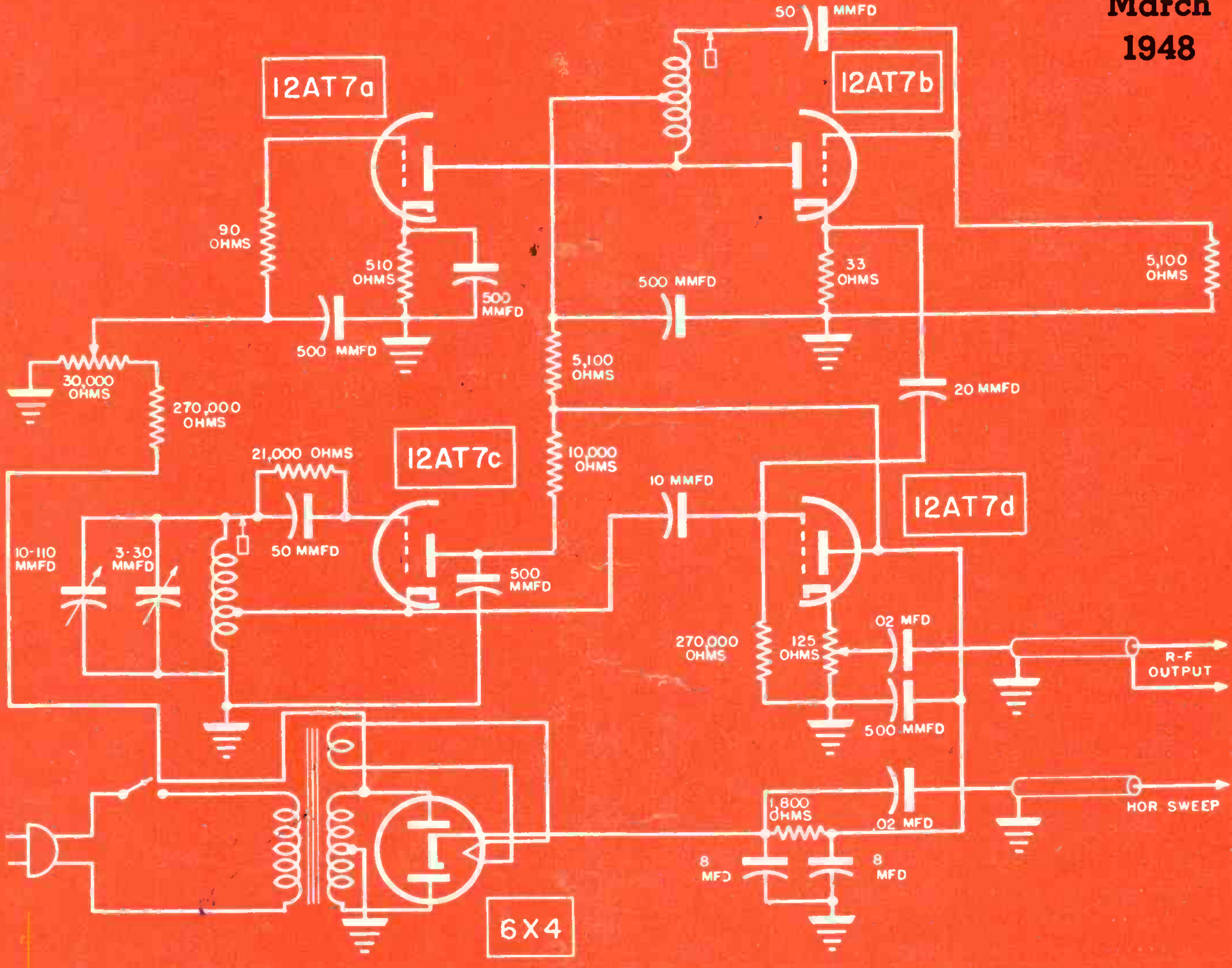
RADIO · TELEVISION · ELECTRONIC

SERVICE

March
1948



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[See page 2]

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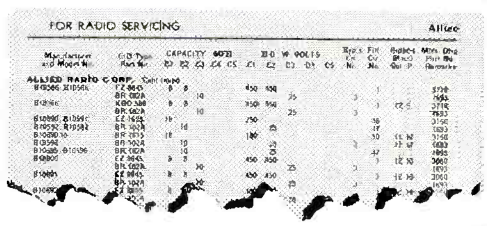

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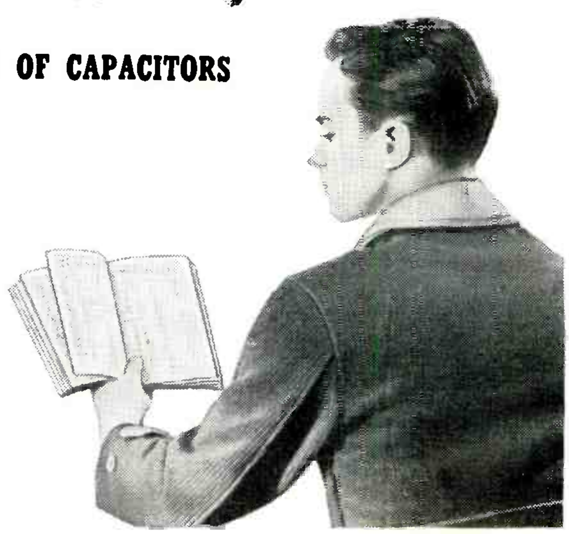


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Vol. 17, No. 3

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SERVICE

March, 1948

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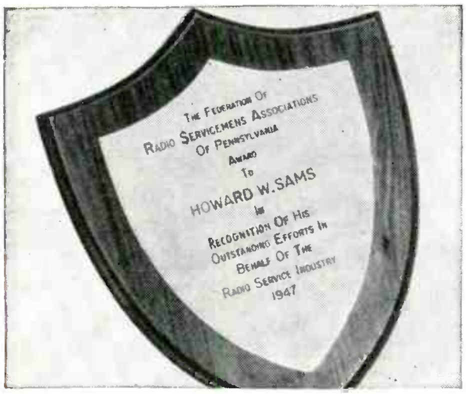

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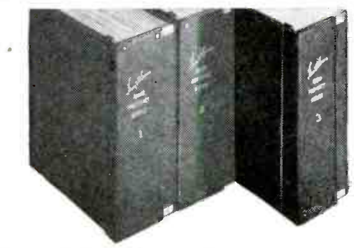

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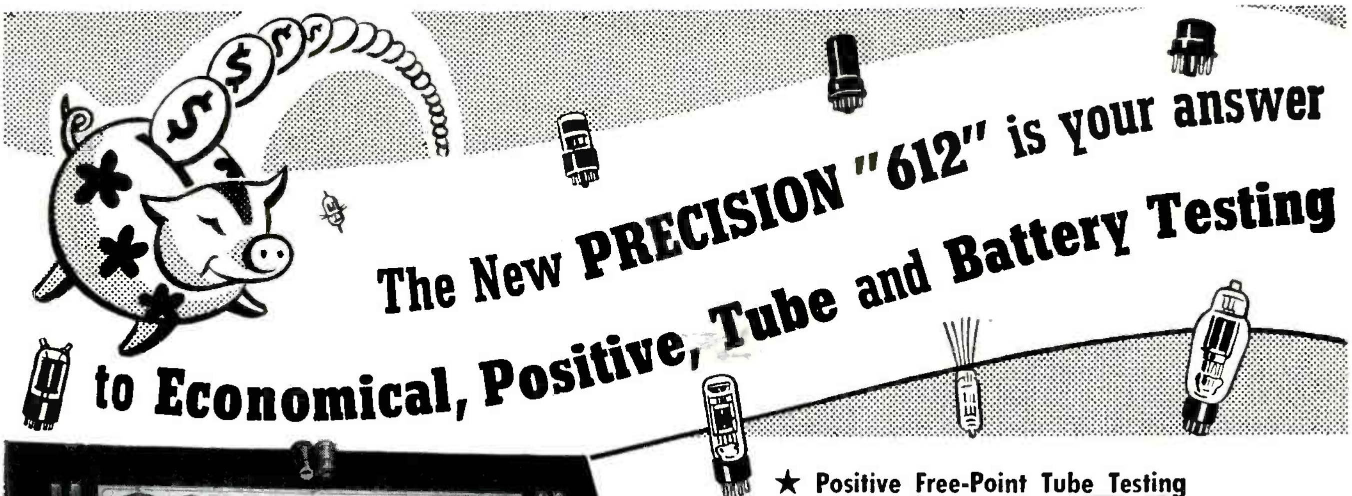

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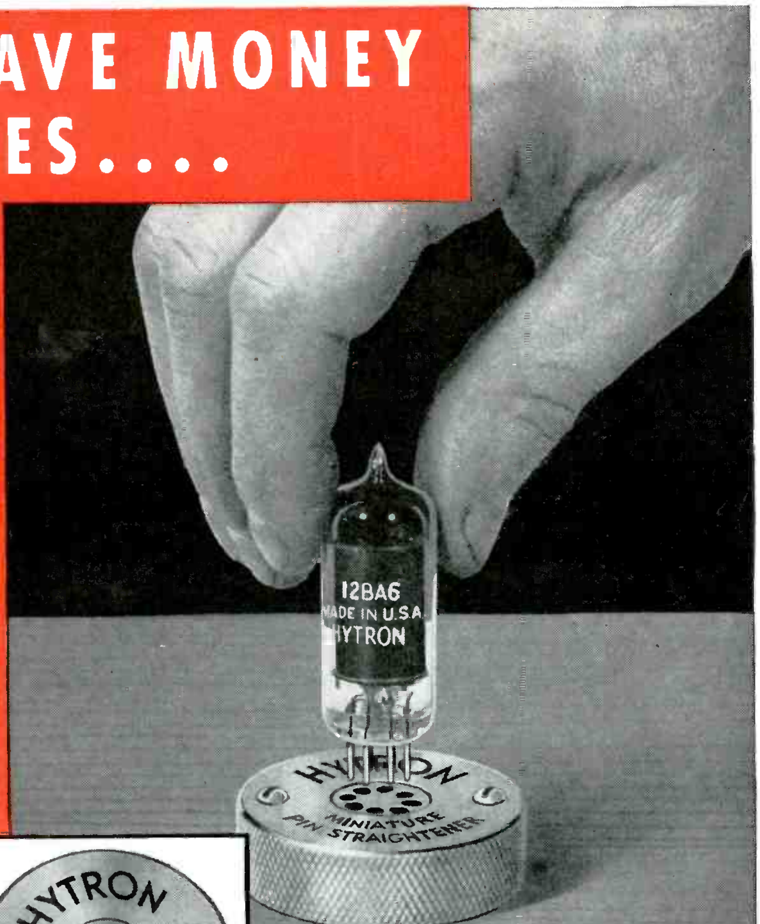

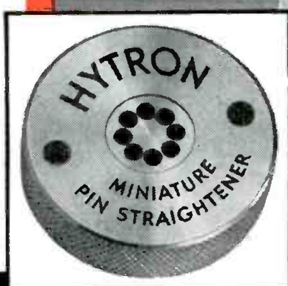

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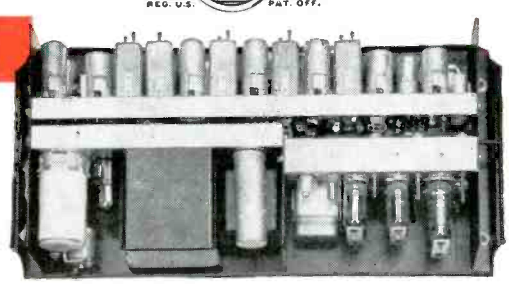

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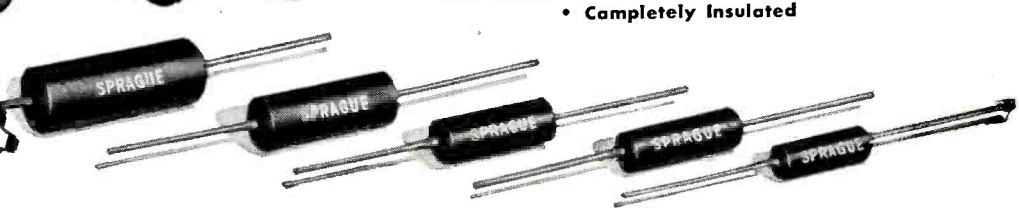

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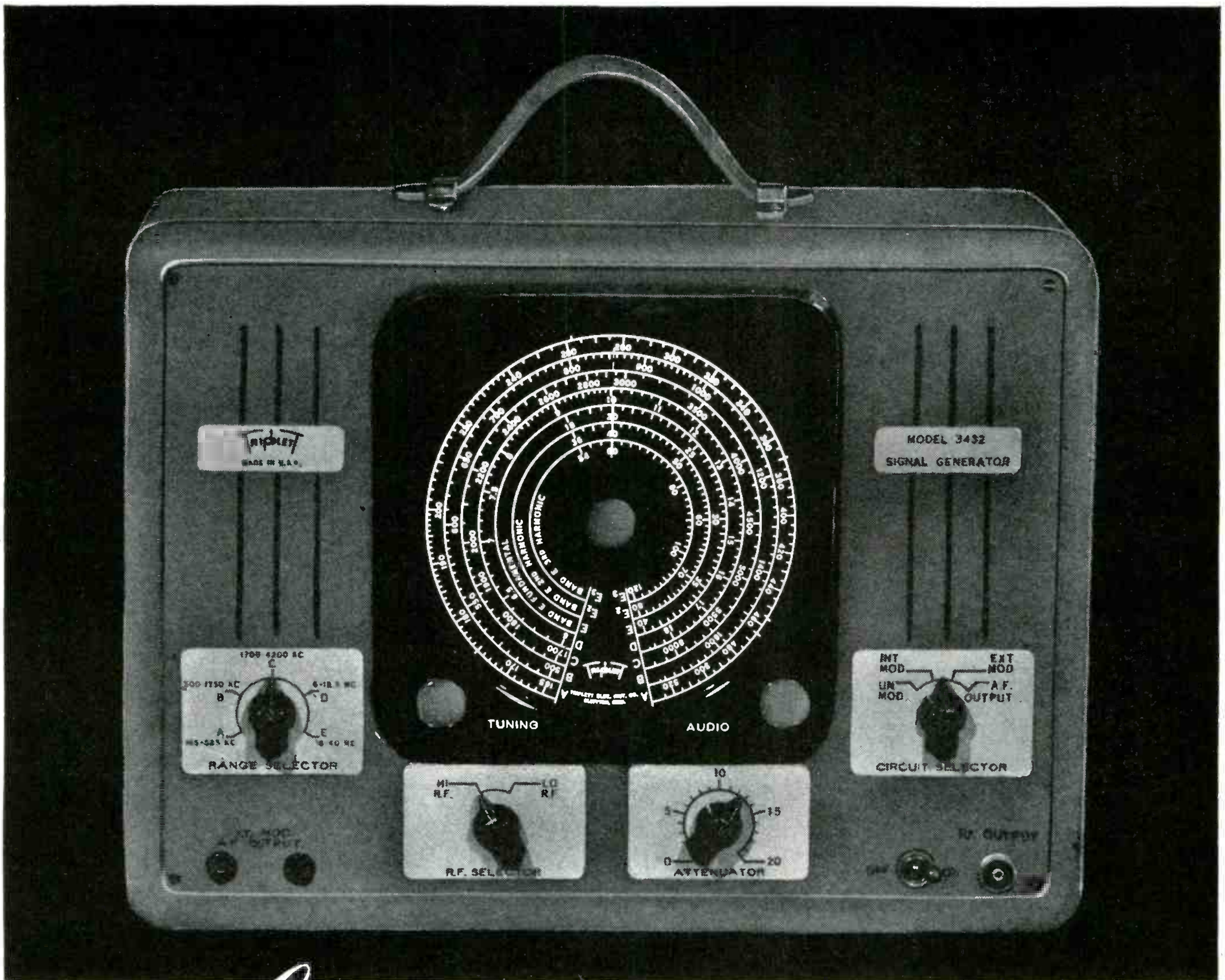

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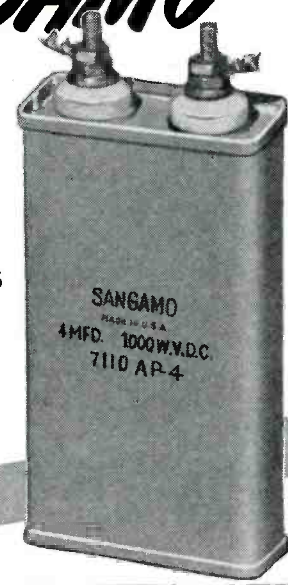

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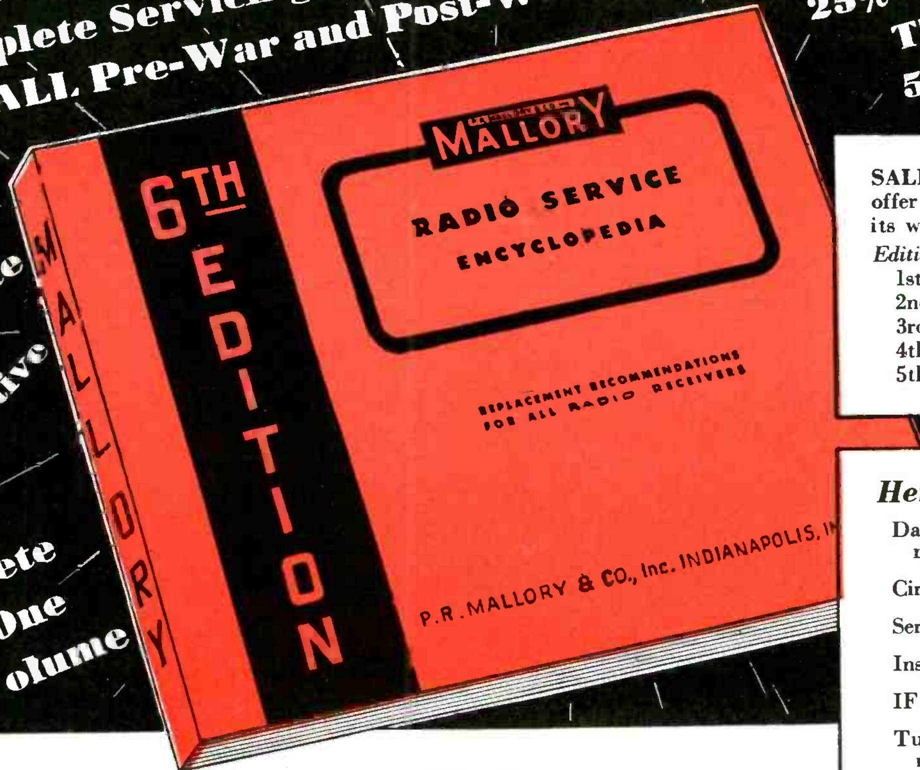

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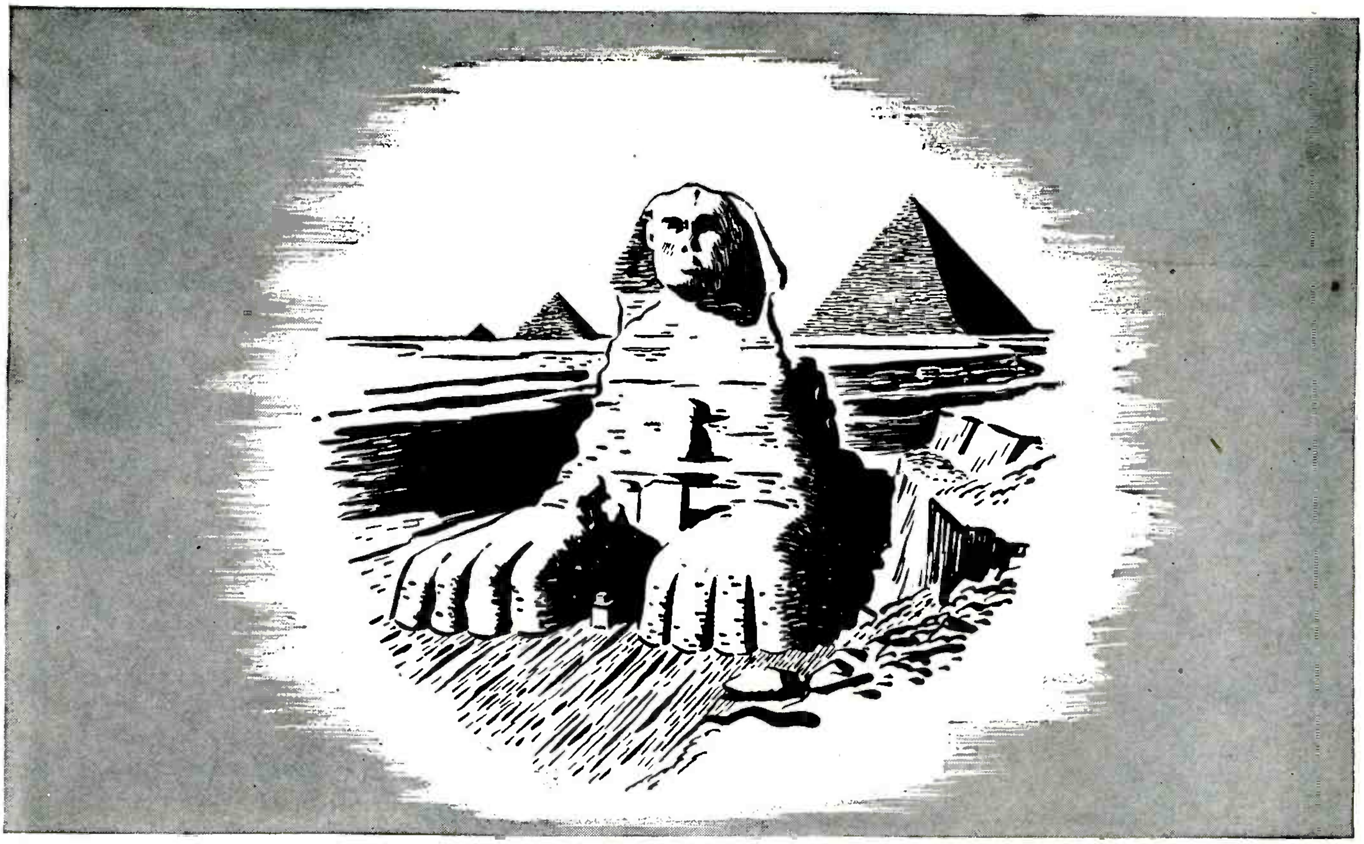

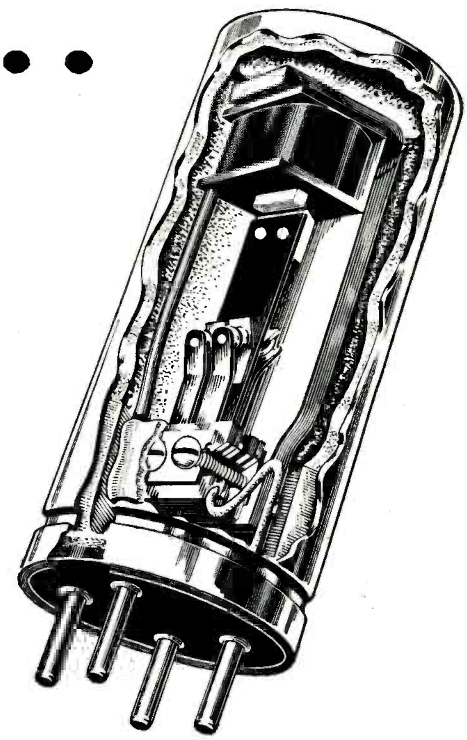

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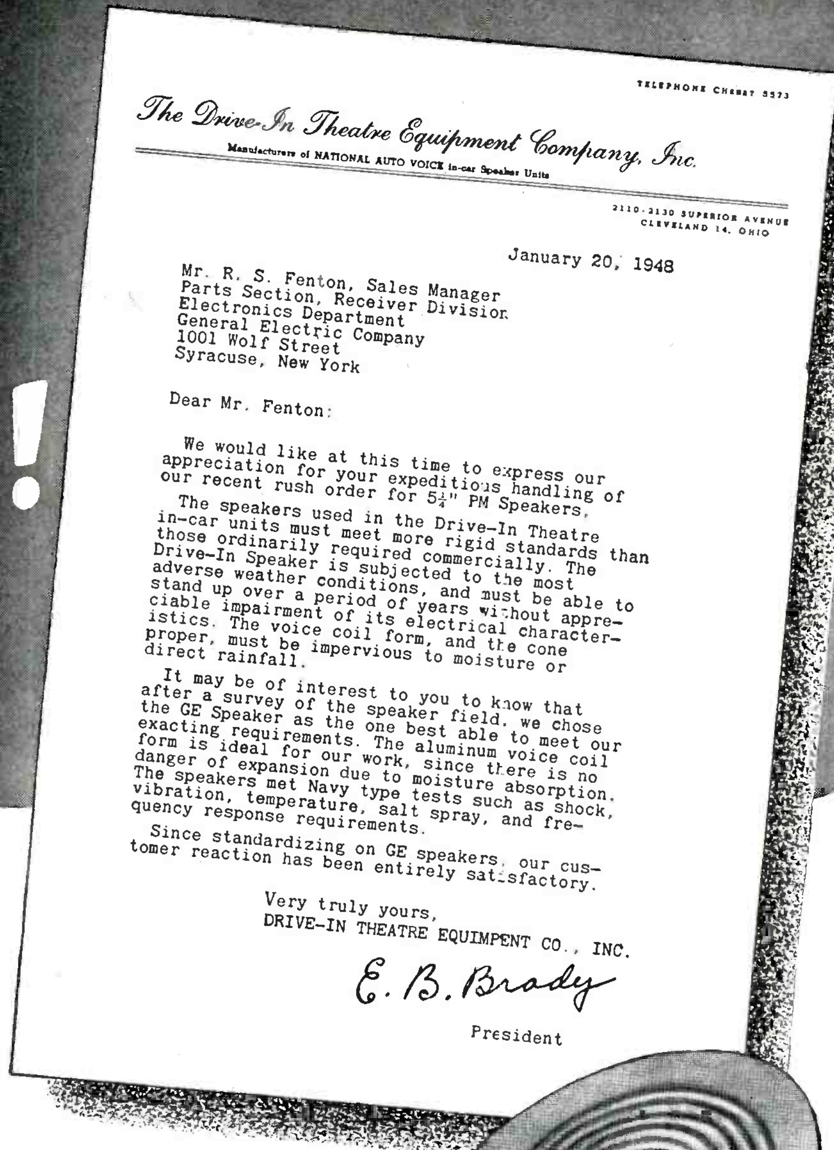

TELEPHONE CHERRY 5573

The Drive-In Theatre Equipment Company, Inc.

