

CABINET-BOTTOM VIEW DISASSEMBLY INSTRUCTIONS

Chassis Removal

Remove four screws from bottom of cabinet and two screws from inside cassette holder. Remove On-Off-Charge-Volume knob. Lift off cabinet top and disconnect speaker wires, external antenna jack and external power source jack.

Remove two screws holding picture tube top cover and remove cover. Remove four screws from bottom of cabinet holding tape recorder. Remove two screws and spring holding picture tube block. Remove two screws holding side control. Remove four screws holding printed circuit board directly below picture tube block.

Remove four screws holding the remaining printed circuit board. Remove three screws holding volume/tuning controls. Remove chassis from the cabinet.

PICTURE TUBE REMOVAL

Follow "Chassis removal" procedure and remove high voltage anode lead, picture tube socket and yoke from the picture tube.

Remove four screws holding front cover and one screw holding picture tube retaining bracket.

Remove picture tube do not lift picture tube by the neck of the tube.

SERVICING IN THE FIELD

CRT - IMPLOSION PROTECTION AND CLEANING

A separate safety glass is employed; chassis and CRT must be removed for cleaning.

FUSE/FUSE DEVICE

Two 2 amp Fuses are used for low-voltage power supply protection. (See Transistor Placement Chart for location.)
A .4 amp Fuse is used for AC line protection. (See Transistor Placement Chart for location.)

HORIZONTAL OSCILLATOR

Adjustment of the horizontal hold is accomplished by the proper setting of the Horiz Hold Control. (See "Transistor Placement Chart" for location.)
Coarse adjustment of the horizontal hold is accomplished by the proper setting of the Horiz Freq. Control. (See "Transistor Placement Chart" for location.)

WIDTH

The width may be varied by adjusting the width coil. (See "Transistor Placement Chart" for location.)

FOCUS

The focus may be varied by means of a focus control. (See "Transistor Placement Chart" for location.)

AGC

The AGC may be varied by means of RF AGC and IF AGC controls. (See "Transistor Placement Chart" for location.)

CENTERING

Centering is accomplished by proper adjustment of two magnetic rings located on the yoke rear cover.

SET 1303 FOLDER 1

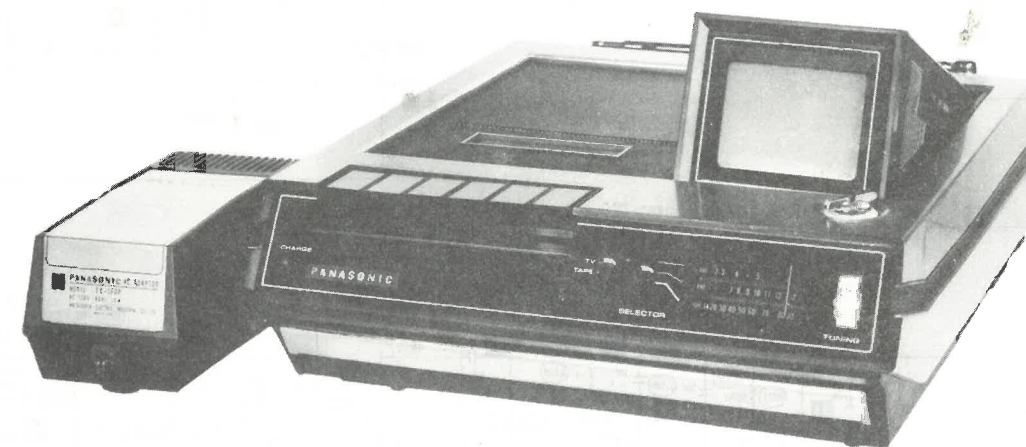
PANASONIC MODELS
TR-003, TR-003C, TP180C, TY180P

PHOTOFACT® Folder with CIRCUITRACE®



For Supplier Address See PHOTOFACT Index

PANASONIC MODELS
TR-003, TR-003C, TP180C, TY180P



Model TR-003

SAFETY PRECAUTIONS

Make sure line voltage does not exceed rating of set. Check high-voltage regulation and adjust to correct value.
Be sure shields and rear cover are in place and secure.

Beware of shock from high voltage or AC line. Discharge high voltage to HV cage only.
Use extreme care when handling picture tube. Do not bump, scratch, or exert undue strain.

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HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206



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. 3PC594 10 9 8 7 6 5 4 3 2 1 0

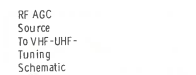
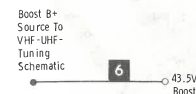
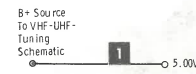
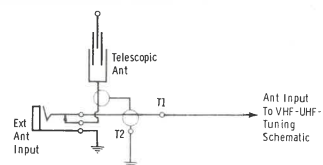
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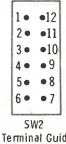
SET 1303 FOLDER 1

PANASONIC MODELS
TR-003, TR-003C, TP180C, TY180P

SET 1303 FOLDER 1

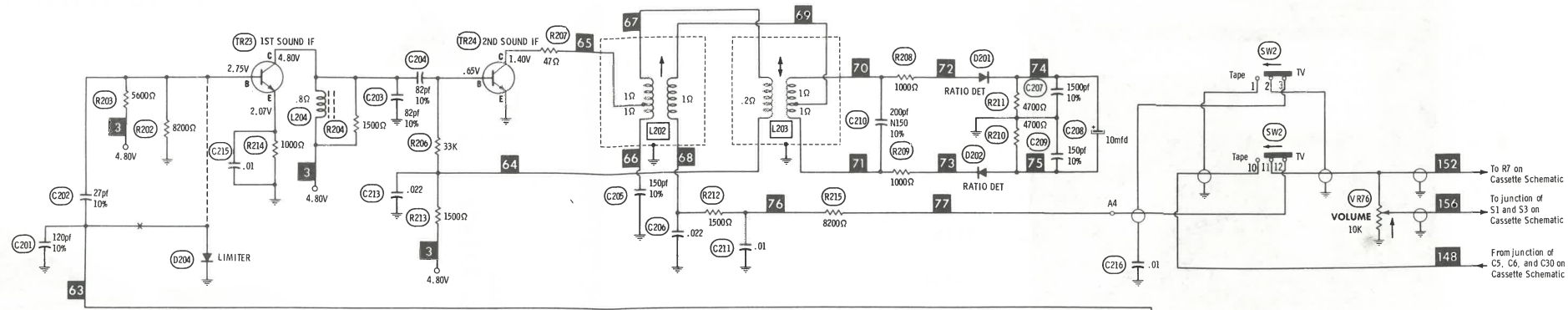


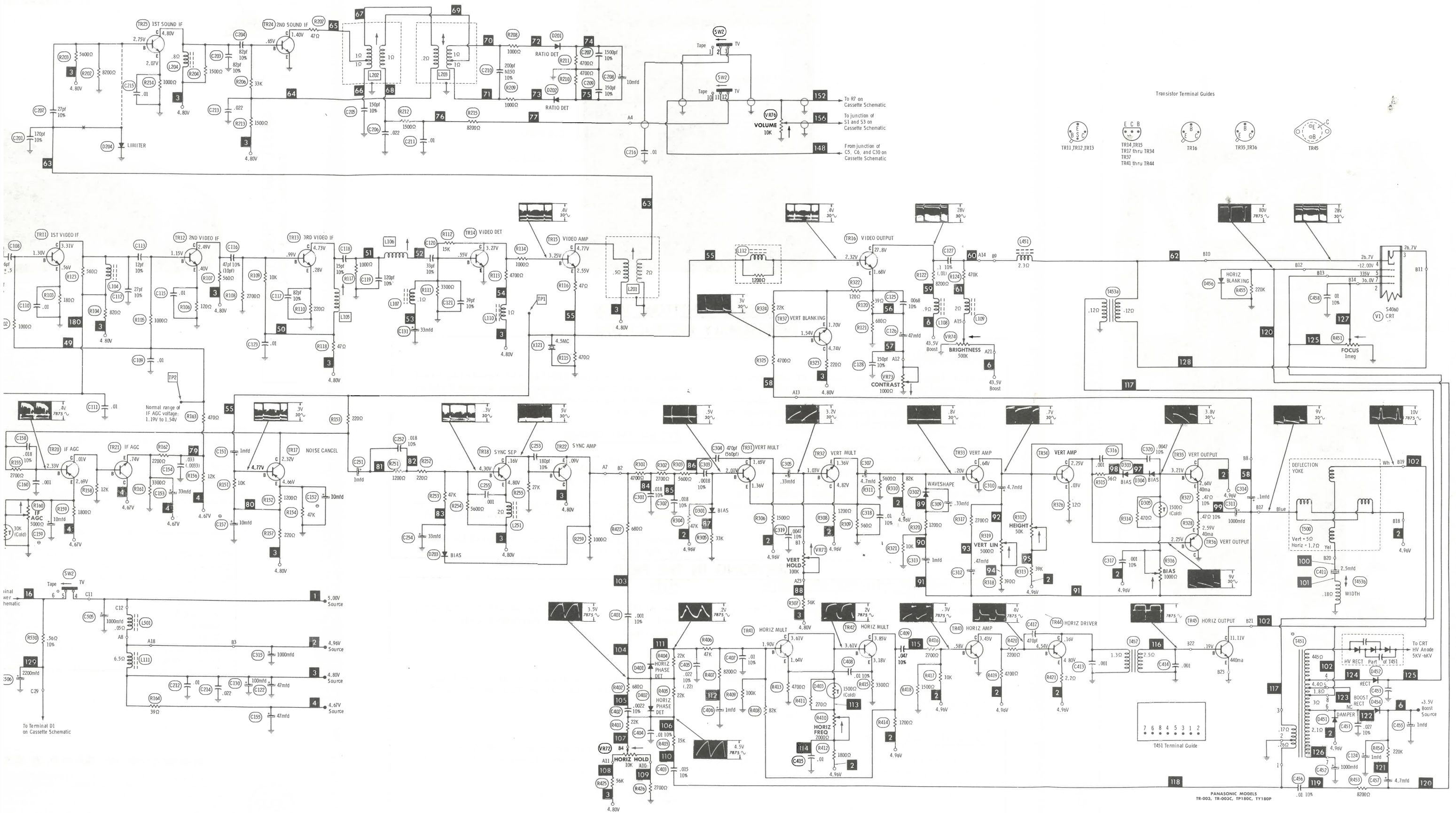
| B+ DISTRIBUTION | Connections |
|-----------------|-------------|
| 5.00V | 2 |
| 4.96V | 14 |
| 4.80V | 13 |
| 4.67V | 7 |
| Boost | 3 |
| 43.5V | 3 |



Denotes ground. (Voltage reference unless otherwise indicated).
 --- Indicates connection used in some versions.
 * Indicates connection not used in some versions.
 * Omitted in some versions.
 e See parts list.
 Values shown in () are used in some applications.
 Resistors are 1/2W or less, 5%, unless otherwise indicated.
 Supply voltage maintained at rated value for measurements.
 Voltage and resistance measured with VTVM or equivalent meter.
 no signal applied and controls adjusted for normal operation.
 Arrow on control indicates direction of advance.
 Numbers assigned to terminals may not be found on the unit.
 Waveforms taken with controls adjusted for 28V peak-to-peak signal at CRT with monochrome test pattern.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
 with **CIRCUITRACE**
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RESISTANCE MEASUREMENTS

| ITEM | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 | PIN 9 | PIN 10 | PIN 11 | PIN 12 | PIN 13 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| V1 | NC | 150K | 600K | 600K | 200K | NC | 700K | | | | | | |
| MEASUREMENTS BELOW TAKEN WITH METER HAVING .08V MAX BETWEEN PROBE TIPS | | | | | | | | | | | | | |
| ITEM | E | B | C | | ITEM | E | B | C | | ITEM | E | B | C |
| TR11 | 180Ω | 5200Ω | 1300Ω | | TR23 | 1000Ω | 3400Ω | 460Ω | | TR44 | 460Ω | 5700Ω | 1.3Ω |
| TR12 | 120Ω | 5200Ω | 1000Ω | | TR24 | 0Ω | 35K | 2000Ω | | TR45 | 0Ω | 2.5Ω | INF * |
| TR13 | 220Ω | 2200Ω | 500Ω | | TR31 | 560Ω | 45K | 2000Ω | | TR51 | INF | INF | INF |
| TR14 | 0Ω | 2800Ω | 4000Ω | | TR32 | 560Ω | 100K | 1700Ω | | TR52 | INF | INF | INF |
| TR15 | 520Ω | 5000Ω | 460Ω | | TR33 | 0Ω | 4700Ω | 57K | | TR53 | INF | INF | INF |
| TR16 | 720Ω | 460Ω | INF * | | TR34 | 12Ω | 57K | 1meg | | TR54 | 220Ω | 4000Ω | 8500Ω |
| TR17 | 1800Ω | 11K | 680Ω | | TR35 | 30K # | 1300Ω | 460Ω | | TR55 | 220Ω | 7000Ω | 50K |
| TR18 | 460Ω | 5500Ω | 27K | | TR36 | 30K # | 1meg | 0Ω | | TR56 | 1600Ω | 20K | 1700Ω |
| TR19 | 800Ω | 6000Ω | 19K | | TR37 | 820Ω | 22K | 700Ω | | TR57 | 150Ω | 1700Ω | 260Ω |
| TR20 | 1200Ω | 3500Ω | 12K | | TR41 | 4700Ω | 30K | 3000Ω | | TR58 | 0Ω | 260Ω | 150Ω |
| TR21 | 2700Ω | 12K | 460Ω | | TR42 | 3300Ω | 3000Ω | 1600Ω | | TR59 | 1000Ω | 1000Ω | 1700Ω |
| TR22 | 1000Ω | 27K | 460Ω | | TR43 | 0Ω | 1500Ω | 5500Ω | | | | | |

* READING DEPENDS UPON POLARITY OF METER CONNECTIONS. INF INFINITE
THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT. NC NO CONNECTION

MISCELLANEOUS ADJUSTMENTS

UHF AND VHF TUNER TRACKING ADJUSTMENTS

Adjust R609 to obtain proper tracking of UHF stations.

Adjust R610 to obtain proper tracking of high channel VHF stations.

Adjust R611 to obtain proper tracking of low channel VHF stations.

AGC ADJUSTMENT

Tune in a strong TV station and set Contrast and Brightness controls fully clockwise. Set RF AGC Control R169 to the center of its range.

Adjust the IF AGC control R160 until instability appears in the picture (pulling, jitter, overload etc.) Reduce the control to the point just below the instability.

Adjust the RF AGC control R169 to the point where snow just disappears in the picture. Check all available stations for proper AGC action.

AUTOMATIC DEEP DISCHARGE PROTECTOR ALIGNMENT

This adjustment requires the use of an external DC power supply.

Remove bottom plate and remove batteries. Connect power supply to battery terminal clip. (Observe

Polarity) turn R511 fully clockwise. Connect an Ammeter in series with the negative lead of power supply. Connect a VTVM across battery leads.

Turn set on and adjust power supply to 5.5 volts. Adjust R511 counterclockwise until ammeter shows zero amps. (TV receiver will stop operating.)

AUTOMATIC OVER CHARGE PROTECTOR ALIGNMENT

Make test circuit as shown in figure below. Turn the selector switch to "Off-Charge" position. Turn R501 fully counter-clockwise. Adjust power supply for 6.7 volts.

Adjust R501 clockwise to the point where ammeter shows slightly more than zero.

AVR ADJUSTMENT (AUTOMATIC VOLTAGE REGULATOR)

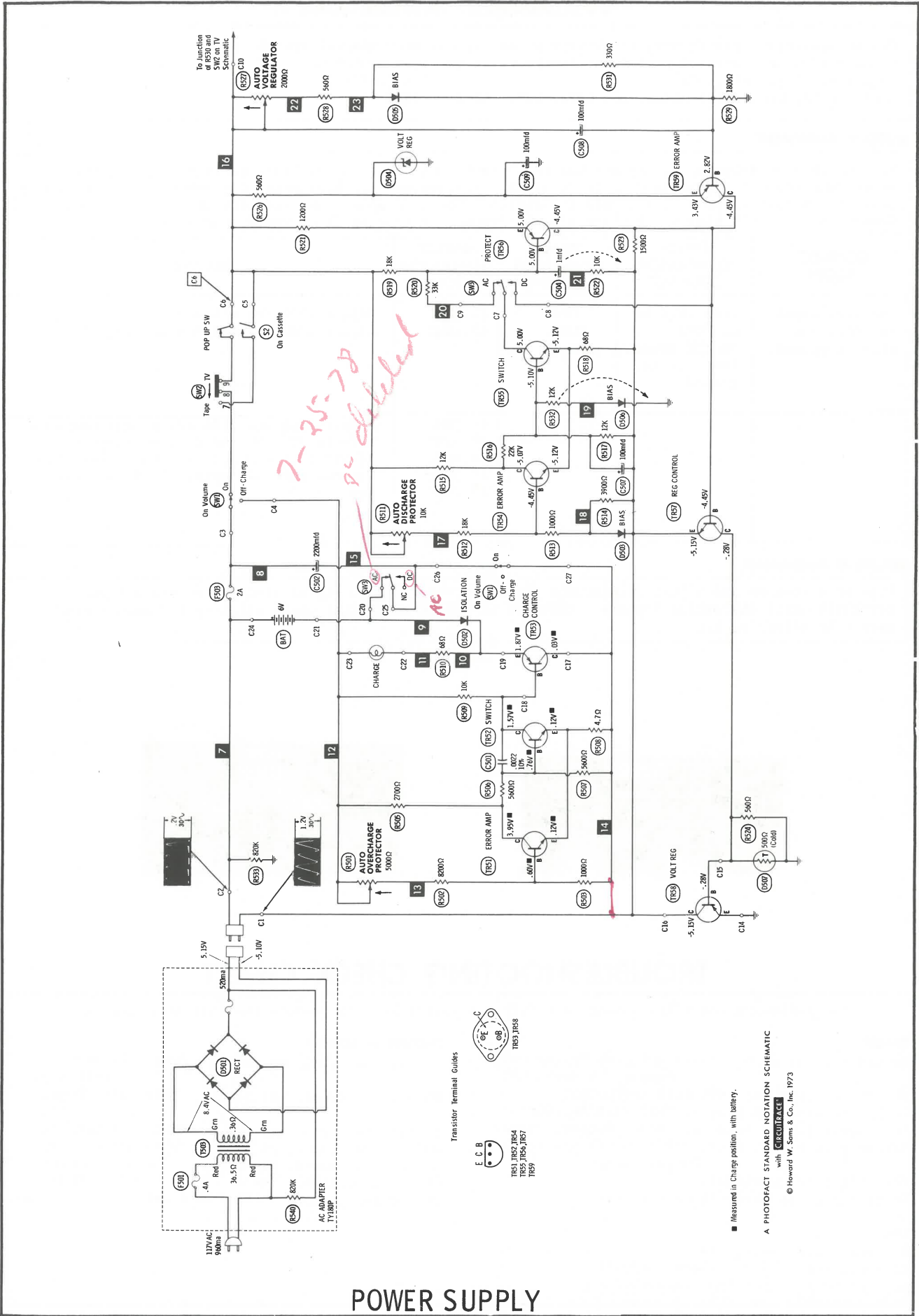
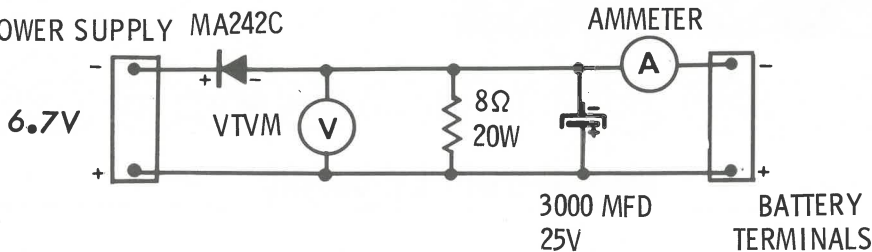
Connect a VTVM to point C6 on power supply board.

Adjust R527 to obtain 5 volts B+.

HORIZONTAL SWEEP ADJUSTMENTS

Tune in a TV station and set all controls for normal operation. Set Horizontal Hold VR72 to the center of its mechanical range. Adjust Horizontal Frequency Control R410 to a point where it is virtually impossible to lose Horizontal Sync while switching from channel to channel.

POWER SUPPLY MA242C



TV ALIGNMENT INSTRUCTIONS

Use an isolation transformer, or observe polarity, and maintain voltage at 117VAC.
Allow a 20-minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GC ELECTRONICS
L101, L102, L103, L105, L106, L9, L201, L202, L203...#9440

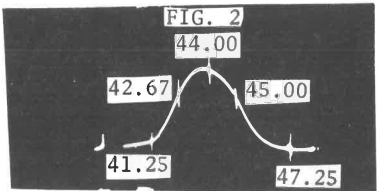
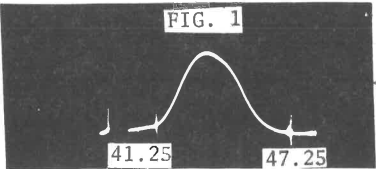
VIDEO IF ALIGNMENT

Set the channel selector to highest unused channel. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. Use only enough generator output to provide a usable indication. Note: Response may vary slightly from that shown. Connect a +5 volt bias to TP2, low side to ground, located on Video-Sync-Sound Board.

| CONNECT SCOPE | SWEEP GENERATOR COUPLING | SWEEP GENERATOR FREQUENCY | MARKER GENERATOR FREQUENCY | REMARKS |
|--|---|---------------------------|---|--|
| Vertical input to TP1, low side to ground. | Thru .001mfd to TP2 on VHF tuner, low side to ground. | 44MC (10MC Sweep) | 41.25MC 47.25MC | Adjust L101 for MINIMUM. Adjust L102 for MINIMUM see Fig. 1. |
| " | " | " | 41.25MC 42.67MC 44.00MC 45.00MC 47.25MC | Adjust L105 and L106 for proper response. Effects 42.67MC and 45.00MC markers. Adjust L103 and L202 (on VHF Tuner) for maximum gain and symmetry of response. See Fig. 2. |

SOUND IF ALIGNMENT

Tune in a station and adjust L201&L202 for maximum sound. Reduce signal strength at the antenna terminals until distortion appears. Continue to reduce the signal while aligning for undistorted output by adjusting L203.



