Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION

radio • tv • hi-fi

Vol. 17, No. 3 & 4 Fall and Winter, 1965

Speed Control For Portable Electric Tools

It is often desirable to control the speed of an electric drill or other small portable tool incorporating a brush-type "universal" motor. The silicon controlled rectifier (SCR) is widely used for this purpose, and a motor control unit (see Fig. 1) utilizing the SCR is described here. The basic electronic components for the control unit are available in the General Electric Experimenter Line.

Brief Description

Briefly, the unit works like this: a silicon controlled rectifier is placed in series with the power line and the tool motor, and is gated to supply half-wave pulses of current of varying length to the motor. The gating voltage is supplied from a potentiometer which sets the basic motor speed. Motor speed is automatically controlled by comparing the voltage placed on the SCR gate through the speed control potentiometer with that generated by the motor as it spins (counter EMF). When a load is placed on the motor, the motor begins to slow down and this decreases the counter EMF. The decrease in counter EMF causes the SCR to be triggered earlier in the a-c cycle, and the longer current pulses resulting maintain the speed and torque relatively constant. To obtain full, unregulated speed, the SCR is shorted by switch S1 in Fig. 2.

The two control units shown in Figure 1 use the same components and circuit; they were constructed to show different packaging methods. Almost any enclosure could be used for a unit, and parts layout is not critical.

