Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION

radio · tv · hi-fi

Vol. 16, No. 2 Summer, 1964

The Oscilloscope — Checking Square Wave Response — 3

In the last two issues information was given on building a high impedance probe and a square wave generator. In this issue the interpretation of wave shapes will be described.

There are a number of service oscilloscopes available today which incorporate wide band amplifiers. Some of these are priced well within the reach of the average service shop. When replacing old equipment, serious thought should be given to the advantages to be gained by acquiring an oscilloscope with wide band characteristics.

In spite of this fact, the older scope, with less desirable characteristics, can be put to good use. For all practical purposes, the sine wave response of the vertical amplifier need be no better than 20 cps to 500 KC + 0-20% and 20 cps to 1 megacycle + 0-50% for alignment and troubleshooting the average monochrome receiver.

Compare Wave Shapes

One simple method of checking the response is by using a known good television receiver, and a station signal source. By comparing the wave shapes displayed on the scope to those published in the service notes, applicable to the receiver being used, the usability of the scope can be appraised.

For these tests, a high-impedance, low capacity probe is attached to the vertical input of the scope and the following tests made: With the receiver tuned to a station so as to produce a normal picture, observe the wave shapes developed at the points designated in Table I comparing these with the wave shapes illustrated in the service notes or schematic.

TABLE I

a. Horizontal pulse at video detector
b. Vertical pulse at video detector
c. Horizontal pulse at clipper grid
d. Vertical pulse at clipper grid
e. Horizontal pulse at clipper plate
f. Vertical pulse at clipper plate
g. Pulse at plate of vertical amplifier
h. Reference pulse to phase detector
i. Grid of horizontal output tube

If they do not reasonably correspond, either the scope or probe or possibly both units contain frequency discriminating elements which tend to produce inaccurate results.

When observing a pulse it is general practice to sync the scope at ½ or ⅓ its repetition rate. This generally facilitates locking-in of the observed pulse and results in less tendency to overexpand size in the horizontal direction. Without the addition of time markers, discrepancies may not be observed if the pulse is overexpanded. Therefore, a higher degree of accuracy can be obtained if two or three images of the desired pulse are displayed on the scope.

One serious drawback that may be encountered in this system of testing, is the possibility that discrepancies of certain pulses as observed may not be caused by a deficiency in the scope. Antenna problems, ghost conditions and occasionally, the station signal itself may produce a subnormal vertical or horizontal pulse. To minimize the possibility of erroneous conclusions regarding the usability of the scope, when observing the pulses, signals from several stations should be observed.

Using Square Wave Generator

A more precise method for determining the usability of the scope and probe is by using a square wave to determine frequency characteristics.

Details for building a simple square wave generator and power supply for checking the oscilloscope and probe were given in the Vol. 16 No. 1 issue.

Two frequency checks are made, one at 60 cps and the second at 15 kc with the square wave generator connected to the vertical input terminals of the oscilloscope. By comparing the resultant wave shapes with those illustrated, the accuracy of the scope in respect to frequency response will be indicated. Figure 1 shows the square wave output of the generator described in the last issue. This wave form should be essentially the same for both low and high frequencies.

The tilt in Fig. 2 represents a loss of low frequency. Some scopes may display a similar amount of tilt in the upward or positive direction.

Tilt is mainly due to low frequency discrimination and phase shift in the vertical amplifiers. This condition, when excessive, can usually be corrected by the proper choice of coupling capacitors. Occasionally, this condition can be corrected or greatly minimized by changing the value of the grid resistor in one of the stages following the input stage.

The rounding-off of the top left and lower right corners of the square wave in Fig. 3 represents defective high frequency response.

A more noticeable deficiency of the amplifiers in the high frequency range is indicated by the sloping sides and rounded corners as shown in Fig. 4.

(continued on page 7)

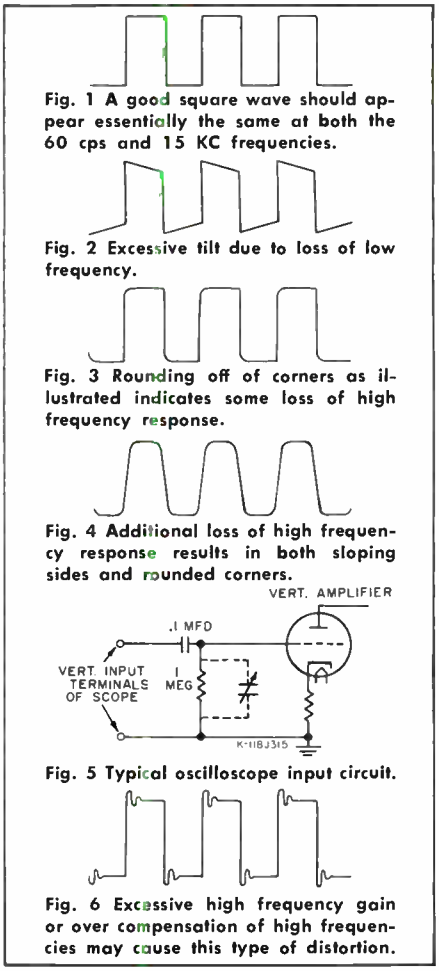


Fig. 1 A good square wave should appear essentially the same at both the 60 cps and 15 KC frequencies.

