ELECTRONIC SERVICING

APRIL 1958 • 50¢

SILICON RECTIFIERS FOR TV AND RADIO

VIDEO SPEED SERVICING METHODS

ANSWERMAN

WORKBENCH

SCHEMATICS

AIRLINE WG 5040A

WESTINGH

G E Q2

ZENITH T

PHILCO 7H20

AT42

31

AT4221

EDITORIAL STAFF

Sanford R. Cowan ..... Publisher
Oscar Fisch ..... Editor
Irving Tepper ..... Associate Editor
Robert T. Dargan ..... Technical Editor
San D'Arcy ..... Contributing Editor
Paul Goldberg ..... Contributing Editor
Elbert Robberson ..... Marine Communications Editor
Lawrence Fielding ..... HI-FI & PA Editor
David Fish ..... Art Director
Selma Uslaner ..... Research

•

BUSINESS STAFF

Advertising Sales

New York and East — Richard A. Cowan, Jack N. Schneider, 300 West 43rd Street, New York 36, N. Y., JUdson 2-4460

Chicago and Midwest — Jim Summers, Suite 556, Pure Oil Building, 35 E. Wacker Drive, Chicago 1, Ill., ANdover 3-1154

West Coast — Ted E. Schell, 2700 West 3rd Street, Los Angeles 57, Calif., DUnkirk 2-4889

Charles W. Hoefer, 1664 Emerson Street, Palo Alto, Calif., DAvenport 4-2661

Charles W. Gardner, Jr. ..... Production Mgr.

•

CIRCULATION

Harold Weisner ..... Circulation Mgr.
Carol J. Binderman ..... Ass't Circulation Mgr.
Rose Mercurio ..... Circulation Dept.

ELECTRONIC SERVICING *(formerly Radio-TV Service Dealer)* is published monthly by Cowan Publishing Corp., 300 West 43rd Street, New York 36, New York, JUdson 2-4460. Subscription Price: $2.00 one year, $5.00 two years in the United States, U. S. Possessions, Canada and Mexico. Elsewhere $1.00 per year additional. Single copies 50¢. Second Class Mail privileges authorized at New York, N. Y.

POSTMASTER: SEND FORM 3579 TO ELECTRONIC SERVICING, 300 WEST 43rd STREET, NEW YORK 36, N. Y.

ELECTRONIC SERVICING

VOL. 19, NO. 4 Member APRIL, 1958

A. ILLUMINATED SIGN-A-RAMA. Visible for blocks. Brightly lit with six flashing lamps. Double-faced, large—48" by 24"—gives top identification to your store or shop. Mounting hardware is included.

B. ILLUMINATED SPECIAL-MESSAGE SIGN. Carries your name, or tells any brief message you select. Ideal for windows or interiors. 37" by 14". Uses two 30-watt bulbs. Kit of letters and numerals is included.

C. DISPLAY BACKDROP. Arrange this handy back-up display to meet your advertising needs. Material is flexible, can be curved or will mount flat. For window trim, walls, or counter fronts. Two 36" x 24" designs per strip.

D. GIANT TUBE CARTON. Eye-arresting... indicates the quality components you install and sell.

E. DOOR, WINDOW DECAL. Neat, attractive, new dry-apply type. 12" diameter.

...GENERAL ELECTRIC'S COLOR-KEYED SHOP SIGNS!

Color-keyed to the G-E tube carton—symbol of quality!

Here is your chance to give your shop-front and windows eye-appeal with "sell". Colors of all eleven new General Electric signs and displays match handsomely the famous G-E tube carton. Quality appearance is keyed to high quality of product—a message every passerby is sure to read.

Attractive and modern, General Electric's color-keyed signs and displays also stand for leadership. They identify your shop as a source for television repairwork done to professional standards, backed by up-to-the-minute facilities.

All your display needs are met by smart new G-E designs—from an eye-catching, easy-to-apply door or window decal, to metal and illuminated outdoor and indoor signs... plus colorful utility items like the electric clock and thermometer.

These brand-new signs and displays are waiting for you *now* at your General Electric tube distributor's. Ask him how to obtain them! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

SERVICE CLOTHING, smartly styled, also is available. Garments are color-keyed to new G-E signs and displays—give that professional look. Durable, launder easily.

SERVICE CASES in three useful sizes—small, medium, and large—match color-theme of General Electric displays. Now you can carry with you neatly, compactly, everything you need for making home service calls!

Progress Is Our Most Important Product

GENERAL ELECTRIC

11-11-102

METAL FLANGE SIGN. A display workhorse. Double-faced. Mount it anywhere! Compact—15" by 12"—handy for building corners, delivery entrances, and other side locations.

ILLUMINATED CLOCK, electric. Both useful and advertises your business. Easily read—16" diameter—with long-life bulbs. Hang on a wall, or mount on a counter (easel is provided).

HANGING METAL SIGN. For shop front or service entrance. Message both sides, plus your nameplate. Large—48" by 36"—easily seen. Hanging hardware is included; lights are available.

COUNTER-WALL-WINDOW SIGN. Illuminated. Use it anywhere in your shop! Wrap-around cover has the attractive display on both sides. 15" by 11½" by 5".

OUTDOOR-INDOOR THERMOMETER. Tells temperature accurately. Every viewer will see your advertising message. Replaceable front. 12" diameter.

METAL TACK-ON SIGN. Narrow, smart dimensions—14" by 42". Fasten against building, or mount as a free-standing display.

Silicon Rectifiers for Television and Radio

by T. C. Pridmore

Semiconductor Division
Westinghouse Electric Corporation
Youngwood, Pennsylvania

TELEVISION manufacturers have recently been experimenting with silicon rectifiers for power supply circuits, the results being that all or most of their 1958 series television sets will be equipped with these new devices.

Silicon Advantages

There are several reasons for using silicon in manufacturing rectifiers. The new silicon rectifiers do not age and, therefore, will give a continuous high *dc* voltage over an extended period of time. They have considerably lower forward drop than selenium or vacuum tube rectifiers, giving higher *dc* voltage output in the same rectifier circuits. They are hermetically sealed and not subject to corrosion. They can operate at elevated temperatures and, therefore, may be placed in any part of a conventional TV or radio circuit without harm to the rectifiers. They are very compact and with their pigtail leads may be wired directly into a circuit in much the same way as a resistor or capacitor. Finally, in replacing selenium rectifiers with silicon units, it is not necessary to remove the old unit, but simply to clip the leads.

What does all this mean to the serviceman using these silicon rectifiers? Despite their extremely long life, it is possible for these rectifiers to fail in service, usually due to a short in the B-plus supply causing an excessive amount of *dc* to flow through the rectifiers. This type of failure is much the same as that observed in either selenium or vacuum tube rectifiers when the filter capacitor shorts, or when a shorted tube is connected in the circuit. Therefore, in TV sets originally equipped with silicon rectifiers, it is necessary to replace them with a new unit.

Silicon Replacements

On those sets currently using selenium rectifiers, it is possible to replace the selenium rectifier with a silicon rectifier during a normal service repair call. This replacement is very simple since it is not necessary to mount the silicon rectifier in a particular manner, and it may be wired directly into the circuit after clipping the selenium rectifier out. A word of caution—do not at any time place the silicon unit in parallel with the selenium unit since their characteristics may not match sufficiently to allow parallel operation.

The case or body of the silicon rectifier is the cathode terminal and should be connected to the B-plus side of the load—the input filter capacitor of the TV set. It is possible to retain the peak limiting resistor if it is a 4.7 ohm unit or by shunting the existing unit with an appropriate size resistor.

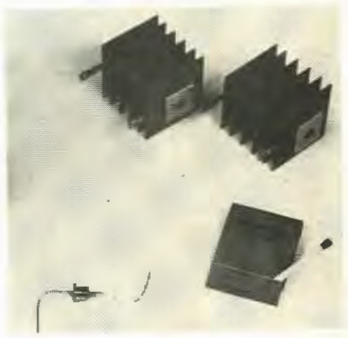
Along with an increase in B-plus voltage there is an increase in reliability, reducing the necessity of making frequent "call-backs" to replace the aging selenium. This increase in the B-plus voltage will usually increase the overall performance of the set by improving picture width, height and sensitivity.

Also, the silicon units may be used in voltage doubler circuits commonly found in TV sets by replacing each selenium unit with a silicon unit.

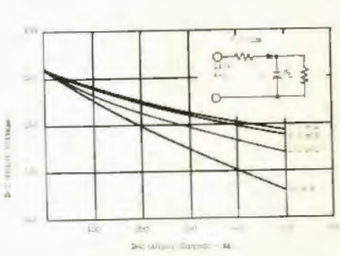
Silicon Ratings

It is important to note that each of the silicon units is rated for a particular voltage application. The 1N1169 silicon-junction rectifier for TV-radio application is rated for normal residential input voltage, that is, up to a high-line voltage of 129 volts *rms*. It is rated as an "off-the-line" rectifier and not intended to be used in power transformer circuits. Like selenium, these units are rated for either an *rms* voltage or a peak inverse voltage of a particular value. For example, while the 1N1169 is rated for up to 129 volts *rms* input, it is also rated for 400 volts peak inverse. Since a TV

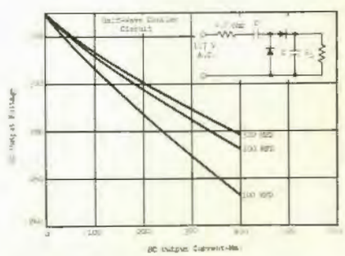
[*Continued on page 48*]



The size comparison between selenium rectifiers and a silicon rectifier.



The regulation characteristics of the 1N1169 in typical rectifier circuits found in radio and T.V.



Operation characteristics of the 1N1169 in voltage doubler circuits commonly found in T.V.

workbench

by Paul Goldberg

This month's installment is devoted to butchered sets. An important factor in solving these problems is getting from the set owner the receiver's service history. (Ed. Note—This is sometimes more difficult than the actual repair.)

RCA KCS47B

The customer stated that a friend of the family had installed a power transformer and since that time the receiver had a critical horizontal sync condition. The receiver was turned on and it was observed that the receiver indeed had a critical horizontal sync condition. The power transformer circuitry was next examined and was found to be wired correctly. As a "sure" check the following tubes were replaced: V107, 12AU7, *dc* restorer and sync amplifier, 6SN7, V108, sync amplifier and V110, 6SN7 horizontal oscillator and control. These were all replaced individually, but had no effect. Voltage checks were next made at the horizontal oscillator and control tube V110, 6SN7. It was noted here that as we moved wires around in the oscillator circuit, the picture would lock in and move out of horizontal sync. Here was the clue! With an insulated alignment tool, wires in this circuit were moved around to determine which had the greatest effect. It was discovered that when the filament wires of the 6W4 damper were moved, the greatest effect on the horizontal sync occurred. These filament wires were passing directly over the horizontal oscillator V110 as shown in *Fig. 1*. We remembered that

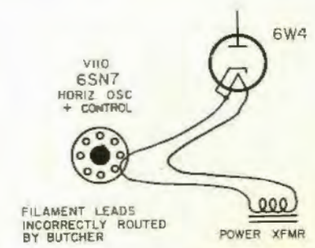


Fig. 1—The damper filament leads upset oscillator sync.

the 6W4 filament wires are usually wedged close to the chassis, away from the horizontal oscillator V110. We therefore re-routed the filament wires properly. When this was done there was no longer a horizontal sync problem. Because the 6W4 filament is tied to its cathode the filament wires carry high boost voltage. The pulses in the boost circuit were being coupled to the horizontal oscillator due to the proximity of the filament wires.

When the butcher had installed the power transformer, he had neglected to route the 6W4 filament leads correctly.

Dumont RA-167

The customer stated that since a relative had repaired the receiver, there was no picture and no sound on channels 11 and 13. The receiver was turned on and it was observed that there was no picture and no sound on channels 11 and 13, while all other channels were normal. The tuner tubes, the 6J6 oscillator and mixer and the 6BK7, *rf* amplifier were replaced individually, but had no effect. As this was a standard coil barrel type cascode tuner, the #11 and #13 oscillator slugs were adjusted with no effect. Next the oscillator and *rf* coils #11 and #13 were replaced, but this also had no effect. A side flange covering the tuner circuitry was then removed. As this seemed to be an oscillator problem, a plate voltage check was made at pin #1 of the 6J6. The voltage measured about +45 volts instead of about +110 volts. Here was our clue! The coil barrel

[*Continued on page 10*]

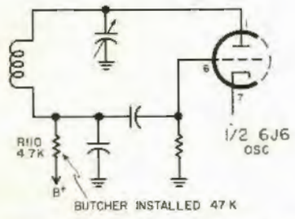


Fig. 2—Oscillator failed on high end due to low plate voltage.

had to be removed next in order that the complete oscillator circuitry be made visible. When this was done we observed immediately that *R110* the oscillator plate resistor instead of being 4.7K was a 47K resistor. (See *Fig. 2*) We therefore replaced *R110* with a 4.7K, 1 watt resistor and reinstalled the coil barrel and all parts of the tuner. The receiver was turned on and after all the oscillator slugs were adjusted, channels 11 and 13 as well as all the other channels tuned in properly.

When the butcher had attempted to install a new *R110* for the defective one, he failed to consult a schematic diagram, and by mis-reading the color code of the burned or defective *R110*, installed a 47K resistor instead of a 4.7K.

RCA KCS48A

The customer stated that a good friend had cured the trouble in his receiver, but since that time the top of the picture was hooking. This trouble is usually caused by a defective tube that receives the *age* voltage. Therefore, the 6CB6 *rf* amplifier and the first, second, and third video *if* amplifiers 6AU6, 6CB6, 6AU6 were replaced, but had no effect. The *dc* restorer, sync separator, sync amplifier and horizontal oscillator were also replaced, but had no effect. The 6AL5, *age* rectifier and second detector and the 6AV6 bias clamp were replaced, but also had no effect. In order to determine whether this was an *age* problem or a horizontal sync problem the *age* circuit was clipped at point "X" and a –4 volt from a battery was connected at point "Z" as shown in *Fig. 3*. When this was done the picture straightened out. Thus, we had an *age* problem. The diagram was next consulted. This receiver uses half of the 6AL5, V105, as

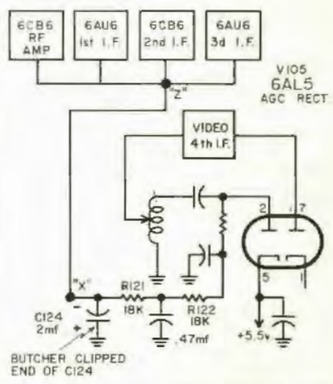


Fig. 3—Partial schematic of the RCA KCS-48 *age circuit*.

an *age* rectifier. This tube rectifies the video input after which the negative voltage drops across the diode load resistor is filtered of its video by the filter network *C124 2mf*. *R121 18K*, *R122 18K*, and *C127 .47 mf*. This negative *age* bias is fed back to *rf* and *if* grids. Knowing these facts and that we did not have a video overload problem, we assumed that we might have an *age* filtering problem. The battery set up was next disconnected and the receiver was connected in the original manner. The *age filtering* circuitry was next examined, and it was noted that *C124*, 2mf had its negative end clipped off. When it was resoldered, it caused a video overload. Condenser *C124* was resistance checked and was found to read dead short. A new *C124*, *2mf* was then installed. After this was done the receiver functioned properly with no hooking and no overload.

When the butcher had discovered that *C124* was shorted, he simply clipped it out of the circuit instead of replacing it. This of course left the receiver with the hooking coudition.

Admiral 1723D

The customer stated that a friend had serviced this receiver and had replaced a resistor which had burned out. Since that time the horizontal hold was critical. The receiver was turned on and it was observed that the horizontal hold was critical. The horizontal sync circuitry was examined in order to locate the resistor that had been replaced. We finally located a new resistor replacement. After studying the schematic, we found that the friend had replaced *R442* with a 2.7 ohm resistor (see *Fig. 4*) instead of a 22 ohm resistor. This of course reduced the feedback pulse from the horizontal output transformer to the dual diode, *CR401*.

