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1968

VOLUME TV-27

Television

Servicing Information

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	20	1960
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	18	1958
	17	1957
	16	1956
	15	1955
	14	1954
	13	1953
	12	1952
	11	1951
	10	1950
	9	1949
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	5	1942
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	3	1940
	1	1926-1938

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MODEL CHART

MODEL	COLOR	NAME	SIZE	TUNER CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
P1850C	White	Ranger	†18"	NB1979-1	94C323-2	94C296-11	1H5NB79-1
P1857C	Walnut	Ranger					
P1859C	Black	Ranger					
P2020C	White	Festival	†20"	NB2129-1	94C323-2	94C296-11	H5NB29-1
P2029C	Black	Festival					
P2037C	Walnut	Jubilee					

†Picture measured diagonally.

(Service material on pages 3 through 8)

GENERAL

Models covered by this manual use a unique "instant play" chassis having four tubes plus picture tube and thirteen transistors. Frequently it is referred to as a hybrid chassis since both tube and transistors are employed. Tubes are used for the output of the sound, vertical and horizontal sections. The rest of the circuitry is transistors or diodes. Both VHF and UHF tuners are transistorized.

IMPORTANT SERVICE NOTE

When servicing this chassis, with the back removed, use an isolation transformer and polarized line cord to avoid possible damage to test equipment, personal shock or catastrophic transistor damage. Unplug set for repair work rather than turning off with AC switch.

ADJUST PRE-SET FINE TUNING

Turn on set. Set channel selector knob to desired channel. If picture or sound is received for the channel, rotate fine tuning knob slightly to bring in best picture with clearest sound. Repeat the procedure for other used VHF channels.

RASTER TILT ADJUSTMENT

If raster is tilted, loosen deflection yoke clamping screw at rear of yoke. Rotate yoke until raster is straight. Tighten yoke clamping screw. Do not allow yoke to move back on neck of picture tube.

PICTURE CENTERING

The picture may be centered vertically and/or horizontally by moving the centering tabs, which are located on the back of the deflection yoke assembly.

OVERALL AGC ADJUSTMENT AND RF DELAY

Normal installation and setup adjustments are basically the same as previous tube type chassis. However, the following procedures should be used for Overall AGC adjustment and RF delay.

1. Turn set on and let it warm up for 5 minutes.
2. Set both controls 1/3 clockwise.
3. Tune in strongest station. Adjust Overall AGC until overload occurs, then back off 10%
4. Tune in weakest station, or disconnect antenna, to barely give sync bars above snow.
5. Adjust RF Delay (innermost control) until signal to noise ratio seems best, then back off slightly.
6. Again tune in strongest station; recheck Overall AGC control.
7. If two adjacent channels are available, preferably with greatly different signal levels, (except 4-5 & 6-7) check for cross-modulation on weaker channel. Slightly touch up RF Delay for minimum cross-modulation.

HORIZONTAL HOLD ADJUSTMENT

The horizontal hold control is set at the factory and seldom requires readjustment. Adjustment need only be made if 11LT8 tube (V402) has been replaced and the picture cannot be locked in with slight adjustment of the horizontal hold control.

Before proceeding with adjustment, be sure that the picture will sync vertically, as lack of both vertical and horizontal sync generally indicates sync circuit trouble. Lack of only horizontal sync generally indicates trouble in the horizontal sync (phase detector) circuit.

1. Remove cabinet back, Connect a polarized interlock cord and/or isolation transformer.

2. Allow a few minutes for set to warm up. Tune in weakest station, set brightness and contrast controls for a normal picture.

3. A. Turn off set to avoid possible transistor damage.

   B. Using a piece of hook-up wire, ground test point "S" through a .47 mf, 200V capacitor to the metal tuner bracket or a metal shield.

   C. Turn on set.

4. Adjust horizontal hold control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

5. A. Turn off set to avoid possible transistor damage.

   B. Remove wire short and capacitor from test point "S".

6. Turn set on and set channel selector to weakest station. Switch channel selector on and off channel, picutre should remain in horizontal sync.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT

If the picture is of incorrect height (vertical size) adjust the height control. This adjustment may affect the vertical linearity of the picture. If necessary, alternately adjust the vertical linearity control and height control. Note: Upper portion of the picture is affected mostly by the vertical linearity control: lower by the height control.

ADJACENT CHANNEL INTERFERENCE

A higher adjacent channel picture trap is incorporated into this receiver, but left disconnected. Should higher adjacent picture interference be a problem, connect C304 as shown in dotted lines on schematic. If trap requires further adjustment, see "Adjacent Picture Trap Adjustment".

ADMIRAL Chassis 1H5NB79-1, H5NB29-1, Alignment Information

GENERAL ALIGNMENT NOTES

Aligning a transistorized RF-IF system is not too different from a conventional tube-type set. The first thing to remember is to disconnect power completely when making and breaking connections and to use an isolation transformer with "hot chassis" designs. A decoupled and properly matched network connects the generators to the set and a decoupling filter feeds the detected sweep signal to the oscilloscope. The scope is calibrated to give the same sweep as is detected with a normal video signal. A forward AGC bias is provided to the set. Since forward AGC crossover is very rapid, you may find it necessary to reduce the bias slightly to obtain an output. Begin with spot alignment and monitor with sweep for final touch-up. All board shields and braids must be in place and grounded before alignment.

IF ALIGNMENT PROCEDURE

Connect isolation transformer between receiver and AC line. Keep receiver disconnected unless power is called for. Refer to for equipment set-up.

1. With power off, solder decoupling filter to TP "V" at base of Q304 on bottom of chassis. Keep shields in place.

2. With power off, ground TP "R" RF AGC. This will disable RF amp. Short out VHF antenna terminals on tuner. Set VHF tuner to Channel 12 or other higher unused channel.

3. With power off, solder mixer matching pad to TP5 on VHF tuner. Ground lead to chassis. (See tuner top view)

4. Turn on AM generator and sweep generator, but keep output off. Use crystal calibrated frequency standard for initial adjustments. (RCA WR-99A or equiv.)

5. With power off, adjust RF Delay and Overall AGC Control to midposition.

6. With power off, connect the positive bias lead to TP "I". Connect a negative lead to chassis.

7. Turn set on. Using VTVM, adjust bias supply to give positive 4.3V. If you do not obtain an output, reduce the bias slightly.

8. Connect VTVM to decoupling filter. With no signal, the VTVM will indicate about plus 2.4 volts. This is the transistor operating bias. As the signal will increase, the positive voltage will swing less positive. To increase the dynamic range of VTVM, set to lower scale and reposition with VTVM "Zero" adjustment.

9. Use only enough RF signal to obtain a positive indication. Adjust slugs very carefully.

10. Set generator at 45.3 MC and adjust mixer collector coil L107 for maximum swing in less positive direction.

11. Set generator at 44.5 and adjust L302, L303 and T301A for maximum swing in less positive direction.

12. Set generator at 43.5 MC and adjust T301B for maximum swing in less positive direction.

13. Set generator at 47.25 MC and adjust L301 for minimum. (That is, VTVM reading will be adjusted for most positive indication.)

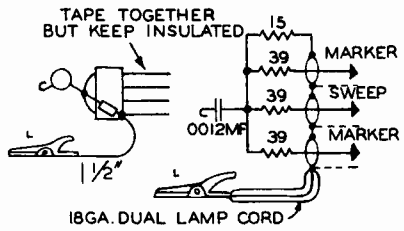
14. Important! Repeat steps 10 and 13.

15. Set generator at 39 MC and adjust L300 for minimum. If L300 does not give indication, disregard. See "Adjusting Adjacent Picture Trap.)

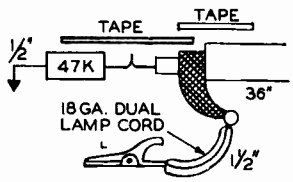
16. Calibrate oscilloscope at 2 volts P to P. Transfer decoupling filter to oscilloscope.

17. Turn on sweep generator, 7 MC sweep width. Adjust sweep with low markers to give 2 volts P to P on scope. Set frequency standard at 45.75 MC and calibrate AM generator at this frequency. (Refer to S1062, step 8.) Now transfer frequency standard to 42.17 giving two markers. Keep markers very low.

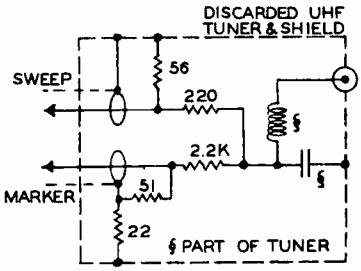
18. Round curve nose by slightly adjusting T301B. Position 45.75 MC by adjusting mixer coil L107. (See notes on curve for proper marker position.) Minimum color interaction can be obtained with 42.17 MC 40% or less.



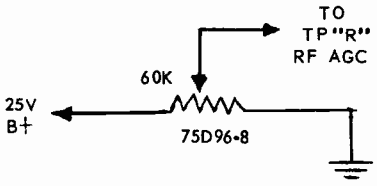
MIXER MATCHING PAD



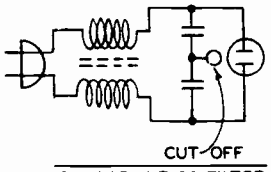
DECOUPLING FILTER



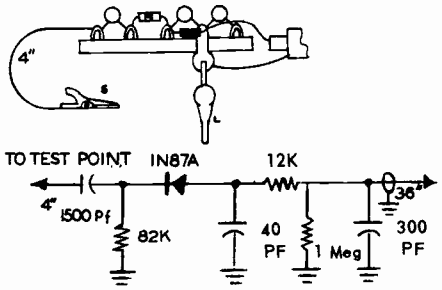
CHANNEL-1 JIG



RF AGC BIAS JIG



CALRAD LP-95 FILTER



VIDEO DETECTOR NETWORK

4.5 MC SOUND IF ALIGNMENT

1. Tune in normal picture on strongest TV station. Allow about 15 minutes for set to warm up. See figure 1 for adjustment location.

2. Using non-metallic alignment tool, slowly turn slug L202 to several turns to left until a buzz is heard in sound. Then slowly turn slug L202 to the right for loudest and clearest sound. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at center of second point of loudest sound noted as slug is turned in (toward bottom of coil).

3. Reduce signal to antenna terminals until there is considerable hiss in sound. For best results, use a step attenuator, connected between antenna and antenna terminals. Signal can also be reduced by disconnecting antenna and placing it close to antenna terminals or leads.

4. Carefully adjust slug L201 and L305 for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug L201.

5. If above alignment is correctly made, no further adjustment is required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure. In some instances to eliminate regenerative buzz detection it may be necessary to replace sound detector tube, followed by complete sound alignment.

(NOTE: Do not readjust slug L202 unless sound is distorted. If L202 is readjusted, all steps in alignment procedure should be repeated exactly as instructed.

4.5 MC SOUND TRAP ADJUSTMENT

1. Connect mixer base matching pad to TP4.
2. Connect frequency standard to mixer base matching pad cable (WR-99A).
3. Connect video detector to base of Q305.
4. Connect VTVM to detector cable. Set VTVM on low scale.
5. Set tuner to unused high channel.
6. Ground TP "R".
7. Set frequency standard at 46.25 MC modulate with 4.5 MC only.
8. Turn up RF output only enough to obtain indication.
9. Adjust L306 for minimum VTVM indication (maximum positive).

OVERALL VHF RESPONSE CURVE CHECK

This procedure allows observation of bandpass response curve from antenna terminals to video detector.

1. Set the equipment up as outlined in IF alignment instructions.

2. Attach sweep and marker generators at VHF antenna terminals through VHF isolation network. No other leads should be attached to these terminals.

3. Set the channel selector to Channel 13. Adjust RF AGC bias network to +2.75 volts at TP "R". Maintain +4.3 at TP "I". Use two separate bias supplies.

4. Accurately set marker at 211.25 MC (video carrier frequency of Channel 13.)

5. Monitor the IF output, maintain 2.0 volts peak to peak amplitude as procedure continues.

6. Using fine tuning control, set video carrier marker at 35% (corresponding to 45.75 MC).

7. Observe the response as shown in figure. Repeat steps 3, 4, 5 and 6 for other VHF channels, using correct channel marker. Refer to frequency table in S1022.

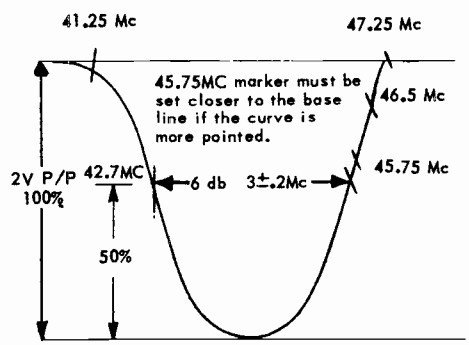
8. In most instances severe tilt on one channel only will indicate that particular tuner strip is out of adjustment, a defective balun, input trap or bypass capacitor. Severe tilt on all channels can be tuner trouble, but usually the problem will be found with the IF strip during IF adjustment. If the tilt is on all channels and is not severe, it can usually be compensated for by slightly adjusting mixer collector coil.

ADJUSTING PICTURE TRAP

This chassis has provisions for incorporating higher channel adjacent picture trapping.
1. Make sure trap parts are in circuit and installed correctly by having C304 connected.
2. Factory trap setting is 39MC, permitting fringe sound reserve.
3. Tune receiver to the channel below one giving interference.
4. Tune L300 trap towards 39.75MC, until interference is not objectionable. Turning trap further will reduce fringe sound performance.

CHANNEL 1 OBSERVATION

1. Generally, set equipment up as outlined under "IF Sweep Alignment".
2. Calibrate scope for 2V P-P, then connect to TP-V.
3. Apply a positive 4.3V bias to TP-I.
4. Apply a separate positive 2.75V bias to TP-R, RF-AGC. Use the bias pot jig, if desired.
5. Set the VHF selector to UHF position, (channel 1).
6. Disconnect UHF to VHF tuner cable at UHF tuner. Connect free end of this cable to Channel 1 Jig. Connect marker and sweep generator to Channel 1 Jig. Cables.
7. Adjust L102A as required, until top tilt and 45.75MC position agree with IF curve. Read notes on 45.75MC marker positioning.



IF RESPONSE CURVE

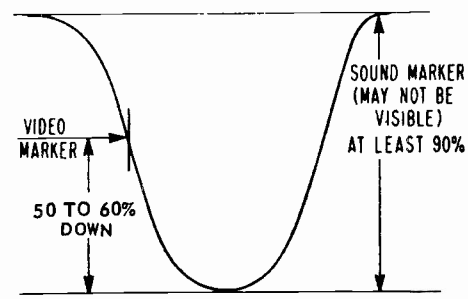
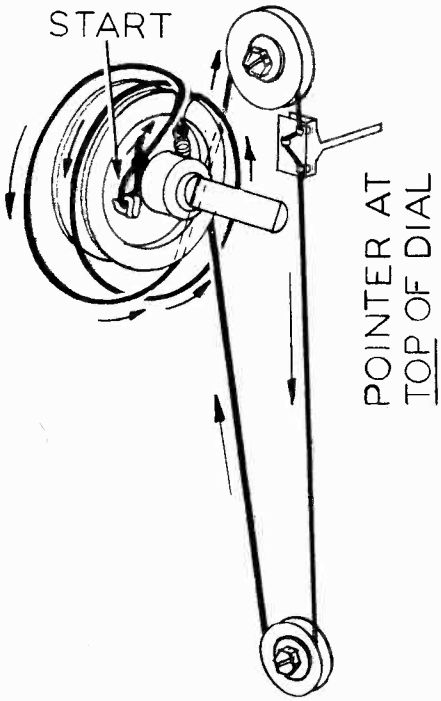
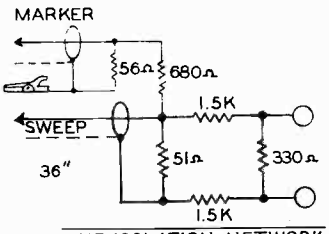


Fig. G Ideal Overall VHF & IF Response Curve

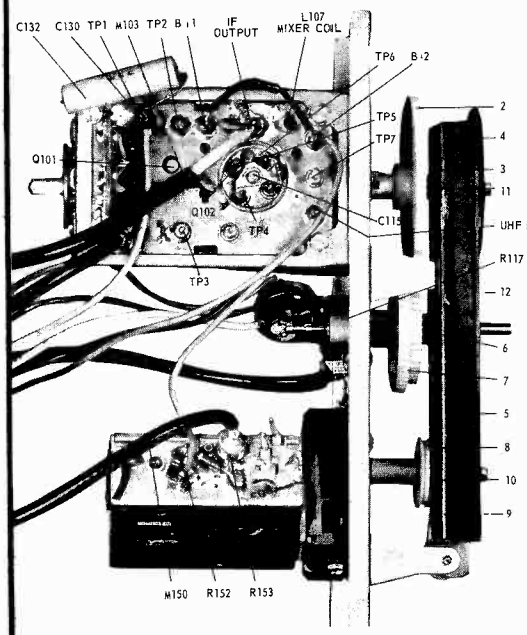
ADMIRAL Chassis 1H5NB79 1, H5NB29-1, Schematic Diagram



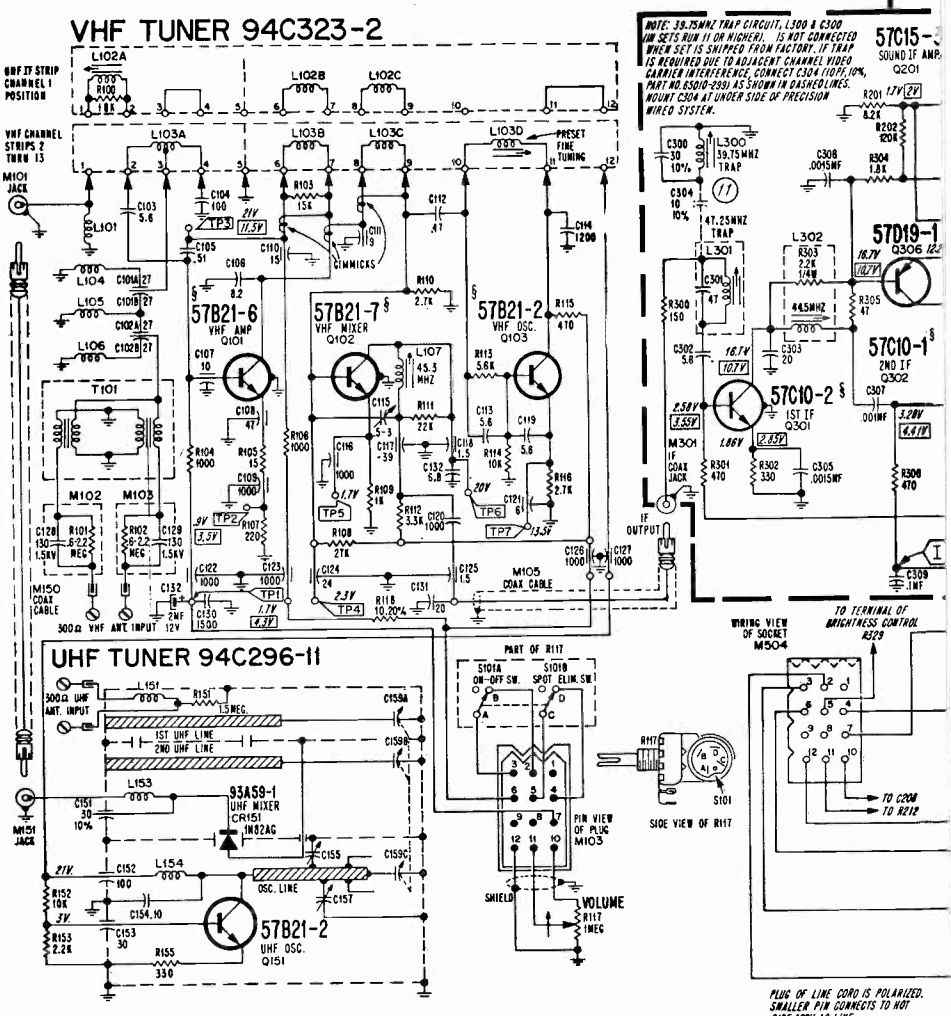
UHF DIAL STRINGING DIAGRAM



VHF ISOLATION NETWORK



NB1979-1 & NB2129-1 TUNER CLUSTER PART SYMBOLS AND TEST POINTS



PLUG OF LINE CORD IS POLARIZED. SMALLER PIN CONNECTS TO HOT SIDE 120V AC LINE.

SCHEMATIC NOTES:

CHASSIS GROUND. RESISTOR VALUES 1/2 WATT, 10% AND CAPACITOR VALUES IN PICOFARADS UNLESS OTHERWISE INDICATED.

RESISTANCE VALUES OF COILS LESS THAN 1Ω IS NOT SHOWN. HZ INDICATES CYCLES PER SECOND.

VOLTAGE AND WAVEFORM NOTES:

*DC VOLTAGES, TAKEN WITH VTVM, WITH RESPECT TO CHASSIS GROUND. TAKEN FROM 120V AC LINE. *WAVEFORMS AND P-P VOLTAGES MAY VARY, DEPENDING ON CALIBRATION OF TEST EQUIPMENT AND PARTS TOLERANCES. WHERE TWO DC VOLTAGES ARE INDICATED, READING TAKEN WITH TV SIGNAL IS SHOWN IN BLOCK, READING TAKEN WITH NO-SIGNAL IS SHOWN WITHOUT BLOCK.*

OFF-SIGNAL VOLTAGES TAKEN ON UNUSED VHF CHANNEL WITH ANT. TERMINALS SHORTED. VOLUME CONTROL AT MIN. BRIGHTNESS AND CONTRAST CONTROLS AT MAX. ALL OTHER CONTROLS IN NORMAL OPERATING POSITION. ON-SIGNAL VOLTAGES AND WAVEFORMS TAKEN WITH TRANSMITTED NOISE FREE SIGNAL PRODUCING 4 TO 5 VOLTS AGC AT TEST POINT R. CONTRAST, BRIGHTNESS CONTROLS SET FOR NORMAL PICTURE.

TRANSISTOR CAUTION:

TO AVOID DAMAGE TO TRANSISTORS, DO NOT ARC 2ND ANODE LEAD TO CHASSIS GROUND. DO NOT TURN SET ON WITH TRANSISTOR(S), TUBE(S) OR LEADS REMOVED OR UNSOLDERED. USE CAUTION TO PREVENT ACCIDENTAL SHORT BETWEEN COMPONENT TERMINALS OR TO CHASSIS GROUND. DO NOT USE AN ORDINARY OHMMETER FOR RESISTANCE MEASUREMENT. USE VTVM ON R X 100 RANGE OR HIGHER. DO NOT APPLY EXCESSIVE HEAT TO TRANSISTOR LEADS.

AGC CAUTION:

DO NOT DISTURB FACTORY SETTING OF AGC CONTROL. IF AGC ADJUSTMENT IS REQUIRED, REFER TO SERVICE NOTES. IF NECESSARY TO DISTURB AGC ADJUSTMENT, MARK ROTOR POSITION SO THAT CONTROL CAN BE RETURNED TO ITS EXACT ORIGINAL SETTING.

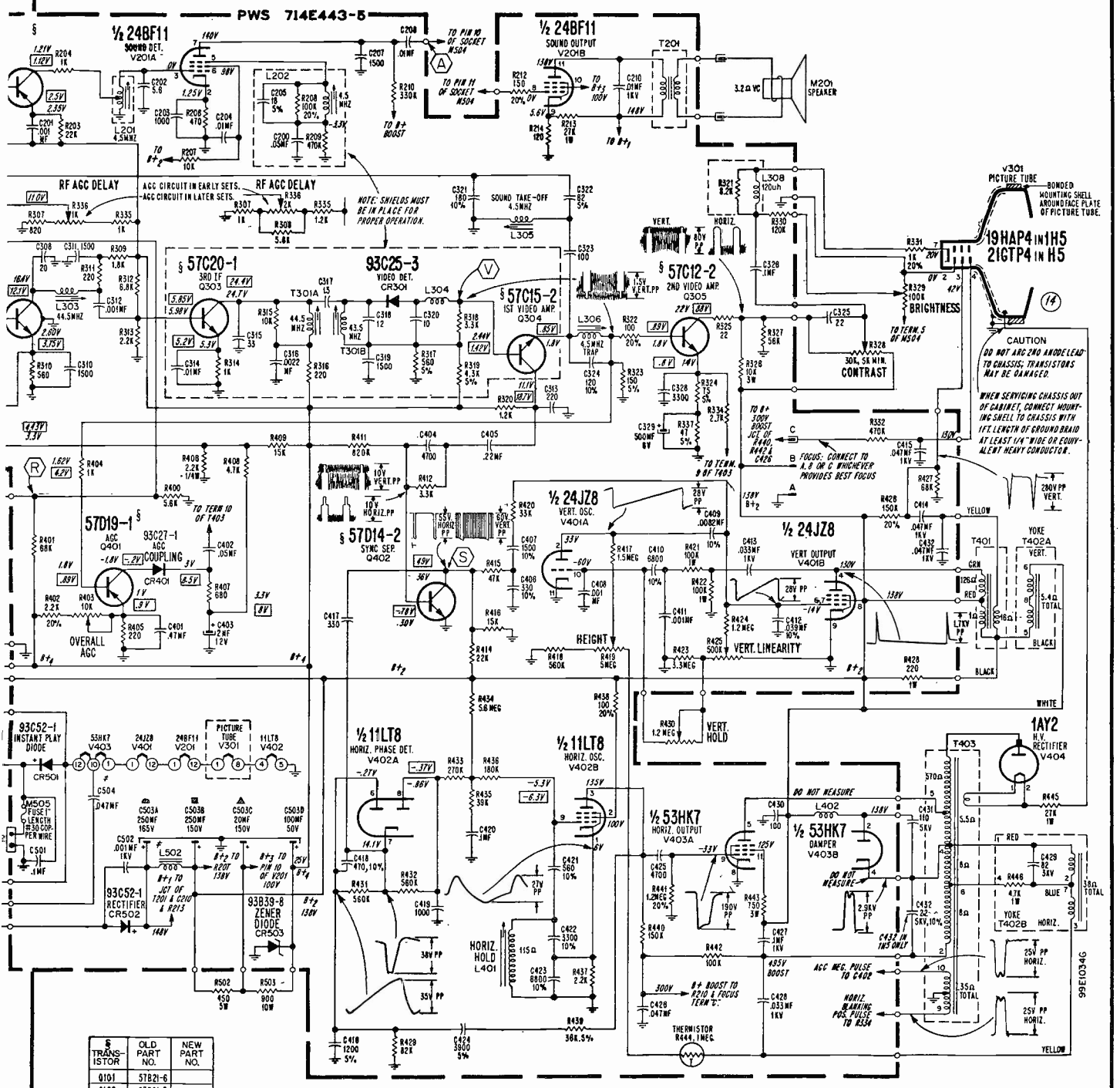
** ALL WAVEFORMS TAKEN WITH A WIDE-BAND OSCILLOSCOPE, SOME DEGRADATION WILL BE NOTICED IN HORIZ. WAVEFORMS WHEN USING EQUIPMENT WITH NARROW BANDPASS.*

 # COMPONENT NOT MOUNTED ON PRECISION WIRED SYSTEM.

§ SEE TRANSISTOR TABLE

The following equipment (or its equivalent) is necessary to properly service and align this product.

1. Crystal-Calibrating Signal Generator (RCA WR-99A)
2. Sweep Generator with linear output (EICO 369)
3. General Purpose AM Generator (EICO 324)
4. VTVM with accurate .5V DC scale (Knight KG-625)
5. Dual Bias box (Sencore BE-113)
6. DC Coupled Oscillosope free of hum and distortion (EICO 460 or equiv.)
7. Alignment tools 98A30-12 large and 98A30-14 small.
8. Properly constructed jigs and networks. Note: Generator networks for 51 ohm!
9. Voltage Calibrator; 3 line isolation filters (Calrad LP-95)
10. Small Soldering Iron (Heath GH-52)
11. Variac
12. Isolation transformer (RCA WP25A) Tape up direct uniso-lated outlets.
13. Ground Braids. (See servicing hints)



§ TRANSISTOR	OLD PART NO.	NEW PART NO.
Q101	57B21-6	
Q102	57B21-7	
Q103	57B21-2	
Q151	57B21-2	
Q201	57C15-3	57B108-6
Q301	57C10-2	57B101-4
Q302	57C10-1	57B102-4
Q303	57C20-1	57B103-4
Q304	57C15-2	57B107-8
Q305	57C12-2	57B104-8
Q401	57D19-1	57B106-12
Q402	57D14-2	57B105-12

RUN CHANGES

(10) Start of production.

(11) Adjacent channel trap (L300 & C300) added, see note at L300.

(12) (13) No service significance.

(14) In 1H5 chassis, grounding braid was added from picture tube mounting shell to chassis ground.

TERMINAL VIEWS OF TRANSISTORS

Q201, Q203, Q304, Q308, Q401 & Q402 — Q101, Q102, Q301 & Q302 — Q103 & Q305 — TYPE (NPN) — (TYPE PNP)

CATHODE ANODE DIODE

E = EMITTER
B = BASE
C = COLLECTOR
S = SHIELD

S = SHIELD CONNECTION ONLY IN Q301 & Q302.

H5 & 1H5 CHASSIS SCHEMATIC DIAGRAM

CHASSIS SERVICE SET-UP PROCEDURE

When operating the chassis and picture tube apart, it is imperative that proper grounds be maintained between picture tube and chassis! Failure to observe the following precautions can result in damaged transistors!

1. If the aquadag is not grounded to the 'SteelBond' picture tube flange by a spring in the upper right corner, tape 18 inches of bare wire across the 'dag' with light service masking tape and fasten it to the lower right corner of the flange. Then, connect a 12" (No longer!) length of ½" braid from this corner to the screw that mounts high voltage cage to end of chassis.

2. Connect a length of insulated ½" braid from the VHF Tuner to the left rear corner of chassis pan.

3. Disconnect any braid running from picture tube flange to tuner cluster (ONLY while servicing with chassis apart from picture tube!).

4. Use an isolation transformer for power source!

CHASSIS SAFETY CHECK

After making any chassis repairs the following safety test is recommended to avoid any possible AC shock hazard to the user.

1. Disconnect the AC power plug and turn on-off switch to "on."
2. Short the AC line cord blades together.
3. Connect ground lead of VOM or VTVM to shorted line cord blades. Set meter to high ohm scale.
4. Using ohmmeter prob, test for leakage at all shafts, chassis mounting bolts, antenna terminals, and any other part that could conduct line voltage to the user if a short existed or if receiver has been damaged by lightning.
5. The reading in most cases will be infinite and at minimum 600K ohm, unless a defect exists.

Q305 OPERATING TEMPERATURE

Video output transistor Q305 is a silicon type of power transistor and normally operates at about 200 degrees fahrenheit.

FRINGE AREA SERVICE HINTS

Where snowy pictures are encountered in weak reception areas, the following hints may prove useful:

1. Make sure RF delay control is set at optimum setting. Refer to AGC adjustments.

2. If desired, video peaking may be reduced by connecting a 22pf, 1KV (65D10-276) ceramic capacitor from Q305 collector to ground.

BONDING STRAP RUN CHANGE

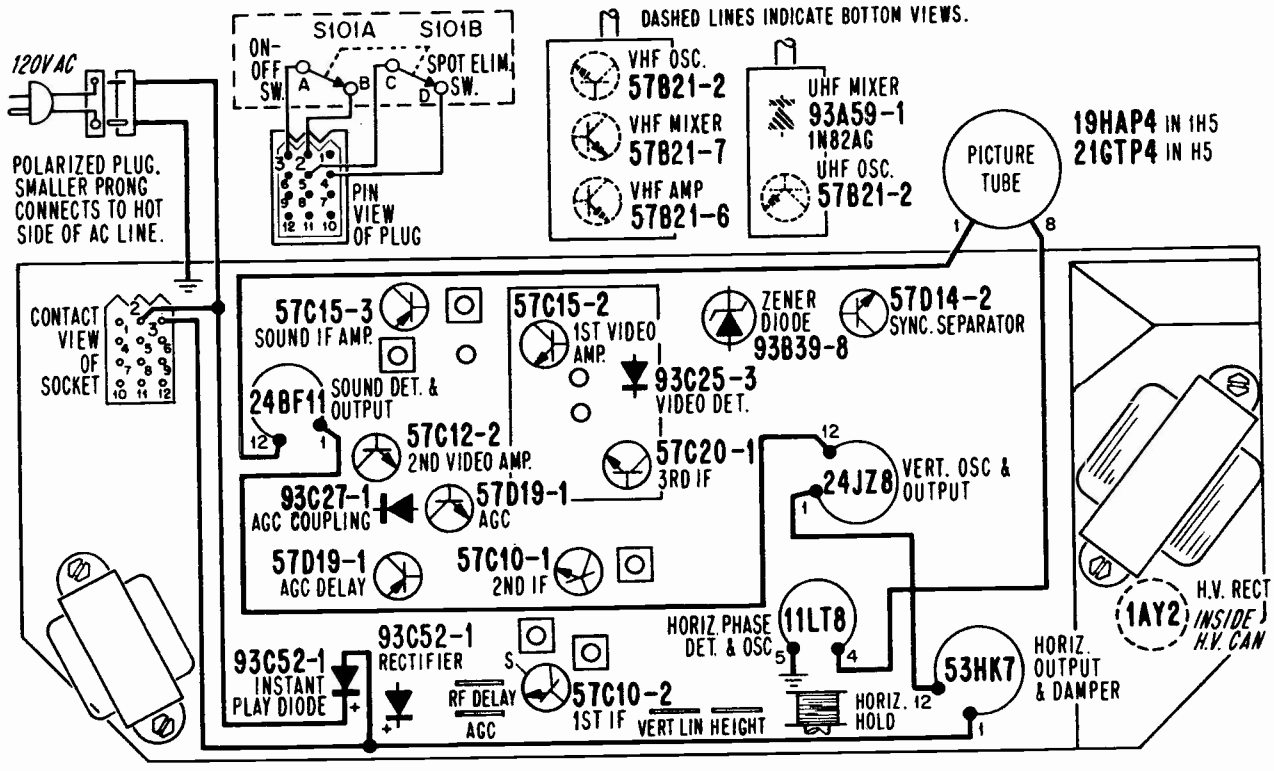
Any P1850C, -57C or 59C that do not have a heavy bonding strap between the high voltage cage chassis retaining screw and the steel bond of the picture tube should be revised as explained below. This will avoid possible damage to the transistors caused by static dischatge of the picture tube or other components.

This strap must be constructed of two 4½" x ½" braided copper straps in parallel and must be installed from the lower picture tube mounting screw to the screw mounting HV cage to end of chassis.

Only the 18" models listed above are affected; 20" models with the H5 chassis have a heavy bracket from chassis to picture tube flange which provides the necessary bond.

RF-DELAY CONTROL CHANGE

To extend the electrical bandspread of the RF-Delay Control, current production sets use the circuit shown on schematic. In an intrim period, the altermate circuit also on the schematic was used. Very early production did not have R307, or R308, and R335 was 1.5K.



TUBE & TRANSISTOR LOCATION CHART

ADMIRAL

MODEL CHART

MODEL	NAME	COLOR	PICTURE TUBE	VHF TUNER	UHF TUNER	CHASSIS
PN7604	Festival	Beige	*16"	94E281-7	94E296-4	H3-1A
PNC7610	Cavalier	Black				
PNC7613	Cavalier	Butterscotch				
PNC7627	Creston	Walnut				
PNC9001	Kingsley	Sandalwood	*18"	94E281-7	94E296-4	H4-1A
PN9010	Dartmouth	Black				
PNC9010	Dartmouth	Black				
PNC9014	Dartmouth	Beige				
PNC9026	Coronet	Blue Linen				
PNC9027	Coronet	Walnut				
ANC9029		White Linen				
TN9009H	†Seaview	White	*18"	94E281-7	94E296-4	1H4-2A

*Picture Measured Diagonally. †Motel and Hotel Model.

CHASSIS REMOVAL & SERVICING

1. The chassis can be slid partially out for servicing by:
A. Pulling off all of the knobs except the tuner knobs.
B. Disconnect antenna and remove cabinet back.
C. Remove screw and washer holding chassis to cabinet front. The screw and washer are located by the multiple control assembly.
D. Slide chassis part way out for servicing.

2. VHF-UHF tuner assembly removal:
A. Remove the tuner knobs and one screw securing the front of the tuner to the front of the cabinet.
B. Pull the tuner assembly back and out

3. High voltage cage access:
A. Pry forward on the plastic projections located on the top front of the high voltage cage.
B. Lift off the white plastic top.
C. Slide the plastic tube cover off.

HORIZONTAL LOCK ADJUSTMENT

The Horizontal Lock control is set at the factory and seldom requires readjustment. Adjustment need only be made if 8LT8 tube (V402) has been replaced and the picture cannot be locked in with slight adjustment of the Horizontal Lock control.

Before proceeding with adjustment, be sure that the picture will sync vertically, as lack of both vertical and horizontal sync generally indicates sync circuit trouble. Lack of only horizontal sync generally indicates trouble in the horizontal sync (Phase detector) circuit.

1. Remove cabinet back. Connect a polarized interlock cord.
2. Allow a few minutes for set to warm up. Tune in weakest stations, set brightness and contrast controls for a normal picture.
3. Using a piece of hook-up wire, ground test point "S" (pin 11 of V401A, 23Z9 tube) through a .12-.15, 600V capacitor to the metal tuner bracket or a metal shield.
4. Adjust horizontal lock control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.
5. Remove wire short and capacitor from test point "S". Set channel selector to weakest station. Switch channel selector on and off channel, picture should remain in horizontal sync.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT

If the picture is of incorrect height (vertical size), adjust the Height control. This adjustment may affect the vertical linearity of the picture. If necessary, alternately adjust the Vert. Lin. control and Height control.

VHF CHANNEL ADJUSTMENT

These sets are provided with a channel adjustment slug for each channel, see illustration. Adjust as follows:

1. Turn receiver on and allow 15 minutes warm up.

2. Set Channel Selector at highest channel to be adjusted. Set Fine Tuning control at center of tuning range, by rotating it one third turn counter-clockwise from full clockwise rotation. Set other tuning controls for normal picture and sound.

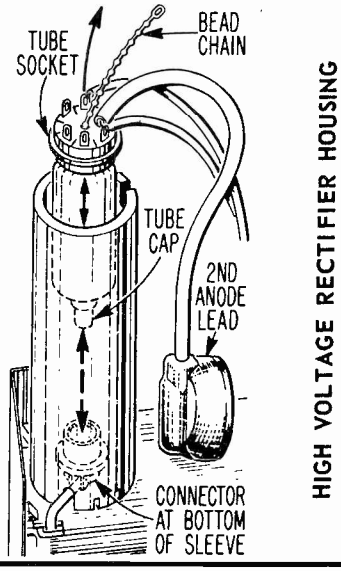
3. Remove Channel Selector knob and VHF indicator.

4. Using a non metallic alignment tool, carefully adjust channel slug for best picture. Note: Sound may not be loudest at this point. Repeat procedure for each channel to be adjusted.

ALIGNMENT OF UHF IF INPUT USING A TRANSMITTED SIGNAL

Alignment of UHF IF input coil (part of VHF tuner), should be made if UHF reception is poor and after usual causes of poor UHF reception have been checked.

To align UHF IF input coil, tune in UHF channel with normal picture and sound. Using non-metallic alignment tool very carefully adjust slug L106A for best picture, consistent with good sound. For UHF tuner adjustment locations, see Fig. 2.



ADMIRAL Chassis 1H4-2A, H3-1A, H4-1A, Service Information (Continued)

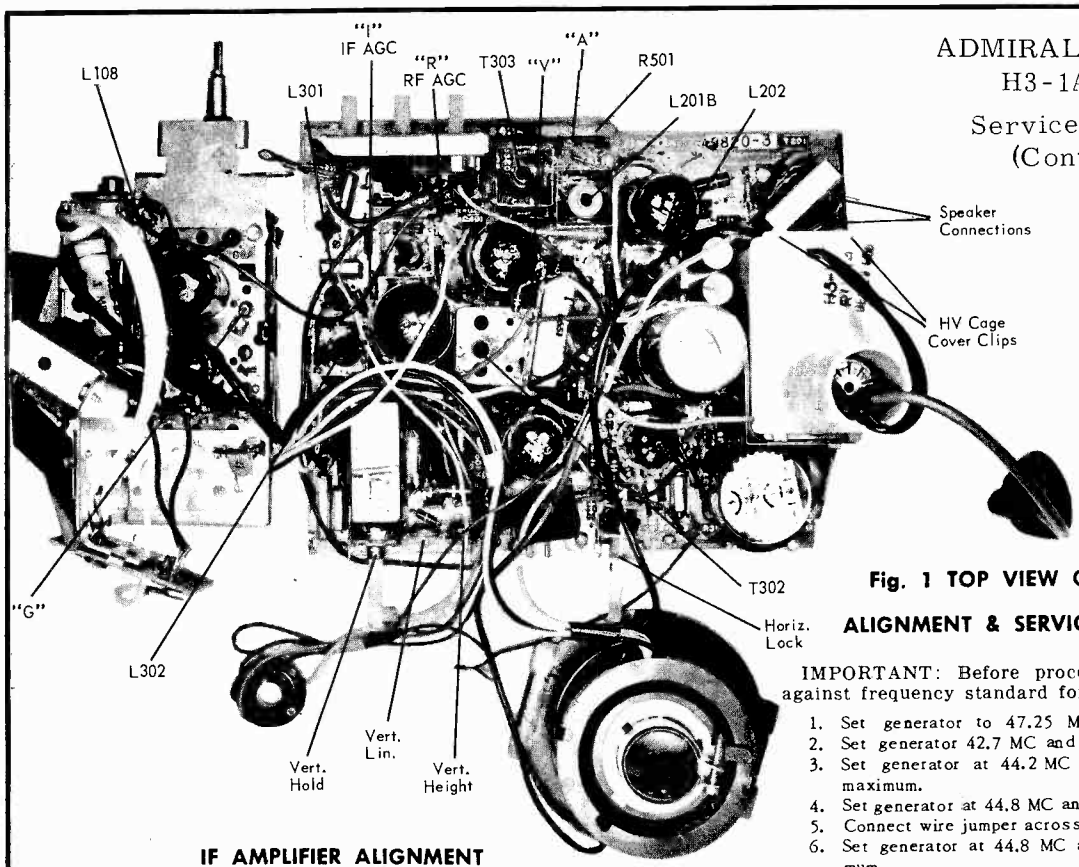


Fig. 1 TOP VIEW OF CHASSIS SHOWING ALIGNMENT & SERVICE ADJUSTMENT LOCATIONS

IF AMPLIFIER ALIGNMENT

Connect isolation transformer between AC line and receiver. Connect negative of 6 volt bias supply to test point "I" (IF AGC), "R" (RF AGC) positive to chassis. See figure 1.

Using needle nose alligator clip or looped end of hookup wire, connect matching network shown in figure 2 to test point "G", low side directly to tuner, see figure 4. Connect signal generator to matching pad.

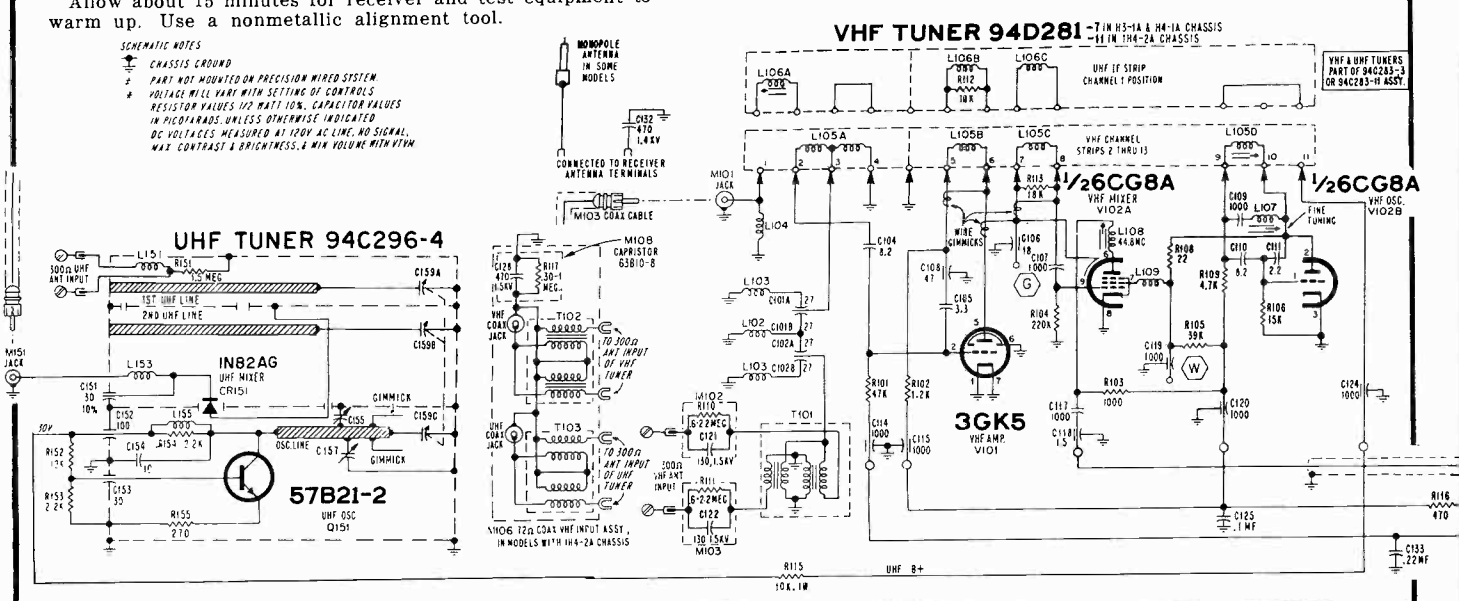
Connect VTVM high side to test point "V" through a decoupling filter, see figure 5. Connect low side to chassis.

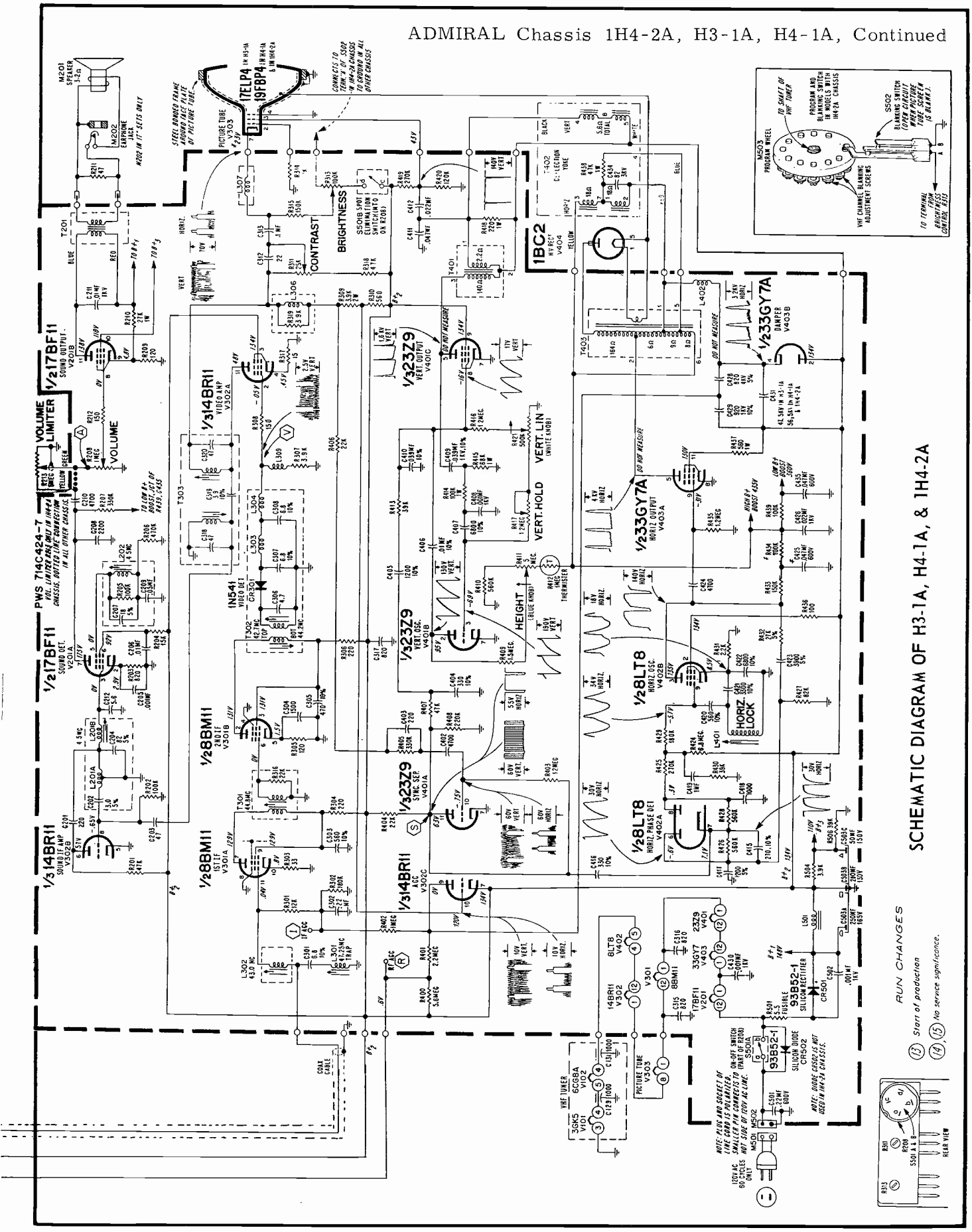
Set Channel Selector to Channel 12, (or other high end channel which does not affect indication). Connect jumper wire across antenna terminals. Set RF generator output to give reading 1-2 volts over residual reading for all IF alignment adjustments.

Allow about 15 minutes for receiver and test equipment to warm up. Use a nonmetallic alignment tool.

IMPORTANT: Before proceeding check signal generator against frequency standard for calibration.

1. Set generator to 47.25 MC and adjust L301 for minimum.
2. Set generator 42.7 MC and adjust T302 top slug for maximum.
3. Set generator at 44.2 MC and adjust T302 bottom slug for maximum.
4. Set generator at 44.8 MC and adjust T301 for maximum.
5. Connect wire jumper across IF input coil L302.
6. Set generator at 44.8 MC and adjust L108 on tuner for maximum.
7. Remove wire jumper of step 5.
8. Set generator at 43 MC and adjust L302 for maximum.
9. Disconnect signal generator and connect sweep generator. Connect marker signals through matching pad connections to test point "G".
10. Disconnect VTVM from decoupling network and connect oscilloscope calibrated for 3 volts P to P to network.
11. Set sweep frequency at 43 MC, sweep width approximately 7 MC. Maintain 3 volts P to P sweep display by adjusting sweep R.F. Keep marker at low level to prevent over loading. A reduction in sweep output should reduce amplitude without altering the shape of the response curve.
12. If 45.75 MC marker is not within tolerance or markers not in proper location on curve, adjust L108 to position 45.75 MC marker. Adjust T302 top to correct shape of curve. Avoid reducing amplitude of curve as much as possible.




SCHEMATIC DIAGRAM OF H3-1A, H4-1A, & 1H4-2A
RUN CHANGES
(13) Start of production
(14) (15) No service significance.
VOLUME
VOLUME LIMITER
1/2 17BF11
SOUND OUTPUT
1/3 14BR11
SOUND IF AMP
1/2 17BF11
SOUND DET.
1/2 88M11
1ST I.F.
1/3 14BR11
VIDEO AMP
1N541
VIDEO DET.
1/2 88M11
2ND I.F.
1/3 23Z9
VERT. OUTPUT
1/3 23Z9
VERT. OSC.
1/3 23Z9
SYNC. SEP.
1/3 14BR11
AGC
1/2 8LT8
HORIZ. OSC.
1/2 8LT8
HORIZ. PHASE DET.
1/2 33GY7A
HORIZ. OUTPUT
1/2 33GY7A
DAMPER
1BC2
HV REC.
1TELP4
19FBP4
PICTURE TUBE
BRIGHTNESS
CONTRAST
HEIGHT
VERT. HOLD
VERT. LIN
HORIZ. LOCK
THERMISTER
93B52-1
SILICON RECTIFIER
SILICON DIODE
VHF TUNER
PROGRAM WHEEL
BLANKING SWITCH
REAR VIEW

IF RESPONSE CURVE CHECK

1. Allow about 15 minutes for receiver and test equipment to warm up.
2. Set VHF tuner to Channel 12. Connect negative of 6 volts bias supply to test points "R" and "I"; positive to chassis.
3. Connect sweep generator to VHF tuner to test point "G" through the generator matching network of figure 4. Ground low side nearby.
4. Connect oscilloscope high side to test point "V" through decoupling filter of figure 5, low side to chassis.
5. The IF curve now obtained should be check against the ideal response curve, see figure 3. Maintain sweep output at 3V PP as alignment progresses. Keep markers low. A reduction in sweep output should reduce curve amplitude without appreciably altering the shape of the response curve.
6. If the curve is not within tolerance or markers not in proper location, L108 VHF Tuner Mixer Plate Coil should be adjusted for 45.75M video marker and T302 Top for rounded curve nose.

OVER-ALL VHF-IF RESPONSE CURVE CHECK

1. Set VHF Channel Selector on channel 12. Connect negative of -6 volt bias supply to test point "R" (IF AGC) and -1.75 volt to test point "I" (RF AGC) positive to chassis. See figure 1.
2. Connect isolation transformer between AC line and receiver. Allow about 15 minutes for receiver and test equipment to warm up.
3. Attach the sweep generator at the VHF tuner antenna terminals, using VHF isolation network. See figure 7.
4. Connect oscilloscope high side to test point "V" through decoupling filter, low side to chassis. Adjust sweep generator for 3 volt peak to peak at test point "V".
5. Compare response curve obtained against ideal curve shown in figure 6.

VHF AMPLIFIER AND MIXER ALIGNMENT

VHF tuners used in these receivers feature high stability and trouble-free operation. In general, RF and mixer alignment is permanent. However, individual channel oscillator screws or slugs are provided should oscillator adjustment be required after replacement of VHF oscillator tube. For tuner adjustment locations, see figure 2. If it is definitely determined that complete tuner alignment is required, return tuner to your Admiral Distributor for repair or replacement.

ALIGNMENT OF 4.5MC TRAP

Alignment of 4.5MC (beat interference) trap T303 top slug requires use of a hexagonal non-metallic alignment tool.

To align 4.5MC trap T303 top slug, tune in television station with beat interference pattern in picture. While closely observing picture, adjust slug T303 top slug for minimum interference pattern.

Note that adjustment T303 top slug is slug farthest from bottom of coil. Use caution so as not to disturb bottom slug, slug nearest bottom of coil, as sound IF alignment will be affected.

4.5MC SOUND IF ALIGNMENT

1. Tune in normal picture on strongest TV station. Allow about 15 minutes for set to warm up. See figure 1 for adjustment locations.
2. Using non-metallic alignment tool, slowly turn slug L202 to several turns to left until a buzz is heard in sound. Then slowly turn slug L202 to the right for loudest and clearest sound. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at center of second point of loudest sound noted as slug is turned in (toward bottom of coil).
3. Reduce signal to antenna terminals until there is considerable hiss in sound. For best results, use a step attenuator, connected between antenna and antenna terminals. Signal can also be reduced by disconnecting antenna and placing it close to antenna terminals or leads.
4. Carefully adjust slug L201B for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Re-adjust slug L201B. NOTE: Slug L201B should be at end nearest bottom of coil.
5. Carefully adjust slug T303 bottom slug for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Re-adjust slug T303. Caution: Slug T303 is located nearest bottom of coil. Use care so as not to disturb slug nearest top of coil.
6. If above alignment is correctly made, no further adjustment is required. However, if sound remains distorted at normal volume level (when receiver is tuned for best sound) repeat entire procedure.

CAUTION: Do not re-adjust slug L202 unless sound is distorted. If L202 is re-adjusted, all steps in alignment procedure should be repeated exactly as instructed.

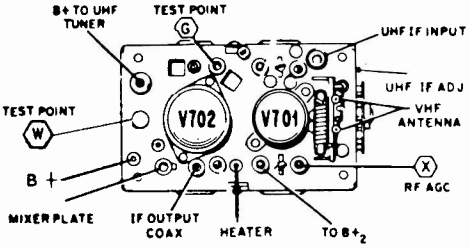


Fig. 2 TOP DRAWING OF VHF TUNER

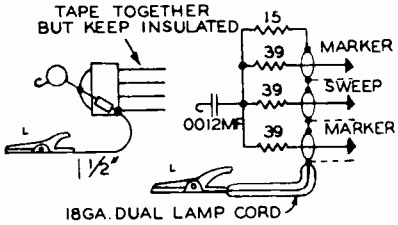


Fig. 4 MIXER GRID MATCHING PAD

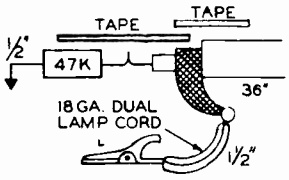


Fig. 5 DECOUPLING FILTER

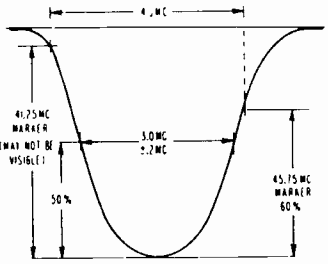


Fig. 3 IF CURVE

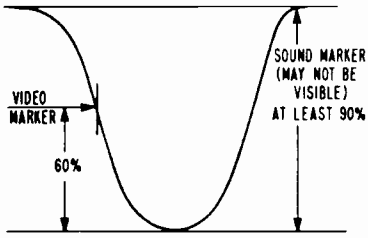


Fig. 6 IDEAL RESPONSE CURVE

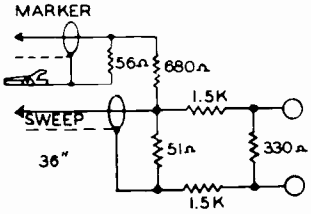


Fig. 7 VHF ISOLATION NETWORK

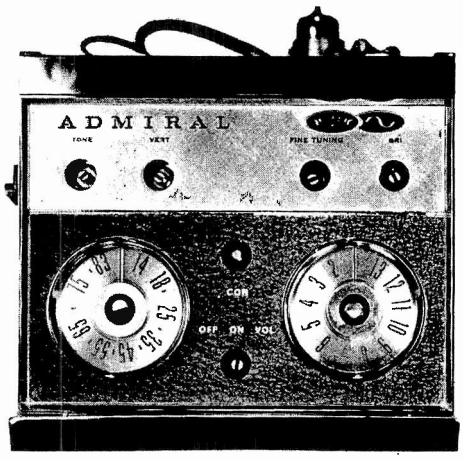
ADMIRAL

MODEL IDENTIFICATION CHART

MODEL	FINISH	NAME	SIZE	TUN. CLUSTER	CHASSIS
TG9728W	Gray	Cavalier	19"	G1950-1	2G750-1
PG9737W	Walnut	Kingsley	19"	G1950-3	2G750-3
PG9739W	White	Kingsley	19"		
PG2134W	Beige	Avalon	21"	G1950-2	2G750-2
PG2137W	Walnut	Avalon	21"		
TG3710M	Charcoal	Westerly	23"	GB2360-4	2G760-4
TG3711M	Brown	Westerly	23"		
TG3713M	Beige	Westerly	23"		
TG3721M	Walnut	Creston	23"	GB2360-5	2G760-5
CG3731M	Walnut	Hubbard	23"	GB2360-4	2G760-4
CG3732M	Mahogany	Hubbard	23"		
LG3741M	Walnut	Ingram	23"		
LG3742M	Mahogany	Ingram	23"		
LG3745M	Maple	Monticello	23"		
LG3751M	Walnut	Devon	23"		
LG3751	Walnut	Devon	23"	GB2360-1	G760-1
LG3771W	Walnut	Nording	23"	GB2360-5	2G760-5
LG3775M	Maple	Henderson	23"		
LG3801M	Walnut	Dunholm	23"	CB2355-2	6G755-2
LG3805M	Maple	Greensboro	23"		
LG3819M	Cherrywood	Devereux	23"		
LG5401M	Walnut	Bristol	25"	CB2355-2	6G755-2
LG5411M	Walnut	Ardmore	25"		
LG5415M	Maple	Lee	25"		
PGS9734W*	Beige	Kingsley	19"	G1995-1	2G795-1
SMG3701M**	Walnut	Trenton	23"	CB2360-6	2G760-6

*Model uses S326AN hand unit and 5H9N sonar amp.
**Model also uses 22C5A radio chassis and RC7W4P-71AN or RC7W4P-87AN record changer covered by manuals S1033, S1015, and S1015A.

The schematic diagrams and other service material on pages 14 through 18, are exact for the group of models listed in the chart at left. The additional sets listed in the two tables below are practically identical to the sets covered.



6G7 Tilt-Out Assembly Top View

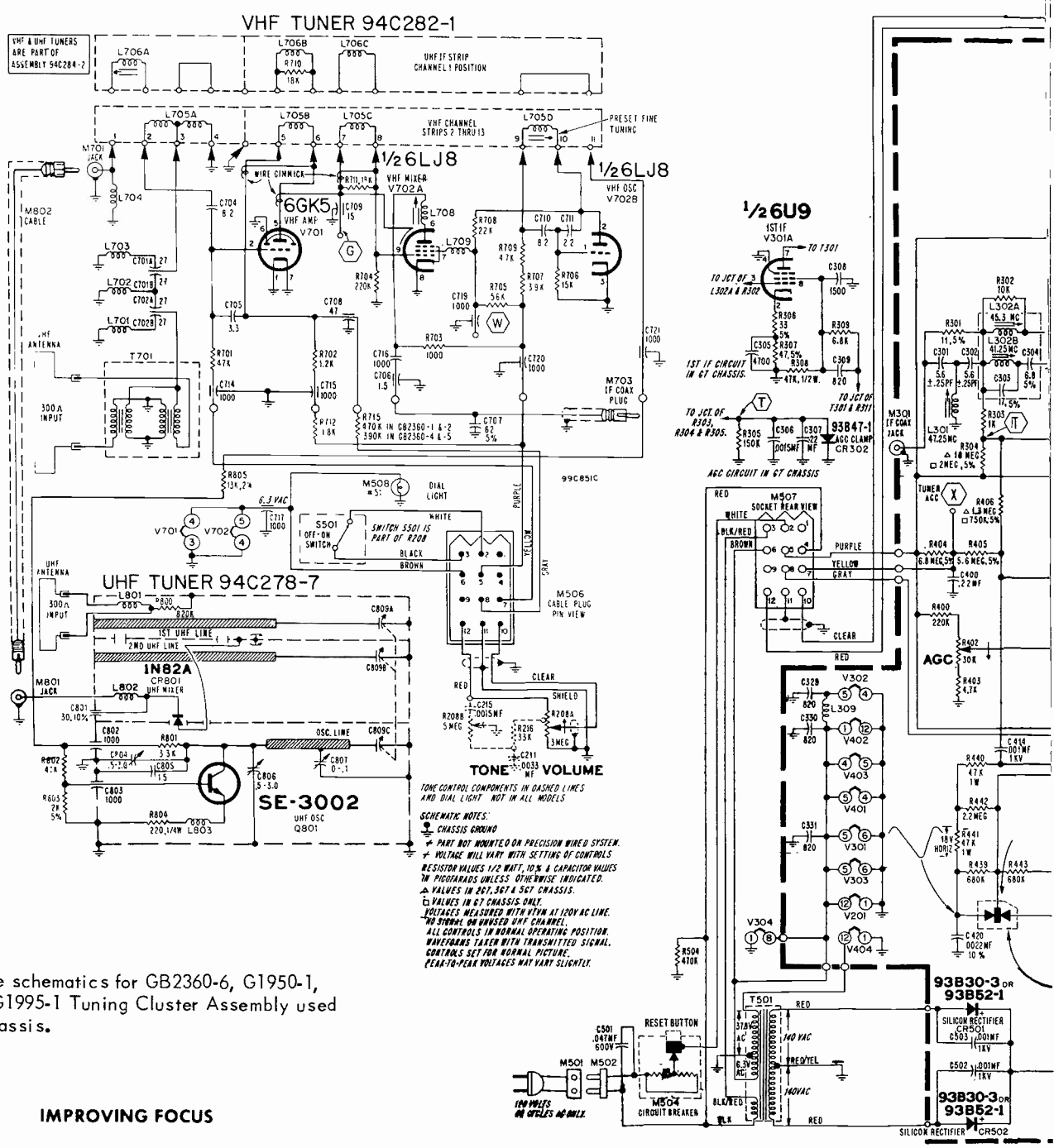
MODEL CHART

MODEL	NAME	COLOR	SIZE	TUNING CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
PH9731	Wilson	Beige	19"	HB1961-2	94E282-8	94E280-7	2G761-2
PH9737	Wilson	Walnut	19"				
PH2171	Aberdeen	Beige	21"	HB1961-2	94E282-8	94E280-7	2G761-2
PH2177	Aberdeen	Walnut	21"				
TH3013	Burton	Beige	23"	GB2360-5	94E282-1	94E282-1	2G760-5
TH3021	Burton	Walnut	23"				
CH3001	Compton	Walnut	23"	GB2360-5	94E282-1	94E278-7	2G760-5
CH3002	Compton	Mahogany	23"				
LH3021	Linden	Walnut	23"	GB2360-5	94E282-1	94E278-7	2G760-5
LH3025	Palmerston	Maple	23"				
LH3031	Asbury	Walnut	23"				

MODEL CHART

MODEL	COLOR	DESIGNED FOR	SIZE	TUNING CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
TGA9739HW	White	Hotel-Motel	19"	G1951-1	94E273-8	94E278-4	3G751-1
TGR9739HW	White	Hotel-Motel	19"	G1951-2	94E273-8	94E278-4	3G751-2
THE3731	Brown	Educational	23"	GB2360-2	94E282-1	94E278-7	G760-2
THVE3731	Brown	Educational	23"	GB2350-1	94E282-1	None	G750-1
THE3731M	Brown	Educational	23"	GB2360-5	94E282-1	94E278-7	2G760-5
THVE3731M	Brown	Educational	23"	GB2350-2	94E282-1	None	2G750-2
THVE3731MA	Brown	Educational	23"	GB2350-2	'94E282-1	None	2G750-2
TG2147HW*	Walnut	Hotel-Motel	21"	GB2152-1	94E281-9	94E278-6	4G752-1

*Also uses 4J4 AM Radio Chassis.



See separate schematics for GB2360-6, G1950-1, -2, -3, and G1995-1 Tuning Cluster Assembly used with this chassis.

IMPROVING FOCUS

The picture tube of these receivers utilizes electrostatic focus in connection with a three position focus adjustment.

For obtaining best overall sharpness of pictures, focus adjustment should be checked at installation and when servicing. Once focus adjustment is properly made, no further need for readjustment is required.

From rear view of chassis note that there are three focus (pin) connections at top rear of the chassis board, points shown as "A", "B", and "C". To make adjustment connect plug-in focus lead to either of the three focus pins, whichever provides the best focus at central area of picture tube. Important: Focus adjustment should be made with controls set for picture with normal contrast and brightness.

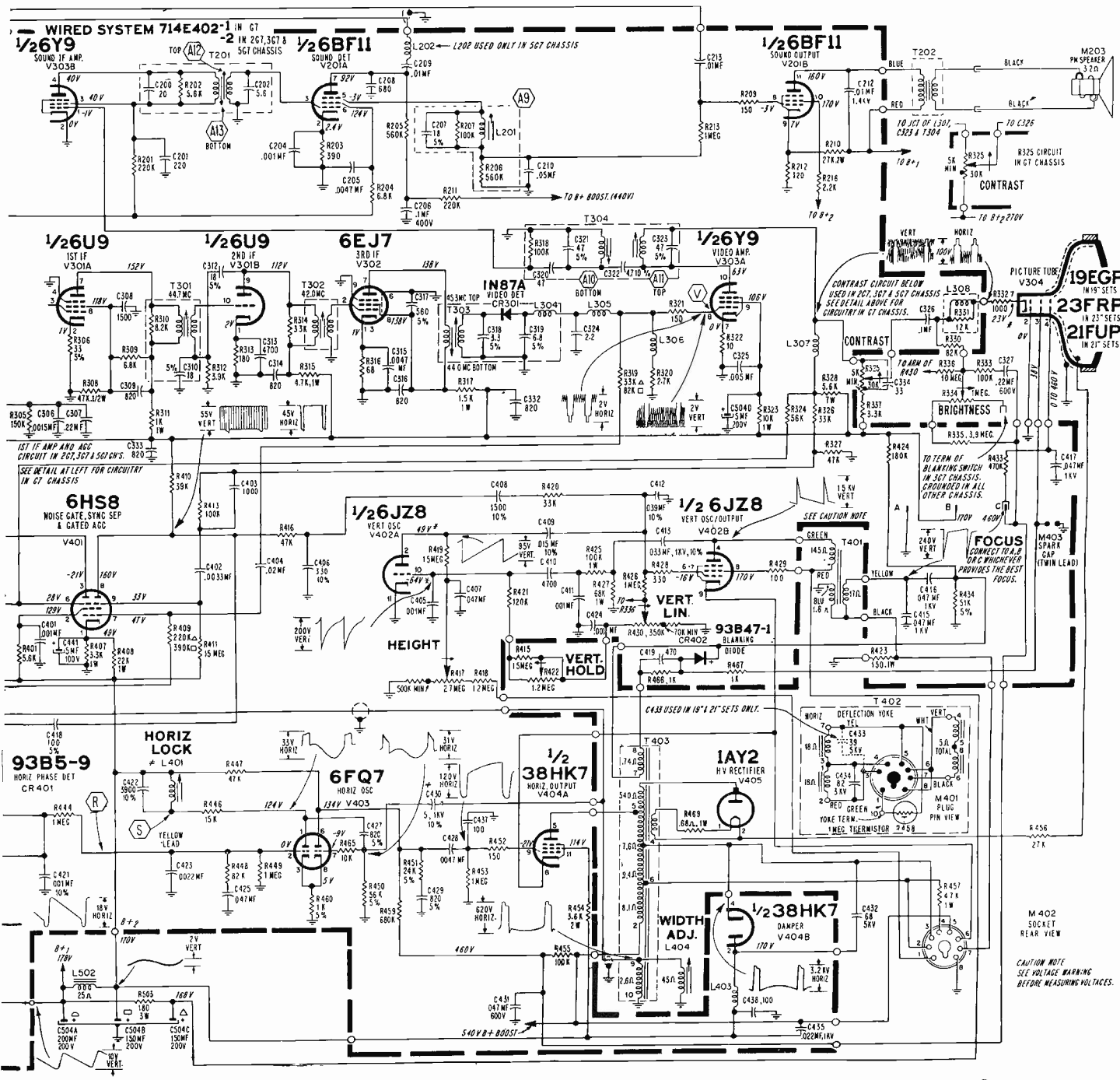
Caution: High B+ potential is present at focus terminals. To prevent electric shock, use care to avoid accidental contact with focus terminals.

HOME HORIZONTAL LOCK ADJUSTMENT

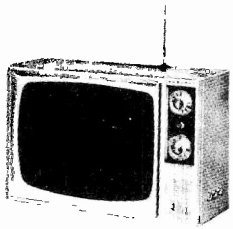
Make adjustment if picture "slips sideways" or "tears" when switching channels. Adjustment is made by rotating flexible shaft extending from rear of set. Adjust as follows:

1. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for normal Picture. Important: Before proceeding, be sure that AGC control has been adjusted according to instructions in this manual.

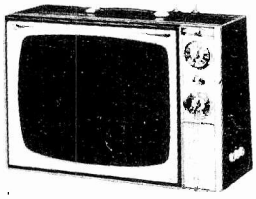
2. Reduce Contrast to minimum. Very slowly turn Horizontal Lock adjustment to the right or left until picture is in sync. Interrupt the television signal by switching Channel Selector off and on channel. Picture should remain in sync. If picture bends or loses sync, adjust Horizontal Lock so that picture remains in sync and bending of vertical lines does not appear at top of picture. Check adjustment on all channels.



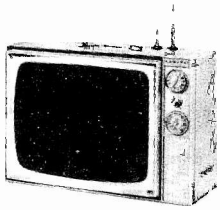
G7, 2G7 CHASSIS SCHEMATIC DIAGRAM WITH TUNING CLUSTER ASSEMBLY CB2360-1, 4 & 5



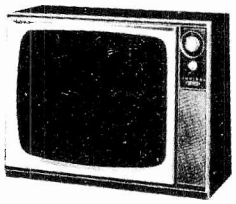
TG9728W



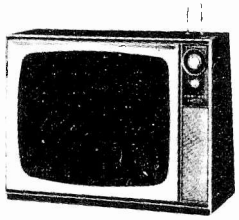
PG9737, 39W
PGS9734W



PG2134W, 37W

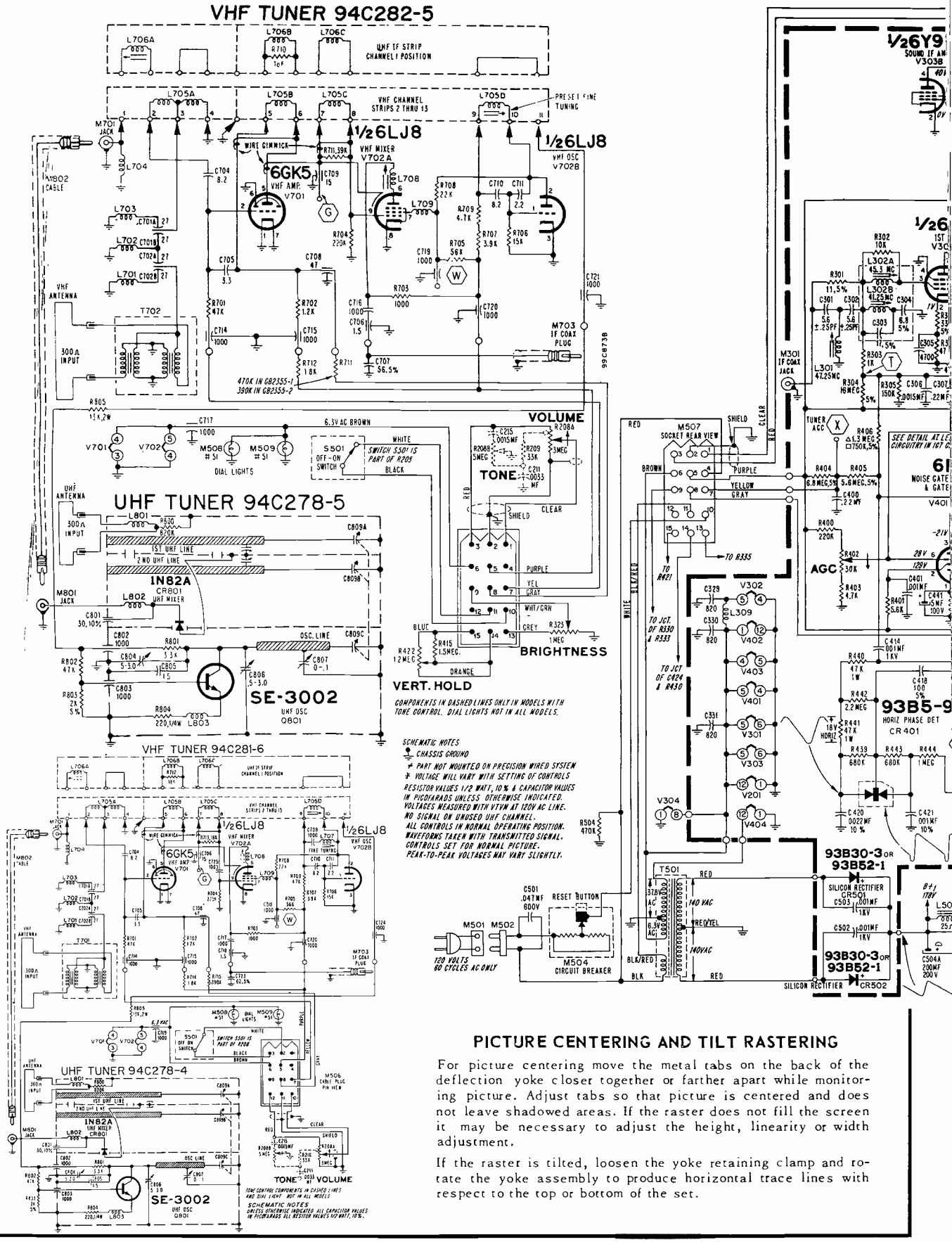


TG3710M SERIES



TG3721M

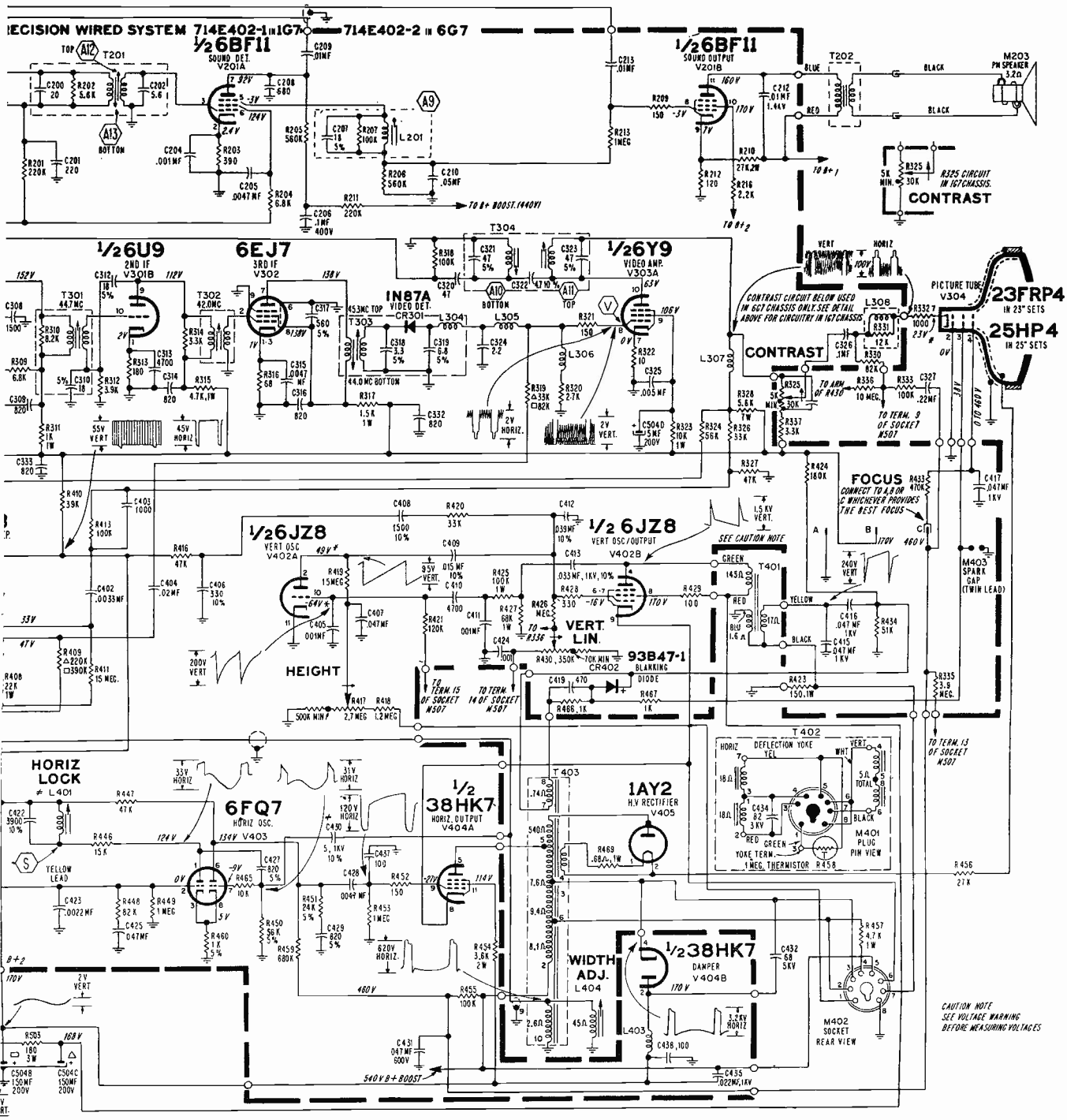
ADMIRAL Chassis 6G755-2 Schematic Diagram



PICTURE CENTERING AND TILT RASTERING

For picture centering move the metal tabs on the back of the deflection yoke closer together or farther apart while monitoring picture. Adjust tabs so that picture is centered and does not leave shadowed areas. If the raster does not fill the screen it may be necessary to adjust the height, linearity or width adjustment.

If the raster is tilted, loosen the yoke retaining clamp and rotate the yoke assembly to produce horizontal trace lines with respect to the top or bottom of the set.



6G7 SCHEMATIC DIAGRAM WITH TUNING CLUSTER ASSY. CB2355-2

PRESET FINE TUNING OR OSCILLATOR ADJUSTMENT

All models are equipped with a VHF tuner having preset fine tuning for each VHF channel. Adjust the fine tuning knob for best picture consistent with good sound after the set has warmed up for five minutes. Repeat this procedure for each used VHF channel. There is no other oscillator slug adjustment.

VERTICAL HEIGHT AND LINEARITY ADJUSTMENT

If the raster does not fill the screen at the top or bottom, or if the top or the bottom of the picture is squeezed or stretched, this adjustment will be required after centering picture:

Alternately adjust the Vertical Height and Vertical Linearity controls on the back of the chassis so that the raster is equally scanned with approximately 3/8" overscan on both the top and bottom. Incorrect setting of these controls is likely to cause vertical foldover or vertical instability.

AGC CONTROL ADJUSTMENT

The AGC control is an AGC threshold control which is used solely to adjust the receiver for optimum operation under all signal conditions.

Note: This control is set at the factory and will not normally require field readjustment.

Improper AGC control adjustment can result in picture bending, tearing (overloading) or buzz in the sound. However, these same conditions can also be caused by other troubles in the set. Make adjustment as follows:

1. Turn set on and allow 15 minutes to warm up.
2. Turn Channel Selector to strongest station in the area.
3. Turn Contrast and Brightness controls fully to the right.
4. Very slowly turn AGC control to the left, just to the point where picture is weak (loses contrast).
5. Adjust Horizontal Lock (at rear of set) and Vertical Hold control (at side of set) for steady picture, without bending of vertical lines at top of picture.
6. Very slowly turn AGC control to the right, until picture just begins to bend, tear, shift, or buzz is heard in sound. Then very slowly turn the AGC control to the left, to the point at which picture bending, tearing, shifting and buzz is removed.
7. Make final adjustment by turning AGC control an additional 10 degrees to the left.
8. Recheck at maximum contrast on all channels. Picture should not overload and should reappear immediately after changing channels.

IMPORTANT: AGC adjustment should always be made on the strongest TV station received. If adjustment is made only on a weak station, AGC overload may occur when a strong TV station is tuned in.

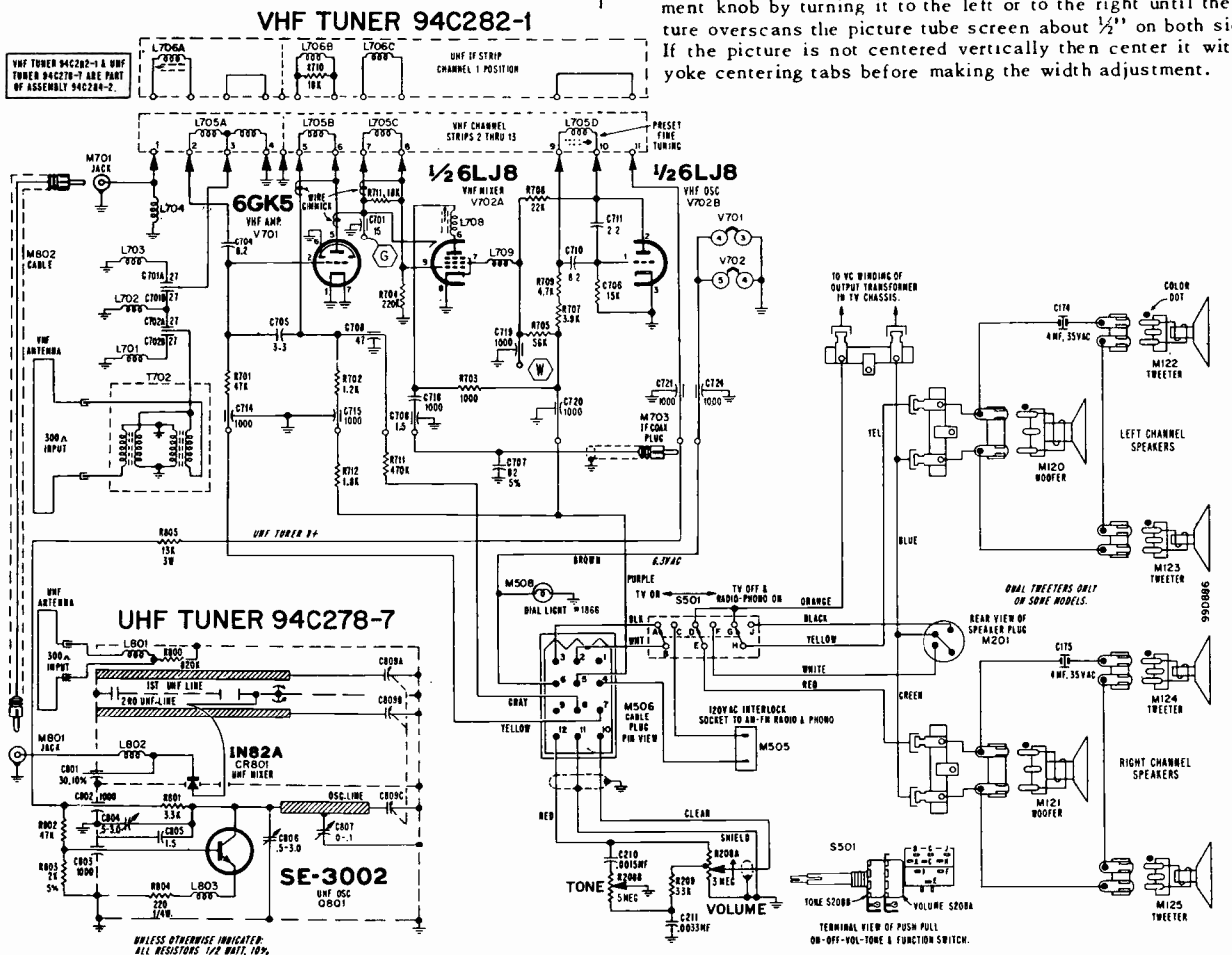
SHOP HORIZONTAL LOCK ADJUSTMENT

Caution: Before proceeding with adjustment, be sure that the picture will sync vertically, as lack of both vertical and horizontal sync indicates sync circuit trouble. Lack of only horizontal sync generally indicates trouble in the horizontal sync (phase detector) circuit. Adjust as follows:

1. Remove cabinet back. Connect interlock cord.
2. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for a normal picture. Important: Before proceeding, be sure that the AGC control has been adjusted according to instructions in this manual.
3. Using a piece of hook-up wire, short test point "R" (pin 2 of V403, 6FQ7 tube), to chassis ground. See schematic for test point locations.
4. Connect a .22 mf 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R446, 15 K) to chassis ground. Caution: To avoid B+ shock, turn receiver off when making this connection.
5. With picture in vertical sync, set Horizontal Lock control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.
6. Remove the .22 mf capacitor from the horizontal lock coil.
7. Remove wire short from test point "R" Set Channel Selector to weakest station. Switch Channel Selector on and off channel, picture should remain in horizontal sync. If necessary, adjust horizontal lock coil slightly to bring picture in sync.

WIDTH ADJUSTMENT

If the picture is too wide or too narrow, adjust the Width adjustment knob by turning it to the left or to the right until the picture overscans the picture tube screen about ½" on both sides. If the picture is not centered vertically then center it with the yoke centering tabs before making the width adjustment.



GB2360-6 TUNING CLUSTER ASSY., CHASSIS 2G7

Admiral

MODEL CHART

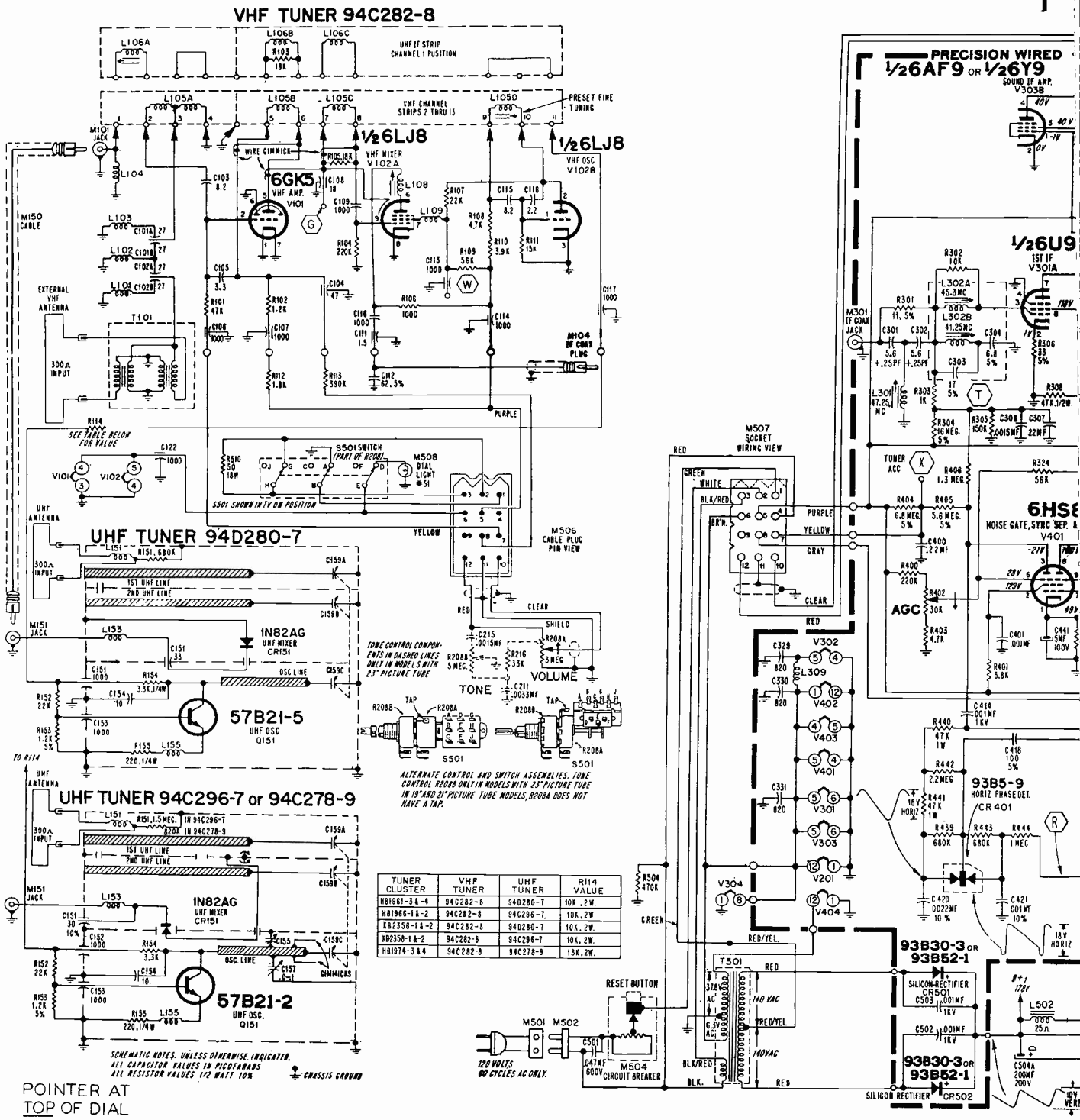
MODEL	NAME	COLOR	SIZE	TUNING CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
PK9731	Wanderer	Beige	19"	HB1961-3	94E282-8	94E280-7	7G761-3
PK9737	Wanderer	Walnut					
PKS9737	Adventurer	Walnut	19"	KB1996-2 or KB1999-2	94E273-13 94E273-13	94E280-7 94E278-9	8G796-2 8G799-2
AK2147		Walnut	21"	GB2152-2	94E281-9	94E278-6	4G752-2
PK2177	Roamer	Walnut	21"	HB1961-3 or HB1961-4 or HB1966-1 or HB1966-2 or HB1974-3 or HB1974-4	94E282-8 94E282-8 94E282-8 94E282-8 94E282-8 94E282-8	94E280-7 94E280-7 94E296-7 94E296-7 94E278-9 94E278-9	7G761-3 7G761-4 7G766-1 7G766-2 7G774-3 7G774-4
THC3032	Kingsley	Mahogany	23"	GB2360-7	94E282-1	94E278-7	2G760-7
TKC3012M	Randall	Walnut	23"	KB2358-1 or KB2358-2	94E282-8 94E282-8	94E296-7 94E296-7	7G758-1 7G758-2
TKC3012	Randall	Walnut					
TKC3015	Randall	Maple					
CK3021	Blakeley	Walnut	23"	KB2356-1	94E282-8	94E280-7	7G756-1
LK3031	Edgemont	Walnut					
LK3035	Revere	Maple					
LK3041	Copenhagen	Walnut					
LK3045	Princeton	Maple					
LK3051	Milan	Walnut					
THE3731MC	Educational	Walnut	23"	GB2360-5	94E282-1	94E278-7	2G760-5
THVE3731MC	Educational	Walnut	23"	GB2350-2	94E282-1	NONE	2G750-2
THA9737H	Executive	Walnut	19"	HB1965-1	94E273-12	94E280-7	3G765-1
THA9739H	Executive	White	19"	HB1973-1	94E273-14	94E280-7	3G773-1
THR9739H	Imperial	White	19"	HB1965-2	94E273-12	94E280-7	3G765-2

ADDITIONAL MODIFIED MODELS RELEASED AT A LATER DATE

MODEL	NAME	COLOR	SIZE	TUNER CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
T2061C	Manchester	Walnut	22"	KB2358-1 or KB2358-2	94E282-8	94E296-7	7G758-1 or 7G758-2
TNC3312	Hastings	Walnut					
TNC3315	Hastings	Maple					
L2081	Highland	Walnut	22"	KB2358-1 or KB2358-2	94E282-8	94E296-7	7G758-1 or 7G758-2
L2085	Monticello	Maple					
L2091	Bristol	Walnut					
L2095	Henderson	Maple					
LN3331	Westbury	Walnut					
LN3335	Meriden	Maple					
LN3341	Forreston	Walnut					
LN3345	Wedgewood	Maple					
TKE3011	Educational	Walnut	22"	KB2358-3 or KB2356-3	94E282-8	94E296-7 94E280-7	9G758-3 or 9G756-3
TNE3011	Educational	Walnut					

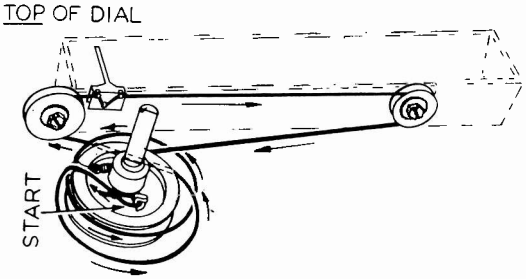
(Circuit diagram and service information on pages 20 through 22)

ADMIRAL Chassis Types 7G7+, 8G7+, 9G7+, Schematic Diagram



TUNER CLUSTER	VHF TUNER	UHF TUNER	R114 VALUE
HB1961-3 & 4	94C282-8	94D280-7	10K, 2W.
HB1966-1 & 2	94C282-8	94C296-7	10K, 2W
XB2356-1 & 2	94C282-8	94D280-7	10K, 2W.
XB2358-1 & 2	94C282-8	94C296-7	10K, 2W.
HB1974-3 & 4	94C282-8	94C278-9	15K, 2W.

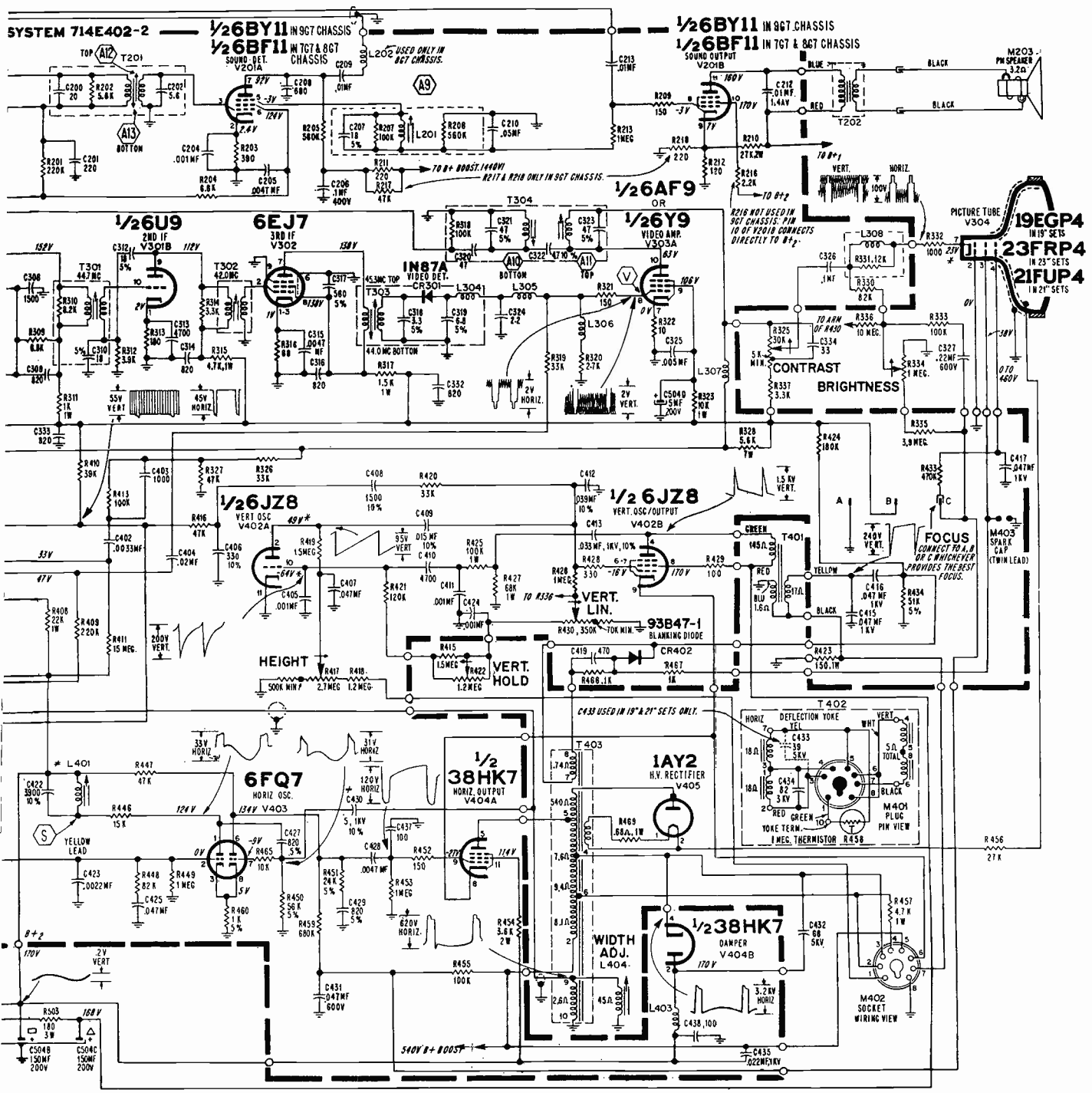
POINTER AT TOP OF DIAL



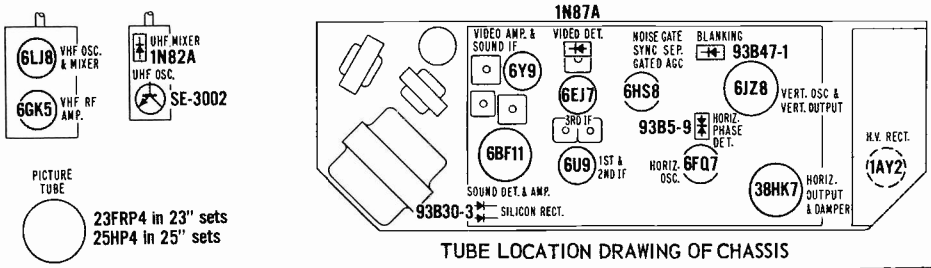
SLIDE RULE TUNING CLUSTER DIAL STRINGING DIAGRAM

"INSTANT ON" FEATURE

S501 switch and R51 50 ohm, 18 watt resistor in the tuner cluster are the main parts of the "instant on" feature. When the set is turned off S501 switched R51 in series with the power supply transformer primary, turns the dial light off and opens the power transformer secondary center tap which stops the B plus power supply operation. When the set is turned off the tubes operate with approximately 5.1 VAC instead of their usual 6.3 VAC level. The horizontal output tube will have approximately 30 VAC instead of 38 VAC.

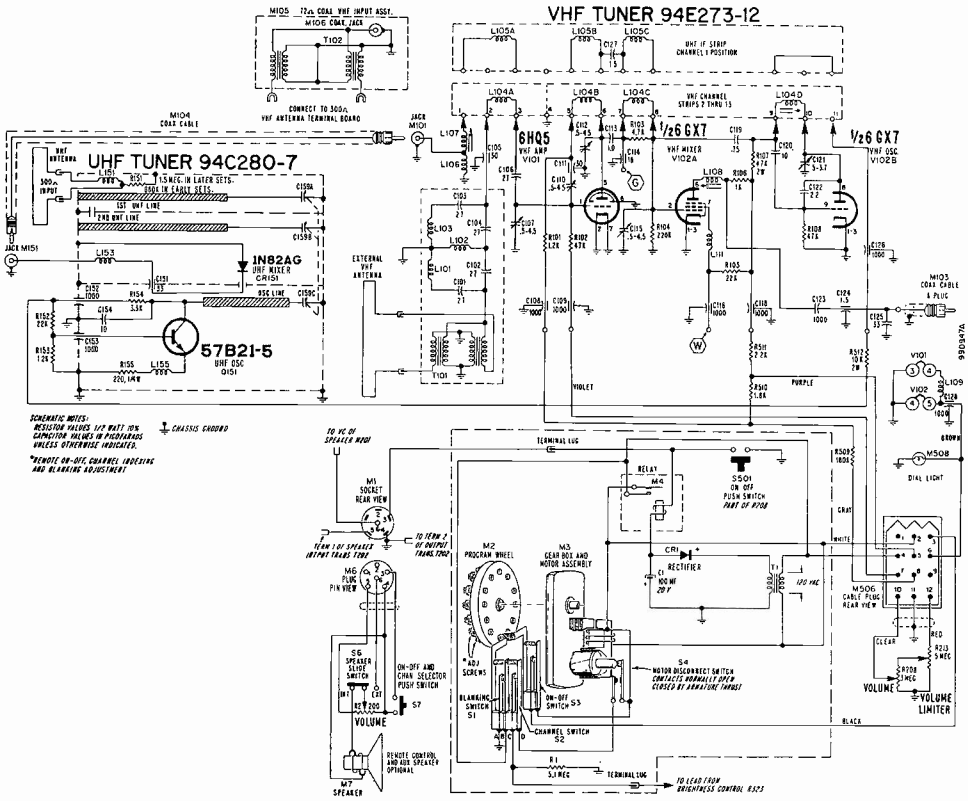


7G7, 8G7 & 9G7 CHASSIS SCHEMATIC DIAGRAM

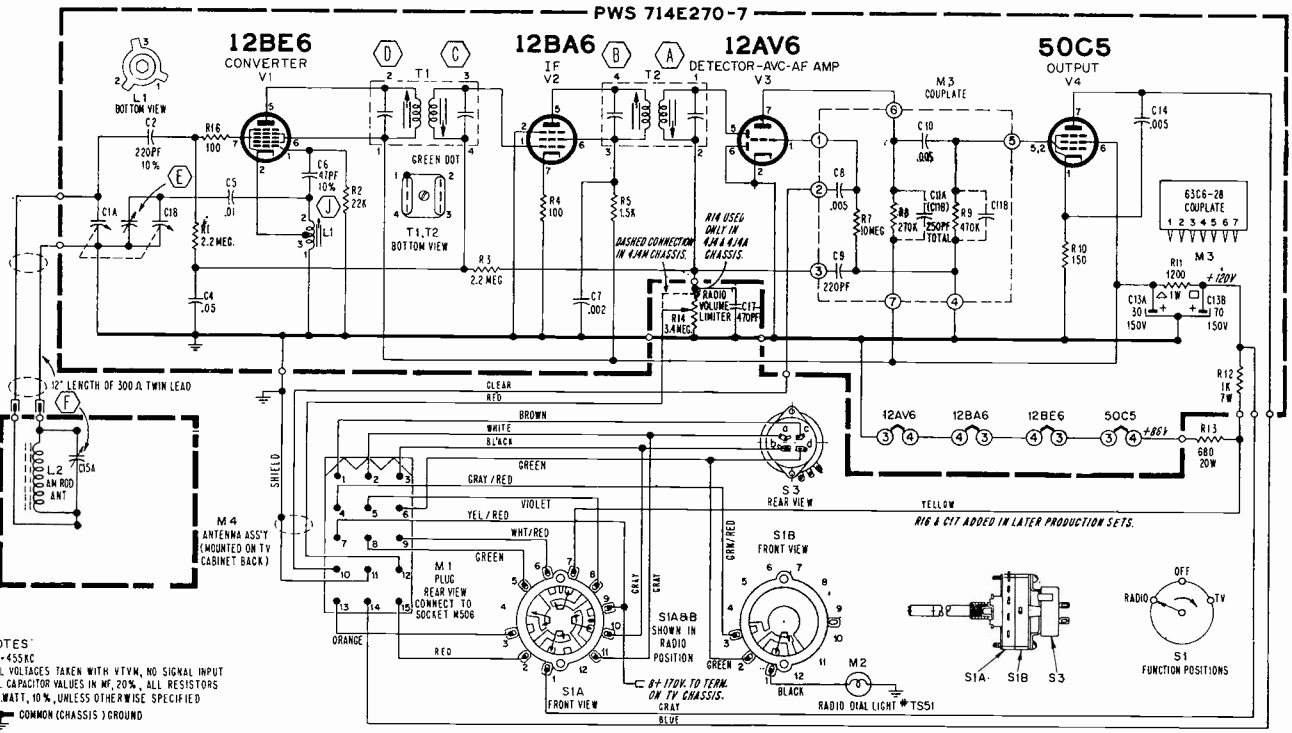


TUBE LOCATION DRAWING OF CHASSIS

ADMIRAL Tuner HB 1965-2 and Radio 4J4M Schematics, used in various chassis



HB1965-2 TUNER CLUSTER SCHEMATIC DIAGRAM



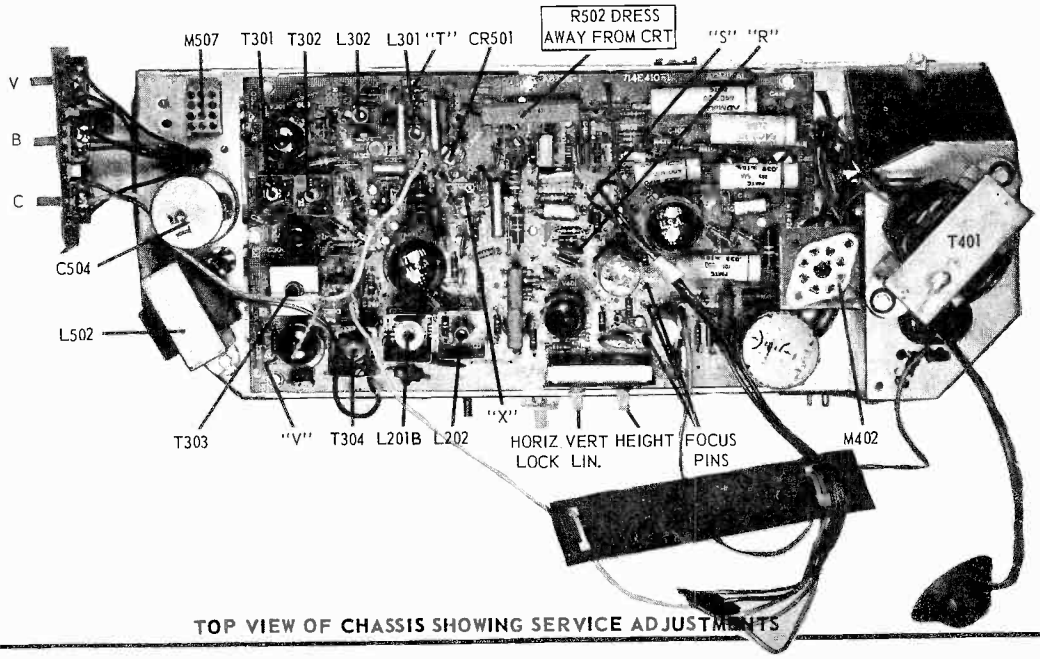
4J4M RADIO SCHEMATIC DIAGRAM FOR AK2147

Admiral

MODEL CHART

MODEL	NAME	COLOR	SIZE	TUNER CLUSTER	VHF TUNER	UHF TUNER	CHASSIS
ANC9127		Black Walnut	18	NB1976-1 or NB1977-1 or NB1978-1	94E282-10	94E280-7	G5NB76-1
PNC9113	Central Park	Driftwood				94E278-9	G5NB77-1
PNC9117	Central Park	Walnut				94E296-7	G5NB78-1
PNC9119	Central Park	White Linen					
PNC9800	Stanford	Black Vinyl	18	NB1908-1 or NB1906-1	94E282-10	94D296-7	6G5NB08-1
PNC9807	Stanford	Black Walnut				94E280-7	6G5NB06-1
PNSC9800	Grenadier	Black Vinyl	18	NB1946-1	94C273-15	94D296-7	1G5NB46-1
PNSC9807	Grenadier	Black Walnut					
PNC2110	Amherst	Black	20	NB2126-1 or NB2125-1 or NB2130-1	94E282-9	94D296-7	9G5NB26-1
PNC2114	Amherst	Beige				94E280-7	9G5NB25-1
PNC2127	Avalon	Walnut				94E278-9	9G5NB30-1
PNC2129	Avalon	White					
PNC2146	Sherwood	Blue Linen	20	NB2127-1 or NB2124-1	94E282-10	94E296-7	9G5NB27-1
PNC2147	Sherwood	Walnut				94E280-7	9G5NB24-1
CN3311	Weston	Walnut	22	GB2321-3	94D281-1	94D278-6	3G521-3
CN3312	Weston	Mahogany					
LN3301	Ramsell	Walnut					
LN3305	Stock Bridge	Maple					
LN3311	Ashburn	Walnut					
LN3321	Kimberly	Walnut					
TN3700	Griffin	Charcoal					
TNC3700	Griffin	Charcoal					
TNC3701	Griffin	Walnut					
TNC3705	Griffin	Maple					

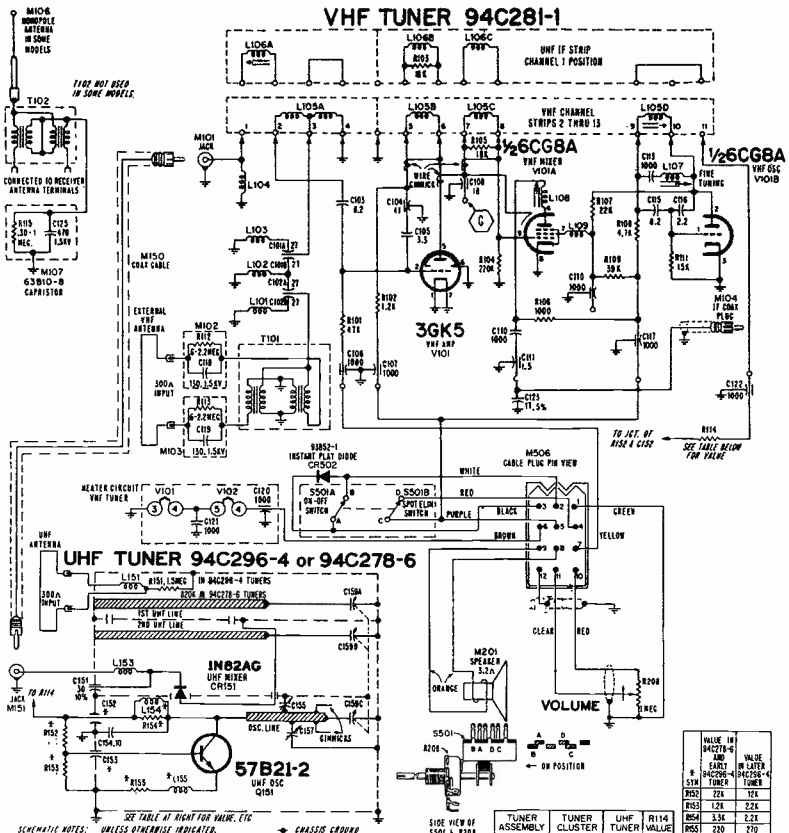
Schematic diagram and other service material on pages 23 through 25.
For alignment information see Volume TV-26, 1967 TV, pages 18-20.



TOP VIEW OF CHASSIS SHOWING SERVICE ADJUSTMENTS

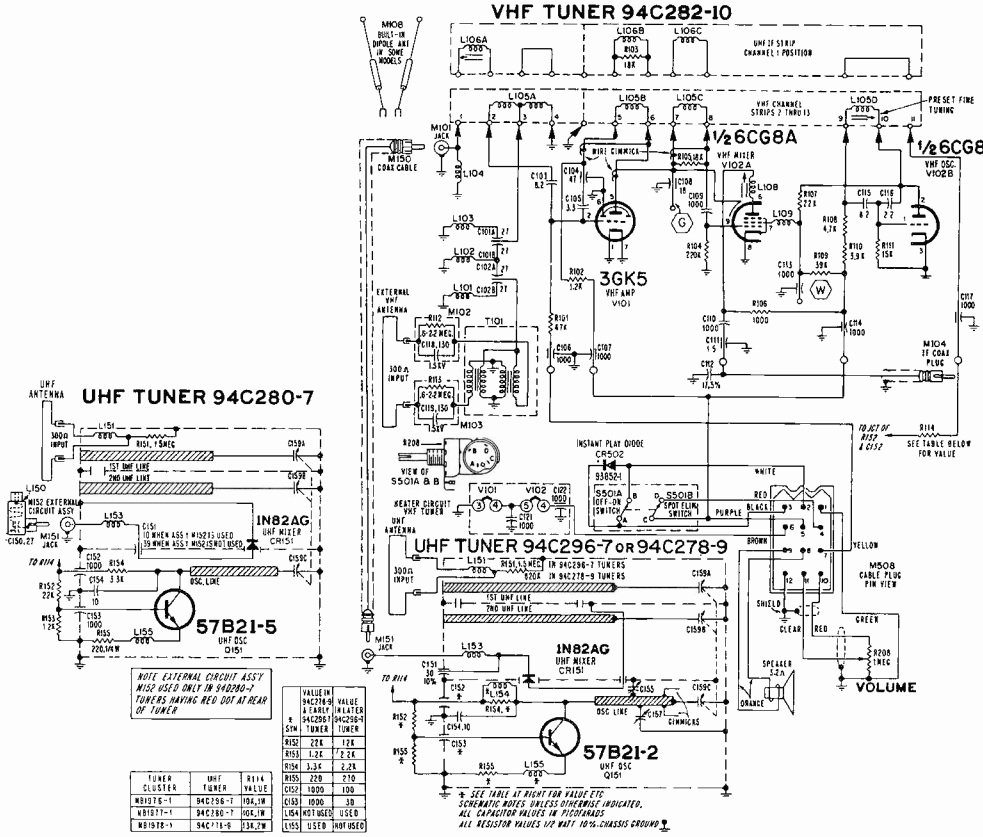
ADMIRAL Tuners Clusters used in various chassis

TUNER CLUSTER SCHEMATIC FOR GB2321-3



TUNER ASSEMBLY	TUNER CLUSTER	UHF TUNER	R114 VALUE
94C283-9	GB2321-3	94C296-4	10K,1W
94C283-2	GB2321-4	94C278-6	15K,2W

# SYM	VALUE IN 94C278-6 AND EARLY 94C296-4 TUNER	VALUE IN LATER 94C296-4 TUNER
R152	22K	12K
R153	1.2K	2.2K
R154	3.3K	2.2K
R155	220	270
C152	1000	100
C153	1000	30
L154	NOT USED	USED
L155	USED	NOT USED

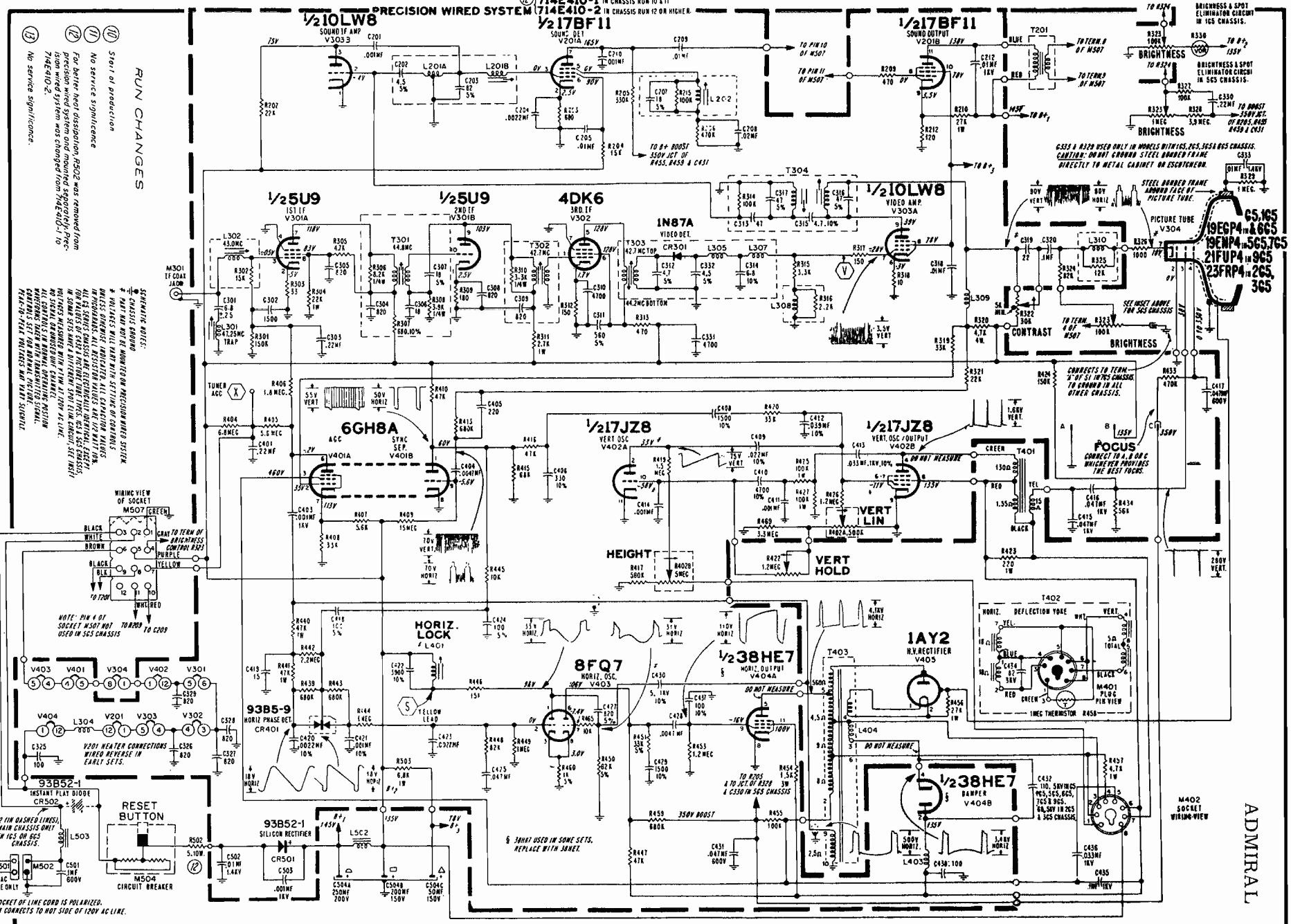


NOTE EXTERNAL CIRCUIT ASS'Y M152 USED ONLY IN 94C280-7 TUNERS HAVING RED DOT AT REAR OF TUNER

TUNER CLUSTER	UHF TUNER	R114 VALUE
NB1976-1	94C296-7	10K,1W
NB1977-1	94C280-7	10K,1W
NB1978-1	94C278-9	33K,2W

# SYM	VALUE IN 94C278-9 & EARLY 94C296-7 TUNER	VALUE IN LATER 94C296-7 TUNER
R152	22K	12K
R153	1.2K	2.2K
R154	3.3K	2.2K
R155	220	270
C152	1000	100
C153	1000	30
L154	NOT USED	USED
L155	USED	NOT USED

TUNER CLUSTER SCHEMATIC FOR NB1976-1, 77-1, & 78-1



G5, 2G5, 3G5, 5G5, 7G5 & 9G5 CHASSIS SCHEMATIC DIAGRAM

SERVICING THE HORIZONTAL AND HV SECTIONS

Hybrid transistor TV servicing of horizontal and high voltage sections must be accomplished by methods that do not allow the usual arcing method. Drawing arcs is likely to ruin several transistors. The arc pulses associated inductors and feed high back EMF transients into low voltage circuits. These sharp transients contain RF components which defy grounds and filters. They can easily enter any or all of the transistors and exceed their maximum rated voltage, thus permanently damaging the junctions.

The following procedure will help you locate a defect in this section without arcing the high voltage. The method for isolating a defect of insufficient width, low high voltage and off frequency operation is the same as servicing for no raster.

Try this procedure on a correctly operating set to familiarize yourself with the test. Remember to use an isolation transformer and to unplug (not just turn off with switch) before making or breaking any connections and connecting or disconnecting test equipment.

1. Replace V402, V403 and V404 tubes to eliminate possible failure caused by defective tube(s).
2. Make a visual check of the horizontal and high voltage parts. Check the high voltage with a VTVM with a high voltage probe. Normal high voltage is 16-18KV with the brightness and contrast at minimum. If there is normal singing of the high voltage transformer then trouble is usually isolated to V404 high voltage rectifier stage. If the oscillator is not operating the V403A plate will get red hot and V403 will be damaged. Service the oscillator after disconnecting R443 connected to Pin No. 11 of V403A.
3. Check the oscilloscope waveform at the grid of V403A. If this wave form has the correct shape and frequency then V402 circuits can be considered normal. Otherwise make repairs to V402 circuits until the waveform is correct. V402 is usually normal even though the peak-to-peak voltage at V402 plate and V403 grid bias voltage is less than the values shown (-33V). The horizontal oscillator partially operates from the boosted B+ voltage and the V403 bias from Class C operation. Continue to step 4 if the conditions of step 3 are met.
4. Measure the screen voltage (Pin No. 11 on V403A). This should be 125V DC at this pin. If not then check and measure the B+ voltage at the junction of R443 and C427 which should be 138V DC, and relatively free of horizontal sweep waveforms. If not, then replace C503.
5. Next disconnect C431 (and C432 if used) one at a time to see if they are shorted. The set should still produce a raster with these parts disconnected but the raster will be distorted.
6. Substitute C427 and C428 with new parts to see if the original parts were defective.
7. Remove the black plastic cover on the back of the yoke and see if R446 is over heating. This resistor will overheat if there is an unbalance of yoke current. This overheating can be caused by an open or shorted yoke and or open flyback.
A. Disconnect red and blue yoke leads and check for continuity between terminal No. 4 and 6 of T403.
B. With the yoke still disconnected check for continuity and resistance between yellow, blue and red yoke leads.
C. Reconnect yoke leads.
D. Disconnect C429 and check for leakage.
8. Check the waveform at terminal No. 9 or 10 of T403 if the waveform does not have the notch in its peak and or if the amplitude is low. Then T403 is usually defective.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT

If the picture is of incorrect height (vertical size) adjust the height control. This adjustment may affect the vertical linearity of the picture. If necessary, alternately adjust the vertical linearity control and height control. Note: Upper portion of the picture is affected mostly by the vertical linearity control: lower by the height control.

HORIZONTAL HOLD ADJUSTMENT

The horizontal hold control is set at the factory and seldom requires readjustment. Adjustment need only be made if 11LT8 rube (V402) has been replaced and the picture cannot be locked in with slight adjustment of the horizontal hold control.

Before proceeding with adjustment, be sure that the picture will sync vertically, as lack of both vertical and horizontal sync generally indicates sync circuit trouble. Lack of only horizontal sync generally indicates trouble in the horizontal sync (phase detector) circuit.