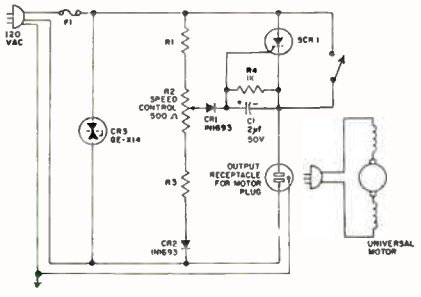


Fig. 2 Schematic of motor control units

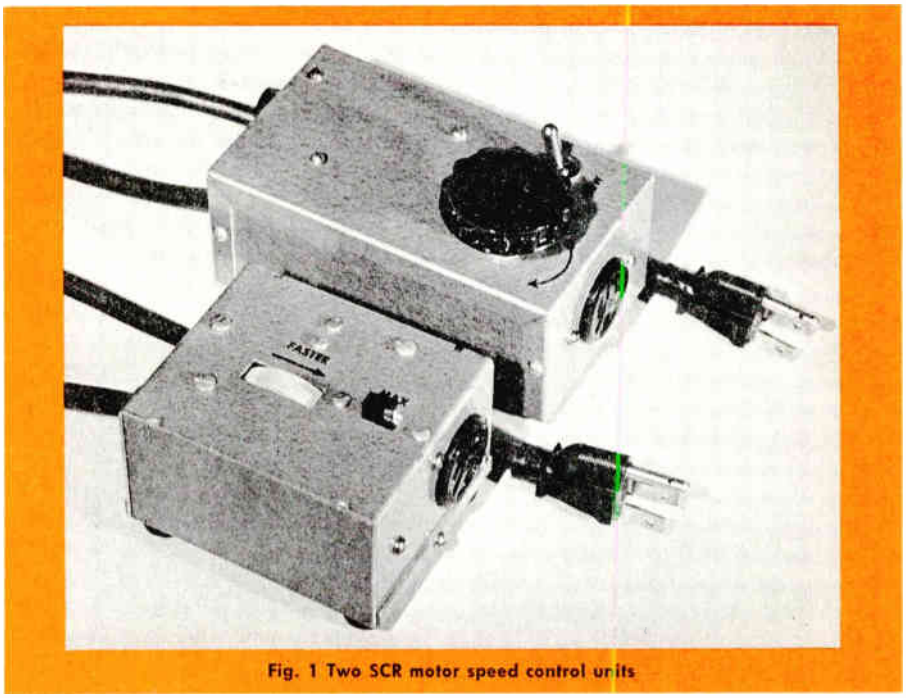


Fig. 1 Two SCR motor speed control units

One Hand Controls

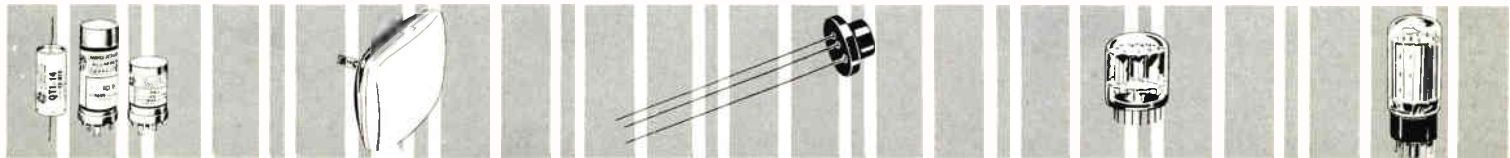
The smaller of the two units was designed for one-hand operation, with the motor speed controlled by a thumbwheel. The switch which gives full motor speed is placed so that the thumb may be slid from the thumbwheel to it with a minimum of motion. Both thumbwheel and switch are placed so that either right or left-handed operation is possible. This unit shown at the bottom of Figs. 3 and 4 on page three requires rather careful placement of parts, and some thought must be given to wiring and assembling in the proper sequence in order to get everything to fit. The second unit shown at the top of Figs. 3 and 4 is larger than the first and all components are more accessible. Obviously, an even larger case could be used for maximum ease of construction.

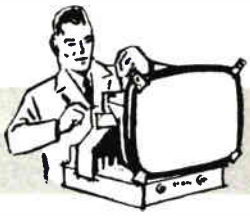
Use Experimenter Kit

Both of the units are constructed with the new G-E Experimenter/Hobbyist Kit, ETR-4288, shown in Fig. 5. The small parts are mounted on push-in terminals in the perforated board. This system allows small parts to be anchored firmly, but also makes temporary mounting of some

(Continued on Page 3)

Fig. 5 New G-E Experimenter/Hobbyist Kit, ETR-4288, used in construction of units in Fig. 1





BENCH NOTES

SERVICE HINTS

I. Admiral 21X1, 21X2, 21B1, 21C1 chassis (and any TV set using the single tuned horiz oscillator stabilizing coil).

These sets refused to synch horizontally and any attempt to get into sync would result in severe horizontal squegging and no sync could be accomplished. After a thorough check of components in the oscillator circuit R431 (5600 ohm) plate load resistor was found to have increased about 3000 ohms. Replacement to correct value produces original stable sync.

II. Muntz Model 321T3 — Loss of horiz. frequency.

This set, when cold, would have a normal picture, however, after about five minutes the horiz.osc. would change frequency drastically and the high voltage would decrease accordingly. A complete check of components in the osc. and AFC circuits failed to disclose defective part. After allowing set to "rest" it would come on again in good sync. This peculiar problem was solved by replacement of C15 (68 uuf) feedback capacitor to the AFC portion of oscillator.

Leonard Chioma
Video-Sound Co.
2020 Natalen Rd.
Winter Park, Fla.

TAPE PART HOLDER

To hold tiny components positioned for soldering, thumbtack or otherwise fasten a strip of masking tape, gummed side up, to the test bench, then lay the parts to be soldered on the gummed surface where they'll stay put.

S. Clark
Box 2162
East Bradenton, Fla. 33507

CHEMICAL SAVER

To prevent shop chemicals such as cement, phono cleaners and other evaporating components from deteriorating wrap two or three layers of plastic or scotch tape around neck. This will seal contents in and keep air out.

John Daugila
4 Helen Avenue
Freehold, N. J.

CONVERGENCE AID

In making static convergence adjustments on a color set, it is much easier to concentrate on the dots in the middle of the screen if these are outlined by using masking tape to form a small square in the center of the screen. With fewer dots present it is easier to concentrate on the smaller area which hastens the convergence process. Use a type of tape that leaves no residue when removed — and use a type easily removed.

Harold Jones
Harold's TV
810 College
Bowling Green, Ky.

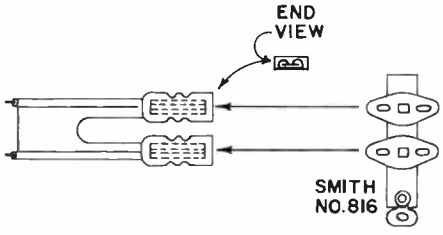
HEAT SOURCE

I have found that a ladies hand type hairdryer is a useful tool in my shop. It does a good job of concentrating heat in a small area. It has been especially useful in finding component breakdowns due to heat.

Marvin S. Cohne
Marv's Radio & TV Service
3 Second St.
Framingham, Mass.