Manufacturers of NATIONAL AUTO VOICE In-car Speaker Units

2110-2130 SUPERIOR AVENUE
CLEVELAND 14, OHIO

January 20, 1948

Mr. R. S. Fenton, Sales Manager
Parts Section, Receiver Division
Electronics Department
General Electric Company
1001 Wolf Street
Syracuse, New York

Dear Mr. Fenton:

We would like at this time to express our appreciation for your expeditious handling of our recent rush order for 5¼" PM Speakers.

The speakers used in the Drive-In Theatre in-car units must meet more rigid standards than those ordinarily required commercially. The Drive-In Speaker is subjected to the most adverse weather conditions, and must be able to stand up over a period of years without appreciable impairment of its electrical characteristics. The voice coil form, and the cone proper, must be impervious to moisture or direct rainfall.

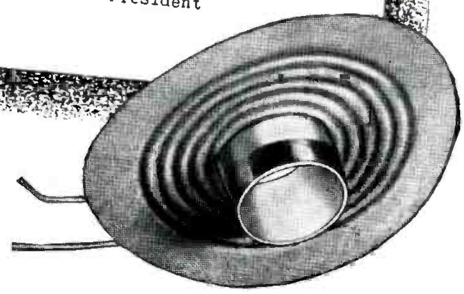
It may be of interest to you to know that after a survey of the speaker field, we chose the GE Speaker as the one best able to meet our exacting requirements. The aluminum voice coil form is ideal for our work, since there is no danger of expansion due to moisture absorption. The speakers met Navy type tests such as shock, vibration, temperature, salt spray, and frequency response requirements.

Since standardizing on GE speakers, our customer reaction has been entirely satisfactory.

Very truly yours,
DRIVE-IN THEATRE EQUIPMENT CO., INC.

E. B. Brady

President



ALUMINUM FOIL BASE VOICE COIL

THE LETTER reproduced here speaks for itself and —G-E Speakers. The superb engineering which makes this speaker ideal for outdoor use, also makes it ideal for replacement in home receivers, where widely varying conditions of dryness and humidity affect speaker performance.

Here is an opportunity to develop the speaker replacement market to its fullest extent and push the outdoor theatre market.

G-E Speakers are competitively priced—and in quality they are outstanding. Build speaker business now. Send us your order.

For complete information write:
General Electric Company, Electronics Department, Electronics Park, Syracuse, New York.

GENERAL ELECTRIC

169-G2

TV and the Service Man

TELEVISION has struck its stride and with gusto! Today there are over quarter of a million tv receivers. February production was nearly 36,000 units representing an annual production rate of more than 430,000, an increase of 141% over the average 1947 month's output. This accelerated interest has projected tv installation and servicing up front, way up front. As we noted last month, tv is no longer a service of a few areas. Not only do we have stations in the key trading spots of the country but in the smaller sites too, and more to come. And the network links, for years on the drawing board, are now becoming a fact. In October, an AT&T coaxial link will join Cleveland, Detroit, Toledo, Milwaukee, Chicago and St. Louis. In December, these cities will join the eastern network which consists of Boston, New York, Philadelphia, Baltimore, Washington and Richmond. Radio-relay links are extending coverage, too. The Boston-to-New York link, only discussed last month, as a future possibility, is now in operation.

A few months ago it was believed that about a score of companies might be producing tv models. Today, there are over 50 in full scale production.

Tv has become quite a business, and it's still a baby. It's growing and growing fast and Service Men can grow with it, keeping pace with the developments, seeking every opportunity to learn what makes the tv set tick and acquiring the know-how which we discussed last month.

As our contribution to this expanding industry, the contents of this issue are, in the main, devoted to tv . . . covering such important factors as installation, servicing, receiver design, instruments, antennas and tubes. And in future issues tv will continue to be featured in many articles.

In This Issue

THE ALL-IMPORTANT subject of tv installation is thoroughly analyzed by Edward M. Noll of Temple University . . . *page 18*. On-the-spot photos of a typical installation illustrate the vital points Service Men must follow in tv installation today. Noll analyzes the careful planning procedure required, detailing such factors as the initial survey, pretesting of the receiver in the Service Shop, checking of antenna with test receiver, positioning of the receiver and the use of operating instructions for the benefit of the customer.

On page 20 will be found another extremely important discussion, the curbing of tv receiver proximity interference. This article, prepared by Ira Kamen, discloses the remedies for such problems as local oscillator reradiation, leading ghosts, poor image-rejection response, unregulated power systems and sweep circuit reradiation.

The *Ser-Cuits section,* this month, is devoted to an analysis of three unusually interesting types of television receivers. The discussion which begins on page 32 covers tv models using electrostatic-deflection picture tubes and magnetic-deflection projection-type picture tubes. In these analyses will be found a step-by-step discussion of the variety of circuits used. Reasons for the design and use of the circuits are explained carefully. Full-page circuits appear within this comprehensive circuit feature of SERVICE.

Television antennas are also featured in an article, this month, on page 26. This presentation by P. M. Randolph provides an unusually useful antenna-length chart for tv and f-m dipoles. Randolph also tells how to convert an f-m dipole for television-receiver use on the six lower channels.

A handy television-test instrument is also described this month. The discussion, on page 48, covers a sweep signal generator for tv and f-m.

The *Tube News* section (page 30), this month, is also devoted to tv, with an analysis of stagger-tuned video i-f systems using 6AG6, 6AU6, 6BA6, 6AK5, 6BJ6 and 6BH6 miniatures. Typical circuits are offered. Also appearing in this discussion, are some useful notes on the 5TP4 projection tube, which, incidentally, is used in the projection receiver described in the circuits section.

Read these articles carefully and keep them for ready reference. You will find them mighty handy for your television installation and servicing work.

Servicing Opportunities

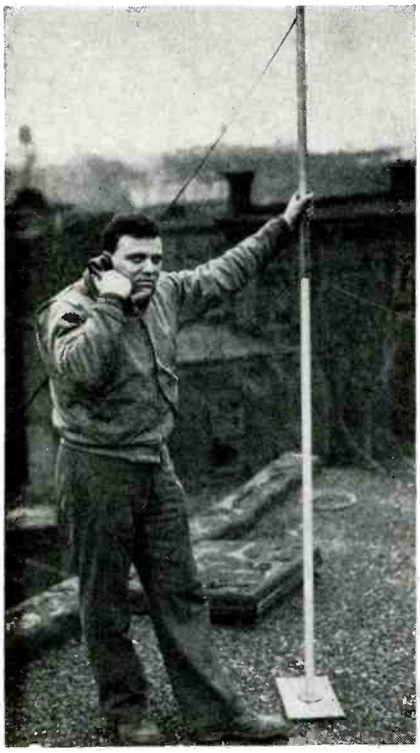
F-M has opened many new fields for the Service Man. We've mentioned taxicabs, trucks, commercial buses, etc. And now we have the public-service bus equipped with f-m, buses serving northern Kentucky and metropolitan Cincinnati, another blueprint idea come to life! About 150 cars in this bus line will eventually be equipped with special f-m receivers. The sets feed from six to eight speakers per bus.

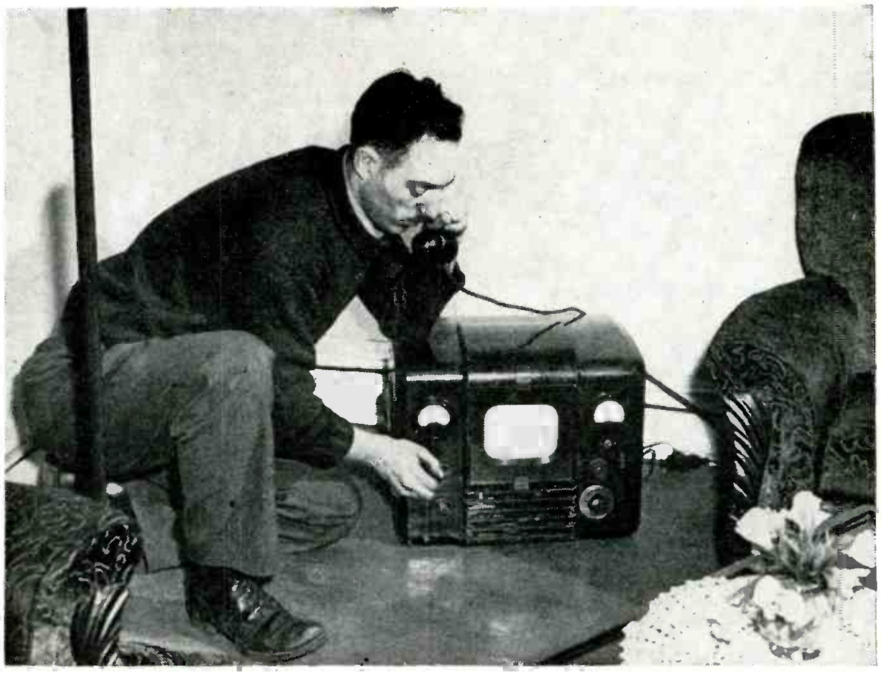
A bus line in Virginia is also experimenting with this type of f-m service. Others will fall in line soon. The Service Man can play a major role in installing this equipment, servicing it and even setting up a plan to sell the receivers to local bus companies through a cooperative dealer arrangement.

There appears to be quite a bit of new business around for the progressive Service Man!

F-M Radio Relay

MANY have inquired about the number of stations in the f-m continental network . . . who they were and where they are located. There are *27* stations in the network, nineteen of which are connected by a radio link, and the remaining eight by wire. The link stations are: WWHG, Hornell, N. Y.; WKNP, Corning, N. Y.; WIBX-FM, Utica, N. Y.; WGTR, Paxton, Mass.; WMNE, Mt. Washington, N. H.; WXHR, Cambridge, Mass.; WNLC-FM, New London, Conn.; WIZZ, Wilkes Barre, Pa.; WBCA, Schenectady, N. Y.; WBIB, New Haven, Conn.; WDRC-FM, Hartford, Conn.; WFMZ, Allentown, Pa.; WBAB-FM, Atlantic City, N. J.; WLAN-FM, Lancaster, Pa.; WLOB, Claremont, N. H.; WCFR, Fall River, Mass.; WABX, Harrisburg, Pa.; WXNJ, Plainfield, N. J., and WFMO, Jersey City, N. J. Wire-line stations are: WASH, Washington, D. C. (*key*); WFIL-FM, Philadelphia, Pa.; W2XMN-W2XEA, Alpine, N. J. (New York City); WNBF-FM, Binghamton, N. Y.; WSYR-FM, Syracuse, N. Y.; WHFM, Rochester, N. Y.; WBEN-FM, Buffalo, N. Y., and WHLD, Niagara Falls, N. Y.—L. W.





Left: Receiving instructions on orientation of television antenna from Service Man in apartment with test television set. Above: Instructing antenna man how to orient the antenna to secure maximum results on tv receiver.

TV Antenna-Receiver Installation Methods

Installation of Television Receiver And Antenna Requires Careful Planning, And Involves An Initial Survey, Pre-Testing of Receiver In Service Shop, Detailed Check of Antenna With Test Receiver, Positioning of Set And Use of Lucid Operating Instructions

by EDWARD M. NOLL

Instructor in Television Temple University

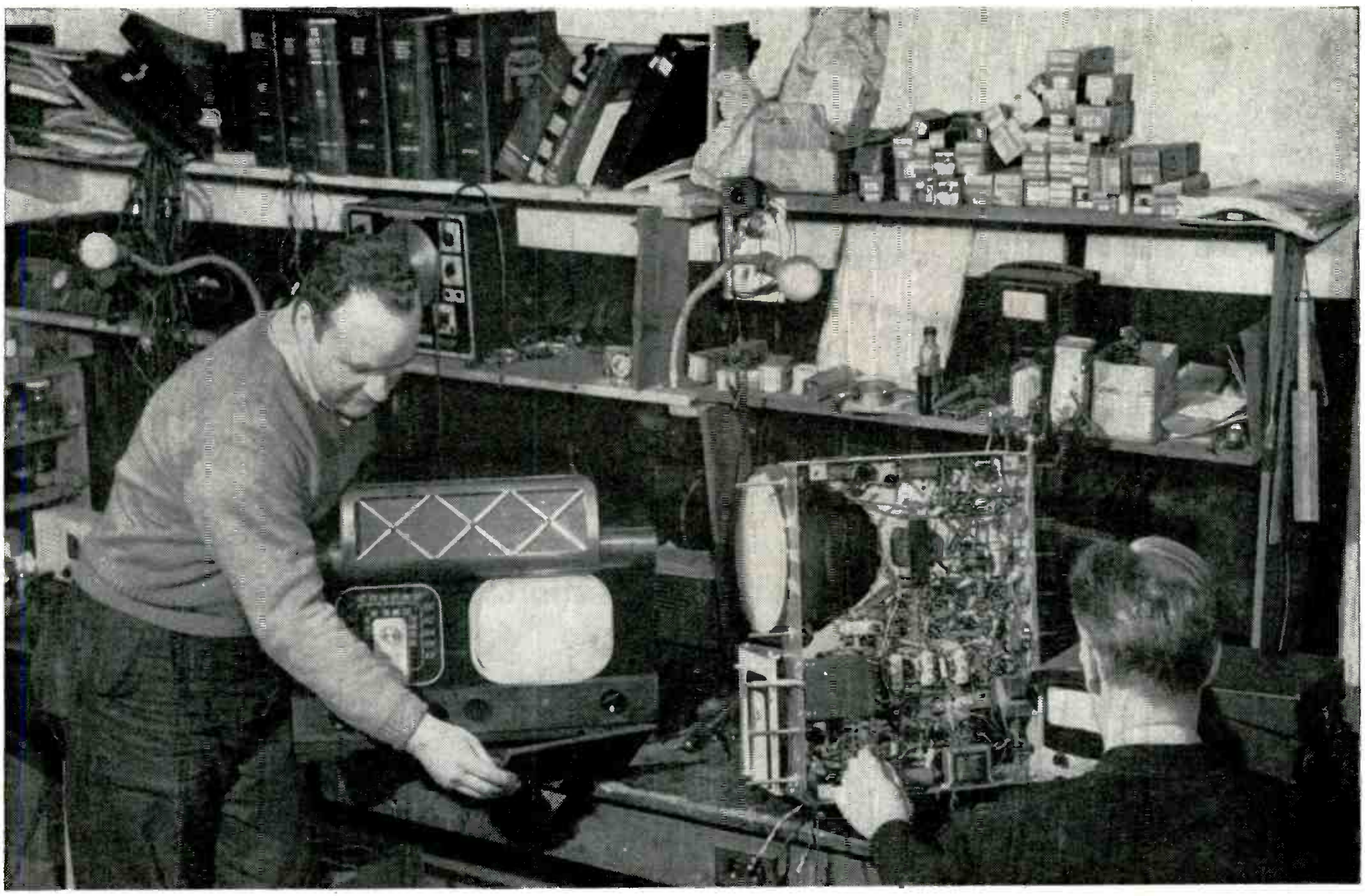
THE PERFORMANCE of a tv receiver is a function of the installation as well as the receiver proper. A painstaking installation is the most economical path to customer satisfaction.

Customer confidence gains with every inconvenience removed. For instance, there's no need to make the customer's home a receiving department or his living-room an assembly line. In the main, television receivers should be assembled at the shop and given an eight-hour test before they are delivered. In transit between shop and customer they can be wrapped in moving blankets and ride where they are not subject to shock.

The following procedure, used and recommended by the Pioneer Television Company of Philadelphia, has created substantial respect for workmanship and installation effectiveness in this area.

Initial Survey

Initial survey of location is of paramount importance and involves a number of decisions; type of antenna, antenna position and tentative orientation, type of support and guying, location of receiver, and path of transmission line. Choice of antenna type itself is often a difficult task because it is dependent on relative signal strengths, number and frequency of stations, direction of stations, and signal-to-noise ratios. Generally, the antenna is either broad-band or cut for the weakest station, and is directed toward that station. In areas in which all signals are weak separate antennas are often necessary. Likewise, antennas must be directed away from noise sources whenever possible. The type and heighth of mast depends on location and building structure. Support and guying of mast to withstand



Above: Testing television set in Service Shop before delivery to customer's home. Receivers are subjected to an eight-hour test to assure maximum operating efficiency when installed. Service Man at left is checking horizontal and vertical sync controls. Point-to-point voltage tests are being conducted by Service Man at right.

high winds is very important. The antenna mast must lock-in tightly after orientation to prevent a shift in antenna element position and antenna directivity over a period of time, a frequent cause of gradually degenerating performance.

The general positioning of the receiver in the house should be ascertained and a plan evolved for running the transmission line unobstrusively and rigidly. Transmission line should be tied down and isolated from metallic and other surfaces against which it may rub or transfer signal.

Antenna Installation

On many jobs the survey and antenna installation proceed concurrently in the hands of an experienced crew.[1] The most important consideration in the erection of the antenna is rigid support and effective guying, when necessary, to withstand wind and prevent shifting of position. The

(*Continued on page* 40)

[1]Most service groups use a two-man crew.

Instructing customer on use of controls on television receiver.

Right: Blanketed, tested television receiver being brought to truck for delivery to customer.

Curbing TV Receiver Proximity Interference

Remedies For Such Problems As Local Oscillator Reradiation, Leading Ghosts, Poor Image Rejection Response And Unregulated Power Systems. Serious Problem of Sweep-Circuit Reradiation Thoroughly Analyzed

by IRA KAMEN

Commercial Radio Sound Corp.
New York City

The problems of interference where tv receivers operate in close proximity to each other and to broadcast receivers are becoming acute in many areas. Most of the problems are the result of design defects in some of the tv receiver circuits.

First, let us analyze where tv receivers operate in close proximity to each other and to broadcast receivers.

We have: (*1*) Multiple dwellings, (*2*) hotels, (*3*) dealer establishments, (*4*) attached private homes, (*5*) schools, and in other minor groups in tv studios, industrial buildings, etc.

The problem of tv interference and receiver design defects has been carefully considered in the design of master antenna systems, such as the type illustrated in Fig. 1, and components have been incorporated to preclude the possibility of an inherent defect in any one tv receiver from affecting the operation of another tv receiver connected to the system.

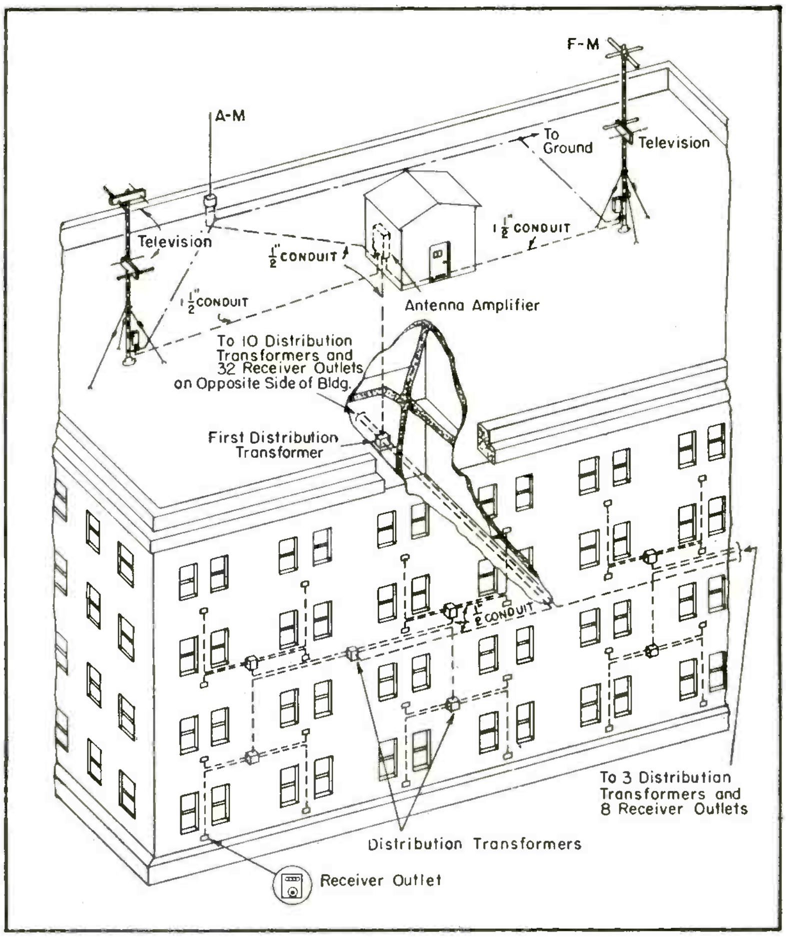
Now let us analyze the types of interferences which have been found when tv receivers operate in proximity to other tv receivers or on a common transmission line.

Problem 1—Local oscillator reradiation: This is caused by failure to provide a preselector ahead of the converter stage, lack of shielding, circuit coupling between antenna inputs and local oscillators. Many tv models have a combination of these defects.

The interference manifests itself by showing *r-f* lines in the pattern of the affected receiver, as shown in Fig. 2. This condition is most prominent when the poorly designed receiver is on channel 2 (54-60 mc) and another tv receiver is operating on channel 5. You can readily see that the local oscillator frequency of the offending receiver (incoming frequency plus i-f frequency) is transmitting a signal in the channel 5 band (76-82 mc). In cities, other than those using the New York channels, the problem will be acute between channels 1 and 4, and 3 and 6.

