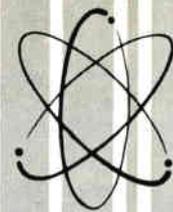




Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION
radio • tv • hi-fi



Vol. 15, No. 3

Fall, 1963

Reliability Improved in G-E Picture Tubes

In television, as is the case in all phases of electronics, great strides have been made in both circuitry, and styling. Television receivers are bigger and better, and thanks to advances in manufacturing techniques, cost the consumer less than ever before. Scarcely a home is without at least one set and two or more per household is becoming the rule rather than the exception.

As the "eye" of the receiver, the picture tube has also undergone considerable evolution, particularly towards assuring greater reliability of performance. This condition has been made increasingly difficult by the growth in tube size on one hand and the widening of the tube deflection angle on the other. The tube size has run the gamut from 10" to 27" and the deflection angle from 50° to 114°.

New Shorter Tubes

The most popular sizes in currently produced receivers are 19", 114", and 23", 92°, 110°, and 114°. As an example, the 21" 70° tube produced ten years ago had an overall length of 24" while a typical 23" 114° of today is about half as long, some 13" or so. Fig. 1 shows the size difference between a 21", 70° and a 23", 114° picture tube.

In many instances trends in television receiver cabinet styling have given the impetus to the development of shorter, wider angle picture tubes. While excellent from the standpoint of consumer acceptance, these changes have put considerably more stringent requirements upon the picture tube performance. The tubes must now operate at higher voltage and current levels to produce the bright, sharply focused picture the viewer expects to see. Particularly in the 110° and 114° types this has been more difficult to attain. In order to reduce the sweep power requirements, these wide angle types have had their neck cross sectional areas reduced by 40%, the region of the tube in which the electron gun is located. As a result the design, fabrication, and insertion of the electron gun in the tube neck have become much more critical.

General Electric picture tube engineers were made most aware of

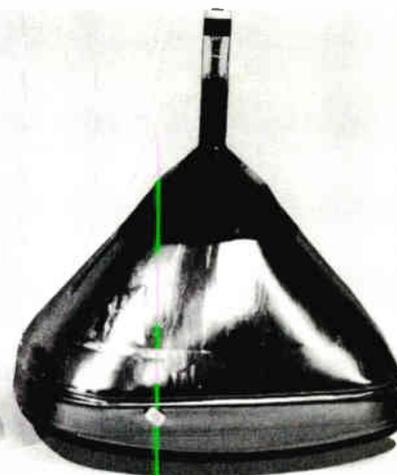


Fig. 1 This shows the difference in neck diameter and overall length between the 23 inch,

114° picture tube at left and the 21 inch, 70° tube at the right.

these new demands upon the introduction of the 23KP4, 114° deflection tube, in 1959. While this tube performed most satisfactorily in the initial stages, field experience indicated that its life was not up to General Electric's high standards. A thorough study was made of the design parameters, cathode emitting characteristics, getterings, and all processing and assembly techniques. The result was a complete redesign of the electron gun, improved gettering methods for better gas cleanup, and of particular significance, a new cathode material applicable to much longer operating life.

To cite some performance data, two groups of 23KP4 tubes were

given a 2000 hour accelerated life test. The first group, using the original design and processing methods averaged 75% of the original cathode emission at the end of the test. The second group, with the improvements mentioned above averaged 98% of the original cathode emission at the endpoint of the test.

The valuable information learned from the 23KP4 performance study has been incorporated in both original equipment and replacement picture tubes manufactured by General Electric. Not only at the start, but through thousands of hours of acceptable performance, General Electric picture tubes are now better than ever.

"Charity Day" Successful In Suburban Chicago

A "Charity Day" conducted last November by the South Suburban Radio & Television Servicemen's Association was so successful this Chicago group has decided to make it an annual affair.

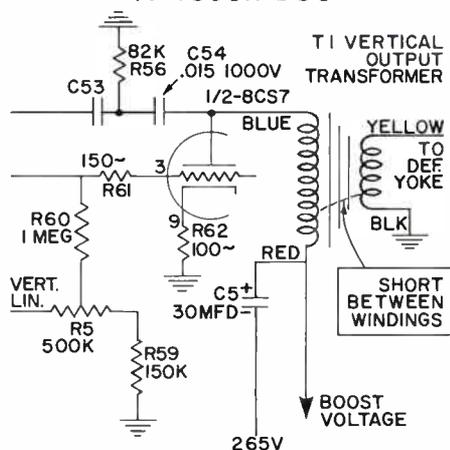
Frank Salapatek, program chairman, said that on "Charity Day" all members donated receipts for their services (excluding parts) to recognized charities named by customers. Upon receiving payment for their work, dealers made out checks to the designated charities, placed them in stamped and addressed envelopes and gave them to the customers to mail. Service dealers wishing further details may write to Mr. Salapatek, 12720 S. Western Ave., Blue Island, Illinois.





