

**SERVICE MANUAL**

# The Fisher®

# 434

## 4/2-Channel Stereo Receiver



WORLD LEADER IN HIGH QUALITY STEREO

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### REQUIRED TEST EQUIPMENT

The following test equipment is required to completely test and align the Tuner Section and the CD-4 Demodulator Section of the 434 Receiver.

- Line Voltage Autotransformer or Voltage Regulator
- AC DC Multimeter
- Accurately Calibrated AC Voltmeter
- Oscilloscope (Flat to 100 kHz Minimum)
- Low-Distortion Audio Oscillator
- Harmonic Distortion Analyzer
- CD-4 Generator (Fisher 3109 or equivalent)
- Frequency Indicator, Fisher
- Model 3129 OR Frequency Counter
- Four (4) Load Resistors, 8-ohms, 250 Watts (Minimum Rating)
- Low-Distortion AM-FM Signal Generator
- 10.7 MHz Sweep Generator
- 455 kHz Sweep Generator
- Multiplex Generator
- Two (2) RCA Shorting Plugs

**CAUTION:** This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistorized equipment and printed circuitry.

CHASSIS PARTS LIST

| Ref. Des.         | Description                                | Part Number   | Ref. Des. | Description                     | Part Number |
|-------------------|--|---------------|-----------|---------------------------------|-------------|
|                   | <b>FRONT PANEL</b>                         |               |           |                                 |             |
| —                 | Jacks, Earphone (4)                        | JK20627-5     | —         | Fuse Holder                     | EA51408     |
| —                 | Knob, TUNING                               | EK20049       | —         | Fuse, 2-1/2A, 125V, Slo-Bo      | FL51313-5   |
| —                 | Knobs (2), Control                         | EK20048       | —         | Fuses (4), 1-1/2A, 125V, Slo-Bo | FL51313-20  |
| —                 | Dual Knobs (4), (Top)                      | EK20051       | —         | Strain Relief                   | EM21116-8   |
| —                 | Dual Knobs (4), (Bottom)                   | EK20053       | —         | Line Cord                       | W50023-1    |
| —                 | Knobs (7), Pushbutton                      | EK20046-4     | —         | Circuit Breaker (85°C)          | 8M51455     |
| —                 | Knob                                       | EK20060-2     | —         | Antenna Support Assembly        | AS4130-140  |
| —                 | Knob                                       | EK20058-2     | —         | Ferrite Antenna                 | LA51417-2   |
| —                 | Knob                                       | EK20059-2     | —         | Antenna Support Bracket         | AB51465     |
| —                 | Balance Control (Joy Stick)                | RP50160-315   |           |                                 |             |
| —                 | Knob, Lever                                | EK20050-1     |           |                                 |             |
| —                 | Dress Panel Assembly                       | AS4119-120    | —         | PRINTED CIRCUIT BOARDS          |             |
| —                 | Window                                     | AD23116       | —         | PCB, Power Amplifier            | PB2379-1    |
| —                 | Spring, Window Retainer                    | AN51427       | —         | PCB, Regulated Power Supply     | PB2380-1    |
| —                 | End Strip, Right                           | AD23083-6     | —         | PCB, SQ Decoder & Preamp        | PB2381-6    |
| —                 | End Strip, Left                            | AD23083-5     | —         | PCB, Audio Control              | PB2389-1    |
| CR508             | L.E.D. STEREOBEACON                        | TR19001       | —         | PCB, FM-AM Tuner                | PB2385-1    |
| —                 | Tuning Shaft Assembly                      | AS20734       | —         | PCB, Dial Lamp                  | PB2390-1    |
| —                 | Pointer Assembly (Plastic)                 | AS20512       | —         | PCB, Decoder Lamp Assembly      | PB2395-2    |
| 1910              | Lamp, Pointer                              | LM21442-1     | —         | PCB, SQ Logic                   | PB2382-6    |
| —                 | Dial Plate                                 | AS4119-109-2  |           |                                 |             |
| 1901 through 909  | Lamps, Dial (9), 2112D                     | LM21421-6     |           |                                 |             |
| 1101 through 1104 | Lamps, SQ, CD-4/4-CH, CD-MATIC, and MUTING | LM21421-7     |           |                                 |             |
| M1                | Meter, Signal                              | MC21627-1     |           |                                 |             |
| M2                | Meter, Center of Channel                   | MC21628-1     |           |                                 |             |
| —                 | Meter Clip                                 | AB4130-123    |           |                                 |             |
| —                 | Pulley Bracket Assembly (FRONT)            | AS4130-134    |           |                                 |             |
| —                 | Pulley Bracket (FRONT)                     | AS4130-119    |           |                                 |             |
| —                 | Pulley Bracket Assembly (Front Top)        | AS4119-119    |           |                                 |             |
| —                 | Pulley Bracket                             | AB4119-112    |           |                                 |             |
| —                 | Pulley Bracket Assembly (Left Side)        | AS4130-136    |           |                                 |             |
| —                 | Pulley Bracket                             | AS4130-121    |           |                                 |             |
| —                 | Pulley Idlers                              | E50540-3 & -2 |           |                                 |             |
|                   | <b>REAR CHASSIS</b>                        |               |           |                                 |             |
| —                 | Shorting Plug Assembly                     | AS25020       |           |                                 |             |
| —                 | Plug                                       | EG25021-1     |           |                                 |             |
| —                 | 15 Jack Connector                          | JK25007       |           |                                 |             |
| —                 | AC Receptacle                              | JK25009       |           |                                 |             |
| —                 | Plate Fuse Holder                          | AM51409       |           |                                 |             |

Note: Chassis mounted components may also be listed on the parts list of the circuit with which they function electrically.

HARMONIC DISTORTION TEST

CAUTION: Limit the following tests to no more than ten minutes each. Use 8-ohm resistors with a minimum power rating of 250 watts when connecting a load across the speaker terminals. Remove the SPKR FUSES from the receiver rear panel and replace them with 10 ampere fuses of the same rating.

Control Settings: Unplug the AC power cord and set the front panel controls as follows:

BASS, TREBLE, and MASTER BALANCE controls to center positions.

SPEAKERS switch to AC OFF.

SELECTOR switch to AUX.

MODE SELECTOR "CD-4/4-CH" pushbutton depressed.

LOUDNESS pushbutton out (not depressed).

VOLUME control to MIN.

ONE CHANNEL DRIVEN:

1) Connect a low distortion frequency generator to AUX IN FRONT LEFT jack. Set generator frequency to 1 kHz and output to minimum.

2) Connect an 8-ohm load resistor between FRONT SPEAKERS LEFT and COM terminals. Connect a Harmonic Distortion Analyzer and an AC VTVM in parallel across the 8-ohm load.

3) Connect the AC power cord and set the SPEAKERS switch to 4. Increase VOLUME control to MAX.

4) Increase generator to 18 watts RMS (12.0 volts RMS across the 8-ohm load). The meter on the Harmonic Distortion Analyzer should read less than 1.0%.

5) Repeat steps 1 through 4 for FRONT SPEAKERS RIGHT, REAR SPEAKERS LEFT, and REAR SPEAKERS RIGHT channels.

ALL CHANNELS DRIVEN:

1) Connect an 8-ohm load resistor across all of the SPEAKER output terminals.

2) Depress the MODE SELECTOR "MONO" pushbutton.

3) Check for distortion of 1.0% or less at 16 watts RMS (11.35 volts RMS) on each channel with all channels driven simultaneously.

4) Disconnect all test equipment. Remove the 10 ampere fuses installed at the beginning of the test and replace the original fuses.

TUNER ALIGNMENT PROCEDURES

FM ALIGNMENT – BASS, TREBLE, and MASTER BALANCE controls to center positions, SPEAKERS switch to PHONES position, MODE SELECTOR "2-CH" pushbutton depressed, SELECTOR switch to FM position, and VOLUME control to MIN position.

Maintain generator output as low as possible for suitable indication.

| ITEM   | GENERATOR   | DIAL SETTING   | INDICATOR  | PROCEDURE  |
|--|---|--|--|--|
| Note: The FM IF circuit utilizes a non-tunable ceramic filter which establishes the IF bandpass. To insure symmetrical tuning and selectivity, the IF must be aligned precisely to the center of the filter bandpass, rather than to 10.7 MHz as in conventional LC circuits.  |   |  |  |  |
| 1. IF ALIGNMENT  | Connect 10.7 MHz Sweep Generator to pin 63, ground to pin 5Y. Markers are not required. Set generator output to -10db (300mv).            | Position of non-interference. Connect jumper from pin 26 to pin 5R on Tuner board. | Scope vertical input to pin 57, ground to pin 5U. Set vertical sensitivity to 0.5v/cm. | Adjust Z502 top and bottom slugs for maximum gain and best symmetry. See figure for FM IF.   |
| 2. PRELIMINARY DETECTOR ALIGNMENT  | Same as above. Adjust for S-curve display. Generator output to -20 db.  | Position of non-interference.  | Scope vertical input to pin 58.  | Adjust Z503 top slug for maximum gain and best linearity. Adjust Z503 bottom slug for minimum gain and best linearity. See figure for FM DETECTOR ALIGNMENT. Note: Harmonic Distortion test must be performed as part of detector alignment. Remove jumper from between pins 26 and 5R on Tuner board. |
| Note: Connect 120-ohm composition resistors in series with each lead from the RF generator to match the 50-ohm output to the 300-ohm input impedance. Generator output voltage is reduced to one-half at antenna terminals. Signal voltages specified in this table are generator output levels, not antenna voltages. |   |  |  |  |
| 3. FRONT END ALIGNMENT   |   | Tuning knob fully counterclockwise.  |  | Center dial pointer on "0" and cement.   |
| 4.   | FM generator to FM Antenna terminals through 120-ohm resistors. Set to 90 MHz. Adjust output for approximately 2 on Field Strength meter. | Center of 90 MHz calibration mark on dial.   | Front panel Field Strength meter (M1) and Center of Channel meter (M2).                | Adjust L504, L502, and Z501 for maximum deflection on Field Strength meter (M1) and zero deflection of (M2). Reduce generator output to keep Field Strength meter indication at approximately 2.   |
| 5.   | Set to 106 MHz.   | Center of 106 MHz calibration mark on dial.  | Same as above.   | Adjust C503, C509, and C518 for maximum deflection on Field Strength meter (M1) and zero deflection of (M2). Reduce generator output to keep Field Strength meter indication at approximately 2. Repeat steps 4 and 5 for optimum alignment.   |