BENCH ANTENNA CONNECTION

Many portable TV sets have antenna leads with terminals which are completely insulated such as the type in the drawing. After many attempts at an easy method of connecting my bench antenna (terminated in alligator clips) I hit on this simple method.



Using a terminal strip such as Smith #816 or equivalent and plugging in one side leaves an exposed connection in easy access. The strip "fits in" easily yet gives a snug fit.

Jack Lyman
The Television
Technology Co.
14608 S. Post Oak
Houston, Texas 77045

SHOE POLISH FINISHING

For touching up nicks and scratches that occur in the shop on customers' TV and radio enclosures that are of wood and are older sets, we've found shoe polish of appropriate hue ideal for covering up the blemishes. At the same time, the polish blends in nicely with the original wood finish.

Harry J. Miller
Advance Television Radio
991 Forth-Second St.
Sarasota, Fla.

AID FOR CLEANING TUNERS

For cleaning TV tuners I use a mascara brush with the bristles cut down to about 3/16 inch.

First I scrub the contacts, then I put chlorathane on the brush and scrub the contacts again until they are bright and shiny. When I think that they are clean enough I spray them with contact cleaner.

This method has always worked well for me and I am sure it will give you a cleaner tuner and a better picture.

Darrell Helms
21 Wellington Street
Malone, N. Y.

INTERMITTENT PROTECTION

After spending a great deal of time trying to locate intermittent horizontal trouble I found it was caused by dirt and lint that was on the chassis. Since then, before I start any repairs I clean each one throughly.

I have found that a good way of doing this is to use a one inch paint brush to whisk components and chassis while holding a vacuum cleaner hose 5 or 6 inches away. The vacuum will pick-up all dirt and lint that is loosened by the brush without the danger of the vacuum hose bending or breaking any of the components.

Roy G. Hambrick
1750 Glendon Road
Salem, Virginia

PICTURE TUBE PROTECTION

Wrapping CRTs in woolen or synthetic woolen fibre blankets can be very hazardous. Glass readily slips on this type of surface. When a CRT is picked up and hand carried wrapped in this type of blanket, a slippery handling effect is encountered with the glass. This effect also is noticed when transporting the CRT, still wrapped, in a vehicle, unless considerable additional support is provided.

As described, the overall result is potentionally dangerous. Obviously, the safer handling mode for a CRT is a carton. Usually none is available on a service call. Therefore, use an old cotton blanket or other suitable safer covering — not slippage prone.

James G. Hamlett
330 Everingham Rd.
Syracuse, N.Y. 13205

ADDED SUPPORT

Chevrolet auto radio 985159, 985315 and all others of similar design: after locating and repairing an open circuit on P C Board in vicinity of can electrolytic, loosely fit a capacitor mounting bracket around the can, close to the top, and solder strap or leg to the housing of the adjacent push button tuning assembly. Then use a little cement or varnish (GE Glyptal) to lock the bracket to the can. This added support eliminates can vibration and will greatly reduce future breaks in P C Board area as it ages.

R. L. Edwards
Chesapeake Electronics
P. O. Box 88
Deale, Maryland 20751

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.

SPEED CONTROL FOR ELECTRIC TOOLS

(Continued from Page 1)

parts for optimum value selection practical, since the serrated jaws of the push-in terminals will hold component leads tight enough for circuit testing prior to soldering.

No matter what construction style is used, certain precautions must be taken. Since we are involved with power-line voltages and a handheld device, *adequate* grounding precautions must be taken. A three-wire appliance cord and grounding outlet should be used, and the unit case should be firmly connected to the ground lead. The body of the appliance cord should be securely fastened to the case so that no strain is placed on the connections of the cord leads to the circuit, since the unit is certain to be dangled by the cord from time to time.

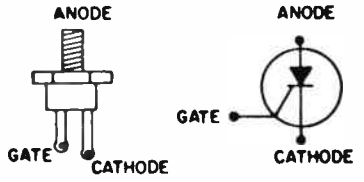


Fig. 6 Terminal identification for the SCR

SCR Utilized

The silicon controlled rectifier shown in Fig. 6 must be provided with means to transfer the heat produced in it to the case of the control unit. This may be done by mounting the SCR on a small angle, folded from a piece of aluminum and in turn mounting the angle on the control-unit case. The SCR must be electrically insulated from the aluminum angle with the mica and teflon washers supplied with the SCR. The assembly method is shown in Figure 7. After the SCR is mounted on the aluminum angle and the angle bolted to the case, an ohmmeter should be used to check for a possible short between the rectifier body and the control-unit case.