BENCH NOTES

TV TOUGH DOG



We had a Westinghouse model H-P3312 portable come into the shop with a vertical collapse which turned out to be a "tough dog." Generally most vertical troubles are quite easy to find although this case took more time than usual. The voltage on pin 3 of the control grid was only a -1.5 volts and this voltage changed and was intermittent. The correct voltage should be about a -2.5 volts. The plate of the vert oscillator was +15 volts and a low grid voltage of -9 volts.

Generally a person would think that the vertical tube was not oscillating properly but, the boost voltage was down to 250 volts and should be about 520 volts. The white vertical line did not fill out the screen horizontally. After the transformer was on about fifteen minutes the transformer became warm. The transformer resistance checked good or real close to the schematic diagram resistances. Little voltage was measured across the cathode resistor.

The blue lead was cut from the plate of the 8CS7 and the voltage was only about 15 volts. The voltmeter reading of 100 ohms showed practically a short between windings. Since the secondary of the transformer was connected to ground an internal short between primary and secondary caused the defect. The vertical transformer was replaced and the TV returned to normal.

Homer L. Davidson
2821 5th Avenue, S.
Fort Dodge, Iowa

ARCING FLY-BACKS

I have had difficulty eliminating corona discharge or high voltage arcing from fly-back transformers especially at the H.V. rectifier plate lead. I have tried acrylic sprays and corona dope with only partial success. When acrylic spray doesn't overcome the condition I strip the "wax" insulation coating from a defective horizontal output transformer. The wax is melted and allowed to flow to a substantial depth over the troubled area of the fly-back.

Joe Pezzotti
6 Linden Drive
Broomall, Pa.

WISE SUBSTITUTE

Since I don't have a bench mounted vise, I have found the following to be a solution to the problem of how to hold volume controls when cutting shafts to the proper length. I drilled a hole in the edge of one of my benches. The hole diameter was $\frac{1}{4}$ inch. It holds the control solid during the sawing operation. This hole was drilled in the top board parallel with the surface and positioned so that the saw could not hit anything.

Merrill Breeze
The Radio Clinic
912 Main St.
Little Rock, Ark.

ZENITH TV MODELS A1510L, A1511G, A1512J, A1515W

Symptoms: Low horizontal frequency and inability to synch either vertically or horizontally with about $\frac{1}{3}$ of pix tube blackened out on left side.

These multiple problems are the result of an open filter capacitor 100 uf 300VDC. Replace entire block which consists of 3 sections as generally the input capacitor to the voltage doubler tends to lose capacitance resulting in decreased B+ to set.

Len Chioma
2020 Natalen Rd.
Winter Park, Fla.

Editor's note: Use G-E Service-Designed capacitors cat. nos. XC3-35 and QTI-13.

DRILL HANGER

A hand drill is an awkward tool to store out of the way. Simplify this by chucking a suitable cotter key in the chuck of the drill, then slip the loop of the cotter over a conveniently-placed finishing nail.

Harry J. Miller
Advance TV-Radio
991 42nd Street
Sarasota, Florida

KNOB REPAIR

Always keep a bit of plastic in the service kit for mending broken knobs. Melt the plastic with your soldering gun and spread on the broken edge of the knob and press together. It sometimes works better than cement.

Grigsby Radio and TV
Granger, Ia.

SCREW HOLDER

Holding a hex screw in a nut driver for installation in a close place can sometimes be difficult. I tear off a piece of paper masking tape about $\frac{1}{4}$ inch long and stick it over the hex screw then push the nut driver down over the screw. This holds the screw securely until it is driven down. Will also prevent the short ones from being pushed back into the driver.

Roy Pope
215 Locust
Clarksville, Texas



"He found out what that hum was — a bee!"

CLEANING CHASSIS

For cleaning radio and TV chassis I use a small paint brush and a vacuum cleaner. The paint brush will get down between the tubes and components to loosen the dirt and the vacuum cleaner hose held near by will suck up the dirt. The end result is a nice clean chassis and no dust in the air.