TUNER ALIGNMENT (CONT'D)

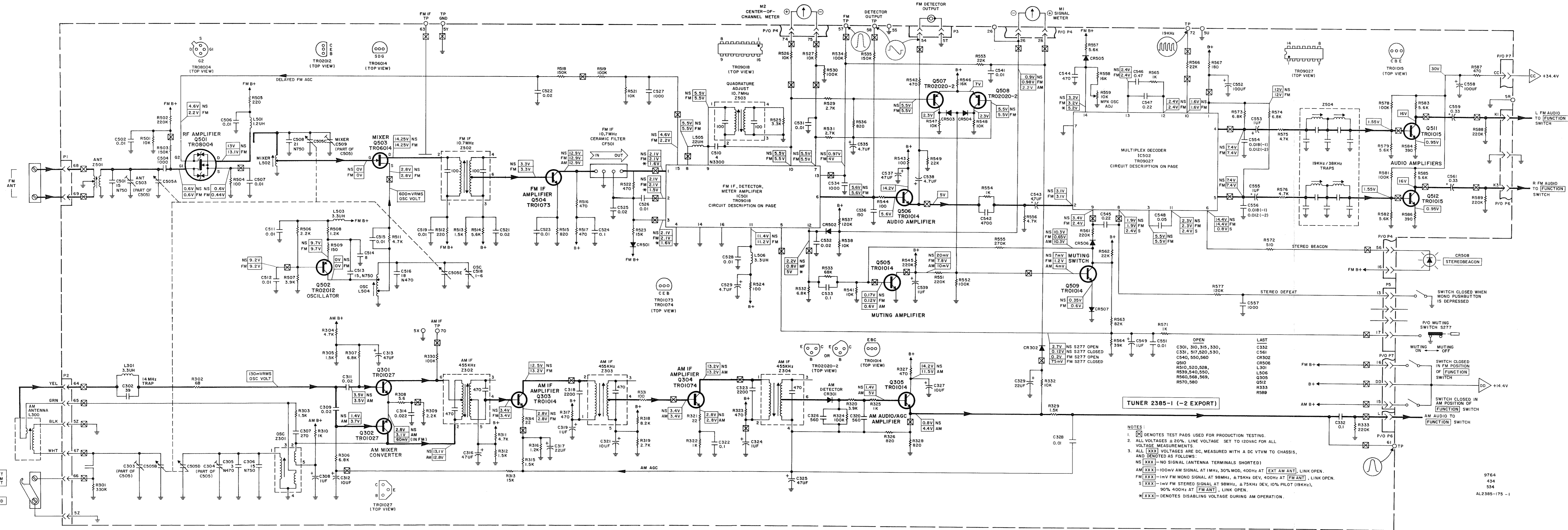
| ITEM                                      | GENERATOR  | DIAL SETTING                                   | INDICATOR  | PROCEDURE   |
|---|--|--|--|---|
| 6. FINAL DETECTOR ALIGNMENT (MINIMUM THD) | Set generator to receiver frequency. Modulate with 400 Hz ± 75 kHz deviation. Connect generator to FM Antenna terminals. | Tune receiver to position of non-interference. | Scope vertical input to OUT TO RECORDER FRONT LEFT jack on rear panel of receiver.                             | Reduce generator output for noise to be visible on sine wave. Readjust generator frequency to center noise on positive and negative half cycles. See figure for SYMMETRICAL TUNING RESPONSE. Note: Do not change generator or receiver tuning; proceed with Harmonic Distortion test. |
| 7.  | Same as above. Increase generator output to 2 mV.  | Same as above.                                 | Connect AC VTVM and Harmonic Distortion Analyzer to OUT TO RECORDER FRONT LEFT jack on rear panel of receiver. | Adjust Z503 top slug for center of channel indication on M2. Adjust bottom slug for minimum THD. (Typically 0.2%.)  |
| 8A. MPX OSC ADJUSTMENT                    | Same as above with CW output of 2 mV.  | Same as above.                                 | Connect frequency counter to pin 72.   | Adjust R559 for indication of 19 kHz ± 100 Hz.  |
| 8B. ALTERNATE MPX OSC ADJUSTMENT          | Same as above.   | Same as above.                                 | Scope vertical input to pin 72. Scope horizontal input to MPX generator 19 kHz pilot output.                   | Adjust R559 for a stable Lissajou display as shown on figure for MPX OSC ALIGNMENT.   |

AM ALIGNMENT – BASS, TREBLE, and MASTER BALANCE controls to center position, SPEAKERS switch to PHONES position, MODE SELECTOR "2-CH" pushbutton depressed, SELECTOR switch to FM position, and VOLUME control to MIN position.

Maintain generator output as low as possible for suitable indication.

| ITEM                   | GENERATOR  | DIAL SETTING                                 | INDICATOR   | PROCEDURE  |
|------------------------|--|--|---|--|
| 1. IF ALIGNMENT        | 455 kHz sweep generator to pin 70, ground to pin 5X.   | Position of non-interference near 1400 kHz.  | Scope vertical input to pin 61 ground to pin 5U. Set vertical sensitivity to 0.2v/cm. | Connect a jumper between pin 67 and pin 5Z. Adjust Z302, Z303, and Z304 top and bottom slugs for maximum gain and best symmetry. Keep signal low enough for noise on response as shown in figure for AM IF ALIGNMENT. Disconnect jumper. |
| 2. FRONT END ALIGNMENT | AM generator to EXT AM ANT and GND terminals. Open GND link. Set to 600 kHz. Modulate with 400 Hz, 30% modulation. | Center of 600 kHz calibration mark on dial.  | Front panel Field Strength meter (M1).  | Adjust Z301 and L300 (antenna) for maximum Field Strength meter indication. Reduce generator output to keep meter reading below 3.   |
| 3.                     | Set to 1400 kHz.   | Center of 1400 kHz calibration mark on dial. | Front panel Field Strength meter (M1).  | Adjust C303 and C304 for maximum deflection. Keep meter reading below 3. Repeat steps 2 and 3 until optimum alignment is reached.  |

# TUNER SCHEMATIC



## TUNER PARTS LIST

| Ref. Des.   | Description                   | Part Number | Ref. Des.                                    | Description                  | Part Number |
|---|-------------------------------|-------------|--|------------------------------|-------------|
| C302  | Ceramic, 39pF, N330, 50V      | CK22344-22  | L504   | Coil, FM Oscillator          | LC21833-1   |
| C303, 304   | P/O C505                      |             | L505   | Choke, 22uH                  | L50848-18   |
| C305  | Ceramic, 3pF, ±0.25pF, N470   | CK22346-4   | M1   | Signal Meter                 | MC21627-1   |
| C306, 501, 513  | Ceramic, 15pF, 5%, N750, 50V  | CK22344-2   | M2   | Center-of-Channel Meter      | MC21628-1   |
| C307  | Ceramic, 270pF, 10%, 50V      | CK22350-5   | Q301, 302                                    | Transistor, NPN (A494/BF194) | TR01027     |
| C308, 319, 324, 539, 549, 553, 555                                    | Electrolytic, 1uF, 50V        | CE22342-2   | Q303, 305, 505, 506, 509                     | Transistor, NPN (BC239C)     | TR01014     |
| C309, 311, 521, 522, 525, 532   | Ceramic, 0.02uF, +80-20%, 50V | CK22354-2   | Q304   | Transistor, NPN (BF199)      | TR01074     |
| C312, 321, 327  | Electrolytic, 10uF, 50V       | CE22342-4   | Q501   | Transistor, Dual-Gate MOSFET | TR08004     |
| C313, 316, 325, 537   | Electrolytic, 47uF, 16V       | CE22342-8   | Q502   | Transistor, PNP (SP871)      | TR02012     |
| C314  | Mylar, 0.022uF, 10%, 50V      | CY22356-9   | Q503   | Transistor, N-Channel FET    | TR06014     |
| C317, 329   | Electrolytic, 22uF, 35V       | CE22342-6   | Q504   | Transistor, NPN (BF198)      | TR01073     |
| C318, 323   | Polystyrene, 2200pF, 5%, 33V  | C51256-30   | Q507, 508                                    | Transistor, PNP (2N4250)     | TR02020-2   |
| C320, 326   | Ceramic, 560pF, 10%, 50V      | CK22350-9   | Q511, 512                                    | Transistor, NPN              | TR01015     |
| C322, 524, 533  | Ceramic, 0.1uF, +80-20%, 50V  | CK22354-3   | R301   | 330K                         | RF25DC334J  |
| C328, 502, 506, 507, 511, 512, 515, 519, 523, 526, 528, 531, 541, 551 | Ceramic, 0.01uF, +80-20%, 50V | CK22354-1   | R302   | 68                           | RF25DC680J  |
| C332  | Mylar, 0.1uF, 10%, 50V        | CY22356-11  | R303, 305, 312, 315, 329, 513                | 1.5K                         | RF25DC152J  |
| C503  | P/O C505                      |             | R304, 311, 511, 556, 575, 576                | 4.7K                         | RF25DC472J  |
| C504, 527, 534, 557   | Ceramic, 1000pF, 10%, 50V     | CK22350-12  | R306, 307, 532, 573, 574                     | 6.8K                         | RF25DC682J  |
| C505 A, B, C, D, E  | Tuning Gang Assembly          | CV21015     | R308   | 5.6                          | RF25DC5R6J  |
| C508  | Ceramic, 21pF, 10%, N750, 50V | CK22345-15  | R309, 506                                    | 2.2K                         | RF25DC222J  |
| C509  | P/O C505                      |             | R310, 322, 325, 554, 565, 571                | 1K                           | RF25DC102J  |
| C510  | Tubular, 4pF, ±0.25pF, N3300  | CT22336-11  | R313, 523                                    | 15K                          | RF25DC153J  |
| C514  | Ceramic, 8pF, 5%, NPO, 50V    | CK22344-5   | R314, 321                                    | 22                           | RF25DC220J  |
| C516  | Tubular, 18pF, ±5%, N470      | CT22336-12  | R316, 508                                    | 1.2K                         | RF25DC122J  |
| C518  | Trimmer, 1-6pF                | C50B938-5   | R318   | 8.2K                         | RF25DC822J  |
| C529, 535, 538, 543   | Electrolytic, 4.7uF, 50V      | CE22342-3   | R319, 529, 531                               | 2.7K                         | RF25DC272J  |
| C536  | Ceramic, 150pF, 10%, 50V      | CK22350-2   | R320, 507                                    | 3.9K                         | RF25DC392J  |
| C542  | Ceramic, 4700pF, 10%, 50V     | CK22347-22  | R324, 330, 519, 530, 534, 552, 578, 581      | 100K                         | RF25DC104J  |
| C544  | Silvered Mica, 470pF, 5%, 50V | CA22313-1   | R326, 328, 515, 536                          | 820                          | RF25DC821J  |
| C545, 547   | Mylar, 0.22uF, 10%, 50V       | CY22356-12  | R331, 504, 524, 543, 544                     | 100                          | RF25DC101J  |
| C546  | Mylar, 0.47uF, 10%, 50V       | CY22356-13  | R332, 501, 521, 526, 527, 538, 541, 547, 548 | 10K                          | RF25DC103J  |
| C548  | Polyester, 0.05uF, 10%, 100V  | CY22335-5   | R333, 502, 545, 551, 561, 588, 589           | 220K                         | RF25DC224J  |
| C552  | Electrolytic, 100uF, 16V      | CE22342-12  | R503, 518, 535                               | 150K                         | RF25DC154J  |
| C554, 556   | Mylar, 0.018uF, 5%, 50V       | CY22356-3   | R505, 512                                    | 220                          | RF25DC221J  |
| C558  | Electrolytic, 100uF, 35V      | CE22342-10  | R509   | 150                          | RF25DC151J  |
| C559, 561   | Tantalum, 0.33uF, 35V         | CL22305-9   | R514, 557, 579, 582, 583, 585                | 5.6K                         | RF25DC562J  |
| CF501   | Filter, ceramic, 10.7 MHz     | ZK22110     | R525   | 3.3K                         | RF25DC332J  |
| CR301, 502  | Diode, Germanium (AA119)      | TR12001-4   | R533   | 68K                          | RF25DC683J  |
| CR302, 501, 503, 504, 505, 506, 507                                   | Diode, Silicon                | TR13006-2   | R537, 577                                    | 120K                         | RF25DC124J  |
| CR508   | Light Emitting Diode          | TR19001     | R546, 558                                    | 16K                          | RF25DC163J  |
| IC501   | I.C., FM IF                   | TR09018     | R549, 553, 562, 566                          | 22K                          | RF25DC223J  |
| IC502   | I.C., MPX Decoder             | TR09027     | R555   | 270K                         | RF25DC274J  |
| L300  | Antenna, AM Ferrite           | LA51417-2   | R559   | Variable, 10K, 20%           | RV50150-23  |
| L301, 503, 506  | Choke, 3.3uH                  | LC21814-2   |  |                              |             |
| L501  | Choke, 1.2uH                  | LC21822-2   |  |                              |             |
| L502  | Coil, FM Mixer                | LC21833-2   |  |                              |             |