This interfering signal has been found to upset tv receivers when their

Fig. 1. Apartment house a-m/f-m/tv master antenna system. (*Courtesy Commercial Radio Sound Corp.*)



respective antennas are as much as 100′ apart. The reradiated r-f signal from the offending tv receiver local oscillator couples into the antenna input circuit, climbs the cable, goes into the antenna and makes the tv receiver act like a low-powered transmitter. Many a *ham* has been erroneously blamed for causing this interference.

During demonstrations, with tv receivers at low signal levels, the reradiating receiver has been found, in many cases, *tearing* the picture on another receiver when the channel 2 to 5 tuning combination exists, even though the offending tv receiver *is not connected to an antenna.*

Solution A: Install a multiple antenna system.[1] Multiple dwellings, dealers and other establishments equipped with master-antenna systems will find that the special transformers and isolation outlets prevent the defective receiver from reradiating any further than the outlet. Master antenna systems providing 3 to 5,000 microvolts of tv signal to each tv receiver minimize the effect of the r-f interference as the signal-to-interference level is so high.

Solution B: Locate offending receiver as far as possible physically from other tv receivers.

Solution C: In private homes, a preselector could be installed ahead of the reradiating receiver.

Solution D: A trifilar transformer[2] (70 ohms unbalanced to 300 ohms balanced) installed with coaxial line will considerably reduce the reradiating signal level; Fig. 3.

Problem 2—Leading ghosts: This condition is usually found in poorly shielded tv receivers installed in strong signal areas and is most prevalent in those receivers with 300-ohm balanced inputs.

The cause of leading ghosts is explained in Fig. 4. These leading ghosts are only a problem when several hundred feet of cable are installed between the tv receiver and its antenna and where extremely strong signals are present in the location where the tv receiver is installed. Many an installer has found an external antenna adjustment impossible because of the direct signal pick-up and *amazed* that an indoor antenna provided more satisfactory pictures.

Solution: An investigation of one of these *amazing stories,* where the indoor signal, fifteen floors below the roof, provided a better signal than the rooftop, revealed that the problem was direct pickup. The following corrective steps were taken:

(*A*) Installed coaxial line between antenna and tv receiver.

(*B*) Removed the 300-ohm line between external and internal receiver input and connected a 70-ohm coax to one side of the tv sets's balanced 300-ohm transformer input and ground, which matched the 70 ohms; ½ the number of turns were used, therefore ¼ the impedance or 300/4 = 75 ohms.

(*C*) Used a high-gain antenna array so that maximum signal was fed into the tv receiver from the external antenna.

By taking these corrective steps it was found that the pictures and the signal-to-noise ratio from the external antenna was a great improvement over the *amazing* indoor antenna. Direct pickup in average signal areas does not present a problem because the external signal is so much stronger than the direct pickup that it swamps the direct signal to a level where it is not visible.

A good test to determine if direct pickup is going to be a problem is to turn on the tv receiver and look at the strength of the pictures without an antenna. A steady high-definition picture may mean you have a serious problem to solve.

Problem 3—Sweep-circuit radiation: The horizontal sweep circuits, which include the deflection coils, radiate high-level harmonic interference signals which blanket the broadcast band with *beeps.* Large tube and projection tv sets have been the worst offenders. Tests with loop antenna a-m receiver midgets have indicated that the interfering sweep harmonics can be picked up in a 100′ radius from many of the present tv receivers. During a master-antenna system demonstration, where ten tv receivers were operating simultaneously, a radio dealer establishment a floor below and approximately 75′ away found he could not demonstrate his a-m radio receivers because of the high level sweep circuit radiation from the tv receivers under test.

In an apartment house, the situation is, of course, more acute. Many a Service Man has credited the *beeps* as an alignment difficulty. Removal of the a-m receiver from the customer's apartment, of course, eliminated the *beeps.*

There is no solution to this problem except to locate the a-m receiver as

(*Continued on page* 41)

[1]Such as the RCA Antenaplex system.
[2]RCA.

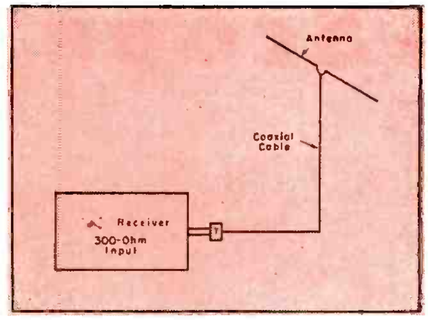


Fig. 3.—Reducing a reradiated signal level with a trifilar transformer (50/70-ohm unbalanced input to 300-ohm balanced output). The twin-lead between the receiver and the transformer is a 300-ohm line and made as short as possible. The coaxial cable lead is an RG58 or 59/U.

Fig. 2. Typical r-f interference pattern on picture-tube screen. (*Courtesy Belmont Radio.*)

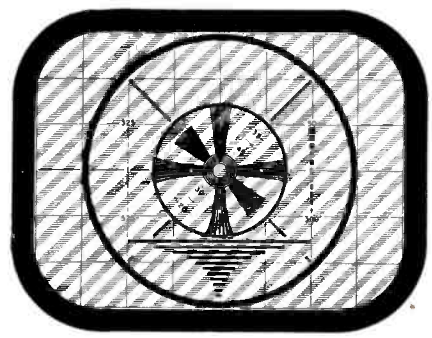
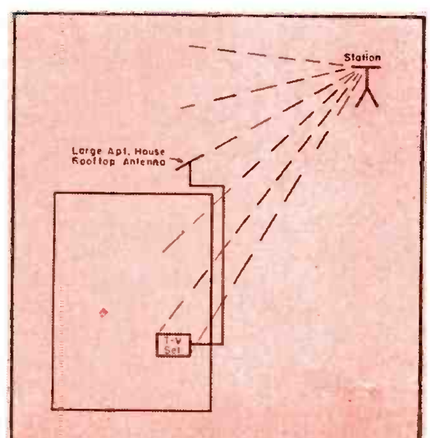
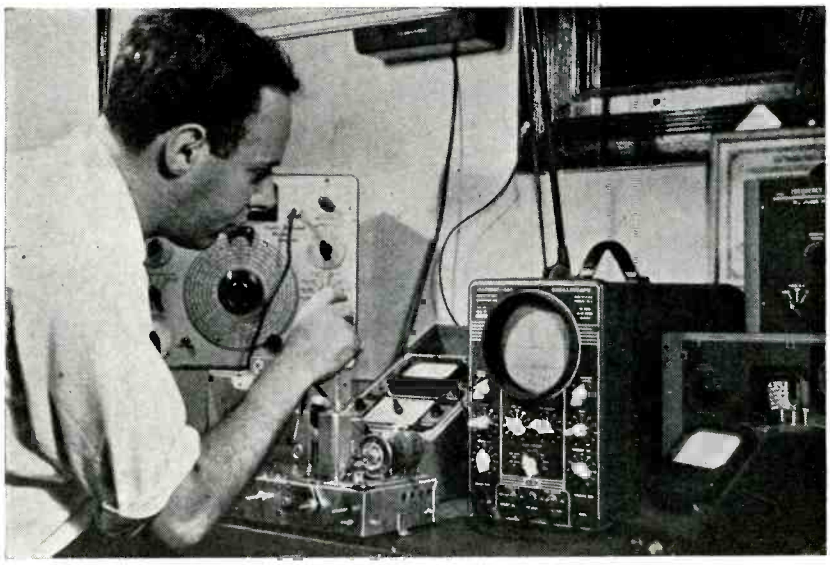


Fig. 4. The cause of leading ghosts is explained in this figure. Signal picked up by the antenna has a time delay in cable before it reaches the television set. The direct tv signal is picked up by the receiver (due to insufficient shielding) and reaches the r-f circuits before the signal from the antenna.



'Scope Wave Patterns



Using a 'scope in practice.

How To Use Controls On The 'Scope To Secure Proper Wave Patterns. Typical 'Scope Pictures Illustrate Methods Of Operation

by ALVIN A. BAER

Meybaer Radio
New York City

THE OSCILLOSCOPIC representation of a particular a-c wave may take several different forms. For this reason, it is important that the influence that the various controls of the 'scope exert on the pattern be determined and recognized.

As an example, let us take Fig. 1. This is a Lissajou figure of two a-c waves, identical in frequency, applied simultaneously to both the horizontal and vertical inputs. To obtain this picture, the local sawtooth oscillator was turned off by means of the switch on the coarse frequency control. In this picture the two voltages were photographed at the moment they were 90° out of phase. An elliptical figure is the result of the amplitude of the horizontal input signal being higher than that to the vertical input. If both voltages were of equal amplitude, as well as frequency, a perfect circle would result.

Fig. 2 shows a Lissajou pattern of a 2:1 frequency ratio. Assuming that the input to the vertical amplifier of the 'scope is a 60-cycle wave, the input to the horizontal amplifier is thirty cycles. In other words, the vertical trace has moved up and down twice, while the horizontal trace moved across the face of the screen once. Here again the phase relationship will change the appearance of the resulting figure.

Figs. 3 and 4 show frequency ratios of 3:1 and 4:1, respectively. The patterns usually rotate slowly, and may be likened to figures holding hands, and slowly turning in a circle, like children dancing. As in the previous illustrations, the frequency ratio is determined by counting the peaks.

Fig. 13. The setup that was used to create the patterns described in this paper.

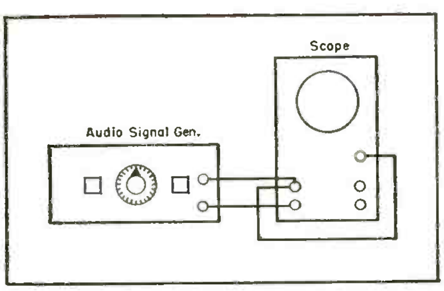


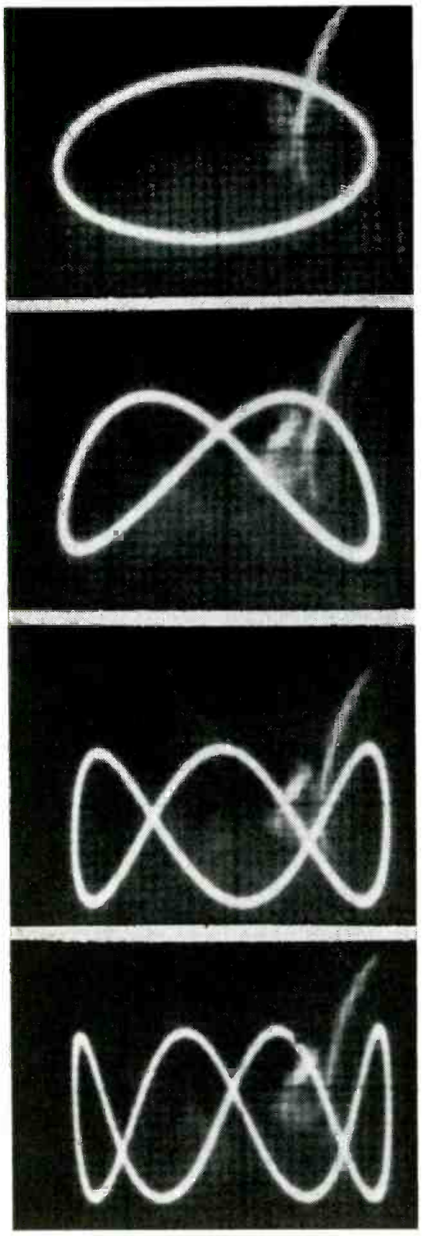
Fig. 5 shows a complicated voltage ratio, 3:2. It will be noted that three peaks can be counted vertically, while two peaks appear horizontally.

It is suggested that the 'scope user acquaint himself with these various forms, by applying 60 cycles to the horizontal input and the output of an audio signal generator to the vertical input. Most 'scopes have a 6-volt 60-cycle binding post on their panel, which can be used for this source, by connecting to the horizontal input; Fig. 6.

Lissajou figures may be considered as an indirect representation of a-c wave forms. By using the local sawtooth oscillator, which is usually connected internally and controlled by means of the coarse and fine frequency controls, a direct representation of a-c forms in more familiar pattern may be obtained.

Here, again, the 'scope controls will be responsible for the patterns obtained. This point is graphically demonstrated in Figs. 7, 8 and 9. In Fig. 7, a high frequency a-c waveform has been correlated with the positioning of the fine and coarse-frequency controls, so that three peaks are displayed. An examination of the picture shows

[1]*See article on How the Scope Works in January,* 1948, SERVICE, *for basic scope-operation data.*



Figs. 1, 2, 3 and 4 (top to bottom). Fig. 1 illustrates a Lissajou figure of two a-c waves, identical in frequency, applied simultaneously to both horizontal and vertical inputs. In Fig. 2, we have a Lissajou figure of a 2:1 frequency ratio. Figs. 3 and 4 illustrate patterns with frequency ratios of 3:1 and 4:1.

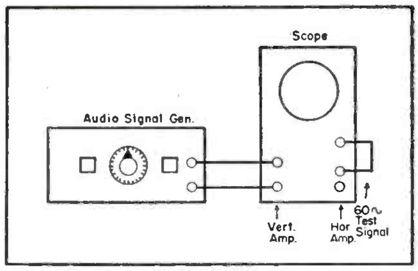


Fig. 6. Applying 60 cycles to the horizontal input and the output of an audio signal generator to the vertical input to study 'scope patterns.

fine waveform in conventional display; frequency is 5,000 cycles.

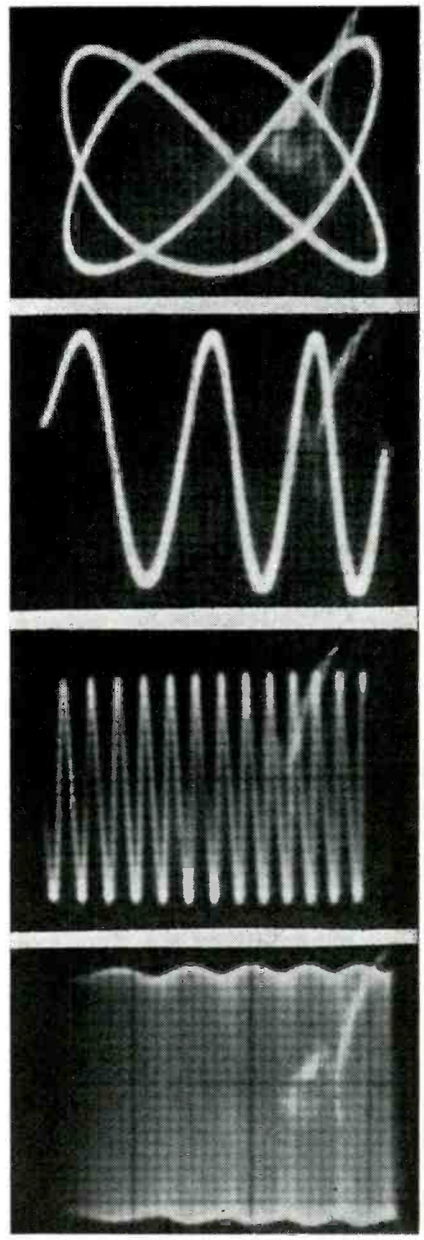
Fig. 8 is another picture of the same wave, but the frequency of the local sawtooth oscillator has been reduced, by means of the frequency controls, so that many more peaks appear. The wave detail has been reduced, and the result is a series of closely spaced sine waves.

Fig. 9 shows the same wave at a much lower setting of the frequency control. Now, the high-frequency wave appears as a solid wall. However, it will be noted that there is a ripple on both the top and bottom of the signal. This ripple effect betrays the presence of some secondary a-c voltage in the signal. By noting the coarse-frequency control setting, an approximation of the frequency of this secondary voltage may be determined. In this case it happens to be 60-cycle hum. It will be noted that there is a resemblance between this picture and the conventional representation of a modulated signal. It can be seen then that two audio frequencies may act the same as a modulated signal.

Fig. 10 shows an aggravated form of Fig. 9. Here, the hum potential has been increased, so that the modulating effect of hum is more evident.

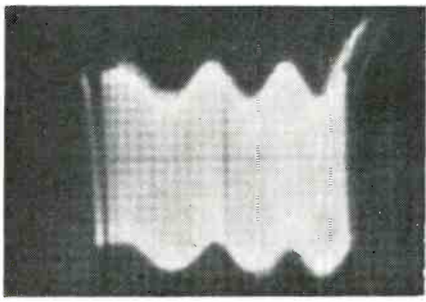
Whereas Figs. 9 and 10 show the intermodulation of two widely separated audio frequencies, Fig. 11 shows what happens when the two frequencies are more closely associated. This pattern is an extreme representation of a fundamental sine wave and its second harmonic. Fig. 12 shows what has actually happened. It is important that the voltage relationship be kept in

(*Continued on page* 43)



Figs. 5, 7, 8 and 9 (top to bottom). Fig. 5 shows a complicated voltage ratio of 3: 2. In Fig. 7 we see three peaks that result from a correlation of a high frequency a-c waveform by positioning of the fine and coarse frequency controls. In Fig. 8 appears another picture of the same wave (Fig. 7), but the frequency of the local sawtooth oscillator has been reduced by means of frequency controls so that many more peaks appear. In Fig. 9 we see the same wave but at a much lower setting of the frequency control.

Figs. 10 and 11 (left and right). In Fig. 10 appears an aggravated form of Fig. 9, with a hum potential increased so that the modulating effect of hum is more evident. Fig. 11 shows what happens when the two frequencies are more closely associated.



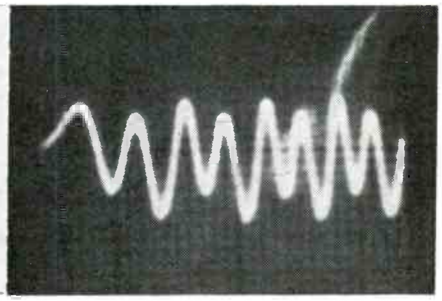
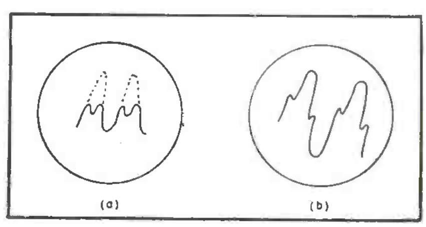


Fig. 12. In Figs. 9 and 10 we have the intermodulation of two widely separated audio frequencies and in Fig. 11 is shown what happens when the two frequencies are more closely associated. Patterns in this figure illustrate what has actually happened in these three instances.



Conversion Efficiency Of Loudspeakers

Obtaining Maximum Intensity of Sound With Minimum Power Input. Sound Pressure Value Chart Shows Power Required Per Speaker, Distribution Angle And Proper Size Amplifier Required

by E. M. EDWARDS

THE ABILITY to make an efficient sound survey and then submit an estimate with the assurance that it will be competitive, is limited almost wholly by the Sound Man's technical background and experience. The most common obstacle to the successful planning of any p-a installation is the problem of providing satisfactory sound in different types and sizes of industrial areas where considerable variations in noise level exist. Not only must great care be exercised in the selection of the proper speakers for optimum voice or music distribution or both, but of equal importance, the number of speakers necessary and the determination of the amount of audio power required to drive each speaker at the desired level. The solution of the latter automatically provides the answer to the sound installations chief pitfall — the economic choice of loud-speakers and amplifier.

Trumpet[aa]	Driver Unit[aa]	Dispersion Angle	Watts Input to Voice Coil	Sound Pressure in db* Distance from Loudspeaker 10′	20′	40′	80′	160′
Reflex[1]	25 Watts[a]	90°	1 Watt	103	97	91	85	79
Reflex[2]	25 Watts[b]	90°	1 Watt	100	94	88	82	76
Reflex[3]	25 Watts[b]	90°	1 Watt	100	94	88	82	76
Reflex[4]	25 Watts[b]	80°	1 Watt	100	94	88	82	76
Reflex[5]	12 Watts[c]	75°	1 Watt	96	90	84	78	72
Radial Reflex[6]	25 Watts[a]	360°	1 Watt	93	87	81	75	69
Radial Reflex[7]	25 Watts[b]	360°	1 Watt	90	84	78	72	66
Radial Reflex[8]	12 Watts[c]	360°	1 Watt	86	80	74	68	62
Radial Reflex[8a]	25 Watts[b]	360°	1 Watt	90	84	78	72	66
Paging/Talk Back[9]	Built-In	90°	1 Watt	95	89	83	77	71
Radial Communication/ Talk Back[10]	Built-In	360°	1 Watt	85	79	73	67	61
Paging/Talk Back[11]	Built-In	120°	1 Watt	87	81	75	69	63
Paging/Talk Back[12]	Built-In	90°	1 Watt	97	91	85	79	73
Radial Communication/ Talk Back[13]	Built-In	360°	1 Watt	87	81	75	69	63
Submergence Type Unit[14]	Built-In	360°	1 Watt	84	78	72	66	60
Submergence Type Unit[15]	Built-In	150°	1 Watt	91	85	79	73	67
Submergence Type Unit[16]	Built-In	120°	1 Watt	91	85	79	73	67

aa, bbUniversity

1Type GH with 6½′ air column and 85 cycle low-frequency cutoff; type LH with 4½′ air column and 120-cycle low frequency cutoff.

2Type GH.

3Type LH.

4Type PH with 3½′ air column and 150-cycle low-frequency cutoff.

5Type SMH with 2½′ air column and 200-cycle low-frequency cutoff.

6Type RLH with 5′ air column and 120-cycle low-frequency cutoff.

7Types RLH and RPH, RPH having a 4′ air column and 150-cycle low-frequency cutoff.

8Type RSH with 3′ air column and 180-cycle low-frequency cutoff.

8aSame as *8*.

9Type IB-8; 12 watts, 300 to 6,000 cycles.

10Type IBR; 12 watts, 300 to 6,000 cycles.

11Type MIL; 3 watts, 400 to 9,000 cycles.

12Type CR; 18 watts, 250 to 6,000 cycles.

13Type RCR; 18 watts, 250 to 6,000 cycles.

14Type MSR; 15 watts, 250 to 6,000 cycles.

15Type MM-2; 15 watts, 300 to 6,000 cycles.

16Type MM-2TC; 15 watts, 300 to 6,000 cycles.

aType PAH, 80 to 6,000 cycles.

bType SAH, 90 to 10,000 cycles.

cType MAH, 100 to 6,000 cycles.

*Measured with G-R sound level meter 759B (0 db, 10^{-16} watts per sq. cm. (.0002 dyne)).

Note I: To increase the sound pressure 3 db, double the input power. To increase it 6 db, quadruple the input power.

Note II: Doubling the distance *from* the loudspeaker will result in a drop of 6 db. Reducing the distance *to* the loudspeaker 50%, will result in an *increase* of 6 db.

Table 1. Sound pressure values measured on mouth axis.

Available data which treats sound coverage in terms of number of watts input required for so many cubic or square feet of area for a given industry, in many instances disregards the efficiency of the loudspeaker in its calculations. Since the ultimate purpose of a sound system is to provide *sound* at a predetermined level, merely specifying watts input per speaker without taking into consideration the *conversion efficiency* of the particular speaker is quite misleading.

The conversion efficiency of a loudspeaker is the ratio of the useful acoustical output to the electrical power input. Constantly improving techniques in the design of unit-driven reflex projectors have reflected themselves in conversion efficiencies of the order of 40 to 50% as compared with 2 to 10% of the conventional cone speaker. The difference in input power requirements for a given sound output thus becomes very apparent.