TROUBLESHOOTING CHECK CHART

The following chart lists component failures most likely to produce the indicated symptom.

SWEEP

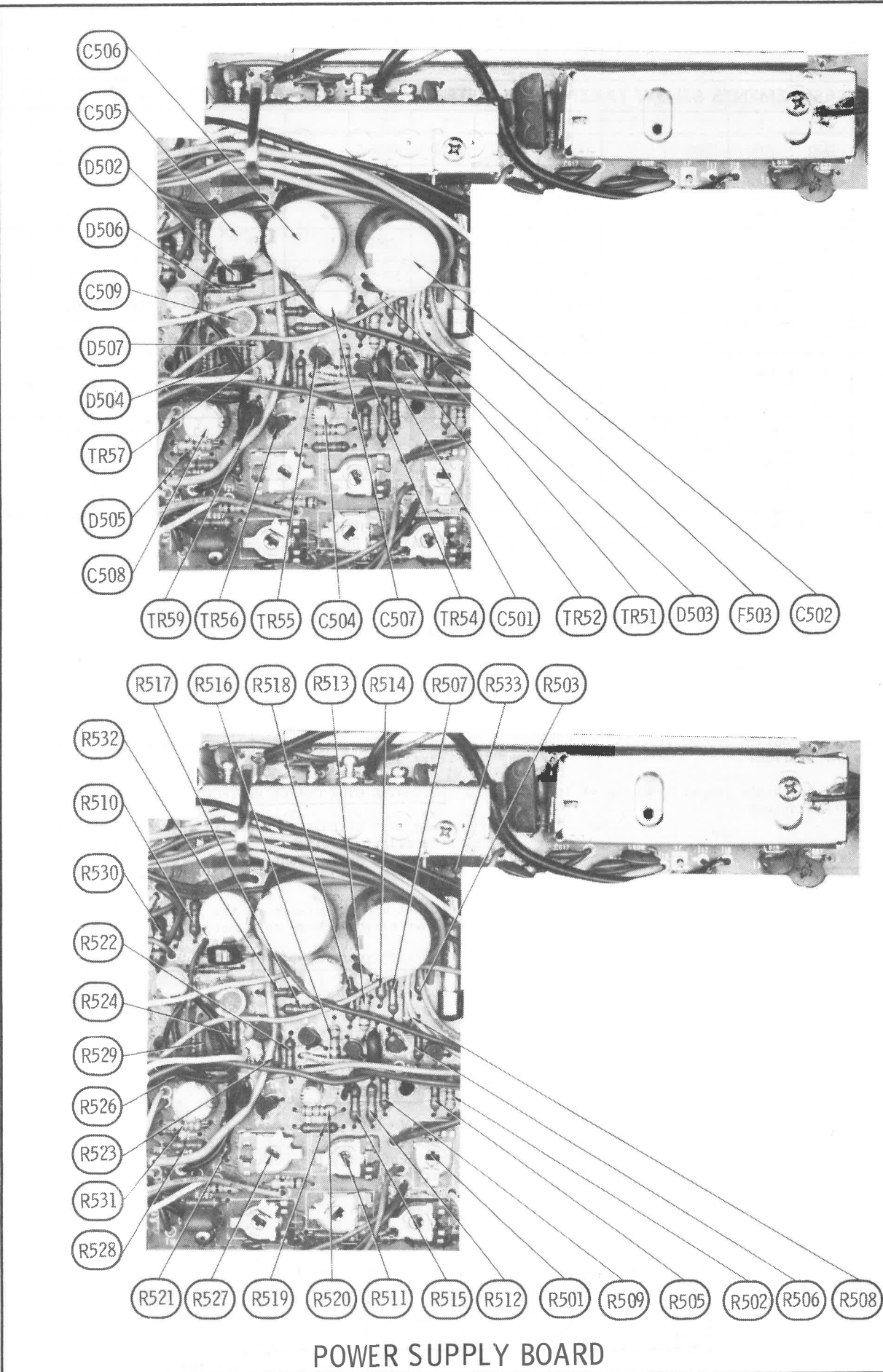
No raster, has sound: Horiz Mult/Amp/Driver/Output, Damper, HV Rect, CRT.
No vert deflection: Vert Mult/Amp/Output
Poor vert lin or foldover: Vert Mult/Amp/Output
Poor horiz lin or foldover: Horiz Output, Damper
Narrow picture: LV Rect, Horiz Mult/Amp/Driver/Output, Damper.
Vert off freq: Vert Mult
Horiz off freq: Horiz Phase Det/Mult

SYNC

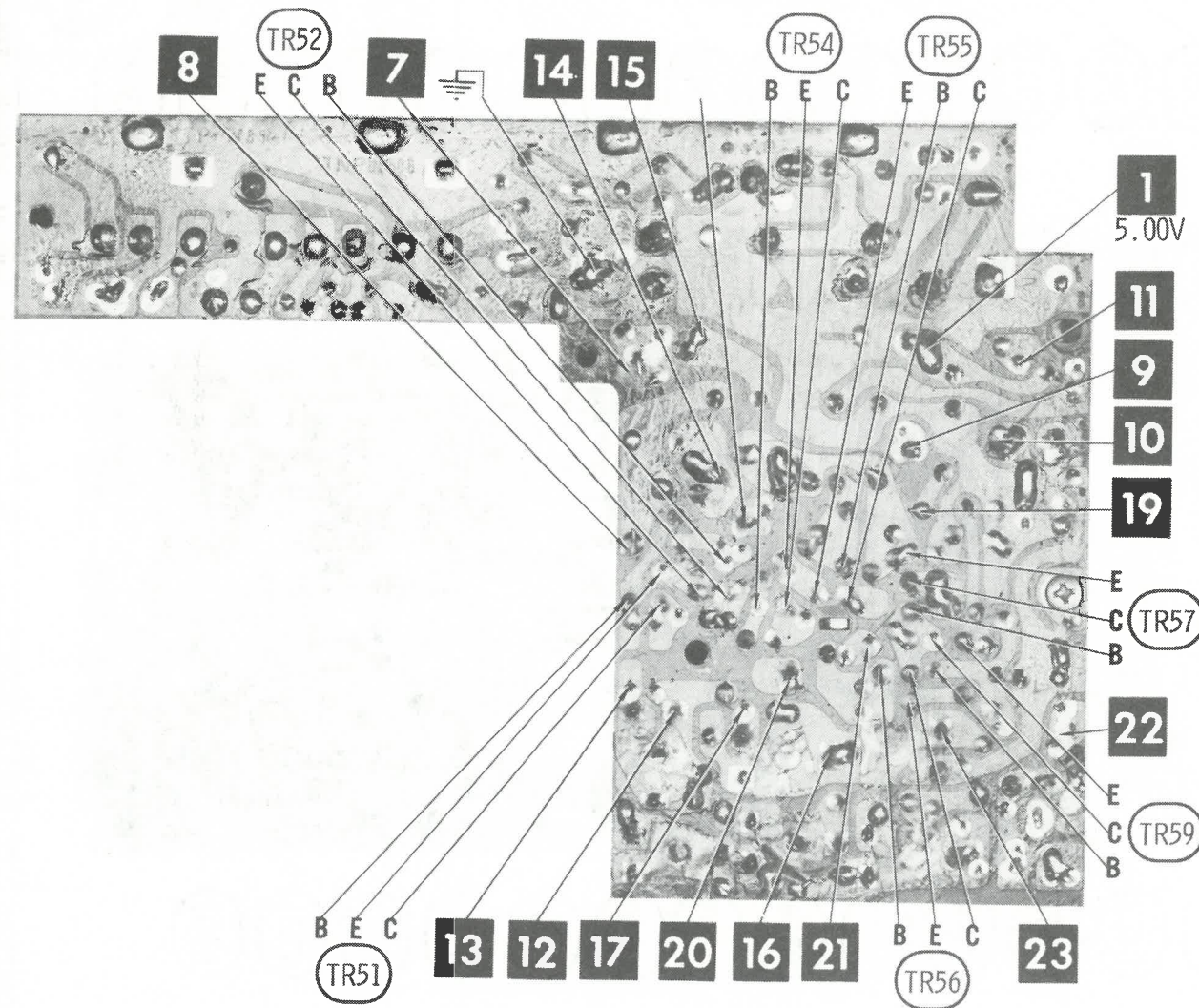
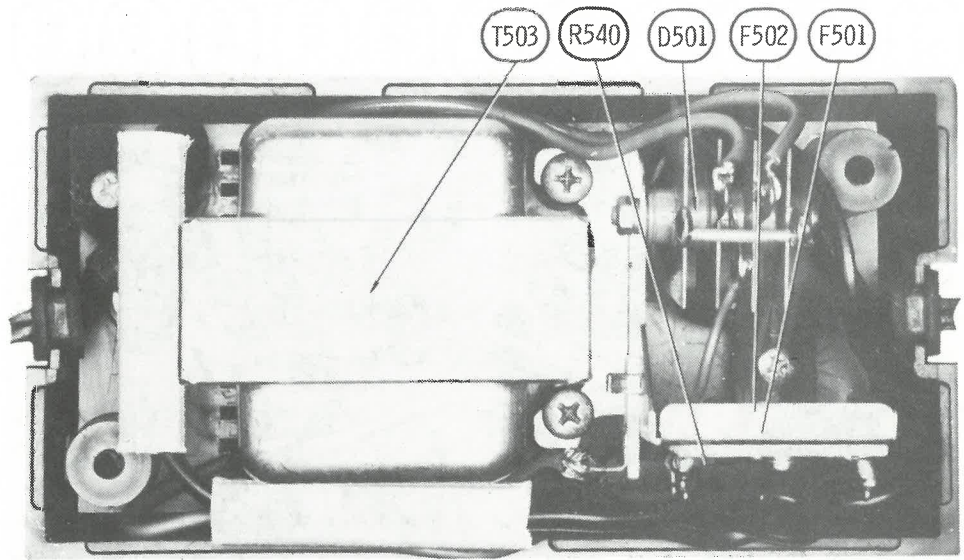
No vert sync: Vert Mult
No horiz sync: Horiz Phase Det/Mult
No vert/horiz sync: Sync Separator/Amp

PICTURE or SOUND

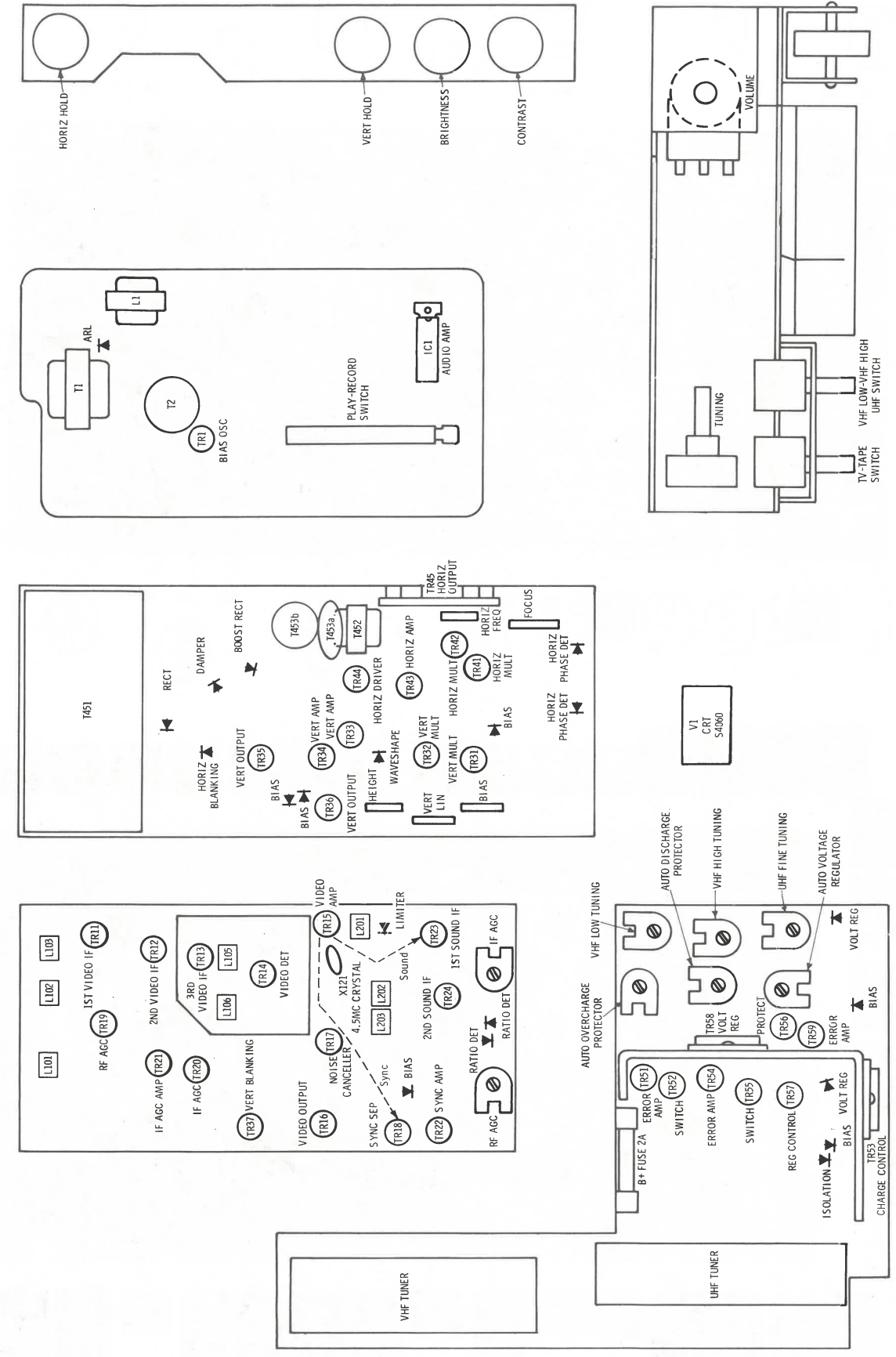
No pic, no sound, no raster: Fuses, LV Rect, Volt Reg.
No pic, no sound, has raster: Video IFs, Tuner Mixer.
No pic, no sound, has snow: Tuner RF/Mixer/Osc.
No pic, has sound, no raster: Video Output, CRT.
No pic, has sound, has raster: Video Amp. Output
Has pic, no sound: Sound IFs, Ratio Det, Audio Amp.
Overloaded picture: AGC, Video Det.



AC ADAPTOR



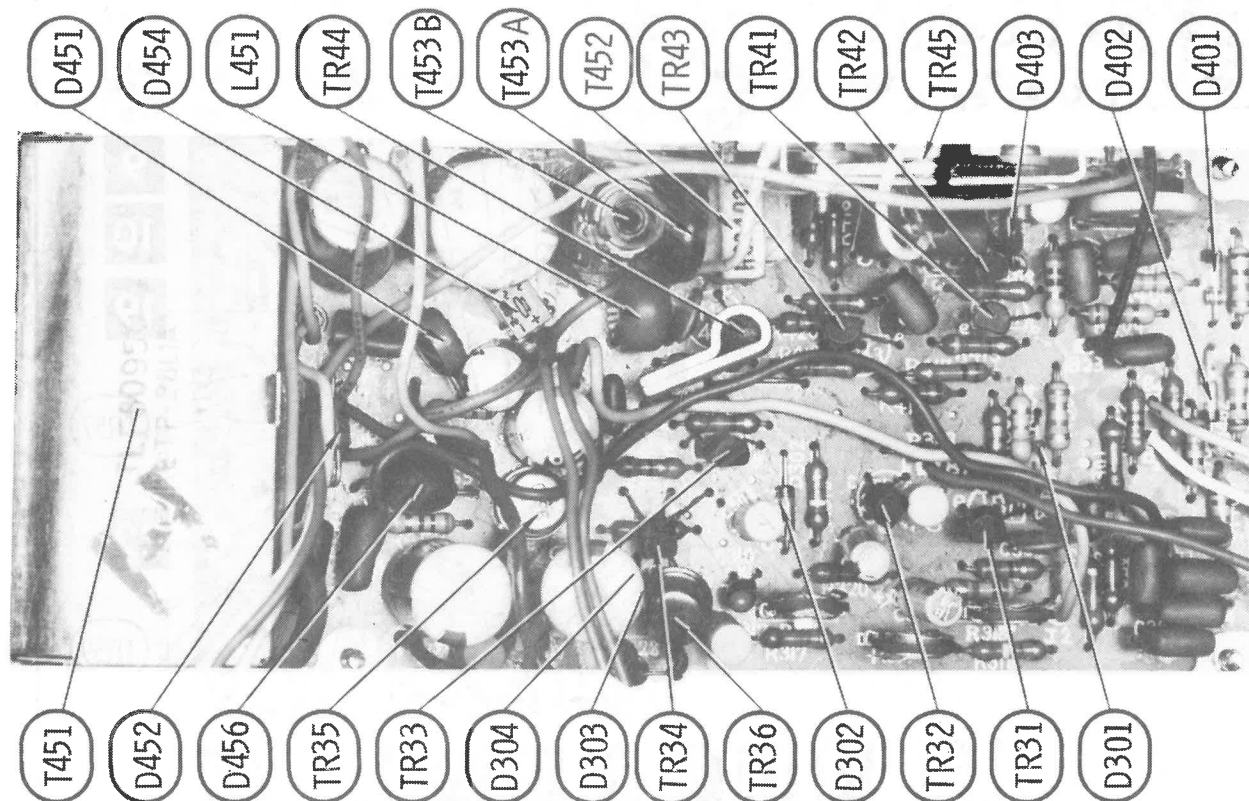
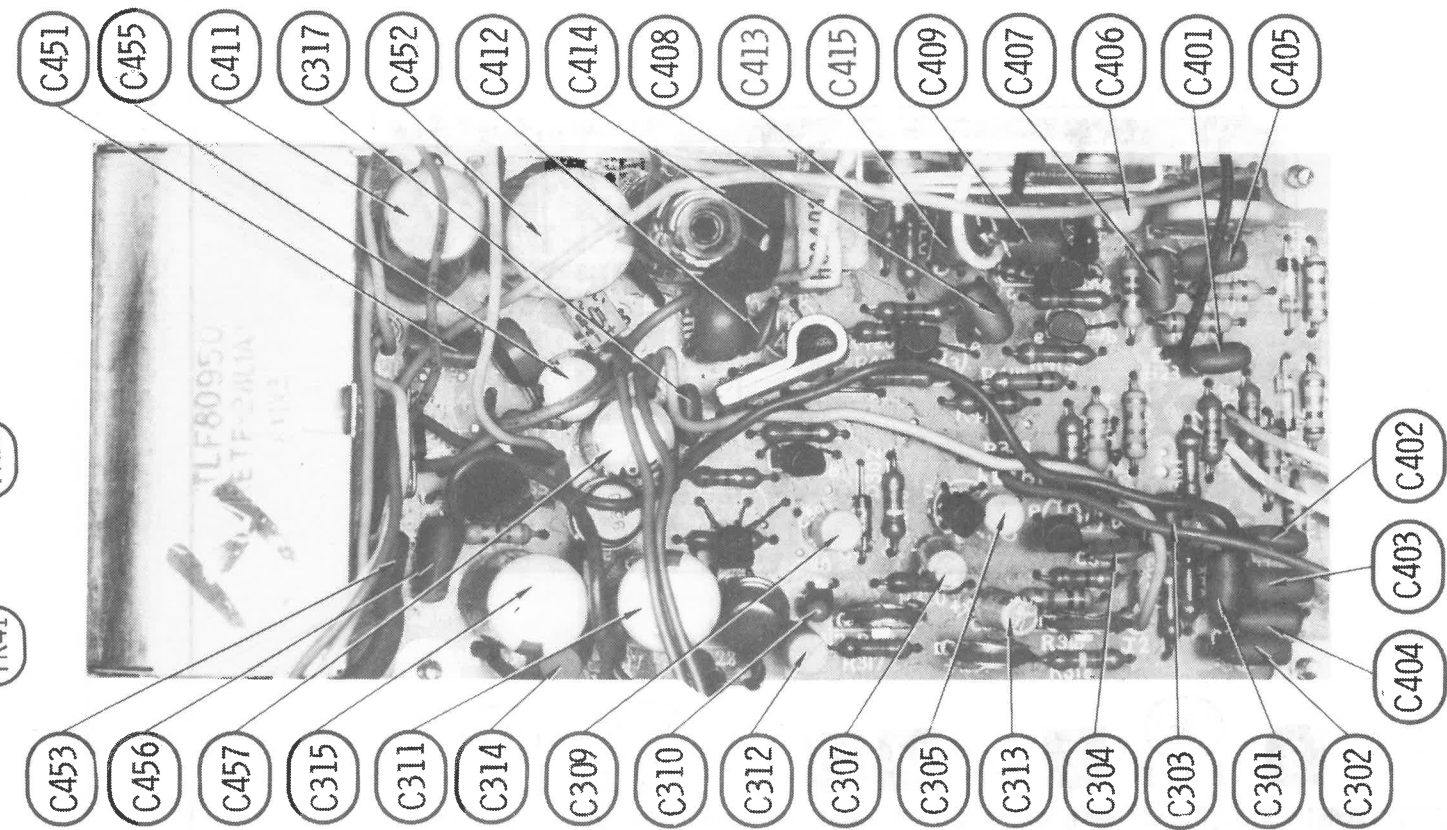
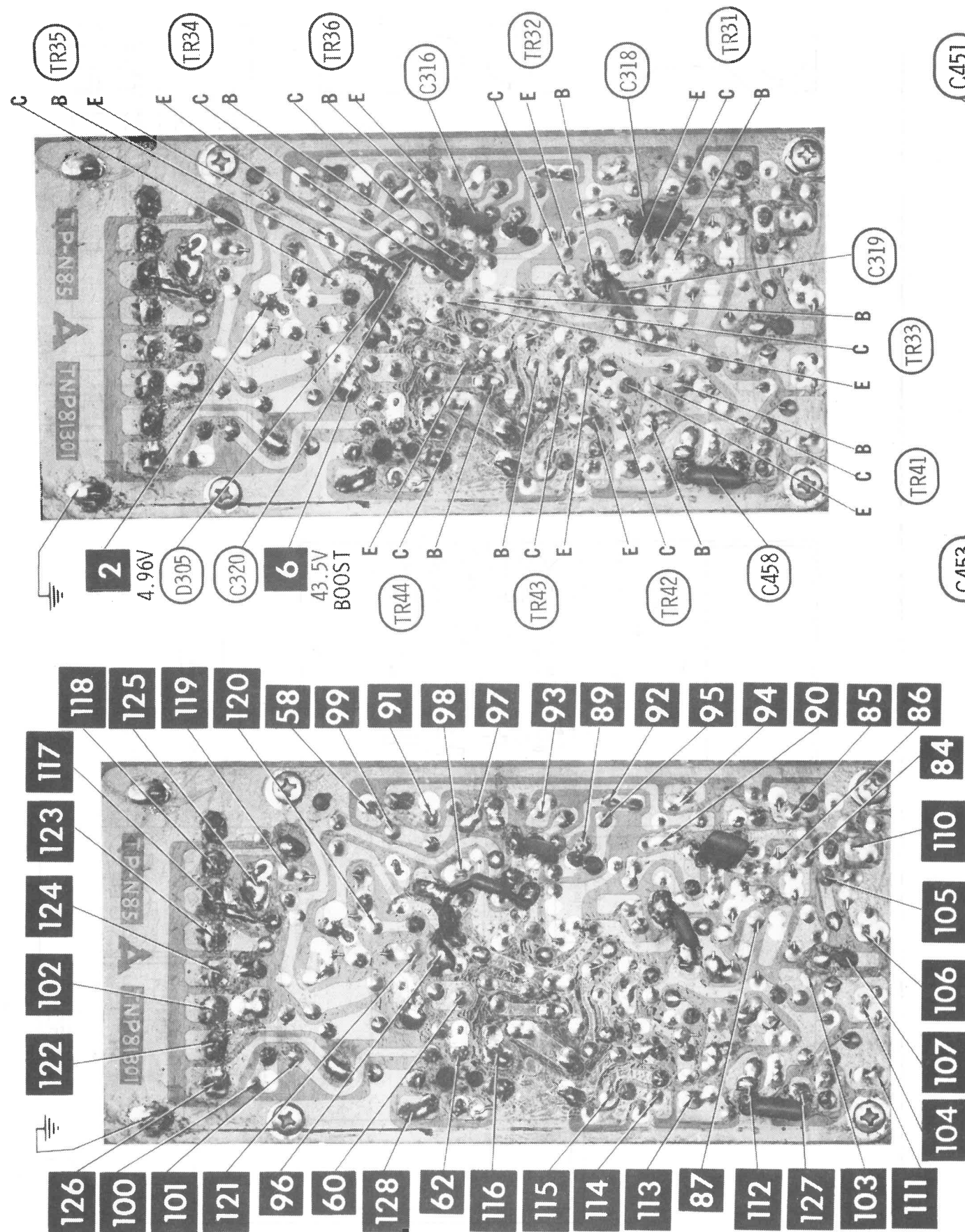
A Howard W. Sams CIRCUITRACE® Photo POWER SUPPLY BOARD