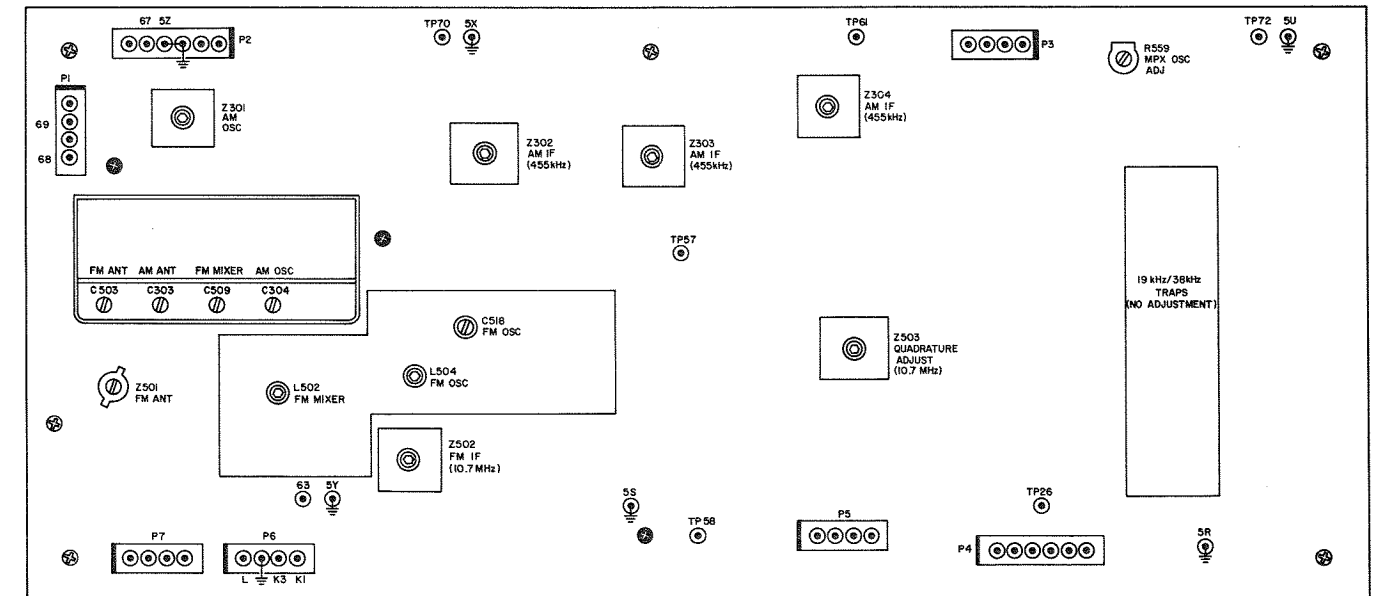
## TUNER PARTS LIST

(CONTINUED)

| Ref. Des. | Description                | Part Number  | Ref. Des. | Description                                   | Part Number |
|-----------|----------------------------|--------------|-----------|---|-------------|
| R563      | 82K                        | RF25DC823J   | Z302      | Transformer, 455 KHz IF                       | ZZ50210-161 |
| R564      | 39K                        | RF25DC393J   | Z303      | Transformer, 455 KHz IF                       | ZZ50210-156 |
| R567      | 180                        | RF25DC181J   | Z304      | Transformer, 455 KHz IF                       | ZZ50210-159 |
| R572      | Composition, 510, 5%, 1/2W | RC20BF511J   | Z501      | Coil, FM Antenna                              | LC21832     |
| R584, 586 | 390                        | RF25DC391J   | Z502      | Transformer, 10.7 MHz IF                      | ZZ50210-146 |
| S11       | Switch, SELECTOR           | SR4130-151   | Z503      | Transformer, 10.7 MHz IF                      | ZZ50210-180 |
| S101      | Switch, MODE SELECTOR      | SP50200-72-1 | Z504      | Coil, 19 kHz/38 xHz Trap                      | ZZ50210-190 |
| S277      | Switch, MUTING             | SP50200-60   | -         | Terminal Board, Antenna (FM ANT, Ext AM Ant.) | ET51459     |
| Z301      | Coil, AM Oscillator        | ZZ50210-181  |           |   |             |

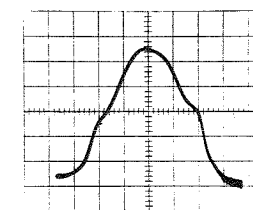
All resistors are deposited film, 5%, 1/4 Watt unless otherwise noted. K = Kilohm.

## TUNER BOARD LAYOUT

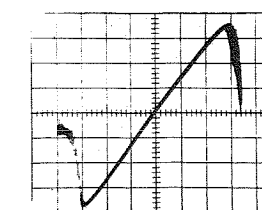


NOTE: CHASSIS GROUNDS ARE COMPLETED THROUGH MOUNTING SCREWS (⊙). TIGHTEN BEFORE ATTEMPTING ALIGNMENT.

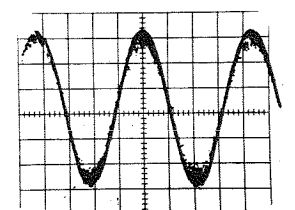
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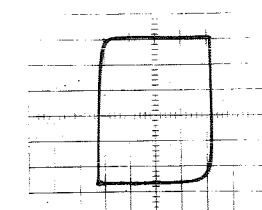
FM IF ALIGNMENT.



