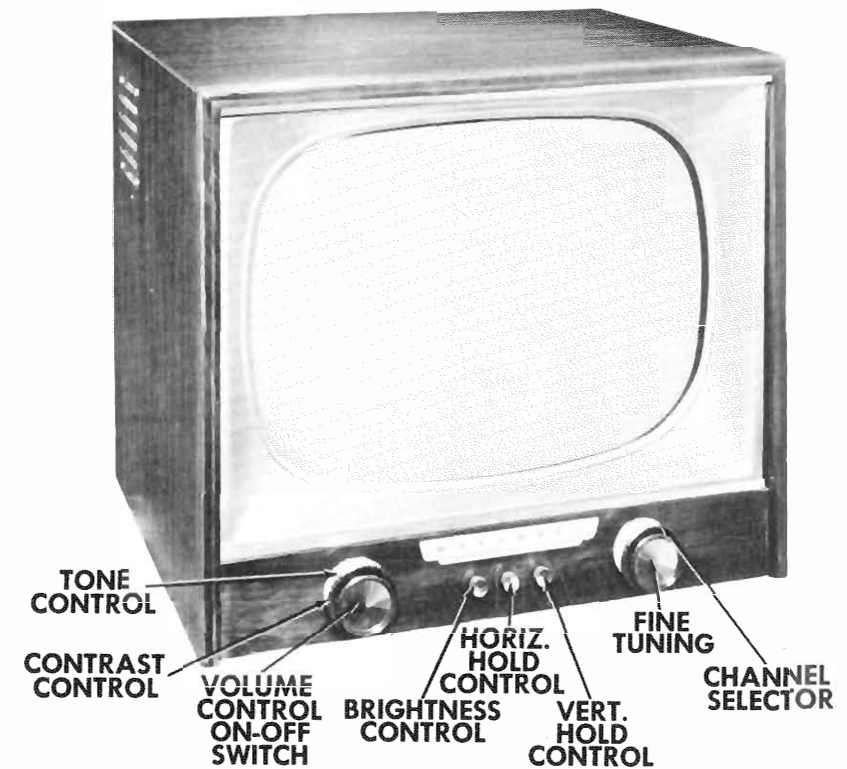


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



| MOTOROLA MODEL 21T18 (Ch. RTS-525A-03) | | | | |
|--|---|---|----------------------------------|---------|
| TRADE NAME | MOTOROLA | MODELS | CHASSIS | TUNER |
| | | 21K20, B | WTS-525, A-00, A-01, A-02, A-03 | VHF |
| | | 21T18, B | RTS-525, A-00, A-01, A-02, A-03 | VHF |
| | | Y21K20, B | WTS-525Y, A-00, A-01, A-02, A-03 | VHF-UHF |
| | | Y21T18, B | RTS-525Y, A-00, A-01, A-02, A-03 | VHF-UHF |
| MANUFACTURER | Motorola Inc., 4545 Augusta Blvd., Chicago, Ill. | | | |
| TYPE SET | Television Receiver | | | |
| TUBES | Nineteen | | | |
| POWER SUPPLY | 110-120 Volts AC - 60 Cycle | | | |
| TUNING RANGE | Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier) | | | |
| RATING 1.22 Amp. @ 117 Volts AC | | | | |
| INDEX | | | | |
| Alignment Instructions | 6, 7, 8 | Photographs (Cont) | | |
| Disassembly Instructions | 22 | Trans., Inductor & Alignment Identification | 23 | |
| Horizontal Sweep Circuit Adjustments | 13 | Resistance Measurements | 11 | |
| Parts List and Descriptions | 15 thru 18 | Servicing in the Field | 22 | |
| Photographs | | Schematic (TV) | 2 | |
| Cabinet-Rear View | 13 | Schematic (UHF Tuner) | 20 | |
| Capacitor Identification | 4, 9 | Trouble Shooting Aids | 12, 21 | |
| Chassis-Top View | 3 | Tube Failure Check Chart | 10 | |
| RF Tuner | 5, 21 | Tube Placement Chart (Bottom View) | 11 | |
| Resistor Identification | 14, 19 | Tube Placement Chart (Top View) | 10 | |

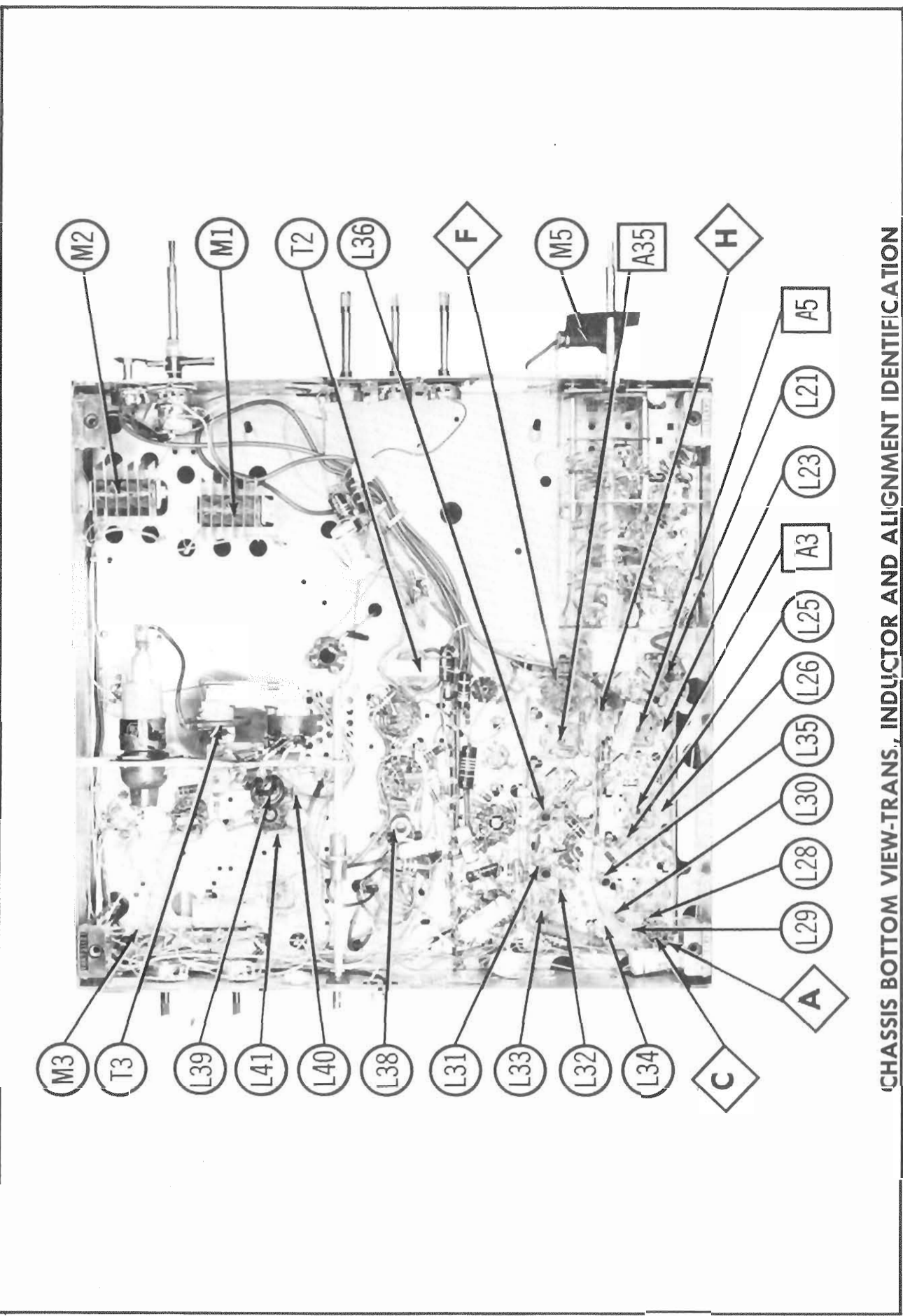
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."

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MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B



CHASSIS BOTTOM VIEW-TRANS, INDUCTOR AND ALIGNMENT IDENTIFICATION

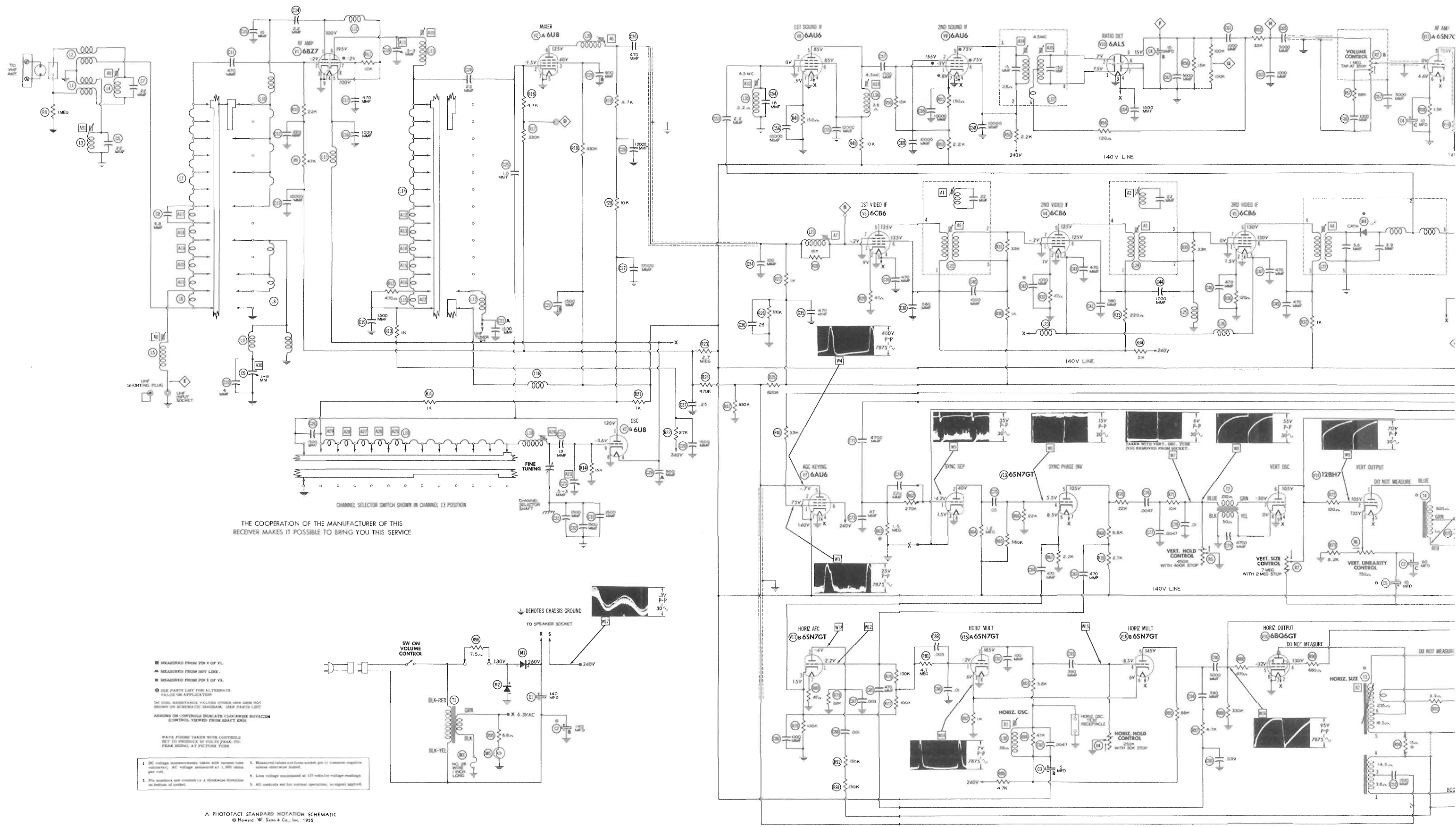
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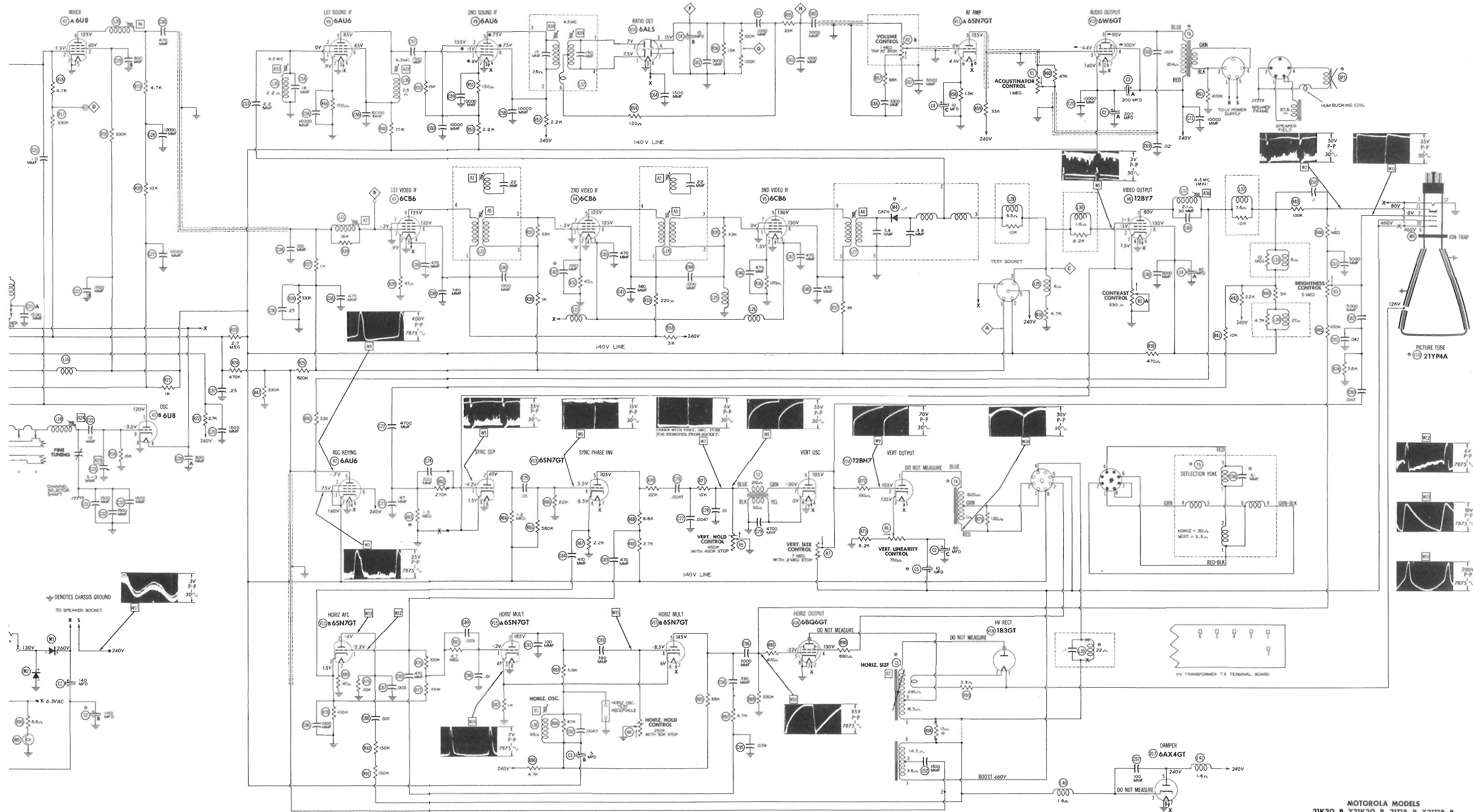
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| TRADE NAME | |
|--------------------------|-------|
| MANUFACTURER | Moto |
| TYPE SET | Tele |
| TUBES | Nine |
| POWER SUPPLY | 110-1 |
| TUNING RANGE | Chan |
| Alignment Instructions | |
| Disassembly Instruction | |
| Horizontal Sweep Circuit | |
| Parts List and Descript | |
| Photographs | |
| Cabinet-Rear View | |
| Capacitor Identifica | |
| Chassis-Top View | |
| RF Tuner | |
| Resistor Identificat | |