1. Remove cabinet back, Connect a polarized interlock cord and/or isolation transformer.

2. Allow a few minutes for set to warm up. Tune in weakest station, set brightness and contrast controls for a normal picture.

3. A. Turn off set to avoid possible transistor damage.

B. Using a piece of hook-up wire, ground test point "S" through a .47 mf, 200V capacitor to the metal tuner bracket or a metal shield.

C. Turn on set.

4. Adjust horizontal hold control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

5. A. Turn off set to avoid possible transistor damage.

B. Remove wire short and capacitor from test point "S".

6. Turn set on and set channel selector to weakest station. Switch channel selector on and off channel, picutre should remain in horizontal sync.

AGC TROUBLESHOOTING

If the AGC circuit is suspected of malfunctioning, the following procedure should be followed:

1. Make sure the power supply is furnishing between 23.75 and 26.25 volts.

2. Check the weak signal operation by the following method:

Remove the antenna or select an unused channel and measure tuner and IF AGC bias voltages. Tuner bias should be from 1.5 to 2 volts at TP "R". IF bias should be about 3 volts at TP "I". If these voltages are proper and there is no snow or noise in the sound, a problem exists elesewhere in the receiver after Q302.

3. Assuming there is snow and noise in the sound, check the strong signal operation by the following method:

Connect the antenna and tune to strong signal. Adjust the Overall AGC Control through its range. If a blank raster or distorted picture is all that can be seen, measure the tuner and IF AGC voltages. These voltages should be considerably higher than what they were for no signal. About 4.5 volts for the tuner AGC. If both of these voltages are too low, make sure the AGC gate transistor Q401 is turned on by measuring the base voltage. If the voltage is over 1.5 volts between the emitter and base, look for trouble in Q303 and Q304. If the base voltage is 1.5 volts or less, measure the voltage at C403. If over 2.5 volts, check connections and polarity to flyback RF Delay Control R336 setting and emitter voltage of AGC gate Q401. The emitter voltage should vary from about 0.5 to 2.5 volts with overall AGC control adjusted through its range. If all of the above check satisfactorily, replace the AGC transistor Q401.

GENERAL ELECTRIC

MODELS

M718DWD
M720DWD
M730DMD
M730DWD
M732DMP
M740DWD
M760DMD
M760DWD
M762DMP

AD CHASSIS

DISASSEMBLY PROCEDURE

CABINET BACK: Disconnect any antenna wires. Then remove the screws securing the back to the cabinet and carefully detach the back.

CHASSIS: First remove the back as described. Remove the chassis retaining screws. On table models the screws are removed from the bottom of the cabinet and for consoles the chassis retaining screws are removed from the top back corners of the chassis. The front lip of the chassis is retained by clips on console models. Remove the control knobs and the screws holding the control assembly to the escutcheon. Discharge and remove the picture tube anode; take off the picture tube socket; yoke; antenna board; disconnect the loudspeaker. The chassis and control assembly is now removed from the cabinet.

PICTURE TUBE: Remove the cabinet back and chassis as described; then place the cabinet face down on a soft cloth-covered surface. A wood block, two inches thick, is placed under the cloth where the top middle of the cabinet front will rest. Remove one 5/16-inch hex head screw from the tube sling. The picture tube is now removed from the cabinet.

ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY: Adjust R208 and R214 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of mask.

WIDTH CONTROL: Adjust this control for largest picture necessary to fill mask.

HORIZONTAL HOLD:

1. Tune the receiver controls for normal operation.
2. Short Test Point VI to the chassis with a jumper wire.
3. Adjust HORIZONTAL HOLD until picture just "floats" back and forth across the screen.
4. Remove the chassis jumper from Test Point VI.

AGC CONTROL:

Field Adjustment: Tune in the strongest available signal and adjust R179 to the point where overloading is indicated by "tearing" of the picture. Then back off the AGC control to just beyond the point where the overload condition disappears.

Instrument Adjustment:

1. Tune in a broadcast signal, preferably a monoscope signal that is monitored to assure that the percentage of sync does not exceed 25 percent.
2. Connect an oscilloscope to the high side of the contrast control. Synchronize the scope to vertical rate.
3. Adjust the fine tuning for smear and the AGC control for 100 to 110 volts peak to peak with no sync compression.

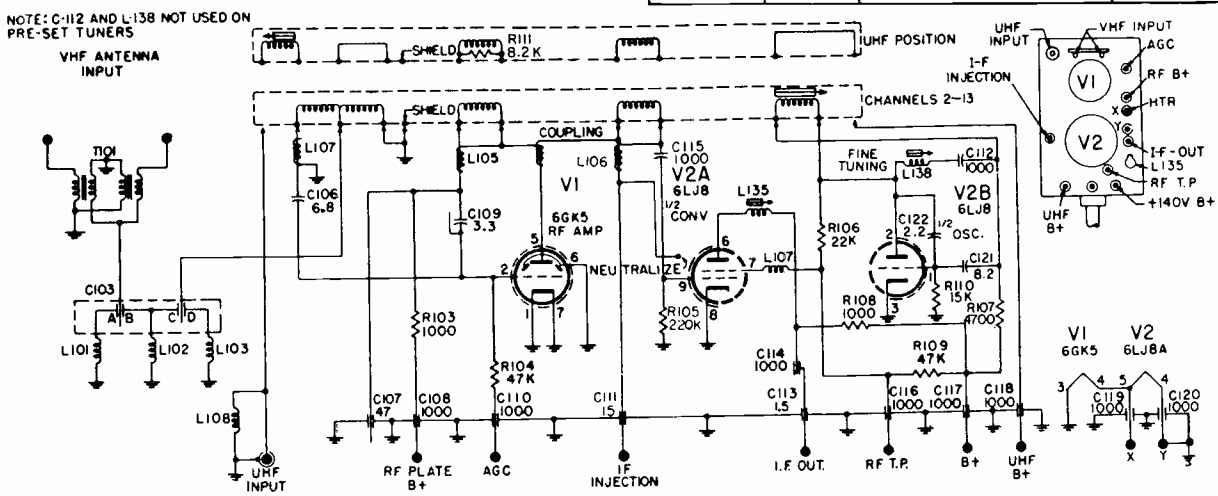
PICTURE TUBE ADJUSTMENTS

PICTURE TILT: To correct picture tilt, loosen the YOKE clamp. Adjust yoke to correct tilt. Secure yoke with clamp.

PICTURE CENTERING: Rotate the two centering rings located at the rear of the yoke assembly until picture is properly centered.

TV CHASSIS TUBES & SEMICONDUCTORS

SYMBOL	PURPOSE	TYPE
Q100	UHF Osc. Transistor NPN	ET15X3
V1	RF Amplifier (Refer to appro-	6GK5
V2	Osc.—Mixer priate tuner)	6LJ8
V3	1st and 2nd IF Amplifier	6AR11
V4	3rd IF Amplifier & AGC Keyer	6JN8
V5	Video Amp., Clipper, & 4.5MC Amp.	6AF11
V7	Audio Det., Audio Output	6T10
V8	Vert. Osc., Vert. Output	6FY7/6FM7
V9	Hor. Phase Det., Hor. Osc.	6LT8
V10	Hor. Output	6GE5
V11	High Voltage Rectifier	1K3
V12	Horizontal Damper	6AX3
V13	Picture Tube	23FVP4A
Y1	UHF Mixer Diode	ET16X14
Y151	Video Det. Diode	ET16X1
Y401/ Y402	Low Voltage Rectifier— Diodes, Silicon	ET57X30



ET86X261, ET86X262 SCHEMATIC DIAGRAM

SAFETY CHECK

Perform the following SAFETY CHECKS after servicing this receiver.

1. INSPECT LEAD DRESS inside receiver — wires should not be pinched by chassis, should not touch receiving tubes or power resistors.
2. MEASURE THE RESISTANCE (with cabinet back assembled) from two shorted blades of power plug to chassis — Must be between 700K and 4.0 meg. ohms.

CHASSIS SPECIFICATIONS

POWER INPUT RATING:	Frequency . . . . . 60 cycles Voltage . . . . . 110—128 volts Wattage 190
OPERATIONAL FREQUENCIES:	Picture IF Carrier . . . . . 45.75MC Sound IF Carrier . . . . . 41.25MC Intercarrier Sound 4.5MC

RECEIVER ALIGNMENT

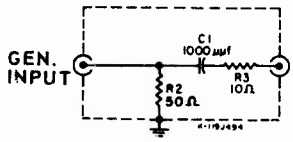
VIDEO I-F SYSTEM

AM PRE-PEAKING & TRAP FREQUENCIES

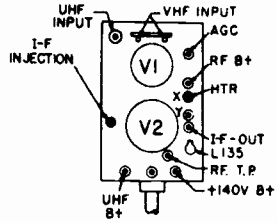
L150 . . . . . Min. 47.25 MC	T151 . . . . Max. 43.0 MC
L135 . . . . Max. 45.75 MC	T152 . . . . Max. 45.2 MC
L151 . . . . Max. 42.50 MC	L153, L154 Max. 44.15 MC

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up.

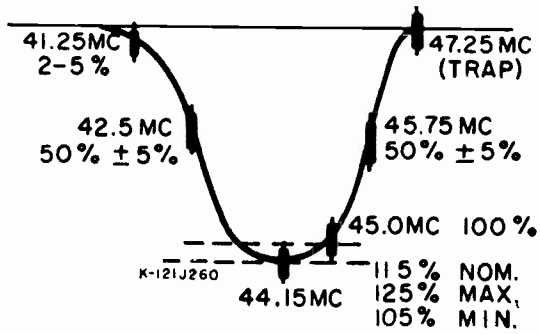
1. Turn volume control to minimum and contrast control fully clockwise. Set channel selector to unused high VHF channel (9-13) and fine tuning fully counterclockwise.
2. Short antenna terminals together.
3. Connect oscilloscope to Test Point III thru 22,000 ohms resistor not more than 1.5 inches away from Test Point III. Connect −4.5V bias between Test Point II and chassis.
4. Inject signals from a properly terminated AM signal generator or sweep generator, through NETWORK shown, To the I F injection point on the VHF Tuner as shown in the illustration.
5. Align the receiver to produce the response curve illustrated.
6. All cores are positioned away from printed board.
7. Either a speaker or 3.2 ohm 5W load resistor must be connected to speaker terminals.



I-F INJECTION NETWORK



I-F INJECTION



I-F RESPONSE CURVE

VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Adjust L150 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal. Do not retouch this adjustment.
2	38—48 MC sweep generator, with scope calibrated 4 volts peak to peak for 2 inch deflection.	Adjust L154 and L153 in the following sequence: A. Tune L153 core so top of core is flush w/top of coil. B. Tune L154 for max. deflection of 44.15 MC marker. (Do not re-adjust scope) C. Tune L153 for max. deflection of 44.15 MC marker.	Do not retouch these adjustments.
3		L135 (converter plate) for max. deflection of the 45.75 MC marker.	
4		L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.
5		T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	
6		T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7		L151 if necessary to shape the nose.	

RECEIVER ALIGNMENT (CONT'D)

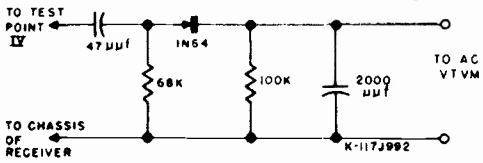
4.5 MC TRAP ALIGNMENT

1. Connect a −7.5V bias to Test Point II, with the positive bias lead grounded to chassis.
2. Turn contrast control to maximum, volume to minimum.
3. Connect the DETECTOR NETWORK shown to Test Point IV and feed its output to an AC VTVM.
4. Apply a 4.5MC AM signal through a 5μμf capacitor at Test Point III.
5. Adjust the top core of T154 for minimum reading on Test Point IV. Two core positions will give an apparent minimum indication, the correct one is the first reached while turning the core from the top end of the coil form toward the circuit board.

NOTE: Retouching of the trap adjustment may be necessary after alignment of the audio take-off.

AUDIO ALIGNMENT WITH ON-THE-AIR SIGNALS

1. Tune in a strong local signal and set receiver volume to a low audible level.
2. Adjust L301 for maximum undistorted, buzz-free audio output. Start with the core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3. Connect a variable bias supply (3 to 15V) to the AGC test point with the positive lead to the chassis. Adjust bias until audio signal distorts on peaks slightly, then adjust core of T301 to curb distortion. Repeat this procedure several times at increased bias level until maximum clarity of audio is obtained.
4. Adjust the bottom core of T154, repeating the bias advances in step 3, to achieve the optimum setting for noise-free performance at low signal levels.



DETECTOR NETWORK

IF BOARD COMPONENT LOCATION

TRIANGLE NUMBERS INDICATE CONNECTION POINTS FOR WIRES AS LISTED.

▲1. T302 SECONDARY, SPEAKER WIRE, & AUDIO CABLE SHIELD.
▲2. YELLOW WIRE OF AUDIO CABLE.
▲3. GRAY TUNER AGC WIRE.
▲4. TUNER I.F. OUTPUT CABLE CENTER CONDUCTOR.
▲5. GREEN WIRE OF AUDIO CABLE.
▲6. VIOLET WIRE TO▲9 ON POWER SUPPLY BOARD.
▲7. T302 SECONDARY, & SPEAKER WIRE.
▲8. VIOLET WIRE TO ▲11 ON POWER SUPPLY BOARD & TO T302
▲9. BLUE WIRE TO ▲15 ON SWEEP BOARD.
▲10. GREEN WIRE TO ▲6 ON SWEEP BOARD.
▲11. ORANGE WIRE TO ▲14 ON POWER SUPPLY BOARD.
▲12. NO. 26 GAUGE FUSE WIRE TO ▲13 ON POWER SUPPLY BOARD.
▲13. BROWN WIRE TO ▲1 ON SWEEP BOARD.
▲14. BROWN WIRE TO TUNER FILAMENT CONNECTION.
▲15. ORANGE/WHITE WIRE TO R169 CONTRAST CONTROL
▲16. GREEN WIRE TO R169 CONTRAST CONTROL.
▲17. YELLOW WIRE TO PIN 7 OF PICTURE TUBE.
▲18. BLUE WIRE TO R173 BRIGHTNESS CONTROL.
▲19. TUNER SHIELDED CABLE GROUND CONNECTION.
▲20. ORANGE WIRE TO ▲14 ON POWER SUPPLY BOARD.
▲21. RED/YELLOW WIRE TO ▲12 ON POWER SUPPLY BOARD.
▲22. RED/YELLOW WIRE TO ▲12 ON POWER SUPPLY BOARD.
▲23. WIRE TO LDR.

CAPACITORS

C150–C8
C154–A8
C155–H8
C156–E6
C158–G4
C159–H6
C160–H7
C163–L6
C164–L2
C165–M7
C166–N8
C167–O8
C168–N7
C169–N2
C172–P4
C176–F9
C178–I4
C179–M3
C303–I2
C304–I3
C305–F2
C306–C3
C307–A3
C308–C2
C311–K1
C318–B2

RESISTORS

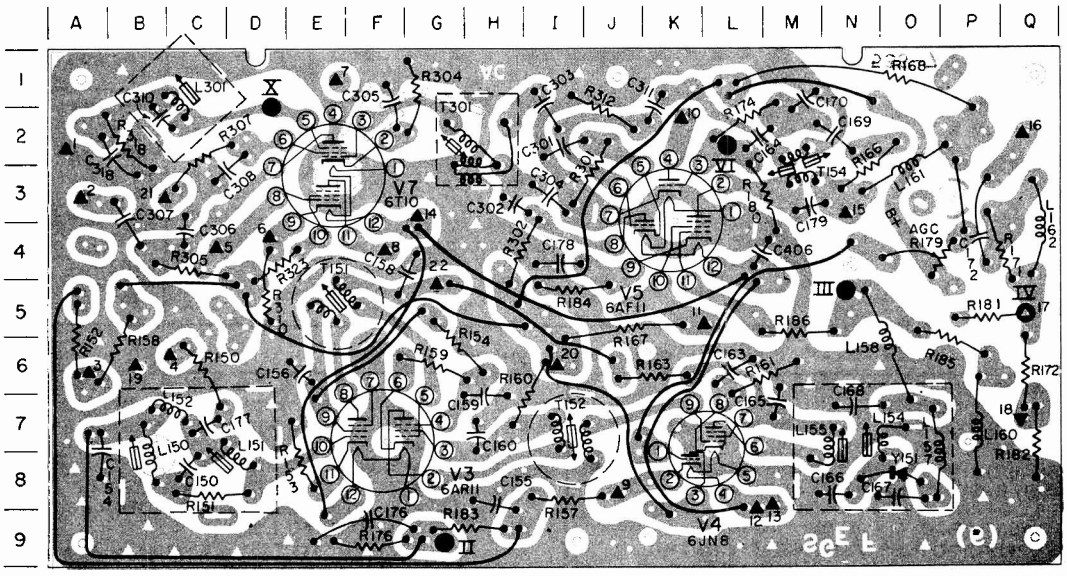
R151–C8
R152–A6
R153–E8
R154–H6
R157–I8
R158–B6
R159–G6
R160–H6
R161–M6
R163–J6
R166–O2
R167–J5
R168–M1
R171–Q4
R172–Q6
R174–L2
R176–F9
R179–O4
R180–L3
R182–Q7
R183–H9
R184–I5
R185–O5
R302–I4
R304–G1
R305–C4
R307–D4
R310–D5
R312–J1
R318–B2

COILS & TRANSFORMERS

L150–B7
L151–D7
L152–B7
L153–N7
L154–O7
L157–P7
L158–O5
L160–P7
L161–O3
L162–Q4
L301–C1
T151–E5
T152–I7
T154–M3
T301–H2

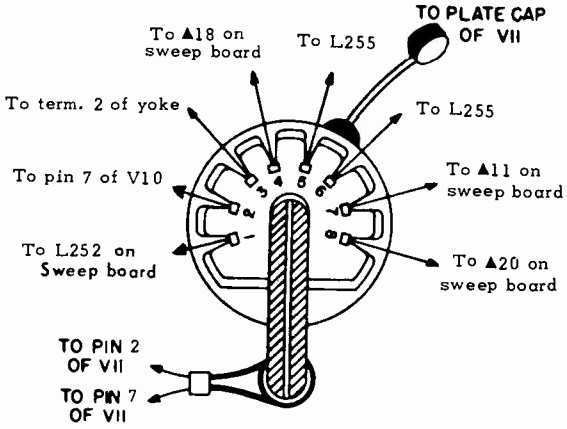
TEST POINTS

II –G9
III–N5
V1–L2

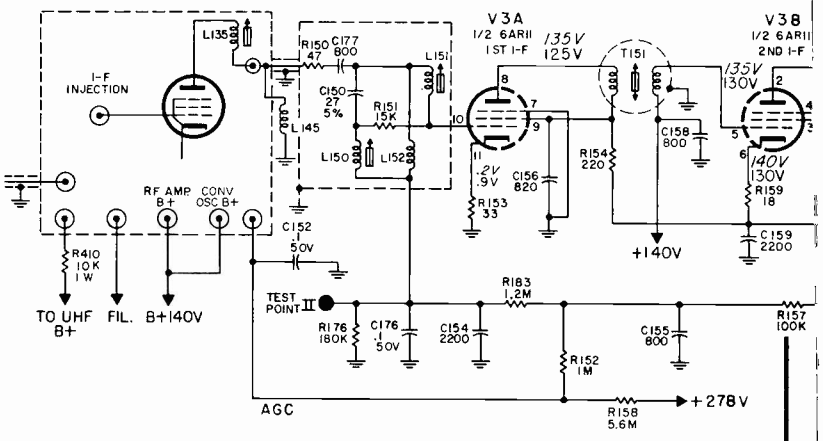


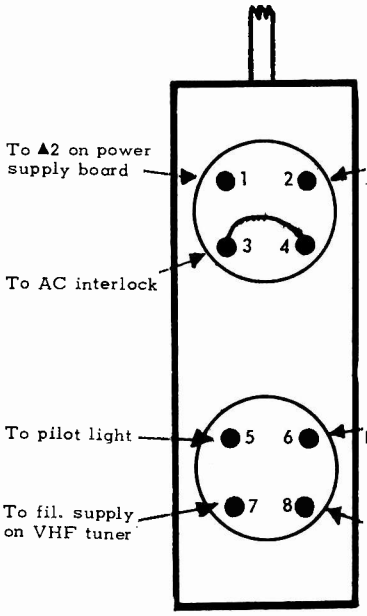
IF CIRCUIT BOARD COMPONENT VIEW

GENERAL ELECTRIC Chassis AD, Schematic Diagram

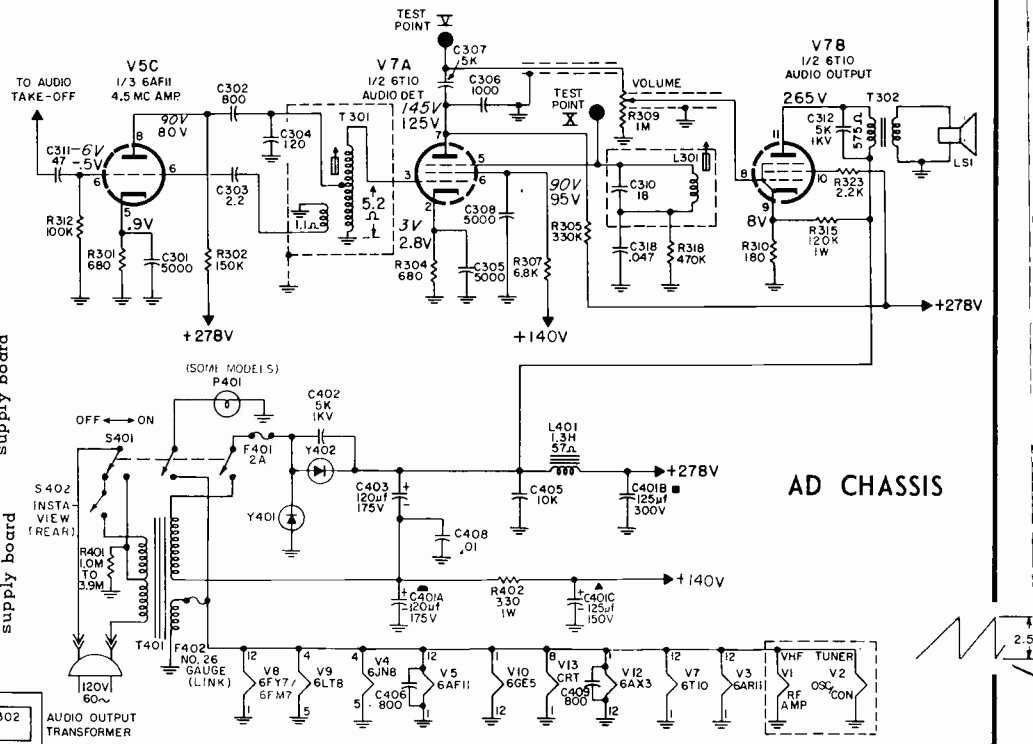


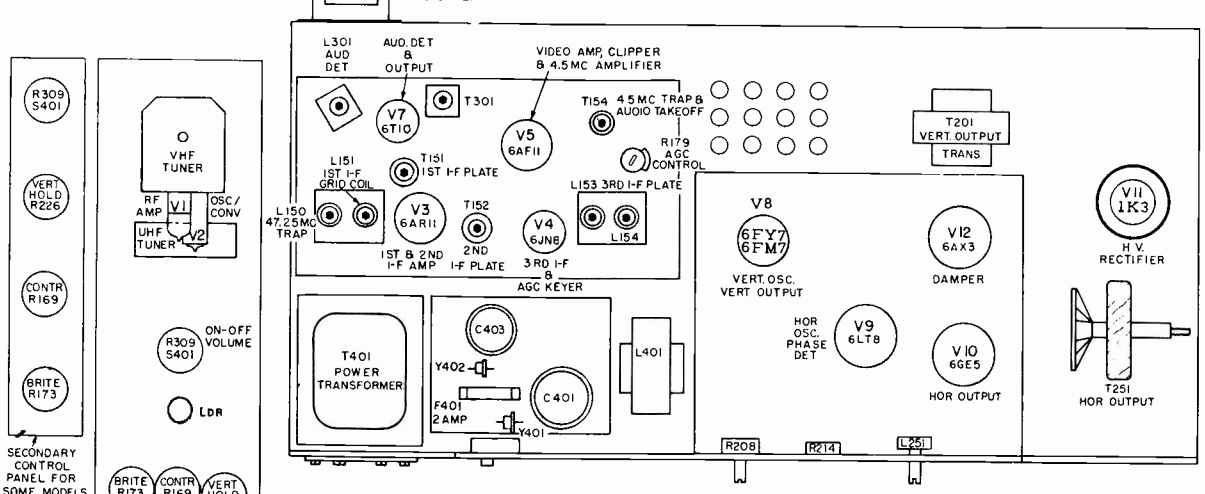
T251 WIRING





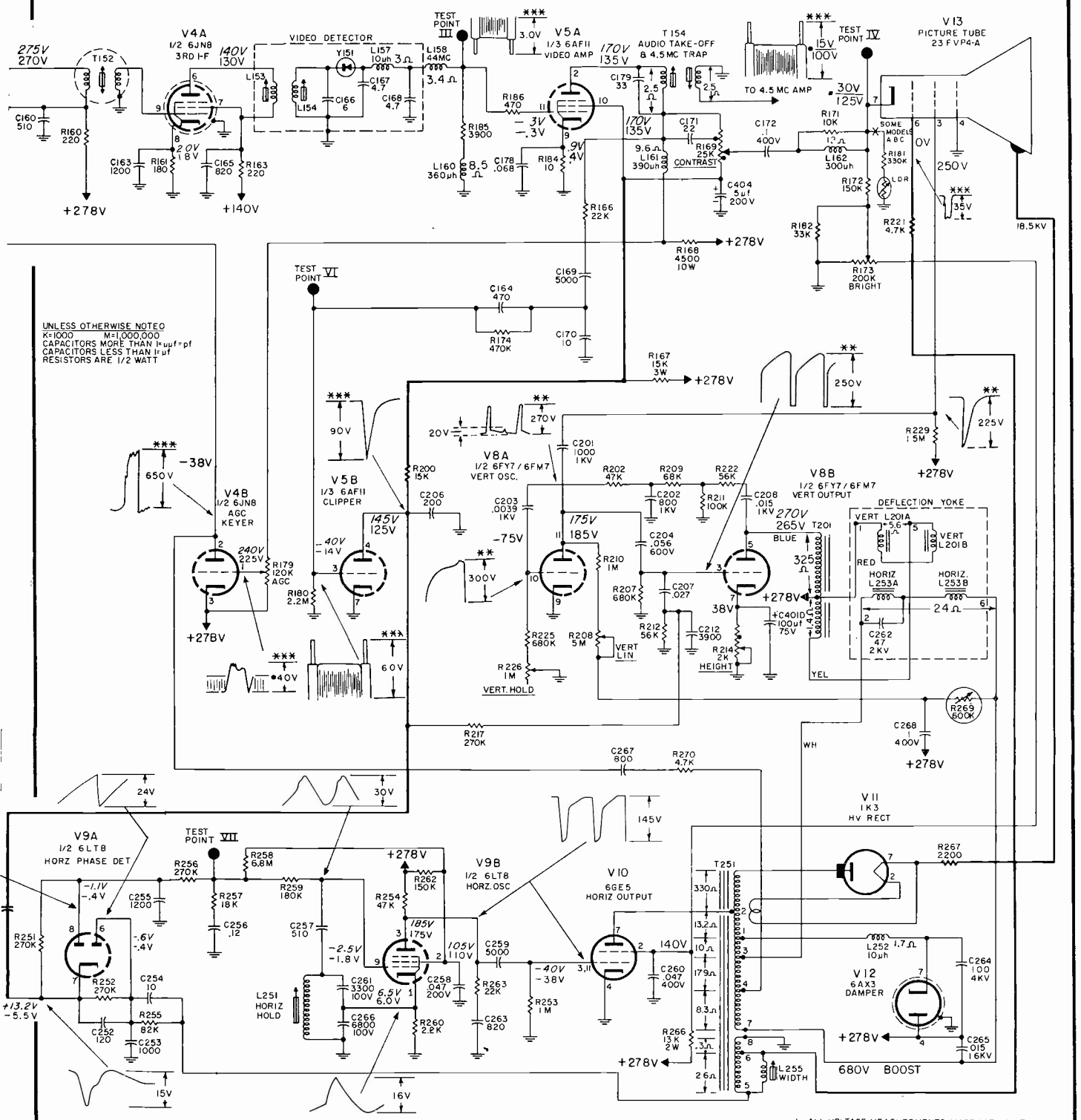
S401 WIRING



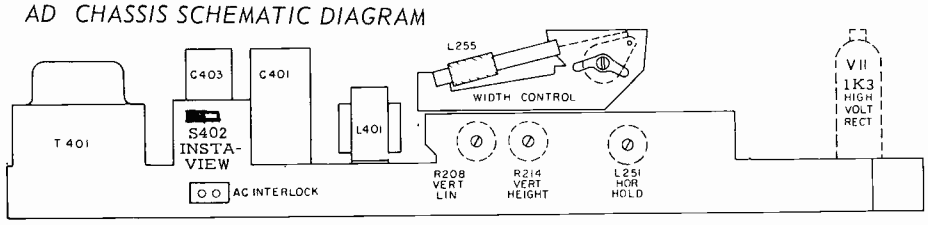


TUBE AND ADJUSTMENT LOCATIONS

GENERAL ELECTRIC Chassis AD, Schematic Diagram, Continued



AD CHASSIS SCHEMATIC DIAGRAM



1 ALL VOLTAGE MEASUREMENTS MADE WITH A VTVM WITH RESPECT TO CHASSIS GROUND, RECEIVER CONTROLS SET FOR NORMAL OPERATION. MEASUREMENTS MAY DEVIATE ± 10% AT 120V AC LINE VOLTAGE

2 WHERE ON-SIGNAL AND OFF-SIGNAL MEASUREMENTS VARY, TWO VOLTAGES ARE SHOWN ON-SIGNAL VOLTAGE APPEARS IN *ITALICS* OVER OFF-SIGNAL VOLTAGE

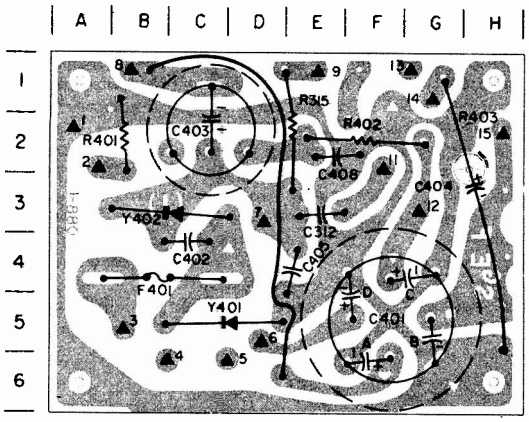
ON-SIGNAL VOLTAGES & WAVE SHAPES TAKEN WITH A NOISE FREE SIGNAL PRODUCING -2.5 TO -3.5 VOLTS AGC AT VHF TUNER

OFF-SIGNAL VOLTAGES TAKEN WITH ANTENNA DISCONNECTED & ANTENNA TERMINALS SHORTED TOGETHER ON UNUSED CHANNEL

— • INDICATES VARIATION WITH CONTROL SETTING

** - INDICATES SCOPE SYNCHED AT 1/2 VERT FREQ

*** - INDICATES SCOPE SYNCHED AT 1/2 HORIZ FREQ

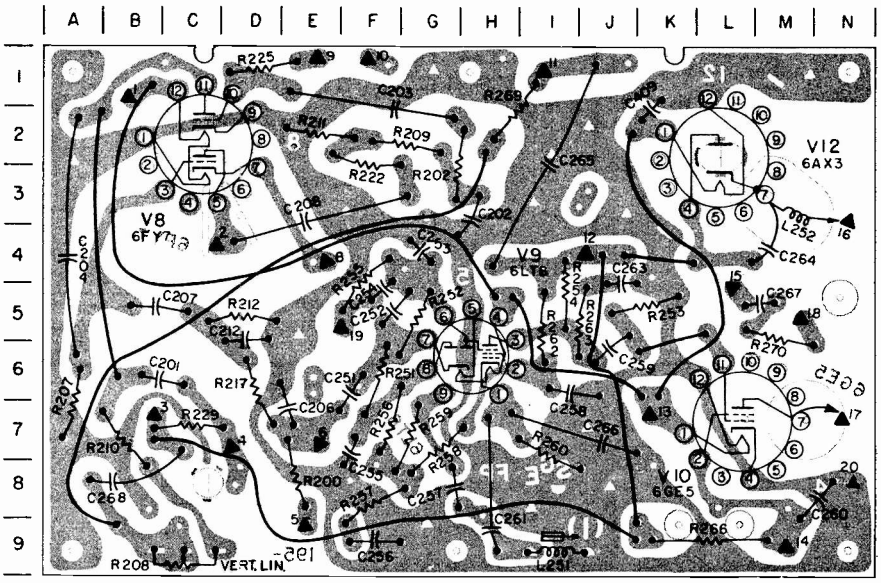


POWER SUPPLY CIRCUIT BOARD

POWER SUPPLY BOARD WIRING

TRIANGLE NUMBERS REPRESENT POINTS ON THE BOARD FOR INTERCONNECTING WIRES. WIRES ARE CONNECTED TO POINTS INDICATED.

▲1. Grn-yell. to T401
▲2. Blk. to T401 &S401
▲3. Red to S401
▲4. Red to T401 & Red/wh to S401
▲5. Brn/yell. to T401 & AC interlock
▲6. Yell. to ▲8 on Sweep board
▲7. Grn. to L401 & T302 red lead
▲8. Blue to T401
▲9. Violet to ▲6 on I.F. Board
▲11. Violet to ▲8 on I.F. Board
▲12. Red/yell. to ▲21. on I.F. Board, to tuner B+ & to ▲22 on I.F. board.
▲13. Grn. to T401 & F402
▲14. Orange to ▲11 on I.F. Board, ▲5 on Sweep Board, & to R169 contrast control.
▲15. To L401 Red lead, To ▲20 on I.F. Board, & to ▲3 on sweep Board.



SWEEP CIRCUIT BOARD COMPONENT VIEW

SWEEP BOARD COMPONENT LOCATION

RESISTORS	
R200—E8	R252—G5
R202—G2	R253—H5
R207—A6	R254—I4
R208—C9	R255—F4
R209—F2	R256—F7
R210—B7	R257—F8
R211—E2	R258—G7
R212—D5	R259—G7
R217—D6	R260—I7
R222—F2	R262—I5
R225—D1	R263—J5
R229—C7	R266—L9
R251—F6	R269—H2
	R270—M5

CAPACITORS	
C201—B6	C256—F9
C202—H3	C257—G8
C203—F1	C258—I6
C204—A4	C259—J6
C206—E7	C260—N8
C207—B5	C261—H9
C208—E3	C263—J4
C212—D5	C264—M4
C251—F6	C265—I2
C252—F5	C266—J7
C253—G4	C267—M5
C254—F5	C268—A8
C255—F7	C409—K1

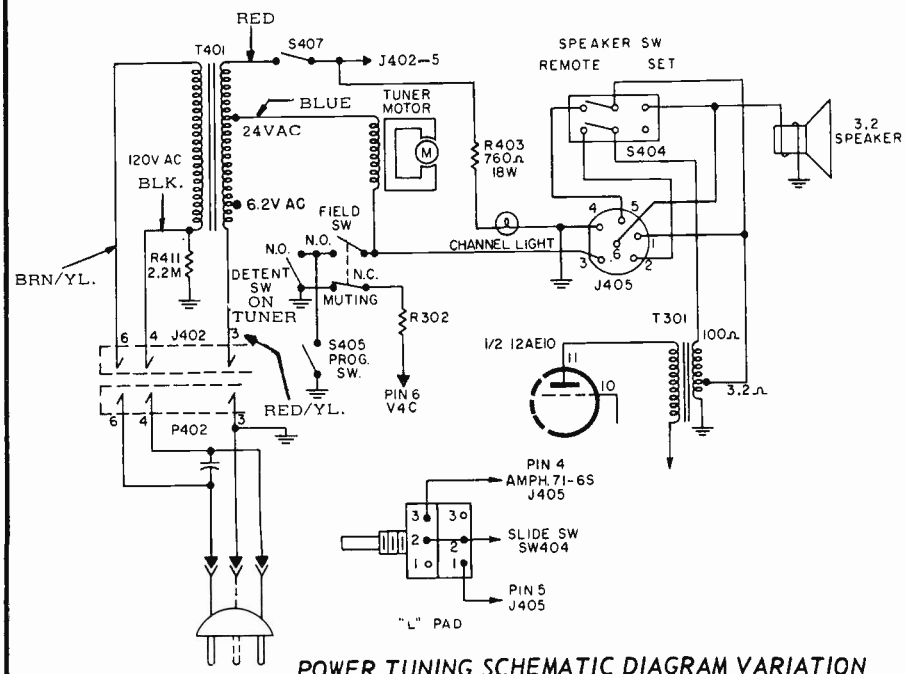
SWEEP BOARD WIRING

▲1. BROWN WIRE TO ▲13 ON IF BOARD
▲2. BLUE WIRE TO T201
▲3. RED WIRE TO ▲15 ON POWER SUPPLY BOARD
▲4. RED & GREEN WIRE TO CRT SOCKET PIN 3
▲5. ORANGE WIRE TO ▲14 ON POWER SUPPLY BOARD
▲6. GREEN WIRE TO ▲10 ON IF BOARD
▲8. YELLOW WIRE TO R214 HEIGHT CONTROL & TO ▲6 ON POWER SUPPLY BOARD
▲9. GREY WIRE TO R226 VERT.HOLD CONTROL
▲10. YELLOW WIRE TO T201 & TERM 5 OF YOKE
▲11. RED & WHITE WIRE TO T251 TERM 7 & TO TERM 6 OF YOKE
▲12. RED WIRE TO T201 & TO TERM 1 YOKE
▲13. BROWN WIRE TO PIN 8 OF CRT SOCKET
▲14. ORANGE WIRE TO R173 BRITE CONTROL
▲15. BLUE WIRE TO ▲9 ON IF BOARD
▲16. WIRE TO T251 TERM 1
▲17. WHITE WIRE TO T251 TERM 2
▲18. BLUE WIRE TO T251 TERM 4
▲19. WIRE TO L255
▲20 WIRE TO T251 TERM 8

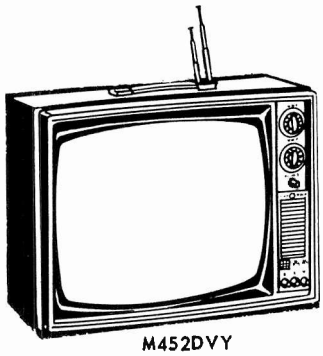
GENERAL ELECTRIC

DD Chassis

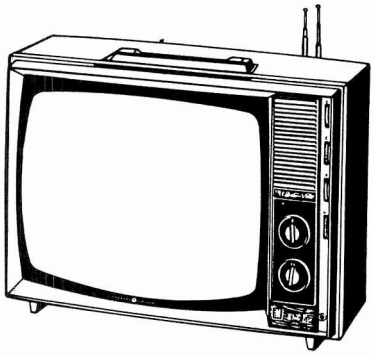
Models M402DWD, M404DVY, -DWD M406DWD, M408DWD, R415DWD, M420DEB, PAM424CVY, PAM451CWD, M452DVY, M454DWD, R455DWD, and the group of sets M603 through R621D. (On the next four pages)



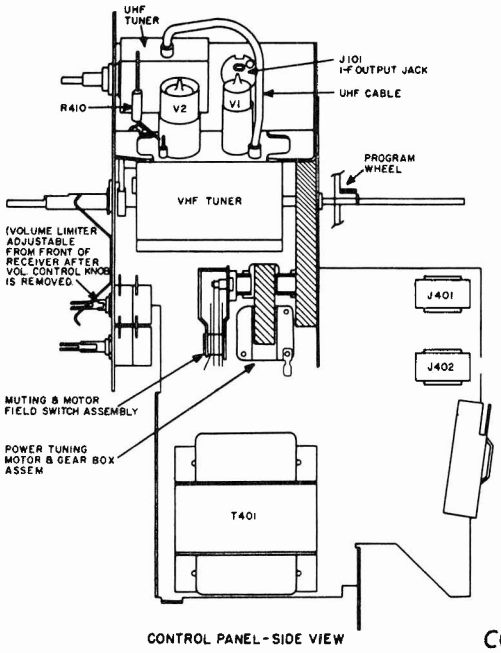
POWER TUNING SCHEMATIC DIAGRAM VARIATION



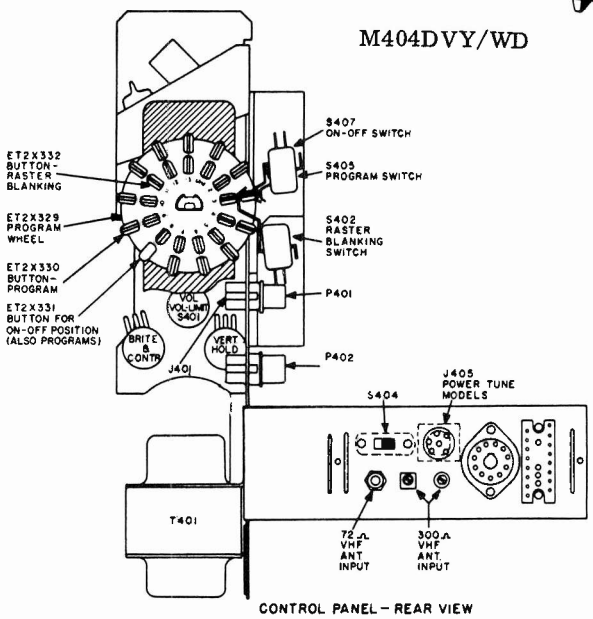
M452DVY



M404DVY/WD



CONTROL PANEL-SIDE VIEW



CONTROL PANEL-REAR VIEW

CONTROL PANEL

Chassis DD

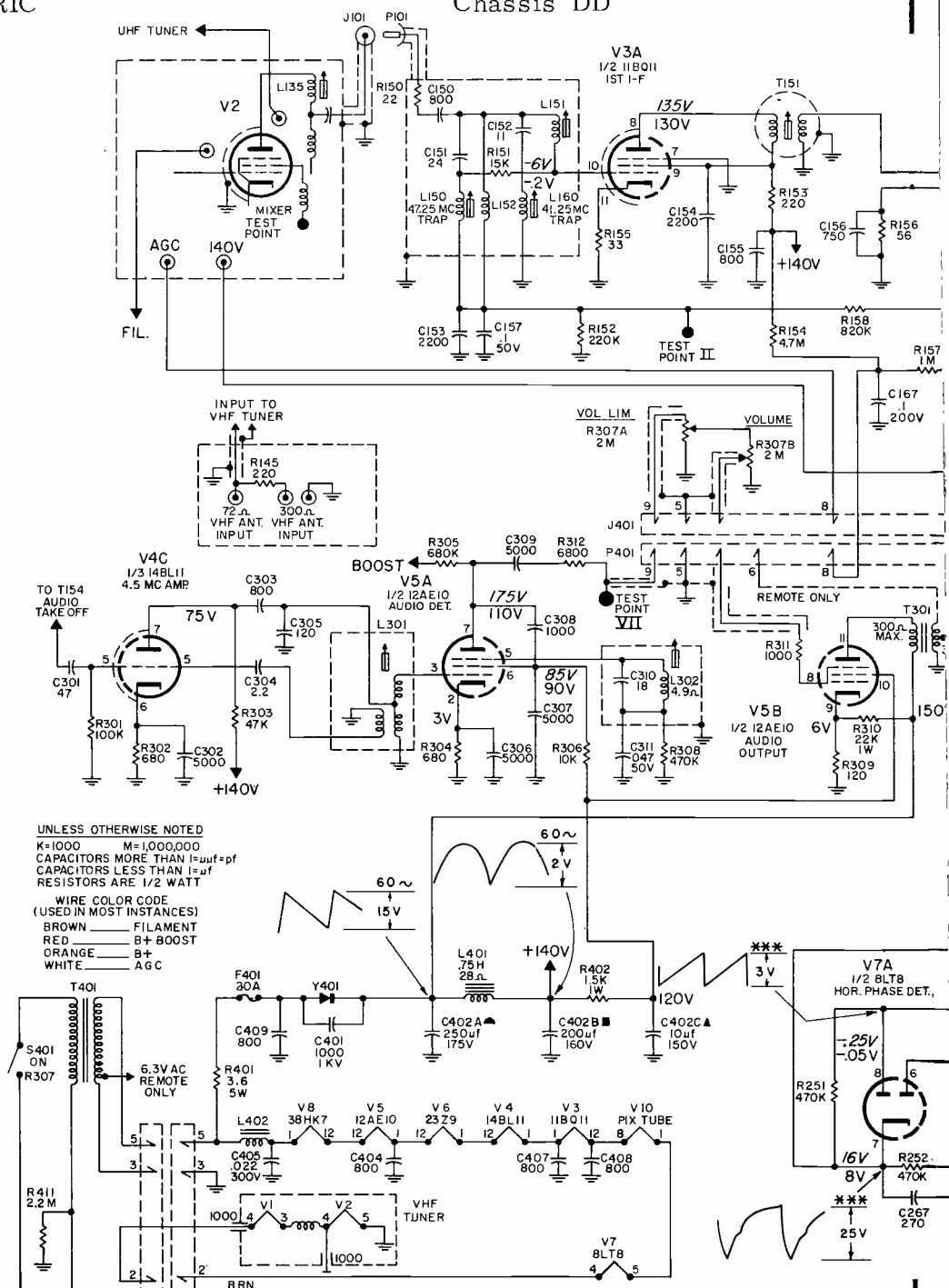
Dissassembly Instructions for Some Models

CABINET BACK; Disconnect any external antenna wire. Remove the hex head screws securing the cabinet back. Swing the left side of the back away from the receiver just far enough to reach the 300 ohm VHF & UHF antenna input leads that are located inside of the cabinet back. Unplug the VHF antenna lead from the VHF tuner input terminals and the UHF leads are unplugged from the terminals on the cabinet back.

CHASSIS; Remove the cabinet back as previously described. Remove the VHF & UHF tuner knobs. Unplug the picture tube socket and high voltage anode lead, then remove and disconnect the following;

1. Four hex head screws from the tuner plastic bracket assembly.
2. Two hex head screws from the secondary control bracket.
3. One hex head screw from the left front corner of chassis that retains ground straps to chassis.
4. Two hex head chassis retaining screws from the bottom corners of chassis.
5. Remove earphone jack retaining nut and hex head screw that retains the terminal board next to earphone jack. Then unsolder the two speaker leads from the speaker.
6. Unsnap the LDR mounting bracket from the mounting boss.

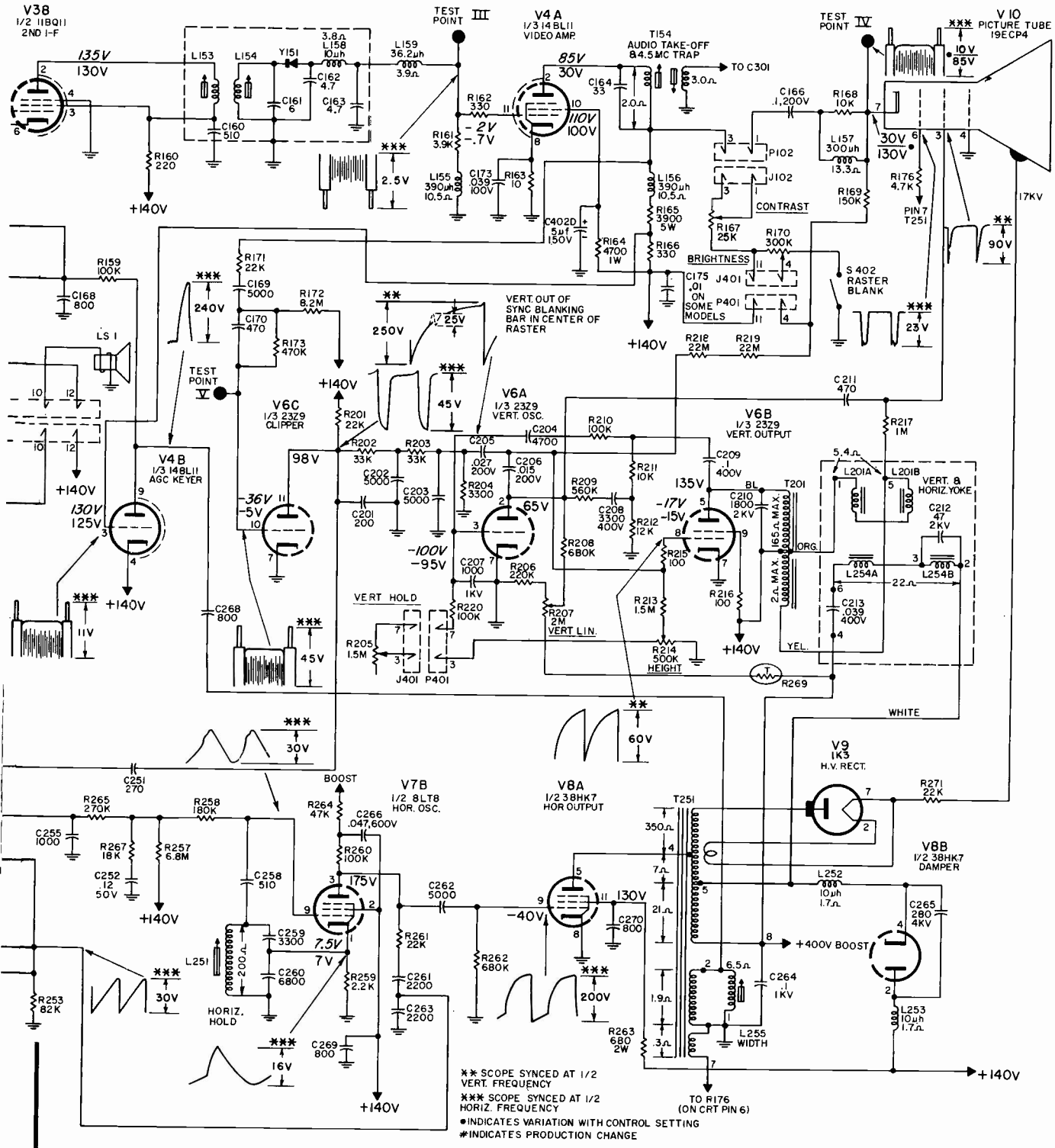
The chassis is now slid back from the cabinet front and the yoke is then removed. Reassemble in the reverse order of disassembly. Notice that the front of the chassis is retained by two plastic bosses molded into the cabinet front. These bosses mate with two slots in the front apron of the chassis.



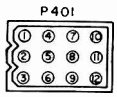
NOTE: FOR USE WITH 100Ω SPEAKER CONNECT DARK GREEN LEAD FROM VOLUME CONTROL TO TERMINAL #2 ON 71-6S

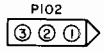
DD CHASSIS

GENERAL ELECTRIC Chassis DD Schematic Diagram, Continued



SERIES DD CHASSIS SCHEMATIC DIAGRAM





NOTE- COMPONENTS INDICATED WITH ASTERISK ARE IN REMOTE MODELS ONLY.

1. ALL VOLTAGE MEASUREMENTS MADE WITH A VTVM WITH RESPECT TO CHASSIS GROUND, RECEIVER CONTROLS SET FOR NORMAL OPERATION. MEASUREMENTS MAY DEVIATE ± 10% AT 120V AC LINE VOLTAGE.
2. WHERE ON-SIGNAL & OFF-SIGNAL MEASUREMENTS VARY TWO VOLTAGES ARE SHOWN ON-SIGNAL VOLTAGE APPEARS IN *ITALICS* OVER OFF-SIGNAL VOLTAGE
ON-SIGNAL VOLTAGES & WAVE SHAPES TAKEN WITH A NOISE FREE SIGNAL PRODUCING -2.5 TO -3.5 VOLTS AGC AT VHF TUNER.
OFF-SIGNAL VOLTAGES TAKEN WITH ANT. DICONNECTED & ANTENNA TERMINALS SHORTED TO-GETHER ON UNUSED CHANNEL.
ALL OTHER CONTROLS ARE ADJUSTED FOR NORMAL OPERATION.

INTERCONNECTING WIRING

▲1 GREEN WIRE TO POWER TRANSF. SECONDARY
▲2 GREEN WIRE TO POWER TRANSF. SECONDARY
▲3 WHITE WIRE TO RELAY COIL L3
▲4 WHITE WIRE TO R9, SENSITIVITY CONTROL
▲5 YELLOW WIRE TO R9 SENSITIVITY CONTROL
▲6 BLACK WIRE TO R9 SENSITIVITY CONTROL
▲7 CENTER CONDUCTOR OF TRANSDUCER INPUT CABLE
▲8 SHIELD BRAID OF TRANSDUCER INPUT CABLE
▲9 YELLOW WIRE TO RELAY COIL L4
▲10 RED WIRE TO RELAY COILS L3 & L4

GENERAL INFORMATION

The 2R100 Remote Control System utilizes frequencies of 41.5 and 38.5KC to perform the functions of ON—OFF—VOLUMEsstepping and CHANNEL selection.

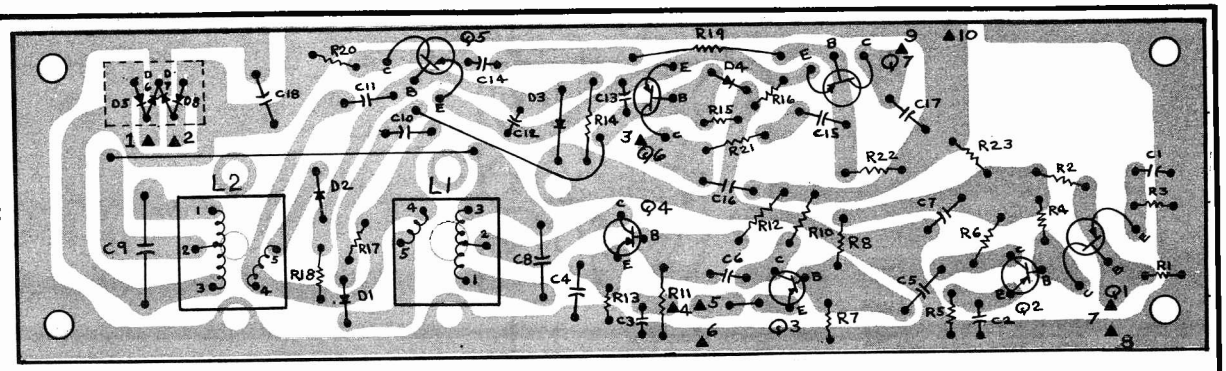
The Remote Receiving unit is self-contained and is completely transistorized while, the two button transmitter is of the mechanical variety utilizing metal rods to produce the necessary activating frequencies.

The Remote Receiver is supplied AC Power when the OFF—ON—VOLUME Switch on the front of the T.V. receiver is in the ON position . This then allows the user to remotely control the T.V. Receiver with the two button transmitter.

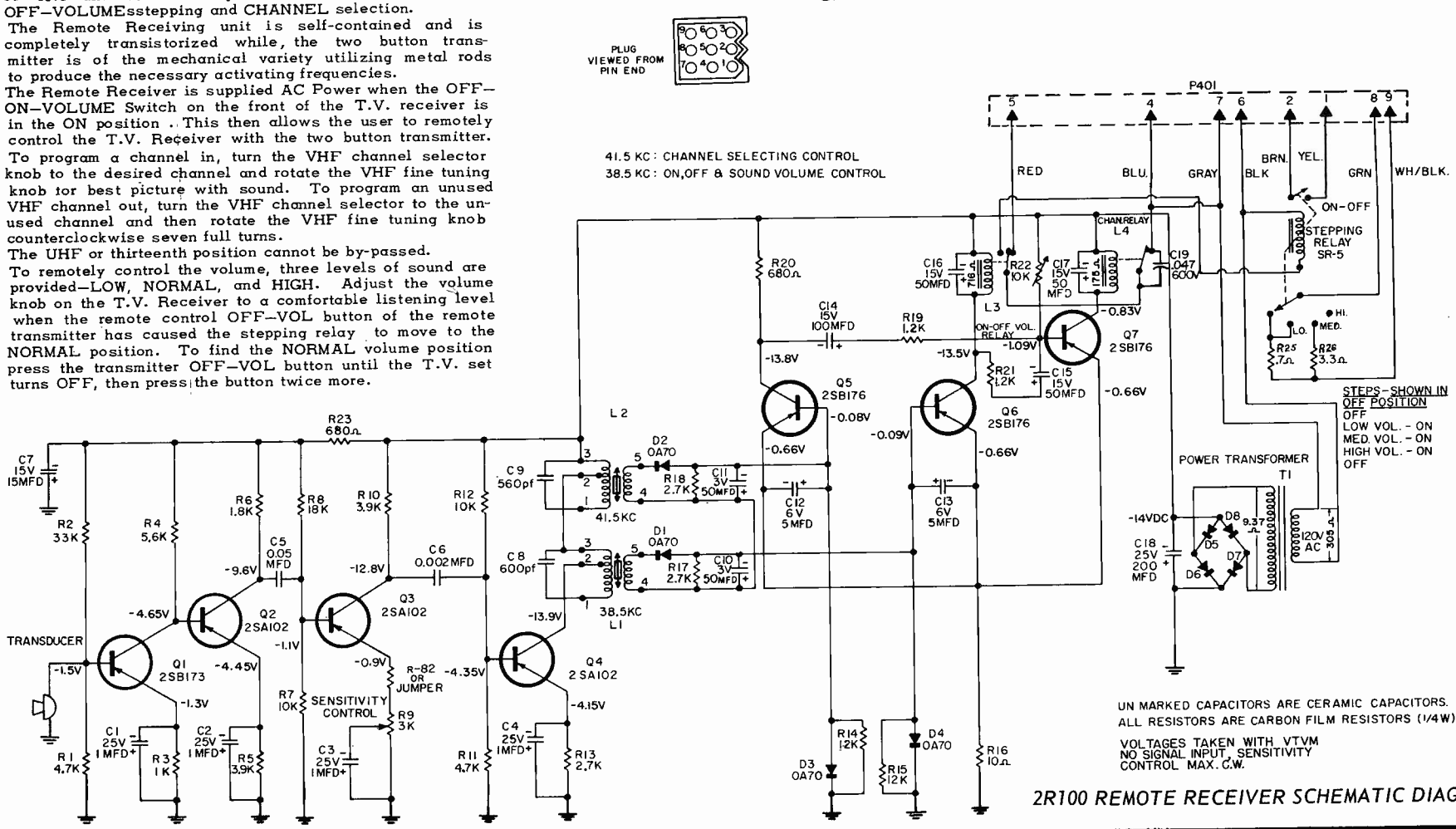
To program a channel in, turn the VHF channel selector knob to the desired channel and rotate the VHF fine tuning knob for best picture with sound. To program an unused VHF channel out, turn the VHF channel selector to the unused channel and then rotate the VHF fine tuning knob counterclockwise seven full turns.

The UHF or thirteenth position cannot be by-passed.

To remotely control the volume, three levels of sound are provided—LOW, NORMAL, and HIGH. Adjust the volume knob on the T.V. Receiver to a comfortable listening level when the remote control OFF—VOL button of the remote transmitter has caused the stepping relay to move to the NORMAL position. To find the NORMAL volume position press the transmitter OFF—VOL button until the T.V. set turns OFF, then press the button twice more.



CIRCUIT BOARD COMPONENT VIEW



2R100 REMOTE RECEIVER SCHEMATIC DIAGRAM

G.E. 2R100 Remote Control used in DD Chassis

GENERAL ELECTRIC

Chassis S-2

Models M150SWH-2, M151SEB-2, M506SVY-2, M507SEB-2, M510SEB-2

ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY: Adjust R209 and R206 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of mask.

HORIZONTAL HOLD: With controls set for normal operation, tune in a station. Connect a .1 uf capacitor between Test Point VI and ground. Adjust L251 for a picture which barely floats across the screen; then remove the capacitor.

PICTURE TUBE ADJUSTMENTS

PICTURE TILT: To correct picture tilt, loosen the clamp on the yoke and carefully adjust the yoke for proper picture display. Then release the clamp to secure the yoke.

PICTURE CENTERING: Rotate the two centering rings located at the rear of the yoke assembly until picture is properly centered.

FIELD AUDIO ADJUSTMENT

1) Properly tune in a strong local signal and set the volume control to a low audible level.
2) Adjust L302 Quad. Coil for maximum, buzz free audio output. Start with core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3) Reduce signal to low level by switching to a weak station or reduce signal with step type attenuator.
4) Detune fine tuning away from audio until distortion occurs.
5) Adjust secondary of L301 Interstage Transformer (bottom core) for best audio.
6) Adjust secondary of L165B Take-Off Transformer (top core) for best audio.
7) Adjust primary of L301 Interstage Transformer (top core) for best audio.
8) Alignment is to be made in exact order prescribed. Do not retouch any adjustment except Quad. Coil unless sequence is repeated.

NOTE: L165A Primary (bottom core) 4.5 MC, trap is factory aligned and should not be adjusted. If accidently mistuned, it may be reset by turning core downward until it bottoms on the circuit board. Then turn core up into the coil eight (8) complete turns.

DISASSEMBLY

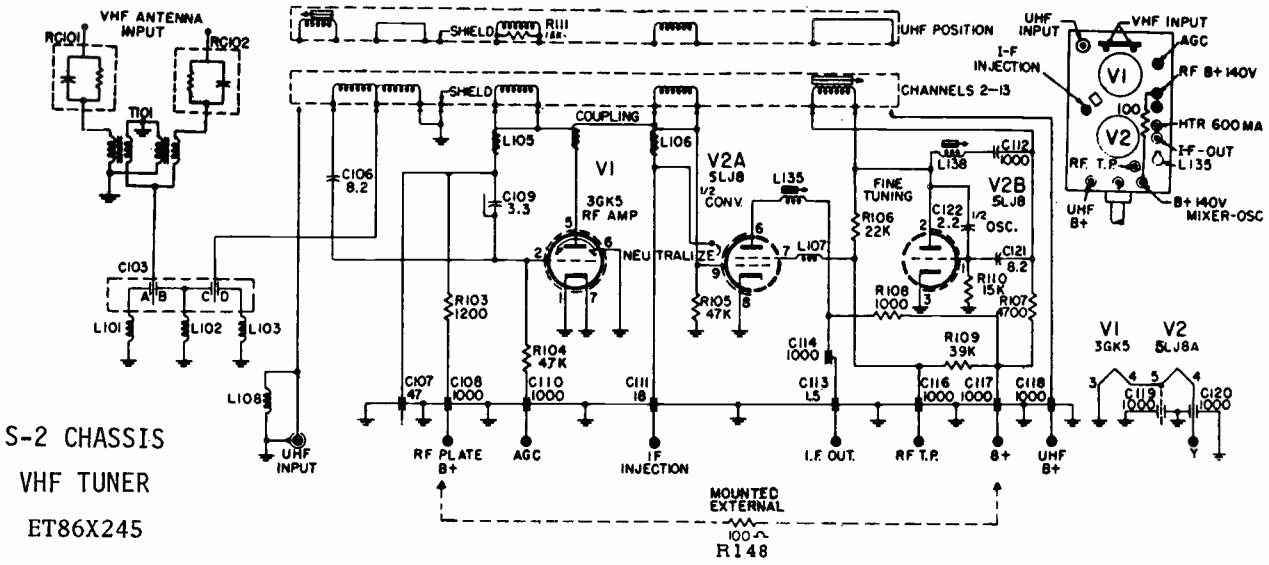
To remove the cabinet back, disconnect all leads from the antenna terminal board and remove the five screws holding the back to the cabinet front. Carefully disengage the power interlock and pull the back away from the front assembly.

The chassis circuit board may be withdrawn for service when the back and secondary control knobs have been removed. Disconnect the anode lead from the CRT and remove the hex head screw which holds the electrolytic support clamp to the tuner bracket. Carefully slide the circuit board back along the retaining slots. If necessary, the speaker may be removed by detaching the retaining clips holding it to the cabinet front.

The tuner package may be removed by taking off the tuning knobs removing the hex head screws holding it to the cabinet front and detaching the grounding strap. The UHF tuner is attached to the tuner mounting bracket by three screws.

To remove the picture tube, first dismount the chassis and tuner assembly, and remove the yoke and CRT socket. Place the cabinet face down on a soft, cloth-covered surface. Loosen the CRT sling screw, remove the screws holding the mounting brackets at the corners, and take off the CRT sling. Carefully lift out the picture tube.

When reassembling, make certain that the grounding straps are properly connected.

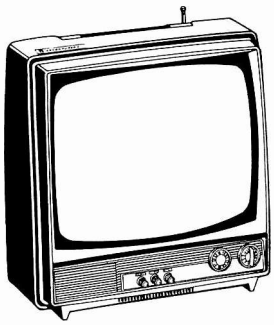


S-2 CHASSIS

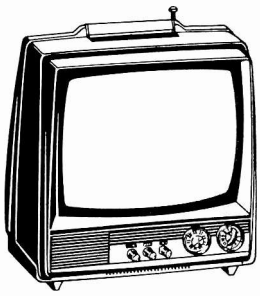
VHF TUNER

ET86X245

GENERAL ELECTRIC Chassis S-2 Schematic Diagram

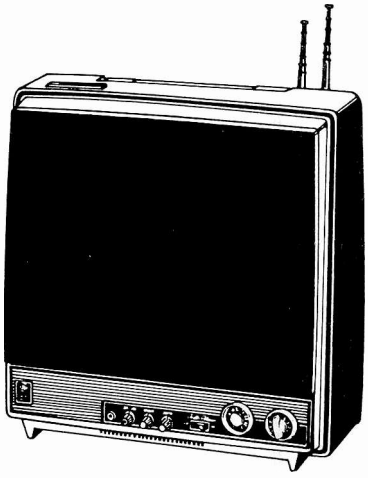


M506SVY-2
M507SEB-2

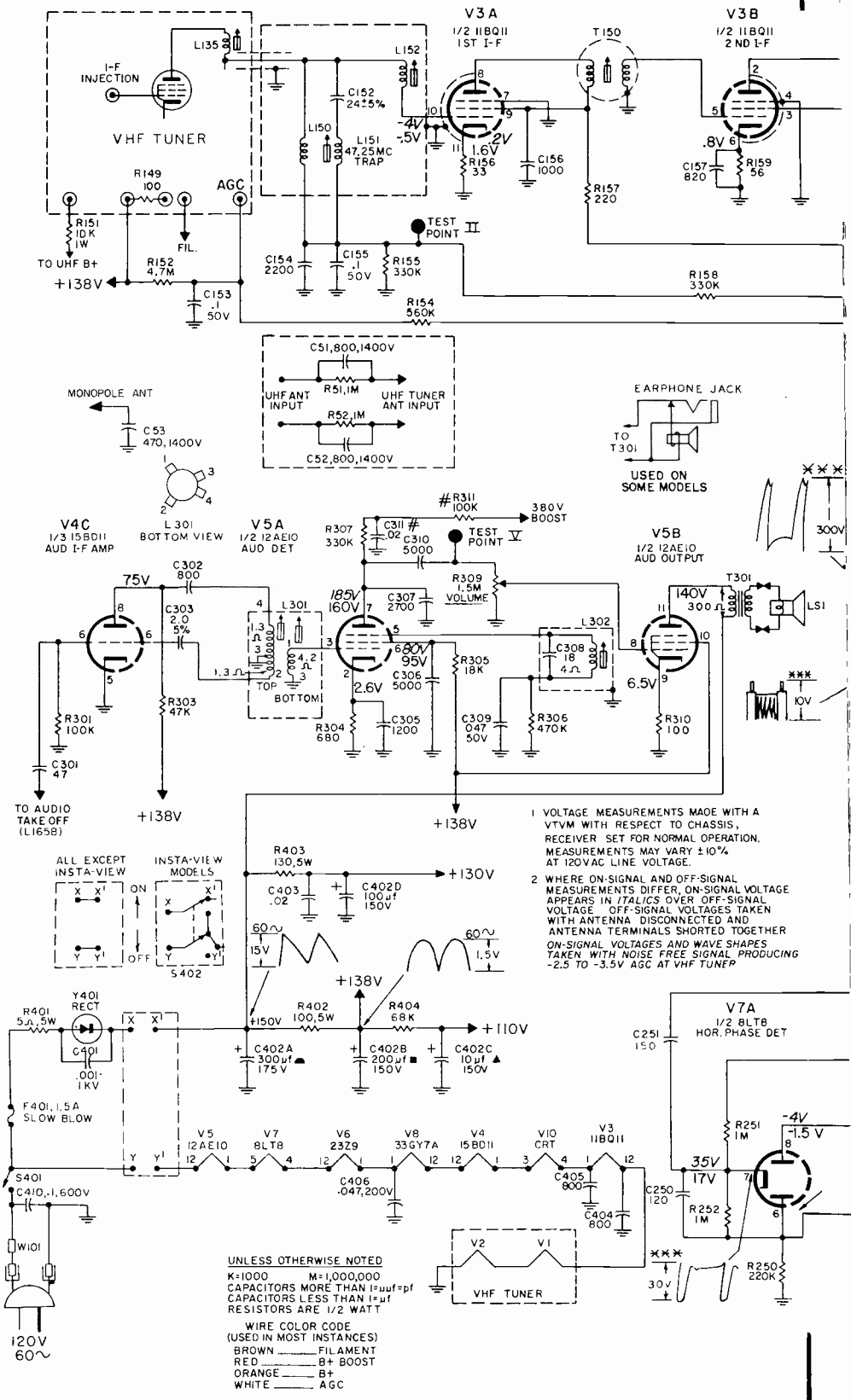


M150SWH-2

M151SEB-2



M510SEB-2



1 VOLTAGE MEASUREMENTS MADE WITH A VTVM WITH RESPECT TO CHASSIS, RECEIVER SET FOR NORMAL OPERATION. MEASUREMENTS MAY VARY ±10% AT 120VAC LINE VOLTAGE.

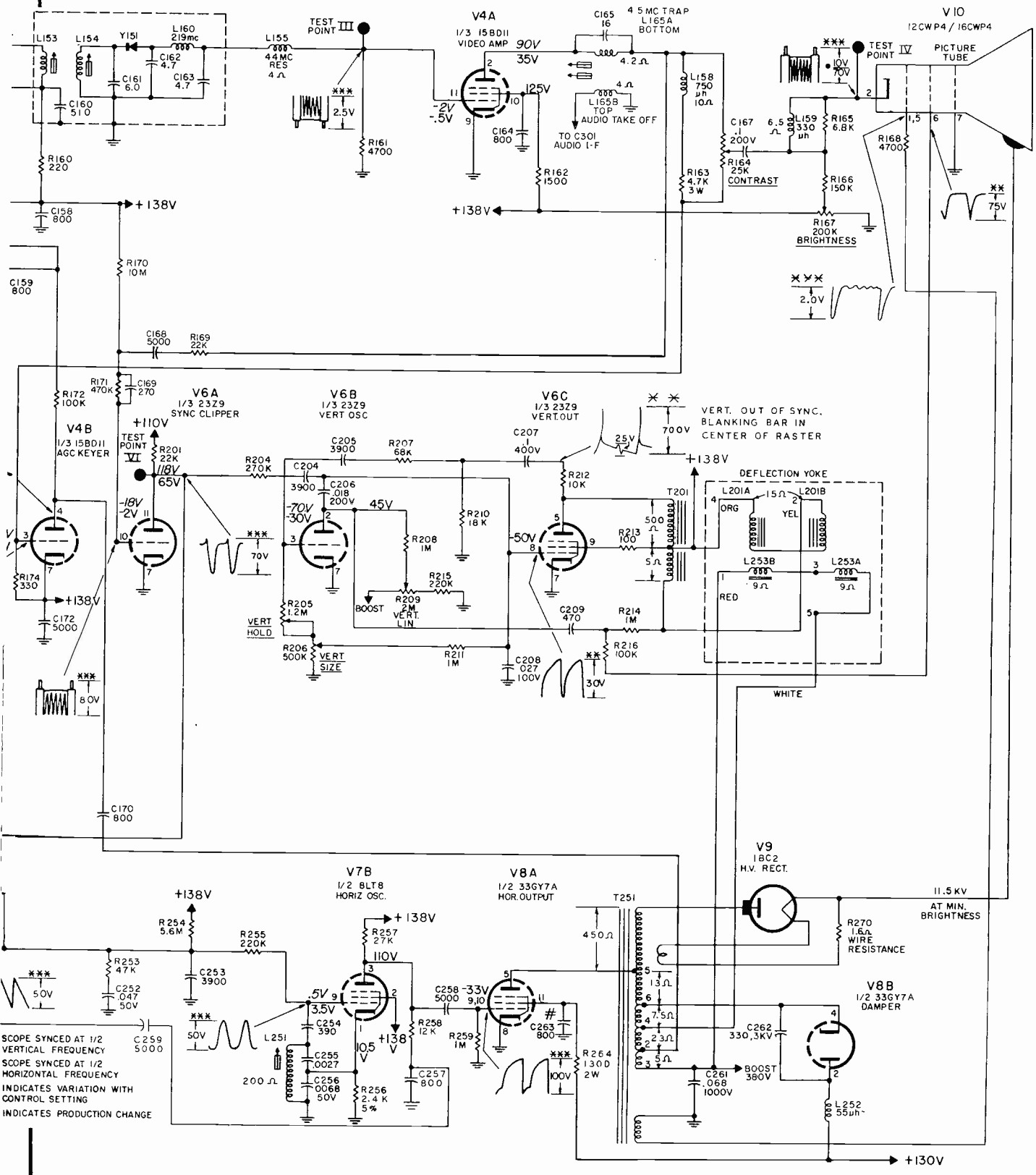
2 WHERE ON-SIGNAL AND OFF-SIGNAL MEASUREMENTS DIFFER, ON-SIGNAL VOLTAGE APPEARS IN *ITALICS* OVER OFF-SIGNAL VOLTAGE. OFF-SIGNAL VOLTAGES TAKEN WITH ANTENNA DISCONNECTED AND ANTENNA TERMINALS SHORTED TOGETHER

ON-SIGNAL VOLTAGES AND WAVE SHAPES TAKEN WITH NOISE FREE SIGNAL PRODUCING -2.5 TO -3.5V AGC AT VHF TUNER

UNLESS OTHERWISE NOTED
K=1000 M=1,000,000
CAPACITORS MORE THAN 1=µµf=pf
CAPACITORS LESS THAN 1=µf
RESISTORS ARE 1/2 WATT

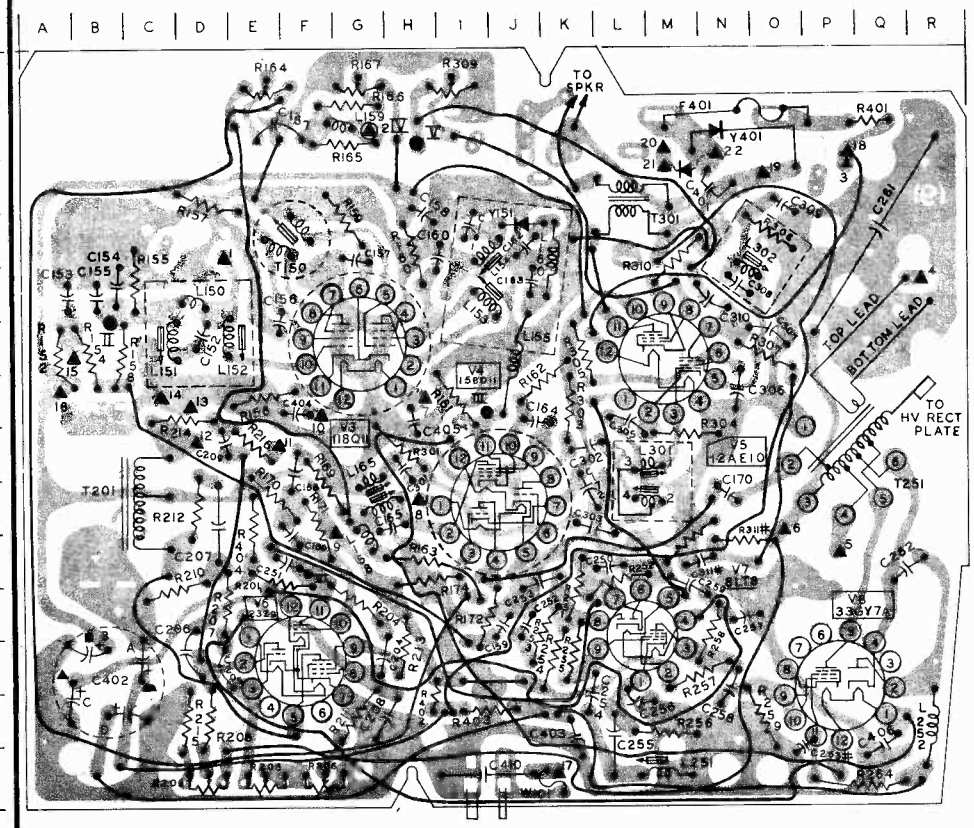
WIRE COLOR CODE
(USED IN MOST INSTANCES)
BROWN ____ FILAMENT
RED ____ B+ BOOST
ORANGE ____ B+
WHITE ____ AGC

GENERAL ELECTRIC Chassis S-2 Schematic Diagram, Continued



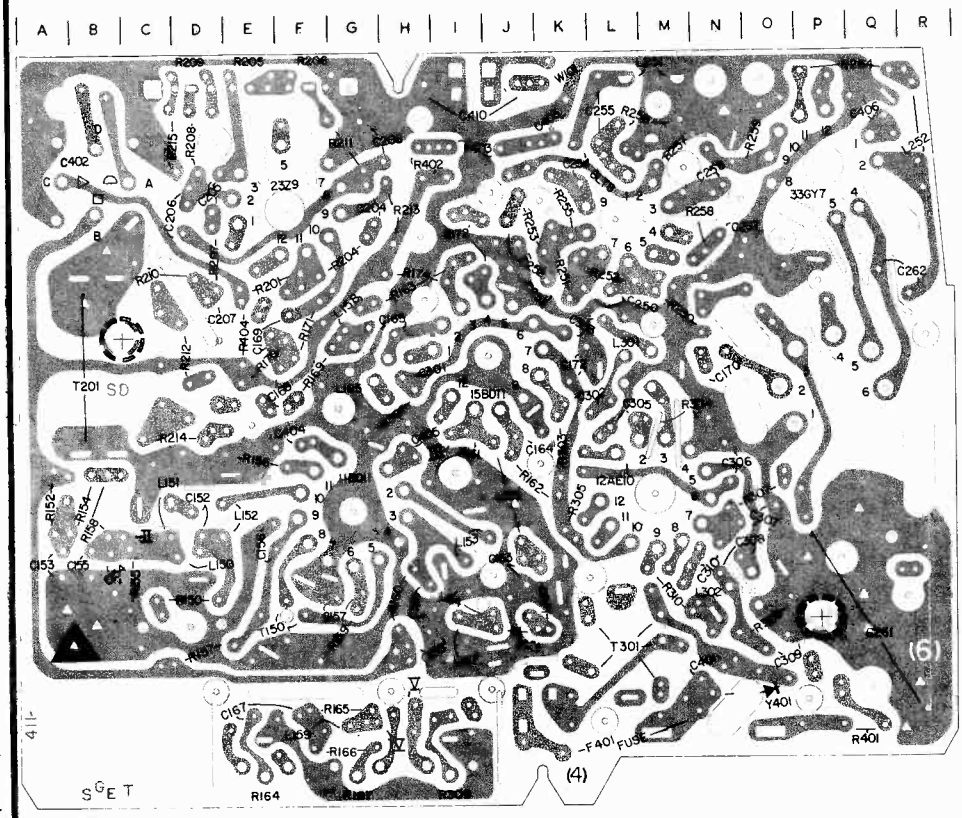
S-2 CHASSIS

GENERAL ELECTRIC Chassis S-2 Servicing Information, Continued



COMPONENT SIDE VIEW

# Indicates a production change



COPPER SIDE VIEW

RESISTORS				CAPACITORS	
R152	A7	R255	K12	C152	D6
R154	B6	R256	M13	C153	A5
R155	C5	R257	M12	C154	B5
R156	E7	R258	N11	C155	B5
R157	D3	R259	O13	C156	E6
R158	C6	R264	Q14	C157	G4
R159	G4	R301	H8	C158	H4
R160	H4	R303	K7	C159	J11
R161	I7	R304	M8	C160	H4
R162	J7	R305	K6	C161	I4
R163	H10	R306	O3	C162	J4
R164	E1	R307	O6	C163	J5
R165	G2	R309	I1	C164	J7
R166	G2	R310	M4	C165	H9
R167	G1	R311	O10	C167	E2
R169	F8	R401	Q2	C168	F8
R170	E9	R402	H13	C169	F10
R171	F9	R403	I13	C170	N9
R172	I11	R404	E9	C172	K9
R174	H10			C204	G12
R201	E10	COILS		C205	D12
R204	G11	L150	D5	C206	D12
R205	E14	L151	C6	C207	D9
R206	F14	L152	E6	C208	G13
R207	D11	L153	I5	C209	D8
R208	D13	L154	I4	C250	L10
R209	D14	L155	L6	C251	E10
R210	C11	L158	G10	C252	J11
R211	G13	L159	G2	C253	J10
R212	D9	L160	K4	C254	K13
R213	H12	L165	G8	C255	L13
R214	C7	L251	M14	C256	L13
R215	D13	L252	R13	C257	M11
R216	E8	L301	M8	C258	N12
R250	M10	L302	N5	C259	M10
R251	K11			C261	Q4
R252	L10	DIODES		C262	Q10
R253	J12	Y151	J4	C263	P14
R254	K12	Y401	N2	C301	H8
				C302	K8
FUSES		TUBES		C303	K9
F401	N2	V3	G6	C305	L7
W101	J14	V4	J9	C306	N7
TRANSFORMERS		V5	M6	C307	O6
T150	F4	V6	E12	C308	N5
T201	C9	V7	L11	C309	O3
T251	P8	V8	P12	C310	N5
T301	L3	TEST POINTS		C311	N10
		TP II	B6	C401	N3
		TP III	I7	C402	B12
		TP IV	G2	C403	K13
		TP V	H2	C404	F7
		TP VI	F10	C405	H7
				C406	Q13
				C410	I14

TRIANGLE (▲–O) NUMBERS

INDICATE WIRE CONNECTIONS

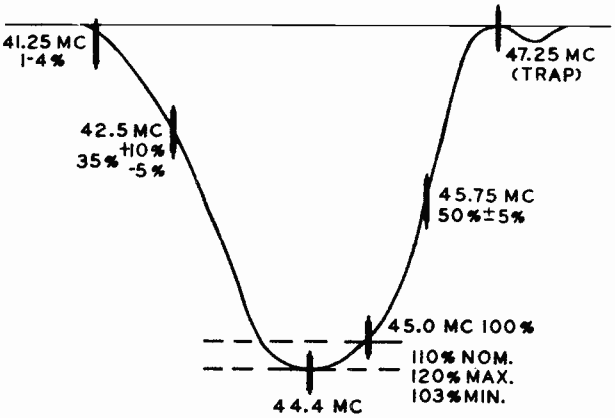
- ▲ 1. SHIELDED LEAD FROM TUNER IF
- ▲ 2. YELLOW LEAD TO P2 CRT SOCKET
- ▲ 3. BROWN LEAD TO S401 ON R309
- ▲ 4. BLUE LEAD TO R160 ON CRT
- ▲ 5. WHITE LEAD TO YOKE TERM 5
- ▲ 6. RED LEAD TO YOKE TERM 1
- ▲ 7. BROWN LEAD TO PIN 4 CRT
- ▲ 8. BROWN LEAD TO PIN 3 CRT
- ▲ 9. ORANGE LEAD TO YOKE TERM
- ▲ 10. BROWN LEAD TO VHF TUNER
- ▲ 11. GREEN LEAD TO PIN 6 CRT
- ▲ 12. YELLOW LEAD TO YOKE TERM 2
- ▲ 13. BLACK LEAD TO PIN 7 CRT
- ▲ 14. BLACK LEAD FROM TUNER GR
- ▲ 15. WHITE LEAD TO VHF TUNER AGC
- ▲ 16. ORANGE LEAD TO TUNER C138V B+
- ▲ 17. BROWN LEAD TO S401 ON R309

GENERAL ELECTRIC Chassis S-2 Alignment Information, Continued

VIDEO I-F SYSTEM

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up. Power the receiver from an isolation transformer.

1) Turn volume control and fine tuning counterclockwise, and contrast control fully clockwise. Set channel selector to Channel 11. Short antenna terminals together.
2) Connect oscilloscope to Test Point III thru 22,000 ohms resistor not more than 1.5 inches away from Test Point III. Connect a variable bias supply (0-20V) between Test Point II and chassis. Set bias at -3.5V.
3) Inject signals from a properly terminated generator through the I-F INJECTION NETWORK shown, to the I-F injection point on the VHF Tuner.
4) Align the receiver to produce the response curve illustrated.
5) Position all cores at ends of coils away from circuit board except as noted below.

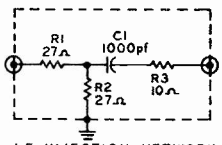


I-F RESPONSE CURVE

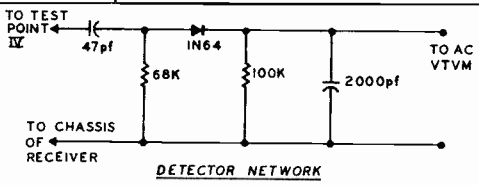
AM PRE-PEAKING & TRAP FREQUENCIES

L151 ..... Min. 47.25 MC	T150..... Max. 44.4 MC
	L152..... Max. 44.4 MC
L135 ....,... Max. 45.75 MC	L154, L153. Max. 44.4 MC

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	L151 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal.
2	44.4 MC AM, scope calibrated 3V PP for 2" deflection.	L154, then L153 for maximum.	Position L153 core at end of coil nearer circuit board. Maintain 2" deflection on scope by adjusting signal strength.
3		T150 for maximum.	
4	38-48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2" deflection; markers at 41.25, 42.5, 44.4, 45.0, 45.75 MC 47.25 MC	L135 for maximum deflection of the 45.75 MC marker.	
5		L152 for proper nose shaping.	
6		Turn L135 core clockwise to place 45.75 MC marker at 50%.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.
7		Readjust L152 to shape nose around 44.4 MC pivot.	
8		Readjust T150 for proper placement of 42.5 MC marker if curve is too narrow.	Repeat Step 7 to shape nose after Steps 8 and 9.
9		Spread or knife turns of L150 if 42.5MC marker is above 30%	



I-F INJECTION NETWORK



DETECTOR NETWORK

AUDIO ALIGNMENT PROCEDURE

GENERAL: Allow the receiver and test equipment at least 20 minutes warm-up. Power the receiver from 120 Volts AC through an isolation transformer. A speaker, or a 3.2 ohm, 5 watt dummy should be connected across the audio output transformer secondary at all times.

CHASSIS PREPARATION:

1) Brightness, Horizontal, and Vertical controls should be set for a normal picture.
2) Set the contrast control to maximum and the volume control to minimum.
3) Connect a -10 Volt DC bias to Test Point II with the positive lead grounded to the chassis.
4) Connect a -0.5 Volt DC bias to Test Point III through a 750 uh isolation choke (ET36X376).

4.5 MC TRAP ADJUSTMENT:

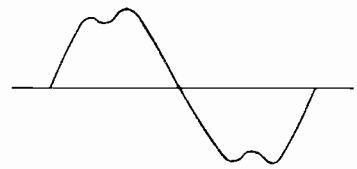
1) Pre-set the Quadrature coil (L302) with the core flush to the top of the coil form, away from the circuit board.
2) Connect the DETECTOR NETWORK shown to Test Point IV and feed the output to an AC VTVM.
3) Apply a 100 mv, 40% modulated, 4.5 MC AM signal through a DC blocking capacitor (.05 mfd) to Test Point III.
4) Adjust L165A 4.5 MC Trap (bottom core) for minimum reading on the VTVM at Test Point IV (± 1/4 turn).
5) Remove the 4.5 MC AM signal and the detector network.

AUDIO ALIGNMENT:

1) Connect an oscilloscope to Test Point V through a 22,000 ohm resistor.
2) Feed in a 50 uv, 4.5 MC, ± 7.5 KC FM signal at Test Point III through a blocking capacitor.
3) Adjust Quad Coil L302 for maximum undistorted sine wave on the oscilloscope. Start with the core away from the circuit board and tune into the coil form for the second peak indication.
4) Reduce the level of the FM input signal until distortion break-up of the sine wave appears.
5) Align the Audio Interstage (L301) secondary (bottom core) until the break-up of the sine wave is symmetrical, as shown in the diagram below.
6) Align the Sound Take-Off L165B (top core) as in steps 4 and 5 above.
7) Align the Interstage primary (L301 top core) as in steps 4 and 5 above.

NOTE: Each core should be aligned once only. Do not go back and touch up previously adjusted cores while aligning.

8) Disconnect signal generator, oscilloscope, and bias supplies.



GENERAL ELECTRIC

VC CHASSIS
V-1 CHASSIS

MODELS
M106VGY-1
M107VRD-1
M108CSD
M138CVY
M138VVY - 1

DISASSEMBLY PROCEDURE

CABINET BACK:

Disconnect all antenna leads from the screw terminals on the antenna strip. Remove the four screws from the cabinet front and carefully pull the cabinet back to the rear.

To reassemble the back, place the receiver face down on a soft clean cloth. Slide the back on carefully, making sure the power interlock engages. Then return the receiver to an upright position and replace the four screws which hold the front and back sections together..

CHASSIS REMOVAL:

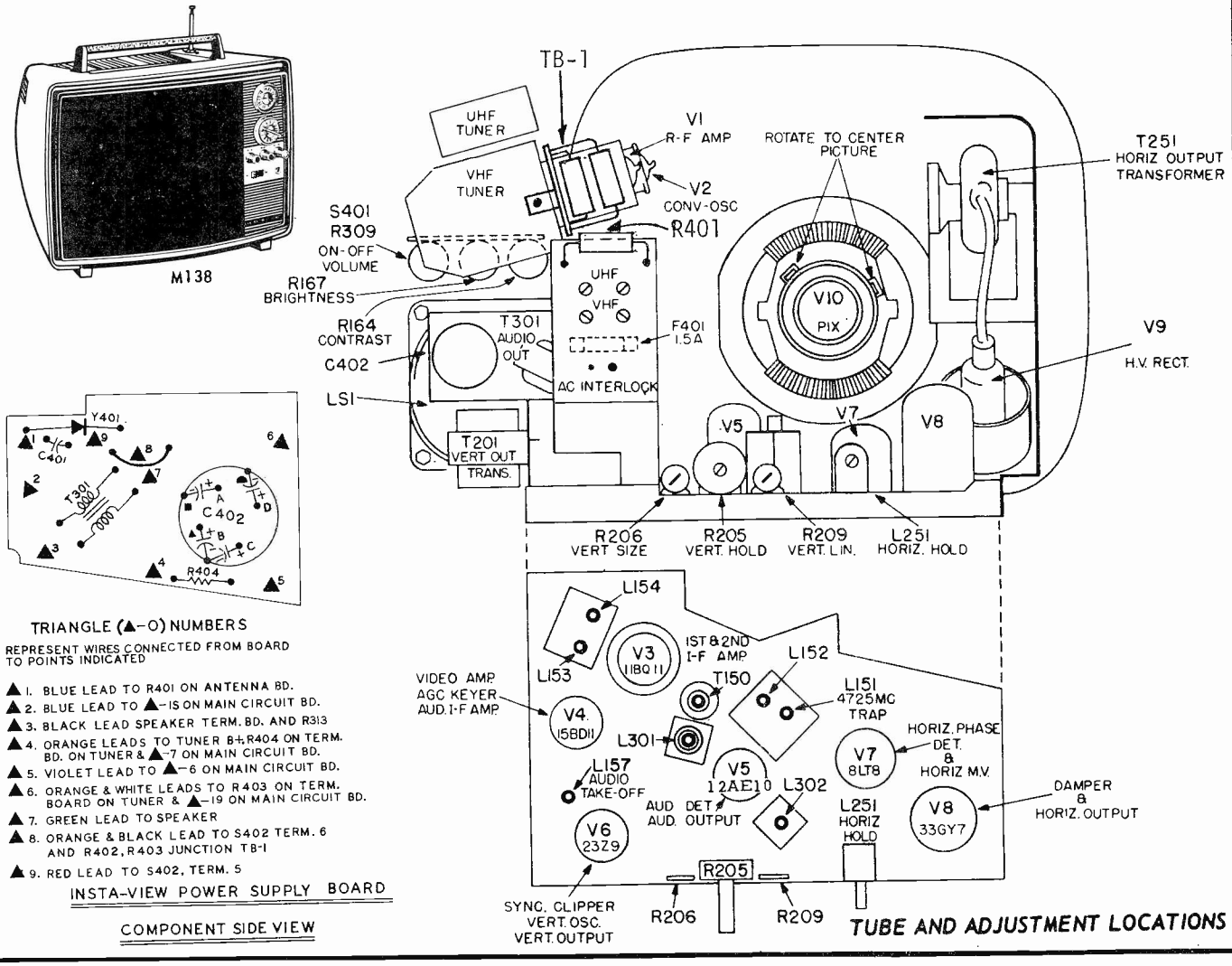
Remove the cabinet back and the knobs from the VHF and UHF tuners. Take out the two screws which retain the tuner; tilt the receiver forward and remove the two screws holding the chassis frame to the front assembly. Remove the anode lead, socket and yoke from the picture tube. The chassis may now be separated from the front assembly sufficiently for servicing operations.

PICTURE TUBE REPLACEMENT:

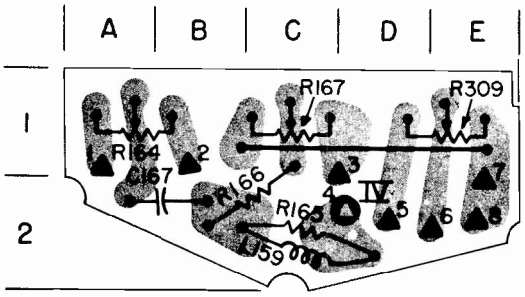
Separate the chassis and front assembly as described. Place the front assembly face down on a soft cloth and remove the four screws and clamps holding the CRT in place. The picture tube may now be withdrawn from the assembly. In reassembling, make sure the picture tube grounding straps are properly connected.

ACCESS TO FRONT CONTROLS

The brightness, contrast and volume controls occupy a miniature circuit board which is mounted on the cabinet front by means of a single clip, and may be pulled away from the front assembly once the knobs have been removed.



FRONT CONTROL BOARD VIEWED FROM COMPONENT SIDE

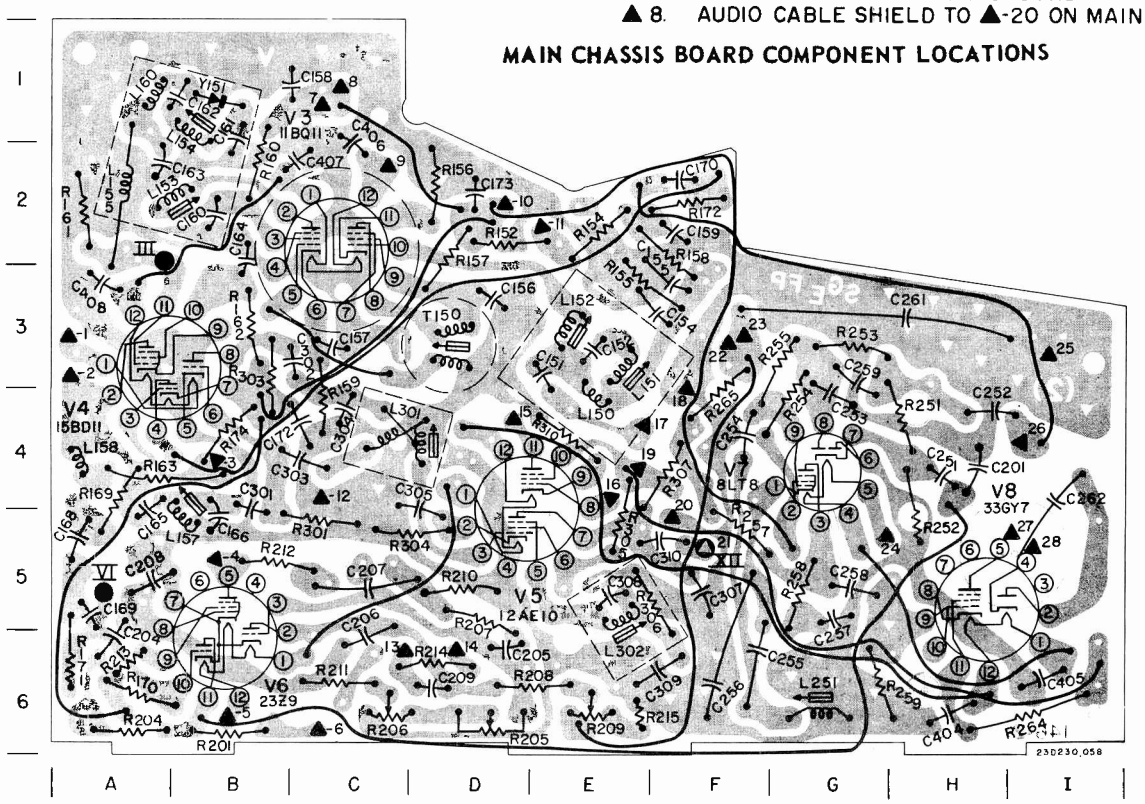


TRIANGLE (▲-O) NUMBERS

REPRESENT WIRES CONNECTED FROM BOARD TO POINTS INDICATED.

- ▲ 1. YELLOW LEAD TO ▲-2 ON MAIN CIRCUIT BD.
- ▲ 2. ORANGE AND GREEN LEAD TO ▲-3 ON MAIN CIRCUIT BOARD
- ▲ 3. ORANGE LEAD TO ▲-8 ON MAIN CIRCUIT BD.
- ▲ 4. YELLOW LEAD TO PIN 2 OF PICTURE TUBE
- ▲ 5. YELLOW AUDIO CABLE LEAD TO ▲-21 ON MAIN CIRCUIT BOARD
- ▲ 6. GREEN AUDIO CABLE LEAD TO ▲-16 ON MAIN CIRCUIT BOARD
- ▲ 7. BLACK LEAD TO CHASSIS GROUND
- ▲ 8. AUDIO CABLE SHIELD TO ▲-20 ON MAIN CIRCUIT BD.

MAIN CHASSIS BOARD COMPONENT LOCATIONS



BOARD VIEWED FROM COMPONENT SIDE

BOARD COMPONENT LOCATIONS BY COORDINATES

RESISTORS		CAPACITORS			COILS
R152—D2	R207—D5	C151—E3	C172—B4	C261—H3	L150—E4
R154—E2	R208—E6	C152—E3	C173—D2	C262—I4	L151—E3
R155—E3	R209—E6	C154—F3	C201—H4	C301—B4	L152—E3
R156—D7	R210—D5	C155—F3	C204—A6	C302—C3	L153—B2
R157—D2	R211—C6	C156—D3	C205—D6	C303—C4	L154—B1
R158—F2	R212—B5	C157—C3	C206—C5	C304—C4	L155—A2
R159—C4	R213—A6	C158—C1	C207—C5	C305—D4	L157—B5
R160—B2	R214—D6	C159—F2	C208—A5	C307—F5	L158—A4
R161—A2	R215—F6	C160—B2	C209—D6	C308—E5	L160—A1
R162—B3	R251—H4	C161—B1	C251—H4	C309—F6	L251—G6
R163—A4	R252—H5	C162—B1	C252—H4	C310—F5	
R169—A4	R253—G3	C163—B2	C253—G4	C404—H6	L301—C4
R170—A6	R254—G4	C164—B2	C254—F4	C405—I6	
R171—A6	R255—G3	C165—A5	C255—G6	C406—C1	T150—D3
R172—F2	R257—F5	C166—B5	C256—F6	C407—C2	
R174—B2	R258—G5	C168—A5	C257—G5	C408—A3	
R201—B6	R259—H6	C169—A5	C258—G5		
R204—A6	R264—I6	C170—F2	C259—G3		
R205—D6	R265—F4	R303—B3	R305—E5	R307—F4	
R206—C6	R301—C5	R304—D5	R306—E5	R310—E4	

TRIANGLE (▲-O) NUMBERS

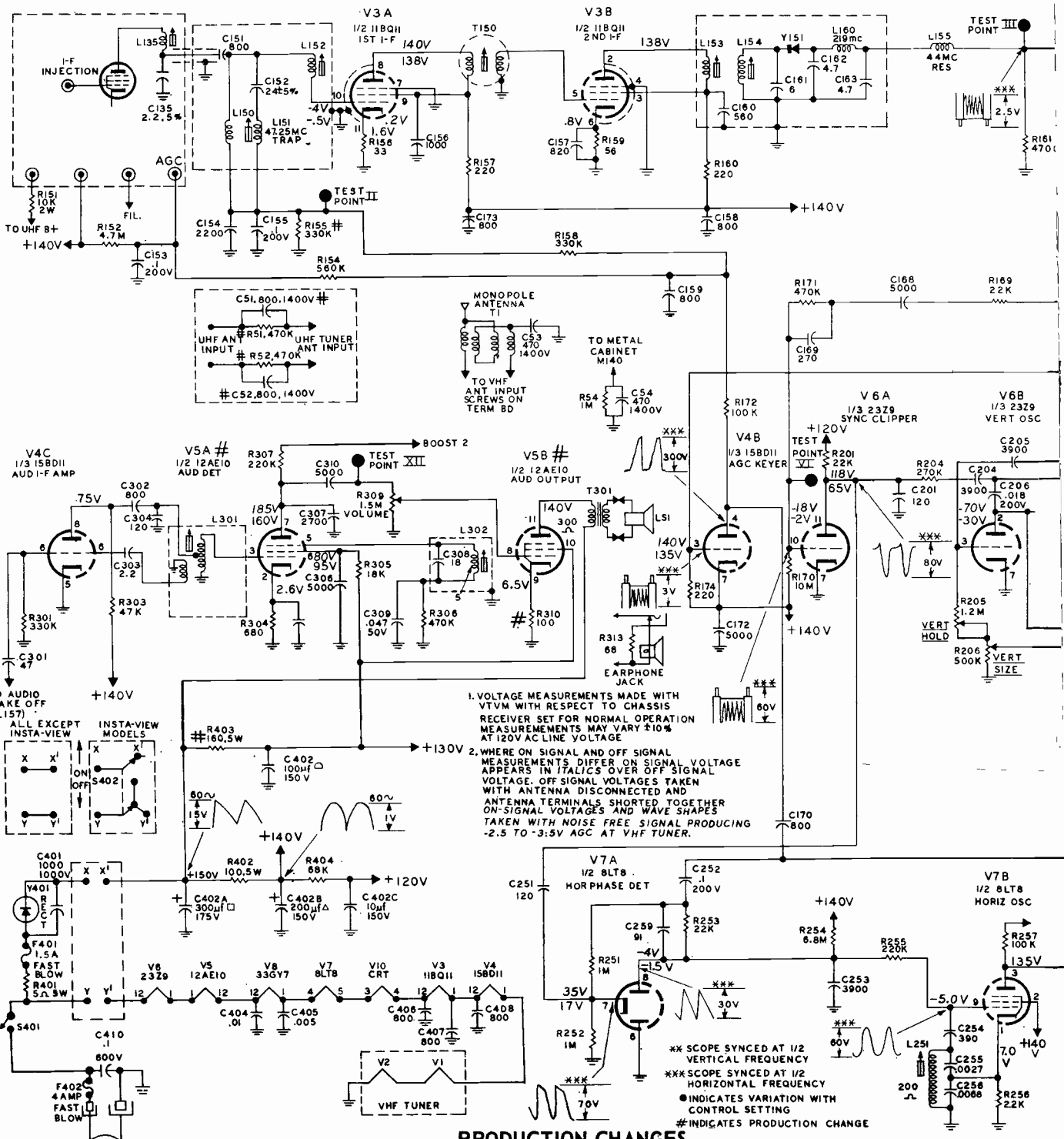
REPRESENT WIRES CONNECTED FROM BOARD TO POINTS INDICATED

- ▲ 1 BROWN LEAD TO TUNER FILAMENT
- ▲ 2 YELLOW LEAD TO ▲-1 ON CONTROL BOARD
- ▲ 3 ORANGE & GREEN LEAD TO ▲-2 ON CONTROL BD
- ▲ 4 BLUE LEAD TO T201 (VERTICAL OUTPUT TRANS
- ▲ 5 BROWN LEAD TO F401 AND S401 (SEE NOTE)
- ▲ 6 VIOLET LEAD TO ▲ 5 ON POWER SUPPLY BD
- ▲ 7 ORANGE LEAD TO ▲ 4 ON POWER SUPPLY BD
- ▲ 8 ORANGE LEAD TO ▲ 3 ON CONTROL BD
- ▲ 9 BROWN LEAD TO PICTURE TUBE PIN 4
- ▲ 10 ORANGE LEAD TO TERMINAL 2 OF YOKE
- ▲ 11 WHITE LEAD TO TUNER AGC
- ▲ 12 BLACK LEAD TO PICTURE TUBE PIN 7
- ▲ 13 GREEN LEAD TO PICTURE TUBE PIN 6
- ▲ 14 YELLOW LEADS TO YOKE TERMINAL 4 AND T201
- ▲ 15 BLUE LEAD TO ▲2 ON POWER SUPPLY BD
- ▲ 16 GREEN LEAD OF AUDIO CABLE ▲-6 VOLUME CONTROL ARM
- ▲ 17 WHITE LEAD OF I-F CABLE TO TUNER I-F INPUT
- ▲ 18 SHIELD OF I-F CABLE TO TUNER GROUND
- ▲ 19 ORANGE AND WHITE LEAD TO ▲6 ON POWER SUPPLY BD
- ▲ 20 AUDIO CABLE SHIELD TO ▲8 ON CONTROL BD
- ▲ 21 YELLOW LEAD OF AUDIO CABLE TO VOLUME CONTROL
- ▲ 22 RED LEAD TO TERMINAL 5 OF YOKE
- ▲ 23 RED LEAD TO TERMINAL 3 OF T251
- ▲ 24 BROWN TO PICTURE TUBE PIN 3
- ▲ 25 BLACK LEAD TO TERMINAL 1 OF T251
- ▲ 26 BLUE LEAD TO TERMINAL 2 OF T251
- ▲ 27 WHITE AND RED LEAD TO TERMINAL 5 OF T251
- ▲ 28 WHITE AND RED LEAD TO TERMINAL 6 OF T251

NOTE TO S402 TERM 6 ON INSTA VIEW MODELS

ROMAN ● III NUMERALS
INDICATES TEST POINTS

GENERAL ELECTRIC Chassis V-1, Schematic Diagram



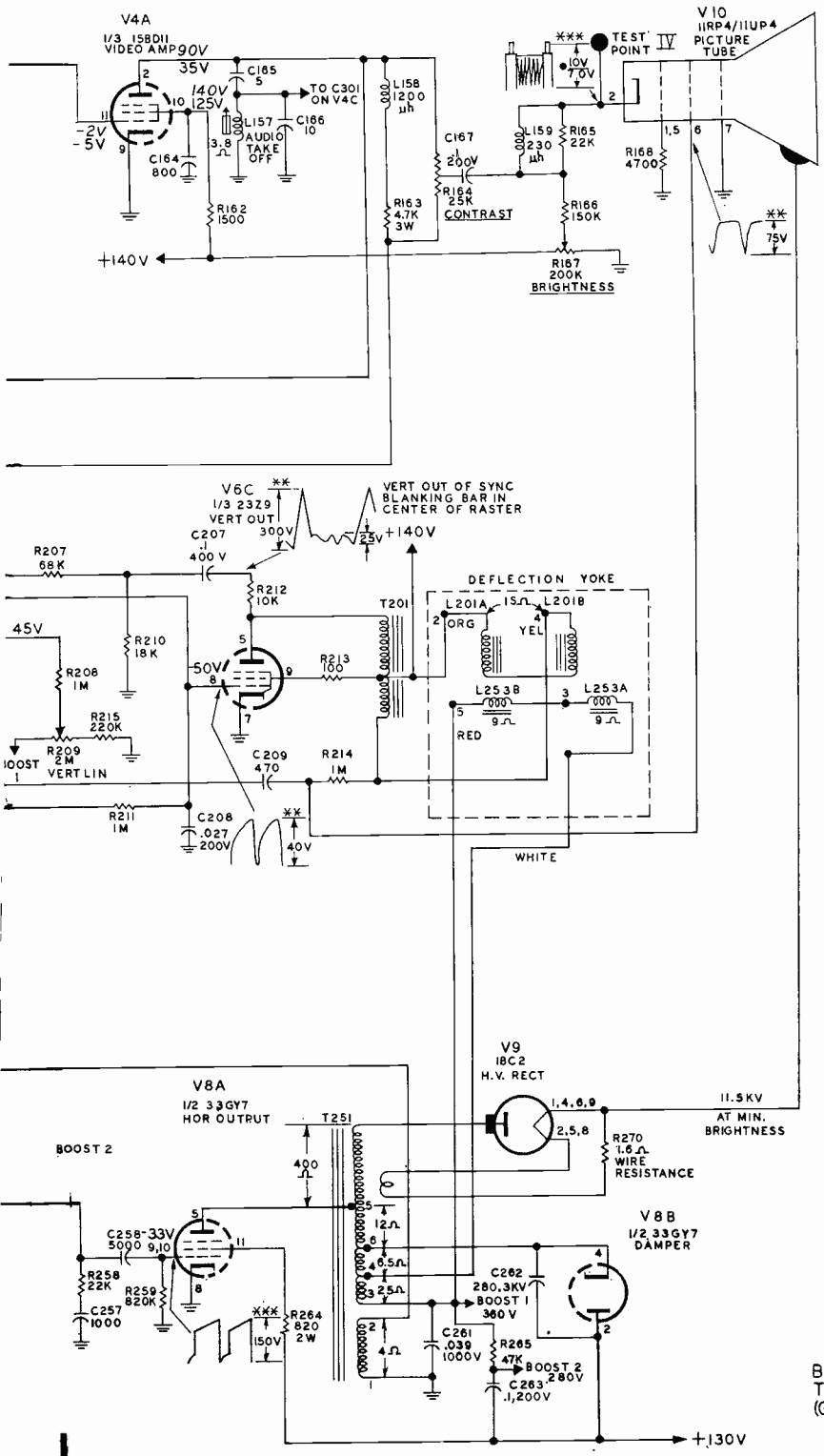
UNLESS OTHERWISE NOTED
K=1000 M=1,000,000
CAPACITORS MORE THAN 1-μμf=pf
CAPACITORS LESS THAN 1-μf
RESISTORS ARE 1/2 WATT

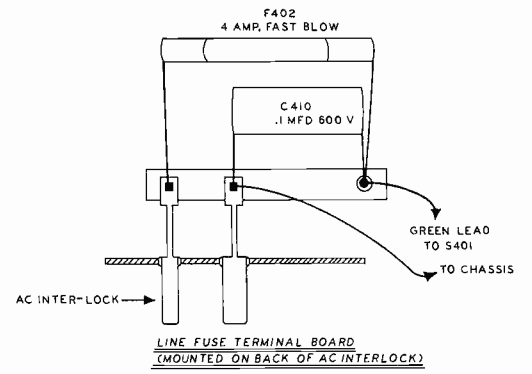
WIRE COLOR CODE USED IN MOST INSTANCES
BROWN——FILAMENT
RED——B+ BOOST
ORANGE——B+
WHITE——AGC

PRODUCTION CHANGES

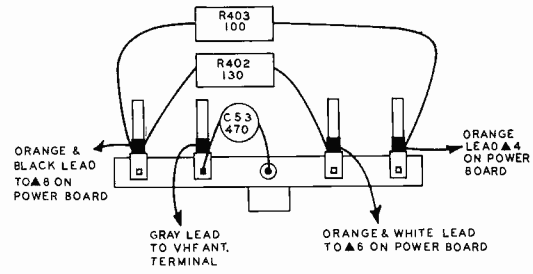
SYMBOL	DESCRIPTION OF CHANGE
R51, C51	Combination may be a 1 megohm, 1/2 watt resistor with a 470pf capacitor (ET22X151) in some models.
R52, C52	Replace with the values used in production.
R155	180K, 1/2 watt used in early production.
R158	820K, 1/2 watt used in early production.
R310	150 ohm, 1/2 watt used on some chassis which have 17BF11 in V5 application.
R403	130 ohm, 5 watt, wire wound used in some models (COMMON). Replace with value used in production.
V5	May be type 17BF11 or 12AE10. Replace with type used. The 17BF11 requires a 150 ohm cathode resistor (R310). The 12AE10 requires a 100 ohm cathode resistor (R310).

GENERAL ELECTRIC Chassis V-1, Schematic Diagram, Continued

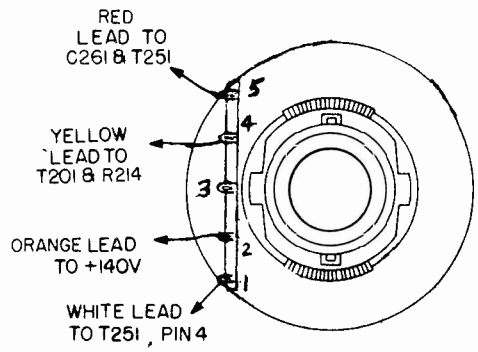




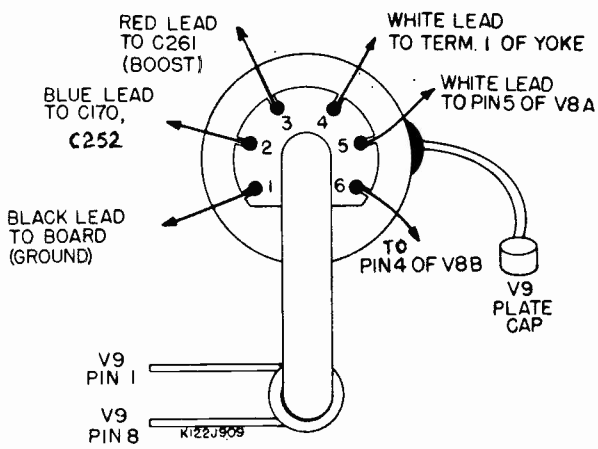
LINE FUSE TERMINAL BOARD
(MOUNTED ON BACK OF AC INTERLOCK)



TB-1 WIRING—MOUNTED ON VHF TUNER BRACKET



YOKE WIRING



T251 WIRING

HEIGHT AND VERTICAL LINEARITY: Adjust R209 and R206 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of the mask.

HORIZONTAL HOLD: With controls set for normal operation, tune in a station. Connect a .1 uf capacitor between Test Point VI and ground. Adjust L251 horizontal hold for a picture which barely floats across the screen, then remove the capacitor.

RECEIVER ALIGNMENT

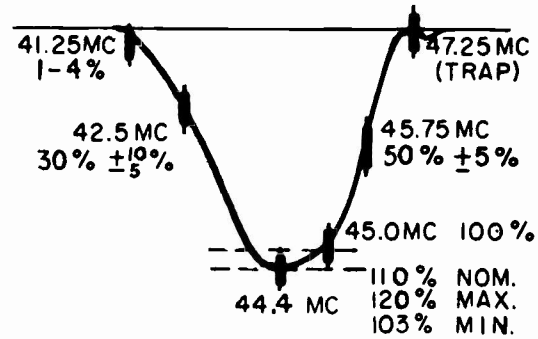
VIDEO I-F SYSTEM

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up. Power the receiver from an isolation transformer.

1. Turn volume control and fine tuning counterclockwise, and contrast control fully clockwise. Set channel selector to Channel 11. Short antenna terminals together.
2. Connect oscilloscope to Test Point III thru 22,000 ohms resistor not more than 1.5 inches away from Test Point III. Connect a variable bias supply (0—20V) between Test Point II and chassis. Set bias at -3.5V.
3. Inject signals from a properly terminated AM signal generator or sweep generator, through the I-F INJECTION NETWORK shown, to the I-F injection point. This point is accessible at the base of the Converter (V2) on the top deck of the VHF tuner.
4. Align the receiver to produce the response curve illustrated.
5. Position all cores at ends of coils away from circuit board except as noted below.

AM PRE-PEAKING & TRAP FREQUENCIES

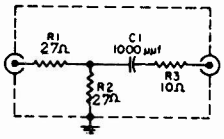
L151	Min. 47.25 MC	T150	Max. 44.4 MC
		L152	Max. 44.4 MC
L135	Max. 45.75 MC	L154, L153 .	Max. 44.4 MC



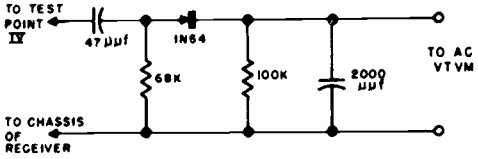
I-F RESPONSE CURVE

VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Adjust L151 for minimum scope deflection.	Use maximum scope sensitivity and smallest possible signal.
2	44.4 MC AM	Adjust L154, then L153 for maximum.	Position L153 core at end of coil nearer circuit board.
3		Align T150 for maximum.	
4		Adjust L135 for maximum deflection of the 45.75 MC marker.	
5		Adjust L152 for proper nose shaping.	
6	38—48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection; markers at 41.25, 42.5, 44.4, 45.0 MC & 45.75 MC	Turn L135 core clockwise to place 45.75 MC marker at 50%.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.
7		Readjust L152 to shape nose around s 44.4MC pivot.	
8		Readjust T150 for proper placement of 42.5MC marker if curve is too narrow.	Repeat Step 7 to shape nose after Steps 8 and 9.
9		Spread or knife turns of L150 if 42.5MC marker is above 30% on curve.	



I-F INJECTION NETWORK



DETECTOR NETWORK

4.5 MC TRAP ALIGNMENT

1. Connect a -10V bias to Test Point II, with the positive bias lead grounded to chassis.
2. .05μf capacitor between Pin 5 of V5A and chassis.
3. Turn contrast control to maximum, volume to minimum.
4. Connect the DETECTOR NETWORK shown to Test Point IV and feed its output to an AC VTVM.
5. Apply a 4.5 MC AM signal through a capacitor at Test Point III.
6. Adjust the L157 takeoff core for minimum reading on Test Point IV. Two core positions may give an apparent minimum indication; the correct one is nearer the top end of the coil form.

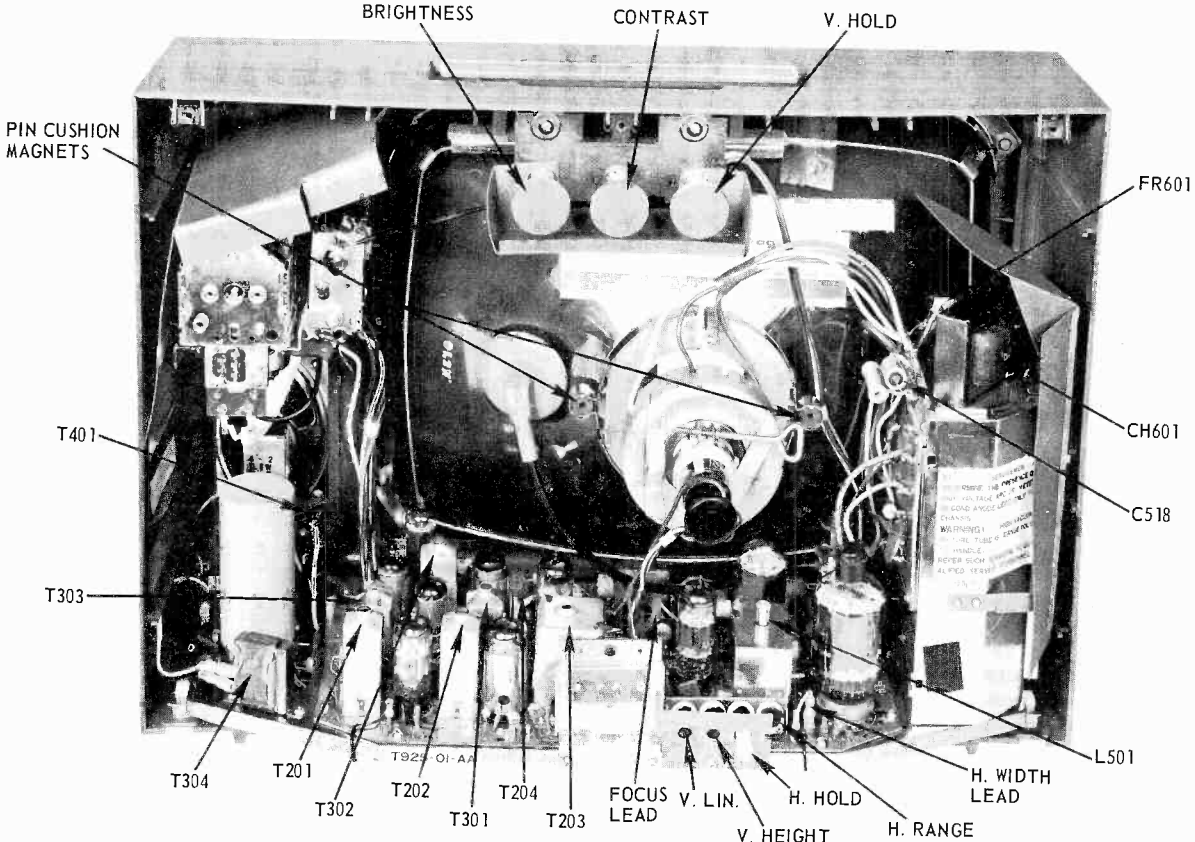
NOTE: Retouching of the trap adjustment may be necessary after alignment of the audio takeoff.

AUDIO ALIGNMENT WITH ON-THE-AIR SIGNALS

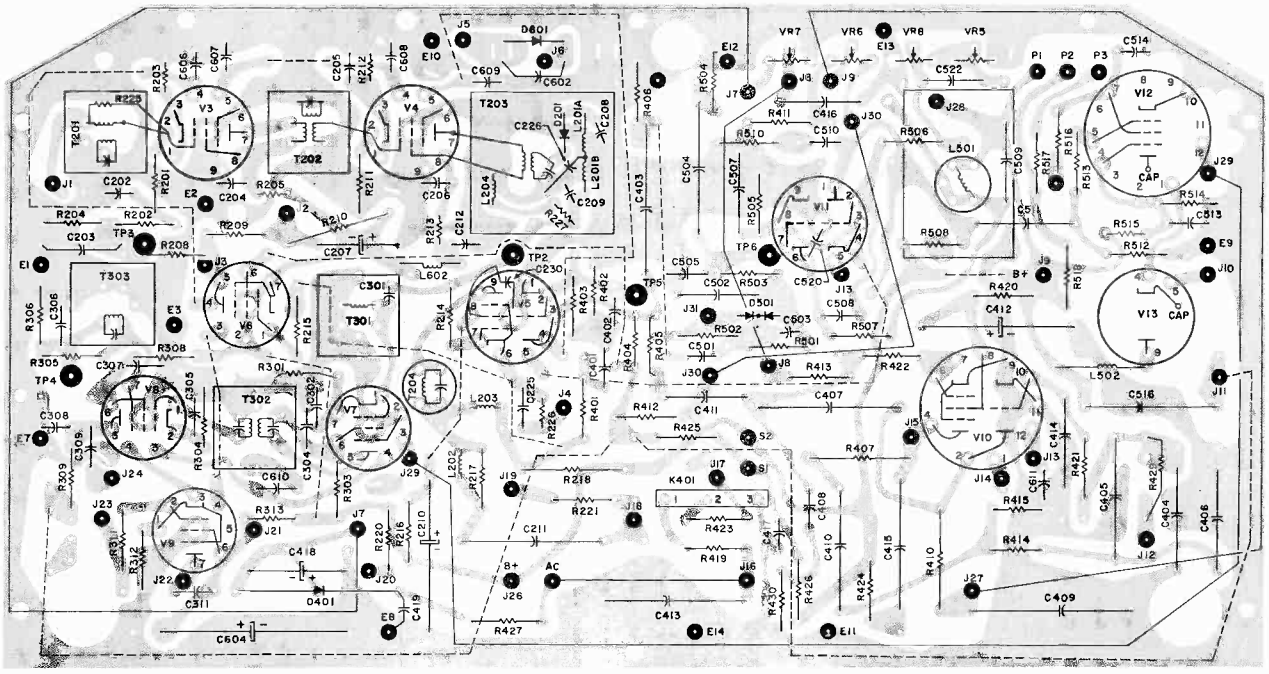
1. Tune in a strong local signal and set receiver volume to a low audible level.
2. Adjust L302 for maximum undistorted, buzz-free audio output. Start with the core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3. Connect a variable bias supply (3 to 15V) to the AGC test point with the positive lead to the chassis. Adjust bias until audio signal distorts on peaks slightly, then adjust core of L301 to curb distortion. Repeat this procedure several times at increased bias levels until maximum clarity of audio is obtained.
4. Adjust audio takeoff core, L157, repeating the bias advances in step 3, to achieve the optimum setting for noise-free performance at low signal levels.

