



Techni-talk



COMPLETE ELECTRONIC SERVICING INFORMATION
radio • tv • hi-fi

VOL 13, No. 2

MAR.-MAY, 1961

Bench Power Supply for Transistor Radios

The portable voltage supply shown in Fig. 1 will supply all of the power requirements for transistor radio servicing. It is a real time-saver when used with all types of transistor operated devices and is essential when servicing smaller size radios such as the General Electric P830 series.

The unit shown in Fig. 1 is easy to construct and the total cost should run between \$10.00 and \$20.00 depending on the meter used. All parts listed below are standard and can be obtained from your General Electric tube distributor.

Parts List

- 1 10" x 8" x 7" Metal Utility Cabinet
 - 1 G-E Catalog No. 513X46 Panel Meter 2 1/2" 0-150 MA
 - 1 Rotary Switch non-shorting type with 5 positions (Mallory No. 3215 J or equivalent)
 - 1 Phone Jack — 1/4" open circuit type
 - 1 Phone Plug — standard 1/4" size
 - 6 #6 1 1/2 Volt Dry Cells (Burgess or Eveready)
 - 2 Completely Insulated Alligator Clips
- Necessary wire to make internal connections.
3 ft. wire to connect phone jack to phone plug.

The only item that might have to be ordered by a distributor is the utility cabinet. These cabinets are available in about ten different sizes and this particular size might not be in stock.

In order to obtain accurate measurements it is important that the meter have a very low terminal resistance. Since the meter is connected in series with the voltage supply the resistance of the meter can reduce the voltage appreciably.

A meter with a resistance of 100 ohms connected to a circuit with a current drain of 10 ma will reduce the voltage by 1 volt ($E=I \times R$). This is significant because of the low operating voltage requirements for transistor radios. Obviously it would be possible to use a high resistance meter and add an additional battery. A rheostat could then be used to adjust the voltage applied



Fig. 1 Completely assembled power supply for servicing transistor radios.

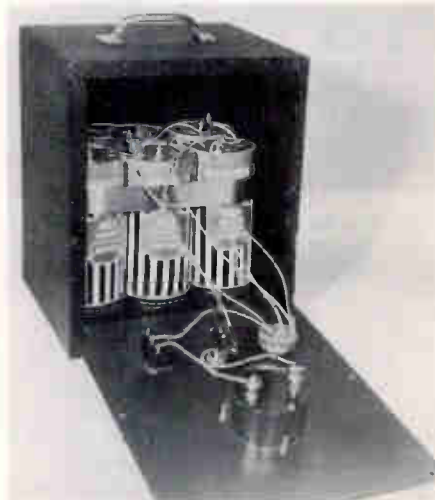


Fig. 2 Inside view with front cover removed.

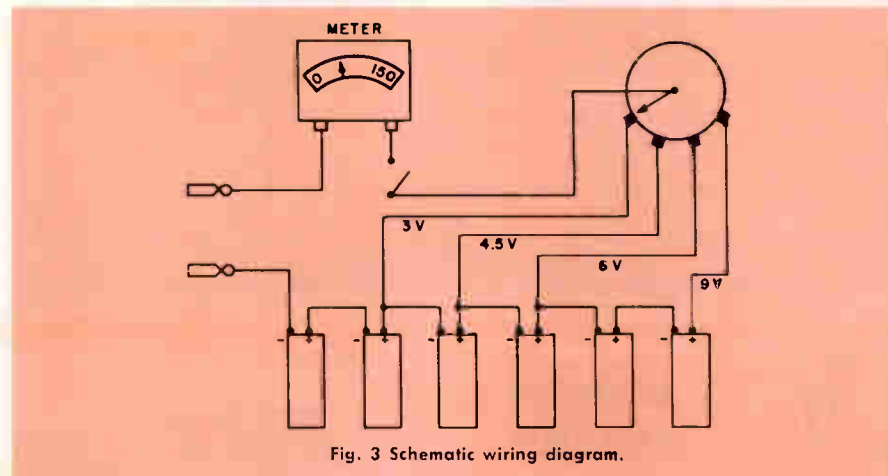


Fig. 3 Schematic wiring diagram.

to each circuit or receiver. This would be time-consuming however, because an adjustment would be necessary whenever the current drain varied such as changing the volume control setting. The meter used and recommended has an internal resistance of 0.33 ohms. Obviously the current flow through this meter cannot materially affect the voltage applied to a circuit or receiver.

A 100 ma meter could be used, however it would be more susceptible to overload and damage particularly in case of a short circuit. Care must be exercised with any meter so that its ratings are not exceeded.

