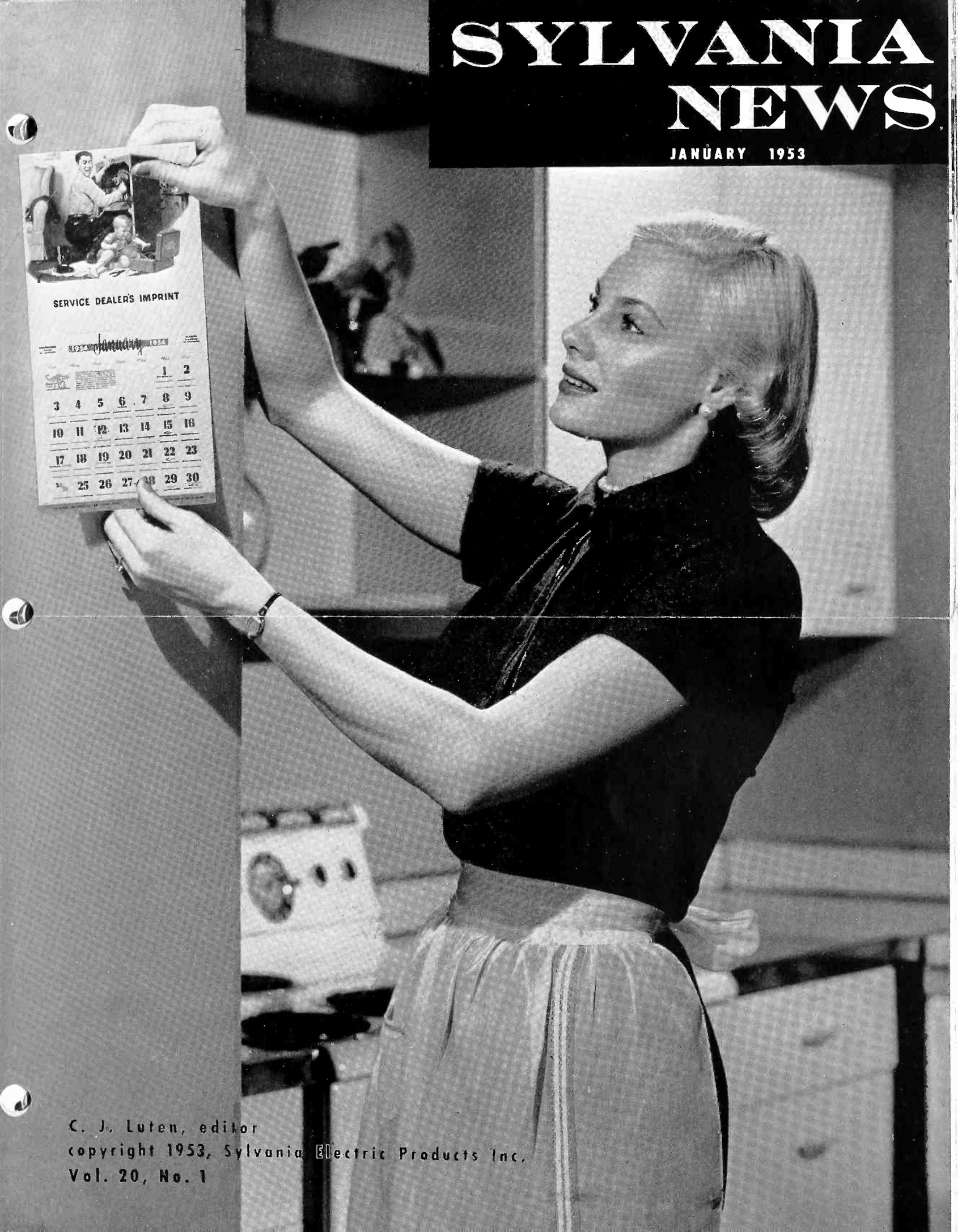
SYLVANIA NEWS

JANUARY 1953



C. J. Luten, editor

Vol. 20, No. 1

WHAT IS YOUR SHARE OF THE SERVICE BUSINESS IN 1953?

By Harold H. Rainier

Just a short time ago I asked our Sales Research Department to project its excellently detailed survey of radio and television service business to include new material of interest to Sylvania Distributors and to you, their customers. I requested the following information: 1) the estimated number of television sets which would be in use by the end of 1952 in every trading area in our country, 2) the percentage of television saturation in each of those areas, and 3) the expected 1953 service business in parts sold at list price.

When these figures are available, I feel that Sylvania can perform yet another service to those who buy and sell its radio and television picture tubes. Many service dealers through the country, concerned about the amount of business available to them in the area they serve, write us for the answer. They always receive a reply.

But this time, I think that in addition it will be good to provide inquiring service dealers with figures which might represent a year's goal for them. Each service dealer knowing what potential business is available in his area in 1953 will have

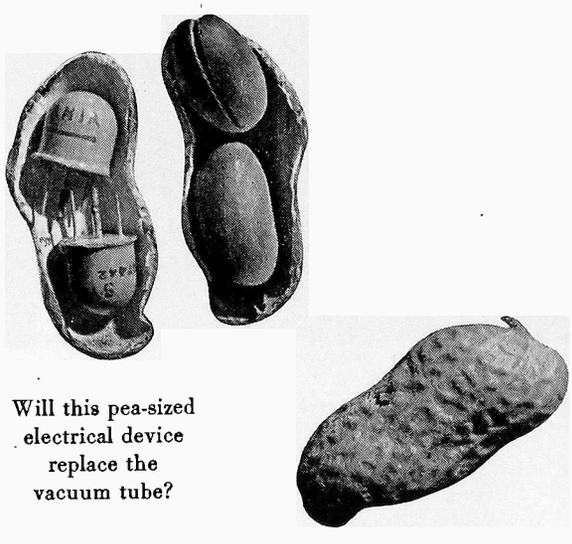
(Continued on page 10)

ESTIMATED RADIO-TV SERVICE BUSINESS - 1953
IN SELECTED TRADING AREAS

Trading Area	Radio Homes	Estimated TV Sets In Use 12/31/52	% TV SET Saturation	Expected 1953 Service Bus. in Parts @ List Price
Birmingham, Ala.	198,000	98,600	49.8	$ 5,588,100
Buffalo, N. Y.	312,120	270,300	86.6	12,710,100
Cleveland, Ohio	530,840	475,400	89.6	22,149,300
Detroit, Mich	869,630	602,600	69.3	30,300,200
Erie, Pa.	80,350	51,500	64.0	2,656,600
Houston, Texas	284,720	165,100	58.0	8,826,000
Indianapolis, Ind.	336,980	238,600	70.8	11,912,100
Kansas City, Mo.	357,370	174,900	48.9	9,980,900
New Orleans, La.	239,920	120,700	50.3	6,812,000
Omaha, Neb.	188,750	130,900	69.3	6,579,300
Phoenix, Ariz.	90,630	42,400	46.8	2,465,200
Providence, R. I.	229,530	173,600	75.6	8,492,300
Richmond, Va.	129,980	67,600	52.0	3,765,700
Salt Lake City, Utah	145,880	66,500	45.6	3,908,000
San Diego, Calif.	203,610	148,900	73.1	7,358,000
San Francisco, Calif.	355,750	187,200	52.6	10,381,200
Seattle, Wash.	272,280	123,000	45.2	7,256,700
Tampa, Fla.	169,290	9,400	5.5	2,232,700
Tulsa, Okla.	113,190	57,500	50.8	3,231,400
Louisville, Ky.	244,900	137,900	56.3	7,452,200

THE TRANSISTOR

By J. J. Sutherland
General Manager, Electronic Division



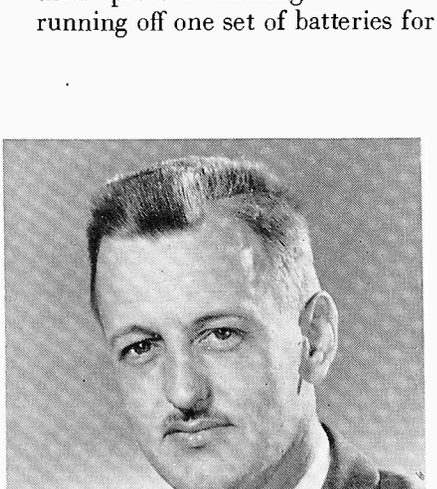
Will this pea-sized electrical device replace the vacuum tube?

During the past year, most of us have read or heard of germanium triodes, or transistors, and the wondrous things they will do. We have also heard rumors of how they will replace vacuum tubes. If this were true it would naturally cause great concern here in Sylvania. After all, we are one of the largest manufacturers of vacuum tubes. In something like 28 years we have made more than a billion of these tubes.

The transistor should be considered as a distinctively different component, *not a replacement for the vacuum tube.* There is no reason to believe that this electronic device will make the vacuum tube obsolete. The fact is that most types of vacuum tubes definitely will not disappear.

Actually transistors, which are about the size of a pea, offer tremendous possibilities. When they become available they could very well eventually make possible:

1. *small, vest-pocket and wrist watch radios*, almost as good as table models, occupying less volume than present hearing aids and running off one set of batteries for over a year, or perhaps someday even running indefinitely from the heat of the user's body;
2. *portable television sets*, smaller and better than present models;
3. *giant digital computers* ("electronic brains"), filling about a tenth their present space.



J. J. SUTHERLAND

I said earlier that Sylvania is one of the largest suppliers of vacuum tubes. It is gratifying to report that the company holds an equivalent position in the field of "semiconductor devices," which includes diodes and transistors. Diodes have been made by the millions for a number of years. The first germanium diode to be offered commercially, the famous 1N34, was marketed by Sylvania in 1945. About six million diodes were made last year and these found their way into everything from radar to television.

Let's take a look at what constitutes the semi-conductor device. The heart of the semi-conductor is a tiny slab, usually of Germanium. Electrically, it is neither a good conductor, like copper, nor a good insulator, like glass. If we take a small piece of Germanium (measuring 40/1000 of an inch) and properly connect each of two wires we find that Germanium will allow current to flow quite easily in one direction and will strongly resist current flow in the other direction. This forms a diode, which is comparable to a two-element tube, acting as a rectifier to change alternating current to direct current. These diodes have a variety of uses in television sets, radio sets, computers and other electrical equipment. When a third wire is added to a piece of Germanium, which has been processed slightly differently than for a diode, we have a transistor or triode. A little signal current fed into the Germanium through this third wire most remarkably influences its reaction to current through the other two wires. Where power current flow was strongly resisted in the diode the Germanium in the transistor has now opened its crystalline lattice gates, and the more widely opened the greater the signal current.

Thus we have, for certain classes of work, a vacuum tube amplifier with no vacuum. These tiny devices are much smaller than the smallest of the subminiature tubes. They have many advantages over vacuum tubes, being smaller, longer lived, and potentially more reliable and cheaper. They do not require hot filament or hot cathode, which means they can operate with considerably less power.

At present the transistor is still in development. No sizeable quantities have been produced as yet. There are a number of limitations which will have to be overcome before it can be considered as an important item in radio and television. It is extremely sensitive to temperature and humidity, and a serious problem has been that of instability of electrical characteristics during its usage. In its present state of advancement it cannot be used in such things as UHF television or microwave application. A great deal of research and development work is being done to solve these particular problems, but it will be some time yet before transistors will be used in sizeable quantities in any applications. Considerable research and development work is also being

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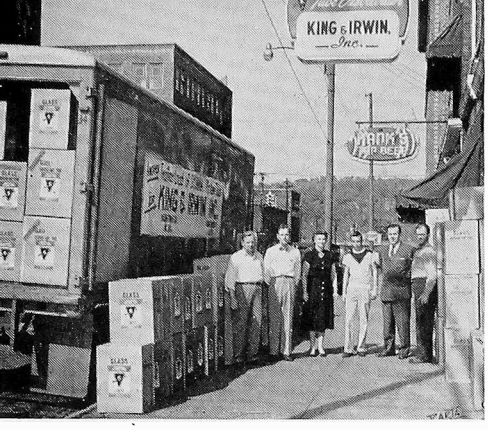
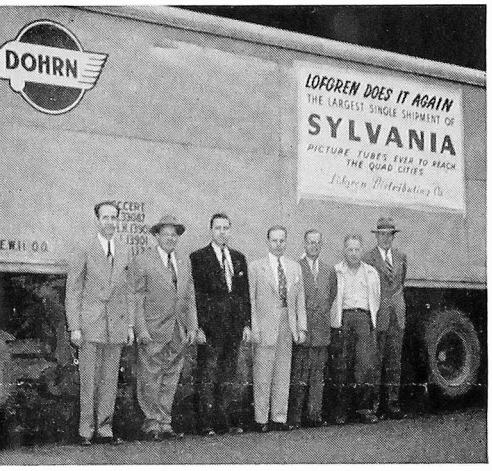


More New Members of Sylvania's Truckload of Picture Tube Club



At all points of the compass, more and more Sylvania Distributors are stocking fast-moving Sylvania TV Picture Tubes by the truckload to give their dealer customers the best possible service. The demand for Sylvania Picture Tubes is greater than ever—their superior performance having been proved beyond all doubt through recent exhaustive tests conducted by the United States Testing Company.

Top left there's a truckload for King & Irwin, Huntington, W. Va. Left to right: Earl Irwin, L. Swan, Mrs. M. Bromley, Veron Hamilton of King & Irwin; Sylvanian Justin McCarthy; and Ray King, president of King & Irwin.

Top right Tom Lawrence, sales manager of Chemcity Radio, Charleston, W. Va. (left), delivers a picture tube right from the Sylvania truck to service dealer Rank Sigmon, owner of Charleston Radio Service Co.

Here's a king-size truckload (bottom left) for Lofgren Distributing Co., Moline, Ill. From left to right: Bob Eberhardt, Joe Kehoe (Lofgren proprietor), Bud Neary of Lofgren; D. E. Smith, Sylvania Field Representative; Mack Bennett and Harry Fryxell of Lofgren; and E. J. Haase, Sylvania District Sales Manager.

At bottom right, unloading a truckload of Sylvania Picture Tubes are (from left to right): John Vail, Sylvania Field Representative; Frank Austin, a Jamestown, N. Y. serviceman; L. Nichols, Pete Son of Johnson Radio and Electronic Equipment Co. (Sylvania Distributor in Jamestown receiving this shipment); Joe Caprino of Caprino Radio; Johnson Radio's Bern Nelson and Mickey Jones; Chet Johnson, owner of Johnson Radio; and Sylvania District Manager Justin McCarthy.

TV SET PRODUCTION EXCEEDS RADIO OUTPUT

Production of television receivers in the week ending October 31 surpassed the output of radio sets for the first time, according to estimates announced by the Radio-Television Manufacturers Association. At the same time, manufacturers inventories of TV sets have dropped to the lowest mark since November, 1950.

RTMA estimated video set production at 205,957 units and the radio output at 205,931 units in the week ending October 31, compared with 195,139 television models and 198,190 radios the week before.

Manufacturers inventories were estimated at 80,108 TV sets and 189,833 radios. A breakdown of the radio report showed the manufacture of 85,758 home sets, 30,628 portables, 45,522 auto receivers and 44,023 clock radios.

Will Question FCC On Color TV Ruling

Congressman Charles A. Wolverton of New Jersey has declared that the Federal Communications Commission will be called before the House Interstate and Foreign Commerce Committee under the new Republican administration for an explanation of its ruling on color television.

Representative Wolverton will return to Washington on January 3 as chairman of the important Commerce Committee. He said that one reason for calling the FCC early was its ruling in favor of a color TV system developed by the Columbia Broadcasting System. Another color system has been submitted for approval by the Radio Corporation of America.

The color ruling, Mr. Wolverton said, was an evidence of "too hasty decisions" on the part of "alphabetical autocrats." He said the government regulatory agency would be asked to justify "many of the restrictions they have been imposing under Democratic rule."

SYLVANIA NEWS

TECHNICAL SECTION

JANUARY 1953 Vol. 20, No. 1

William O. Hamlin, Technical Editor

BANDPASS AND THE TV PICTURE

By W. O. Hamlin - Technical Publications Section

The bandpass of a television receiver is of prime importance for sharp, clear, good contrast television pictures. The typical overall video bandpass of a tv receiver should extend from 60 cycles to over 2 mc. Better receivers have bandpass frequencies up to 3.5 mc. Loss of the proper video bandpass due to serious misadjustment of tuned stages or defective parts in video stages will produce a very inferior picture. The effect of the poor bandpass can be readily detected by viewing a test pattern but is more difficult to see in the usual television program. For this reason, many television viewers will continue to use their tv receiver unaware that the picture could be better if the set were realigned or repaired.

Poor high frequency response gives the picture a washed out appearance and lack of picture detail. It is easy to see in the vertical wedges of a test pattern (See Figure 1). Notice that the fine lines are practically invisible. This effect is explained by considering what happens when the modulated electron beam sweeps across the face of the picture tube.

The beam sweeps across the picture tube at a great rate of speed; it takes only 63 microseconds (63 millionths of a second) to scan one complete line. As it produces the light area of the test pattern there is little change in beam modulation, which is represented as B in Figure 2, and it is unaffected by the narrow bandwidth. However, when the incoming signal changes to black, in a split microsecond, which is represented as A in Figure 2, the video amplifier cannot amplify the high video frequency component. The edges of black areas are not sharp and small details and lines such as the vertical wedges may not show at all.

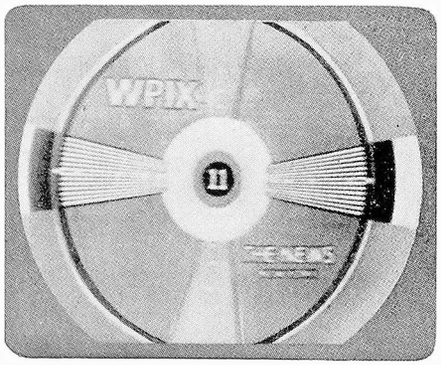


Figure 1. Inadequate high frequency video response.

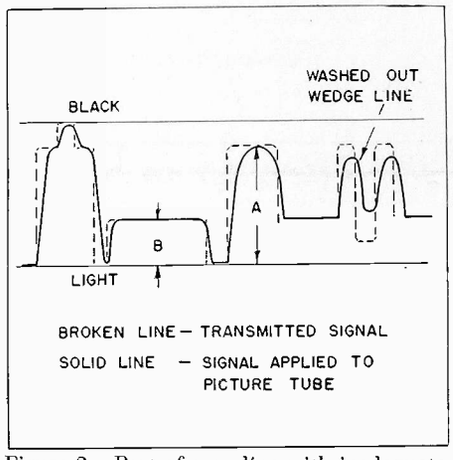


Figure 2. Part of scan line with inadequate high frequency video response.

Some of the causes for poor high frequency bandpass are defective peaking coils in the video amplifiers or serious misalignment of r f or i f sections. Also, excessive capacitance between video circuits and ground will reduce high frequency response. It may be improved by dressing leads in the video amplifier circuits and the video lead to the picture tube.

Poor low frequency response causes large dark areas to be non-uniform in brightness and have trailing edges. Vertical blanking will not be effective and it may be difficult to keep the picture in sync if the trouble is ahead of the sync take-off point.

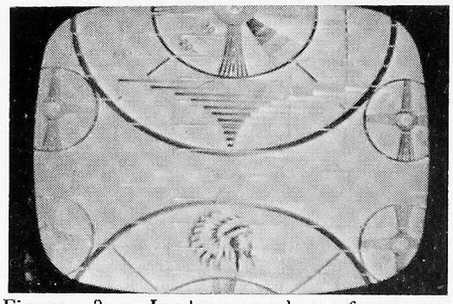


Figure 3. Inadequate low frequency video response.

Figure 3 shows a test pattern on the screen of a tv receiver that has poor low frequency response. The picture was deliberately moved off center to show the absence of the usual blanking bar between pictures. Notice how the horizontal dark bars in the lower center fade out toward the right.

The most likely cause of this condition would be an open video coupling capacitor which, due to sheer bulk, would allow high frequency components of the signal to leak through but effectively blocks the lows. This coupling capacity must be large to pass the low limit of 60 cycles. To eliminate this critical part many manufacturers have used direct coupling between the video amplifier and the picture tube cathode. This eliminates one cause of trouble with low frequency response.

Probably the most common cause of narrow or non-uniform bandpass is improper alignment of r f or i f stages which is quite critical, especially in fringe area reception. Amplification over the video bandwidth should be uniform to conform with the bandwidth of the transmitted signal, and proper alignment is necessary to achieve this. The typical bandpass waveform of a

(*Continued on page 7*)

A Yagi Antenna For The UHF TV Channels

By P. R. Simon
Advanced Application Engineer

A Yagi type of antenna is one of the simplest high gain antennas to build for reception of one particular channel. Such an antenna using No. 8 aluminum wire as directors and reflector and a dipole constructed of ¼″ and ⅛″ brass tubing was optimized dimensionally to achieve the greatest gain on channel 22 or 521 mc.

A gain of 9 db was measured and a good front to back ratio and a good match to 300 ohm twin line was obtained. The dimensions of the antenna are shown in Figure 1. The boom was made of a wax impregnated oak strip ¾″ x ¾″ x 32″ and mounted to its support at the end beyond the reflector. This type of antenna should find wide application for other u h f channels as u h f stations come on the air in the future. To facilitate the construction of antennas for other channels, in Table 1 are shown all the dimensions that change with frequency converted to fractions of a wavelength. The symbols L and S refer to the element length and spacing as described in Figure 1 with all other dimensions remaining the same as specified. For further convenience in finding the center wavelength of the u h f channels from No. 14 to 83, the formula below was derived:

TABLE I

Yagi Dimensions in Wavelength

Dimension	*Wavelengths*
S_1	0.215
S_2	.240
S_3	.200
S_4	.290
S_5	.285
L_1	.495
L_2	.450*
L_3	.430
L_4	.430
L_5	.420
L_6	.415

*L_2 is overall length of the ¼″ diameter element of the dipole.

$$\text{Wavelength (inches)} = \frac{11800}{6\ (\text{u h f channel number}) + 389}$$

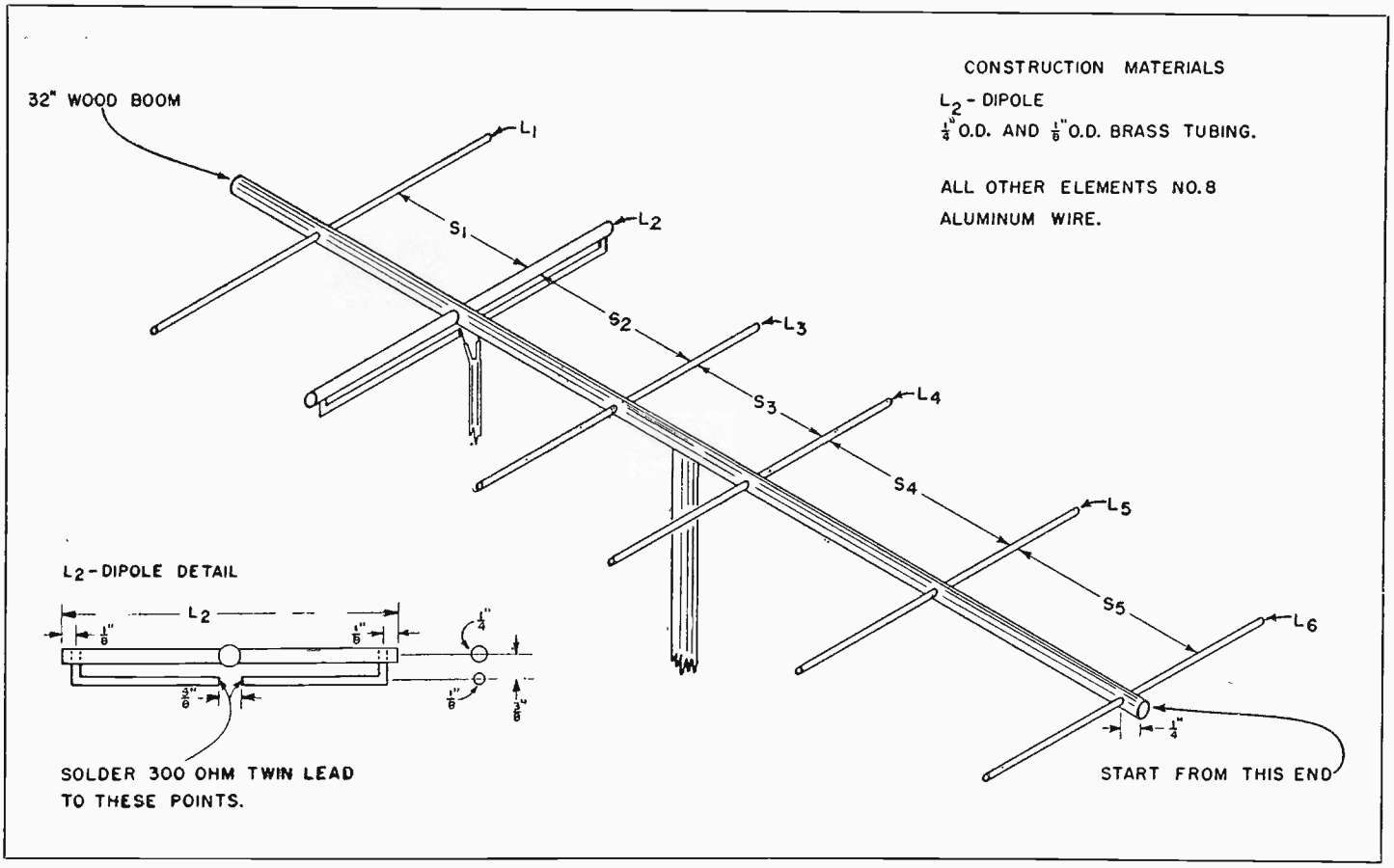


Figure 1. A U H F Yagi Antenna

THE NEW UHF TV CHANNELS

Channel	Freq. MC	Channel	Freq. MC	Channel	Freq. MC
14	470–476	37	608–614	60	746–752
15	476–482	38	614–620	61	752–758
16	482–488	39	620–626	62	758–764
17	488–494	40	626–632	63	764–770
18	494–500	41	632–638	64	770–776
19	500–506	42	638–644	65	776–782
20	506–512	43	644–650	66	782–788
21	512–518	44	650–656	67	788–794
22	518–524	45	656–662	68	794–800
23	524–530	46	662–668	69	800–806
24	530–536	47	668–674	70	806–812
25	536–542	48	674–680	71	812–818
26	542–548	49	680–686	72	818–824
27	548–554	50	686–692	73	824–830
28	554–560	51	692–698	74	830–836
29	560–566	52	698–704	75	836–842
30	566–572	53	704–710	76	842–848
31	572–578	54	710–716	77	848–854
32	578–584	55	716–722	78	854–860
33	584–590	56	722–728	79	860–866
34	590–596	57	728–734	80	866–872
35	596–602	58	734–740	81	872–878
36	602–608	59	740–746	82	878–884
				83	884–890

Bandpass & The TV Picture

(*Continued from page 5*)

television receiver, which you have seen so often in servicing manuals, is designed to give just the right amounts of sound and picture carrier with wide band video modulation for best reproduction of the transmitted signal. The set should be aligned to this waveform by use of a tv signal generator and an oscilloscope.

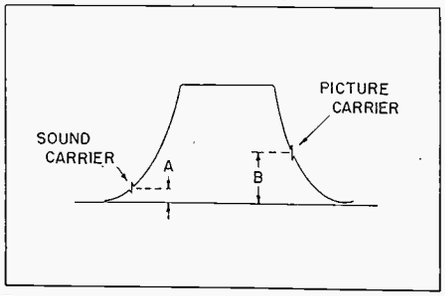


Figure 4. Typical intercarrier bandpass.

In an intercarrier receiver it is important that the sound carrier level does not become greater than 10% of the picture carrier at the video amplifier. This is because greater amplitudes will cause distorted sound due to video modulation of the 4.5 mc beat note sound signal. Amplitudes much less than 3% of the picture carrier would not give a high enough sound level. The optimum ratio of sound to picture is depicted in Figure 4. A—the sound carrier level is 3% of B—the picture carrier level. B is about 50% down the slope from maximum video frequency amplification to match the vestigal side band signal received from the station.

Misadjustment of the i f stages that raises the sound carrier up the slope may cause distortion of the sound and/or bands in the picture. Bands in the picture are more commonly caused by misadjustment of the sound take-off trap (See Figure 5). Improper bandpass in

(*Continued on page 8*)

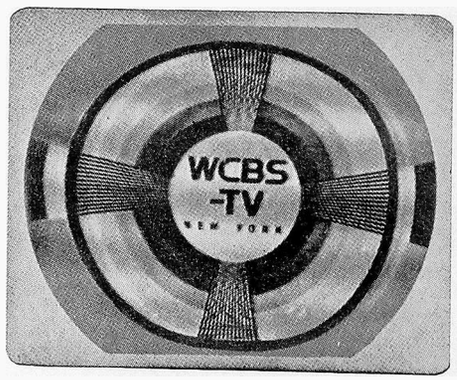


Figure 5. Sound in video applied to picture tube.

(*Continued from page 7*)

the other direction (raising the picture carrier up the slope) will accentuate the low frequencies and reduce the higher video frequencies.

Sometimes in fringe area reception the technician will deliberately distort the bandpass waveform in order to get more gain from the i f stages. This reduces the high frequency video response as was mentioned, but the theory is that a poor picture is better than none. There may be some merit to this procedure if care is taken that the sound carrier strength has the proper ratio to the video carrier. In this respect the separate sound channel set has an advantage because peaking the video will not affect the sound.

Peaking the i f's for ultra fringe area reception can be done scientifically by two different methods. An oscilloscope and sweep frequency generator must be used for both. The first method is to peak up the normally flat portion of the bandpass curve until the video carrier marker rides close to the top (See Figure 6A).

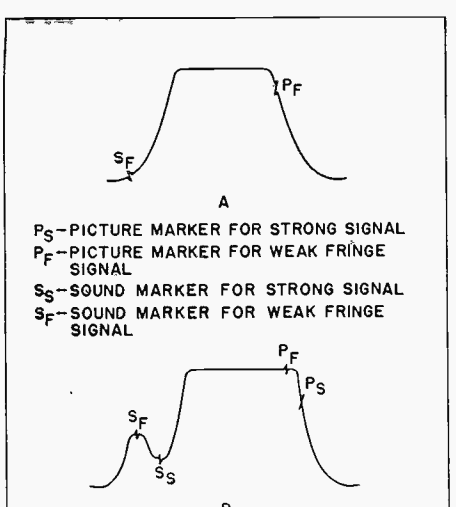


Figure 6. Peaked video bandpass for fringe areas. A—Ordinary peaked i f bandpass. B—Peaked i f bandpass by using special traps.

The left hand slope is adjusted so that amplification of the sound carrier marker is about 3% of the video carrier.

An improved method that gives a better wave shape is to peak the right hand video portion of the waveform and set the sound carrier marker on top of a minor peak (See Figure 6B). The minor peaks occur in most wide band amplifiers and can be made to coincide with the sound marker by adjusting various traps in the receiver.

Today it is possible to achieve the same high gain without distorting the wave shape by the use of a low noise, high gain booster between the antenna and the receiver. Remember that you cannot get clear and detailed pictures without amplifying almost all the video frequencies.

Service Hints

DUMONT RA 112, 133—Have had numerous complaints about tuning indicators sticking. Many hours may be spent in the shop, checking these units, to no avail, for the trouble is *not* in the chassis. The trouble stems from the fact that the celluloid window (in the cabinet) warps in towards the indicator needle. There are two remedies: First, the celluloid may be reversed in the holder. Secondly, the chassis bolts may be loosened and the chassis pulled back as far as possible. The knobs will still hold securely.—H. Melnick, Elmont, New York.

TO AVOID LOSS OF TV LINE CORDS through forgetfulness and to save having to grope for hard-to-reach wall or floor receptacles, make a tv line connector as follows: Cut off receptacle plug from a tv connector and replace with a male connector which will fit into the tv back cover plug. Cover exposed part with tape. Then simply plug into back cover (with cover removed from set) and other end into receiver as usual.—Leo A. Beck, Butler, Pennsylvania.

EMERSON 124B, 669B, 675B—In all sets feeding back a portion of the vertical retrace, check for an open coupling condenser from vertical output section to brightness control. Complaint for this is white retrace lines in pix when brightness is brought up to viewable level. (On Emerson 124B series, Emerson 669B, and Emerson 675B.)—Harry Ringel, New York City.

HIGH VOLTAGE PROBE FOR THE POLYMETER

Often the television service technician has a need to measure the extremely high voltages found in television receivers.

A dim picture on the CR tube may be caused by trouble in the flyback high voltage supply. The trouble is most easily located by checking the d c voltages throughout the circuit (filter capacitor, voltage doubler or tripler capacitors, rectifier tubes). A low voltage reading will help find which part or tube is at fault or indicate that there is trouble in the horizontal deflection circuit.

You can measure these high voltages, ranging from 6 KV to 30 KV, on the Polymeter by using the high voltage probes that are sold as accessories to the meter. The probes are designed for low leakage, high breakdown voltage, and safety to the user.

The Sylvania Type 222 High Voltage Probe will multiply the Polymeter ranges by 10 allowing a maximum reading of 10,000 volts d c. The Sylvania Type 225 probe multiplies the ranges by 30 permitting a reading up to 30,000 volts. Since the resistors in the probes are adjusted for use with the Sylvania Polymeter, the probes will not function correctly with other makes of instruments.

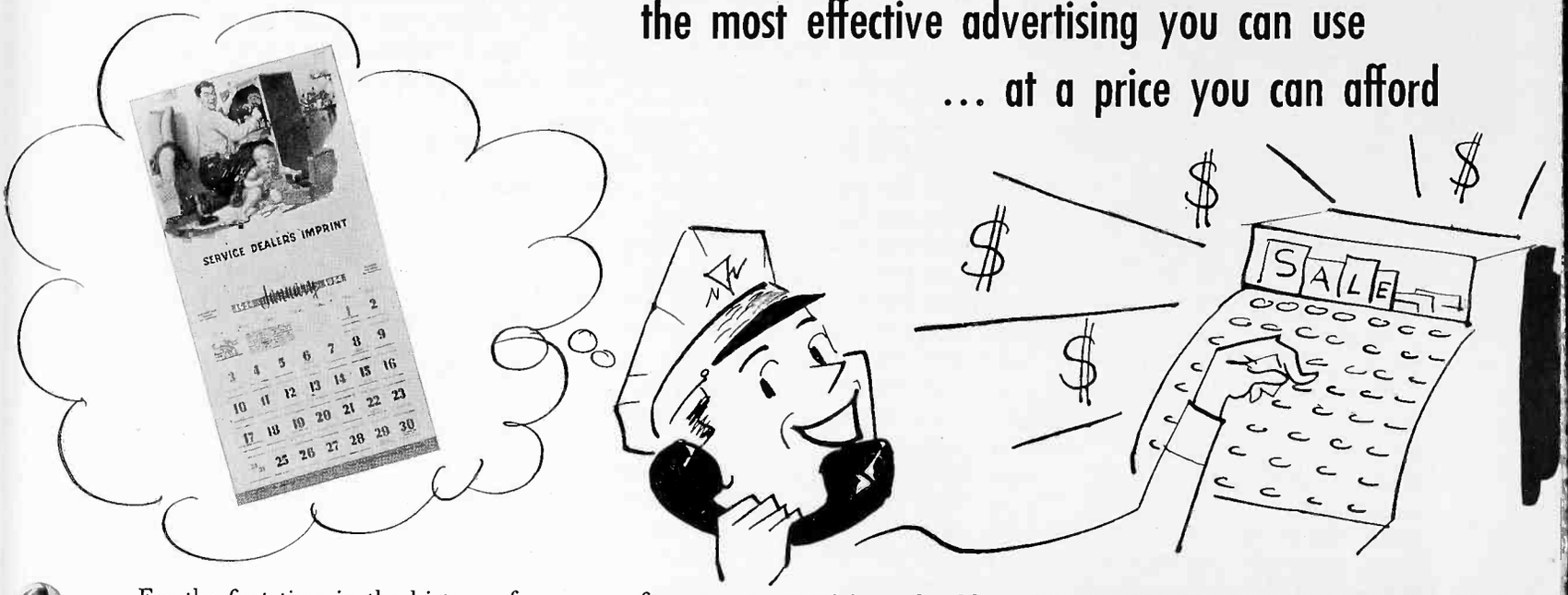
SYLVANIA NEWS

MERCHANDISING SECTION

JANUARY 1953 Vol. 20, No. 1

SYLVANIA OFFERS YOU . . . YOUR OWN PERSONALIZED CALENDAR

the most effective advertising you can use ... at a price you can afford



For the first time in the history of the service industry, a service dealer can buy a big, colorful personalized calendar for his business — for pennies. Sylvania has made this possible with its 1954 calendar, tailor - made for radio - television service dealers.

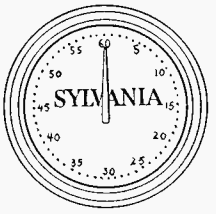
This calendar will do more for you than any other single advertising aid you can use. Just think:

1. Your business imprint on this calendar constantly reminds your prospects of you every day in the year.
2. This calendar provides your Christmas greeting for 1953.
3. It promotes your business the way you'd want to promote it. It tells everybody you are a skilled television and radio technician . . . that you're reliable, experienced, use the best replacement parts, and charge a fair price. The feature . . . Here's the Inside Story of Your Television Set . . . will stimulate interest and understanding of your service problems. Here's a chance for you to help educate the public and to will the profits expert servicing should bring.
4. It's loaded with home - appeal features that will get read. Women, especially, will consult the cooking and home care hints on the back of each of the calendar pages.
5. It has liberal space for your customers' reminder memos.
6. Its cover is illustrated by famous magazine cover artist Fred Stanley.

What does this calendar cost you? Only 1½ cents per prospect each month. Your personalized Sylvania calendar is offered to you in lots of 100. Each 100 costs you but $18.00. For an additional $1.40 your 100 calendars will be made available to you already stuffed in envelopes suitable for mailing.

Your Sylvania calendar will make money for you every day in 1954, will give you the greatest return for your advertising dollar. See your Sylvania Distributor today or write the Sylvania Advertising Department, 1100 Main Street, Buffalo 9, N. Y. Make sure your phone rings more than ever before in '54.

BEAT THE CLOCK HELPS SELL YOUR SERVICE



The commercials on Sylvania's popular television show *Beat the Clock* continually plug the serviceman who displays the Sylvania Radio and Television emblem. They tell your prospects that the man behind that emblem offers dependable service and quality materials. Recent commercials have pointed out that the man behind the Sylvania emblem sells Sylvania television picture tubes, whose superior performance has been proved beyond all doubt as a result of recent exhaustive tests conducted by the United States Testing Company.

Make sure you have the Sylvania emblem on your window, door, and truck. You may obtain as many as you want free from the Advertising Department, 1100 Main St., Buffalo 9, New York or from your local Sylvania Distributor.

Here's an up-to-the-minute list of the television broadcast stations carrying *Beat the Clock:*

City	*Station*	*Local Time and Day*
Birmingham	WAFM–TV	10:00–10:30 PM Tues.
Phoenix	KPHP–TV	8:30– 9:00 PM Sat.
Los Angeles	KNXT	7:30– 8:00 PM Sat.
San Diego	KFMB–TV	10:30–11:00 PM Thurs.
San Francisco	KPIX	7:30– 8:00 PM Sat.
Denver	KBTV	7:30– 8:00 PM Sat.
Washington	WTOP–TV	7:30– 8:00 PM Sat.
Jacksonville	WMBR–TV	7:30– 8:00 PM Sat.
Atlanta	WAGA–TV	7:30– 8:00 PM Sat.
Chicago	WBKA	6:30– 7:00 PM Sat.
Rock Island	WHBF–TV	9:00– 9:30 PM Sat.
Indianapolis	WFBM–TV	6:30– 7:00 PM Sat.
Ames-Des Moines	WOI–TV	5:15– 5:45 PM Fri.
Louisville	WHAS–TV	10:00–10:30 PM Thurs.
Baltimore	WMAR–TV	7:30– 8:00 PM Sat.
Boston	WNAC–TV	5:00– 5:30 PM Sat.
Detroit	WJBK–TV	7:30– 8:00 PM Sat.
Minneapolis	WTCN–TV	6:30– 7:00 PM Sat.
Kansas City	WDAF–TV	11:00–11:30 PM Sat.
St. Louis	KSD–TV	11:00–11:30 PM Fri.
Omaha	KMTV	10:30–11:00 PM Sat.
Buffalo	WBEN–TV	5:30– 6:00 PM Sat.
New York	WCBS–TV	7:30– 8:00 PM Sat.
Syracuse	WHEN	7:30– 8:00 PM Sat.
Charlotte	WBTV	5:00– 5:30 PM Sat.
Greensboro	WFMY–TV	6:30– 7:00 PM Sat.
Cincinnati	WKRC–TV	7:30– 8:00 PM Sat.
Cleveland	WXEL	7:30– 8:00 PM Sat.
Columbus	WBNS–TV	7:00– 7:30 PM Mon.
Dayton	WHIO–TV	7:30– 8:00 PM Sat.
Oklahoma City	WKY–TV	11:00–11:30 PM Wed.
Lancaster	WGAL–TV	2:30– 3:00 PM Sun.
Philadelphia	WCAU–TV	7:30– 8:00 PM Sat.
Dallas	KRLD–TV	6:30– 7:00 PM Sat.
San Antonio	KEYL	6:30– 7:00 PM Sat.
Salt Lake City	KSL–TV	6:30– 7:00 PM Mon.
Roanoke	WSLS–TV	7:30– 8:00 PM Sat.
Seattle	KING–TV	4:30– 5:00 PM Sat.
Milwaukee	WTMJ–TV	11:00–11:30 PM Mon.

Additional Steel For Radio-TV Sets

Manufacturers of radios, television sets, appliances, automobiles and other consumer durable products have been granted an average of 15 per cent more steel for the first quarter of 1953 by the Defense Production Administration.

Manufacturers of radio and TV sets originally had received allocations equal to 33 per cent of pre-Korean levels because of the steel strike. These supplemental allotments will permit the production of a substantial number of additional receivers during the first quarter of next year.

A total of 8,000 extra tons of steel will be made available in the first quarter for radio-television manufacturers, it was learned.

What Is Your Share of The Service Business In 1953?

(*Continued from page 2*)

something definite to shoot at. He can tell for sure at the end of 1953 whether or not he has obtained the share of business he has aimed for.

The table at the bottom of page 2 is an illustration of the data that we will have early in 1953. While the figures shown here are not final, they are tentative estimates. They describe the estimated repair business for twenty trading areas selected at random, and should be of great interest to anyone concerned with the radio and television service industry. When the final data is available, it will accurately reflect—as the figures below indicate—the vast business set service has become and point the way toward an even brighter future.

It will be seen that the percentages of TV saturation range up and down the scale. It must be remembered, however, that even when saturation is virtually complete, there is no end to purchase of new sets. For quite some time, replacement sales of radio sets have been extremely high even though complete saturation was long ago reached.

There is, of course, not enough space in SYLVANIA NEWS to print the complete findings of our Sales Research Department. If, however, you are interested in receiving the figures for your city's trading areas, you may obtain them by writing the editor of SYLVANIA NEWS, 1740 Broadway, New York 19, N. Y. It is planned that they will be ready for distribution in February.

Sylvania Sit-N-Fixit Now For Sale

The demand for the Sylvania Sit-N-Fixit, since its withdrawal as a premium last summer, has been so great that it is now being made available for sale. You can pick up an extra Sit-N-Fixit—or if you missed getting one, introduce yourself to the most amazing servicing aid you ever used—at your nearest Sylvania Distributor. It is priced at $8.95.

The Sylvania Sit-N-Fixit will make your service calls easier, faster, more comfortable. It consists of two parts. First, there is a smart, plastic-bound, carry-all, zippered case that makes a perfect drop cloth for tools, tubes, and parts. This case will protect your customers' rugs and floors. Second, the stool itself, made of folding aluminum and a water repellent sailcloth, makes it ideal for the beach or a camping trip.

On one side of the stool is a zippered side pocket that holds screwdrivers, alignment tools, soldering iron, solder, and other tools you may need—ready for instant use. On the opposite side of the Sit-N-Fixit there is a flap designed especially to hold your Sylvania Wrench Kits and Plier Pack.

The Sylvania Sit-N-Fixit is sure to make your job easier, and its neat, smart appearance will impress your customers. Don't delay. See your Sylvania Distributor today. Or write Sylvania Advertising Department, 1100 Main Street, Buffalo, New York.

RTMA SERVICE COMMITTEE TO SPONSOR TECHNICIAN TRAINING COURSE

As one phase of its broad educational program for television technicians, the RTMA Service Committee under Chairman R. J. Yeranko recently approved a plan to sponsor a television technician training course in the New York Trade School. This is an endowed trade school in New York City and is separate from the city schools.

The committee hopes to get the course installed in the school in the very near future. A requirement for prospective students is that they have knowledge of radio servicing. As a part of the Service Committee's effort to up-grade technicians, the projected course would enable television servicemen to specialize in various phases of TV set servicing.

An instructor with both teaching knowledge and experience in the service industry will be engaged to direct the course according to the proposal. The program also involves an industry advisory board consisting of representatives from the Service Committee and Sections of the RTMA Parts Division. Member-manufacturers have agreed to furnish the necessary equipments and special materials required for the course.

In another action to further its general educational program, the committee engaged a booth during the convention and exhibition of the American Vocational Association at Boston on Dec. 1-5. At that time the committee displayed the equipments used in the proposed training course and informed vocational educators of the RTMA TV technician training program. The booth was manned by service representatives of RTMA member-companies.

US TV Service Outlook Bright

The outlook for the rapid development of a nation-wide television service has been greatly strengthened by the results of a technical survey of operations of the first commercial UHF television station — KPTV, Portland, Oregon.

Brightened by the results of the study is the prospect of good TV reception in the new areas to be served by UHF stations. In the Federal Communications Commission's blueprint of 2,051 potential television stations, 1,445 are allocated in the UHF portion of the frequency spectrum.

450 MILLION TUBES WILL BE PRODUCED DURING NEXT YEAR

Representatives of the receiving tube industry advisory committee in a meeting with the National Production Authority estimated 1953 tube production at about 450 million units. NPA was more optimistic, placing the figure at approximately 487 million units, including an increase in military requirements of 60 per cent over 1952 production.

NPA explained its figure was based on an estimated production of 6.2 million new television sets and 12 million radios in 1953. The figure for renewal tubes was set at about 80 million.

Members of the transmitting and special purpose tube committee saw NPA charts indicating a rising production through the fourth quarter of 1952.

The tube manufacturers reported no serious shortage of any type of tube and no alarming materials problems.

IMAGINATIVE, LOW COST OUTDOOR STORE IDENTIFICATION

Here's an idea for low-cost outside store identification that many service dealers may find useful. Leon J. Gero of Taftville, Conn., owner of Gero's Radio and Television Service, recently bought a $1.25 Sylvania outdoor flange sign from his local Sylvania Distributor. He wanted to display as prominently as possible the Sylvania Service Emblem and tie in with the program of national magazine and television advertising Sylvania sponsors for service dealers.

Though Gero felt he could not afford the big Sylvania electric metal-plastic outdoor sign, he thought he would do the best he could with $40 and the Sylvania steel flange sign. The picture at left shows how well he succeeded.

Gero's sign stands nine feet and five inches from the ground. It is painted a sunshine yellow and is trimmed and lettered in bright red. Light bulbs in the circular portion illuminate the flange. A little money and lots of imagination has given Gero effective outdoor advertising both day and night.

THE TRANSISTOR

(*Continued from page 3*)

done on applications and circuits, because the transistor has its own circuit peculiarities, and is not simply a tube replacement item. This work is paralleling the work on the transistor itself and will result in new industry growth, creating an electronic market which will supplement the vacuum tube business as we now know it. In addition, by making possible new circuit applications it will expand the total number of tubes in use. This is because many of the new circuits will use both tubes and transistors.

We can expect great new strides in electronics. But this will not make existing facilities obsolete. It

will add to existing techniques and broaden our markets. Sylvania's role in this changing picture is clear. We will continue as a major supplier of existing components and, at the same time, exploit our position as a pioneer in the fields of germanium diodes and transistors.

In This Issue

SYLVANIA NEWS

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Vol. 20, No. 1 JANUARY 1953

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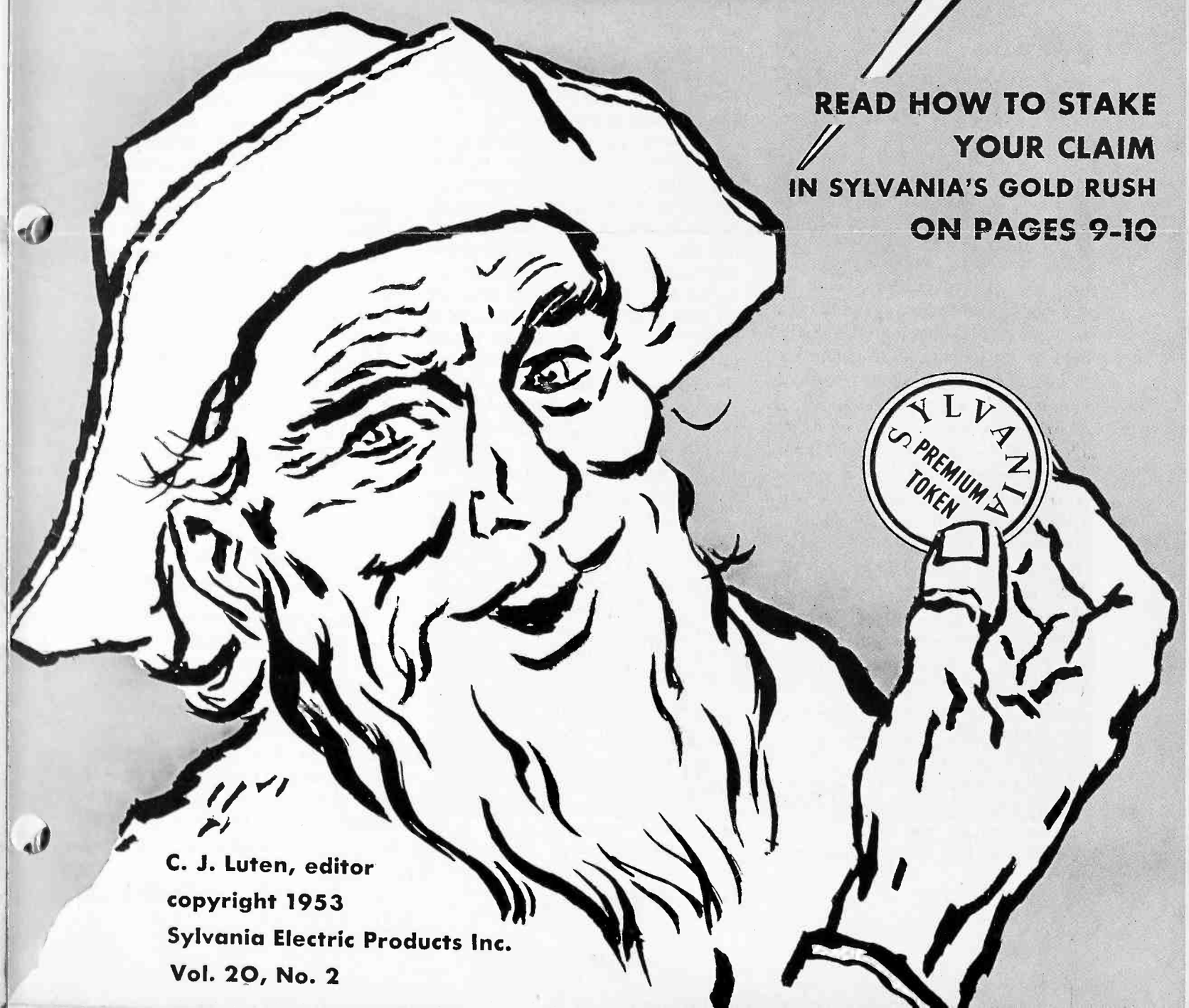
SYLVANIA NEWS

FEBRUARY 1953

Strike it Rich!

READ HOW TO STAKE YOUR CLAIM IN SYLVANIA'S GOLD RUSH ON PAGES 9-10



C. J. Luten, editor

Vol. 20, No. 2

A PLAN TO CREATE CONFIDENCE IN TV SET OWNERS

By Frank Moch, * President, NATESA

FRANK MOCH

Without doubt, every TV service shop, regardless of location or classification, that is either independent, distributor owned, or factory operated has suffered serious loss of both income and prestige because of the low regard in which service is generally held by the public. The public has had some reason for such an attitude because of the shady operations of an extremely small minority of shops. The practices of a few service companies which have caused the greatest doubts in the public's mind have been 1) phony ads offering service at ridiculously low rates, 2) failure to fulfill the promises of these phony ads, 3) poor quality work, 4) excessive charges, 5) long delays, 6) failure to give simple guarantees, 7) failure to make good on legitimate complaints, 8) sloppy personnel, 9) sloppy, ill-equipped shops, and 10) use of second hand, inferior parts. Other factors contribute to the problem, many of which are outside the control of service. One major problem is the disinterested attitude of the rest of the industry and their lack of desire to properly acquaint the public on the need of good service. Some definite progress is, however, being made on this subject.

Honest, qualified service companies, through their local associations and the national alliance NATESA, have for a long time been aware of the problems. They have done an admirable job of protecting the public from frauds, incompetents and phonies. They have long sponsored a National Code of Ethics. This self policing has assured set owners really good service at honest rates when dealing with association members. Unfortunately, the phonies don't belong to associations; in fact, they would not be accepted. The industry generally has done nothing to encourage use of the self policed association members as opposed to the racketeers. In fact, the industry has actually, generally, refused to cooperate in exposing the racketeers. As a result, the situation has deteriorated to such an extent that legitimate service companies are forced to compete with the racketeer on their price offers while at the same time they are expected to render honest service. This has depressed the rate which the public wants to pay, causing serious financial loss to honest service companies. It is further aggravated by the fact that the amount of money available from service jobs is so small that adequate wages cannot generally be paid for professional quality technicians. Hourly wages for good men run $2.50 maximum. Compare this with a house wiring electrician who gets $3.50 per hour and more, truck drivers getting $2.50 per hour, or the TV factory aligner or trouble shooter getting $1.90 per hour, none of whom need anywhere near the education and training, the continuous study to keep up to date or the knack of psychologically handling people, and it is obvious that the problem of keeping good men in the profession will rapidly become insurmountable. Because of this, today there are actually fewer men available than in 1948 even though far more sets need service.

Service has repeatedly asked other segments of industry for cooperation in solving this mutual problem, without success. It is obvious that a solution must be found *and instituted.* Neither independent service, which has a huge investment in time, money and effort, the TV-Radio set owners who have no way to really distinguish between honest, reliable companies and the undesirables or for that matter the rest of the TV industry can afford to permit the present situation to degenerate further.

One alternative is a plan for qualifying and certifying service shops and servicemen, through industry wide cooperation. This plan is designed not to eliminate anyone who is qualified to do a good job on an honest basis, it is designed to encourage higher class persons to enter and stay in the service field by making it a good profession and a good business in which reasonable profits can be made for good service performed.

The other alternative is government imposed legislation and licensing. Independent service would prefer an industry controlled solution. It is up to the rest of the industry to decide what course will be followed. These are our plans.

QUALIFICATIONS OF TECHNICIANS PLAN

Refresher course will be conducted for: 1) Association member employees and 2) outsiders who are actively engaged in the service business.

The course consists of one lecture of approximately 3 hours per week (with a break of 10 minutes at half way point). Qualified distributors and factory service personnel will be asked to cooperate in the conduct of

(*Continued on page 4*)

Sylvania Conducts Meeting for TV Tradesmen in New UHF Territory

The second UHF television station in the United States, WHUM-TV, Reading, Pa., commenced a regular program service for the rich eastern Pennsylvania market in December. Operating at a maximum power of 260,000 watts on Channel 61, this station serves a population of 2,675,000 persons. Officials of the Eastern Radio Corp., which owns and operates this station, claim that WHUM-TV is the world's most powerful television station.

In all, some $750,000 has been poured into this new television station, according to Humboldt J. Greig, president of Eastern Radio Corp., who has an extensive background in the field of radio and television broadcasting.

One of the outstanding features of this new television station is a transmitting tower 1,036 ft. in height, erected at a cost of $250,000. Since this tower has been built on top of a mountain 1,652 ft. in height, it is actually 2,688 ft. above sea level. This is twice that of the Empire State Building in New York. It has been erected about 85 miles northeast of Reading and just south of Pottsville.

Greig asserted last week that WHUM-TV transmits with more power than all the TV stations in New York and Philadelphia combined. Among the important cities which WHUM-TV serves in addition to Reading are Allentown, Harrisburg, Wilkes-Barre, Bethlehem, Lancaster, York, Williamsport, Hazelton, Easton, Lebanon, Pottsville, Pottstown, Kingston and Nanticoke. Greig predicts that over 100,000 TV receivers capable of receiving WHUM-TV will be in operation in this area this month. After that, he expects 50,000 additional sets capable of receiving the new station's signal in use during the next quarter of 1953. Set makers and manufacturers of UHF converters and tuner strips are co-operating with the station by shipping equipment into this area.

A number of meetings have already been held in this market during recent weeks for television servicemen and dealers at which they were briefed on the problems with which they will be faced now that the new UHF station is on the air. Sylvania Electric Products Inc. and the George D. Barbey Co., Reading, distributor of Sylvania tubes and parts, recently conducted an elaborate meeting at the Berkshire Hotel, this city, with some 400 servicemen in attendance. Engineers and technicians from Sylvania Electric explained installation and repair problems in connection with UHF receivers, and outlined differences in UHF and VHF antennas and reception problems.

A dinner meeting at the Abraham Lincoln Hotel for members of the Barbey organization, representatives of Sylvania Electric, officials of WHUM-TV and a number of nearby Sylvania distributors preceded the service meeting.

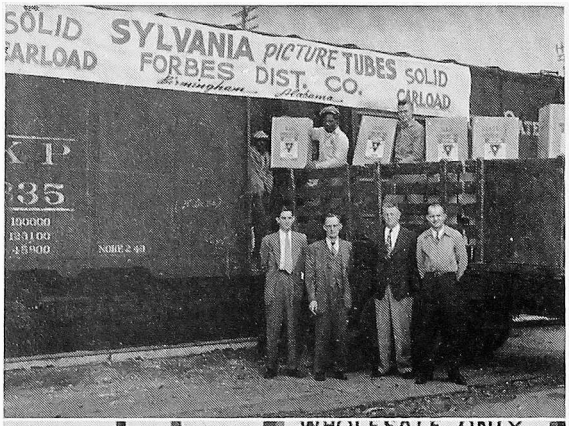
Every phase of the UHF television story was discussed by Sylvania engineers, who also explained experiences gained in Portland, Ore., where the first commercial UHF station in the world was placed in operation several weeks ago.

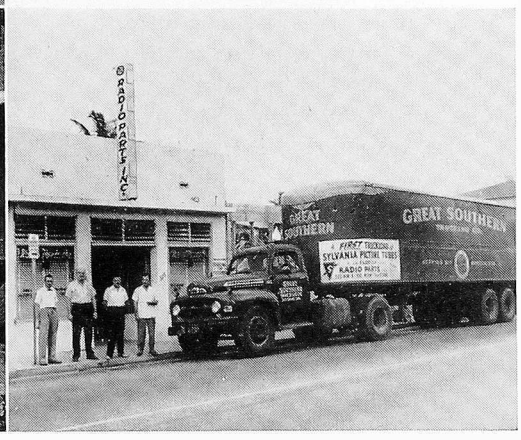
The Reading market presents a far different problem than did Portland. In the latter city, there was no television whatsoever before the UHF station went on the air there. Television is available to residents in this area from three VHF stations located in Philadelphia. Community antennas are also in operation in the territory. However, station officials pointed out that the new UHF station will provide this rich market with high quality pictures. The station will be affiliated with the Columbia Broadcasting System.

Among Sylvania representatives on hand for the occasion were: H. H. Rainier, manager of distributor sales; R. W. Andrews, merchandising manager; Bill Hopkins, division manager; Hank Fillman, of the Sylvania Radio and TV set division; George Isham, Eastern Regional Manager; Herb Johnson of the public relations department; W. T. Buschmann, Sales Promotion Manager; H. A. White, engineering supervisor; and W. J. Anderson and R. E. Grow, technical speakers.

A portion of the crowd of service dealers that attended the special UHF Sylvania Service Meeting in Reading, Pa.

New Members of Sylvania's Truckload of TV Tubes Club





At all points of the compass Sylvania distributors continue to stock fast-moving Sylvania television picture tubes by the truckload to give their dealer-customers the best possible service.

Here are pictures of three Sylvania distributors receiving recent truckload shipments. At left (and here's a new twist) is a carload shipment to Forbes Distribution Company, Birmingham, Alabama. Standing in front of the pick-up truck are (left to right): P. H. Powell of Fulwiler & Chapman; Ernest E. Forbes, Jr., Forbes president; Mile C. Pass and Charles D. Mitchell, also of Forbes. Standing in the truck are Roosevelt Hubbert (at left) and Calvin Green, also of Forbes.

Bottom left photo shows James Howard of Pittsburgh Radio and Television Lab (at left). Picking up four high-quality Sylvania picture tubes just delivered as part of a truckload shipment to M. V. Mansfield Company, Pittsburgh, Pennsylvania. Others in the photo (left to right) are Al Burke, Mansfield; Paul Davis, Pittsburgh Radio; M. V. Mansfield, Mansfield president; and Sylvanian George Isham.

Below still another truckload shipment of Sylvania picture tubes to Radio Parts, Miami, Florida. Standing in front of the establishment (left to right) are: Sid Lucker, Secretary and Treasurer; E. V. Seidler, President; L. M. Huff and Joe Carson, salesmen.

A PLAN FOR CONFIDENCE

(*Continued from page 2*)

sessions. Course to consist of 10 sessions as follows: 1) Front ends, 2) Video I. F., 3) Audio I. F., 4) Vertical sweep and sync, 5) Horizontal sweep, 6) Hi-voltage systems, 7) Low voltage systems, 8) Alignment, 9) Record changers, and 10) Antennae.

Upon completion of course, a clinic will be held. All set distributors in the area will be asked to have booths fully equipped and manned to answer all technical questions on their products. The 12th week, a written examination will be given on practical theory and practice. Questions asked in test will be determined on the basis of practical value by a committee from independent associations, distributor service manager, factory service managers and RTMA. A grade of 70% needed to pass. Those that pass will be issued a certificate attesting to the fact that the applicant has taken the course and passed the requirements.

The entire industry will be expected to publicize the course to the service industry and the certification to the public and will then recommend that only certified personnel be used by certified shops.

SHOP CERTIFICATE PLAN

A local committee, picked from the service association, the distributors and BBB will, upon request of any shop, inspect the facilities and equipment of that shop. Before making the inspection, the management will be expected to furnish a statement regarding the approximate amount of gross service business done in the previous 12 months, the number and classification of personnel, approximate dollar size of inventory of parts and tubes, type and quantity of test equipment in shop. A certificate of insurance should accompany the statement. These facts will be used to determine ability to properly render service.

After study of the submitted forms, each applicant will be cleared with the various local set distributors, the BBB and a commercial credit agency.

Points to be considered are: 1) Shop space, 2) Office facilities, 3) Test equipment, 4) Service data, 5) Parts stocks, 6) Insurance coverage, 7) Credit record, 8) Complaint record with distributors and BBB, 9) Manpower.

Upon passing investigation, the service shop will be issued a certificate and an emblem and be permitted to advertise as an industry approved service agency. Since adequate shop facilities are a must, it is important that the public be advised to buy service only from Certified Shops to be sure of getting a good deal. Certificate is subject to cancellation for due cause at the discretion of the certification committee.

(*Continued on page 12*)

SYLVANIA NEWS

TECHNICAL SECTION

FEBRUARY 1953 Vol. 20, No. 2

William O. Hamlin, Technical Editor

EXPERIMENTAL UHF TELEVISION STATION KG2XDU - PART II

By J. B. Grund - Advanced Application Engineer

TRANSMITTER SITE

Emporium, the headquarters of the Radio Tube Division of Sylvania, is situated in the Allegheny Mountains of Northwestern Pennsylvania. The elevation of the town proper is from 1020 to 1070 feet above sea level and the surrounding hills rise sharply to 1200 feet above the valley floor. Television signals are received in the valley occasionally, but on the hill tops consistent reception of several v h f tv stations is possible.

It was desirable to choose a site which would overlook the town, allow good reception of v h f signals, and be accessible by road. A site 1100 feet above and 1.7 miles southeast of the center of Emporium was selected (See Figure 1). This location overlooks more than half the homes in town and is of sufficient elevation to be a good receiving point for v h f television stations.

The hill summit was cleared of trees and a small concrete block, fireproof building was erected to house the transmitter and associated equipment. Because of its isolated location, no windows were included in the building; therefore, air vents and exhaust fans were necessary to supply ventilation.

THE TRANSMITTER

Sylvania tubes were used throughout the transmitter (See Figure 2) except for the u h f transmitting type used in the last tripler and final amplifier.

The sound and picture transmitters are nearly identical, the main difference being in the modulation circuits. Oscillator stages are followed by two buffer-amplifiers, two triplers, and a 4X150A final amplifier. The outputs are combined and fed to a high gain antenna system.

In order that tv receivers of the inter-carrier sound type will operate properly, it is necessary to maintain an exact 4.5 mc between the sound and picture carriers. Therefore, station KG2XDU in addition to maintaining the frequency of the picture carrier within the frequency tolerances required by the terms of the license, maintains a continuous check of the sound and picture carriers so as to maintain a constant 4.5 mc difference.

The station identification signal on the picture carrier is provided by a video test pattern generator utilizing a custom-built monoscope tube which produces a test pattern with the station call letters superimposed thereon.