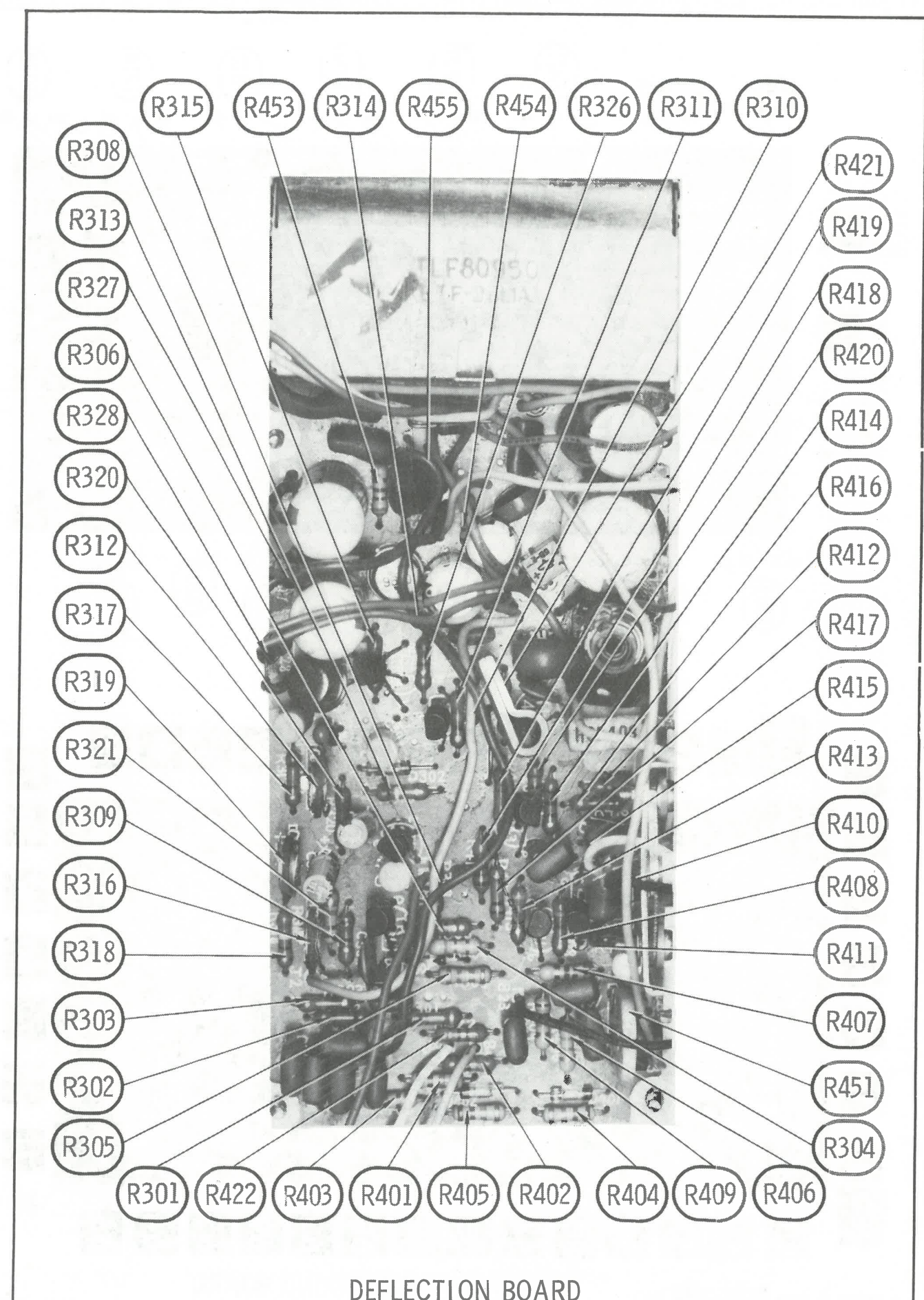
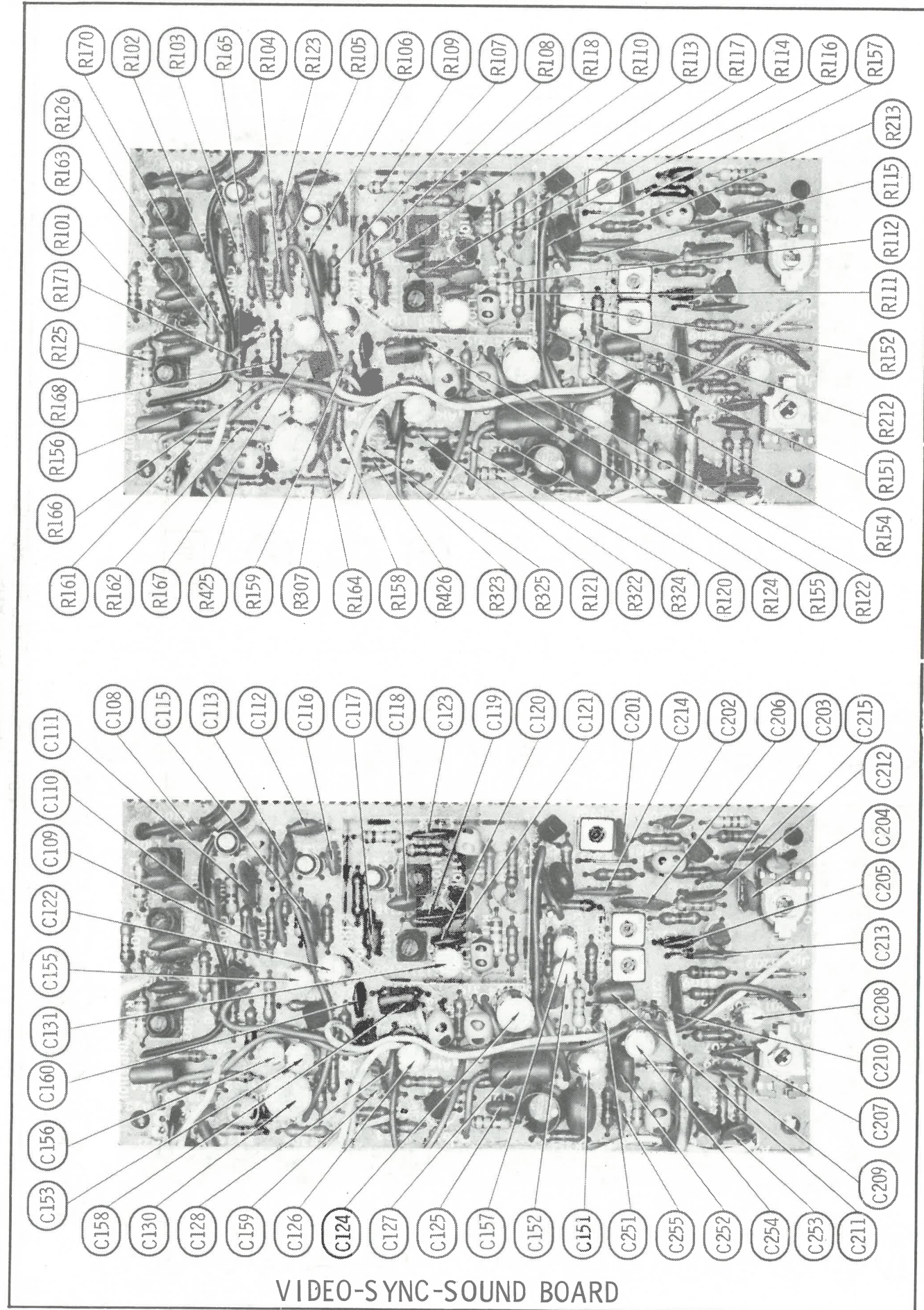


TRANSISTOR PLACEMENT CHART

PANASONIC MODELS
TR-003, TR-003C, TP180C, TY180P

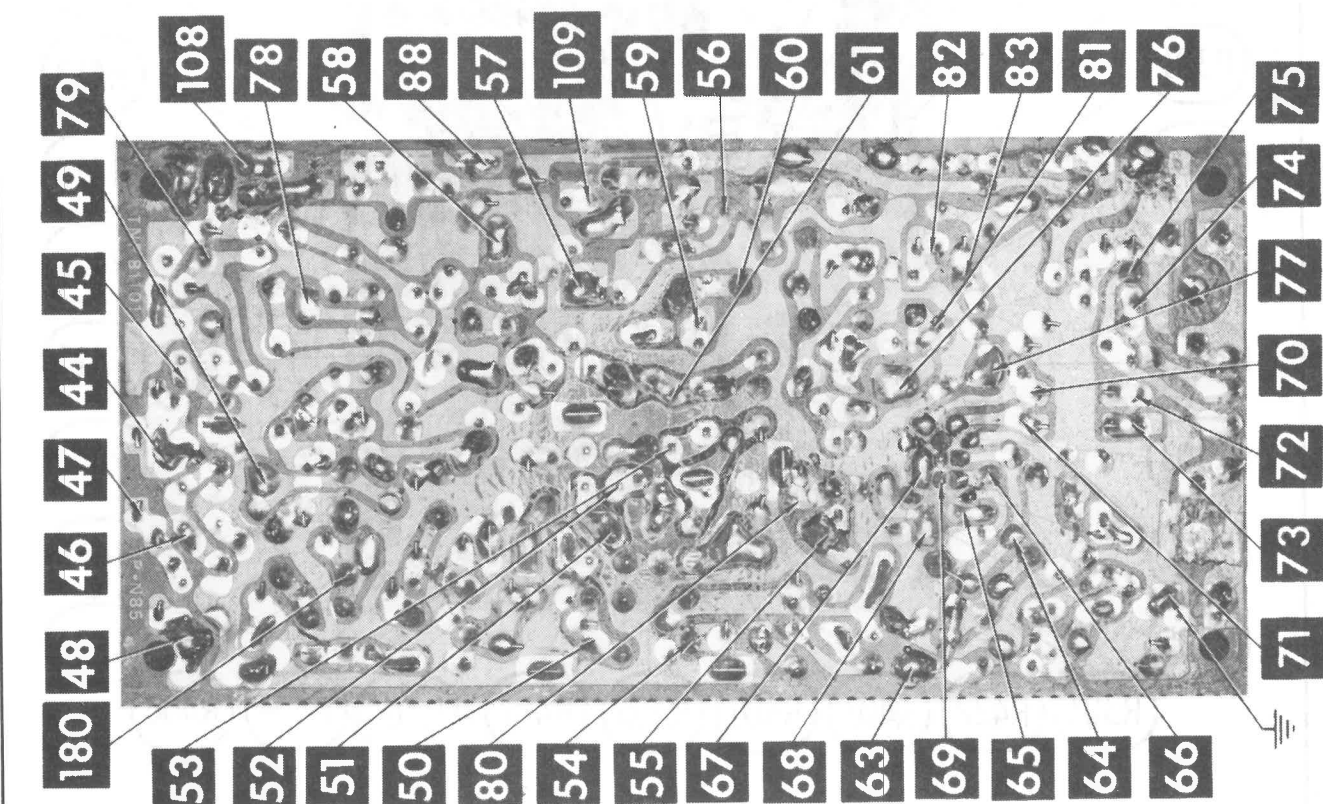
FOLDER 1



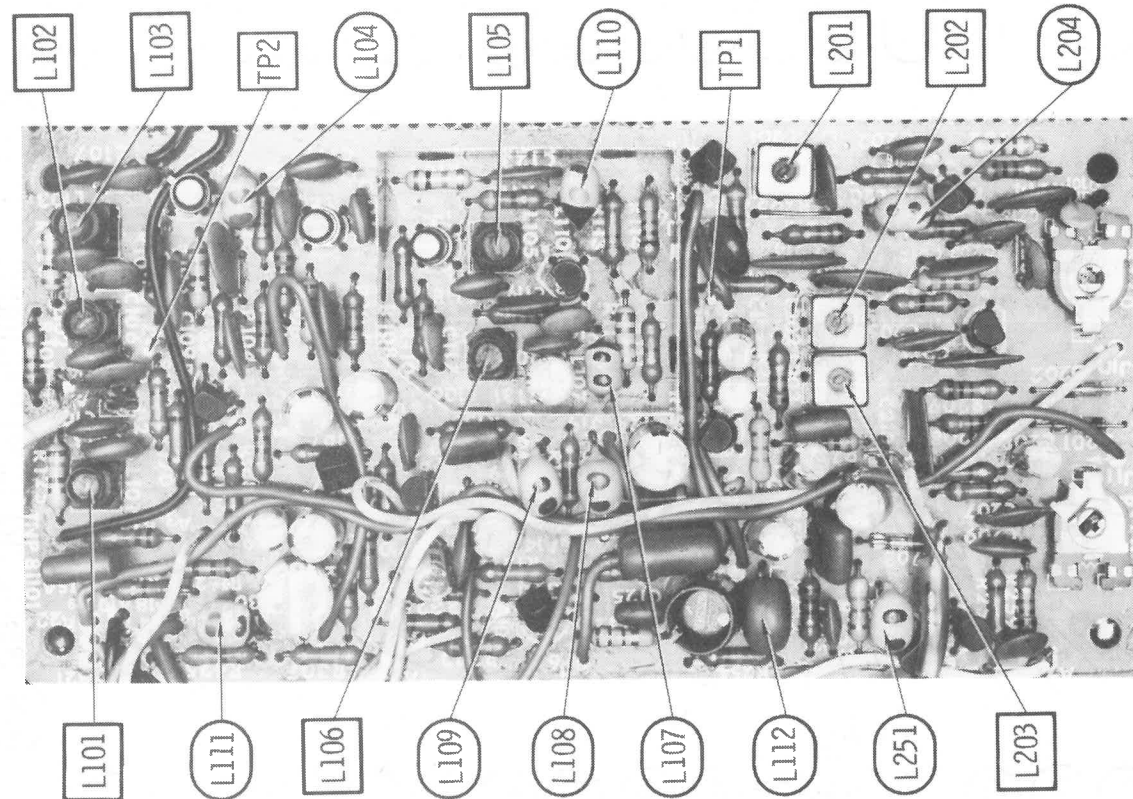
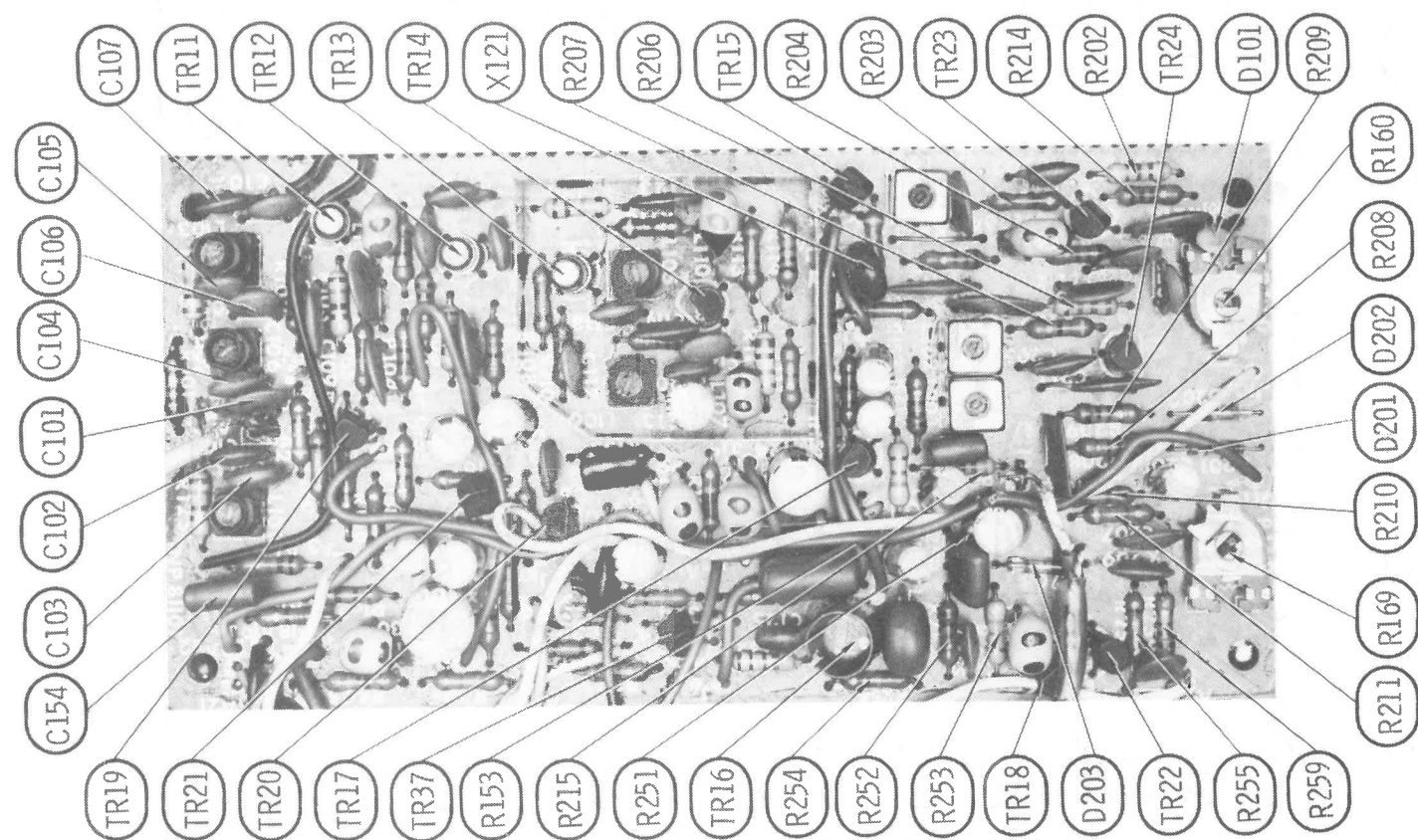
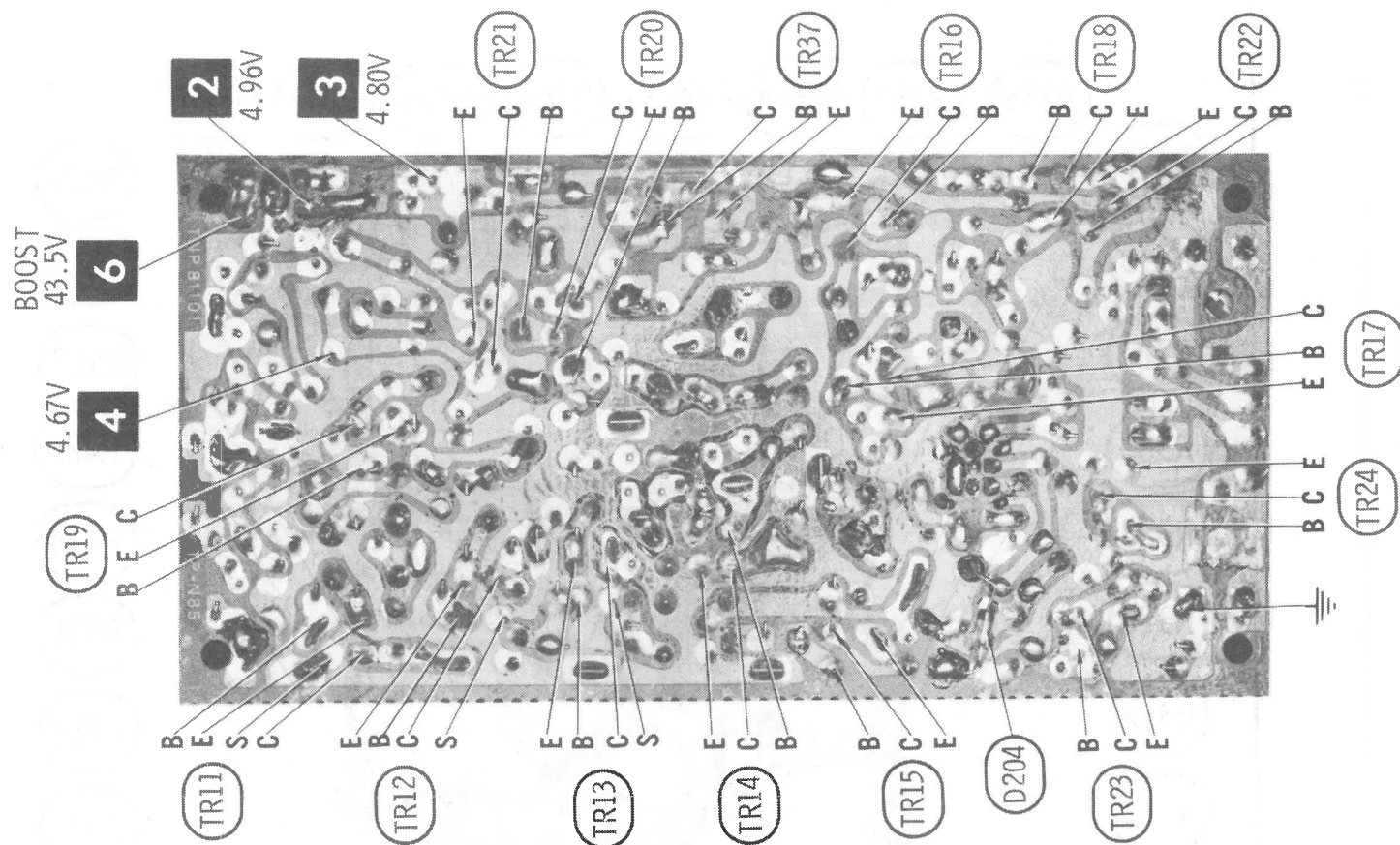


