



SYLVANIA NEWS

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R. A. PENFIELD, Editor

JANUARY, 1948

EMPORIUM, PENNA.

VOL. 15, NO. 1

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SELL MORE SERVICE AT LOW COST BY DIRECT MAIL

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Finding out the answers to the questions you want to know is the biggest problem. Accurate information will cost you money, but its worth to you in the end will be limitless. Your researchers can be high school girls. Hire them on an incentive basis of three or four cents a name and let them work after school covering your territory. One hundred names may cost you three or four dollars, but their eventual return to you in repair jobs will be much more.

Leave A Reminder

Your researchers can also get your foot in the door for the first

time when they make their survey. For little expense you can equip them with your business card or some other literature which will give housewives hints on the care of their radio. (The Sylvania "Pennies" folder contains many items which will serve this purpose well at low cost to you. Note also the new promotion item on this page which will be a help to you.)

Request your researchers to leave the advertising material with the housewife after they have completed the interview. This will help you and make the housewife feel that you are interested in her radio's welfare.

Of course politeness is a necessary asset for such an employee. There is nothing that does more to sell an idea or a business than politeness. Little things like preliminary introductions before asking questions and a pleasant "thank-you" and "good-bye" will leave lasting impressions on the potential customer.

Classify Your Information

After you have received the information, it should be classified into groups which will require special attention. For example, you might classify the names by the age of the radio. The newer radios in one group, radios a year older in another, etc. This process may sound like a tedious one, but in a short time you will find that the time and money saved will be well worth the effort.

The sample card shown on the previous page is ideal for filing in a classified form. By keeping the size small, all the necessary information is easily at hand for convenient reference. Small inexpensive file boxes are available at any stationery store to accommodate this size card.

With the names of your prospective customers classified in the above manner, you can direct your campaign to be most effective where it will do the most good for you. For the owners of older radios, more frequent mailings are important, because their radios are not as dependable as the newer ones. For the newer radios, your object is to get your name fixed in their mind for future service or other sales.

Your Hard Work Will Pay Off

Direct mail is inexpensive advertising. The large selection of Sylvania postal cards available to you may be purchased for the price of the stamp, a considerable saving for you. These attractive mailing pieces are designed to grab the reader's attention and bring more business to your door.

Sounds like a lot of work doesn't it? Well, it is and we will admit it, but how about the money it will help you to make, and the few bucks you'll be able to save by this planned method of advertising? In the end it will mean more money in your pocket, and after all, isn't that the reason you are in business?

HUBBY LAUGHS AT WIFE'S MENTION "RADIOS NEED EXPERT ATTENTION"



There is nothing like a first class bungler to louse up a radio. You know what we mean—those radio owners who think they know it all, who, to save a little money wreck a set so bad it can't be fixed for less than the price of a new one—the guy who, after it happens, calls you all sorts of names because he thinks you are over charging him to rebuild his set.

We know you don't like that guy, so here's a neat bit of advertising that will help to discourage such antics. You can use it as a mailing piece or for distribution on your counter. Either way you use it, it

will help convince people that **RADIOS NEED EXPERT ATTENTION.**

These folders, printed in seven bright colors to catch your customers' eye are available free from our advertising department in Emporium, Pa. If you want your imprint on them there will be a small charge for the printing at the following scale:

| | |
|------------|--------|
| 100 | \$1.00 |
| 250 | 1.50 |
| 500 | 2.50 |
| 1000 | 3.50 |

SYLVANIA NEWS TECHNICAL SECTION

Copyright 1948, Sylvania Electric Products Inc.

A. V. BALDWIN, Technical Editor

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

AMPLIFIER TONE CONTROL SYSTEMS

Supplementing the amplifier design article in our March, 1947 issue, we asked Roy McNaughton to explain some of the details involved when tone control or correction is included in an amplifier circuit.

In a previous article* we gave a simplified means of designing an amplifier having a reasonably flat frequency response from 100 cps. to 5000 cps. Since many people have decided preferences regarding the amount of bass and treble in the programs they hear, some means of varying the amplifier frequency response is quite desirable. The simpler means for controlling the response of amplifiers will be discussed in the following paragraphs.

Nearly all of the simpler means for tone control or shaping the response curve are based on simple high and low pass filter circuits. For example, the circuit of Figure 1a is a simple high pass filter while that of Figure 1b is a low pass system.

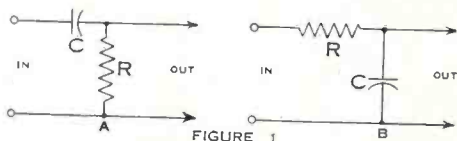


FIGURE 1

In operation the output from the circuit of Figure 1a will increase with increasing frequencies applied to the input, while that from Figure 1b will decrease as the frequency is increased. This is caused by the fact that the reactance of C decreases with increasing frequency and therefore, a smaller portion of the applied voltage appears across the condenser as the frequency increases. Theoretically the above action is true from zero frequency (DC) to infinitely high frequency, but for all practical purposes the effect is restricted to a small section of the spectrum. The change in response is negligible beyond the frequency limits at which the condenser reactance is equal to $1/10$ and 10 times the value of resistance in the circuit. There are many varia-

tions of these two simple circuits which are used for treble or bass attenuation, but they will be discussed in connection with their use in a typical amplifier circuit such as that described in the former article.

There are several combinations of inductance, capacitance, and resistance which may be used for tone control systems, but since they are usually more critical and subject to electromagnetic pickup in the inductance used for audio work, they will not be covered in this article.

Typical Tone Compensation Systems

To evaluate any form of tone control used in connection with an amplifier it is necessary to establish a reference point for both gain and frequency. For this discussion we will consider the gain of the amplifier at 400 cycles per second as the reference point, and all circuits mentioned will be classified accordingly as low or high frequency boost or attenuation systems.

The circuit of Figure 2 is perhaps the most commonly used form of tone control but is seldom recognized as such. It consists of nothing more than a coupling condenser and the following grid resistor. By proper selection of the values of C and R this circuit may be adjusted to give negligible attenuation at the reference frequency and increasing attenuation as the frequency is reduced.

LOW FREQUENCY ATTENUATION

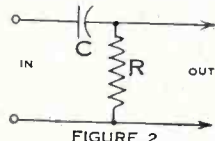


FIGURE 2

Due to other design considerations in the amplifier, this form of tone control is made variable only on rare occasions.

The opposite of the action secured from the circuit of Figure 2 may be obtained by the use of either

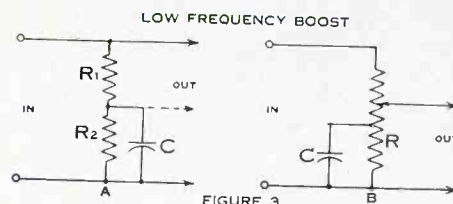


FIGURE 3

Figure 3a or 3b. Both of the circuits in Figure 3 operate on the principle that the total impedance in the circuit increases as the frequency is reduced, thus forming a load impedance which varies inversely with the frequency. The circuit of Figure 3a is most commonly used as the plate load for voltage amplifier tubes whose operating conditions are so adjusted that the stage gain increases as the plate load impedance rises. The circuit of Figure 3b is commonly used with a tapped volume control and may be inserted as a second detector load impedance or as the grid return impedance of an amplifier stage. When the circuit of Figure 3a is used as a microphone or pick-up load impedance the dotted line shown is used as the high output lead. When connected in this manner the condenser shunts the output terminals and therefore increases the ratio of output to input impedance as the frequency decreases. This circuit could be considered high frequency attenuation just as well as low frequency boost since the operation is the same.

Both circuits of Figure 3 may be made variable in response by using different values of C selected by a switch or other means.

Figures 4a and 4b show the most commonly used means of providing tone control on the upper portion of the audio spectrum. The most frequently used position for these circuits in an amplifier is the grid circuit of one or more of the amplifier tubes.

The circuit of Figure 4a is used quite frequently by radio receiver manufacturers to give a smooth tone

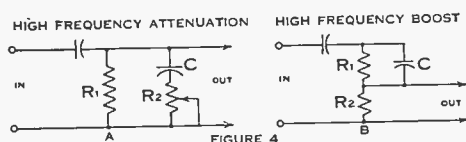
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*Sylvania News, March 1947

AMPLIFIER TONE CONTROL SYSTEMS (Cont'd)

control which operates on the high frequency end of the audio pass band.

Condenser C is usually selected so that when R2 is zero the high frequency attenuation starts at a frequency near the reference point. As R2 is increased C becomes increasingly less effective in bypassing the high frequencies, thus providing smooth control of the high frequency response of the amplifier. In the circuit of Figure 4b both R1 and R2 are usually relatively high values of resistance and C a small capacitance. In this circuit the output at and below the reference frequency is



approximately equal to $\frac{E_{in} R_2}{R_1 + R_2}$ and increases to a value approaching E_{in} as the frequency increases. When properly designed all the foregoing circuits attenuate certain frequencies while maintaining normal response from the reference frequency to the opposite end of the band.

Figures 5a and 5b show circuits similar to the above but applied in a manner which gives a stage gain variation with frequency. This is accomplished by connecting the filter section into a feed-back circuit. Figure 5a will boost the higher frequencies when condenser C is chosen to have a value insufficient to provide an adequate by-pass for cathode resistor R at the reference and lower frequencies. At the higher frequencies C becomes an effective by-pass and thus removes the degeneration from the tube circuit.

When properly chosen values of R1, R2 and C are used in the circuit of Figure 5b, the stage may be made to have considerable inverse feedback at the high frequencies and relatively little at the reference and low frequencies. Condenser C should be so chosen that its reactance at the low frequencies is high with respect to the total impedance in the series-parallel combination of R1, R2 and R. Resistor R1 is used to limit the

HIGH FREQUENCY BOOST

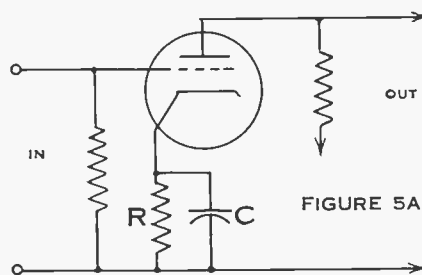


FIGURE 5A

amount of feedback at the high frequencies and R represents the impedance in the driving source or in practice the output impedance of the preceding stage (i.e. Rb and Rp of the preceding stage in parallel). Figure 5b must be carefully designed

HIGH FREQUENCY BOOST

OR

HIGH FREQUENCY ATTENUATION

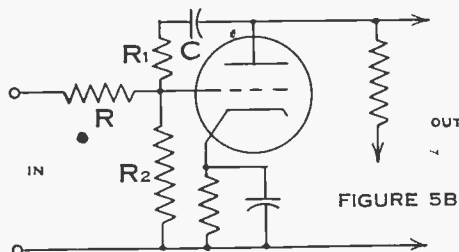


FIGURE 5B

since the R-C network may give sufficient phase-shift to the feedback signal that the stage becomes regenerative at an unwanted frequency.

A word about the position of tone control systems in an amplifier may be in order at this time. Since nearly all of the simple tone control circuits described may be classified as the opposite of the name applied, care must be taken that a low frequency boost circuit is not followed by a high frequency boost circuit which operates by reducing the reference and low frequencies. For example, the circuit of Figure 3a or 3b should not be followed by the circuit of Figure 1a since these two circuits will tend to cancel out and produce flat response. In most phono and microphone amplifiers some bass boosting and for high fidelity some treble boost is desirable. Bass boost may be obtained by using the circuit of Figure 3a in the input grid circuit with the dotted line connected to the input grid and the same circuit, using the top output lead, in the plate load for a pentode input amplifier as shown in Figure 6. Treble boost may be

obtained by using the circuit of Figure 4b in the following grid circuit or that of Figure 5a in the cathode circuit of the following tube. If treble attenuation is desired the circuit of Figure 4a may be used in the grid circuit of the output tube. With push-pull output stages the condenser C and resistor R2 of Figure 4a may be connected from grid to grid. These circuits are also shown in Figure 6.

In designing an amplifier having any of the bass or treble boost circuits described it must be remembered that the overall gain of the amplifier is reduced at the reference frequency. Therefore, sufficient additional gain at the reference frequency must be included in the design to make up for that lost in the tone control circuits. The design of the amplifier must provide also for the additional gain which occurs at the boosted frequencies so that overloading with resulting distortion at these frequencies does not occur.

In the circuit of Figure 6, a slight modification has been added in section A which was not covered in the description of Figure 3A. In Figure 3A the low frequency boost is obtained at the cost of high frequency attenuation which becomes quite extensive as the frequency approaches the high end of the audio band. The addition of the 100 uuf condenser and the 100 K resistor in the circuit limits the high frequency attenuation of this circuit to approximately the attenuation at the reference frequency. The resistor and condenser values used in this circuit are found by calculations of admittances and impedances at each of several frequencies in the band desired, including the reference frequency.

These calculations using the values assigned indicate that the signal applied to the grid of the input tube, assuming constant voltage from the pickup, will be approximately 61% at 50 cycles per second, 33% at 100 c.p.s., 21.5% at 400 c.p.s., and 21.8% at 4000 c.p.s.

Sections B and C in Figure 6 both affect the impedance of the plate load and therefore the gain of the input Type 7C7 tube. The gain

(Continued on next page)

AMPLIFIER TONE CONTROL SYSTEMS (Cont'd)

at each of several frequencies in the desired band is obtained by calculating the plate load impedance at each frequency and interpolating the gain from the R-C data in the new Sylvania Technical Manual. At frequencies of 50, 100, 400, and 4000 cycles per second the gain of the input stage assuming constant grid signal will be approximately 164, 159, 145 and 120 respectively.

Section D has been used in the circuit of Figure 6 to illustrate the most common form of high frequency attenuation circuit. The condenser value has been chosen to give a negligible effect at the reference frequency when the resistance, R15, is set at zero. The plate resistor R13 for the second amplifier has been assigned a relatively low value so that the tube operation approximates a constant current generator. Under these conditions the voltage across the total plate impedance consisting of C11, R14, R13 and the tube Rp in

parallel is equal to IZ with Z variable with frequency. Using the values assigned the signal reaching the output tube grid will approximate 100%, 100%, 95%, 88%, and 35% of the low frequency value at the frequencies of 50, 100, 400, 800, and 4000 cycles per second when the 1 meg. control is set for maximum high frequency attenuation. When the 1 meg. tone control resistance is all in the circuit no appreciable high frequency attenuation will be introduced and the response will be that caused by sections A, B, and C.

By summarizing the results described above it is possible to plot the approximate response curve of the circuit in Figure 6 from the pickup to the grid of the output tube from calculations of the overall

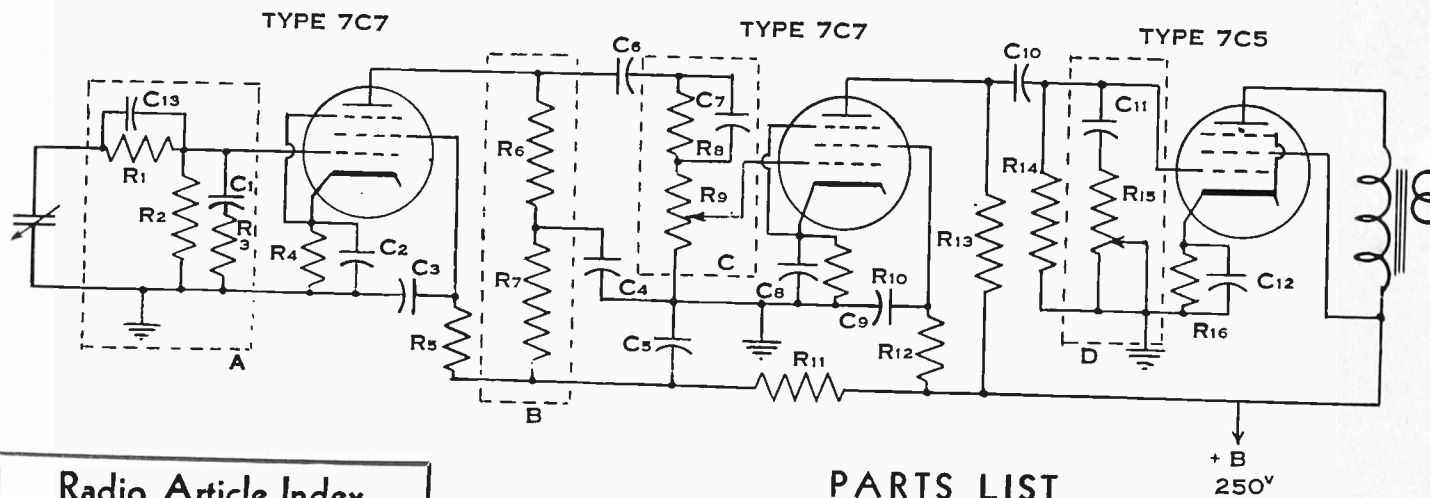
gain at the several frequencies.

With 400 c.p.s. as the reference the response with minimum attenuation in section D would be + 9.4 db, + 3.9 db, 0, and +2.54 db at frequencies of 50, 100, 400, and 4000 cycles per second. With section D set for maximum high frequency attenuation the response at the same frequencies would be +9.83 db, +4.32 db, 0, and -6.17 db respectively.

In all of the above calculations and results reported, all effects of tube and stray capacities have been neglected and it has been assumed that the output from the pickup is constant over the frequency range. Since these conditions do not exist in actual practice the circuit shown in Figure 6 should be accepted as an illustration of the circuits used for tone compensation and control systems, and may require some modification if these exact characteristics are desired in a practical design.

| Frequency | Overall Gain | Attenuation of Section D | |
|-----------|---|--------------------------|------|
| | | Max. | Min. |
| 50 c.p.s. | $0.61 \times 164 \times .5 \times 80 \times 1 =$ | | 4000 |
| 100 " | $0.33 \times 159 \times .503 \times 80 \times 1 =$ | 2115 | 2115 |
| 400 " | $0.215 \times 145 \times .542 \times 80 \times 1 =$ | | 1352 |
| 400 " | $0.215 \times 145 \times .542 \times 80 \times .95 =$ | 1287 | |
| 4000 " | $0.218 \times 120 \times .865 \times 80 \times 1.0 =$ | | 1810 |
| 4000 " | $0.218 \times 120 \times .865 \times 80 \times .35 =$ | 633 | |

FIGURE 6



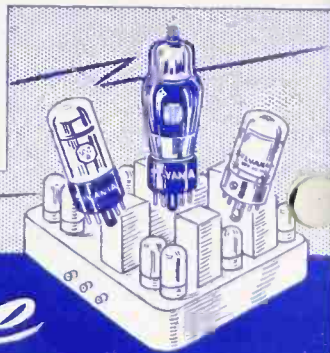
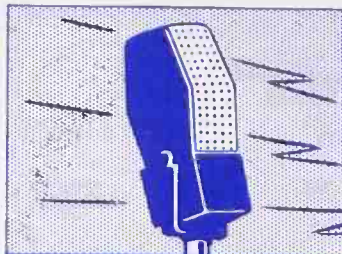
Radio Article Index

The editor has recently found an index service that may be of interest to many servicemen and to all experimenters. It is called the Radiofile and is a cumulative monthly listing of all the important construction and theoretical articles in a selected group of 14 radio magazines. The service costs \$1.00 per year and is published by Richard H. Dorf, 255 West 84th Street, New York 24, N.Y.

PARTS LIST

| RESISTOR | TYPE | OHMS | CONDENSER | TYPE | CAPACITY |
|----------|------------|----------|-----------|---------------|----------|
| R1 | Carbon | 1.5 meg. | C1 | Paper | .001 |
| R2 | Carbon | 3.3 meg. | C2 | Electrolytic | 25 mf. |
| R3 | Carbon | 100,000 | C3 | Paper | .1 mf. |
| R4 | Carbon | 1000 | C4 | Paper | .01 mf. |
| R5 | Carbon | 1.2 meg. | C5 | Electrolytic | 8 mf. |
| R6 | Carbon | 100,000 | C6 | Paper | .05 |
| R7 | Carbon | 150,000 | C7 | Mica or Paper | .001 mf. |
| R8 | Carbon | 250,000 | C8 | Electrolytic | 50 mf. |
| R9 | Variable | 250,000 | C9 | Paper | .25 mf. |
| R10 | Wire Wound | 470 | C10 | Paper | .05 mf. |
| R11 | Carbon | 47,000 | C11 | Paper | .004 mf. |
| R12 | Carbon | 330,000 | C12 | Electrolytic | 50 mf. |
| R13 | Carbon | 68,000 | C13 | Mica | 100 mmf. |
| R14 | Carbon | 250,000 | | | |
| R15 | Variable | 1 meg. | | | |
| R16 | Wire Wound | 360 | | | |

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



THE

Service Exchange

Neat Termination for Cable: At a point about one inch from the end of the shielded wire, double it back sharply. At the "knee" of the bend, take a sharp-point instrument and work a hole through the woven shield, being careful not to break any of the individual strands of the shield. After this hole in the shield (made by displacing the strands) is sufficiently large, insert a small screwdriver between the exposed inner wire and the shield, and pull the inner lead out through the hole. Flatten out the remaining piece of empty shielding, and for connection you will have the convenient equivalent of two wires. This method has the advantages of being neat, sturdy, and of eliminating the necessity of soldering a wire to the end of the shield for making this connection, which sometimes results in breaking down the insulation of the inner lead.—Max McKahan, Buchanan, Michigan.

* * *

Removing Tight Knobs: I sometimes get radios in for repair which have their knobs on so tight that I am afraid of breaking my finger nails in removing them. So I figured out a way of doing it with insulated wire which I have never seen in print. An 18" long piece of #18 or 20 D.C.C. Magnet wire is looped around the knob with about 4" projecting on each side. These wires are then twisted together to keep them from sliding off the knob and these two ends are wound around a pair of pliers or a handle of some kind with which the knob can be pulled off easily.—D. T. Gailey, Worthington, Pennsylvania.

* * *

Poor Tracking on Grunow Model 470 (Chassis C): The circuit shown in Riders Manual (6-1 General Household Utilities) is incorrect since the grid leak has no path to ground. It is doubtful if sets were actually made this way, but I did find some sets which were connected as shown in the book. The correct circuit is obtained by connecting

the 50,000 ohm resistance between the oscillator grid and ground. The padding condenser (A6) goes to ground instead of to the 50,000 ohm resistor.—Albert E. Baez, Philadelphia, Pa.

* * *

Bad Hum in Philco 40-190 Code 121: This trouble is quite difficult to locate and is going to be quite common on account of the increasing age of the radio concerned. This bad hum which increases as the volume control is turned up may be caused by a corroded contact between a riveted soldering lug and the chassis. In this receiver the cathode and filament leads of the Type 41 power tube and the 7A6 detector are connected together with a wire and are grounded with a wire going from 7A6 tube base to chassis through the riveted connection mentioned above. The filament lead from the transformer connects to the base wiring on the socket of one of the 41 tubes. The balance of the tubes in the receiver draw their filament current from the chassis via this riveted connection. If there is an appreciable voltage drop across this riveted connection due to a poor contact, then this voltage drop or hum current is connected in series with the cathode of the 7A6 detector tube with the result that this hum is strongly heard in the speaker. Somebody spent a lot of time on this radio ahead of me and couldn't locate the source.—Donald Slattery, Chadron, Nebraska.

* * *

Philco Model L1201 Poor Reception: The trouble with this model has been in the Z-301 second IF transformer. This transformer is located very close to and directly above the output tube. The transformer is heavily coated with a low melting point wax which soon runs into the trimmers causing extreme loss of sensitivity and selectivity. We realigned some of these sets three or four times before finally giving up and replacing the transformers with one which was not wax impregnated. We happened to have

some war surplus IF transformers which were iron core and tropicalized. These greatly improved the original performance of this radio. However, where these are not obtainable, any good standard IF transformer without the wax would do.—Irving Jackson, Eugene, Ore.

* * *

Signal Tracer: Recently I needed an indicating device to use in "signal tracing" a set I was working on. I happened to think of my R-C Bridge I made following instruction in Technical Section Volume 11 Number 5 of October, 1944. I connected the Bridge chassis to set chassis and using a blocking condenser in series with a test lead connected to common post of the three R and C posts on Bridge panel, thus utilizing the 7F7 amp and diode rectifier of the Bridge I was able to check the progress of a signal through the set very readily. I used the RX 1 meg position on Range Sw and found the eye adjust control enabled me to find a satisfactory operating point for the 6E5.—W. L. McCann, Cincinnati 5, Ohio.

* * *

Philco 46-1201: On ten inch records, rubbing of the guide arms against the record while playing is caused by a manufacturing defect which is easily corrected. This is caused by the slot, at the back of the turn table in which the pin that joins the two guide arms is set, being cut too long. As the arms are moved together or apart the pin can move the length of the slot, but the arms cannot move any further than the length of the slot will permit. Some way or other in some of these machines this slot was cut too long and the arms can move too close together with the result that the rubber rollers on the arms touch the edge of the record. Since there is no adjustment on these machines, the only remedy is to fill in the correct end of the slot with a small amount of solder which will correct this trouble completely.—Donald Slattery, Chadron, Nebraska.

SHOP OF THE MONTH



Ray Moore Radio Service after second face lifting. There can be no doubt, Ray Moore is in the radio servicing business.

SELLING SERVICE IS GOOD BUSINESS FOR SUBURBAN SHOP

Ex-serviceman Builds New Business And Better Health In Rural Community.

Ray Moore moved to Salem, Ore. in 1932 and opened a radio service, business after having been a "ham" for 15 years. He handled new sets, but found that servicing is what really pays off for a dealer of moderate means. Mr. Moore operates his business on a strictly cash basis and maintains only a reasonable stock. By operating this way, his overhead is low and the profit he takes home is high.

"The important thing is to be the best in the business," says Mr. Moore.

During part of the recent war Mr. Moore served with the U. S. Navy as a radarman. Physical disability brought him back to civilian status in late 1942 and he filled in training men and women for the Air Forces. When he went back into radio servicing, his big problem was to find a location for his shop. Rents were high and places were hard to find. Because of his health he did not want to go back to the basement shop of the electrical appliance store where he was before the war. The solution to his problem was finally found when he located a place along a main highway just outside of Salem.

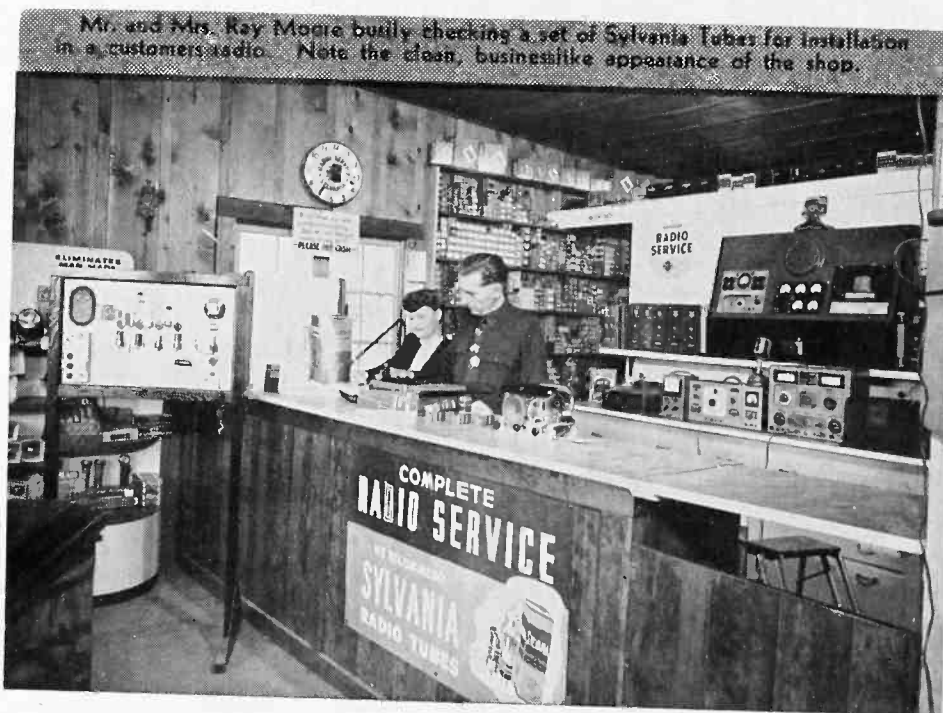
The place had possibilities. There was plenty of traffic along the road, and after a face lifting his shop was ready for business on September 1, 1945. Business exceeded all expectations, especially car radio repairs. Hundreds of new customers noticed the shop with plenty of free parking,

and the business started to pay off. Now, just two years later, the shop and grounds have been paid for and additional remodeling has been completed to make the place more up to date with larger shop space and living quarters. One glance at Ray Moore's shop tells you that he is really in the radio business.

Also active in the business is Mrs. Moore who waits on customers and holds a lead over her husband in selling complete sets of Sylvania Tubes when ailing radios are brought in for repair. Her big stake in the business has been to bring

better health back to Mr. Moore through planning his work and seeing that plenty of recreation in the form of hunting and fishing is squeezed into his schedule.

Biggest leader in tube sales for Ray Moore has been Sylvania Tubes. In fact, he has taken Oregon's slogan, "Keep Oregon Green," and used it to express his feelings about Sylvania tubes. "It certainly will be a pleasure to once again keep our shelves filled with those neat clean looking green and black Sylvania cartons," writes Mr. Moore.



Mr. and Mrs. Ray Moore busily checking a set of Sylvania Tubes for installation in a customer's radio. Note the clean, businesslike appearance of the shop.

IDEA DEPARTMENT

WHAT ABOUT YOUR IDEA?

There are plenty of little tricks to smart merchandising. Perhaps you have tried some, but there are others which may give your business a boost. The "Got An Idea" department has just that thing in mind. It is a trading post for ideas which put spark into your selling. You send them to us; we tell others



about them; you find out new things which will help your business. This system helps everyone get more out of their business.

Drop us a line and tell us about your idea. We in turn will send you a certificate worth \$5.00 in Sylvania merchandising aids, if we publish it in *THE NEWS*. You have nothing to lose and everything to gain. Why not sit down right now and write The Editor, SYLVANIA NEWS, 500 Fifth Ave., New York 18, N. Y. about your idea.

IDENTIFY YOUR WORK TO CASH IN ON WHOLESALE SERVICE

Many servicemen do repair work for large department stores on a wholesale basis. This helps their business but gives the consumer the impression that the larger store has a repair department. It is all right for supplementing your income, but it does not get your name spread around.

Denver Newbauer, Greenville, Ohio has found one way to grab the credit for this business. On return calls for repairs, the customers now

come directly to him. His remedy is this, "In all of the radios we repair for larger stores, we glue our card to the chassis. When the radio needs servicing again they come into our shop from the customers direct. Now we get the credit instead of the large stores."

Mr. Newbauer also used newspaper and theater advertising to get his name in the public eye. His crusading has now paid off and he has all the business he can handle.

PENNSYLVANIA SERVICEMEN DISCUSS PROBLEMS AT CLINIC

The fundamental technical advances which have taken place in the electronic industry as they apply to the technician's needs, as well as the changing pattern for small business, was the basis for discussions when the Federation of Radio Servicemen's Associations of Pennsylvania met on January 11, 12 and 13 in Philadelphia.

The discussions, which were held under the title, The Town Meeting of Radio Technicians, was under the joint sponsorship of the RMA, the Sales Managers Club, NEDA, the Electronic Parts and Equipment Manufacturers and the Mid-Atlantic Chapter, the Representatives, with the assistance and

cooperation of the Pennsylvania group and the Philadelphia Radio Servicemen's Association.

Well known authorities on technical developments, engineering and merchandising spoke on such subjects as FM, television and various phases of business management. The Town Meeting was being programed for its practical usefulness to the technician's earning power, and the convention came as an outgrowth of many areas of confusion in the industry.

Startling new developments in the field of electronics and all types of modern test equipment were demonstrated in their practical application to shop procedures at the Town Meeting.

A FRIENDLY SERVICE PLEASES, SELLS

When Mr. Charles McCleskey, Jr., Baton Rouge, La. has a call to pick up a radio for servicing, he tucks a table model under his arm and leaves it at his customer's home while the old one is being serviced. "These days, a large number of people are susceptible to trade in or straight sales when confronted in this fashion . . . Also, the customer has a radio at all times," writes Mr. McCleskey. Even if the customer doesn't buy a new radio, he is not without one while the old set is being repaired. Besides that, you can make a lot of friends by giving this little service.

DEMONSTRATION HELPS SELL SPEAKERS

K. M. Collins, Avon Radio and Appliance Shop, Dallas, Tex., has sent us this idea which helps him to do more business.

"Install in your work bench, counter or display table a high quality PM speaker. Run leads with test clips to your work bench. It will take just a second to series the voice coils on a set on the bench. When the customer is in the shop show him the difference a good speaker can make. You'll sell speakers, particularly on car sets."

PROVE YOUR WORK WITH WORN OUT PARTS

With so much publicity about the radio man being a gyp W. J. O'Brien, Baltimore, Md. uses an idea which helps to combat this feeling. When Mr. O'Brien repairs a set he returns all the old parts which he removes from his customer's radio in the boxes which held the new parts. "This helps to convince them that they are not being 'taken' and it also satisfies their natural curiosity about 'what's wrong with the dern thing'." When you meet up with a sceptical customer, who thinks he is being victimized, a few minutes taken to explain the trouble will work wonders to convince him that you are on the level.



Final touches are added to the assembled instrument. To these women, a soldering iron is no foreign object.



Frequent inspections during construction help keep the cost of manufacture low and the cost to servicemen within reasonable range.

SCOPE PRODUCTION REQUIRES SKILLED HANDS

Building an oscilloscope is not the work of amateurs. Skilled craftsmen who have the know-how of electrical circuits and topnotch production methods are the basic element of any piece of equipment. Sylvania production workers have that know-how.

Quality is an intangible denominator in a product, but some measurement of it can be made in the workers who produce the product. Sylvania workers are able to translate that intangible into the

finished product to bring to the serviceman the best in test instruments.

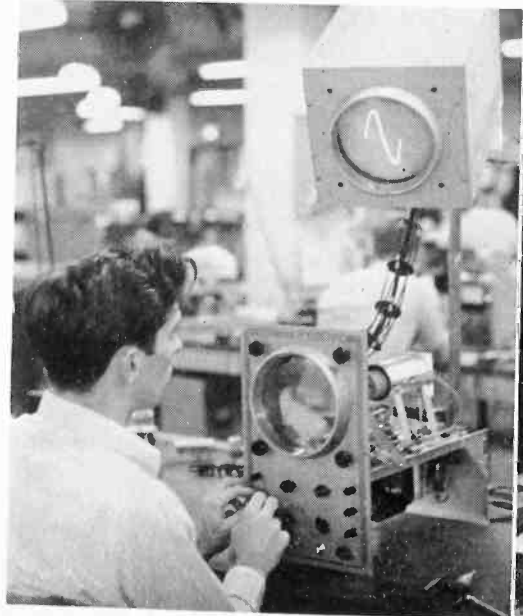
Nimble fingers of comely production workers handle the tiny parts of the instrument with ease. Parts find their way into place in a split second when the fingers of these workers swing into action. Tools are no problem to these workers. They are as familiar with a soldering iron, screwdriver and pliers as any man.

At Sylvania, a finished product is not enough. Experience shows Sylvania employees know their job. To insure top quality, all operations are inspected after they are completed. This procedure eventually saves you, the service dealer, money since a well built instrument is the best answer to economy.

When construction of Sylvania test instruments is completed, simulated tests of all conditions under which the instrument is designed to perform are made.

Stationary cathode ray tube is used to check instrument under actual operating conditions.

Instruments which reveal inaccuracies in final test are returned to engineers who check every part and connection for quality. Note—Polymeter used for testing.



ITALIANS BEAT GAS SHORTAGE WITH MOTOR SCOOTERS

Servicemen who had serious gasoline problems to buck during the recent war can easily sympathize with Erik Pontremoli and Ettore Marchetti of Compagnia Generale Radiofonica in Milano, Italy. Gas is so scarce these days in Italy that even public transportation is limited. Messrs. Pontremoli and Marchetti have beaten the situation and can now be seen dashing about the streets of Milano on motor scooters.

Compagnia Generale Radiofonica is one of Sylvania's Italian representatives. They were visited recently by Walter Coogan, head of Sylvania International Division, while he was on a tour of European countries. Mr. Coogan reports that since the scooters are able to make 35 or 40 miles on a gallon of gas they have helped considerably in carrying on the business activity of the Italian company.



Erik Pontremoli and Ettore Marchetti pose for a picture on their scooters in the street in Milano, Italy. No other vehicles are on the street. Was gas ever that scarce for our radio servicemen?

ON THE COVER

Henry Clifton, Sylvania production engineer looks over a group of 7-INCH oscilloscopes before they are packaged for shipment. See the News section for a picture story on 'scope production.

FACTS & FIGURES . . .

Television Shown Expanding

Latest FCC reports indicate that no less than 54 cities in 29 states are now slated to have television. Tabulation of video broadcast authorizations and applications shows six TV stations licensed, 65 holding construction permits, and 45 applications pending. Eleven of the stations holding construction permits are now on the air under temporary authority.

Phone Recorders Approved

FCC now says it is okay to record telephone conversations, provided, of course, that an automatic tone warning is sounded to indicate to all parties on the wire that the message is being recorded. Another field for servicemen to watch. No strings are attached to who is to install and service the instruments, as long as it meets certain FCC requirements.

FM-AM Set Output Near Million

Production of FM - AM radio receivers in November reached a new high and brought the total output for the first eleven months of 1947 to almost one million. Total sets for the month numbered 1,615,541 of which FM-AM sets claimed 151,244 and television sets 24,135. The television production reflected a 77.9% increase over average monthly production for the year.

DICK TRACY RADIO READY FOR USE

First step toward the wrist radio has been made by the Bureau of Standards. In a recent issue of Life Magazine great note was made of the latest Bureau first, with pictures showing a simulated holdup being reported to headquarters in true Dick Tracy style over the wrist radio.

An outgrowth of research on proximity fuze and the printed circuit, the set was designed and built by Dr. Cleo Brunetti of Bureau of Standards. It utilizes the subminiature tube and the printed circuit which are responsible for its size. Size of the tube in the set is said to be 1 1/8" in length.

Patents for the printed circuit of the radio have been applied for by Bureau of Standards in the name of the U. S. Government.

SYLVANIA NEWS

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Vol. 15, No. 1

JANUARY, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

SYLVANIA NEWS

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R. A. PENFIELD, Editor

FEBRUARY, 1948

EMPORIUM, PENNA.

VOL. 15, NO. 2



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SERVICEMEN REPLY ON LICENSING ISSUE

MIXED SENTIMENTS REFLECTED IN LETTERS

Mixed sentiments from all parts of the country greeted our invitation for servicemen to comment on the licensing problem which has recently come into prominence in New York. Although the majority of people who wrote us were against the measure, many of the arguments submitted which supported it were well thought out reactions.

Although Sylvania prefers to remain neutral on the matter, we feel that it is imperative that servicemen should be encouraged to express their opinions to public authorities and to the RMA. In doing so we believe that the ultimate outcome will be a true expression of what the servicemen want in their own industry. Not to express an opinion is the surest way to open the door and to the shackles of discontent unrest.

Bad Publicity Unfounded

Sylvania knows, as a result of an impartial nationwide survey, sponsored by our own research department, that the radio serviceman is not looked upon generally as a gyp. His business is generally respected and his prices are thought to be reasonable in the minds of the 89% of the American public, while 93% of the people interviewed were satisfied with the last repairs made on their radio. With this belief in mind, we have in the past and will continue to key our national advertising to the reading public to convince them that the few who attempt to discredit the industry are false.

More Opinions Needed

The continued expression of servicemen in regard to their feelings on the matter of licensing is welcomed by the management of Sylvania and we will continue to pass these sentiments along to our readers. No story is complete without both sides of the argument being heard, and it is through this method that we will continue to bring you information on the progress of the health of the radio servicing profession.

Here are some of the comments we have received on both sides of the fence in the licensing issue.

FOR LICENSING...

"... No law is perfect. I would say between the two evils the licensing of radio technicians is preferred." E. J. Stiner, Houston, Tex.

"... I feel that some form of regulation would be beneficial. If licensing is the means of weeding out the 'men from the boys' then we are in favor of it." Savage & Swartz, Los Angeles, Calif.

"... We should like to express our sincere acclamation to such a proposition... any logical and qualified technician would feel no opposition toward such a licensing act... a licensed operator would easily gain precedence to an unauthorized..." W. J. Gerhold, Pittsburgh, Pa.

"... I personally feel that it's one of the best ideas thought of for the benefit of radio servicemen... you have nothing to fear from licensing if you are confident that you 'know your stuff'... it will protect you from fly-by-night clip artists... besides gaining prestige and respect from your customers..." Phil Smith, New York.

...AGAINST LICENSING

"... For years electricians and plumbers have been licensed in most centers of population. Does this mean that they conduct better business relations with their customers? I say no. By and large licensing has been extensively used to limit membership... and conveys little regard for workmanship qualifications..." Joseph A. Kucher, Whitney Pt., N. Y.

"... Licensing in my estimation would not cure anything. A man who knows will not lose and a good job advertises itself..." Leo Branch, Batesville, Ark.

"... I am opposed to any form of licensing because I believe that it will not remove the trouble. As long as there are dishonest men there will always be some means of escape..." J. D. Speicher, Bellerose, N. Y.

"... The man who does work knowingly and does not do it well or best and charges more than perhaps he should, ticket or no ticket, will get no distance at all..." Hammond Matthews, Silverton, Calif.

WILL 1948 BE A BANNER YEAR FOR TELEVISION?

Set makers and broadcasters are predicting that 1948 will be a banner year for video. They are raising great cries that new stations and more sets will be available to the public in numbers as yet unknown. Sounds like a good opening for servicemen and plenty of sales for everyone concerned.

Just how many of the first of the year promises will be made good, no one can tell, but from all indications many new advances will be made. Already 16 stations are on the air under license or temporary authority. Nearly 100 additional applicants are now gunning for video in 54 cities in 29 states.

Politics May Be Boom For Video

Big boom for television is expected at the National Republican and



Democratic conventions in Philadelphia next summer. Already plans are being formulated for country wide promotion, and some predictions have been made for a nation wide hookup to give all large metropolitan areas a chance to view the proceedings.

Predictions of one official of a set manufacturer state that five billion dollars will go into video in the next few years for building and equipping stations, developing networks and purchasing receivers. Other predictions have said that television receiver sales will be about three times those of 1947 with an estimated retail price tag of at least \$200,000,000.

Television, unlike FM, is an entirely new concept of radio reception. By utilizing the eye and the ear, it seeks no bounds in which to operate. Though it is still in the luxury class, it has captured the

(Continued on page G-7)

SYLVANIA NEWS MERCHANDISING SECTION

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A NEAT APPEARANCE SELLS SERVICE

Does your business claim a professional look? Sounds like a silly question but if you stop to think a moment, you'll agree that it is important. There is nothing as convincing to a customer as an appearance which shows you know good business practices. There are so many little details that are important to people who buy.

Your Letters Are Salesmen

Take for instance your letterheads. Do you use attractive stationery neatly typewritten, or do you depend on any scraps of paper you might find when you want to write a letter? Look over your record cards. Can they convince a customer that you are a good businessman? Believe us, it all counts when you are bidding for a customer's dollar.

Not that everyone stops to think about it when he makes a purchase, but it is just something that grows upon you. Look around at other businesses. Where do you like to buy? The answer to that question is your answer.

On the other hand, all your

business need not be plush promotion. People like plain and simple things. A few signs, a clean looking window, an attractive shop, business like communication pieces are the necessary essentials. If you can afford to spend a lot of money on plush looking promotion, well and good. If you can't, do the best you can with what you've got.

Your Shop Should Say "Attention"

Getting a customer to notice you is half the fight of selling him your service. Effective displays, correspondence, neat looking business-like appearances are as much a part of making money for you as knowing how to fix the radios once you have convinced people that you're the man with whom to do business.

Below, for example, are copies of a couple of letters which have been written to the Editor by servicemen. Which is the most convincing? Which demands your respect and gives you confidence in the author and his business? Of course we will all agree that the neat looking typewritten copy is the best. Has that business like look. Convinces

you that maybe this fellow knows his business without even seeing him.

Paint Is Like A New Suit

You'll be surprised what a good broom, a few cans of paint and a little work will do for your shop. You'll marvel at the good job neat business records and attractive stationery will do to give your business "the professional look."



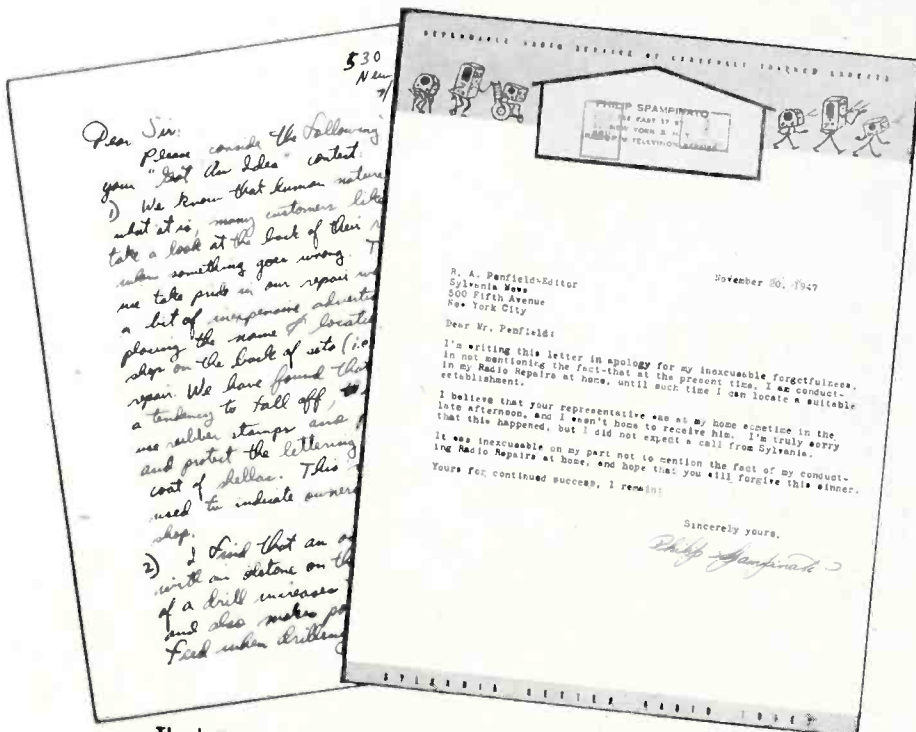
Make the Most of Your Windows

There are many other things that are important in gaining a good impression from would-be customers. Take your store window for instance. Which kind of a window do you like to stop and look at? The Five Cent to a Dollar Store? Certainly not. We usually prefer the neat looking window which has simplicity as its basis. The window that features only one or two items in some interesting arrangement.

Window displays, to have customer interest, should have one theme in mind. Muddles of several ideas only serve to confuse the public and they give up in disgust. Good window displays are powerful selling tools. They should not be spur of the moment inspirations, but you should put plenty of thought into their creation.

Look Into Sylvania Helps

No smart business man can afford to pass up top flight business helps and promotion items. For your convenience and saving, Sylvania has many of these items which will help you give a professional appearance. You might prefer to design your own, but whatever you do, keep in mind that everything you do that the public will notice is advertising. It may be good, or it may be bad. That depends on you. Keep in mind, however, "the impression is the thing" and good impressions sell more service.



The letters you write are important reflections on your business. A neat appearing letter will help your sales.

SERVICE STATIONS FOR SYLVANIA EQUIPMENT

Sylvania is happy to announce that we now have nine Authorized Electronic Service Stations established at Key cities throughout the country ready to serve distributors and servicemen. Defective Sylvania test equipment (not electronic tubes) may be sent to the nearest station without advance authority.

In accordance with our standard RMA warranty, all equipments should be carefully packed to avoid damage in transit and shipment must be prepaid. The service station will thoroughly check every instrument and will return it to you prepaid.

No charge will be made for service within the warranty. If out of warranty, charges will be made direct by the service station.

The establishment of these service stations is another Sylvania aid to good sales and customer relationships.

AUTHORIZED FIELD SERVICE STATIONS FOR SYLVANIA EQUIPMENT

Beverly Hills: Red Man Radio Service, 9732 Santa Monica Boulevard, Beverly Hills, Calif.

Atlanta: Radio Television Company, 688 Ponce de Leon Avenue, N. E., Atlanta, Georgia.

Seattle: Howell's Electric Supply & Service Co., 522 Union Street, Seattle, Washington.

St. Louis: King Radio Service Company, 6642 Delmar Boulevard, St. Louis, Missouri.

Chicago: Master Electric Service, 835 West Washington Boulevard, Chicago, Illinois.

Dallas: Mr. Francis T. Wright, 4449 McKinney, Dallas, Texas.

New York: Home Radio Service, Inc., 253 East 72nd Street, New York, New York.

Newton: Test Instrument Service, 227 Washington Street, Newton, Massachusetts.

San Francisco: Service Radio Wholesale, 1411 Post Street, San Francisco, California.

YOUR BUY IS BETTER WHEN YOU BUY FROM LOCAL DISTRIBUTORS

There is an old saying that "a penny saved is a penny earned." Many of us approve of it, but few of us practice it. We can suggest a good practice, however, which will help bear out this theory. First of all, contrary to many beliefs, there is no bargain basement for good radio components. Good, reliable replacement parts in the sets you repair, purchased from your local distributor is the way to defeat griping customers and work returned for defective parts. When you put a sub-standard tube or other part in a customer's radio, your chances for complaints increase.

Well Known Brands Are Money Brands

The best solution we know to avoid getting into trouble with your customers is to buy quality, nationally advertised tubes and parts from your local distributor. When you buy a name brand like Sylvania you are darn sure of getting a tube that will stand the test. Quality has always been the watchword of Sylvania tubes and that is your assurance of satisfactory tubes in replacements.

You will find Sylvania distributors located conveniently in all areas of

the country. Your Sylvania distributors' prices are always reasonable and fair and his service superior. He is willing to bend over backward to do a favor for you. When you've got a complaint he will give you all the consideration he can. He usually maintains a technical staff to help you with particular problems which you might have. His job is service to you and that is his aim in running his business.

Quick Service Is Important

When you buy from your Sylvania distributor, you can be assured of quick service on your orders. He can supply you with dependable name brand parts. Because you buy from your local distributor, you can maintain a more balanced inventory on the volume items you need, since his salesmen are well acquainted with the demand for particular repair parts. Quick service in a short time assures your customers little waiting time for their radio repairs when their set requires parts which aren't on your shelves. To save yourself time and trouble, buy your supplies from your Sylvania distributor. It will pay you dividends in the end.

OUR EDITOR NEEDS YOUR HELP

It is a funny thing about some jobs. You either need plenty of outside help, or you can glide along on your own initiative. Now there are a lot of people who don't like others butting in on their business. With us it's different. We are darn happy when people tell us what to do.

You see, we feel that anybody who reads our magazine has a right to let us know the kind of stuff he wants to read. We like to have people tell us what they want. Makes our job easier and

helps to weed out some of the trash that might get into print if we didn't know. That's why we like

to receive letters from servicemen. Your ideas today will be our policies tomorrow. In case you've got some troubles, just lick a three cent stamp and put it on an envelope with your comments enclosed. You'll be doing us a big favor as well as yourselves. Our address? Oh, yes, The Editor, SYL-



You can help weed out the NEWS.

VANIA NEWS, 500 Fifth Ave., New York 18, N. Y.

SYLVANIA NEWS TECHNICAL SECTION

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A. V. BALDWIN, Technical Editor

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement

FREQUENCY MODULATION

JAMES H. CANNING
Sylvania Commercial Engineering Department

This is the first of a series of articles on FM to appear in the Sylvania News. These articles are intended to give the serviceman a working knowledge of the general features of FM, with regard to how it works, what its principal characteristics are, and how the FM servicing problem is approached.

It is believed that a comparison of FM with present broadcast AM will make the clearest presentation, so let's look first at some of the "new and different" features of this new method of broadcasting.

FM Uses Higher Frequencies

Present broadcast AM operates in the frequency range of 545-1610 kc, while FM is assigned frequencies in the 88-108 mc range, which is almost 100 times the AM frequencies! Right away we find some significant differences, regardless of the method of modulation.

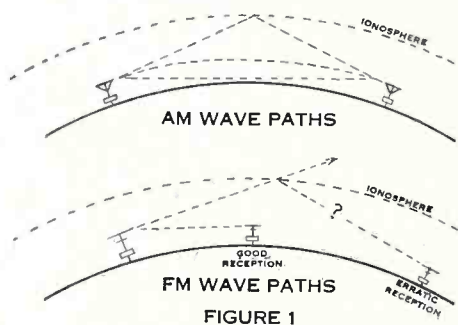


FIGURE 1

First there is the difference in the number of paths for RF energy to follow in going from the transmitting antenna to the receiving antenna at AM broadcast and at very high frequencies. Figure 1a shows the three different paths possible at AM broadcast frequencies, and Figure 1b shows the single reliable path possible for transmission at about 100 mc (the new FM band). This diagram shows why the range of an FM station is normally limited to a line-of-sight path. However, if this path is free from interruptions, reception over quite a long distance is possible. There is no ground wave

at these very high frequencies, but when the line-of-sight path is blocked, reflections from solid objections such as houses and hills often make FM reception possible. Very long distance reception—thousands of miles—is sometimes reported in cases where the sky-wave from a distant transmitter happens to reach a receiving antenna. This sky-wave is a very undependable path, however, and does not give reliable reception.

A second result of the use of much higher frequencies for FM is a certain reduction in natural static. At broadcast frequencies static generated at long distances is received just the same as signals—and from all directions! At high frequencies the line of sight limitation holds for static as well, and only noise generated within a very limited range is picked up. Furthermore, the amount of static generated in nature at 100 mc is very much less than that generated at broadcast frequencies.

Wide Bandwidth Available for FM

Present AM broadcast station carrier frequency assignments are spaced 10 kc apart, thus permitting sidebands of 5 kc only on each side of the carrier, for each station (Figure 2a). This corresponds to a maximum modulating frequency of 5,000 cycles. Higher modulating frequencies, if used by adjacent stations, would cause mutual interference distortion due to overlapping of the sidebands. Of course, if there is no adjacent station on either side with effective signal strength, higher modulating frequencies could be used.

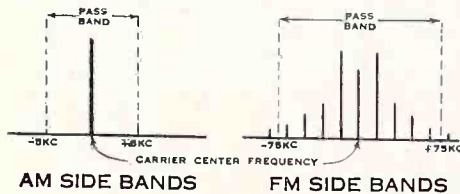


FIGURE 2

In the case of FM, channel assignments have been made 200 kc apart, which is sufficient to permit the handling of a modulation frequency of 15,000 cycles. The sideband picture for FM is somewhat more complex than for AM (Figure 2b), as there are a number of sidebands for each modulation frequency, with an interval between sidebands which is equal to the modulating frequency. A 150 kc channel will effectively handle the sidebands for a 15,000 cycle FM signal, so that the 200 kc channel provided by law is adequate.

It is evident then that it is possible to transmit and reproduce widerange audio signals via the present FM channels, due to the wide band-width available.

Different Way of Modulating

AM signals are transmitted by changing the carrier amplitude an amount corresponding to the loud-

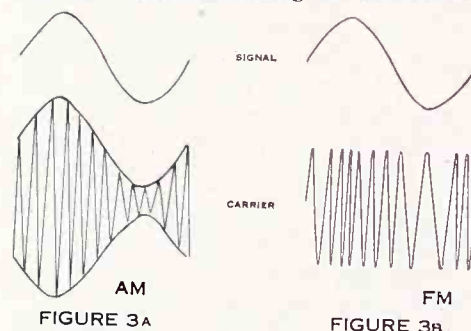


FIGURE 3A

FIGURE 3B

ness of the modulating signal, and at a rate corresponding to the frequency of that signal as in Figure 3a. Thus, the louder the sound, the greater the carrier amplitude will be changed each cycle. The higher the pitch of the sound, the more rapidly will this change take place.

FM signals, however, are transmitted by changing the carrier frequency by an amount corresponding to the loudness of the modulating signal, and at a rate corresponding to the frequency of that signal, see Figure 3b. In this case, the louder

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SYLVANIA'S VACUUM COMPLETE LINE OF TECHNICAL

FREQUENCY MODULATION (Cont'd)

the audio signal the greater the carrier frequency will be changed above and below its center frequency during each modulation cycle. The higher the pitch of the audio signal, the more rapidly this change will take place.

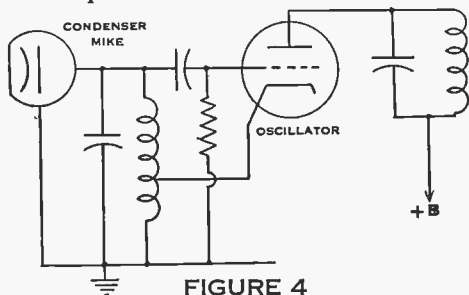


FIGURE 4

Figure 4 illustrates a simple method of accomplishing frequency modulation. In this illustration, a condenser mike is placed across the frequency-determining portion of an oscillator, and the change of capacitance in the condenser mike due to sound waves will change the frequency of the oscillator. The louder the sound the greater will be the change in capacitance during each sound cycle, and hence the greater the change in oscillator frequency. The number of times per second each frequency change repeats itself will depend on the frequency of the modulating sound in cycles per second. At no time will there be an appreciable change in the amplitude of the oscillator output. This is an example of what is accomplished at commercial FM transmitters by more suitable and complex means.

Comparison of AM and FM Receiver Components

The block diagram of Figure 5 compares the basic elements of these two types of receivers, and shows which element in an AM set corresponds to each element in an FM set—if there is one! Later on the important elements of an FM receiver will be discussed in more

detail, but for now just the main points of difference will be noted.

First of all it is seen that the antenna is different. This is because the antenna at FM frequencies is more critical, both in regard to signal strength gain, and possible loss of energy in the lead-in from unbalance and leakage. Considerable gain can be realized in an antenna system of just the right dimensions, and at FM frequencies these dimensions are small enough to be practical. Therefore, we find a special antenna for FM, usually some form of dipole, which is directional, and which must come fairly close to matching the special lead-in and the receiver. If it is correctly installed and directed it will take RF energy from surrounding space and pass it on to the FM receiver efficiently.

Next it is noted that most FM receivers have an RF stage, in order to build up signal strength, which provides image rejection and prevents the oscillator from radiating. Following the RF stage is the converter, which is preferably an oscillator-mixer combination using triodes, such as the Type 7F8 duo-triode. The function of the converter is exactly the same as in an AM set, converting the incoming FM signal, which is varying around a center frequency of the order of 100 mc, to an FM signal varying around a center frequency of 10.7 mc (the standard FM intermediate frequency). This signal then passes through the IF amplifier (usually two stages), which must have approximately 150 kc bandwidth to amplify the frequency deviations occurring on the received signal.

Removing Unwanted AM from Incoming FM Signals

Next we find a new device, the limiter, which has no counterpart in AM receivers.

When a frequency modulated signal is picked up and amplified, it will be found to have collected some amplitude variations resulting from static, multi-path reception, etc. Now if a device is placed in the receiver to clamp a ceiling on the amplitude of incoming signals, no amplitude variations above a certain level will be passed on (Figure 6).

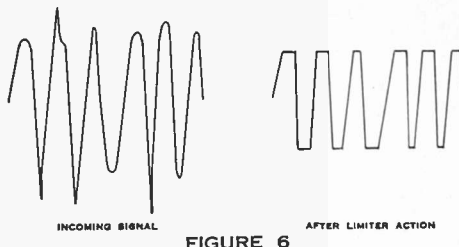


FIGURE 6

This limiting action results in a very marked reduction in noise, providing a sufficiently strong signal is being received. The limiter is usually an IF stage with a grid-leak biased tube with low plate voltage, which saturates easily and clips both positive and negative peaks at the limit set. It is placed just ahead of the discriminator, and passes frequency variations without alteration. Incidentally, this tube is the last one in the line-up to react to amplitude changes, so the limiter grid current is used as an amplitude indicator for making RF and IF alignment. We cannot use an output meter across the voice coil to align an FM set!

The FM Detector

After passing through the limiter stage, a device which changes frequency variations into amplitude variations is used in FM receivers to recover the audio signal. There are many types of circuits used, such as balanced discriminators, ratio detectors, locked-oscillator detectors, super-regenerative detectors, and pulse-count detectors. Some of these circuits are capable of quite good limiting action in themselves,

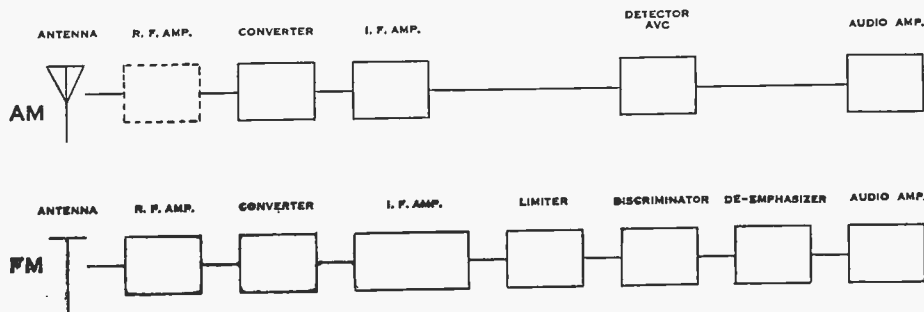


FIGURE 5

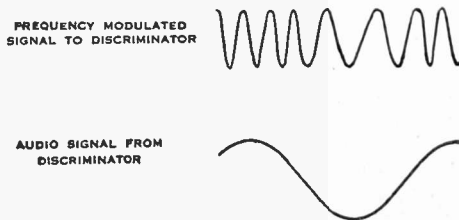


FIGURE 7
(Continued on page 8)

CRYSTAL DIODE AND SELENIUM RECTIFIER POLARITY

There have been numerous requests for an explanation of the polarity markings on Sylvania crystal diodes. Figure 1a shows the markings as they appear on the Sylvania Type 1N34, and inside the

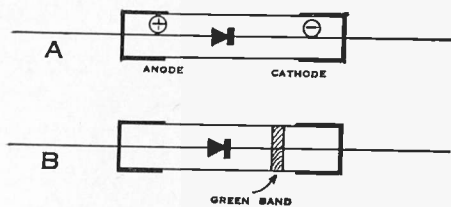


FIGURE 1

body of the crystal is shown the symbol used to represent it in circuit diagrams. This symbol is drawn to conform to the accepted standard, which calls for the arrow to point in the direction of lower resistance. This of course will be in the opposite direction from the greatest electron flow.