R. Lindenbaum TV Service
1908 Getty Street
Muskegon, Mich.

PRINTED CIRCUIT AID

When it becomes necessary to test components on printed circuit boards, and especially when removing heat sensitive components as transistors, or when removing i.f. cans or sockets, things can become quite messy, if not downright aggravating.

I have used all the "hints and procedures," and have finally stumbled upon the really best way to do it.

Use a small model makers hand grinding tool, with a small $\frac{1}{4}$ by $\frac{1}{16}$ thin circular saw blade in the chuck.

To isolate a component, a $\frac{1}{16}$ inch slit can be made in any printed circuit lead cleanly, just as easy or perhaps easier than cutting a lead in the old fully wired sets. Repair of the cut is simple with a low wattage iron.

Imagine, no heat to remove components, and the mounting holes are left clean as new for the new component. No melting plastic board, and no — "one big pool of solder."

The only precaution to be observed is the presence of microscopic solder filings which may possibly blow into variably condensers, etc., although we have not experienced that trouble yet.

A soft brush is useful to dust the board after isolating a component.

John E. Rahtes
930 Nassau Road
Uniondale, L.I., N.Y.

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.

Reduce Call-Backs with G-E Service-Designed 6AX4GTB

New grey "overcoat" on heater wire, shown in Fig. 1, increases life and practically eliminates possibility of arc-over between heater and cathode. The "overcoat" dissipates heat

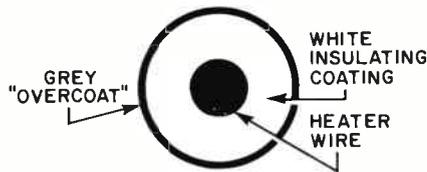


Fig. 1 Enlarged cross-section drawing of new heater wire with grey "overcoat."

faster and thereby reduces the heater operating temperature. This minimizes the possibility of the insulating coating developing fractures and/or "boiling" off. A spool of the heater wire without the "overcoat" appears at the left of Fig. 2 and the new wire at the right.

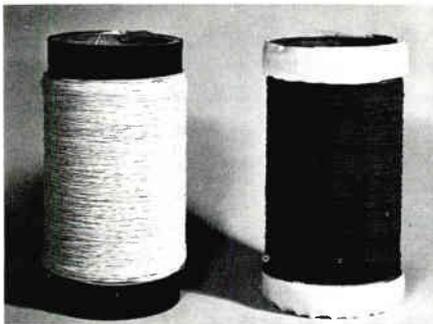


Fig. 2 Small spool of ordinary heater wire at left and new wire with grey "overcoat" at right.

When this insulation is lost it leaves the bare heater wire exposed and, therefore, subject to arc-over due to the high peak voltage between the cathode and heater in damper tube circuits.

Since the new heater wire operates at a lower temperature, there is a marked reduction in the expansion and contraction of the heater wire. The heater wire and the insulating coating have entirely different coefficient of expansion rates. Therefore, the cooler the operating temperature of the heater, the less expansion and contraction.

Fig. 3 illustrates just what happened to the insulating coating as a result of this expansion and contraction. The numerous fractures allow the heater temperature to increase wherever the wire is exposed. This "boils" off more insulating material, exposes more heater wire surface, and increases the possibility of an arc developing between the cathode and heater. This arc may be self-healing and intermittently blow the B+ fuse or may be a permanent "short" which will blow the fuse as soon as it is replaced.