PANASONIC MODELS
TR-003, TR-003C, TP180C, TY180P

FOLDER 1



VIDEO-SYNC-SOUND BOARD



PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements.

Have your local distributor check Sams COUNTER FACTS* for the most up-to-date replacement.

COILS (RF-IF)

| ITEM No. | USE | REPLACEMENT DATA | | | | |
|----------|----------------------|------------------|-------------------|--|--------------------------------------|--|
| | | PART No. | MEISSNER PART No. | MILLER PART No. | WORKMAN PART No. | |
| L101 | 41.25MC Trap | TLI31051 | 19-2004 | 4586 | TA811 | |
| L102 | 47.25MC Trap | TLI31051 | | | | |
| L103 | IF Input | TLI31051 | | | | |
| L104 | RF Choke (.33uh) | TUTR33-999A | | | | |
| L105 | Video Detector (Pri) | TLI31051 | | | | |
| L106 | Video Detector (Sec) | TLI31051 | 19-2009 | 74F106AP 72F824AP 72F124AP 72F564AP 72F824AP 74F276AP (2) | T806 T307 T814 (2) | |
| L107 | RF Choke (1uh) | TLT010-999A | | | | |
| L108 | Peaking (820uh) | TLT821-999A | | | | |
| L109 | Peaking (120uh) | TLT121-999A | | | | |
| L110 | Peaking (560uh) | TLT561-999A | | | | |
| L111 | Peaking (820uh) | TLU821-999C | 19-1005 | 72F105AP 72F124AP 72F274AP 4624 | T823 T307 | |
| L112 | RF Choke (2.8uh) | TLU2R8-122C (1) | | | | |
| L201 | Sound Take-off | TLT801307 | | | | |
| L202 | Ratio Detector (Pri) | TLT803301 | | | | |
| L203 | Ratio Detector (Sec) | TLT803302 | | | | |
| L204 | RF Choke (10uh) | TLT100-999A | 19-2018 | | T862 | |
| L251 | Peaking (120uh) | TLT121-999A | | | | |
| L451 | Peaking (270uh) | TLU271-223C | | | | |
| L501 | RF Choke (15uh) | | | | | |

(1) Includes 1200 Resistor.
(2) Shunt with 1200 Resistor.

COILS (Sweep Circuits)

| ITEM No. | FUNCTION | REPLACEMENT DATA | | | | | |
|----------|------------------|------------------|-----------------|------------------|------------------------------|----------------|------------------|
| | | MFR. PART No. | MILLER PART No. | STANCOR PART No. | THORDARSON MEISSNER PART No. | TRIAD PART No. | WORKMAN PART No. |
| T453 | Width & Filament | TLH80901 | | | | | |

TRANSFORMERS (Sweep Circuits)

| ITEM No. | USE | REPLACEMENT DATA | | | | NOTES |
|----------|--|------------------|------------------|---------------------|----------------|--|
| | | MFR. PART No. | STANCOR PART No. | THORDARSON PART No. | TRIAD PART No. | |
| T451 | Horizontal Output | TLF80950 (1) | | | | (1) Used in Model TR-003. (2) Used in Model TR-003C |
| | Horizontal Output | TLF80950-3(2) | | | | |
| T452 | Horizontal Driver | TLH80403 | | | | |
| T500 | Yoke (Horiz.=100uh) 55° (Vert. = 4MH) | TLY80901DS | | | | |

TRANSFORMER (Power)

| ITEM No. | RATING | | | REPLACEMENT DATA | | | | NOTES |
|----------|-------------------|--------------------|--------|-------------------------------|------------------|---------------------|----------------|---|
| | PRI. | SEC. 1 | SEC. 2 | MFR. PART No. | STANCOR PART No. | THORDARSON PART No. | TRIAD PART No. | |
| T503 | 117VAC @.96AAC | 8.4VAC @520MADC | | TLP80207 (1) TLP80207-1(2) | | | | (1) Used in Model TR-003. (2) Used in Model TR-003C. |

FUSE DEVICES

| ITEM No. | DESCRIPTION | REPLACEMENT DATA | | | | | | |
|----------|---------------------------------------|------------------|--------|---------------|--------|---------------------|--------|------------------|
| | | PART No. | | BUSS PART No. | | LITTELFUSE PART No. | | WORKMAN PART No. |
| | | DEVICE | HOLDER | DEVICE | HOLDER | DEVICE | HOLDER | |
| F501 | .4 amp @ 120V Quick-Acting Pigtail | XBA2H04NR5 | | GJV 4/10 | | | | |
| F502 | 2 Amp @ 250V Quick-Acting Pigtail | TSF5202-6 | | GJV2 | | 318002 | | |
| F503 | 2 Amp @ 125V Quick Actinq Pigtail | TSF-35202 | | GJV2 | | 318002 | | |

MISCELLANEOUS

| ITEM No. | PART NAME | PART No. | NOTES |
|--------------------|---|---|---|
| SW2 SW3 X121 | Antenna VHF Tuner UHF Tuner Switch Switch Crystal Printed Circuit Board Printed Circuit Board Printed Circuit Board | TSA8102 TNV16115ET TNV86113E TSE80301S EFC-A4R5M2 TNP81101-21 TNP81301-21 TNP81506-21 TNP81506-22 | UHF and VHF Rod Antenna TV-Tape (Slide) AC-DC (Leaf) 4.5MC Video-Sync-Sound IF Deflection Power Supply used in Model TR-003 Power Supply used in Model TR-003C |

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

| ITEM | PART No. | ITEM | PART No. |
|-----------------------------------|--------------|---|--------------|
| Picture Tube Cover Complete | TKY800601-1 | Front Panel | TKP8050530-1 |
| Top Cabinet Complete | TKY800701-1 | Speaker Panel | TKP8050540 |
| Bottom Cabinet Complete (TR-003) | TKY800801-1 | Indicator Panel | TKP8050520 |
| Bottom Cabinet Complete (TR-003C) | TKY800801-2 | Handle | TKK809208-1 |
| Escutcheon | TKE801201 | Antenna Holder | TKK809916 |
| Protective Window | TKG800614 | Knob - On-Off Charge Volume | TKX80529-1 |
| Side Panel (Right) | TKP8050550 | Knob - Contrast, Brightness, Vert Hold, | TKX80530-1 |
| Side Panel (Left) | TKP8050560 | Horiz Hold | |
| Tape recorder pop-up cover | TKP8010371-1 | Knob, Tuning | TBX80528-1 |

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

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Have your local distributor check Sams COUNTER FACTS* for the most up-to-date replacement.

WIRING DATA

| | |
|-------------------------------------|--|
| High Voltage Lead | Use BELDEN No. 8869 (17KV) |
| Shielded Hook-up Wire | Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor) |
| General-use Unshielded Hook-up Wire | Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors |
| 300-Ohm Tuner Input Lead | Use BELDEN No. 8225 |
| 300-Ohm Antenna Lead-in | Use BELDEN No. 8230 or 8275 |
| Antenna Rotor Cable | Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor |

PICTURE TUBE

| ITEM No. | REPLACEMENT DATA | | | | NOTES |
|----------|------------------|---------------------------|--------------|-------------------|-------|
| | MFR. PART No. | GENERAL ELECTRIC PART No. | RCA PART No. | SYLVANIA PART No. | |
| V1 | S4060 | | | | |

SEMICONDUCTORS

| ITEM No. | TYPE / MFR. No. / PART No. | REPLACEMENT DATA | | | | | | |
|----------|------------------------------------|---------------------------|----------------------------------|----------------------|----------------------|----------------------|------------------------|------------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| D201 | 0A90/TVS0A90 | 1N34AS (7) | 1N34A (7) | PTC207 (7) | HEP134 (7) | SK3087 (7) | | ECG 110 (6) |
| D202 | 0A90/TVS0A90 | | | | | | | |
| D203 | 0A90/TVS0A90 | 1N34AS | 1N34A | PTC207 | HEP134 | SK3087 | | ECG 109 |
| D204 | 0A90/TVS0A90 | 1N34AS | 1N34A | PTC207 | HEP134 | SK3087 | | ECG 109 |
| D301 | MA26/TVSMA26 | GE-300 | D200 | PTC214 | | SK3100 | RT218 | ECG 177 |
| D302 | 0A90/TVS0A90 | 1N34AS | 1N34A | PTC207 | HEP134 | SK3087 | | ECG 109 |
| D303 | MA26/TVSMA26 | GE-300 | D200 | PTC214 | | SK3100 | RT218 | ECG 177 |
| D304 | MA26/TVSMA26 | GE-300 | D200 | PTC214 | | SK3100 | RT218 | ECG 177 |
| D401 | 0A90/TVS0A90 | 1N34AS (7) | 1N34A (7) | PTC207 (7) | HEP134 (7) | SK3087 (7) | | ECG 110 (6) |
| D402 | 0A90/TVS0A90 | | | | | | | |
| D451 | FG2PC/TVSFG2PC | GE-511 | D172 | PTC216 | HEPR3012 | SK3130 | | ECG 506 |
| D452 | BB10/TVSBB10 | GE-504A | D172 | PTC216 | HEPR3012 | SK3130 | | ECG 506 |
| D454 | TVM550 | GE-504A | 8D6 or 5A6D | PTC202 | HEPR3012 | SK3017A or SK3032 | RT210 or RT215 | ECG 116 or ECG 117 |
| D456 | FR2-02C/TVSFR2-02C | GE-511 | D172 | PTC216 | HEPR3012 | SK3130 | | ECG 506 |
| D501 | PT6d22/1 | GE-504A (4) | 10DB2P or 18DB2A | PTC401 or PTC201 (4) | HEP176 or HEP156 (4) | SK3105 or SK3030 (4) | RT213 (4) or RT214 (4) | ECG 166 or ECG 116 (4) |
| D502 | FR2-02C/TVSFR2-02C | GE-511 | D172 | PTC216 | HEPR3012 | SK3130 | | ECG 506 |
| D503 | MA26/TVSMA26 | GE-300 | D200 | PTC214 | HEPR3012 | SK3100 | RT218 | ECG 177 |
| D504 | RD4AM/TVSRD4AM(10) | GE-300 | Z1200 | PTC501 | HEPR3012 | SK3055 | RT218 | ECG 134 |
| D505 | MA26/TVSMA26 | GE-300 | D200 | PTC214 | HEPR3012 | SK3100 | RT218 | ECG 177 |
| D506 | 0A90/TVS0A90 | 1N34AS | 1N34A | PTC207 | HEPR3012 | SK3087 | | ECG 109 |
| TR11 | 2SC562/TVS2SC562 | GE-60 | IRTR-70 | PTC132 | HEP709 | SK3039 3017 | RT113 | ECG 161 |
| TR12 | 2SC563/TVS2SC563 | GE-61 | IRTR-70 | PTC132 | HEP709 | SK3018 | RT113 | ECG 161 |
| TR13 | 2SC563/TVS2SC563 | GE-61 | IRTR-70 | PTC132 | HEP709 | SK3018 | RT113 | ECG 161 |
| TR14 | 2SC828(P)(Q)(R)/TVS2SC828(P)(Q)(R) | GE-20 | TR-21 | PTC123 | HEP728 | SK3018 3132 | RT107 | ECG 123A |
| TR15 | 2SC828(P)(Q)(R)/TVS2SC828(P)(Q)(R) | GE-20 | TR-21 | PTC123 | HEP728 | SK3018 3122 | RT107 | ECG 123A |
| TR16 | 2SC58A/TVS2SC58A | | IRTR-78 | PTC117 | HEP712 | SK3044 | RT110 | ECG 154 |
| TR17 | 2SA564(P)(Q)/TVS2SA564(P)(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3114 | RT126 | ECG 159 |
| TR18 | 2SA564(P)(Q)/TVS2SA564(P)(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3114 | RT126 | ECG 159 |
| TR19 | 2SA564(P)(Q)/TVS2SA564(P)(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3114 | RT126 | ECG 159 |
| TR20 | 2SA564(P)(Q)/TVS2SA564(P)(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3114 | RT126 | ECG 159 |
| TR21 | 2SC828(P)(Q)(R)/TVS2SC828(P)(Q)(R) | GE-20 | TR-21 | PTC123 | HEP728 | SK3018 | RT107 | ECG 123A |
| TR22 | 2SC828(P)(Q)(R)/TVS2SC828(P)(Q)(R) | GE-20 | TR-21 | PTC123 | HEP728 | SK3018 | RT107 | ECG 123A |
| TR23 | 2SC829(B)/TVS2SC829(B) | GE-20 | TR-21 | PTC123 | HEP50 | SK3018 | RT107 | ECG 107 |
| TR24 | 2SC829(B)/TVS2SC829(B) | GE-20 | TR-21 | PTC123 | HEP50 | SK3018 | RT107 | ECG 107 |
| TR31 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR32 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR33 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR34 | 2SC828(R)/TVS2SC828(R) | GE-20 | TR-21 | PTC123 | HEP728 | SK3124 | RT107 | ECG 123A |
| TR35 | 2SC696(B)(E)(H)/TVS2SC696(B)(E)(H) | | TR-25 | PTC143 | HEPS3002 | SK3024 | RT114 | ECG 128 |
| TR36 | 2SA546(B)(E)(H)/TVS2SA546(B)(E)(H) | | TR-28 | PTC142 | HEPS3021 | SK3025 | RT115 | ECG 129 |
| TR37 | 2SC828(P)(Q)/TVS2SC828(P)(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3018 | RT107 | ECG 123A |
| TR41 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR42 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR43 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR44 | 2SA543/TVS2SA543 | GE-67 | TR-28 | PTC142 | HEP242 | SK3025 | RT115 | ECG 129 |
| | CS1256HG | GE-67 | TR-28 | PTC142 | HEP242 | SK3025 | RT115 | ECG 129 |
| TR45 | TVSCS1256HG | GE-12 | TR-23 | PTC104 | HEP241 | SK3021 | | ECG 175 |
| TR51 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR52 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR53 | 2SB449(F)/TVS2SB449(F) | GE-16 | TR-01 | PTC105 | HEP230 | SK3009 | RT127 | ECG 121 |
| TR54 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |

PANASONIC MODELS
TR-003, TR-003C, TP180C, TP180P

FOLDER 1

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements.
Have your local distributor check Sams COUNTER FACTS* for the most up-to-date replacement.

SEMICONDUCTORS (cont)

| ITEM No. | TYPE / MFR. No. / PART No. | REPLACEMENT DATA | | | | | | |
|----------|----------------------------|---------------------------|----------------------------------|------------------|-------------------|--------------|------------------|-------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| TR55 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR56 | 2SA564(Q)/TVS2SA564(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3025 | RT126 | ECG 159 |
| TR57 | 2SC828(Q)/TVS2SC828(Q) | GE-20 | TR-21 | PTC123 | HEP728 | SK3020 | RT107 | ECG 123A |
| TR58 | 2SB449(F)/TVS2SB449(F) | GE-16 | TR-01 | PTC105 | HEP230 | SK3009 | RT127 | ECG 121 |
| TR59 | 2SA564(Q)/TVS2SA564(Q) | GE-22 | TR-19 | PTC103 | HEP57 | SK3025 | RT126 | ECG 159 |

(4) Four required. (6) Matched Pair. (7) Two required - select matched pair.
(10) Zener.