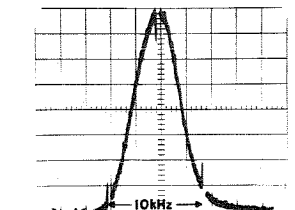
FM DETECTOR ALIGNMENT



SYMMETRICAL TUNING

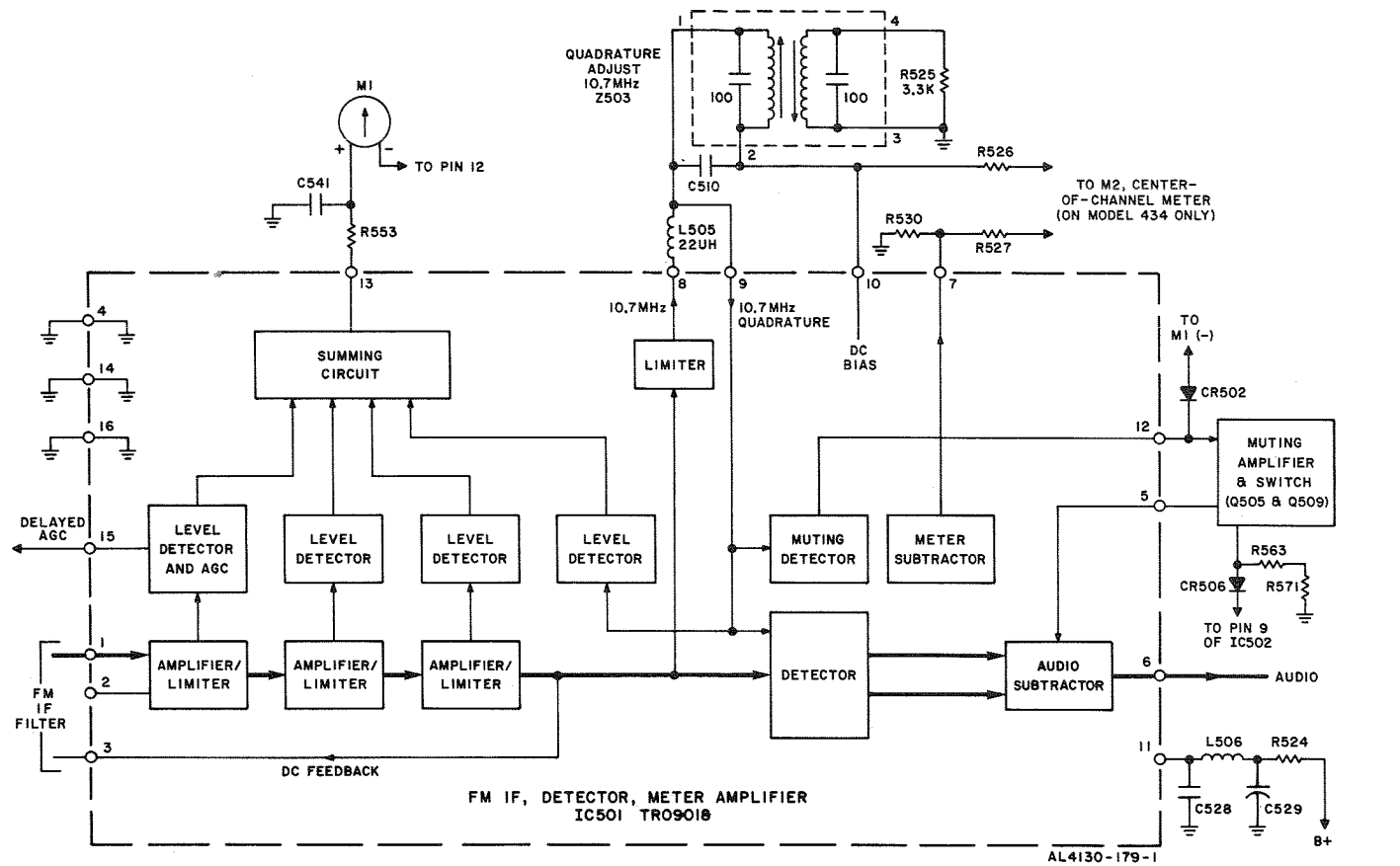


MPX OSC ADJUSTMENT



AM IF ALIGNMENT

## TUNER IC SIGNAL FLOW



## TUNER IC DESCRIPTION

### IF DETECTOR IC

The input from the IF filter is processed through three stages of amplification and limiting. The output of the third limiter is applied to a fourth limiter, and a balanced detector. The push-pull output from the detector is combined differentially in the subtractor stage to produce an audio output at pin 6.

The output from the fourth limiter is applied through L505 to tuned circuit Z503. At the exact center of the IF passband (nominally 10.7 MHz), Z503 is preset to provide a 10.7 MHz quadrature (90 degrees out-of-phase) signal to the detector. The phase of the signal from the tuned circuit changes proportionally with changes in the frequency of the IF signal. With no audio modulation, the inputs of the detector are in quadrature and the outputs of the detector are balanced. No differential signals appear at the outputs of the subtractor stages. When the frequency on the IF signal deviates from 10.7 MHz (as a result of audio modulation or station detuning), the de-

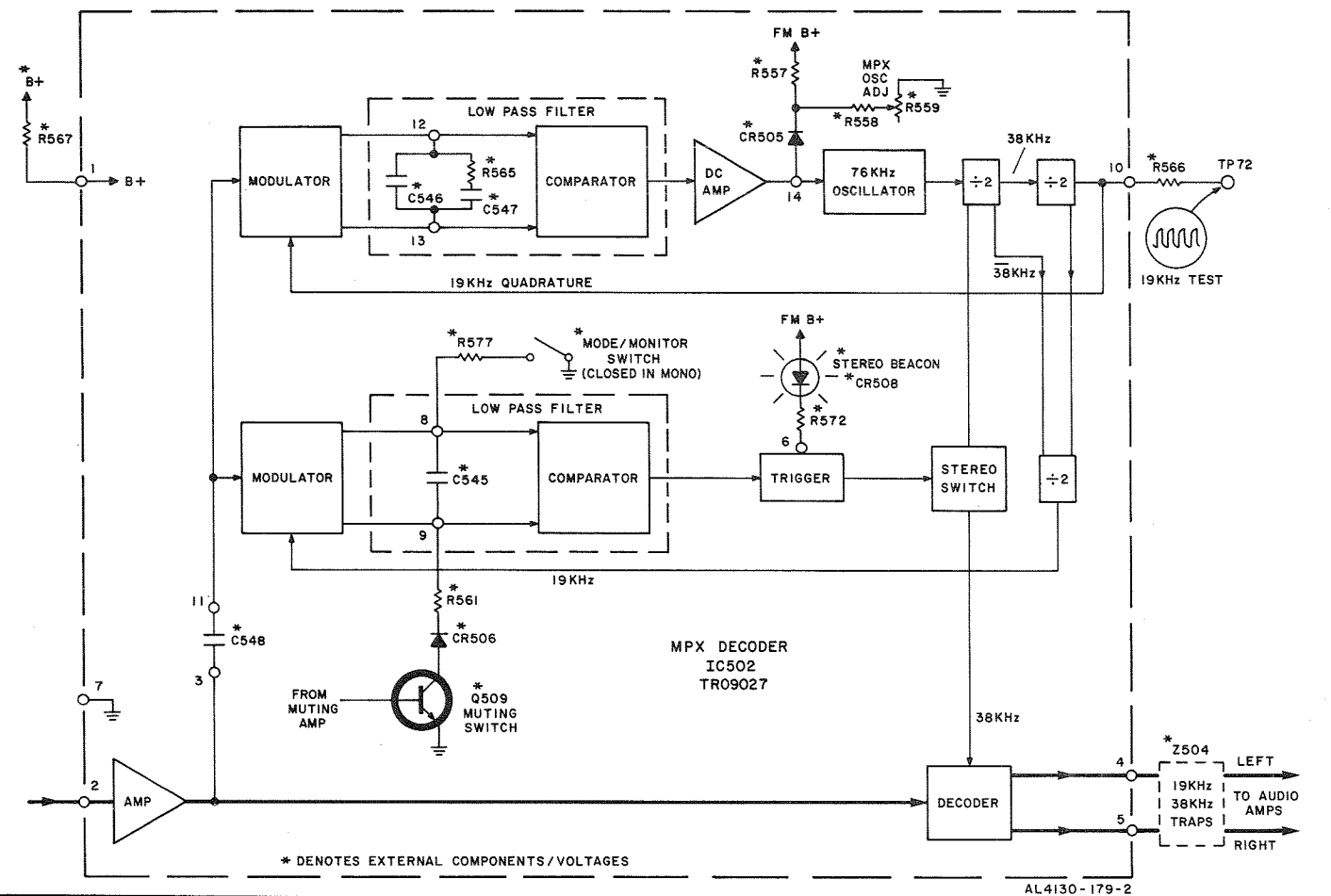
tor outputs are unbalanced and a differential DC signal appears at pin 6.

The muting detector (pin 12) monitors the envelope signal-to-noise ratio across the tuned circuit and feeds the detected noise to the muting amplifier and switch. Excessive noise in the signal generates a control voltage which is amplified and applied to pin 9 of IC502 to force the receiver into monophonic operation.

Level detectors monitor the IF signal levels at the three amplifier/limiter stages and at the tuned circuit. Each limiter, beginning with the last, saturates progressively as the input level increases. Rectified signals from the level detectors are summed and applied (pin 13) as a linear-log voltage to the Field Strength meter.

An AGC voltage (pin 15) for the RF amplifier is obtained from the first level detector. This AGC voltage is delayed until the IF signal in the first amplifier approaches limiting.

## TUNER IC SIGNAL FLOW



## TUNER IC DESCRIPTION

### MPX DECODER IC

When the receiver is tuned to a stereo broadcast the composite audio fed to pin 2 consists of sum-and-difference signal information (L+R and L-R), and a 19kHz pilot tone. The L+R information is in the form of normal audio. The L-R information is Amplitude Modulated on a suppressed 38kHz subcarrier. (At the transmitter, the subcarrier is derived from the pilot tone through a frequency-doubler.) In order to extract the L-R information, it is necessary to regenerate the 38kHz subcarrier and apply it, together with the composite signal, to the decoder. Left and Right channel information is then decoded by addition and subtraction of the L+R and L-R information.

The top line of the block diagram shows the 38kHz subcarrier regeneration loop. The 76kHz oscillator output is processed through two frequency divider stages to furnish 38kHz and 19kHz outputs. The 19kHz output is a quadrature (90° out-of-phase) signal which is applied to the modulator. When the composite input signal contains a 19kHz pilot tone (stereo broadcast) the 19kHz quadrature signal is phase-compared to the pilot signal and the resulting DC voltage fed through the DC amp to the oscillator, where it corrects the frequency. As a

result, the oscillator is continuously phase-locked to the pilot signal. The setting of R559 determines the frequency of the free-running oscillator. With the oscillator phase-locked to the pilot, the 38 kHz output from the first divider is in the correct phase for decoding a stereo signal. The regenerated 38kHz signal is fed to the decoder via a stereo switch. The stereo switch closes when a sufficiently large 19kHz pilot tone is detected in the second modulator-comparator circuit. A third frequency divider stage, which processes signals derived from the first two dividers, returns a 19kHz in-phase signal to the second modulator-comparator for pilot detection. The DC voltage derived from the second modulator-comparator circuit is applied to the trigger which activates the STEREO-BEACON indicator and the stereo switch.