An audio amplifier supplies the frequency modulated sound transmitter with signals from the tv receiver, a tone oscillator, tape recorder or microphone.

Various other monitors and meters are used, including an on-the-air picture monitor, and a Sylvania Model 400 'Scope to show percentage of visual modulation.

The video test pattern generator runs all the time; the rest of the equipment operates from time clocks. One time clock turns the transmitters on and off at preset times. Another time clock controls a Sylvania Model 508 tv receiver. The low noise cascode input of this receiver makes a booster unnecessary. Signals from WJAC-TV Johnstown, Channel 6, 88 miles away are received snow-free. A third time clock switches in the KG2XDU test pattern and aural announcement every 15 minutes to automatically delete the station identification from WJAC-TV as required by the FCC. A tape recorder makes the aural station announcement.

Because of the satellite operation, eight of the twelve transmitter power supplies are voltage regulated to maintain constant transmitter power input under varying line voltage. There is an overload relay on each power supply in addition to the line fuse. These overload relays in conjunction with time delay tubes and relays on the control panel of each transmitter automatically switch off the whole transmitter if a short circuit or other malfunction is not cleared within ten seconds. When the transmitter is again switched on (manually) pilot lamps show where the fault occurred.

A 98 foot guyed tower, strong enough to withstand the severest storm, was erected on the hill at the highest elevation. The terms of the construction permit required the tower to be painted with alternate orange and white bands and surmounted with red beacon lights (See Figure 3).

It was decided that a directional antenna should be used to take advantage of its power gain and concentrate the signal over Emporium. The antenna originally consisted of two sections of eight half-wave dipoles in phase with reflectors. The two sections were mounted 60 degrees apart so that between the half power points the horizontal radiation pattern

(*Continued on page 6*)

Figure 1. The transmitter site from the air.

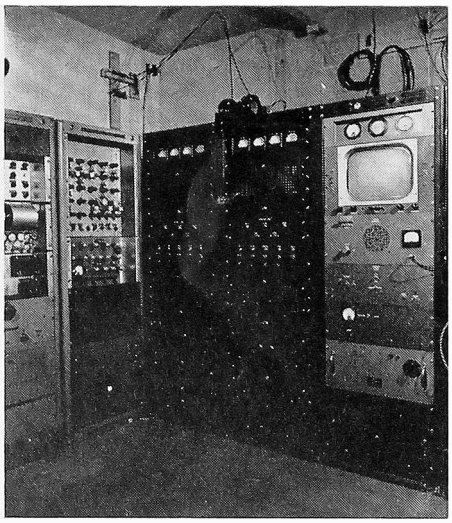


Figure 2. The KG2XDU transmitter racks.

Figure 3. The KG2XDU tower and station building.

Experimental UHF

(*Continued from page 5*)

covered a 110 degree arc. The antenna has been recently changed with a view to improving the vertical radiation pattern. Andrew Type 738 seven-eighths inch semi-flexible air dielectric coaxial cable feeds the signal from the transmitters to each section of the antenna. Transformers are used to match the 52 ohm unbalanced cable impedance to the 300 ohm balanced input sections of the antenna. The signal attenuation in these 100 foot feedlines is negligible and the V S W R of the completed system is low, about 1.2 to 1.

RECEPTION

With no obstructions between transmitting and receiving antennas, a dipole will supply a satisfactory picture to the u h f receiver or converter. However, Yagi antennas cut to Channel 22 or corner reflectors are usually necessary to eliminate "ghosts" caused by reflected signals. A satisfactory picture has been obtained 10 miles from the transmitter, yet in the southeast section of Emporium, less than two miles from the transmitter, but shadowed by a hill, only weak, multipath signals reflected from another hill north of town are received. These signals give a weak and snowy picture with from two to five "ghosts". It is hoped that station KG2XEL on Channel 82 located in Emporium will give better signal coverage and supply a signal to sections thus shadowed from KG2XDU by hills.

KG2XDU signals can be received throughout most of the town by converters installed on v h f television receivers. Antennas required vary from dipole where the signal is strongest to four stacked 6-element Yagi arrays in weak signal areas. The corner reflectors are more effective than the 6-element Yagi in areas where reflections cause multiple ghosts.

KG2XDU is operated daily to supply a u h f signal for the Sylvania Engineering Laboratories. The test pattern and tone and program material from WJAC-TV are broadcast with the transmitter unattended but closely monitored. The broadcasts have proved very helpful in carrying out tube development in u h f tuners and converters. Other manufacturers have also been aided by the signals in the development of v h f—u h f tuners built around Sylvania tubes. This is another segment of the Sylvania program to bring better radio and television to the public.

Additions and Corrections for Type 139-140 Tube Testers

Type	A	B	C	D	E	F	G	Test
6BK7	6.3	0	—	0	1	3	18	W
					3	7	18	W
6X8 (Correction of G Setting Only)							48	
							37	
5608 (Correction of G Setting Only)							46	
							46	
5670	6.3	1	58	3	7	6	30	U
	6.3	1	58	3	3	7	30	U
5687	12.6	0	9	0	1	3	19	X
	12.6	0	9	0	4	7	19	X

Additions and Corrections for Type 219-220 Tube Testers

	A	B	C	D	E	F	G	K
6BK6	Change last two tests from U to T							
6BK7	6.3	4	58	25	5	2X	1	3
	6.3	4	35	25	5	7X	6	8
6X8 (Correction of D Setting Only)				38				
12L8	12.6	6	7	40	7	15X	8	2
	12.6	6	7	40	7	35X	4	2
5608A	2.5	1	7S	48	7	3Y	2	4
	2.5	1	7S	48	7	5Y	6	4
5670	6.3	1	89	25	9	3X	4	2
	6.3	1	29	25	9	7X	6	8
5687 (Correction of First K Setting Only)								3

PICTURE TUBE PICTURES

During the next few months we plan to devote this spot to a picture and a short description of an unusual test, process or method used in the manufacture of Sylvania Television Picture tubes.

This month's picture depicts an air comparator being used to test the vitally important grid-to-cathode spacing in constructing the electron gun. A stream of pure, clean air is directed through the opening between the grid and cathode. The comparator then measures the resistance to the air flow. If the spacing is too great the resistance will be low, while close spacing will yield too high a resistance. The instrument may then be calibrated to the production limits desired. This enables the operator to adjust this grid-cathode spacing to within 5/10,000 of an inch.

In addition to its convenience, this method also has another important advantage in that no gauge or other tool comes in contact with the surface of the cathode. This eliminates the possibility of chemically contaminating the cathode. Notice that the operator is wearing finger-protectors. This is done to prevent contaminating the gun structure by body salts due to perspiration.

These are but a few of the many precautions to ensure the high built-in quality of Sylvania Picture Tubes.

A Powerful UHF TV Station

A high power uhf tv station will soon go on the air in Reading, Pennsylvania. WHUM-TV is a uhf station on Channel 61 with 250,000 watts effective radiated power.

It is important to us because it is a prototype of other stations that will cover the United States with tv signals not too far in the future. The power radiated by this station at a frequency of 755 mc was impossible not very long ago, but a new klystron tube was developed that will do the job.

A helical head antenna mounted atop a 1,036 foot guyed tower confines the signal to low angles of radiation and thus increases the effective power radiated. The tower is located on a 1,600 foot mountain which raises the antenna elevation to over 2,600 feet. It is expected that the service area will cover a 62 mile radius from the tower because of the high power and height.

The servicemen in the Reading area were prepared for the advent of u h f by various group service meetings where they were told about u h f converters and antennas. Not all new u h f areas will get this personal u h f instruction. Keep posted with the SYLVANIA NEWS, Technical Section for the latest developments.

Your SERVICE HINT Is Worth $5.00

Sylvania will send you a certificate worth five dollars towards the purchase of any advertising item listed in our "Multiplying Pennies" booklet for your latest service hints.

All you have to do is send us your solution to a servicing problem—a solution that's novel or more efficient than the ordinary method. If the editors of SYLVANIA NEWS find it acceptable for publication, you'll receive your five dollar certificate in the next mail! Please do not send routine or generally known information.

Send your service hints to:

SYLVANIA ELECTRIC PRODUCTS INC.
Technical Publications Section
EMPORIUM, PENNSYLVANIA

Service Hints

STANDARD COIL TUNERS—A plate bypass of 10 $\mu\mu$f opens in the r f section, 6AG5-6CB6 or 6BC5, causing a condition of weak reception on some channels only. No amount of oscillator tuning will bring in these weak channels. This capacitor is easily accessible and is a Ceramicon mounted on the side r f plate to ground.

This is also true of the GE continuous type tuner, but here they utilize 3 tubes, two r f stages with 1 to 3 $\mu\mu$f screw type trimmers mounted on the top of tuner for plate bypassing. A cold solder connection or corrosion breaks down and opens trimmer. Seashore salt air and atmospheric conditions will have a terrific effect on these trimmers causing weakness on some channels and no reception at times. Place a hot lamp over section after cleaning with carbon tet.—Harry Ringel, New York City.

ANTENNA CONNECTIONS—INSTALLATION—Permanent and rust-free connections for antennas and lighting arrestors can be made by applying roof patching cement on the connection after the nut has been tightened. Rust will not form and it will make for a better installation with less call-backs. Also if you install open-end antennas this compound on the end of the rods will reduce the loss considerably.—Donat A. Duquet, Waterville, Me.

SOLDERING IRON TIPS—Tips of soldering irons eventually become corroded from the heat and are almost always impossible to remove when a replacement is necessary. In order to avoid this, graphite powder dusted onto the portion of the threaded tip and on the threads of the soldering iron chamber will permit the tip to be removed easily at any time.—Norman Deschambault, P. Q., Canada.

PHILCO MODEL 49-1278—This set had a loss in sound and snow in the picture of channel 1 which was not caused by external factors such as the antenna system. On examining the tuner, it was found that contact finger number 1 of terminal board number 7 was broken and not making contact from the antenna to the rf coil. To repair this mechanical failure, I used a strip of thin gauge spring brass and soldered it over the full length of the contact finger. It is a good practice to check all turret type of tuners for this sort of trouble.—Louis E. DelColle, 3404 Taylor Terrace, Philadelphia 45, Pa.

CIRCUIT BREAKERS—It is a good idea to install 5 to 6 amp. circuit breakers on the power outlets of the service bench, one breaker for four outlets. Generally not more than two breakers are needed for the average service shop. They are not expensive and pay for themselves in saving fuses and lost time. The breakers operate instantaneously on direct shorts in test instruments, and radio and television sets and are easy to reset. Being connected in only one side of the line to the outlets, they are easy to install.—James P. Torre, 57 St. Nicholas Ave., Brooklyn 27, New York.

REPAIRING PHONO DRIVE WHEELS—For emergency repairs on worn phono drive wheels which do not have any holes or dents in the rubber rim, but are worn sufficiently to slightly change the speed of the turntable, or if worn where insufficient drive pressure is maintained, the following tip may be worthwhile. We have found some of them going strong a year after this "temporary" repair is made. Carefully "peel" the rubber from the rim of the wheel and cut a narrow piece of white physicians tape just long enough to reach around the periphery in the slot without overlap, and with the sticky side toward the wheel. Then replace the rubber ring in its original position on the wheel smoothing it down carefully and evenly. This will increase the diameter very slightly and also the pressure against the driven turntable. This stunt can be used in recorders and other units using the same type of drive.—M. G. Goldberg, St. Paul, Minnesota.

RIGHT ANGLE SOLDERING IRON—What to do with old soldering irons having either broken tips or frozen in tips has been a problem for some time. Provided the element and cord are otherwise in good condition, drill a quarter inch hole through the end of the iron as close as possible to the end. Now secure a piece of copper rod about a quarter inch in diameter and over two inches long, then force this copper rod through the iron. One end of the copper rod should be beveled and then tinned for correct soldering. Now with the rod forced into the iron you have an efficient right angle soldering iron which is excellent for use in present day servicing, particularly when working in tight corners and on tv tuners. —Seymour Greenberg, Whitestone, L. I., New York.

6 VOLT PHONO MOTOR—Being called upon for a PA system for mobile use in a political campaign, I needed a phonograph to operate from 6 VDC IMMEDIATELY! So, since I didn't have time to produre an inverter, I took a standard phonograph assembly, removed the motor, which had a ¼" driveshaft, and substituted a 6 VDC *PARALLEL* WOUND fan motor with a ¼" shaft. It had the same speed as the original motor (usually 1750 rpm) so everything worked fine! Do not use a series motor though, as every increase in gas feed causes the generator voltage to increase, and produces "WOW".—Harold J. Weber, Sparta, Illinois.

SYLVANIA NEWS

MERCHANDISING SECTION

FEBRUARY 1953 Vol. 20, No. 2

STAKE YOUR CLAIM IN THE SYLVANIA GOLD RUSH!

Save Sylvania tokens; they're pay dirt, pardner

The Sylvania Gold Rush has begun. Service dealers can prospect in a big way until March 31st. By prospecting, we mean saving Sylvania Tokens, which you receive when you buy one Sylvania Picture Tube or 25 Sylvania Receiving Tubes from your Sylvania Distributor.

You will find your Sylvania Tokens are real gold nuggets, and that they will obtain for you any of the handsome 25 bonus gifts Sylvania is offering to you as an extra dividend for your purchases of Sylvania Tubes.

You will want to collect as many Tokens as you can. Then select your gift or gifts from the impressive array of prizes shown at right and on page 10. Next fill in the order form which you received with your announcement of the Sylvania Gold Rush and send or take it to your Sylvania Distributor with the required number of Tokens.

Tokens are good only at the distributor who issues them. If you have misplaced your order form, you can pick up another at your Sylvania Distributor.

After you have done this, you have nothing to worry about. Your gift or gifts will arrive by mail in approximately two weeks. Please do not send your order to Sylvania; this will only delay the shipment of your gifts. All orders must be sent to your Sylvania Distributor.

Remember, you get one premium token FREE with every Sylvania Picture Tube or with every 25 Sylvania Receiving Tubes you buy. Sylvania Tokens are good as gold—your bonus when you purchase Sylvania Tubes.

And look what your tokens will buy! 25 beautiful gifts—plenty of items for you, your wife and children. Gifts for the home, for your shop.

Start saving Sylvania Tokens today. Be sure you cash in plenty of nuggets in Sylvania's big Gold Rush.

South Bend Fly Rod.—24 Tokens

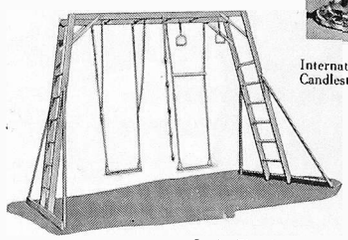
Defiance Tool Chest.—35 Tokens

Flint Stainless Steel Kitchen Tool Set.—21 Tokens

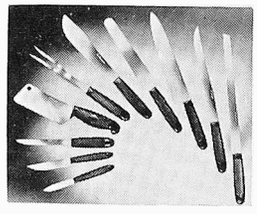
Colson Baby Bike.—31 Tokens

Airex Mastereel Spinning Outfit.—41 Tokens

International Sterling Console Candlesticks.—22 Tokens



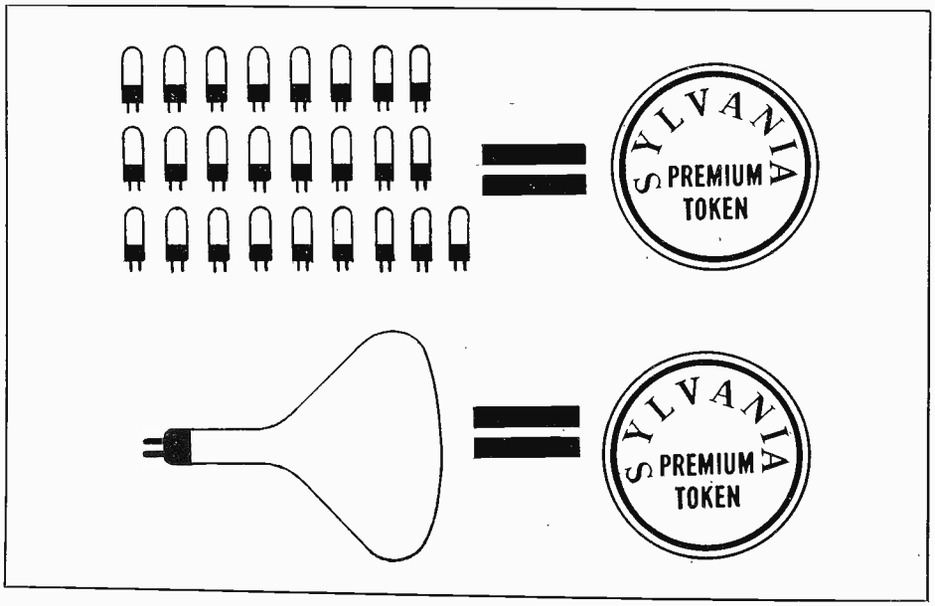
Jumbo Play Gym.—54 Tokens



Cattaraugus Kitchen Cutlery Set —30 Tokens

Durham Folding Bridge Set.—53 Tokens

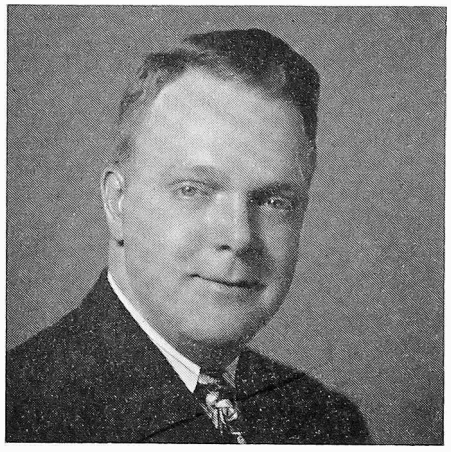
HERE'S HOW SYLVANIA PAYS OFF!



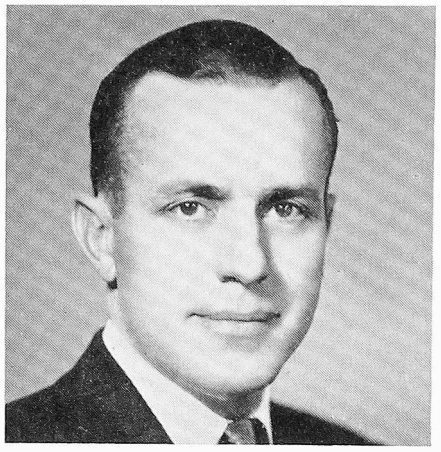
FOUR SYLVANIA PROMOTIONS

EDWARD P. ATCHERLEY

ROBERT L. McNELIS



R. C. HOFFMAN



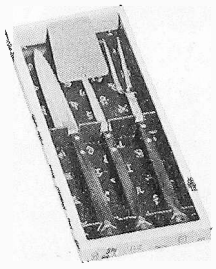
JUSTIN J. McCARTHY

Edward P. Atcherley has been appointed Mid-western regional sales manager, distributor tube sales, of Sylvania Electric Products Inc., according to Harold H. Rainier, manager of distributor sales, radio and television picture tube sales.

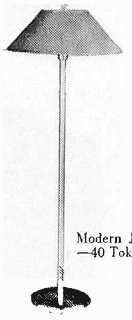
Mr. Atcherley assumes supervision of distributor tube sales in these districts: Western, with headquarters in Kansas City, Mo.; Southwestern, Dallas, Tex.; Central, Chicago; East Central, Columbus, Ohio. His headquarters will be at Sylvania's Chicago offices at 3450 West Division Street.

Other promotions announced by Mr. Rainier include the appointment of Robert L. McNelis to succeed Mr. Atcherley as Central district sales manager, with headquarters in Chicago; and Justin J. McCarthy to succeed Mr. McNelis as Metropolitan district sales manager, distributor tube sales, with headquarters in New York. R. C. Hoffman, a sales representative in the Central district, goes to Pittsburgh as Mid-eastern district sales manager, succeeding Mr. McCarthy.

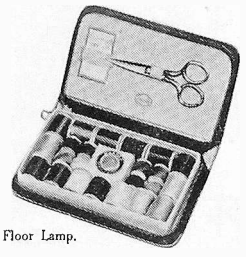
MORE PREMIUMS IN SYLVANIA'S GOLD RUSH



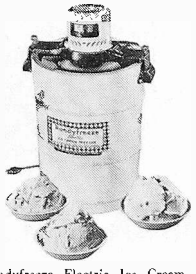
Flint Town and Country Set.—11 Tokens



Modern Junior Floor Lamp.—40 Tokens



DeLuxe Sewing Kit.—10 Tokens



Handyfreeze Electric Ice Cream Freezer.—40 Tokens

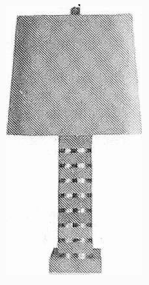
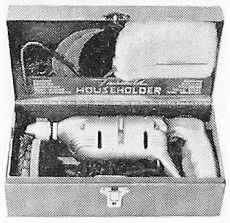


Table Lamp.—32 Tokens

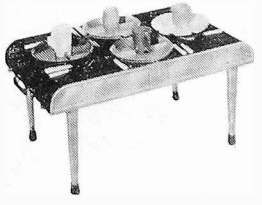
Caddy Master.—47 Tokens



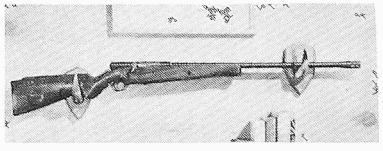
Fairchild ¼" Drill Kit.—45 Tokens

Roxanne's Famous TV Doll.—15 Tokens

Nu-Airflow Minnow Bucket.—9 Tokens

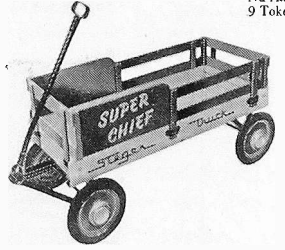


Snak-Pak Picnic Kit and Table.—36 Tokens



Mossberg 3-Shot Bolt Action Shotgun.—52 Tokens

MacGregor Badminton Set.—24 Tokens



Steger Truck Wagon.—36 Tokens

Durham Folding Bridge Table.—20 Tokens

La Cross Woman's Manicure Set.—13 Tokens

Ideal's Sleeveless Hunter.—11 Tokens

MAKE MORE MONEY IN 1954; USE SYLVANIA'S PERSONALIZED HOME CALENDAR ESPECIALLY DESIGNED FOR SERVICE DEALERS

You can't miss making more money in 1954, if you have your own personalized calendar on the walls of every home in your community. A calendar that tells your prospects and customers who you are, what your service is, where you're located, the easy way to get in touch with you.

The Sylvania Personalized Home Calendar for 1954 is the first of its kind ever offered exclusively to radio-television service dealers. It features a special, exclusive picture painted by famous Saturday Evening Post cover and feature artist Fred Stanley.

Here's what the new Sylvania Calendar will do for you. 1) It will put your business sign in every home. Handy, convenient, this calendar will make it easy for your customers to call you when they need your service. 2) It will hang in each home —365 days of the year. A constant reminder of you. 3) It will give you *1st call* over all competitors in your area.

The Sylvania Calendar costs you less than any other advertising you can use . . . only 1½ cents per month, per home. Blanket your territory with your calendars. Make sure the sign of your business is hanging in every home with a radio or television set. Every calendar can bring you increased profitable business all through the year.

Just think—for only 18 cents per year, you put your personal salesman in each of your prospects' homes.

Your calendars will make money for you every day. And what a return for your investment! Just a few new service calls gained from the calendars you have placed in homes will return your investment and assure you of increased profits.

The Sylvania Calendar is the lowest cost calendar of its kind you can buy. Offered exclusively as a service to radio-television service dealers, Sylvania is making this unique calendar available to you at a big saving. It is loaded with items of interest. There's the home appeal features. Every woman will appreciate the valuable recipes and home care hints in this calendar which they will hang in preference to all others.

Your personalized Sylvania Calendar will promote your business the way you want to promote it. It tells everybody you're a skilled television and radio technician, that you're reliable, experienced, use the best replacement parts, and charge a fair price. The feature . . . Here's the Inside Story of Your Television Set . . . will stimulate interest and understanding of your service problems. Here's a chance to help educate the public and to win the profits expert servicing should bring.

The calendar will serve as your Christmas Greeting for 1953.

Never before has one calendar offered so much to both the service dealer giving it and the customer or prospect receiving it.

Here is how to order your calendar:

1. Place your order NOW! *This is important to insure your shipment this fall.* Use the order blank which you recently received with your announcement of the Sylvania Calendar. Or pick up another blank if you misplaced yours, at your Sylvania Distributor.

2. Order enough to cover all the homes in your area.

3. Be sure to include prospects as well as customers.

4. Order envelopes for calendars that you will use as a "Christmas Greeting Card."

5. Order calendars to deliver to prospects personally during the "Holiday Season" and on new calls during the year.

A PLAN FOR CONFIDENCE

(Continued from page 4)

NATESA Code of Ethics

1. Employ qualified personnel to assure proper service. No student shall be passed off as a technician.

2. Make proper arrangements for the protection of reserve funds on contracts.

3. Carry adequate insurance coverage.

4. Avoid trick advertising which offers to service or deliver materials under conditions which are questionable or unfair to the set owner or your fellow members.

5. Employ approved methods of doing installations and maintenance.

6. Issue a standard guarantee.

7. Have available sufficient and proper test equipment to assure a good job.

8. Maintain an adequate service data library.

9. Render service no later than 24 hours.

10. Install only such parts and tubes as are really necessary. Use only new parts and tubes of a quality at least equal to original equipment.

11. Leave with or return to customer all parts and tubes replaced (except where impractical).

12. Issue an itemized bill.

13. Give estimates before major work is performed.

14. Service sets in home whenever possible.

15. Be honest, courteous and treat each client in a professional manner.

16. Observe the Golden Rule.

*Frank Moch is president of the National Alliance of Television and Electronic Service Associations. NATESA recently cited Sylvania "for the greatest service rendered by any industry manufacturer" to the cause of the serviceman in 1951 and for having demonstrated "on numerous occasions a fine realization of its responsibilities and consideration for other segments of the industry and public, particularly its fine program commercials portraying the true position of service."

LATEST EDITION OF TV RECEIVER TUBE COMPLEMENT BOOK

The recently published third edition of Sylvania's *Television Receiver Tube Complement Book* is proving to be a useful and popular addition to the service shop.

More than twice the size of last year's edition, the new book contains complete complements of nearly 4,000 television set models, by over 100 manufacturers. The data supersedes that in the original two editions, but includes previous complements as well as later model TV sets now on the market.

The models are listed numerically under alphabetically-arranged brand names. In cases where brand names and manufacturers' names differ, a cross index has been established. An index of manufacturers' names and addresses is also included.

The *Television Receiver Tube Complement Book* has been prepared as a servicing aid, useful in maintaining a more balanced and adequate stock of replacement tubes. The book also aids in selecting substitute picture tubes and in determining tube types when the type is in doubt.

The new book is available from the Advertising Department, Sylvania Electric Products Inc., 1100 Main Street, Buffalo, New York. The price of the new edition of this popular book is 75 cents. When ordering from Buffalo, please enclose check, cash or money order.

In This Issue

SYLVANIA NEWS

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Vol. 20, No. 2 FEBRUARY 1953

PUBLISHED BY
SYLVANIA ELECTRIC PRODUCTS INC.

MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

SYLVANIA NEWS

TECHNICAL SECTION

MARCH 1953 Vol. 20, No. 3

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligations

ION TRAP MAGNETS

By G. E. Fogg, Field Engineer

Television Picture Tube Division

One of the very important factors in servicing tv sets is use of the correct ion trap magnet and its proper adjustment.

The mere presence of raster on the tube is no indication that the magnet has been properly adjusted. Operation of the set for even a few seconds with the magnet incorrectly adjusted may permanently damage the picture tube. Hence, it is of utmost importance that the magnet be correctly adjusted immediately.

There are two general classes of ion trap magnets—double and single field types (See Figure 1). Each type of magnet is used with a specific electron gun structure and in most instances, a particular tube type.

The physical construction of ion trap magnets varies considerably. The double field type always has two pairs of pole pieces or two ring magnets; the single field type has only one magnet.

The proper field strength of an ion trap magnet is dependent on several factors; the most important being the gun design and the high voltage (A_2 Voltage) on the picture tube.

In the case of a double field ion trap magnet, a field strength of 35 gausses in the main field will usually be satisfactory. For tube types requiring single field magnets, two strengths—35 gausses and 45 gausses, will be adequate for practically all applications. In general, the higher operating voltages will require stronger magnets.

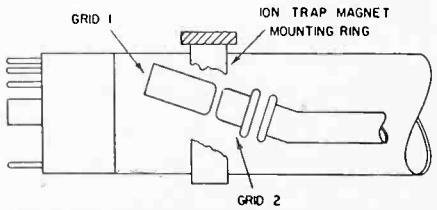


Figure 2. Approximate Placement of Ion Trap in Relation to Electron Gun.

A good method of adjusting an ion trap magnet is as follows: Locate the ion trap magnet approximately at the slant cut or anode bend, which is visible through the neck (See Figure 2). In the case of double magnet ion traps, place the smaller (weaker) magnet toward the tube face. With the brightness and contrast controls turned to minimum, turn the set on and allow it to warm up for about a minute. Turn the contrast and brightness controls about half way on. Move the ion trap magnet back and forth along the neck and around it until the picture is brightest. Now, readjust the contrast and brightness controls for proper contrast and brightness level used by the customer. Readjust the ion trap magnet position for maximum brightness. The ion trap *must never* be used to center the picture on the tube.

In the case of the split ring double field ion trap magnet, some rotational adjustment of the weaker magnet with respect to the stronger magnet may be required for pattern centering. After final adjustment, the ion trap magnet should be within ¾″ of the slant cut between second grid and anode or the bend in anode on guns having a bent anode structure. If the magnet is beyond this range, a magnet of different field strength should be used.

If, after the correct set up of the ion trap magnet has been made, the magnet is too close to, or on the tube base, a magnet of lower field strength should be used. The reverse is true if the ion trap magnet is too close to the face end of the tube.

The table lists the types of ion trap magnets to be used with the various types of picture tubes.

(*Continued on page 6*)

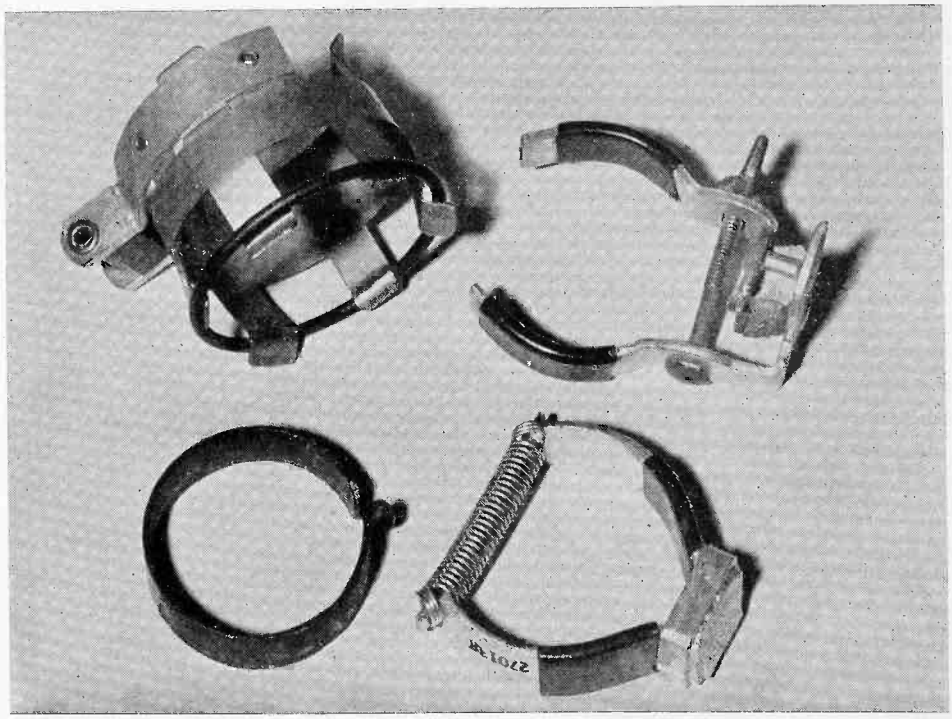


Figure 1. A Selection of Common Ion Traps, a Double Magnet Type in the Upper Left.

PRECAUTIONS IN USING "UNUSED" TUBE PINS AS "TIE-POINTS"

It is a common practice in the electronics industry, home construction and in service shops to utilize the "unused" socket pin lugs as "tie-points" to mount other components.

If this practice is to be used proper precautions must be observed.

If the tube basing diagram gives a certain pin number followed by NC, it means that no internal connection has been made to this pin and hence, the corresponding lug is available for use as a "tie-point."

If, however, the basing diagram gives a pin number followed by IC, it means that this pin is internally connected to some part of the tube structure and is NOT available for use as a "tie-point." Such internal connections may be made by the tube manufacturer for a number of reasons of a mechanical or electrical nature. Therefore, connections should NOT be made to any pin marked IC.

NEW MINIATURE UHF TRIODE OSCILLATOR

A new miniature 7-pin medium mu triode, designated the 6T4, has recently been released by the Radio Tube Division of Sylvania Electric Products Inc.

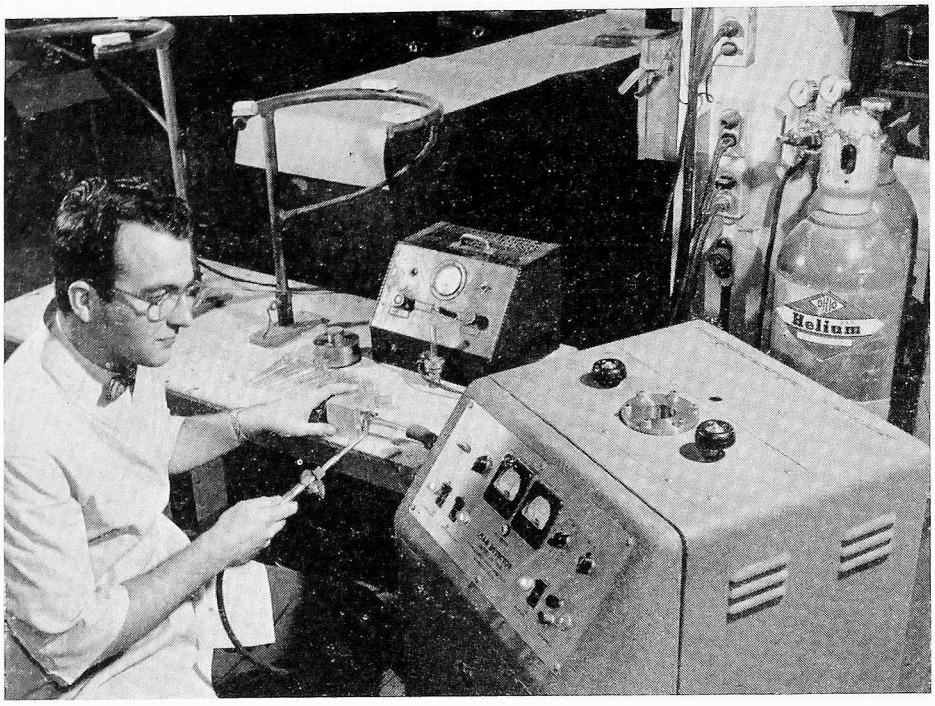
The Sylvania Type 6T4 was designed for service as an oscillator in television tuners or converters covering the new u h f bands. The tube features short bulb, T-5½ construction, having a maximum overall length of 1¾ inches, and a maximum seated height of 1½ inches. The Sylvania 6T4 also features double plate and grid connections to reduce lead inductance. In circuits designed for its use the 6T4 is capable of operation up to 1000 mc.

When operated with 80 volts on the plate and a plate current of 18 ma, the Sylvania Type 6T4 has a transconductance of 7000 umhos, an amplification factor of 13, and a plate resistance of 1860 ohms.

ION TRAP MAGNET TYPE

D-Double		S-Single	
Tube Type	Trap	Tube Type	Trap
7DP4	D	17AP4	S
7QP4	S	17BP4/A/B/C	S
		17CP4/A	S
8AP4	S	17FP4	S
8AP4A	S	17GP4	S
		17HP4	S
10BP4/A	D	17JP4	S
10MP4/A	D	17KP4	S
		17LP4	S
12LP4/A	D	17QP4	S
12QP4/A	S	17RP4	S
12RP4/A	S	17SP4	S
12TP4	D	17TP4	S
12UP4/A/B	D	17UP4	S
12VP4/A	D	17VP4	S
12WP4	S	17YP4	S
12YP4	S		
		19AP4/A/B/C/D	S
14BP4/A	S	19DP4/A	S
14CP4	S	19EP4	D
14DP4	D	19FP4	D
14EP4	S	19GP4	S
14GP4	S	19JP4	S
14HP4	S	19QP4	S
15CP4	D	20CP4/A	S
15DP4	S	20DP4/A	S
		20FP4	S
16AP4/A	D	20GP4	S
16CP4	D	20HP4	S
16DP4/A	D	20JP4	S
16EP4/A/B	D	20LP4	S
16FP4	S	20MP4	S
16GP4/A/B	S		
16HP4/A	D	21AP4	S
16JP4/A	D	21DP4	S
16KP4/A	S	21EP4/A	S
16LP4/A	D	21FP4/A	S
16MP4/A	D	21KP4	S
16QP4	D	21MP4	S
16RP4	S	21WP4	S
16SP4	D	22AP4/A	S
16TP4	S		
16UP4	D	24AP4/A	S
16VP4	S	24BP4	S
16WP4/A	D		
16XP4	D	27AP4	S
16YP4	S	27EP4	S
16ZP4	D	27GP4	S
16ABP4	S	27LP4	S
16ACP4	S		
16AEP4	S	30BP4	S

PICTURE TUBE PICTURE



This month's picture illustrates one of the more unusual tests employed to maintain the high quality of Sylvania Picture Tubes.

The seal between the base connecting wires (stem leads) and the glass wafer end (header) is critically important in cathode ray tube construction. Seals must be faultless to assure the constant high vacuum necessary to peak performance and long life.

Sylvania uses Consolidated Engineering Corporation Helium Leak Detectors with Sylvania - designed fittings, for inspection of these seals. The glass wafer is mounted vacuum tight onto the "Sniffer." The "Sniffer" is attached by special hose to the detector console which contains pumps, amplifiers, calibration circuits, and the leakage indicator.

Helium gas from the cylinder is passed over the exposed side of the wafer. If there is a leak the "Sniffer" will relay the condition to the console and the indicator will respond.

The Helium Leak Detector shown is a very sensitive instrument. The elimination of wafers evidencing even minute leakage is one of the more important Sylvania manufacturing steps that assures prolonged picture tube life.

TESTING TELEVISION PICTURE TUBES

In response to numerous requests, the list of picture tubes which may be checked using the Sylvania 228 Adapter has been greatly enlarged.

Using the Sylvania 228 Adapter in conjunction with a Sylvania Tube Tester Model 139, 140, 219 or 220, practically all the commonly used 10 to 30 inch magnetic types may be checked. In many instances it will not be necessary to remove the tube from the set, thus saving valuable time. Be sure the set is turned OFF before attaching the Adapter to the picture tube! Make the settings according to the tube type being tested, and plug the Adapter into your Sylvania Tube Checker.

The numerical scale readings on the Tube Checker are used, rather than the Good-Bad scale. This is due to the difference between the low tube tester voltages and the high tv receiver operating voltages for the CRT.

There are only a few defects, such as gas, which show up only with a very high voltage applied to the tube. Using the Sylvania 228 Adapter with one of the Sylvania Tube Testers will detect 80-85% of the defective picture tubes.

The settings listed below apply to any A, B, C or D version of these types.

(*Continued on page 8*)

PEAK-TO-PEAK TV VOLTMETER PROBE

In servicing television receivers it is often desirable to measure the amplitude of complex waveforms. When an oscilloscope is not available the technician may wish to do this on his V T V M by using a crystal probe.

The probe shown in Figure 1 is a full-wave doubler circuit. The Sylvania Type 1N58 Germanium Crystal (D_1) conducts whenever its cathode is negative. This causes the 0.5 μf capacitor (C_1) to charge in a negative polarity across the 10 megohm resistor (R_1), producing a negative d c voltage at the terminals. The other 1N58 crystal (D_2) is connected in opposite polarity and produces a positive d c voltage across its 10 megohm load (R_2). These two voltages add in series across the resistors so that the V T V M will read peak-to-peak values on the d c scale.

This crystal probe will be a handy accessory to the Sylvania Polymeter when making home service calls.

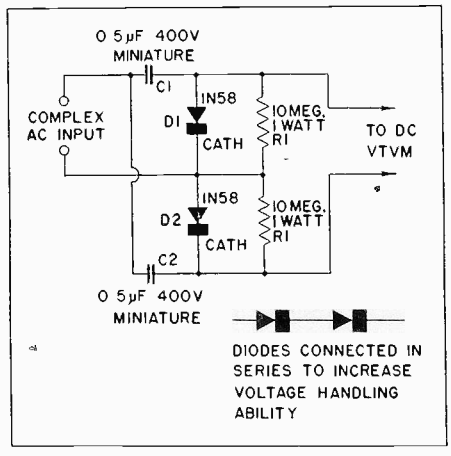


Figure 1. A Crystal Diode Voltage Probe.

(*Continued from page 7*)

LIST OF PICTURE TUBES

10BP4	17AP4	20GP4
10FP4	17BP4	20HP4
12KP4	17CP4	20JP4
12LP4	17FP4	20LP4
14BP4	17GP4	20MP4
14CP4	17HP4/17RP4	21AP4
14DP4	17JP4	21DP4
14GP4	17KP4	21EP4
16AP4	17LP4/17VP4	21FP4
16EP4	17SP4	21MP4
16GP4	17TP4	21WP4
16JP4	17UP4	21ZP4
16KP4	19AP4	24AP4
16LP4	19DP4	24BP4
16QP4	19EP4	27AP4
16RP4	19QP4	27EP4
16TP4	20CP4	27GP4
16WP4	20DP4	27LP4
16ZP4	20FP4	30BP4

Settings For Sylvania Tube Testers, Types 219-220

Type	A	B	C	D	E	F	G	K
See List	6.3	1	8	68	8	2U	5	7

Leakage Limits		Emission Limits	
Over 120		Above Average	Over 26
110-120		Passing	15-26
100-110		Doubtful	10-15
100 or less		Bad	10 or less

Settings For Sylvania Tube Testers, Types 139-140

Type	A	B	C	D	E	F	G	Test
See List	6.3	4	7	1	3	8	75	V

Emission Limits	
Above Average	Over 22
Passing	12-22
Doubtful	8-12
Bad	Below 8

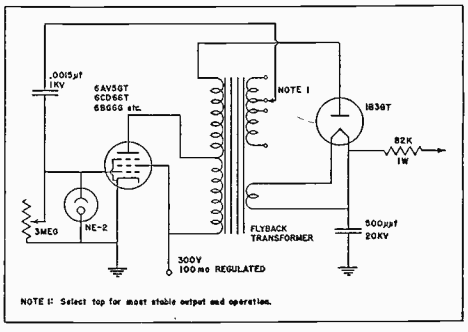
Service Hints

USING PIPE CLEANERS IN THE SHOP—Though we do not smoke a pipe we use quite a large number of ordinary pipe cleaners in our business. One of the best uses is in fastening the line cord to the back of TV sets to keep the excess off the floor, especially in table models where the loose cord looks unsightly from the viewing position. We also use them for tying the various cables to the chassis after folding the cords and cables neatly back on themselves. This prevents damage to parts on the chassis, and prevents loose cords and cables from falling down and dragging —as in the case of the long power cord—and causing tripping with consequent damage to the person and equipment when moving the chassis from bench to car or into the customer's house. They may also be used for fastening a service ticket to the back of the set by fishing one of the pipe cleaners thru the vent holes and back thru another hole.—M. G. Goldberg, St. Paul, Minnesota.

HIGH VOLTAGE SUPPLY FOR TESTING AND EXPERIMENTING—

The flyback voltage supply shown below is a useful instrument in the service shop, experimenter's lab, or the Ham Shack. It can be used as a supplementary supply for electrostatic tv sets when the original fails and is being repaired. The breakdown voltage of variable and neutralizing capacitors can be found easily by using a V T V M that can measure up to 20 kv. Connect the meter across the high voltage terminals and measure the voltage at the breakdown point. It can be measured visually by the arc or by the dip in voltage, the dip method being the better. Due to the small amount of power used, no damage will be done to the average high grade capacitor of the air dielectric type. DO NOT USE ON CAPACITORS OTHER THAN AIR DIELECTRIC TYPES.

For testing ceramic capacitor, charge it above the normal operating voltage of the circuit it is employed in, BUT NOT ABOVE THE CAPACITOR RATING. Then shut off the supply. The rate of voltage drop as observed on the V T V M over a period of time will indicate the quality of the capacitor. There should still be a good charge on the capacitor after 35 seconds. ALWAYS SHORT THE CAPACITOR BEFORE HANDLING THEM.—Harold J. Weber, Sparta, Illinois.



SYLVANIA NEWS

APRIL 1953

C. J. Luten, editor

Vol. 20, No. 4

SYLVANIA SERVICE SERIES OFFERS THEORETICAL AND PRACTICAL HELP

By Bob Grow, Sylvania Sales Engineer

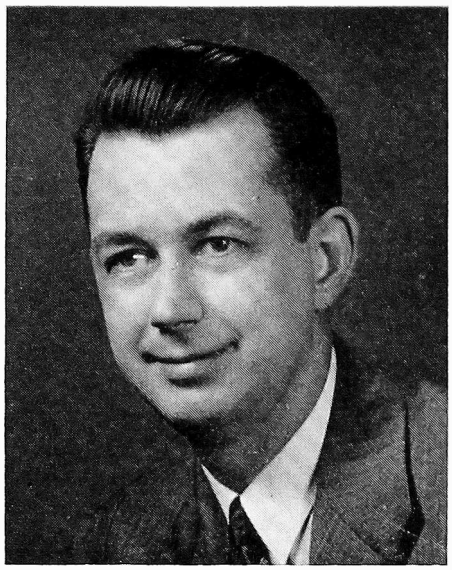
UHF, already a significant factor in television, will be of outstanding importance before all the returns are in. To help service dealers everywhere keep pace with this area of transmission, the Sylvania Service Series, through its visual aid programs, are planning during 1953 in key areas to illustrate the proper techniques for servicing in this high frequency range.

Since the advent of UHF, and its acceleration since the freeze was lifted by the F. C. C. last July, Sylvania engineers through experimentation and research have been working on the serviceman's many problems. The Sylvania Service Series has quite a story today. As new techniques develop and new applications prove their worth, this information will be passed on at its meetings. In this way the serviceman is kept up-to-date with all the new and better ways of coping with this new and relatively undeveloped frequency spectrum.

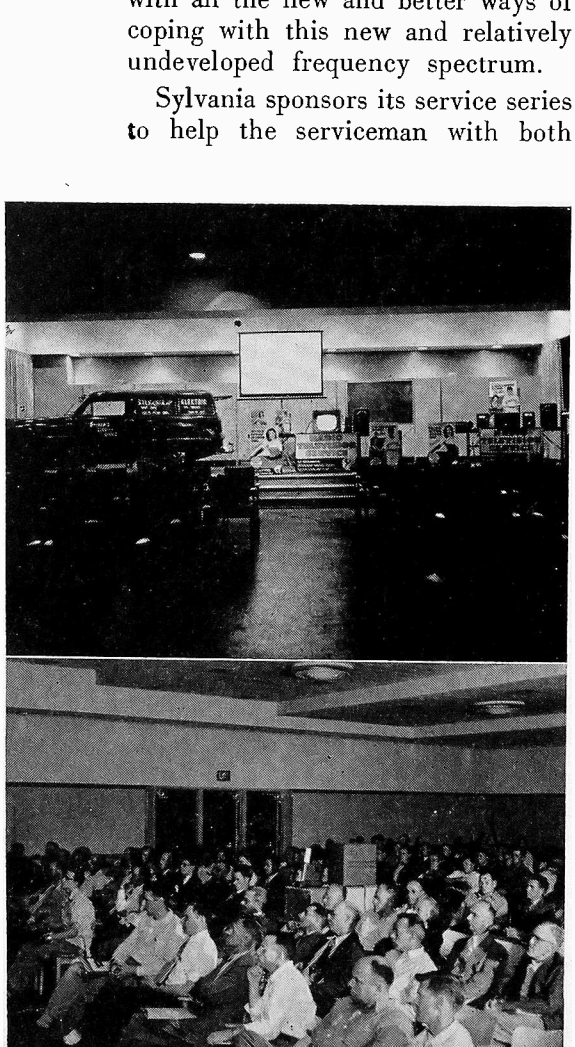
Sylvania sponsors its service series to help the serviceman with both theory and practical application problems in television service. Technical meetings are conducted by factory trained and service experienced engineers.

An outgrowth of the close relationship between the manufacturer and service dealers since the beginning of radio, the Sylvania Service Series recognizes the serviceman's importance as a contributing factor in the growth of the entire radio and television industry. The series is still another Sylvania service directed toward the serviceman. It is brought to him through his local Sylvania distributor, who, in cooperation with the Sylvania representative in the area, combine efforts to promote the most concise and effective television service meetings in the country today.

The Sylvania Service Series ranges over the entire country. It travels in a specially equipped station wagon that carries Sylvania's complete line of test equipment as well as a specially prepared television set and a slide projector. By using a projector and slide, circuits and theory may be discussed easily and clearly. The custom-made television set used in these meetings has a special bank of switches that make it possible to show certain malfunctions encountered by the serviceman in his everyday servicing. Also in use are a type 300 voltage calibrater and two type 400 oscilloscopes. One scope is near the television set and one half way in the audience. The one in the audience is a slave unit conducted by the master scope near the television set to enable those in the back of the room to observe the wave form shown during the meeting. The rest of Sylvania's complete line of test equipment is also on display and various applications of these instruments are referred to during the meeting.



It is estimated that the Sylvania Service Series conducted meetings before 12,500 servicemen during 1952 alone. Add to this the Sylvania distributors and their sales personnel and it becomes clear that close to 15,000 people closely allied to radio and television are contacted yearly. Sylvania Service Series slogan "Learn How Sylvania Service Series Can Mean $ $ $ to You" is certainly apt. Those who have been regular attenders of these meetings know it. If you have not yet attended a Sylvania service meeting, contact your Sylvania Distributor and ask him when the next meeting in your area will be.



Here's a Sylvania Service Meeting all set up and ready to go.

The set-up for a recent Sylvania Service Meeting held in Madison, Wisconsin and sponsored by Satterfield Radio Supply. Notice the oscilloscope and slide machine in the foreground. This scope is a slave unit which shows the audience in the back of the auditorium the same pattern being shown on the stage. Slide machine is also operated from the stage.

Six Million TV Sets; 9.7 Million Radios in 1952

Over six million television sets and 9.7 million radios were produced during 1952, according to estimates compiled by RTMA.

The estimated industry output for the year was reported as 6,096,279 TV sets and 9,711,236 radios. This compares with the industry's 1951 production level of 5,384,798 television receivers and 12,627,362 radios.

For December 1952, a six week statistical reporting period, the Association estimated that 921,086 TV sets were produced and 1,325,158 radios. This compares with the production in December, 1951, a five-week reporting period, of 467,108 television receivers and 868,100 radio sets.

Home sets with FM facilities totaled 409,678 units during the year while 94,185 television sets with FM circuits were produced.

The table at right shows revised radio and television set production by months for 1952.

Production by Months for 1952

	Television	Home Sets	Portables	Auto	Clock	Total Radio
January	404,932	288,724	68,433	195,147	80,151	632,455
February	409,337	312,705	72,866	267,779	106,103	759,453
March (5 weeks)	510,561	357,689	99,720	343,314	175,169	975,892
April	322,878	286,164	110,529	275,250	176,003	847,946
May	309,375	288,927	128,351	215,478	155,588	748,344
June (5 weeks)	361,152	297,669	205,186	246,909	124,489	874,253
July	198,921	203,868	81,353	95,220	61,295	441,736
August	397,769	235,728	105,006	94,315	108,753	543,802
September (5 weeks)	755,665	324,786	126,666	230,706	183,496	865,654
October	724,117	314,459	113,552	163,494	180,841	772,346
November	780,486	389,853	153,503	195,200	185,639	924,195
December (6 weeks)	921,086	452,556	194,827	406,258	271,507	1,325,158
Total	6,096,279	3,753,128	1,460,002	2,729,070	1,769,036	9,711,236

OHIO SERVICEMEN SEE HOW SYLVANIA BUILDS QUALITY TV PICTURE TUBES

One of the largest groups of servicemen ever to make a TV picture tube plant tour recently went through the Sylvania plant at Ottawa, Ohio. Guests of Burroughs Radio Inc. of Canton and Mansfield, these service technicians were able to see Sylvania's skilled workmen in a really modern factory containing the latest mass production equipment. Their trip proved to them that Sylvania Television Tubes have quality "built-in."

This large group of Ohio servicemen and sales department personnel of Burroughs Radio Inc. filled three Greyhound Buses when they made their recent tour of Sylvania's TV picture tube plant at Ottawa, Ohio.

New Radio Tube Laboratory Set For Williamsport

The Radio Tube Division plans to construct a 120,000-square-foot engineering laboratory in Williamsport, Pa., it has been announced by Matthew D. Burns, general manager of the division.

The research and development work of the new laboratory will augment work now being carried on in divisional engineering laboratories in Emporium, Pa., headquarters of the Radio Tube Division.

The new laboratory will be devoted, among other things, to development work and pilot plant operation in radio receiving tubes for military use; new product development work; fundamental chemical research; and application engineering, including a rating laboratory in which tubes will be evaluated for performance under abnormal conditions. Other research and developmental activities in various fields of electronics also will be undertaken at the new laboratory.

While some ground preparation has been started at the laboratory site on Third Street, approximately two miles from the business center of Williamsport, actual construction is not expected to begin until May or early June. The two-story building will be of brick and steel construction.

It is planned that the laboratory will be in full operation soon after the first of next year. Approximately 400 persons will be employed, including about 100 who now are members of the Sylvania staff at the present Williamsport receiving tube plant. The balance will be new employees from the Williamsport area.

Ralph P. Clausen, chief engineer of the Radio Tube Division's general engineering department, will direct the operations of the new laboratory.

PHILADELPHIA GROUP STARTS SECOND YEAR OF INDUSTRY ACTIVITY

With the publication of its first annual report the Joint Electronics and Radio Committee on Service of Philadelphia has launched the second year of the organization's extensive and aggressive public and intra-industry campaign in behalf of the service industry.

The 48-page report, now being distributed, contains a history of the growth of the JERCS from its beginning at a dinner table discussion among several Philadelphians prominent in the service industry to its emergence as an active group whose program attracted national attention. The booklet carries almost 100 congratulatory messages from manufacturers, distributors and servicemen who have thrown their support behind the group's campaign for the coming year.

The 1953 program got under way recently with a meeting at the Franklin Institute in Philadelphia. Some 8,000 invitations were mailed to servicemen in this area to hear a lecture and demonstration on the latest developments in UHF.

This lecture was the first in a series on monthly sessions presently scheduled to run until May. A new series is also being readied for the fall. Subject matter for these educational meetings is arranged by the technical education advisory panel, a committee of service manager-members of the JERCS.

In addition to its intra-industry activities, the JERCS has instituted a long-range public relations program which includes reports in the daily press, radio and television shows and talks before civic and industrial groups.

Radio Equipment Company of Omaha, Nebraska has recently opened a new store. Trim and neat on the outside as anyone can see above, with plenty of parking area, the store is just as good looking on the inside. A staunch Sylvania Distributor, Radio Equipment Company has found still another way of making itself easy to do business with. Shown at left are Sylvanian Ed Haase and E. H. Nestander, president of Radio Equipment.

SYLVANIA NEWS

TECHNICAL SECTION

APRIL 1953 Vol. 20, No. 4

William O. Hamlin, Technical Editor

UNSTABLE BLOCKING OSCILLATORS

By W. O. Hamlin, Technical Editor

Instability of vertical oscillators will cause vertical roll of the television picture during initial warm-up or at other times depending on the conditions causing it. By analyzing the operation of the circuits involved and the conditions connected with the instability, the job of curing the trouble will be made easier.

A popular vertical oscillator tube is the Sylvania Type 6BL7GT which is especially designed for this application. The high current available at low supply voltage provides the power necessary to deflect wide angle picture tubes. However, the stability depends a great deal on the type of oscillator, sync circuits, and quality of parts used.

A circuit is presented in Figure 1. The first section is a blocking oscillator and discharge circuit in which the frequency is determined by R_1, R_2, and C_1. The second section is a sawtooth amplifier which drives the deflection coils.

The blocking oscillator, as with all oscillators, needs feedback of energy from plate to grid. Transformer T_1 accomplishes this function. Any change in plate current will induce a voltage on the grid through T_1 to aid this change. Therefore, an increase in plate current causes a positive voltage to appear on the grid which results in a further increase in plate current. The positive grid voltage charges capacitor C_1.

As the changing current rises to saturation, the field in the plate winding of T_1 ceases to increase. Instantaneously there is no longer an induced voltage on the grid, and because there is no longer a changing potential, the capacitor C_1 begins to discharge. The discharge causes the positive potential on the grid to become less positive causing less plate current to flow. The plate coil field of T_1 starts to collapse. This collapsing field, in turn, induces a voltage on the grid winding in a reverse direction, causing the grid to become more and more negative. This continues until the grid is driven beyond cut-off. R_1 and R_2 must be large in order to maintain the cut-off condition until it is time for the next cycle. R_2 is made adjustable so that the 60 cycle vertical sweep frequency can be approximated. This is called the vertical hold control. If a positive 60 cycle sync pulse is applied to the grid it will cause the oscillator to lock in with the received signal. See Figure 2A.

The resultant plate voltage waveform is a pulse that is applied across C_2 and R_3. See Figure 2B. C_2 and R_3 shape the sawtooth component of the sweep signal.

To save time in troubleshooting the unstable oscillator, a little deduction will tell you where to start looking. If the picture will not sync in at all on a strong signal, but the horizontal holds and the picture rolls slowly in a vertical direction, you can suspect the trouble is between the sync separator and the grid of the oscillator. Using an oscilloscope will tell you quickly where the vertical sync pulses disappear or are weak. Most servicing manuals will tell you the voltage amplitude to expect. The Sylvania Type 300 Oscilloscope Calibrating Standard will be very useful in this type of measurement. With this instrument it is possible to measure the amplitude of any wave-form on your 'scope in a few seconds.*

*Sylvania News, Technical Section, August, 1951.

Because the proper operation of these sync circuits depends on the time constants of the components, the values of the components and their quality are important. A changed value of resistance or a leaky capacitor can raise hob with sync separation, amplification or integration.

To carry on our deduction process, if the vertical hold control will not bring the picture down to a slow roll on a weak signal at any position of the vertical hold control and might not even lock in on a strong signal, it is an indication that the trouble is in the grid circuit of the 6BL7GT because that is the frequency determining section of the oscillator.

In some sets the 6BL7GT could be at fault. After much operating time some of these tubes could develop grid emission which changes the grid bias and thus the frequency. If this be the case, change to a new Sylvania tube. Through extensive testing and research, Sylvania has developed a 6BL7GT that has a very minimum of grid emission even after long usage.

Defective parts that change the

(*Continued on page 6*)

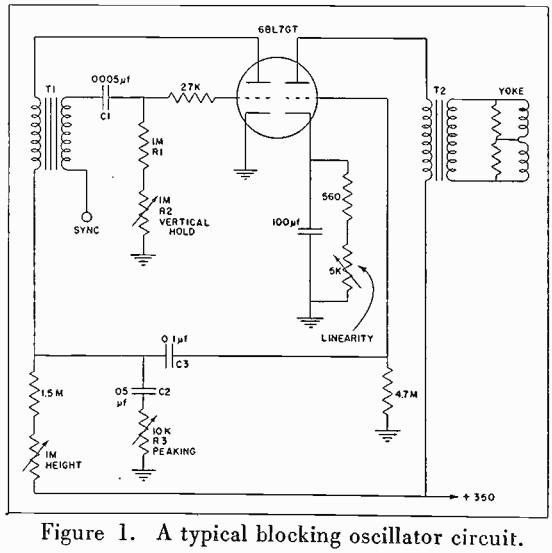


Figure 1. A typical blocking oscillator circuit.

(*Continued from page 5*)

rate of oscillator blocking may cause this condition. If C_1 is leaky it will not hold the cut-off bias a sufficient length of time to give a 60 cycle frequency at any setting of the vertical hold control. Because of the nature of the condition, the frequency would be higher than 60 cycles which may make it impossible for the sync pulses to lock in the picture.

A change in value of R_1 or R_2 will either increase or decrease the frequency of oscillation; an increase in resistance will decrease the frequency and vice versa. If the vertical hold adjustment locks in the picture at the extreme end of its range it would be wise to change R_1 to a value that allows adjustment near the center, if you are sure that a defective part is not involved. Add resistance to R_1 if the control adjusts at maximum resistance, subtract resistance from R_1 if it adjusts at minimum resistance.

In some sets a long warm-up time is required for stabilization of the oscillator developed grid bias which determines operating frequency. This initial warm-up time is usually in the order of 25 seconds and may take as long as 60 seconds. If this time is excessive, another tube will probably reduce it.

In servicing television circuits there is no more valuable aid than a good 'scope and a voltage calibrator which will save hours of unsuccessful troubleshooting. Also, an analysis of circuit operation will save time and make more money for you in tv.

Your questions on blocking oscillators problems are invited. Those of greatest merit will be published with the answer.

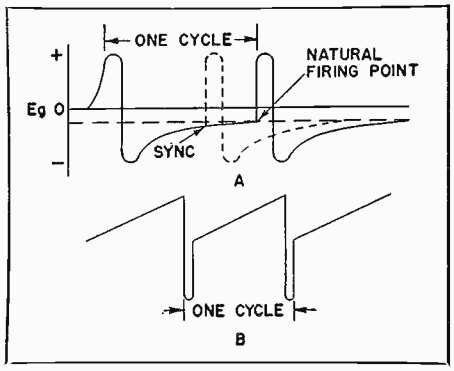


Figure 2. Blocking oscillator waveforms.

PICTURE TUBE PICTURES

This month's Picture Tube Picture concerns another of the many exacting tests which Sylvania Picture Tubes must undergo to ensure the highest quality available.

A minimum of three gas checks, in addition to many other tests, are run before the tube leaves the factory. The final gas check is compared with records of several previous gas checks made along the production line.

If any indication is given that even a minute amount of gas has been generated inside the tube or has leaked in after evacuation, the tube is promptly rejected.

This is another example of how carefully Sylvania Picture Tubes are built to give their long, trouble-free life.

NEW CHARTS FOR SYLVANIA TUBE TESTERS

New Roll Charts are now available to all owners of Sylvania 139/140 and 219/220 Tube Testers. Copies may be obtained at $1.00 each from Sylvania Electric Products Inc., 1221 West Third Street, Williamsport, Pennsylvania. Attn: Mr. Jack Mintzer.

Revised roll charts for Sylvania tube testers are prepared as a service to users of Sylvania equipment. Between revisions, supplemental settings are published in SYLVANIA NEWS as soon as available.

High Electrostatic Picture Tube Substitution

rroughs - Picture Tube Division

In similar fashion, if a voltage divider having several taps is used, it is best to move the connecting wire rapidly from one tap to another until the best focus point is found. Once the proper focus voltage is selected, it will not usually be necessary to make further adjustments during the life of the tube.

Table 1

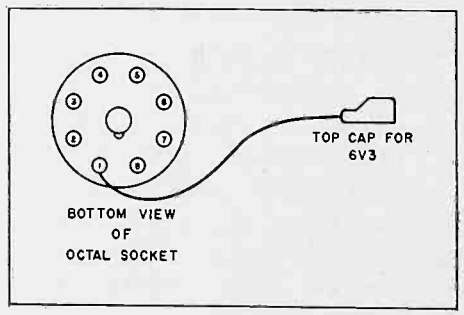
High Voltage E_s Focus	Suggested Low Voltage E_s Focus
Type	Replacement
17FP4A	17HP4/17RP4
20FP4	20HP4
20GP4	20HP4A

APTER FOR TYPE 6V8
219/220 TUBE TESTER

et the Tube Tester in the usual manner. socket. Plug the adapter into the octal ector *from the adapter* to the top cap of ne regular manner.