[*Continued on page 48*]

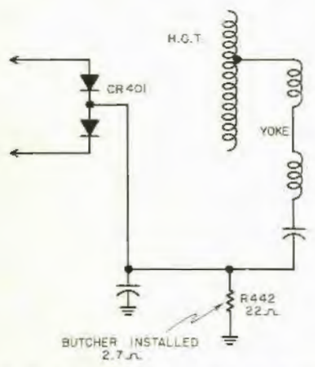


Fig. 4—Reduced R442 cut sync level producing critical hold.

ANSWERMAN

Answerman:

I am servicing a TV receiver which goes out of horizontal sync in less than half an hour of operation. The receiver cannot be brought back into sync with the tank circuit adjustment. The tubes have been replaced in the circuits that might possible cause this trouble. Condensers C93 and C92 have been replaced as well as some resistors and condensers in the oscillator circuit. When the chassis is in the cabinet the difficulty is more prone to occur than when it is on my service bench. I have taken the chassis back several times thinking I had corrected the difficulty only to have it occur again. The thing is driving me crazy. Can you help me? The receiver is a Spartan chassis 15V215.

J. D.
Reno, Nevada

In examining the schematic of the receiver, one component seems more likely to be the cause of the problem than the others. This component is condenser *C124*, a .082 *mf* condenser as shown in *Fig. 1*. The condenser is very likely developing an increasing amount of leakage as it becomes warmer in the cabinet. On the service bench this might be simulated by holding a heavy soldering iron or gun near the condenser so that heat can be radiated into the condenser. Of course, the heat could be applied with a heat lamp but this causes all the components to become warm and doesn't indicate which one is at fault. If condenser *C124* develops a leak it will cause a positive voltage to appear at the grid of the multivibrator. This voltage check will indicate that the condenser is leaking. In replacing it, use a condenser with a voltage rating of 600 volts.

Answerman:

On a C.E. chassis "ST" the picture pulls through the middle. The pull is not great but sufficient to make the picture unsatisfactory to watch. Some of the voltages in the circuits are not normal, or, rather are higher than called for in the service literature. I haven't been able to find any reason for this as yet. Also, there seems to be a slight amount of distortion in the sound. I haven't bothered to investigate this distortion as yet as I can see no significant connection to my other more serious problems. Although the pull is not really bad there doesn't seem to be any cause for it that I can find. I sure would like somebody to help me with this one. Sync problems such as this type always have thrown me for a loss.

G. A.
St. Louis, Mo.

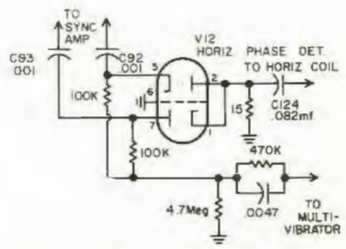


Fig. 1—Partial schematic of the horizontal *afc* system used in the Spartan 15V215 TV set.

The fact that the audio is slightly distorted may be the clue to the whole situation. In examining the circuitry it will be found that the audio output tube performs the additional function of voltage division. The resultant voltage obtained at the 6AS5 audio output cathode of 135 volts is fed to the 6BY6 sync clipper tube as well as other stages in the receiver. An increase in the voltage from the cathode of the audio output tube will adversely affect the sync clipping operation. It may even affect the video *if* amplification if the 135 volts has increased appreciably. There would most probably be an accumulative effect on the problem in that the video level from the *if* stages would be greater than it should be, thereby increasing the sync separation problem.

The cause of an increase of the 135 volts from the audio output tube may be a result of a number of possible causes. First, strange as it may sound, the 6AS5 audio output tube should be replaced. The tube itself may be at fault.

However, should this not be the case the bias arrangement on the 6AS5 grid should be examined. It is quite possible that one of the grid resistors, *R308* and *R309* shown in *Fig. 2*, has changed value.

There is one other possibility that should also be investigated should the trouble still remain elusive. This possibility is condenser *C311, 80 mf*. Should the condenser have developed leakage the 135 volt potential will be increased and thus account for the existing symptoms.

[*Continued on page 45*]

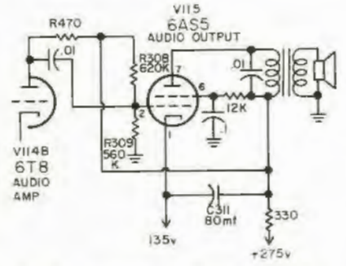


Fig. 2—Audio output stage of the GE ST line. Defect in R308 or R309 could cause distortion.

Ad Libs

by S. R. COWAN

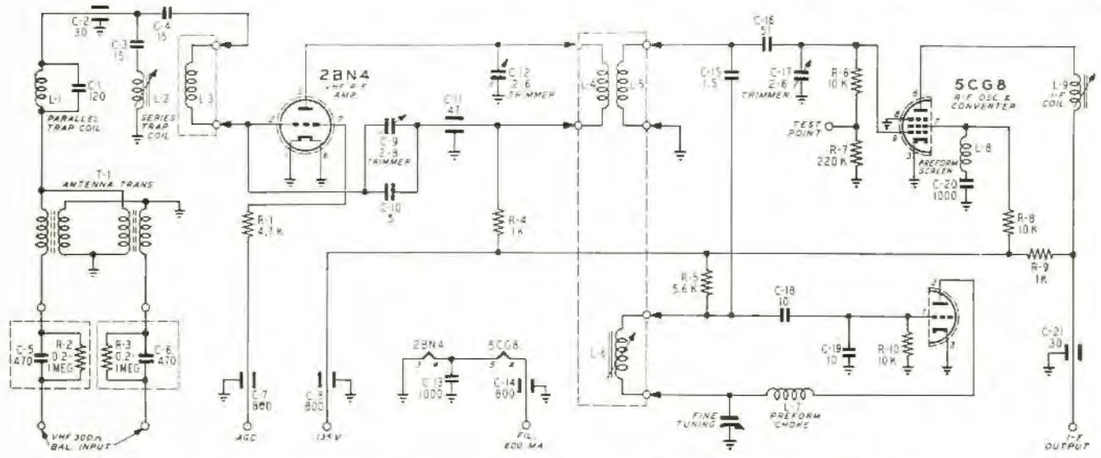
Latest statistics: 47,251,400 TV sets are now in use here in the U.S.A. 83.1% of the nation's 42.4 million homes have 1 set or more. In some major cities 96.7% of the homes have at least 1 set and less than 3% of the population is situated where TV signals are still not receivable. In less than 2 years only 1%, about 5,000 homes, will still not be able to watch TV if they want to.

These figures must have a bearing upon any service shop owner's future calculations. Such a shop owner can now say to himself that his income potential is nearing optimum were competition to remain status qno . . . unless "something drastic" happens to change the outlook. There are two factors that fall into the "something drastic" category.

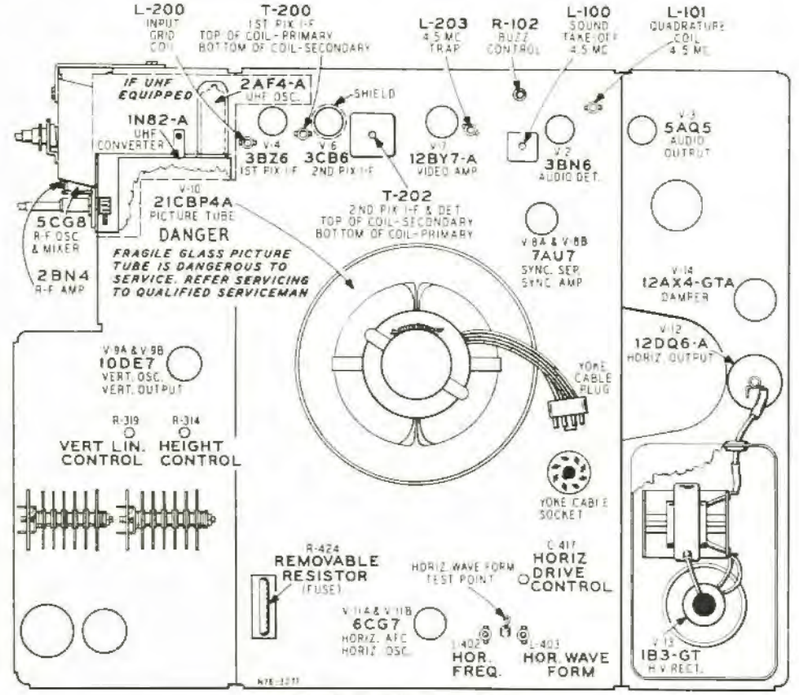
First of these is color TV. Slowly but surely color TV is making progress, but by no means fast enough to mean anything dollar-wise to 99.9% of the independent servicemen. Second is the hoped for introduction of "hanging" or "edge-lit" TV in the not too distant future. (These TV sets, in case you didn't know, at the outset would be transistorized types about 21 inches wide, 16 inches high and 5 inches thick, and just like any oil-painting or picture, would hang on the wall. Several major manufacturers have preferred not to develop color TV and instead are doing much research and developing on this type receiver, hoping to bring monochrome models out within two years.) ■■

Television Receiver Model WG-5040A

AIRLINE



25A1165 TUNER STANDARD COIL PART No. FNS-031



Chassis Tube Layout and Trimmers

CAUTION

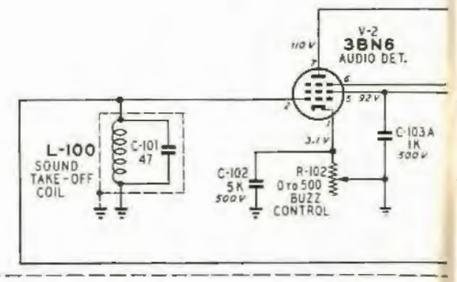
This chassis is connected directly to one side of the 117 volt AC line. Use an isolation transformer between the line cord plug and power receptacle when servicing this chassis.

ALL RESISTANCE VALUES IN OHMS AND $\frac{1}{2}$ WATT UNLESS OTHERWISE SPECIFIED.

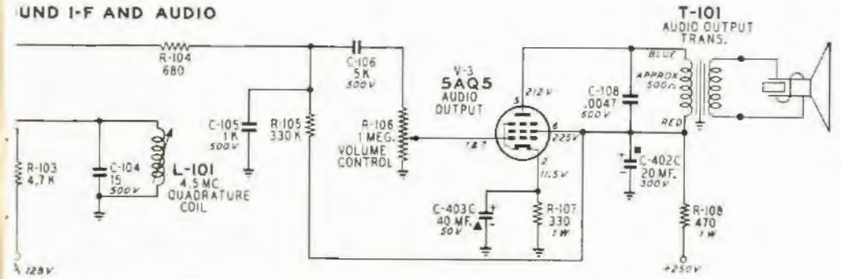
ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF. AND ABOVE 1.0 IN MMF. UNLESS OTHERWISE NOTED.

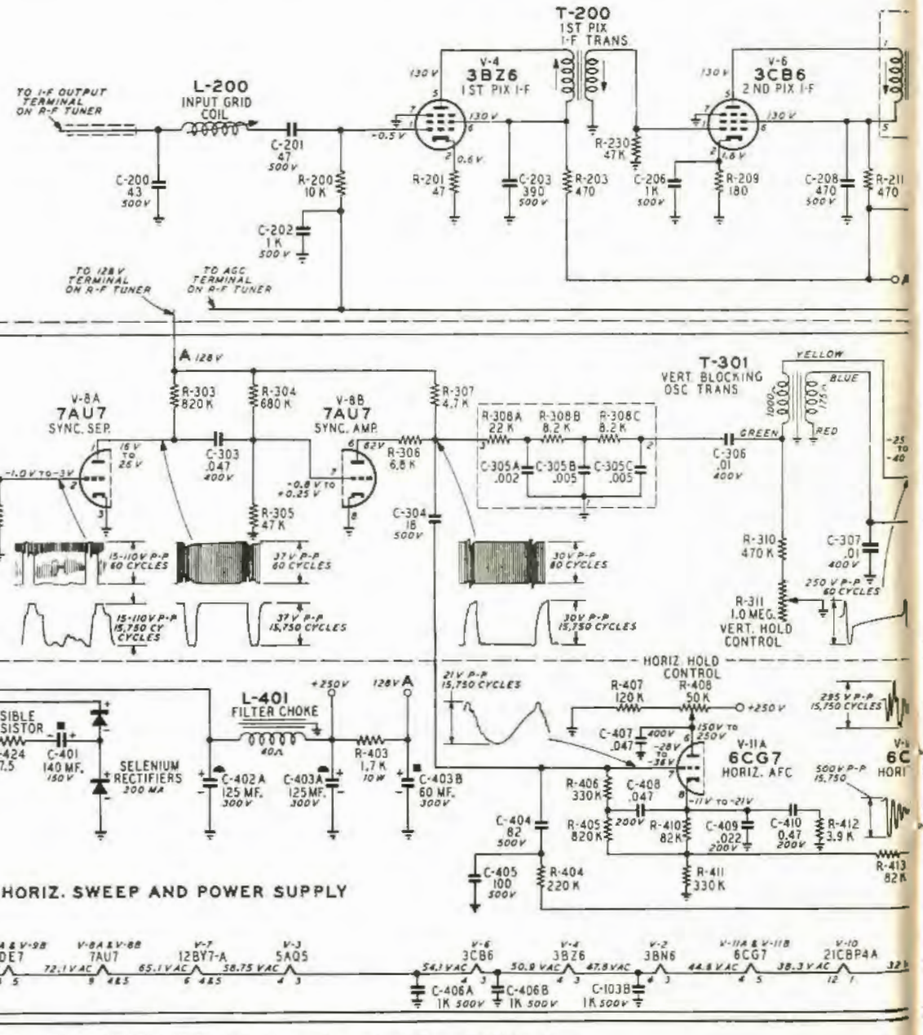
COIL RESISTANCE VALUES LESS THAN 1.0 OHM ARE NOT SHOWN.

K=1000

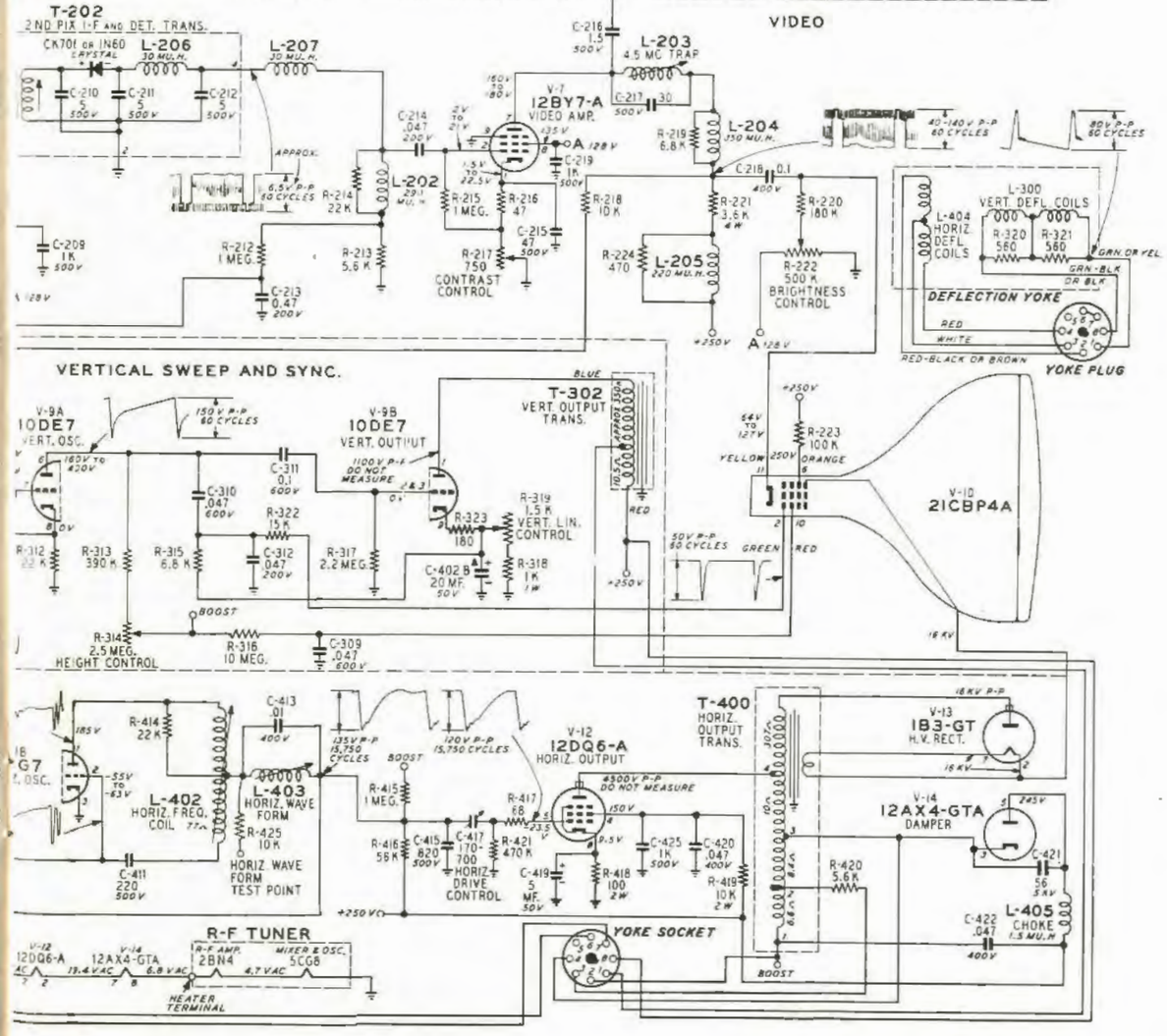


SOUND I-F AND AUDIO





VIDEO



VERTICAL SWEEP AND SYNC.

