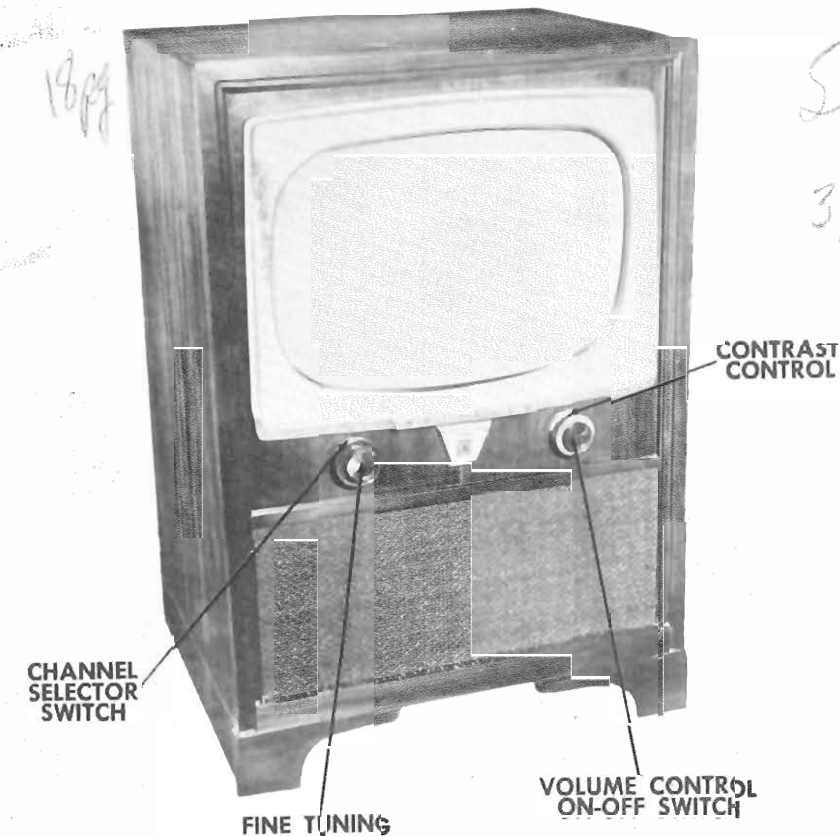


R AND INDUCTOR IDENTIFICATION

PHOTOFACT* Folder



MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, EA, 21T5A, BA (Ch. TS-324, A)



| TRADE NAME | MOTOROLA MODELS | TV CHASSIS | RADIO CHASSIS |
|--------------|--|--------------|-------------------------|
| | 21C1, B | TS-292, A, B | |
| | 21F2, B | TS-292, A, B | HS-316 |
| | 21F3, B | | |
| | 21K4, A, B, W | TS-292, A, B | |
| | 21K5, B | | |
| | 21K6, B | | |
| | 21K7 | | |
| | 21T3 | TS-501A | |
| | 21T4A | | |
| | 21T4EA | TS-324A | |
| | 21T5A, BA | | |
| MANUFACTURER | Motorola Inc., 4545 Augusta Blvd., Chicago, Ill. | | |
| TYPE SET | Television Receiver | | |
| TUBES | Eighteen | | |
| POWER SUPPLY | 110-120 Volts AC-60 Cycle | | |
| TUNING RANGE | Channels 2 thru 13 | | |
| | | RATING | 1.36 Amp @ 117 Volts AC |

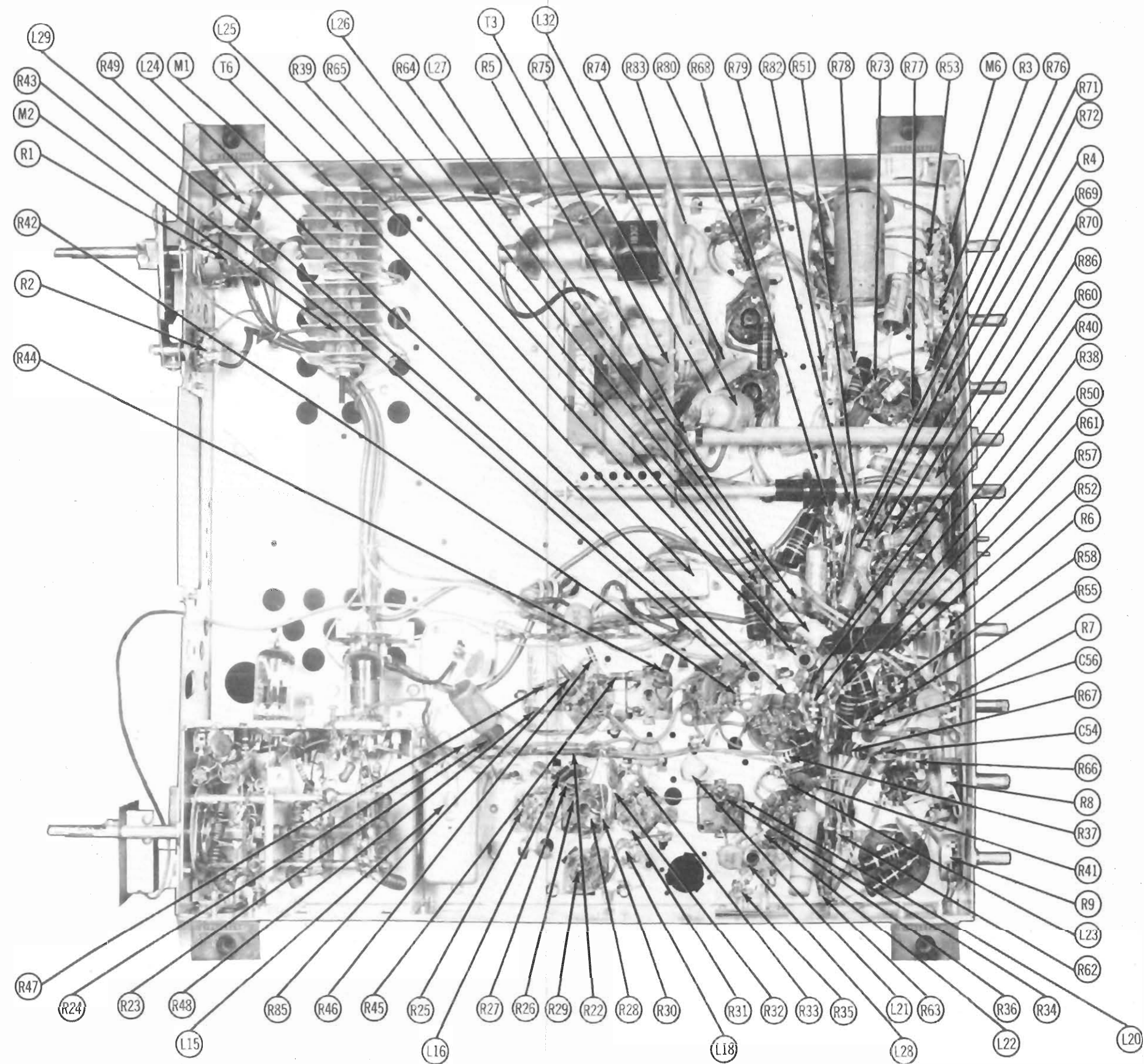
| INDEX | |
|--|--|
| Alignment Instructions..... 6, 7 | Photos (Cont) |
| Disassembly Instructions..... 11 | RF Tuner |
| Horizontal Sweep Circuit Adjustments..... 11 | Resistor and Inductor Identification..... 15, 16 |
| Parts List and Descriptions..... 12, 13, 14 | Resistance Measurements..... 8 |
| Photographs..... | Schematic..... 2 |
| Cabinet-Rear View..... 11 | Tube Failure Check Chart..... 5 |
| Capacitor and Alignment Identification..... 4, 9 | Tube Placement Chart (Bottom View)..... 8 |
| Chassis-Top View..... 3 | Tube Placement Chart (Top View)..... 5 |

For Service Information on Radio Chassis, see Model 21F1, Photofact Set 173, Folder 9. For Service Information on Record Changer, see Model RC. 37, Photofact Set 141, Folder 8, or Record Changer Manual CM-4..