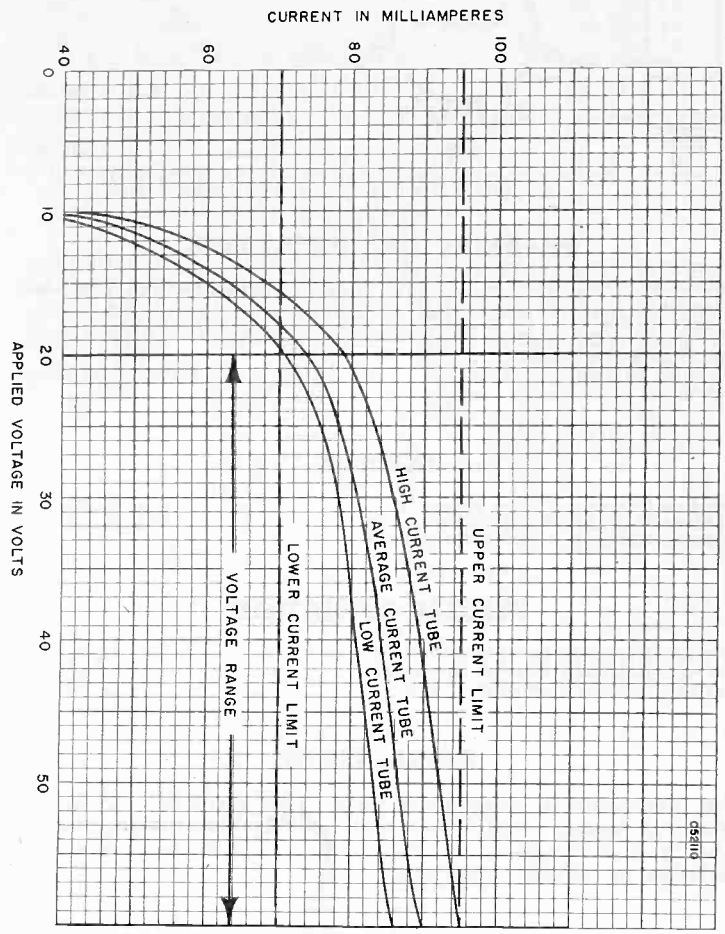
TTINGS FOR TYPE 6V3

	E	F	G	K
)	5	Z	2	
	5	Z	7	
)	5	Z	9	



Sylvania Type 40A1

AVERAGE CHARACTERISTICS



(*Continued from page 5*)

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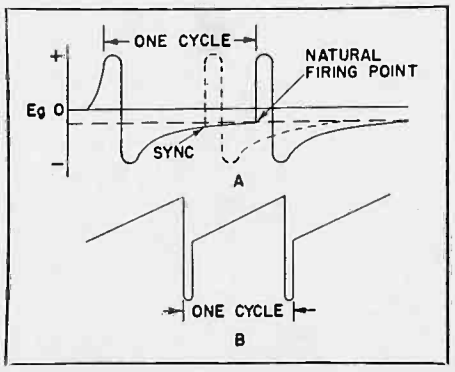
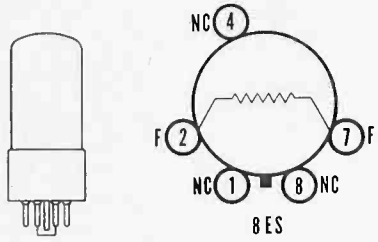


Figure 2. Blocking oscillator waveforms.

PICTURE TUBE PICTURES

Sylvania Type 40A1

HORIZONTAL STABILIZER



PHYSICAL SPECIFICATIONS

Base	Intermediate Shell Octal 5-Pin
Filament	Iron
Type of Cooling	Radiation
Maximum Overall Length	3¼"
Maximum Seated Height	2 11/16"
Mounting Position	Vertical, Base Down
Basing	8ES

RATINGS

Absolute Maximum Current Range	70 to 95 Ma
Absolute Maximum Voltage Range	20 to 60 Volts
Absolute Maximum Ambient Temperature	65° C

TYPICAL OPERATION

Average Operating Current at 40 Volts	84 Ma
Average Operating Current at 20 Volts	74 Ma
Average Operating Current at 60 Volts	90 Ma

APPLICATION

The Type 40A1 is a gas filled ballast tube designed to maintain relatively constant current over a specified operating voltage range. The type is designed for application as a horizontal deflection stabilizer in television receivers.

SYLVANIA RADIO TUBES

Issued as a supplement to the manual in Sylvania News for April 1953

High Electrostatic Picture Tube Substitution

rroughs - Picture Tube Division

21MP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[1]	14,000 Volts d c
Grid No. 4 Voltage	−55 to +300 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[2]	−33 to −77 Volts d c
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
2. Visual extinction of undeflected focused spot.

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

SYLVANIA PICTURE TUBES

In similar fashion, if a voltage divider having several taps is used, it is best to move the connecting wire rapidly from one tap to another until the best focus point is found. Once the proper focus voltage is selected, it will not usually be necessary to make further adjustments during the life of the tube.

Table 1

High Voltage E_s Focus	Suggested Low Voltage E_s Focus
Type	Replacement
17FP4A	17HP4/17RP4
20FP4	20HP4
20GP4	20HP4A

APTER FOR TYPE 6V8
219/220 TUBE TESTER

et the Tube Tester in the usual manner.
1 socket. Plug the adapter into the octal
ector *from the adapter* to the top cap of
he regular manner.

ETTINGS FOR TYPE 6V3

	E	F	G	K
0	5	Z	2	
0	5	Z	7	
0	5	Z	9	

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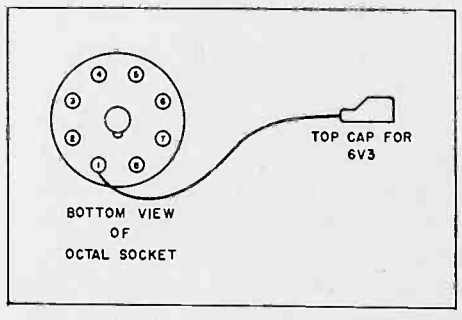


(*Continued from page 5*)

rate of oscillator blocking may cause this condition. If C_1 is leaky it will not hold the cut-off bias a sufficient length of time to give a 60 cycle frequency at any setting of the vertical hold control. Because of the nature of the condition, the frequency would be higher than 60 cycles which may make it impossible for the sync pulses to lock in the picture.

A change in value of R_1 or R_2 will either increase or decrease the frequency of oscillation; an increase in resistance will decrease the frequency and vice versa. If the vertical hold adjustment locks in the picture at the extreme end of its range it would be wise to change R_1 to a value that allows adjustment near the center, if you are sure that a defective part is not involved. Add resistance to R_1 if the control adjusts at maximum resistance, subtract resistance from R_1 if it adjusts at minimum resistance.

In some sets a long warm-up time is required for stabilization of the oscillator developed grid bias which determines operating frequency. This initial warm-up time is usually in the order of 25 seconds and may take as long as 60 seconds. If this time is excessive, another tube will probably reduce it.

In servicing television circuits there is no more valuable aid than a good 'scope and a voltage calibrator which will save hours of unsuccessful troubleshooting. Also, an analysis of circuit operation will save time and make more money for you in tv.

Your questions on blocking oscillators problems are invited. Those of greatest merit will be published with the answer.

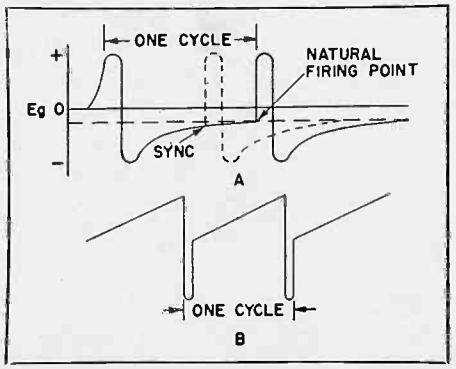


Figure 2. Blocking oscillator waveforms.

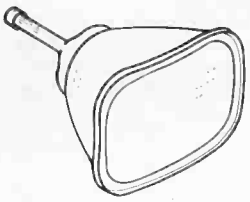
PICTURE TUBE PICTURES

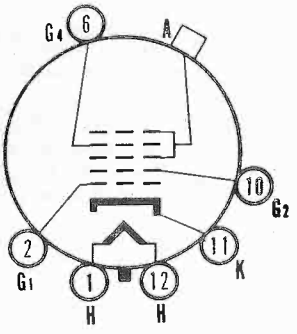
Sylvania Type 21MP4

TELEVISION PICTURE TUBE

21" Direct Viewed
Frosted Filter Glass
Single Field Ion Trap

Rectangular Metal Type
Magnetic Deflection
Low Voltage Electrostatic Focus





12-M

CHARACTERISTICS

General Data	
Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Frosted Filter Glass
Light Transmittance (approx.)	66 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	18⅛ x 13¹¹⁄₁₆ Inches
Bulb Contact	Metal Cone Lip
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	16,000 Volts d c
Grid No. 4 (Focusing Electrode) Voltage	−500 to +1000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Sec.	410 Volts d c
After Equipment Warm-up Period	180 Volts d c
Heater Positive with Respect to Cathode	180 Volts d c

SYLVANIA PICTURE TUBES

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High Electrostatic Picture Tube Substitution

rroughs - Picture Tube Division

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APTER FOR TYPE 6V8
219/220 TUBE TESTER

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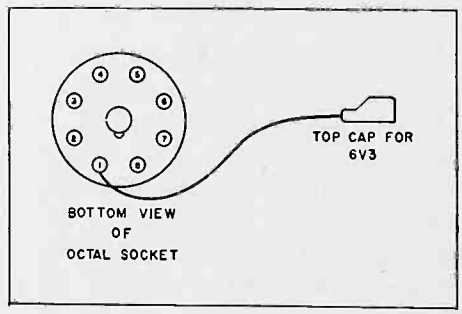
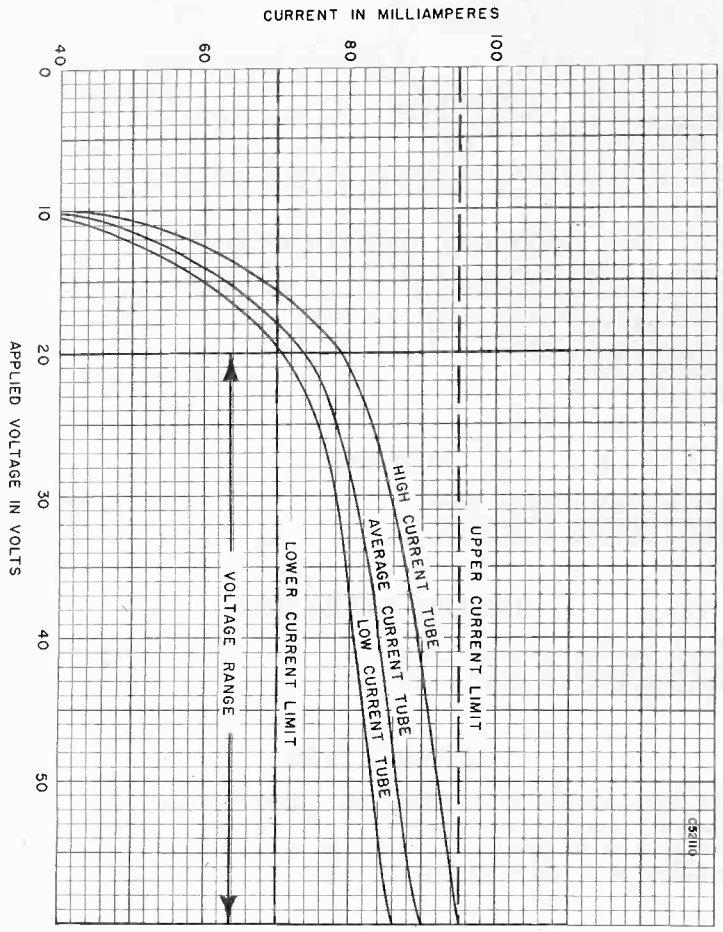
ETTINGS FOR TYPE 6V3

	E	F	G	K
0	5	Z	2	
)	5	Z	7	
0	5	Z	9	



Sylvania Type 40A1

AVERAGE CHARACTERISTICS



(*Continued from page 5*)

rate of oscillator blocking may cause this condition. If C_1 is leaky it will not hold the cut-off bias a sufficient length of time to give a 60 cycle frequency at any setting of the vertical hold control. Because of the nature of the condition, the frequency would be higher than 60 cycles which may make it impossible for the sync pulses to lock in the picture.

A change in value of R_1 or R_2 will either increase or decrease the frequency of oscillation; an increase in resistance will decrease the frequency and vice versa. If the vertical hold adjustment locks in the picture at the extreme end of its range it would be wise to change R_1 to a value that allows adjustment near the center, if you are sure that a defective part is not involved. Add resistance to R_1 if the control adjusts at maximum resistance, subtract resistance from R_1 if it adjusts at minimum resistance.

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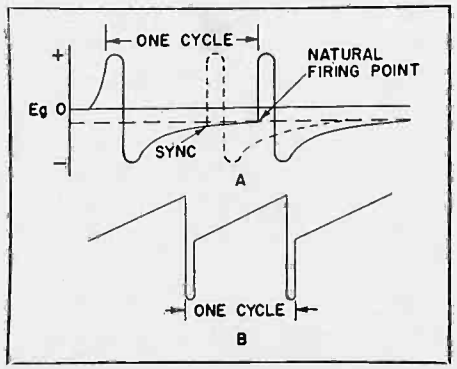
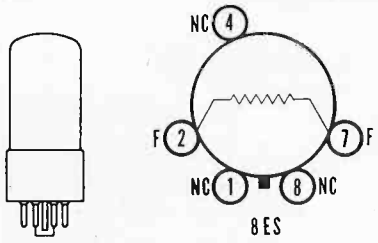


Figure 2. Blocking oscillator waveforms.

PICTURE TUBE PICTURES

Sylvania Type 40A1

HORIZONTAL STABILIZER



PHYSICAL SPECIFICATIONS

Base	Intermediate Shell Octal 5-Pin
Filament	Iron
Type of Cooling	Radiation
Maximum Overall Length	3¼"
Maximum Seated Height	2 11/16"
Mounting Position	Vertical, Base Down
Basing	8ES

RATINGS

Absolute Maximum Current Range	70 to 95 Ma
Absolute Maximum Voltage Range	20 to 60 Volts
Absolute Maximum Ambient Temperature	65° C

TYPICAL OPERATION

Average Operating Current at 40 Volts	84 Ma
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SYLVANIA RADIO TUBES

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High Electrostatic Picture Tube Substitution

rroughs - Picture Tube Division

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20GP4	20HP4A

APTER FOR TYPE 6V8
219/220 TUBE TESTER

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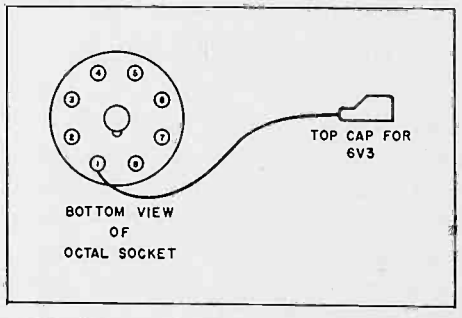
TTINGS FOR TYPE 6V3

	E	F	G	K
)	5	Z	2	
)	5	Z	7	
)	5	Z	9	



21MP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[1]	14,000 Volts d c
Grid No. 4 Voltage	−55 to +300 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[2]	−33 to −77 Volts d c
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
2. Visual extinction of undeflected focused spot.

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(*Continued from page 5*)

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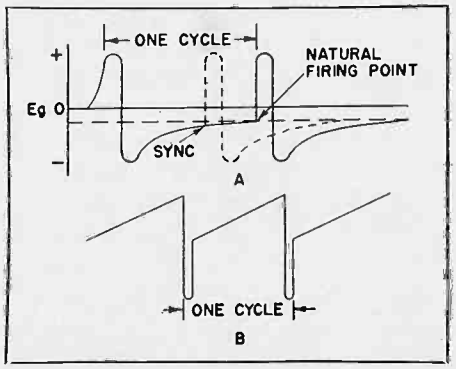


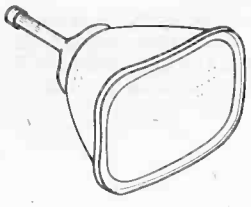
Figure 2. Blocking oscillator waveforms.

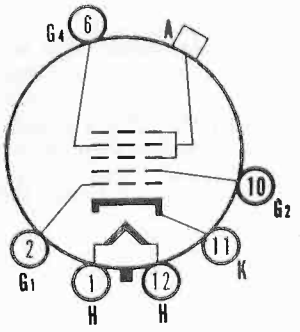
PICTURE TUBE PICTURES

Sylvania Type 21MP4

TELEVISION PICTURE TUBE

21" Direct Viewed
Frosted Filter Glass
Single Field Ion Trap
Rectangular Metal Type
Magnetic Deflection
Low Voltage Electrostatic Focus





12-M

CHARACTERISTICS

General Data	
Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Frosted Filter Glass
Light Transmittance (approx.)	66 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	18 3/8 x 13 11/16 Inches
Bulb Contact	Metal Cone Lip
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	16,000 Volts d c
Grid No. 4 (Focusing Electrode) Voltage	−500 to +1000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Sec.	410 Volts d c
After Equipment Warm-up Period	180 Volts d c
Heater Positive with Respect to Cathode	180 Volts d c

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in Sylvania News for April 1953

High Electrostatic Picture Tube Substitution

By F. L. Burroughs - Picture Tube Division

Several electrostatic-focus picture tubes introduced two years ago were of the high voltage focus type. They were never widely used in television receivers. The high voltage electrostatic focus types listed in Table I may be replaced with some advantage by the suggested low voltage electrostatic-focus tubes more readily available. The basing arrangement on the newer low voltage focus tubes is the same as for the ones they replace, so it is only necessary to connect the number 6 pin to a new focus voltage point in the tv receiver.

The first step in substituting a low focus voltage tube in place of one operating at the higher focus voltage is to disable the existing focus voltage supply. This supply operates at several thousand volts so the usual precautions in dealing with high voltage should be followed.

Then the lead from the low voltage focus pin should be connected to a variable voltage source of a few hundred volts. The best voltage supply to use in most television sets is the picture tube's G2 supply. A potentiometer may be connected as shown in Figure 1, or, if preferred, a simple voltage divider consisting of three or four one megohm resistors is satisfactory.

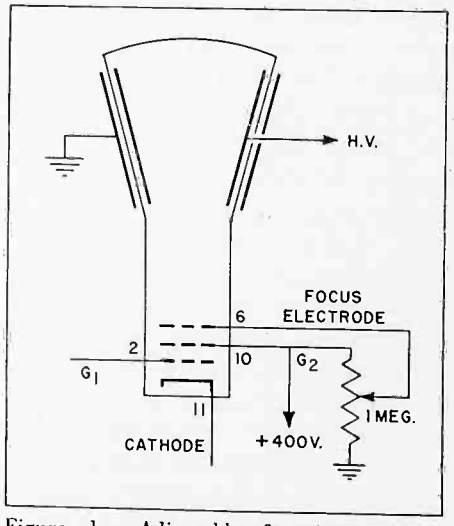


Figure 1. Adjustable focusing voltage

When the changes in the set wiring are completed, the focus voltage should be set at the proper point. Before the focus voltage adjustments are made, the ion trap should be moved along the neck to the point where the brightest picture is obtainable. Then the brightness and contrast controls should be set so that a picture of the desired brightness is being viewed.

In adjusting for best focus it will be necessary to change the focus voltage about 100 volts at a time to notice an appreciable change in focus on the tube. Moving the potentiometer arm quickly through its entire range will show changes in tube focus most clearly, and then the point of best focus can be promptly determined.

In similar fashion, if a voltage divider having several taps is used, it is best to move the connecting wire rapidly from one tap to another until the best focus point is found. Once the proper focus voltage is selected, it will not usually be necessary to make further adjustments during the life of the tube.

Table 1

High Voltage E_s Focus	Suggested Low Voltage E_s Focus
Type	Replacement
17FP4A	17HP4/17RP4
20FP4	20HP4
20GP4	20HP4A

SETTINGS AND ADAPTER FOR TYPE 6V8 SYLVANIA MODEL 219/220 TUBE TESTER

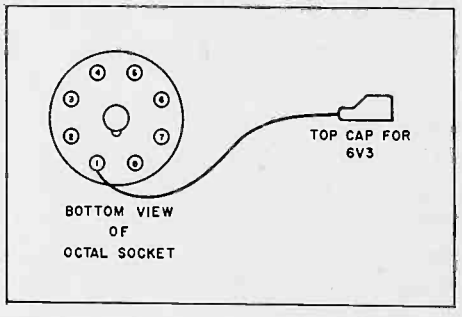
Using the settings listed below, set the Tube Tester in the usual manner. Plug the Type 6V3 into the nine-pin socket. Plug the adapter into the octal socket. Connect the top cap connector *from the adapter* to the top cap of the type 6V3. Read the meter in the regular manner.

MODEL 219/220 SETTINGS FOR TYPE 6V3

A	B	C	D	E	F	G	K
6.3	4	579	10	5	Z	2	
6.3	4	579	10	5	Z	7	
6.3	4	579	10	5	Z	9	

Note: The 139/140 Tube Tester will check the 6V3 without the adapter. Settings are included in the new roll chart (see chart announcement on Page 6).

Adapter for type 6V3 to be used in conjunction with Sylvania Model 219/220 Tube Tester is shown to the right.



Service Hints

PERIODIC CLEANING OF CONTACT POINTS on turret type tv tuners is a must for efficient reception. Carbon tetrachloride and numerous other cleaning fluids are not recommended, due to their leaving a film when dry. A corrugated rubber wedge (type used to prevent car windows rattling) may be used to remove corrosion by rubbing against contacts. Contact should then be brushed off with a completely dry typewriter brush.—Seymour Greenberg, Whitestone, L. I., N. Y.

Editor's Note—Not practical for all turret type tuners without disassembling.

EMERSON 629, B SERIES TV—No picture, no raster; high voltage dropped from 14,000 volts to less than 2,000 volts. The 2 megohm resistor in the high voltage doubler supply dropped in value from 2 megohms to less than 800,000 ohms. It is advisable that this resistor be replaced with a 4 watt resistor to prevent future recurrence of this condition.—S. Plauski, New York, New York.

SILVERTONE MODELS 1162, 1117 AND 1172—made by Air King Company (CBS). These models had cases of horizontal double pulsing. This was caused by incorrect resistors and resistors changing value with use. To correct this condition, change the 270K ohm resistor (from Pin 6 to B+ of the 12BH7 horizontal oscillator tube circuit) to 220K ohms. This must be done without changing any other resistance value.—Joseph P. Lopardo, Jr., Philadelphia, Pa.

ENLARGED SCREW HOLES—To repair enlarged screw holes for holding backs or lids on radios, I stick a piece of solder in the hole and cut off flush with the cabinet surface. When the screw is reinserted the solder leads up the hole and makes the screw fit firmly.—Gilbert H. Doty, Dayton, Ohio.

TEST PROBE ADAPTERS — A chuck type test probe tip can be made to accommodate banana plugs by drilling out the end with a No. 24 drill. Either a banana plug or an alligator clip will slip into the hole. A banana plug wound over with insulated wire with one end bare will make a condenser probe tip. I used a 4" banana plug socket with a 100K resistor inside for an isolation resistor tip which fits over the banana plug.—Maury Kerr, Redondo Beach, Calif.

CROSLEY MODELS EU-21COL, EU-21COL-BD — The picture first appears normal and then turns negative after five minutes and very faint after ten. All voltages are normal except for the last video (6AH6) which is slightly higher.

Checking with a 'scope shows high distortion on the plate of the 6AH6 and no gain. By using a V T V M I discovered that the picture control in the cathode circuit had high resistance. It checked good when cold. The carbon disc was cracked which would open up from heat after the set had been on for awhile.—Joseph Nolter, Mahanoy City, Pa.

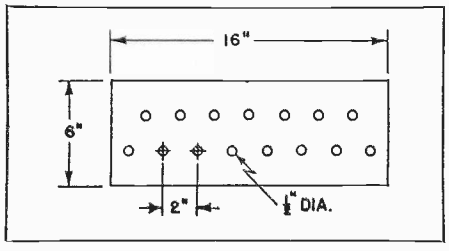
ARCING CLIP TYPE TERMINALS—All TV Receivers. In tv sets with 1B3, 6BG6 or 6BQ6, the arcing causes bright intermittent flashes on the screen. It can be remedied by changing clips with ceramic caps.—Signal Radio, New Haven, Conn.

HIGH VOLTAGE CABLES—All TV Receivers. Intermittent snaps of high voltage in the high voltage supply indicates installation breakdown. This can be remedied by replacing cables with high tension auto ignition type. Thereafter, there is no trouble if the cable touches the chassis.—Signal Radio, New Haven, Conn.

REMOVING OR REPLACING PICTURE TUBES—Before tube is removed from set place a straight edge (ruler or pencil) as a guide from the tube flare to socket. Place a drop of red nail polish on each unit on tube neck (yoke, focus coil, ion trap and tube socket). When the tube is replaced these adjustments can be lined up with ease.—J. P. Torre, Brooklyn, New York.

PROTECTING PHONO CARTRIDGES—Remove the soft rubber liner from a defective vibrator. When servicing record players, slip this liner over the cartridge. This will prevent injury to pickup or needle from "banging around" during examination or repair operations. It can also be used when delivering set to owner.—Radio Hospital, Los Angeles 33, California.

TEST LEAD RACK—Save time and improve the appearance of your shop by storing test leads on this easily constructed rack. The rack shown below can be made longer if necessary but the size shown here is ample to take care of an ordinary service shop.



This rack is made from a board 16" x 6" x ¾". Drill holes across the board 2" apart (see sketch above). Insert ordinary clothespins into these holes. A small amount of glue applied to the head of the clothespin will hold them secure.

Test leads can be inserted into, over or between the clothespins.—Donat A. Duquet, Waterville, Maine.

HANDY TEST PROBE TIP INSULATOR—Many times I have had trouble watching the test probe contact and Polymeter at the same time. I have made testing easier by slipping a piece of rubber wire insulation over the tip of the test probe, letting it extend over the end of the tip by about 1/32". By placing the end of the rubber on the point of contact, I can take a reading by exerting slight pressure on the probe while watching the meter.—Daniel H. Webster, Dubuque, Iowa.

SYLVANIA NEWS

MERCHANDISING SECTION

APRIL 1953 Vol. 20, No. 4

BEAT THE CLOCK, MORE POPULAR THAN EVER, PROMOTES THE SYLVANIA PRODUCTS YOU SELL

Nielson ratings for January, 1953 show that the company's television program, *Beat the Clock*, currently is rated higher than ever before. Its January rating was 27.3, as compared with 25.4 in December, 1952. This means that over 27 of every 100 homes having TV sets in the areas reached by *Beat the Clock*, are tuned in to the show.

Since Sylvania assumed sponsorship of the show back in September, 1950, its Nielson rating, which is an indication of popularity, has risen sharply. In September, 1951, *Beat the Clock* was rated at 13.9, less than half what its rating is today.

The sponsor identification record of *Beat the Clock*, at 69.6, is well above average. It means that of every 100 TV owners queried on who sponsored *Beat the Clock*, nearly 70 identified the show as Sylvania sponsored. This rating is higher than those of such popular television shows as Burns & Allen, Fred Waring, I Married Joan, Martin Kane, Mr. Peepers, My Friend Irma, Our Miss Brooks, Treasury Men in Action and Walter Winchell, to mention only a few.

Beat the Clock, was the subject of a two-page spread in the Sunday, February 8, issue of *This Week*, which has the largest circulation of any magazine in the world. The article was titled *Try These TV Stunts.*

An up-to-date list is shown, right, of the television stations carrying Sylvania's television show, *Beat the Clock.* There are a total of forty-two stations—seventeen are live and twenty-five are filmed. This schedule became effective January 3, 1953 and will continue for twenty-six weeks to June 27, 1953.

State	City	Station	Local Time & Day
Ga.	Atlanta	WAGA—TV	7:30— 8:00 PM Saturday
Ia.	Ames	WOI—TV	5:15— 5:45 PM Friday
Tex.	Austin	KTBC—TV	5:30— 6:00 PM Saturday
Ala.	Birmingham	WAFM—TV	10:00—10:30 PM Tuesday
Md.	Baltimore	WMAR—TV	7:30— 8:00 PM Saturday
Mass.	Boston	WNAC—TV	5:00— 5:30 PM Saturday
N. Y.	Buffalo	WBEN—TV	5:30— 6:00 PM Saturday
Ill.	Chicago	WBKB—TV	6:30— 7:00 PM Saturday
N. C.	Charlotte	WBTV	4:30— 5:00 PM Saturday
Ohio	Cincinnati	WKPC	7:30— 8:00 PM Saturday
Ohio	Cleveland	WXEL—TV	7:30— 8:00 PM Saturday
Ohio	Columbus	WBNS—TV	7:00— 7:30 PM Monday
Ohio	Dayton	WHIO—TV	7:30— 8:00 PM Saturday
Mich.	Detroit	WJBK—TV	7:30— 8:00 PM Saturday
Col.	Denver	KBTV	7:30— 8:00 PM Saturday
Tex.	Dallas	KRLD—TV	6:30— 7:00 PM Saturday
Tex.	El Paso	KROD—TV	8:30— 9:00 PM Saturday
N. C.	Greensboro	WFMY—TV	6:30— 7:00 PM Saturday
Ind.	Indianapolis	WFBM—TV	6:30— 7:00 PM Saturday
Pa.	Johnstown	WJAC—TV	2:30— 3:00 PM Saturday
Fla.	Jacksonville	WMBR—TV	7:30— 8:00 PM Saturday
Mo.	Kansas City	WDAF—TV	11:00—11:30 PM Saturday
Pa.	Lancaster	WGAL—TV	2:30— 3:00 PM Sunday
Calif.	Los Angeles	KNXT—TV	7:30— 8:00 PM Saturday
Ky.	Louisville	WHAS—TV	10:00—10:30 PM Thursday
Minn.	Minneapolis	WCCD—TV	6:30— 7:30 PM Saturday
Wis.	Milwaukee	WTMJ—TV	11:00—11:30 PM Monday
N. Y.	New York	WCBS—TV	7:30— 8:00 PM Saturday
Okla.	Oklahoma City	WKY—TV	11:00—11:30 PM Wednesday
Neb.	Omaha	KMTV	10:00—10:30 PM Saturday
Ariz.	Phoenix	KPHO—TV	8:30— 9:00 PM Saturday
Pa.	Philadelphia	WCAU—TV	7:30— 8:00 PM Saturday
Ill.	Rock Island	WHBF—TV	6:30— 7:00 PM Saturday
Va.	Roanoke	WSIS—TV	7:30— 8:00 PM Saturday
N. Y.	Syracuse	WHEN—TV	7:30— 8:00 PM Saturday
Mo.	St. Louis	KSD—TV	11:00—11:30 PM Friday
Calif.	San Diego	KFMB—TV	10:30—11:00 PM Thursday
Calif.	San Francisco	KPIX	7:30— 8:00 PM Saturday
Tex.	San Antonio	KEYL	6:30— 7:00 PM Saturday
Utah	Salt Lake City	KSL—TV	5:30— 6:00 PM Saturday
Wash.	Seattle	KING—TV	4:30— 5:00 PM Saturday
D. C.	Washington	WTOP—TV	7:30— 8:00 PM Saturday

3 OF THE HANDIEST SERVICING AIDS YOU'LL EVER OWN

Service dealers who own and use the Sylvania Plier Pack, the 4-in-1 magnetic screw driver, and the Sylvania Sit-N-Fixit will tell you that these servicing aids are as helpful as any they have ever used.

All three are now available for the serviceman who wants to be really well equipped. The plier pack is $3.95, the magnetic screw driver $2.75, and the Sit-N-Fixit $8.95. The above are all service dealer cost prices.

These items can be obtained from your local Sylvania Distributor or by ordering direct from the Sylvania Advertising Distribution Department, 1100 Main Street, Buffalo, N. Y.

The Sylvania Plier Pack is a pocket pack of three precision-matched miniature pliers especially designed for radio and television service work. No cheap, cold-rolled or stamped pliers are these. Forged from the finest quality steel and plated with heavy chrome, they are made by a leading manufacturer of surgical instruments and precision tools. These pliers, designed and produced especially for Sylvania, are tools worthy of a craftsman. The practicality of these three pliers in doing radio and television servicing can be clearly seen in the picture on this page. The first tool on the left is a 4¾-inch slip joint pliers. It has an adjustable 2-position slip joint, precision-matched jaws, and finely milled teeth. The one in the middle, a 5¼-inch needle-nosed pliers, has perfectly matched jaws and is just the tool for getting at what is otherwise inaccessible wiring and terminals. The tool on the right is designed to make ordinarily awkward right-angle work seem as easy as anything. It is a 4½-inch parrot-nosed pliers with adjustable 3-position slip joint, matched jaws, and finely milled teeth. These quality pliers are housed in a compact polystyrene case. The case, which is only one-half-inch thick and has the advantage of a tough transparent hinged cover, is at once handy and durable.

The Sylvania 4-in-1 Magna-Tip Screw Driver is a fine tool permanently magnetic and equipped with four interchangeable bits—two for slotted screws, two for Phillips heads. You can work faster, especially in remote or ordinarily inaccessible spots with this wonderful tool. An alnico magnet in the shank charges the bit with ten times the "pull" needed to hold the screw firmly while you place, start, and drive it home. It will never lose its magnetic force. The Sylvania Magna-Tip is actually four screw drivers in one—and a hex driver to boot. Four hardened tool steel bits come with each tool. One bit is in the bit holder and three bits are housed in the special handle compartment. With bit removed the Magna-Tip is a one-quarter-inch hex driver. It magnetically holds hex head screws and permits quick driving and removal.

The Sylvania Sit-N-Fixit will make your home service calls easier, faster, more comfortable. It consists of two parts. First, there is a smart, plastic-bound, carry-all, zippered case that makes a perfect drop cloth for tools, tubes, and parts. This case will protect your customers' rugs and floors. Second, the stool itself, made of folding aluminum and a water-repellent sailcloth, makes it ideal for the beach or camping trip. On one side of the stool is a zippered side pocket that holds screwdrivers, alignment tools, soldering iron, solder, and other tools you may need ready for instant use. On the opposite side of the Sit-N-Fixit there is a flap designed especially to hold your Sylvania Wrench Kits and Plier Pack.

Government Ends Curb On Essential Material

The controlled materials plan has been modified by the Office of Defense Mobilization so that the producers of steel, copper and aluminum can supply civilian buyers on a free market basis after they have met defense demands.

This recently issued order has nothing to do with price control, which is still maintained on all three basic metals. Price curbs will end, however, before April 30.

The order, announced by Arthur S. Flemming, acting director of the Office of Defense Mobilization, is expected to make more essential material available to manufacturers of radio and television sets, makers of parts and accessories and producers of appliances for the home.

It was also revealed that the administration will junk the controlled materials plan for rationing steel, copper and aluminum on June 30.

Up to the present order, as additional production capacity became available for civilian orders, producers and their customers had to apply to the government for permission to use additional supplies of steel, copper and aluminum for civilian products. Allotments of these basic metals made by the government for April, May and June will remain in force, officials said, but manufacturing consumers will be free to use any additional quantities they can obtain in the open market.

The allocations for the first quarter are too far along in production to be changed by the new order, manufacturers said, but they welcomed the relaxation for the second quarter. The relaxation of controls on metals brings in what is called an "open end" system which is to continue until the controlled materials plan is terminated on June 30.

Mr. Flemming emphasized that his order applied only to materials and allotments and did not affect the present price controls upon the metals.

One of the first effects of the relaxed controls on steel distribution, it was indicated, may be a rush by civilian users to get orders on the books at steel mills for future deliveries.

TOO MANY TUBES

When you have a difficult servicing problem and curse television receivers for being complicated, remember what a digital computer man has to contend with. One unit of a five-digit machine may contain 275 vacuum tubes, 350 crystal rectifiers, 800 resistors, 675 capacitors, 100 pulse transformers, and 80 r f chokes.

Another member of Sylvania's truckload of picture tubes club is West Side Radio Supply, Detroit, Mich. Shown in the above photo are owner Joe Opalinski, his two brothers Chet and Adam, and Sylvanian Bill Kelley.

More Materials To Be Available For TV Antennas

Recent removal of television and automobile receiving antennas from the civilian-type items list paves the way for larger allocations of controlled materials to manufacturers of these products, the National Production Authority of the Department of Commerce revealed recently.

Richard W. Cotton, director of NPA's Electronics Division, explained that the action was necessary to avert a growing shortage of TV and automobile receiving antennas.

Heavy replacement demands have developed in both items, Mr. Cotton said. In addition, requirements for TV receiving antennas will rise sharply in areas to be serviced by the 175 new stations for which construction permits have been issued by the Federal Communications Commission.

Civilian-type items, Mr. Cotton explained, are those normally produced for household or direct personal use, or which are otherwise considered non-essential. Allocations of steel, copper and aluminum for these products are at a lower level than those for products not on the NPA list, Mr. Cotton said.

CORRECTION

In the December, 1952 issue of SYLVANIA NEWS in an article entitled *Service Dealer Protection*, it was stated that "most policyholders don't know that their insurance policy is voided automatically if a fire is caused by lightning striking an antenna unless an approved type of lightning arrestor is installed between a receiver and the antenna."

The above statement is inaccurate. There is no such restriction in the standard fire insurance policy; however, it is true that where the service-dealer can be held responsible fire underwriters very likely would attempt to recover payments made to policy holders from these dealers.

In This Issue

SYLVANIA NEWS

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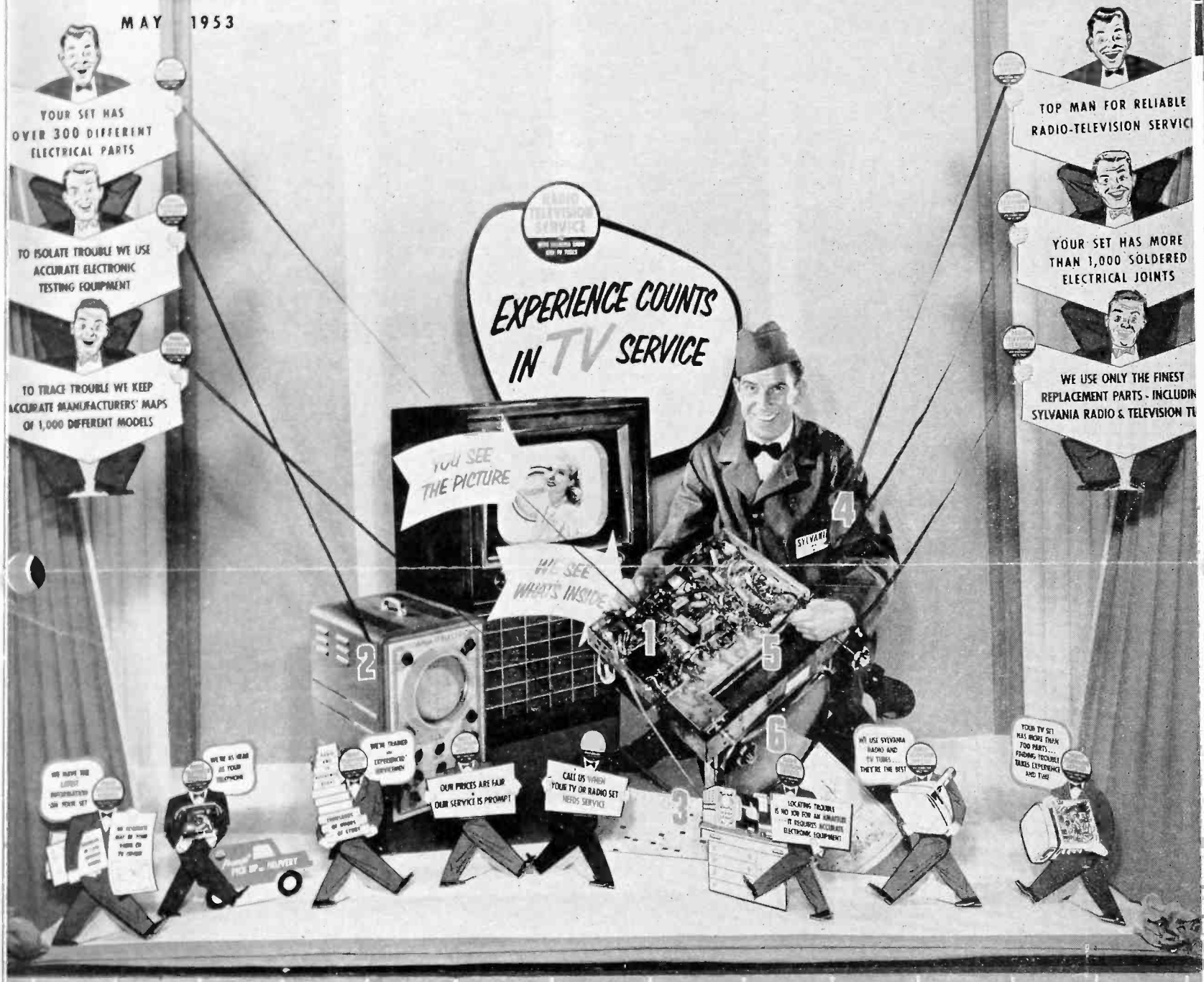
SYLVANIA NEWS

MAY 1953



C. J. Luten, editor

Vol. 20, No. 5

ARE YOU A THIEVING CROOK . . . or an underpaid highly-skilled technician?

By Kenneth Sloan, President, Radio Parts of Arizona

Yes, we think you are—one or the other, that is. No doubt, some of our readers are thieving crooks, many of you are underpaid, highly skilled technicians. We have learned, after many years of experience with most of you, that you are honest, hard-working men of excellent character, but in most cases underpaid for the quantity and quality of your knowledge and experience. We have had years of experience and we know the truth. But have you looked at a magazine or a newspaper lately? Have you seen some of the articles that are being published about TV and Radio repair men? Have you heard some of the things people are saying about TV repair shops? It's really something!

I was at a party the other night and got to talking to a stranger—he asked me about my business and I told him. Said that we sold radio and TV parts to repair shops. "Cripes", he said, "What a bunch of crooks, how do you stand it? They sure are rotten, aren't they?" I nearly blew a gasket. I assured the misguided and misinformed character that I had been in the same business for over 13 years, that we did hundreds of thousands of dollars worth of credit business with radio and TV repair men every year and that our credit losses were below the National average for wholesalers and then I told him a few other things and asked him where he got HIS ideas. He admitted that he had been reading items in the papers and magazines and some friends had told him about the raw deal they got. It's a bad reputation—but apparently you've got it—and it seems to be getting worse.

There is a great deal of ballyhoo for State and City regulation and licensing of TV repair and installation men and business. A proposed schedule for such regulation has been nationally circulated and has been proposed for our neighboring city of Los Angeles. It is our opinion that such regulation will do a great deal of harm to people in the business—to the industry as a whole and to the entire art of radio, TV and electronics in general. We believe that everything possible should be done to discourage and prevent the passage of such legislation. We do not believe that such regulation would do any good whatever in preventing misrepresentation and fraud in the business of Electronics Maintenance.

We do believe, however, that something should be done about the reputations of radio and TV repair men. We do not think that there is any great amount of fraud involved—we believe that it is largely a matter of misinformation and rumor.

We believe that one solution of the problem would be uniformly higher prices for radio and TV repairs. That sounds like a silly way to reduce fraud—by raising prices, but we think it would work. During the past more than thirteen years we have written on the subject of more money for radio repairmen. We have written such articles from all angles. Always we have appealed to radio men to raise their prices to the point where they could take plenty of time to do a good job, could afford to have good modern test equipment, and not need to do anything unethical or dishonest to make a reasonably good income. We have always insisted that the way to be successful in any service business is to be the highest priced—and be the best. I always quote as an example a very well known auto ignition shop in Phoenix. The man was good and he kept getting better and he kept up to date. His prices were always high—they still are now that the shop has grown to be a big business—but I have never heard of a dissatisfied customer. I have heard people moan and groan about the high prices charged, I have heard people say that they have had trouble

KENNETH SLOAN

with a job and that it had to go back to the shop time after time, but all of their work is guaranteed to be satisfactory, and it is. I have heard it said, "It will cost you plenty, but if you want it done right take it to Joe Doakes." They have the sort of reputation that radio and TV repair men need—but badly! They got that reputation by charging enough to do a good job. They have been in business for years and years. I'll bet that they have outlasted hundreds of thieving crooks who have tried to chisel in on their business.

It is my studied opinion that the reputations of Radio and TV servicemen will not greatly improve until such time as the whole level of the average technician has been raised. If there were a hundred or more good shops in Phoenix, shops which always turned out firmly guaranteed work at reasonably high prices, it would make little difference if some thieving crook set up shop and clipped a few of the bargain-hunting chiselers. There is a great need right now for additional good TV repair and installation men, yet right at this time many capable men are leaving TV work to work at better paying jobs. The public is unwilling to pay prices which will attract and keep good men in the business—the public, as usual, is

(*Continued on page 12*)

A New Business Control System For TV Service Operations

From the above desk, one employee can virtually operate a good-sized service business. Shown here is the basic Markem Service System package: desk tray, master card sets, duplicate receipt forms imprinted, colored date guides, and a complete alphabetical file.

Markem Service Systems, a subsidiary of the Markem Printing Company, is now marketing a business control system specially designed for the television service operator. Recognizing a need that has existed since television plummeted upon the national scene, Lawrence Kanover, a Business Systems specialist, developed a simplified, inexpensive method to effectively control small and large TV service operations.

The Markem System coordinates in fewer hands the necessary paperwork required in the handling of service calls from their inception to their completion. The system, as described by Kanover, will enable telephone operators, without leaving their seats, to receive, post and schedule all incoming calls or service requests; will reduce the number of operators for any given number of accounts; will give service technicians a complete history on each receiver; will set up all the required service records at one writing; will reduce paper work and papers and require less space; will reduce the time to route service men to predesignated areas; will catch duplicate and nuisance calls; and identify immediately the type of service to be given the individual customer.

Kanover has created a system with such flexibility that it meets the needs of the small service dealer as well as the expansive requirements of the large contractor. The basic Markem Service Systems' package now available through special Systems Distributors at $87.00 consists of following elements: specially adapted Markem Desk Tray, 200 Master Sets (Master Card and Office Master), 1000 Duplicate Receipt Forms imprinted, Colored Date Guides (25 of each of six days) and a complete A to Z file.

Kanover will gladly provide any interested service operator with further information. Write to him, Markem Service Systems, 145 Hudson Street, New York 13, New York.

RTMA APPOINTS TELEVISION SERVICE COURSE DIRECTOR

As another step in its program to advance the technical ability of the television serviceman, the RTMA Service Committee has named Paul B. Zbar to be chief instructor for the industry's training course at the New York Trade School. Mr. Zbar's assistant is yet to be selected by the Service Committee, under the chairmanship of R. J. Yeranko, the Magnavox Co.

The course, which is being underwritten in both money and equipment by RTMA members, is already underway. Mr. Zbar has formulated preliminary plans for the course of instruction and has installed on each of the 15 work benches test equipment donated by member-companies of the RTMA Instrument and Test Equipment Section, under the chairmanship of Roland M. Bixler, J-B-T Instruments Inc.

The course, the first of its kind under RTMA sponsorship, is designed to up-grade the present television serviceman and increase his technical proficiency. From the experience gained at the New York Trade School, a privately endowed school, a syllabus of the course will be prepared for use by the vocational training schools throughout the country.

Mr. Zbar has had wide experience in both the education and radio-television fields. He has been the director of a national group of television training schools and holds a master's degree in education. Mr. Zbar also is a member of the Institute of Radio Engineers.

FIVE NEW 21-INCH SYLVANIA TV PICTURE TUBES NOW AVAILABLE

Sylvania has announced the addition of five new 21-inch rectangular, all-glass television picture tubes to its renewal line. They are:

21WP4 . . . 21XP4 . . . 21YP4 . . . 21ZP4 . . . 21ZP4A.

These new tubes are spherical-face types, as compared to cylindrical-face types such as 21EP4A and 21FP4A. All are currently employed in from one to several brands of new television receivers, and represent growing replacement potential.

Types 21WP4 and 21XP4 are respectively magnetic and low-voltage electrostatic focus types. Both use a bulb measuring 20⅝" diagonal, smaller than that used for all other 21-inch types. Both are supplied with external conductive coating.

Type 21YP4 is a low-voltage electrostatic focus tube with external coating. It is similar to type 21FP4A except that the 21YP4 has a spherical face. The bulb measures 21 7/32" diagonal.

Types 21ZP4 and 21ZP4A are magnetic focus types, similar to 21EP4 and 21EP4A, except for their spherical face. The 21ZP4A has an external conductive coating; the 21ZP4 does not. Bulbs measure 21 7/32" diagonal.

MORE TV RECEIVERS TO BE SOLD IN 1953

Consumers expect to buy more TV sets and appliance products this year than in 1952, the Federal Reserve Board recently revealed.

The board's optimistic outlook for continued high level consumer expenditures was based on preliminary findings from its eighth annual survey of consumer finances. The study is made each January and February in conjunction with the Survey Research Center of the University of Michigan.

"The general conclusion to be drawn from the 1953 survey is that consumers have a confident attitude concerning their financial positions and expect to purchase major household durable goods and automobiles in large volume this year. They also plan to purchase new and existing houses in substantial volume," the board said.

Plans to purchase major household goods, especially television sets and furniture are substantially more numerous than they were a year ago. Intentions to buy refrigerators appear little changed from last year.

In 1952 retailers in this country sold 6,145,000 television sets and 3,570,000 electric refrigerators.

"Increases in income in 1952 were widely distributed and, with consumer prices relatively stable, the proportion of consumers who feel their financial situations have improved is somewhat larger than it was in any previous postwar survey," the board noted.

NEW TRUCKLOAD MEMBER

One of the latest Sylvania distributors to stock fast-moving Sylvania television picture tubes by the truckload is Masline Radio and Electronic Equipment Co. of Rochester, N. Y. Masline is like so many other Sylvania distributors; he aims to give his dealer-customers the best possible service.

In the picture at left Jean Levy and Ed Masline are shown holding one of the Sylvania TV tubes from the truckload shipment. Others in the photograph include Sylvania salesmen and engineers and members of the Masline personnel. Left to right: Bill Kelly, John Vail, Zita Oberer, Betty Schwab, Dot Greeley, Bob Mosher, Len Colt, Leo Solt, Carl Putman, Vic Lotempio, Jean Levy, Ed Masline, Charles Palmeter, John Taylor, Bob Jackson, Frank Scally, Phil Gombatto, Joe Scally, Tom Bullfinck, Warren Kaufman, Jerry Tiede, Al Masline, Bob McGinty.

New Technical Manual

The ninth edition of the Sylvania Technical Manual is now ready for distribution. The new edition is the same popular receiving and television picture tube manual which incorporates supplements issued for the 8th edition. Owners of the new manual will find more room for inserting the monthly supplements, which are enclosed regularly with SYLVANIA NEWS.

Twenty-five new types, previously issued as supplements, make the Sylvania Technical Manual a complete volume of tube information. It is widely used by servicemen, experimenters, engineers and "hams".

It is available for $2.00 from Sylvania Electric Products Inc. Advertising Distribution Department, 1100 Main St., Buffalo, N. Y.

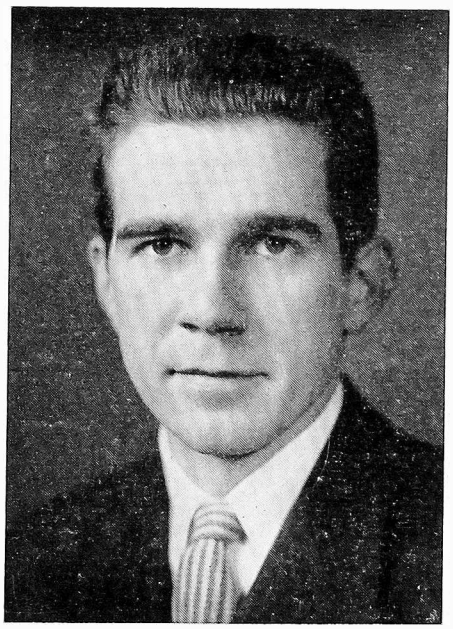
New Sylvania Salesman

A newcomer to the Sylvania Central District distributor tube sales force is Jerry P. Driscoll.

A native of Appleton, Wisconsin, Driscoll was formerly in the sales departments of Dennison Manufacturing Company of New York and the Charles F. Hubb Company of Connecticut.

Prior to his joining Dennison, Driscoll spent four years in the Navy Air Transport Service. He is a graduate of Lawrence College.

Driscoll is now handling the territory embracing Chicago, Rockford and Milwaukee. He makes his headquarters at Sylvania's Chicago sales offices, 3450 West Division Street.



JERRY P. DRISCOLL

SYLVANIA NEWS

TECHNICAL SECTION

MAY 1953 Vol. 20, No. 5

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligations

INSTALLING UHF ANTENNAS

By P. R. Simon

Advanced Application Engineer

The foremost television problem in American communities this year is the arrival of u h f, either in competition with existing v h f stations or as the only station. Attention is focused on the u h f antenna and converter because they are the only salient features at the receiving end of u h f tv that are different from v h f. The problem is so new that servicemen with u h f installation experience are woefully lacking in most communities. However, here at Emporium, the Sylvania Experimental Station KG2XDU (Channel 22) has provided a proving ground for u h f reception.*

Almost all conditions of reception are found in Emporium. Line-of-sight locations receive a signal up to 30,000 microvolts per meter, and unfavorable locations receive little or no signal with multiple out-of-phase reflections from the hills. Some of the ghosts due to these reflections are equally strong as the true signal.

Over flat terrain, distant u h f reception is possible with elaborate fringe area type of antennas. However, because of the narrow, irregular valley, Emporium had the additional problem of eliminating ghosts. In fact, the reflections were used for reception in many instances.

*J. B. Grund—EXPERIMENTAL U H F STATION KG2XDU — Sylvania News, December, 1952 and February, 1953.

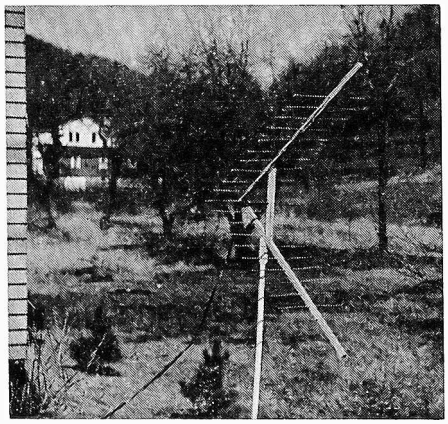


Figure 1. A corner reflector for the reduction of ghosts on u h f.

Ghosts are caused by reflected signals which have travelled over a different and longer transmission path and are picked up by the receiving antenna. They usually travel over a different path than the true signal and thereby make it possible to eliminate them. The characteristics of the antenna under these conditions should include a high front-to-back ratio. This is the ratio of the signal received with the antenna directed toward the station to the signal received with the antenna directed away from the station.

One of the best antennas we found for exclusion of ghost signals was the corner reflector (See Figure 1). This antenna virtually shuts out all the signals arriving from the rear. Ghost-free reception was obtained where previously annoying double and triple images prevailed.

U H F has the advantage of smaller antenna dimensions than v h f television. Multiple stacked arrays that are cumbersome when built for v h f become small, easily managed units at ultra high frequencies (See Figure 2). These high gain antennas have the inherent property of a very narrow lobe in their field patterns. There is a direct relationship between antenna gain and the main lobe width (See Figure 3). The sharp directivity of this type of antenna makes the azimuth adjustment critical when installing it. Location and height adjustments are critical at u h f due to reflection and attenuation of the signal by interfering bodies which increase with increasing frequency.

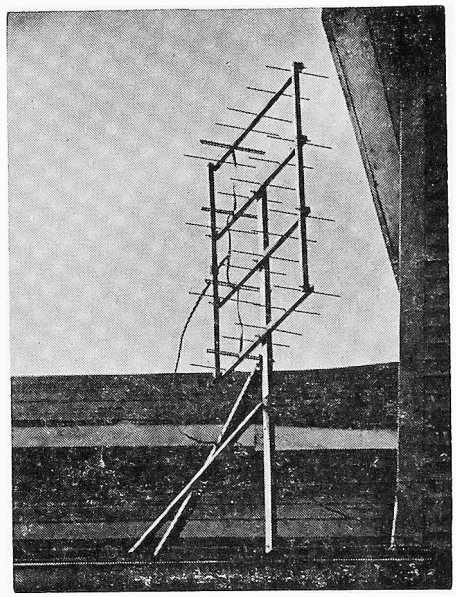


Figure 2. V H F stacked Yagi antennas for high gain in fringe areas.

A v h f installation was easily made by choosing a convenient chimney mount and approximately orienting the array toward the station. Our experience with u h f has been that moving a Yagi beam up, down, or to either side only three feet varied the field strength to double or triple its previous value. An ultra high frequency field strength meter proved invaluable in this process. We improvised one in the laboratory by converting a commercial v h f field strength meter which uses a Standard Coil Turret Tuner. The plug-in strips allowed us to simply replace one of the unused v h f strips with one for the u h f channel desired. It was also necessary to add a 300 ohm shielded lead from the meter terminals to the tuner input to prevent oscillation or a spurious reading when no signal is present.

As there is probably more than one unused v h f channel in most areas, new u h f stations can be received

(*Continued on page 6*)

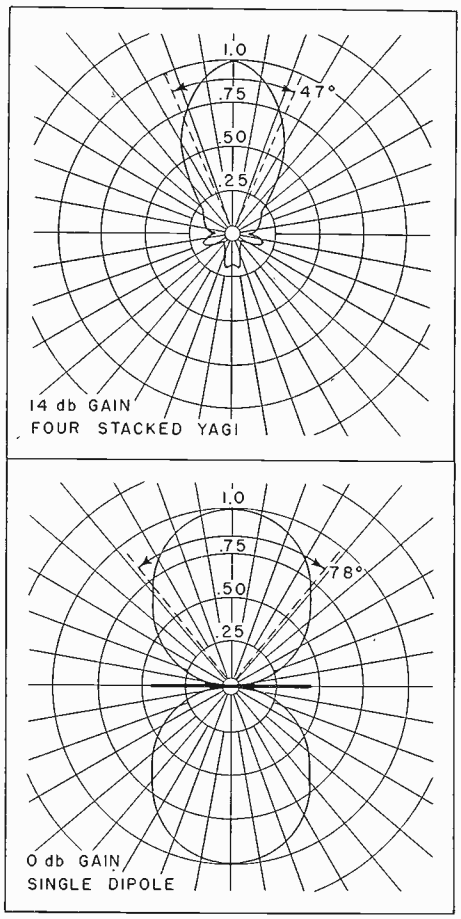


Figure 3. Horizontal field patterns of a four stacked Yagi and dipole antennas.

$$\text{Power gain over dipole} = \frac{25{,}250}{\text{Angle A} \times \text{Angle B}}$$

Angles A and B are in planes at right angles to each other; e.g. horizontal and vertical.

UHF ANTENNAS (*Continued from page 5*)

with the appropriate strip without reducing its use as a v h f field strength meter.

With this meter in view of the person installing the antenna, the location of the highest field strength can be ascertained with a few trials. The usual roof-to-set communication practice of aligning a tv antenna includes a delay of observer response which results in a long chore. Thus, the use of a portable field strength meter shortens the job considerably.

Television viewers in fringe areas may shy from the thought of adding more antennas to the already crowded roof-top apparatus where v h f has been received. Many will try to receive u h f on their present arrays. For strong signal strength areas, they may be adequate for good reception. We used an all-channel v h f conical mounted on the laboratory roof to successfully receive the KG2XDU (Channel 22) signal at a distance of 1.5 miles from the transmitter. In other nearby line-of-sight locations satisfactory pictures were obtained by using the antenna built into the converter or set. The built-in type of antenna is usually a folded half-wave dipole or triangular fan which is considered to have little or no gain.

In weak signal areas special high gain u h f antennas are necessary. There are a wide variety of this type of antenna; just about every type of beam known is practical at these frequencies. However, the wide frequency span covered by u h f tv (470 to 890 mc) makes the construction of an all-channel high gain antenna difficult. The inverse relationship between gain and bandwidth necessitates a sacrifice in gain to achieve a bandwidth adequate to cover all the desired channels. Television owners in ultra-fringe areas require single channel, extra high gain type of arrays for each channel to be received. This is not too great a trial when the small size of the u h f array is considered.

Although the KG2XDU transmitter is of the experimental low power class, with a maximum e.r.p. of 300 watts visual and 100 watts aural, we have been successful in receiving a picture at a distance of 10 miles. In this test, over a theoretical line-of-sight, a single Yagi antenna was used which had a gain of 9 db.*

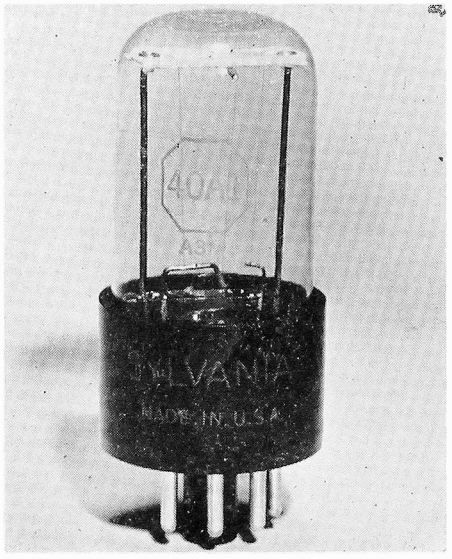
We will continue this series with a discussion of ultra high frequency converters next month.

*P. R. Simon—A HIGH GAIN YAGI ANTENNA, SYLVANIA NEWS, January, 1953

A HORIZONTAL DEFLECTION STABILIZER TUBE

For many years, the television receiver manufacturer has been forced to allow a generous safety margin in the design of the horizontal deflection circuit in order that tube ratings would not be exceeded at high line voltage. Such a design requirement made it difficult, at times, to obtain full scan at low voltage even with maximum settings of the horizontal controls.

A relatively low cost solution to



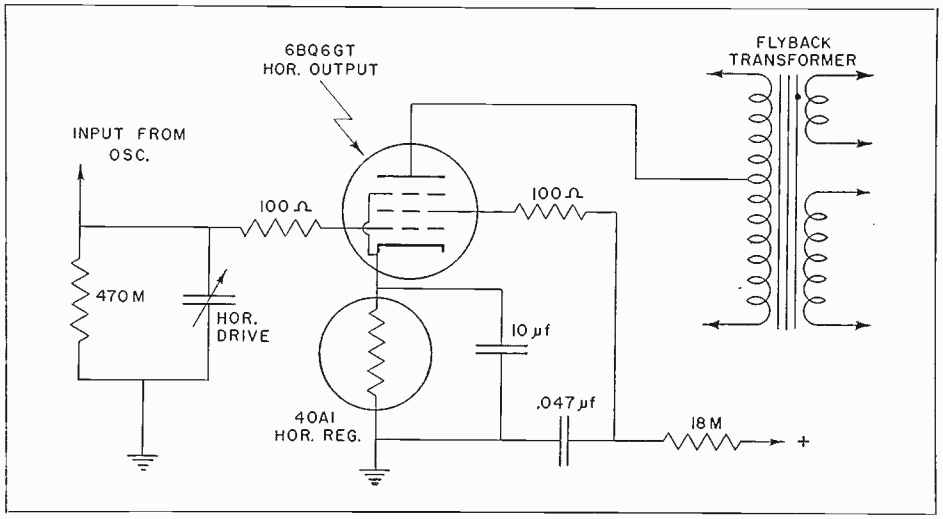


Fig.1. A typical circuit using the Sylvania type 40A1.

the problem is supplied by Sylvania Type 40A1 Horizontal Deflection Stabilizer Tube. This is a filamentary type ballast tube having an average voltage current characteristic as shown in the Sylvania Technical Manual Supplement. The Type 40A1 is used as the cathode resistor of the horizontal output tube in receivers specifically designed for its use (See Figure 1). Because of the non-linear resistance characteristic, variations in anode voltage, picture width, output tube cathode current and damper diode current with line voltage are considerably below that which result from using a fixed cathode resistor. It becomes possible, therefore, to operate the horizontal output tube near full scan capabilities at low line voltage without subjecting it to operating conditions which exceed the maximum ratings at high line voltage. This insures greater reliability and trouble-free operation.

In Table I are given figures which illustrate the desirable effects of using the Type 40A1 in television receivers. The figures of Table I (B) were obtained by substituting a variable cathode resistor for the Type 40A1 and adjusting it so that at 117 volt line, operating currents and voltages were identical to those obtained with Type 40A1 at 117 volt line. The stabilizing effect of the Type 40A1 is apparent at once. Of special interest is the greatly reduced variation in output tube cathode current and damper current.

While it is not a complete solution to the problem of scan changes with line voltage, the Sylvania Type 40A1 Horizontal Deflection Stabilizer is of considerable value in maintaining less variant values of horizontal output tube cathode current, damper current, anode voltage and scan width with varying line voltage than would be the case with the use of a fixed cathode resistor.

The Sylvania Type 40B2 has recently been announced. The addition of this tube allows more flexible circuit design.

TABLE I

Percentage Variation of Operating Currents and Voltages with Respect to 117 Volt Line Conditions — Line Voltage Varied From 105 to 130 Volts.

	Output Tube I_k	I_{damper}	Second Anode E	Scan*
A—With 40A1	10.7%	9.5%	15.7%	6.6%
B—With R_k	28.6%	25.9%	27.5%	15.8%

** Scan measurements made using large circle of "Indian Head" test pattern.*

AN EASILY BUILT UHF TV CORNER REFLECTOR ANTENNA

By P. M. Reinhardt—Technical Publications Section

The 90° corner reflector antenna for u h f tv, shown in the accompanying figures, is relatively simple to construct, since it contains fewer critical dimensions than a Yagi of comparable gain. The antenna described in this article has a gain of about 10 db, or slightly better than a single six element Yagi. The corner antenna provided a better picture than a pair of 6 element stacked Yagi antennas, since it appears less susceptible to ghosts, due partly to its better front-to-back ratio. Our location is such that we receive the signal down in a valley solely by reflection from a nearby hill, thus our antenna points away from the transmitter. In this location the corner antenna provided better results than either a single, or a two stack Yagi. The antenna may be built for any of the u h f channels by laying out the dimensions in terms of the wavelength, and then converting these to inches.

The only dimensions which are somewhat critical are those involved in the construction of the dipole and its matching section, and the spacing (D) of the dipole from the vertex element. While it is possible to match 300 ohm line directly to the dipole, this is not recommended since it requires a considerable increase in dimension D. If D is increased too greatly, the field pattern may change from a single lobe to one having several major lobes unless the length of the sides (W) is increased. Thus to have a physically compact antenna with a single major lobe and to keep the size reasonable, D was made a quarter wavelength long and a matching section included. The dipole element is a half wave, shortened due to the tubing diameter, and the presence of the matching section.

Once dimensions A and D are chosen (depending upon the channel desired), the other dimensions are simple. The length of the reflector elements L are not critical since they are not parasitically excited. They should preferably be at least the length of the dipole A plus D, (¾ of a wavelength), which is another reason for keeping D reasonably small. These reflector elements are not cut to any particular frequency but are merely greater than A so that they may approximate the effect of a solid sheet. By the same token, the spacing S is not critical so long as it is somewhat less than D, so it was made a tenth wavelength.