ELECTROLYTIC CAPACITORS

| ITEM No. | RATING | REPLACEMENT DATA | | | | | | | |
|----------|------------|------------------|---------------|--------------------|---------------------------|---------------------------|------------------|------------------|--|
| | | MFR. PART No. | ARCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | GENERAL ELECTRIC PART No. | MALLORY PART No. | SPRAGUE PART No. | |
| C122 | 47 10V | ECEA10V47UC | RME-D-D-050 | EP15-50 | WBR50-25 | MT1-16 | MTV50CB15 | EV-1226 | |
| C124 | 1 160V | ECEA160V1C | ME-3-R-001 | EP15-50 | WBR1-450 | QT1-1 | TC595 | TVA-1434 | |
| C126 | 47 10V | ECEA10V47UC | RME-D-D-050 | EP15-100 | WBR50-25 | MT1-16 | MTV50CB15 | EV-1226 | |
| C130 | 100 10V | ECEA10V100UC | RME-E-D-100 | EP15-100 | WBR100-16 | MT1-19 | MTV100CB10 | EV-1130 | |
| C131 | 33 10V | ECEA10V33NC | ME-3-D-035 | EP15-25 | WBR35-50 | MT1-13.5 | MTV30CB25 | EV-1125 | |
| C151 | 1 50V | ECEA50V1NC | RME-A-J-001 | EP50-2 | WBR1-50 | MT1-1 | MTV1CB50 | EV-1615 | |
| C152 | 10 16V | ECEA10V10NC | RME-B-E-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C153 | 33 10V | ECEA10V33NC | RME-A-D-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C155 | 47 10V | ECEA10V47UC | ME-3-D-035 | EP15-25 | WBR35-50 | MT1-13.5 | MTV30CB25 | EV-1125 | |
| C156 | 10 16V | ECEA10V10NC | RME-D-D-050 | EP15-10 | WBR50-25 | MT1-16 | MTV50CB15 | EV-1226 | |
| C157 | 10 16V | ECEA10V10NC | RME-B-E-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C159 | 10 16V | ECEA10V10NC | RME-A-D-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C208 | 10 16V | ECEA10V10NC | RME-B-E-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C251 | 1 50V | ECEA50V1NC | RME-A-J-001 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C254 | 33 10V | ECEA10V33NC | RME-A-D-010 | EP15-10 | WBR10-25 | MT1-5 | MTV10CB50 | EV-1222 | |
| C305 | .33 25V | ECAG25ER33KC | RME-A-G-005 | EP30-5 | WBR5-50 | MT1-3 | MTV5CB50 | EV-1319 | |
| C307 | 4.7 25V | ECAG25V4R7NC | | | | | TDC334K050EL | SD35-R339 | |
| C309 | .33 25V | ECAG25ER33KC | | | | | MTV5CB50 | EV-1319 | |
| C310 | 4.7 16V | ECAG16E4R7C | | | | | TDC334K050EL | SD35-R339 | |
| C311 | 1000 10V | ECEA10V1000Q | RME-M-D-1000 | EA15-1000 | WBR1000-16 | QT1-32 | TDC474K050EL | SD35-4R79 | |
| C312 | .47 25V | ECAG25ER47C | | | | | TC1210A | EV-1160 | |
| C313 | 1 50V | ECEA50V1NC | RME-A-J-001 | EP50-2 | WBR1-50 | MT1-1 | TDC474K050EL | EV-1310 | |
| C314 | .1 25V | ECAG25ER1C | | | | | MTV1CB50 | EV-1615 | |
| C315 | 1000 10V | ECEA10V1000Q | RME-M-D-1000 | EA15-1000 | WBR1000-16 | QT1-32 | TDC104K050EL | SD35-R109 | |
| C406 | 1 50V | ECEA50V1NC | RME-A-J-001 | EP50-2 | WBR1-50 | MT1-1 | TC1210A | EV-1160 | |
| C411 | 2.5 NP 25V | ECEA25N2R5ZC | | | | | MTV1CB50 | EV-1615 | |
| C452 | 1000 16V | ECEA16V1000Q | RME-N-E-1000 | EA15-1000 | WBR1000-16 | QT1-32 | TC1501B | EV-1260 | |
| C455 | 1 160V | ECEA160V1C | ME-3-R-001 | EP50-2 | WBR1-450 | QT1-1 | TC595 | TVA-1434 | |
| C457 | 4.7 160V | ECEA160V4R7C | ME-6-R-005 | EA15-2000 | WBR8-250 | QT1-3.5 | TC50XA | TVA-1438 | |
| C502 | 2200 16V | ECEA16V2200C | ME-G2000 | EA15-2000 | WBR2000-16 | QT1-33 | TC1520A | TVA-1175.3 | |
| C504 | 1 50V | ECEA50V1NC | RME-A-J-001 | EP50-2 | WBR1-50 | MT1-1 | MTV1CB50 | EV-1615 | |
| C505 | 1000 10V | ECEA10V1000Q | RME-M-D-1000 | EA15-1000 | WBR1000-16 | QT1-32 | TC1210A | EV-1160 | |
| C506 | 2200 10V | ECEA10V2200Q | ME-D2000 | EA15-2000 | WBR2000-16 | QT1-33 | TC1220 | EV-1180 | |
| C507 | 100 10V | ECEA10V100NC | RME-E-D-100 | EP15-100 | WBR100-16 | MT1-19 | MTV100CB10 | EV-1130 | |
| C508 | 100 10V | ECEA10V100NC | RME-E-D-100 | EP15-100 | WBR100-16 | MT1-19 | MTV100CB10 | EV-1130 | |
| C509 | 100 10V | ECEA10V100NC | RME-E-D-100 | EP15-100 | WBR100-16 | MT1-19 | MTV100CB10 | EV-1130 | |

CAPACITORS

| ITEM No. | RATING | MFR. PART No. | REPLACEMENT DATA | | | | |
|----------|------------------|---------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | ARCO/ELMENCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C101 | 150 50V 10% | ECCCO5080D | CCD-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C102 | 12 50V 10% | | CCTO-120 | | NP012 | CNO412 | 10TCC-Q12 |
| C103 | 8 50V ±.5pf | | | | NP08 | | 10TCC-V82 |
| C104 | 5 50V ±.5pf | | | | NP05 | | 10TCC-V50 |
| C105 | 5 50V ±.5pf | | | | NP05 | | 10TCC-V50 |
| C106 | 5 50V ±.5pf | RCCCO5060D | CCTO-120 | | NP012 | CNO412 | 10TCC-V50 |
| C107 | 12 50V 10% | | | | NP06 | | 10TCC-Q12 |
| C108 | 6 50V ±.5pf | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C109 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C110 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C111 | .01 50V | | CCTO-270 | | NP027 | CNO427 | 10TCC-Q27 |
| C112 | 27 50V 10% | | CCTO-120 | | NP012 | CNO412 | 10TCC-Q12 |
| C113 | 12 50V 10% | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C115 | .01 50V | | CCTO-470 | DTZ-47 | NP047 | CNO447 | 10TCC-Q47 |
| C116 | 47 50V 10% | | CCTO-820 | DTZ-82 | NP082 | CNO482 | 10TCC-Q82 |
| C117 | 82 50V 10% | ECCCO5080D | CCTO-150 | DTZ-15 | NP015 | CNO415 | 10TCC-Q15 |
| C118 | 15 50V 10% | | CCTO-121 | DTZ-120 | | CNO312 | 10TCC-T12 |
| C119 | 120 50V 10% | | CCTO-330 | DTZ-33 | NP033 | CNO433 | 10TCC-Q33 |
| C120 | 33 50V 10% | | | | | CNO439 | 10TCC-Q39 |
| C121 | .39 50V 10% | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C123 | .01 50V | | 1DP-1-682 | | | | 1PB-D68 |
| C125 | .0068 50V 10% | | 1DP-2-104 | | | | 225P10491WD3 |
| C127 | .1 50V 10% | | CCD-151 | DD-151 | DPMS2P1 | GP150 | 10TS-T15 |
| C128 | 150 50V 10% | | 1DP-1-333 | | | | 1PB-S33 |
| C154 | .033 50V | | 1MD-1-183 | | | | 1PB-S18 |
| C158 | .018 50V 10% | ECCCO5080D | CCD-102 | DM-102 | GP1000 | SM210 | 2SS-D10 |
| C160 | .001 50V | | CCTO-121 | DTZ-120 | | | 10TCC-T12 |
| C201 | 120 50V 10% | | CCTO-270 | | NP027 | CNO427 | 10TCC-Q27 |
| C202 | 27 50V 10% | | CCTO-820 | DTZ-82 | NP082 | CNO482 | 10TCC-Q82 |
| C203 | 82 50V 10% | | CCTO-820 | DTZ-82 | NP082 | CNO482 | 10TCC-Q82 |
| C204 | 82 50V 10% | | CCTO-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C205 | 150 50V 10% | | | | | | |
| C206 | .022 50V | TCCC05201PM | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C207 | 150 50V 10% | | CCD-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C209 | 150 50V 10% | | CCD-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C210 | 200 N150 50V 10% | | * | | | | 10TQW-T22 |
| C211 | .01 50V | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C212 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C213 | .022 50V | | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C214 | .022 50V | | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C215 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C216 | .01 | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C252 | .018 50V 10% | | 1MD-1-183 | | | PVC1118 | 1PB-S18 |
| C253 | 180 50V 10% | | CCD-181 | DD-181 | GP180 | GP318 | 10TS-T18 |
| C255 | .001 50V | | CCD-102 | DM-102 | GP1000 | SM210 | 2SS-D10 |
| C301 | .018 50V 10% | | 1MD-1-183 | | | PVC1118 | 1PB-S18 |
| C302 | .018 50V 10% | | 1MD-1-183 | | | PVC1118 | 1PB-S18 |
| C303 | .0018 50V 10% | | 1MD-1-182 | | | | 1PB-D18 |
| C304 | 470 50V | | CPR-1800J | CPR-1800J | DPMS2P1 | GP347 | 10TS-T47 |
| C316 | .001 50V | | CCD-471 | DM-471 | GP1000 | SM210 | 2SS-D10 |
| C317 | .001 50V 10% | | CCD-102 | DM-102 | DPMS6D1 | PVC621 | 225P10291WD3 |
| C318 | .01 50V 10% | | 1DP-2-104 | | | PVC101 | 225P10491WD3 |
| C319 | .0047 50V 10% | | 1MD-1-472 | CPR-4700J | DPMS6D1 | PVC621 | 1PB-D47 |
| C320 | .0047 50V 10% | | 1MD-1-472 | CPR-4700J | DPMS6D1 | PVC621 | 225P10291WD3 |
| C401 | .001 50V 10% | ECQM1273KZB | 6DP-1-102 | CPR-1000J | | | 1PB-D22 |
| C402 | .0022 50V 10% | | 1MD-1-222 | CPR-2200J | | | 225P15391WD3 |
| C403 | .015 50V 10% | | 1DP-1-153 | DD-153 | DPMS6S15 | PVC2115 | 225P10391WD3 |
| C404 | .01 50V 10% | | 1DP-1-103 | CPR-10000J | DPMS6S22 | PVC1122 | 225P22391WD3 |
| C405 | .022 50V 10% | | 1DP-1-222 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C407 | .01 50V 10% | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C408 | .01 50V 10% | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC1147 | 225P47391WD3 |
| C409 | .047 50V 10% | | 1DP-2-473 | | DPMS6S47 | GP347 | 10TS-T47 |
| C412 | 470 50V | | CCD-471 | DM-471 | GP1000 | SM210 | 2SS-D10 |
| C413 | .001 50V | | CCD-102 | DM-102 | GP1000 | SM210 | 2SS-D10 |
| C414 | .001 50V | | CCD-102 | DM-102 | GP1000 | SM210 | 2SS-D10 |
| C415 | .01 50V 10% | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C451 | .027 100V 10% | | 1MD-1-273 | | | | 1PB-S27 |
| C453 | .01 400V | | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | 4PS-S10 |
| C456 | .01 400V 10% | | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | 4PS-S10 |
| C458 | .01 400V 10% | | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | 4PS-S10 |
| C501 | .0022 50V 10% | | 1MD-1-222 | CPR-2200J | | | 1PB-D22 |

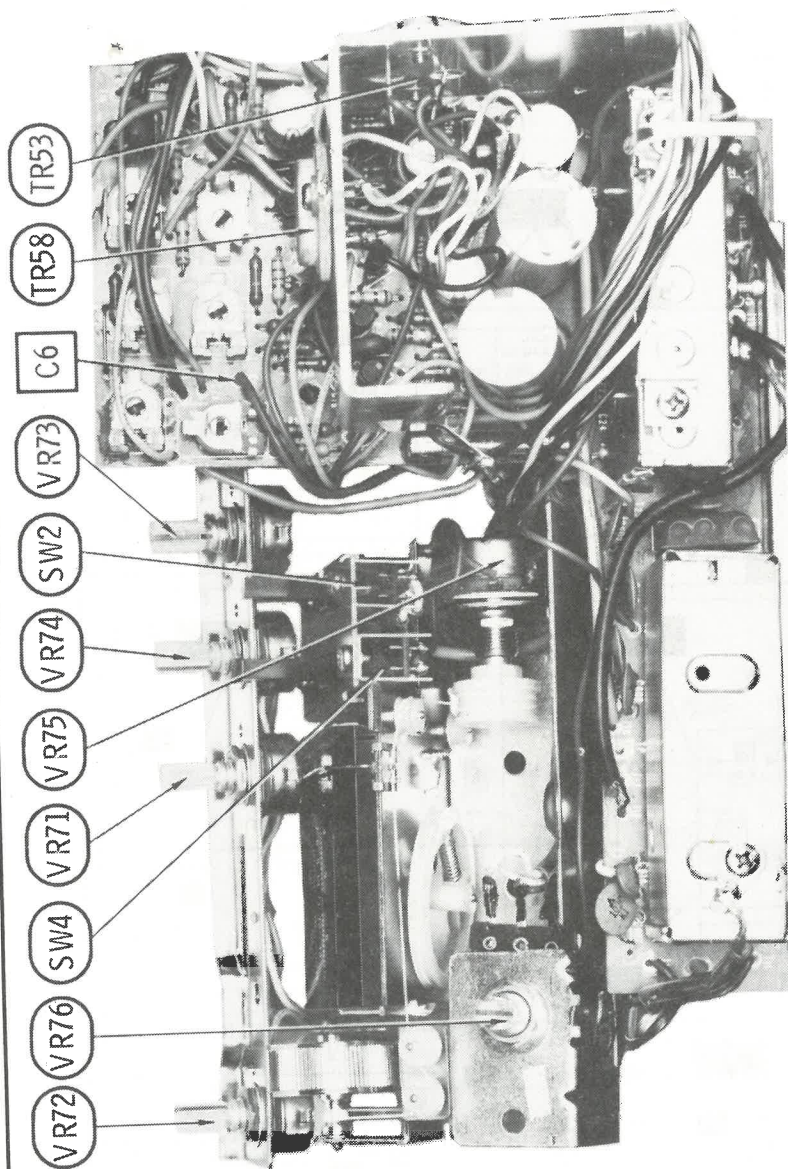
PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements.
Have your local distributor check Sams COUNTER FACTS* for the most up-to-date replacement.

CAPACITORS (cont)

| ITEM No. | RATING | MFR. PART No. | REPLACEMENT DATA | | | | |
|----------|------------------|---------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | ARCO/ELMENCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C206 | .022 50V | TCCC05201PM | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C207 | 150 50V 10% | | CCD-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C209 | 150 50V 10% | | CCD-151 | DD-151 | GP150 | GP315 | 10TS-T15 |
| C210 | 200 N150 50V 10% | | * | | | * | 10TQW-T22 |
| C211 | .01 50V | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C212 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C213 | .022 50V | | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C214 | .022 50V | | CCD-203 | CK-203 | MGPO2 | TA120 | TG-S20 |
| C215 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C216 | .01 | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C252 | .018 50V 10% | 1MD-1-183 | | | | PVC1118 | 1PB-S18 |
| C253 | 180 50V 10% | CCD-181 | DD-181 | GP180 | GP318 | SM210 | 10TS-T18 |
| C255 | .001 50V | CCD-102 | DM-102 | GP1000 | | SM210 | 2SS-D10 |
| C301 | .018 50V 10% | 1MD-1-183 | | | | PVC1118 | 1PB-S18 |
| C302 | .018 50V 10% | 1MD-1-183 | | | | PVC1118 | 1PB-S18 |
| C303 | .0018 50V 10% | 1MDF-1-182 | | | | | 1PB-D18 |
| C304 | 470 50V | CCD-471 | DD-471 | GP470 | GP347 | GP347 | 10TS-T47 |
| C316 | .001 50V | CCD-102 | DM-102 | GP1000 | SM210 | SM210 | 2SS-D10 |
| C317 | .001 50V 10% | 6DP-1-102 | CPR-1000J | DPMS6D1 | PVC621 | PVC621 | 225P10291WD3 |
| C318 | .01 50V 10% | 1DP-2-104 | | | DPMS2P1 | PVC101 | 225P10491WD3 |
| C319 | .0047 50V 10% | 1MDF-1-472 | CPR-4700J | | | | 1PB-D47 |
| C320 | .0047 50V 10% | 1MDF-1-472 | CPR-4700J | | | | 1PB-D47 |
| C401 | .001 50V 10% | 6DP-1-102 | CPR-1000J | | DPMS6D1 | PVC621 | 225P10291WD3 |
| C402 | .0022 50V 10% | 1MDF-1-222 | CPR-2200J | | | | 1PB-D22 |
| C403 | .015 50V 10% | 1DP-1-153 | DD-153 | DPMS6S15 | PVC2115 | PVC2115 | 225P15391WD3 |
| C404 | .01 50V 10% | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | PVC211 | 225P10391WD3 |
| C405 | .022 50V 10% | 1DP-1-223 | | DPMS6S22 | PVC1122 | PVC1122 | 225P22391WD3 |
| C407 | .01 50V 10% | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | PVC211 | 225P10391WD3 |
| C408 | .01 50V 10% | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | PVC211 | 225P10391WD3 |
| C409 | .047 50V 10% | 1DP-2-473 | | DPMS6S47 | PVC1147 | PVC1147 | 225P47391WD3 |
| C412 | 470 50V | CCD-471 | DD-471 | GP470 | GP347 | GP347 | 10TS-T47 |
| C413 | .001 50V | CCD-102 | DM-102 | GP1000 | SM210 | SM210 | 2SS-D10 |
| C414 | .001 50V | CCD-102 | DM-102 | GP1000 | SM210 | SM210 | 2SS-D10 |
| C415 | .01 50V 10% | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | PVC211 | 225P10391WD3 |
| C451 | .027 100V 10% | 1MD-1-273 | | | | | 1PB-S27 |
| C453 | .01 400V | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | PVC411 | 4PS-S10 |
| C456 | .01 400V 10% | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | PVC411 | 4PS-S10 |
| C458 | .01 400V 10% | 4DP-1-103 | CPR-10000J | DPMS6S1 | PVC411 | PVC411 | 4PS-S10 |
| C501 | .0022 50V 10% | 1MDF-1-222 | | CPR-2200J | | | 1PB-D22 |



CHASSIS-TOP VIEW

PHOTOFACT® Folder

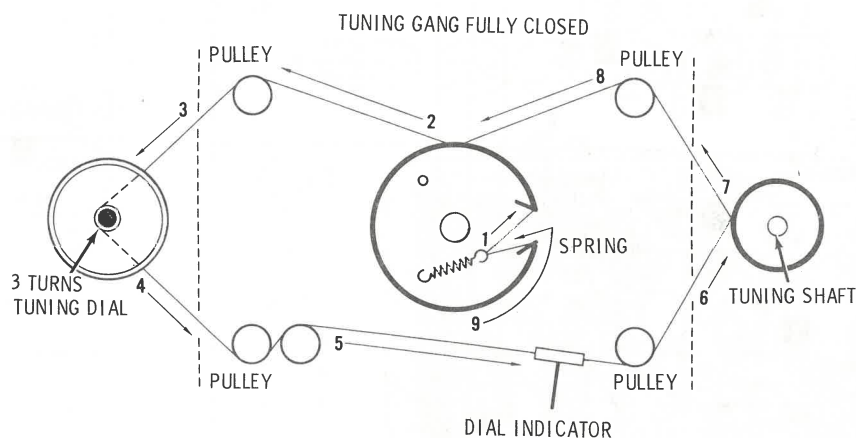
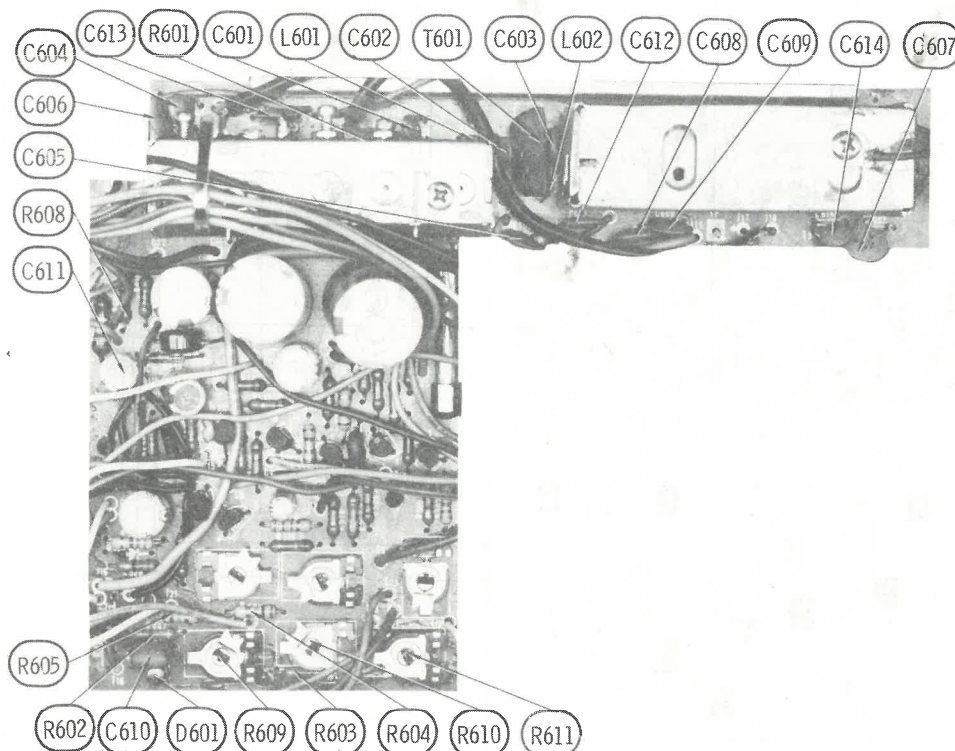
with CIRCUITRACE®

PANASONIC TUNERS
Used With MODELS TR-003, TR-003C

IMPORTANT FILING NOTICE

This PHOTOFACT Folder covers equipment used with the TV chassis covered in PHOTOFACT SET 1303 FOLDER 1. File this Folder with the TV Folder in the yellow filing jacket provided.