R-F TUNER

ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.

AIRLINE

Television Receiver Model WG-5040A

INSTRUCTIONS
CHASSIS ASSEMBLY REMOVAL

1. Remove knobs from the side of the cabinet.
2. Remove cabinet back.
3. Disconnect the antenna and speaker leads.
4. Remove screw used in mounting control bracket to side of cabinet.
5. Remove screw (painted red) at top of vertical output transformer.
6. Push entire control bracket assembly to the right until the shafts clear the cabinet.
7. Remove screws holding chassis brackets to top of cabinet.
8. Remove only 4 screws (2 at each side) from the bottom side of the shelf.
9. Gently pull the chassis assembly out from the cabinet.

CAUTION — DO NOT LOOSEN OR REMOVE ANY OTHER SHELF SCREWS INSIDE CHASSIS COMPARTMENT.

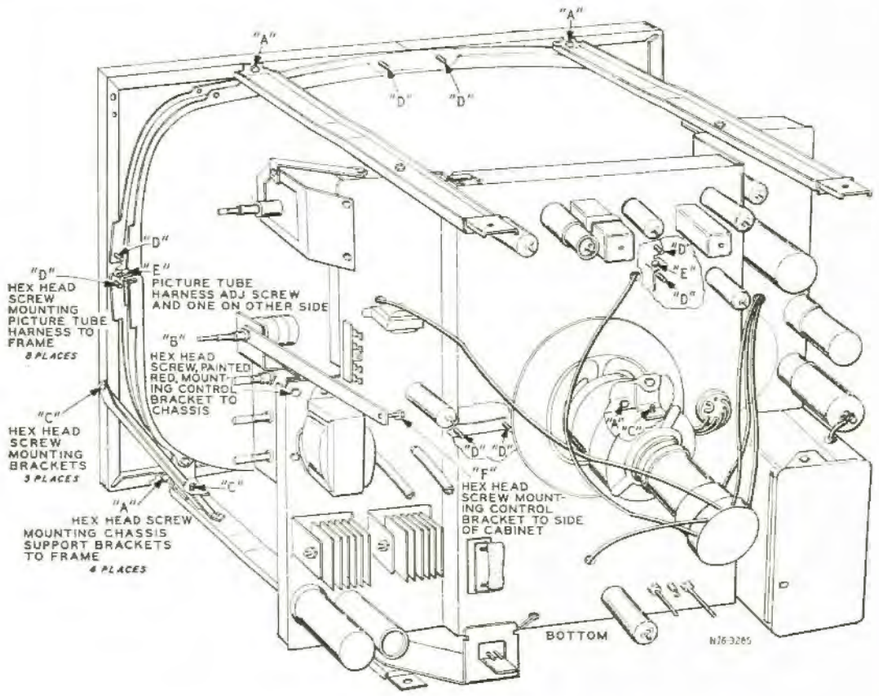
10. Place entire assembly face down on a cushioned surface which should be thick enough to allow far clearance of control shaft. Disconnect the yoke plug, picture tube socket, anode lead and remove the beom aligner magnet and deflection yoke.

PICTURE TUBE REMOVAL

1. Remove 4 screws marked "A" on illustration.
2. Remove 2 screws marked "B" on illustration.
3. Remove 3 screws marked "C" on illustration and lift chassis from Pix Tube Frame Assembly.
4. Loosen 8 screws marked "D" ond 2 screws marked "E" an illustration.
5. Remove old picture tube and install new tube reversing the steps outlined abave, keeping the following in mind:

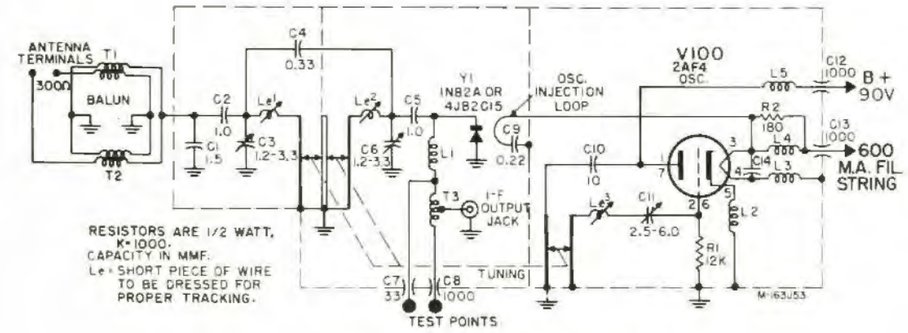
A. There is a mold match line on the picture tube. Assemble the harness to the picture tube, centering the harness over the mold match line on picture tube. Holes are provided in harness to check the centering. Then tighten the screws marked "E" until the picture tube is firmly in place on harness.

NOTE — If the abave is not observed, difficulty may be encountered in replacing the entire assembly into the cabinet.

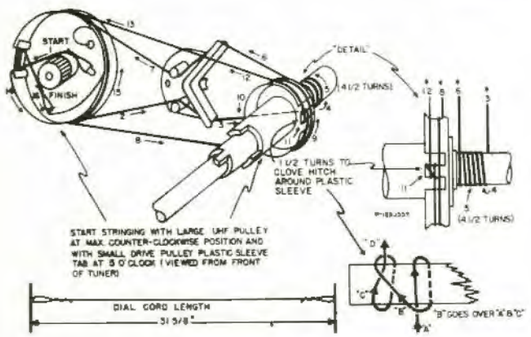


Picture Tube Replacement

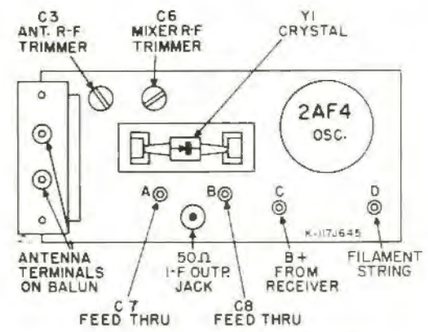
GENERAL ELECTRIC



Schematic Diagram for UHF Tuner, RUX-023



UHF Tuner Drive Stringing Diagram



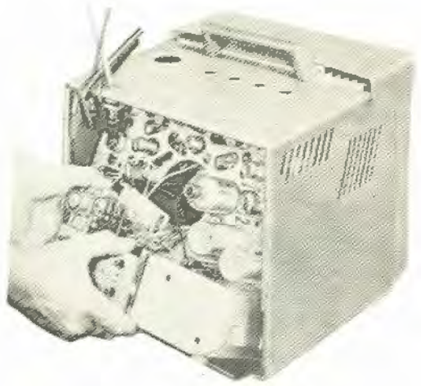
Top View UHF Tuner RUX-023

TO REMOVE THE CHASSIS FROM THE CABINET

Disconnect any antenna connected to the antenna terminal board. Remove the cabinet back by taking out the screws securing the back to the cabinet and the interlock bracket. Remove the knobs from the shafts on the top of the cabinet. Take out the three bottom screws located at the middle and rear of the cabinet bottom. Remove the two Phillips head screws from the top of the cabinet located to the rear of the contrast and brightness control. Extend the outer section of the telescoping antenna to its full length. Disconnect the picture tube socket and remove the ion trap. Tilt the chassis out from the bottom as viewed from the rear, at the same time, slide the chassis out over the neck of the tube. Loosen the yoke clamp and slide the yoke back over the neck of the picture tube.

The anode should be discharged with a jumper connected first to the chassis. The anode lead is disconnected by squeezing the anode clip. The leads attached to the speaker can be unsoldered from the speaker terminals or the nuts securing the speaker to the cabinet can be removed and the complete speaker can be taken out.

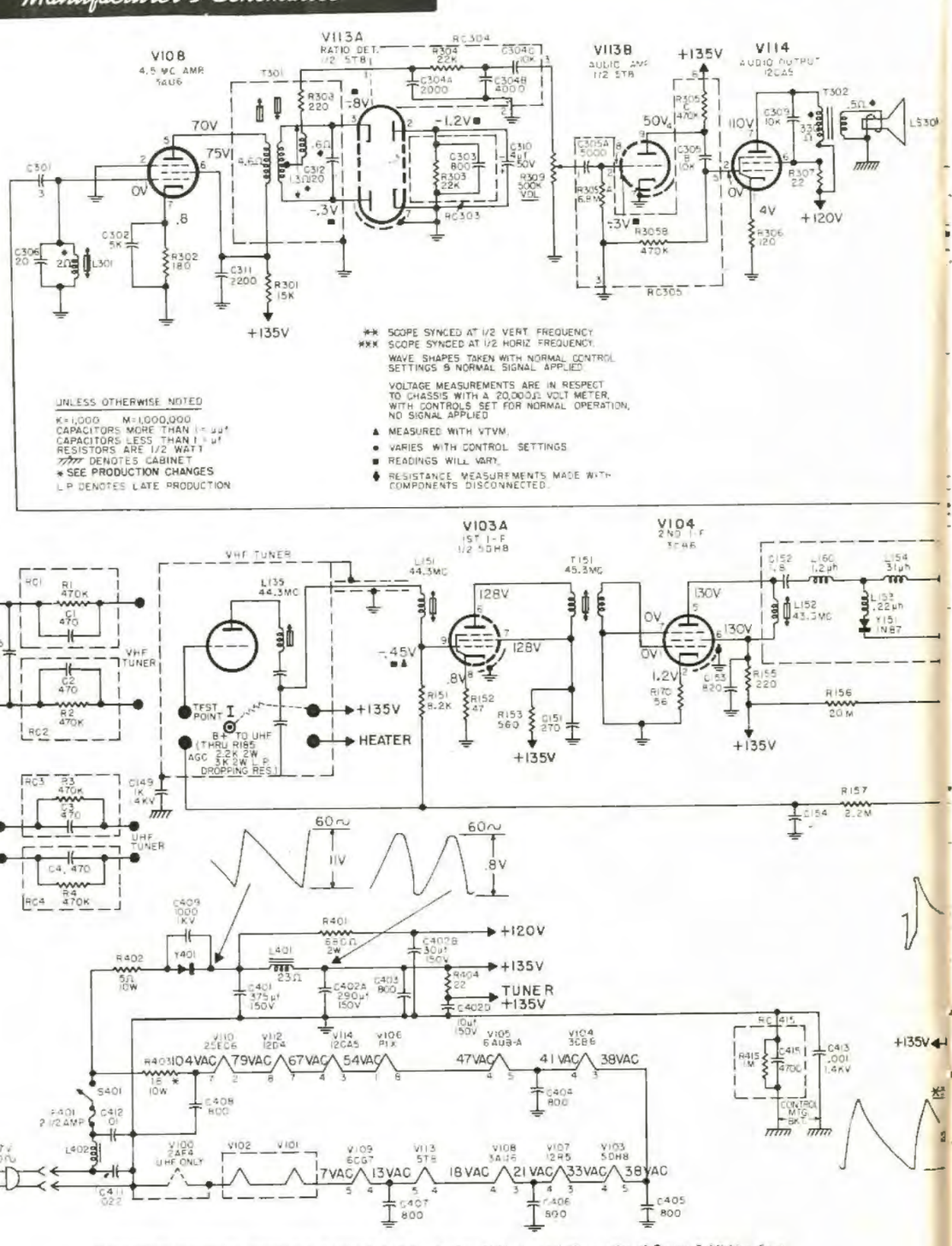
To install the chassis, reverse the above procedure, making sure that the anode and speaker leads are connected and the phosphor bronze terminal which is soldered to the by-pass condenser on the tuner is inserted in the bottom of the nylon nut so that the bottom screw secures the terminal to the bottom of the cabinet.



Chassis Removal

Television Receiver Series Q2

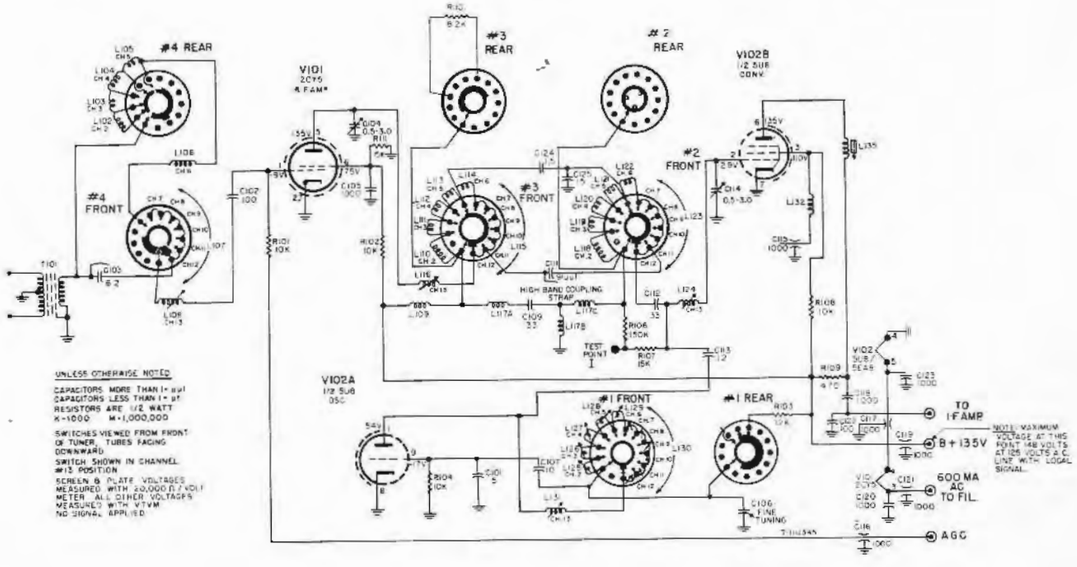
GENERAL ELECTRIC



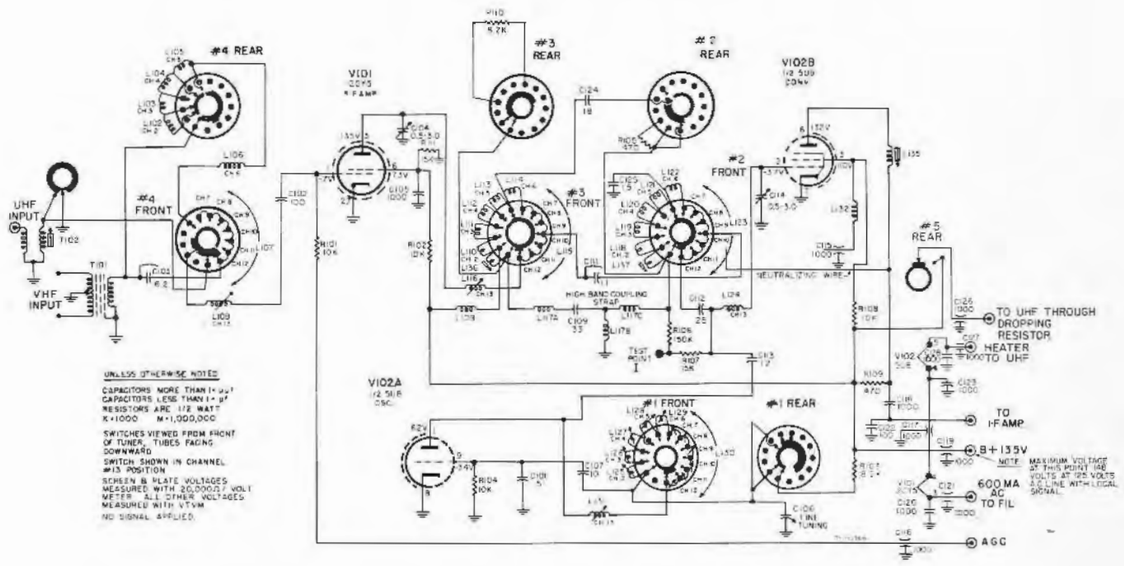
ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.

