 1 to 13. Will Pay Cash.—Hunt Radio, 110 S. Fairview St., Liberty, Missouri.

* * *

Wanted—Filament transformer to be used in modern tube tester. Primary tapped for variable line voltage 110 volts, 60 cycle secondary with tap for from ¾ volt to full line voltage that will be right for all present receiving tubes.—Geo. C. Anderson, 2236 Indiana Ave., St. Louis Mo.

* * *

Sell or Swap—Hickok 188X FM-AM oscillator, brand new never used. Hallicrafters S-31 FM-AM tuner. P. A. equipment.—V. R. Parker, R. F. D., Lunenburg, Mass.

* * *

Wanted—Hammarlund Super-Pro, 18 inch PM speaker.—V. R. Parker, R. F. D., Lunenburg, Mass.

* * *

Wanted—Weston 301 Meters, all ranges. Also burned out 301's and metal or bakelite cases for same. RCA or Capital Engineering Course, back issues of Electronics, Communications, Radio Book. Spot cash or swap.—Jack Elliot, 1002 W. Spring St., Lima, Ohio.

* * *

For Sale—Receiving and transmitting tubes; variable fixed and electrolytic condensers; standoff, strain and leadin insulators; telegraph sounders, etc.—Grote Reber, 212 W. Seminary Ave., Wheaton, Illinois.

* * *

Wanted—Copies of Phillips Technical Review 1930 to 1940; Edison storage cells, meters, DC to AC converter.—Grote Reber, 212 W. Seminary Ave., Wheaton, Illinois.

* * *

Swap or Sell—One electric guitar pickup with volume control. Used once.—Payad Radio Service, 202 E. Main St., Staunton, Illinois.

* * *

Sell or Swap—Remington Portable Typewriter, Meissner 4-Tube Noise Silencer-Factory built complete. Rider 2, 3, 4 and Index. National SW3 tubes and 8 coils-13-200 meters. Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Want—Test equipment, Beat frequency audio oscillator, capacity analyzer, Electrical Drill. All inquiries answered.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Sell or Swap—Two University high fidelity dual range loud speakers. Model WCC-list each $122.-00. These are in fine condition and were used very little. S. W. Christie, 36 Miller St., Pontiac, Mich.

* * *

Wanted—Solar Condenser Analyzer, Model CE. Will pay cash for Analyzer in good condition.—Westbrook Radio Clinic, 3112-A Windsor Rd., Austin, Texas.

* * *

Wanted—Diagram instructions and full data on the Superior Allmeter AMR. Will pay all postage required.—Oscars Radio & Elec. Service, Merrill, Iowa.

* * *

Wanted—Volt Ohmist Jr., Precision Tube Checker #912 or #954, Signal Generator #E-200, V. T. V. M. #EV-10. Supreme V. C. M. #542 or Triplett #666-S; Solar Analyzer #Q. C. A. Jackson Audio Oscillator #652, Rider's Manuals #1 and #12; 3 Inch Oscilloscope.—For Cash.—R. H. Turner, 7510 Harter Ave., St. Louis, Mo.

* * *

Wanted—Supreme tube & tester portable, and Triplett volt-ohm-milliameter tester. Rider Manuals 4 to 12. State condition.—Charles I. Omplo, 2228 Newbold Ave., Bronx, N. Y.

* * *

Wanted—Will pay cash for Supreme Vedolyzer #560, Supreme signal generator #561, Supreme audolyzer #562, Supreme #385 combination tube checker and diagnometer, Aervox #75 capacity and resistance bridge, and good condenser decade boxer.—Jos. C. Kennedy, 3407 14th St. N. W., Washington, D. C.

* * *

Wanted—Good short wave communication receiver. Describe fully, state best cash price.—Oliver F. Klein, 2235 N. 39th St., Milwaukee, Wis.

* * *

Sell or Swap—Large lot of new resistors, parts, etc.—Oliver F. Klein, 2235 N. 39th St., Milwaukee, Wis.

* * *

Wanted—One 954 pentode, one 955 Acorn tubes. Can use two of each. Pay cash or trade Weston meters, new receiving or transmitting tubes, IRC WW3 and WW1 precision resistors, Weston 590 battery R. F.-A. F. oscillator, or state what you want.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Sell or Swap—Model 17, Hickok Signal Generator, excellent condition; also miscellaneous radio parts. Want RCA Audio Oscillator and DB meter with ranges from —20 to plus 50, accurate for entire audio range.—Arthur H. Clow, 2322 Harvard, Independence, Mo.

* * *

Wanted—Model 5420 Garod radio (24 tubes), fair condition, at fair price.—Edw. J. Danaher, 134 Merrimac St., Buffalo, N. Y.

* * *

For Sale—Hickok model RFO-4 oscillograph, used very little. $65 cash.—L. T. Plautz, 1013 S. Warren, Saginaw, Mich.

* * *

For Sale—Model 510-CM Hickok tube and set tester, and Model 177-CM signal generator. Also test lead kit. Used very little.—F. Manthey Van Metre Chevrolet Sales, Ripon, Wis.

* * *

Sell or Swap—1 WE 219D rectifier tube, 3 WE 205D triodes, and 25B WE amplifier. Make offer.—F. F. Feiner, 3673 Lafayette Ave., St. Louis, Mo.

* * *

Wanted—Will pay cash for one RCA Rider Voltohmyst Jr. Must be in good condition. State price.—Louton Radio Service, Malvern, Arkansas.

* * *

Wanted—Galvanomometer, 0-125 M-A full scale. Must be good condition.—Myron Zielinski, 709 Garfield, Bay City, Mich.

Sylvania News

OCTOBER, 1942 EMPORIUM, PENNA. Vol. 9, No. 12

SERVICING THE SOLOVOX

PART II

By G. A. HODSON,
Hammond Instrument Co.

NOTE:—In the last issue of "Sylvania News" we presented Part I on "Servicing the Solovox". Due to the lack of space Fig. 3 was necessarily omitted. Therefore it is shown in Part II.

Volume Control

The volume of the Solovox is controlled by a knee-operated rheostat. This rheostat is actually a switch connected to seven fixed resistors, and is, therefore, not subject to wear as is the usual type of volume control. This rheostat forms part of a voltage divider circuit which varies the grid bias to the remote cutoff control tubes V11 and V12, and, therefore, changes the gain of these tubes to produce a corresponding change of volume in sound from the speaker. The grid potential varies from approximately + 45 volts at the maximum volume position (depending on setting of maximum volume control), to ground potential at the minimum position.