Fig. 2 is a photograph of the internal construction and wiring. Since the schematic shown in Fig. 3 is very simple, no additional wiring information should be required. It should be pointed out, however, that some sort of device should be used to hold the batteries in a fixed position. The flexible metal strap shown in Fig. 2 completely encircles the batteries and is attached to the cabinet with the two center screws which hold the back cover in place.

Technicians engaged in servicing transistor devices will find this power supply well worth the time and expense spent in its construction.



SERVICING TELEVISION TUNERS III

In the last issue test equipment, sweep generator termination and attenuation units were discussed. In this issue the additional pieces of equipment required to service dismantled tuners will be described.

Load and Power Requirements

There are two general ways to satisfy load and power requirements for trouble-shooting a dismantled tuner, namely, a television receiver chassis or a dummy load and power supply. Since most service shops have a TV chassis available for test purposes, a considerable amount of construction will be saved and in addition more realistic response curves will be obtained by this method. A TV chassis will also provide adequate plate and filament voltages for most tuners.

Holding Jigs

Some type of holding device or jig is ordinarily necessary when repairing or aligning dismantled tuners. A suitable jig may be made quite easily as shown in Figs. 1 and 2. A slightly modified bench vice may also be used as a holding jig. The vice must hold the tuner unit securely in place while allowing sufficient space along the sides and top for accessibility to all components and alignment points.

The tuner test chassis should be located close to the holding jig or vice. A terminal strip for the plate, filament and bias voltages should be mounted on this chassis and located near the holding jig. Leads from this terminal strip should be terminated in small test clips with insulated sleeves. This will facilitate the operation when changing tuners.

The video detector output can also be brought out to this terminal strip for ease in connecting the scope. A short length of low impedance coax such as RG-59U should be used in

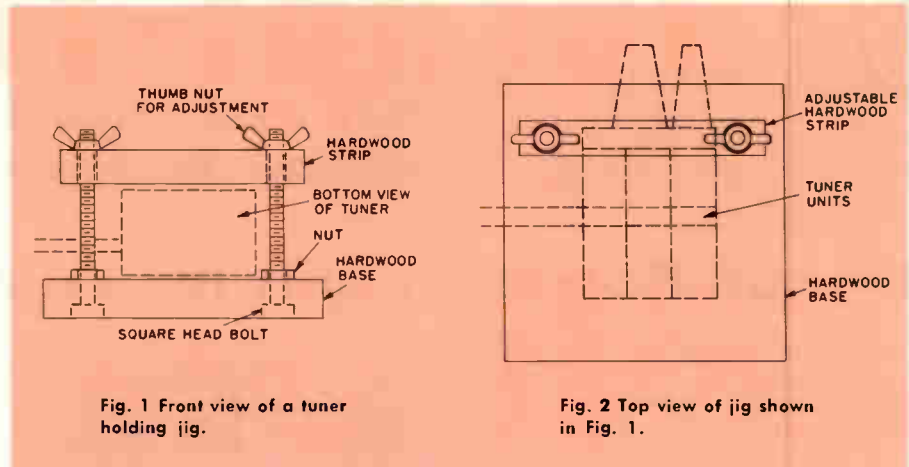


Fig. 1 Front view of a tuner holding jig.

Fig. 2 Top view of jig shown in Fig. 1.

connecting the tuner output to the chassis i-f input except on those tuners which have their own output lead as an integrated part of the tuner. In this case the lead is usually a coax or low impedance twin lead which accompanies the tuner when it is dismantled from the chassis. Provision should be made on the test chassis for connecting this lead to the i-f input.

Bias voltages can be obtained from a battery source or from a bias supply such as the one described in the Volume 12, No. 3 issue of *TECHNITALK*. Make sure the correct bias voltages are applied to the chassis as well as the tuner.

Test Set-Up

When the test chassis and holding jig are ready for use make the following test to insure that the set-up is correct. With a known good tuner of the type specified for that chassis and mounted on the test chassis, check both r-f and i-f alignment. Make the necessary adjustments in

accordance with alignment instructions published in the applicable service notes. When this is done, detach the tuner and mount it in the holding jig. Again check overall alignment; if adequate care has been taken in setting up this equipment, only very slight discrepancies will be found in the alignment curves. If too great a discrepancy exists, such as improper marker positioning and a non-symmetrical response curve or excessive tilt, check for:

- A. INADEQUATE GROUNDING of individual pieces of test equipment including the chassis and tuner unit.
- B. COAX LEAD TOO LONG. This lead should not be longer than eight to ten inches.
- C. DEFECTIVE COAX LEAD. Check for leakage between conductor and shield due to excess solder or flux.
- D. INADEQUATE GROUNDING at either end of the coax shield. One end of the coax should be grounded

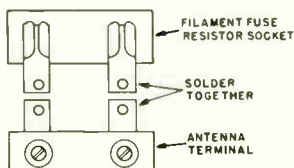
(Continued on page 9)



ANTENNA CONNECTOR

For those antenna leads from tuners that terminate in pins, I have made up the following gadget. A filament fuse resistor terminal socket and an antenna terminal connector soldered together make a quick and solid connection. Make up several and keep them handy.