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." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1953 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, EA, 21T5A, BA (Ch. TS-324, A)



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

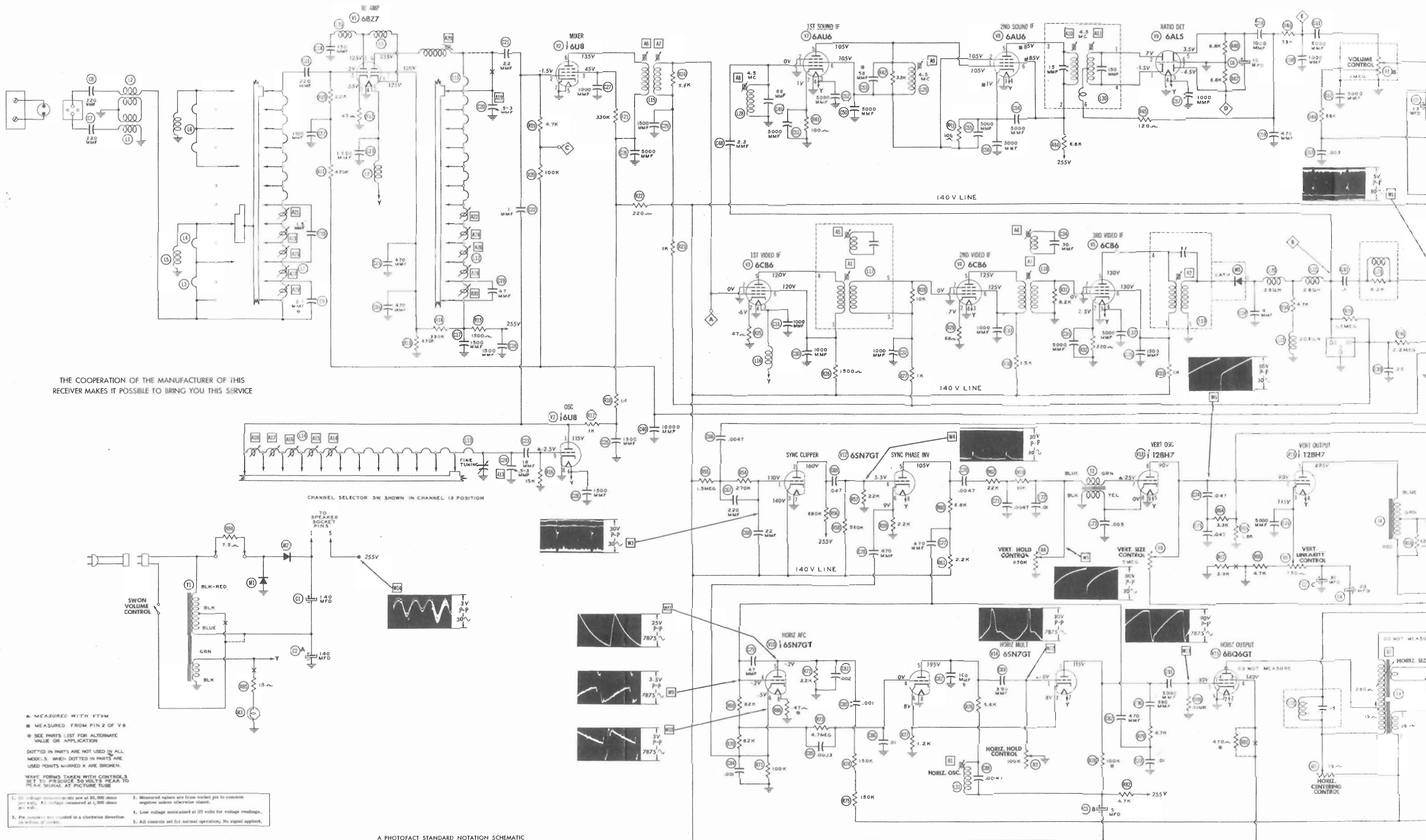
CHAN
SELEC
SWIT

| TRADE NAME | |
|-----------------------------|------|
| MANUFACTURER | Mo |
| TYPE SET | Tel |
| TUBES | Eig |
| POWER SUPPLY | 110- |
| TUNING RANGE | Ch |
| Alignment Instructions... | |
| Disassembly Instructions | |
| Horizontal Sweep Circuit Ac | |
| Parts List and Discriptions | |
| Photographs | |
| Cabinet-Rear View | |
| Capacitor and Align | |
| Chassis-Top View. | |

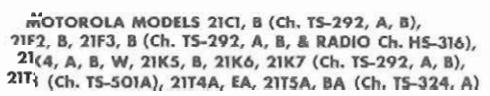
For Service Information or
Record Changer, see Mode

HOW

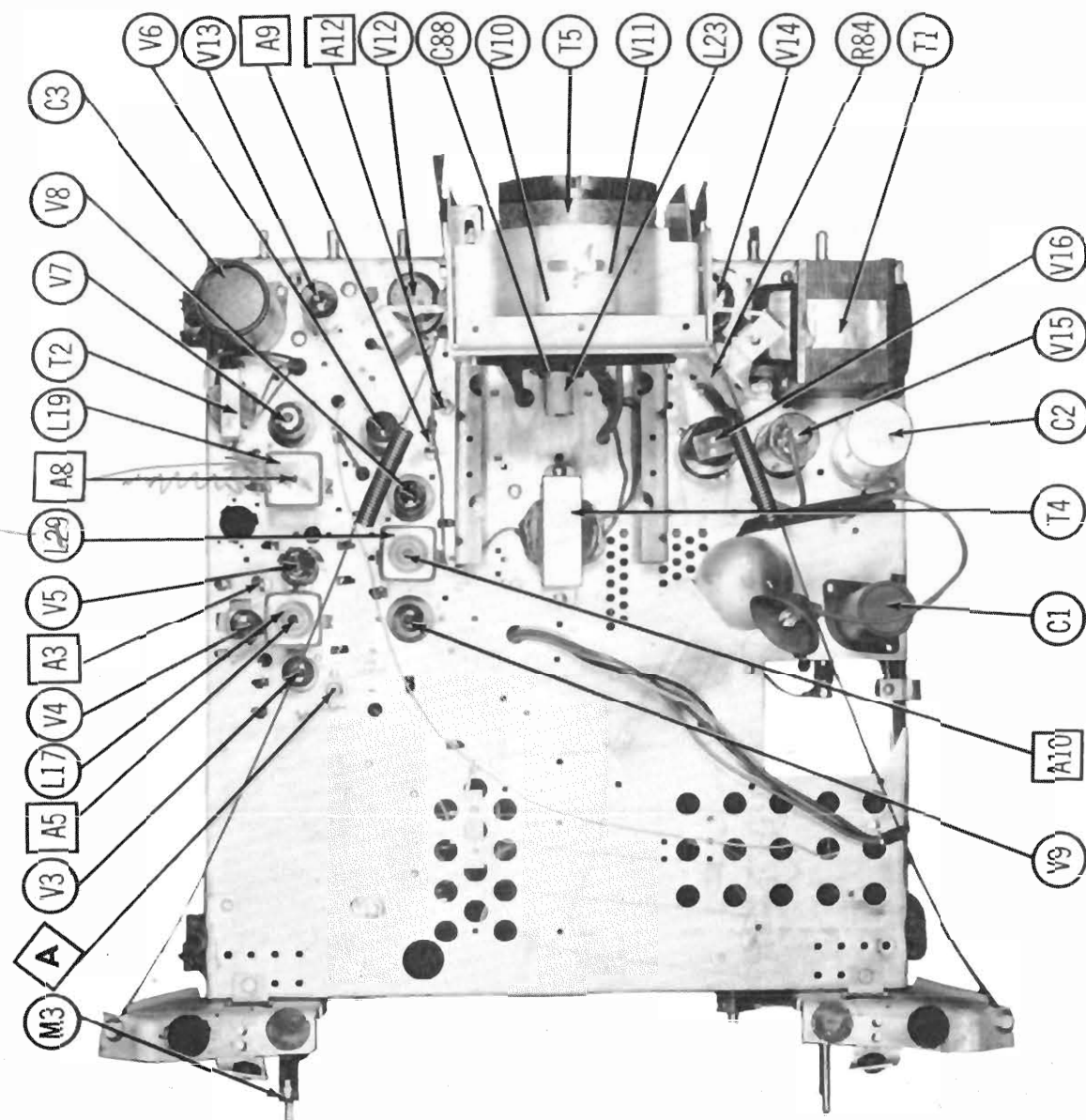
"The listing of any available replacem
case a recommendation, warranty or
as to the quality and suitability of sec
parts have been compiled from inform
Inc., by the manufacturers of the part
"Reproduction or use, without expres



