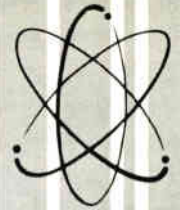




# Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION  
radio • tv • hi-fi



Vol. 16, No. 4

Winter, 1964

## The Oscilloscope — Use in Troubleshooting — 5

In the previous issues emphasis was placed on the importance of utilizing basic measuring instruments for troubleshooting those defective receivers containing other than tube-caused faults. Of equal importance is the manner in which these instruments are put to use.

For instance, when symptoms definitely identifying the fault are obscure, a procedure should be followed enabling the technician to locate the trouble in the least possible time. This procedure should be based on a methodical step-by-step plan of action. By following such a procedure and using the appropriate test equipment at the right time, the defect can usually be found without making repetitious tests or other time-consuming errors.

### Troubleshooting Procedure

Listed below is a suggested troubleshooting procedure. Follow this course of action, carefully eliminating possible sources of trouble during each step, progressing through the tests indicated for each step, until the fault is located:

1. Study schematic — Familiarity with circuitry will help to identify section containing fault.
2. Check tubes — Substitute with known good tubes.
3. Make a visual inspection of components in a suspected circuit — Charred, burned or visually damaged parts can be located in many instances without the aid of test equipment.
4. Make voltage checks of supply and socket voltage preferably with tubes in sockets — Use a 20,000-ohm-per-volt meter in non-critical circuits or use a vacuum tube voltmeter for all voltage checks including grid, agc and other critical circuits. Keep in mind that some voltages in a normal circuit may vary up to 20% in respect to those indicated on the schematic. This deviation from the nominal is generally due to line voltage variations, component tolerances and tube loading variations. It is recommended that these tests be performed with the receiver operat-

ing on a line voltage of 117 volts (or the manufacturer's stated nominal line voltage if different).

5. Make a point-to-point check of supply circuits where abnormal conditions are found in step No. 4 using a voltmeter — Read the source voltage and then take readings on the load side of each component progressing toward the socket.
6. Check grid and cathode voltages — A. An excessive cathode voltage may indicate an open or off value cathode resistor. B. Check grid voltage with the tube out of the socket. Abnormal positive voltages on the grid may be indicative of a leaky or shorted coupling capacitor. This condition generally causes the plate voltage to drop below normal and would be evident during the socket voltage check with the tube inserted.
7. Check resistance of the grid and cathode socket connections to ground.
8. Check supply circuits for hum in excess of the values shown on the schematic using an oscilloscope.

9. Make certain ground connections to chassis are electrically secure.

10. Check signal, synchronizing and sweep circuits with the oscilloscope — Several examples of the procedure to follow are given. This type of step-by-step checking can be used for troubleshooting most circuits. Select a central point and then, dependent upon conditions found at that point, further checking will be done in circuits ahead of or after that point.

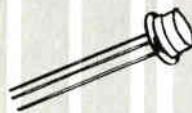
a. If no picture is displayed on the picture tube, use the oscilloscope and check at the video detector. No video at this point indicated the fault is located between the tuner and point of test. If however, normal signal is present, the fault is located between the point of test and the picture tube.

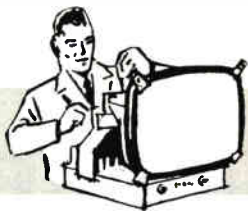
b. If the problem deals with loss of sync, use the oscilloscope and check at the clipper grid. Depending upon presence or absence of sync at this point it can then be determined whether the fault is located before or after the clipper grid. Detailed instructions for troubleshooting specific circuits will be given in future issues.

### No More Loose Caps on G-E Tubes



The top cap on the right is welded and does not require solder which could loosen due to heat build-up.



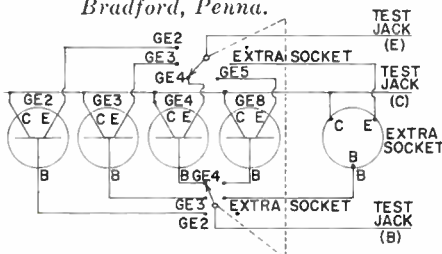


# BENCH NOTES

## TRANSISTOR SUBSTITUTION BOX

Below is the schematic of a substitution box for transistors. I constructed the unit using General Electric transistors GE2, GE3, GE4, and GE8. The switch is of the two pole six position type. An empty transistor socket was used to connect any other transistor into the circuit. I used a 4 1/4" x 2 1/4" x 1 1/2" aluminum utility box to house the unit. Be sure to insulate GE8 from the chassis as it is at collector potential. When soldering do not use any more heat than necessary. In operation DO NOT switch a different transistor into the circuit.

Cal Abbott  
17 Nelson Avenue  
Bradford, Penna.



## MANY USES FOR FOIL

A roll of aluminum foil solves heat problems — even for transistors!