The length of the reflector sides then determines the number of reflector elements required. The lengths of the sides are not especially

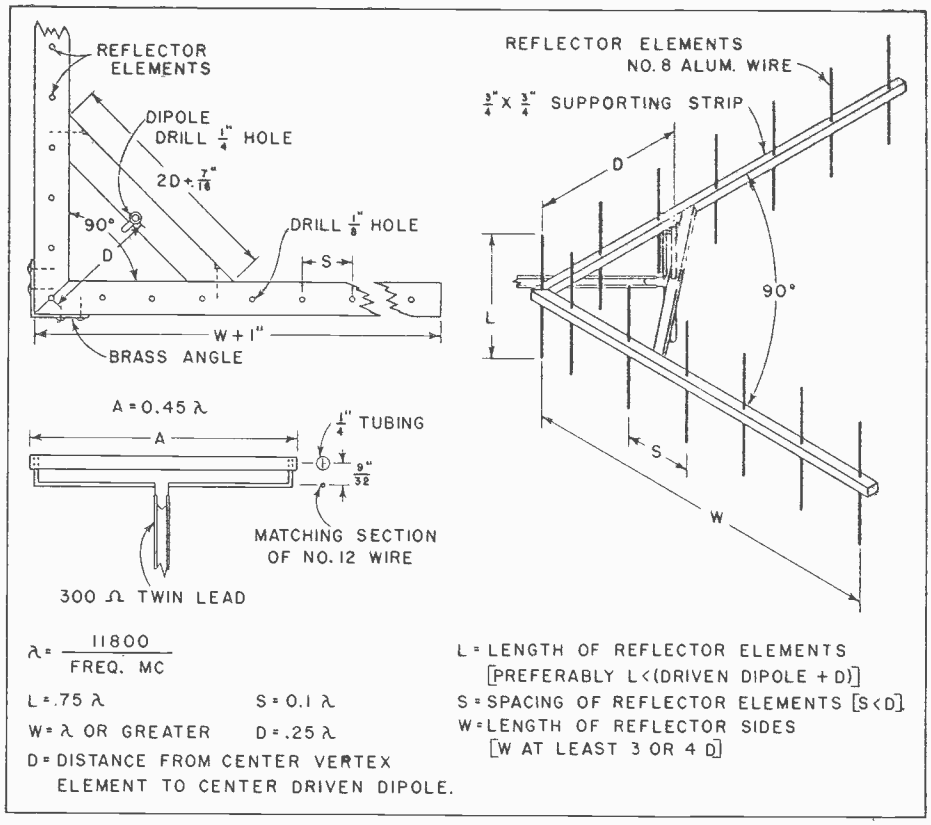
(Continued on page 8)

AN EASILY BUILT UHF ANT.

(Continued from page 7)

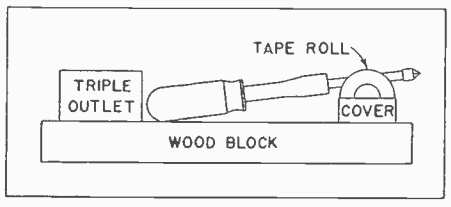
critical, but should be at least three or four times D, so we used a full wavelength. This results in ten elements on each side, plus one for the vertex.

Please note that dimension D determines the impedance of the dipole (for a given angle) and thus along with the diameter of the dipole and wire used in the matching section, results in the proper match to 300 ohm twin lead. If either the 90° angle, or D is changed, a change would be required in the dipole matching assembly. It is suggested that the constructor follow the dimensions given unless he is very familiar with the designing of matching sections.



Service Hints

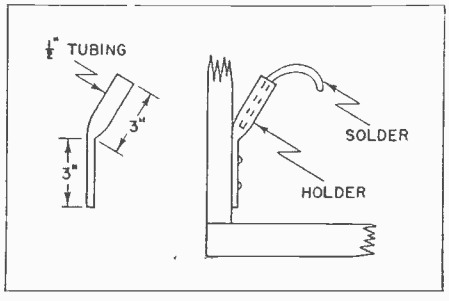
COMBINATION SOLDERING IRON HOLDER AND ELECTRIC OUTLET—I have carried this handy gadget on service calls for years. The base is made from the end of a pear crate. The holder is an adhesive tape can. The triple outlet is of the molded extension cord variety with a



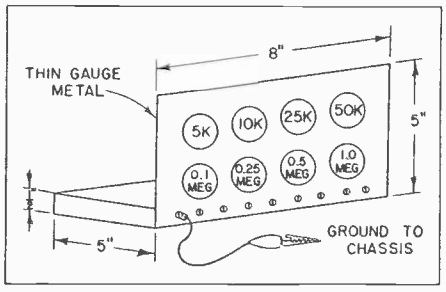
10 foot piece of heavy duty cord and plug. The outlet is fastened near one end of the base board and the inside or roll part of the can is screwed to the board so that the tip rests slightly above it when the handle of the iron rests against the outlet. The cover of the can is forced over the screwed-down roll so that it forms a cup for solder droppings and a convenient place to tin your iron.

The wide base prevents it from tipping over. The outlet provides juice for your instruments and you don't have a hot holder to carry home. — Martin L. Shapero, Fort Wayne, Indiana.

SOLDER HOLDER FOR SERVICEMEN — The following sketch illustrates a Bar Solder Holder which will be found very handy especially when one has to use his two hands besides holding the solder. It is made by taking a 6″ piece of ½″ copper tubing and flattening 3″ of it on a vise. Drill two holes on the flattened piece and attach to the bench where it will be easy to reach. —D. A. Duquet, Waterville, Maine.



BENCH RESISTANCE CONTROL BOARD—To speed up repairs on questionable controls, I used a resistance control board which contains eight variable resistance controls of different sizes. If a control is suspected to be bad, the leads are disconnected and the proper control



on the board is clipped to them. Using the good controls proves whether the one in the set is good or bad.

Many television set controls are quite critical; they will test alright by instrument but will not work properly. By this substitution method, you can't go wrong.—James P. Torre, Brooklyn, N. Y.

SYLVANIA NEWS

MERCHANDISING SECTION

MAY 1953 Vol. 20, No. 5

SYLVANIA PROMOTES YOUR BUSINESS ON BEAT THE CLOCK

The window streamer at left will be given to you by your Sylvania Distributor so you can identify yourself with the new money-making campaign Sylvania has designed to promote your business.

Here's the greatest money-making campaign ever designed for television service dealers.

Every week during May every television set owner in your area will be part of a four million audience hearing about your service over the 49 CBS television stations which carry the Sylvania TV show *Beat the Clock*. Check the list on Page 10 for the *Beat the Clock* station in your area.

Sylvania will tell your prospects in this huge audience *your* story. Five times they will hear that "experience counts in TV service." Five commercials will tell the story of television service: why it takes time, money and experience to give good television service.

You tie in with this big profit building campaign in your own locality by using the dramatic window dress shown on this month's cover of SYLVANIA NEWS. This window dress has built into it some terrific sales building features:

1. It's a complete window trim for any size window.
2. It tells a powerful story about your service.
3. It's life size.
4. A powerful built-in flasher calls attention to the display.
5. It's in seven beautiful colors.
6. It's furnished complete with everything you need to trim your store window.

And remember, when you start using your Sylvania window dress, you will immediately identify yourself to your customers and prospects as the service dealer whose story they heard on *Beat the Clock*.

On top of this, your Sylvania Distributor will give you a supply of colorful window streamers which will tell your customers to watch *Beat the Clock*. These streamers will be imprinted with your local TV station, time and day for *Beat the Clock*.

(*Continued on page 10*)

Above are a series of mailing pieces which will help you gain even more business during Sylvania's great, new campaign.

Sylvania Promotes Your Business On Television; Identify Yourself With This Great Profit-Building Campaign

State	City	Station	Local Time & Day
Ga.	Atlanta	WAGA—TV	7:30— 8:00 PM Saturday
Ia.	Ames	WOI—TV	5:15— 5:45 PM Friday
Tex.	Austin	KTBC—TV	5:30— 6:00 PM Saturday
Ala.	Birmingham	WAFM—TV	10:00—10:30 PM Tuesday
Md.	Baltimore	WMAR—TV	7:30— 8:00 PM Saturday
Mass.	Boston	WNAC—TV	5:00— 5:30 PM Saturday
N. Y.	Buffalo	WBEN—TV	5:30— 6:00 PM Saturday
Ill.	Chicago	WBKB—TV	6:30— 7:00 PM Saturday
N. C.	Charlotte	WBTV	4:30— 5:00 PM Saturday
Ohio	Cincinnati	WKRC—TV	7:30— 8:00 PM Saturday
Ohio	Cleveland	WXEL	7:30— 8:00 PM Saturday
Ohio	Columbus	WBNS—TV	7:00— 7:30 PM Monday
Colo.	Colorado Springs	KKTV	7:30— 8:00 PM Saturday
Ohio	Dayton	WHIO—TV	7:30— 8:00 PM Saturday
Mich.	Detroit	WJBK—TV	7:30— 8:00 PM Saturday
Colo.	Denver	KBTV	5:30— 6:00 PM Saturday
Tex.	Dallas	KRLD—TV	6:30— 7:00 PM Saturday
Tex.	El Paso	KROD—TV	8:30— 9:00 PM Saturday
Mich.	Grand Rapids	WOOD—TV	7:30— 8:00 PM Saturday
N. C.	Greensboro	WFMY—TV	6:30— 7:00 PM Saturday
Tex.	Houston	KGUL—TV	6:30— 7:00 PM Saturday
Ind.	Indianapolis	WFPM—TV	6:30— 7:00 PM Saturday
Pa.	Johnstown	WJAC—TV	2:30— 3:00 PM Saturday
Fla.	Jacksonville	WMER—TV	7:30— 8:00 PM Saturday
Mich.	Kalamazoo	WKZO—TV	7:30— 8:00 PM Saturday
Mo.	Kansas City	WDAF—TV	11:00—11:30 PM Saturday
Pa.	Lancaster	WGAL—TV	2:30— 3:00 PM Saturday
Calif.	Los Angeles	KNXT—TV	7:30— 8:00 PM Friday
Ky.	Louisville	WHAS—TV	10:00—10:30 PM Thursday
Tex.	Lubbock	KDUB—TV	6:30— 7:00 PM Saturday
Minn.	Minneapolis	WCCO—TV	6:30— 7:00 PM Saturday
Wis.	Milwaukee	WTMJ—TV	11:00—11:30 PM Monday
N. Y.	New York	WCBS—TV	7:30— 8:00 PM Saturday
Okla.	Oklahoma City	WKY—TV	11:00—11:30 PM Wednesday
Neb.	Omaha	KMTV	10:00—10:30 PM Saturday
Ariz.	Phoenix	KPHO—TV	8:30— 9:00 PM Saturday
Pa.	Philadelphia	WCAU—TV	7:30— 8:00 PM Saturday
Pa.	Reading	WHUM—TV	7:30— 8:00 PM Saturday
Ill.	Rock Island	WHBF—TV	6:30— 7:00 PM Saturday
Va.	Roanoke	WSIS—TV	7:30— 8:00 PM Saturday
N. Y.	Syracuse	WHEN—TV	7:30— 8:00 PM Saturday
Mo.	St. Louis	KSD—TV	11:00—11:30 PM Friday
Calif.	San Diego	KFMB—TV	10:30—11:00 PM Thursday
Calif.	San Francisco	KPIX	7:30— 8:00 PM Saturday
Tex.	San Antonio	KEYL	6:30— 7:00 PM Saturday
Utah	Salt Lake City	KSL—TV	5:30— 6:00 PM Saturday
Wash.	Seattle	KING—TV	4:30— 5:00 PM Saturday
D. C.	Washington	WTOP—TV	7:30— 8:00 PM Saturday
Ohio	Youngstown	WKBN—TV	7:30— 8:00 PM Saturday

(*Continued from page 9*)

Now, this big promotion package, containing window dress and streamers, will be supplied to you free by your Sylvania Distributor when you give him 10 Sylvania Premium Tokens. Remember, your Sylvania distributor supplies you with one Premium Token every time you buy 25 Sylvania receiving tubes or one Sylvania TV Picture Tube.

When you collect the required number of tokens, take them to your distributor and he will furnish you with the window trim. At that time, be sure to ask him about other ways he can help you tie in with this terrific sales building program.

Also part of the promotion package are an assortment of powerful direct mail pieces which can also be used to promote your service during May and the months to come. Included in this assortment are two stamped, imprinted government postal cards which tell your prospects that you are the man to call when their set needs service. There is also a jumbo postal card which tells your customers that your service is prompt, your prices fair, your service dependable. Lastly, there is a colorful broadside which tells your customers that their TV set is a ticket to fun and entertainment. This broadside reminds them that their ticket to good television service is *you*.

You can buy one or all of these mailing pieces to tie in with this great campaign. Your name, address and phone number is imprinted on each piece, if you desire. Cost of the mailers is $2.00 for each 100 you order or 4 Sylvania Premium Tokens.

To order a supply of these mailing pieces, see your Sylvania Distributor when you order your window dress kit.

For further information about Sylvania's new promotion, ask your Sylvania Distributor salesmen.

NATESA OFFICERS AND COMMITTEES

The officers and committee of the National Alliance of Television and Electronic Service Associations are shown above at the fourth national convention of NATESA recently held in Kansas City. Left to right, front row: M. D. Thompson, Lee Roscoe, Howard Segens, Al Richards (President, Television Service Engineers), Jack McDowell (Secretary, NATESA), Jim Blair, Pete Cenci. Second row, left to right: Bob Hester, Don Day, Paul Stewart, Tommy Thomason, Bill Dunfee, Mac Metoyer, Forest McCarty, Charles Corteville, Merrill Wright. Third row, center to right: Walter Niswonger, Jim Forristal, Walter Tague, Wayne Ludden.

New TV Authorization For 339 Outlets

Since lifting the freeze last summer, the F. C. C. has authorized the construction of 339 new television stations, according to a recent RTMA tabulation. Of the new authorization, approximately 50 were in operation during mid-April, including several which are conducting low-power equipment tests.

Fifty-five special temporary authorizations to begin commercial telecasting have been granted, including 26 for U. H. F. and 29 for V. H. F. outlets. The post-freeze authorizations are for 114 V. H. F. stations and 225 U. H. F. outlets.

Latest Nielson ratings show that *Beat the Clock* is rated higher than ever before. Its January rating was 27.3 as compared with 25.4 in December, 1952. This means that over 27 of every 100 homes having TV sets in the area reached by *Beat the Clock*, are tuned into the show. This huge audience, containing your customers and prospects, will be hearing the story of your business during this month. The photo above shows Bud Collyer (second from right) cheering a recent winning team on *Beat the Clock*.

LONG BEACH RTA ELECTS NEW OFFICERS

The new officers of the Long Beach Radio Technicians Association are: (seated, left to right) Harry E. Ward, Merlyn Cochems, Joe Martin, Fred Abrams, Clarence Spencer. Standing, left to right: Richard Harding, Hal Myers, Les Huckins. The Long Beach RTA is the oldest group of its kind in the radio and television service industry.

Are You A Thieving Crook?

(*Continued from page 2*)

getting what they pay for. It is unfortunate that more shops do not have high priced, high quality, service for sale. The customer-public would like it better in the end.

One of the principal reasons why radio and TV servicemen are underpaid, as we have stated so very often before, is not because they don't charge enough for their really difficult large jobs. The minimum charges of practically all shops is too low. Years ago, before prices went up at all, we preached and practiced the principle that any radio set was worth a minimum service charge of $3.50. My contention has been that when a set comes into a shop it does *not play*. When it goes out of the shop it *does play*. In the final analysis, that is all that matters to the owner-customer. Actually, it makes little difference to him whether it's a tube loose in a socket or a burned-out power transformer. He is paying to get the thing fixed. There is a minimum price which most customers will pay without kicking too much—without believing that TV servicemen are thieving crooks. It is the minimum prices which must be raised to the point where exorbitant charges do not have to be made for the jobs that were really difficult and on which the repair man was just plain unlucky and which gave him a bad time.

We have no idea what the minimum charge for service on a TV set should be, but with respect to the larger sets —14 inch screens and up—we suspect that it should be somewhere between 12 and 15 dollars. I suspect that is quite a bit higher than the average. I had my own TV set serviced not too long ago. The bill was $12.50 and the job was not too satisfactory. I paid the bill and was not very happy about it. If the bill had been higher —if I had been given a good selling job with it—and the set had worked better than it ever had, I would still be raving about high prices the shop charged but I would also have said, "Well,—he's a high-priced man, but he's sure worth it—go to the Blank Radio Shop if you want a really good job." High prices and high quality will redeem the reputations of the radio and TV service business.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
1100 Main Street
Buffalo 9, N. Y.

Sec. 34.66 P. L. & R.
U. S. POSTAGE
PAID
Permit No. 3402
Buffalo, N. Y.

For

J. A. Renville
163 Main St.
Luzerne, Pa.

Form 3547 Requested

VOL. 20, No. 5 MAY 1953

PUBLISHED BY
SYLVANIA ELECTRIC PRODUCTS INC.

MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

In This Issue

SYLVANIA NEWS

JUNE 1953

C. J. Luten, editor

Vol. 20, No. 6

SYLVANIA DISTRIBUTOR EDUCATES, SELLS NORTHERN CALIFORNIA ON QUALIFIED TV SERVICE DEALERS

This emblem identifies all G. M. Popkey Qualified Service Dealers.

When the San Francisco Better Business Bureau reported a 29 per cent increase in television service complaints during 1952, Don W. Clark, vice president and general manager of the G. M. Popkey Company, a staunch Sylvania Distributor, had an idea and decided to act upon it. Just a few months have gone by; but already the service business of San Francisco seems healthier and the TV set owning public a good deal wiser than it once was, thanks to the Popkey Company.

Here's the Popkey plan that has paid off and grows stronger by the week. Popkey sponsors the William Winter news program which is telecast each Wednesday evening over San Francisco's KPIX. A popular program, the 15-minute Winter show is telecast four nights a week and currently ranks third among the multiple-weekly TV shows in Northern California.

On the Wednesday Winter show the commercials are devoted to a group of dealers Popkey has selected as G.M.P. Qualified TV Service Dealers.

The beginning commercial consists of an announcement for these service dealers and a reminder that they can be identified by the special Qualified TV Service decal in their store windows.

The middle commercial takes up the various problems of the dealer in his relations with the public as they concern TV service. As an example of this, a 21-inch chassis was recently demonstrated in actual operation with the Winter program being carried on the picture tube screen. It was shown that the picture was of poor quality because of a defective tube which, when changed, cleared the picture up immediately. Detailed explanation was given of how tubes deteriorate, and how many times the viewer is not conscious of this until his picture is extremely poor.

Each program promotes the qualified group of dealers who have the necessary equipment and ability and who have been pledged to a program of fair practices and charges. Popkey qualifies only those who can meet its rigid specifications. Sometimes a service technician actually appears on the program along with the announcer. The announcer, by the way, is the program director of the station; and Popkey feels he lends an air of authority to his discussion of television.

At first qualified service dealer names and addresses were given on the program, but because of the time element that device was dropped. Instead, Popkey has built a listing in a weekly magazine entitled *TV Preview*. This listing appears each week and calls attention to the locations of every qualified dealer. Service dealers pay for their magazine listings, but the ad is completely under Popkey's control. Circulation of these service business names and the magazine is boosted by Popkey's offering a three week subscription free to anyone requesting it.

Popkey found quite a number of qualified TV service dealers who had so much work they did not actually take a listing in *TV Preview*. Even so, the dealers listed in a mid-April issue of the magazine was approximately 265.

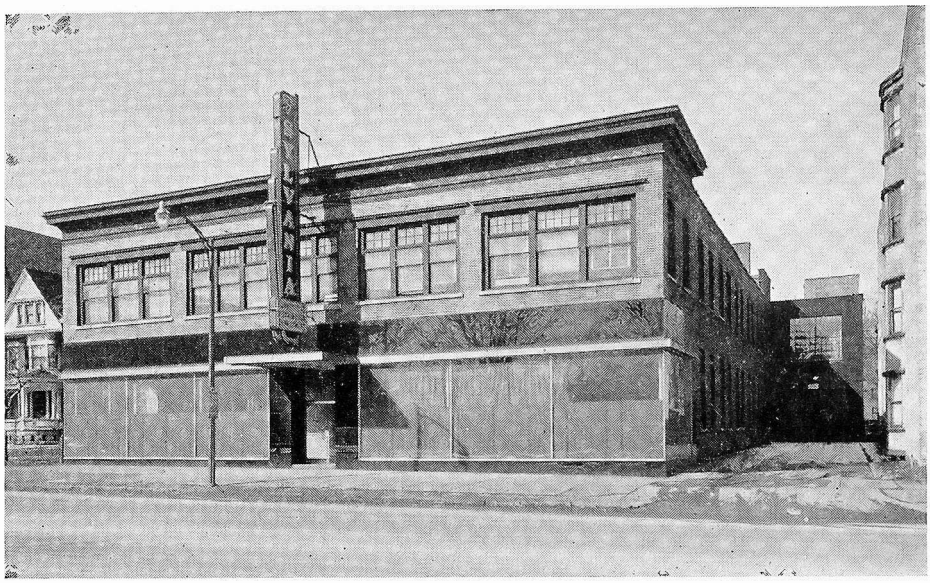
When the original 13 week period of Popkey sponsorship was about up, the qualified service dealers were most concerned and anxious that the program continue. Needless to say, it has and the response from the public continues to be excellent. Many dealers say their servicemen are asked continually whether they are members of the qualified group. Requests for free copies of *TV Preview* have been high, and many have specified they wanted the magazine for the listing of qualified dealers.

Popkey, incidentally, has renewed its contract with the William Winter show for 26 weeks beginning the first of May. A newspaper program has already been announced by Popkey to supplement this TV program. It will include 40 inch ads twice a month

(*Continued on page 10*)

Looking at the listing of qualified dealers in *TV Preview* are: left to right, Sandy Spillman, KPIX program direction and announcer for the William Winter news show; William Winter; and Don W. Clark, vice-president and general manager of the G. M. Popkey Co.

NEW, LARGER FACILITIES ENABLE SYLVANIA TO SERVE BETTER YOUR ADVERTISING NEEDS



Thousands of our readers will recall that last winter, when they ordered low-cost Sylvania advertising materials to help their businesses, it was necessary to remember a change of address. Sylvania's Advertising Distribution Department had moved from Emporium, Pa. to 1100 Main Street, Buffalo 9, N. Y. It moved to new, larger quarters for one reason—to serve you faster and better.

The primary function of this important department is to prepare, purchase, stock and distribute helpful advertising material to you and all the rest of Sylvania's customers. It also prepares and handles mailings, bulletins, publications such as SYLVANIA NEWS for the company's sales and advertising departments and prepares and processes bulletins and forms used by many of Sylvania's plants and offices.

The Advertising Distribution Department is divided into four sections: (1) administrative and clerical section, (2) shipping section, (3) mailing section, (4) multigraph section.

The Administrative and Clerical section handles all communications with you—our customers—sales and advertising departments and suppliers. It processes, records and bills orders for advertising received from you, issues credits as required, does its own cashiering, filing and record keeping, in addition to performing all purchasing functions in the connection with its various activities.

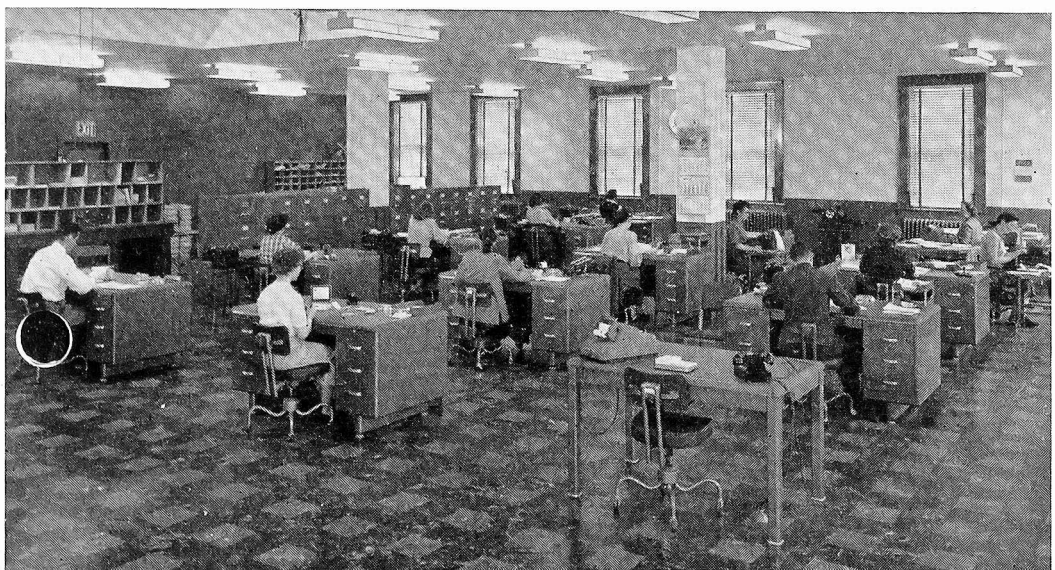
After orders are processed in the clerical section, they are sent to the Shipping Section where requested material is packed and shipped, in accordance with instructions, by the best and fastest means of transportation. Shipping Section also receives all advertising materials, warehouses them, and maintains inventories, records and controls.

The Mailing Section maintains files of customers' names totaling over 350,000 individual names. As a reader of SYLVANIA NEWS, your name is in this file. Mailing lists are set up by various categories so that any portion of a list can be used as required. Modern addressographing machinery is provided to facilitate handling of all mail operations.

The Multigraph Section processes the literature, bulletins and forms as needed in various departments of the company. It has equipment for duplicating, collating, folding and stitching. This section, by the way, imprints the advertising aids you buy.

The Advertising Distribution Department is under the direction of Terry P. Cunningham, director of all Sylvania advertising. The Buffalo organization is headed by H. G. Kronenwetter, Manager of Advertising Distribution. He is assisted by W. F. Liebel, Superintendent.

(*Continued on page 11*)



The photo at the top of the page is an exterior view of the Sylvania Advertising Distribution Department's building and its driveway leading to its Shipping Section. The two story building has 38,000 square feet. It has an elevator of 5000 pound capacity, large enough to accommodate a one and a half ton truck. There are 60 employees in the entire department at the present time.

A general view of the clerical section is shown at left.

SIX NEW MEMBERS OF SYLVANIA'S TRUCKLOADS OF PICTURE TUBES CLUB

Here are six more distinguished members of Sylvania's rapidly expanding truckloads of picture tubes club. Like their many fellow members, these Sylvania Distributors aim to give their dealer-customers the best possible service.

All the Sylvania Picture Tubes you see at top left are a portion of a truckload delivered to Melville Radio Corp. of White Plains, N. Y. and Flushing, L. I., N. Y. Looking on (left to right) are: Harold Jennelly, general manager of Melville Radio; Justin McCarthy and Ted Swensen; and Frank Melville, president of Melville Radio.

Top right shows a recent delivery made to Arpio Sales of Chicago. Left to right: Dan Skord, Sylvanian Bob McNelis, Charles Smith, Rudy Windisch, Ben Kaplan, Nick Francis, and Sylvanian Jerry Driscoll.

The truckload of Sylvania Picture Tubes shown middle left helped to celebrate the opening of Island Radio's new branch store in Huntington, Long Island, N. Y. Left to right: Sylvanian Ted Swensen; Island Radio salesman Max Ackerman; Sy Kazmeroff, new branch manager; Jack F. Bressler and Mac Barnett, secretary and president respectively of Island Radio; Arthur Harris, Island Radio Office manager; and Sylvanians Justin McCarthy and George Isham.

The middle right photo shows a delivery of Sylvania Picture Tubes to the P. I. Burks Co. in Louisville, Kentucky. Left to right: William Kladden, Millard Burks, Sylvanians Bill Wray and Bob McNelis, P. I. Burks, and the two truck drivers.

Bottom left shows a truckload shipment of fast-moving Sylvania picture tubes to Radio Parts Co. of Milwaukee, Wisconsin. Left to right: Stan Jordan, Bob McNelis, Jerry Driscoll, Ernie Behagen, Henry Arenholtz, and Don Glaubitz.

Poor weather can't keep Sylvania Picture Tubes from coming through at the right time, as this lower right photo attests. Superior Radio Parts of Racine, Wisconsin and Rockford, Illinois has led the way in its area by being the first to order a truckload shipment of high-quality Sylvania picture tubes. Left to right: Gene Marrow, Richard Mathews, Richard C. Campbell, Helen Turnmire, Robert Kinzley (kneeling), Bunny Zemke, and Harold Bryger.

SYLVANIA NEWS

TECHNICAL SECTION

JUNE 1953 Vol. 20, No. 6

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligations

UHF CONVERTERS

By P. R. Simon
Advanced Application Engineer

To receive u h f television signals on the standard v h f television set, the only addition necessary, except for the antenna, is a frequency converter. This is a device which transforms the ultra high frequency signals (470-890 mc) to either a very high frequency that the set normally receives (low channels 54-88 mc, high channels 174-216 mc), a special converter frequency (usually 130 mc), or converts directly to the receiver's i f frequency. Remote antenna distribution systems, either commercial or private, often convert the signal at the antenna because of the large cable losses at u h f, thereby making converters at each receiver unnecessary.

There are two general classes of converters—the fixed-tuned, single channel unit and the all-channel tunable unit. Both single and double conversion are used. In double conversion, the u h f is reduced to v h f which is in turn converted to the i f by the v h f mixer. Turret tuner strips are in the fixed-tuned category. These coil strips are available for all channels. Any of the original v h f strips can be replaced with a u h f unit as described immediately below (See Figure 1).

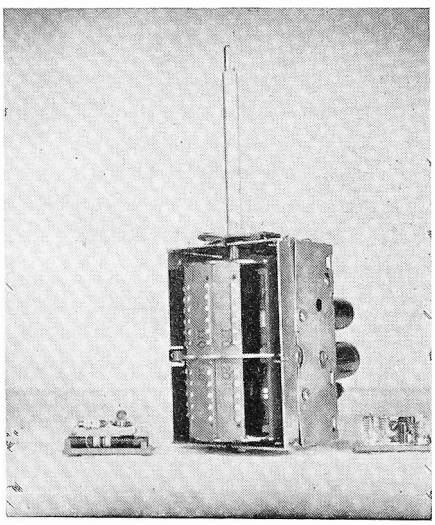


Figure 1. Turret tuner showing u h f tuning strips removed.

Most turret tuners use two strips per channel for the oscillator and antenna systems, respectively. The u h f strips usually contain two crystal diodes. One diode accentuates the oscillator harmonic content while the second diode is the u h f crystal mixer (See Figure 2).

Another single channel type is the complete external unit containing oscillator and mixer, fixed-tuned coils, and a u h f-v h f switch. Some of these converters obtain power from the set, and some have a self-contained power supply.

In a converter using a Sylvania Type 6AN4 tube as a mixer with a Type 6T4 oscillator, it is possible to achieve improved conversion efficiency. The addition of an r f amplifier stage using a 6AN4 tube will provide additional gain which is useful in weak signal areas.

The advantage of any fixed-tuned type is its simplicity and lower cost. Some limitations of the fixed-tuned converter are the number of channels available and the sacrifice of a v h f channel in the turret type. Also, they must be readjusted or replaced by a technician if a different channel is to be received. The unit that is fastened to the back of the set has a physical disadvantage in that the person tuning the set must reach behind it to switch from u h f to v h f.

Several experimental single channel converters were constructed in the Advanced Application Laboratory of Sylvania's Receiving Tube Division for the purpose of u h f tube development. It is interesting, as representative of the fixed-tuned converter unit, to study their u h f circuitry.

A converter using two Sylvania Type 12AT7 tubes (a twin triode widely used at lower frequencies) operated successfully on Channel 22.

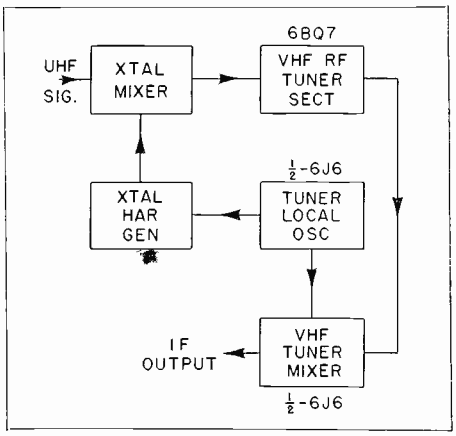


Figure 2. Block diagram of turret tuner strips used in standard coil tuners.

It contains a grounded grid r f amplifier and a grounded grid mixer in one tube; a Hartley oscillator, using a "hairpin loop" for the coil, and an i f preamplifier were contained in the other tube. The result was an efficient converter, but it had a poor noise factor which becomes objectionable in weak signal areas.

The same type of circuit using the Sylvania u h f tubes, Types 6AN4 and 6T4, gives greater gain and less noise (See Figure 3). A single Type 6AN4 grounded grid r f amplifier performs remarkably well at u h f, as compared to ordinary tubes. This type has a high voltage gain and low noise figure. By using it as an r f amplifier, the overall noise of a converter can be reduced and additional gain obtained.

The majority of commercial tuners are in the variable tuned category which can receive all the ultra high frequency television channels. The main advantage is that special channel adjustments are unnecessary. Secondly, they can be installed by anyone, unless a special u h f antenna installation is needed. The channel used for the second conversion frequency is at the discretion of the manufacturer. For this purpose,

(*Continued on page 6*)

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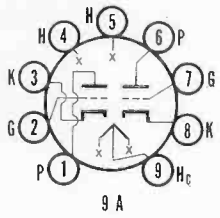
This book would be very useful for a serviceman who wishes to improve his ability to use his instruments for maximum benefit; and would be excellent for newer servicemen who have a knowledge of fundamentals but lack proficiency in using equipment.

Sylvania Type 12AZ7

DUO TRIODE



9 A

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T-6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 13/16"
Mounting Position	Any
Basing	9A

RATINGS (Each Section)

Heater Voltage Series/Parallel	12.6/6.3 Volts
Heater Current Series/Parallel	225/450 Ma
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Grid Voltage (dc)	−50 Volts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances

	Shielded[1]	Unshielded
Grid to Plate (Each Section)	1.9 μμf	1.9 μμf
Input (Each Section)	3.2	3.1 μμf
Output (Section 1)[2]	1.3	0.5 μμf
Output (Section 2)	1.6	0.4 μμf
Grounded Grid Operation		
Input (Each Section)	7.0	6.9 μμf
Output (Section 1)[2]	2.8	2.0 μμf
(Section 2)	3.2	2.0 μμf
Plate to Cathode (Each Section)	0.23	0.24 μμf

CHARACTERISTICS AND TYPICAL OPERATION

Class A_1 Amplifier

Plate Voltage	100	250 Volts
Cathode Bias Resistor	270	200 Ohms
Plate Current	3.7	10 Ma
Transconductance	4000	5500 μmhos
Amplification Factor	60	60
Plate Resistance	15,000	10,900 Ohms
Grid Voltage (approx.) I_b = 10 μa	−5	−12 Volts

NOTES:

1. Shield No. 315.
2. Section No. 1 connects to pins No. 6, 7 and 8. Section No. 2 connects to Pins No. 1, 2 and 3.

SYLVANIA RADIO TUBES

Issued as a supplement to the manual in Sylvania News for June 1953

areas may be achieved by selecting crystals, since some diodes are less

21XP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts d c
Grid No. 4 Voltage	−64 to +352 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts d c
Ion Trap Magnet Current	75 ± 50% Ma d c

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC 111 single field ion trap.

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

SYLVANIA PICTURE TUBES

SYLVANIA TYPE 6V3

The Sylvania Type 6V3 television damper tube, unique in its physical construction, aids greatly in flyback circuit design.

The cathode, which is normally connected to a base pin in other tubes, connects to the top cap in the 6V3. Thus, when the cathode is operated at high peak voltages, such as those occurring in flyback circuits, there is less danger of voltage breakdown between base pins. The bulb also acts as a stand-off insulator for the cathode-to-flyback transformer lead. In addition, the high voltage lead is kept short and above the chassis which eliminates the need for a feed-through insulator, a source of high voltage breakdown.

The Sylvania 219/220 Tube Tester is designed so that each pin is brought out to a corresponding switch number. This feature is very valuable in that it enables the operator to know exactly which element is faulty on shorts tests. A slight disadvantage of this arrangement, due to the straight through connections, is the necessity of using an adapter to test the 6V3. This adapter is very easily constructed from an octal tube base and a top cap connector (See SYLVANIA NEWS, Technical Section, April, 1953).

The Sylvania 139/140 Tube Tester uses a different circuitry which does not have the pin number to switch correlation. On this instrument the 6V3 can be tested without an adapter.

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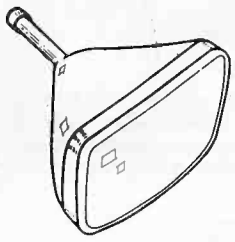
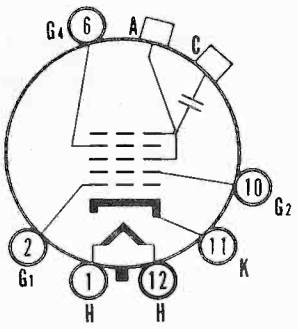
Sylvania Type 21XP4

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Rectangular Glass Type
Single Field Ion Trap — Low Voltage Electrostatic Focus
External Conductive Coating





12-L

CHARACTERISTICS

General Data	
Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
External Conductive Coating to Anode[1]	750 $\mu\mu$f Max. 500 $\mu\mu$f Min.
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	17 x 12¾ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	18,000 Volts d c
Grid No. 4 Voltage (Focusing Electrode)	-500 to +1000 Volts d c
Grid No. 2 Voltage	410 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d c
After Equipment Warm-up Period	150 Volts d c
Heater Positive with Respect to Cathode	150 Volts d c

SYLVANIA PICTURE TUBES

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An ohmmeter is the only equipment needed to check a crystal diode for burnout. Put the test leads across the crystal and take a reading; reverse the leads and take another reading. One of the resistance values should be at least ten times greater than the other for the crystal to be good.

Optimum performance of a 1N82 silicon crystal diode mixer is obtained at a d c current of 0.5 ma. This value gives the lowest noise level with a high conversion efficiency. The d c current, caused by the oscillator injection voltage, is adjusted by varying the oscillator coupling to the mixer. Many converters have some provision for easy insertion of a milliameter for the adjustment.

When soldering to crystal diodes, precautions should always be taken to prevent overheating them. For this reason, most applications use a clip-type crystal holder that sometimes becomes loose and is a source of noise to the converter. If soldering is done to the pigtails of the crystals, a pair of pliers should be held on the lead between the crystal and the soldering iron to conduct heat away from the crystal.

When servicing a converter, it can be ascertained in several ways that the oscillator section is working: first, the presence of crystal current as previously mentioned; second, the use of an absorption type wavemeter in the u h f spectrum; third, measuring the d c grid bias on the oscillator tube which should be from –4 to –8 volts with respect to ground. A calibrated u h f wavemeter would also be useful in checking the tuning range of the oscillator; this is important because the other tests only indicate the presence of oscillation but not the frequency. It is conceivable that the malfunctioning of certain components could change the frequency of oscillation and still give the normal indications of bias and crystal current.

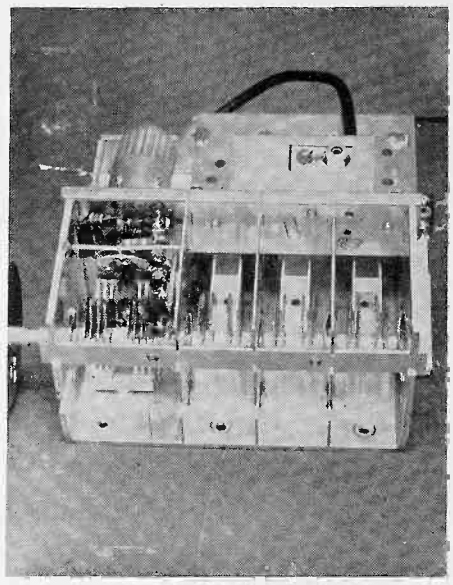

Figure 4.
The u h f converter which is optional equipment for the Sylvania 508 chassis.

Because of the extremely high frequency, replacement of components and tubes of the r f section presents problems not usually encountered in conventional radio and television service. The length of leads, lead dress, and placement of parts is quite critical.

SYLVANIA TYPE 6BQ6G

The Sylvania Type 6BQ6G is a beam power amplifier designed for use as a driver tube in horizontal deflection circuits. It is identical to the popular Sylvania Type 6BQ6GT except for bulb size.

The trend toward larger screen television receivers has placed heavier demands on deflection circuits, with the consequent increase in heat dissipation. Tubes with the suffix "G" use the ST type of bulb, which has a larger surface for heat radiation than the "GT" or glass tubular type.

For this reason, the Type 6BQ6G was developed which will operate at a lower bulb temperature than the "GT" version for the same operating conditions. The "G" and "GT" styles are interchangeable where physical space is adequate.

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The Sylvania Type 6V3 television damper tube, unique in its physical construction, aids greatly in flyback circuit design.

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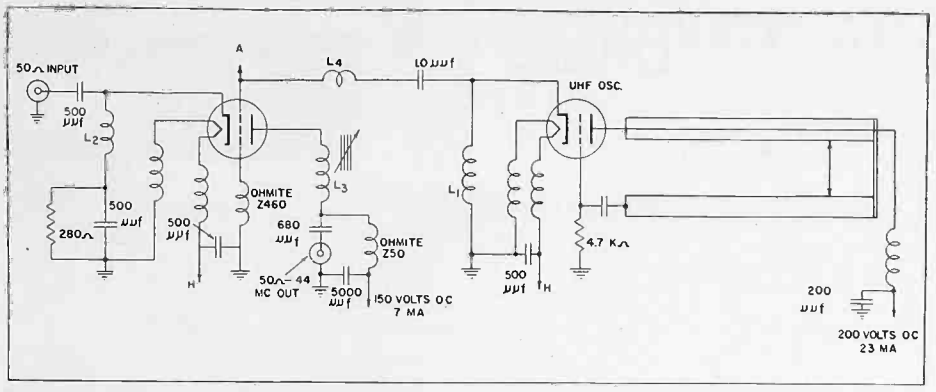

Figure 3. Schematic of 6AN4-6T4 in a grounded grid u h f mixer and local oscillator circuit.

(*Continued from page 5*)

some sets have been provided with a special frequency which is not used for television broadcasting. Converters are available with this special i f output, generally a frequency around 130 mc (between the f m broadcast band and Channel 7).

The external variable tuned converter is represented by the Sylvania Models C31M, C32M and the C33M. In these converters, the antenna input, mixer and oscillator stages are tuned by shorted quarter-wave lines which give stability and a higher "Q" than is obtainable in ordinary inductance coils.

The Models C31M and C32M can use either the Sylvania Type 6T4 or the Type 6AF4 as the oscillator. The crystal mixer can use either the Type 1N72 or 1N82. The i f preamplifier is a 6BQ7 in a low-noise, cascode circuit. The C33M is identical except for the i f amplifier which is a Sylvania Type 6CB6. The output of these converters is broadbanded on Channels 5 and 6 so that either channel can be used.

The trend in the tunable converter field is to make the unit an integral part of the television receiver by placing it in the cabinet so that the v h f-u h f tuning can then be combined physically in a single tuning and channel switching mechanism on the front panel of the receiver. With the advent of the Sylvania Types 6AN4 and 6T4, it is now possible to use the same r f amplifier, mixer and oscillator stages to tune the v h f band as well as the u h f bands. These types will appear in new set designs in the near future.

The new Sylvania television receivers are optionally equipped with a u h f tuner that operates in conjunction with the v h f unit. The very popular 1-508-2 Chassis is equipped with a u h f tuner using a 6J6 for the oscillator and two 1N82 silicon crystals. The 1-510-2 Chassis employs a u h f tuner using a Type 6AF4 or Sylvania Type 6T4 oscillator and a Sylvania Type 6AN4 as a mixer.

As the v h f turret tuner is rotated to the u h f position, the v h f-r f amplifier and mixer become an i f preamplifier at 40 mc. An actuating lever turns on the u h f tuner power, turns off the v h f oscillator, switches the u h f output to the v h f input terminals, and the u h f channel numbers appear in a window on the dial. The v h f fine tuning control becomes the u h f continuous channel selector. This all takes place in one turn of the v h f channel selector switch!

The u h f tuner employs double-tuned preselector circuits, a local oscillator at one-half the injection signal frequency, and an oscillator doubler circuit. The r f tuned circuits are of the transmission-line type consisting of quarter-wave coaxial lines, end tuned by a capacitor. The entire unit is silver plated (See Figure 4).

REPAIR

Silicon crystal diodes are commonly used as mixers at ultra high frequencies. Many converters on the market today use the Sylvania Type 1N82. In converters using crystal mixers, some improvement in signal-to-noise ratio in weak signal

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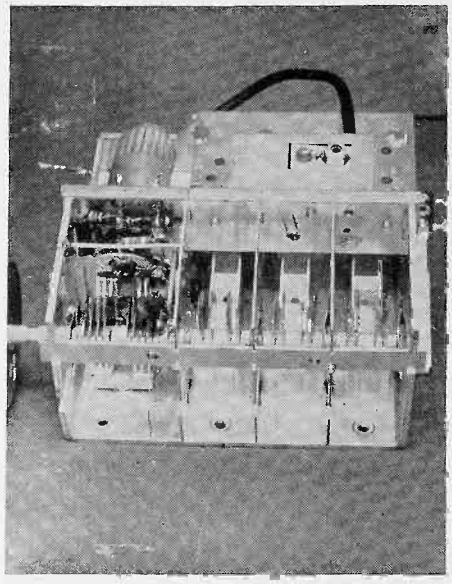

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SYLVANIA TYPE 6V3

The Sylvania Type 6V3 television damper tube, unique in its physical construction, aids greatly in flyback circuit design.

The cathode, which is normally connected to a base pin in other tubes, connects to the top cap in the 6V3. Thus, when the cathode is operated at high peak voltages, such as those occurring in flyback circuits, there is less danger of voltage breakdown between base pins. The bulb also acts as a stand-off insulator for the cathode-to-flyback transformer lead. In addition, the high voltage lead is kept short and above the chassis which eliminates the need for a feed-through insulator, a source of high voltage breakdown.

The Sylvania 219/220 Tube Tester is designed so that each pin is brought out to a corresponding switch number. This feature is very valuable in that it enables the operator to know exactly which element is faulty on shorts tests. A slight disadvantage of this arrangement, due to the straight through connections, is the necessity of using an adapter to test the 6V3. This adapter is very easily constructed from an octal tube base and a top cap connector (See SYLVANIA NEWS, Technical Section, April, 1953).

The Sylvania 139/140 Tube Tester uses a different circuitry which does not have the pin number to switch correlation. On this instrument the 6V3 can be tested without an adapter.

CORRECTION

We wish to correct an error which appeared in the April Issue of SYLVANIA NEWS. The third column listed under the "Model 219/220 Tube Tester Settings for Type 6V3" should read

C
579
259
257

The heading should read "Settings and Adapter for Type *6V3* Sylvania Model 219/220 Tube Tester."

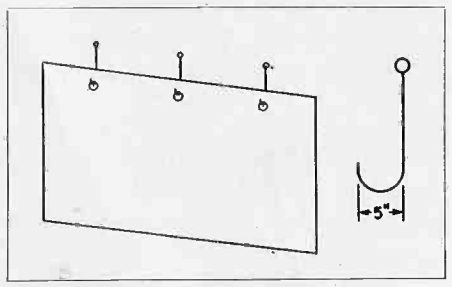
Service Hints

NOTICE: Due to International Exchange restrictions on promotional items, we can no longer accept Service Hints from countries other than the United States and Canada. We wish to thank our foreign readers who have submitted "Service Hints" in the past. It is with sincere regret that this notice has to be published.

USING OLD PLASTIC CABINETS—Old bakelite plastic radio or tv cabinets can be sawed into "boards" for insulating material. Most cabinets have a very high dielectric rating. I have found that most of them will stand about 20,000 volts per ⅛ inch thickness.

These "boards" could then be used as high voltage terminal strips, feed through insulators, rectifier socket mounts, etc., in tv and similar cathode-ray tube equipment, and for a hundred and one other uses around electronic equipment. In addition, they cost nothing.—Harold J. Weber, Sparta, Illinois.

CHART RACK—Today there are many charts of all kinds available to the serviceman by the manufacturers. Most of the time the small radio shop is not equipped with suitable space to properly hang them on the wall and make use of them. This



is what I do to remedy the situation. First, the chart is pasted to any kind of cardboard. Old boxes will do. Use linoleum cement, it does a neat job. Next, make several eyelets, spacing them evenly along the top of the charts. Fashion the hooks with any kind of wire and screw on the wall. The charts can be kept neat and always available this way. Donat A. Duquet, Waterville, Maine.

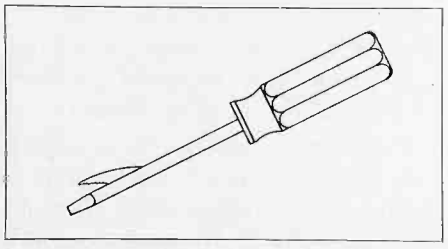
SYLVANIA 139-140 TUBE TESTER LINE VOLTAGE CALIBRATION—I always take my tube tester on calls but not always my V T V M. Sometimes I have reason to suspect low line voltage and wish to check it. This can be done by recording meter readings for each line voltage on a card and gluing it to the inside lid of the tube tester. I set the line voltage adjustment switch on #1 position and recorded the reading on the lowest meter scale for voltages from 60 to 130 volts in five-volt steps.

Voltage Control Position #1

Meter Read On Lower Scale	Indicated Line Voltage
30	60 Volts
32	65
34	70
—	—
—	—
56	125
58	130

—Shott's Radio and Television Service, Burbank, Calif.

ELECTRICIAN'S SCREWDRIVER—This screwdriver loop maker will be found very handy for the electrician especially where pliers are hard to use. As the sketch shows, it can be made easily with any straight blade screwdriver. The added piece can



be set any place along the blade to suit one's purpose. Solder this piece or braze according to the equipment available. Use an old plier jaw for the extra piece. To use, insert the wire in the slot and turn the screwdriver to the right or to the left and the loop is made. Then pull back the screwdriver and use this same tool to tighten the screw.—D. A. Duquet, Waterville, Maine.

ELECTROFLASH UNITS—SAFETY FIRST—I was reading your Technical Section the other day about the electroflash unit and some of the safety precautions to be observed. I have a little more to add about safety, etc,. since I did quite a bit of service and rebuilding on this type of equipment. As for safety, it isn't any joke and must be observed. Also, the repairman should fully contemplate his repair actions beforehand in regard to the safe discharge of the high voltage condenser because it is possible to get badly stung from the flash gun even though the high voltage condenser was originally discharged. Moreover, if you do any work on these units, be sure that you are not unduly tired and hazy on what you are doing.

One night last summer when I was perspiring freely and dog-tired, I worked on the gun section of the flash unit. The unit was pulled from the a c line and the high voltage condenser discharged by first triggering the gas tube, by resistance, and then by the interlock switch. The flash unit had an interlock switch that shorted out the high voltage condenser when the unit was pulled from the carrying case, but when it was set on the bench the interlock switch opened up. I pulled the gun unit from its casing and picked up what I thought was an insulated section and received a hard jolt. The high voltage condenser had enough residual charge to build up voltage and I had touched a broken piece of insulation around the high voltage resistance string. A high voltage oil-paper condenser of high microfarad rating can also build up a voltage by just setting in a place where there are high temperature fluctuations. As a precaution against bad shocks, work with just one hand when possible.—J. Perkinson, Jr. Miami, Florida.

SYLVANIA NEWS

MERCHANDISING SECTION

JUNE 1953 Vol. 20, No. 6

ORDER YOUR OWN 1954 PERSONALIZED HOME CALENDARS TODAY!

You can't miss making more money in 1954, if you have your own personalized calendar on the walls of every home in your community. A calendar that tells your prospects and customers who you are, what your service is, where you're located, the easy way to get in touch with you.

The Sylvania Personalized Home calendar for 1954 is the first of its kind ever offered exclusively to radio-television service dealers. It features a special, exclusive picture painted by famous *Saturday Evening Post* cover and feature artist Fred Stanley.

Here's what the new Sylvania Calendar will do for you. 1) It will put your business sign in every home. Handy, convenient, this calendar will make it easy for your customers to call you when they need your service. 2) It will hang in each home—365 days of the year. A constant reminder of you. 3) It will give you *first call* over all competitors in your area.

The Sylvania Calendar costs you less than any other advertising you can use . . . only 1½ cents per month, per home. Blanket your territory with your calendars. Make sure the sign of your business is hanging in every home with a radio or television set. Every calendar can bring you increased profitable business all through the year.

Just think—for only 18 cents per year, you put your personal salesman in each of your prospects' homes.

Your calendars will make money for you every day. And what a return for your investment! Just a few new service calls gained from the calendars you have placed in homes will return your investment and assure you of increased profits.

The Sylvania Calendar is the lowest cost calendar of its kind you can buy. Offered exclusively as a service to radio-television service dealers, Sylvania is making this unique calendar available to you at a big saving. It is loaded with items of interest. There's the home appeal features. Every woman will appreciate the valuable recipes and home care hints in this calendar which they will hang in preference to all others.

Your personalized Sylvania Calendar will promote your business the way you want to promote it. It tells everybody you're a skilled television and radio technician, that you're reliable, experienced, use the best replacement parts, and charge a fair price. The feature . . . Here's the Inside Story of Your Television Set . . . will stimulate interest and understanding of your service problems. Here's a chance to help educate the public and to win the profits expert servicing should bring.

The calendar will serve as your Christmas Greeting for 1953.

Never before has one calendar offered so much to both the service dealer giving it and the customer or prospect receiving it.

Here is how to order your calendar:

1. Place your order NOW! *This is important to insure your shipment this fall.* Use the order blank which you recently received with your announcement of the Sylvania Calendar, or pick up another blank if you misplaced yours, at your Sylvania Distributor.
2. Order enough to cover all the homes in your area.
3. Be sure to include prospects as well as customers.
4. Order envelopes for calendars that you will use a "Christmas Greeting Card."
5. Order calendars to deliver to prospects personally during the "Holiday Season" and on new calls during the year.

Sylvania Distributor Sells Northern California on Qualified Service Dealers

(*Continued from page 2*)

in the *San Francisco Examiner* and the *Oakland Tribune* on Sundays. These papers have a combined circulation on Sunday in Northern California of over 700,000. In addition, Popkey is localizing this program in other key cities in its territory, including San Jose, Salinas, Monterey, Watsonville, Stockton, Modesto, and Sacramento, with two by five-inch ads appearing twice monthly. All of these ads will carry the listing of the Qualified Dealers in each trading area. There will also be supplemental ads with a qualified caption similar to a trade mark listing in phone books to which dealers can tie in.

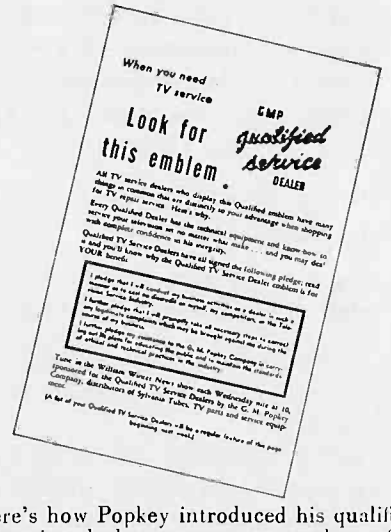
Another help in this big campaign has been the Sylvania mailing piece, "What's Wrong With Your TV Set?" on which Popkey has printed a story on why the consumer should call a Qualified Dealer and made available to its dealers with their imprint.

Don W. Clark, Popkey vice president and general manager, is proud that his company has never asked dealers for any direct business to qualify for listing privileges and that a few do not buy anything from Popkey. And he is firm when he remarks: "We do not qualify anyone because they do business with us."

Popkey now has two types of dealers in its qualified group—the participating and the non-participating. The non-participating group consists of those who qualify but who do not choose to pay ten dollars for their tie-ins with all of the programs promotions. All of these dealers receive decals to place on their trucks, places of business and in their advertising.

The participating dealers are automatically listed in all of the key city newspapers and participate in prize contests that are conducted on the TV program. They also receive other promotional material such as window streamers, stickers for invoices, and in addition, are listed without charge in the trademark listing in the telephone directory. Popkey has made these listings an integral part of its program and have contracted for listings as they become available in all Northern California directories. All dealers who are participating members will have their names in the next edition of the telephone books in their areas.

Popkey is also setting up a cooperative fund based on participating members' purchases which the dealer can use for any advertising in newspapers or in other approved media on a 50-50 cooperative basis, provided the dealer uses the G.M.P. emblem in his ads.


When you need TV service

Look for this emblem

GMP qualified service DEALER

Here's how Popkey introduced his qualified service dealer program to readers of *TV Preview*.

This Sylvania direct mail piece tells the set owner about the complexity of his TV set and the skill and equipment necessary to repair it. This educational folder is being used with great service by Popkey Qualified Service Dealers.

Though the end of Popkey's plan is scarcely in sight and the amount of good it has done can hardly be measured, it should be noted that the San Francisco Better Business Bureau, which helped to start the whole affair, has had its manager appear on the program and is enthusiastic about the entire operation.

Revised TV Tube Booklet Now Available -- FREE

The familiar green Sylvania Television Picture Tube and General Purpose Cathode Ray Tube characteristic booklet has been revised to include the latest tube modifications and type changes.

Over thirty types have been added to give you the latest information possible. This brings the total types listed to over 250 tubes, which require 56 different basing diagrams.

Screen sizes vary from the tiny "one-inch" Type 913 for oscilloscopes to the giant 27 and 30-inch tubes used in the latest TV sets. It is of interest to note that these listings give recommended Anode Voltages from 500 volts for the 913 to 75,000 volts for a projection type.

In line with its previous practice, Sylvania has included tubes manufactured by other companies. This has been done to make the chart as useful as possible, not only to Sylvania customers, but for everyone interested in cathode ray tubes.

The revised Sylvania Television Picture Tube and General Purpose Cathode Ray Tube characteristics booklet is obtainable through Sylvania distributors or from Sylvania Advertising Distribution Department, 1100 Main Street, Buffalo, New York, free of charge.

(*Continued from page 3*)

An overall view of the multigraph section is shown at right. Here there are seven multilith machines (offset type) and five multigraph machines (letterpress style). The multiliths are used for general printing work, while the multigraphs are used almost exclusively for imprinting and bulletin processing.

A general view of the mailing section can be seen at lower right. In the foreground the two young ladies are seated before two graphotypes, which are used for embossing metal addressograph plates.

An overall view of the shipping section is shown below. More than 12,000 orders are sent out each month.

REVISED RECEIVING TUBE BOOKLET NOW AVAILABLE -- FREE

The Sylvania Radio and Television Receiving Tubes characteristics booklet is now available in a new revised edition. In addition to the previously listed types, the very latest television receiver and Sylvania subminiature tubes have been included. It is the most complete and useful free chart of its kind.

Over 750 different receiving tube types are listed in the booklet along with their basing diagrams. For easy reference, the basing diagrams appear on the same page as the tube to which they belong.

Interesting tubes recently added are the Sylvania Type 6AN4 u h f mixer and the Sylvania Type 6T4 u h f oscillator. These tubes have special characteristics for ultra high frequency operation but are contained in ordinary miniature style bulbs. Another noteworthy tube is the Sylvania Type 5647 that has a diameter slightly over one-eighth of an inch and a length of one and one-quarter; this is one of the smallest vacuum tubes made. The charts give quick reference data on not only these newer tubes but on the older, seldom-used tubes as well.

The three back pages are devoted to other useful information. A Crystal Diode chart lists all of the most popular Sylvania types normally encountered by the radio and television servicemen. A Tube Base Arrangements chart is revised with the addition of the latest types and their bases. Also, the Sylvania Panel Lamp chart aids in replacing burned out pilot lights.

The new Sylvania Radio and Television Receiving Tubes characteristics booklet is obtainable through Sylvania distributors or from Sylvania Advertising Distribution Department, 1100 Main Street, Buffalo, New York, free of charge.

ESFETA ELECTS OFFICERS

The Empire State Federation of Electronic Technicians Association Incorporated elected officers at a recent meeting held at the Hotel Arlington in Binghamton, New York. They are: Max Liebowitz, President, representing Associated Radio Television Servicemen of New York; John Wheaton, Vice President, representing Long Island Radio Television Guild; Charles Kohl, Treasurer, representing Electronic Technicians Association of Kingston, New York; Wayne Shaw, Secretary, representing Radio Servicemen of America; Andrew Wentworth, Sergeant - at - Arms, representing Radio Technicians Guild of Rochester.

Shown at a recent Sylvania Service Meeting are (left to right, front row): Frank Curlo, Springfield Radio; Bob Grow, Sylvania Sales Engineer; Lou Richmond, Springfield Radio; Murray Dressler, Hatry & Young of Springfield, Mass. Second row: Sylvanian Curt Wall; Bart Carpenter, Springfield Radio; Sylvanians Jerry Lankard and Sam McDonald; Nick Young, Hatry & Young. Also pictured is a portion of the audience at this Sylvania Service Meeting jointly sponsored by Hatry & Young, Springfield Radio, and B. H. Spinney Co.

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
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Buffalo 9, N. Y.

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11905 Ivahar Street
Wheaton, Md.

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Form 3547 Requested

VOL. 20 NO. 6 JUNE 1953

PUBLISHED BY
SYLVANIA ELECTRIC PRODUCTS INC.

MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

In This Issue

SYLVANIA DISTRIBUTORS ORDER TRUCKLOADS OF SYLVANIA PICTURE TUBES TO MEET HEAVY DEALER DEMAND

The tremendous demand by radio and television service dealers all over the country for high quality Sylvania Picture Tubes has enabled the Sylvania Distributor to give better service than ever before on all popular types. It has given the distributor the opportunity to order in large quantities and to accommodate dealer customers with needed Sylvania Picture Tubes—right now.

An example of the alertness of Sylvania Distributors to respond to the demands of their customers is illustrated by the fact that five of them in Ohio—Burroughs Radio Company of Canton, United Radio Inc. of Cincinnati, Electronic Supply Corp. and Thompson Radio Supplies of Columbus, and Srepco Inc. of Dayton—recently ordered entire truckloads of Sylvania Picture Tubes. That's service deluxe!

No matter how you look at it, it is clear that Sylvania Distributors are making every effort to satisfy their dealer customers. Their aim is to stock just the type Sylvania Picture Tube the dealer needs and to deliver it as speedily as possible. Who could ask for anything more?

This latest heavy demand by service dealers for Sylvania Picture Tubes indicates their desire to use the very best materials in repairing television sets. This is more than just a vague trend toward sound and profitable business practice. It proves that most service dealers everywhere are doing the best job they can to satisfy and keep their customers. Such a policy means profits for today and tomorrow for all dealers.

- George Boller of Electronic Supply Corp. and Bruce McEvoy, Sylvania's East Central Sales Manager (at far right), are shown above looking on as another truck full of Sylvania Picture Tubes gets unloaded.
- There's an important transaction going on at left. Curt Nagle, (at right) owner of Thompson Radio Supply, Columbus, Ohio, has just accepted the shipping papers on a truckload of Sylvania Picture Tubes from Bruce McEvoy. Ray Immel, manager of Thompson's, looks as if the deal has his approval, too.

- Here (at left) are some of the Dayton radio and television service dealers who turned out for the terrific delivery of Sylvania Picture Tubes made to Srepco, Inc. Included in the gathering are members of Srepco's sales personnel.
- At bottom left Abe Yeagerman, owner-partner of United Radio (front), and Art Cole, salesman, Irv Horwitz, purchasing agent, Sam Kaplan, owner-partner, Sylvania's Bruce McEvoy, and Tony Ruse (left to right) start a bucket brigade of Sylvania Picture Tubes.
- The salesmen of Burroughs Radio Company are shown below unloading "another truckload of high quality Sylvania Picture Tubes." That's going to make a lot of satisfied service dealers in Canton, Ohio.

Sylvania Engineers Reveal Advances For Television Electronics

Design data and performance of "printed" unit assemblies for television receiver production that should save critical materials and reduce labor required to produce television sets, was described by W. H. Hannahs and Norman Stein during technical sessions of the recent National Convention of the Institute of Radio Engineers, held in the Waldorf-Astoria Hotel, New York City.

The new production technique was described by Hannahs and Stein, as dividing a television set into about twenty subassemblies, each containing an electron tube and associated components. Each unit is made by printing the associated components on two small "cards", one made of a ceramic material and the other made of plastic.

Multiple electrical points between the "cards" are made simply by dipping them in molten solder, thus eliminating the need of interconnecting wires. The new technique contrasts with conventional TV set assembly requiring hand soldering for hundreds of parts and wires.

During their presentation of the new technique, Hannahs and Stein reported that etching and silk screening techniques are combined to produce the new TV circuit "cards".

They also gave engineering data and performance for an intermediate frequency amplifier such as is commonly used in TV receivers for operation at 25 megacycles. The amplifier, of the new printed assembly type, contained resistors that were fabricated within commercial tolerances.

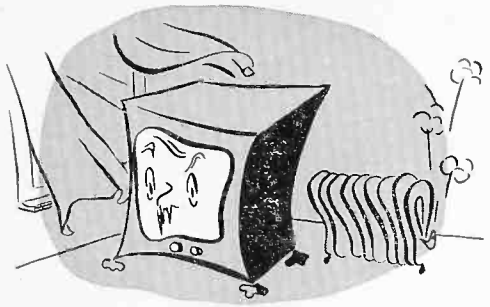
SYLVANIA CONTINUES TO PROMOTE GOOD DEALER-CUSTOMER RELATIONS

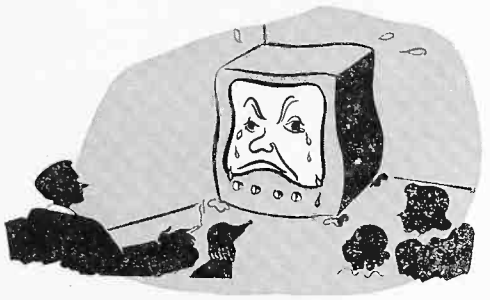
Sylvania spares no effort to acquaint your customers and prospects with the facts concerning proper care of their television sets. Sylvania is continually using popular magazines and papers as a way of telling the set owner that he must never explore the inside of a TV set. Repeated often enough, set owners come to understand that when something goes wrong with their equipment they should call a qualified television repair technician.