Dewey Jackson
Jackson's TV & Radio
2614 W. Beverly Blvd.
Montebello, California



IRON CLEANER

Cut the handle off an old wire scratchbrush and mount it permanently on the workbench where most soldering is done, you can then wipe your soldering iron or gun clean without leaving your work.

Mounted near a vise, the brush also saves time and steps in cleaning hand-held components.

E. Mayover
1601 — 14th St. W. (U.S. 41)
Bradenton, Florida

SPARE TIPS

Save those blown out fuse resistors such as the 5.6 and 7.5 ohm types. You can unsolder the plug-in tips and use them for other purposes. They come in handy for speaker and antenna connections on TV or radio receivers that need them.

Charles Jackson
General Delivery
Buckner, Ill.

PENETRATING PEROXIDE

We're seldom without a small bottle of hydrogen peroxide in our service kits.

A few drops of it left to soak a few minutes will make the most stubbornly-tight screw, nut or bolt yield with magic-like ease.

Advance TV-Radio
991 Forty-Second St.
Sarasota, Florida

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.

NEW G.E. ELECTRON GUN

TYPICAL STAGES IN THE DESIGN
OF A GENERAL ELECTRIC PICTURE TUBE ELECTRON GUN



Use of Rubber Membrane Analog

The design engineer is utilizing a rubber membrane analog where the electric fields of an electron gun are replaced by the surface of an elastic membrane. The tension and height of the membrane are adjusted, and highly polished metal balls are dropped on the surface. A high speed camera and a stroboscope are used to photograph the trajectory of an electron beam as simulated by the path of travel of the balls.



Testing New Design Cathode-Filament Assemblies

The cathode, an element of the electron gun, emits electrons when heated to the proper temperature by a tungsten filament. Newly designed cathode-filament assemblies are shown here mounted in a bulb which is evacuated and the cathode temperature carefully measured before the designs are approved.



Shadowgraph Checks Assembled Gun

Having assembled a prototype electron gun in the laboratory, the technician magnifies it on a shadowgraph, permitting her to check very closely the accuracy of the spacing, orientation and alignment of the various electrodes.



Check of Focus Quality

The prototype electron gun is sealed into a tube and the various characteristics are checked. Here the growth of the cathode spot on the phosphor screen with increase in electron beam current can be examined. This is a measure of the focus quality of the electron gun under varying drive conditions.



Latest Gun Design Now Used in Black-Daylite Picture Tubes

This is the culmination of the design process, General Electric's latest very short electron gun used in the 23KP4 picture tube. This gun is designed to provide extremely sharp focus and resolution and to operate at very high voltages.

HEART OF THE GENERAL ELECTRIC PICTURE TUBE

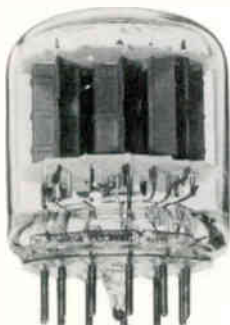
The heart of the General Electric picture tube, the element which more than any other determines the life and quality of the tube, is the electron gun. The adequacy of its design, the selection of materials, the care in cleaning and assembling the gun parts are prime factors in giving the consumer a product with which he will be completely satisfied.

The electron gun does what its name implies. It "shoots" a beam of electrons towards the phosphor screen which is deposited on the tube face. The energy imparted to the phosphor screen by the electron beam is released in the form of visible light on the tube face. To perform its function properly, the electron gun must first contain an abundant reservoir of electrons for dependable long life; and secondly, it must direct and focus the beam to pinpoint sharpness at the point of contact on the phosphor screen. This precision focus must be maintained when the beam is swept completely across the tube face from top to bottom and from side to side.

Being well aware of their importance, General Electric designs and manufactures its own electron guns at its modern facilities at Electronics Park in Syracuse, New York. There experienced tube engineers leave nothing to chance in creating guns to the most exacting standards for specific applications. Such factors as tube size, length, deflection angle, neck diameter, sweep power requirements and available anode voltage, to name a few, are considered when preparing new gun designs. Computer and analog studies are made to analyze such parameters as beam trajectory, focus lens structure and field strength. Magnified models of proposed gun designs may be made and immersed in an electrolytic plotting tank where field patterns are measured and traced. Such devices are employed to do away with the old trial and error method of research and design.

