



# Techni-talk



COMPLETE ELECTRONIC SERVICING INFORMATION  
radio • tv • hi-fi

VOL. 13, No. 1

JAN.-FEB., 1961

## SERVICING TELEVISION TUNERS II

In the last issue the principal causes of tuner failures were discussed with a general description of the VHF tuner unit. In this issue test equipment and loading requirements will be described.

### Test Equipment Required

The test equipment necessary for making repairs to chassis mounted tuners consists of an R-F sweep generator G.E. type ST-4A or the equivalent, a marker generator, G.E. type ST-5A or equivalent, an oscilloscope such as the G.E. ST-12A. (See Figure 1), a vacuum tube voltmeter and a source of bias voltage.

An AM generator in the 40-50 megacycle range with a modulating frequency of 400 or 1000 cycles, although not absolutely necessary, will prove very useful in some cases.

Every precaution must be taken to insure a good grounding between individual pieces of equipment. Correct impedance matching must be maintained between the generator output and the input to the tuner. (See Figures 2a, b and c.) This information is supplied by the manufacturer of the specific equipment used or included in the service notes pertaining to the tuner unit.

A considerable improvement in the results obtained from the General Electric ST-4A sweep generator, when used in the R-F frequency ranges, is possible if the attenuator unit shown in Figure 2c is substituted for the ST-8A balanced output adapter.

### Substitute for ST-8A

The dual carbon 100 ohm potentiometers should be enclosed in a small metal box, preferably copper, so that all seams can be tightly soldered. Suitable connectors for plugging into the generator and out-

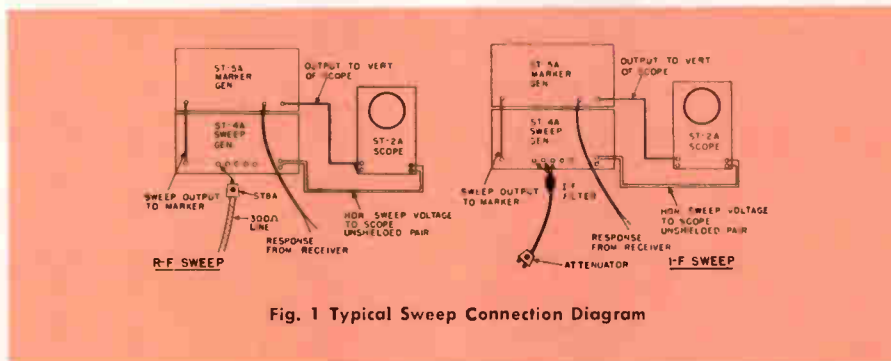


Fig. 1 Typical Sweep Connection Diagram

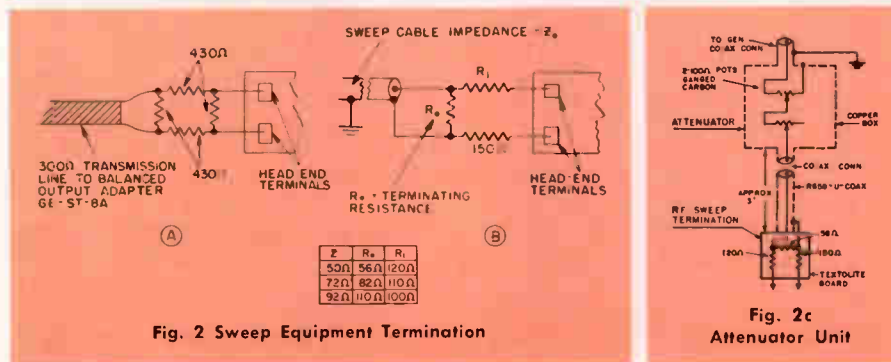


Fig. 2 Sweep Equipment Termination

Fig. 2c Attenuator Unit

put cable should be mounted at either end of the box. The potentiometer shaft extends through the bottom of the box and is fitted with a knob. The top of the box may be sealed or fitted with a tight cover to maintain adequate shielding.

A 52 ohm coax cable such as RG-58U approximately 3 ft. long is used between the attenuator box and the tuner antenna input terminals. One end of this cable is fitted with an appropriate plug so that it may be inserted into the attenuator box. The other end of the cable is terminated in a resistive network which is mounted on a small textolite board

fitted with connectors for ease in making contact to the tuner. This attenuator unit matches the 90 ohm output from the ST-4A to the 300 ohm input at the tuner. However, by making suitable changes in the potentiometer resistance values, this type of attenuator can be adapted to other types of generators.

Several additional pieces of equipment are required in order to service dismantled tuners. Basically, this boils down to a substitute for the original chassis and consists of a holding jig, source of power, and a loading device to be described in the next issue.

**INTRODUCING**  
New **GENERAL ELECTRIC**  
"Service Designed" **CAPACITOR LINE**  
**A FEW WILL DO**

See pages 3, 4 and 5 for details

## Friendly Tips at Income Tax Time

by V. R. Dahlgren

Specialist — Taxes, Royalties and Insurance  
Receiving Tube Department



In this day of constantly changing tax laws and their interpretations, combined with their increasing complexity, it is unfortunate but understandable that many small businessmen may miss opportunities for tax savings unless they themselves carefully follow such changes or avail themselves of the services of qualified legal or tax counsel.

All too often, we tend to ignore the value of a dollar saved in income tax as compared with dollar cost reductions in other areas of our business. The comparison is even more striking when tax dollars saved (or lost) are matched with the equivalent sales dollars. If we assume, for example, that a partner in, or a sole owner of, a business is in the 26% income tax bracket, the following table of comparisons may be enlightening.