GENERAL ELECTRIC

Television Receiver Series Q2



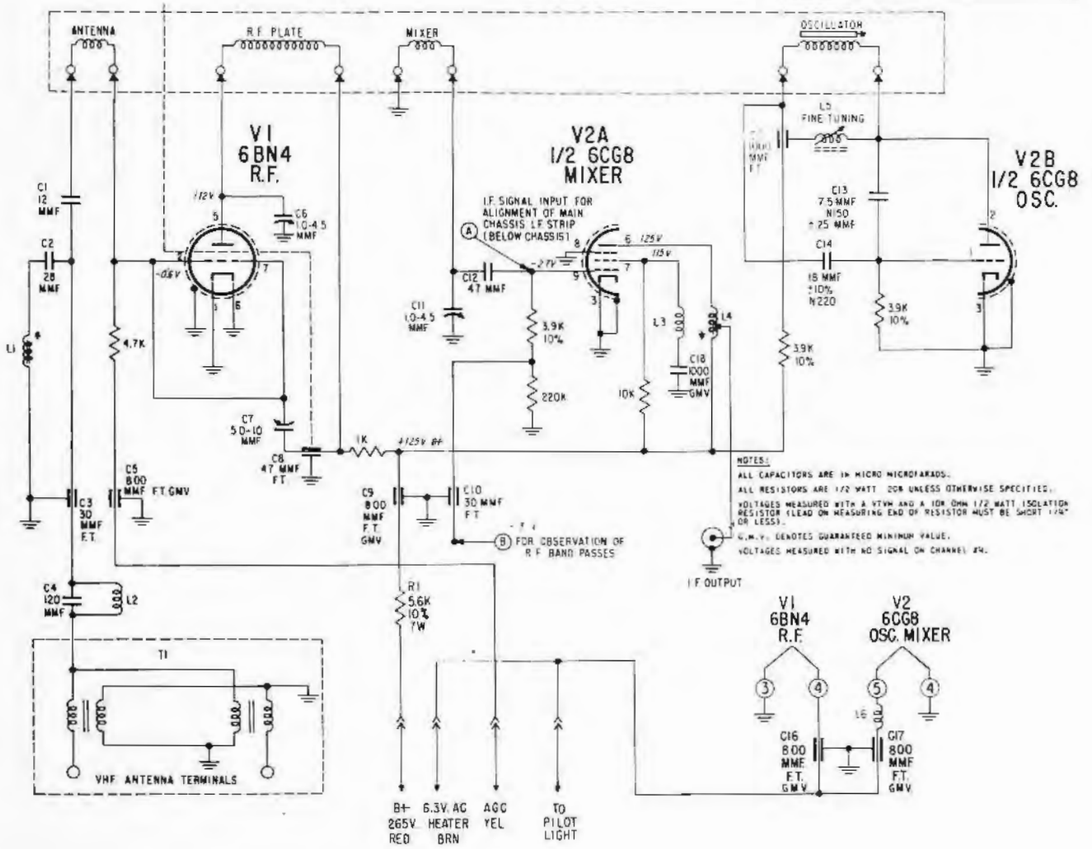
Schematic Diagram VHF Tuner RJX-099

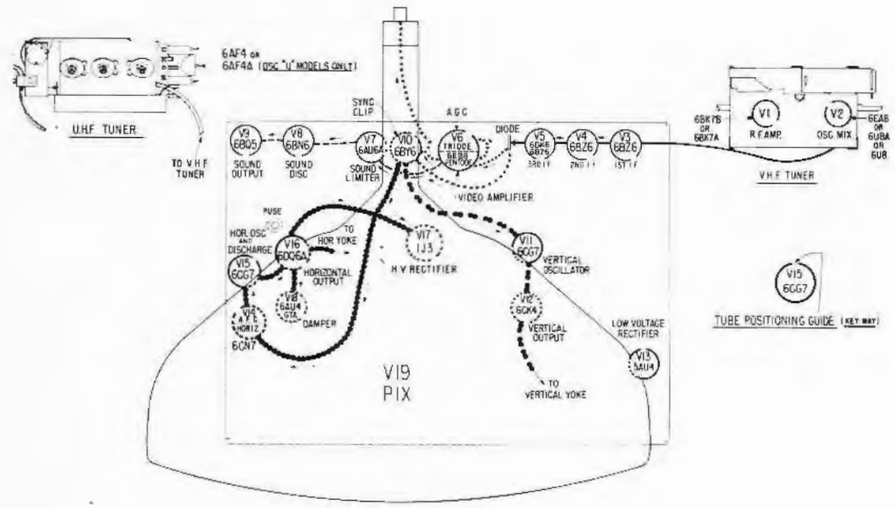


Schematic Diagram VHF Tuner RJX-100

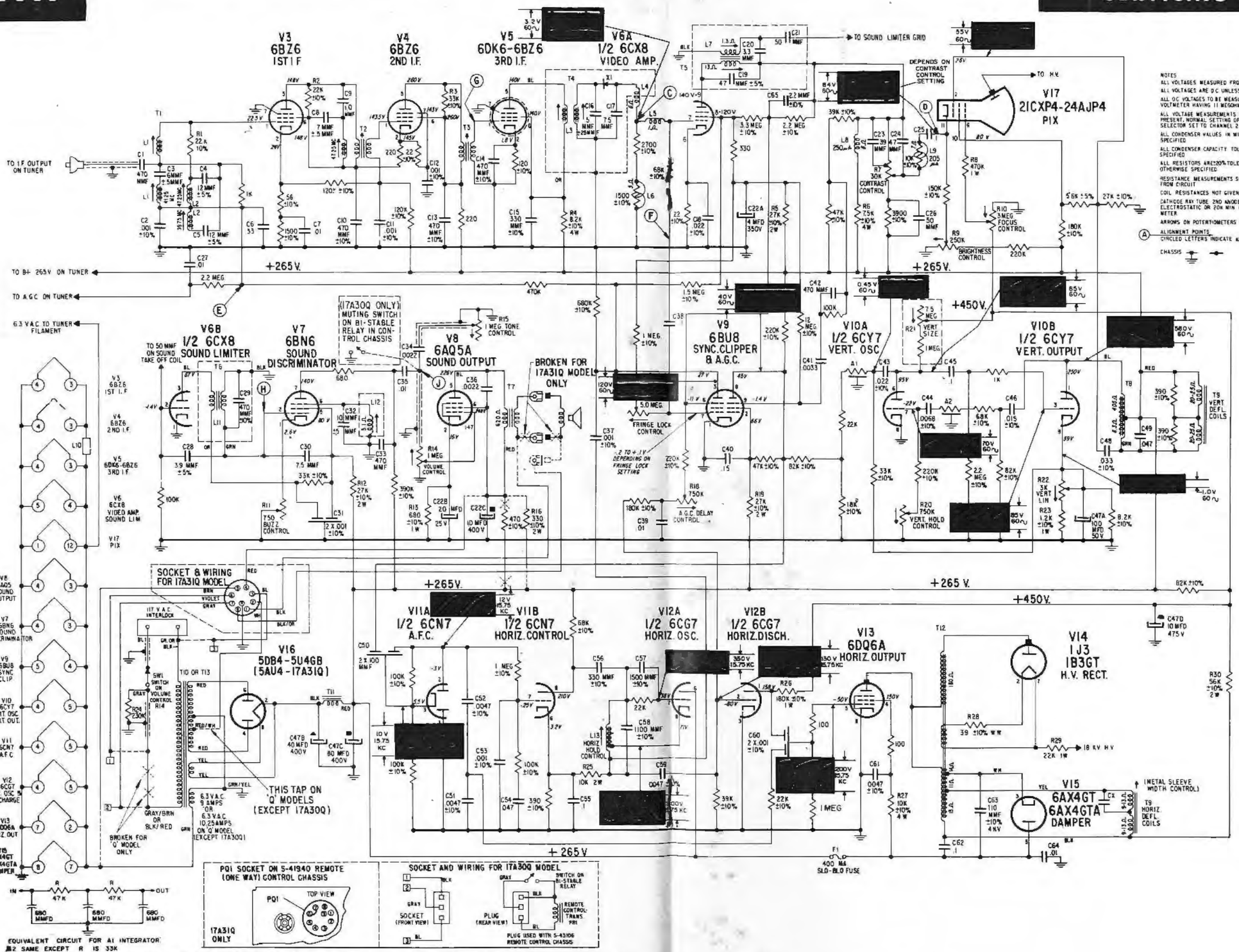
Television Receiver Model 17A30-Q

ZENITH





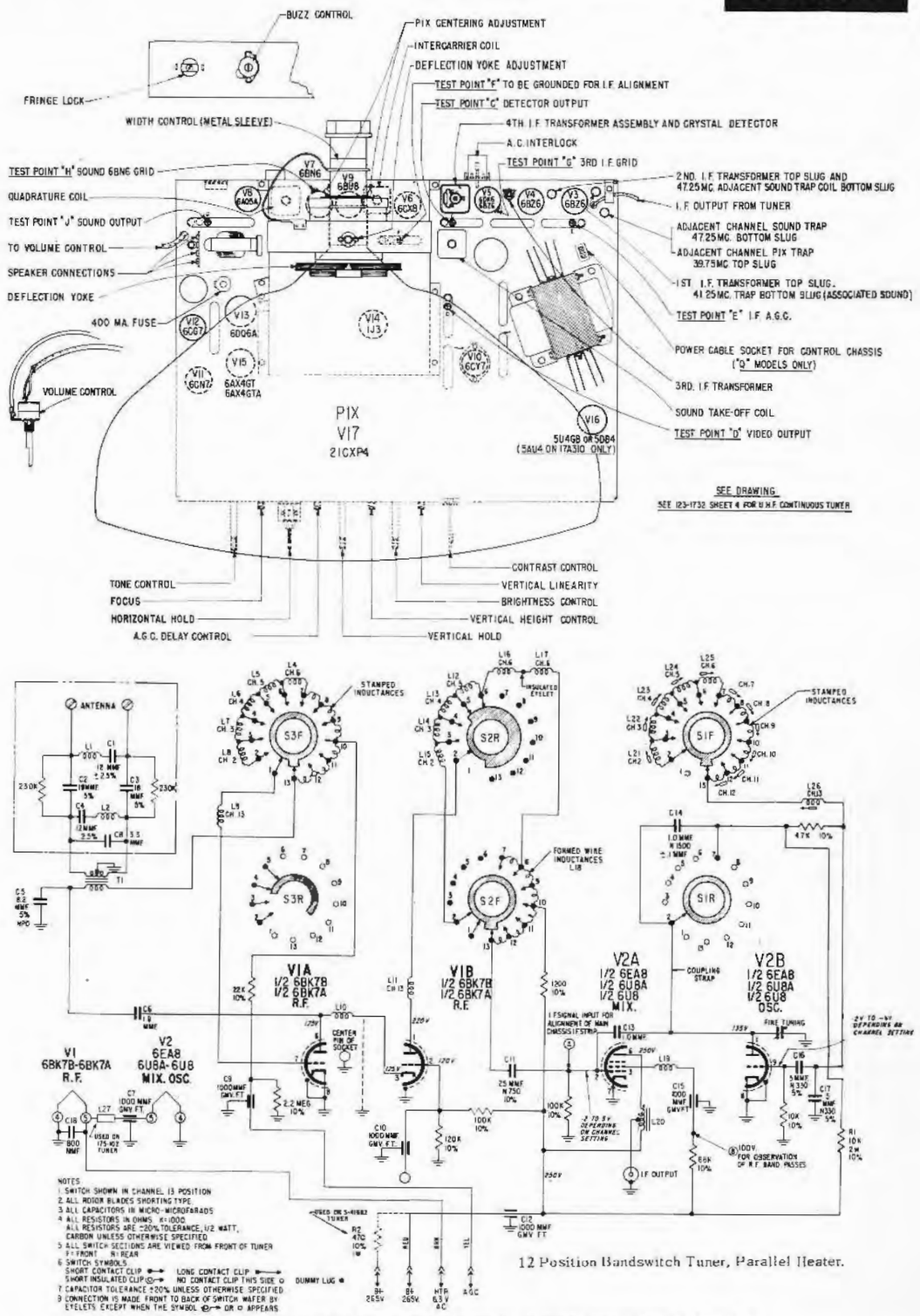
ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.



ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.

Television Receiver Model 17A30-Q

ZENITH

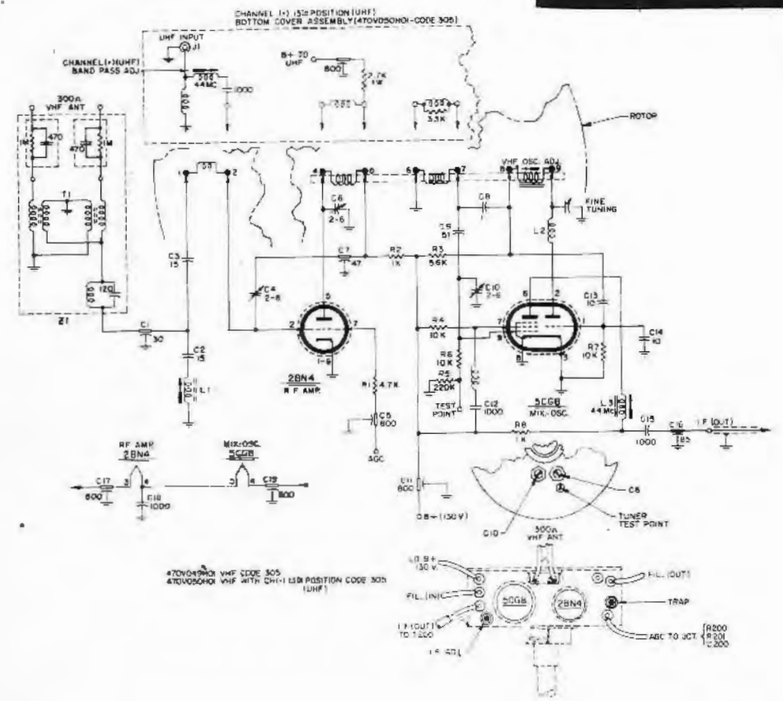


NOTES
1. SWITCH SHOWN IN CHANNEL 13 POSITION
2. ALL ROTOR BLADES SHORTING TYPE
3. ALL CAPACITORS IN MICRO-MICROFARADS
4. ALL RESISTORS IN OHMS K=1000
   ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
5. ALL SWITCH SECTIONS ARE VIEWED FROM FRONT OF TUNER
   F-FRONT R-REAR
6. SWITCH SYMBOLS
   SHORT CONTACT CLIP ⟷ LONG CONTACT CLIP ⟷
   SHORT INSULATED CLIP ⟷ NO CONTACT CLIP THIS SIDE ○
7. CAPACITOR TOLERANCE ±20% UNLESS OTHERWISE SPECIFIED
8. CONNECTION IS MADE FRONT TO BACK OF SWITCH WAFER BY EYELETS EXCEPT WHEN THE SYMBOL ⟷ OR ○ APPEARS

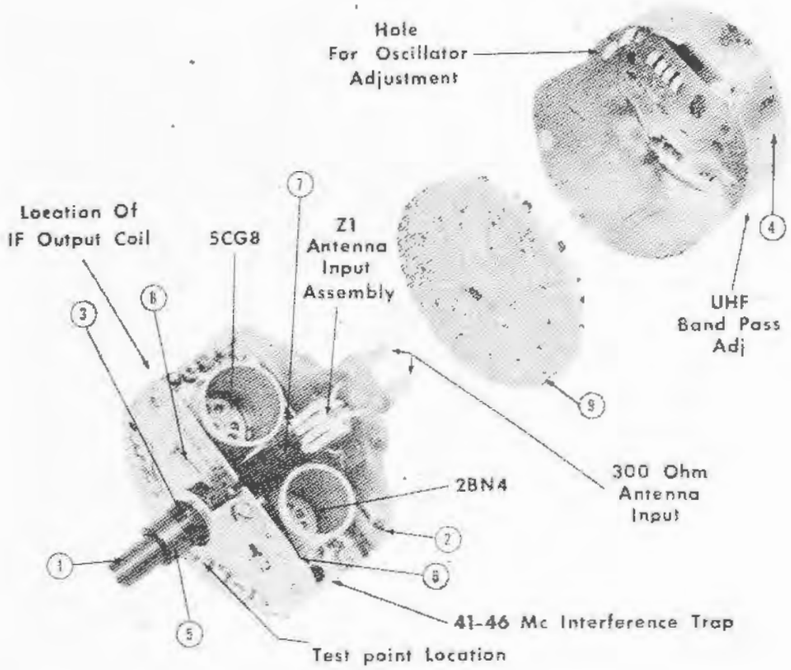
12 Position Bandswitch Tuner, Parallel Heater.

