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VOL. 3 NO. 2

GE Electronic TUBES
Techni-talk on AM, FM, TV Servicing

CONVERSION OF 10- AND 12-INCH RECEIVERS TO USE LARGER SIZE PICTURE TUBES

This is the fourth of a series of articles on converting ten and twelve inch TV receivers to use fourteen, sixteen or seventeen inch rectangular picture tubes. In this issue a General Electric twelve inch Model 12C101 was converted to use a General Electric 16KP4-A aluminized picture tube and a Stromberg-Carlson twelve inch Model TV-12 series 11 was converted to use a General Electric 14CP4 picture tube.

The following discussion is a description of the procedure followed which produced satisfactory results with respect to the particular model converted. If a conversion is attempted on a similar model of an earlier or later date or on a different model from the same manufacturer, then additional adjustments and steps may be necessary. The changes which were made have not been approved by the manufacturer and may therefore invalidate the manufacturer's warranty.

GENERAL ELECTRIC MODEL 12C101

The General Electric Model 12C101 shown in Fig. 1A was originally a twelve inch TV receiver which used a 12KP4-A picture tube. This was converted to use a General Electric 16KP4-A aluminized picture tube although adequate cabinet space was available to use a 17BP4-A picture tube. The completed conversion is shown in Fig. 1B.

The following parts were used in making this conversion:

1—General Electric 16KP4-A picture tube.
1—General Electric RLD-024 deflection yoke.
1—General Electric RET-003 ion trap magnet.
1—General Electric RTO-085 horizontal sweep transformer.
1—Nine pin miniature socket.
1—General Electric 6S4 tube.
1—2200 ohm 1 watt resistor.
1—4.7 megohm ½ watt resistor.
1—Sixteen inch light Royalite plastic mask measuring 18 in. x 14 in. (Manufactured by Precision Plastics, Inc., in Chicago and represented by the Hy-Art Co., 136 Liberty St., New York City, N. Y.)

The complete receiver was brought into the shop and the chassis was removed. The following changes were then made to adapt this chassis to use a 16KP4-A picture tube:

1. Replaced the original deflection yoke with a General Electric RLD-024 using the old yoke as a wiring guide. The original focus coil did not have to be replaced.

2. The rivets were removed from the base of the two half-moon sections which held the yoke in place. This was done by forcing the rivets out with a husky screw driver used as a lever since the use of a drill was found impracticable. The two half-moon sections were then remounted to the original bracket using a self-tapping screw through the front holes of the half-moon sections and the back hole of the mounting bracket. In this way the yoke was remounted about one inch in back of its original position. Another screw was fastened through the back holes of the half-moon sections to provide rigidity.

3. The front portion of the high-voltage compartment was bent slightly so that it didn't interfere with the bell of the picture tube.

4. The front section of the chassis on which the 12KP4-A picture tube rested was removed by first removing the controls and then the self-tapping screws on each side. The filter choke and audio output transformer were also removed. The triangular sections of the front marked "A" in Fig. 2A were removed by cutting along the dotted lines with a hack saw. The sides were bent over as shown in Fig. 2B and a piece of one-inch wide rubber cushion was cemented over the ends. The bottom of the picture tube should be five inches above the bottom as indicated in Fig. 2B.

5. A nine pin miniature socket was mounted in the extra tube socket hole which was already punched out of the right top portion of the chassis. This was just in front of the high-voltage compartment and was used for the vertical output tube in models beginning with numbers 16C, 16T and 17C. A 6S4 tube was used and wired into the circuit as shown in Fig. 3. The filament was connected between the a-c plug and pin 12 of the picture tube. This was done by removing the a-c end of the black lead which was connected from pin 12 of the picture tube to one of the a-c input terminals. One side of the 6S4 filament was then connected to the black lead and the other side to the a-c input terminal.

6. The cathode resistor R299 was changed to 2200 ohms and a 4.7 meg resistor was connected across R296 to obtain sufficient height with good linearity.

7. A General Electric RTO-085 horizontal output transformer was substituted for the original transformer and wired as shown in Fig. 4.