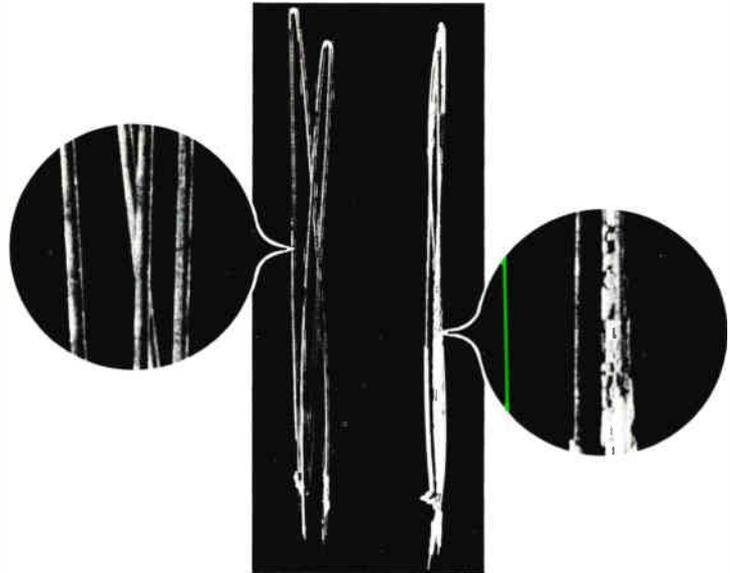
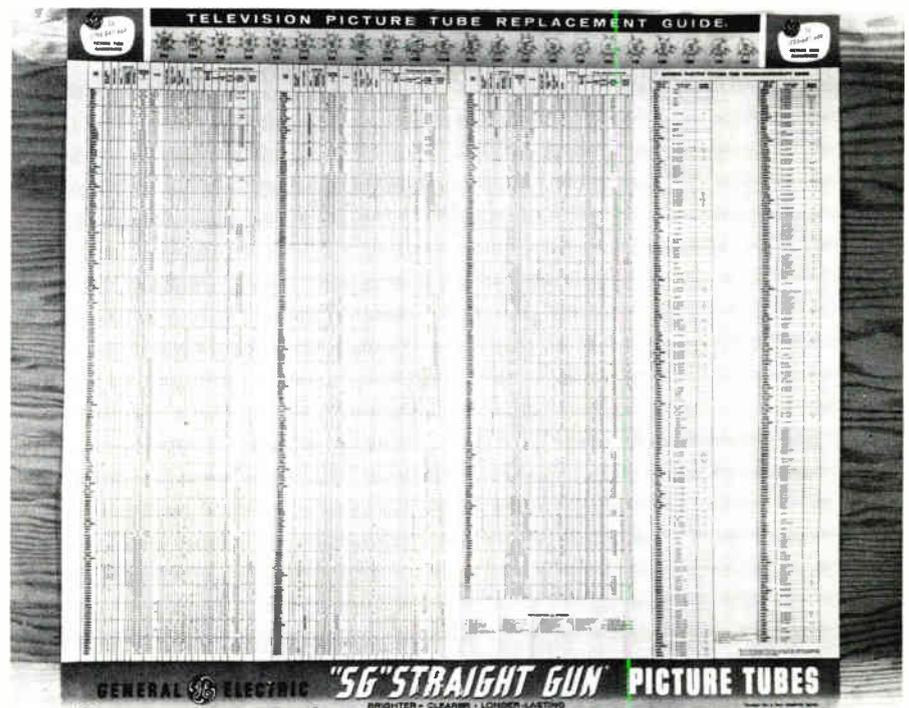


Fig. 3 The heater at the left is typical of a heater with the grey "overcoat" after a 7000 hour life test. The heater at the right is a typical heater without the "overcoat" which failed after a 2500 hour life test. Enlargements are shown of each center portion.

General Electric Service-Designed tubes are constantly being improved to increase reliability and reduce call-backs. The new 6AX4GTB is just one of these improvements. All other General Electric damper tubes also use this new type heater wire.

Future issues of Techni-talk will describe and discuss other Service-Designed improvements which will increase your profits by reducing in-warranty call-backs. Ask your distributor for Service-Designed General Electric receiving tubes.