Models V-2364-1-2-3-4

WESTINGHOUSE



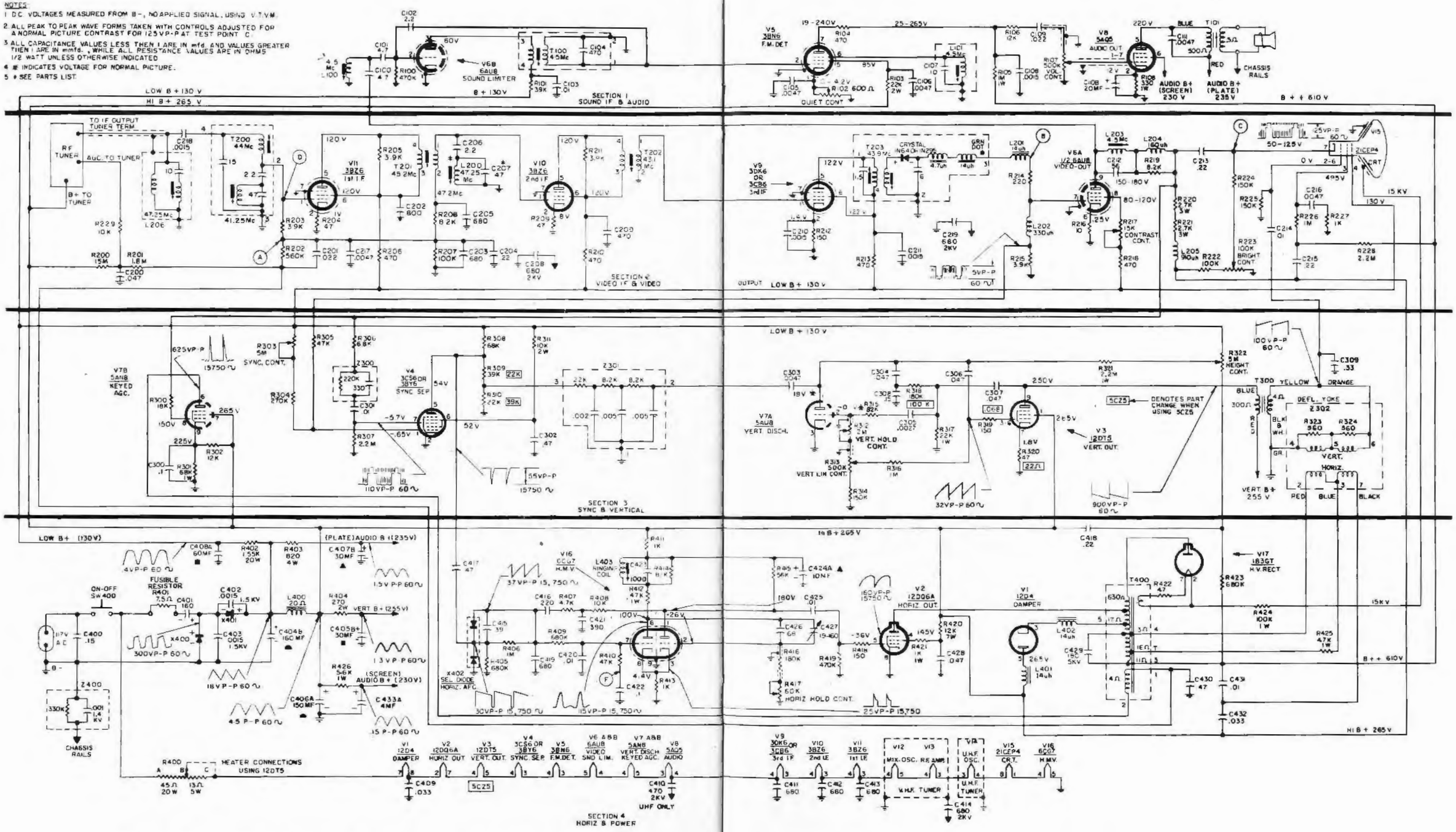
470V050H01 tuner schematic diagram.



470V050H01 tuner, exploded view.

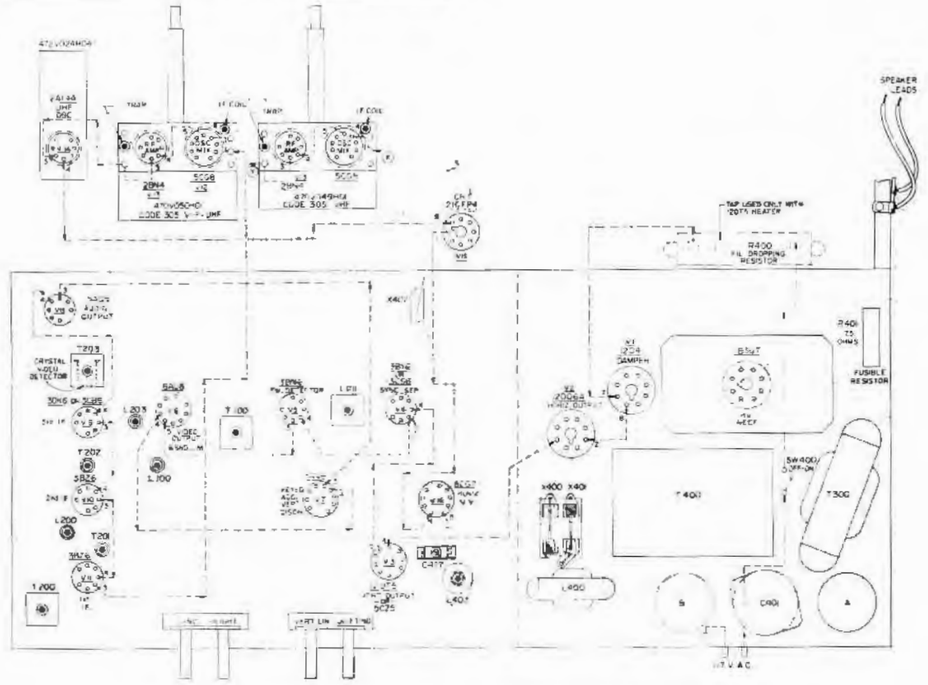
WESTINGHOUSE

Television Receiver Models V-2364-1-2-3-4

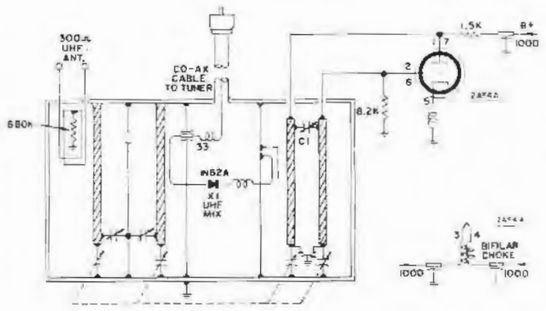


WESTINGHOUSE

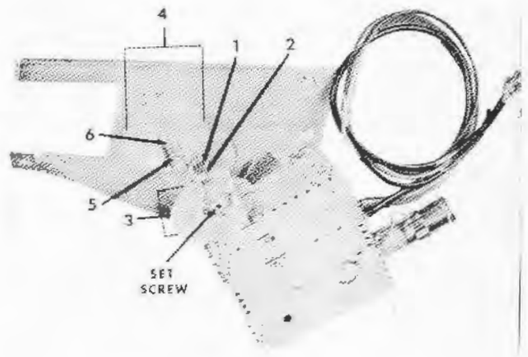
Models V-2364-1-2-3-4



Tube location, heater string, and adjustments. Top view of chassis.



472V024H04 UHF tuner schematic diagram.



472V024H04 UHF tuner.

CAUTION

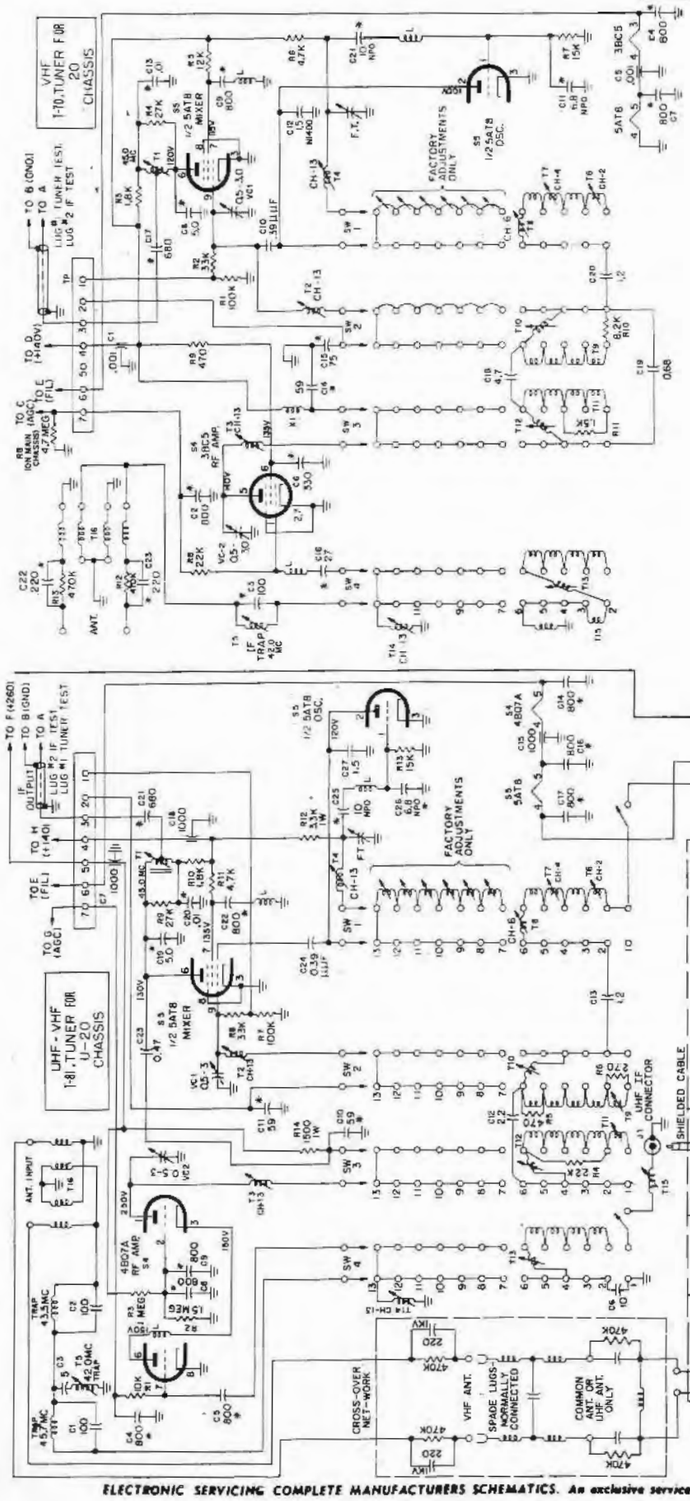
Use an isolation transformer to prevent electric shock!

When making adjustments or servicing with the receiver in or out of its cabinet, **use an isolation transformer between the source of AC and the receiver AC input.** Reason: One side of the AC supply is directly connected to the receiver chassis ground. The isolation transformer serves to isolate the receiver chassis ground from earth ground.

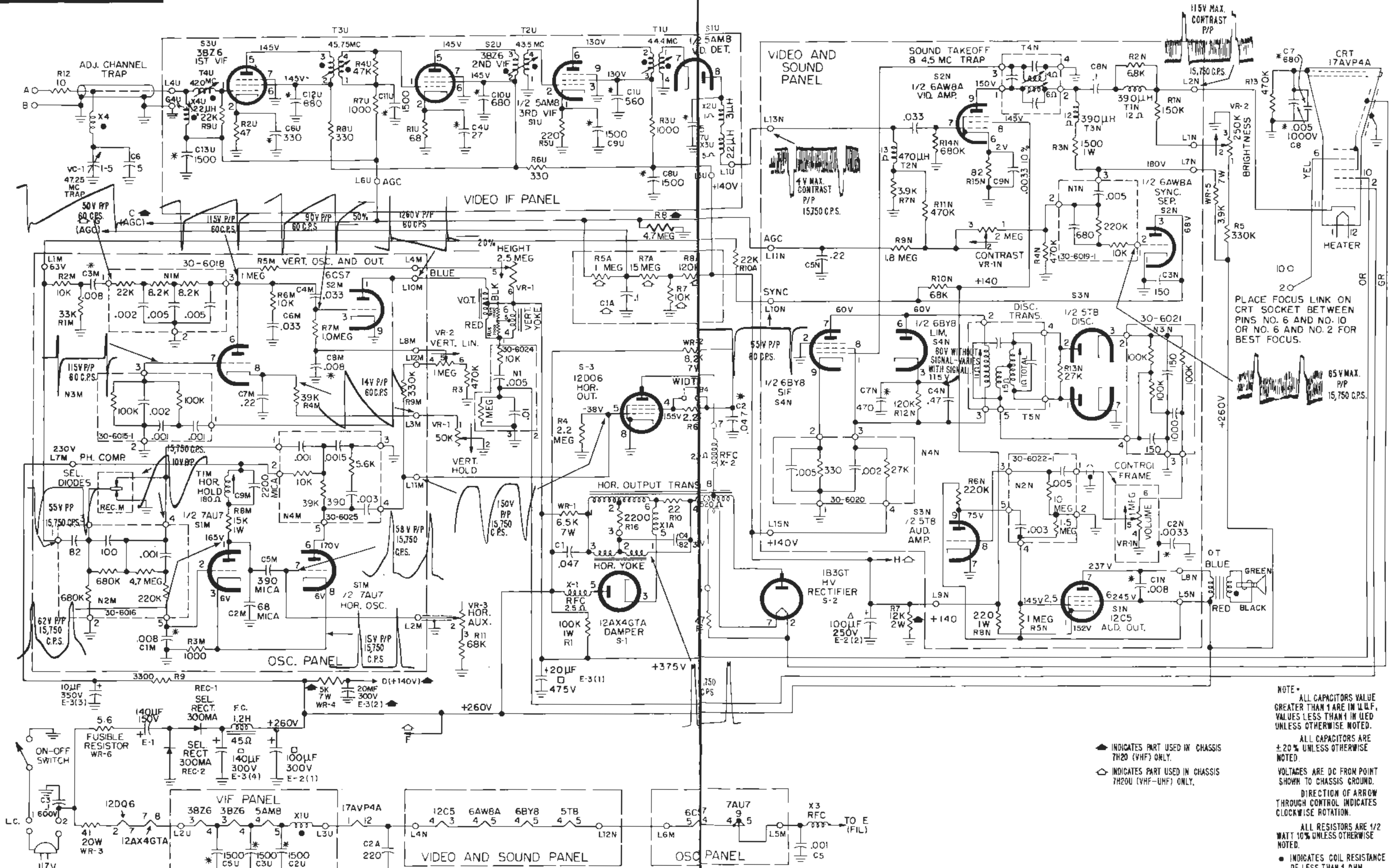
Note that the danger of shock exists with the receiver turned off, if the AC plug is connected! When changing tubes, pull out the AC plug.