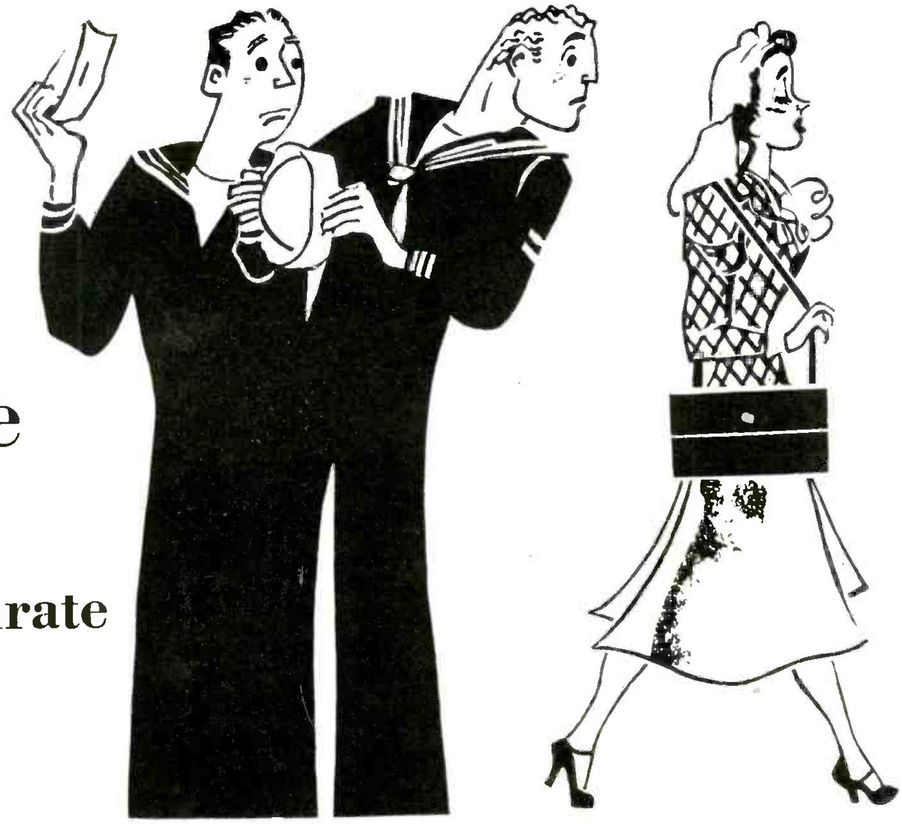
Since large-scale reproduction of sound has become commonplace, efficiency becomes an all-important consideration. High-power audio frequency amplifiers are costly and it becomes logical to reduce the amplifier output to a minimum by the use of high efficiency speakers. The price differential between a 35-watt amplifier, which may represent the maximum actually required for a well planned system and a 100-watt amplifier determined from haphazard data, automatically reflects itself in the final price quotation and can readily spell the difference between a successful transaction and the loss of a sale.

In table I appear data disclosing the sound levels available from an as-

(*Continued on page* 42)

Uniform Resistance

Mallory carbon controls are accurate in overall resistance value



You will find no variation in the resistance values of Mallory carbon controls. Frequent, critical inspections reject the imperfect, and pass only those carbon elements of the resistance values specified on the labels.

Recently dozens of controls from leading manufacturers were tested competitively for overall resistance value. Mallory controls averaged within 2% of specified resistance, the closest tolerance of any group in the test.

Every carbon element that goes into Mallory controls is individually inspected to be sure that its resistance value is the same as specified on the labels.

In volume controls you look for uniform resistance, accurate tapers, silent operation and long life. Mallory gives you all four, and more, too. The Mallory trade mark is your assurance that the volume control, vibrator or capacitor you buy is the finest that can be made.

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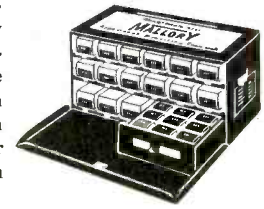

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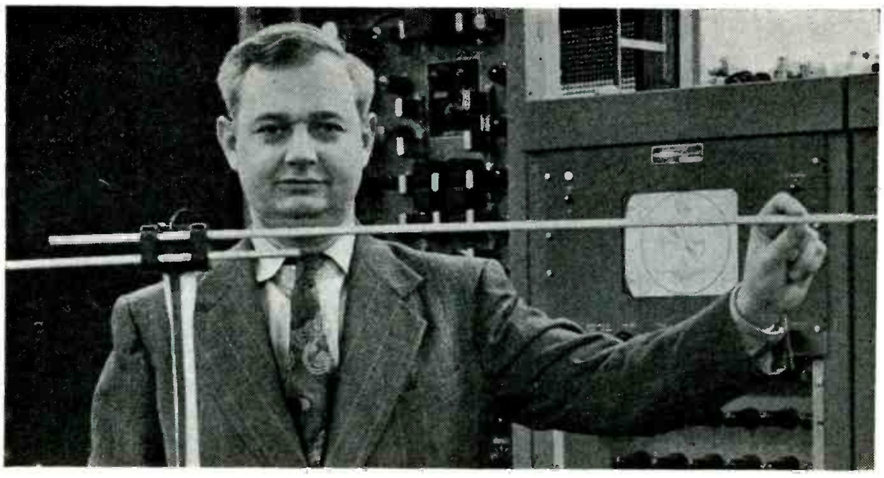

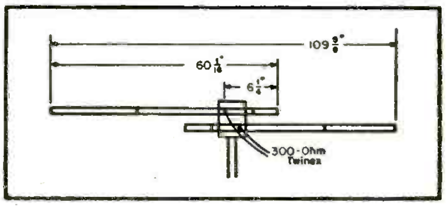

Fig. 2. Converting an f-m dipole for tv use on channels *1* to *6*. The ¼" tubing is telescoped inside of the original elements.

Fig. 3. Don H. Kresge of Bendix Radio with a converted f-m antenna.

Servicing Helps

F-M/TV Dipole Antenna Length Chart . . . Converting F-M Dipole For TV Use . . . Installing Crystal Filter in Hallicrafters S-40

by P. M. RANDOLPH

SERVICE MEN are often confronted with the problem of determining lengths of antennas to be used for television and f-m, particularly, where it is possible to operate on indoor systems. The plot of Fig. 1 will come in quite handy for this purpose. It provides the lengths of antennas for the thirteen channels from 54 to 216 mc,* and includes the f-m and tv bands.

The chart was plotted for straight dipole antenna types which, by the way, can be made of twin conductor material such as twinex,[1] which is available in 300-ohm, 150-ohm and 75-ohm impedances.

As a check on the accuracy of the length of the antenna provided by the plot, the following formula can be used:

$$L = \tfrac{1}{2} \text{ wavelength}$$

$$L_{feet} = \frac{492 \times .94 \text{ (end effect)}}{\text{frequency (mc)}}$$

$$L_{inches} = \frac{5{,}549.76}{F_R \text{ (mc)}}$$

To achieve comparatively broadband coverage with these antennas, the lengths should be cut for the mid-frequencies of the desired bands, closer to the preferred station. Incidentally, the lengths can be made 4" or 5" longer and snipped off during testing.

In placing the indoor antennas, it is necessary to spot them carefully in the room since the height, length and width of the room controls the operating efficiency of the antenna.

Warning

Indoor tv antennas will only work satisfactorily where a substantial signal exists and there are few surrounding interfering elements. While the indoor antennas will work in some locations effectively, the outdoor antennas will always provide best results.

F-M Dipole Conversion

Outdoor f-m antennas of the dipole type[2] can be converted to provide pickup for low tv bands, one to six.

The method of conversion is shown in Fig. 2. Two long pieces of tubing (¼ x 30") are inserted in the ends of the f-m antenna elements to form two new elements, each measuring 60 1/16" long. These new pieces of tubing may be made to press fit snugly inside of the original f-m dipole elements by slightly flattening the ends of these original elements.

The total length of this antenna will be 109⅝". Completely new elements may be used; .375" OD, .049" wall.

Installing Crystal Filter I-F In S40

MANY SERVICE MEN have inquired about the installation of a crystal filter unit in professional type receivers, such as the Hallicrafters S40. The conversion may be made by changing the first i-f stage, shown in Fig. 4, to a crystal filter unit as shown in Fig. 5. The unit can be installed temporarily via a 5-prong socket or permanently.

The permanent installation requires a selectivity control (a 250,000 ohm pot) with a s-p-d-t switch for cutting the crystal filter nework in and out of the circuit.

Two additional controls for selectivity and phasing, will have to be installed on the front panel.

A crystal i-f transformer will also be needed. If such a transformer is not

---

[1]Amphenol, Federal, etc.
[2]Bendix ADIFOO.
*Channel 2, 54-60 mc; 3, 60-66 mc; 4, 66-72 mc; 5, 76-82 mc; 6, 82-88 mc; 7, 174-180 mc; 8, 180-186 mc; 9, 186-192 mc; 10, 192-198 mc; 11, 198-204 mc; 12, 204-210 mc; 13, 210-216 mc.
**Television f-m antenna-length plot prepared by David A. Miller.
***Television conversion data prepared by D. H. Kresge, Manager, Radio and Television Service, Bendix Radio.

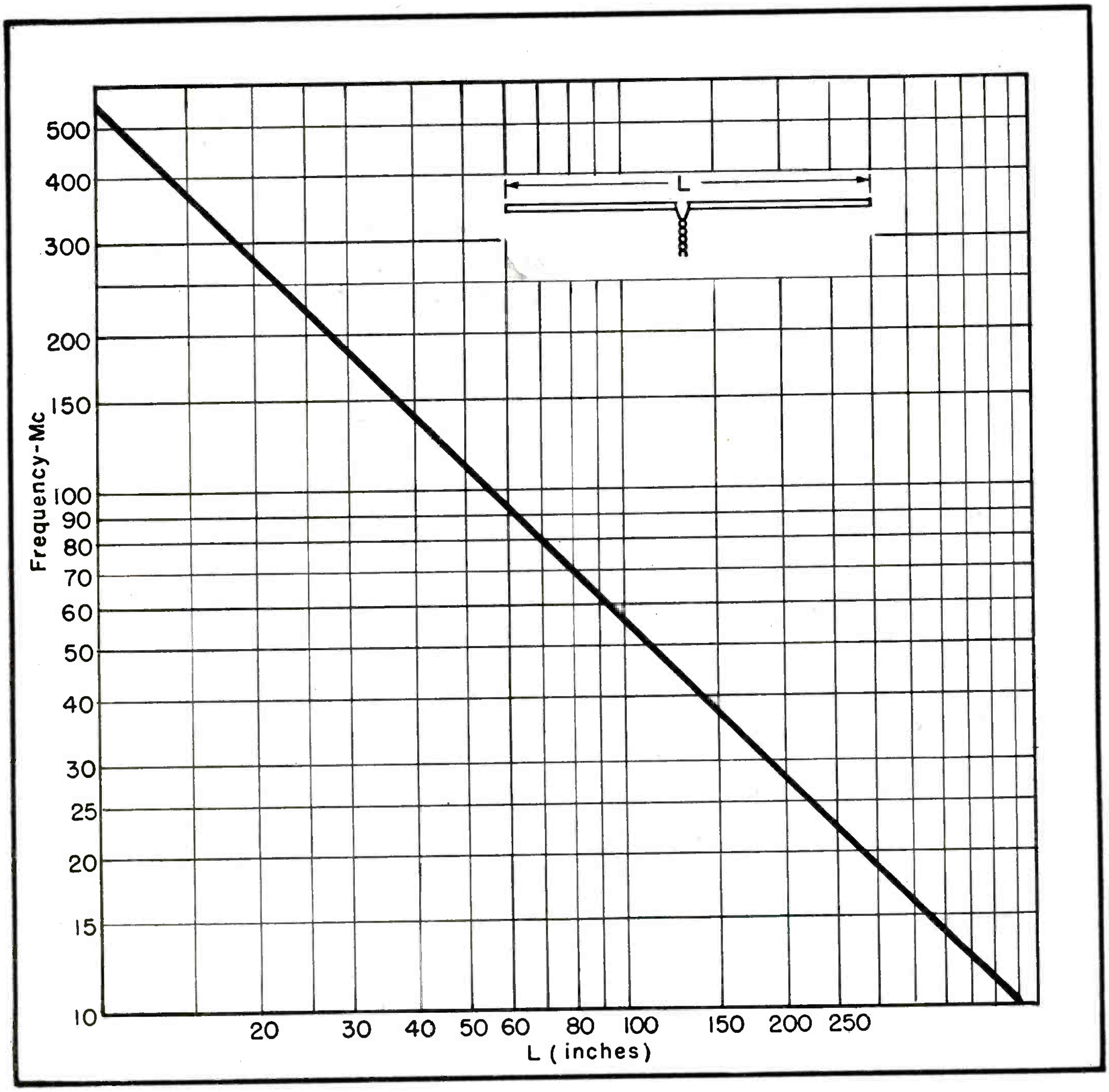

Fig. 1. Plot providing lengths of antennas to be used for television and f-m on all 13 channels.

readily available, a standard iron core type i-f transformer may be converted to the purpose. It is only necessary to remove the shunt capacitor from the secondary, and tighten the coupling between primary and secondary. Since less inductance is required on the secondary than in conventional transformers, the iron core should be adjusted until most satisfactory operation is obtained.

The tuned circuit in the grid return of the first i-f is a tuned circuit resonant at the i-f frequency. This may be constructed from the secondary of

(*Continued on page 47*)

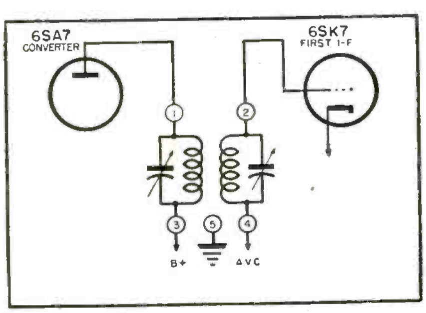

Fig. 4 (left). The first i-f coupling circuit in the Hallicrafters S40.

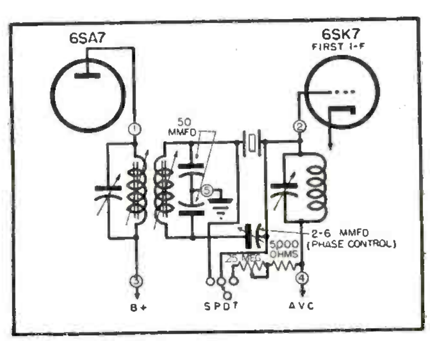

Fig. 5. Circuit of Fig. 4 converted to a crystal filter system. Points *1* to *5* refer to socket contacts if a removable type of filter is planned. A limiting resistor of 5,000 ohms is used in series with the selectivity control to prevent shorting of the first i-f grid circuit.

ASSOCIATIONS

ARSNY

The first bulletin of the Associated Radio Servicemen of New York, Inc., was released recently. Edited by Kurt J. Goldbeck, the bulletin covers the report of the grievance committee, the recently inaugurated disabled veterans' project and other association news. The grievance committee report stated that only twenty complaints had been received after the committee's offer to handle customer complaints had been published. And seventeen of these complaints were settled immediately. As a result of this excellent record, many of the broadcast commentators who had been critical of Service Men activity in New York revised their opinion and went on the air praising the Service Men and urging the Service Men to join the ARSNY.

An unusual disabled veterans project is being studied by ARSNY. The plan suggests that Service Men who have inoperative or unsaleable receivers should donate them to the association for repair and transfer to the veterans' hospitals. Volunteers from the association will devote time and services to make the necessary repairs. Hal Sheffel, who produces a program on WMCA entitled "Something Should Be Done About It," has been supporting this interesting project during his broadcasts. WMCA is carrying spot announcements, publicizing the veterans plan, too.

Offices of the Associated Radio Servicemen of New York, Inc., are now at 545 Fifth Avenue, New York 17.

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LVRSA

Gordon Jacoby, corresponding secretary of the Lehigh Valley Radio Service Association, Allentown, Penna., has notified us that their 15th Annual Banquet and Electronics Exhibit will be held on March 29th at the Elks Club in Phillipsburg, N. J.

During a recent meeting, the executive committee of the association was instructed to study the proposal to join the Federation of Radio Servicemen's Association of Pennsylvania.

•

RTG

James L. Shepley, secretary of the Radio Technicians' Guild, Whaling City Chapter, New Bedford, Mass., has reported that a new set of bylaws have been prepared for the association.

Standish L. Smith of the New England Telephone and Telegraph Co. addressed a recent meeting of the RTG on audio response. Mr. Smith, who was a communications officer during the recent war, analyzed such factors as flat response, binaural effects, cabinet resonance and audio degeneration. The boys were told how audio degeneration can be used to overcome distortion in the amplifier. Mr. Smith also described the use of high and low-pass filters for boosting

(*Continued on page* 47)

TEN YEARS AGO

From the Associations News page of SERVICE, March, 1938

Twenty-four local chapters had joined the RSA. . . . The first issue of RSA house organ had been mailed. Featured were circuit diagrams of Zenith receivers. . . . The chief engineer of KDAL, addressed the Duluth chapter of RSA, discussing broadcasting and the Service Man. John T. Springer, Ed Nys and Gary Kasberg were in charge of another meeting during the month held at a night club. . . . Don Stover and S. A. Frank were chosen as nominees for District Ten of the Freeport Chapter of the RSA. A. G. Mohaupt presented an interesting lecture on the 'scope during one of the meetings. . . . The Flint Chapter celebrated its first year of affiliation with the RSA with a dinner and dance. At an election meeting, W. Stiles was elected president, H. Wilke, vice president, James Pugh, secretary, and W. Mudge, treasurer. . . . John Rose was nominated for the office of director from District Nineteen of the Binghamton Chapter of RSA. Walter Jones of Sylvania spoke to the boys at a meeting at Ithaca, N. Y. . . . The Jackson Electrical Instrument Co. sponsored a talk on test equipment before the Chicago Chapter of RSA. During a previous meeting, eleven manufacturers of test equipment participated in an instrument show. . . . The metropolitan New York Chapter of RSA prepared a series of technical meetings under the supervision of Ed Mandeville. George Duvall was chairman of the chapter, Selig Rosengarten, secretary, and J. J. Gonoud, treasurer. . . . A cooperative advertising campaign was planned by the Manchester Chapter of RSA. The chapter also adopted a new constitution. . . . RCA sponsored a technical session for the Davenport Chapter, which was held in the People's Power Building, Moline, Illinois. Klauss Electric Company donated door prizes. . . . Horace Perry, member of the Boston Chapter of RSA, presented a talk on the use of test equipment. Plans were announced for a cooperative advertising campaign to promote the betterment of servicing conditions in the Boston area. . . . B. Burlingame talked to over 100 members of the Newark RSA Chapter. . . . RCA and Philco arranged for technical sessions before the Newark chapter. . . . D. C. Shaw, branch manager for United Motors Service Company, talked before a group of the Buffalo chapter on "What Follows Saturation." At another meeting Mr. Gerhardt of Philco discussed the subject of "Servicing Ten Million Philcos." . . . George Becker of the Multi-Arc Labs. addressed the Radio Service Association of California, analyzing vacuum tube manufacturing problems. At another meeting Charles F. White of the University of California told the boys about "Distortion in Diode Detection Circuits." He also presented some interesting facts on the "new infinite impedance detector."

Stagger-Tuned Video I-F Systems Using 6AG5, 6AU6, 6BA6, 6AK5, 6BJ6 And 6BH6 Miniatures . . . Corona Control On 5TP4 Projection Tube.

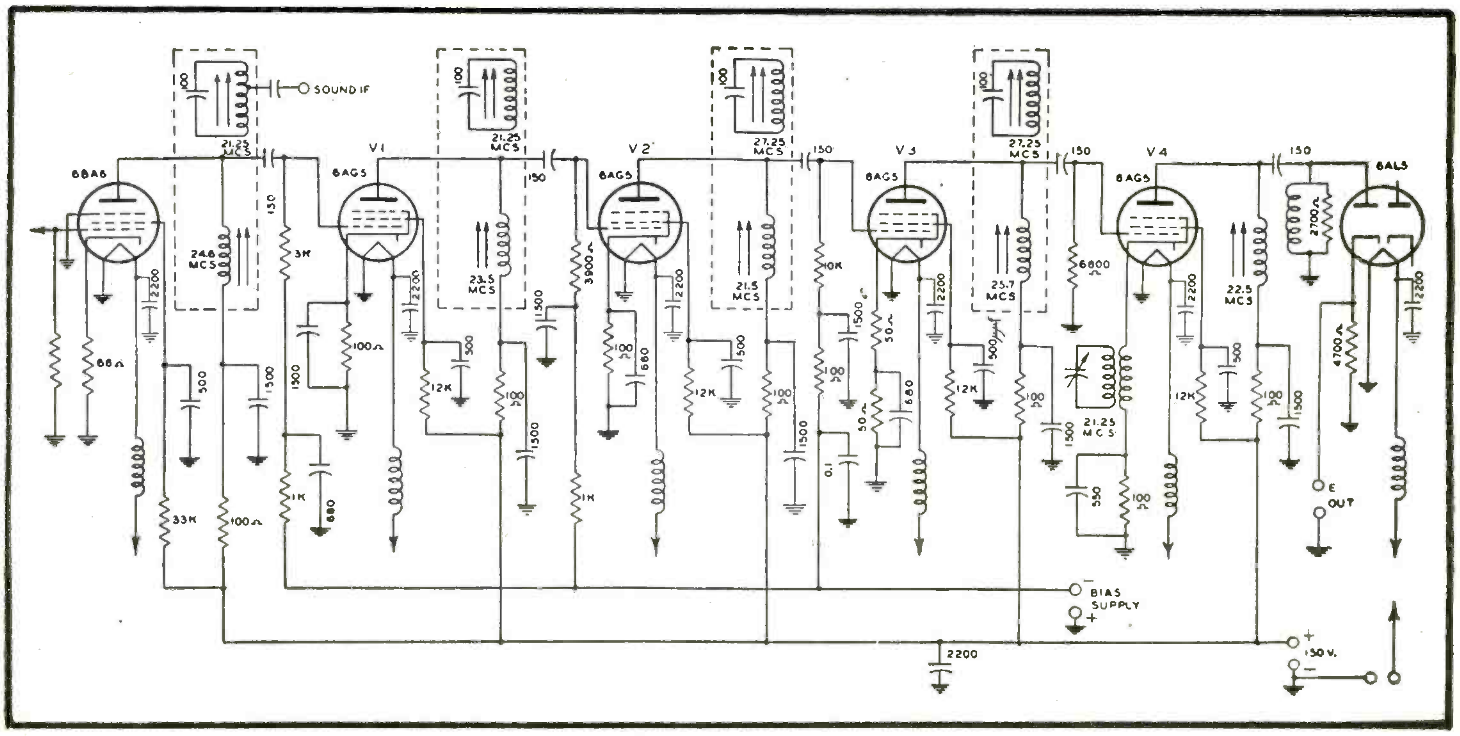
by L. E. STEWART

In many tv receivers stagger-tuned wide-band intermediate-frequency systems utilizing miniature tubes are employed. The 6AG5, 6AU6, 6BA6, 6AK5, 6BJ6, and 6BH6 miniatures are used, in the main.

Some receivers use the 6AK5s in place of the 6AG5s because they have slightly lower grid-to-plate and input capacitances and provide slightly higher gain. The 6AK5, however, has a more complicated construction and, consequently, is more expensive to manufacture. The gain of the 6AG5, compared to that of the 6AU6 or the 6BA6, and its lower cost compared to that of the 6AK5 justify a preference for its use in most tv receivers. The 6AU6 is used where high average stage gain at reduced bandwith is desired.

Types 6BJ6 and 6BH6, designed to operate with a heater current of 150

Fig. 1. Schematic of a 4-stage stagger-tuned video i-f amplifier, using 6AG5s. The chokes in this circuit have 14 turns of No. *20* enamelled wire, wound on ¼" diameter form 1½" long.