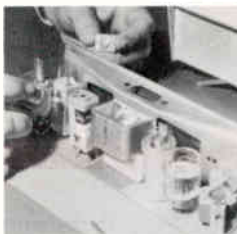
As these theoretical and analog studies proceed, prototype guns are assembled in the laboratory and sample tubes are built to verify the predicted results. When a pilot run has been made with the final approved design, the detailed drawings and specifications are issued to the manufacturing section. All part dimensions and spacing of electrodes are held to very close tolerances so that the electron guns will do the complete job for which they have been designed.

Up goes the showroom curtain on in the most advanced



COMPACTRON. General Electric's revolutionary new multi-function vacuum device. It's here today—now—designed into some of the newest 1961 television sets. **COMPACTRON.** You'll be seeing more—in entertainment equipment, industrial control, instrumentation, communications. **COMPACTRON.** Here's what it means to you in . . .

CIRCUITRY. COMPACTRON devices package a combination of functions into a single miniature envelope. The result: fewer components, less space per function, more compact circuitry than is possible with miniature tubes—and higher power output, greater sensitivity than transistors. Circuits with COMPACTRONS require fewer sockets and clips. Twelve stem leads serve as rigid mounting pins which can be inserted directly into clips on simplified circuit boards. Large $\frac{3}{4}$ -inch diameter pin circle reduces clustering of associated components.



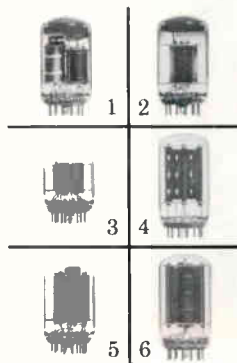
SERVICE. As more and more equipment with COMPACTRON devices comes on the market, you're the man who will need the answers to your customers' service and replacement needs. Equipment with COMPACTRONS offers the appeal of miniaturization plus the advantages of vacuum device reliability. Compatible functions in one envelope mean fewer components and plug-in replacement with no time-consuming hand selection of replacements.

SALES. You have a stake in COMPACTRON devices because your future replacement sales will include these revolutionary new multi-function devices. Six COMPACTRON types are now in production: *For table radios*—(1) Combined oscillator, converter and intermediate frequency amplifier; (2) Combined second detector, audio amplifier, audio output amplifier and rectifier. *For television*—(3) Horizontal oscillator and automatic frequency control; (4) Horizontal damping diode (single diode); (5) Vertical deflection amplifier and oscillator; (6) Horizontal deflection amplifier. Nine other types are committed to production and approximately 40 more are being developed now.

For more information about America's newest electronic marvel, contact your G-E tube distributor. Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Ky.

*T. M. General Electric Co.

RECEIVING TUBES, CATHODE RAY TUBES, CAPACITORS, AUDIO PRODUCTS



Progress Is Our Most Important Product

GENERAL  ELECTRIC

New **COMPACTRON** devices

TV sets ever



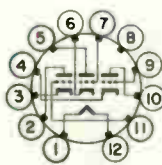
What's new!

COMPACTRON*



devices

6K11 THREE-SECTION TRIODE



12BY

The 6K11 is a COMPACTRON* device containing two high- μ triodes and one medium- μ triode. Features of the tube include separate pin connections for all three cathodes, grids, and plates; an internal shield between sections 1 and 3; a button base, and a compact glass envelope.

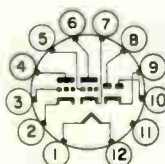
Heater voltage, AC or DC.....6.3 volts
Heater current0.6 Amperes

AVERAGE CHARACTERISTICS

	Section 1	Section 2 and 3
Plate Voltage...	250	250 Volts
Grid Voltage.....	-8.5	-2.0 Volts
Amp. Factor.....	17	100
Plate Resistance, approximate.	7700	62,500 Ohms
Transconductance	2200	1600 Micromhos
Plate Current....	10.5	1.2 Milliampers
Grid Volt. approx.	-24	... Volts

1b = 10 Microamperes

6B10 DUPLEX-DIODE TWIN TRIODE



12BF

The 6B10 is a COMPACTRON* device containing two diodes and two triodes. The triode sections have separate cathodes and the diode sections have a common cathode. The diodes are intended for horizontal phase-detector service and the triodes for horizontal oscillator service.

Heater Voltage, AC or DC.....6.3 Volts
Heater Current0.6 Ampere

AVERAGE CHARACTERISTICS, EACH SECTION

Plate Voltage	250 Volts
Grid Voltage	-8.0 Volts
Amplification Factor	18
Plate Resistance, approximate.....	7200 Ohms
Transconductance	2500 Micromhos
Plate Current	10 Milliampers
Grid Voltage approximate.....	-20 volts

1b = 50 Microamperes

Average Diode Current, Each Diode
With 5 Volts DC applied....20 Milliampers

*T.M. of General Electric Co.