Profit Margin on Sales Before Tax	Equivalent Sales for \$1000 Cost Saving (before tax)	Equivalent Sales for \$1000 Tax Saving (after tax)
1%	\$100,000	\$135,135
2%	50,000	67,568
3%	33,333	45,045
4%	25,000	33,784
5%	20,000	27,027
6%	16,667	22,523
7%	14,286	19,305
8%	12,500	16,892
9%	11,111	15,015
10%	10,000	13,514
11%	9,091	12,285
12%	8,333	11,261
13%	7,692	10,395
14%	7,143	9,651
15%	6,667	9,009

The higher the tax bracket on the last increment of taxable income, the more important becomes the dollar of tax savings. It may also be seen that tax savings, as well as other cost savings, become increasingly significant in terms of sales dollars as the profit margin percentage declines. The sales value of any amount of tax saving, regardless of your particular tax rate or profit margin percentage before taxes, may be obtained by using this formula:

$$* \text{Sales Value} = \frac{\text{Tax Saving} \div (100\% - \% \text{ Tax Rate})}{\% \text{ Profit Margin}}$$

The desirability of tax saving having been established, it would seem appropriate to remind businessmen to take a long, close look at their methods and bases used for calculating depreciation of capital assets for income tax purposes. It could well be that a review of your practices in this area, particularly in view of recent liberalizations in the Internal Revenue Code, would result in income tax savings to you.

\*\*Key Moves to Cut Company Taxes\*\* — Copyright 1960 by Prentice Hall, Inc. (Federal Tax Report Bulletin, 1-7-60).

Generally, it is felt desirable to write off depreciable assets as rapidly as possible over the useful life of the property. The amount written off at the end of the useful life, plus the salvage value, should be equal to the original cost or other basis of the property. New assets can now be written off more rapidly by use of the double declining-balance method, sum-of-the-years digits method and others which tend to concentrate the major part of the depreciation write-off in the early years of the useful life of the asset. By so doing, working capital may be retained in the business currently which, under a straightline method of depreciation, would be paid in income tax.

This could be quite an important consideration for an expanding or small business. Your existing method of depreciating older assets, or groups of assets, however, cannot be changed to a more accelerated method without the express consent of the Internal Revenue Service. Consult your tax or legal counsel for more details.

### 1958 Tax Law

The Small Business Tax Revision Act of 1958 incorporated another very useful and advantageous depreciation privilege into the Internal Revenue Code specifically designed to help small businesses. This permits an additional first year depreciation allowance on newly acquired used or new depreciable personal property (not real property) if the taxpayer elects to do so. The extra depreciation allowed in the first year of acquisition is equal to 20% of the cost or other basis provided the aggregate of such costs or other bases in any given tax year does not exceed \$10,000 (\$20,000 in the case of a husband and wife filing a joint return).

There appears to be no necessity of pro-rating this additional depreciation allowance in the first year based on the date of acquisition. Also, the normal or usual depreciation (based on the remaining cost or other basis, but pro-rated from the date of acquisition) may be taken in the year of acquisition in addition to the special allowance. For the reasons mentioned earlier, this can be a definite boon to small or expanding businesses where working capital is in increasingly short supply. Again, consult your local tax or legal counsel for detailed applications to your particular business.

Be sure that you have taken all the depreciation to which you are

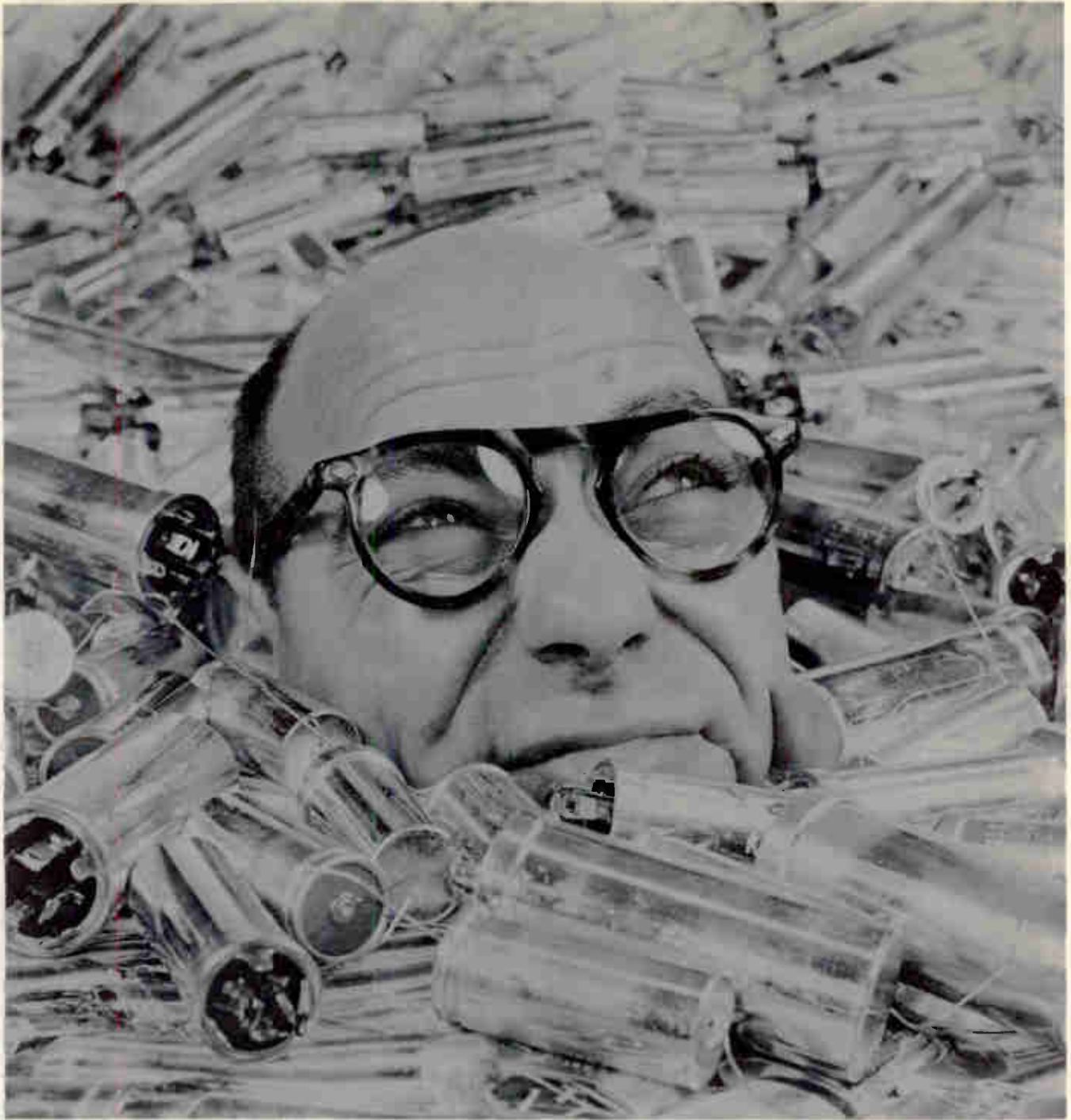
entitled. Forgotten depreciation deductions in prior years cannot be added to future years' deductions. On the other hand, Internal Revenue will insist that *all* allowable depreciation, whether you have deducted it or not, be applied to your cost or other basis when computing capital gain or loss on sale of the asset.