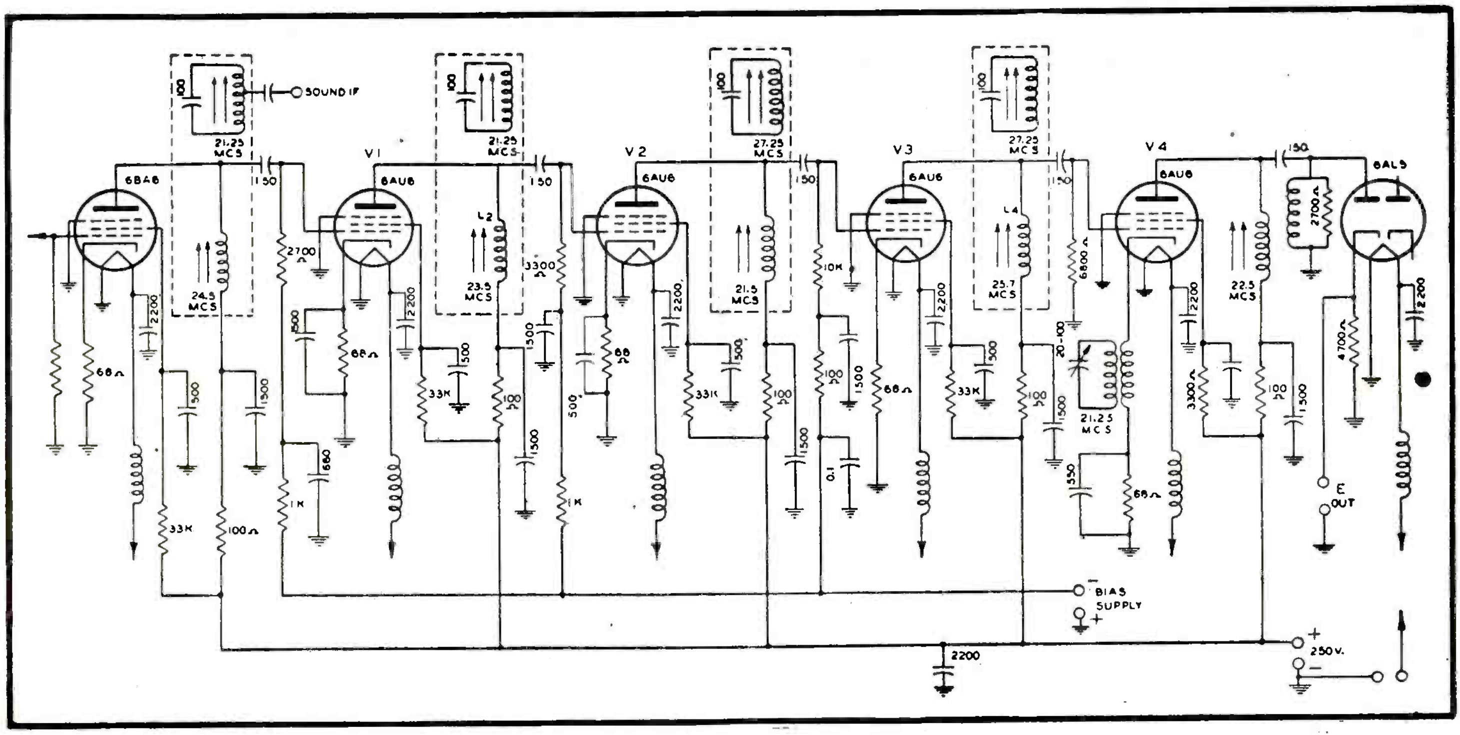


Fig. 2. Schematic of another 4-stage stagger-tuned video i-f amplifier using, however, 6AU6s. Values of coils and chokes identical to those in the circuit of Fig. 1.

ma, are recent additions to the miniature line for use where low heater current is a requisite. The gain of the 6BH6 is approximately equal to that of the 6AU6 and the gain of the 6BJ6 is approximately equal to that of the 6BA6.

In Fig. 1 appears a circuit diagram for a video i-f system using a 6AG5 complement, and in Fig. 2 we have a circuit diagram for a system using a 6AU6 complement. Each system includes the plate circuit of a converter stage and a 6AL5 video detector. Each stage is tuned by adjusting its inductance for resonance with the tube and circuit capacitances. Because tube capacitances vary from type to type, the system requires retuning to obtain the same band-pass characteristic for all tube complements.

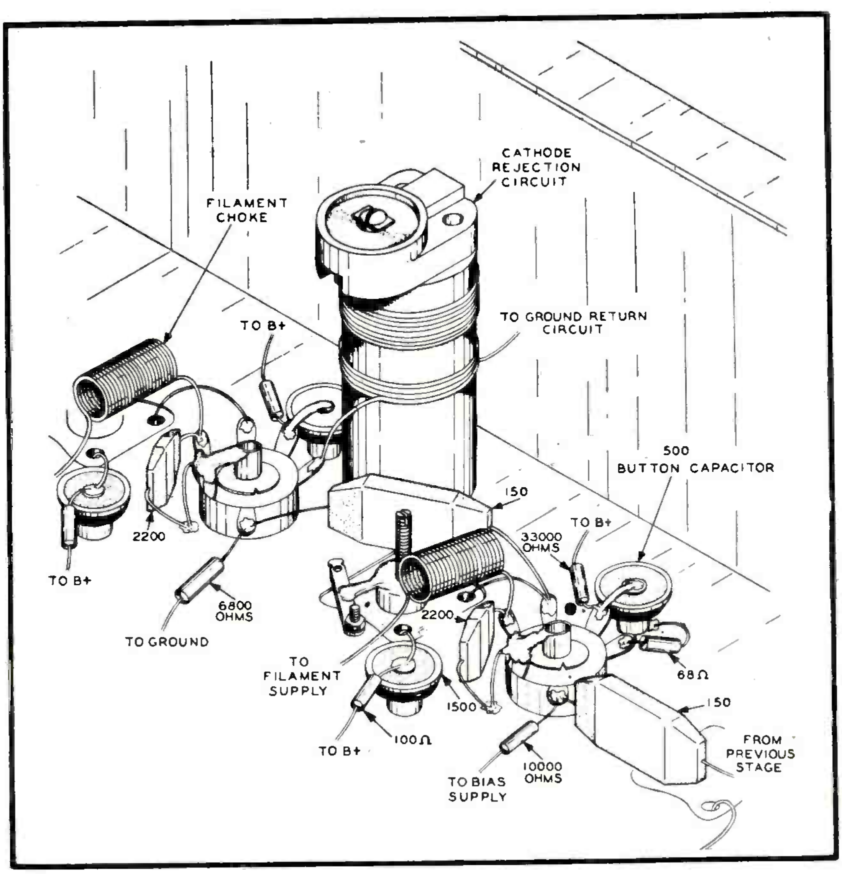
Gain and Band-Pass

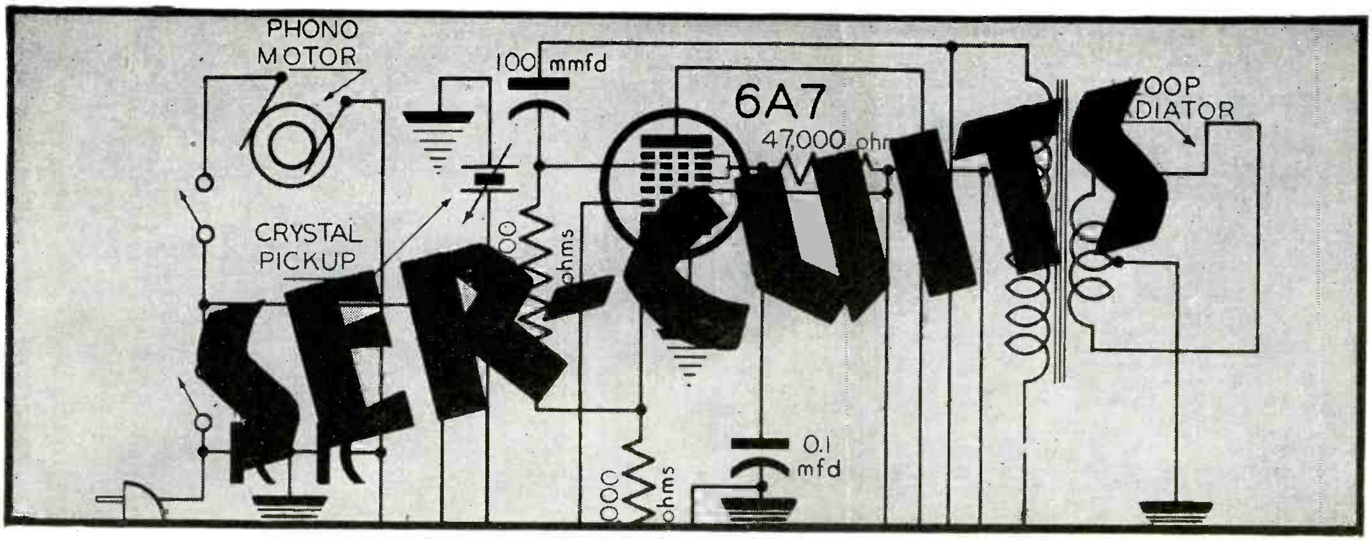
A tabulation of average gain-per-stage values for each four-tube complement is shown in Table 1 (page 44).

Construction of multistage video i-f amplifiers requires careful technique in design and wiring to minimize regeneration and interstage coupling. The use of miniature tubes is helpful because they permit a very compact construction. In Fig. 3 appears a typical mechanical arrangement of i-f amplifier components. To obtain maximum results, these layouts must be followed faithfully. Any component removed for repair, replacement or

(*Continued on page* 44)

Fig. 3. Mechanical arrangement and placement of components in a video i-f amplifier stage.





Analysis of TV Receivers Using Electrostatic-Deflection Picture Tubes and Magnetic-Deflection Projection-Type Picture Tubes; Motorla VT71, Belmont 21A21 And G. E. 901 and 910

Many circuit innovations have been incorporated in the new tv receivers.

In Fig. 1 appears an interesting example of this advanced type of design. Here we have the Motorola VT71, featuring an electrostatic picture tube, the horizontal scanning being at 15,750 cps and the vertical scanning at 60 cps. The receiver, a 14-tube direct-viewing model, features an automatic brightness stabilizer and automatic gain control. The picture i-f carrier frequency on channels *1* to *6* is 26.4 mc and on channels *7* to *13*, 22.5 mc. The sound i-f carrier frequency on channels *1* to *6* is 21.9 mc and on channels *7* to *13*, 27 mc. Audio discriminator bandwith is 250 kc between peaks.

The r-f unit consists of a 6AG5 r-f amplifier and a 7F8 dual triode, one section of which is the r-f oscillator and the other the converter. Switching is accomplished by means of a three-wafer eight-position station-selector switch, providing complete coverage of the thirteen channels. Iron core coils, mounted to the switch wafers provide the correct impedance match of the antenna input to the 6AG5 r-f amplifier and also provide channel selectivity. Since the input impedance of the r-f amplifier decreases inversely as the square of the frequency, this impedance becomes comparatively low for channels *7* to 13. The *Q* of the circuit is *6* and the bandwith is *25* mc. Since the bandwidth is great, there is no need for tuning here. The coils in the input circuit of the 6AG5 are tuned at the video carrier of its channel, while the coils in the output circuit of the 6AG5 are tuned at the audio carrier of the channel for the lower channel only. This provides a flat-topped input response of the proper bandwith.

The i-f amplifier is a bit different from the conventional coupled system. Wide-band results are obtained with three stages of i-f. The converter plate uses a tuned transformer and each successive i-f amplifier utilizes one tuned circuit each. The transformer and following plate coils are tuned to different frequencies to obtain adequate gain and bandwidth. The i-f coils are tuned as a group for a bandpass curve. The converter transformer is an overcoupled bandpass transformer, also covering the same bandwidth. To keep the i-f bandwidth constant for all settings of the gain (contrast) control, the input capacity of the controlled tubes must be maintained relatively constant. This is done by using unbypassed cathode resistors. Connecting these control tubes in series from B– to B++ provides a simple means of preventing the disturbing of the load distribution between the two busses.

A contrast control varies the bias of the 6AG5 first and second i-f amplifiers. This is done by connecting the two tubes in series between B++ and B–, providing current flow through both tubes as a group, returning the grid of the second i-f amplifier to B+ or a fixed voltage. As the grid voltage of the first i-f amplifier becomes more negative, the cathode potential of the second i-f amplifier rises proportionately, effective causing the grid of this tube to become more negative. Thus, the contrast control controls manually the output of these amplifier tubes and consequently, the output of the video amplifier.

The detector is a half-wave rectifier, using a germanium crystal (1N34), which also acts as converter providing the difference frequency between the video i-f and the audio i-f (it produces a 4.5 mc f-m audio signal).

A pair of 230-microhenry coils and a 15-mmfd capacitor are used as a low-pass filter in the crystal circuit to filter out i-f harmonics. This unit is completely shielded to prevent regeneration. A .1-mfd capacitor and 1-megohm resistor in the input grid circuit of the video amplifier tube, 6AU6, provide a small biasing voltage for the video amplifier and prevent contact potential of the video amplifier from biasing off the crystal and causing a loss of sensitivity on weak signals.

In the video amplifier, the 6AU6 also acts as a noise limiter. The output of the second detector is in a negative direction and noise peaks drive the 6AU6 beyond cutoff, thus being clipped. The video output is taken through a filter network consisting of a 350-microhenry coils and 39,000-

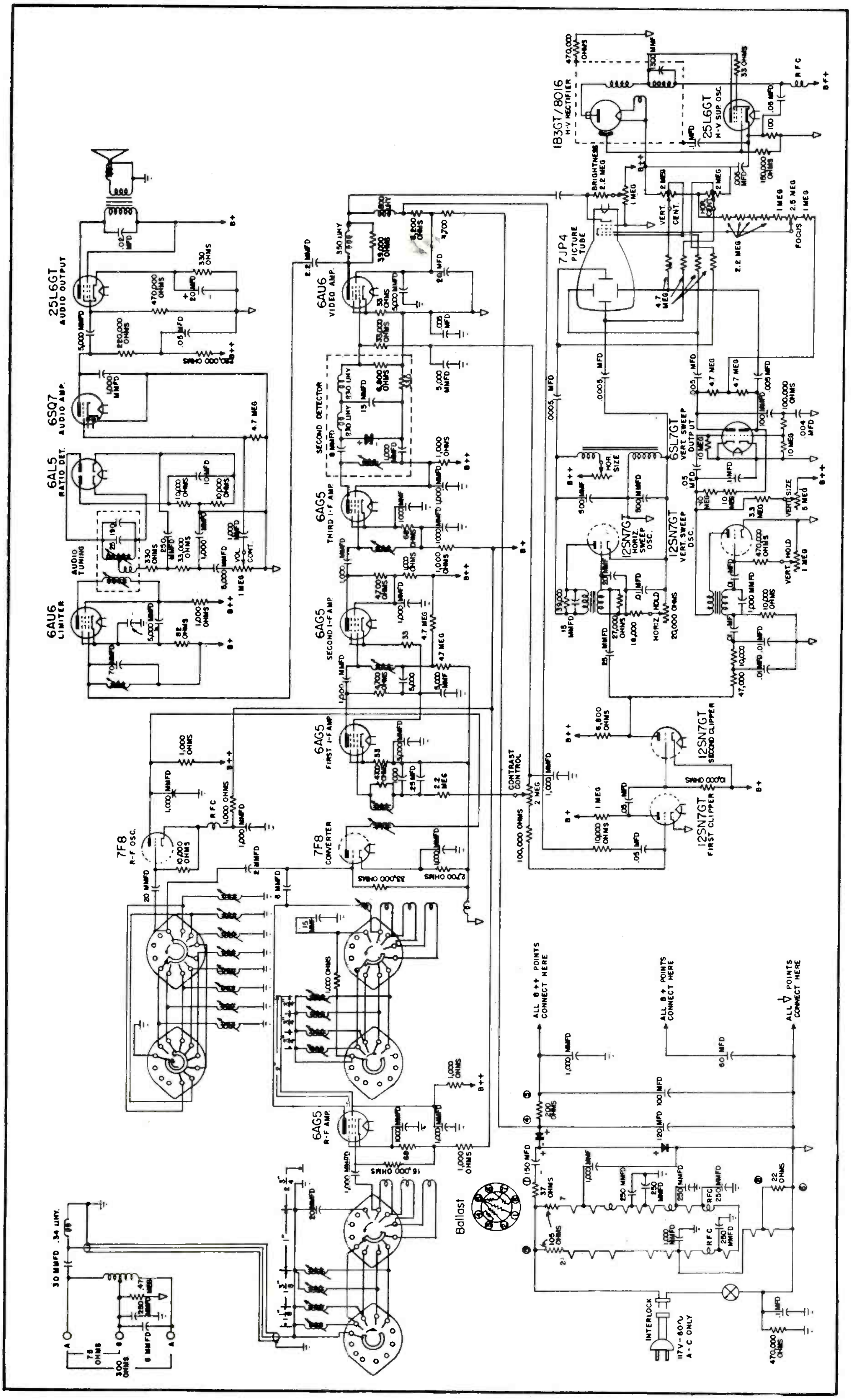


Fig. 1. Motorola VT71 using a 7" electrostatic-deflection picture tube.

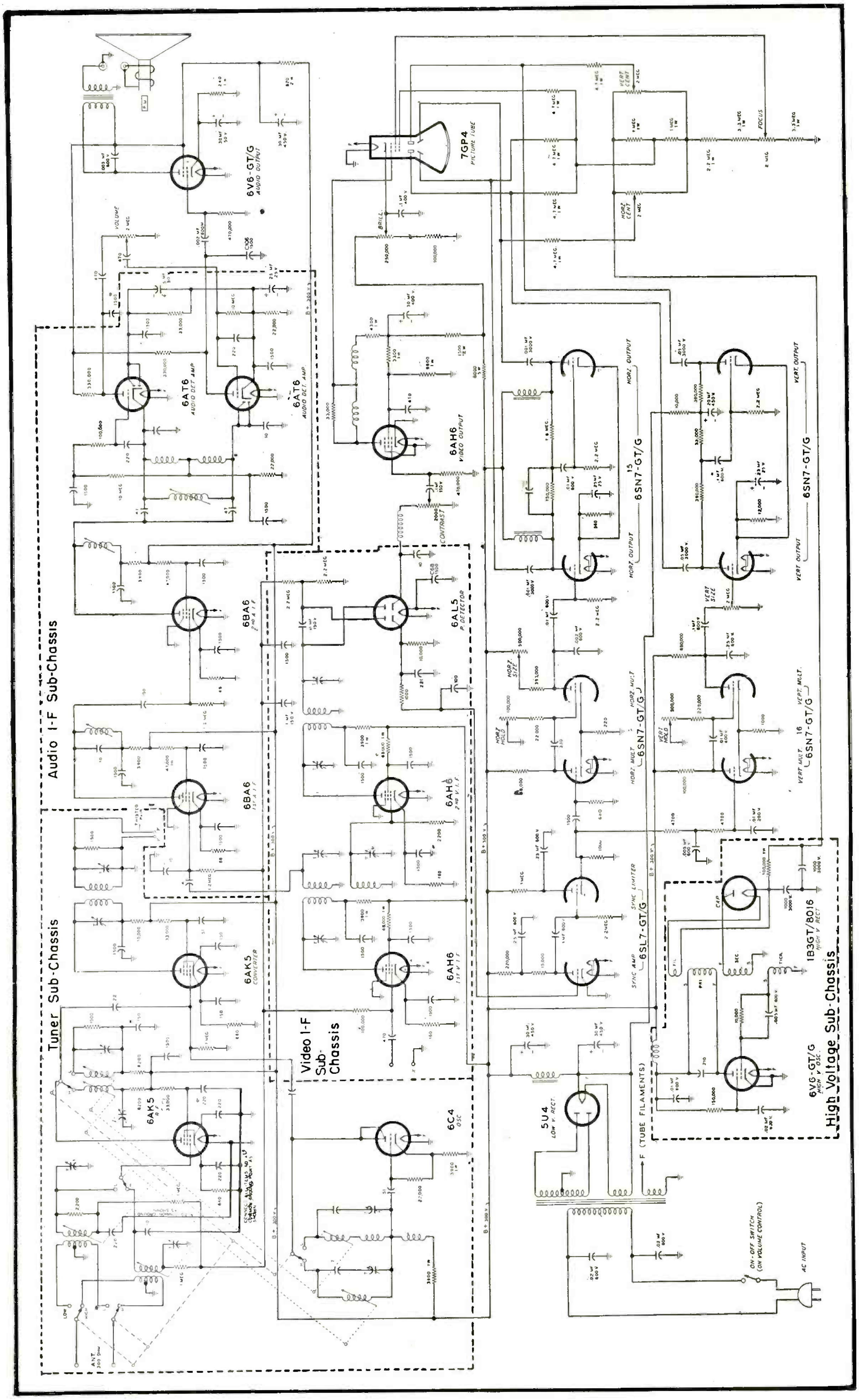


Fig. 2. Belmont 21A21 early model television receiver using a 7GP4 electrostatic-deflection tube.

ohm resistor, and fed to the cathode of the picture tube; feeding the cathode is equivalent to feeding the grid due to the high picture-tube plate resistance. It is necessary to feed the picture tube this way, because the output of the video amplifier is positive. This filter tends to provide uniform gain of the stage at the higher frequencies.

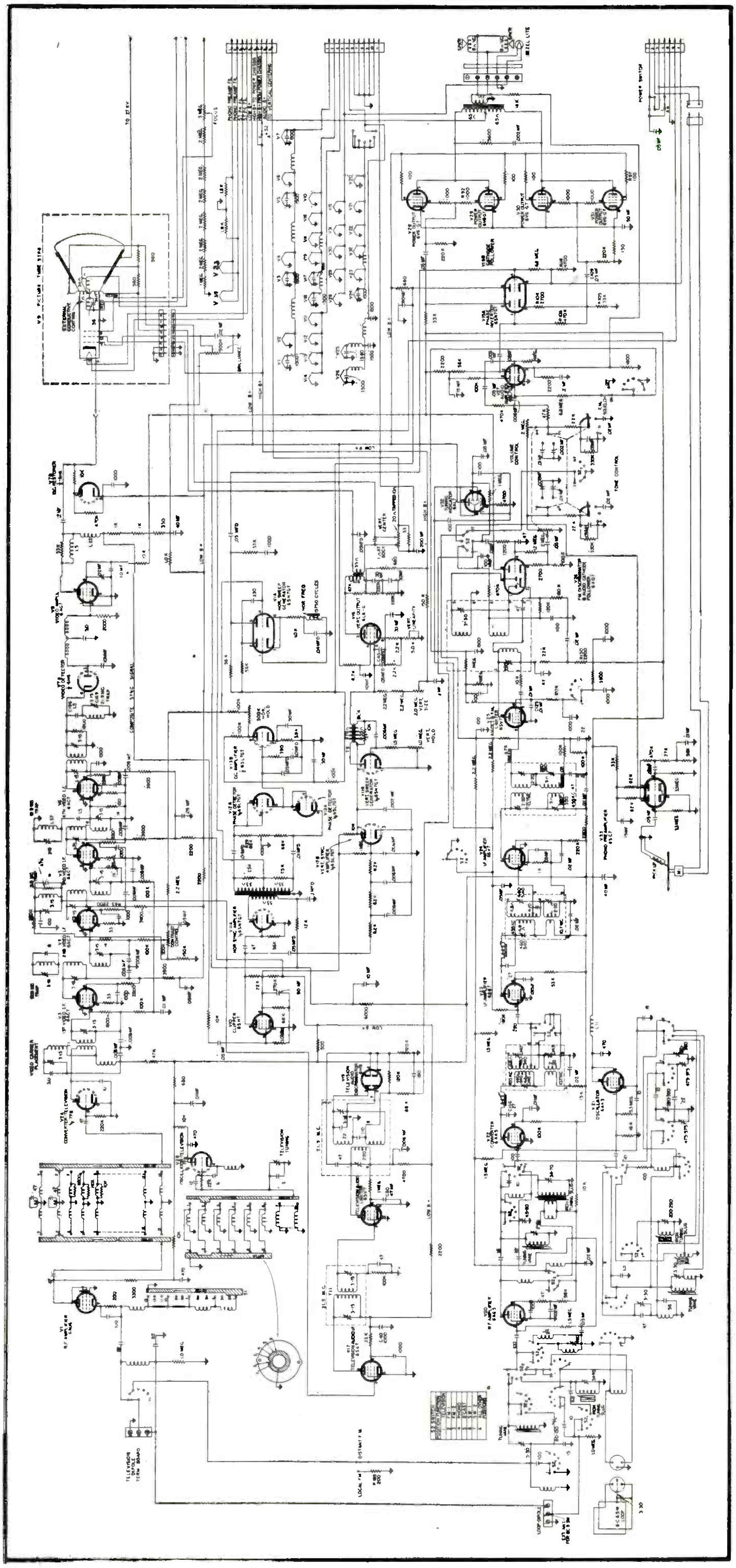
The a-c brightness stabilization system in this Motorola model is quite unique. Self-bias is developed on the picture tube by the beam current flowing through an 8.2-megohm resistor. The total picture tube cathode current develops a bias voltage across this resistor which automatically sets the correct picture tube bias for line voltage and high voltage variations. The bias is also independent of picture contrast. The video signal is coupled capacitively to the cathode of the picture tube through a .05-mfd capacitor. Thus, the instantaneous average potential developed on the tube varies about the average value of the picture signal.