On some of the early Sylvania crystal literature this standard was not followed, but since this has been adopted by the rest of the industry we will be using it in any descriptive material dated since October 1947.

Recent production of Sylvania crystals in the 1N34 style will be marked with a green band and the letters CATH to indicate the cathode end. See Figure 1b. The polarities for a germanium diode

are not the same as those for a silicon diode.

The germanium crystal acts as a rectifier because it passes current more readily in one direction than in the other. It is marked with the DC polarity which would have to be applied for maximum current flow (Figure 2).

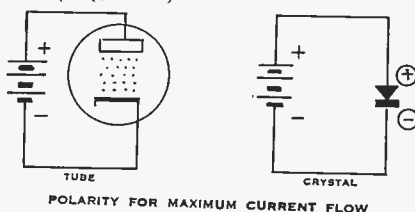


FIGURE 2

It happens that the polarity as read in any circuit using a crystal rectifier will actually be just the opposite from the markings on the crystal, as in Figures 3, 4, and 5.

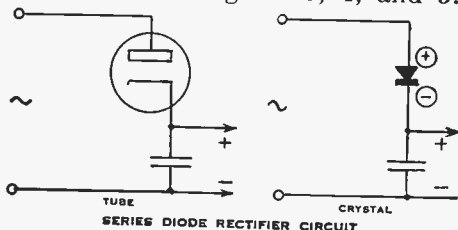


FIGURE 3

Thus it is seen that the terminal marked + on the crystals and shown as → on the circuit diagram can be considered as the "plate" of the

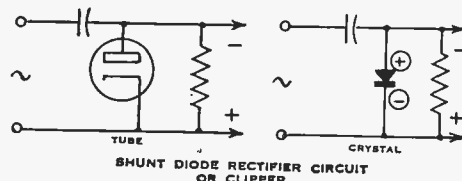


FIGURE 4

crystal diode, and the terminal marked - on the crystal and shown as | on the circuit diagram can be considered as the cathode.

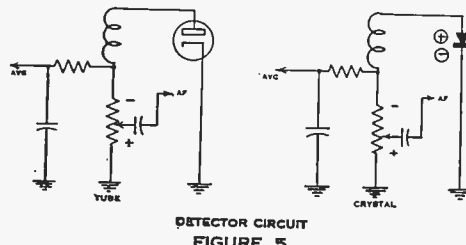


FIGURE 5

Sylvania selenium rectifiers are now marked with CATH printed on the cathode side of the unit. In a rectifier circuit, this would be the positive reading terminal, just the same as if it were the cathode of a vacuum tube.

It is easy to see how some confusion could arise from these markings, but they make good sense when looked at as we have in this article. We hope we have settled any doubts regarding the connections to these useful little crystals.

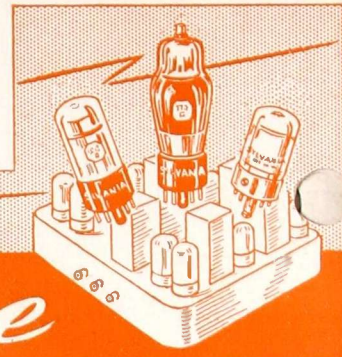
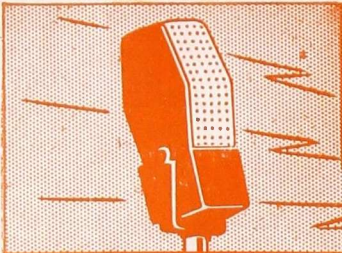
RECENT ADDITIONS TO THE TUBE CHECKER CHART

The latest additions to the Sylvania Type 139-140 tube checker chart are listed below. Instructions for adding the 9 pin socket required for the 6T8 etc. are given on the following page.

| TYPE | A | B | C | D | E | F | G | TEST | TYPE | A | B | C | D | E | F | G | TEST |
|------------|------|---|------|---|---|-----|----|------|------------|------|----|----|---|---|----|----|------|
| 1B3GT/8016 | 1.4 | 0 | 2457 | 0 | 8 | — | 78 | T | 12BD6..... | 12.6 | 0 | — | 0 | 4 | 36 | 41 | X |
| 2D21..... | 6.3 | 0 | 4 | 0 | 5 | — | 20 | Y | 12SW7..... | 12.6 | .0 | 7 | 1 | 5 | 8 | 46 | W |
| 2E26..... | 6.3 | 0 | 36 | 0 | 8 | 024 | 27 | Y* | | | | 78 | 1 | 2 | — | 56 | T |
| 6AL7GT.... | 6.3 | 0 | — | 0 | 1 | 5 | — | Y** | 12SX7GT... | 12.6 | 0 | 78 | 1 | 3 | 3 | 49 | X |
| 6AS7G..... | 6.3 | 0 | 78 | 1 | 3 | 3 | 20 | Y | 19T8..... | 12.6 | 0 | — | 0 | 4 | 9 | 50 | T |
| 6BD6..... | 6.3 | 0 | — | 0 | 7 | 5 | 20 | Y | | | | | 3 | — | 50 | T | |
| 6BF6..... | 6.3 | 0 | — | 0 | 4 | 36 | 41 | X | | | | | 2 | — | 50 | T | |
| | | | | | 3 | 3 | 65 | X | 26A7GT.... | 25 | 0 | 68 | 2 | 2 | 2 | 29 | W |
| | | | | | 4 | — | 57 | T | 1274..... | 6.3 | 0 | — | 0 | 1 | — | 22 | Y |
| | | | | | 5 | — | 57 | T | 5679..... | 6.3 | 0 | 4 | 0 | 3 | — | 22 | Y |
| 6BG6G..... | 6.3 | 0 | — | 0 | 8 | 47 | 27 | Y | | | | | 5 | — | 55 | T | |
| 6T8..... | 6.3 | 0 | — | 0 | 4 | 9 | 50 | T | X6030..... | 2.5 | 1 | 57 | 1 | 3 | — | 72 | V |
| | | | | | 3 | — | 50 | T | | | | | | | | | |
| | | | | | 2 | — | 50 | T | | | | | | | | | |
| 12AU7..... | 12.6 | 0 | 5 | 0 | 1 | — | 50 | T | | | | | | | | | |
| | | | | | 3 | 7 | 60 | U | | | | | | | | | |
| | | | | | 1 | 3 | 60 | U | | | | | | | | | |

*Meter should read zero.
**Tube should glow.

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



THE Service Exchange

Kadette Model P Weak: If you encounter low volume and sensitivity in a Kadette Model P, and isolate the speaker by the substitution method to be the definite trouble, remove the speaker and test the permanent magnet. If it is strong, then remove the length of sleeving from the two speaker wires, and run them through separate pieces of spaghetti, to the plate and screen connections of the output tube (38). I found that the wires get kinked and the thin insulation rubs off, causing a partial short, lowering the volume. When I ran the wires through separate pieces of spaghetti, the volume was restored to normal.—Harold Garrett, Sedalia, Missouri.

* * *

Clicking in 1946 DeSoto Radio: 1946 DeSoto Automatic Third Gear Solenoid and Relay will cause a distinct clicking in the radio when the car is running over 30 M. P. H. Install a .5 mfd. condenser (generator type) from the heavy yellow lead to ground, making sure you have a

good clean ground with all paint and dirt removed, on the solenoid relay. This relay is located on the left fender apron inside the motor compartment, next to the generator relay.—Charles R. Couch, Jr., Gainesville, Florida.

* * *

1946 DeWald Model A-501: I have come across several of these sets with distortion and rattle on high volume. After the usual tracing and testing, I found the speaker to be at fault. This type of speaker is almost impossible to replace as it is also used to support the dial frame and most of them, because of the size of the frame around the magnet, will either be too high or too low for the dial to mount properly. Solution: Tap the magnet a little at a time and in different places, each time trying it out. I have found it to relieve the situation in about 2 or 3 taps on the magnet. After the correction is made, apply cement wherever the magnet touches other objects. This is also true with other P. M. Alnico

V speakers because of the objects between the magnet and the cone.—Sherman J. Stiegel, Chicago, Illinois.

* * *

General Electric E105—Very poor Sensitivity: This set may have very poor sensitivity and no colorama tuning after replacing shorted .05 by-pass condenser (C25) on primary of first IF transformer.

If no plate voltage on 6A8 oscillator tube, remove IF transformer from can and replace the 2200 ohm resistor which is hidden inside. It will save hours of searching.—Robert A. Traub, Rochester New York.

Frequency Modulation (Cont'd)

and so require no limiter stage. All, however, have an audio output whose intensity varies with the amount of frequency change of the signal, and whose frequency corresponds to the rate of frequency change of the signal. (Figure 7).

From the discriminator, which corresponds to the AM detector in a general way, the signal goes through a simple low-pass network called the de-emphasizer, to the audio amplifier (Figure 8). This network serves to remove excessive emphasis on the high frequency audio signals, as this was deliberately introduced at the FM transmitter to over-ride noise, which is predominantly high in pitch in FM receivers.

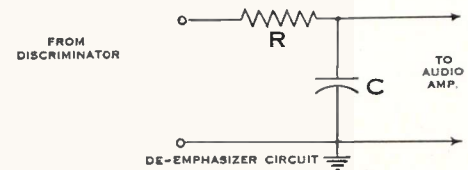


FIGURE 8

Now, if the audio portion of the receiver (including the speaker) is flat to 15,000 cycles, the full possible range of FM can be realized. If the audio system is not adequate, much of the inherent advantage of high fidelity reproduction will be lost.

The next in this series of articles on FM will deal with antennas.

YOU CAN NOW MODERNIZE YOUR SYLVANIA TUBE CHECKER

For those who want to keep up-to-date and add the new socket to their present checkers, Sylvania has made available a 9 pin socket kit containing the necessary instructions, and color coded wires enabling you to do a professional job. The kit will be sold only through Sylvania distributors at a cost of 75c. Do not send orders to the factory.

If you do not wish to purchase the kit any 9 pin socket may be installed as follows:

- (1) On the Type 139 remove the left end block and bottom cover plate; on the Type 140 remove the panel assembly from the cabinet.
- (2) Remove the dummy socket located on the left-hand side of the panel.
- (3) Install the 9 contact Noval socket in the vacant position with #5 contact towards the top of the panel.
- (4) Connect the leads as follows:

| 9 PIN NOVAL SOCKET CONTACT NUMBER | SOCKET (OR SWITCH) AND CONTACT NUMBER | LEAD LENGTH AND COLOR |
|-----------------------------------|---------------------------------------|------------------------|
| 1 | 4-Contact Socket 2 | 3" Red |
| 2 | 5-Contact Socket 3 | 4" Green |
| 3 | 7-Contact Miniature Socket 6 | 3 1/2" Brown-White Tr. |
| 4 | 4-Contact Socket 4 | 2 1/4" Black |
| 5 | 4-Contact Socket 1 | 2" Brown |
| 6 | 6-Contact Socket 4 | 6" Black-Red Tr. |
| 7 | 5-Contact Socket 4 | 3" Yellow |
| 8 | B-Switch Top Cap Lug | 7 1/2" Black |
| 9 | 7-Contact Miniature Socket 5 | 6" White |

SERVICEMAN OF THE MONTH

FATHER BUILDS BUSINESS FOR VET SON

Radio is nothing new to Henry Miller who began to follow the industry when it wore knee pants. Radio became his hobby and as it grew, his knowledge of it grew. He made many of his own parts and tried many of the old time experiments of the early radio fans.

When the war came along, Mr. Miller decided that if he was drafted, he didn't want to be in a labor battalion as he was in the first war. Knowing some trade would be helpful if he did get drafted, Henry Miller spent his evenings from 11 P.M. to 2 A.M. going to electronics school. "Might as well make use of his previous knowledge in a field that he liked," he decided.

Well, like many other men who were rounding the corner on the age limits, he was never drafted. His radio knowledge, however, didn't lose its value. Mr. Miller took on the job of servicing radios in his basement in his spare time. It was a tough job trying to get business under these conditions, but he had a plan in mind and his idea soon began to pay off.

Today, Henry Miller has a business which has earned him a good reputation as well as supplementing his income. His main object is not just to add a few dollars to his income, but to develop a growing business for his veteran son. His boy is now going to electronics school on the G. I. Bill after doing a turn in the army. When his schooling is completed, he and his father plan to set up their radio repair business on a full time basis.

With an advertising program like that developed by Mr. Miller, he and his son can hope to do a big radio servicing business. For father and son, there will be plenty of radios to repair, because they know that you have to advertise to make a go of the servicing business.

MAIL CAMPAIGN BRINGS RESULTS FOR BROOKLYN SERVICEMAN

Ask Henry Miller of Brooklyn, N. Y. if you don't believe that "proof of the puddin' is in the eatin'." We had a pleasant chat with Mr. Miller recently and found out that a lot of ideas that we have about direct mail campaigns have done great things for his business. He has changed our ideas a little, but the basic plan of a direct mail campaign still sticks.

Mr. Miller's campaign is a continuing one which demands customer participation. It all pays off too, and Henry Miller has the figures to prove it. Any serviceman can do the same thing and can expect good results. "I think it would work out swell for any fellow in a small town," said Mr. Miller.

As we have suggested many times, Mr. Miller has laid out the area he wants to cover. With that in mind he goes to his nearest election board where he obtains the names of registered voters in that area. It's a simple matter to get plenty of names, because the area he covers is largely residential.

Each month a mailing is made to 500 persons on the list. His mailing piece is a simple one cent postal card with a return card attached. This way, it is not difficult for a customer to request that his radio be serviced. "You see," says Mr. Miller, "people are lazy. If you want to do business with them, you've got to make things as easy as possible for them."

Still think that it's not such a hot idea? If you do, could you use 20 to 25 more customers a month if they only cost you ten dollars

in promotion? Mr. Miller thinks so, and he thinks his idea is worth the time and money he spends on getting more business. You see, he's getting his name spread around. Many of his customers are people who aren't on his mailing list, but who have heard about him from others who have received his convenient little cards.

RADIO - SERVICE - REPAIR

YOUR RADIO, PHONOGRAPH OR RECORD-CHANGER MAY NEED INSPECTION OR REPAIR, SOME DAY. PUT THIS CARD WITHIN CABINET OF THE RADIO, SO THAT IT WILL BE HANDY FOR YOU TO MAIL THE ATTACHED REPLY CARD WHEN YOU NEED ME.

HENRY MILLER
3224 FILLMORE AVE.
BROOKLYN 10, N. Y.

PHONE—ES. 6-6898 AFTER 6 PM AND I WILL CALL FOR AND DELIVER ANY REPAIR JOB AT REASONABLE RATE. NO CHARGE FOR PICKUP OR DELIVERY.

HENRY MILLER
3224 FILLMORE AVE.
BROOKLYN 10, N. Y.

CALL AND PICK UP MY SET ANY EVENING.

NAME.....

ADDRESS.....

PHONE.....

ALL WORK GUARANTEED—ONLY FIRST CLASS REPLACEMENT PARTS AND TUBES USED ON ALL JOBS.

Postal Card and Customer Return used by Henry Miller of Brooklyn.

Another thing that helps out is the fact that many families in his territory are working people. Don't have time to look around for a repair shop when they need work done. It is easy for them to just mail Mr. Miller the card and have him pick up their radio at their convenience.

In a nutshell, Mr. Miller's idea is that of service to the customer. By constant plugging he is able to keep them aware of him and it is an easy matter for a person with a sick radio to get a repairman. It is all done by signing their name. Works swell and customers appreciate it because as you already know, "People are lazy."

Report On Town Meeting Of Radio Technicians



John G. Radner, secretary, and Dave Krantz, president, of Pennsylvania group pause for SYLVANIA NEWS camera during Town Meeting.



W. L. Parkinson, chairman of RMA Service Committee outlines steps RMA has taken to combat licensing of servicemen.



Col. J. H. LeBrum, presiding speaker of Town Meeting, calls for comments from convening radio technicians.

CODE OF ETHICS

Presented to Technicians and RMA for Adoption at Town Meeting by Representatives of 26 Service Organizations.

In order that I identify myself and my business as a member of the radio-electronic technicians' profession, and in order that I may assist in maintaining the radio-electronic industry upon the highest possible level—thus insuring public confidence—I hereby subscribe to the following Code of Ethics:

- I I will at all times, without any exceptions, perform my work to the very best of my knowledge and ability. In addition, I will make a sincere effort to improve my knowledge of the technical and business requirements of my profession, thereby enabling me to render still better radio-electronic service.
- II I will conduct myself and my business in an honest and straightforward manner, meriting and inspiring the confidence of my customers.
- III I will, whenever practicable and desirable, prefer to use original factory replacement parts. In other cases, I will use replacement parts known to be of equal or better quality, thus insuring satisfactory performance.
- IV I propose to charge a just and fair price for all professional services rendered.
- V I will exercise all reasonable care in handling my customers' property.
- VI I will guarantee all radio-electronic service performed which has been authorized and for which payment has been received, for a period of ninety (90) days.
- VII I will engage only in fair and ethical practices recommended and approved by the radio-electronic technicians' profession as being conducive to public confidence.



Richard Guilfoyle warns of pitfalls in television service when he tells "I Spent \$91,000 to Earn \$90,000 in TV Service."

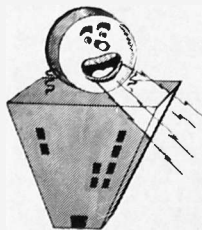


Code of Ethics prepared by representatives is read to group by John G. Radner. W. L. Parkinson is seated.



The serviceman's case is presented to W. L. Parkinson by Dave Krantz, proxy of PRSMA and Pennsylvania serviceman.

WHO EVER CALLED IT SILENT LIGHT? BEAM CARRIES SOUND HALF MILE



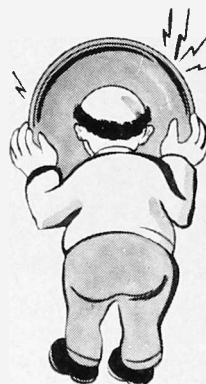
Sometimes we wonder how easy this life of ours is going to become. Everyday you read about new inventions or applications of new ideas which make things a good bit more simple. Take for instance this little item we read in the papers a few weeks back.

The radio editor of a Chicago newspaper recently sent in his story to the desk by means of an invisible searchlight beam. We have all seen these demonstrations take place in a room, but this is the first time we've heard about it happening over a distance of a quarter of a mile.

Known as the talking lamp, this device was first developed during the war for the navy to enable secret two way conversation between ships

and shore. The talking lamp emits invisible infra red radiations which are beamed toward a sensitive receiver. The waves are picked up by a photoelectric cell and are reproduced into spoken words.

At first reading we were a little interested to know if the present telephone communication was on shaky ground. We were convinced otherwise when we realized that we would have a tough time tuning in our wife's beam when we wanted to tell her we would be late for dinner. We have decided to stick to the old wire system and leave the light to the navy and the newspapers.



SERVICE CONFLAB COUNTED HUGE SUCCESS

Although official results of the Town Meeting of Radio Technicians, held recently in Philadelphia, were not available when this issue of THE NEWS went to press, the program presented was generally considered a success by those in attendance.

Some 1200 technicians from 23 states gathered to thrash out their problems at the meeting. The program presented was practical as well as helpful in all phases of the servicing business. The sessions of the three day meeting provoked much comment both pro and con from the technicians.

Following the presentation of the prepared papers the floor was open for discussion of the subjects presented. Television and FM servicing took a large place on the program which dug into the finer details of problems encountered in this type of servicing.

One unique feature of the meeting was the televising of the entire proceedings. For those who did not wish to view the proceedings in live form, large screen video sets were installed in adjoining rooms where many choose to obtain their schooling in the subjects discussed.

Further details of the Town Meeting will be presented in future issues of THE NEWS. Questionnaires answered by the attending technicians will give the basis for planning similar meetings in various parts of the country.

WILL 1948 BE A BANNER YEAR FOR TELEVISION

(Continued from page G-6)

interest and enthusiasm of the public in the areas where it is now an available service.

New Profits For Servicemen

For servicemen, video is a new field which offers many opportunities for increased earnings. Complicated installation problems require expert knowledge. Maintenance of television receivers are also fields of promise which can be lucrative to servicemen. To meet the demands television will make on servicemen, much effort is required if technicians are to exploit this market to the best of their ability.

Servicemen have an ax to grind in the future of television. In areas where video is now a reality, servicemen were caught short in having only a limited knowledge of its problems. To assure success in television reception many manufacturers developed their own service companies for the installation and service of sets, much to the chagrin of the local servicemen.

It was a situation that couldn't be ignored. Reluctance of servicemen to acquaint themselves with the new industry seriously hampered their earning power. They were caught with their pants down.

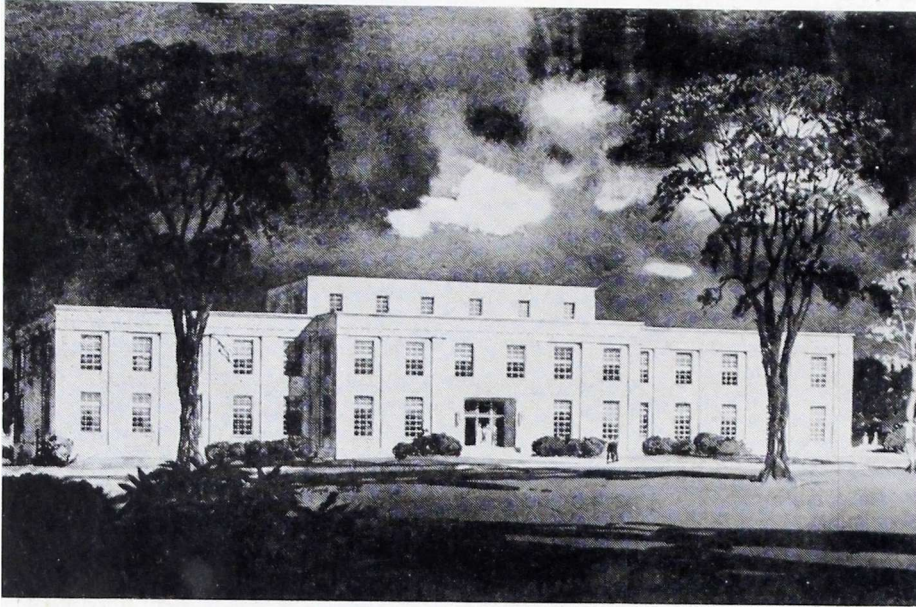
Study For Technicians Important

In areas where television is still a plan on paper, service dealers and technicians can jump the gun and get in on the ground floor when the new industry becomes a reality. Efforts should be made for schools and further study of the intricacies of the new industry. Complete study of the necessities of successful television set servicing and installation are important if servicemen are to earn their share of the money which will be spent. When people spend several hundred dollars on television for their home, they will expect a great deal in return. Experts will help them realize the best from their investment, but doodlers, who wait, will discourage its growth. Time spent now in preparing for your part will be returned to you in profits later.

RMA AUTHORIZES FIVE CLINICS ANNUALLY

Success of the experimental Town Meeting of Radio Technicians in Philadelphia has prompted the RMA Directors to approve continuation and expansion of the plan. The board has approved a recommendation that similar clinics for radio servicemen be held in five major cities annually. Details for plans for new Town Meetings are being worked out by the Industry Coordinating Committee. The Town Meeting program will feature the latest technical information on the servicing of television and FM receivers and business techniques.

SYLVANIA STARTS CONSTRUCTION AT ELECTRONIC RESEARCH CENTER



Above is an artist's sketch of the first building in Sylvania's electronic research development at Bayside, L. I. The first building of a group to be known as Sylvania Center, will, when completed, house a

physics laboratory and will be used for long-term development of electronic equipment, television, FM and radar. Completion of the first building of the Center is expected early next summer.

EIGHT OF TEN 1947 PASSENGER CARS RADIO EQUIPPED

Firm demand for new passenger automobiles now being produced at the 1941 rate, and the increasing number of new car buyers taking a radio as original equipment, will provide a good market for auto radios during 1948, according to Frank W. Mansfield, director of sales research for Sylvania.

Stating that only slightly fewer passenger cars will be produced in 1947 than were produced in 1941, Mansfield said that the number of radio equipped new cars will increase to approximately 84% in 1947, a big gain since the last prewar year. During 1947, he continued, auto radio production will hit a new high of approximately 2,860,000 units, a gain of approximately 265,000 over the previous 1941 record.

This trend of auto set sales for new cars, Mansfield continued, does not necessarily mean that radios are being forced on new car buyers. The largest increase in original equipment auto radio sales occurred during 1939 through 1941. During those years the number of new cars sold with a radio increased from 44% in 1939 to 59% in 1940 and to 71% in 1941.

Today almost all auto radios produced are sold to auto makers, he said, stating that the industry produced 780,000 units in 1934; 1,750,000 in 1937; and 2,600,000 in 1941. The only peacetime years which did not represent progressive increase in production were: 1938 with 800,000 units; 1939 with 1,200,000; and 1946 with 1,600,000 was still low because of reconversion.

ON THE COVER

Television, baby of the communications industry, is on the lips of every serviceman. To some, its problems are common knowledge, to others, a shroud of mystery still surrounds it. Video is an industry still containing many bugs, many of which are the serviceman's problem. For a report on what industry leaders are thinking about television, see pages G-6 and 7. See also RMA plans for service clinics on page G-7.

SYLVANIA NEWS

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Vol. 15, No. 2

FEBRUARY, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment



SYLVANIA NEWS

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R. A. PENFIELD, Editor

MARCH, 1948

EMPORIUM, PENNA.

VOL. 15, NO. 3



In This Issue

NEWS

ARSNY MEETS THE CHALLENGE

MERCHANDISING

NEW WINDOW DECAL

TECHNICAL

FREQUENCY MODULATION

ARSNY MEETS THE CHALLENGE

When New York City councilman, Stanley Isaacs recently drew up a bill calling for licensing of radio servicemen, a group of New York technicians became upset. They knew their profession wasn't lily white, but they also knew that there were a lot of hard working radio men around who could do a good job without being licensed. Their first move was to get a good serviceman's organization operating to prove their point. **Associated Radio Servicemen of New York, Inc.** was the result.

The job was a big one, but these men were proud of their business and they didn't want government red tape to tie them down. The organization grew big overnight. They had a purpose and they weren't going to lose sight of it. These men were determined to save their business from the white-washing it had been getting for the past several years.

It hasn't been an easy matter to get the New York servicemen to meet this problem. In spite of the compactness of New York it was a tough job trying to get men interested in protecting their business. After a whirlwind of meetings during which the membership of the group gradually grew to more than 300, a plan of attack was finally agreed upon.

ARSNY Fights Back

Councilman Isaacs proposed bill stirred up much comment. Newspapers were quick to pick up the flag of smearing the servicemen. The new group was ready to fight back. When anyone attacked the the radio servicemen publicly, ARSNY got radio time to answer the charges. When the problems of the servicemen were understood the bad publicity ceased.

To date, no further action has been taken on the licensing issue in New York. The Associated Radio Servicemen of New York have successfully had the bill shelved and are now embarking on a constructive program for the mutual benefit of its members.

To become a member of the New York organization is not just a matter involving a few dollars in dues. The group has set up high standards for membership. To be accepted as a member of this organization a technician must meet



IDENTIFYING DECAL OF ARSNY MEMBERS

the following requirements:

1. Have at least four years of full time practical experience in the maintenance and repair of radio-electronic equipment, and
2. Satisfactorily pass an advanced theoretical and practical examination in radio-electronics.

Apprentice Program Beneficial

In addition, the group has worked out a program with the Teachers Guild of New York which provides that students under training for technicians must work as apprentices for a certain period under a bonafide member of ARSNY. These men are granted apprentice rights in the organization while in training.

Other benefits for technicians which are under development by the ARSNY are designed to build the prestige of the radio technician in the eyes of the public. For the furtherance of technical knowledge, the planning committee is working on a program of speakers to bring up-to-date information to the technicians. The organization is plugging the idea of presenting an itemized bill for every job performed. This, the group feels, will help to make the public realize that the serviceman is not just a tinker. It will also help to eliminate the discrepancies when complaints are made.

Complaints Handled Efficiently

Every effort is now being made to eliminate any doubt in the customer's mind that he is being "taken" when he gives up his radio for repairs. Complaints are being solicited throughout the metropolitan area in an effort to disprove the bad publicity which servicemen have received. In every case a complaint made to the organization has been adjusted to the satisfaction of all concerned.

To handle complaints and carry out the business of the organization they have created a central office in mid-town New York. Here complaints are received, and locations of members are given to people who request information of a reliable serviceman. Calls are forwarded to a shop near the caller and reliable work is guaranteed.

ARSNY is currently working on a plan by which local radio stations will channel calls to their office. Spot announcements will be made at various times to get the public acquainted with the organization's program. To further improve their stature in the eyes of the public the organization has prepared a decal which will be placed on the window of each member's shop. Stiff requirements have been established for owners who display this identifying mark. To have the decal placed on his window the technician is required to meet minimum standards involving test equipment and general shop appearance. The organization realizes that certain equipment is necessary if proper attention is to be given to servicing of FM and television receivers.

Radios For Hospitals

Next on the program will be a campaign to repair old radios to be placed in veterans hospitals in the New York area. The work will be done free of charge by members of the organization.

The Associated Radio Servicemen of New York is a progressive organization which is destined to do much to benefit the radio servicemen. Servicemen have been kicked around by too many for too long and this type of organization will do much to raise the general standards as well as give them their rightful place in the business world.

SYLVANIA NEWS MERCHANDISING SECTION

Copyright 1948, Sylvania Electric Products Inc.

Your Customers Read New Radio Fan Magazine

1948 ADS FEATURE NEW WINDOW DECAL

Featured prominently in Sylvania's 1948 advertising will be the new decal comania pictured below. By placing a facsimile of this decal in all of our advertising, we are going to tell the public that this sign is the hallmark of radio service. It is of course offered free to radio servicemen using Sylvania tubes.

This decal is an eye catching bit of identification for you. Its six



brilliant colors of green, black, red and yellow and bold lettering on the big 12" and 8" background will let the public know that you are a Sylvania radio service-dealer. It will be the mark he will look for when his radio needs service. Display it prominently on your door or window. Your delivery truck and car will also be good places to display this eye catching sign of identification.

To get the new Sylvania serviceman decal write to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. Specify the quantity and size (8" or 12") in your letter.

SYLVANIA AD CAMPAIGN PLUGS SERVICE IN "RADIO BEST"

Sylvania's 1948 national advertising campaign is designed to give America's reading public the inside information about your radio service. The top radio fan magazine which will carry Sylvania advertising is Radio Best, new radio fan publication, fourth issue of which is now on the news stands. Each month during 1948, beginning in May, half page ads plugging your service work will appear in this magazine. Radio fans will be told that radio troubles need expert attention at the sign of dependable radio service—their Sylvania serviceman.



Radio Best is one of the fastest growing fan magazines in the radio entertainment business. Although still a youngster, its circulation has grown by leaps and bounds since the first issue appeared on the news stand three months ago. Already the 22,000 readers of the first issue have multiplied to 250,000. Its popularity is growing fast. If you haven't seen a copy of Radio Best, get one from your news stand today and see why its popularity is so great.



The people who read Radio Best are your customers—the people to whom radio is the most important form of entertainment. By striking at the source, Sylvania's 1948 advertising campaign will command the attention of radio listeners and

point out the symptoms of a sick radio. And like any good advisor the ads will suggest that the reader see his Sylvania radio serviceman to be assured of the best performance from his radio.



The first advertisement of the series will appear in the May issue of Radio Best. This and future ads of the series will carry out the cartoon theme—real eye-catchers to any reader. These advertisements will also appear in the top magazines of America's reading public—Colliers', Saturday Evening Post and Life. This is the type of backing good servicemen can't afford to pass up. Your reading public depends on nationally advertised products. That is why Sylvania backs the serviceman to the hilt with this kind of advertising.

A PRISON - A WAR - A MAGAZINE THE STORY OF A RADIO TUBE

Although the recent war is now written on the pages of history, we still hear stories of unusual happenings which warm the heart but will never grace the pages of our history books. Just recently we received a letter about one of these events, which we proudly pass along to our readers. The writer of this letter is an Englishman, who, because of his present attachment to the British government prefers to remain anonymous. The letter comes to us from Liverpool, England.

"Dear Sir:

Whilst engaging in relieving the navigating officers of a vessel in this port, I came across the enclosed advertisement of your products in an old "Radio News"¹ lying in the cabin I was occupying. The name brought back memories of the late summer of 1944.

"At that time I and several thousand other officers and men of the Allied forces were unwilling guests of the Imperial Nippon Army. The particular camp in which I was existing at the time was one situated not very far west of Bangkok.

"A number of us had brought with us to this camp, then recently built, sufficient radio parts to build a two valve set (or two tube, you would say, I think) to keep us in touch with the main news. As you can understand, the parts we got were spares from other "underground" sets operating in other camps and were on their last legs owing to many years' use and unavoidably rough treatment by the conditions on the Burma-Siam railway job.

"On testing the parts, the officer who was to build the set and whose assistant (as well as friend) I was, found, to our dismay, that the journey proved the last straw for our tubes. Contact was made, however, through some of the prisoners who went through the camp fence at night, with local friendly inhabitants of Chinese-Siamese extraction and the supply

of a new tube (only one!) arranged for at a cost of (if I remember rightly) 60 Ticue or Baht² (Siamese dollars), together with one or two other much needed parts.

"The tube (and other parts) duly arrived and the trade mark name on the tube read "Sylvania." A few nights later we were listening to Delhi broadcasting music and news.

"I would like to be able to say that that one tube kept us in touch with the world for the rest of the war. Unfortunately, after we had got the set working, the senior Allied officers of the camp decreed that, for certain very good reasons, we would have to close down.

"The set was accordingly dismantled, but not before we had been given an uncomfortable half-hour (which seemed much longer) when the "Nips" had a "snap" kit search. Under my section of the sleeping platform, on which our kit was spread, was an open hole containing all the spares and the battery for the set. Were we relieved when the searching "Nips" passed on to another section of the hut and we could get the hole (which had been opened for work on the set) filled in!?"

¹ August 1946

² \$26.54 American Money

DO YOU HAVE THE TIME?

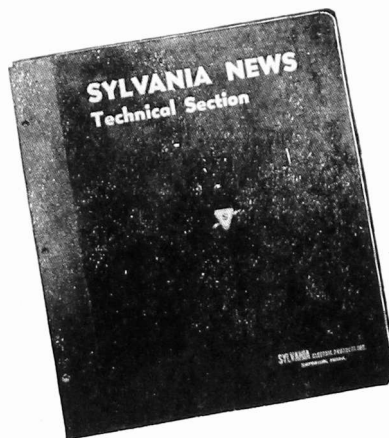
Time is a never ending subject of conversation. On the street or in your shop the question "What time is it?" never fails to bring your customers attention to the clock in the wall or to the nearest store window.

To meet this ever recurring question the Sylvania clock stands ready



to furnish the answer...and with its answer comes your reminder that you are in the service business. Make sure the people who pass your shop can find their answer in your window. Order your clock today from the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. The price? \$9.50.

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SYLVANIA ELECTRIC PRODUCTS INC.
EMPORIUM, PA.

Enclosed is \$..... (cash, check or money order). Please send me Vol. 1, Vol. 2, (bound in book form), Vol. 3 (loose leaf) of the back issues of the SYLVANIA NEWS Technical Section @ \$1.00 for each volume.

NAME.....

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SYLVANIA NEWS TECHNICAL SECTION

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A. V. BALDWIN, Technical Editor

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

FREQUENCY MODULATION

JAMES H. CANNING
Sylvania Commercial Engineering Department

FM Antennas

For the high frequencies used in the present FM broadcast band (88-108 mc), best results can be obtained only when an efficient antenna is used—particularly when the receiver is distant from the transmitter, and when the receiver is shielded by steel buildings, wiring, etc. Many FM receivers and converters utilize “internal” antennas—or the power line—which make it possible to receive powerful local FM stations without any other antenna. However, in less favorable locations a good antenna is necessary, in building up enough signal to reduce the noise. Properly designed FM antennas are also very directional, and minimize both unwanted station interference and noise pickup.

Various Types

The basic FM antenna is a single dipole (Figure 1), where two rods

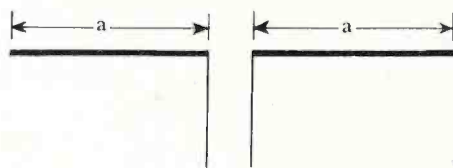


FIGURE 1

(a, a) each having a length equal to a quarter wave at about 100 mc, are secured end-to-end but not touching. This antenna will pick up signals coming from directions at right angles to its length, from either side, and discriminate against signals coming from other directions. Signals coming from directions along the line of the dipoles will be most reduced in strength. Sometimes a single rod about 5% longer than the length of the dipole is placed parallel to the dipole, and about a quarter wave length (or less) away

from it (Figure 2). This is called a reflector, and greatly strengthens signals coming to the dipole antenna

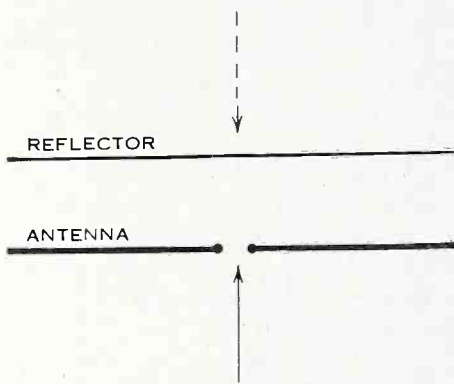


FIGURE 2

from a direction away from the reflector, but greatly reduces the strength of those coming from the same side as the reflector. Another form of dipole is the “folded” dipole (Figure 3a). This antenna has the same directional characteristics as the simple dipole, and can be used with a reflector (Figure 3b) in the same way. In some cases “directors” or single rods of slightly less than a quarter wave length may be placed about .15 wave length in “front” of the dipole, with a reflector behind the dipole. See Figure 4. This increases the gain in the direction of the line up, and reduces it from other directions.

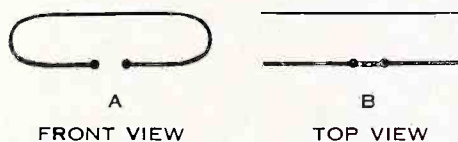


FIGURE 3

The diameter of the dipole elements affects the bandwidth of

the antenna—the larger the diameter of the elements the broader the bandwidth received. Dipole quarter wave sections are usually cut for mid-band frequencies, and each rod measures:

$$L \text{ (in ft.)} = \frac{246 \times .95}{F \text{ (in mc.)}}$$

The frequency F is usually chosen at the center of the band, unless response is desired on a particular station. The difference in length for the high and low ends of the band is about 6 inches.

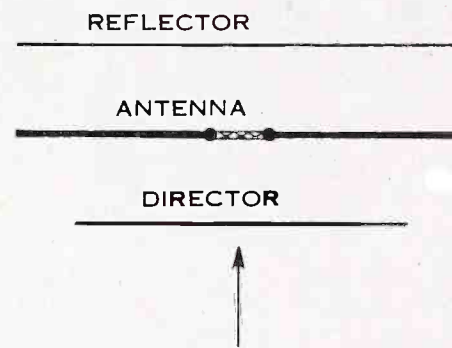


FIGURE 4

Impedance Matching

In order to obtain the maximum transfer of energy from the antenna to the receiver it is necessary to use a lead-in whose surge impedance is nearly equal to the characteristic impedance of the antenna used, and to the input impedance of the FM receiver. The length of the lead-in has nothing to do with its surge impedance, as this characteristic is determined by the diameter of wire used and the distance separating the wires for twin lead-in, and by the relative diameters of the two conductors in co-ax cables (Figure 5).

Section Vol. 1 \$1.00—Vol. 2 \$1.00—Vol. 3 \$1.00

Binders With Complete File of Technical

FREQUENCY MODULATION (Cont'd)

246



FIGURE 5

Mis-match of less than 10 to 1 will not greatly affect the output signal strength, but will possibly affect the noise level, where the signal-to-noise ratio is very poor. Correct matching is more important for television where a correct match is essential to reduce "ghosts". The characteristic impedance of simple dipole antennas is about 75 ohms, while that of folded dipoles is about 300 ohms. Some of the older FM receivers had an input impedance of 75 ohms, but almost all FM and TV receivers are now standardized on the 300 ohm input impedance. Although twin lead-in and co-ax cable are available in the necessary impedances, it is evident that it might be necessary to do some impedance matching with certain combinations of antennas and receivers. Close impedance match can be obtained by using a quarter-

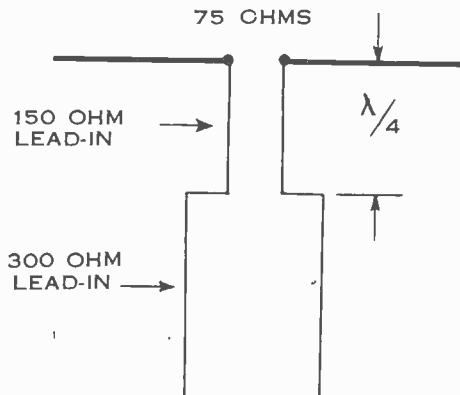


FIGURE 6

wave matching section. Figure 6 shows how a 75 ohm dipole can be matched to a 300 ohm lead-in by using a quarter-wave 150 ohm section of twin lead-in at the antenna, and Figure 7 shows how a 300 ohm antenna and lead-in can be matched to a 75 ohm input receiver by using the same stub at the receiver. The length of this quarter-wave stub (in feet) should be:

$\frac{246}{F}$ x V, where V is the propagation constant of the type of lead-in used. This constant is usually given by the manufacturer, and is about .77 for 150 ohm twin lead-in, and about .66 for coaxial cable.

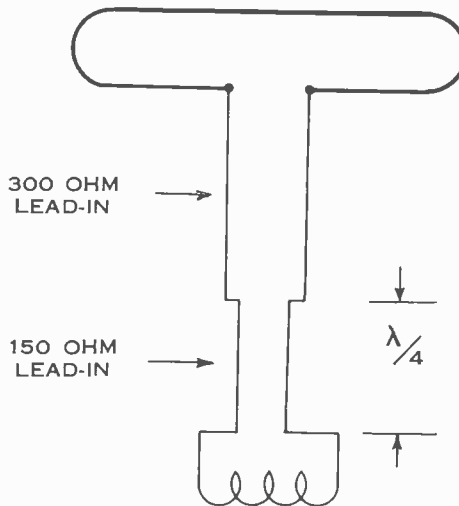


FIGURE 7
Choosing an Antenna

There are a great many types of FM antennas on the market, most of them based on the quarter-wave dipole, and each has its own particular features. An antenna that is first of all mechanically and electrically well constructed is desirable, then consideration must be given to the characteristics necessary to do the particular job. Some antennas are designed to have broader frequency response than others. Some have multiple elements in various arrangements to broaden directivity as well as bandwidth. In some types dipoles are "stacked" in order to broaden the angle of reception, and dipoles complete with reflector are obtainable. One recently announced antenna uses two dipoles at right angles for reception from four directions.

Direction of Reception

Although many FM antennas are definitely directional, in many practical installations considerable reflected energy is received, so that sometimes the best reception from a

station will not be in a direct line toward it, but along the direction of reception of greatest energy from that station—which might be a reflection from a building, a hill, etc. The most effective method for finding the proper direction to turn the antenna is to rotate it until the reception from the desired station is minimum, then rotate it exactly 90 degrees. This is because the null point is much sharper than the maximum point, and so can be found more accurately.

Polarization

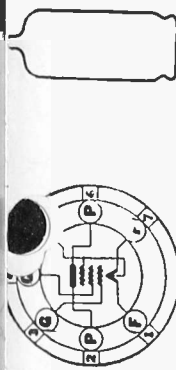
Waves from FM broadcast transmitters are generally horizontally polarized, so that dipole and dipole reflector antennas should be in a horizontal plane for reception of FM broadcasts. However, the waves sometimes acquire some vertical polarization from reflection, so that in some cases tilting the antenna out of the horizontal may give stronger signals. This must be done by experiment. For obtaining the best tilt, as well as direction of an antenna, a small FM receiver or converter may be connected to the antenna, and readings made of the current to the limiter grid of this set. Listening to the receiver and noting the dial setting will show what station is being received, and as the antenna is adjusted the limiter grid current will change, reaching a maximum for optimum antenna orientation.

Noise Reduction

For quiet reception the received signal must have at least twice the strength of the noise, and must develop enough voltage to operate the limiter. Noise reception can be reduced by making the antenna directional away from the noise source, if there is a definite source. Whenever a highly directional antenna is being used there will be a reduction of noise in any case, because noise generated in areas not in the direction of maximum reception will be greatly attenuated. Some noise might be picked up on the lead-in, and when twin lead cable is used, it is often beneficial

Sylvania Type 3Q4

PENTODE POWER AMPLIFIER



7BA-0-0

PHYSICAL SPECIFICATIONS

| | |
|-----------------------------|------------------------|
| Base..... | Miniature Button 7 Pin |
| Bulb..... | T-5 1/2 |
| Maximum Overall Length..... | 2 1/2" |
| Maximum Seated Height..... | 1 3/8" |
| Mounting Position..... | Any |

RATINGS

| | | |
|---|----------|-----------|
| Filament Voltage | Parallel | Series |
| Dry Battery Operation Must Never Exceed..... | 1.6 | 3.2 Volts |
| AC-DC Power Line Operation Design Center..... | 1.3 | 2.6 Volts |
| Maximum Plate Voltage..... | 90 | 90 Volts |
| Maximum Screen Voltage..... | 90 | 90 Volts |
| Maximum Cathode Current (Zero Signal)*..... | 12 | 6 Ma. |

*When series filament connections are used a shunting resistor should be used across the negative filament section. (pins 1 and 6) to limit cathode current to the value specified. If other tubes in a series filament string contribute to the filament current of the 3Q4, another resistor should be connected between pins 1 and 7 so chosen to carry any excess current over ratings.

TYPICAL OPERATION CLASS A₁ AMPLIFIER

| | | |
|-------------------------------------|-------------------|-----------------|
| Filament Voltage..... | Parallel Filament | Series Filament |
| Filament Current..... | 1.4 | 2.8 Volts |
| Plate Voltage..... | 0.100 | 0.050 Ampere |
| Screen Voltage..... | 90 | 90 Volts |
| Grid Voltage..... | 85 | 90 Volts |
| Peak Signal Voltage..... | -5.0 | -4.5 Volts |
| Zero Signal Plate Current..... | 5.0 | 4.5 Volts |
| Zero Signal Screen Current..... | 6.9 | 9.5 |
| Plate Resistance (Approximate)..... | 1.5 | 1.7 Ma. |
| Mutual Conductance..... | 0.12 | 0.12 Megohm |
| Total Resistance..... | 1975 | 2000 μ mhos |
| Total Harmonic Distortion..... | 10000 | 10000 Ohms |
| Maximum Signal Power Output..... | 7 | 7 PerCent |
| | 0.25 | 0.24 Watt |

APPLICATION

Sylvania Type 3Q4 is a miniature type power output pentode having a 50 ma. center tapped filament. With series filament connection this tube may be used in a series filament arrangement with other tubes in the 50 ma. filament group. With parallel filament connections this tube may be run directly from a single cell dry battery filament supply with satisfactory service over the range of voltages encountered during the service life of such batteries.



7AQ-0-0

Sylvania Type 3Q5GT

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 3LF4

PHYSICAL SPECIFICATIONS

| | |
|-----------------------------|--------------------------|
| Base..... | Intermediate Octal 7 Pin |
| Bulb..... | I-9 |
| Maximum Overall Length..... | 3 3/4" |
| Maximum Seated Height..... | 2 1/4" |
| Mounting Position..... | Any |

RATINGS

| | |
|---|-----------|
| Maximum Filament Voltage | Parallel |
| Dry Battery Operation Must Never Exceed..... | 1.6 Volts |
| AC-DC Power Line Operation Design Center..... | 3.2 |
| | 2.6 |

TYPICAL OPERATION

| | | |
|-----------------------|-----------------|-------------------|
| Filament Voltage..... | Series Filament | Parallel Filament |
| Filament Current..... | 2.8 | 1.4 Volts |
| | 0.05 | 0.10 Ampere |

For other rating, operation and application data refer to Sylvania Lock-In type 3LF4.

Sylvania

LOOSE LEAF SERVICE

3

We are continuing this month with two more sheets for insertion in your Sylvania Technical Manual. Just cut along the dotted line and use the insertion tool described in the October Technical Section.

From the comments already received from servicemen we know this new Sylvania service is greatly appreciated. The small amount of time required for you to trim and insert these sheets will be repaid by the convenience of having up-to-date tube data always available in your Sylvania Manual.

Data on the new type 50X6 is given this time along with a corrected sheet for 3Q4 etc., which was made necessary by mistakes in both the first and second printing of the Manual.



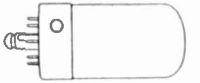
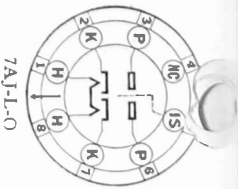
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COMMERCIAL ENGINEERING
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SYLVANIA ELECTRIC

EMPORIUM, PENNA.

Sylvania Type 50X6

HIGH-VACUUM RECTIFIER



PHYSICAL SPECIFICATIONS

| | |
|-----------------------------|---------------|
| Base..... | Lock-In 8 Pin |
| Bulb..... | 19 |
| Maximum Overall Length..... | 3 5/8" |
| Maximum Seated Height..... | 2 3/8" |
| Mounting Position..... | Any |

RATINGS

| | |
|--|------------|
| Heater Voltage AC or DC 10%..... | 50 0 Volts |
| Heater Current..... | 150 Ma. |
| Maximum Inverse Plate Voltage..... | 700 Volts |
| Maximum Steady State Peak Current Per Plate..... | 450 Ma. |
| Maximum DC Output Current Per Plate..... | 75 Ma. |
| Maximum Heater to Cathode Voltage..... | 350 Volts |
| Tube Voltage Drop at 150 Ma. Per Plate..... | 22 Volts |

TYPICAL OPERATION

VOLTAGE DOUBLER

| | | |
|---|-----|-----------|
| Heater Voltage AC or DC..... | 50 | 50 Volts |
| Heater Current..... | 150 | 150 Ma. |
| AC Plate Voltage Per Plate RMS..... | 117 | 117 Volts |
| Filter Input Condenser..... | 16 | 16 Mfd. |
| Minimum Total Effective Plate Supply Impedance..... | 30 | 15 Ohms |
| DC Output Current..... | 75 | 75 Ma. |

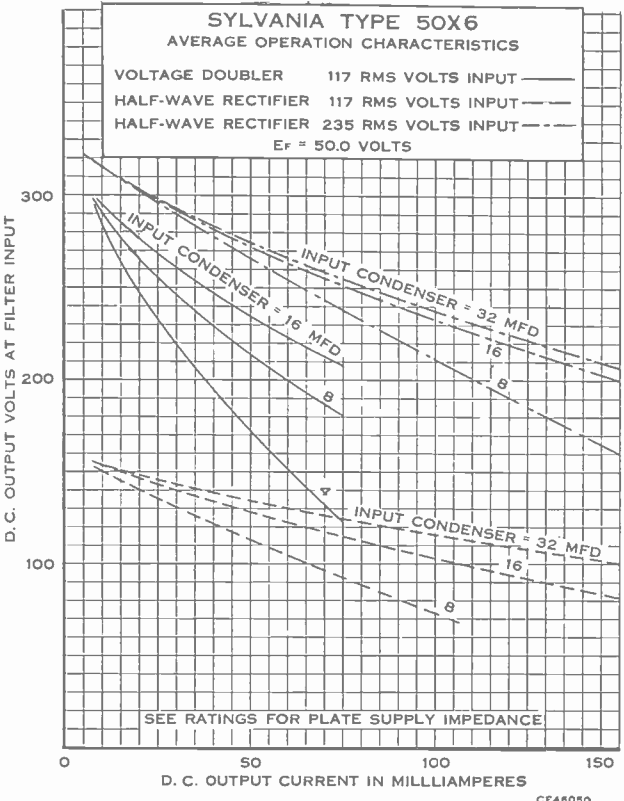
HALF-WAVE RECTIFIER

| | | | |
|---|-----|-----|-----------|
| Single Section — Condenser Input Filter | 50 | 50 | 50 Volts |
| Heater Voltage AC or DC..... | 150 | 150 | 150 Ma. |
| Heater Current..... | 117 | 150 | 235 Volts |
| Plate Supply Voltage AC (RMS)..... | 16 | 16 | 16 Mfd. |
| Filter Input Condenser..... | 15 | 40 | 100 Ohms |
| Minimum Total Effective Plate Supply Impedance..... | 75 | 75 | 75 Ma. |
| DC Output Current..... | | | |

APPLICATION

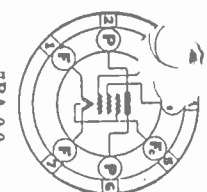
Sylvania Type 50X6 is a Lock-In voltage doubler rectifier designed for use in AC-DC receivers. Additional application notes for this service will be found under Type 25Z5.

The load curve is given below.



3S4 Sylvania Type

PENTODE POWER AMPLIFIER



PHYSICAL SPECIFICATIONS

| | |
|-----------------------------|------------------------|
| Base..... | Miniature Button 7-Pin |
| Bulb..... | 19 1/2 |
| Maximum Overall Length..... | 2 3/8" |
| Maximum Seated Height..... | 1 7/8" |
| Mounting Position..... | Any |

RATINGS

| | | |
|--|-----------|------------|
| Maximum Filament Voltage..... | Parallel† | Series |
| Design Center for AC-DC Operation..... | 1.6 | 3.2 Volts |
| Maximum Plate Voltage..... | 1.3 | 2.6 Volts |
| Maximum Screen Voltage..... | 90 | 90 Volts |
| Maximum Cathode Current..... | 67.5 | 67.5 Volts |
| | 11.0 | 5.5* Ma. |

†For parallel filament operation, the pins 1 and 7. Negative end of filament connected to pin No. 5.

*A shunting resistor across negative filament section, pins 1 and 5, is necessary to limit cathode current to value given.

TYPICAL OPERATION

AMPLIFIER CLASS A1

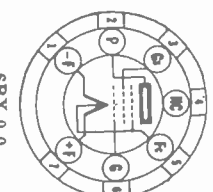
| | | | |
|-----------------------------------|-------|------|----------------|
| Filament Voltage..... | 1.4 | 2.8 | 2.8 Volts |
| Filament Current..... | 0.100 | 0.05 | 0.05 Amperes |
| Plate Voltage..... | 67.5 | 90 | 90 Volts |
| Screen Voltage..... | 67.5 | 67.5 | 67.5 Volts |
| Grid Voltage..... | -7 | -7 | -7 Volts |
| Peak A-F Grid Voltage..... | -7 | -7 | -7 Volts |
| Zero Signal Plate Current..... | 7.2 | 6.0 | 6.1 Ma. |
| Zero Signal Screen Current..... | 1.3 | 1.2 | 1.1 Ma. |
| Mutual Conductance (Approx.)..... | 1850 | 1400 | 1425 micromhos |
| Plate Resistance (Approx.)..... | 0.1 | 0.1 | 0.1 Megohm |
| Load Resistance..... | 5000 | 5000 | 8000 Ohms |
| Total Harmonic Distortion..... | 10 | 12 | 13 Per Cent |
| Maximum Signal Output..... | 180 | 160 | 236 Milliwatts |

APPLICATION

Sylvania Type 3S4 is a power amplifier pentode of miniature construction and is very similar to type 1S4 but designed for operation at either 1.4 volts or 2.8 volts. It is particularly suitable as an output tube in compact, light weight, portable equipment which may be operated on batteries or AC-DC power lines. The high operating efficiency allows the tube to be used with light weight low B supply voltages. Circuit applications are similar to those for Sylvania Types 11B4 and 3Q5GT.

3V4 Sylvania Type

PENTODE POWER AMPLIFIER



PHYSICAL SPECIFICATIONS

| | |
|-----------------------------|------------------------|
| Base..... | Miniature Button 7 Pin |
| Bulb..... | 1-5 3/4 |
| Maximum Overall Length..... | 2 1/8" |
| Maximum Seated Height..... | 1 1/8" |
| Mounting Position..... | Any |

Note: With the exception of the base diagram given above the characteristics of type 3V4 are identical with those of type 3Q4 given on a previous page.

CE46050

6BX-0-0

FREQUENCY MODULATION (Cont'd)

to twist this cable one turn per foot of length, for noise cancellation. Co-ax cable is self shielding, and is better for stubborn cases of lead-in noise pickup. Twin-lead shielded cable ("Twinax") is likewise better for noise reduction but more expensive.

Installation

In making a FM installation it is first of all necessary to find out what stations, if any, can be received at the customer's location. If he is located near several powerful FM transmitters, the internal antenna of the set is usually sufficient. If there is a bad noise problem, however, an antenna raised above the noise field would be of value in increasing signal to noise ratio. If the location is far from any FM broadcast transmitter there is a chance that reliable FM reception is impossible, and the receiver cannot be blamed, nor the serviceman! The only way to be sure is to make a test of the location by checking with a temporary antenna hooked onto a receiver. This will give you an indication of the available signal, and the signal to noise ratio. From this information the performance of

various receivers may be predicted. If you have set aside a particular FM receiver or converter of your own for such measurements, you can actually record signal strength of various stations at each location in terms of first limiter grid current. If you keep these records, you will be able to predict pretty closely what kind of reception an FM set owner might expect in each locality. These figures could be used, if necessary, to prove to the customer that poor reception is caused by location limitations rather than by a faulty receiver.

Twin lead-in wire is generally used in FM installations. This type of lead-in should be kept about 2 inches away from metallic members by stand-off insulation to prevent losses by absorption. Corners should be gradual to avoid reflections due to a change in surge impedance. No type of insulator or fixture should be used which requires the cable to be split or the spacing between the wires altered, except of course right at the antenna and set terminals. Lightning protection in the case of folded dipoles is secured merely by grounding the

center of the part of the dipole away from the lead-in connection. This is a point of zero voltage, and is ordinarily the mechanical support point of this type of antenna. In the case of the simple dipole a dual-point lightning arrestor must be used, with one discharge point connected to each outside terminal, and the center point grounded. Such an arrestor must be installed right at the antenna terminal block so that no leads will be necessary from the lead-in to the arrestor. Do not use the mica break-through type of arrestor here, as the shunt capacity may have a reactance less than 300 ohms at 100 mc.

Install the antenna as high above virtual ground (ground or roof), as possible, consistent with mechanic strength. (Don't forget to consider possible ice load, wind, etc.). A high antenna will usually be further out of noise fields and will be more free of shielding objects than one near the roof.

The next article in this series will explain the operation of limiters and of several FM detectors.

SOME MANUAL CORRECTIONS

Some time ago when the first printing of the Manual began to run low we had the printer correct a few of the more serious errors. If you wish to make the corresponding corrections in your copy they are listed here for your convenience. However, if you have received your Manual recently look on the flyleaf to be sure you have the first printing.

Page 63: The bias voltage shown for Type 85AS should be 9.0 volts.

Page 68: The diagram for 8AB should have an extra line drawn from the center of the right-hand filament to the plate on pin 6.

Type 0B3: Minimum operating current should be changed to 5 ma.

Type 1G5GT: Please knock the top cap off the bulb view.

Type 1H5GT: The basing designation should be changed to read 5Z-1-7.

Type 1L4: The last line under

Typical Operation should read "Grid Bias for 10 ua Plate Current."

Type 1LA6: The last line under Ratings should read "Maximum Cathode Current 4.0 ma."

Type 3Q5GT: Series and Parallel column heads were interchanged in the first printing and a wrong base diagram was used in the second printing. The extra loose-leaf sheet enclosed with this issue will correct both printings.

Type 5Y3GT: The condenser input curve was omitted. This was supplied in the loose-leaf sheets included with the November-December issue.

Type 6H6GT: Typical Operating Conditions should be changed to: AC Voltage per plate (RMS), 150 Volts Max.; DC Output Current, 8 Ma. Max.

Type 6N7GT: Subheading should read Duotriode Power Amplifiers.

Type 6Q7GT: Second line from bottom of page should refer to Type 7C6 (not 7C7).

Type 6SR7: Lock-In equivalent should be Type 7E6 (not 7E7).

Type 6V6GT: Maximum Screen Voltage listed should be 285 volts.

Type 6X5GT: Lock-In equivalent should be Type 7Y4 (not 7Y7) and add Maximum Peak Plate Current . . 210 ma., under ratings.

Type 7C6: The second paragraph of the Application should refer to Type 7B6 for the diode curves (not 7B7).

Type 7W7: The last line of the Typical Operation tabulation should read "Grid Voltage for 10 ua Plate Current."

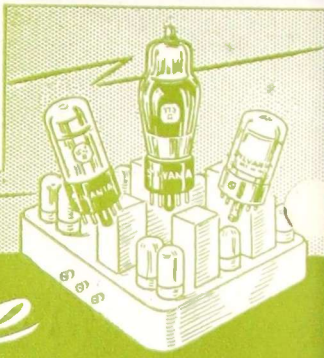
Type 7X7: Maximum Overall Length should be changed to $3\frac{3}{32}$ ", Maximum Seated Height should be $2\frac{5}{8}$ ".