8. The 16KP4-A picture tube was then inserted into the yoke assembly. A piece of stranded wire was used to ground the graphite coating on the picture tube. This was fastened to the chassis with a self-tapping screw and to the picture tube with several pieces of Scotch tape. The picture tube end of the wire

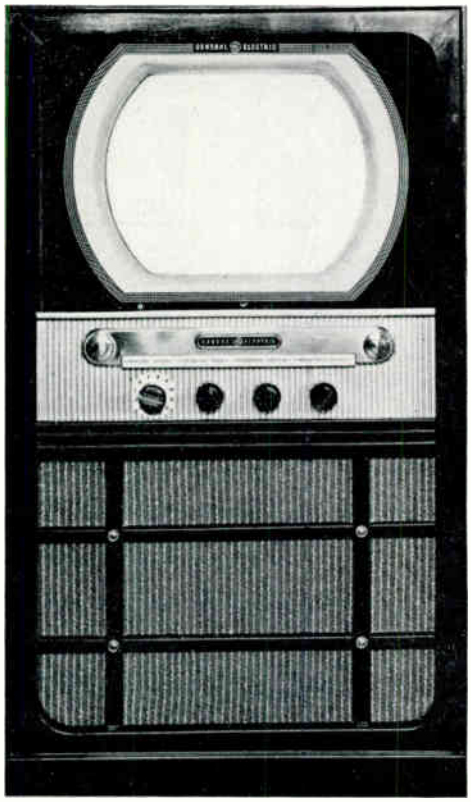

Fig. 1A. General Electric twelve inch Model 12C101 before conversion.

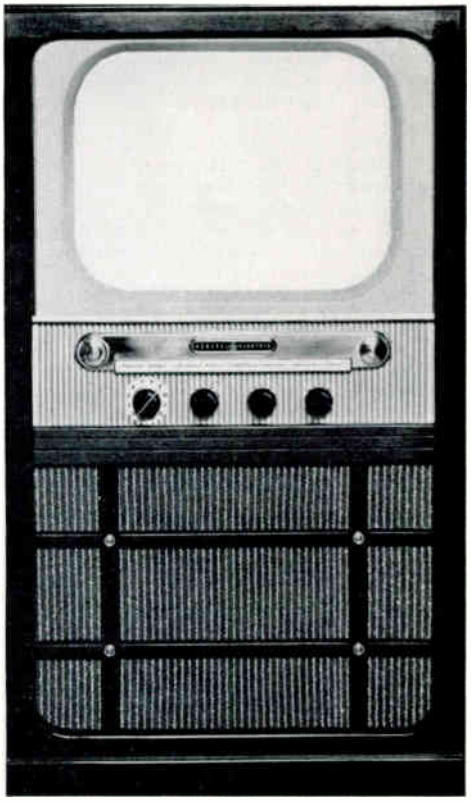

Fig. 1B. The same receiver after being converted to use a General Electric 16KP4-A picture tube.

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GENERAL ELECTRIC

SCHENECTADY 5, N. Y.

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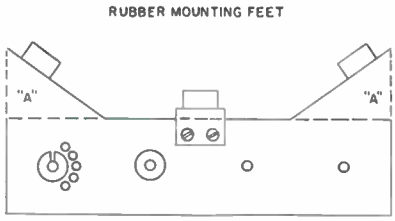


Fig. 2A. Front portion of the General Electric Model 12C101 chassis showing the front area which must be removed to accommodate a larger size picture tube.

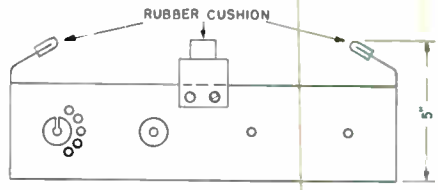


Fig. 2B. Showing the vertical side portion of the chassis which was bent to provide support for the 16KP4-A picture tube.

was stripped back about two inches to assure good contact.

9. The front of the picture tube was fastened to the chassis with a piece of metal hanger strap commonly used on antenna chimney mounts. Two five-inch pieces of one-inch wide sponge rubber were used between the top corners of the picture tube and the hanger strap to prevent slippage and absorb shock.

10. The RET-003 ion trap magnet was placed on the neck of the picture tube and all electrical connections were made. The set was turned on and the ion trap and focus coil correctly positioned. The necessary controls were then adjusted to obtain a linear test pattern.