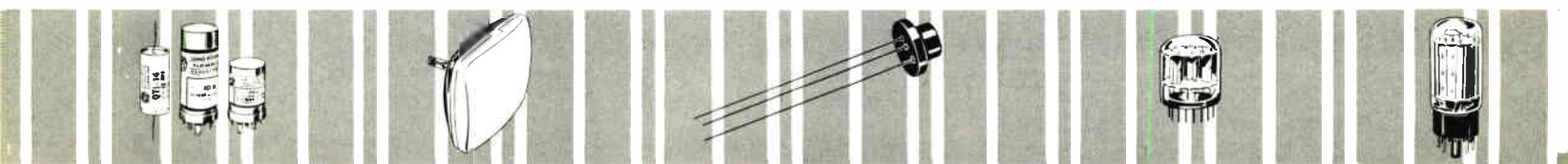
Fig. 2 Excessive tilt due to loss of low frequency.

Fig. 3 Rounding off of corners as illustrated indicates some loss of high frequency response.

Fig. 4 Additional loss of high frequency response results in both sloping sides and rounded corners.

Fig. 5 Typical oscilloscope input circuit.

Fig. 6 Excessive high frequency gain or over compensation of high frequencies may cause this type of distortion.



BENCH NOTES

PIX TUBE SUBSTITUTE

To complete the filament circuit of a series TV set without the picture tube simply plug a series picture tube brightener into the picture tube socket of the TV set.

Russell V. Book
6808 Navarre Rd., S. W.
Massillon, Ohio

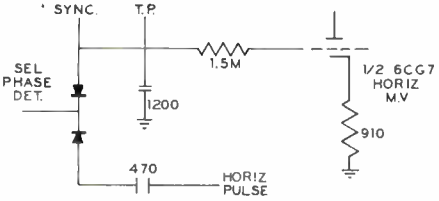
VISIBLE PARTS SUPPLY

Some rows of screw type jars with their lids mounted on shelves enclosed in a wood framework adjacent to the workbench make it easy to see, select and inventory small components and require scant space, considering the volume of stored parts.

H. Josephs
P. O. Box 22
Gardenville, Pennsylvania

NO RASTER ON "MM"

It was noticed in a G-E portable MM chassis that if the "bottom" half of the selenium phase detector opened, the high voltage and raster would disappear. If the antenna was disconnected the raster would reappear.



When the phase detector was operating normally, the voltage measured at the grid of the horizontal multivibrator read -1.5. With the "bottom" half of the phase detector open, the voltage at the grid measured -3.0 with the antenna disconnected and the set would produce a raster, but with the antenna connected and the set tuned to a station, the grid voltage would change to -15.0 causing loss of oscillation and high voltage and loss of raster.

P. M. Preston
Central Television-Radio Company
2646 University Avenue
San Diego 4, California

NOISY TUNERS

Most all TV tuners I have run across which are noisy are usually this way because of dirty, corroded and/or loose band switch contacts. Most often, I find the contacts are loose rather than dirty or corroded.

Many times this trouble can be isolated to one section which is common to several channels but anyone knows how compact these units are. The trick I use before bending ALL the contacts is to have the set going and the selector in the position which is causing the noisy picture then carefully drop a drop of Quietrole on the hard-to-get-to contacts. As soon as the liquid has made contact, the noise will be gone if this is the contact making trouble. This can save considerable time locating the faulty contact.

Harvey Nations
80 Oak Hill Drive
Asheville, N. C.

TUNER CLEANING HINT

Instead of just spraying the contacts in wafer type tuners, bend a pipe cleaner and apply cleaning fluid to the bent tip. Hold bent portion against each wafer ring as the tuner shaft is rotated. A much cleaner contact surface will result. After cleaning, lubricate each metal ring with suitable lubricant using another pipe cleaner.

Dealers Service
2100 Conway Road
Orlando, Florida

TURNTABLE RETAINER

A record changer, when inverted, often results in the turntable falling off the spindle, causing loss of bearings or damage to spindle or table. A rubber grommet or motor mount can be forced over the spindle until flush against the turntable, and will retain turntable security.

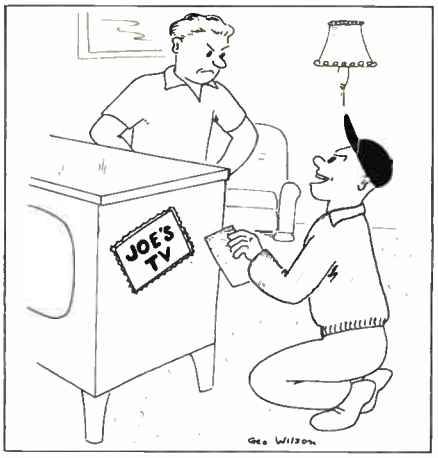
Harry Meermans
Meermans Radio & Television
R. F. D. No. 2
Wooster, Ohio

LARGE SPAGHETTI SUBSTITUTE

I have a number of different size and shape plastic handles from containers of laundry bleach, etc. They have good use as a heavy spaghetti tubing for the high voltage lead when small arcing develops.

I've used these handles several times as a feed through insulator when installing an antenna system where the lead-in must enter through an aluminum storm window. I drill the necessary hole and install a piece of handle tubing with the curved part turned downward which keeps the lead-in wire in the proper position for water to drip off during the wet weather.