The Vibrato

The vibrato effect is produced by means of a magnetically driven reed having a small piece of powdered iron attached to it in such a way as to vibrate in and out of a coil placed beside the reed. Thus, the inductance of the coil varies periodically as the powdered iron core swings in and out of it. This coil is connected to a tap on the master oscillator tuning coil, and causes the oscillator frequency to vary, producing a vibrato

(Continued on page 2)

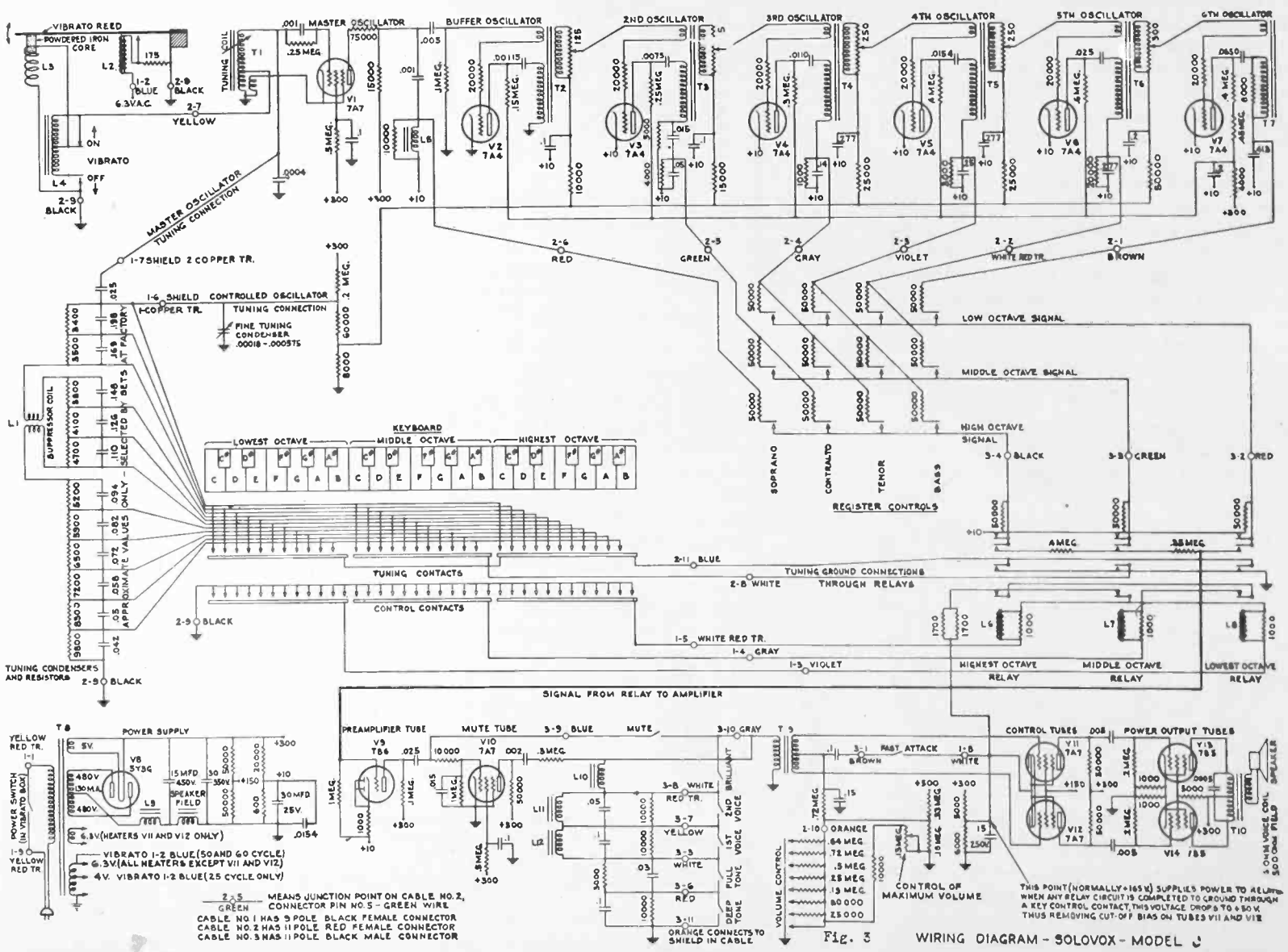


Fig. 3 WIRING DIAGRAM - SOLOVOX - MODEL J

SERVICING THE SOLOVOX

(Continued from page 1)

effect. This reed is caused to swing when the volume control lever is pulled forward in starting the instrument. After the reed is once started, the magnetic drive keeps it in motion as long as the instrument is on.

Tuning

The Solovox, as a whole, is tuned by adjusting the frequency of the master oscillator. The tuning knob accomplishes this by moving a powdered iron core in and out of inductance L1.

Power Output Tubes

V13 and V14 are power output pentodes connected in the usual push-pull manner to drive the loud speaker. The speaker field functions as a choke coil in the power supply system.

Power Supply

The power supply of the Solovox uses a single rectifier tube V8.

Note that control tubes V11 and V12 have a separate heater winding on power transformer T8. This prevents an appreciable difference in potential from arising between the heaters and cathodes of control tubes V11 and V12.

Service Procedures

No special tools or test equipment are necessary to service the Solovox. A volt-ohm-milliameter with several scales, the equivalent of which most every radio Serviceman has, is adequate to make any electrical measurements necessary. Most small electrical parts used (tubes, condensers and resistors) are available to the radio man. Special electrical and mechanical parts may be obtained from any Solovox dealer.

Experience has shown that troubles with the Solovox are seldom of a serious nature and can usually be corrected quickly by a service man who has studied the operation of the instrument carefully and understands the manner in which keyboard and tone cabinet are interconnected. For example, if the middle octave is silent using "CONTRALTO" tablet but sounds with other registrations, and lowest octave sounds with "SOPRANO" tablet in, time is wasted checking the tube or circuit of the oscillator in the tone cabinet. This is true because signal for these two octaves is supplied by the same oscillator with different registrations, and the test made with the "SOPRANO" tablet proves the oscillator is operating. Probable cause of this case of trouble would be a dirty contact back of the "CONTRALTO" tablet. (Refer back to Figure 1 for illustration of how some oscillators serve double duty.)

To check a Solovox for normal operation pull out volume control lever under keyboard. This operates a switch to turn the instrument on and starts the vibrato reed swinging. Now push in "SOPRANO" and "DEEP TONE" tablets only. Try all notes starting with high B and continuing to low C. Now cancel "SOPRANO" tablet and push in "CONTRALTO" and run down the keyboard. Similarly check with "TENOR" and "BASS" register tablets. Next push in "CONTRALTO" again and try one note only with each of the other tablets used with "DEEP TONE". "VIBRATO OFF" should greatly reduce vibrato effect. "FAST ATTACK" speeds up response when key is depressed. "MUTE" changes the quality of any register set-up. The other controls "DEEP TONE" to "BRILLIANT" inclusive alter the tone quality over a wide range.