CABINET CHANGES

The safety glass and mask were removed from the cabinet. The safety glass was held in place by two wooden plugs located at the top of the front wooden panel, one above the Selector-Tuning shaft on one side and above the Brightness-Contrast shaft on the other side. The Phillips screws holding the brass panel in place had to be removed as well as the two wooden plugs at the front of the chassis shelf. The safety glass was pushed upward to allow the removal of the brass plate. The safety glass could then be lowered and removed.

The wooden panel was marked off using a scriber and a cardboard template about $\frac{1}{8}$ in. larger than the faceplate of the picture tube. This was centered on the mask area and the wooden panel was cut out using a keyhole saw. A sixteen inch light Royalite mask measuring 14 in. x 18 in. designed for use in back of the safety glass was used. This was cut down to the size of the safety glass with a pair of ordinary scissors. The paint backing was removed from the safety glass with a putty knife and acetone.

The mask, safety glass and brass panel were then replaced in the cabinet and the chassis was inserted. The faceplate of the picture tube should fit closely against the edge of the mask. It may be necessary to slightly reposition the picture tube at this time in order to obtain the proper contact with the mask. The completed conversion is shown in Fig. 1B.

STROMBERG-CARLSON MODEL TV-12 SERIES 11

The next receiver converted was a twelve inch Stromberg-Carlson radio-phonograph combination shown before conversion in Fig. 5 and after conversion in Fig. 6. In this model the chassis was recessed to accommodate a portion of the original 12JP4 picture tube, and for this reason there was insufficient cabinet space for a sixteen inch picture tube. Therefore the 14CP4 was the largest size which could be used without major chassis changes.

The following parts were used in making this conversion:

1—General Electric 14CP4 picture tube.

1—General Electric RET-003 ion trap magnet.

1—Stancor DY-7 70° deflection yoke or equivalent.

1—Stancor A-8128 horizontal sweep transformer or equivalent.

1—Cavity type anode connector to fit 14CP4 picture tube.

1—.05 mfd 600 volt capacitor.

1—5000 ohm 2 watt resistor.

1—400 mmfd mica capacitor.

1—1000 ohm 25 watt resistor.

1—14 in. plastic mask measuring 10½ in. x 13½ in. outside dimensions. The mask used was a No. 14SG manufactured by the Deitz Miracle Lens Co., 141 President St., Passaic, N. J. (a mask of some other manufacturer may be used, however, the outside dimensions are important as the mask just fits as can be seen in Fig. 6.)

Due to the size and weight of the cabinet it was not removed from the owner's home. However, the chassis and picture tube were taken out and brought to the shop. It might be pointed out at this time that the 12JP4 picture tube had the early type electron gun construction and therefore developed an ion spot. This type of defect will not appear on a General Electric 14CP4 picture tube.

The following circuit changes were then made:

1. The deflection yoke was changed to a 70° Stancor DY-7 using the original yoke as a wiring guide. Before replacement it was found that the yoke mounting bracket assembly should be turned around. This was necessary because the deflection yoke had to be positioned about one inch closer to the front of the chassis.

2. The horizontal sweep output transformer was replaced with a Stancor A-8128. The width control was disconnected and the original 200 mmfd capacitor C287 was reconnected across the horizontal deflection coils as shown in Fig. 7.

3. A .05 mfd capacitor was connected across terminals 5 and 6 to extend the width.

4. Changed the 6BG6-G screen resistor R247 to a 5000 ohm 2 watt resistor.

5. Shorted out the 6BG6-G cathode resistor R-300.

6. Reduced capacitance of C271 in the horizontal drive control circuit to 300 mmfd which corrected the horizontal linearity. The capacitor substitution box described in Vol. 2 No. 6 was used to determine this capacitance.