FOUR NEW G-E BLACK-DAYLITE PICTURE TUBES

Listed below is a summary of significant characteristics for each of the new General Electric Black-Daylite picture tubes. All of these tubes are magnetic deflection with electrostatic focus and do not require an ion-trap magnet.

17DQP4

110° LOW G₂ VOLTAGE
Construction...110° rectangular glass
Overall length12 $\frac{1}{8}$ "
Neck Length5"
Heater6.3v, .45a
GunLow voltage electrostatic focus, low G₂ voltage, non-ion trap
Anode voltage.....17.6KV absolute max.
External conductive coating...1200-1700 mmf.



7FA

17DRP4

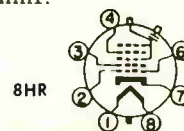
110° 450 Ma HEATER
Construction 110° rectangular glass
Overall length10 $\frac{1}{8}$ "
Neck length3 $\frac{1}{8}$ "
Heater2.68v, .45a
Gun.....Low voltage electrostatic focus, non-ion trap
Anode voltage17.6KV absolute max.
External conductive coating 900-1400 mmf.



8JK

17DSP4

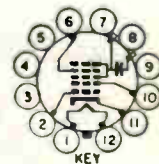
110° 600 Ma HEATER
Construction...110° rectangular glass
Overall length11 $\frac{1}{4}$ "
Neck length4 $\frac{1}{8}$ "
Heater6.3v, .6a
GunLow voltage electrostatic focus, non-ion trap
Anode voltage19.8KV absolute max.
External conductive coating....1000-1500 mmf.



8HR

21DLP4/DQP4

90° SHORT NECK
Construction...90° rectangular glass
Overall length17"
Neck length4 $\frac{1}{2}$ "
Heater6.3c, .6a
GunLow voltage electrostatic focus, non-ion trap
Anode voltage22KV absolute max.
External conductive coating2000-2500 mmf.



12L

VAC-U-SEL® DUAL DIODES



Look for these counter display cards at your G-E electronic distributor whenever a reliable replacement is needed for TV horizontal phase detector or other dual diode circuits.

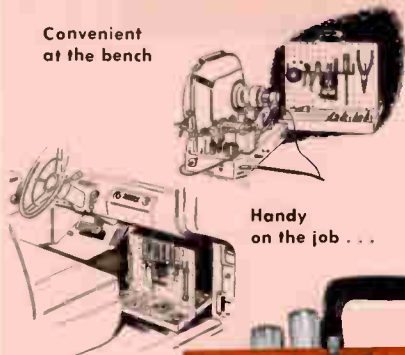
New



SPECIAL WORK TOOLS

G-E Service Aids are designed to build profits in every phase of your operation — specially developed and field-tested for the TV/Radio service dealer.

Convenient
at the bench

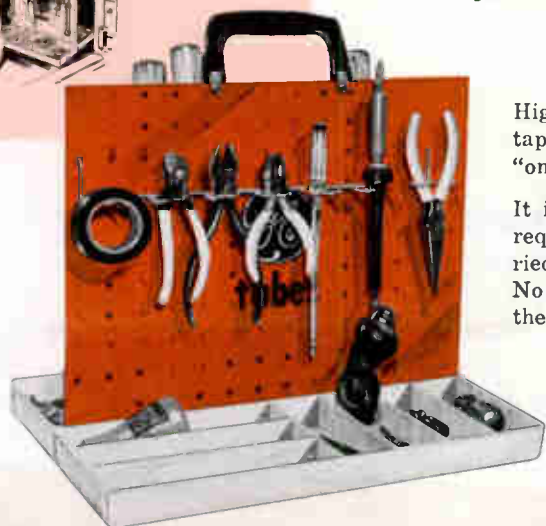


Handy
on the job . . .

TOOL TOTER ETR-2338

The ETR-2338 Tool Toter is a convenient, lightweight, portable unit designed for use wherever tools are needed and used.

On the service bench it will hold all the tools ordinarily used in service or alignment work. The peg-board with various type tool holders keeps screw drivers, pliers, nut drivers and wrenches clearly visible and easily removed or replaced.



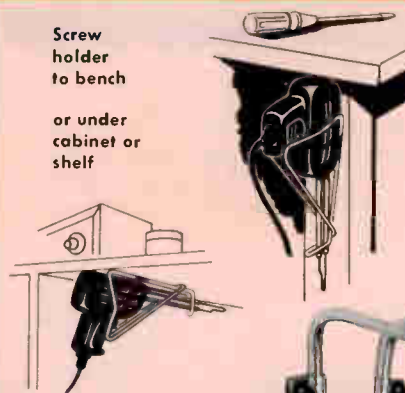
High-impact plastic trays will hold screws, nuts, lockwashers, fuses, tape, capacitors and any other small parts or tools that are needed "on-the-spot."