(Cont'd On Next Page)

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

THE

Service Exchange



Locating Defective Condensers:

The usual procedure used to locate defective condensers causing intermittent trouble is to tap them or "wiggle" them with the fingers, while listening to the receiver for change in volume or appearance of noise. I have found in several cases, however, that the condenser was so well supported by the other lead or by surrounding parts that the defective lead was not moved enough to exhibit the abnormality it caused at intermittent times. However, if the wire leads themselves are gently twisted or tapped, the defect often becomes apparent. Therefore, I believe other servicemen may be able to use this hint to good advantage. In the case of one receiver with intermittent fading and cutting out in the customer's home, but which would perform perfectly in the shop, I located a bad oscillator coupling condenser with this tool whereas simply tapping and pushing the condenser as a whole did not affect it.

The tool is very simple and consists of simply a round piece of bakelite, wood or other insulating material of convenient length and about $\frac{3}{8}$ " or $\frac{1}{2}$ " in diameter with a $\frac{1}{4}$ " slot sawed in the end with a

hacksaw.

In use the slot in the tool is placed over the condenser lead to be mechanically tested. The tool then may be gently twisted or pushed upon which will cause the defect to become apparent.

I would hesitate to mention such a simple piece of equipment except that it has proven to be well worth while in my shop, not only for locating faulty condensers, but for mechanically testing wiring and connections in all parts of a radio circuit.—Harold Miller, Columbus, Ohio.

* * *

Intermittent Motorboating in Philco Model 45: This was especially bad first thing in the morning, strictly intermittent at other times. Paralleling of almost any condenser would shock the circuit and temporarily clear it. It would disappear when tuned right on a station, but the slightest detuning and it would return. It also would stop as long as I held my finger on the grid cap of the last IF tube. Placing my finger on the oscillator section of the tuning condenser would cause it to change tone. The short-wave band of this set had not been used and I found that thorough cleaning and adjusting of the contacts of the band switch eliminated the difficulty. Of course, every set that is repaired should be thoroughly cleaned, but with a difficulty like this care should be taken that it is not washed away with carbon-tet, then time wasted waiting for it to recur.—J. M. Woodruff, Los Angeles 26, California.

* * *

Philco 46-427 Filter Condenser Trouble: In working on Philco radio 46-427 I had trouble keeping the filter condenser from shorting. Everything checked O. K. except the filter condensers would be shorted. This model has a .04 mfd. from plate to cathode of the 35Z5 tube. When I removed this condenser, which is part number C102, the filters didn't heat anymore. Even this condenser wasn't shorted.—Arthur E. Cook, Rowe, Virginia.

Philco Radio-Phonograph, Model 46-1201:

This set was inoperative except when the tuning condenser was fully open, when several short-wave stations came in weakly. After considerable checking I discovered the signal grid of the 7A8 tube shorted to ground. The metal screw on the rear of the chassis binding the blue external antenna lead to the chassis was shorting the 7A8 grid lead underneath the chassis and underneath the oscillator coil, where it is impossible to see. It is possible to effectively repair this trouble without removing the set from the cabinet by removing the offending metal screw and sawing the end off.—E. W. Sprague, Batavia, N. Y.

* * *

Cabinet Repair Tip: I have put in considerable time at times holding splintered pieces in place while waiting for the glue to set sufficiently so I could let loose. I found that strips of scotch tape placed across the glued pieces hold them in splendid shape. It works especially fine on rounded pieces and corners.—Donald Slattery, Chadron, Nebr.

* * *

Sealing Alignment Screws: Many of the "little things" a serviceman does in repairing a radio do not show. For example, few people understand about aligning a set and to them it seems to be another superficial item to increase the serviceman's profit.

I have made a practice of putting a little fingernail polish on the trimmer screws after they are set. For "IF" cans and screws below the chassis that are adjusted from the top, I put scotch tape over the holes and put the nail polish around the edge of it.

This practice seems to impress customers that I have made a sincere effort to do a thorough job. I also find that people are less likely to tamper with sets fixed in this way and the set remains aligned longer and better.—William P. Mazur, Cleveland, Ohio.

Manual Corrections (Cont'd)

- Type 10: Please add, Filament Current . . . 1.25 Amperes
- Type 14R7: Subheading should read "Duodiode Pentode."
- Type 25A6GT: The wrong glass bulb shape is shown, should be GT shape with no cap.
- Type 83V: The third line under Ratings should read "Maximum Peak Inverse Voltage, 1400 volts."
- Type 117Z6GT: Please add, Heater Voltage 117 Volts
Heater Current 75 Ma.
Change third line under Ratings to read "Maximum DC Output Current per Plate."
- Type 1229: Subheading should read "Sharp Cut-Off R.F. Tetrode."
- Type 1275: Please add, Filament Current . . . 2.0 Amperes

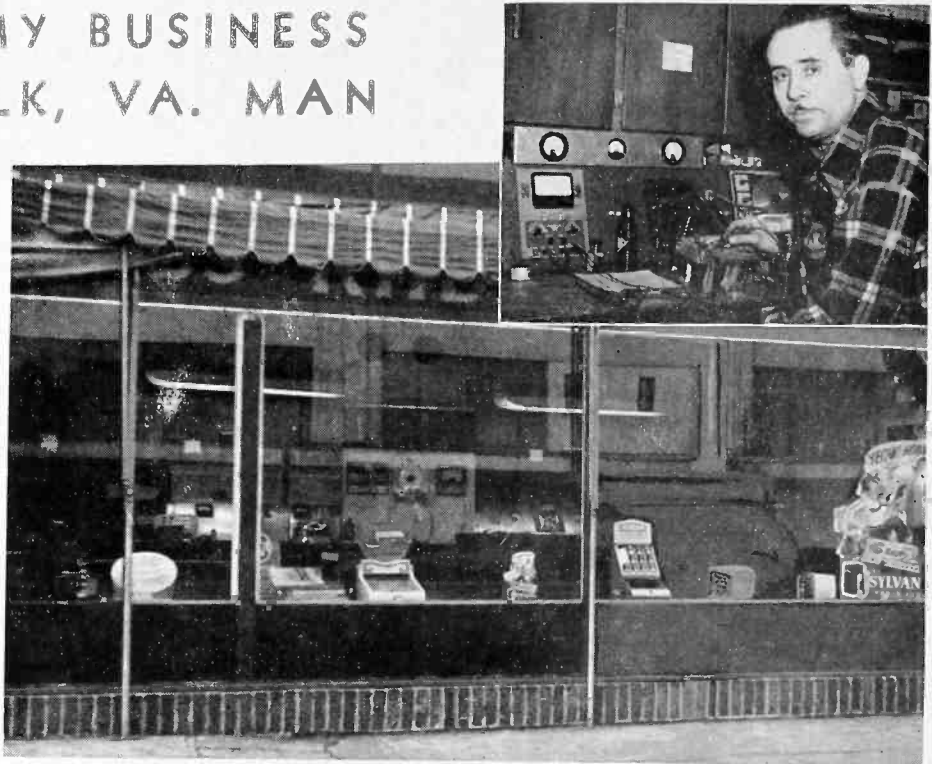
SERVICEMAN OF THE MONTH

SERVICE IS MY BUSINESS SAYS NORFOLK, VA. MAN

Radio service is James Bradshaw's business. That's common knowledge in Norfolk, Va., because Mr. Bradshaw doesn't let people forget.

Located just off one of the busy Norfolk streets Bradshaw's Radio Service does a booming business servicing radios in this city. It wasn't until about two years ago that James Bradshaw got into the radio servicing business, but today he looks like he had been in business for a lifetime.

When the doors were opened at the Bradshaw Service Shop two years ago, the owner knew that adequate promotion was necessary if the business was to flourish and become successful. He knew also



Big show windows of Bradshaw Radio Service are good salesmen for passing public. Two service benches in the window give passers the "inside" of radio servicing. Inset: Owner, James Bradshaw checks a table radio with a Sylvania Polymeter.



John M. VanDyke, one of Bradshaw's seven servicemen works at show window bench. Neatness of working area helps sell customers service.

Much of the proof that Bradshaw Radio Service is tops in the business is shown by the fact that ten people are kept busy repairing sets and operating the business. It takes a lot of promotion to keep radios coming in at such a rate. However, the complete service offered to the customer is adequate assurance of plenty of work. For instance, when a customer brings his only radio in for repair, the Bradshaw service shop loans him another to use while the work is being done. The shop owns ten radios which are used for just this purpose.

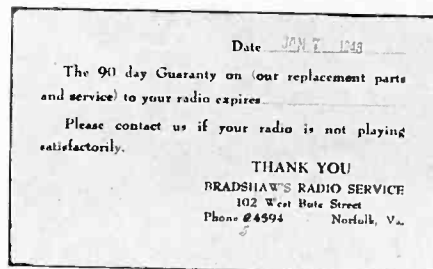
the card is mailed to the owner, so that any complaints can be handled under the ninety day guarantee. Customers know by this notice that James Bradshaw stands behind his service work.

For the promotion of new customers, Sylvania postcards are sent out regularly to keep people reminded that Bradshaw's Radio Service is in the radio servicing business.

James Bradshaw is not satisfied with his present business. His business sense tells him that a better equipped shop and a more attractive location will help increase his service business. With this in mind, he has plans for building a new shop when construction costs come more within reason. In his present location he has the best equipment available including two Sylvania Polymeters and a Sylvania, 7" Oscilloscope. His store window service bench, where sets are repaired regularly, is an eye-catcher for passers-by and does much to attract more business. A fine businessman like Mr. Bradshaw is a good example how to get ahead in the service business.

that the quality of service given to his customers had to be superior to keep the wolf away from the door.

All this James Bradshaw knew and he set out to accomplish the big job ahead of him. Today his business speaks for itself. His is one of Norfolk's busiest service shops. Because the business is exclusively service, great emphasis can be put on the quality of the work. This type of service is appreciated by his customers.



Another helpful service provided for his customers is illustrated in the postal card shown here. Sixty days after the set has been repaired,

IDEA DEPARTMENT

FREE ADVERTISING? IT'S EASY --- IF YOU KNOW HOW

"Advertising," it has been said, "is anything which will favorably bring your name to the attention of the public." Well, this is indeed true, and the more free advertising you can get, the better off you are. L. H. Harry of Pinehurst, Idaho has accomplished a lot with the idea he is now using. Feeling that if he could do something to give people the impression that he was more interested in their problems than their pocketbooks, he would accomplish much to improve his business.

With this idea in mind, Mr. Harry arranged with his local paper, **The Shoshone Tribune**, to publish a weekly article dealing with the basic essentials of radio. In these articles he talks in simple terms to the readers, telling them about how a radio works and how to take care of a radio to get the best service from it. One of the articles Mr. Harry has used is a story from the July 1947 issue of **THE NEWS** which discusses the relative cost of radios during the past two decades. By taking a more personal interest in his customers through this type of promotion, Mr. Harry has established himself on a more personal basis with his customers. People don't forget his name and the space he gets weekly in the newspaper is plenty of free advertising.

ON THE COVER

Lovely Ann Sothern needs little introduction to most of us. As warmhearted, lovable "Maisie" she is frequently seen on the screen and heard over the radio. We think she is a good thing to look at, too. If you don't agree put the cover picture on your door or window and let your customers comment. We know they will.

WOT'S YOUR IDEA?

Doctors and dentists have their medical journals in which to exchange ideas about their business, and for servicemen, we hope the **SYLVANIA NEWS** serves much the same purpose. If you have some technical ideas which have helped you in your service work and you think they will help others, (these ideas may help you) send them along to our Technical Editor, in Emporium, Pa. If you've got some good ideas which help you run your business better, or make money for you, we'd like to hear about them too. Just drop us a line telling us about what you have done to improve your service to **SYLVANIA NEWS**, 500 Fifth Ave., New York 18, N. Y.

We don't expect you to tell big secrets for nothing, so if your idea has merit and we publish it, we'll send you a little gift. (A tube if it is a technical hint or a \$5 Merchandising Certificate if it has to do with selling your service) as remuneration for your effort. Your idea may help others increase their business or shop efficiency, and perhaps some other ideas will help you do a better job for your customers.

THE "COKE SET" ARE STAR SALESMEN OF SERVICE

They say children are the best salesmen in the world. Their power of suggestion exceeds that of printed advertising literature. Mr. Roswell Buskey, Plattsburg, N. Y. took this old idea to heart and used it to increase his service business. He now has ten high school boys and girls as salesmen and gets about two-thirds of his repair work from their efforts. The teen-agers are on an incentive basis, so the harder they work, the more money they get for sodas and cokes.

Mr. Buskey passed out 100 Sylvania business cards to each of his "employees." The kids put their initials on the cards and distributed them to radio owners around the city, instructing them to take the card along when they need work done on their radio. When a radio comes into Mr. Buskey's shop with somebody's initials on the card, he pays the student 10% of the repair bill as a commission on the work they have done. The idea has proved successful and the cost to Mr. Buskey is very moderate. "I found that six out of 10 repair jobs were the result of this form of advertising," reports Mr. Buskey.

UNCLE SAM STEPS IN AGAIN TO HELP SELL SERVICE

When Mr. S. J. Szkotnicki of Buffalo, N. Y. returns a service job to one of his customers, he encloses a few, self-addressed stamped postal cards. The customers, satisfied with the job he has done, pass the postal cards along to their friends and a lot of new business comes to Mr. Szkotnicki. His repair work done on one set encourages the owner to recommend his work to others, and to help them remember, the owner passes along the card.

This system makes it easy for prospects to reach a radio serviceman.

I am in need of Radio Service. Please
call at address below.

Name-----
Address-----
I will be home-----Date

Sample of Postal Card used by
Mr. Szkotnicki.

JUST FOR A LAUGH... OR SAVE YOUR NECK!

For busy people like radio servicemen, it is important that telephone messages be kept straight. With this in mind one of our messengers who has a habit of looking around for all sorts of gadgets brought us the little form pictured below.

Telephone Message

FOR

MR. _____

WHILE YOU WERE

Asleep Tired Coffeeing

Playing Golf Helling Around

In Conference On the Can

YOUR—

Wife Mother-in-Law Blonde

Red Head Brunette Platinum

Club Secretary Banker Broker

Bookie Pal Girl's Father

CALLED AND LEFT WORD FOR YOU TO—

Bring home some _____

Send out that Fur Coat

Marry the Girl

Pay _____ Renew that note

Send Check Come by the Apartment

Cover that Overdraft

Get the hell out of town

This little call slip is designed to take care of all situations, and if you can keep your wife or mother-in-law from peeking at them they might be just the thing to keep the office help from spilling the works about any outside interests that you might have. At any rate, we hope this little slip is good for a laugh or two.

KEEP YOUR NOSE IN THE NEWS

The May issue of SYLVANIA NEWS will carry complete details on how you can profit from Sylvania's 1948 national advertising campaign. If business is slow and you're looking for good, inexpensive promotion for your service, watch the May issue of THE NEWS. If you are building toward a future in radio service, this campaign will give you the right kind of a tonic. Selling your service is good business, so don't miss the details in the May NEWS.

VETERANS—IS YOUR BUSINESS ON ITS FINANCIAL FEET?

Many veterans of the past war who are in the radio servicing business are struggling along under adverse conditions, lack of equipment and inadequate facilities for running their business because they lack the money necessary for purchase of equipment. These veterans in many cases, may be suffering hardships needlessly, because they are not acquainted with the Loan Guarantee provision of the G. I. Bill of Rights. Under this provision of the veterans bill, loan of money for improvement of facilities, purchasing new equipment or building up sufficient working capital for operating their business may be made easier.

If you are a veteran and need additional equipment with which to run your business more profitably, it may be to your advantage to investigate the loan possibilities under this law. This provision is a valuable asset to you, and you should exercise your best judgment if you take advantage of it.

Valid Reasons for G. I. Loans

It might be advantageous to you if we listed some of the reasons which are valid when borrowing money. Here are some as listed in a Veterans Administration booklet on the subject.

1. to buy a business
2. to buy a building or land for business purposes
3. to buy business supplies and inventory
4. to buy machinery, tools and equipment for operating a business (test equipment would fall under this category)
5. to construct, repair or improve a business building (remodeling your shop would be under this classification)
6. to obtain working capital for a business (this would help you purchase sufficient inventory to give better service.)

How Much Can You Borrow?

Contrary to many beliefs, the government does not loan you

money under the law. The Veterans Administration only guarantees part of the loan, which means that you are borrowing money with your government as a signer. In other words, if you can borrow money on your own credit, the additional government credit allows you to borrow that much more. Under this arrangement the government will guarantee up to \$2000 on a \$4000 non-real-estate loan and up to \$4000 on real estate loans.

If you want to borrow money for the purpose other than the purchase of real estate, you can obtain it on a ten year term. The interest on any loan, whether it be for real estate or for non-real estate cannot exceed 4% under the provisions set forth in the bill.

Where Shall I Go For A Loan?

If you have made up your mind that you need funds to improve your business and wish to make this type of a loan (provided you are a veteran, of course) you should go to any of the following people to secure loans, i.e., banks, building and loan associations, public and private lending agencies. After proper investigation of your case the agency will decide whether or not your request is valid. The agency from which you obtain the loan has the necessary information and forms which you will be required to fill out in connection with the government guarantee. **DO NOT GO TO THE VETERANS ADMINISTRATION TO BORROW MONEY.** They are not a lending agency.

Any lending agency will be happy to furnish you with details of this guaranteed loan proposition. Your nearest Veterans Administration office will also be happy to talk over your problems and advise you of the loan possibilities. Perhaps the answer to some of your financial problems can be found if you can take advantage of this privilege. Remember, your business future depends on a good financial standing.

LONG BEACH, CALIFORNIA RTA BEGINS 10th YEAR OF SERVICE



Above are the officers of the Radio Technicians Association, Inc. of Long Beach, California. RTA is now beginning its tenth year as an active service organization. During its life RTA has successfully defeated a licensing proposal and established a uniform scale of service

charges by their members. Those seated in the picture are l. to r. Frank Gregson, v.p.; Glenn L. Holloway, pres.; Walt Day, sec.; standing l. to r. Rod McIntire, program manager; Harry E. Ward, public relations; Clarence S. Spencer, treasurer.

1947 SET PRODUCTION SETS ALL TIME RECORD

Production of radio and television receivers during 1947 exceeded all previous records according to an announcement by the RMA. In a tabulation of sets produced it was shown that 17,695,677 sets of all types came off production lines during the year by RMA member-companies. Preliminary estimates indicate that total production of all radio set manufacturers may exceed 18,500,000.

Greatest increase in production of a particular type of set was in television receivers which showed a jump of nearly 27 times the 1946 production. About six times the 1946 production was shown in PM-AM receivers, of which 1,175,104 were produced in 1947. An interesting footnote is that 16,345,002 sets made in 1947 were AM receivers of one sort or another including portables and car radios.

Business Week Magazine raised an eyebrow recently after a peek at these figures, and asked the question "Radios: Oversold?" These production figures reveal a pile of radios manufactured but the fact still remains that 7% of the American homes do not have sets of any type and only about 35% of our homes have more than one set. Continued high production of radio and television sets will mean a resultant increase in radio service. FM and television are new fields for coverage in radio sets. Their entirely new approach to radio is a valuable asset in selling new customers more service.

Radios are no longer looked upon as family possessions, but are fast becoming personal possessions. "A radio for everyone" should be the shout which greets those who think radios oversold. The accomplishment of this will be aided by the continued appearance of lower-priced sets within the price range of junior and sister. Lower prices will encourage more radio sets, and lower prices are on their way—as far as radios are concerned.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
P. O. BOX 431
EMPORIUM, PENNA.

RETURN POSTAGE GUARANTEED

For:

Mr. J. Kenneth Bowran
Rt. 4
Rocky Mount, Va.

Sec. 562, P. L. & R
U. S. POSTAGE
PAID
Emporium, Pa.
Permit No. 1

POSTMASTER: If addressee has moved, notify sender on Form 3547, postage for which is guaranteed. When Form 3547 is sent abandon this mailing. Return only if no correct address is available.

Vol. 15, No. 3

MARCH, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment



SYLVANIA NEWS

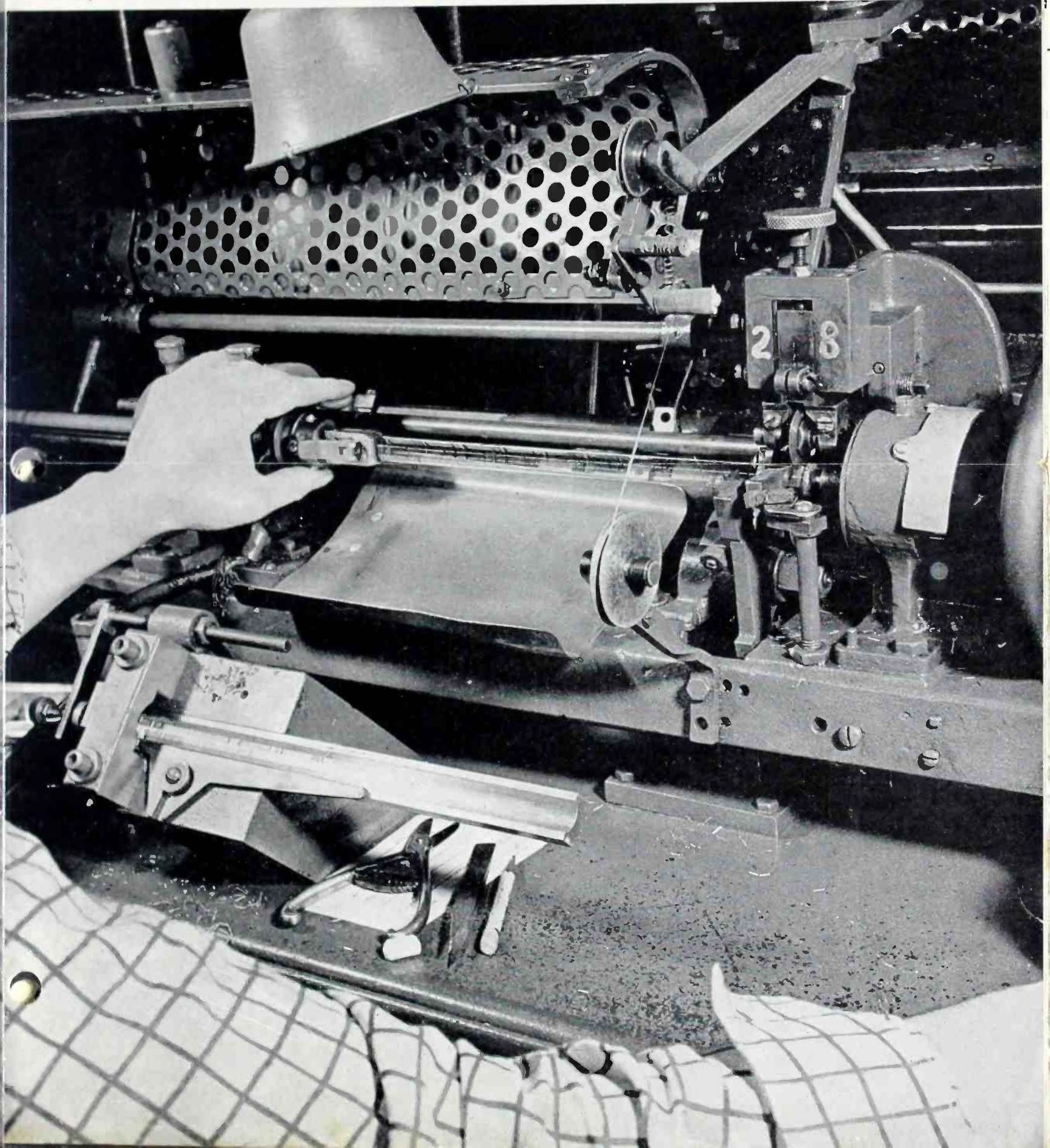
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R. A. PENFIELD, *Editor*

APRIL, 1948

EMPORIUM, PENNA.

VOL. 15, NO. 4





More About Town Meeting

An extremely flexible plan for continuance of the Town Meeting of Radio Technicians in various cities throughout the country this year has been announced by H. W. Clough, chairman of the Radio Parts Industry Co-ordinating Committee. The next meetings, prompted by the success of the Philadelphia meeting, will also be experimental in nature with the ultimate aim of finding a sound, constructive pattern by which the radio industry will cooperate to help the radio technician to become a better craftsman and businessman.

Because of the nature of the problem which faces the technician and the industry in the maintenance and servicing of television and FM, the future meetings will be testing grounds to find the most effective method of cooperation for the mutual benefit of the technician and the manufacturers. Selection of cities and dates for future meetings has been left in the hands of Harry E. Ehle, chairman of the Town Meeting committee.

Effects of the Philadelphia meeting are now being set down in basic facts. It has been established that the technician prefers and likes a non-commercial meeting. It has also been definitely indicated that there is a great need on the part of the radio technician for education on television and FM problems by the radio industry. This information is necessary to insure effective

installation and servicing of these more complicated devices.

Through a questionnaire circulated in the final session of the meeting in Philadelphia it was learned that 97% of those in attendance felt that the meeting was a worthwhile effort and justified the loss of time and money involved in leaving their shops. In an analysis of the papers presented, 76% of the attending technicians voted an unqualified "yes" to a question of whether they liked them. Half of the responding radiomen wanted more technical papers at future meetings, while only about 20% were in favor of more business papers. Most of those in attendance at the meeting favored a yearly affair while some thought two such sessions each year would be more advantageous.

Mr. Ehle has suggested to the Co-ordinating Committee that future meetings should be preceded by more publicity and a closer cooperation with the trade and local press. He also suggested that the plan of 50-50 technical-business paper balance be maintained and that a trial of four night meetings should be considered.

The use of displays for the meetings should be decided by local committees and commercialization and active selling should be eliminated wherever possible, Mr. Ehle suggested. Demonstration of test equipment was strongly recommended by the chairman.

First Look At Video

The thrill that comes from a first glimpse of television was expressed recently in Srepc News, monthly publication of Standard Radio & Electronics Co., Sylvania distributors in Dayton, Ohio. As yet Dayton has no television outlet, but Cincinnati, 50 miles away, has a 400 watt outlet.

Standard Radio wanted to find out what video was all about so they built some sets and put up some antennae that "resemble ice-plant heat exchangers." When they completed preparations, they hooked up the antenna and tuned in the station. "To say that we were thrilled or that our knees went weak is mild understatement," goes their story. "As the pictures appeared we had an experience similar to that of our first program on our first radio years ago."

All the gadgets needed to make the signal stronger have been added to the sets around Dayton. When they break down, the boys open them up and work on them. So far they have done alright and even though the sets are more complicated than the ordinary radio receiver, it has not been impossible to understand them.

SREPCO urges dealers and servicemen in areas where television may soon be a reality to get their hands on a kit or set and familiarize themselves with its operation and construction. We, too, feel that it will be to the serviceman's advantage to acquaint himself with television. The dividends earned later will be more than enough to repay you for your trouble now.

On The Cover

Precision is a basic essential in grid winding for Sylvania Radio Tubes. Perfect operator control is necessary when this whirling machine transforms hair-like wire into tightly coiled, accurately spaced grids. Grids are inspected on the Bal-opticon which throws a greatly magnified shadow of the grid on a lighted screen where a scale measures the width between turns—they must not vary.

Put the cover on your shop window. It will bring customers into your shop.

SYLVANIA NEWS MERCHANDISING SECTION

Copyright 1948, Sylvania Electric Products Inc.

Your Mailman Can Be Your Best Salesman



Profits in the radio service business depend on the number of favorable impressions you can make in the minds of the people in your trading area. In a nutshell, your problem is: "How do I make a favorable impression on folks with whom I never have a chance to talk?" Advertising, of course, is one good answer.

You may have some good arguments against advertising, but you still have the problem of making that good impression, and no matter how little you have to spend you still can scrape up some money to spend on advertising. Maybe it's \$5 a year, or maybe it's \$500, but you want it to buy just as much advertising as it can—good advertising that is going to go to real prospects.

A wise answer to your problem is "direct mail"—the mailing of postal cards, sales letters and other reminders to a carefully accumulated list of radio set owners in your territory. No matter what you spend, direct mail, if it is done properly, will bring you results proportional to the amount you spend.

Your Mailing List

Your direct mail campaign will do a double job of selling and keeping customers sold, if it is well written and, equally important, is based upon an accurate, adequate up-to-date mailing list. If your mailing list isn't kept in A-1 shape, direct mail advertising is soon going to cost you more than it will pull in profits.

Dependable Sources

The main sources of mailing list names fall roughly into ten categories. They are: (1) customer lists, (2) directories, (3) public records, (4) the local postmaster, (5) roster and membership lists, (6) lists bought or exchanged, (7) personal contact, (8) information from other tradespeople, (9) advertising, and

Direct mail advertising of your radio service business can bring steady profits. Here are some sensible suggestions on how to build a good "live" mailing list that will effectively cover your service market.

(10) newspaper clippings. To help you exploit these sources fully, each is discussed below.

Customer Lists

Satisfied customers are one of your chief assets. If they are to be "kept sold" they should periodically be included on your mailing lists. A courteous mail inquiry can frequently persuade customers to furnish you with the names of others in their neighborhood who would be interested in your services.

Directories

City directories published annually in many cities and available in libraries and frequently drug-stores, list by street and number the names of persons living in each house and apartment. Telephone directories obtainable at the business offices of local telephone companies likewise list by street and number the names of persons having phone service. The phone companies will rent sections of these address-indexed phone directories for reasonable fees. Remember, however, not all radio owners have telephones!

Public Records

Public records are official and therefore usually highly accurate. Access to most costs nothing. For others, a small fee may be charged. They include: voters' registrations, city tax lists, license and permit records of all kinds, miscellaneous city clerk's records, county tax lists, income tax lists, license and permit records, miscellaneous county clerk's records.

Local Postmaster



In towns of certain populations it is possible to send printed matter direct to the postmaster for placement in all post office lock boxes. At any rate, a friendly conference with your local postmaster can yield not only names for your mailing list but many sound suggestions on correct mailing procedures such as the periods during which mails are lightest, devices by which the post office will cooperate in informing you of changes of address, and his observations as to consumer reaction to various types of mail appeals.

Postmasters also have a service for checking the accuracy of already established mailing lists. This service which guarantees your obtaining the correct address of everyone on your list if it is known to the post office, is available throughout the country at a charge of one cent per name.

Membership Lists

Public records and official listings can be augmented by lists of memberships in local churches, lodges, clubs and other social groups. These are frequently obtainable from the secretaries of each organization, if they are approached in the proper manner and told of the use to which the list is to be put.

Purchased Lists

Organizations whose business it is to compile and maintain mailing lists for sale are located throughout the country. Neighboring non-competing retailers may also have established mailing lists which they may be willing to loan or exchange.

Other Tradespeople

In addition to actual exchange of lists with non-competing retailers, other business people can do much to help you keep your list up to date. Milkmen, mailmen and newspaper carriers are usually the first to know when families move in or out.

Your Mailman Can Be Your Best Salesman Continued from Page M-13

Maintaining the friendship of the tradespeople and checking regularly with them can make your job much easier.

Personal Contact



Telephone solicitation, house-to-house doorbell canvassing, and the use of "key operators" are other tools to build mailing lists. They are especially useful in keeping established lists up to date. High school students can frequently be hired to do the telephone or doorbell ringing on the basis of so much per name. The "key operator" technique consists of deputizing one person in each block to furnish you with the names and addresses of others living in that block in exchange for some gift or preferential treatment from your shop.

Advertising

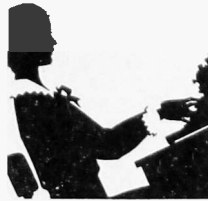
The beginning of a good mailing list can sometimes be obtained by a newspaper or radio advertisement which invites people to clip a coupon or write to your shop. Offers of catalogs or price lists, contests, special premium offers, or the advertising of a "necessity purchase"—a low priced item of popular appeal—can bring you many contacts and names.

Clippings

Newspaper clipping bureaus are now commonly established on the American scene. They can be hired to clip for you the news of the move, marriage or death of persons in your market area. If you don't wish to hire a clipping bureau, regular personal reading of your local paper will provide much of this information.

These are the principal means by which direct mail address lists are usually compiled. As in other aspects of competitive business, a little ingenuity always helps. For instance, there was a local cigar maker, anxious to learn the names and addresses of smokers in his area. He laid a petition on the cigar counters of every tobacco store in the several towns of his territory. The petition had nothing whatsoever to do with tobacco but it served

to accumulate the names of men who had been in the tobacco stores of his market area.



Your interest in them will encourage them to give you more business.

Make it a point to ask all your customers if they are on your mailing list. If not, have them leave their names and ad-

resses when they are in your store.

List Maintenance

Once established, a mailing list must be kept accurate and up to date if it is going to mean profits via direct mail advertising. Many of the means by which you first accumulate your list can be used continually to keep it up to the minute. In addition to these—checking new directories, tradespeople, the postmaster, etc.—direct mail can be used to become automatically self correcting.

On every third class mailing, the following notation in the lower left hand corner of the envelope will bring a correct address: "Postmaster: If addressee has removed and new address is known, notify sender on Form 3547, postage for which is guaranteed." It will cost 2 cents per name received but will guarantee an up-to-date list.

Reasonable perseverance in these few suggestions can soon give you a firm basis for a first class direct mail campaign advertising your radio

service. Couple it with a friendly, well-written message or two and you will soon find direct mail paying off in new faces and new business.

Low Cost

An average mailing of Sylvania postal cards will cost you \$10.00 per 1000 prospects covered. If the charge for an



average radio service job is \$4.50, you need sell less than about two and one half customers to pay for your mailing expenses. When names on your list are recorded incorrectly, misspelled, bear wrong initials or wrong titles (such as "Mrs." for "Miss"), your mailing to that group of prospects is likely to do more harm than good in your campaign to develop good will. When your list is incomplete, listing the party at 12 and 16 Park Street but skipping the one at 14 Park, you are likely to miss good prospects and subsequent sales.

Direct mail can take your personality and the story of your services into your prospects' homes via the postbox. It can bring people into your shop and you into their homes. It will give you the opportunity of being one of the first to welcome newcomers to your neighborhood and offer them your services. Besides these aggressive functions, postal publicity can do a nice job of fence mending, too.

Get your list of prospects up to date NOW!

Get ready for . . .
Sylvania's Big Advertising Campaign for Radio Service Dealers

SYLVANIA NEWS TECHNICAL SECTION

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A. V. BALDWIN, Technical Editor

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

FREQUENCY MODULATION

LIMITERS and FM DETECTORS

JAMES H. CANNING

Sylvania Commercial Engineering Department

In the first article of this series on FM we briefly described the limiter, and the manner in which it removes amplitude changes from the FM signal, but still passes on frequency variations unchanged. This sort of a device is necessary because the balanced discriminator type of FM detector will respond to AM as well as to FM signals, and noise is mainly AM.

The Limiter Circuit

A simple limiter stage is merely a regular IF amplifier with low plate voltage, and sometimes a condenser-resistor bias system in the grid, and possibly a dropping resistor in series with the screen (Figure 1).

TYPICAL LIMITER CIRCUIT

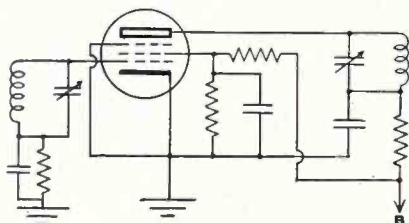


FIGURE 1

The effect of these measures is to limit sharply the maximum plate current of the tube and give it a very sharp cut-off transfer characteristic (Figure 2). As a result it will act normally as an amplifier until the signal applied to the grid reaches positive peaks high enough to run the plate current up to its maximum possible value under the circumstances. Beyond this point (e_1 on Figure 2) any further increases in signal amplitude, such as noise bursts, will not make any changes in the plate current. The Limiter, therefore, should be supplied with enough IF signal to operate well into this saturation region to suppress noise and amplitude modulation.

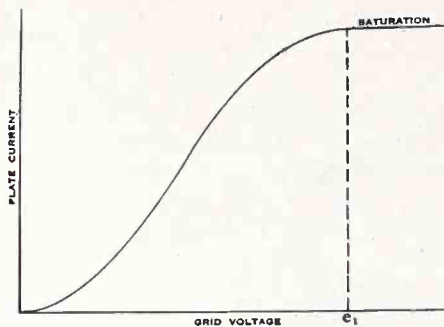


FIGURE 2

The majority of the negative part of the signal is also clipped off, so that negative noise peaks are not passed on. This distorted wave form is restored to a frequency modulated sine wave by the fly-wheel action of the resonant circuit into which the limiter tube works.

Noise and interfering signals get through FM sets sometimes even when the signal strength is sufficient to operate the limiter. This can happen when the interfering noise or signal is roughly more than half the strength of the desired signal. It is caused by actual frequency modulation of the desired signal by these unwanted signals. The limiter cannot improve this situation as by its design it will pass frequency changes. Downward modulation or momentary drops in amplitude will result in plate current changes in the limiter tube, and noise or distortion in the receiver. Such a condition can be caused by fading, multi-path reception, or mis-tuning of the IF stages.

The Balanced Discriminator

The balanced discriminator is the basic FM detector and makes use of the phase characteristics of inductively coupled circuits at resonance and non-resonance. Figure 3 shows how the plate coil L_1 of the

limiter stage is coupled into a secondary winding both inductively and capacitively (via C_1). These two coils make up the discriminator transformer, and both primary and secondary are tuned to the IF of the receiver. The secondary is center-tapped and the output across each half of this winding goes into an ordinary diode rectifier. The voltages developed across the diode load resistors R_1 and R_2 are opposing, and if the same signal voltage goes into each diode the resultant output voltage E_o is zero.

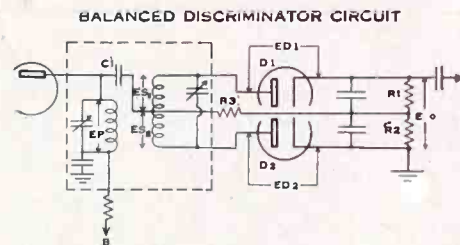


FIGURE 3

Now there are two RF voltage components which combine in each half of the secondary to produce the resultant RF voltages for the two diodes. With an applied unmodulated RF signal there is first the voltage E_p which condenser C_1 feeds from the plate of the limiter directly to the center tap of the secondary, and which is applied equally (across resistor R_3) to both diodes. This voltage is shown by the curve marked E_p in Figures 4A and 4B.

In the half of the discriminator secondary connected to diode 1 there is also an induced voltage E_{s1} resulting from inductive coupling from the primary. This voltage is represented by the curve marked E_{s1} in Figure 4A. This voltage will be just 90° out of phase with the curve E_p when the discriminator

(Continued on next page)

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FREQUENCY MODULATION (Cont'd)

is tuned exactly to resonance with the applied signal. These two voltages have the resultant E_{d1} which represents the actual voltage applied to diode 1.

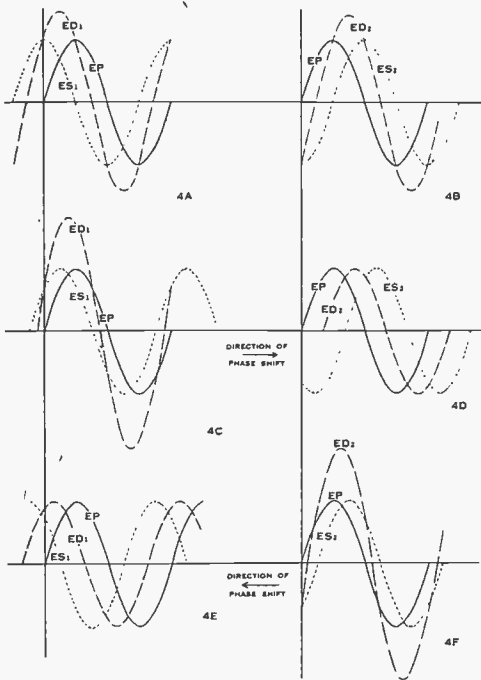


FIGURE 4

In the half of the secondary connected to diode 2 there is also induced a voltage E_{s2} (in Figure 4B). This voltage will also be just 90° out of phase with E_p at resonance, but furthermore is 180° out of phase with the induced voltage E_{s1} in the other half of the secondary. However, it will combine with E_p to give exactly the same resultant amplitude E_{d2} as was obtained in the half of the secondary connected to diode 1. As the rectifier voltages are connected in opposition, there will be no voltage output from the discriminator when the secondary is tuned exactly to resonance with the unmodulated applied signal.

Now if the secondary of the discriminator is de-tuned slightly on one side of resonance—or if the incoming signal shifts slightly in frequency—Figures 4C and 4D show how the resultant voltages E_{d1} and E_{d2} applied to the two diodes become unequal, and therefore the output voltages are unbalanced and there is a resultant voltage difference E_o appearing across the diode cathodes. This is because the voltage E_p capacitively connected from the primary remains

the same, but when the secondary is no longer resonant to the applied frequency, the phase of the induced voltage E_{s1} in the half of the secondary connected to diode 1 will move toward being more in phase with E_p and will therefore decrease the resultant voltage E_{d2} applied to this diode. (Figure 4D). The combination of these rectified voltages in the diode cathode circuits results in an output voltage E_o , with the cathode of diode 1 at a negative potential to ground.

If the secondary of the discriminator is de-tuned slightly to the other side of resonance, or if the incoming signal shifts slightly the other way in frequency, a similar effect takes place, except that the induced voltage E_{s1} in the half of the secondary which previously moved toward being more in phase with E_p , will move more out of phase and the resultant voltage E_{d1} applied to diode 1 will be decreased (Figure 4E). The induced voltage E_{s2} in the other half of the secondary, which previously moved further out of phase with E_p , now moves toward being in phase, and the resultant voltage applied to diode 2 will be increased (E_{d2} in Figure 4F). Thus, there will be a potential E_o of opposite polarity developed between the diode cathodes, making the cathode of diode 1 positive to ground.

The further the swing away from resonance the greater will be the phase shift in the discriminator secondary, and as a result the greater will be the net potential E_o developed between the diode cathodes. Thus this circuit will change frequency variations into voltage variations which are proportional to the frequency shift and vary in polarity with the side of resonance to which the frequency shift occurs. This gives us an audio signal conforming exactly to the modulating voltage applied at the FM transmitter. The response characteristic of the discriminator is shown in Figure 5.

The Ratio Detector

The ratio detector depends on the same action as the balanced discriminator for its frequency shift-to-AF signal conversion, and the portion of the ratio detector shown within the dotted lines in Figure 6

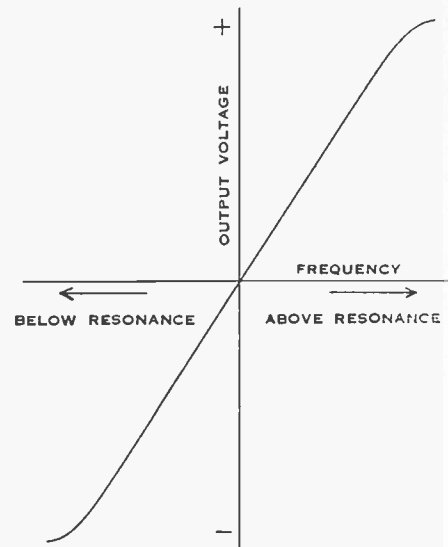


FIGURE 5

is the same in principle as that shown in dotted lines of Figure 3. The minor changes in the ratio detector circuit merely provide for link-coupling from primary to secondary, instead of the small condenser connected to the secondary center tap from the top of the primary. The results are practically the same. However, the diodes are connected in series instead of parallel, so that the voltage across the common load resistor R_1 (Figure 6) will be the sum of the resultant voltages from the two halves of the secondary. This voltage will appear across the large filter condenser C_1 which is of the order of 2 to 8 mf. This sum value of voltage depends only on the amplitude of the incoming signal; but due to the large size of C_1 rapid changes in amplitude such as noise and AM are strongly suppressed, just as the ripple in a power supply filter is suppressed by the filter condenser.

Now the two condensers C_2 and C_3 , with their common terminals at RF ground, will have an instantaneous voltage across each which corresponds to the resultant voltage from the half of the discriminator's secondary which is connected to the corresponding diode. For instance, the potential across C_2 will be greater than that across C_3 if the resultant voltage from the top half of the secondary is greater than that from the bottom half. Thus, the phase-shifting action

(Continued on page 16)

BATTERY OPERATED ELECTROFLASH UNIT

Some time ago we published the circuit diagram used in the AC operated Sylvania-Wabash Electroflash unit. We understand that a few of the braver servicemen were able to build their own units from the data given. Another popular model is the battery operated Electroflash, the circuit of which is given below.

The voltage doubler rectifier circuit is very similar to the AC model except for the use of cold cathode rectifier tubes which give better battery economy. Some circuits have been published elsewhere using filament type rectifiers; one of the most complete of these was that published in RADIO CRAFT for September 1947. Any serviceman wishing to build either type of electroflash unit would do well to read the above mentioned article as it contains much more information on the mechanical construction than we can give here.

The original circuit printed in SYLVANIA NEWS did not use

the Sylvania Type OA5 trigger tube, but to all who inquired we sent the Type OA5 data sheet which shows that part of the circuit practically the same as given below. To those who are just getting interested in electroflash work we should explain that the advantages of using a Type OA5 are (1) lower voltage is used in the push-button circuit giving greater safety (2) lower current in this circuit giving less trouble with arcing or sticking contacts in cameras and synchronizers.

Operation of the OA5 Tube

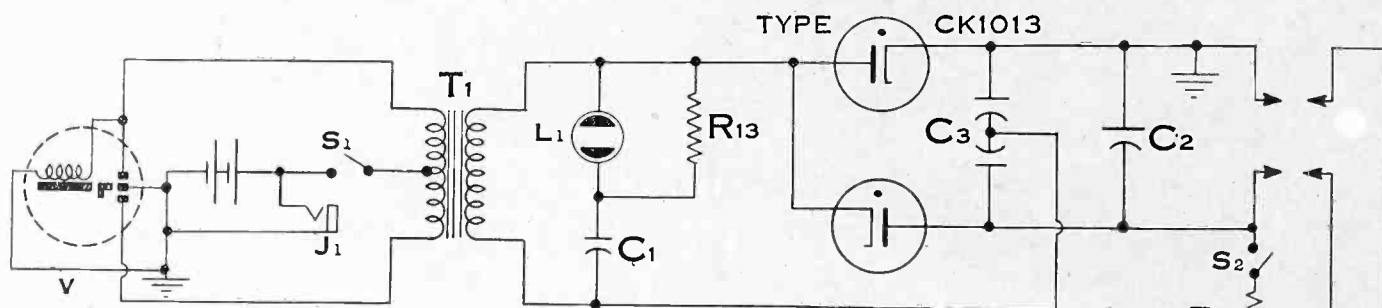
The ratings of this type were given in SYLVANIA NEWS for December 1946 and will not be repeated here. Briefly its actions is as follows: There are three grids between the cathode and the anode and with proper potentials on these the tube will not break down even with 1000 volts applied. However, a slight change in the voltage applied to the control grid will cause the tube to conduct.

The tube does not conduct the discharge current to the flash tube, only the discharge of condenser C4 through the ignition transformer which in turn triggers the flash tube. It is quite correct for the second grid of the Type OA5 to be left floating as this is the most sensitive condition.

Photographic Procedures

One of the points not explained in our original article is that the chemical action on the film of this short duration high intensity light is different from the action of the same amount of light at ordinary speeds. This is particularly noticeable with certain fine grain developers and hardly noticeable with some others such as the well known D76. Instead of using a larger aperture the cure is 30 to 100% longer development. The exact amount to use should be determined by each photographer to suit his camera, developer and personal preference.

BATTERY ELECTROFLASH CIRCUIT DIAGRAM

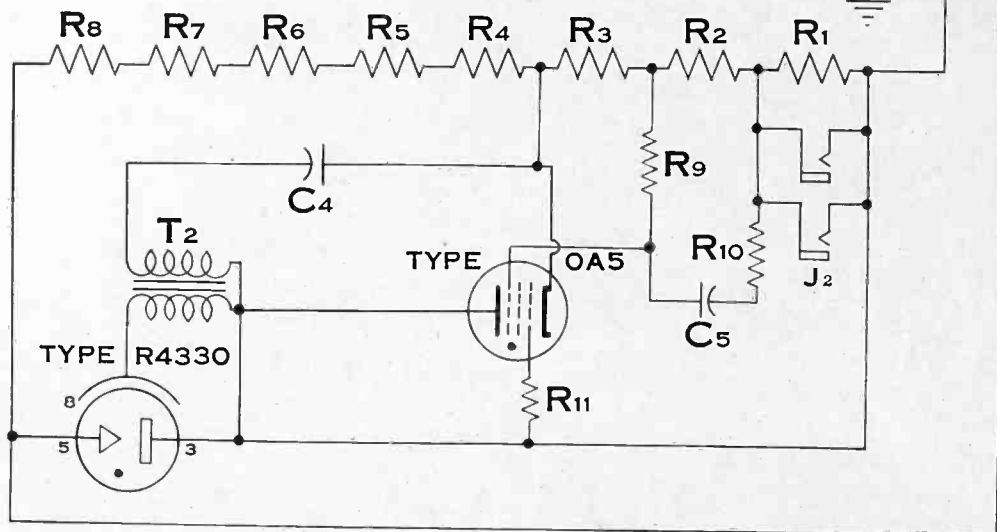


PARTS LIST

| Condenser | Capacity | Working Voltage |
|-----------|----------------|-----------------|
| C1 | .001 mfd. | 2500 |
| C2 | 32 mfd. | 2500 |
| C3 | .05 - .05 mfd. | 2000 |
| C4 | .25 mfd. | 1000 |
| C5 | .01 mfd. | 600 |
| Resistor | Ohms | Watts |
| R1 | .51 Meg. | 1/2 |
| R2 | 1.8 Meg. | 1/2 |
| R3 | .47 Meg. | 1/2 |
| R4 to R8 | 1.6 Meg. each | 1 |
| R9 | 10 Meg. | 1/2 |
| R10 | .27 Meg. | 1/2 |
| R11 | 10 Meg. | 1/2 |
| R12 | 5000 | 10 |
| R13 | 47,000 | 1/2 |

MISCELLANEOUS

| Battery | 4 Volt Storage |
|---------|------------------------------------|
| J1 | Battery charging connection |
| J2 | Camera and Synchronizer connection |
| L1 | Neon Indicator Lamp |
| S1 | Off-On switch S.P.S.T. |
| S2 | Safety switch |
| T1 | Vibrator Transformer |
| T2 | Trigger Transformer |
| V | Vibrator |



FREQUENCY MODULATION (Cont'd)

TYPICAL RATIO DETECTOR CIRCUIT

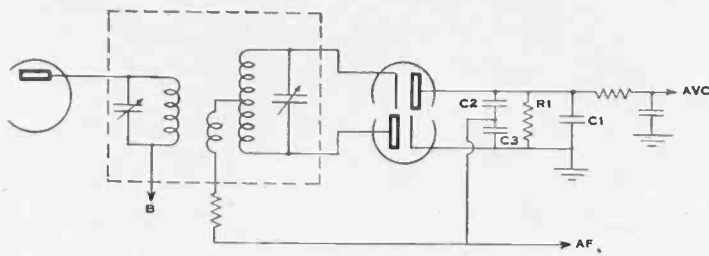


FIGURE 6

BRADLEY DETECTOR CIRCUIT

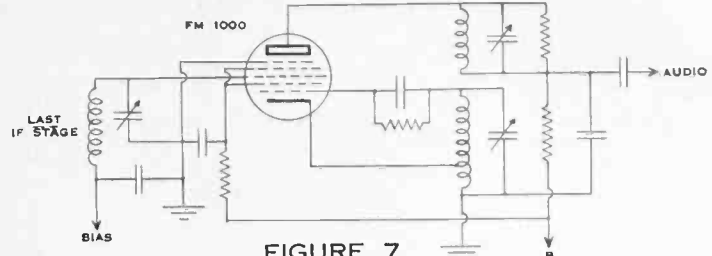


FIGURE 7

discussed under balanced discriminators occurs again, but this time the difference shows up across the individual diode load condensers. Therefore, by connecting to the common terminal of C₂ and C₃ (Figure 6), an AF voltage is obtained which corresponds to the frequency modulation, just as in the case of the balanced discriminator. The response curve is as shown in Figure 5. The name "ratio detector" comes from the fact that although the sum of the voltages across C₂ and C₃ remain constant for frequency modulated signals, the ratio of the voltage across C₃ and C₂ is the same as the ratio of the two RF voltages applied to the diodes.

As the voltage across C₁ varies with slow signal strength changes, we can take AVC or AFC voltage from the top of this condenser, as shown in Figure 6.

The ratio detector is not used with a limiter because the big

condenser C₁ starts by-passing rapid amplitude variations even at very low signal strengths. However, the output from a ratio detector will vary with slow signal strength changes, while with a limiter there will be no increase in output with signal strength after the limiter is saturated.

Other FM Detectors

Another circuit frequently encountered is called the Bradley Detector (Figure 7). Here the FM-1000 tube, which is quite similar to a 7Q7 in general construction, is used as a locked oscillator. Grid No. 1 of the tube is connected into a circuit oscillating at the IF of the set. As the frequency variations coming in through the IF stages of the set from a FM signal reach grid #3 they pull the oscillator into making the same frequency shifts. This results in plate current changes in the tube which are proportional to the amount of the frequency

shift, thus giving us our AF signal in the plate circuit.

The FrcModyne circuit, usually found in low-priced converters, uses a combination super-heterodyne, super-regenerative circuit, with FM detection obtained by slight off-resonance tuning in the plate circuit. The super-heterodyne action enables the super-regenerative detector to operate at a constant frequency and permits optimum setting of quench frequency. The super-regenerative circuit has high gain, and has considerable limiting action as the output does not depend entirely on the strength of the input signal. Detection by off-resonance tuning (side-slope detection) is the same effect as we get by tuning an AM receiver slightly off resonance to hear FM signals.

In the next article in this series alignment procedure for some of the more common FM circuits will be discussed.

SERVICE HINTS

Correction On Philco 46-1201 (January): Donald Slattery states that there is no adjustment on this record player to allow for clearance between the edges of a ten inch record and the guide rollers. I believe that if he will inspect this player closely, he will find an index lever adjustment for this purpose back of the cartridge. It is an eccentric cam and is adjusted merely by loosening the screw through it and turning the cam until there is a clearance of 1/16 inch between the record edges and the guide rollers.—John A. Springer, Uniontown, Penna.

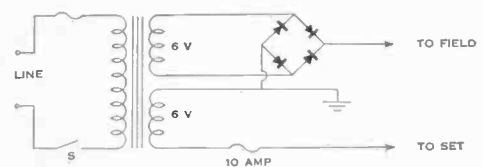
Editor's Note: A number of people noted this mistake but we can only print the one giving the clearest short explanation.

Other clear explanations were received from W. E. Shreffler; H. Parker; Merle F. Barker.

Testing Auto Radios on A.C.: If you don't want a messy storage battery under the bench to test an occasional auto set on the bench you can use 6 v. A.C. from a transformer.

All you have to do is disconnect the speaker field and either use a separate speaker or supply D.C. from the rectifier shown in the circuit. The vibrator and tubes will work with no hum if otherwise in working order.

It is a good idea to use a circuit breaker in place of the 10 amp fuse.—David V. Chambers, Upper Darby, Pa.



HEARING AID MAGAZINE

Any servicemen specializing in hearing aid repair work will be interested in knowing that there is now a magazine on the subject. It is called "Hearing Aid—Journal of the Industry" and is published by Hearing Aid Publishing Company, 45 Inner Drive, St. Paul, Minnesota.

Serviceman of the Month . . .

An Eye For Business

Two years ago, Jerry Kauffman of Reading, Pa. sat down to do a little figuring. He had worked quite a few years for others as a radio technician and had done a good job, but he hadn't made much headway himself. It didn't take much thinking for him to decide to open his own business. After all, the good reputation he had earned elsewhere would put him in good stead to get plenty of service business on his own.

After a little looking around, Jerry found a suitable place in a quiet residential district in Reading. The space wasn't as large as he had dreamed about, but it would do. There was lots of space to put things if he was economical about it.

Business was a little quiet at first around Jerry's shop, but that gave him a chance to fix the place up a



Radio Ambulance is a good business getter for Jerry Kauffman. Better customer service is one answer to his success. Truck is painted white with bright red lettering.



Jerry Kauffman, left, and M. P. Fisher at modern, well equipped service bench.

bit. A coat of paint and a roomy workbench with all his instruments installed in plain view gave the place a new look. With the service bench just behind the counter in plain sight of his customers, it was easy for them to tell that he knew his business when he gave their radio a quick check. That was a good selling point.

One of the first things that was on Jerry's list when he started in business for himself was a novel way to make himself known around the city. He wanted something unusual, something that would make people look twice. The final outcome was his Radio Ambulance. You would have to have darn poor vision to miss seeing that truck when it passed you on the street.

Today, Jerry Kauffman does a

good radio service business. Supplemented by the sale of radio sets, the business keeps him and his assistant on their toes to keep customers satisfied and give good service. He has become one of the pioneer's in television sales, service

and installation in the area. Sylvania tubes have played an important part in Jerry Kauffman's service business because Jerry knows that he can count on them to be dependable when he uses them for replacement in a service job.

Service - Sylvania - 14 Years



Fourteen years as a serviceman and a Sylvania tube dealer is the record of H. C. Sosebee of Clarksville, Ga. As head of the service department of Reeves Hardware Company, Mr. Sosebee does a good job keeping

the radios in his community in good working order. He is one of the many Sylvania tube servicemen being served in Georgia by Specialty Distributing Co., Atlanta, distributor of Sylvania tubes.

IDEA DEPARTMENT

Cabinet Repair Can Pay

Outward appearances in any business are important. If a customer's radio looks like new when it is returned to him, his immediate reaction is that you have done a good job in repairing it. That is the theory Phillip L. Davidson, Phil's Radio Service, Brooklyn, N. Y. uses to give his customers good service.

"It has been our policy that when we repair a radio set, the cabinet as well should be repaired if necessary," writes Mr. Davidson. "By that, I mean, fixing chips, cracks and scratches in the wood. Doing this kind of work makes for good will and an appreciable customer. Burning in cracks with a matching shade of shellack stick and then finishing and polishing gives the cabinet a new

appearance."

"... any radio serviceman who knows or wishes to learn that art of cabinet touch-up can rest assured that this practice will lend a valuable asset to his business."

"... This encourages a sound reputation and good recommendations." It also invokes plenty of favorable customer comment.

Mr. Davidson sent us complete plans for building a burning-in stove, which can be made for only a few cents. If any servicemen are interested in building such a stove, please write to us at Sylvania Electric Products Inc., 500 Fifth Ave., New York 18, N. Y. and we will be happy to send you Mr. Davidson's plans.

Tube Inventory Control

Perhaps one of the biggest jobs that faces the radio service dealer is that of maintaining an adequate tube inventory. With so many tube types listed, it takes plenty of close

checking to know what you have in stock. Many times the lack of a certain type is responsible for the loss of a service job, or the cause of much inconvenience.

| Type No | Bin 3 | Bin 4 | Bin 5 |
|---------|-------|-------|-------|
| 5X4G | - | | |
| 5Y3G | XX | | |
| 5Y4G | XX | | |
| 5Z3 | XX | | |
| 6 | - | | |
| 6A3 | - | | |
| 6A4 | - | | |
| 6A5 | ○ ○ | XX | |
| 6A6 | ○ | XX | |
| 6A7 | XX | XX | |
| 6A8 | XX | XX | |
| 6AB5 | - | | |
| 6AB7 | XX | | |

checking to know what you have in stock. Many times the lack of a certain type is responsible for the loss of a service job, or the cause of much inconvenience.

S. E. Patterson, Oxford, Kan.,

has worked out a very effective way to keep his tube stock records up to date at all times. With the chart pictured below he is able to tell how many tubes of a type are in stock, whether a tube has been called for in the last 60 days, or whether the tube has no demand in his store. With this type of record, booking is simplified, and tubes are easily located when they are needed. Key for the chart is as follows:

Brackets and numbers indicate bin in which tubes may be found.

- indicates that the tube has not been needed

within the last 60 days.

O indicates that the tube has been needed, but was not in stock.

/ indicates the tube is in stock (one line means a tube). XX indicates tubes sold.

Test Lead Trouble?

David V. Chambers, Upper Darby, Pa., tells us a good way to keep aerial and ground leads on the rear of the bench out of the way, yet have them long enough to reach over to the counter. This is accomplished by drilling holes in the rear of the bench large enough for the leads to slide through. Loop the leads under the bench with a pulley and a four or six ounce weight. The weight should be adjusted so that it clears the floor. A knot in the cord will let the lead slip back beneath the bench and leave only the bulldog clip showing.

Test leads can be kept out of the way with long rubber bands attached to the ceiling above the instrument.

Price Increase

We have just been advised of an increase in price, effective April 15, by our supplier of book matches. All orders received post marked before this date will be filled at the current prices. All orders received after April 15 will be billed at the new prices.

The new schedule of prices on Sylvania Book Matches is as follows:

- 1,000- \$ 5.50 plus \$.40 Fed. Tax
- 2,500- 13.13 plus 1.00 Fed. Tax
- 5,000- 22.50 plus 2.00 Fed. Tax
- 7,500- 31.88 plus 3.00 Fed. Tax
- 10,000- 42.50 plus 4.00 Fed. Tax

On all quantities under 10,000 transportation charges are collect from the factory. On quantities of 10,000 and over transportation charges are prepaid.