Oscillator Adjustment

The Solovox has been designed for easy servicing. Adjustments are simple and parts are easily accessible for testing. The adjustment most frequently performed involves the controlled oscillators. This adjustment should be clearly understood by the service man because oscillators must be known to be functioning properly before a proper approach can be made to most Solovox service problems.

The master oscillator is tuned by the condensers in the keyboard and supplies frequencies for the highest octave of the

(Continued on page 3)

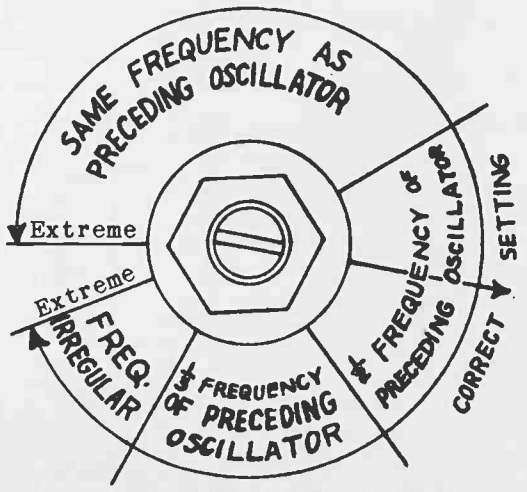


FIG. 4 COMPLETE ROTATION OF OSCILLATOR ADJUSTMENT

NOTE--Position of correct setting shown does not mean that every slot will assume this position when adjusted.

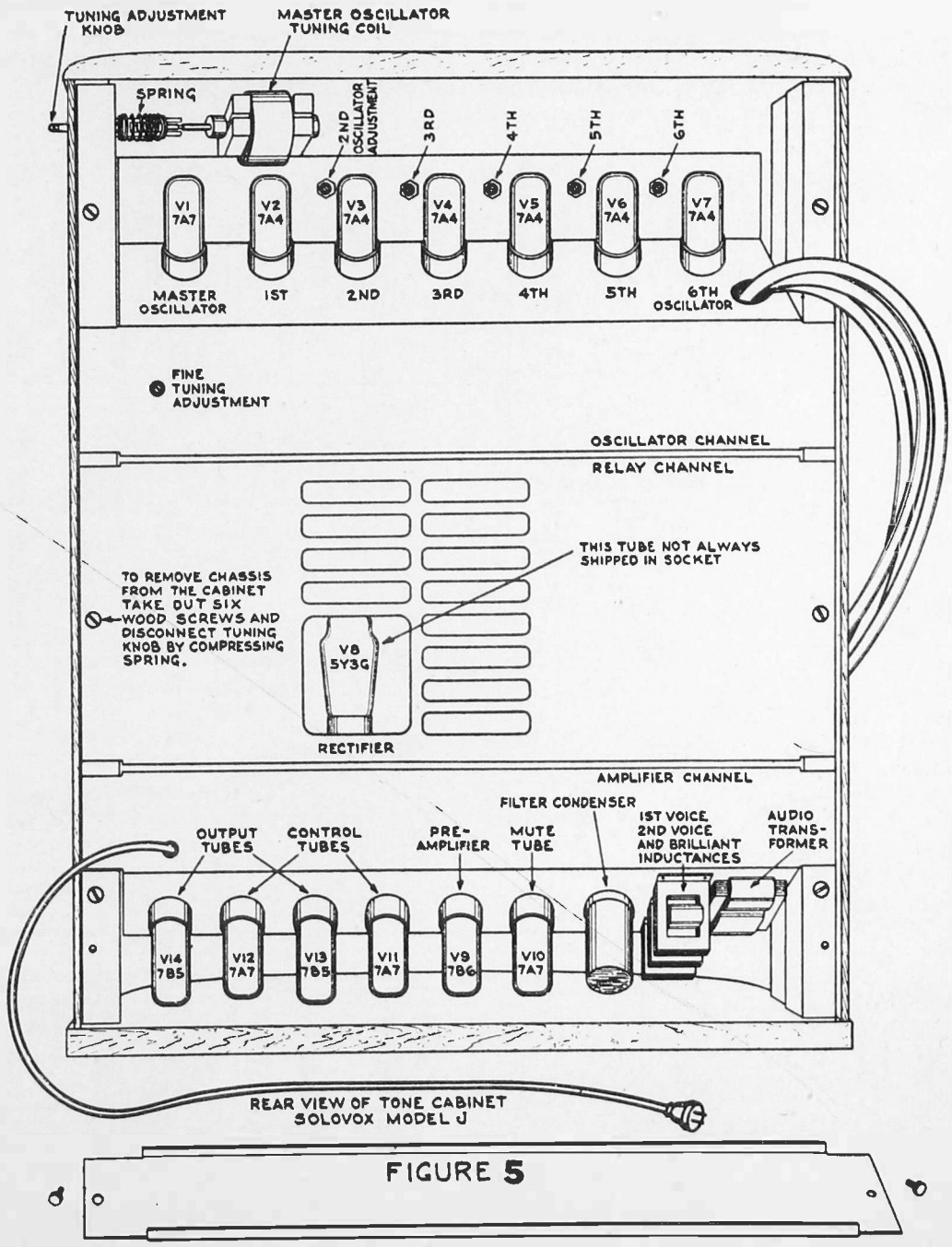


FIGURE 5

THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Each hint accepted entitles the writer to his choice of one Sylvania receiving tube. Please indicate preference when submitting hints. Don't send routine or generally known information. Please specify tube choice.

Philco Model 41-285. If the complaint has been that push buttons never have held adjustment, replace the 370 mmf dual condenser attached to the gang switch with a new improved type silver mica, part #30-1187 and then reset push buttons. This can apply to all 1941 models using push buttons as it seems that the rivets holding the connections make poor connection and affect the capacity.—P. T. Adams, Cleveland, Ohio.

* * *

To Eliminate Tire Static. Remove valve core, pour about one ounce of powered graphite in each tire tube. Replace the valve core and inflate tire. This does a good job of eliminating tire static and is easy to obtain as it can be purchased at any auto parts store for a few cents.—Oliver F. Klein, OK Radio Service, Milwaukee, Wisc.

* * *

Philco Model 37-602. The average life of an electrolytic filter condenser in this set (replacement as well as original) seems to be between 6 and 8 months. This life can be greatly improved by disconnecting the filament voltage dropping resistor located under the chassis and connecting a line type resistor in its place. The chassis of this set is completely enclosed with no provision for ventilation. The high temperature of the chassis causes rapid deterioration of the condenser. The original resistor should be left in place as a part of this resistor is used to provide voltage for the pilot light. To simplify the wiring, connect the pilot light resistor between the 6A8G and 6Q7G filaments and connect the line resistor to the 25Z6G filament.—L. T. Austine, Woodlawn, Maryland.