HOW

The listing of any available replace
case a recommendation, warranty or
as to the quality and suitability of su
parts have been compiled from inform
Inc., by the manufacturers of the pa
"Reproduction or use, without expre

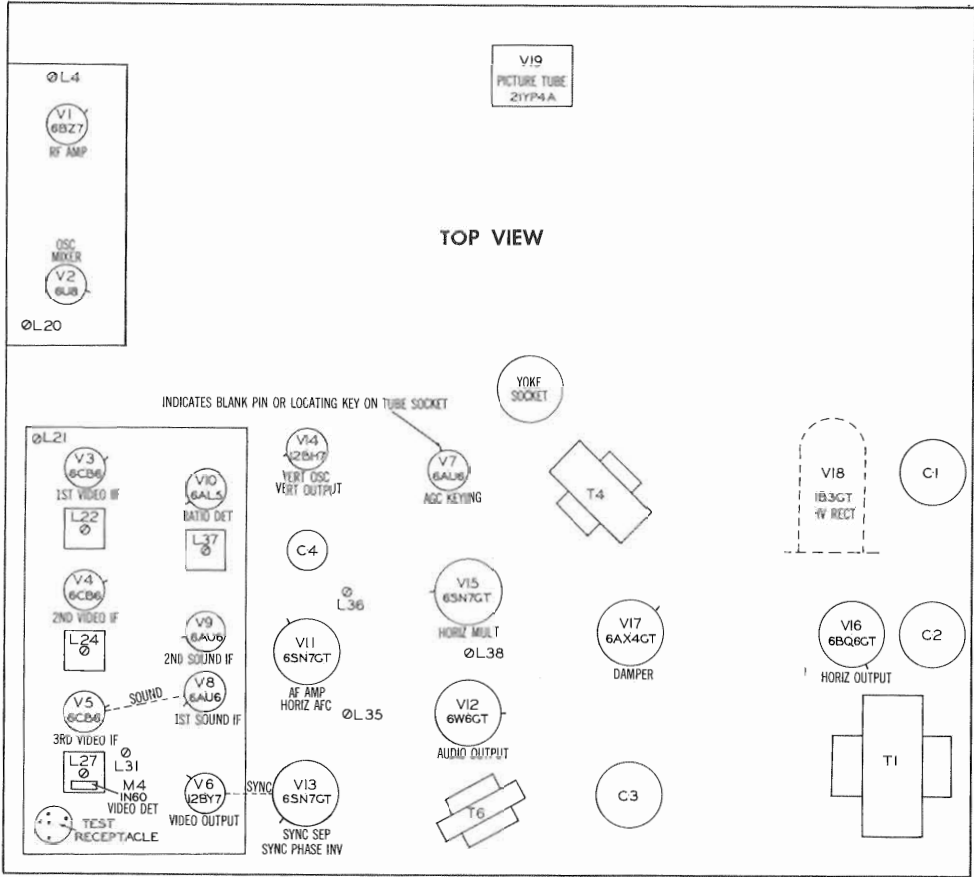




MOTOROLA MODELS
 21K20, B, Y21K20, B, 21T18, B, Y21T18, B

MOTOROLA MODELS
 21K20, B, Y21K20, B, 21T18, B, Y21T18, B

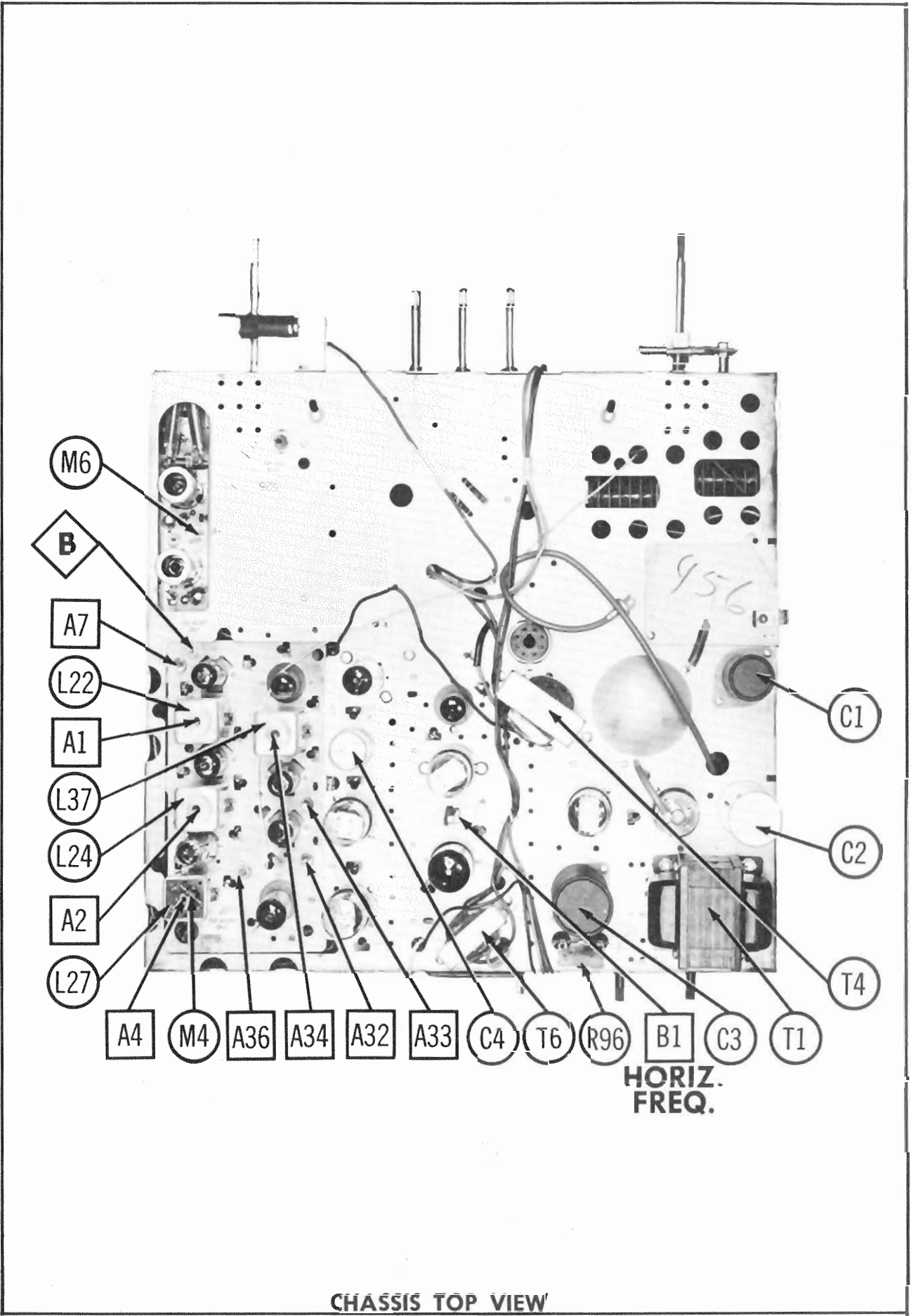
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

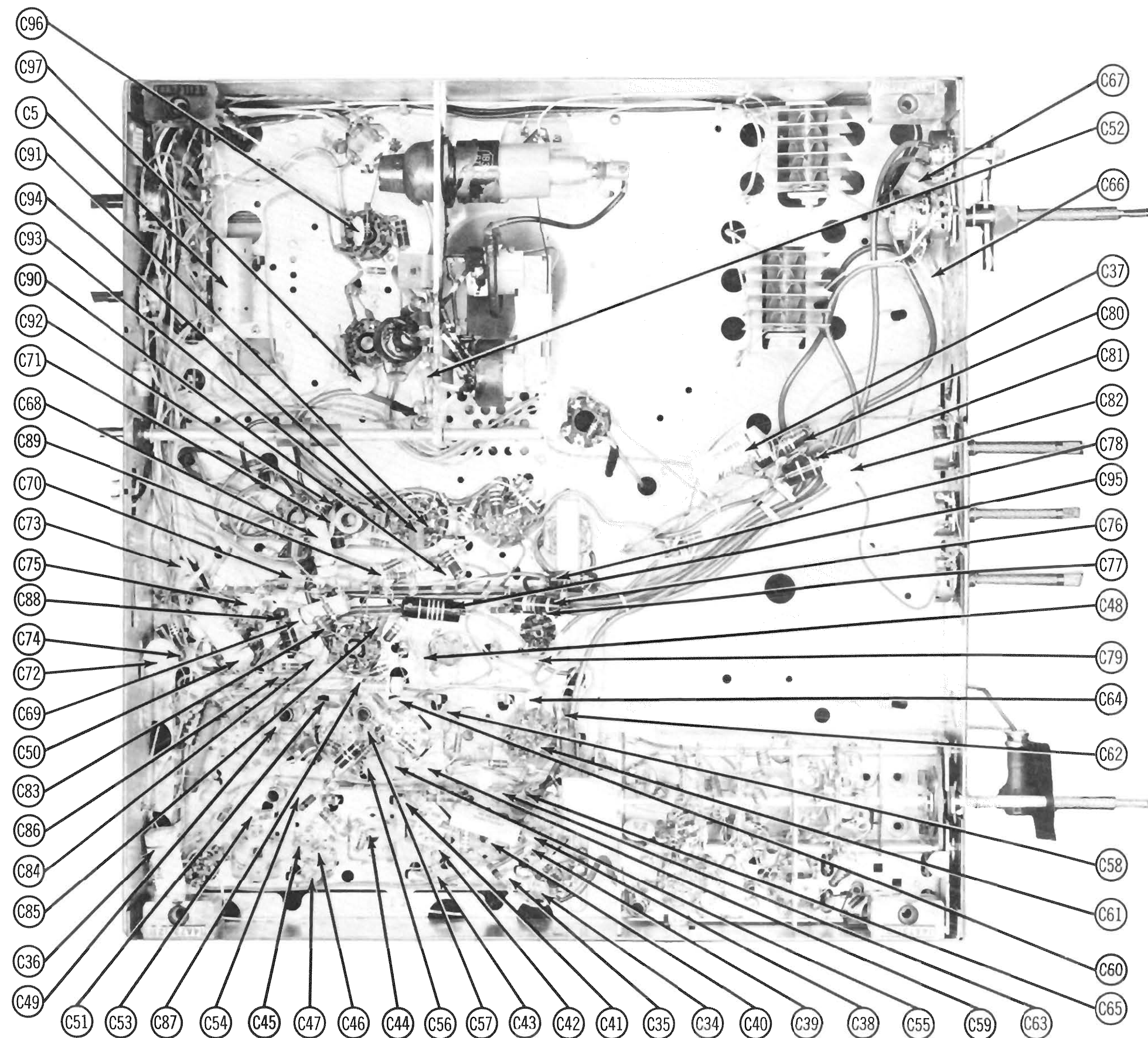
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