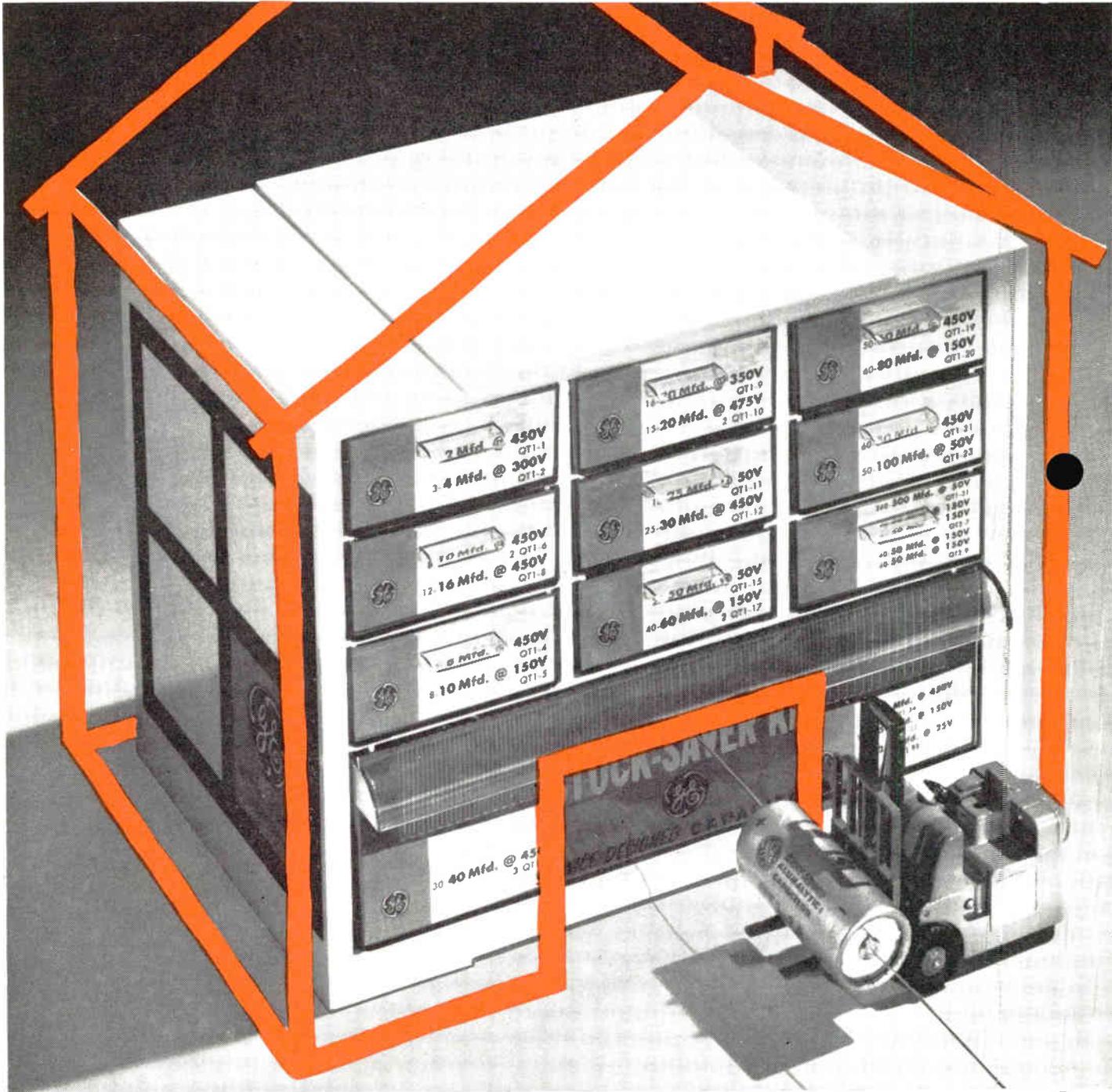
New Picture Tube Interchangeability and Replacement Guide Now Available from G-E Distributors



Ask your distributor for ETR-702H. This is probably the most complete picture tube wall chart now available. ETR-702H contains essential physical and electrical characteristics for almost 600 types. A list of recommended General Electric replacements is also included.

A FEW
WILL DO

Stock all the capacitors you need in



ANOTHER ACCENT ON VALUE FROM

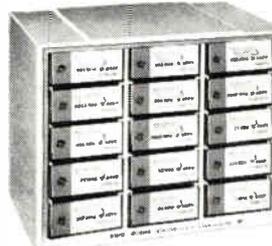
n a pint-size warehouse

This small warehouse is stocked with enough capacitors to meet most of your replacement needs. We call it a Stock-Saver Kit because, on the average, one G-E capacitor replaces four types.

Before G.E. developed Stock-Saver Capacitors, it was practically impossible for you to keep a supply in your shop. It tied up too much money. But G.E. found a way to replace more than 150 different types with only 25 capacitors. This makes it possible for you to select the most-needed types and keep a supply on hand. The cost is low because *a few will do*. To make it even more convenient and profitable for you to use G-E capacitors, we have built selected stocks and put them in attractive storage units. You pay only for the capacitors . . . there's no charge for the pint-size warehouse. These kits will save you the cost of single-unit ordering...not to mention pesky trips for emergency pickups.

**FOR A LOW-COST START, WE'RE
MAKING YOU THIS SPECIAL OFFER**

BUY ONE OF THESE...