Here is the latest article written by a Sylvanian designed to help your prospects and customers as well as your business. It is entitled *How to Care for Your Set* and was written by W. M. Maguire, Commercial Engineer for Sylvania. It appeared in the March 14th issue of *TV Guide* which reached over 400,000 homes in the New York area and 25,000 families in Washington, D. C. and its suburbs.

"There are three simple television housekeeping rules that, if followed, will add to the life of your set and will make viewing more pleasant for you.

"They are similar to the rules of hospitality for a house guest. Make him comfortable; give him proper ventilation; and see that he gets his face washed.





"*First*: Remember that your receiver is a precision instrument. Too much humidity or dryness will affect it. Therefore, place your set away from windows or radiators.

"*Second*: While you are watching your favorite show in comfort, your set is working hard. It can get overheated, and that's when wear-and-tear speeds up. Let your set "breathe" freely by allowing at least one inch of free air-space on all sides. Never place your receiver flush against any wall surface.

"*The third rule* is the simplest of all. Wash regularly the protective face of the picture tube with a synthetic detergent. Dry wiping causes static charges that attract more dust to the glass.

"Whenever you handle your receiver use the utmost care. Above all, do not explore the inside workings, for you may receive a severe shock, even after the set has been turned off and the plug has been pulled out of its wall socket. There is even a chance that your kinescope, a high vacuum tube, may collapse with explosive force.

"Gentle treatment will insure long and faithful service from your TV set."

Sylvania Caravan Turns East

The Sylvania Caravan turned east at Seattle, Washington on April 28th. This month it will bring informative television service meetings—with the cooperation of local Sylvania Distributors—to Boise, Idaho on May 2nd and to Pocatello, Idaho on May 5th. The Caravan will be in Montana on the 7th in Billings, the 8th in Great Falls, and the 9th in Butte. From May 12th to June 6th, ask your Sylvania Distributor about news of service meetings in the area from Cheyenne, Wyoming to St. Louis, Missouri.

17JP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts dc
Focusing Coil Current (approx)[4]	100 Ma dc
Ion Trap Magnet Field Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

[2]Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
[3]Visual extinction of undeflected focused spot.
[4]For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 10¾ x 14¼ inch picture area sharply focused at center of screen.

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in SYLVANIA NEWS for May 1952

YLVANIA NEWS

CAL SECTION

AY 1952 Vol. 19, No. 5

E. Alan Mahannah, Jr., Technical Editor

n Engineer

tuned impedance transformer. This tuned impedance transformer will serve two functions: first, as the frequency selector and, second, to transform the impedance at the amplifier plate to the impedance of the mixer input.

Mixer sections may use silicon or germanium crystal diodes as the mixer. In such arrangements, and with the proper amount of oscillator injection, 0.5 ma of crystal current, these crystals have an input resistance of about 250-300 ohms and an

(*Continued on page 7*)

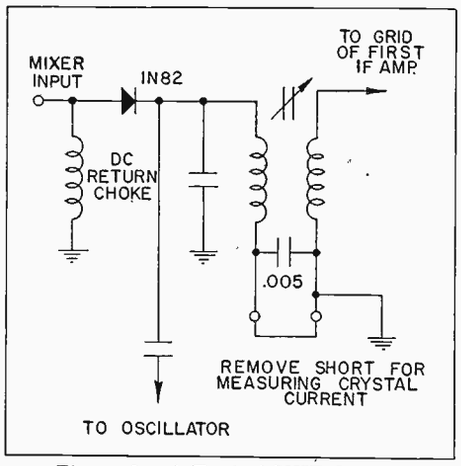


Figure 3. A Typical UHF Crystal Mixer Circuit

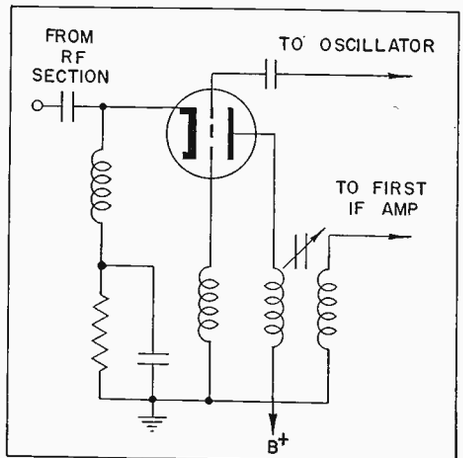


Figure 4. A Triode Mixer for UHF TV

SYLVANIA CONTINU

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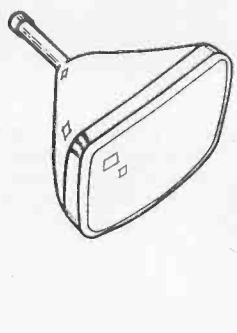
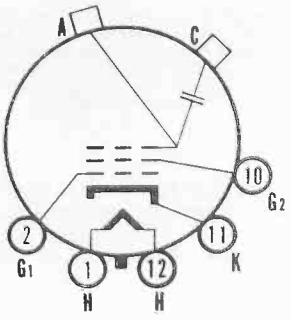
"They are similar to the rules of hospitality for a house guest. Make him comfortable; give him proper ventilation; and see that he gets his face washed.

Sylvania Type 17JP4

TELEVISION PICTURE TUBE

17" Direct Viewed — **Rectangular Glass Type**
Gray Filter Glass — **Magnetic Deflection**
Magnetic Focus — **Single Field Ion Trap**
External Conductive Coating





12-N

CHARACTERISTICS

General Data	
Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflecting Angle	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f.
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f.
External Conductive Coating to Anode[1]	750 $\mu\mu$f. Max. 500 $\mu\mu$f. Min.
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	14¼" x 10¾"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	18,000 Volts dc
Grid No. 2 Voltage	410 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	150 Volts dc
Heater Positive with Respect to Cathode	150 Volts dc

Notes:
[1]External conductive coating must be grounded.

SYLVANIA PICTURE TUBES

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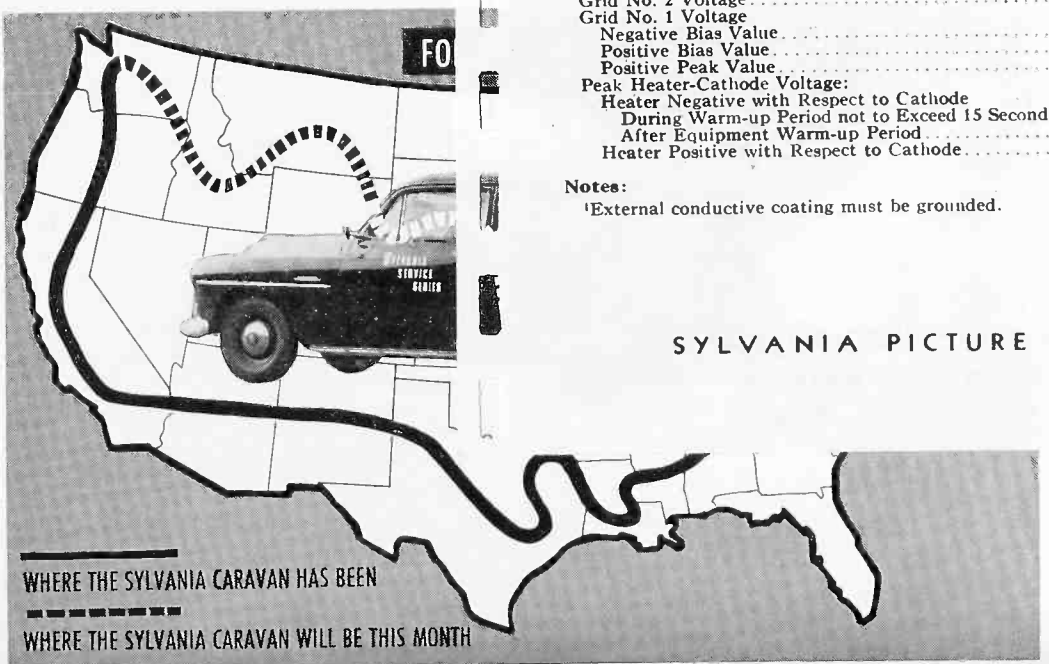

vania Distributor about news of service meetings in the area from Cheyenne, Wyoming to St. Louis, Missouri.

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20HP4 (cont'd)
20HP4A

Peak Heater-Cathode Voltage:
Heater Negative with Respect to Cathode
During Warm-up Period not to Exceed 15 Seconds.... 410 Volts dc
After Equipment Warm-up Period..... 180 Volts dc
Heater Positive with Respect to Cathode..... 180 Volts dc

Recommended Operating Conditions

Final Anode Voltage[1]..... 14,000 Volts dc
Grid No. 4 Voltage..... −56 to +310 Volts dc
Grid No. 2 Voltage..... 300 Volts dc
Grid No. 1 Voltage Required for Cutoff[2]..... −33 to −77 Volts dc
Ion Trap Magnet Field Strength (approx.)..... 40 Gauses

Circuit Values

Grid No. 1 Circuit Resistance..... 1.5 Megohms Max.

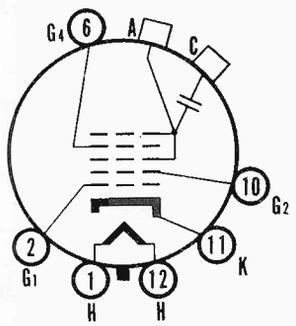
Notes:
[1]Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
[2]Visual extinction of undeflected focused spot.

20HP4A

The Sylvania Type 20HP4A is equivalent to the Type 20HP4 except for the addition of an external conductive coating.

External Conductive Coating to Anode Capacitance[1]
Maximum..... 1500 μμf.
Minimum..... 750 μμf.
Basing..... 12L

Notes:
[1]External conductive coating must be grounded.



12-L

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in SYLVANIA NEWS for May 1952

YLVANIA NEWS

CAL SECTION

AY 1952 Vol. 19, No. 5

E. Alan Mahannah, Jr., Technical Editor

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n Engineer

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(*Continued on page 7*)

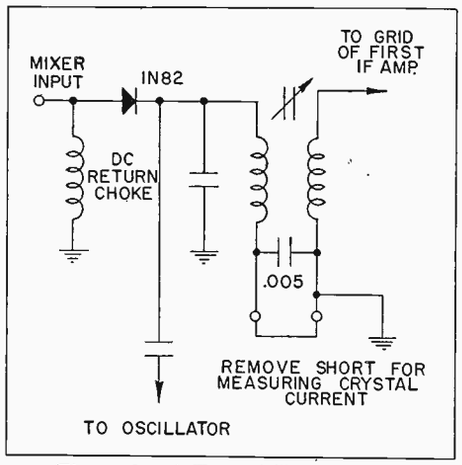

Figure 3. A Typical UHF Crystal Mixer Circuit

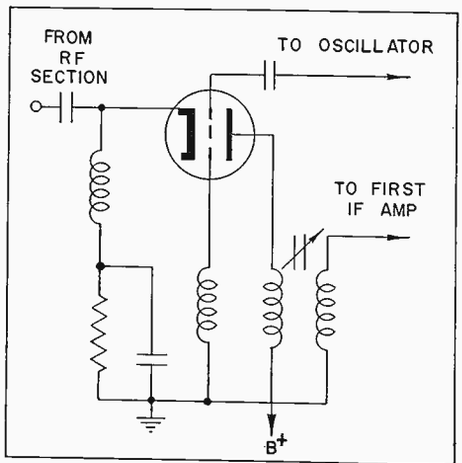

Figure 4. A Triode Mixer for UHF TV

SYLVANIA CONTIN[illegible]

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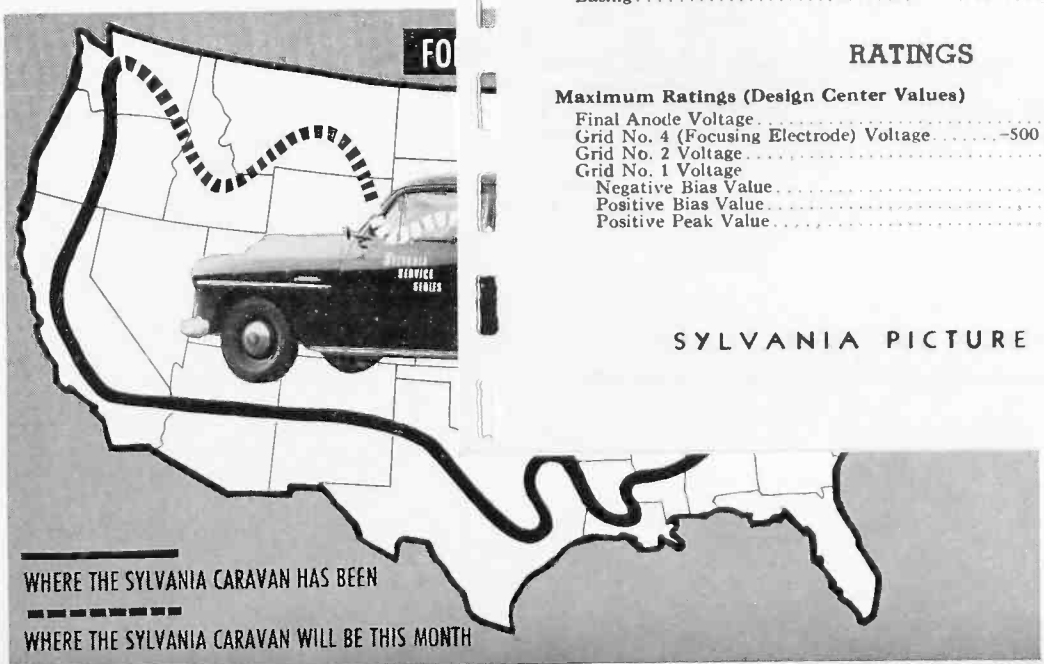

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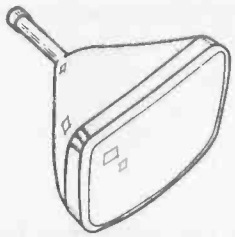
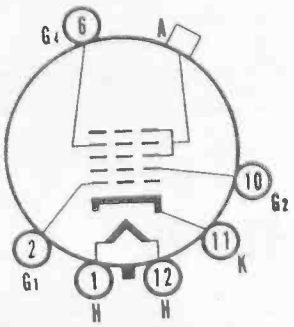
Sylvania Type 20HP4 20HP4A

TELEVISION PICTURE TUBE

20" Direct Viewed — **Rectangular Glass Type**
Gray Filter Glass — **Magnetic Deflection**
Single Field Ion Trap — **Low Voltage Electrostatic Focus**
(20HP4A Has External Conductive Coating)





12-M

CHARACTERISTICS

General Data	
Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	12¾" x 17"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)	
Final Anode Voltage	16,000 Volts dc
Grid No. 4 (Focusing Electrode) Voltage	-500 to +1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts

SYLVANIA PICTURE TUBES

SYLVANIA NEWS

TECHNICAL SECTION

MAY 1952 Vol. 19, No. 5

E. Allan Mahannah, Jr., Technical Editor

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AN INTRODUCTION TO UHF TELEVISION CIRCUITRY—PART II*

By E. H. Boden, Advanced Application Engineer

INTRODUCTION

An u h f television tuner is made up of three sections, an r f section, a mixer section, and a local oscillator section. The r f section may or may not have amplification and the mixer section may contain either a tube mixer or a crystal mixer. All three of these sections will be present in every tuner or converter.

For our discussion here, we shall treat each section separately, giving the function and operation of each section.

RF SECTION

The r f section has four functions: (1) To present the proper impedance termination to the transmission line connecting the tuner with the antenna. (2) To provide preselection of the received signal. (3) If an amplifier is used, to provide a maximum of signal gain with a minimum of added noise. (4) To deliver the signal to the mixer at the impedance of the mixer input.

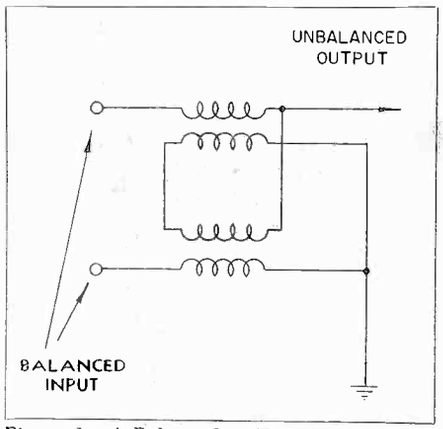
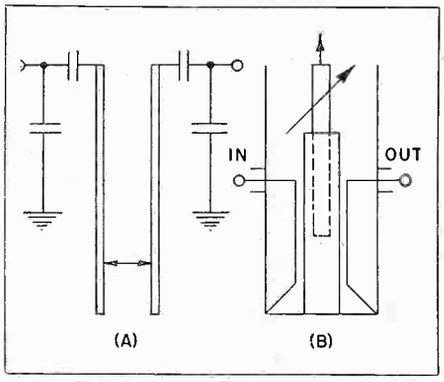


Figure 1. A Balanced to Unbalanced Input Transformer

The first function is dependent on the type of input and the circuits which follow the input. With a 300 ohm balanced input, a balanced to unbalanced transformer (similar to the type shown in Figure 1 and presently used on v h f inputs) may be used to match the antenna to the circuitry that follows. The unbalanced output of the antenna transformer is then connected to a frequency selector. The frequency selector is designed to pass the desired signal and attenuate the undesired signals, such as the image signal and the oscillator voltage attempting to travel to the antenna. This frequency selection may be obtained with any tuned circuit that is capable of tuning the u h f channels. Such a tuned circuit may be a shorted section of lines (see Figure 2) or a butterfly resonator. The output of the preselector is then made to match the input of the mixer circuit. If an r f amplifier is used, the antenna input transformer will match the antenna to the input of the amplifier. Since an r f amplifier at u h f would be a grounded-grid type†, the input impedance of the amplifier will be approximately equal to the reciprocal of its transconductance. This means the input resistance of the tube will be quite low. In the plate circuit of the amplifier there will then be a tuned impedance transformer. This tuned impedance transformer will serve two functions: first, as the frequency selector and, second, to transform the impedance at the amplifier plate to the impedance of the mixer input.



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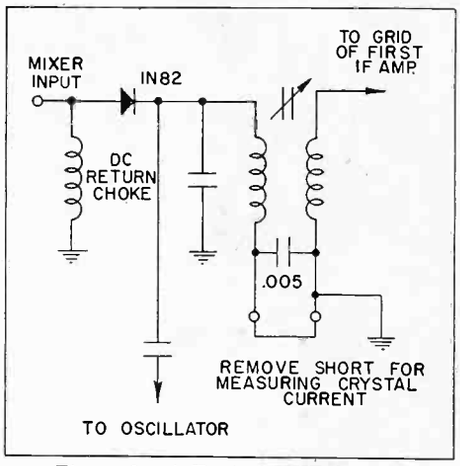
Mixer sections may use silicon or germanium crystal diodes as the mixer. In such arrangements, and with the proper amount of oscillator injection, 0.5 ma of crystal current, these crystals have an input resistance of about 250-300 ohms and an

(Continued on page 7)



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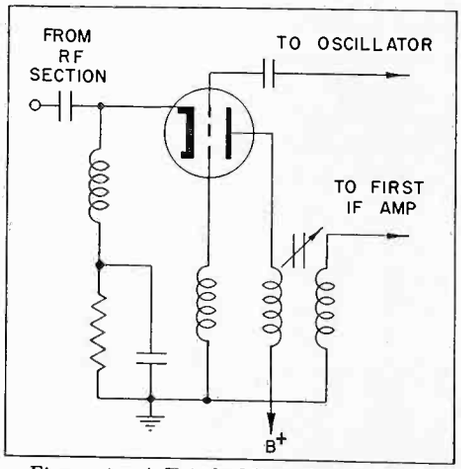

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SYLVANIA CONTIN

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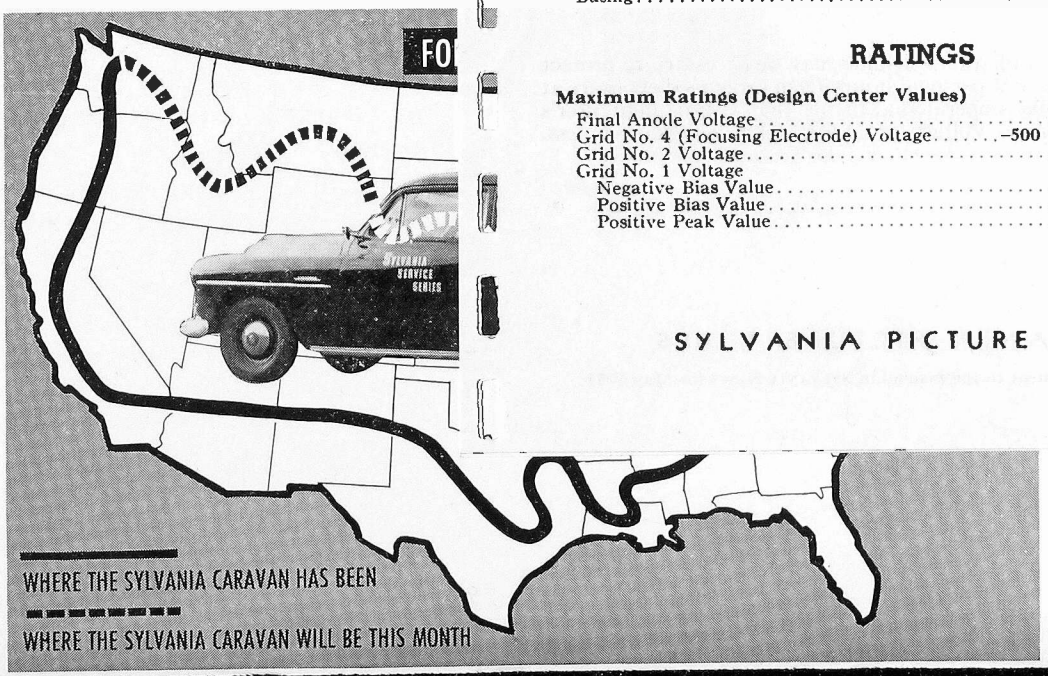

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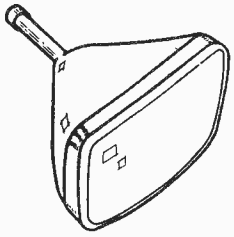

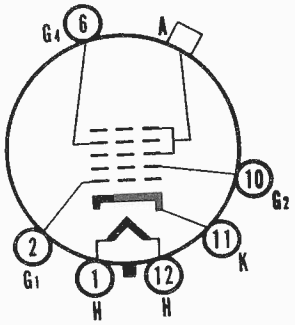

12-M

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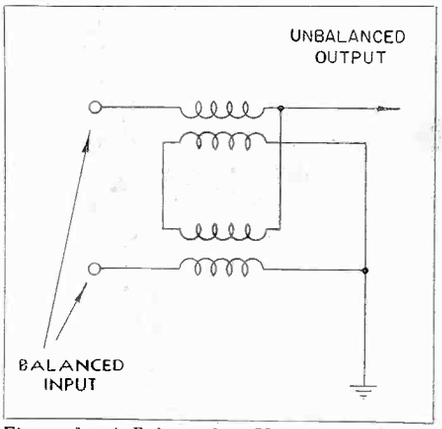

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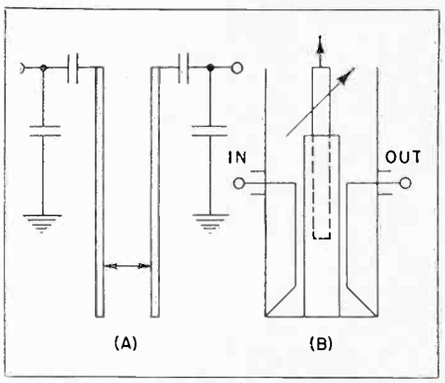

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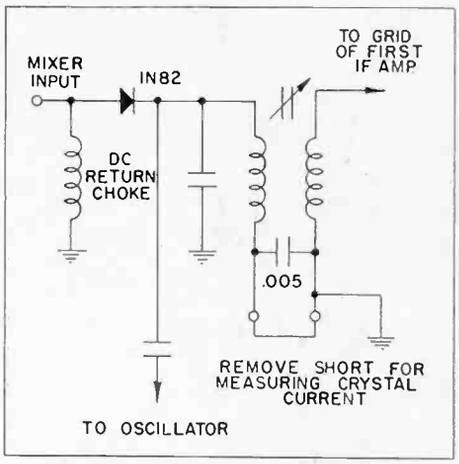

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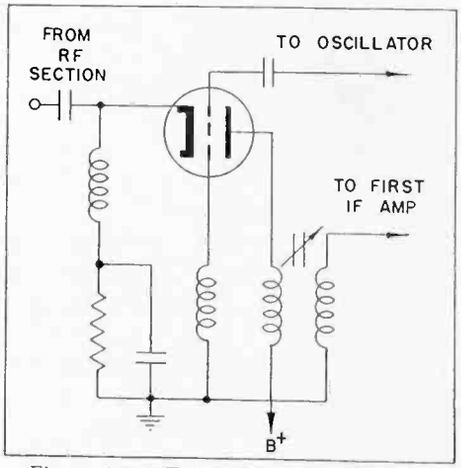

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†F. E. Terman, *RADIO ENGINEERS' HANDBOOK*, page 471.

BY-SERVICE CLASSIFICATION

The following *BY-SERVICE* listing of tubes has been prepared to assist the service technicians and engineers in selecting suitable substitutions for types not listed in charts or when a major change in power supply is undertaken. Although only the basic characteristics are listed these are sufficient to eliminate the majority of tubes not suitable for the particular application. Thus, the user can quickly select a group of possible tubes and then eliminate, by individual examination, those which for other reasons may be undesirable.

Since it is impossible to include the complete *BY-SERVICE* listing of tubes in this issue of SYLVANIA NEWS, watch the next issue for continuation of the chart.

AMPLIFIERS (REMOTE CUT-OFF RF) PENTODES - TETRODES

Types	Ef	If	Style	Gm
1A4P	2.0	0.06	ST-12	625 725
1A4T	2.0	0.06	ST-12	625 650
1AB5	1.2	0.13	Lock-in	1100 1350
1D5GP	2.0	0.06	ST-12	625 725
1D5GT	2.0	0.06	ST-12	625 650
1P5GT	1.4	0.05	GT	750
1SA6GT	1.4	0.05	GT	750 950 970
1T4	1.4	0.05	Min.	700 900
6AB7	6.3	0.45	Metal	3500
6BA6	6.3	0.30	Min.	4300 4400
6BD6	6.3	0.30	Min.	2000 2350
6BJ6	6.3	0.15	Min.	3600 3650
6D6	6.3	0.30	ST-12	1500 1600
6E7	6.3	0.30	ST-12	1500 1600
6K7/G	6.3	0.30	Metal/ST-12	1650 1450
6K7GT	6.3	0.30	GT	1650 1450
6R6G	6.3	0.3	ST-12	1160
6S7/G	6.3	0.15	Metal/ST-12	1250 1750
6SD7GT*	6.3	0.30	GT	3350 3600
6SG7*	6.3	0.30	Metal	4100 4700 4000
6SG7GT*	6.3	0.30	GT	4100 4700 4000
6SK7/GT	6.3	0.30	Metal/GT	2350 2000
6SS7	6.3	0.15	Metal	1950 1850
6U7G	6.3	0.30	ST-12	1500 1600
7A7	6.3	0.30	Lock-in	2350 2000
7AH7	6.3	0.15	Lock-in	3300
7B7	6.3	0.15	Lock-in	1675 1750
7H7	6.3	0.30	Lock-in	4000
7T7	6.3	0.3	Lock-in	4900 4000
12BA6	12.6	0.15	Min.	4300 4400
12BD6	12.6	0.15	Min.	2000 2350
12BY7	6.3 12.6	0.6 0.3	T-6½	12000
12K7GT	12.6	0.15	GT	2350 2000
12SG7	12.6	0.15	Metal	4100 4700 4000
12SK7/GT	12.6	0.15	Metal/GT	2300 2000
14A7	12.6	0.15	Lock-in	2350 2000
14H7	12.6	0.15	Lock-in	4000
26A6	26.5	0.07	Min.	2000 4000
34	2.0	0.06	ST-14	560 600 620
35/51	2.5	1.75	ST-14	1020 1050
35S/51S	2.5	1.75	ST-14	1020 1050
39/44	6.3	0.30	ST-12	960 1000 1050
58/58S	2.5	1.0	ST-12	1500 1600
58AS	6.3	0.40	ST-12	1500 1600
78	6.3	0.30	ST-12	1275 1100 1450
5590*	6.3	0.15	Min.	2000
5725	6.3	0.175	Min.	
9001*	6.3	0.15	Min.	1400

*Semi-remote

AMPLIFIERS (SHARP CUT-OFF RF) PENTODES - TETRODES

Types	Ef	If	Style	Gm
1AE4	1.25	0.10	Min.	1550
1AF4	1.4	0.025	Min.	825 950
1B4P	2.0	0.06	ST-12	560 650
1E5GP	2.0	0.06	ST-12	560 650
1L4	1.4	0.05	Min.	925 1025
1LC5	1.4	0.05	Lock-in	750 775
1LG5	1.4	0.05	Lock-in	800 800 1050
1LN5	1.4	0.05	Lock-in	800
1N5GT	1.4	0.05	GT	750
1U4	1.4	0.05	Min.	900
3E6	1.4	0.10	Lock-in	2100
	2.8	0.05		1800
6AC7	6.3	0.45	Metal	6750

Types	Ef	If	Style	Gm
6AG5	6.3	0.30	Min.	4750 5100 5000
6AH6	6.3	0.45	Min.	9000
6AJ5	6.3	0.175	Min.	2750
6AK5	6.3	0.175	Min.	5000 4300 5100
6AM6	6.3	0.30	Min.	7500
6AS6	6.3	0.175	Min.	3500
6AU6	6.3	0.30	Min.	3900 4450 5200
6BC5	6.3	0.30	Min.	4900 6100 5700
6BH6	6.3	0.15	Min.	3400 4600
6C6	6.3	0.30	ST-12	1185 1225
6CB6	6.3	0.30	Min.	6200
6D7	6.3	0.30	ST-12	1185 1225
6J7	6.3	0.30	Metal	1225
6J7G	6.3	0.30	ST-12	1225
6J7GT	6.3	0.30	GT	1225
6SE7GT	6.3	0.30	GT	3100 3400
6SH7	6.3	0.30	Metal	4000 4900
6SH7GT	6.3	0.30	GT	4000 4900
6SJ7/GT	6.3	0.30	Metal/GT	1575 1650
6W7G	6.3	0.15	ST-12	1225
7AB7	6.3	0.15	Lock-in	1800
7AD7	6.3	0.60	Lock-in	9500
7AG7	6.3	0.15	Lock-in	4200
7AJ7	6.3	0.3	Lock-in	2275 1575
7AK7	6.3	0.8	Lock-in	6500
7C7	6.3	0.15	Lock-in	1225 1300
7G7	6.3	0.45	Lock-in	4500
7L7	6.3	0.30	Lock-in	3000 3100
7V7	6.3	0.45	Lock-in	5800
7W7	6.3	0.45	Lock-in	5800
12AU6	12.6	0.15	Min.	3900 4450 5200

Types	Ef	If	Style	Gm
12AW6	12.6	0.15	Min.	5000 5100 4750
12J7GT	12.6	0.15	GT	1225
12SH7/GT	12.6	0.15	Metal/GT	4000 4900
12SJ7	12.6	0.15	Metal	1575 1650
12SJ7GT	12.6	0.15	GT	1575 1650
14C7	12.6	0.15	Lock-in	2275 1575
14W7	12.6	0.225	Lock-in	5800
15	2.0	0.22	ST-12	710 750
22	3.3	0.132	ST-14	125
24A/24S	2.5	1.75	ST-14	1000 1050
32	2.0	0.06	ST-14	640 650
36	6.3	0.30	ST-12	1000 1050 1080
57/57S	2.5	1.0	ST-12	1185 1225
57AS	6.3	0.40	ST-12	1185 1225
77	6.3	0.30	ST-12	1100 1250
1221	6.3	0.30	ST-12	1185 1225
1223	6.3	0.30	ST-12	1185 1225
1229	2.0	0.06	ST-12 Spec. Type 32	
1231	6.3	0.45	Lock-in	5500 6500
1273	6.3	0.30	Lock-in	2275 1575
1280	12.6	0.15	Lock-in	2275 1575
5591	6.3	0.15	Min.	5000 4300 5100
5654	6.3	0.175	Min.	5000
5693	6.3	0.3	Metal	1650
5847	6.3	0.3	T-6½	12500
5879	6.3	0.15	T-6½	1000
5901	1.4	0.05	T-3	900
9003	6.3	0.15	Min.	1800

*Require separate oscillator

(Continued Next Issue)

UHF TELEVISION CIRCUITRY

(Continued from page 5)

output impedance of about 450 ohms. In the process of conversion, the signal will suffer a voltage loss of about two thirds, with the above mentioned amount of oscillator injection. Should the oscillator injection change, the input and output resistance and the conversion loss and noise properties of the crystal may change in such a way as to degrade the signal at the output of the mixer. It is therefore important that the oscillator injection be maintained as close to the proper value as possible. Shown in Figure 3 is a typical u h f crystal mixer circuit with provisions for the measurement of crystal current. With the short removed and a 0-5 d c milliampere meter connected at that point, adjustment of the oscillator injection may be made.

In the event that a triode is used as the mixer, the circuit will be of the form shown in Figure 4. This circuit is less critical for variations of oscillator injection, but since larger amounts of oscillator power are used, more difficulty is found in preventing it from appearing at the antenna.

Although the tuning circuit and some of the components in the oscillator may be different than those found in v h f tuners, the basic operation of the oscillator is quite conventional. There are two additional requirements for the local oscillator, as well as stability. It must supply oscillator power to the mixer and it must track with the preselector. Tracking adjustments will include a small capacitance or inductance across the tuned circuit for adjustment of the low end and a small adjustable capacitor in series with the grid connection to track the high end.

To prevent direct oscillator radiation, all parts of the oscillator circuit must be well shielded.

In view of the frequencies involved in the u h f tele-

(Continued on page 8)

RENECKED PICTURE TUBES

Occasionally, television viewers or servicemen notice the presence of slight bulges or indentations in the necks of picture tubes. Worriedly, they ask if this indicates that the bulbs have at some time had new necks or portions of necks installed.

"Renecking," as the process is called, *is entirely normal* to the manufacture of first quality picture tubes, and is necessary for several reasons.

Renecking begins with the glass manufacturer. Since different characteristics of the glass are required in different parts of the bulb, the glass used in the neck, for instance, must be of different composition than that used in the face plate. Otherwise, when the neck is heated to seal in the mount, impurities may be given off which could contaminate the tube. Thus, renecking is necessary right at the start, to provide a bulb of suitable characteristics.

Further renecking occurs when bulb necks are broken by handling or bumping in production lines. This may occur either in the glass plant or during processing by the picture tube manufacturer. In such cases, it is desirable to reneck as near the base end as practicable, to eliminate annealing problems.

Finally, bulbs of finished tubes which do not meet with electrical and screen quality standards are saved and sent through the complete manufacturing process again. Briefly, this includes cutting off the neck to remove the base and gun, and cleaning off the old screen and internal coating. A new length of neck is then sealed to the bulb in order to provide a standard length neck for the sealing in operation. The renecked bulb is carefully inspected by the same standards. A new screen and new internal conductive coating are then applied. A new gun is sealed in and the tube is exhausted. The tube is thus completely new in every respect.

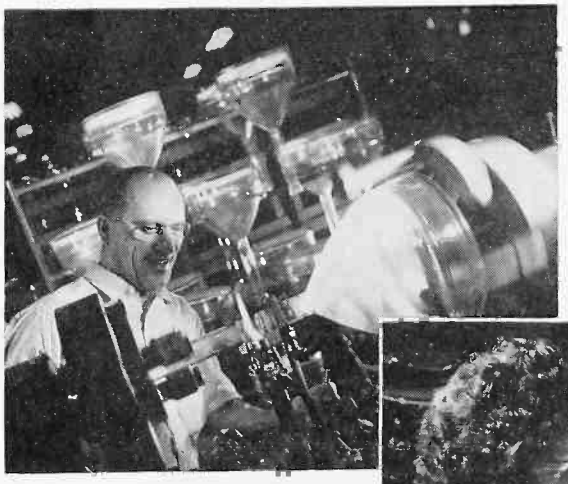
The exact percentages of renecks attributable to each cause will vary, but each bulb runs a hazardous course, starting with the bulb manufacturer. As a result (and with some variation from time to time and among tube types) it is likely that many picture tubes have been renecked at some stage, in addition to the renecking necessary to provide the special glass neck required on all tubes.

Renecking is performed in a special glass lathe. The bulb with its foreshortened neck and a new length of neck are heated and sealed together. Care is taken to assure that any irregularities in the glass fall well within specifications. This means the tube will accommodate standard size accessories, such as coils, ion traps or focusing devices.

A picture tube has one primary purpose—to present a good picture for a long period of time. Renecking is of no consequence to the overall quality, performance or life.

It is interesting to note that a manufacturer with high final performance quality standards may reject many finished tubes and, therefore, have an even higher number of renecked bulbs among his finished products than a manufacturer whose standards are not as high.

Renecking involves the economic factor that it reduces the number of bulbs that must be scrapped and, thus, is a factor in the reduction of prices to their present realistic level. Renecking is a standard practice used by all of the leading manufacturers in the industry and has no adverse effect on performance. A renecked tube will give exactly the same quality picture as a non-renecked tube having identical electrical characteristics.



A Sylvania technician (above) is shown using one of the special glass lathes in one of the steps of the renecking process.

A conductive coating is being *hand-applied* to a television picture tube as the tube is rotated in a special jig.

Correction

Formula in Figure 1, Page 6 of the March issue of SYLVANIA NEWS should read:

$$\lambda \text{ in inches} = \frac{11800}{F_{mc}}$$

U H F TELEVISION CIRCUITRY

(*Continued from page 7*)

vision channels, greater precautions must be exercised in wiring and in the selection of components. At 890 mc, channel 83, many capacitors commonly used at v h f become an inductance with considerable resistance loss. For instance, at u h f, when a one inch length of #18 wire is connected in series with a 1 $\mu\mu$f capacitor, it becomes a series resonant circuit at about 800 mc. Therefore, lead lengths at u h f will be found to be quite short and components will need to be of high quality.

The circuits discussed here are not the only possible circuits, but ones chosen to illustrate what is presently planned for some u h f television tuners and converters. An understanding of the circuits given here should be of assistance in understanding other u h f circuits.

SYLVANIA NEWS

MERCHANDISING SECTION

MAY 1952 Vol. 19, No. 5

Campbell Radio Offers Tulsans A Full Range of Service

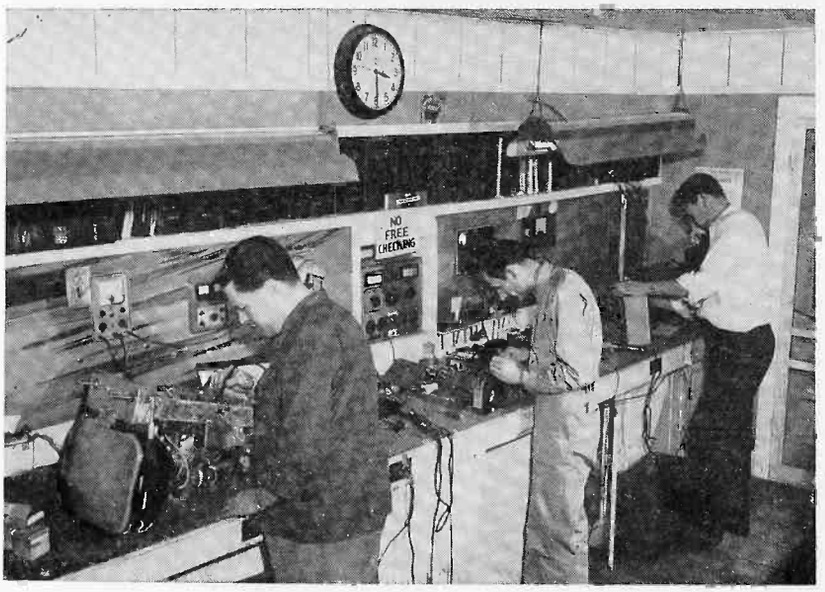
Campbell Radio Service in Tulsa, Oklahoma is a thriving business institution. Owned and operated by A. E. Campbell, this shop offers an unusual variety of services to set owners in Tulsa and its suburban areas.

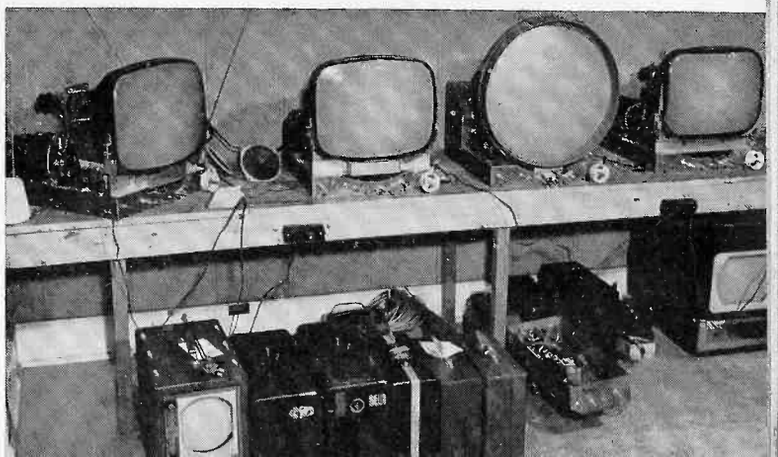
Campbell sells and repairs both home and automobile radios as well as television sets. He also rents, installs, and maintains mobile and stationary units of sound equipment.

Now in its seventh year at the present location, Campbell Radio Service employs three top-flight service technicians with long experience in the field. They are in charge of repairing all sets brought into the shop for service. Campbell handles all of the outside calls. A helper for TV antenna installations is also employed.

Campbell Radio Service maintains a full line of test equipment—oscilloscopes, vacuum tube voltmeters, test pattern generator, marker generator, sweep signal generator, capacitor analysers, and the like. This well-ordered shop also boasts a neat "cook bench" for final checking of all repaired sets.

An enthusiastic user of Sylvania Tubes, Campbell brings to his job a background which includes two decades of radio service and broad experience as a supervisor in the electronics department at Douglas Aircraft.





The efficiency of Campbell Radio Service is reflected in the tidy impression of its exterior (top photo). Same story inside, too. At the bench from left to right (middle photo): Technicians Gil Marsh, C. D. Wilson, and Ralph Cook. When these sets leave the "cook bench" (at bottom), they are really repaired. All sets that Campbell Radio services must operate successful for several hours before they are considered repaired. This bench, in full view of customers, provokes steady comment pertaining to the thoroughness of "Campbell service."

IT'S BASEBALL SEASON AND

Leo Durocher IS ON YOUR TEAM

Baseball season has begun under a full head of steam. Most everyone is going to the ball parks or following the fortunes of the major leagues by way of television, radio, and the newspapers. Interest is particularly high where it concerns the New York Giants, the miracle team of 1951. No less high is the interest surrounding the National League pennant-winning team manager, Leo Durocher, the most colorful, controversial leader in the game today.

Leo is helping to sell your service right now. Last season's manager of the year is telling the prospects in your town who read *Life*, *Colliers*, *Saturday Evening Post*, *or Better Homes & Gardens* about the advantages of taking their defective radio and television sets to your shop. He tells them about the precision test equipment you have and the quality Sylvania Tubes you use when replacement parts are needed.

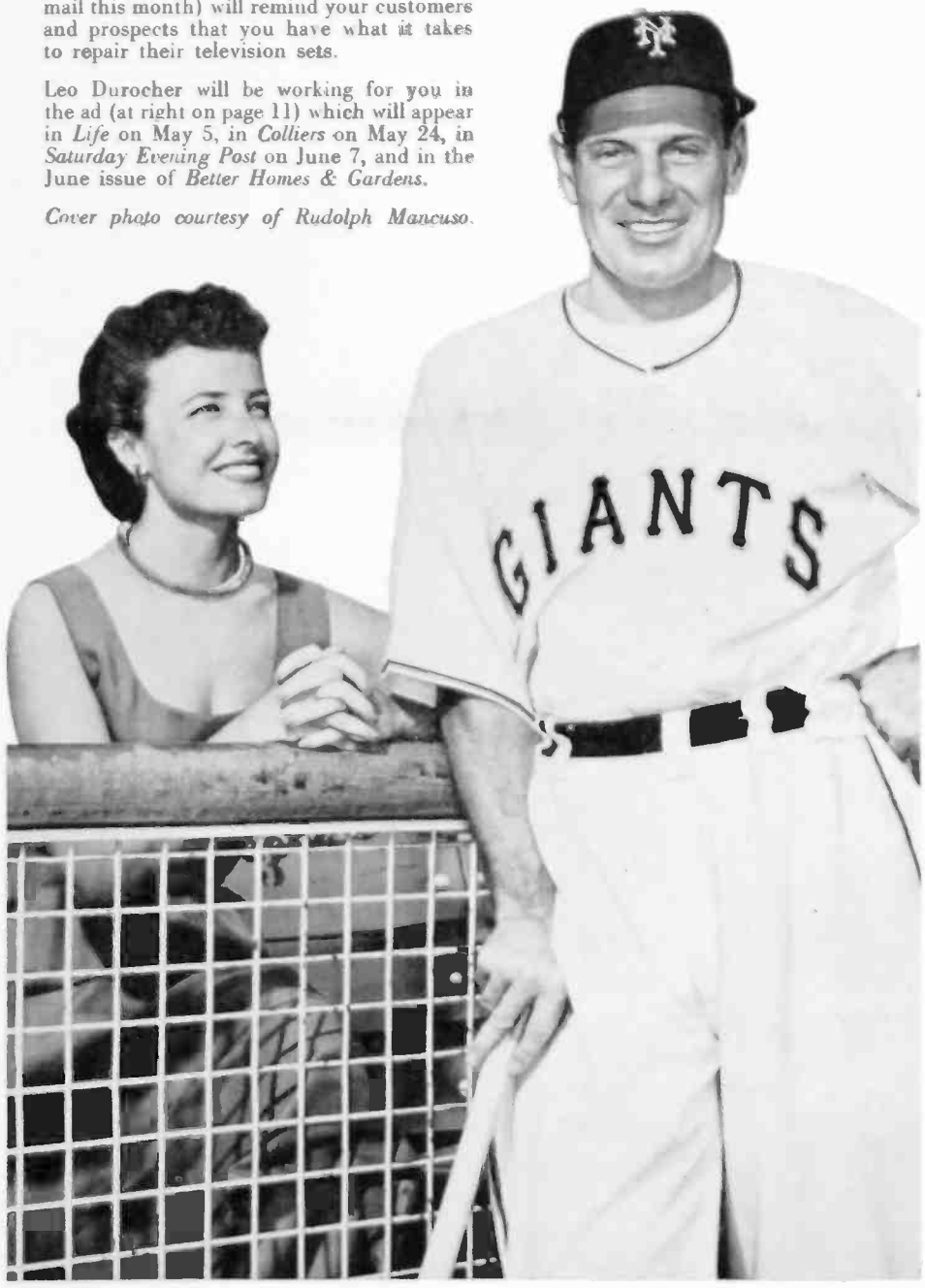
Leo is also working for you through the medium of those eye-catching window and counter cards and colorful window streamers you received with your Sylvania Spring Campaign Kit. And don't forget that giant postal card of Leo in the campaign kit. When you mail that out this month, the popular Giant manager tells your prospects about the intricacies of a television chassis and the equipment and know-how you have to do a first class repair job.

That's a lot of advertising support for you to win more profits. Sylvania has planned the right help at the right time. Leo Durocher's boost at the beginning of a new baseball season will go a long way toward making your business a "winner" during the next two months.

The counter card (at the left on page 11) of Leo Durocher and his famous actress wife Laraine Day that you received in your Sylvania Advertising Campaign Kit will do a powerful job of selling your service throughout the baseball season. And that giant postal card of Leo (which you will want to mail this month) will remind your customers and prospects that you have what it takes to repair their television sets.

Leo Durocher will be working for you in the ad (at right on page 11) which will appear in *Life* on May 5, in *Colliers* on May 24, in *Saturday Evening Post* on June 7, and in the June issue of *Better Homes & Gardens*.

Cover photo courtesy of Rudolph Mancuso.



RTMA Service Manager Seeks Cooperation from Servicemen

Declaring that "pointing the finger of accusation" insisting that the "other fellow do something" will not solve any of the problems now facing the TV industry, A. Coumont, RTMA Service Manager, called for co-operation between manufacturers, retailers and servicemen.

In a recent address prepared for delivery before the Federation of Radio Servicemen's Association of Pennsylvania at the Hotel Harrisburger in Harrisburg, Pa., Coumont said the major problem facing the industry is to get the customer back into his proper place—that of customer. By service problems, the RTMA Service Manager explained he meant problems in relation to maintaining a high quality of professional ethics by servicemen and problems which manufacturers have in attempting to assist servicemen.

"For the moment, to properly orient ourselves and move in the right direction together," Coumont said, "it will be fundamental to subscribe to the one common denominator—the TV customer.

"The customer has been taken for granted—someone who would always be there—while the service groups and industry went their own separate ways condemning one another and politiking when a strong unity was most needed. Meanwhile the public was awakened to a position of seemingly helplessness and in their state of confusion were avid readers of press reports that magnified service gyps; called for licensing of servicemen in the mistaken promise it would protect them from fraud; and are buying 'Fix-It-Yourself' books by the thousands."

Coumont told the servicemen that he had no doubt that through concerted time and effort customers' confidence can be strengthened.

A BIGGER, DEEPER SYLVANIA SERVICE KIT

A completely new and larger Sylvania Service Kit is waiting for you at your Sylvania Distributor. It is the best tube carrying case on the market. Best of all, it still carries the same old price of Sylvania's first and smaller case—$9.95.

This fine kit is a practical addition to any serviceman's equipment. It is made from sturdy ⅜-inch plywood and covered with a tough scratch and scuff resistant plastic material which looks like expensive leather. An ample 12½ x 18 x 7 inches, the kit will hold a maximum of 75 tubes. It also has special pockets in the lid to hold most of the tools required on outside-the-shop service calls. It is also handy for use as an over-night or week-end travel case.

Don't fail to ask your Sylvania Distributor about the big Sylvania Service Kit. It's a real buy at $9.95.

Newly Elected Officers

Here are the newly elected officers of the Florida Radio and Television Technicians Guild. Front, left to right: President Steven Petruff and Treasurer A. Ed Stevens. At back: Vice President Shan Desjardines and Secretary Thomas M. Middleton.

In This Issue

SYLVANIA NEWS

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

Sec. 34.66 P. L. & R.
U. S. POSTAGE
PAID
Permit No. 1
Emporium, Pa.

For

David F. Zarim
1408 Downing St. N. E.
Washington 18, D. C.

A

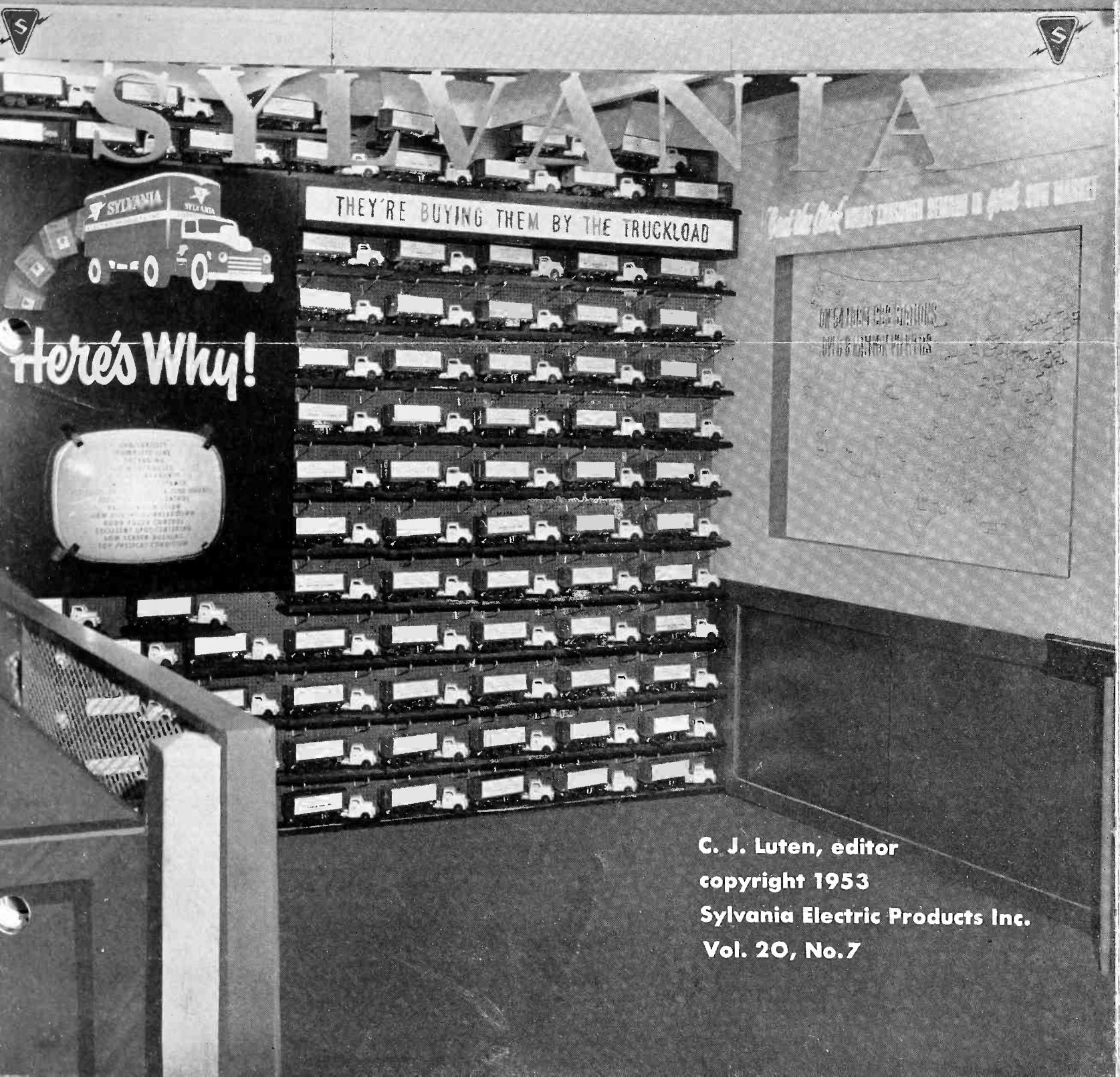
Form 3547 Requested

Vol. 19, No. 5 MAY 1952

PUBLISHED BY
SYLVANIA ELECTRIC PRODUCTS INC.
MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

SYLVANIA NEWS

JULY AUGUST 1953



C. J. Luten, editor

Vol. 20, No. 7

TWO VIEWPOINTS ON THE SERVICE INDUSTRY

Spurred by the rapid growth of television, the service industry expanded during the past few years at a terrific rate. With this extraordinary development came all kinds of problems that very few had time to get set for.

Last February's SYLVANIA NEWS contained an article by Frank Moch, president of the National Alliance of Television and Electronic Service Association, who presented many of the service dealer's problems and offered recommendations for solving them. This article, *A Plan to Create Confidence in TV Set Owners*, has provoked wide discussion and quite a number of letters.

Of special interest were letters from Jack Rathsburg of B. J. Fitzner Co., Manufacturers Representatives, Detroit, Mich. to your editor, and Mr. Moch's reply to Mr. Rathsburg. SYLVANIA NEWS is pleased to open its pages to these and other writers who offer fresh comments on the radio and television service business. Though the opinions of the present authors are not necessarily those of Sylvania Electric Products Inc., the publication of their letters here represents a part of the responsible position SYLVANIA NEWS has consistently tried to maintain toward the service industry for over 20 years.

Mr. Rathsburg writes:

"Dear Mr. Luten:

"It is difficult to refrain from commenting on Mr. Frank Moch's article in the February issue of SYLVANIA NEWS.

"No doubt the purpose and intent of Mr. Moch and his NATESA are well meant and sincere, but the proposed methods of achieving their ends seem certainly ill advised and perverse, if not illegal.

"What Mr. Moch and so many of his well meaning associates have apparently failed to realize, is that today's Television Service Dealer must accept classification as a responsible businessman in the Industry pattern and in the American system. As yet he has not earned this distinction.

"The Service Dealer and Service Technician through their various associations, including NATESA, protest that they should be accorded professional status, and that they should be paid for what they know, rather than for the net worth of the services which they render. If they would get their feet on the ground and consider themselves as merchants and tradesmen which they actually should be, and be aware that they have a serious obligation to provide their service commodity to the public, as a branch of one of America's largest industries, they would do well by the Industry that fosters them.

"Mr. Moch complains that truck drivers and electricians draw better rates than Television Service Men. Certainly if the economics of the transportation and the electrical industries did not provide for these better rates, they (the industries) could not survive and merit public acceptance. It would seem logical, therefore, that there is serious management error in the Television Service Industry, when, with all its glamour, it cannot compete in the manpower market.

"The Service Dealer cries 'wolf' to the rest of the Industry without realizing that he himself is the 'wolf' and his own worst enemy. Set and parts suppliers steadily come to his rescue, and work with and for him and promote him to the public. In spite of all this, it is still necessary for set manufacturers and their distributors to take an active part in the maintenance of their sets at consumer level. It is noteworthy, in this connection, that in our large Midwestern city, four of the leading set manufacturers make up to 2000 service calls per day, in order to keep their brands operating satisfactorily.

(*Continued on page 10*)

H & L Radio Supply Co. of Fort Worth, Texas, which received one of the *Parts Jobber Magazine* "Jobber of the Year" awards at the Electronic Parts Show recently held in Chicago, also received an award from Sylvania as a member of its truckload of picture tubes club. Only H & L didn't take just a truckload to serve its customers, it took a railroad car load. Below, at left, the carload is shown being delivered. Above at left, Roxanne, star of Sylvania's TV show *Beat the Clock*, and Sylvanian Arden Still (left), present Walt Logston and Dennis Hightower, owners of H & L, a replica of their carload purchase.

More Sylvania Distributors Join The TV Tube Truckload Club For Their Dealers

This month's cover of SYLVANIA NEWS shows a portion of the display Sylvania exhibited at the Electronic Parts Show recently held in Chicago's Conrad Hilton Hotel. This part of the display contained 86 miniature trucks which were awarded to the Sylvania Distributors who had purchased one or more truckloads of Sylvania TV Picture Tubes.

The exhibit also emphasized why so many distributors join this fast-growing club. The idea is to give dealer customers service: the best picture tube when they need it. The impressive tests recently conducted by the United States Testing Company rated Sylvania Picture Tubes best of all tubes tested. Members of the Sylvania Truckload Club know that Sylvania Picture Tubes will best protect their customers' reputation for good service and sound business practices, and save them money on callbacks.

Three of the latest members of the truckload club are shown below.

At top right can be seen the kind of service Park Electronics, Morris Plains, N. J. gives. James Prunty of Wolfe's Television Service takes his Sylvania Picture Tubes right from the truck from (left to right): Bill O'Donnell of Park and Sylvanians Ted Swensen and Justin McCarthy. Prunty knows his Sylvania Distributor will have the right tube at the right time.

At middle right are two truckloads recently received by Radio Distributing Company, Indianapolis, Indiana. From left to right: Paul Custer, Bob Campbell, Lee Harrell, Sylvanian Bill Wray, Max Nowlin, Jack Bannon, Jan Eden, and John Deja.

Bottom photo shows a truckload shipment made to Stallman of Ithaca Inc. In this photo, left to right: Art Stallman, owner; his employees Albert A. Macri, Arthur F. Jayne, John A. Graves, Mrs. Gladys Ballard, Richard A. Coyle, Mrs. Gladys Cody, Donald L. Barber, Mary Malone, Rexford E. Ballard, R. J. West, Mrs. Mary Brown, Edward Lovell; Sylvanians Paul Frappoli, John Connelly, William L. Rust, George Isham, and John Vail; and the two truck drivers.

Over 21.5 Million TV Sets Shipped

From 1946 through the end of 1952, over 21.5 million television sets were shipped to dealers throughout the country, according to a survey just prepared by the Radio-Television Manufacturers Association.

Although the report is not designed to show the actual number of television sets in use in the various areas —due to obsolescence, export from the area, dealers' inventory and other factors—it does give a picture of the original distribution of the 21,812,263 sets shipped to dealers during the seven year period.

Sylvania Announces Plans For New TV Tube Plant In California

Sylvania recently announced that it is arranging to purchase a site at Fullerton, Calif. for a television picture tube plant. H. Ward Zimmer, Sylvania president, said that the company is acquiring a 20-acre site on Orangethorpe Avenue. The community is 30 miles southeast of Los Angeles.

Mr. Zimmer pointed out that the new plant is being built to meet the requirements of West Coast TV set manufacturers. The TV replacement tube market as well as details concerning the proposed plant will be announced in the near future, he said.

"With industry sales estimates running as high as 7,200,000 sets at the consumer level in 1953, Sylvania, as one of the top two producers of TV picture tubes, is creating this new facility as a further step in meeting the television industry's expanding requirements," Mr. Zimmer said.

Sylvania maintains warehousing facilities at Emeryville, Calif., north of Oakland and in Los Angeles. The company also operates an electronics laboratory at Mountain View, Calif., near San Francisco.

ORDER YOUR 1954 HOME CALENDARS TODAY

Roxanne, popular star of Sylvania's TV show *Beat the Clock*, is shown at right hanging up a 1954 personalized service dealer calendar. That's what your customers will be doing around the first of the year, if you act quickly.

The Sylvania Personalized Home calendar for 1954 is the first of its kind ever offered exclusively to radio-television service dealers. It features a special, exclusive picture painted by famous *Saturday Evening Post* cover and feature artist Fred Stanley.

Here's what the new Sylvania Calendar will do for you. 1) It will put your business sign in every home. Handy, convenient, this calendar will make it easy for your customers to call you when they need your service. 2) It will hang in each home—365 days of the year. A constant reminder of you. 3) It will give you *first call* over all competitors in your area.

The Sylvania Calendar costs you less than any other advertising you can use . . . only 1½ cents per month, per home. Blanket your territory with your calendars. Make sure the sign of your business is hanging in every home with a radio or television set. Every calendar can bring you increased profitable business all through the year.

Just think—for only 18 cents per year, you put your personal salesman in each of your prospects' homes.

Your calendars will make money for you every day. And what a return for your investment! Just a few new service calls gained from the calendars you have placed in homes will return your investment and assure you of increased profits.

Place your order now. This is important to insure your shipment this fall. Use the order blank which you received with your announcement of the Sylvania Calendar, or pick up another blank, if you misplaced yours, at your Sylvania Distributor. Order enough to cover all the homes in your area. Be sure to include prospects as well as customers. Order envelopes for calendars for which you will use a Christmas Greeting Card.

SYLVANIA NEWS

TECHNICAL SECTION

JULY AUGUST 1953 Vol. 20, No. 7

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligations

SERVICING THE ELECTROFLASH

PART I (WABASH MODELS R-1140 AND R-1142)

By J. H. MINTZER, Supervisor of Factory Service Stations

A considerable amount of correspondence is received by the Company regarding the servicing of electroflash equipment. A typical query in a large percentage of the letters received is, "Will you please advise where I can send my electroflash for repairs? Our local radio technicians cannot repair this type of equipment." Actually, there is no reason for a serviceman to doubt his ability to understand and repair electroflash equipment. The circuit theory is fundamentally simple and the only factor which should be of any concern is safety. This cannot be stressed too greatly. However, it is felt that the average present-day technician, with his knowledge and experience in television, is well aware of the danger involved when working with lethal voltages.

THEORY OF OPERATION

We feel that a brief introduction to the theory of electroflash operation and some trouble-shooting kinks on the Wabash portable models, will enable many servicemen to pick up a few dollars which would have ordinarily slipped through their fingers.

Fundamentally, all that is required to fire the Sylvania Type R-4330 flash tube is a high voltage supply capable of a fairly heavy instantaneous current. Secondly, a method is required to trigger this energy through the tube. The power supply is a conventional voltage doubler circuit. The transformer secondary voltage, approximately 900 volt r m s, is doubled and rectified with a pair of half-wave rectifier tubes which charge a heavy storage capacitor, usually 25 to 35 microfarads. After the unit is turned on for approximately 20 seconds, a charge is built up in the capacitor to maximum value necessary to obtain the required watt seconds of energy. This energy is fed to the gun or flash tube assembly by means of a high voltage cable.

To properly trigger or ionize the gas in the flash tube, the energy supplied from the power supply must discharge through the flash tube and be converted to light energy at the required instant. The voltage supplied by the power supply (above 2000 volts) is not of a sufficient potential to ionize the flash tube gas; therefore, ionization must be accomplished by an external triggering circuit. The triggering circuit of the gun assembly in Figure 1 consists of: the trigger transformer T-102; Sylvania Type OA5 (X-7027) thyratron trigger tube; fixed capacitors C-104 and C-105; and the voltage divider resistor network totaling about 10.8 megohms. The voltage from the power supply applied to this divider network supplies about 40 microamperes of current between the cathode and the "keep alive" grid of the Sylvania Type OA5 (pins 3 and 4). Capacitors C-104 and C-105 charge during this period.