Set For Minimum Speed

The minimum speed of the motor being controlled is determined by the value of R3 in Fig. 2. This resistor could be made variable if minimum speed is critical or the unit is to be used with a number of different tools. However, a fixed resistor is usually satisfactory. Various values can be tried, by pushing their leads into the clips on the perforated board, until a value is found which allows the motor to run at the desired minimum speed. The resistor should then be soldered in place.

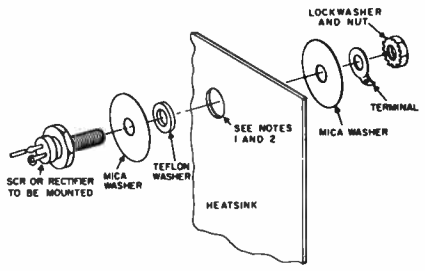


Fig. 7 Insulated SCR mounting

The motor control unit is designed to maintain reasonably constant motor speed with changes in load, consistent with the relative simplicity of the device. This can be demonstrated by running the drill at low speed and attempting to slow it down by grasping the drill chuck. You will find that the drill will really buckle

(Continued on page 6)

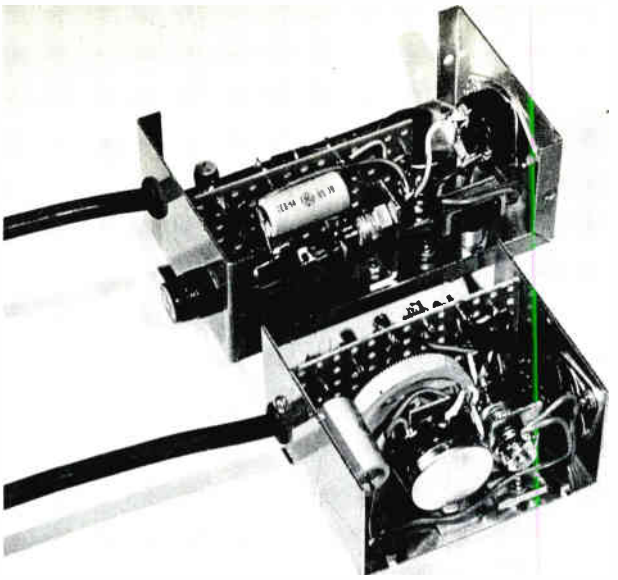


Fig. 3 Inside view of control units

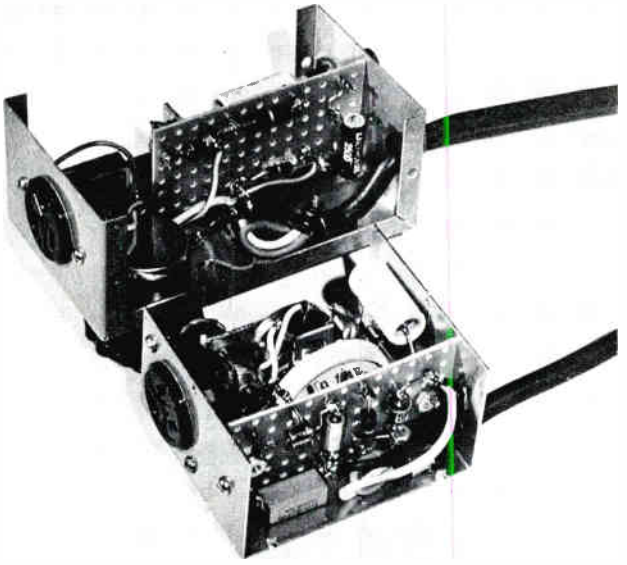


Fig. 4 Inside view of control units

PART LIST

C1 — 2μf, 50-volt capacitor (G-E, MT1-1)
CR1, CR2 — 1N1693 silicon diode (G-E)
CR3 — Thyrector (G-E, X-14)
F1 — Fuse, 5-ampere
R1 — 2500 ohm, 5 watt, wirewound resistor
R2 — 500 ohm, wirewound potentiometer
R3 — 15 ohm, 1 watt resistor (See text)
R4 — 1000 ohm, ½ watt resistor
S1 — SPST switch (Slide switch in small unit and toggle switch in large unit.)
SCR1 — Silicon controlled rectifier (G-E, C30B)
Case — Small unit, 3¾ x 3 x 2⅛ (LMB, 135); Large unit, 5¼ x 3 x 2⅛ (LMB), T-F 780)
Cord — Three-wire appliance cord (Belden, 17408-S)
Fuseholder — Clip types for small unit, panel mount for large unit.
Knob — The knob used in small unit is a replacement dial for a small AC-DC radio.
Power Outlet — Three-wire grounding outlet (Amphenol, 160-2)
Perforated board, push-in terminals, rubber feet (G-E, Experimenter/Hobbyist Kit ETR 4288)