Magnavox

T925 SERIES TELEVISION CHASSIS



REAR VIEW OF CHASSIS



NOTE: THE DOTTED LINES ARE THE JUMPERS ON THE TOP OF THE BOARD.
THE SOLID LINES ARE THE JUMPERS ON THE BOTTOM OF THE BOARD.

CIRCUIT BOARD LAYOUT
(VIEWED FROM COPPER SIDE)

ADJUSTMENTS

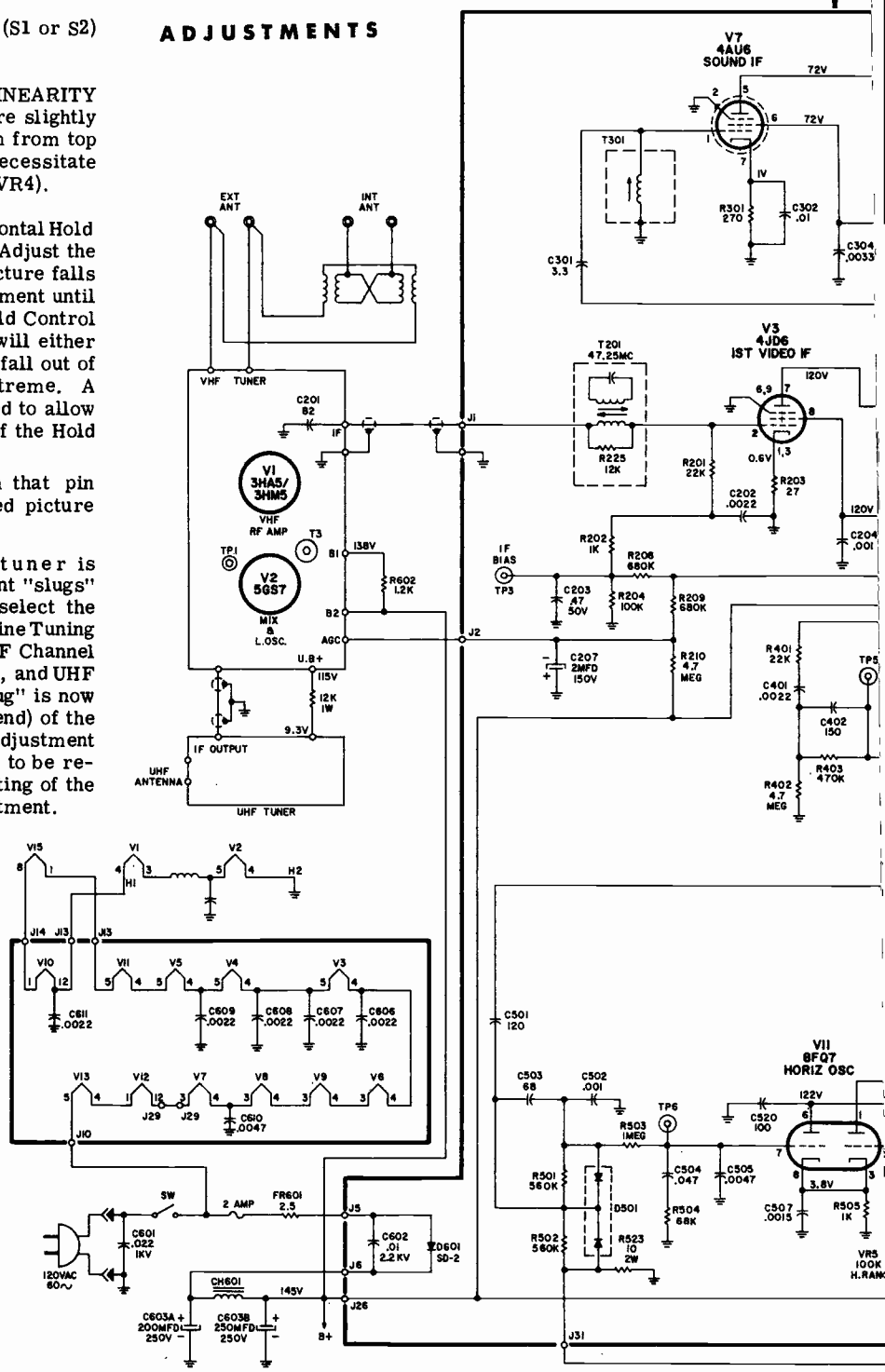
FOCUSING-Place the focus lead on that pin (S1 or S2) which provides the best focus.

VERTICAL HEIGHT (VR6) & VERTICAL LINEARITY (VR7)-Adjust these controls so that the picture slightly overfills the mask with the linearity uniform from top to bottom. Adjustment of either control will necessitate readjustment of the Vertical Hold Control (VR4).

HORIZONTAL OSCILLATOR-Place the Horizontal Hold Control (VR8) at its mid-range position. Adjust the Horizontal Stabilizing Coil (L501) until the picture falls out of sync. Reverse the direction of adjustment until the picture just pulls into sync. Rotate the Hold Control from stop to stop to insure that the picture will either stay in sync over the range of rotation or fall out of sync by an equal number of bars at each extreme. A Horizontal Range Control (VR5) is provided to allow coarse adjustment of the operating range of the Hold Control.

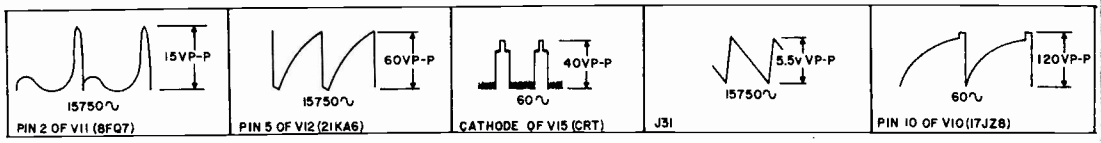
WIDTH-Place the Horizontal Width lead on that pin (P1, P2, or P3) which provides the desired picture width.

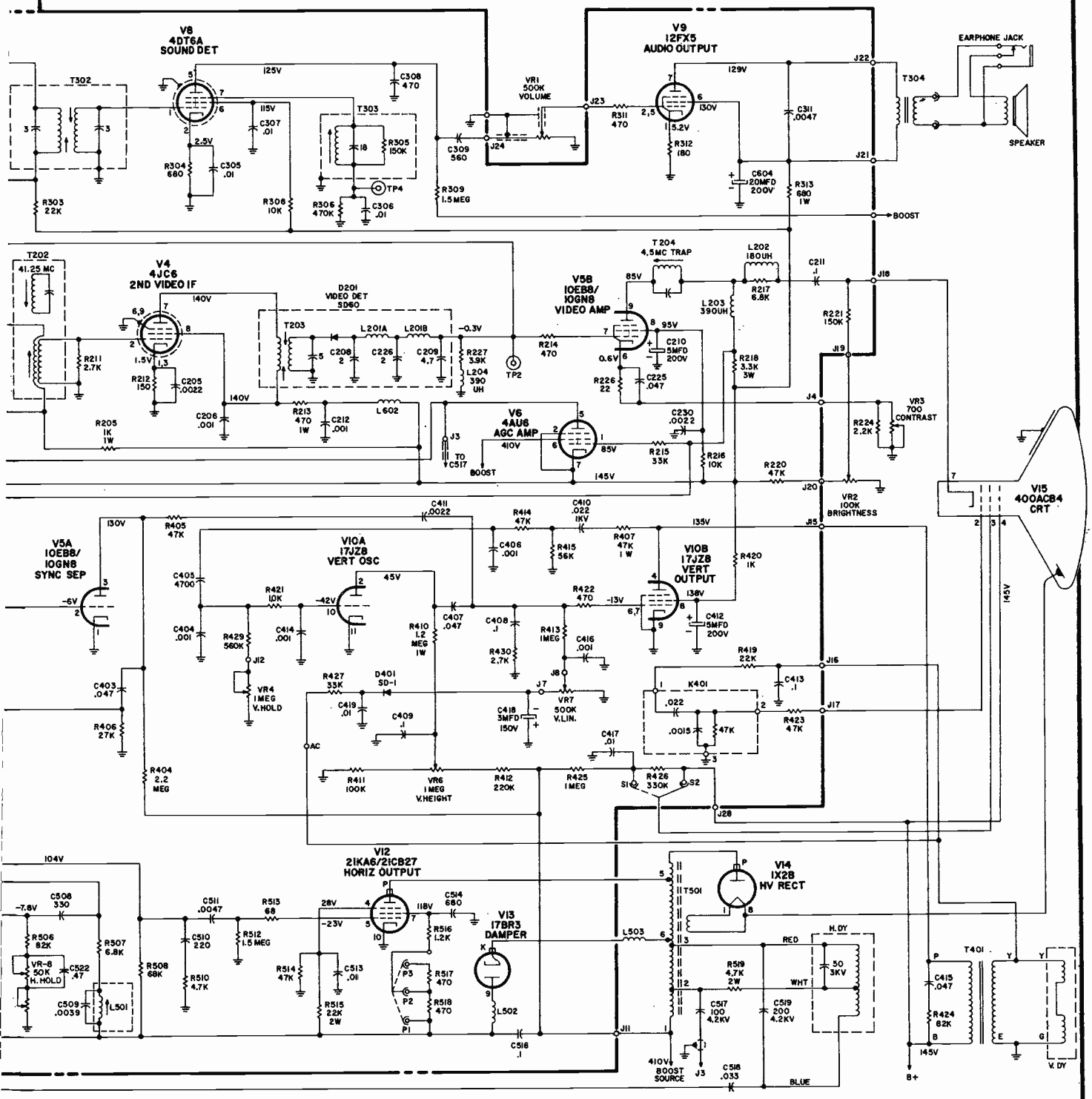
VHF OSCILLATOR (LO2-LO13)-The VHF tuner is equipped with individual oscillator adjustment "slugs" for each channel. To adjust the "slug", select the highest channel to be received and set the Fine Tuning Knob to mid-range. Then remove the VHF Channel Selector, VHF Fine Tuning-UHF Tuning Knob, and UHF Channel Indicator. The selected channel "slug" is now accessible through a hole at the front (shaft end) of the tuner. Adjust the "slug" using a non-metallic adjustment tool. Repeat the adjustment for all channels to be received. Do not disturb the mid-range setting of the Fine Tuning Control while making the adjustment.



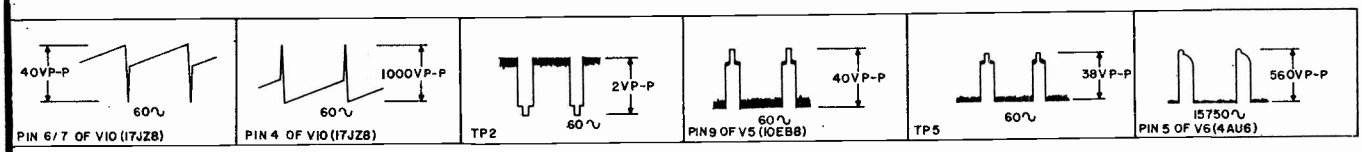
NOTES: UNLESS OTHERWISE SPECIFIED,
1. CAPACITANCE VALUES OF 1 AND LESS ARE IN MICROFARADS.
2. CAPACITANCE VALUES GREATER THAN 1 ARE IN PICOFARADS.
3. VOLTAGES MEASURED WITH NO SIGNAL, CONTRAST CONTROL SET TO MAXIMUM, AND LINE VOLTAGE 120 VAC.

4.5MC TRAP (T204)-Adjust this control for minimum beat on the picture.





T925 SCHEMATIC DIAGRAM



ALIGNMENT INSTRUCTIONS

VIDEO ALIGNMENT

1. Always use an isolation transformer when aligning and allow sufficient warm-up time for the television chassis and test equipment.

2. Using a low impedance Bias Supply, apply a -3.0 Volts to TP3 (IF Bias).

3. Connect an oscilloscope through a 10K isolation resistor to TP2. Set scope gain for 3 Volts P-P.

SWEEP GENERATOR CONNECTION	MARKER FREQUENCIES	SWEEP GENERATOR FREQUENCY	ADJUSTMENTS
Pin 2-4JC6	43.5MC 45.0MC	43MC 10MC Sweep	Adjust T203 (Bottom Slug) to position markers as shown in Figure 1. Adjust T203 (Top Slug) to obtain a response curve similar to Figure 1.
TP 1(On VHF Tuner)	47.25MC 41.25MC	43MC 10MC Sweep	Adjust T201 (Bottom Slug) to position the 47.25MC marker as shown in Figure 2. Adjust T201 (Top Slug) to obtain maximum attenuation of the 47.25MC marker. Adjust T202 (Top Slug) to obtain maximum attenuation of the 41.25MC marker.
TP 1 (On VHF Tuner)	42.75MC 45.0MC 45.75MC	43MC 10MC Sweep	Set VHF Tuner to Channel 13 or any unused channel. Make the following adjustments to obtain an overall response curve similar to Figure 2: Adjust T202 (Bottom Slug) for maximum gain between 42.75MC and 45.75MC. Adjust Tuner Converter Coil (T3) to position the 45.75MC marker at 40% response. Adjust T201 (Bottom Slug) to position the 42.75MC marker at 65% response.

FIGURE 1

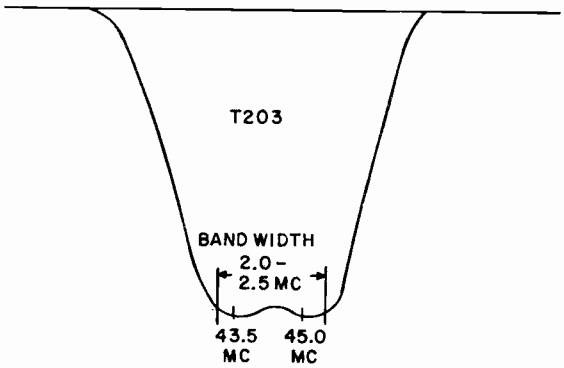
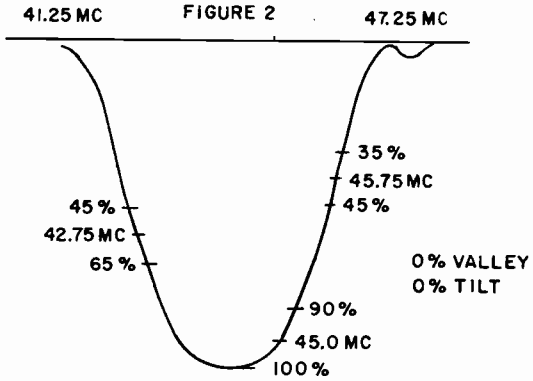


FIGURE 2



SOUND ALIGNMENT

1. Turn the Quadrature Coil (T303) to minimum inductance (core out).

2. Tune the receiver to a strong local station (preferably a tone signal or music). Adjust the Quadrature Coil (T303) just past the point of maximum sound with minimum distortion.

3. Reduce the signal input by removing the antenna (or placing an adjustable pad across the antenna terminals) so that with the Volume Control set at near maximum, the sound level is low. Tune the Fine Tuning Control through undistorted sound, leaving it set on the verge of distortion.

4. Adjust T302 (Top and Bottom slugs) and T301 for minimum distortion.

5. Readjust Fine Tuning as necessary during the adjustment of T301 and T302 to maintain the conditions described in Step 3 above.

MODELS GEN-11468A

(Service material on pages 51 through 54)

Chassis Removal

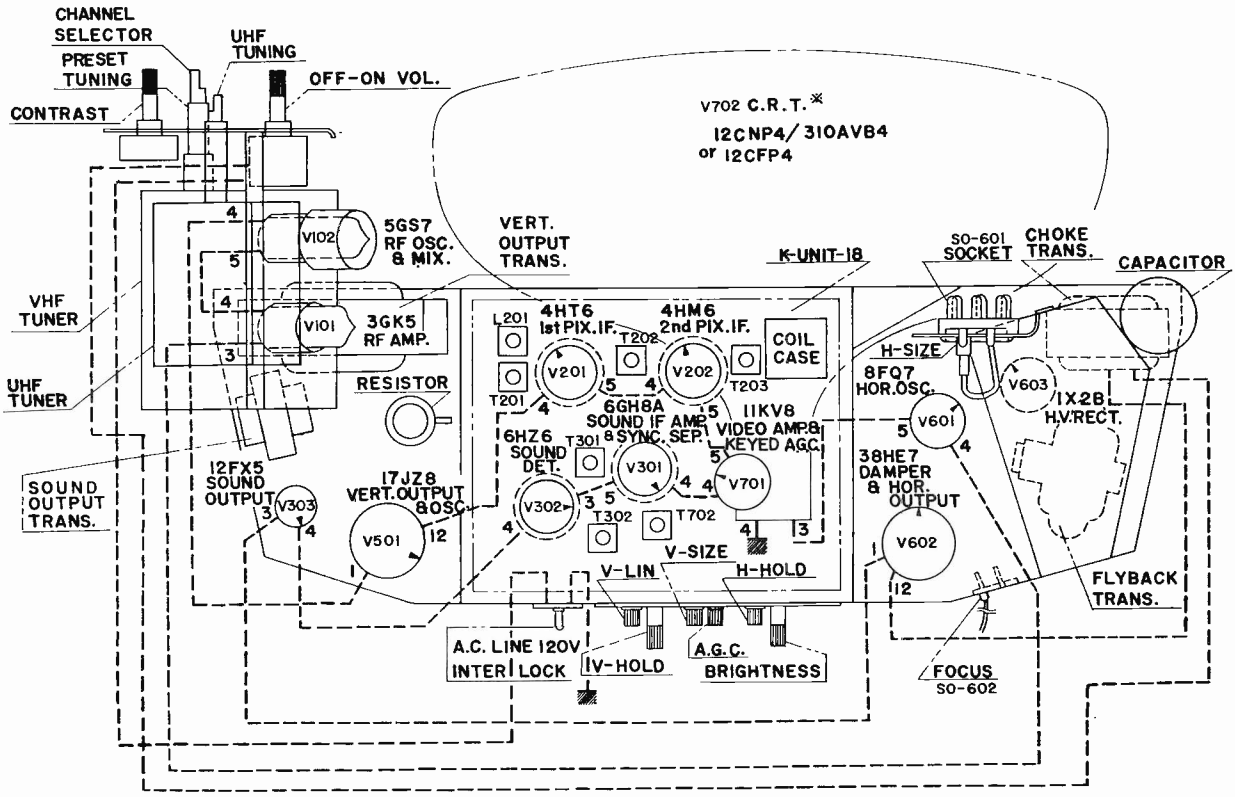
Whenever it becomes necessary to remove the chassis from the cabinet, proceed in the following manner:

1. Remove the OFF-ON Volume, Contrast, UHF Indicator, UHF Fine Tuning, VHF channel selector and VHF fine tuning knob from the front of the cabinet.
2. Lay the cabinet face down on a soft pad to protect the picture tube face plate.
3. Remove the five cabinet back retaining screws.
4. Remove the cabinet back and disconnect the antenna leads.
5. Disconnect the deflection yoke plug, picture tube socket, anode lead and speaker leads.
6. Remove the six chassis retaining screws.
7. After removing three nuts and a screw, separate the tuner mounting bracket from the front cabinet.
8. The chassis may now be completely removed from the cabinet.

Removing and Installing Picture Tube

In order to remove or replace the picture tube, the chassis must first be removed. Refer to CHASSIS REMOVAL procedure. When the chassis has been removed proceed as follows:

1. Disconnect the picture tube retaining strap.
2. Remove the picture tube from the cabinet. (CAUTION: Refer to the set caution label on high voltage compartment cover. Always avoid handling the neck of the picture tube.)
3. Place the picture tube in proper position in the cabinet.
4. Connect the picture tube retaining strap. 5. Reassemble the set.



Chassis Tube Layout and Adjustments

※THESE TWO TYPES OF PICTURE TUBES ARE INTERCHANGEABLE WITHOUT ANY CIRCUITRY CHANGES.

MONTGOMERY WARD Model GEN-11468A Schematic Diagram

Controls

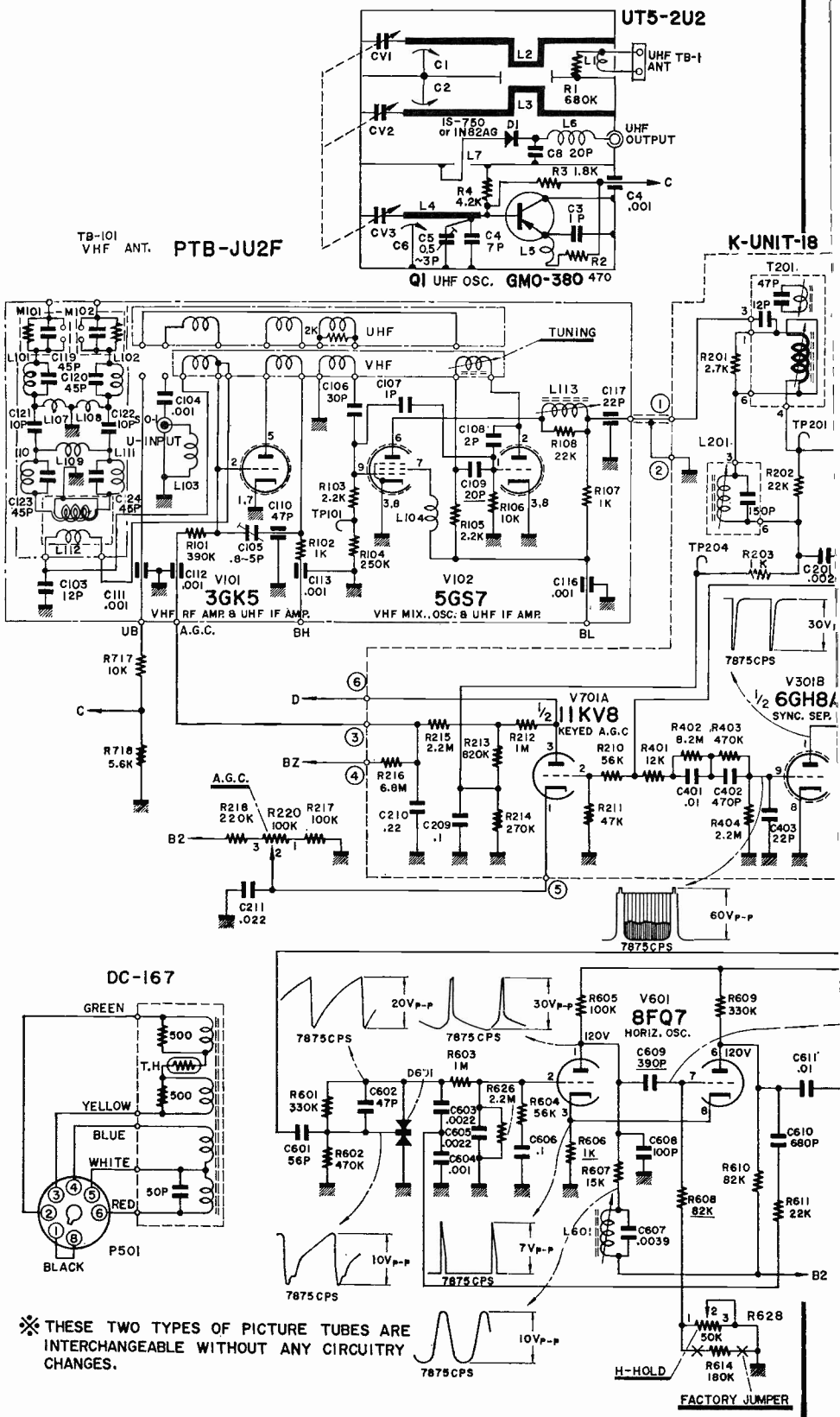
R315, SW-701	500K ohm, Pot., Volume W/on-off Switch (8V-091UL)
R516	1 Megohm, Pot., Vert. Size (Assembly)
R517	1 Megohm, Pot., Vert. Linearity (Assembly)
R628	50K ohm, Pot., Horiz. Hold (Assembly)
R720	20K ohm, Pot., Contrast
R721	250K ohm, Pot., Brightness (Assembly)
R515	1Megohm, Pot., Vert. Hold (Assembly)
R220	100K ohm, Pot., AGC (Assembly)

Coils and Transformers

L201	Coil, 47.25 MC Trap (2TIF-487)
L202	Coil, Filter (TL-42)
L203	Coil, Filter (TL-67)
L204	Coil, Peaking (TL-260)
L205	Coil, Peaking (TL-275)
L206, L207	Coil, RF Choke (TL-603)
L301	Coil, Filter (TL-42)
L601	Coil, Horiz. Stabilizing (TL-97)
L602	Coil, Snivet (TL-601)
T201	Transformer, 1st PIX IF (TIF-302)
T202	Transformer, 2nd PIX IF (TIF-343)
T203	Transformer, PIX Detector (TL-99)
T301	Transformer, Sound IF (2TIF-490)
T302	Transformer, Sound Detector (TIF-544)
T303	Transformer, Audio Output (7T-171)
T501	Transformer, Vartical Output (8T-187)
T601	Transformer, Horizontal Output (8FT-617)
T701	Transformer, Power (9T-166)
T702	Transformer, 4.5MC Trap (2TIF-491)

Resistors

R406	27K ohm, 1/2W, 10%, Carbon
R501	68K ohm, 1/2W, 10%, Carbon
R502	5.6K ohm, 1/2W, 10%, Carbon
R503	100K ohm, 1/2W, 5%, Carbon
R504	1K ohm, 1/2W, 10%, Carbon
R505	1.2 Megohm, 1/2W, 10%, Carbon
R506, R512	15K ohm, 1/2W, 10%, Carbon
R507	1 Megohm, 1/2W, 10%, Carbon
R508	1.5 Megohm, 1/2W, 10%, Carbon
R509	150 ohm, 1/2W, 20%, Carbon
R510	100K ohm, 1/2W, 10%, Carbon
R511	220 ohm, 1W, 10%, Carbon
R610	82K ohm, 1/2W, 10%, Carbon
R611	22K ohm, 1/2W, 10%, Carbon
R612	1 Megohm, 1/2W, 10%, Carbon
R613	68 ohm, 1/2W, 20%, Carbon
R614, R623	180K ohm, 1/2W, 10%, Carbon
R615, R616	1.5K ohm, 1/2W, 10%, Carbon
R617	3.3K ohm, 2W, 10%, Carbon
R618	3.9K ohm, 1W, 10%, Carbon
R619, R625	100K ohm, 1/2W, 10%, Carbon



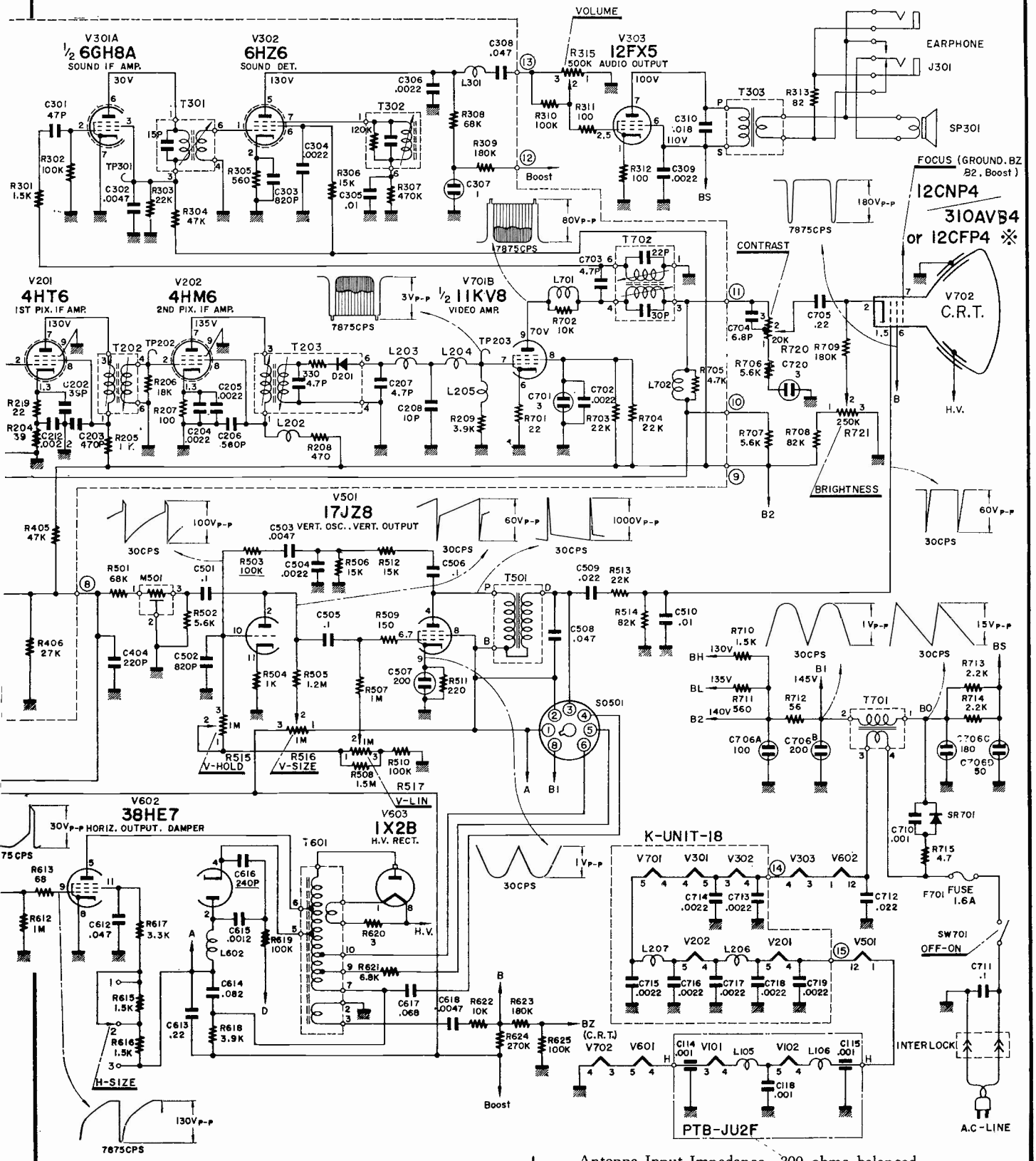
※ THESE TWO TYPES OF PICTURE TUBES ARE INTERCHANGEABLE WITHOUT ANY CIRCUITRY CHANGES.

Power Supply .....120 volts 60 cycls A.C.

Power Consumption .....110 watts

Power Output .....1.1 watts

MONTGOMERY WARD Model GEN-11468A Schematic Diagram, Continued



Tuning Ranges .....VHF-Channels 2 thru 13
UHF-Channels 14 thru 83

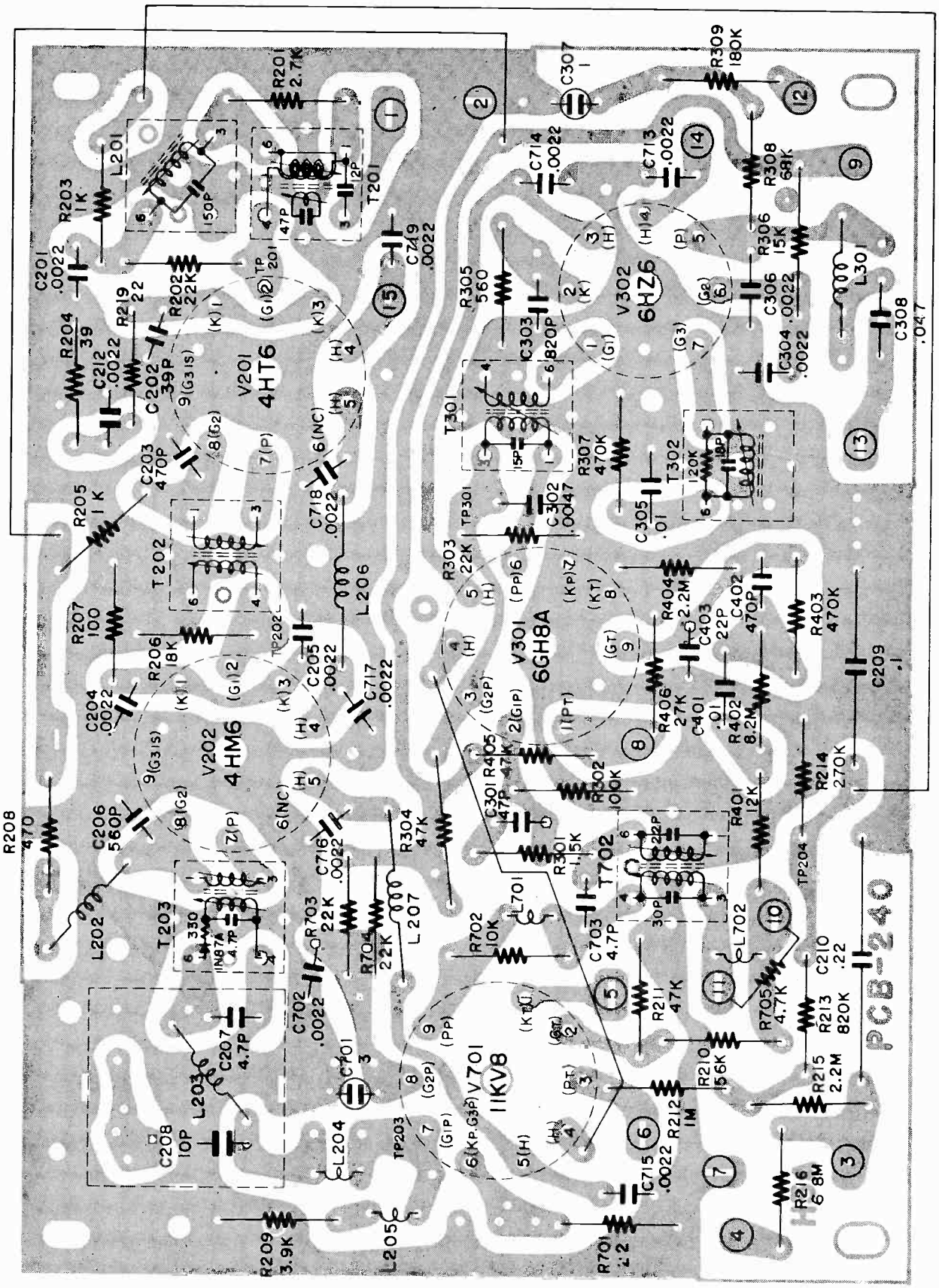
Intermediate Frequency.....Picture-45.75 Mc
Sound-41.25 Mc

Antenna Input Impedance...300 ohms balanced

Intercarrier Sound System...4.5 Mc

Speaker Size & Type .....7cm×11cm 1107P-44A
8Ω@400c/s, 240~9000c/s

PRINTED CIRCUIT BOARD (Bottom View)



CHASSIS REMOVAL

Seven (7) screws secure the chassis to the cabinet. They are located as follows: three (3) on the tuner mounting bracket, one (1) at the upper right hand corner and three (3) on the bottom of the cabinet.

Removing components from the etched board is facilitated by the fact that the circuitry (plating) appears on one side of the board only and the component leads are inserted straight through the holes and are not bent or crimped.

It is recommended that a solder extracting gun be used to aid in component removal. An iron with a temperature controlled heating element would be desirable since it would reduce the possibility of damaging the board due to over-heating.

The nozzle of the soldering gun is inserted directly over the component lead and when sufficiently heated, the solder is drawn away leaving the lead free from the copper plating. This method is particularly suitable in removing multi-terminal components.

COIL SHIELD REMOVAL

The shields on the IF input assembly (L-100, L-101, L-102 and L-103), the video detector transformer (L-107 and L-108) and the ratio detector transformer (T-301) are mounted to the board with spring clips for ease of removal. The shields may be removed by carefully rocking the shield while pulling upward. It may be necessary to pry up shield slightly to start it. Avoid excessive bending of the plated board while removing shield.

FINE TUNING ADJUSTMENT

Rotate the fine tuning knob in either direction for best picture and sound on all available channels. Turning the fine tuning shaft to the right or left engages the pre-set gears. The gears, in turn, change the position of the core in the oscillator coil. Individual coils are used for each channel. Therefore, channel pre-set adjustments can be made in any sequence.

FOCUSING ADJUSTMENT

To provide for differences in the picture tube gun structure, a focus adjustment is provided by three (3) lugs located on the chassis. They provide a ground potential point, a B+++ voltage point and a bootstrap voltage point. Connect the blue lead from the picture tube socket to the lug which provides the best over-all focus, center to edge of screen.

VIDEO BIAS ADJUSTMENT

The bias on the 1st video amplifier is adjusted for the no-signal condition. Proceed as follows:

1. Disable 3rd IF amplifier, Q-3, by shorting base and emitter together.

2. Set contrast control, R-130, full clockwise (maximum contrast).

3. Measure 2nd video amplifier, Q-5, collector voltage and adjust video bias control for 23V DC on the collector. Line voltage should be set a 122 volts when adjustment is made.

RF AGC DELAY CONTROL ADJUSTMENT

Adjustable RF AGC delay is incorporated to provide the best possible signal to noise ratio and freedom from overload. The purpose of delaying the RF AGC (which reduces tuner gain) is to operate the tuner RF stage at high gain until its signal output is greater than mixer noise. The control is adjusted as follows:

1. Set RF AGC control maximum clockwise position (minimin AGC).

2. Tune in a signal that will produce 3.5 to 4 volts at T.P. "A" (IF AGC buss).

3. Adjust RF AGC control for 3 volts at T.P. "C" (RF AGC).

4. Check T.P. "C" for 2.5 volts between channels and no overload visible at the CRT on strongest channels.

An alternate method of adjusting the RF AGC delay control is by viewing the picture. Tune in the strongest channel available. Adjust the control and note its effect on the picture. In one range of control setting, the picture will have noise or a busy background and as the control is rotated, the picture will clear up. Further rotation of the control will cause overload on strong signals as evidenced by loss of interlace. Set the control midway between the point at which the noise disappears and the overload point.

NOTE: Holes have been provided in the cabinet bottom to allow adjustment of the video bias and RF AGC without removing cabinet back.

NOISE GATE CONTROL

The noise gate control is used to adjust the receiver for best hold stability under noise and different signal strength conditions.

To adjust, tune in a channel for best picture and sound. Turn the noise gate control clockwise (when viewed from rear of receiver) until the picture becomes unstable (rolls down or slips, etc.). Then, turn control counter-clockwise until the picture returns to normal. Check all channels; if any are unstable, continue turning control counter-clockwise until the picture is normal on all channels.

CIRCUIT GUARD

The circuit guard is a thermal cut-out type of overload relay. It is in series with the power into the receiver for protection against shorts in the chassis.

The circuit guard will remain in the "closed circuit" state when the current requirements are normal. In the event of a continuous high current overload, the bi-metallic elements of the unit will become heated to the extent of "opening" the contacts and disconnecting the AC power. After the bi-metallic elements have cooled, the circuit guard may be re-set by depressing the plastic re-set button.

The circuit guard is designed to remain "closed" on the higher-than-normal instantaneous surge currents encountered during the initial warm-up. The circuit guard is unique in the fact that when a short exists in the associated circuitry, power is not re-applied when the re-set button is held depressed.

MOTOROLA Chassis 12TS-458, Alignment Information

PRE-ALIGNMENT INSTRUCTIONS

Before alignment of the video IF section is attempted, it is advisable to thoroughly check the system. If alignment is attempted on an IF section in which a faulty component exists, successful alignment will probably be impossible and the entire procedure will have to be repeated when the real cause of the trouble is corrected.

VIDEO IF & MIXER ALIGNMENT

Preliminary Steps

1. Maintain line voltage at 120 with variac.

2. Disable horizontal oscillator by unplugging yoke leads.

3. Disable local oscillator by setting tuner between channels.

4. Apply the positive lead of a 4.5 volt bias supply to IF AGC (T.P. "A") buss and negative lead to chassis ground.

5. Check for correct 1st video amplifier bias by measuring 2nd video amplifier collector voltage. Voltage should read 23V with no signal input.

6. Set the contrast and brightness control at maximum (extreme clockwise position). Set noise gate control maximum counter-clockwise.

7. Short across tuner input terminals.

8. Maintain 1 volt peak to peak at the base of video amplifier except when specific values are given in the procedure chart.

9. Refer to "Video IF and Sound Alignment" detail for component and test point locations.

NOTE: To reduce the possibility of inter-action between the two tuning cores in a double-tuned transformer or coil, each core should be adjusted for optimum response in the tuning position nearest its respective end of the coil form.

4.5MC TRAP ADJUSTMENT (T-100 and T-200)

1. Carefully tune receiver to local station and advance contrast control.

2. Adjust local oscillator (with fine tuning control) to bring 4.5Mc interference strongly into the picture.

3. Adjust sound trap (T-200) for minimum sound beat on the picture tube screen. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference. Adjust T-100 for maximum audio output. Retouch if necessary to reduce 4.5 interference in video.

STEP	SWEEP GENERATOR AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To base of 1st IF amplifier thru 120 ohm resistor in series with .001mf capacitor. Set sweep to 44Mc, markers as required. By-pass junction of L-103 and C-105 to ground thru a .001mf capacitor.	Scope to base of 1st video amplifier thru 47K ohm resistor.	47.25Mc trap, L-104.	Minimum response at trap frequency (see curve #1). NOTE: Temporary reduction of bias and an increase of generator output may be required to see trap clearly.
2.	Same as Step #1.	Same as Step #1.	Both cores of 3rd IF transformer (L-107 and L-108).	Adjust for maximum response at 44Mc (see curve #2). NOTE: The 3rd IF transformer consists of two individual coils inductively coupled.
3.	Same as Step #1.	Same as Step #1.	1st IF coil (L-105).	Adjust for best overall response (see curve #2).
4.	To mixer T.P. M thru .001mf capacitor. Set sweep to 44Mc, markers as required. Remove by-pass capacitor from junction of L-103 and C-105 to ground.	Same as Step #1.	47.25Mc trap, L-102, 41.25Mc trap, L-101, and 37.5Mc trap, L-100.	Minimum response at proper trap frequency (see curve #3). NOTE: Temporary reduction of bias and and increase of generator output may be required to see trap clearly.
5.	Same as Step #4.	Same as Step #1.	Mixer plate coil, L-26, on tuner and 1st IF input coil, L-103.	To obtain curve #4. The mixer plate coil, L-26, affects the center peak or tilt and the 1st IF input coil affects the two outside peaks. Tune coils simultaneously for proper tuning and band-width consistent with maximum gain.

SOUND ALIGNMENT (Station Signal Method)

The 2nd 4.5Mc amplifier stage is designed to oscillate at a frequency very close to 4.5Mc. The 4.5Mc input signal controls the frequency of its oscillation. The advantage of having the stage oscillate becomes apparent on weak signals because audio signals too weak to be heard above the noise level are strong enough to control the oscillations and result in a usable FM output signal.

PRELIMINARY STEPS

1. Connect a pair of 100K ohm resistors in series.

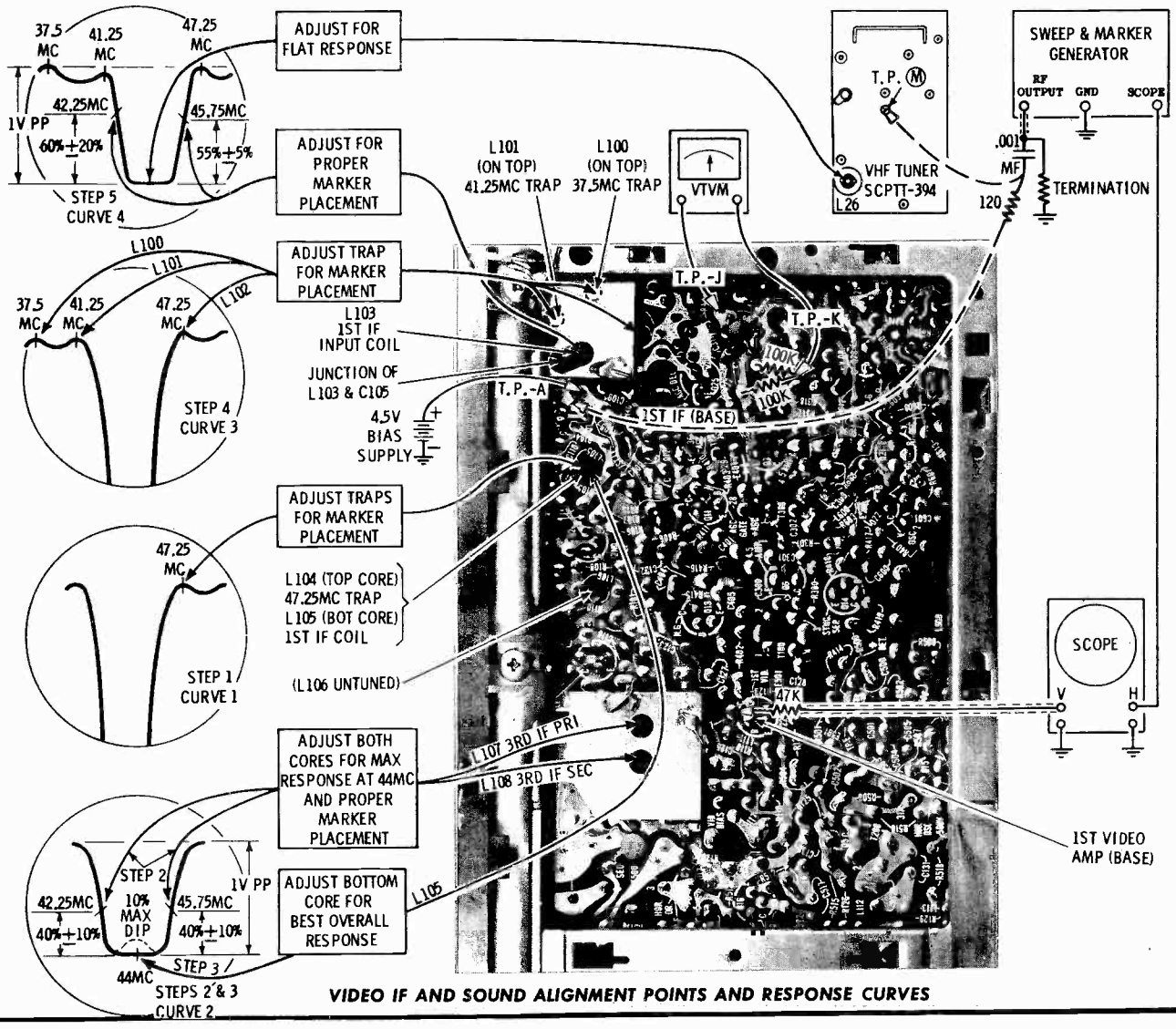
2. Connect above resistors across C-312 (T.P. "I").

3. Tune in a strong TV station and adjust fine tuning for maximum audio.

4. Refer to "Video IF and Sound Alignment Detail" for coil and test point locations.

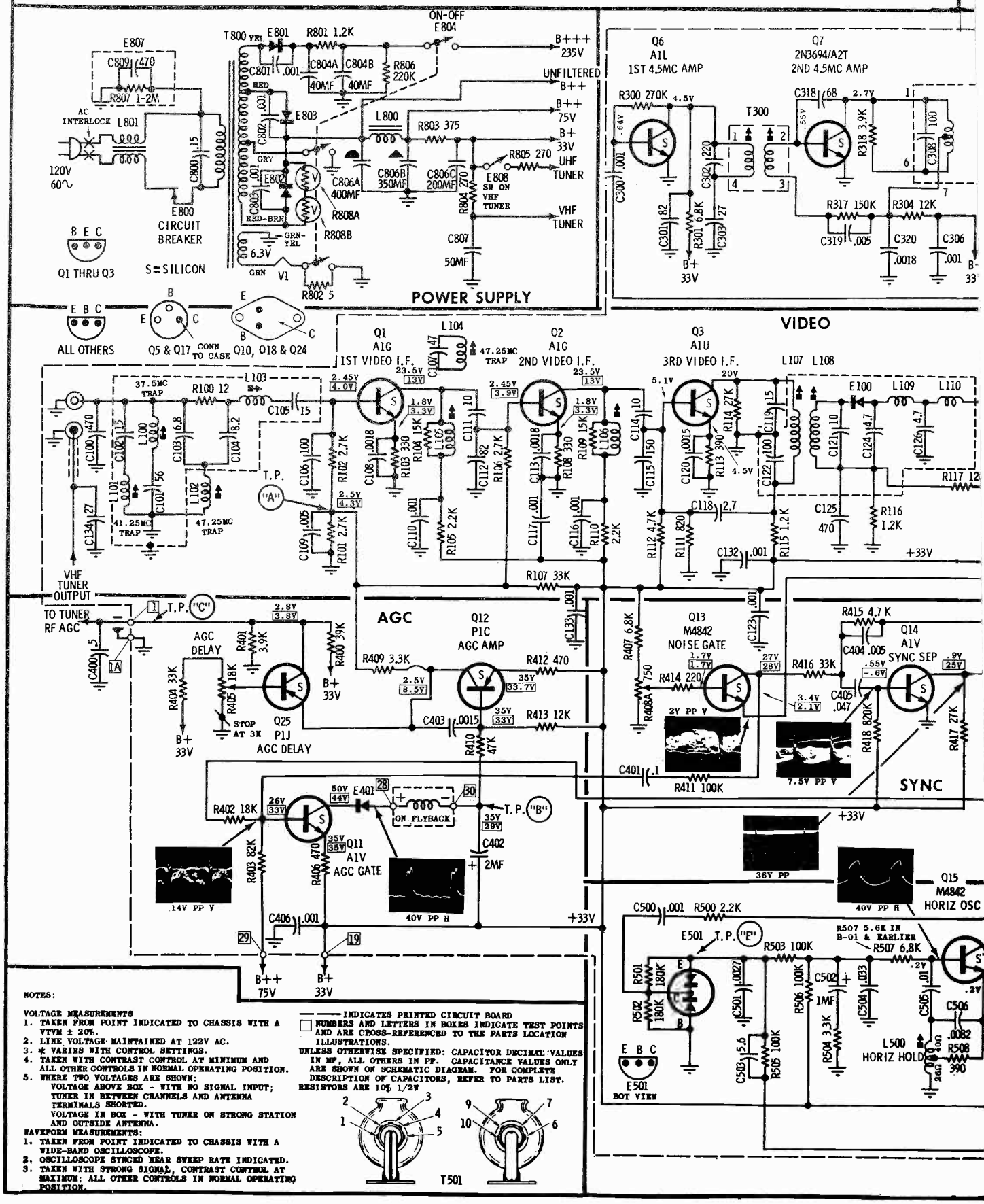
MOTOROLA Chassis 12TS-458, Alignment Information, Continued

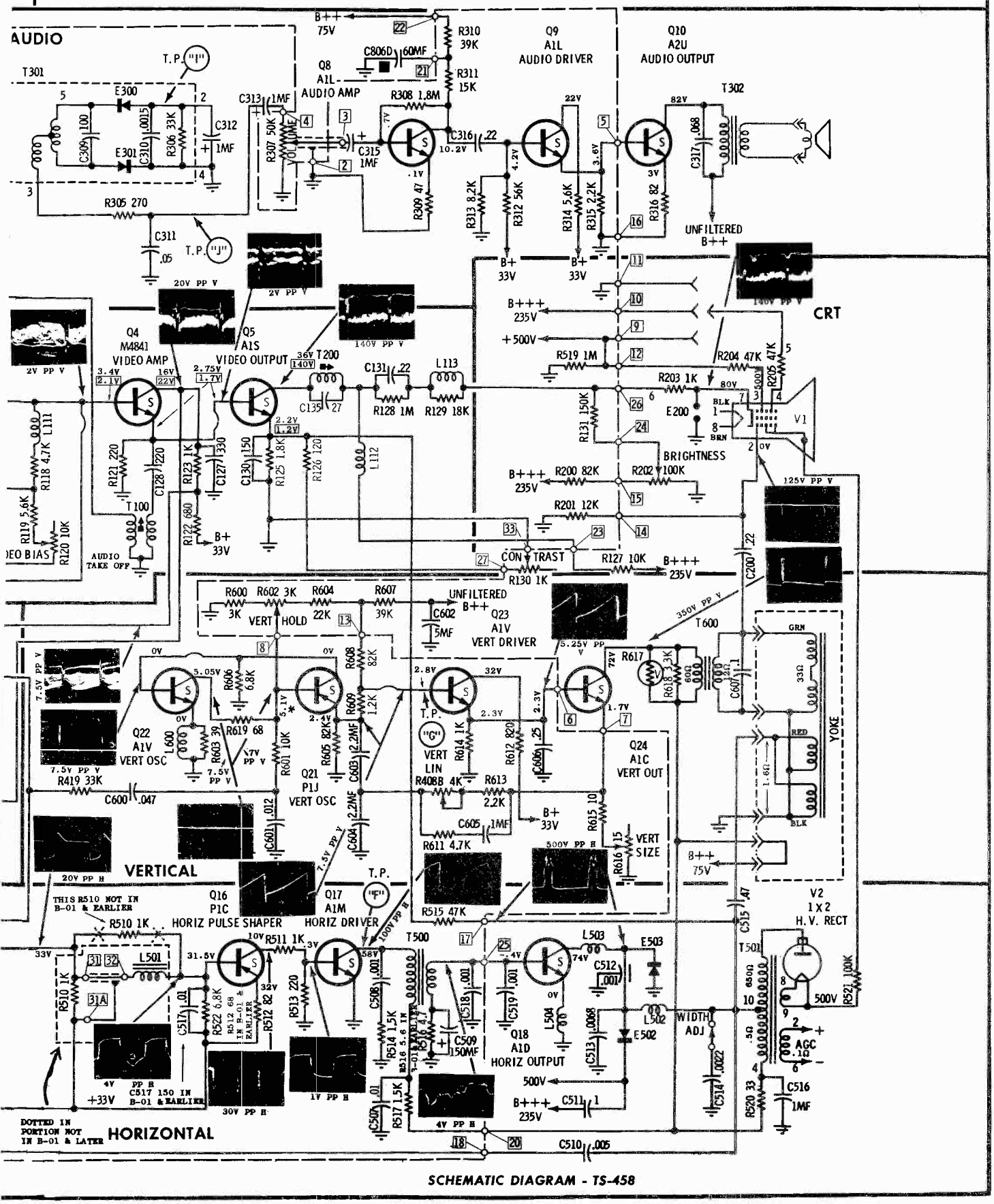
STEP	STATION	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	Strong signal	One lead of VTVM to junction of two 100K resistors, (T.P. K) other lead to junction of R-305 and C-311 (T.P. J). Set meter to zero center.	T-301 ratio detector transformer.	Detune secondary (bottom core) to give an indication on the meter. Note direction of meter indication. Leave core in this position.
2.	Strong signal	Same as Step #1.	Same as Step #1.	Adjust primary (top core) for maximum meter indication in same direction as noted in Step #1.
3.	Strong signal	Same as Step #1.	Interstage transformer, T-300.	Adjust for maximum output.
4.	Strong signal	Same as Step #1.	T-301 ratio detector transformer.	Adjust secondary (bottom core) for zero volts (center scale).
5.	Weak signal	Listening test.	Interstate transformer, T-300.	Reduce signal until considerable noise is present in audio. Signal input can be reduced by tuning into smear or reducing signal input to tuner. Adjust T-300 for minimum noise and best audio as judged by listening to output.



VIDEO IF AND SOUND ALIGNMENT POINTS AND RESPONSE CURVES

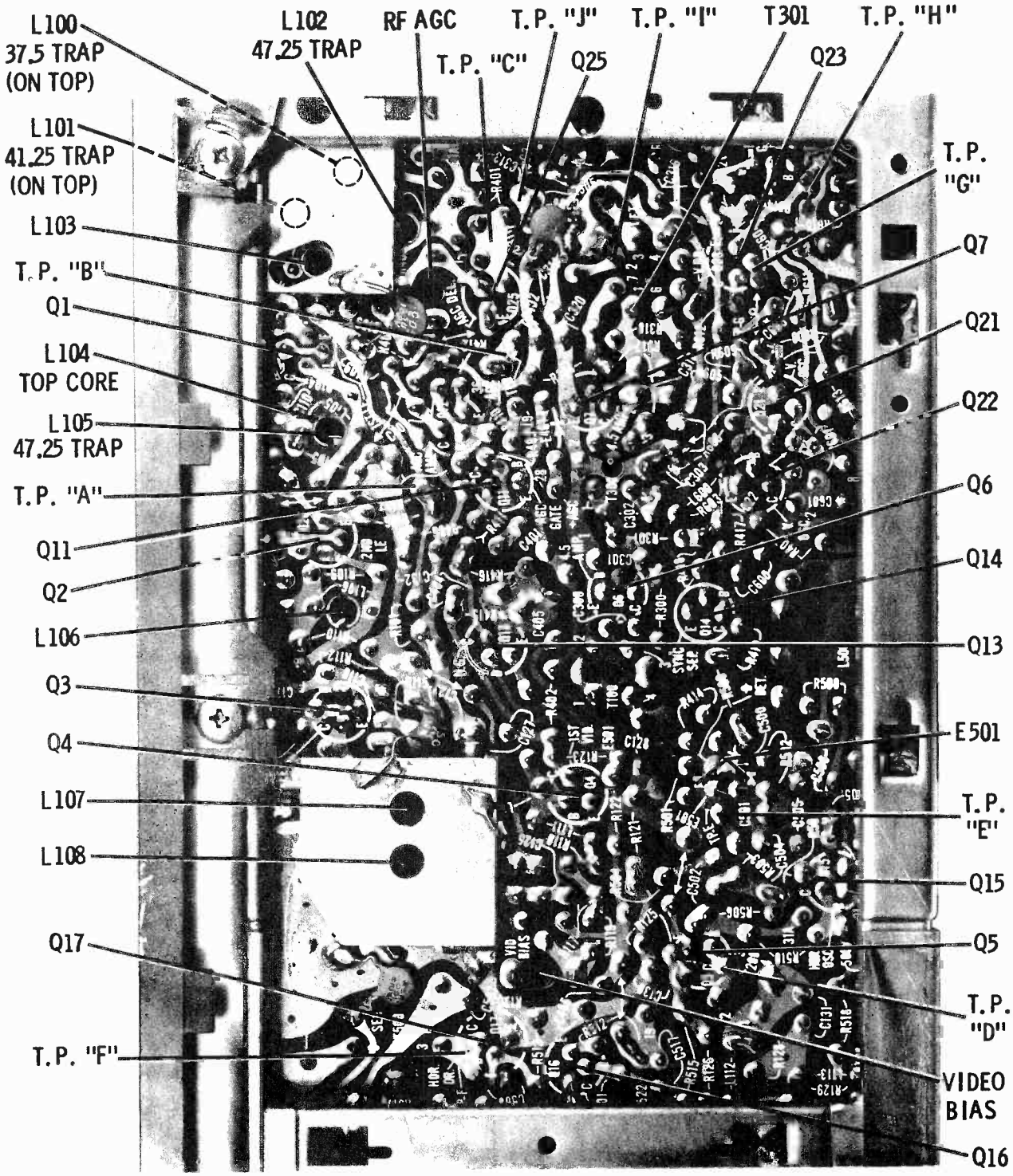
MOTOROLA Chassis 12TS-458, Schematic Diagram





SCHEMATIC DIAGRAM - TS-458

MOTOROLA Chassis 12TS-458, Etched Board Information



ETCHED BOARD PARTS LOCATION AND TEST POINTS - BOTTOM VIEW

MOTOROLA

CHASSIS TS-592

MODELS XT621D, XT735D, XT736D, XU738D, XU739D, XU740D, XU741D, XS744D, XS745D, XL746D

The diagram and other service material on these sets is on pages 61 through 64. For alignment see pages 56-57 as given under Chassis 12TS-458.

MODEL BREAKDOWN CHART

MODEL	CHASSIS	VHF TUNER	UHF TUNER	CRT
XT621D	20TS-592	OPTT-394	KTT-622 or KTT-626	21GCP4
XT735D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XT736D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XU738D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XU739D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XU740D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XU741D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XS744D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XS745D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4
XL746D	22TS-592	OPTT-394	KTT-622 or KTT-626	23JEP4

ETCHED BOARD CIRCUIT TRACING

The top (component side) of the chassis board contains a complete legend of the chassis circuit that appears on the bottom and identification of all components by reference numbers that are related to the reference numbers on the schematic diagram. The circuit may be traced from the top of the chassis board and all components can be identified eliminating the need of making any reference to the bottom of the chassis board.

The circuit side (bottom) of the chassis board also contains a complete legend which includes component reference numbers, transistor identification, coil terminals and the wiring (jumper wires) is traced in to provide easy circuit tracing of the wiring that appears on the top side of the chassis board.

The transistors are identified by their function as well as the reference number. The transistor elements are identified as follows: E - emitter, B - base and C - collector.

Breaks appear in the wire tracing to facilitate the identification of component location. Each wire trace begins and ends with an arrow.

To further facilitate circuit tracing of the etched chassis board, a photograph of the chassis board with the pertinent test points identified and related to the schematic diagram is included in this manual.

The test points on the schematic diagram are identified descriptively and/or by numbers and are blocked in or circled for easy identification. These test points are also shown on the chassis board photographs and serve to pinpoint the physical location of the electrical junction or test point of interest.

CHASSIS REMOVAL (20TS-592)

Twelve (12) screws secure the chassis to the cabinet. They are located as follows. Two (2) on the tuner mounting bracket, one (1) at the upper left-hand corner, one (1) at the middle right side and seven (7) on the bottom of the cabinet. One screw must also be removed from the upper forward corner of the tuner to release the ground strap.

CHASSIS REMOVAL (22TS-592)

Ten (10) screws secure the chassis and tuner assembly to the cabinet. Four (4) screws fasten the tuner assembly to the bezel. Five (5) screws are used on the bottom of the cabinet and one (1) screw on the right side.

VIDEO BIAS ADJUSTMENT

The bias on the 1st video amplifier is adjusted for the no-signal condition. Proceed as follows:

1. Disable 3rd IF amplifier, Q-3, by shorting base and emitter together.

2. Set contrast control, R-130, full clockwise (maximum contrast).

3. Measure 2nd video amplifier, Q-5, collector voltage and adjust video bias control for 23V DC on the collector. Line voltage should be set at 122 volts when adjustment is made.

RF AGC DELAY CONTROL ADJUSTMENT

Adjustable RF AGC delay is incorporated to provide the best possible signal to noise ratio and freedom from overload. The purpose of delaying the RF AGC (which reduces tuner gain) is to operate the tuner RF stage at high gain until its signal output is greater than mixer noise. The control is adjusted as follows:

1. Set RF AGC control maximum clockwise position (minimum AGC).

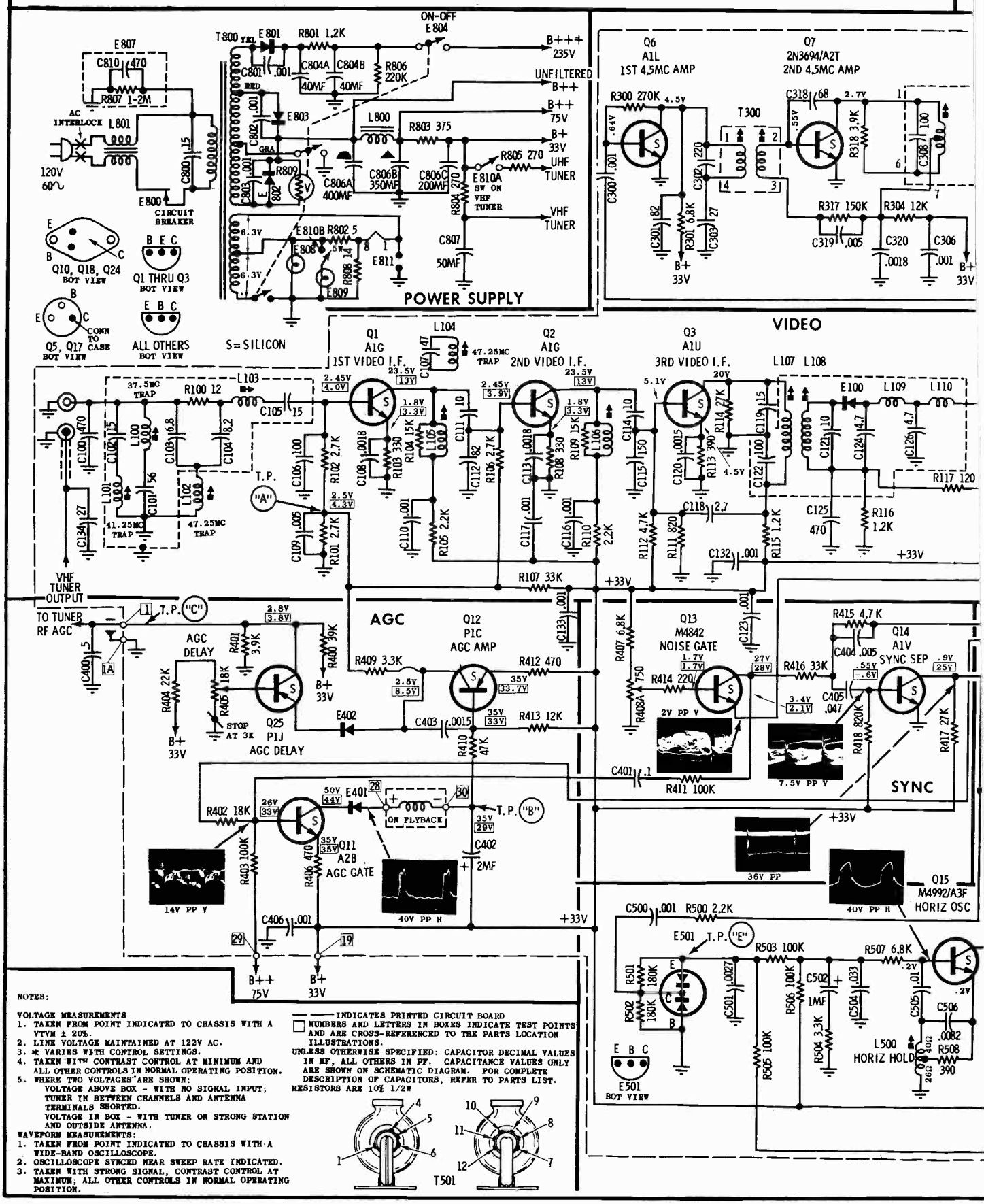
2. Tune in a signal that will produce 3.5 to 4 volts at T.P. "A" (IF AGC buss).

3. Adjust RF AGC control for 3 volts at T.P. "C" (RF AGC).

4. Check T.P. "C" for 2.5 volts between channels and no overload visible at the CRT on strongest channels.

An alternate method of adjusting the RF AGC delay control is by viewing the picture. Tune in the strongest channel available. Adjust the control and note its effect on the picture. In one range of control setting, the picture will have noise or a busy background and as the control is rotated, the picture will clear up. Further rotation of the control will cause overload on strong signals as evidenced by loss of interlace. Set the control midway between the point at which the noise disappears and the overload point.

MOTOROLA Chassis 20TS-592, 22TS-592, Schematic Diagram



NOTES:

VOLTAGE MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM ± 20%.
2. LINE VOLTAGE MAINTAINED AT 122V AC.
3. * VARIES WITH CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.
5. WHERE TWO VOLTAGES ARE SHOWN:
   VOLTAGE ABOVE BOX - WITH NO SIGNAL INPUT; TUNER IN BETWEEN CHANNELS AND ANTENNA TERMINALS SHORTED.
   VOLTAGE IN BOX - WITH TUNER ON STRONG STATION AND OUTSIDE ANTENNA.

WAVEFORM MEASUREMENTS:
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

— — — INDICATES PRINTED CIRCUIT BOARD

☐ NUMBERS AND LETTERS IN BOXES INDICATE TEST POINTS AND ARE CROSS-REFERENCED TO THE PARTS LOCATION ILLUSTRATIONS.

UNLESS OTHERWISE SPECIFIED: CAPACITOR DECIMAL VALUES IN MF, ALL OTHERS IN PF. CAPACITANCE VALUES ONLY ARE SHOWN ON SCHEMATIC DIAGRAM. FOR COMPLETE DESCRIPTION OF CAPACITORS, REFER IN PARTS LIST.

RESISTORS ARE 10% 1/2W

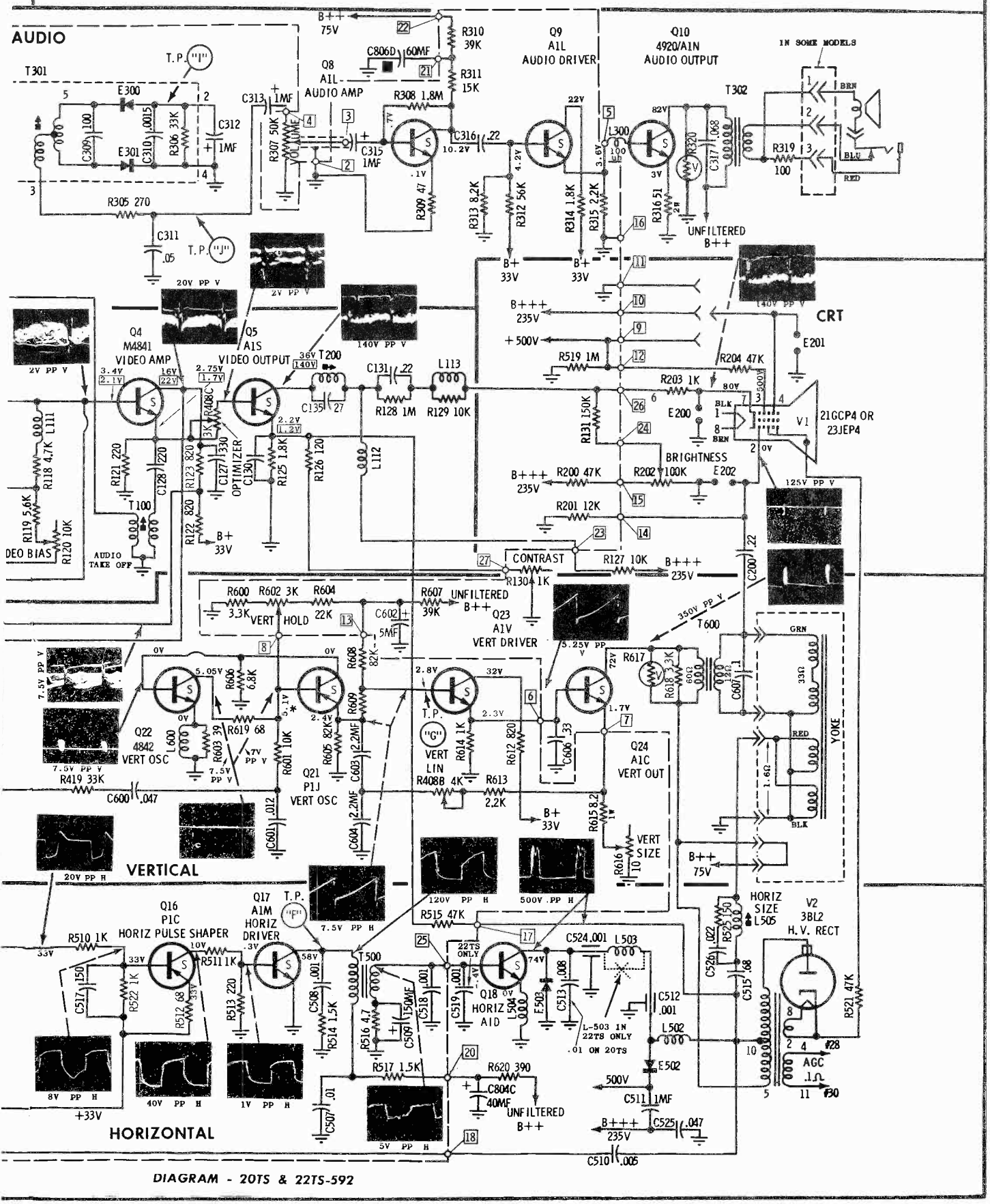
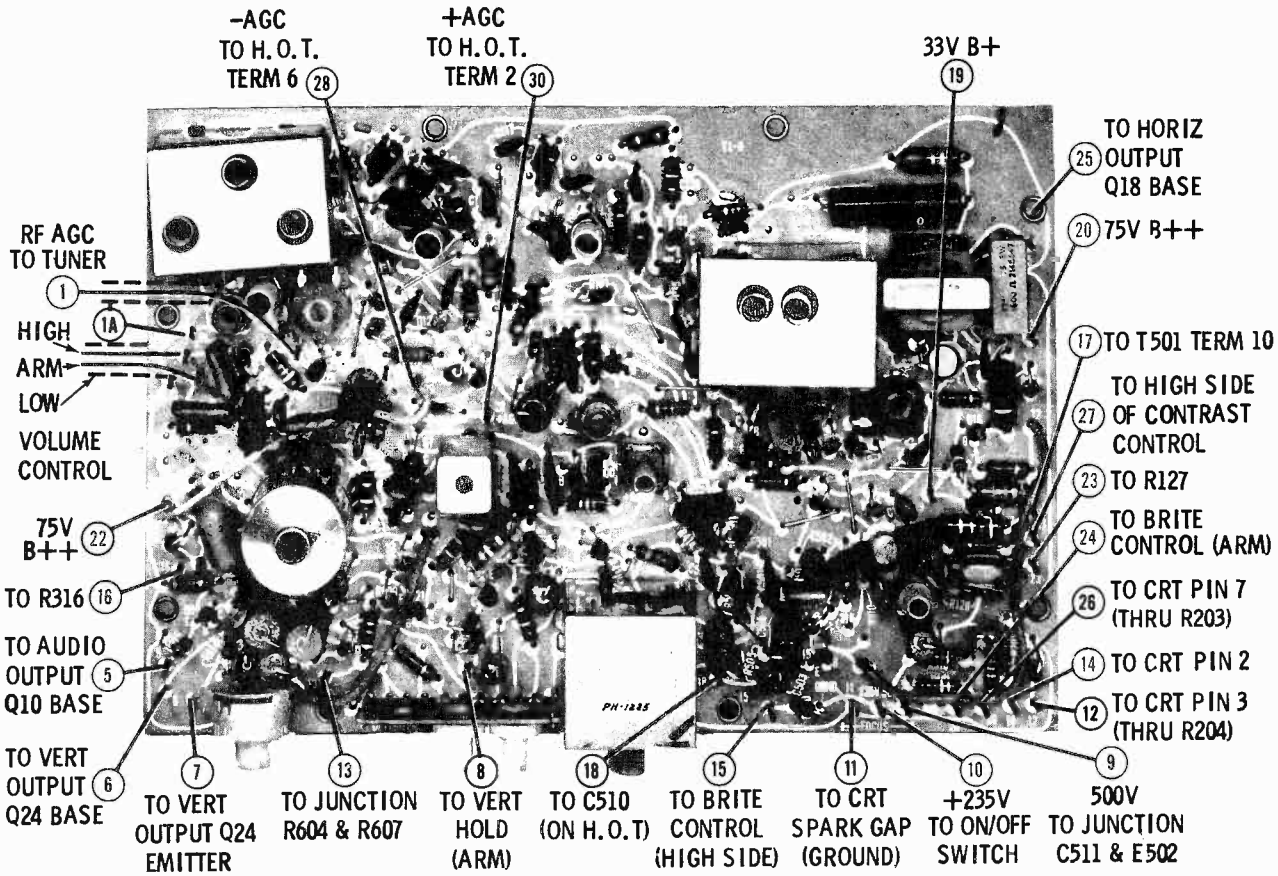
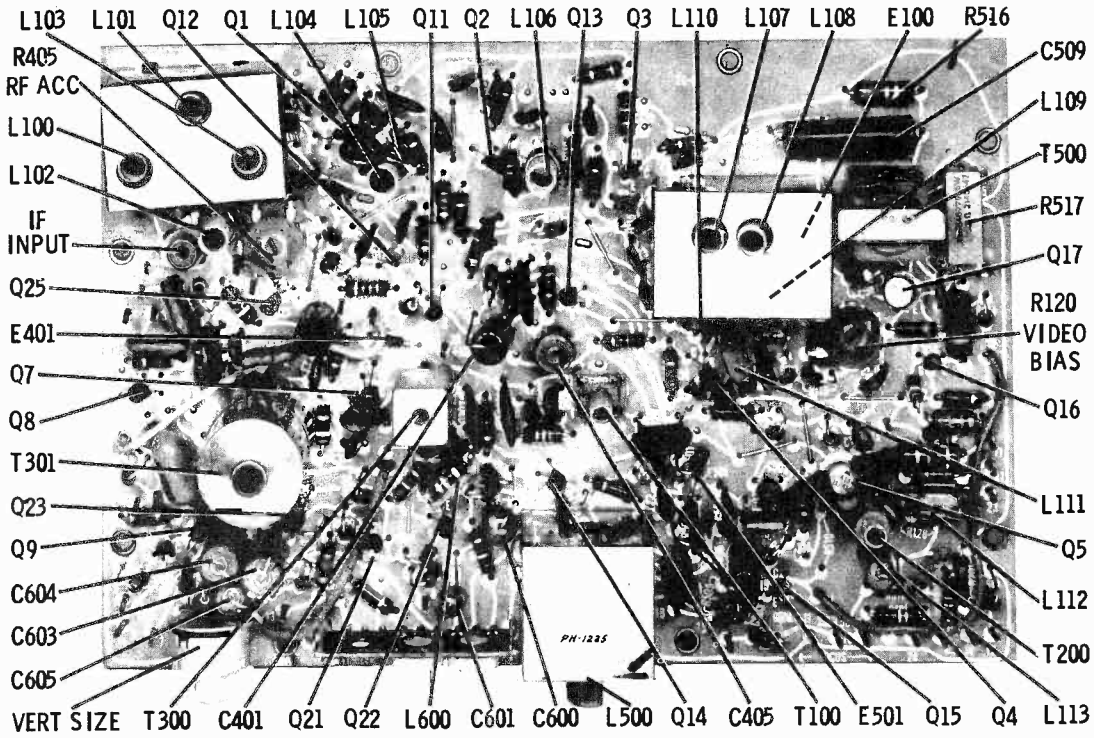


DIAGRAM - 20TS & 22TS-592

MOTOROLA Chassis 20TS-592, 22TS-592, Etched Board Information



ETCHED BOARD TO CHASSIS INTER-CONNECTIONS



ETCHED BOARD PARTS LOCATION - TOP VIEW

PHILCO

PHILCO-FORD CORPORATION

CHASSIS 18N35 (one of "R" Line)

Models R4342BK, TN, R4344WA, R4346WA, R4602WA, R4604MB, WA, R4606WA, R4608EA, MA, R4609WA, R4610MC, WA, R4614EA, R4626WA, R4628WA, R4632WA

PANEL LUG CONNECTIONS

FROM	TO
M1	A.O.T. (RED)
M2	VR6-2
M4	VR6-3
M5	CRT #6
M6	YOKE #4
M7	H.O.T. #4
M7	YOKE #7
M8	CRT #5
M9	VR5-1
M10	VR4-5
M10	V.O.T. (BLK)
M11	VR5-3
M12A	H.O.T. #2
M13	VR5-2
M14	A.O.T. (BLU)
M15	C48A
M15	VR3-2
M15A	(E)
M16	C11T (ON TUNER)
M17	VR5-5
M18	B2-1
M18A	C17T (ON TUNER)
M20	YOKE #11
M21	VR3-1
M21A	FOCUS
M22	VR4-4
M22A	M15
M23	H.O.T. #7
M24	M6
M24	V.O.T. (GRN)

*VALUES VARY WITH USE OF VR2
JUMPER USED WHEN VR2 IS OMITTED

SYM	REMARKS	
VR2	OMITTED	PROVIDED
R15	1.2M	470K
R45	1.2M	1M

V7 21GY5/21JZ6 HOR. OUT.

PIN	VOLTS
3	120V
5	-20V

V4 17BE3/17BZ3 DAMPER

PIN	VOLTS
4	150V
7	HV

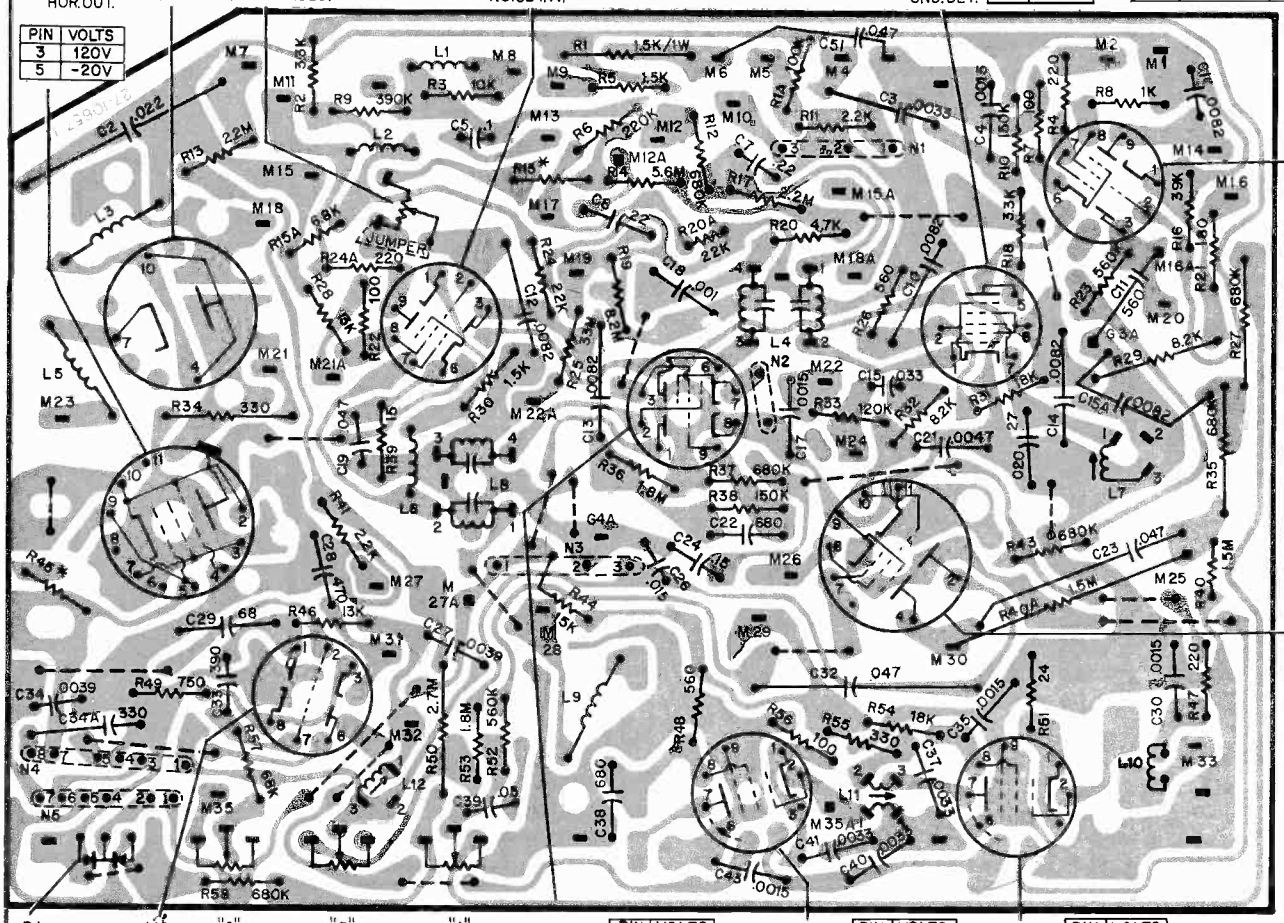
VR2 NOISE INV. ADJ. (IF PROVIDED)

V3 10KR8 VID. OUT. & NOISE INV.

PIN	1	2	3	6	8	9
VOLTS	.05V	-7.5V	68V	.5V	65V	54V

V2 4CS6 SND. DET.

PIN	VOLTS
2	3.5V
5	80V
6	75V



V1 10JY8 AUD. OUT. & GATE

PIN	VOLTS
1	150V
2	83V
3	-3V
6	2.8V
8	148V
9	145V

V6 17JZ8 VERT. OSC. & VERT. OUT.

PIN	VOLTS
2	21V
4	145V
6	-17V
8	145V
10	-21V

D1 PHASE COMP.

V8 8FQ7 HOR. OSC.

PIN	1	2	3	6	7
VOLTS	100V	.1V	3.2V	120V	-9.4V

"C" HOR. HOLD AUX. "B" VERT. LIN. "A" VERT. SIZE VR1

V5 6GH8 SND. I.F. & SYNC. SEP.

PIN	VOLTS
1	58V
3	60V
6	58V
7	1V
9	-1.3V

V10 4EJ7 2 ND. V.I.F.

PIN	VOLTS
1	1.6V
7	140V
8	145V

V9 4EH7 1 ST. V.I.F.

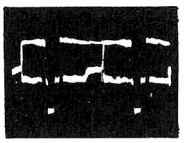
PIN	VOLTS
1	.5V
7	150V
8	50V

Bottom View - Perma Circuit Panel Components - 18N35 Chassis

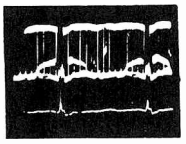
PHILCO Chassis 18N35 Schematic Diagram

OSCILLOSCOPE WAVEFORMS

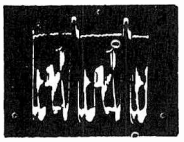
These waveforms were taken with the receiver adjusted for an approximate output of 2.5V p/p at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing except for photos 1, 2 and 3 where contrast was at maximum. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms...not the sweep rate of the oscilloscope. All readings taken with Model PS127 Sencore Oscilloscope.



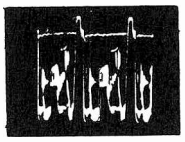
1 2.5 Volts p/p, 15,750 cps (max contrast)



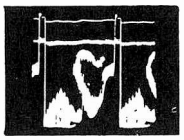
2 2.5 Volts p/p, 60 cps (max contrast)



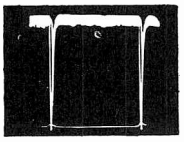
3 110 Volts p/p, 15,750 cps (max contrast)



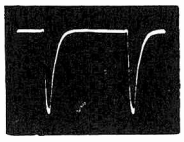
4 70 Volts p/p, 15,750 cps



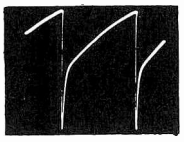
5 70 Volts p/p, 60 cps



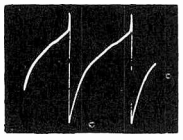
6 50 Volts p/p, 60 cps



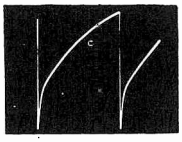
7 50 Volts p/p, 15,750 cps



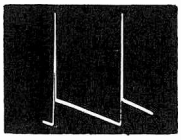
8 40 Volts p/p, 60 cps



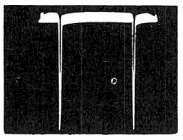
9 80 Volts p/p, 60 cps



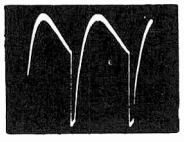
10 40 Volts p/p, 60 cps



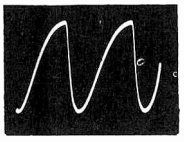
11 1300 Volts p/p total, 120 Volts p/p, sawtooth, 60 cps



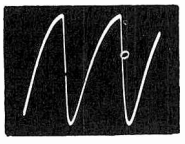
12 60 Volts p/p, 60 cps



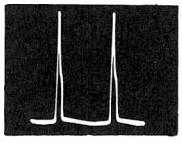
13 8 Volts p/p, 15,750 cps



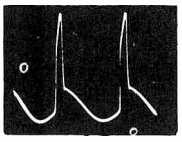
14 11 Volts p/p, 15,750 cps



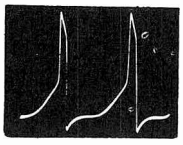
15 15 Volts p/p, 15,750 cps



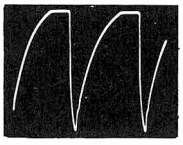
16 9 Volts p/p, 15,750 cps



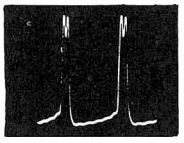
17 34 Volts p/p, 15,750 cps



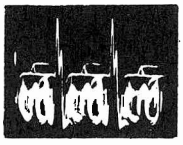
18 29 Volts p/p, 15,750 cps



19 100 Volts p/p, 15,750 cps



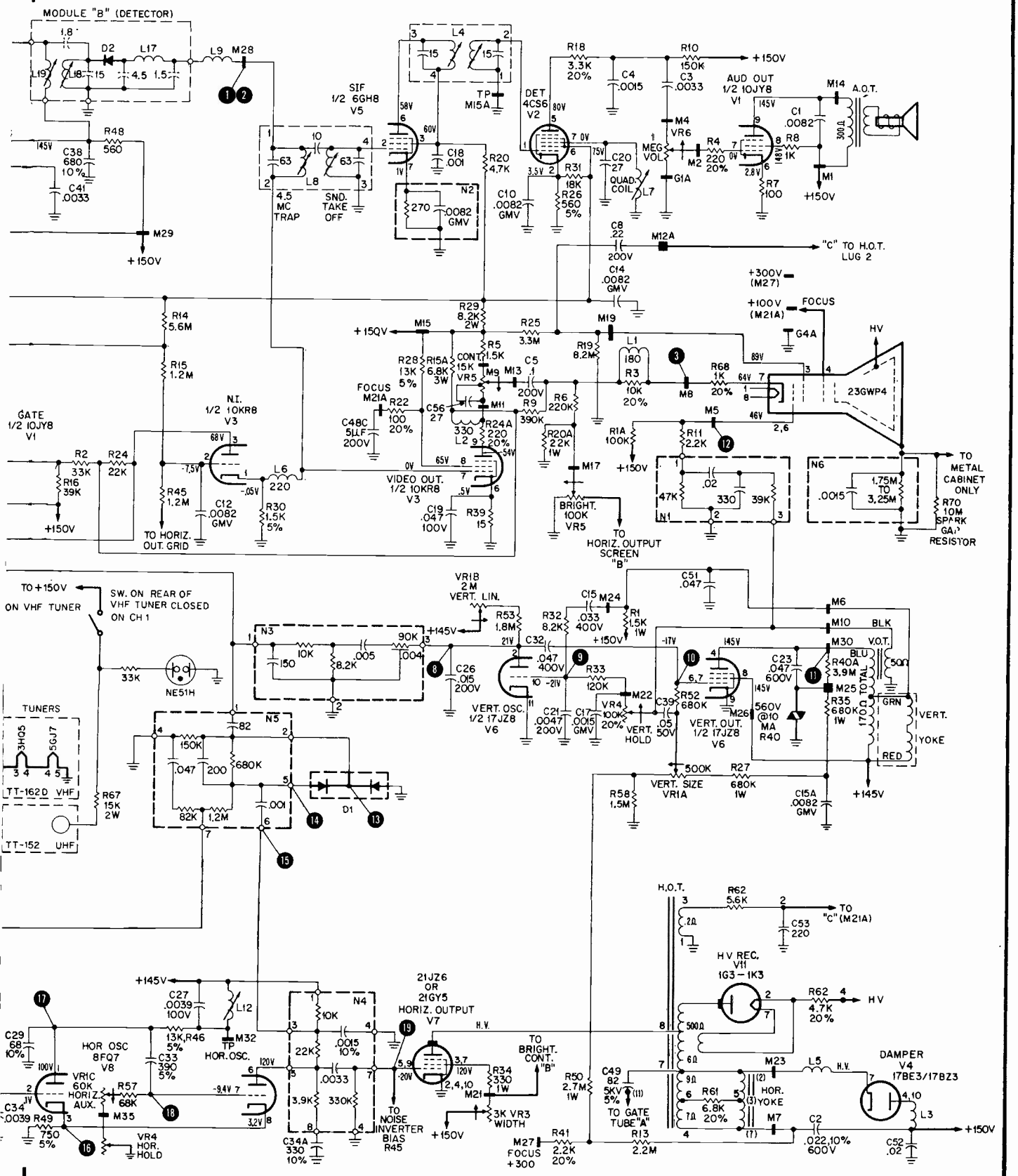
20 440 Volts p/p, 15,750 cps



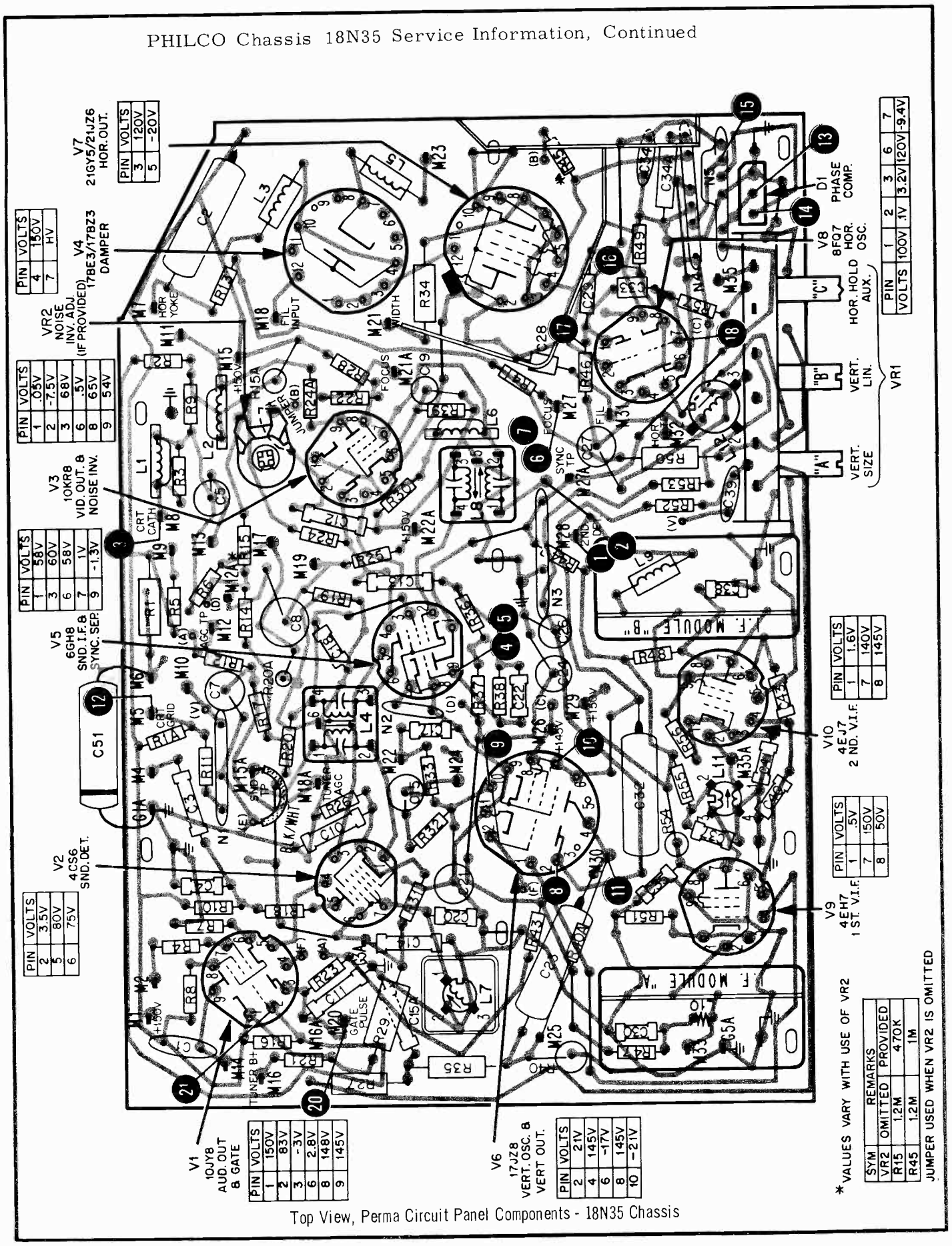
21 70 Volts p/p, 15,750 cps

NOTES:
1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. . ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A V.T.V.M. FROM POINT INDICATED TO CHASSIS GROUND.
3. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
4. BALLOONS (10) (11) ETC. SHOWN ON SCHEMATIC INDICATE WAVEFORM TEST POINTS.
5. CONTROL SETTINGS:
   NOISE ADJ. CONTROL VR2 NOT SHOWN
   VOLUME - MINIMUM
   CONTRAST - MID-RANGE
   BRIGHTNESS - MID-RANGE
   ALL OTHER CONTROLS SET FOR NORMAL OPERATION.

PHILCO Chassis 18N35 Schematic Diagram, Continued



Schematic Diagram - 18N35 Chassis



Top View, Perma Circuit Panel Components - 18N35 Chassis

PHILCO

CHASSIS 18JT41 & 18NT45
(Service material on pages 69 through 74, with separate diagrams)

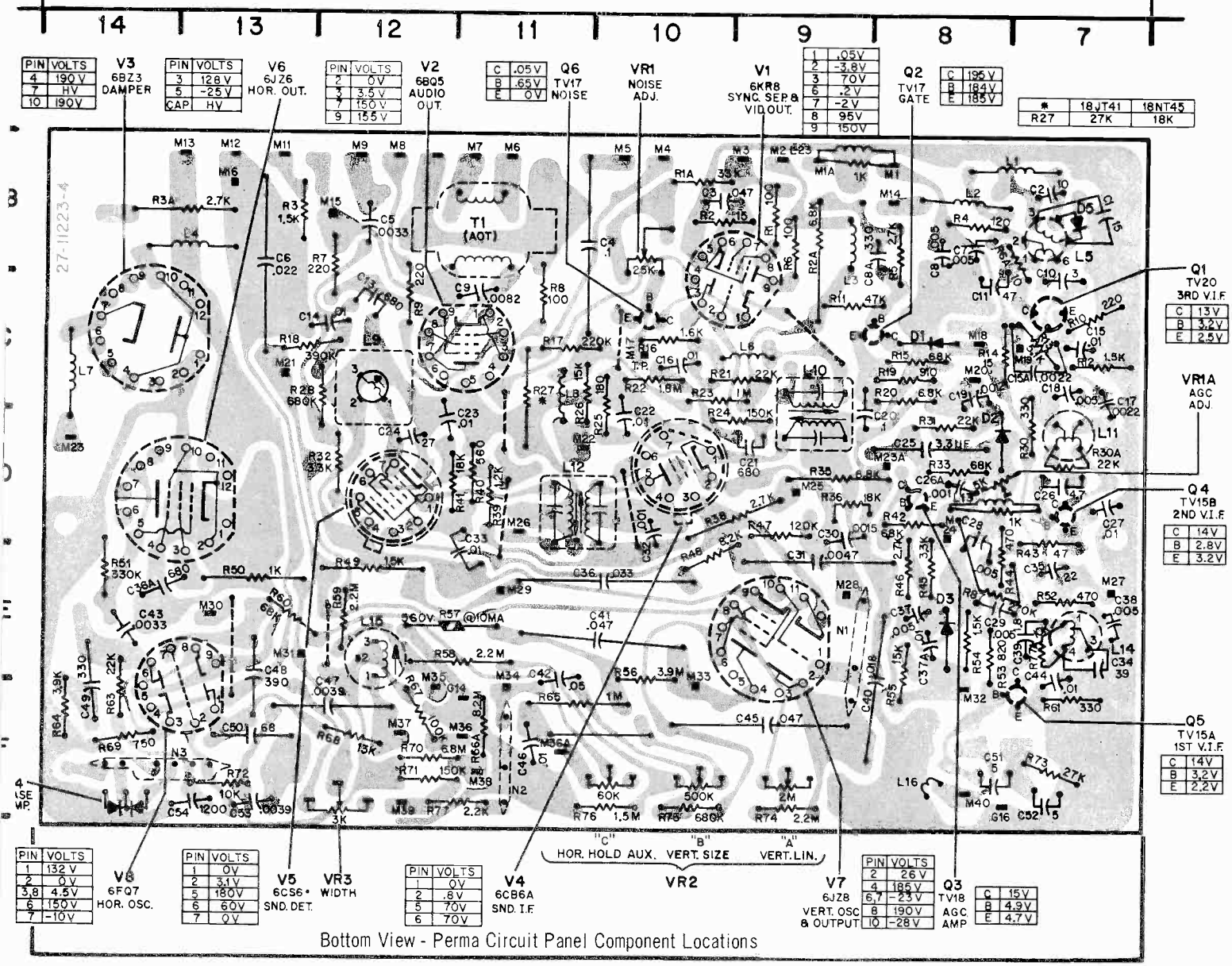
PANEL INTERCONNECTING LEADS

A TO A
B TO B
C TO C
D TO D
E TO E
F TO F
G TO G
H TO H

POINTS ARE INDICATED BY BALLOONS A B ETC.

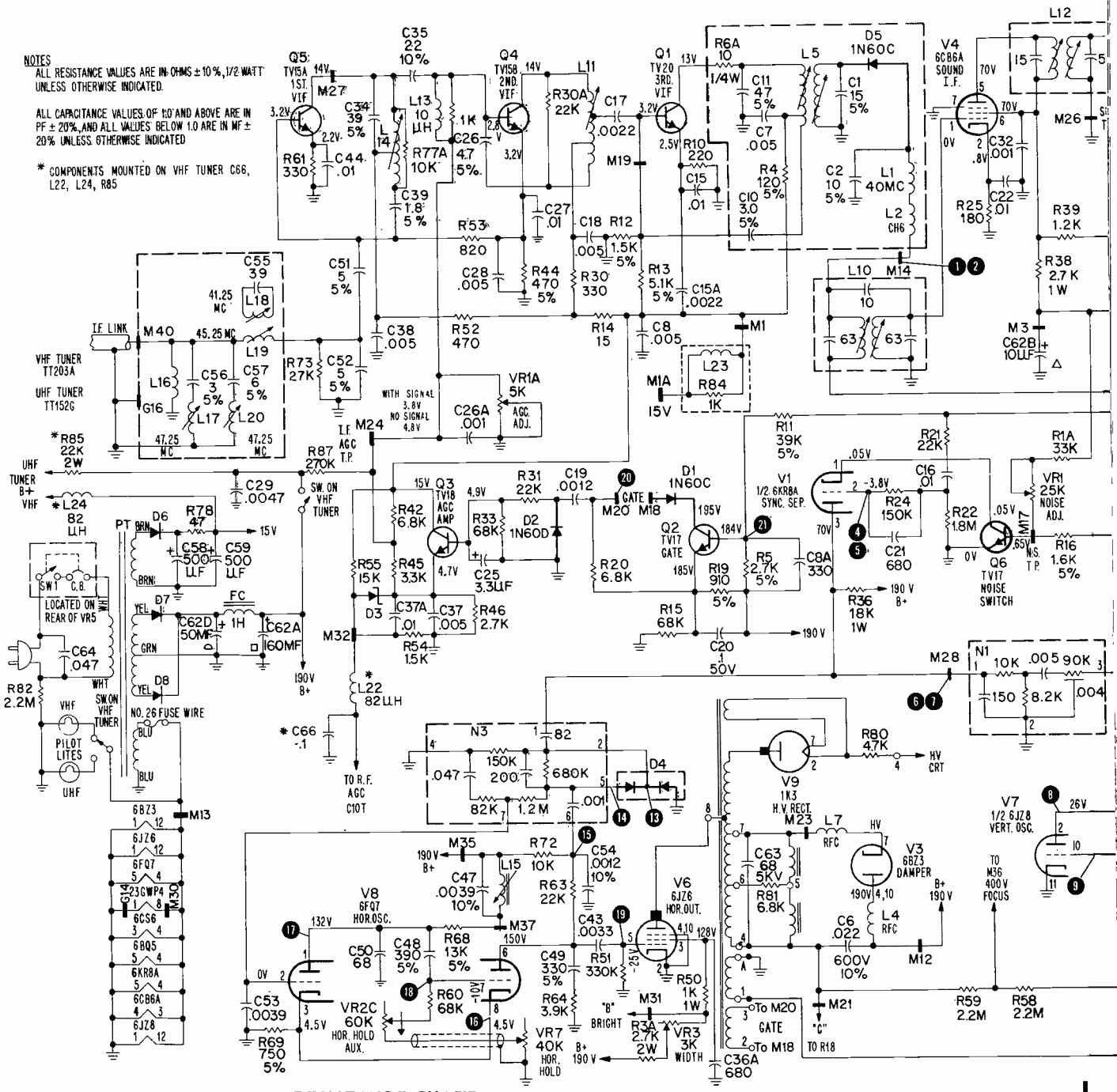
PANEL LUG CONNECTIONS

FROM	TO
M1A	R78 (15V. SUPPLY)
M2	VR8-1
M3	C62B
M4	VR6-2
M5	VR8-2
M6	SPEAKER
M7	SPEAKER
M8	VR5-2
M9	VR5-3
M11	VR8-3
M12	C62-A
M13	B2-6
M14	L10 (SND TRAP)
M15 (BOT)	C62-C
M16	YOKE #6
M16 (BOT)	V.O.T. (RED)
M17	NOISE SW. T.P.
M18	H.O.T. #3
M20	H.O.T. #2
M21 (BOT)	H.O.T. #4
M22	CRT #5
M23	H.O.T. #7
M23A (BOT)	C62-A
M24	IF AGC T.P.
M25 (BOT)	VR7-3
M26	L12 (SND T.P.)
M29 (BOT)	YOKE #11
M29 (BOT)	V.O.T. (GRN)
M30	CRT #8
M31 (BOT)	VR6-3
M32	L22 (ON TUNER)
M33 (BOT)	V.O.T. (BLUE)
M34	VR7-2
M34 (BOT)	V.O.T. (BLK)
M35	FOCUS +190V
M36	FOCUS +400V
M38	CRT #3
M38	C60
M39	CRT #6



Bottom View - Perma Circuit Panel Component Locations

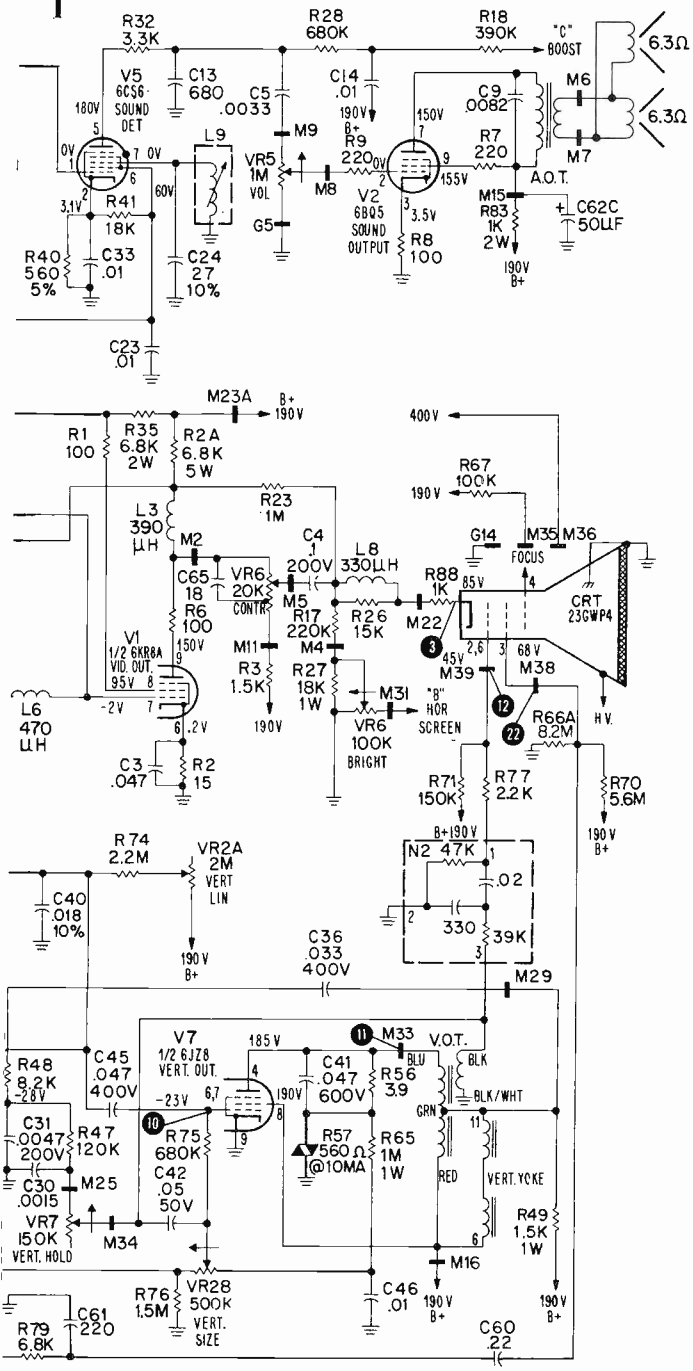
PHILCO Chassis 18NT45 Schematic Diagram



RESISTANCE CHART

TUBE	USE	PIN NUMBERS 1	2	3	4	5	6	7	8	9	10	11	12
V2-6BQ5	Audio Out	NC	150K	100Ω	FIL	FIL	NC	10K	NC	10K			
V3-6BZ3	Damper	FIL	NC	NC	8K	NC	NC	8.5M	NC	NC	8K	NC	FIL
V4-6CB6A	Sound I.F.	3.5Ω	180Ω	FIL	FIL	9K	9K	GND					
V5-6CS6	Sound Detector	6Ω	560Ω	FIL	FIL	10M	9K	3Ω					
V6-6JZ6	Horiz. Out	FIL	GND	14K	GND	330K	NC	NC	330K	NC	GND	NC	FIL
V7-6JZ8	Vert. Osc. & Output	FIL	4M	NC	8K	NC	2.2M	2.2M	8K	GND	200K	GND	FIL
V8-6FQ7	Horiz. Osc.	23K	1.9M	750Ω	FIL	FIL	42K	80K	750Ω	GND			

PHILCO Chassis 18NT45 Schematic Diagram, Continued

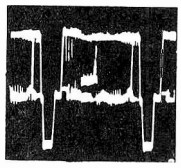


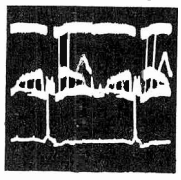
Schematic Diagram - 18NT45 Chassis

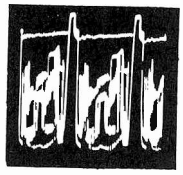
NOTES:
1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A V.T.V.M. FROM POINT INDICATED TO CHASSIS GROUND.
3. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
4. BALLOONS SHOWN ON SCHEMATIC INDICATE WAVEFORM TEST POINTS.
5. CONTROL SETTINGS:
   VOLUME - MINIMUM
   CONTRAST - MID RANGE
   BRIGHTNESS - MID RANGE
   ALL OTHER CONTROLS SET FOR NORMAL OPERATION

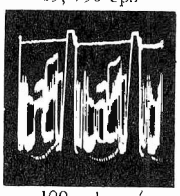
OSCILLOSCOPE WAVEFORMS

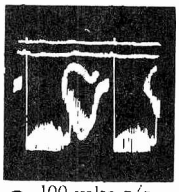
These waveforms were taken with the receiver adjusted for an approximate output of 2.5V p/p at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing except for photos 1, 2 and 3 where contrast was at maximum. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms...not the sweep rate of the oscilloscope.

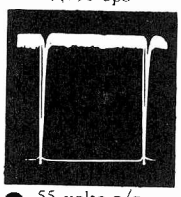

1 2.5 volts p/p, 15, 750 cps

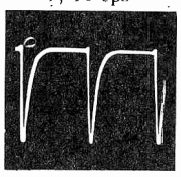

2 2.5 volts p/p, 60 cps

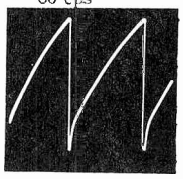

3 115 volts p/p, 15,750 cps

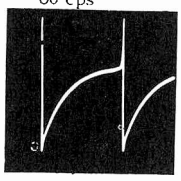

4 100 volts p/p, 15,750 cps

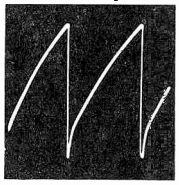

5 100 volts p/p 60 cps

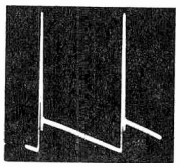

6 55 volts p/p 60 cps

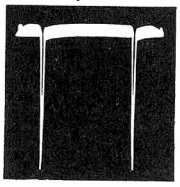

7 55 volts p/p, 15,750 cps

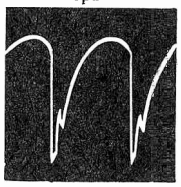

8 50 volts p/p, 60 cps

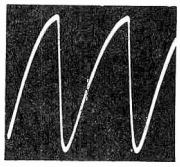

9 85 volts p/p, 60 cps

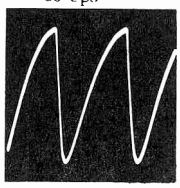

10 50 volts p/p, 60 cps

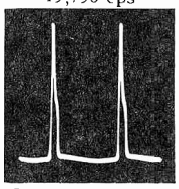

11 1300 volts p/p total, 130 volts p/p sawtooth, 60 cps

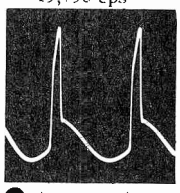

12 115 volts p/p, 60 cps

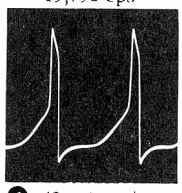

13 11.5 volts p/p, 15,750 cps

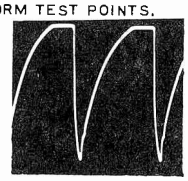

14 15 volts p/p, 15,750 cps


15 21 volts p/p, 15,750 cps


16 14 volts p/p, 15,750 cps


17 48 volts p/p, 15,750 cps


18 42 volts p/p, 15,750 cps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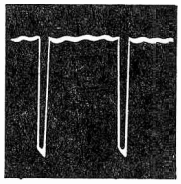
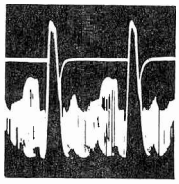
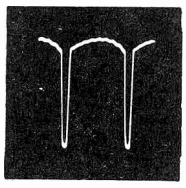
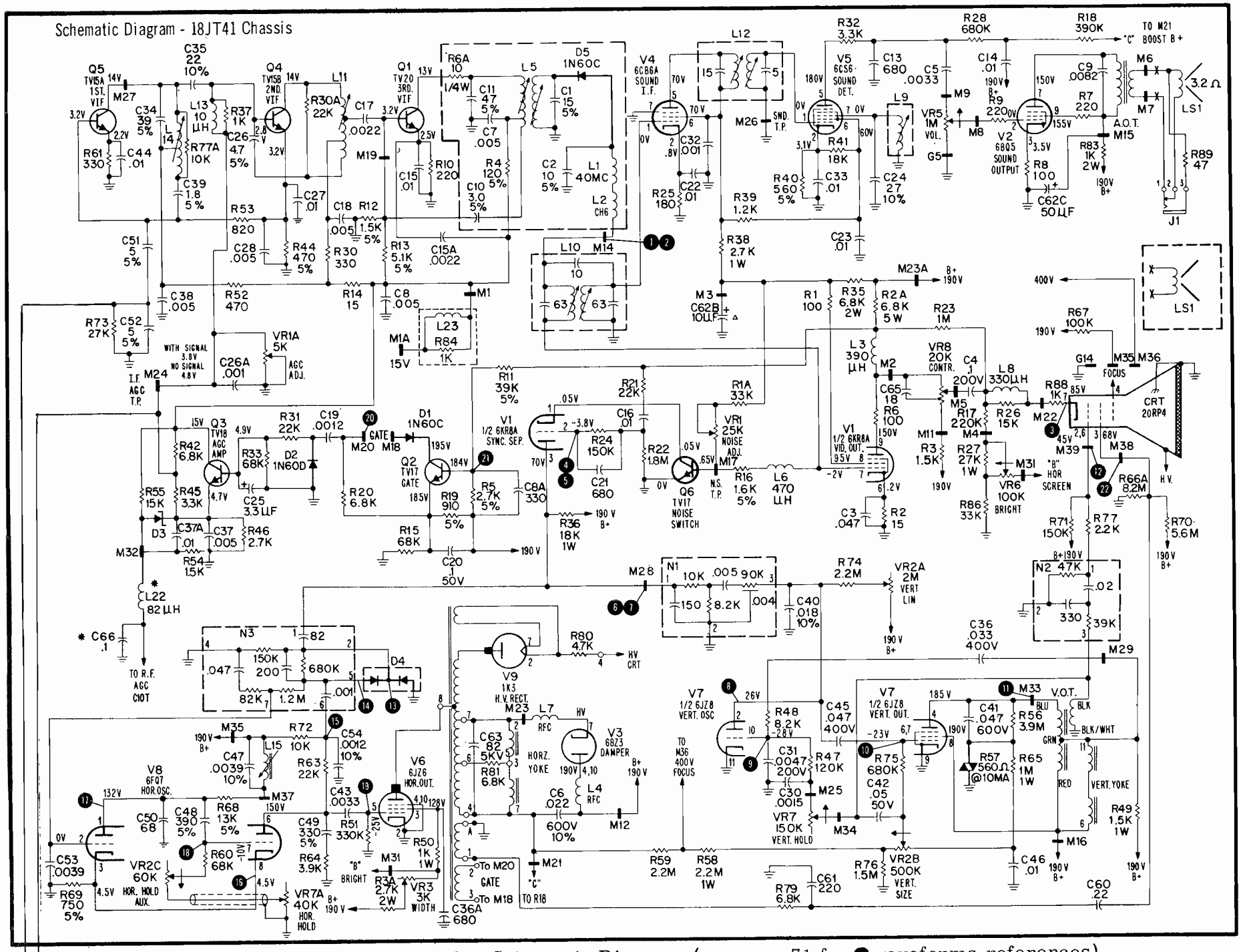

20 22 volts p/p, 15,750 cps


21 12 volts p/p, 15,750 cps

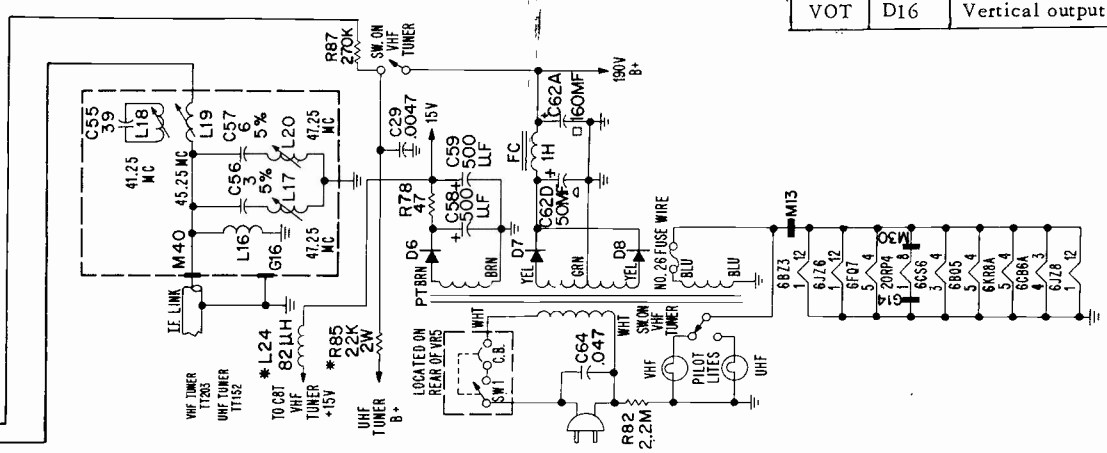

22 90 volts p/p, 15,750 cps



PHILCO Chassis 18JT41 Schematic Diagram (see page 71 for ● waveforms references)

NOTES:
1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A V.T.V.M. FROM POINT INDICATED TO CHASSIS GROUND.
3. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
4. BALLOONS SHOWN ON SCHEMATIC INDICATE WAVEFORM TEST POINTS.
5. CONTROL SETTINGS:
   VOLUME - MINIMUM
   CONTRAST - MID RANGE
   BRIGHTNESS - MID RANGE
   ALL OTHER CONTROLS SET FOR NORMAL OPERATION

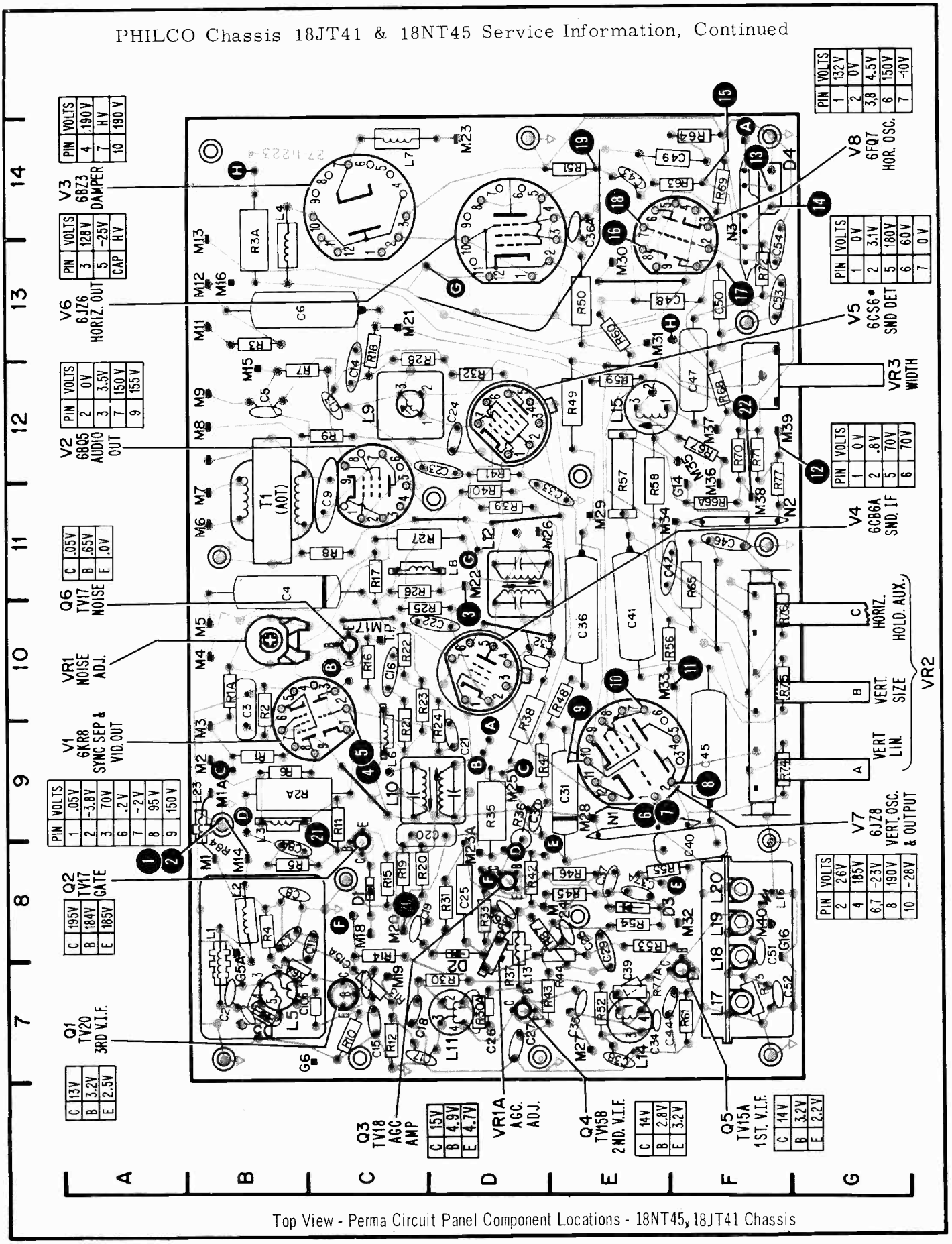
SYMBOL	LOCATION	DESCRIPTION	SERVICE PART NO.
		CAPACITORS	
C1	B7	15 pf, 3rd video IF	30-1293-61
C2	B7	10 pf, 2nd detector	30-1293-24
C3	B10	.047 mf, video cath	30-4709-21
C4	B10	.1 mf, video cplg	30-4706-26
C5	B12	.0033 mf, audio out grid	30-1294-42
C6	B13	.022 mf, 600V, Boost	30-4697-10
C7	B8	.005 mf, 3rd video IF	30-1294-24
C8	B8	.005 mf, AGC filter	30-1294-24
C8A	B8	330 pf, Gate base	30-1294-12
C9	C11	.0082 mf, Audio plate	30-1294-32
C10	C7	3 pf, 3rd IF neut	30-1221-41
C11	C8	47 pf, IF coll 3rd	30-1293-47
C13	C12	680 pf, sound det plate	30-1294-10
C14	C12	.01 mf, sound det B+	30-1294-6
C15	C7	.01 mf, 3rd IF emit	30-1294-6
C15A	F7	.0022 mf, IF B+	30-1294-9
C16	C10	.01 mf, Sync sep grid	30-1294-6
C17	C7	.0022 mf, 3rd IF base	30-1294-9
C18	C7	.005 mf, 2nd IF B+	30-1294-24
C19	C8	.0012 mf, Gate cplg	30-1294-53
C20	D8	.1 mf 100V, AGC gate	30-1272-8
C21	D9	680 pf, sync sep grid	30-1294-10
C22	D10	.01 mf, sound IF	30-1294-6
C23	D11	.01 mf, sound det.	30-1294-6
C24	D12	27 pf, Quadrature	30-1293-50
C25	D8	3.3 mf, AGC filter	30-2612-1
C26	D7	4.7 pf, 2nd IF neut	30-1221-40
C26A	-	.001 mf, Noise adjust	30-1294-25
C27	D7	.01 mf, IF emit	30-1294-6
C28	D8	.005 mf, 2nd IF emit	30-1294-24
C29	D8	.0047 mf, IF AGC	30-1294-13
C30	D9	.0015 mf, Vert hold	30-1294-30
C31	E9	.0047 mf, Vert feed	30-4706-24
C32	E10	.001 mf, SIF screen	30-1294-20
C33	E11	.01 mf, sound det cath	30-1294-6
C34	E7	39 pf, part of L14	
C35	E7	22 pf, 1st IF coll	30-1293-60
C36	E10	.033 mf, Vert feed	30-4697-2
C36A	-	680 pf, horiz. out scr.	30-1294-48
C37	E8	.005 mf, AGC emit	30-1294-24
C37A	E8	.01 mf, Zener bypass	30-1294-6
C38	E7	.005 mf, IF AGC	30-1294-24
C39	E7	1.8 pf, 1st IF neut	30-1221-33
C40	F8	.018 mf, Vert charge	30-4709-35
C41	E10	.047 mf, Vert damp	30-4706-36
C42	F11	.05 mf, Vert feed filter	30-1272-14
C43	E14	.0033 mf, Horiz. out grid	30-1294-42
C44	E7	.01 mf, 1st VIF emit	30-1294-6
C45	F9	.047 mf, Vert cplg	30-4697-9
C46	F11	.01 mf, Vert size	30-1294-6
C47	F12	.0039 mf, Horiz stabilizer	30-4706-21
C48	F13	390 pf, Horiz osc.	30-4707-2
C49	F14	330 pf, Horiz charge	30-4707-12
C50	F13	68 pf, Horiz osc	30-4707-3
C51	F8	5 pf, 1st IF base	30-1293-25
C52	G7	5 pf, 1st IF base	30-1293-25
C53	G13	.0039 mf, phase comp	30-1294-39
C54	G13	1200 pf, Horiz saw	30-1294-41
C55	-	39 pf, 41.25 mc trap	30-1293-36
C56	-	3 pf, 47.25 mc trap	30-1287-29
C57	-	6 pf, 47.25 mc trap	30-1293-43
C58	B4	500 mf/20V, 15V supply	30-2614-2
C59	C4	500 mf/20V, 15V supply	30-2614-2
C60	B16	.22 mf, Horiz retrace	30-4706-27
C61	B16	220 pf, horiz retrace	30-1294-64
C62	D6	160/10/50/50 mf @ 200V filter	**30-2616-1**
C63	-	68 pf, Horiz yoke	30-1246-19
C64	F1	.047 mf, AC line bypass	30-4714-6
C65	F3	18 pf, contrast	30-1293-91
C66	-	.1 mf, tuner AGC	30-4704-9
		DIODES	
D1	C8	1N60C, AGC gate	34-8022-6
D2	D8	1N60D, AGC filter	34-8022-7
D3	E8	Zener, AGC	34-8057-10
D4	G14	Dual Selenium, phase comp	34-8037-1
D5	B7	1N60C, video det	34-8022-6
D6	B5	Silicon, rect +15V	34-8054-7
D7	C4	Silicon, rect B+	34-8054-11
D8	C5	Silicon, rect B+	34-8054-11
		COILS	
L1	B7	40 mc, det choke	32-4837-1
L2	B8	Chan 6 dropout	32-4645-7
L3	C9	390 mh, video plate	32-4762-11
L4	B13	60 mc, damper plate	32-4112-62
L5	B7	3rd VIF	32-4884-5
L6	C9	470 mh 2nd det	32-4762-22
L7	C14	60 mc, damper cath.	32-4112-62
L8	C11	330 mh, video plate series	32-4762-20
L9	C12	Quadrature, snd det.	32-4876-1
L10	C9	4.5 mc trap & snd takeoff	32-4688-13
L11	D7	2nd VIF	32-4885-7
L12	D11	SIF interstage	32-4745-12
L13	D8	Choke, 2nd VIF base	32-4887-2
L14	E7	1st VIF	32-4885-6
L15	E12	Horiz stabilizer	32-4754-3
L16	F8	Tuner coupling	32-4652-96
L17	F7	47.25 mc trap	32-4652-78
L18	F7	41.25 mc trap	32-4652-80
L19	F8	1st base pole	32-4652-79
L20	F8	47.25 mc trap	32-4652-78
L22	-	82 mh, Tuner AGC	32-4762-27
L23	B9	Choke, +15V supply	32-4887-2
L24	-	82 mh, Tuner +15V	32-4762-27
		NETWORKS	
N1	E9	Vert Integrator	30-6030-12
N2	F11	Vert retrace	30-6024-9
N3	F13	Phase comp.	30-6035-2
		TRANSISTORS	
Q1	C7	TV20, 3rd IF	34-6000-72
Q2	C8	TV17, AGC gate	34-6001-63
Q3	D8	TV18, AGC amp.	34-6001-64
Q4	D7	TV15B, 2nd IF	34-6000-70
Q5	F7	TV15A, 1st IF	34-6000-69
Q6	C10	TV17, Noise switch	34-6001-63
		TRANSFORMERS	
AOT	B11	Audio output	33-10039-1
FC	D4	1h, filter choke B+	32-10010-9
HOT	E16	Horiz output	**32-10065-2**
PT	E5	Power	32-10064-1
VOT	D16	Vertical output	32-10012-8



NOTES
ALL RESISTANCE VALUES ARE IN OHMS ± 10%, 1/2 WATT UNLESS OTHERWISE INDICATED

ALL CAPACITANCE VALUES OF 1.0 AND ABOVE ARE IN PF ± 20%, AND ALL VALUES BELOW 1.0 ARE IN MF ± 20% UNLESS OTHERWISE INDICATED

* COMPONENTS MOUNTED ON VHF TUNER C66, L22 L24, R85



Top View - Perma Circuit Panel Component Locations - 18NT45, 18JT41 Chassis

PHILCO

CHASSIS 18LT43

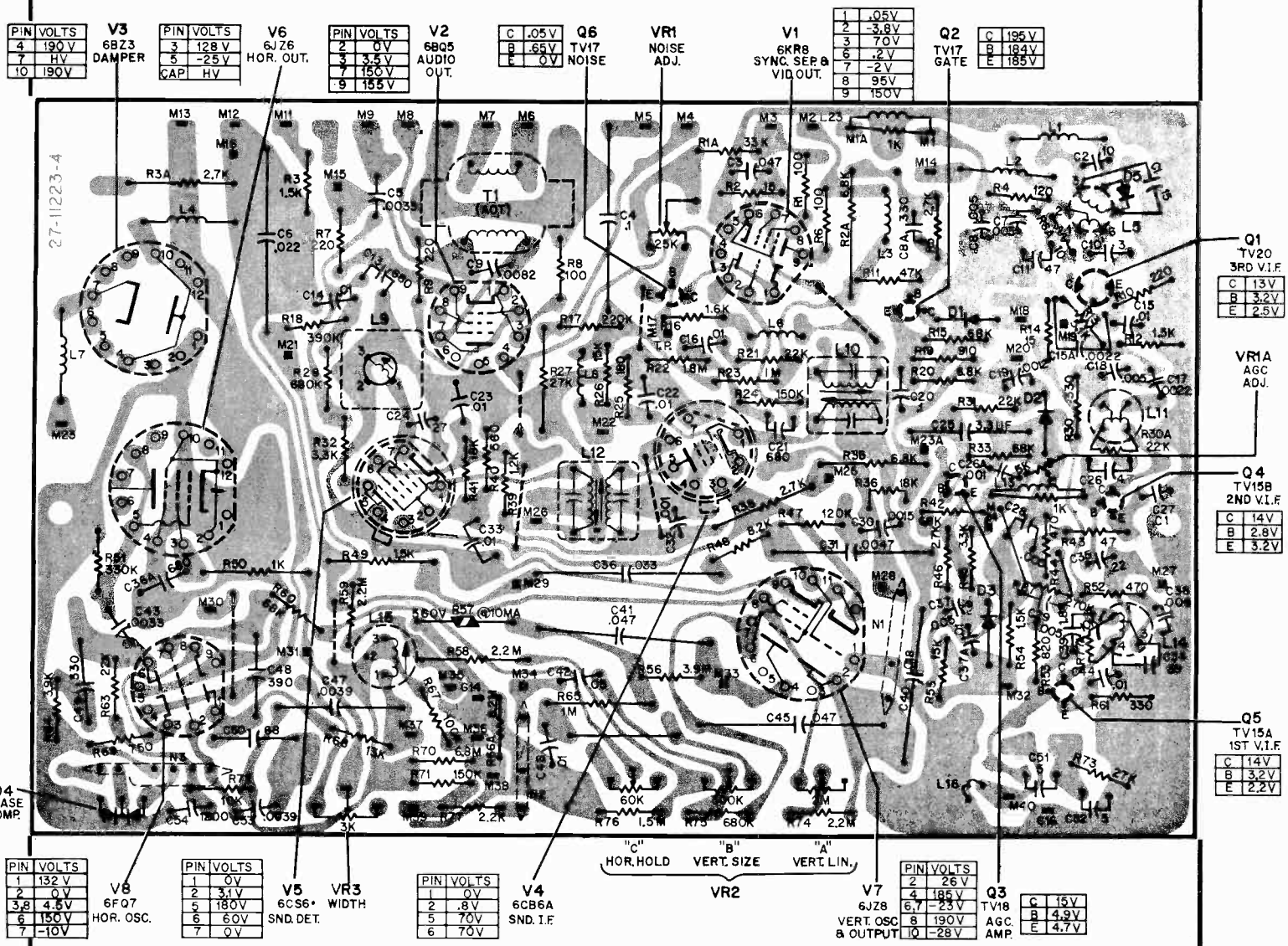
PANEL INTERCONNECTING LEADS

A TO A
B TO B
C TO C
D TO D
E TO E
F TO F
G TO G
H TO H

POINTS ARE INDICATED BY BALLOONS A, B ETC.