(*Continued on page 8*)

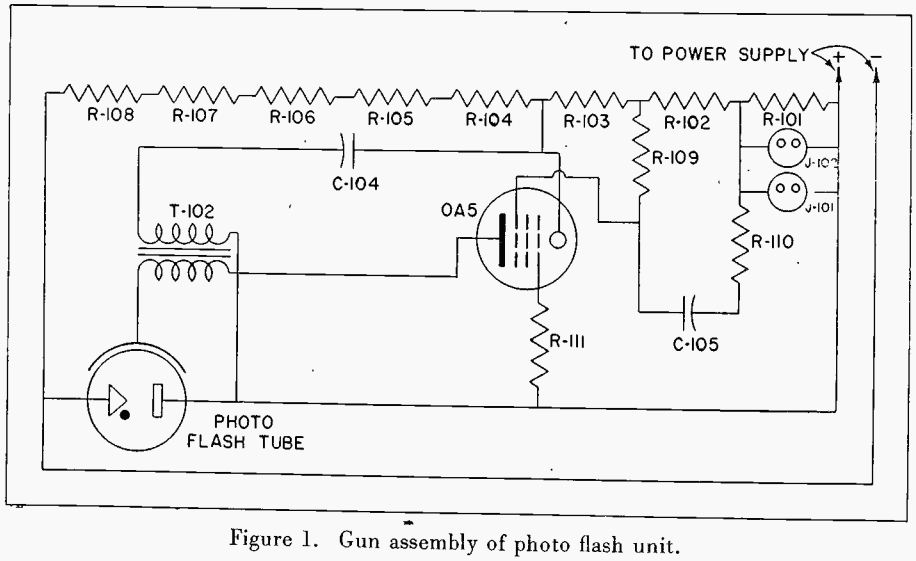


Figure 1. Gun assembly of photo flash unit.

J. H. MINTZER

Mr. Mintzer is Supervisor of the Factory Service Department for Test Equipment. He joined Sylvania in 1946, after leaving the Army and became a specialist in repairing servicemen's and laboratory test equipment. In 1932 he received an amateur radio license; his call letters are now W3LFU. His Army experience included three years overseas duty with the AACS. He served as Chief Operator, maintenance technician and instructor in direction finding, radio teletype, heavy transmitting, ground-to-air and instrument landing equipment.

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ORDER YOUR 1954 HOME CALENDARS TODAY

Roxanne, popular star of Sylvania's TV show *Beat the Clock*, is shown at right hanging up a 1954 personalized service dealer calendar. That's what your customers will be doing around the first of the year, if you act quickly.

The Sylvania Personalized Home calendar for 1954 is the first of its kind ever offered exclusively to radio-television service dealers. It features a special, exclusive picture painted by famous *Saturday Evening Post* cover and feature artist Fred Stanley.

Here's what the new Sylvania Calendar will do for you. 1) It will put your business sign in every home. Handy, convenient, this calendar will make it easy for your customers to call you when they need your service. 2) It will hang in each home—365 days of the year. A constant reminder of you. 3) It will give you *first call* over all competitors in your area.

The Sylvania Calendar costs you less than any other advertising you can use . . . only 1½ cents per month, per home. Blanket your territory with your calendars. Make sure the sign of your business is hanging in every home with a radio or television set. Every calendar can bring you increased profitable business all through the year.

Just think—for only 18 cents per year, you put your personal salesman in each of your prospects' homes.

Your calendars will make money for you every day. And what a return for your investment! Just a few new service calls gained from the calendars you have placed in homes will return your investment and assure you of increased profits.

Place your order now. This is important to insure your shipment this fall. Use the order blank which you received with your announcement of the Sylvania Calendar, or pick up another blank, if you misplaced yours, at your Sylvania Distributor. Order enough to cover all the homes in your area. Be sure to include prospects as well as customers. Order envelopes for calendars for which you will use a Christmas Greeting Card.

SERVICING THE

SYLVANIA NEWS

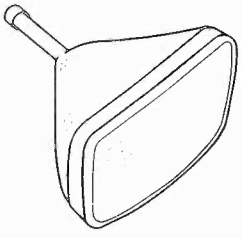
CAL SECTION

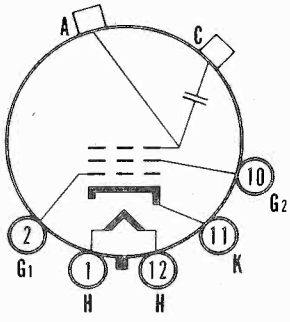
AUGUST 1953 Vol. 20, No. 7
William O. Hamlin, Technical Editor

Sylvania Type 21WP4

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Magnetic Focus
Single Field Ion Trap — Rectangular Glass Type
External Conductive Coating





12-N

CHARACTERISTICS

General Data	
Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
External Conductive Coating to Anode	750 μμf Max.
	500 μμf Min.
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	17 x 12¾ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	18,000 Volts d c
Grid No. 2 Voltage	410 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d c
After Equipment Warm-up Period	150 Volts d c
Heater Positive with Respect to Cathode	150 Volts d c

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in Sylvania News for July-August 1953

2000 volts) is not of a sufficient potential to ionize the flash tube gas; therefore, ionization must be accomplished by an external triggering circuit. The triggering circuit of the gun assembly in Figure 1 consists of: the trigger transformer T-102; Sylvania Type OA5 (X-7027) thyratron trigger tube; fixed capacitors C-104 and C-105; and the voltage divider resistor network totaling about 10.8 megohms. The voltage from the power supply applied to this divider network supplies about 40 microamperes of current between the cathode and the "keep alive" grid of the Sylvania Type OA5 (pins 3 and 4). Capacitors C-104 and C-105 charge during this period.

(Continued on page 8)

J. H. MINTZER

Mr. Mintzer is Supervisor of the Factory Service Department for Test Equipment. He joined Sylvania in 1946, after leaving the Army and became a specialist in repairing servicemen's and laboratory test equipment. In 1932 he received an amateur radio license; his call letters are now W3LFU. His Army experience included three years overseas duty with the AACS. He served as Chief Operator, maintenance technician and instructor in direction finding, radio teletype, heavy transmitting, ground-to-air and instrument landing equipment.

MECHANICAL PRESSURE TESTING TV PICTURE TUBES

By G. D. Ostrander, Television Picture Tube Division

Previously published articles have pointed out many of the important factors which must be considered in the production of Television Picture Tubes. Pictures and articles have been published concerning the importance of thorough testing and the many precautions necessary in manufacturing screens. Maintaining control of the critical spacings in the electron gun has been emphasized as well as the absolute necessity of insuring leak-proof seals in the base. All these precautions, however, are of no avail if the bulb is not of the same high quality and built with the same care.

Much research in this basic field has been done by the bulb manufacturers. A well designed bulb is also important from the standpoint of safety in handling, both during production and during installation. Since the tubes are rigidly inspected for physical flaws and imperfections, it is also advantageous to have the best bulb possible to reduce the number of rejects during the manufacturing process. These factors become increasingly more important as the size of the bulb is increased.

The present trend toward larger television picture tubes, and Sylvania's policy of building the highest possible quality into its products, makes it necessary to obtain more and more information as to the strength and behavior of both glass and metal bulbs under the stresses created by the high vacuum in the tube. Faced with the need for information, methods have been devised to mechanically test such tubes under pressures greater than one atmosphere, (approximately 15 pounds per square inch). Such methods may use either air or liquid (water) pressure systems. Both systems are used by Sylvania's Television Picture Tube Division. Each method has its own advantages and limitations.

In using the liquid system, the tube is enclosed in a screen cage (See Figure 1) and is lowered into a tank which is filled with water at a known temperature. The tank is then sealed off and a controlled cushion of air is allowed to enter the tank to build up the pressure to any desired value. (See Figure 2). Due to the incompressibility of water, the pressure is transmitted equally over the whole surface of the tube, and the pressure is built up until the tube is broken at some indicated gauge pressure. Tubes to be tested in this manner may be first abraded, (or scratched) using 150 emery grit, around the four sides and corners of the faceplate to simulate any desired degree of abrasion encountered in handling. The water tank setup is quite flexible, requires a minimum of space, and enables rapid testing at a moment's notice.

Occasionally it may be desirable to pressure check bulbs before they are made into tubes and exhausted. This is done simply by inserting a rubber stopper into the flared end of the neck and subjecting the bulb to pressure as before. The applied pressure in this case (since the bulb contains air at atmospheric pressure and not a vacuum) will be read directly as gauge pressure, whereas tubes already exhausted are actually under a pressure of 15 pounds per square inch due to the vacuum, plus the indicated gauge pressure. To eliminate any confusion which might exist when referring to the test results, all pressures are recorded as absolute readings and refer to actual pressures exerted upon the tube or bulb body whether the tube is under a vacuum or stoppered to air.

This liquid system is very useful in obtaining data quickly to detect any flaws in bulb construction or defects due to scratches, chips or imperfections in glass quality. Much useful information may be obtained from the remains of the tube, by examining the fracture patterns of the glass chips.

It may also be of interest to subject bulbs to pressure for longer periods of time to determine glass or metal fatigue effects occurring over a period of days. Any such setup which must run continuously, twenty-four hours a day for a week or so, must be care-

Figure 1. A tube being placed in the case preparatory to being lowered into the water pressure tank.

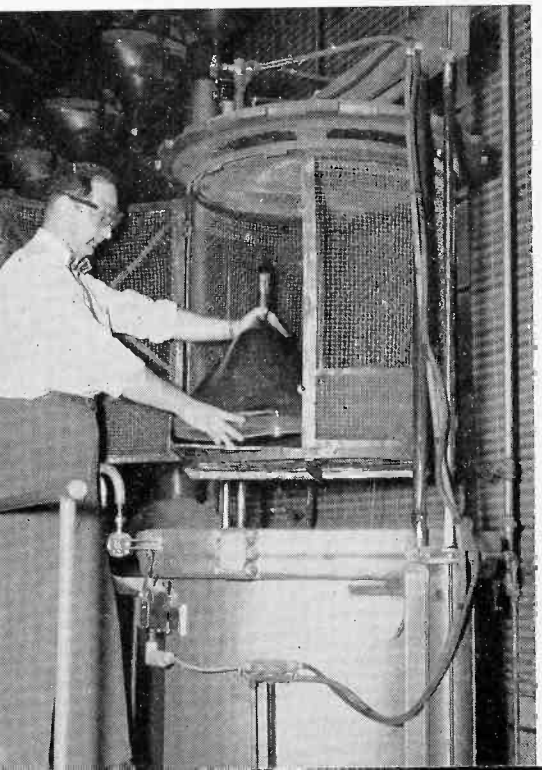
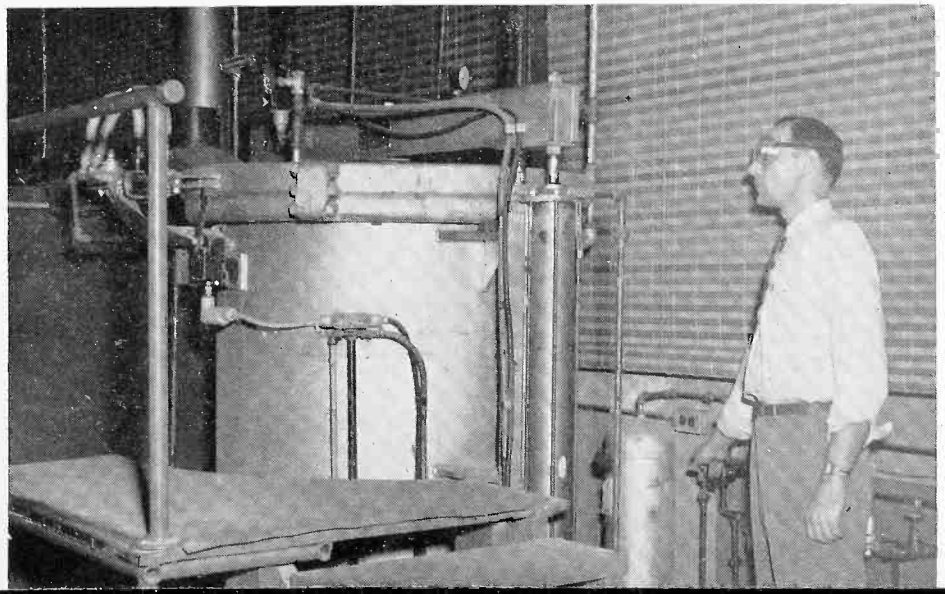


Figure 2. Applying pressure after tube is lowered into water pressure tank.



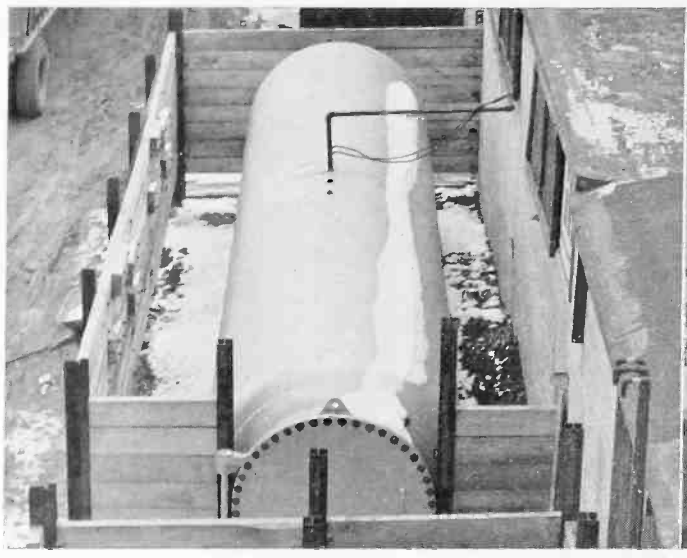


Figure 3. Air pressure tank with its gasketed cover in place.

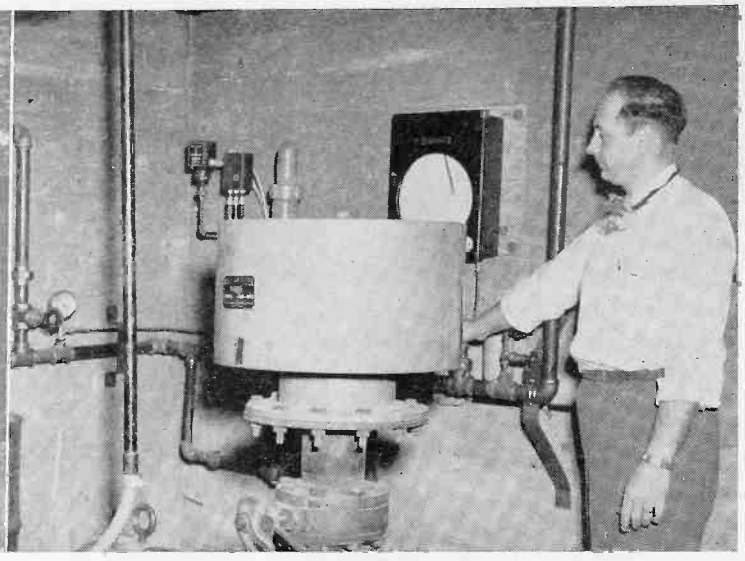


Figure 4. Recording and control position for air pressure tank.

fully controlled as to pressure. A means must also be devised to monitor the tubes under test and indicate their condition. Such a testing system has been set up and is now being used by Sylvania's Television Picture Tube Division General Engineering Department at Seneca Falls. Consistent and reliable data cannot be obtained by tests of one or two tubes since they represent too small a sample. The pressure tank must be large enough to accommodate a number of tubes at one time, thus allowing tests to be conducted on a group of tubes to obtain more reliable data.

The tank now in use for this purpose has a capacity of 800 cubic feet and is 27 feet long by 6 feet in diameter. One end of the tank has a gasketed cover which is sealed airtight by 44 one inch by six and one-half inch long steel stud and nut assemblies. (See Figure 3). The maximum allowable working pressure of the tank is 60 pounds per square inch. Safety valves, or "pop-off" valves are set at the maximum working pressure of the tank. An automatic controlled air pressure system is provided, together with continuous seven-day pressure recorder. (See Figure 4). Once the system is put into operation at the desired pressure, the tank may be left unattended except for regular checks on the progress of the test.

Tests are usually conducted on groups of ten or twelve tubes at a time. Each tube is placed in a cardboard carton to protect it from flying particles in case a nearby tube fails. In order to monitor each tube from outside the tank and to make a daily check on tube failures, electrical cables are connected to the filament of each tube. These cables are then passed through a pressurized fitting in the tank and finally terminated at an indicating device. This consists of a transformer in series with a group of microswitches. Each switch, when depressed, isolates that tube being monitored and checks for continuity of filament by means of a current meter. If the tube has failed there will be no current indicated on the meter.

When tests are conducted in the air tank upon bulbs which have no filaments, i.e. unfinished tubes, a trigger mechanism is attached to the bulb. This closes the circuit in the event of tube failure and records it at the outside control position.

Tests are being run continuously in this tank on all types of glass and metal bulbs and tubes. The data compiled has yielded valuable information on the mechanical properties of picture tubes. This is yet another example of the "Applied Research" conducted by Sylvania Electric Products Inc. to ensure the highest possible quality tubes.

Vertical Line Troubles

Various vertical lines can be observed on television screens which indicate different conditions. The most familiar of these is the straight black line on the left caused by either "Barkhausen Oscillations" in the horizontal output tube or a defective horizontal output tube.

A vertical white bar on the left is usually caused by insufficient damping due to a weak damper tube, defect in the voltage boost system or defect in horizontal sweep output.

A white vertical bar near the center of the picture indicates either a misadjusted drive control, defect in the horizontal discharge circuit, horizontal amplifier circuit, or a defect in the voltage boost system.

A black narrow vertical band with ragged edges very close to the left hand edge of the raster, which changes to small crawling diagonal lines when a strong signal is received, is termed the "spook." The spook originates by radiation from the horizontal deflection circuits and is picked up by the r f and i f stages. This new type of interference is reduced by better shielding between these circuits and placing 1-5 μh chokes in the damper tube plate and cathode leads.

SERVICING THE ELECTROFLASH

(*Continued from page 5*)

When a gun is triggered, either by the manual push-button switch or by the camera shutter switch (connected by plugs to J-101 and J-102), R-101 is shorted out. The result is that a sharp positive rise in potential appears on C-105 and, therefore, at the grid of the OA5 (pin 2). Ionization takes place and allows a heavy current flow through the OA5, discharging C-104. The primary of the trigger transformer T-102 is energized by this current causing a potential of 15 kv peak volts across the secondary. This voltage is applied to the R-4330 flash tube trigger grid and is sufficient to cause ionization. This allows the stored-up energy of the power supply storage capacitor to be discharged through the tube, resulting in an instantaneous flash of light.

The Wabash portable electroflash (R-1140 and R-1142) can be studied as typical units even though they are no longer manufactured. They differ only in their method of obtaining flashing power. The gun is essentially the same for both units. Some guns use slightly different values of resistors in the divider network, but they still total about 10.8 megohms. The R-1140 is designed to operate only from a 110-125 volt a c, 60 cycle line source. Its circuit appears in Figure 2. Rated flash figures in watt-seconds are based on an input line

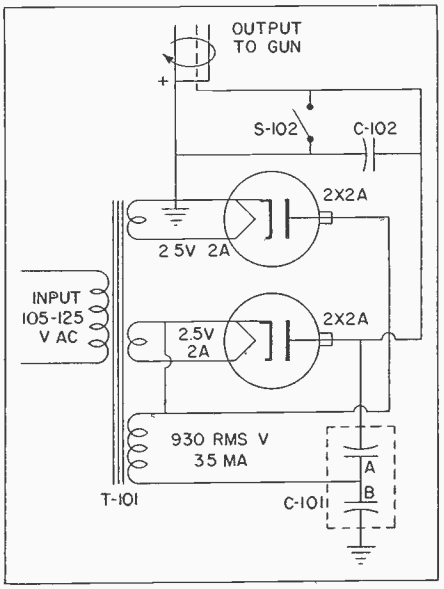


Figure 2. 110 volts a c power supply for the R-1140 photo flash.

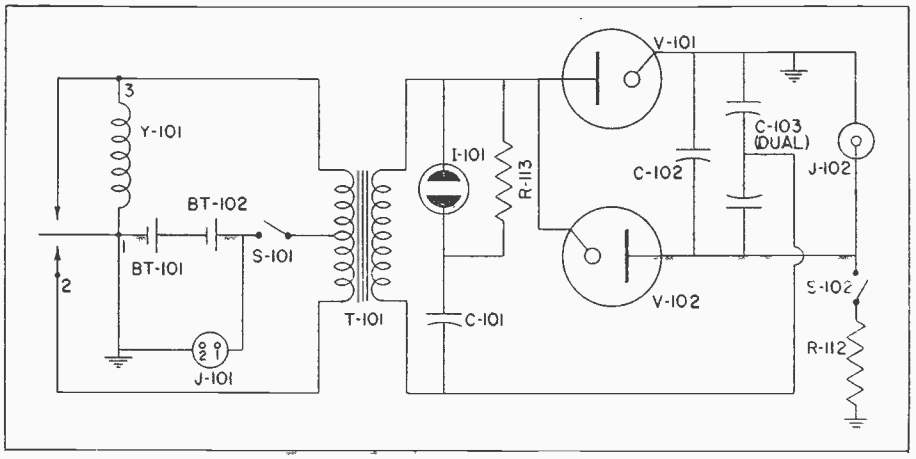


Figure 3. Battery operated power supply for the R-1142 photo flash.

voltage of 117 volts; but, providing the gun is in good condition, the line voltage can vary considerably in either direction before erratic flashing can be expected. The R-1140 power supply uses a conventional voltage doubling system consisting of a power transformer (T-101), a pair of Type 2X2A rectifier tubes, doubling capacitor (C-101) and storage capacitor (C-102). It operates as described in the third paragraph.

The R-1142 model, Figure 3, is designed for battery operation. It is a battery-vibrator type supply operating on a 4 volt system. Components making up this supply are: a pair of 2 volt wet cells (BT-101 and BT-102), vibrator (Y-101), power transformer (T-101), two Type CK-1013 or CK-1027 rectifier tubes, doubling capacitor (C-103) and storage capacitor (C-102). A resistor (R-112) is used to discharge the storage capacitor when the safety switch (S-102) is closed. The neon lamp (I-101) merely acts as a pilot lamp. Operation is similar to the R-1140 except for the power source.

To be continued next month with a discussion of servicing procedures for the Electroflash.

Service Hints

DUMONT MODEL RA112—Serial numbers below 123594.—Symptoms were static in the sound with video normal.

Sound channel tubes proved to be ok. The 1000 ohm resistor to the 2nd sound i f tube was overheating but the ceramic bypass capacitor was not shorted.

I replaced the Discriminator Transformer (DuMont Part No. 20004441) and the trouble was cured.

Later, examination of the old transformer showed that the mica sheets of the capacitor inside the transformer had broken down. The circuit was changed in later models to prevent this from occurring.—Vincent Cama, Brooklyn, New York.

WESTINGHOUSE MODEL H710T-2 Chassis 2217-5 — Picture three fourths normal size and width of picture changes with Horizontal Hold adjustment. The 6BQ6 Horizontal Amplifier Plate was slightly red. The d c voltages checked approximately correct and all sync pulses and horizontal drive were normal.

When checking the d c voltages on the 6BQ6 it was found that the plate load resistor R-438 (33K) was missing from the circuit. Replacing this resistor effects a complete cure. I had one more set with the same trouble.—J. Nolter, Mahanoy City, Penna.

SYLVANIA NEWS
MERCHANDISING SECTION
JULY AUGUST 1953 Vol. 20, No. 7

CLEAR EXPLANATIONS HELP SELL YOUR TV SERVICE

Radio and TV service dealers will sell their service better, keep their customers satisfied; if they take the trouble to explain just a part of their work. A recent situation involving Mrs. F. Laura Hunt of Westfield, New Jersey; Station Radio, a Westfield service business; and Sylvania's distributor tube sales department, Metropolitan New York district, clearly supports the argument for better dealer-customer relations.

On April 7 Mrs. Hunt wrote Sylvania's New York office as follows: "Having watched your *Beat The Clock* program almost weekly and remembering your commercials with interest, I looked in the yellow pages of my telephone book and found that Station Radio advertises the Sylvania service emblem and that it handles Sylvania tubes.

"Friday, I called the Station Radio serviceman and asked him to check my TV set which was not operating properly. I was told it would cost five dollars if I had no more than simple repairs involving no replacement parts. Saturday, the serviceman came, looked at the set and replaced four or five tubes (they were not Sylvania tubes). He said my set had further ailments (he thought the transformer was gone) and that he would have to take it to his shop. He estimated the complete service charge at 25 dollars.

"On Tuesday he called and said the entire repair job would cost me 40 dollars. After I hung up, I thought it curious that he had not explained the 15 dollars difference in charges. I telephoned Station Radio the following day, asked the serviceman to cancel my service order and to return my set. I was told that it would cost 15 dollars to return the set. Isn't that a dishonest way to treat me?

"Can you help me in this matter, and if you cannot, is there a Better Business Bureau near me that will listen to my story? You are always so fair in your decisions on *Beat The Clock* and Bud Collyer is such an upright man; that is the reason I have written you. If you have any suggestions, they will be appreciated by a woman 68 years old, living alone."

When Mrs. Hunt's letter arrived in Sylvania's New York Office, Harold Rainier, manager of distributor tube sales, replied saying that he would have his office "investigate the matter and see what could be done."

Later in the week Justin McCarthy, manager of distributor tube sales in the New York City area, got in touch with Station Radio and obtained the service dealer's side of the story, and discovered the basis of the misunderstanding between the dealer and his customer. After Mr. McCarthy had obtained a list of parts and labor charges from the dealer, he called Mrs. Hunt and told her that 10 tubes would have to be replaced in her set (all Sylvania, as the lady had requested), also a condenser and vertical blocking oscillating transformer. He then described the complexity of the required labor and it was clear why the charge would be 40 dollars. After this brief but detailed description, Mrs. Hunt was completely satisfied and glad to pay the charge Station Radio had set. But at the same time, she also asked: "Why didn't that serviceman tell me all this?"

There must be thousands of stories similar to this one. And every time you hear about such a situation, you realize that you can sell your service best by explaining to your customers what it has taken for you to do the job properly. Such a story also reminds service dealers who use Sylvania receiving and picture tubes just how much Sylvania's *Beat the Clock* show continually supports them throughout the year.

Televiewers remember this sign.

TWO VIEWPOINTS (*Continued from page 2*)

"There has always been a tendency in the Industry for a group, such as NATESA and others, to prejudge the other people in the business. NATESA's nine points of prerequisition do not make the yardstick of Industry success. No group has the right, constitutionally or morally of requiring compliance to a set of rules, deemed as desirable or utopian in its consideration.

"Set distributors, commercial credit agencies, and certainly Better Business Bureaus have neither right nor duty of censure, restriction, or investigation into the structure of an enterprise.

"If a business operation is legal, and responsible to its customers and suppliers, no one, at least in America, can dictate other requirements. If an individual wants to conduct his business from the basement of his home, or any other place for that matter, and if he satisfies customers, with honest service at profitable prices, and is a desirable account to his suppliers, that man must be accorded a position of honor and consideration by the Industry.

"Regulation and arbitrary control have no place, even in trade associations. The Industry itself must be supreme and should foster the association and use it as an instrument of positive industry promotion to the public. Every Service Dealer must be accepted as bona fide until, without question, his customers prove him otherwise. Only then should an Industry group discriminate against him, and the extent of the discrimination can only be disassociation of the questionable operator. This, of course, would have little weight in hampering the operation, unless, the association had so well sold its members to the public, that the disassociation would mean ruin. Should such be the case, very few dealers would chance ostracism by the association, and therein would be the restriction that would clean up the Industry.

"Why Service Associations do not point in this direction is a mystery. NATESA should be in an enviable position to bring this about, with a well planned, long-term campaign of consumer promotion, financed by its own members and member groups.

"And were it to go two steps further, and offer complete loyalty to legitimate suppliers only and train its personnel in the proper business fundamentals of cost, credit and profit; the Television Service Industry would assume its appointed place in the economy of the country.

Very truly yours,
Jack Rathsburg"

Mr. Moch replied, saying—

"Dear Mr. Rathsburg:

"Your recent letter to Mr. Luten has been referred to me. I am happy to see that there are different opinions on so vital a subject. It would certainly be a sorry indication of the thinking ability of people within our industry if all opinions were alike.

"Since you were national president of IRSM (of which I was a member), I am sure that you have a good insight into the problems of service. I am sure you will be the first to admit that the service industry has always been the step-child of the electronics industry as a whole. I am sure you will recall the days of 50c service and $18.00 a week salaries for good radio servicemen. And I am sure also that you will admit that because of the far greater problems of TV, both from a technical and consumer relations standpoint, the far greater investment necessary and the vastly greater management problems; TV service cannot be considered the same as radio service of the dim, distant past.

"NATESA or TISA-Illinois, of which I am also President, in no way attempts to be a dictator either in its own segment of the industry or the industry as a whole.

"I am sure also that if you were a part of this industry in the very early days of TV in 1946-47, you would recall that a very close control was exercised by the manufacturers and later the set distributors of all TV service agencies which bore approval. This control consisted of scrutiny of technical ability, shop facilities, data, man-power, financial position,

Sylvania Wins NATESA Award Second Year In Row

For the second year in a row Sylvania has received a NATESA Friends of Service Management Award for "outstanding service to service management in creating better customer relations."

Frank Moch (right), president of the National Alliance of Television and Electronic Service Associations, is shown above giving the award to Frank W. Mansfield, Sylvania's Director of Sales Research.

TWO VIEWPOINTS (*Continued from page 10*)

insurance coverage and continual training. At that time you will remember that because of this close control, the TV service industry was 'clean' and uncastigated. The NATESA Plan, incidentally, is simply a continuation of those fine principles which were espoused by the manufacturers and set distributors at that time and which at the present time are frowned upon by those who originally propagated these ideas. As long as the industry is plagued by intimations that service is not necessary, the public will refuse to accept service as an honest and ethical industry and profession. By the same token, the public will hesitate to pay legitimate fees which make for legitimate wages. This thinking immediately works into the hands of the 'gimmick' service companies who advertise cut-rate service and then really go to work on the customer. When a customer is stung, he then blames not himself, for being a sucker, but condemns the entire industry as a whole.

"Your statement that the set distributors would like to get out of the service business is not borne out by actual facts. This business has great possibilities for lucrative operations which many distributors certainly recognize. Since a very proper method of handling service originally existed, those distributors who as you say are rendering 2000 consumer calls per day are doing so only because they can make money as a result.

"Your suggestion that every operator must be accepted as bonafide until proved otherwise is not accepted by any other profession. Electrical contractors and electricians must prove their worth before they can ply their trade and business. This applies to the plumber, the doctor, the dentist, the barber, the beautician, the accountant, and an almost endless string of endeavors. The theory that a crook or incompetent should be permitted to go his merry way until he creates chaos and distrust which is reflected unfavorably upon his honest competitors is unthinkable. This is the basis of all the problems,

(*Continued on page 12*)

NEW SERVICE STICKER PRINTED ON MYSTIK TAPE NOW AVAILABLE

The newly designed Sylvania Service Sticker is an inexpensive calling card that will bring you big returns. Printed in yellow, red, and black, the sticker features the Sylvania radio-television service emblem, your imprinted store name, address, and phone number, a place for the date and the work done on the set you have serviced.

These clever stickers measure 3⅛ by 3 inches and are printed on handy Mystik tape. When you put a Sylvania Service Sticker on the back of a radio or television set, you simply peel off the paper backing and attach the sticker permanently by a few light rubs. It adheres to any smooth, dry surface.

The customer then remembers your business the next time that set or another in the house needs service. He will also probably recognize the Sylvania service emblem as the one he has seen advertised on Sylvania's weekly television show *Beat the Clock*. This gives you still another opportunity to tie into the advertising Sylvania uses to promote your business.

The new Sylvania Service Stickers are priced at $6.50 for 250 and $10 for 500. Order your supply today from your Sylvania Distributor or from the Advertising Distribution Dept., Sylvania Electric Products Inc., 1100 Main Street, Buffalo, N. Y.

Radio, Television Production Up Sharply First Quarter

Production of television receivers attained an annual rate of more than nine million sets in the first quarter of 1953, according to recently released RTMA statistics.

The output of radio receivers in the first three months of 1953 was at the yearly rate of more than 15 million sets, RTMA said.

First quarter production of TV sets at 2.3 million compared with 1.3 million sets in the same 1952 period. Output of radio receivers in the first three months of 1953 totaled 3.8 million as against 2.3 million sets manufactured in the corresponding 1952 period. TV production consequently has increased about 77 per cent and radio output about 65 per cent.

Production in March, a five-week period, showed 810,112 TV sets and 1,549,203 radios compared with 510,561 TV sets and 975,892 radios manufactured in the same 1952 month.

Radios with FM circuits manufactured in the first three months of this year totaled 50,701. In addition 23,771 TV receivers containing FM facilities were produced.

TWO VIEWPOINTS (*Continued from page 11*)

of the distrust and the low regard in which service is often held by the public. If these people were screened by being forced to prove their qualifications, we would not be cursed by an almost endless string of newspaper and magazine condemnations.

"I assure you I will do everything possible to further any idea which you may be able to propound which would solve the problems of the industry. As to your three points: (1) Training the service dealer in business principles, this is being done by various service associations, far more so than at any time during the radio days. (2) As regards loyalty, this is a very sad subject; for most legitimate service operators find too many suppliers selling at wholesale prices to retail customers. (3) The associations, through editorial material in newspapers, television coverage in public participation programs and lectures before various civic and social groups, are doing a tremendous job of consumer education. If the set manufacturers had in the past done the job which you attribute to them, the consumer relations problem would be very simple today. We do admit that a number of component manufacturers, such as Sylvania, GE, Sprague and a few others have been doing a job for us for a long time. For this we are grateful and we are sure it has not been without benefits of greater acceptance and more profit for these companies as well.

As a closing thought, let me say that the service industry is not fighting with itself but is trying hard to eliminate such malpractices which you mention as use of questionable materials and tubes, and the offering of services below cost with the consequent inability to fulfill responsibility. It is only by eliminating these problems that service can be elevated to its proper level. If this is prejudging as you argue against your own statements, then we are guilty; just as guilty as is the bar association, the medical association and the accountants association. If you have a better solution for the problem, let us hear some positive suggestions and we assure you we will be forever grateful.

Sincerely yours,

Frank J. Moch, *President*

N A T E S A"

Sylvania Launches ETA Lectures

The first of a series of 1953 lectures for radio and television servicemen and dealers, co-sponsored by Sylvania Electric Products and the Electronic Technicians Association was recently held in the Veterans Memorial Building, Highland Park, Mich. Despite unfavorable weather conditions, more than 900 persons attended.

Ralph L. Carew, Chairman of the ETA extended welcome to members and guests. He discussed the progress of the association and the established code of ethics for members.

Emery H. Lee, FCC, delivered an interesting talk on TVI filtering.

Andrew Ferguson, Sprague Products, offered many suggestions regarding capacitors.

Bruce E. McEvoy, Sylvania District Sales Manager, introduced William Anderson, Sylvania's Field Engineer, who discussed UHF—servicing and test equipment, antennas and reception. He felt confident the average serviceman would be able to work into UHF without much difficulty. He supplemented his remarks by using a projector and slides for a clearer understanding.

In This Issue

SYLVANIA NEWS

SYLVANIA ELECTRIC PRODUCTS INC.
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VOL. 20 NO. 7 JULY-AUGUST 1953

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SYLVANIA ELECTRIC PRODUCTS INC.
MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

SYLVANIA NEWS

SEPTEMBER 1953

C. J. Luten, editor

Vol. 20, No. 8

SYLVANIA T-N-T (TUBE-N-TOOL) CHEST HOLDS MORE, SAVES YOU MONEY ON RECALLS

The Sylvania T-N-T (Tube-N-Tool) Chest is the greatest business aid ever offered the TV Service Industry and the best investment a service dealer can make. It is practically a complete shop—portable.

With the T-N-T Chest you can forget about *recalls*—the thing that costs you more money than any other one item during a year.

This chest—a big 20 inches long, 9 inches wide, 15 inches deep—holds more tubes than any other one ever offered—187. It also holds a large folding aluminum tool kit that has enough space to accommodate your soldering gun, a complete set of tools, all necessary parts—everything needed for a home TV service call.

The spacious Sylvania T-N-T Chest also has a place for your mirror and your ohm meter.

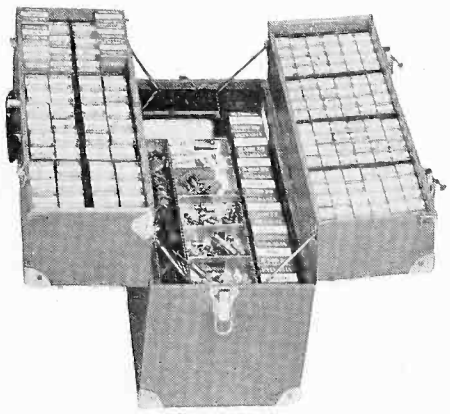
And this Chest is made to last! It is made of fir and bass woods for light weight and study construction. It has dovetailed corners for extra strength and long life. It is not covered with paper—but with genuine DuPont Fabrikoid in a natural grain pigskin color. It is washable, waterproof and mildew-proof. It wipes clean with a damp cloth. The chest weighs 39 pounds completely full and when empty is six pounds lighter than any other comparable caddy on the market.

The hardware on this chest is of the highest quality metal. The hinges are made of case-hardened brass plated steel. Four additional stoppers are used to securely support the case when it is open and to close the case easily. Eight brass plated steel corners provide permanent protection against scuffing and bumping. Four brass studs protect the bottom of the case from nicking or scratching. Four sturdy brass plated steel catch fasteners keep the chest tightly closed. Four brass plated steel angle clamps protect and reinforce the chest's dovetailed construction. All hardware is brass plated to prevent rusting.

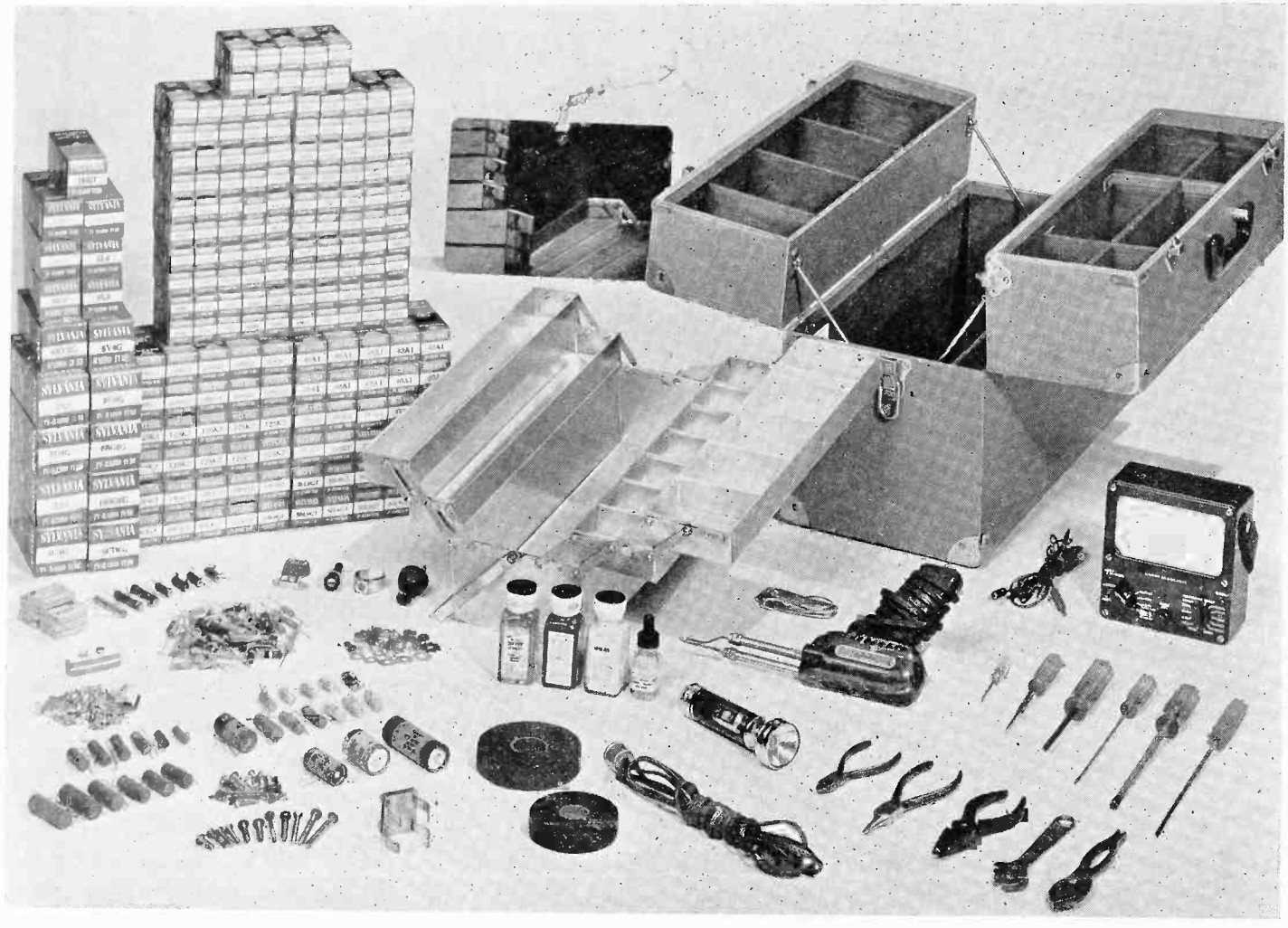
The T-N-T Chest's unbreakable Polystyrene handle, which passed a 500 pound test weight, is attached by screws and reinforced by metal strip to give support and security. In addition the handle is placed slightly off center so that the kit slants slightly away when you carry it. It is so designed that, when closed, rain cannot get into it.

The Sylvania T-N-T Chest is a $24.95 dealer net priced item. You can obtain yours from your local Sylvania distributor for only five dollars and 30 Sylvania premium tokens. Remember, you get one token for every 25 Sylvania receiving tubes or every Sylvania picture tube you purchase.

Never before has a service dealer had an opportunity to make such a sound business investment for so little money. Save on recalls! Start collecting Sylvania Premium Tokens today! You'll want to see your Sylvania Distributor as soon as possible about your T-N-T Chest. You'll find it saves you more money than any other single business aid you've ever used.



Here's the Sylvania T-N-T Chest all filled up. At the top of page 3, look at how much the T-N-T Chest holds.



Sylvania Warehouse in Ipswich, Massachusetts

Sylvania's warehouse in Ipswich, Massachusetts now stocks a full line of Sylvania receiving tubes and test equipment as well as the television picture tubes, electronic devices, and lighting and photoflash products it previously handled. The warehouse is another concrete example of Sylvania's desire to give maximum service to all its customers who handle its products.

The Ipswich plant contains 21,000 square feet and holds enough receiving and television picture tubes to take care of all of Sylvania's distributors in Maine, Massachusetts, New Hampshire, Vermont, and Rhode Island.

The Ipswich warehouse has been shipping television picture tubes since October of last year to this same territory. Customers regularly receive shipments within 8 to 48 hours after the order is received. This same excellent service will be maintained on all the items which have recently been added to the Ipswich territory.

Fred Smith, Sylvania Manager of Factory Services; Henri Jappe, Partner, A. W. Mayer Company, Boston; Harland Durkee, Ipswich Warehouse Factory Manager; Jack Kelly, Sylvania Manager of Community Relations; Joseph R. Coupal, Jr., Ipswich Town Manager; Sylvanians Dick Beynon, Manager of Tube Distribution and Sam McDonald, Northeastern Renewal Tube Sales Manager, are shown (left to right) in front of the truck which brought the first Sylvania receiving tubes and test equipment to the Ipswich warehouse.

Lofgren, Fordham Staunch Sylvania TV Tube Truckload Club Members

Here's a parts jobber really equipped to give his customers the right picture tube when they need it. Lofgren Distributing Co. of Moline, Ill. recently purchased three king-size truck loads of Sylvania TV Picture Tubes. This company knows that Sylvania Picture Tubes will best protect its customers' reputation for good service and sound business practices, and save them money on callbacks.

Shown in the top photo (left to right): Harry Fryxell, Lofgren buyer; Sylvanian E. J. Haase; Joe Kehoe, owner of Lofgren Distributing Co.; and D. E. Smith and Bud Mayberry of Sylvania.

Another new, aggressive member of the Sylvania Truckload of Picture Tubes Club is Fordham Radio Supply Co., New York City. The bottom picture documents a gala occasion. In addition to the Fordham personnel and Sylvanians, several Fordham customers made it a point to be on hand when the shipment of Sylvania Picture Tubes arrived.

Here are some of the people who were in attendance (left to right): Sylvanian Ted Swenson; Bob Powell, Fordham owner, with young Bruce Powell; Dave Emmett and George Sheehy of Sylvania; Dan Doyle and Dave Grossman of Concourse Radio Corp., Bronx, N. Y.; Fred Dagavar, Dagavar & Dagavar Auto Radio, also of the Bronx; Mannie of Mannie's Radio & TV, Bronx; Sylvanian Sol Avick, and Howard Claman of Dagavar.

RECORD TV SET OUTPUT

Television set production for the first five months of this year topped all the previous January to May periods on record, the Radio-Television Manufacturers' Association recently announced. Radio output for the period was more than 1,600,000 receivers above the same five months of 1952.

During the first 21 weeks of this year, 3,309,757 TV sets and 6,102,711 radios were manufactured, according to the RTMA report. In 1952, a total of 1,957,083 TV receivers and 4,469,432 radios were produced in the same period.

The May television output was estimated at 481,936 sets by the association, only 4,064 units under the record for the month of 486,000 established in May, 1950. Radio production for May was 1,108,991 sets, as compared with 843,569 units manufactured during the same 1952 month.

Radios with FM circuits manufactured during May totaled 41,275 units. An additional 276 television sets with FM facilities also were produced.

The May radio production report revealed the production of 278,156 home sets, 129,391 clock radios, 204,065 portables and 497,379 auto radios.

Sylvania Service Meetings Move Eastward

Radio and Television Servicemen in the Eastern and Midwestern States will want to watch for the Sylvania Caravan as it moves eastward toward the conclusion of its transcontinental tour. Widely acclaimed throughout the country, it brings you helpful lectures and demonstrations on TV servicing and on the use of test equipment.

These meetings, sponsored by your Sylvania Distributor, are scheduled in the Ohio, Indiana and Michigan territory from Sept. 9-16. Thereafter, it's New York, Pennsylvania, and West Virginia area from September 30 to October 7; and the Northeastern territory from October 21-28.

SYLVANIA NEWS

TECHNICAL SECTION

SEPTEMBER 1953 Vol. 20, No. 8

William O. Hamlin, Technical Editor

SERVICING THE ELECTROFLASH

PART II (WABASH MODELS R-1140 AND R-1142)

By J. H. MINTZER, Supervisor of Factory Service Stations

When servicing electroflash units, the first thing to be determined is the location of the source of the trouble. In most cases, you can assume that if the "keep alive glow" is visible in the Sylvania Type OA5 trigger tube, the power supply is operating normally. The OA5 tube can be seen by unscrewing the bottom end cover on the base of the gun on Wabash models. The "keep alive glow" appears as a small lighted violet spot at the base of the tube elements. If the glow is not visible, it could, of course, be a gun defect such as a defective OA5 or an open resistor R-111, in Figure 2 (1)*; but, as stated previously, the chances are that it is power supply trouble. Therefore, checking the power supply should be the next logical step. The power supply should be removed from the cabinet to be sure that the storage capacitor is discharged before any attempt is made to measure voltages. The case should never be removed from the gun before it is detached from the power supply.

To remove the Wabash R-1140 model from its cabinet, first remove the two chassis mounting screws located on the bottom of the cabinet. The power supply can then be lifted out. If the storage capacitor is in a charged condition, a loud pistol-like report will be heard as the safety switch shorts out the terminals of the capacitor. If this report is not heard, proceed with extreme caution as the shorting switch spring may have been bent in a previous repair and is not making contact. Lay the supply on its side and, with a piece of good insulating material about a foot long, close the shorting switch contact. It is located directly over the ungrounded terminal of the storage capacitor. Before making any measurements, be sure that this switch is closed and in proper working condition. These capacitors can build up a residual charge even though no voltage is being applied. They have been known to lay on a shelf for months and then surprise a careless handler with a "teeth shaking jolt." It is a good idea to short the terminals out when storing them.

After all precautions have been taken with the capacitor, a voltage reading should be taken of the output. The meter should be switched to its high range and connected to the circuit before the supply is turned on, bearing in mind that all Wabash electroflash equipment use a positive ground. Before turning the power supply on, set it in an upright position so as to disengage the shorting switch contact. The voltage reading obtained should be approximately 2350 volts, in Figure 2 (2), at a normal line voltage of 117 volts a c input in units using either Sylvania Type R-4330 or R-4340. Should the output reading obtained be much less than this figure, normal power supply service procedure can be used in checking out the components.

The Wabash R-1142 power supply is a battery-vibrator type which may be removed from its cabinet in the following manner. First, remove the four screws located on the top and carefully lift the top cover off. The safety switch on this model is held open by means of a small bakelite rod seated against this top cover. If care is not used, the rod can be broken or fly out and become lost due to the tension exerted on it by the safety switch spring. Be sure that the switch is closed. Use a piece of insulated material and push the contacts together if necessary. The two cabinet ends can be removed by inserting a knife under the heads of the casing rivets and prying them out. Four Phillips head countersunk screws hold the chassis to the main body of the cabinet. Servicing this supply is the same as the R-1140 previously mentioned, except that the battery and vibrator should be checked.

Should the power supply prove to be in normal working condition, the next step is testing the gun. Figure 1 shows front and back internal views of the two Wabash gun models. Again, a word of caution: always disconnect the gun from the power

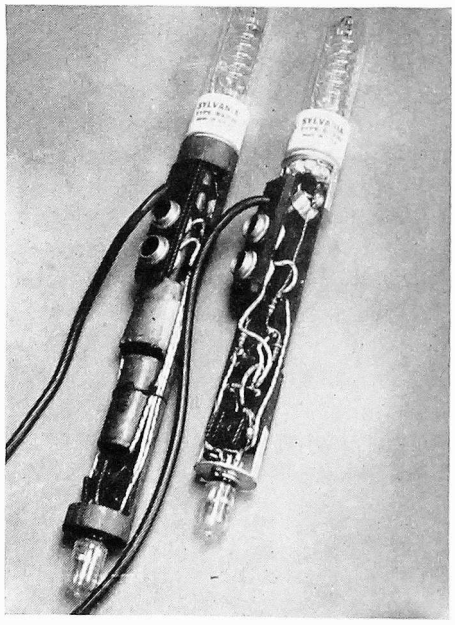


Figure 1. Two types of photo flash guns using SYLVANIA tubes. The SYLVANIA Type OA5 trigger tube can be seen on the lower end.

*Numbers in parentheses refer to circled numbers on the drawing indicating various trouble points.

SERVICING ELECTROFLASH PART II

(*Continued From Page 5*)

supply before removing the case and attempting measurements. Safety is the primary consideration, although erroneous resistance readings would result were it not disconnected. The gun can be removed from its case in the following manner. Remove the flash tube and reflector. In the Wabash models, the reflector mounting bracket is held in place by two No. 4 self-tapping screws; the retaining band and tube clamp encircling the top of the gun are held in place by one No. 4 machine screw. Insert the forefinger under the flash tube socket and pull; at the same time, grasp the gun with the other hand and push the bakelite connector strip upward with the thumb. There is danger of breaking wires if this procedure is not followed.

The first check should be a resistance reading of the voltage divider network made up of resistors R-101 to R-108 in Figure 2 (3). This can best be done by measuring between pins 3 and 5 of the flash tube socket or between pin 5 and the exposed shield of the high voltage cable. The reading obtained should be approximately 10.8 megohms, plus or minus five per cent. If the variation exceeds five per cent, check each resistor in the divider individually and replace if necessary. Special attention should be given to the value of R-101 to see that it is within its five per cent tolerance; intermittent operation may result if it is not. The unit will flash automatically without being triggered or will not flash at all, depending on whether R-101 is excessively above or below its specified tolerance. Should the divider resistors check okay, a check should then be made of the values of the trigger tube supply resistors, R-109, R-110 and R-111. Again, if any exceed their tolerance they should be replaced.

This is probably the best time to explain why new batteries are installed in portable units when, in many cases, it is not the batteries that are at fault. All conditions in the gun being normal, a total of about 180 flashes can be expected out of a set of fully charged batteries in good condition. This figure is based on factory tests, flashing the unit every consecutive 20 seconds. However, flashing at longer intervals will reduce the number of available flashes proportionately. Certain conditions in the gun will alter those figures. A gun in good electrical condition will fire at a minimum voltage of 1750 volts. If the trigger supply voltages were not correct or the oscillatory trigger capacitors had over the nominal amount of leakage, the minimum flashing voltage would increase. Therefore, even if the batteries were in a fully charged condition, fewer flashes would be obtained, sometimes reducing to almost one-half the normal number. One of the most common causes of this reduced flashing voltage range is the condition of the capacitors C-104 and C-105 in Figure 2 (4). If a capacitance tester is not available, we suggest the replacement of these capacitors rather than relying on the familiar ohmmeter "kick" test. Ordinarily not much trouble should be encountered with the triggering transformer (T-102). Excessive moisture will affect its operation; therefore, the rubber weather-proofing band should always be replaced around the top of the gun and flash tube. The primary of the trigger transformer will measure practically a short circuit on most ohmmeters. The secondary will measure about 20 ohms and will occasionally open up, but these cases are rare.

Ordinary tube failures can be just as troublesome in this type of unit as well as in radio and tv servicing. The R-4330 and OA5 characteristics can result in delayed or advanced firing time due to a change in ionization voltage requirements resulting from any of the common defects to which all tubes are subject. For instance, the complaint could be intermittent or erratic firing. If the supply voltages build up to a peak maximum over a long charging time, the flash tube will fire. After once being fired and heated, it will continue firing at 200 or 300 volts less with normal triggering voltages. The serviceman should bear in mind that consecutive firing of the equipment in this manner can give a false impression that the equipment is operating properly. A professional photographer, however, may need the flash in fifteen seconds after turning the unit on, which is insufficient time for the peak voltage build-up necessary to fire the faulty gun. A normally working gun should fire within 15 seconds of "power on"; if it does not, the customer's complaint of erratic firing is probably justified.

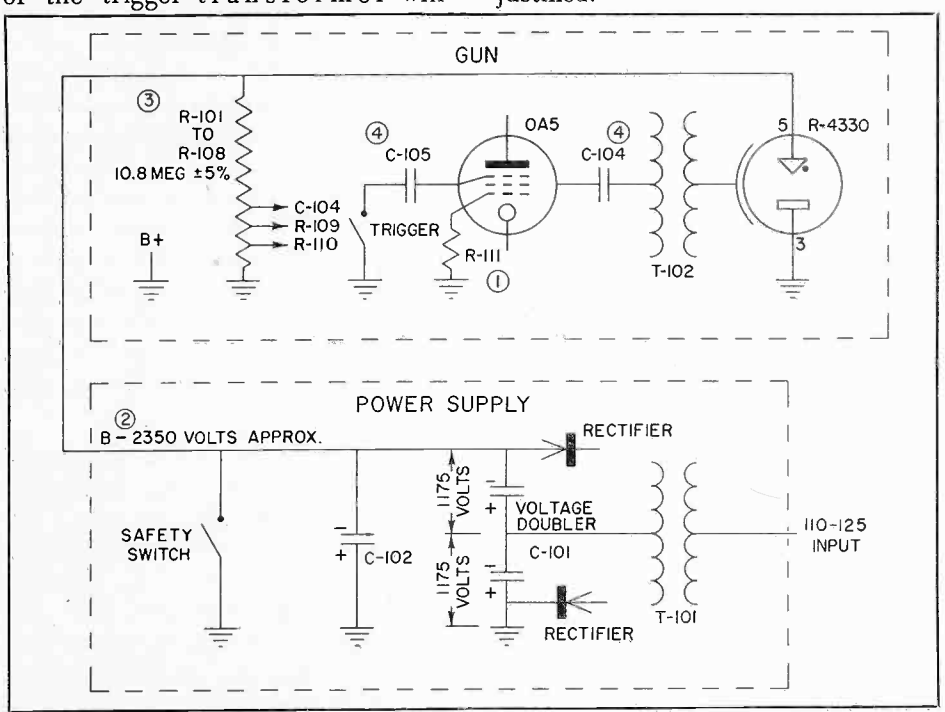


Figure 2. A partial single line schematic of a photoflash unit to aid in trouble shooting. Circled numbers indicate trouble points mentioned in the article.

807 (cont'd)
807W

TYPICAL OPERATION

Class AB_1 A F Power Amplifier and Modulator

(2 tubes triode connected)	CCS[1]	ICAS[2]
DC Plate Voltage	400	400 Volts
DC Grid 1 Voltage[3]	−45	−45 Volts
Peak A F Grid 1 to Grid 1 Voltage[4]	90	90 Volts
Zero Signal DC Plate Current	60	60 Ma
Maximum Signal DC Plate Current	140	140 Ma
Effective Load Resistance (Plate to Plate)	3000	3000 Ohms
Maximum Signal Driving Power (approx.)	0	0 Watts
Total Harmonic Distortion	3	3 Percent
Maximum Signal Power Output (approx.)	15	15 Watts

Class AB_2 A F Power Amplifier and Modulator (values are for two tubes)

DC Plate Voltage	400	500	600	750 Volts
DC Grid 2 Voltage[5]	300	300	300	300 Volts
DC Grid 1 Voltage (Fixed Bias)	−25	−29	−30	−32 Volts
Peak Grid to Grid Signal Voltage	78	86	78	92 Volts
Plate Current (Zero Signal)	90	72	60	52 Ma
Plate Current (Max. Signal)	240	240	200	240 Ma
Grid 2 Current (Zero Signal)	5	5	5	5 Ma
Grid 2 Current (Max. Signal)	10	10	10	10 Ma
Load Resistance (Plate to Plate)	3200	4240	6400	6950 Ohms
Driving Power (approx.) Max. Signal[6]	0.2	0.2	0.1	0.2 Watts
Power Output (approx.)[7]	55	75	80	120 Watts

Class C Unmodulated R F Power Amplifier or Oscillator (single tube)

DC Plate Voltage	400	500	600	750 Volts
Grid 2 Voltage[5]	250	250	250	250 Volts
Grid 2 Dropping Resistor	20,000	42,000	50,000	85,000 Ohms
Grid 1 Voltage[8]	−45	−45	−45	−45 Volts
Peak Signal Voltage	65	65	65	65 Volts
Plate Current	100	100	100	100 Ma
Grid 2 Current	7.5	6.0	7.0	6.0 Ma
Grid 1 Current (approx.)	3.5	3.5	3.5	3.5 Ma
Driving Power (approx.)	0.2	0.2	0.2	0.2 Watts
Power Output (approx.)	25	30	40	50 Watts

NOTES:

1. CCS—Continuous Commercial Service.
2. ICAS—Intermittent Commercial and Amateur Service.
3. The dc grid 1 circuit resistance should be limited to 100,000 ohms with fixed bias or 500,000 ohms with cathode bias.
4. The driver stage should be capable of supplying the No. 1 grids of the class AB_1 stage with the specified driving voltage at low distortion.
5. May be obtained from a separate well regulated source or from the plate supply voltage if a voltage divider is used.
6. The effective grid circuit resistance should not exceed 500 ohms per grid, or the impedance 700 ohms.
7. Distortion in practical circuits should not exceed 5%, 5% and 3% respectively, under CCS conditions.
8. Bias may be provided by use of 12,800 ohm grid leak, 410 ohm cathode resistor, fixed separate source or a combination of these. The grid circuit resistance should not exceed 25,000 ohms.

SYLVANIA RADIO TUBES

† Laboratory experiments have indicated that transistors designed with 200 watt ratings are possible.

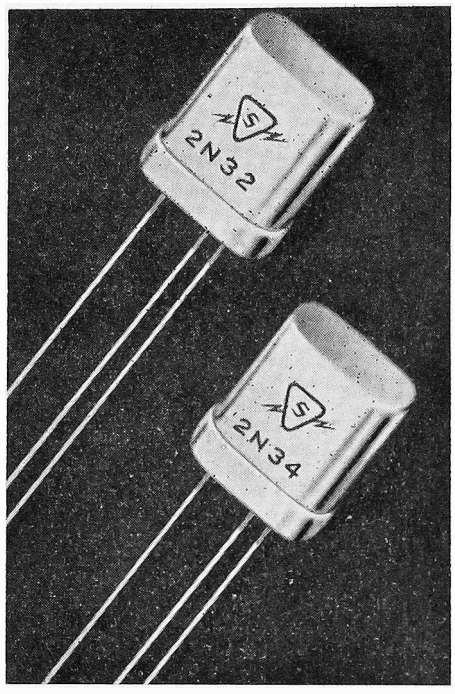


Figure 1. Two hermetically sealed SYLVANIA triode transistors.

familiar with vacuum tube circuitry. However, a comparison between the familiar tube and the unfamiliar transistor may aid in understanding the characteristics of the new device. (See Table I).

Figure 2 shows a cross-sectional diagram and proper biasing polarities for the four types of transistors that have been developed. It can be seen that the polarities of the supplies for the N-P-N junction and the P type point-contact transistors are similar to those used for vacuum tubes.

For the purpose of illustrating their functions, an analogy can be made between the vacuum tube grid to the transistor base, cathode to the emitter and plate to the collector. But, due to the different approach in transistor theory, such an analogy may result in erroneous conclusions. Therefore, caution must be exercised in this comparison.

They are similar to the triode vacuum tube in the number of its elements and can be connected in various configurations such as a grounded emitter amplifier with base input, grounded base amplifier with emitter input, or a grounded collector amplifier with base input.

The points which are usually confusing to the serviceman, when first

(*Continued on page 8*)

SERVICING ELECTROFLASH PART II

(*Continued From Page 5*)

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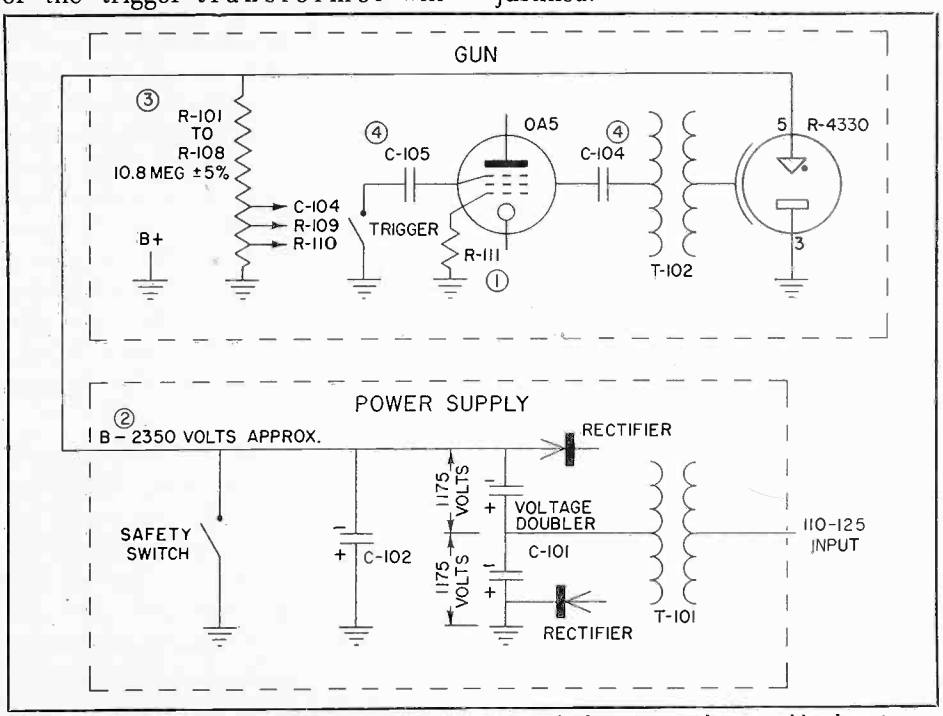

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Zero Signal DC Plate Current	60	60 Ma
Maximum Signal DC Plate Current	140	140 Ma
Effective Load Resistance (Plate to Plate)	3000	3000 Ohms
Maximum Signal Driving Power (approx.)	0	0 Watts
Total Harmonic Distortion	3	3 Percent
Maximum Signal Power Output (approx.)	15	15 Watts

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DC Plate Voltage	400	500	600	750 Volts
DC Grid 2 Voltage[5]	300	300	300	300 Volts
DC Grid 1 Voltage (Fixed Bias)	−25	−29	−30	−32 Volts
Peak Grid to Grid Signal Voltage	78	86	78	92 Volts
Plate Current (Zero Signal)	90	72	60	52 Ma
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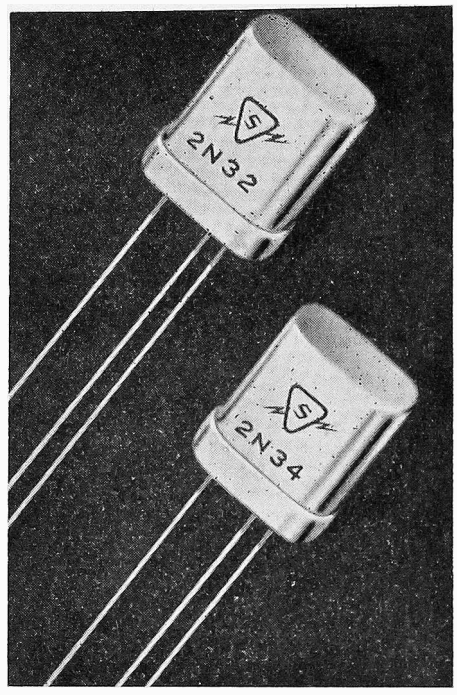

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Figure 2 shows a cross-sectional diagram and proper biasing polarities for the four types of transistors that have been developed. It can be seen that the polarities of the supplies for the N-P-N junction and the P type point-contact transistors are similar to those used for vacuum tubes.