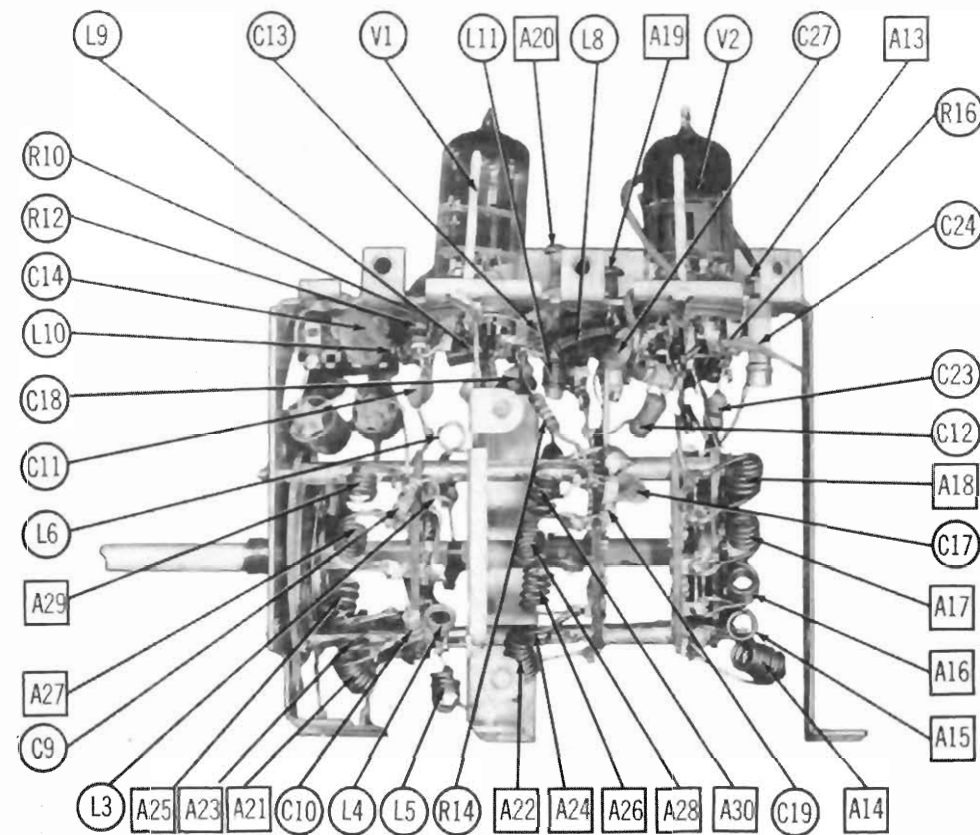
MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Cl. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, AE, 21T5A, BA (Ch. TS-324, A)



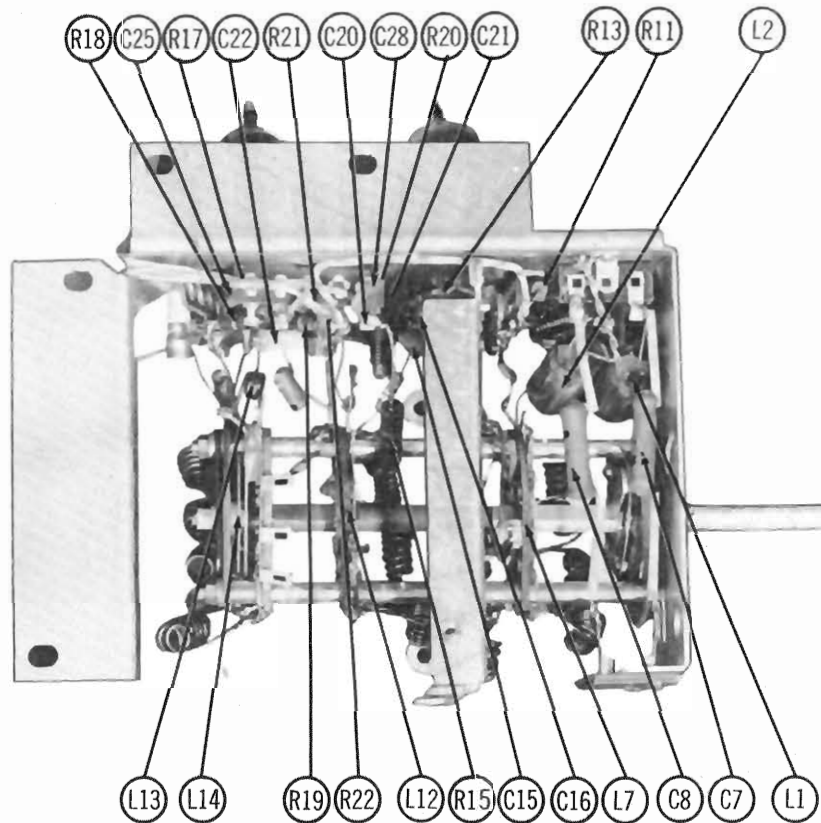
MEIA DOL SISSV/HD



L30 - Submitted for reprint 1/25/66

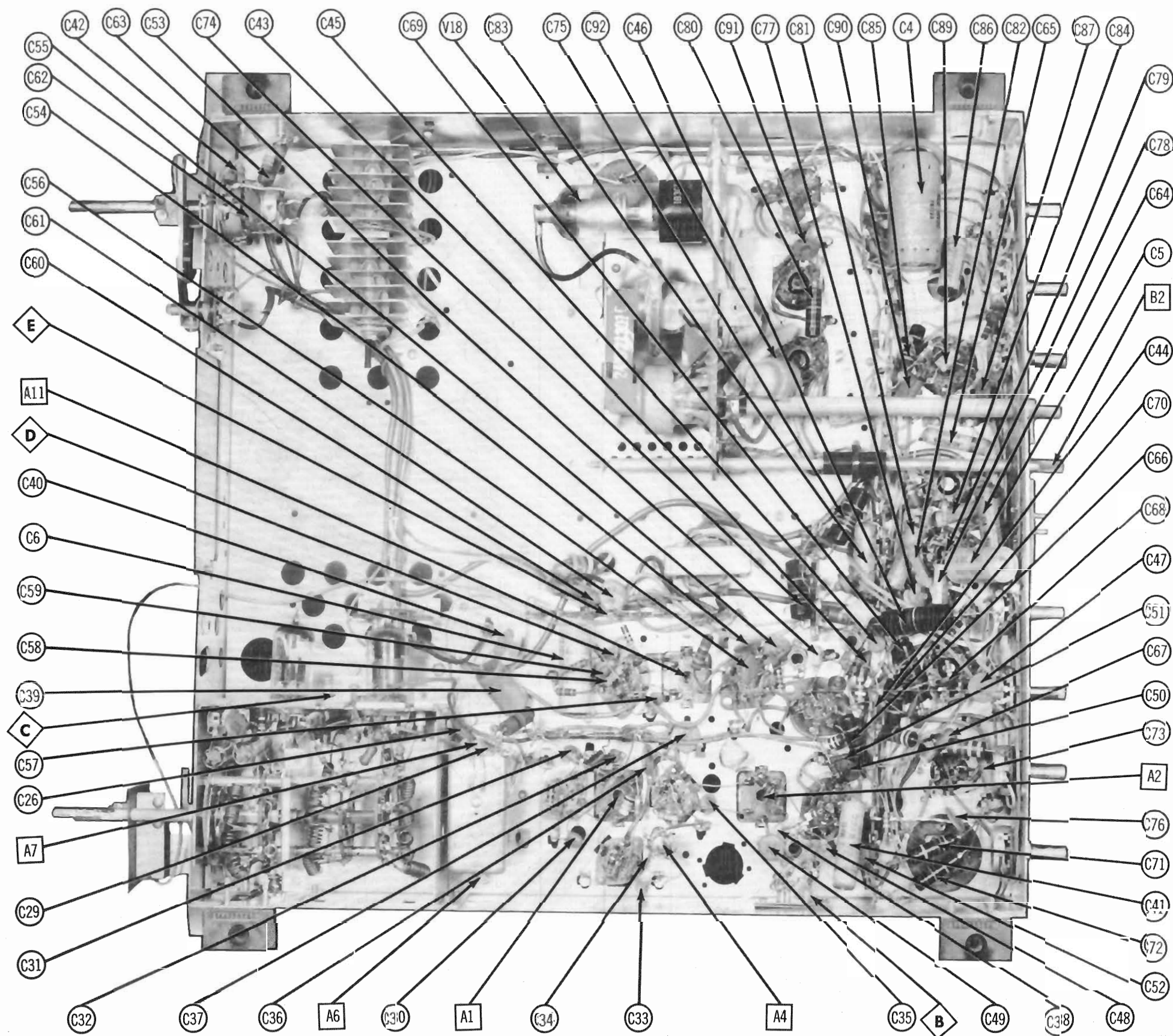


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, EA, 21T5A, BA (Ch. TS-324, A)