It is a real time saver when servicing automobile radios. All tools required to remove or make minor repairs on auto sets can be carried in the "Tool Toter" and they are all visible and ready for use. No more digging in a service case or making several trips to get the "right" tool.

Order ETR-2338, "TOOL TOTER" Cash only \$3.00 or \$2.50 cash plus 10 G-E carton tops (types beginning with "6")

Screw
holder
to bench

or under
cabinet or
shelf



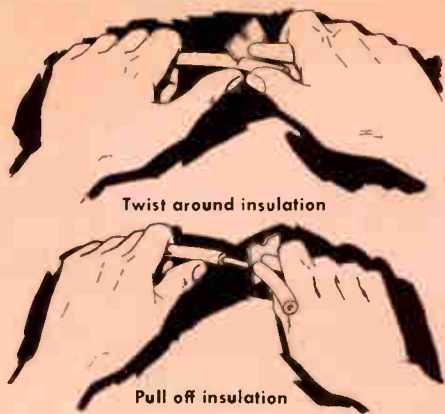
SOLDERING GUN HOLDER ETR-2582

- Mounts to edge of service bench or peg-board.
- Holds soldering gun in safe position.
- Protects hands, wires, diagrams and tools from burns.
- Fits all popular type soldering guns.



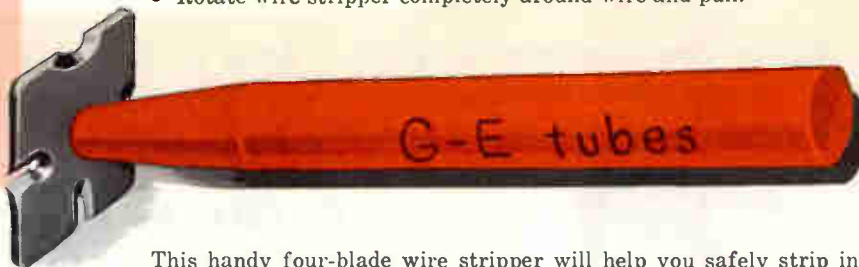
The G-E Soldering Gun Holder prevents burns and damage to instruments, wires and service manuals. It can be easily mounted to any surface with clamps and screws supplied with unit.

Order ETR-2582, "SOLDERING GUN HOLDER" Cost \$0.65



WIRE STRIPPER ETR-2376

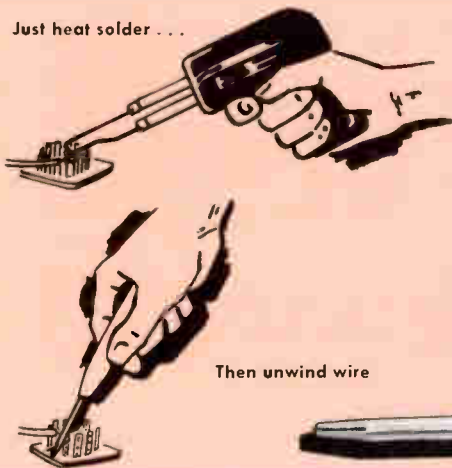
- Four cutting edges for most wire sizes.
- Select cutting edge slightly smaller than outside dimension of insulation.
- Press insulated wire fully into cutting channel.
- Rotate wire stripper completely around wire and pull.



This handy four-blade wire stripper will help you safely strip insulation from wires on service calls or at the service bench. Wire stripper is sturdy, easy to use, and the four cutting edges are ready for immediate use.

Orange color handle makes it easy to find wire stripper on the bench or in the service case.

Order ETR-2376, "WIRE STRIPPER" Cost \$0.50



SOLDERING TOOL ETR-2377

- Helps remove "wrap-around" soldered wires. (Heat solder first)
- Convenient size (6" long) and shaped for general repair work.
- Orange color handle makes it easy to locate soldering tool on the bench or in service case.
- Single ended tool easier to hold and use.



The above illustrations show the features and how to use the Soldering Tool. Removing "wrap-around" wire from soldered connections has always been a problem to service-men. The tapered, forked end feature makes it easy to grasp and unwind "wrap-around" wires from soldered connections.

Order ETR-2377, "SOLDERING TOOL" Cost \$0.60

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-2338 Tool Toter	\$3.00 each.....
.....	ETR-2338 Tool-Toter \$2.50 cash plus 10 G-E Carton tops (types beginning with "6") . .	\$2.50 each.....
.....	ETR-2582 Soldering Gun Holder	\$0.65 each.....
.....	ETR-2376 Wire Stripper	\$0.50 each.....
.....	ETR-2377 Soldering Tool	\$0.60 each.....