Mr. John R. Zanath
Terrace TV & Radio
1809 Grant St.
Aliquippa, Pennsylvania



"Remember that nice decal you put on the car you sold me?"

HV SHOCK PROTECTION

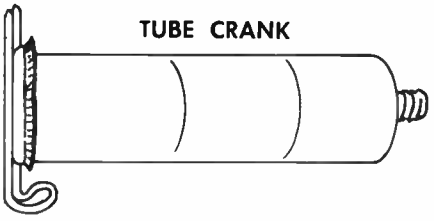
In servicing T.V. chassis which is removed from the cabinet, but connected to the picture tube there is always danger of electric shock and possible arcing to the chassis. This is most noticeable at the junction of the H.V. lead from the set and the extension lead to the H. V. anode of the picture tube.

I have found the easiest and quickest protection from this is the G.E. ETR-1094 Tube Puller. Insert the extension lead through the hole in a ETR 1094 Tube Puller and after the connection is made the puller is slid up to cover the junction. The small end of this puller is just right for a snug fit over the female connector of the extension.

On those extensions that are smaller than the puller a small piece of tape will hold the puller in place.

Clyde A. Raglin
Norman's Radio & TV
220 East Main Street
Carmi, Illinois

TUBE CRANK



Get the last drop of expensive cements, solvents, etc., out of collapsible tubes and with no mess by bending a long cotter key eye into crank form and using it as the handle. Slip the key across the bottom of the tube.

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

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.

RECEIVING TUBE POPULARITY LISTING

Listed below are the 166 most popular tube types based on distributor usage. One list is in order by usage and the other by alpha-numerical sequence. The figure following each tube type indicates popularity. Number 1, 5U4GA/5U4GB had the highest volume; Number 2, 6CB6A was next, etc.

LISTING BY VOLUME

*5U4GA/5U4GB	1	6BZ7	27	6AF4A	55	*6W4GT	83	6CL6	111	12SA7	139
6CB6A	2	*12DQ6B	28	6BA6	56	6EB8	84	6X5GT	112	12SK7	140
*6AX4GTB	3	6EA8	29	17DQ6B	57	25L6GT	85	12AV5GA	113	6AG5	141
6CG7	4	12AX4GTB	30	6AN8A	58	6BN4A	86	12AZ7A	114	6CN7	142
6SN7GTB	5	6CD6GA	31	1R5	59	6BU8	87	12SQ7	115	6DA4	143
6BQ7A	6	1B3GT	32	6BN6	60	6CL8A	88	1U4	116	6J5	144
12AU7A	7	12BY7A	33	6K6GT	61	6CU5	89	1U5	117	6SJ7	145
6U8A	8	6BK7B	34	6DQ5	62	6CY5	90	6BK4	118	12BL6	146
50C5	9	6CG8A	35	6EM7	63	7AU7	91	6BS8	119	12CU5	147
*6DQ6B	10	*1X2A/1X2B	36	6AM8A	64	3A3	92	6CS6	120	12SN7GTA	148
35W4	11	*6J6A	37	6BC8	65	6CQ8	93	6CX8	121	12W6GT	149
6AU6A	12	12AV6	38	6BE6	66	3DG4	94	6EA7	122	3DT6A	150
*6BQ6GTB/6CU6	13	6CM7	39	6GH8	67	5AM8	95	6EM5	123	6BA8A	151
OZ4	14	6S4A	40	10DE7	68	5AT8	96	6EW6	124	6BG6GA	152
6AQ5A	15	6T8A	41	6BH6	69	6DR7	97	12AT6	125	6BN8	153
1G3GT	16	*6V6GT	42	12B4A	70	*6DT6A	98	*12BQ6GTB	126	6BR8A	154
*12AX7	17	5Y3GT	43	4BQ7A	71	17AX4GTA	99	25CD6GB	127	6CF6	155
12AT7	18	3BZ6	44	6AS5	72	6BH8	100	1V2	128	6CS7	156
12BA6	19	3CB6	45	6BQ6GA/6CU6	73	2BN4A	101	4BZ6	129	6CW4	157
6AL5	20	6AV6	46	*6AU8A	74	3V4	102	6AB4	130	6CZ5	158
*6AU4GTA	21	35Z5GT	47	6BL7GTA	75	6AH6	103	6AK5	131	6DK6	159
6AW8A	22	6BQ5	48	50L6GT	76	12AD6	104	6BJ6	132	19AU4GTA	160
6BZ6	23	35C5	49	6DE4	77	5CL8A	105	6DN7	133	*25BQ6GTB	161
12BE6	24	2CY5	50	6DE6	78	*6BC5	106	6FQ7	134	5T8	162
*6X8A	25	5U8	51	12AU6	79	6SL7GT	107	6GK5	135	6AS8	163
12BH7A	26	6AF4	52	5AQ5	80	6X4	108	8AW8A	136	6CY7	164
		6L6GC	53	5CG8	81	8CG7	109	12AV7	137	6DW4	165
		6W6GT	54	6C4	82	50EH5	110	12CA5	138	25DN6	166