The second audio i-f frequency (4.5 mc) is obtained from the second detector which acts as a converter for the video (26.4 mc) and audio (21.9 mc) i-f frequencies. This signal is amplified by the video amplifier and removed from the video plate through 2-mmfd and 70-mmfd capacitors and an adjustable iron-core input grid coil, which acts as a bandpass filter. The variable coil is used to peak the filter to 4.5 mc. A 5,000-mmfd capacitor shunted across a 220,000-ohm resistor provide grid leak bias for the limiting amplifier tube, a 6AU6. This tube also provides amplification of the 4.5-mc audio i-f.

Clippers

The triode sections of a 12SN7 are used as a first and second clipper in this Motorola receiver. These circuits serve to separate the horizontal and vertical synchronizing pulses from the video signal, applying them to the horizontal and vertical sweep oscillators. The purpose of the synchronizing pulses is to properly trigger the oscillators at the correct moment and keep the receiver scanning in synchronism with the transmitter. The initial sync separation takes place in this clipper section. The video signal is taken from the output of the video amplifier and fed through a 10,000-ohm resistor and .05-mfd capacitor to the grid of the first clipper. With no sig-

(*Continued on page* 36)



nal applied, the tube has zero bias. With the signal applied the positive polarity sync pulse voltage causes the grid to become positive and draw grid current. This charges the .05-mfd coupling capacitor negatively causing a steady bias voltage to develop across a 100,000-ohm resistor, which is connected to the *agc* circuit and the contrast control, which has a value of 2 megohms. The biasing voltage developed in this manner prevents plate current from flowing except on the positive synchronizing pulses. An amplified current, controlled by these pulses, develops in turn, sync pulses across a pair of load resistors, which have a value of 470,000 ohms and 6,800 ohms. This output is then applied to the grid of another triode section of the 12SN7 where clipping of the outward peaks is accomplished, resulting in double clipping for better syncing of the picture, even under adverse signal conditions. The second clipper grid resistor, the 6,800-ohm unit, is of a low value so as to maintain wide-band response of the sync pulses at this point. Zero bias is used so that the pulses always go negative beyond cutoff for clipping the irregular envelope and noise peaks.

The high voltage power supply is also quite unusual employing a separate high-voltage oscillator, 25L6GT, connected as a triode, which generates a frequency of approximately 140 kc. The r-f plate voltage is stepped up to a peak voltage of over slightly 6,000 through an auto transformer. The primary is roughly tuned to the natural frequency of the high-*Q* secondary. The 6,000 peak volts appearing on the secondary coil are applied to the plate of the high-voltage rectifier tube, 1B3GT/8016. Current drain is approximately 350 microamperes. Due to peak rectification, the d-c output of the rectifier remains close to peak plate voltage. A .005-mfd capacitor maintains the plate voltage substantially constant for low-frequency load variations. Feedback to the oscillator grid is obtained by a capacitive coupling device consisting of a coil spring mounted around the rectifier tube envelope.

In the voltage divider network, two 2-megohm potentiometers provide beam centering adjustment while an additional 2.5-megohm potentiometer is employed for focusing. The second anode voltage for the picture tube is taken from the common center taps of the centering controls.

The low-voltage power supply provides filament and plate voltage for all

Fig. 3. GE 901 and 910 tv receiver using a magnetic-deflection projection-type picture tube, the 5TP4.

of the circuits, except the high-voltage system. The filament string is a series-parallel circuit arranged to serve the .3-ampere tubes and the .6 ampere required for the picture tube. Filament of the ratio detector and audio amplifier (6S8GT) is placed in series with the picture-tube filament next to B– to reduce the audio hum. Since it is a .3-ampere tube it was necessary to place a 22-ohm resistor in parallel with the filament of the 6S8GT.

Plate supply is a voltage-doubler system using selenium rectifiers.

Belmont 21A21

In Fig. 2 appears another electrostatic-deflection tube tv model, one of the earlier types, using a 7GP4 picture tube. In this model, a 6AK5 is used in the r-f amplifier, with a higher-than-normal bias to reduce the input loading on the high-band coils. A 2,200-ohm resistor is used to damp the low-band coil.

The gain of the r-f amplifier is controlled by an avc voltage developed by the video-detector current.

The antenna is transformer coupled to the input of the r-f amplifier and is connected to a balanced coupling coil to provide a substantially constant input impedance of 300 ohms to the antenna throughout each band.

Inductance of the coils is varied by means of slugs. On the high band, the shunt capacitance (the inter-electrode capacitance of the tube) is large with respect to the coil. To increase the size of the coil and maintain the same effective reactance, a trimmer is connected in series with the coil.

The converter also uses a 6AK5 biased by cathode bias (680-ohm resistor shunted by a 150-mmfd capacitor). The oscillator voltage appearing on the grid causes rectification and charges the grid resistor and capacitor combination, a 1-megohm unit and a 4-mmfd capacitor.

The output of the r-f amplifier is coupled to the converter through a single tuned plate load 6-mc wide. The converter grid is coupled to the oscillator by the 4-mmfd capacitor.

The converter i-f transformer is double-tuned to a center frequency of 25.25 mc and over-coupled to provide a bandwidth of 3.5 mc.

In the oscillator we have a 6C4 connected as a modified Colpitts using the cathode-to-grid and cathode-to-plate inter-electrode capacities to maintain oscillation. The oscillator is tuned 26.5 mc above the picture carrier.

In the video assembly are the first and second i-f amplifier and picture-

(*Continued on page* 52)

Tips On Soldering*

Types of Solder and Flux to Use . . . Preparing Iron . . . Applying Flux . . . Pretinning Aluminum Surfaces . . . Applying Heat and Solder Properly . . . Retinning Surfaces . . . Rules for Caring of Iron

by R. W. KISE

Industrial Heating Division
General Electric Company

WHILE SOLDERING is a relatively simple procedure, there are some rules which should be followed if the soldering is to be successful and the joint soldered a sound one. These rules are simple.

What Is Soldering?

Soldering is the joining together of two metallic materials by means of a third material, solder. This bond is made possible by raising the temperature of the materials to be joined to the melting point of the solder. In joining these materials, the solder goes through four stages: It melts, wets and flows, is drawn into the joint by capillary attraction, and it cools and solidifies.

Equipment

Soldering Iron: The wattage of the soldering iron required for a given job depends on the material to be soldered, speed of soldering required, type of solder used and the relative efficiency of the iron selected. For instance, a copper part of a given size and weight will require more heat to be soldered than a comparable steel part because it conducts heat much faster. The best method of choosing the proper irons in the case of high speed continuous soldering is by test on the work to be soldered.

Solder: Solder is composed of tin and lead in various percentages. The solders most commonly used are 40-60, 50-50, and 60-40, the first percentage figure indicating the tin content.

The 40-60 and 50-50 solders are good general purpose solders, while the 60-40 solder is best on high speed continuous soldering and, because it is free-flowing at lower temperatures, is best for the amateur.

Flux: The purpose of a flux is to remove oxide films that are always present, and to prevent further oxidation during the heating of the joint. Flux is no substitute for proper preliminary cleaning where grease, paint, dirt, rust, or heavy oxides are present. Proper selection of the flux depends upon the material to be soldered; see Table 1.

Rosin flux is non-corrosive and should be used when soldering electrical connections and where corrosive residue cannot be removed by cleaning. Rosin should also be used when soldering near insulation or on pretinned surfaces.

In all other cases where the joint can be thoroughly cleaned of corrosive residue after soldering, acid or active flux can be used. This particular flux should be kept away from insulated wire or similar materials, however, since the insulating properties would be destroyed by the acid or acid fumes.

Flux is available (*a*) incorporated as a core, or in grooves, in wire solder, called flux core solder, or (*b*) in the form of paste, liquid, or powder for separate application.

Mechanical Strength

Solder should not be depended on alone for strength, whenever it is possible to support the joint by mechanical means. For example, it is often

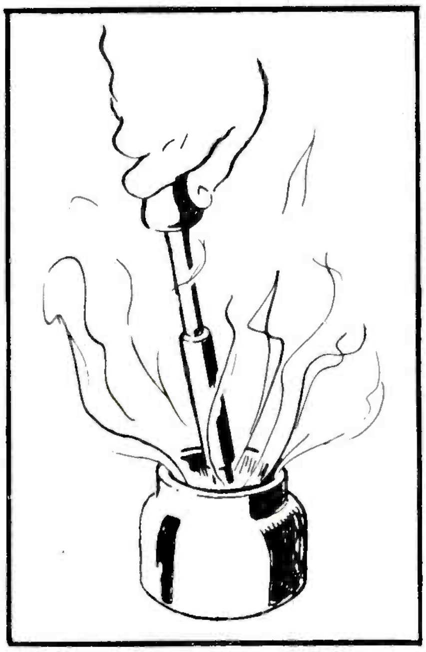
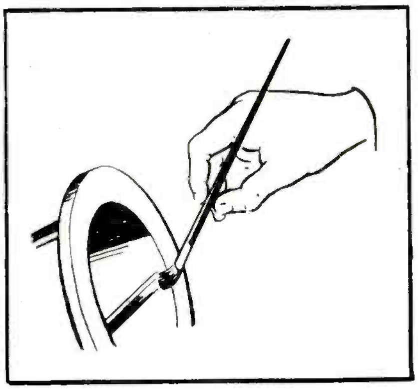


Fig. 3. Flux should never be added to the tip of the iron but to the part to be soldered.

Fig. 4. Applying separate liquid or paste flux with a paddle or brush.



Figs. 1*a* and *b* (top) and 2*a* and *b* (bottom). How to add strength to soldered joint by securing it to a terminal is illustrated in 1*a* and *b*. In 2*a* and *b* are shown methods of joining wire to gain support in a soldered joint.

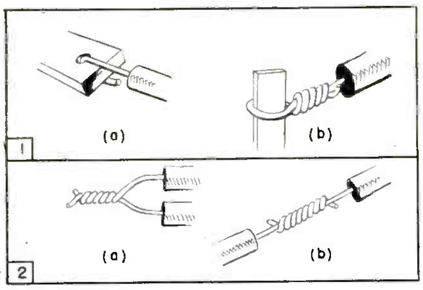
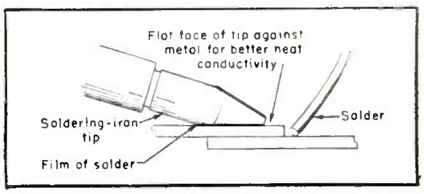


Fig. 5. Applying iron to joint to secure maximum heat on surface to be soldered.



Base Material or Applied Finish	Rosin Flux	Aniline-phosphate Flux	Zinc-chloride Flux
Hot tin dip	Yes	Yes	Yes
Hot solder dip	Yes	Yes	Yes
Electro tin 0.0005"	Yes	Yes	Yes
Electro tin 0.0002"	1	Yes	Yes
Silver plate	2	Yes	Yes
Cadmium plate	3	3	Yes
Nickel plate	No	Fair	Yes
Galvanized steel	No	No	6
Copper	4	Yes	Yes
Brass	4	Yes	Yes
Phosphor-bronze	4	Yes	Yes
Beryllium-copper	No	Fair	Yes
Aluminum-bronze	No	No	5
Silicon-bronze	No	Yes	Yes
Zinc and zinc plate	No	No	6
Monel	No	Fair	Yes
Nichrome	No	No	Yes
Steel	No	No	Yes
Stainless steel	No	No	7

1. Parts finished with 0.0002 in. electro-tin plate should be soldered within a short time. Otherwise, difficulty may be encountered. This thin coating can be preserved if treated in hot palm oil or its equivalent.
2. Electro-silver-plated parts are readily soldered with rosin if the plated parts are soldered within a reasonable length of time after plating. Parts carried in stock over long periods may corrode or tarnish sufficiently to prevent rosin flux from being effective.
3. Cadmium plate over brass, bronze, or copper solders well with rosin-aniline or zinc-chloride fluxes. Cadmium plate over steel is not readily soldered with rosin flux. However, if the steel is given a pre-plate of copper before cadmium plating, then rosin is a very effective flux.
4. Copper-brass, and phosphor-bronze can be soldered with rosin flux if they are mechanically or chemically cleaned prior to soldering. If these alloys have tarnished slightly, rosin flux will not produce good soldering. Chemically cleaned copper, brass, and phosphor-bronze can be protected and preserved with a "water-dip" lacquer coating, which does not impair subsequent soldering.
5. Aluminum-bronze is not readily soldered unless it has been specially cleaned. Kolene cleaning salts are effective.
6. A zinc-chloride flux containing free hydrochloric acid should be used on zinc, zinc-plated parts, or galvanized steel.
7. Stainless steel can be soldered with zinc chloride if it is chemically cleaned, but there are proprietary stainless-steel fluxes, formulated for stainless steel, which are more active than common zinc chloride.

Table 1. Fluxes which can be used on different base materials or finishes.

possible to add mechanical strength to the work by securing it to the terminal with a few turns of the wire; Figs. 1*a* and 1*b*. In joining wire, the wire should be twisted together for greater strength; Figs. 2*a* and 2*b*. Where facilities are available, spot welding is recommended as a means of obtaining mechanical strength on such items as

(*Continued on page* 53)

*From an article which appeared in *Mill and Factory*.

TV Installation Methods

(*Continued from page* 19)

antenna must be high and in the clear. Incidentally, it has been found that in city areas the signals often seem to be in layers and an increase in signal strength is often encountered when antenna is lowered. This condition is attributed to a shift in the vertical angle directivity of the antenna as its wavelength above a ground is changed.

In city areas and noisy locations the best antenna position can only be found by searching for it. This is particularly the case when optimum performance is desired on a number of stations. To assist in this task it is wise to set up a phone link between roof and test receiver at tentative receiver location in the house. The antenna is shifted to various positions and performance checked as to signal strength, noise and reflections. When an optimum point is found, antenna is securely clamped in that position.

The antenna installation should be neat, present as little an eyesore as possible, and must be made without damage to customer's property.

Receiver Installation

The actual antenna installation and orientation, made with the assistance of a test receiver, permits a thorough check of antenna performance. While the actual antenna installation is being made the customer's receiver is possibly under test at the shop on its eight-hour continuous run. If any component in the receiver is on the borderline it is likely to go out on this sustained run. In addition the receiver can be tuned, if necessary, and adjusted for peak performance before it reaches the customer's house.

A shop-tested receiver, carefully conveyed to the consumer's home will provide peak performance as soon as receiver is turned on.

Receiver Positioning and Customer Instructions

The customer's cooperation must be obtained in choosing a position for the receiver. The receiver should be positioned at some point which does not require shifting of furniture whenever the set is to be used. It is preferable to have the equipment away from intense lighting at night and away from bright sunlight for daytime viewing.

Operating procedure should be explained carefully. This is extremely important for a thorough understanding of tuning will provide optimum results for the set owner and free the Service Man from unnecessary call-backs for minor adjustments. The Service Man should observe and guide the customer as he goes through tuning procedures. Concise written instructions can be prepared and left with customer to augment verbal instructions.

Effectiveness of Plan

The foregoing procedures present a direct approach to tv installation. They do not require any increase in man-hours and most definitely cut down return calls and installation uncertainties.

The customer's house is not used for receiver assembly and there is no collection of debris to be carted away. Actually, at the instant the customer's receiver is turned on he will see a clean picture, which is likely to remain so for a considerable period of time.

TV Interference

(*Continued from page* 21)

far as possible from the tv set in the neighboring apartment or home.

Serious Problem

This is a serious problem and requires immediate attention by industry. Mr. and Mrs. Public will become mighty disillusioned when they find that their tv receivers will prompt complaints from their neighbors because of the interference generated by their tv receiver. When regular tv shows are transmitted for the daytime audience and the tv receiver in an apartment house begins interfering with a-m reception, and the Service Man reports that the *beeps* in the a-m set are being caused by "tv receiver interference from the woman on the third floor," quite a bit of explaining will be required. When apartment houses are equipped with amplified a-m master antenna systems, the higher level a-m signals fed into the receivers may mask the level of the sweep-circuit interference.

General Problems

Some of the recently-released low priced tv receivers have compromised their circuits so much that the following defects can be expected.

(*A*) — Poor image rejection response which shows up badly when the tv receiver is connected to a master antenna system where the f-m signals are at a high amplified level. A bypass filter at the tv receiver antenna input terminals does much to eliminate this interference.

(*B*) — Unregulated power supplies that throw hold circuits out of adjustment. This condition arises where the line voltage may vary 5 volts or more with the load of receivers, tv sets and electrical apparatus. A regulator[3] on the main line supply to the tv receiver will keep the voltage steady. Most shops were never wired to anticipate the load of simultaneous operation of many tv receivers in addition to other equipment.

These new problems supplement the interference signals from prewar diathermy x-ray, ultra-violet and neurosurgical equipment which flagrantly violates the FCC regulations (over a dozen Eastern companies lease prewar diathermy equipment).

[3]Sola type.

Speaker Conversion Efficiency

(*Continued from page 24*)

sortment of trumpets[1] using different driver units and the sound levels of oudspeakers with built-in driver units. Particular attention should be paid to the subscript notes, since they are the key to the relationship of power input, sound level and area of distribution. Knowing the dispersion angle of a given speaker and the distance it is to cover, it becomes relatively simple to determine the approximate area of the arc of sound distribution for any predetermined sound level.

The average noise levels existing in typical industrial plants are shown in table II. Numerous measurements were made in a number of similar industrial establishments with the same sound level measuring instrument employed in obtaining the sound levels in table I and the results averaged. Voice and signals were then transmitted over an amplified system at a volume level sufficient to assure consistent performance. Another series of measurements were made and the results again averaged. From these tests it was determined that a loudspeaker level approximately *10 db* higher than the ambient noise level was necessary to satisfactorily override the existing noise. Similar measurements were then made with program material which included incidental music. A loudspeaker level approximately 16-*db* higher than the noise level was found to be satisfactory. Correlating the information in tables I and II, it became possible to approximate the amount of power required for a given speaker to deliver a predetermined sound level at a given distance.

In Fig. 1 appears an illustration of conversion efficiency obtainable in a typical installation. The sound distribution area served by a specific type of loudspeaker must take into con-

[1]University.

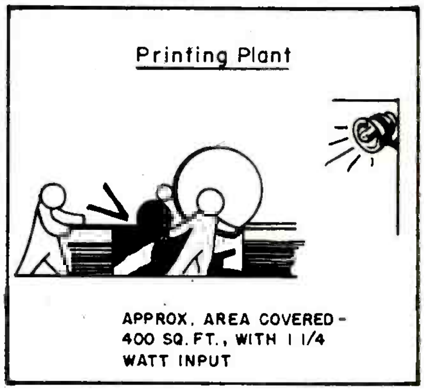


Fig. 1. Conversion efficiency obtainable in a typical installation, using a 12-watt paging and talkback-type speaker. In a machine shop, a reflex loudspeaker trumpet with a 25-watt unit can cover 1,500 square feet with a 5-watt input. A 3-watt paging and talkback speaker can be used in a department store to provide 1,600 square feet coverage with 1-watt input.

Industry	*DB Level*
Boiler Factory	105
Riveting	95
Factory (*Noisy*)	90
Machine Shop (*Average*)	85
Screw Machine	85
Punch Press	80
Printing Press	80
Restaurant (*Noisy*)	80
Factory (*Average*)	75
Assembly Plant	70
Shipping and Receiving	70
Stenographic Room	65
Department Store	65
Restaurant (*Average*)	60
Stockroom	60
Garage	55
Office (*Average*)	50
Storage Warehouse	50
Quiet Office	40

Table II. Noise levels for typical industries.

sideration the ambient noise level of the particular industry. Of course, consideration must be given to the likelihood of increased noise due to future changes in physical layout, addition of factory machinery, etc. Obstructions and presence of sound absorbing material will also materially affect sound distribution. Sufficient reserve power must be incorporated in the amplifier to provide for any such emergency.

Units of Area

Although the foregoing technique is universally applicable, no installation is a law unto itself and slight variations may be called for under certain conditions. The sole criteria of a successful system is *ease of hearing* and this can only be accomplished by providing an even and adequate sound level. Working in terms of *units of area* rather than the *over-all area* will accomplish this aim.

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'Scope Patterns

(*Continued from page* 23)

mind. What the 'scope is showing is the voltage sum of two sine waves.

Both waves have started off by increasing in amplitude. However, the harmonic has started to reverse its polarity after following the path of the slower fundamental half way. Thus, we have two voltages, one rising, the other falling. When the fundamental reached its peak, the harmonic was reaching its peak but in the opposite direction. The result was a dip where we should have had a peak. Fig. 12*a* shows the two voltages in phase. In Fig. 12*b*, the phase has shifted and the dip appears along the sine curve of the fundamental.

System Used

All of the foregoing patterns were created artificially with a setup shown in Fig. 13. It is suggested that the 'scope user set up the same layout and experiment with various combinations of frequency, using 60 cycles as the base. For example, 3rd, 4th and 5th harmonics may be created, as well as other intermodulation effects. In this manner, complex waveforms may be recognized and analyzed where encountered.

Tube News

(*Continued from page* 31)

study, must be put back in its original position.

The grid-No. 2 (screen) bypass capacitors used in the Fig. 3 amplifier are of the ceramic button type and are mounted as close as possible to the tube base pins. Heater chokes are employed to prevent undesirable coupling between stages. The untuned type of choke which serves to decouple each stage from the common supply impedance is generally satisfactory. In extreme cases, however, it may be necessary to use tuned parallel circuits resonating at the i-f frequency in place of the chokes. Resistance-capacitance filters are included in each plate circuit to prevent coupling through the common B+ line. Although the amplifier will work satisfactorily with certain of these decoupling circuits omitted, such practice is not recommended because the arrangement of the leads become more critical.

It is important to use mechanical arrangements which afford short leads so that wiring capacitances may be kept to a minimum value. The control-grid and plate circuit leads must not be dressed against the chassis but should be spaced away from it so as to minimize capacitance to ground.

A typical i-f transformer used in these amplifiers is shown in Fig. 4. They are usually shielded, although satisfactory results may be obtained without the use of individual shields because no two circuits are tuned to the same frequency. Removing the shields, however, may seriously affect the ease of circuit adjustment because regeneration may occur before the circuits are properly aligned.

Rejection traps of the absorption type are somewhat critical with respect to coupling and, therefore, ad-

Type Employed in Four-Tube Complements	*Over-all Gain*[1]	*Effective Average Stage Gain*
6AK5	10,000	10.0
6AG5	6,500	9.0
6AU6	3,000	7.5
6BA6	1,280	6.0
6BJ6	Not measured	. . .
6BH6	Not measured	. . .

Table 1. Average gain-per-stage values for 4-tube setups shown in Figs. 1 and 2, and similar systems.

[1]Over-all video i-f gain was, in this instance, considered as the amount of d-c voltage developed by the video detector per a-c (rms) volt applied to the grid of the first i-f stage. Over-all gain data were obtained by applying a 23.5-mc signal to the control grid of the first i-f stage. Mixer gain, therefore, was not included as part of the video i-f gain. The band-pass characteristics of the system were obtained by placing a 6BA6 in the mixer position and applying the i-f signal to its control grid.

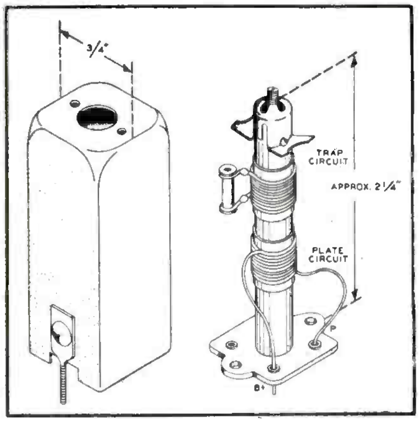

Fig. 4. Mechanical details of the i-f transformer used in stagger-tuned systems.

justment of the spacing between the coils may be required. The traps reflect a low impedance at their parallel-resonant frequency, thereby providing attenuation. At a slightly lower frequency, the traps introduce a high impedance effecting a slight rise in the response curve. The cathode rejection traps are tuned to attenuate this response. The coil in the cathode circuit of the fourth i-f stage must be in series resonance with the stray cathode-to-ground capacitance at a frequency approximately equal to the resonant frequency of the adjustable iron-core plate coil of this tube. If the coil and capacitance are not in resonance, a loss in stage gain will result because of the degenerative effect of the inductive reactance in the cathode circuit.