* * *

Substitute Cable Plug. A defective metal tube with the top cut off and all the elements removed makes a good cable plug for connections into a regular octal socket. Smooth off the cut edges, connect the cable to the prongs and fill with wax or pitch. If near excessive heat, use a furnace cement, etc.—A. Berger, Neillsville, Wisc.

* * *

Seeburg Phonographs. Remote control Seeburg Phonographs often play the wrong selection from the Wall-O-Matics. This is due to a weak or defective 2A4G tube. Replace with a Sylvania 2A4G. The switch to the line condenser often corrodes causing wrong selections. Clean with carbontetrachloride. Harry A. Shapiro, Detroit, Michigan.

* * *

Wurlitzer Model 616. An unusual case of fading was encountered on a few of these models in this locality. The machines would play about half-way through a record and then gradually die out. It was noticed that the 45 driver tube was not lit and although a new tube was inserted, it also went out as soon as the tubes were thoroughly warmed up. This was caused by the filament contacts on the socket. Bending the contacts is only a temporary repair and a new socket should be installed.—Marion L. Rhodes, Knightstown, Ind.

* * *

G. E. Radios With "Beam-A-Scope" Antennas. When broadcast reception is poor and short wave stations are encountered on the broadcast band, check the resistance between the chassis and the shield of the "Beam-A-Scope" on the broadcast band only. If this reads near one ohm instead of zero, then the shield is not grounded but is on the "Grid" end of the loop. Reversing the end connections at the band switch will correct the trouble. Realignment will be required. —Herbert Struck, Portland, Oregon.

* * *

Crosley Model 52TA. Nine out of ten new sets of this model which we have received have had the same complaint—bad tone and intermittent noise and distortion. The variable condensers are not at ground potential and trouble is caused by dial face shorting on drive cord pulley. Cement insulating cloth on back of dial face gives a permanent repair.—George C. Blisard, Mgr., Service Department, Cogdell Auto Supply Co., Waco, Texas.

SERVICING THE SOLOVOX

(Continued from page 2)

six octave tonal range. The buffer oscillator, which is considered as a controlled oscillator although it has no adjustment potentiometer, is used as an electronic link between the master oscillator and the rest of the controlled oscillators and has its circuit constants predetermined so as to oscillate at the same frequency as the master oscillator. Each of the remaining controlled oscillators when supplied with the proper amount of locking signal should oscillate at one half the frequency of the preceding oscillator. This locking signal is the same signal that is generated by the preceding oscillator but the amplitude is regulated by the adjustment potentiometer and then impressed upon the grid of the following oscillator tube.

Assuming that the master and preceding oscillator are operating correctly, the following is an explanation of what happens in a complete rotation of an adjustment potentiometer. See figure #4. Turning the potentiometer to its extreme counter clockwise position the oscillator will operate at the same frequency as the preceding oscillator because the amplitude of the locking signal is too great.

Now, turning the potentiometer clockwise, a point is reached where the oscillator locks-in at one-half the frequency of the preceding oscillator because the amplitude of the locking signal is of proper intensity to cause this condition. It is then operating exactly one octave below the preceding oscillator and for correct adjustment the potentiometer arm should be set midway between the top and bottom limits of this ½ frequency range.

Turning the potentiometer further clockwise, a point will be reached where it will either lock-in at one-third the frequency (this is an octave and a fifth below musical speaking) or, it may refuse to lock-in and will start to hunt a frequency of its own which bears no definite mathematical relation to the frequency of the preceding oscillator. A "gurgle" is usually present at the point where the oscillator starts to change to different frequency.

Conditions that may make oscillator adjustment difficult or impossible are the following: 1 Improper operating voltages at the grid, plate or cathode of an oscillator tube 2 Defective oscillator tubes. 3. Inoperative master or buffer oscillator. 4. Defective parts associated with the oscillator circuits.

PROCEDURE FOR ADJUSTMENT OF OSCILLATORS. The primary requisites for adjusting oscillators are that the master and buffer are operating correctly and that you must start by adjusting the 2nd oscillator and then progressively adjust each succeeding oscillator.

Quickest method is as follows. 1. Push "on" the "SOPRANO" only and adjust the 2nd and 3rd oscillator by depressing

(Continued on page 4)

SERVICING THE SOLOVOX

(Continued from page 3)

F key in the middle and lowest octave respectively. 2. Push "on" the "BASS" only and adjust the 4th, 5th and 6th oscillator by depressing F key in the highest, middle and lowest octave respectively. 3. You may check adjustment of the six octave tonal range by running down the scale, first with the "SOPRANO" only "on" and then with the "BASS" only "on". Of course, in this check the low C key with the "SOPRANO" "on" should be chromatically related to the high B key with the "BASS" "on".

If the adjustment potentiometers should get so far out of adjustment that you become confused, the following hint may prove helpful. Turn all potentiometers to their extreme counter clockwise positions and then follow the normal oscillator adjustment procedure.

Full information on this adjustment and others is continued in a booklet titled "TO SOLOVOX OWNERS" which is furnished, including complete wiring instruction cards, with each instrument. This service literature may be obtained from dealers or direct from the factory on request. A service bulletin titled "Hammond Solovox Technician" is issued regularly and is available to radio Servicemen from Solovox dealers.

Solovox Tube Socket Voltage

These readings are taken with a 1000 ohms-per-volt meter, having three scales of 15, 150 and 600 volts. All voltages are taken with a line voltage of 117 and deviations of as much as 20% may be caused by line voltage variations. All controls are off, the volume control is in its softest position, and no key is depressed unless specified. The negative lead of the voltmeter is connected to chassis ground.

Connect Positive Voltmeter Lead to	Meter Should Read	This Shows Voltage of
Terminal A (amplifier channel)	300 volts	Amplifier and master oscillator B
Terminal B (oscillator channel)	290 volts	Controlled oscillator B
Terminal C (oscillator channel)	10.5 volts	Controlled oscillator cathodes
Tube VI plate	135 volts	Master oscillator plate
Tube VI screen	35 volts	Master oscillator screen
Tube V9 plate	150 volts	Preamplifier plate
Tube V9 cathode	12.5 volts	Preamplifier bias
Tube V10 plate	137 volts	Mute plate
Tube V10 screen	26 volts	Mute screen
Tubes V11 and V12 plates	195 volts	Control tube plates
Tubes V11 and V12 screens	135 volts	Control tube screens
Tubes V11 and V12 cathodes (no key depressed)	170 volts	Control tube cathodes (tubes cut off)
Tubes V11 and V12 cathodes (any key depressed)	50 volts	Control tube cathodes (tubes operating)
Tubes V13 and V14 plates	305 volts	Output tube plates
Tubes V13 and V14 screens	290 volts	Output tube screens
Tubes V13 and V14 cathodes	24 volts	Output tube bias
Terminal D (volume control in softest position)	0 volts	Control tube grids
Terminal D (volume control in loudest position)	35 volts	Control tube grids (voltage will vary depending on setting of maximum volume control)
Terminal E (negative lead connected to terminal F)	76 volts	Speaker field

A. C. VOLTAGES

Heater voltage to all tubes except V8.	=6.3 volts R.M.S.
Reetifier tube V8 filament voltage	=5.0 volts R.M.S.
Ground to either plate of rectifier tube.	=490 volts R.M.S.
A.C. Ripple voltage across speaker field	=3.5 volts R.M.S.