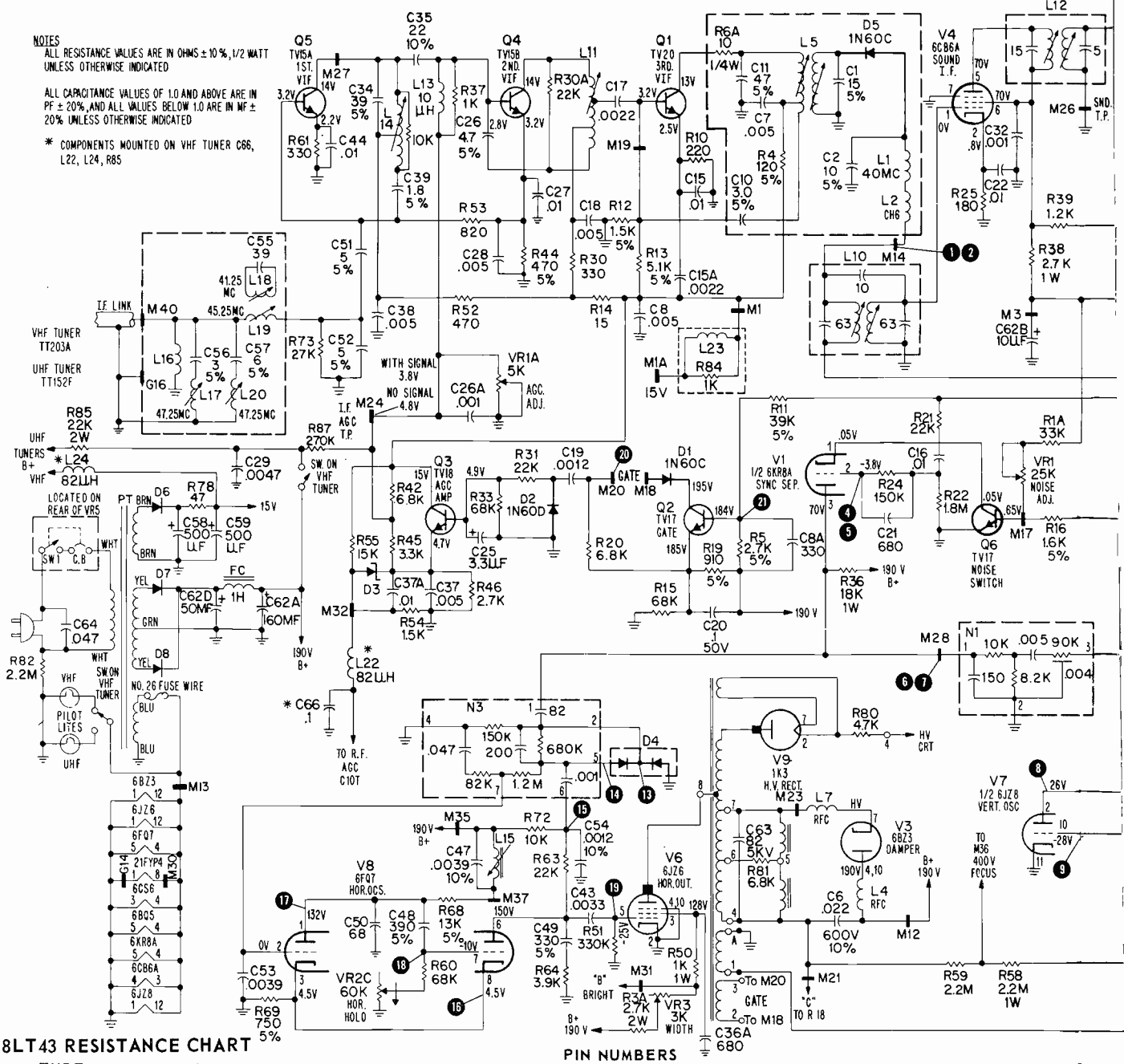
18LT43 PANEL LUG CONNECTIONS

FROM	TO	FROM	TO
M1A	R78 (15V. SUPPLY)	M22	CRT #5
M2	VR6-5	M23	H.O.T. #7
M3	C62B	M23A (BOT)	C62-A
M4	VR6-2	M24	IF AGC T.P.
M5	VR6-6	M25 (BOT)	VR7-3
M6	SPEAKER	M26	L12 (SND T.P.)
M7	SPEAKER	M29 (BOT)	YOKE #11
M8	VR5-2	M29 (BOT)	V.O.T. (GRN)
M9	VR5-3	M30	CRT #8
M11	VR6-7	M31 (BOT)	VR6-3
M12	C62-A	M32	L22 (ON TUNER)
M13	B2-6	M33 (BOT)	V.O.T. (BLUE)
M14	L10 (SND TRAP)	M34	VR7-2
M15 (BOT)	C62-C	M34 (BOT)	V.O.T. (BLK)
M16	YOKE #6	M35	FOCUS +190V
M16 (BOT)	V.O.T. (RED)	M36	FOCUS +400V
M17	NOISE SW. T.P.	M38	CRT #3
M18	H.O.T. #3	M38	C60
M20	H.O.T. #2	M39	CRT #6
M21 (BOT)	H.O.T. #4		



Bottom View - Perma Circuit Panel Component Locations - 18LT43 Chassis

PHILCO Chassis 18LT43 Schematic Diagram



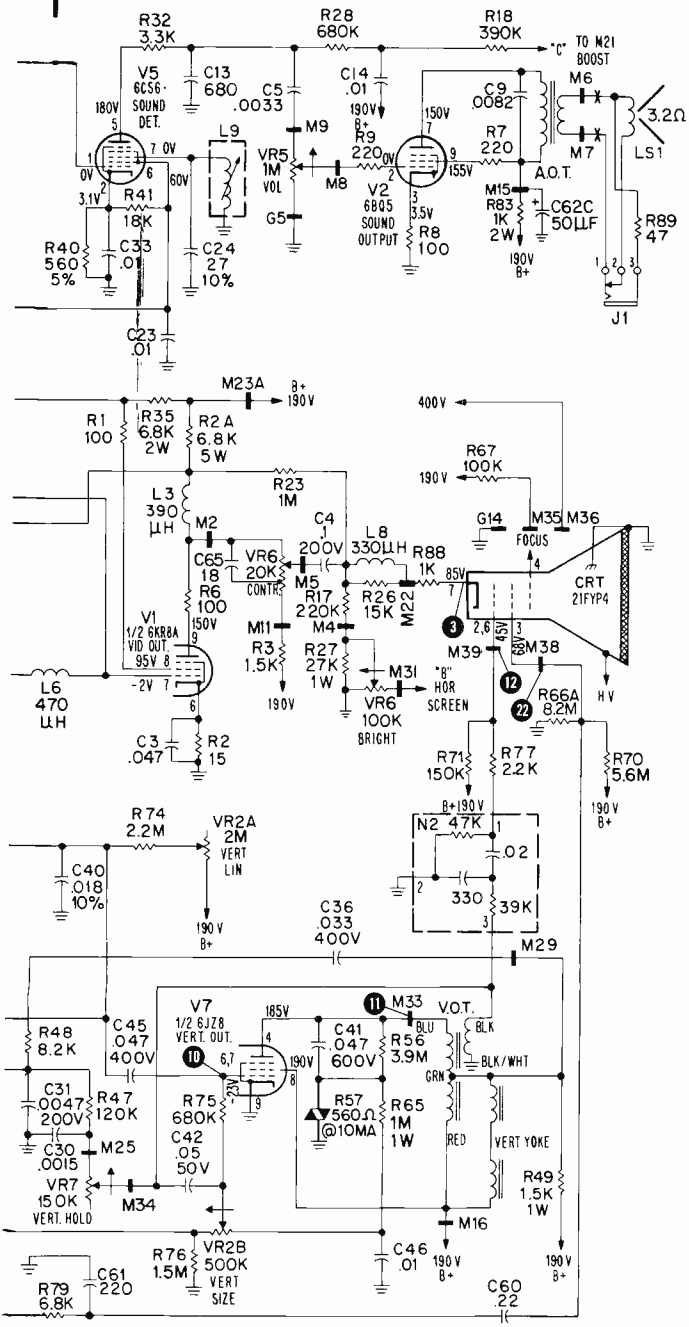
18LT43 RESISTANCE CHART

PIN NUMBERS

TUBE	USE	1	2	3	4	5	6	7	8	9	10	11	12
V1-6KR8	Sync Sep & Vid. Out	*30K	2M	11K	FIL	FIL	15Ω	*40K	8.5K	11K			
V2-6BQ5	Audio Out	NC	150K	100Ω	FIL	FIL	NC	10K	NC	10K			
V3-6BZ3	Damper	FIL	NC	NC	8K	NC	NC	8.5M	NC	NC	8K	NC	FIL
V4-6CB6A	Sound I.F.	3.5Ω	180Ω	FIL	FIL	9K	9K	GND					
V5-6CS6	Sound Detector	6Ω	560Ω	FIL	FIL	10M	9K	3Ω					
V6-6JZ6	Horiz. Out	FIL	GND	14K	GND	330K	NC	NC	330K	NC	GND	NC	FIL
V7-6JZ8	Vert. Osc. & Output	FIL	4M	NC	8K	NC	2.2M	2.2M	8K	GND	200K	GND	FIL
V8-6FQ7	Horiz. Osc.	23K	1.9M	750Ω	FIL	FIL	42K	80K	750Ω	GND			

*WITH POSITIVE LEAD OF VTVM TO GROUND

PHILCO Chassis 18LT43 Schematic Diagram, Continued

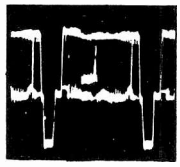


Schematic Diagram - 18LT43 Chassis

NOTES:
1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A V.T.V.M. FROM POINT INDICATED TO CHASSIS GROUND.
3. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
4. BALLOONS SHOWN ON SCHEMATIC INDICATE WAVEFORM TEST POINTS.
5. CONTROL SETTINGS:
   VOLUME - MINIMUM
   CONTRAST - MID RANGE
   BRIGHTNESS - MID RANGE
   ALL OTHER CONTROLS SET FOR NORMAL OPERATION

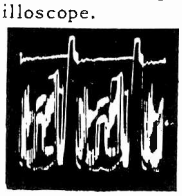
OSCILLOSCOPE WAVEFORMS

These waveforms were taken with the receiver adjusted for an approximate output of 2.5V p/p at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing except for photos 1, 2 and 3 where contrast was at maximum. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms...not the sweep rate of the oscilloscope. All readings taken with Model 1450 B&K Oscilloscope.



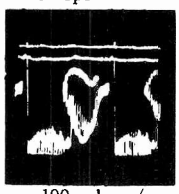
1 2.5 volts p/p, 15, 750 cps

2 2.5 volts p/p, 60 cps

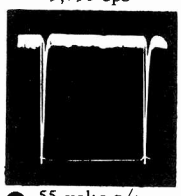


3 115 volts p/p, 15,750 cps

4 100 volts p/p, 15,750 cps



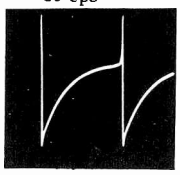
5 100 volts p/p 60 cps



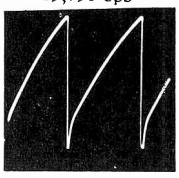
6 55 volts p/p 60 cps

7 55 volts p/p, 15,750 cps

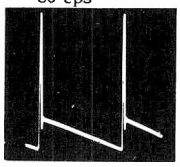
8 50 volts p/p, 60 cps



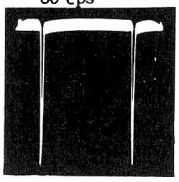
9 85 volts p/p, 60 cps



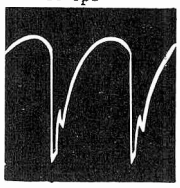
10 50 volts p/p, 60 cps



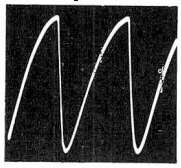
11 1300 volts p/p total, 130 volts p/p sawtooth, 60 cps



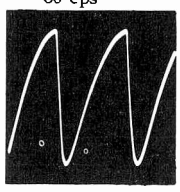
12 115 volts p/p, 60 cps



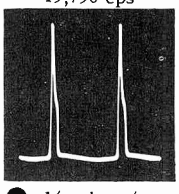
13 11.5 volts p/p, 15,750 cps



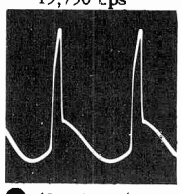
14 15 volts p/p, 15,750 cps



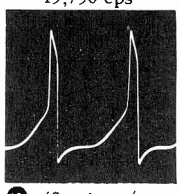
15 21 volts p/p, 15,750 cps



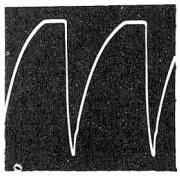
16 14 volts p/p, 15,750 cps



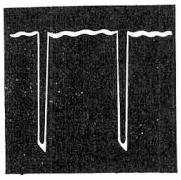
17 48 volts p/p, 15,750 cps



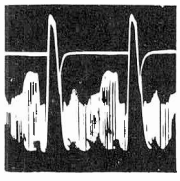
18 42 volts p/p, 15,750 cps



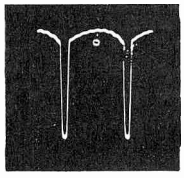
19 140 volts p/p, 15,750 cps



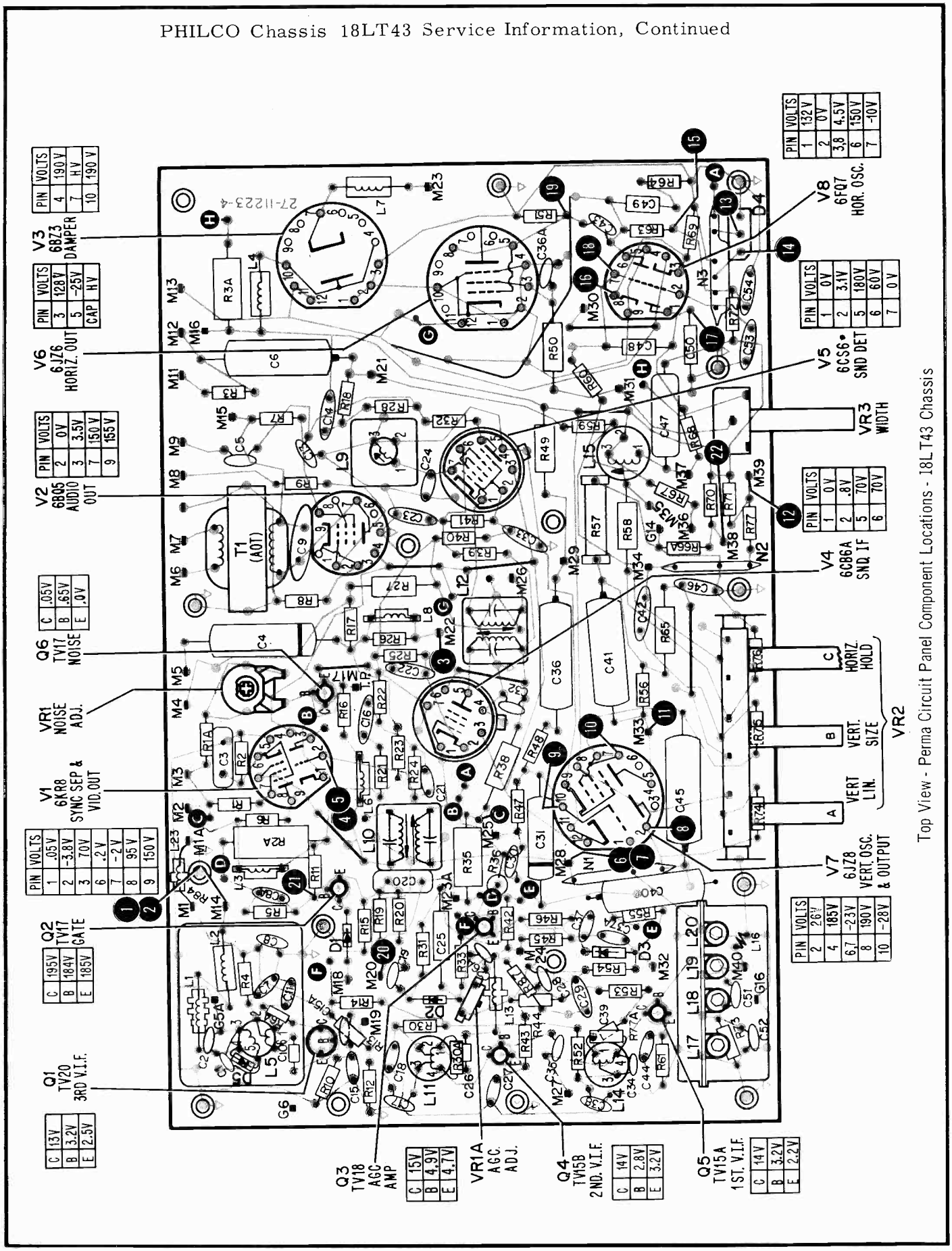
20 22 volts p/p, 15,750 cps



21 12 volts p/p, 15,750 cps



22 90 volts p/p, 15,750 cps



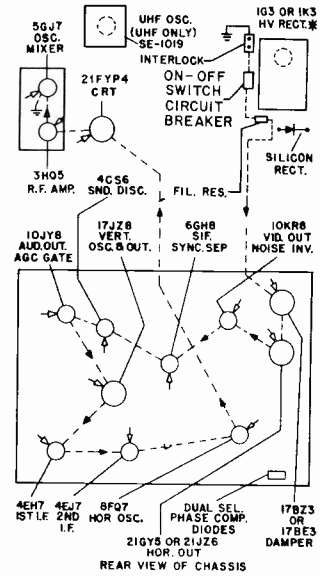
Top View - Perma Circuit Panel Component Locations - 18LT43 Chassis

PHILCO

CHASSIS 18L33

18L33 PANEL LUG CONNECTIONS

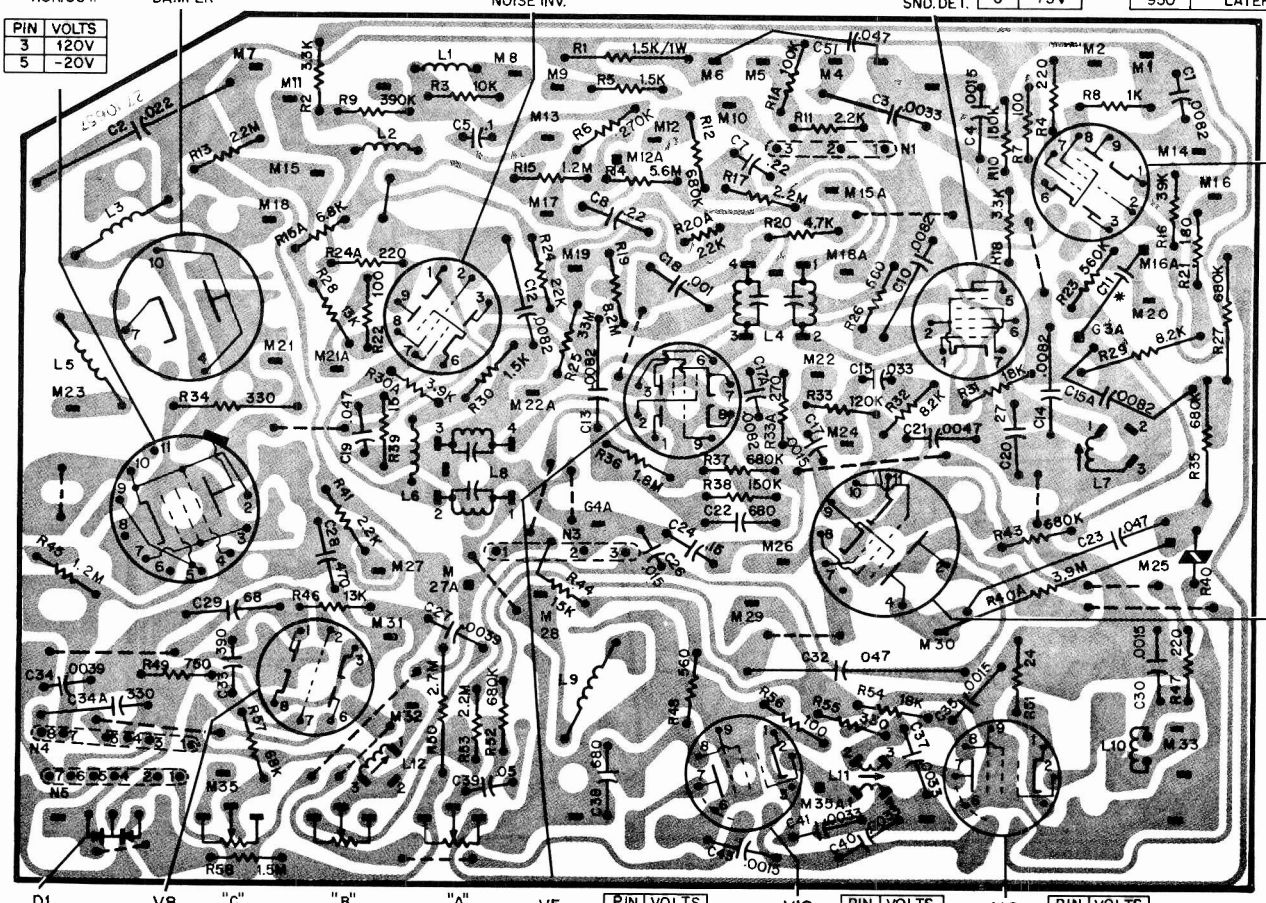
FROM	TO	FROM	TO
M1	A.O.T. & C48 A	M18A	C17T TUNER AGC
M2	VR6-#2	M19	CRT-#3
M4	VR6-#3	M20	YOKE #11 (C49)
M5	CRT #2, #6	M21	VR3- & VR5-1
M6	M24 & YOKE #4	M21A	C48C & FOCUS
M7	YOKE #7 & H.O.T. #4	M22	VR4-3
M8	CRT #5	M22A	M15 & M29
M9	VR5-#5	M23	H.O.T. #7
M10	VR4-#2 & V.O.T.	M24	M6 & V.O.T.
M11	VR5-#7	M26	C48B & YOKE #6
M12	AGC T.P.	M27	FOCUS
M12A	H.O.T. #2	M28	2ND DETECTOR T.P.
M13	VR5-#6	M29	M22A
M14	A.O.T.	M30	V.O.T. & R40A
M15	M22A	M31	CRT-#1
M15A	E (GND) SND T.P.	M32	HOR. OSC. T.P.
M16	C11 TUNER B+	M33	J1T (TUNER IF)
M17	VR5-#2	M35	CHASSIS GND
M18	B2-2	M35A	IF T.P.



Dotted lines indicate filament string

* This tube in high voltage cage

Note: Arrows at socket circles indicate large spacing on miniature tubes, or key position on other tubes.



PIN	VOLTS
4	150V
7	HV

PIN	VOLTS
3	120V
5	-20V

PIN	1	2	3	6	8	9
VOLTS	.05V	-75V	68V	.5V	65V	54V

PIN	VOLTS
2	3.5V
5	80V
6	75V

* VALUE CHANGES

C11	PRODUCTION
680	EARLY
950	LATER

PIN	VOLTS
1	150V
2	83V
3	-3V
6	2.8V
8	148V
9	145V

PIN	VOLTS
2	21V
4	145V
6	-17V
8	145V
10	-21V

PIN	1	2	3	6	7
VOLTS	100V	.1V	3.2V	120V	-9.4V

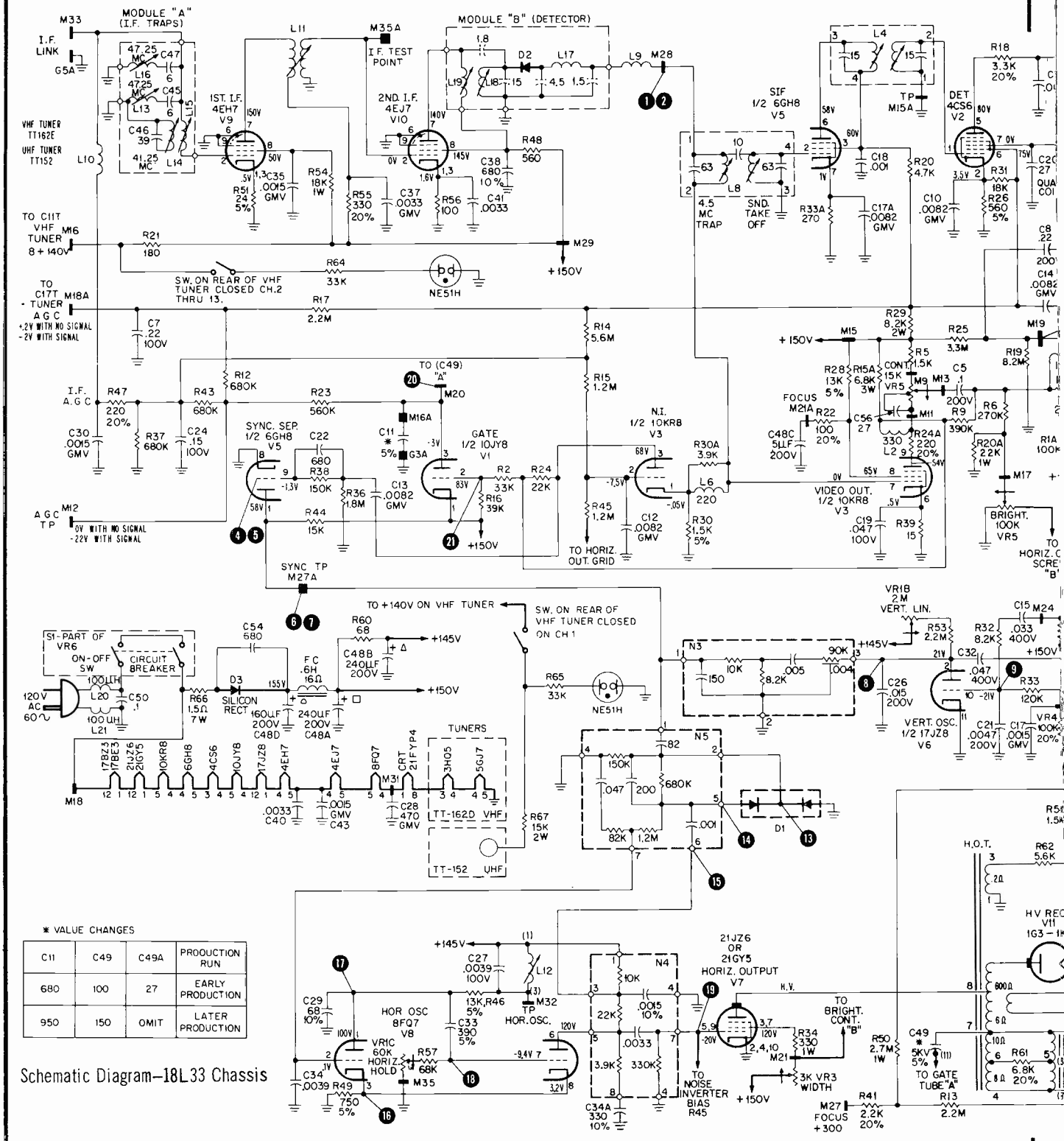
PIN	VOLTS
1	58V
3	60V
6	58V
7	1V
9	-1.3V

PIN	VOLTS
1	1.6V
7	140V
8	145V

PIN	VOLTS
1	.5V
7	150V
8	50V

Top View–Perma Circuit Panel Components–18L33 Chassis

PHILCO Chassis 18L33 Schematic Diagram

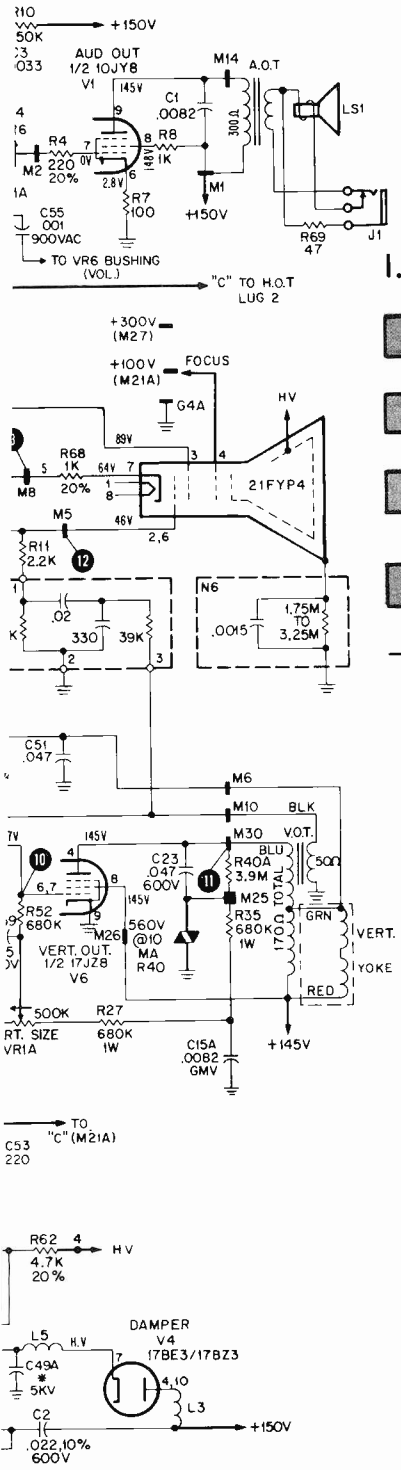


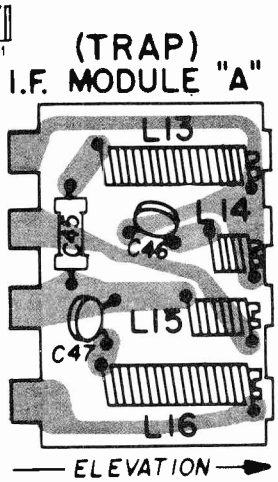
* VALUE CHANGES

C11	C49	C49A	PRODUCTION RUN
680	100	27	EARLY PRODUCTION
950	150	OMIT	LATER PRODUCTION

Schematic Diagram—18L33 Chassis

NOTES:
1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A V.T.V.M. FROM POINT INDICATED TO CHASSIS GROUND.
3. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
4. BALLOONS (10) (11) ETC. SHOWN ON SCHEMATIC INDICATE WAVEFORM TEST POINTS.
5. CONTROL SETTINGS:
   VOLUME - MINIMUM
   CONTRAST - MID-RANGE
   BRIGHTNESS - MID-RANGE





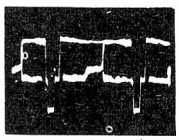
RESISTANCE CHART

SYMBOL	TUBE	USE	PIN NUMBERS 1	2	3	4	5	6	7	8	9	10	11	12
V1	10JY8	Audio Out. & A.G.C.	12K	36K	1.3M	FIL	FIL	100	260	12K	12K			
V2	4CS6	Sound Detector	6	500	FIL	FIL	160K	12K	3 5					
V3	10KR8	Video Out. & Noise Inv.	*300	900K	35K	FIL	FIL	15	*300	25K	12K			
V4	17BE3/17BZ3	Damper	FIL			12K	INF	INF	9M	INF	INF	12K	INF	FIL
V5	6GH8	Sound IF & Sync Sep.	12K	2	12K	FIL	FIL	12K	270	0	1.9M			
V6	17JZ8	Vert. Osc. & Output	FIL	3 8M	INF	12K	INF	1 8M	1 8M	12K	0	200K	0	FIL
V7	21GYS/21JZ6	Horiz. Output	FIL	0	12K	0	300K	12K	12K	12K	300K	0		FIL
V8	8FQ7	Horiz. Osc.	25K	2.2M	750	FIL	FIL	45K	95K	750	0			
V9	4EH7	1st Video IF	24	420K	24	FIL	FIL	0	12K	20K	0			
V10	4EJ7	2nd Video IF	100	0	100	FIL	FIL	0	12K	12K	0			

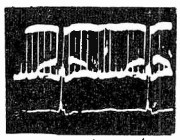
ALL RESISTANCES ARE MEASURED IN OHMS
*DEPENDS ON POLARITY OF METER USED

OSCILLOSCOPE WAVEFORMS

These waveforms were taken with the receiver adjusted for an approximate output of 2.5V p/p at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing except for photos 1, 2 and 3 where contrast was at maximum. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms...not the sweep rate of the oscilloscope. All readings taken with Model 1450 B & K Oscilloscope.

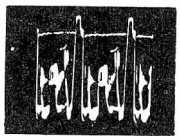


1 2.5 Volts p/p, 15,750 cps (max contrast)

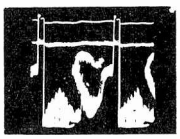


2 2.5 Volts p/p, 60 cps (max contrast)

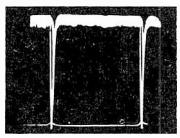
3 110 Volts p/p, 15,750 cps (max contrast)



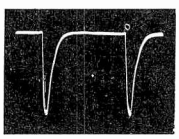
4 70 Volts p/p, 15,750 cps



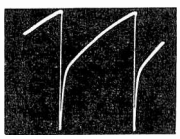
5 70 Volts p/p, 60 cps



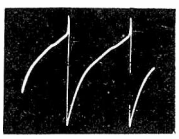
6 50 Volts p/p, 60 cps



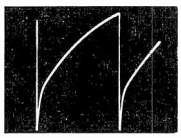
7 50 Volts p/p, 15,750 cps



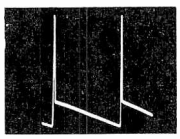
8 40 Volts p/p, 60 cps



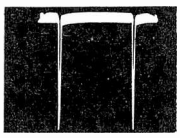
9 80 Volts p/p, 60 cps



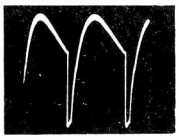
10 40 Volts p/p, 60 cps



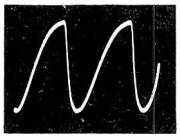
11 1300 Volts p/p, 60 cps



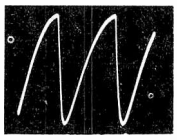
12 60 Volts p/p, 60 cps



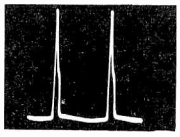
13 8 Volts p/p, 15,750 cps



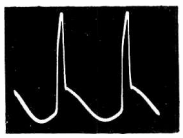
14 11 Volts p/p, 15,750 cps



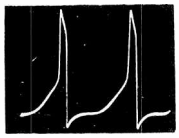
15 15 Volts p/p, 15,750 cps



16 9 Volts p/p, 15,750 cps

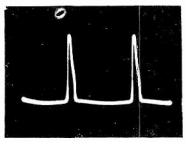


17 34 Volts p/p, 15,750 cps

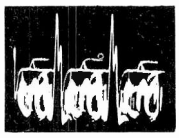


18 29 Volts p/p, 15,750 cps

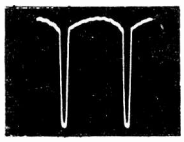
19 100 Volts p/p, 15,750 cps



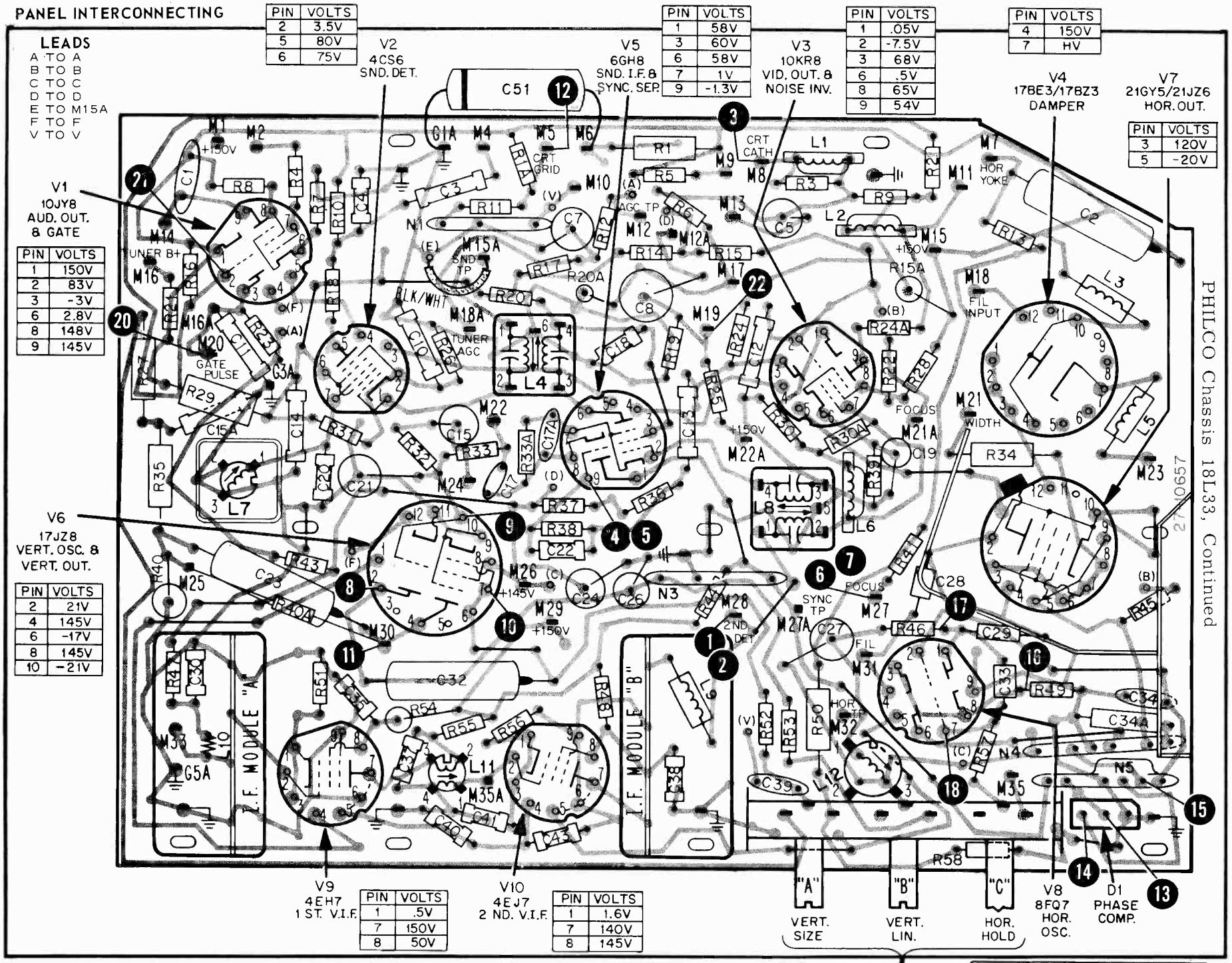
20 400 Volts p/p, 15,750 cps



21 70 Volts p/p, 15,750 cps



22 45 Volts p/p, 15,750 cps



PIN	VOLTS
2	3.5V
5	80V
6	75V

PIN	VOLTS
1	58V
3	60V
6	58V
7	1V
9	-1.3V

PIN	VOLTS
1	.05V
2	-7.5V
3	68V
6	.5V
8	65V
9	54V

PIN	VOLTS
4	150V
7	HV

PIN	VOLTS
3	120V
5	-20V

PIN	VOLTS
1	150V
2	83V
3	-3V
6	2.8V
8	148V
9	145V

PIN	VOLTS
2	21V
4	145V
6	-17V
8	145V
10	-21V

PIN	VOLTS
1	.5V
7	150V
8	50V

PIN	VOLTS
1	1.6V
7	140V
8	145V

PIN	1	2	3	6	7
VOLTS	100V	1V	3.3V	120V	0.4V

Bottom View—Perma Circuit Panel Component Location 18L33 Chassis

RCA VICTOR

Models AJ-061E, M, AH-053E, use Chassis KCS-152D, and Model AH-044Y uses Chassis KCS-152E. Service material on pages 83 through 86. For alignment information see page 126 in Volume TV-25, and pages 110-111 of TV-24.

HORIZONTAL SINE WAVE ADJUSTMENT

Remove sync by shorting Terminal "AE" (Zone 6-F, PW200) to chassis ground. Short sine wave coil L207 by connecting a jumper wire between TP4 and Terminal "W" (Both in Zone 6-A, PW200).

Adjust horizontal hold control until picture sides are vertical (15.75 KC). Remove short from sine wave coil (TP4 and Terminal "W"), then adjust L207 sine wave coil so that the picture sides are again vertical. Remove short from sync (Terminal "AE").

From CCW direction of horizontal hold control, pull in from out of sync condition should be from 1 to 3 bars. From the CW direction from 1 to 8 bars. There should be no loss of raster on either extreme of control rotation.

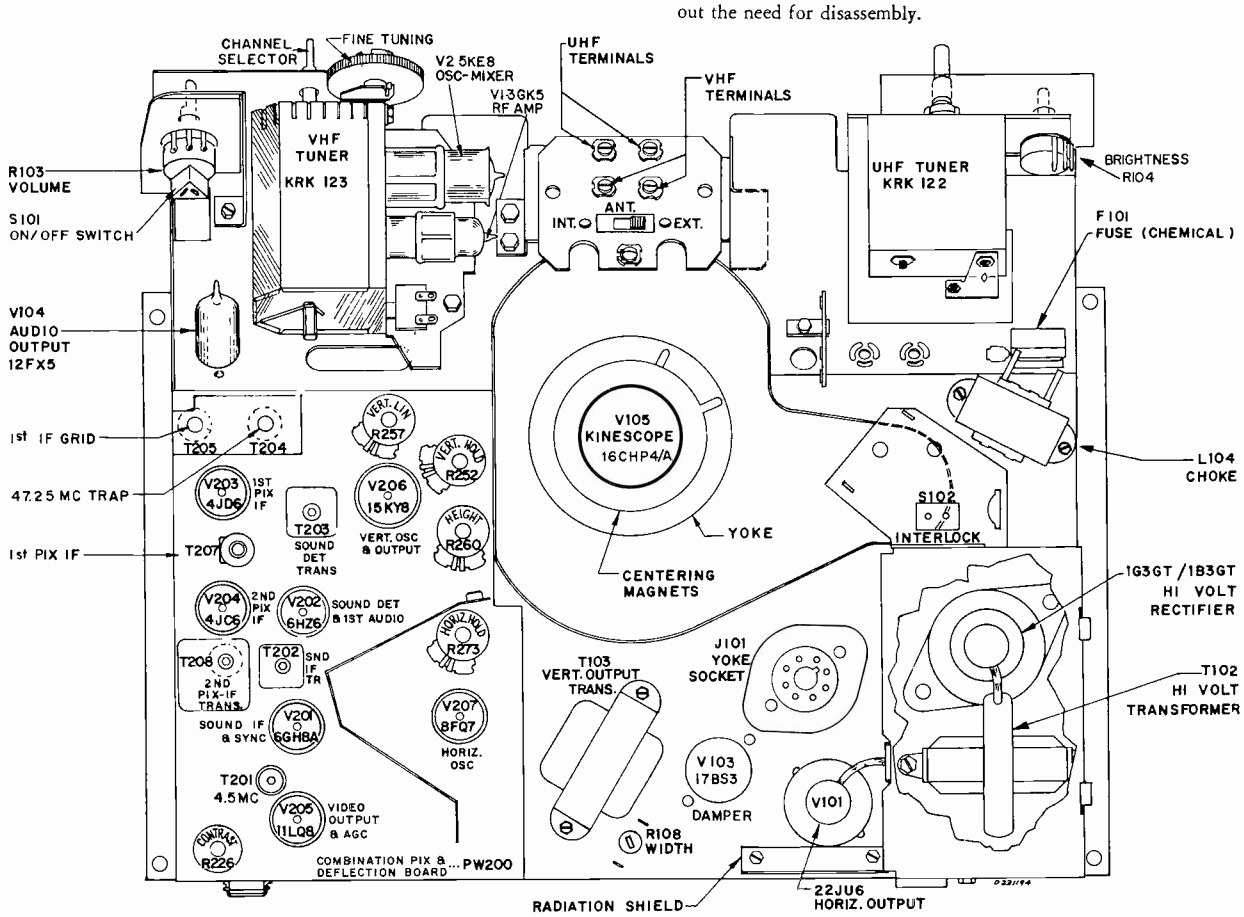
CHASSIS REMOVAL

The knobs must be removed from the brightness control, the volume control, the VHF tuner shaft, and the UHF tuner shaft in order to remove the chassis.

To disassemble the instrument, remove the six screws from the back (two at top and two at bottom), the screw at the AC power cord input, and the screw just below the VHF antenna input terminals. Disconnect the VHF and UHF antennas, then remove back. The chassis and tuners are removed as a unit. Remove the four hex-head fasteners (two on each side of the chassis). Disconnect the yoke plug and the two speaker pin plugs at the speaker. Remove the chassis partially and disconnect the second anode lead.

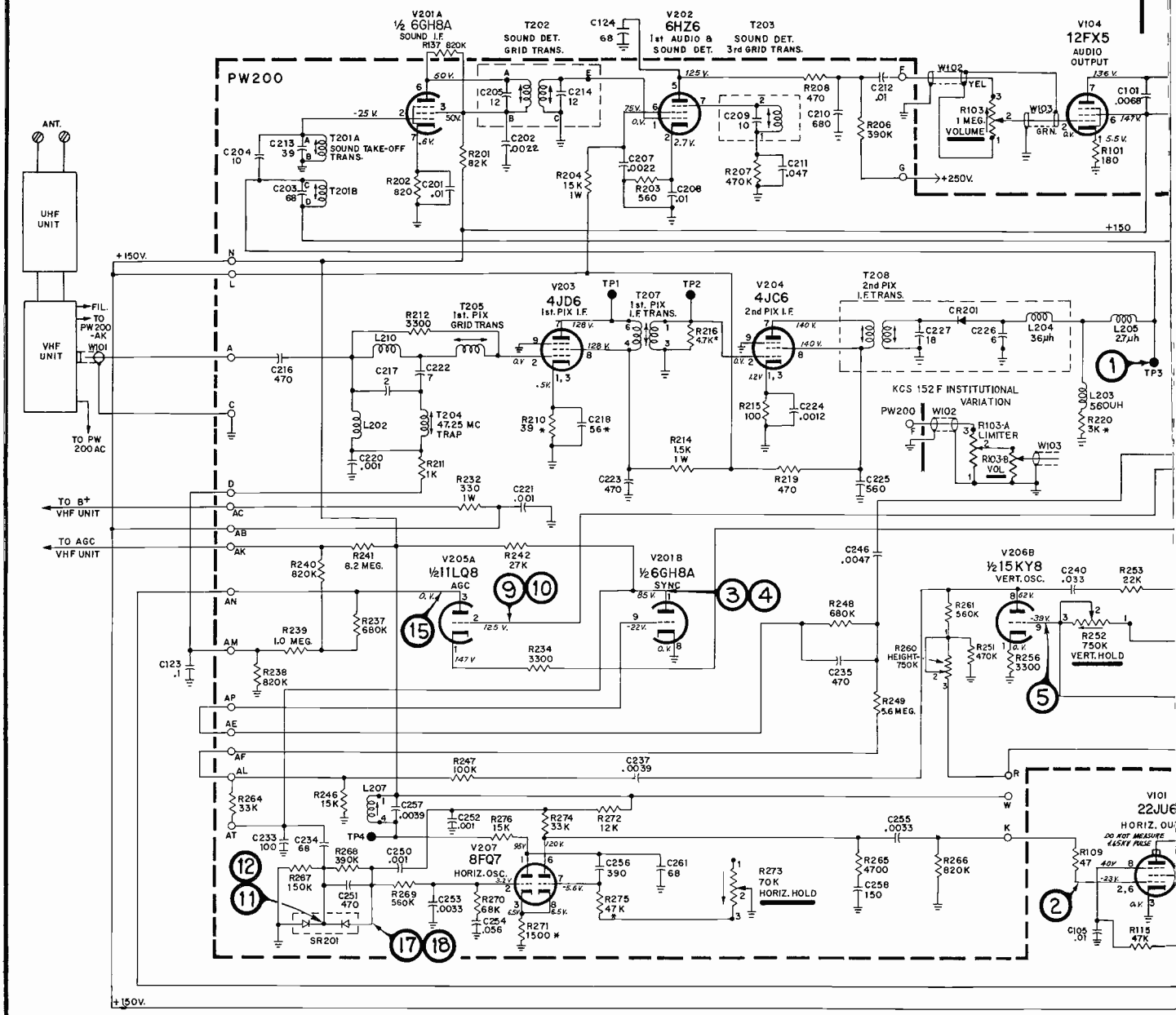
PICTURE TUBE CLEANING

The television instruments covered in this data feature a picture tube with a permanently reinforced face plate requiring no additional safety glass. Therefore, the face of the kinescope may be cleaned without the need for disassembly.

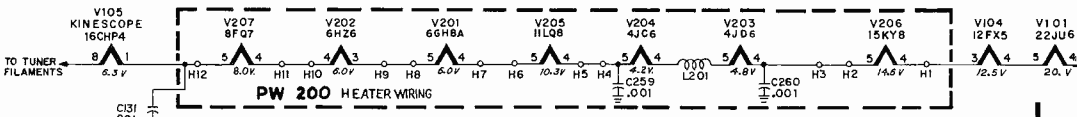


KCS152D Chassis Layout

RCA Victor Chassis KCS-152D Schematic Diagram

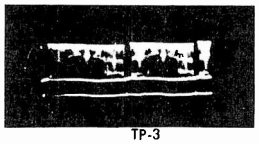


ALL VOLTAGES WITH NO SIGNAL

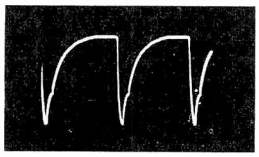


1. ALL RESISTANCE VALUES ARE IN OHMS.
2. K = 1000
3. ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN μf, 1.0 AND ABOVE ARE IN pf, EXCEPT AS INDICATED.
4. * INDICATES 5%.
5. ALL RESISTORS ARE ½ WATT, EXCEPT AS INDICATED. DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.

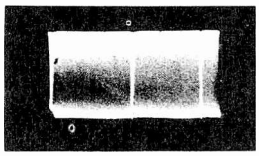
KCS152D CHASSIS WAVEFORMS



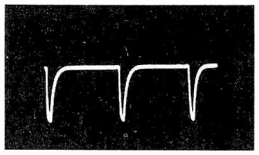
TP-3
SECOND DETECTOR
1 VERTICAL Rate 1.5V P-P



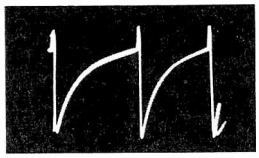
V101 PINS 2 & 6
2 HORIZONTAL OUTPUT GRID
HORIZONTAL RATE 110V P-P



3
V201B PIN 1
SYNC PLATE
VERTICAL RATE 65V P-P

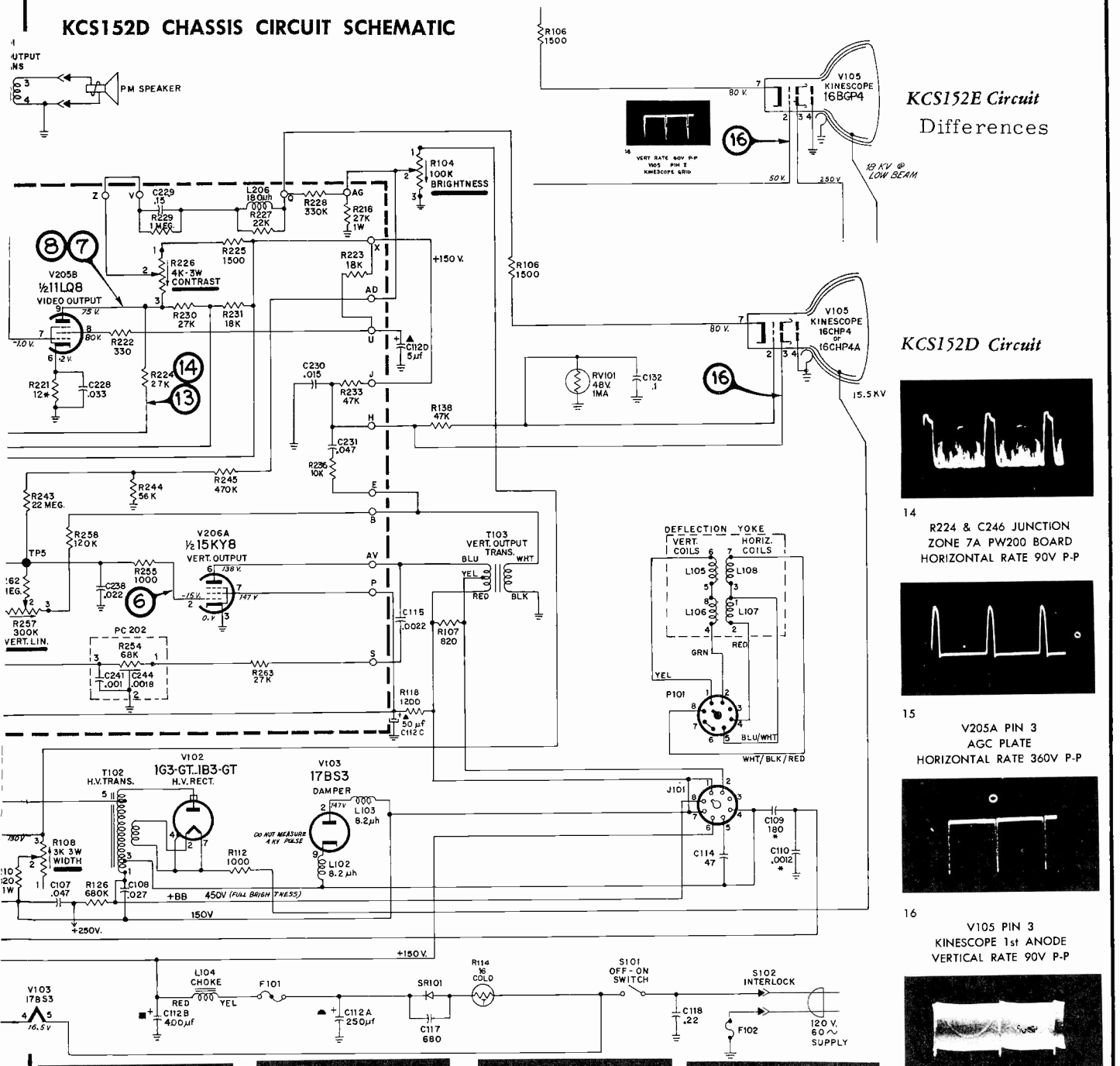


4
V201B PIN 1
SYNC RATE
HORIZONTAL RATE 65V P-P



5
V206B PIN 9
VERTICAL OSCILLATOR GRID
VERTICAL RATE 140V P-P

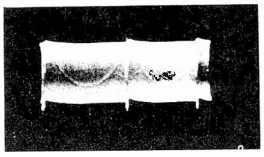
KCS152D CHASSIS CIRCUIT SCHEMATIC



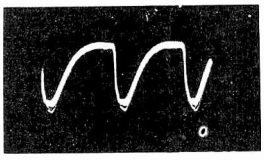
14
R224 & C246 JUNCTION
ZONE 7A PW200 BOARD
HORIZONTAL RATE 90V P-P

15
V205A PIN 3
AGC PLATE
HORIZONTAL RATE 360V P-P

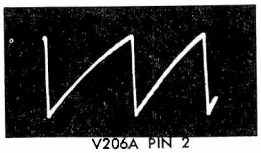
16
V105 PIN 3
KINESCOPE 1st ANODE
VERTICAL RATE 90V P-P



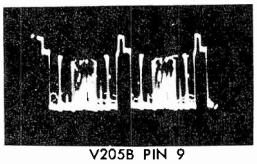
17
SR201 ANODE
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 12V P-P



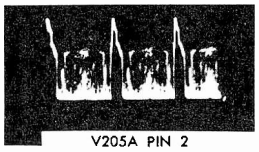
18
SR201 ANODE
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 12V P-P



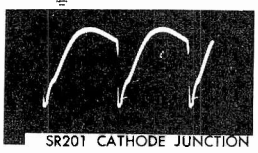
6
V206A PIN 2
VERTICAL OUTPUT GRID
VERTICAL RATE 25V P-P



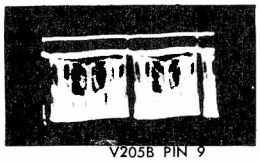
8
V205B PIN 9
VIDEO AMPLIFIER PLATE
HORIZONTAL RATE 90V P-P



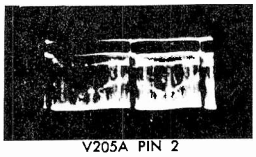
10
V205A PIN 2
AGC GRID
HORIZONTAL RATE 40V P-P



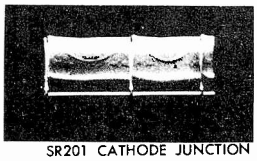
12
SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 12V P-P



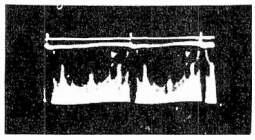
7
V205B PIN 9
VIDEO AMPLIFIER PLATE
VERTICAL RATE 90V P-P



9
V205A PIN 2
AGC GRID
VERTICAL RATE 40V P-P

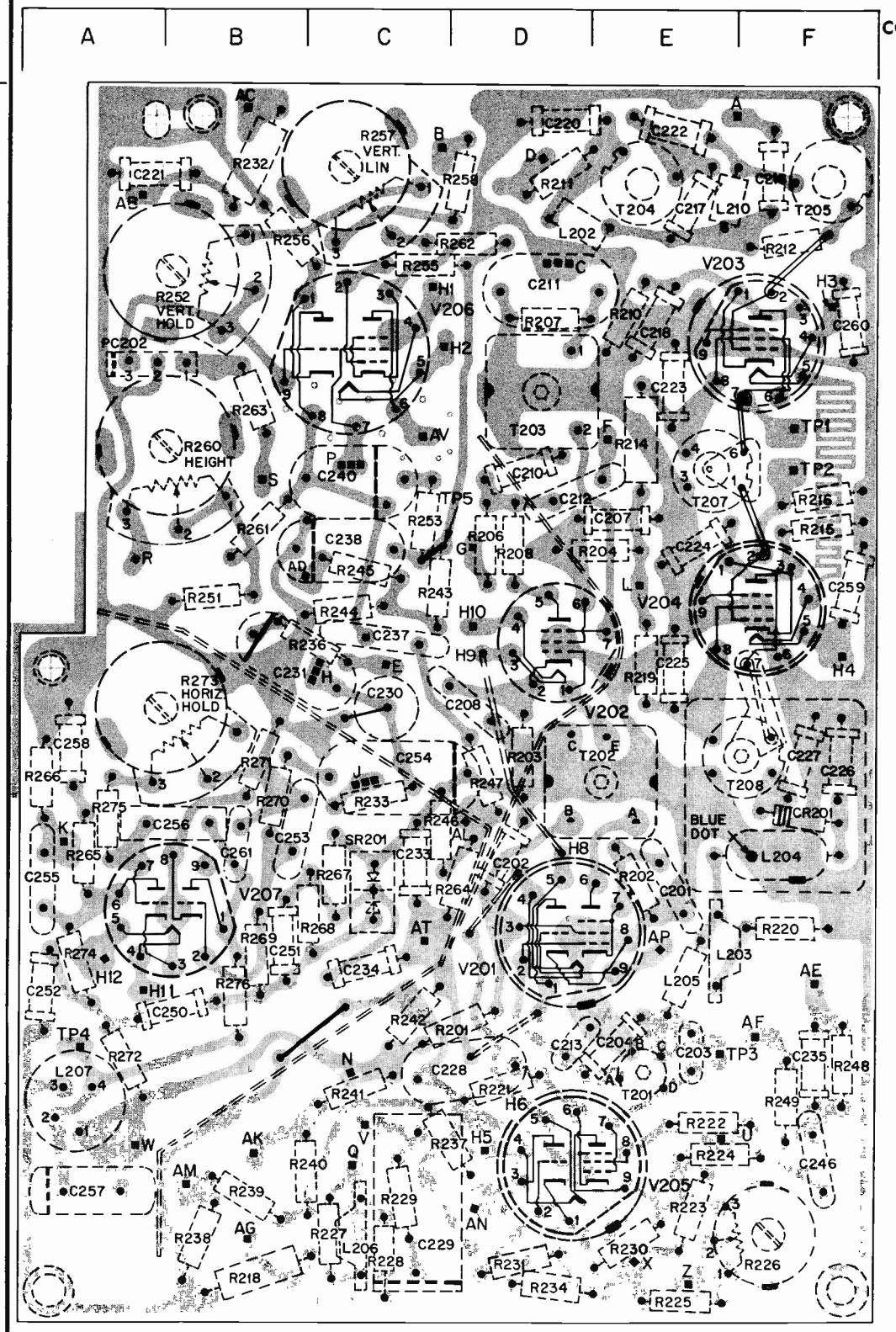


11
SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 12V P-P



13
R224 & C246 JUNCTION
ZONE 7A PW200 BOARD
VERTICAL RATE 90V P-P

RCA Victor KCS-152D, E, **PW200 SOLID COPPER CIRCUIT ASSEMBLY—PHANTOM VIEW**



COMPONENT LOCATION GUIDE

C201	5E
C202	5D
C203	6E
C204	6E
C207	3E
C208	4D
C210	3D
C211	2D
C212	3D
C213	6D
C216	1F
C217	1E
C218	2E
C220	1D
C221	1A
C222	1E
C223	2E
C224	3E
C225	4E
C226	4F
C227	4F
C228	6D
C229	7C
C230	4C
C231	4B
C233	5C
C234	5C
C235	6F
C237	4C
C238	3C
C240	3C
C246	6F
C250	6B
C251	5B
C252	6A
C253	5B
C254	4C
C255	5A
C256	5B
C257	7A
C258	4A
C259	3F
C260	2F
C261	5B
CR201	5F
L202	1D
L203	5E
L204	5F
L205	6E
L206	7C
L207	6A
L210	1E
PC202	2A
R201	6D
R202	5E
R203	4D
R204	3D
R206	3D
R207	2D
R208	3D
R210	2E
R211	1D
R212	1F
R214	3E
R215	3F
R216	3F
R218	7B
R219	4E
R220	5F
R221	6D
R222	6E
R223	7E
R224	7E
R225	7E
R226	7F
F227	7C
R228	7C
R229	7C
R230	7E
R231	7D
R232	1B
R233	4C
R234	7D
R236	4B
R237	6D
R238	7B
R239	7B
R240	7C
R241	6C
R242	6C
R243	3C
R244	3C
R245	3C
R246	5C
R247	4D
R248	6F
F249	6F
R251	3B
R252	2A
R253	3C
R255	2C
R256	1B
R257	1C
R258	1D
R260	3A
R261	3B
R262	1D
R265	5A
R264	5D
R265	5A
R266	4A
R267	5C
R268	5C
R269	5B
R270	4B
R271	4B
R272	6A
R273	4B
R274	5A
R275	5A
R276	6B
SR201	5C
T201	6E
T202	4E
T203	2D
T204	1E
T205	1F
T207	3E
T208	4F
V201	5D
V202	4D
V203	2F
V204	3F
V205	7B
V206	2C
V207	7E

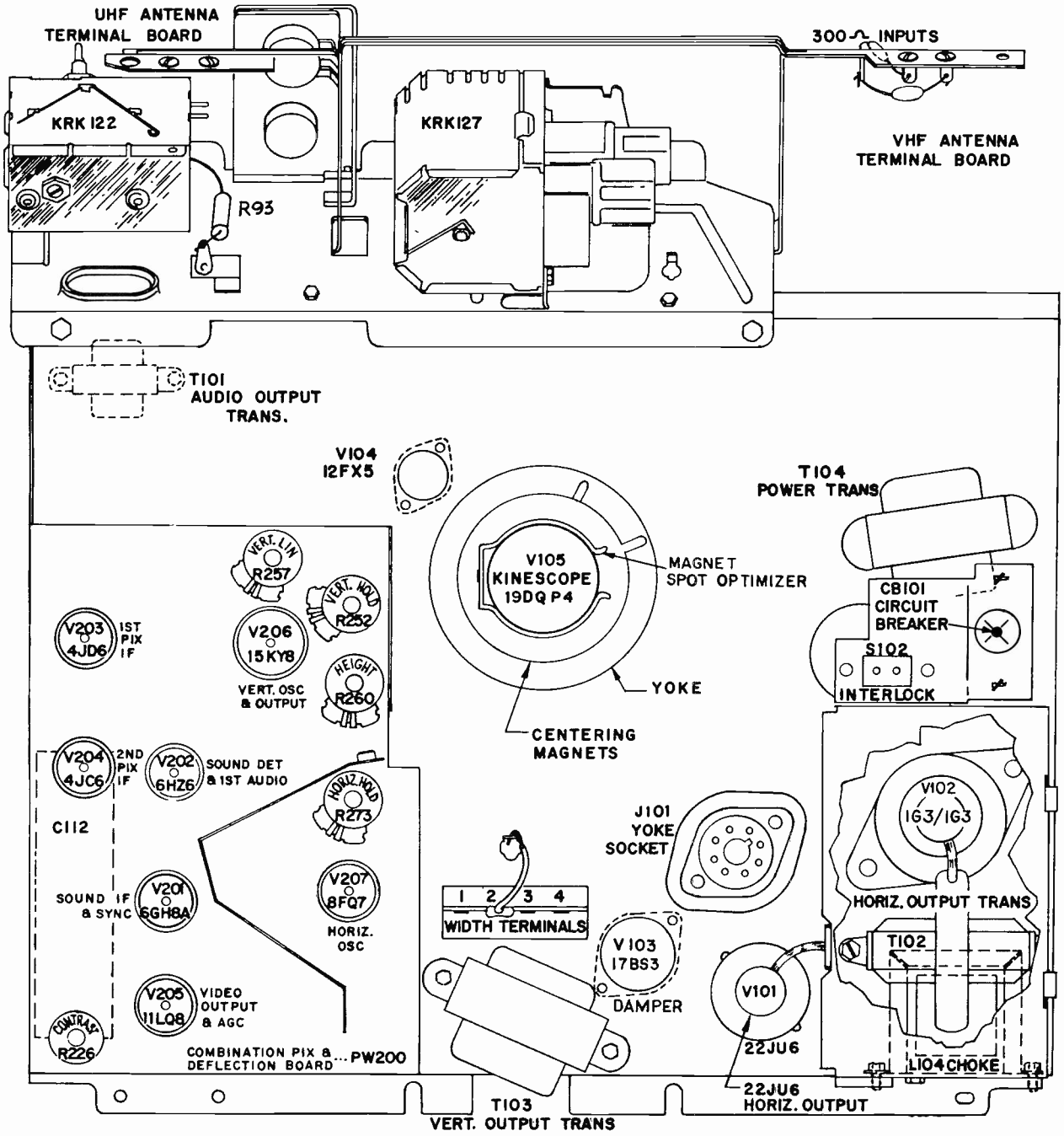
PW200 Solid Copper Circuit Assembly—Phantom View

PW200—TERMINAL LOCATION GUIDE

A 1E	AV 3C	AT 5C	H1 ..... 2C	H12 ..... 5A	R 3A	U 6E
AB 1A	B 1C	C 2D	H2 ..... 2C	J 4C	S 3B	V 6C
AC 1B	AK 6B	D 1D	H3 ..... 2F	K 5A	TP1 ..... 2F	W 6A
AD 3B	AL 5D	E 4C	H4 ..... 4F	L 3E	TP2 ..... 3F	X 7E
AE 6F	AM 7B	F 3E	H5 ..... 6D	N 6C	TP3 ..... 6F	Z 7E
AF 6F	AN 7D	G 3D	H10 ..... 4D	P 3C	TP4 ..... 6A	
AG 7B	AP 5E	H 4B	H11 ..... 6A	Q 7C	TP5 ..... 3C	

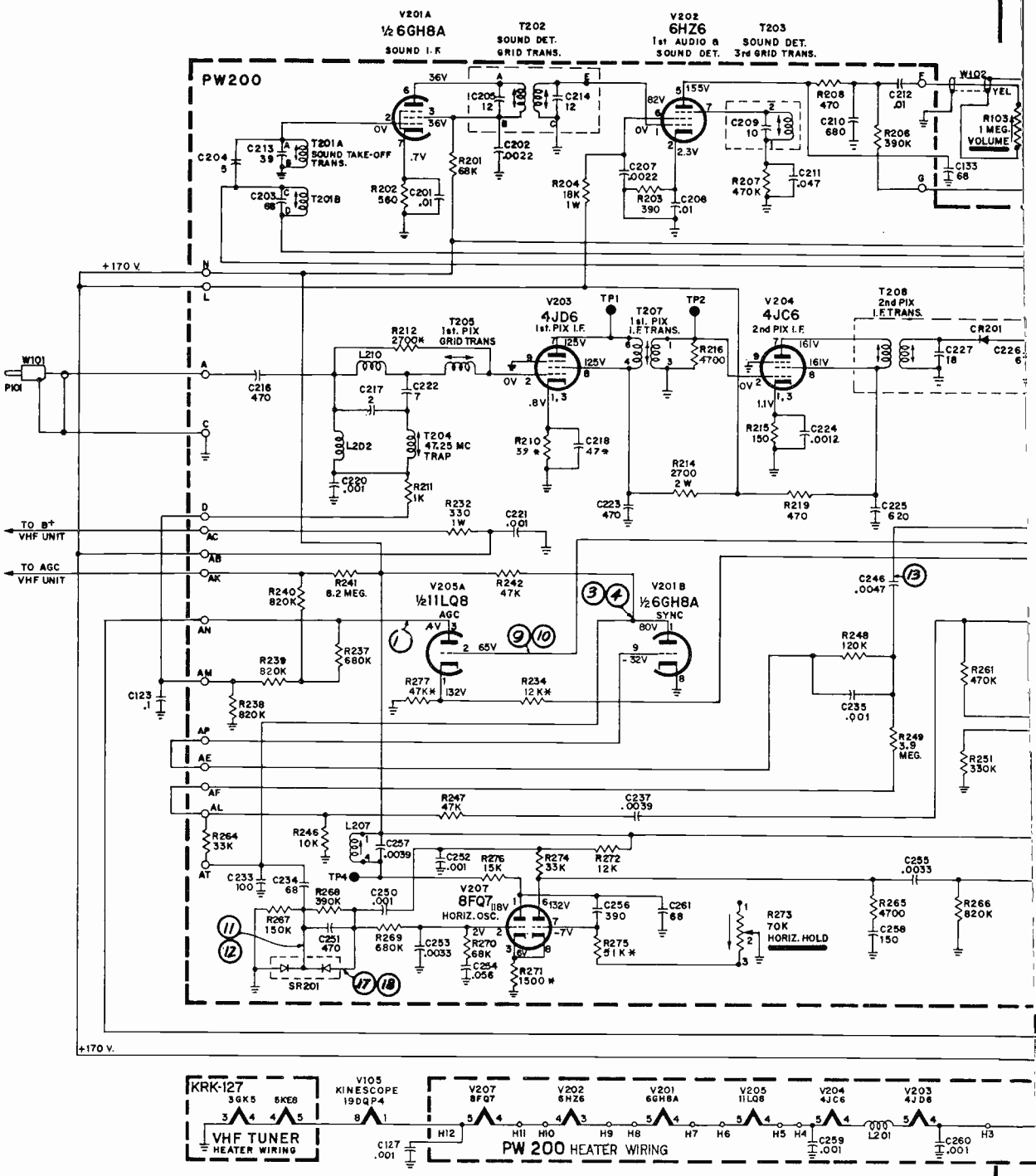
RCA VICTOR

Models AJ-079E, H, using Chassis KCS-155F. Service material on pages 87-90. Alignment information on page 126 of TV-25, and pages 110-111 of Vol. TV-24.



Chassis Layout

RCA Victor Chassis KCS-155F Schematic Diagram



DISASSEMBLY INSTRUCTIONS

1. Remove the five front control knobs On/off-Volume, Brightness, VHF Channel Selector, Fine Tuning, and UHF Channel Selector.

2. Remove seven back cover screws: two each at the top and bottom, one above the AC interlock, and one each at the separate UHF and VHF antenna terminal boards.

3. Disconnect the yoke plug, the picture tube socket, and the speaker cable at the speaker terminals.

4. Remove the four hex head chassis screws, two each at the top and bottom of the chassis. Move the chassis out slightly and disconnect the second anode lead and the picture tube grounding spring. Remove the chassis.

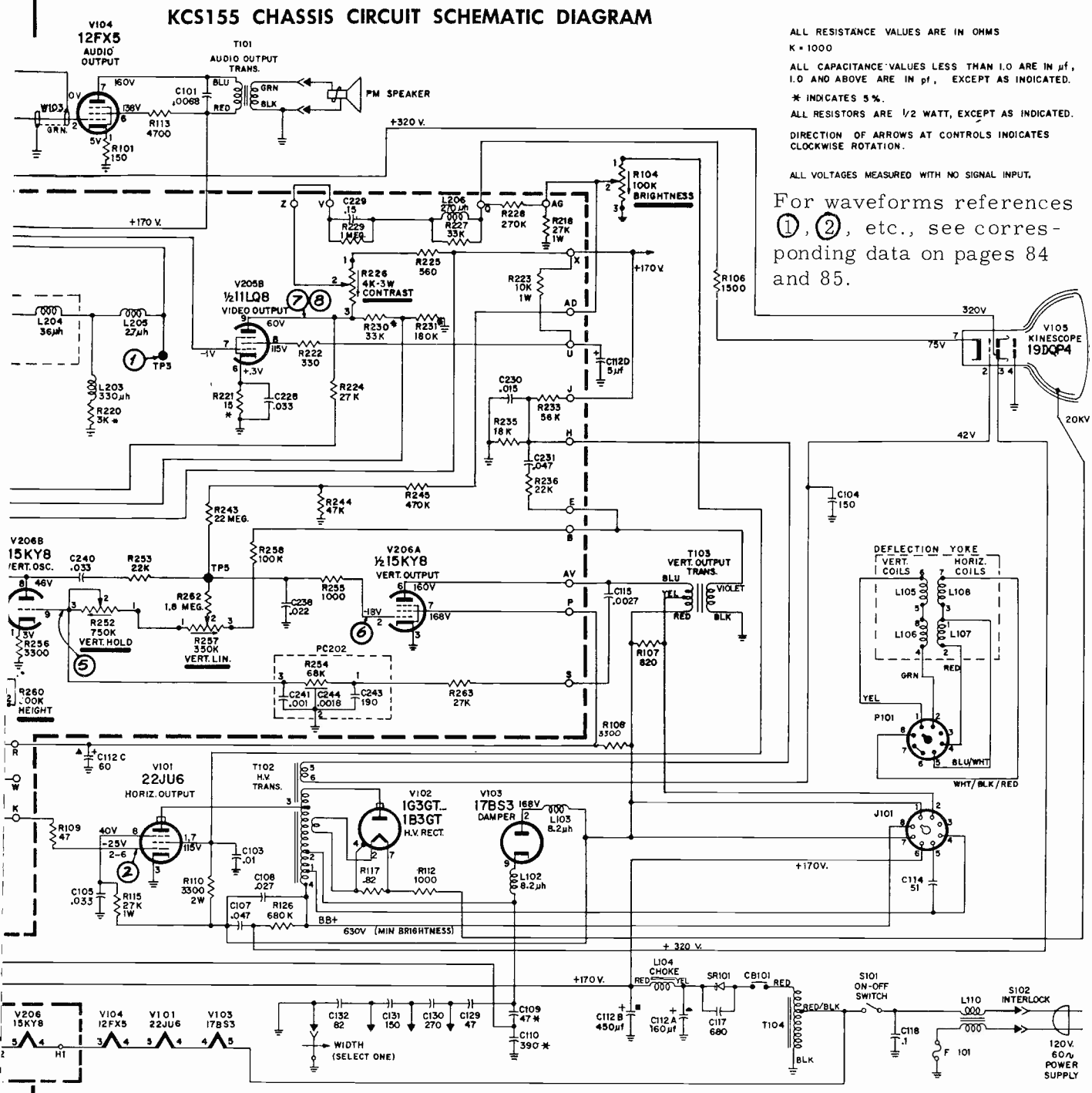
5. To remove the picture tube, place the instrument face down on a padded surface. Loosen the picture tube retainer wire compression bolt enough so that the retainer wire can be slipped out of the four "S" shaped corner brackets.

6. Grasp the picture tube firmly on each side and lift it out of the mask.

KCS155 CHASSIS CIRCUIT SCHEMATIC DIAGRAM

ALL RESISTANCE VALUES ARE IN OHMS
K = 1000
ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN µf, 1.0 AND ABOVE ARE IN pf, EXCEPT AS INDICATED.
* INDICATES 5%.
ALL RESISTORS ARE 1/2 WATT, EXCEPT AS INDICATED.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
ALL VOLTAGES MEASURED WITH NO SIGNAL INPUT.

For waveforms references ①, ②, etc., see corresponding data on pages 84 and 85.

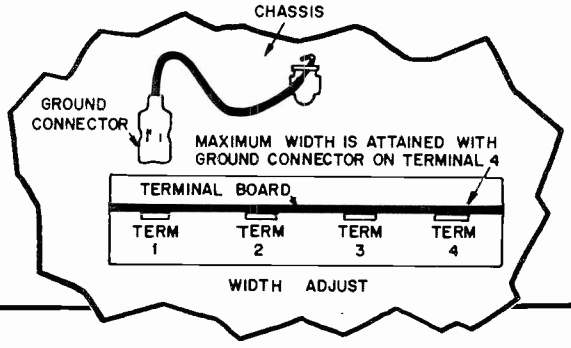


HORIZONTAL SINE WAVE ADJUSTMENT

Remove the sync by shorting Terminal "AE" (Zone 4B, PW200) to chassis ground. Short the sine wave coil by connecting a clip lead between TP-4 (Zone 1B, PW200) and Terminal "W" (Zone 1A, PW200).

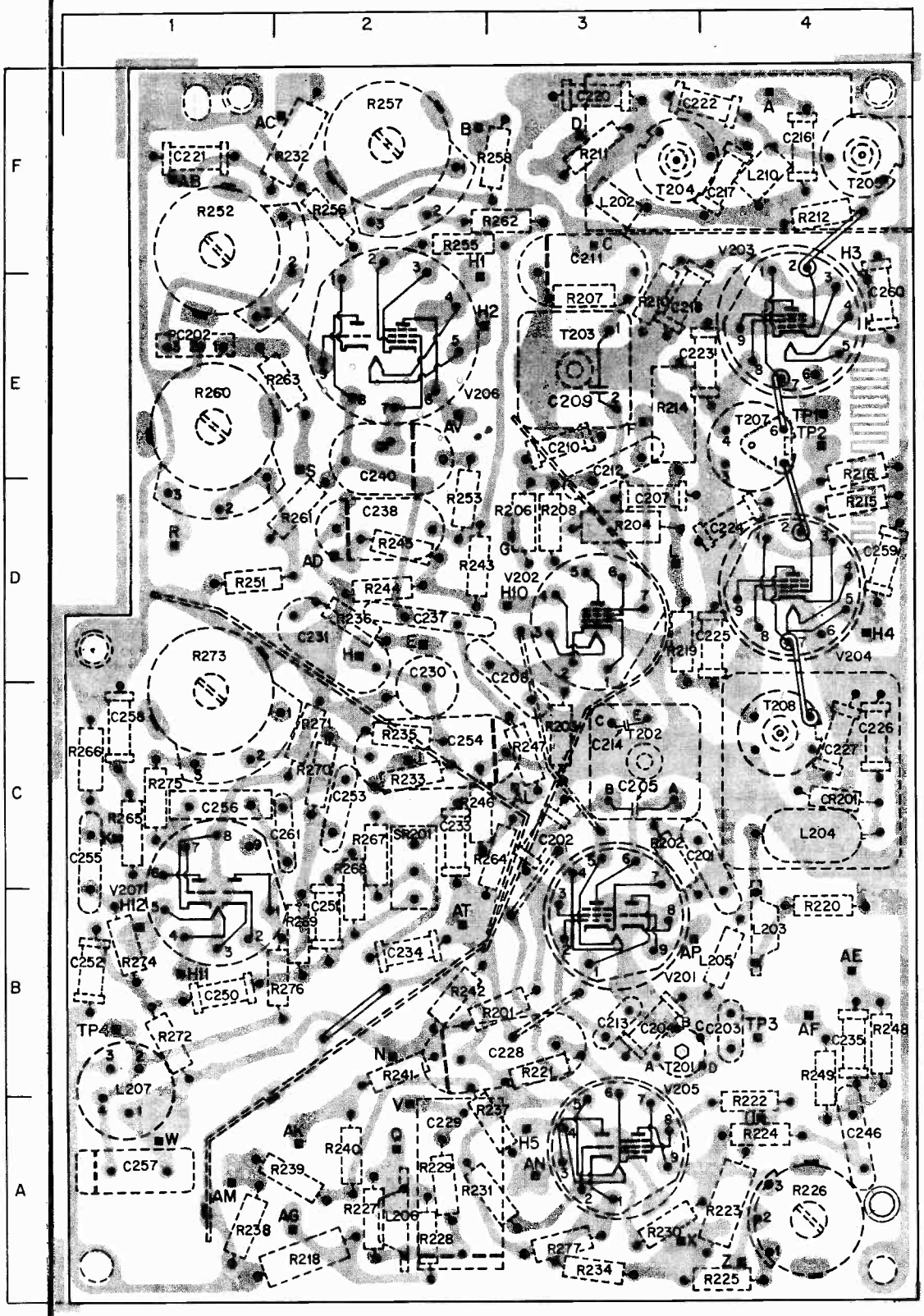
Adjust the horizontal hold control until the picture sides are vertical (15.75 kc). Remove the short from the sine wave coil (TP-4 and Terminal "W"), then adjust L207 sine wave coil so that the picture remains stationary or drifts slowly horizontal with the sides again vertical (15.75 kc). Remove the short from the sync terminal (PW200-AE).

WIDTH AND LINEARITY ADJUSTMENTS



RCA Victor Chassis KCS-155F **PW200 CIRCUIT ASSEMBLY, PHANTOM VIEW**

(Continued)



PW200 Circuit Board Assembly

PW200 COMPONENT LOCATION GUIDE

C201	4C
C202	3C
C203	4B
C204	3B
C205	3C
C207	3D
C208	3D
C209	3E
C210	3E
C211	3F
C212	3E
C213	3B
C214	3C
C216	4F
C217	4F
C218	3E
C220	3F
C221	1F
C222	4F
C223	4E
C224	4D
C225	4D
C226	4C
C227	4C
C228	2A
C229	2A
C230	2C
C231	2D
C233	2C
C234	2B
C235	4B
C237	2D
C238	2D
C240	2E
C241	1E
C243	1E
C244	1E
C246	4A
C250	1B
C251	2B
C252	1B
C253	2C
C254	2C
C255	1C
C256	1C
C257	1A
C258	1C
C259	4D
C260	4E
C261	2C
CR201	4C
L201	4E
L202	3F
L203	4B
L204	4C
L205	4B
L206	2A
L207	1B
L210	4F
PC202	1E
R201	3B
R202	3C
R203	3C
R204	3D
R206	3D
R207	3E
R208	3D
R210	3E
R211	3F
R212	4F
R214	3E
R215	4D
R216	4D
R218	2A
R219	3D
R220	4B
R221	3B
R222	4A
R223	4A
R224	4A
R225	4A
R226	4A
R227	2A
R228	2A
R229	2A
R230	3A
R231	2A
R232	2F
R233	2C
R234	3A
R235	2C
R236	2D
R237	3A
R238	1A
R239	2A
R240	2A
R241	2B
R242	2B
R243	2D
R244	2D
R245	2D
R246	2C
R247	3C
R248	4B
R249	4B
R251	1D
R252	1F
R253	2D
R254	1E
R255	2F
R256	2F
R257	2F
R258	3F
R260	1E
R261	2D
R262	3F
R263	2E
R264	3C
R265	1C
R266	1C
R267	2C
R268	2C
R269	2B
R270	2C
R271	2C
R272	1B
R273	1C
R274	1B
R275	1C
R276	2B
R277	3A
SR201	2C
T201	3B
T202	3C
T203	3E
T204	3F
T205	4F
T207	4E
T208	4C

TERMINAL GUIDE

A	4F
AB	1F
AC	2F
AD	2D
AE	4B
AF	4B
AG	2A
AK	2A
AL	3C
AM	1A
AN	3A
AP	3B
AT	2B
AV	2E
B	2F
C	3F
D	3F
E	2D
F	3E
G	3D
H	2D
H1	2E
H2	2E
H3	4E
H4	4D
H5	3A
H10	3D
H11	1B
H12	1B
J	2C
K	1C
L	3D
N	2B
P	2E
Q	2A
R	1D
S	2E
U	4A
V	2A
W	1A
X	3A
Z	4A
TP1	4E
TP2	4E
TP3	4B
TP4	1B

RCA VICTOR

Chassis KCS-156J used in Models AJ-097E, M, and
Chassis KCS-156P used in Models AJ-139MK, WK.
(Service material on pages 91-94; alignment on 99-100).

INSTRUMENT DISASSEMBLY

1. Remove four knobs—Brightness, On-Off, Channel Selector, Fine Tuning—from front of cabinet.
2. Remove the ring UHF antenna and disconnect the 300 ohm antenna leads at the antenna terminal board.
3. Remove seven back cover screws—three at the top, three at the bottom, and one at the antenna terminal board. Remove the back cover. During reassembly, secure the monopole balun assembly ground wire lug under the upper left hand corner screw.
4. Disconnect the VHF and UHF antenna cables from the antenna terminals of the tuners. Move the TMA to the service position at the left rear side of the chassis and secure with the two hex head screws provided for that purpose.
5. Remove the kinescope socket, second anode lead, yoke plug, and speaker cable.
6. Remove the two hex head chassis screws—one at the left and one at the right.
7. Remove the chassis.
8. To remove the kinescope, place cabinet face down on a foam rubber mat or soft cloth. Loosen the kinescope wire retainer bolt with a Phillips screw driver until the wire is loose enough to slip out of the "S" shaped brackets. Lift out the kinescope.

AGC AND SYNC

The Sync and AGC circuits are designed for optimum performance under varying signal conditions and no controls are provided.

TESTING PICTURE PROPORTIONS

Rotate the vertical hold control to roll picture slowly downward and study the blanking bar. If it is not level, or if the bar varies in thickness as it moves down the screen, makes adjustments as prescribed in width and linearity adjustments.

CENTERING

If the picture is not positioned correctly on the screen, it may be necessary to center the picture with the two disc magnets mounted behind the yoke cover. Both horizontal and vertical centering are accomplished at once by rotating the discs together or separately. Perform this adjustment along with vertical height, vertical linearity, and width, as they are interdependent.

DEFLECTION YOKE

If the picture is tilted, loosen the yoke clamp screw and rotate the yoke to level the picture. Retighten the yoke clamp.

HORIZONTAL SINE WAVE ADJUSTMENT

Remove sync by shorting Terminal "AE" (zone 2A, PW200) to chassis ground. Short sine wave coil L207 by connecting a jumper wire between TP4 (zone 5A, PW200) and Terminal "W" (zone 4A, PW200).

Adjust horizontal hold control until picture sides are vertical. Remove shorting jumper across the sine wave coil and adjust L207 until picture remains stationary with sides vertical. Remove short from sync.

From CCW direction of horizontal hold control, pull in front out of sync condition should be from 1 to 3 bars; from the CW direction, from 1 to 8 bars. There should be no loss of raster on either extreme of control rotation.

WIDTH AND LINEARITY ADJUSTMENTS

Set the AC input voltage at low line, 108 volts.

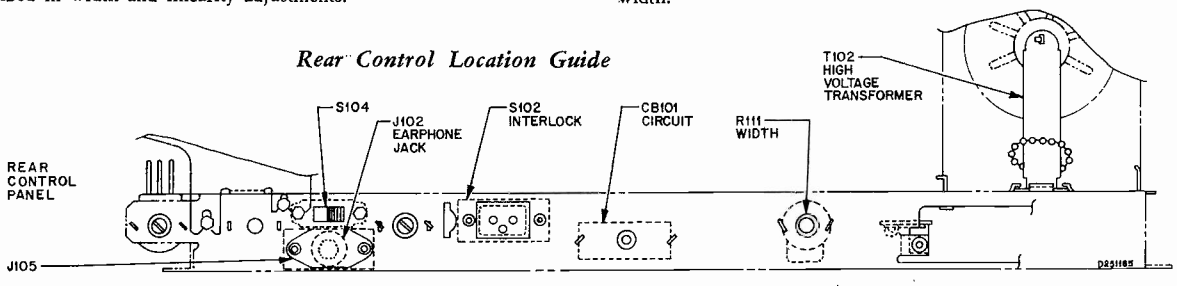
With the centering magnets, center the raster vertically and horizontally.

Adjust the Height and Vertical Linearity Controls for a symmetrical raster that fills the screen +0, −¼" at the top and bottom.

Adjust the width control, R111, so that the raster just fills the screen horizontally +0, −⅛".

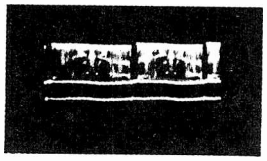
Set the AC input voltage to normal 120 volts. The raster should now be of the proper proportions. With the vertical Hold Control, roll the picture slowly downward. If the Height and Vertical Linearity Controls are set properly, the blanking bar will not change in width.

Rear Control Location Guide

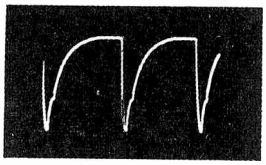


RCA Victor Chassis KCS-156 Schematic Diagram

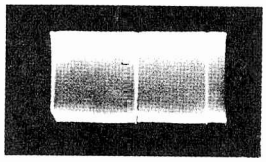
WAVEFORMS



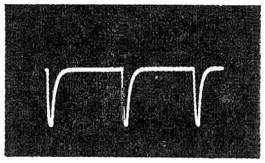
① TP-3
SECOND DETECTOR
VERTICAL RATE 2V P-P



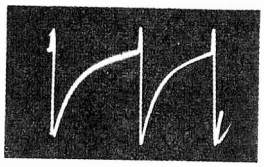
② V101 PINS 2 & 6
HORIZONTAL OUTPUT GRID
HORIZONTAL RATE 130V P-P



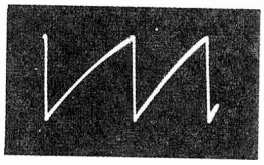
③ TP-5
SYNC PLATE
VERTICAL RATE 60V P-P



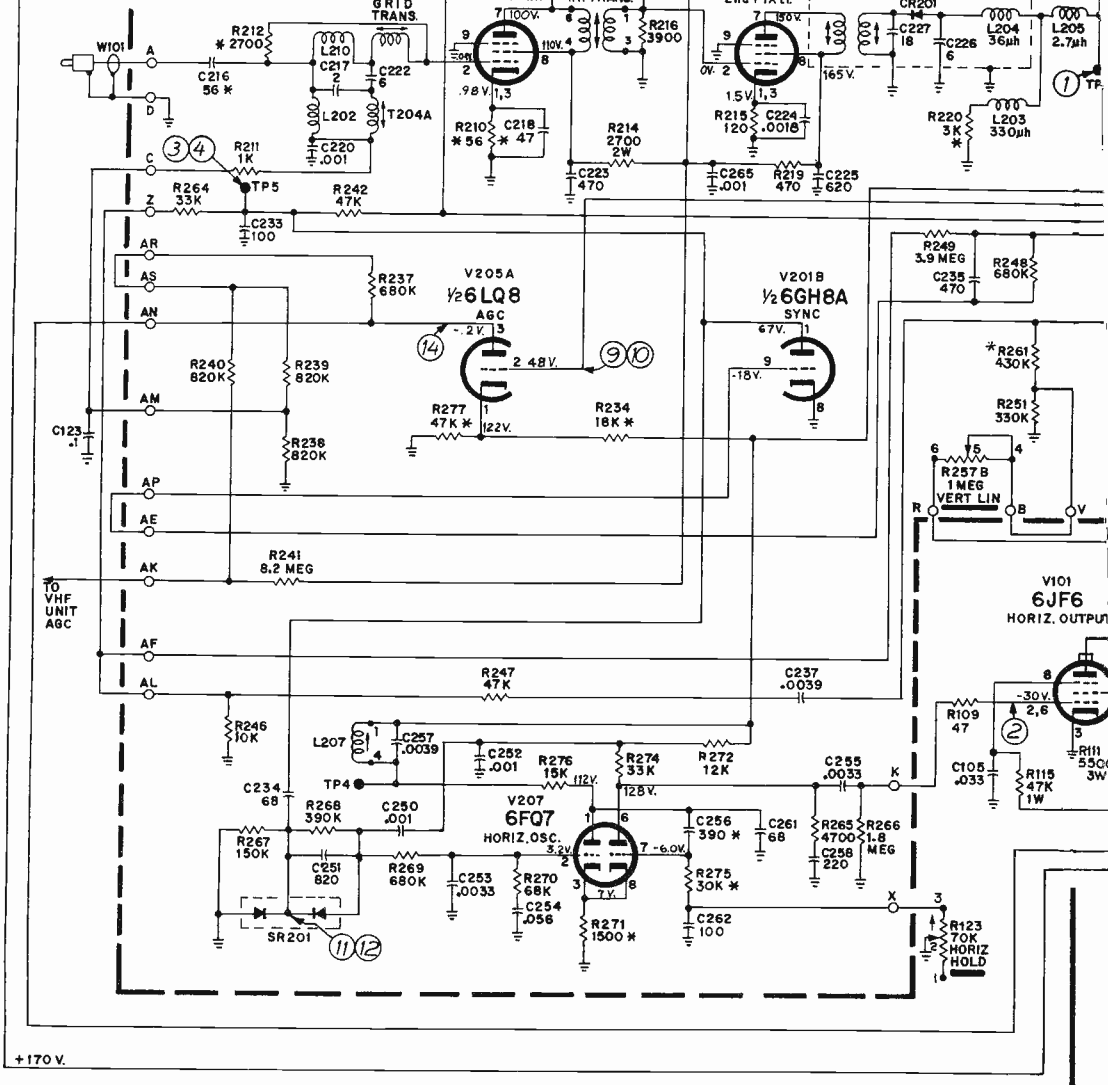
④ TP-5
SYNC PLATE
HORIZONTAL RATE 60V P-P

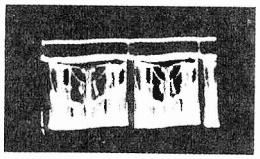


⑤ V206B PIN 9
VERTICAL OSCILLATOR GRID
VERTICAL RATE 180V P-P

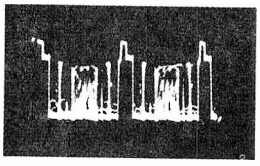


⑥ V206A PIN 2
VERTICAL OUTPUT GRID
VERTICAL RATE 28V P-P

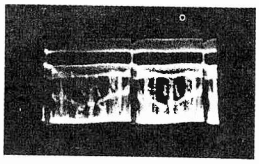




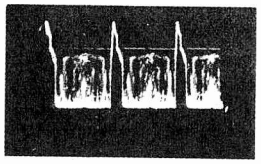
7 V205B PIN 9
VIDEO AMPLIFIER PLATE
VERTICAL RATE 110V P-P



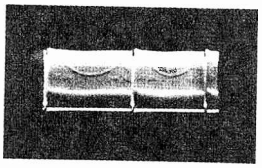
⑧ V205B PIN 9
VIDEO AMPLIFIER PLATE
HORIZONTAL RATE 110V P-P



⑨ V205A PIN 2
AGC GRID
VERTICAL RATE 80V P-P



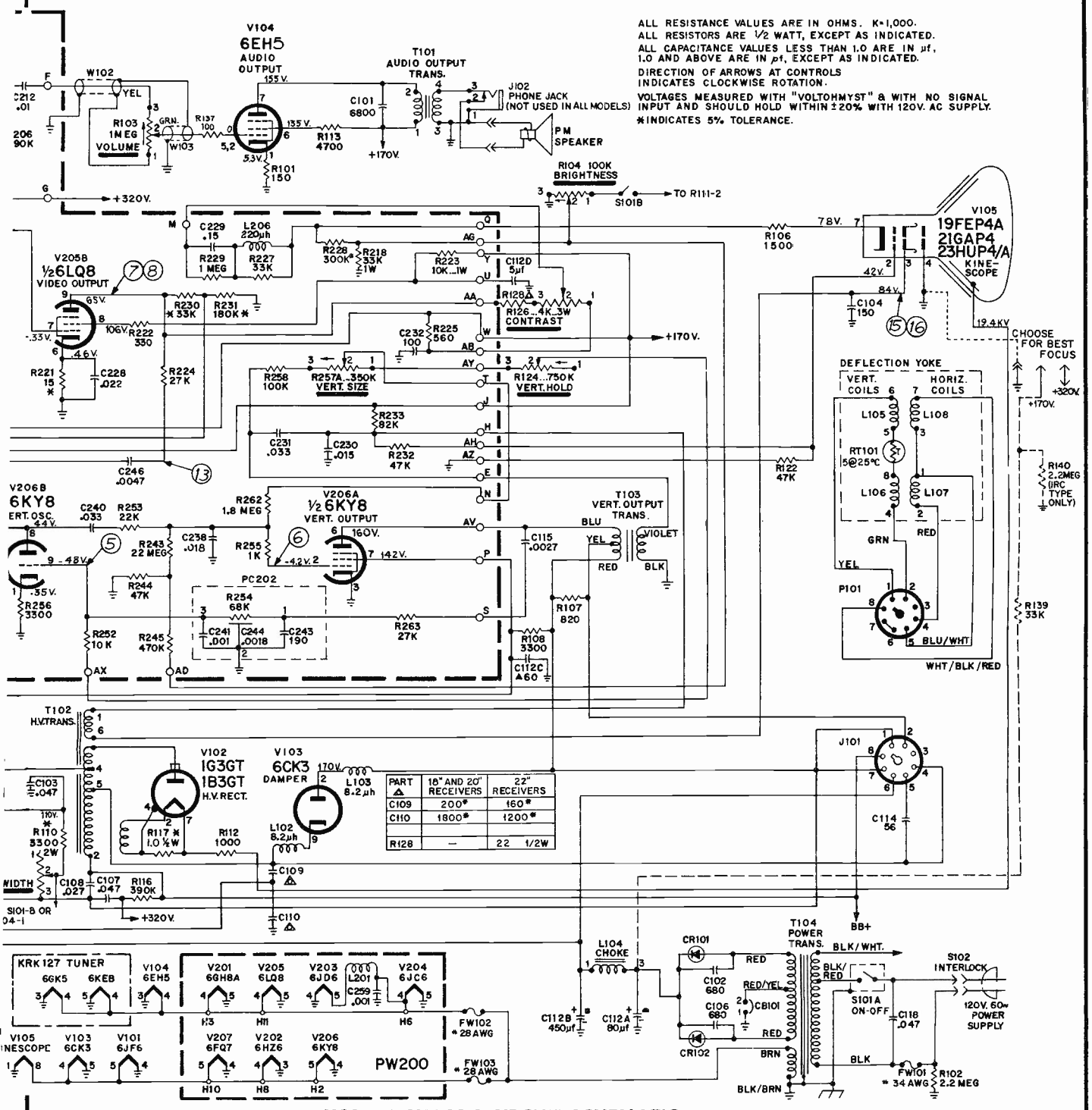
⑩ V205A PIN 2
AGC GRID
HORIZONTAL RATE 80V P-P



⑪ SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 12V P-P

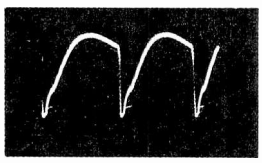
RCA Victor Chassis KCS-156 Schematic Diagram, Continued

ALL RESISTANCE VALUES ARE IN OHMS. K=1,000.
ALL RESISTORS ARE 1/2 WATT, EXCEPT AS INDICATED.
ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN µf, 1.0 AND ABOVE ARE IN µf, EXCEPT AS INDICATED.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
VOLTAGES MEASURED WITH "VOLTOHMYST" & WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 120V. AC SUPPLY.
*INDICATES 5% TOLERANCE.

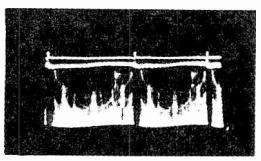


PART △	18" AND 20" RECEIVERS	22" RECEIVERS
C109	200*	160*
C110	1800*	1200*
R128	—	22 1/2W

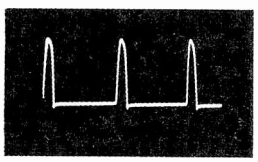
KCS156 CHASSIS CIRCUIT SCHEMATIC



(12) SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 12V P-P

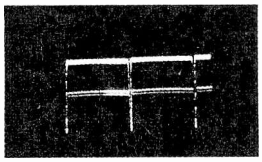


(13) R224 & C246 JUNCTION
(ZONE 1B PW200 BOARD)
VERTICAL RATE 100V P-P



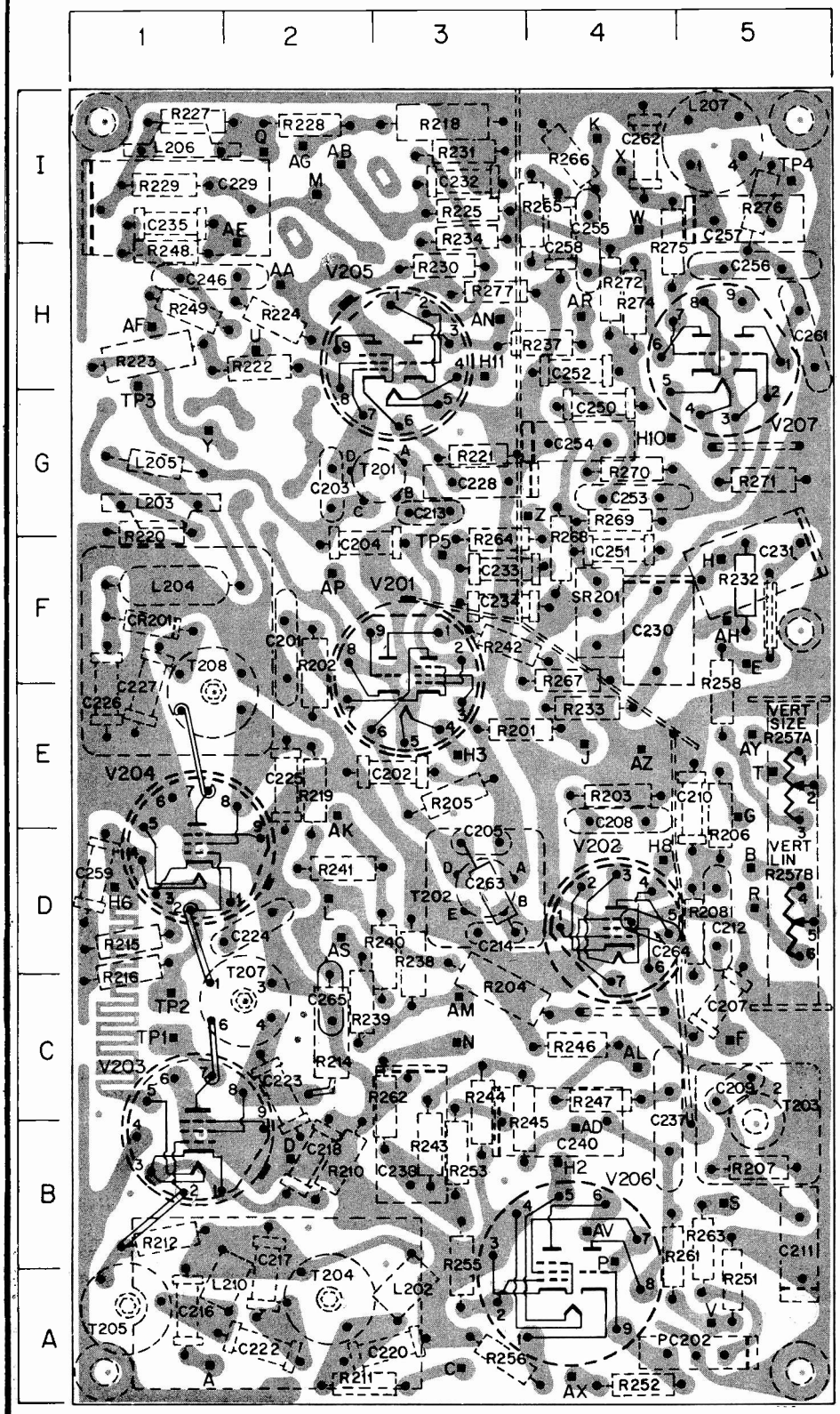
(14) V205A PIN 3
AGC PLATE
HORIZONTAL RATE 330V P-P

(15) V105 PIN 3
KINESCOPE 1ST ANODE
HORIZONTAL RATE 40V P-P



(16) V105 PIN 3
KINESCOPE 1ST ANODE
VERTICAL RATE 130V P-P

PW200 PHANTOM VIEW



PW200 Phantom View

PW200 COMPONENT LOCATION

C201	4F
C202	3E
C203	4G
C204	4F
C205	3D
C207	1C
C208	2E
C209	1C
C210	1E
C211	1B
C212	1D
C213	3G
C214	3D
C216	5A
C217	4B
C218	2B
C220	4A
C222	4A
C223	4C
C224	4D
C225	4E
C226	5E
C227	5E
C228	3G
C229	4I
C230	2F
C231	1F
C232	3I
C233	3F
C234	3F
C235	5I
C237	2C
C238	3B
C240	2B
C246	5H
C250	2G
C251	2F
C252	2H
C253	2G
C254	2G
C255	2I
C256	1H
C257	1I
C258	2H
C259	5D
C261	1H
C262	2I
C263	3D
C264	2D
C265	4C
CR201	5F
L202	3A
L203	5G
L204	5F
L205	5G
L206	5I
L207	1I
L210	5A
PC202	2A
R201	3E
R202	4F
R203	2E
R204	3C
R205	3E
R206	1D
R207	1B
R208	1D
R210	4B
R211	4A
R212	5B
R214	4C
R215	5D
R216	5D
R218	3I
R219	4E
R220	5G
R221	3G
R222	4H
R223	5H
R224	4H
R225	3I
R227	5I
R228	4I
R229	5I
R230	3H
R231	3I
R232	1F
R233	2E
R234	3I
R237	2H
R238	3D
R239	4C
R240	3D
R241	4D
R242	3F
R243	3B
R244	3C
R245	3C
R246	2C
R247	2C
R248	5H
R249	5H
R251	1A
R252	2A
R253	3B
R255	3B
R256	3A
R257A	1E
R257B	1D
R258	1E
R261	2B
R262	3C
R263	1B
R264	3F
R265	2I
R266	2I
R267	2F
R268	2F
R269	2G

TEST POINT LOCATION GUIDE

R270	2G
R271	1E
R272	2H
R274	2H
R275	2H
R276	1I
R277	3H
SR201	2F
T201	2G
T202	3D
T203	1C
T204	4A
T205	5A
T207	4C
T208	5F
V201	3F
V202	2D
V203	5C
V204	5E
V205	4H
V206	2B
V207	1G
A	5A
AA	4H
AB	4I
AD	2B
AE	4I
AF	5H
AG	4I
AH	1F
AK	4E
AL	2C
AM	3C
AN	3H
AP	4F
AR	2H
AS	4D
AV	2B
AX	2A
AY	1E
AZ	2E
E	1F
F	1C
G	1E
H	1F
H2	2B
H3	3E
H6	5D
H8	2D
H10	2G
H11	3H
J	2E
K	2I
L	4D
M	4I
N	3C
P	2B
Q	4I
R	1D
S	1B
T	1E
U	4H
V	1A
W	2I
X	2I
Y	5G
Z	2G
TP1	5C
TP2	5C
TP3	5G
TP4	1I
TP5	3F

RCA VICTOR

MODEL AND CHASSIS CROSS REFERENCE

Model	Name	Chassis	TMA	Tuner	Picture Tube	Antennas VHF//UHF	Remote
AJ-083E, M	*"TRIMETTE"*	KCS160E	107G	KRK127B/122AH, BH, DH	19FEP4A/B	Monopole/ Ring	
AJ-089G, H	*"FASHIONETTE"*	KCS160P	129C	KRK127AA/120MA, NA, PA, WP, XP	19FEP4A/B	Dipole/ Ring	
AJ-093MR, WR	*"CELEBRITY"*	KCS160C	129A	KRK127J/120MA, NA, PA, WP, XP	19FEP4A/B	Dipole/ Ring	KRS29A KRT4B
AJ-135HK, NK, WK	*"BLITHE"*	KCS160F	107H	KRK127B/122AH, BH, DH	19FEP4A/B	Dipole/ Ring	
AJ-137WK, YK	*"REVELER"*	KCS160N	129B	KRK127AA/120MA, NA, PA, WP, XP	19FEP4A/B	Dipole/ Ring	

Material on above listed sets is on pages 95 through 100. The models listed below use "instant-on," but are practically identical to the material included.

Model	Name	Chassis	TMA	Tuner	Picture Tube	Antennas VHF/UHF	Remote
AJ-161MR,WR	*"WAYFARER"*	KCS160J	140A	KRK127R/120MA, NA,PA,WP,XP	20SP4	Dipole/Ring	KRS29A KRT4B
AJ-231WK	*"MODERNETTE"*	KCS160M	138A	KRK127N/120MA, NA,PA,WP,XP	21GAP4	Dipole/Ring	

DISASSEMBLY INSTRUCTIONS

AJ-083, AJ-135K

1. Remove four front control knobs (On-Off/Volume, Brightness, Channel Selector, and Fine Tuning).
2. Disconnect the VHF and UHF antennas at the antenna terminal board.
3. Remove seven cross-point back cover screws—three at the top, one under the antenna terminal board, one at the AC interlock, and two underneath. Remove the back cover.
4. Remove seven hexhead chassis screws: two securing the handle bracket, one under the UHF dial pointer slide, one each in the upper left and right corners, and two in the bottom of the chassis base.
5. Disconnect the speaker leads, the picture tube socket, and the yoke plug.
6. Slide the chassis back and remove the second anode lead. Remove the chassis.

AJ-089, AJ-137K

1. Perform steps 1 and 2 as outlined above.
2. Remove six cross-point back cover screws—two at the top, one under the antenna terminal board, one at the AC interlock, and two underneath the cabinet.
3. Remove four ¼" chassis screws: One in each of two top brackets and two in the bottom of the chassis base.
4. Remove four 11/32" hexnuts securing TMA to the front bezel. Move the TMA to the test position (a threaded stud and a slot in the left side of the chassis is provided for this purpose) and secure it with one of the 11/32" nuts.
5. Perform steps 5 and 6 outlined above.

AJ-093R

1. Perform the first 3 steps outlined above for the AJ-089, AJ-137K.
2. Disconnect the KRS29A remote control receiver cable assemblies (except those which connect between the pre-amp and the relay boards).
3. Remove the screw which secures the remote receiver bracket to the cabinet and remove the assembly.
4. Perform steps 4 and 5 above.

WIDTH AND LINEARITY ADJUSTMENTS

Set AC line voltage at 108 volts.

Adjust the height and vertical linearity controls for a symmetrical raster that just fills the screen from top to bottom.

Set the brightness and contrast controls to maximum and adjust the width control (R110) so that the raster just fills the screen horizontally. If necessary, turn the centering magnets to center the raster.

Turn the contrast control to minimum and center the raster vertically. If the height and linearity adjustments are correct the raster should fill the screen +0, −¼" at the top and bottom. When normal 120 volts line is restored, the vertical blanking bar should not change in width as the picture is rolled slowly downward and the picture should have the proper amount of horizontal scan.

CENTERING

If the picture is not positioned correctly on the screen, it may be necessary to center the picture with the two disc magnets mounted behind the yoke cover. Both horizontal and vertical centering are accomplished at once by rotating the discs together or separately. Perform this adjustment along with vertical height, vertical linearity, and width, as they are all interdependent.

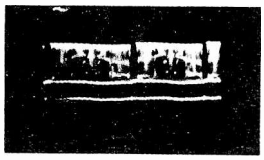
HORIZONTAL SINE WAVE ADJUSTMENT

Remove sync by shorting Terminal "AE" (Zone 4B, PW200) to chassis ground. Short sine wave coil L207 by connecting a jumper wire between TP4 (Zone 1A, PW200) and Terminal "W" (Zone 2B, PW200).

Adjust horizontal hold control until picture sides are vertical. Remove short from sine wave coil (TP-4 and Terminal "W"), then adjust L207 sine wave coil so that the picture remains stationary with sides vertical. Remove short from sync (Terminal "AE").

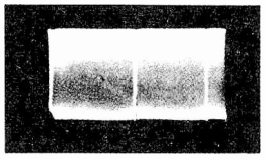
From CCW direction of horizontal hold control, pull in from out of sync condition should be from 1 to 3 bars. From the CW direction from 1 to 8 bars. There should be no loss of raster on either extreme of control rotation.