### Check Depreciation Deduction

Check the "useful life" you have set on your depreciable assets. Conditions of wear and tear, use, obsolescence or salvage value may have changed drastically since your original estimation which may indicate a shorter useful life than the one on which your current depreciation is based. If so, shorten the remaining useful life and thus concentrate the remaining undepreciated cost or other basis into a shorter period with consequent higher depreciation in each of the remaining years.

If, for any reason, you may have understated your original cost or other basis (i.e. your depreciation base), your current and future years depreciation should be boosted, using the higher base less, not only the actual depreciation taken in prior years, but also the amounts which should have been taken. Internal Revenue Service will not permit the "picking up" of such added depreciation missed in prior years and adding it to current or future years' depreciation deductions, but your depreciation for current and future years will be increased by higher adjusted depreciation now applicable to those years. Consideration should be given to the advisability of filing amended returns for those prior years still "open," however.

If you feel that changes should be made in your depreciation schedules, be sure the proposed changes are founded on sound economic fact and not "wishful thinking" since you may have to convince Internal Revenue Service that you are right. On the other hand, don't "short change" yourself merely because you prefer not to have questions asked. If the changes you propose are reasonable and legal, you should encounter no difficulty in effecting the changes on your income tax return. Since this article is, of necessity, written in general terms, be sure to consult expert counsel with regard to your individual problems and remember — it is always more profitable to *save* a dollar *after* income tax than it is to *earn* one *before* income tax. Happy filing!



GENERAL ELECTRIC TAKES  
THE **CONFUSION** OUT OF THE  
CAPACITOR BUSINESS!



**A FEW WILL DO!**

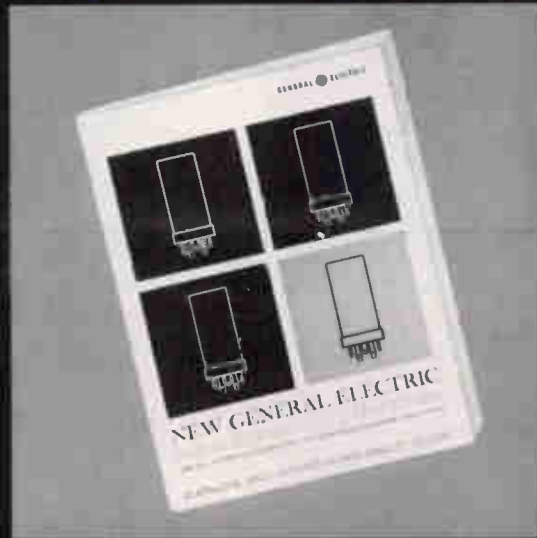
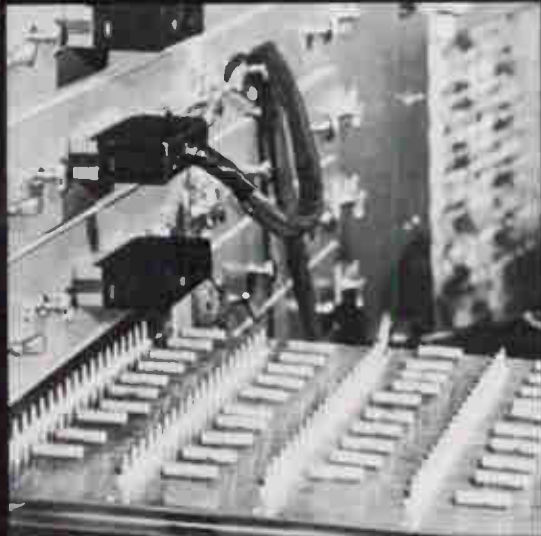
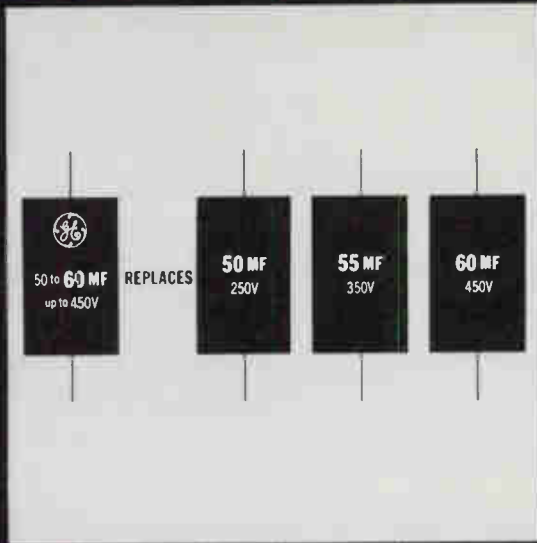