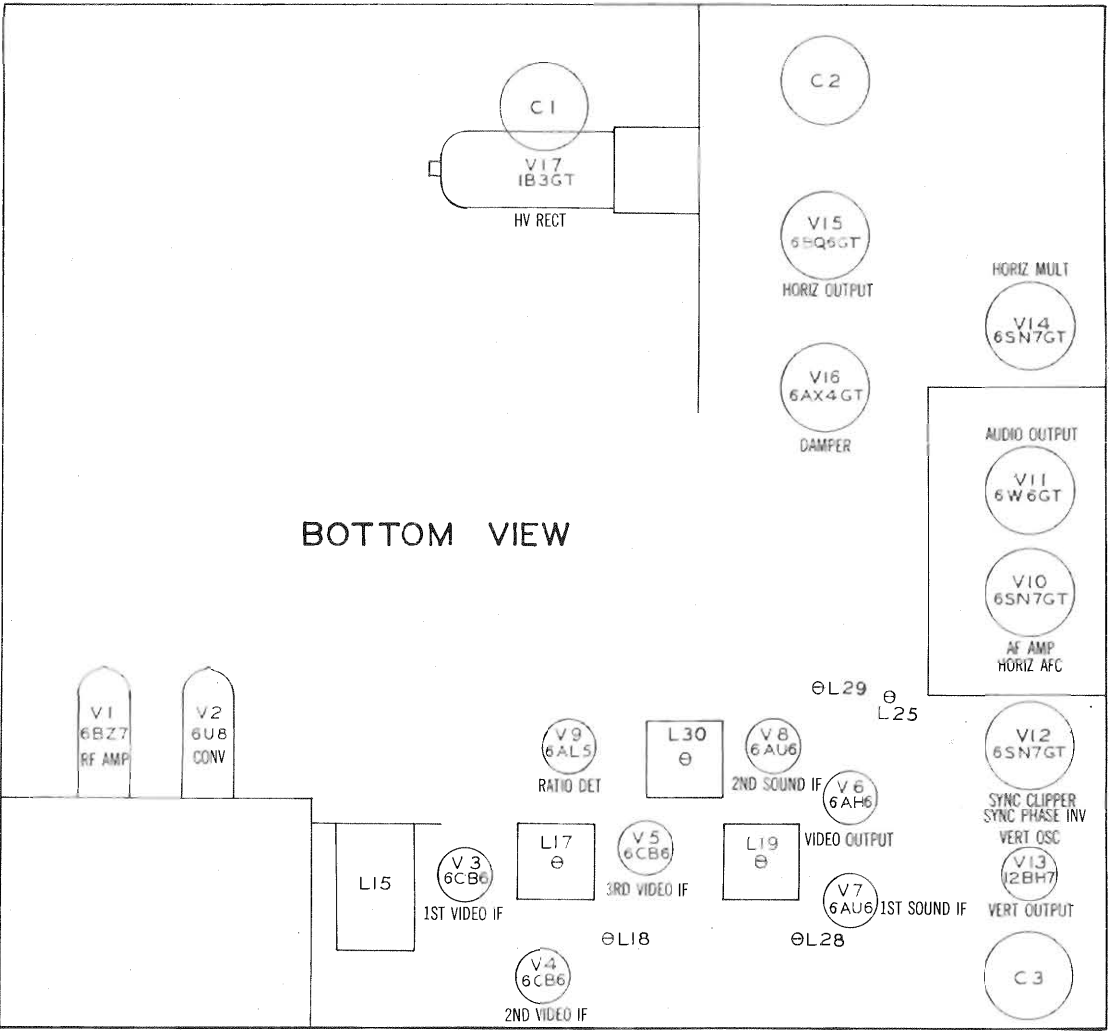


CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

RESISTANCE MEASUREMENTS

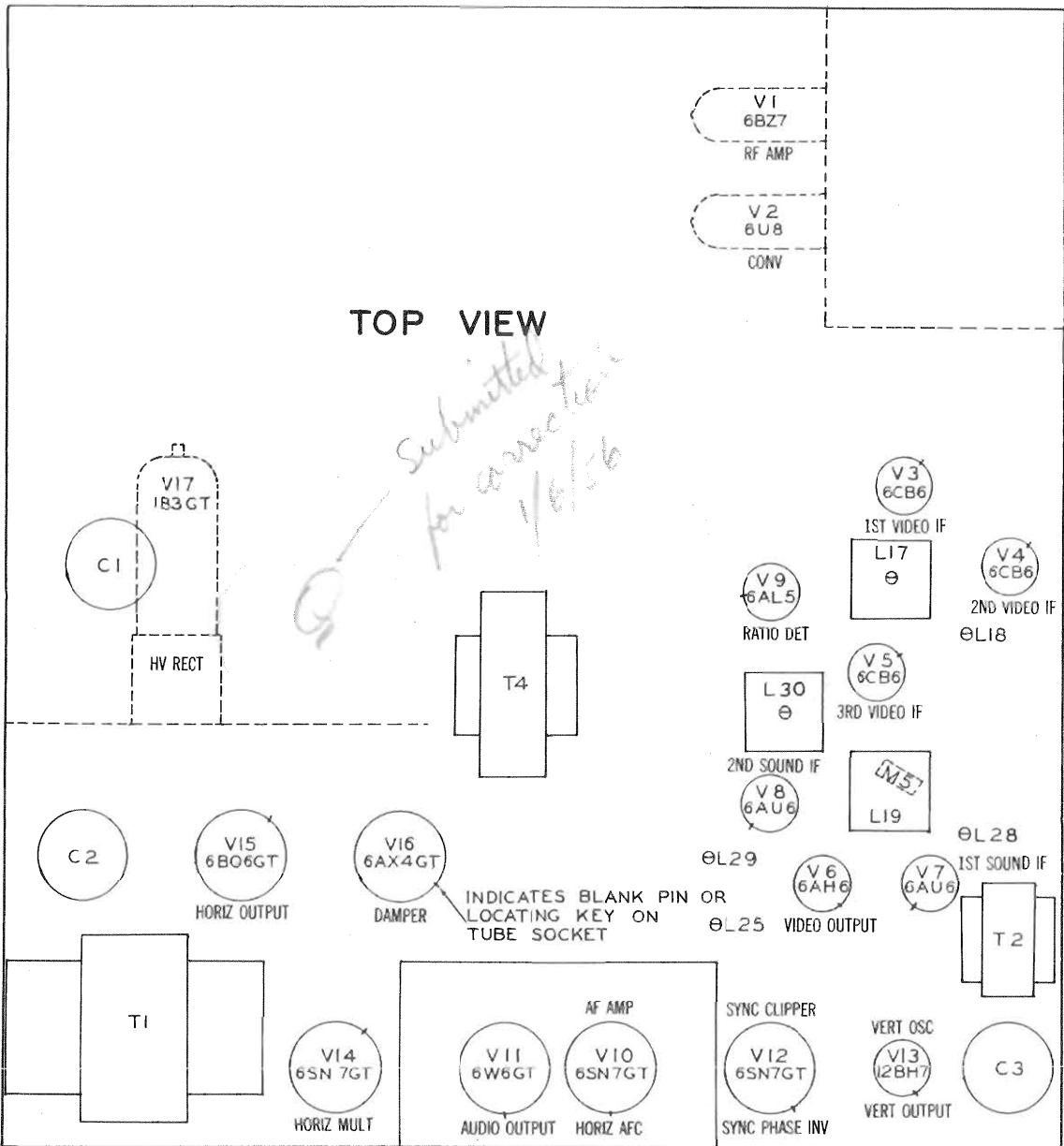
| Item | Tube | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 | Pin 9 |
|------|--------|---------|---------|--------|--------|---------|---------|--------|-------|------------------|
| V 1 | 6BZ7 | INF | 4.2Meg | 470 | 00 | .10 | #1.6K0 | #213K0 | INF | 00 |
| V 2 | 6U8 | #2.2K0 | 3.8Meg | #370K0 | .10 | 00 | #2200 | 00 | 00 | 15K0 |
| V 3 | 6CB6 | 1.5Meg | 470 | .10 | 00 | #1.5K0 | #1.5K0 | 00 | | |
| V 4 | 6CB6 | 1.5Meg | 680 | .10 | 00 | #1.5K0 | #1.5K0 | 00 | | |
| V 5 | 6CB6 | 00 | 2200 | 00 | .10 | #1K0 | #1K0 | 00 | | |
| V 6 | 6AH6 | 1.1Meg | 1750 | .10 | 00 | #4K0 | #39K0 | 1750 | | |
| V 7 | 6AU6 | 00 | 00 | .10 | 00 | #1000 | #1000 | 1000 | | |
| V 8 | 6AU6 | #1000 | 1000 | 00 | .10 | #6.8K0 | #6.8K0 | INF | | |
| V 9 | 6AL5 | INF | INF | .10 | 00 | 6.8K0 | 00 | 6.8K0 | | |
| V 10 | 6SN7GT | 240K0 | #33K0 | 1.2K0 | 264K0 | 22K0 | 100K0 | .10 | .470 | |
| V 11 | 6W6GT | 270K0 | .10 | #2980 | #860 | #33K0 | 182K0 | 00 | 180K0 | |
| V 12 | 6SN7GT | #1.8Meg | #680K0 | 100 | 21.5K0 | 19K0 | 2.2K0 | 00 | .10 | |
| V 13 | 12BH7 | #7800 | #2.7Meg | 8.4K0 | .10 | .10 | #2.7Meg | 500K0 | 500 | 00 |
| V 14 | 6SN7GT | 90K0 | #105K0 | 1.2K0 | 4.9Meg | #10.4K0 | 1.2K0 | .10 | 00 | Top Cap #400 |
| V 15 | 6BQ7GT | INF | .10 | #105K0 | 100 | 330K0 | 22K0 | 00 | 00 | |
| V 16 | 6AX4GT | INF | #240 | 1 Meg | INF | #860 | #300K0 | 00 | .10 | |
| V 17 | 1B3GT | | | | | | | | | Top Cap #3200 |
| V 18 | 21FP4 | .10 | 1.8K0 | 370K0 | #150 | 690K0 | 00 | | | |