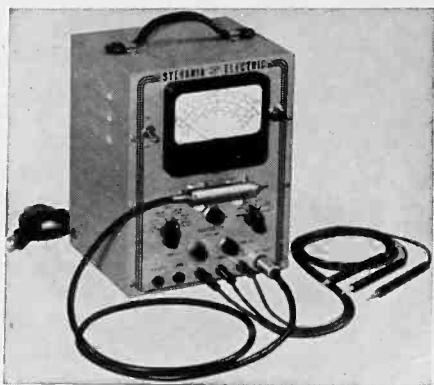
Orders for the Service Style Matches only will be accepted in the 1,000 quantity. On the regular style Sylvania Book Matches the minimum quantity we can accept is 2,500.

The above quotation, of course, includes all imprinting. Use Sylvania Book Matches to promote your business. They are surefire salesmen.

Sylvania Test Equipment Gets "New Look"

Additional RF Zero Control Feature Of Polymer

Along with the "new look" in women's clothes, Sylvania announces that the Sylvania Polymer is now appearing on distributor's shelves with a "new face." This new model, known as Type 134Z, includes an additional control for accurate RF zero settings. This additional technical feature will be welcome information to readers who are frequently required to measure RF voltages. The new face is similar to that of the Oscilloscope Type 132. The face is silver gray with Sylvania green lettering for easier reading.



POLYMER TYPE 134Z

The Sylvania Polymer is designed for accurate measurement of electrical condition in circuit components operating with power, audio and radio frequencies up to 300 mc. An unusual, compact vacuum tube probe is provided for modern signal tracing technique.

Owners of the earlier model have praised the Sylvania Polymer for its accuracy and utility in servicing FM, AM and

television receivers.

Your Sylvania distributor is ready to give you complete information on the Sylvania Polymer.

New Face Improves 3 Inch Scope

Also modernized by a face lifting is the Sylvania Oscilloscope Type 131. This is the Sylvania scope with the 3" screen which was introduced to the radio trade sometime ago. The face has been modernized to conform with other test instruments in our line. The simplicity of design of the new face makes the scope much easier to read and a more attractive instrument for your service bench.

The oscilloscope is an extremely



OSCILLOSCOPE TYPE 131

Keeping Up With Television

Infant television shows great promise for 1948 in construction of new stations and increased set production. It means too, a new field to be cultivated for installation and service. In fact, people are beginning to realize that television and service go hand in hand.

Video set output during February reached a new peak with 35,889 receivers reaching the finish line. January production indicated a rise in the proportion of consoles and the total output since the war is now estimated at 250,937 sets.

In the TV station picture, FCC records show 18 stations in operation, 82 holding construction permits and 143 applications pending. Many existing video broadcasters have announced plans for improving their facilities in the coming months.

WCBS-TV in New York is now in the process of building what they term "the nation's largest television studio plant." Their program also includes lining up affiliates all over the country and planning for

national transmission for its programs.

Development of network facilities are already underway at NBC where regular programs now reach out over the Schenectady-New York-Philadelphia-Washington area. The networks also announced recently that they are working on a king-sized studio to handle bigger and better productions.

To bring video more into the reach of the average man's pocket-book, several manufacturers have sets on the market at a price under \$200. For bars and taverns, there are large screen projection sets now available.

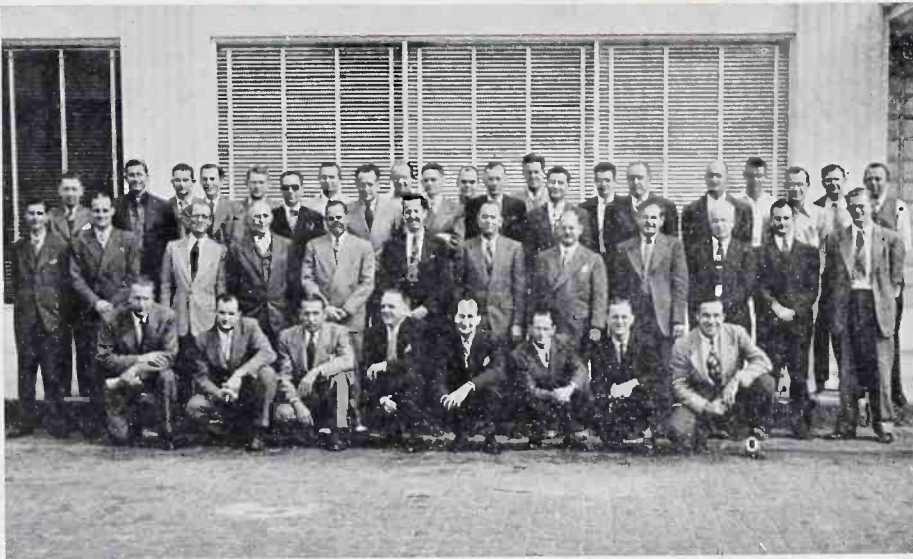
Whether or not video will fulfill all the expectations of the next year remains to be seen. Servicemen are saddled with a large responsibility in this new medium. They must know how to install and service the home receivers so that maximum satisfaction will be received by the owner. It is a big job with plenty of promise of increased profits.

valuable instrument in any service shop. Weighing only 18 pounds, the Type 131 scope is extremely convenient when portable work is involved. The five range selection control which permits close adjustment to any desired frequency allows fine frequency control from 15 to 40,000 cycles. The amplifier response is uniform within 3 db. from 10 cycles to 100 kilocycles and has a sensitivity through the amplifiers sufficient to cause one inch total peak to peak deflection with 0.5 volts r. m. s. input.

The relatively low cost of the Sylvania 3" scope puts it in a class within the reach of every serviceman. With the rising tide of FM and television receivers on the market, servicemen will find that an oscilloscope is indispensable in servicing work.

Florida Sunshine

Facts and Figures



While people north of the Florida state line were shivering and digging out from some of the worst snow storms in history, 40 members of Thurow Distributors' seven branches gathered in Tampa, Fla. for a three day general sales meeting. H. M. "Doc" Carpenter, president of the company, announced the

company plans for 1948. W. P. Laws and J. A. Mook, Jr. outlined the sales and advertising program for the coming year. A banquet with special entertainment served to lighten the spirits of those in attendance. Above is the entire Thurow sales department beaming through the Florida sun.

Sales Record

Sylvania sales during 1947 were the highest in peacetime history. Total for the year, including wholly owned subsidiaries, was \$95,715,638. This represented an increase of 38% over 1946. Net income for 1947 amounted to \$2,507,075 which, after an allowance for \$397,414 for preferred dividends, was equal to \$2.10 per share on common stock.

Set Production

Overall set production during February remained at a high seasonal level. Television receiver production climbed to an annual production rate of 430,000 with 35,889 sets produced. (See page G-15 for more television developments.) FM-AM set production for the same month totaled 140,629, an increase of more than 4,000 over January. Total production for the month was 1,379,605 sets of all types.

FM Broadcasters

FCC records indicate that 432 FM broadcast stations are now operating. Total number of construction permits and conditional grants on record are more than 900. FM broadcasters are now going on the air at the rate of about five per month.

Television Boost

Recent permission for use of live music over video has given it another boost. Previously, musical programs over television were accompanied by recorded music. Programming is already under way which will include the use of live musicians over video stations in New York and other cities.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
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Vol. 15, No. 4

APRIL, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

In This Issue NEWS

- MORE ABOUT TOWN MEETING
- MERCHANDISING
- YOUR MAILMAN CAN BE YOUR BEST SALESMAN
- TECHNICAL
- BATTERY OPERATED ELECTROFLASH
- F. M. DETECTORS AND LIMITERS
- SERVICE HINTS

SYLVANIA NEWS

MAY, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

R. A. PENFIELD, Editor

VOL. 15, NO. 5



This is the
NEW
SYLVANIA RADIO
SERVICEMAN DECAL

It is the
SIGN OF
DEPENDABLE RADIO
SERVICE

(See page G-18 for Details)

RADIO PARTS
SHOW
EDITION

An Invitation

The welcome mat will be out at Booth 49 when the Chicago Parts and Electronic Equipment Show gets under way in the Stevens Hotel on May 11. Sylvania sales and advertising personnel will be on hand to answer questions and demonstrate the Sylvania products on display.

In addition to a complete display of Sylvania receiving tubes, cathode ray tubes, transmitting tubes, test equipment and electronic products, you will have a chance to look over our advertising helps and sales promotion material. Sample material for the local dealer tie-in program for the 1948 advertising campaign will be available for a first hand observation. Members of the advertising department will be glad to explain its use. (See page M-17 of this issue for the details of this campaign.)

Are You This Serviceman?

We recently heard a story about a radio serviceman which we think worthy of passing along to our readers. We think it is a good example of what not to do if you want to stay in the radio servicing business. Our informant, a genial little man who seldom has a bad word to say about anything, was hot under the collar when he told us about his experience. And he had very good reason to be.

"Three months ago," he said, "I found that my record player wouldn't work. The first impulse was to call a radio serviceman. Of course, we haven't lived in the neighborhood very long, so I didn't have much choice but to call the first one I found listed in the phone book."

When he placed his call, Mr. X was told that the serviceman would be glad to be of service and that he would call for the radio that afternoon. Being of a helpful nature, our hero pulled the radio out into the middle of the floor and sat down to wait for the serviceman.

* * *

When the serviceman called at the home he looked over the set and decided that he had better take the record player to his shop to work on it. With this in mind he set about dismantling the set to remove the record changer from the cabinet. Here is where the fun began. First he removed the chassis bolts to pull the radio from the cabinet. After a few yanks at the chassis our friend informed him that perhaps removing the knobs from the controls would help.

After numerous other boners, the serviceman finally got the changer

out of the cabinet, tucked it under his arm and departed. To our friend's amazement, the radio had been left in the middle of the floor with all the wires dangling. "This," he mused "doesn't seem like a very courteous way to do business."

The owner of the record changer bid his set good-by two weeks before Christmas. When it left, he had the serviceman's assurance that it would be back in a week. This assurance gave him great peace of mind. It would be tough to get along without his machine during the holidays.

* * *

Exactly three weeks after Christmas, the serviceman made his appearance with the changer under his arm. When quizzed about the long delay, he muttered something about calling on the telephone once and receiving no answer. That was the only excuse for the long delay.

After the changer was installed the radio man picked up his tools and departed without the slightest attempt to see if it was in working order or request payment for his service.

* * *

When he departed, our little man set about to once again enjoy recorded music. Much to his surprise, he found that there was something else wrong with the machine. Of course, there was nothing to do but call the serviceman again and tell him his findings. The reply was that the changer would be called for and looked over again. That all took place three months ago but as yet, the serviceman hasn't called, nor has he sent

a bill for the original work done on the changer.

When our informant finished his story, using a string of invectives which we cannot print here, he asked our advice in the matter. He wants his record changer to work, but he is scared to death of servicemen, he says. We assured him that the man with whom he had been dealing was not typical of all servicemen and that perhaps he might try another.

The damage has been done, however. Mr. X has run against a problem that will remain an indelible mark on his mind. His future dealings with servicemen will be wrapped in a heavy garb of suspicion.

* * *

Had someone advertised his service and acquainted our man with the type of service good technicians give, perhaps he would be less cynical now.

We all resent the bad name the service industry has in the eyes of the public. The bad name, however, comes from a few, not most of us. The few bad are dragging the good through the mud. It is a situation which requires the efforts of all thinking-servicemen if it is to be corrected.

Editor's note: This is a true experience. In telling it we are not criticizing the service industry, but merely trying to show the pitfalls of incompetent business practices and poor technical ability.

ON THE COVER

The pretty little girl on our cover is the favorite lady of radio service. She holds the new Sylvania decal which is your key to more business. In all our 1948 advertising the decal will be featured as the sign of dependable radio service. The decal comes in two sizes, a big 12 inch one and a smaller 8 inch size. Place it in a prominent spot on your store window, door, truck or car. The more you identify yourself with the serviceman we advertise, the better your chances are for more business.

If you want to attract customers to your store, use this cover as a window streamer, or build a window display around it. People are sure to take notice of you.

SYLVANIA NEWS

MERCHANDISING SECTION

MAY, 1948

Copyright 1948
Sylvania Electric Products, Inc.

EMPORIUM, PENNA.

VOL. 15, NO. 5

Four Ways To Boost Your Service Business



Complete material for four months in one big kit includes window streamers, newspaper ad mats, stamped, imprinted government postal cards, and window displays for use each month.

This year Sylvania offers to radio servicemen a coordinated advertising program at extremely low cost. Local direct mail campaigns tied in with national advertising will completely identify you with Sylvania radio tubes and good radio service.

Every month during the next year Sylvania will advertise the radio serviceman in *Radio Best*, *Life*, *Colliers* and *Saturday Evening Post*. Each ad in these publications will prominently display the identifying decal of the Sylvania tube dealers. Since we can't put every dealer's

name in these ads, the decal will serve the same purpose.

Complete local tie-in for the radio serviceman is offered in a kit containing four months of complete advertising material. The kit includes three colorful window displays, four window streamers, four newspaper ad mats and sufficient direct mail postal cards, imprinted with your name, address and telephone number, to cover your mailing list. The cost of the entire kit is the price of the postage on the cards. (If you purchase 800 cards, your cost for the complete program will be \$8.00).

The display material for each month will follow the same theme of the current national ad. Window display, window streamer, postal card and ad mat will have the same headline and illustration. It will all add up to a five way attack on your customers. Your identification for the campaign will be the new Sylvania decal which should be prominently displayed on your door, window and truck. Since all of the advertising material will carry this decal, it is important that you display it prominently. It comes in two sizes (8" and 12").

The part you play in this campaign is simple and will require very little of your valuable time. One postal card mailed to each of your prospects every month, plus a little time in decorating your shop window with the current tie-in material is all that is required.

To join in this big merchandising campaign is simple. Sit down and figure out how many names on your mailing list. Multiply that number by four and you have the total number of cards you will need in the first kit. (The kits have been designed to supply material for four months to save you time and expense). Send us your check, money order, or cash if you prefer, covering a cost of one penny for each postal card you will need to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. Be sure to include instructions for the postal cards.

Advertising is like pump priming. You have to do it for a while before it brings results. Your returns from the first cards you mail might not even be noticeable, but remember, that you are imprinting your name on the customer's mind. Sooner or later he will need you and your card will help him remember.

If you do not already have a mailing list or want to improve your old one, read the story on page M-13 in the April issue *THE NEWS* which gives you some good pointers on how to build a good mailing list.

Keeping Records Can Help Your Profits

Making headaches pay is smart business. Keeping records of your service jobs is a headache which will pay off in bigger profits for you. When you know what parts went into Mrs. Jones' radio and how much they cost you, you have very little trouble figuring out how much dough should go into your pocket at the end of the month.

All types of business are built on record keeping. The better records you keep, the more chance you have for increasing your profits. One answer to simplified records is the Sylvania Job Record Cards available to you at a moderate cost.

This job record card gives you a complete story on the trouble encountered and the parts used in repairing a set. They are of convenient size for easy filing and provide an accurate account of the material used—a big help when you order new parts for your inventory.

Aside from the fact that they help you, Sylvania Job Record Cards give your customers a complete story on the job you did on their radio. It will help to avoid confusion if they question your charges. The cards also carry your written guarantee of the service work which you have performed. Stamped in large red letters on the customer receipt are the words "TERMS CASH." You can eliminate confusion and collect the money due you when the customer understands the terms on his receipt.

Sylvania Job Record Cards are available at a very moderate cost. They come with your imprint on the customer receipts, so that your name will stick with the radio. Drop a line to the Advertising Dept., Sylvania Electric Products Inc., Emporium, Pa. and order a supply of job record cards. You'll be surprised how much easier it makes your work.

Customer Receipt: Features a large red stamp that reads "TERMS CASH" and "YOUR IMPRINT HERE". It includes fields for "JOB NO.", "Owner", "Street", "City", "Date Job Accepted", "Model or Serial", "Radio", and "NUMBER AND CONDITION OF TUBES".

Warranty Card: Titled "SET OWNER'S WARRANTY KEEP THIS WITH RADIO". It contains a "GUARANTEE" section with a small illustration of a radio and text explaining the service guarantee.

Parts List Table: A table with columns for "NO.", "TYPE", "TYPE", "COST", and "LEFT". Below the table are fields for "Total Tubes \$", "MATERIAL USED", and "Total Material \$".

Service Invoice: A detailed form for recording service work, including fields for "TUBES REPAIRED", "Other Material", "Check Up", "Repair", "Alignment", "Total", "Sales Tax", "Grand Total", "Paid", and "Date". It also includes a "YOUR IMPRINT HERE" section with a price list: 100 - \$1.00, 150 - 1.75, 500 - 3.00.

Spring Cleaning Portables And Service

Spring gives us a funny feeling. The cool breezes that blow through the blossoming trees and the smell of newly turned earth inspire us to do great things. When we open the door on the first day the balmy breezes feel warm enough, the dust blows out from beneath the counters and benches and we realize that a good house cleaning would do a lot to dress up the place.

The clean smell of a fresh coat of paint and a newly scrubbed floor will lift your moral and life won't seem so tough after all. Your friends and customers too, will be impressed. It is always nice to do business in a fresh looking place.

Clean windows and new window displays will make your shop more attractive—a better place to work. Now, more than ever people are shopping around. If you win their eye your chances for sales are greatly increased.

Time was when warm weather meant a let down in service business. Sunshine and warm breezes pulled people outdoors away from their radios. It meant the radio was not used too much, so there was little opportunity for it to show defects. The serviceman's pocket book was a little thinner.

Today things have taken a turn for the better, as far as the service dealer is concerned. Why? The portable radio, of course. Outdoor activities can be made much more pleasant because of this modern device. Because of this, the serviceman can expect more business during the old slump.

If you are on your toes, you can turn the portable market into more dollars in your pocket. Different problems encountered in the ownership of the portable make it a good money maker in the maintenance business. Like babies, the portable requires a good bit of attention, if

it is to remain in proper working condition. Batteries need to be checked periodically to see that they are in good condition. Frequent cleaning of accumulated dust and dirt and a periodic tube check will keep your customers happy by having the radio in good working condition at all times.

Although there may not be too much profit in a service of this type, it will lead to bigger and better service jobs if the proper kind of attention is given to portable service. A modest ad campaign of direct postal cards or newspaper ads should be used to acquaint people of this type of service. Better still, a phone call to a portable owner telling about such service for a small fee will win customers. You'll be surprised how much good will you can create by giving your customers a maintenance service on their portables. More use of portables mean more service jobs.

SYLVANIA NEWS

TECHNICAL SECTION

MAY, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 5

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FREQUENCY MODULATION ALIGNMENT OF FM RECEIVERS

JAMES H. CANNING

Sylvania Commercial Engineering Department

In order to obtain the best performance from any radio receiver, AM or FM, it is necessary to have the various circuits tuned in such a manner that good response is obtained at all frequencies within its tuning range. By good response is meant good sensitivity, selectivity, uniformity, and fidelity.

Before the advent of FM, the main objective in the alignment of AM receivers, in most cases, was to obtain sensitivity and uniformity only. In other words, the AM receiver had to receive stations well and have a fairly uniform response over the band. A simple AC meter across the output of the set, or better, a meter reading developed AVC bias serves as indicator while the tuned circuits are adjusted. However, for a complete, high quality alignment job on even an AM receiver the factors of selectivity and fidelity must be considered also. Although the same simple indicator will serve to give readings of these two factors, the fact that four primary characteristics of the receiver are being varied at the same time makes observation difficult, particularly as the best adjustment for one is probably not the best for others. For instance, highest fidelity does not occur at the same adjustment as best selectivity in either AM or FM. As one of the outstanding features of FM reception is high fidelity, it is essential to consider this factor in alignment.

Connecting Test Equipment into the FM Receiver Circuit

In aligning an FM receiver, which is our primary consideration here, connections must be made to some point ahead of the limiter in order to get indications of amplitude changes for alignment of the RF and IF stages. If there are one or two limiter stages, a vacuum tube volt-

meter such as the Sylvania Polymeter may be connected across the first limiter grid resistor (Figure 1), and when an unmodulated signal is applied to any stage ahead of the limiter, the VTVM will show a negative voltage proportional to the strength of the signal. Apply the signal to the converter grid, or the grid of any IF stage, and align all the stages between that point and the limiter grid for maximum VTVM reading. The signal generator should of course be set to the IF of the set (usually 10.7 mc) and the stages should be tuned starting from the last IF and working toward the converter.

Response Curves

When the IF stages have been aligned according to this procedure they are tuned to a point of maximum IF sensitivity, but nothing is known about selectivity and fidelity.

Now if the signal frequency is moved about the 10.7 mc point, the response as indicated on the VTVM may vary in several different ways, as shown in Figure 2. If the frequency of the signal generator is moved from 10.45 mc up to 10.95 mc and the reading of the VTVM plotted every 50 kc, some kind of a response curve, possibly similar to one of the examples in Figure 2, will be obtained. Note that the f_0 (10.7 mc) point is always the highest point of the curve. This is because the condition of adjustment for maximum response at IF frequency was assumed. However, different things happen in the different curves as the frequency moves away from the center. This is significant, because in FM the signal itself must have a channel 150 kc wide to operate in, and response should be constant at least over this range for good fidelity.

(Continued on page T-18)

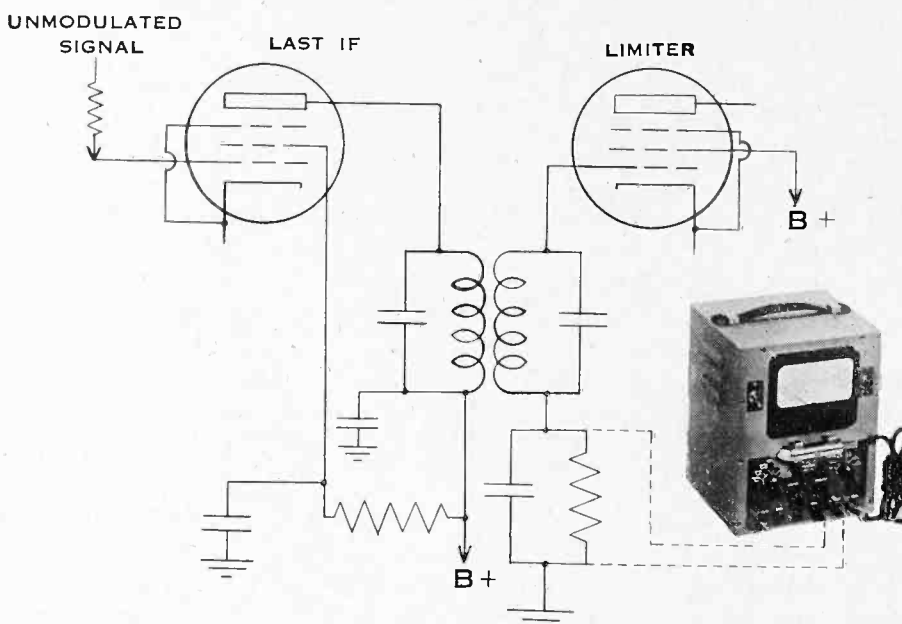


FIGURE 1

FREQUENCY MODULATION (Cont'd)

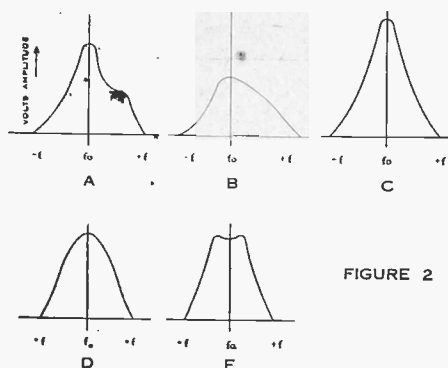


FIGURE 2

An ideal response curve is shown in Figure 3. The coupling, number of stages, feedback, circuit resistance, loading, stage gain, and tuning are among the principle factors determining the shape of the curve.

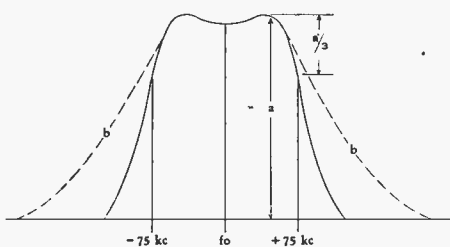


FIGURE 3

Usually everything but tuning is fixed by the manufacturer, although it is possible to adjust coupling and feedback in many cases. Note that in Figure 3 the top of the curve is quite flat for 75 kc on either side of the IF carrier frequency, thus permitting the FM signal to deviate over this range without distortion. Also the two "skirts" of the curve are not too wide. If they trailed out as shown by the dotted line b, the selectivity of the set would be reduced, as there would be some response to stations in nearby channels. The shape of the curve is symmetrical about the center frequency. In Figure 2A and 2B are two curves which are unsymmetrical and which cause distortion.

Methods of Obtaining Response Characteristics

By varying the tuning of the IF transformers some changes can be made in the shape of the response curve, particularly if triple tuned IF transformers are used in the set. However, it is very difficult to make these adjustments unless a better method of observing results is used, such as oscilloscope alignment. In this method, the vertical amplifier of an oscilloscope, such as the

Sylvania Type 131 or 132, is connected instead of a VTVM across the first limiter grid resistor (Figure 4). The horizontal sweep frequency of the scope is set to 60 cycles, and then a signal which is moved up and down in frequency about the IF at the rate of 60 times per second is applied to the grid of one of the preceding IF stages. This signal must be furnished by a frequency modulated oscillator, whose center frequency is set to the receiver's IF, and then swept back and forth by means of a reactance tube controlled by the line frequency. This signal should be applied to the grid of the tube ahead of the stage being aligned. Alignment should begin with the last IF or limiter stage, working toward the front of the set by moving the point at which the signal is applied, but leaving the oscilloscope connected across the first limiter grid resistor.

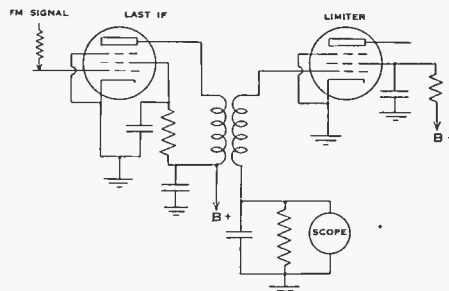


FIGURE 4

The signal applied should be sufficient to saturate the limiter or the alignment won't be correct under actual conditions.

Now it will be possible actually to see the response characteristic of the IF part of the receiver on the screen of the oscilloscope, and the results of tuning and other adjustments on the receiver can be seen immediately in their effect on the shape of the response curve. Incidentally, on most scopes the response curve will be below the axis, as the voltage peaks will be negative. Also, for the true response curve on a 60 cycle oscilloscope sweep, and sine wave control of the reactance tube in the signal generator, two separate response curves will be seen. If the oscilloscope horizontal sweep frequency is changed to 120 cycles, both these curves will fall on about the same place on the screen of the scope and they will overlap to a considerable

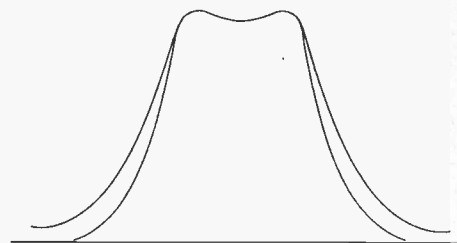


FIGURE 5

extent (Figure 5). If 60 cycle saw-tooth control of the reactance tube is used in the signal generator, a single trace will be seen with the oscilloscope sweep set at 60 cycles.

The Ratio Detector

In the event an FM receiver using the ratio detector is being aligned, the oscilloscope may be

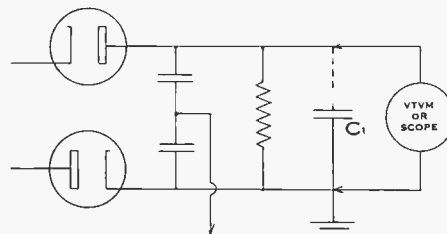


FIGURE 6

connected as shown in Figure 6, with the large condenser C1 temporarily disconnected to make the ratio detector temporarily sensitive to rapid amplitude changes. If a VTVM is being used instead of an oscilloscope, with an unmodulated signal applied to the IF section, the meter can simply be connected across C1 without disconnecting any wires, as slow signal amplitude changes will appear here as voltage variations. Although the response characteristics obtained either way will include the characteristics of the ratio detector transformer, the error is slight and usually may be ignored.

When a receiver using the FM-1000 tube in a Bradley detector is encountered, the IF is aligned by shorting pin No. 2 of this tube to ground (to stop the local oscillator), putting a jumper across the plate coil and placing a VTVM (when using an amplitude modulated signal) or an oscilloscope (when using an FM signal) across the plate resistor of the tube. Response of the IF stages will be indicated by the VTVM readings, or by the trace on the oscilloscope. However, all

(Continued on page T-19)

FREQUENCY MODULATION (Cont'd)

the instructions of the set manufacturer should be followed with particular care. Incidentally, the IF of sets using this detector is usually 9.1 mc instead of 10.7 mc.

Detector Adjustment

Referring to Figure 7, the discriminator coil of a balanced discriminator is tuned by connecting

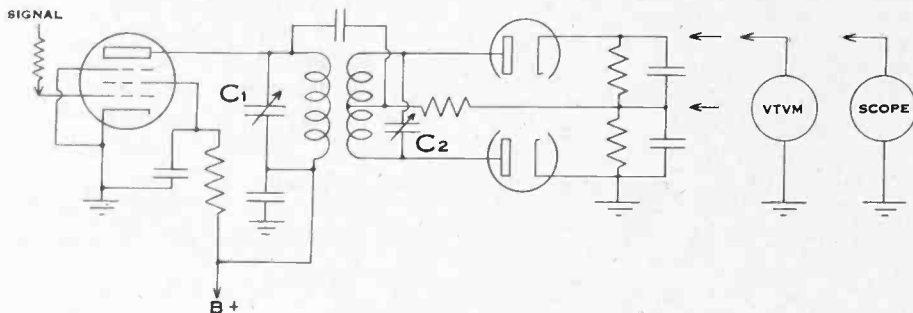


FIGURE 7

a DC VTVM across the output of the discriminator (between cathodes of the double diode), and with an unmodulated signal of 10.7 mc applied at the converter grid tune the discriminator secondary (C2) until the VTVM reading is zero. This adjustment is critical, and on one side of zero a fairly large positive, and on the other side a fairly large negative voltage will be read. Then connect the VTVM across only one of the diode load resistors and adjust C1 until the reading is maximum. Then return the VTVM across both diode load resistors and readjust C2 for zero reading. This method results in a very accurate detector adjustment. However, if an oscilloscope and an FM signal generator are being used, connect the oscilloscope across the two diode cathodes and adjust C2 until the two discriminator response curves (obtained by using 120 cycle sweep on the scope) cross at, and

are symmetrical about the base line (Figure 8A). The pattern obtained with slight misadjustment of C2 is shown in Figure 8B. Then adjust C1 for maximum height of trace, and finally readjust C2 to optimum.

In the case of a ratio detector, a network of two equal resistors of about 100,000 ohms must be connected across the diode load resistor

when making the adjustment with an unmodulated IF signal and a VTVM. (Some circuits already have RL grounded at the center). Connect the VTVM from the common point of these resistors to the

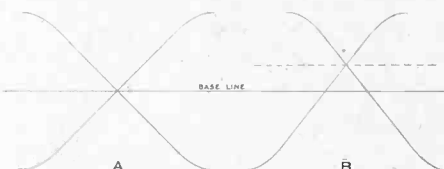


FIGURE 8

detector output lead, and tune the ratio detector secondary for zero output (Figure 9). If an FM signal generator is used, the vertical amplifier of an oscilloscope may be connected across the output of the ratio detector, without using the special resistor divider network. The pattern obtained will be the same as in the case of the balanced discriminator, and the tuning of the

secondary of the ratio detector coil is adjusted for center cross-over. The primary of this coil is tuned for maximum height of the trace.

With the Bradley detector, the detailed steps given by the manufacturer should be followed in adjusting the detector with a VTVM. Using an FM signal generator and an oscilloscope, the oscilloscope is connected across the detector load resistor (Figure 10). With the local oscillator running, the tube will function as an FM detector, and the typical discriminator curves will be obtained. The slug which tunes the plate coil is then adjusted for baseline cross-over of the traces. To be certain that the oscillator section of the tube is operating at the right frequency, shunt out the

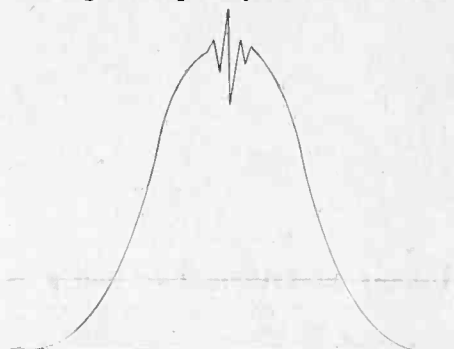


FIGURE 11

plate coil while observing the discriminator pattern on the scope as just explained. Then a pattern similar to Figure 11 should appear. If the pip appears at one side or other of the top of the response curve, the oscillator tuning condenser should be varied until this is corrected.

Adjustment of RF Stage

The adjustment of the RF end of an FM receiver has not been discussed thus far, as there is very

(Continued on page T-20)

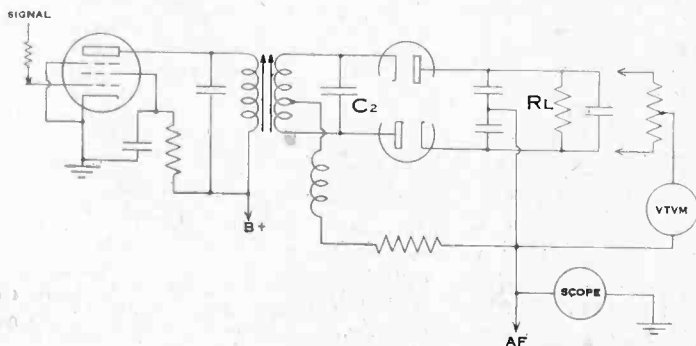


FIGURE 9

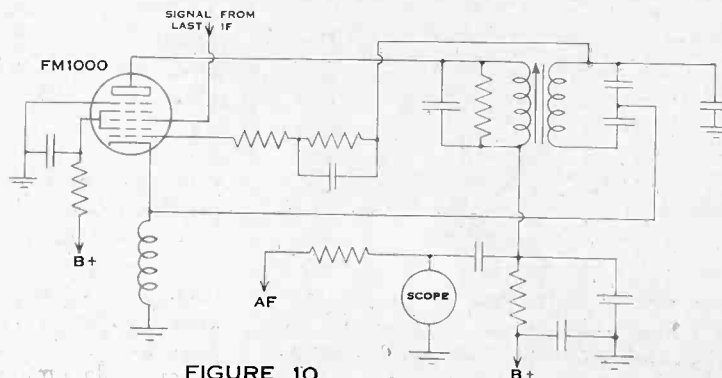


FIGURE 10

Service Exchange

Philco Beam - of - Light Panels: This particular headache was a continuous source of trouble. Almost all the panels we installed required maintenance calls, but we learned the hard way, and if the following procedure is followed carefully, it becomes a simple job.

(1) Drop phono compartment lid and pull slide all the way front. Have set turned on, and on phono.

(2) Remove turn table and neon socket (let hang).

(3) Remove rim drive by loosening small screw in center and free by using screw driver blade in screw slot and tapping it out.

(4) Drop motor plate by removing 2 nuts on speed control screw.

(5) Remove bell drive. In original model a helical spring will be found at top of bell drive, also several washers, generally one metal and two fibre. Discard these as they will not be used again.

(6) Take rim drive bronze bearing and fit it over bell drive shaft. This should drop down easily. The chances are it won't so take a small piece of crocus cloth and run the bearing over this, also use the crocus cloth on drive shaft. Remember, the whole secret lies in a free bearing.

(7) Clean off old oil and grease on lower end of bell drive and put a few drops of *light* oil on lower bearing and reassemble motorplate, bell

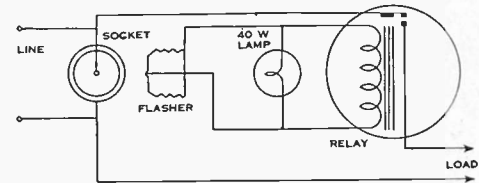
drive, bearing, *one* paper or fibre washer and then the rim drive, oil motor bearing felts, clean off all grease with carbon tet, and turn on motor switch. If properly done there will be plenty of torque in the rim drive though it may sometimes be necessary to use a #566201 Philco spring for additional pressure (no more than 6 oz.) on the horizontal drive.

(8) Put a drop of oil on spindle below the rim drive, also a few drops under cycling gear at the turn table spindle and on the under side of the turn table. Replace neon socket and check. The turn table should pick up *full* speed at one revolution. If it runs slow adjust by raising motor shelf keeping stroboscope lines moving clockwise.

(9) Adjust pulse plate to a point where no clicking is heard, then adjust contact arm so that the swing contact meets the pulse plate squarely, and make all further adjustments for tripping at the contact arm.—Arnold J. Maisel, Clifton, New Jersey.

* * *

Flasher for Heavy Currents: Having the need of a flasher to handle nearly 500 watts and none available, we used one rated at 60 watts and hooked it up with a 40 watt lamp and a small 110 volt power relay with contacts rated at



10 amperes. We found that the flasher would not operate the relay alone since it did not draw enough current, so combined the lamp into the circuit as a "loading device." A soldering iron element wrapped in asbestos paper would serve just as well if the light was undesirable. The simple circuit is shown above:—Ralph F. Saba, Evansville, Indiana.

* * *

Motorola Automatic 1946-1947 Auto Radio Tuners: The early model tuners had a solid plate in the back of the solenoid housing, the later models had a small hole in the back to permit the air to escape, caused by the plunger moving in and out when in operation. This small hole is covered by a brass eccentric washer which is adjustable to permit more or less air to escape acting as a speed regulator. A slow early model tuner can be speeded up by making a very small hole with a fine drill or a light tap of an ice-pick. A later type plate can be ordered, part No. 76556. Do not oil or lubricate these tuners.—Frank Krantz, Philadelphia, Pa.

FREQUENCY MODULATION (Cont'd)

little difference between the method of tracking an FM and an AM receiver. Of course, in tracking an FM receiver having a limiter, the voltage drop across the first limiter grid resistor must be used to indicate response, using an unmodulated signal. In a ratio detector receiver the strength of the incoming signal is read across the diode load resistor. In the case of the Bradley detector, if the oscillator section of the FM1000 tube is shorted out, and an AM signal applied to the RF stage, output may be read on an AC meter or scope at the output of the detector, or actually across the

voice coil winding of the output transformer.

As for bandwidth in the RF stage, this circuit is operating somewhere between 88 and 108 mc, and in this region the bandwidth of a circuit is inherently wide enough to pass the entire FM signal in most cases.

General

Due to the high frequency involved in FM receivers, parts layout, arrangement of wiring, temperature changes, and parts tolerances are more critical than in an AM receiver. In replacing any part in an FM set, try to use an exact replacement and install it in

the same physical position as the original part. Otherwise, feedback and regeneration or oscillation may occur.

Before aligning an FM set it is very desirable to allow both the set and the signal generator to warm up about ten minutes so that further changes due to temperature will be at a minimum.

A careful job of alignment will insure an FM set having maximum sensitivity, selectivity, and fidelity, and will give the kind of reception which is possible with this form of broadcasting, but which is not always realized in practice.

Serviceman of the Month . . .



Attractive store front is good selling point for Paul Gannaway. People appreciate pleasant surroundings when they are buying service.

Working A Fertile Field

Good work, backed by reasonable rates and best quality parts and tubes is the way Paul Gannaway, Owensboro, Ky. has made his radio servicing business successful. Mr. Gannaway operates Paul's Radio Service and specializes in automobile radio service.

So successful has he been that he has acquired warranty service contracts from all leading auto radio manufacturers for the area. For seven of the ten years he has been in business he has used

Sylvania tubes and gives their dependability much credit for his success.

After The Flood

Paul Gannaway moved to Owensboro in 1937 just after a big flood hit the town. He had on record two years experience in a small radio service shop in a near-by town. He got a job in Owensboro and a year later bought out the shop and business from the owner.

Realizing that there was a fertile field in auto radio, he soon moved his shop to a new location which afforded a side lot where he could readily carry on this type of service. Since he was the only service dealer specializing in auto radio repair he soon acquired his warranty contracts.

Looking For New Shop

Last year, an automobile agency acquired the property which he occupied. Like every town, Owensboro had growing pains, so it was practically impossible to find a suitable location to carry on his business. That prompted his idea to build. Among other things, this would give him a chance to have things to his own liking.

Building, too, brought many problems, but during his search for a location he found a house on a prominent corner which could be remodeled to fit his needs. The result is obvious. Today, Paul's Radio Service is one of the most up-to-date shops in the Owensboro area.

Continuous advertising in newspapers, over the radio, and direct mail has done much to help Paul Gannaway build up his business. It has been hard work, but knowing how and the application of his knowledge and experience have done the trick of satisfying his customers. They like his courteous treatment and good work. That is why Paul's Radio Service has paid off for its owner.

We're Looking For You

What makes your service shop or service department distinctive? Do you specialize in certain types of work? Does your bench claim improvements over others? Can you claim things about your business that others can't? Even if you think your shop is just like any other we would like to hear about it. We are proud of the radio servicemen and we would like to tell others about you. Dig out some pictures you have taken and send them along to us. If we print them, we will send you some extra copies of THE NEWS to show to your customers. The publicity will help your business grow.

Drive in for automobiles spurs auto radio service. Working close to his tools speeds up service work for Mr. Gannaway.

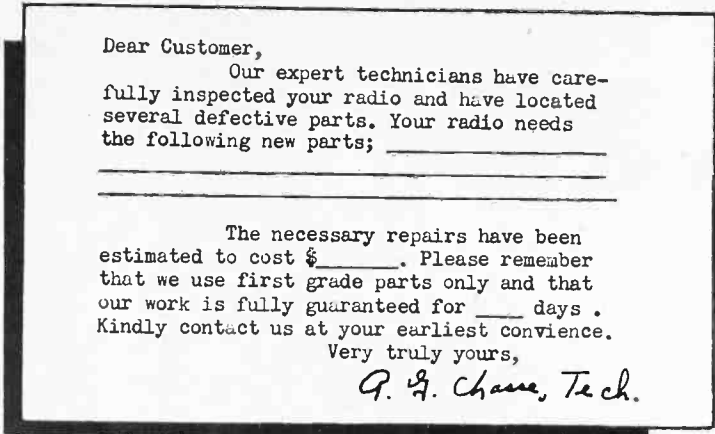


IDEA DEPARTMENT

Another Use For Postal Cards

One of the most versatile salesmen we have is the penny government postal card. It has a variety of uses which sell new customers, and keep old ones thinking our

as well as the customer a good outlet when he tosses the radio on your counter and says, "Look it over and let me know what it will cost to fix it." It is a written

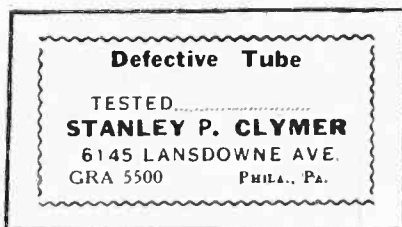


business is tops. Its latest use, submitted by A. G. Chasse, Lawrence, Mass. is in the form of a customer service. It gives you

estimate to the customer which protects both him and yourself. If you don't believe that it works, try it for a while and see the results.

Tube Salesman

Let Stanley Clymer of Philadelphia tell you about a little scheme he uses to sell his customers radio tubes. "The little tube sticker (shown here) is cheap and a good merchandiser. All tubes in our shop that are in any way defective are marked 'low,' 'bad,' 'shorted,' etc. in the blank space. This prevents mix-up on the bench or with the rest of the tubes checked. The



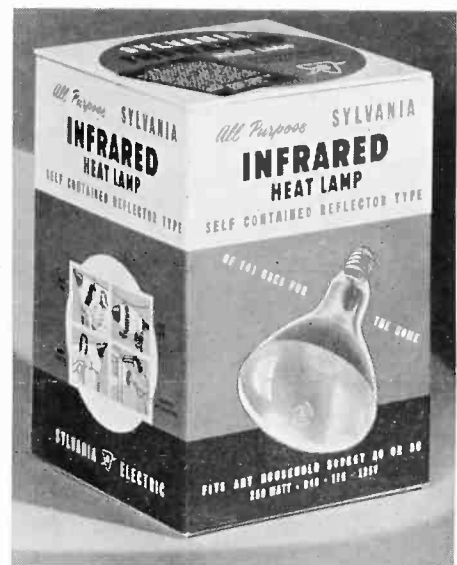
customer may not wish to replace all his defective tubes at once, but the little sticker will have a moral effect in the fact that he may not be getting the best out of his radio with bad tubes in it. The fact that the tube sticker is so plain and to the point does the trick."

About Your Idea

What little suggestion have you for increasing your efficiency or selling your service? Your suggestion may win you a \$5.00 Certificate which you can exchange for Sylvania advertising material or business forms. Send along your idea today. Our address is The Editor, SYLVANIA NEWS, Sylvania Electric Products Inc., 500 Fifth Ave., New York 18, N. Y.

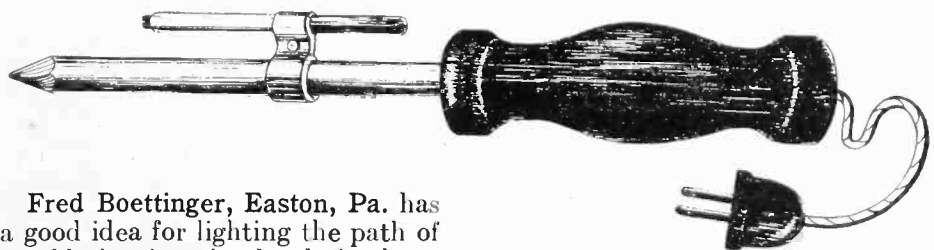
Cure For Dampness

Radio sets sometimes become damp from moisture in the air. Frank L. Grover, Norwich, Conn. offers a good suggestion for drying them out in a hurry. When you run across a set in this condition "put the set under a Sylvania Infrared lamp for about an hour. This stunt is also excellent for auto antennae or leads that absorb moisture," reports Mr. Grover.



Sylvania Infrared lamps are available in every part of the country, so if you are continually running up against this problem, it may be a good idea to purchase one from your nearest Sylvania lighting dealer or distributor. They are available at a moderate cost.

See Where You Solder



Fred Boettinger, Easton, Pa. has a good idea for lighting the path of a soldering iron in the dark places of a chassis. This creation will help to improve your visibility when working in these dark spots. A small, pen-sized flashlight is attached to the soldering iron with

clamps. It is easily removed when not needed or for replacing the batteries. Above is a sketch of the arrangement used.

The Radio Market

Just how sizable the market for new radio receivers is was demonstrated recently in Hartford, Conn. where RMA sponsored a special promotion of their "radio in every room" campaign. The theme of the radio being a personalized possession was stressed throughout the two week test period. Department stores and radio dealers decorated their windows around this theme. Newspaper advertisements and radio spots plugged the story.

Net result was that the Hartford trading area outsold a similar test in Providence, a city of approximately the same size, by $2\frac{1}{2}$ to 1. (No special promotion was used in Providence.) Final comments from radio dealers were that the test campaign had given them an idea which would help them promote sales the year around. The campaign demonstrated to the Hartford dealers the effectiveness of advertising and solid promotion of their product. The concentrated effort of more than 300 dealers was the pulling force that convinced the public that radio is a personal possession.

Experience in the Hartford campaign should be a good guide to others who see the radio market as a waning one. The 2500 receivers sold in Hartford over the two week test period against the 979 sold in Providence is good indication that the radio market is good for some time. The key to the success of the venture is, of course, advertising.

Active promotion of your service business can accomplish similar results. When radio sales increase and more radios are used, your service business will grow. More radios in use mean more radios to be serviced.

License Postponed

New York City Councilman Stanley Isaacs has agreed to postpone his proposed ordinance to license servicemen at least until next fall. He has agreed to this action to permit the RMA and other organizations an opportunity to put their programs for handling the situation into effect.

Midwestern Salesmen



"PETE" PATRICK

Two changes in Sylvania sales personnel have been announced by H. H. Rainier, manager of distributor tube sales. D. C. "Pete" Patrick, formerly manager of the Western division with headquarters in Kansas City, has been moved to the Central Division and will make his headquarters in Chicago.

Pete has long been associated with the tube business both with Sylvania



ED HAASE

and other manufacturers, and is familiar with the problems of service dealer and distributor.

Mr. E. J. Haase has been appointed to succeed Pete as manager of the Western Division. Ed has spent a good many years in sales promotion and wholesale selling and is familiar with many of the problems of dealers and distributors. He will be located in Kansas City.

What Is Ahead In Radio?

Just how much more improvement can be made in radio listening was brought out in the recent Institute of Radio Engineers meeting in New York. New developments in the field show that we are just beginning to scratch the surface in improving our radio receivers.

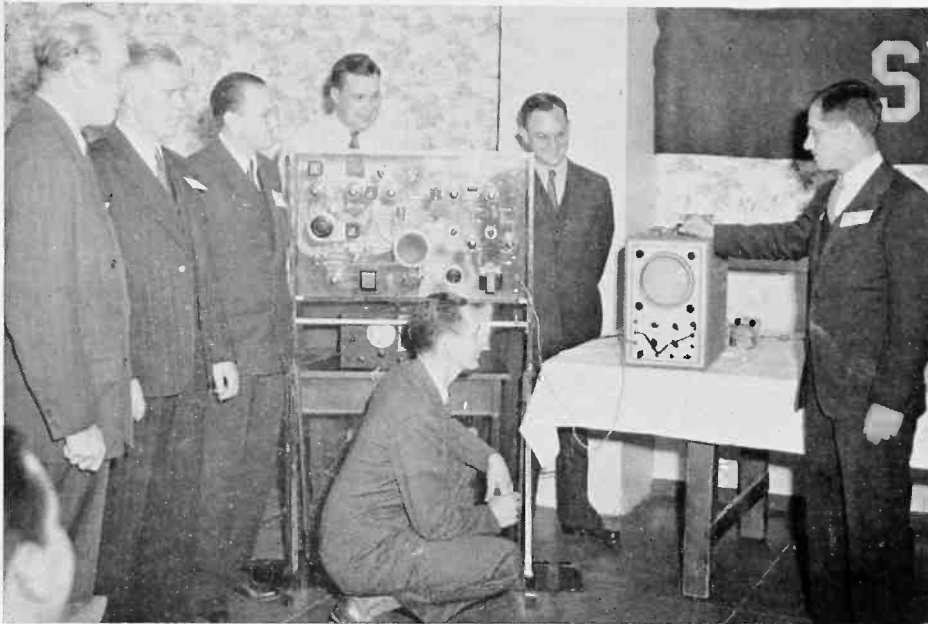
One of the papers presented before the convening engineers showed how noise on international as well as local radio can be defeated. The system recommended was described as "single side band transmission." In this system two separate channels would be used to carry sound from microphone to receiver. Through the new system, lightweight receivers are possible and existing apparatus of conventional design can be changed and used at low cost.

The many advantages of such a system would include no harmonic distortion resulting from fading signals, less interference and greatly improved fidelity. Such a system would also make possible significant gains in isolation between the programs and interference from near-by stations.

Better and cheaper FM sets were predicted in a paper which described a device known as the "gated beam" tube. This device, no larger than an ordinary receiving tube, has part of an FM limiter circuit inside its glass envelope. The tube operates similar to a small cathode ray tube. Some experimental sets have been built utilizing the device, and reports indicate that it performs as well as the best FM sets. It also makes sets easier to tune and reduces the manufacturing cost since the sets contain fewer parts.

One paper, presented by Dr. Robert M. Bowie, manager of research for Sylvania, discussed the problem of preventing blemishes on the television viewing tube. The blemishes are the result of constant bombardment of the tube face by negative ions. When this occurs, a spot is burned on the face of the tube which affects the picture on the screen. For his research in this field, Dr. Bowie has been granted two basic patents for "ion" traps, which are essential for blemish free television images.

Sylvania Service School



Interest in Sylvania's 7" Oscilloscope is displayed by Westerners during a recent service meeting at Medford, Ore., sponsored by Verl G. Walker Co., Sylvania distributors. Servicemen from 13 cities attended the meeting. Above is C. T. Clark,

Sylvania division manager; V. G. Walker, P. J. O'Neil, V. G. Walker Co.; V. M. Califf, engineer KMEDA. M. C. Gaston, V. G. Walker Co.; P. A. Schmidt, C.A.A. and Jim Canning, Sylvania commercial engineering department.

Facts & Figures...

FM Station Statistics

Latest count of FM stations shows 482 on the air, 906 outstanding authorizations and 103 applications pending. Reports from the FM Association show that nearly 40 more stations expect to be in operation within the next three months.

Video Station Report

With the recent addition of WGN-TV, Chicago to TV stations on the air, the total is now up to 21. Construction permits have been granted for more than 100 stations. Total applications pending is 218.

New York Town Meeting

A Town Meeting of Radio Technicians has been authorized for New York in the summer or early fall of this year. The meeting will be patterned after the Philadelphia meeting held last January. Emphasis will be placed on servicing and installation of television receivers. Four other cities have requested that similar meetings be held, but action has been deferred until after the New York meeting. These cities are Boston, Los Angeles, Chicago and Atlanta.

With the advent of FM and television, the radio industry can still expect large dollar sales, according to the Department of Commerce, Survey of Current Business.

SYLVANIA NEWS

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Vol. 15, No. 5

MAY, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

In This Issue

NEWS

ARE YOU THIS SERVICEMAN?

MERCHANDISING
FOUR WAYS TO BOOST YOUR
SERVICE BUSINESS

TECHNICAL
FREQUENCY MODULATION



SYLVANIA NEWS

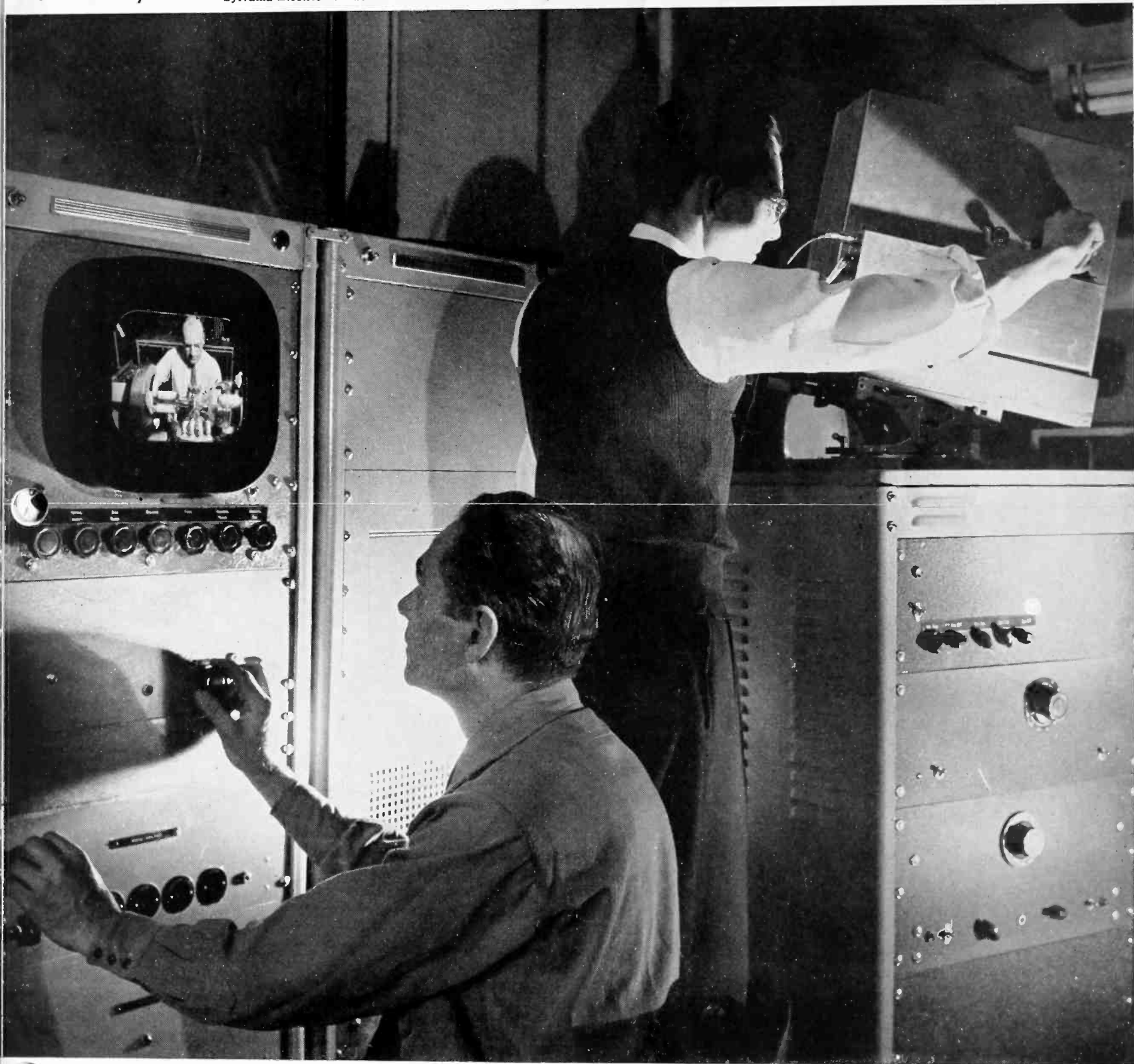
JUNE-JULY, 1948

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Sylvania Electric Products Inc.

EMPORIUM, PENNA.

R. A. PENFIELD, *Editor*

VOL. 15, NO. 6



In This Issue—MAKING TELEVISION PICTURE TUBES

BEGINNING NEXT ISSUE

NEW SERIES OF ARTICLES ON TELEVISION

NORMAL?

By KENNETH SLOAN, Editor

"PARTS PEDDLER"

RADIO PARTS OF ARIZONA

Are servicemen really doing a good selling job today? After many years of a seller's market the customer is finally getting the upper hand. It seems to be more difficult to get business. The result is that dealers are beginning to think that the business just isn't there. As we see it service dealers need to do one thing—learn how to sell in a competitive market—learn how to bring customers to their shop. By learning how to sell again we mean making use of every promotional dollar you can to help create new sales of service and products.

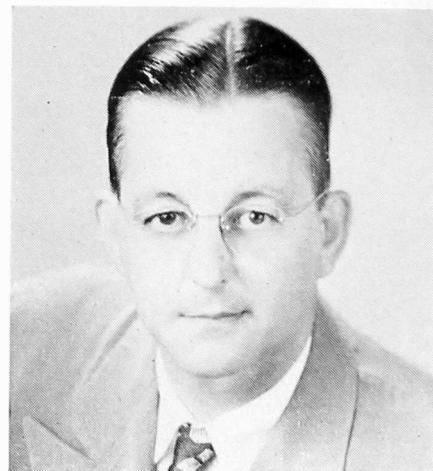
Hardly a day passes but what some dealer will tell us, 'Well, it's getting back to normal.' And by 'normal' he means it's stinky, lousy, poor! We have been trying to figure out just what 'normal' actually is. We have reached a point in our thinking where we are stopped by the idea that 'normal' for one person or one dealer is not normal for all. There are old, long-established stores that are not doing the business they did prior to, and during, the war. There are other

new and old concerns which are doing a very good business and expanding. Neither condition can be called 'normal,' if you try to base business volume on any pre-war figure.

Overall retail sales in January, 1947, were up about 39% over '46 and about 50% up in '48. (Figures not exact.) It proves that money is being spent more than ever before. These are figures—\$ figures—however and prices are 'UP' too—(had you heard?) This does show that our population has increased, and that more money is being spent here. If, as so many dealers claim, the radio business is BAD, it can only be attributed to the fact that radio dealers are not doing the selling job that other merchandisers are doing, or else people do not want radios and radio repairing. People are still listening to radio—many are buying new sets—and there are more radios being repaired now than ever before! There are also more dealers and repairmen in the country than ever before.

We were talking to an old-timer in the business just the other day. His business is poor. In the same town is another operator who is constantly growing and expanding. This operator is getting his business away from his competition.

Business is NOT BACK TO NORMAL! Too many dealers have forgotten how to sell. Some dealers have already learned how to sell again. The old-timer we were talking about said that they had lots of 'Lookers,' but they didn't buy. They were walking out. The 'old-timer's' good reputation and his years of advertising were getting his prospects—but he wasn't closing sales. He has forgotten how! His employees never knew how. The 'old-timer' should remember how it was done about 1930. A person who walked into a radio store to actually inquire about a new radio was a Godsend! Most prospects were the result of 'Cold-Turkey' foot work.



KEN SLOAN

We wonder what the result would have been on some of the 'prospects who walked out' if a good salesman had talked to them for a few minutes—found out the type and color of set they preferred, and given them a GOOD demonstration of the radio and a good sales talk. It would take a couple of hours time—some night work—and it would be a gamble. The prospect might not buy—but he wouldn't have just 'walked out.' He might have bought some other radio—but it would have been a radio sale. It would have helped the industry to compete with other classes of merchandise. The selling effort would have kept him hot on the thought of radio. If he didn't buy a new set, he might have been sold on a complete overhaul of his old one. The radio business will not be back to normal until the time when 'prospects' are tracked down and then given the free opportunity to pick the radio of their choice from three or four sets demonstrated in pleasant surroundings. The radio repair business will not be back to normal until the prospect is given a very reasonable estimate of repairs in his own home.

We do not believe that the business will be back to normal until lack of sales forces us to do a SELLING JOB to compete with each other and with other merchandise.

EDITOR'S NOTE: Perhaps many servicemen feel that business is bad. With so much talk about money matters these days, we feel that an evaluation of your business is in order. A thorough investigation of sales and sales promotion material should reveal your shortcomings. When you have the answer, then do something about it. Business comes to you only when you encourage it.