PANASONIC TUNERS
Used With MODELS TR-003, TR-003C



HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206



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. 3PC594

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DATE 3-73

SET 1303 FOLDER 1-A

PANASONIC TUNERS
Used With MODELS TR-003, TR-003C

5.00V

1 24 39

41 42 30 25 26

27 28 29 43 40 44 31 38

VHF TUNER PARTS LIST AND DESCRIPTION
(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS

| ITEM No. | TYPE / MFG. No. / PART No. | REPLACEMENT DATA | | | | | | |
|----------|----------------------------|---------------------------|----------------------------------|------------------|-------------------|--------------|------------------|-------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| D201 | MA320G1 (8) | | | | | | | |
| D202 | MA53 | | | | | | | |
| D203 | MA320G1 (8) | | | | | | | |
| D204 | MA53 | | | | | | | |
| D205 | MA53 | | | | | | | |
| D206 | MA320G1 (8) | | | | | | | |
| D207 | MA53 | | | | | | | |
| D208 | MA320G1 (8) | | | | | | | |
| D209 | MA53 | | | | | | | |
| Q201 | 2SC761Y | GE-11 | | PTC132 | HEP709 | SK3039 | RT108 | ECG 161 |
| Q202 | 2SC563 | GE-11 | TR-21 | PTC132 | HEP709 | SK3018 | RT113 | ECG 161 |
| Q203 | 2SC645 | GE-11 | TR-21 | PTC132 | HEP56 | SK3018 | RT108 | ECG 107 |

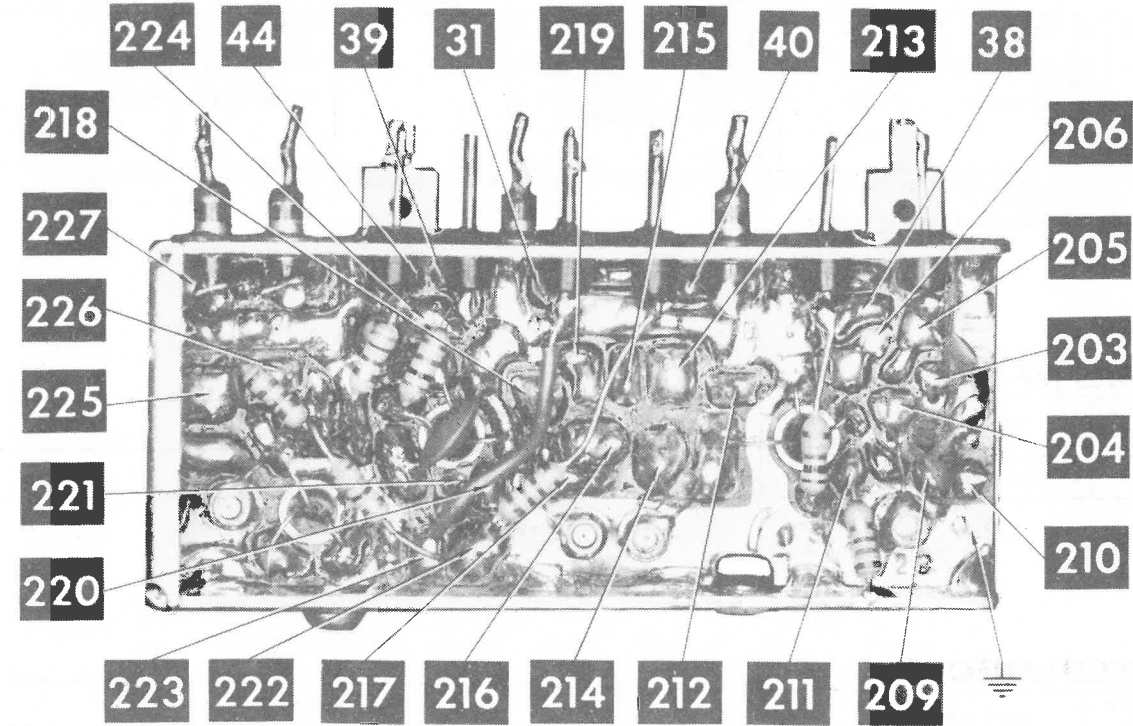
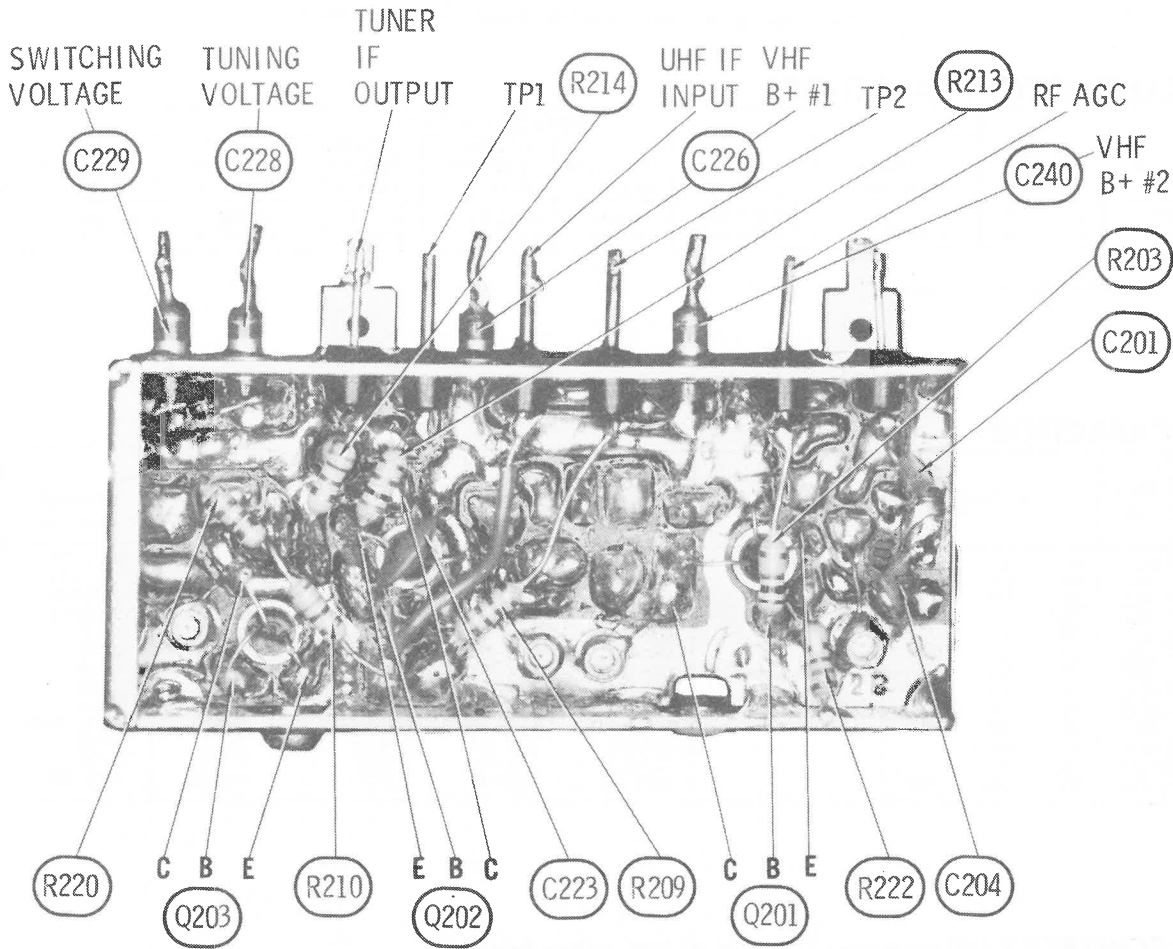
(8) Varactor.

CAPACITORS

| ITEM No. | RATING | MFG. PART No. | REPLACEMENT DATA | | | | |
|----------|--------|---------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | ARCO/ELMENDO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C201 | .005 | | | | | | |
| C202 | .005 | | | | | | |
| C203 | 1-5pf | | | | | | |
| C204 | .005 | | | | | | |
| C205 | 1.5pf | | | | | | |
| C206 | .005 | | | DTZ-1R5 | NP01P5 | CN0515 | 10TCC-V15 |
| C207 | .005 | | | | | | |
| C208 | 10pf | | | | | | |
| C209 | .005 | | CCT0-100 | DTZ-10 | NP010 | CN0410 | 10TCC-Q10 |
| C210 | .5-3pf | | | | | | |
| C211 | .005 | | | | | | |
| C212 | 7pf | | | | | | |
| C213 | .005 | | | DTZ-6R8 | NP06P8 | CN0568 | 10TCC-V68 |
| C214 | 7pf | | | | | | |
| C215 | .5-3pf | | | DTZ-6R8 | NP06P8 | CN0568 | 10TCC-V68 |
| C216 | .005 | | | | | | |
| C217 | .005 | | | | | | |
| C218 | .005 | | | | | | |
| C219 | .005 | | | | | | |
| C220 | .005 | | | | | | |
| C221 | 2pf | NPO | | DTZ-2R2 | NP02P2 | CN0522 | 10TCC-V22 |
| C222 | .005 | | | | | | |
| C223 | .01 | 10% | | | | | |
| C224 | 20pf | | | | | | |
| C225 | .005 | | | | | | |
| C226 | .001 | | | | | | |
| C227 | 1pf | NPO | | | | CN0510 | 10TCC-V10 |
| C228 | .001 | | | | | | |
| C229 | .001 | | | | | | |
| C230 | 5pf | NPO | | | NP05 | | 10TCC-V50 |
| C231 | 2pf | N750 | | | | | |
| C233 | 39pf | | | | | | |
| C234 | .5-3pf | | | | | | |
| C235 | .005 | | | | | | |
| C236 | .005 | | | | | | |
| C237 | 12pf | NPO | | | | | |
| C238 | 4pf | | | | NP03P9 | | 10TCC-V39 |
| C239 | .005 | | | | | | |
| C240 | | | | | | | |

PANASONIC TUNERS
Used With MODELS TR-003, TR-003C

FOLDER 1-A



UHF TUNER PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS

| ITEM No. | TYPE / MFR. No. / PART No. | REPLACEMENT DATA | | | | | | |
|----------|----------------------------|---------------------------|----------------------------------|------------------|-------------------|--------------|------------------|-------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| Q301 | 2SC761 (Y) | GE-11 | | PTC132 | HEP709 | SK3039 | RT108 | ECG 161 |
| Q302 | 2SC761 (Y) | GE-11 | | PTC132 | HEP709 | SK3039 | RT108 | ECG 161 |
| Q303 | 2SC948 | GE-11 | | PTC133 | HEP709 | SK3019 | RT108 | ECG 161 |
| X301 | MA320 (8) | | | | | | | |
| X302 | MA320 (8) | | | | | | | |
| X303 | MA320 (8) | | | | | | | |

(8) Varactor.

CAPACITORS

| ITEM No. | RATING | MFR. PART No. | REPLACEMENT DATA | | | | |
|----------|--------|---------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | ARCO/ELMENCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C301 | 7pf | | | DTZ-6R8 | NP06P8 | CN0568 | 10TCC-V68 |
| C302 | 7pf | | | DTZ-6R8 | NP06P8 | CN0568 | 10TCC-V68 |
| C303 | 2pf | | | DTZ-2R2 | NP02P2 | CN0522 | 10TCC-V22 |
| C304 | .001 | | | | | | |
| C305 | 2pf | | | | | | |
| C306 | .001 | | | | | | |
| C307 | .001 | | | | | | |
| C308 | 8pf | | | | | | |
| C309 | | | | | | | |
| C310 | | | | | | | |
| C311 | 8pf | | | | | | |
| C312 | .001 | | | | | | |
| C313 | 100 | | CCT0-101 | DTZ-100 | NP0100 | CN0310 | 10TCC-T10 |
| C314 | 2.5pf | | | | | | |
| C315 | .001 | | | | | | |
| C316 | .001 | | | | | | |
| C317 | 10pf | | | | | | |
| C318 | .001 | | | | | | |
| C319 | 85pf | | | | | | |
| C320 | .001 | | | | | | |
| C321 | 6pf | | | | | | |
| C322 | | | | | | | |
| C323 | 20pf | | | | | | |
| C324 | 1.5pf | N220 | * | | | * | |
| C325 | .001 | | | | | | |
| C326 | .001 | | | | | | |

COILS (RF-IF)

| ITEM No. | USE | MFR. PART No. | NOTES |
|----------|---------------|---------------|-------|
| L301 | UHF IF Output | | |

| ITEM No. | USE | MFR. PART No. | NOTES |
|----------|---------------|---------------|-------|
| L302 | UHF IF Output | | |

VHF-UHF TUNING PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS

| ITEM No. | TYPE / MFR. No. / PART No. | REPLACEMENT DATA | | | | | | |
|----------|----------------------------|---------------------------|----------------------------------|------------------|-------------------|--------------|------------------|-------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| D601 | AN155/TVSAN155 (10) | GEZD-33 | Z-1220 | ZB-30 | HEP609 | SK3095 | | ECG 5084 |

(10) Zener.

VHF-UHF TUNING PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

ELECTROLYTIC CAPACITORS

| ITEM No. | RATING | REPLACEMENT DATA | | | | | | |
|----------|------------------|------------------|----------------------------|--------------------|---------------------------|---------------------------|------------------------|--------------------|
| | | MFR. PART No. | ARCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | GENERAL ELECTRIC PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C611 | 47 16V 47 10V | ECEA10V47UC4 | RME-E-E-050 RME-D-D-050 | EP15-50 EP15-50 | WBR50-25 WBR50-25 | MT1-16 MT1-16 | MTV50CB15 MTV50CB15 | EV-1226 EV-1226 |

4 Alternate used in some parts.

CAPACITORS

| ITEM No. | RATING | MFR. PART No. | REPLACEMENT DATA | | | | |
|----------|---------------|---------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | ARCO/ELMENCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C601 | 5pf 50V +.5pf | | | | NP05 | | 10TCC-V50 |
| C602 | 15pf 50V 10% | | | | NP015 | | 10TCC-Q15 |
| C603 | 7pf 50V +.5pf | | | | NP07 | CN0415 | 10TCC-V68 |
| C604 | 18pf 50V 10% | | | | NP018 | CN0418 | 10TCC-Q18 |
| C605 | .01 50V | | CCT0-150 | DTZ-15 | MGPO1 | TA110 | TG-S10 |
| C606 | .01 50V | | CCT0-6R8 | DTZ-6R8 | MGPO1 | TA110 | TG-S10 |
| C607 | .01 50V | | CCT0-180 | | MGPO1 | TA110 | TG-S10 |
| C608 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C609 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C610 | .01 50V 10% | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C612 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C613 | .01 50V | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| C614 | 47pf 50V 10% | | CCD-103 | CK-103 | MGPO1 | TA110 | TG-S10 |
| | | | CCT0-470 | DTZ-47 | NP047 | CN0447 | 10TCC-Q47 |

CONTROLS (All wattages 1/2 watt, or less, unless listed)

| ITEM No. | FUNCTION | RESIST-ANCE | REPLACEMENT DATA | | | | |
|----------|-------------------------|-------------|------------------|----------------------------|--------------------|------------------|------------------|
| | | | MFR. PART No. | CENTRALAB PART No. | CLAROSTAT PART No. | CTS-IRC PART No. | MALLORY PART No. |
| R609 | UHF Fine Tuning | 500K | EVL S3AA00B55 | TSV-500K (1) or T-500K (1) | | X201R504B (1) | MTC55L1 (1) |
| R610 | VHF High Channel Tuning | 500K | EVL S3AA00B55 | TSV-500K (1) or T-500K (1) | | X201R504B (1) | MTC55L1 (1) |
| R611 | VHF Low Channel Tuning | 500K | EVL S3AA00B55 | TSV-500K (1) or T-500K (1) | | X201R504B (1) | MTC55L1 (1) |
| VR75 | Tuning | 500K | EVS S9A307E55 | | | | |

- (1) For horizontal mounting, bend the two outside terminals to fit "PC" board. Use jumper wire to connect center terminal to "PC" board.
(2) Cut off one of the outside terminals.

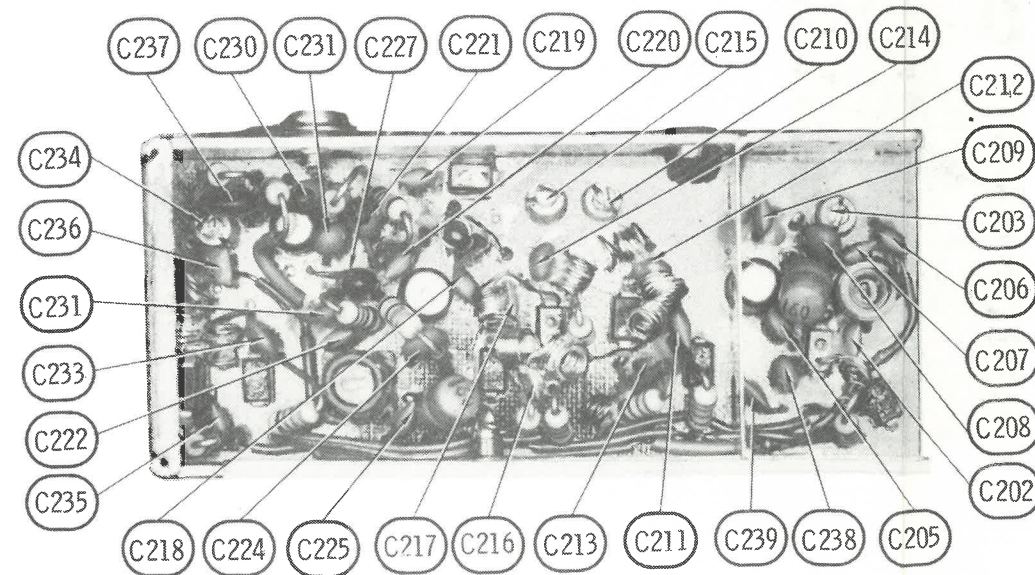
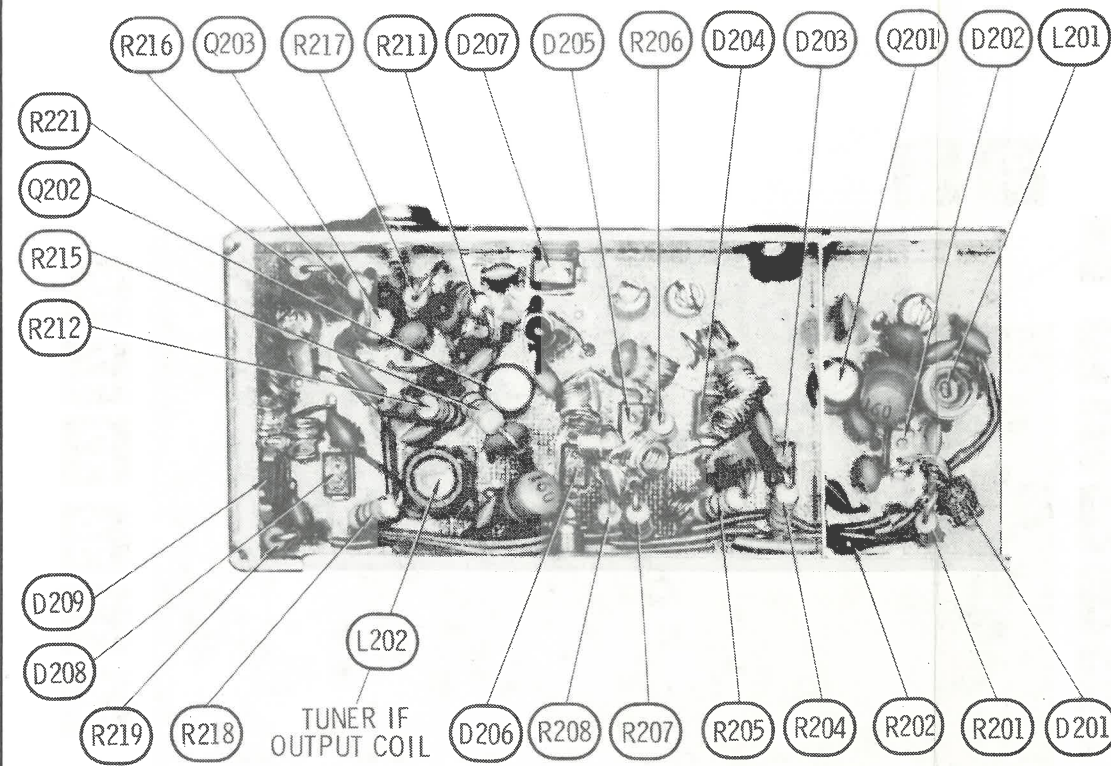
COILS (RF-IF)

| ITEM No. | USE | MFR. PART No. | NOTES |
|----------|--------------------|---------------|-------|
| L601 | RF Choke (4 turns) | TLR809403 | |
| L602 | RF Choke (4 turns) | TLR809403 | |