Television Receiver Model 7H20 - 7H20U

PHILCO



ELECTRONIC SERVICING COMPLETE MANUFACTURERS SCHEMATICS. An exclusive service of Cowan Publishing Corp.



INDICATES PART USED IN CHASSIS 7H20 (VHF) ONLY.

INDICATES PART USED IN CHASSIS 7H20U (VHF-UHF) ONLY.

NOTE - ALL CAPACITORS VALUE GREATER THAN 1 ARE IN µµF, VALUES LESS THAN 1 IN µF UNLESS OTHERWISE NOTED.

ALL CAPACITORS ARE ± 20% UNLESS OTHERWISE NOTED.

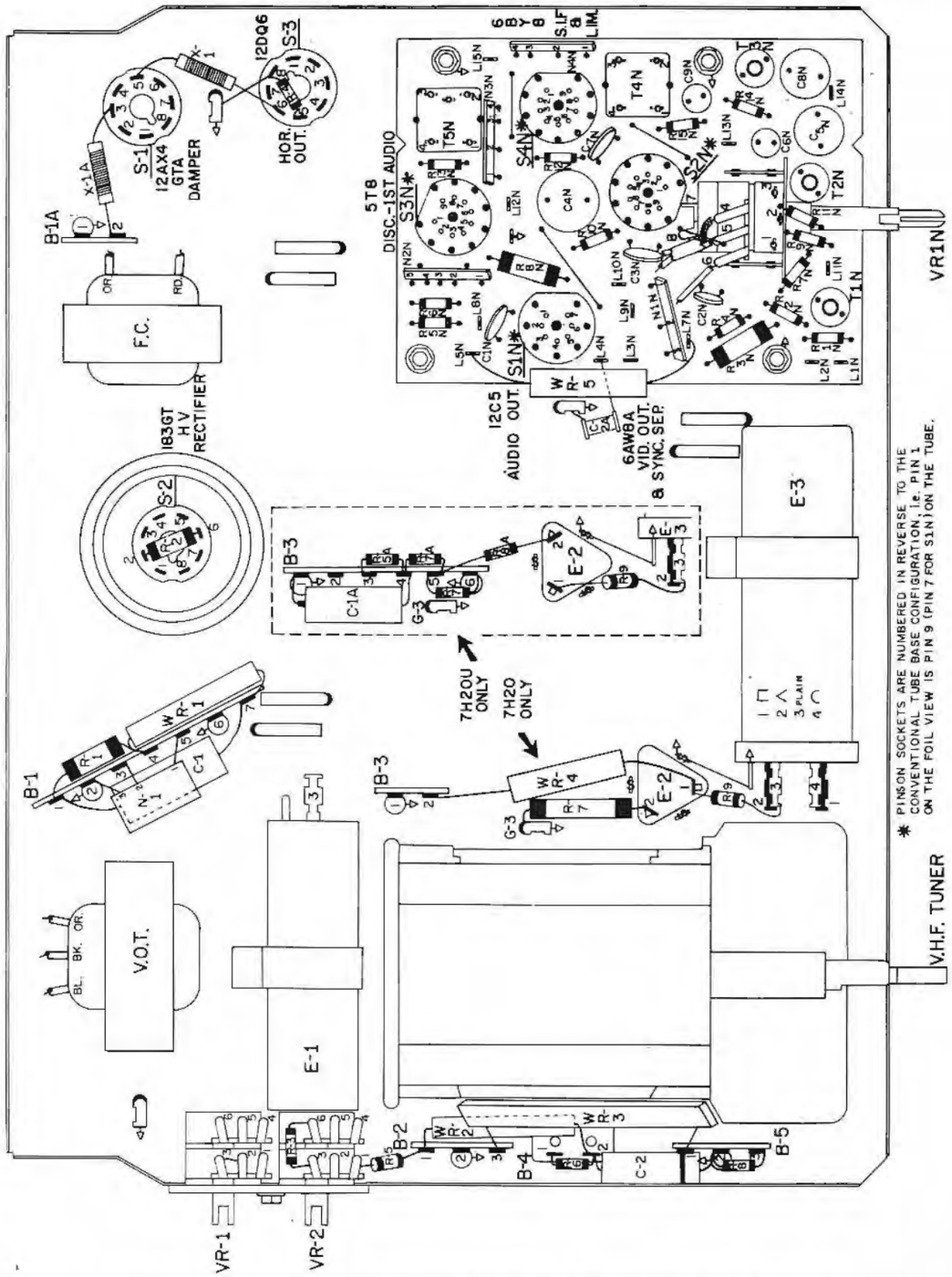
VOLTAGES ARE DC FROM POINT SHOWN TO CHASSIS GROUND.

DIRECTION OF ARROW THROUGH CONTROL INDICATES CLOCKWISE ROTATION.

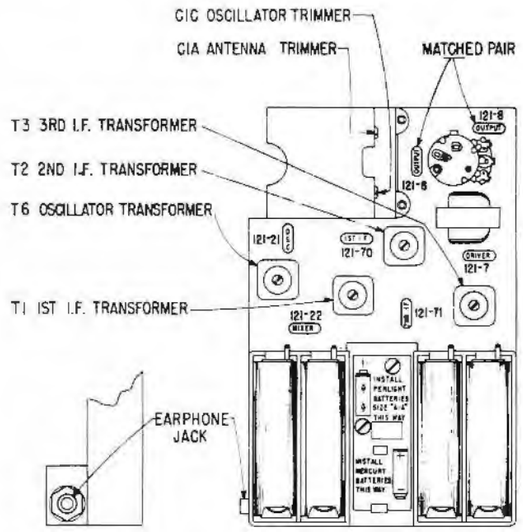
ALL RESISTORS ARE 1/2 WATT 10% UNLESS OTHERWISE NOTED.

• INDICATES COIL RESISTANCE OF LESS THAN 1 OHM.

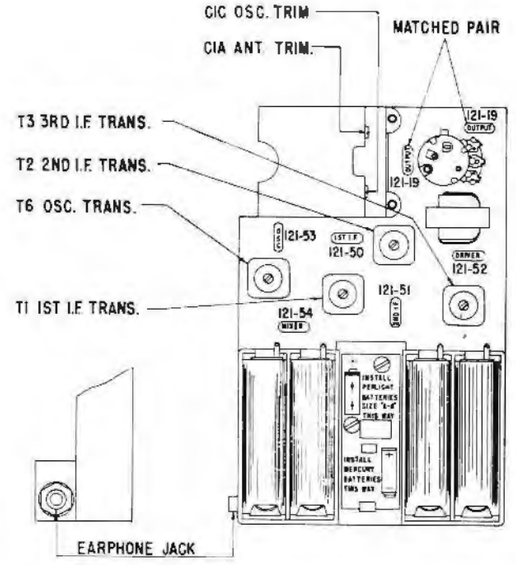
PHILCO



ZENITH



TRANSISTOR & TRIMMER LAYOUT FOR 7AT42



TRANSISTOR & TRIMMER LAYOUT FOR 7AT42Z1

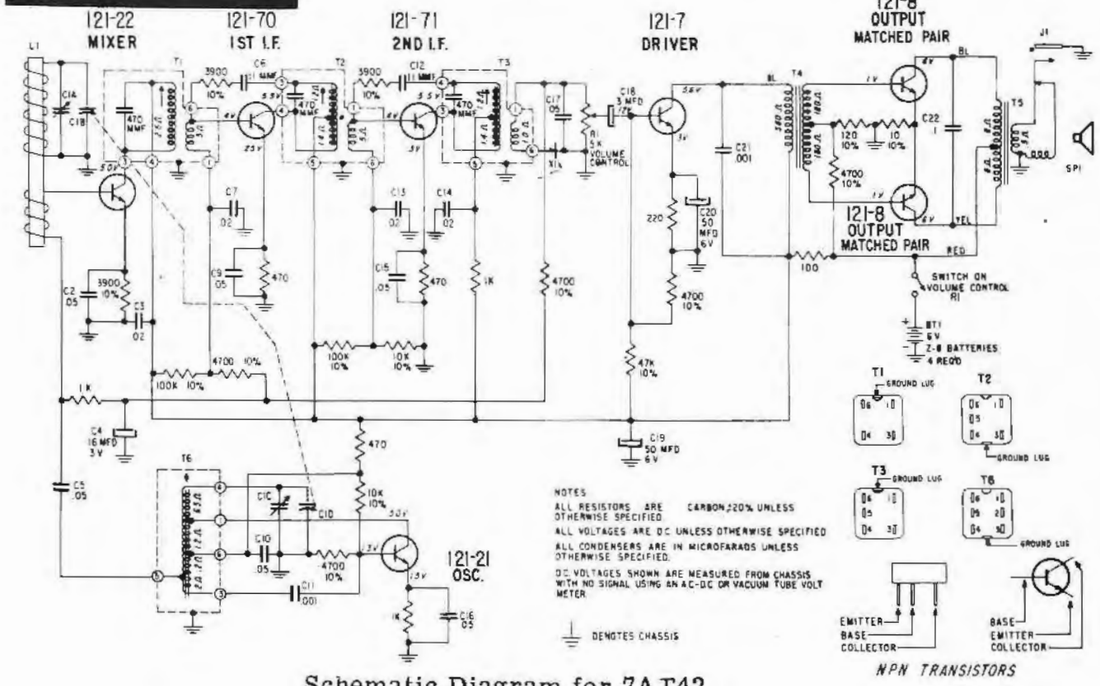
Alignment Procedure

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment
2	1620 KC		—	Gang wide open.	C1C	Set Oscillator to dial scale.
3	535 KC		—	Gang Closed	Adjust slug in T6	Set Oscillator to dial scale.
4	REPEAT STEPS 2 & 3		—	—	—	—
5	1260 KC		—	1260 KC	C1A	Align loop ant.

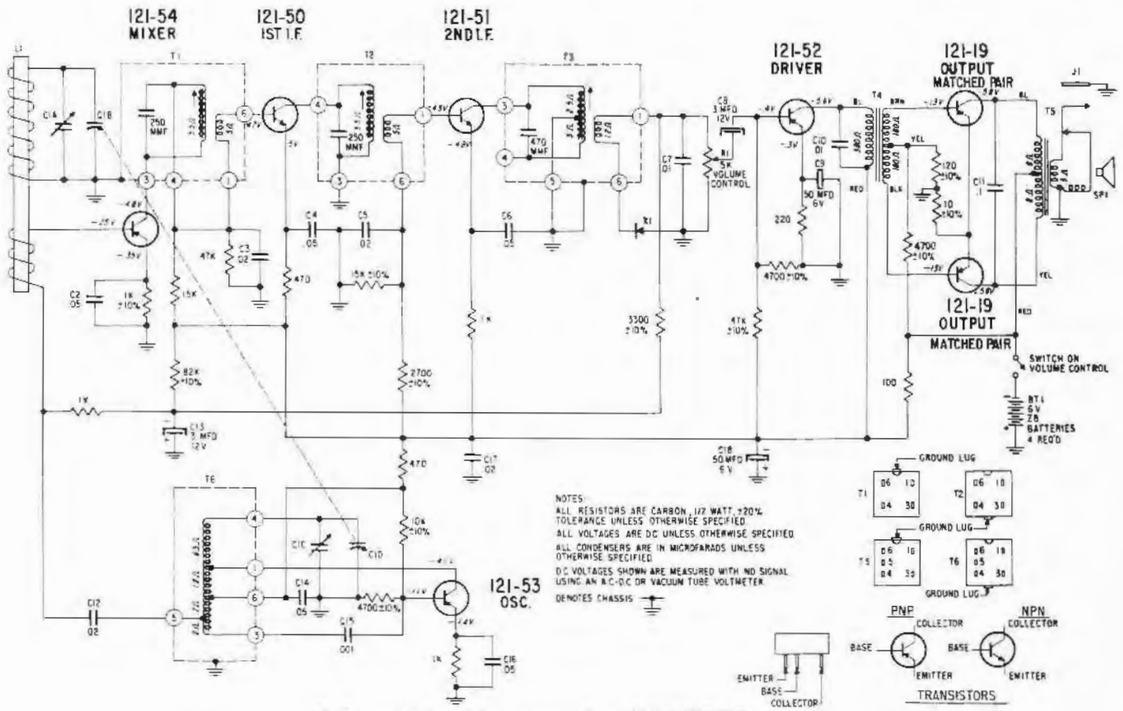
Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	Mixer	Osc.	1st. I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
7AT42,	Green	Green 102-3498	Zenith RETMA Type	121-22 2N194 NPN	121-21 2N193 NPN	121-70 NPN	121-71 NPN	103-19 1N87G	121-7 2N35 NPN	121-8 2N35-2N35 Matched Pair NPN NPN	Sylvania
7AT42Z1	Red	Red 102-3474	Zenith Type	121-54 PNP	121-53 PNP	121-50 NPN	121-51 NPN	103-19 1N87G	121-52 PNP	121-19 Matched Pair PNP PNP	Texas Instrument