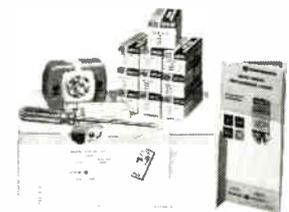
KIT K-415
Contains 108 of 15 popular ratings of paper-mylar® type capacitors.
List Price
Capacitors.....\$33.42
Kit..... 4.98
VALUE..... 38.40
Your cost, complete, only \$19.92



KIT K-100
Contains 19 electrolytic tubular units in the 14 most popular ratings.
List Price
Capacitors.....\$30.00
Kit..... 4.98
VALUE..... 34.98
Your cost, complete, only \$17.95



KIT K-201
Contains 16 most popular electrolytic twist-prong types.
List Price
Capacitors.....\$50.00
Kit..... 5.00
VALUE..... 55.00
Your cost, complete, only \$29.95



KIT K-202
Contains 10 twist-prong capacitors designed for auto replacement. In addition you get a magnetic service light, a tab adjuster and a handy auto replacement guide.
List Price
Capacitors.....\$33.30
Service aids..... 3.25
VALUE..... 36.55
Your cost, complete, only \$19.98

AND GET THIS ONE FREE...\$7.75 VALUE



This kit is a handy top-opening type . . . just the right size for carrying in your tool or tube caddy. It contains 21 of the five most popular paper-mylar ratings. This \$7.75 value is yours at *no extra charge* when you buy one of the shelf-type kits shown above.

SEE YOUR GENERAL ELECTRIC DISTRIBUTOR TODAY!

THIS OFFER EXPIRES OCTOBER 31, 1963

Progress Is Our Most Important Product

GENERAL  ELECTRIC

1 YOUR G-E ELECTRONICS DISTRIBUTORS

What's new!

G-E Tubes Are Three To Four Times Better

Three-to-four times better! That's the remarkable reliability displayed by G-E tubes over non-G-E tubes in a 3-million-hour life test in 50 television sets of a leading manufacturer (other than G-E).

The experiment, conducted and reported by General Electric, was started in July, 1961 and completed in May, 1962. The test consisted of two consecutive runs which were identical except for the receiving tubes. Run No. 1 was conducted using the original, non-G-E tubes. The tube complement consisted of one each of 15 tube types. Each set was operated at normal line voltage, 120 volts, through 200 cycles of "10 hours on — 2 hours off" (plus a down-period of 16 hours each week) for a total of 2,000 operating hours. During Test Run No. 1, there were 15 tube failures distributed among 7 of the tube types.

Immediately following the completion of Test Run No. 1, the same 50 sets were re-tubed, using General Electric tubes in 14 of the 15 sockets of each set. The remaining tube was not replaced since it was not a G-E manufactured type. The sets were operated and cycled, as before, for 2,000 hours. During Test Run No. 2, there were 4 tube failures distributed among 3 of the tube types.

Failure rates, obtained from these test runs, are: 1.07%/1000 hours for Test Run No. 1, Non-G-E tubes; and 0.29%/1000 hours for Test Run No. 2, G-E tubes.

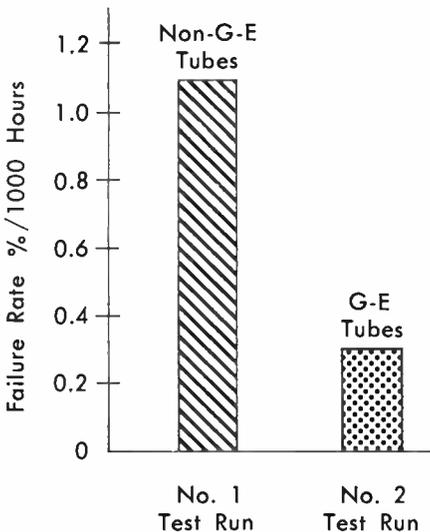


Fig. 1 Average failure rates of 14 tube types, G-E vs Non-G-E Tubes

A failure rate of approximately 1%/1000 tube-hours is considered fairly good for commercial receiving tubes. Hence, the failure rate of 1.07%/1000 tube-hours for non-G-E tubes represents standard reliability. By comparison, the failure rate of 0.29%/1000 tube-hours for the G-E tubes is only 27%, or about one-fourth as much as the non-G-E tubes. In other words, the G-E tubes were nearly 4 times as reliable as competitive tubes. This is high reliability! For longer life and better performance always ask your distributor for General Electric receiving tubes.