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The points which are usually confusing to the serviceman, when first

(*Continued on page 8*)

SERVICING ELECTROFLASH PART II

(*Continued From Page 5*)

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The first check should be a resistance reading of the voltage divider network made up of resistors R-101 to R-108 in Figure 2 (3). This can best be done by measuring between pins 3 and 5 of the flash tube socket or between pin 5 and the exposed shield of the high voltage cable. The reading obtained should be approximately 10.8 megohms, plus or minus five per cent. If the variation exceeds five per cent, check each resistor in the divider individually and replace if necessary. Special attention should be given to the value of R-101 to see that it is within its five per cent tolerance; intermittent operation may result if it is not. The unit will flash automatically without being triggered or will not flash at all, depending on whether R-101 is excessively above or below its specified tolerance. Should the divider resistors check okay, a check should then be made of the values of the trigger tube supply resistors, R-109, R-110 and R-111. Again, if any exceed their tolerance they should be replaced.

This is probably the best time to explain why new batteries are installed in portable units when, in many cases, it is not the batteries that are at fault. All conditions in the gun being normal, a total of about 180 flashes can be expected out of a set of fully charged batteries in good condition. This figure is based on factory tests, flashing the unit every consecutive 20 seconds. However, flashing at longer intervals will reduce the number of available flashes proportionately. Certain conditions in the gun will alter those figures. A gun in good electrical condition will fire at a minimum voltage of 1750 volts. If the trigger supply voltages were not correct or the oscillatory trigger capacitors had over the nominal amount of leakage, the minimum flashing voltage would increase. Therefore, even if the batteries were in a fully charged condition, fewer flashes would be obtained, sometimes reducing to almost one-half the normal number. One of the most common causes of this reduced flashing voltage range is the condition of the capacitors C-104 and C-105 in Figure 2 (4). If a capacitance tester is not available, we suggest the replacement of these capacitors rather than relying on the familiar ohmmeter "kick" test. Ordinarily not much trouble should be encountered with the triggering transformer (T-102). Excessive moisture will affect its operation; therefore, the rubber weather-proofing band should always be replaced around the top of the gun and flash tube. The primary of the trigger transformer will measure practically a short circuit on most ohmmeters. The secondary will measure about 20 ohms and will occasionally open up, but these cases are rare.

Ordinary tube failures can be just as troublesome in this type of unit as well as in radio and tv servicing. The R-4330 and OA5 characteristics can result in delayed or advanced firing time due to a change in ionization voltage requirements resulting from any of the common defects to which all tubes are subject. For instance, the complaint could be intermittent or erratic firing. If the supply voltages build up to a peak maximum over a long charging time, the flash tube will fire. After once being fired and heated, it will continue firing at 200 or 300 volts less with normal triggering voltages. The serviceman should bear in mind that consecutive firing of the equipment in this manner can give a false impression that the equipment is operating properly. A professional photographer, however, may need the flash in fifteen seconds after turning the unit on, which is insufficient time for the peak voltage build-up necessary to fire the faulty gun. A normally working gun should fire within 15 seconds of "power on"; if it does not, the customer's complaint of erratic firing is probably justified.

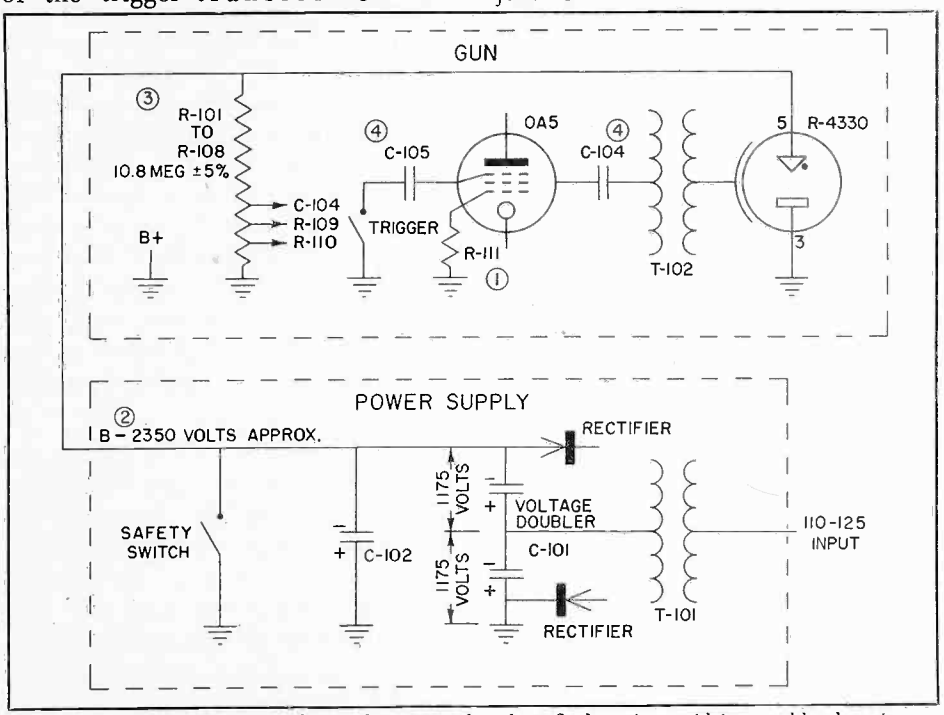

Figure 2. A partial single line schematic of a photoflash unit to aid in trouble shooting. Circled numbers indicate trouble points mentioned in the article.

TECH TOPICS

TRANSISTORS

BY W. O. HAMLIN

The transistor is a semi-conductor* amplifying device which came to the public's attention five years ago when it was announced that operative units had been constructed.

Since then, considerable progress has been made in the methods of constructing transistors; so that today, the experimental laboratory model is emerging commercially. Investigations and experiments continue in the semi-conductor field so that large quantities will be available for general use by the public.

The transistor has several features which are a definite advantage over vacuum tubes in certain types of electronic equipment and devices. They are small in size—the average unit being from ½" to 1" high; power requirements are low—many transistor circuits have been designed to run from ordinary flashlight cells; their life is extremely long—predicted to be 70,000 to 100,000 hours; and a reduction in size and number of associated circuit components is usually possible.

In this early stage of transistor development, there are numerous problems concerning their manufacture and application of them. One of the subjects of investigation, which engineers expect to solve shortly, is production methods that will make transistors with uniform and dependable electrical characteristics equaling the quality that has been achieved over the years in vacuum tubes.

Transistor circuits are different than those for vacuum tubes. Current flow, circuit voltage polarities, input impedance, and output impedance seem odd when first viewed by one familiar with vacuum tube circuitry. However, a comparison between the familiar tube and the unfamiliar transistor may aid in understanding the characteristics of the new device. (See Table I).

*A semi-conductor is material having a conductivity lower than metals, but higher than that of insulators.

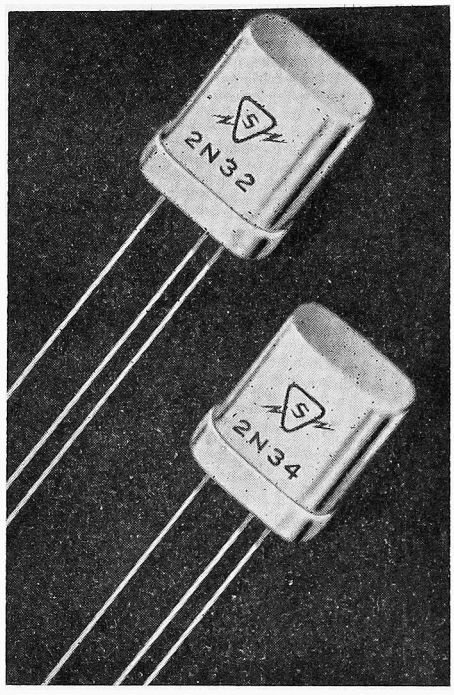

Figure 1. Two hermetically sealed SYLVANIA triode transistors.

Figure 2 shows a cross-sectional diagram and proper biasing polarities for the four types of transistors that have been developed. It can be seen that the polarities of the supplies for the N-P-N junction and the P type point-contact transistors are similar to those used for vacuum tubes.

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The points which are usually confusing to the serviceman, when first

(Continued on page 8)

TABLE I

COMPARISON OF TRANSISTORS AND VACUUM TUBES

Criteria	Transistors	Tube
Gain/Stage	0–40 db	0–40 db
Noise Figure at 1000 c p s, BW = 1 c p s	10–50 db	0–30 db
Freq. Limit as an Amplifier	0–30 mc	0–60 k mc
Freq. Limit as an Oscillator	300 mc	0–60 k mc
Output Power (Po)	0–200 mw †	0–kilowatts
Class A Efficiency	Point Contact 35% Junction 35–49%	35%
Class B Efficiency	>80%	79%
Class C Efficiency	99%	85%
Oscillator Efficiency	>70%	60–70%
Total Power Required	Point Contact 4–50 mw Junction 1–100 μw	50 mw to 2 w
Physical Volume	0.0005–0.02 in.³	0.125–1.0 in.³
Temperature Limitations	−60°c to 80°c	−60°c to 200°c
Shock Limitations	20,000 to 30,000 G	750 G
Life	>70,000 hours	0-5,000 hours

† Laboratory experiments have indicated that transistors designed with 200 watt ratings are possible.

SERVICING ELECTROFLASH PART II

(*Continued From Page 5*)

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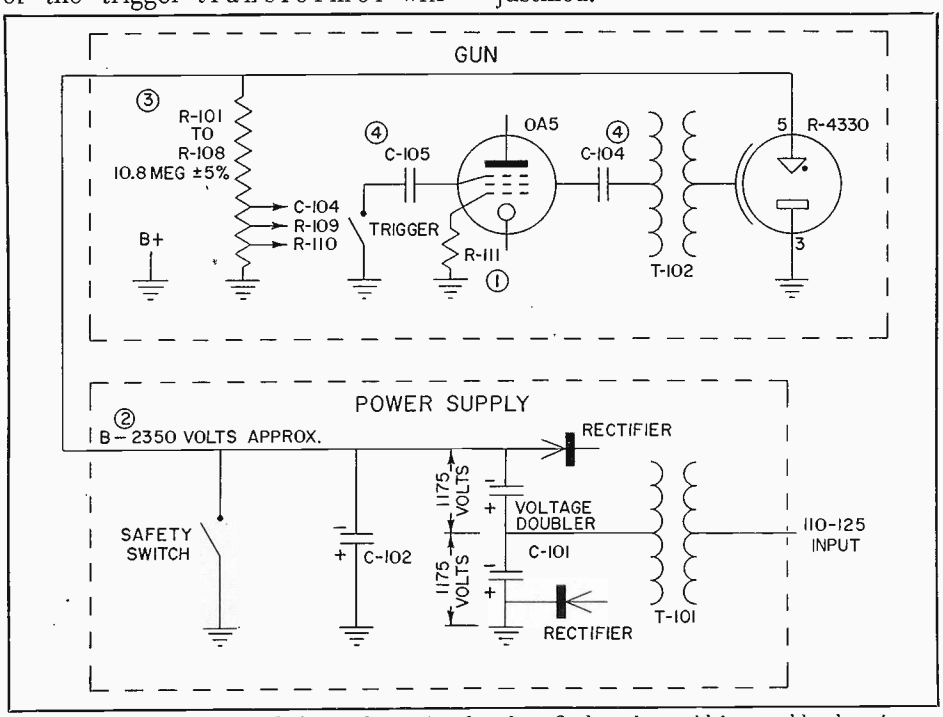
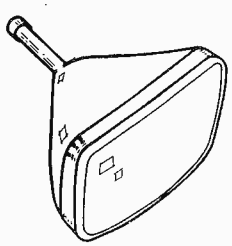


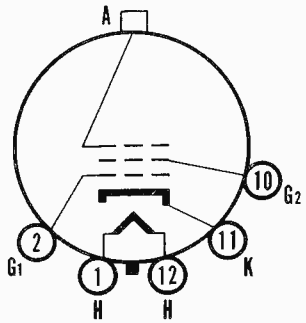
Figure 2. A partial single line schematic of a photoflash unit to aid in trouble shooting. Circled numbers indicate trouble points mentioned in the article.

Sylvania Type 21ZP4
21ZP4A

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Rectangular Glass Type
Single Field Ion Trap — Magnetic Focus





12-D

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	75 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	19⅛ x 14⅜ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12D

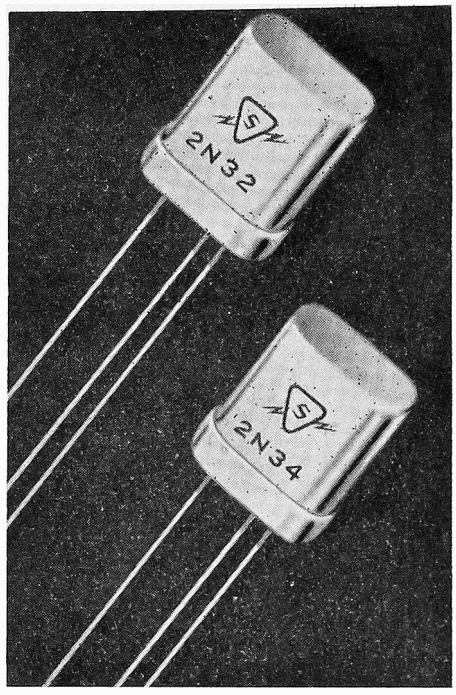
RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-Up Period Not to Exceed 15 Secs...	410 Volts d c
After Equipment Warm-Up Period	180 Volts d c
Heater Positive with Respect to Cathode	180 Volts d c

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in Sylvania News for September 1953



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The points which are usually confusing to the serviceman, when first

(*Continued on page 8*)

TECH TOPICS

(*Continued From Page 7*)

encountering transistor circuits are:

1. the conflict in voltage polarity between conventional vacuum tube circuitry and P-N-P junction and N type point-contact transistor circuitry.
2. the change in biases from constant voltage to constant current sources.

The transistor is biased from a constant current source in order to insure a stable operating point. It is obtained by making the source impedance large in comparison with the load impedance. One way of doing this, is to place a large resistance in series with a voltage source so that the effective source impedance is at least ten times greater than the load impedance.

As shown in Figure 2C and 2D, the point-contact transistor employs two pointed wire contacts which are similar to the rectifying contacts in crystal diodes and the *cat-whisker* in the old-time galena crystal radios. The junction type of transistor of Figure 2A and 2B depends upon the barrier formed by the junction of two dissimilar types of germanium (N type and P type). N type of germanium has an excess of available electrons (negative charges), while the P type has a deficiency of electrons (holes or positive charges). The amplifying nature of a transistor depends upon the emitter terminal introducing minority carriers (holes for N type of germanium and electrons for P type germanium) into the semi-conductor material.

Typical characteristics for the Sylvania Type 2N32 point contact transistor and the Sylvania Type 2N34 P-N-P junction transistor are given in Table II. These new hermetically sealed transistors are pictured in Figure 1.

The majority of the transistors now commercially available are of the junction type. The junction transistor, because of its low noise figure (10 db), will generally be used for small signal linear applications. The point-contact transistor, because of its negative resistance characteristics, will find wide applications in non-linear circuits, such as computer and switching applications.

TABLE II

Typical Values	2N32 Grounded Base Amplifier	2N34 Grounded Emitter Amplifier
Input Impedance	300 ohms	600 ohms
Output Impedance	20,000 ohms	60,000 ohms
Emitter Bias Current	0.5 MA	1 MA
Collector Voltage	−25 volts	−6 volts
Operating Power Gain	21 db*	40 db†

*Measured with a collector load resistance of 10 k ohms, and a generator impedance of 500 ohms, and a signal frequency of 270 c p s.
†Measured with a collector load resistance of 30 k ohms, a generator impedance of 500 ohms, and a signal frequency of 270 c p s.

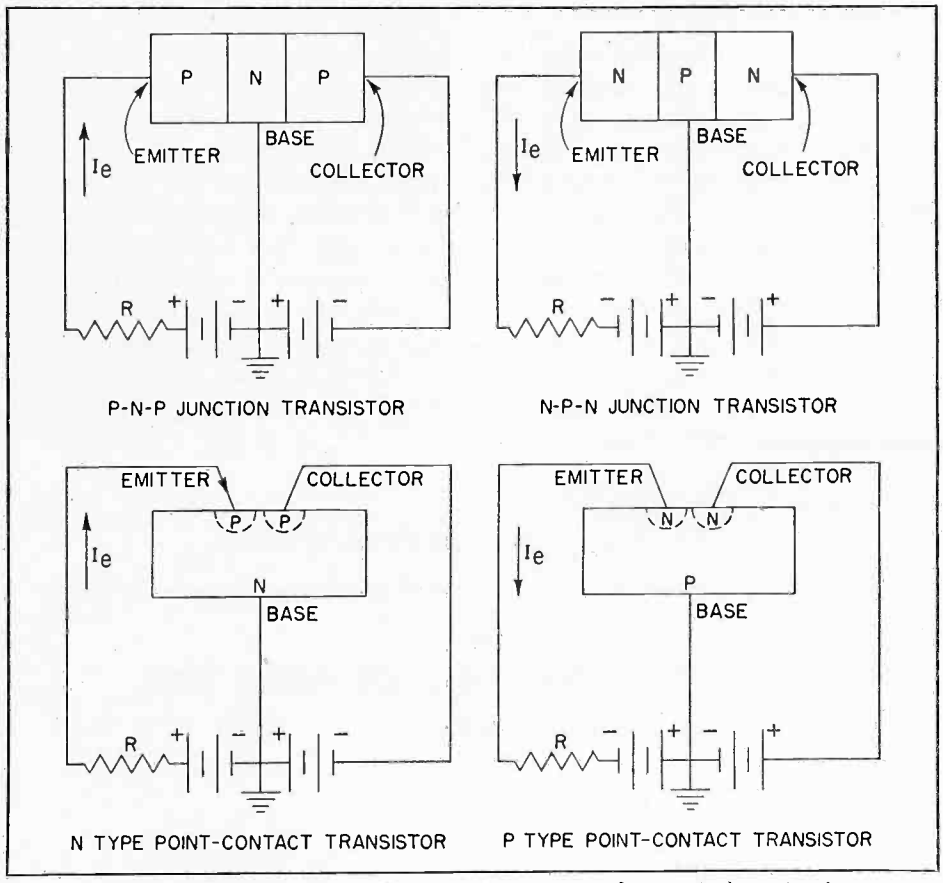


Figure 2. Four types of triode transistors connected in equivalent circuits.

SERVICE HINTS

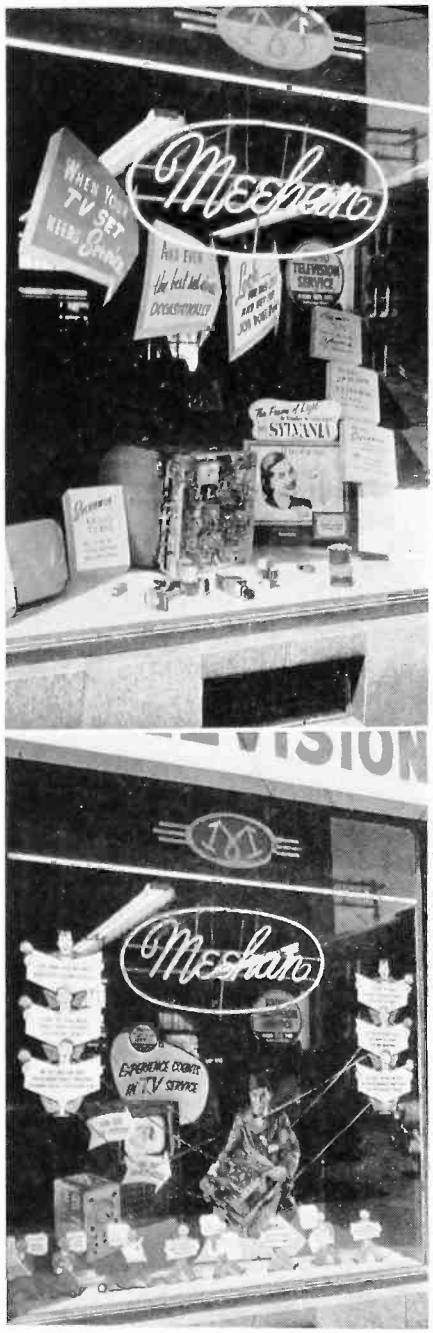
RCA TV SETS—On any RCA television set using a 6BQ7 and 6X8 in the tuner, there is a condenser marked C5 in the schematic that is 22 $\mu\mu$f. This condenser sometimes cracks open in the summer months because of the expansion of the metal plate that it is bound to. The symptoms are that channel 2 will intermittently appear on channel 4, etc. Replacing this condenser usually will clear up this trouble.—Murray Gellman, Brooklyn, New York.

SYLVANIA NEWS

MERCHANDISING SECTION

SEPTEMBER 1953 Vol. 20, No. 8

MEEHAN TV FINDS SERVICE PROFITABLE IN MORE WAYS THAN ONE



Meehan TV appeals to passerby's understanding of TV service with window displays like the two shown above. Top photo shows a display patterned after one run in a recent issue of SYLVANIA NEWS. Above is the current Sylvania window display. Needless to say, Meehan TV is a staunch booster for high quality Sylvania Receiving and Picture Tubes.

Meehan TV of Gary, Indiana is a sales and service business—with the accent on service.

Meehan sells television sets, electrical appliances, all kinds of household white goods. He's a lighting contractor, too. He does his selling at 906 West Fifth Avenue. Just around the corner is his service business at 470 Tyler Street.

Meehan's service operation expanded with the introduction of television—just like every other alert sales and service business. Service helps sell TV sets. It grew so large that it moved to its present new quarters in February of this year. This move was accompanied by local newspaper advertising of more than a half page.

This ad announced: "You asked for it! Here it is! Meehan TV, Gary's outstanding TV servicing organization, cordially invites you, the TV public of Gary, to the formal opening of their 'larger, all new' television-radio service department . . . In television, no set is any better than the facilities available for servicing it. We have the facilities!" This will give the reader an idea of the tone of this ad.

Here's what it had to say about service business-customer relations: "Our continued business existence is based on gaining the full confidence of you and other set owners like you. We aren't in business to 'gyp' you or to overcharge you. Our success is based on doing each and every job to the level best of our ability, at a fair

(*Continued on page 12*)

Starting at left and going clockwise about the room can be seen a few of Meehan's radio-television service technicians: Don Hisick, Elmer Nelson, Bob Level, Charles Ryalls (shop foreman), Elmer Marsolek, and Harry Hartnup. Notice the portable tables for test equipment.

LAST CALL FOR 1954 SERVICE DEALER CALENDARS

This is your last chance to order the 1954 Sylvania Personalized Home Calendar, the first of its kind ever offered to radio and television service dealers.

You can't miss making more money in 1954, if you have your own personalized calendar on the walls of every home in your community. A calendar that tells your prospects and customers who you are, what your service is, where you're located, the easy way to get in touch with you.

The Sylvania Personalized Home Calendar for 1954 is the first of its kind ever offered exclusively to radio-television service dealers. It features a special, exclusive picture painted by famous Saturday Evening Post cover and feature artist Fred Stanley.

Here's what the new Sylvania Calendar will do for you. 1) It will put your business sign in every home. Handy, convenient, this calendar will make it easy for your customers to call you when they need your service. 2) It will hang in each home—365 days of the year. A constant reminder of you. 3) It will give you *1st call* over all competitors in your area.

The Sylvania Calendar costs you less than any other advertising you can use . . . only 1½ cents per month, per home. Blanket your territory with your calendars. Make sure the sign of your business is hanging in every home with a radio or television set. Every calendar can bring you increased profitable business all through the year.

Just think—for only 18 cents per year, you put your personal salesman in each of your prospects' homes.

The Sylvania Calendar is the lowest cost calendar of its kind you can buy. Offered exclusively as a service to radio-television service dealers, Sylvania is making this unique calendar available to you at a big saving. It is loaded with items of interest. There's the home appeal features. Every woman will appreciate the valuable recipes and home care hints in this calendar which they will hang in preference to all others.

Your personalized Sylvania Calendar will promote your business the way you want to promote it. It tells everybody you're a skilled television and radio technician, that you're reliable, experienced, use the best replacement parts, and charge a fair price. The feature . . . Here's the Inside Story of Your Television Set . . . will stimulate interest and understanding of your service problems. Here's a chance to help educate the public and to win the profits expert servicing should bring.

The calendar will serve as your Christmas Greeting for 1953.

Never before has one calendar offered so much to both the service dealer giving it and the customer or prospect receiving it.

(*Continued on page 11*)

ORDER FORM

I would like to take advantage of the Sylvania Service Dealers' calendar offer for 1954—It is my understanding that these calendars will be delivered to me prepaid with my own advertisement printed on them.

PLEASE ENTER MY ORDER AS FOLLOWS:

Quantity	Minimum Order 100 Calendars	Amount
.....	1954 Sylvania "SERVICER" Home Calendars @ 18c each	$.....
.....	Envelopes (calendars inserted) @ $1.40 per 100	$.....
	City or State Sales or Use Tax	$.....
	Total	$.....
	☐ .....CHECK, CASH, MONEY ORDER ENCLOSED	

Please ship my calendars to:

.....

.....

.....

PLEASE PRINT

Your advertising copy will be printed exactly as you show it here—Abbreviations, spelling, etc. will be just as you show it. Check your ad carefully. Attach a piece of stationery for correct spelling.

1st Line _____

2nd Line _____

3rd Line _____

4th Line _____

SYLVANIA PLIER PACK NOW AVAILABLE AT NEW LOW PRICE

The Sylvania Plier Pack, popular pocket pack of three precision matched pliers specially designed for radio and television service work, is now available at the new low price of $2.95. A $4.50 value, the Sylvania Plier Pack has been widely used during the past 2 years; and for that reason Sylvania has been able to effect a saving which it is passing on to the service dealer.

Every serviceman will want to own and use these handsome pliers, if he has not already tried them. No cheap, cold-rolled or stamped pliers are these! Forged from the finest quality steel and plated with heavy chrome, they are made by a leading manufacturer of surgical instruments and precision tools. These pliers, designed and produced especially for Sylvania, are tools worthy of a craftsman.

The practicality of these three pliers in doing radio and television servicing can be clearly seen in the picture on this page. The first tool on the left is a 4¾-inch slip joint pliers. It has an adjustable 2-position slip joint, precision-matched jaws, and finely milled teeth. The one in the middle, a 5¼-inch needle-nosed pliers, has perfectly matched jaws and is just the tool for getting at what is otherwise inaccessible wiring and terminals. The tool in the right is designed to make ordinarily awkward right-angle work seem as easy as anything. It is a 4½-inch parrot-nosed pliers with adjustable 3-position slip joint, matched jaws, and finely milled teeth.

These quality pliers are housed in a compact polystyrene case. The case, which is only one-half-inch thick and has the advantage of a tough transparent hinged cover, is at once handy and durable. It makes a perfect "pocket-pack."

The Sylvania Plier Pack—at the new low price of $2.95—is now available either through your local Sylvania Distributor or Sylvania's Advertising Distribution Department, 1100 Main Street, Buffalo 9, N. Y.

SERVICE DEALER CALENDARS

(*Continued from page 10*)

Here is how to order your calendar:

1. Place your order NOW! *This is important to insure your shipment this fall.* Use the order blank printed on page 10.

2. Order enough to cover all the homes in your area.

3. Be sure to include prospects as well as customers.

4. Order envelopes for calendars that you will use as a "Christmas Greeting Card."

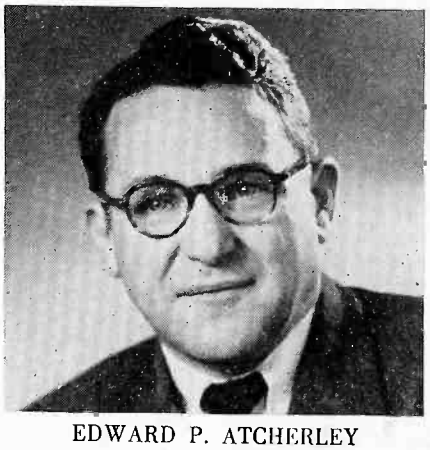
5. Order calendars to deliver to prospects personally during the "Holiday Season" and on new calls during the year.

THREE SYLVANIA PROMOTIONS

The appointment of Edward P. Atcherley as Merchandising Manager for renewal tube sales of Sylvania has been announced by H. P. Gilpin, general sales manager, radio and television picture tube sales. Mr. Atcherley's headquarters will be at Sylvania's New York Office, 1740 Broadway. A member of the Sylvania sales staff since 1948, Mr. Atcherley previously was regional sales manager for renewal sales in the Midwest district with headquarters in Chicago.

Other promotions announced include the appointment of Bruce McEvoy to succeed Mr. Atcherley as regional sales manager for renewal sales in the Midwest district. Formerly sales manager of the East Central district, Mr. McEvoy will now make his headquarters at Sylvania's Chicago offices, 3450 West Division Street.

John P. Vail, formerly salesman in the Mideastern district, has been promoted to manager of the East Central district, succeeding Mr. McEvoy. Mr. Vail will be located in Cleveland.



EDWARD P. ATCHERLEY

BRUCE McEVOY

JOHN P. VAIL

(*Continued from page 9*)

price for our skilled labor. It's only when you patronize the shops that feature 'bargains' at ridiculously low prices that you need worry. Good television and radio service can't be bought on the bargain counter. Set owners who recognize this aren't likely to get 'gyped'."

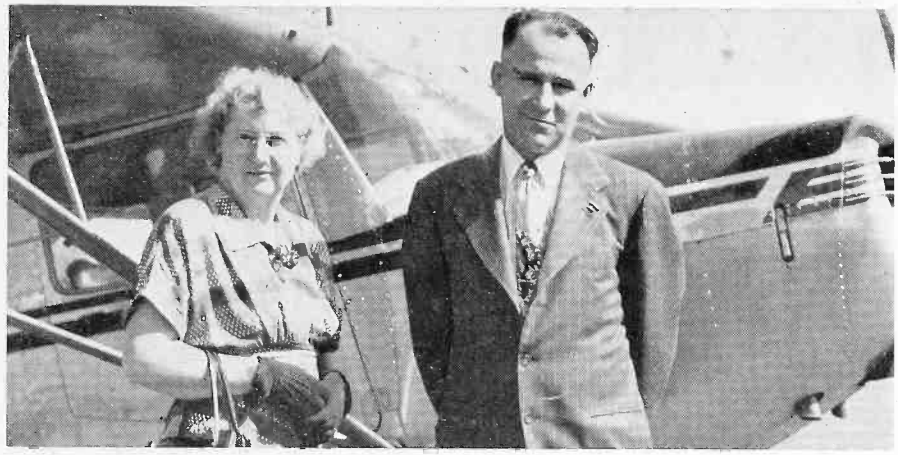
It is easy to see that Meehan TV takes its service business seriously, is trying to foster better understanding with its customers through advertising, and consequently is a rousing success. There are other reasons, too. Here are some: Meehan TV handles service from other furniture and department stores—30 of them—which have no service departments. It goes after service of sets not sold by itself or its business contacts with outdoor and theatre as well as local newspaper advertising. It also has a good-looking telephone book listing.

Meehan continually uses the windows of its service department for advertising purposes. Recently it took an idea from SYLVANIA NEWS and expanded it into the display shown on page 9. It is now using, of course, the new Sylvania window display.

Meehan TV has eight trucks for outside calls and they are painted different colors. Maurice F. Allison, one of Meehan TV's owners, says this device convinces the man on the street that the business is even larger than it is.

Servicing at Meehan TV has a few unusual refinements which pay off. All tubes in any TV or radio set that is pulled are checked regardless. All test equipment is portable (see photo on page 9) and much time is saved in this manner. In Meehan TV's "cook rack," TV sets are tested for from four to six hours. And there is antenna provision for each set being "cooked."

Edward D. Meehan, Florence M. Meehan, and Maurice F. Allison, owners of Meehan TV, have built an unusually successful business. Certainly their operation offers many helpful tips to other aspiring service organizations.



Mr. and Mrs. Sandy Richardson of Toledo, Washington flew to Medford, Oregon in their private plane to attend a recent Sylvania Service Meeting sponsored by the Verl G. Walker Company. The Richardsons are former Southern Oregon residents and for several years have made an annual 600 mile pilgrimage to Medford, Oregon to attend Service Meetings. Richardson has been actively engaged as a serviceman and ham radio operator for over twenty years.

In This Issue

SYLVANIA NEWS

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VOL. 20 NO. 8 SEPTEMBER 1953

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MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS

SYLVANIA NEWS

TECHNICAL SECTION

OCTOBER 1953 Vol. 20, No. 9

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligation

TWIN LEAD "SPRIGS" FOR CONNECTING TWO TV ANTENNAS TO ONE FEED LINE

BY W. P. MUELLER - SECTION HEAD ADVANCED APPLICATION SECTION

In many instances, the fringe area television viewer is faced with the problem of having two stations that can be received, but only the use of separate high gain antennas will give satisfactory reception. There are several ways of solving this problem.

One solution is the use of a broadband antenna, such as a conical, or bowtie, in conjunction with a rotator. However, this method usually produces a less satisfactory picture than the use of a single-channel, high gain antenna. Also, the rotator installation approximates the cost of an additional antenna.

Another method often used is reception on separate high gain, single-channel antennas, which are selected by a switch or simply by clipping the appropriate feeder to the antenna terminals of the receiver. The goal of better picture quality is accomplished, yet the inconvenience of changing feeders for each channel is enough to plague any housewife who is already confused by the number of controls on her tv set.* The problem can be solved conveniently and efficiently by means of a simple filter circuit in the feed line to each antenna, thus avoiding the need for any additional switches.

The filter functions on the principle that a signal traveling down a transmission line will not be affected by another line across it if the second line presents a high impedance at the signal frequency.

Such a filter can be constructed with inductance coils and capacitors tuned to the channels being received. However, the use of twin lead stubs is somewhat cheaper and more convenient, particularly if the filter is outdoors where it would be necessary to weatherproof the coils and capacitors. Placing the network at the antennas allows one feeder to bring both signals to the receiver without the use of a remote switch. We shall call these tuned stub filters *sprigs* from their physical appearance.

*A mixing transformer eliminates these difficulties, but it inserts additional loss in the line which may be detrimental to a weak signal.

Theory

Two basic circuit types are required. The first must reject the lower frequency channel and pass the higher frequency channel, while the second must pass the lower and reject the higher frequency channel. These two basic filter types are presented in Figures 1 and 2; their reactance vs. frequency characteristic and two possible forms of the physical arrangement are shown.

Figure 1 shows the filter which is used on the line from the low frequency antenna. Figure 1A represents graphically the reactance characteristic plotted against frequency. Figure 1B is the equivalent L-C circuit and Figure 1C its equivalent twin lead stub or *sprig* circuit.

Additional isolation between the two antennas is secured by connecting them together in such a way as to make use of the principle that a short circuit across a transmission line will look like an open circuit at a distance of a quarter wavelength away.

For example, the high channel series resonant circuit is placed a quarter wavelength at the high channel from the common junction of the two antennas. Similarly the low channel series resonant circuit is placed one quarter wavelength at the low channel from the common junction. This transforms the short circuits to high impedances across the opposite antennas. A study of Figure 3 will explain the operation of the filter more clearly than a lengthy word description.

Figure 3 gives the dimensions of stubs 1 and 2 in terms of wavelength. To obtain the length of twin lead, the electrical length in space must be multiplied by its propagation factor,

(*Continued on page 6*)

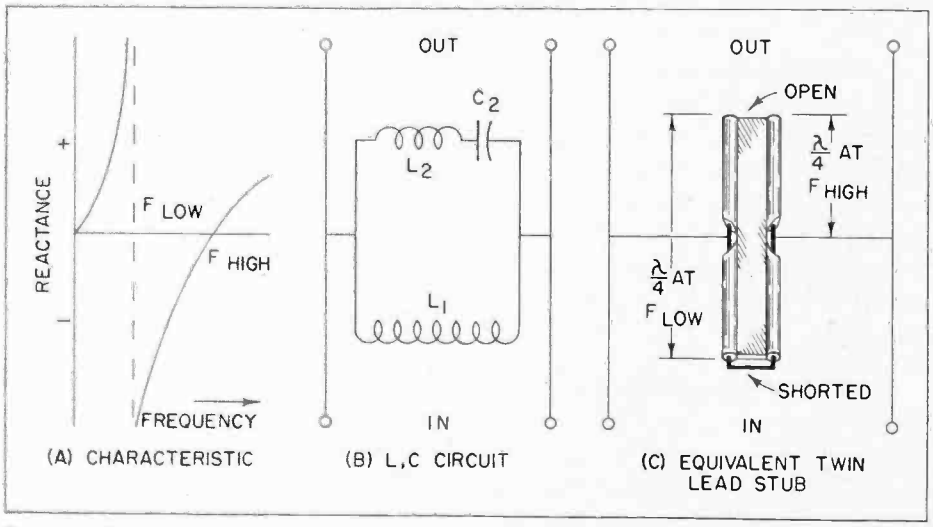


Figure 1. Filter for use on the lower channel tv feeder to reject the higher frequency channel

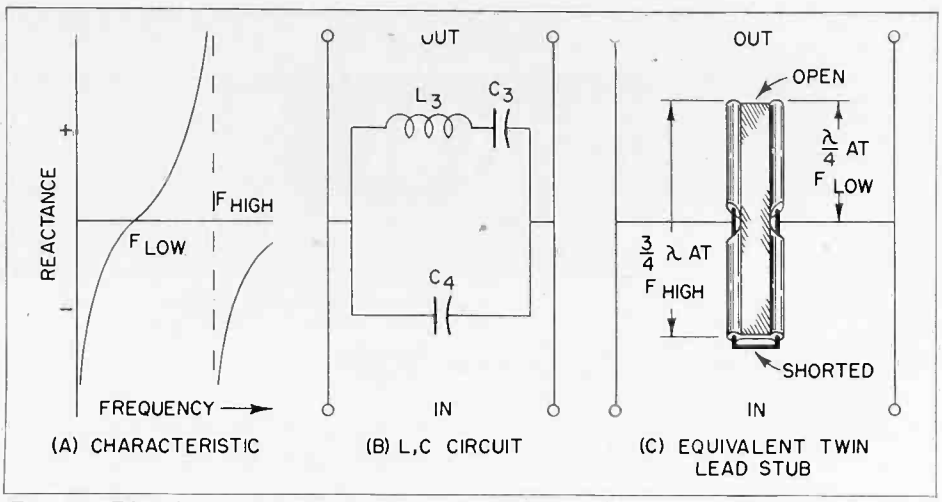


Figure 2. Filter for use on the higher channel tv feeder to reject the lower frequency channel

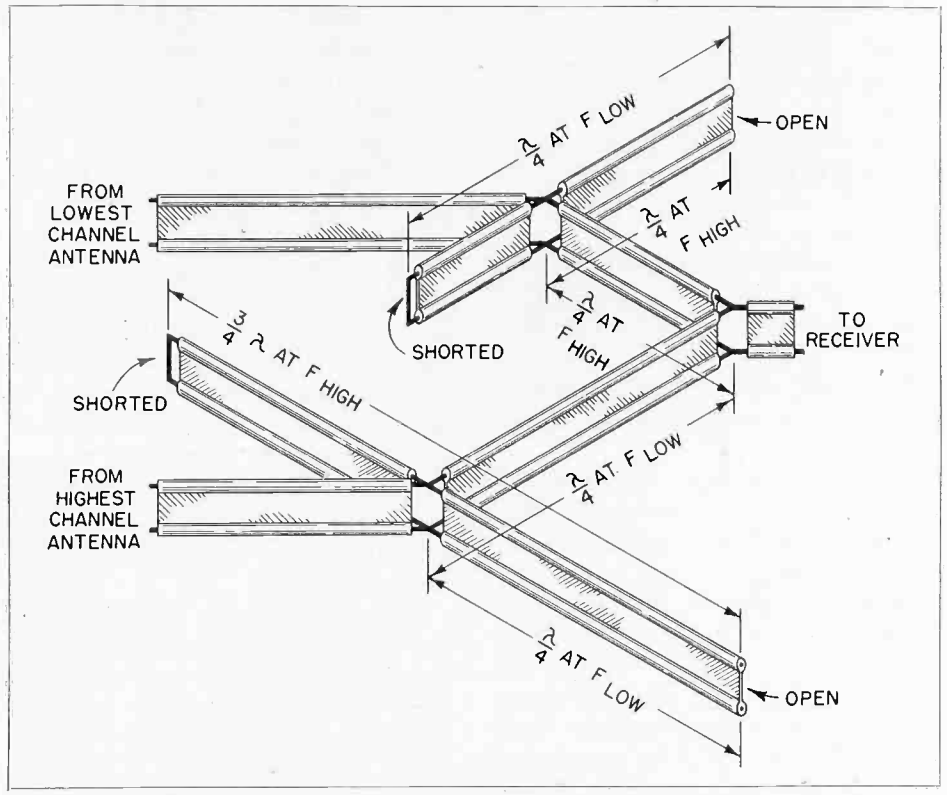


Figure 3. Twin lead sprigs for connecting two television antennas to one feed line.

(*Continued from page 5*)

which is about .82 for most flat twin lead or use the twin lead length equaling one-quarter wavelength for each tv channel which is given in the TV Channel Table elsewhere in this issue. Multiply this length at the high frequency channel by three to obtain the sprig length for the higher frequency antenna line.

An added advantage of using sprigs is that lightning protection may be achieved by connecting a ground wire to the center of the shorted ends shown in Figure 3. This does not affect the efficiency of the system because the short is "cold" to r f at these frequencies.

At ultra high frequencies the stubs also provide additional rejection of i f interference pickup, because the shunting stubs are so short that they represent only 10 to 20 ohms at the i f frequencies.

There is one limitation in using sprigs. They will not work properly on harmonically related frequencies because tuned lines will show resonance on any number of quarter wavelengths. Fortunately, most tv frequencies are not harmonically related.

AGC BIAS

The Sylvania Chassis 502, 507 and 508 use an age bias cross-over network in conjunction with a keyed age amplifier tube. The purpose of this network is to allow the r f tuner section to operate with 0 bias when no signal or very weak signal is present and switch to large age bias control when a normal signal is received. At the same time, the age bias to the i f amplifiers is permanently divided down to a lower value. This system results in the best noise figure in the tuner when it is most needed and prevents overloads, with attendant wash out of picture, on very strong signals. The age switching or cross-over control tube is termed—age clamper.

FIELD STRENGTH METERS

An indispensable instrument for the TV serviceman is a field strength meter. It will save time both in repairing and installing antenna systems. You can increase customer satisfaction by showing him that the choice of antennas for him was done scientifically rather than the "by guess or by gosh" system. Also time is saved, resulting in more money for your pocket, by quickly orienting the antenna from the roof top. The field strength meter is invaluable in checking transmission line losses and determining the cause of transmission line and antenna troubles.

NOISE IMMUNITY CIRCUITS

The trend in better, more stable, fringe area television receivers continues in this year's models by the addition of noise immunity or noise suppression circuits. They are principally designed to prevent the sweep oscillators of the receiver from being affected by strong noise pulses.

There are a great variety of circuits to perform this function. They are usually a part of the sync separation or sync amplification circuits and go by many names such as noise gate, noise canceller, noise suicide, noise clipper, etc.

TV CHANNELS TABLE

Frequency, Quarter Wave Length, and Quarter Wave Length of Twin Lead for determining antenna dimensions and twin lead stub lengths. (Wave length is to the nearest 1/32 inch.)

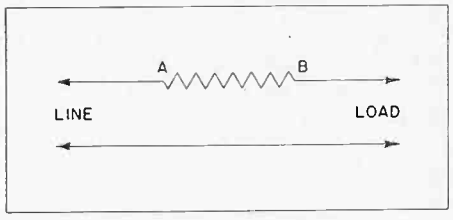
Channel No.	Freq. Range	1/4 λ in in.	1/4 λ Twin Lead in in.
VHF			
2	54-60	51 13/16	42 13/32
3	60-66	46 29/32	38 15/16
4	66-72	42 13/16	35 3/32
5	76-82	37 13/32	30 21/32
6	82-88	34 3/4	28 1/2
FM-98 mc	88-108	30 5/32	24 23/32
7	174-180	16 21/32	13 21/32
8	180-186	16 3/32	13 3/16
9	186-192	15 19/32	12 13/16
10	192-198	15 3/32	12 13/32
11	198-204	14 23/32	12 1/16
12	204-210	14 1/4	11 23/32
13	210-216	13 27/32	11 11/32
UHF			
14	470-476	6 1/4	5 1/8
15	476-482	6 3/16	5 1/16
16	482-488	6 1/8	5 1/32
17	488-494	6 1/32	4 31/32
18	494-500	5 31/32	4 29/32
19	500-506	5 7/8	4 13/16
20	506-512	5 13/16	4 25/32
21	512-518	5 3/4	4 23/32
22	518-524	5 11/16	4 21/32
23	524-530	5 5/8	4 19/32
24	530-536	5 9/16	4 9/16
25	536-542	5 1/2	4 1/2
26	542-548	5 7/16	4 7/16
27	548-554	5 3/8	4 13/32
28	554-560	5 5/16	4 3/8
29	560-566	5 1/4	4 5/16
30	566-572	5 3/16	4 1/4
31	572-578	5 5/32	4 7/32
32	578-584	5 3/32	4 3/16
33	584-590	5 1/32	4 1/8
34	590-596	5	4 3/32
35	596-602	4 15/16	4 1/16
36	602-608	4 29/32	4
37	608-614	4 27/32	3 31/32
38	614-620	4 13/16	3 15/16
39	620-626	4 3/4	3 29/32
40	626-632	4 11/16	3 7/8
41	632-638	4 21/32	3 13/16

Channel No.	Freq. Range	1/4 λ in in.	1/4 λ Twin Lead in in.
UHF			
42	638-644	4 5/8	3 25/32
43	644-650	4 19/32	3 3/4
44	650-656	4 17/32	3 23/32
45	656-662	4 1/2	3 11/16
46	662-668	4 15/32	3 21/32
47	668-674	4 13/32	3 5/8
48	674-680	4 3/8	3 19/32
49	680-686	4 5/16	3 17/32
50	686-692	4 9/32	3 17/32
51	692-698	4 1/4	3 1/2
52	698-704	4 7/32	3 15/32
53	704-710	4 3/16	3 7/16
54	710-716	4 5/32	3 13/32
55	716-722	4 3/32	3 3/8
56	722-728	4 3/32	3 11/32
57	728-734	4 1/16	3 5/16
58	734-740	4 1/32	3 9/32
59	740-746	3 31/32	3 1/4
60	746-752	3 15/16	3 1/4
61	752-758	3 29/32	3 7/32
62	758-764	3 29/32	3 3/16
63	764-770	3 7/8	3 5/32
64	770-776	3 27/32	3 1/8
65	776-782	3 13/16	3 1/8
66	782-788	3 25/32	3 3/32
67	788-794	3 3/4	3 1/16
68	794-800	3 23/32	3 1/32
69	800-806	3 11/16	3 1/32
70	806-812	3 21/32	3
71	812-818	3 5/8	2 31/32
72	818-824	3 19/32	2 31/32
73	824-830	3 9/16	2 15/16
74	830-836	3 9/16	2 29/32
75	836-842	3 17/32	2 7/8
76	842-848	3 1/2	2 7/8
77	848-854	3 15/32	2 27/32
78	854-860	3 7/16	2 27/32
79	860-866	3 7/16	2 13/16
80	866-872	3 13/32	2 25/32
81	872-878	3 3/8	2 25/32
82	878-884	3 3/8	2 3/4
83	884-890	3 11/32	2 23/32

SERVICE HINTS

A SIMPLE WATTMETER SUBSTITUTE can be rigged up cheaply in the following manner: Use a one ohm, heavy wattage resistor and connect it as shown. An ordinary A C voltmeter connected across A and B permits a wattage check accurate enough for service applications. For example, if the voltmeter reads three volts, then since I equals E/R that is 3/I or three amperes, then W equals 3 x 120 or 360 watts. In practice, all that needs to be done is to multiply the voltmeter reading by 120 (the line voltage). Thus two volts means 2 x 120 or 240 watts—five volts means 5 x 120 or 600 watts, etc. A 25 watt resistor permits loads up to 600 watts to be checked—a 50 watt resistor will handle up to 850 watts—a simple ohms law calculation will indicate any higher reading values desired.

The strategic uses of a wattmeter for servicing are too numerous to mention here, but will certainly suggest themselves to the enterprising serviceman. Total cost (less voltmeter, which it is devoutly hoped we all possess) less than a dollar. —H. L. Solomon, Brooklyn, N. Y.



MOTOROLA MODEL 21T2 Chassis 351-A—Intermittent Reception.—This set would play for hours, then suddenly cut off. It finally cut off in the shop after playing 15 hours, so that I was able to track down the trouble. By using a signal generator to inject a signal, I worked back toward the front end and located the trouble in the antenna coil. A new antenna coil wound with No. 30 enamelled wire worked perfectly. The old coil apparently had shorted turns causing a bad mismatch at the input.—J. Nolter, Mahanoy City, Pa.

POWER LINE FILTER BY-PASS IN TV RECEIVERS—Working on an RCA Television Model 9TW309 with a snowy picture and normal sound, I found that the antenna transformer was burned open.

First, suspecting lightning damage, I examined the lightning arrestor and found it correctly installed.

The antenna contained a folded dipole which had a d c connection to the mast. The mast was grounded through the lightning arrestor strap.

The a c potential between the antenna lead and the chassis was measured and found to be approximately line voltage. Reversing the a c plug lowered the potential considerably. Checking the line bypasses showed one to be shorted which made the chassis "hot" with a c.

This trouble would not have shown up in other than a properly grounded antenna system. It is easy to realize the importance of such a situation since the chassis floats at line potential.

If the antenna transformer had been replaced without replacing the capacitor, it would have burned out also. Therefore, it is a good policy to check these capacitors on all sets.—Adam Zelinski, Jersey City, N. J.

ROSIN SOLUTION—About one ounce of rosin is dissolved in 3 ounces of alcohol by allowing it to stand at room temperature in a glass-stoppered bottle. The final solution has several excellent uses around the service shop, such as:

Non-corrosive soldering-flux for litz and other fine wires.

Prevent slipping of dial cords after the cord has been moistened with the solution and dried.

Cement for holding screws in wood, etc.

Violin-bow rosin is the best grade for this purpose. 180-proof denatured alcohol is suitable if pure grain alcohol is not obtainable.—Irvin Levin, Hyattsville, Maryland.

CLEANING TV TUNERS—Wafer-Tier Type TV coil switches such as used in RCA models 721TS, 621TS, 630TS become noisy and make poor contact after being used for some time. It is hard to reach the contacts for cleaning by ordinary methods. It was found that a flit gun filled with carbon tetrachloride could be used to spray the fluid directly onto the contacts.

Tuner contacts oxidize after being in use for some time, poor contact results which may cut off reception altogether. The use of a good silver polish will clean them up very nicely. — C. L. Mintzer, Brooklyn, New York.

EDITOR'S NOTE—Carbon tetrachloride leaves a slight film when it dries. Do not spray it in the tuner indiscriminately.

SILVERTONE 101-867TV—Intermittently the picture would lack contrast, go out of focus, and sound would become weak. The set worked fine at the shop and no amount of tapping, heating or change in position caused the intermittent condition.

Since the trouble occurred at the customer's home, we suspected the voltage supplies; therefore, we made a list of voltages across the voltage dividers. Two weeks later the set began acting up in the customer's home and we made another voltage list while the set was in this condition.

Comparing the readings and checking against the schematic showed the trouble to be in the Candohm resistor R67318 located inside the high voltage cage. It had shorted between the resistance element and metal case of the resistor which lay against the chassis. Replacing it cured the trouble.—George's Radio, Santa Ana, California.

HANDLING PLASTIC CABINETS —The new plastic cabinets are hard to handle, especially the 21" table models. A suction cup device used by people who handle large sheets of plate glass for store fronts works like a charm and provides a real hand hold for safe and convenient handling. They may be obtained from suppliers of glass equipment.—H. H. Heinrich, New London, Wisconsin.

SYLVANIA NEWS

NOVEMBER 1953

C. J. Luten, editor

Vol. 20, No. 10

TELEVISION SERVICING, RECEIVERS DESCRIBED AS MUCH BETTER

TV set servicing is much better today than it was a few years ago, and so are the receivers, James D. (Jim) Secrest, executive vice president of the Radio - Electronics - Television Manufacturers Association, said in a recent talk at the Radio and Television Service Clinic and Electronic Fair at Fort Worth, Texas.

"Those of you who are just getting into television are more fortunate than your colleagues who suffered from the ignorance of the public and the inexperience of the manufacturer when television was new," he said.

"The industry has learned a lot about making and servicing television receivers in the past six or seven years, and the TV set today is a far better instrument and more fool-proof than it was when television was still a novelty.

"Every new TV area, of course, goes through an adjustment period, but I believe the introduction of TV today creates far fewer problems for the dealer and the serviceman than it did when all markets were new."

Mr. Secrest cited a recent statement by the Association of Better Business Bureaus, which has co-operated with the RETMA service committee in solving service problems, in support of his statement that great improvements have been made in the service field.

"Unquestionably there were 'gyps' in the service field in the early days of television, and there are some today," he added. "But I believe that they have declined greatly in number and that, at best, their life in any community is short-lived. The 'gyp' in any field soon runs out of suckers."

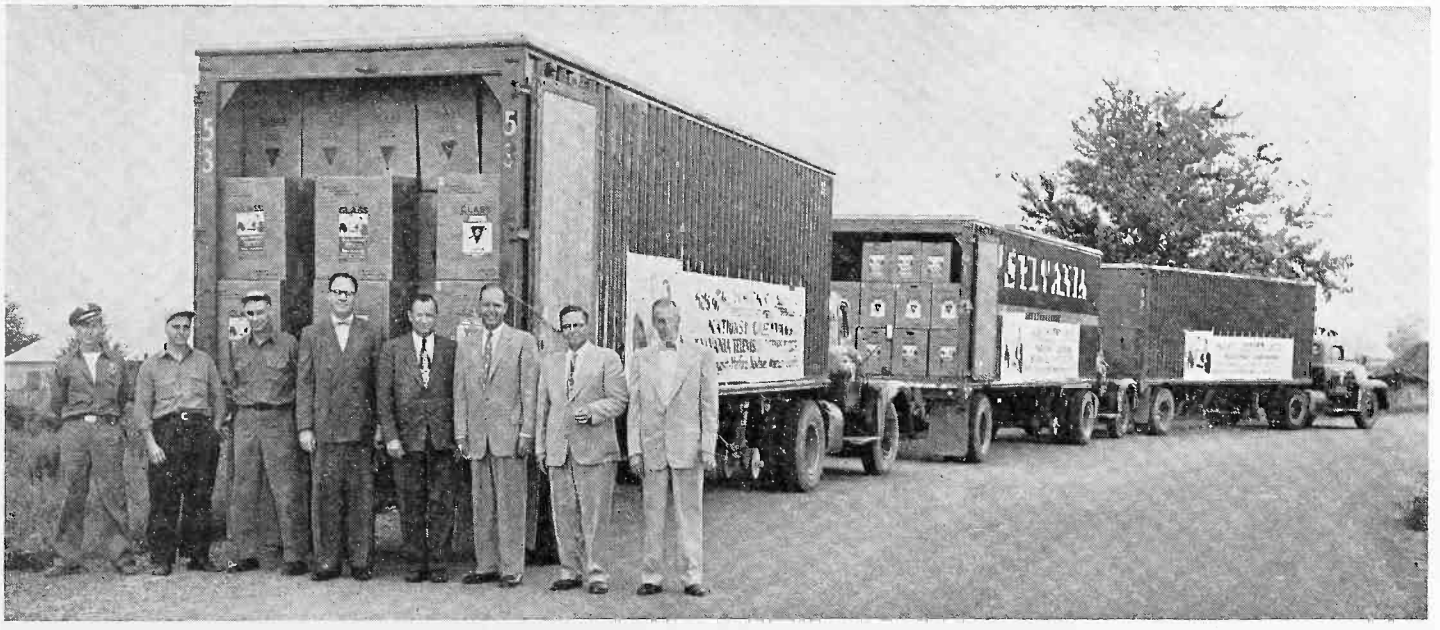
Recalling that RETMA has consistently opposed licensing of service technicians, Mr. Secrest said:

"We have maintained that the industry can do a more effective job in cleaning its own house than can any governmental bureaucracy—large or small. I believe developments of recent years have justified our faith in the honesty and competency of the average serviceman.

"However, we believe that the industry has an obligation to provide adequate training facilities for service technicians and that servicemen owe it to themselves and to their customers to keep abreast of the progress in their vocations. Today's TV serviceman, like a doctor, a lawyer, or any other professional man, must acquire new knowledge constantly if he is to serve his public properly."

The decrease in the number of service calls per set, which was also partly attributed to the set owner's greater familiarity with his receiver, should in no sense alarm the serviceman, Mr. Secrest said.

"The reduction in calls per set will be more than offset by the rapid growth in the number of set owners," he explained. "There is plenty of work today to keep the estimated 50,000 servicemen busy servicing 25 million TV receivers, and many more technicians will be required when we have 50 million television sets in this country, probably less than five years from now."



MORE NEW MEMBERS OF SYLVANIA'S TRUCKLOAD OF PICTURE TUBES CLUB

At all points of the compass, more and more Sylvania distributors are stocking fast moving, *best by test* Sylvania TV pictures by the truckload to give their dealer customers the best possible service. The demand for Sylvania pictures is greater than ever—their superior performance having been proved beyond all doubt through recent exhaustive tests conducted by the U. S. Testing Company.

The top photograph shows Sam McDonald of Sylvania presenting John Manoog, Jr., general manager of Radio Electronic Sales Company, Worcester, Massachusetts, with a miniature replica of a truckload shipment. At left is John Manoog, Sr., owner of Radio Electronic Sales Company.

In the bottom photo, seated is Sylvania sales representative Bill Wray and his wife, Dorothy. Standing from left to right are Jack Bannon, owner of Radio Distributing Company, Indianapolis, Indiana; Lee Harrell; Max Nouchin; Sylvanian Shirley Bielenda, who is presenting a miniature model of the truck which delivered this king-size order of Sylvania Picture Tubes; and Peg Moore, Radio Distributing Company bookkeeper.

The photo seen at the bottom of page two documents the first caravan of Sylvania television picture tubes ever delivered. The customer is Hatry Electronic Enterprises of Bridgeport, New Haven, Hartford, Waterbury, and Stamford, Connecticut. This tremendous shipment was one of the feature events marking the celebration of Hatry Electronic Enterprises' 25th Anniversary. Shown in the photo, left to right, are the three truck drivers, Sylvania District Manager Sam McDonald; Harold Johnson (Hatry); Curt Wall, Sylvania salesman; Ed Gedney (Hatry); and Sylvania Regional Manager George Isham.

(*Continued on page 11*)

National Advertising Promotes The Sylvania Products You Sell

Boosting your sales of Sylvania receiving tubes is this powerful ad which will run in four colors on December 6th in all the newspapers carrying the Sunday supplement, *The American Weekly*.

Radio and TV owners will read about the high quality, ruggedness, and dependability of the Sylvania receiving tubes you sell in these newspapers:

Albany Times - Union, Baltimore American, Boston Sunday Advertiser, Buffalo Courier - Express, Chicago American, Cincinnati Enquirer, Cleveland Plain Dealer, Dallas Times-Herald, Detroit Times, Los Angeles Examiner, Miami Herald, Milwaukee Sentinel, New Orleans Item, New York Journal American, Philadelphia Bulletin, Pittsburgh Sun-Telegraph, Portland Oregonian, St. Louis Globe-Democrat, St. Paul Sunday Pioneer Press, San Antonio Light, San Francisco Examiner, Seattle Post-Intelligencer, Syracuse Herald-American, Washington, D. C. Times-Herald, Houston Chronicle.

This ad will also run on October 25th in the Sunday supplements of the Nashville Tennesseean, and the New York Times. The Denver Post will carry this dynamic ad in its November 1st Sunday supplement.

Servicemen See How Sylvania Builds Quality TV Picture Tubes

A large group of servicemen recently saw "The Story of Highest Quality Sylvania Picture Tubes," by way of a tour through the Sylvania plant at Seneca Falls, New York. This tour was sponsored by Beacon Electronics, Inc., of Utica and Watertown, New York. Beacon provided a bus which took the servicemen to and from the plant. Sylvania served luncheon to the group before the beginning of this tour.

Each tour included inspection of the following operations: lighting tests; incoming material inspection; finishing; raw bulb inspection; solution room; settling; screen inspection; bulb wash; internal coating; parts processing; mounting; mount inspection; lehr baking and screen inspection; sealing; exhausting; final testing and color room. During the process valuable and expensive equipment such as settling bulbs, bulb washers, 12" lehrs, screen inspection equipment, sealing equipment, in-line and straight-line exhaust equipment, aging conveyors, and test equipment was shown. The picture at left shows the group of servicemen as well as their hosts in front of a main entrance at Sylvania's Seneca Falls plant.

SERVICING THE

YLVANIA NEWS
CAL SECTION
EMBER 1953 Vol. 20, No. 10
William O. Hamlin, Technical Editor
This information in Sylvania News is furnished without assuming any obligations

27EP4 (cont'd)
27RP4

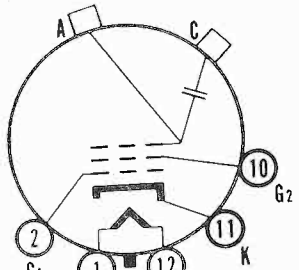
Recommended Operating Conditions	
Anode Voltage	20,000 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage[1] Required for Cutoff	−28 to −72 Volts d c
Focusing Coil Current[2] (approx.)	125 ± 20% Ma d c
Ion Trap Magnet Strength (approx.)	40 Gausses
Circuit Values	
Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:
1. Visual extinction of focused raster. Extinction of the stationary focused spot will require that these values be about 5 volts more negative.
2. For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 24 x 18½ inch picture area sharply focused at center of screen.

27RP4

The Sylvania Type 27RP4 is identical to Type 27EP4 except for having an external conductive coating which must be grounded.

External Conductive Coating to Anode Capacitances	
Maximum	750 μμf
Minimum	500 μμf
Basing	12N



12-N

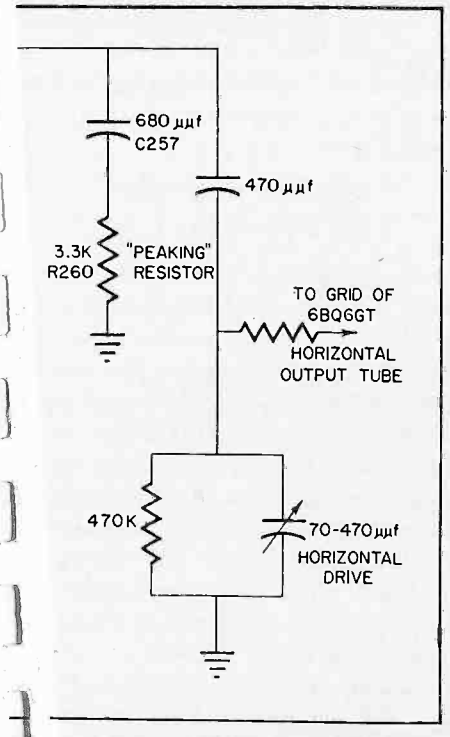
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

SYLVANIA PICTURE TUBES

oscillator. It is called by various names depending on the manufacturer such as, ringing coil, horizontal stabilizing control, horizontal frequency control or horizontal lock adjustment. Sometimes a resistor is shunted across the LC circuit to decrease the amplitude of the oscillation developed by the circuit to the value for best stability and to broaden the response of the circuit.

Note in Figure 2 that there are no waveforms shown for the grid of the first stage. This is because the grid of this stage has no periodic waveform developed on it due to the basic multivibrator action, but rather is held at ground potential or at some d c voltage, depending on the type of AFC circuit used. When the oscillator tends to drift off frequency, the

(*Continued on page 6*)



nge CO8) and 504 (change CO2).

National Advertising Promotes The Sylvania Pr

How Sylvania traffic

Boosting your sales of Sylvania receiving tubes is this powerful ad which will run in four colors on December 6th in all the newspapers carrying the Sunday supplement, *The American Weekly*.

Radio and TV owners will read about the high quality, ruggedness, and dependability of the Sylvania receiving tubes you sell in these newspapers:

Albany Times - Union, Baltimore American, Boston Sunday Advertiser, Buffalo Courier - Express, Chicago American, Cincinnati Enquirer, Cleveland Plain Dealer, Dallas Times-Herald, Detroit Times, Los Angeles Examiner, Miami Herald, Milwaukee Sentinel, New Orleans Item, New York Journal American, Philadelphia Bulletin, Pittsburgh Sun-Telegraph, Portland Oregonian, St. Louis Globe-Democrat, St. Paul Sunday Pioneer Press, San Antonio Light, San Fran

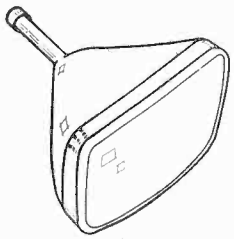
Servicemen See H

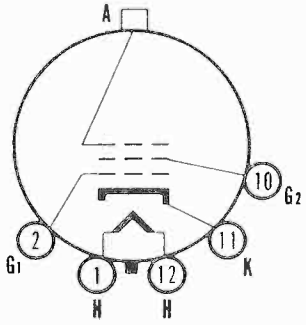
A large group of servicemen recently saw "The Story of Highest Quality Sylvania Picture Tubes," by way of a tour through the Sylvania plant at Seneca Falls, New York. This

Sylvania Type 27GP4

TELEVISION PICTURE TUBE

27" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Magnetic Focus
Single Field Ion Trap — Rectangular Glass Type
Spherical Faceplate





12-D

CHARACTERISTICS

General Data	
Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	85 Degrees
Diagonal	90 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	68 Percent
Electrical Data	
Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
Ion Trap Magnet	External, Single Field Type
Mechanical Data	
Minimum Useful Screen Dimensions	24¼x18½ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12D

RATINGS

Maximum Ratings (Design Center Values)	
Anode Voltage	22,500 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater Negative with Respect to Cathode	
During Warm-up Period Not to Exceed 15 Sec.	410 Volts
After Equipment Warm-up Period	180 Volts
Heater Positive with Respect to Cathode	180 Volts

SYLVANIA PICTURE TUBES

Issued as a supplement to the manual in Sylvania News for November 1953

SYLVANIA NEWS

TECHNICAL SECTION

NOVEMBER 1953 Vol. 20, No. 10

William O. Hamlin, Technical Editor

This information in Sylvania News is furnished without assuming any obligations

SERVICING THE HORIZONTAL SWEEP MULTIVIBRATOR

By G. L. QUINT -- Technical Publications Section

The multivibrator is another of the relaxation oscillator "family" that is sometimes used in television receivers to generate the sweep voltages.