ZENITH

Transistor Radios 7AT42-7AT42Z1



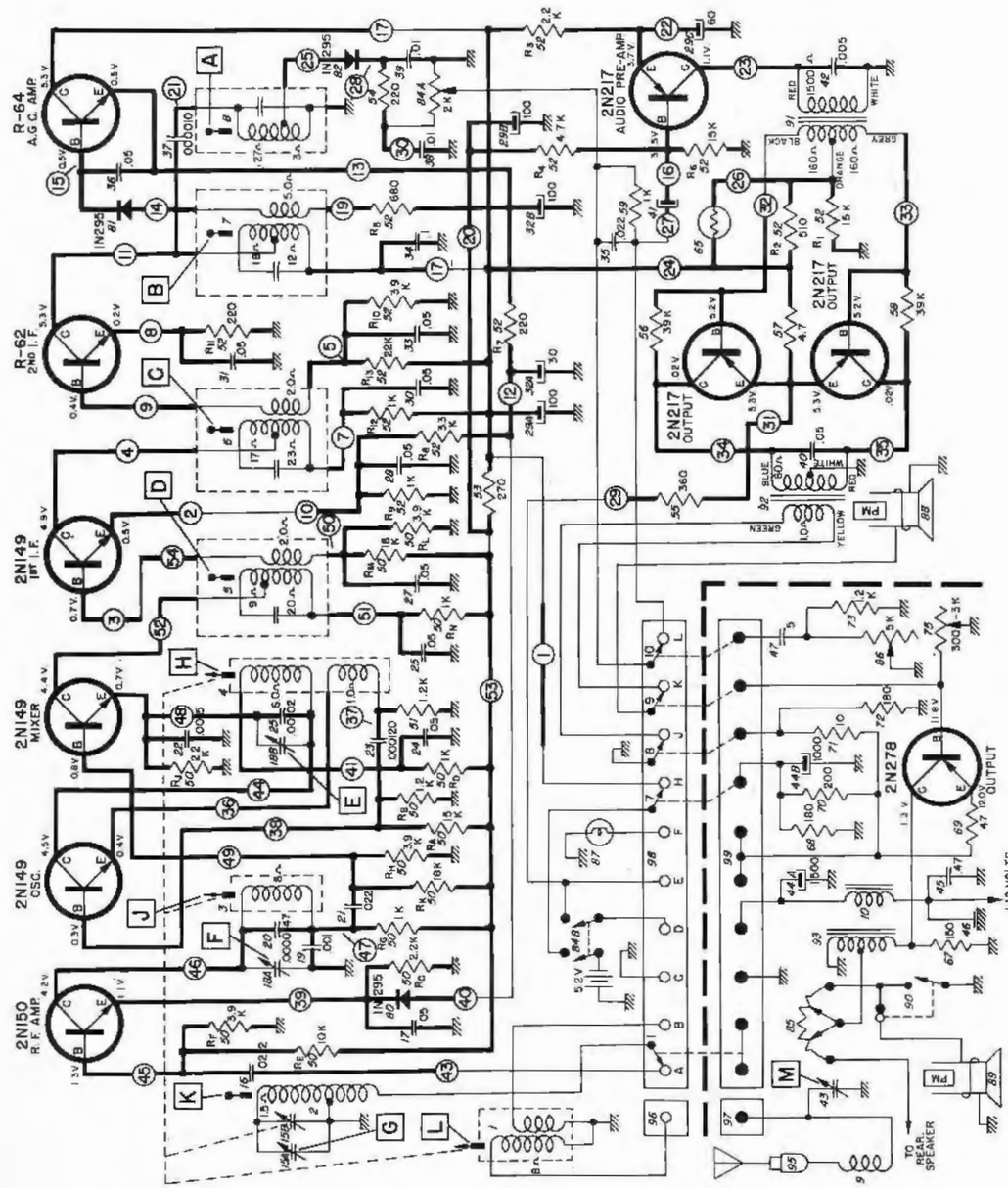
Schematic Diagram for 7AT42



Schematic Diagram for 7AT42Z1

Delco - Oldsmobile 989131

OLDSMOBILE

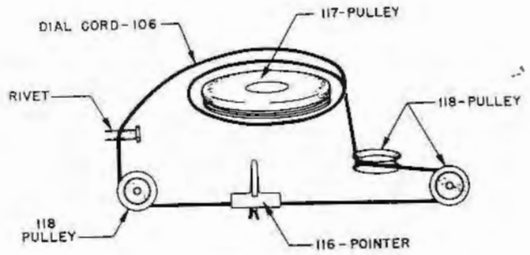


OLDSMOBILE 989131

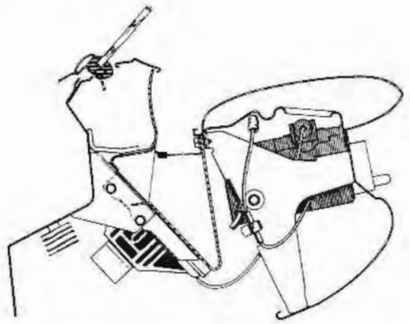
PRINTED CIRCUIT SHOWN IN HEAVY LINES

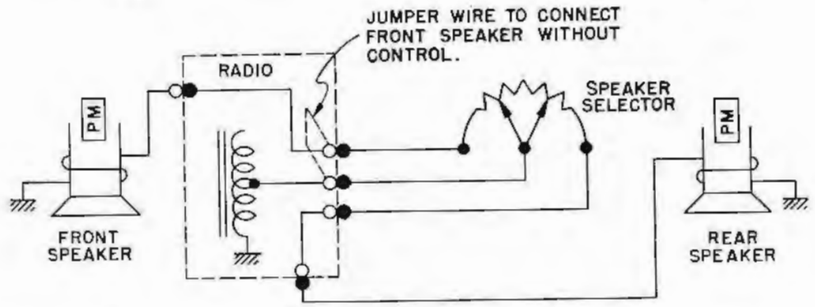
OLDSMOBILE

Delco - Oldsmobile 989131



DIAL CORD


SECTION THRU INSTRUMENT PANEL SHOWING SPEAKER INSTALLED



1958 Oldsmobile Model 989127

Suppression Equipment Used—

Generator capacitor (Part #6030) .5 mfd.

Distributor suppressor—Not needed

Ignition coil capacitor (Part #6089) .3 mfd.

Voltage regulator capacitor (Part #6030)

Hood grounding clip (Part #555348) Mounts directly behind rear hood bumper on the front left hand fender.

Mounting—

This model is a one unit set with a separate speaker. The receiver unit is held in place on the right and left hand side by mounting brackets and mounted to the panel by the two control bushing nuts. The glove box should be removed before removing or reinstalling the receiver unit.

The speaker and baffle assembly are held in place to the finishing panel by four screws and to the speaker brackets on dash panel by four screws. It is mounted to the back side of the instrument panel between the panel and shelf by five screws. Before removing the speaker and baffle assembly, it is necessary to remove the clock and shelf.

Antenna lead-in plugs into the connector on the left side of the receiver unit. The antenna trimmer is located on the bottom side and to the rear of the receiver on model 989127.

Dial light is replaceable without removal of the receiver unit. It is located on the left side toward the top of the set. To remove, pry out the dial light socket with a small screwdriver.

The fuse (Part #455640 7.5 amperes) is located on the fuse block on the fire wall.

The "A" lead (green) from the receiver unit is connected to the green lead from the wiring harness and the connector is clipped to the radio left hand support.

The speaker lead is connected to an interlock plug located on the bottom of the receiver unit next to the transistor radiator.

1958 Oldsmobile Model 989129

Same as model 989127 except a foot switch is used. The plug for this foot switch connects to a socket located on the bottom of the receiver next to the transistor radiator.

1958 Oldsmobile Model 989131

This model mounts the same as 989127. This is the Tran-Portable model which has the removable portable unit making this a two unit set. The antenna trimmer is located just below the antenna lead-in connector and the speaker lead is connected to the interlock plug on the right hand side of the rack unit.

Mfr: General Electric **Chassis No.** U

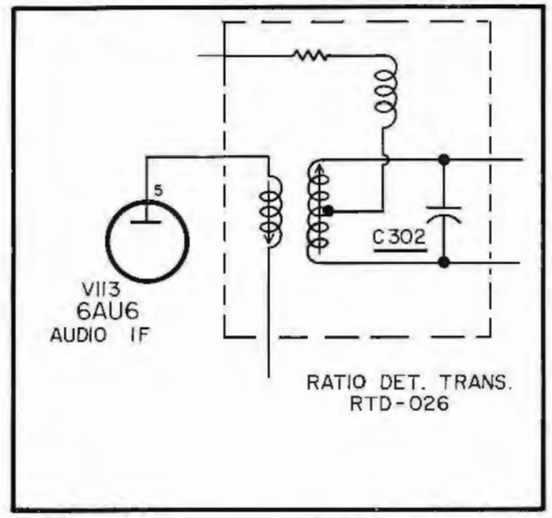
Card No: GE-U-1

Section Affected: Sound

Symptoms: Intermittent and distorted sound.

Cause: Intermittent leakage in *C302* in base of RTD-026 ratio detector transformer.

What To Do: Replace transformer RTD-026.



Mfr: General Electric **Chassis No.** U

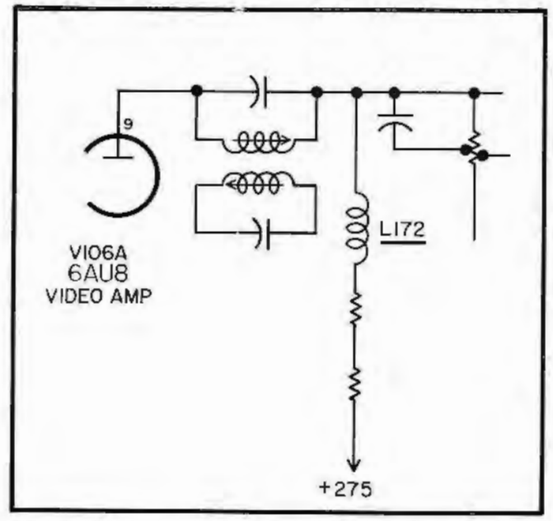
Card No.: GE-U-2

Section Affected: Pix

Symptoms: Video overloading.

Cause: Open video peaking *L172*. Capacitive coupling between coil windings passes signal, but of insufficient value to develop *agc* voltages.

What To Do: Replace *L172, 390 mh.*



Mfr: General Electric **Chassis No.** U

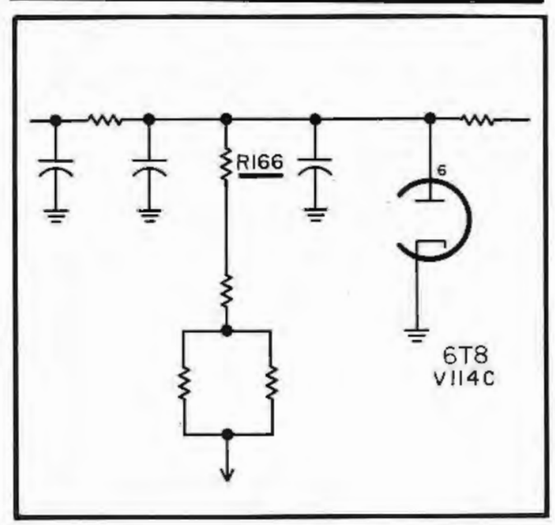
Card No: GE-U-3

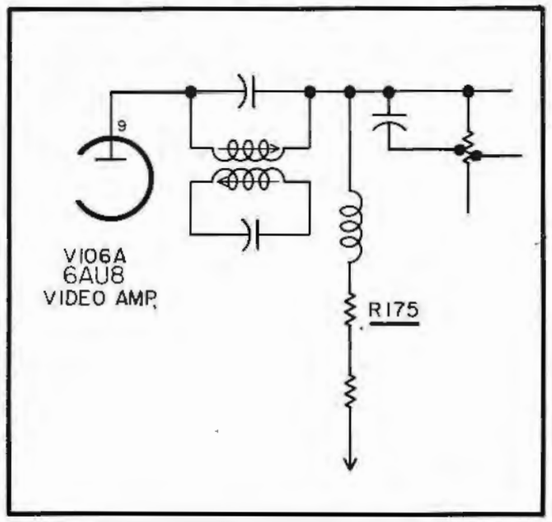
Section Affected: Pix

Symptoms: Reduced sensitivity, snowy pix.

Cause: *R166* changes value increasing the bias on the tuner *agc* line.

What To Do: Replace *R166, 22 megohms.*





Mfr: General Electric **Chassis No.** U

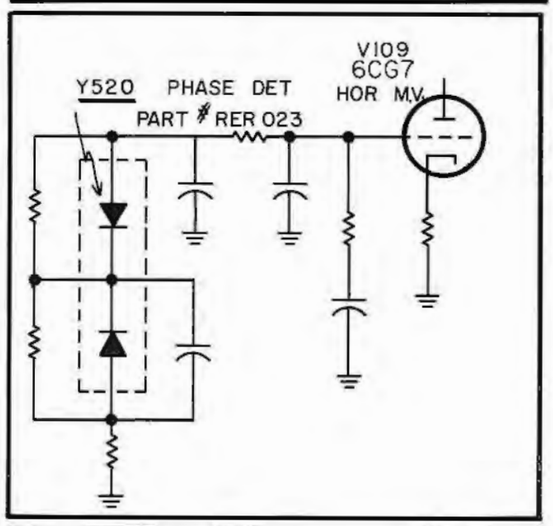
Card No: GE-U-4

Section Affected: Pix

Symptoms: Negative pix.

Cause: *R175* video plate load resistor open. B plus is still fed thru *R173*.

What To Do: Replace *R175, 5600 ohm 2W.*



Mfr: General Electric **Chassis No.** U

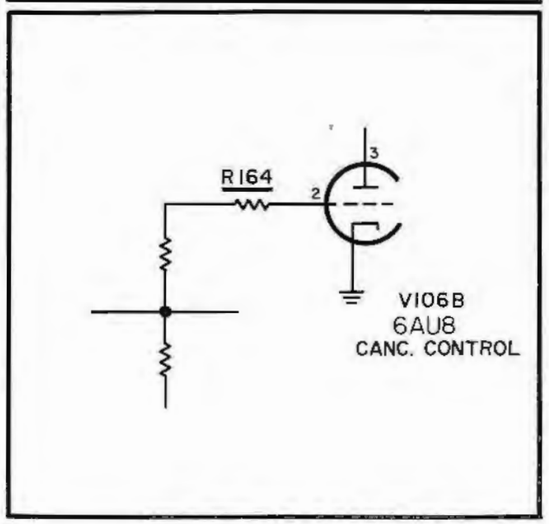
Card No: GE-U-5

Section Affected: Raster and sync.

Symptoms: Intermittent loss of raster and horizontal sync.

Cause: Open, leaky or mismatched dual seleniums.

What To Do: Replace seleniums *Y250* with part number RER-023. If not available a matched pair of germaniums will be satisfactory.



Mfr: General Electric **Chassis No.** U

Card No: GE-U-6

Section Affected: Pix

Symptoms: Intermittent overload and poor signal to noise ratio.

Cause: Gassy 6CF6 tubes in the first and second *if* stages.

What To Do: The circuit can be modified simply so that gassy tubes do not upset proper operation. Change *R164* from *2.2 megs* to *100K.*

Mfr: Sylvania **Chassis No.** 1-537

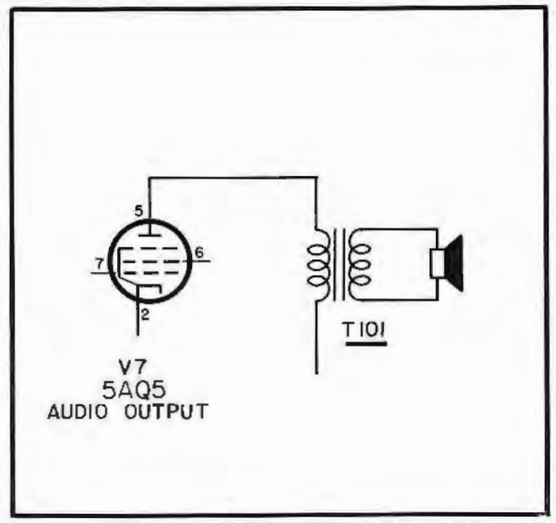
Card No: SY-1537-1

Section Affected: Sound

Symptoms: Insufficient sound.

Cause: Shorted turns in *T101*, audio output transformer.

What To Do: Replace *T101.*



Mfr: Sylvania **Chassis No.** 1-537

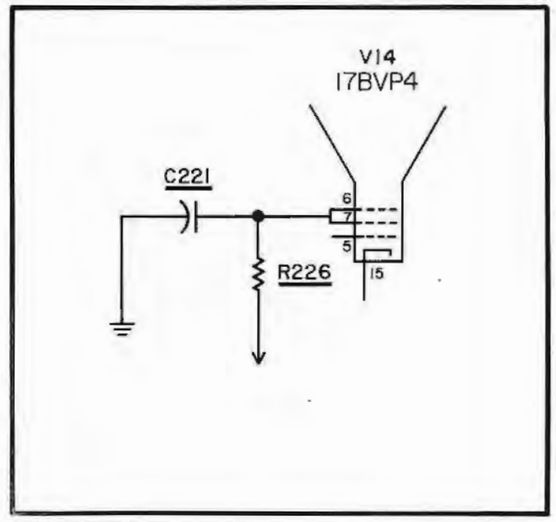
Card No: SY-1537-2

Section Affected: Raster

Symptoms: No Raster

Cause: Shorted *C221* and burned *R226.*

What To Do: Replace *C221, .01 mfd.* and *R226, 470K.*



Mfr: Sylvania **Chassis No.** 1-537

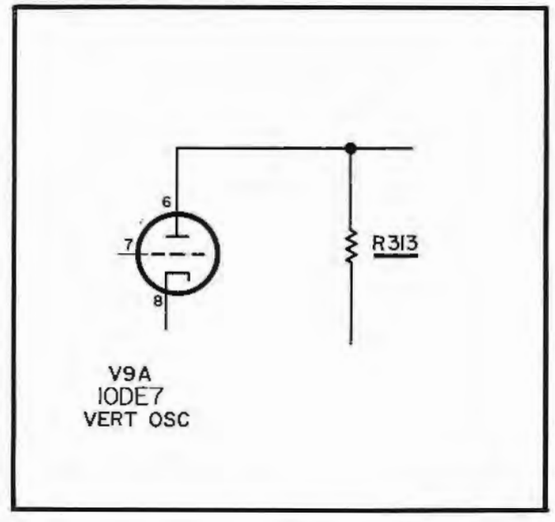
Card No: SY-1537-3

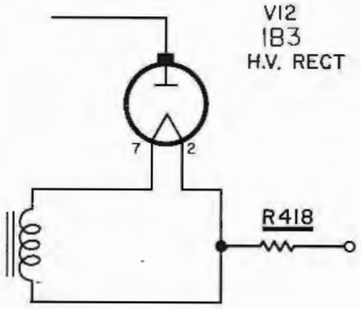
Section Affected: Vertical sweep.