AREA SELECTOR SWITCH IN "LOCAL" POSITION
↑ MEASURED FROM 140V LINE
MEASURED FROM OUTPUT OF M2
■ MEASURED FROM PIN 3 OF V16
• MEASURED FROM PIN 7 OF V8



TUBE PLACEMENT CHART

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

MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B),
A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B),
21I3 (Ch. TS-501A), 21I4A, EA, 21I5A, BA (Ch. TS-324, A)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard can be eliminated by removing the horizontal output tube, V15.
The possibility of RF interference from V15 during alignment is also eliminated by this procedure.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery through 47KΩ to pin 1 of the test receptacle on left hand side of chassis. Connect the positive lead to chassis.
Turn Area Selector switch to LOCAL.
If a distorted or unstable response curve is seen on scope during alignment it may be necessary to disable the local oscillator by shorting across the oscillator inductance (position 2 to position 13 on the band switch).
If two resonance points are found while adjusting the IF cores or traps use the one with core near the outer end of coil winding.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
|---------------|--|---------------------------|--------------------------------------|------------------------------|--|--------|---|
| 1. .001MFD | High side to point A Low side to chassis. | 24.8MC (10MC Swp) | 26.8MC | Any non-interfering channel. | Vert. amp thru 47KΩ to point B. Low side to chassis. | A1, A2 | Adjust A1 to place 26.8MC marker 50% down on high frequency side of response curve. Adjust A2 for a flat top or symmetrical response curve similar to fig. 1. |
| 2. " | " | " | 22.8MC | " | " | A3, A2 | Adjust A3 to place 22.8MC marker 50% down on low frequency side of response curve. Adjust A2 for a flat top or symmetrical response curve similar to fig. 1. |
| 3. " | " | " | 21.9MC | " | " | A4 | Adjust for MINIMUM 21.9MC marker indication on response curve. |
| 4. " | " | " | 27.9MC | " | " | A5 | Adjust for MINIMUM 27.9MC marker indication on response curve. |
| 5. " | High side to point C Low side to chassis. | " | 21.9MC 23.0MC 26.4MC 27.9MC | " | " | A6, A7 | Short across R19. Adjust for response similar to fig. 2. |

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

| DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | CHANNEL | CONNECT VTVM | ADJUST | REMARKS |
|---------------|--|----------------------------|-----------------------------|---|-------------|--|
| 6. .001MFD | High side to point B Low side to chassis. | 4.5MC (Unmod.) | Any non-interfering channel | DC probe to point D. Common to chassis. | A8, A9, A10 | Adjust for maximum deflection. |
| 7. " | " | " | " | DC probe to point E. Common to chassis. | A11 | Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. |

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
|---------------|--|---------------------------|----------------------------|-----------------------------|---|-------------|--|
| 6. .001MFD | High side to point B Low side to chassis. | 4.5MC (450KC Swp) | 4.5MC | Any non-interfering channel | Vert. Amp. to point D. Low side to chassis. | A8, A9, A10 | Disconnect stabilizer capacitor C6. Adjust for curve of maximum amplitude and symmetry as in fig. 3. |
| 7. " | " | " | " | " | Vert. Amp. to point E. Low side to chassis. | A11 | Reconnect capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in fig. 4. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines. |

4.5MC TRAP ALIGNMENT

| DUMMY ANTENNA | SIGNAL GENERATOR COUPLING | SIGNAL GENERATOR FREQUENCY | CHANNEL | CONNECT VTVM | ADJUST | REMARKS |
|---------------|--|----------------------------|-----------------------------|---|--------|--------------------------------|
| 8. .001MFD | High side to point B Low side to chassis. | 4.5MC (Unmod.) | Any non-interfering channel | DC probe thru detector (fig. 5) to pin 11 of picture tube. Common to chassis. | A12 | Adjust for MINIMUM deflection. |

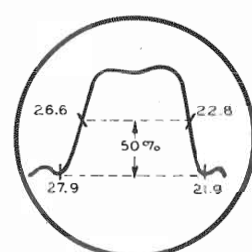


FIG. 1

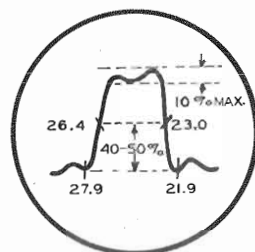


FIG. 2

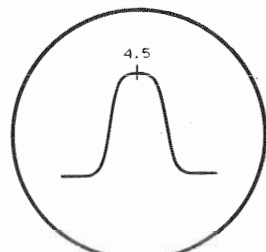


FIG. 3

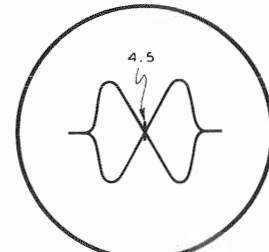


FIG. 4

ALIGNMENT INSTRUCTIONS (CONT.)

OSCILLATOR ALIGNMENT

Remove oscillator short, if used previously.
Connect the synchronized sweep voltage from the signal 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 of its range.
Connect a 5000 ohm, 10 watt resistor from the red B+ bus to chassis to restore voltages disturbed by removal of V15.

| DUMMY ANTENNA | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | CHANNEL | CONNECT SCOPE | ADJUST | REMARKS |
|------------------------------|--|--|--|-------------------------------|---|--------|---|
| 9. Two 120Ω Carbon Resistors | Across antenna terminals with 120Ω in each lead. | 195MC (10MC Swp) | 197.75MC | 10 | Vert. Amp. thru 47KΩ to point B. Low side to chassis. | A13 | Adjust to place the sound marker slightly higher in frequency than the 21.9MC trap dip. This is necessary to compensate for the frequency shift caused by removal of the tuner cover. |
| 10. " | " | 213MC (10MC Swp) 207MC (10MC Swp) 201MC (10MC Swp) 195MC (10MC Swp) 183MC (10MC Swp) 177MC (10MC Swp) | 215.75MC 209.75MC 203.75MC 191.75MC 185.75MC 179.75MC | 13 12 11 9 8 7 | " | " | Check all high band channels to see if the markers can be properly placed within 30 degree rotation from mid-position of the tuning control. If not, adjust L13 compressing or expanding the coil turns. If L13 is changed it may be necessary to readjust A13 on Channel 10. |
| 11. " | " | 85MC (10MC Swp) | 87.75MC | 6 | " | A14 | Set the fine tuning trimmer 15 degrees off mid-capacity position (toward more capacity). Compress or expand A14 to place sound marker as in Step 9. |
| 12. " | " | 79MC (10MC Swp) | 81.75MC | 5 | " | A15 | " |
| 13. " | " | 69MC (10MC Swp) | 71.75MC | 4 | " | A16 | " |
| 14. " | " | 63MC (10MC Swp) | 65.75MC | 3 | " | A17 | " |
| 15. " | " | 57MC (10MC Swp) | 59.75MC | 2 | " | A18 | " |

ANTENNA AND RF ALIGNMENT

Set area selector switch to suburban or fringe position.
The antenna coils are tuned to the video carrier side and RF coils are tuned to the sound carrier side.
Preset A20 midway in the coil.
The two impedance matching transformers, L1 and L2, must not be closer than 1/4 inch to each other or a trap action will be noted on Channel 12 or 13.