ALPHA-NUMERICAL LISTING

OZ4	14	6AB4	130	6BK7B	34	6CU5	89	6L6GC	53	12B4A	70
1B3GT	32	6AF4	52	6BL7GTA	75	6CW4	157	6S4A	40	12BA6	19
1G3GT	16	6AF4A	55	6BN4A	86	6CX8	121	6SJ7	145	12BE6	24
1R5	59	6AG5	141	6BN6	60	6CY5	90	6SL7GT	107	12BH7A	26
1U4	116	6AH6	103	6BN8	153	6CY7	164	6SN7GTB	5	12BL6	146
1U5	117	6AK5	131	6BQ5	48	6CZ5	158	6T8A	41	*12BQ6GTB	126
1V2	128	6AL5	20	6BQ6GA/6CU6	73	6DA4	143	6U8A	8	12BY7A	33
*1X2A/1X2B	36	6AM8A	64	*6BQ6GTB/6CU6	13	6DE4	77	*6V6GT	42	12CA5	138
2BN4A	101	6AN8A	58	6BQ7A	6	6DE6	78	*6W4GT	83	12CU5	147
2CY5	50	6AQ5A	15	6BR8A	154	6DK6	159	6W6GT	54	*12DQ6B	28
3A3	92	6AS5	72	6BS8	119	6DN7	133	6X4	108	12SA7	139
3BZ6	44	6AS8	163	6BU8	87	6DQ5	62	6X5GT	112	12SK7	140
3CB6	45	*6AU4GTA	21	6BZ6	23	*6DQ6B	10	*6X8A	25	12SN7GTA	148
3DG4	94	6AU6A	12	6BZ7	27	6DR7	97	7AU7	91	12SQ7	115
*3DT6A	150	*6AU8A	74	6C4	82	*6DT6A	98	8AW8A	136	12W6GT	149
3V4	102	6AV6	46	6CB6A	2	6DW4	165	8CG7	109	17AX4GTA	99
4BQ7A	71	6AW8A	22	6CD6GA	31	6EA7	122	10DE7	68	17DQ6B	57
4BZ6	129	*6AX4GTB	3	6CF6	155	6EA8	29	12AD6	104	19AU4GTA	160
5AM8	95	6BA6	56	6CG7	4	6EB8	84	12AT6	125	*25BQ6GTB	161
5AQ5	80	6BA8A	151	6CG8A	35	6EM5	123	12AT7	18	25CD6GB	127
5AT8	96	*6BC5	106	6CL6	111	6EM7	63	12AU6	79	25DN6	166
5CG8	81	6BC8	65	6CL8A	88	6EW6	124	12AU7A	7	25L6GT	85
5CL8A	105	6BE6	66	6CM7	39	6FQ7	134	12AV5GA	113	35C5	49
5T8	162	6BG6GA	152	6CN7	142	6GH8	67	12AV6	38	35W4	11
*5U4GA/5U4GB	1	6BH6	69	6CQ8	93	6GK5	135	12AV7	137	35Z5GT	47
5U8	51	6BH8	100	6CS6	120	6J5	144	12AX4GTB	30	50C5	9
5Y3GT	43	6BJ6	132	6CS7	156	*6J6A	37	*12AX7	17	50EH5	110
		6BK4	118			6K6GT	61	12AZ7A	114	50L6GT	76

*All Versions

use these inexpensive "Salesmen"...often

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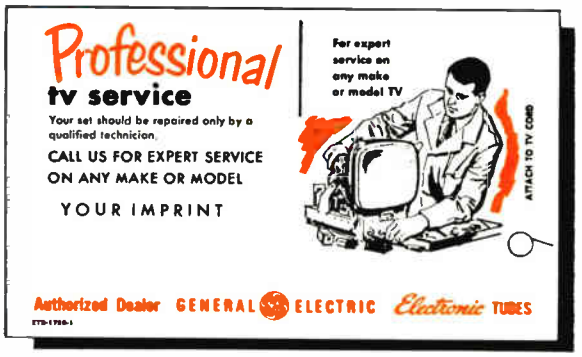

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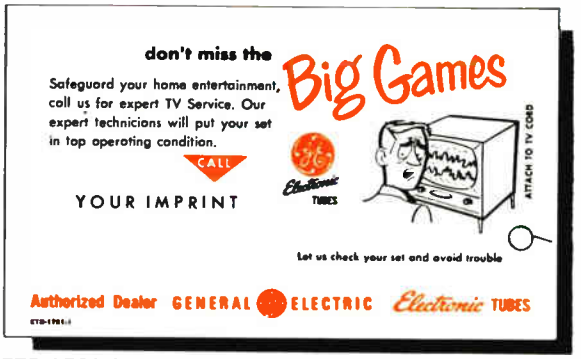

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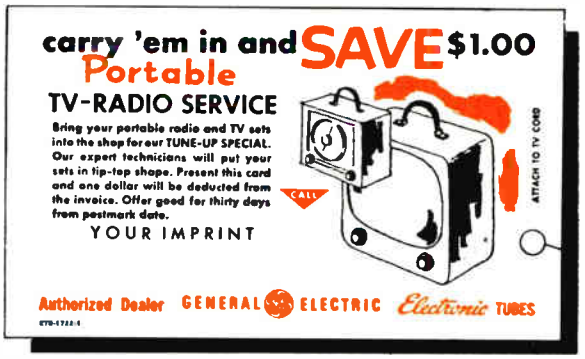