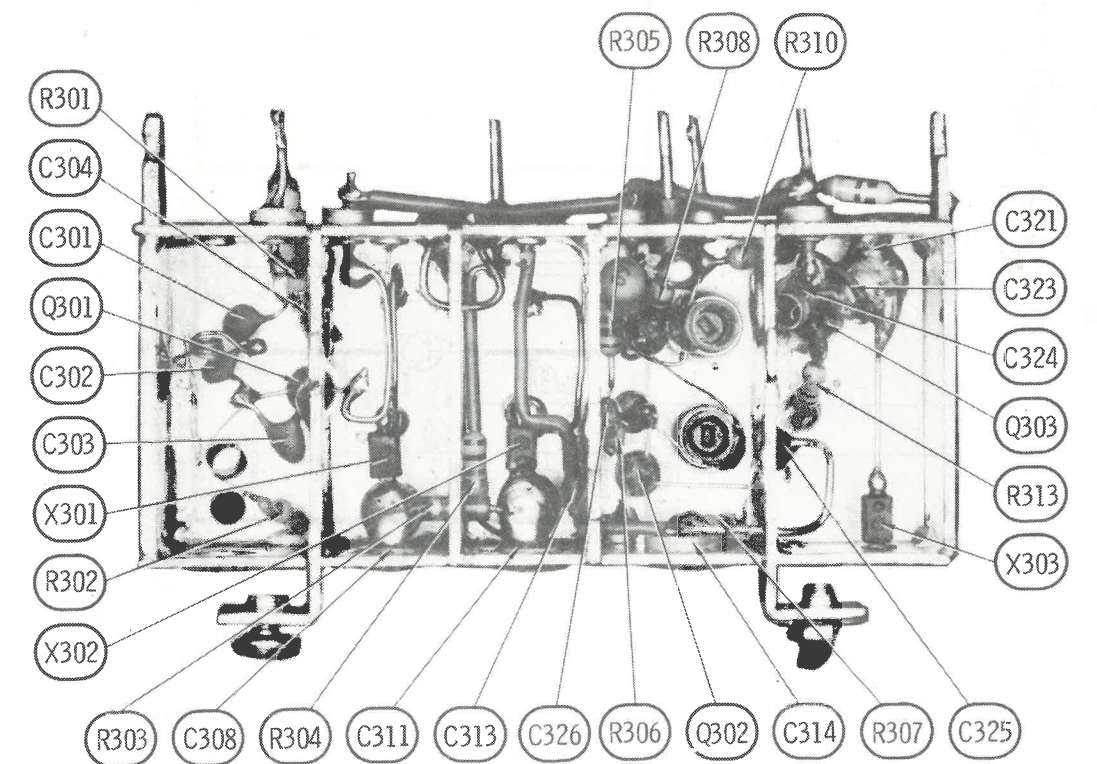
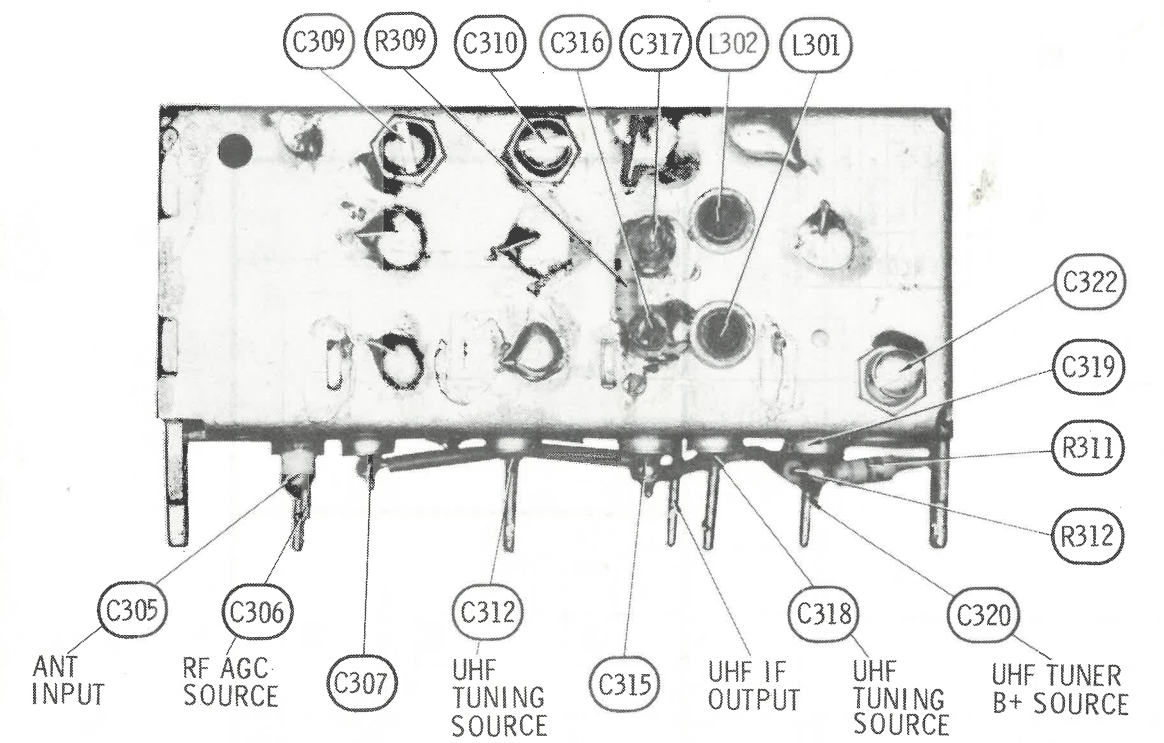
| ITEM No. | USE | MFR. PART No. | NOTES |
|----------|-------------|---------------|-------|
| T601 | 4.5MHz Trap | EXA5XZ01 | |

MISCELLANEOUS

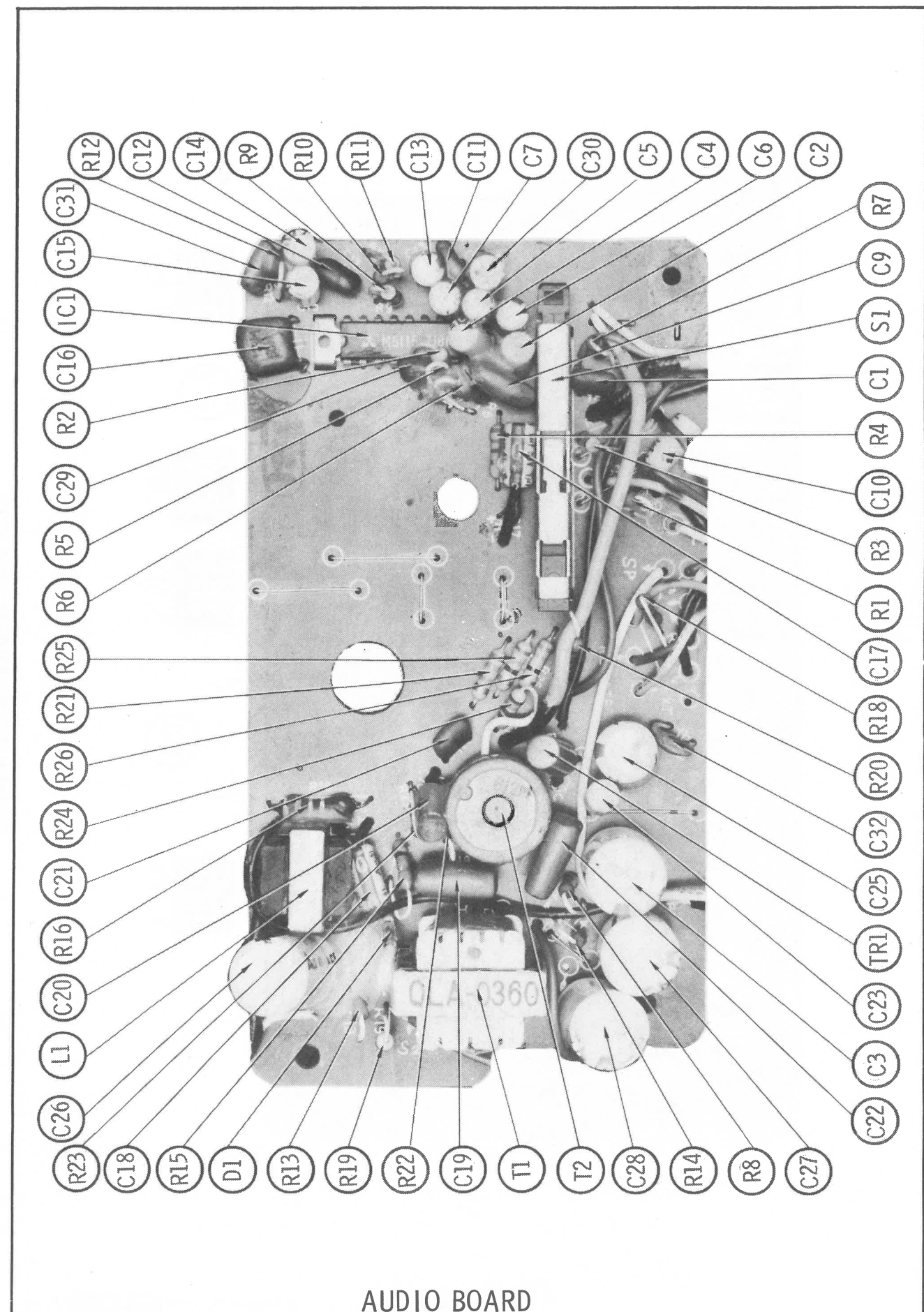
| ITEM No. | PART NAME | PART No. | NOTES |
|----------|-----------|-----------|----------------------------|
| SW4 | Switch | TSE803023 | Band Selector (Slide type) |



VHF TUNER



UHF TUNER



AUDIO BOARD

SET 1303 FOLDER 1-B

PANASONIC TAPE RECORDER
Used With MODELS TR-003, TR-003C

PHOTOFACT® Folder

with CIRCUITRACE®

PANASONIC TAPE RECORDER
Used With MODELS TR-003, TR-003C

IMPORTANT FILING NOTICE

This PHOTOFACT Folder covers equipment used with the TV chassis covered in PHOTOFACT SET 1303 FOLDER 1. File this Folder with the TV Folder in the yellow filing jacket provided.

This unit is a two-track monaural recorder having a speed of 1-7/8 ips. Automatic recording level is provided.

Jacks are provided for microphone, monitor, external power, and remote operation.

CLEANING - HEAD DEMAGNETIZING - LUBRICATING

Clean all tape contact surfaces with a soft, lint-free material and head cleaner or methyl alcohol. Use alcohol to remove oil and grease from all driving surfaces.

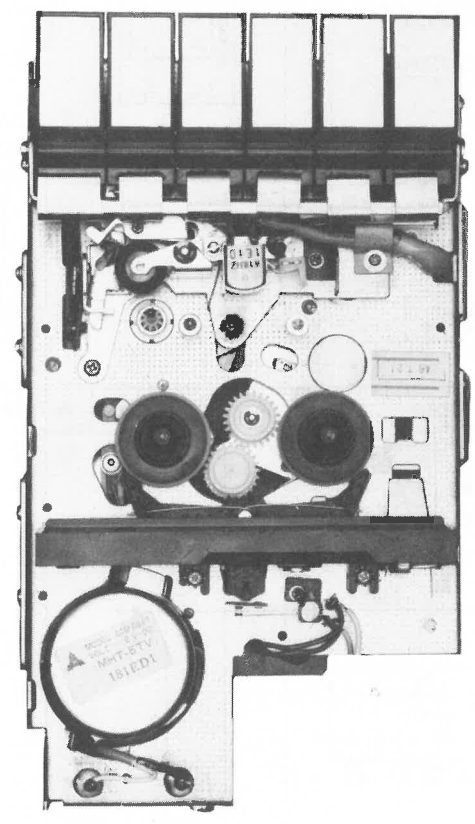
CAUTION: Avoid getting head cleaner on any plastic surface.

Lubricate bearings and bushings lightly with

#20 machine oil. Use a light film of non-hardening grease on cam surfaces.

Bearings are oil-less type and do not need lubrication. Lubricate bushings lightly with #20 machine oil. Use a light film of nonhardening grease on cam surfaces.

Demagnetize head when unit is serviced. Avoid using magnetic materials near head.



PANASONIC TAPE RECORDER
Used With MODELS TR-003, TR-003C

SET 1303 FOLDER 1-B

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

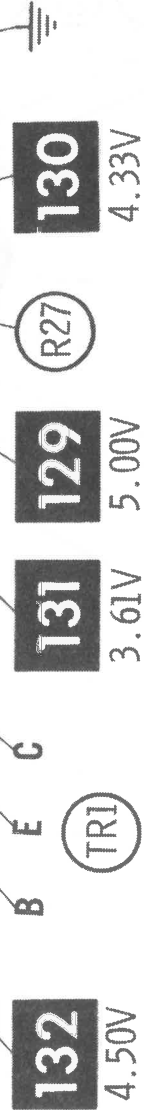
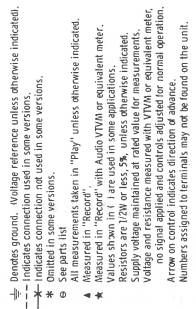


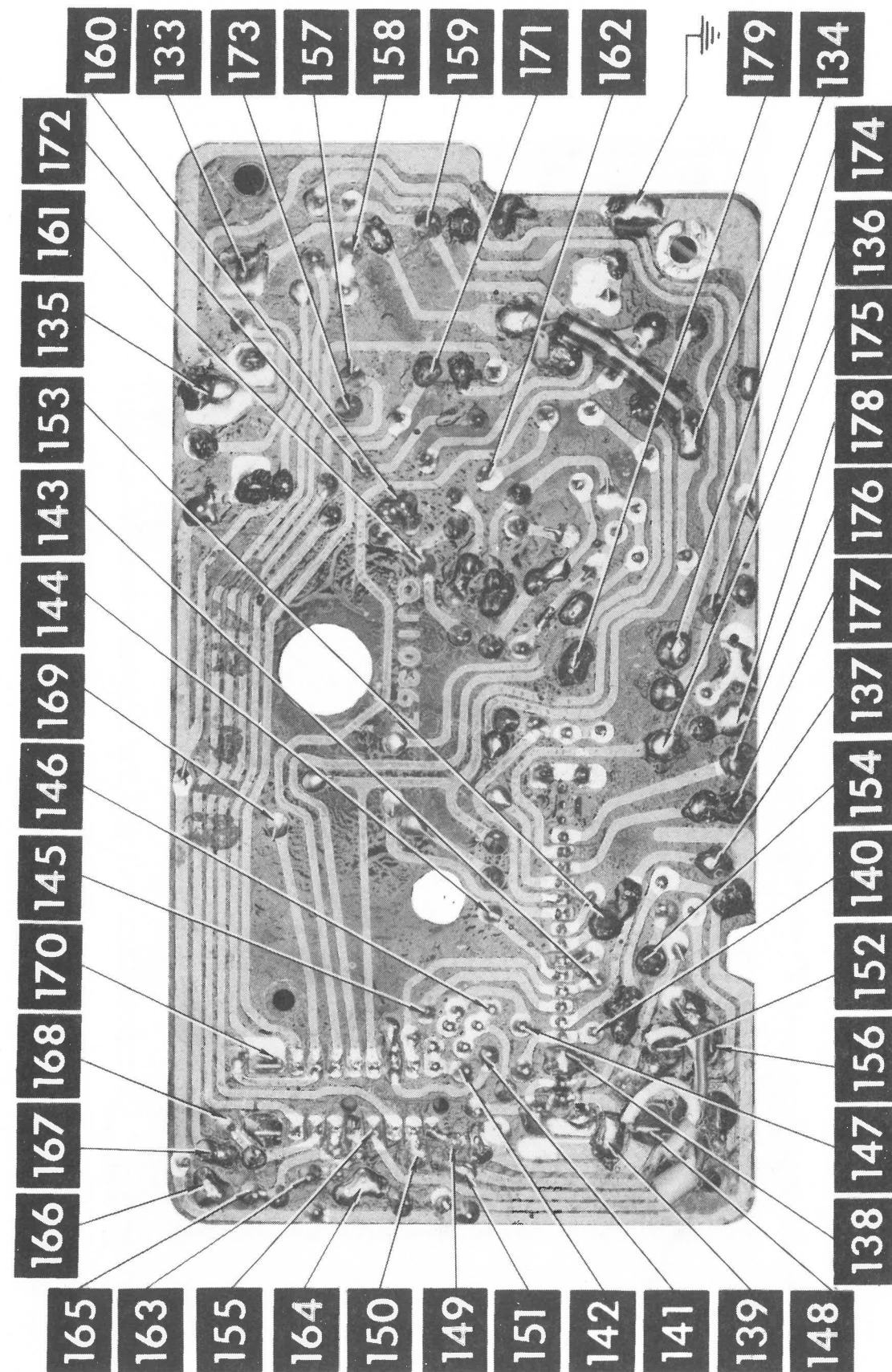
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. 3PC594

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DATE 3-73

SET 1303 FOLDER 1-B

A Howard W. Sams **CIRCUITRACE[®]** Photo



AUDIO BOARD

A Howard W. Sams CIRCUITRACE® Photo

OPERATING INSTRUCTIONS

RECORD

Press Cassette and Stop buttons and insert a cassette, closed side first. Tabs on closed side must be intact.

Connect the microphone, move the switch on the microphone to On, and push and hold Record button while pressing Play button.

The unit will automatically maintain the correct recording level.

PLAY

Insert a cassette, press Play button, and adjust the volume.

MONITOR

To monitor the source while recording, connect an earphone to Earphone Output jack.

SEQUENCE OF OPERATION

PLAY

Pressing the Play button, locked by Plate (46) and Spring (47), slides Assembly (43) to move Plate (15), actuating Switch (S2) and releasing Spindles (4) and (5).

Assembly (43) also moves Assembly (28) to move the head forward and to press Roller (1) against the capstan. Assembly (43) also releases Assembly (22), pivoted by Spring (18), to press Shaft (9) against Spindle (4).

The motor -- through Pulley (31), Belt (2), Pulley (11), Felt (6), and Shaft (9) -- drives Spindle (4).

RECORD

The Record sequence is the same as "Play". However, the tab on the cassette pivots Lever (24) to permit the Record button to be pressed. Pressing the Record button slides Rod (45) to actuate Switch (S1).

FAST FORWARD

Pressing the Fast Forward button, locked by Plate (46) and Spring (47), slides Rod (44) to move Plate (15), actuating Switch (S2) and releasing Spindles (4) and (5). Rod (44) also releases Lever (23), pivoted by Spring (17), to press Idler (13) against Flywheel (10).

The Fast Forward button also slides Rod (42) to cause the pin on Rod (42) to pivot the arm on Assembly (36), pivoting Assembly (36) to allow Spring (17) to press Idler (12) against Spindle (4).

The motor -- through Pulley (31), Belt (2), Flywheel (10), Idler (13), Belt (3), Pulley (33), and Idler (12) -- drives Spindle (4).

REWIND

Pressing the Rewind button, locked by Plate (46) and Spring (47), slides Rod (44) to move Plate (15), actuating Switch (S2) and releasing Spindles (4) and (5). Rod (44) also releases Lever (23), pivoted by Spring (17), to press Idler (13) against Flywheel (10).

Rod (44) also releases Assembly (36), pivoted by Spring (37), to press Idler (14) against Spindle (5).

The motor -- through Pulley (31), Belt (2), Flywheel (10), Idler (13), Belt (3), Pulley (33), Idler (12), and Idler (14) -- drives Spindle (5).

STOP

Pressing the Stop button pivots Plate (46) to release any depressed button and allows Springs (7), (38), and (41) to reverse the "Play" or "Record" sequence. Springs (7), (17), (37), (39), and (40) reverse the "Fast Forward" sequence. Springs (17) and (39) reverse the "Rewind" sequence.

AUTOMATIC STOP

The Automatic Stop sequence is the same as "Stop". However, the tape tension against Detector (52) pivots Lever (27), causing Plate (49) to pivot Rod (48) against the cam on Gear (57). The cam on Gear (57) pushes Rod (48) to pivot Plate (46), releasing any depressed button.

The motor -- through Pulley (31), Belt (2), Flywheel (10), and the Gear (54) -- drives Gear (57).

CASSETTE EJECT

Pressing the Cassette Eject button pivots the latch on Assembly (30) to release the lid and to eject the cassette.

PANASONIC TAPE RECORDER
Used With MODELS TR-003, TR-003C

FOLDER 1-B

ADJUSTMENTS

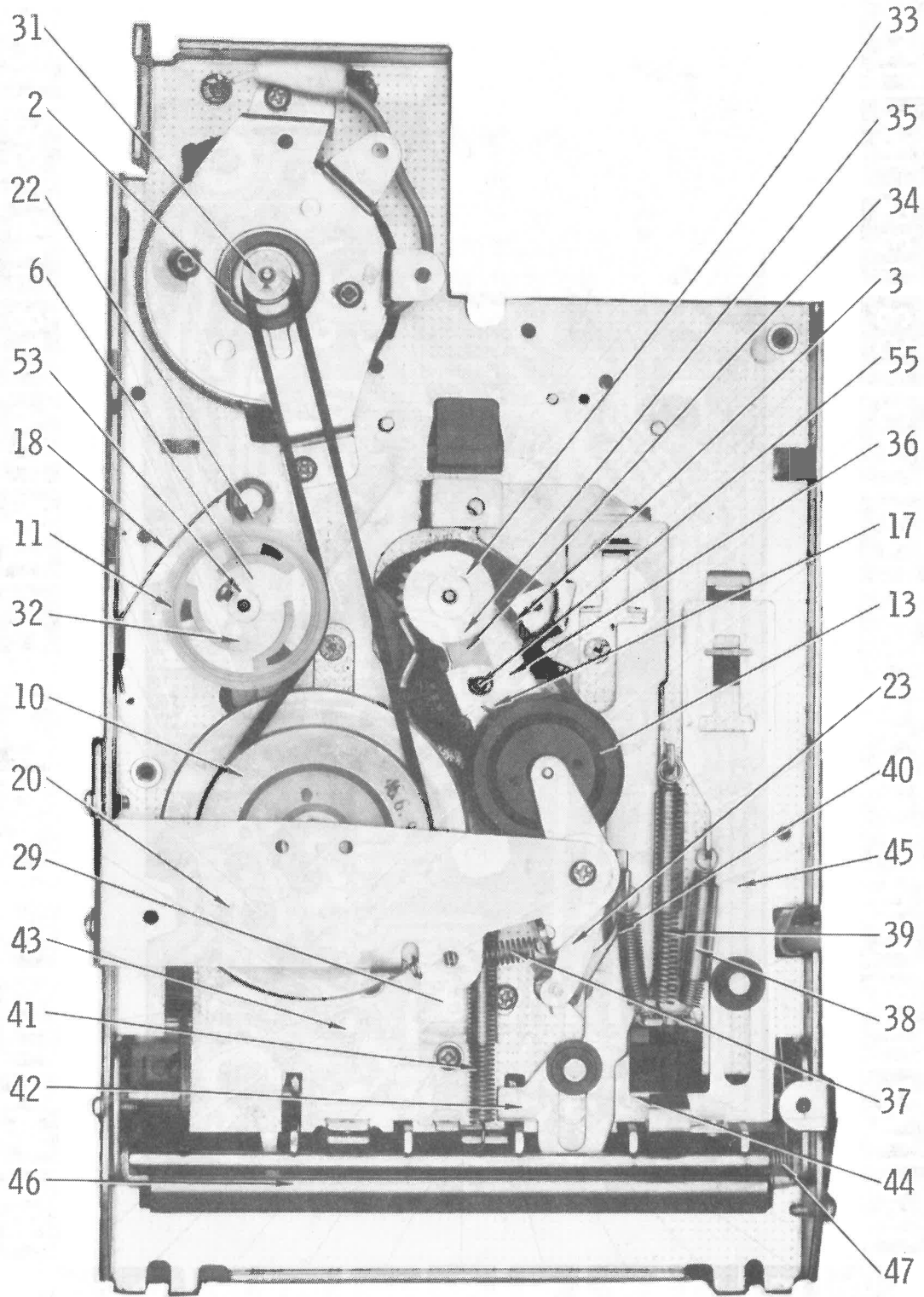
- IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 1.
- 1. All voltage measurements referred to in this chart are made at a tape speed of 1-7/8 ips with an audio VTVM having a flat response to 100KC.
 - 2. All torque measurements are made at a tape speed of 1-7/8 ips with a spring scale applied to a point 1 inch from spindle center.
 - 3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

| ADJUST | REMARKS |
|-----------------------------|---|
| Play Take-up Torque | Nominal value 1-1/4 oz. Controlled by setting of Set Collar Assembly (53). |
| Fast Forward Take-up Torque | Nominal value 1-1/2 oz. Controlled by condition of rubber parts in drive train. |
| Rewind Torque | Nominal value 1-1/4 oz. Controlled by condition of rubber parts in drive train. |
| Braking Torque | Measured in Stop. Nominal value 1 oz. counterclockwise on supply spindle. Nominal value 1 oz. clockwise on take-up spindle. Controlled by tension of Spring (7). |
| Pressure Roller Pressure | Nominal value 16 oz. Controlled by tension of Spring (8). |
| Record/Play Head Azimuth | Connect an AC VTVM across speaker, play an azimuth-test tape, and adjust B1 for maximum output. |
| Erase Current | Nominal value 5.6ma (2.1VDC) in erase head. No adjustment provided. |
| Record Bias | Nominal value 13.8V rms (.38ma) across record/play section of erase/record/play head. No adjustment provided. |
| Bias Oscillator | Nominal frequency 41KC. No adjustment provided. |
| A.R.L. Operation | Select record mode and disable bias oscillator by disconnecting R26. Apply a 1000-cycle signal at .44V rms (-5db) through a 100K resistor to Mic Input. Voltage across record/play section of erase/record/play head should be .55V rms (-3db). Increasing input level 10db should increase voltage across head less than 2 db. |