7. Increased the resistance of R304 by 1000 ohms to extend width and correct linearity.

8. Replaced ball type anode connector with a cavity type connector.

(Continued on Page 3)

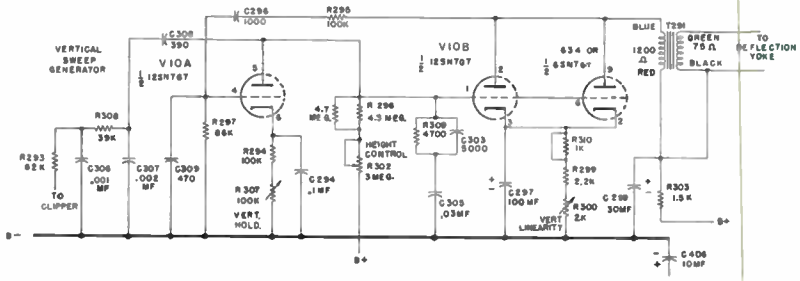


Fig. 3. Vertical sweep generator circuit of General Electric Model 12C101 after making necessary changes to obtain sufficient sweep for a 16KP4-A picture tube.

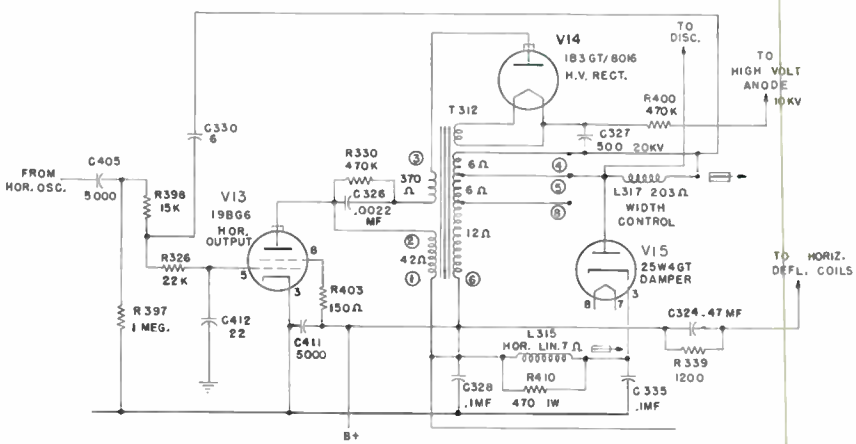
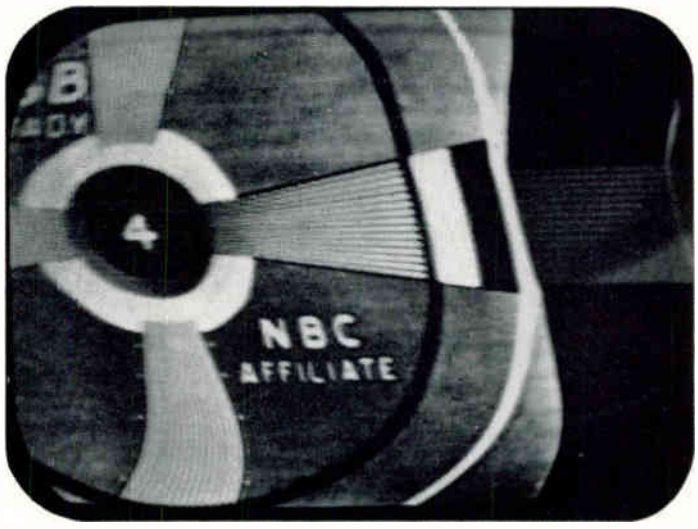


Fig. 4. Horizontal output circuit of General Electric Model 12C101 after making necessary changes to obtain adequate sweep width and HV for a 16KP4-A picture tube.