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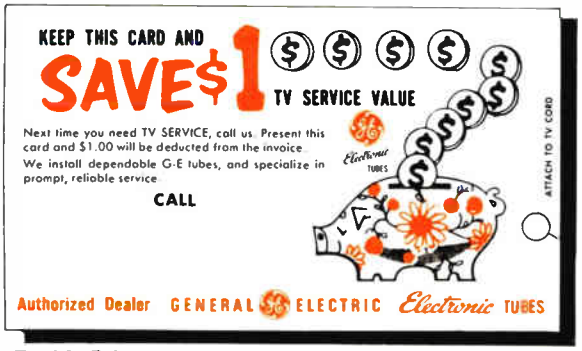

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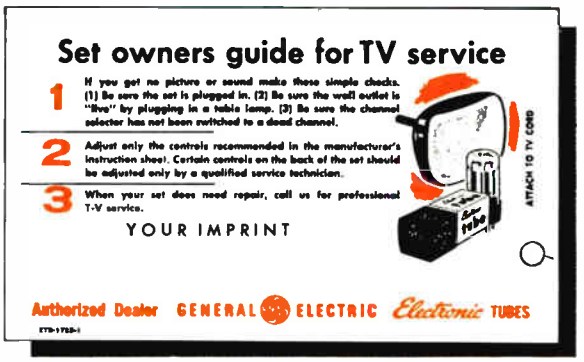

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let the postman be your best salesman with these colorful post cards

ORDERING INSTRUCTIONS POST CARDS

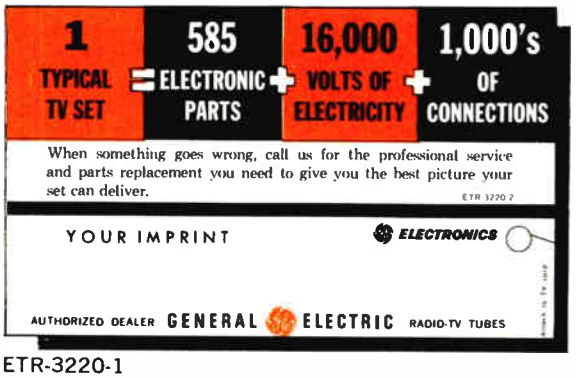
Select and send an appropriate service message every month from this wide assortment. You can build an effective mailing list from your local telephone directory, concentrate mailings on the area you can profitably develop and serve.

Available printed on regular 3-cent government post cards or blank stock. Actual size —3¼" x 4½". Colors, red-orange and black. Order by ETR number printed on card. Cost as follows:

Unstamped

No imprint—100	$1.50
Imprinted, one side (first 100)	$4.25
Each add'l 100 (imprinted)	$1.75
Imprinted, with Indicia	
For first 100	$7.00
Each add'l 100	$2.00

Unstamped cards can be imprinted with your postal permit number or postage applied locally. Regular imprint includes name, address and phone number.



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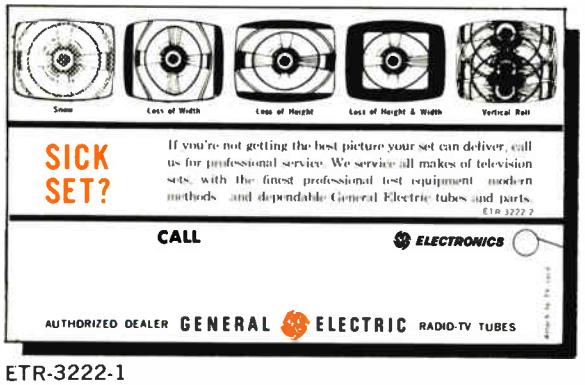

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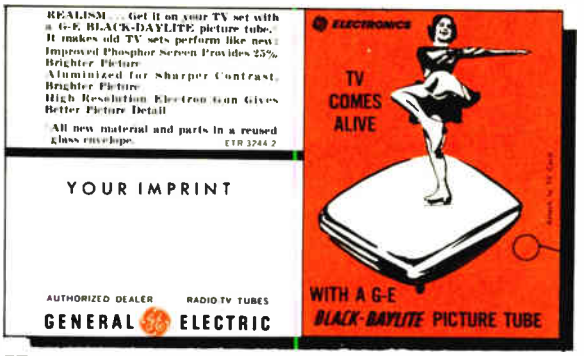

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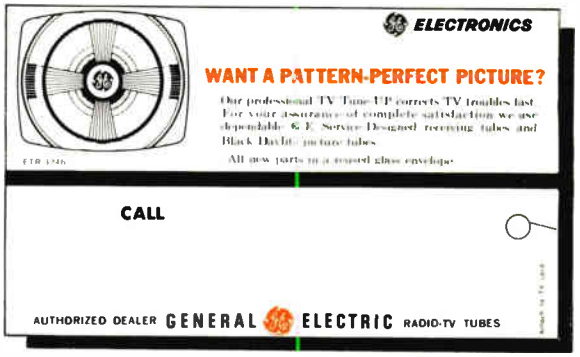