Symptoms: Height decreases after receiver plays awhile.

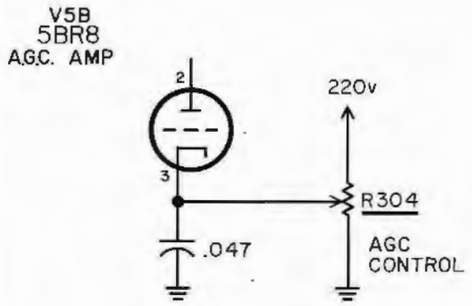
Cause: *R313* increases in value.

What To Do: Replace *R313, 1.2 meg.*

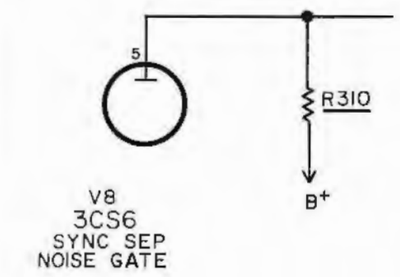




Mfr: Sylvania **Chassis No.** 1-537
Card No: SY-1537-4
Section Affected: Raster
Symptoms: Streaks in raster.
Cause: *R418* is arcing internally.
What To Do: Replace *R418, 4700 ohms.*



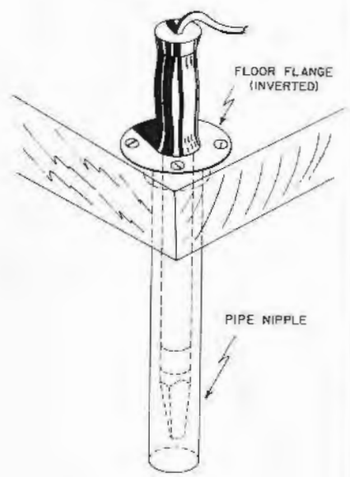
Mfr: Sylvania **Chassis No.** 1-537
Card No: SY-1537-5
Section Affected: Pix
Symptoms: Video overload.
Cause: *R304, agc* control is open.
What To Do: Replace *R304, 150K* control.



Mfr: Sylvania **Chassis No.** 1-537
Card No: SY-1537-6
Section Affected: Sync.
Symptoms: Horizontal tearing and intermittent vertical roll.
Cause: *R310* has decreased in value.
What To Do: Replace *R310, 220K.*

Shop Hints and Short Cuts

We would welcome hints and short cuts from our readers. ES will pay $5 for each hint used. Sorry, but we cannot be responsible for unaccepted material. In case of duplication, first received will be accepted.



Store a hot soldering iron safely out of the way, but handy for use, by dropping it into a pipe nipple set in the workbench. Fit the neck of a floor flange in a hole in the bench; mount the flange upside down, then, from beneath the bench, turn a pipe nipple into the threaded flange.

H. J. M.
Sarasota, Fla.

Use scotch #49 tape in place of bonding wire (from hood to chassis of a car). You don't have to look for bolts and nuts, just scrape the paint off and stick it on. Number 49 scotch is heavy aluminum tape with a conductive adhesive. It undoubtedly has many other shop applications.

R & M TV
Elizabeth, N. J.

Here's a new use for the wife's clear nail polish. It makes an excellent

[Continued on page 44]

SHOP HINTS AND SHORT CUTS

[*from page 43*]

weatherproof covering for the hardware which connects the transmission line to the antenna.

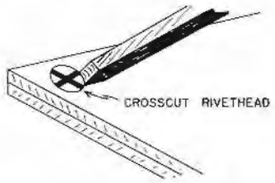
R. G.
N.Y.C.

A king-size magnifying glass mounted on the workbench with a swivel arm makes easy, the minute examination of small parts.

E. M.
Brandenton, Fla.

An intermittent picture tube due to poor solder connections in the filament pins may be remedied in the following way: With a fine three cornered file make a groove across each of the filament pins. This will expose the filament wires. Take a hot soldering iron and run some solder in each of the grooves, filling them. Smooth the pins. In trying to solder the pins in the regular way, the solder will not stay in but boil out of the pins.

A. O.
Thorp, Wisc.



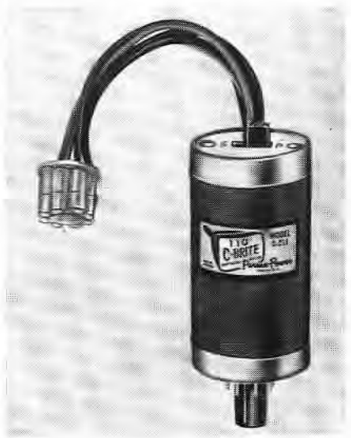
Cutting out a rivet is easier, especially if it's in close quarters, by first using the chisel to crosscut the head. Each quarter of the rivet can then be knocked off with less effort, and less danger of flying fragments. Very handy on chassis work.

H. J. M.
Sarasota, Fla.

NEW PRODUCTS

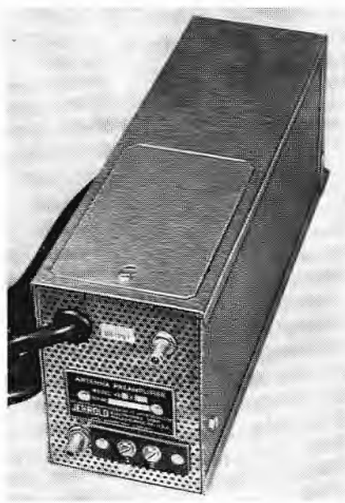
A new electrically operated, disappearing type auto radio antenna, is now being marketed by The Tenna Mfg. Co., Cleveland, Ohio. Designated the Model TM-1 Tennamatic, this universal mounting, motor-driven antenna, ntilizes a patented thrust-limiting clutch, which prevents "motor burnout," the major cause of failure on many available electric antennas. The telescoping mast extends or retracts in a maximum of ten seconds. The unit's 15 pound thrust assures free action even in zero weather. The motor operates on 12 volts *dc* and draws a maximum of ten amperes. Its housing is treated with special waterproofing compound. It is equipped with quick mount leads and fast disconnect plugs. Model TM-1 is designed for front mounting, TM-2 for rear mount. The TM-3 is a conversion kit which permits the TM-1 to be rear-mounted.

• • •



Looking ahead to the tremendously growing need for 110° base tube briteuers, Perma-Power Company, Chicago, has just added these uuits to its line. The new "C-Brite" Briteners work on series or parallel wired filament circuits as required by setting a selector switch. They are anto-former type briteners giving a full 7.8 v. output. The model C-211 "C-Brite" is designed for use with the Button Base (R.C.A.) type 110° pix tubes; Model C-221 "C-Brite" is designed for use with the Shell base (Sylvania-Dumont) type 110° pix tubes. Both units are already in stock at leading distributors everywhere.

• • •



An *fm* preamplifier which effectively extends the reception range of high-fidelity *fm* tuners has been announced by the Jerrold Electronics Corporation. Known as the Range Extender this Jerrold *fm* Preamplifier is designed for simple home installation between the antenna and the *fm* tuner. In addition to "pulling in" stations outside normal *fm* reception area, the Range Extender achieves full "limiting" on a weak station eliminating "hash" and noise. According to Walter Goodman, Sales Manager of Jerrold's Jobber Products Division which distributes the new unit, the Range Extender has been tested extensively in key *fm* markets where it has as much as doubled the nnmber of receivable stations.

• • •

Central Electronics, Inc., manufacturers of the original "Rejuvatube" *crt* rejuvenator, announces the new Model RE-2 "Rejuvatube." The model features a rugged, heavy duty steel carrying case; illuminated meter; new TV interlock power cords and a new "cube socket" selector and cable as a "one piece" assembly. The new "cube socket" and switch assembly enables the testing and rejuvenation of each gun of a color tube; 110° short tubes with miniature or medium bases and conventional black and white tubes. A new circuit and an additional direct reading scale on the meter allows the serviceman to check "gas content" of all popular pix tubes. A new four page brochure on the Model RE-2 is available by writing the manufacturer at 1247 W. Belmont Ave., Dept. ES, Chicago 13, Illinois.

ANSWERMAN

[*from page 13*]

Dear Sir:

A Sentinel model 1U-1202 on my service bench exhibits interference in the picture on certain channels. The interference has the appearance of what I have seen pictured as Snivets. That is, a spasmodic line on the right side of the picture. Most conventional checks have been made such as tube changes, etc. Nothing seems to help or correct the condition.

S. F.
Chicago, Ill.

The screen circuit of the horizontal output tube should be investigated as the most logical cause of this difficulty. The bypass condenser in the 6CD6 stage shown in *Fig.* 3 should be reduced in capacity from .047 to about 1000 *mmf*, 500 volts. Resistor *R85* may have to be eliminated for further improvement. In addition, the screen B plus supply resistor may also require a reduction in resistance if the width should be insufficient. Generally, it is not desirable to allow the

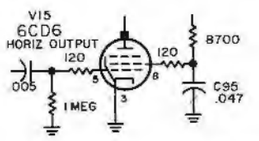


Fig. 3—Changing value of components may remedy snivets.

screen voltage to be higher than 135 volts on a 6CD6 tube. Concerning capacitor *C95*, there have been cases where the reduction required to clean up the condition was down to 820 *mmf*.

Mr. Answerman:

I have a Raytheon chassis 21T42 which exhibits poor horizontal linearity across the picture. My circuit examination does not reveal anything wrong in the horizontal deflection system. Every component, the tubes and the flyback have been checked and even substituted for. In view of this do you know of anything I can do to improve the linearity of this receiver?

J. W.
Baltimore, Md.

Anti-pin cushion magnets should be installed on the picture tube near the yoke assembly. This will improve the horizontal linearity. The anti-pin cushion magnets used by several manufacturers should provide the correction needed. The Raytheon part number for the magnet is 201-26614.

Dear Sir:

I always have trouble determining if a local oscillator in a radio is operating. I realize that in many cases I can measure the bias in the oscillator circuit and conclude that with the bias present the oscillator is working. However, with the transistor radios I find this difficult. What method would you suggest to be used with transistor radios in determining that the local oscillator circuit is operating?

E. P.
Cleveland, Ohio

One of the best methods of quickly determining whether a transistor local oscillator circuit is working is to connect a high gain scope to the oscillator circuit and note if the oscillating waveform can be obtained.

Another method has been employed extensively with radios using vacuum tubes and generally it works well with transistor radios also. This method involves using a properly operating radio and holding the radio being serviced near it. The inoperative radio's dial is adjusted below the operating radio's broadcast band setting by its own *if* frequency. When the oscillator frequency of the defective radio is different by approximately the *if* frequency of the normally operating radio a squeal will be heard from the properly operating radio. Radiation from the radio under test will be picked up in the *rf* stage of the normally operating radio and handled in a manner similar to an ordinary radio broadcast signal. As a result a squeal will be audible which will be variable in pitch as the oscillator circuit in the radio under test is tuned. This check is possible even if the *if* and audio circuits in the defective receiver are inoperative since the oscillator circuit is independent of the other portions of the receiver.

Dear Mr. Answerman:

A serviceman friend of mine states that it is possible to damage a transistor by checking it with an ohmmeter as used in the resistance measurment method of electronic servicing. I don't quite see how this is true. It would make the servicing of small transistor radios quite difficult. Can you give me some information on this?

S. H.
Richmond, Va.

As it undoubtedly is realized, transistor radios operate with very low potentials. They are in the order of 3 to 9 volts with only a few transistor radios employing slightly higher voltages. Connecting an ohmmeter, which also uses low voltage batteries or a vacuum tube ohmmeter, could be considered similar to connecting a battery to the transistor. Proper polarity connections of the battery are essential to prevent damage that could occur if the reverse polarity is applied. Improper connections would make the bias incorrect with a resultant excessive current flow. Likewise, incorrect ohmmeter polarities when connected to a transistor can cause excessive conduction through the transistor and permanently damage it. When the measurement of resistances is required in a transistor radio, the transistor should be removed or disconnected as the case may be. In addition to doing this to protect the transistor, it is also desirable so that the resistances of the transistor will not affect the measurement through parallel connections.

In line with the above is another caution concerning the insertion or removal of a transistor with the battery voltage applied. Always disconnect the battery potentials via the on-off switch or remove the batteries. Otherwise, instantaneous surge currents can ruin the transistor and make the servicing problem doubly difficult.

Perhaps the best method of servicing small transistor radios is to measure the *dc* voltages in the different circuits and only check resistors and condensers with a ohmmeter when there is no other way of locating the trouble. ■ ■

WORKBENCH

[*from page 11*]

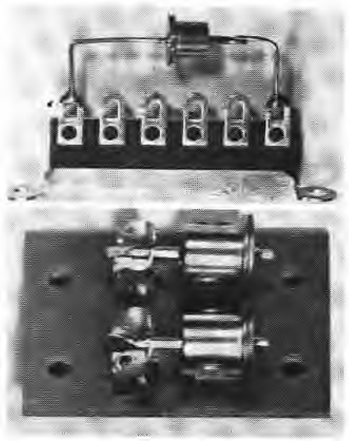
thus causing the critical horizontal hold. Resistor *R442* was next replaced with a 22 ohm, 1 watt resistor and the receiver now functioned properly.

The butcher had found *R442* burned and without referring to a schematic, he mis-read the color code and installed a 2.7 ohm resistor instead of a 22 ohm resistor. ■ ■

SILICON RECTIFIERS

[*from page 6*]

set with a voltage doubler has a maximum inverse voltage of approximately 375 volts, this allows a margin of safety in using this rectifier.



Typical silicon mountings.

In the event that higher peak inverse voltages are encountered, it is necessary to use different units. For instance, the 1N1217 is rated at 50 volts peak inverse; the 1N1218 at 100; the 1N1219 at 150; the 1N1220 at 200; the 1N1221 at 300; the 1N1222 at 400; the 1N1223 at 500; the 1N1224 at 600; the 1N1225 at 700; and the 1N1226 at 800 peak inverse voltage. (Note that while the 1N1222 is also a 400 volt peak inverse unit, it is rated for general application as opposed to the 1N1169 which is rated expressly for TV. The 1N1222 can substitute for a 1N1169, but a 1N1169 cannot substitute for 1N1222.)

These silicon rectifiers are extremely important in equipment that must operate at high temperatures, have extreme restrictions on space, have the utmost reliability, or that must be free from contamination. Silicon rectifiers are also important for use in military equipment where reliability requirements are highest. ■ ■

Advertiser's Index

straight from the shoulder talk...

A TV Picture Tube Warranty is only as good as the manufacturer who issues it...

You can rely on the Picture Tube Warranty of RCA

The manufacturer's warranty is for your protection. An RCA 12-month warranty card is assurance that your replacement picture tube is a genuine RCA Silverama—and that the reputation and integrity of RCA stand behind it. It's well worth while to insist on an RCA Silverama, the same advanced tube used in many of the new '58 TV sets. Often, it will even produce a picture more brilliant, sharper, clearer than your set gave when new! So, if your picture tube should need replacing, be sure you get what you pay for, the best picture tube made—RCA Silverama. After your service dealer installs it, ask him to complete your copy of the warranty card. One comes with every genuine RCA Silverama Picture Tube.

Super-Aluminized RCA Daylight Clear

RCA Silverama®

PICTURE TUBES

RCA Electron Tube Division, Harrison, N. J.

"Just as good" isn't good enough for your TV!

Let's face it! Nothing lasts forever. When you have to pay out good money for a replacement Picture Tube, you're entitled to the best that modern electronics can produce—that's an RCA SILVERAMA. It stands to reason that RCA, with its great laboratories, facilities, and "know-how"—produces the finest Picture Tubes money can buy. So, don't let "just as good" tempt you. Remember, RCA Silverama Picture Tubes cost no more than other brand-name aluminized tubes ... they are warranted for one full year, too.

Super-Aluminized RCA Daylight Clear

RCA Silverama®

PICTURE TUBES

RCA Electron Tube Division, Harrison, N. J.

...that makes it easy for you to sell the #1 picture tube... RCA Silverama®

Messages like these appear regularly in TV Guide and other publications, telling millions of TV viewers (many of them your customers) the facts about their all-important picture tube.

RADIO CORPORATION OF AMERICA

Electron Tube Division — Harrison, N. J.