New G-E Capacitor line includes Tubulars, Twist-Prong and Miniature Electrolytics and Paper-Mylar types

General Electric's new line of Service-Designed Capacitors slashes from 1,200 to just 295 the total number of types necessary to make all aluminum electrolytic capacitor replacements! In fact, you will be able to meet 70% of your replacement needs with just 20 types!

General Electric, long a leading manufacturer of original equipment capacitors, has cut the number of types needed for replacement by eliminating the needless duplication and overlapping of many present ratings. Through its new extended-range concept, similar to the one servicemen are already using in replacing rectifiers, G-E has taken the confusion out of making capacitor replacements!

Whether you stock capacitors yourself or order them as needed from your distributor, you will be able to simplify your purchasing and increase your profits on every capacitor replacement you make—because General Electric capacitors are Service-Designed with *you* in mind!



## NEW G-E SERVICE-DESIGNED CAPACITORS

**1. CUT NUMBER OF TYPES BY 75%! You can meet all your needs with fewer types because every G-E capacitor meets not just one, but a range of capacitance and voltage requirements. One G-E capacitor rated "50-60 mfd up to 450 V," for example, will replace any capacitor rated 50, 55 or 60 mfd at any voltage up to and including 450 V.**

**2. MEET MOST NEEDS WITH SMALL STOCK! For the first time it's possible to meet most replacement needs with a small number of units. The 14 tubular types in this Stock-Saver Kit, for example, will meet 9 out of 10 tubular electrolytic replacement needs! And you can buy this kit now from your G-E capacitor distributor at a greatly reduced introductory price!**

**3. LAST LONGER ON SHELF AND IN SERVICE! Because all G-E Alumalytic® capacitors are made with 99.99% pure aluminum foil, their lower-leakage currents reduce**

the chances that you'll ever get a "dud" from your distributor! G-E leadership in advanced-design capacitors for critical military applications brings you unmatched quality.

**4. FREE 100%-COMPLETE REPLACEMENT GUIDE! The most complete catalog and replacement guide ever published shows you in a flash which G-E capacitor replaces any capacitor used in any radio or TV set in the past ten years! For your free copy, see your G-E capacitor distributor or write General Electric Company, Electronic Components Division, Owensboro, Kentucky.**

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**

# BENCH NOTES

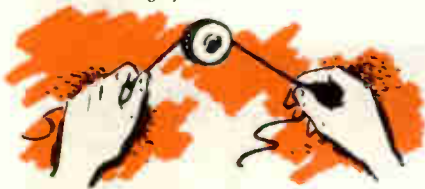


## KNOB REMOVAL

How many times have you run up against hard to remove control knobs?

These knobs can be removed with a shoe lace placed behind the knob. Hold one end in your left hand, the other in your right hand and pull first with one hand and then with the other. The most stubborn control knobs can be removed with ease.

Louis Matz  
9701 Ave. J  
Chicago, Ill.



## CAUTION ON SMOG REMOVAL

Refer to Techni-Talk Oct.-Nov., 1960. Subject—Smog Removal.

Mr. John Cotton of Dallas, Texas (see page 6 of Oct.-Nov., 1960 issue) suggests radio service solvent to remove excessive grime accumulation on picture tubes, *glass tubes* that is, but here's hoping some enterprising neophyte doesn't

try the same solution on the new plastic bonded face plates. If so he will really be in trouble with softening of the plastic and a ground glass effect similar to the ground glass in a camera.

Clifford C. Trout  
440-448 Lancaster Ave.  
Reading, Pa.

## NON-SLIP METERS

Place a few strips of adhesive tape on the slick bottoms of test meter cases and the meters won't be pulled off the bench to the floor. Put the tape on cross-cross fashion.

Harvey Muller, Muller's Mart  
Box 6  
Danboro, Pa.

## PHILLIPS SCREW DRIVER

Make a powerful combination screw driver for removing Phillips screws in cramped quarters, by grinding one end of an Allen wrench so it fits the Phillips screw slot.

The other end of the tool can still be used on conventional Allen set screws.

S. Clark  
Box 2162  
East Bradenton, Fla.

## DRILL STOP

Any technician who has had to drill new holes in a chassis without a drill stop knows how heartbreaking it is to find out that he has just punctured a quad-section electrolytic underneath the chassis, or knocked some connections loose. To prevent this, use as a stop the shaft bushings that are often found in car radios. These usually have  $\frac{1}{4}$ " or  $\frac{3}{8}$ " holes, and so can be used on almost any drill from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " without wobbling. These bushings are usual-

ly secured by Allen or slotted set screws, and provide the advantage of small size and no protruding heads.