NAME.....

STREET ADDRESS.....

CITY, ZONE No. AND STATE.....

(Please Print)

World Radio History

ORDER
From Your G-E Distributor
Or Use Coupon

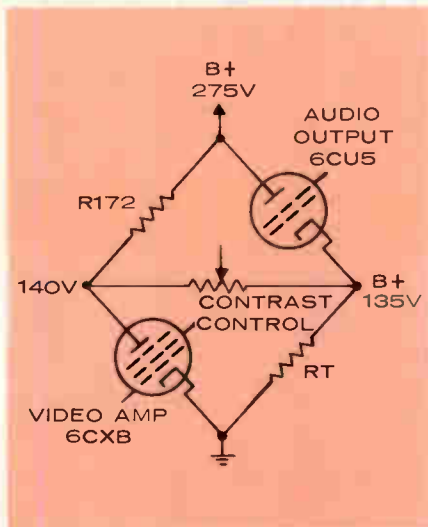
TELEVISION

SERVICING THE "M6" CONTRAST CONTROL CIRCUIT

One of the problems encountered in servicing television receivers is secondary component failures. By this we mean the failure of a component not associated with the original problem. This condition appears as a result of a redistribution of current when some radical circuit change occurs due to shorting or opening of a component. Since it is not economically sound to design a television chassis to prevent all secondary component failures, this problem will occur at times.

The contrast control circuit used in the "M6" and several other chassis may exhibit a secondary failure under certain conditions. This is most easily shown by re-arranging the video amplifier and contrast control circuit as indicated in the drawing.

As shown at the right, R T (representing all circuits appearing between ground and B+ 135V) together with the audio output tube, form a voltage divider. Likewise, the video amplifier tube and its plate load R172 form another divider. The contrast control connects from the plate of the video amplifier to the B+ 135 or to about 5 volts difference in potential. It is readily seen that if the video amplifier tube opens, the plate assumes a potential of 275V and places 140 volts across the contrast control. Similarly, if for some reason the B+ 135V becomes shorted to ground, the control has 140 volts applied. Again if the 6CU5 shorts or R172 opens, excessive voltage appears



across the contrast control. Its wattage dissipation is exceeded under these conditions and may result in damage, if continued.

To avoid setting up the above condition, the receiver should be turned off before changing tubes, particularly the 6CX8 and 6CU5.

The contrast control should be checked through its range for proper operation, following any condition of overload. Any sudden change of contrast or erratic video when the control is rotated indicates burned spots. An open control will result in a very little change of contrast, but will introduce a progressive smear as the control is rotated toward the counter-clockwise end.

RADIO

P715, P765 Intermittents and Motorboating

Motorboating

Replacing batteries will not necessarily be a complete cure. Increase C12 from 50mf. to 100 mf., even though the installation of new batteries gives good operation. The 50mf. (C12) may be replaced with a 100mf. or shunted with another 50 mf.

Intermittents

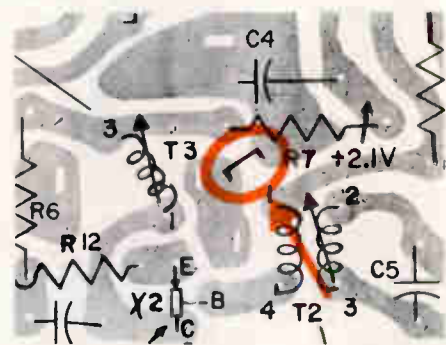
Resolder all T3 and T4 mounting lugs to chassis board.

Solder tuning gang lugs to chassis board.

Tin battery contacts.

Clean contact surfaces of all batteries.

Intermittents in the vicinity of T2, T3, T4, X2, and X3 can be eliminated by connecting a piece of bus wire across the connections shown in red circled area.



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-752 Twin-X Wrench Set	\$3.15 each
TOTAL AMOUNT OF CHECK OR MONEY ORDER

Name.....

Street Address.....

City, Zone No. and State.....

(Please Print)

If your address is incorrect or if you expect to move within the next two months, please print new address and mail to Editor, Techni-talk, General Electric Co., Owensboro, Ky.

SERVICING TELEVISION TUNERS III

(Continued from page 2)

to the test chassis and the other end to the tuner. These ground leads should not extend more than two inches from the cable shield itself.

E. INCORRECT SUPPLY VOLTAGES. Make sure low and high B+ are connected to the correct terminals on the tuner. Bias voltage to the AGC terminal should be approximately -3.0 volts or as specified in the service notes.