Alignment Procedure

In aligning the i-f system, a fixed-frequency signal generator is used and a theoretical alignment frequency is applied to the grid of each stage starting at the last i-f stage and working back to the converter grid. A low-capacitance high-frequency voltmeter is connected to the plate circuit of the stage being aligned and the tuned circuit adjusted for maximum output. After each circuit has been tuned to the theoretical alignment frequency, a sweep generator may be used to check the over-all response. Only slight additional adjustment of the i-f coils should be needed to provide proper response.

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5TP4[a] TV Tube Corona Control

A HIGH-VOLTAGE SYSTEM may be subject to corona, especially when the humidity is high, unless suitable precautions are taken. Corona, which is an electrical discharge appearing on the surface of a conductor when the voltage gradient exceeds a certain value, causes deterioration of organic insulating materials, induces arc-over at points and sharp edges, and forms ozone, a gas which is deleterious to many insulating materials. Sharp points or other irregularities on any part of the high-voltage system may increase the possibility of corona and should be avoided. Thus smooth, rounded contours and surfaces are must factors here.

To avoid the possibility of corona developing between the bulb and the metal support ring, a band of conductive coating in contact with the second-anode contact button is applied to the 5TP4 around the rim of the bulb. With properly designed metal support rings, no corona will occur between the bulb and support. If the support is made of an insulating material, however, corona may occur un-

(*Continued on page* 46)

[a]RCA projection tube, operated with 27,000 volts.

Tube News

(*Continued from page* 45)

less the portions of the support assembly near the tube face are made conductive. Both the insulating and conductive coatings on the 5TP4 are black to reduce reflection of light and resultant loss of picture contrast.

The conductive coating on the neck of the bulb, which is provided primarily to prevent corona between yoke and the glass neck, must be grounded, preferably by means of a grounding clamp at the base end of the coating. The clamp must not grip the neck so tightly that it sets up glass strains which may eventually cause cracks, but it should exert sufficient pressure to insure good contact. The resistance of the coating is sufficient to prevent damping of the deflection yoke. Because of this high resistance, a contact area at least one-quarter of one square inch must be used. This coating must not be scratched and must never be washed with liquids likely to soften or dissolve lacquers.

As further precautions to prevent corona, the deflection yoke must present a smooth surface electrically to the bulb support ring. The contour of the yoke winding should approximate the contour of the bulb, departing gradually from it toward the outer edge of the winding. The yoke windings must not touch the cone of the bulb above the reference line (approximately at junction of cone and neck).

TV Tube Handling

Because finger marks may cause high-voltage leakage paths, the tube should always be handled at the neck or that part of the tube having a conductive band. It should never be handled at insulating-coating portions.

[*The foregoing application note data are based on copyrighted material supplied by RCA.*]

MILLIONTH RECORD CHANGER

Mayor Martin H. Kennelly of Chicago receiving the millionth postwar record changer made by Webster-Chicago Corp.

Servicing Helps

(*Continued from page 27*)

a 455 kc i-f transformer. If it simplifies construction, an iron core type may be used. If a permanent installation is not used the can of the crystal i-f transformer should be grounded to the fifth prong of the socket.

Circuit operation is simple, and is explained by Fig. 6. Essentially, the crystal and tuned circuits may be considered as two high-impedance networks, forming a signal divider network to the grid of the first i-f tube. As the potentiometer resistance is reduced, the impedance represented by the tuned circuit is reduced. This brings into action the high impedance of the crystal at other than resonant frequency, and the resulting selectivity is increased. The phasing control is used to balance out the coupling capacitance introduced by the crystal holder, thereby further increasing the circuit selectivity.

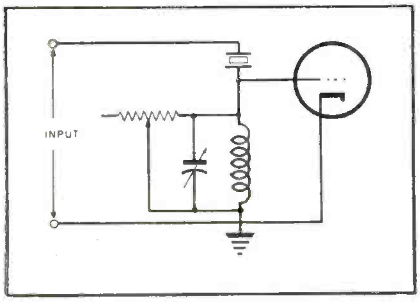


Fig. 6. The divider network established by the crystal and tuned circuits. As the potentiometer resistance is decreased, the impedance relationship between the crystal and tuned circuit is increased, thereby increasing the filter action of the crystal.

Associations

(*Continued from page 28*)

or attenuating frequencies in the amplifier.

RSA

A NOTE FROM R. A. BREGENZER states that the Radio Servicemen's Association of Pittsburgh, Pa., will soon reorganize. It is expected that the association will soon have as many members as it had in the pre-war era.

GBESA

A LICENSING ORDINANCE was recently introduced by the Green Bay Electronics Servicemen's Association, Green Bay, Wisconsin. According to the ordinance, all Service Men would be required to obtain a license to operate in the city. Some 42 members of the association signed a petition for the ordinance which it is understood is patterned like the Madison, Wisconsin, Law enacted some ten years ago.

F-M/TV Sweep Signal Generator

(See Front Cover)

A SWEEP-SIGNAL GENERATOR[1] for f-m and tv is diagrammed on the front cover this month.

The circuit consists of two r-f oscillators, mixer, filter and horizontal sync circuit and a power-line frequency-controlled reactance modulator.

One portion of the oscillator, 12AT7*b*, has an iron-slug fixed-tuned coil for 114 mc. Its 114-mc center frequency is swept at a 60-cps rate over a range of from approximately 40 kc to 5 mc, both above and below center frequency, by reactance-modulator tube, 12AT7*a*. The actual sweep rate is double the line frequency or 120 sweeps per second for a 60-cycle line.

The 114-mc output of the *b* section of the 12AT7 is fed from a 33-ohm resistor in its cathode circuit through a 20-mmfd capacitor to the mixer, 12AT7*b*, which a second variable frequency oscillator, 12AT7*c*, also feeds through a 10-mmfd coupling capacitor. This tunable oscillator covers the 112 to 37-mc range.

Calibration

The inner dial scale on this generator is calibrated in difference frequency between the two oscillators; 114 – 112 mc = 2 mc on the dial, 114 – 37 mc = 77 mc, etc. The middle dial scale is calibrated as 60/154 mc. in terms of the second harmonic of the first or difference-frequency range. The outer scale is calibrated as 155/226 mc, this range being provided by the sum frequencies of the two oscillators, where 114 + 37 = 151 mc, while 114 + 112 = 226 mc.

Output Control

In this sweep generator which is, of course, to be used for visual circuit alignment only, the output voltage is controlled by an output potentiometer of 125 ohms, which operates over a range of approximately ½ volt maximum, to a level low enough to reduce the 'scope beam trace to zero. The output impedance varies from approximately 5 ohms at minimum to 125 ohms at maximum output.

[1] McMurdo Silver 909.

New Products

HYTRON MINIATURE TUBE PIN STRAIGHTENER

A miniature tube pin straightener has been announced by Hytron Radio & Electronics Corp., 76 Lafayette Street, Salem, Mass.

The pin straighteners, built of special stainless steel and aluminum, are turned out in an automatic screw machine. Has mounting holes for bench use, as well as a comfortable shape and knurling for hand use.

* * *

TINIT SOLDERING COMPOUND

A powder-form soldering compound, Tinit, for receiver use has been announced by Tinit Manufacturing Co., P.O. Box 794, Denver, Col.

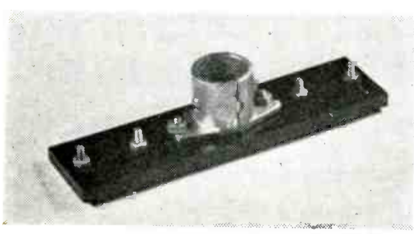
The compound, which contains tin, can be put into corners and inaccessible places, a small amount of heat being required for soldering. The compound is said to penetrate grease and dirt, and can be used on all metals, including sheet aluminum.

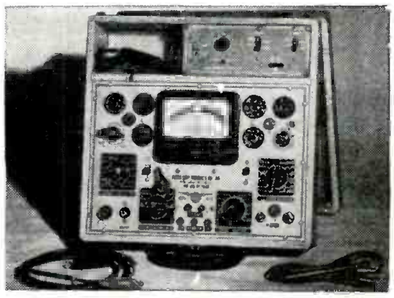
The product has been sold for many years to automotive, refrigeration and other jobbers.

* * *

OAK RIDGE ANTENNA COLLAR CLAMP

All aluminum collar clamps to hold f-m or tv antenna and reflector elements on mast or cross arm in place more permanently, have been announced by Oak Ridge Antenna Co., 239 E. 127 St., N.Y.C. Clamps prevent the elements from twisting or slipping out of position.





RCP SERVISHOP INSTRUMENT

A service shop in a carrying case, model 8073 Servishop, has been announced by Radio City Products Company, Inc., 152 West 25th Street, New York 1, N. Y. Said to be the equivalent of six instruments; tube tester, multitester, f-m signal generator, a-m signal generator, audio oscillator, and capacity tester.

Tube tester tests all the new miniature tubes, and has all the features of RCP's model 322, with 800 listings in the tube charts. The capacity tester reads *good* or *bad* for leakage of electrolytics, for paper or micas. Both the f-m and a-m signal generators are set for four needed calibration frequencies and are similar to models 720 and 710. The audio oscillator has a 400-cycle output.

Ranges of the multitester are: d-c and a-c voltmeters . . . 0/10/50/500/1,000 volts (1,000 ohms per volt); d-c milliammeter . . . 0/1/10/100/1,000; d-c ammeter . . . 0/10 amperes; ohmmeter . . . 0/500/5,000 ohms, and 0/0.1/1/10 megohms; db meter . . . —8 to +15, +15 to 29, +29 to 49, +32 to 55 db; output meter . . . 0/10/50/500/1,000 volts.

* * *

MALLORY NOISE FILTER

A noise filter, type X6, has been announced by P. R. Mallory & Co., Inc., Indianapolis.

The filter is installed between the plug of the offending appliance and the wall outlet.

A display card explaining the use of the filter has been designed to carry six of the units on the face of the card.

WEBSTER CHICAGO WIRE RECORDER

A wire recorder, model 78, for connection to existing amplifier circuits, has been announced by Webster-Chicago Corp., 5610 W. Bloomingdale Avenue, Chicago 39, Ill.

Unit with push-button controls, consists of a wire transporting mechanism, preamplifier, interstage amplifier, oscillator and built-in power supply. Has calibrated recording level meter.

* * *

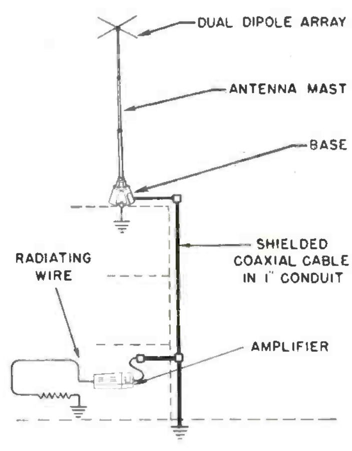
BRACH SIGNAL BOOSTER SYSTEM

A *Puratone Signal Booster System* has been announced by L. S. Brach Manufacturing Corp., Newark 4, New Jersey.

The signal booster system was developed by Brach electronic engineers in conjunction with Professor J. L. Potter of Rutgers University, and Wesley Kidd of Chicago. It covers a frequency range of .3 to 20 mc for a-m operation, and 85 to 110 mc for f-m. Uses wide-band, dual video-type amplifier circuits which are said to assure faithful reproduction of speech and music on all stations at an average tone level.

The installation consists of a dual-dipole antenna array supported by an aluminum mounted mast mounted on the roof of a building. Signals from the antenna are carried to the signal-booster amplifier by means of shielded coaxial cable in a 1" conduit. Wide-band amplifier provides sufficient over-all gain and limiting at low noise levels to any number of receivers.

(*Continued on page 50*)



New Products

(*Continued from page* 49)

VERTROD TV/F-M ANTENNA

A tv/f-m antenna. Continental type, with adjustable dipole elements, calibrated in megacycles, has been announced by Vertrod Corp., 17 Williams St., Brooklyn 7, N. Y.

Adjustable dipole elements are mounted in a five-foot tempered aluminum alloy mast. Can be mounted at any angle making it adaptable for use in all positions. Antenna kit is equipped with the necessary elements, insulator, mast, and universal base mounting bracket.

* * *

VANDRUFF REAR SEAT AUTO SPEAKER

An auto rear-seat speaker has been announced by VanDruff Specialties, 8695 State Street, South Gate, California.

Speaker has a heavy duty G.E. 6½" Alnico V p-m unit. Grills are designed for flexibility to permit installation in any automobile. A three-way switch is provided.

* * *

VISION RESEARCH SIGNAL BOOSTER

An r-f amplifier, with self-contained power supply, for tv signal boosting has been announced by Vision Research Laboratories, 87-50 Lefferts Boulevard, Richmond Hill, N. Y.

The booster is a selective amplifier, and thus tends to reject unwanted off-channel interference. A two-position switch provides amplifier and normal operation. When in *off* position the antenna is connected directly to the television receiver and thus has no effect upon normal signals which require no boosting.

Available in three models: TVL, channels 1-6; TVH, channels 7-13; and FM, 88 to 108 mc.

* * *

EICO VTVM

A vtvm, model 221, has been announced by Electronic Instrument Company, Inc., 926 Clarkson Avenue, Brooklyn 3, N. Y.

Has electronic a-c and d-c ranges: 0-5, 10, 100, 500, 1,000 volts. Electronic ohmmeter measures from .2 ohm to 1,000 megohms in 5 ranges. Wide range db scale. Automatic overload said to prevent meter burn out.

KAPPLER WIDE-BAND SUPERHET A-M TUNER

A wide-b and a-m tuner has been developed by the Kappler Company, 7302 Melrose Ave., Los Angeles 46, Calif.

Has a bridge-type balanced modulator in a superheterodyne circuit. Also features an infinite impedance second detector which provides an extremely high ratio of d-c to a-c.

Performance characteristics: Output, 1 volt across 500 ohms for 100% modulation; noise level, 75 db below 1 volt; pass band, 20 kc, down 3 db 10 kc either side of carrier frequency; power, 42.5 watts at 117 volts 50/60 cycles; antenna, single wire or balanced line.

* * *

CLAROSTAT CONTROL AND RESISTOR REPLACEMENT KIT

A replacement kit, Han-D-Kit No. 5, has been released by Clarostat Mfg. Co., Inc., 130 Clinton St., Brooklyn, N. Y. Kit contains twelve of the most popular values of plain, tapped and slip-drive controls, together with a selection of twelve attachable shafts and four ad-a-switches; six ballast tubes most generally called for; five Greenohms or 10-watt wire-wound power resistors; plus a double-ended wrench, authorized service plaque, copy of latest catalog, and a registration card calling for a free copy of the new Clarostat service manual, all packed in a green-finished steel cabinet.

ELECTRONIC LAB CONVERTER

Converters for use on tv sets in d-c metropolitan areas have been announced by Electronic Laboratories, Inc., Indianapolis.

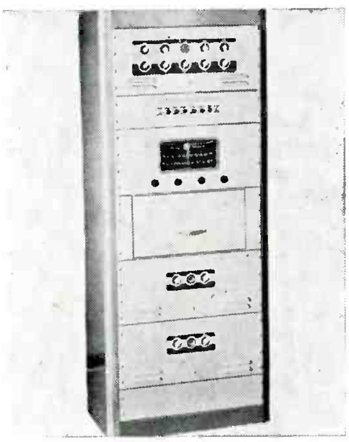
Two types have been developed, model 110R15 for table model tv receivers, and model 110R30, for console models.

* * *

NEWCOMB AUDIO RACK ASSEMBLIES

Basic elements for cabinet type rack systems have been announced by Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.

Cabinet, 59½" high x 23½" wide x 16" deep, will accept six 9" x 20⅜" panels. Units which can be used in the rack include 60-watt p-a (model K-60P-900), pre-amplifier (model KX-6-900), dual channel pre-amplifier (model PR-2-450), monitor speaker, phono-changer, etc.

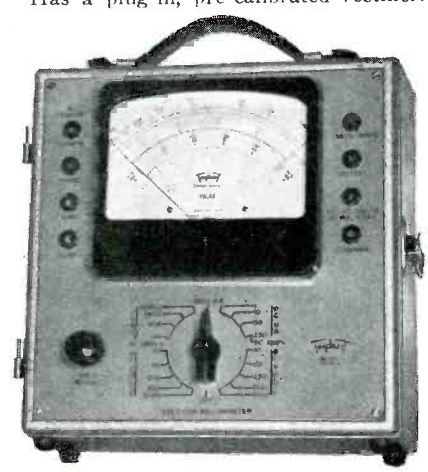


TRIPLETT VOLT-OHM-MIL-AMMETER

A 20,000 ohms-per-volt d-c multi-range volt-ohm-mil-ammeter, type 2405-A, has been announced by the The Triplett Electrical Instrument Co., Bluffton, Ohio.

Thirty-five ranges: Voltages to 1,000 d-c at 20,000 ohms/volt and a-c at 1,000 ohms/volt; d-c current ranges from 0-50 microamperes to 10 amps; a-c amps to 10; db, —10 to +55. Also provides output and capacitor tests.

Has a plug-in, pre-calibrated rectifier.



* * *

ULLMAN MAGNETIC TOOLS

Magnetic tools, *Magimmicks,* of the all angle ball joint type, which can be used to retrieve nuts, bolts and other ferrous items, have been announced by Ullman Products Corporation, Ullman Bldg., B'klyn (15) N. Y.

COLLINS TV/F-M ANTENNA

An f-m/tv antenna which can be used on the thirteen tv 44-216 mc and 88-108 mc f-m channels has been announced by Collins Machine Co., 56-21 Northern Boulevard, Woodside, N. Y.

Consists of two broad-band dipoles connected by frequency-selective circuits to a common transmission line, 73 to 300 ohms impedance.

* * *

NATIONAL UNION CAPACITORS

A line of 131 types of replacement capacitors has been announced by National Union Radio Corp., Newark, N. J.

Types include metal tube, cardboard sleeve dry electrolytics in singles and duals (*Numite*); super-seal cardboard tubular dry electrolytics with mounting strap in dual and triples (*Nucarmite*); aluminum can, screw base dry electrolytics in singles and duals (*Thredmount*); twist-tab mounting aluminum can dry electrolytics in singles, duals, triples and quadruples (*Twistab*); and small paper tubulars for multiple parallel or series-combination installations (*Nupamite*).

* * *

KOILED KORDS TEST LEADS

Retractile test leads have been announced by Koiled Kords, Inc., Hamden, Connecticut. Test leads, in conventional red and black colors, are made in 48" retracted lengths which will extend to 20'. The ratio is 1' of retracted Koiled Kord to 5' extended.

Inquiries may be addressed to E. L. Love, sales manager, Koiled Kords, Inc., Box K, Hamden, Connecticut.

Ser-Cuits

(*Continued from page 37*)

detector stages, employing double-tuned circuits overcoupled to have a 3.5-mc bandwidth, with a 25.25-mc center frequency.

The first and second video i-f amplifiers use 6AH6s with the first video i-f avc controlled. The second stage feeds one-half of a 6AL5 as a conventional a-m detector, which feeds the video amplifier. The other half of the 6AL5 provides a dual purpose. Its input time constant is such that it holds its bias just above picture black level and delivers separated super sync to the sync amplifier. Because of this action, the tube can also provide avc voltage, which is used on the r-f tube and first tube of both i-f strips.

In the audio unit are the first and second audio i-f amplifiers and the audio detector, using single tuned i-f coils peaked at 22.25 mc, with an f-m ratio detector. The first and second audio i-f amplifiers use 6BA6s and the first audio i-f tube is avc controlled.

The audio detector amplifier tubes are duo-diode-triode 6AT6s, serving both as an f-m ratio detector and as two stages of audio amplification. The diode currents of the ratio-detector portion of the 6AT6s develop an f-m audio voltage across a 22,000-ohm resistor with a 1,500-mmfd capacitor bypassing the audio i-f frequency. The cathode current of the triode section of the 6AT6 also passes through the 22,000-ohm resistor, placing a d-c voltage drop in series with the diode circuit. This makes it necessary to use a compensating network, a 22,000-ohm resistor and 25-mfd capacitor, in the cathode circuit of the 6AT6 audio-detector amplifier.

There is also a noise rejection circuit in the ratio detector which utilizes a 33,000-ohm resistor and 5-mfd capacitor.

In the high voltage supply, a 6V6GTG is used as a tuned plate r-f oscillator with two additional windings on an oscillator coil to provide high a-c voltage and filament voltage for a 1B3GT/8016 rectifier tube.

In the video output stage, a 6AH6 is used, biased by the rectified video signal appearing on the grid, and is d-c coupled to the picture tube grid. This arrangement with a heavy bleeder on the screen optimizes d-c restoration.

The sync amplifier and limiter share a 6SL7. The first section amplifies the sync signal obtained from the sync separator diode of the picture detector, and the second section acts as a limiting cathode follower which clips off the noise peaks and supplies constant sync voltage to multivibrators.

A 6SN7 is used in the vertical saw-tooth generator as a conventional cathode-coupled multivibrator with an integrating circuit feeding sync pulses to the first grid.

Another 6SN7 is used in a horizontal sawtooth generator and also as a conventional cathode-coupled vibrator with a differentiating circuit. The vertical multivibrator can be adjusted with a vertical-hold control to sync at 60 cycles, while the horizontal multivibrator is adjusted with a horizontal-hold control to sync at 15.75 kc.

A 5U4 full-wave rectifier is used in the low-voltage power supply to supply 300 volts d-c at 200 ma.

The 7GP4 is operated with the heater grounded and the second anode at a +3,000-volt potential.

G.E. 901 and 910

In Fig. 3 appears another current model television receiver using, however, an electrostatic focus, *magnetic* deflection-type projection tube, the 5TP4. A very high voltage is supplied to the plate of this tube, 27,000 volts.

In this receiver one 6AU6 is used as an r-f amplifier, a 7F8 as a converter oscillator, 6AC7s in four stages of video i-f, 6H6 as a video detector/d-c restorer, 6AG7 as a video amplifier, 6SH7 as a clipper, 6SN7GT as a horizontal-sync amplifier and vertical sweep, 6SL7GT as a horizontal discriminator and vertical-sync amplifier, another 6SL7GT as a horizontal discriminator and d-c amplifier, a pair of 6SN7GTs in horizontal sweep generator and phase inverter stages, 6L6G as a vertical sweep output, 6SG7 for tv audio i-f, 6SV7 as a tv audio limiter, 6H6 as a tv audio discriminator, 6AG5 as an r-f amplifier, a pair of 6AK5s in oscillator and converter stages, 6SG7 in one i-f amplifier and 6SV7 in another i-f amplifier, with another 6SV7 as an a-m detector and f-m limiter, 6AQ7 as an f-m discriminator and audio-cathode follower, 6SL7 as an audio amplifier, four 6V6GTs in pushpull audio output, 6AL7 as a tuning indicator, 6SC7 as a phono pre-amplifier, three 5U4Gs as rectifiers, two 6BG6Gs for horizontal sweep output, 6AS7G for horizontal damping and four 1B3GTs as high-voltage rectifiers.

The video tv i-f in this receiver is 22.4 to 26.4 mc. The i-f for the tv audio is 21.9.

This model is a combination broadcast, f-m, tv and shortwave unit covering the low and high bands on the f-m channels and the 9.4 to 9.9 and 11.6 to 12.1-mc shortwave bands.

Soldering

(*Continued from page* 39)

cans, containers, etc. Soldering (*tacking*) at a few spots serves the same purpose.