...to attract attention
...create a favorable impression
...direct customers into your store

outdoor signs

SIGN

This deluxe outdoor illuminated sign can be seen blocks away. Six flashing lamps with 6500 lumens output give you dealer identification that stands out from all others in your business neighborhood. Your dealership name and all necessary hardware included. Size — 24″ x 48″. Colors — red-orange, black, grey, and white.

ETR-1290, SIGN (double face)
Cost $168.75
ETR-1290-1, SIGN (single face)
Cost $106.25

PROJECTING SIGN

A big, bright, double-faced sign, ideal for the store front. Baked enamel on 18-gauge metal. All hanging hardware included. Size—48″ x 36″. Colors—red-orange, black, grey, and white.

ETR-1566, PROJECTING SIGN
Cost $27.00

PROJECTING SIGN NAMEPLATE

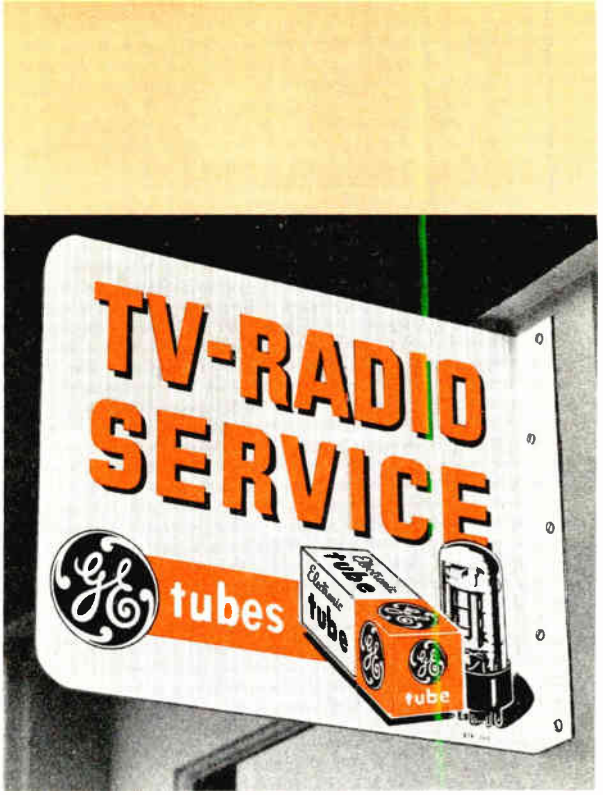
Your dealership name individually applied in baked enamel on 18-gauge metal. Attaches to hanging hardware provided with ETR-1566.

ETR-1566-1, PROJECTING SIGN NAMEPLATE
Cost $7.50

TWO-WAY LIGHT SET

Bright illumination for your outdoor sign and store front. Attaches to hanging hardware provided with ETR-1566.

ETR-1566-2, TWO-WAY LIGHT SET
Cost $20.75



METAL FLANGE SIGN

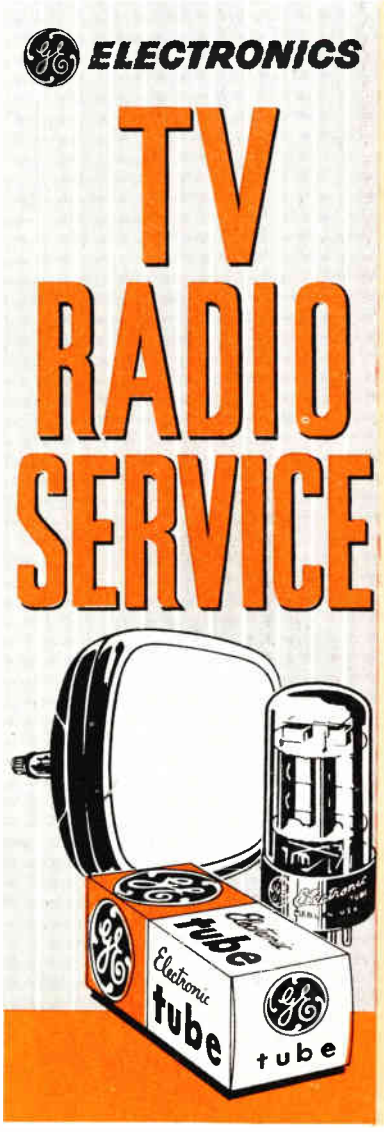
A smaller, double-faced sign with dozens of uses. Can be mounted on side of store, counter, door jamb, any flat surface, including masonry. Baked enamel on 20-gauge metal. Size—15″ x 12″ x 1½″. Colors—red-orange, black, grey, and white.