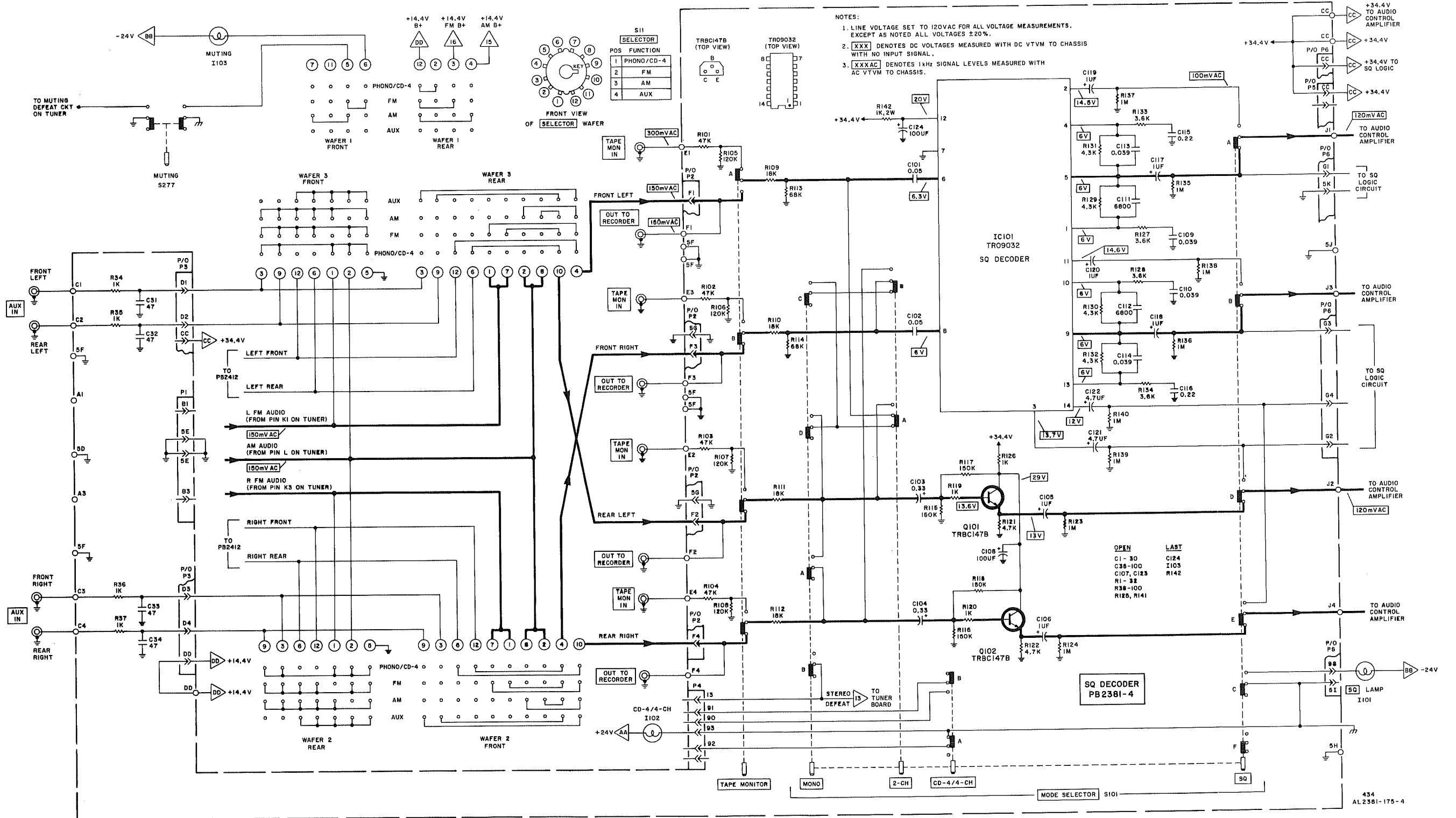
The circuit is forced into the monophonic mode by grounding pin 8, or by applying a positive DC voltage to pin 9. With very low-level, noisy FM signals a positive voltage from pin 12 of IC501 is amplified without change of polarity and applied to pin 9 of IC502 forcing the circuit into mono operation. During AM operation pin 14 is effectively grounded thus disabling the 76kHz oscillator and eliminating interference.

# SQ DECODER SCHEMATIC

## SQ DECODER PARTS LIST

| Ref. Des.                      | Description                    | Part Number |
|--------------------------------|--------------------------------|-------------|
| C31, 32, 33, 34                | Ceramic, 47pF, 10%, 50V        | CK22345-9   |
| C101, 102                      | Ceramic, 0.05uF, +80-20%, 100V | CK22362-4   |
| C103, 104                      | Sintered Aluminum, 0.33uF, 25V | CS22340-3   |
| C105, 106                      | Tantalum, 1.0uF, 35V           | CL22305-3   |
| C108, 124                      | Electrolytic, 100uF, 35V       | CE22342-10  |
| C109, 110, 113, 114            | Mylar, 0.039uF, 5%, 50V        | CY22356-16  |
| C111, 112                      | Mylar, .0068uF, 5%, 50V        | CY22356-2   |
| C115, 116                      | Mylar, 0.22uF, 5%, 50V         | CY22356-17  |
| C117, 118, 119, 120            | Sintered Aluminum, 1uF, 25V    | CS22340-5   |
| C121, 122                      | Sintered Aluminum, 4.7uF, 25V  | CS22340-6   |
| Q101, 102                      | Transistor, BC147B             | TRBC147B    |
| IC101                          | IC, SQ Decoder                 | TR09032     |
| R34, 35, 36, 37, 119, 120, 126 | 1K                             | RF25DC102J  |
| R101, 102, 103, 104            | 47K                            | RF25DC473J  |
| R105, 106, 107, 108            | 120K                           | RF25DC124J  |
| R109, 110, 111, 112            | 18K                            | RF25DC183J  |
| R113, 114                      | 68K                            | RF25DC683J  |
| R115, 116, 117, 118            | 150K                           | RF25DC154J  |
| R121, 122                      | 4.7K                           | RF25DC472J  |
| R123, 124, 135-140             | 1M                             | RF25DC105J  |
| R127, 128, 133, 134            | 3.6K                           | RF25DC362J  |
| R129, 130, 131, 132            | 4.3K                           | RF25DC432J  |
| R142                           | Wirewound, 1K, 2w, 5%          | RW200W102J  |

All resistors are deposited film, 5%, 1/4W unless otherwise noted. K = Kilohm.