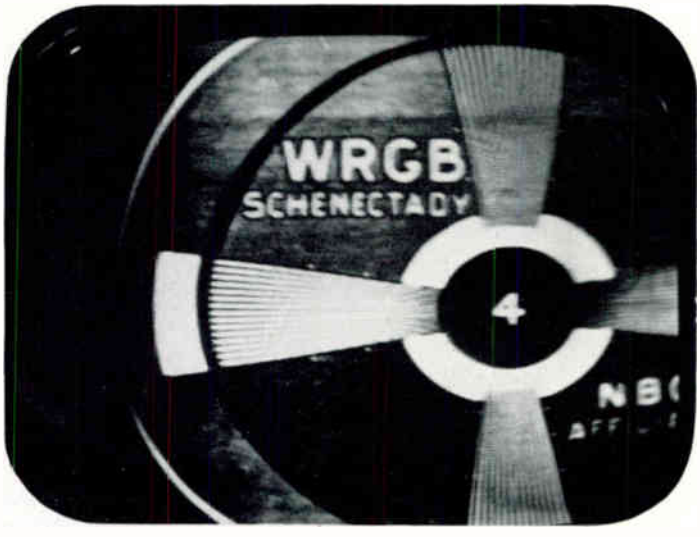
Tele-Clues

FILE THIS SHEET IN YOUR TELE-CLUE BINDER

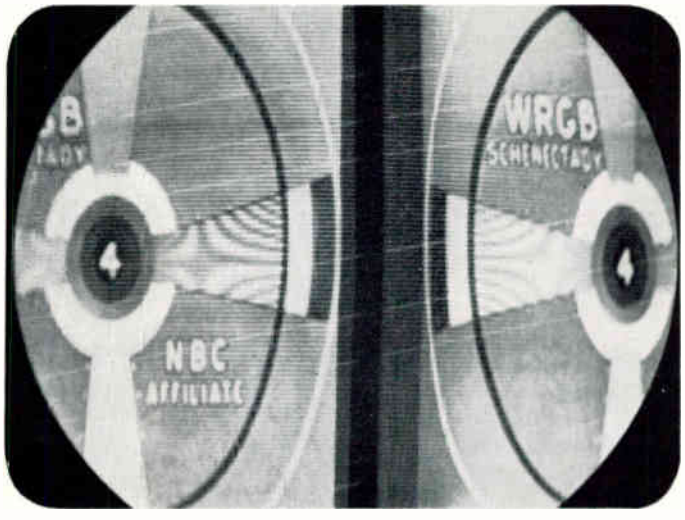
Tele-Clue No. C-73—Short between filament and cathode (terminals 8 and 9) on 12AT7 video amplifier in 12T3 receiver.



Tele-Clue No. K-74—A short between the cathode and heater in the 6SL7-GT Sync Amplifier and clipper tube used in a large number of General Electric chassis will result in a picture similar to either Tele-Clue No. 74 or 75. The contrast control has little or no effect. Horizontal synchronization is extremely critical with a horizontal jitter or weaving present most of the time.



Tele-Clue No. K-75—This is also the result of a short between cathode and heater in the 6SL7-GT Sync Amplifier and clipper tube and the same explanation as given for Tele-Clue No. 74 will apply here. The only difference is that horizontal synchronization occurs so that the black border can be seen at the left instead of at the right of the picture tube.



Tele-Clue No. E-76—This defect in horizontal synchronization which was the only point where horizontal sync would occur indicates a phase shift in the horizontal oscillator circuit shown in Fig. 1. This circuit is used in the Westinghouse Model H-606K12. A similar circuit, however, is used in a considerable number of TV receivers. This defect was caused by a change in the value of R453 from 220,000 ohms to 8000 ohms.

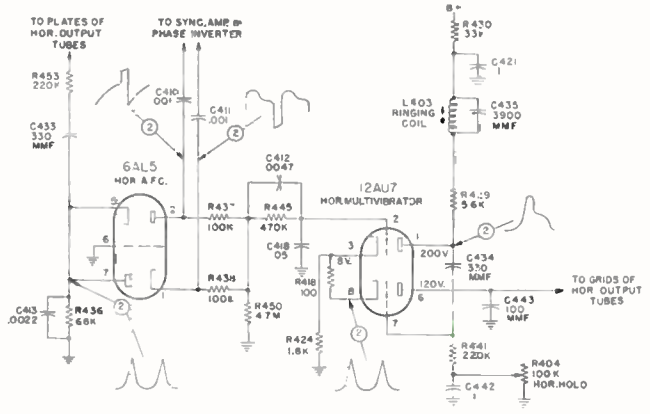


Fig. 1. Horizontal A.F.C. and multivibrator circuit used in the Westinghouse Model H-606K12 chassis No. V-2150-111 TV receiver.

BEGINNING with this issue, the page containing Tele-Clues will be a separate sheet punched for insertion in your Tele-Clue binder. These binders which contain seventy-two Tele-Clues and an index sheet are available through your local GE or Ken-Rad tube distributor.

Tele-Clues pertaining to defects in the SYNC AMPLIFIER AND CLIPPER CIRCUITS will be coded with the letter K. Please write this reference above the letter K or the index sheet in your binder. Also enter the Tele-Clue number in the proper column on the index sheet according to the key letter which preceeds each number.