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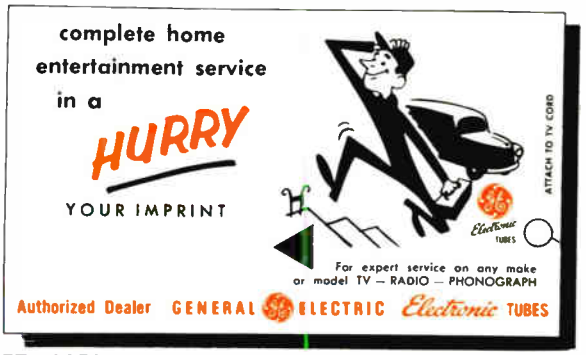

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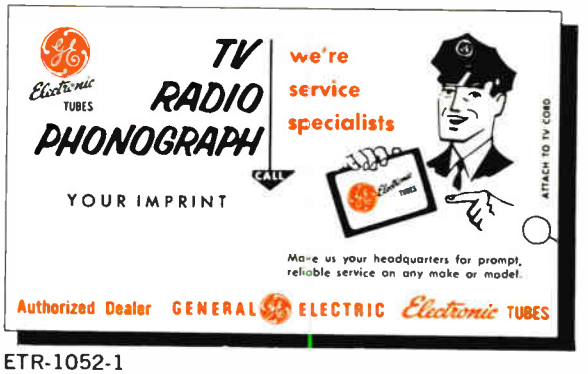

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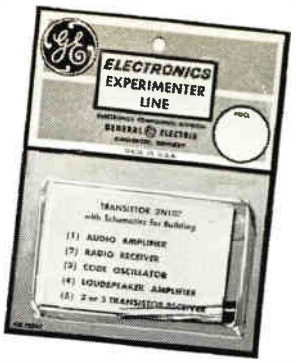
EXPERIMENTER / HOBBYIST ELECTRONIC COMPONENTS

Each electronic component in this series is blister packaged with circuit diagrams from which educational, practical, and interesting electronic devices can be built.



SILICON CONTROLLED RECTIFIER GE-X1
with Schematic for Building
PLUG IN SPEED CONTROL FOR GENERAL PURPOSE APPLICATIONS

This silicon controlled rectifier is a sensitive, rugged solid state switch for use on 117 volt household circuits. Controlling up to 4.7 amperes the GE-X1 makes a fine speed control for hand tools, blenders, mixers, lamp dimmers, HO train control and automotive alternator regulator. User Price $6.30.

GE-X1

SILICON CONTROLLED RECTIFIER GE-X2
(LIGHT ACTIVATED SWITCH)
with Schematic for Building
"SLAVE" PHOTOFLASH FOR FLASHBULBS

This "mighty midget" is the first light activated power switch. The GE-X2 is a genuine *silicon* controlled rectifier that is controlled by *light*. Conducting up to ¼ ampere, up to 25 volts, it can be used in photoelectric controls, experimental ignition system, SLAVE PHOTOFLASH circuits, miniature lightweight static relays and punched card or tape readouts. User Price $3.50.

GE-X2

SILICON CONTROLLED RECTIFIER GE-X3
with Schematic for Building
12 VOLT REGULATED BATTERY CHARGER

A silicon controlled rectifier for high current (up to 13 amps) at lower voltage up to 50 PIV. The GE-X3 is ideal for applications requiring higher current such as battery chargers, electroplating, relay replacement, or low voltage controls operating from automobile or boat batteries. User Price $5.95.

GE-X3

SILICON RECTIFIER GE-X4
with Schematic for Building
HIGH-LOW-OFF CONTROL FOR HEATER, LAMP, MOTOR, ETC.

For the first time a low priced high current conventional silicon rectifier. With a 20 amp rating, at voltage as high as 200 PIV, the GE-X4 can be used in Hi-Lo lamp dimmers, motor speed controls, battery chargers, and in conjunction with the GE-X1, or GE-X3, full wave SCR light dimmers or D.C. Power Supplies. User Price $1.95.

GE-X4

SILICON CONTROLLED RECTIFIER GE-X5
with Schematic for Building
ENLARGER PHOTOTIMER

This is a rugged little silicon controlled rectifier capable of handling up to 1.6 amps and 50 volts. Because it can be activated by an extremely low signal power (a momentary signal of 200 micro watts or *less*) the GE-X5 is invaluable for use in simple remote controls, temperature controls, alarm systems and a host of other imaginative and intriguing devices. User Price $4.45.

GE-X5

PHOTOCELL GE-X6
with Schematic for Building
(1) LIGHT FLASHER
(2) NIGHT CONTROL

This cadmium sulfide photo conductive cell is end-illuminated and can be used up to 250 volts peak AC or DC in control applications such as relay controls, automatic light flashers, remote indicator, and punched card or tape readouts. User Price $1.75.

GE-X6

REED SWITCH GE-X7
with Schematic for Building
(1) LIGHT FLASHER
(2) BURGLAR ALARM

This reed switch can carry loads from 15 volt-amperes down to micro amperes. The GE-X7 with external magnetic actuation is ideal for liquid-level controls, weight measuring devices, temperature limiters, multiple relays and many other applications. User Price $1.00.

GE-X7

TRANSISTOR GE-X8
with Schematic for Building
(1) LIGHT FLASHER
(2) LIGHT TARGET
(3) TRIGGERED LIGHT SOURCE

The GE-X8 is an NPN isolated case germanium medium speed transistor designed for low level switching and amplification in applications such as oscillators, direct coupled amplifiers, flashers and bi-stable lamp driver circuitry. User Price $.85.