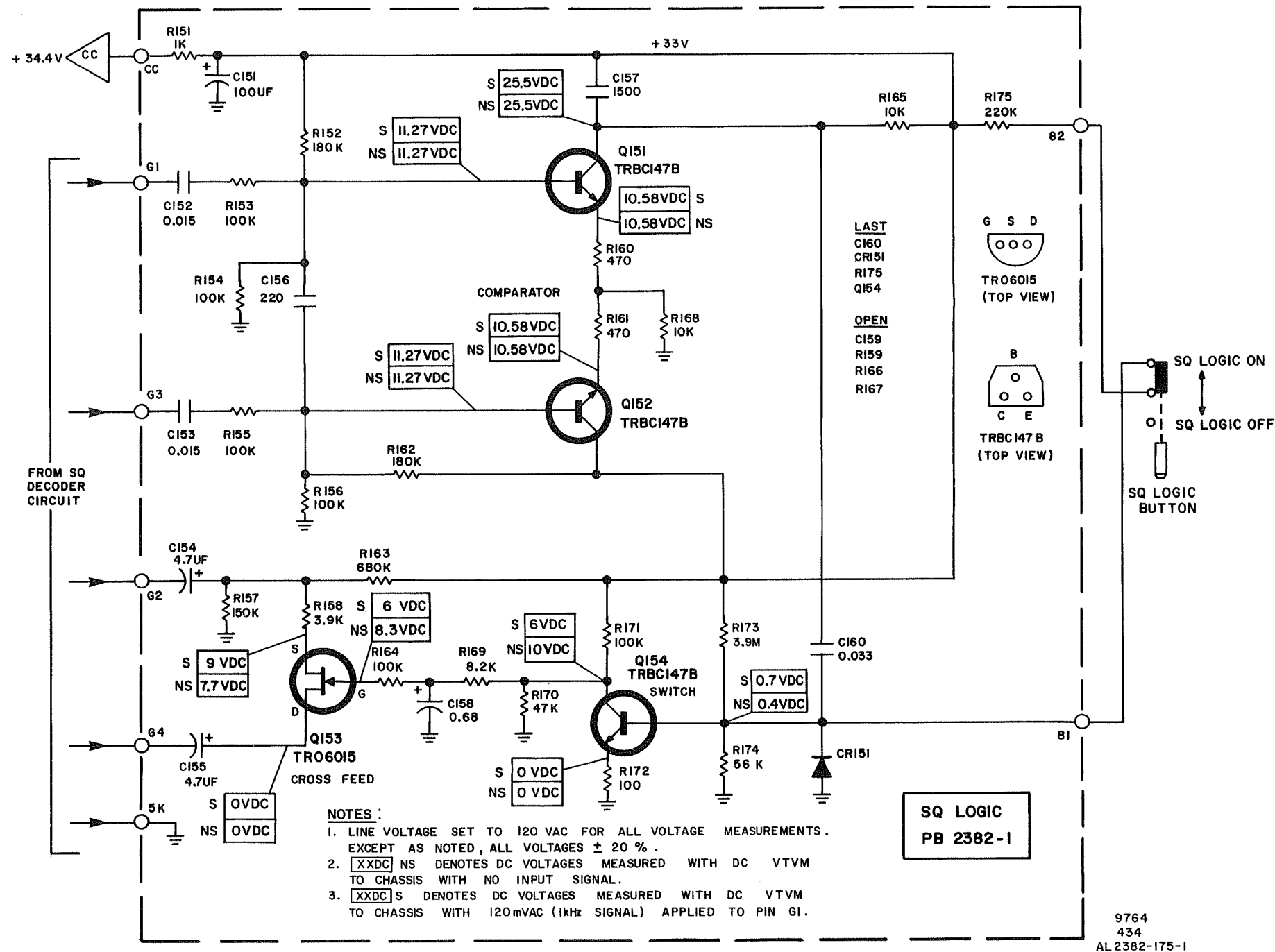


SQ LOGIC SCHEMATIC

SQ LOGIC PARTS LIST

| Ref. Des.                     | Description                   | Part Number |
|-------------------------------|-------------------------------|-------------|
| C151                          | Electrolytic, 100uF, 50V      | CE22342-9   |
| C152, 153                     | Mylar, 0.015uF, 5%, 50V       | CY22356-5   |
| C154, 155                     | Sintered Aluminum, 4.7uF, 25V | CS22340-6   |
| C156                          | Ceramic, 220pF, 10%, 50V      | CK22350-4   |
| C157                          | Ceramic, 1500pF, 10%, 50V     | CK22351-8   |
| C158                          | Tantalum, 0.68uF, 35V         | CL22305-2   |
| C160                          | Mylar, 0.033uF, 5%, 50V       | CY22356-19  |
| CR151                         | Diode, Silicon                | TR13006-2   |
| Q151, 152, 154                | Transistor, NPN (BC147B)      | TRBC147B    |
| Q153                          | Transistor, N-Channel FET     | TR06015     |
| R151                          | 1K                            | RF25DC102J  |
| R152, 162                     | 180K                          | RF25DC184J  |
| R153, 154, 155, 156, 164, 171 | 100K                          | RF25DC104J  |
| R157                          | 150K                          | RF25DC154J  |
| R158                          | 3.9K                          | RF25DC392J  |
| R160, 161                     | 470                           | RF25DC471J  |
| R163                          | 680K                          | RF25DC684J  |
| R165, 168                     | 10K                           | RF25DC103J  |
| R169                          | 8.2K                          | RF25DC822J  |
| R170                          | 47K                           | RF25DC473J  |
| R172                          | 100                           | RF25DC101J  |
| R173                          | Composition, 3.9M, 10%, 1/2W  | RC20BF395K  |
| R174                          | 56K                           | RF25DC563J  |
| R175                          | 220K                          | RF25DC224J  |

All resistors are deposited film, 5%, 1/4W unless otherwise noted. K = Kilohm, M = Megohm.



- NOTES:
1. LINE VOLTAGE SET TO 120 VAC FOR ALL VOLTAGE MEASUREMENTS. EXCEPT AS NOTED, ALL VOLTAGES  $\pm 20\%$ .
  2. [XXDC] NS DENOTES DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO INPUT SIGNAL.
  3. [XXDC] S DENOTES DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH 120mVAC (1kHz SIGNAL) APPLIED TO PIN G1.

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| Ref. Des.   | Description                    | Part Number |
|---|--------------------------------|-------------|
| C100, 101, 174, 175   | Tantalum, 0.68uF, 35V          | CL22305-2   |
| C102, 103   | Tantalum, 10uF, 25V            | CL22305-17  |
| C104, 105   | Mylar, 5000pF, 5%              | CY22356-28  |
| C106, 107   | Ceramic, 5pF, 5% NPO, 50V min. | CK22344-1   |
| C108, 109   | Tantalum, 2.7uF, 35V           | CL22305-4   |
| C110, 114, 208  | Electrolytic, 100uF, 16V       | CE22342-12  |
| C111  | Electrolytic, 200uF, 16V       | CE22342-15  |
| C112, 113, 120, 121, 129, 130, 131, 132, 158, 159, 180, 181, 182, 183, 207, 210 | Ceramic, 1000pF, 10%, 50V      | CK22350-12  |
| C115, 116, 137, 138, 168, 169   | Mylar, 0.0012, 10%, 100V       | CY22335-23  |
| C117, 124   | Mylar, 0.0015, 10%, 100V       | CY22335-24  |
| C118, 119   | Mylar, 0.0033, 10%, 100V       | CY22335-7   |
| C122, 123, 125, 126, 142, 143, 148, 149   | Sintered Aluminum, 4.7uF, 25V  | CS22340-6   |
| C128  | Electrolytic, 100uF, 35V       | CE22342-10  |
| C133, 134, 139, 140, 188, 189, 190, 191   | Mylar .01, 10%, 100V           | CY22335-1   |
| C135, 136   | Ceramic, 330pF, 10%, 50V       | CK22350-6   |
| C144, 145   | Mylar, 0.012, 10%, 100V        | CY22335-10  |
| C146, 147, 203, 204, 215, 216   | Sintered Aluminum, 0.47uF, 25V | CS22340-4   |
| C150, 151, 166, 167, 170, 171, 213, 218   | Mylar, 0.022, 10%, 100V        | CY22335-12  |
| C152, 153   | Mylar, 0.0068, 10%, 100V       | CY22335-9   |
| C154, 155   | Mylar, 0.1, 10%, 100V          | CY22335-18  |
| C156, 157, 209, 211, 212, 214   | Sintered Aluminum, 1uF, 25V    | CS22340-6   |
| C160, 161   | Electrolytic, 4.7uF, 50V       | CE22342-3   |
| C162, 163, 178, 179   | Mylar, 0.0082, 10%, 100V       | CY22335-25  |
| C164, 165   | Mylar, 0.047, 10%, 100V        | CY22335-22  |
| C172, 173, 192  | Electrolytic, 10uF, 25V        | CE22342-28  |
| C176, 177   | Mylar, 0.15, 10%, 100V         | CY22335-19  |
| C184, 185, 186, 187   | Mylar, 0.0039, 10%, 100V       | CY22335-4   |
| C193, 194   | Sintered Aluminum, 2.2uF, 25V  | CS22340-10  |
| C195, 196   | Mylar, .015, 10%, 100V         | CY22335-2   |
| C197, 198   | Mylar, 0.033, 10%, 100V        | CY22335-14  |
| C199, 200, 201, 202   | Ceramic, 560pF, 10%, 50V       | CK22350-9   |
| C205, 206   | Mylar, 0.039, 10%, 100V        | CY22335-15  |
| CR100 through CR108   | Silicon Diodes                 | TR13006-2   |
| L100 through L105   | Inductor, audio, 22mH          | LC21834-2   |



# CD-4 DEMODULATOR PARTS LIST

(CONTINUED)

| Ref. Des.  | Description              | Part Number | Ref. Des.  | Description              | Part Number  |
|------------|--------------------------|-------------|------------|--------------------------|--------------|
| L106, 107  | Inductor, audio, 160mH   | LC21834-1   | R135, 142, | 3.9K                     | RF25DC392J   |
| IC100, 101 | CD-4 IC Demodulator      | TR09035     | 147, 160,  |                          |              |
| Q102, 103, | Transistor, PNP (2N4250) | TR02020-2   | 201, 204,  |                          |              |
| 114, 115   |                          |             | 225, 230,  |                          |              |
| Q104, 105  | Transistor, NPN          | TR01015     | 239, 246   |                          |              |
| Q106       | Transistor, (BC239C)     |             | R136, 138, | 47K                      | RF25DC473J   |
| through    |                          |             | 223, 234   |                          |              |
| 113, 116   |                          |             | R139, 148, | 1.2K                     | RF25DC122J   |
| through    |                          |             | 199, 200,  |                          |              |
| 124        |                          | TR01014     | 241, 250   |                          |              |
| Q126       | Transistor, NPN          | TR01053-5   | R143, 144, | 2.7K                     | RF25DC272J   |
| R100, 101, | 1K                       | RF25DC102J  | 227, 232   |                          |              |
| 167, 174   |                          |             | R145, 150, | 5.6K                     | RF25DC562J   |
| R102, 103  | 1M                       | RF25DC105J  | 173, 176   |                          |              |
| R104, 105  | 120K                     | RF25DC124J  | 191, 192,  |                          |              |
| R106, 107, | 82K                      | RF25DC823J  | 197, 198   |                          |              |
| 215, 222   |                          |             | R149, 156, | 220K                     | RF25DC224J   |
| R108, 109  | 820                      | RF25DC821J  | 157, 162   |                          |              |
| R110, 249, | 100K                     | RF25DC104J  | R151, 153, | 3.3K                     | RF25DC332J   |
| 251, 257,  |                          |             | 154, 158,  |                          |              |
| 258        |                          |             | 209, 212,  |                          |              |
| R111, 114, | 10K                      | RF25DC103J  | 213, 216,  |                          |              |
| 115, 121,  |                          |             | 221, 228,  |                          |              |
| 122, 137,  |                          |             | 207, 210,  |                          |              |
| 141, 146,  |                          |             | 211, 214,  |                          |              |
| 152, 171,  |                          |             | 219, 220,  |                          |              |
| 172, 255   |                          |             | 226, 245,  |                          |              |
| R112, 113  | 820K                     | RF25DC824J  | 247, 254,  |                          |              |
| R116, 117, | 56K                      | RF25DC563J  | 256        |                          |              |
| 131, 132,  |                          |             | R159, 164  | Resistor, variable, 100K | RV50150-23-8 |
| 133, 140,  |                          |             | R165, 170  | 1.5M                     | RF25DC155J   |
| 177, 181,  |                          |             | R168, 169, | 330                      | RF25DC331J   |
| 182, 189,  |                          |             | 187, 188   |                          |              |
| 190, 193,  |                          |             | R175, 178  | 33K                      | RF25DC333J   |
| 194, 195,  |                          |             | R179, 180  | 39K                      | RF25DC393J   |
| 196, 260   |                          |             | R183, 184  | Resistor, variable, 10K  | RV50150-23-7 |
| R118, 119  | 1.8K                     | RF25DC182J  | R185, 186  | 22K                      | RF25DC223J   |
| R120, 126  | 82, 1/2W                 | RF50DC820J  | R202, 203  | 390                      | RF25DC391J   |
| R127, 128, | 100                      | RF25DC101J  | R205, 208  | 12K                      | RF25DC123J   |
| 229, 231,  |                          |             | R217, 224  | 18K                      | RF25DC183J   |
| 236, 238   |                          |             | R233, 235, | 1.5K                     | RF25DC152J   |
| R129, 134  | 27K                      | RF25DC273J  | 240, 242   |                          |              |
| R130, 161, | 2.2K                     | RF25DC222J  | R237, 244  | 8.2K                     | RF25DC822J   |
| 166, 206,  |                          |             | R248       | 470                      | RF25DC471J   |
| 218, 243,  |                          |             |            |                          |              |
| 252        |                          |             |            |                          |              |

All resistors are deposited film, 5%, 1/4W unless otherwise noted. K = Kiloohm; M = Megohm.