Tele-Clue No. H-77—This photograph and the one shown in Tele-Clue No. 78 illustrate the effect of low emission in a picture tube. The picture with the brightness and contrast controls adjusted for correct balance between the blacks and whites was very dull and had a washed-out appearance similar to Tele-Clue No. H-60. When the contrast control was advanced the color gradation between black and white practically disappeared as shown above.

Tele-Clue No. H-78—This photograph shows the result of advancing the brightness control on the same tube used in Tele-Clue No. 77. The contrast control was returned to normal. The five shading rings around number 4 should vary in shading from black in the center to white on the outside. In the above photograph the outer ring is darker than the next inner ring. This is just the reverse of the normal shading sequence.

G-79

G-80

Tele-Clue No. G-79 & 80—These photographs illustrate the result of a fourteen inch picture tube which imploded while in its cabinet. The tremendous force released is apparent from the condition of the safety glass in these photographs. Fortunately this type of glass breakage, which obviously was due to the fracture occurring first in the faceplate, does not occur very often. In one case this did happen sometime during the night to a receiver not in its cabinet. Pieces of glass were scattered all over the service shop and were found imbedded in the walls about twenty feet away.

These photographs illustrate that if an implosion occurs while the set is in the cabinet, damage would result only to the receiver. However, utmost care should be exercised when removing, transporting or repairing a receiver outside of its cabinet. The potential danger is great since a scratch or defect in the glass of the tube may cause an implosion at any time. Therefore it is advisable to use every precaution including the wearing of safety glasses while working around exposed picture tubes.

TELE-TIPS

No. 36. There are some areas where a TV receiver may be operated on a power line frequency slightly different from that on which the transmitter is operating. This will result in a slow weaving or "Mae West" movement of the picture. This can sometimes be eliminated by changing the A.F.C. and/or the horizontal oscillator tube. If this doesn't work try increasing the value of the capacitor which filters the power supply to the clipper and A.F.C. tube. The nominal value of this capacitor is 40 mfd. When this is increased to 100 mfd, the weaving is usually reduced to a point no longer objectionable.

No. 37. In some early model G-E receivers incorporating A.G.C., excessive buzz was experienced when the set was operated on the high band channels. This can be corrected on some receivers by connecting the converter grid resistor to ground instead of to the A.G.C. voltage supply.

No. 38. Considerable time can sometimes be saved when checking for complete loss of HV by removing the connection to one side of the horizontal deflection coils. If a short exists in these coils *only* when the receiver is operating, a resistance check will be normal and a check of the wave shapes will also appear normal. When the shorted deflection coils are removed from across the horizontal sweep transformer some high voltage (usually about 50 per cent) will be present although somewhat lower than normal.

No. 39. A compass held a few inches from the metal cone can be used to determine whether the metal cone of a picture tube is magnetized as well as the area that is affected.

(Continued from Page 2)

9. The 14CP4 picture tube was then inserted into the yoke assembly and a grounding wire was fastened from the chassis to the graphite coating on the picture tube. The picture tube end of the wire was stripped back about two inches and several pieces of Scotch tape were used to fasten it to the graphite coating.

10. A piece of metal hanger strap fastened to the chassis with self-tapping screws was used to hold the 14CP4 picture tube in place. Two three inch pieces of sponge rubber one inch wide were used at the top corners to prevent slippage and absorb shock.

11. The RET-003 ion trap magnet was placed on the neck of the picture tube and all electrical connections were made. Since the deflection yoke was mounted closer to the front of the chassis it was also necessary to move the focus coil ahead. The set was then turned on and the necessary electrical and mechanical adjustments were made to obtain a linear test pattern.

CABINET CHANGES

The mask and safety glass were removed from the cabinet. The cabinet was then marked for cutout using a scriber and a fourteen inch template. This template was about one-eighth inch larger all around than the 14CP4 faceplate. The position of the template was determined by measuring the distance between the top of the picture tube plus one-eighth inch and the bottom of the chassis. The bottom of the template was about one-quarter of an inch below the bottom of the original opening. The template was, of course, centered horizontally over the original opening.

The wood in the front panel was reasonably thin so a keyhole saw was used to enlarge the mask area.