VOLTAGE WAVEFORMS

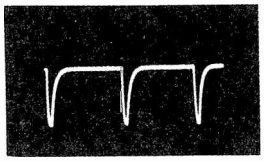


① TP-3
SECOND DETECTOR
VERTICAL RATE 2V P-P

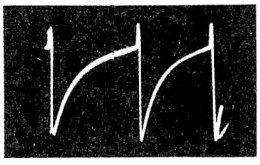
② V101 PINS 2 & 6
HORIZONTAL OUTPUT GRID
HORIZONTAL RATE 130V P-P



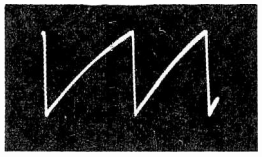
③ TP-5
SYNC PLATE
VERTICAL RATE 60V P-P



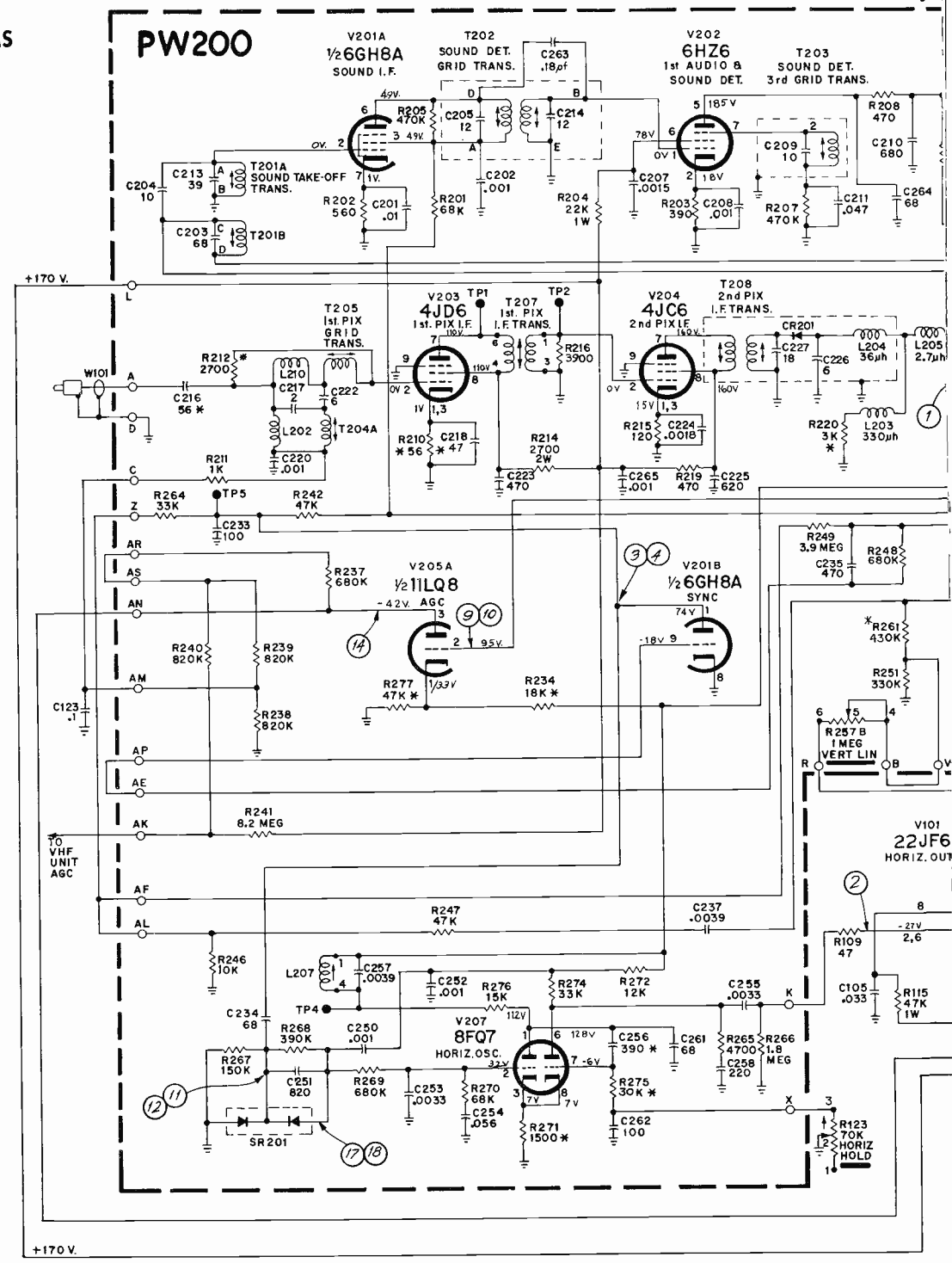
④ TP-5
SYNC PLATE
HORIZONTAL RATE 60V P-P

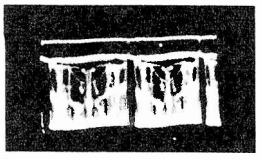


⑤ V206B PIN 9
VERTICAL OSCILLATOR GRID
VERTICAL RATE 180V P-P

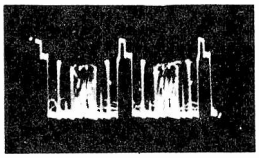


⑥ V206A PIN 2
VERTICAL OUTPUT GRID
VERTICAL RATE 28V P-P

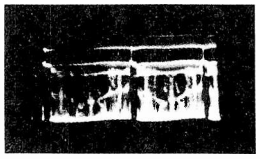




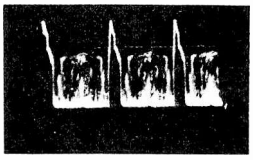
⑦ V205B PIN 9
VIDEO AMPLIFIER PLATE
VERTICAL RATE 110V P-P



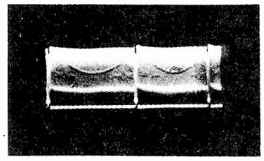
⑧ V205B PIN 9
VIDEO AMPLIFIER PLATE
HORIZONTAL RATE 110V P-P



⑨ V205A PIN 2
AGC GRID
VERTICAL RATE 80V P-P



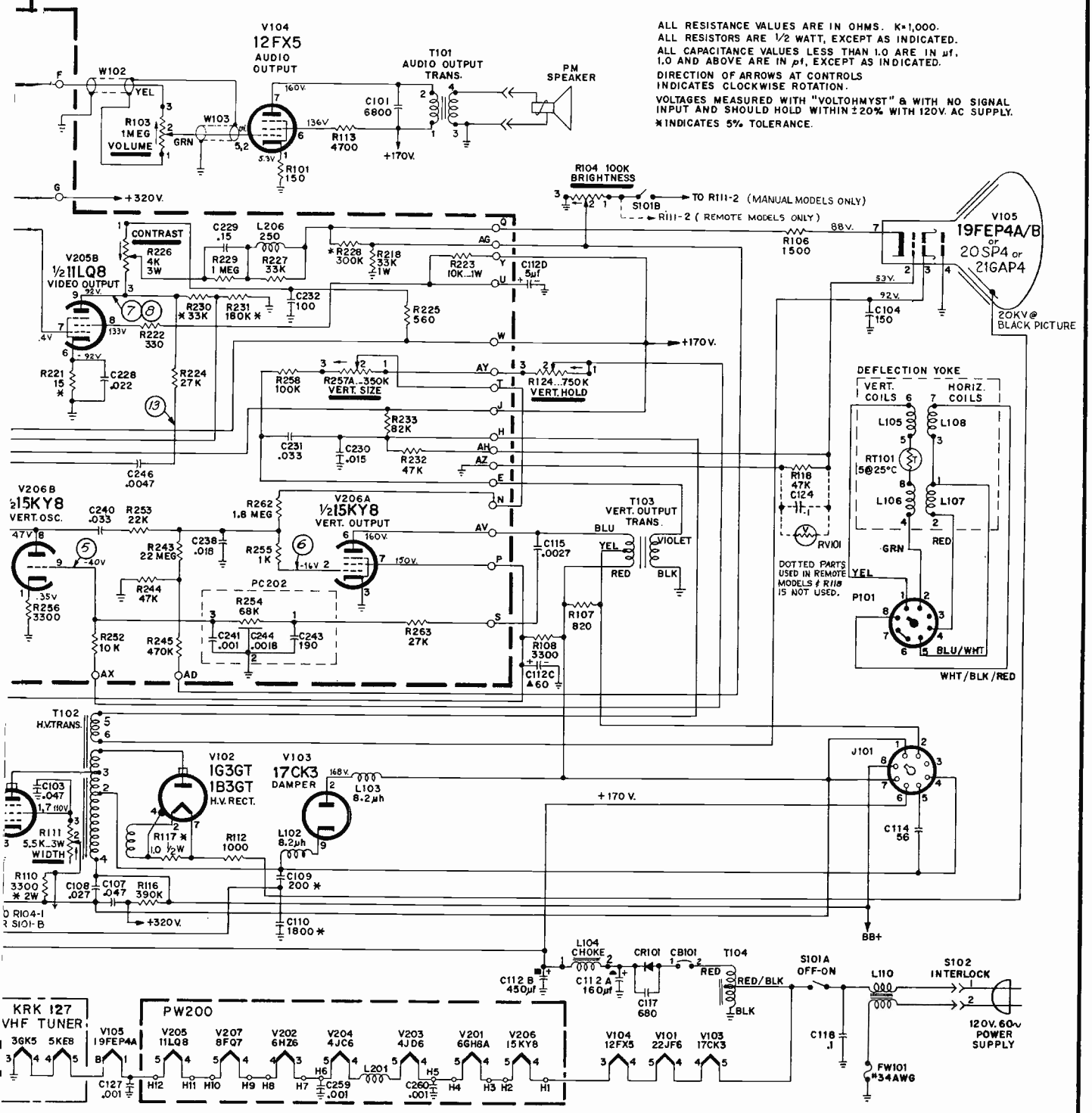
⑩ V205A PIN 2
AGC GRID
HORIZONTAL RATE 80V P-P



⑪ SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 12V P-P

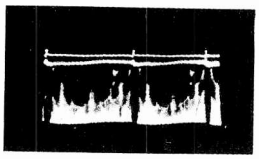
RCA Victor Chassis KCS-160 Series Schematic Diagram, Continued

ALL RESISTANCE VALUES ARE IN OHMS. K=1,000.
ALL RESISTORS ARE 1/2 WATT, EXCEPT AS INDICATED.
ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN µf, 1.0 AND ABOVE ARE IN µf, EXCEPT AS INDICATED.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
VOLTAGES MEASURED WITH "VOLTOHMYST" & WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 120V. AC SUPPLY.
* INDICATES 5% TOLERANCE.

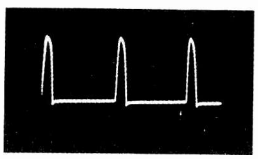


KCS160 SERIES CHASSIS CIRCUIT SCHEMATIC DIAGRAM

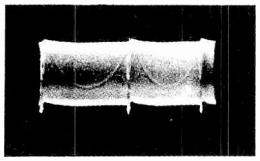
(12) SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 12V P-P



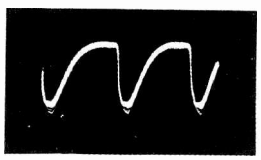
(13) R224 & C246 JUNCTION
(ZONE 4B PW200 BOARD)
VERTICAL RATE 100V P-P



(14) V205A PIN 3
AGC PLATE
HORIZONTAL RATE 330V P-P

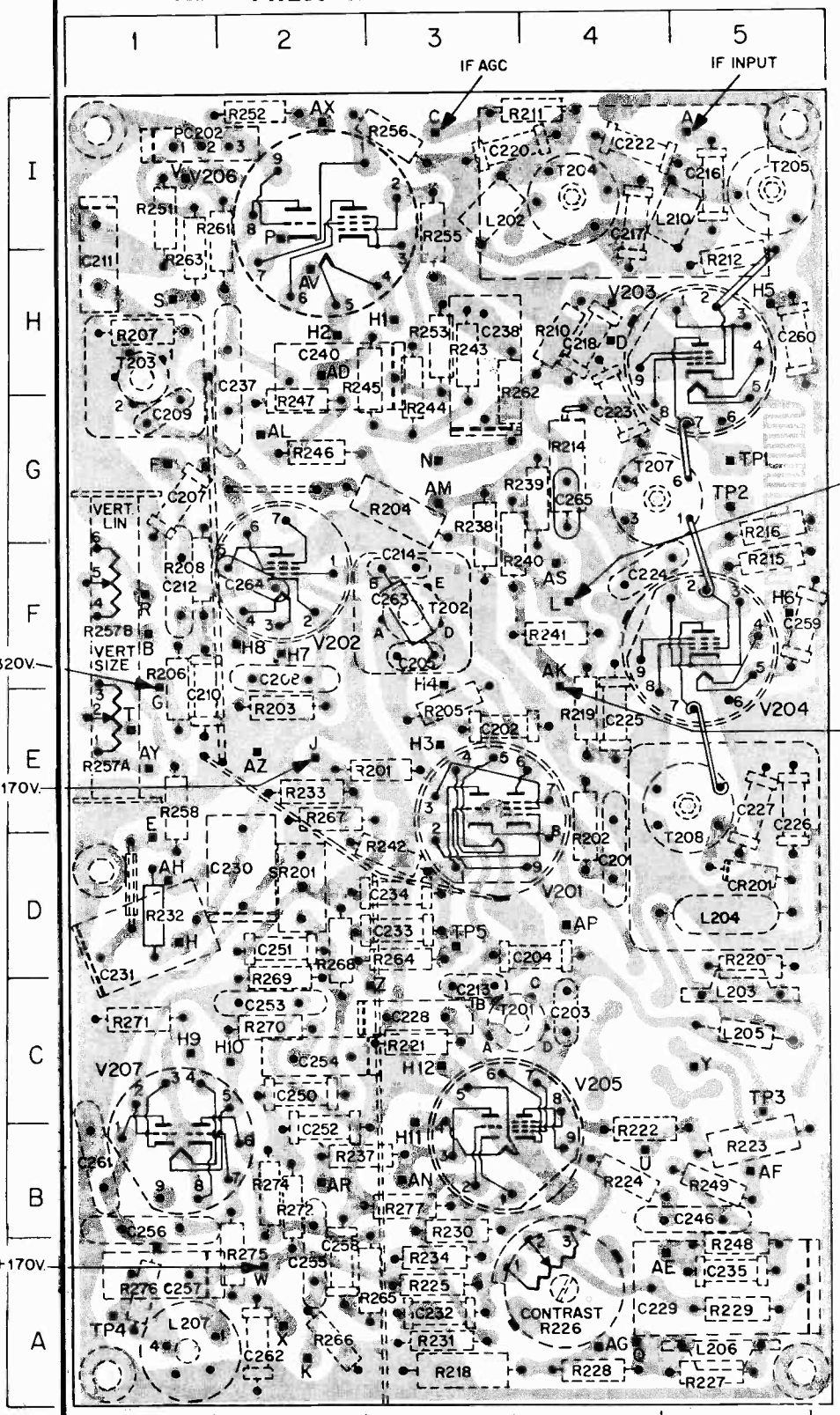


(17) SR201 ANODE
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 15V P-P



(18) SR201 ANODE
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 15V P-P

RCA **PW200 CIRCUIT ASSEMBLY**



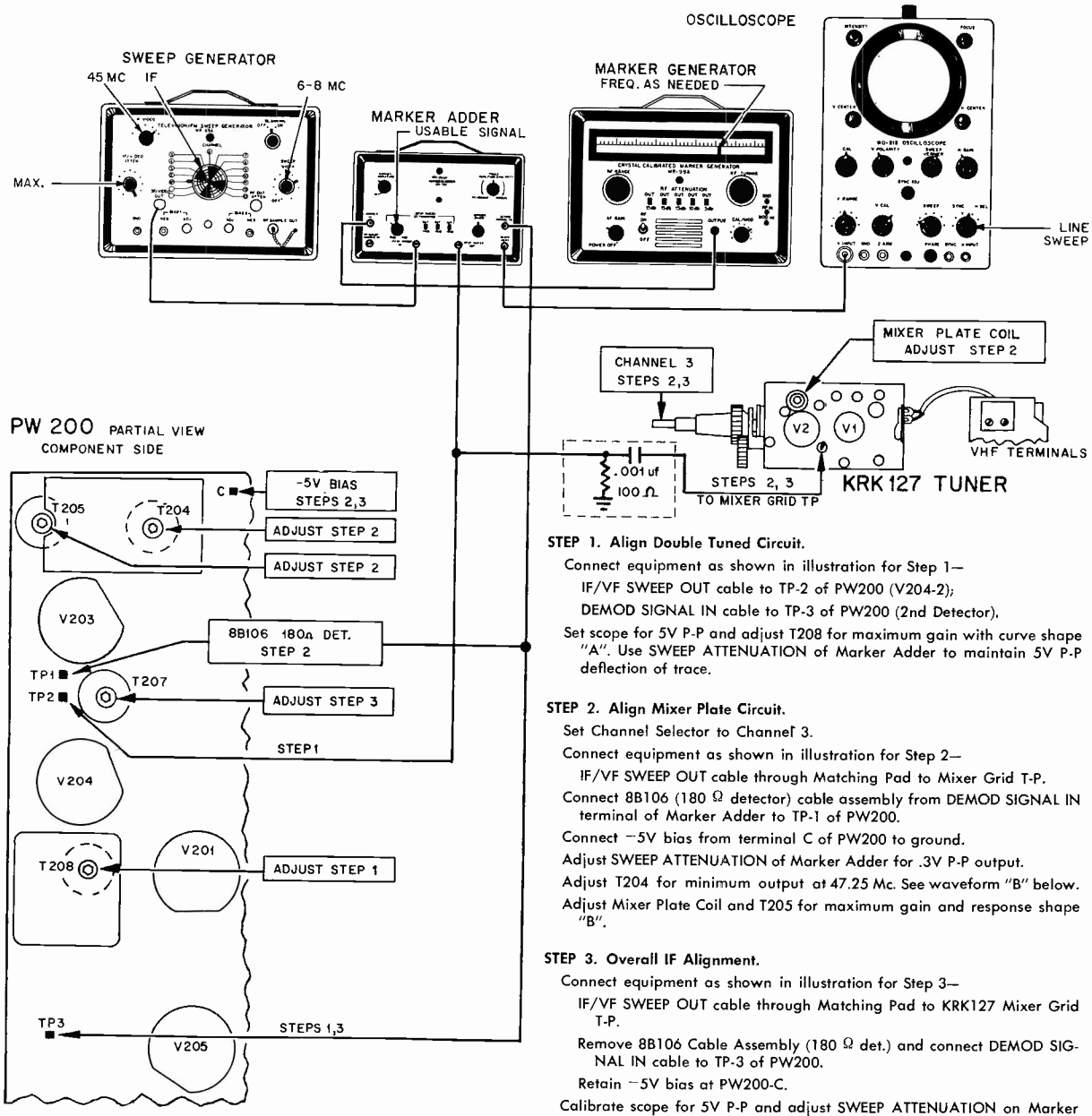
PW200 Circuit Assembly, Phantom View

COMPONENT LOCATION GUIDE

C201	4D	R206	1E
C202	3E	R207	1H
C203	4C	R208	1F
C204	4D	R210	4H
C205	3F	R211	4I
C207	1G	R212	5H
C208	2F	R214	4G
C209	1G	R215	5F
C210	1E	R216	5G
C211	1H	R218	3A
C212	1F	R219	4E
C213	3C	R220	5D
C214	3F	R221	3C
C216	5I	R222	4B
C217	4I	R223	5B
C218	4H	R224	4B
C220	3I	R225	3A
C222	4I	R226	4A
C223	4G	R227	5A
C224	4F	R228	4A
C225	4E	R229	5A
C226	5E	R230	3B
C227	5E	R231	3A
C228	3C	R232	1D
C229	5A	R233	2E
C230	2D	R234	3B
C231	1D	R237	2B
C232	3A	R238	3G
C233	3D	R239	4G
C234	3D	R240	3F
C235	5A	R241	4F
C237	2H	R242	3D
C238	3H	R243	3H
C240	2H	R244	3H
C241	1I	R245	3H
C243	1I	R246	2G
C244	1I	R247	2G
C246	5B	R248	5B
C250	2C	R249	5B
C251	2D	R251	1I
C252	2B	R252	2I
C253	2C	R253	3H
C254	2C	R254	1I
C255	2B	R255	3I
C256	1B	R256	3I
C257	1A	R257A	1E
C258	2B	R257B	1F
C259	5F	R258	1E
C260	5H	R261	2I
C261	1B	R262	3H
C262	2A	R263	1I
C263	3F	R264	3D
C264	2F	R265	3A
C265	4G	R266	2A
		R267	2E
CR201	5D	R268	2D
		R269	2C
L201	...	R270	2C
L202	3I	R271	1C
L203	5C	R272	2B
L204	5D	R274	2B
L205	5C	R275	2B
L206	5A	R276	1A
L207	1A	R277	3B
L210	5I		
		T201	3C
R201	3E	T202	...
R202	4E	T203	1H
R203	2R	T204	4I
R204	3G	T205	5I
R205	3E	T207	4G

Terminal Guide																	
A	5I	AK	4E	AX	2I	G	1F	H7	2F	L	4F	V	1I	TP1	5G
AD	2H	AL	2G	AY	1E	H	1D	H8	2F	N	3G	W	2B	TP2	5G
AE	4B	AM	3G	AZ	2E	H1	3H	H9	1C	P	2I	X	2A	TP3	5C
AF	5B	AN	3B	B	1F	H2	2H	H10	2C	Q	4A	Y	5C	TP4	1A
AG	4A	AP	4D	C	3I	H3	3E	H11	3B	R	1F	Z	3C	TP5	3D
AH	1D	AR	2B	D	4H	H4	3E	H12	3C	S	1H				
		AS	4F	E	1D	H5	5H	J	2E	T	1E				
		AV	2H	F	1G	H6	5F	K	2A	U	4B				

PICTURE IF ALIGNMENT—KCS156, KCS160 CHASSIS



STEP 1. Align Double Tuned Circuit.

Connect equipment as shown in illustration for Step 1—

IF/VF SWEEP OUT cable to TP-2 of PW200 (V204-2);

DEMOD SIGNAL IN cable to TP-3 of PW200 (2nd Detector).

Set scope for 5V P-P and adjust T208 for maximum gain with curve shape "A". Use SWEEP ATTENUATION of Marker Adder to maintain 5V P-P deflection of trace.

STEP 2. Align Mixer Plate Circuit.

Set Channel Selector to Channel 3.

Connect equipment as shown in illustration for Step 2—

IF/VF SWEEP OUT cable through Matching Pad to Mixer Grid T-P.

Connect 8B106 (180 Ω detector) cable assembly from DEMOD SIGNAL IN terminal of Marker Adder to TP-1 of PW200.

Connect −5V bias from terminal C of PW200 to ground.

Adjust SWEEP ATTENUATION of Marker Adder for .3V P-P output.

Adjust T204 for minimum output at 47.25 Mc. See waveform "B" below.

Adjust Mixer Plate Coil and T205 for maximum gain and response shape "B".

STEP 3. Overall IF Alignment.

Connect equipment as shown in illustration for Step 3—

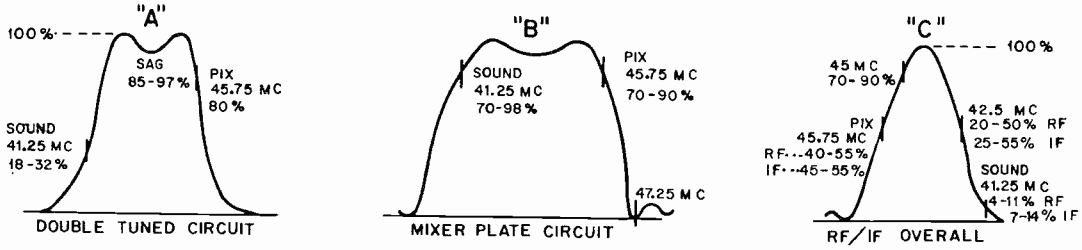
IF/VF SWEEP OUT cable through Matching Pad to KRK127 Mixer Grid T-P.

Remove 8B106 Cable Assembly (180 Ω det.) and connect DEMOD SIGNAL IN cable to TP-3 of PW200.

Retain −5V bias at PW200-C.

Calibrate scope for 5V P-P and adjust SWEEP ATTENUATION on Marker Adder to maintain full scale deviation of trace.

Adjust T207 if necessary to give response similar to "C" below.



SOUND ALIGNMENT—KCS156, 160, 163, 164 CHASSIS

SOUND IF, SOUND DETECTOR, AND 4.5 MC. TRAP

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY.....Apply —10 volts to the I F AGC bus at terminal "C" on PW200.

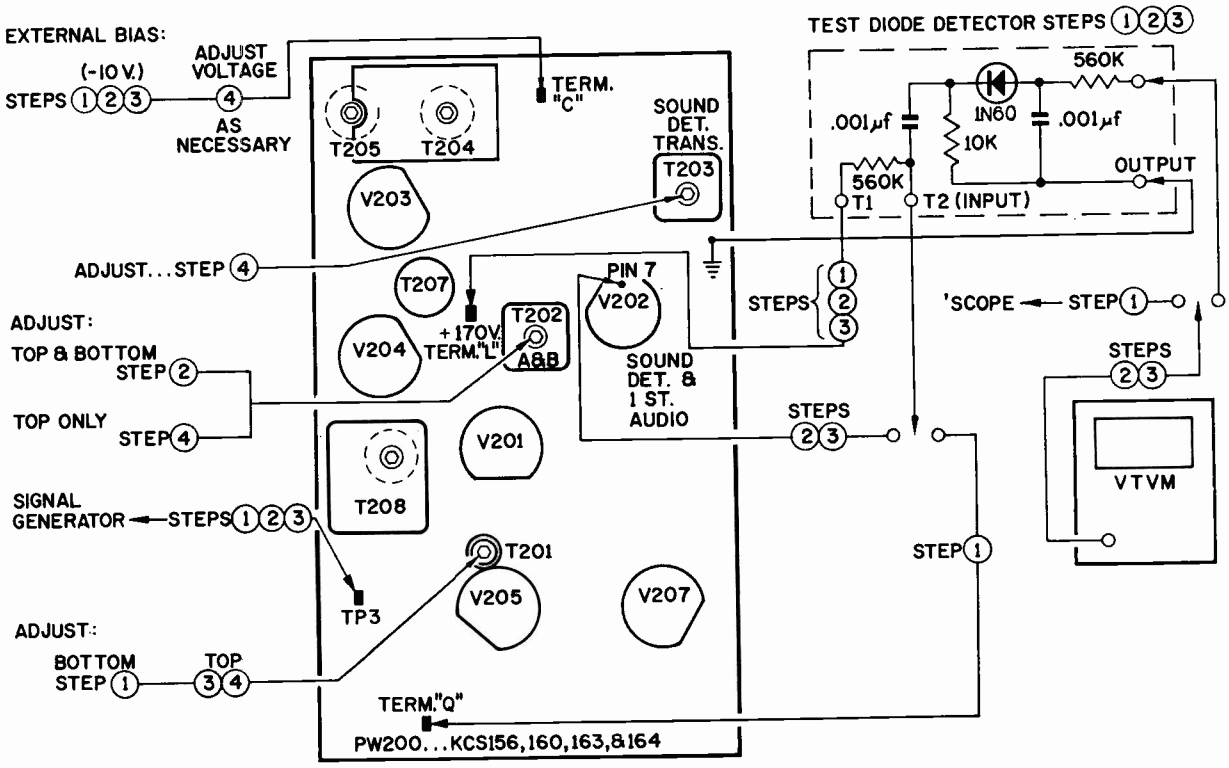
OSCILLOSCOPE.....Through test diode detector as shown to PW200 terminals "L" and "Q".

SIGNAL GENERATOR.....To TP3 on PW200.

VTVM.....Through test diode detector as shown to PW200 terminal "L" and V202 pin 7.

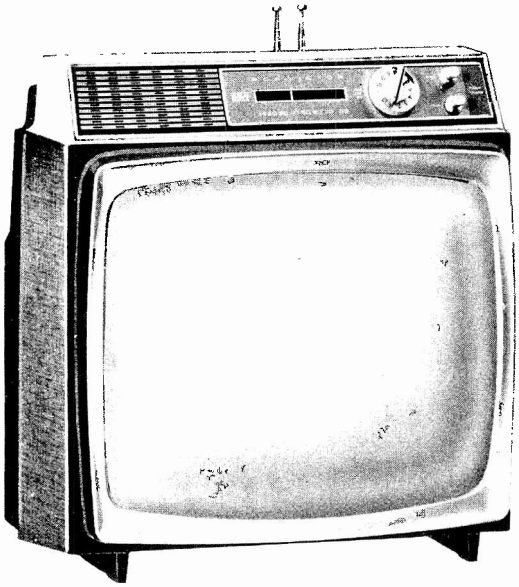
GENERAL.....Set contrast control fully clockwise.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
1	Adjust 4.5 mc. trap	4.5 mc. 600 cycle AM mod.	T201B (bottom)	Adjust for minimum 600 cps. indication on oscilloscope. The core should penetrate the coil from the board side when finally adjusted.
2	Adjust driver coil	4.5 mc.	T202A & B	Adjust for maximum negative DC on meter. Set generator for 0.5 to 1.0 volts when peaked. T201A top core and T202A core should penetrate the coil from top of can and T202B should penetrate coil from board side when finally peaked.
3	Adjust sound take-off coil	4.5 mc.	T201A (top)	
	NOTE: DO NOT READJUST T202B (BOTTOM) AFTER TRANSFORMER PEAKED IN STEPS 2 & 3.			
	Disconnect bias and the diode test detector. Turn off signal generator and tune in strongest signal in area (use test pattern if available), adjusting volume control for normal volume (approx. ¼ turn from C.C.W.). Turn core of T203 flush with top of coil form. Reapply bias and adjust until hiss can be heard in sound.			
4	Adjust quadrature coil	Not Used	T203	Turn core clockwise to 2nd peak, adjusting for maximum volume and least hiss in sound. If necessary, retouch T201A & T202A (top cores) only.



RCA VICTOR

Models AJ-087E, M, W, use Chassis KCS-164E; Models AJ-091M, W, use Chassis KCS-164D; and similar "instant-on" Models AJ-193BK, WK, and AJ-225S, Y, use KCS-164F, K. For alignment see pages 100, and 109.



INSTRUMENT DISASSEMBLY

The knobs must be removed from the Brightness Control, the Volume Control, and from the Tuner in order to remove the chassis.

The back cover is secured by 3 Phillips head screws at the top, two on the bottom, and one each at the AC interlock and the antenna terminal board. Before removing the rear cover, disconnect the UHF ring antenna and disconnect the dipole leads from the antenna terminal board.

The chassis and the tuner mounting assembly are removed as a unit. Remove the 5 hex head screws which secure the chassis at the top, and the screw near the bottom at either side of the cabinet. Next disconnect the speaker leads, the kinescope socket, and the yoke plug. Pull the chassis away from the cabinet to disconnect the 2nd anode lead. Short the 2nd anode button to the chassis before handling the picture tube.

To remove the picture tube, loosen the compression bolt enough to slip the mounting wire over the retaining bracket. Remove the picture tube from the cabinet by grasping it firmly at opposite corners of the faceplate.

Reassemble in reverse order.

CIRCUIT BREAKER

The B+ supply for this instrument is protected by a circuit breaker rather than a fuse. The reset button is located on the rear of the chassis and is accessible to the user. The circuit resets when the button is depressed and becomes operative when the button is released.

WIDTH AND LINEARITY ADJUSTMENTS

Adjust the Vertical Height and Linearity controls for an approximately symmetrical raster.

Note: Width adjustments are most accurate when made with low line, 108 VAC, supply voltage.

Set both Brightness and Contrast controls at maximum. (Fully clockwise.) Adjust width control, R111, until the raster just fills the screen horizontally +0, −⅛". Turn centering magnets together and individually to center the raster.

Turn contrast control to minimum, then center the raster vertically. After the Vertical Height and Linearity adjustments are completed at 108 VAC supply voltage, the raster should fill the screen +0, −¼" at the top and bottom.

If the vertical height and linearity controls are properly set the raster will fill the screen the proper amount at normal 120 VAC supply voltage, and the blanking bar will not change in width as the picture is rolled vertically.

HORIZONTAL SINE WAVE ADJUSTMENT

Remove sync by shorting Terminal "AE" (zone 2B, PW200) to chassis ground. Short sine wave coil L207 by connecting a jumper wire between TP4 (zone 5A) and Terminal "W" (zone 4A) on PW200.

Adjust the Horizontal Hold control, R123, until the picture sides are vertical. Remove shorting wire from across the sine wave coil. Adjust L207 Sine Wave Coil until the picture remains stationary and the sides vertical. Remove short from sync grid (Terminal "AE").

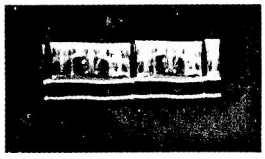
From counterclockwise direction of the Horizontal Hold Control, the pull in from out of sync condition should be from 1 to 3 bars, and from the clockwise direction, 1 to 8 bars. There should be no loss of raster on either extreme of control rotation.

AGC AND SYNC

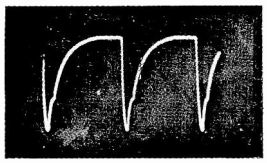
The Sync and AGC circuits are designed for optimum performance under varying signal conditions and no controls are provided.

RCA Victor Chassis KCS-164 Series Schematic Diagram

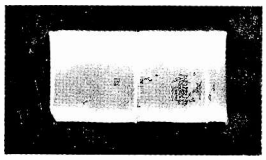
VOLTAGE WAVEFORMS



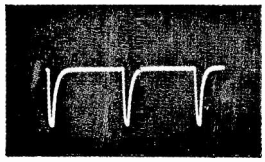
① TP-3
SECOND DETECTOR
VERTICAL RATE 2V P-P



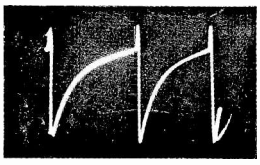
② V101 PINS 2 & 6
HORIZONTAL OUTPUT GRID
HORIZONTAL RATE 130V P-P



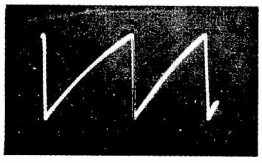
③ TP-5
SYNC PLATE
VERTICAL RATE 60V P-P



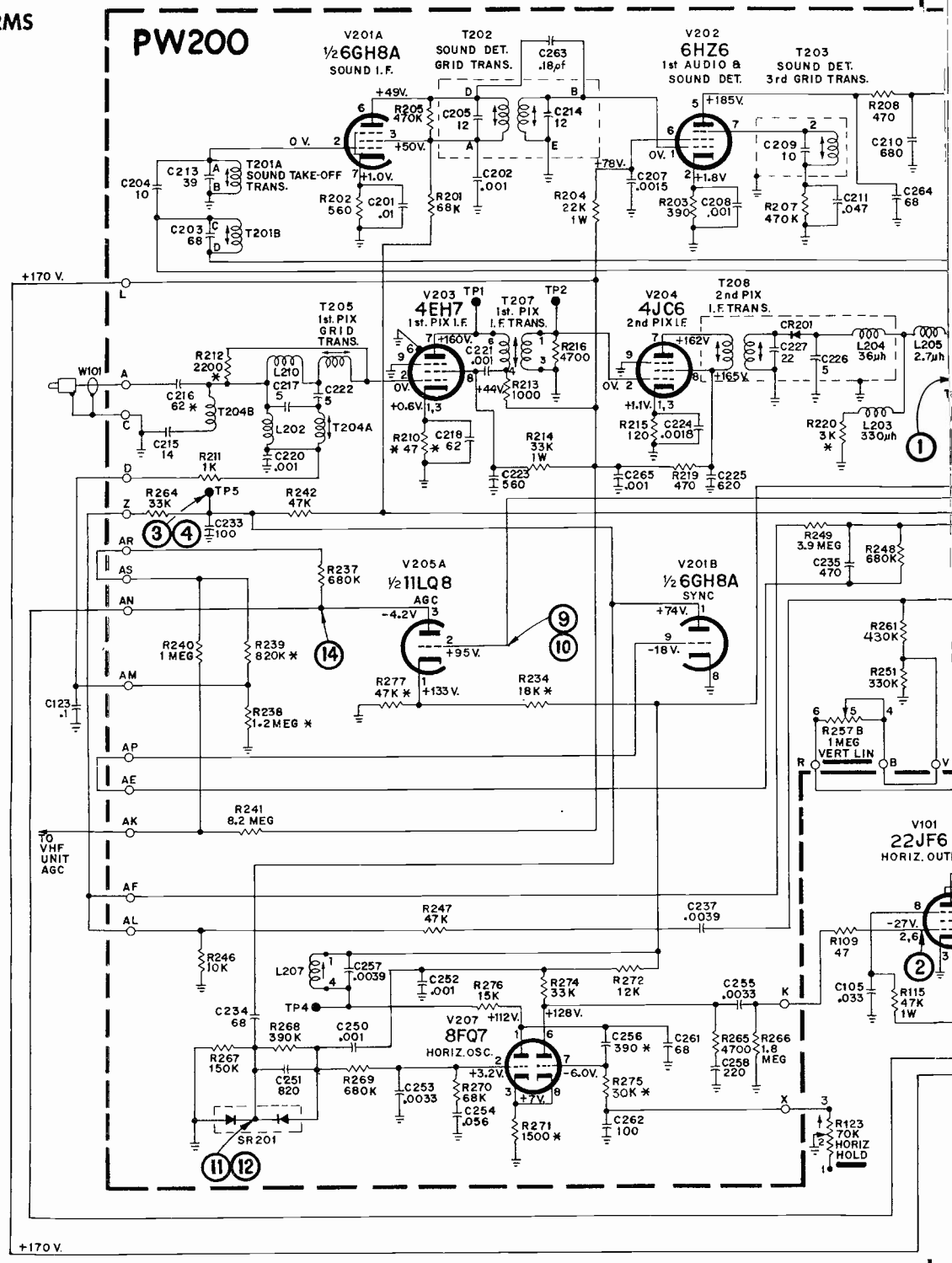
④ TP-5
SYNC PLATE
HORIZONTAL RATE 60V P-P

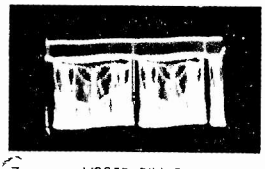


⑤ V206B PIN 9
VERTICAL OSCILLATOR GRID
VERTICAL RATE 180V P-P

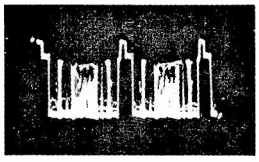


⑥ V206A PIN 2
VERTICAL OUTPUT GRID
VERTICAL RATE 28V P-P

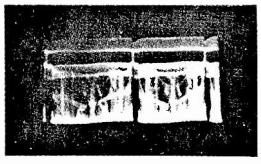




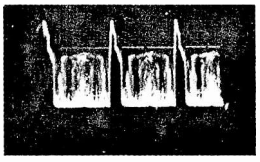
⑦ V205B PIN 9
VIDEO AMPLIFIER PLATE
VERTICAL RATE 110V P-P



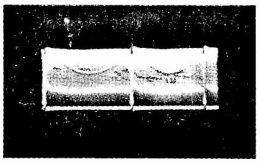
⑧ V205B PIN 9
VIDEO AMPLIFIER PLATE
HORIZONTAL RATE 110V P-P



⑨ V205A PIN 2
AGC GRID
VERTICAL RATE 80V P-P



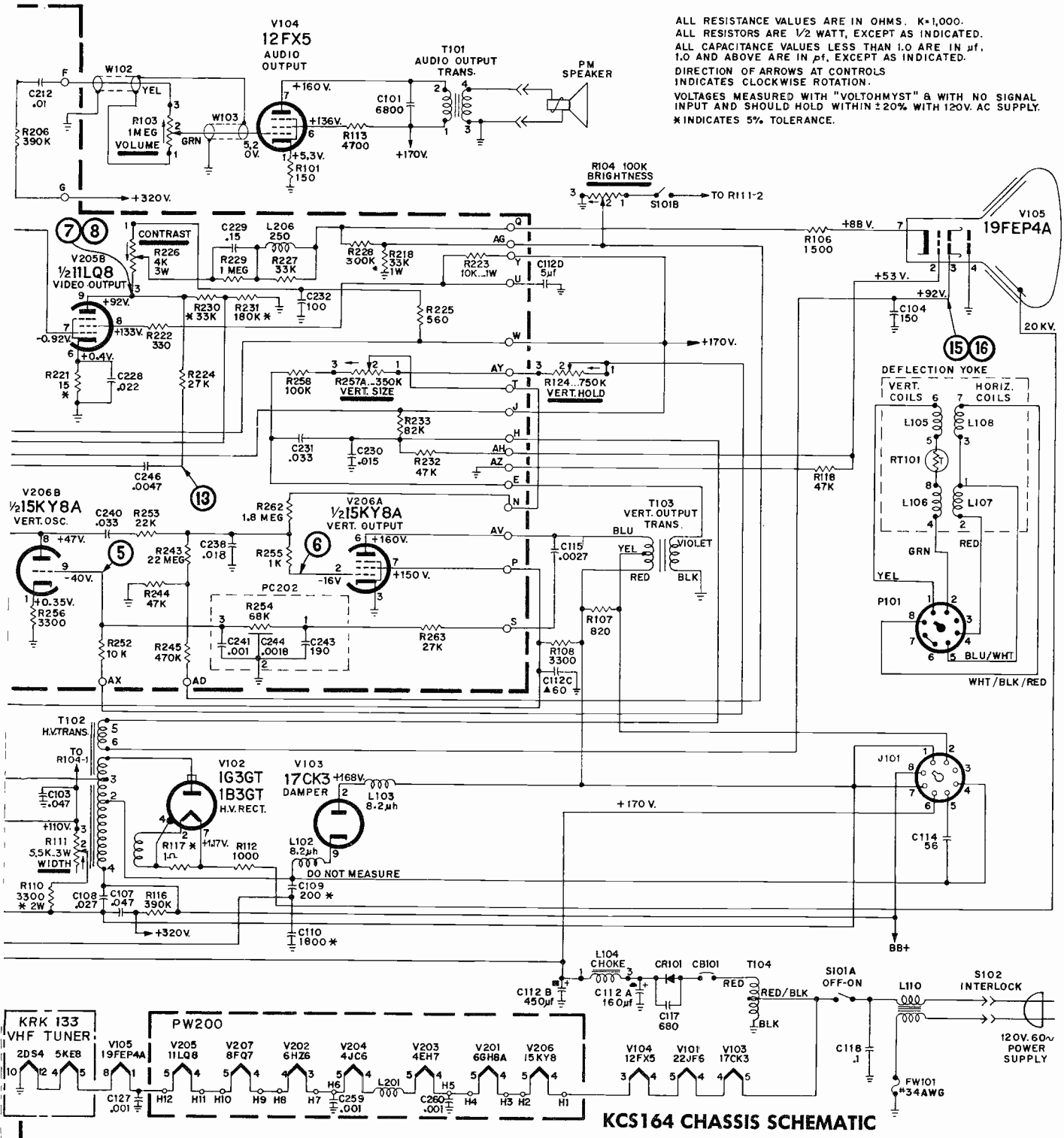
⑩ V205A PIN 2
AGC GRID
HORIZONTAL RATE 80V P-P



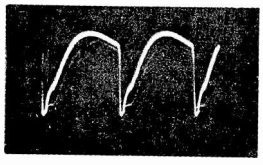
⑪ SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
VERTICAL RATE 12V P-P

RCA Victor Chassis KCS-164 Series Schematic Diagram, Continued

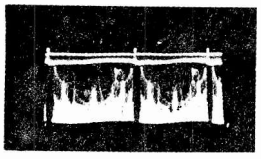
ALL RESISTANCE VALUES ARE IN OHMS. K=1,000.
ALL RESISTORS ARE 1/2 WATT, EXCEPT AS INDICATED.
ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN µf, 1.0 AND ABOVE ARE IN µf, EXCEPT AS INDICATED.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
VOLTAGES MEASURED WITH "VOLTOHMYST" & WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN ±20% WITH 120V. AC SUPPLY.
* INDICATES 5% TOLERANCE.



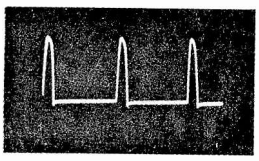
KCS164 CHASSIS SCHEMATIC



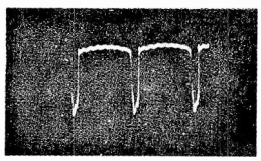
(12) SR201 CATHODE JUNCTION
HORIZONTAL PHASE DETECTOR
HORIZONTAL RATE 12V P-P



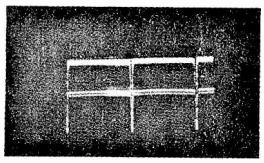
(13) R224 & C246 JUNCTION
(ZONE 1B PW200 BOARD)
VERTICAL RATE 100V P-P



(14) V205A PIN 3
AGC PLATE
HORIZONTAL RATE 330V P-P



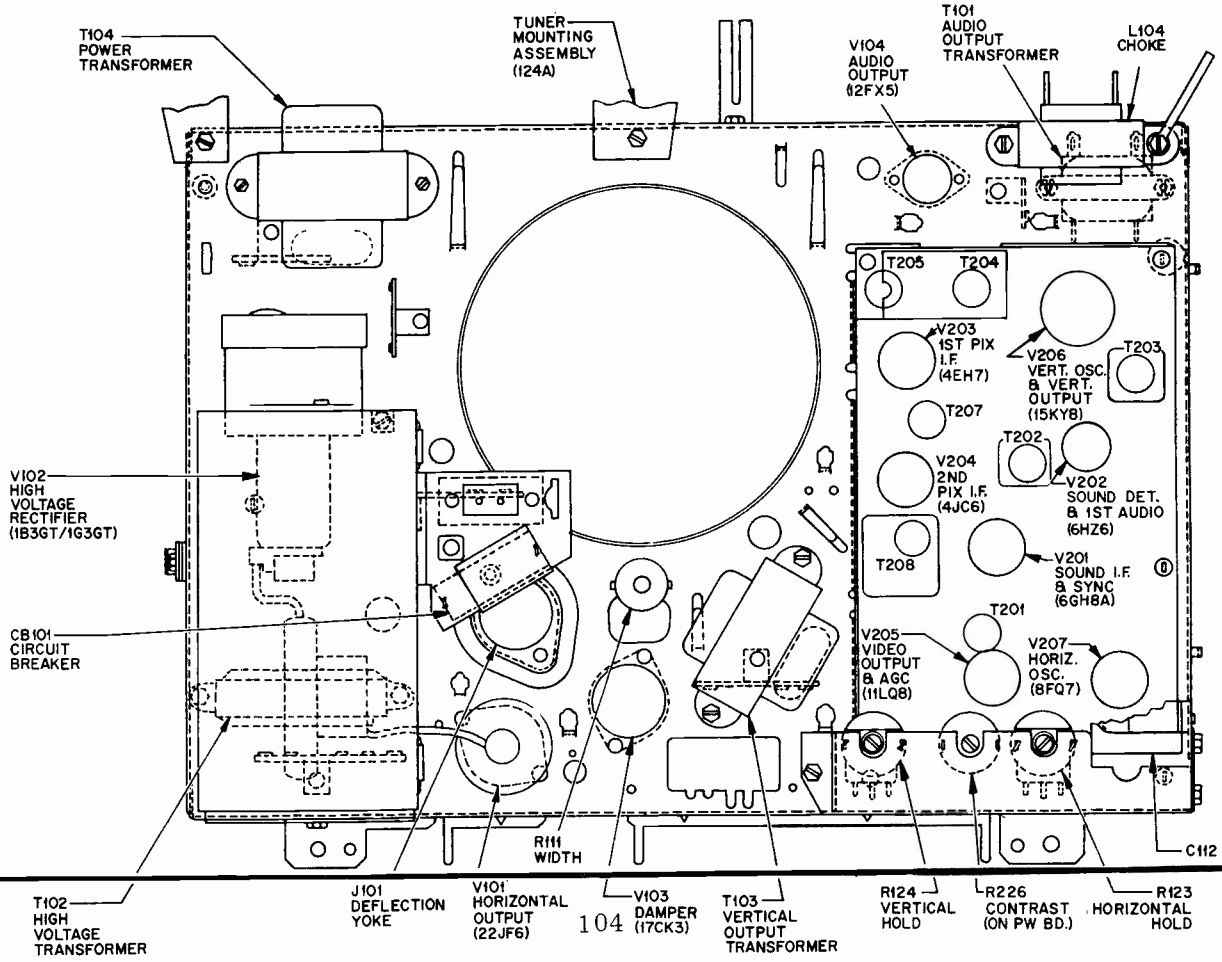
(15) V105 PIN 3
KINESCOPE 1ST ANODE
HORIZONTAL RATE 40V P-P



(16) V105 PIN 3
KINESCOPE 1ST ANODE
VERTICAL RATE 130V P-P

TRANSFORMER AND DEFLECTION YOKE DC RESISTANCE CHART

Symbol No.	Description	Winding	Lead	Terminal No. or Lead Color	DC Resistance ±15%	Remarks
T101	Audio Output Transformer	Primary	Start	1	450 ohms	Colored Dot designates Terminal 1.
			Finish	2		
		Secondary	Start	3	.6 ohms	
			Finish	4		
T102	Horizontal Output Transformer	AGC	Start	5	.199 ohms	All leads in High Voltage cage should be dressed away from the transformer and free from slack. Solder connections should be made with minimum of solder with no sharp points. Retain original lead dress.
			Finish	6		
		Primary	Start	4	20.13 ohms (4-3)	
			Tap	2	15.35 ohms (4-2)	
			Finish	3	4.78 ohms (2-3)	
		High Voltage	Start	3	590 ohms	
			Finish	Plate		
T103	Vertical Output Transformer	Primary	Start	Yellow	190 ohms	Dress all leads carrying Video or Audio information away from the transformer.
			Finish	Blue		
		Secondary	Start	Yellow	9 ohms	
			Finish	Red		
		Feedback	Start	Violet	235 ohms	
			Finish	Black		
T104	Power Transformer	Primary	Start	Black	48 ohms	Mounting bolts should be drawn down snugly. Preserve original lead dress.
			Finish	Black/Red		
		Secondary	Start	Black/Red	2.85 ohms	
			Finish	Red		
L105	Yoke	Vertical Coils	Start	5 P101-1	25.4 ohms ±7%	A jumper across Terminals 6 and 7 of P101 feeds B+ to the deflection circuits. Vertical and Horizontal circuits are inoperative with yoke plug removed.
			Finish	6		
L106			Start	4 P101-2		
			Finish	8		
L107		Horizontal Coils	Start	1 P101-5	37.5 ohms ±10%	
			Finish	2 P101-4		
L108			Start	3 P101-5		
			Finish	7 P101-8		



RCA VICTOR

Chassis KCS-158B, C, used in Models AJ153E, J, and AJ-157M, W.
(Service material on pages 105-108; alignment on pages 109-110.)

CIRCUIT BREAKER

The B+ supply for this instrument is protected by a circuit breaker rather than a fuse. The reset button is located on the rear of the chassis and is accessible to the user. The circuit breaker resets when the button is depressed and becomes operative when the button is released.

SERVICE CONTROL LOCATION

The VHF Channel selector and the concentric Fine Tuning/UHF Tuning controls are located on the front panel. The inner knob is the VHF channel selector, while the outer ring is the UHF channel selector. This same outer knob when pushed and rotated becomes the pre-set VHF fine tuning. Located at the top of the control panel is the "Instant-Pic" on-off rocker switch and below it are the Brightness and "Master" on-off/volume controls.

The Vertical Hold, Contrast, and Horizontal Hold control shafts extend through the lower right rear of the back cover. The Vertical Size, Linearity, Sync Stability, and AGC controls mount as a single unit (R257A, B, C, and D) along the right edge of the circuit board assembly, PW200, and are screwdriver accessible through holes in the right side of the back cover. The Width and Horizontal Linearity adjustments are chassis mounted and are accessible when the back cover is removed.

INSTRUMENT DISASSEMBLY

1. Remove four front control knobs (On-Off/Volume, Brightness, Channel Selector, and Fine Tuning).
2. Disconnect the VHF and UHF antennas at the antenna terminal board.
3. Remove six cross-point back cover screws—two at the top, one under the antenna terminal board, one at the AC interlock, and two underneath the cabinet.
4. Remove four 1/4" chassis screws: One in each of two top brackets and two in the bottom of the chassis base.
5. Remove four 11/32" hexnuts securing TMA to the front bezel. Move the TMA to the test position (a threaded stud and a slot in the left side of the chassis is provided for this purpose) and secure it with one of the 11/32" nuts.
6. Disconnect the speaker leads, the picture tube socket, and the yoke plug.
7. Slide the chassis back and remove the second anode lead. Remove the chassis.

CENTERING

If the picture does not fill the screen, it may be necessary to center the picture with the two disc magnets mounted behind the yoke cover. Horizontal and vertical centering are accomplished at the same time by rotating the discs together or separately. Perform this adjustment along with vertical height, vertical linearity, and width, as they are interdependent.

TESTING PICTURE PROPORTIONS

Rotate the vertical hold control to roll the picture slowly downward and study the blanking bar. If it is not level, or if the bar varies in thickness as it moves down the screen, make adjustments as prescribed in the next two paragraphs.

DEFLECTION YOKE

If the picture is tilted, loosen the yoke clamp screw and rotate the yoke to level the picture. Check that the yoke is seated firmly against the picture tube bell. Retighten the yoke clamp.

VERTICAL SIZE AND LINEARITY

Tune the instrument to a strong local station and set the brightness control for a minimum viewable picture. With the AC line set at 120 volts, adjust the vertical linearity and size controls for a linear picture with a 1/2" overscan at both top and bottom. Set the line voltage at 108 volts and if necessary, readjust the controls so that the raster just fills the screen. The linearity and size controls should have approximately 10% rotation in reserve when finally adjusted.

HORIZONTAL LINEARITY ADJUSTMENT

Use cross hatch, or broadcast, and adjust linearity coil L109 to give symmetry in the center of the screen.

With maximum contrast and brightness, check that the voltage drop across the horizontal output screen resistor R110 is not more than 13V.

WIDTH

The width adjustment is made with R123. With normal line voltage, the raster should overscan the mask about 5/8 inch on each side. At 108 VAC line, raster should just fill the screen.

HORIZONTAL SINE WAVE ADJUSTMENT

Remove the sync by placing a short clip lead between the plate of the sync output tube, V201-B (TP-5, PW200 Zone 4E) and ground. **Do not leave the clip lead attached for extended periods since there is a small positive potential (about +45V.) on TP-5.** Short the sine wave coil, L207, by attaching an additional clip lead from TP-4 (PW200, Zone 1H) to PW200 terminal "W" (PW200, Zone 2H).

Adjust the horizontal hold control, R135, so that the free-running frequency is 15.75kc (picture sides vertical). Remove the clip lead from TP-4 and terminal "W" and adjust the sine wave coil, L207, until the picture sides are again vertical (15.75kc). Remove the short from TP-5 to ground.

In the counterclockwise direction of the horizontal hold control, pull-in from the out-of-sync condition should be a minimum of one bar and a maximum of three bars. In the clockwise direction, it should pull in from one to eight bars. There should be no loss of raster on either extreme of control rotation.

AGC AND SYNC STABILIZER

Turn the Sync Stabilizer Control (R257C) completely counterclockwise and adjust the AGC (R257D) while tuned to a strong, local station. Turn the AGC control clockwise until picture begins to distort, and then counterclockwise slightly below the point where the distortion is eliminated. Quickly switch off channel and back. If the picture distorts and bends or does not reappear immediately, rotate the AGC control counterclockwse. Recheck by switching off channel and back again. Advance the sync stabilizer control fully clockwise and rotate the horizontal hold control (R135) counterclockwise until horizontal sync is lost. Then slowly sync the picture again. If the picture hangs up, or bends before locking in, retard the sync stabilizer control until this symptom is eliminated.

Note: Adjust AGC before sync stabilizer.

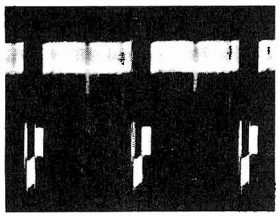
INSTANT-PIC FEATURE

The power auto transformer, T104, is equipped with a reduced AC potential tap which supplies constant current to the tube filaments. When the rocker-type DPDT switch, S103 A-B (located on TMA139), is pushed "ON," full AC potential is applied to the tube filaments and the chassis power supply is energized.

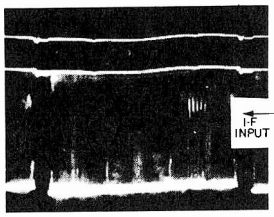
For extended periods of disuse (such as vacations), a master on-off switch, S101, is provided so that the receiver may be turned fully off.

RCA Victor Chassis KCS-158 Series Schematic Diagram

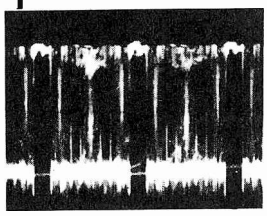
VOLTAGE WAVEFORMS



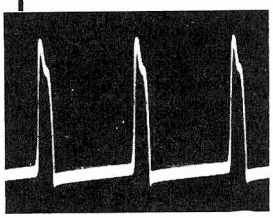
(2) TP-3 PW200
2ND DETECTOR
HORIZONTAL RATE 3V P-P



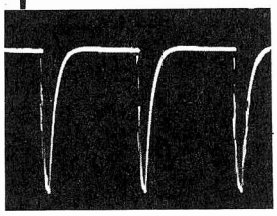
(4) JUNCTION L208-R224
SYNC & SND. AMP. PLATE
VERTICAL RATE 50V P-P



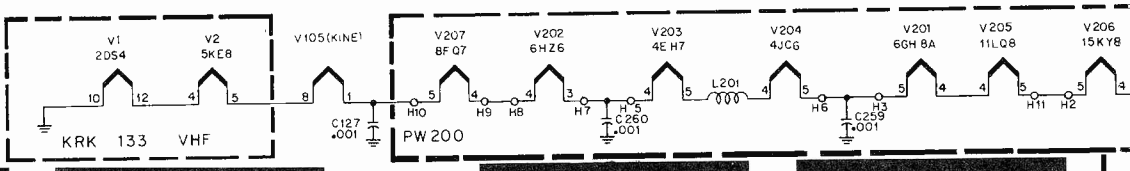
(6) PW200-Z
VIDEO OUTPUT PLATE
HORIZONTAL RATE 120V P-P

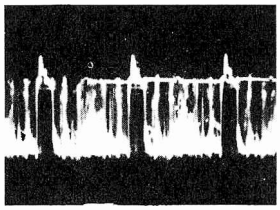


(7) PW200-AN
AGC TRANSISTOR COLLECTOR
HORIZONTAL RATE 55V P-P

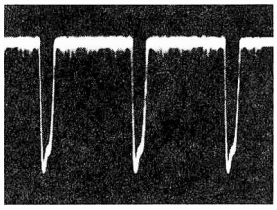


(8) TP-5 PW200
SYNC AMPLIFIER PLATE
HORIZONTAL RATE 40V P-P

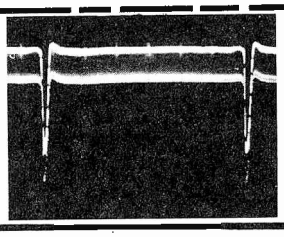




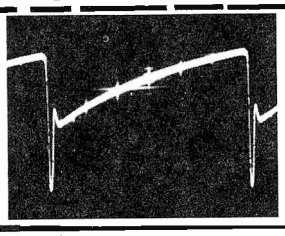
(11) PW200-AT
AGC TRANSISTOR BASE
HORIZONTAL RATE 1.5V P-P



(12) V105 PIN 2
HORIZONTAL BLANKING
HORIZONTAL RATE 40V P-P



(13) V105 PIN 2
VERTICAL BLANKING
VERTICAL RATE 150V P-P

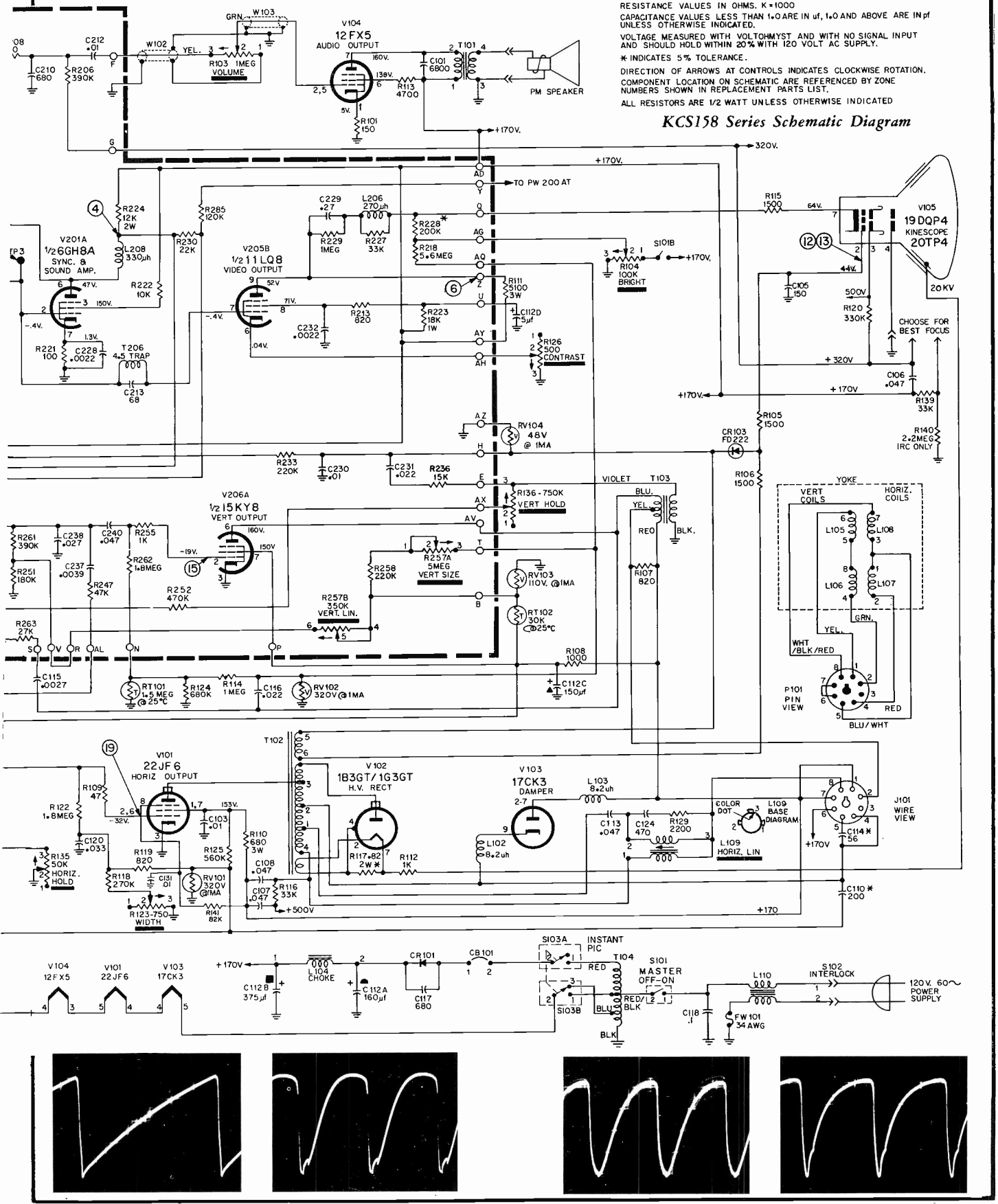


(14) V206B PIN 9
VERTICAL OSC. GRID
VERTICAL RATE 150V P-P

RCA Victor Chassis KCS-158 Series Schematic Diagram, Continued

RESISTANCE VALUES IN OHMS. K=1000
CAPACITANCE VALUES LESS THAN 1.0 ARE IN uf, 1.0 AND ABOVE ARE IN pf UNLESS OTHERWISE INDICATED.
VOLTAGE MEASURED WITH VOLTOHMYST AND WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN 20% WITH 120 VOLT AC SUPPLY.
* INDICATES 5% TOLERANCE.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
COMPONENT LOCATION ON SCHEMATIC ARE REFERENCED BY ZONE NUMBERS SHOWN IN REPLACEMENT PARTS LIST.
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE INDICATED

KCS158 Series Schematic Diagram



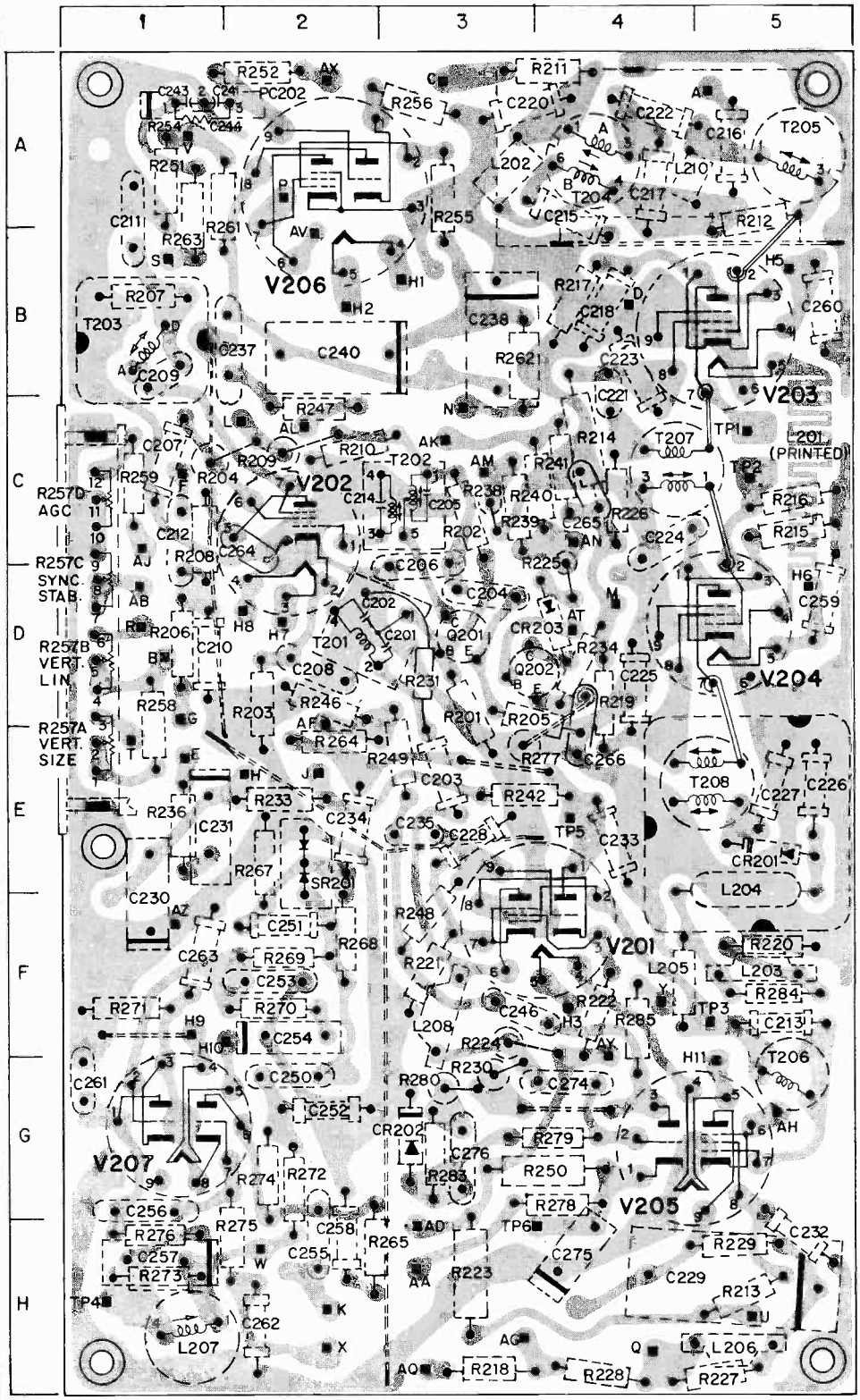
(15) V206A PIN2
VERTICAL OUTPUT GRID
VERTICAL RATE 28V P-P

(16) SR201
CATHODE JUNCTION
HORIZONTAL RATE 12V P-P

(18) SR201
HORIZONTAL AFC ANODE
HORIZONTAL RATE 15V P-P

(19) V101 PINS 2-6
HORIZONTAL OUTPUT GRID
HORIZONTAL RATE 100V P-P

PW200 CIRCUIT ASSEMBLY, PHANTOM VIEW (Continued)



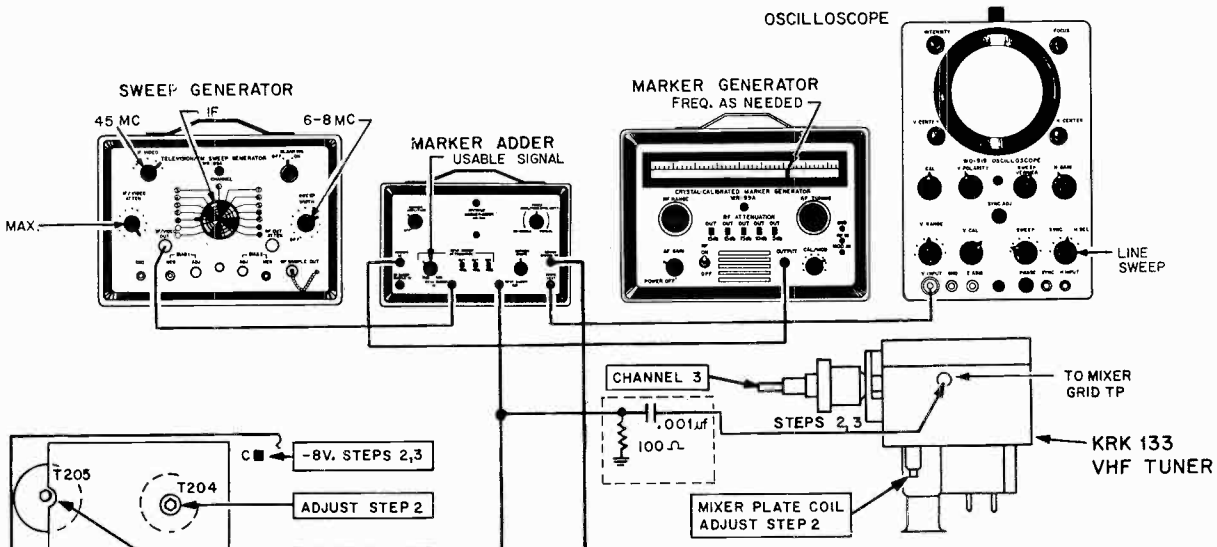
COMPONENT LOCATION GUIDE

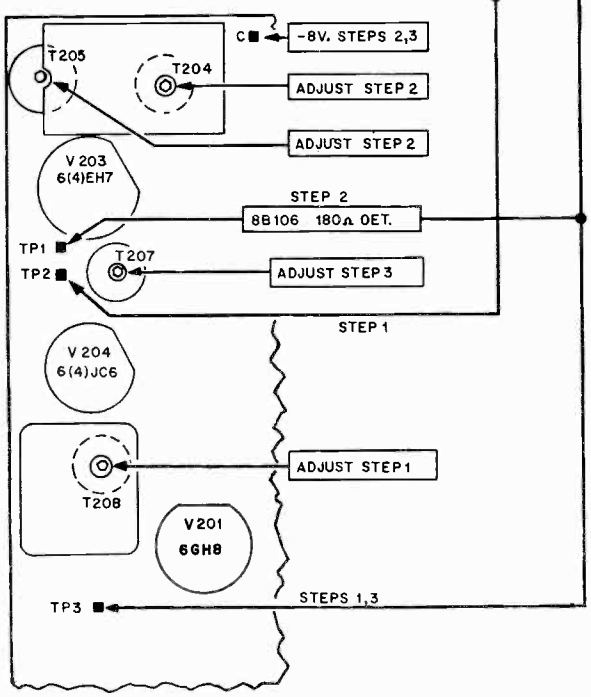
C201	3D
C202	3D
C203	3E
C204	3D
C205	3C
C206	3D
C207	1C
C208	2D
C209	1B
C210	1D
C211	1A
C212	1C
C213	5F
C214	3C
C215	4A
C216	5A
C217	4A
C218	4B
C220	3A
C221	4C
C222	4A
C223	4B
C224	4C
C225	4D
C226	5E
C227	5E
C228	3E
C229	5H
C230	1F
C231	7E
C232	5H
C233	4E
C234	2E
C235	3E
C237	2B
C238	3B
C240	2B
C241	1A
C243	1A
C244	1A
C246	3F
C250	2E
C251	2F
C252	2G
C253	2F
C254	2F
C255	2H
C256	1G
C257	1H
C258	2H
C259	5D
C260	5B
C261	1G
C262	2H
C263	1F
C264	2C
C265	4C
C266	4E
C274	4G
C275	4H
C276	3G
CR201	5E
CR202	3G
CR203	4D
L201	5C
L202	3A
L203	5F
L204	5F
L205	4F
L206	5H
L207	1H
L208	3F
L210	4A
PC202	1A
Q201	3D
Q202	3D
SR201	2E
R201	3D
R202	3C
R203	2D
R204	1C
R205	3D
R206	1D
R207	1B
R208	1C
R209	2C
R210	2C
R211	4A
R212	5A
R213	5H
R214	4C
R215	5C
R216	5C
R217	4B
R218	3H
R219	4D
R220	5F
R221	3F
R222	4F
R223	H
R224	3F
R225	4D
R226	4C
R227	5H
R228	4H
R229	5H
R230	3G
R231	3D
R233	2E
R234	4D
R236	1E
R238	3C
R239	3C
R240	4C
R241	4C
R242	3E
R246	2D
R247	2C
R248	3F
R249	3E
R250	4G
R251	1A
R252	2A
R254	1A
R255	3A
R256	3A
R257A	1E
R257B	1D
R257C	1D
R257D	1C
R258	1D
R259	1C
R261	2A
R262	3B
R263	1A
R264	2E
R265	2H
R267	2E
R268	2F
R269	2F
R270	2F
R271	1F
R272	2G
R273	1H
R274	2G
R275	2H
R276	1H
R277	3E
R278	4G
R279	4G
R280	3G
R283	3G
R284	5F
R285	4F
T201	2D
T202	3C
T203	1B
T204	4A
T205	5A
T206	5G
T207	4C
T208	5E

Terminal Guide

A	5A
AA	3H
AB	1D
AD	3H
AF	2D
AG	3H
AH	5E
AJ	1C
AK	3C
AL	2C
AM	3C
AN	4C
AQ	3H
AT	4D
AV	2B
AX	2A
AY	4F
AZ	1F
B	1D
C	3A
D	4B
E	1E
F	1C
G	1D
H	2E
H2	2B
H6	5D
H8	2D
H10	2F
H11	5E
J	2E
K	2H
L	2C
M	4D
N	3C
P	2A
Q	4H
R	1D
S	1B
T	1E
U	5H
V	1A
W	2H
X	2H
Y	4F
Z	4H
TP1	5C
TP2	5C
TP3	5F
TP4	1H
TP5	4E
TP6	3H

PICTURE IF ALIGNMENT—KCS158, KCS159, KCS163, KCS164 CHASSIS





PW200 PARTIAL VIEW
COMPONENT SIDE

STEP 1. Align Double Tuned Circuit.

Connect equipment as shown in illustration for Step 1—
IF/VF SWEEP OUT cable to TP-2 of PW200 (V204-2);
DEMOD SIGNAL IN cable to TP-3 of PW200 (2nd Detector).

Set scope for 5V P-P and adjust T208 for maximum gain with Curve Shape "A". Use SWEEP ATTENUATION of Marker Adder to maintain 5V P-P deflection of trace.

STEP 2. Align Mixer Plate Circuit.

Set Channel Selector to Channel 3.

Connect equipment as shown in illustration for Step 2—
IF/VF SWEEP OUT cable through Matching Pad to Mixer Grid T-P.

Connect 8B106 (180 Ω detector) cable assembly from DEMOD SIGNAL IN terminal of Marker Adder to TP-1 of PW200.

Connect —8V bias from terminal C of PW200 to ground.

Adjust SWEEP ATTENUATION of Marker Adder for .3V P-P output.

Adjust T204 bottom for minimum output at 47.25 Mc; adjust T204 top for minimum output at 39.75 Mc. See waveform "B" below.

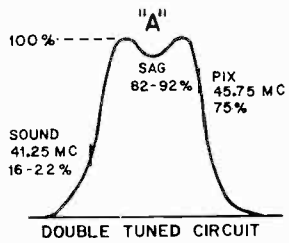
Adjust Mixer Plate Coil and T205 for maximum gain and proper response shape "B".

STEP 3. Overall IF Alignment.

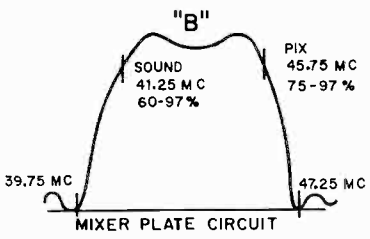
Connect equipment as shown in illustration for Step 3—
IF/VF SWEEP OUT cable through Matching Pad to KRK133 Mixer Grid T-P.
Remove 8B106 Cable Assembly (180 Ω det.) and connect DEMOD SIGNAL IN cable to TP-3 of PW200.
Retain —8V bias at PW200-C.

Calibrate scope for 5V P-P and adjust SWEEP ATTENUATION on Marker Adder to maintain full scale deviation of trace.

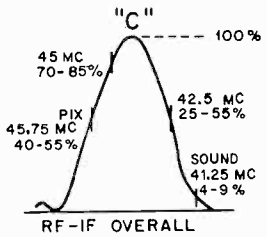
Adjust T207 if necessary to give response similar to "C" below.



DOUBLE TUNED CIRCUIT



MIXER PLATE CIRCUIT



RF-IF OVERALL

SOUND ALIGNMENT—KCS158, KCS159 CHASSIS

SOUND IF, SOUND DETECTOR, AND 4.5 MC. TRAP

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY.....Apply —10 volts to the I F AGC bus at PW200 terminal "C".

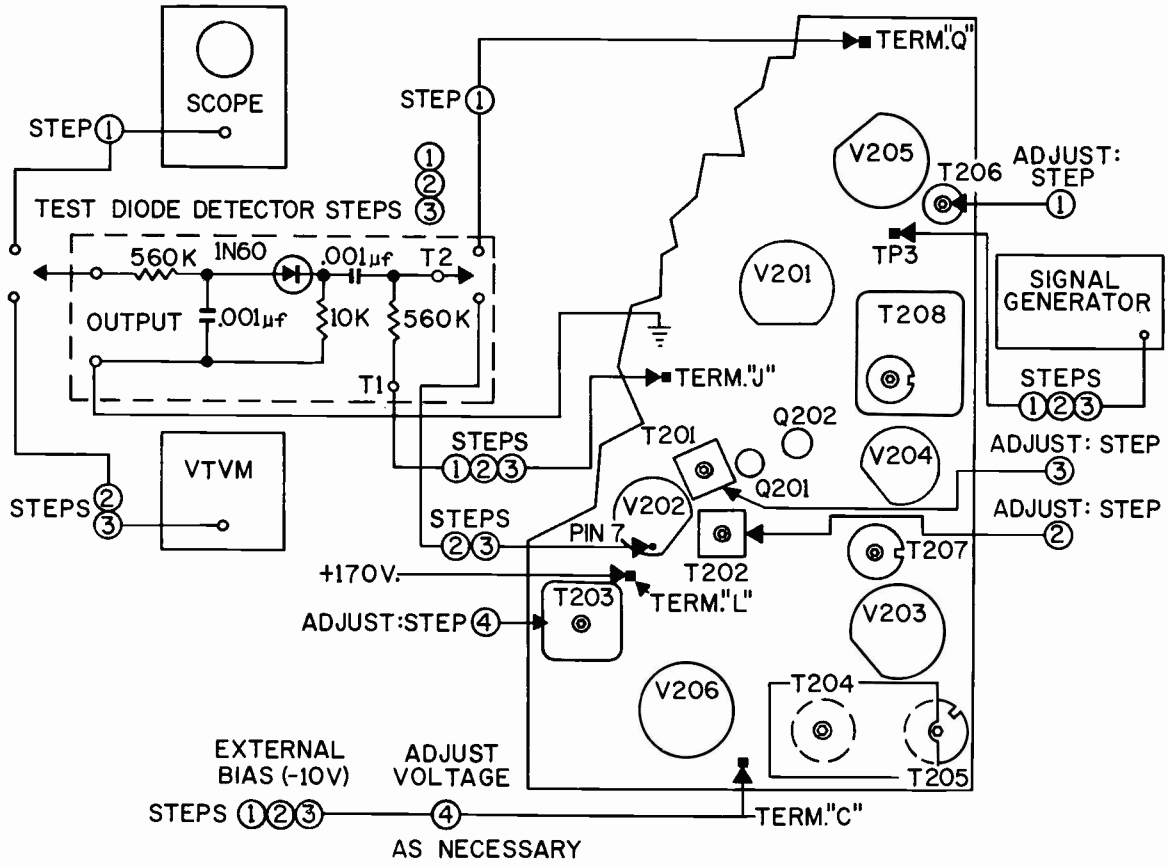
OSCILLOSCOPE.....Through test diode detector as shown to PW200 terminal "Q" and PW 200 terminal "L".

SIGNAL GENERATOR.....To TP3 on PW200.

VTVM.....Through test diode detector as shown to PW200 terminal "L" or "J" (B+) and V202 pin 7.

GENERAL.....Set contrast control to maximum clockwise.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
1	Adjust 4.5 mc. trap	4.5 mc. 600 cycle. AM mod.	T203	Adjust for minimum 600 cps. indication on oscilloscope.
2	Adjust driver coil	4.5 mc.	T202A & B	Adjust for maximum negative DC on meter. Set generator for 0.5 to 1.0 volts when peaked. T202A core should penetrate the coil from top of can and T202B should penetrate coil from board side when finally peaked.
3	Adjust sound take-off coil	4.5 mc.	T201	
	NOTE: DO NOT READJUST T202B (BOTTOM) AFTER TRANSFORMER PEAKED IN STEPS 2 & 3.			
	Disconnect bias and the diode test detector. Turn off signal generator and tune in strongest signal in area (use test pattern if available), adjusting volume control for normal volume (approxi. ¼ turn C.C.W.). Turn core of T203 flush with top of coil form. Reapply bias and adjust until hiss can be heard in sound.			
4	Adjust quadrature coil	Not Used	T206	Turn core clockwise to 2nd peak, adjusting for maximum volume and least hiss in sound. If necessary, retouch T201 & T202A top cores only.



RCA VICTOR

Chassis KCS-159H used in Models AJ-115W; Chassis KCS-159P used in Models BJ-247M, W; and Chassis KCS-159N used in Models CJ-335W, CJ-343M, W, CJ-351L; service material pages 111-114, alignment 109-110.

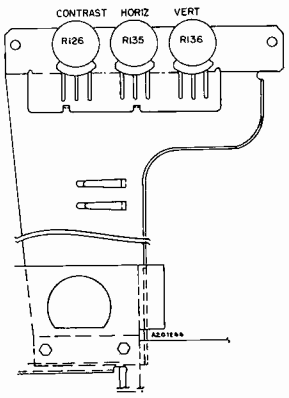
GENERAL DESCRIPTION

The B & W Television receivers covered in this supplement are table model and console instruments using the KCS159 Chassis Series. The major differences between the KCS159P and N used with these models and the KCS159H covered in the basic data are the physical location of the horizontal hold, vertical hold, and contrast controls and the type of picture tube used. In all the above models, the three controls are mounted on a bracket attached to the right front apron of the chassis (see illustration) so as to be accessible to the customer at the lower right side of the cabinet front.

The 23HFP4A picture tube used with these instruments is of Pan-O-Ply type construction which requires no additional safety glass. The picture tube may be cleaned simply by wiping the face plate with a soft cloth and glass cleaner without any need for instrument disassembly.

These instruments are equipped with concentric pre-set VHF fine tuning and lighted VHF/UHF channel indicator windows. The table model receiver, BJ-247, is equipped with a built-in VHF dipole antenna and an adjustable ring UHF antenna. If an external antenna is used, disconnect the built-in antenna leads and bend them away from the antenna terminal board to prevent possible picture flashing or "ghosting."

FRONT CONTROL BRACKET



Front Control Bracket

WIDTH

The width adjustment is made with R123. With normal line voltage, the raster should overscan the mask about 5/8 inch on each side. At 108 VAC line, raster should just fill the screen.

HORIZONTAL SINE WAVE ADJUSTMENT

Remove the sync by placing a short clip lead between the plate of the sync output tube, V201-B (TP-5, PW200 Zone 2D) and ground. **Do not leave the clip lead attached for extended periods since there is a small positive potential (about +45V.) on TP-5.** Short the sine wave coil, L207, by attaching an additional clip lead from TP-4 (PW200, Zone 5A) to PW200 terminal "W" (PW200, Zone 4A).

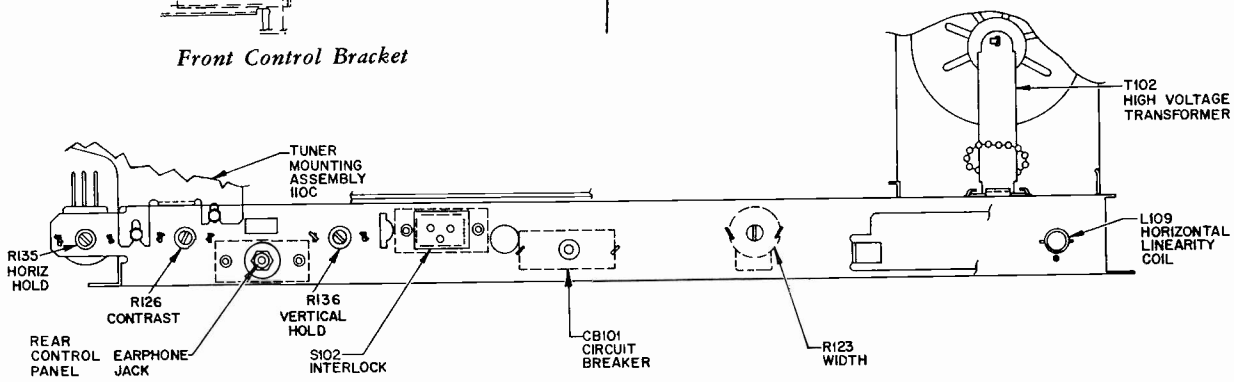
Adjust the horizontal hold control, R135, so that the free-running frequency is 15.75kc (picture sides vertical). Remove the clip lead from TP-4 and terminal "W" and adjust the sine wave coil, L207, until the picture sides are again vertical (15.75kc). Remove the short from TP-5 to ground.

In the counter-clockwise direction of the horizontal hold control, pull-in from the out-of-sync condition should be a minimum of one bar and a maximum of three bars. In the clockwise direction, it should pull in from one to eight bars. There should be no loss of raster on either extreme of control rotation.

AGC AND SYNC STABILIZER

Turn the Sync Stabilizer Control (R257C) completely counterclockwise and adjust the AGC (R257D) while tuned to a strong, local station. Turn the AGC control clockwise until picture begins to distort, and then counterclockwise slightly below the point where the distortion is eliminated. Quickly switch off channel and back. If the picture distorts and bends or does not reappear immediately, rotate the AGC control counterclockwise. Recheck by switching off channel and back again. Advance the sync stabilizer control fully clockwise and rotate the horizontal hold control (R135) counterclockwise until horizontal sync is lost. Then slowly sync the picture again. If the picture hangs up, or bends before locking in, retard the sync stabilizer control until this symptom is eliminated.

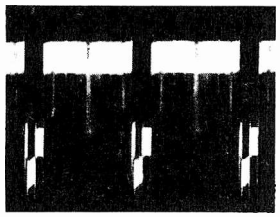
Note: Adjust AGC before sync stabilizer.



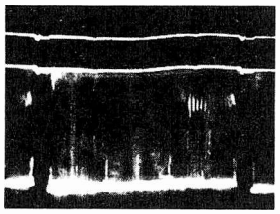
Service Control Location, Chassis Rear Apron

RCA Victor Chassis KCS-159 Series Schematic Diagram

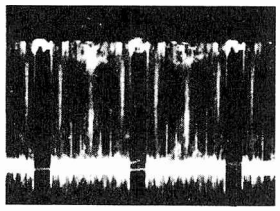
VOLTAGE WAVEFORMS



(2) TP-3 PW200
2ND DETECTOR
HORIZONTAL RATE 3V P-P

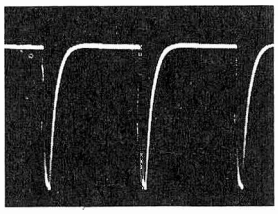


(4) JUNCTION L208-R224
SYNC & SND AMP. PLATE
VERTICAL RATE 50V P-P

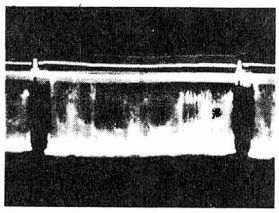


(6) PW200-Z
VIDEO OUTPUT PLATE
HORIZONTAL RATE 120V P-P

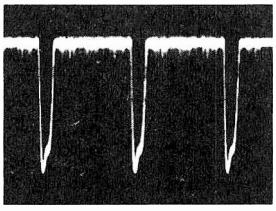
(7) PW200-AN
AGC TRANSISTOR COLLECTOR
HORIZONTAL RATE 55V P-P



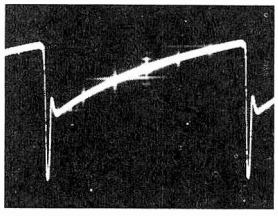
(8) TP-5 PW200
SYNC AMPLIFIER PLATE
HORIZONTAL RATE 40V P-P



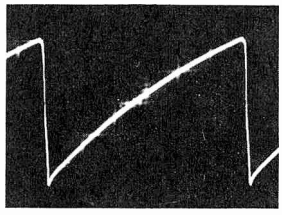
(10) PW200-AT
AGC TRANSISTOR BASE
VERTICAL RATE 1.5V P-P



(12) V105 PIN 2
HORIZONTAL BLANKING
HORIZONTAL RATE 40V P-P



(14) V206B PIN 9
VERTICAL OSC. GRID
VERTICAL RATE 150V P-P



(15) V206A PIN2
VERTICAL OUTPUT GRID
VERTICAL RATE 28V P-P

RCA Victor Chassis KCS-159 Series Schematic Diagram, Continued

RESISTANCE VALUES IN OHMS, K=1000

CAPACITANCE VALUES LESS THAN 1.0 ARE IN uf, 1.0 AND ABOVE ARE IN pf UNLESS OTHERWISE INDICATED.

VOLTAGE MEASURED WITH VOLTOHMYST AND WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN 20% WITH 120 VOLT AC SUPPLY.

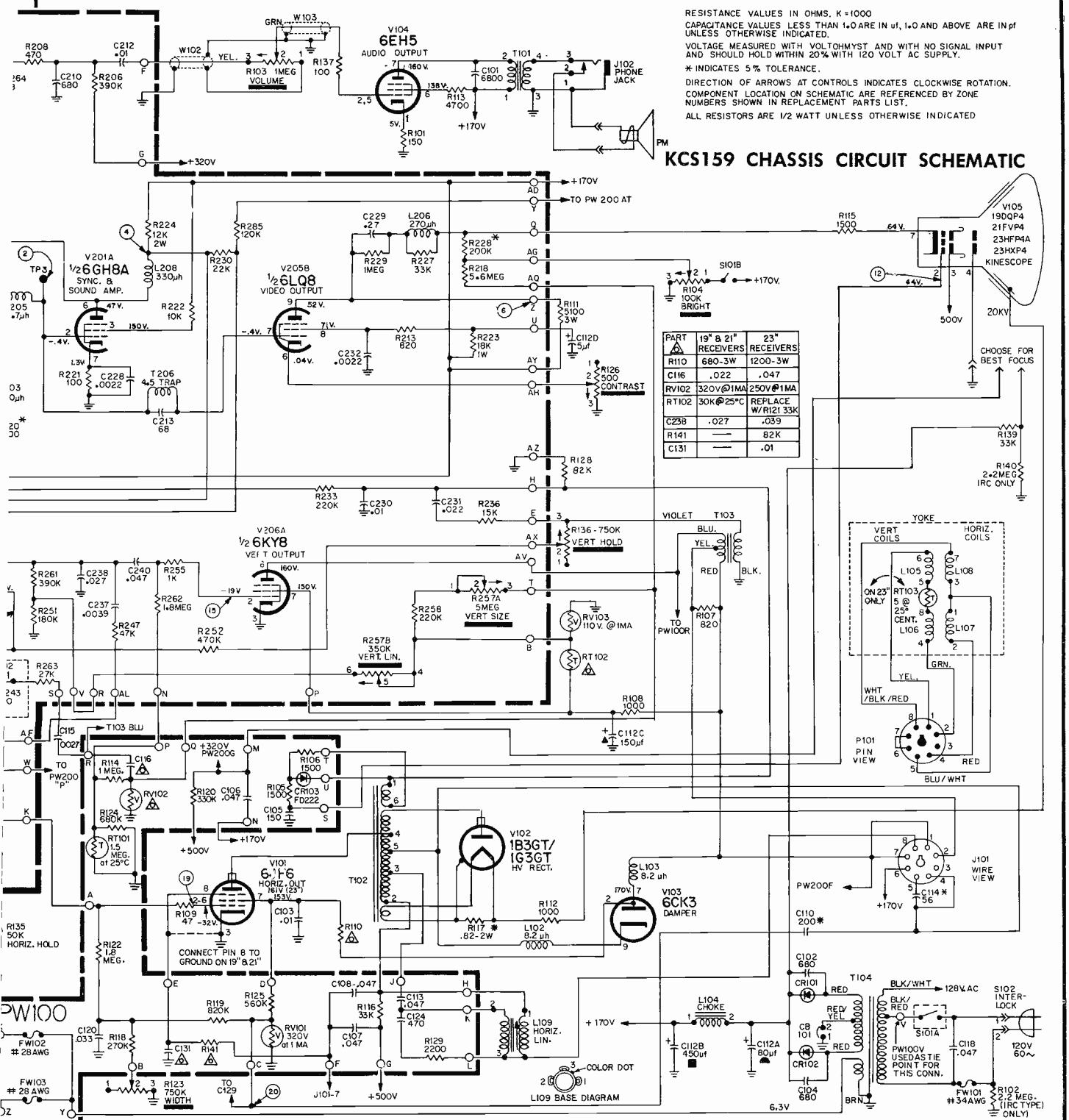
* INDICATES 5% TOLERANCE.

DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.

COMPONENT LOCATION ON SCHEMATIC ARE REFERENCED BY ZONE NUMBERS SHOWN IN REPLACEMENT PARTS LIST.

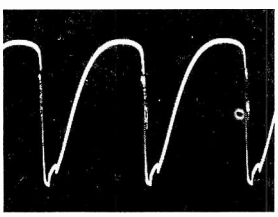
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE INDICATED

KCS159 CHASSIS CIRCUIT SCHEMATIC

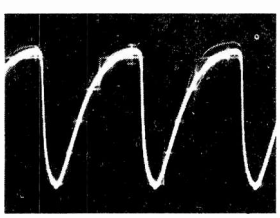


PART	19" & 21" RECEIVERS	23" RECEIVERS
R110	680-3W	1200-3W
C116	.022	.047
RV102	320V@1MA	250V@1MA
RT102	30K@25°C	REPLACE W/R121 33K
C238	.027	.039
R141	—	82K
C131	—	.01

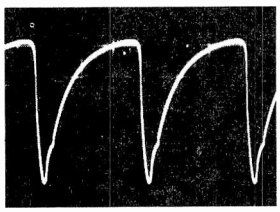
KCS159 Series Schematic Diagram



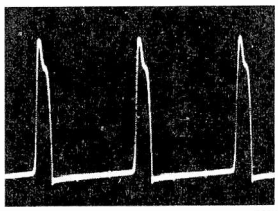
(16) SR201 CATHODE JUNCTION HORIZONTAL RATE 12V P-P



(18) SR201 HORIZONTAL AFC ANODE HORIZONTAL RATE 15V P-P

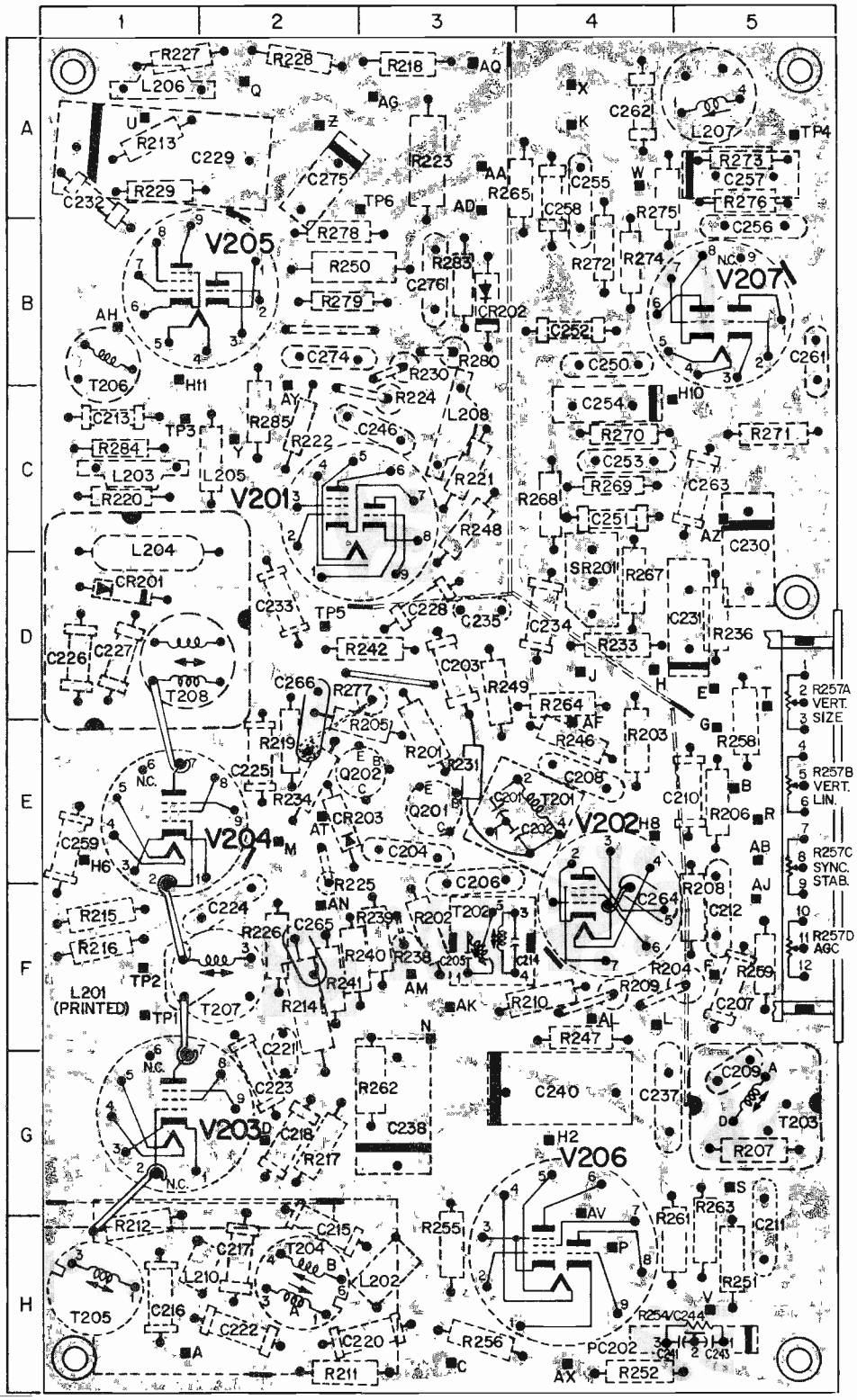


(19) V101 PINS 2-6 HORIZONTAL OUTPUT GRID HORIZONTAL RATE 100V P-P



(20) C110 AND C129 JUNCTION HORIZONTAL REFERENCE SIGNAL HORIZONTAL RATE 700V P-P

RCA Victor KCS-159, **PW200 CIRCUIT ASSEMBLY, PHANTOM VIEW** (Continued)



PW200 Circuit Board Assembly

PW200 COMPONENT LOCATION

C201	3E
C202	3E
C203	3D
C204	3E
C205	3F
C206	3E
C207	5F
C208	4E
C209	5G
C210	5E
C211	5H
C212	5F
C213	1C
C214	3F
C215	2H
C216	1H
C217	2H
C218	2G
C220	3H
C221	2F
C222	2H
C223	2G
C224	2F
C225	2E
C226	1D
C227	1D
C228	3D
C229	1A
C230	5C
C231	5D
C232	1A
C233	2D
C234	4D
C235	3D
C237	4G
C238	3G
C240	4G
C241	5H
C243	5H
C244	5H
C246	3C
C250	4B
C251	4C
C252	4B
C253	4C
C254	4C
C256	5B
C257	5A
C258	4A
C259	1E
C261	5B
C262	4A
C263	5C
C264	4F
C265	2F
C266	2D
C274	2B
C275	2A
C276	3B
CR201	1D
CR202	3B
CR203	2E
L201	1F
L202	3H
L203	1C
L204	1C
L205	2C
L206	1A
L207	5A
L208	3C
L210	2H
PC202	5H
Q201	3E
Q202	3E
R201	3E
R202	3F
R203	4E
R204	5F
R205	3E
R206	5E
R207	5G
R208	5F
R209	4F
R210	4F
R211	2H
R212	1H
R213	1A
R214	2F
R215	1F
R216	1F
R217	2G
R218	3A
R219	2E
R220	1C
R221	3C
R222	2C
R223	3A
R224	3C
R225	2E
R226	2F
R227	1A
R228	2A
R229	1A
R230	3B
R231	3E
R233	4D
R234	2E
R236	5D
R238	3F
R239	3F
R240	2F
R241	2F
R242	3D
R246	4E
R247	4F
R248	3C
R249	3D
R250	2B
R251	5H
R252	4H
R254	5H
R255	3H
R256	3H
R257A	5D
R257B	5E
R257C	5E
R257D	5F
R258	5E
R259	5F
R261	4H
R262	3G
R263	5H
R264	4D
R265	4A
R267	4D
R268	4C
R269	4C
R270	4C
R271	5C
R272	4B
R273	5A
R274	4B
R275	4A
R276	5A
R277	3D
R278	2B
R279	2B
R280	3B
R283	3B
R284	1C
R285	2C
SR201	4D
T201	4E
T202	3F
T203	5G
T204A	2H
T204B	2H
T205	1H
T206	1B
T207	2F
T208	1D

Terminal Guide

A	1H
AA	3A
AB	5E
AD	3A
AF	4E
AG	3A
AH	1B
AJ	5F
AK	3F
AL	4F
AM	3F
AN	2F
AQ	3A
AT	2E
AV	4G
AX	4H
AY	2C
AZ	5C
B	5E
C	3H
D	2G
E	5D
F	5F
G	5E
H	4D
H2	4G
H6	1E
H8	4E
H10	4C
H11	1B
J	4D
K	4A
L	4F
M	2E
N	3F
P	4H
Q	2A
R	5E
S	5G
T	5D
U	1A
V	5H
W	4A
X	4A
Y	2C
Z	2A
TP1	1F
TP2	1F
TP3	1C
TP4	5A
TP5	2D
TP6	3A

SEARS, ROEBUCK AND CO.

Silvertone

TELEVISION CHASSIS NO. 456. 528. 529. } 70342

MODELS

7151 7155 7158
7152 7156
7154 7157

DEFLECTION YOKE AND CENTERING RING ADJUSTMENT – Follow this procedure in adjusting the Deflection Yoke and Centering Rings.

1. Turn the receiver on and disconnect the antenna.
2. The deflection yoke is held on the neck of the picture tube by a clamp device. Loosen the clamp, by unscrewing the screw on the clamp, and carefully move the yoke as far forward as possible on the neck of the picture tube. Rotate the yoke until the top and bottom edges of the raster are squared with the chassis. Tighten the screw.

NOTE: A Width Device is located between the Deflection Yoke and the neck of the picture tube. This must be adjusted before the Yoke clamp is tightened.

3. Center the raster horizontally and vertically, and eliminate shaded corners by simultaneously, but independently, rotating the centering rings until the best effect is obtained.
4. Turn the brightness control to the point giving normal picture brilliance. Maintain brightness at this level during the following adjustments. Center the contrast control.

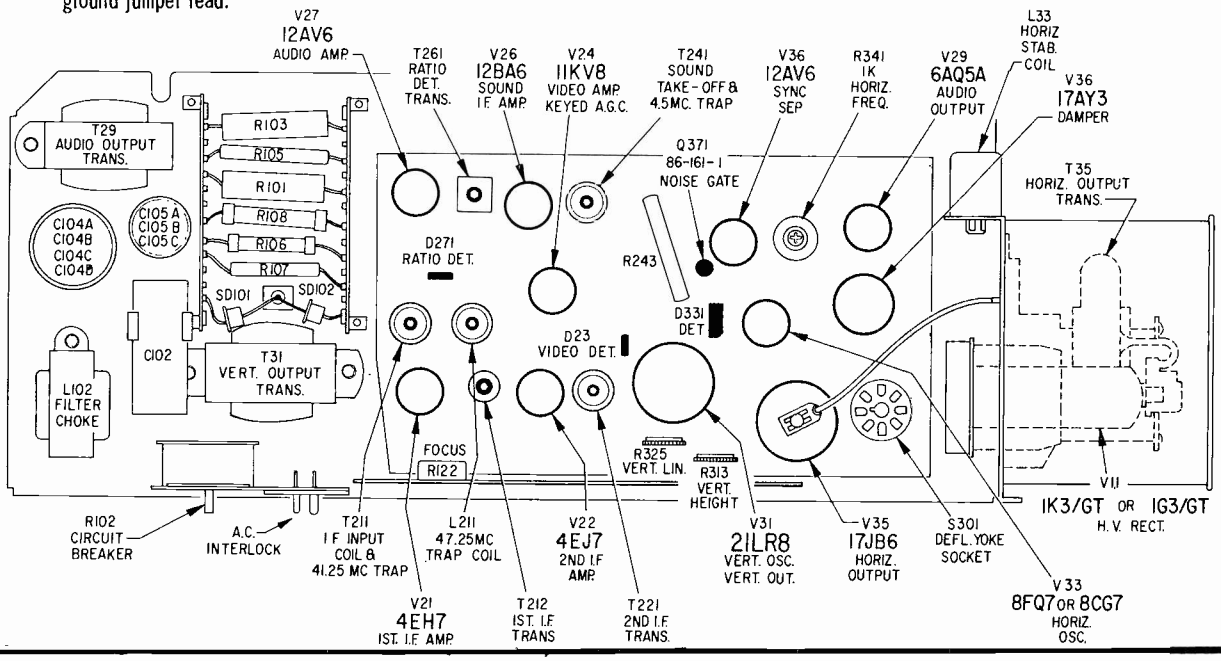
WIDTH DEVICE ADJUSTMENT – The Width Device is a piece of metallic foil attached to a sheet of plastic; it forms a half circle around the top half of the picture tube neck. (During all adjustments, the Width Device must remain centered on the top half of the picture tube neck.) Be sure that the Width Device is pulled as far toward the base of the picture as possible. The Width Device should be left in this position unless further adjustment is necessary. For further adjustment, follow steps given below:

1. Loosen the screw on clamp which secures the Deflection Yoke to the picture tube.
2. During the following adjustment hold the Deflection Yoke in position and do not disturb the relative position between the Deflection Yoke and the picture tube. Slide the Width Device forward or backward until the picture has proper width. The plastic corners can be bent to ease moving.

NOTE: The Width Device may affect the vertical sweep, in which case, the Vertical Height and Vertical Linearity controls may have to be readjusted when the width adjustment has been completed.

HORIZONTAL FREQUENCY AND HORIZONTAL STABILIZER CONTROL ADJUSTMENT (Field & Shop)

1. Tune set to an active channel and center the Horizontal Hold Control.
2. Short L33 (Horizontal Stabilizer Coil) by connecting a jumper across J341 and J342, also short J331 to ground with a jumper lead.
3. Turn variable cathode resistor (R341) completely counter-clockwise.
4. Advance R341 SLOWLY clockwise until picture just locks in.
5. Remove jumper from Horizontal Stabilizer Coil.
6. Lock in picture by adjusting the Horizontal Stabilizer Coil, which in effect is the Horizontal Hold Control, finally, remove J331 ground jumper lead.



SEARS Chassis 456.70342 (etc.) Alignment Information

PRELIMINARY

Alignment is an exacting procedure and should be undertaken only when necessary. The following equipment is required for alignment work.

1. Hickok 610, 610A Signal Generator or equivalent where a 4.5 Mc Cyrstal controlled frequency (CW) is available.
   The following I.F. Carriers are necessary.
   - 4.5 Mc Intercarrier Sound IF
   - 41.25 Mc Video IF Sound Carrier Frequency
   - 42.55 Mc Video IF Bandwidth Marker
   - 44.15 Mc Video IF Center Frequency
   - 45.75 Mc Video IF Picture Carrier Frequency
   - 47.25 Mc Marker
2. Electronic voltmeter (VTM)
3. RF Sweep generator with a frequency range of 40 to 50 Mc with a sweep width of at least 10 Mc, having an adjustable output of at least 0.1 volts.
4. Cathode ray oscilloscope, preferably with a wide band vertical amplifier and an input calibrating source.
5. Isolation transformer.

PRELIMINARY ALIGNMENT NOTES:

a. It is recommended that the receiver be connected to an isolation transformer during alignment. Allow at least 5 minutes for set to warm up before any alignment is attempted.
b. Connect oscilloscope hot lead through 10K ohm isolation resistor to Point Ⓒ Connect ground lead of oscilloscope directly to main chassis.
   (Adjust signal input to maintain 2 volts peak to peak)
c. Apply -6 volts bias to AGC IF line, -side to Point Ⓑ +side to chassis.
d. Connect correct signal generator as shown in chart below.
e. Clip hot lead of marker generator to the insulation of RF sweep generator hot lead. Connect ground lead to chassis.

NOTE: Before hooking up to Point "C" (IF INJ) rotate tuner to channel 13.

VIDEO I.F. ALIGNMENT

Step	Sweep Generator (40-50 MC) Connect To	Marker Generator See Note Above	Output Waveform	Adjust	Remarks
1.	Pin 2 of 4EH7 (V21) thru .001 mfd. Cap.	44.15 MC	Figure 1	T221	Adjust T221 for maximum response at 44.15 Mc.
2.	Same	Same	Same	T212 (Top)	Turn bottom core of T212 to bottom of coil form before adjusting T212 top. Adjust T212 top for maximum response at 44.15 Mc.
3.	Same	45.75 MC	Same	T212 (Bottom)	Adjust T212 (Bottom) for symmetry of response shown in Figure 1.
4.	Same	45.75 MC	Same	T212 (Top)	Readjust T212 top to position the 45.75 Mc Marker at the 3db point of the response curve.
5.	If necessary, repeat steps 1 through 4 to obtain proper response. NOTE: If proper 3.2 MC Bandwidth is not obtained. (3.2 Mc ± .2 Mc), refer to Bandwidth Loop Adjustment.				
6.	Point "C" (IF INJ.) See Fig. 3	41.25 MC	Figure 2	T211 (Top)	Adjust T211 top for minimum response at 41.25 Mc.
7.	Same	47.25 MC	Same	L211	Adjust L211 for minimum response at 47.25 Mc.
8.	Same	45.75 MC	Same	L905 Tuner IF Output Coil	Adjust L905 to position the 45.75 Mc marker at the 6 db point of response curve.
9.	Same	42.55 MC	Same	T211 (Bottom)	Adjust T211 (bottom) for symmetry of response in Figure 2.
10.	If necessary, repeat steps 6 through 8 to obtain response curve of Figure 2.				

BANDWIDTH LOOP ADJUSTMENT

The first I.F. transformer has a vertical hairpin loop in the secondary winding. This loop must not be touched unless the bandwidth specifications (3Mc ±.2Mc) are incorrect. Adjust as follows:

1. To narrow the I.F. response curve, pull the loop away from the primary of T212 (top). Repeat Steps 2 through 5 of the Video I.F. Alignment. See Figure 4.
2. To broaden the I.F. response curve, press the loop toward the primary of T212 (top). Repeat Steps 2 through 5 of the Video I.F. Alignment. See Figure 4.

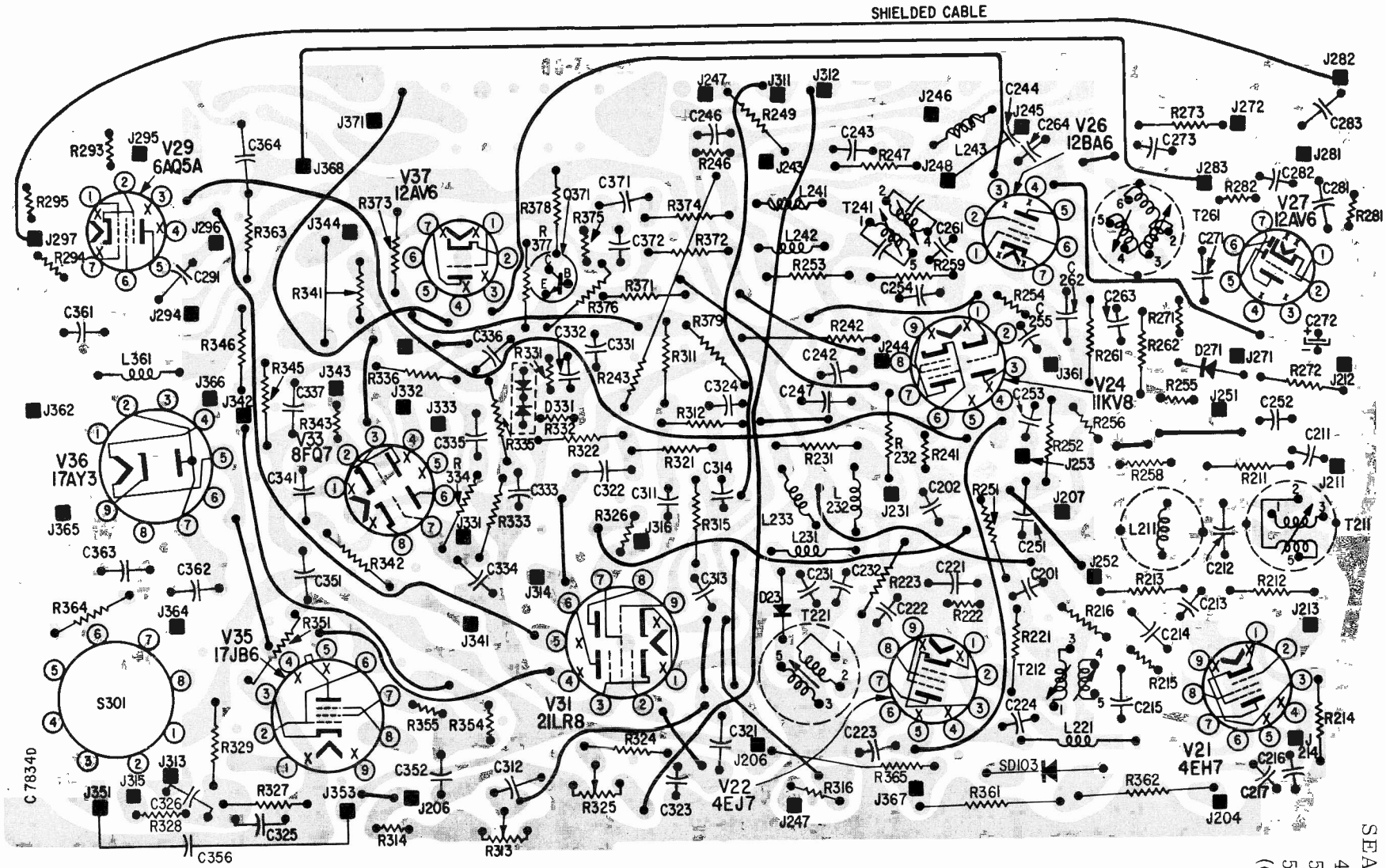
SOUND ALIGNMENT

PRELIMINARY:

A. Apply -9V bias to Point B
B. Set channel selector to unused channel.

Step	Signal Generator Frequency	Connect to	Output Indicator	Connect to	Adjust	Remarks
1.	4.5Mc	J231 (Test Point Ⓒ)	VTVM	Junction of two 100K ohm resistors. See NOTE 1.	T261 top for zero (mid-scale)	Sig. Gen. Output 1v.
2.	4.5Mc	Same	VTVM	Test Point Ⓐ	T261 bottom for max.	Sig. Gen. output less than 10K uv (to avoid limiting)
3.	4.5Mc	Same	VTVM	Same	T241 bottom for max.	Same
4.	4.5Mc	Same	VTVM	Same	T241 top for max.	Same
5.	Remove meter, bias voltage, generator; tune set to station. Set fine tune for best picture and touch-up 4.5Mc reject trap (T241) (Top Core only) for minimum sound beat in picture.					

NOTE 1 – Connect two 100K ohm resistors (Matched Pair) in series between test point Ⓐ and ground. Connect negative lead of VTVM to junction of two resistors and the positive lead to J272. VTVM should be on low range with Zero volts at mid-scale.



NOTES:
1. WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE.
2. SOLID LINES INDICATE WIRE JUMPERS.
3. WIRE JUMPER UNDER V33 TUBE SOCKET BETWEEN PIN NO. 3 & PIN NO. 8, NOT SHOWN.

WIRING DIAGRAM I.F. SYNC SOUND VERTICAL-HORIZONTAL BOARD

SEARS, ROEBUCK
456 70342
528.70342
529.70342
(Continued)

SEARS Chassis 456.70342, 528.70342, 529.70342, Schematic Diagram

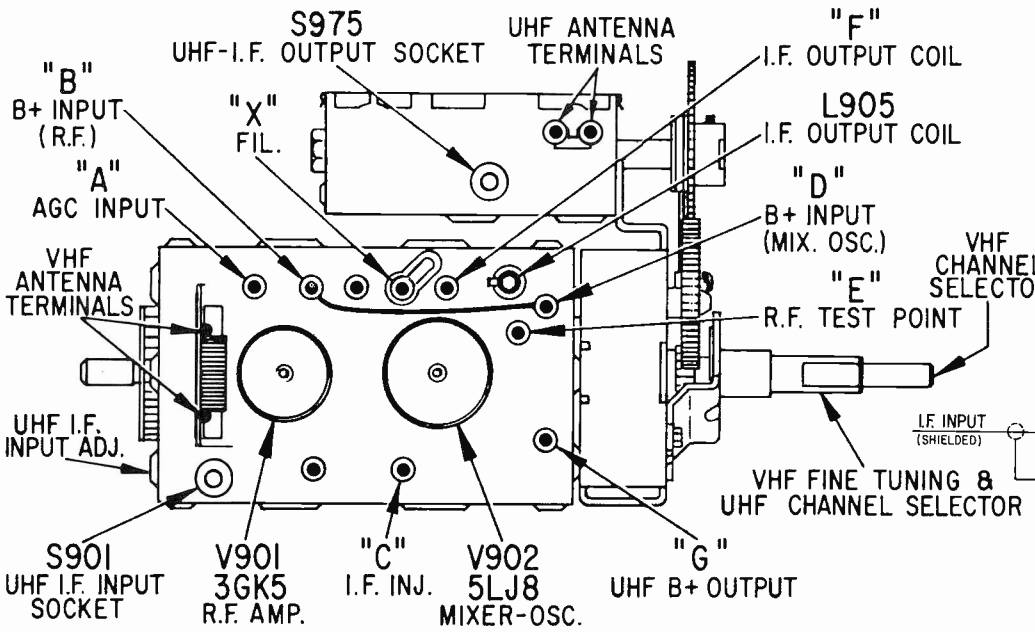


FIGURE 3 – UHF-VHF TUNER VIEW

TELEVISION CHASSIS NOS. 456. 528. 529. } 70342

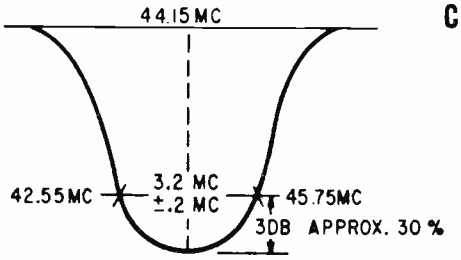


Fig. 1

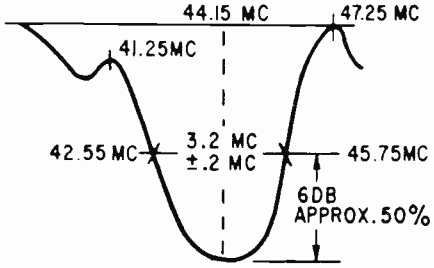


Fig. 2

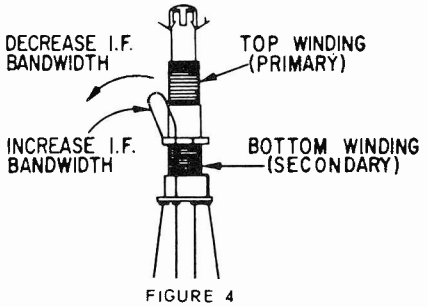
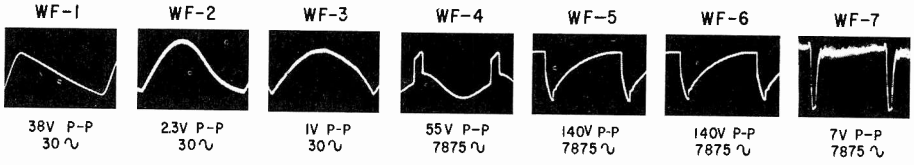
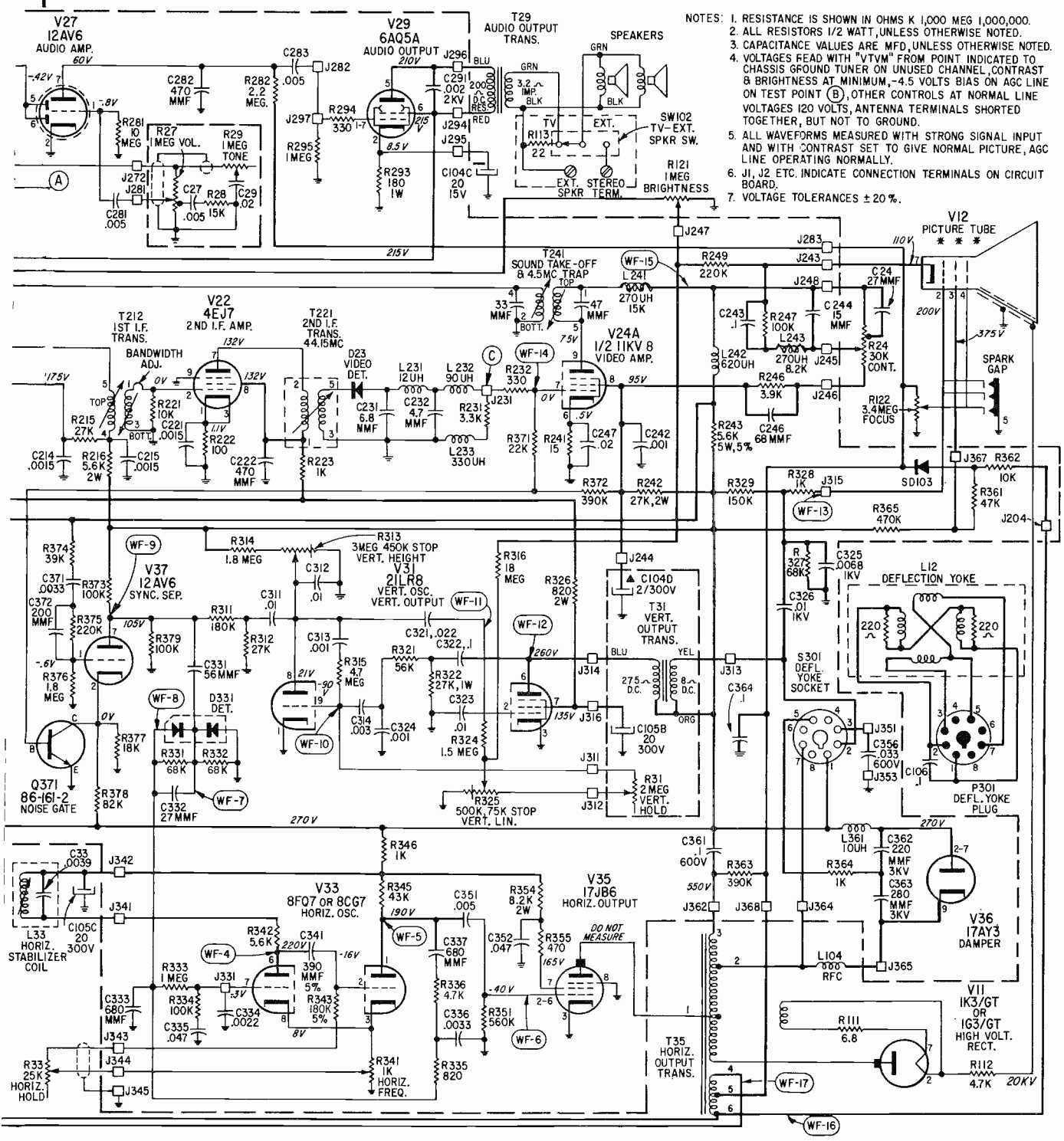


FIGURE 4

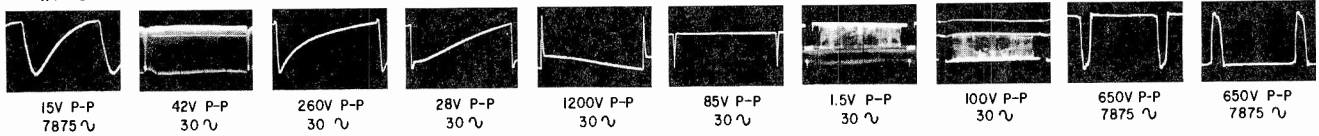


SEARS Chassis 456.70342 (etc.) Schematic Diagram, Continued



NOTES:
1. RESISTANCE IS SHOWN IN OHMS K 1,000 MEG 1,000,000.
2. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE MFD, UNLESS OTHERWISE NOTED.
4. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND TUNER ON UNUSED CHANNEL, CONTRAST & BRIGHTNESS AT MINIMUM, -4.5 VOLTS BIAS ON AGC LINE ON TEST POINT (B), OTHER CONTROLS AT NORMAL LINE VOLTAGES 120 VOLTS, ANTENNA TERMINALS SHORTED TOGETHER, BUT NOT TO GROUND.
5. ALL WAVEFORMS MEASURED WITH STRONG SIGNAL INPUT AND WITH CONTRAST SET TO GIVE NORMAL PICTURE, AGC LINE OPERATING NORMALLY.
6. J1, J2 ETC. INDICATE CONNECTION TERMINALS ON CIRCUIT BOARD.
7. VOLTAGE TOLERANCES ± 20%.