- POWER SUPPLY FAILURE**
No raster, no sound - V12, Selenium Rectifiers (M1 and M2) Fuse (M3)
- LOSS OF PICTURE OR SOUND**
No pic, no sound, has raster - V2, V3, V4, V5, V12
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V7, V19
Has pic, no sound - V8, V9, V10, V11, V12
Overloaded picture - V7
- SYNC FAILURE**
No vert. sync - V13, V14
No horiz. sync - V11, V13, V15
No vert. or horiz. sync - V13
- SWEEP FAILURE**
No raster, has sound - V15, V16, V17, V18, V19
No vertical deflection - V14
Poor vert. linearity or foldover - V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, M1, M2
Vert. off freq. - V13, V14
Horiz. off freq. - V11, V13, V15



CHASSIS TOP VIEW

SET 272 FOLDER 8



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓢ to chassis. The junction of these two resistors is alignment point Ⓢ as shown on the schematic.

| DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | CHANNEL | CONNECT VTVM | ADJUST | REMARKS |
|---------------|--|----------------------------|-----------------------------|---|---------------|---|
| 21. Direct | High side to point Ⓢ. Low side to chassis. | 4.5MC (Unmod) | Any non-interfering channel | DC probe thru 10KΩ to point Ⓢ. Common to chassis. | A32, A33, A34 | Adjust for maximum deflection. |
| 22. " | " | " | " | DC probe to point Ⓢ. Common to point Ⓢ. | A35 | Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Check steps 21 and 22 for best accuracy. |

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
|---------------|--|---------------------------|----------------------------|-----------------------------|---|---------------|---|
| 21. Direct | High side to point Ⓢ. Low side to chassis. | 4.5MC (450KC Swp) | 4.5MC | Any non-interfering channel | Vert. Amp. thru 10KΩ to point Ⓢ. Low side to chassis. | A32, A33, A34 | Disconnect stabilizing capacitor C4B. Adjust for curve of maximum amplitude and symmetry similar to Fig. 7. |
| 22. " | " | " | " | " | Vert. Amp. to point Ⓢ. Low side to chassis. | A35 | Reconnect stabilizing capacitor C4B. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 8. SLIGHTLY retouch A34 for maximum amplitude and straightness of crossover lines. |

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

This method provides an accurate signal source. Tune in a TV station. See steps 21 and 22 of "Sound IF Alignment Using AM Signal Generator and VTVM" for VTVM connections and for adjustment of A32 for sharp alignment, turn fine tuning slightly off station so that VTVM reads 6 to 8 volts from point Ⓢ to chassis.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

| DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | CHANNEL | CONNECT VTVM | ADJUST | REMARKS |
|---------------|--|----------------------------|-----------------------------|--|--------|--|
| 23. Direct | High side to point Ⓢ. Low side to chassis. | 4.5MC (Unmod) | Any non-interfering channel | DC probe thru detector Fig. 9 to pin 11 (cathode) of picture tube. | A36 | Adjust for MINIMUM deflection. Remove 2500Ω, 10 watt resistor from 240 volt buss. Replace V16 in its socket. |

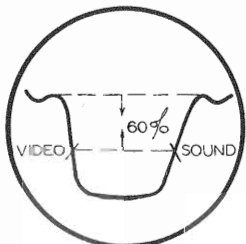


FIG. 4

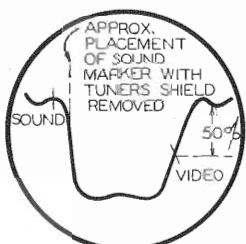


FIG. 5

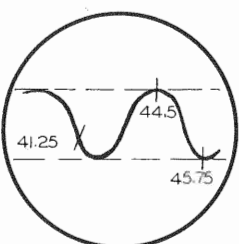


FIG. 6

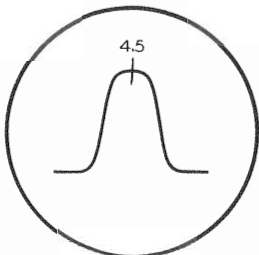


FIG. 7

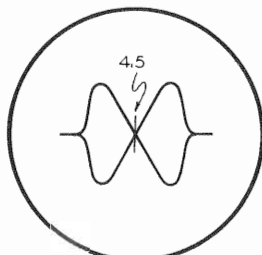


FIG. 8

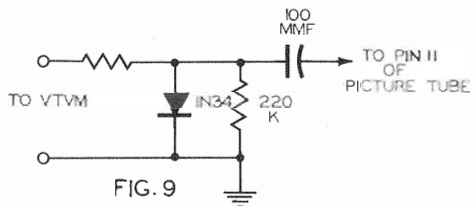
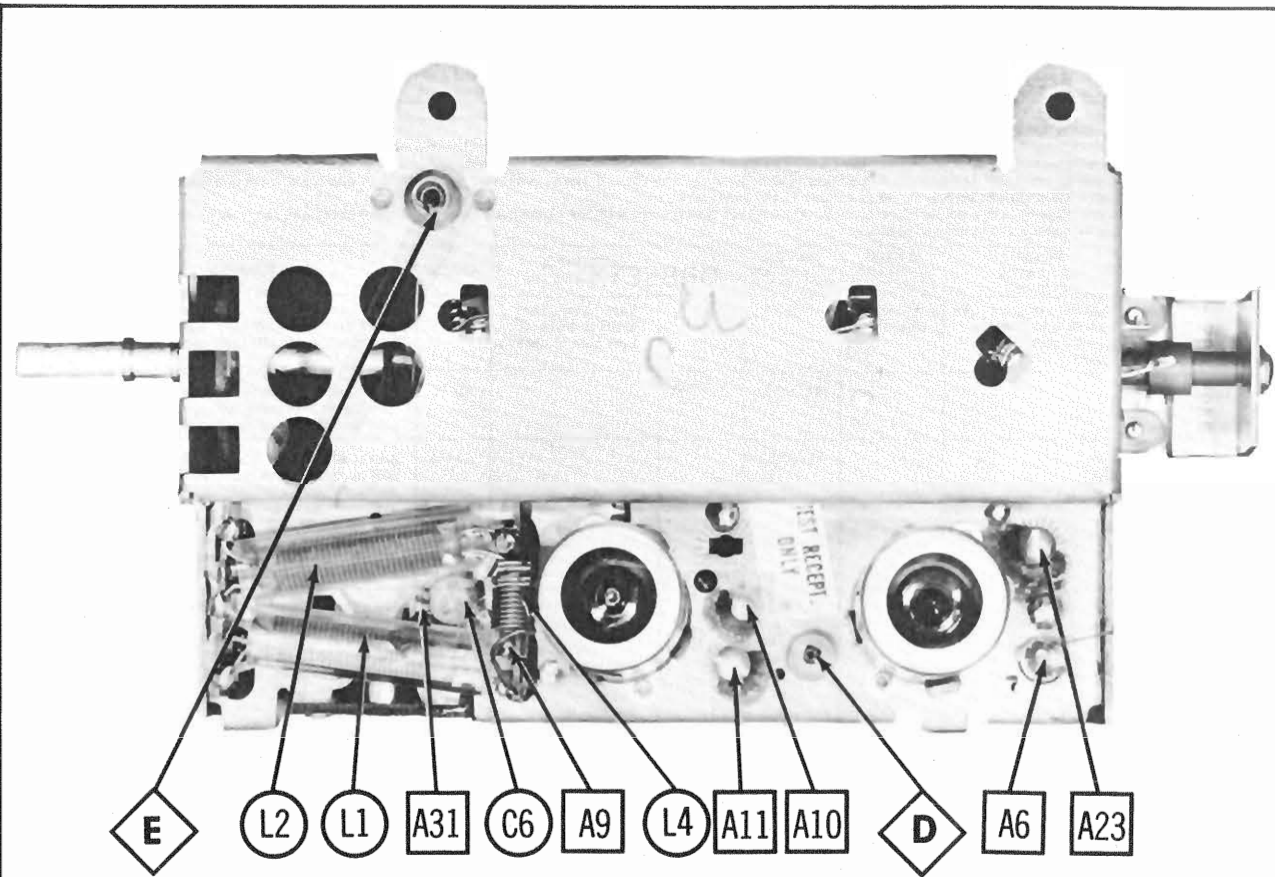
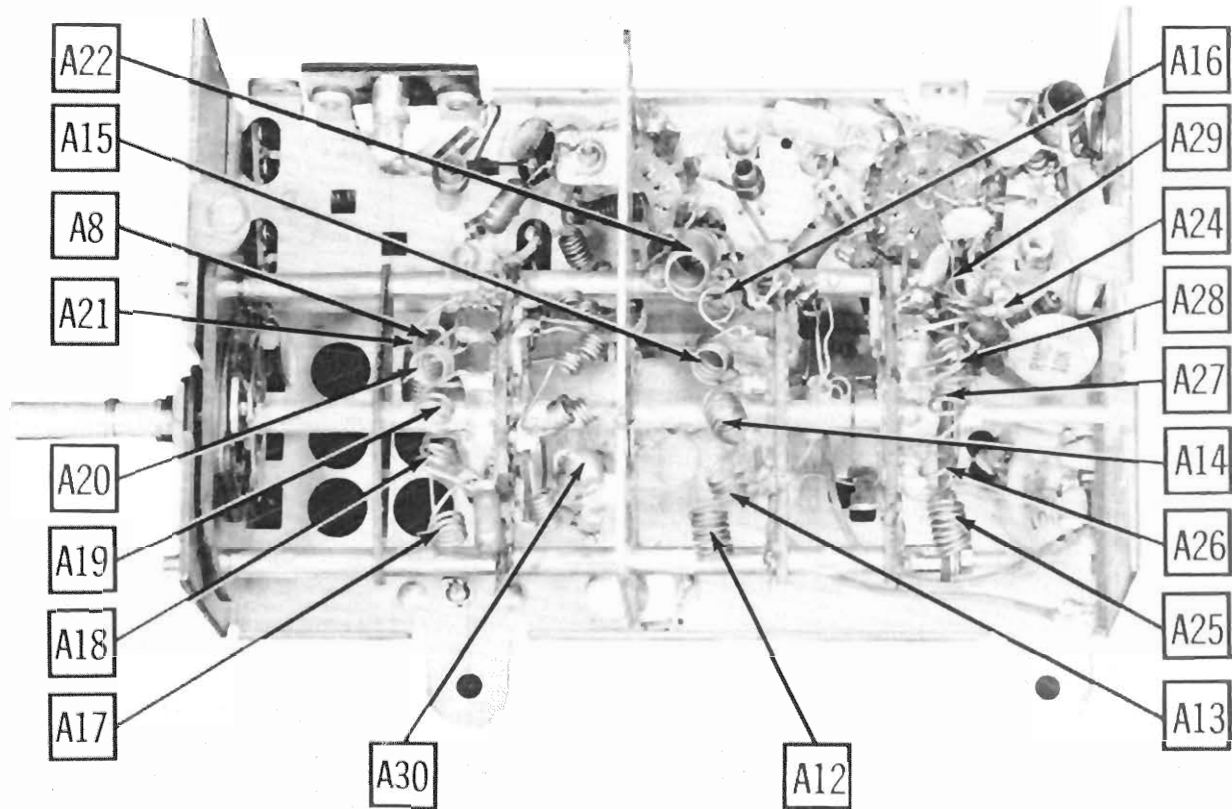