ETR-1565, METAL FLANGE SIGN
Cost $2.25

GIANT TACK-ON SIGN

An all-purpose, all-weather advertising sign that can be mounted on the side of a building or attached to a wood backdrop as a free-standing post sign. Baked enamel on 26-gauge metal. Size—14″ x 42″. Red-orange, black, grey, and white.

ETR-1564, GIANT TACK-ON SIGN
Cost $2.70



Order items by Title and ETR Number through your AUTHORIZED G-E DISTRIBUTOR.

What's new!

NEW AUDIO SERVICE GUIDE

The new Audio Service Guide Publication 37-9000-65 contains 300 pages of technical information on all G-E monaural/stereo phonographs, portable and console, manufactured from 1958 thru 1964 inclusive.

The Audio Service Guide includes:

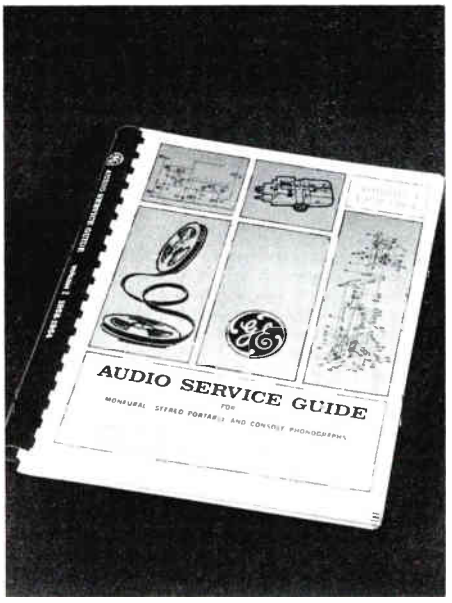
- Picture Guide Section
- Model Specifications
- Circuit Diagrams
- Components Board Layouts
- Exploded Views — Record Changer — Tape Mechanisms
- Replacement Parts Lists

The Picture Guide Section has been incorporated to assist in identifying those models when the model number is unknown. The model number is listed below the picture and includes all models in this particular series.

The Table of Contents has been designed as a quick reference which can be used to locate the specific product information desired.

The Audio Service Guide is part of a continuing effort at General Electric to provide the service technician with efficient and effective service tools to enable him to give his customer faster and better service.

The price for the Audio Service Guide is $4.75 and should be ordered from the address shown on the coupon below.



New 300 page Audio Service Guide covers models produced from 1958 through 1964.

General Electric Company
Product Service
2200 North 22nd Street
Decatur, Illinois 62525

Please send me the following item:

.....Pub. No. 37-9000-65 Audio Service Guide @ $4.75 each.

SHIP TO:

Name.....

Street.....

City and State.....

(Include applicable state and local tax)
Make all checks or money orders payable to "General Electric Company."

SPEED CONTROL

(Continued from Page 3)

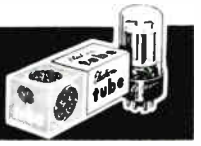
down and pull. Caution — don't try this at high speed, or you may lose some skin.

Use As Screwdriver

One of the most useful applications is the use of this speed control with a screwdriver bit in the drill chuck. At a very low speed setting, wood screws will go in with a minimum amount of effort. If you can't get a drill bit the screwdriver blade from a screwdriver set with interchangeable blades will usually fit the electric drill chuck.

The silicon controlled rectifier is a versatile device, destined for many domestic and shop control uses. If you would like more information on how SCR's work and how they may be applied, the *General Electric Hobby Manual*, ETR-3960, should be in your possession. Because of the increasing use of SCR's, a future issue of *Techni-Talk* will feature a simple SCR tester to help you in troubleshooting SCR devices.