| 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. | 183MC (10MC Swp) | 181.25MC 185.75MC | 8 | Vert. amp thru 47KΩ to point C. Low side to chassis. | A19 | Adjust to place markers within limits of fig. 6. |
| 17. " | " | 213MC (10MC Swp) | 211.25MC 215.75MC | 13 | " | A20 | Recheck channel 8 and retouch A19 if necessary. |
| 18. " | " | 85MC (10MC Swp) | 83.25MC 87.75MC | 6 | " | A21, A22 | Compress or expand for response within limits of fig. 7. Tilt on low channels can be controlled by adjusting antenna matching coil, L5. |
| 19. " | " | 79MC (10MC Swp) | 77.25MC 81.75MC | 5 | " | A23, A24 | " |
| 20. " | " | 69MC (10MC Swp) 63MC (10MC Swp) 57MC (10MC Swp) | 67.25MC 71.75MC 61.25MC 65.75MC 55.25MC 59.75MC | 4 3 2 | " | A25, A26 A27, A28 A29, A30 | " |
| 21. " | " | Not Used. | 104.7MC (400° Mod) | " | Vert. amp thru 47KΩ to pin 11 of picture tube | A29, A30 | Set contrast control at maximum. Adjust fine tuning control for maximum amplitude on scope. Adjust A29 & A30 for MINIMUM 400° response on scope. Note generator output required to obtain 20 Volt peak to peak on scope. |
| 22. " | " | " | 57MC | " | " | " | Adjust fine tuning control for maximum amplitude on scope. Note generator output required to obtain 20 Volts peak to peak on scope. Output required in step 21 should be at least 6000 times that of step 22. If not, repeat step 21 and 22. |

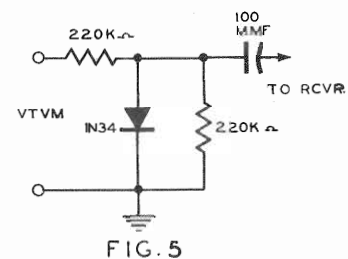


FIG. 5

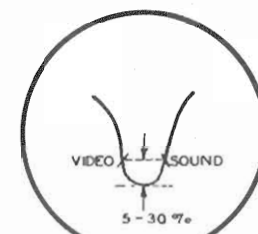


FIG. 6

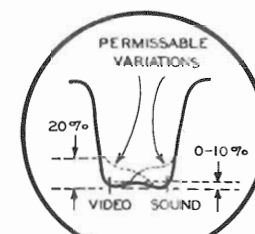


FIG. 7

MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B), 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, EA, 21T5A, BA (Ch. TS-324, A)

PARTS LIST AND DESCRIPTIONS (Continued)

RF-IF (COILS) CONT.

| ITEM No. | USE | DC RES. | | REPLACEMENT DATA | | NOTES |
|----------|----------------------|---------|--------|-------------------|----------------|---------------------------|
| | | PRI. | SEC. | MOTOROLA PART No. | MERIT PART No. | |
| L20 | Series Peak-ing Coil | 2.8Ω | | 24B711413 | TV-180 | 28 Microhenries |
| L21 | Shunt Peak-ing Coil | 9.5Ω | | 24K710140 | TV-184 | 202 Microhenries |
| L22 | Series Peak-ing Coil | 2.8Ω | | 24B711413 | TV-180 | 28 Microhenries |
| L23 | Series Peak-ing Coil | 2.6Ω | | 24K721272 | | Wound on 8.2KΩ resistor |
| L24 | Series Peak-ing Coil | 12Ω | | 24K721116 | TV-151 | Wound on 10KΩ resistor |
| L25 | 4.5MC Trap | 2.3Ω | | 1V792736 | | |
| L26 | Shunt Peak-ing Coil | 9.5Ω | | 24K710140 | TV-184 | 203 Microhenries |
| L27 | Shunt Peak-ing Coil | 15.5Ω | | 24K721271 | | Wound on 1.2KΩ resistor |
| L28 | 1st. Sound IF | 1.2Ω | | 1V790341 | TV-151 | |
| L29 | 2nd. Sound IF | 1.2Ω | | 1V790341 | TV-151 | |
| L30 | Ratio Det. | 2.8Ω | .4Ω CT | 24B702543 | TV-110 | Tertiary Winding - .1Ω |
| L31 | Horiz. Osc. | 40Ω | | 24K701558 | TV-163 | |
| L32 | Horiz. Lin. | 13Ω | | 24A710751 | | Wound on .15MMF capacitor |

SELENIUM RECTIFIER

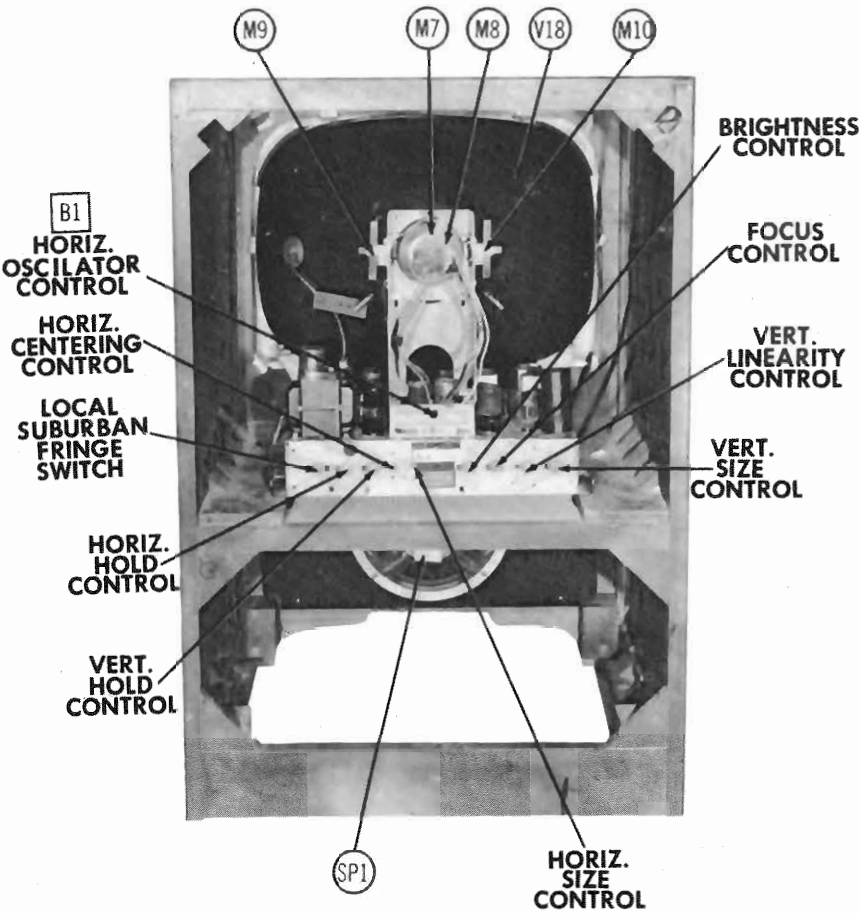
| ITEM No. | RATING CURRENT | REPLACEMENT DATA | | | | | NOTES |
|----------|----------------|-------------------|-------------------|-------------------|------------------|------------------|-------|
| | | MOTOROLA PART No. | SYLVANIA PART No. | SELETRON PART No. | FEDERAL PART No. | MALLORY PART No. | |
| M1 | .160A | 48B700555 | NH-5 | 6Q4 | 1050 | 6S250 | |
| M2 | .160A | 48B700555 | NH-5 | 6Q4 | 1050 | 6S250 | |

DIAL LIGHTS

| ITEM No. | BASE TYPE | VOLTS | AMPS | BEAD COLOR | REPLACEMENT DATA | | NOTES |
|----------|-----------|-------|------|------------|-------------------|--|----------|
| | | | | | MOTOROLA PART No. | | |
| M3 | Bayonet | 6-8 | .15 | Brown | | | Type #47 |