GE-X8

TRANSISTOR MANUAL, ETR-3296
22 fact-filled chapters containing transistor theory; interesting transistor circuits for radios, amplifiers, oscillators, etc., valuable information needed by every engineer, hobbyist, experimenter. Price $2.00.

TRANSISTOR GE-X9
with Schematic for Building
(1) LIGHT FLASHER
(2) LIGHT TARGET
(3) TRIGGERED LIGHT SOURCE

The GE-X9 is a PNP germanium alloy transistor for extremely reliable medium power amplification and switching at low frequency. An ideal companion to the GE-X8, this transistor can be used to build light flasher, light target or triggered light source. User Price $.85.

GE-X9

UNIJUNCTION TRANSISTOR GE-X10
with Schematics for Building
HIGH PRECISION TACHOMETER
(For Automative Type Ignition Systems)

The characteristics of the Unijunction make it invaluable for use in oscillators, timing circuits, voltage sensing circuits, SCR firing circuits and bi-stable circuits. User Price $4.95.

GE-X10

ZENER DIODE GE-X11
with Schematic for Building
HIGH PRECISION TACHOMETER
(For automative type ignition systems)

The GE-X11 is a silicon Zener diode rated 8.2 volts at 1 watt. It can be used in low voltage transistor or silicon controlled rectifier applications requiring voltage regulation or voltage transient protection. User Price $2.25.

GE-X11

TRANSISTOR GE-M100
with Schematic for Building
CITIZENS BAND RECEIVER and CONTROL UNIT (27MC)

A top quality germanium mesa transistor for the ham, hobbyist and citizens bander. The GE-M100 is packaged with complete circuit diagrams covering the construction of a transistorized citizens band receiver and remote control units. User Price $1.50.

GE-M100

TRANSISTOR 2N107
with Schematics for Building
(1) AUDIO AMPLIFIER
(2) RADIO RECEIVER
(3) CODE OSCILLATOR
(4) LOUDSPEAKER AMPLIFIER
(5) 2 or 3 TRANSISTOR RECEIVER

An alloy junction audio transistor PNP that's ideal for hobbyist projects such as simple audio amplifiers; one, two, or three transistor radios; code practice oscillator, and loudspeaker audio amplifiers. User Price $.55.

2N107

TRANSISTOR 2N170
with Schematics for Building
(1) THREE TRANSISTOR RADIO
(2) DIRECT COUPLED AMPLIFIER
(4) PRE-AMPLIFIER

A low voltage high frequency NPN transistor — an ideal companion to the 2N107 listed above. The 2N170 can be used to build pocket radios, amplifiers and other interesting devices. User Price $.75.

2N170

UNIJUNCTION TRANSISTOR 2N2160
with Schematics for Building
(1) TRANSISTOR METRONOME
(2) CODE PRACTICE OSCILLATOR

A device which has quite different electrical characteristics from those of the conventional transistor, the unijunction transistor is a three-terminal semi-conductor featuring: (1.) Low cost (2.) Low value of firing current (3.) A negative resistance characteristic that is stable with temperature and life (4.) A stable firing current (5.) A high pulse-current capability. These characteristics make the unijunction invaluable for use in oscillators, timing circuits, voltage sensing circuits, SCR firing circuits and bi-stable circuits. User Price $1.49.

2N2160

ELECTRONICS EXPERIMENTER HOBBYIST MANUAL, ETR-3737
Every engineer, experimenter, hobbyist, student, technician can learn new SCR and Rectifier applications with the simple but interesting and useful circuits in this manual. Price $1.00.

Ask your distributor for a copy of the new Experimenter/Hobbyist Catalog with Applications and Parts Lists, ETR-3730-A.

TELEVISION

Modifications for G-E ST-16A Color Generator

The crosshatch and dot patterns on some ST-16A Generators are too broad for setting up satisfactory convergence. Here is a circuit modification which appreciably sharpens the display on these generators. Details are given below, but some variation in component values may be necessary in your particular generator.

1. Add a 51K ½ watt resistor across diode CR10, located between the junction of R123 and R125 (from lug 7 of V12B).

2. Add a 51K ½ watt resistor from the B+ side of R118 to the junction of R116 and R117.

3. Change C45 from 10uuf. to 43uuf. If difficulty is encountered in obtaining vertical lines only, a light adjustment of the 157KC trimmer capacitor C-51 will cure it and sharpen the lines at the same time.

Some servicemen seem to prefer to use either vertical bars or horizontal bars only, when converging a color receiver. This is easily done on the G-E ST-16A with the following modification details.

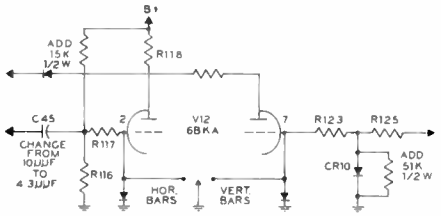
1. Install a single pole, double throw center off toggle switch in the bottom chassis pan near the line cord entrance location.

2. Connect the center terminal of the toggle switch to Chassis ground.

3. Wire one end terminal of the switch to lug 2 of V12 (6BK7A) and the remaining switch terminal to lug 7 of the same tube. (see schematic).