SELL AND SWAP SERVICE DISCONTINUED

Notice **Notice** **Notice**

It is with much regret that we find it necessary to eliminate the Sell and Swap service. We realize that this service has been very helpful and we certainly appreciate the interest of those who have made use of it.

It has been our practice to publish the ads in the order in which they are received, and as the number received exceeds the amount of space available for months to come, we have decided, in fairness to all, to discontinue the column with the forthcoming issue.

We assure you, however, that this space will be devoted to a series of technical articles which will contain much useful information that is of utmost importance at this time.

This service has been offered without charge for the purpose of helping jobbers and servicemen in the exchange of needed radio parts and equipment that are hard to obtain due to war conditions.

Wanted—Good used 16-inch dual-speed recorder or recording turntable. Cash for good buy.—H. Schecter, 47 Oakview Dr., Station "C", Dayton, Ohio.

* * *

Wanted—A high range ohmeter 0-10 megohms.—Clinton Weddle, P. O. Box 265, Bassetts, Virginia.

* * *

Wanted—Modern volt-meter tube tester, cathode ray oscillograph complete. All Rider manuals. Any Supreme tester, especially the 504. Typewriter in fair condition.—Airways Radio, % Mr. Clay, 5858 S. Halsted St., Chicago, Illinois.

* * *

Wanted—Will pay cash for Rider's Radio Manuals, Volumes #7, 8, 9, 10, 11 and 12, complete with index and supplements and in good condition; either all or part. Quote your best price.—Reed's Electric Co., 621 High St., Palo Alto, Calif.

* * *

Wanted—Rider's Manuals, Volumes 11 and 12 with index. Also 1000 or 500 watt output A. C. light plant; state best cash offer expected.—John W. Reigel, Route #2, Annville, Penna.

* * *

Wanted—"A" battery eliminator to operate auto sets from 110 volts A. C. Rider Manuals 7 to 10, inclusive.—Vin Taverna, 155 Blackford Ave., Port Richmond, S. I., N. Y.

* * *

Wanted—Triplett Model 675 A. C. Ammeter or Model 671 A. C. Milliameter "Little Triplett" or something similar, must be accurate.—Colp Radio Service, Box 151 Bridgewater, Nova Scotia, Canada.

* * *

Wanted—Vibrator tester and one six volt power pack.—Payad Radio Service, 203 E. Main St., Staunton, Illinois.

* * *

Wanted—RCA Rider "Chanalyst", RCA Junior Voltohmist or good Vacum Tube Voltmeter. Gerald Hess, Moravia, New York.

* * *

Wanted—Good, used or new Hickox 19X Oscillator. Advise price and condition, etc.—P. C. Bean, 226 W. Broadway, Newton, Kansas.

* * *

Wanted—Rider Manuals No. 6 to 13. State lowest cash price. Have 1930 RTI Radio Course to swap.—Wayne Fernyhough, Jerome, Arizona.

* * *

Wanted—Direct reading low range A. C. Wattmeter, 0-50-100-250-500-1000 milliamperes 3" A. C. Meters. Will pay cash. Give full description of model and condition.—Wm. A. Barlow, 16 Laurel Pl., Nutley, N. J.

* * *

Wanted—Superior 1230 or 1130 Signal Generator and a Superior 1220 volt ohm meter, or instruments of a different make that are similar to these. Will pay cash and answer all inquiries received.—Oscar's Radio Service, Merrill, Iowa.

* * *

Wanted—Superior or American pocket laboratory. Superior's model is 1220. Would also consider instrument similar to latter of a different make. I want high meg. scale. Will pay cash.—Oscar's Radio Service, Merrill, Iowa.

Wanted—Radio City #803 Tube and Set Tester American RF & AF Signal Generator, Model 4103 Or what have you in other types? Give full details and lowest cash price. A. E. Andrews, 330 Center St. Rear, South Haven, Michigan.

* * *

Wanted—Will pay cash for Triplett Meters Models 321, 331 and 341, 3 inch round; Models 327, 337 and 347, 3 inch square, D. C. milliammeters, voltmeters, A. C. voltmeters, thermo ammeters, etc., all ranges.—H. Charles Kaetel, Room 412, 3120 West Wisconsin Ave., Milwaukee, Wisconsin.

* * *

Wanted—Late model tube and set tester, or tube tester only. Rider's Manuals #1 to #12, also Audio Oscillator. Have Weston 301 meters, one 0 to 200 microamps and one 5 mil rectifier type.—Norman Jacobson, 1117 Gerard Ave., Bronx, New York.

* * *

Wanted—Triumph Model 840 oscilloscope. Will pay cash (if reasonable). Am interested in two each 955 and 954 tubes in good condition that will work 500 M. C.—W. G. Eslick, 111 Lincoln Avenue, Lexington, Kentucky.

* * *

Wanted—RCA Junior Voltohmyst, Precision Model 912P portable 4½" meter 1941 tube tester, also RCA Station Allocator and C B capacity tester.—Capitol Radio Service, 637 W. 21st St., Erie, Penna.

* * *

Cash—For LCR Bridge, CDB-3 or 5 condenser decade box, decade resistance boxes, wattmeter, galvanometer and meters of all kinds.—J. T. Lipani, 157 Leverett St., Boston, Mass.

* * *

Wanted—U. H. F. parts, transmitter and receivers. Need not have power supplies. U. H. F. tubes 1 to 10 watts. Rider Books other than manuals. Stencil post card duplicator. Give best cash price or ideas of radio parts needed in trade. Will send full data. See back issues for my ads.—Bob Eubank, 1227 Windsor Ave., Richmond, Virginia.

* * *

Wanted—Will pay cash for any good service equipment such as Supreme #560A Vedolyzer, #561 Audolyzer, #562 Signal Generator, #571 Oscillator, #504, #592 or Precision #920, #954, #844, #854P, E-200, EV10, 856 or Aerovox 75 Condenser Checker. Kennedy's Radio, 3407 14th St. N.W., Washington, D. C.