MISCELLANEOUS

| ITEM No. | PART NAME | MOTOROLA PART No. | NOTES |
|----------|-------------------|-------------------|--|
| M4A | RF Tuner | 1U720970 | TT-44 (Complete) |
| B | RF Tuner | 1U721334 | TT-45 (Complete) Ch. TS-501A |
| M5A | Crystal Diode | 48C711052 | Video Detector |
| B | Crystal Diode | 48K711077 | Alternate |
| C | Crystal Diode | 48K712196 | Alternate |
| D | Crystal Diode | 48K712199 | Alternate |
| E | Crystal Diode | 48K712200 | Alternate |
| M6 | Switch | 40A720172 | Area Selector |
| M7 | Centering Magnet | 48A721145 | With Deflection Yoke Cover |
| M8A | Ion Trap | 24K711843 | |
| B | Ion Trap | 24K711842 | Alternate |
| M9 | Correction Magnet | 48B720968 | Right Hand |
| M10 | Correction Magnet | 48K720969 | Left Hand |
| | Knob | 36A720197 | Hold Controls (2 Used) (Push-on Type) |
| | Knob | 36A485457 | Hold Controls (2 Used) (Setscrew Type) |
| | Knob | 36B712294 | Area Selector (With Spring Insert) |
| | Cabinet | 16E720760 | Model 21C1 |
| | Cabinet | 16F720916 | Model 21F2 |
| | Cabinet | 16K720917 | Model 21F2B |
| | Cabinet | 16F721068 | Model 21F3 |
| | Cabinet | 16K721069 | Model 21F3B |
| | Cabinet | 16F720239 | Model 21K4 |
| | Cabinet | 16K720240 | Model 21K4B |
| | Cabinet | 16K720241 | Model 21K4W |
| | Cabinet | 16F720609 | Model 21K5 |
| | Cabinet | 16K720610 | Model 21K5B |
| | Cabinet | 16F720697 | Model 21K6 |
| | Cabinet | 16F720942 | Model 21K7 |
| | Cabinet | 16F721197 | Model 21T4A |
| | Cabinet | 16K721199 | Model 21T4EA |
| | Cabinet | 16E720744 | Model 21T5A |
| | Cabinet | 16K720745 | Model 21T5BA |
| | Cabinet | 16F711977 | Model 21T3 |
| | Knob | 36B720253 | Channel Selector (Includes front and rear) |
| | Knob | 36C720252 | Contrast |
| | Knob | 36B720250 | Fine Tuning and Off/On Volume (2Used) |
| | Knob | 36K720251 | Tune |
| | Bezel | 13K720212 | |



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and turn in a TV station, preferably a test pattern. Normally the horizontal hold control will have a sync range of approximately 70 degrees. If the control is too critical, adjust as follows:

1. Short out the horizontal oscillator coil to chassis with a .25MFD 400 Volt capacitor. This may be done by connecting the capacitor across the 2 pin socket at rear of chassis.

2. With the horizontal centering control, move the picture to the left so that the right hand edge of the raster is visible. The blanking pulse appears as a dark vertical bar at right of raster. Adjust the horizontal hold control until approximately 1/16 inch of sync. pulse is visible as a darker bar to the right of the blanking pulse.

3. Remove the .25MFD capacitor from across the horizontal oscillator coil.

4. Adjust the horizontal oscillator slug (B1) for the same amount of sync pulse as was seen in step 2. Readjust the horizontal centering to normal.

Adjust the horizontal size (B2) for a picture slightly wider than necessary to fill the picture mask horizontally. As this control also affects the vertical size it may be necessary to adjust the vertical size control.

RASTER CORRECTOR MAGNETS

Reduce the raster size so that four corners are visible. If necessary, the position of the corrector magnets may be varied until the corners are right angles and the opposite sides of the raster are parallel.

DISASSEMBLY INSTRUCTIONS

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

NOTE: FOR PICTURE TUBE REMOVAL IT IS NECESSARY TO REMOVE CHASSIS AS OUTLINED ABOVE.

MOTOROLA MODELS 21C1, B (Ch. TS-292, A, B) 21F2, B, 21F3, B (Ch. TS-292, A, B, & RADIO Ch. HS-316), 21K4, A, B, W, 21K5, B, 21K6, 21K7 (Ch. TS-292, A, B), 21T3 (Ch. TS-501A), 21T4A, EA, 21T5A, BA (Ch. TS-324, A)

TUBES (SYLVANIA or Equivalent)

| ITEM No. | USE | REPLACEMENT DATA | | RMA BASE TYPE | NOTES |
|----------|--------------------|-------------------|----------------------|---------------|-------|
| | | MOTOROLA PART No. | STANDARD REPLACEMENT | | |
| V1 | RF Amplifier | 6BZ7 | 6BZ7 | 9AJ | |
| V2 | Converter | 6U6 | 6U6 | 9-AE | |
| 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 | 6AH6 | 6AH6 | 7BK | |
| V7 | 1st. Sound IF Amp. | 6AU6 | 6AU6 | 7BK | |
| V8 | 2nd. Sound IF Amp. | 6AU6 | 6AU6 | 7BK | |
| V9 | Ratio Detector | 6AL5 | 6AL5 | 6BT | |
| V10 | AF Amplifier | 6SN7GT | 6SN7GT | 8BD | |
| V11 | Horiz. AFC | 6SN7GT | 6SN7GT | 7AC | |
| V12 | Audio Output | 6SN7GT | 6SN7GT | 8BD | |
| V13 | Sync. Clipper | 6SN7GT | 6SN7GT | 8BD | |
| V14 | Vert. Oscillator | 12BH7 | 12BH7 | 9A | |
| V15 | Horiz. Mult. | 6SN7GT | 6SN7GT | 8BD | |
| V16 | Horiz. Output | 6BQ7GT | 6BQ7GT | 6AM | |
| V17 | Damper | 6AX4GT | 6AX4GT | 4CG | |
| V17 | RV Rectifier | 1B3GT | 1B3GT | 3C | |

CATHODE-RAY TUBE

| ITEM No. | MOTOROLA PART No. | SYLVANIA PART No. | RMA BASE TYPE | NOTES |
|----------|-------------------|-------------------|---------------|-----------------------------|
| | | | | |
| V18A | 21FP4 | 21FP4 | 12C | ① Circuit changes necessary |
| | 21FP4 | 21FP4 | 12C | |
| | 21P4 | 21P4 | 12D | ② Focusing Device Required |
| | 21P4A | 21P4A | 12D | |

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 |
|----------|--------|-------------------|------------------|-------|
| | | MOTOROLA PART No. | AEROVOX PART No. | |
| C1 | 150 | 23B44097 | E3A120 | |
| C2A | 150 | 23B720750 | E4D575 | |
| C2B | 150 | | | |
| C3 | 150 | | | |
| C4 | 150 | | | |
| C5 | 150 | | | |
| C6 | 150 | | | |
| C7 | 150 | | | |
| C8 | 150 | | | |
| C9 | 150 | | | |
| C10 | 150 | | | |
| C11 | 150 | | | |
| C12 | 150 | | | |
| C13 | 150 | | | |
| C14 | 150 | | | |
| C15 | 150 | | | |
| C16 | 150 | | | |
| C17 | 150 | | | |
| C18 | 150 | | | |
| C19 | 150 | | | |
| C20 | 150 | | | |
| C21 | 150 | | | |
| C22 | 150 | | | |
| C23 | 150 | | | |
| C24 | 150 | | | |
| C25 | 150 | | | |
| C26 | 150 | | | |
| C27 | 150 | | | |
| C28 | 150 | | | |
| C29 | 150 | | | |
| C30 | 150 | | | |
| C31 | 150 | | | |
| C32 | 150 | | | |
| C33 | 150 | | | |
| C34 | 150 | | | |
| C35 | 150 | | | |
| C36 | 150 | | | |
| C37 | 150 | | | |
| C38 | 150 | | | |
| C39 | 150 | | | |
| C40 | 150 | | | |
| C41 | 150 | | | |
| C42 | 150 | | | |
| C43 | 150 | | | |
| C44 | 150 | | | |
| C45 | 150 | | | |
| C46 | 150 | | | |
| C47 | 150 | | | |
| C48 | 150 | | | |
| C49 | 150 | | | |
| C50 | 150 | | | |
| C51 | 150 | | | |
| C52 | 150 | | | |
| C53 | 150 | | | |
| C54 | 150 | | | |
| C55 | 150 | | | |
| C56 | 150 | | | |
| C57 | 150 | | | |
| C58 | 150 | | | |
| C59 | 150 | | | |
| C60 | 150 | | | |
| C61 | 150 | | | |
| C62 | 150 | | | |
| C63 | 150 | | | |
| C64 | 150 | | | |

PARTS LIST AND DESCRIPTIONS

CAPACITORS (CONT.)