The multivibrator can be designed to operate as a *free-running* oscillator at a frequency determined by its circuit parameters, or it may be made to operate in synchronism with an external signal at a given frequency or some submultiple of the given frequency. It can also be designed to operate as a single-shot device requiring an external trigger signal to initiate and/or terminate its operation.

There are many forms of the multivibrator, depending upon the function that it is to perform. This article will deal with only the typical circuits which the television serviceman is likely to encounter.

CATHODE COUPLED MULTIVIBRATOR

In Figure 1 is shown a typical cathode coupled multivibrator horizontal sweep oscillator. The feedback necessary to produce oscillation is supplied via C_{256}, from the plate of the first stage to the grid of the second stage and by R_{258}, the common cathode resistor. The trapezoidal voltage necessary to produce a sawtooth current in the deflection coils is developed across C_{257} and R_{260}. The peaking resistor, R_{260}, is necessary to produce proper linearity of the sweep current in the deflection coil.

The LC circuit (L_{68} and C_{255}) is shocked into oscillation by the multivibrator action and oscillates at a frequency close to 15,750 cycles per second to increase the stability of the oscillator. It is called by various names depending on the manufacturer such as, ringing coil, horizontal stabilizing control, horizontal frequency control or horizontal lock adjustment. Sometimes a resistor is shunted across the LC circuit to decrease the amplitude of the oscillation developed by the circuit to the value for best stability and to broaden the response of the circuit.

Note in Figure 2 that there are no waveforms shown for the grid of the first stage. This is because the grid of this stage has no periodic waveform developed on it due to the basic multivibrator action, but rather is held at ground potential or at some d c voltage, depending on the type of AFC circuit used. When the oscillator tends to drift off frequency, the

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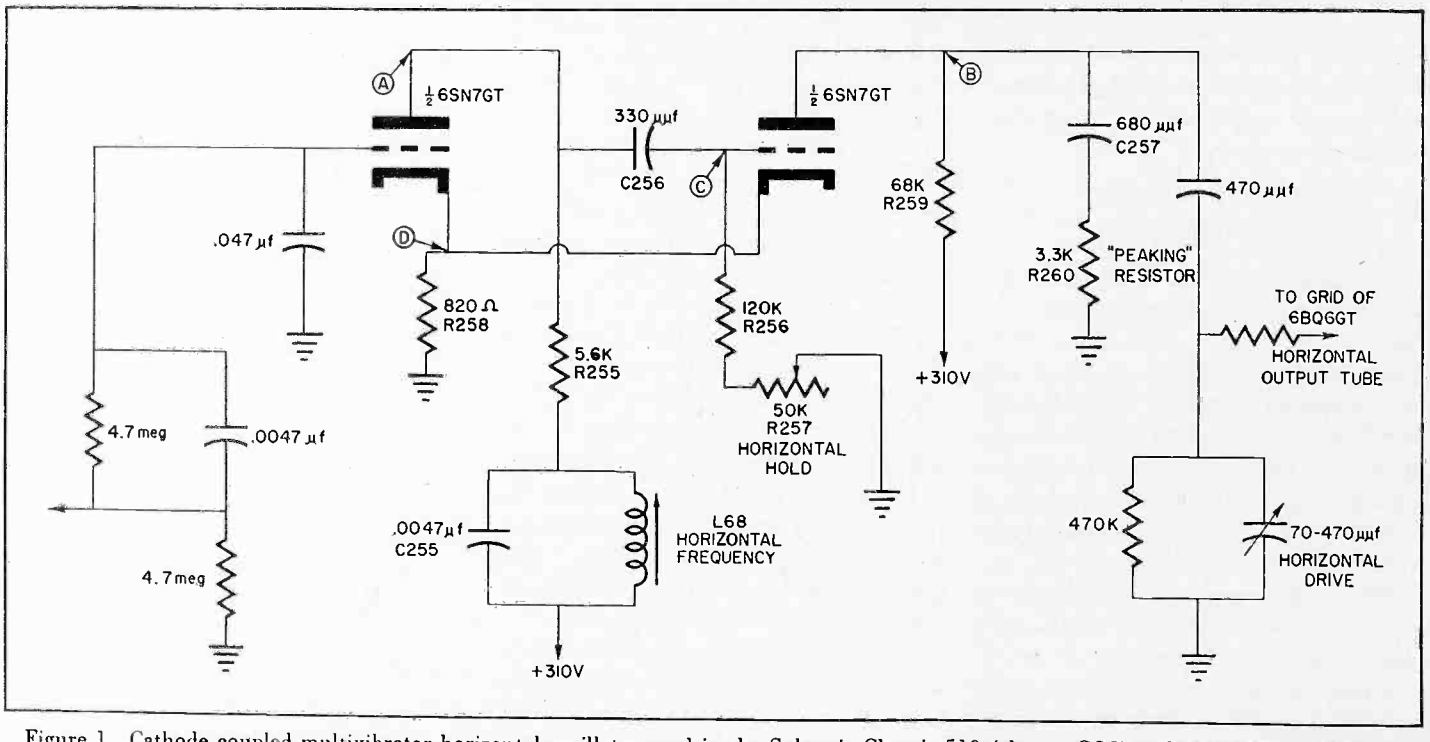

Figure 1. Cathode coupled multivibrator horizontal oscillator used in the Sylvania Chassis 510 (change CO8) and 504 (change CO2).

National Adverti… p
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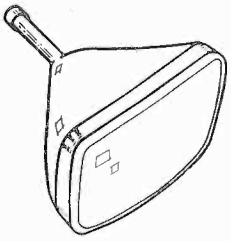
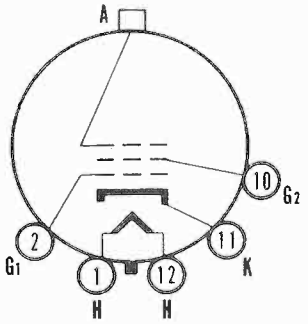
group of servicemen as well as their hosts in front of a main entrance at Sylvania's Seneca Falls plant.

Sylvania Type 27EP4 27RP4

TELEVISION PICTURE TUBE

27" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Magnetic Focus
Single Field Ion Trap — Rectangular Glass Type
Spherical Faceplate — Aluminized Screen
27RP4 has an External Conductive Coating





12-D

CHARACTERISTICS

General Data

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Deflecting Method	Magnetic
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Diagonal	90 Degrees
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Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	24 x 18½ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12D

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	20,000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
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SYLVANIA PICTURE TUBES

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27GP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[1]	20,000 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage[2] Required for Cutoff	−28 to −72 Volts d c
Focusing Coil Current[3]	125 ± 20% Ma d c
Ion Trap Magnet Strength (approx.)	40 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
2. Visual extinction of focused raster. Extinction of the stationary focused spot will require that these values be about 5 volts more negative.
3. For JETEC focusing coil No. 109 or equivalent 3 inches from reference line with the combined grid No. 1 bias voltage and video signal voltage adjusted to produce a highlight brightness of 20 foot lamberts on a picture area of 24¼ x 18½ inches.

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 Volts, whichever is less.

SYLVANIA PICTURE TUBES

SYLVANIA NEWS

TECHNICAL SECTION

NOVEMBER 1953 Vol. 20, No. 10

William O. Hamlin, Technical Editor

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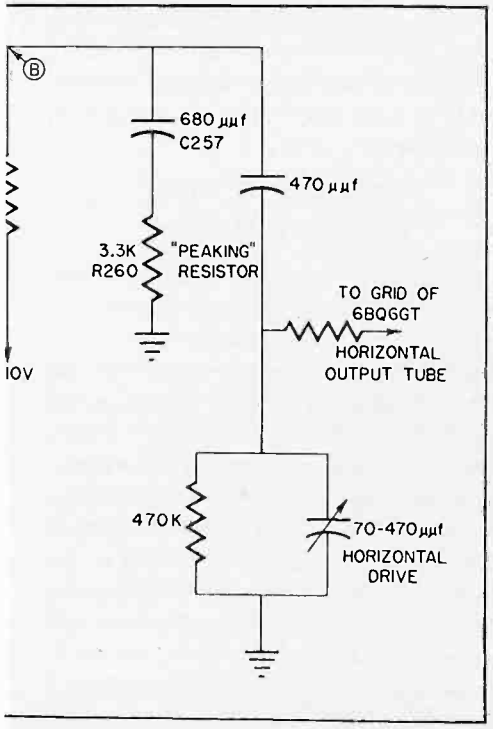

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This ad will also run on October 25th in the Sunday supplements of the Nashville Tennesseean, and the New York Times. The Denver Post will carry this dynamic ad in its November 1st Sunday supplement.

Servicemen See How Sylvania Builds Quality TV Picture Tubes

A large group of servicemen recently saw "The Story of Highest Quality Sylvania Picture Tubes," by way of a tour through the Sylvania plant at Seneca Falls, New York. This tour was sponsored by Beacon Electronics, Inc., of Utica and Watertown, New York. Beacon provided a bus which took the servicemen to and from the plant. Sylvania served luncheon to the group before the beginning of this tour.

Each tour included inspection of the following operations: lighting tests; incoming material inspection; finishing; raw bulb inspection; solution room; settling; screen inspection; bulb wash; internal coating; parts processing; mounting; mount inspection; lehr baking and screen inspection; sealing; exhausting; final testing and color room. During the process valuable and expensive equipment such as settling bulbs, bulb washers, 12" lehrs, screen inspection equipment, sealing equipment, in-line and straight-line exhaust equipment, aging conveyors, and test equipment was shown. The picture at left shows the group of servicemen as well as their hosts in front of a main entrance at Sylvania's Seneca Falls plant.

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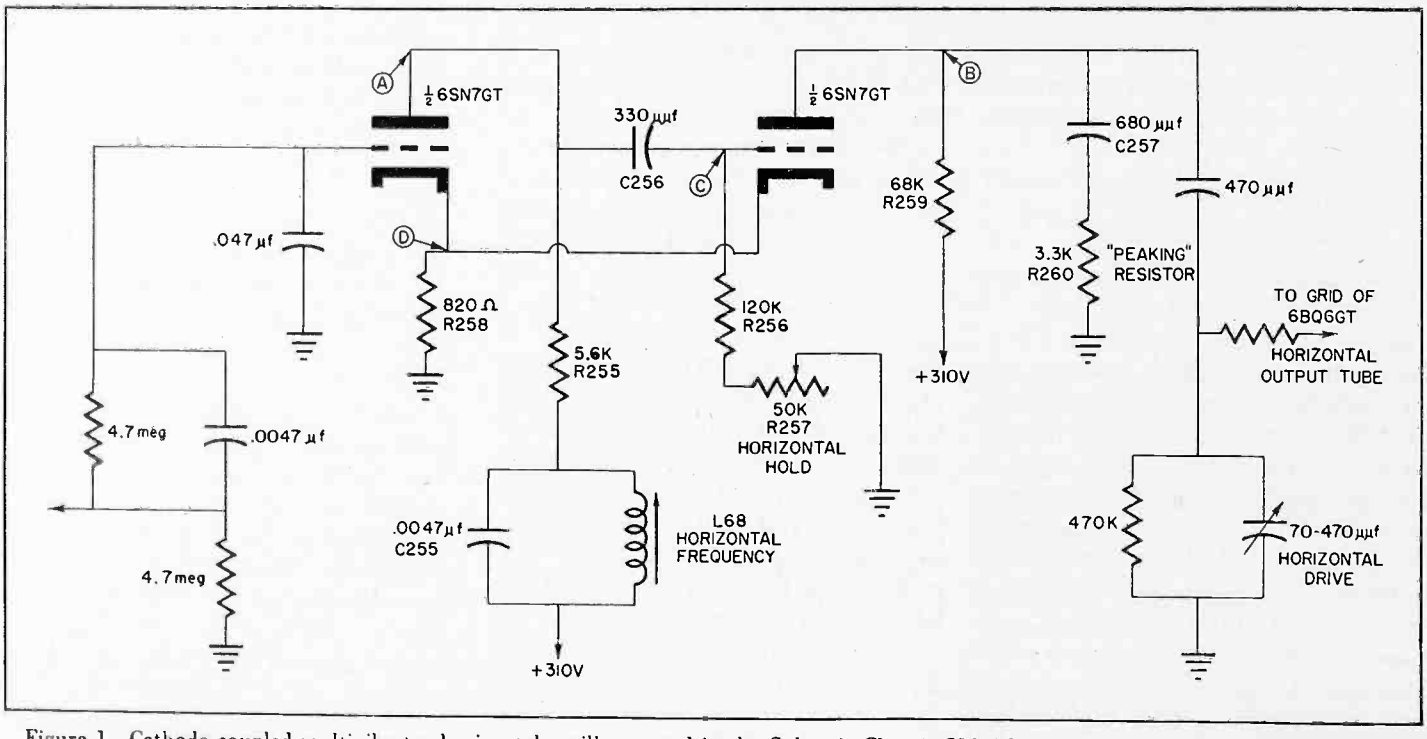
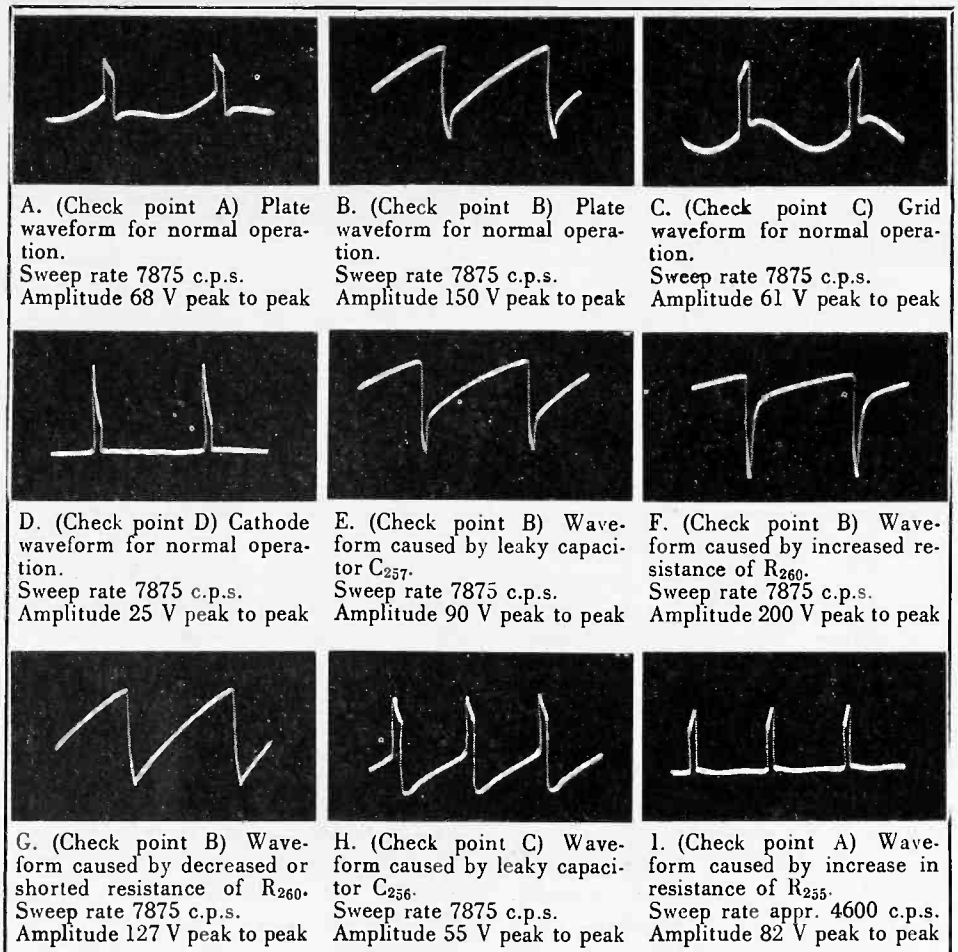


Figure 1. Cathode coupled multivibrator horizontal oscillator used in the Sylvania Chassis 510 (change CO8) and 504 (change CO2).

SERVICING THE HORIZONTAL SWEEP MULTIVIBRATOR (Cont.)



A. (Check point A) Plate waveform for normal operation.
Sweep rate 7875 c.p.s.
Amplitude 68 V peak to peak

B. (Check point B) Plate waveform for normal operation.
Sweep rate 7875 c.p.s.
Amplitude 150 V peak to peak

C. (Check point C) Grid waveform for normal operation.
Sweep rate 7875 c.p.s.
Amplitude 61 V peak to peak

D. (Check point D) Cathode waveform for normal operation.
Sweep rate 7875 c.p.s.
Amplitude 25 V peak to peak

E. (Check point B) Waveform caused by leaky capacitor C_{257}.
Sweep rate 7875 c.p.s.
Amplitude 90 V peak to peak

F. (Check point B) Waveform caused by increased resistance of R_{260}.
Sweep rate 7875 c.p.s.
Amplitude 200 V peak to peak

G. (Check point B) Waveform caused by decreased or shorted resistance of R_{260}.
Sweep rate 7875 c.p.s.
Amplitude 127 V peak to peak

H. (Check point C) Waveform caused by leaky capacitor C_{256}.
Sweep rate 7875 c.p.s.
Amplitude 55 V peak to peak

I. (Check point A) Waveform caused by increase in resistance of R_{255}.
Sweep rate appr. 4600 c.p.s.
Amplitude 82 V peak to peak

Figure 2. Oscilloscope waveform photographs at check points labeled in Figure 1. All waveforms taken with respect to ground.

(*Continued from page 5*)

AFC circuit applies voltage of proper polarity and amplitude to bring the oscillator into sync.

SERVICING THE MULTIVIBRATOR

According to the well known ancient proverb "that one picture is worth a thousand words," we will show actual oscilloscope pictures of how defective circuit components effect the normal multivibrator function and its waveforms. If the sweep capacitor C_{257} should develop leakage, the waveform at point B of Figure 1 will be approximately as shown in Figure 2E. It is impractical to discuss the effects of various amounts of leakage current. Therefore, we will show only a representative example. Note in Figure 2E how the *sweep voltage* has started to curve as compared to the normal waveform of Figure 2B. The effects on the picture may be, decreased brightness, decreased width or picture non-linearity. If C_{257} shorts, which is an example of extreme leakage, the oscillator will cease to function and loss of high voltage will result. Checking the d c voltage at check point B of Figure 1 is also a helpful double check. If R_{259}, the plate load resistor of this stage, should increase in value it will also cause the d c plate voltage of this stage to be lower, but will not cause the sweep to be non-linear. Therefore, proper interpretation of the waveform as shown on the oscilloscope will greatly reduce the time needed to locate the defective components.

In the event that C_{257} was found defective, there is the possibility that the set will still not be normal after C_{257} is replaced due to other malfunctioning components. A defective capacitor often will cause overload and possible change in value of an associated component, in this case R_{259} and R_{260}. This is indicated by one or more of the following symptoms; picture crowded at the right, decreased width, raster off center, insufficient brightness, multiple pictures and loss of horizontal sync. To localize the trouble to the multivibrator circuit, check the waveform at point B in Figure 1—the normal waveform is shown at Figure 2B. Figure 2F shows the abnormal waveform resulting from an increase in R_{260}. Figure 2G shows the abnormal waveform resulting from R_{260} decreasing or shorted out, which would cause the picture to spread out at the right and a white vertical bar to appear down the center of the raster. When replacing these components, exact replacements or components having the same characteristics should be used.

If the coupling capacitor C_{256} should develop leakage, the following symptoms might occur; instability of the horizontal oscillator, loss of sync, picture overlap, hold control becomes ineffective or effective only at extreme settings producing a multiple picture or decreased brightness. Should C_{256} be shorted or have very high leakage, loss of high voltage will result because the oscillator cannot function. Examination of the waveform at point C of Figure 1 will help to localize the trouble. The normal waveform at this point is shown in Figure 2C and the abnormal waveform is shown in Figure 2H. Comparing the two waveforms, note the change in shape and frequency. The oscilloscope sweep is set at 7,875 cycles per second and with normal conditions we observe two cycles of operation. The abnormal waveform shows three cycles of operation for the same sweep frequency, indicating that our oscillator is running too fast. If the serviceman would put a mark on his scope sweep frequency controls at points where 30, 60, 7,875 and 15,750 cycles

(*Continued on page 8*)

TECH TOPICS

KEYED AGC By W. O. Hamlin

AGC stands for *Automatic Gain Control* similar to the AVC in radio receivers. It is a method of automatically holding the television picture contrast to a uniform level so that the sets contrast control does not have to be adjusted at every fluctuation in strength of the received signal.

Ordinary AGC has the same action as the radio sets AVC. An increase in the received signal strength will increase a negative bias voltage applied to the i f and r f amplifier tubes which in turn reduces the gain of the set. In such a system the time constant* is, of necessity, long. A shorter time constant would cause the circuit to respond to the video modulation and have a degenerative effect on the 60 cycle vertical sync pulses.

Fringe area television is affected by airplane flutter† which is too rapid a change in signal strength for the conventional AGC to follow. In addition, strong noise interference may cause AGC action and reduce the amplifier gain.

Both disadvantages of AGC are overcome by a Keyed AGC circuit. The Keyed AGC circuit used in the Sylvania 509 chassis is shown in Figure 1.

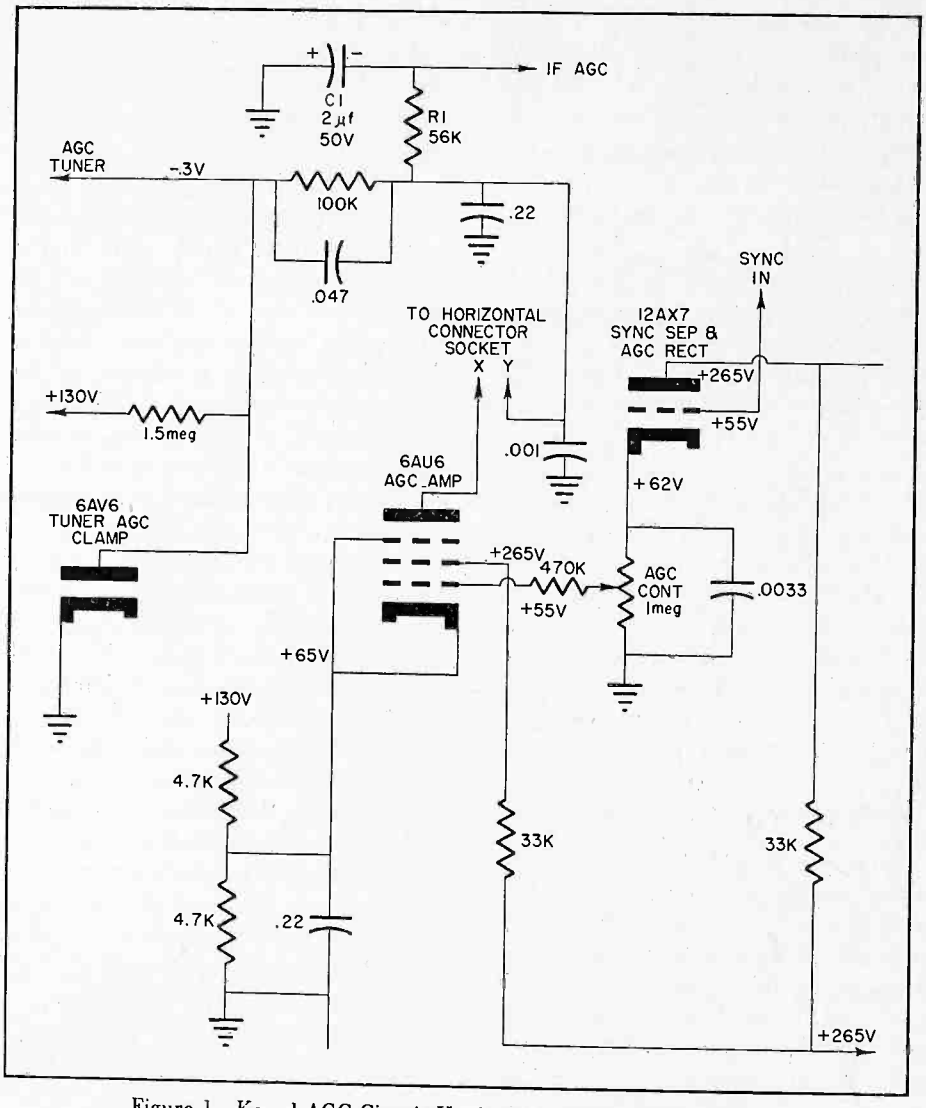


Figure 1. Keyed AGC Circuit Used in the Sylvania 509 Chassis.

The AGC tube is biased below cut-off by a small positive voltage on the cathode (10 volts on the 6AU6 between pins 1 and 7). The tube cannot conduct unless the potential on the plate is increased and the grid potential is made more positive at the same time. A positive pulse from the horizontal deflection circuits supplies the necessary plate voltage in synchronism with the received sync pulses. It is applied to the plate through a dc blocking capacitor or separate winding on the horizontal flyback transformer so that tube conduction may occur at the horizontal sweep rate of 15,750 cycles per second. The amplitude of this pulse is approximately 340 volts peak to peak across X-Y in the circuit shown.

The additional positive grid voltage necessary is supplied by positive horizontal sync pulses of the received signals which are added to the dc grid voltage and cause conduction to occur. Maximum amplitude of the sync pulses is 4 volts peak to peak in the circuit of Figure 1.

Under these conditions, pulses from the video signal and horizontal deflection circuit must both be present for Keyed AGC action. Sync pulse amplitude determines the amount of AGC voltage that will be developed during the horizontal blanking period. It is adjusted by the 1 megohm AGC control for proper contrast and steady picture when receiving the strongest station.

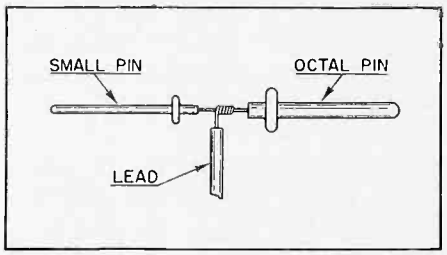
The pulse rectifier (½ a 12AX7) has 7 volts of negative bias which allows only the sync pulses to be applied to the AGC amplifier grid. Keyed AGC action occurs as described and a negative bias is applied to the i f tubes and tuner. R_1 - C_1 is a filter network for the i f stages. The 6AV6 diode clamp prevents the AGC line from going positive on weak signals.

*Length of time it takes the control bias to adjust to the changes in signal strength.
†A very rapid rise and fall in signal strength with passing airplanes.

SERVICE HINTS

TEST SPEAKER CONNECTOR— Many of the auto radios have separate speakers, which are often left in the car as the radio is removed for repair. The problem on the test bench is to wire in the test speaker. I have found that 90% of the auto radios can be serviced with this gimmick.

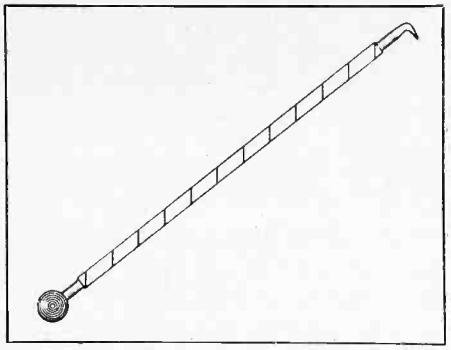
Take one small pin from a vibrator or type 80 tube and one pin from an octal tube. Connect them as shown in the picture. Fasten one lead to the center of the pins. Fasten an alligator clip to the other lead for a ground connection. You insert the proper pin into the radio socket; the small on Ford, Mercury etc., the large on Motorola, Philco, Hudson, Kaiser Frazer, etc.—Frank T. Kurowski, New Hartford, N. Y.



SOLDERING AID — There are many soldering aid tools on the market, however a home made tool is easily constructed.

Before you discard that old auto antenna rod, cut off the top section with the red ball (about 8″). Then grind down about ½″ of the end to a fine tip and bend over into a hook (see picture). You can tape over the rod for insulation.

It can be used for an exploratory probe and soldering aid or as a tapper



for microphonic tubes by using the plastic ball.—Frank T. Kurowski, New Hartford, N. Y.

TROUBLESHOOTING LIGHT — Sometimes I have trouble getting into dark corners when on a service call. I remedied the difficulty by unscrewing the tip of my Ungar soldering pencil and replacing the tip with a 7 watt candelabra bulb. Now I get all the light I need.—Stephen Goch, Bronx, New York.

SERVICING THE HORIZONTAL SWEEP MULTIVIBRATOR

(*Continued from page 6*)

per second sweep occur, he will provide himself with a quick method of comparing operating times in various television sweep circuits and thus be able to determine if the circuits are operating too fast or too slow compared with normal operation.

If R_{258}, the common cathode resistor, should happen to become shorted, from a heater-cathode short for instance, the oscillator will become inoperative causing loss of horizontal sweep and high voltage. Replacing the tube will correct the situation if the trouble is from a heater-cathode short. If heater-cathode leakage exists, but not to the extent to make the oscillator inoperative, the following symptoms might be indicated; loss of horizontal sync, hold control ineffective, raster dim, brightness control ineffective, decreased width and varying the horizontal hold control causes picture brightness to vary. The waveform at point B in Figure 1 will be similar to that of Figure 2F.

R_{255} and R_{259} may increase in value if their rated wattage is exceeded as might be caused by one of the following: A leaky or shorted C_{256}, R_{258} shorted as previously mentioned, or if the oscillator frequency becomes so high that the oscillator tube's average plate current increases. Figure 2A shows the normal waveform at Check point A of the 6SN7GT horizontal oscillator tube and Figure 2J shows the abnormal waveform resulting from increased value of R_{255}. Note the change in shape and frequency of the abnormal waveform. The frequency of the multivibrator is lower, the sinusoidal variations so clear in Figure 2A are flattened off in Figure 2J and the ratio of trace to retrace time has increased.

REPLACING COMPONENTS

Since the proper operation of the sweep circuit is affected to a very great extent by its component values, it should be emphasized that defective components be replaced with exact duplicates. For instance, the coupling capacitor C_{256} should have very little leakage current for proper operation. If this capacitor is replaced by one whose dielectric has very poor insulation quality, normal operation may exist when the chassis is out of the cabinet, but when the chassis is placed in the cabinet the temperature rise of this component may cause erratic operation due to the leakage current increasing as the temperature increases. This fact not only applies to this circuit but to other circuits where the temperature rise effects the components in critical functions. Also, the tolerance of the resistors must be the same as specified by the set manufacturer or proper operation will be impeded. Since the frequency of a multivibrator is critical with respect to the cut-off characteristic of the tube(s) used, the slight variation in characteristics between tubes of the same type may necessitate readjustment of the hold control for most stable operation after a replacement is made.

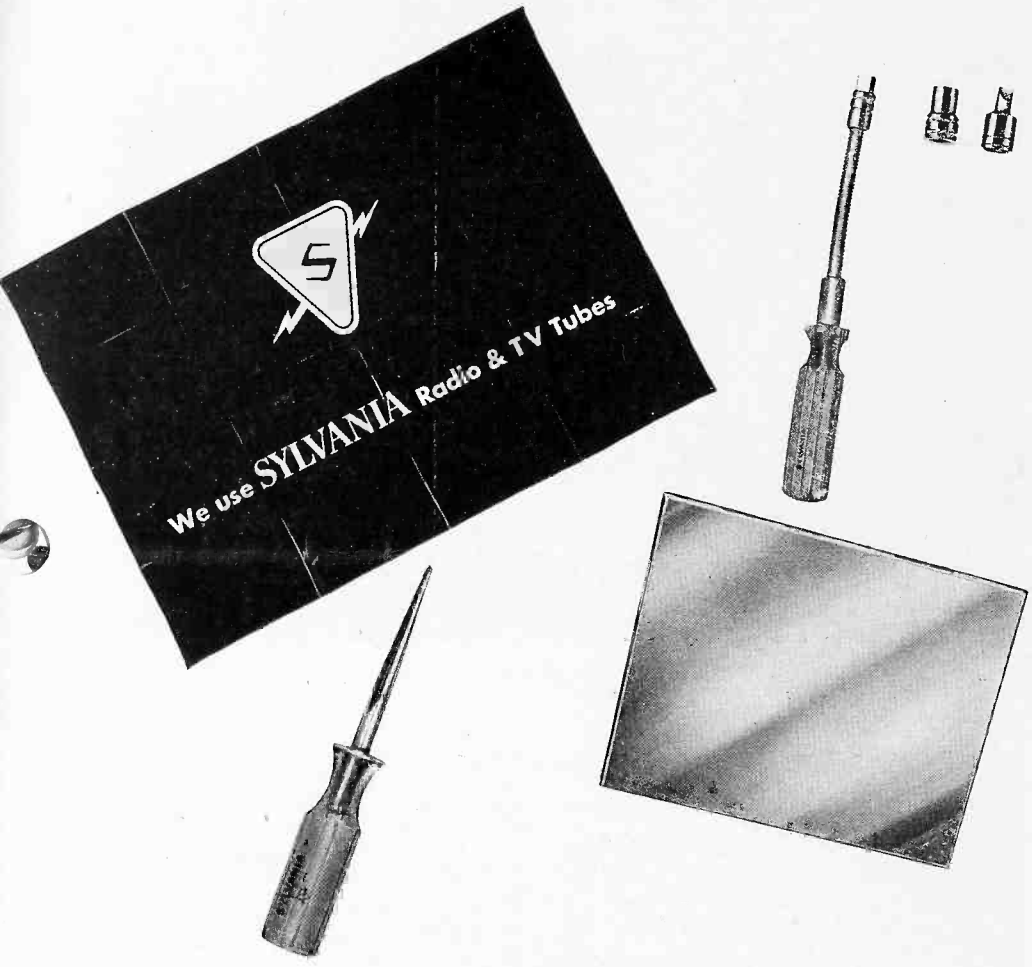
The author wishes to express his thanks to Mr. Carl A. Peterson of the SYLVANIA Commercial Engineering Laboratories for his assistance in taking the photographs which appear.

SYLVANIA NEWS

MERCHANDISING SECTION

NOVEMBER 1953 Vol. 20, No. 10

SYLVANIA'S 10 FOR 4 SPECIAL FREE . . . MAKES YOUR SERVICE WORK EASIER



Sylvania's big 10 for 4 special is the greatest combination of tools and aids ever offered a serviceman. It is yours —free—at your Sylvania Distributor with your purchase of Sylvania receiving and television picture tubes, beginning November 1st.

The 10 for 4 special means that you collect 10 Sylvania premium tokens and give them to your Sylvania distributor for 4 sensational tools and aids. Remember, you get one Sylvania token each time you purchase 25 Sylvania receiving tubes or one TV picture tube.

Sylvania looked far and wide before they were able to offer you this tremendous service package. Once you start using the service tools and aids, you'll never know how you did without them.

Just think, you get a drop cloth—a big 36 x 48 inches—made of strong, durable, vinyl plastic. It cleans easily; it keeps the customer's home clean; and you will find it useful around the shop. When you use it in a customer's home, you will help to sell your service as a clean, tidy operation.

Also in the 10 for 4 special is a mirror for making linearity adjustments in television servicing. It is of ample size and made of polished steel for durability. It comes equipped with a handy-to-use easel back.

And that's not all! You get a reamer with a strong, sure-grip plastic handle and a hardened steel head which is precision grooved and useful for many jobs. It will give you good service and will last for years.

Lastly, there is the flex spinner wrench. It, too, has a strong plastic handle, as well as a flexible steel neck. It comes equipped with different stainless steel heads, screw driver and one-quarter inch hex wrench. It is designed for those hard-to-get-at spots, and once you have used it you will wonder how you ever did without it. In the shop and on home calls you will find it something that will save you minutes and money.

The Sylvania 10 for 4 special is the first in a long line of highly useful service aids that will make outstanding additions to your Sylvania T-N-T Chest. You will want to ask your Sylvania distributor about all of them as they come along, because they are designed to make your service work easier.

Your Sylvania distributor has the 10 for 4 pack now. See him today. Purchase your supply of Sylvania receiving and picture tubes and start saving your Sylvania tokens. You have until the end of the year to collect the 10 you need for the 4 valuable tools and aids being offered.

RADIO ENGINEERING INSTITUTE OF OMAHA OFFERS COMPLETE RADIO TRAINING COURSE TO BLIND STUDENTS

Radio Engineering Institute of Omaha, Nebraska, is the only school in the world, so far as we have been able to learn, that offers a complete radio training course to the blind. Based upon the experience of Lavon Peterson, born blind and long an expert radio technician, the school is able to train a blind man with necessary ability in this highly skilled and specialized work.

Radio Engineering Institute has been carrying out a program for training blind and handicapped persons in repairing of radios since the fall of 1945. Students have been drawn from the 48 states and many graduates are now operating their own shops successfully from coast to coast.

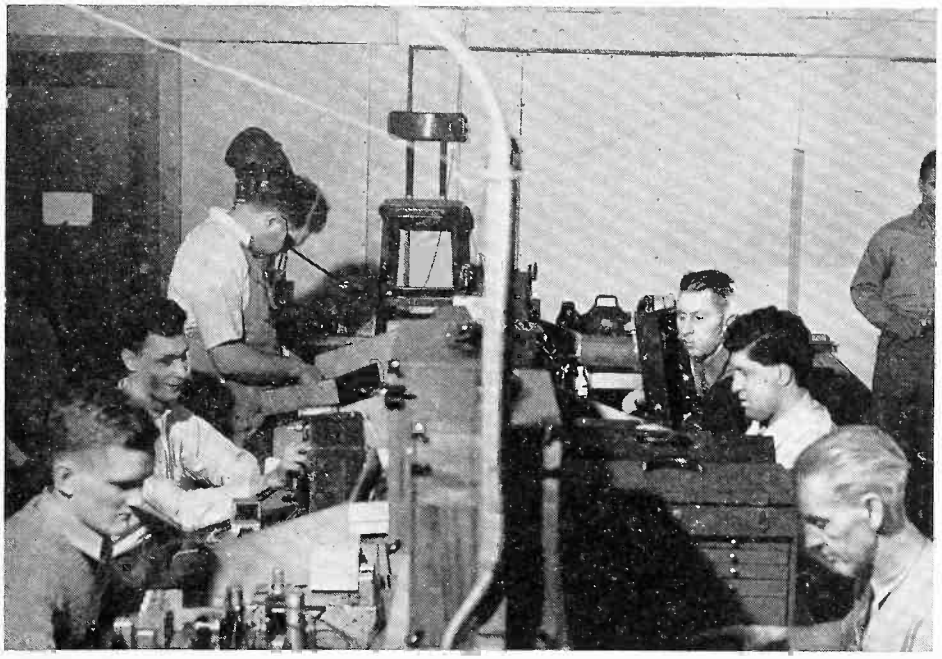
This course for the blind is for a period of one year, five months of which are spent in learning the fundamentals of radio and component circuits. The remaining months are devoted to the actual repairing of radios—the student's practical training. The radios students work on are brought in by the public and are repaired at cost. Contrary to the sighted person who can study the diagram on a circuit, the blind student must have a mental picture of the component parts of the radio circuit in his mind continuously. This, with a certain amount of dexterity of the hand which he acquires from his practical experience, constitutes the training Radio Engineering Institute gives its students.

Special methods of handling conventional tubes have been devised. The blind can be taught to do an expert job of soldering. Circuits can be traced, tubes and parts can be solved as a result of this unique school's training.

It has also developed several types of testing equipment that makes it possible for the blind to make the

(Continued on page 12)

Lavon Peterson is shown demonstrating the Braille meter attachment before a group of blind trainees.



Here are some Radio Engineering Institute students building and repairing radios.

OVER 25 MILLION TV SETS IN HOMES

A total of 376,000 television sets was installed in this country during the month of July to bring the United States total of homes with TV receivers as of August 1 to 24,895,000, according to an estimate recently released by Hugh M. Beville, Jr., director of research and planning for the National Broadcasting Company. However, with installations during the month of August, the total at the present time is now substantially in excess of 25,000,000.

In the 12 months since August 1, 1952, 6,540,000 U. S. homes have acquired television sets. This compares with an increase of 5,083,000 TV families during the period of August 1, 1951 through August 1, 1952, according to the latest figures compiled by NBC.

TV Interference Aids Distributed

RETMA, in connection with the Washington Television Interference Committee and the Electric Institute of Washington has prepared two educational aids on the causes and cures of Television interference for distribution to all TV Service Dealers and Technicians in the greater Washington, D. C. Area. It is pointed out in a pamphlet on the general subject of TVI that the Radio amateur is actually involved in "only a small portion" of the television interference picture.

A number of other causes of the complex TVI problem are detailed, leading to the conclusion that "the average television receiver owner is not trained either to diagnose or to understand his personal interference situation. He requires honest and intelligent advice from his television technician."

More New Sylvania Truckload Members of Picture Tubes Club

(*Continued from page 3*)

The top photograph shows a truckload shipment to Stolz-Wicks in Milwaukee, Wisconsin. Left to right: Harry Retzlaff; Irv Wicks, partner; John Wicks, John Stolz, partner; Lloyd Simmons and Don Lau. This truckload of Sylvania television picture tubes was one of the feature events in the celebration of the recent opening of Stolz-Wicks new store location.

In the bottom photograph is a truckload shipment of Sylvania TV picture tubes to Ackermann Radio Sales, Milwaukee, Wisconsin. This is yet another instance of a Sylvania distributor stocking fast moving Sylvania picture tubes by the truckload, to meet the great dealer demand.

Left to right: the truck driver, Sylvanian Jerry Driscoll, Marge Ackermann, Gladys Schowalter, Nora Eigner, and Charles Ackermann, owner of Ackermann Radio Sales.

The boys at Figart's Radio Supply Co., Los Angeles, Calif., are proud to advertise the Sylvania products they sell. Their shirts tell their customers what they think of Sylvania Receiving and Picture Tubes. Left to right: Dana Hoover, Frank Ropes, Fuad Huwaidi, Ron Tew, Dick Stowell, Jim Pelham, Wes Pearson, Al Stephens, Fred Dering.

SYLVANIA NEWS

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VOL. 20, No. 10 NOVEMBER 1953

PUBLISHED BY
SYLVANIA ELECTRIC PRODUCTS INC.
MANUFACTURERS OF SYLVANIA RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES, FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, ELECTRIC LIGHT BULBS, PHOTOLAMPS, RADIO AND TELEVISION RECEIVERS.

RADIO ENGINEERING INSTITUTE COURSE

(*Continued from page 10*)

necessary tests and measurements vital to his profession. As each student goes through his training, he builds and learns to use this equipment. Upon graduation, each student takes his testing equipment with him for use in his own business.

Such a course makes the blind student feel that he is not entirely dependent on someone else and is qualified to be self-supporting. From the psychological viewpoint, these students have the feeling of having accomplished something, plus the satisfaction of being in business for themselves.

Radio Engineering Institute, in addition to its radio technician course for the blind, also offers a full range of normal specialized training for sighted radio and television technicians. Directors of this admirable institution are Lavon Peterson and W. B. Weddington.

GEORGE SHEEHY IS NEW SALES REPRESENTATIVE

Harold H. Rainer, sales manager, distributor tube sales for Sylvania, recently announced that George A. Sheehy, formerly manager of the Sylvania New York warehouse, has been promoted to the position of sales representative for the Sylvania radio and television tube divisions. Sheehy, who has been with Sylvania since 1949, will handle distributor renewal sales for the company in the North Jersey areas.

He will make his headquarters at 1740 Broadway, New York 19, N. Y.

In This Issue

SYLVANIA NEWS

TECHNICAL SECTION

DECEMBER 1953 Vol. 20, No. 11

William O. Hamlin, Technical Editor

SERVICING THE VERTICAL SWEEP MULTIVIBRATOR

BY G. L. QUINT - TECHNICAL PUBLICATIONS SECTION

The plate-coupled multivibrator is another of the popular *relaxation* oscillators that is sometimes used for producing the necessary scanning signals in television receivers.

Many different tube combinations and circuit versions are used for the vertical oscillator. Some manufacturers combine the output stage as part of the oscillator circuit while others use an oscillator circuit complete in itself driving a separate output amplifier.

The 1953 DuMont sets use a 6AB4-6S4 multivibrator with the 6S4 serving also as the vertical output amplifier. 1954 Zenith chassis 19L26, 19L28; and the earlier chassis 19K20, 19K22 and 19K23 combine one section of a 12AX7 with the 6AH4GT output stage to form the oscillator circuit.

General Electric 1954 models, 'EE' chassis, on the other hand, employ a 12BH7 twin triode oscillator driving the separate 6AH4GT output stage. RCA KCS82 chassis use the same configuration with different tubes. A 6SN7GT twin triode functions as the oscillator with a 6K6GT for the output stage.

CIRCUIT OPERATION

Figure 1 shows the plate-coupled multivibrator type vertical sweep oscillator as used in the Zenith 19K20, 19K22 and 19K23 chassis. The 6AH4GT vertical output stage is also part of the oscillator circuit. Conditions necessary to produce oscillations are accomplished by coupling the plate of the 12AX7 to the grid of the 6AH4GT via C67, and by coupling the plate of the 6AH4GT to the grid of the 12AX7 via the voltage divider (C68, C69), another voltage divider network (R91, C70, R89), and R87-C71. This elaborate coupling circuit is necessary to attenuate and shape the high voltage pulse present at the plate of the 6AH4GT. To observe and measure the waveform present at the output stage plate necessitates the

(*Continued on page 6*)

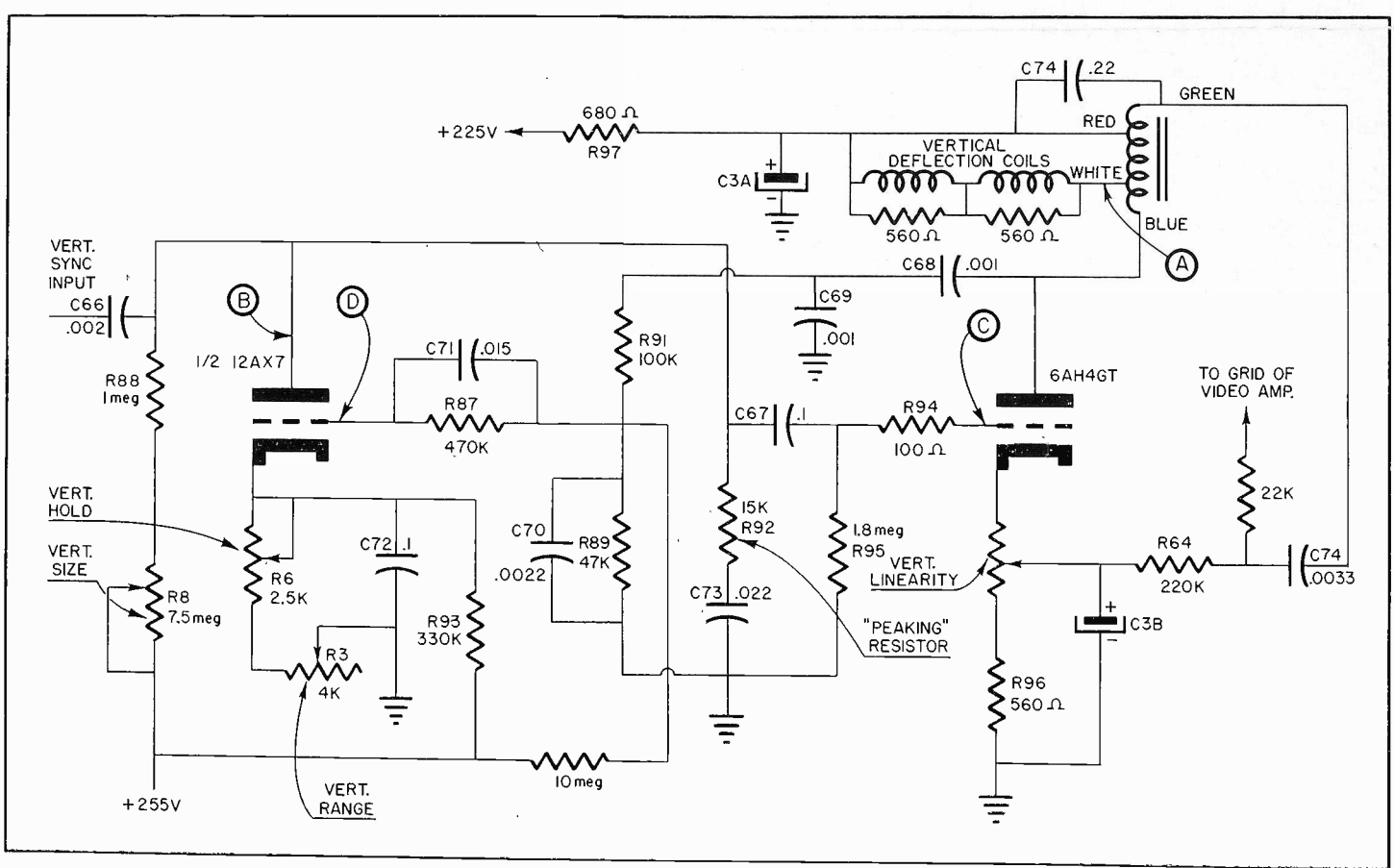


Figure 1. Vertical Multivibrator Oscillator for Zenith Chassis 19K20, 19K22 and 19K23.

SERVICING SWEEP MULTIVIBRATOR

(*Continued from page 5*)

use of a voltage divider that will not distort the waveform in order to keep within the input voltage rating of the oscilloscope. A more convenient method of checking the output waveform of this stage is to observe the waveform at the tap of the vertical output transformer which feeds the vertical deflection coils. The pulse amplitude here is usually of the order of 100 to 200 volts, eliminating the need for a voltage divider.

R8, the vertical size or height control, and R88 form the plate load for the 12AX7. These high values assist in producing better sweep linearity because the RC time constant of the sweep interval for C73, the sweep capacitor, is very long compared to the duration of the vertical sweep time interval. Thus, the charge of C73 is confined to the time during which the charging portion of the exponential curve is fairly "linear." R8 functions as a height control by varying the amplitude of the charge on C73.

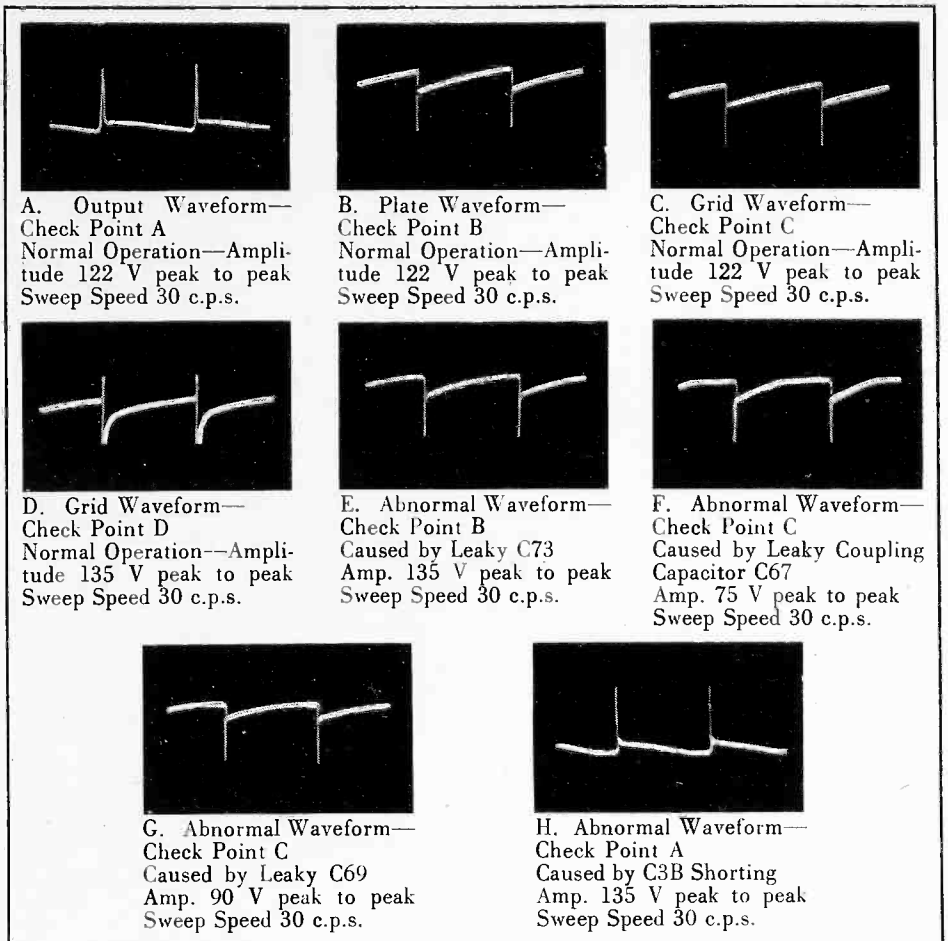
The "trapezoidal" voltage necessary to produce a linear current in the deflection coils is produced across R92 and C73, which in turn is amplified in the vertical output stage.

R3 and R6 in the cathode circuit of the 12AX7 vary the bias of this stage and thus control the frequency of the oscillator. R5 in the cathode of the 6AH4GT output stage functions as a linearity control by adjusting the operating point of this stage in such a manner that the non-linearity of the tube characteristics helps to overcome the inherent non-linearity of the sweep voltage developed across R92 and C73.

TROUBLE SHOOTING

The waveforms shown in Figures 2A, B, C and D show the waveforms at the check points indicated in Figure 1 under normal operating conditions. The other waveforms show how malfunctioning components affect multivibrator action, thus producing poor scanning signals with attendant distortion of the picture dimensions and/or linearity.

The troubles discussed do not include tube defects since this is one of the first things the serviceman checks in normal service procedure.



A. Output Waveform—Check Point A
Normal Operation—Amplitude 122 V peak to peak
Sweep Speed 30 c.p.s.

B. Plate Waveform—Check Point B
Normal Operation—Amplitude 122 V peak to peak
Sweep Speed 30 c.p.s.

C. Grid Waveform—Check Point C
Normal Operation—Amplitude 122 V peak to peak
Sweep Speed 30 c.p.s.

D. Grid Waveform—Check Point D
Normal Operation—Amplitude 135 V peak to peak
Sweep Speed 30 c.p.s.

E. Abnormal Waveform—Check Point B
Caused by Leaky C73
Amp. 135 V peak to peak
Sweep Speed 30 c.p.s.

F. Abnormal Waveform—Check Point C
Caused by Leaky Coupling Capacitor C67
Amp. 75 V peak to peak
Sweep Speed 30 c.p.s.

G. Abnormal Waveform—Check Point C
Caused by Leaky C69
Amp. 90 V peak to peak
Sweep Speed 30 c.p.s.

H. Abnormal Waveform—Check Point A
Caused by C3B Shorting
Amp. 135 V peak to peak
Sweep Speed 30 c.p.s.

Figure 2. Waveforms showing normal and abnormal operating conditions. All waveforms taken with reference to ground.

If C73, the *sweep* capacitor, should develop leakage, one or more of the following symptoms may show up in the picture: decreased height, picture flattened on the bottom, height and/or linearity controls cannot be adjusted to produce normal picture. This trouble may be localized by examination of the waveform at check point B in Figure 1. The waveform under this condition is shown in Figure 2E. Note how the *sweep* voltage has started to curve compared to the normal waveform of Figure 2B. The amount of curvature will depend upon the amount of leakage current present in the capacitor. Figure 2E indicates the effect when the capacitor had a leakage resistance of one megohm.

Figure 2F shows the waveform at check point C which results when C67, the coupling capacitor from the plate of the 12AX7 to the grid of the 6AH4GT, becomes leaky. This condition may show up as picture folded over at the bottom, poor linearity, raster may not fill screen, linearity and height controls ineffective, or vertical hold may become very unstable. Note in Figure 2F the obvious distortion of the signal compared to the waveform of Figure 2C for normal operation. High leakage or a short of C67 will cause the oscillator to become inoperative and loss of sweep will result.

Figure 2G shows the waveform at point C which results when C69 becomes leaky. This condition may show up as one or more of the following symptoms on the picture: picture flattens off at the bottom, poor linearity, raster will not fill screen, height and linearity controls cannot be adjusted to produce proper raster, vertical hold unstable, or intermittent vertical scan. Comparison of the normal waveform (Figure 2C) with the abnormal waveform (Figure 2G)

(*Continued next page*)

NOTES ON USING TWIN LEAD SPRIGS

We have had a number of inquiries for further information on the article "Twin Lead Sprigs for Connecting Two TV Antennas to One Feed Line." Reiterating a statement in the article, the one primary limitation of sprigs is that they will not work properly if the high frequency is an odd harmonic of the low frequency. The question then arises as to how close the high frequency channel can be to an odd harmonic frequency for proper operation.

There is no general rule to cover this problem, because it depends upon the 'Q' of the sprig and the distance from the junction to the short in terms of wave length at the higher channel. In general, if the high frequency v h f channel is two channels removed from the low channel harmonic, operation will be satisfactory. Combinations that will not work are listed in the table. Channels on either side of the listed ones are in the doubtful range, especially in the u h f region where a margin of several channels from the harmonic is necessary. The harmonic limitation does not apply if coils and capacitors are used to construct the filter traps.

TABLE 1

Low Channel	*High Channel*
2	7, 21, 40, 59, 78
3	9, 30, 51, 72
4	12, 16, 39, 62
5	27, 54, 80
6	34, 63
7	24, 83
8	27
9	30
10	33
11	36
12	39
13	42

Channel combinations to avoid. Adjacent channels will also be troublesome, especially at the higher frequencies.

One anomalous factor which was not clearly explained in the article is the instance where a quarter wave at the low frequency is longer than three quarter wave lengths at the high frequency, so that it is impossible to construct the high frequency feeder stub as shown in Figure 3. This is easily rectified, as this stub can be any odd multiple of a quarter wave length such as, $^3/_4$, $^5/_4$, $^7/_4$ etc. If the short across the sprig comes very close (in terms of wave length) to the feeder, it is an indication that a harmonic of the low frequency is being approached and the system might not work properly.

Another use for sprigs is at the receiver end of the feeder from a combination u hf-vh f antenna. If the frequency relations are right, you may use them in reverse and connect them to separate receiver inputs for u h f or v h f.

SERVICING SWEEP MULTIVIBRATORS

(Continued from page 6)

shows a curvature and flattening off of the sweep voltage.

Figure 2H shows the waveform at check point A of Figure 1 when C3B, the cathode bypass capacitor for the vertical output stage, develops a short or very high leakage. One or more of the following symptoms may show up in the picture: linearity control ineffective, poor linearity, raster lacks normal brightness except at extreme setting of brightness control. The reason for the decreased brightness may be explained by the fact that should the cathode bias resistor short out due to C3B shorting, or a heater-cathode short, the gain of the vertical output stage increases resulting in a greater sweep current amplitude in the deflection coils. This causes a greater vertical sweep and the raster now covers more area; therefore, the brightness control has to be advanced to obtain normal brilliance. In other words, for a given setting of the brightness control and a normal size raster, the screen exhibits a given amount of light—if we keep the brightness constant but increase the "size" of the raster it is obvious that the brightness will decrease. This same effect may result due to a lowering of the high voltage output of the flyback supply for the CRT anode, in which case the picture is said to "bloom." If this condition exists it may also be accompanied by a shortened horizontal scan.

It should be emphasized again that defective components should be replaced with exact duplicates as far as electrical characteristics, tolerance, etc., are concerned.

Correction For "Servicing The Horizontal Sweep Multivibrator"

This article appearing in the November issue of the SYLVANIA NEWS, Technical Section, had an error in Figure 2.

To correct this error, simply interchange waveform photographs over the caption labelled 2A and 2C.

TUBE TYPES ADDED TO NEW ROLL CHARTS

(See announcement on page 8)

Tester 139/140

6AJ4	6AN4	6V4	12B4
6AM4	6GL6	12A4	12BZ7
5726			

Tester 219/220

1AG5	6CL6	12BZ7	5881
6AJ4	6V4	5703	6111
6AM4	12A4	5726	6112
6AN4	12B4		

ROLL CHART CORRECTION FOR 228 CR TUBE ADAPTER SETTINGS

219-220 pc No. 18325E roll chart emission reading for 228 adapter should read:

10	15
Bad | Doubtful	Good

139-140 pc No. 15845-H-1-53 roll chart emission reading for 228 adapter should read:

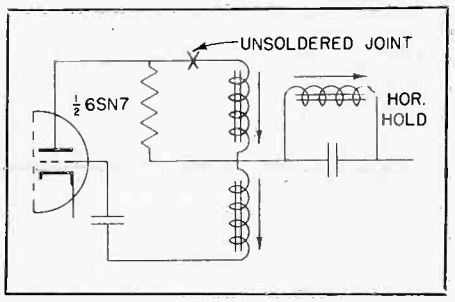
8	12
Bad | Doubtful	Good

SERVICE HINTS

OPEN HORIZONTAL SYNC GUIDE TRANSFORMER — Raster shrinks and shifts to upper right of picture tube, dims and defocuses, and goes out of horizontal sync.

When defect occurred the voltage on the horizontal oscillator tube decreased noticeably. It seemed as though the horizontal sync guide transformer was open yet it showed continuity with the set off.

The defect was finally located as an unsoldered lead on the horizontal sync guide transformer. (See Figure below).—William Miller, Pittsburgh, Penna.



TESTING FOR SHORTS IN TV VOLTAGE SUPPLIES—An indispensable gadget for discovering the cause of burned out fuses in TV sets can be made by soldering a ½ to 2 ampere automobile light bulb across a burned out fuse and inserting same into the TV fuse clips. Intermittent shorts can be located by watching bulb while jarring suspected components.—Blue Radio & TV, Hartford, Connecticut.

When a set has blown a fuse we connect two 120 volt, 40 watt lamps in series across the fuse clips. The lamps light up and don't burn out which gives us a chance to test for shorts. — Jopp Electrical Works, Princeton, Minnesota.

EDITOR'S NOTE—Useful for trouble causing fuses to blow. Lower voltages caused by bulb resistance may prevent the trouble from showing up.

CATHODE TO FILAMENT SHORT IN PICTURE TUBE—The complaint was an intermittent picture on an Emerson Model 690B.

Upon loss of picture there were the symptoms of poor a c filtering—a dark screen except for a 3 inch band of white across it.

By checking with a scope, I found video at the grid of the 6AC7 video amplifier but none at the plate. Pulling the socket off the picture tube made the signal appear at the video amplifier plate.

The trouble was a cathode to filament short in the 19AP4 picture tube.—William Miller, Pittsburgh, Penna.

MOTOROLA MODEL 5A5 PORTABLE RADIO—The rectifier tube in this set is the type 117Z3. Normally the plate lead of this tube, as given on the standard tube basing diagrams, is connected to pin 5. This receiver is wired with the plate lead to pin 1, which is an internal connection that may or may not be to the plate, depending on the manufacturer.

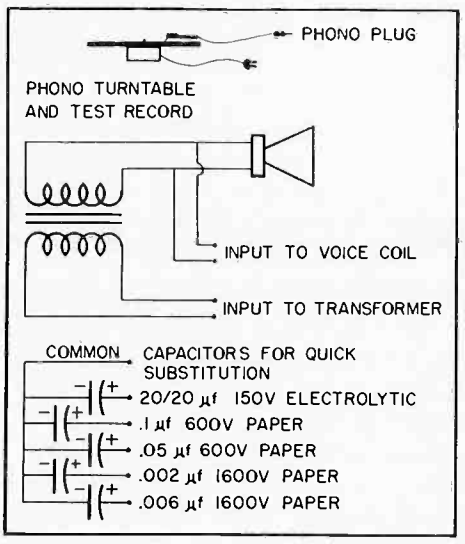
To allow replacement with any 117Z3, simply move the plate lead from pin 1 to pin 5.—Bob and Mary Bair, Hood River, Oregon.

TRAV-LER, MODEL 12T—At first there was an annoying crackling sound. Then it was observed that there were sparks between ground clip and outside of cathode ray tube.

Improving the ground did not eliminate the sparking. Shortly after that the picture would go on and off. Next, no picture and no raster.

Replacing the 500 μμfd 20KV condenser cleared it all up and restored the picture, and eliminated the sparking.—S. J. Manson, Mattapan, Mass.

AUDIO TEST UNIT FOR HOME SERVICE CALLS—In order to eliminate removal of a chassis from a customer's home for minor audio repairs, I have constructed a portable audio test unit as shown in the diagram below, to diagnose troubles quickly.—F. Boettinger, Easton, Pa.



NEW CHARTS FOR SYLVANIA TUBE TESTERS

New Roll Charts are now available to all owners of Sylvania 139/140 and 219/220 Tube Testers. Copies may be obtained at $1.00 each from Sylvania Electric Products Inc., 1221 West Third Street, Williamsport, Pennsylvania. Attn: Mr. Jack Mintzer.

New tube types added to the chart are listed on Page 7.
Between revisions, supplemental settings are published in SYLVANIA NEWS as soon as available.