*** Picture Tube 23HFP4 or 23HFP4A



WF-8	WF-9	WF-10	WF-11	WF-12	WF-13	WF-14	WF-15	WF-16	WF-17
15V P-P 7875 ∿	42V P-P 30 ∿	260V P-P 30 ∿	28V P-P 30 ∿	1200V P-P 30 ∿	85V P-P 30 ∿	1.5V P-P 30 ∿	100V P-P 30 ∿	650V P-P 7875 ∿	650V P-P 7875 ∿

SEARS, ROEBUCK AND CO.

Silvertone

CHASSIS NOS. 456., 528., 529. — 70370, 70371

TELEVISION MODELS:

8112	81131	9112	9117
81121	8115	9113	9118
8113	81151	9115	
8116	8117	9116	
81161	81171		

(Service material on pages 120 through 124)

FOCUS ADJUSTMENT
Connect pin No. 4 of CRT to either J53, J90, or J72 for well defined scanning lines.

DEFLECTION YOKE AND CENTERING RINGS ADJUSTMENTS
Follow this procedure to adjust the Deflection Yoke and Centering Rings.
1. Turn the receiver on and disconnect the antenna.
2. The deflection yoke is held on the neck of the picture tube by a clamp device. Loosen the clamp screw and carefully move the yoke as far forward as possible on the neck of the picture tube. Rotate the yoke until the top and bottom edges of the raster are squared with the chassis. Tighten the screw.

NOTE: A Width Device is located between the Deflection Yoke and the neck of the picture tube. This must be adjusted before the Yoke clamp is tightened.

3. Center the raster horizontally and vertically, and eliminate shaded corners by simultaneously, but independently, rotating the centering rings until the best effect is obtained.
4. Turn the brightness control to the point giving normal picture brilliance. Maintain brightness at this level during the following adjustments. Center the contrast control.

WIDTH DEVICE ADJUSTMENT
The Width Device is a piece of metallic foil attached to a sheet of plastic; it should be placed so that the identification notch is centered on top of the picture tube neck. (During all adjustments, the identification notch must remain centered on the top half of the picture tube neck.) Be sure that the Width Device is pulled as far toward the base of the picture tube as possible. The Width Device should be left in this position unless further adjustment is necessary. For further adjustment, follow steps given below:
1. Loosen the screw on clamp which secures the Deflection Yoke to the Picture tube.
2. During the following adjustment hold the Deflection Yoke in position and do not disturb the relative position between the Deflection Yoke and the picture tube. Slide the Width Device forward or backward until the picture has proper width. The plastic corners can be bent to ease moving.

NOTE: The Width Device may affect the vertical sweep, in which case, the Vertical Height and Vertical Linearity controls may have to be readjusted when the width adjustment has been completed.

HORIZONTAL FREQUENCY AND HORIZONTAL STABILIZER CONTROL ADJUSTMENT (Field) Shop
1. Turn set to an active channel.
2. Short L103 (Horizontal Stabilizer Coil) by connecting a jumper across J57 and J58, also short J52 to ground with a jumper lead.
3. Turn variable cathode resistor (R51) completely counter-clockwise.
4. Advance R51 SLOWLY clockwise until picture just locks in.
5. Remove jumper from horizontal stabilizer coil.
6. Lock in picture by adjusting the horizontal stabilizer coil, which in effect is the Horizontal Hold Control, finally, remove J52 ground jumper lead.

TUNER RF OSCILLATOR ADJUSTMENT
If the range of the fine tuning control is not adequate to tune in a clear picture on one or more channels, the respective channel oscillator range slug requires adjustment. This can be done in the following manner:
(1) Set the fine tuning control to the center of its range. The fine tuning control is approximately at the center of its range when the flat portion on the fine tuning shaft is parallel to the top of the tuner.
(2) *Adjust - with a non-metallic blade screwdriver for clearest picture. Extreme care should be taken not to exert undue pressure on the slug.

*If more than one channel requires the above adjustment, the order of channel adjustment is unimportant since each oscillator range adjustment is independent of the other.

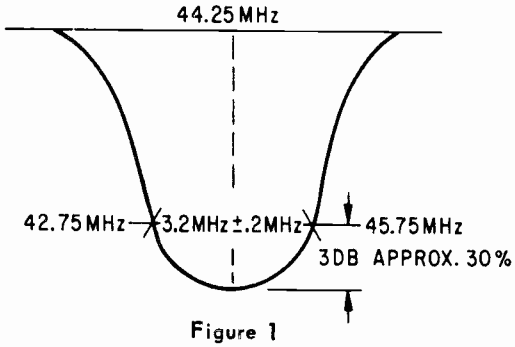


Figure 1

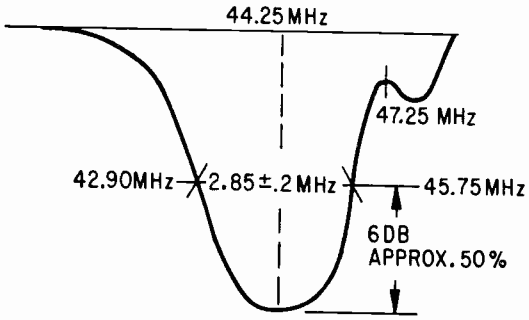


Figure 2

PRELIMINARY

Alignment is an exacting procedure and shiuld be undertaken only when necessary. The following equipment is required for alignment work.

1. Hickok 610, 610A Signal Generator or equivalent where a 4.5 MHz Crystal controlled frequency (CW) is available.
   The following I.F. Carriers are necessary.
   - 4.5 MHz Intercarrier Sound IF
   - 42.75 MHz Video IF Bandwidth Marker
   - 44.25 MHz Video IF Center Frequency
   - 45.75 MHz Video IF Picture Carrier Frequency
   - 47.25 MHz Adjacent Sound Carrier Frequency
2. Electronic voltmeter (VTVM)
3. RF Sweep generator with a frequency range of 40 to 50 MHz with a sweep width of at least 10 MHz, having an adjustable output of at least 0.1 volts.
4. Cathode ray oscilloscope, preferably with a wide band vertical amplifier and an input calibrating source.
5. Isolation transformer.

PRELIMINARY ALIGNMENT NOTES

a. It is recommended that the receiver be connected to an isolation transformer during alignment. Allow at least 5 minutes for set to warm up before any alignment is attempted.
b. Connect oscilloscope hot lead through 10K ohm isolation resistor to Point C. Connect ground lead of oscilloscope directly to main chassis. Adjust signal input to maintain 2 volts peak to peak.
c. Apply -3 volts bias to AGC line, – side to Point B + side to chassis
d. Connect correct signal generator as shown in chart below.
e. Clip hot lead of maker generator to the insulation of RF sweep generator hot lead. Connect ground lead to chassis.

Note: See Chassis View for Adjustment Locations.
Note: Before hooking up to point "C" Figure 3 IF INJ, rotate tuner to Channel 13.

VIDEO I.F. ALIGNMENT

Step	Sweep Generator (40-50 MHz) Connect To	Marker Generator See Note Above	Output Waveform	Adjust	Remarks
1.	Pin 1 4CB6(V4) thru .001 mfd. Cap	44.25 MHz	Figure 1	T4	Adjust T4 for maximum response at 44.25 MHz.
2.	Same	Same	Same	T3 (Top)	Turn bottom core of T3 to bottom of coil form before adjusting T3 top. Adjust T3 top for maximum response at 44.25 MHz.
3.	Same	45.75 MHz 42.75 MHz	Same	T3 (Bottom)	Adjust T3 (Bottom) for symmetry of response shown in Figure 1.
4.	Same	45.75 MHz	Same	T3 (Top)	Readjust T3 top to position the 45.75 MHz marker at the 3db point of the response curve.
5.	If necessary, repeat steps 1 through 4 to obtain proper response. NOTE: If proper 3.2 db bandwidth is not obtained (3.2 MHz ± .2 MHz), refer to Bandwidth Loop Adjustment.				
6.	Point "C" IF Injection See Fig. 3.	47.25 MHz	Figure 2	L4 (Top)	Adjust L4 (top) for minimum response at 47.25 MHz.
7.	Same	45.75 MHz	Same	L905 Tuner IF Output Coil	Adjust L905 to position the 45.75 MHz marker at the 6db point of response curve.
8.	Same	42.90 MHz 45.75 MHz.	Same	L4 (Bottom)	Adjust L4 (bottom) for symmetry of response in Figure 2.
9.	If necessary, repeat steps 6 through 8 to obtain response curve of Figure 2.				

BANDWITH LOOP ADJUSTMENT

The first I.F. transformer has a long vertical lead adjacent to the primary and secondary windings. This wire must not be touched unless the bandwidth specifications (2.85 MHz ±.2MHz) are incorrect. Adjust as follows:

1. To narrow the I.F. response curve, pull the wire away from the 1st I.F. Coil (T3) top. Repeat steps 2 through 5 of the Video I.F. Alignment. See Figure 4.
2. To broaden the I.F. response curve, press the wire toward the 1st I.F. Coil (T3) top. Repeat steps 2 through 5 of the Video I.F. Alignment. See Figure 4.

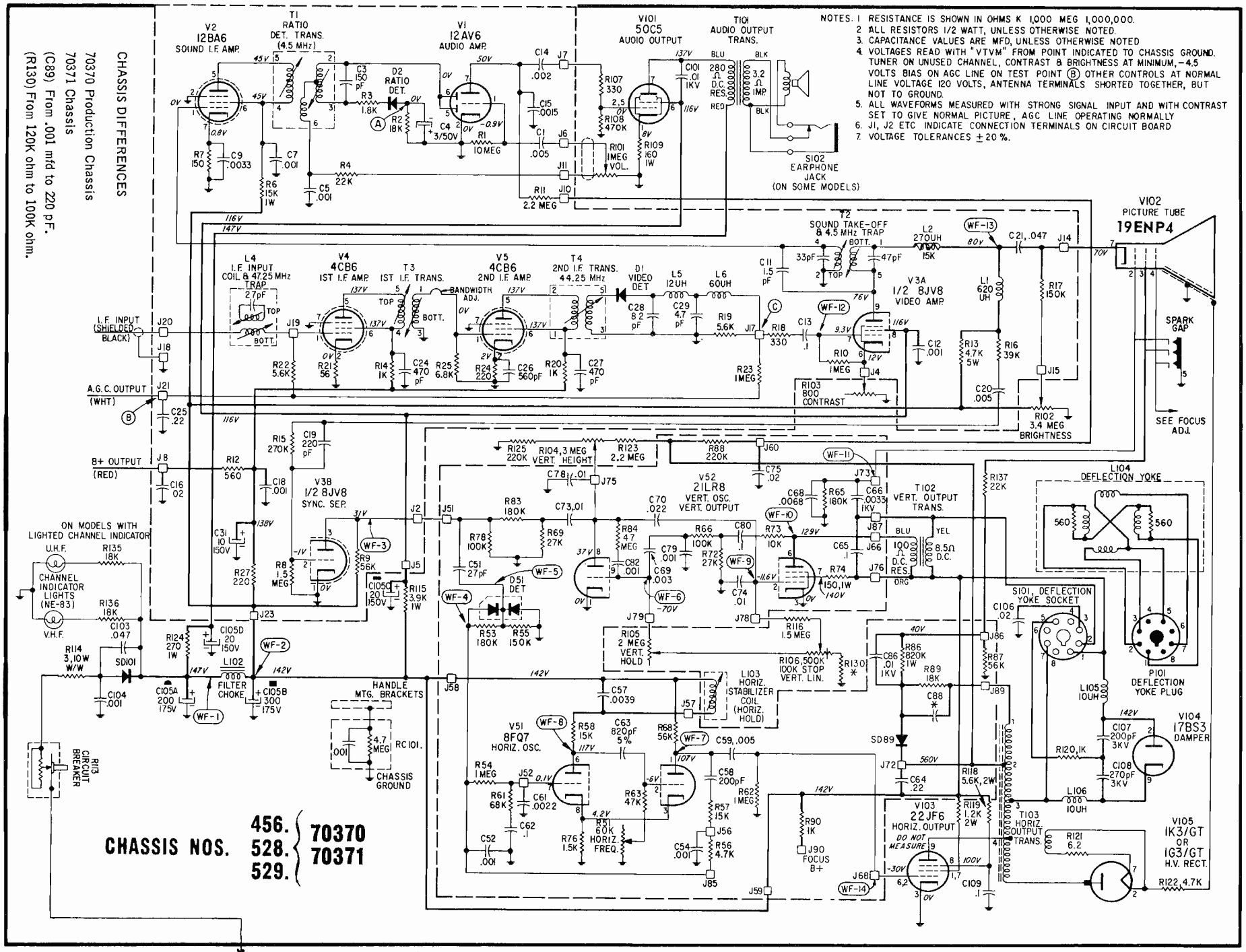
SOUND ALIGNMENT

PRELIMINARY

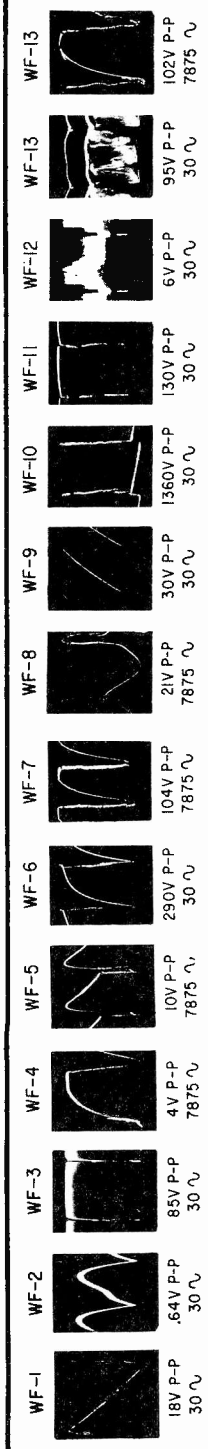
A. Apply - 9V bias to Point Ⓑ.
B. Set channel selector to unused channel.

Step	Signal Generator Frequency	Connect to	Output Indicator	Connect to	Adjust	Remarks
1.	4.5 MHz	J17 (Test Point Ⓒ	VTVM	Junction of two 100 K ohm resistors. See NOTE 1.	T1 top for zero (mid-scale)	Sig. Gen. Output 20 kwv.
2.	4.5 MHz	Same	VTVM	Test Point Ⓐ	T1 bottom for max.	Sig. Gen. output less than 10K uv (To avoid limiting)
3.	4.5 MHz	Same	VTVM	Same	T2 bottom for max.	Same
4.	4.5 MHz	Same	VTVM	Same	T2 top for max	Same
5.	Remove meter, bias voltage generator; tune set to station. Set fine tune for best picture and touch-up 4.5 MHz reject trap (T2) top top core only for minimum sound beat in picture.					

NOTE: 1 - Connect two 100K ohm resistors (Matched Pair) in series between test point Ⓐ and ground. Connect negative lead of VTVM to junction of two resistors and the positive lead to J11. VTVM should be on low range with Zero volts at mid-scale.



SCHEMATIC DIAGRAM FOR CHASSIS 70370, 70371



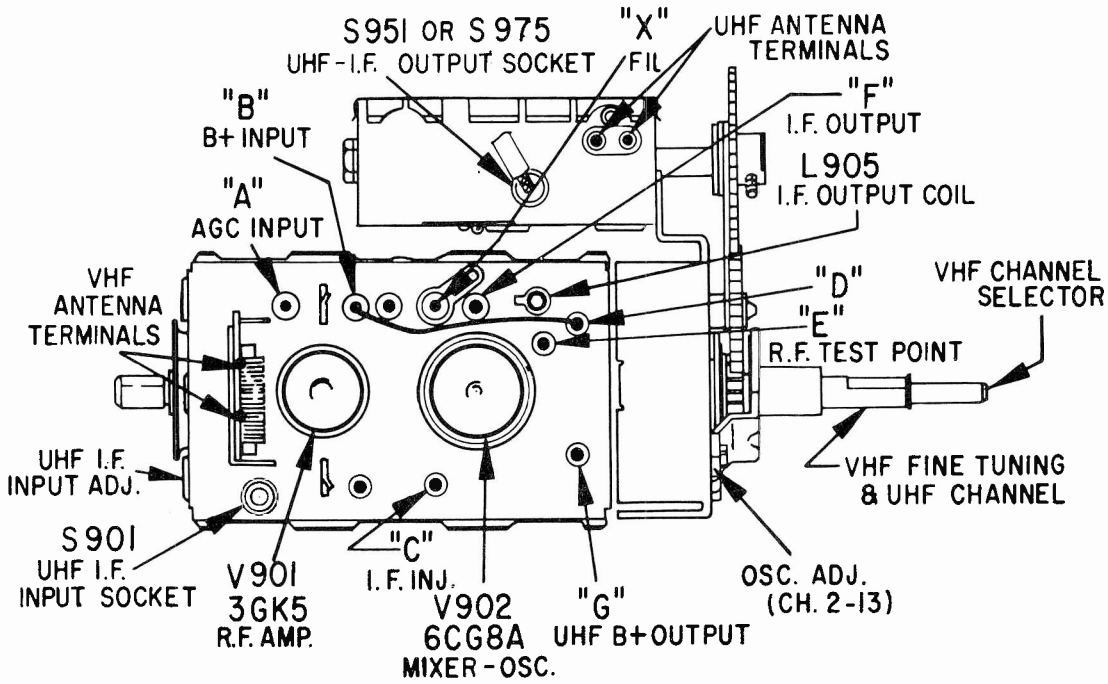


FIGURE 3 – UHF-VHF TUNER VIEW

CHASSIS NO. 456. 528. 529. } 70370 70371

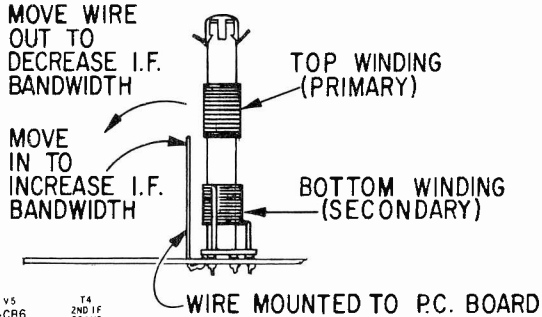
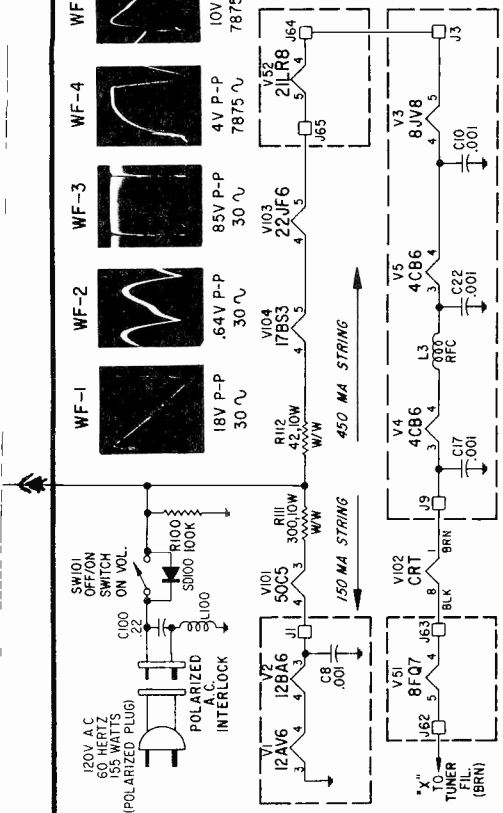
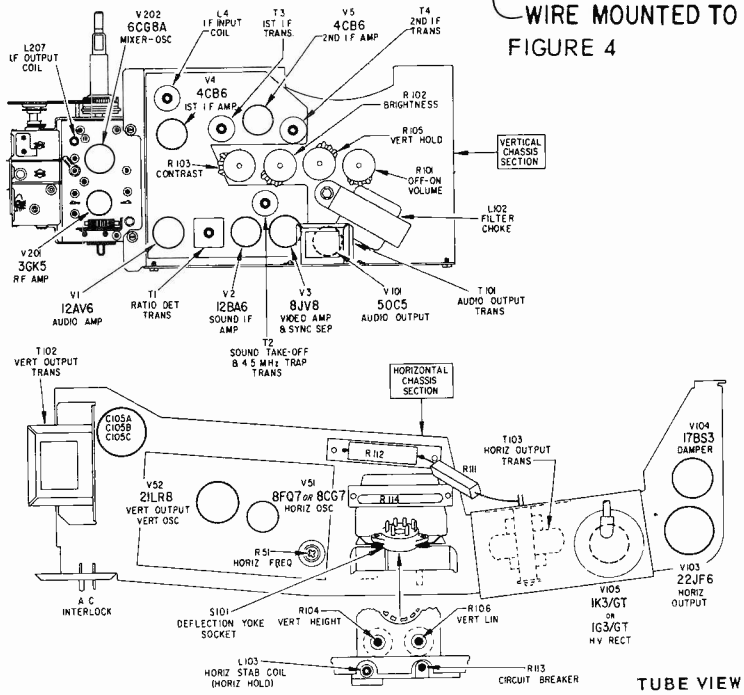
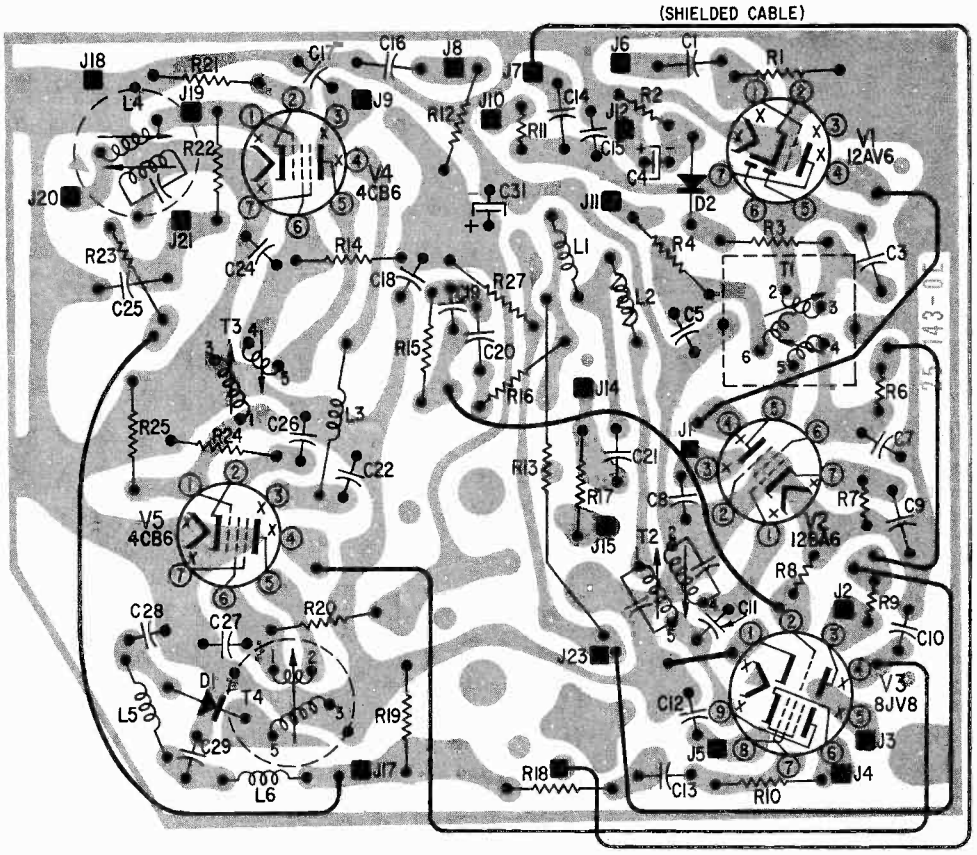


FIGURE 4

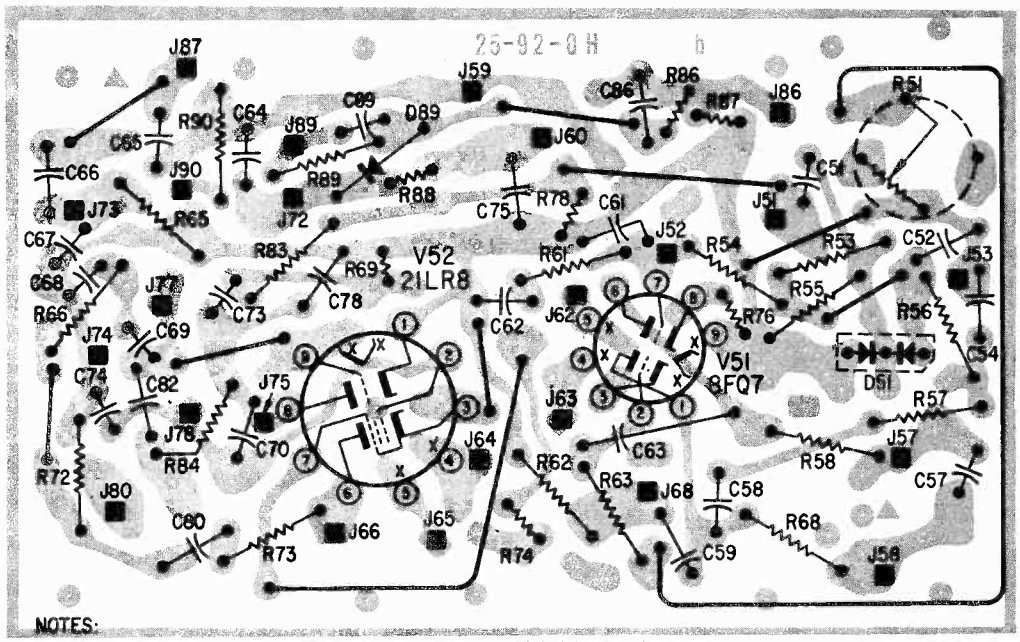




TUBE VIEW CHASSIS



WIRING DIAGRAM I. F. AND SOUND BOARD



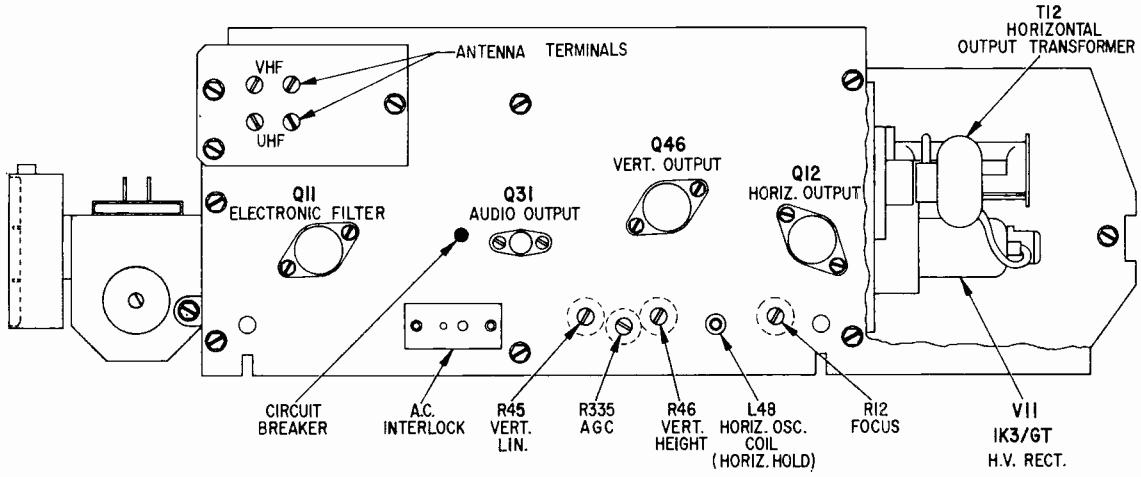
1. WIRING DIAGRAM IS SHOWN FROM CIRCUIT SIDE OF BOARD.
2. SOLID LINES INDICATE WIRE JUMPERS.

WIRING DIAGRAM HORIZONTAL-VERTICAL DEFLECTION BOARD

SEARS, ROEBUCK and CO.

CHASSIS NOS. 456. 528. 529. } 71000

USED IN MODEL :
7122



REAR VIEW, CHASSIS

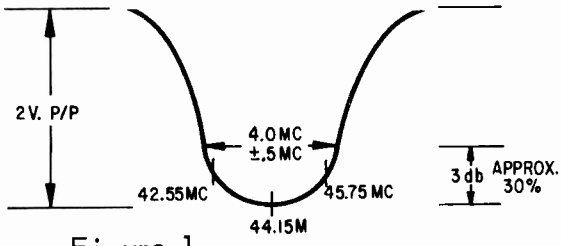


Figure 1

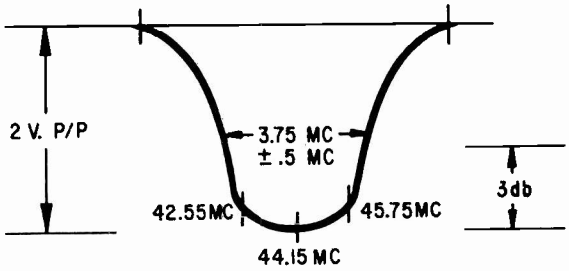


Figure 2

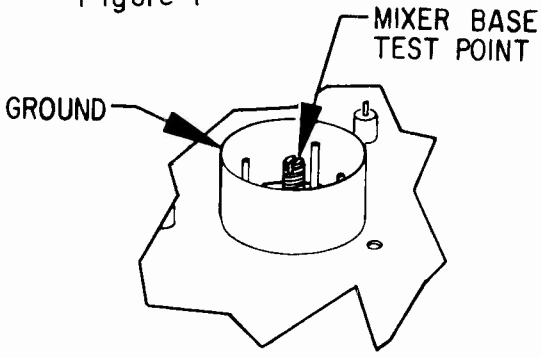


Figure 3

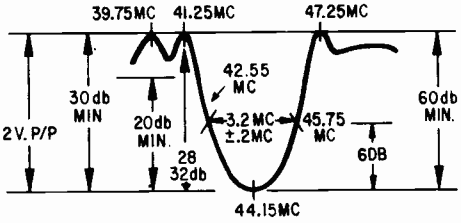


Figure 4

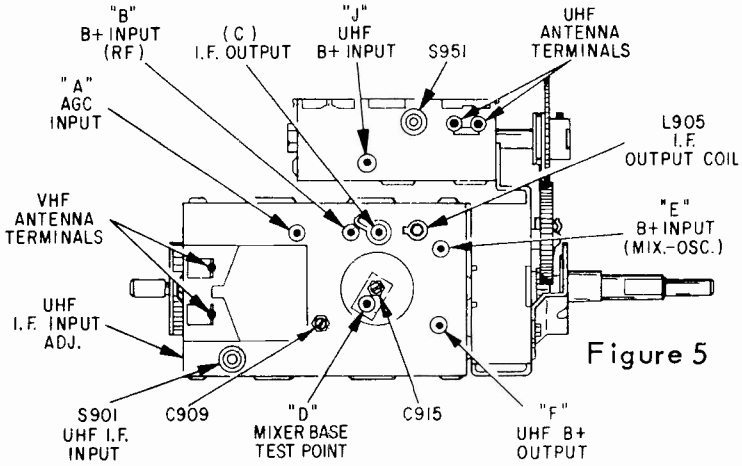
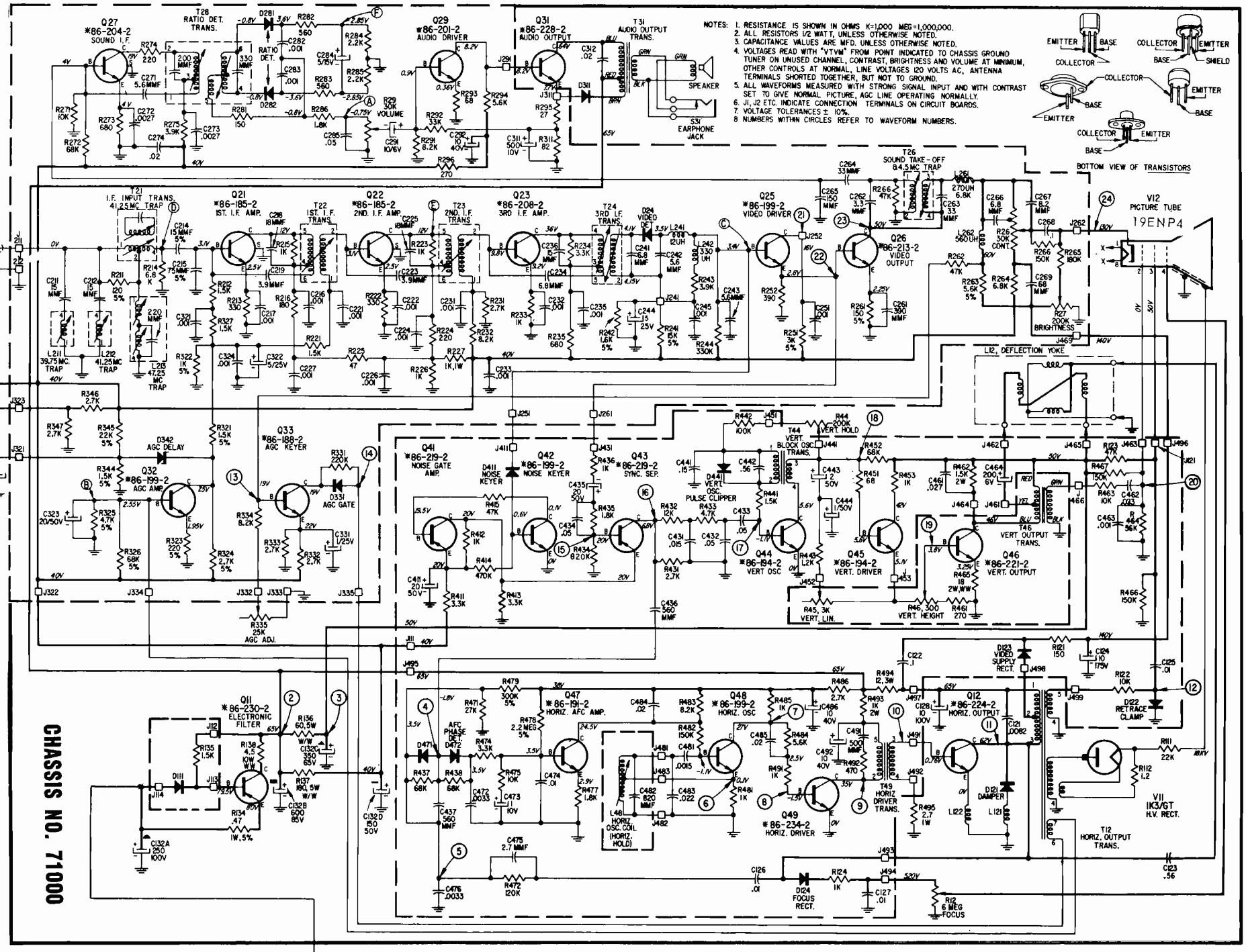


Figure 5


NOTES:
1. RESISTANCE IS SHOWN IN OHMS K=1,000 MEG=1,000,000.
2. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE MFD. UNLESS OTHERWISE NOTED.
4. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND TUNER ON UNUSED CHANNEL, CONTRAST, BRIGHTNESS AND VOLUME AT MINIMUM, OTHER CONTROLS AT NORMAL, LINE VOLTAGES 120 VOLTS AC, ANTENNA TERMINALS SHORTED TOGETHER, BUT NOT TO GROUND.
5. ALL WAVEFORMS MEASURED WITH STRONG SIGNAL INPUT AND WITH CONTRAST SET TO GIVE NORMAL PICTURE, AGC LINE OPERATING NORMALLY.
6. J1, J2 ETC. INDICATE CONNECTION TERMINALS ON CIRCUIT BOARDS.
7. VOLTAGE TOLERANCES ± 10%.
8. NUMBERS WITHIN CIRCLES REFER TO WAVEFORM NUMBERS.
BOTTOM VIEW OF TRANSISTORS
EMITTER
BASE
COLLECTOR
SHIELD
Q27 *86-204-2 SOUND I.F.
T26 RATIO DET. TRANS.
Q29 *86-201-2 AUDIO DRIVER
Q31 *86-228-2 AUDIO OUTPUT
T31 AUDIO OUTPUT TRANS.
SPEAKER
S31 EARPHONE JACK
R29 30K VOLUME
T21 I.F. INPUT TRANS. 41.25 MC. TRAP
Q21 *86-185-2 1ST. I.F. AMP.
T22 1ST. I.F. TRANS.
Q22 *86-185-2 2ND. I.F. AMP.
T23 2ND. I.F. TRANS.
Q23 *86-208-2 3RD I.F. AMP.
T24 3RD I.F. TRANS.
D24 VIDEO DET.
Q25 *86-199-2 VIDEO DRIVER
T26 SOUND TAKE-OFF 84.5 MC TRAP
Q26 *86-213-2 VIDEO OUTPUT
V12 PICTURE TUBE 19ENP4
R27 200K BRIGHTNESS
L12, DEFLECTION YOKE
I.F. INPUT CABLE
B+ OUTPUT (MIX-OSC.) RED/WHT
B+ OUTPUT (RF) RED/GRN
AGC OUTPUT WHT
L211 39.75 MC. TRAP
L212 41.25 MC TRAP
L215 47.25 MC TRAP
Q32 *86-199-2 AGC AMP.
D342 AGC DELAY
Q33 *86-188-2 AGC KEYER
D331 AGC GATE
R335 25K AGC ADJ.
Q41 *86-219-2 NOISE GATE AMP.
D411 NOISE KEYER
Q42 *86-199-2 NOISE KEYER
Q43 *86-219-2 SYNC. SEP.
D441 VERT. OSC. PULSE CLIPPER
T44 VERT. BLOCK OSC TRANS.
R44 200K VERT. HOLD
Q44 *86-194-2 VERT OSC
Q45 *86-194-2 VERT. DRIVER
Q46 *86-221-2 VERT. OUTPUT
T46 VERT. OUTPUT TRANS.
R45, 3K VERT. LIN.
R46, 300 VERT. HEIGHT
Q11 *86-230-2 ELECTRONIC FILTER
Q47 *86-191-2 HORIZ. AFC AMP.
AFC PHASE DET.
Q48 *86-199-2 HORIZ. OSC
L48 HORIZ. OSC. COIL (HORIZ. HOLD)
Q49 *86-234-2 HORIZ. DRIVER
T49 HORIZ DRIVER TRANS.
Q12 *86-224-2 HORIZ. OUTPUT
D123 VIDEO SUPPLY RECT.
D122 RETRACE CLAMP
D121 DAMPER
T12 HORIZ. OUTPUT TRANS.
V11 1K3/GT H.V. RECT.
D124 FOCUS RECT.
R12 6 MEG FOCUS
C132A 250 100V
C132B 600 85V
C132D 150 50V
C132C 350 65V
CHASSIS NO. 71000

(23) 75V P-P 30~

(22) 12.5V P-P 30~

(21) 25V P-P 30~

(20) 115V P-P 30~

(19) 7V P-P 30~

(16) 10V P-P 30~

(17) 4.5V P-P 30~

(16) 20V P-P 30~

(15) 2.5V P-P 30~

(14) 50V P-P 7875~

SEARS Chassis 456.71000 (etc.) Alignment Information, Continued

PRELIMINARY NOTES ON IF ALIGNMENT:

a. It is recommended that the receiver be connected to an isolation transformer during alignment.

b. Connect 30K ohm resistor from base of Q32 to ground and disconnect wire from base of Q32 (J334). (This will preset AGC Voltage.)

c. Ground low side of J241, using the shortest possible lead.

d. Connect scope using a 10K ohm isolation resistor as hot lead between base of Q25, Point "C" and ground.

e. Adjust signal input to maintain 2V P-P at Point "C".

f. Connect sweep generator to collector of Q22 (T P.E.) and adjust top and bottom core of T24 for following response. (See Figure 1).

NOTE: Remove collector screws from horizontal output transistor if yoke is not connected. A dummy load of a 60 ohm, 10W. resistor should be used. Use on isolation transformer. Adjust 60 cps supply voltage for +40V. at I.F. supply buss. Set channel selector to channel 13.

VIDEO I.F. ALIGNMENT

Step	Sweep Generator (40-50Mc) Connect To:	Output Waveform	Adjust	Remarks
1	Point "D"	Figure 2	T22	Adjust T22 and T23 for maximum response at 44.15Mc. Reduce sweep input to keep detector output below 2V P-P. See response in figure 2.
2	Same	Same	T23	
3	Mixer Base	Figure 3, Figure 4	T21	Adjust for responses shown in figure 4.
4	Same	Same	L211	Adjust for minimum at 39.75Mc.
5	Same	Same	L212	Adjust for minimum at 41.25Mc.
6	Same	Same	L213	Adjust bottom coil to 47.25Mc. Now adjust top coil for max. depth near 47.25Mc.

L213 Top and Bottom Coils may interact slightly so bottom coil may have to be touched up after depth adjustment is made.

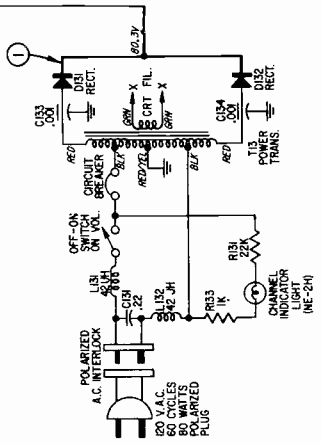
SOUND ALIGNMENT

PRELIMINARY:

1. Set Channel Selector to an active station.
2. If set appears to be near overload, adjust AGC control for proper operation.
3. If horizontal output is not operating, connect a 140V. supply to low side of video load resistor (R263).

Step	Air Signal 4.5 Mc	Output Indicator	Connect to	Adjust	Remarks
1	Air Signal	VTVM	Top of Volume Control T.P. (A)	T28 (Ratio Detector Secondary) for zero.	
2	Air Signal	VTVM	Test Point (F)	T28 (Ratio Detector Primary) bottom for max.	Air signal should be attenuated to give snowy picture.
3	Air Signal	VTVM	Same	T26 Top for max.	
4					
5	Set fine tune for best picture and touch-up. 4.5Mc reject trap (T26 Bottom) for minimum sound beat in picture.				Select station with strongest possible signal.

NOTE: VTVM should be on Low Voltage range and set for zero center.



(2) 0.2V P-P 30~

(4) 8V P-P 7875~

(6) 16V P-P 7875~

(8) 13V P-P 7875~

(10) 11V P-P 7875~

(13) 7V P-P 7875~

(12) 100V P-P 7875~

(1) 11V P-P 30~

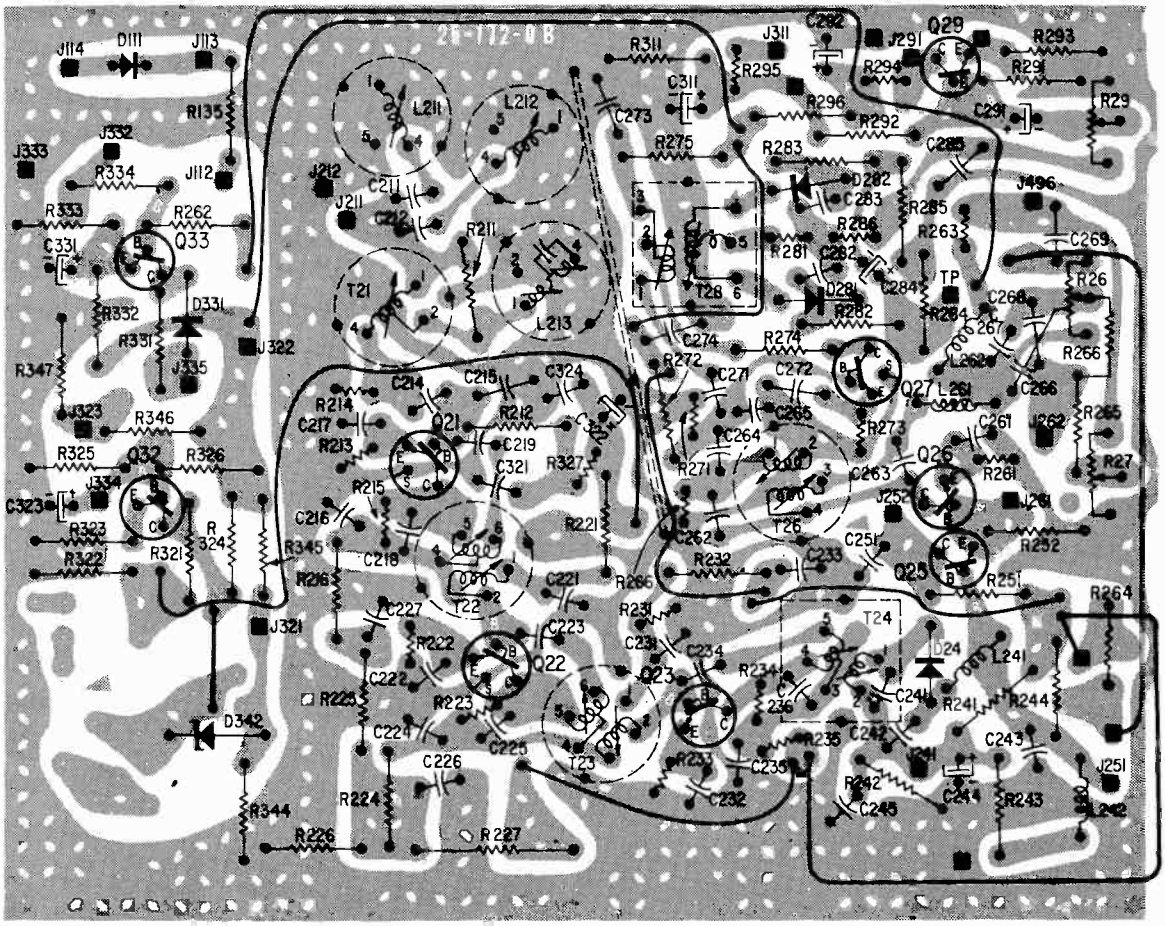
(3) 2.25V P-P 30~

(5) 9V P-P 7875~

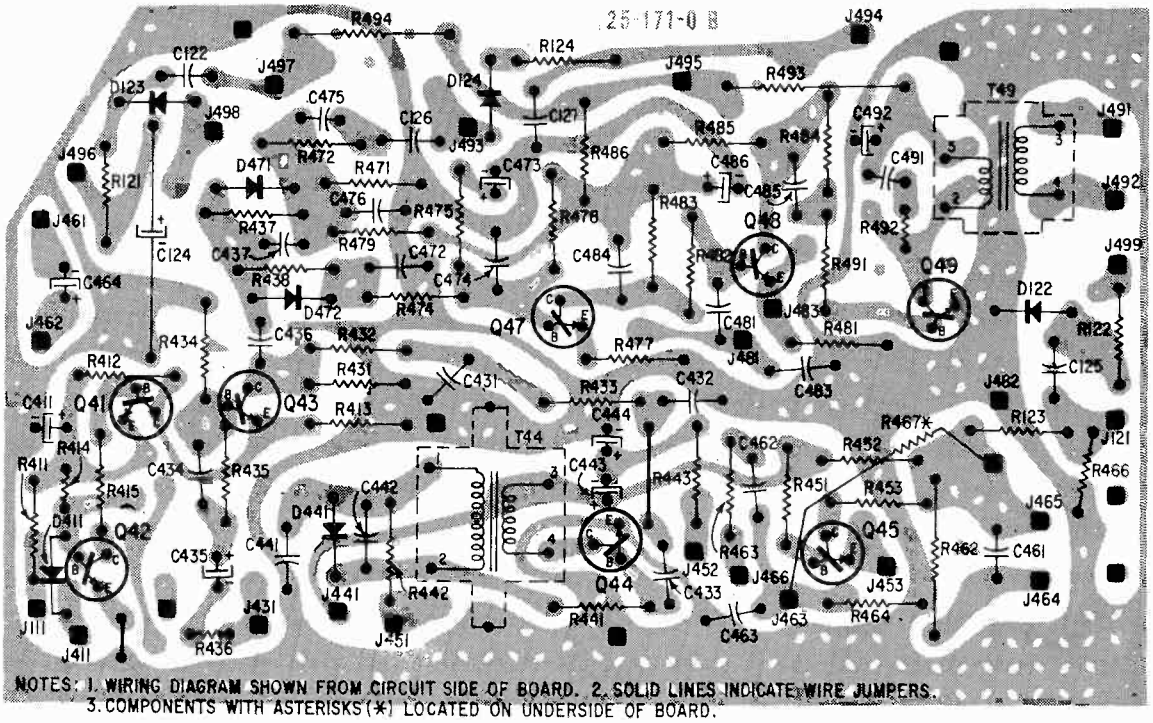
(7) 23V P-P 7875~

(9) 160V P-P 7875~

(11) 550V P-P 7875~



WIRING DIAGRAM I.F. AND SOUND BOARD



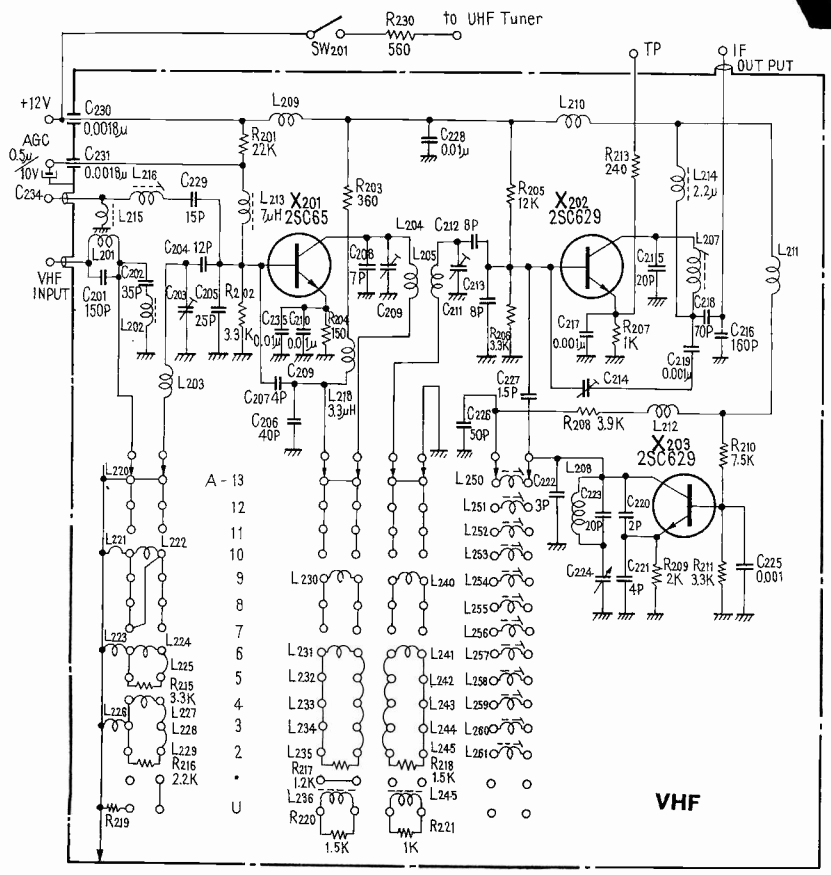
NOTES: 1. WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE OF BOARD. 2. SOLID LINES INDICATE WIRE JUMPERS.
3. COMPONENTS WITH ASTERISKS (*) LOCATED ON UNDERSIDE OF BOARD.

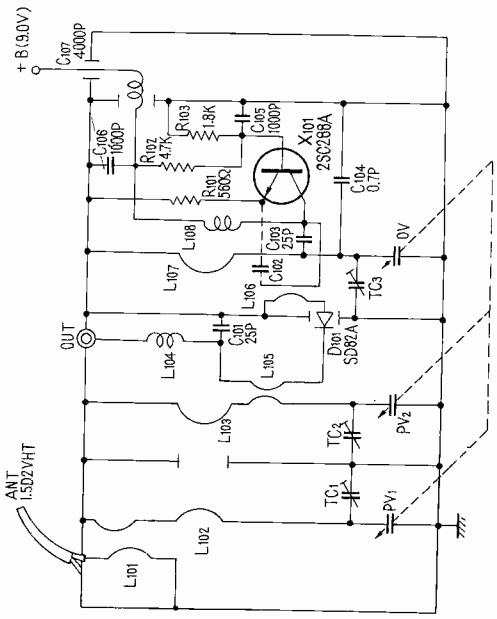
WIRING DIAGRAM HORIZONTAL-VERTICAL DEFLECTION BOARD

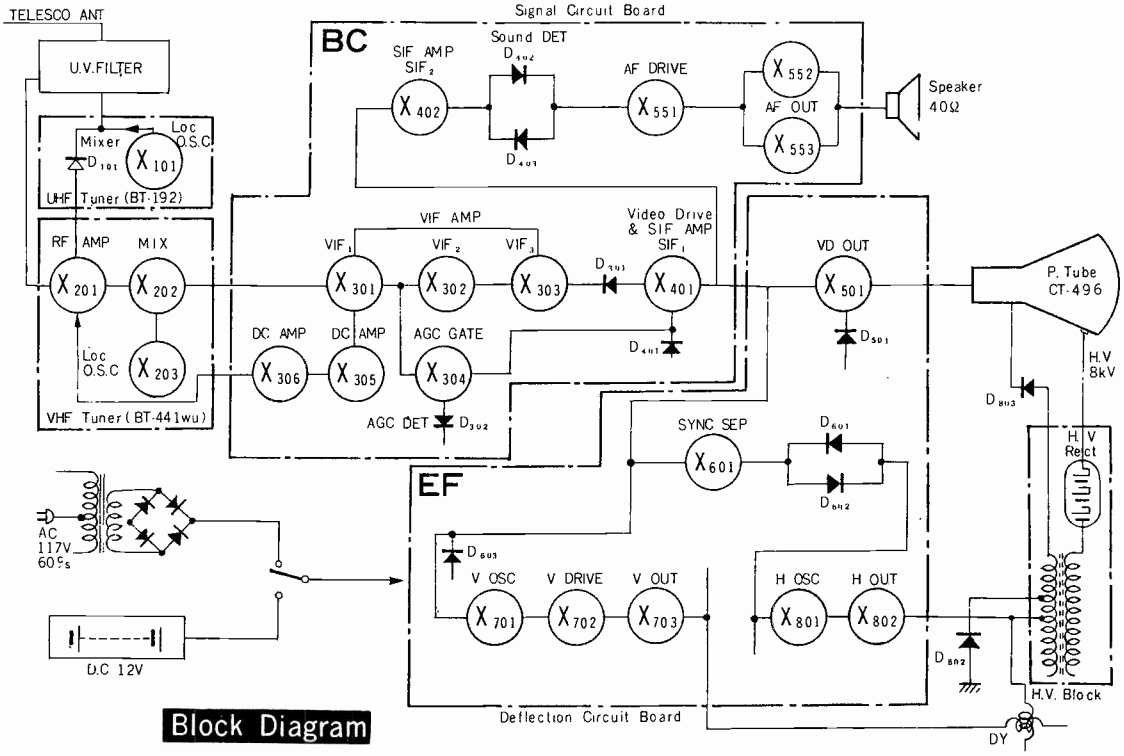
SONY

TV-500U

(Service material on pages 129 through 136)



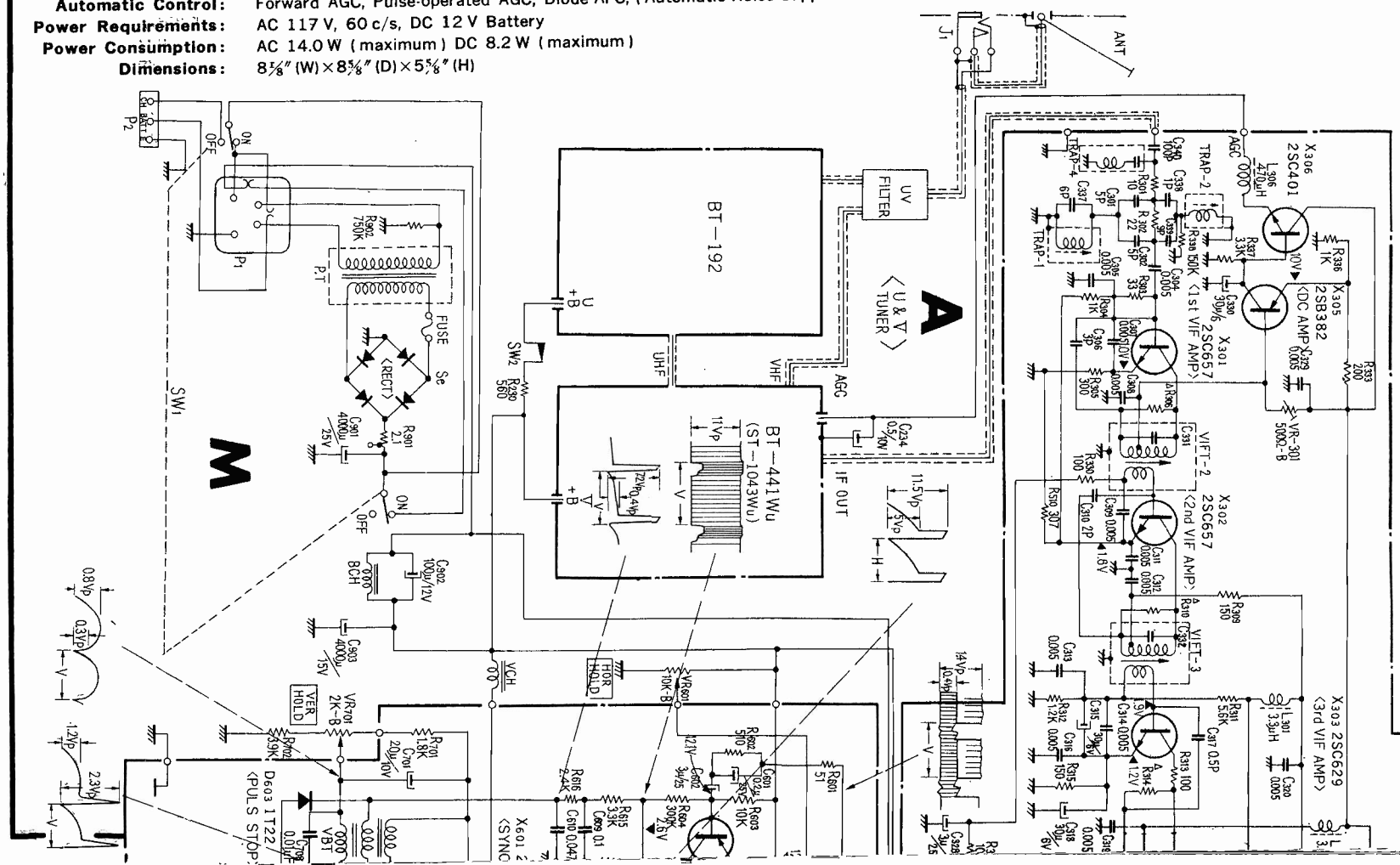


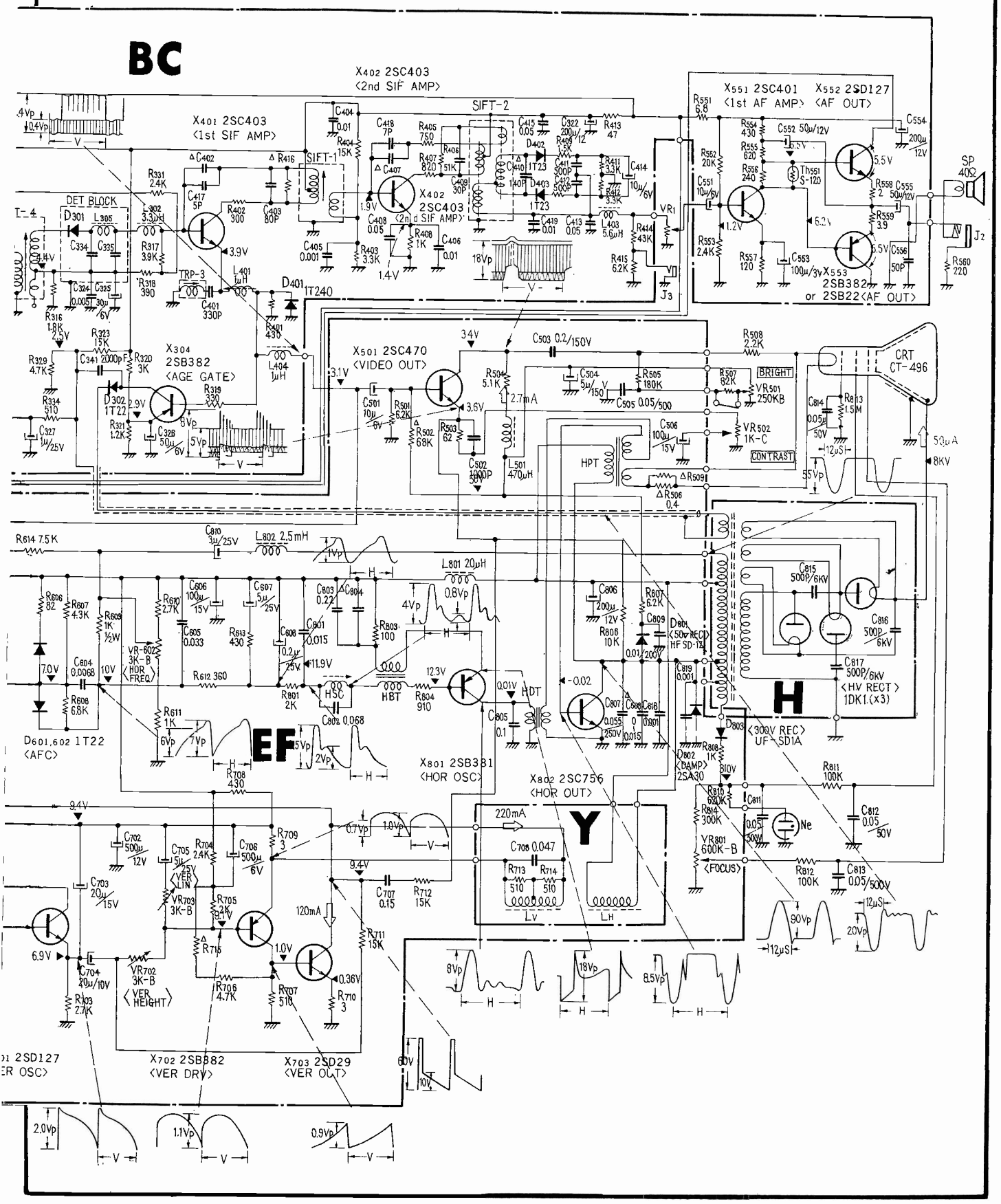


Block Diagram

Specifications

Picture Tube:	5″, 70° Deflection, Aluminized Screen Direct Heating Cathode
Transistor:	22 (9 Silicon 13 Germanium)
Diode:	16 (including 4 Selenium)
Channel Coverage:	A2--A13 in VHF Band and A14- A83 in UHF Band
Tuner:	Disc Turret Type for VHF Band and Continuous Tuning Type for UHF Band
Maximum Sensitivity:	VHF 5μV (10 Vpp at Picture Tube Cathode) UHF 5μV (10 Vpp at Picture Tube Cathode)
IF Circuit:	3 Stages with 4 Stagger Tuned Elements Video IF 45.75 Mc, Sound IF 41.25 Mc, Band Width 3.1 Mc
Sound System:	4.5 Mc Intercarrier System Power Output Stage; OTL System, 300 mW Speaker 2¾″×4″, 40Ω Voice Coil
Automatic Control:	Forward AGC, Pulse-operated AGC, Diode AFC, (Automatic Noise Suppressor)
Power Requirements:	AC 117 V, 60 c/s, DC 12 V Battery
Power Consumption:	AC 14.0 W (maximum) DC 8.2 W (maximum)
Dimensions:	8⅝″ (W)×8⅝″ (D)×5⅝″ (H)




BC
X402 2SC403
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X401 2SC403
<1st SIF AMP>
SIFT-2
SIFT-1
X402 2SC403
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X551 2SC401
<1st AF AMP>
X552 2SD127
<AF OUT>
X553 2SB382
or 2SB22<AF OUT>
SP
40Ω
DET BLOCK
X304
2SB382
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CRT
CT-496
BRIGHT
CONTRAST
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EF
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X703 2SD29
<VER OUT>
<VER HEIGHT>
<VER LIN>
<HOR FREQ>
<DAMP>
2SA30

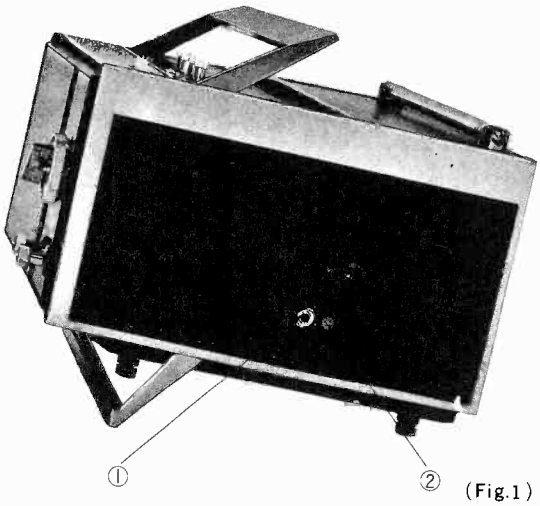
Method of Dissasembling the Set

To Remove the Rear Cabinet Cover

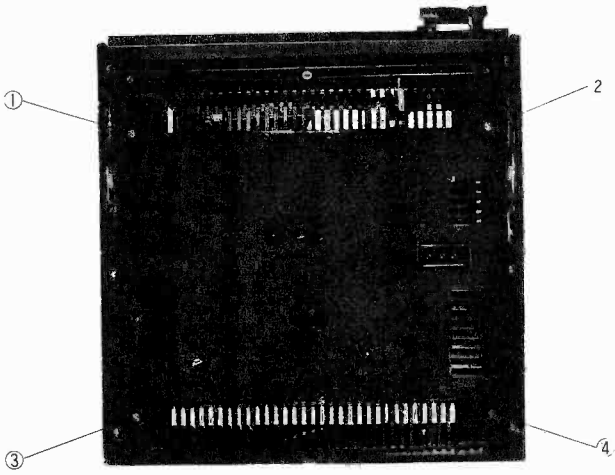
(1) Remove the Screws (② in Fig. 1).

(2) Remove the Antenna Jack Nut (① in Fig. 1).

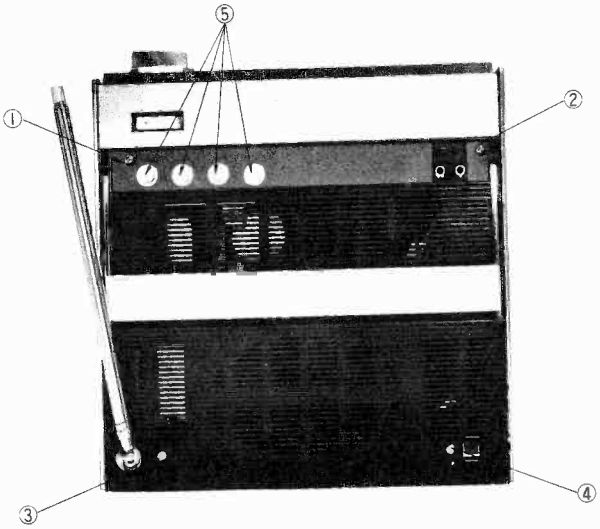
(3) Remove the four Feet (①, ②, ③ and ④ in Fig. 2).



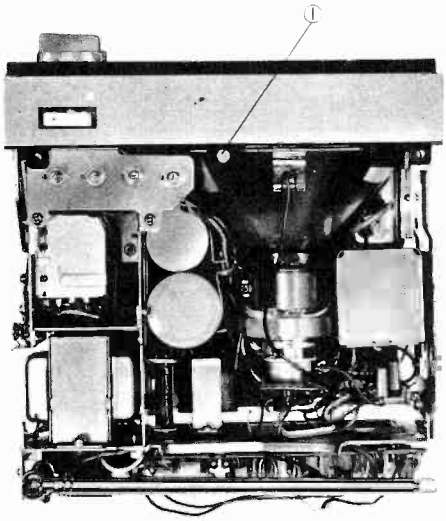
(Fig.1)



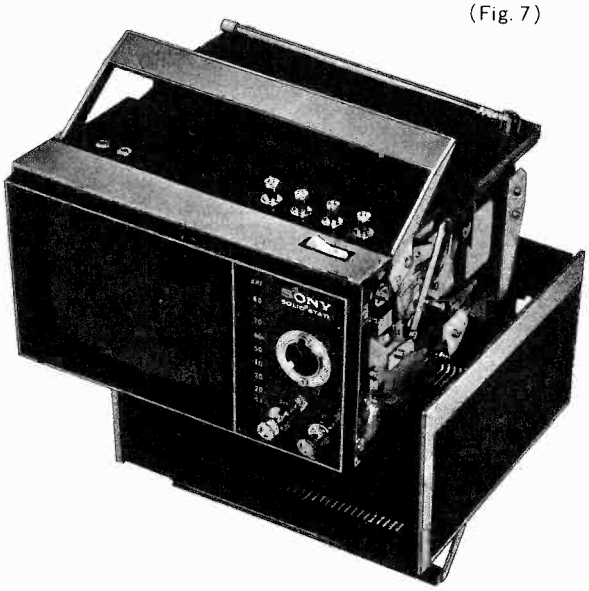
(Fig. 2)



(Fig. 6)



(Fig. 7)



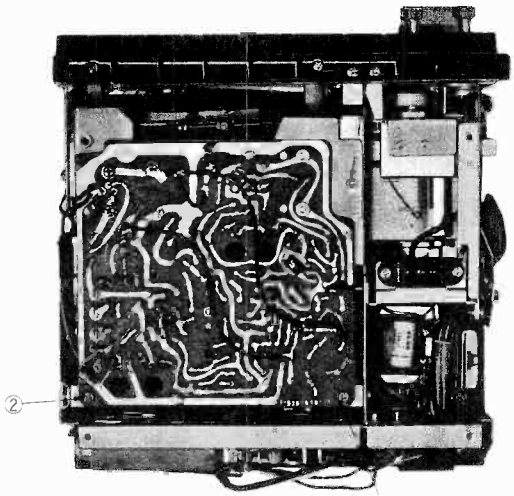
To Remove the Upper Cabinet Cover (Serial No. 16,501 and After)

(1) Remove the four Screws (①, ②, ③ and ④ in Fig. 6).

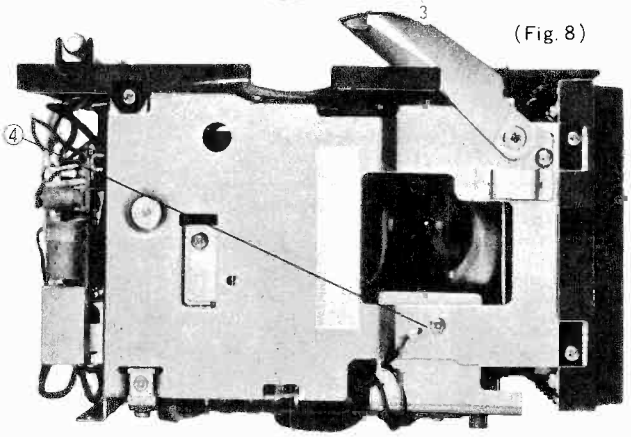
(2) Pull four Control Knobs Straight out (⑤ in Fig. 6).

To Remove the Upper Ornamental Plate

(1) Remove the Screws (① in Fig. 7).



(Fig. 8)

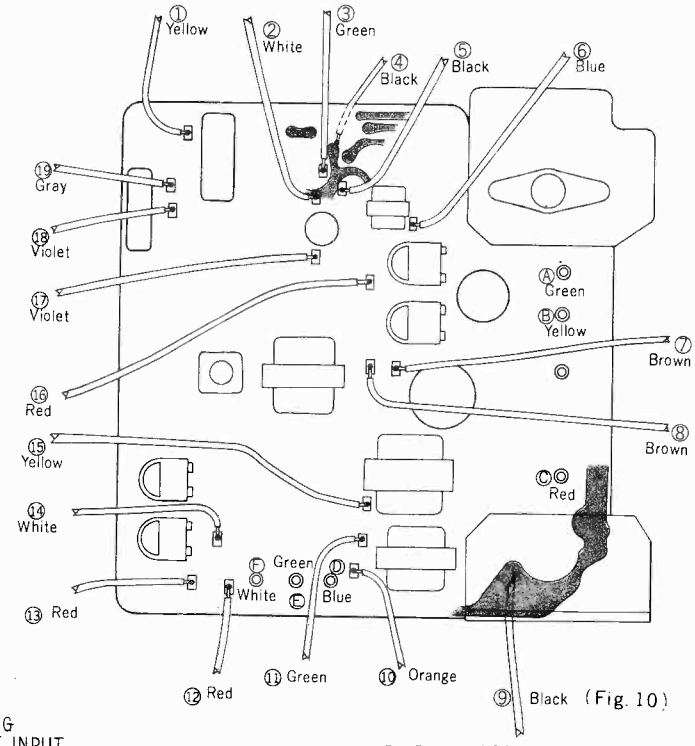


To Remove the Deflection Circuit Board

(1) Remove the four Screws ①, ②, ③ and ④ in Fig. 8, 9).

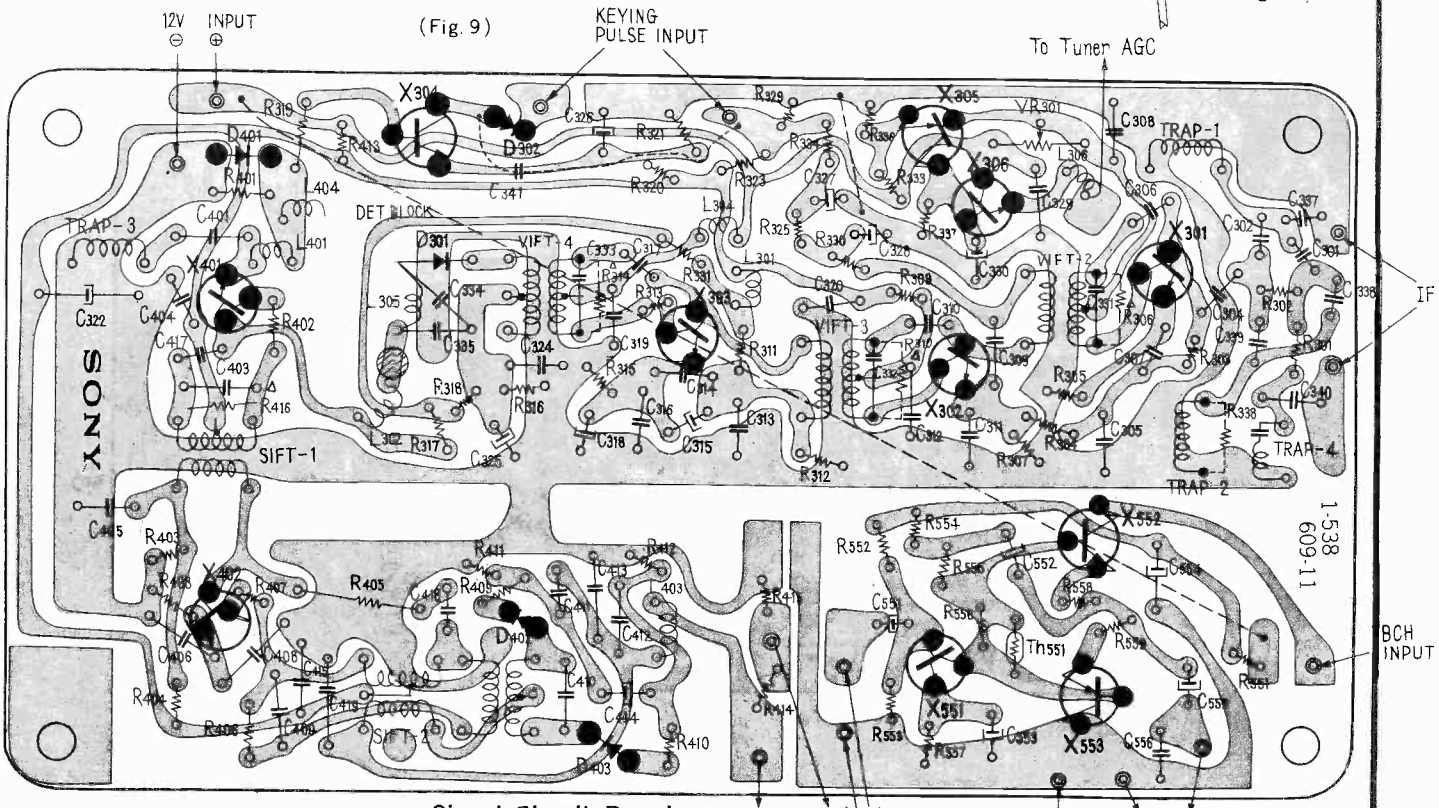
(2) Pull out the six Connectors Ⓐ, Ⓑ, Ⓒ, Ⓓ, Ⓔ and Ⓕ in Fig. 10).

(3) Unsolder the nineteen Leads ①~⑲ in Fig. 10).

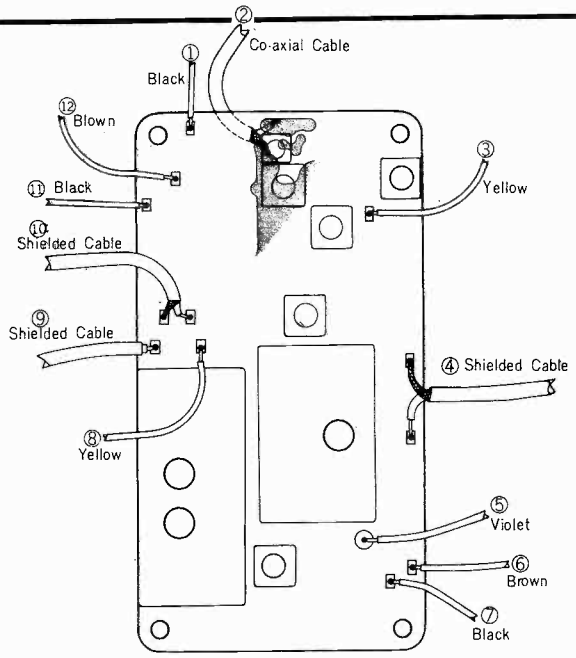


(Fig. 10)

(Fig. 9)



Signal Circuit Board
---Conductor Side---

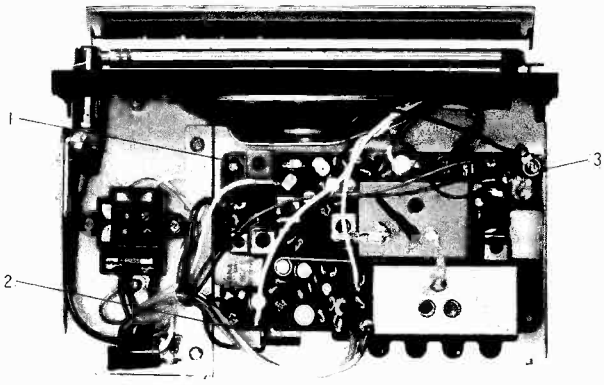


(Fig. 11)

To Remove the Signal Circuit Board

(1) Unsolder the two Shielded Leads, one Co-ax Cable and eight Leads (①~⑫ in Fig. 11).

(2) Remove the three Screws (①, ② and ③ in Fig. 12).

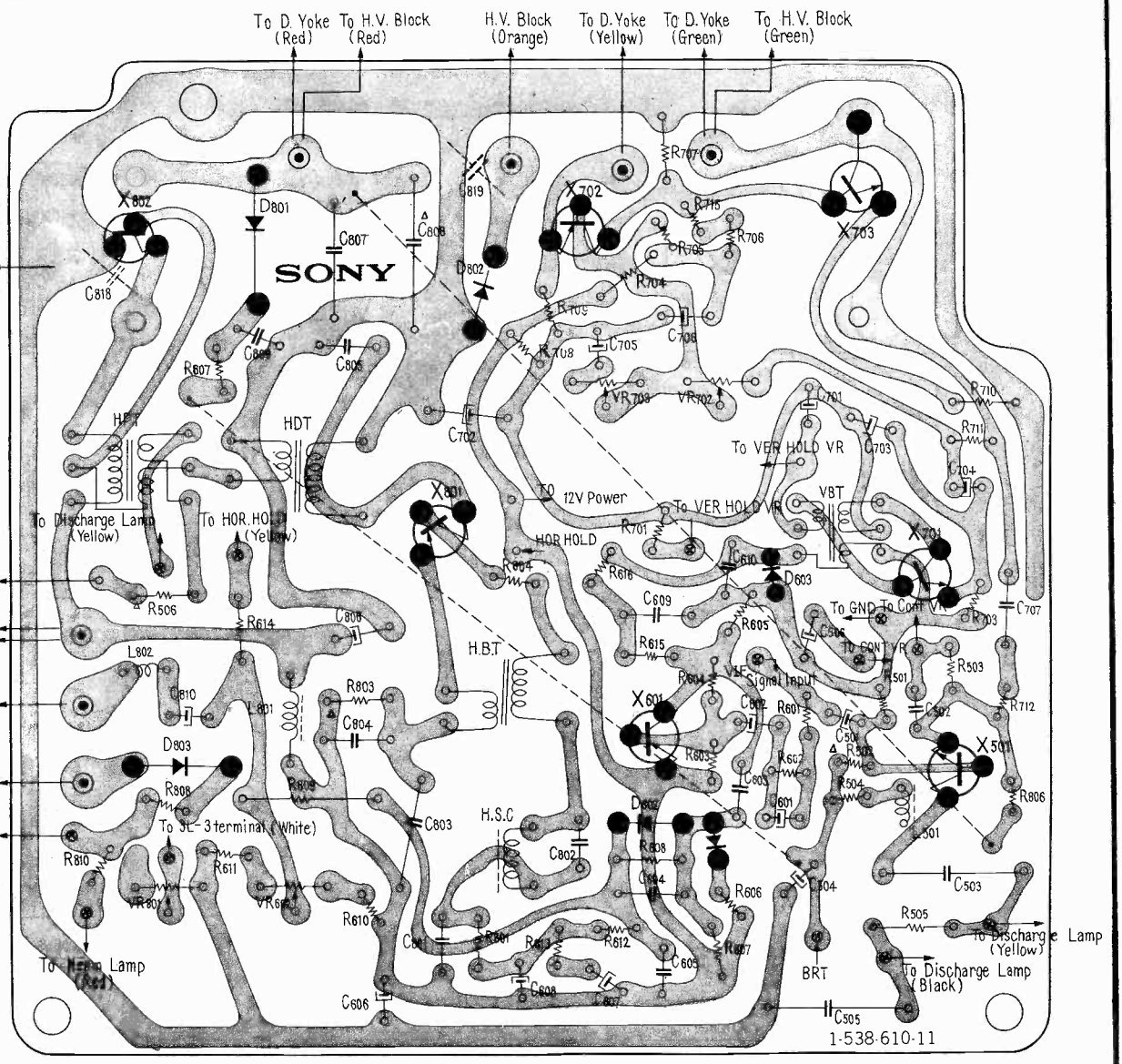


(Fig. 12)

Mounting Diagram

Deflection Circuit Board

---Conductor Side—



SONY TV-500U Alignment Information

A. VIF Response Curve Adjustments

Pre-Alignment Steps

(1) Unsolder the Keying Pulse Lead.

(2) Connect an Oscilloscope to the Base of X_{401} and the ground through a Noise Filter, which consists of a 10KΩ resistor and a 500μμF Capacitor as shown in Fig.

(3) Connect a Sweep Generator and a Marker Generator to the Test Point (TP) of the Tuner through a 0.02μF capacitor.

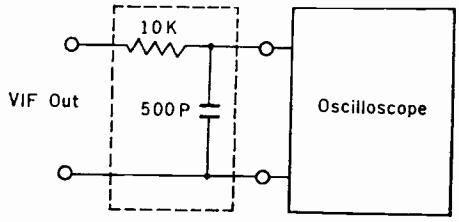
(4) Set the Tuner to a free channel in area.

Step	Equipment	Connection	Freq.	Adjust	
1	Signal Gen. Oscilloscope	VIF Input Terminal VIDEO DET OUT (Base of X_{401} and the ground)	34Mc (AM, 1Kc, 40%)	TRAP-4	for minimum modulated Waveform.

Step	Marker Gen. Freq.	Adjust	Correct Marker position on the response curve	Remarks
2	41.25 Mc	TRAP-301	Ⓢ (dip)	
3	47.25 Mc	TRAP-302	Ⓛ (dip)	
4	42.5 Mc	VIFT-2	Ⓟ (50%)	VIF Standar
5	45.75 Mc	VIFT-3	Ⓥ (45%)	Response Curve.
		VIFT-4		See Fig.
6	45 Mc	VIFT-3	Ⓐ (100%—1.4 Vpp)	
		VIFT-4		

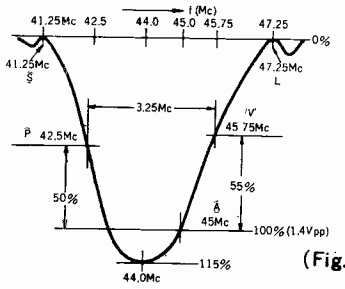
Note: If a proper response curve similar to Fig. 18 is not obtained by the adjustment procedures described above, replace the damping resistor (R_{306} or R_{314}) with proper one for best result.

Noise Filter



(Fig. 31)

VIF Standard Response Curve



(Fig. 32)

B. SIF Adjustments

Pre-Alignment Steps

(1) Set the Brightness Control to the optimum and the Contrast Control to the maximum positions.

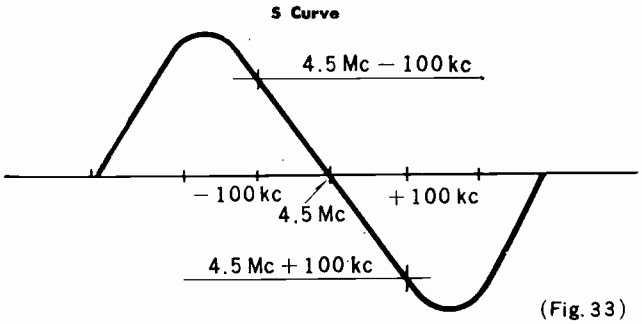
(2) Remove the Tuner Output Leads.

(3) Connect a 5KΩ resistor across SIF output terminal and ground.

Step	Equipment	Connection	Freq.	Adjust	
1	Test Oscillator	VIDEO DET OUT	4.5 Mc	TRAP-3	for minimum stripes on the picture.
2	Same	Same	4.5 Mc	$SIFT_1$ & Pri. of	
	Voltmeter	Across R_{411}		$SIFT_2$ (Pink)	for maximum reading on the Voltmeter.
3	Sweep Gen.	VIDEO DET OUT	4.5 Mc (AM)	Sec. of $SIFT_2$	for minimum modulated waveform.
	Standard Signal Gen.	Same			
	Oscilloscope	SIF output terminals Across a Dummy resistor of 5KΩ			

Note: (1) Repeat the above procedures two or three times.

(2) If S curve is not symmetrical with respect to the intersection of the S curve and return line, adjust primary of $SIFT_2$ for optimum result.

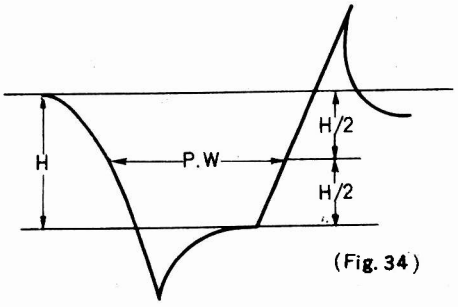


(Fig. 33)

C. Deflection Circuit Adjustments

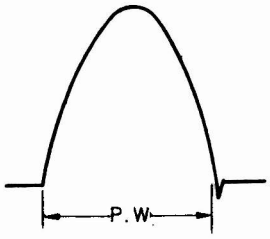
Step	Adjustment for	Preliminary Instruction	Equipment	Connection	Adjust	
1	Ic of X_{501} (VID. Out)	Set to free channel. Check 12V and 50V Power Supply.	Voltmeter	Across R_{504}	R_{502} (57K–75KΩ)	For approx. 18.5V reading.
2	Heater Voltage (Picture tube)	Check 12V Power Supply.	Voltmeter	Between Picture tube Heater Pins	R_{509} (1Ω~2Ω)	For approx. 0.6V reading.
3	Ic of X_{702} (Vert. Out)	Lock in Sync. Check 12V Power Supply.	Same	Across R_{710}	R_{707} (120Ω–1.5KΩ)	For approx. 0.38–0.41V reading.
4	Vert. Height and Linearity	Receive a Test Pattern.			VR_{703} (Vert. Linearity) VR_{701} (Vert. Height)	For optimum Vertical Height and Linearity on the Picture.
5	Pulse Width	Lock in Sync.	Oscillo-scope	Emitter of X_{801}	C_{804} (0.068–0.22μF)	For 7.5–8.5μsec. (Fig. 34)
6	HSC (Horizontal Stability Coil)	Lock in Sync. Receive a Test Pattern.			HSC	So that the picture is stable in either case whether HSC is shorted or normal.
7	Horizontal Width	Lock in Sync. Brightness Controls to optimum positions.	Oscillo-scope	Collector of X_{802}	C_{808} (0~0.015μF)	For 11.6–12.2μsec. (Fig. 35)
8	Horizontal Frequency	Set the Contrast and Brightness Controls to optimum positions. Receive a Test Pattern.			VR_{602} (Hor. Freq.)	To obtain same number of diagonal bars by applying some electrical shocks respectively when setting VR_{601} to fully clockwise and counter-clockwise positions.
9	Focus	Same Lock in Sync.			VR_{801} (600KΩ)	To obtain best focus on the picture.

Waveform of Horizontal X_{801} Transistor



(Fig. 34)

Waveform of Horizontal X_{802} Transistor

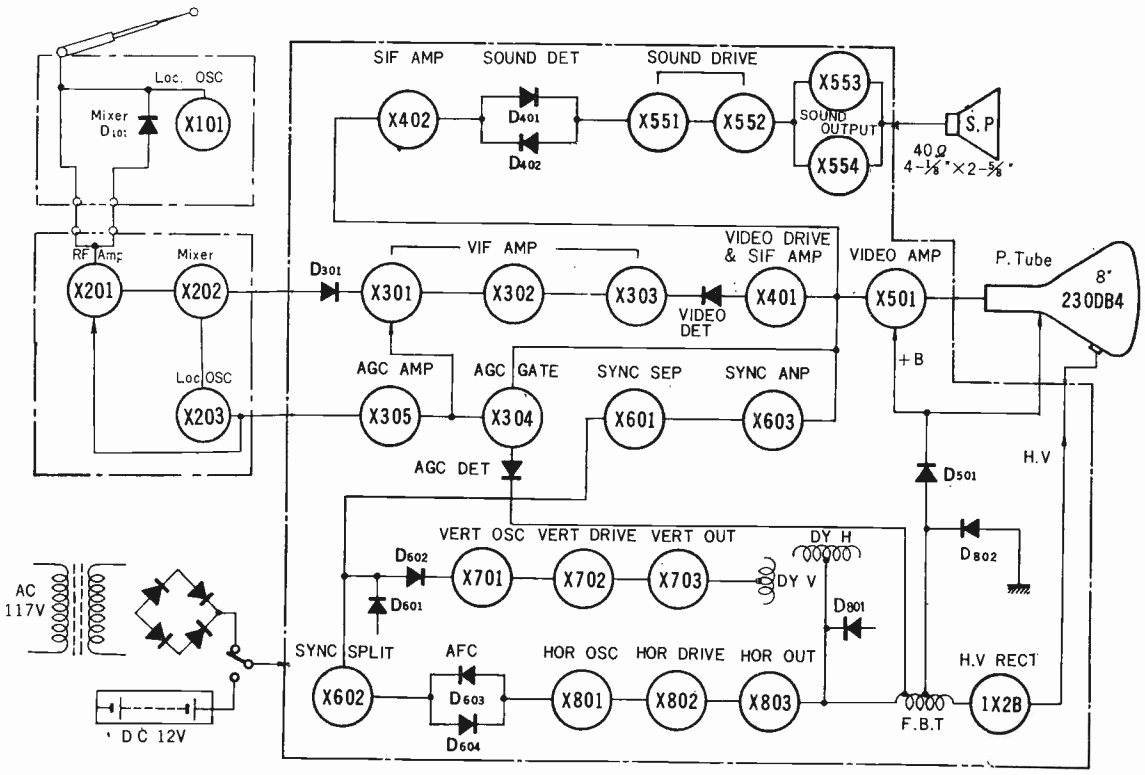


(Fig. 35)

SONY TV-900U

Specifications

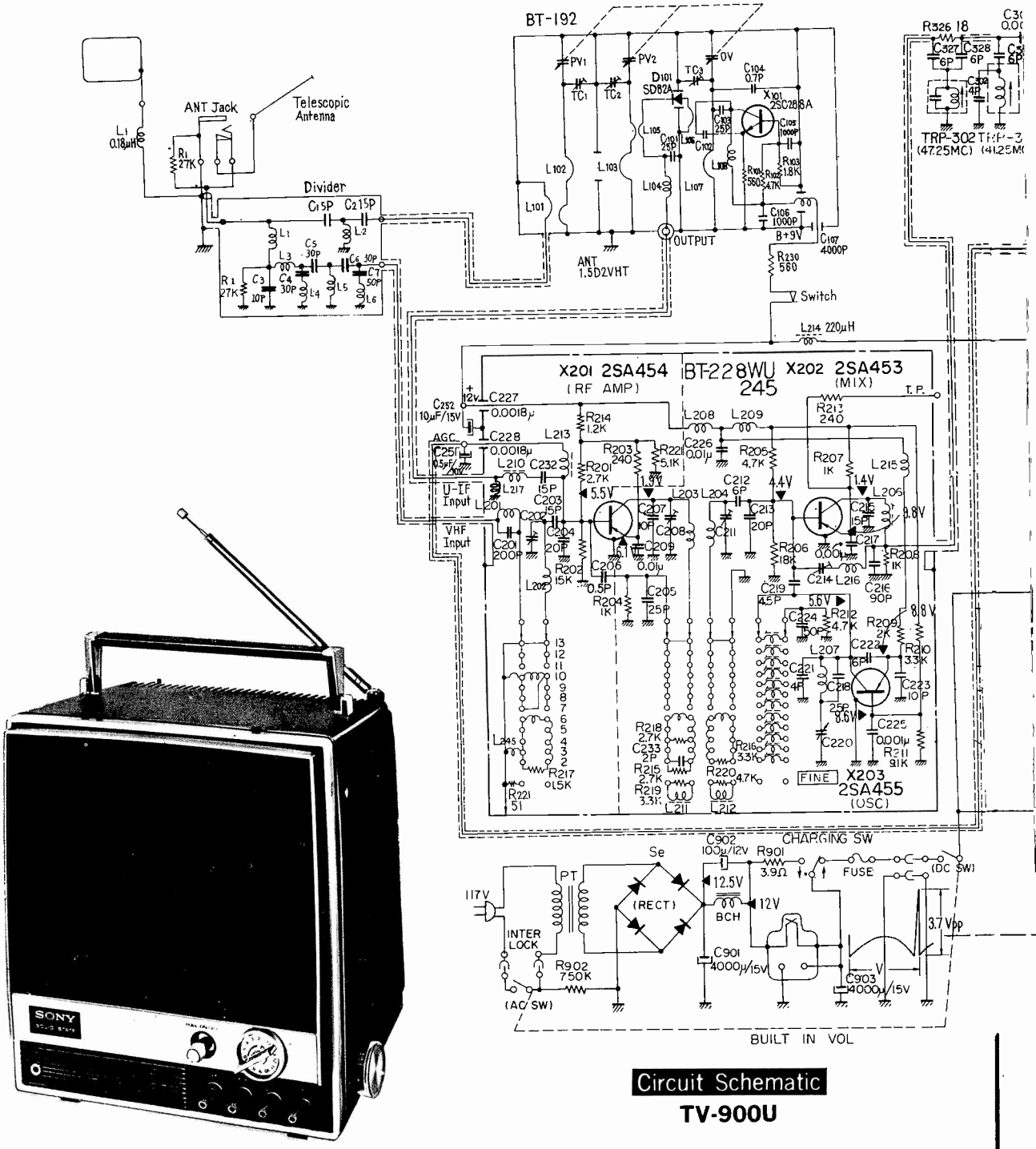
Picture Tube:	8″ (measured diagonally), 90° Deflection, 20 mm Neck Dia., Aluminized Screen
Transistor:	25 (10 Silicon-including 9 Epitaxial, 15 Germanium)
Diode:	18
Channel Coverage:	A2~A13 VHF, and A14~A83 UHF
Maximum Sensitivity:	5μV (10Vp-p) both in VHF and UHF
IF Circuit:	3 Stages with 4 Stagger Tuned Elements Video IF 45.75 Mc, Sound IF 41.25 Mc, Bandwidth 3.2 Mc
Sound System:	4.5 Mc Intercarrier System Power Output Stage, SEPP-OTL system, 300 mW Speaker, 4-⅛″×2-⅝″ Oval Type, Impedance 40Ω
Automatic Control:	Keyed AGC, Diode AGC, Balanced Diode AFC
Power Requirement:	AC 117V, 60 c/s, DC 12V
Power Consumption:	AC 23W, DC 15W
Dimensions:	10″×9″×8-¾″ 252(H)×228(W)×219(D) mm
Weight:	10 lbs. (4.6 Kgs.)
Glare Proofing:	Black Screen



Block Diagram

SONY TV-900U Schematic Diagram

SONY CORPORATION



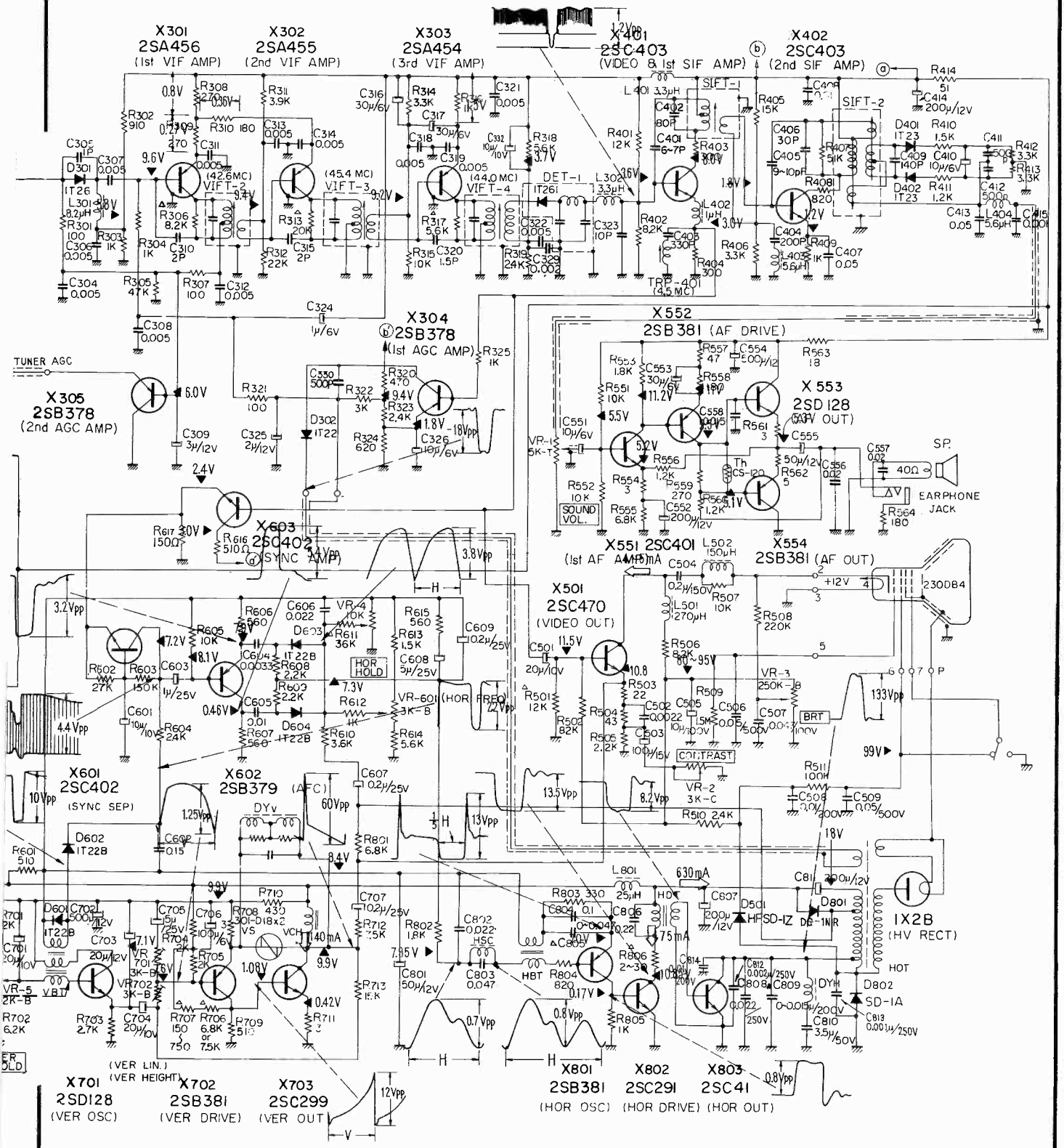
Circuit Schematic

TV-900U

Circuit Board No.

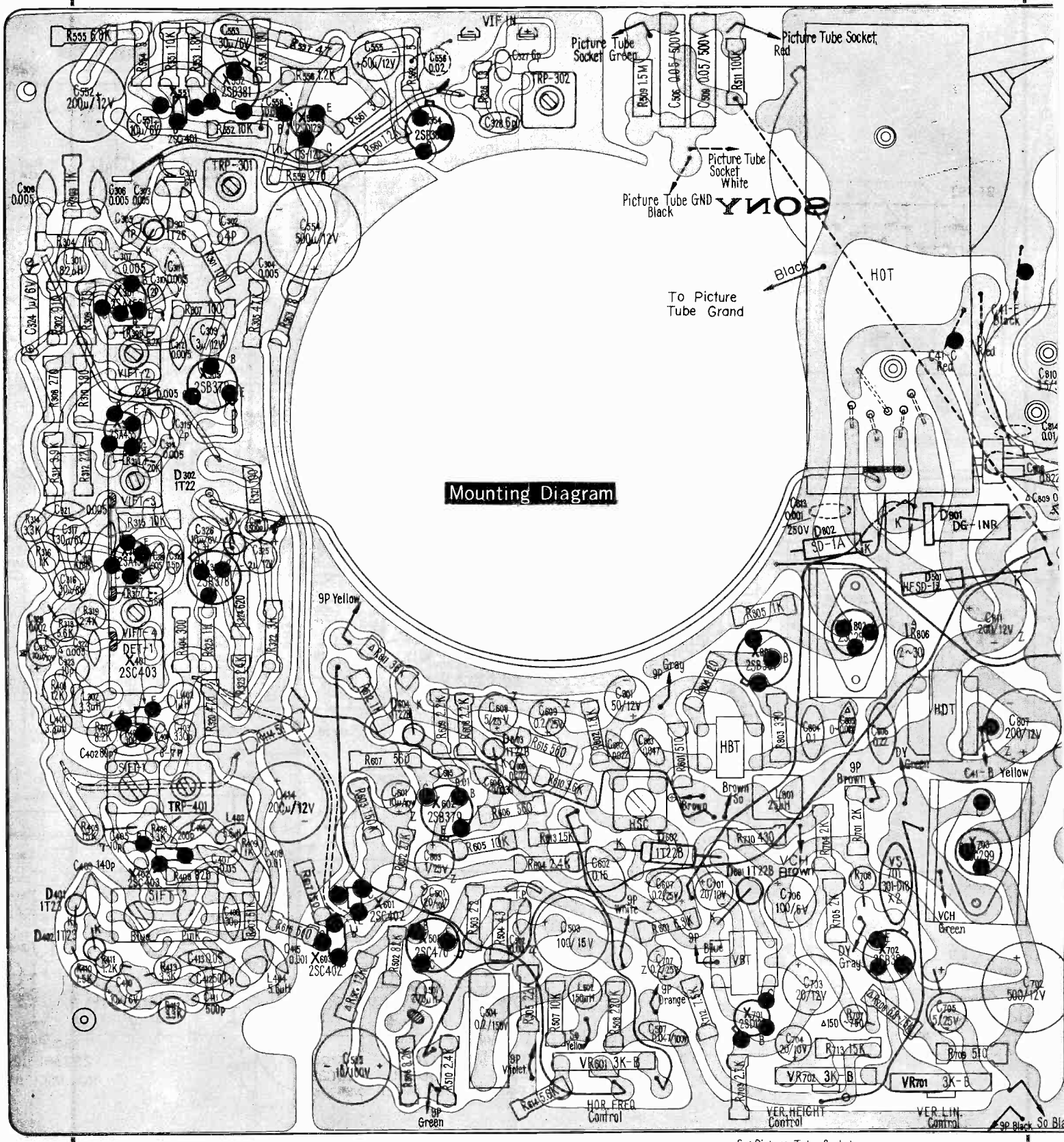
Signal & Deflection Circuit Board
1-538-278-15

SONY TV-900U Schematic Diagram, Continued



☆ : Voltage values are measured from earth to the points indicated.

☆ : Resistor and Capacitor marked with ▲ are to be adjusted.



Signal and Deflection Circuit Board

— Components Side —

SYLVANIA

CHASSIS B09-1, -2

ADJUSTMENTS

CENTERING ADJUSTMENT

1. Position deflection yoke as far forward as possible on the neck (against the flare) of the picture tube.
2. Rotate centering adjustment rings (located on yoke cover) individually or together, until picture is centered. Turn brightness control to a low level and check that no corner cutting exists in the picture.

HORIZONTAL AFC ADJUSTMENT

Before performing the following procedure, check AGC adjustment as described under controls.

1. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
2. Adjust Vertical Height, Vertical Linearity and Width control for normal picture.
3. Adjust [L400] Horizontal Stabilizing coil for 10 volt AC with hot lead of probe at horizontal test point (D), ground lead to chassis, keeping picture locked in with [R414] Horizontal hold control as adjustment is being made.
4. Short pin 2 of V6 (10JT8) to ground and adjust [R414] until the picture becomes as stable as possible.
5. Remove short from V6, rotate channel selector to a position on which no signal is received; then return to the original station. The picture should immediately fall into sync. If not, repeat steps 3, 4 and 5.

HORIZONTAL LINEARITY

Before attempting to adjust Horizontal Linearity coil [L406], make certain all other controls are adjusted for normal picture viewing. Using a test pattern, preferably a circle, rotate core of [L406] until it is all the way out. Then slowly turn core inward until the right hand side of test pattern (as viewed from the front) is pulled out to its maximum. When maximum is reached, reverse rotation of the core very slightly until both sides of the circle are linear. Final adjustment of the Vertical Height, Vertical Linearity and width controls may become necessary after adjusting [L406]

GENERAL

POWER SUPPLY - This receiver is designed for operation on 120 Volt, 60 cycle alternating current (AC) only. Never connect to a supply having a different frequency or voltage.

AUTOMATIC OVERLOAD LIMITER (Circuit Breaker) - By shutting off the power, the Automatic Overload Limiter on the rear of the receiver affords protection to the chassis against certain electrical overloads. Resetting, by pushing in on the RED button, may be all that is required to resume operation.

ON-OFF VOLUME - Turn on the receiver and allow approximately 30 seconds for warm-up. On models in which the ON/OFF switch is combined with the Volume control, estimate the control setting for desired volume. Additional adjustment may be desired after warm-up or program changes.

EARPHONE JACK (On Some Models - Located on rear of receiver) - Provision is made whereby an earphone attachment may be used for private listening. Insert the plug of the earphone into the jack receptacle. Use of the earphone automatically disconnects the speaker and the volume may be controlled in the normal manner.

VHF CHANNEL SELECTION - VHF channels 2 through 13 are selected by rotating the VHF channel selector knob to the desired channel. After selecting the desired channel finer tuning is obtained by rotation of the FINE TUNING KNOB. Rotating to one extreme will cause the picture to become blurred and to the opposite extreme, streaked and wavy. Rotate towards the wavy side and then turn back slightly until the picture is clear and sharp. Many models incorporate Sylvania's "Picture Prompter" which automatically maintains the best picture and sound on each VHF channel after initial fine-tuning adjustments have been made. Once properly pre-set to each local channel, additional adjustment is seldom required.

BRIGHTNESS-CONTRAST ADJUSTMENT - Rotate contrast control fully counterclockwise (minimum contrast). Adjust brightness control so that a known black object is a true black with little or no grey shading. Readjust contrast control for most pleasing picture. NOTE: once correct brightness setting has been established, it is not normally necessary to readjust the brightness control. Use the contrast control to adjust for variations in room lighting.

VERTICAL HOLD - Use this control to stop vertical movement, rolling up or down. To adjust, rotate knob until picture rolls slowly from top to bottom, then rotate in the opposite direction just beyond the point where the picture snaps in and is stable.

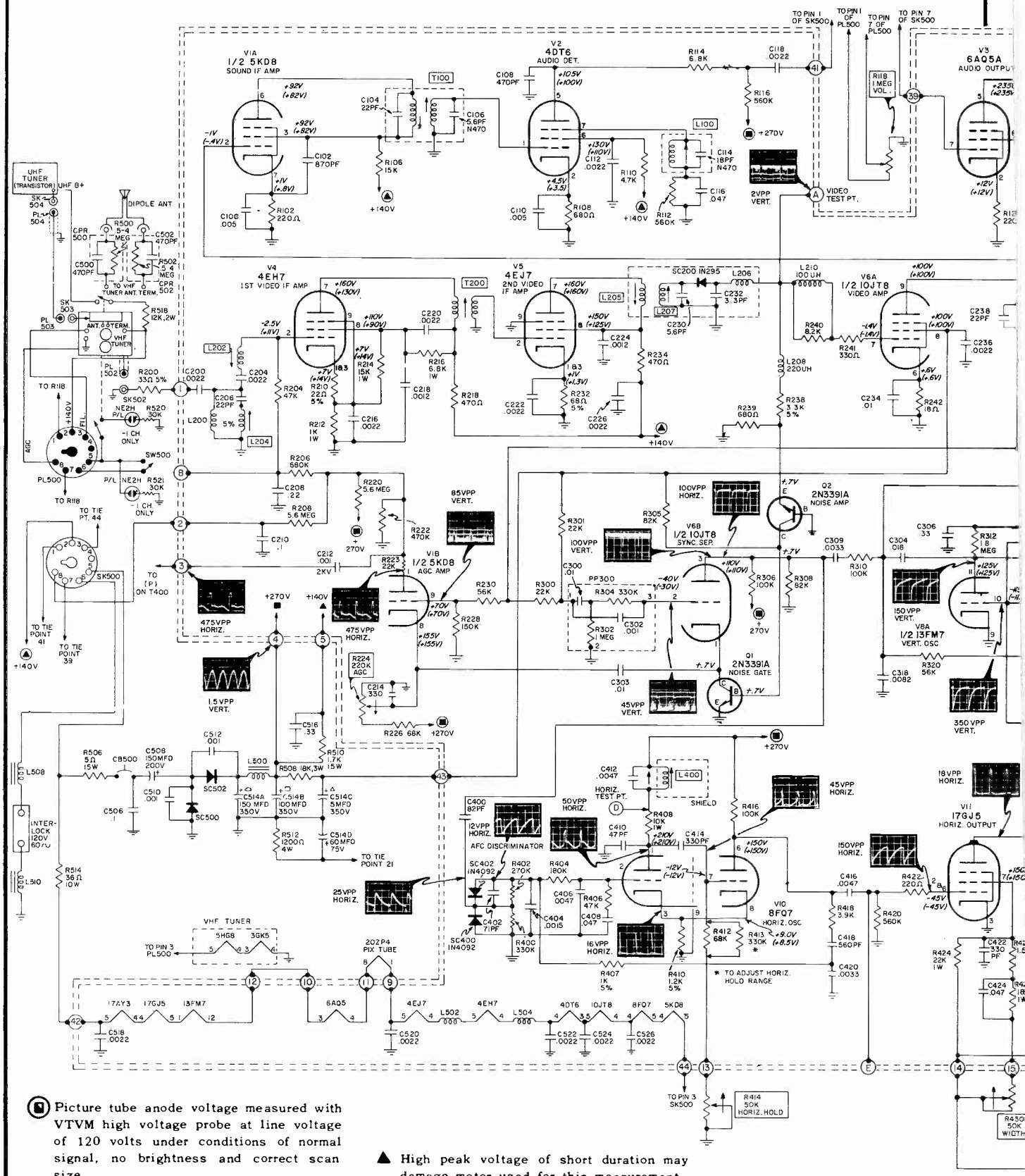
HORIZONTAL HOLD (On rear of receiver) - If the picture bends slightly, shifts horizontally, or if there are diagonal bars, adjust this control until the picture locks in and appears normal.

HEIGHT-VERTICAL LINEARITY - These two controls are interdependent. If the picture is out of proportion vertically, or compressed at top or bottom, adjust both controls until the picture assumes normal proportions. The Height Control especially affects the bottom of the picture. Linearity the top. NOTE: The Vertical Hold Control should be checked after any changes in adjustment of Height or Vertical Linearity Controls.

WIDTH - If the picture is out of proportion horizontally, adjust this control until the picture assumes normal proportion.

AGC - Use this control only if normal contrast cannot be obtained with CONTRAST Control, or if the picture is not steady. Tune in a strong channel and then rotate clockwise until the picture "jumps" or is unsteady, then back off until the picture becomes steady and normal.

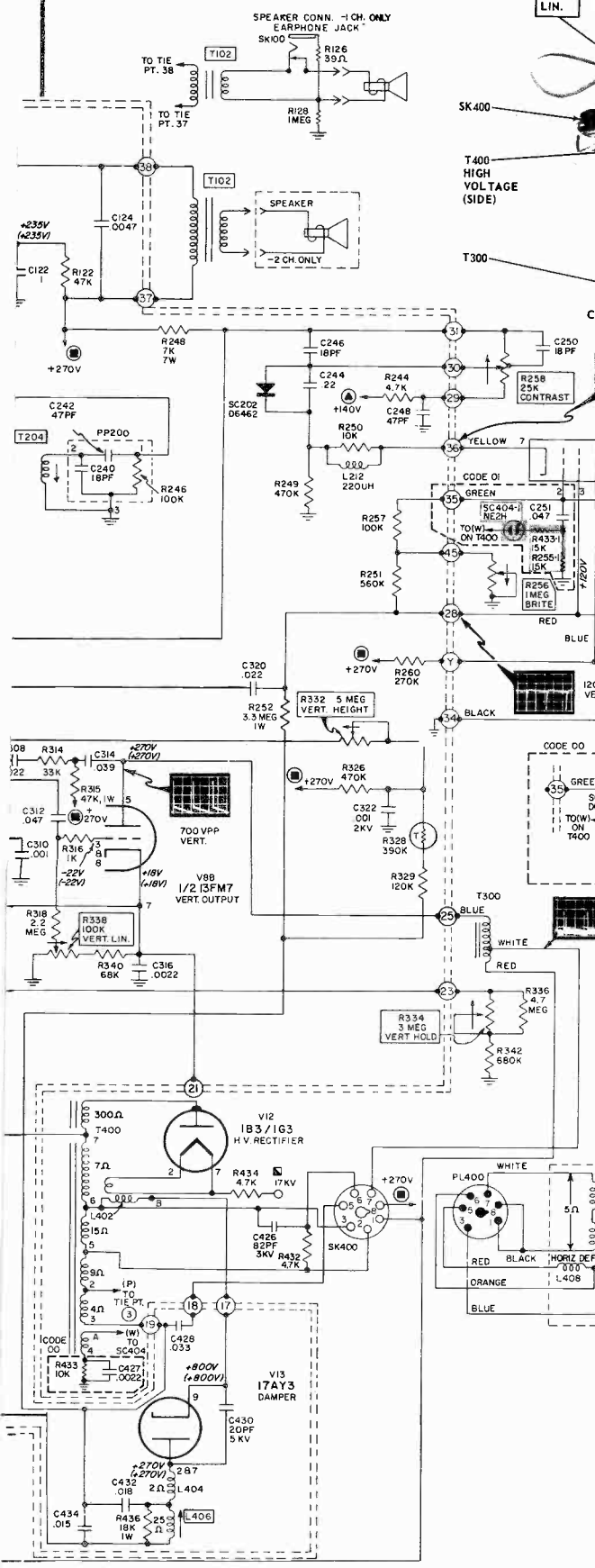
SYLVANIA Chassis B09-1, -2, Schematic Diagram, Continued

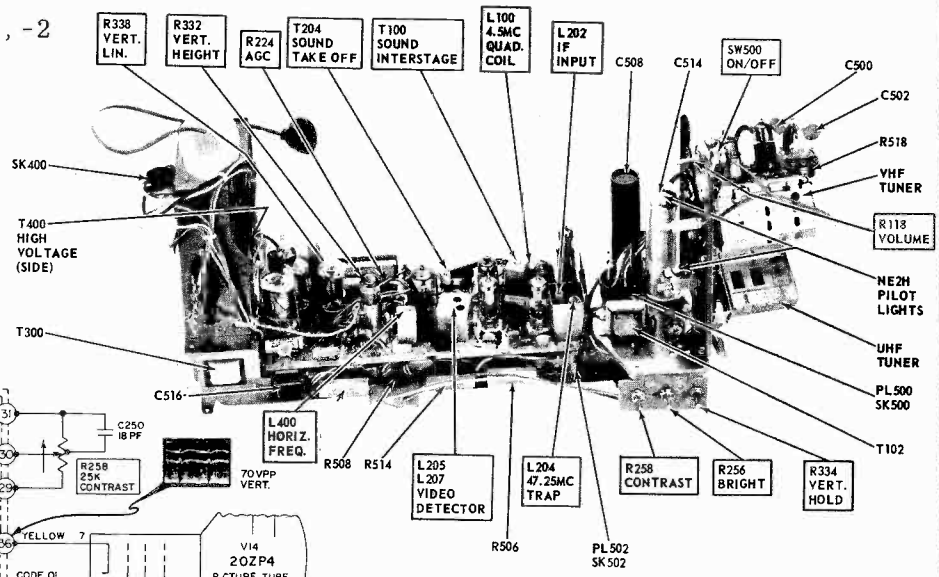


Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 120 volts under conditions of normal signal, no brightness and correct scan size.

▲ High peak voltage of short duration may damage meter used for this measurement.

SYLVANIA Chassis B09-1, -2





VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED.

1. Voltages measured to chassis using VTVM.
2. AC power source 120 volt 60 cycle line.
3. Voltage readings in brackets taken with no input; channel selector set to a free channel, antenna disconnected, antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to a strong local station developing approximately -7 volt on AGC Buss. NOTE: AGC VOLTAGE AT TEST POINT (B) WILL VARY FROM -7 VOLT ON A VERY STRONG SIGNAL TO A +20 VOLT ON A VERY WEAK SIGNAL.
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

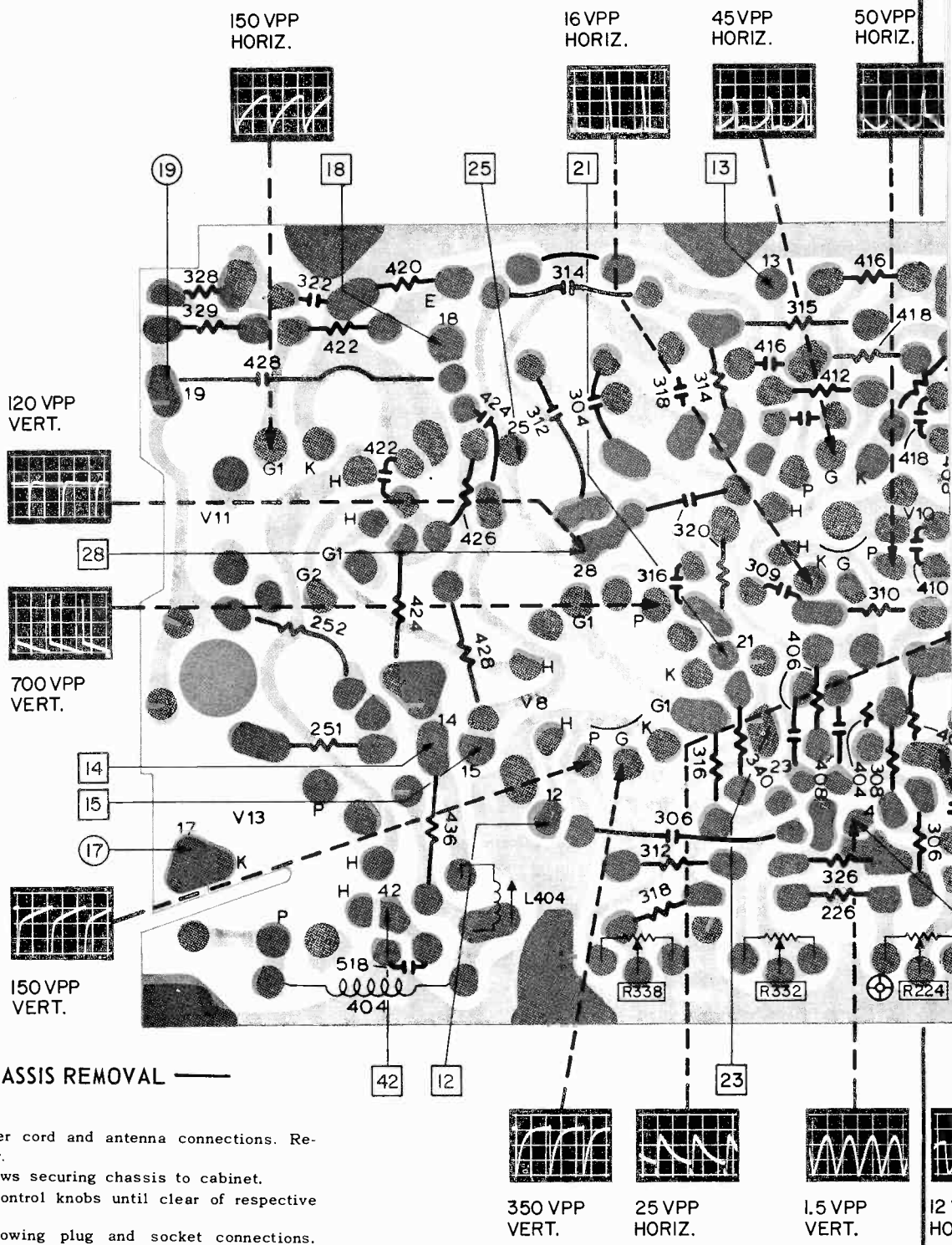
WAVEFORM MEASUREMENT CONDITIONS

1. Channel selector set to strong channel.
2. Contrast control set for signal of 70 volt peak to peak at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using a wide band oscilloscope. (Other type oscilloscopes may alter waveform shapes or amplitudes.)
4. The terms "VERT" or "HORIZ" refer to scope frequency.

GENERAL SCHEMATIC NOTES

1. Voltage sources are indicated by encircled symbols, corresponding symbols without circles indicate voltage tie points.
2. Average resistances of coils and transformers are shown and are measured with component connected in circuit.
3. Encircled numbers on edge of printed circuit indicate tie points, corresponding with those shown on parts layout of printed board.
4. All capacitors are in microfarads unless otherwise specified.
5. Coils, transformers, plugs and sockets are shown as viewed from the bottom.
6. Arrows on controls indicate direction of clockwise rotation.