NEW GENERAL ELECTRIC TUBES AND COMPACTRONS LISTED BY RECEIVER



Here is a list of *NEW* General Electric receiving tubes and compactrons and the manufacturers using these types in their receivers. Be ready to service the new model receivers by having at least one of each type on hand. They are now available from your General Electric tube distributor.

TYPE	SET MANUFACTURER	FUNCTION
2HQ5	GE 11" Color	RF Amp.
5KE8	RCA	Osc. — Mixer
5KZ8	GE 11" Color	Osc. — Mixer
6AC10*	GE (Color)	Color different amp.
6AD10*	Admiral TV	Audio Det. — output
6GJ5A	RCA	Hor. Output
6LJ8	Admiral & GE TV	Osc. — Mixer
6LT8	GE (Color)	Hor. Osc. & AFC
8AR11*	GE (Color)	IF Amp.
8BU11*	GE (Color)	Burst gate, Burst amp., Syn Clipper
8BQ11*	GE (Color)	IF amp. Chroma amp.
10LZ8	Westinghouse	Video amp.
11FY7*	GE 11" TV	Vert. Osc. — Output
12AE10*	GE 12" TV	Audio Det. — Output
12BF11*	GE (Color)	Sound Det. & Audio Output
12HG7	GE (Color)	Video Output
14BR11*	GE	Video amp., Sound IF, AGC
22BH3A	Warwick TV	Damper
31JS6A*	Warwick (Color)	Hor. Output

*Compactron type

PLAN E $9.50, ETR 3790

Factory Service Manual Coverage for Color and Monochrome TV • Stereo Theater Console Phonographs • AM-FM-FM Stereo Tuners Record Changers • Porta-Fi System • Tape Recorders Built-In Electronic Systems

Includes — Binder For TV Service Manuals

YOU WILL RECEIVE . . .

- Up-to-date Parts Price Listings
- "Service Talk"
- "Techni-Talk"
- "Audio Notes"
- Alignment Charts and Waveforms
- Replacement Parts Lists
- Schematic Diagrams
- Circuit Board Layouts
- Exploded Views

PLAN F $13.50, ETR 3791

Recommended for NEW Subscribers

YOU WILL RECEIVE . . .

1. Includes Plan E for 1966
2. Plus TV Service Manuals & Binder Covering All Current ("A" Line) Models
3. Plus All Console Phonograph, Tuner, Tape Recorder & Record Changer Coverage for 1965

Your early subscription to "PLAN E OR F" will assure you of receiving prompt delivery of accurate service data now being prepared for publication in General Electric Television Service Manuals for 1966.

SERVICE NOTES

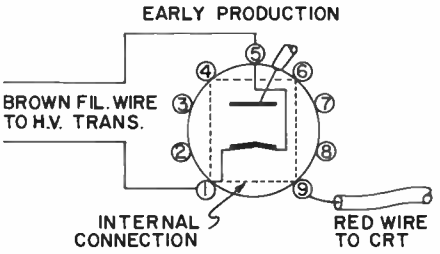
TELEVISION

SB CHASSIS

H. V. Rectifier Failures

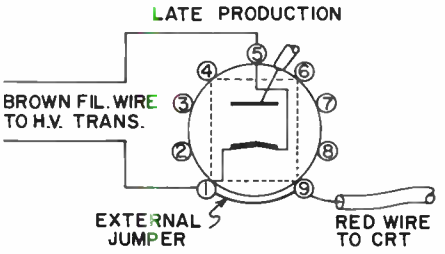
A few cases of 1BC2 rectifier failures have been attributable to the socket connections used in early production receivers.

The internal construction of the 1BC2 includes a corona shield which is supported by welding to the inner ends of pins 1, 4, 6 and 9. For convenience in assembly, early production sets were connected as shown in Fig. 1.



It is apparent that the HV connections must pass through the internal connections in the tube and may be opened in the event of a weld failure in the tube.

Late production receivers are connected as in Fig. 2, which provides a positive H.V. connection to the tube filament and increases reliability.



If you encounter any 1BC2 failures, you should install a jumper between lugs 1 and 9 of the tube socket. If the tube has failed due to opening of a weld, it may then operate without replacement. This jumper will also eliminate any possibility of subsequent tube failure from this cause.