ON THE COVER

Sylvania engineers make tests of television tubes under actual operating conditions from transmitting and receiving equipment built in our own laboratories. Image orthicon camera is used to pick up action in laboratories at the Emporium plant. Control panel monitors pick-up. Through continued research Sylvania is able to offer manufacturers and servicemen many helpful suggestions in the field of television. Through constant research tube improvements are made. Better television in the future will be the result of the research. For information on cathode ray production see the Technical Section in this issue. This is the first in a series of articles on television theory.

SYLVANIA NEWS

MERCHANDISING SECTION

JUNE - JULY, 1948

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Sylvania Electric Products Inc.

EMPORIUM, PENNA.

VOL. 15, NO. 6

Shop Before You Set Up Shop

Shop location is a very important matter in radio service. The amount of business you get is greatly dependent on the accessibility of your service facilities to your customers. In addition, a service shop should be in a location which will encourage the trade of new customers as well as old. The most prosperous businesses attribute their success to location.

Choosing a location which will be the best merchandiser for you is a difficult problem. Consideration must be given to such problems as population, type of people, income bracket of the inhabitants, buying habits of the residents, property values and number of competitors which you will have.

The population of a particular district in which you are interested directly determines the amount of business you can expect to do. If there are several other service shops in the neighborhood, you can only expect to do a portion of the volume of business. The more shops, the less your chances for survival, unless you can offer special talents. You should not consider a particular location unless you can be sure of doing business with at least 1000 families. More would be advisable since this is the barest minimum of people who can support this type of business.

When you consider a location, your chances are better when you select a neighborhood which has a large percentage of upper income residents. This class of people are those who buy the most at more frequent intervals. Even when times are more difficult this class of people retain a high volume of buying.

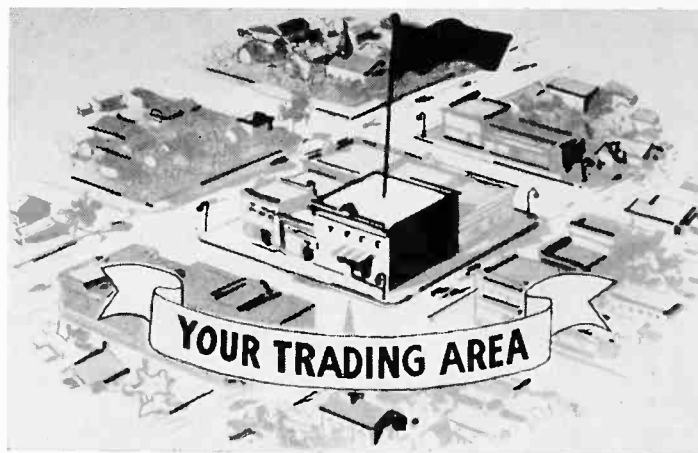
In many districts, most of the buying is done outside the local shopping center, especially on high cost items such as radios. Even though there are stores in the locality, these are used mainly for

Remember These Points When Choosing a Location for Your Shop

1. Population of the area.
2. Income bracket of the residents.
3. Residents buying habits.
4. Property values.
5. Number of competitors.
6. Location in trading area.

last minute items instead of regular purchases. Your selection of a neighborhood should therefore be limited to those areas in which the volume shopping is done. This can easily be determined by talking to other store owners and a selected group of local residents.

Property values must come in for consideration in shop location for obvious economic reasons. If the rents are high, you will naturally have to do a larger volume of business to show a profit at the end of the year. If property values are



low, the community should be thoroughly investigated before you locate. In any case, your yearly expenditure of rent should not exceed 5% of your gross income. In most cases 3% should be sufficient. The smaller rent you pay, because of location, the more you will have to advertise in other ways. A top location on a well traveled

street is considered good advertising in itself, although you will still be required to spend money on some form of advertising.

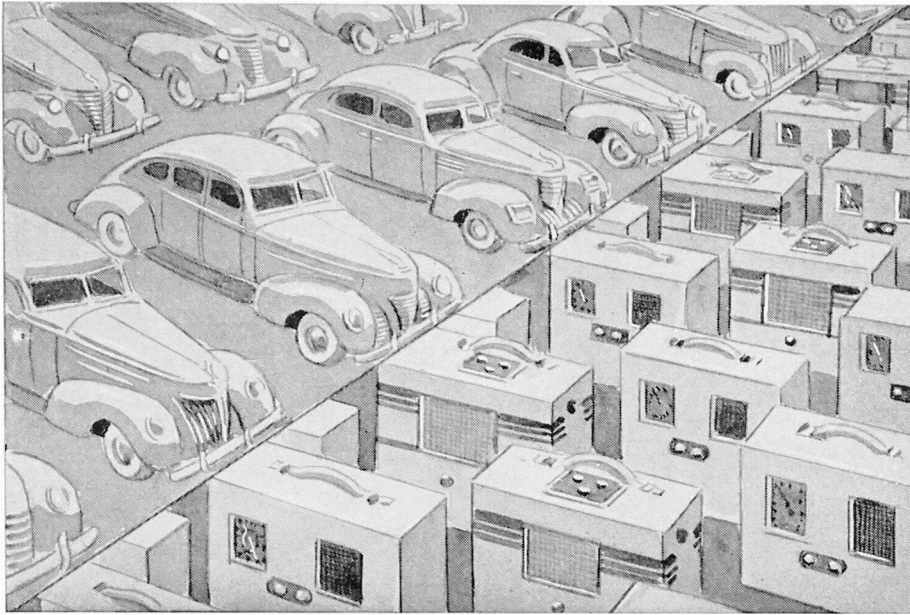
One of the chief concerns in selecting a location for a service shop is the number of competitors you will have. Too many will offer too much competition and you will threaten the success of your business. You should, however, have at least one competitor in a community which is large enough. Most people like to shop around even for service, and they are reluctant to do business with a single shop. In many cases there will be no shopping around, but the psychological effect of competition on people will be of help to you in getting them to select you—if you sell your service to them through advertising.

Once you have selected the area in which you intend to locate, consideration must be given to the location within that area. Well traveled streets are always the best places to establish a shop. A spot close to the main district is best because the rent is in most cases a little cheaper and your service is convenient for people on other shopping missions.

Your best location is a key street on the edge of a main shopping center. The location should be on the street which is traveled most by the people going into this area. One edge is most likely more traveled than any other and, here again, consideration should be given to the class of people using the entrance. The higher class of people will bring you more business because they are more willing to spend money on your service.

In this type of location you can make excellent use of your windows to advertise your service. The more appeal they have the more money people will spend in your shop.

Profitable Summer Market



Summer time is vacation time. Vacation time means travel—travel by automobile. Good servicemen will not overlook the fertile field of auto radio service this summer. Now, more than ever, the radio plays when the owners are out in their cars—and more cars than ever have radios.

Some servicemen shy away from auto radio service but they are passing up a profitable business. In a survey made recently by Sylvania researchers it was found that 84% of all new cars made in 1947 had radios as original equipment. Total automobile sets manufactured in 1947 was 3,029,637. If people want cars with radios, they want those radios to play. Result? More radio service business for you.

Auto radio service business is somewhat more difficult to dig out than home radio service but a few simple suggestions will help you get more of this business. One of the best ways to get more of this business is to make use of your friends who operate gasoline stations. Most attendants sell their own service with a friendly "Check your oil and water?" Very seldom does anyone refuse them, so they naturally sell more oil.

For a small consideration, or perhaps if you are on friendly enough terms, no consideration, you can have the attendant ask "How is your radio playing these days?"

The customer is sure to react to a question like this. It may mean the sale of a tube or two, or perhaps a very profitable service job.

By working with an automobile service station, car owners will react favorably to your business. If they know that they can tie-in auto radio service with their regular car service, they will feel more kindly to the service station. It will help that station do more business. Most people like "one stop" service in their cars.

If your shop facilities are limited you might also be able to use some of the station facilities for removing and installation of the automobile sets. This is another feature which will appeal to set owners.

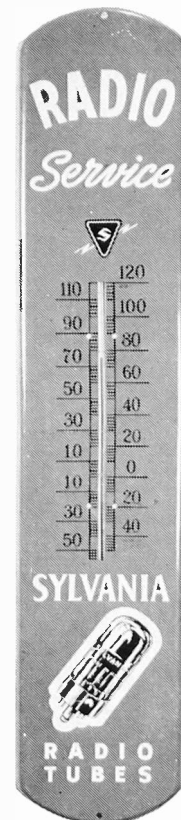
The main point in establishing yourself in this type of business is to get your name before the public. If you can work out an arrangement with a gasoline service station, you will be opening the door to a very profitable form of business for yourself. The advertising you will get from the station attendants will be a valuable chunk of public relations for you.

Auto radio service is good business. It is profitable business which can help you increase your profits. Some servicemen specialize in this type of work. It is a type of service business which will help you get more business in other lines if you do a good merchandising job.

How Hot Is It?

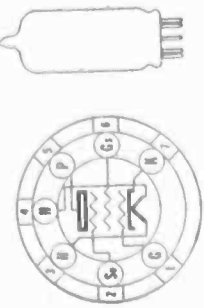
You can't beat the weather as a topic of conversation. When it's hot, you talk about how hot it is. When it's cold, you still talk about the weather. Something is always happening with the weather.

Sylvania now has a promotional item which will make your shop a topic of conversation when the weather comes up. This big new thermometer is designed to do a selling job for you. Made of sturdy steel, it promotes your service business. The green lacquer finish



on this thermometer makes it an all-weather fixture for the outside of your shop. The black lettering is easy to read. Size of the thermometer is 38 $\frac{3}{4}$ inches high by 8 $\frac{1}{4}$ inches wide.

You'll want this giant thermometer on your shop. From the freezing North to the steaming hot South, you can be sure that you'll get the right temperature reading. It shows temperatures from 50 degrees below zero to 120 degrees above. The price delivered to you is \$2.95. Order this thermometer today from your Sylvania distributor or from the Advertising Dept., Sylvania Electric Products Inc., Emporium, Pa.



Sylvania Type 6AK6 PENTODE POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base..... Miniature Button 7-Pin
 Bulb..... T5 1/2
 Maximum Overall Length..... 2 3/8"
 Maximum Seated Height..... 1 1/8"
 Mounting Position..... Any

RATINGS

Heater Voltage AC or DC..... 6.3 Volts
 Heater Current..... 150 Ma.
 Maximum Plate Voltage..... 300 Volts
 Maximum Screen Voltage..... 300 Volts
 Maximum Plate Dissipation..... 2.75 Watts
 Maximum Screen Dissipation..... 0.75 Watts
 Maximum DC Heater-Cathode Voltage..... 100 Volts
 Maximum Plate Resistance..... 100,000 Ohms
 Maximum Screen Resistance..... 100,000 Ohms
 Maximum DC Heater-Cathode Resistance..... 100,000 Ohms

Direct Interelectrode Capacitances*

Grid to Plate..... 0.12 μ f.
 Grid to Screen..... 0.12 μ f.
 Grid to Cathode..... 3.6 μ f.
 Output..... 4.2 μ f.

*Without external shield.

TYPICAL OPERATION

A.F. Power Amplifier

Heater Voltage..... 6.3 Volts
 Heater Current..... 150 Ma.
 Plate Voltage..... 180 Volts
 Screen Voltage..... 181 Volts
 Grid Voltage..... Connected to Cathode at Volts
 Peak AF Grid Voltage..... -6 Volts
 Zero Signal Plate Current..... 6 Volts
 Plate Resistance..... 151 Ma.
 Load Resistance..... 2.20 Megohm
 Total Harmonic Distortion..... 2,000 μ mhos
 Maximum Signal Power Output..... 10.1 Watts

APPLICATION

Sylvania Type 6AK6 is a power amplifier pentode designed for use in compact light-weight radio equipment. It is similar in characteristics to Sylvania Type 6G6G.

Sylvania
**LOOSE
 LEAF
 SERVICE**

4

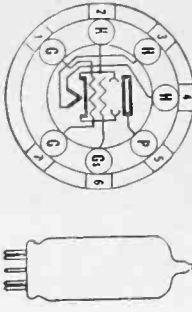
We are continuing this month with two more sheets for insertion in your Sylvania Technical Manual. Just cut along the dotted line and use the insertion tool described in the October Technical Section.



Compiled by
 COMMERCIAL ENGINEERING
 DEPARTMENT

**SYLVANIA
 ELECTRIC**

EMPORIUM, PENNA.



7BZ-0-0

Sylvania Type 6AQ5 BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base..... Miniature Button 7-Pin
 Bulb..... T5 1/2
 Maximum Overall Length..... 2 3/8"
 Maximum Seated Height..... 2 3/8"
 Mounting Position..... Any

RATINGS

| | |
|---|---------------|
| Heater Voltage AC or DC..... | 6.3 Volts |
| Heater Current..... | 450 Ma. |
| Maximum Plate Voltage..... | 250 Volts |
| Maximum Screen Voltage..... | 250 Volts |
| Maximum Plate Dissipation..... | 12 Watts |
| Maximum Screen Dissipation..... | 2 Watts |
| Maximum Peak Heater-Cathode Voltage..... | 90 Volts |
| Maximum Grid-Circuit Resistance For Fixed Bias..... | 0.1 Megohm |
| Direct Interelectrode (Capacitances): | |
| Grid to Plate..... | Shielded 0.17 |
| Input..... | 8.0 |
| Output..... | 11.0 |
| Unshielded | |
| Grid to Plate..... | 0.35 μ f. |
| Input..... | 7.6 μ f. |
| Output..... | 6.0 μ f. |

TYPICAL OPERATION

AF Power Amplifier - Class A1

| | | |
|--|--------|-------------|
| Heater Voltage..... | 6.3 | 6.3 Volts |
| Heater Current..... | 450 | 450 Ma. |
| Plate Voltage..... | 180 | 250 Volts |
| Screen Voltage..... | 180 | 250 Volts |
| Control Grid Voltage..... | 8.5 | -12.5 Volts |
| Peak AF Grid Voltage..... | 29 | 12.5 Volts |
| Zero Signal Plate Current..... | 30 | 45 Ma. |
| Maximum Signal Plate Current..... | 3 | 47 Ma. |
| Zero Signal Screen Current (Approx.)..... | 4 | 4.5 Ma. |
| Maximum Signal Screen Current (Approx.)..... | 58,000 | 7 Ma. |
| Plate Resistance (Approx.)..... | 3700 | 4100 Ohms |
| Transconductance..... | 5500 | 5000 Ohms |
| Load Resistance..... | 8 | 8% |
| Total Harmonic Distortion..... | 2.0 | 4.5 Watts |
| Maximum Signal Power Output..... | | |

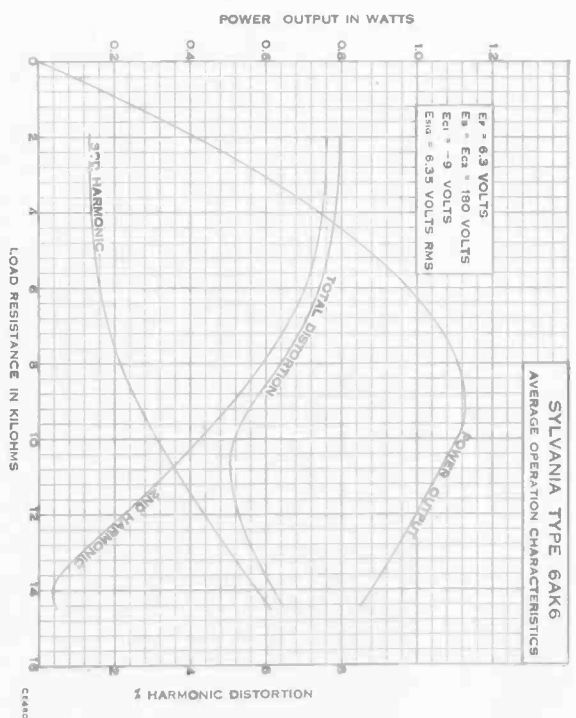
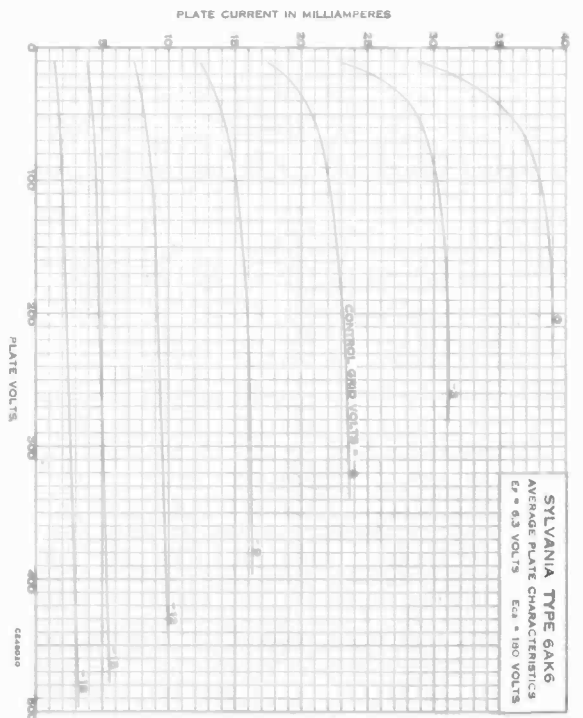
AF Power Amplifier - Class AB1*

| | |
|---|-------------|
| Plate Voltage..... | 250 Volts |
| Screen Voltage..... | 250 Volts |
| Control Grid Voltage..... | -15 Volts |
| Peak AF Grid to Grid Voltage..... | 30 Volts |
| Zero Signal Plate Current..... | 70 Ma. |
| Maximum Signal Plate Current..... | 79 Ma. |
| Zero Signal Screen Current..... | 5 Ma. |
| Maximum Signal Screen Current..... | 1.3 Ma. |
| Plate Resistance (per tube)..... | 60,000 Ohms |
| Transconductance (per tube)..... | 3750 Ohms |
| Effective Load Resistance (plate to plate)..... | 10,000 Ohms |
| Total Harmonic Distortion..... | 5% |
| Maximum Signal Power Output..... | 10 Watts |

APPLICATION

Sylvania Type 6AQ5 is a beam power amplifier in the miniature style designed for use in compact AC or auto sets. Since it is identical to Type 6V6GT except that the highest rating is not recommended, the same characteristic curves may be used.

SYLVANIA RADIO TUBES



SYLVANIA RADIO TUBES

SYLVANIA NEWS

TECHNICAL SECTION

JUNE - JULY, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 6

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

MAKING SYLVANIA TELEVISION PICTURE TUBES

The recently accelerated demand for television sets has made it necessary to work the Sylvania Cathode Ray Tube Plant at maximum capacity, but in anticipation of still greater demand a new building is being constructed which will increase the output of Sylvania television tubes several times.

From time to time we have described various processes in the manufacture of receiving tubes, but many of the steps in making television picture tubes are entirely different and more interesting. These are explained here by J. H. Loughlin, Senior Engineer in our Cathode Ray Tube Plant.



FIGURE 1. A general view of the screen settling department.

After the bulbs are inspected for flaws and chemically cleaned they receive the "phosphor" coating. The quality of the picture you see depends so much on the purity and uniformity of the fluorescent screen that extreme care is taken with all steps of this process. Figure 1 shows the apparatus used for measuring out the exact quantities of the chemicals required and several racks

of bulbs in process of settling can be seen in the background. The screen is applied by allowing the active material to settle out of a liquid suspension onto the tube face. It is important that the bulbs not be disturbed in this process or a uniform coating will not be obtained. The screen material for P1 screens used for scopes is Willemite and for

(Continued on page T-22)

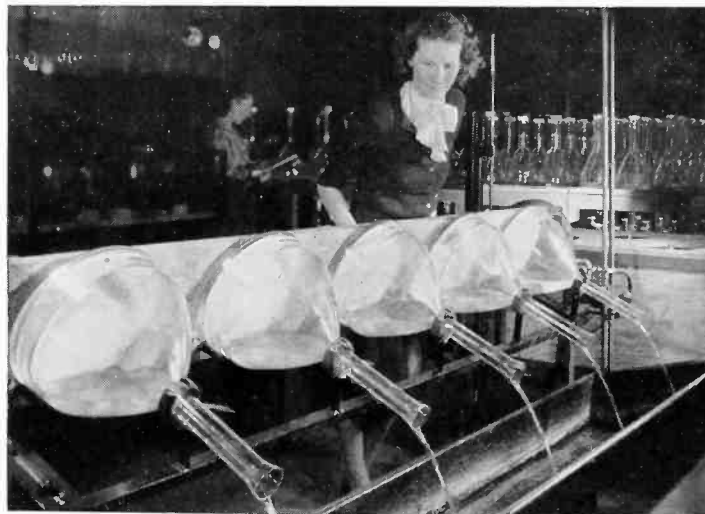


FIGURE 2. After settling the liquid is poured off slowly by this machine.

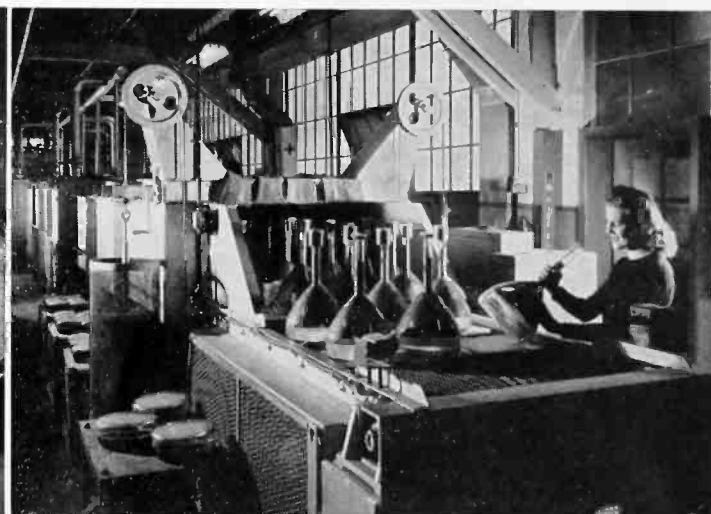


FIGURE 3. The bulbs are baked in a long oven to remove moisture.



FIGURE 4. A step in assembling an electrostatic type gun.



FIGURE 5. The mount is sealed into the bulb in this machine.

the P4 television screens may contain a complex mixture of zinc and cadmium sulphides. The settling time required is about one hour, after which the supernatant (spent) liquid is poured off as shown in Figure 2. In the foreground of Figure 1 some of the bulbs are shown drying while an operator is inspecting the coating by means of lights placed underneath. Following this the graphite conductive coating is brushed on the inside of the bulb and the moisture is baked out by passing slowly through an oven 85 feet long. Figure 3 shows the bulbs being inspected as they come out of the oven; note that each bulb face is protected by a glass cloth pad to prevent its being scratched.

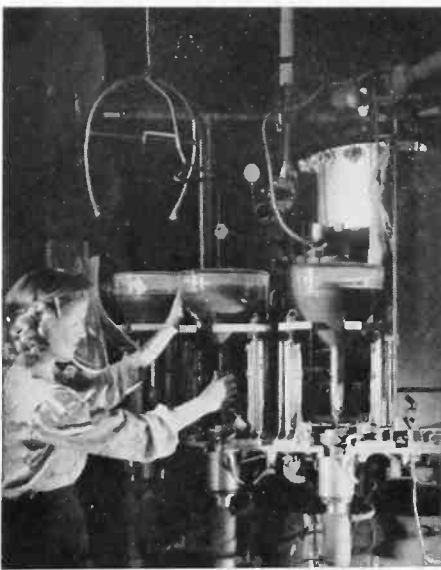


FIGURE 6. Loading a tube on the exhaust machine. The bulb on the right is just about to enter the oven.

Mounting

In order to obtain a beam which may be focused to a sharp point, all the parts of the electron gun are held in position by the jigs used in the mounting process. In order to prevent the parts of the gun from becoming even slightly magnetized and thus affecting the path of the beam, non-magnetic stainless steel parts are used. Figure 4 shows a typical welding operation after all the parts have been located and the ceramic rods threaded through their supporting clamps. In the picture an electrostatic type gun assembly is being welded to the stem leads. The parts used are somewhat like the usual radio tube plates and grids except that they are shaped differently in order to produce a narrow beam of electrons which can be deflected as it passes between the end pairs of plates.

Sealing and Exhaust

The sealing operation is shown in Figure 5 where a number of 7" tubes are shown on the 16 position machine. The sealing operation melts the glass at the neck of the bulb and fuses it to the softened edge of the glass disc which forms part of the stem. From here the tube goes to the very large exhaust machine shown in Figure 6 where the glass parts are heated in an oven while the air is pumped out. After most of the air has been pumped out, the gas occluded in the metal parts is driven off by heating the metal with induction heaters. The emission coating on the cathode is also formed on the exhaust machine as the com-

bined heat from the filament and the inductively heated metal parts breaks down the carbonates used in the cathode coating to the oxides required for a good emitter. After all possible gas has been driven off and pumped out the tube is tipped off. Note the horseshoe-shaped sling suspended from the ceiling required to take the weight of the tube during the tipping-off process.

Unlike smaller tubes, the getter is flashed after exhaust, and each tube is fitted with a base, aged and tested.

Testing

Every tube is given a complete test for mechanical defects, gas, screen brightness, electrical characteristics, and is operated with a test

(Continued on page T-24)



FIGURE 7. Final testing includes measuring the light output as shown here.

DON'T GET STUCK ON SURPLUS TUBES

We get frequent requests for information on the use of tubes now being offered as war surplus.

The purchase of surplus equipment is of course a gamble; so to help our readers avoid buying merchandise which might later prove useless to them we are listing here a few points to look for when such "deals" present themselves.

Cathode Ray Tubes

A glance through the current surplus listings show the following types available which have been arranged by focusing and deflection methods

| Electrostatic Focusing and Deflection | Electromagnetic Focusing and Deflection | Mixed |
|---------------------------------------|---|-------|
| 2AP1 | 3HP7 | 7CP1 |
| 3AP1 | 5FP4 | 7DP4 |
| 3BP1 | 7BP7 | 9JP1 |
| 3CP1 | 12DP7 | |
| (radial deflection) | | |
| 3DP1 | | |
| (radial deflection) | | |
| 3FP1 | | |
| 3GP1 | | |
| 3JP1 | | |
| 5AP1 | | |
| 5BP1 | | |
| 5CP1 | | |
| 5GP1 | | |
| 5HP1 | | |
| 5JP1 | | |
| 5NP1 | | |
| 7EP1 | | |
| 12GP7 | | |
| 902 | | |
| (2" diam. P1 screen) | | |
| 908 | | |
| (3" diam. P5 screen) | | |

The characteristics of the various phosphors used on the screen are as follows:

| Phosphor | Color | Persistence | Used For |
|----------|--------------|-------------|--------------|
| P1 | Green | Medium | Scopes |
| P2 | Blue-Green | Long | Spec. Scopes |
| P3 | Yellow-Green | Medium | Scopes |
| P4 | White | Medium | Television |
| P5 | Blue | Very Short | Spec. Scopes |
| P6 | White | Medium | Television |
| P7 | Blue | Medium | Radar |
| | Yellow | Long | |
| P11 | Blue | Very Short | Spec. Scopes |
| P12 | Orange | Long | Radar |

In selecting a type for use in a scope, only Electrostatic types should be selected and the phosphor may be any of those listed except P7 and P12. Those listed as special, however, may have too long or too short a persistence for most uses. Those listed as having radial deflection have an electrode in the center of the screen and were provided with a special scale useful only for polar diagrams.

When picking a type for experimental television, either electrostatic or electromagnetic types may be used, but be sure the type you buy is at least approximately correct for the circuit you wish to use. The electrostatic types will work in circuits similar to those used for Types 7GP4, 7JP4, or 10HP4. The electromagnetic types will require a circuit more or less similar to that used for Type 10BP4. We doubt if anyone would be satisfied with any color screen except white for this service, but P1 and P3 will give a satisfactory picture if the color is not objectionable

Other Tubes

Most of the other surplus tubes are described well enough in the ads that the purchaser should be able to determine the suitability of the type for his purpose.

Klystrons and Magnetrons, of course, are good only at the frequency for which they are designed. TR tubes such as 1B24 etc. are apparently not useful in amateur transmitters since they will dissipate only the small amount of average power supplied by a radar pulse.

Other surplus equipment such as meters, signal generators, etc. are generally described well enough for you to make an intelligent selection.

CORRECTION

The battery electroflash circuit diagram on page T-15 of the April SYLVANIA NEWS contains a drafting error with regard to polarity of the plug connecting the gun assembly to the power supply.

This can be corrected by reversing the two contacts of the leads from the gun assembly, (in the upper right hand corner of the diagram) so that each arrow head makes contact with the one now diagonally across from it.

SQUARE WAVE GENERATOR

For rapid checking of the response characteristics of audio amplifiers, square wave testing gives a continuous indication which shows immediately any changes resulting from repairs or adjustments to the circuit under test. Figure 1 shows a simple but efficient circuit for generating square waves from a sine wave source.

Square waves are made up of a large number of odd harmonics, and when passed through any amplifier will show its general response characteristic. The output of the amplifier is connected to the vertical plates of an oscilloscope.

(Continued on page T-24)

| PART | VALUE | RATING |
|--------|------------|--------|
| R1, R2 | 500 K Ohms | ½ Watt |
| R3, R4 | 50 K Ohms | 1 Watt |
| R5, R6 | 8 K Ohms | ½ Watt |
| C1, C4 | 0.1 µf | 400 V |
| C2 | 40 µf | 450 V |
| C3 | 20 µf | 450 V |

SQUARE WAVE GENERATOR

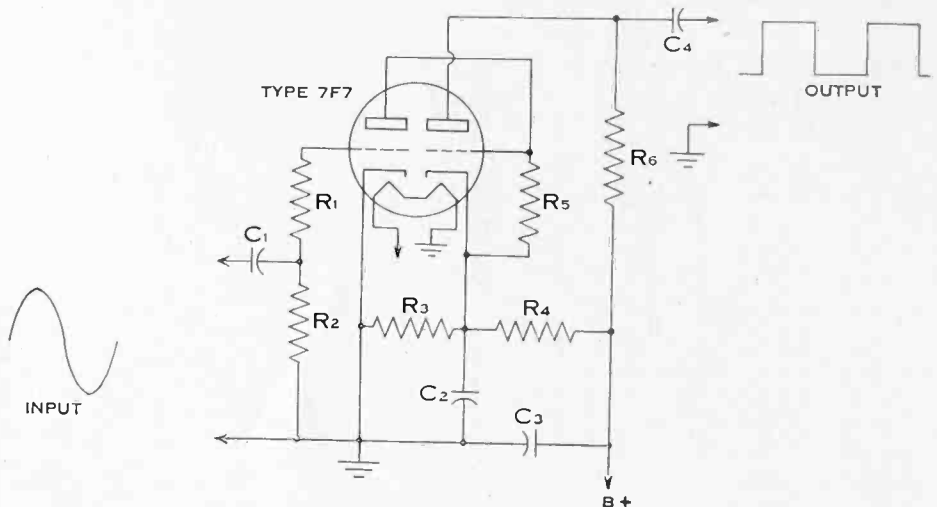


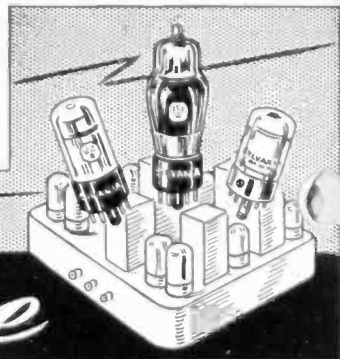
FIGURE 1

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



THE

Service Exchange



Distortion Due to Incorrect Load on Output Tube: If the output transformer or tube type has been changed in a radio, bad distortion may result, as output pentodes are critical for load resistance. When a 50L6 is used in place of a 35L6, for example, the load should be decreased.

An easy way to correct this is to place a resistor across the primary of the output transformer. The value will have to be determined by ear since very few laboratories are equipped to determine the exact value.

If the load resistance is already too small a very small resistor can be added in series with the voice coil. Half an ohm here would make a large percentage change as, for example, it is 9% of the voice coil impedance in a 6 ohm speaker.—R. W. Short, Lock Haven, Pa.

* * *

Silvertone 6050 Chassis No. 132 825-2: Noisy operation of this set may be caused by the pointer scraping against the scale. This shorts out the 2.2 meg resistor in the AVC circuit. There seems to be another set having the same number as this set, but this tube complement is 12SA7, 12SK7, 14R7, 35L6 and 35Z5.—Billy Tucker, St. Simons Island, Georgia.

SQUARE WAVE GENERATOR (Cont'd)

Square waves generated from about a 60 cycle signal, if passed through an amplifier having poor low frequency response, will look somewhat like Figure 2. Note the change in the following edge of the square wave. To check high audio frequency response, a square wave generated from a sine wave of about 600 cycles is necessary. If the amplifier has poor high frequency response, the wave form of the output will look somewhat like Figure 3. Note the change in the leading edge of the square wave.

Dewald A-514 Burned Resistor: If this set has a burned out 1500 ohm 1 watt resistor or it smokes when the power is turned on, before taking time out to check filter condensers, which would be first thought, check the socket connections of type 12BE6, as several recently brought to us all with this trouble proved to be caused by a run of solder shorts between #6 and 7 pins. As this tube is at the extreme opposite end of the chassis to the rectifier it will save some time to check this point first. Naturally, replace the burned resistor.—O. J. Kunkle, Philadelphia, Pa.

* * *

Special Wrench for Drive Shaft Set Screws: Some sets, especially Philco's, use a special screw on the dial cord drive wheel for which no wrench is available, and in many cases they are so placed that they cannot be reached by pliers. A special wrench for these can be made by sawing a 1/4" deep slot in the end of a 1/4" steel rod. Use a hacksaw with two blades and widen the resulting slot with a thin file to about 1/8" to fit the end of the set screws. A hole in the other end for a T handle or a nut brazed on to fit a socket wrench will complete this useful tool.—Albert Brindley, Jr., Philadelphia, Pa.

Ford Zenith and Philco Vibrator Failures: Vibrator failures in 99% of the 1947 Ford Zenith and Philco radios are due to the same wire being broken. I have repaired piles of these by the replacement of this one wire with a piece of test lead wire that is a half inch longer than the original wire. The original was too short and in every one of these vibrators I have checked so far the same wire was at fault. I realize that some servicemen might take exception to this on the grounds that they would rather sell a new vibrator than to repair one, but I think that so long as the vibrator points are in perfect condition and so long as this operation involves no adjusting of the points and only takes five minutes for the job, that it is proper and right to save the customer the cost of a new vibrator.—Donald Slattery, Chadron, Nebraska.

CATHODE RAY TUBES *Con't*

pattern to be sure there are no dark areas with a picture of the correct size on the screen. Figure 7 shows the test operator reading the light intensity on a meter. Tested tubes are stored in lots of which representative samples are given additional tests, followed by a life test which must be satisfactory before that lot is released for shipment.

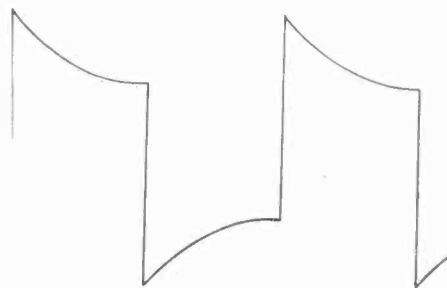


FIGURE 2

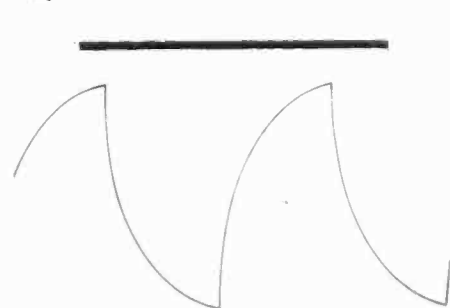


FIGURE 3

Now Appearing

So that service dealers may better coordinate their local advertising with Sylvania's national ads which appear monthly in *Life*, *Colliers*, *Saturday Evening Post* and *Radio Best*, we will publish in each issue of *SYLVANIA NEWS* the date on which these magazines will appear on the



"It won't stop whistling!"

Stray whistles in your radio rob you of listening pleasure. Banish those sounds now. Call the radio man displaying the Sylvania emblem. He can make your radio perform as it did the day it left the factory. You'll hear programs so clearly, you'll think you've got a new set. How does he do it? It's skill, for one thing, Sylvania testing equipment and Sylvania radio tubes, for another. This top combination adds up to finest repairs at fair cost. So, take your radio to the sign of dependable service.



Product of Sylvania Electric Products Inc.

SYLVANIA RADIO TUBES

Above is the Sylvania ad which is appearing during June. Look for it in *LIFE* on June 25, news stands. Look for the ads, point them out to your customers. They will help sell your service business—put more money in your pocket.

Mail the government postal cards provided in your advertising kit near the date the ads appear. You'll get better results from the coordinated program.



"I've had no peace since it started whistling!"

Does your radio sound like it's calling Rover? Unwanted noises cut in on listening pleasure, should be cut out—but fast! Who'll do the job? The service dealer displaying the Sylvania sign. The man's an expert! In no time he can make your old radio sing bright as new. Let him tackle it with his Sylvania testing equipment. Have him replace worn tubes with high quality Sylvania tubes. Get your radio fixed at the sign of dependable service. The work is good, prices fair.

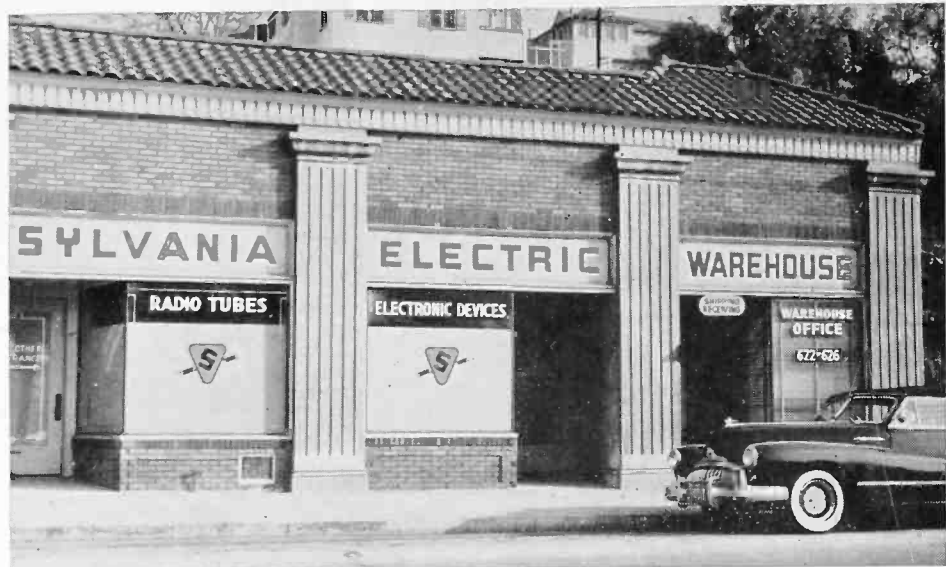


Product of Sylvania Electric Products Inc.

SYLVANIA RADIO TUBES

The ad pictured above will appear in *RADIO BEST* on July 1, *SATURDAY EVENING POST*, July 7 and *COLLIER'S* on July 23. Remember these dates when you mail the postal cards for July.

Designed For Better Service



Sylvania's Los Angeles warehouse serves distributors in seven states in the far west. Complete stock of Sylvania tubes and test equipment is always available for quick delivery.

In order to provide better service on delivery of Sylvania products to distributors and dealer-servicemen, four warehouses in as many cities handle distribution in scattered points of the country. First warehouse to be established by Sylvania was in Los Angeles, Calif. Through

this warehouse it has been possible to eliminate delays caused by transportation of merchandise from the factory 3,000 miles away. By depending on the warehouse for his stock the distributor can be assured of quick delivery on orders of an unusual nature. The time saving results in savings of dollars for all concerned.

The four employees of the Los Angeles warehouse are personnel experienced in the problems of handling Sylvania products in a changing market. With the demands for Sylvania tubes constantly changing, it is a valuable asset to have a well stocked source of supply near at hand to help meet any unusual demands.

National Ad Schedule

Here is the complete schedule of Sylvania's national advertising for the remaining months this year. The dates shown are the dates on which the magazine will appear on the news stands.

| | |
|----------------|----------|
| Radio Best | July 1 |
| Sat. Eve. Post | July 7 |
| Collier's | July 23 |
| Radio Best | Aug. 1 |
| Collier's | Aug. 13 |
| Life | Aug. 27 |
| Radio Best | Sept. 1 |
| Sat. Eve. Post | Sept. 8 |
| Life | Sept. 24 |
| Radio Best | Oct. 1 |
| Sat. Eve. Post | Oct. 6 |
| Collier's | Oct. 22 |
| Radio Best | Nov. 1 |
| Collier's | Nov. 12 |
| Life | Nov. 26 |
| Radio Best | Dec. 1 |
| Sat. Eve. Post | Dec. 1 |
| Life | Dec. 17 |

These magazines will have a combined circulation of over 84,000,000 this year.



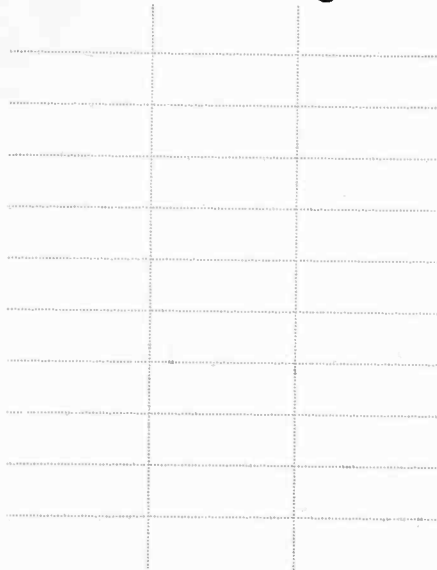
Staff includes Harold Fontaine, warehouse foreman; W. G. Patterson, manager of distributor sales, California Division; Dave Verrell, assistant warehouseman; Grace Farmer in charge of office (not in picture).

IDEA DEPARTMENT

For Faster Postal Mailing

Most servicemen find it a very grueling task to address postal cards for mailing. We don't blame them, and to make the job easier we've been looking around for some system which will do the work and reduce your time and effort. Of course, the best way to do it would be by addressograph, but this is more expensive than most servicemen can afford. The efficient, as well as economical way to do it, was shown to us by Mr. H. B. Senesac, service dealer in Chicago, Ill.

For mailing his postal cards, Mr. Senesac uses gummed labels. These are available in sheets of 33 labels. Addresses are typed on the labels and three carbons are made on similar sheets. The result is that four labels to each prospect are addressed at one time. Of course, if you do not own a typewriter, you could also write with indelible pencil. The result would not be as effective as the typewritten sheets, but would serve the purpose.



Label sheet in 8½ in. x 11 in. size

These labels are available from most stationery stores at a moderate cost. You will be well repayed in time savings if you use them when mailing your postal cards.

Dust Cloth Sales

Doing a job on a set which can be seen by the customer is always a good way to win a customer's confidence. AP's Sales & Service, Schenectady, N. Y. has a neat little trick which inspires customer confidence. They write us, "When a customer brings in a set to have the tubes checked, invariably the chassis and cabinet will reveal a wealth of dust. We have a dustcloth handy and immediately go about dusting before checking the tubes. To avoid embarrassment to the customer, especially women, we hastily add, 'Too bad you can't get into the set every week to give it a housecleaning without fear of shock or damage to your radio'."

"To all radios brought in for repair we do a thorough housecleaning and also clean dial window with carbon tetrachloride and polish the cabinet too. Finally our label is cemented to the finished product for future repeat business and recommendation."

Making Use Of Mr. Bell's Invention

Using the telephone to its best advantage is a good way to promote more business. The convenience of the telephone for most people is a decided advantage when securing

Here are two ideas which servicemen have used to promote their phone number. H. Jarrett, Cornwall, Ont. has printed the forms pictured below. These are passed out over the counter and to his service customers. They could also be used as a handy mailing piece. Part of the cards



the services of a radio serviceman. If your phone number is a byword of the public, you can be sure that you will get more radio service business.

FIRE - - 5337

POLICE - - 5296

SHERIFF - - 6602

RADIO REPAIR 6226 THE MAGIC NUMBER

Dial It Backwards and You Will Still Get DOMANGUE RADIO

which Mr. Jarrett uses have the important telephone numbers of the community printed on them. These are for his local customers. The others are for customers in surrounding communities. Of course, the use of his own phone number on the handy cards keeps his name beside the phone at all times.

Domangue Radio, Houma, La.

has used a bigger card for distribution to public places and also for home use. They plug the use of their "magic number," a good point which will help people remember. Mr. Domangue reports that they received about "\$500 worth of good will from a small expenditure of \$15.00 for the cards"—a good return in any man's language.

SREPCO Sponsors Video School

Interest in television is running high. In every city and town where there is a hint of television in the near future, servicemen are getting together for the purpose of study and practical instruction in this new type of broadcasting.

Rated high among the schools we have heard about so far is one which is being sponsored by Standard Radio & Electronic Products Co. a Sylvania distributor in Dayton, Ohio. To date four schools have been held—three in Dayton and one in Springfield. The most unusual feature of the schools is that, as yet, neither of these cities have a television station in operation. Nearest

secured. The man, Louis Sander, knew the story on the practical side of television through his service work and through designing and building his own receivers.

The course offered by SREPCO includes a minimum of theory and a lot of practical knowledge. Proof of the value of the program undertaken is shown in the attendance which they have had at their meetings. The original plan was to have 60 service dealers, but the popularity of the course has made it necessary to run four different classes. To date the total enrollment of the schools is 259 men.

The people at SREPCO are

Wins Promotion



JOHN HAUSER

Appointment of John H. Hauser as assistant manager of distributor tube sales has been announced by H. H. Rainier, manager of distributor tube sales. In his new capacity John will continue to make his headquarters in Emporium, but will make frequent trips into the field to assist distributors and dealers.

John Hauser has been associated with Sylvania for seven years during which time he has worked mainly in the sales department. He has been actively associated with the problems of customer service and will continue to devote much of his time to continued better service for our customers.



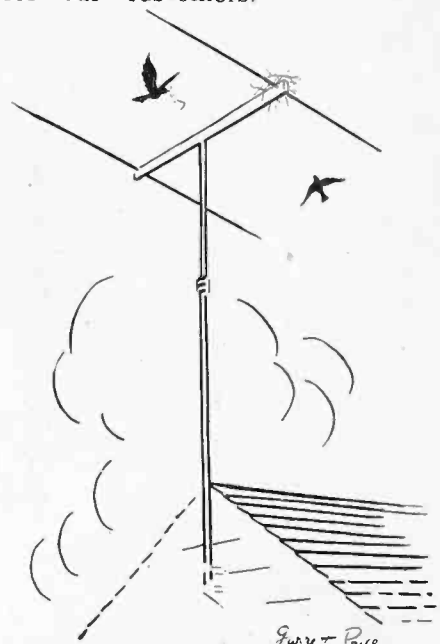
SREPCO television school attracts many servicemen. Four separate classes have now been held to help familiarize servicemen with problems of video. Standing at illustration board is Louis Sandor, instructor. Standing at right is H. E. Ruble, Standard Radio.

broadcaster is Cincinnati, 50 miles away.

Reception from Cincinnati has been good in Dayton, especially since WLWT has increased its power, and a few sets are appearing in the Dayton area. SREPCO discovered on the appearance of the video receivers that service personnel in the area were not familiar with TV problems so they set out to do something about it. Services of a competent engineer who had been a radio serviceman were

pleased with the interest shown by the servicemen. "It is exciting to see the interest with which these men approach their new problem and we are positive we will be well equipped to install and maintain television receivers," says Rube Ruble, head of the program.

Dealers in the Dayton-Springfield area who have not yet taken advantage of this television school and would like additional information on future classes should contact H. E. Ruble at SREPCO in Dayton.



Garret Price

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ARSNY Has New Service

The Associated Radio Servicemen of New York have announced that they have completed arrangements with radio station WNEW to present spot announcements at frequent intervals in the interest of the organization.

These spot announcements will inform the public of the services provided by ARSNY. They will tell listeners how they may avail themselves to the services of the organization and what they can do in the case of discrepancies in the service work. The announcements plug the decal used by members of the group as the mark of reliable radio service.

The New York service organization has been active only seven months but they have gained much respect in the New York area. The group meets regularly and have presented a list of rewarding speakers at their meetings. With emphasis mainly on television, the group have been doing a good job of self education. One recent meeting was attended by over 1000 service-

men from the area. The results of such a meeting speak well for the good job being done by ARSNY for the service industry in New York. Membership in the organization now exceeds 400.

FACTS & FIGURES

VIDEO AT A GLANCE

FCC records show that there were 28 video stations on the air as of June 11, 1948. In addition, 101 construction permits have been issued and 269 applications for station construction are pending before the Commission.

The RMA reported that TV set shipments by member-companies during the first quarter of 1948 amounted to 106,136 receivers. This brings total distribution since Jan. 1, 1947 to 268,317. Twenty-seven states and the District of Columbia have now received varying amounts of TV sets although some shipments have been to few areas where there is no regular television broadcast service.

Joins Old Timers

H. H. Rainier, manager of distributor tube sales for Sylvania became a member of the radio industry's "Old Timers Club" at the Chicago Radio Parts and Electronic Equipment Show last month. Membership in the Old Timers Club is limited to those people who have been associated with the industry for more than 20 years.



Photo courtesy Radio News

Pat Juden pins a Sylvania Flower on Harold Rainier during the radio "Old Timers" party at the Chicago Parts and Electronic Equipment Show.

During his entire service in the radio business, Harold Rainier has been associated with radio tube sales. Harold Rainier joined Sylvania eight years ago after holding down a sales manager's job with a competitive company for many years.

H. G. "Bob" Kronenwetter, manager of advertising production and W. G. "Pat" Patterson, manager, California division, were also inducted into the "Old Timers Club" at the Parts Show in Chicago.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
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EMPORIUM, PENNA.

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VOL. 15, NO. 6

JUNE - JULY, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

In This Issue
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NORMAL?
MERCHANDISING
SHOP BEFORE YOU
SET UP SHOP
TECHNICAL
MAKING SYLVANIA
TELEVISION PICTURE TUBES

SYLVANIA NEWS

AUGUST, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

R. A. PENFIELD, Editor

VOL. 15, NO. 7

This Sylvania Ad Appears
In
Radio Best August 1
Collier's August 13
Life August 27



"You're right, ma'am—it is burned out!"

What do you do if your radio burns out? Why you call the radio service dealer who displays the Sylvania emblem. Anything short of a heap of ashes, he can fix. Count on this friendly expert whenever your set shows signs of wear.

His work is tops, his prices fair. He uses both Sylvania testing equipment and Sylvania radio tubes for best results. Remember, when your radio needs fixing, look for this sign of dependable service.

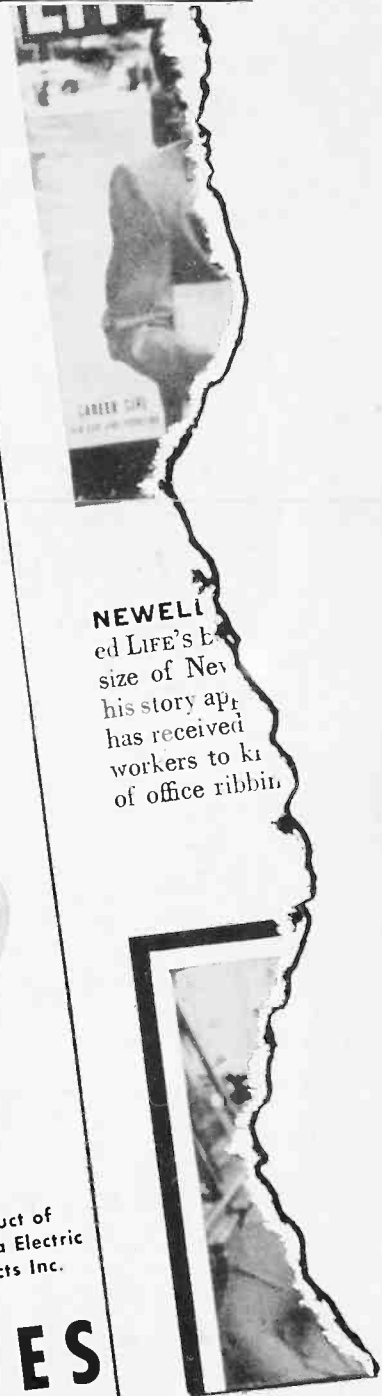


SIGN OF
DEPENDABLE
RADIO SERVICE



Product of
Sylvania Electric
Products Inc.

SYLVANIA RADIO TUBES



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Here's A NEW Service Kit

Once again Sylvania service kits are available to service dealers. This new kit is a handsome and practical addition to any service business.



The new Sylvania service kit is ruggedly constructed of $\frac{3}{8}$ " plywood covered with a brown plastic fabric which has the appearance of fine leather. The plastic covering is scratch and scuff resistant. This is a service kit that "can take it" for many years to come.

Solid brass hardware with two locks and keys add much to the appearance of the case. Dirt and grime can easily be removed with soap and water.

The interior of the case measures 17" x 11 $\frac{3}{4}$ " x 5 $\frac{1}{2}$ ". The tube capacity of this kit is over 75 tubes, depending on the size of the carton (kit shown here contains 129 tubes). The tool compartment in the lid is designed to hold the most commonly used tools required for 'out of the shop' service.

For many years Sylvania made available to its service dealer customers an outstanding service kit. But for some time now we have been unable to supply a service kit because we have been unable to get a quality kit at a fair price. Now we do have a kit—one designed especially for Sylvania service-dealers. The price of this new kit is only \$9.95, transportation charges prepaid.



Ask your Sylvania Distributor to show you this professional looking service kit today. You need it for carrying tubes, parts and small equipment needed for your outside service work on radio receivers, television sets, sound systems, electronic devices and other general service work.

Television: Full Steam Ahead

In this issue of SYLVANIA NEWS we inaugurate a new series of technical articles on the fundamentals of television. Even though a very small percentage of our population is enjoying this new medium of communication now, plans for construction of video stations are slated for most of our major cities within the next few years.

The potentials of television in our life are almost beyond comprehension. Already this long distance method of seeing has thrilled many and brought exciting events of our times to the general public. Its future is bright. The instant transmission of events as they happen to

cities hundreds of miles away is as exciting as being on the spot.

As an art, both technically and as entertainment television is destined to achieve great heights. The present day audience is small. Perhaps no more than one in ten persons have yet seen it work. The market for expansion is large. Television audiences, however, are multiplying day by day. From an average audience of less than 2,000,000 today, television is expected to touch the lives of over 10,000,000 in two years. In just a few short years, a coast to coast television network will link many of the major cities of our country.

Manufacturers are rapidly joining

the march with television receivers. Images in these sets range from three by three inches to the size of a newspaper page. Theater television is also under development and has been tested publicly in several cities.

Additional impetus was given television through the Republican and Democratic conventions. For the first time at any historic event reporters, candidates and the general public were able to view the proceedings from comfortable chairs in pleasant surroundings. Stratovision, long advocated as long distance means of transmitting video signals, was also given a successful trial. Result was that the viewers more than 300 miles away from the proceedings in Philadelphia were able to observe without the aid of lines and cables.

An interesting sidelight which we note on stratovision is that residents in Emporium, Pa., home of Sylvania radio tubes, were able to receive the signal from the plane which soared over Pittsburgh, nearly 150 miles away. Emporium has long been noted as having one of the poorest locations for radio reception in the country.

How fast television is growing was noted by Max F. Balcom, president of the RMA and vice-president and treasurer of Sylvania at the RMA annual convention in Chicago. Mr. Balcom predicted that television receivers manufactured this year will reach between 600,000 and 750,000. This is compared to 175,000 produced in 1947.

A review of television transmitting facilities indicates that there are now 30 stations broadcasting regularly and 101 have been issued construction permits and many of these hope to be broadcasting before the year ends.

ON THE COVER

Reproduced on this month's cover is Sylvania's national ad which will appear during August in Radio Best, Collier's and Life. This is just a part of the big co-ordinated advertising program Sylvania is making available to dealers this year. For complete details on how you can put these ads to work for you in your own community see page M-26 and M-27 of the Merchandising Section.

SYLVANIA NEWS

MERCHANDISING SECTION

AUGUST, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

VOL. 15, NO. 7

How You Can Repair Marred Radio Cabinets



1. After heating spatula wipe clean with cloth to remove carbon deposit.



2. Melt shellac stick onto spatula by holding it against heated spatula.



3. Spread shellac on spatula into scratch or cut and allow to thoroughly harden.



4. Smooth shellac with felt pad containing shellac stick rubbing fluid.

A furniture scratch is a housewife's biggest gripe. There is nothing so heartbreaking to the lady of the house as a scratch or a scar on a fine piece of furniture. You can make or break your reputation by taking into a home a set which has received blemishes while in your hands.

On the other hand, you can win your way into that lady's heart by touching up scratches and scars on the finish of her radio while you have it in for repairs. Repairing the finish on sets you service is just as important as putting in new condensers or tubes to make the set play better. What's more, the owner of that set will be more than pleased if old faithful comes back shining like new as well as playing better than ever before.

Repairing marred cabinets is not a difficult job. It is inexpensive for you as well. The fact of the matter is, you might be able to add more money to your pocket by

providing the service at a small fee. Which ever way you do it, this added service will create good will and business for you.

The materials you need for refinishing or touching up cabinets may be purchased from most radio parts distributors at a small cost. Complete kits which contain the essential material needed for taking care of minor cabinet injuries may be purchased for as low as \$2.95. These



5. Scratch stick kit contains both stain filler and liquid scratch polish.

kits are perhaps the easiest and most inexpensive way to get the supplies you will need.

Minor Scratches

Scratches which do not penetrate deep into the finish are easily removed by applying a scratch removing cream polish. (Non greasy is best.) This polish is applied with a soft cloth and then rubbed into the surface with a soft cloth until dry. Final polish of the cabinet with a wax base polish will give the finish a gloss of a new cabinet (Figure 6).

If the cabinet in question shows only a few small scratches, they can usually be repaired with a scratch stick (Figure 5). This device is a small stick containing solid stain at one end and a felt cork in a bottle of liquid at the other. To repair cabinets you need only rub the stain over the scratch then buff the area with the felt. The kit is a small, handy tube which can be carried in your service kit or pocket for use in a customer's home. This type of cabinet repair is not practical when there are a great many scratches or when the scratches are cut deep into the finish.

Deep Scratches

For deep cut scratches repair can be made with a shellac stick. This requires a definite technique so should not be attempted until you have gained some proficiency.

When using shellac, the color should be a little lighter in color than the finish on the cabinet

(Continued on Page M-28)



6. Cabinets should be dusted with soft cloth using scratch removing polish.

NEW CO-ORDINATED CAMPAIGN OFF

The second kit in the co-ordinated advertising campaign offered by Sylvania this year is now available to service dealers. This big campaign ties in your local business with Sylvania's national advertising during September, October, November and December.

Each month in Life, Collier's, Saturday Evening Post and Radio Best, Sylvania's advertising tells more than 12,000,000 readers about you and your service. You will want to include this new advertising campaign in your sales promotion program. It will help increase the business in your service department and sell your other products.

Material offered in this big advertising kit includes four colorful window displays, four bright, eye-catching window streamers, eight newspaper ad mats for use in your

"My radio—it just started whistling!"

If your radio "blowing the whistle" on listening pleasure? Then you'd better whistle for the help of a skilled service man. You'll do fine if you find the fellow who displays the Sylvania sign on his store front. He's the one who knows it better. He's got the tools, the ability and the dependability to do the job you need at a price that's fair. Makes no difference whether your car has a radio or a portable, or whether you're a high school, college or adult student. Sylvania service men are the best. They'll get your radio working again at the most dependable service.

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

SYLVANIA RADIO TUBES

This ad appears in Radio Best, Sept. 1; Sat. Eve. Post, Sept. 8; Life, Sept. 24.

CAMPAIGN FOR SEPTEMBER

"My radio—it just started whistling!"

If your radio sounds like a traffic cop, whistle for our service department. We'll make it play like new. You'll be pleased with our prompt service and low prices.

CALL US AT THE FIRST SIGN OF TROUBLE

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

IMPRINT

Mail this government postal card in September. You pay only the postage on each card you mail.

We Repair All Types and Brands of Radios

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

Attach this window streamer to your window during September. FREE.

"My Radio—it just started whistling"

When your Auto-Radio-Portable or Console Combination needs Servicing—

WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Large, full color window display for September. It is FREE.

Radio Announcements for the Radio Service Dealer

FOR THE MONTH OF SEPTEMBER

Radio spot announcements for September. FREE.

"My radio—it just started whistling"

When your radio needs repairs, call our expert service department. You'll find yourself why most people prefer our low prices and prompt service.

WE REPAIR ALL MAKES OF RADIOS

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

IMPRINT

FORM NAME
FIRM NAME
FIRM ADDRESS
FIRM TELEPHONE NUMBER

Ad mats for your local paper during September. FREE.



Colorful decal helps co-ordinate advertising material. Notice its use in all the material.

"How! How! How! I have repaired those put up that sign!"

Most of the people in your community stop at the shop displaying the Sylvania sign when their radios need fixing. Why? Because that emblem means dependable service. The man who stands behind it has the skill and the equipment to turn out the finest radio repairs at the lowest possible price. He's got Sylvania testing devices to help him do a better job faster. He's stocked with Sylvania radio tubes which assure you of better radio listening. When your set needs care, call the man at the sign of dependable service.

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

SYLVANIA RADIO TUBES

This ad appears in Radio Best, Oct. 1; in Sat. Eve. Post, Oct. 6; Collier's on Oct. 22.

CAMPAIGN FOR OCTOBER

"We're HEADQUARTERS for Dependable Radio Service"

When your radio needs repairs, call our expert service department. You'll find yourself why most people prefer our low prices and prompt service.