Kurt A. Cockrum  
Rt. 2, Box 424  
Vashon, Washington

## PIX TUBE SUBSTITUTE

We have all found it easier or desirable to pull a chassis and leave the picture tube in the cabinet at the customers' home. When this is a series heater type receiver we must substitute a test 8YP4 or something similar.

I have taken a worn out 6SN7 with a good heater and clipped off the keyway and all pins except the heater pins. I use this when I have audio trouble or even while looking for other troubles. I find that even the small 8PY4 is in the way for checking some components on certain chassis. I am also extending the useful life of my test picture tube and taking no chance of accidental tube breakage.

One word of caution is necessary—cover and tape out of contact the 2nd anode lead. Use your test picture tube for final check and testing after repair.

Chuck Belote  
624 Science Hill Dr.  
St. Louis 37, Mo.

Those desiring to have letters published in this column should write the Editor Techni-Talk, Electronic Components Division, General Electric Company, Owensboro, Kentucky. For each such letter selected for publication you will receive \$10.00 worth of General Electric tubes. In the event of duplicate or similar items, selection will be made by the Editor and his decision will be final. The Company shall have the unlimited right without obligation to publish or otherwise use any idea or suggestion sent to this column.

Caution: The ideas and suggestions expressed in this column are those of the individual writers. These ideas and suggestions have not been tried by the General Electric Company and therefore are not endorsed, sponsored or recommended.

# G-E Wireless Remote Control System VII

This is the final installment of this series covering the General Electric Wireless Remote Control System used with the "M-5", "U-4" and "U-5" lines of receivers. In this article the audio frequency alignment of the transmitter will be described.

## Transmitter Audio Freq. Alignment

When alignment of any portion of the audio section of the transmitter is contemplated, it is essential that the remote system receiver be in good operating condition.

Proceed with the audio frequency alignment described below after first allowing the remote receiver at least 15 minutes warming time. Remove the bottom from the transmitter case. Connect a 1,000 uuf capacitor (WT22X28) across C656 (refer to circuit diagram Fig. 2 in Vol. 12, No. 1). Place the transmitter near the receiver and check each push button for proper function. Should any button fail to properly actuate its corresponding function, tune the audio coils as outlined.

In order to easily determine if each function is operating, it is suggested that the cover of the receiver

be removed and the individual sensitive relays be watched for operation as the buttons are pressed. Each function has a separate sensitive relay, and examination of the contacts will determine if the relay is activated. Remember to keep the receiver in the upright position.

## Tuning Sequence

The sequence of tuning is L651, L652, L653, and L654. Depress first the "on-off" function button and hold the function button depressed while performing the adjustments. The same procedure is repeated for each function. Be sure the transmitter is held steady for each alignment. Never readjust a previously set coil without again completing the alignment of each of the succeeding coils.

1. Replace the remote receiver antenna with a dummy antenna. (Fig. 2 in Vol. 12, No. 6).
2. Connect a VTVM, adjusted to read the 10 or 15 VAC scale, from ground to Test Point II. (Fig. 2 in Vol. 12, No. 4).
3. Depress the "off-on" button and move the transmitter near the dum-

my antenna to cause the "off-on" function to be activated.

4. Slowly move the transmitter away from the dummy antenna until the "off-on" function is just barely de-activated.

5. Without moving the transmitter, carefully tune the core of L651 back and forth. If the function is activated, repeat step 4.

6. Repeat steps 4 and 5 until it is no longer possible to activate the "off-on" function by rocking the core of L651 back and forth no more than  $\pm \frac{1}{8}$  turn.

7. While observing the VTVM, adjust L651 for a sharp "dip" in meter deflection.

8. Adjust each of the 4 remaining coils L652, L653, L654 by depressing the corresponding function button and performing steps 3 thru 7 above.

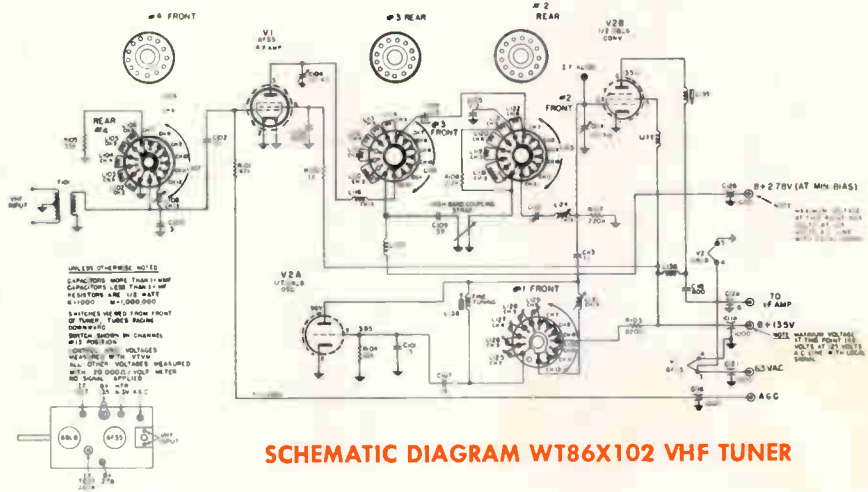
9. Remove the .001 uf capacitor from across C656 of the transmitter. Disconnect the VTVM, and remove the dummy antenna from the remote receiver. Reconnect the remote receiver antenna and from a reasonable distance check the operation of each of the four transmitter functions.