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|------------------|-------|
| | | MOTOROLA PART No. | AEROVOX PART No. | |
| C65 | 150 | | | |
| C66 | 150 | | | |
| C67 | 150 | | | |
| C68 | 150 | | | |
| C69 | 150 | | | |
| C70 | 150 | | | |
| C71 | 150 | | | |
| C72 | 150 | | | |
| C73 | 150 | | | |
| C74 | 150 | | | |
| C75 | 150 | | | |
| C76 | 150 | | | |
| C77 | 150 | | | |
| C78 | 150 | | | |
| C79 | 150 | | | |
| C80 | 150 | | | |
| C81 | 150 | | | |
| C82 | 150 | | | |
| C83 | 150 | | | |
| C84 | 150 | | | |
| C85 | 150 | | | |
| C86 | 150 | | | |
| C87 | 150 | | | |
| C88 | 150 | | | |
| C89 | 150 | | | |
| C90 | 150 | | | |
| C91 | 150 | | | |
| C92 | 150 | | | |
| C93 | 150 | | | |
| C94 | 150 | | | |

Note 1. Some Models use 39MMF in this application (Part #21R118956)
 Note 2. Some Models use 68MMF in this application (Part #21R400928)
 Note 3. Some Models use 220MMF in this application (Part #21R115906)
 Note 4. Used in Ch. TS-292 and Ch. TS-501A only.
 Note 5. Not used in Ch. TS-501A.
 Note 6. Ch. TS-501A use .01MFD in this application (Part # 8R9658)
 Note 7. Used in Ch. TS-501A only.

CONTROLS

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|--------------|-------|
| | | MOTOROLA PART No. | IRC PART No. | |
| R1A | 2500Ω | 18B720263 | QJ-380* | |
| R2A | 1 Meg | 18A71999 | QJ-137 | |
| R3A | 100KΩ | 18A720195 | QJ-128 | |
| R4A | 100KΩ | 18A720196 | QJ-133 | |
| R5A | 100KΩ | 18A721285 | QJ-138 | |
| R6A | 100KΩ | 18A722441 | QJ-138 | |
| R7A | 100KΩ | 18A720289 | QJ-138 | |
| R8A | 100KΩ | 18A7202475 | QJ-105 | |
| R9A | 100KΩ | 18A7202443 | QJ-141 | |

* CONCENTRIC EQUIVALENT KIT K-4, BASE ELEMENTS & SHAFTS B27-111X & P1-224 (Panel)

B13-137X & R4-306 (Rear) & SWITCH 76-1.
 Note 1. Connect a 39KΩ resistor in series with clockwise terminal & pin 1 V14. This control is used with push-on type knobs. For those receivers employing set screw type knobs this control is part No. 18A702468.

Note 2. Connect a 330KΩ resistor in series with clockwise terminal & ground. This control is used with push-on type knobs. For those receivers employing set screw type knobs this control is part No. 18K71278.

Note 3. Some models use alternate control (Part No. 1V721286).

Note 4. Connect a 100KΩ resistor in series with clockwise terminal & ground.

Note 5. Connect a 1 Meg resistor in series with clockwise terminal & positive side of C4.

RESISTORS

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|--------------|-------|
| | | MOTOROLA PART No. | IRC PART No. | |
| R10 | 22KΩ | 6R6397 | BTS-22K | |
| R11 | 47KΩ | 6R6032 | BTS-470K | |
| R12 | 47KΩ | 6R6550 | BTS-470K | |
| R13 | 470KΩ | 6R6377 | BTS-470K | |
| R14 | 390KΩ | 6R6446 | BTS-390K | |
| R15 | 1500Ω | 6R5700 | BTS-15K | |
| R16 | 15KΩ | 6R2119 | BTS-15K | |
| R17 | 1000Ω | 6R6301 | BTS-1000 | |
| R18 | 1000Ω | 6R6301 | BTS-1000 | |
| R19 | 4700Ω | 6R6039 | BTS-4700 | |
| R20 | 100KΩ | 6R6075 | BTS-100K | |
| R21 | 330KΩ | 6R6014 | BTS-330K | |
| R22 | 220Ω | 6R6270 | BTS-220 | |
| R23 | 1000Ω | 6R6397 | BTS-1000 | |
| R24 | 5600Ω | 6R6117 | BTS-56K | |
| R25 | 47Ω | 6R6550 | BTS-470 | |
| R26 | 1500Ω | 6R6038 | BTS-1500 | |
| R27 | 1000Ω | 6R6301 | BTS-1000 | |
| R28 | 10KΩ | 6R6320 | BTS-10K | |
| R29 | 68Ω | 6R2039 | BTS-68Ω | |
| R30 | 1500Ω | 6R6038 | BTS-1500 | |
| R31 | 8200Ω | 6R2004 | BTS-8200 | |
| R32 | 220Ω | 6R6270 | BTS-220 | |
| R33 | 1000Ω | 6R6301 | BTS-1000 | |
| R34 | 4700Ω | 6R6038 | BTS-4700 | |
| R35 | 1.5Meg | 6R6460 | BTS-1.5Meg | |
| R36 | 2.2Meg | 6R6227 | BTS-2.2Meg | |
| R37 | 1 Meg | 6R6046 | BTS-1 Meg | |

RESISTORS (CONT.)

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|--------------|-------|
| | | MOTOROLA PART No. | IRC PART No. | |
| R66 | 4700Ω | 6R6038 | BTS-4700 | |
| R67 | 3900Ω | 6R6038 | BTS-3900 | |
| R68 | 120Ω | 6R5551 | BTS-120 | |
| R69 | 82KΩ | 6R5644 | BTS-82K | |
| R70 | 82KΩ | 6R5644 | BTS-82K | |
| R71 | 100KΩ | 6R6031 | BTS-100K | |
| R72 | 22KΩ | 6R6397 | BTS-22K | |
| R73 | 4.7Meg | 6R2122 | BTS-4.7Meg | |
| R74 | 150KΩ | 6R410053 | BTA-150K | |
| R75 | 150KΩ | 6R410053 | BTA-150K | |
| R76 | 5600Ω | 6R6117 | BTS-5600 | |

Note 1. RF Choke used as a resistor.
 Note 2. In chassis TS-292A & TS-324A, R66 & R67 replaced by 8700Ω resistor (3 Watt) (Part No. 17K70950)
 Note 3. Some models use a 120KΩ resistor in this application.
 Note 4. Not used in all models.
 Note 5. Used only in chassis TS-501A.

TRANSFORMER (FILAMENT)

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|----------------|-------------------|-----------------|-------|
| | | MOTOROLA PART No. | STANCO PART No. | |
| T1 | 117VAC 0.7A | 25B721779 | P-2948 | |

TRANSFORMER (SWEEP CIRCUITS)

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|-----------------|-------|
| | | MOTOROLA PART No. | STANCO PART No. | |
| T2 | 50Ω | 25K702429-K | A-8125 | |
| T3 | 295Ω | 25K702429-1 | A-3000-2 | |
| T4 | 15Ω | 25K71027-G | A-8140 | |
| T5A | 40Ω | 25K71027-4 | DY-10 | |

① Alternate Vert. Osc. Trans.
 ② Drill one new mounting hole.
 ③ Alternate horiz. output Trans.
 ④ Alternate vert. output Trans.
 ⑤ Connect as auto trans.
 ⑥ Use original deflection network.

TRANSFORMER (AUDIO OUTPUT)

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|-----------------|-------|
| | | MOTOROLA PART No. | STANCO PART No. | |
| T6 | 2.1KΩ | 25B710925D | A-3876 | |

SPEAKER

| ITEM No. | RATING | REPLACEMENT DATA | | NOTES |
|----------|--------|-------------------|-----------------|-------|
| | | MOTOROLA PART No. | JENSEN PART No. | |
| SPI | 10" | 50C712344 | 10E60S | |

COILS (RF-IF)

| ITEM No. | USE | DC RES. | REPLACEMENT DATA | | NOTES |
|----------|-------------|---------|-------------------|----------------|-------|
| | | | MOTOROLA PART No. | MERIT PART No. | |
| L1 | Ant. Trans. | 82 | 24B720936 | | |
| L2 | Ant. Trans. | 82 | 24B720936 | | |
| L3 | Ant. Trans. | 82 | 24B720936 | | |
| L4 | Ant. Trans. | 82 | 24K721337 | | |
| L5 | Ant. Trans. | 82 | 24K721337 | | |
| L6 | Ant. Trans. | 82 | 24K721337 | | |
| L7 | Ant. Trans. | 82 | 24K721337 | | |
| L8 | Ant. Trans. | 82 | 24K721337 | | |
| L9 | Ant. Trans. | 82 | 24K721337 | | |
| L10 | RF Choke | 82 | 24B721256 | | |
| L11 | RF Choke | 82 | 24A721394 | | |
| L12 | RF Choke | 82 | 24K721209 | | |
| L13 | RF Choke | 82 | 24K721209 | | |
| L14 | RF Choke | 82 | 24K721209 | | |
| L15 | RF Choke | 82 | 24K721209 | | |
| L16 | RF Choke | 82 | 24K721209 | | |
| L17 | RF Choke | 82 | 24K721209 | | |
| L18 | RF Choke | 82 | 24K721209 | | |
| L19 | RF Choke | 82 | 24K721209 | | |