## CD-4 ALIGNMENT PROCEDURES

**APPLICABLE CONTROL SETTINGS** — Set the applicable controls on the front panel of the 434 receiver as follows:

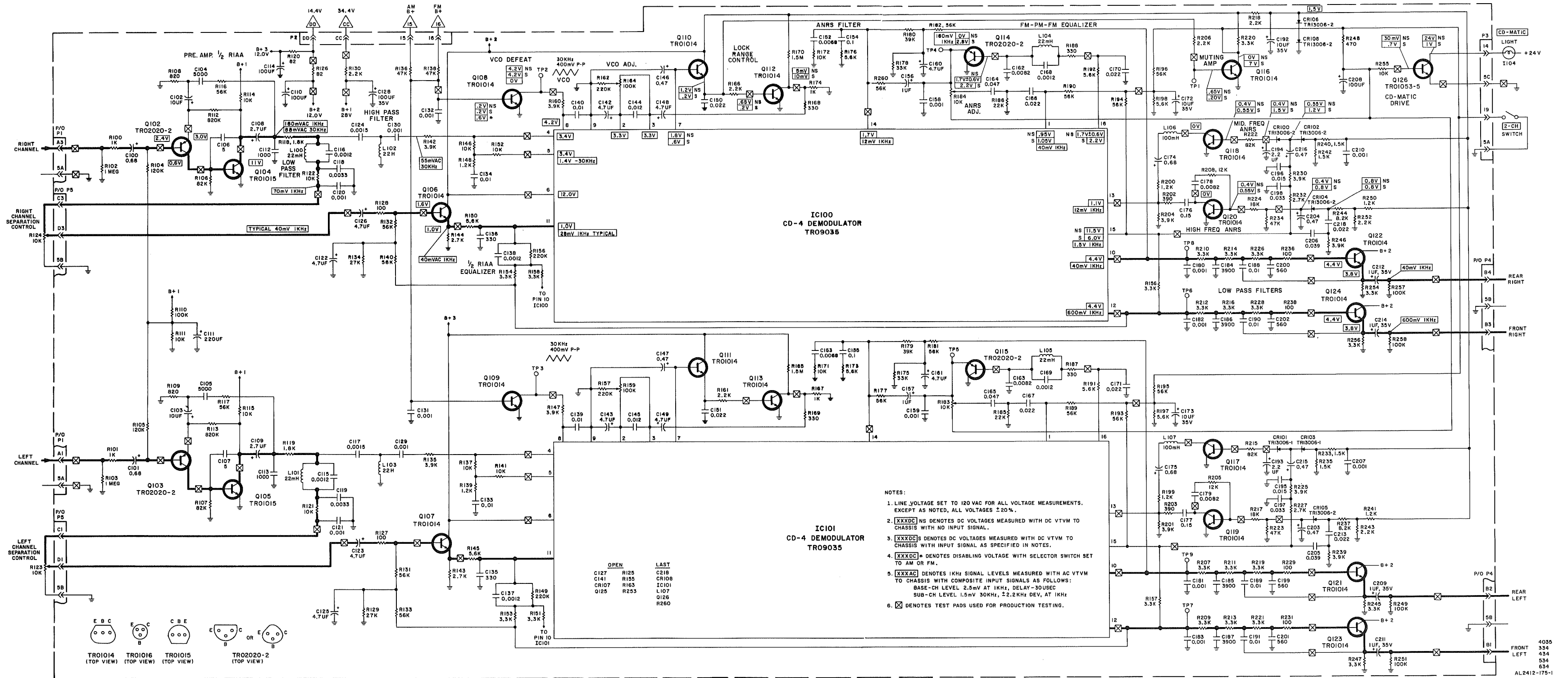
**SELECTOR** switch to PHONO/CD-4, **MODE SELECTOR** CD-4/4-CH pushbutton depressed, and **VOLUME** control to MIN.

| ITEM              | TEST CONNECTIONS  | INDICATOR  | PROCEDURE   |
|-------------------|---|--|---|
| 1. ANRS ALIGNMENT | Connect audio oscillator to T.P. 5 on PB2412 circuit board. Set oscillator output to 25 mV and frequency to 10 kHz. | AC VTVM to OUT TO RECORDER-FRONT LEFT jack on receiver rear panel. | Defeat the muting circuit by grounding T.P. 1 on PB2412 circuit board. Set LEFT and RIGHT SEPARATION controls (R123 and R124) at front panel of receiver to minimum (fully counterclockwise). Adjust R183 for 17.5 mV reading on the meter. |

## CD-4 ALIGNMENT (CONT'D)

| ITEM  | TEST CONNECTIONS   | INDICATOR  | PROCEDURE   |
|---|--|--|---|
| 2.  | Connect audio oscillator to T.P. 4 on PB2412 circuit board. Set oscillator output to 25 mV and frequency to 10 kHz.  | AC VTVM to OUT TO RECORDER-FRONT RIGHT jack on receiver rear panel.  | Adjust R184 for a reading of 17.5 mV on the meter.  |
| 3. VCO ALIGNMENT  | Connect oscilloscope and frequency counter to T.P. 3 on PB2412 circuit board.  | Scope display will be a triangular waveform 400 mV peak-to-peak.   | Retain the ground connection made in step 1 to defeat the muting circuit. Using two RCA shorting plugs, short out PHONO IN LEFT and RIGHT jacks. Adjust R159 for a 30 kHz $\pm$ 200 Hz indication on the frequency counter. |
| 4.  | Connect oscilloscope and frequency counter to T.P. 2 on PB2412 circuit board.  | Scope display will be a triangular waveform 400 mV peak-to-peak.   | Adjust R164 for a 30 kHz $\pm$ 200 Hz indication on the frequency counter.  |
| 5. VCO ALIGNMENT (ALTERNATE METHOD)   | Connect frequency indicator (Fisher 3129 or equivalent) to T.P. 3 on PB2412 circuit board.   |  | Adjust R159 for full brightness of indicator lamp on the frequency indicator.   |
| 6.  | Connect frequency indicator to T.P. 2 on PB2412 circuit board.   |  | Adjust R164 for full brightness of indicator lamp on frequency indicator. Remove ground connection from T.P. 1 (muting circuit) and remove shorting plugs from PHONO IN jacks.  |
| 7. SEPARATION ALIGNMENT   | Connect CD-4 Generator to PHONO IN LEFT and RIGHT jacks on rear panel of receiver. Set generator output as follows:<br><br>Sub-Channel carrier level . . . . . 1.5 mV<br>Channel Selector . . . . . FRONT<br>Deviation . . . . . 2.2 kHz<br>Base Channel . . . . . 2.5 mV<br>Input Frequency . . . . . 1 kHz<br>Delay . . . . . 40 usec. | Connect AC VTVM to OUT TO RECORDER-REAR LEFT jack on rear panel of receiver. CD-MATIC indicator lamp on front panel of receiver should be illuminated. | Adjust LEFT CD-4 SEPARATION control (R123) at receiver front panel for minimum reading on the meter.  |
| 8.  | Same as above.   | Connect AC VTVM to OUT TO RECORDER-REAR RIGHT jack on rear panel of receiver.  | Adjust RIGHT CD-4 SEPARATION control (R124) at receiver front panel for minimum reading on the meter.   |
| 9. LEFT CHANNEL SEPARATION  | Connect AC VTVM to OUT TO RECORDER-FRONT LEFT jack on rear panel of receiver.  | AC VTVM  | Meter reading should be 500 mV $\pm$ 150 mV. Record this reading as zero dB.  |
| 10.   | Connect AC VTVM to OUT TO RECORDER-REAR LEFT jack on rear panel of receiver.   | AC VTVM  | Meter reading should be at least 20 dB below zero dB reading recorded in step 9.  |
| 11. RIGHT CHANNEL SEPARATION  | Connect AC VTVM to OUT TO RECORDER-FRONT RIGHT jack on rear panel of receiver.   | AC VTVM  | Meter reading should be 500 mV $\pm$ 150 mV. Record this reading as zero dB.  |
| 12.   | Connect AC VTVM to OUT TO RECORDER-REAR RIGHT jack on rear panel of receiver.  | AC VTVM  | Meter reading should be at least 20 dB below zero dB reading recorded in step 11.   |
| <p>NOTE: Upon completion of CD-4 Alignment disconnect all test equipment and replace RCA shorting plugs in PHONO IN-LEFT and RIGHT jacks.</p> |  |  |   |