# Tele-Clues

"LW" SCHEMATIC

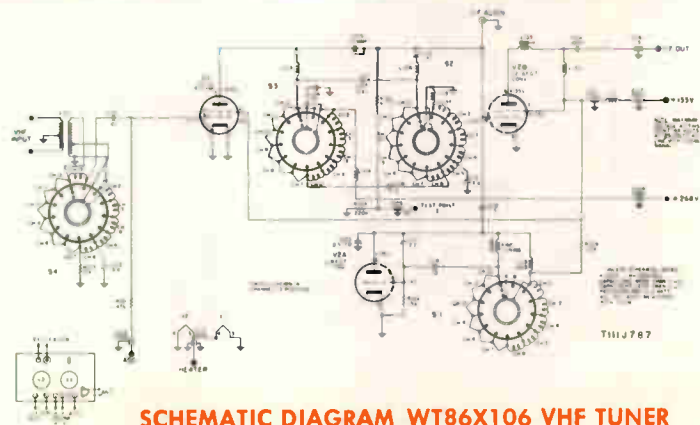
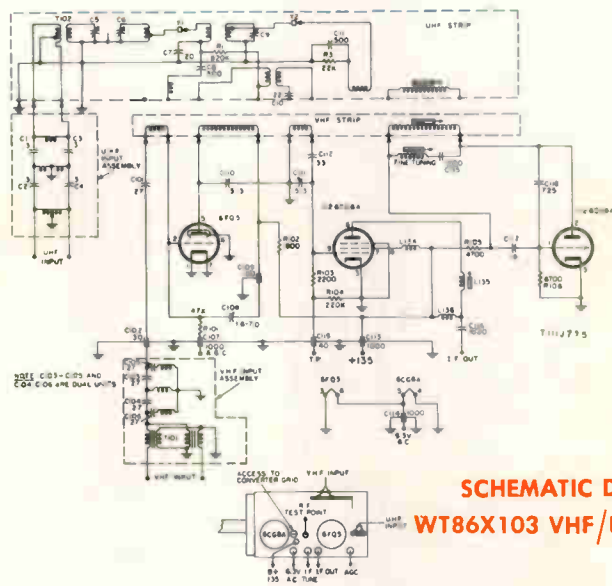


Schematic diagram for "LW" line of General Electric receivers. These receivers use 19 inch electrostatic aluminized picture tubes.