* * *

Wanted—Exposure meter, Weston 650 or 850 or G. E.—ultra high frequency tubes up to ten watt. Give condition, best price, or outline of swap items such as tubes, variable condensers, books, etc. Have new 808, 807, 506 Weston's 10, 100, 300 M. A. D. C.—Bausch and Lomb microscope, table type folding, in box 5 X 6 X 2. Lenses, four—perfect condition.—Bob Eubank, 1227 Windsor Ave., Richmond, Va.

* * *

Wanted—Short-wave or all-wave receiver. Cabinet, age, condition not important. Also small portable battery AC or DC compact, testing equip't, manuals and books.—Glenn Watt, Chanute, Kansas.

TECHNICAL SECTION

Sylvania News

DECEMBER, 1942 EMPORIUM, PENNA. Vol. 10, No. 1

Revised Technical Manual Now Ready

Includes Up-to-Date Data on All Tube Types

Presenting essential tube data and circuit information in a convenient reference form, Sylvania's Technical Manual carefully revised and brought up to date—has just been released.

With 275 pages full of reliable technical information, this Manual should be a "must" on the bench or in the pocket of everyone interested in radio sales and service.

The contents of the Manual are divided into these subjects:—

1. Fundamental Properties of Vacuum Tubes, including Amplifier Classification and Definitions.
2. General Tube and Circuit Information.
3. Characteristics of Sylvania Receiving Tubes by Types with listing of approximately 400 types.
4. Typical Radio Receiver and Amplifier Circuits.

Through the use of handy index tabs the main sections of the Manual are clearly indicated and readily accessible for quick reference.

One section has been devoted to a listing of the new types of tubes released since the last issue of the Manual and a section pertaining to panel lamps has been added to make it as complete as possible. A special plastic binding allows the Manual to lie flat and remain open at whatever page is being consulted.

Sylvania distributors have copies of the newly revised Technical Manual and you may secure your copy from them or by writing directly to the Advertising Department, Sylvania Electric Products Inc., Emporium, Penna. Price per copy is 35c. Be sure to enclose remittance when ordering.

Frank Langstroth Leaves NEWS to Enter Army

Frank Langstroth, former Technical Editor of Sylvania News, has received a leave of absence from the company to enter the services of our country. At present he is with the United States Army Signal Corps. Frank has many friends in the industry who join us in looking forward to his return to his former activities.

PRECAUTIONS IN SUBSTITUTING RECTIFIER TUBES

The acute shortage of radio tubes is causing the serviceman no end of problems in devising ways and means of using types which are available as substitutes for types which can not be procured. There is perhaps more danger in substituting rectifiers without carefully considering the problems than is the case in substituting most other types of tubes. The best rule which should be followed wherever possible, when rectifier tubes must be changed, is to replace a cathode type tube with a cathode type tube and a filament type tube with a filament type tube. After a substitution has been made it is very important to make certain that the voltage drop in the tube now being substituted is approximately the same as in the tube type that was replaced, otherwise the voltage supplied to the filter condensers may be so high as to exceed the safe rating of the filter condensers. With electrolytic condensers as difficult to obtain as they are at present, it may become a serious matter if they fail because of excessive voltage.

The substitution of a cathode type rectifier tube for a filament type rectifier tube invariably results in from 30 to 50 volts additional being available across the filter and means that the filter condensers will have to take this extra voltage. If they are already operating close to their maximum rating, this will probably result in premature filter condenser failure.

The substitution of a filament type tube for a cathode type tube will usually result in less voltage finally being applied across the filter condenser. Another situation, however, will arise in connection with this type of substitution which may be very serious. This comes about because the filament type tube heats up within two seconds, whereas the cathode type rectifier tube requires about nine seconds before the operating temperature reaches a value sufficient to permit normal operation of the tube. Most present day receivers employ cathode type output tubes which also require about nine seconds before they are ready to operate satisfactorily. When a combination of cathode type output tubes and cathode type rectifier tubes are employed, voltage is available across the filter when the output tube is ready to draw current so that the voltage across the filter condenser rises slowly. If, however, a fast heating filament type tube is substituted in place of the cathode type rectifier, then the rectifier tube will supply voltage to the filter after two seconds but the drain on the receiver will be practically nothing until nine seconds has elapsed. This means, therefore, that the voltage available across the filter system will be very high due to the fact that low current is being drawn. This voltage in extreme cases may become so high that every by-pass and coupling condenser in the receiver may be blown. It is important to make certain that the voltage which is delivered to the filter before the output tubes are heated is low enough so that the filter condensers and other condensers in the equipment will not be destroyed. This has been taken care of in many receiver designs by supplying a self-regulating wet electrolytic condenser at the input to the filter. This type of condenser has a property of having extremely high leakage when the voltage exceeds its rating and this leakage returns to a normal value when this voltage returns to its rated value.

This is a good place to point out also that when the first section of a filter system is replaced that the condenser should be replaced with one of the same type since otherwise the leakage characteristics may result in unexpected surges which may cause permanent damage to condensers in other parts of the circuit.

It is hoped that the points brought out in this article will serve to save the embarrassing situations which might otherwise arise in connection with less careful methods of substitution of rectifier tubes in existing equipment.

SERVICE SELLING

SOLDIERS USE DISCS

Soldiers have often found difficulty in writing home after a day's hard training. With this fact uppermost a new business is opening up in the neighborhood of Uncle Sam's training camps—supplying a portable instantaneous disc recorder and a supply of paper core blanks. With this, the recruit can speak those words for home into the microphone.

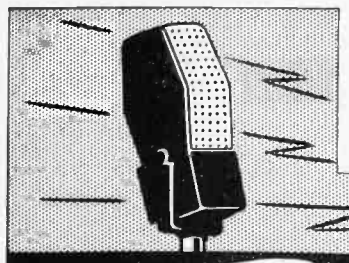
Filament-Grid Short Circuits In Filament Type Tubes

Does Short Circuit Exist Under Service Conditions?

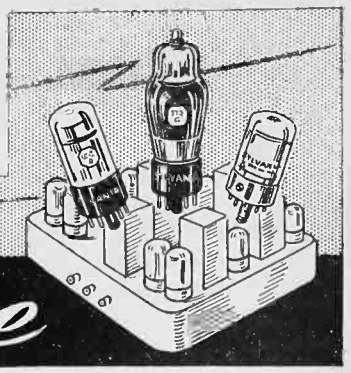
Recently we have received a considerable number of complaints on battery type tubes which indicated that commercial tube checkers were showing up tubes as having grid-filament shorts. In many instances it was reported to us that the tubes worked perfectly satisfactory in equipment. In other instances tubes were sent back to us for analysis. Our analysis showed that there were no short circuits between filament and grid. An investigation was made of several commercial tube checkers in which these defects were being noted to ascertain the cause for such indicated shorts, when in reality no shorts were present.