Soldering Procedure

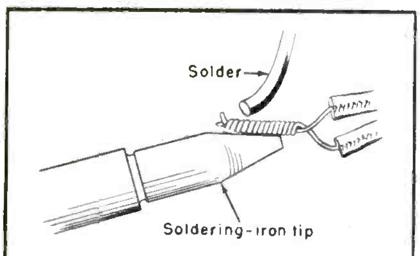
Cleaning: The work to be soldered must be free of dust, dirt, and other foreign materials. You should not depend on soldering flux to remove dirt, grease, paint, rust, or heavy oxide coatings. Proper preliminary cleaning is essential for good soldering joints. Before starting to solder, work should be cleaned with sandpaper, wire brush or chemical cleaner. Acids should be avoided unless it is possible to rinse thoroughly to remove residue.

Preparing the Iron: Tip of the iron should be tinned with solder as soon as it is hot enough to melt the solder. The resultant solder film prevents oxidation. If screw tip type irons are being used, after the tip is up to temperature, it should be screwed in tightly. This will improve heat conductivity to the tip and prevent flux fumes from corroding the tip threads. The iron will not operate satisfactorily unless this precaution is taken.

Applying Flux: The purpose of a flux is (a) to dissolve any oxide that covers the surfaces of the work to be soldered, and (b) to prevent oxide from forming when heat is applied to the work, so that the solder can flow into the seams and unite with the metal surfaces. Flux should be applied to the part to be soldered, never to the tip of the iron; Fig. 3. When core solder is used, the flux in the core melts at a low temperature and covers the work, thus preventing oxidation as the part approaches the temperature required to melt the solder. If a separate liquid or paste flux is used, it can be applied to the work with a brush or paddle; Fig. 4. In no case should the tip be dipped into the flux, either before or during heating. In any case, it should be applied before the work be-

(*Continued on page* 54)

Fig. 6. When soldering wire joints, etc., iron should be held underneath work.



Soldering

(*Continued from page 53*)

comes hot enough to oxidize from the heat. If acid flux is used, it should be no stronger than necessary, and used sparingly. It should be confined to the part being soldered and kept away from the iron, especially the threads of the screw tip type irons.

Pretinning for Soldering: The best soldered joints are obtained when the surfaces to be joined are pretinned with solder. This consists of coating the surface of the joints with solder after it has been properly cleaned and fluxed. Some metals are easily tinned by merely spreading the solder over their surfaces with a hot iron. It may be necessary, however, to work the solder onto the surface of some metals with a rubbing action with the hot iron. For instance, in soldering aluminum the metal must be brought up to soldering temperature and the solder rubbed onto the surface of the aluminum by means of a wire brush. Repeated heating and rubbing is necessary to properly pretin so that good soldering of the part is possible. This mechanical rubbing, in the case of pretinning aluminum, can be eliminated by using tin-zinc solder containing a minimum of 60 per cent tin. This solder can be applied to aluminum by merely rubbing it on the aluminum surface with the flat side of the tip without the use of any flux or mechanical scrubbing, as mentioned previously. Pretinning is necessary when soldering all metals if an air- or watertight joint is expected. Copper, brass, steel, wire, sheet, and strip are available *tinned,* ready for soldering.

Applying Heat: The next step in the soldering procedure is to bring the temperature of the joint to be soldered up to the melting point of the solder. To do this, the tip should be applied to the joint in such a way that the

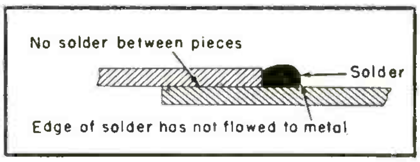
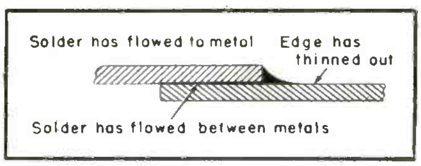


Fig. 7. What happens to the solder when the work is not hot or clean enough.

Fig. 8. How the solder flows properly when the joint has been brought to the proper temperature.



largest area of the tip working face comes in contact with the work; Fig. 5. There must be a heavy film of solder between the working face of the tip and the joint being soldered. Therefore, pressure is not necessary since this film of solder conducts the heat from the tip to the work. A *dry* tip which does not have this film of solder to help conductance of the heat will take a longer time to bring the joint up to proper temperature.

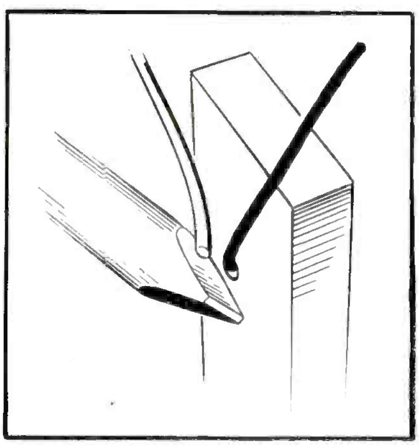
When soldering wire joints and similar work, it is best to hold the iron underneath the work; Fig. 6. This makes it easier to apply the solder and enables the tip to support the solder until the joint becomes hot enough for the solder to flow into it.

Applying the Solder: Solder should be applied to the *work* or *joint being soldered*. This is the best guarantee that the work is up to the proper temperature. The solder should flow *onto* the metal and *into* the joint. Merely melting the solder is not enough, it must flow *onto* the metal. Fig. 7 shows a cross-section of a joint where the solder melted, but because the work was not hot enough (or clean enough), the solder did not flow. Fig. 8 shows a joint properly soldered. Here the solder flowed onto the clean metal after the joint had been brought up to the proper tempertaure. It will be noted that in Fig. 7 the solder tends to hold together and consequently did not thin out at the edge. In Fig. 8 the solder has been attracted by the metal. It will also be noted that the edge of the solder has thinned out and the solder has been drawn between the metals by capillary attraction.

Soldering Rules: In soldering a vertical surface, solder should be applied to trough formed by the tip of the iron and the surface to be soldered, and

(*Continued on page* 56)

Fig. 9. In soldering vertical surfaces, solder should be applied to trough formed by the tip of the iron and surface, with iron then pressed against the surface.



Soldering

(*Continued from page* 55)

then the iron should be pressed against the surface; Fig. 9. In soldering a horizontal surface, solder should be applied to the upper side of the part to be soldered and allowed to flow downward around the part (Fig. 6). In soldering electrical connections, care should be taken not to burn insulation or contacts. In this instance, soldering must be done quickly. In soldering seams, work should be arranged in such a way that a trough is formed, enabling the solder to flow down and through the seam. The flat tip of the iron should be placed against the work and followed with solder at the side of the tip. Repeated action helps to fill the seam.

Too much solder should not be used—just enough to do the job. Surplus solder can be removed with the hot tip of the iron, or with a file.

Cooling: When sufficient solder has been applied and it has flowed onto the metal and into the joint, the tip of the iron should be slid from the work—not lifted. This will insure an even soldered surface. The work should be allowed to cool until the metal is well below the freezing point of the solder. During this cooling period, the parts must remain absolutely fixed in respect to each other. The slightest movement of the parts at this time will result in a partially fractured joint which will not have satisfactory strength or hardness.

Cleaning: After the parts have cooled, proper cleaning to prevent corrosion should be considered. Rosin residue will not cause corrosion and need not be removed unless subsequent flaking may be harmful. Acid flux must always be removed if corrosion is to be avoided.

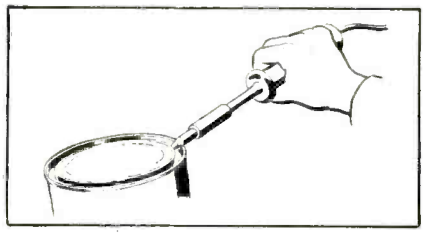


Fig. 10. Iron should not be used to pry open cans.

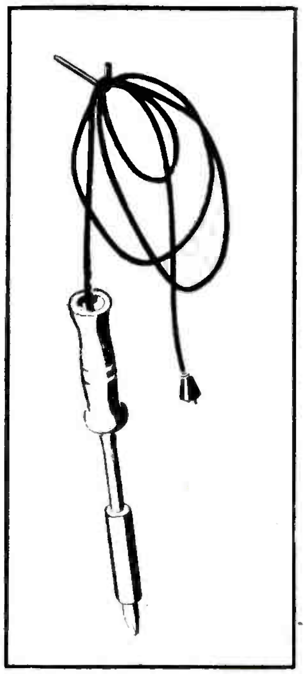


Fig. 11. Iron cord should not be hung on a nail or hook.

Care of the Soldering Iron

(*a*)—Your soldering iron should not be abused. It is not built to withstand careless handling. It should be used only to solder, not to hammer or to pry; Fig. 10.

(*b*)—The cord of your iron, when not in use, should be wrapped neatly around the handle, or hanked loosely. Avoid unnecessary damage caused by hanging the iron on a nail or hook by its cord; Fig. 11. Also, avoid pulling, jerking or twisting the cord. Keep the cord away from sharp tools or the hot tip of the soldering iron.

(*c*)—The tip of your iron should be kept tinned at all times by occasionally flowing solder and flux over its working surface. Rubbing the tip over a piece of steel wool at intervals during soldering will restore the original lustre to the tinning and keep the tip clean.

(*d*)—Your iron will overheat if allowed to idle for long periods, or if the work being soldered is extremely lightweight for the soldering iron being used. Iron must be disconnected for short periods if it tends to burn the flux and blacken the copper, since a burned tip will not solder satisfactorily. The black oxidation will insulate the tip and prevent proper heat transfer to the work.

If this happens, the tip must be retinned, as follows:

(*1*)—Allow iron to cool.

(*2*)—Clean working surface with steel wool or light sandpaper. Unless tip is pitted, do not file.

(*3*)—Reconnect iron. Apply flux to working surface unless core solder is used. Hold solder against tip until solder melts. Cover working area (about one-half inch on all sides) with solder.

(*4*)—The copper tip of your iron will occasionally become pitted. This is natural since copper, which has high heat conductivity and is therefore best for tips, oxidizes easily and, being soft, wears away. When pitting occurs, the pitted section can be filed with a fine file to a smooth surface, removing no more copper than is absolutely necessary. To retin, the method outlined in (3) should be followed.

It is important to remember that your soldering iron is a tool, and should be treated as such. You should learn to use it properly and to maintain it as you would any other tool, and it will keep you out of soldering trouble and serve you for a long time.

RCA PHONO REPLACEMENT GUIDE

A guide which shows the exact replacement crystal to use in RCA Victor phonos has been prepared by the RCA tube department.

Folder contains outline diagrams of the crystal cartridges used in the pickup arms, diagrams showing the shape, mounting holes, and other necessary information. Folder also contains two indexes, one listing phono by model number showing the proper crystal replacement for each, and the second listing RCA crystals by stock number and showing what RCA phono they may be used in.

RCA's *Magic Tone Cell* and *Silent Sapphire Crystal Pickup* are also described in the folder. The *Tone Cell* is recommended for modernization of 69 RCA radio-phono models.

* * *

SUPREME, INC. ACQUIRES SUPREME INSTRUMENT CORP.

Supreme, Inc., has acquired the manufacturing rights, facilities and assets of the Supreme Instruments Corporation. The new corporation is composed of executives, representatives and key employees of the old company.

Supreme Inc., will continue to sell test equipment and meters under the name *Supreme*.

No immediate changes of personnel or policy are contemplated.

Officers and directors are E. G. Perkins, president; D. S. Hill, vice president; and C. A. Carroll, secretary and treasurer. Directors include H. W. Burwell, R. M. Campion, Harper Johnson, and B. O. Burlingame.

* * *

BACE TELEVISION CORP. APPOINTING DISTRIBUTORS FOR MULTI-UNIT TV MODEL

The Bace Television Corporation, Hackensack, N. J., are now selecting distributors for its *multi-unit* set which comprises any number of viewing screens operated from one central control unit.

* * *

WAHLGREN NOW PREXY OF WCEMA, INC.

Wallace Wahlgren, San Francisco, has been elected president of WCEMA, which was recently incorporated in California. The organization membership is spread over the states of California, Oregon, Washington, Idaho, Utah, Nevada and Arizona with two main groups, the Los Angeles and San Francisco councils.

These councils will alternate in staging annual show, the show for 1948 being held at the Los Angeles Biltmore on Sept. 30 and Oct. 1 and 2.

WCEMA has been voted as an active sponsor in the Radio Parts Industry Coordinating Committee activities.

RADIO'S OLD TIMERS TO MEET AT PARTS SHOW ROUND-UP

Radio's Old Timers, *ROT*, are preparing for their annual round-up at the parts show in May.

The second annual affair, a cocktail party, will be held in private dining room No. 2, at the Stevens Hotel, from 5:00 to 7:00 P.M. on Monday, May 10, just ahead of the Radio Industry Banquet. Only paid-up members of *ROT* will be able to attend.

ROT was created in prewar days as a common meeting ground for those who have been in radio in a commercial way for a long period of years. Anyone who believes he is eligible for membership in this *honorary* society is urged to communicate with John O. Olsen, president, Radio's Old Timers, 1456 Waterbury Road, Lakewood, Cleveland, Ohio.

* * *

UNGER BECOMES WARD S-M

Roy Brown Unger has been appointed sales manager of Ward Products Corp.

He was formerly assistant sales manager of the jobber division.

* * *

JOHNSON APPOINTED HICKOK SALES MANAGER

H. D. Johnson, formerly assistant sales manager for The Hickok Electrical Instrument Co., has been appointed sales manager, succeeding the late Robert Williams.

RIDER MANUAL VOLUME XVII OUT IN MARCH

Volume XVII of the *Perpetual Troubleshooter's Manuals*, published by John F. Rider, Publisher, Inc., 404 Fourth Avenue, New York 16, N. Y., has been scheduled for delivery during this month.

Volume XVII will contain more than 1,600 pages and will also have the companion *How It Works* book and cumulative index for volumes XVI and XVII.

Clarified schematics will be carried on in volume XVII.

* * *

ELECTRONIC LABS REORGANIZED

Electronics Laboratories Inc., Indianapolis, Ind., have received a loan of $285,000 from R.F.C. and have set up a new organization. Norman Kevers is president, and Walter Peek, vice president, in charge of sales.

* * *

WEBSTER-CHICAGO APPOINTS PARSONS SALES REP.

Newell B. Parsons has been appointed sales representative for Webster-Chicago Corp., 5610 W. Bloomingdale Avenue, Chicago 39, Illinois.

Parsons will cover the Chicago and Milwaukee trading areas.

* * *

MAGNETAPE RECORDER CATALOG

An 8-page catalog 4901, has been published by the magnephone division of Amplifier Corp. of America, 398-31 Broadway, New York 13, N. Y.

Described are seventeen standard and portable models, ranging in playing time for a single reel of magnetic tape from 15 minutes to 8 full hours.

* * *

ESPEY TV TRAINING KIT ADOPTED BY RTS

A tv training Kit, produced by the Espey Manufacturing Company, 528 E. 72nd St., N.Y. 21, N.Y., has been adopted as a basic tv training tool in the courses given by the Radio-Television School of New York.

* * *

G. F. PLATTS NOW CLIPPARD V-P

George F. Platts has been appointed executive vice president of Clippard Instrument Laboratory, Inc., 1125 Bank Street, Cincinnati, Ohio.

Mr. Platts holds the rank of Commander, U.S.N.R., and during World War II served in connection with the #2 Secret Weapon Project, receiving a commendation ribbon from the Secretary of the Navy for his services. He was formerly general manager of the electric products division, McQuay-Norris Mfg. Co., St. Louis, Mo.

KRIM NAMED MANAGER OF RAYTHEON RECEIVING TUBE DIV.

Norman B. Krim has been appointed manager of the receiving tube division of Raytheon Manufacturing Co.

Mr. Krim suceeds Carl J. Hollatz, vice-president of Raytheon's subsidiary, Belmont Radio Corp., who has become general manager of Belmont.

* * *

TELEVISION INTRODUCED TO BOSTON BY TRANSVISION AND SIGHTMASTER

The engineering staff of Transvision and Sightmaster joined forces with the Boston Bell Telephone Co. and CBS, during the first tv show in Boston, installing 14 tv receivers in Filene's department store.

An all-day show was put on in the windows on three sides of Filene's Washington Street store. Program originated in New York and was flashed to Boston over the A.T.&T. microwave link.

* * *

SOLAR PROMOTES ALFRED S. GARTNER

Alfred S. Gartner has been named assistant sales manager of Solar Manufacturing Corporation.

Mr. Gartner has been with Solar for nearly five years.

MILLING BECOMES COMMERCIAL VICE PRESIDENT OF RCA SERVICE COMPANY

J. A. Milling has been appointed to a newly-created post of commercial vice president of the RCA Service Company. Prior to his new appointment, Mr. Milling was general manager of the parts division of the RCA tube department.

* * *

GEORGE KOCH OF SIMPSON DEAD

George Koch, secretary, director and sales manager of the Simpson Electric Company, passed away on Sunday, February 15, 1948 after a brief illness.

Mr. Koch was sales manager of the Simpson Electric Company for 14 years. He was formerly associated with Ray Simpson at the Jewell Electrical Instrument Company from 1922 until 1932.

* * *

JABLON JOINS ESPEY

W. W. Jablon, formerly of Hammarlund Manufacturing Company, has been elected vice president of the Espey Manufacturing Company, Inc., 528 East 72 Street, New York City. He will head both the jobbing and special products divisions.

* * *

SUPREME PUBLICATIONS F-M/TV SERVICING MANUAL

An f-m/tv manual, *Most-Often-Needed F.M. and Television Servicing Information* has been published by Supreme Publications, 9 South Kedzie Ave., Chicago 12, Ill. Presents specific factory instructions on adjustment and repair of many popular models. Also offered are a variety of installation and servicing data.

JOTS AND FLASHES

SERVICE CLINICS patterned like the recent Town Meeting of Radio Technicians held in Philadephia have been temporarily scheduled for New York, Los Angeles, St. Louis and Kansas City. The meetings will feature talks on the business and technical aspects of servicing and may also provide an exhibit on test equipment of today. Harry Ehle, who was chairman of the Town Meeting Committee, reported that 97% of the Service Men interviewed after the Town Meeting indicated that they got enough out of the meetings to justify the effort and would like to have another one next year. . . . Life memberships in the PRSMA were awarded to Bob Baggs of the Harry P. Bridge Co. and Harry Kalker of Sprague Products at the Town Meeting of Technicians in Philadelphia. . . . The Federation of Radio Service Men of Pennsylvania presented an award to Howard W. Sams for outstanding contributions to the Servicing industry in 1947, during the Town Meeting. . . . A subcommittee of the National Electrical Wholesalers Association's Service and Repair Parts Committee are making a study of the distributors problems involved in installation and servicing of tv receivers in metropolitan New York. . . . Jack Clune, general merchandise manager of Air King Products died recently as a result of injuries suffered in an automobile accident. . . . A 172-page catalog, No. 115, has been released by Allied Radio Corporation, 833 W. Jackson Blvd., Chicago 7, Illinois. The catalog contains data on some 10,000 items, including test equipment, batteries, p-a systems, phono, wire, disc and tape recorders, etc. . . . Larry E. Gubb of Philco has been appointed to the finance committee of the Committee for Economic Development. . . . Ben Lehman has resigned as vice president and general manager of Radio Wire Television, Inc. . . . Robert J. Harrington is now assistant director of sales for Industrial Television, Inc., 359 Lexington Avenue, Clifton, N. J. He was formerly with Allen B. DuMont Labs. . . . Samuel S. Egert was recently elected president of the New York Chapter of The Representatives. William Gold was named vice president and Ben Joseph, secretary-treasurer. . . . Oak Ridge Antenna Co. are now located at 239 E. 127th Street, New York City. . . . Eckstein Radio & Television Co. have moved to LeRoy, Minnesota. . . . The National Bureau of Standards have released a 200-page book on "Safety For the Household." It's known as NBS Circular 463 and may be obtained from the Superintendent of Documents, Washington 25, D.C. for 75c. . . . Bittan-Nevins Co. will hereafter operate under the name of D. R. Bittan Co., Inc., 53 Park Place, New York 7. D. R. Bittan is president. Raymond Steckel, vice president and Bernard Brown, treasurer. . . . A 64-page catalog has been released by Radolek Co., 601 W. Randolph Street, Chicago 6, Ill. . . . Specialty hardware and component parts for tv are now being featured by the Christie Television Corp., Oakford, Pa. . . . Hatry and Young, 203 Ann Street, Hartford, Conn., recently celebrated their 20th anniversary. . . . DuMont has reached an agreement with the Crosley Corp. to manufacture tv receivers under its patents. . . . Video Television Inc., are now located at 239 E. 127th Street, New York City. Burt U. Levy is president of the company. . . .

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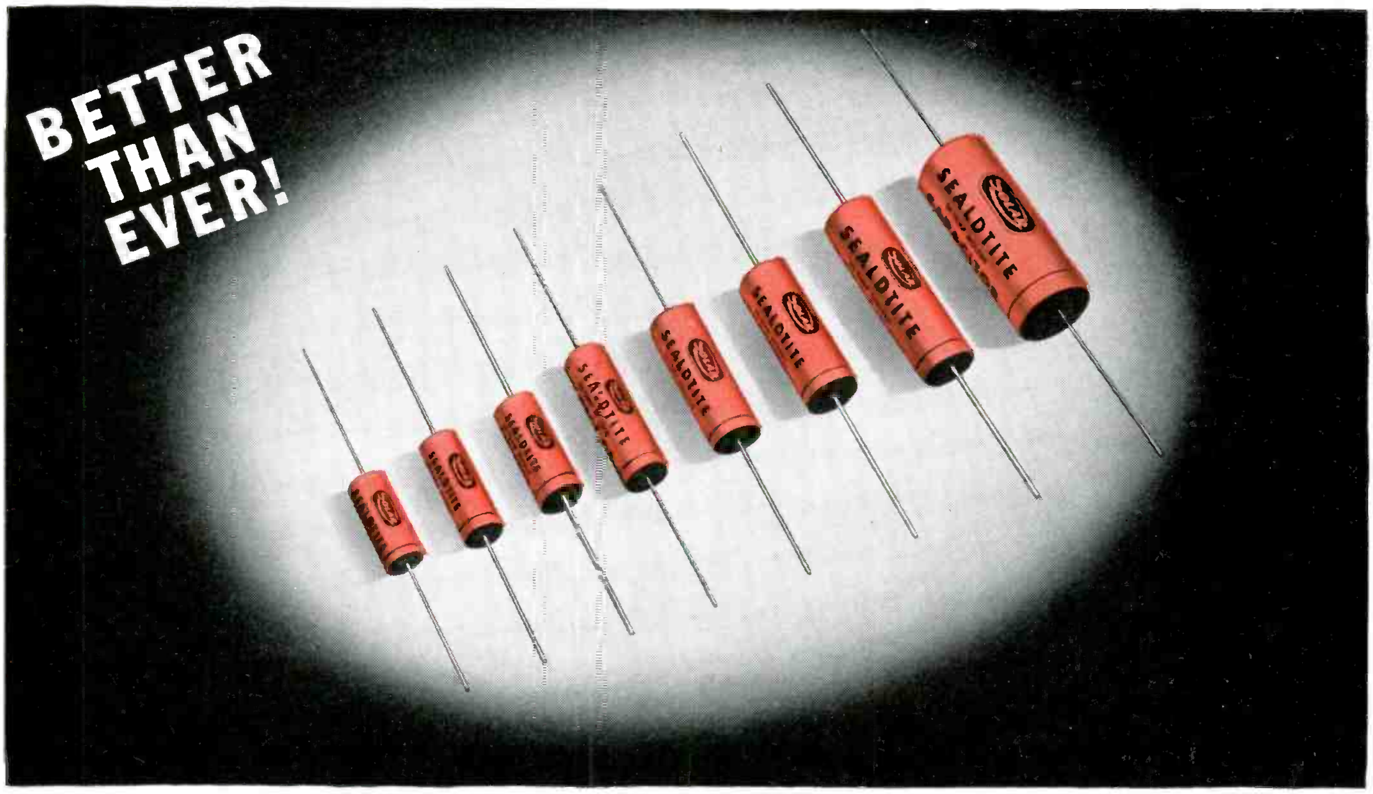

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