FIG. 9



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW ALIGNMENT IDENTIFICATION

SET 272 FOLDER 8

ALIGNMENT INSTRUCTIONS

| ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT | | | | | | | |
|--|--|---|--|-------------------------------|--|----------|--|
| Remove the horiz. output tube V16 from its socket. This will eliminate the high voltage shock hazard and reduce scope interference during alignment. Place a 2500Ω 10 watt resistor from 240V B+ to chassis to stabilize voltages during alignment. | | | | | | | |
| VIDEO IF ALIGNMENT | | | | | | | |
| Connect the negative lead of a 6 volt battery to point Ⓢ. Positive side of battery to chassis. Disable local oscillator by shorting pin 9 (grid) of V2 (6U8) to chassis with short lead. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. Attenuate the sweep generator to maintain 3 to 5 volts peak to peak at point Ⓢ. If sweep generator has no built in markers, loosely couple the output of an accurately calibrated AM signal generator to the video IF strip. The IF coils and traps have two points of resonance. The correct settings are with the cores away from the center of the coil form so as not to affect coupling between coil and trap windings. | | | | | | | |
| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
| 1. .001MFD | High side to point Ⓢ. Low side to chassis. Use short leads as possible | 44MC (10MC Swp) | 41.25MC | 13 | Vert. Amp. thru 47KΩ to point Ⓢ. Low side to chassis | A1 | Adjust so that notch falls at 41.25MC. Use sufficient generator output so that trap notch is clearly defined. (Fig. 1). |
| 2. " | " | " | 47.25MC | " | " | A2 | Adjust so that trap notch falls at 47.25MC. Temporarily remove the -6 volts bias to provide better trap notch definition (Fig. 1). |
| 3. " | " | " | 45.75MC | " | " | A3, A4 | Adjust A4 to place 45.75MC marker at 60% on high side of response curve. Simultaneously adjust A4 for flat top and symmetrical response similar to Fig. 1. |
| 4. " | " | " | 42.25MC | " | " | A5 | Adjust to place 42.25MC marker at 50% on response curve. Simultaneously retouch A4 to obtain response similar to Fig. 1. |
| 5. " | High side to point Ⓢ. Low side to chassis. Use very short leads. | " | 41.25MC 42.25MC 45.25MC 47.25MC | " | " | A6, A7 | Simultaneously adjust A6 and A7 for response similar to Fig. 2. A6 positions curve and A7 has leveling effect. To check the 41.25MC and 47.25MC trap attenuation, connect the DC probe of VTVM to point Ⓢ. Common to chassis. Take readings with marker generator set to 41.25MC, 44.0MC and 47.25MC. The voltage ratio between 41.25MC and 44.0MC should be between 30 and 65 and the voltage ratio between 47.25MC and 44.0MC should be between 100 and 200. |
| REGENERATION CHECK | | | | | | | |
| Leave pin 9 of V2 shorted to chassis but remove 6 volt bias supply. With generator and scope connect as in step 5, observe response curve. Any regeneration will be indicated by sharp peaks on the response curve. | | | | | | | |
| IF SENSITIVITY MEASUREMENT | | | | | | | |
| Connect the high side of an AM signal generator to point Ⓢ. Low side to chassis. Set signal generator to 44.0MC. Connect the DC probe of VTVM to point Ⓢ. Common to chassis. A signal of less than 750 microvolts from the generator should produce one volt on VTVM. | | | | | | | |
| MIXER SENSITIVITY MEASUREMENTS | | | | | | | |
| Connect the high side of an AM signal generator thru .001MFD capacitor to point Ⓢ. Low side to chassis. Set signal generator to 44.0MC. Short out R16 4.7K. Switch channel selector to UHF (channel 1) position. A signal of less than 100 microvolts from the generator should produce one volt at VTVM. | | | | | | | |
| RF AND MIXER ALIGNMENT | | | | | | | |
| Preset A8 and A9 fully into coil. Preset A10 midway into coil. Remove tuner shield. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated, with its characteristic impedance, usually 50 ohms. | | | | | | | |
| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
| 6. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 177MC (20MC Swp) | 175.25MC 179.75MC | 7 | Vert. thru 47KΩ to point Ⓢ. Low side to chassis. | A11, A8 | Adjust A-11 so that sound and video marker fall within limits shown in Fig. 3. Adjust A8 until side of channel 7 is affected, then back off A8 so it just stops affecting channel 7. NOTE: If core is turned in too far, it will affect channel 6 setting. |
| 7. " | " | 213MC (20MC Swp) | 211.25MC 215.75MC | 13 | " | A10 | Adjust for response curve similar to Fig. 3. Be sure markers fall within limits shown. Recheck channel 7. If necessary, retouch A-11. Make no further adjustment of A8 at present. |
| 8. " | " | 207MC (20MC Swp) 201MC (20MC Swp) 205.25MC (20MC Swp) 199.25MC (20MC Swp) 195MC (20MC Swp) 193.25MC (20MC Swp) 189MC (20MC Swp) 187.25MC (20MC Swp) 185MC (20MC Swp) 181.25MC (20MC Swp) 177MC (20MC Swp) | 205.25MC 209.75MC 203.75MC 209.75MC 203.75MC 199.25MC 197.25MC 191.75MC 185.75MC 181.25MC 175.25MC 179.75MC | 12 11 10 9 8 7 | " | | Check for response curve similar to Fig. 3. (If response is checked with tuner shield cover in place the video marker will move up the curve a short distance, but markers should be within tolerance.) |
| 9. " | " | 85MC (20MC Swp) | 83.25MC 87.75MC | 6 | " | A12, A17 | Adjust A12 by compressing or expanding coil turns to obtain response similar to Fig. 4 with marker's not falling below 60%. Usually the antenna coils A17 thru A21 are not to be adjusted. If the antenna coils have been distorted, they may be adjusted by compressing or expanding coil turns for maximum response in conjunction with the RF coils (A12 thru A16). If it is necessary to adjust any antenna coil in following steps, then the UHF coil adjustment of A8 must be repeated as in step 6. |
| 10. " | " | " | 83.25MC 87.75MC | " | " | A9 | Adjust FM trap core, A9 until a slight effect is noted on sound side of response curve (Fig. 4). |

ALIGNMENT INSTRUCTIONS (cont)

| RF AND MIXER ALIGNMENT CONTINUED | | | | | | | |
|--|--|--|--|-------------------------------------|---|--------------------------|--|
| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
| 11. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 79MC (20MC Swp) | 77.25MC 81.75MC | 5 | Vert. Amp. thru 47KΩ to point Ⓢ. Low side to chassis. | A13, A18 | Adjust A13 by compressing or expanding coil turns for response similar to Fig. 4. For A18 see remarks step 9. |
| 12. " | " | 69MC (20MC Swp) | 67.25MC 71.75MC | 4 | " | A14, A19 | Adjust A14 for response similar to Fig. 4. For A19 see remarks step 6. |
| 13. " | " | 63MC (20MC Swp) | 61.25MC 65.75MC | 3 | " | A15, A20 | Adjust for response similar to Fig. 4. For A20 see remarks step 9. |
| 14. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 57MC (20MC Swp) | 55.25MC 59.75MC | 2 | Vert. Amp. thru 47KΩ to point Ⓢ. Low side to chassis. | A16, A21 | Adjust for response similar to Fig. 4. For A21 see remarks in step 9. Replace tuner shield and recheck channels 13 thru 2. Response on channels 6 thru 2 must be similar to Fig. 4 with markers not falling below 60% on response curve. |
| 15. Direct | High side to point Ⓢ. Low side to chassis. | 44MC (20MC Swp) | 42.25MC 46.75MC | UHF (Chan. 1) | " | A22 | Remove tuner shield. Adjust A22 by compressing or expanding coil for response curve similar to Fig. 4. Replace tuner shield. |
| OSCILLATOR ALIGNMENT | | | | | | | |
| Remove shorting jumper from pin 9 of V2 to chassis. Replace the 6 volt bias supply as under "Video IF Alignment". Use only enough sweep output from generator to produce usable pattern on scope. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Set the fine tuning control to the mid-position range. | | | | | | | |
| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
| 16. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 195MC (10MC Swp) 213MC (10MC Swp) 207MC (10MC Swp) 201MC (10MC Swp) 189MC (10MC Swp) 183MC (10MC Swp) 177MC (10MC Swp) | 193.25MC 197.75MC 211.25MC 215.75MC 205.25MC 209.75MC 187.25MC 191.75MC 181.25MC 185.75MC 175.25MC 179.75MC | 10 13 12 11 9 8 7 | Vert. Amp. thru 47KΩ to point Ⓢ. Low side to chassis. | A23 | Adjust to place sound marker SLIGHTLY higher than the sound trap notch. This allowance must be made due to the removal of tuner shield. With shield replaced, the sound marker should move down into the trap notch. Check channels 7 thru 13 noting if sound marker for each channel falls just above the trap notch. Response should be similar to Fig. 5. If more than a 30 degree rotation of fine tuning controls is necessary to place sound marker in proper position on any high band channel adjust A23. A23 is adjusted it may be necessary to readjust A23 on channel 10. |
| 17. " | " | 85MC (10MC Swp) | 83.25MC 87.75MC | 6 | " | A25 | Check to see that fine tuning is at mid-capacity. Adjust A25 by compressing or expanding coil to place sound marker just above trap notch as in Fig. 5. |
| 18. " | " | 79MC (10MC Swp) 69MC (10MC Swp) 63MC (10MC Swp) 57MC (10MC Swp) | 77.25MC 81.75MC 67.25MC 71.75MC 61.25MC 65.75MC 55.25MC 59.75MC | 5 4 3 2 | " | A26 A27 A28 A29 | Adjust by compressing or expanding coil to place sound marker just above trap notch (Fig. 5) with fine tuning control set within 15 degrees of mid-position. |
| UHF TUNER ALIGNMENT | | | | | | | |
| This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field. | | | | | | | |
| CHANNEL 7 INTO 6 INTERFERENCE TRAP AND IF ALIGNMENT | | | | | | | |
| Instructions are the same as for "Oscillator Alignment". | | | | | | | |
| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
| 19. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 85MC (10MC Swp) | 83.25MC 87.75MC | 6 | Vert. Amp. thru 47KΩ to point Ⓢ. Low side to chassis. | A30 | This is channel 7 into 6 trap adjustment. Set fine tuning so that sound marker falls into trap notch. Increase sweep generator output to produce visible response on scope. Adjust A30 for MINIMUM response. |
| 20. " | " | 44MC (10MC Swp) | 41.25MC 44.50MC 45.75MC | 2 | " | A31 | Increase sweep generator output to produce visible response on scope. Adjust A31 for MINIMUM response similar to Fig. 6. |

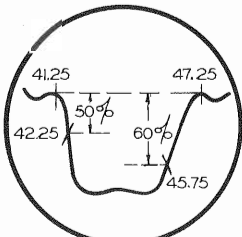


FIG. 1

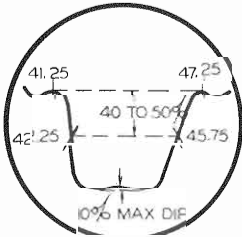


FIG. 2

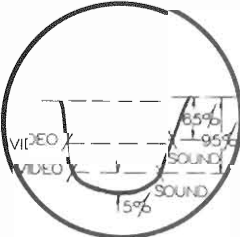


FIG. 3

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of VHF Tuner Oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See Disassembly Instructions.)

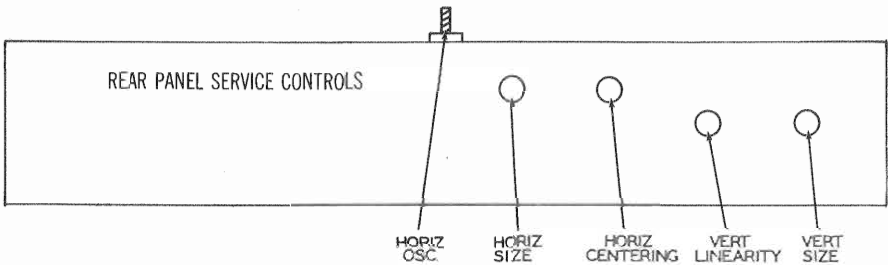
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 4 wood screws holding metal strip at the top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

To adjust the horiz. osc., it is necessary to remove the rear cover and supply power to set.

Adjustment is located on top of chassis. Set horiz. hold control at the center of its range and adjust the horiz. osc. slug (L38) until picture synchronizes horizontally. For location see tube placement chart.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust ratio detector secondary located on bottom of chassis. (See tube replacement chart for location.) Chassis removal is necessary for adjustment.

FUSES

One fuse is used for filament protection. (For location see Tube Placement Chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

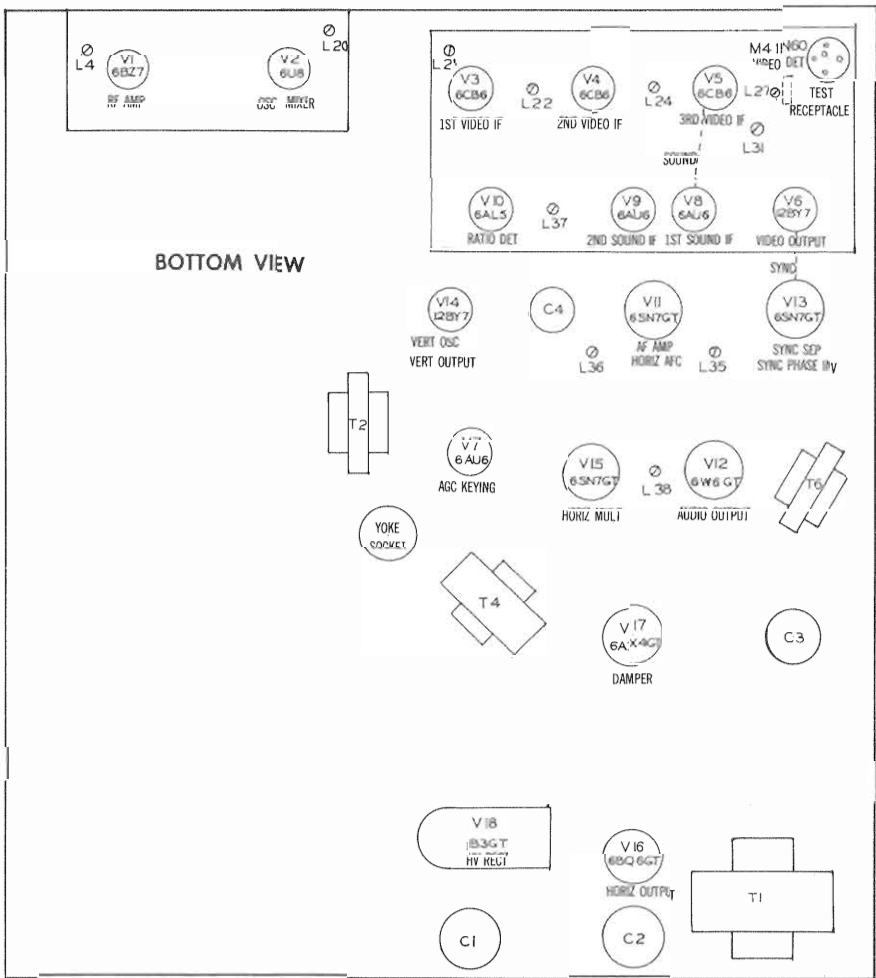
NOTE: If it is necessary to remove the chassis for servicing, it is also necessary to remove the speaker. The speaker is the elector-magnetic type and must be connected for proper operation.