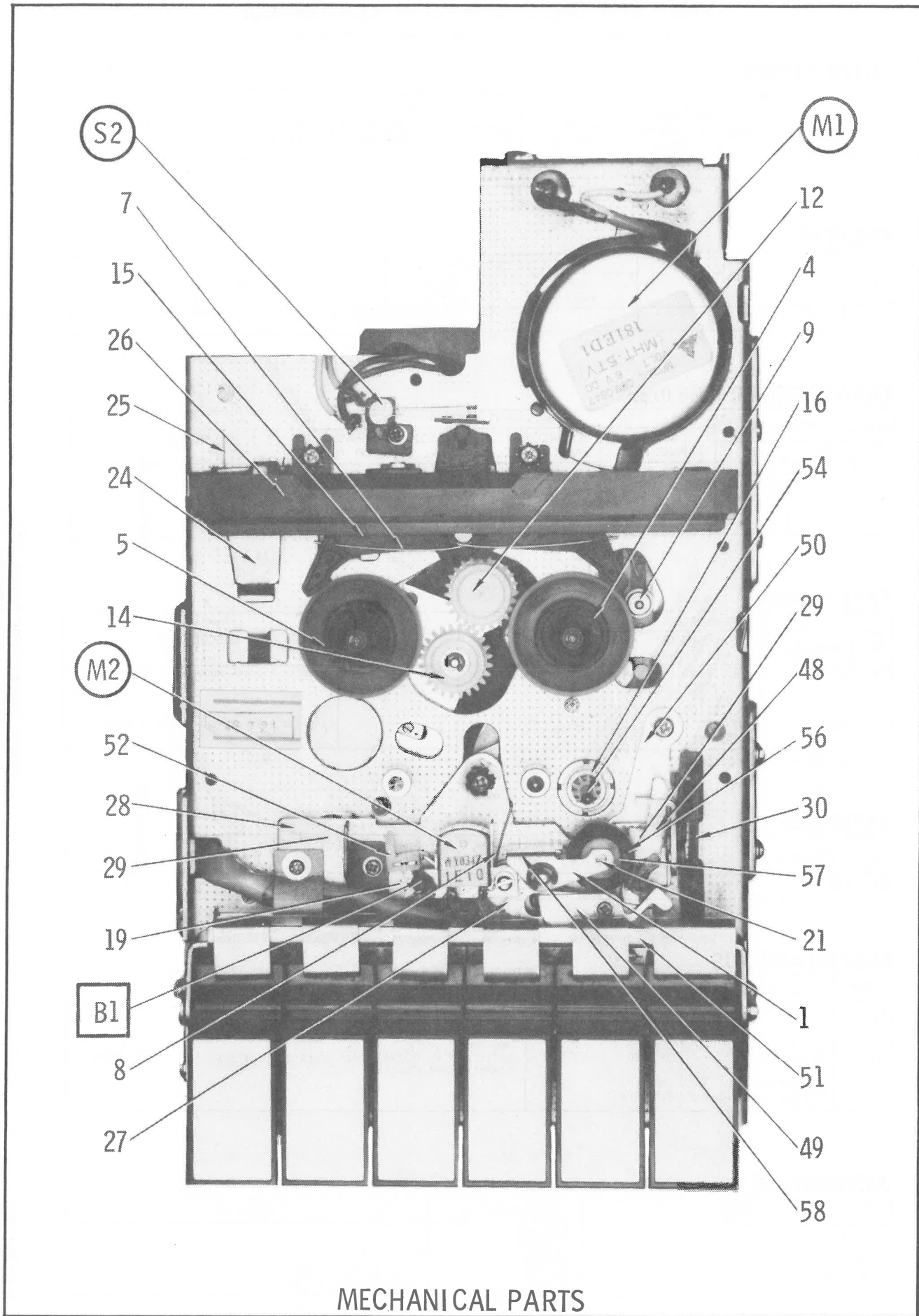
TROUBLE CHART

IMPORTANT: Before consulting this chart, refer to General Servicing Information on page 1.

| SYMPTOM | REMARKS |
|--|--|
| Take-up erratic or inoperative in Play or Record. | Spindle (4) dirty, worn, or binding. Shaft (9) dirty, worn, or binding. Clutch (6) dirty or worn. Pulley (11) dirty or binding. Spring (18) weak or missing. |
| Take-up erratic or inoperative in Fast Forward | Spindle (4) dirty, worn, or binding. Idler (12) dirty or binding. Idler (13) dirty, worn, or binding. Spring (17) weak or out of place. Belt (3) dirty, worn, or broken. Flywheel (10) dirty. |
| Rewind erratic or inoperative | Spindle (5) dirty, worn, or binding. Idler (14) dirty, worn, or binding. Idler (12) dirty, worn, or binding. Idler (13) dirty, worn, or binding. Belt (3) dirty or broken. Flywheel (10) dirty. Pulley (33) dirty or binding. Spring (17) weak or broken. |
| Spindles do not stop immediately when stop function is selected. | Plate (15) worn or binding. Spring (7) weak or missing. |



MECHANICAL PARTS



TROUBLE CHART (Continued)

| SYMPTOM | REMARKS |
|---|---|
| Capstan does not rotate. | Belt (2) dirty, worn, or broken. Flywheel binding. Motor defective or not supplied with power. Pulley (31) loose. |
| Tape rides up and down between capstan and pressure roller. | Capstan bent. Roller (1) worn. Excessive take-up torque. |
| Wow or flutter. | Roller (1) dirty or worn. Belt (2) dirty or worn. Bearing (16) binding. Cassette defective. Motor defective. Excessive take-up torque. |
| Sound is weak or distorted. | Record/play head dirty, misadjusted, or defective. Amplifier defective. Bias oscillator defective. Cassette defective. |
| Erase weak or inoperative. | Erase head dirty or defective. Insufficient erase current. |

MECHANICAL PARTS LIST

| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|----------|----------|--------------------------------|----------|-----------|--------------------------------|
| 1 | QXBK0020 | Pressure Roller Assembly | 30 | (5) | Cassette Eject Assembly |
| 2* | QBD0131* | Flywheel Belt* | 31 | QXP0252 | Motor Pulley Assembly |
| 3 | QDB0114 | Fast Forward Belt | 32 | QBP1229 | Friction Spring |
| 4* | QXPO328* | Take-up Spindle Assembly* | 33 | (1) | Fast Forward Pulley |
| 5* | QXPO328* | Supply Spindle Assembly* | 34 | (1) | Fast Forward Arm |
| 6 | QBJ1445 | Felt Clutch | 35 | QXL0266 | Fast Forward Arm Assembly |
| 7 | QBN1088 | Brake Spring | 36 | QXL0258 | Fast Forward Lever |
| 8 | QBN1112 | Pressure Roller Spring | 37 | QBN1089 | Connection Pulley Lever Spring |
| 9 | (6) | Take-up Lever Shaft | 38 | QBT1434 | Record Switch Rod Spring |
| 10 | QXF0061 | Flywheel Assembly | 39 | QBT1371 | Rewind Rod Spring |
| 11 | QBJK0057 | Take-up Pulley -C | 40 | QBT1405 | Fast Forward Rod Spring |
| 12 | QBJ1383 | Fast Forward Gear Idler | 41 | QBT1478 | Playback Rod Spring |
| 13* | (2)* | Connection Pulley Idler* | 42 | QXMK0013 | Fast Forward Rod Assembly |
| 14 | QBJ1384 | Rewind Gear Idler | 43 | QXMK0012 | Playback Rod Assembly |
| 15 | QBJ1381 | Brake Plate | 44 | QMR1163 | Rewind Rod |
| 16 | (3) | Capstan Bearing | 45 | QXMK0014 | Record Switch Rod Assembly |
| 17 | QBN1084 | Gear Lever Spring | 46 | QMF1391 | Push-button Lock Plate |
| 18 | QBN1087 | Take-up Lever Spring | 47 | QBN1090 | Lock Plate Spring |
| 19 | QBC1157 | Azimuth Adjust Spring | 48 | QMRA0011 | Auto Stop Rod |
| 20 | QXHK0020 | Flywheel Bracket | 49 | QMQA0002 | Stop Plate |
| 21 | QMN1295 | Pressure Roller Shaft | 50 | QXHK0002 | Auto Stop Table Assembly |
| 22 | QXLK0069 | Take-up Lever Assembly | 51 | QBTAA0006 | Lock Release Spring |
| 23 | QXL0264 | Connection Pulley Lever Ass'y. | 52 | QBJ1585 | Stop Detector |
| 24 | (4) | Erase Safety Lever | 53 | QBP1242 | Set Collar Assembly |
| 25 | (4) | Erase Safety Lever Spring | 54 | QDG1025 | Pinion Gear |
| 26 | QXQK0005 | Cassette Retainer Assembly | 55 | QMS1563 | Rewind Gear Shaft |
| 27 | QMLA0013 | Stop Lever | 56 | QXPO325 | Pressure Roller |
| 28 | QXKK0039 | Head Plate | 57 | QDG1029 | Stop Gear |
| 29 | QDK1002 | 3/32" Steel Ball Bearing | 58 | QMLA1014 | Pressure Roller Lever |

* Flywheel Belt - E-V/GAME Replacement Number 1425-07.
WALSCO Replacement Number 1425-07.

* Idler Tire - E-V/GAME Replacement Number 1425-13.
WALSCO Replacement Number 1425-13.

* Spindle Tire - E-V/GAME Replacement Number 1425-13.
WALSCO Replacement Number 1425-13.

(1) Part of Assembly (35). (2) Part of Assembly (23). (3) Part of Chassis. (4) Part of Assembly (26).
(5) Part of Assembly (50). (6) Part of Assembly (22).

PANASONIC TAPE RECORDER
Used With MODELS TR-003, TR-003C

FOLDER 1-B

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS

| ITEM No. | TYPE / MFGR. No./PART No. | REPLACEMENT DATA | | | | | | |
|----------|---------------------------|---------------------------|----------------------------------|------------------|-------------------|--------------|------------------|-------------------|
| | | GENERAL ELECTRIC PART No. | INTERNATIONAL RECTIFIER PART No. | MALLORY PART No. | MOTOROLA PART No. | RCA PART No. | SPRAGUE PART No. | SYLVANIA PART No. |
| D1 | 0A81 | 1N34AS | 1N34A | PTC207 | HEP134 | SK3087 | | ECG 109 |
| IC1 | M5115P | | | | | | | |
| TR1 | 2SB172(A) | GE-2 | TR-05 | PTC109 | HEP254 | SK3004 | RT121 | ECG 102A |

ELECTROLYTIC CAPACITORS

| ITEM No. | RATING | REPLACEMENT DATA | | | | | | | |
|----------|--------|------------------|---------------|--------------------|---------------------------|---------------------------|------------------|------------------|--|
| | | MFGR. PART No. | ARCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | GENERAL ELECTRIC PART No. | MALLORY PART No. | SPRAGUE PART No. | |
| C2 | .68 | 25V | ECAG25ER68 | | | | TAS684K035POA | EV-1611 | |
| C3 | 470 | 10V | ECEA10V470N | RME-K-D-500 | EA15-500 | WBR500-16 | MTV500DN15 | EV-1150 | |
| C4 | 3.3 | 25V | ECEA25V3R3N | RME-A-G-003 | EP30-5 | WBR5-50 | MTV3CB50 | EV-1318 | |
| C5 | 1 | 50V | ECEA50V1N | RME-A-J-001 | EP50-2 | WBR1-50 | MTV1CB50 | EV-1615 | |
| C6 | 3.3 | 25V | ECEA25V3R3N | RME-A-G-003 | EP30-5 | WBR5-50 | MTV3CB50 | EV-1318 | |
| C7 | 10 | 16V | | RME-B-E-010 | EP15-10 | WBR10-25 | MTV10CB50 | EV-1222 | |
| | 10 | 10V | ECEA10V10N/ | RME-A-D-010 | EP15-10 | WBR10-25 | MTV10CB50 | EV-1222 | |
| C10 | 1 | 50V | ECEA50V1N | RME-A-J-001 | EP50-2 | WBR1-50 | MTV1CB50 | EV-1615 | |
| C13 | 10 | 16V | | RME-B-E-010 | EP15-10 | WBR10-25 | MTV10CB50 | EV-1222 | |
| | 10 | 10V | ECEA10V10N/ | RME-A-D-010 | EP15-10 | WBR10-25 | MTV10CB50 | EV-1222 | |
| C14 | 3.3 | 25V | ECEA25V3R3N | RME-A-G-003 | EP30-5 | WBR5-50 | MTV3CB50 | EV-1318 | |
| C15 | 1 | 50V | ECEA50V1N | RME-A-J-001 | EP50-2 | WBR1-50 | MTV1CB50 | EV-1615 | |
| C17 | 1 | 50V | ECEA50V1N | RME-A-J-001 | EP50-2 | WBR1-50 | MTV1CB50 | EV-1615 | |
| C18 | 4.7 | 25V | ECEA25V4R7N | RME-A-G-005 | EP30-5 | WBR5-50 | MTV5CB50 | EV-1319 | |
| C23 | 2.2 | 6.3V | ECAG6E2R2 | ME-1-B-002 | EP6-2 | WBR2-50 | MTV2CB50 | EV-1317 | |
| C25 | 220 | 6.3V | ECEA6V220N | ME-6-B-200 | EA6-250 | WBR250-16 | MTV200DB10 | EV-1140 | |
| C26 | 1000 | 6.3V | ECEA6V1000Y | RME-L-B-1000 | EA6-1000 | WBR1000-16 | TC610B | EV-1060 | |
| C27 | 470 | 10V | ECEA10V470N | RME-K-D-500 | EA15-500 | WBR500-16 | MTV500DN15 | EV-1150 | |
| C28 | 470 | 10V | ECEA10V470N | RME-K-D-500 | EA15-500 | WBR500-16 | MTV500DN15 | EV-1150 | |
| C30 | .22 | 25V | ECAG25ER22 | | | | TAS224K035POA | SD35-R229 | |

/ Alternate used in some versions.

CAPACITORS

| ITEM No. | RATING | | | MFGR. PART No. | REPLACEMENT DATA | | | | |
|----------|--------|------|-----|----------------|-----------------------|--------------------|---------------------------|------------------|------------------|
| | | | | | ARCO/ELMENCO PART No. | CENTRALAB PART No. | CORNELL-DUBILIER PART No. | MALLORY PART No. | SPRAGUE PART No. |
| C1 | .0022 | 50V | 10% | | 1MDF-1-222 | CPR-2200J | DPMS-6D22 | PVC6222 | 1PB-D22 |
| C9 | .027 | 50V | 10% | | 1MD-1-273 | | DPMS-6S27 | PVC6127 | 1PB-S27 |
| C11 | .0022 | 50V | | | 1MDF-1-222 | CPR-2200J | DPMS-6D22 | PVC6222 | 1PB-D22 |
| C12 | .001 | 50V | | | 6DP-1-102 | CPR-1000J | DPMS6D1 | PVC621 | 225P10291WD3 |
| C16 | .018 | 50V | | | 1MD-1-183 | | | PVC1118 | 1PB-S18 |
| C19 | .1 | 50V | | | 1DP-2-104 | | DPMS2P1 | PVC101 | 225P10491WD3 |
| C20 | 680 | 125V | 10% | | DM-20-681J | CPR-680J | CD19FD681J03 | SX368 | 424ME6800J501 |
| C21 | .0022 | 50V | 10% | | 1MDF-1-222 | CPR-2200J | DPMS-6D22 | PVC6222 | 1PB-D22 |
| C22 | .1 | 50V | | | 1DP-2-104 | | DPMS2P1 | PVC101 | 225P10491WD3 |
| C29 | .0022 | 50V | | | 1MDF-1-222 | CPR-2200J | DPMS-6D22 | PVC6222 | 1PB-D22 |
| C31 | .01 | 50V | | | 1DP-1-103 | CPR-10000J | DPMS6S1 | PVC211 | 225P10391WD3 |
| C32 | .0022 | | | | CCD-222 | DD-222 | GP2200 | GP222 | 10TS-D22 |

RESISTORS (Power and Special)

| ITEM No. | RATING | REPLACEMENT DATA | |
|----------|-----------------|------------------|----------------|
| | | WORKMAN PART No. | MFGR. PART No. |
| R16 | .47 1/2W Carbon | | ERM12PR47 |

| ITEM No. | RATING | REPLACEMENT DATA | |
|----------|--------|------------------|----------------|
| | | WORKMAN PART No. | MFGR. PART No. |
| | | | |

COILS (RF-IF)

| ITEM No. | USE | REPLACEMENT DATA | | | |
|----------|-----------------|------------------|-------------------|-----------------|------------------|
| | | PART No. | MEISSNER PART No. | MILLER PART No. | WORKMAN PART No. |
| T2 | Bias Oscillator | QLB0135 | | | |

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

FILTER CHOKE

| ITEM No. | RATINGS | | | REPLACEMENT DATA | | | | NOTES |
|----------|--------------------|---------|------------------------------|------------------|------------------|---------------------|----------------|-------|
| | CURRENT (Measured) | DC RES. | INDUCTANCE (0 CURRENT 1000~) | MFGR. PART No. | STANCOR PART No. | THORDARSON PART No. | TRIAD PART No. | |
| L1 | .1ADC | 2.1 | 5mh | QLP0105 | | | | |

SPEAKER

| ITEM No. | TYPE | REPLACEMENT DATA | | NOTES |
|----------|------------------|------------------|---------------|-------|
| | | MFGR. PART No. | QUAM PART No. | |
| SP1 | 3-1/2" PM 8 ohms | EAS9P70SC | | |

TRANSFORMER (Audio Output)

| ITEM No. | IMPEDANCE | | REPLACEMENT DATA | | | | NOTES |
|----------|-----------|--|------------------|------------------|---------------------|----------------|-------|
| | PRI. | SEC. | MFGR. PART No. | STANCOR PART No. | THORDARSON PART No. | TRIAD PART No. | |
| T1 | 77CT | 8 Feedback Tap @ 43 ohms DC Resistance | QLA0360 | | | | |

TAPE HEADS

| ITEM No. | MEASURED | | | MFGR. PART No. | NORTRONICS PART No. | DESCRIPTION |
|----------|------------|-----------------------------------|------------|----------------|---------------------|--|
| | INDUCTANCE | BIAS/ERASE VOLTS (RMS) | BIAS FREQ. | | | |
| M2 | 255mh | 13.8V rms (.38ma) .032VDC (.07ma) | 41KC | WY034Z | | Cassette 2-Track Mono Record/Play Section* |
| | 84mh | 2.1VDC (5.6ma) | | | | Cassette 2-Track Mono Erase Section* |

* Combo Record/Play/Erase head.

BATTERIES

| ITEM No. | VOLTAGE | MFGR. PART No. | EVEREADY PART No. | NOTES |
|----------|---------|----------------|-------------------|-------|
| BAT | 6V | TY355C | | |

MISCELLANEOUS

| ITEM No. | PART NAME | PART No. | NOTES |
|----------|-----------------------|----------|---|
| M1 | Motor | QDM0647 | Drive Motor (2150 RPM @ 4.8VDC) |
| S1 | Switch | QSS1116A | Record-Playback (Push-button) |
| S2 | Switch | QSB0186 | Tape Power (Leaf) |
| S3 | Switch | QSS1080 | Monitor Off-On (Slide) Part of earphone, microphone, remote jack, Assembly, part #QEJ0175 |
| | Microphone | WM2241P | |
| | Printed Circuit Board | QEMK0019 | |

ACCESSORIES

| ITEM | MFGR. PART No. | REMARKS |
|--|---|---|
| Earphone AC Cord DC Cord AC Adaptor | EAE3YDDA TSX163-2 TSX8105 TY-180P TY-180C | Used in Model TR003 Used in Model TR003C |

PANASONIC TAPE RECORDER
Used with MODELS TR-003, TR-003C

FOLDER 1-B