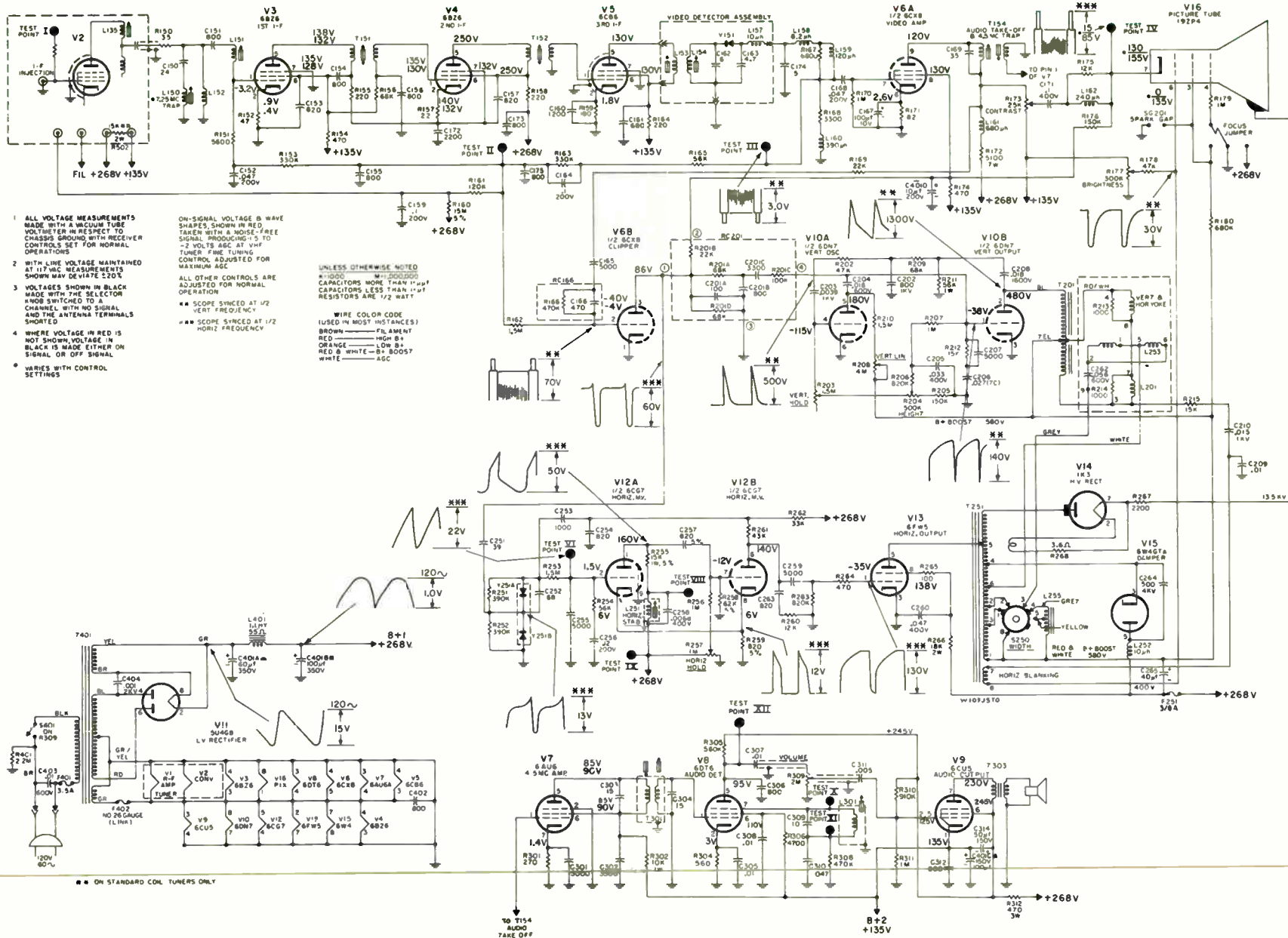


## NEW TELE-CLUE BINDER ETR-1095-A

A 3-ring binder complete with all Tele-Clues and Tele-Clue Schematics plus tabbed dividers is now available from your General Electric tube distributor. This binder will also hold over 100 issues of Techni-Talk. Ask your distributor for ETR-1095-A or use order coupon on page 9.



### "LW" SCHEMATIC WITH VOLTAGES AND WAVESHAPES





# SERVICE NOTES

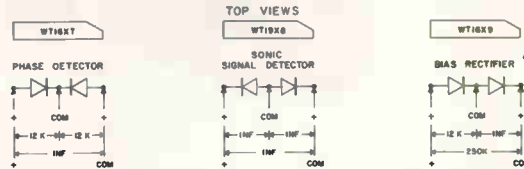
## TELEVISION

### Identifying Dual Diodes

The new line of General Electric television receivers employs three dual combinations. One is employed as the horizontal phase detector (WT16X7). Two are used in the Sonic Remote Receiver Circuitry, the first as a Signal Detector (WT16X8) and the other as a Bias Rectifier (WT16X9). Physically these diodes appear to be much the same but electrically they differ greatly. The Phase Detector has common an-

odes, and the Bias Rectifier is series connected. While each diode is plainly marked, a simple ohmmeter check can eliminate any confusion with these components.

The diagram below shows the measurements taken with a Simpson 260 meter. A VTVM may be used and the polarities of conduction shown will remain the same; however, the values may differ with meters as is the case of using other VOM types.



Simpson 260 Meter or Equivalent Set for High Ohms (R x 10,000)

## RADIO

### Fading and Intermittent Audio

Intermittent and fading audio is one of the most exasperating trouble-shooting problems confronting the radio serviceman.

This problem is most prevalent on the radios that employ a copper conductor circuit pattern on both sides of the circuit board. The two conductor patterns are electrically connected through certain holes in the circuit board by a coating of copper.

The contracting and expansion of the circuit board due to thermal action is of such magnitude that a crack or break in the copper conductor may occur in the holes (thru-

cons). A crack or break will cause intermittent audio or a fading effect in reception.

Circuit boards with "thru-cons" were used in models 455, 670, P735, 850, 860, 875, 900D, 905, 911D, 915, 930, 935, and 940.

When intermittent audio is diagnosed, check continuity between both circuits around each "thru-con" with a continuity checker.

When a break is found, insert a piece of bus wire through the hole and solder to the proper circuit point on each side of the board. This will eliminate a recurrence of an intermittent at that point.

### ORDER COUPON

General Electric Company  
Department "B"  
3800 N. Milwaukee Ave.  
Chicago 41, Illinois

Enclosed is money order or check payable to General Electric Company for:

Quantity		Price
.....	ETR-2000 Techni-Talk Binder . . . . .	\$2.00 each .....
.....	ETR-2579 Complete Set of Techni-Talk back issues Vol. 1, No. 1 — Vol. 12, No. 5. (Includes Tele-Clues) . . . . .	\$3.25 each .....
.....	ETR-1095-A Binder with Tele-Clues and Tele-Clue Schematics . . . . .	\$3.25 each .....
.....	ETR-1592 TV Safety Glass Puller . . . . .	\$0.75 each .....
.....	ETR-2037 Pin Straightener . . . . .	\$0.50 each .....
.....	ETR-2008 16 lb. Paper Bags . . . . .	\$9.50 per M .....
.....	ETR-2008-1 10 lb. Paper Bags . . . . .	\$7.50 per M .....
.....	ETR-2008-2 4 lb. Paper Bags . . . . .	\$4.50 per M .....
.....	TOTAL AMOUNT OF CHECK OR MONEY ORDER . . . . .	

Name.....  
Street Address.....  
City, Zone No. and State.....  
(Please Print)

## HEAVY KRAFT PAPER BAGS AVAILABLE IN THREE SIZES



Paper bags printed in blue with G-E product identification are now available from G-E tube distributors. There are three sizes (4, 10 and 16 lb.) which are suitable for packaging various small items sold over the counter.

ETR-2008, 16 lb. size, 1000 for \$9.50

ETR-2008-1, 10 lb. size, 1000 for \$7.50

ETR-2008-2, 4 lb. size, 1000 for \$4.50

The 4 lb. size bag is ideal for use as a receptacle for knobs, chassis bolts, etc., while receiver is being repaired. When repair is completed defective parts can be returned to customer in one of these bags. If customer's name and address is written on the bag it will prevent the possibility of losing or mixing up parts from different receivers. Space on back can be used for dealer's rubber stamp.