1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws and 1 metal screw from rear cover. Remove rear cover.
3. Disconnect speaker.
4. Remove 4 speaker nuts. Remove speaker.
5. Remove 2 wood screws from antenna bracket.
6. Remove 4 chassis bolts. Remove chassis.

RESISTANCE MEASUREMENTS

| Item | Tube | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 | Pin 9 |
|------|--------|--------|---------|---------------|----------------|-----------------|--------------|-------|-------|------------------|
| V 1 | 6BZ7 | INF | 700KΩ | 0Ω | 0Ω | .1Ω | †4KΩ | INF | INF | 0Ω |
| V 2 | 6U8 | ‡2KΩ | 900KΩ | ‡30KΩ | .1Ω | 0Ω | ‡16KΩ | 0Ω | 0Ω | ‡5KΩ |
| V 3 | 6CB6 | 270KΩ | 47Ω | 0Ω | .1Ω | †3.5KΩ | †3.5KΩ | 0Ω | | |
| V 4 | 6CB6 | 270KΩ | 47Ω | .1Ω | 0Ω | †3.5KΩ | †3.5KΩ | 0Ω | | |
| V 5 | 6CB6 | 3Ω | 120Ω | .1Ω | 0Ω | ‡1KΩ | ‡1KΩ | 0Ω | | |
| V 6 | 12BY7 | 70Ω | 4.7KΩ | 70Ω | 0Ω | 0Ω | .1Ω | ‡5KΩ | ‡500Ω | 70Ω |
| V 7 | 6AU6 | ‡40KΩ | ‡0Ω | 0Ω | .1Ω | 250KΩ | †85Ω | ‡0Ω | | |
| V 8 | 6AU6 | 2.2Ω | 0Ω | 0Ω | .1Ω | ‡10KΩ | ‡10KΩ | | | |
| V 9 | 6AU6 | 60KΩ | 60KΩ | 0Ω | .1Ω | †2.3KΩ | †2.3KΩ | 60KΩ | | |
| V 10 | 6AL5 | INF | INF | 0Ω | .1Ω | 15KΩ | 0Ω | 0Ω | | |
| V 11 | 6SN7GT | 300KΩ | 22KΩ | 100KΩ | 200KΩ | †33KΩ | 1.5KΩ | 0Ω | .4Ω | |
| V 12 | 6W6GT | 470KΩ | 0Ω | †300Ω | †85Ω | †33KΩ | 470KΩ | .1Ω | 60KΩ | |
| V 13 | 6SN7GT | 1.8Meg | ‡1.2Meg | 70Ω | 22KΩ | ‡10KΩ | 2.2KΩ | .1Ω | 0Ω | |
| V 14 | 12BH7 | ‡900Ω | ‡3Meg | 10KΩ | .1Ω | .1Ω | ‡3Meg | 650KΩ | 50Ω | 0Ω |
| V 15 | 6SN7GT | 5Meg | †10KΩ | 1KΩ | 140KΩ | †70KΩ | 1KΩ | .1Ω | 0Ω | |
| V 16 | 6BQ6GT | †70KΩ | .1Ω | ‡0Ω | ‡68Ω | 330KΩ | 330KΩ | 0Ω | 0Ω | Top Cap ‡33Ω |
| V 17 | 6AX4GT | ‡330KΩ | ‡24Ω | 1.7Meg | INF | †85Ω | †85Ω | .1Ω | 0Ω | Top Cap ‡270Ω |
| V 18 | 1B3GT | | PINS | 1 - 8 | HAVE | INFINITE | RESISTANCE | | | |
| V 19 | 21YP4A | .1Ω | 470KΩ | Pin 6 ‡17Ω | Pin 10 ‡17Ω | Pin 11 ‡10KΩ | Pin 12 0Ω | | | |

† MEASURED FROM OUTPUT OF M.
‡ MEASURED FROM 140V LINE.
‡ MEASURED FROM PIN 3 OF V17.



TUBE PLACEMENT CHART

SET 272 FOLDER 8

TROUBLE SHOOTING AIDS

SWEEP

| HORIZONTAL | VERTICAL | | | | |
|---|--|-----------------|-------------------|---|--|
| <p>LOSS OF SWEEP</p> <p>Follow procedure outlined under "Loss of High Voltage".</p> <p>INSUFFICIENT SWEEP</p> <p>Check by substitution V16 and V17. Check M1 and M2. Check T3, T5A, R90, R87, C96, C94, C95 and other associated components.</p> <p>DRIVE LINES</p> <p>Check by substitution V16 and V17. Check C96, C94, R87, T3 and other associated components.</p> <p>DRIVE LINES</p> <p>Check by substitution V16 and V17. Check C96, C94, R87, T3 and other associated components.</p> <p>COMPRESSED LEFT SIDE</p> <p>Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.</p> <p>FOLDS</p> <p>Follow procedure outlined under "Drive Lines".</p> <p>PIE CRUST EFFECT</p> <p>Check by substitution V15, V16 and V17. Check C90 for open. Check L38, C92, C89 and other associated components.</p> <p>XMAS TREE EFFECT</p> <p>Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check L38, C92, C88, C86, C85 and other associated components.</p> | <p>LOSS OF SWEEP</p> <p>Substitute V14. Check waveform W9.</p> <table border="1"> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check T4, T5B, R6, R73 and other associated components.</td><td>Check T2, R7, and other associated components.</td></tr> </table> <p>INSUFFICIENT SWEEP</p> <p>Substitute V14. Check R7, R6, R73, T4 and other associated components.</p> <p>COMPRESSED AT BOTTOM</p> <p>Substitute V14. Check C5, C80, C81, R7 and other associated components.</p> <p>COMPRESSED AT TOP</p> <p>Substitute V14. Check R6, R73, C5, C2C, T4 and other associated components.</p> <p>HOLDS</p> <p>Substitute V14. Check R73, C5, C80, C81 and other associated components.</p> | If Satisfactory | If Unsatisfactory | Check T4, T5B, R6, R73 and other associated components. | Check T2, R7, and other associated components. |
| If Satisfactory | If Unsatisfactory | | | | |
| Check T4, T5B, R6, R73 and other associated components. | Check T2, R7, and other associated components. | | | | |

SYNC

| | |
|--|--|
| <p>LOSS OF VERTICAL AND HORIZONTAL SYNC</p> <p>Substitute V13. Check C72, C74, C75, R68, R69, R64 and other associated components.</p> <p>LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY</p> <p>Substitute V14. Check C76, C78, C79, T2, R5 and other associated components.</p> | <p>LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY</p> <p>Check by substitution V11 and V15. Check C83, C84, C89, C92, L38, R83 and other associated components.</p> <p>HORIZONTAL BENDING</p> <p>Check by substitution V11, V12, V13, and V15. Check horizontal AFC network.</p> |
|--|--|

VIDEO

| | |
|---|--|
| <p>LOSS OF VIDEO</p> <p>Substitute V6. Check R39, R42, C48, C4A, C50, L33, L32, L34 and other associated components.</p> <p>SOUND BARS (4.5MC BEAT)</p> <p>Adjust tuner fine tuning for best sound and picture. Check adjustment A36. Check video IF alignment.</p> <p>POOR CONTRAST</p> <p>Substitute V6. Check L32, L33, L34, C50, C51, C48, R39, R42 and other associated components.</p> | <p>NEGATIVE PICTURE</p> <p>Substitute V6. Check picture tube. Check video crystal network. Check L28, L29, L30, C50 and other associated components.</p> <p>SMEAR</p> <p>Substitute V6. Check L28, L29, L30, L32, L33, L34, C50 and other associated components.</p> <p>WIDE BLACK BAR ACROSS PICTURE</p> <p>Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.</p> |
|---|--|

AUDIO

| | | | | | |
|---|--|-------------------|--|--|--|
| <p>WEAK OR NO SOUND</p> <p>Check by substitution V8, V9, V10, V11 and V12. Check stages V11 and V12 using audio signal generator. Apply audio signal across R2B.</p> <table border="1"> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check ratio detector and audio IF stages for component failure or change of value.</td><td>Check C65, C67, C4C, R58, T6, speaker and other associated components.</td></tr> </table> | If Satisfactory | If Unsatisfactory | Check ratio detector and audio IF stages for component failure or change of value. | Check C65, C67, C4C, R58, T6, speaker and other associated components. | <p>BUZZ</p> <p>Adjust tuner fine tuning for best sound and picture. Check adjustment A35. If still unsatisfactory, check audio IF alignment.</p> <p>DISTORTED</p> <p>Follow procedure outlined under "Weak or No Sound".</p> |
| If Satisfactory | If Unsatisfactory | | | | |
| Check ratio detector and audio IF stages for component failure or change of value. | Check C65, C67, C4C, R58, T6, speaker and other associated components. | | | | |

TROUBLE SHOOTING AIDS (cont)

POWER

| | |
|---|---|
| <p>DEAD SET</p> <p>If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check R96, M1 and M2. Check B+ filter and decoupling network.</p> | <p>SMALL AND/OR DIM PICTURE</p> <p>Check R96, M1 and M2. Check B+ filter and decoupling network.</p> |
|---|---|

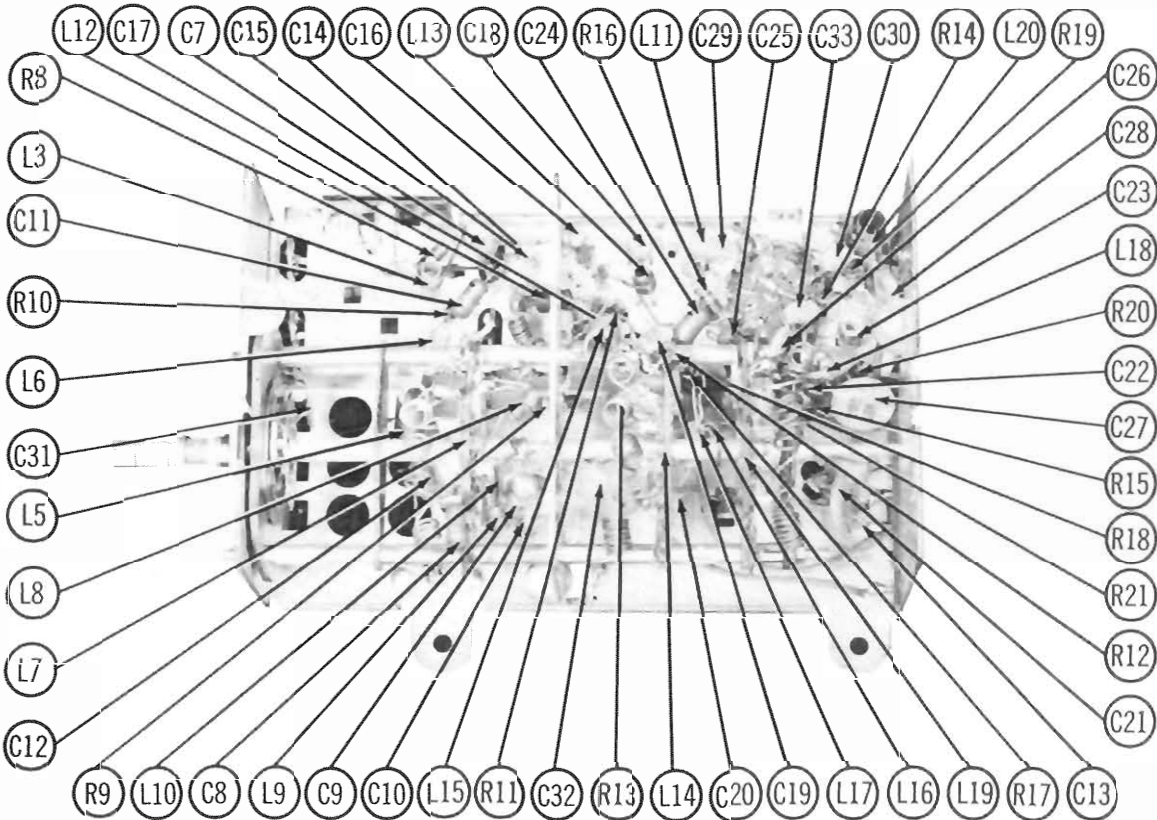
HIGH VOLTAGE

| | | | | | |
|--|---|-------------------|--|---|---|
| <p>LOSS OF HIGH VOLTAGE</p> <p>Check by substitution V15, V16, V17, V18 and V12. Check waveform W16.</p> <table border="1"> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check T3, T5A, C97, R90 and other associated components.</td><td>Check L38, C91, C92, C93, C96, R86, R83, R85 and other associated components.</td></tr> </table> | If Satisfactory | If Unsatisfactory | Check T3, T5A, C97, R90 and other associated components. | Check L38, C91, C92, C93, C96, R86, R83, R85 and other associated components. | <p>INSUFFICIENT HIGH VOLTAGE</p> <p>Check by substitution V16 and V17. Check M1 and M2. Check R96, R90, R87, C94, C95 and other associated components.</p> <p>BLOOMING</p> <p>Check by substitution V16, V17 and V18. Check M1 and M2. Check T3, R96, R90, C96 and other associated components.</p> |
| If Satisfactory | If Unsatisfactory | | | | |
| Check T3, T5A, C97, R90 and other associated components. | Check L38, C91, C92, C93, C96, R86, R83, R85 and other associated components. | | | | |