1. Soldering with a long iron, wrap aluminum foil on barrel all the way to tip. As you put the iron down through wires that are close, you won't even scorch one and plastic won't melt.
2. When working on a printed board and looking for a crack pull enough foil from roll to have about 4 or 6 inches to spare over length of board. Cut a small hole just about size of clamp lamp shade in middle of foil sheet and put up on board. Two strips of tape will hold top end. Clamp lamp on bench to shine through hole in foil. Observe from other side of board. The light is concentrated and you see better. The only heat on board is at porthole in foil. Move as necessary to work the whole board.
3. If components are removed from printed board cut them off and take a new strip of foil from roll the size of board plus 4 or 5 extra inches, tape top of foil to board. Turn up the edges of foil to catch drippings. Press foil over. Cut off terminals and replace new component or components. After solder connections cool, gently pull foil away. No heat only on the connections. Also no warped or blistered boards.
4. While working on chassis or soldering in confined areas, put a strip of foil large enough to cover chassis, and press down on place you are going to cut wires. Work foil under parts, cut, replace and solder as usual. After connections are cold, gently pull out foil. All solder beads will be in foil, so lift carefully.
5. When replacing a tuner wrap foil around tuner before disconnecting wires. Press foil gently over connections so when you cut wires or solder, there won't be any bits of wire or solder

beads falling inside tuner — also no parts can change value from heat.

6. While replacing a tube socket use a new piece of foil and press each socket prong through foil. Make solder connections and pull foil away. Socket will not be charred and no solder will get into socket holes.

7. Foil is especially helpful when replacing wires and resistors on those plastic hi voltage sockets and you won't make the plastic soft.

8. Voltage and resistance measurements may require soldering and unsoldering. Take a small piece of foil and wrap completely around capacitor or resistor you are going to check, before unsoldering. Take foil off for measurement and put foil back on to resolder. This will prevent any change in value from heat.

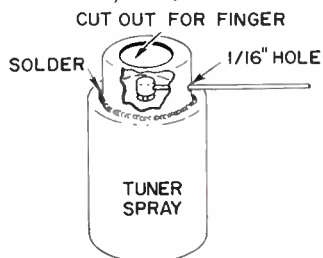
There are many more uses for aluminum foil that you will think of as you use it.

M. E. Bellows  
Box 235  
Big Flats, N. Y.

## SPRAY SAVER

I have on occasions lost 1/2 to 3/4 can of tuner spray in my caddy, which is a nuisance and costly. Take the top of the spray can, cut a 3/4" hole in top for finger to press the nozzle, then drill a 1/16" hole in side for the extension to go through. Also spot solder top to can. Now you have instant use of spray without bother to put on extension or top falling off.

John J. Daugila  
4 Helen St.  
Freehold, N. J.



## GE MODEL M204VYV (LY CHASSIS)

Symptom: Pix rolls requiring resetting of vertical hold control. Pix can be stabilized but as set continues to play the bottom of pix folds up. Removing the vertical osc. and output tube (6JZ8) for a short period and then replacing it corrects condition for a short time before it reappears. This would make you suspect grid emission of the tube.

Remedy: Actual trouble is a leaky .015/400v condenser \* (C41) located just to left of 6JZ8 on printed board and is easily replaced. (Apparently removing 6JZ8 momentarily removes heat of tube affecting condenser.)

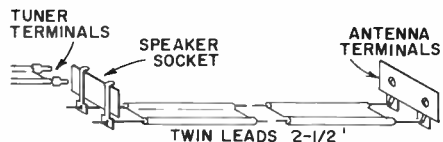
\*Replace with General Electric MPC 6S15

Bill Fisher  
Fisher TV  
760 S. 5th Ave.  
Mt. Vernon, N. Y.

## ANTENNA LEAD EXTENSION

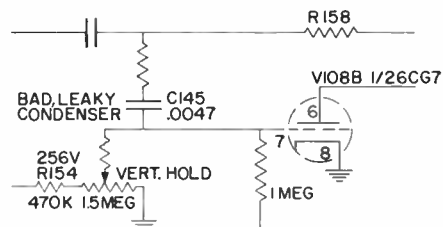
Many TV sets have plug type terminals which connect the lead-in antenna from the back to the tuner. It is very annoying when servicing to take the back off and not have enough room to get at the tubes, without disconnecting the antenna from the tuner. I have made a 2 1/2 foot extension with a speaker socket on one end and a standard 300 ohm receptacle on the other end. This unit is also very useful in the shop when the set has to be removed for servicing. Below is the diagram.

Rudolph E. Petrucci  
John Petrucci & Son  
77 America St.  
Providence, R. I.



## VERTICAL CHANGE

We had a RCA model 17S6022U TV receiver come in from a local motel. The vertical hold would change after the set was on. Get up and adjust the vertical and in a few minutes one had to get up and set the vertical hold again. The receiver would roll after the control was set.