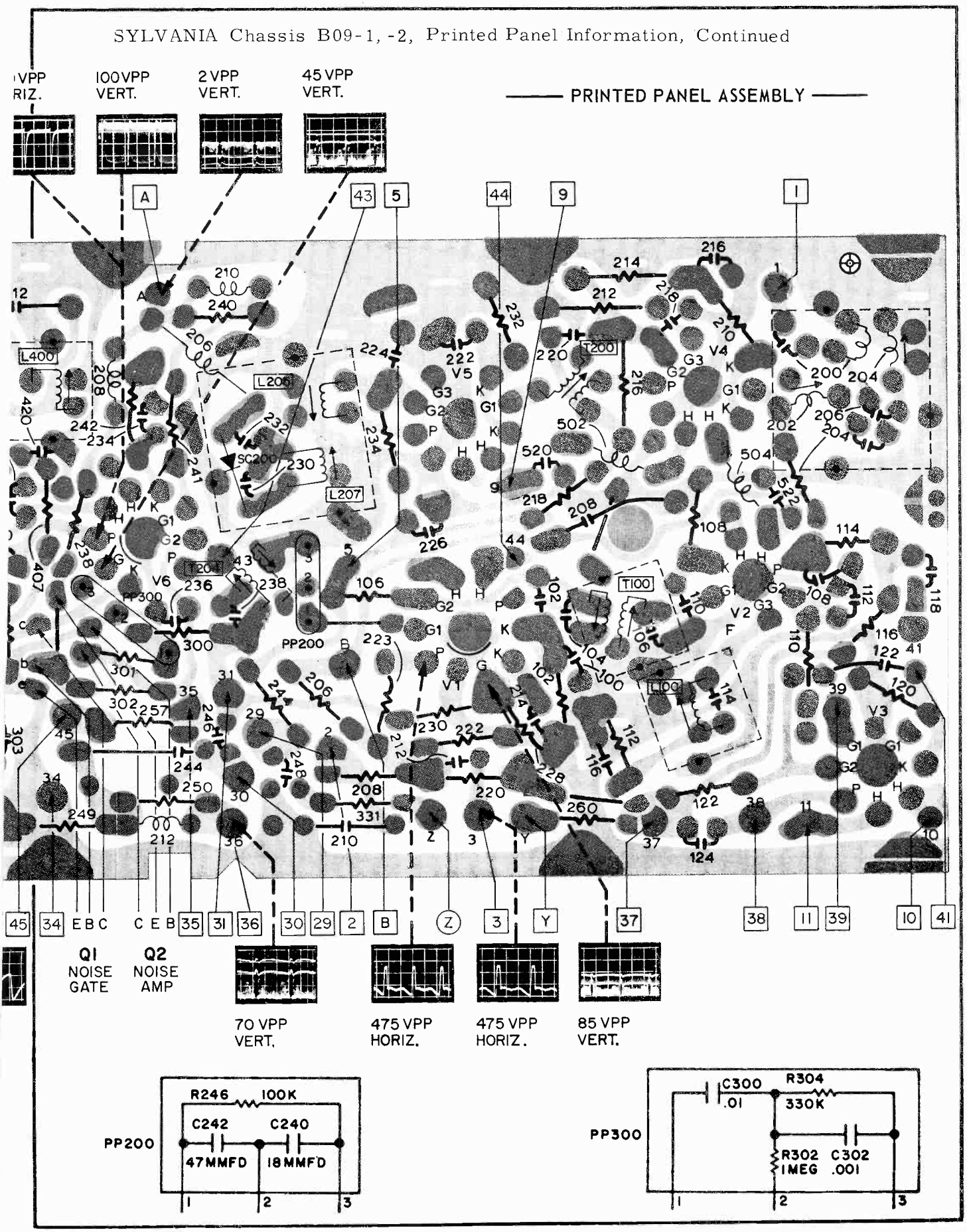
SYLVANIA Chassis B09-1, -2, Printed Panel Information



CHASSIS REMOVAL

1. Disconnect AC power cord and antenna connections. Remove interlock cover.
2. Remove two (2) screws securing chassis to cabinet.
3. Pull out on lower control knobs until clear of respective shaft.
4. Disconnect the following plug and socket connections.
   - A. Yoke - at chassis.
   - B. Tuner cluster - at chassis.
   - C. Picture Tube Cable - at picture tube.
   - D. High Voltage Lead - at picture tube
   - E. IF Input - at chassis.
   - F. Speaker Leads - at speaker
   - G. Wire Braid - at chassis.
5. Remove chassis mounting screws.
6. Slide chassis to rear until clear from cabinet.
7. Remove tuner cluster knobs by pulling straight outward.
8. Remove tuner mounting screw securing tuner cluster to cabinet.
9. Lift tuner cluster upward slightly and then back. Remove tuner cluster.
10. To replace chassis, reverse the above procedure, making certain to engage lower control knobs.

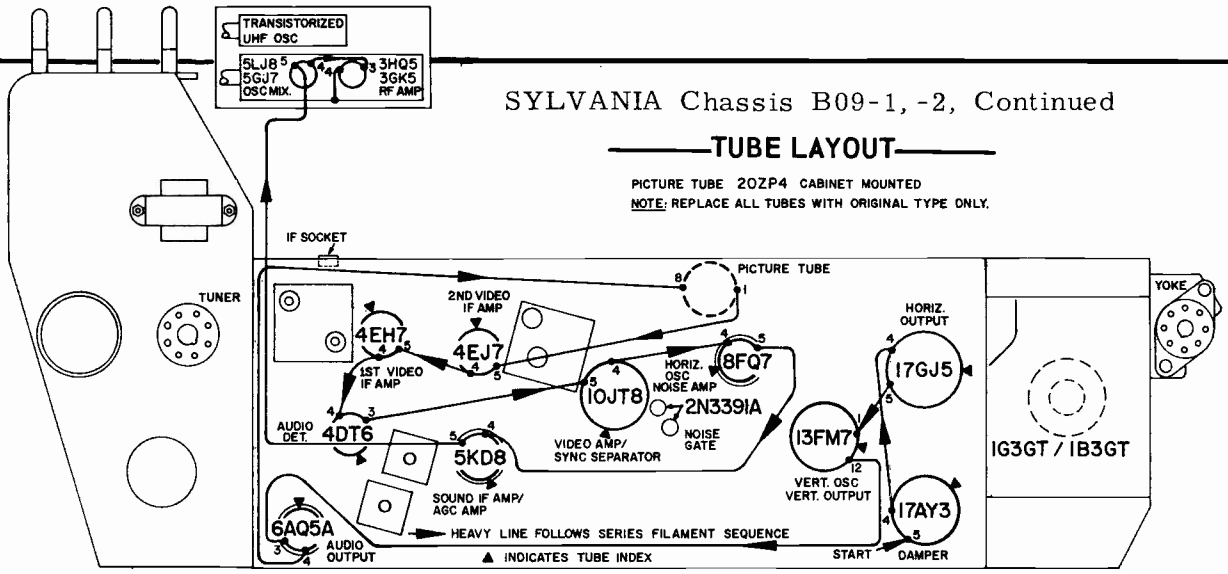
NOTE: To remove yoke, loosen screw on yoke retaining ring. Slide yoke to the rear until clear from the neck of the picture tube. To replace yoke reverse the above procedure, being careful not to strike the neck of the picture tube.


PRINTED PANEL ASSEMBLY
VPP RIZ.
100VPP VERT.
2 VPP VERT.
45 VPP VERT.
Q1 NOISE GATE
Q2 NOISE AMP
70 VPP VERT.
475 VPP HORIZ.
475 VPP HORIZ.
85 VPP VERT.
PP200
R246 100K
C242 47MMFD
C240 18MMFD
PP300
C300 .01
R304 330K
R302 1MEG
C302 .001

TUBE LAYOUT

PICTURE TUBE 20ZP4 CABINET MOUNTED

NOTE: REPLACE ALL TUBES WITH ORIGINAL TYPE ONLY.



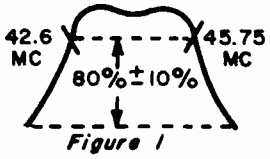
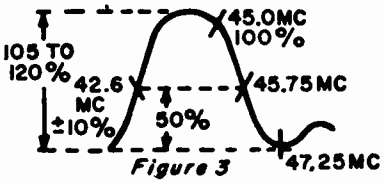
ALIGNMENT PROCEDURE

VIDEO IF, SOUND IF AND 4.5 MC TRAP ALIGNMENT PROCEDURES

PRELIMINARY INSTRUCTIONS

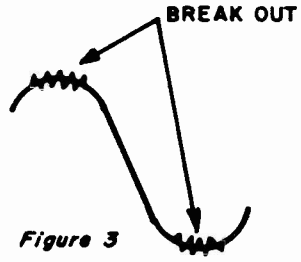
1. Line voltage should be maintained at 120 volts.
2. Keep marker generator coupling at a minimum to avoid distortion of the response curve.
3. Do not use tubular capacitors for coupling sweep into receiver. Disc ceramics are best.
4. For best results, solder the sweep generator ground to chassis, do not use clips.
5. Sweep generator "hot" lead must make good electrical contact at all points given under TEST EQUIPMENT HOOK -UP.
6. Adjust sweep generator output for maximum peak-to-peak response curve on the scope.
7. Receiver and test equipment should warm up for approximately 15 minutes before alignment.

VIDEO IF ALIGNMENT

STEP	ALIGNMENT SET - UP NOTES	TEST EQUIPMENT HOOK - UP	ADJUST
1	Set VHF tuner to a free channel that does not disturb the response curve. Short point (B) to ground and connect a -10V DC source to tie point (2). Connect - 30 volt DC source (-) terminal to pin 2 of V10 (+) terminal to chassis.	SWEEP GENERATOR - Through a .002 MFD capacitor to pin 2 of V5. Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - Loosely coupled as a marker to sweep generator lead. OSCILLOSCOPE - Through a 10K resistor connected to test point (A)	L205 and L207 so that the 42.6 MC marker and the 45.75 MC marker are of equal amplitude. See Figure 1.  *Figure 1* L205 Positions marker amplitude. L207 Adjusts for tilt.
2	Same as Step 1. *Figure 2*	SWEEP GENERATOR - Through a .002 MFD capacitor to IF test point on tuner. Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - Same as Step 1. OSCILLOSCOPE - Same as Step 1.	T200 so that both the 42.6 MC and 45.75 MC markers are of equal amplitude and at 55% of response curve. See Figure 2.
3	Same as Step 1.  *Figure 3*	SWEEP GENERATOR - Same as Step 2. SIGNAL GENERATOR - Same as Step 1. OSCILLOSCOPE - Same as Step 1.	L204 for maximum dip at 47.25 MC TUNER MIXER COIL - To position 45.75 MC marker at 50% of response curve while 45 MC marker is maintained at 100%. L202 To obtain response as shown in Figure 3. Top of response curve should be smooth and rounded and should rise from 105% to 120%.

ALIGNMENT PROCEDURE (CONTINUED)

4.5 MC TRAP AND SOUND IF ALIGNMENT

STEP	ALIGNMENT SET - UP NOTES	TEST EQUIPMENT HOOK - UP	ADJUST
1	Set contrast control to maximum. Connect - 30 volts DC source (-) terminal to test point (B) and pin 2 of V10 (+) terminal to chassis.	SIGNAL GENERATOR - Through a .0047 MFD capacitor to test point (A). Set signal generator to 4.5 MC, preferably crystal calibrated or controlled, with at least 100 millivolts output. VTVM - Through detector network shown in Figure 1, to cathode of picture tube - tie point (36).	Separate cores of [T204] then Adjust top core of [T204] for minimum reading on meter.
2	Same as Step 1.	SIGNAL GENERATOR - Same as Step 1. VTVM - Through detector network shown in Figure 2. to pin 7 of 4DT6	[T100] Bottom core [T100] Top core [T204] Bottom core For maximum meter reading using weakest possible signal.
3	Same as Step 1.  *Figure 3*	SIGNAL GENERATOR - Same as Step 1. OSCILLOSCOPE - Through .0047 MFD capacitor to tie point (41).	With core of [L100] at the top of coil form, rotate core inward (clockwise). (NOTE: Coil has two (2) peaks of resonance). Tune through the first peak and adjust the core for maximum amplitude on the second peak. Decrease signal strength until break out occurs, then readjust top core of [T100] until break out occurs simultaneously on both peaks. See Figure 3.
4	Remove all test equipment leads etc. Connect antenna and check receiver on a strong local station.		

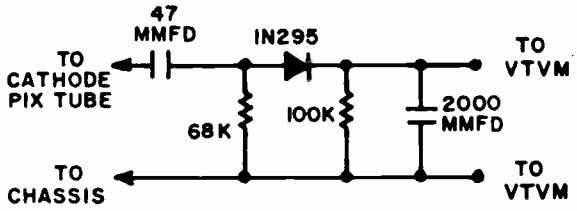


Figure 1

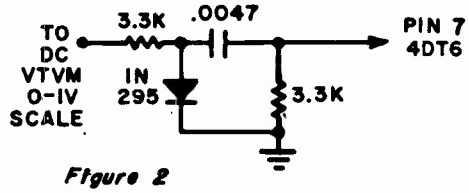


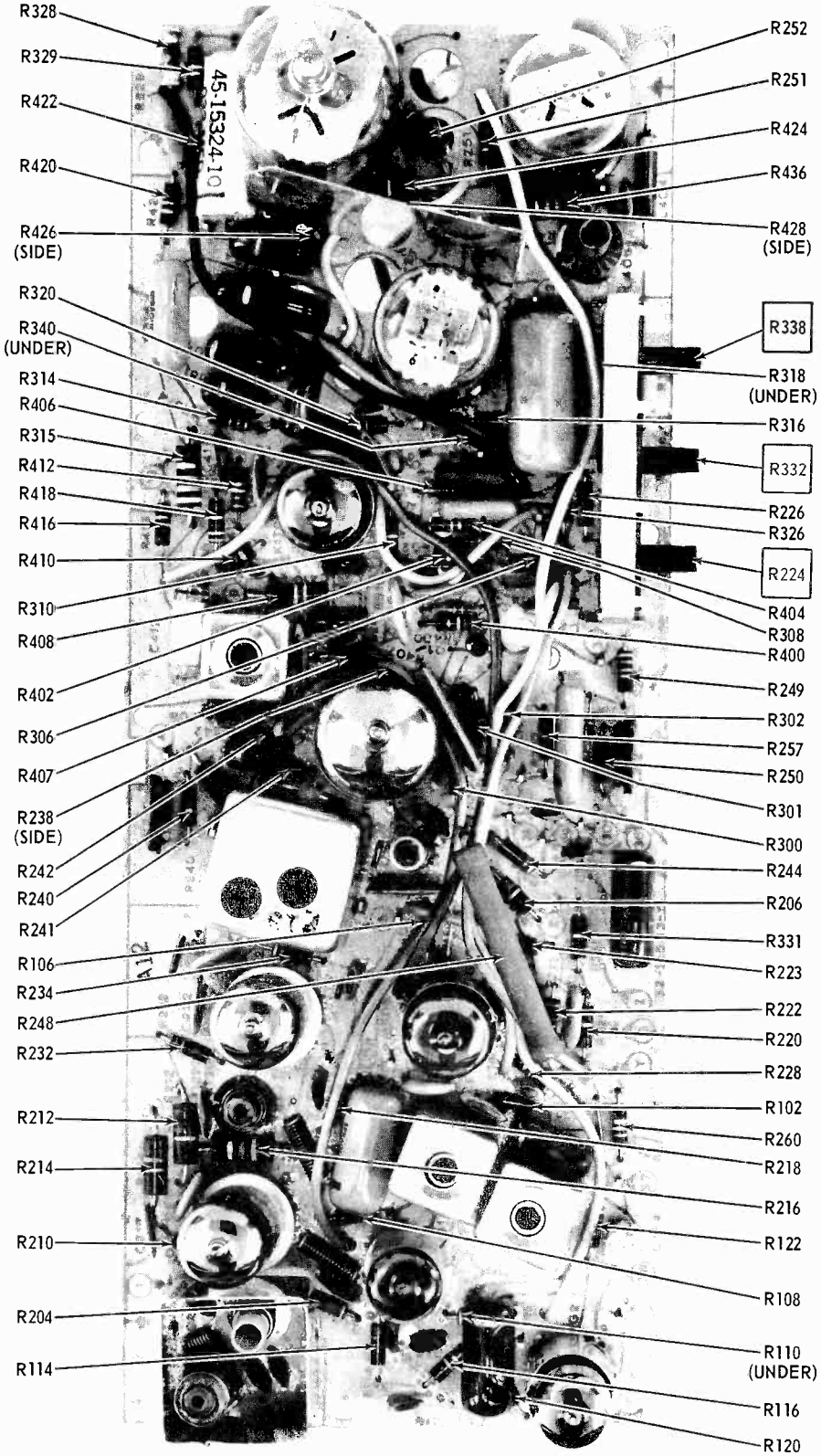
Figure 2

ALTERNATE SOUND ALIGNMENT USING TRANSMITTED SIGNAL

Tune in strongest available channel and adjust for best picture. Turn AGC control clockwise until picture begins to distort and adjust [L100] for best sound and minimum buzz. Use tuning point where core is closest to chassis board.

Turn AGC counterclockwise until sound gets weak and noisy. Adjust [T100] top and bottom core and [T204] bottom core for loudest and clearest sound and minimum hiss.

PRINTED PANEL ASSEMBLY



RESISTORS

Westinghouse

MODEL AND CHASSIS CHART

MODEL	CHASSIS	CABINET STYLE	TUNERS USED	INSTANT ON	CRT
BT23A18A BT92A18A	V2659-1	Antique Gold	VHF 470V177D01	No	23HRP4 110°
BT23A38A BT92A38A	V2659-2	Walnut Grain	UHF 472V060D01	Yes	

CHASSIS REMOVAL

The speaker and CRT remain in the cabinet.

1. Remove the front knobs.
2. Remove the back cover. The horizontal hold knob remains with the back cover.
3. Remove the screws holding the antenna terminal board to the cabinet.
4. Unhook the dag spring at the chassis end.
5. Unsolder the speaker leads at the transformer.
6. Remove the CRT socket, and loosen the yoke. The yoke is removed with the chassis.
7. Discharge and disconnect the anode lead at the CRT.
8. Remove the tuner and control panel assembly by removing the screws holding it to the cabinet mounting brackets.
9. Remove the screws holding the chassis to the cabinet.
10. Remove the chassis.
11. When replacing the back cover be sure the horizontal hold extension shaft engages the knob in the back cover.

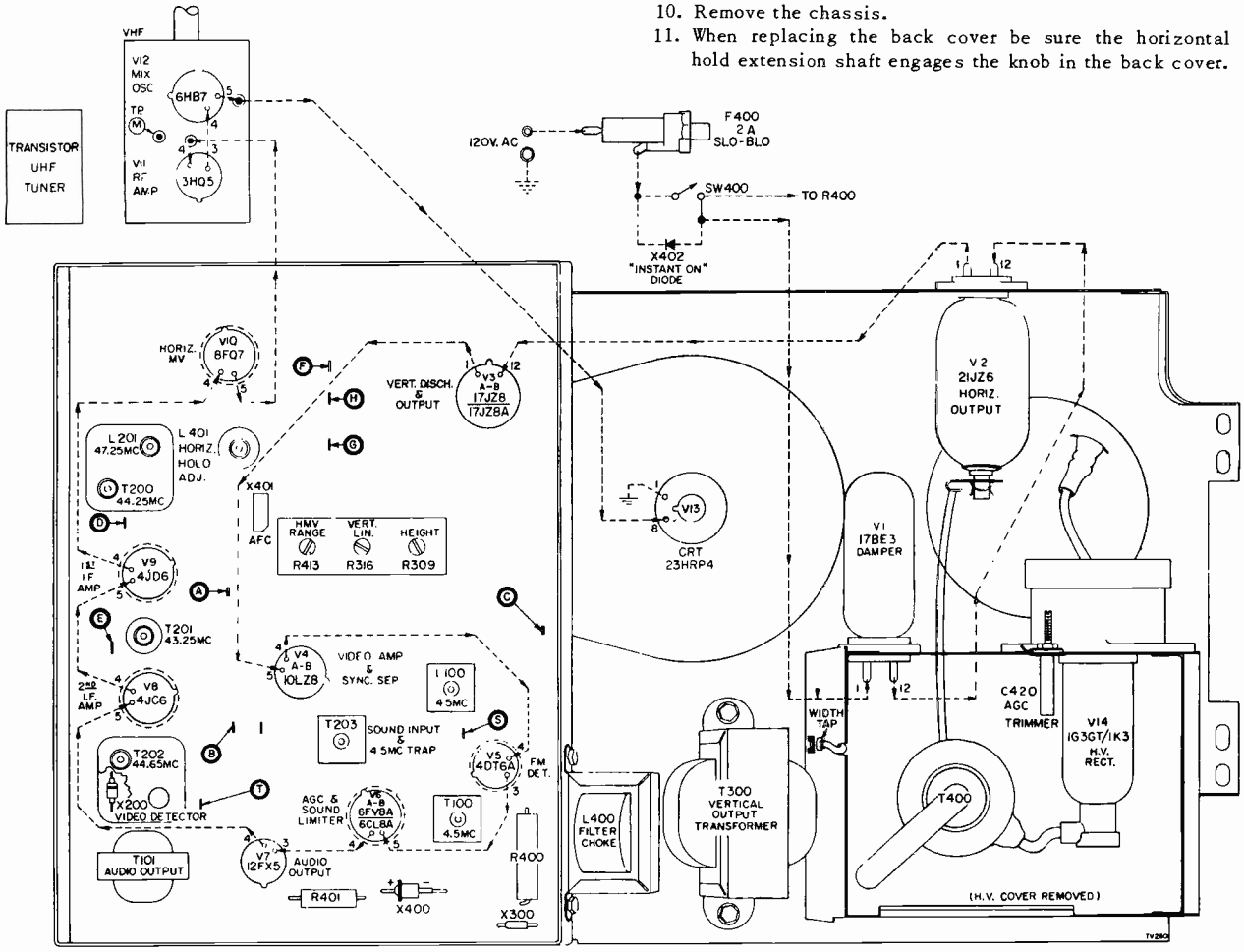


Figure 1 – Rear View TV Chassis

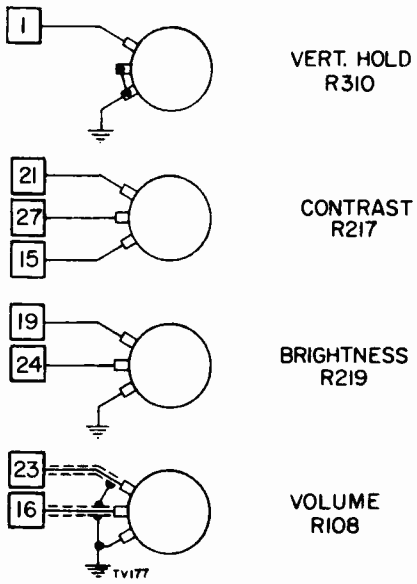


Figure 4 – Control Wiring Diagram

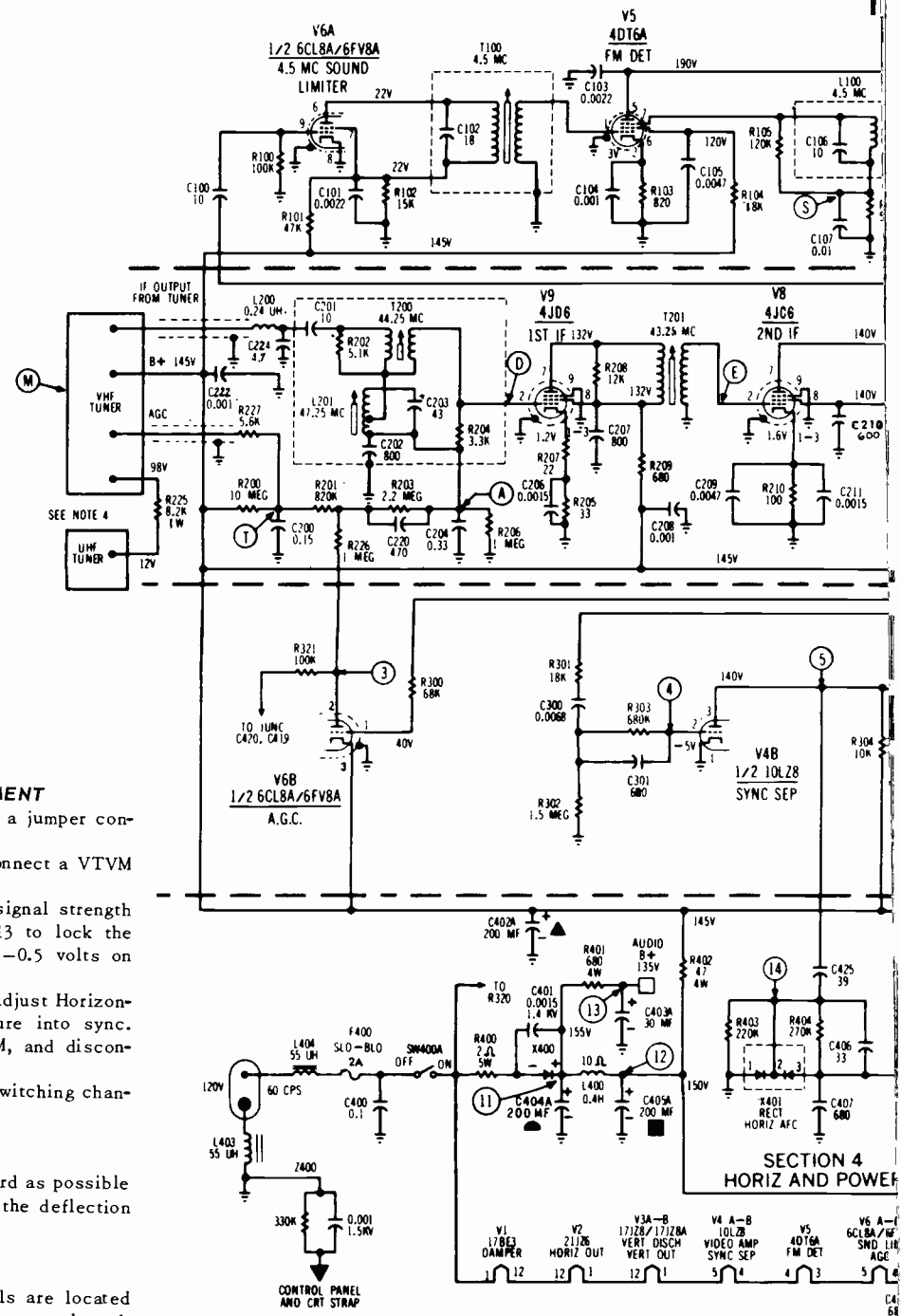
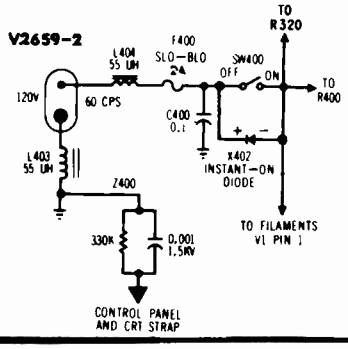


Figure 3 – Schematic Diagram V2659



ADJUSTMENTS

HORIZONTAL RANGE AND HOLD ADJUSTMENT

1. Short out Horizontal Hold coil L401 with a jumper connected across 'G' – 'H'.
2. With the meter zero set at center scale, connect a VTVM (1.5V range) across 'F' and 'B'.
3. Tune the receiver to a station of normal signal strength and adjust Horizontal Range control R413 to lock the picture into sync. Then adjust R413 for –0.5 volts on the VTVM.
4. Remove the jumper across 'G' & 'H', and adjust Horizontal Hold control L401 to lock the picture into sync.
5. Adjust L401 for –0.5 volts on the VTVM, and disconnect the VTVM.
6. Verify the horizontal sync adjustment by switching channels.

DEFLECTION YOKE

The deflection yoke should be as far forward as possible (touching the bell of the CRT). Rotation of the deflection yoke is used to level the raster.

HEIGHT AND VERTICAL LINEARITY

The Height and Vertical Linearity controls are located on the PC board, and are accessible for adjustment through the back cover.

With a narrow screwdriver, adjust these controls alternately until a picture of proper height and linearity is obtained.

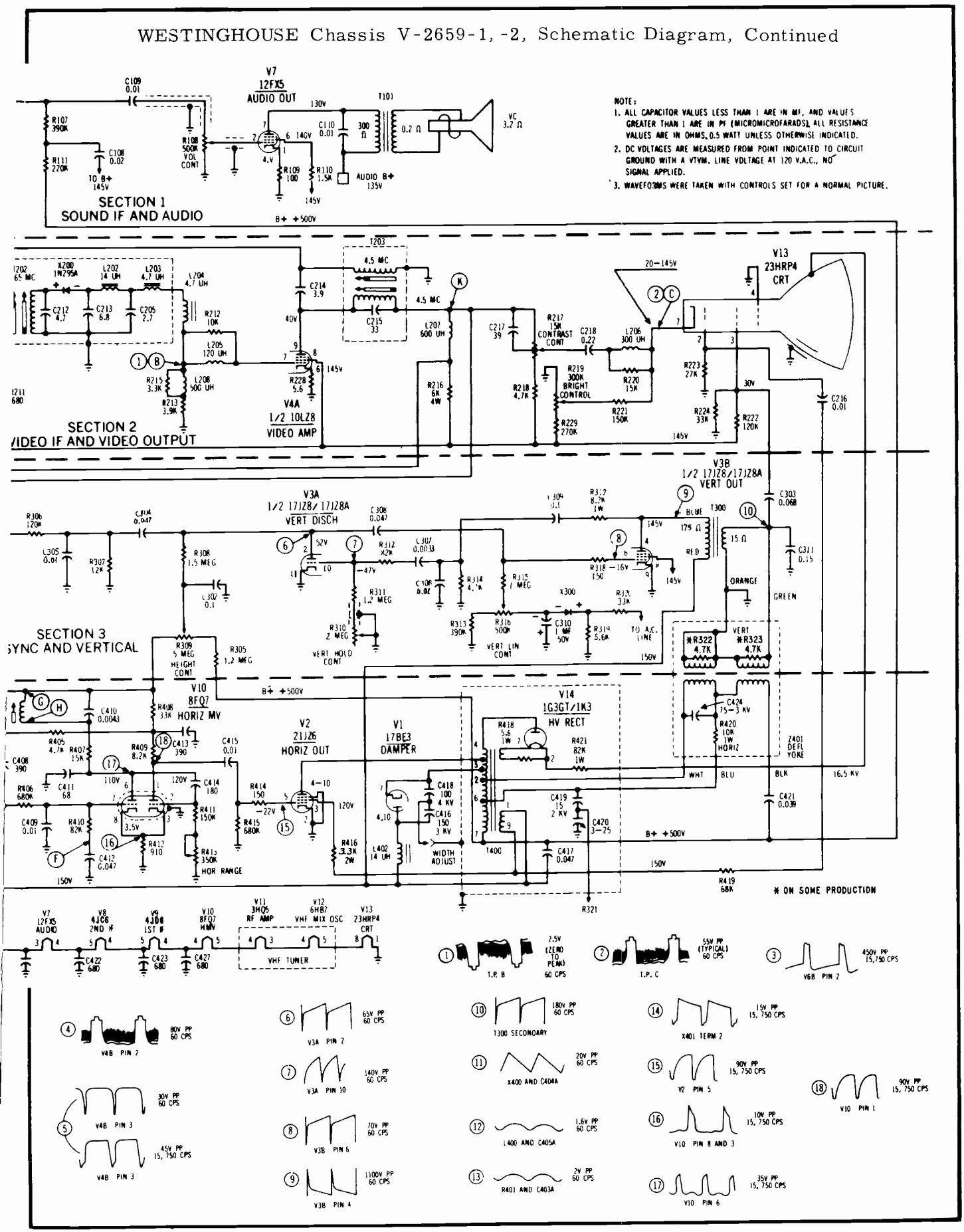
AGC ADJUSTMENT

Tune in the stronger station. Adjust C420 with a screwdriver until the picture bends at the top. Then turn the screw back slightly until the bend disappears.

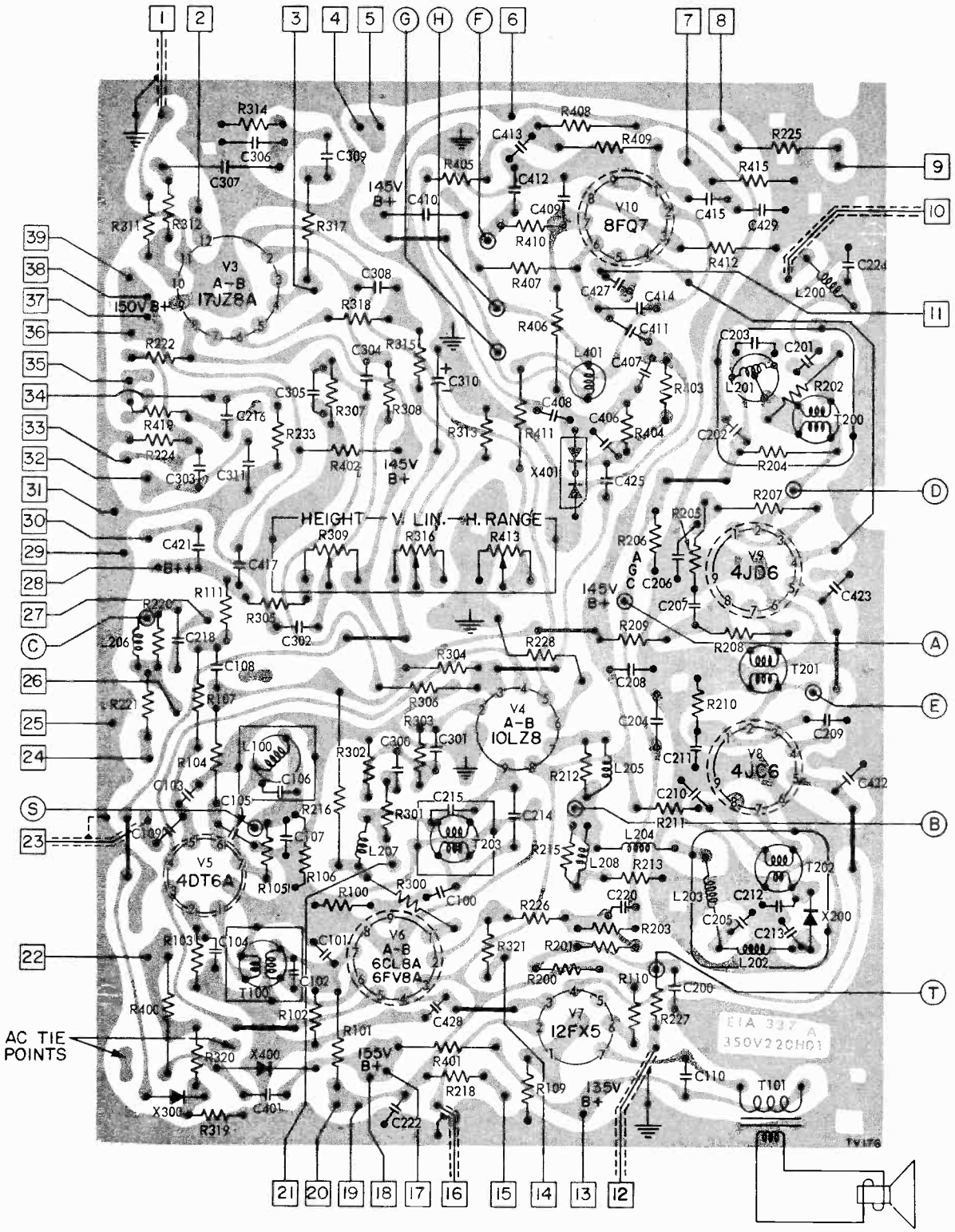
CENTERING

The centering rings, located at the rear of the deflection yoke, should be rotated to center the raster.

WESTINGHOUSE Chassis V-2659-1, -2, Schematic Diagram, Continued



WESTINGHOUSE Chassis V-2659-1, -2, Printed Board Information



Bottom View of PC Board. Top Components are Shown In Solid Outline.
Tube Pin Numbering is For Bottom of Socket.
Squared Numbers Refer to PC Board Call-Outs
Circled Letters Refer to Test Points

SOUND ALIGNMENT

EQUIPMENT: VTVM
PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L100) for maximum sound from the speaker.
3. Disconnect the antenna. Use a jumper wire to short TP (B) to B–.
4. Connect the VTVM to TP (S).
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to Short TP (B) to B–.
7. Place the antenna input close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.
8. Adjust the limiter input coil (T203 top slug) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna and turn contrast control to maximum clockwise. Inject a 4.5 MC CW signal through a .001mf capacitor to TP (B). Connect a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to TP (C). Set the VTVM to 1.5-2V DC range. Turn the set on and allow ten minutes for warmup. Then adjust T203 bottom slug for minimum on the VTVM.

IF ALIGNMENT

EQUIPMENT

1. ***Sweep Generator*** with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. ***CW (Marker) Generator*** which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. ***Oscilloscope*** with good low frequency response characteristics.
4. ***VTVM.***
5. ***Bias Supply*** of –2.0 volts and –3 volts.
6. ***Standard Alignment Tool*** with a 3/32" hexagonal tip (long enough to reach bottom slugs)

TERMINATION AND ADJUSTMENT OF EQUIPMENT

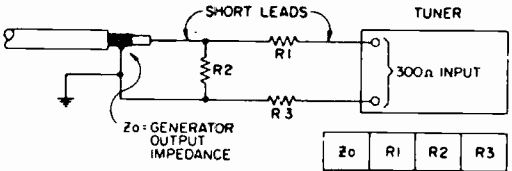
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 7. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring –1.5 volts.

Generators – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 6. Connect the signal cable ground near the ground of the stage where the signal is injected.

Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the –1 volt point. (2) When the oscilloscope is being used, the marker frequencies do not distort the response curve.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 5 – Impedance Matching Network

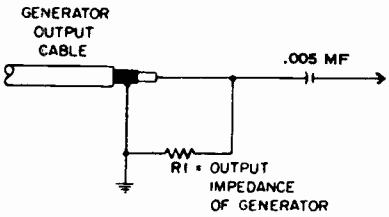


Figure 6 – Generator Cable Termination.

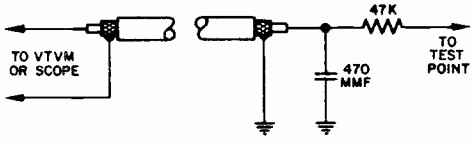


Figure 7 – VHF Decoupling Network.

P.C. BOARD LEGEND

1. R310, vertical hold, high end
2. Pin 1 of 21JZ6 filament
3. T300, vertical transformer, blue
4. Tuner filament
5. Pin 8 or CRT, filament
6. Tuner B+, 145-volts
7. R414, horizontal drive
8. B+ from VHF tuner
9. B+ to UHF tuner
10. IF input from VHF
11. Tuner filament
12. AGC to tuner
13. C403A, audio B+, 135 volts
14. C419 and C420, AGC pulse
15. R217, contrast, low end
16. R108, arm of volume control
17. C404A, B+ filter
18. L400 filter choke
19. R219, brightness control, B+
20. C402A, B+ filter
21. R217, contrast control, high end
22. SW400, AC switch
23. R108, volume control, high end
24. R219, brightness control, arm
25. Pin 4 of CRT
26. Pin 7 of CRT
27. R217, contrast control arm
28. T400, lug 7, B++
29. T300, vertical transformer ground
30. Z401, yoke, black
31. Z401, ground
32. Z401 and T300, vertical blanking
33. Pin 3 or CRT
34. Pin 2 of CRT
35. T400, lug 9
36. L400, B+ filter choke
37. L402, damper choke
38. C405A, B+
39. T300, vertical transformer, red

TEST POINTS

A AGC for IF
B Video detector
C CRT cathode
D 1st IF input
E 2nd IF grid
F Horizontal MV
G Horiz adj coil
H Horiz adj coil
M Mixer grid (Tuner)
S Quad coil
T AGC for tuner

IF ALIGNMENT

Step	*Test Equipment and Connection*	*Adjustment*
1.	−3 bias to TP (A) and −2V bias to TP (T). Short antenna terminals. Channel selector to channel 10. Connect jumper from Pin 2 of V6B to B− to disable the AGC pulse.	
2.	Oscilloscope and VTVM to TP (B) IF sweep generator with CW marker to TP (E) a. 44.65 MC b. 45.75 MC.	a. T202 primary (top slug): Maximum amplitude on VTVM. T202 secondary (bottom slug): Rocking symmetrical response at 44.65 MC. b. Place 45.75 MC marker at 70% of peak response (see Figure 8 for waveshape and marker placement).
3.	CW generator to TP (D). a. 43.25 MC	a. T201: Maximum amplitude on VTVM.
4.	CW generator to TP (M). a. 44.25 MC. b. 44.25 MC. c. 47.25 MC. It may be necessary to increase generator output and/or decrease bias.	a. Tuner mixer output coil: Maximum on VTVM. b. T200: Maximum on VTVM. c. L201: Minimum on VTVM.
5.	Connect sweep generator to TP (M) at 44.25 MC. Couple CW generator with marker at 44.25 MC to sweep generator cable. Keep marker amplitude low to avoid distorting response. Adjust scope for 2V PP.	Mixer output coil for maximum amplitude. T200 for "rocking symmetrical response with waveshape and markers" as shown in Figure 10.
6.	CW generator to TP (M) at 47.25 MC.	Repeat step 4c.
7.	Oscilloscope, 2V PP. Sweep generator thru impedance matching network (see Figure 5) to antenna terminals. Set pix marker at 211.25 MC, channel 13. Inject 45.75 MC marker into IF section by connecting CW output cable to outer shield of IF link cable.	Fine tuning to center of range Channel selector to channel 13. Oscillator slug setting: Picture carrier should fall at 45.75 MC (± 300 KC) marker on scope. (See Figure 11).
8.	Repeat step 7 for all channels in descending order.	

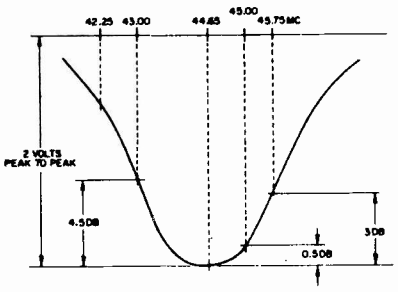


Figure 8 – Typical IF Response, 2nd IF Amp Grid to 2nd Det.

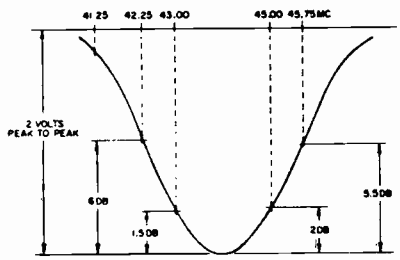


Figure 9 – Typical IF Response, 1st IF Amp Grid to 2nd Det.

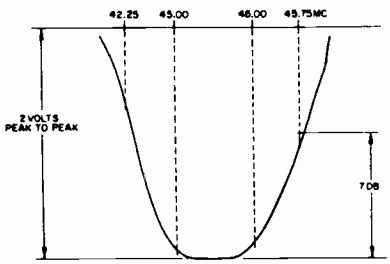


Figure 10 – Typical IF Response, Mixer Amp Grip to 2nd Det.

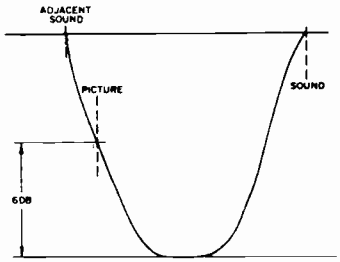


Figure 11 – Typical RF-IF Response

Westinghouse

MODEL AND CHASSIS CHART

MODEL	CHASSIS	TUNERS	FEATURES	CRT
BP-21A58A	V-2486-6	470V179D01 VHF 472V060D05 UHF	Instant On	21GAP4 (banded) 114°
BP-19A470	V-2486-14	470V159D02 VHF 472V051D01 UHF	Instant On	19FEP4A (banded) 114°
BP-19A670	V-2486-13	470V160D02 VHF 472V051D02 UHF	Instant On	19FEP4A (banded) 114°

CHASSIS REMOVAL, V2486-6

The speaker and CRT remain in the cabinet.

1. Remove the fully exposed front knobs. The VHF dial remains with the chassis on some models.
2. Remove the back cover. The horizontal hold knob remains with the back cover.
3. Disconnect the antenna lead at the antenna.
4. Unsolder the speaker leads at the transformer.
5. Remove the CRT socket, loosen the yoke and remove the width insert if one is used. The yoke is removed with the chassis.
6. Discharge and disconnect the anode lead at the CRT.
7. Raise the handle to carry position.
8. Remove the tuner and control panel assembly by removing the screws holding it to the cabinet mounting brackets.
9. Remove the screws holding the chassis to the cabinet.
10. Remove the chassis.
11. When replacing the back cover be sure the horizontal hold extension shaft engages the knob in the back cover.

PICTURE TUBE REMOVAL

When replacing a Steel-Guard picture tube, use only an Exact Replacement tube.

1. Remove the chassis.
2. Place the cabinet face down on a soft cloth.
3. Loosen the screw that holds the wire retaining ring around the CRT (see Figure 2).
4. Remove the four corner retainers from the cabinet, each held with 2 screws.
5. Remove the retaining ring together with the four retainers.
6. Carefully remove the picture tube.

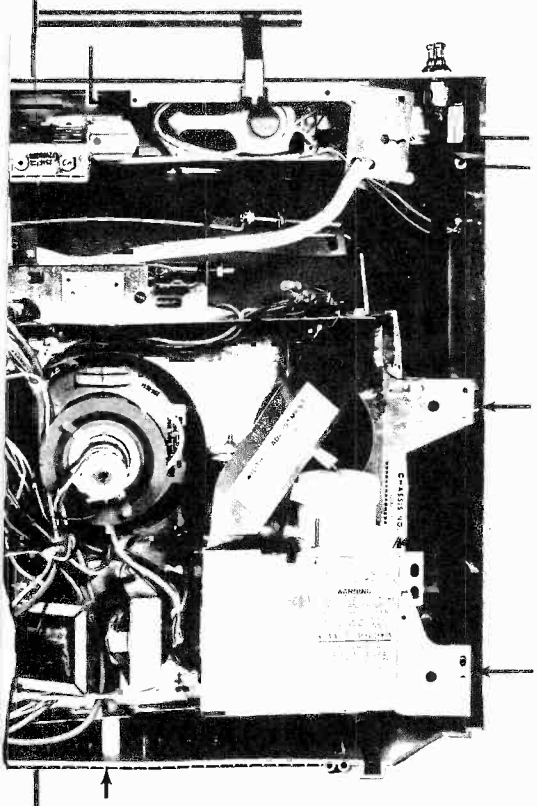


Figure 1 Chassis removal, showing screws

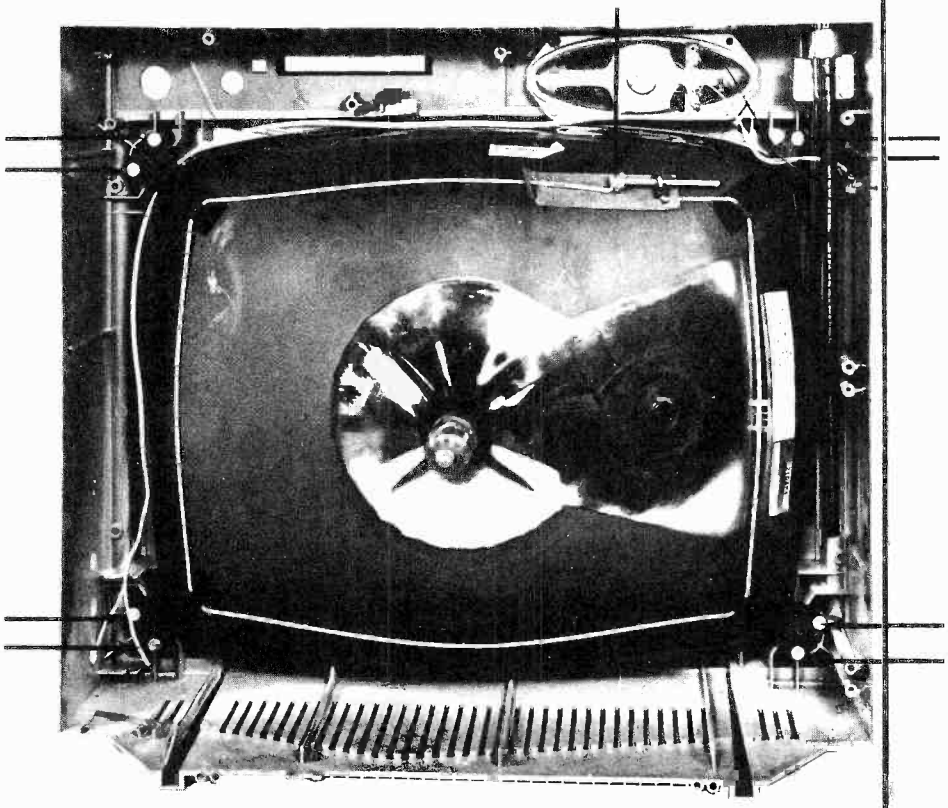
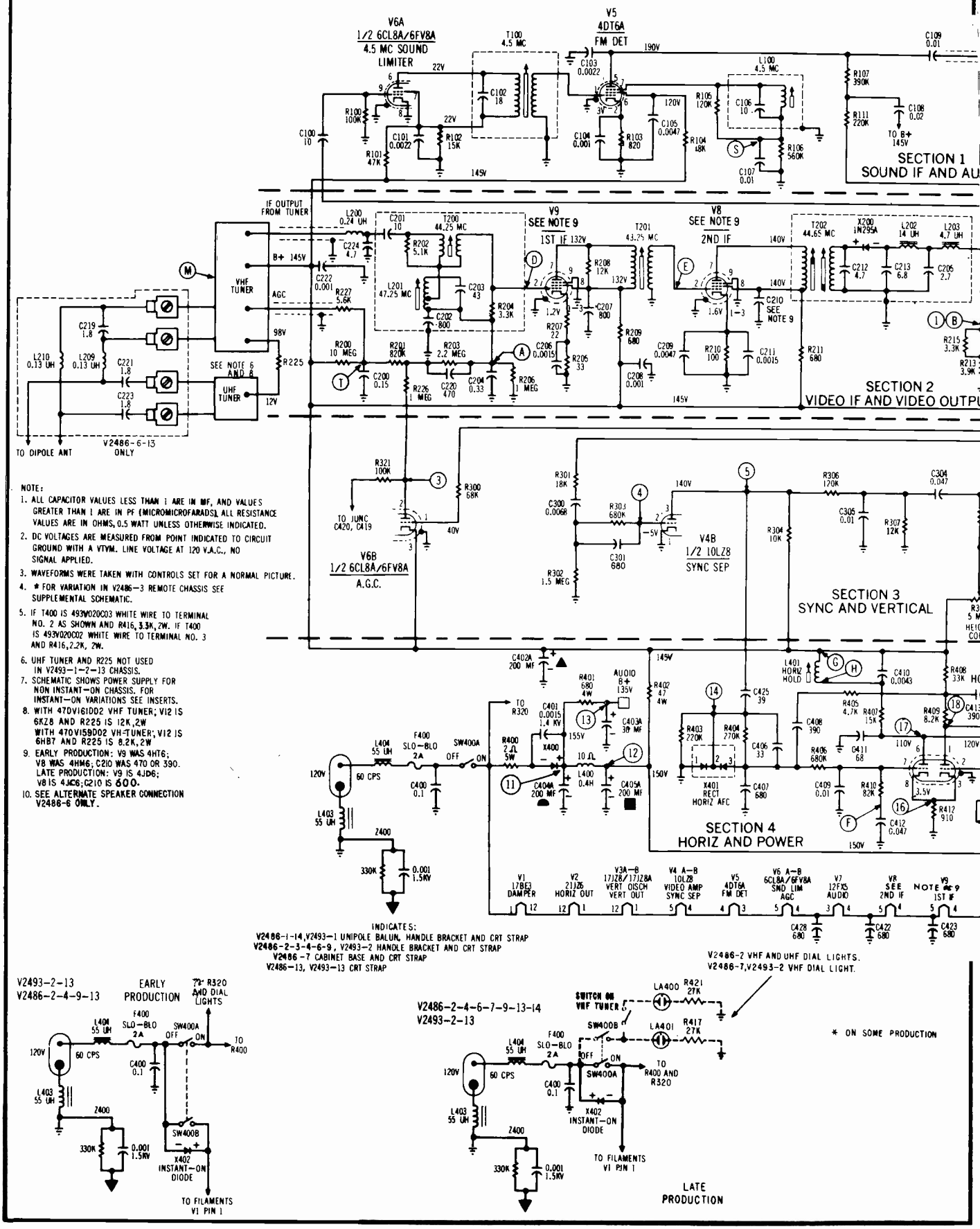


Figure 2 CRT removal, showing retaining screws

WESTINGHOUSE Chassis V-2486, V-2493, Schematic Diagram



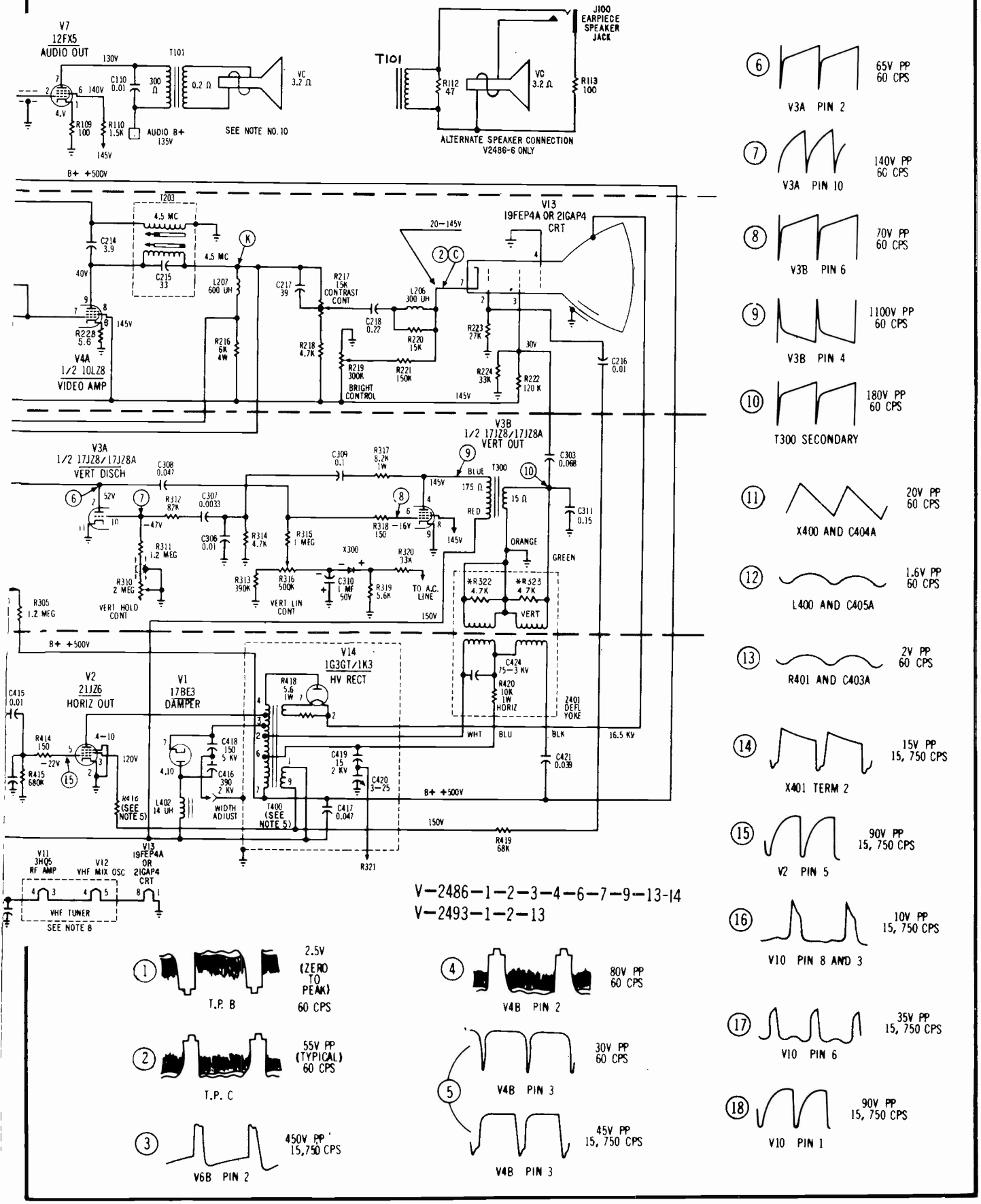
NOTE:

1. ALL CAPACITOR VALUES LESS THAN 1 ARE IN MF, AND VALUES GREATER THAN 1 ARE IN PF (MICROMICROFARADS). ALL RESISTANCE VALUES ARE IN OHMS, 0.5 WATT UNLESS OTHERWISE INDICATED.
2. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CIRCUIT GROUND WITH A VTVM. LINE VOLTAGE AT 120 V.A.C., NO SIGNAL APPLIED.
3. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE.
4. * FOR VARIATION IN V2486-3 REMOTE CHASSIS SEE SUPPLEMENTAL SCHEMATIC.
5. IF T400 IS 493V020C03 WHITE WIRE TO TERMINAL NO. 2 AS SHOWN AND R416, 3.3K, 2W. IF T400 IS 493V020C02 WHITE WIRE TO TERMINAL NO. 3 AND R416, 2.2K, 2W.
6. UHF TUNER AND R225 NOT USED IN V2493-1-2-13 CHASSIS.
7. SCHEMATIC SHOWS POWER SUPPLY FOR NON INSTANT-ON CHASSIS. FOR INSTANT-ON VARIATIONS SEE INSERTS.
8. WITH 470V161DD2 VHF TUNER; V12 IS 6KZ8 AND R225 IS 12K, 2W WITH 470V159D02 VH-TUNER; V12 IS 6HB7 AND R225 IS 8.2K, 2W
9. EARLY PRODUCTION: V9 WAS 4HT6; V8 WAS 4HM6; C210 WAS 470 OR 390. LATE PRODUCTION: V9 IS 4JD6; V8 IS 4JC6; C210 IS 600.
10. SEE ALTERNATE SPEAKER CONNECTION V2486-6 ONLY.

INDICATES:
V2486-1-14, V2493-1 UNIPOLE BALUN, HANDLE BRACKET AND CRT STRAP
V2486-2-3-4-6-9, V2493-2 HANDLE BRACKET AND CRT STRAP
V2486-7 CABINET BASE AND CRT STRAP
V2486-13, V2493-13 CRT STRAP

V2486-2 VHF AND UHF DIAL LIGHTS.
V2486-7, V2493-2 VHF DIAL LIGHT.

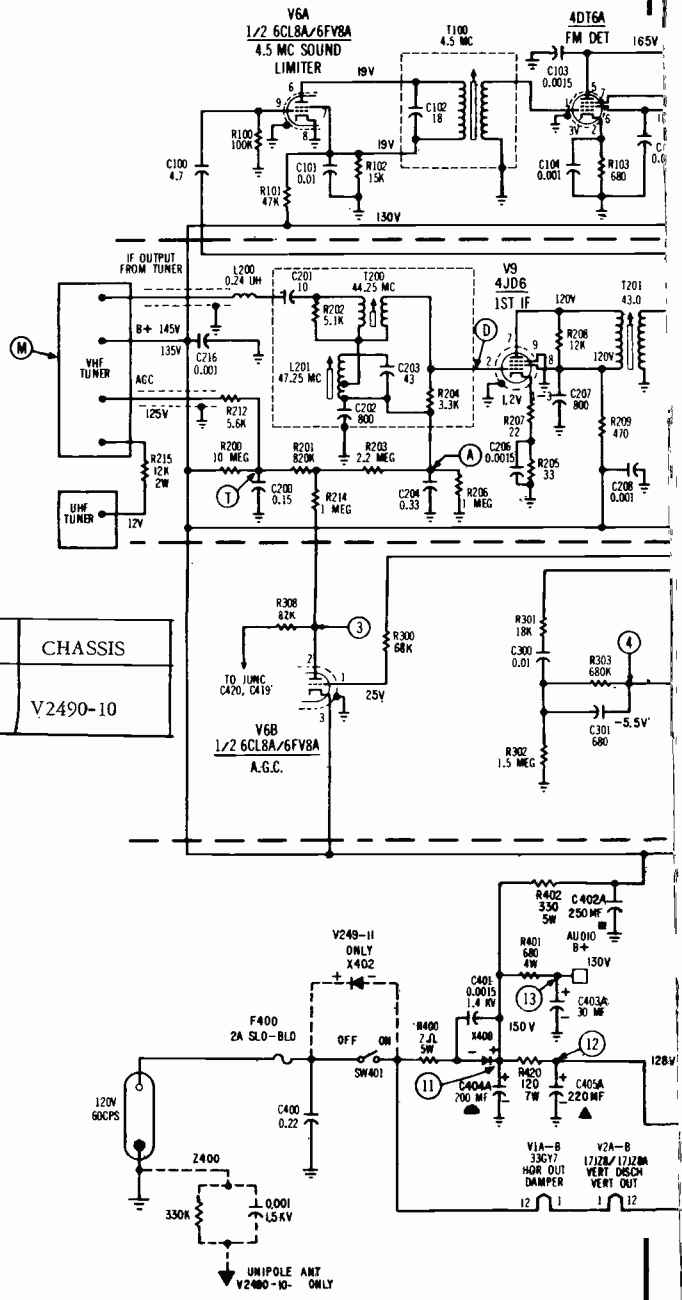
WESTINGHOUSE Chassis V-2486, V-2493, Schematic Diagram, Continued

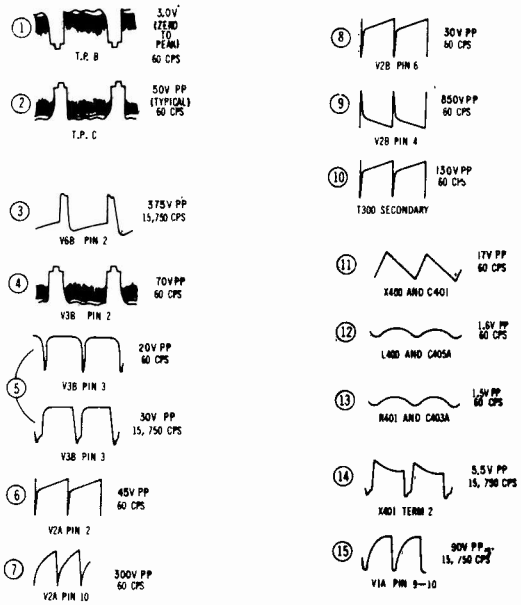


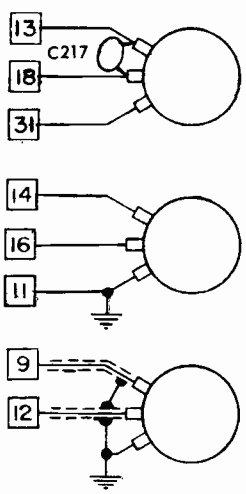
Westinghouse

MODEL	CHASSIS	TUNERS
H-P8030C H-P8031C	V-2490-11	VHF 470V158D03 UHF 472V056D01
BP12A17C BP12B17C	V-2490-10	
BP12A67C	V-2490-11	
BP12A57C		

MODEL	CHASSIS
BP82A17C BP82B17C	V2490-10



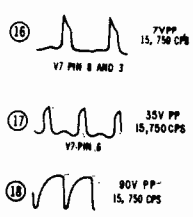




CONTRAST
R217

BRIGHTNESS
R219

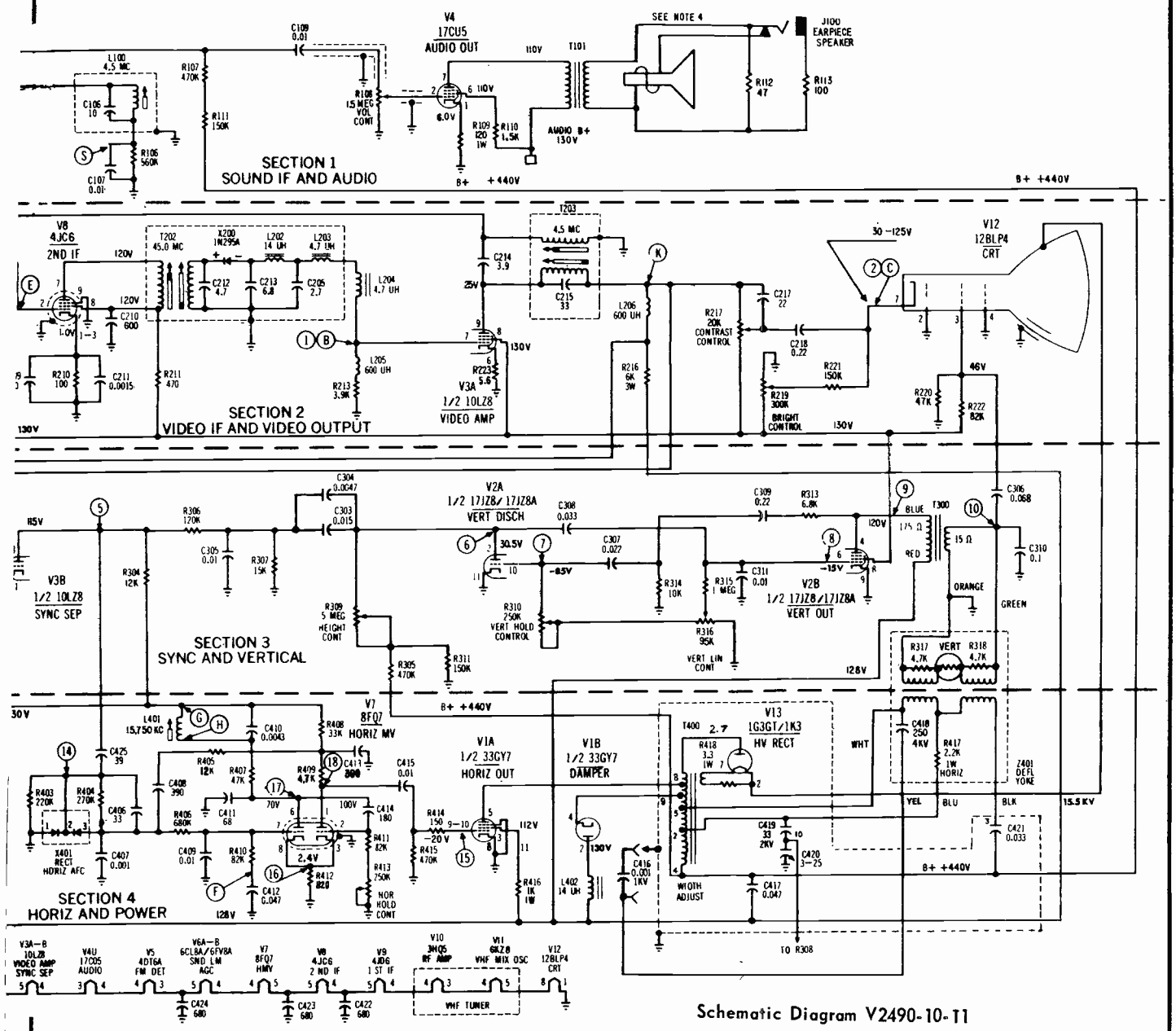
VOLUME
R108



NOTE:
1. ALL CAPACITOR VALUES LESS THAN 1 ARE IN MF, AND VALUES GREATER THAN 1 ARE IN PF (MICROMICROFARADS). ALL RESISTANCE VALUES ARE IN OHMS, 0.5 WATT UNLESS OTHERWISE INDICATED.
2. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CIRCUIT GROUND WITH A VTVM. LINE VOLTAGE AT 120 V.A.C., NO SIGNAL APPLIED.
3. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE.
4. EARPIECE SPEAKER AND R112, R113 PROVIDED ON V2490-11 ONLY.

Control Wiring Diagram, Refer to PC Board Legend

WESTINGHOUSE Chassis V-2490-10, -11, Schematic Diagram, Continued



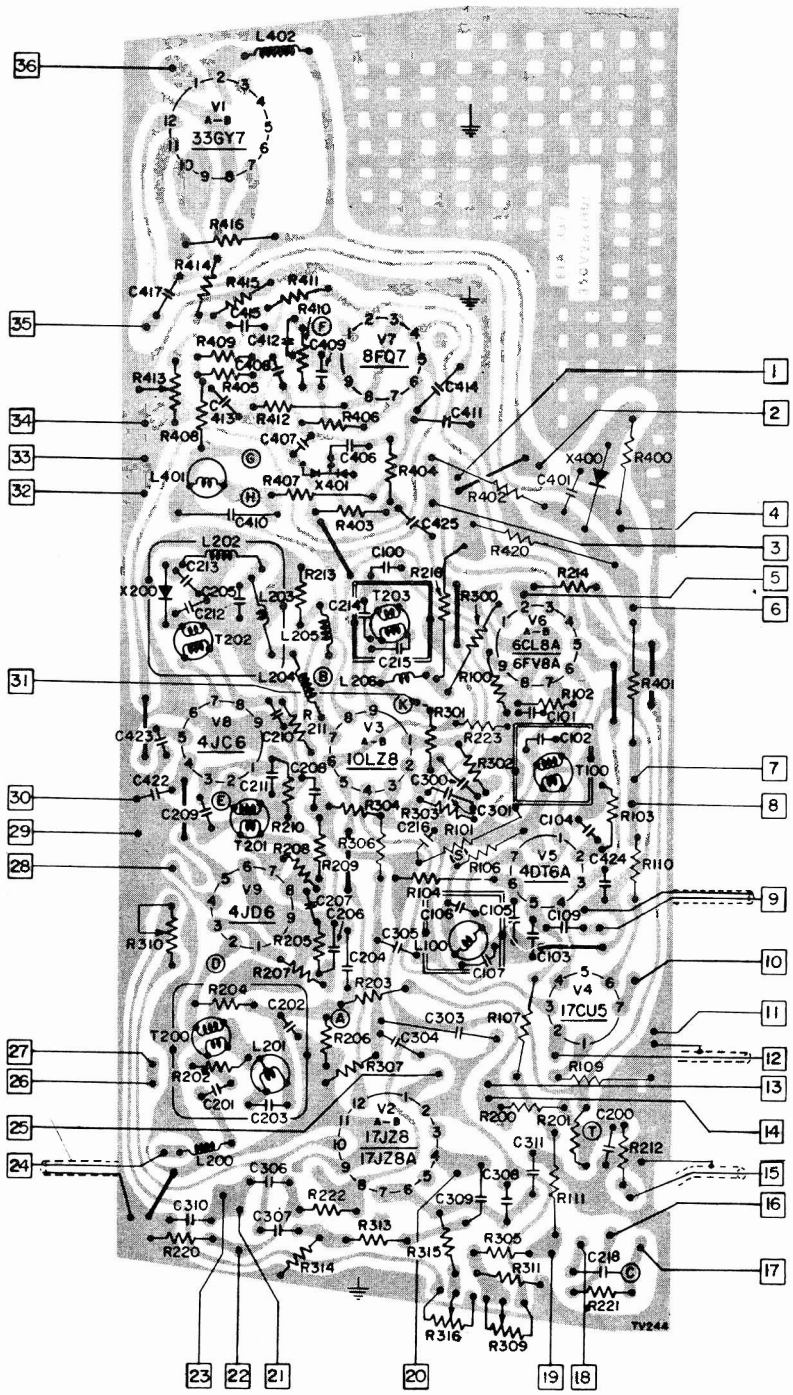
Schematic Diagram V2490-10-11

TUBE PIN RESISTANCE CHART

PART	TYPE	1	2	3	4	5	6	7	8	9	10	11	12
V1A-B	33GY7	Fil	30		620K	620K			0	470K	470K	*1.8K	Fil
V2A-B	17JZ8/17JZ8A	Fil	+1.4M		*300		*1M		*80	0	250K	0	Fil
V3A-B	10LZ8	0	2.2M	30K	Fil	Fil	5.6	4.5K	*80	*5K			
V4	17CU5	180	+0-750K	Fil	Fil		*2K	*950					
V5	4DT6A	4	680	Fil	Fil	*1M	*3.3K	*620K					
V6A-B	6CL8A 6FV8A	*75K	4M	*80	Fil	Fil	*47K	15K	0	100K			
V7	8FQ7	*41K	+160K	820	Fil	Fil	*47K	1.2M	820				
V8	4JC6	100	.2	100	Fil	Fil	0	*540	*540	0			
V9	4JD6	55	1M	55	Fil	Fil	9	*540	*540	0			
V10	3HQ5	3M	0	Fil	Fil	*1.8K	0	0					
V11	6KZ8	*12K	150K	0	Fil	Fil	*1K	*30K	0	10K			
V12	12BLP4	Fil	0	*28K	0			+220K *280K	Fil				
V13	1K3/1G3GT	INFINITE											

+Reading will vary depending upon settling of associated controls.
*Resistance measured from tube pin indicated to junction of L400 and X400.
Resistance measured from tube pin indicated to circuit ground.

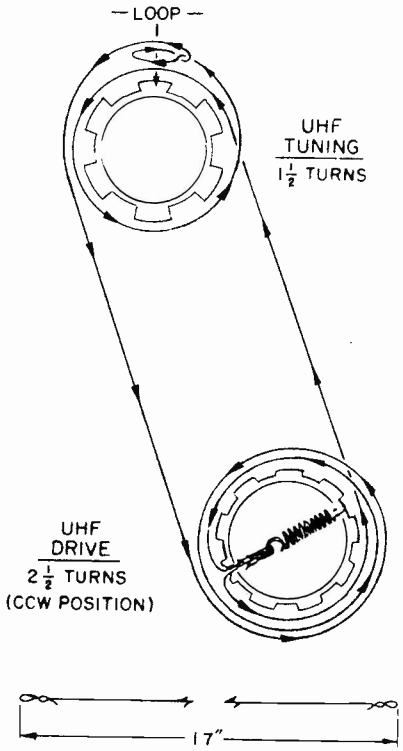
WESTINGHOUSE Chassis V-2490-10, -11, Printed Circuit Information



Bottom View PC Board

PC BOARD LEGEND

1. 250 mf ■, C402
2. Red lead - T300
3. 220 mf ▲, C405
4. To SW400, OFF-ON
5. R308-Pin #1 - T400
6. 200 mf ●, C404
7. 30 mf, C403
8. Red lead - T101
9. High end, Vol. Cont., R108
10. Black lead, T101
11. Low end Brightness Cont., R219
12. Arm Volume Cont., R108
13. High end, Contrast Cont., R217
14. High end, Brightness Cont., R219
15. AGC to tuner
16. Arm Brightness Cont., R219
17. Pin #7, CRT (Brown lead)
18. Arm Contrast Cont., R217
19. To Pin #4 - T400
20. Blue lead T300
21. Orange lead T300
22. Pin #3, CRT (Blue lead)
23. Orange lead, Z401 (yoke)
24. I.F. Input cable
25. To pin #1, 33GY7 (V1A-B)
26. Filament - Tuner
27. Pin #8, CRT (yellow lead)
28. Filament - Tuner
29. Green lead - T300
30. Green lead - Z401 (yoke)
31. Low end Contrast Cont., R217
32. Pin #4, CRT (Orange lead)
33. Pin #2, CRT (Green lead)
34. Pin #1, CRT (Black lead)
35. Pin #4 - T400
36. To Pin #1, 17JZ8 (V2A-B)



UHF Dial Stringing

TEST POINTS

- A AGC for IF
- B Video detector
- C CRT cathode
- D 1st IF input
- E 2nd IF grid
- F Horizontal MV
- G Horiz adj coil
- H Horiz adj coil
- M Mixer grid (Tuner)
- S Quad coil
- T AGC for tuner

PICTURE TUBE REMOVAL

Follow procedure under chassis removal and proceed with the following steps.

1. Place the cabinet face down on a soft cloth.
2. Remove the four corner retainers from the cabinet front. Note: The upper left hand corner picture tube mounting bracket mounts the dag spring.
3. Carefully remove the picture tube.

ZENITH RADIO CORPORATION

Y-MODELS WITH 8Y4B36, 13X16(Z), 13Y16(Z), 14N22(Late Production), 14N33Z, 14X21(Z)Late Production, 14Y21(Z), 14Y26, 14Y27 AND 14Y33 CHASSIS

MODEL AND CHASSIS INFORMATION

MODEL	TYPE	CHASSIS	CR TUBE
S2700L	Hospital Set	14Y27	20UP4
S2712R2,R3,W2,W3	Console	14N22	23FNP4
S2716W2,W3	Console	14N22	23FNP4
T2615W	Portable	13X16	13DP4
T2615W1	Portable	13X16Z	13DP4
T2615W2	Portable	13Y16	13DP4
T2615W3	Portable	13Y16Z	13DP4
T2625W	Portable	14Y21	17EQP4
T2625W1	Portable	14Y21Z	17EQP4
T2651G,G1,L,L1	Portable	14Y33	20UP4
T2659W,W1	Portable	14Y33	20UP4
T2692W2,W3	Table	14Y26	21FXP4
T2710W,W1	Console	14N22	23FNP4
X2017W2	Portable	14N33Z	19GAP4
X2410Y,Y1	Table	14N22	23FNP4
Y1405C,L,X	Portable	13X16	13DP4
Y1405C1,L1,X1	Portable	13X16Z	13DP4
Y1405C2,L2,X2	Portable	13Y16	13DP4
Y1405C3,L3,X3	Portable	13Y16Z	13DP4
Y1410H,W	Portable	13X16	13DP4
Y1410H1,W1	Portable	13X16Z	13DP4
Y1410H2,W2	Portable	13Y16	13DP4
Y1410H3,W3	Portable	13Y16Z	13DP4
Y1810C,X	Portable	14Y21	17EQP4
Y1810C1,C1	Portable	14Y21Z	17EQP4
Y1820H,W	Portable	14Y21	17EQP4
Y1820H1,W1	Portable	14Y21Z	17EQP4
Y2011C,C1	Portable	14N33Z	19GAP4
Y2014C,C1,L,L1	Portable	14Y33	20UP4
Y2017H,H1,W,W1	Portable	14Y33	20UP4
Y2022M,M1,W,W1	Portable	14Y26	20UP4
Y2042W	Portable with space command "300"	14Y26	20UP4
Y2212L,L1	Table	14Y26	21FXP4
Y2212L2,L3	Table	14X26	21FXP4
Y2212L4,L5	Table	14Y26	21FXP4
Y2217J,X	Table	8Y4B36	21FXP4
Y2222M,W	Table	8Y4B36	21FXP4
Y2245W	Table with space command "300"	8Y4B36	21FXP4
Y2410Y,Y1	Table	14N22	23FNP4
Y2412W,W1,W2,W3	Table	14N22	23FNP4
Y2414W	Table	14N22	23FNP4
Y2417R,R1,W,W1	Console	14N22	23FNP4
Y2421W,W1,W2,W3	Console	14N22	23FNP4
Y2422H,H1,H2,H3	Console	14N22	23FNP4
Y2424M,M1	Console	14N22	23FNP4
Y2427R,R1,R2,R3, W,W1,W2,W3	Console	14N22	23FNP4

The numeral "7" was added to the model number of the following Black and White receivers in the "X" line delivered after January 1, 1967. The "7" does not indicate any changes.

X71921W	(Same as X1921W)
X71925J,L	(Same as X1925J,L)
X71930H,W	(Same as X1930H,W)
X72310Y	(Same as X2310Y)
X72310W2	(Same as X2310W2)
X72317R,W,W1	(Same as X2317R,W,W1)
X72320W,W1	(Same as X2320W,W1)
X72322H	(Same as X2322H)
X72326R,W	(Same as X2326R,W)

These sets are in Volume TV-26.

AGC ADJUSTMENT

Tune in a strong TV signal and slowly turn the AGC control until a point is reached where the picture distorts and buzz is heard in the sound. The control should then be backed down from this position and set at a point comfortably below the level of intercarrier buzz, picture distortion and improper sync. This setting corresponds in general to 3 volts peak-to-peak at the Video Detector stage in the 8Y4B36 chassis, 2.5 volts peak-to-peak at the Video Detector stage in the 13X16, 13Y16, 14X26, 14Y26 and 14Y27 chassis and 3.5 volts peak-to-peak in the 14N22, 14N33Z, 14Y21 and 14Y33 chassis.

CENTERING ADJUSTMENT

The centering assembly is built into the yoke housing. This assembly is made of two magnetic rings which can be rotated by means of tabs. Centering is accomplished by gradually rotating each tab separately and/or rotating both tabs simultaneously until the picture is centered.

CHANNEL OSCILLATOR ADJUSTMENT (VHF TUNER)

In all VHF tuners, each channel can be adjusted individually with the receiver fine tuning knob without interaction with other channels. Several turns of the knob are permissible, in either direction, to obtain proper adjustment.

ALIGNMENT

SOUND ALIGNMENT: ALL CHASSIS

Proper alignment of the 4.5 MHz intercarrier sound circuit can be made only if the signal to the receiver antenna terminals is reduced to a level below the limiting point of the Gated Beam Sound Detector. This level can be easily identified by the "hiss" that accompanies the sound. Various methods may be used to reduce the signal level. However, a step attenuator is recommended for most satisfactory results. Alignment is made as follows:

1. Connect the step attenuator between the antenna and the receiver antenna terminals.
2. Tune in a TV signal. Adjust the step attenuator until the signal is attenuated to a level where a "hiss" is heard with the sound.
3. Adjust the sound take-off coil (top and bottom cores), intercarrier transformer, quadrature coil and buzz control for the best quality sound and minimum buzz. It must be remembered that any of these adjustments may cause the "hiss" to disappear and further reduction of the signal will be necessary to prevent the "hiss" from disappearing during alignment.

IF ALIGNMENT: GENERAL

A standard VHF sweep signal generator with accurate marker signals must be used for IF and tuner alignment work if the best results are to be obtained. It is important to terminate the output cable properly. Always check for a reactive attenuator. If the attenuator is reactive or if the output cable is improperly terminated, correct alignment cannot be made since the degree of attenuation may change the shape as well as the amplitude of the response curve.

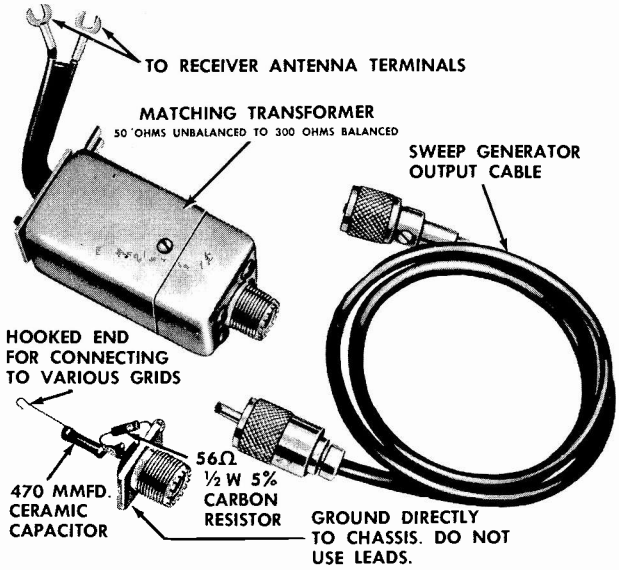


Fig. 1 Alignment Fixtures for RF-IF Alignment

The output (lead) of the sweep generator must be terminated with the correct matching transformer when connecting to the 300 ohm antenna input, or the special terminating network when connecting into a circuit other than the antenna input. See Fig. 1. Use 10-15 MHz sweep width for best results.

Use a calibrated oscilloscope connected through a 10K ohm isolation resistor. Connect shielded (ground) lead to chassis nearby. Connect scope to test-point C (detector output in main chassis) unless otherwise indicated in the particular procedure.

The alignment and test-points in the procedures are found on the particular top-view (layout) diagram of the chassis or tuner being aligned.

NEVER ALLOW THE AMPLITUDE OF THE RESPONSE CURVE TO EXCEED THE PEAK-TO-PEAK VOLTAGE SHOWN ALONGSIDE THE RESPONSE CURVE, or erroneous results will be obtained.

IF ALIGNMENT
8Y4B36 CHASSIS

GENERAL

During the alignment of the IF chassis the AGC lead (violet) must be disconnected and an external bias voltage from a low impedance source applied at the AGC input (test point "E"). It is important that the bias voltage be no more than that specified since incorrect bias voltages in a transistor set can lead to incorrect results or even damage to the transistors.

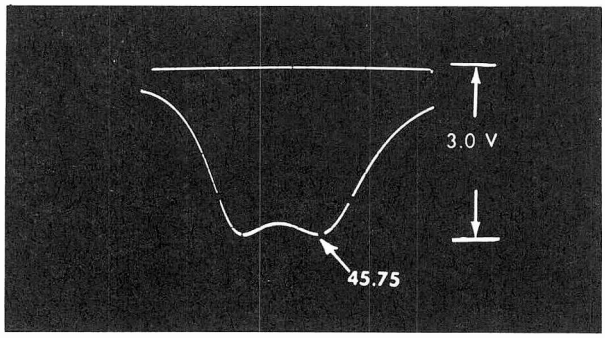


Fig. 2 4th IF Response Curve

The signal generator must be isolated from the IF circuit by the use of the standard network consisting of a 470 PF capacitor shunted by a 56 Ohm 1/2 watt resistor. The shielded lead must be grounded directly to chassis nearby. DO NOT USE LEADS. The oscilloscope also must be isolated by the use of a 10K Ohm series resistor.

PRELIMINARY SET-UP:

Set channel selector to channel 13.
Short test point F to chassis ground.
Disconnect AGC (violet) lead at test point E and apply positive 3 volt bias measured at test point E.

Connect calibrated oscilloscope to test point C; shielded lead to chassis nearby.

1. ALIGN 4TH IF COIL

Connect a 30 PF capacitor from test point K to test point G. See Fig. 24. Test points G and K are accessible from rear of IF chassis. Connect signal generator high-side to test point G; low-side to chassis nearby. (The 30 PF capacitor across L6, is necessary to prevent distortion of 4th IF response curve).

Set signal generator to 45 MHz (6 MHz wide) with output set to produce 3 volts at test point C.

Adjust 4th IF coil (top and bottom cores of T2) for response as shown in fig. 2. Disconnect signal generator and remove 30 PF capacitor across G-K.

2. 1ST, 2ND AND 3RD IF COILS AND TRAP ALIGNMENT

Using a 100 ohm resistor in series with signal generator, connect signal generator to test point A on VHF tuner. Reduce output of generator to maintain 3 volts at test point C.

Adjust top core of T1 (L1A) for maximum amplitude and position of 45 MHz marker as shown in fig. 3. Adjust bottom core of 2nd IF coil (L5B) and single core of 3rd IF coil (L6) alternately for maximum amplitude, bandpass and symmetry as shown in fig. 3.

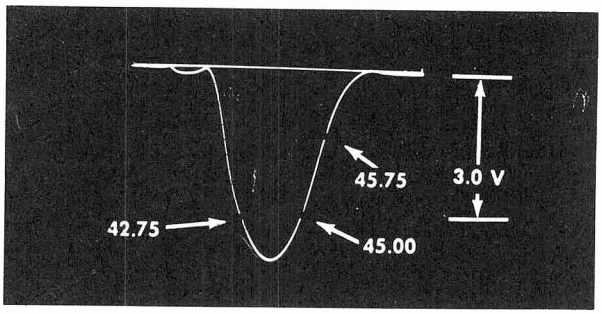


Fig. 3. Overall IF Response Curve

Increase scope gain to produce response as shown in fig. 4.

Adjust trap coils L4 (47.25 MHz), L3 (39.75 MHz) and L2 (41.25) for minimum amplitude and positions of marker frequencies as shown in fig. 4. (Note that trap coils L2 and L4 have two cores.)

Decrease scope gain to produce response curve shown in fig. 3. Reduce positive bias to 1.5 volts. Then decrease signal generator gain to produce response shown in fig. 4.

Adjust top core of 2nd IF coil (L5A) for maximum extension (response curve between marker frequencies 39.75 MHz and 41.25 MHz) as shown in Fig. 4).

Reduce generator output to produce response curve as shown in fig. 5. The 45 MHz marker now should be located at right-hand peak as shown. Repeat steps 1 and 2 above if necessary to position 45 MHz marker as required.

Reset positive bias to 3 volts at test point E and signal generator output for 3 volts at test point C.

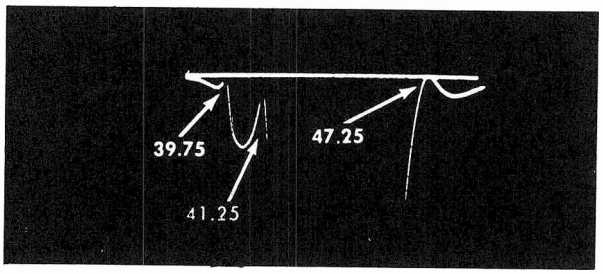


Fig. 4 Expanded View of Traps

3. OVERALL IF ALIGNMENT

Adjust mixer collector coil in VHF tuner. Adjust coil for position of 42.75 MHz marker as shown in fig. 3. Repeat steps 1 and 2 above if necessary, to produce proper response, band width and symmetry of curve as required.

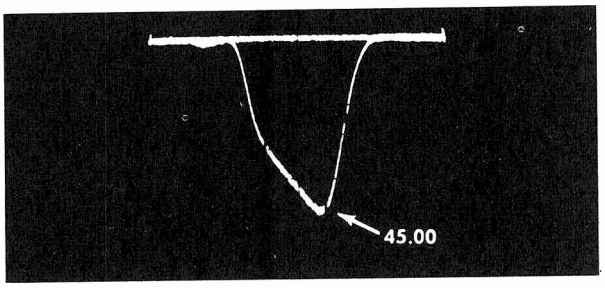


Fig. 5 Position of 45 MHz Marker

IF AGC CONTROL ADJUSTMENT

The purpose of the IF AGC control is to set the amount of gain reduction of the IF amplifier by modifying the cut-off characteristics of the 1st IF transistor. The correct setting is critical and establishes the best overall performance on all signals operating at one time in any particular area.

The IF AGC control (R47) is set at the factory and under normal usage will not need readjustment. However, if the 1st IF transistor has been replaced, or if the control has been misadjusted, it can be checked for proper adjustment only as follows:

Using a 100 ohm resistor in series with signal generator lead, apply a signal of 45.00 MHz to test point A on VHF tuner. Apply 2.8 volts positive bias to test point E. Adjust IF AGC control to produce 3.0 volts DC output at test point C. The correct setting of this control must be consistent with the correct position of the 45 MHz marker frequency in fig. 5.

IF ALIGNMENT
14N22, 14Y26 and 14Y27 CHASSIS

GENERAL

With the 175-640, 680 and 750 series tuners, turn the selector to channel 13. With the 175-500 series tuners, turn the selector between any two channels. An incorrect position of the channel selector can cause an erroneous response.

When aligning the 14N22 chassis, turn the Peak Pix control fully to the left.

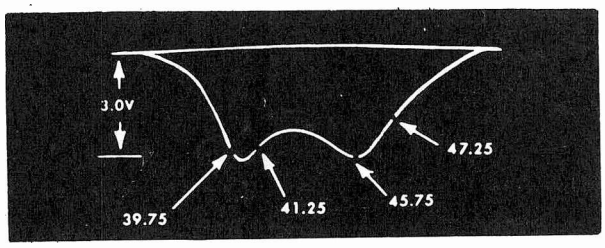


Fig. 6 4th IF Response Curve

1. ALIGN 4TH IF TRANSFORMER

Connect the sweep generator to test-point G (grid 1, pin 1 of the 3rd IF tube). Adjust sweep generator output to obtain a response similar to Fig. 6.

Set the marker frequency to 45.75 MHz and alternately adjust the top and bottom of the 4th IF transformer for maximum gain and symmetry with the 45.75 marker positioned as shown. The two peaks must be equal in height with the high-frequency peak at 45.75 MHz. If the correct response cannot be obtained, check the position of the ferrite slugs in the coils to see that they are not butted. The slugs should be in their respective windings at the opposite ends of the coils.

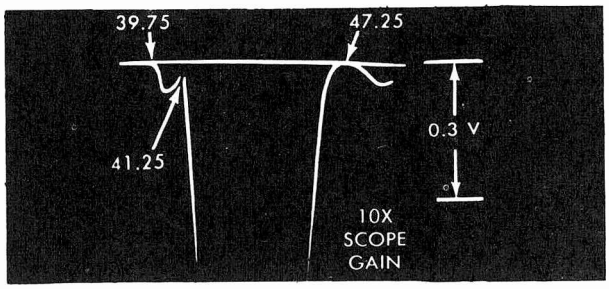


Fig. 7 Expanded View of Trap Markers

2. ALIGN WAVETRAPS.

Connect the sweep generator to test point "A" (on VHF tuner). Short test points "F" and "E" to chassis. Adjust the sweep generator output to obtain a response similar to Fig. 9. Switch oscilloscope to 10X gain to "blow up" the traps.

Refer to Fig. 7 and adjust the 39.75 MHz and the 41.25 MHz traps for minimum marker amplitude. Remove short at test point E and connect a jumper between test point "E" and the junction of the 68 ohm and 1800 ohm resistors in the cathode circuit of the 1st IF tube. This will provide an additional "blow up" of the 47.25 MHz traps as shown in Fig. 8. Adjust the 47.25 MHz trap for minimum marker amplitude.

3. ALIGN 1ST, 2ND AND 3RD IF COILS.

Disconnect jumper between "E" and the 68 ohm and 1800 ohm cathode resistors and reconnect between

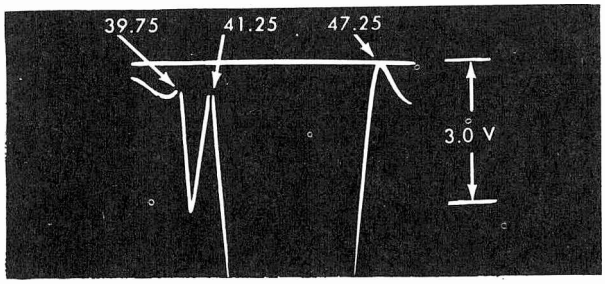


Fig. 8 Further Expansion of Traps For Better View of the 39.75 MHz and 47.25 MHz Marker Locations

"E" and chassis. Readjust sweep generator for 3 volts peak-to-peak output. Alternately, adjust the 2nd, 3rd and 1st IF transformers and the IF output (Mixer plate) coil in VHF tuner, until an overall response similar to Fig. 9 is obtained.

It will be found that the 2nd IF affects the low-frequency side and the 3rd IF the high-frequency side of the response curve.

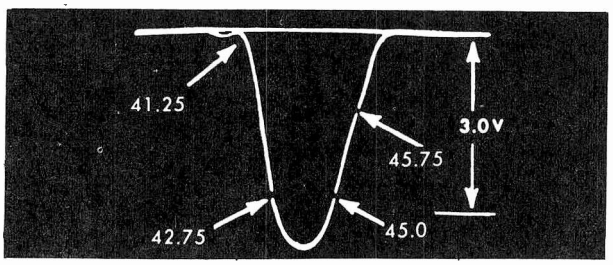


Fig. 9 Overall IF Response Curve

IF ALIGNMENT: 14N33Z AND 14Y33 CHASSIS.

Turn the channel selector so that the rotor rests between channels. This will prevent an erroneous response.

1. ALIGN 4TH IF TRANSFORMER.

Connect sweep generator to test-point G (grid 1, pin 1 of 3rd IF tube). Adjust generator output, to obtain a response curve similar to Fig. 10.

Alternately adjust the top and bottom of the 4th IF transformer for maximum gain and symmetry with the 45.75 MHz and the 42.75 MHz markers positioned as shown in Fig. 10.

If the correct response cannot be obtained, check the position of the slugs in the coils. They should be in the opposite ends of the coil; not butted near the center of the coil.

2. ALIGN WAVETRAP.

Connect the sweep generator to test-point "A" on VHF tuner. Short test-point "F" to chassis and connect a jumper between test-point "E" and the bottom end of the 68 ohm resistor in the cathode of the 1st IF. This provides a "blow up" of the 47.25 MHz trap as shown in Fig. 11. Adjust the 47.25 MHz trap marker for minimum amplitude.

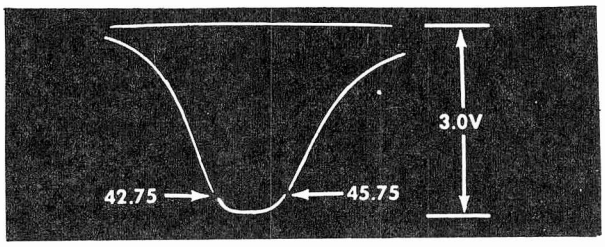


Fig. 10 4th IF Response Curve

3. ALIGN 1ST, 2ND AND 3RD IF COILS.

Disconnect the jumper between "E" and the bottom end of the 68 ohm cathode resistor and connect jumper between "E" and the chassis. Adjust sweep generator for 3 volts peak-to-peak output. Alternately, adjust the 2nd, 3rd and 1st IF coils and IF output (mixer plate) coil in VHF tuner for an overall response similar to Fig. 12. It will be found that the 2nd IF affects the low-frequency side and the 3rd IF the high-frequency side of the response curve.

IF ALIGNMENT: 13X16, 13Y16 AND 14Y21 CHASSIS

Turn the channel selector so that the rotor rests between channels. This will prevent an erroneous response.

1. ALIGN 4TH IF TRANSFORMER

Connect sweep generator to test-point G (grid 1, pin 1 of 3rd IF tube). Adjust generator output, to obtain a response curve similar to Fig. 10.

Alternately adjust the top and bottom of the 4th IF transformer for maximum gain and symmetry, with the 45.75 MHz and the 42.75 MHz markers positioned as shown in Fig. 10.

If the correct response cannot be obtained, check the position of the slugs in the coils. They should be in the opposite ends of the coil; not butted near the center of the coil.

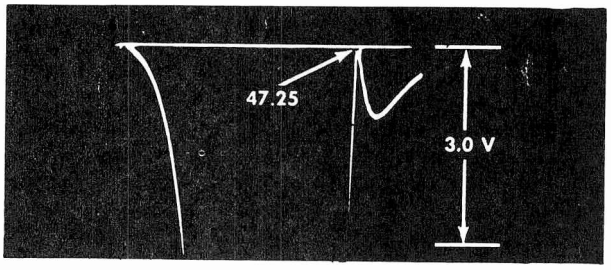


Fig. 11 Expanded View of 47.25 MHz Trap Marker

2. ALIGN WAVETRAP.

Connect sweep generator to test-point A on VHF tuner. Short test points E and F to chassis ground. This will provide a "blow up" of the 47.25 MHz trap marker as shown in Fig. 11.

Adjust the 47.25 MHz trap for minimum amplitude.

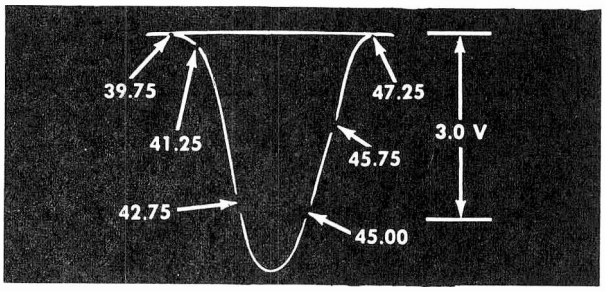
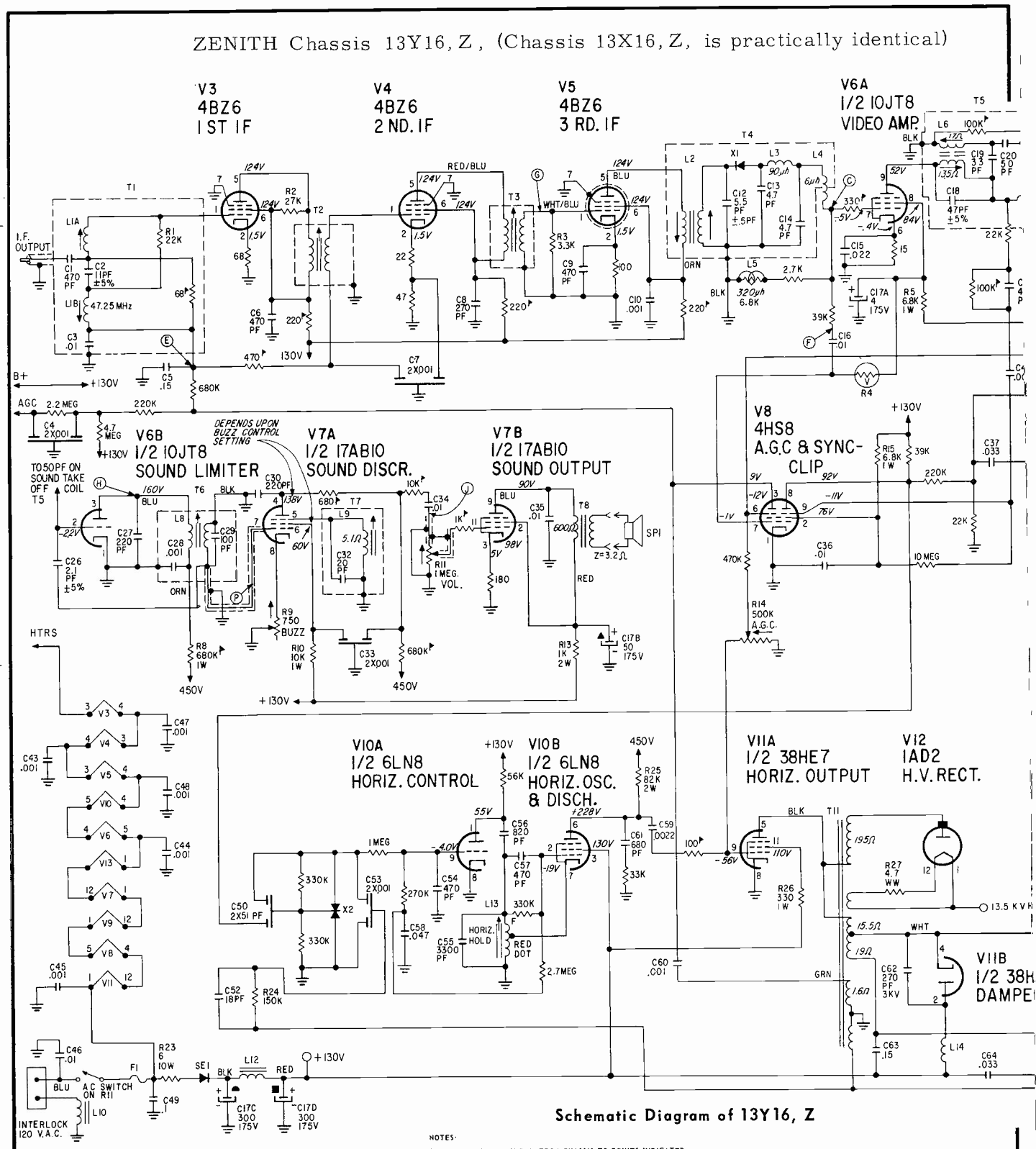


Fig. 12 Overall IF Response Curve

3. ALIGN 1ST, 2ND AND 3RD IF COILS.

Remove jumper between test point "E" and chassis. Apply negative 6 or 7 volts bias to test point "E", positive lead to chassis ground. Adjust sweep generator for 3 volts peak-to-peak output. Alternately adjust the 2nd, 3rd and 1st IF transformers and the IF output (mixer plate) coil in VHF tuner, for an overall response similar to Fig. 12.

ZENITH Chassis 13Y16, Z, (Chassis 13X16, Z, is practically identical)



Schematic Diagram of 13Y16, Z

NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE

FOR CAPACITOR CAPACITY TOLERANCE SEE LEGEND

ALL RESISTORS ARE ± 10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

INDICATES INSULATED BRACKET

▶ INDICATES 20% MAY BE USED

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

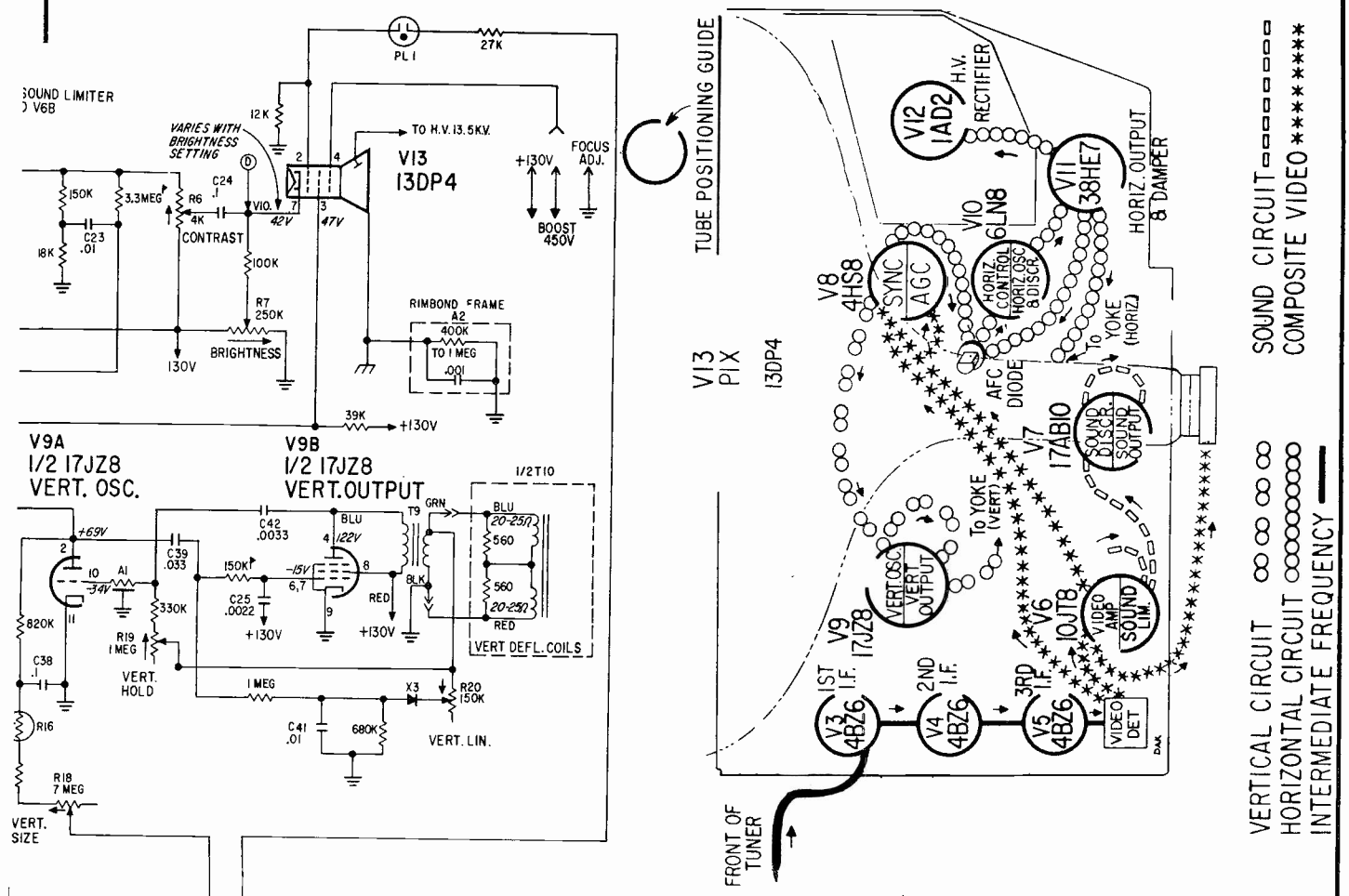
CHASSIS — INDICATES VOLTAGE SOURCE.

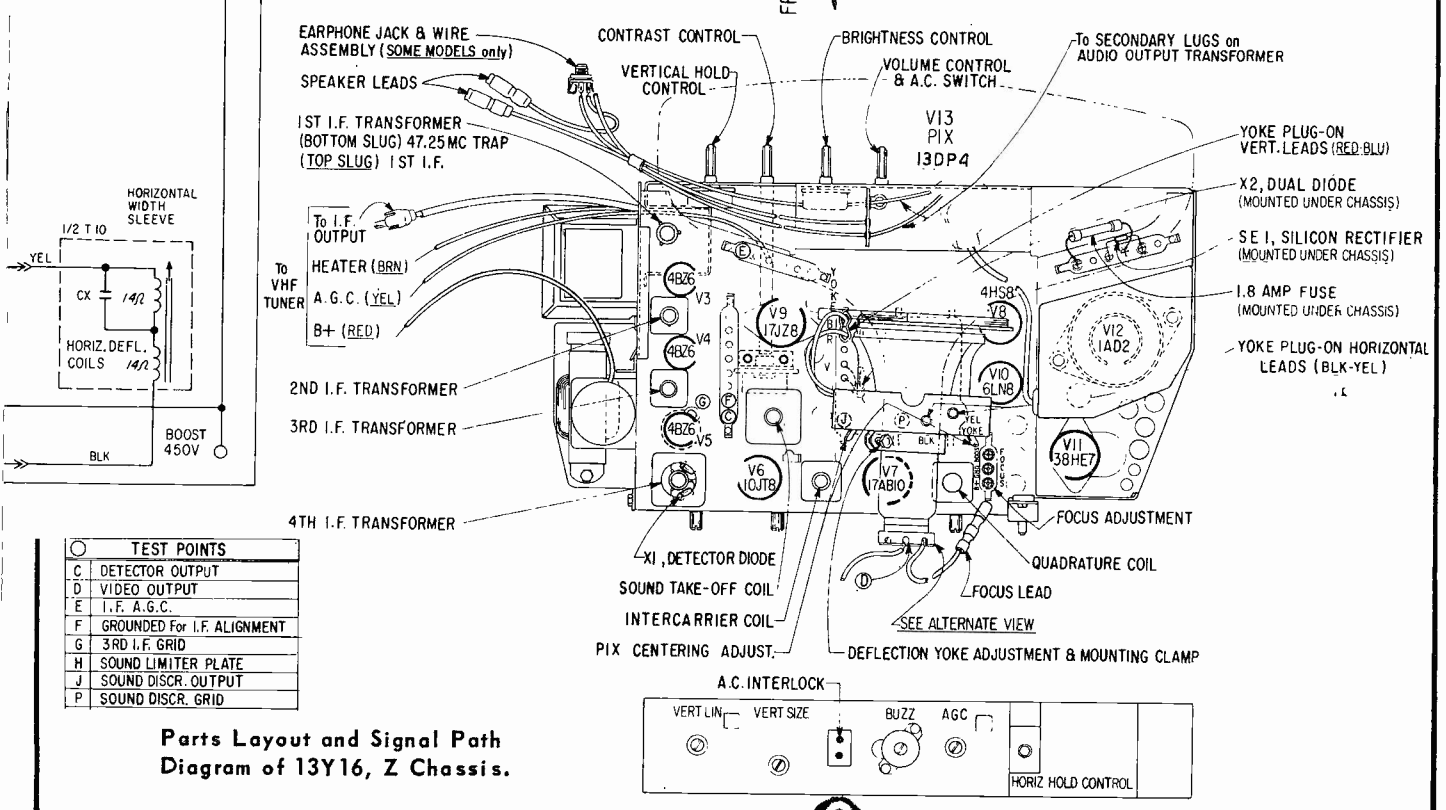
PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE

CX= CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITH A RANGE OF 47 PF TO 72 PF (3 K.V., ±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS WHERE APPLICABLE.

C - DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I.F. AGC
F - GROUNDED FOR I.F. ALIGNMENT
G - 3RD I.F. GRID
H - SOUND LIMITER PLATE
J - SOUND OUTPUT
P - SOUND DISC GRID

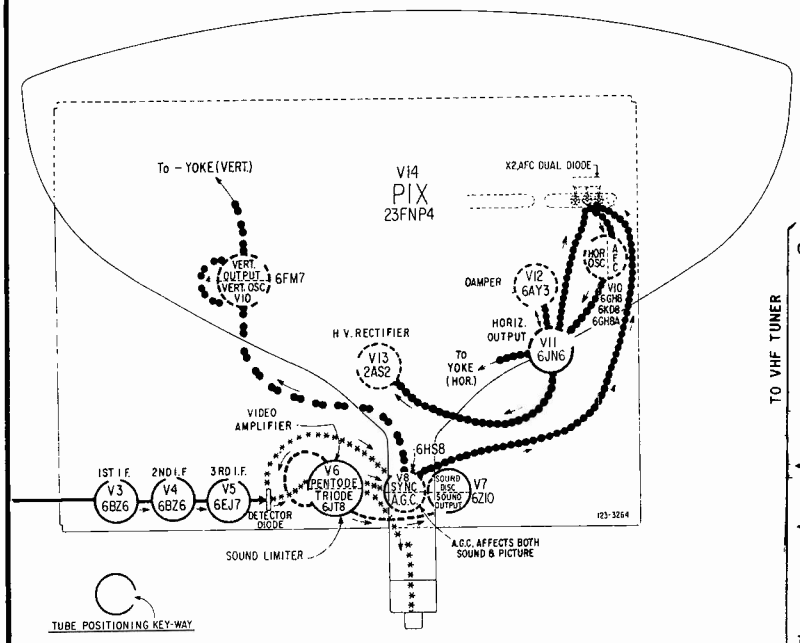




	TEST POINTS
C	DETECTOR OUTPUT
D	VIDEO OUTPUT
E	I.F. A.G.C.
F	GROUNDED For I.F. ALIGNMENT
G	3RD I.F. GRID
H	SOUND LIMITER PLATE
J	SOUND DISCR. OUTPUT
P	SOUND DISCR. GRID

Parts Layout and Signal Path Diagram of 13Y16, Z Chassis.

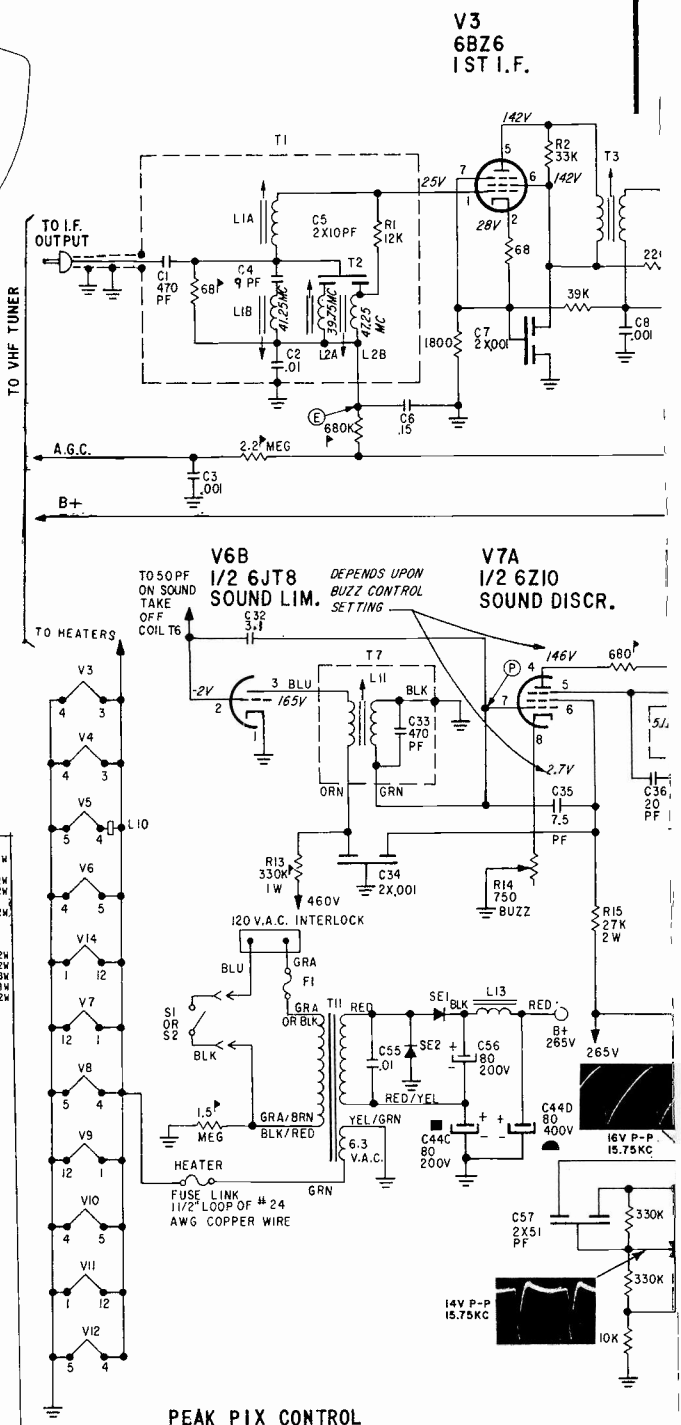
ZENITH Chassis 14N22 Schematic Diagram, Continued



Signal Path Diagram of 14N22 (Late Production) Chassis.

ITEM NO.	PART NO.	DESCRIPTION	
C1	22-3217	470 PF DISC	500V
C2	22-4617	.01 MFD DISC	500V
C3	22-7	.001 MFD	500V
C4	22-2481	8 PF DISC ±.5 PF	500V
C5	22-3540	2 X 10 PF 5%	500V
C6	22-5107	.15 MFD MOLDED 20%	100V
C7	22-21	2 X .001 MFD DISC 10%	500V
C8	22-7	.001 MFD DISC	500V
C9	22-7	.001 MFD DISC	500V
C10	22-3140	270 PF DISC CAP. 10%	500V
C12	22-9	100 PF DISC 10%	500V
C13	22-18	.0022 MFD DISC 10%	500V
C14	22-17	.001 MFD DISC 10%	1000V
C15	22-3221	5.5 PF DISC .5 PF	500V
C16	22-1516	4.7 PF GIMMICK 20%	500V
C17	22-1516	4.7 PF GIMMICK 20%	500V
C18	22-5002	150 PF DISC 10%	500V
C19	22-3299	3.3 PF GIMMICK	500V
C20	22-3515	50 PF DISC 20%	500V
C22	22-2467	47 PF 5%	500V
C23A		4 MFD ELECTROLYTIC	350V
C23B	22-3898	100 MFD ELECTROLYTIC	25V
23C		10 MFD ELECTROLYTIC	400V
C23D		30 MFD ELECTROLYTIC	475V
C24	22-3239	.1 MFD MOLDED 20%	400V
C25	22-4617	.01 MFD DISC	500V
C26	22-3065	27 PF GIMMICK 10%	500V
C27	22-5183	75 PF DISC	500V
C28	22-3250	10 PF DISC 10%	500V
C29	22-3239	.1 MFD MOLDED	400V
C30	22-2635	.033 MFD MOLDED 10%	400V
C32	22-3707	3.1 PF GIMMICK 5%	500V
C33	22-2480	470 PF MICA 10%	500V
C34	22-21	2 X .001 MFD DISC 10%	500V
C35	22-2742	7.5 PF GIMMICK	500V
C36	22-5393	20 PF 10% DISC	500V
C37	22-2	220 PF DISC	500V
C38	22-8	.0022 MFD DISC	1000V
C39	22-4617	.01 MFD DISC	500V
C40	22-2704	.0068 MFD DISC 10%	500V
C42	22-8	.0022 MFD DISC 20%	1000V
C43	22-7	.001 MFD DISC	500V
C44A		4 MFD ELECTROLYTIC	150V
C44B	22-5491	100 MFD ELECTROLYTIC	50V
C44C		80 MFD ELECTROLYTIC	200V
C44D		80 MFD ELECTROLYTIC	400V
C45	22-3239	.1 MFD MOLDED	400V
C46	22-11	.0033 MFD DISC 20%	500V
C47	22-6	470 PF DISC 20%	1000V
C48	22-4371	.1 MFD MOLDED 20%	600V
C49	22-4322	.022 MFD MOLDED 10%	400V
C50	22-2656	.0068 MFD MOLDED 10%	200V
C52	22-4369	.1 MFD MOLDED	400V
C53	22-3040	.015 MFD MOLDED 10%	1000V
C54	22-3537	.047 MFD MOLDED 20%	200V
C55	22-4617	.01 MFD DISC	500V
C56	22-3957	80 MFD ELECTROLYTIC	200V
C57	22-25	2 X 51 PF DISC 15%	500V
C58	22-3250	10 PF GIMMICK 10%	500V
C59	22-21	2 X .001 MFD DISC 10%	500V
C60	22-3627	.047 MFD MOLDED	100V
C62	22-6	470 PF DISC 20%	1000V
C63	22-4637	1000 PF POLYSTYRENE	400V
C64	22-6	470 PF DISC 20%	1000V
C65	22-3471	3300 PF POLYSTYRENE 10%	400V
C66	22-12	.0015 MFD DISC 10%	500V
C67	22-4617	.01 MFD DISC	500V
C68	22-26	2 X .0015 MFD DISC 10%	500V
C69	22-4617	.01 MFD DISC	500V
C70	22-1775	.047 MFD MOLDED	400V
C72	22-2954	75 PF DISC 10%	4KV
C73	22-4371	.1 MFD MOLDED 20%	600V
R1	63-2372	15K OHM A.B. ONLY	1/2W
R2	63-4008	33K OHM 10% A.B. ONLY	1/2W
R3	63-5313	3.3K OHM 10%	2W
R4	63-5159	1.5K OHM PEAK PIX	
R5	63-5715	12K OHM 10%	2W
R6	63-5338	6.8K OHM 10%	7W
R7	63-6795	20K OHM CONTRAST	
R8	63-6181	470K OHM	1W
R9	63-5150	250K OHM BRIGHTNESS	
R10	63-6467	3 MEGOHM FOCUS	
R12	63-6181	470K OHM	1W
R13	63-6174	330K OHM	1W
R14	63-3284	750 OHM BUZZ	
R15	63-4837	27K OHM 10%	2W
R16	63-6794	1 MEGOHM TONE CONTROL	
R17	63-6996	1 MEGOHM VOLUME CONTROL & SWITCH	
R19	63-6069	1K OHM	1W
R20	63-5472	VOLTAGE DEPENDENT RESISTOR	
R22	63-5726	22K OHM 10%	2W
R23	63-4389	8.2 MEGOHM 10% A.B. ONLY	1/2W
R24	63-6482	10K OHM AGC	
R25	63-5159	2.2 MEGOHM 10% A.B. ONLY	1/2W
R26	63-4660	5 MEGOHM VERT. SIZE	
R27	63-5149	750K OHM VERTICAL HOLD	
R28	63-4815	2.5K OHM VERTICAL LINEARITY	
R29	63-5315	120K OHM 10% I.R.C. ONLY	1/2W
R30	63-5747	68K OHM 10%	2W
R32	63-4375	6.8K OHM 10%	3W
R33	63-4693	22K OHM A.B. OR STKPL. ONLY	1W
R34	63-5740	47K OHM 10%	2W
R35	63-4726	THERMAL RESISTOR SUPPLIED WITH YOKE	
L1A	S-58821	1ST I.F. & TRAP COIL ASSEM.	
L1B			
L2A	S-53072	ADJ. CHANNEL TRAP COIL	
L2B			
L3	S-47968	4TH I.F. COIL	
L4	20-2014	DETECTOR SHUNT PEAKING COIL	
L5	20-2013	DETECTOR SERIES PEAKING COIL	
L6	20-2004	CHOKE COIL	
L7	S-50341	SOUND TAKE-OFF ASSEMBLY	
L8	20-2012	SHUNT PEAKING COIL	
L9	20-2504	SERIES PEAKING COIL	
L10	149-333	FERRITE SLEEVE	
L11	S-41899	INTERCARRIER COIL	
L12	S-66427	QUADRATURE COIL	
L13	95-1682	FILTER CHOKE	
L14	S-56875	HORIZONTAL OSCILLATOR COIL	
L15	20-2005	CHOKE COIL	
T1	S-75122	1ST I.F. & TRAP COIL	
T2	S-65421	ADJACENT CHANNEL TRAP	
T3	S-65172	2ND I.F. COIL	
T4	S-56613	3RD IF. TRANSFORMER	
T5	S-58824	4TH I.F. TRANSFORMER	
T6	S-73081	SOUND TAKE-OFF COIL	
T7	S-65419	INTERCARRIER COIL	
T8	95-2385	SOUND OUTPUT TRANSFORMER	
T9	95-2384	VERTICAL OUTPUT TRANSFORMER	
T10	95-2383	DEFLECTION YOKE	
T11	95-2105	POWER TRANSFORMER	
T12	S-63279	HORIZONTAL SWEEP TRANSFORMER	
F1	136-66	FUSE 2 AMP BELFUSE TYPE	
S1	PART	PART OF R17	
X1	103-23	CRYSTAL DIODE	
X2	103-20	DUAL SELENIUM DIODE	
A1	87-8	INTEGRATOR UNIT	
A2	87-7	INTEGRATOR UNIT	
CX	ON T10	SUPPLIED WITH YOKE	
PL1	100-397	NE2H NEON BULB	
SE1	212-27	SILICON DIODE RECTIFIER	
SE2	212-27	SILICON DIODE RECTIFIER	
SP1		SPEAKER	

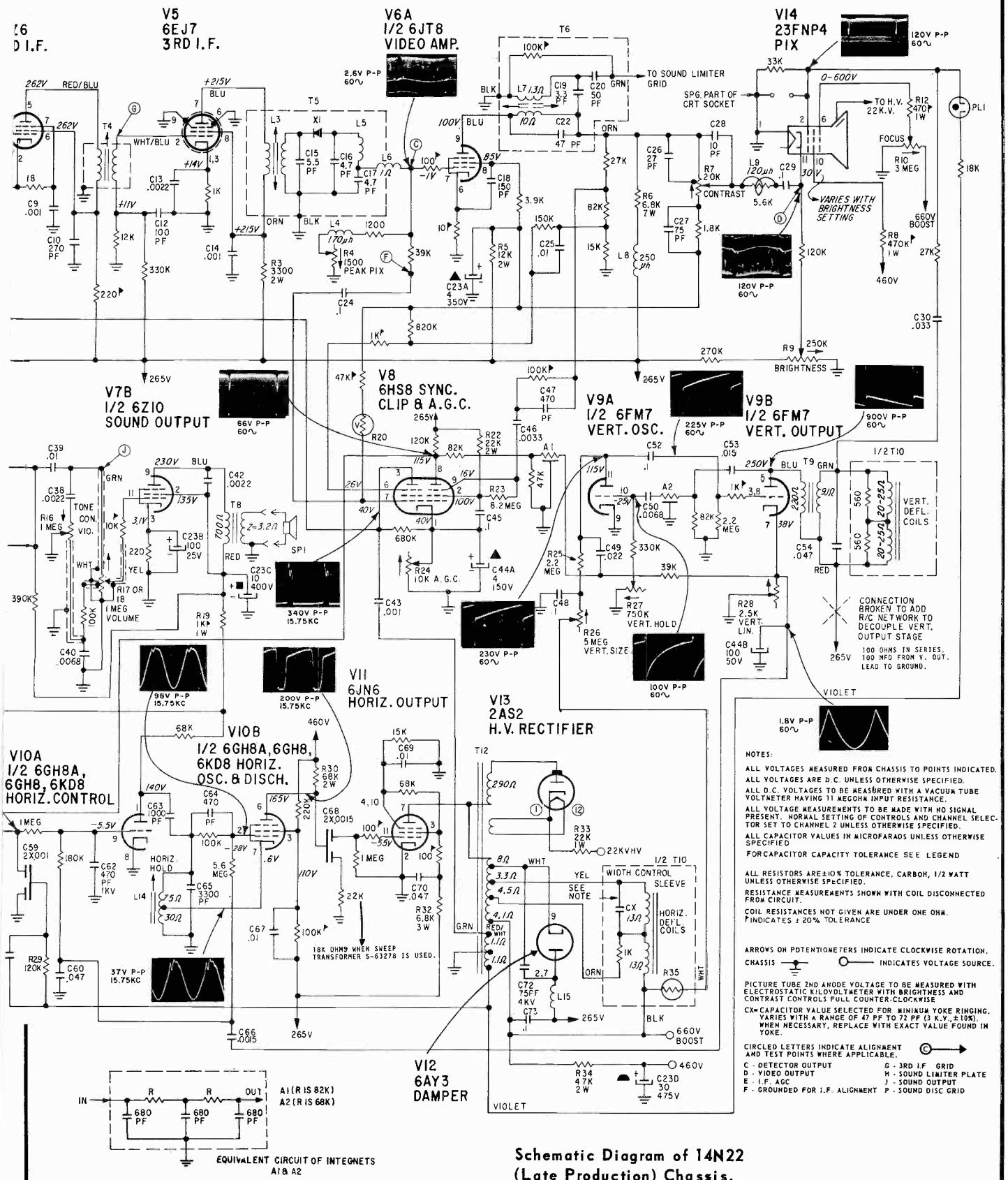
Schematic Diagram of 14N22 (Late Production) Chassis.