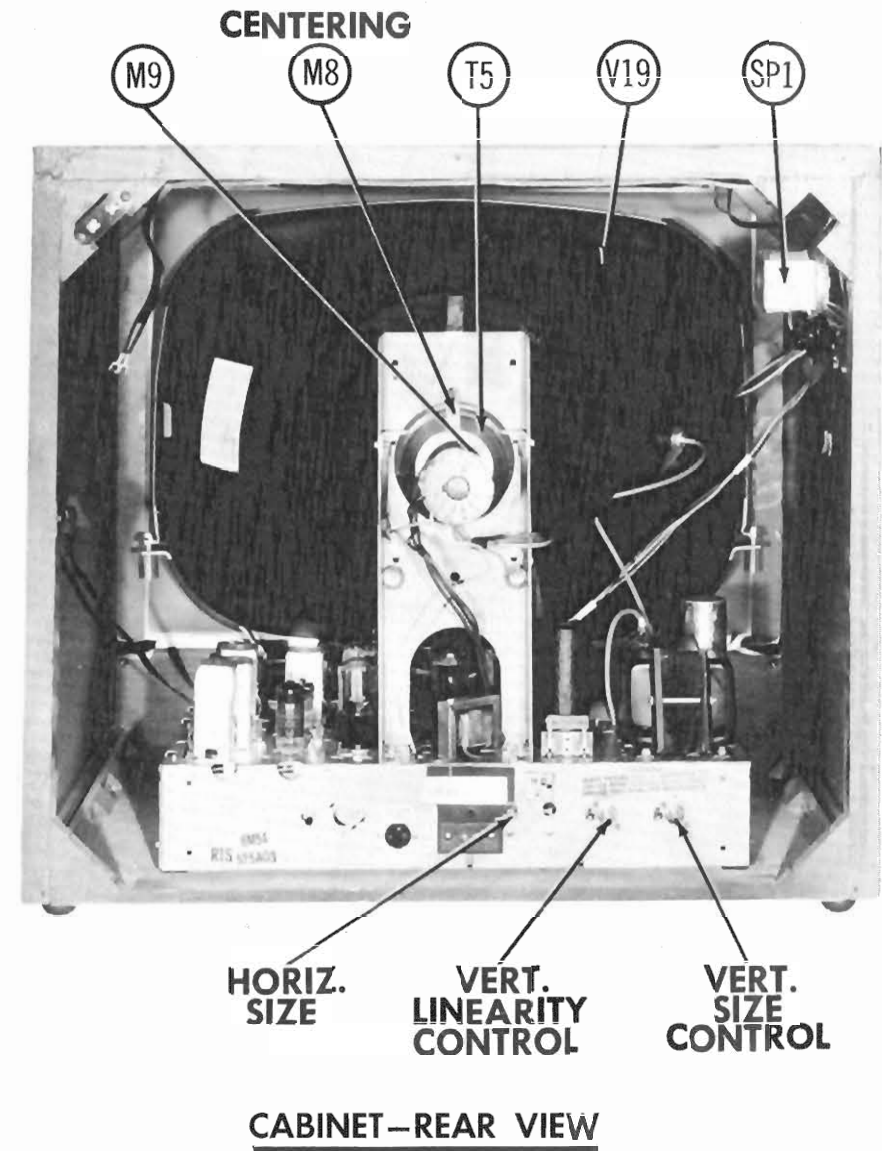
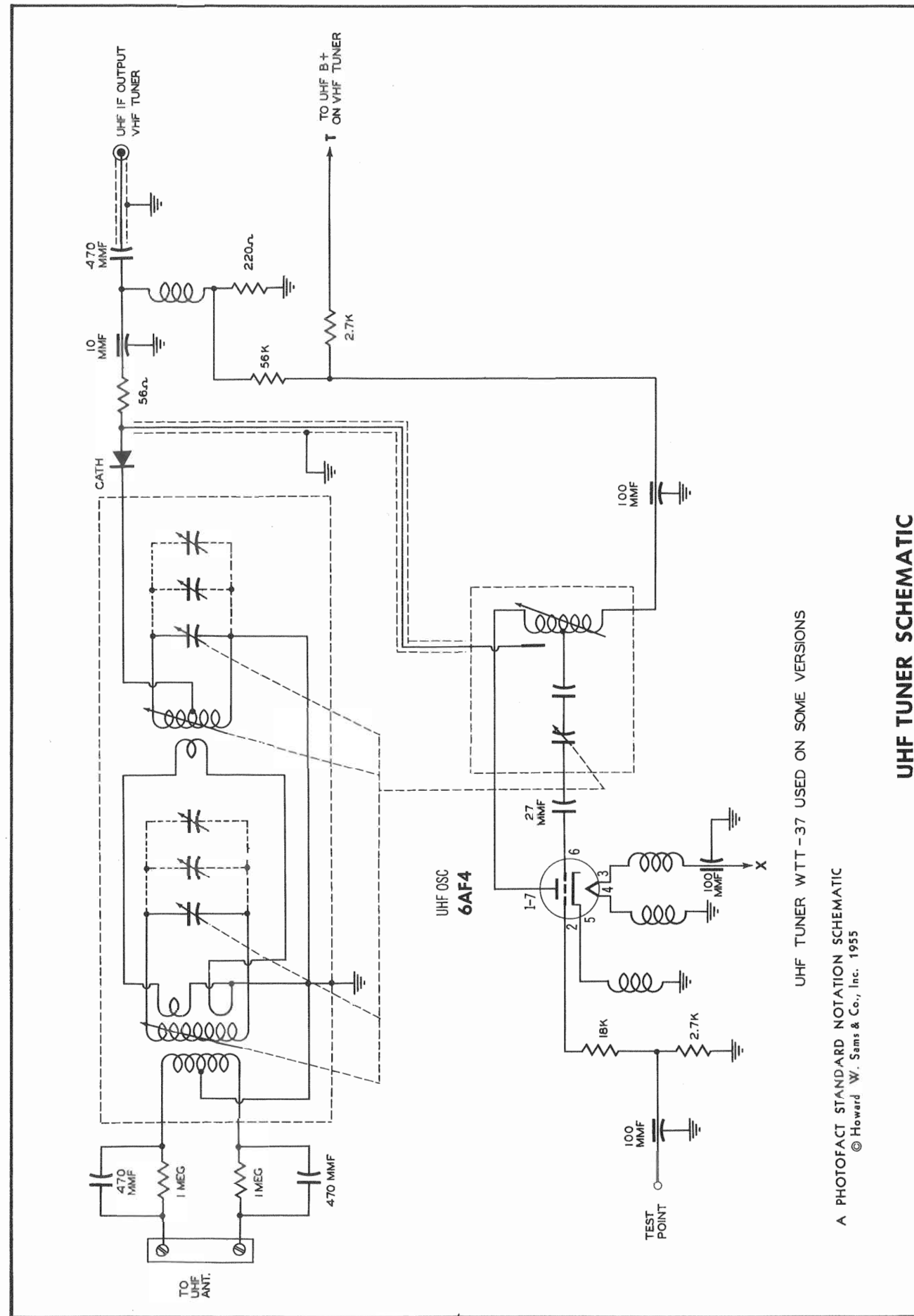
GENERAL

| | |
|---|---|
| <p>RASTER, SOUND, NO PICTURE</p> <p>Follow procedure outlined under "Loss of Video".</p> <p>RASTER, PICTURE, NO SOUND</p> <p>Follow procedure outlined under "Weak or No Sound".</p> <p>RASTER, NO SOUND, NO PICTURE</p> <p>Check by substitution V1, V2, V3, V4, V5 and V6. Check C70 and other components associated with video IF stages.</p> | <p>NO RASTER, NO SOUND</p> <p>Follow procedure outlined under "Dead Set".</p> <p>KEYSTONE EFFECT</p> <p>Check T5 and its associated components.</p> <p>INTERMITTENT STREAKS</p> <p>Check high voltage section for corona discharge and arcing.</p> |
|---|---|

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



RF TUNER BOTTOM VIEW

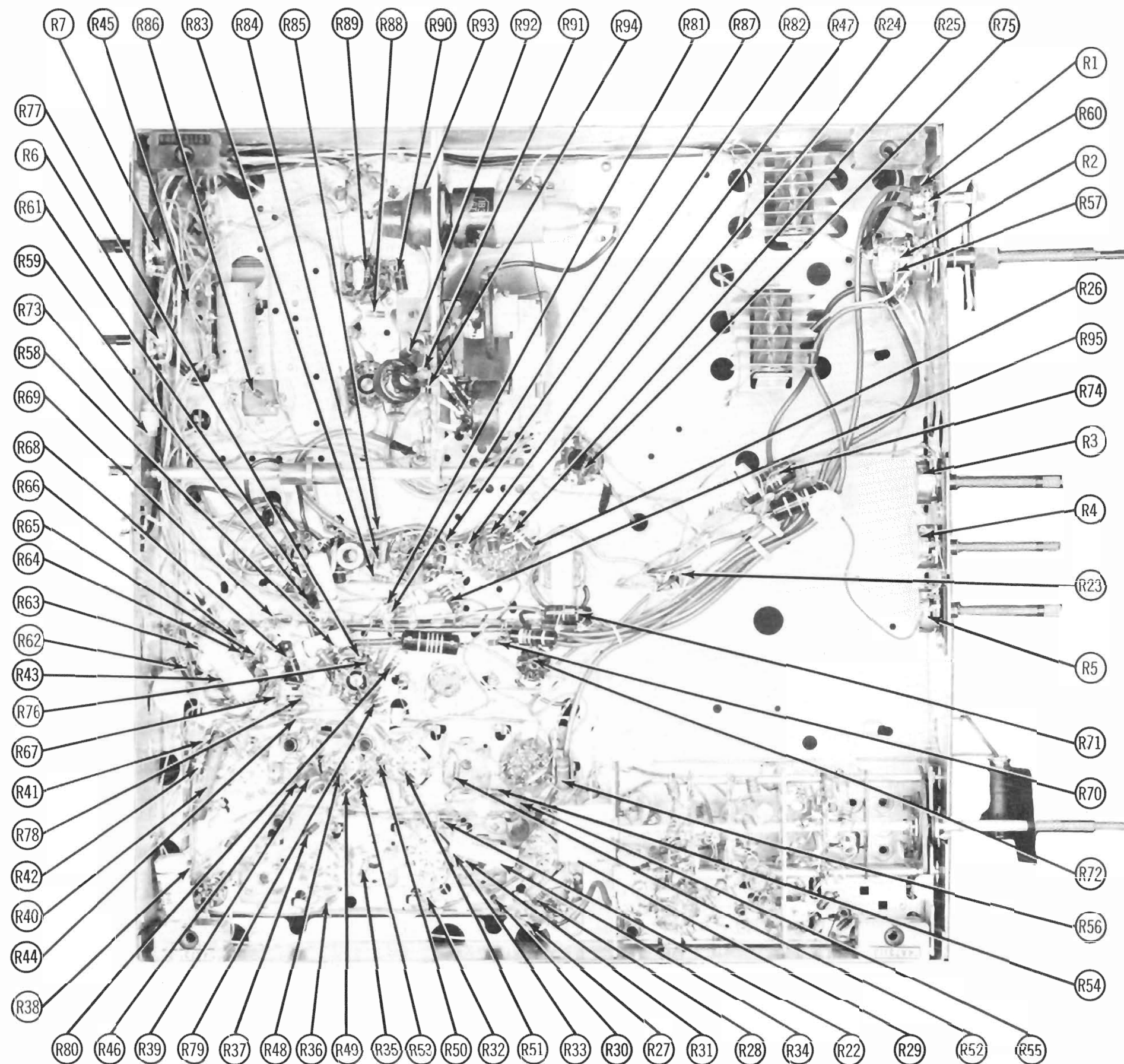


HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn set on and tune in a TV station, preferably a test pattern.

Normally the horizontal hold control will have a sync range of approximately 30 degrees. If the controls are too critical, adjust as follows.

1. Short the horiz. oscillator coil (L38) to ground with a .25MFD 400 volt capacitor. This may be done with the chassis in cabinet by placing the capacitor across the two pin sockets on rear of chassis labeled "Test Receptacle Only".
2. With the horizontal centering lever, move the picture to the right so the left edge of raster may be seen. Adjust the horiz. hold control until no blanking pulse appears and the picture just starts to fold on the left. The blanking pulse is the gray bar just to the left edge of the raster. It may be necessary to adjust the contrast and brightness control to make this gray bar pulse visible.
3. Remove the .25MFD capacitor across L38.
4. Adjust the horiz. osc. coil slug (B1) until no sync pulse can be seen as in step 2 and recenter picture. Adjust the horizontal size adjustment (B2) located on rear of chassis slightly wider than necessary to fill picture mask horizontally. Since this adjustment affects the vertical size, it may be necessary to adjust the vertical size control at the same time.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS (Continued)
FUSES

| ITEM No. | TYPE | RATING | REPLACEMENT DATA | | | | | |
|----------|-------------------|--------|-------------------|--------|---------------------|--------|---------------|--------|
| | | | MOTOROLA PART No. | | LITTELFUSE PART No. | | BUSS PART No. | |
| | | | FUSE | HOLDER | FUSE | HOLDER | FUSE | HOLDER |
| M3 | 1" piece #20 wire | | | | | | | |

CRYSTAL DIODES

| ITEM No. | ORIG. TYPE | REPLACEMENT DATA | | | NOTES |
|----------|------------|-------------------|-------------------|--|------------|
| | | MOTOROLA PART No. | SYLVANIA PART No. | | |
| M4 | | 48K733204* | 1N60 or 1N132 | | Video Det. |

* Alternate part numbers.