Ask your G-E tube distributor to order a supply of the bags you need. If your distributor is unable to supply you, use the coupon on this page and mail to our Chicago warehouse.



### ETR-2037 Miniature Tube Pin Straightener

- Straightens pins on all 7 and 9 pin miniature tubes.
- Helps eliminate tube damage caused by bent pins.
- Red-Orange color makes it easy to locate on service bench or in service case.
- Ask your distributor for ETR-2037 or use order coupon.

# ORIGINAL G-E SERVICE AIDS

## TV Safety-Glass Puller ETR-1592

Here is a real time-saver when removing the safety glass from television receivers. The ETR-1592 TV Safety-Glass Puller is small enough (3" in diameter) to fit in any service case, easy to use and will not leave any marks on the glass. The stained wooden handle provides a natural and secure hold.

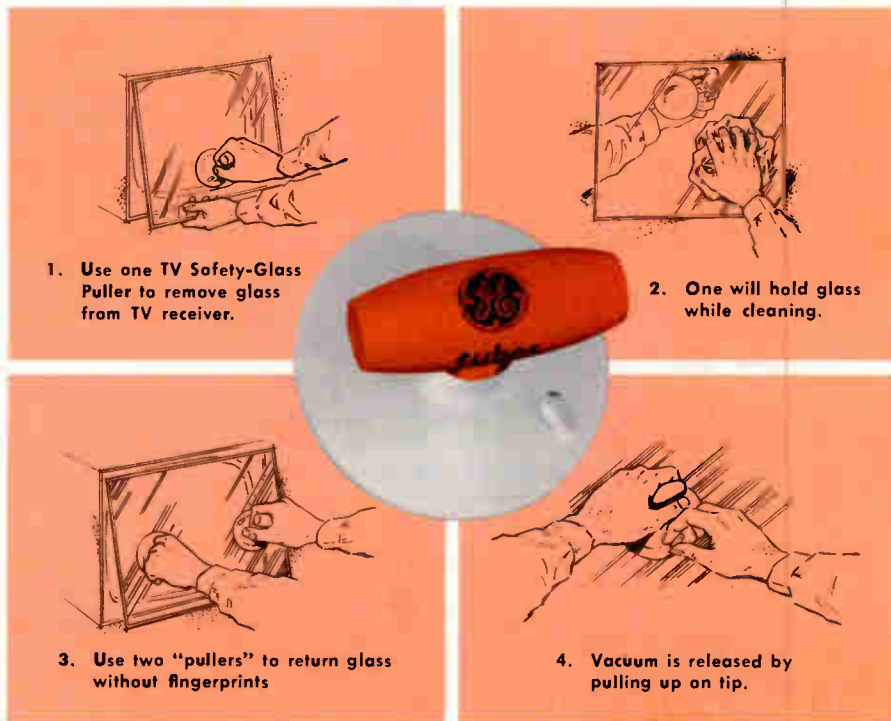
Since the safety glass is seldom removed more than once or twice a year it may stick either to the cabinet or the protective gaskets. The TV Safety-Glass Puller will facilitate glass removal without cracking, chipping the glass or marring the cabinet.

The glass can be securely held on one side with a "glass puller" while the other side is cleaned. When the "glass puller" is removed it will not leave marks.

It is ordinarily almost impossible to return the safety glass to the receiver without leaving some finger marks near the edges of the glass. If two TV Safety-Glass Pullers are used the glass can be replaced without actually touching the glass in any area.

It is easy to use — just press the rubber suction cup on the glass — to remove just pull up on the vacuum release tip.

Why be a "screw driver" mechanic and take a chance on marring or chip-



1. Use one TV Safety-Glass Puller to remove glass from TV receiver.

2. One will hold glass while cleaning.

3. Use two "pullers" to return glass without fingerprints

4. Vacuum is released by pulling up on tip.

ping your customers' property? Use "professional" tools to help create the desired impression.

Ask your G-E tube distributor for a TV Safety-Glass Puller ETR-1592.

If your distributor is unable to supply you, use the coupon on page nine and mail to our Chicago warehouse. The price is only seventy-five cents each.



### Techni-talk



TECHNI-TALK DISTRIBUTION OFFICE

**GENERAL ELECTRIC**

SCHENECTADY, NEW YORK

BULK RATE  
U.S. Postage  
PAID  
Schenectady, N.Y.  
Permit No. 148

VOL. 13, No. 1 JAN.-FEB., 1961

In this issue:	Page
Servicing Television Tuners II.....	1
General Electric Takes the Confusion Out of the Capacitor Business.....	3
Bench Notes .....	6
G-E Wireless Remote Control System VII .....	6
New "LW" Tele-Clue Schematic.....	7
Radio and TV Service Notes.....	9

Techni-talk on AM, FM, TV Servicing, published by-monthly by ELECTRONIC COMPONENTS DIVISION, GENERAL ELECTRIC COMPANY, OWENSBORO, KY. In Canada: Canadian General Electric Co., Ltd., 189 Dufferin St. Toronto 3, Ontario. R. G. Kempton, Editor. Copyright 1961 by General Electric Company.

MR DONALD L HANSEN  
1779 WOODALL DR  
MINNEAPOLIS 21 MINN

E221

RETURN POSTAGE GUARANTEED

This copy of **Techni-talk** comes to you through the courtesy of your General Electric tube distributor.

NOTE: The disclosure of any information herein conveys no license under any General Electric patent and, in the absence of an express written agreement to the contrary, the General Electric Company assumes no liability for patent infringement (or any other liability) arising out of use of such information by others.