CALL US AT THE FIRST SIGN OF TROUBLE

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

IMPRINT

Mail this government postal card during October. Your name, address, phone number is imprinted on the cards.

HEADQUARTERS for Dependable RADIO SERVICE

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

Window streamer for use during October. FREE

Particular folks bring their radios to RADIO SERVICE HEADQUARTERS for dependable repair...

WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Full color window display for your window in October. FREE.

Radio Announcements for the Radio Service Dealer

FOR THE MONTH OF OCTOBER

More radio spots for use during October. FREE.

"We're HEADQUARTERS for dependable radio service"

When your radio needs repairs, call our expert service department. You'll find yourself why most people prefer our low prices and prompt service.

CALL US AT THE FIRST SIGN OF TROUBLE

RADIO SERVICE
We use and recommend Sylvania Radio Tubes

IMPRINT

FORM NAME
FIRM NAME
FIRM ADDRESS
FIRM TELEPHONE NUMBER

Ad mats for your local paper during October. FREE.

local or neighborhood newspaper, spot radio announcements and enough direct mail postal cards to cover your mailing list for four months. The cost to you is the cost of the postage on each card you mail to your prospects.

The material for each month ties in your business with the national ad appearing in the leading magazines. This material along with the new Sylvania decal identifies you with this big campaign. The decal, reproduced here, is available FREE in any quantity you require for your business. It is available in two sizes, 8 inches and 12 inches. This bright emblem, printed in six colors—red, yellow, black, white and two shades of green is the key

SYLVANIA NEWS

TECHNICAL SECTION

AUGUST, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 7

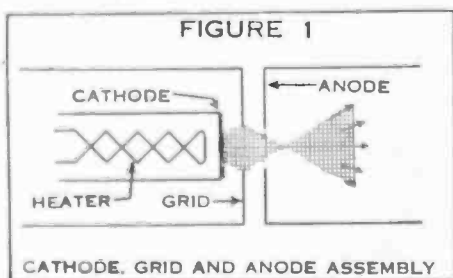
These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

ELECTROMAGNETIC CATHODE RAY TUBES

W. A. DICKINSON, Supervisor of Design and Development
CATHODE RAY TUBE PLANT

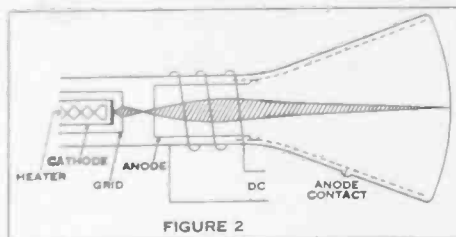
In SYLVANIA NEWS for March-April 1946, Mr. Dickinson described the operation and characteristics of Sylvania Electrostatic Cathode Ray Tubes. Since many television sets use magnetic type tubes an explanation of their operation is necessary to understand this type of television circuit.

The fundamental arrangement of the magnetically focused and deflected gun is shown in Figure 1. It is quite similar to the electrostatic gun up to the focusing electrode. Electrons emitted by the cathode are attracted by the anode through the grid aperture, the potential of which controls the number of electrons and therefore the intensity of the beam. The use of a small cathode emitting surface and a small grid aperture insures a narrow beam which can be focused to a point. An accelerating grid (G2) is added in some types, acting somewhat like the screen grid in a pentode, except that it does not draw any appreciable current.



Electromagnetic Focusing

It is a well known fact that a magnet placed near a cathode ray tube will deflect the beam. Therefore, if a coil, as shown in Figure 2, is placed around the neck of the tube, its magnetic field will cause the beam to converge; in effect it compresses the beam as only those electrons traveling exactly down the axis of the coil will be unaffected. Actually, the coil is shaped as shown in Figure 2A so as to obtain a very concentrated field which does not

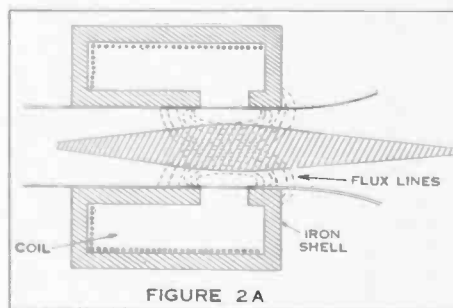


extend beyond the section of the tube neck in which the focusing action is desired. It is peculiar too that no matter at what angle the electrons enter the field, the magnet will push them just the right amount so that when the field is correctly adjusted they will all be focused at the same point on the screen. The path followed by any one electron will be corkscrew shaped since the resultant of the forces is at right angles to the direction of motion of the electron, and also at right angles to the magnetic field.

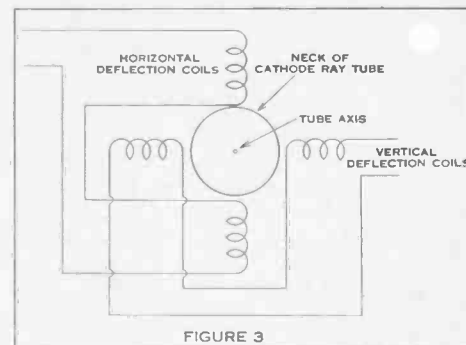
The field must be produced by DC, reasonably well filtered to avoid blurring of the spot. The ampere-turns required by a typical focusing coil on a Type 10BP4 tube is approximately 450 and is ordinarily adjusted by means of a series or shunt resistance.

Electromagnetic Deflection

The coil arrangement for deflection is entirely different from that for focusing. This is shown in Figure 3. Since an electron beam is actually a current of electricity



flowing in a vacuum, the forces exerted on the beam will be of the same nature as the force that turns the coil in a moving-coil meter. This means that as the beam enters the field it will be bent at right angles to the field producing the force, and also at right angles to its own direction of motion towards the screen. By energizing the coils of Figure 3 at the proper frequencies, the beam can be arranged to scan the whole picture area. Notice that in the illustration the coils located above and below the neck of the tube control the horizontal motion of the spot. These 2 pairs of coils must be exactly at right angles to each other and to the axis of the tube to produce a rectangular pattern centered on the tube face.



Since considerable energy is required to establish and change the magnetic fields of force at the high frequencies used, more powerful amplifier tubes are required than for usual radio use. That is why types 7AD7, 6BG6G, and 6AS7G have recently been developed. The tube and circuit requirements for scanning service will be discussed in a later article of this series.

Shielding

In general, either electrostatic or electromagnetic type tubes require shielding from the effects of the

Continued on page T-26

ELECTROMAGNETIC CATHODE RAY TUBES (Continued)

earth's and stray magnetic fields. Strong fields from chokes and transformers at audio or power line frequencies are particularly objectionable and placement of any such parts close to the cathode ray tube should be avoided. Partial shielding of the electromagnetic types is provided by the coil assembly, but when additional shielding is necessary it should be outside the coil assembly and far enough from it not to distort the desired fields. The earth's magnetic field is constant at any particular location and may generally be compensated for by adjustment of the centering controls. Where insufficient range has been provided, this may sometimes be corrected for by rotating the tube in the deflecting coils.

An interesting point is that all the internal parts not required to be magnetic are made of a non-magnetic metals, such as stainless steel, to prevent their becoming magnetized by stray fields while in shipment or in use. Such an occurrence could throw the beam so far out of line that the normal control range might be unable to bring the spot to proper focus on the screen.

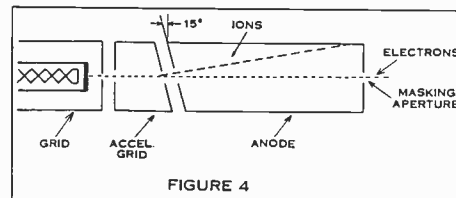
Ion Spot

One of the disadvantages of the simple electromagnetically operated tubes is their susceptibility to "ion spot." An ion is a charged particle of any element; it could be gas or any of the metallic elements present in the tube. A few of these are emitted along with the electrons and a few more are formed when any residual gas is ionized by collision with high speed electrons. On electrostatic tubes negative ions in the beam are deflected with the electrons over the whole screen and so cause negligible damage. In electromagnetic fields, however, these large, heavy particles are deflected only slightly, compared to electrons, and strike the screen in a small area near the center. They cause no fluorescence but eventually cause a dark spot by coating the fluorescent screen with inactive material which prevents the electrons from penetrating and exciting the screen.

The Ion Trap

The only known practical method of eliminating this undesirable

feature is by incorporating an ion trap in the tube structure. This is a Sylvania development which uses the principle of the mass spectrograph. Figure 4 shows how this is done. The accelerating grid and anode have one end cut at about a 15° angle in order to bend the beam—both electrons and ions—at an angle with the axis of the tube. A



magnetic field is applied perpendicular to the plane of the illustration between the second grid and the anode, which brings the electrons back towards the axis of the gun, leaving the ions "trapped" in the anode. In practice, a second and weaker pair of magnets opposite in polarity is placed about one inch closer to the screen to cut off the field of the first pair and center the beam exactly on the axis. These magnets are available either as permanent magnets or as electromagnets operated from a dc power supply. When electromagnetic ion trap magnets are used, the supply must be well filtered to prevent blurring or distortion of the pattern.

A method of reducing the damage done by the ions is to deposit a thin bright coating of metallic aluminum behind the phosphor. This "aluminizing process" partially protects the phosphor coating from ion bombardment and the reflection from it increases the brightness. The greater electrical conductivity prevents the screen from assuming a negative charge so that maximum energy is available from the electrons. All these features combine to produce the brighter pictures required for projection television.

Advantages and Disadvantages of Electromagnetic and Electrostatic Types

Like many other instances in which a desired objective may be secured in more than one way, the choice between electrostatic and electromagnetic types is influenced by costs; in this case the cost not only of the tube but of the associated equipment. For pictures up to the

7" size, satisfactory reproduction may be accomplished at lower cost with electrostatic tubes. The cost of the power supply and amplifiers to operate electrostatic tubes larger than 7" exceeds the cost of the deflecting coils and power supplies required by magnetically operated tubes.

With present day processes and circuits, the 10" tube seems to be just above the dividing line, but satisfactory cost and performance may be obtained with either electrostatic types like the 10IIP4 or electromagnetic types like the 10BP4. Possibly the reason for this is that a set designed for Type 7JP4 requires only minor changes to use a Type 10IIP4.

Electromagnetic types also have a considerable advantage over the electrostatic types by having less deflection defocusing. This is shown by the spot correctly focused when at the screen center, becoming oval when deflected to the edge. Deflection defocusing results from the fact that electrons on one side of the beam are deflected through a slightly different angle from those on the opposite side, elongating or compressing the spot on the tube face, in the direction of its deflection. This non-uniformity of deflection can be held to a minimum by careful tube design, but is inherently greater in electrostatic than in magnetic deflecting fields. Consequently, magnetically deflected tubes are made with wider deflecting angles than are electrostatically deflected tubes.

It has been convenient also on the electromagnetic types to include a large high voltage filter condenser as part of the tube. Since the inner coating of the bulb is at high potential above ground, another similar conducting coating on the outside would form a large condenser. On the 10BP4, for example, a capacitance of about 1500 uuf. is obtained and since the dielectric is glass about 1/8" thick, the voltage rating of the condenser is well above the tube rating. Because of the relatively poor conductivity of such a carbon film, several contacts to this surface are necessary in order to get the full value of capacitance available.

Continued on page T-28

TELEVISION FOR DISTANT COMMUNITIES

One of Sylvania's engineers in Emporium working with television equipment took a set home to see if he could receive the Stratovision* broadcast of the Republican convention. It worked so well that he invited a number of friends and neighbors to see it. Emporium is in a mountain valley in very sparsely inhabited country and we

would normally expect to be one of the last communities to which television would be available. We are about 150 miles from Pittsburgh or Buffalo and nearly 300 miles from Philadelphia.

The success of this demonstration shows that after the commercial problems have been solved, there will be no technical difficulty

in making television programs available for the whole country. It will also add to the problems of the F. C. C. on frequency allocations.

*Stratovision is a word coined by Westinghouse engineers and means reception and rebroadcast of television programs by a plane flying in the stratosphere.

HEATER-CATHODE LEAKAGE INDICATION ON SYLVANIA TUBE CHECKERS

An understanding of the problems connected with this test will enable a serviceman to properly evaluate the indication given by the tube checker.

Since the same circuit is used for this test as for shorts and leakage between other elements, the sensitivity should, if possible, be a compromise between the optimum value required for each purpose. Consideration should also be given to the fact that detector tubes and output tubes have considerably different tolerances for heater-cathode leakage, as the circuits are not equally critical. A third problem is due to the manufacturing tolerances and changes of the component values during service.

The instruction book does not explain why the short checker lamp sometimes shows color on only one of its two elements and at other times both elements show. The short checker circuit consists essentially of an AC voltage source in series with a small condenser, the neon lamp, and the elements of the tube selected by Switch E. If the tube resistance is below the minimum limit, both halves of the neon lamp will light. In many cases, however, the resistance in one direction is different from the resistance in the opposite direction so only one element will light. Examples of this may be found in some cases of heater-cathode leakage, and in some of the larger receiving and power tubes where the spacing between the cathode and the grid is small and a large amount of peak emission is available. In the first case the use of the tube will

determine whether or not it is defective, and in the second case the tube is normal for its type.

Sylvania engineers have selected an optimum value of sensitivity for this test of between 1 and 2 megohms. This will be the proper value to indicate noisy or leaky tubes on the other elements, but is more sensitive than necessary for most heater-cathode leakage tests. However, if you have a complaint of hum on a detector or high gain audio amplifier tube, a heater-cathode leakage poorer than 1 to 2 megohms could be the cause. On the other hand, rectifiers and tubes used in the higher level stages of amplifiers

should still be considered serviceable even if this test does show an apparent defect.

The circuit in which the tube is used should also be considered. Any set in which the heater and cathode are tied together (as in most auto sets) will not be critical for this leakage. AC operated tubes in circuits which have a fairly high resistance between the cathode and ground are likely to be critical. AC-DC sets are generally less critical, not because of the circuit but because the 60 cycle hum output can scarcely be heard in their small speakers.

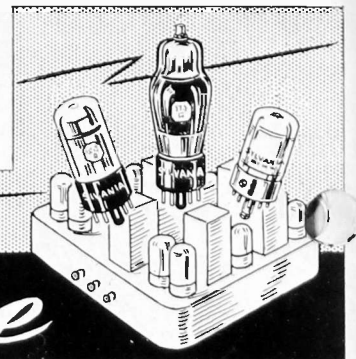
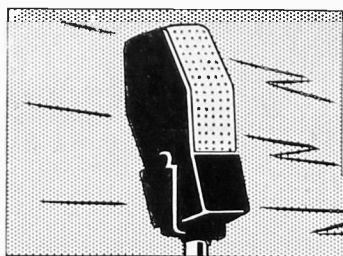
Component variations are minimized as much as possible by use of good grade components. The neon lamp, however, does change its characteristics with use. When you have reason to question the operation of this circuit, a new lamp is very easily obtained and tried out. In order to check the sensitivity of the circuit just select a few resistors in the range of $\frac{1}{2}$ to 5 megohms and find the highest value which will indicate on the tube checker when placed between two elements. This test should be made with no tube in the socket and with the switches set for any type for which you are familiar with the basing. The test resistance should be connected between the cathode and any other element and switch E rotated to the position which indicates leakage between these elements. For example, if you are familiar with the 7A7 basing connect the resistor between pins 2 and 7, put the B, C, and D switches on 0, —, 0, as required for this type and E on 1.

Additional Television Instruction

The article on television in this issue is one of a series which will explain the function and operation of each section of a television set. The series will require about twelve issues to complete, so if television will be available in your community sooner you should consider obtaining information from additional sources.

We would like to call your attention to what seems to be a very good television course which is available through the Howard W. Sams Photofact Service. Installments are sent out twice monthly with their regular Photofact mailing. Five installments are ready now and will be sent at once to those signing up for the course. See your distributor for additional details and an application blank.

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



THE *Service Exchange*

G. E. Model 250 Portable: I recently had a difficult time locating the cause of a very bad hum in this model. The trouble was finally found to be due to a poor ground connection on the 22,000 ohm feedback resistor in the tone control network. The poor contact was in the spring connection to the aluminum chassis, and besides cleaning and tightening this I also connected a jumper to the ground on the first audio socket.—Charles McCleskey, Jr., Baton Rouge 14, Louisiana.

* * *

Magnetic Soldering Iron Holder: If you use a 6 volt type soldering iron, pistol grip type, a very good holder can be made using a horse shoe magnet from an old magnetic speaker. Holes are already drilled so that it can be mounted about an inch away from mounting surface. Ford model T magneto magnet probably O. K., too.—S. E. Stolp, Stolp Radio Service, Eau Claire, Wisconsin.

* * *

Aid For Replacing Dial Cords: In replacing a dial string on a number of radios, it is vexing to me and maybe others, to keep the string from flying off the roller wheels and tuning shaft, just as you are about to make a final tie at the end of the job. To keep the string in place I clamp a small piece of adhesive tape right over the roller wheel and string as I proceed with the job from one point to next.—Mr. J. T. Partin, Pineville, Kentucky.

Philco 48 - 1270 Push Button Switch: In some of these sets the push button off switch does not work properly and the radio will not turn on. This is not due to a defective switch but is due to the trigger that attaches to the push button arm being loose. In building up this switch, two rivets were supposed to be used in fastening the trigger to this arm but sometimes one of them was omitted. It is impossible to replace this rivet without removing the entire switch, which in itself is a big job, but the equivalent can be accomplished by soldering the trigger to the arm. First though, the trigger must be properly lined up with the arm. This can be done by inserting a piece of wire of the proper size through the two holes where the rivets should have been. The soldering is the difficult part of the job. Unless the serviceman has an iron that can get into very tight places such as the so-called new "Speed Iron" the task is impossible. A little flux should be run along the line of contact between the trigger and the push button arm before applying the solder. If properly soldered the switch will operate perfectly and the whole task can be done in a small fraction of the time required to replace the entire wafer switch assembly, to say nothing of the time required for realignment of the receiver required if the switch assembly is removed.—Donald Slattery, Chadron, Nebr.

Intermittent Operation And Noise On Motorola Auto Radios 405, 505, 605, And Golden Voices: This condition always seems to be caused by a 6SA7 tube with an internal short. However, I have found it to be the result of a short between the tuning coils and the coil assembly. You will note that the terminal surface of the coils are mounted flush with the assembly plate, and therefore a strand of the coil wire is often projecting from the terminal and when the coil is inserted in the barrel causes a short which shows only by strain on the chassis, due to the mounting bolts or by vibration. To cure, unsolder the terminal wires, then unsolder the lugs holding the coil in the barrel and remove the coil. Remove all excess solder and flux from the terminal and check for a stray wire around the bakelite base. Be careful that the tuning core is centered properly in the coil when replacing same.—Robert M. Eckert, Finksburg, Maryland.

* * *

Rectifier Tube Burnouts In Admiral 101A: Customer complaint is that the Type 80 tube burns out about every month on Admiral radio Model 101A. We have had two of these radios in and the complaint was the same and the remedy the same. The factory made a slip and connected the 6.3 volt winding to the 80 tube and the 5 volt to the others. Merely reverse the filament windings. Here was one case where shorted filters or bypasses did not burn out the rectifier tube.—Roy Nishimura, Spokane, Washington.

ELECTROMAGNETIC CATHODE RAY TUBES (Continued)

Precautions

The safety precautions to be observed in using and handling television tubes should be fairly well known by now. An additional hazard also exists in those types having the exterior coating. This condenser can hold its charge for a

day or so and should be discharged with a wire before handling. Electromagnetic tubes have so much more weight at the bulb end and an even smaller neck than the electrostatic types that it is not safe to handle or support them only by the neck. Here is one servicing pre-

caution that is seldom mentioned. In any circuit in which the high voltage anode is not near ground potential, good insulation around the bulb face and its supports is necessary to prevent the differences in potential from distorting the picture.

FALL ADVERTISING BY SYLVANIA



Sylvania's ads appear in these leading national magazines every month.

for success in this big co-ordinated advertising program.

This big fall advertising and sales promotion campaign for September, October, November and December comes to you complete in one big kit. Remember you pay only the



Complete material for four months in one kit.

postage on the government postal cards you order. Each month is packed in a separate envelope for your convenience.

If you have not received the broadside we mailed you a few days ago which gave full details about this campaign, write today to the Advertising Dept., Sylvania Electric Products Inc., Emporium, Pa. Ask for the complete details of Sylvania's co-ordinated advertising program for service dealers for September, October, November and December.

"My husband says it's a leaky condenser"

If your radio reception sounds "all wet," call our service department. We'll make it and make it play crystal clear in no time. You'll like our low prices too.

RADIO SERVICE
We use and recommend Sylvania Radio Tubes.
IMPRINT

Colorful government postal card in November mailing. You pay only the postage on the cards.

When your radio needs fixing—call our skilled Service Department

RADIO SERVICE
WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Window streamer for November. Use it the entire month. FREE.

"My husband says it's a leaky condenser"

Expert radio repair at economical prices in our specialty

RADIO SERVICE
FIRM NAME

Ad mats for November tie in with campaign. FREE.

This ad appears in Radio Best on Nov. 1; Collier's on Nov. 2; Life on Nov. 26.

CAMPAIGN FOR NOVEMBER

"My husband says it's a leaky condenser!"

A leaky condenser will dampen you when you want to hear the best. Why? Because it makes your radio sound all wet. When that happens you need the help of the expert workman in his shop at the Sylvania Radio Tube Service Department. Let him examine that troubled set of yours. Fixing it will give you sensitive, no static, setting equipment to work in long quiet with greater speed, certainty. And it will give you high quality Sylvania radio tubes, the tubes that give crystal-clear reception. For good radio repairs at fair prices, clip at the sign of dependable service.

RADIO SERVICE
Product of Sylvania Electric Products Inc.

SYLVANIA RADIO TUBES

Radio Announcements for the Radio Service Dealer

RADIO SERVICE
FOR THE MONTH OF NOVEMBER

Radio spot announcements for November. FREE.

"My husband says it's a leaky condenser!"

When your radio reception sounds all wet... let our Skilled Serviceman fix it

RADIO SERVICE
WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Window display will dress up your window in November. FREE.

"It jangles when it should jingle"

If your radio makes Christmas bells sound faint, call our service department. Our experts will have it playing loud and clear in no time. Our modern methods make possible our low prices.

RADIO SERVICE
We use and recommend Sylvania Radio Tubes.
IMPRINT

Mail this government postal card in December. You pay only the postage on the card.

Let us put your radio in perfect condition for the Christmas Holidays

RADIO SERVICE
WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Window streamer for use during December. In three colors. FREE.

"It jangles when it should jingle"

We repair all makes of radios

RADIO SERVICE
FIRM NAME

Two newspaper ad mats for December. Two sizes. FREE.

This ad appears in Radio Best, Dec. 1; Sat. Eve. Post, Dec. 1; Life, Dec. 17.

CAMPAIGN FOR DECEMBER

"It jangles when it should jingle!"

If silvery Christmas bells sound a bit tinny on your radio, you ought to call the serviceman who displays the Sylvania emblem. Of course, he may not come upon a midnight clear, but he's at your service all day long. And he's a Santa to troubled radios, makes them sound like new. Let him examine your set with his Sylvania testing equipment and repair weak tubes with his famous live Sylvania radiotubes. You're in for a happy new year of listening pleasure, if you do. Yes, you get good work at fair prices at the sign of dependable service.

RADIO SERVICE
Product of Sylvania Electric Products Inc.

SYLVANIA RADIO TUBES

Radio Announcements for the Radio Service Dealer

RADIO SERVICE
FOR THE MONTH OF DECEMBER

Radio spot announcements for December. FREE.

"It jangles when it should jingle"

Let us put your radio in first class condition so you'll enjoy a Merry Christmas

RADIO SERVICE
WE USE AND RECOMMEND SYLVANIA RADIO TUBES

Big window display for December. Printed in full color. FREE.

IDEA DEPARTMENT

How To Repair Marred Radio Cabinets

(Continued from Page M-25)

which you expect to refinish. (The shellac will darken with the application of heat.) The blade of the spatula you use should be heated in the blue part of an alcohol flame. The use of alcohol is recommended because it will deposit the least amount of carbon on the blade of the spatula.

(An electric soldering iron held against the spatula is also an effective heater. In place of a spatula, a curved grapefruit knife can be used).

After the blade is hot, wipe clean with a soft cloth. (Figure 1) This should be done quickly so that the blade does not become cool. The clean blade is necessary to eliminate any foreign substance from the shellac. This operation completed, touch the shellac stick to the blade and allow some to melt. (Figure 2) If the shellac bubbles on the blade, it is too hot. Wait until it stops bubbling before applying it to the cabinet.

The shellac should be applied sparingly to the scratch and care must be exercised to avoid touching the rest of the finish with the hot blade. (Figure 3) If the shellac will not flow freely from the blade, reheat it and repeat the process. When the scratch is completely filled, allow the shellac to harden thoroughly.

Excess shellac may be cut off with a razor blade after the shellac has hardened. If necessary leave a slight ridge of shellac. To smooth out the surface and complete the job, saturate a piece of heavy felt or a blackboard eraser with shellac stick rubbing fluid and rub over the repaired area until it is smooth. (Figure 4) Fine steel wool, fine sandpaper, pumice or rottenstone may also be used in this operation, but this requires care so that the surrounding area is not marred. Always work with the grain of the wood when finishing.

When the scratch has been completely filled in and smoothed, complete the operation by cleaning the surface and polish with a wax polish.

Deeper cuts which have penetrated the finish may be repaired the same way as scratches. In such cases, however, it is necessary to stain the wood to restore the color. Spirit or alcohol stains are best for this type of work. Spirit stains will penetrate the wood more easily.

In using stain it is important to use a stain which is lighter than the surface. It is easier to add several coats than to lighten a spot which is too dark. After the staining, proceed with refinishing the same as you would a scratch by using the scratch stick process.

The source of material and photographs used in this article were furnished through the courtesy of the General Cement Manufacturing Co., Rockford, Ill. Materials mentioned in this article may be purchased through local distributors.

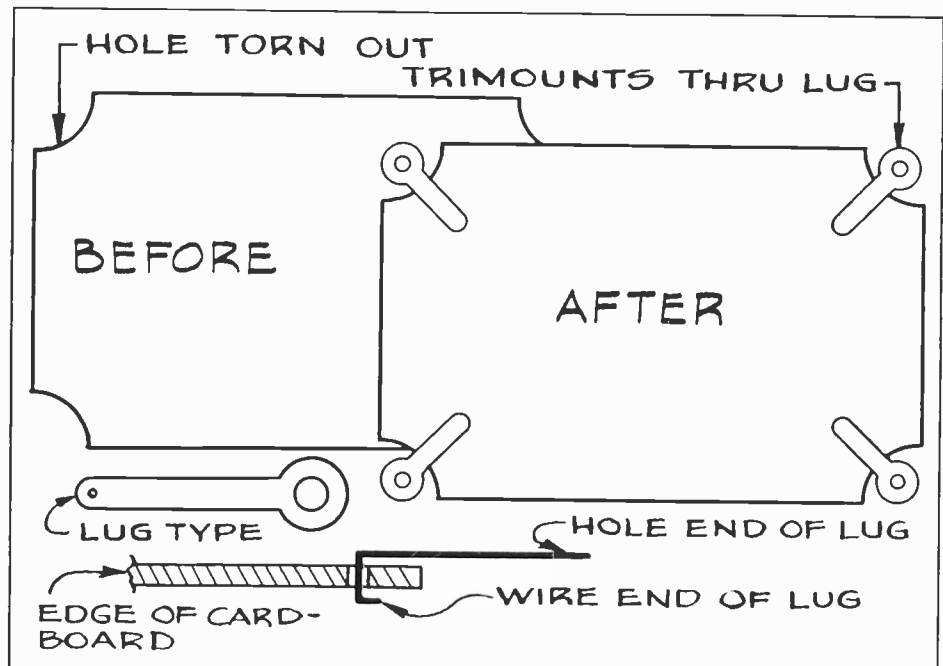
Chassis Holder

Mr. R. T. Fanetti has sent us a good idea for building a chassis holder for sets you are repairing. This holder can be built in an hour's time and is adjustable to fit any sized set. The chassis can be turned in any position on this holder.

For convenience the chassis holder can be folded and thrown into a tool kit when not needed or when needed on a service call. Simplicity of construction is noted by Mr. Fanetti when he says "All the work is straight and can be bent in a vise. The slot is cut by drilling a hole, inserting a hacksaw and cutting out the strip."

We will be glad to send servicemen complete plans for the chassis holder if you will send us a card requesting it. Address your request to The Editor, SYLVANIA NEWS, 500 Fifth Ave., New York 18, N. Y.

Replace Cardboard Backs



Arthur Ball, Ponca City, Okla., writes us that "One sure way to connect loose cardboard backs on little AC-DC sets where the corner holes have been torn out is the use of large, long solder lugs as metal tabs. The large hole, generally used

to go over the screw, is used to fasten the cardboard to the case by means of trimounts. The long slender part is pushed through the slot cut in the cardboard and clamped over it." The illustration above shows how this is achieved.

Now "Done In"



Sylvania tubes have long been known for their durability. Frequently we hear from people who tell us that they have been using their set for a long time and never renewed the tubes. Latest claimant of long service is Mr. Charles H. Roe of Tarrytown, N. Y.

Mr. Roe wrote us recently to find out if the types he needed for his set were still available. The only numbers he could find on the tubes were the code numbers which indicate the warranty date. These numbers showed that the tubes have been in constant use since 1934.

From Mr. Roe's description of the tubes and type of set we were able to figure out that the type he needed was probably a 24A. We can all agree that this is an excellent record of operation.

Television Record

According to a survey made of the viewers of the Louis-Walcott fight, 86.6 of the television homes in the seven cities where it was carried via video were tuned to that program. Estimated audience has been set at 6,000,000 with home receivers accounting for twelve persons per set.

This rating, given by the C. E. Hooper survey, was the highest in the history of radio or television. Next highest was the war message delivered by President Roosevelt on December 9, 1941.

In New York, viewers of public sets in taverns was said to average about 140. The total home audience in New York was, however, larger than the tavern audience.

Skilled in Spite of Handicap



Hobbyist in radio turned serviceman is not unusual, but when a man like John Jacobin of Sedro Woolley, Wash. does it, that is news. Born without arms and with malformed legs, Mr. Jacobin spent many years displaying his unusual talents in show business. When the war curtailed show business, Mr. Jacobin decided to go into the radio servicing business.

Radio was nothing new to him. He had spent much of his leisure time studying radio from correspondence schools. Until he went into business full time, he had fixed radios for his neighbors. The business became so good that he now has his own shop and works at the business full time.

John Jacobin has built his business on a reputation for quality service "by using the best quality

parts available in performing the best service I know how". As for Sylvania tubes, he says without question, "Sylvania Tubes? I like them!"

Listed among his other accomplishments are banjo, guitar and trumpet playing. When he isn't busy he likes to cruise in his 22 foot power launch and pursue his favorite hobby, fly-fishing!

"Radio service is about the best field for a handicapped person" according to Johnny. In spite of his handicap he handles tools with ease. His feet are the hands he uses to manipulate. When it comes to a soldering iron, he tucks it under his chin and goes to work. No radio is too complicated for John Jacobin. He fixes all types and proudly announces that he has had no complaints from his customers.

Are You Modernizing?

Recent surveys made by building authorities indicate that a majority of businesses have plans for remodeling their facilities this year. Many servicemen are undoubtedly planning to remodel their own shops.

Sylvania has published a booklet giving complete plans for building a model service shop which contains many helpful suggestions which could be used for modernization. Dealers interested in obtaining a copy of the booklet may write to the Advertising Department, Sylvania Electric Products Inc., Emporium,

Pa. Please enclose 10c to cover the cost of handling.

For those who have already done some remodeling, we would like to see pictures of your new store and obtain a description of the work you have done. If we publish the pictures in SYLVANIA NEWS we will mail you a \$5.00 certificate which you can exchange for sales help and other material available through our advertising department. Send us both "before" and "after" photographs so that we may properly judge the work you have done.

Boston Servicemen Meet Sylvania

State Campaign



Servicemen in the Boston area recently enjoyed a service meeting sponsored by A. W. Mayer Co. and DeMambro Radio Supply, Sylvania distributors in Boston. Over 200 servicemen attended. The men in the picture above are the Syl-

vanians who were present with the sponsoring distributors. L. to r. are G. C. Isham, J. H. Canning, G. C. Connor, Joe DeMambro, E. W. Butler, A. W. Mayer, Henry Jappe, E. H. Ulm, Frank DeMambro, S. J. McDonald, A. C. Viebranz.

The Federation of Radio Servicemen's Associations of Pennsylvania are currently planning a promotion campaign designed to get more business and put radios in good working order for the fall and winter listening season.

The program, which has been designated as Preventive Radio Maintenance Week, will be concentrated in a one week period. Each of the seven service organizations who represent over 1700 radio technicians in Pennsylvania will carry out the program in their own locality. Use of radio time, newspaper ads and window material will inform the public. Emphasis will be placed on improving reception in old radios through a general check-up to locate faulty parts.

Any repairs found necessary in the check-up will be made at the regular rate if the customer requests they be done. The promotion, which is planned for late September, will call attention to the fact that minor faults can hamper good listening, though not be serious enough to completely disable the set. Service of these difficulties will increase the listening pleasure, according to the organization.

The promotion will be planned on an experimental basis this year. Individual chapters of the Association located in Philadelphia, Harrisburg, Wilkes Barre, Allentown, Bethlehem, Scranton, Reading, and Williamsport will operate the program in their own communities. One group in the Federation will be selected as a testing ground for the campaign. In this area all types of promotion material will be used and the group hopes to devise plans for carrying out future promotions from information obtained.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
P. O. BOX 431
EMPORIUM, PENNA

RETURN POSTAGE GUARANTEED

Sec. 562, P. L. & R.
U. S. POSTAGE
PAID
Permit No. 1
Emporium, Pa.

For:

Mr. J. Kenneth Bowran
Rf. 4
Rocky Mount, Va.

PRINTED IN U.S.A.

POSTMASTER: If addressee has moved, notify sender on Form 3547, postage for which is guaranteed. When Form 3547 is sent abandon this mailing. Return only if no correct address is available.

Vol. 15, No. 7

AUGUST, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

In This Issue
NEWS
NEW SYLVANIA SERVICE KIT
MERCHANDISING
HOW TO REPAIR MARRED
RADIO CABINETS
TECHNICAL
MAGNETIC DEFLECTION
CATHODE RAY TUBES



SYLVANIA NEWS

SEPTEMBER, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMFORIUM, PENNA.

R. A. PENFIELD, Editor

VOL. 15, NO. 8

THE NATIONAL EVENING
POST
AUGUST 7, 1948 15¢

Radio **best** TELEVISION
THE RADIO & TELEVISION PICTURE MAGAZINE
SEPTEMBER 1948



"My radio - it just started whistling!"

Is your radio "blowing the whistle" on listening pleasure? Then you'd better whistle for the help of a skilled service man. You'll do fine, if you call on the fellow who displays the Sylvania emblem. Know his business? No one knows it better. He's got the tools, the ability and the dependability, to do the job you need at a price that's fair. Makes no difference whether your set is a huge console, a pocket portable, or an auto radio... his Sylvania testing equipment and high quality Sylvania radio tubes assure top results. Want your old radio to sound like new? Stop at the sign of dependable service.



SIGN OF
DEPENDABLE
RADIO SERVICE



Product of
Sylvania Electric
Products Inc.

SYLVANIA RADIO TUBES

This Sylvania Ad Appears
In More Than 9,000,000
Copies of
Radio Best - Life
Saturday Evening Post
During September



HALL
OF THE
ES
CONGRESS
STATES

LIFE

ollier

Five Town Meetings Scheduled

The first in a series of five educational meetings for radio technicians to be held during the coming months will be held in New York's Hotel Astor on Sept. 27, 28, 29, according to Harry A. Ehle, chairman of the Town Meeting Committee of the Radio Parts Industry Coordinating Committee.

The program for the meeting will follow the pattern set in the first Town Meeting held in Philadelphia earlier this year. (SYLVANIA NEWS, Feb. 1948; April 1948.) All radio technicians and students are cordially invited to attend the meeting. There is no expense involved for the attending technicians.

In announcing the New York meeting and other meetings Mr. Ehle said, "The Town Meeting program marks the first, carefully thought out step in a long range program designed to help the technician help himself to keep abreast of the rapidly changing requirements of the radio servicing business.

"The whole industry is changing with historic rapidity as television and FM expand. To stay in business the technician must keep pace with

the industry. Unless he keeps pace with the industry, the consumer's confidence in our products will drop—a drop which surely will be reflected in sale of sets and parts.

"It is the realization of this new interdependence of manufacturer, distributor and technician that is responsible for the working out of this broad, long-range educational program."

The approach of the Town Meeting is flexible and can be adapted to the needs of every city. Its initial success has attracted much comment from national publications which have been quick to criticize the radio technician. It is the industry's answer to various criticisms such as the demand for licensing technicians.

The New York program will incorporate many suggestions made by technicians at the first Town Meeting in Philadelphia. Afternoon and evening sessions will supplant the all day sessions of the previous meeting so that technicians may spend the morning in their shops taking care of routine business.

Four additional meetings will be held in as many cities during the



HARRY EHLE

fall and winter. The present schedule calls for a meeting at the Hotel Bradford in Boston on November 15, 16, and 17. Others will be held in Atlanta during January, Los Angeles in March, and Chicago in April.

Co-operation for promotion of the meetings will be obtained from set and parts distributors in each city. National expenses for staging and arranging the meetings will be born by the Co-ordinating Committee which is composed of Radio Parts and Equipment Manufacturers, RMA, The Sales Managers Club (Eastern division) and the West Coast Electronic Manufacturers Association.

* * *

develops in the middle of the picture area. In Sylvania's laboratories an electrode arrangement was devised whereby the particles which caused this brown spot are trapped, thus preventing marking of the screen.

Sylvania To License R. C. A.

Sylvania has announced that it has licensed the Radio Corporation of America under some 200 radio and television tube patents. The license will run for seven years.

For many years, Sylvania has been engaged in a program of research and these patents and other radio, television and lighting patents have been one of the results of this program.

Several of the patents included in the licensing agreement are concerned with indirectly heated cathode radio tubes, internal shielding in radio tubes used principally in high-frequency applications, and the well known ion trap featured in modern television picture tubes.

Most tubes used in AC sets, AC-DC sets and in automobile sets utilize indirectly-heated cathodes. Sylvania pioneered in the development and commercial use of bundled heaters. This development prevents connections from occurring unin-

tionally between the cathode and heater in these tubes.

Before the advent of Sylvania's developments concerned with internal shielding, it had been necessary to widely separate the input and output terminals of a high gain high-frequency tube at opposite ends of the tube.

The shielding arrangement makes it possible to provide all terminal connections at the base of a high-gain tube. While Sylvania introduced this arrangement in its all-glass lock-in tubes it is applicable to other types of single-ended tubes, including the glass miniature tubes now being so widely used.

The ion trap prevents the formation of a dark spot in the screen of a picture tube in television receivers. Picture tubes utilizing magnetic coils for deflecting the scanning beam over the fluorescent screen have the disadvantage that after a few hours of use a brown spot

ON THE COVER

Reproduced on this month's cover against the background of Life, Collier's, Saturday Evening Post, and Radio Best is the Sylvania ad which will appear during the month of September. This ad appears in Radio Best which reached the news stands on September 1st; the Saturday Evening Post which reached the news stands on September 8th; and Life will be on the news stands on September 24th. Use the campaign material for September near these dates. See Page M-30 for the story on how Sylvania's national campaign has worked for one radio service dealer.

SYLVANIA NEWS

MERCHANDISING SECTION

SEPTEMBER, 1948

Copyright 1948
Sylvania Electric Products Inc.

EMPORIUM, PENNA.

VOL. 15, NO. 8

How You Can Repair Marred Radio Cabinets

PART 2

The source of material and photographs used in this article were furnished through the courtesy of the General Cement Manufacturing Co., Rockford, Ill. Materials mentioned in this article may be purchased through your local distributor.

This is the second of a series of two articles describing the repair and refinishing of marred radio cabinets. Sending a radio back into a home sparkling like new as well as playing better than before is good business. You will gain a good reputation by taking time to polish a radio cabinet before you return it to a living room.

Gouges, nicks, cuts and cases where some of the wood has actually been removed from the cabinet requires a great deal of care in refinishing. The chief reason for this is that the hole must be filled in.

In cases such as these, all foreign matter should be removed from the hole. Use a knife to scrape the surface clean. The hole should then be filled in with Savogran Wood Putty or Plastic Wood. The putty should be smoothed while still moist and allowed to dry for at least twenty-four hours.

When the fill has dried for the required length of time, shave off the excess with a razor blade. The area should be finished off by using a fine sandpaper, steel wool, pumice or rotten stone. In this process care should be exercised so that you will not mark the surrounding area.

When smooth, stain the area with several coats of light stain until the desired shade is reached. On small areas a neat repair job can be finished off by rubbing with a wax polish.

If the cabinet has a noticeable grain in the wood, the repair you have made will probably show. It will not be as noticeable as the hole, but you should inform your customers so that they do not expect too much from this type of repair.

Plastic Wood and Savogran Wood Putty can also be used to replace small bits of ornament which have been damaged or broken off. The putty or Plastic Wood should be moulded roughly into the desired shape before it hardens. After it hardens, a razor blade may be used to carve it into the shape wanted. In carving, do not exert too much pressure as the pressure may tend to dislodge the material.

Repairing Splits

Badly damaged cabinets—split through, broken apart at the corner, split or peeling veneer—are really jobs for an expert cabinet maker. You can do a satisfactory job, but in most cases your time and expense will not warrant the trouble involved.

In many cases you can glue the veneer which has come loose at the

edges. A good grade of wood glue such as casein, hide or fish glue should be used in this process. The veneer should not be moved any more than necessary since it is very thin and can be easily split. When you have inserted the glue under the veneer apply as much pressure as you can when you clamp it. Use a smooth block of hard wood over the area between the clamp and the veneer.

Refinishing Large Surfaces

In some cases large panels or even the entire cabinet should be refinished. To do this requires a great deal of skill and experience and unless you are equipped to do good work, it is inadvisable to attempt it.

If you do attempt such a job, however, you should remove every trace of the old finish. The cabinet should then be sponged thoroughly with turpentine to remove the chemicals and then sanded with fine sandpaper or steel wool until it is perfectly smooth.

There are several methods of refinishing which we shall mention only in passing. The dip and rub finish is a method in which the finish is applied with a pad instead

(Continued on page M-32)

Items needed for simple cabinet repairs. Front row, l. to r. spatula, alcohol lamp, Plastic Wood, French varnish, stick shellac, steel wool, felt pad. Back row, l. to r. rubbing oil, wood glue, scratch removing polish, scratch stick, stain, sandpaper, wax base polish.



This Sign Will Sell Service



Sylvania's new metal shadow box sign is a window sign that is designed to sell YOUR service. The big bright red letters RADIO SERVICE will make people stop as they pass your shop. They will remember this sign in your window when their radio needs service.

The face of the sign is glass. The background is translucent yellow-like the color of the Sylvania decal. The letters on the face are bright red outlined in black. The bottom half of the sign is black with yellow lettering.

This new sign is convenient for

hanging in your window, on your wall, or can be placed on a small flat surface in your window. Two eyes in the top of the sign are for hooks or chains. Size is 18 $\frac{1}{4}$ " long, 8 $\frac{1}{4}$ " high, 3 $\frac{3}{4}$ " deep.

Two incandescent bulbs light the sign for night or indoor showing. (The bulbs are not included when we ship the sign to you.) Seven feet of line cord are supplied to reach your nearest outlet. The metal is a brown finish trimmed in chrome.

Ask your Sylvania distributor to show you this new Sylvania sign today. The price is \$4.50 including shipping charges.

Likes Campaign

Sylvania's co-ordinated advertising campaign for May, June, July, and August has been acclaimed by servicemen in all parts of the country. Typical of the comments made by servicemen is that of Guy Brooks, Alabama City, Ala., a letter from whom we quote below: "Gentlemen:

"Just a few words to let you know that we believe you have hit the "Bull's Eye" with your four months summer advertising campaign. This is the first summer in our history that we have done an average amount of service work and as your planned campaign is the only advertising that we have attempted we can only say truthfully that it has paid us off well.

"We believe that a year-round planned campaign in periods of four months will be a real business builder. We are adding fifty new names and addresses to our mailing list, bringing it up to the two hundred mark and would like to have the next four months service. Will you please send us the proper application blank by return mail so that we may have the service in plenty of time to address the cards for the September mailing.

Respectfully,

Guy Brooks

BROOKS RADIO SERVICE"

New Letterheads For Dealers

Two new letterheads, designed especially for Sylvania service dealers and incorporating the new Sylvania decal insignia have been announced by Sylvania's advertising department.

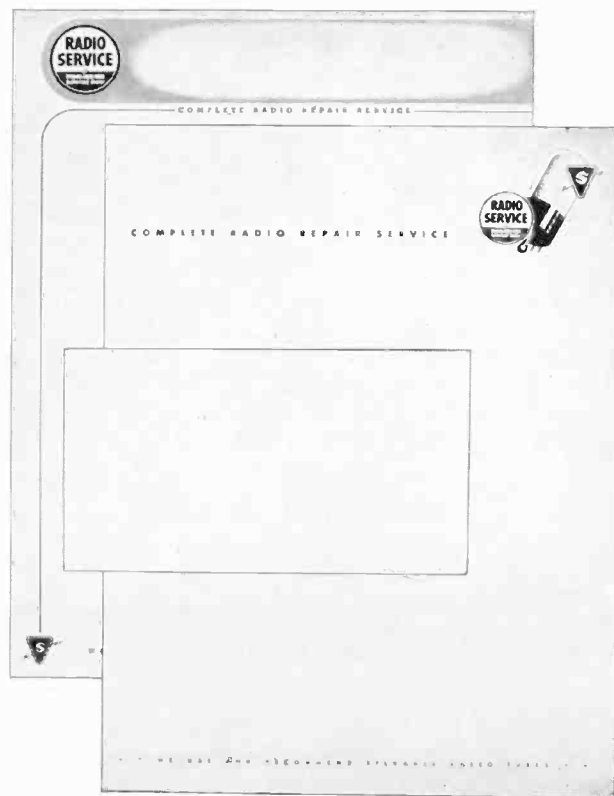
These colorful letterheads are designed to help you further identify your business with Sylvania's national advertising through use of the radio service decal which appears in all Sylvania's advertising and business aids. Printed in three colors (one, yellow, green and black, the other yellow, green and rust), the new letterheads will include the service dealer's imprint.

It is a well established fact that business letterheads help to stimulate sales of merchandise and service. By using attractive, businesslike stationery, you can create an immediate business-like reaction in your customers.

These two new letterheads are now available at no increase in cost. The price includes your name, address and telephone number imprinted on the letterhead and envelopes. The prices for letterheads and envelopes in the following quantities are:

250 — \$1.75 500 — \$3.00 1000 — \$5.00

Order yours today from your Sylvania distributor, or write to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. Include your check, cash or money order for the proper amount. Be sure to specify the style of letterhead you prefer. Style on left is 200, 201 on right.



SYLVANIA NEWS

TECHNICAL SECTION

SEPTEMBER, 1948

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Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 8

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application hereof or for patent infringement.

FUNDAMENTALS OF TELEVISION

WM. P. MUELLER

SYLVANIA APPLICATION LABORATORY

This is the second of a series of articles on Television by Sylvania Engineers.

With some thirty-six TV stations in some twenty-one communities now on the air or scheduled to begin commercial operation before year's end, it is apparent that television is definitely here. Many servicemen in the larger metropolitan areas are already deep in TV installation and servicing. In view of the growing popularity of this new medium and its rapid spread to more and more areas, it behooves every serious serviceman to learn as much about TV as possible, in order to be able to explain it to his present customer, and to be ready for it when TV signals eventually invade his neighborhood. This may be earlier than one anticipates due to the greater range made possible by "Stratovision" (the relaying of TV from a high flying plane), which is now undergoing experimental tests. The purpose of this article is to give a general explanation of the fundamentals of our present television system. Subsequent issues will take up the various parts of the television receiver in greater detail.

Frequency Channels and Assignments

The FCC has assigned twelve frequency channels to commercial television stations. Originally there were thirteen, but the FCC has recently found it necessary to delete Channel 1 in order to eliminate sharing of television frequencies with other services. A channel consists of a band of frequencies six megacycles wide. For example, Channel 2 extends from 54 to 60 mc. The video carrier frequency, upon which is impressed the picture information, is located 1.25 mc

from the lower edge of the channel, or at 55.25 mc. The sound carrier frequency, upon which is impressed the sound modulation, is located 4.5 mc higher, or at 59.75 mc for Channel 2. The present channels and their location in the frequency spectrum are shown in Table 1 for ready reference.

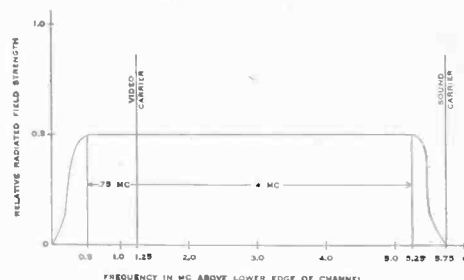
Table 1
Television Frequency Assignments

| Channel No. | Band mc | Video-Carrier Frequency mc | Audio-Carrier Frequency mc |
|-------------|---------|----------------------------|----------------------------|
| 2 | 54-60 | 55.25 | 59.75 |
| 3 | 60-66 | 61.25 | 65.75 |
| 4 | 66-72 | 67.25 | 71.75 |
| 5 | 76-82 | 77.25 | 81.75 |
| 6 | 82-88 | 83.25 | 87.75 |
| 7 | 174-180 | 175.25 | 179.75 |
| 8 | 180-186 | 181.25 | 185.75 |
| 9 | 186-192 | 187.25 | 191.75 |
| 10 | 192-198 | 193.25 | 197.75 |
| 11 | 198-204 | 199.25 | 203.75 |
| 12 | 204-210 | 205.25 | 209.75 |
| 13 | 210-216 | 211.25 | 215.75 |

Television Frequency Assignments

Note that there are five "low band" channels and seven "high band" channels. There is also a 4 mc gap between Channels 4 and 5, these frequencies being assigned to other services. Since not more than seven channels have been assigned to any one metropolitan area, some receivers are aligned to tune to any eight of the total twelve channels. Thus these receivers are capable of receiving all the stations of that particular locality.

FIGURE 1
STANDARD VESTIGIAL SIDEBAND TELEVISION CHANNEL AS TRANSMITTED



The arrangement of a TV channel is shown in Figure 1. Most of the frequency spectrum is utilized by the picture modulation side bands of the video carrier. Vestigial side band modulation of the picture carrier is used. This means that one entire side band and a small part of the other side band are transmitted.

The sound which accompanies the picture is transmitted by frequency modulating the sound carrier. In view of previous articles in SYLVANIA NEWS on FM, nothing more need be said about this except that the maximum frequency deviation of the television sound is 25 kc instead of the 75 kc used in FM broadcasting on the 88 to 108 mc band.

How a Picture is Transmitted

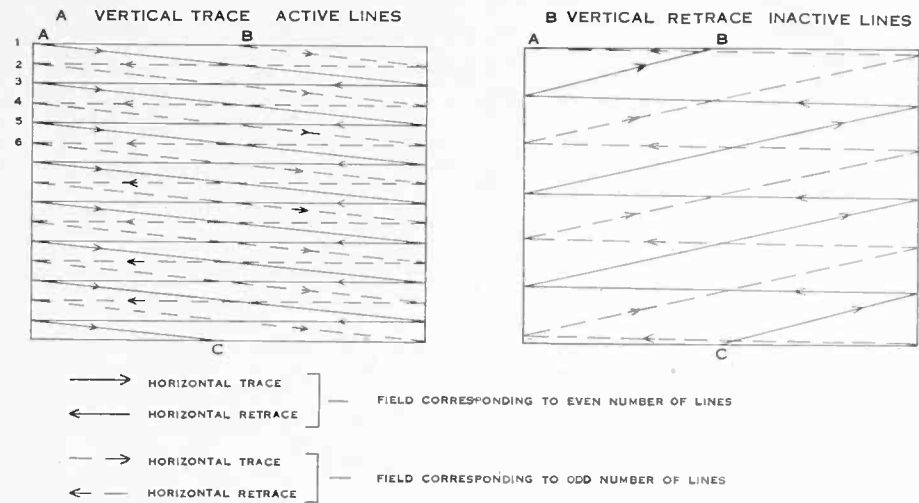
or, The Essentials of the Video System

The transmission of a picture by radio is inherently a much more complex process than the transmission of sound. Sound is a one dimension phenomenon; at any one particular, (infinitely small,) instant all that need be known is the loudness of the sound. To transmit a picture, it is necessary to examine one particular small spot on the picture, modulate the video carrier in intensity according to the shade of the picture at this particular spot, and at the same time to sweep the spot quickly across the picture according to some definite plan until the entire picture area has been covered. This process is called scanning. Obviously, it is necessary that the spot of light on the picture tube of the television receiver vary in intensity according to the shade of the spot on the original picture, and furthermore that it keep in

FUNDAMENTALS OF TELEVISION (Continued)

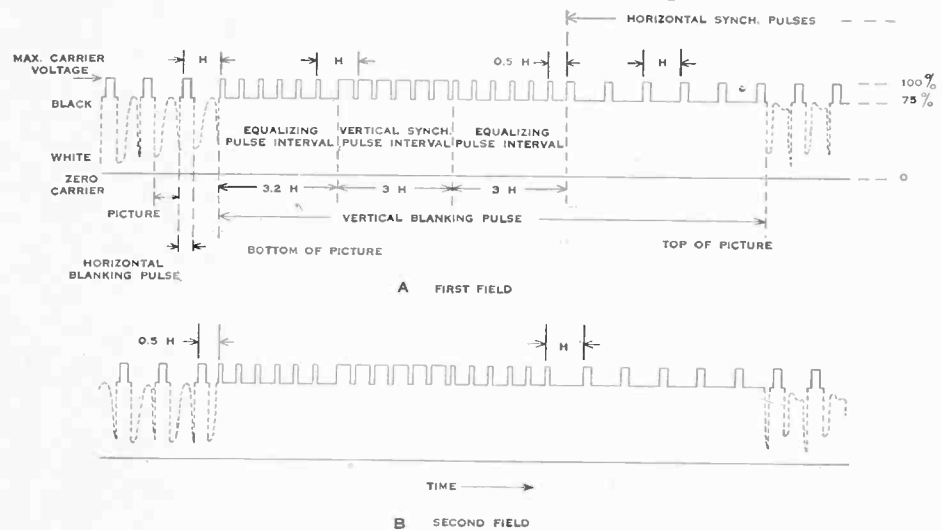
exact synchronization with the spot of the transmitter. In order to do this, synchronization pulses are also transmitted, and since the spot must be deflected both horizontally and vertically in order to cover the entire picture, both vertical and horizontal synchronization pulses are transmitted. The spot moves across the picture at a constant rate from left to right, as determined by a saw tooth wave running at a repetition rate of 15,750 cycles per second and at the same time the spot is deflected downward at a linear rate controlled by the 60 cycle saw tooth vertical deflection. The picture tube is biased to cut off during the retrace time of both vertical and horizontal scanners, and these blanking pulses are also furnished by the transmitter. The synchronizing pulses are transmitted during the blanking period. In order to reduce the apparent flicker, and at the same time retain good resolution at practical scanning speeds, "interlaced" scanning is employed, which means that alternate lines are scanned in succession, or that all even numbers of lines are scanned first, then all odd numbers of lines, and so on. Interlaced scanning is illustrated in Figure 2. The actual number of lines shown have, of course, been necessarily greatly reduced to illustrate the principle. Figure 2A shows the conditions which exist during the vertical trace for two different fields, one corresponding to the even numbers of lines and the other to the odd number of lines. The horizontal retrace lines are blanked out and do not appear on the picture tube. One complete set of alternate lines is called a field. Two successive fields make up a complete picture called a frame. There are 60 fields or 30 frames produced per second. This speed is adequate to show swiftly moving subjects. Figure 2B illustrates the conditions which exist during the vertical retrace. The picture tube is dark during this interval, due to the vertical blanking pulse, so that none of these lines appear upon the picture tube, and these lines are hence inactive. Since the vertical retrace takes up some 7.5% of the total time, only about 485 of the total 525 lines are active in making up the picture. The

FIGURE 2
INTERLACED SCANNING



speed at which the spot moves across the picture tube as it paints the picture, figures out to approximately 7000 miles per hour for a 10 inch tube! A very busy little spot indeed! Stated another way, the time required to move the spot from left to right to produce one line is about 60 millionths of a second. Since this spot may be turned on and off or modulated several hundred times as it traces one line, it is readily apparent why the modulating frequency becomes 5 mc. This is why the video band width required to fully utilize the resolution possible with a 525 line system is some 4.5 mc, and explains why 6 megacycles of the valuable and crowded radio frequency spectrum is taken up by one TV channel.

The envelope of a standard modulated video carrier is shown in Figure 3 for a short interval of time which includes the vertical blanking pulse or pedestal. Looking at the right hand edge of pattern (a), note the words "black" and "white". This indicates that the black level of the picture is set at 75% of maximum carrier voltage. The top quarter of the available carrier voltage is used to transmit the synchronizing pulses. These occur in the region which is "blacker than black" and thus do not appear on the picture tube. The "white" or maximum brightness used is set at a carrier level not more than 15% of maximum carrier level. The actual video signal or picture information in one line is transmitted during the interval shown



STANDARD TELEVISION SYNCHRONIZING WAVE SHAPE

FIGURE 3



AUTHORIZED SYLVANIA DISTRIBUTORS

Effective September 1, 1948



Radio Tubes, Test Equipment, Electronic Devices

ALABAMA

Birmingham

Auto Service Co.
1916 4th Ave., South
James W. Clary Co.
2024 North 4th Ave.
Reid Distributing Co.
1724 Fifth Ave., North
Montgomery

Mobile

Nolin-McInnis, Inc.
205 Commerce St.
Teague Hardware Co.
132-134 Commerce St.

Mobile

Nelson Radio & Supply Co.
263-71 St. Louis St.

ARIZONA

Phoenix

Radio Parts of Arizona
36 W. Madison St.

Tucson

Standard Radio Parts
551 North Fourth Ave.

ARKANSAS

Blytheville

Blytheville Radio Supply
112 South First St.

Little Rock

Southern Radio Supply
1417-1419 Main St.
Thurman Supply Co.
115 West 11th St.

CALIFORNIA

El Centro

Ira Huffman Co.
1125 West Main St.
Imperial Hardware Co.
535 Main St.

Fresno

DeJarnatt Wholesale Radio Parts
1260 Van Ness Ave.
Kierulff & Co.
498 N. Fresno St.

Long Beach

Fred S. Dean Company
969 American Ave.

Los Angeles

California Electronic Supply, Inc.
3430 South Hill St.
Figart's Radio Supply Co.
6320 Commodore Sloat Drive
*Henry Radio
11240 West Olympic Blvd.
Kierulff & Co.
822-830 W. Olympic Blvd.

San-Henderson Co.
100 N. Alvarado St.
Radio Products Sales, Inc.
1201 S. Main St.

Stamford

Harty & Young, Inc.
97 Main St.
Stamford Radio Supply
562 Atlantic St.

Waterbury

Harty & Young, Inc.
89 Cherry St.

DELAWARE

Wilmington

Radio Electric Service Co. of Pa., Inc.
Fourth & Tenth Sts.

DISTRICT OF COLUMBIA

Washington
Capital Radio Wholesalers
2120-22 Fourteenth St., N. W.

Rucker Radio Wholesalers
1312 14th St., N.W.

FLORIDA

Jacksonville

Radio Parts Company
712 Main St.
Thurow Distributors, Inc.
15-17 E. Church St.

Lakeland

Radio Accessories Co.
1054 S. Florida Ave.

Miami

Thurow Distributors, Inc.
420 S. W. 8th Ave.
Welder Radio & Appliance Co.
1809 N.E. Second Ave.

Orlando

Hammond-Morgan, Inc.
Box 3162
Radio Accessories Co.
71 East Church St.

Thurow Distributors, Inc.
129-131-133 S. Court St.

Pensacola

Gulf Electric Supply Co.
115-117 E. Gregory St.
Thurow Distributors, Inc.
906 E. Cervantes St.

Tallahassee

Thurow Distributors, Inc.
P. O. Box 962

Tempa

Thurow Distributors, Inc.
134-136 S. Tempa St.
West Palm Beach
Thurow Distributors, Inc.
308-10 S. Olive Ave.

GEORGIA

Atlanta

Beck & Gregg Radio Co.
217 Luckie St., N.W.
Garvin Electric Co.

Terre Haute

Archer & Evinger
1348 Wabash Ave.

IOWA

Burlington

Union Supply Co.
Fourth & Washington Sts.

Cedar Rapids

Gifford-Brown, Inc.
106-108 First St., S.W.

Des Moines

Gifford-Brown, Inc.
1216 Grand Ave.
Radio Trade Supply Co.
1224 Grand Ave.

H.E. Sorenson Co.
100 S. W. First St.

Dubuque

Boe Distributing Co.
498 N. Grandview Ave.

Sioux City

Dukes Radio Co.
114 West 4th St.

KANSAS

Topeka

The Overton Electric Co., Inc.
522 Jackson St.

Wichita

Interstate Distributors, Inc.
1236 East Douglas St.

KENTUCKY

Lexington

Electronic Distributors
134 West Third St.
Louisville
P. I. Burks & Co.
911 W. Broadway

Newport
Apex Distributing Co.
506 York St.

Paducah

West Kentucky Electronic Supply Co.
1207 Broadway

LOUISIANA

Alexandria

Central Radio Supply Co.
116 DeSoto St.

Baton Rouge

Electronic Supply Co.
1751-53 North 21st St.
Lafayette
Radio Electronic Supply
1419-21 Cameron St.