48C711052
48K711077
48K722720
48K733158
48K712199

MISCELLANEOUS

| ITEM No. | PART NAME | MOTOROLA PART No. | NOTES |
|----------|------------------|------------------------|--|
| M5 | Dial Light | | #44, Bayonet |
| M6A | Tuner | 1U733422 | VHF - Chassis WTS-525 |
| B | Tuner | 1U733614 | VHF - Chassis RTS-525, RTS-525Y, WTS-525Y |
| M7 | Tuner | WTT-37 | UHF - Chassis RTS-525Y, WTS-525Y |
| M8A | Centering Device | 48A721145 | Includes yoke cover - (For all yokes except Motorola yoke part #24C733436) |
| | Centering Device | 48A733487 | Includes yoke cover - (For Motorola yoke part #24C733436 only) |
| M9 | Ion Trap | 59K734027 or 59K734028 | |
| | Cabinet | 16K733328 | Models 21K20, Y21K20 |
| | Cabinet | 16K733330 | Models 21K20B, Y21K20B |
| | Cabinet | 16E733431 | Models 21T18, Y21T18 |
| | Cabinet | 16K733432 | Models 21T18B, Y21T18B |
| | Knob | 36K733398 | Channel Selector - Models 21K20, B |
| | Knob | 36K730174 | Channel Selector - Models 21T18, B |
| | Knob | 36B733397 | VHF - Channel Selector - Models Y21K20, B |
| | Knob | 36B730171 | VHF - Channel Selector - Models Y21T18, B |
| | Knob | 36C733399 | Contrast - Models 21K20, B, Y21K20, B |
| | Knob | 36C730162 | Contrast - Models 21T18, B, Y21T18, B |
| | Knob | 36C730167 | Tone - Models 21K20, B, Y21K20, B, Y21T18, B |
| | Knob | 36B733395 | Fine tuning & on-off-volume - Models 21K20, B, Y21K20, B |
| | Knob | 36B733493 | Fine tuning & on-off-volume - Models 21T18, B, Y21T18, B |
| | Knob | 36B733492 | Horiz., Vert., Brightness - All Models |
| | Scale | 34C730165 | UHF Channel Indicator - Models Y21K20, B, Y21T18, B |
| | Safety Glass | 61K733577 | Models 21K20, B, Y21K20, B |
| | Safety Glass | 60K734345 | Models 21T18, B, Y21T18, B |
| | Mask | 13E734163 | All Models |

PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

| ITEM No. | USE | REPLACEMENT DATA | | RETMA BASE TYPE | NOTES |
|----------|-----------------------------|-------------------|----------------------|-----------------|-------|
| | | MOTOROLA PART No. | STANDARD REPLACEMENT | | |
| V1 | RF Amp. | 6BZ7 | 6BZ7 | 9AJ | |
| V2 | Mixer - Osc. | 6U8 | 6U8 | 9AE | |
| V3 | 1st Video IF Amp. | 6CB6 | 6CB6 | 7CM | |
| V4 | 2nd Video IF Amp. | 6CB6 | 6CB6 | 7CM | |
| V5 | 3rd Video IF Amp. | 6CB6 | 6CB6 | 7CM | |
| V6 | Video Output | 12BY7 | 12BY7 | 9BF | |
| V7 | AGC Keying | 6AU6 | 6AU6 | 7BK | |
| V8 | 1st Sound IF Amp. | 6AL5 | 6AU6 | 7BK | |
| V9 | 2nd Sound IF Amp. | 6AL5 | 6AU6 | 7BK | |
| V10 | Ratio Det. | 6AL5 | 6AL5 | 6BT | |
| V11 | AF Amp. - Horiz. AFC | 6SN7GT | 6SN7GT | 8BD | |
| V12 | Audio Output | 6W6GT | 6W6GT | 7S | |
| V13 | Sync Sep. - Sync Phase Inv. | 6SN7GT | 6SN7GT | 8BD | |
| V14 | Vert. Osc. - Vert. Output | 12BH7 | 12BH7 | 9A | |
| V15 | Horiz. Mult. | 6SN7GT | 6SN7GT | 6BD | |
| V16 | Horiz. Output | 6BQ6GT | 6BQ6GT | 6AM | |
| V17 | Damper | 6AX4GT | 6AX4GT | 4CG | |
| V18 | HV Rectifier | 1B3GT | 1B3GT | 3C | |

CATHODE-RAY TUBE

| ITEM No. | MOTOROLA PART No. | REPLACEMENT DATA | | | | RETMA BASE TYPE | NOTES |
|----------|-------------------|---------------------|---------------------------|-------------------------------|-----------------------|-------------------|---|
| | | CBS-HYTRON PART No. | GENERAL ELECTRIC PART No. | SYLVANIA PART No. | WESTINGHOUSE PART No. | | |
| V19 | 21YP4A ① | 21YP4A ① 21YP4 | 21YP4A ① 21YP4 | 21YP4A ① 21YP4 21AFP4 ② | 21YP4A ① 21YP4 | 12L 12L 12M | ① Aluminized ② Circuit changes necessary |

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

| ITEM No. | RATING | | REPLACEMENT DATA | | | | | | NOTES |
|----------|--------|------|-------------------|--------------------|---------------|------------------|------------------|------------------|--------|
| | CAP. | VOLT | MOTOROLA PART No. | CENTRALAB PART No. | ERIE PART No. | MALLORY PART No. | PYRAMID PART No. | SANGAMO PART No. | |
| C1 | 140 | 150 | 23B484097 | | | FP117 | TM-140-150 | T-050 | Note 3 |
| C2A | 200 | 150 | 23B733495 | | | FP312.5 TC48 | | | |
| B | 140 | 150 | | | | | | | |
| C | 60 | 150 | | | | | | | |
| C3A | 200 | 150 | 23B710941 | | | FP216.1 | TM-200-150 | PL-15200 | Note 4 |
| B | 5 | 150 | | | | | TD-4-150 | PL-1504 | |
| C4A | 30 | 150 | 23B733494 | | | FP333.6 | TM-302010-250 | T-010 | |
| B | 10 | 50 | | | | | | | |
| C5 | 10 | 450 | 23A702450 | | | TC72 | TD-10-450 | FM-4510 | Note 4 |
| C6 | 22 | | 21R120539 | | | | | | |
| C7 | 22 | | 21R120539 | | | | | | |
| C8 | 6.8 | | 20K731175 | 829-6 | | CT552 | | | |
| C9 | 1-6 | | 21R15953 | | | | | | Note 4 |
| C10 | 4 | | 21R15856 | D6-471 | GPIK-471 | UC-5347 | | | |
| C11 | 470 | | 21R410115 | D6-221 | GPIK-221 | UC-5322 | | | |
| C12 | 220 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C13 | 10000 | | | | | | | | Note 4 |
| C14 | 2.2 | | 21R15948 | TCZ-2.2 | NPOK-2R2 | | | | |
| C15 | 10 | | 21R121837 | | | | | | |
| C16 | 1000 | | 21R15386 | DD-102 | 801-001 | DC-521 | | | |
| C17 | 470 | | 21R121478 | DD-471 | 801-00047 | UC-5347 | | | Note 4 |
| C18 | .5-3 | | 21K710943 | 829-3 | 3139-01-OR5 | CT565A | | | |
| C19 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C20 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C21A | 1500 | | 21R121406 | DD-152 | 812-0015 | DCD-5215 | | | Note 4 |
| B | 1500 | | | | | | | | |
| C22 | 12 | | 21R121110 | | | | | | |
| C23 | .5-3 | | 21K710943 | 829-3 | 3139-01-OR5 | CT565A | | | |
| C24 | 22 | | 21R119049 | | | | | | Note 4 |
| C25 | 1.0 | | 21R14071 | | | | | | |
| C26 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C27 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C28 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | Note 4 |
| C29A | 800 | | 21R400943 | DD2-102 | 812-001 | DCD-521 | | | |
| B | 800 | | | | | | | | |
| C30 | 470 | | 21R121478 | DD-471 | 801-00047 | UC-5347 | | | |
| C31 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | Note 4 |
| C32 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C33 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C34 | 100 | | 21R410036 | TCN-100 | N75K-1-01 | N7-531 | | | |
| C35 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | Note 4 |
| C36 | .25 | 100 | 8R121575 | | | P14025 | IMP2-P25 | 3302025 | |
| C37 | .25 | 100 | 8R121575 | | | P14025 | IMP2-P25 | 3302025 | |
| C38 | 560 | | 21R120936 | D6-561 | GP2K-561 | UC-5356 | | | |
| C39 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | Note 4 |
| C40 | 1000 | | 21R15386 | DD-102 | 801-001 | DC-521 | | | |
| C41 | 560 | | 21R120936 | D6-561 | GP2K-561 | UC-5356 | | | |
| C42 | 1000 | | 21R15386 | DD-102 | 801-001 | DC-521 | | | |
| C43 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | Note 4 |
| C44 | 1000 | | 21R15386 | DD-102 | 801-001 | DC-521 | | | |
| C45 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | |
| C46 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | |
| C47 | 470 | | 21R14554 | DD-471 | 801-00047 | UC-5347 | | | Note 4 |
| C48 | 5000 | | 21R15312 | DD-502 | 801-005 | DC-525 | | | |
| C49 | 30 | | 21R410048 | | | | | | |
| C50 | .1 | 2000 | 8K120875 | DF-104 | | PT401 | IMP2-P1 | 330201 | |
| C51 | 5000 | | 21R15312 | DD-502 | 801-005 | DC-525 | | | Note 4 |
| C52 | 1500 | | 21R121863 | DD30-152 | | | | | |
| C53 | 2.2 | | 21R15949 | TCZ-2.2 | NPOK-2R2 | | | | |
| C54 | 18 | | 21R120578 | | | | | | |
| C55 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | Note 4 |
| C56 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C57 | 1500 | | 21R120100 | DD-152 | 801-0015 | DC-5215 | | | |
| C58 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C59 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | Note 4 |
| C60 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C61 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C62 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |

| CAPACITORS (cont) | | | | | | | | | |
|-------------------|--------|------|-------------------|--------------------|---------------|------------------|------------------|-----------|--------|
| ITEM No. | RATING | | REPLACEMENT DATA | | | | | NOTES | |
| | CAP. | VOLT | MOTOROLA PART No. | CENTRALAB PART No. | ERIE PART No. | MALLORY PART No. | PYRAMID PART No. | | |
| C61 | 1000 | | 21A121878 | DD-102 | 801-001 | DC-521 | | | |
| C62 | 5000 | | 21R115312 | DD-502 | 801-005 | DC-525 | | | |
| C63 | 1000 | | 21A121878 | DD-102 | 801-001 | DC-521 | IMP6-D1 | K-1210 | |
| C64 | 1500 | | 21R120100 | DD-5215 | 801-0015 | DC-5215 | | | |
| C65 | 3000 | | 21R115312 | DD-525 | 801-005 | DC-525 | IMP6-D5 | C-1250 | |
| C66 | 3000 | | | DD-5233 | 801-0033 | DC-5233 | IMP6-D33 | C-1233 | |
| C67 | 5000 | | 21R115312 | DD-525 | 801-005 | DC-525 | | | |
| C68 | .005 | 1000 | | | | PT1625 | CT10-D5 | 2116-.005 | |
| C69 | .02 | 600 | 8R121566 | | | PT612 | IMP6-S2 | 330612 | |
| C70 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C71 | 10000 | | 21R482726 | DD-103 | 811-01 | DC-511 | | | |
| C72 | 4700 | | | DD-502 | 801-005 | DC-525 | | C-1247 | |
| C73 | 47 | | 21R115593 | TCN-47 | N750K-470 | NT-5447 | | KR-1447 | |
| C74 | 220 | | 21R115905 | D6-221 | GP1K-221 | UC-5322 | | K-1322 | |
| C75 | .05 | 200 | 8R121567 | D6-502 | GP2-333-502 | PT425 | IMP2-S5 | 330215 | |
| C76 | .0047 | 400 | 8K490222 | D6-502 | GP2-333-502 | PT425 | IMP6-D47 | 3306247 | |
| C77 | .0047 | 400 | 8K490222 | D6-502 | GP2-333-502 | PT425 | IMP6-D47 | 3306247 | |
| C78 | .01 | 400 | 8K490226 | D6-103 | GP2-333-103 | PT411 | IMP6-S1 | 330411 | |
| C79 | 4700 | | | DD-502 | 801-005 | DC-525 | | C-1247 | |
| C80 | .047 | 400 | 21R121567 | DF-503 | PT415 | | IMP4-S47 | 3304147 | |
| C81 | .047 | 400 | 21R121567 | DF-503 | PT415 | | IMP4-S47 | 3304147 | |
| C82 | 5000 | 2000 | 21R120093 | DD30-502 | | | | | |
| C83 | 470 | | 21R115856 | D6-471 | GP2L-471 | UC-5347 | | K-1347 | |
| C84 | 470 | | 21R115856 | D6-471 | GP2L-471 | UC-5347 | | K-1347 | |
| C85 | 470 | | 21R115856 | D6-471 | GP2L-471 | UC-5347 | | K-1347 | |
| C86 | 1000 | | 21R114749 | D6-102 | GP2L-102 | UC-102 | IMP6-D1 | K-1210 | |
| C87 | .003 | 600 | 8R121569 | D6-302 | GP2-333-302 | PT623 | IMP6-D3 | 330623 | |
| C88 | .001 | 1000 | 8K490268 | D6-102 | GP2-333-302 | PT621 | CT10-D1 | 3116-.001 | |
| C89 | .003 | 600 | 8R121569 | D6-302 | GP2-333-302 | PT623 | IMP6-D3 | 330623 | |
| C90 | .01 | 400 | 8R121002 | D6-103 | GP2-333-103 | PT411 | IMP4-S1 | 330411 | |
| C91 | 100 | | 21R115900 | D6-101 | GP1K-101 | UC-531 | | K-1310 | |
| C92 | .0047 | 400 | 8K490222 | D6-502 | GP2-333-502 | PT425 | IMP6-D47 | 3306247 | |
| C93 | 390 | 500 | 21K114740 | | | MCB243 | | | |
| C94 | 390 | 500 | 21K114740 | | | MCB243 | | | |
| C95 | .039 | 400 | 8K490231 | | | | | | |
| C96 | 5000 | | 21R115312 | | | | | | |
| C97 | 1000 | 3000 | 21R121424 | DD30-101 | | | | | |
| C98 | 51 | 1500 | 21R120224 | | | | | | Note 2 |