The chassis was placed in the cabinet and the plastic mask was drilled, countersunk and mounted over the picture tube. When the knobs, chassis bolts and cabinet back were replaced the conversion was completed as shown in Fig. 6.

While these circuit modifications have been carefully tested, the General Electric Company can, of course, assume no responsibility for the application of these suggestions to the conversion of any particular receiver. General Electric offers this article as a suggestion of one possible way of making the conversion but it does not represent that this is the only way or the best way of accomplishing the conversion.

In the next issue conversion information on two more television receivers will be included.

Fig. 5. Stromberg-Carlson Model TV-12 Series 11 twelve inch combination before conversion.

Fig. 6. The same receiver as shown in Fig. 5 after being converted to use a General Electric 14CP4 picture tube.

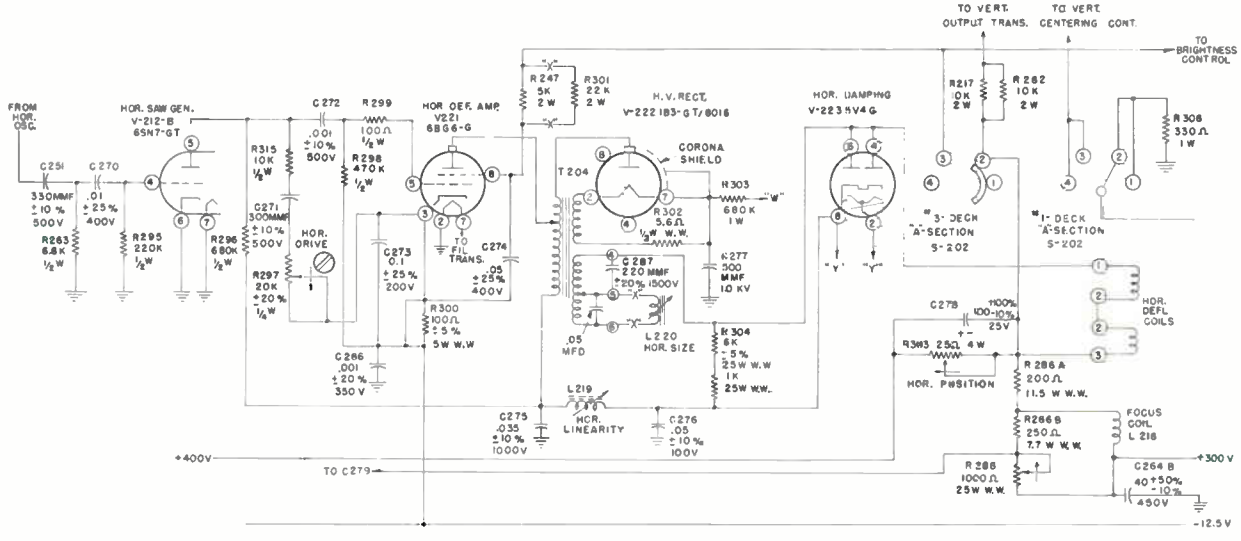


Fig. 7. Horizontal generator and output section of the Stromberg-Carlson Model TV-12 Series 11 after making the necessary changes to obtain adequate sweep width and HV for a 14CP4 picture tube.

BENCH NOTES

Contributions to this column are solicited. For each question, short-cut or chronic-trouble note selected for publication, you will receive $10.00 worth of electronic tubes. In the event of duplicate or similar items, selection will be made by the editor and his decision will be final. Send contributions to The Editor, Techni-talk, Tube Division, General Electric Company, Schenectady 5, New York.

SERVICE HINTS

I believe the following service notes which are based on case histories will be of interest to TV servicemen.

1. Capehart 325F—Intermittent horiz. sync. or inability to sync. horizontally at all; check for unsoldered lead going to lug E within the sync. discriminator transformer T-209.
2. Capehart CX33 Chassis—Vertical bars on screen, no pix, when AGC control is turned up; replace the 10MFD 50 V condenser C233 connected to pin 6 of V213(12AU7) AGC Amplifier. This condenser generally opens and will also make the AGC control extremely sensitive to adjustments.
3. Arvin 3100T—Picture brightness goes out as vertical size is expanded; replace 1B3 tube.
4. Crosley 9-403M-120N—hum in pix and sound due to shorted 6J6 RF tube in tuner unit.
5. Admiral 20T1 chassis—The high voltage measures only 5 KV and brightness control will not function at all, scanning (horiz.) quite short and no video; check for short at junction of R326, R325 to ground.
6. Admiral 21D1 Chassis—Impossible to reach horiz. frequency by adjustments, also horiz. width approximately half size (due to high horiz. freq.): replace 6H6 sync. discriminator tube.