Lake Providence

F. H. Schneider & Sons, Inc.
Monroe
Hale & McNeil
North Third & Pine Sts.

MICHIGAN

Ann Arbor

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605 Church St.

Detroit

Ferguson Radio Supply Co.
622 W. Baltimore Ave.
*Radio Electronic Supply Co.
1112 W. Warren Ave.
Radio Specialties Co.
456 Charlotte Ave.

Flint

Shand Radio Specialties Co.
203 W. Kearsley St.

Grand Rapids

Radio Electronic Supply Co.
443 S. Division St.

Jackson

Fulton Radio Supply Co.
265 W. Cortland St.

Muskegon

Fitzpatrick Electric Supply Co.
444 Irwin Ave. at Wood

Pontiac

Electronic Supply Co.
248 East Pike St.

Saginaw

Radio Parts Co.
Millard & Water Sts.

MINNESOTA

Duluth

G. M. Popkey Co.
206 E. First St.

Minneapolis

Jamney Semple Hill & Co.
Marquette & Second Sts.
Northwest Radio & Electronic Sup. Co.
52 South 12th St.

St. Paul

Northwest Electronic & Radio Sup. Co.
194 West Fourth St.

MISSISSIPPI

Jackson

Orgill Bros. Hardware Co.
Radio & Electronic Suppliers Inc.
713-19 West Monument St.
Southern Distributors Inc.
330 W. Capitol St.

Meridian

Griffin Radio & Supply Co.
P. O. Box 1404

MISSOURI

Jefferson City

Central Missouri Distributing Co.
409 West McCarty St.

Joplin

Four-State Radio & Supply
201 Main St.

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*Nidisco
126 South Warren St.
NEW MEXICO

Albuquerque

J. Miller Supply Co.
111 West Lead Ave
L.B. Walker Radio Co.
114 W. Granite St.

NEW YORK

Albany
Fort Orange Radio Dist. Co., Inc.
642 Broadway

Amsterdam

*Adirondack Radio
54 Market St.

Binghamton

Federal Radio Supply Co.
188 State St.

Buffalo

Dymac, Inc.
2329-31 Main St.
Genesee Radio & Paris Co.
205 Genesee St.

Cortland

Cortland Auto Supply Co., Inc.
12-16 Court St.

Elmira

Barker Rose & Kimball, Inc.
511 Baldwin St.

Glen Falls

Ray Distributing Co.
284 Glen St.

Hempstead

Davis Electronics Corp.
204 Main St.
Island Radio Dist.
412 Fulton Ave.

Ithaca

Stallman of Ithaca
123-127 S. Tioga St.

Jamaica

*Harrison Radio Corp.
172-31 Hillside Ave.

Jamestown

Johnson Radio & Electronic Equip. Co.
48-50 Harrison St.

Malone

Pond Electric & Battery Service, Inc.
123 East Main St.

Middletown

Certified Radio Supply
45 Cottage St.

Mt. Vernon

Radelco Inc.
268 W. First St.

New York City

Arrow Electronics Inc.
82 Cortlandt St.

Electronic Equipment Co.
1460 Bushwick Ave., Brooklyn

Pharm Radio Supply Co.
9 Jerome Ave., Bronx

Harrison Radio Corp.

Lancaster

George D. Barbey Co.
29 East Vine St.
Philadelphia

Emerson Radio of Pennsylvania

225 North Broad St.
Radio Electric Service Co. of Pa., Inc.
3412-14 Germantown Ave.
Radio Electric Service Co. of Pa., Inc.
5133 Market St.

Radio Electric Service Co. of Pa., Inc.
N. W. Cor. Seventh & Arch Sts.

Pittsburgh

Cameradio Company
963 Liberty Ave.

M. V. Mansfield Co.
937 Liberty Ave.

The John Marshall Co.
201 Anderson St.

Pottsville

Moyer Electronic Supply Co., Inc.
330 East Norwegian St.

Reading

George D. Barbey Co.
Second & Penn Sts.

Scranton

*Scranton Radio & Tel. Supply Co.
519 Mulberry St.

Mr. Fred P. Pursell
550 Wyoming Ave.

St. Marys

B & R Electric Co.
Sunbury

Big Boys Auto Parts Co.
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Uniontown

Zimmerman Wholesalers
55 Morgantown St.

Wilkes-Barre

Radio Service Co.
346 S. Main St.

R. B. Wall Co.

58 East Union St.
Williamsport

Williamsport Radio Supply
518 West Third St.

York

J. R. S. Distributors
644 West Market St.

PROVIDENCE

W. H. Edwards Co.
94 Broadway

DeMambo Radio Supply Co.
90 Broadway

SOUTH CAROLINA

Charleston
Wholesale Radio Supply Co.
272 Meeting St.

Columbia

Dixie Radio Supply Co.
1715 Main St.

Greenville

Carolina Radio Supply Co.

Fort Worth

Fort Worth Radio Supply
1201 Commerce St.
Bill Sutton's Wholesale Electronics
601 Commerce St.

Houston

Harrison Equipment Co.
1422 San Jacinto
Sterling Radio Products Co.
1602 McKinney Ave.
Straus Frank Co.
4000 Leeland Ave.

Lubbock

R. & R. Supply Co., Inc.
706 Main St.

San Antonio

Mission Radio, Inc.
814 S. Presa St.
Joseph Thiele Inc.
5th Floor Transit Tower

Texarkana

Lavender Radio Supply Co., Inc.
522 E. Fourth St.

Tyler

Lavender Radio Supply Co.
110-114 Swann St.

Waco

The Hargis Co., Inc.
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Wichita Falls

Mooney Radionic Supply Co.
1104 Grace

UTAH

Salt Lake City

W. H. Bintz Co.
433 W. Third St.
The Salt Lake Hardware Co.
105 North Third St., W.
Standard Supply Co.
531 S. State St.

VERMONT

Burlington

Hagar Hardware & Paint Co.
164-170 St. Paul St.

VIRGINIA

Bristol

Bristol Radio Supply Co.
55 Commonwealth Ave.
Danville
Womack Electric & Supply Co.
502-504 Craghead St.

Lynchburg

Eastern Electric Co.
920-22 Commerce St.

Norfolk

Radio Supply Co.
711 Granby St.

Petersburg

Virginia Battery & Ignition Inc.
35 East Bank St.

Richmond

Radio Supply Co.
3302 West Broad St.

Roanoke

Carolina Radio Supply Co.

103 West 43rd St.

Radio & Electronic Corp.
Greenwich St.
National Radio Distributors
899 Southern Blvd., **Bronx**
*Newark Electric Co., Inc.
242-250 W. 53th St.
*Newark Electric Co., Inc.
212 Fulton St.
*Newark Electric Co., Inc.
115-117 W. 45th St.
Radio Electric Equipment Co.
170 Nassau St.
*Radio Wire & Television, Inc.
100 6th Ave.
*Sun Radio & Electronics Co., Inc.
122-124 Duane St.
Rene M. Jacobs Co., Inc.
40 East 32nd St.
*Terminal Radio Corp.
85 Cortland St.
Wilco Radio Supply Co.
383 East 138th St., **Bronx**

Niagara Falls
Niagara Radio & Parts Co.
1518 Main St.
Plattsburgh
A. H. Marshall Co., Inc.
84 Margaret St.
Ray Distributing Co.
73 Clinton St.
Poughkeepsie
Chief Electronics
104 Main St.
Mid-Hudson Electric Supply Corp.
408 Main St.

Rochester
Erskine-Healy, Inc.
420 St. Paul St.
Masline Radio & Electronic Equip. Co.
192 Clinton Ave., **North**
Rochester Radio Supply Co.
114-118 St. Paul St.
Saranac Lake
George L. Starks & Co., Inc.
8 Woodruff St.
Schenectady
M. Schwartz & Son
710-712 Broadway

Syracuse
Roberts & O'Brien
716 Park Ave.
Mr. Stewart W. Smith
325 East Water St.
Troy
H. A. McRae & Co., Inc.
137 River St.
Utica
Beacon Electronic Distributors
14 Catherine St.
Miller Electric Co., Inc.
11 Hopper St.
*Vaeth Electric Co.
35 Genesee St.

Watertown
Beacon Electronic Distributors
108 Lincoln Bldg.

527 N. Main St.

Portsmouth
Sound Electronic Suppliers
7th & Findlay Sts.
Toledo
Warren Radio Co.
1320 Madison Ave.
Youngstown
Ross Radio Co.
325 W. Federal St.
Zanesville
Thompson Radio Supplies
South Sixth St.
OKLAHOMA
Oklahoma City
Radio Supply, Inc.
724 North Hudson
Tulsa
Harrison Equipment Co.
P. O. Box 2366
Radio, Inc.
1000 S. Main St.

Eugene
Carlson, Hatton & Hay, Inc.
96 East Tenth Ave.
Klamath Falls
R. F. Supply
2319 South Sixth St.
Medford
Verl G. Walker Co.
205 West Jackson
Portland
Jack R. Moore Co.
1615 S. W. 14th Ave.
Northwest Radio Supply Co., Inc.
717 S. W. Ankeny St.
Stubbs Electric Co.
33 N. W. Park Ave.

Allentown
Radio Electric Service Co. of Pa., Inc.
1042 Hamilton St.
Altoona
Hollenback Radio Supply
2221 Eighth Ave.
Beaver Falls
Reliable Motor Parts Co.
1700 Seventh Ave.
Easton
Radio Electric Service Co. of Pa., Inc.
916 Northampton St.
Erie
J. V. Duncombe Co.
1011 W. Eighth St.
Arthur F. Schultz Co.
212 East 18th St.

Harrisburg
Excelsior Radio Co.
17th & Derry Sts.
Radio Distributing Co.
140 S. Second St.
Hazleton
Moyer Electronics Supply Co.
758-60 N. Locust St.
Johnstown
*Cambria Equipment Co.
12 Iron St.

22 South Richardson St.

Spartansburg
McElhenney Radio Supply House
204 St. John St.
SOUTH DAKOTA
Aberdeen
Danielson Brost Co.
202 South Lincoln
Sioux Falls
Warren Radio Supply
115 S. Indiana Ave.
Watertown
Burghardt Radio Supply
Dakota Warehouse
TENNESSEE
Interstate Hardware Co., Inc.
Chattanooga
Curle Radio Supply & Sound Service
825 Cherry St.
Specialty Distributing Co.
709 Chestnut St.

Knoxville
Chemcity Radio & Electric Co.
12 Emory Park
House-Hassen Hardware Co.
759-61 Western Ave.
Roden Electrical Supply Co.
806-808 N. Central Ave.
Memphis
Bluff City Distributing Co.
905 Union Ave.
Orgill Brothers & Co.
10-56 West Calhoun Ave.
Nashville
Electra Distributing Co.
1914 West End Ave.

Abilene
R. & R. Electronic Co.
1074 North First St.
Amarillo
R. & R. Electronic Co.
416-18 W. Tenth St.
West Texas Radio Supply
1026 West Sixth Ave.
Austin
The Hargis Co.
706 West Sixth St.
Beaumont
Montague Radio Distributing Co.
220 Willow St.
Corpus Christi
Electronic Equipment & Eng. Co.
1310 S. Staples St.
Wicks-DeVilbiss Co.
516 S. Staples St.

Dallas
All-State Distributing Co.
2407 Ross Avenue
Harrison Equipment Co.
6234 Peeler St.
Wilkinson Brothers
2406 Ross Avenue
El Paso
Midland Specialty Co.
427 W. San Antonio St.

19 Franklin Rd., S. W.

Staunton
Southern Electric Co.
14 E. Johnson St.
WASHINGTON
Bellingham
Watikus Supply Co.
110 Grand Ave.
Everett
Pringle Radio & Electric Co.
2514 Colby Ave.
Seattle
Radio Electric Supply Co.
2722 Second Ave.
Seattle Radio Supply Inc.
2117 Second Ave.
Herb E. Zobrist Co.
2125 Westlake Ave.
Spokane
Columbia Electric & Mfg. Co.
S. 123 Wall St.
Standard Sales Co.
West 1219 First Ave.

Tacoma
C. & G. Radio Supply Co.
714 St. Helens Ave.
Yakima
Lay & Nord
112-118 S. Second St.
WEST VIRGINIA
Charleston
Chemcity Radio & Electric Co.
1225 E. Washington St.
Clarksburg
Trenton Radio Co.
791 W. Pike St.
Huntington
King & Irwin, Inc.
314 Eleventh St.
Morgantown
Trenton Radio Co.
300 Grant Ave.

Parkersburg
Randle & Hornbrook
536 Seventh St.
Wheeling
Wheeling Radio Supply
924 Market St.
WISCONSIN
Appleton
Appleton Radio Supply
1217 North Richmond
Green Bay
G. M. Popkey Co.
716 Main St.
Madison
Satterfield Radio Supply
326 W. Gorham St.
Marinette
G. M. Popkey Co.
Main at Ninth St.
Milwaukee
Radio Parts Co., Inc.
538 West State St.

Cheyenne
Houge Radio & Supply Co.
2008 Carey Ave.

*Distributors of Selected Sylvania Products.

FUNDAMENTALS OF TELEVISION *(Continued)*

by the dotted line between two successive horizontal blanking pulses. The drawing is not to scale, as the horizontal blanking interval occupies but 16% of the time between successive horizontal blanking pedestals. The equalizing pulses which occur at twice the horizontal frequency are required to maintain proper interlace.

The remaining requirement needed to reproduce the picture in its proper proportions is that the picture have the correct ratio of width to height. This is called the aspect ratio and is $4/3$.

The Video Test Pattern

To enable one to quickly and accurately adjust the TV receiver so that it has the proper aspect ratio, greatest linearity of scan, and proper focus, and to provide means for judging the resolution and degree of contrast obtainable, stationary test patterns are transmitted by the TV stations. A representative test pattern is shown in Figure 4. The proper aspect ratio is achieved by making the top and bottom of the picture tangent to the smaller circle and the sides tangent to the larger circle. Linearity of scan may be judged by how closely the circle approaches a true circle, and by the small squares of horizontal and



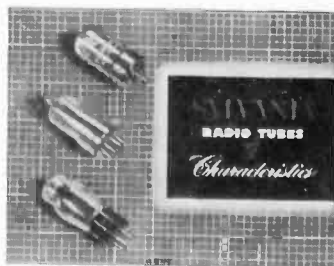
TYPICAL TELEVISION TEST PATTERN
FIGURE 4

vertical bars. Resolution may be determined from the ability to separate the lines in the four wedges of fine lines. Proper background and contrast are indicated by the ability to differentiate between the four degrees of illumination in the inner concentric circles. Focus is adjusted for the

sharpest detail of the "Flashing S" emblem in the center of the pattern, as well as best reproduction of the letters "Sylvania Television".

In the next article the requirements of the television receiver will be taken up, and the function of the various circuits will be discussed in greater detail.

REVISED SYLVANIA CHARACTERISTIC CHARTS



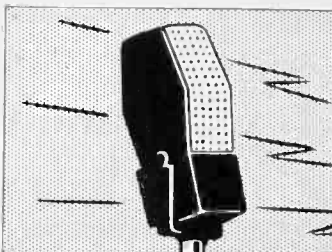
Most servicemen know that the Characteristics Chart is revised about twice a year so that it will be of maximum use to servicemen by including data on the newest types. The latest revision now available is

the first to use the basing nomenclature used in the Manual.

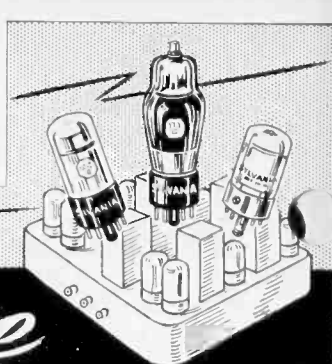
The advantage of this system is that we can give complete information on the basing without referring to a data sheet, and without having a different diagram for each minor variation of shield connections. For example, the basing given for Type 6SJ7GT as 8N-1-5 means that the active elements are connected as in diagram 8N, the external shielding on pin 1 and the internal shield on pin 5. The letter L after the base diagram number means that the only external shielding is the center

lug of the lock-in base.

A coming change is to be a nearly-complete revision of the diagrams themselves to bring them more into line with the latest industry standards. Dotted lines will be used for the grids and shielding will be indicated only by the changed nomenclature in the table. The overwhelming majority of servicemen who sent in their opinions on the use of the functional nomenclature (see September 1947 SYLVANIA NEWS) has convinced us that no drastic changes should be made in the present system.



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



THE Service Exchange

Intermittent Operation RCA Model K-80: I have had complaints that an RCA Model K-80 repeatedly became inoperative. Upon checking I found that withdrawing the 6SA7 converter tube and placing it back in the socket made the receiver operative for several hours. Further checking showed that the 6SA7 oscillator section was not oscillating at the time the receiver was inoperative. Replacing Capacitor C13, 4700 mmf. 400 volts, brought the receiver back to normal.

This trouble was extremely difficult to find because the slightest circuit disturbance, while the re-

ceiver was inoperative, would make the receiver operative and this would hide the intermittent condition in Capacitor C13.—Seymour Sinuk, New York, N. Y.

* * *

Battery Trouble On G. E. Model 250 Portable: I have had complaints on this set due to the battery becoming discharged and perhaps ruined if left in that condition. Customers should be warned that this can happen if the plug is pulled to turn the set off instead of turning the switch to the "off" position. When left in the charge position the relatively small leakage current through the 4 disc rectifiers

in parallel will soon discharge the battery.—Charles Sandberg, Brooklyn, N. Y.

* * *

Neat Storage For Resistors: A neat space saving method of keeping an assortment of carbon resistors handy to the service bench is to stretch a length of discarded coiled heater element between two hooks above the bench. Bend a small hook on the end of one lead of the resistor and hook it into the coil. The color code will show readily and if arranged in order of resistance the desired value may be selected quickly.—Radford Miller, Carmel, N. Y.

RECENT ADDITIONS TO THE TUBE CHECKER CHART

The additions listed below for use on Sylvania Type 139-140 Tube Checkers will interest everyone having one of these instruments. No chart is available listing these and even new instruments do not include them.

| TYPE | A | B | C | D | E | F | G | TEST |
|------------|-----|---|-----|---|---|-----|----|-------|
| 1A1/5E1... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1B1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1C1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1D1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1E1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1F1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1G1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1J1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1K1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1R1G..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1R5..... | 1.4 | 3 | — | 0 | 1 | 016 | 24 | V |
| | | | | | 0 | 8 | 65 | U |
| 1S1G..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1T1G..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1U4..... | 1.4 | 2 | 45 | 4 | 1 | 016 | 20 | V |
| 1W1..... | .75 | 0 | 3 | 5 | 0 | — | — | Fil.† |
| 1X1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1Y1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1Z1..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 2..... | 6.3 | 0 | — | 0 | 0 | — | — | Fil.† |
| 2E24..... | 6.3 | 0 | 356 | 0 | 8 | 024 | 24 | Y |
| 3..... | 117 | 0 | — | 0 | 0 | — | — | Fil.† |
| 3A5..... | 2.5 | 2 | 4 | 4 | 1 | 1 | 58 | U |
| | | 2 | 4 | 4 | 5 | 5 | 58 | U |
| 4..... | 117 | 0 | — | 0 | 0 | — | — | Fil.† |
| 4A1..... | 3.3 | 0 | — | 0 | 0 | — | — | Fil.† |
| 4A6G..... | 2.0 | 6 | — | 0 | 1 | 3 | 19 | V |
| | | | | | 5 | 4 | 19 | V |
| 5..... | 117 | 0 | — | 0 | 0 | — | — | Fil.† |
| 6..... | .75 | 0 | — | 0 | 0 | — | — | Fil.† |
| 6AH6..... | 6.3 | 0 | — | 0 | 4 | 36 | 39 | W |
| 6AQ7..... | 6.3 | 0 | — | 1 | 3 | 3 | 70 | W |
| | | | | | 1 | — | 55 | T |
| | | | | | 4 | — | 55 | T |

| TYPE | A | B | C | D | E | F | G | TEST |
|-------------|------|---|----|---|---|-----|----|-------|
| 6AV6..... | 6.3 | 0 | — | 0 | 3 | 3 | 55 | T |
| | | | | | 5 | — | 60 | T |
| | | | | | 4 | — | 60 | T |
| 6BE6..... | 6.3 | 0 | — | 0 | 4 | 46 | 85 | W |
| | | | | | 5 | 3 | 35 | U |
| 6BH6..... | 6.3 | 0 | — | 0 | 4 | 36 | 50 | U |
| 6BJ6..... | 6.3 | 0 | — | 0 | 4 | 36 | 29 | W |
| 6F5G..... | 6.3 | 0 | — | 0 | 2 | 9 | 55 | T |
| 6SV7..... | 6.3 | 0 | — | 1 | 5 | 380 | 73 | U |
| | | | | | 3 | — | 54 | T |
| 7..... | 117 | 0 | — | 0 | 0 | — | — | Fil.† |
| 7AD7..... | 6.3 | 0 | — | 0 | 1 | 036 | 45 | Y |
| 7F8..... | 6.3 | 1 | 7 | 1 | 2 | 8 | 43 | U |
| | | | | | 5 | 1 | 43 | U |
| 7G7..... | 6.3 | 0 | — | 0 | 1 | 03 | 60 | W |
| 8..... | 117 | 0 | — | 0 | 0 | — | — | Fil.† |
| 9..... | 50 | 0 | — | 0 | 0 | — | — | Fil.† |
| 12AT7..... | 12.6 | 0 | 5 | 0 | 3 | 7 | 40 | U |
| | | | | | 1 | 3 | 40 | U |
| 12AX7..... | 6.3 | 4 | — | 0 | 3 | 7 | 67 | W |
| | | | | | 1 | 3 | 67 | W |
| 12BE6..... | 12.6 | 0 | — | 0 | 4 | 46 | 85 | W |
| | | | | | 5 | 3 | 35 | U |
| 12S8GT..... | 12.6 | 0 | 78 | 1 | 5 | 9 | 50 | T |
| | | | | | 4 | — | 55 | T |
| | | | | | 2 | — | 55 | T |
| | | | | | 1 | — | 55 | T |
| 14Q7..... | 12.6 | 0 | — | 0 | 1 | 036 | 96 | W |
| | | | | | 2 | 4 | 40 | U |
| 46A1..... | 35 | 0 | — | 0 | 0 | — | — | Fil.† |
| 46B1..... | 35 | 0 | — | 0 | 0 | — | — | Fil.† |
| 1280..... | 12.6 | 0 | — | 0 | 1 | 036 | 61 | T |

†NOTE:—This ballast test shows hot continuity only.



Making Shop Windows Pay Dividends

Making use of display material always poses an interesting problem to the busy service dealer. Two alternatives usually exist when it comes to dressing a window. Either the material is thrown together in a hodge-podge without continuity, or the service dealer takes time to make an attractive display which will effectively render his message and make an eye-catcher for the man on the street. The latter is the best way to make your show windows help pay their keep.

Hambrick and Crecente of Moultrie, Ga. are among the group of servicemen who design their windows to sell service. The picture of their window, shown here, tells a good story which goes a long way toward building their service business.

Focal point of the display is a photographic blow-up, 14" x 20", of their service bench. Each instrument on the bench is identified with a number and the copy below tells the function of each instrument in servicing radio receivers.

Background for the window is furnished by display material from Sylvania's national advertising kit. These point out symptoms of ailing radios and give the sales message of the institution. Also in the window are radio sets, tubes, batteries and a Motorola two-way taxi radio which displays the use of Sylvania tubes.

This window display has provoked much comment from the public in Moultrie. The public, in many cases, has seen for the first time the

type of equipment needed to service radios. The message of the window broadly tells the story of the complexity of radio repair and helps to explain why the service dealer must get a fair price for his work.

Window displays like that of Hambrick and Crecente are good business. They utilize available material to its best advantage and get a message across to the public. Most of all, these windows sell your radio service.

DO YOUR WINDOWS SELL YOUR SERVICE?

There are many ways to decorate your shop windows. What have you done which is outstanding in your window dress? We would like to have more stories from service dealers like Hambrick and Crecente. If you have had a good window recently, why not let us hear about it. If you have a picture, perhaps we can use it in SYLVANIA NEWS where it will help other dealers. Send along any material you have to The Editor, SYLVANIA NEWS, 500 Fifth Avenue, New York 18, N. Y.

How To Repair Marred Radio Cabinets

(Continued from page M-29)

of a brush. French polishing is another method. This is considered the most beautiful of finishes. It is a time consuming operation, but the results are well worth the effort.

The complete refinishing processes are advisable only in cases where the customer is interested in preserving a fine radio cabinet. In such cases, it is best if you advise the customer to obtain the services of a professional cabinet refinisher, since most servicemen are not equipped to do a fine job of refinishing.

Repairing Plastic Cabinets

Repairing wood cabinets is the most profitable kind of cabinet repair, however, plastic and portable cabinets can be repaired economically if you learn the few simple techniques involved, but many times a new cabinet will be more satisfactory.

Badly damaged plastic cabinets are almost impossible to repair. If broken pieces are missing, sell the customer a new cabinet. It is more profitable for you and will be more satisfactory to the customer.

Small cracks in plastic cabinets can be repaired with plastic cement.



Use plastic cement in making repairs on moulded plastic cabinets.

This is a special type of cement designed to adhere to the plastic surface. Regular wood glue will not stick to a plastic surface. Apply a liberal coat of the cement to both sides of the crack. When it has dried, apply a heavier coat to one side of the crack and press the sides shut immediately. It is best to allow the glue to dry over night.

Small nicks, chips and scratches can often be filled with shellac

stick in the manner described in our previous article. (Make certain you do not touch the plastic with the hot spatula.) Excess shellac can



Complete cabinet repair kit containing all essential materials for doing a satisfactory cabinet repair.

be removed with a razor blade and the cabinet polished to blend with the rest of the surface.

Portable Cabinets

Portable sets on which the cloth or leatherette cover has been frayed or torn can easily be replaced, or the entire cabinet refinished. The necessary covering can usually be purchased at local upholstery shops. Small areas can be patched, with care exercised to match the fabric.

In some cases it is advisable to recover the entire cabinet. When you do this remove all the old covering and sand the glue that remains on the cabinet. Cut the new material into the proper sizes for the job, using as few pieces as possible, so that there will be a minimum of seams. Seams at corners and edges should be avoided since it is difficult to make the covering stick well at such places. Allow at least one inch to overlap at all the seams.

Lay the new material over the cabinet to make sure it will fit properly and that the patterns match. If the covering is then satisfactory, apply glue to the cabinet and put the new covering in place. When you overlap two pieces, it is best to apply glue to each side of the fabric. Press the pieces down firmly and smooth it out to finish the job.

Giving Customers Advice

When you return a set to a customer's home, inspect the place where the set is to be used. If it seems to be too near radiators or other heating equipment, tell your

customer that excessive heat will dry out the glue and cause splits and allow joints to separate. Placing a set near an open window or other spots where dampness is present will also affect the radio cabinet. Tell your customer the facts about such practices. He will appreciate your suggestions.

MEN WANTED

The U. S. Army Signal School at Fort Monmouth, N. J. has a number of jobs available for radio technicians who have experience in the following subjects: teletype installation, central office maintenance, power equipment, elements of radio, applied communication, radio subjects, wire subjects, electrical fundamentals and signal center.

Applicants for the above positions must have four years of progressive technical experience in the appropriate subject which must have included at least one year, full time, as an instructor. Applications should be sent to the Civilian Personnel Office, Fort Monmouth, N. J.

FCC Discusses Television Reception Problems

The following press release quoted in part has been issued by the FCC in answer to many inquiries concerning television reception. Service dealers in television areas should use these facts when talking with customers about video reception difficulties.

"The Federal Communications Commission is receiving many complaints and inquiries both at its Washington and its field offices relative to television reception limits, sources of interference, and methods of improving reception. Because of the public interest in this subject, the following is furnished for general information.

Allocation Plan

"The Commission assigns television stations to cities and metro-

politan areas under a nation-wide plan, which is designed to provide an equitable distribution of television service throughout the country.

"The Commission's allocation plan is designed so that a television station located in a certain city will furnish a strong enough signal to permit television receivers in or near the city to receive satisfactory service . . . they are assigned sufficient power so that their signal will be strong enough to overcome unwanted 'noise' caused by electrical disturbances in the area.

Reception Limits

"Many of the complaints received by the Commission arise from attempts to receive television stations far beyond their normal

range. At the present time, the maximum range of television reception varies from 20 to 40 miles, depending on the type of station involved and the amount of power it is presently using.

Other Reception Problems

"If you live within the normal (20 to 40 mile maximum) service range of a television station, it should be possible for you to receive satisfactory interference-free television pictures. However, even within this range, good service can be expected only with a properly functioning television receiver, an adequate receiving antenna, and a satisfactory transmission line connecting your antenna and receiver. The reason for this is that television requires a relatively stronger signal for good reception than does AM or FM radio, and your receiver, transmission line and receiving antenna are important factors in making sure that a strong signal is picked up out of the air, and that 'unwanted' signals are rejected by the receiver.

Interference Problems

"Television receivers may be subject to interference (1) from television stations other than the 'desired' stations; (2) from other radio stations; (3) from electrical disturbances caused by medical diathermy machines, industrial heating appliances, etc.; (4) from other television receivers in the vicinity; and (5) ignition systems of motor vehicles. The last is a particularly common source of interference.

"Properly qualified technicians ordinarily can reduce or eliminate objectionable interference."

(Continued on page G-32)

Pros And Cons of Radio Service

Radio technicians were the subject of discussion in an article in the July issue of *Everybody's Digest*. The recent surveys by various groups were reviewed in the article which attempted to find out if radio repairmen were dipping their hands into the public's pocket every time a set was overhauled.

In a description of what was being done by various groups to make the industry a more healthy one, the Town Meeting in Philadelphia was cited as being a step forward in better business as was the New York Associated Servicemen.

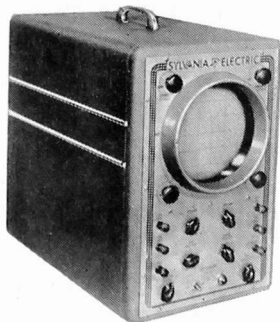
For what it called the customer's own protection, the article listed eight points one should follow when having his radio repaired. Included in these points was a suggestion

which warned people to buy sets which are more efficient—to beware of sets of inferior construction. Know your serviceman and ask for an estimate before work is done, the article said.

Other points outlined included a request for return of old parts, a written guarantee, and an itemized bill. One of the points pointed out that customers should not balk at a service charge or a labor charge. It pointed out that the technician was a skilled worker and his time was valuable.

"Follow these hints and you will get good service at a fair price. You'll stay clear of the incompetent bungler and the slick gyp." the article concluded.

SEVEN INCH SCOPE GOES "HOLLYWOOD"



Latest word from Hollywood is that the Sylvania Oscilloscope Type 132 (the big seven inch 'scope) is now in the movies. Twentieth Century Fox Studios have released a new documentary movie entitled "The Street With No Name." This is a film about the activities of the FBI. In three of the scenes in the movie the Sylvania 'scope is shown in laboratories of the FBI. Watch for this new movie at your local theater and look for the

Sylvania 'scope in the laboratory scenes showing the FBI in action.

"The Street With No Name" is a dramatic and exciting story of what happens when law and order break down in a community and the FBI steps into the picture. This story about the FBI's counterattack against a new era of crime in the making is based on actual case histories from FBI files.

Replacement For The Vacuum Tube?

In recent announcements by Bell Laboratories it has been noted that a new device employing germanium has been used successfully in certain functions of a vacuum tube. The device is said to amplify over 100 times.

The new germanium triode, referred to as a transistor, will, in the opinion of Sylvania engineers, open new fields of applications for electronic devices which will increase the use for both tubes and crystals.

Sylvania has done much of the pioneering in the development and manufacture of germanium diodes. Much has also been done by our engineers in solving the technical problems associated with the manufacture and development of these semi-conductors. Eventually germanium triodes may take over some of the functions of vacuum tubes as have the germanium diodes, but as yet there are many problems of development to be solved, according to Sylvania's engineering department.

Limitations, both electronic and economic, will have to be worked

out before full advantage can be taken of this new application for germanium crystals. Considerable experimental production work is under way at Sylvania to find techniques leading to production efficiency.

In a statement by E. F. Carter, vice-president in charge of engineering for Sylvania, it was pointed out that the principal uses for crystals in the past has been for rectifiers. " . . . the possibilities of using this semi-conductor, germanium, for oscillators, modulators and even amplifiers has been anticipated for a number of years.

"Nevertheless, for the immediate future we see only certain special applications that may be filled by the newly announced transistors. In anticipation of greater uses later on we are devoting much effort to the mechanization of our germanium crystal production. . . for gaining a knowledge of production techniques that can be well applied to other semi-conductor products as they are developed."

Facts & Figures

Half Year Set Output

The first six months of 1948 resulted in production of 278,896 television receivers, 100,000 more than the entire year of 1947. June rate of production was 64,353 receivers manufactured by RMA member-companies.

FM sets for the first half of 1948 totaled 695,313. AM sets accounted for 6,771,210 receivers of which 1,182,262 were auto sets and 1,207,754 were portables. Total production for all types of sets was 7,745,419 for the six months ending June 30.

Television Reception Problems

(Continued from G-31)

"If the interference is caused by a station or device operating on the same frequency as your receiver, the interference cannot be easily avoided. However the use of a directional receiving antenna may be of some benefit.

"Interference from other television receivers in the vicinity of your receiver also may distort the picture or sound you receive. This usually occurs in apartment houses where two or more receivers are in close proximity.

"Certain kinds of interference cannot be eliminated. In particular, if you live outside the maximum service range of two television stations operating on the same frequency at a point where signals of equal strength are received from both stations, your receiver will receive either a distorted picture or garbled sound or both. This type of interference cannot be eliminated, since it is due to the fact that you are outside the service area of the stations involved."

SYLVANIA NEWS

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VOL. 15, NO. 8

SEPTEMBER, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

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FUNDAMENTALS OF TELEVISION
NEW TUBE CHECKER SETTING

SYLVANIA NEWS

TECHNICAL SECTION

OCTOBER, 1948

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Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 9

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

TELEVISION R. F. AMPLIFIERS

By Wm. P. Mueller *

This is the third of a series of articles on Television by Sylvania Engineers.

In last month's article, Television Fundamentals, the essentials of the television system in general were described to provide a background for a proper understanding of the operation of a television receiver. In this article we will begin tracing the signal through the receiver, starting with the antenna and going through the RF stage. Subsequent articles will trace the signal through the remainder of the receiver, treating each essential circuit function in detail.

The Antenna and Transmission Line

The block diagram of a typical television receiver is shown in Figure 1. It is similar to a conventional superheterodyne broadcast receiver, except for the addition of several more circuit functions required to obtain the picture. Let us confine our attention for the present to the antenna, transmission line and RF amplifier.

The types of antennae used for television are similar to the dipoles described for FM reception in the March issue of SYLVANIA NEWS, but they are required to operate over a much wider range of frequencies. For instance, if we consider only the lower band channels, Nos. 2 to 6, the frequency range, or spread, is nearly two to one. (Before channel No. 1 was dropped it was exactly two to one.) A simple dipole antenna which is a half wave length long and is fed at its center has an impedance of about 72 ohms. At

twice the frequency for which it was designed, the antenna is a full wave length long and the impedance at the center is about 2000 ohms. In order to obtain reasonable power transfer from such an antenna over such a wide frequency range, the characteristic impedance of the transmission line which connects the antenna to the receiver should be approximately the geometric mean of 72 and 2000 ohms, or about 380 ohms.

This figure has been rounded off to 300 ohms since the impedance of a folded dipole antenna is 300 ohms and this value has been standardized by the RMA as the balanced to ground input impedance of a television receiver. Some receivers, however, have been designed for 75 ohms balanced to ground input impedance, and require a 75 ohm

transmission line for proper operation.

There is a wide variety of commercial television antennae now available. These include simple dipoles, folded dipoles, dipoles with reflector, and stacked arrays consisting of two or more dipoles with reflectors. The stacked dipoles are recommended by their manufacturers for operation over channels 2 to 6, for the higher band channels 7-13 or for operation over all the channels 2-13. The more complicated antennae, besides having more gain, are much more directional. Directivity is desirable for eliminating reception over several different paths due to reflection from high buildings or hills, etc. Reception over different paths is undesirable in that it may result in several images or "ghosts" appearing upon

(Continued on page T-34)

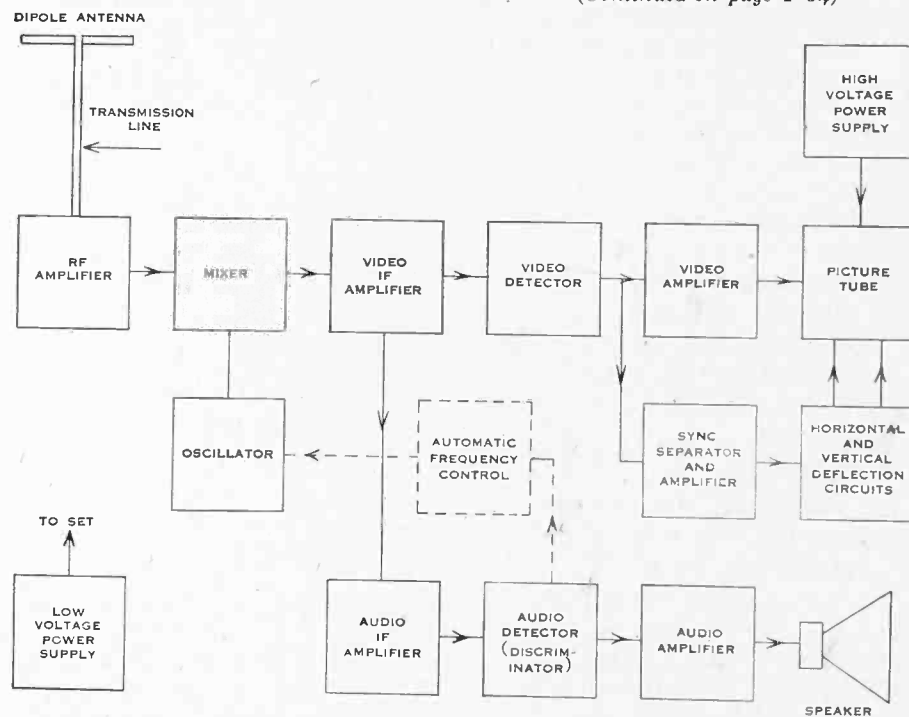


FIGURE 1

BLOCK DIAGRAM OF A TYPICAL TELEVISION RECEIVER

*W. P. Mueller received the degree of B.S.E.E. in 1932 from the Ohio State University. He joined Sylvania in 1933, starting in the Engineering Test Department at Emporium. In 1934 he worked in the Transmitting Tube Department at Clifton, New Jersey, and returned to Emporium the following year where he specialized in tube application problems at VHF as a member of the Tube Application Department. Mr. Mueller served as Supervisor of Engineering at the Industrial Apparatus Plant of Sylvania at Williamsport, Pennsylvania from 1944 to 1946. Since then he has devoted his time to tube application problems in the FM and TV services as a member of the Commercial Engineering Department at Emporium.

TELEVISION R. F. AMPLIFIERS (Continued)

FIGURE 2
TV RF AMPLIFIER USING A PENTODE
AND DOUBLE TUNED INPUT CIRCUIT

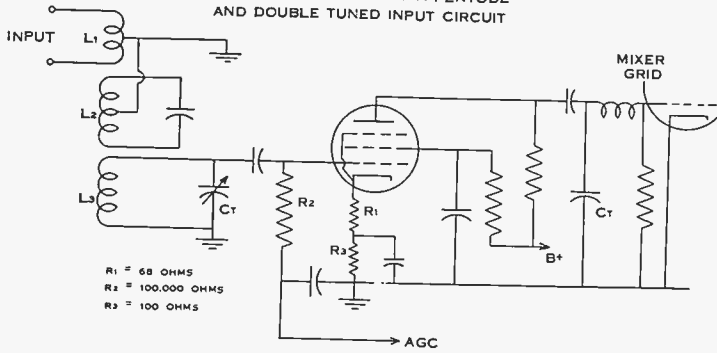
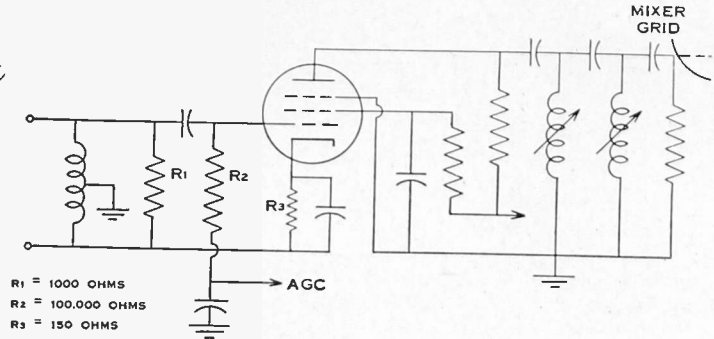


FIGURE 3
TV RF AMPLIFIER USING A PENTODE
AND UNTUNED INPUT



the picture tube. These images are separated a small distance horizontally from each other, due to the finite difference in the time of arrival of the signals over the different paths. If the transmission line is not properly terminated in its characteristic impedance, or if the impedance of the line is altered appreciably by allowing the transmission line to lie against metal objects, reflections may be set up on the transmission line itself, causing ghosts to appear. Since horizontal polarization is used in television transmission, the receiving antenna should be horizontal with respect to ground.

The RF Amplifier Stage

The RF amplifier provides amplification at signal frequencies. Since it must pass both picture and sound carriers in addition to the picture modulation sideband, it must amplify as uniformly as possible over a 4.5 to 6 mc band of frequencies. The purpose of the RF stage is:

1. Provide more gain.
2. Reduce interference from services at frequencies far from the signal frequency.
3. Reduce oscillator radiation.
4. Provide a better signal to noise ratio.
5. Terminate the transmission line in its characteristic impedance.

Let us consider these in order. More gain is obviously desirable to receive a weaker signal, or to eliminate the need of an elaborate outdoor antenna. Gain is probably easier to obtain in the IF amplifier, however, than at signal frequencies. To reduce interference at frequencies

far removed from the signal frequency requires several tuned circuits tuned to signal frequency. Such interference may occur at image frequencies, IF frequency, or even at frequencies which are plus or minus the IF frequency away from harmonics of the oscillator frequency. A convenient way of coupling several tuned circuits at signal frequency together is by means of an RF amplifier stage. The level of power radiated by the local oscillator may cause intolerable interference to nearby TV receivers. The improvement obtained by using an RF amplifier stage to isolate the oscillator from the antenna is considerable, but the amount of oscillator signal radiated is still objectionable in many cases. The ultimate limit upon the sensitivity of a TV receiver is determined by the noise generated in the first tube.

A slightly better signal to noise ratio can be obtained by using a tube as an amplifier rather than as a mixer. To eliminate the possibility of reflections on the transmission

line the input to the RF stage should present a resistive load equal to the standard input resistance of 300 ohms.

High mutual conductance, low input and output capacity tube types are required for the RF stage because of the wide bandwidth required. A small physical structure is also required, so that the circuit can be tuned to as high as 216 mc. The gain of the stage is related to these factors by the equation

$$\text{Gain} = \frac{G_m}{2\pi BWC}$$

where

G_m = mutual conductance
 BW = bandwidth

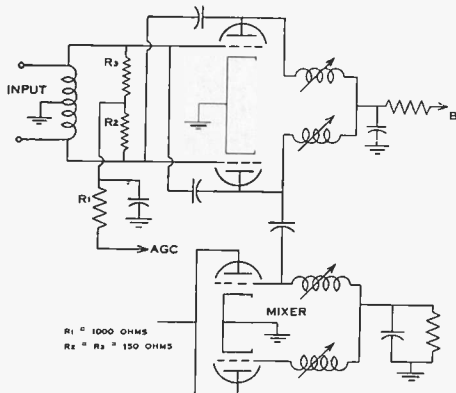
C = total capacity output to ground.

The need for keeping C small has led to the use of variable inductance tuning mechanisms, or separate coils switched into the circuit for each channel. The various physical means of tuning the RF amplifier are common to the mixer and oscillator as well, and will be covered in a future article which deals with the mixer and oscillator.

The five features desirable in an RF stage are not easily obtained in any one design. Some typical RF amplifier stages used in commercial TV receivers are shown in Figures 2, 3 and 4. The circuit of Figure 2 features two tuned circuits in the input to the RF amplifier or three tuned circuits in all at signal frequencies. The purpose of the unbypassed resistor in the cathode circuit is to eliminate changes in the input capacity and resistance of the tube when the grid bias is varied by the automatic gain control.

(Continued on page T-36)

FIGURE 4
TV RF AMPLIFIER USING A DOUBLE TRIODE
AND UNTUNED INPUT



USING YOUR SCOPE FOR D-C MEASUREMENTS

DC voltage or current measurements can be made on your Sylvania scope by applying the DC input voltage directly to the vertical deflection plates. The use of an external voltage divider in conjunction with the scope permits measurement of large DC voltages.

Type 131

In making DC voltage or current measurements (when making current measurements be sure a resistor is shunted across the vertical input) with a Sylvania Type 131 scope, it is necessary to change the position of one condenser in the vertical amplifier, so that the condenser C-103 is connected in the plate lead of the Type 7C7 tube ahead of switch S-103, as shown in

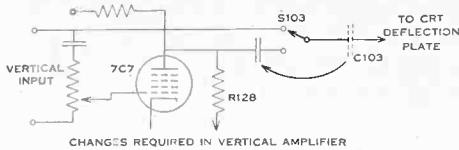
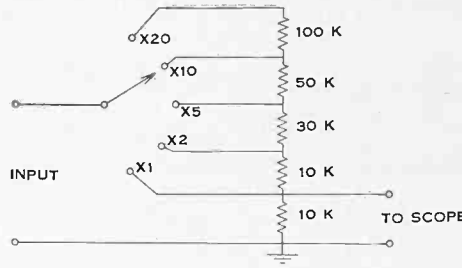


FIGURE 1

Figure 1. The vertical gain control must be turned to the maximum counter-clockwise position to obtain direct cathode ray tube plate connection. With the gain control in this position, the DC voltage can be applied, (through a voltage divider when required) directly to the vertical input terminals on the front panel.

Type 132

The Sylvania Type 132 scope has no blocking condenser in the cathode ray tube deflection plate circuit,



VOLTAGE DIVIDER
FIGURE 2

therefore requires no circuit change. Direct connections to the deflection plates are made merely by throwing the deflection plate switch located on the rear panel of the cabinet to **DIRECT**, and by making connections to the terminal jacks on the rear panel.

In making direct connections, the polarity of the vertical deflection should be such that a positive signal on the ungrounded vertical plate causes the beam to move upwards. In the Type 132 scope, D3 should be the ground terminal and D4 the positive input terminal connections to the voltage divider, for correct polarity of picture.

The suggested divider shown in Figure 2 may be constructed on an external mount or in a separate cabinet, and used in conjunction with your scope for DC measurements. The additional parts needed for the divider are: 1 single pole 5 position switch, 5 resistors (2%), and a mounting bracket.

The maximum DC voltage input which may be applied to the vertical terminals depends on the diameter

of the CR tube and the sensitivity. For the Types 131 and 132 it will require approximately 47 and 42 volts respectively to produce a one-inch deflection. By using the divider shown, higher DC voltages may be observed on the oscilloscope. Care should be taken, however, that the maximum rated voltage to the input terminal is not exceeded.

After connecting the voltage divider to the scope, a zero reading should be taken before applying the DC voltage to be observed, as this modification changes the impedance between deflection plates and ground and is likely to shift the vertical centering.

In order to obtain sweep sync. on Direct Connection, it is merely necessary to set the Sync. Selector to External Sync. and also connect the voltage under observation to the sync. input terminal.

Calibration

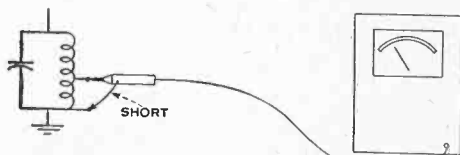
The sensitivity figures given above would be suitable mainly for rough estimates since individual differences in the circuit voltages and the tube itself make considerable variation possible. An accurate calibration is readily obtained by applying known DC voltages. The multiplier shown in Figure 2 will multiply that calibration by factors of 1, 2, 5, 10, and 20.

The sudden shift and gradual return of the zero axis when using the amplifier on a wave with a DC component is well known but this effect is not present when direct connection to the elements is used.

PRECAUTIONS ON USING POLYMER PROBE AT RADIO FREQUENCIES

The probe was included in the Polymer to permit the very short leads required in high frequency measurement work. Unless full advantage is taken of this feature, and the shortest possible leads used, your Sylvania Polymer will not give you all the advantages it has over older style meters without high-impedance RF probes.

Erratic or inaccurate readings and possibly even burn-out of the Type 1247 rectifier tube in the probe



CORRECT USE OF SYLVANIA POLYMER PROBE

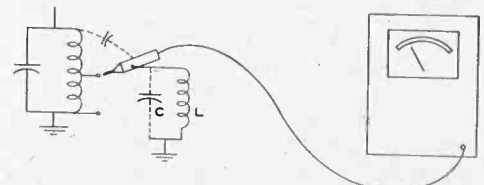
FIGURE 1

may be caused by improper use of the probe, especially at frequencies above about 2 megacycles. An early symptom of this condition is shown by a "body-capacity effect" in which the meter reading changes greatly when a hand is brought near the probe.

Figure 1 shows the correct method of connecting the Sylvania Polymer across an RF source, and Figure 2 shows what this circuit becomes if the RF ground lead is too long or inadequate. The additional length of this ground lead allows either stray pick-up from sources other than that being measured, or in extreme cases may allow a voltage build-up due to resonance. We have had the Type 1247 burn out in such cases when the applied voltage is

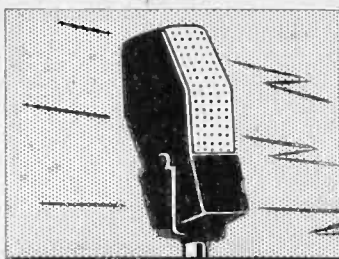
only 25 volts.

In all such RF measurements one side of the circuit across which voltage is being measured must be at RF ground and we suggest a maximum lead length of four inches from the case of the probe direct to the grounded side of the source voltage. For greatest accuracy our engineers recommend clamping the probe case to the chassis as close as possible to the point of measurement.

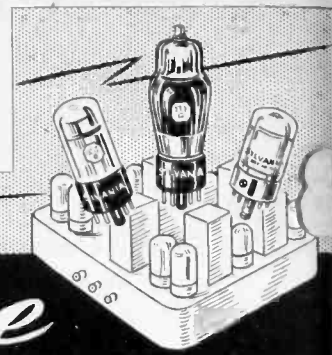


INCORRECT USE OF SYLVANIA POLYMER PROBE

FIGURE 2



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



THE

Service Exchange

Aid In Soldering: You will find this to be a big help when soldering to terminals having a large number of wires. Insert the end of a small rat-tail file or a nail into the hole in the lug while heating the joint, so as to make room for the new lead. The solder should not stick to the nail, or steel with ordinary fluxes. This will overcome the usual trouble of having two leads slip out while you get a new one in.—Leo W. Brandt, Houghton Lake, Mich.

* * *

To Prevent Burned-Out Antenna Coils: Some sets are used in locations where the antenna coil gets burned out frequently. To prevent this connect a small neon lamp from the antenna terminal to a good ground. This will have no effect on the signal but will shunt any lightning surges to ground.—L. W. Brandt, Houghton Lake, Mich.

* * *

Cure For Dial Cord Slipping: I suppose that every serviceman besides myself has had no end of trouble with slipping dial cords. I have had one set in the shop a number of times for this complaint and replacing the dial cords and tightening the springs is only a temporary repair. Using dial dressings on the cord is no better and in fact sometimes it cannot be used at all because it causes the cords to bind and to climb across each other or out of the grooves. I finally got onto a remedy that really works. It is as follows: Take a small rat tail file about $\frac{1}{8}$ inch in diameter and by drawing it with short strokes sideway with considerable pressure against the grooved shaft, cut slots at right angles to the direction which the cord wraps around the shaft. Cut these slots all the way around the shaft and then replace the cord in the groove. It will work like new and in many cases even better than new. I should mention that when cutting these slots that the file should be held at right angles to the tuning shaft, otherwise the slots won't be cut at proper angle.—Donald Slattery, Chadron, Nebr.

More Service Hints Needed

A large number of service hints received unfortunately have to be rejected as unsuitable. To help you get a better percentage of your hints printed we are listing a few of the common faults to be avoided.

We assume that any serviceman's first check on a non-operating set is to see that the proper voltages are applied to the filament, plate and screen of each tube. This automatically locates defective dropping resistors, screen bypasses, etc. Therefore, no "hint" which describes more difficult ways of locating such troubles is likely to be accepted.

Another type of hint we can't use are those that we consider as "haywire jobs." During the war a few of these probably were necessary to "keep them playing" but under present conditions we do not believe that the best servicemen will use any makeshifts. The use of 15c worth of tetrachloride and half an hour's time to clean a noisy 73c volume control is quite similar.

We also like to be sure that the symptoms you describe may be caused by the defect you find. You may not always have the right theory on how it happens, but if it sounds possible and helpful to other servicemen we will print it. In a few cases defects have been described so clearly that although the wrong explanation was given we were able to correct it and explain why the proposed cure was right.

Another cause of rejection is listed on the acknowledgment card as "not technically sound." This includes use of tubes or other parts at higher than rated conditions, use of resistor values which in overcoming one trouble would introduce distortion, destroy AVC action, etc.

Probably the most common cause for rejection is called "routine or generally known information." These are such common troubles that any serviceman who has been in business a year is almost sure to have encountered them.

To put it briefly, (1) describe the defective operation clearly; (2) be

sure that routine checks will not locate the trouble; (3) have some idea why the cure suggested remedies the defective operation described.

Let's have some hints on Television.

* * *

Philco 1256 Combination: Complaint: set requires frequent re-tuning as it warms up. Obviously a capacity change was taking place somewhere in the conversion circuit—but where? Tubes checked fine. All condensers were well within tolerance. Voltages were okay. Finally the oscillator trimmer was torn off the main tuning gang condenser, and was replaced with a new ceramic trimmer solidly mounted. After the oscillator was returned the set worked fine.

Apparently an invisible film of wax had formed on the mica of the original trimmer. This wax melted with the heat of normal receiver operation changing oscillator capacity.

This Service Hint may well be used with any model giving the same symptoms indicating changing tuning component capacity.—David Gnessin, Columbus, Ohio.

TELEVISION R. F. AMPLIFIERS

(Continued from page T-34)

Another pentode stage is shown in Figure 3, which makes use of an untuned input circuit. Balanced input is obtained by feeding into both the grid and cathode of the tube and a good termination of the input transmission line is obtained.

Triodes inherently produce less noise than multigrad tubes, which make them desirable for the input stage. A double triode RF amplifier is shown in Figure 4. Excellent match to the transmission line is obtained by terminating the line with a 300 ohm resistor, but the input circuit is untuned. The triodes are neutralized to prevent excessive oscillator radiation.

Next month's article will discuss the mixer and oscillator of the TV receiver.

SYLVANIA NEWS

TECHNICAL SECTION

NOVEMBER, 1948

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EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 10

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TELEVISION MIXER; OSCILLATOR and AFC

By Franklin L. Burroughs*

This is the fourth of a series of articles on Television by Sylvania Engineers.

Last month's article "Television RF Amplifiers" described antennas and RF amplifier circuits suitable for television receivers. In this article we will discuss the mixer (or frequency-converter), and oscillator circuits.

Since there are no combined oscillator-mixer tubes of the pentagrid or triode-hexode types which will perform adequately in the high television band—174 to 216 Mc. - all modern television receivers capable of tuning the channels from 54 to 216 Mc employ separate oscillator and mixer tubes or duo triodes such as the Sylvania 7F8. In this article these two sections of the receiver will be considered separately.

Mixer

The function of the mixer in a superheterodyne television receiver is to change the frequency of both the video and sound carriers simultaneously. The input signals, applied to the control grid of the mixer, are the video and sound carriers coming from the preceding RF amplifier stage, and a signal from the local oscillator. The frequency difference between the local oscillator signal and the video carrier signal is the intermediate frequency for the video channel, and the frequency difference between the local oscillator and sound carrier signals is the sound channel intermediate frequency. At the present time the recommended frequency for the sound IF channel

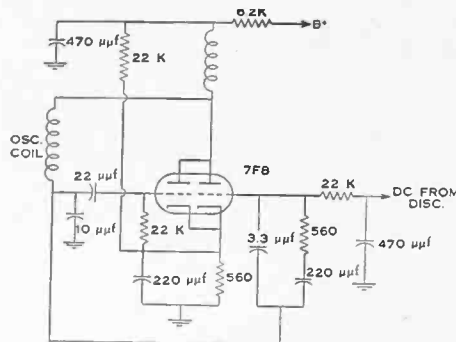


FIG. 1
OSCILLATOR EMPLOYING AUTOMATIC
FREQUENCY CONTROL

lies in the range from 21.25 Mc. to 21.9 Mc. With a few exceptions, which will be described later, in present day television receivers the local oscillator is operated higher in frequency than the video and sound carriers. Then, since the video carrier frequency is 4.5 Mc. below the sound carrier, the video IF channel is 4.5 Mc. higher in frequency than the sound IF channel. For example, on channel 2 the video and sound carrier frequencies are 55.25 Mc. and 59.75 Mc. respectively. With the local oscillator generating a signal at 81 Mc., the sound IF channel is 21.25 Mc., and the video IF channel is 25.75 Mc.

In order to obtain a reasonable conversion gain over the wide band of frequencies accommodated by the mixer stage it is necessary to use a tube which has high gm, sharp cut-off, and low input and output capacitances. Also, since the circuits in the mixer grid must tune to frequencies as high as 216 Mc., a tube having a small physical structure is required. The mixer input circuits are tuned to frequencies so far removed from those amplified in the plate circuit (the sound IF and video IF) that a

considerable amount of grid-plate capacitance can be tolerated without regenerative effects. Triodes are often used as mixer tubes, although there are many receivers which use in the mixer stage a high gm pentode of the same type as the tubes employed in the RF and video IF stages.

Oscillator

The local oscillator in a television receiver must supply to the mixer grid a signal strong enough to enable the mixer to operate as an efficient frequency-converter. The highest frequency of the signal generated is usually nearly 250 Mc. so the oscillator tube must have high gm and a small physical structure which keeps the internal capacitances and lead inductances to a minimum. Single or double triodes are used as local oscillators in practically all television receivers at this time.

It is important that the oscillator signal generated be free from instability due to temperature or voltage supply variations so that the sound IF is centered accurately in the pass band of the sound IF channel, and the signal carriers are properly rejected by the various wave traps in the video IF circuits. The bandwidth of the sound channel in most receivers is about 300 Kc. wide. The oscillator drift allowable in this case without re-tuning is less than .3 Mc. in 237 Mc. at the highest oscillator frequency, or less than .15 percent. To keep the oscillator frequency from drifting considerably it is necessary to construct the oscillator section of the receiver with excellent physical stability, and also to use circuits which give a minimum frequency change with temperature and voltage supply variations.

(Continued on next page)

*Franklin L. Burroughs received the degree of B. S. in Electrical Engineering in 1932 from Syracuse University. He joined Sylvania in 1937, starting in the Engineering Test Department at Emporium. In 1939 he worked in the Television Laboratory at St. Marys, Pennsylvania, and returned to Emporium the following year, where he worked in the Tube Application Department from 1942 to 1946. Mr. Burroughs served as Project Engineer in the Industrial Apparatus Plants at Emporium and Williamsport. Since then he has been with the Advanced Development Section of the Central Engineering Labs at Kew Gardens and Flushing, Long Island, where he is working on television problems.

TELEVISION MIXER, OSCILLATOR AND AFC

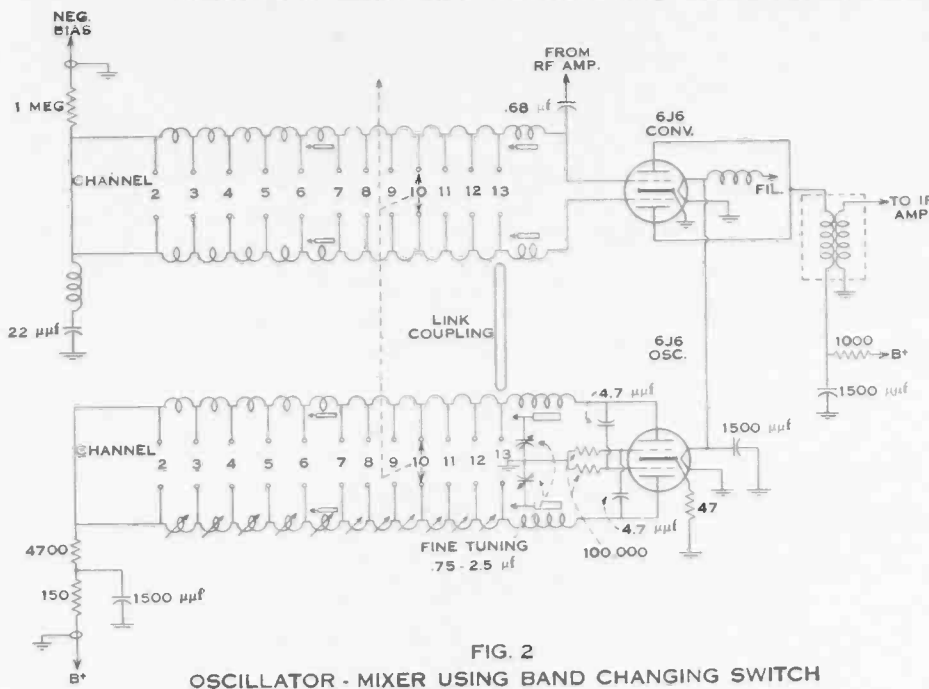


FIG. 2
OSCILLATOR - MIXER USING BAND CHANGING SWITCH

mixer circuits and components used in television receivers which operate satisfactorily in the twelve television channels from 54 to 216 Mc. One system uses a rotating turret which holds individual oscillator, mixer, and RF amplifier coils for each channel. As each channel is selected by a front panel control, the tuned circuit components are brought into their proper positions adjacent to the oscillator, mixer and RF amplifier tubes.