When one stops to analyze just what is occuring, it is fairly easy to see the reason for the discrepancy. In a commercial tube checker, for simplicity reasons, it is usually a practice to make available only one supply voltage. For most types of tubes the value of this voltage is not too important and consequently a value usually above 150 volts is employed. When filament-grid shorts are being checked, however, on any kind of a tube, since the spacing between these elements is very close, the voltage gradient is very high and a considerable electrostatic attraction exists. In the case of 1.4 volt tubes this force is sufficient to attract the filament over to the grid. This results in a grid-filament short being indicated since the filament may actually touch the grid under these conditions. With the proper equipment

(Continued on page 4)



THE information presented in the Sylvania Service Exchange is contributed by servicemen as the result of practical experience. It is very carefully considered before being accepted, and we believe it to be correct and authentic. However, we assume no responsibility with respect to results. Please do not send routine or generally known information.



THE Service Exchange

Philco 16 Code 126. This radio had me guessing for some time. It became inoperative on the high frequency end of the dial. By tuning toward the low frequency end of the dial it cut in about on 1000 k-c and tuned satisfactorily to the end of the dial. By tuning it back toward the high frequency end of the dial, it cut out at about 1200 k-c to the end of the high frequency end of the dial.

After routine checking of the tubes, d-c voltages, paper condensers and resistors, it was found that the oscillator grid current as well as the oscillator cathode voltage, became abnormally high. The defect was found in the oscillator plate coupling condenser, (#38-800 mmf. mica). This condenser had an intermitting leakage of about 30,000 ohms.—Alex Brzuck, Detroit, Michigan.

* * *

Arvin Model 818. Oscillation or as if code signals were riding in with signal when tuning from station to station. Check to see if long coil spring is connected from tuning condenser to coil shield can on front corner of chassis.—Clifton S. Krumling, Blue Earth, Minn.

* * *

Zenith Model 52. When this set is afflicted with a loud r-f gurgle hum, check the radio frequency choke in the first r-f grid return circuit. It will be found open. The break, however, usually occurs near the outside end and can be repaired by unwinding a few turns and resoldering.—Robert E. Altomare, Washington, D. C.

* * *

RCA Victor Model 10K. In servicing these receivers for no operation, I have found the 6L6 dead. When replaced with a new tube the tone is very distorted after a few minutes of operation. The trouble is usually found in the output bias changing from about 16 to 25 volts. Replace the 470,000 ohm grid resistor with a 250,000 ohm ½ watt resistor and the trouble is cured. This should also apply to any receiver using a 6L6 or 6F6.—F. Jordon, San Antonio, Texas.

* * *

Zenith Auto Radio Model 6M192. If you have vibrator hash do the following: Bond the shield cans on the r-f oscillator-detector coils by soldering together and make a good bond to the chassis. Also be sure to solder all ground lugs held by rivets. This applies to other models with coil shield mounted in a like manner.—C. A. Vaughn, Los Angeles, Calif.

TUBES AS AWARDS NO LONGER POSSIBLE

Due to restrictions imposed by war conditions, it is no longer possible for us to offer a choice of one Sylvania receiving tube for each accepted service hint. We do, however, intend to continue this column; and sincerely hope that every serviceman who has unusual information based on practical experience, will continue to submit it for publication. Such cooperation on your part will enable other repairmen to benefit from your experiences, and you in turn will benefit from theirs.

Zenith Model 8S432 (1940). Intermittent oscillation and howl is often caused by a loose i-f tube shield. This shield may seem well grounded, there being a small piece of adhesive tape holding it in place. The remedy is to bend the bottom of the shield so as to make a better ground.—Joseph S. Napora, Uniontown, Penna.

* * *

RCA Model K8o. In this model if whistling exists on the high and low frequency end of the dial, try reversing the loop antenna plugs, situated on the sides of the chassis. Whistling will disappear. This was known to be true on quite a few occasions.—Chester E. Drzewiechi, Arnold, Penna.

* * *

Zenith Chassis, Model 5714. When this set chirps on medium to loud signals it is usually caused by a leaky .002 mfd. condenser connected across the speaker leads. Install another condenser of .002 mfd., 600 volt unit.—Mr. Arnold Lien, McVille, N. D.

* * *

Philco Model 37-38. When this model has a large amount of background noise and oscillation, the trouble can be eliminated by connecting a .05 mfd. condenser from the screen supply of the 1C7G and 1D5G tubes to ground.—Frank V. Vosejpka, Lonsdale, Minn.

Philco Model 37-116 Code 122. For intermittent operation when loss of signal occurs and there is also oscillation which increases as the i-f control is turned to the fidelity position, look for the following: A signal voltage will be evident at the second detector, disappearing as the tuning condenser is turned to the closed position. The remedy is to replace the filter condensers in can (8-3-2 mfds.). They usually check OK for leakage, but have poor power factor.—J. E. Landin, Chicago, Ill.

* * *

Resistance Table. A resistance table, giving point to point tests is very valuable in quickly locating trouble. Make a "case history" of a number of sets, and catalog these resistances: K to Gnd., P to Gnd., Screen to Gnd., Screen to Plate and Control Grid to Gnd. These will help in quickly locating the trouble.—W. H. Updegrove, Carterville, Mo.

* * *

Zenith Radio Nurse. If these jobs lose all their tone, but have what seems to be plenty of volume, look at the 1-meg. resistor on the transmitter's first tube grid. This is a ¼ watt unit, located on the front of the transmitter, next to the mike. Replace this, and your trouble will clear up at once. Also check the filters on these. A cathode leakage on the transmitter occillator tube (79) was discovered. This was replaced with a Sylvania 79, and the trouble has not occurred since.—Jack Darr, Mena, Arkansas.

* * *

Buick 1940-1941 Cars. Complaint of intermittent reception, static, no reception. Before removing receiver from car, check built-in aerial above mirror. Some you will find have shorted aerial lead, others have corroded joints, and others poorly assembled at factory.—Vito F. Daidone, Newark, N. J.

* * *

Pilot Portable Radios. On Pilot portables, the complaint may be a bad hum. Immediately you think it is a poor filter condenser because of pronounced hum. On these radios, the aerial is attached to the back of radio and connected to chassis by means of a 3 pin plug. Tighten female prongs on aerial because hum is due to poor contact causing open grid on r.f. tube.—Vito F. Daidone, Newark, N. J.

WILL THIS HELP YOU OUT?