SB CHASSIS

Intermittent Start Of Horizontal Oscillator

Some cases of intermittent starting of the horizontal oscillator were experienced in early production sets. This was due to a problem in the 8LT8 oscillator tube, which was subsequently improved to reduce the problem.

In addition to the improvement in the 8LT8, R257 was reduced from 180K to 150K, ±20% to increase the plate voltage.

If you should experience this problem replace the 8LT8 and check for the value of R257. If this resistor is 180K replace with a 100K ±10%, measuring to be sure that it is not less than 90K, which is the low limit. The use of 150K ±20% in production assures the same low limit.

A final check to assure that the problem is corrected may be made as follows:

1. Allow set to cool off for 15 minutes.
2. Plug receiver in to a Variac and set at 100 volts input. The horizontal oscillator should always start from cold at this line voltage.

Use Order Coupon Below

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
	Plan E for 1966, ETR-3790	$ 9.50 each
	Plan F for 1966, ETR-3791	13.50 each
	Experimenter/Hobbyist Kit, ETR-4288	.98 each
	Electronic Components Hobby Manual, ETR-3960	1.50 each
	TECHNI-TALK PUBLICATIONS ETR-1095A Three-ring binder with tabbed dividers and all Tele-Clues and Tele-Clue Schematics published to date	4.35 each
	ETR-2000 Three-ring binder with tabbed dividers for Tele-Clues and Tele-Clue Schematics	2.25 each
	ETR-2579 Complete set of TECHNI-TALK back issues Vol. 1 No. 1 — Vol. 16 No. 4 with 3-ring vinyl covered binder (includes all Tele-Clues and Tele-Clue Schematics)	6.25 each
	(Include applicable state and local tax)	TOTAL $

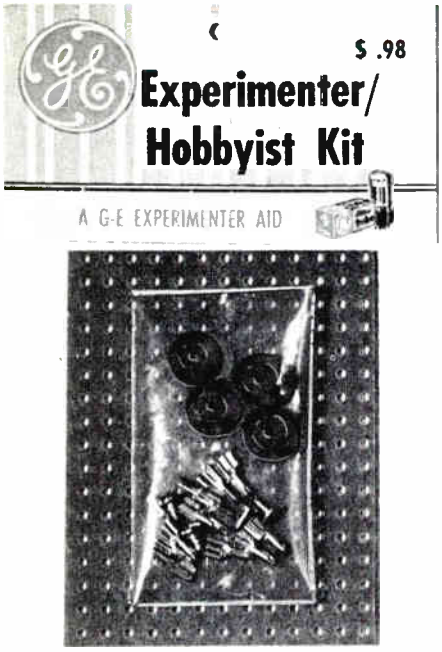
NAME.....

STREET ADDRESS.....

CITY, STATE and ZIP CODE.....

(Please Print)

NEW EXPERIMENTER HOBBYISTS KIT, ETR-4288



Here is a new aid for the service technician experimenter or hobbyist. It can be used to quickly assemble many different electronic circuits. The push-in terminals make it easy to completely wire a circuit and test it before soldering.

The 3½" x 4½" terminal board can be cut to any size such as shown in the article on page one of this issue. The rubber feet can be used either on the terminal board or a metal case.

The G-E Experimenter Hobbyist Kit can be used to construct many of the circuits included in the *Electronic Components Hobby Manual*, ETR-3960, described in the Volume 17, No. 2 issue of Techni-Talk.

Here are a number of the features with a description of ways to use the Experimenter/Hobbyist Kit:

- Easy to assemble and wire simple electronic circuits.
- Some typical circuits can be found in the new G-E Hobby Manual, ETR-3960.
- Fasten rubber feet (4) with self-tapping screws to each corner.
- Push-In terminals (15) fit board holes. Serrated slots go on top.
- Component wires can be pushed into serrated slots with or without soldering. Soldering connections can also be made to terminals underneath board.
- G-E Compactron Socket, ETR-2976, can be attached to board with two $\frac{9}{16}$" or longer No. 4 self-tapping screws.
- 3½" x 4½" terminal board will fit many small metal boxes or can be cut to size. Two or more boards can be fastened together by overlapping and using $\frac{5}{16}$" or longer No. 4 self-tapping screws in rubber feet.

Ask your G-E distributor for a copy of ETR-4288. If he is unable to supply you use order coupon on page 7. The price is only $0.98.

Techni-talk

Vol. 17, No. 3 & 4 Fall and Winter, 1965

In this issue:

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

ELECTRONICS

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