Another arrangement, the circuit diagram for which is shown in Figure 2, accomplishes the channel selection by means of a rotary switch which switches the proper inductance into the mixer and oscillator circuits as each channel is chosen. The plates of the double triode 6J6 oscillator tube are connected to pairs of series inductances in what may be considered a balanced transmission line. A shorting bar connects to opposite switch

Some receivers maintain the oscillator signal at the proper frequency by an AFC system in which a frequency-regulating voltage from the sound discriminator output is applied to a control tube connected to the local oscillator. A circuit diagram of such an AFC oscillator is shown in Figure 1.

Some television receivers employ a sound receiving system known as the intercarrier sound system. A future article in this series will describe the system in detail, but for the present it is necessary to consider one characteristic of intercarrier receivers because of its effect on the local oscillator circuits. In the intercarrier system the heterodyning frequency which determines the sound intermediate frequency is the video carrier. As a result the receiver is relatively immune to local oscillator instability, and the oscillator design is considerably simplified. Also such a receiver may incorporate a simplified IF amplifier of a type which allows the local oscillator to be either lower or higher in frequency than the incoming carriers. In this case the highest oscillator frequency, for channel 13, could be less than 200 Mc.

Practical Oscillator and Mixer Circuits

There are several different practical arrangements of oscillator and

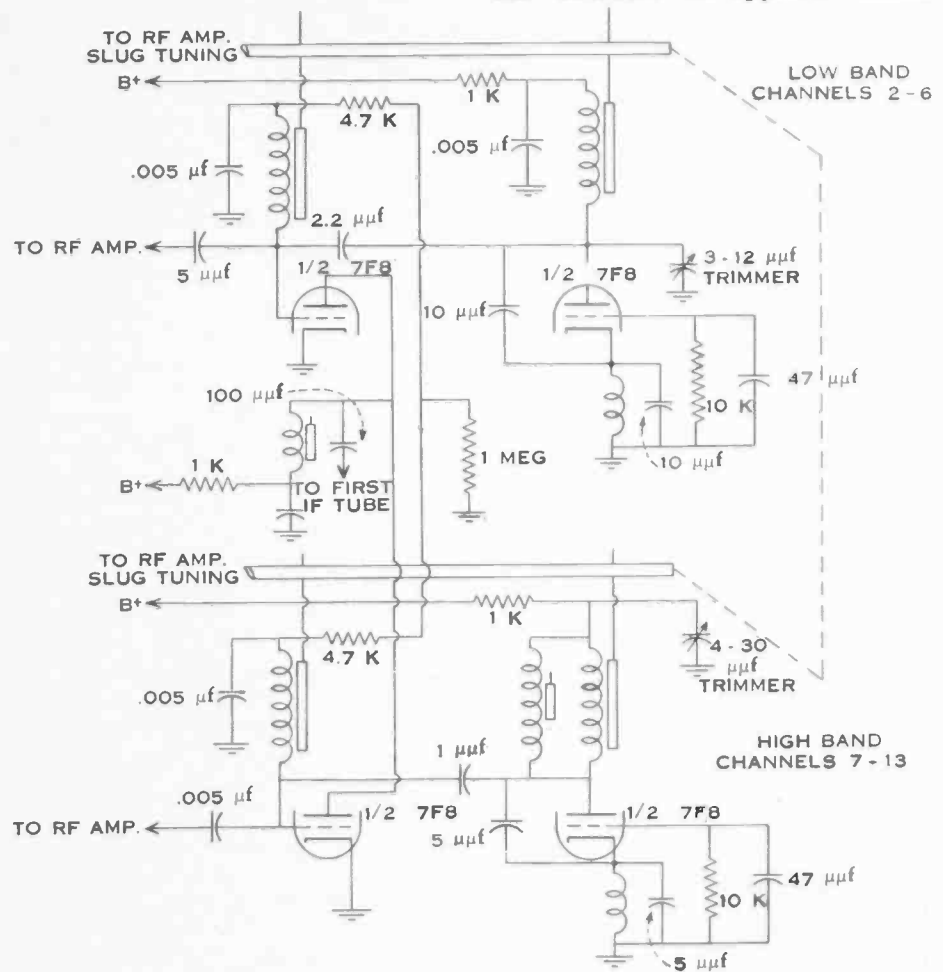


FIG. 3
OSCILLATOR - MIXER USING IRON CORE TUNING

TELEVISION MIXER; OSCILLATOR AND AFC *Continued*

points and moves along the line as the channel selector is rotated. The same switch selects tuned circuit components in the grid circuits of a similar double triode (and also in the RF amplifier tuned circuits which are not shown in this diagram). Magnetic coupling between the oscillator and mixer coils is used to inject the oscillator signal into the mixer grid.

Figure 3 is a circuit diagram for a mixer-oscillator system using iron cores to tune the inductances in the mixer grid and the oscillator plate circuits. In this arrangement separate triode sections are used for the low and high frequency bands since the range of frequencies tuned in each circuit is too great to cover with one slug tuned coil. The oscillator voltage in this case

is coupled to the mixer grid through a small capacitor.

The RF amplifier tuned circuits (not shown on the diagram) are selected by the same bar that holds the iron cores for the oscillator and mixer coils.

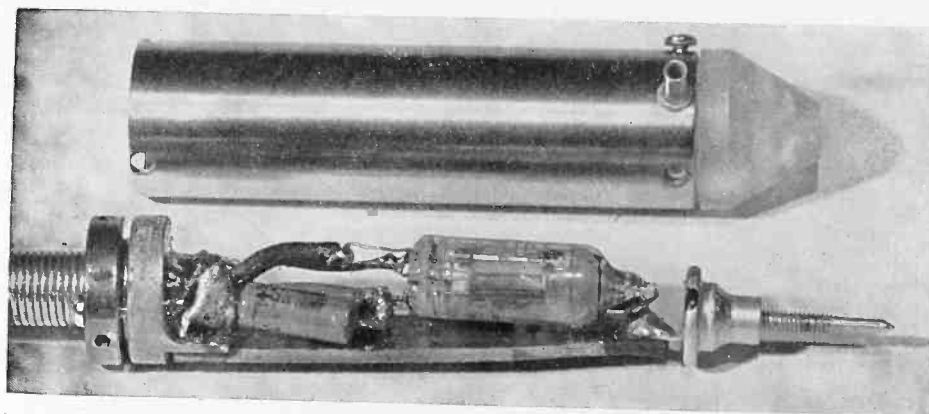
Next month's article will describe the video IF section of the TV receiver.

THE POLYMER PROBE

One of the papers given at the recently concluded I. R. E. Fall Meeting at Rochester, N. Y. by Mr. R. K. McClintock, Assistant to our Chief Engineer, was on applications of the Sylvania sub-miniature tubes. Reference was, of course, made to the use of the Type 1247 diode used in the Sylvania Polymer. An illustration showing the internal construction of the probe is given here.

Our article last month on the proper method of using the probe at high frequencies should have included a statement that in case it is ever desired to have the probe repaired or calibrated it will be necessary to return the whole instrument unless you have the calibration equipment described in the instruction book. This is because the calibrating resistor for the probe is inside the instrument.

We believe we should point out again that the Polymer is unique



in service instruments because of its vacuum tube diode probe. The only other instruments having this feature are laboratory instruments in a much higher price class.

Definite advantages of the diode probe over other types are numerous. Two major advantages are that the diode probe is suitable to measure RF voltages accurately and in addition has a higher impedance, therefore resulting in

almost no load effect on the circuits you test. The low input capacitance of the order of 3 uuf permits the probe to be placed across a tuned circuit so that the circuit may be retuned to maximum by means of the trimmer if required. Care should be used in selecting an instrument for this purpose as the capacitance of some available probes is too high to permit their use for this purpose.

TELEVISION NEEDS BETTER TUBES

One of the very important jobs of the Sylvania Quality Department is to see that Sylvania tubes are of the proper quality for use in all our customers products, AM, FM, and now television sets.

They have recently called our attention to some interesting figures on the effect of even small percentages of inoperative tubes in sets requiring a large number of tubes. In the days of four-tube sets radio set manufacturers could be quite satisfied if two or three tubes out of every hundred were bad. But if you consider a modern 40-tube set a quality level of only 1% bad means that a set manu-

facturer could expect to have an average of 33 inoperative sets (due to bad tubes alone) out of every hundred that are assembled. No manufacturer would tolerate such a condition very long but would seek a tube supplier who could and would supply a higher percentage of good tubes. Therefore, all tube manufacturers are becoming more quality conscious.

The days when it was satisfactory to have 2 to 5 bad tubes in a box of 100 are definitely over; they must be several times better than this. The probability charts show that if a manufacturer is making 40-tube sets he must have not more than

1 bad tube in 780 received in order to have an average of not more than 5% of the sets inoperative before his final inspection.

If you wish to work this out for any other particular case the formula is:

$$S = Tn$$

where

S = the percentage of good sets expressed as a decimal, i.e., 95% = .95

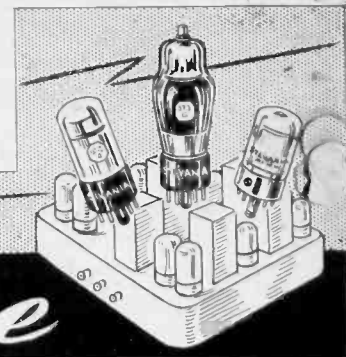
n = the number of tubes used per set

T = the percentage of good tubes expressed as a decimal, i.e., 99% = .99

Continued on page T-40



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THE *Service Exchange*

Television Needs Better Tubes

(Continued from page T-39)

Radio servicemen have been meeting this type of problem for years. Some dead sets you get may have 10 tubes, 20 bypass or filter condensers, 20 resistors, 6 transformers, plus a few other components, any one (or more) of which may be defective.

There are two morals to this: first, as sets get more and more complicated the quality of each component must be improved; second, servicemen servicing such equipment will require both better test instruments and better training.

* * *

Aid In Stringing Dial Cords: Here is an idea that I use to great advantage in stringing dial cords. I take a ten cent plastic crochet hook to reach into close places and handle the cord, tying the knots, etc. The same plastic tool can be used as an alignment screw-driver by dressing down the blunt end with a file. — Guy S. Athearn, New Smyrna Beach, Florida.

* * *

Disagreement With Cord Slipping Cure: I wish to take issue with the "Cure for Dial Cord Slipping" by Donald Slattery, Chadron Nebraska published in the October SYLVANIA NEWS. He says to roughen the shaft around which the dial cord wraps. The roughened shaft will cause the cord to be cut in two in a short while, because the cord does have to slip back into the groove. Also, a customer sometimes runs the pointer to the end of the scale and continues to turn which cuts the cord. I know from experience.

I have found in a large number of cases the ball-bearing point on the tuning condensers becomes gummed up. This can be cleaned by using a screw driver and slightly spring the ball-bearing point apart. Clean with carbon-tet and use a drop of good oil, or in some cases grease.—H. M. Fouts, Lewistown, Illinois.

Motorola 58R11 Noisy: Distortion or noisy reception on Motorola 58R11 is frequently caused by poor ground connection on the speaker. The speaker is rubber mounted so that it doesn't always ground out well. A short flexible wire from chassis to speaker is an easy way to remedy this trouble.—Adolf W. Neufeld, Inman, Kansas.

* * *

Noise And Distortion Caused By Tuning Eye Tube: Many servicemen are inclined to pay little attention to tuning eye tubes while servicing radios for the reason that they contribute nothing to the operation except as a tuning aid. I have found by experience that they can contribute a lot of difficult-to-locate trouble such as noise and distortion. If the elements in this tube are loose it can cause noise and if they are shorting or if the tube is gassy it can cause poor operation of the automatic volume control system with distortion and fading. I have found it good practice to replace all old and dim eye tubes with new ones such as Sylvania 6U5.—Donald Slattery, Chadron, Nebraska.

* * *

Soldering Enameled Wire: Do you have a problem soldering fine wire when rewinding an oscillator coil? Use Cement Solvent (the green stuff) to soften the varnish by dipping the end of the wire right into the bottle. In a few moments scrape off the softened varnish with your fingernails. Now, without any other preparation, solder, using rosin-core solder. No scraping of any kind with a knife, cutting into the wire, weakening it, is necessary. It's the only really practical means of soldering Litz wire.

DAVID GNESSIN
Columbus 1, Ohio

Editor's Note: This does not work equally well on all types of enamel.

Noise And Intermittent Operation Of Zenith Receiver: Several months ago I received a Zenith receiver having the spinning fly-wheel for manual tuning. In the case of these models, the shaft on which the flywheel is mounted is hollow, the smaller volume control shaft passing through the hollow shaft, and the two shafts extending nearly to the rear of the chassis. At each end of the shafts the two are insulated from each other by means of bushings made of an insulating material.

Complaint: On push button, the receiver operated well. On manual tuning, stations tuned in with only about a third of normal volume on the high frequency end of the broadcast band. After realigning the RF and oscillator circuits of the manual tuning system, the trouble seemed to be corrected. However, when I tested by repeatedly switching from manual tuning to push button tuning, the stations came in good on manual tuning at some times, but with the reduced volume at other times.

When this chassis was operated on the bench on manual tuning, I found that it would intermittently shift from good reception to weak reception on the high frequency end when the chassis was shifted on the bench. All voltages check OK except, of course, the AVC voltage when weak reception was experienced.

The trouble was found to be associated with a shifting of the heavy fly-wheel, which was located near the circuit alignment trimmers. The insulating bushing at the rear end of the two control shafts had worn and dropped out, causing the fly-wheel shaft to short out to ground through the volume control shaft. The capacitance of the fly-wheel apparently was great enough to affect the tuned circuits highly when it was shunted off to ground. At any rate, the replacement of the missing bushing remedied the trouble. — James O. Woodward, Springfield, Ohio.



SYLVANIA NEWS

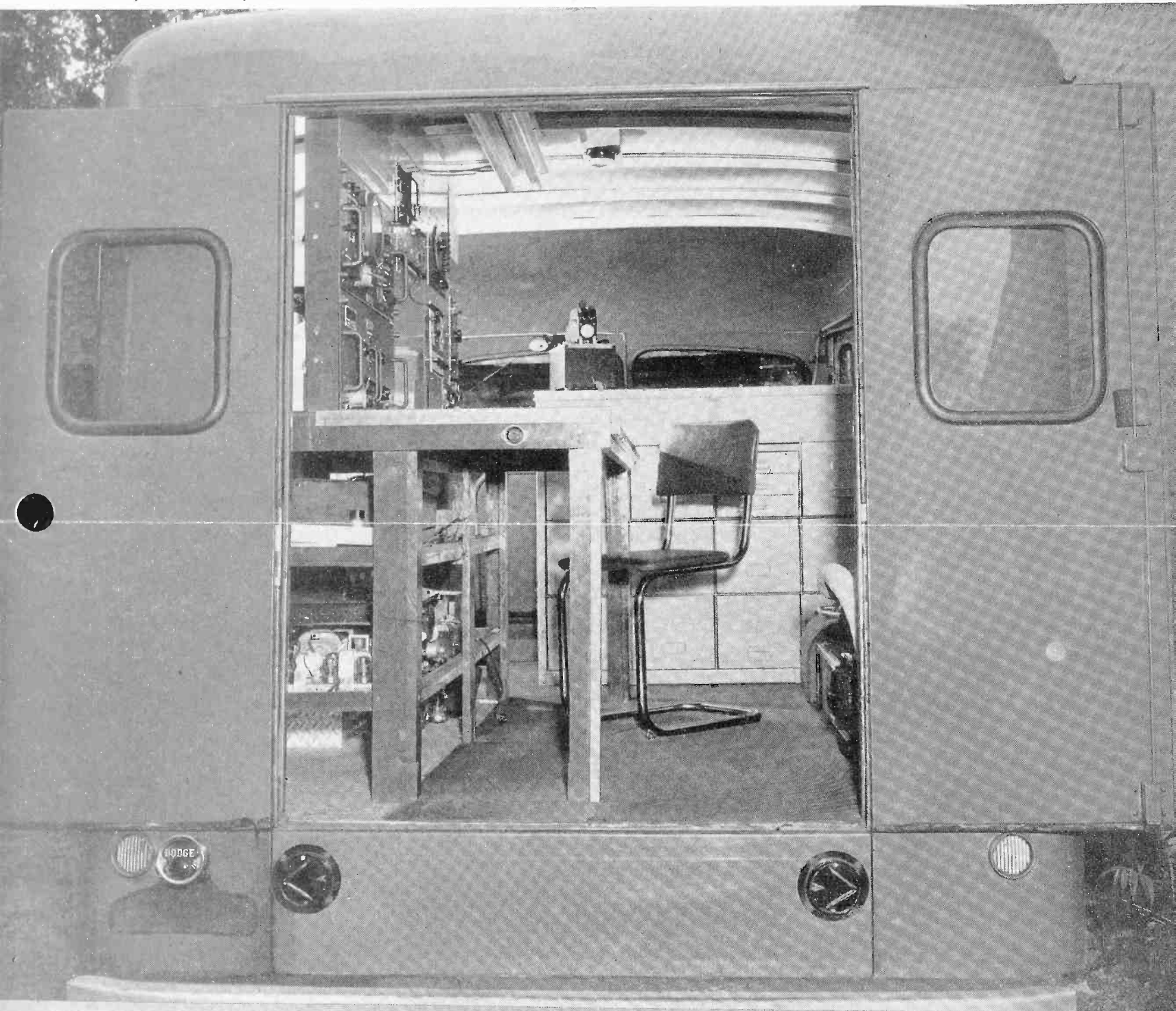
DECEMBER, 1948

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EMPORIUM, PENNA.

R. A. PENFIELD, Editor

VOL. 15, NO. 11



In This Issue

MOBILE RADIO AND TELEVISION SERVICE UNIT MEETS PROBLEMS MORE EFFICIENTLY

See Page M-43

Empire State Technicians Organize

Representatives of service technicians' organizations of New York made a significant step forward on October 31, when they met in Binghamton to form the Empire State Federation of Electronic Technicians Associations.

The State Federation has been created to help further the welfare of the radio technician in New York State, to work toward raising his technical standards, and to promote, among the public, a better understanding of the problems of the radio service technician.

In attendance at the meeting were representatives and delegates from Rochester, Ithaca, New York City, Poughkeepsie and Binghamton. The Federation expects to include all active radio service groups within the state, and has limited its membership to established associations which have regular local activity. Each member association is represented in the State Federation by two delegates, one of whom serves on the Board of Directors.

ESFETA will give any required assistance to technicians or groups of technicians within the state, who are interested in forming their own

local associations. The Federation will also assist in activating associations which are not now operating, and will maintain liaison with federations in other states.

The following officers were elected at the Binghamton meeting. Their term of office ends April 1949. President, T. Lawrence Raymo, RTG, Rochester; Vice-President, Max Leibowitz, ARSNY, New York City; Secretary, Wayne Shaw, RSA, Binghamton; Treasurer, Ben De Young, RTG of Central New York; Sgt.-at-Arms, Evart M. Howland, Hudson Valley RSA.

Elected to the Board of Directors were Herb Snyder, RSA, Binghamton; Robert L. Bryan, RTG, Rochester; Fred Booth, Hudson Valley RSA; Morris Ross, Central N. Y. RTG; and Jack Edel, ARSNY, New York City.

Thirty-five persons attended the meeting, which was held at the Hotel Arlington. The next meeting, which will discuss constitutional questions and incorporation, will be held in about one month. Further details about the Federation may be obtained from Wayne Shaw, 392 Chenango St., Binghamton, N. Y.

Fun And Fancy

"Comic strips are one of the great forces stimulating the American imagination today; and scientists and other creative thinkers read them unashamedly to get ideas for new products," says Henry W. Parker, research adviser for Sylvania.

"Many ideas have been lifted bodily out of popular comics and put to practical use. Man must dream before he can create.

"In the comics we saw such amazing, dreamed-up devices as wrist radios, snooperscopes that see in the dark with infra-red light, missiles that automatically pursue their targets, stratosphere planes and television burglar alarms. Science has already developed all these items that first became known to the public through the medium of the comics.

"Buck Rogers and Dick Tracy are examples of the imagineering that stimulates scientific thinking toward the discovery of more and more technical wonders.

"Comic strips are pure imagination. Through them, one imagination speaks to another. This is the closest relationship known to man."

Town Meetings Continue . . . Atlanta Next

Television installation and service was the major topic stressed at the Town Meeting of Radio Technicians at the Hotel Bradford in Boston on November 15, 16 and 17. The three day meeting was attended by about 1000 radio technicians from the New England area.

The meeting, which was sponsored by radio parts distributors in New England and the RMA, was a completely non-commercial educational venture. It was the second of a series of five meetings of this type to be held this winter in various sections of the country.

"The Boston program, following one in New York in September and an experimental meeting in Philadelphia last January, was shaped to improve on its excellent predecessors," according to Harry Ehle, chairman of the Town Meeting committee of the RMA.

The Technical information presented at the meeting was designed by the speakers to be of practical

usefulness to everyone engaged in television repair and installation. The papers on business management, which were half of the topics on the program, followed the lines of suggestions by such research groups interested in the problems of small business as the Harvard School of Business Administration, the Committee on Economic Development and the U. S. Department of Commerce.

The purpose of Town Meeting is not to change the way of life of the technician in one three day meeting, but rather to help the service dealer take advantage of the steady stream of information which the industry is now making available to him. By doing this it is hoped that the technician will not be left behind by the tremendous advances of the new industry of television.

The next Town Meeting will be held in Atlanta, Ga. in the Municipal Auditorium on January 31 and February 1 and 2. The fourth

meeting in the series announced for this year will be held in the Roger Young Auditorium, Los Angeles, Calif. on February 28, and March 1 and 2. For full details about Town Meeting in these cities, see your local distributor. He will furnish you with details of the times and topics to be discussed.

On The Cover

Television-Radio Service Co. of Schenectady, N. Y. have designed and built a mobile service unit for their work in television. Through the use of this unit they have effected operating economies which are beneficial to both the customer and to the service company. For a complete story about Television-Radio Service Co. see page M-43 of this issue.

SYLVANIA NEWS

MERCHANDISING SECTION

DECEMBER, 1948

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Sylvania Electric Products Inc.

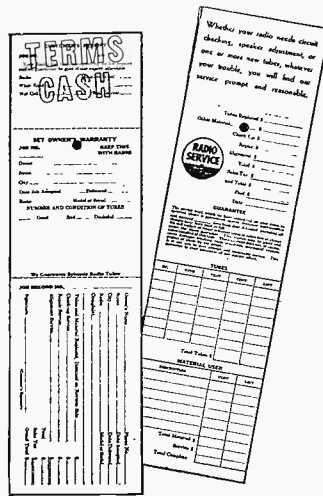
EMPORIUM, PENNA.

VOL. 15, NO. 11

Don't Let Dollar Bills Fool You!

Money in your pocket is no sign that your business is making money! The only real proof of profit from your business is shown in adequate business records. What is more, keeping records of your business is the surest way to guarantee against business failure.

Maintaining adequate records of your service business is not, in itself, a difficult process. For the specific use of service dealers, Sylvania has available a Business Record Book which simplifies the process to a point where it will take but a few minutes a day to keep adequate records. This book gives you an



JOB RECORD CARDS give you a complete picture of each service job as well as a customer's record and receipt. Imprinted with your name, address, phone number. Price 100—\$1.00; 250—\$1.75; 500—\$3.00.

you use in a set, the amount of money they cost you and the labor charge for the job. These cards also help you to keep an inventory of the tubes and parts.

Sylvania Job Record Cards are available in two styles. The first, and more simplified, gives you a 3" x 5" record for your file. The "three in one" record card provides the same information, but also provides a follow up reminder card for each service job. Both are available with your imprint.

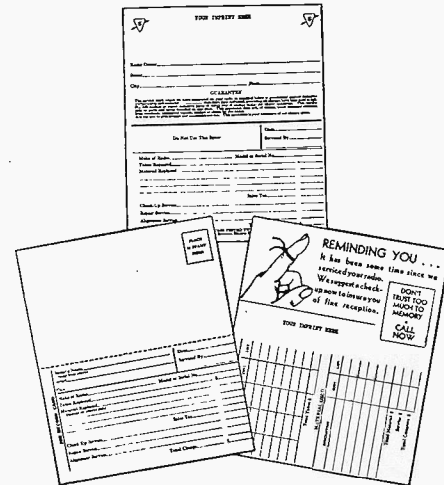
The Business Record Book provides you with a complete account of your business for a year. With this book you can readily discover how much your operating expenses are costing you and what adjustments must be made in your charges to allow you a fair profit on your investment. The book also gives you pertinent tax information which you need to meet your obligations to the government.

The Sylvania Business Record Book is set up in two parts for each month of the year. The first part is an account of your income plus the expenses for the month. Part two is a record of your payments for

merchandise and your payroll record.

The income record is a day by day account of the actual money which you take in. In this space, actual cash received is entered. Weekly income from sales and service and income from any other sources are entered in the book and a final monthly income is recorded.

In the expense portion of the book, overhead expenses such as rent, supplies, electric, gas, phone and other 'cost of doing business items' are entered. The record also provides for social security taxes, withholding taxes and any other business taxes or fees required by your state. These expenses are

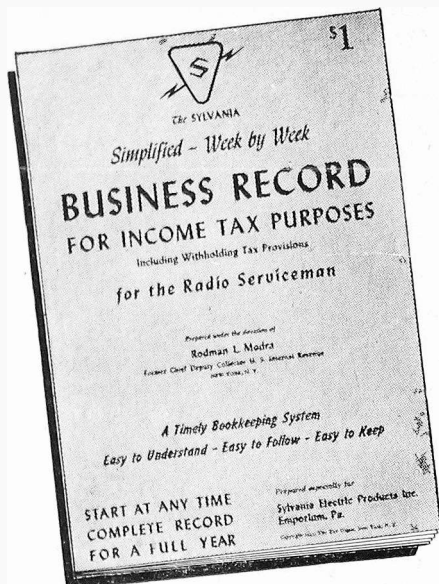


THREE-IN-ONE RECORD CARDS are complete records of each service job plus a special reminder card for follow-up. Imprinted with your name, address and telephone number. Price 100—\$1.50; 250—\$2.50; 500—\$4.00.

totaled and then a week by week account gives you the monthly expenses.

The "Expense" column also shows the personal drawings you have made on your business. When you make payments on loans, equipment, furniture or fixtures, space has been provided for a record of such payments. Most important section of part one of the book is the "Cash Balance for the Month." This

(Continued on page M-44)



SYLVANIA BUSINESS RECORD BOOK is a simplified bookkeeping system which will give you complete information about your finances as well as accurate tax information. Price \$1.00.

accurate picture of how you stand financially from day by day, to week by week, to month by month. Since keeping records is required by law, every service dealer should investigate this simplified system.

First step in keeping records is to have a complete account of each business transaction which you make. This is again simplified through the use of Sylvania Job Record Cards. These cards give you an exact picture of the parts

Lincoln Park Radio and Appliance

RADIOS & PARTS

RANGES — REFRIGERATORS — WATER HEATERS — HOME FREEZERS — WASHERS — P. A. SYSTEMS

WARWICK 8-3000

EASY WASHERS

FRIGIDAIRE PRODUCTS

WARWICK 8-3000

1425 FORT STREET, LINCOLN PARK 16, MICHIGAN

September 15, 1948

Advertising Department
Sylvania Electric Products Inc.
Emporium, Pa.

Gentlemen:

It is a pleasure to write a "success" story about your co-ordinated advertising campaign, because that is exactly what it did to help business.

We trimmed a window displaying radios, parts and Sylvania tubes. The center of the display was the display card, "My radio - it just started whistling." We addressed the complete set of cards for all four mailings, using gummed address labels. All of the addressing was accomplished in one typing. We sent out the first set of 300 cards two days ago and have already received twelve calls for service.

The cards are colorful and attractive. The whole idea is very sound. Our thanks to you for your cooperation in the interest of Sylvania dealers.

Yours very truly,

Samuel Brantigan
Samuel Brantigan

LJB-nl

TRY OUR RADIO TROUBLE SHOOTERS



MIKE'S RADIO AND TELEVISION SERVICE

EXPERT SERVICE ON ALL MAKES

10802 1/2 WEST PICO

LOS ANGELES, CAL.

PHONE: ARDMORE B2232, B. M. 7

DEPENDABLE EFFICIENT SERVICE

November 1, 1948

Advertising Department
Sylvania Electric Products Inc.
Emporium, Pa.

Gentlemen:

I would like this opportunity to tell you how much the Sylvania co-ordinated advertising campaign has helped my business.

Although I have used direct mail postal cards in the past for soliciting new business, the tie-in with national advertising offered in the Sylvania campaign was responsible for an extraordinary return. The response I have had from your campaign has been truly amazing.

As an example, I mailed 1000 postal cards in May at a cost to me of \$10.00. To date this investment has brought a return of \$352.19. During June, July and August I mailed another 1000 cards each month at a total cost of \$30.00. To date the return from this investment has amounted to \$760.46.

You will note that for a total investment of \$40.00 I have, to date, enjoyed an increase in business amounting to \$1,112.65 — all from new customers. I can safely say that there is still more business to come from these cards in future months.

I mailed another 1000 cards to my prospect list of 12,964 names during October and November. I also expect to mail another 1000 cards during December.

Speaking for myself, I would certainly like to see this campaign become a regular 'shot in the arm' at least twice a year. It will do much to help business in the spring and early fall when business is usually slow.

Many thanks and best wishes.

Very truly yours,

MIKE'S RADIO SERVICE

By *Michael Waxman*
Michael Waxman



BRING IN YOUR RADIO TUBES — WE TEST THEM FREE — DEALERS FOR Sylvania SET-TESTED TUBES

Reproduced above are two of the many letters Sylvania has received from dealers who have used the Coordinated Advertising Campaign.

Sylvania Ad Campaign Helps Increase Business

It is a known fact!! The Sylvania coordinated advertising campaign for radio service dealers stimulates business—brings in bigger profits—sells more of all types of merchandise.

This campaign was created especially for radio service dealers by Sylvania. Throughout the normally slump summer months, dealers using the campaign enjoyed a high volume of business. During the fall campaign dealers continued to experience a high return from the use of this campaign.

The Sylvania coordinated advertising campaign is a complete kit which offers you every known type of advertising for your business for three months. Direct mail, point of

sale displays, newspaper ad mats and radio spot announcements are included in the kit for your use in your own locality. Every advertising piece in the kit ties in your business with Sylvania's national advertising. In advertisements in Life, Look, Radio & Television Best, Saturday Evening Post and Collier's you are pictured as the dealer who gives expert radio service. You are identified in every Sylvania ad as the dealer who displays the RADIO SERVICE decal on his door, window or truck.

To capitalize on this campaign and increase your service business use the materials which Sylvania has available for you in your own locality. All of the material is

furnished by Sylvania FREE. The only cost to you is the postage on the cards you mail to your prospects.

There is a new campaign for every month of the year. The next campaign starts in February. Write today for information about this campaign. Find out how you, too, can increase your service business. For full information about the Sylvania coordinated advertising campaign for radio service dealers for February, March and April write a postal card or letter to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. Ask for the complete details about this campaign.

SYLVANIA NEWS

TECHNICAL SECTION

DECEMBER, 1948

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Sylvania Electric Products Inc.

EMPORIUM, PENNA.

A. V. BALDWIN
Technical Editor

VOL. 15, NO. 11

These data have been compiled from information which we believe to be accurate. No responsibility can be assumed in the application thereof or for patent infringement.

TELEVISION VIDEO IF AMPLIFIERS

By Franklin L. Burroughs*

This is the fifth of a series of articles on Television by Sylvania Engineers.

Last month's article "Television Mixer, Oscillator, and AFC" described the circuits used in the television receiver to accomplish frequency conversion. In this article we will discuss video intermediate frequency amplifiers and associated trap circuits.

Gain and Bandwidth Requirements

In a superheterodyne television receiver the signal level of the video intermediate frequency components at the mixer plate may be as low as a few hundred microvolts. For satisfactory video detection this video IF signal must be amplified to a level of one volt or more at the second detector, and this is the function performed by the video IF amplifier. The full gain requirements of video amplifiers vary from about 1000 times in a receiver of fair sensitivity to more than 10,000 times in a receiver designed to give good picture reception at a location in the "fringe" area far distant from the television transmitter.

The video IF amplifier must have uniform gain over a wide band of frequencies if the picture viewed on the cathode ray tube is to show adequate detail. The gain-frequency characteristic curve for a good video IF amplifier is shown in Figure 1. The bandwidth at the half-power points is about 3.5 Mc. It should be noted that the video IF carrier at 25.75 Mc. is placed on the edge

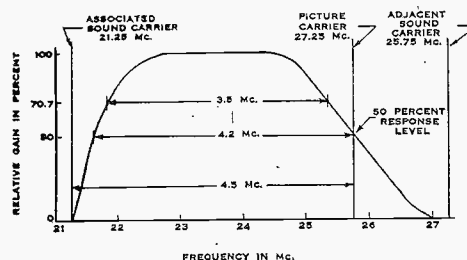


FIGURE 1 - VIDEO IF RESPONSE CURVE

of the pass-band curve at the 50 percent voltage response level. An earlier article in this series described the method in which most of the television channel is utilized to send picture information by vestigial side-band transmission. By this method one entire side band and a small part of the other side band are transmitted. The restoration of the correct picture information is accomplished in the receiver by placing the video IF carrier at the 50 percent point on a sloping response curve of the shape shown in Figure 1.

The associated sound IF is at 21.25 Mc. The response curve of the video IF amplifier slopes quite sharply to suppress the 21.25 Mc. sound IF components before they reach the video detector. In addition it is necessary to suppress the sound IF components at 27.25 Mc., which result from the reception of the television transmitter operating on the adjacent lower frequency channel.

Gain Control

In order to prevent overloading of the video IF stages immediately preceding the detector when strong signals are received, it is customary to apply gain control to two or more stages of the amplifier. Several modern receivers employ a manual gain control system in the video IF

amplifier to vary the contrast of the picture viewed on the cathode ray tube. The control varies the grid bias applied to the first two or three IF amplifier tubes, and thus sets the gain of those stages to the value which gives correct picture contrast. Automatic gain control (AGC) systems employed in television receivers are more complicated in operation than those in the usual broadcast superheterodyne, and will be the subject of an article to be published later on in this series.

IF Amplifier Tube Characteristics

Since it is necessary to amplify uniformly a wide band of frequencies in the video IF amplifier, the tuned circuits involved are of the low Q type. In order to get the maximum gain from the circuits, it is customary to tune the IF coils with the minimum capacitance obtainable which is, in the case of a single-tuned circuit, the sum of the output capacitance of the amplifier tube, plus the input capacitance of the following tube, plus the socket and wiring capacitances. Even with such a small tuning capacitance (about 15 μ f.) the damping resistor can be no greater than a few thousand ohms. For this reason a satisfactory video IF amplifier tube must have high transconductance and low input and output capacitances if reasonable gain per stage is to be secured. These are the properties, already mentioned in previous articles, which apply to television RF amplifier and mixer tubes, and often the same type of high gm pentode is used throughout the RF, mixer, and IF sections of the receiver. Unlike the RF and mixer sections of the receiver, however, the frequencies involved in the video IF stages are much lower, so

(Continued on next page)

*Franklin L. Burroughs received the degree of B.S. in Electrical Engineering in 1932 from Syracuse University. He joined Sylvania in 1937 starting in the Engineering Test Department at Emporium. In 1939 he worked in the Television Laboratory at St. Marys, Pennsylvania, and returned to Emporium the following year, where he worked in the Tube Application Department from 1942 to 1946. Mr. Burroughs served as Project Engineer in the Industrial Apparatus Plants at Emporium and Williamsport. Since then he has been with the Advanced Development Section of the Central Engineering Labs at Kew Gardens and Flushing, Long Island, where he is working on television problems.

VIDEO IF AMPLIFIERS *(Continued)*

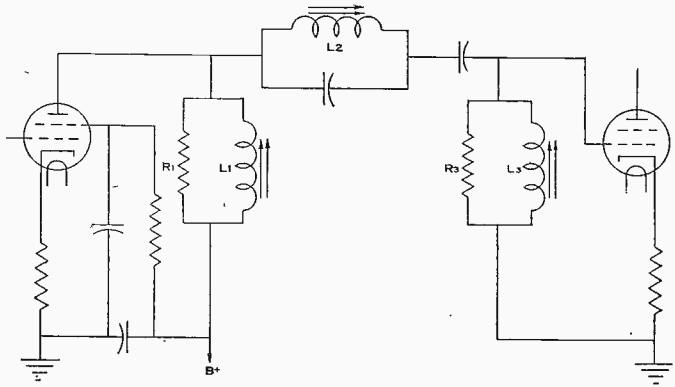


FIGURE 2 - BAND PASS VIDEO IF CIRCUIT

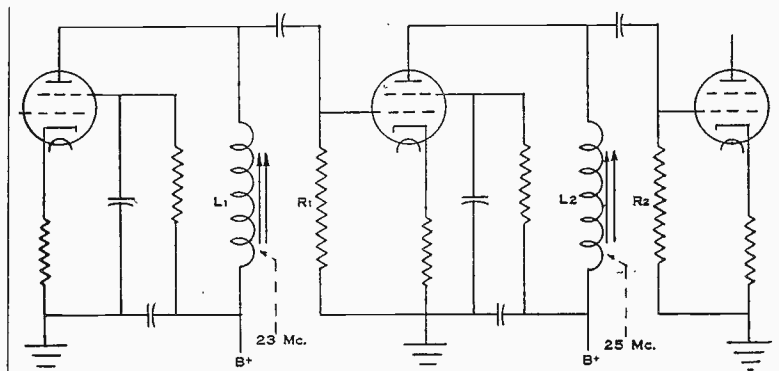


FIGURE 3 - STAGGER-TUNED VIDEO IF CIRCUIT

that a tube of somewhat larger physical structure may be employed if desirable. The intermediate frequencies in present-day receivers are high enough to require the use of tubes having low grid-to-plate interelectrode capacitance to prevent regenerative effects which would distort the picture.

Amplifier Circuits

Modern television receivers incorporate video IF amplifier circuits which represent a compromise between complicated networks of high gain, and the simplest tuned circuits with lower gain. Figure 2 shows a video IF stage with a coupling network based on band-pass filter design. The coil, L_1 , tunes to the IF band with a capacitance made up of the amplifier tube's output capacitance plus a few micromicrofarads of wiring and socket capacitance. L_3 tunes with the input capacitance of its associated tube, plus socket and wiring capacitance. R_1 and R_3 are resistors of a

few thousand ohms which damp their respective plate and grid circuits sufficiently to give the proper gain frequency response curve. L_2 and C_2 make up a tuned circuit which couples the plate and grid circuits and also acts as an anti-resonant circuit at the adjacent (or associated, if so designed) sound IF. The network has the advantage of affording relatively high gain since the input and output capacitances of the amplifier tubes are separated thus allowing higher damping resistors to be used than in the case of a single-tuned circuit.

Figure 3 illustrates a coupling network of the type that has come into use in recent years in wide-band video IF amplifiers. It consists of two single-tuned circuits in separate amplifier stages. Each has the proper band-pass characteristic (adjustable by varying R_1 and R_2) and center frequency to give an overall gain-frequency characteristic similar to that obtained with double-tuned transformers. Since the resonant frequencies of the two tuned circuits used are different from one another, the circuits are called stagger-tuned and the network shown in Figure 3 is called a staggered-pair. A system using three single-tuned stages, each having a different resonant frequency, is called a staggered-triple, and so on through staggered quadruples and quintuples. There are video IF systems in use in which the mixer plate circuit and the circuits in four video IF amplifier tubes are tuned to five different frequencies to form a staggered - quintuple. Other IF amplifiers incorporate quadruples, or two staggered-pairs, or combinations of band-pass filter designs plus stagger-tuned circuits. The gain

obtainable with stagger-tuned circuits is somewhat less than that of networks shown in Figure 2. However, they are simpler to align in the factory initially and later on when being serviced, since each stage can be aligned to its power frequency by using a conventional signal generator while the band-pass networks require a wide-band sweep generator for satisfactory alignment. Figure 4 shows three single-tuned stages staggered at different center frequencies combining to give an overall gain-frequency curve similar to that of a triple-tuned transformer.

Traps

There are several types of trap circuits used to prevent sound IF components from reaching the video detector in sufficient strength to be detected and appear on the picture tube in the form of light and dark

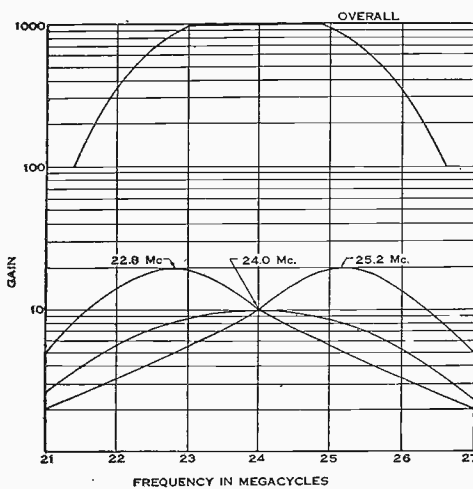


FIGURE 4
INDIVIDUAL AND OVERALL RESPONSE CURVES
FOR STAGGERED-TRIPLE CIRCUIT

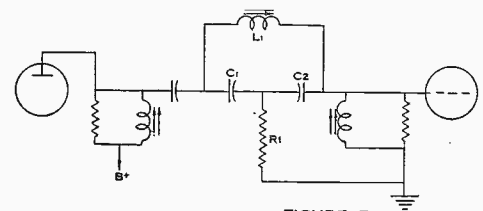


FIGURE 5a

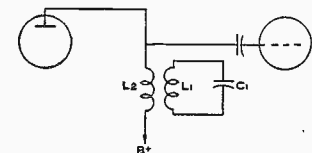


FIGURE 5b

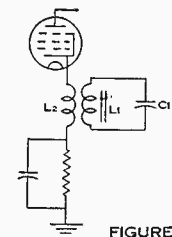


FIGURE 5c

TRAPS FOR VIDEO IF CIRCUITS

VIDEO IF AMPLIFIERS (Continued)

parallel bars. A filter-type circuit, shown in 5a, serves to couple the plate and grid circuits of a video IF amplifier stage. The trap circuit, composed of L_1 , C_1 , and C_2 presents a high impedance to the frequency which it is desired to reject. As a result only a small fraction of the voltage at sound IF is impressed on the control grid of the following stage.

A trap circuit of the absorption type is shown in Figure 5b. It consists of a single-tuned circuit, L_1 , C_1 , coupled magnetically to a tuning coil, L_2 , of the video IF amplifier so that it absorbs a large percentage of the energy from the amplifier circuit at the accompanying or adjacent sound IF. A trap of this type has a very high Q and usually employs a large diameter coil on the same axis as the plate coil.

A trap which acts to cut down the gain of an IF stage at sound IF to a small amount as compared to its gain throughout the video IF pass band is shown in Figure 5c. The tuned circuit L_1 and C_1 reflects into L_2 , through magnetic coupling, an impedance high enough at the sound IF to reduce the gain of the stage to about unity. In this trap circuit a transformer is used so that the impedance of L_2 can be kept small enough throughout the pass band to avoid trouble from regeneration.

Figure 6 is a schematic for a complete video IF system employing a number of the individual circuits described in this article. The mixer plate is coupled to the grid of the first IF tube by a network of the band-pass filter type, and it also has a trap at 21.25 Mc., the associated

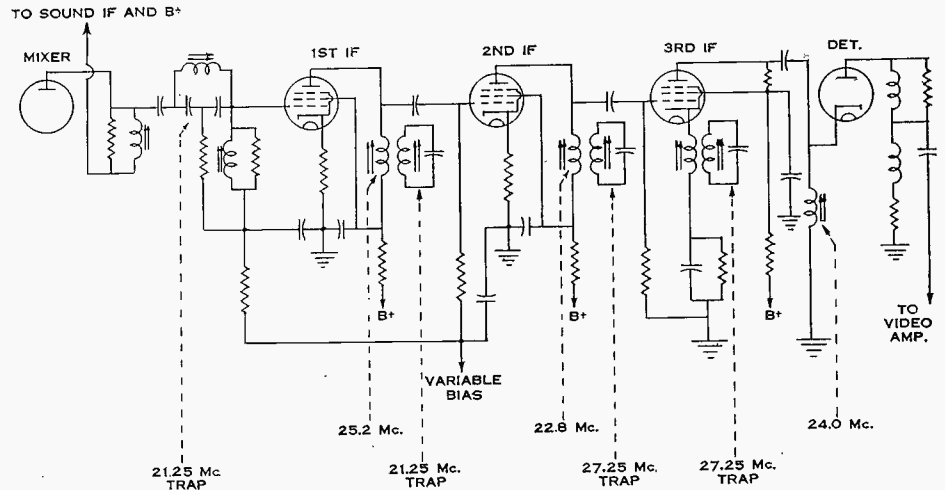


FIGURE 6 - VIDEO IF AMPLIFIER WITH TRAPS

sound IF. The three stages which follow make up a staggered-triple amplifier with center frequencies of 25.2 Mc., 22.8 Mc., and 24.0 Mc., respectively. Two absorption type traps, one at 21.25 Mc. and one at 27.25 Mc., are coupled to the variable iron-core tuned coils in the plate circuits of the 1st and 2nd IF tubes. Another trap designed to eliminate the 27.25 Mc. adjacent sound channel components is in the cathode circuit of the 3rd IF tube.

It should be noted that the cathode resistors in the first two IF stages are unbypassed. Contrast control in the form of a variable negative voltage is applied to the control grids of these two stages. If the cathode resistors were bypassed the circuits would be detuned due to changes in the tube's input capacitance which occur with changing negative control grid voltage.

The gain of an amplifier operating

in the region of 25 megacycles such as the one shown in Figure 6 is high enough to regenerate if certain precautions are not taken. Resistance-capacitance filters are employed in the plate and screen supply circuits to prevent feedback through those connections. Also it is customary to feed the tube heater voltage through small chokes, and to bypass the heater pins to ground at the sockets.

Television receivers which incorporate the intercarrier system of sound reception have video IF amplifiers which differ in some respects from those treated in this article. As mentioned previously the intercarrier system will be the subject of an article to be published later on of this series, at which time the differences in the video IF system will be described. Next month's topic will be "Video Detection and AGC."

SERVICE HINTS

De Wald Model A500: Inoperative or weak, with indications of defective 1st IF coil. Before dismantling coil assembly check grid lead lug on 12BA6 socket for leakage or short to chassis. Obvious remedy: replace socket. However, after examining internal construction of this socket, and having 3 De Walds with same trouble, I found you can grasp the grid lug from the bottom with small pliers, pull straight up as far as possible, then bend lug outward and down

until it rests flat on socket. This makes a quick job and no come-backs. Leakage will not occur again because the right angle bend you have made in lug keeps it from contracting grounded part of socket between socket layers.

—C. Baker, Poughkeepsie, N. Y.

Grunow Model 11G: Intermittent, will play OK at times, then suddenly stop and will not

play again on same station but may on stations above or below with the same ultimate result. Routine check shows everything normal with a headache indicated. Tuning condenser rotor assembly will be found loose enough to just move enough to throw the set out of resonance from its own vibration but too little movement to cause plates to drag. Adjust anvil screw at rear of tuning condenser until rotor is in proper position. Align if necessary.

—C. Baker, Poughkeepsie, N. Y.

TECHNICAL SECTION INDEX

APRIL 1945 TO DECEMBER 1948

The end of the year is an ideal time for us to print the index of all items in the SYLVANIA NEWS Technical Section for the use of those servicemen who keep their copies for reference.

Bound volumes of all previous issues are available for \$1.00 each as follows:

- Volume 1 Technical Section
1935 to 1940 inclusive
- Volume 2 Technical Section
1941 to 1945 inclusive
- Volume 3 Technical Section
1946 to date, loose-leaf

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Mobile Unit Ideal For Television Service

Although the idea of a mobile service unit is not altogether new, its value in servicing and installing television is greatly magnified. Until ten months ago, Herman Pribis of Television-Radio Service Company used the basement of his home as a workshop and office. As his business grew with the great increase of television, Herman Pribis found that he was losing considerable time in bringing sets to his shop for repair. Also apparent was the fact that transportation jars and bumps were instrumental in damaging and knocking out of line some of the finer adjustments of the television receiver.

In searching for the solution to the problem, the idea of a mobile service unit seemed to furnish the best answer. The special van type body of the unit is suspended on a one ton truck chassis by special hydraulic shock absorbers. This serves as a shock mounting for the test instruments and assures their accuracy at all times.

Power for the test panel is furnished by a 1000 watt AC generator. The cabinet at the rear of the driver's compartment houses tubes, transformers and small tools. The work bench is large enough to accommodate two workmen and has shelving underneath for spare chassis, communication phones, cablings, etc. The test panels are made of standard 19" aluminum.

Test instruments included in the panel include one master power supply, supplying electronically controlled voltages to all instruments, a complete high frequency 'scope with built in square wave generator and an audio signal generator supplying both sine and square waves. Also included is a vacuum tube voltmeter capable of measurements up to 250 megacycles, a 120 thousand per volt multi-meter, con checker, one sweep generator accommodating all bands of television. Numerous portable pieces include a two inch 'scope which was built by Mr. Pribis and a crystal controlled signal generator which handles from 8 to 250 cycles as standard equipment in the unit.

One of the valuable pieces of equipment in the mobile service unit is a Sylvania tube tester. Since Mr. Pribis depends on his test



instruments to help speed up his work, he is interested in the best products his money can buy. His reason for purchasing a Sylvania tube checker is stated in the following claim: "Before purchasing a tube checker, we went to your distributor, Mr. Schwartz & Son, Schenectady, N. Y. We examined several tube checkers there. We took with us twelve tubes which we knew to be bad and of all of the tube checkers we examined, we found the Sylvania tube checker rejected eleven out of the twelve, which was the largest amount rejected by any of the other checkers."

"We do like Sylvania products and use them whenever applicable," says Mr. Pribis.

Through the use of a two way radio telephone the truck can keep in constant touch with their office. This is a feature which adds greatly to the service which can be given the customer. It means faster service along with considerable saving of time and expense in operating the unit.

Use of the mobile unit has also been a big help in selling television sets. When the customer knows he can be sure of quick service, he is less reluctant to make a large investment in television.

Ground Floor TV Experience Pays

Getting in on the ground floor of a growing industry is one good way to make sure you will be successful. Herman K. Pribis of Schenectady, N. Y. had that idea about television and it is paying off in big dividends.

Television - Radio Service Co., Herman K. Pribis, president, is a unique organization. Through the use of their mobile service unit they have been able to effect operating economies which give better service to the customer while increasing their own profits. The mobile service unit saves time and trouble for the serviceman and his organization.

The radio experience of Mr. Pribis dates back to 1923. Then radio was strictly a hobby. Later—15 years in fact—he secured a first class operators license from the FCC. It was then that he began to take

radio seriously. From a position of transmitter engineer at one of the local radio stations, he went into the radio servicing field. It was just about two years ago that Mr. Pribis became conscious of the fact that television was destined to become a big business.

To make sure that he got in on the ground floor, he took steps to acquire the fundamental knowledge of the new medium. To secure this knowledge he wrote directly to manufacturers for servicing information on their receivers. In addition he took advantage of television service schools sponsored by manufacturers in his community. All of these attentions to the problem have given him a good basic knowledge of television.

(Continued on page M-44)

New Clock Ties-In Ad Campaign

To help you further tie-in your business with Sylvania's national advertising campaign for radio service dealers get the new wall clock now available with the radio service decal insignia. This clock is a silent partner which can work night and day to help sell your service.

Attractively styled with the same brilliant colors of the radio service decal, this self starting clock enhances the appearance of your shop while serving a useful purpose. Night and day two 15-watt lamps illuminate the face. The bulbs are easily replaced through apertures in the back. The clock uses a minimum of electric current.

Face of the clock is a big 14 inches in diameter. The six foot line cord easily reaches to your nearest plug. The clock hangs from an ordinary hook through a notch in the back plate. The case is aluminum.

To help increase your business and further identify it with the great Sylvania co-ordinated advertising campaign get this clock today. Order from your Sylvania Distributor or the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. The price is \$9.50, including federal excise tax and shipping charges. Enclose your check or money order with your order. We can not accept C.O.D. orders.



Not For Quitters

If there is one enterprise on earth that a 'quitter' should leave alone, it is advertising. To make a success of advertising, one must be prepared to stick like a barnacle on a boat's bottom. He should know before he begins that he must spend money—lots of it. Somebody must tell him that he cannot hope to reap results early in the game . . . advertising does not jerk; it pulls. It begins very gently at first, but the pull is steady. It increases day by day and year by year until it exerts an irresistible power.

John Wanamaker

Don't Let Dollar Bills Fool You!

(Continued from page M-41)

section is a record of your financial position for the month. It shows how much you have spent, how much you have received and what you have left after you pay your bills recorded in part two.

Part two of the Sylvania Business Record Book is an account of your payments for merchandise, such as parts, tubes, etc. In this record you show the amount of money paid and to whom it was paid. It also shows how it was paid, check or cash. This part of the book gives you an accurate payroll record for any

employee with an account of the social security and pay-as-you-go tax.

The complete record for one month is entered on two pages size 8½" x 11". These facing pages give you the full financial picture of your business for each month.

The business record book, which runs for twelve months, contains a yearly profit and loss statement which can easily be prepared from the monthly record. This statement shows the condition of your business at year's end and is a good indicator of how well you are doing. From the profit and loss statement you can determine items which are costing too much and points which can be used to increase your profit and reduce your expenses.

Business records are essential to any business. Through adequate records of yesterday, better planning for tomorrow results. Records can keep you from becoming burdened with high inventories or from losing money because of lack of inventory.

The Sylvania Business Record Book offers you an economical system for keeping record of your expenses and profits. The cost of the book is \$1.00. It can be purchased from your Sylvania distributor, or from the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. It is never too late to start keeping records. Put the Sylvania Business Record Book to work tomorrow. It will pay you dividends at the end of the year.

Ground Floor TV Experience Pays

(Continued from page M-43)

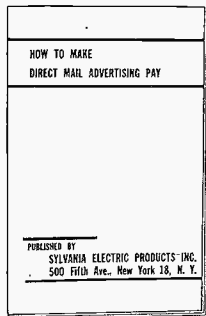
His careful planning has now paid dividends. At the present time Television-Radio Service Company holds exclusive installation contracts for two major television set manufacturers and are under contract to service and install three others.

Another unique feature of the Television-Radio Service Company is its ownership. The organization is strictly a family affair with Mr. Pribis as president, Mrs. Pribis as treasurer and other members of the company being their three sons who range in age from 4 years to 13 years. "This has caused quite a bit of amusement among our friends and business associates," says Mr. Pribis. "The oldest boy, Herman, Jr., is very adept in servicing standard AM radios and helps his father during his spare time in this

line of work as well as in television service and installation."

Based on his own experience, Mr. Pribis, thinks that the following advice will be helpful to servicemen interested in making television profitable. "It is our candid opinion that servicemen who are interested in entering television service should school themselves as they find necessary to acquire the proper knowledge and also secure literature on both theory and practical experience. We feel that installation charges should be sufficiently high so as to attract a type of individual who is willing to spend spare time training to produce high quality work and also a type of individual who can properly present the dealer or dealers, and thereby be a credit to the entire industry."

Tips on Direct Mail Advertising



For the convenience of service dealers who want to make use of more direct mail advertising to increase their business, Sylvania has prepared a booklet entitled, "How to Make Direct Mail Advertising Pay." This booklet gives many helpful hints on how to build a good mailing list and how to use it for increasing your service business. Copies are available FREE upon request by writing a card or letter to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa.

New Distributors

Appointment of the following companies as distributors for Sylvania radio and television tubes, test equipment and electronic products has been announced by H. H. Rainier, manager of distributor tube sales. These distributors are in addition to those listed in the special supplement of the September issue of the SYLVANIA NEWS.

- William B. Allen Supply Co.
916 N. Claiborne Ave.
New Orleans, La.
- Allen & Jamison Co.
Tuscaloosa, Ala.
- Arace Brothers
562 Broadway
Kingston, N. Y.
- Leuck Radio Supply
243 S. 11th St.
Lincoln, Neb.
- National Radio Parts Co.
611 New York Ave.
Brooklyn, N. Y.
- Norman Radio Distributors
9429 Merrick Avenue
Jamaica, New York
- Randolph & Cole, Inc
1516 Church Street
Nashville, Tenn.
- Robinson Television & Electronic Co.
23-05 45th Road
Long Island City, N. Y.
- Shuler Supply Co.
415 Dryades Street
New Orleans, La.

New Handy Pocket Wrench Set

Now available from your Sylvania distributor and the advertising department of Sylvania is a set of eight wrenches attractively boxed in a plastic pocket-sized kit. These wrenches will be extremely useful to radio service dealers in outside calls and in-the-shop service work.

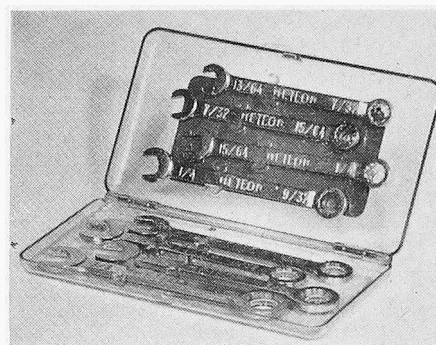
This new Sylvania wrench set is perfect for close work on radios and appliances. Each wrench is made from fine chrome molybdenum steel, heat treated and hardened for strength. The wrenches are finished with nickel. Slim tapered jaws of the wrenches operate half nuts and



Flat case slips into any pocket

reach hard-to-get-at adjustments. On one end is an open end wrench, on the other a twelve point box wrench. All wrenches are accurately broached to close tolerances.

Size of the fitted plastic kit is less than 1/2" thick, 4 1/2" long and 2 1/2" wide—just the right size for small



Set contains 8 wrenches — 16 sizes

pockets. The wrenches in the kit range in size from 13/64" to 7/16". Wrench sizes include:

| | |
|----------------|----------------|
| 13/64" x 7/32" | 9/32" x 5/16" |
| 7/32" x 15/64" | 5/16" x 11/32" |
| 15/64" x 1/4" | 11/32" x 3/8" |
| 1/4" x 9/32" | 3/8" x 7/16" |

The size is plainly marked on the end of each wrench.

This handy wrench set is available from your local Sylvania distributor at the price of \$1.00, including the plastic case. If your distributor does not have the set in stock, order from the Advertising Department, Sylvania Electric Products Inc., Emporium, Pa. If you order from Emporium, please enclose your \$1.00. We can not mail them C.O.D.

Dealer Association News

ARS of Central Pennsylvania

Television is taking its place in the life of the technicians of central Pennsylvania. Although headquarters for the group is in Williamsport, two hundred miles from the nearest TV broadcast station, they have established a laboratory for experimental service work in TV.

Signals from Philadelphia, New York, Washington and Baltimore stations have been successfully picked up on Mostoller Hill, one of the high mountains around Williamsport. The group plans to have full facilities including a forty foot tower with platform, at least two types of antennae and suitable test equipment available at their mountain laboratory according to

the president, Robert Stout.

The facilities are open to all members of the association who are interested in TV. "Our members feel that only by actually working with TV gear can one get to know the stuff," according to John Barsophy, publicity chairman. The actual experimenting will be supplemented with talks and classes on TV and personal study.

ARSD — Columbus, Ohio

Through the cooperation of FM station WKCO this group of dealers will present a weekly 15 minute radio program. The program will feature the radio service dealers of Columbus and particularly the ARSD. Complete plans for the program are still under discussion.

Robot Spectroradiometer For CR Tubes



An automatic recording spectroradiometer for production control of commercial television tubes has been built by the research staff of Sylvania. This instrument will accurately plot the energy output of cathode ray tube screens throughout the entire visible light spectrum in 48 seconds. This is in contrast to former methods which took skilled technicians a half a day to plot hundreds of values. The instrument will be used for production quality control in Sylvania's television viewing tube plants.

FACTS & FIGURES

TV Production Sets Record

Production of television receiving sets set a new record in October when 95,216 receivers crossed the finish line. This brings the total production for 1948 by RMA member-companies to 583,249. This production was 90.2% above the weekly rate for the year.

Station Statistics

FCC records on December 9 showed a total of 717 FM stations, including 27 non-commercial outlets, in operation. The number of television broadcasters on the air is now 47.

Who Has TV?

Latest reports indicate that television sets have been shipped to 40 states and the District of Columbia during the third quarter of this year. This is an increase of nine states over the second quarter. Since the end of the war, 609,892 TV sets have been shipped by RMA member-companies.

October Tube Sales

Sales of radio receiving tubes during the month of October were more than a million above those of September. Total sales for the month were 19,521,368. Sales of tubes for replacement purposes during October totaled 3,676,254.

SYLVANIA NEWS

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Vol. 15, No. 11

DECEMBER, 1948

Published By
SYLVANIA ELECTRIC PRODUCTS INC.
Manufacturers of Sylvania Radio Tubes and Electronic Devices, Sylvania Incandescent Lamp Bulbs, Fluorescent Lamps and Equipment

In This Issue

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EMPIRE STATE
TECHNICIANS ORGANIZE

MERCHANDISING
DON'T LET DOLLAR BILLS
FOOL YOU!

TECHNICAL
TELEVISION
VIDEO IF AMPLIFIERS