NEW GENERAL ELECTRIC TUBES AND COMPACTRONS LISTED BY RECEIVER

tubes



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 re-

ceivers by having at least one of each type on hand. They are now available from your General Electric tube distributor. Asterisk indicates compactron types.

TYPE	SET MANUFACTURER	FUNCTION
*2AS2	Zenith	H. V. Rectifier
2DZ4	Philco	UHF Osc.
2GU5	Admiral TV	RF Amplifier
*3AT2	Zenith	H. V. Rectifier Color TV
3DZ4	Philco TV	UHF Osc.
4HS8	Zenith TV	Syn. AGC
5GX6	RCA	FM Detector
5HG8	Philco TV	Osc. Mixer
6AY3	Zenith TV	Damper
*6AY11	Admiral TV	FM Detector AF Voltage Ampl.
*6BA11	Zenith TV	Sync. and Vert. Osc.
*6BF11	G. E.	Audio Disc. and AF, PO Pentode
6DW4	G. E., Zenith TV	Damper
6DZ4	Motorola, Philco	UHF Osc.
*6GY5	Westinghouse TV	Horizontal Output
6GU5	Admiral TV	RF Amplifier
6HA6	Motorola	Vert. Output
6HE5	Zenith	Pent. Color TV
*6HF5	Zenith	Horiz. Output for Color TV
6HK5	Admiral	Frame Grid RF Amp.
6HS6	DuMont TV	Sync. AGC
6HZ6	GE and RCA Color TV	Sound Discrim.
6JN8	GE TV	AGC, IF Ampl.
6JU8	Zenith	Color Phase Detector
6KA8	RCA, Muntz	Sync. Sep. Noise Inverter
6KZ8	GE TV	Osc. Mixer
8FQ7	Philco TV	Horiz. Osc.
*10AL11	Admiral	Audio Det. and Output
10JY8	Philco TV	Sync. Sep. Video Ampl.
*12BE3	Admiral TV	Damper
*13J10	Zenith TV	AF Power Output
*15BD11	GE TV	Sound IF, Sync. and Video Ampl.
*15FM7	Zenith TV	Vert. Osc. & Output
*17GV5	Zenith TV	Hor. Output
19KG8	Sarkes Tarzian	FM Rec.
20EZ7	Admiral	Low Level AF Amp.
21HJ5	Admiral TV	Hor. Output
*30AG11	Sarkes Tarzian	FM Rec.
*33GT7	GE "SY" TV Chassis	Hor. Output and Damper

SERVICE NOTES

TELEVISION

DAMAGE TO SEMI-CONDUCTOR POWER RECTIFIERS

It may not be generally understood that under certain conditions, semi-conductor rectifiers, silicon, germanium or selenium may be subjected to destructive voltages by repetitive switching on and off of the AC power switch.

The following conditions must all be present for this type of damage to occur:

1. The rectifier circuit must be of the half wave type.

2. The rectifier must be supplied from a power transformer or isolation transformer, which has the on-off switch in its primary circuit.

3. The power transformer must be unloaded at the time. This may occur from an open filament fuse in a parallel filament circuit or an open heater in a series filament string, which is supplied from the power transformer.

4. The power switch must be opened at the instant of peak line voltage.

The rectifier damage is a result of the inductive kick from the unloaded power transformer when the primary is interrupted. This high transient voltage may far exceed the inverse peak rating of the rectifier and cause it to short.

CX COLOR CHASSIS

Bright horizontal line about 3-inches wide, rolling up the screen with brightness level changes at times may be caused by a poor ground connection from can of electrolytic capacitor. (Check grounding of all electrolytics.)

CW COLOR CHASSIS

Intermittent loss of brightness and contrast may be caused by an intermittent electrolytic capacitor C-119D.

QX CHASSIS VENTILATION

Do not cover any of the ventilation slots in the cabinet back. Particularly, those across the top of the back must be completely open, or overheating with consequent damage to the cabinet and components will result.

QX CHASSIS—HORIZONTAL PULL OR WEAVE—MODELS M500X

A few cases have been reported of a horizontal pulling or weaving which is not caused by any defective component or tube.

Symptom

This particular complaint concerns the left side of the picture, and is characteristic of 60-cycle hum in the horizontal sync circuits. The pulling is in the picture area with the raster edge remaining straight.