With the toggle switch in the center off position, the ST-16A functions normally. In the "Hor. Bars" position, the 157.34 K.C. signal is grounded allowing only Horizontal Bars to appear.

In the "Vert. Bars" position, the 419.6 CPS signal is grounded allowing only Vertical Bars to appear.



RADIO

P-925 Modification to Prevent Spurious Signal Reception

SUBJECT:

A number of P-925 AM/SW radios may receive spurious signals on the broadcast band. Spurious signals can be defined as signals that can be received which do not originate in stations broadcasting on the frequency to which the receiver is tuned. These spurious signals interfere with the true signal and may result in "birdie-like" sounds, hiss and whistle effects, or the superimposing of stations.

CAUSE:

The type of transistor used in the local oscillator circuit (TR2) in this receiver will produce harmonics up to eight times (8x) the fundamental tuned frequency due to high beta characteristics. These harmonics beat against short-wave signals and result in a 455 kilocycle output from the mixer stage (TR1). These conditions may also arise when a replacement TR2 oscillator is installed. Be sure to check the broadcast band to insure no spurious signals are present.

REMEDY:

To minimize these spurious signals that result in an intermediate frequency output of the mixer (TR1), add a resistor and a capacitor to the circuitry. Please refer to the service manual for this model and: (a) install a .001 mfd. ceramic capacitor across the terminals of the broadcast antenna loop between pins 3 and 4; (b) then cut open the copper conductor strap between pin 1 of oscillator coil switch (S1C) and pin 2 of broadcast oscillator coil (L1); (c), solder a 680 ohm ¼ watt resistor across the gap made in the conductor strap.

NOTE:

Be sure to check and realign the broadcast oscillator trimmer capacitor C2D and broadcast antenna trimmer capacitor (C2A) for correct tracking of the stations after the modifications are complete. New factory production will include this change.

THE OSCILLOSCOPE

(continued from page 1)

Some oscilloscopes incorporate a small capacitor in the input section that can be adjusted to correct deficiencies in the high frequency. If your scope does not have this feature, it may be possible to make some correction to the high frequency response by adding a capacitor across the input resistor as illustrated in Fig. 5. A variable capacitor with a range of 2. to 20 uuf should be sufficient unless the design of the scope is such that good response is impossible to obtain.

Over compensation of high frequencies is illustrated in Fig. 6. This condition can usually be corrected by increasing the size of the capacitor across the input resistor.

If the foregoing tests indicate that the scope is acceptable, a similar check of the probe should be made. The square wave signals are fed into the probe which has been connected to the vertical input terminals of the scope. Any variation in response between this and the former test can be attributed to the probe.

Some probes contain a compensating capacitor C1 which was illustrated and discussed in the Vol. 15 No. 4 issue. This capacitor can be adjusted to correct undesirable characteristics, which mainly affect the response in the high frequency area such as illustrated in figures 4 and 6.

GE ELECTRONICS

LEADERSHIP IN ELECTRONICS!

LEADERSHIP IN SERVICE AIDS . . . *and here are more G-E FIRSTS*

PART HOLDER ETR-3851

Here is a new inexpensive service aid to help speed bench service work. The new General Electric Part Holder is designed to stand upright or attach to edge of service bench. Many times a "third hand" is needed to hold parts in position particularly while soldering. Other times something is needed to hold a piece of solder or some other item when both hands are being used. More than one G-E Part Holder can be used to hold different parts in a fixed position until solder "sets."

Ask your G-E Electronics distributor for ETR-3851. Better get more than one because you will find many uses for it. If he is unable to supply you use order coupon on page 7. The price is only $.35 each.

POCKET TOOL, ETR-3594

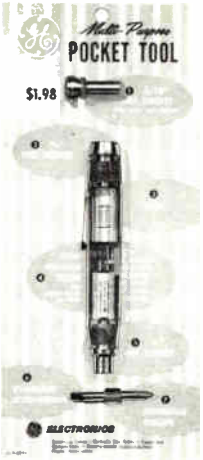
Here is a practical and useful tool that will make servicing easier and faster. This new pocket tool will enable you to remove the back of any receiver regardless of the type of fastening without opening your tool or service case. Look at the many features and uses listed below:

Lightweight pocket tool clips to shirt pocket.

Contains Phillips and standard screw driver; ¼", 5/16" and ⅜" hex sockets; high voltage tester and level.

Use screwdriver end as prod, neon bulb in handle indicates presence of high peak voltage at plate of horizontal output tube or high voltage rectifier.

Lay unit flat with G-E monogram down. Use level when installing phonographs, air conditioners, etc.



Handy for use in shop, car or home. Ask your distributor for ETR-3594 or use handy order coupon on page 7. The price is only $1.98.

Kempton's Korner

General Electric always tries to be conscious of your problems and makes improvements whenever possible.

Seeking to smooth the work and calm the tempers of radio, television and electronic service technicians, the General Electric Tube Department has come up with a new improved receiving tube carton.

Two improvements benefit service technicians:

More space is provided for imprinting larger tube type numbers.

A new method of locking the tab practically eliminates the possibility of it being torn off accidentally. Cleverly-designed die-cut indentations at the corners of the locking tab are used instead of the conventional slits. The indentations serve to lock the box as securely as do the previously used slits, but offer no "head-start" in tearing off the tab.

Techni-talk

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GE ELECTRONICS

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