PEAK PIX CONTROL
14N22 CHASSIS ONLY:

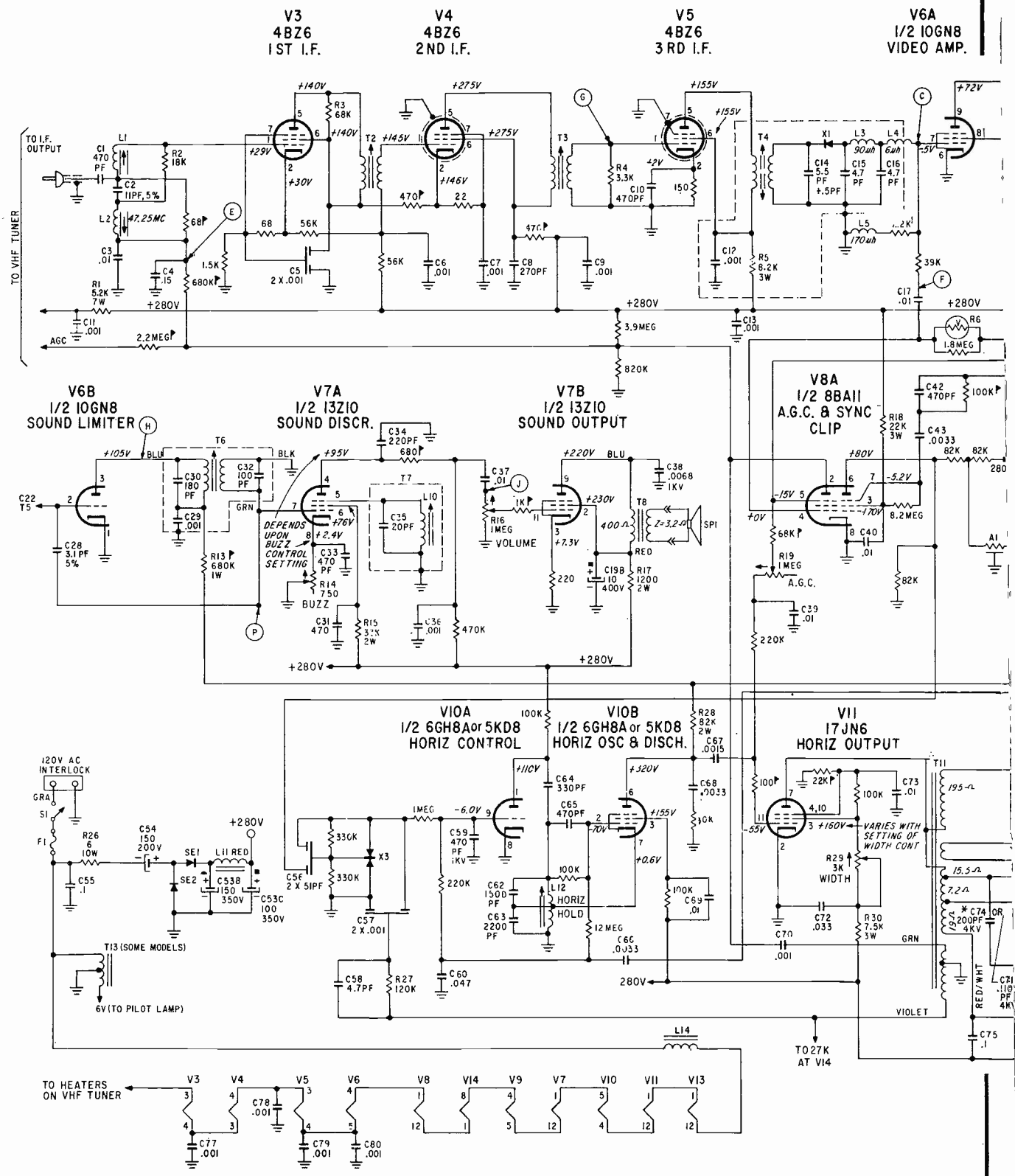
This special customer control is part of the video detector load and has an effect on the video response. The picture can be changed from a slight smear at the extreme counter-clockwise position to an exaggerated overshoot at the maximum clockwise position of the control.

The Peak Pix control is adjusted at the factory for best picture detail under normal signal conditions. However, it can be changed in the home to suit a particular signal or program condition.

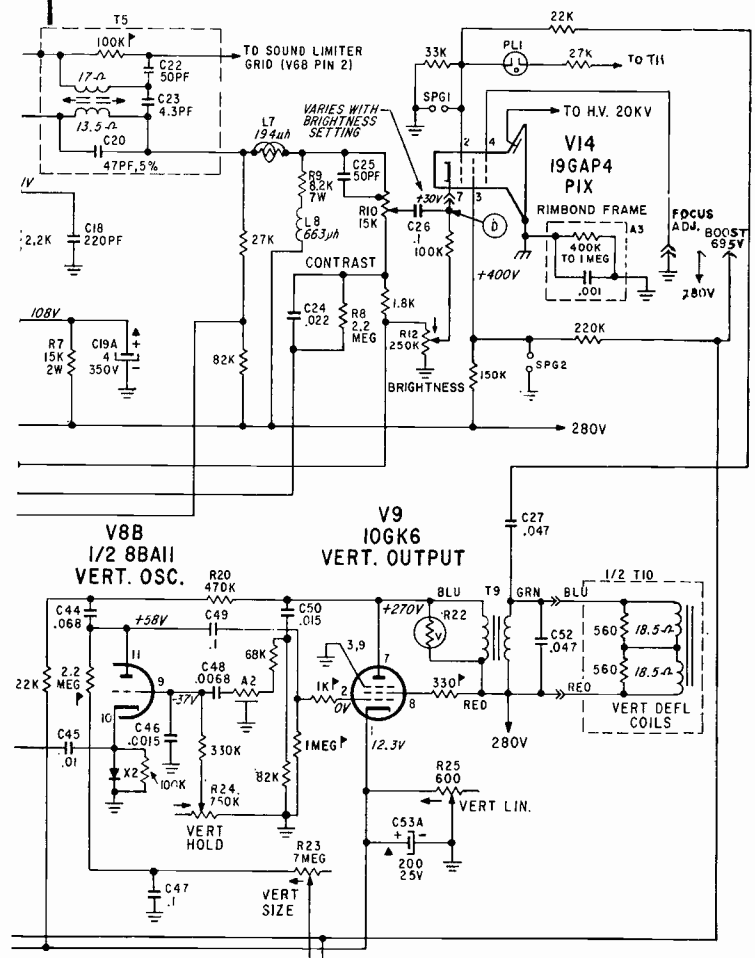


Schematic Diagram of 14N22 (Late Production) Chassis.

ZENITH Chassis 14N33Z Schematic Diagram



Schematic Diagram of 14N33Z Chassis.



HORIZONTAL HOLD CONTROL

The horizontal hold knob is equipped with a stop which limits knob rotation to approximately 270 degrees. To adjust the range of the hold control, remove the knob and turn the shaft to a position where it is impossible to disrupt horizontal synchronization when switching from channel to channel. After adjustment, install the knob with its pointer centered between the stops.

NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

FOR CAPACITOR CAPACITY TOLERANCES SEE LEGEND.

ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

CHASSIS — INDICATES VOLTAGE SOURCE.

PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE

CX=CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITH A RANGE OF 47 PF TO 72 PF (±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

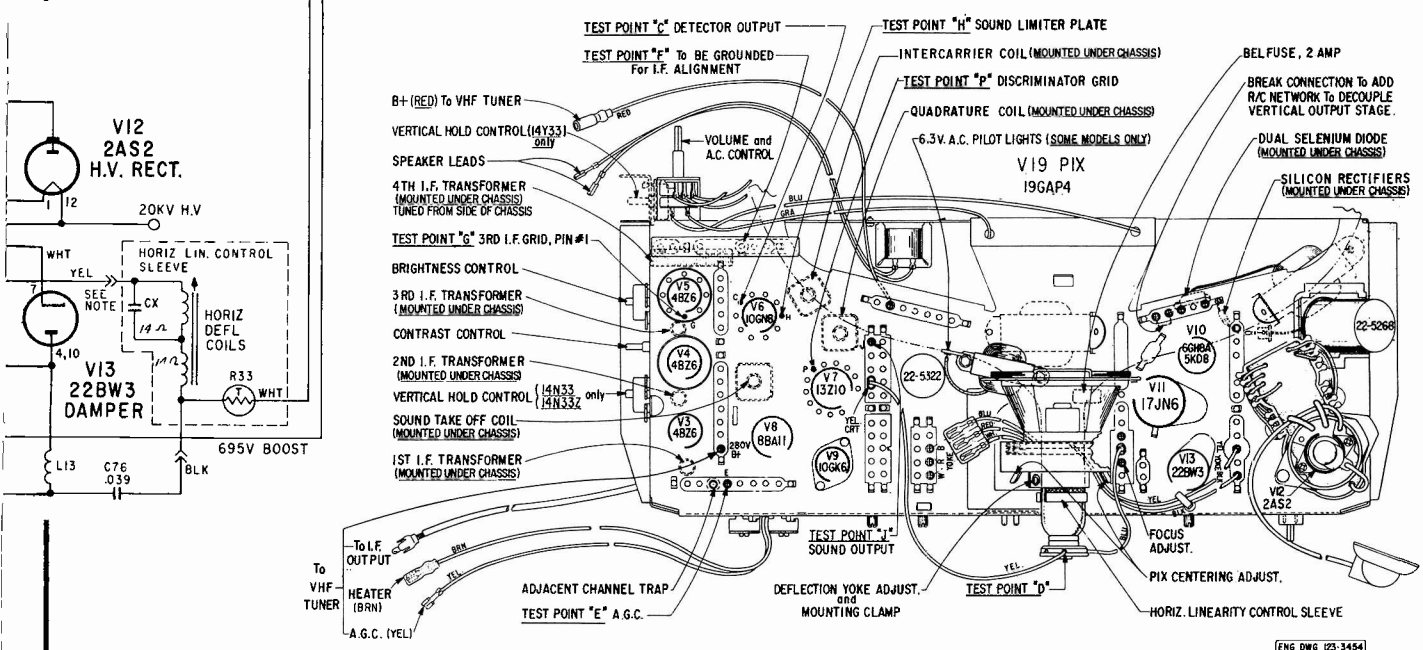
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS WHERE APPLICABLE.

C - DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I.F. AGC
F - GROUNDED FOR I.F. ALIGNMENT
G - 3RD I.F. GRID
H - SECOND LIMITER PLATE
J - SOUND OUTPUT
P - SOUND DISC GRID

INDICATES ±20% TOLERANCE.

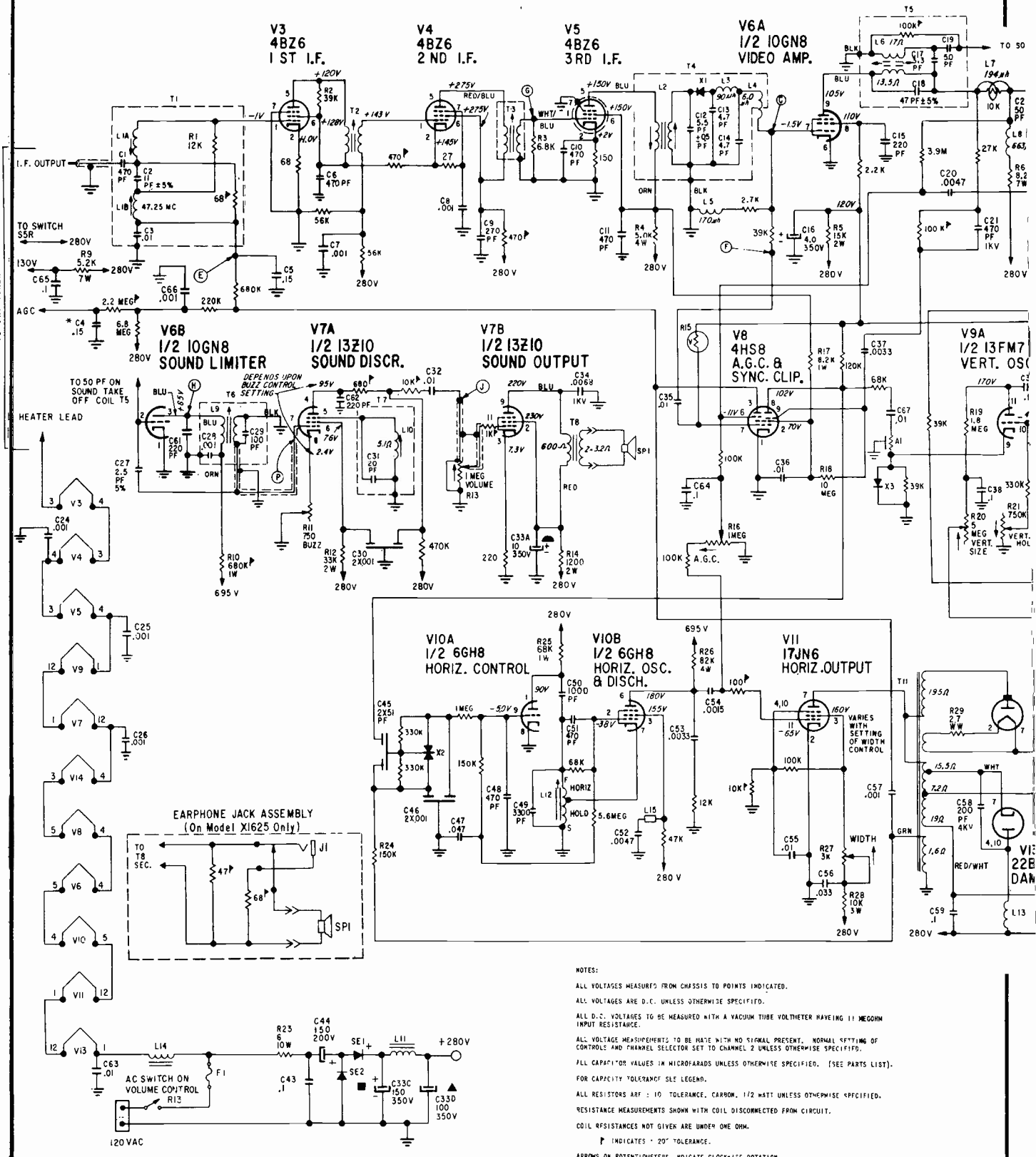
* SEE LEGEND

INDICATES INSULATED BRACKET AND GROUND PLANE (FOR MONOPOLE ANTENNA)



Parts Layout Diagram of 14N33Z Chassis.

ZENITH Chassis 14X21, Z, Schematic Diagram,



NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED. (SEE PARTS LIST).

FOR CAPACITY TOLERANCE SEE LEGEND.

ALL RESISTORS ARE ± 10 TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

▶ INDICATES ± 20% TOLERANCE.

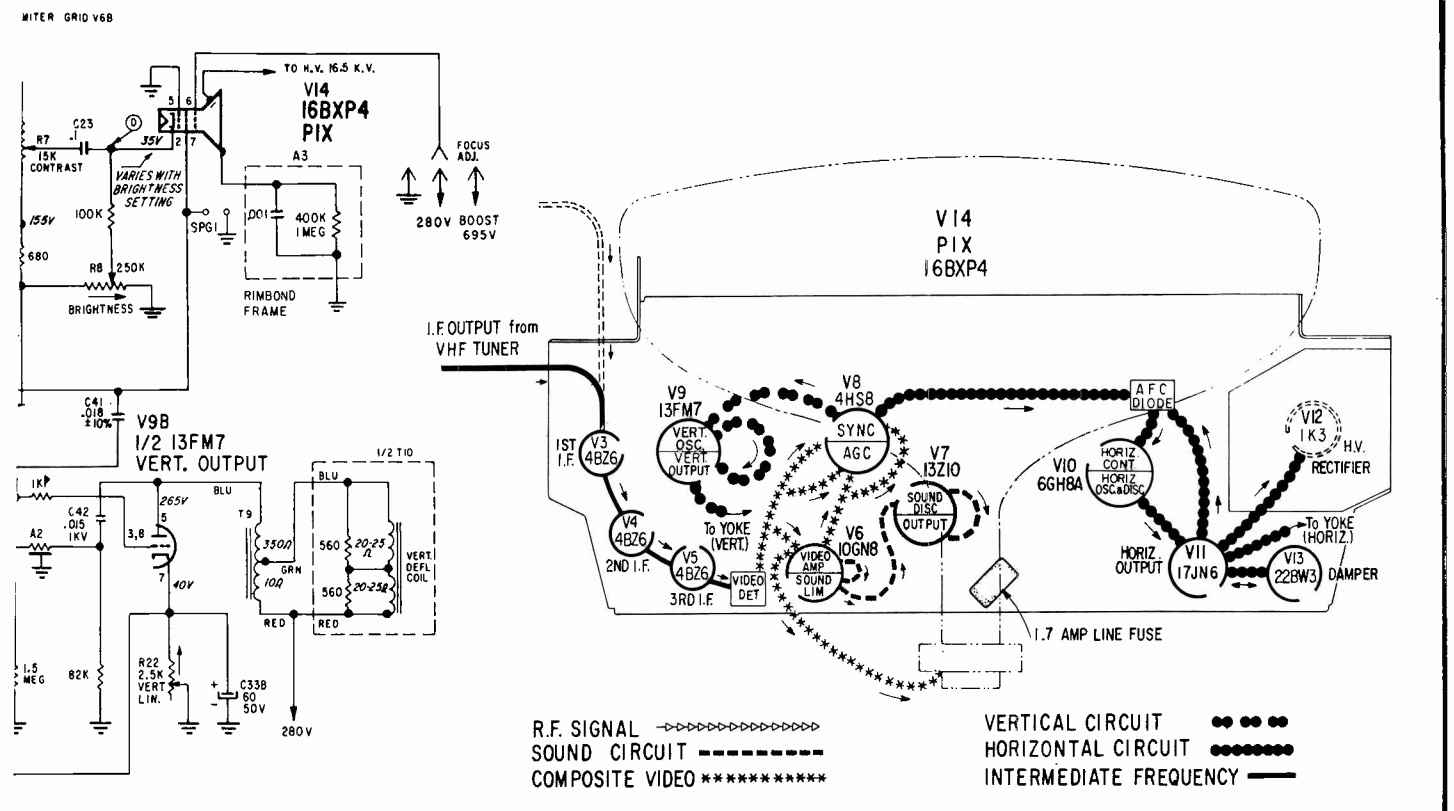
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

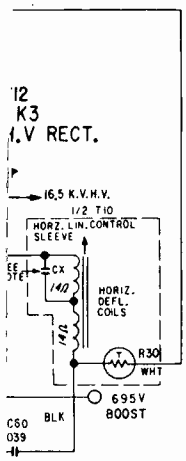
CHASSIS ⏚ ○— INDICATES VOLTAGE SOURCE

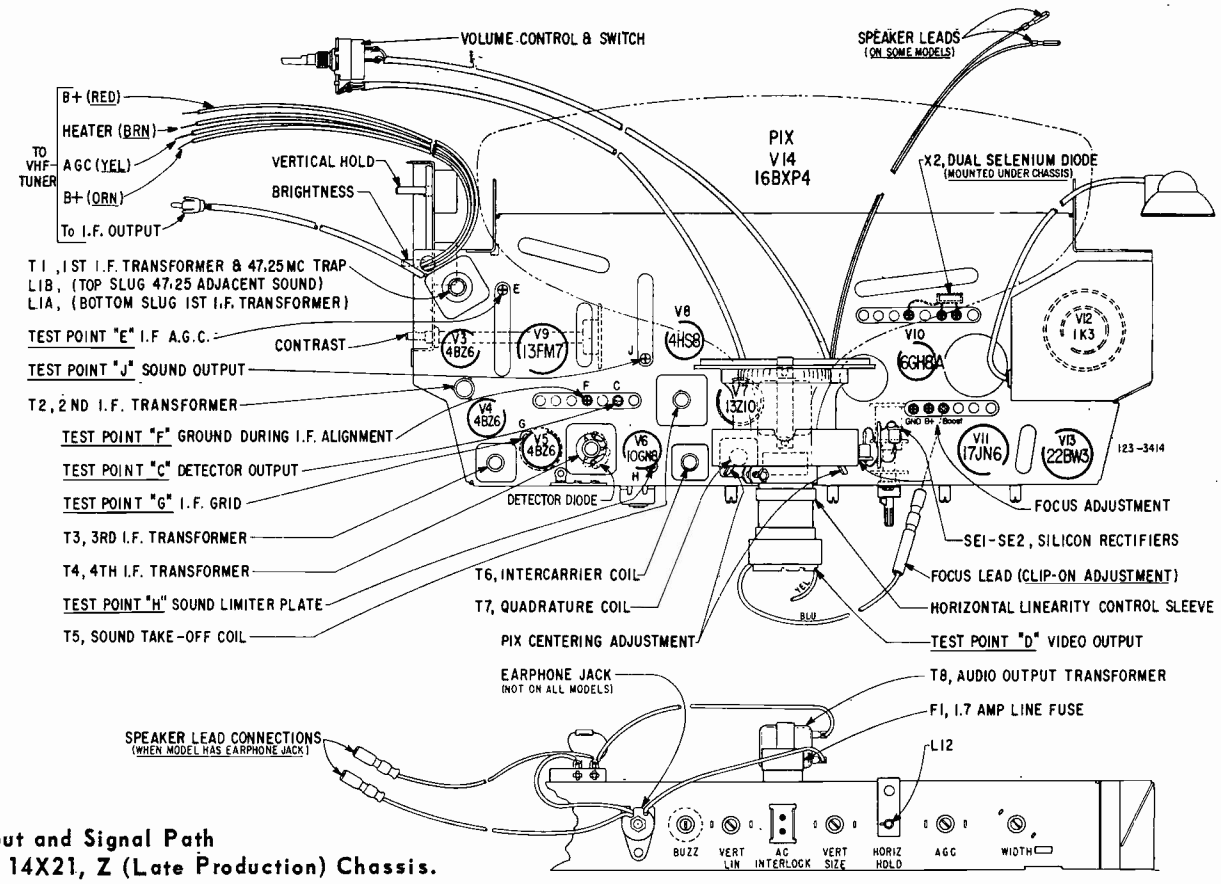
PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE.

CX=CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING VARIES WITH A RANGE OF 47 PF TO 72 PF (3X.V.. ± 10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

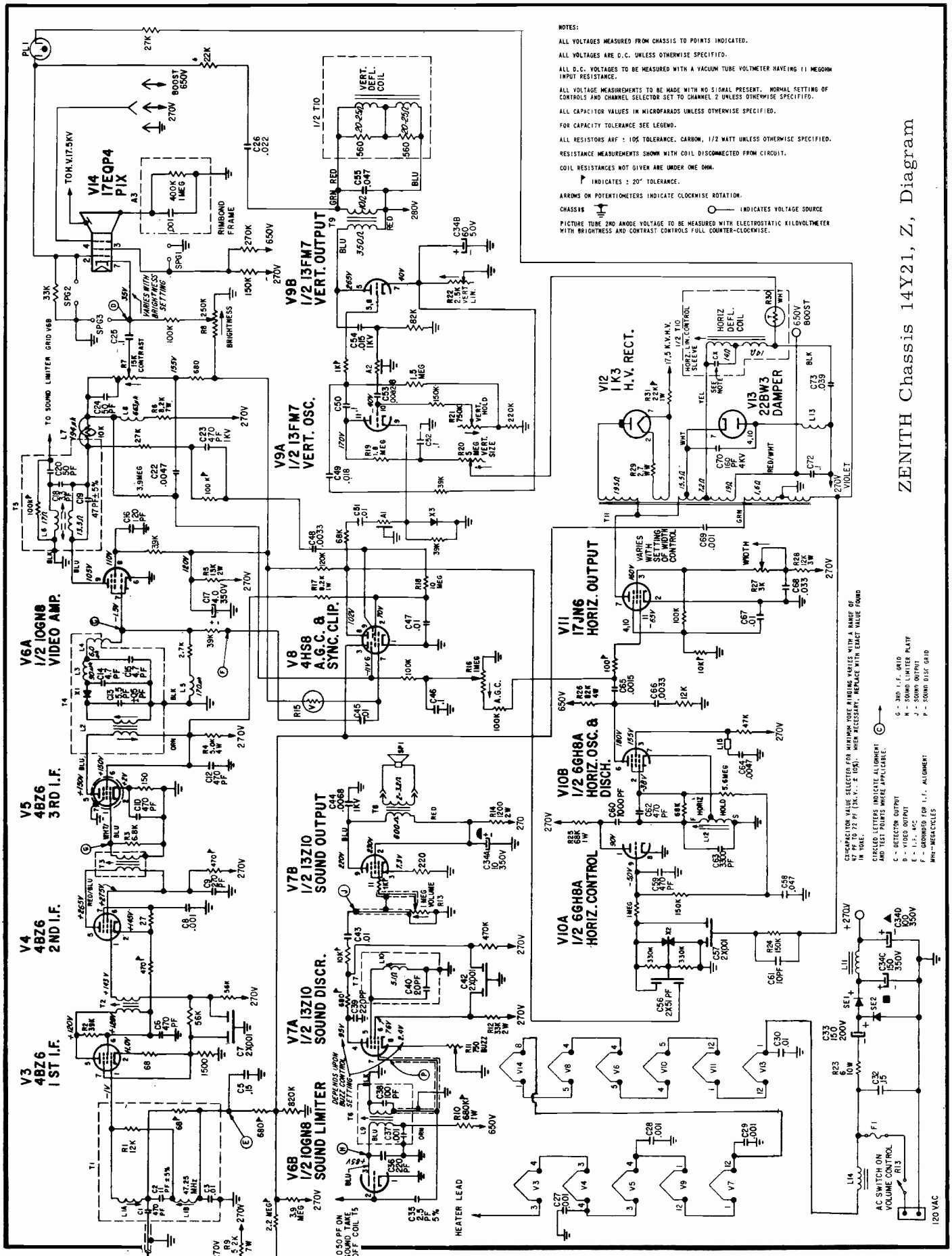
Schematic Diagram of 14X21, Z (Late Production) Chassis.





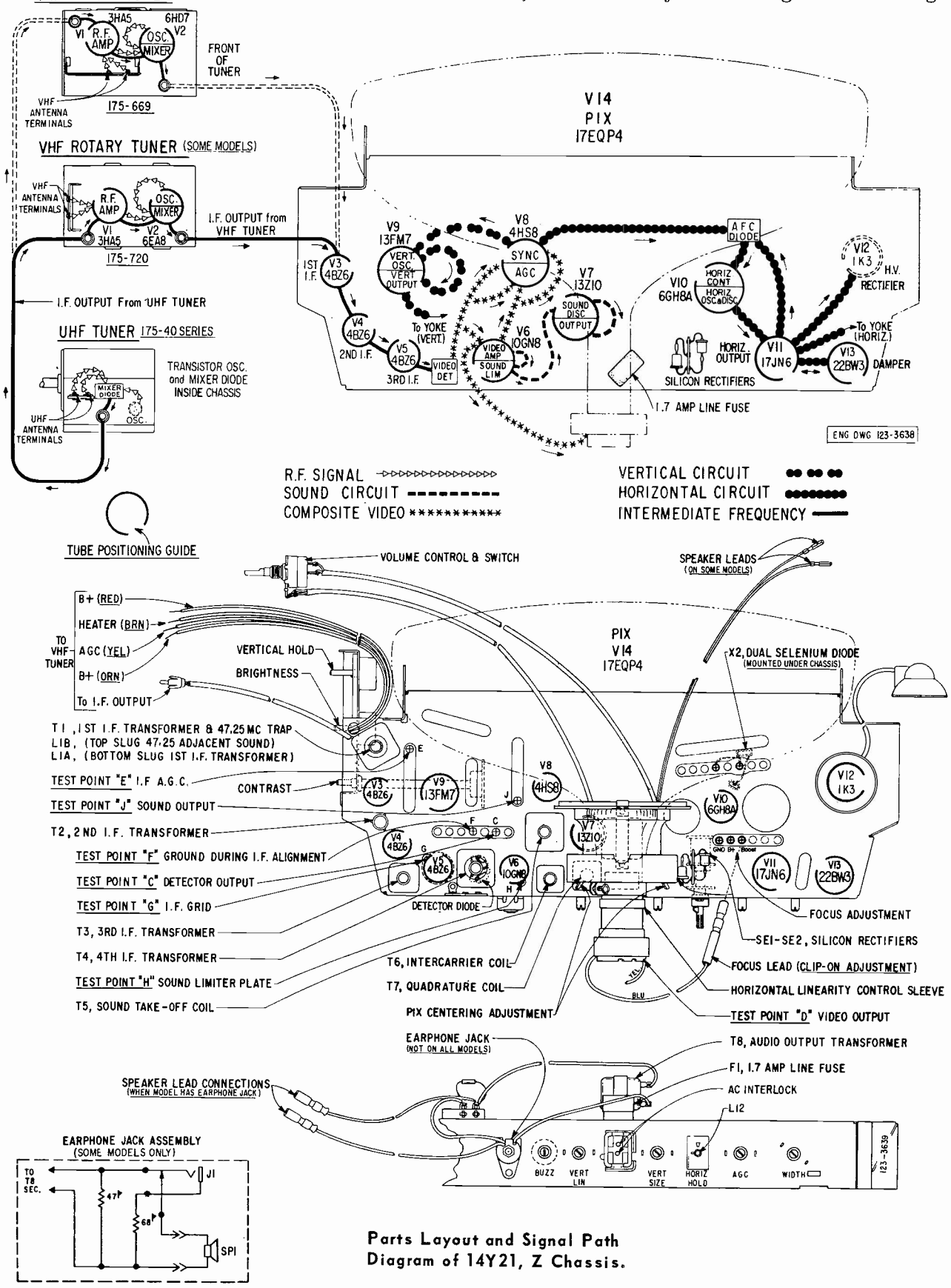


Parts Layout and Signal Path Diagram of 14X21, Z (Late Production) Chassis.



Schematic Diagram of 14Y21, Z

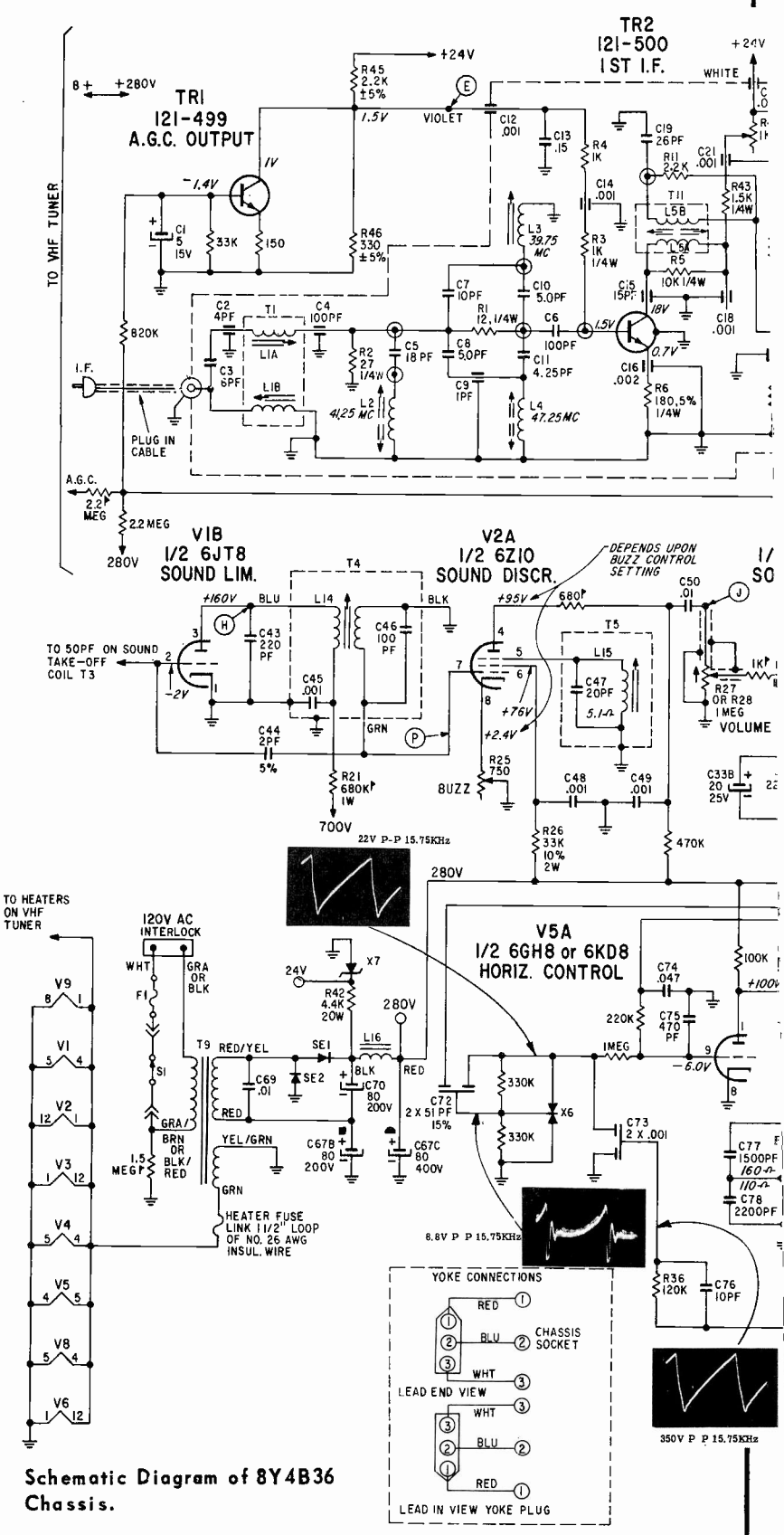
ZENITH Chassis 14Y21,Z, Parts Layout and Signal Path Diagrams



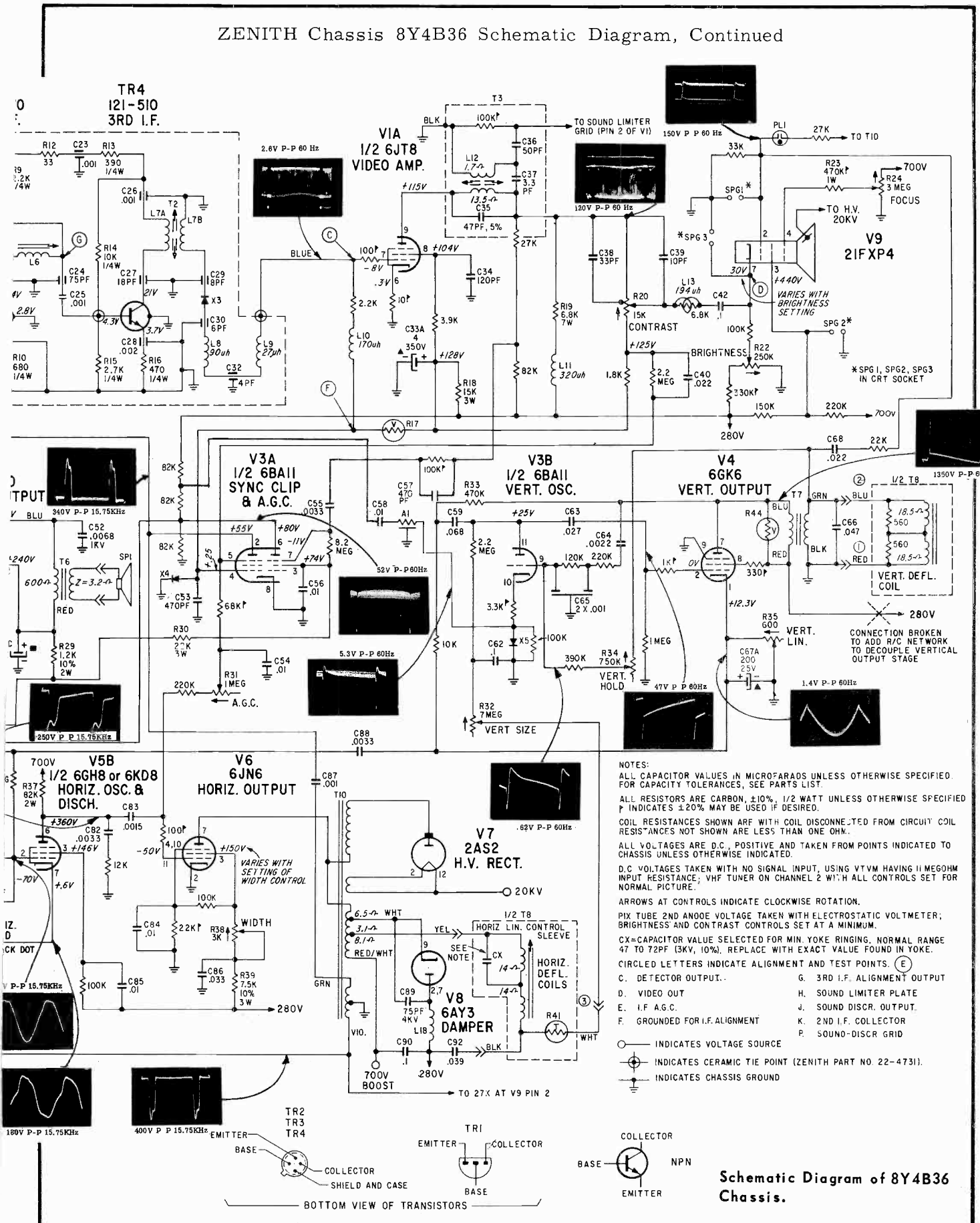
Parts Layout and Signal Path Diagram of 14Y21, Z Chassis.

ITEM NO.	PART NO.	DESCRIPTION	
C1	22-5424	5 MFD ELECTROLYTIC CAP.	15 V
C2	22-4732	4 PF FEED-THRU CAP. ±5%	500 V
C3	22-2381	6 PF DISC CAP. ±10%	500 V
C4	22-4740	100 PF FEED-THRU CAP. 10%	500 V
C5	22-5358	18 PF DISC CAP. 10%	500 V
C6	22-4773	100 PF DISC CAP. 10%	500 V
C7	22-5129	10 PF DISC CAP. ±10%	500 V
C8	22-5392	5 PF DISC CAP. ±.25 PF	500 V
C9	22-4730	1 PF FEED-THRU CAP.	500 V
C10	22-5389	4.25 PF DISC CAP. ±.25 PF	500 V
C11	22-5389	4.25 PF DISC CAP. ±.25 PF	500 V
C12	22-4718	.001 MFD FEED-THRU CAP. GMV	500 V
C13	22-5251	.15 MFD DISC CAP. 20%	12 V
C14	22-4718	.001 MFD FEED-THRU CAP. GMV	500 V
C15	22-4735	15 PF FEED-THRU CAP. 10%	500 V
C16	22-4729	.002 MFD FEED-THRU CAP. GMV	500 V
C17	22-5436	.002 MFD FEED-THRU CAP. GMV	500 V
C18	22-4728	.001 FEED-THRU CAP.	500 V
C19	22-3939	26 PF DISC CAP. 5%	25 V
C20	22-4737	20 PF FEED-THRU CAP. 10%	500 V
C21	22-4728	.001 MF FEED-THRU CAP.	500 V
C22	22-4729	.002 MFD FEED-THRU CAP. GMV	500 V
C23	22-4718	.001 MFD FEED-THRU CAP. GMV	500 V
C24	22-4739	75 PF FEED-THRU CAP. 10%	500 V
C25	22-3318	.001 MFD DISC CAP.	25 V
C26	22-4718	.001 MFD FEED-THRU CAP. GMV	500 V
C27	22-4736	18 PF FEED-THRU CAP. 10%	500 V
C28	22-4729	.002 MFD FEED-THRU CAP. GMV	500 V
C29	22-4734	8 PF FEED-THRU CAP. 10%	500 V
C30	22-4733	6 PF FEED-THRU CAP. 10%	500 V
C31	22-4738	47 PF FEED-THRU CAP. 10%	500 V
C32	22-4732	4 PF FEED-THRU CAP. 10%	500 V
C33A		4 MFO ELECTROLYTIC CAP.	350 V
C33B	22-2744	20 MFD ELECTROLYTIC CAP.	25 V
C33C		10 MFD ELECTROLYTIC CAP.	400 V
C34	22-3847	120 PF DISC CAP. 10%	500 V
C35	22-2467	47 PF DISC CAP. 5%	500 V
C36	22-3515	50 PF DISC CAP. 20%	500 V
C37	22-3299	3.3 PF GIMMICK CAP. 20%	500 V
C38	22-5166	33 PF GIMMICK CAP. 10%	500 V
C39	22-3250	10 PF OISC CAP. 10%	500 V
C40	22-4322	.022 MFD MOLDED CAP. 10%	400 V
C42	22-4369	.1 MFD MOLDED CAP. 20%	400 V
C43	22-2926	220 PF MICA CAP. 10%	500 V
C44	22-2461	2 PF GIMMICK CAP. 5%	500 V
C45	22-3748	.001 MFD DISC CAP. 10%	1KV
C46	22-5106	100 PF MICA CAP. 10%	500 V
C47	22-5393	20 PF DISC CAP. 10%	500 V
C48	22-7	.001 MFD DISC CAP..	500 V
C49	22-17	.001 MFD DISC CAP. 10%	1KV
C50	22-4617	.01 MFD DISC CAP.	500 V
C52	22-5398	.0068 MFD DISC 20%	1KV
C53	22-6	470 PF DISC 20%	1KV
C54	22-4617	.01 MFD DISC CAP.	500 V
C55	22-11	.0033 MFD DISC CAP. 20%	500 V
C56	22-4617	.01 MFD DISC CAP.	500 V
C57	22-6	470 PF DISC CAP. 20%	1KV
C58	22-4617	.01 MFD DISC CAP.	500 V
C59	22-4138	.068 MFD MOLDED CAP. 10%	600 V
C62	22-4371	.1 MFD MOLDED CAP. 20%	600 V
C63	22-4106	.027 MFD MOLDED CAP. 10%	400 V
C64	22-4252	.0022 MFD MOLDED CAP. 10%	600 V
C65	22-21	2 X .001 MFD DISC CAP. 10%	500 V
C66	22-4343	.047 MFD MOLDED CAP. 20%	600 V
C67A		200 MFD ELECTROLYTIC CAP.	25 V
C67B	22-3863	80 MFD ELECTROLYTIC CAP.	200 V
C57C		80 MFD ELECTROLYTIC CAP.	400 V
C68	22-4099	.022 MFD MOLDED CAP. 20%	400 V
C69	22-4617	.01 MFD DISC CAP.	500 V
C70	22-3965	80 MFD ELECTROLYTIC CAP.	200 V
C72	22-25	2 X 51 PF DISC CAP. 15%	500 V
C73	22-21	2 X .001 MFD DISC CAP. 10%	500 V
C74	22-3627	.047 MFD MOLDED 20%	100 V
C75	22-6	470 PF DISC CAP. 20%	1KV
C76	22-3250	10 PF DISC CAP. 10%	500 V
C77	22-3916	1500 PF POLYSTYRENE CAP. 10%	500 V
C78	22-3960	2200 PF MOLDED 10%	400 V
C79	22-3667	330 PF MICA CAP. 10%	500 V
C80	22-3938	470 PF DISC CAP. 20%	500 V
C82	22-13	.0033 MFD DISC CAP. 10%	500 V
C83	22-12	.0015 MFD DISC CAP. 10%	500 V
C84	22-4617	.01 MFD DISC CAP.	500 V
C85	22-4617	.01 MFD DISC CAP.	500 V
C86	22-4333	.033 MFD MOLDED CAP. 20%	400 V
C87	22-7	.001 MFD DISC	500 V
C88	22-11	.0033 MFD DISC 20%	500 V
C89	22-2954	75 PF DISC CAP. 10%	4KV
C90	22-4371	.1 MFD MOLDED CAP. 20%	600 V
C92	22-4348	.047 MFD MOLDED 10%	600 V
R1	63-7102	12 OHM RESISTOR 10% A-B ONLY	1/4 W
R2	63-7103	27 OHM RESISTOR 10% A-B ONLY	1/4 W
R3	63-4185	1000 OHM RESISTOR 10%	1/4 W
R4	63-7011	1000 OHM RESISTOR 10%	1/2 W
R5	63-7106	10 K OHM RESISTOR 10% A-B ONLY	1/4 W
R6	63-4153	180 OHM RESISTOR 5%	1/4 W
R7	63-4231	12 K OHM RESISTOR 10%	1/4 W
R8	63-4210	3.9 K OHM RESISTOR 10%	1/4 W
R9	63-7104	2.2 K OHM RESISTOR 10% A-B ONLY	1/4 W
R10	63-4178	680 OHM RESISTOR 10%	1/4 W
R11	63-7104	2.2 K OHM RESISTOR 10% A-B ONLY	1/4 W
R12	63-7012	33 OHM RESISTOR 10%	1/2 W
R13	63-4168	390 OHM RESISTOR 10%	1/4 W
R14	63-4227	10 K OHM RESISTOR 10%	1/4 W
R15	63-4203	2.7 K OHM RESISTOR 10%	1/4 W
R16	63-4171	470 OHM RESISTOR 10%	1/4 W

ZENITH Chassis 8Y4B36 Diagram



Schematic Diagram of 8Y4B36 Chassis.



NOTES:

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED. FOR CAPACITY TOLERANCES, SEE PARTS LIST.

ALL RESISTORS ARE CARBON, ±10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED. ▶ INDICATES ±20% MAY BE USED IF DESIRED.

COIL RESISTANCES SHOWN ARE WITH COIL DISCONNECTED FROM CIRCUIT. COIL RESISTANCES NOT SHOWN ARE LESS THAN ONE OHM.

ALL VOLTAGES ARE D.C., POSITIVE AND TAKEN FROM POINTS INDICATED TO CHASSIS UNLESS OTHERWISE INDICATED.

D.C. VOLTAGES TAKEN WITH NO SIGNAL INPUT, USING VTVM HAVING 11 MEGOHM INPUT RESISTANCE; VHF TUNER ON CHANNEL 2 WITH ALL CONTROLS SET FOR NORMAL PICTURE.

ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION.

PIX TUBE 2ND ANODE VOLTAGE TAKEN WITH ELECTROSTATIC VOLTMETER; BRIGHTNESS AND CONTRAST CONTROLS SET AT A MINIMUM.

CX=CAPACITOR VALUE SELECTED FOR MIN. YOKE RINGING. NORMAL RANGE 47 TO 72PF (3KV, 10%). REPLACE WITH EXACT VALUE FOUND IN YOKE.

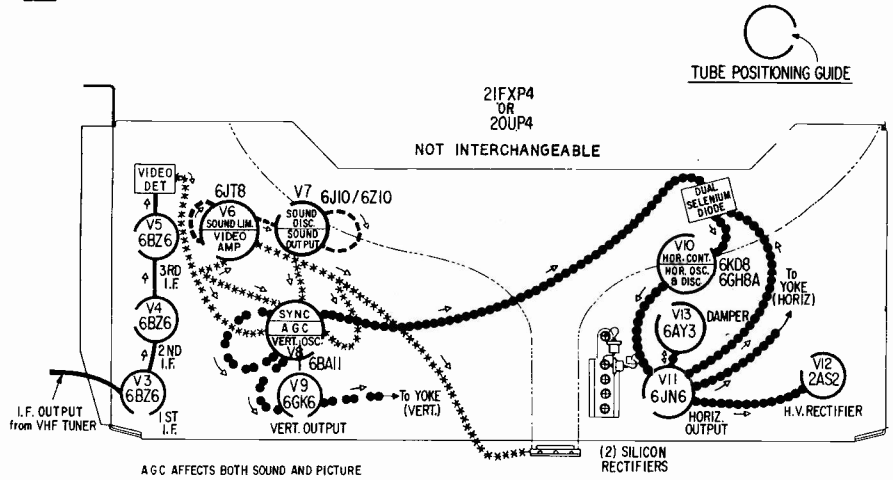
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS. (E)

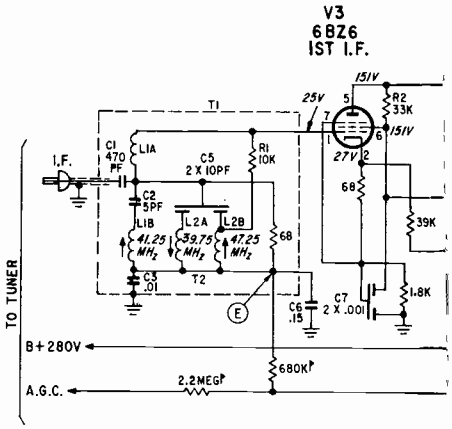
C. DETECTOR OUTPUT.
D. VIDEO OUT
E. I.F. A.G.C.
F. GROUNDED FOR I.F. ALIGNMENT
G. 3RD I.F. ALIGNMENT OUTPUT
H. SOUND LIMITER PLATE
J. SOUND DISCR. OUTPUT
K. 2ND I.F. COLLECTOR
P. SOUND-DISCR GRID

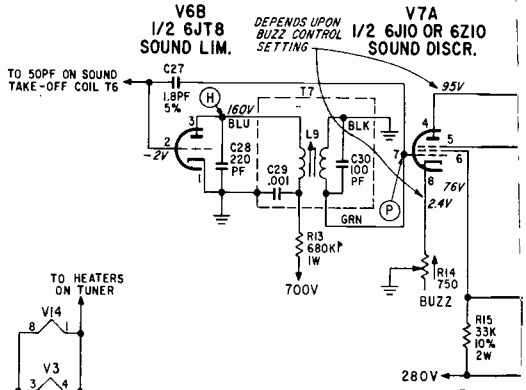
INDICATES VOLTAGE SOURCE
INDICATES CERAMIC TIE POINT (ZENITH PART NO. 22-4731).
INDICATES CHASSIS GROUND

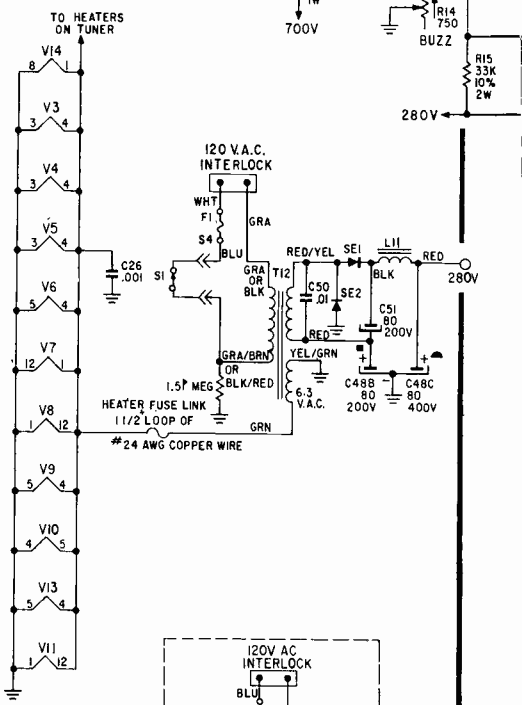
Schematic Diagram of 8Y4B36 Chassis.

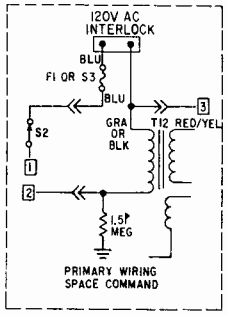
ZENITH Chassis 14Y26 Service Information, Continued



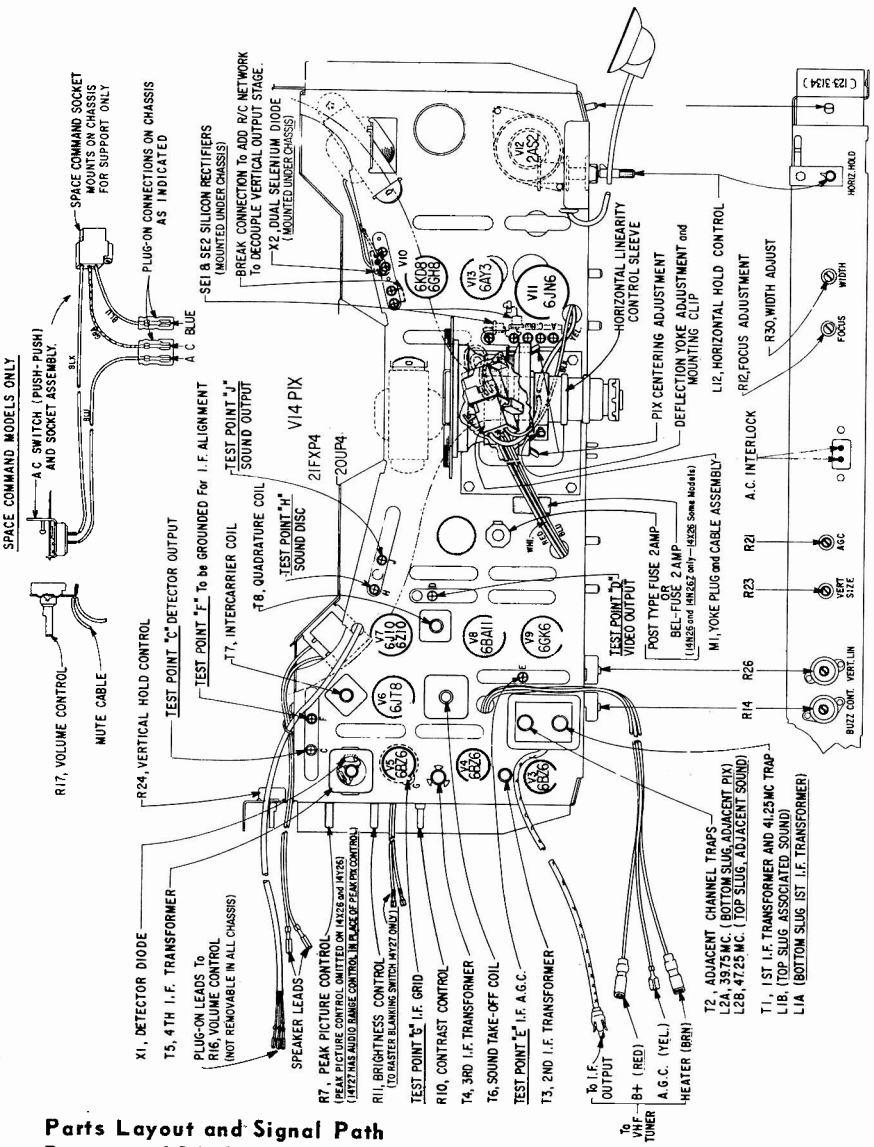






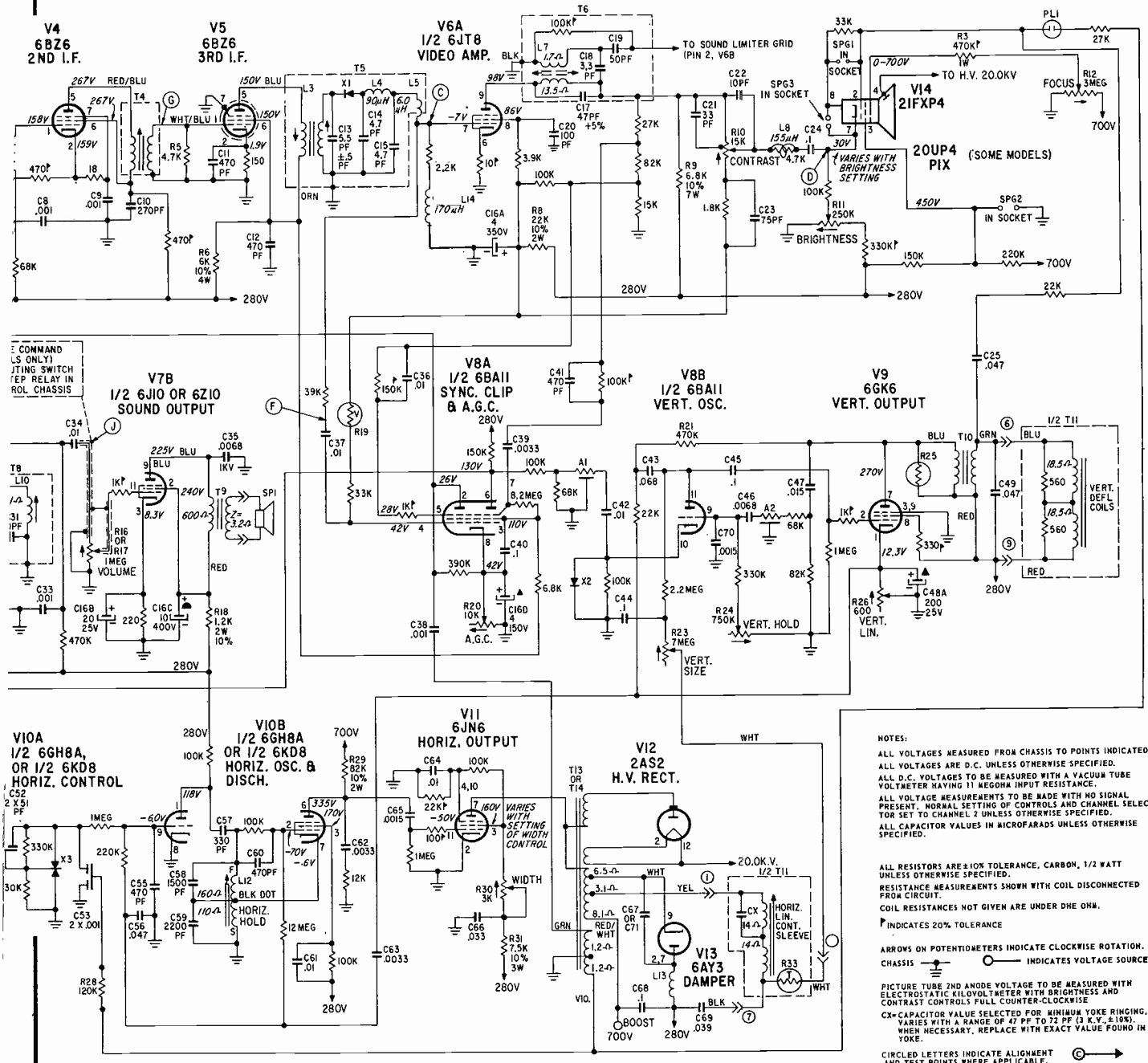


SOUND CIRCUIT
COMPOSITE VIDEO
R.F. SIGNAL
VERTICAL CIRCUIT
HORIZONTAL CIRCUIT
INTERMEDIATE FREQUENCY



Parts Layout and Signal Path Diagram of 14Y26 Chassis.

ZENITH Chassis 14Y26 Schematic Diagram Continued



NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

INDICATES 20% TOLERANCE

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

CHASSIS — INDICATES VOLTAGE SOURCE.

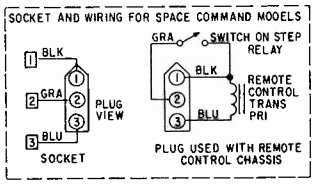
PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE

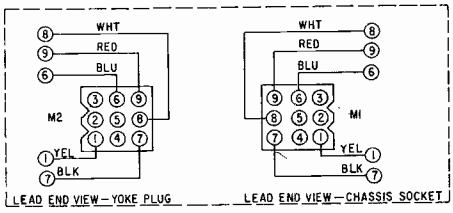
CX= CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITH A RANGE OF 47 PF TO 72 PF (3 K.V., ±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

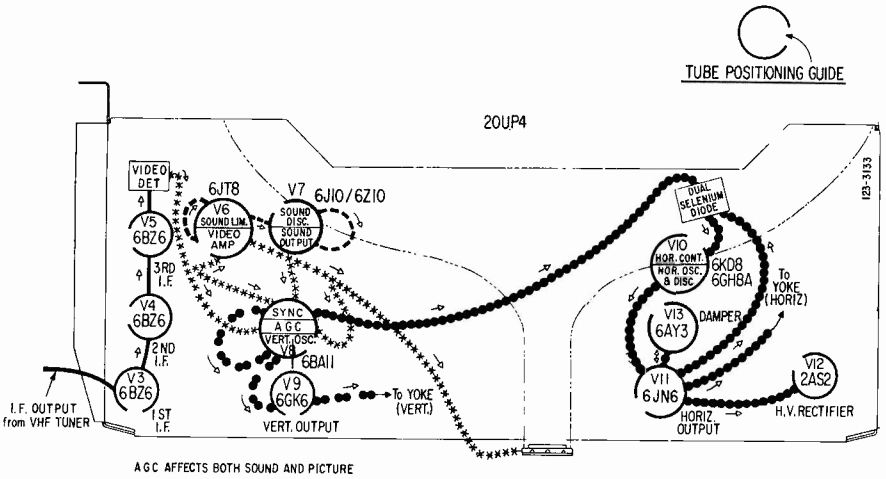
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS WHERE APPLICABLE.

C - DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I.F. AGC
F - GROUNDED FOR I.F. ALIGNMENT
G - 3RD I.F. GRID
H - SOUND LIMITER PLATE
J - SOUND OUTPUT
P - SOUND DISC GRID

Schematic Diagram of 14Y26 Chassis.

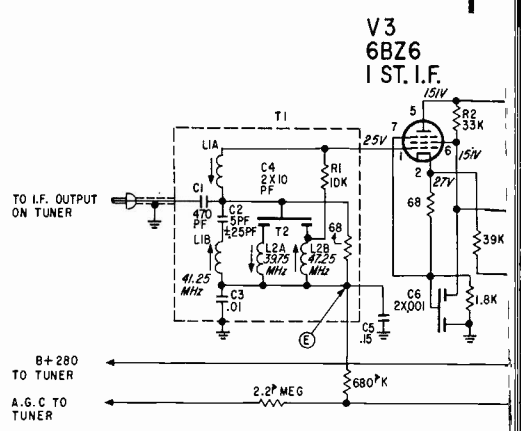


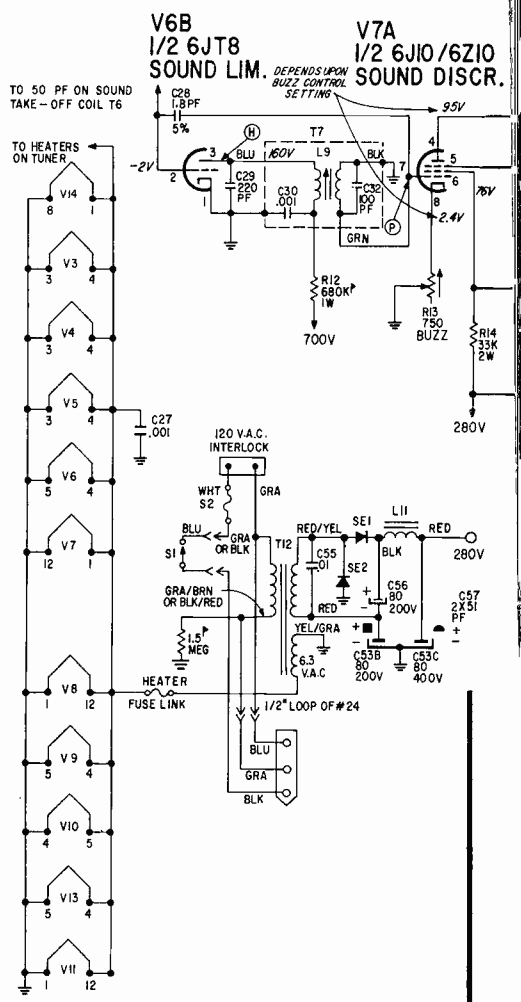


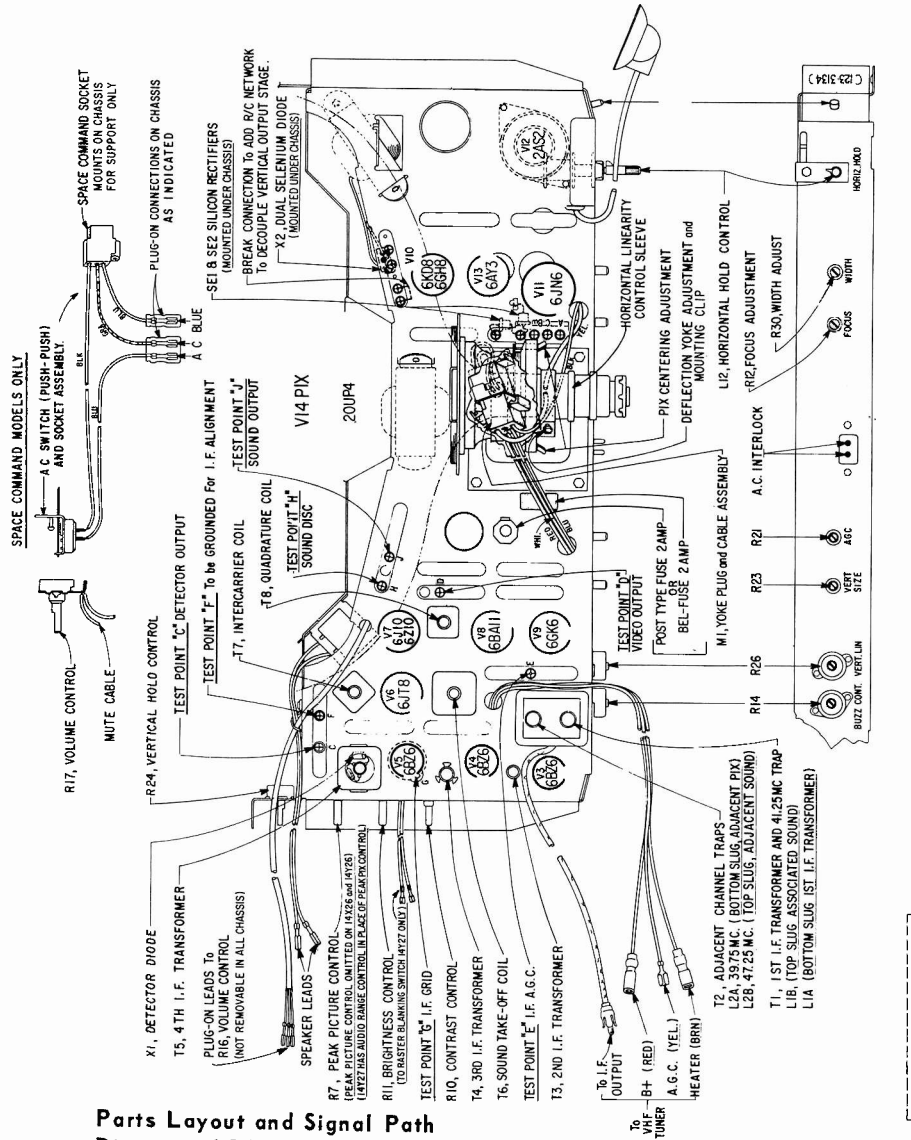


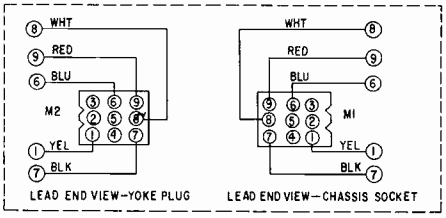
AGC AFFECTS BOTH SOUND AND PICTURE

SOUND CIRCUIT
COMPOSITE VIDEO
R.F. SIGNAL
VERTICAL CIRCUIT
HORIZONTAL CIRCUIT
INTERMEDIATE FREQUENCY

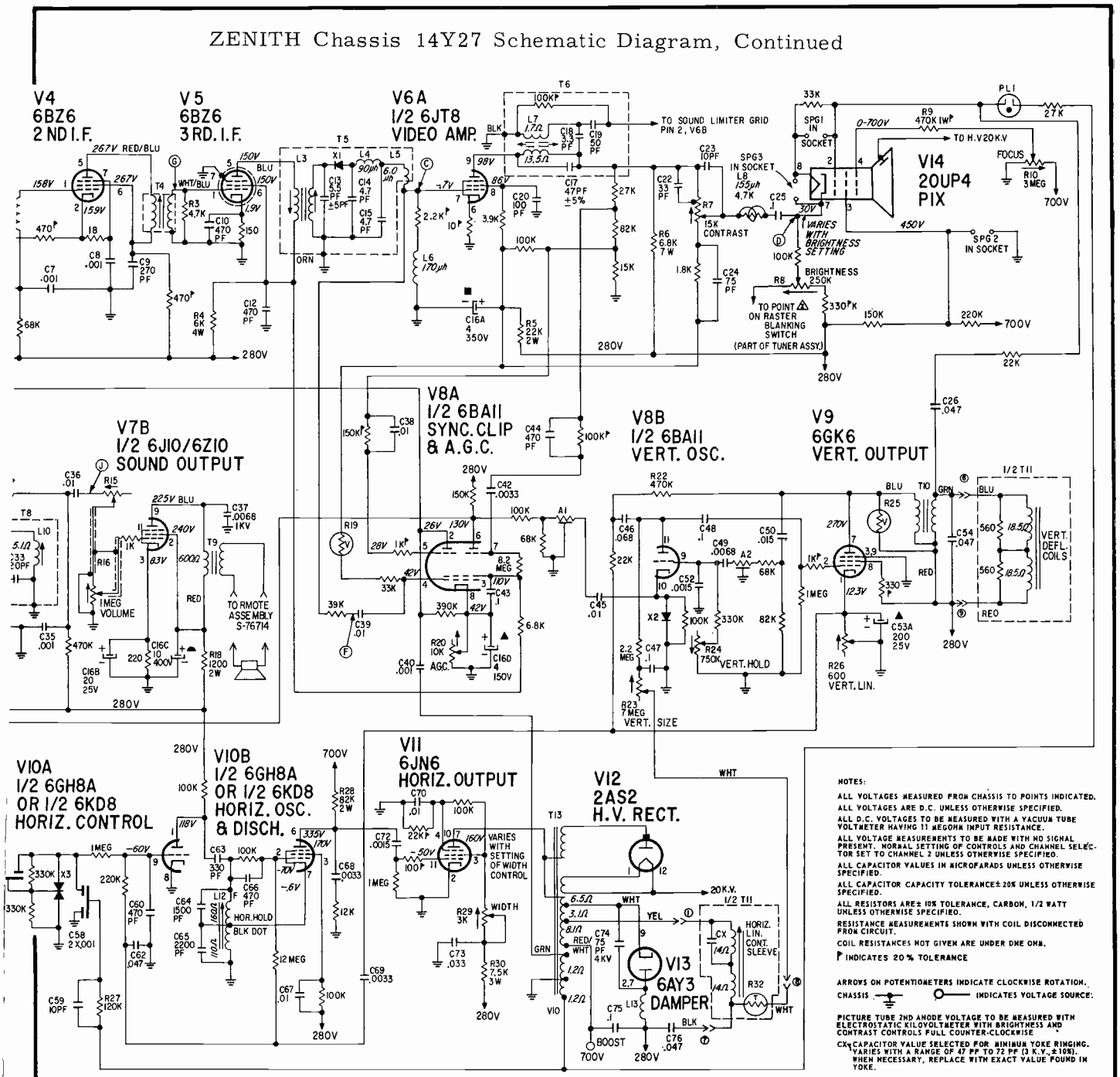








Parts Layout and Signal Path Diagram of 14Y27 Chassis.



NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR CAPACITY TOLERANCE ± 20% UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ± 10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

⚐ INDICATES 20% TOLERANCE

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

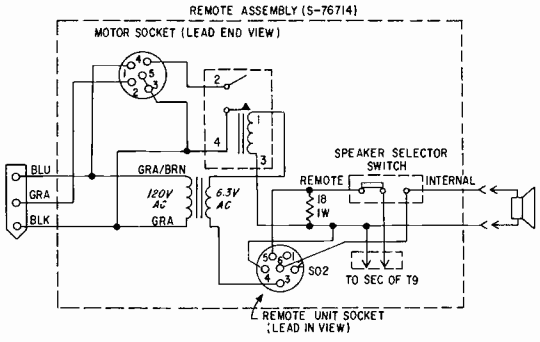
CHASSIS ⏚ —○— INDICATES VOLTAGE SOURCE.

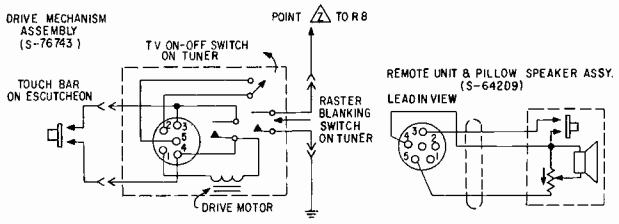
PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE.

CX ⚐ CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITH A RANGE OF 47 PF TO 72 PF (3 K.V. ± 10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS WHERE APPLICABLE. ⓒ→

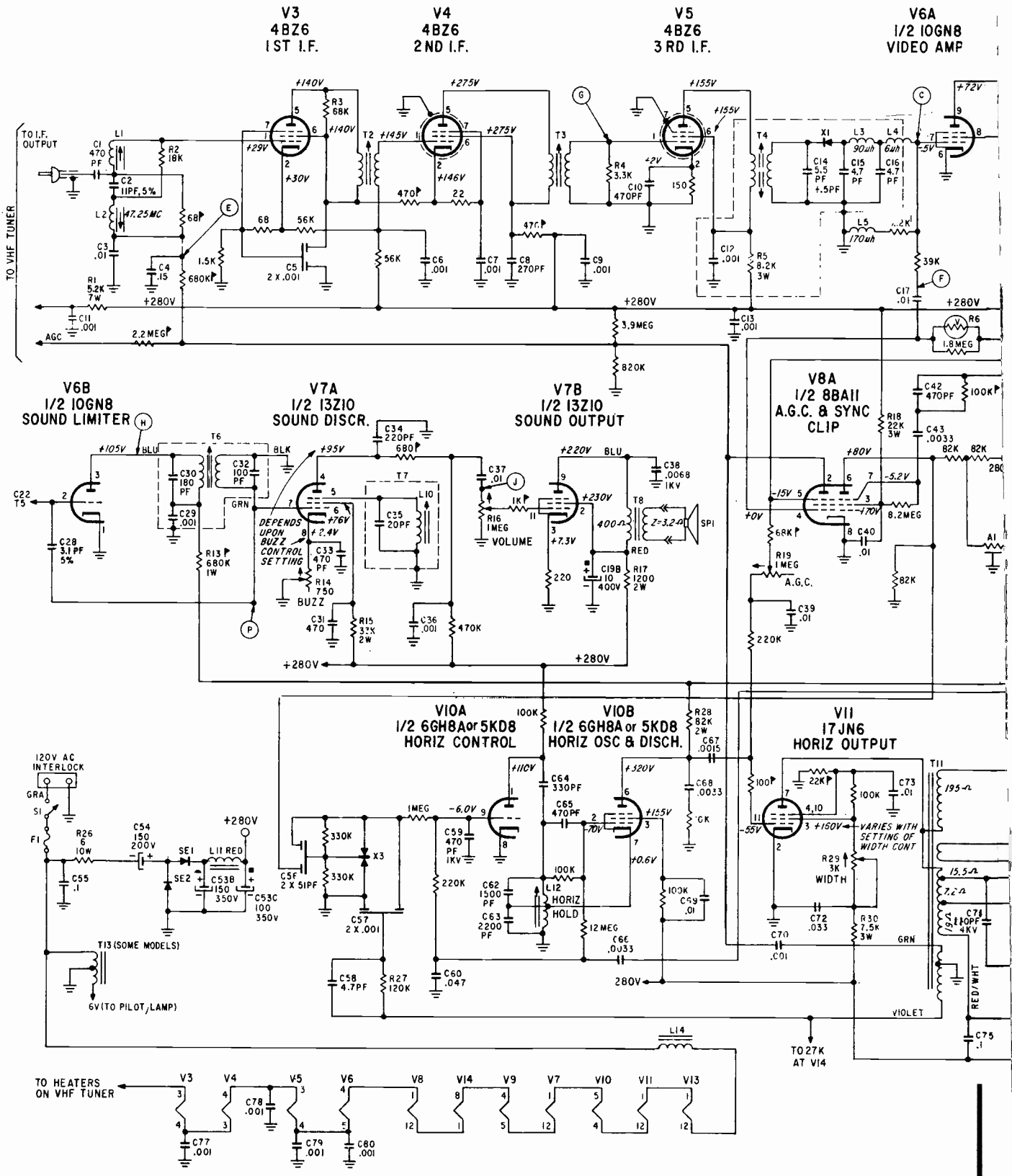
C - DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I.F. AGC
F - GROUNDED FOR I.F. ALIGNMENT
G - 3RD I.F. GRID
H - SOUND LIMITER PLATE
J - SOUND OUTPUT
P - SOUND DISC GRID





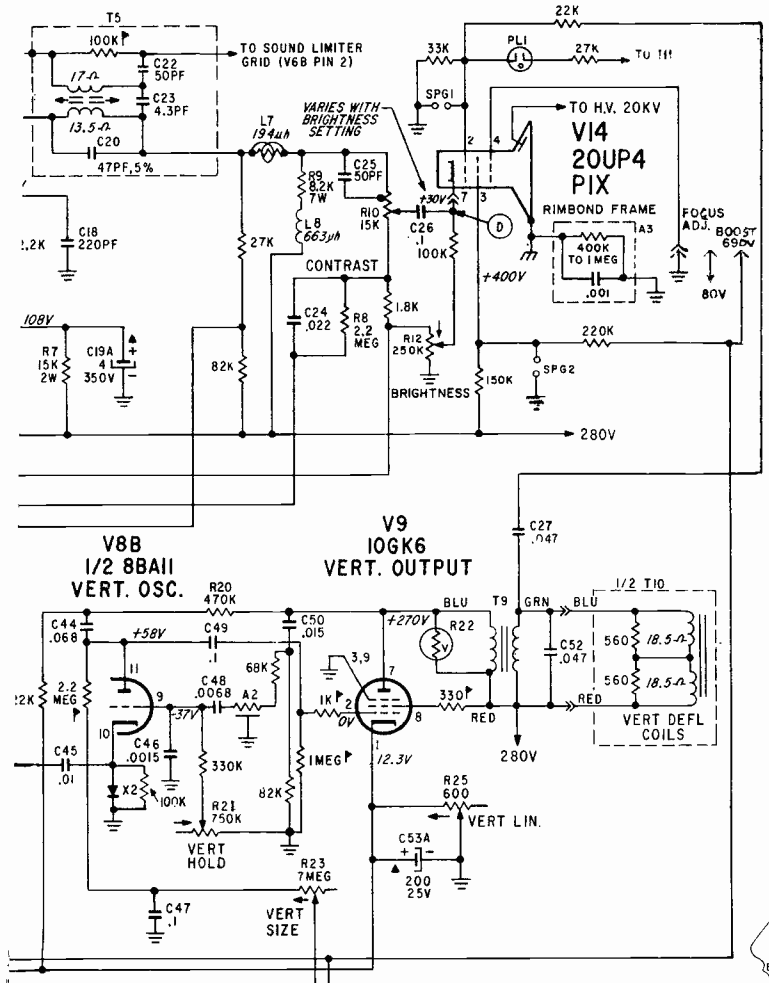
Schematic Diagram of 14Y27 Chassis.

ZENITH Chassis 14Y33 Schematic Diagram



Schematic Diagram of 14Y33 Chassis.

ZENITH Chassis 14Y33 Schematic Diagram, Continued



NOTES.

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.

ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

CHASSIS — INDICATES VOLTAGE SOURCE.

PICTURE TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE.

CX=CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITH A RANGE OF 47 PF TO 77 PF (3 K.V., ±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.

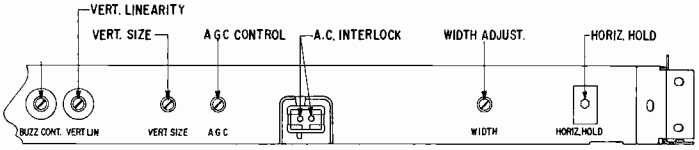
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS WHERE APPLICABLE.

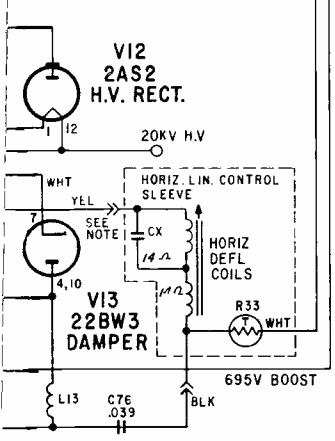
C - DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I.F. AGC
F - GROUNDED FOR I.F. ALIGNMENT
G - 3RD I.F. GRID
H - SOUND LIMITER PLATE
J - SOUND OUTPUT
P - SOUND DISC GRID

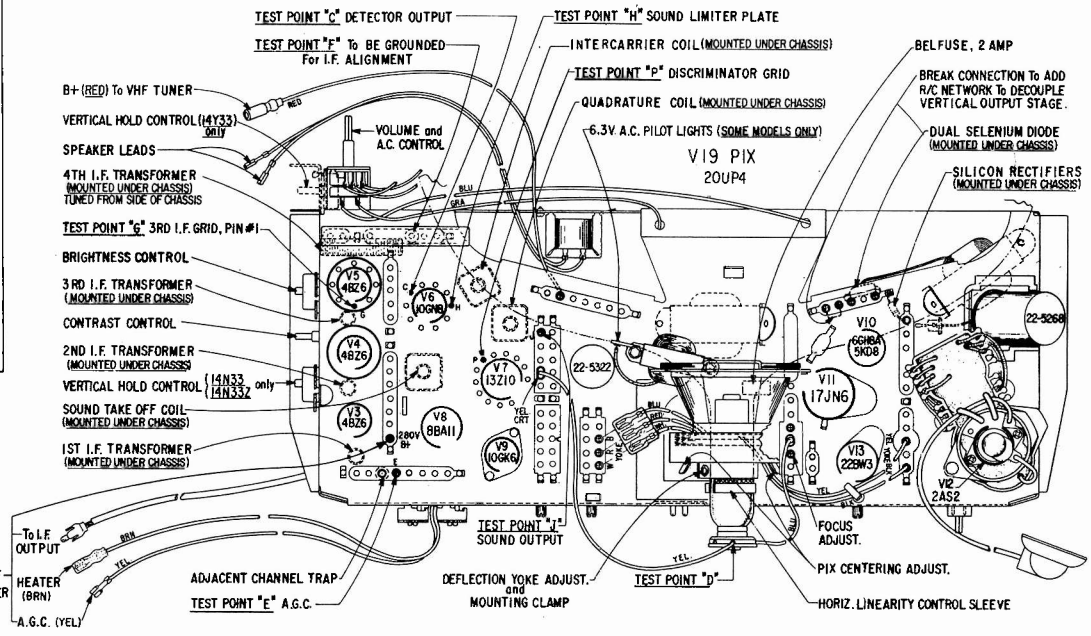
INDICATES ±20% TOLERANCE.

* SEE LEGEND

INDICATES INSULATED BRACKET AND GROUND PLANE (FOR MONOPOLE ANTENNA)



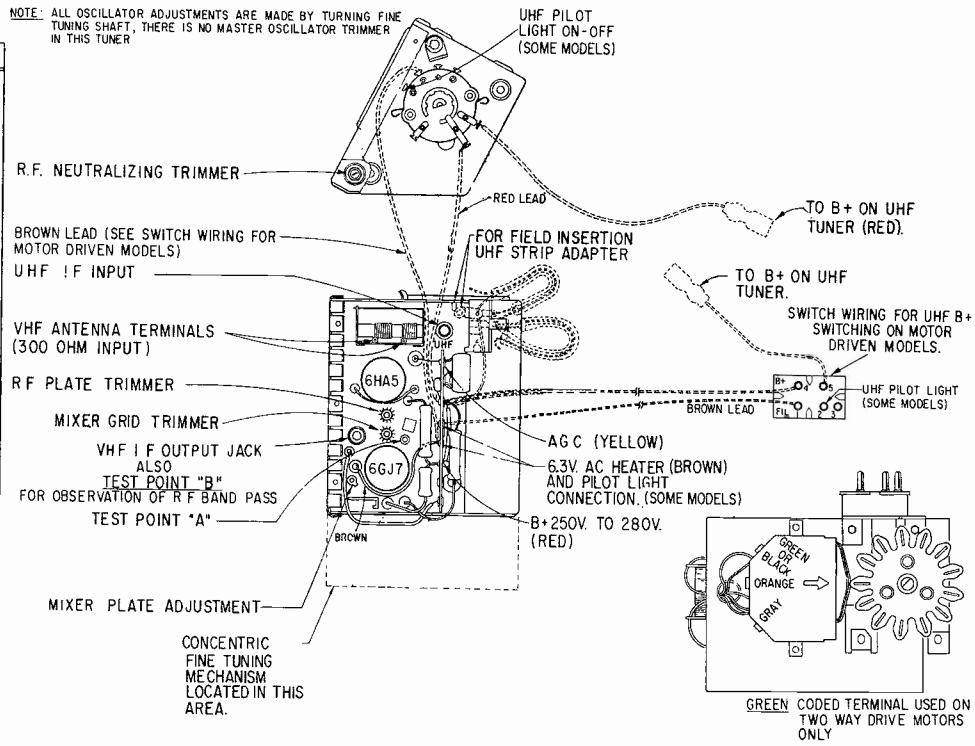


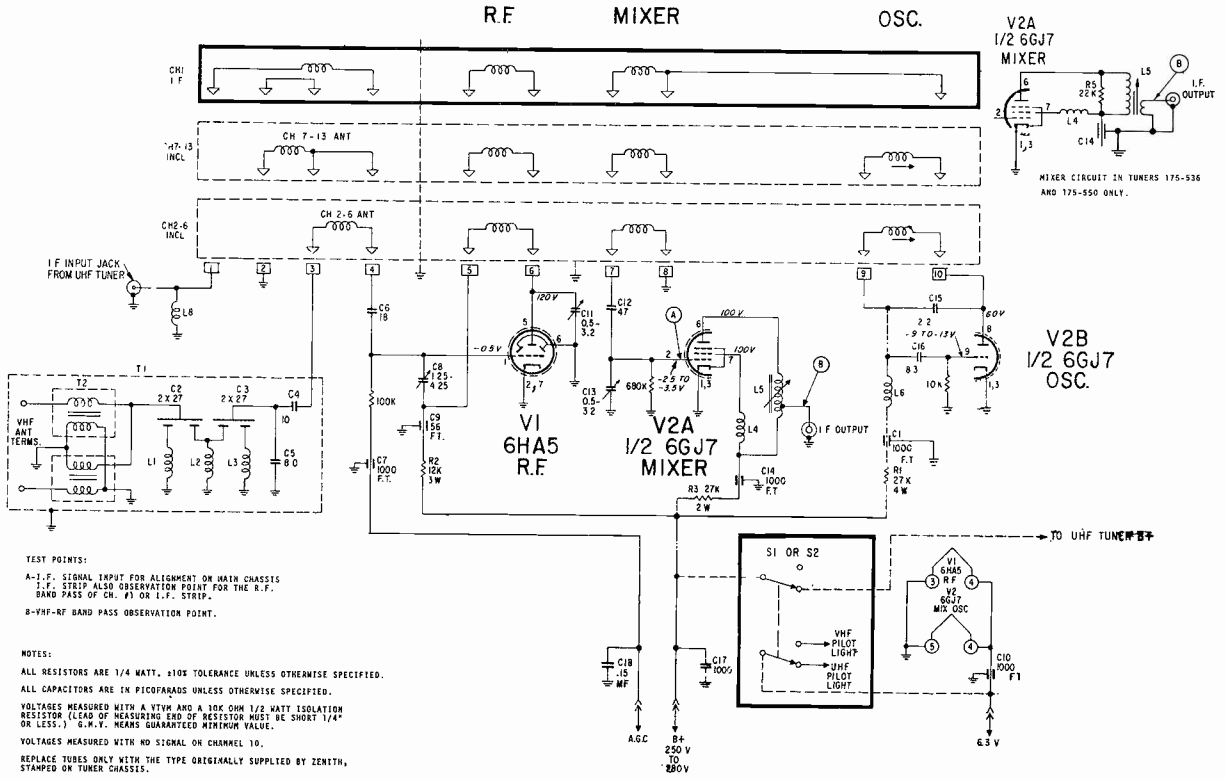


Parts Layout

ZENITH Tuner 175-500 used in some Chassis of Y-Models

ITEM NO.	PART NO.	DESCRIPTION	
C1	22-4613	1000 PF F.T.	500 V
C2	22-3553	2 X 27 PF DISC ±5%	500 V
C3	22-3553	2 X 27 PF DISC	500 V
C4	22-3617	10 PF ±.25 PF N220	500 V
C5	22-3816	8 PF ±.5PF N220	500 V
C6	22-4786	18 PF 5% N220 DISC	500 V
C7	22-4613	1000 PF F.T.	500 V
C8	22-5348	1.25-4.25 PF TRIMMER	500 V
C9	22-3488	56 PF F.T. 7 1/2%	500 V
C10	22-4613	1000 PF F.T.	500 V
C11	22-4510	0.5-3.2 PF TRIMMER	500 V
C12	22-3822	47 PF DISC 5% N470	500 V
C13	22-4510	0.5-3.2 PF TRIMMER	500 V
C14	22-4613	1000 PF F.T.	500 V
C15	22-3621	2.2 PF ±.1 PF N220	500 V
C16	22-3823	8.3 PF ±.1 PF N150	500 V
C17	22-4668	1000 PF G.M.V. DISC	1000 V
C18	22-5317	.15 MF CAP.	100 V
R1	63-5200	27 K OHM 10%	4 W
R2	63-4842	12 K OHM 10%	3 W
R3	63-4837	27 K OHM 10%	2 W
R5	63-7107	22 K OHM 10% AB ONLY	1/4 W
L1	20-874or 20-1009 or 20-799or	I.F. FILTER SERIES RESONANT COIL	
L2	20-1007	I.F. FILTER SHUNT COIL	
L3	20-798or		
L4	20-1006	I.F. FILTER SERIES RESONANT COIL	
L5	20-1030	SCREEN COIL	
	5-59280	MIXER PLATE COIL	
	5-77030	MIXER PLATE COIL (FOR 175-536 & 175-550 ONLY)	
L6	5-49733	OSCILLATOR PLATE CHOKE	
L8	20-1056	CRYSTAL O.C. RETURN COIL	
S1	85-771	CHANGE-OVER SWITCH	
S2	85-790	CHANGE-OVER SWITCH (MOTORIZED TUNER ONLY)	
T1	5-59257	ANTENNA FILTER ASSEMBLY	
T2	5-49189	ANTENNA BALUN	
CH1	174-400	I.F. UHF STRIP ASSEM.	
CH2	174-402	CH. #2 STRIP ASSEM.	
CH3	174-403	CH. #3 STRIP ASSEM.	
CH4	174-404	CH. #4 STRIP ASSEM.	
CH5	174-405	CH. #5 STRIP ASSEM.	
CH6	174-406	CH. #6 STRIP ASSEM.	
CH7	174-407	CH. #7 STRIP ASSEM.	
CH8	174-408	CH. #8 STRIP ASSEM.	
CH9	174-409	CH. #9 STRIP ASSEM.	
CH10	174-410	CH. #10 STRIP ASSEM.	
CH11	174-411	CH. #11 STRIP ASSEM.	
CH12	174-412	CH. #12 STRIP ASSEM.	
CH13	174-413	CH. #13 STRIP ASSEM.	





TEST POINTS:

A-I.F. SIGNAL INPUT FOR ALIGNMENT ON MAIN CHASSIS I.F. STRIP ALSO OBSERVATION POINT FOR THE R.F. BAND PASS OF CH. #3 OR I.F. STRIP.

B-VHF-RF BAND PASS OBSERVATION POINT.

NOTES:

ALL RESISTORS ARE 1/4 WATT, ±10% TOLERANCE UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS ARE IN PICOFARADS UNLESS OTHERWISE SPECIFIED.

VOLTAGES MEASURED WITH A VTVM AND A 10K OHM 1/2 WATT ISOLATION RESISTOR (LEAD OF MEASURING END OF RESISTOR MUST BE SHORT 1/4" OR LESS.) G.M.V. MEANS GUARANTEED MINIMUM VALUE.

VOLTAGES MEASURED WITH NO SIGNAL ON CHANNEL 10.

REPLACE TUBES ONLY WITH THE TYPE ORIGINALLY SUPPLIED BY ZENITH, STAMPED ON TUNER CHASSIS.

Schematic Diagram and Top View of Super Gold Video Guard Tuner (175-500 Series) Nos. 175-536 to 175-575 Incl.

ZENITH RADIO CORPORATION

TRANSISTOR TV CHASSIS 1Y21B55

MODELS T2667W1, Y2060L1, Y2060X1, Y2063W1

(Service material on pages 185 through 190)

GENERAL INFORMATION

The 1Y21B55 chassis is completely solid state except for the picture tube and the high voltage rectifier. The chassis contains 21 transistors and 17 diodes. The high voltage rectifier tube is type 3BM2.

The picture tube is the new 19 inch "squared corner" type 20UP4 rimbond tube. The deflection angle is 114 degrees with 20KV applied to the second anode.

The chassis has a new "molded" sweep transformer designed for use without the usual high voltage cage. The models using this chassis employ completely transistorized UHF and VHF tuners.

There are two separate sub-chassis; one contains the IF amplifier, detector and video driver. The other includes the 4.5 MHz sound IF, the limiter and ratio detector.

This chassis has the "instant on" feature. When the volume control knob is pushed inward then rotated fully to the left the receiver is completely turned off. When the knob is turned to the right the receiver is on standby and the picture tube (and the pilot light on some models) has a low filament voltage applied. When the receiver is on standby, it can be turned on "instantly" by pulling the knob outward. This applies the full filament voltage to the picture tube and the B +70 volts to the receiver.

The power used at 120V 60 cycles is 85 watts and the undistorted sound power output is 1 watt. A 2 amp pigtail type fuse, mounted on the underside of the chassis, is in the AC line at the interlock plug.

THE VIDEO DETECTOR

The output transformer (T3, 4th IF) is an over coupled double tuned circuit which drives a conventional video detector circuit (diode X1). The average output voltage of the detector is approximately 2 1/2 volts peak to peak. This drives TR4, the first video emitter follower.

THE VIDEO AMPLIFIER

There are two stages of video amplification. The video driver stage TR4, is a modified emitter follower circuit that is used to match the relatively high impedance of the detector to the low impedance of the base (input) to the video output amplifier, TR6. Test Point "J" is used to inject the 4.5 MHz signal for aligning the Sound Take-Off transformer. The high positive voltage at the collector of TR6 and the G1 voltage is obtained from the 150 volt supply on the horizontal output transformer.

ADJUSTMENTS

VHF TUNER CHANNEL OSCILLATOR ADJUSTMENT

Each channel can be adjusted individually with the receiver fine tuning knob without interaction with other channels. Several turns of the knob are permissible, in either direction, to obtain proper adjustment.

WIDTH AND HORIZONTAL LINEARITY ADJUSTMENTS

Width-Linearity sleeve on neck of picture tube.

Adjustment is made by sliding the metal width sleeve along the neck of the picture tube until both proper width and best linearity is obtained.

AGC ADJUSTMENT

Tune in a strong TV signal and slowly turn the AGC control until a point is reached where the picture distorts and buzz is heard in the sound. The control should then be backed down from this position and set at a point comfortably below the level of picture distortion and improper sync. This setting corresponds in general to 2.5 volts peak-to-peak at the Video Detector stage.

CAUTION: Misadjustment of the AGC control can result in a washed-out picture, distorted picture, or complete loss of picture and sound.

HORIZONTAL HOLD CONTROL

The horizontal hold control is equipped with a stop which limits knob rotation to approximately 270 degrees. To adjust the AFC, remove the knob and turn the shaft to a position where it is virtually impossible to disrupt horizontal synchronization when switching from channel to channel. After adjustment, install the knob with its pointer centered between the stops.

CENTERING ADJUSTMENT

The centering assembly is built into the yoke housing. This assembly is made of two magnetic rings which can be rotated by means of tabs. Centering is accomplished by gradually rotating each tab separately and/or rotating both tabs simultaneously until the picture is centered.

NOISE GATE

If occasional noise pulses or strong interferences cause the picture to lose sync or break up, turn the Noise Gate control (in the base of the Noise Gate driver transistor and mounted on the rear of the chassis) to the left until the picture breaks up on the strongest signal; then turn control back just to the position where the picture returns to normal again.

The normal setting of this control is +1V to +1.7 volts on the base of the Noise Gate driver, TR5.

VERTICAL PEAKING, VERTICAL LINEARITY AND SIZE

The linearity at the top of the picture is affected by the adjustment of the size, linearity and peaking controls.

It may be necessary to readjust the vertical peaking control, R54, located on the top of the chassis below the neck of the picture tube, after a component is changed in the vertical sweep circuit. It can be adjusted by either using a oscilloscope or observing the screen.

Method 1. Using a Scope

Attach the vertical input of the oscilloscope at the junction of the thermistor, R60 and the collector of the vertical output transistor, TR17. Set the sweep of the scope to display one full vertical sweep and set the gain so the vertical sweep almost fills the screen of the scope. Observe the point at which the retrace pulse ends and the vertical sweep begins. Misadjustment of the vertical peaking control will cause a sharp spike at this point. Adjust the peaking control to eliminate the spike. DO NOT OVERADJUST. Overadjustment of the control will flatten the sweep at this point. Now adjust the size and linearity controls in the usual way, by observing a test pattern if available.

Method 2. Observing the Screen

Adjust (reduce) the size control so the top of the raster can be fully observed. Adjust the peaking control so that the horizontal lines at the top 1 inch of the picture appears to be evenly spaced. Now adjust size and linearity in accordance with normal practice.

ALIGNMENT

IF ALIGNMENT

GENERAL

During the alignment of the IF chassis the AGC lead (violet) must be disconnected and an external bias voltage from a low impedance source applied at the AGC input (test point "E"). It is important that the bias voltage be no more than that specified since incorrect bias voltages in a transistor set can lead to incorrect results or even damage to the transistors.

A special low impedance bias box is available under Zenith part no. 950-179. This bias box can be operated on batteries or the 24V. DC section of the TV power supply.

The signal generator must be isolated from the IF circuit by the use of the standard network consisting of a 470 PF capacitor shunted by a 56 Ohm 1/2 watt resistor. The shielded lead must be grounded directly to chassis nearby. DO NOT USE LEADS. The oscilloscope also must be isolated by the use of a 10K Ohm series resistor.

PRELIMINARY SET-UP:

Set channel selector to Channel 13.
Connect test point F to +24V through a 10K resistor.

Disconnect AGC (violet) lead at test point E and apply positive 3 volt bias measured at test point E.

Connect calibrated oscilloscope to test point J; shielded lead to chassis nearby.

Use alignment tool Zenith part no. 68-45.

STEP 1. ALIGN 4TH IF COIL

Connect a 30 PF capacitor from test point K to test point G. See Fig. Test points G and K are accessible from rear of IF chassis. Connect signal generator high-side to test point G; low-side to chassis nearby. (The 30 PF capacitor across L6, is necessary to prevent distortion of 4th IF response curve)

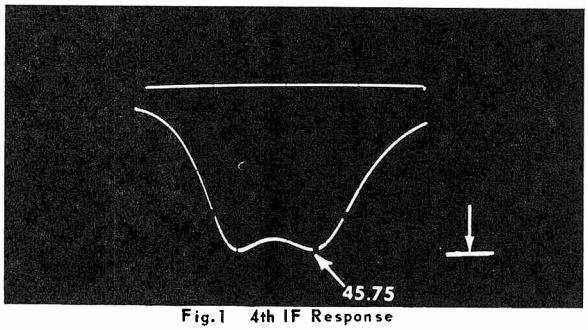


Fig.1 4th IF Response

Set signal generator to 45 MC (6 MC wide) with output set to produce 3 volts at test point J.

Adjust 4th IF coil (top and bottom cores of T3 for response as shown in fig. 1. Disconnect signal generator and remove 30 PF capacitor across G-K.

STEP 2. 1ST, 2ND AND 3RD IF COILS AND TRAP ALIGNMENT

Connect signal generator to test point A on VHF tuner through a series 100 ohm resistor. Reduce output of generator to maintain 3 volts at test point J.

Adjust top core of T1 (L1A) for maximum amplitude and position of 45 MC marker as shown in fig. 2. Adjust bottom core, L5B of 2nd IF coil, T2 and single core of 3rd IF coil (L6) alternately for maximum amplitude, bandpass and symmetry as shown in fig. 2.

Increase scope gain to produce response as shown in fig. 3.

Adjust trap coils L4 (47.25 MC), L3 (39.75 MC) and L2 (41.25 MC) for minimum amplitude and positions of marker frequencies as shown in fig. 3. (Note that trap coil L2 and L4 have two cores)

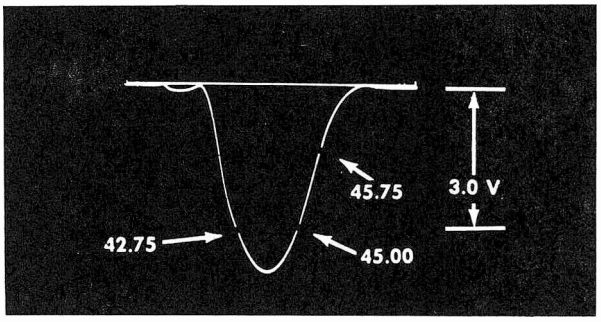


Fig. 2. Overall IF Response Curve.

Decrease scope gain to produce response curve shown in fig. 2. Reduce positive bias to 1.5 volts. Then decrease signal generator gain to produce response shown in fig. 3.

Adjust top core of 2nd IF coil (L5A) for maximum shelf extension (response curve between marker frequencies 39.75 MC and 41.25 MC) as shown in Fig. 3.

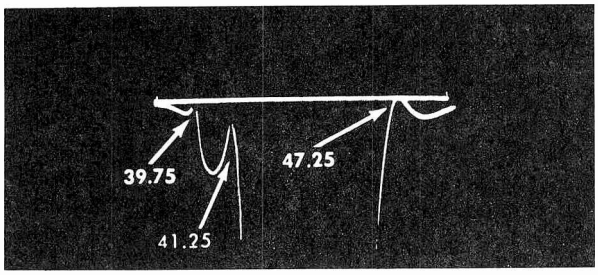
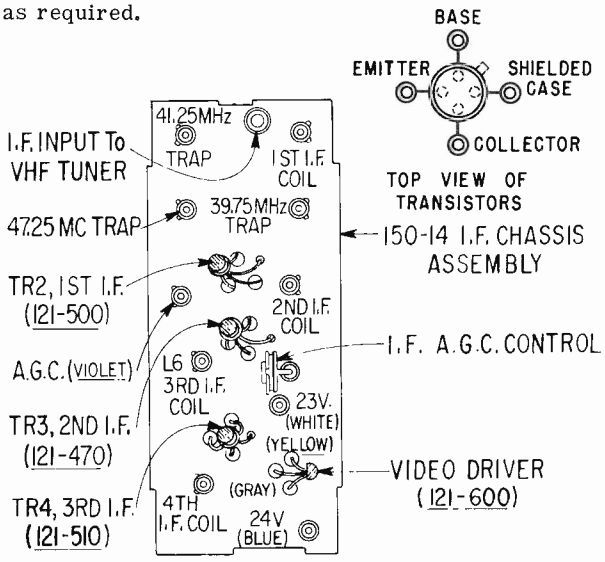


Fig. 3. Expanded View of Traps

Reduce generator output to produce response curve as shown in fig. 4. The 45 MC marker now should be located at right-hand peak as shown. Repeat steps 1 and 2 above if necessary to position 45 MC marker as required.



Top View Of IF Chassis Showing Location of Alignment Test Points and Components.

Reset positive bias to 3 volts at test point E and signal generator output for 3 volts at test point J.

STEP 3. OVERALL IF ALIGNMENT

Adjust mixer collector coil in VHF tuner. Adjust coil for position of 42.75 MC marker as shown in fig. 2. Repeat steps 1 and 2 above if necessary, to produce proper response, band width and symmetry of curve as required.

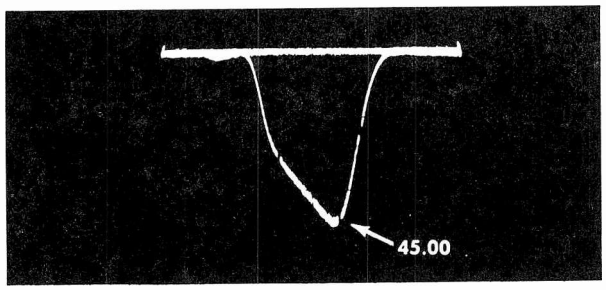
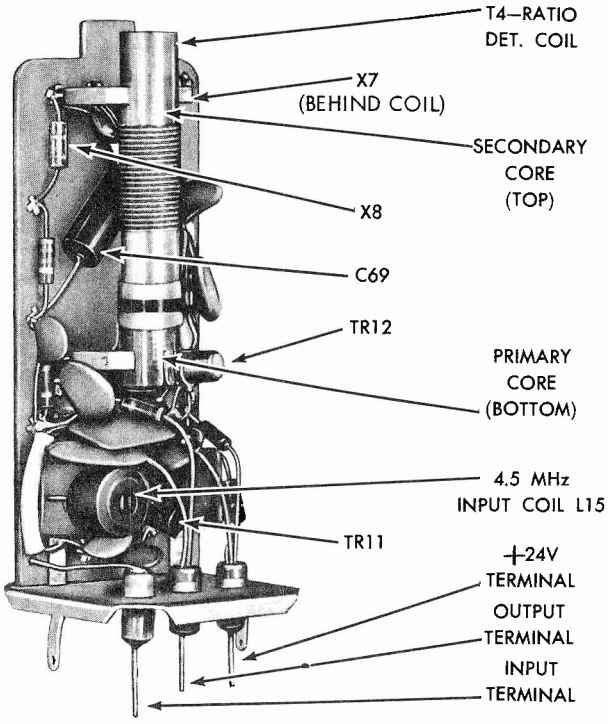


Fig.4 Position of 45 MC Marker.



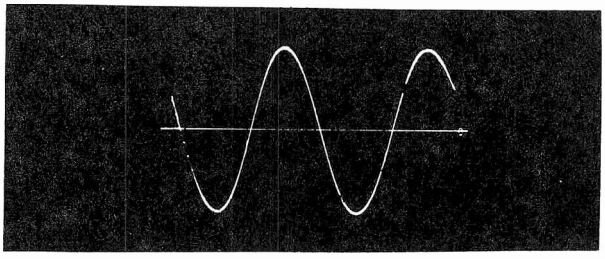
SOUND ALIGNMENT

Method 1. Using a 4.5 MHz FM Signal Generator and an Oscilloscope with a DC input:

Connect the generator (FM modulated at dev. ±20 KHz and 400 HZ tone) to the input terminal on the sound discriminator module.

Connect the scope to the output terminal of the module.

Using a strong signal input (approximately 100 Mv) adjust the secondary coil of the ratio detector (top core of T4) for maximum output and symmetry above and below the zero line on the scope. (See Fig. below) Reduce the input signal and adjust the primary coil of the ratio detector transformer (bottom core of T4) for maximum output.



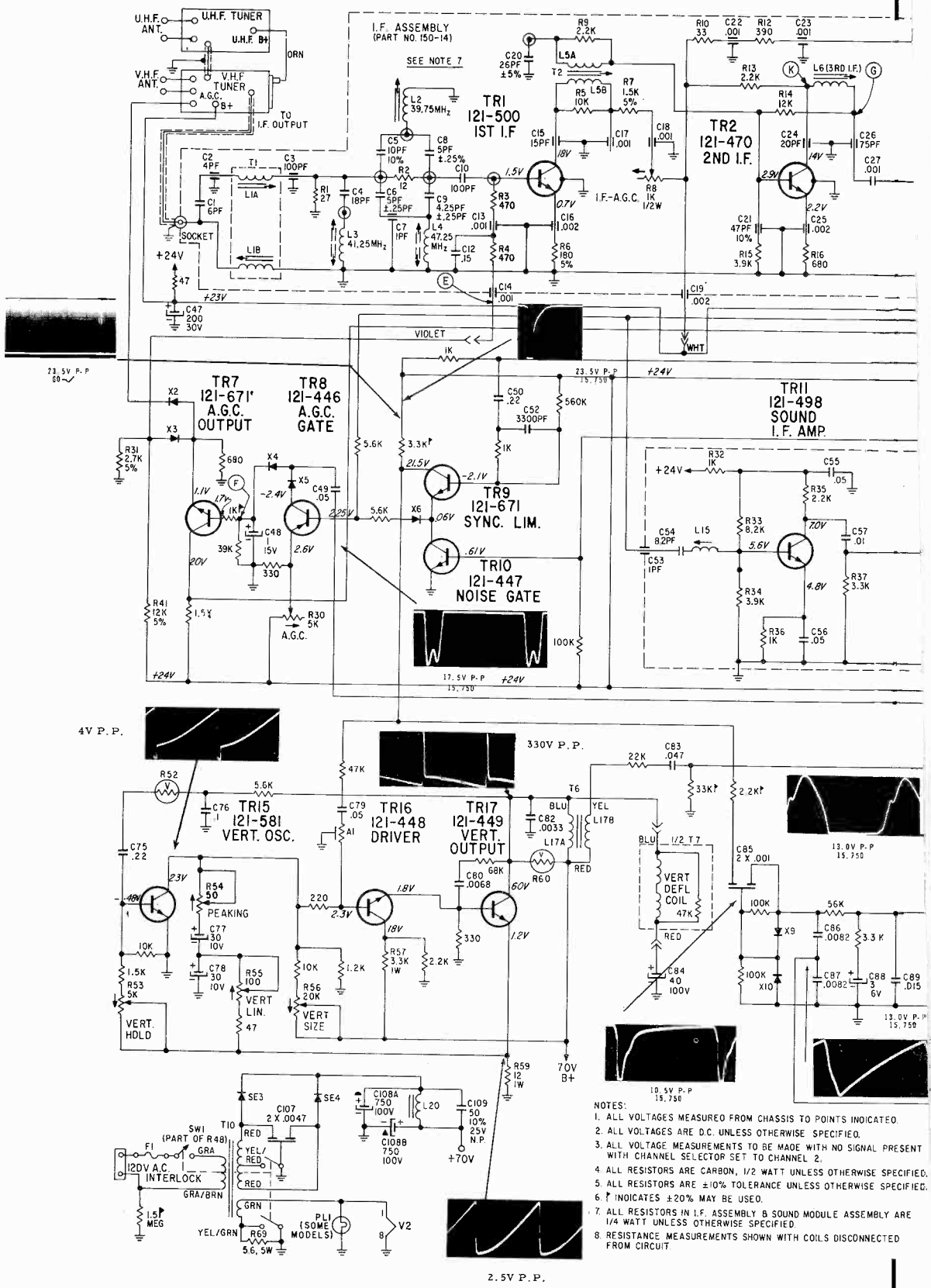
Adjust the 4.5 MHz input coil, L15, for maximum output (initially there may be a loss in output as the coil is tuned.)

Method 2. Using a Strong Air Signal:

Using a strong station tune the secondary core of the ratio detector T4 for best sound. Reduce signal until the sound becomes noisy then tune the input coil, L15, and the primary of T4 for best reception.

As the sound improves continue to reduce the signal and adjust the coils until no improvement in sound can be obtained.

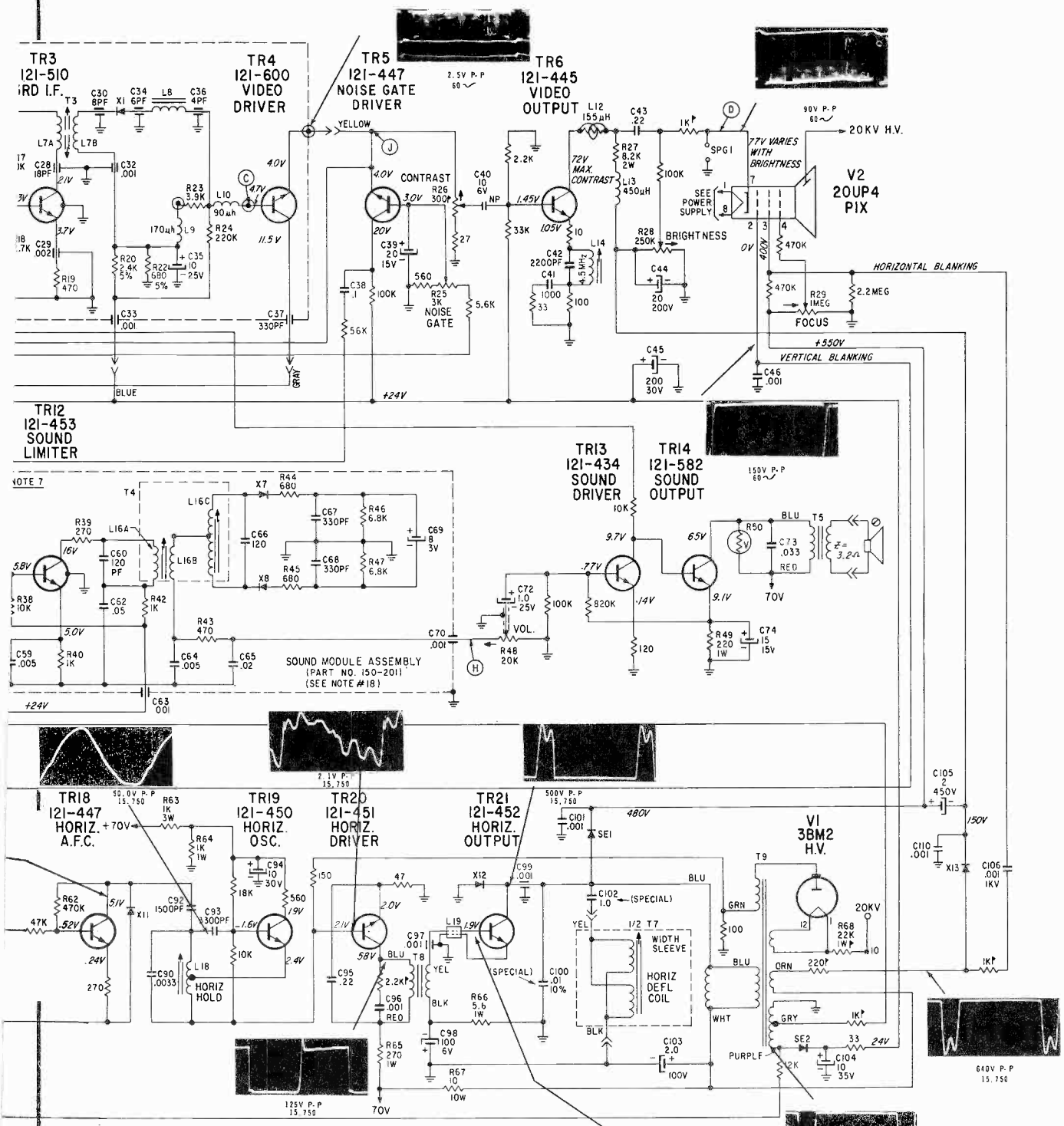
ZENITH Chassis 1Y21B55 Schematic Diagram



NOTES:

1. ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
2. ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT WITH CHANNEL SELECTOR SET TO CHANNEL 2.
4. ALL RESISTORS ARE CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
5. ALL RESISTORS ARE ±10% TOLERANCE UNLESS OTHERWISE SPECIFIED.
6. ⚡ INDICATES ±20% MAY BE USED.
7. ALL RESISTORS IN I.F. ASSEMBLY & SOUND MODULE ASSEMBLY ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
8. RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT.

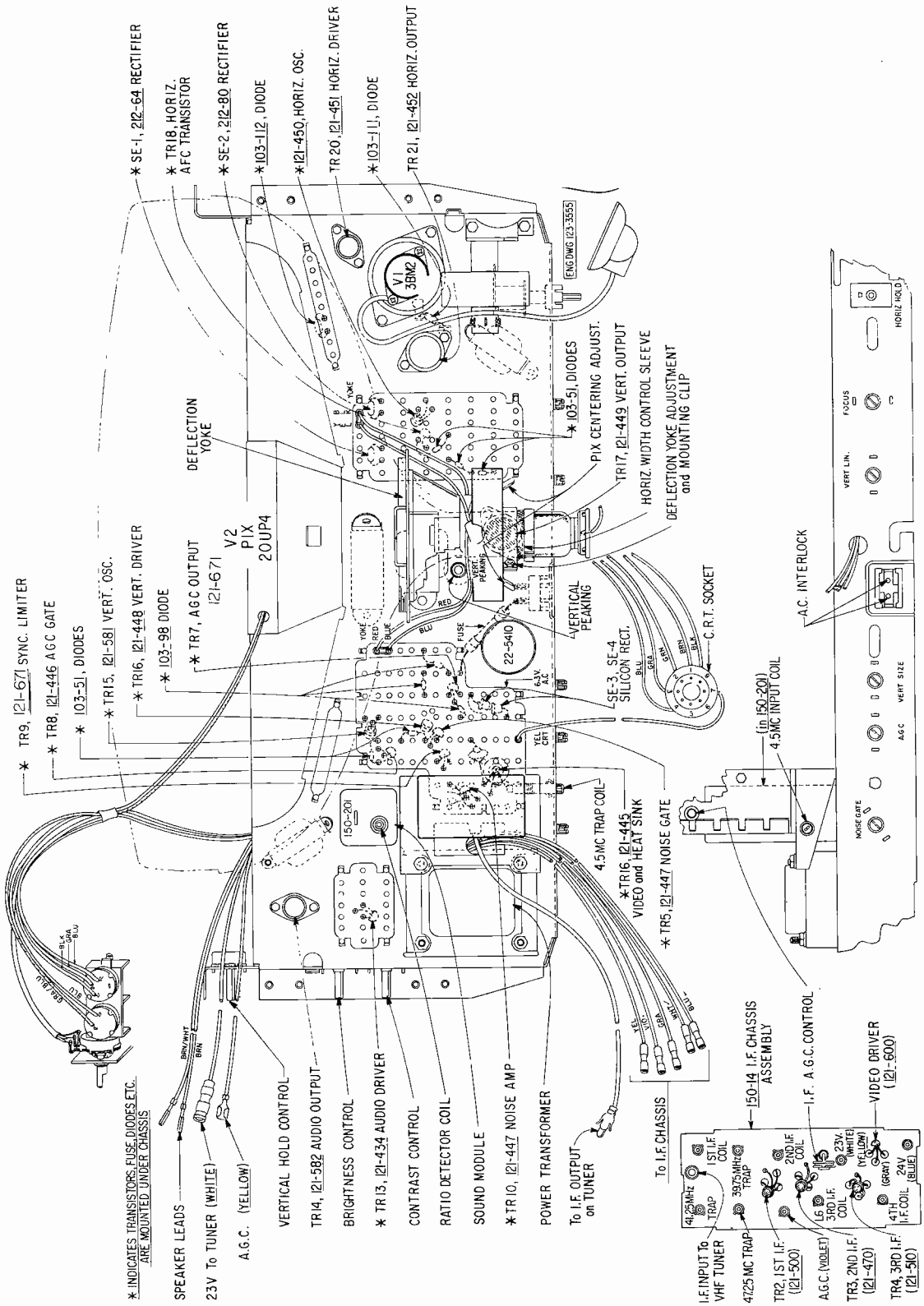
ZENITH Chassis 1Y21B55 Schematic Diagram, Continued



9. COIL RESISTANCES NOT SPECIFIED ARE UNDER ONE OHM.
10. ALL CAPACITY VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
11. SEE LEGEND (SHEET 2) FOR CAPACITY TOLERANCE
12. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
13. MH_z = MEGAHERTZ = MEGACYCLE, μH = MICROHENRY
14. ⏚ INDICATES CHASSIS GROUND.
15. ○— INDICATES VOLTAGE SOURCE.
16. ⊕ INDICATES CERAMIC TIE POINT (ZENITH PART NO. 22-4731.
17. (C)— INDICATES ALIGNMENT OR TEST POINTS.
18. SOUND MODULE VOLTAGE MEASUREMENTS MADE WITH INPUT LEAD DISCONNECTED.

TEST POINTS:
C. DETECTOR OUTPUT
D. VIDEO OUTPUT
E. I.F. A.G.C.
F. A.G.C. OUTPUT
G. 3RD I.F. ALIGNMENT
H. SOUND DISCR. OUTPUT
J. VIDEO DRIVER OUTPUT
K. 2ND I.F. COLLECTOR

ZENITH Chassis 1Y21B55 Parts Layout Diagram



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+ stands for various letters or numbers used.

This manual is made up of factory prepared service material. Editorial changes and selections were made to conform with the objectives of this manual. Our sincere thanks and appreciation is extended to every manufacturer whose products are covered by the material in this manual and who aided us in the preparation of this book.

M. N. Beitman, Chief Editor of the Engineering Staff, Supreme Publications.

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