Leonard D. Chioma
Television Centre, Inc.
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Baltimore, Md.

TV TICKING

I had many complaints from customers, claiming that their TV set would start "ticking" after about 30 minutes of normal operation.

I found on Philco 1601, 1604 and 1634 that this was due to discharge of an accumulated static voltage in the core of the flyback transformer, whose mounting screws were—for absorption of vibration—insulated from chassis by fiber washers.

The addition of solder lugs between screw-head and washers, connected to chassis by not too stiff wires, remedies this noisy condition in every set.

Mark M. Siera
Ideal Radio Company
801 Eighth Ave.
New York 19, N. Y.

G-E MODELS 818 AND 12K1

Here is an easy way to apply line voltage and obtain audio output from General Electric models 818, 12K1 and other television chassis of the same type. The 110 volt input and audio output is connected to the circuit by way of flexible leads terminating in an octal socket.

Obtain a base from a GT type 8 pin tube and melt the solder out of pins 2, 3, 6, and 7. Solder a regular 110 volt line cord with a standard a-c plug on one end to pins 6 and 7 of the tube base. Solder one end of a four foot piece of lamp cord to pins 2 and 3 of the tube base and connect the other end to a standard output transformer of 7000/4 ohms. A four or five inch PM type speaker is then connected to the secondary of the output transformer. Plug the tube base into the octal socket and plug the line cord from the tube base into 110 volts and wait for the set to warm up. The sound will not be full volume because the last stage of amplification is on the radio chassis of this combination.

When servicing these same models, replace the low value wire-wound resistor which connects between the low voltage selenium rectifiers and the filter capacitors with one of higher wattage, as these resistors are under a heavy load and sometimes burn out or open. This prevents a future service call.

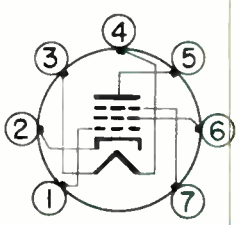
Wade H. Lockey
Radio Electrical Service
216 Daly St.
Philadelphia 48, Pa.

What's new!

6CB6

The 6CB6 is a miniature sharp-cutoff pentode designed for use as a wide-band radio-frequency or intermediate-frequency amplifier in television receivers. Features of the tube include high transconductance and low interelectrode capacitances. The suppressor and cathode are brought out on separate pins.

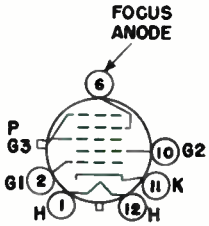
Heater Voltage (A-C or D-C)	6.3 Volts
Heater Current	0.3 Ampere
Plate Voltage	200 Volts
Suppressor Voltage (Pins 2 and 7 connected at socket)	0 Volts
Screen Voltage	150 Volts
Cathode-Bias Resistor	180 Ohms
Plate Resistance (Approx)	0.6 Megohm
Transconductance	6200 Micromhos
Plate Current	9.5 Milliamperes
Screen Current	2.8 Milliamperes
Grid Number 1 Voltage for I_b = 10 Microamperes	−8 Volts



17FP4

The 17FP4 is an electrostatic focus and magnetic-deflection, direct-view picture tube for television applications. It provides a 10¾ by 14¼ inch picture. Features of this tube are an electron gun designed to be used with an external ion trap magnet, a high-quality neutral-density faceplate which increases picture contrast and detail under high ambient light conditions, and a space-saving rectangular faceshape. An external conductive coating serves a filter capacitor when grounded. The dimensions of the faceplate and glass envelope are the same as those of the 17BP4-A.

Focusing Method—Electrostatic	
Deflecting Method—Magnetic	
Deflecting Angle, approximate	
Horizontal	65 Degrees
Diagonal	70 Degrees
Focusing Voltage Approx. 22½% of Second Anode Voltage	



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