The vertical tubes were OK and voltage readings were taken. These readings were quite normal. It was definite that heat was changing the vertical sync. The tip of the soldering iron was placed on all paper condensers and C145 was the culprit. Clipped out this .0047 Mfd. condenser and replaced with a new General Electric MPC6D47.

An ohmmeter was placed across the condenser terminals, and when cold, read in the high negative scale. With an iron placed alongside, the resistance started to change, and when real warm, read about 200,000 ohms.

Homer L. Davidson  
Davidson Radio and TV  
2821 5th Avenue, South  
Fort Dodge, Iowa

## NOTE:

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.



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2 2
2 3
2 4
2 5
2 6
3 1
3 2
3 3
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**SERVICE NOTES**

**AY CHASSIS —  
HORIZONTAL SHRINKAGE**

Some "AY" receivers may exhibit a horizontal shrinkage during warm-up. These receivers will bear one of the following Pack Codes:

- 54C27            54C30            54C31
- 54D01            54D02

This shrinkage is due to a low resistance value of thermistor R-269 which should be checked if this complaint is reported. Any thermistor reading 600K ohms or lower may cause shrinkage.

**CURE:**

Refer to AY Service Manual Page A Y304, "Sweep Circuit Board Components View":

1. In location 10C, adjacent to R-269, clip the B+ Boost wire (Red-White tracer) 1/2" above the circuit board.
2. Strip insulation from both ends of the cut wire and solder a 100K, ± 20%, 1/2 watt resistor in series with this lead.
3. Cover the joints with tape or spaghetti. Dress the lead away from other components or connections.

The above change was incorporated in production starting with Pack Code 54D03. Receivers having the change are stamped EN127 or higher.

**PORTABLE PHONOGRAPH  
SERVICE HINTS**

**MODEL:** RP-2150 Series

**SYMPTOM:** Distorted audio after unit plays 20 to 30 minutes or longer.

**CAUSE:** Leaky coupling capacitor (C-4 or C-5, .02 x 450v). Can be detected by development of positive voltage on grid V2 or V3.

**CORRECTION:** Replace C-4 or C-5 with .02 x 450v disc type ceramic capacitor.

**MODEL:** RP-2150 Series

**CAUSE:** Impedance between B minus and changer frame.

**SYMPTOM:** Buzz superimposed on hum.

**CORRECTION:** The green lead (ground) from the changer power plug P16 to the amplifier chassis is moved from its present location (one end of R18) to the chassis ground end of C-12. The chassis and changer are then common and grounded to B- through a common capacitor (C-12 .033mf x 600v.).

**CAUTION:** Use extreme care to make sure that the green lead is moved to the amplifier chassis ground end of C-12. To inadvertently move the green lead to the B- end of C-12 would place a serious shock hazard on the changer and cabinet.

**NOTE:** This change was made in factory approximately midway in production.

**MODEL:** RP-2160 Series

**SYMPTOM:** Dead set — no audio, changer won't operate.

**CAUSE:** Open fuse. 1.25A 125V slow blow pigtail fuse is soldered into amplifier circuit board — protects both amplifier and changer motor.

**CORRECTION:** Replace fuse.

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The eleventh edition of "Essential Characteristics" (ETR-15L), the General Electric handbook on receiving, five-star and special-purpose tubes, compactrons, thyratrons, gas filled diodes, television picture tubes, reed switches, photoconductive cells and replacement capacitors, now is available from your General Electric tube distributor.

New tube characteristics added to this edition bring to about 2900 the total number of tubes, including 639 monochrome and 5 color picture tubes.

The new edition contains a number of improvements which will make this

booklet easier to use and even more practical in electronic servicing.

One such improvement which first appeared in ETR-15K is the rearrangement of base diagrams which have been enlarged to make them easier to read. All tube types using the same base drawing are listed with each diagram.

Also, the basing diagrams are arranged in numerical-alphabetical order with four on each individual page. The base diagram portion of each page has been cut so the basing can be viewed at the same time as the tube characteristics. First the base diagram number is located in the "Base Connections"

column for any tube type. Then, without turning the top section, the appropriate base diagram can be located in the lower section and opened so both the electrical characteristics and base drawings are visible at the same time.

The listing of all tube types using the same base diagram should be of considerable value particularly when servicing older model receivers. If a tube type is not available, a check of the electrical characteristics for other tubes with the same basing will enable the technician to determine whether or not a substitute can readily be made with another type.

As before, the book includes typical characteristics curves, tube outline drawings, circuit diagrams showing typical applications of receiving tubes and capacitors, and construction data for speaker enclosures.

Tube classification charts have been expanded to facilitate reference to similar types. Cross-reference listings of prototypes for five-star and special-purpose types and a listing of Foreign Types and American near-equivalents are included.

New additions include outline drawings, characteristics for reed switches and photoconductive cells.

Get the new ETR-15L from your distributor — or if he is unable to supply you, use order coupon on page seven. The price is still \$1.50.



**Techni-talk**



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