Note 1: Some versions may use a 470MMF in this application.
Note 2: Chassis WTS-525 uses a 72MMF in this application.
Note 3: Chassis WTS-525 may use a 60MMF/200V, 140MMF/150V or 200MMF/150V in this application.
Note 4: Chassis WTS-525 may use a 10MMF/500V in this application.

| CONTROLS | | | | | | | | | |
|----------|------------|-------|-------------------|--------------|--------------------|--------------------|------------------|---------------------------------------|--|
| ITEM No. | RATING | | REPLACEMENT DATA | | | | | INSTALLATION NOTES | |
| | RESISTANCE | WATTS | MOTOROLA PART No. | IRC PART No. | CLAROSTAT PART No. | CENTRALAB PART No. | MALLORY PART No. | | |
| R1A | 1Meg | 1/2 | 18A733887 | Q11-137 | A47-1Meg-S | AB-69 | U-54 | Acoustinator | |
| B | Shaft | | Not Req. | Not Req. | KSS-3 | AK-4 | Not Req. | Attach to R1A | |
| R2A | 350K | 1/2 | 18B733314 | | RTV-498 | | UE-2S | Contrast - Panel | |
| B | 1Meg | 1/2 | | | | | | Volume & Switch tapped at 500K - Rear | |
| R3A | 5Meg | 1/2 | 18B734142 | Q11-141 | A47-5Meg-S | AB-87 | U-67 | Brightness | |
| B | Shaft | | Not Req. | Not Req. | KSS-3 | AK-4 | Not Req. | Attach to R3A | |
| R4A | 250K | 1/2 | 18K734146 | Q11-129 | A47-250K-S | AB-46 | U-46 | Horiz. Hold - Note 1 | |
| B | with 50K | | | | | | | | |
| R5A | 400K | 1/2 | Not Req. | Not Req. | KSS-3 | AK-4 | Not Req. | Attach to R4A | |
| B | 400K | | 18B734143 | Q11-133 | A47-500K-S | AB-59 | U-50 | Vert. Hold - Note 2 | |
| B | Shaft | | Not Req. | Not Req. | KSS-3 | AK-4 | Not Req. | Attach to R5A | |
| R6A | 750K | 1/2 | 18K734144 | Q11-105 | A47-750-S | AB-415 | U-4 | Vert. Linearity | |
| B | Shaft | | Not Req. | Not Req. | KSS-1/4 | AK-4 | Not Req. | Attach to R6A | |
| R7A | 7Meg | 1/2 | 18B733413 | Q11-141 | A47-7Meg-S | AB-36 | U-82 | Vert. Size - Note 3 | |
| B | with 2Meg | | | | | | | | |
| B | Shaft | | Not Req. | Not Req. | KSS-1/4 | AK-4 | Not Req. | Attach to R7A | |

Note 1: Connect a 47K resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end terminals down.)
Note 2: Connect a 390K resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 3: Connect a 2Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)

| RESISTORS | | | | | | | | | |
|-----------|-----------|------|-------------------|---------------|--|--|--|-------|--|
| ITEM No. | RATING | | REPLACEMENT DATA | | | | | NOTES | |
| | OHMS | WATT | MOTOROLA PART No. | IRC PART No. | | | | | |
| R8 | 1Meg | | 6R6004 | BTS-1Meg | | | | | |
| R9 | 47K | | 6R6056 | BTS-47K | | | | | |
| R10 | 22K | | 6R6397 | BTS-22K | | | | | |
| R11 | 10K | | 6R6056 | BTS-10K | | | | | |
| R12 | 4700 | | 6R6090 | BTS-470 | | | | | |
| R13 | 1000K | | 6R6301 | BTS-1000 | | | | | |
| R14 | 15K | | 6R2119 | BTS-15K | | | | | |
| R15 | 1000K | | 6R6301 | BTS-1000 | | | | | |
| R16 | 4700 | | 6R6039 | BTS-4700 | | | | | |
| R17 | 330K | | 6R6014 | BTS-330K | | | | | |
| R18 | 330K | | 6R6014 | BTS-330K | | | | | |
| R19 | 4700 | | 6R6039 | BTS-4700 | | | | | |
| R20 | 10K | | 6R6034 | BTS-10K | | | | | |
| R21 | 1000K | | 6R6301 | BTS-1000 | | | | | |
| R22 | 2700 | | 6R5666 | BTA-2700 | | | | | |
| R23 | 2.7Meg 5% | | 6R488186 | BTS-2.7Meg 5% | | | | | |
| R24 | 470K 5% | 1 | 6R400205 | BTA-470K 5% | | | | | |
| R25 | 820K | 1 | 6R2053 | BTA-820K | | | | | |
| R26 | 330K | | 6R2096 | BTS-330K | | | | | |
| R27 | 1000K | | | | | | | | |
| R28 | 18K | | 6R6301 | BTS-1000 | | | | | |
| R29 | 47K | | 6R5591 | BTS-18K | | | | | |
| R30 | 1000K | | 6R6301 | BTS-1000 | | | | | |
| R31 | 33K | | 6R6410 | BTS-33K | | | | | |
| R32 | 47K | | 6R5550 | BTS-47 | | | | | |
| R33 | 220K | | 6R3933 | BTS-220 | | | | | |
| R34 | 3000K | 5 | 17K733878 | | | | | | |
| R35 | 33K | | 6R6410 | BTS-33K | | | | | |
| R36 | 120K 5% | | 6R5551 | BTS-120 5% | | | | | |
| R37 | 1000K | | 6R6301 | BTS-1000 | | | | | |
| R38 | 4700 | | 6R6080 | BTS-4700 | | | | | |
| R39 | 4700 | 2 | 6R5593 | BTS-470 | | | | | |
| R40 | 5000 | 5 | 17R121123 | 1 3/4A-5000 | | | | | |
| R41 | 10K | | 6R6320 | BTS-10K | | | | | |
| R42 | 22K | 2 | 6R2096 | BTS-22K | | | | | |
| R43 | 10K | | 6R6031 | BTS-100K | | | | | |
| R44 | 1Meg | | 6R6046 | BTS-1Meg | | | | | |
| R45 | 470K | | 6R6377 | BTS-470K | | | | | |
| R46 | 33K | | 6R6410 | BTS-33K | | | | | |

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

| ITEM No. | RATING | | REPLACEMENT DATA | | NOTES | | | | |
|----------|----------|------|-------------------|--------------|--------|--|--|--|--|
| | OHMS | WATT | MOTOROLA PART No. | IRC PART No. | | | | | |
| R47 | 330K | 1 | 6R5717 | BTA-330K | | | | | |
| R48 | 150K | | 6R3992 | BTS-150 | | | | | |
| R49 | 10K | | 6R6430 | BTA-10K | | | | | |
| R50 | 15K | | 6R6477 | BTS-15K | | | | | |
| R51 | 150K | | 6R3992 | BTS-150 | | | | | |
| R52 | 2200K | | 6R6290 | BTS-2200 | | | | | |
| R53 | 2200K | | 6R6290 | BTS-2200 | | | | | |
| R54 | 120K | | 6R5551 | BTS-120 | | | | | |
| R55 | 33K | | 6R6012 | BTS-33K | | | | | |
| R56 | 15K | | | BTA-15K | | | | | |
| R57 | 68K | | 6R6001 | BTA-68K | | | | | |
| R58 | 1500K 5% | | 6R400459 | BTS-1500 5% | | | | | |
| R59 | 33K 5% | | 6R5758 | BTA-33K 5% | | | | | |
| R60 | 47K | | 6R6048 | BTS-47K | | | | | |
| R61 | 470K | | 6R6377 | BTA-470K | | | | | |
| R62 | 270K | | 6R6414 | BTS-270K | | | | | |
| R63 | 1.5Meg | | | BTS-1.5Meg | Note 1 | | | | |
| R64 | 1.2Meg | | 6R5653 | BTS-1.2Meg | | | | | |
| R65 | 560K | | 6R5697 | BTS-560K | | | | | |
| R66 | 22K | | 6R6397 | BTS-22K | | | | | |
| R67 | 2200K | | 6R6080 | BTS-2200 | | | | | |
| R68 | 6800K | | 1R6428 | BTS-6800 | | | | | |
| R69 | 2700K | | 1R3577 | BTS-2700 | | | | | |
| R70 | 22K | | 1R6028 | BTS-22K | | | | | |
| R71 | 10K | | 1R6040 | BTS-10K | | | | | |

Note 1: Some versions may use a 4.7Meg resistor in this application.
Note 2: Not used in some versions.

| ITEM No. | RATING | | REPLACEMENT DATA | | | | | | |
|----------|--------------|---------------|-------------------|------------------|----------------|----------------|--------------|---------------------|---------------------|
| | PRI. | SEC. 1 | MOTOROLA PART No. | Stancor PART No. | Merit PART No. | Triad PART No. | RCA TYPE No. | Halldorson PART No. | Thordarson PART No. |
| T1 | 117VAC @.67A | SEC. 1 @10.3A | 25B733199 | P-630812 | P-294812 | F-21A12 | | F-551612 | 21F1212 |

① Drill new mounting holes.
② Tape 6.3V CT.


TRANSFORMERS (FILAMENT)

| ITEM No. | USE | REPLACEMENT DATA | | | | | | | |
|----------|----------------------|-------------------|---------------------|----------------|--------------|--------------|------------------|---------------------|----------------|
| | | MOTOROLA PART No. | Halldorson PART No. | Merit PART No. | RCA TYPE No. | Ram PART No. | Stancor PART No. | Thordarson PART No. | Triad PART No. |
| T2 | Vert. Osc. Trans. | 25B730179 | B6702 | A-3003 | | V405 | A-8125 | 24A871 | A-97X |
| T3 | Horiz. Output Trans. | 24K732584 | | | | X118 * | A-8248 * | | |
| | | 24K733407 | | | | | | | |
| T4 | Vert. Output Trans. | 25K721027 | Z1805 ① ⑤ | A-3081 ① ⑥ | | V306 ① ⑤ | A-8140 ① ⑤ | 26S57 ① ⑤ | A-110X ① |
| | | 25B731015 | | | | | | | |
| T5A | Yoke-Horiz. (24.5MH) | 24K732710 | DF603 ⑨ | MDF-74 ⑨ | 214D1 ⑨ | Y70F25 ③ | DY-10A ⑨ | Y-11 ⑨ | Y-20-1 ⑨ |
| B | Vert. (3.5MH) | 24K732710 | | | | | | | |
| | | 24C733436 | | | | | | | |
| | | 24C733411 | | | | | | | |

① Drill new mounting hole(s).
② Includes V21, HV Rectifier.
③ Alternate horizontal output transformer.
④ Alternate vertical output transformer.
⑤ Use 500 turns ratio.
⑥ Use 500 turns ratio.
⑦ Includes octal plug, Motorola part no. 28A732677, does not include rear cover and position device, Motorola part no. 48A721145 (for all except 24C733436 deflection yoke), Motorola part no. 48A733487 (for 24C733436 deflection yoke only).
⑧ Alternate deflection yoke.
⑨ Jumper terminals #1 and #8.
⑩ Use original rear cover and positioning device.
⑪ Use original yoke damping network.

* HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

| | ORIGINAL TERMINAL CONNECTIONS | Halldorson Replacement Connections | Merit Replacement Connections | RCA Replacement Connections | Ram Replacement Connections | Stancor Replacement Connections | Thordarson Replacement Connections | Triad Replacement Connections |
|--------------------|-------------------------------------|--|-------------------------------------|-----------------------------------|-----------------------------------|---|--|-------------------------------------|
| | 6 | | | | 6 | 6 | | |
| | 5 | | | | 5 | 4 | | |
| | 4 | | | | 4 | 3 | | |
| | 3 | | | | 3 | 2 | | |
| | 1 | | | | 1 | 1 | | |
| Special Notes → | | | | | |  | | |