There is an acute shortage of certain types of high mutual metal tubes. These tubes are Types 6AB7, 6AC7, 6SG7 and 6SH7. The Sylvania Type 7V7 or 7W7 may be substituted in many instances if the socket is changed. It will be necessary to readjust the operating voltages slightly to obtain characteristics which are close to those of the tubes which are being replaced. There are instances, of course, where these substitutions can not conveniently be made but it is felt that there may be some applications where the changes shown below can advantageously be employed. A summary of recommended operating points for each of the tubes is given in the following information:—

Characteristics of the Type 6AB7 may be quite closely duplicated by the Types 7V7 or 7W7 when operated in accordance with conditions listed below:

	6AB7	7V7 & 7W7	
Heater Voltage	6.3	6.3	Volts
Heater Current	0.450	0.450	Ampere
Plate Voltage	300	300	Volts
Screen Supply Voltage	200	*300	Volts
Screen Series Resistor	....	50000	Ohms
Control Grid Bias	−3.0	−2.5	Volts
Plate Resistance	0.7	0.5	Megohm
Mutual Conductance	5000	5100	μmhos
Plate Current	12.5	8.0	Ma.
Screen Current	3.2	3.3	Ma.

*Thru series resistor.

The basing connections for the Types 6AB7, 7V7 and 7W7 are as follows:

	6AB7	7V7	7W7
Pin No. 1	Shell	Heater	Heater
Pin No. 2	Heater	Plate	Plate
Pin No. 3	Suppressor	Screen	Screen
Pin No. 4	Grid	Suppressor	Cathode
Pin No. 5	Cathode	Internal Shield	Suppressor
Pin No. 6	Screen	Grid	Grid
Pin No. 7	Heater	Cathode	Cathode
Pin No. 8	Plate	Heater	Heater

The characteristics of the Type 6AC7 may be approached if the suppressor grid of the Type 7V7 is tied to the screen. In the case of the Type 7W7 it will probably be necessary to shield the tube if it is to be connected in this manner. A comparison of the characteristics and basing connections are given below:

	6AC7	7V7 & 7W7	
Heater Voltage	6.3	6.3	Volts
Heater Current	0.450	0.450	Ampere
Plate Voltage	300	250	Volts
Screen Supply Voltage	150	135	Volts
Suppressor	0.	*135	Volts
Control Grid Bias	−2.0	−2.0	Volts
Plate Resistance	1.0	0.16	Megohm
Mutual Conductance	9000	8000	μmhos
Plate Current	10.0	15.0	Ma.
Screen Current	2.5	−1.2	Ma.

*Suppressor tied to screen.

The basing connections for the Types 6AC7, 7V7 and 7W7 are as follows:

	6AC7	7V7	7W7
Pin No. 1	Shell	Heater	Heater
Pin No. 2	Heater	Plate	Plate
Pin No. 3	Suppressor	Screen	Screen
Pin No. 4	Grid	Suppressor	Cathode
Pin No. 5	Cathode	Internal Shield	Suppressor
Pin No. 6	Screen	Grid	Grid
Pin No. 7	Heater	Cathode	Cathode
Pin No. 8	Plate	Heater	Heater

The Type 7V7 tube has a filament current of 450 ma. which is the same as that required for Types 6AB7 and 6AC7. The Type 6SG7 and Type 6SH7 have only 300 ma. drain. Before attempting to substitute the Type 7V7 for either of these two types it is necessary to determine whether the extra filament drain can be tolerated. If so, then the substitution may readily be made. The operating conditions to duplicate the characteristics of the Type 6SG7 are as follows:

	6SG7	7V7 & 7W7	
Heater Voltage	6.3	6.3	Volts
Heater Current	0.300	0.450	Ampere
Plate Voltage	250	300	Volts
Screen Supply Voltage	125	*300	Volts
Screen Series Resistor	...	100000	Ohms
Control Grid Bias	−1.0	−1.5	Volts
Plate Resistance	0.90	0.75	Megohm
Mutual Conductance	4700	4700	μmhos
Plate Current	11.8	5.5	Ma.
Screen Current	4.4	2.2	Ma

*Thru series resistor.

The basing connections for the Types 6SG7, 7V7 and 7W7 are as follows:

	6SG7	7V7	7W7
Pin No. 1	Shell	Heater	Heater
Pin No. 2	Heater	Plate	Plate
Pin No. 4	Cathode	Screen	Screen
Pin No. 4	Grid	Suppressor	Cathode
Pin No. 5	Cathode	Internal Shield	Suppressor
Pin No. 6	Screen	Grid	Grid
Pin No. 7	Heater	Cathode	Cathode
Pin No. 8	Plate	Heater	Heater

The operating conditions for the Type 7V7 to duplicate the Type 6SH7 characteristics are as follows:

	6SH7	7V7 & 7W7	
Heater Voltage	6.3	6.3	Volts
Heater Current	0.300	0.450	Ampere
Plate Voltage	250	250	Volts
Screen Supply Voltage	150	90	Volts
Control Grid Bias	−1.0	−1.5	Volts
Plate Resistance	0.9	0.62	Megohm
Mutual Conductance	4900	4900	μmhos
Plate Current	10.8	5.6	Ma.
Screen Current	4.1	2.35	Ma.

The basing connections for the Types 6SH7, 7V7 and 7W7 are as follows:

	6SH7	7V7	7W7
Pin No. 1	Shell	Heater	Heater
Pin No. 2	Heater	Plate	Plate
Pin No. 3	Cathode	Screen	Screen
Pin No. 4	Grid	Suppressor	Cathode
Pin No. 5	Cathode	Internal Shield	Suppressor
Pin No. 6	Screen	Grid	Grid
Pin No. 7	Heater	Cathode	Cathode
Pin No. 8	Plate	Heater	Heater

FOR ONCE WE CAN AGREE

Certainly Hans, Honorable Emperor and Beloved Fuehrer would object if we bought enemy War Bonds—but I still think it's a very good investment.

FILAMENT-GRID SHORT CIRCUITS

(Continued from page 2)

it is possible to actually see the filament being attracted to the grid structure. In manufacturing these tubes a great deal of difficulty was experienced with this condition until it was recognized that the voltage between grid and filament must be kept at a low enough value so that the filament did not become distorted. This can readily be accomplished by reducing the value of this voltage without any attendant harm since the maximum voltage applied between grid and filament in most battery types will be under 25 volts.

The next time you are testing battery tubes for short circuits and run into grid-filament shorts and the tubes appear to be otherwise alright, it is suggested that you measure the voltage between filament and grid and if it exceeds 50 volts that you disregard the grid-filament short indication.

Generally a real grid-filament short circuit occurs because the filament has been opened up and the hook tension has been sufficient to pull the loose end of the filament up so that it comes in contact with the grid wires thus causing a short circuit. Whenever this occurs, of course, the filament continuity will be broken and this can readily be determined. Under these conditions, of course, the tube will be inoperative and should be discarded for an open filament rather than a short circuit.

This information is being passed on so that tubes will not be falsely accused of having grid-filament shorts when in reality these short circuits do not exist under service conditions.