F. STANDING WAVES are present if the response curve radically changes while running your hand along the 300 ohm line. This may be due to improper termination or excessive lead length of the 300 ohm line between the sweep generator and the tuner input. Substituting Fig. 2C in Volume 13, No. 1 for the ST8A unit will alleviate this condition.

(To be continued)

ORIGINAL G-E SERVICE AIDS

TWIN-X WRENCH SET ETR-752

The General Electric Twin-X Wrench Set is almost indispensable when servicing electronic equipment. Two wrenches take the place of eight different size hex-head socket wrenches. They save space and time either on the bench or in the service case.

A set of these wrenches will save plenty of space and weight in your repair kit and are small enough to carry in your pocket. They are less than three inches across and include all the popular size hex-heads. The one "X" wrench has $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", and $\frac{3}{8}$ " heads and the other supplies

$\frac{11}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{8}$ " and $\frac{1}{2}$ " sizes. The size is clearly marked on each wrench.

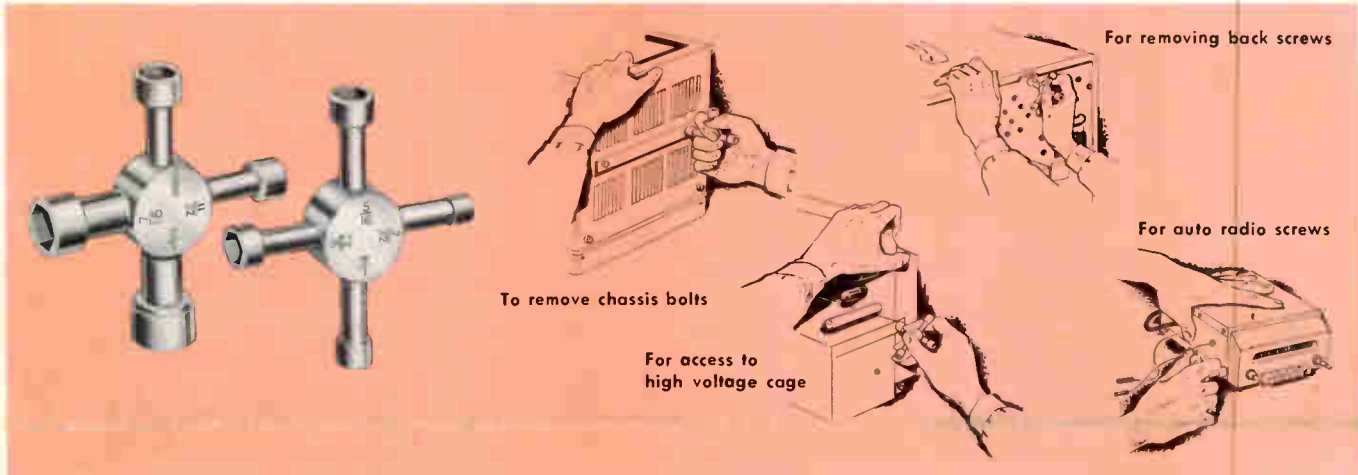
The correct size is always available to remove hex-head screws on cabinet backs, high voltage cages or any other part of a radio or television receiver. And the "X" shape provides plenty of leverage for those "hard to loosen" chassis bolts.

When servicing auto radios the right size is available to remove either the back cover or the complete receiver — and the necessary leverage will make the job easier than with individual socket wrenches. All

shafts are hollow to allow the wrench to grip nuts over a threaded bolt.

The Twin-X Wrench Set is made of case hardened steel, chrome plated to give added protection against rust. The shafts are securely fastened and guaranteed not to loosen in service.

Ask your G-E tube distributor for a Twin-X Wrench Set ETR-752. If your distributor is unable to supply you, use the coupon on page nine and mail to our Chicago warehouse. The price is only three dollars and fifteen cents for the set.



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. 2 March-May, 1961

In this issue:	Page
Transistor Radio-Bench Power Supply	1
Servicing TV Tuners III.....	2
Bench Notes	2
New G.E. Electron Gun.....	3
COMPACTRON* Devices in New TV Sets	4 & 5
What's New!	6
New G-E Service Aids.....	7 & 8
Radio and TV Service Notes.....	9

*A T.M. of General Electric Co.

Techni-talk on AM, FM, TV Servicing, published bi-monthly by Electronic Components Division, General Electric, Owensboro, Ky. In Canada: Canadian General Electric Co., Ltd., 189 Dufferin St., Toronto 3, Ontario. R. G. Kempton, Editor. Copyright 1960 by General Electric Company.

MR DONALD L HANSEN
1779 WOODALL DR
MINNEAPOLIS 21 MINN E221

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.