Tests

1. A test with the scope on Pin 10 of V8A will show a 60-cycle hum.

2. Pin 3 of V8B may read as low as 500K ohms to ground (due to leakage).

Cause

There is a leakage path from Pin 3 of V8B to the adjacent filament circuit copper pattern. This leakage is due to a resin build-up, and should be corrected by scraping if necessary, then cleaning with alcohol. Be sure the entire area between the filament copper pattern and the pins of V8 is cleaned of excess resin.

RADIO

NEW G-E RADIO SERVICE GUIDE VOLUME IV 1961 TO 1963



The new General Electric Radio Service Guide Volume IV is now available from your General Electric tube distributor. This guide covers technical information for all G-E radios manufactured during 1961 and 1962.

This is a supplement to Volume III, ETR-2975 and includes all the features found in the earlier volume such as:

1. Special picture guide section.
2. Schematic diagrams.
3. Complete parts lists.
4. Plastic binding enables Guide to lie flat on bench — stays open to the page you want.

This is a real time-saver and a "must" in every shop. Ask for ETR-3733 or use order coupon below. The price is \$1.45 per copy.

REPEATED SILICON RECTIFIER FAILURE

A few isolated cases of *repeated* silicon rectifier failure have been reported. This condition seems to be caused by transient high voltage peaks or spikes on the incoming AC line. These surges are of extremely short duration (of the order of about 10 microseconds), and are generated by external sources located near the receiver. These surges result from the operation of almost any number of electrical devices — motors, furnace igniters, etc. They can also be caused by a sharp load change across the line, and, at times, even by lightning.

When it has been determined that *repeated* silicon rectifier failure is being experienced, the receiver may be protected against further trouble from these transient voltages by the installation of *three* rectifiers in series in the place of the original one. Each of these rectifiers should also be paralleled by a 50 K, ¼ watt resistor. See Fig. 1 below.

Remember, this procedure should only be employed after it has been positively determined that the set is not at fault and that the condition is a recurrent one. It should *not* be employed on initial failure.

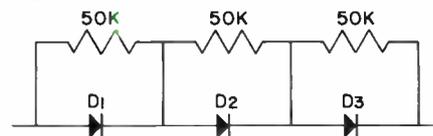


Figure 1

USE ORDER FORM BELOW

ORDER FORM

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

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

Quantity	Price
..... 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. 15, No. 2 (Includes all Tele-Clues and Tele-Clue Schematics).....	\$6.25 each.....
..... ETR-2975 Volume 3 Radio Service Guide Years 1946-1961	\$1.95 each.....
..... ETR-3733 Volume 4 Radio Service Guide Years 1961-1962	\$1.45 each.....
..... ETR-3516 Small Size Tool Case.....	\$3.75 each.....
..... ETR-3517 Large Size Tool Case.....	\$8.75 each.....
..... ETR-3280 Medium Size Tool Case.....	\$7.35 each.....

NAME.....

STREET ADDRESS.....

CITY, ZONE NO. AND STATE.....

(Please Print)

G-E MATCHED PLASTIC TOOL CASES

Three Different Sizes For Your Every Need



Here is an assortment of plastic tool cases that will fulfill your complete requirements. Top section is orange-red and bottom grey as shown.

All three cases are made of high-impact polystyrene and are practically indestructible under normal usage. These cases are warp-free, impervious to grease, oil, salt water and even battery acid.

The top cover has overlapping edges which prevents water from dripping into case. ETR-3517 and ETR-3280 have two cantilever trays which open automatically as the cover is opened. ETR-3516 also has two cantilever trays which are easily opened manually. Each individual tray has various size compartments to keep tools, parts, fuses, etc. separated and easy to locate and remove.

ETR-3517 is 18 $\frac{1}{4}$ " long, 9 $\frac{1}{2}$ " wide and 9 $\frac{1}{2}$ " high. Cost \$8.75.

ETR-3280 is 15 $\frac{3}{4}$ " long, 8" wide and 8 $\frac{1}{4}$ " high. Cost \$7.35.

ETR-3516 is 14" long, 6" wide and 5 $\frac{1}{2}$ " high. Cost \$3.75.

All of these matched Tool Cases can be obtained from your General Electric tube distributor. For your convenience the order coupon on Page 7 may also be used.



Techni-talk



Vol. 15, No. 3

Fall, 1963

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ELECTRONICS

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