# CD-4 SCHEMATIC

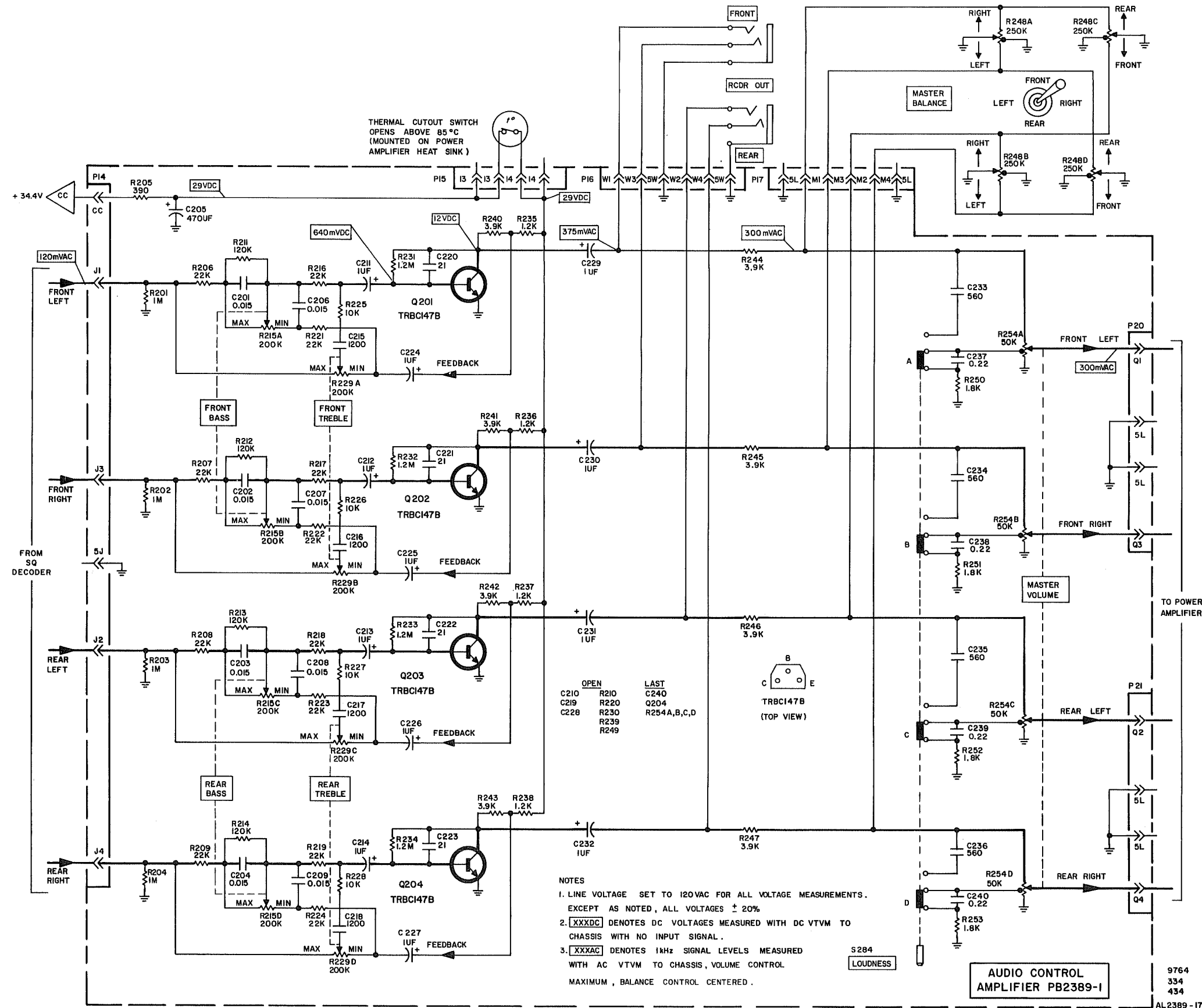


# AUDIO CONTROL AMPLIFIER SCHEMATIC

## AUDIO CONTROL AMPLIFIER PARTS LIST

| Ref. Des.   | Description                                | Part Number |
|---|--|-------------|
| C201, 202, 203, 204, 206, 207, 208, 209                     | Mylar, 0.015uF, 5%, 50V                    | CY22356-5   |
| C205  | Electrolytic, 470uF, 35V                   | CE22343-34  |
| C211, 212, 213, 214   | Sintered Aluminum, 1uF, 25V                | CS22340-5   |
| C215, 216, 217, 218   | Ceramic, 1200pF, 10%, 50V                  | CK22350-17  |
| C220, 221, 222, 223   | Ceramic, 21pF, 5%, 50V                     | CK22344-16  |
| C224, 225, 226, 227, 229, 230, 231, 232                     | Tantalum, 1uF, 35V                         | CL22305-3   |
| C233, 234, 235, 236   | Ceramic, 560pF, 10%, 50V                   | CK22350-9   |
| C237, 238, 239, 240   | Mylar, 0.22uF, 5%, 50V                     | CY22356-17  |
| Q201, 202, 203, 204   | Transistor, NPN (BC147B)                   | TRBC147B    |
| R201, 202, 203, 204   | 1M   | RF25DC105J  |
| R205  | 390, 5%, 1/2 Watt                          | RF50DC391J  |
| R206, 207, 208, 209, 216, 217, 218, 219, 221, 222, 223, 224 | 22K  | RF25DC223J  |
| R211, 212, 213, 214   | 120K                                       | RF25DC124J  |
| R215 (A, B, C, D), 229 (A, B, C, D)                         | Potentiometer, 200K, Rotary (Bass, Treble) | RP50160-313 |
| R225, 226, 227, 228   | 10K  | RF25DC103J  |
| R231, 232, 233, 234   | 1.2M                                       | RF25DC125J  |
| R235, 236, 237, 238   | 1.2K                                       | RF25DC122J  |
| R240, 241, 242, 243, 244, 245, 246, 247                     | 3.9K                                       | RF25DC392J  |
| R248 (A, B, C, D)   | Control, Master Balance                    | RP50160-315 |
| R250, 251, 252, 253   | 1.8K                                       | RF25DC182J  |
| R254 (A, B, C, D)   | Potentiometer, 50K, Rotary (Volume)        | RP50160-311 |
| S284  | Pushbutton Switch (LOUDNESS)               | SP50200-77  |

All resistors are deposited film, 5%, 1/4W unless otherwise noted. K = Kilohm, M = Megohm.

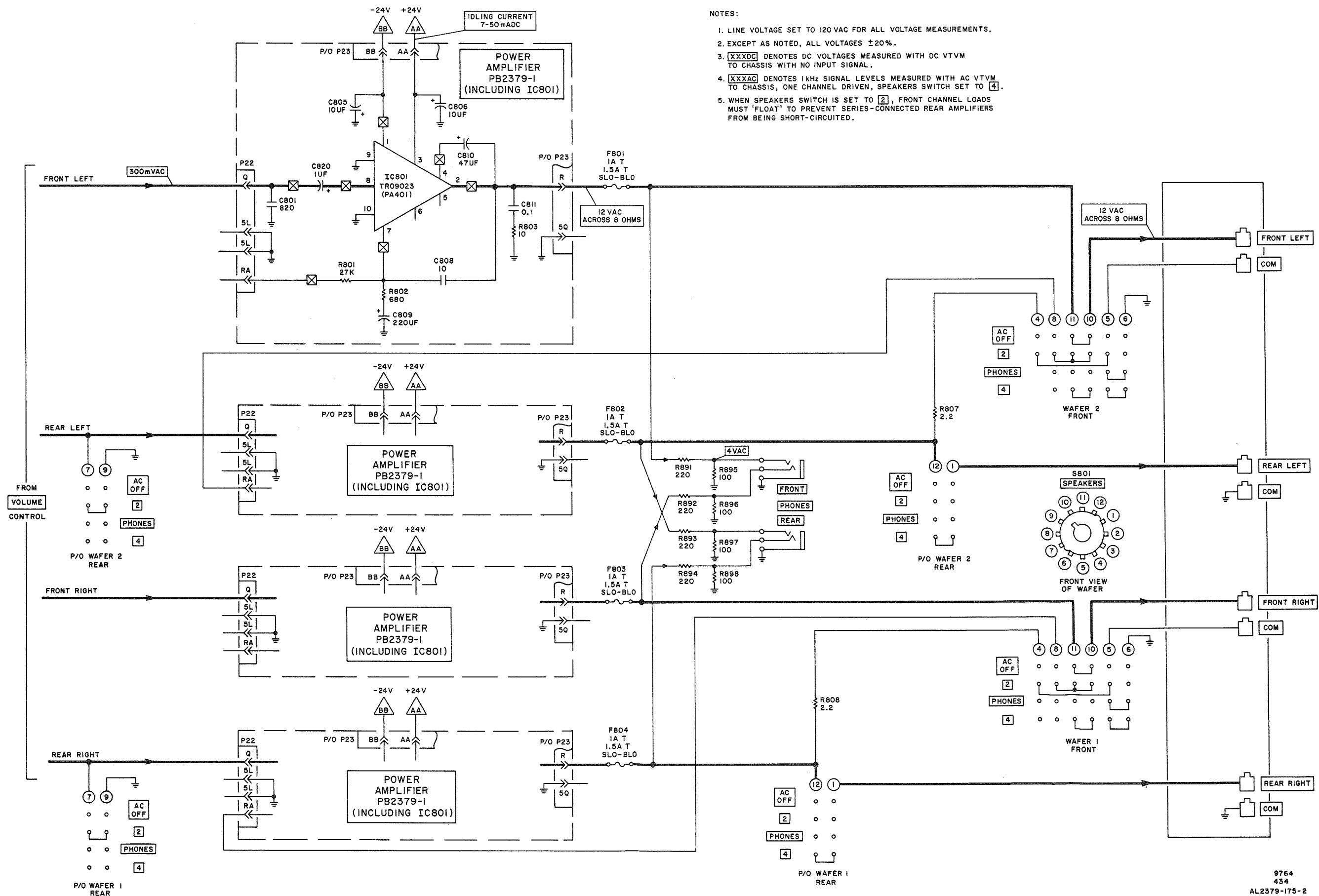


## POWER AMPLIFIER PARTS LIST

| Ref. Des.                  | Description                  | Part Number    |
|----------------------------|------------------------------|----------------|
| C801                       | Ceramic, 820pF, 10%, 50V     | CK22358-11     |
| C802                       | Sintered Aluminum, 1uF, 25V  | CS22340-5      |
| C805, 806                  | Electrolytic, 10uF, 50V      | CE22342-4      |
| C808                       | Ceramic, 10pF, 50V           | CK22360-3      |
| C809                       | Electrolytic, 220uF, 25V     | CE22342-14     |
| C810                       | Electrolytic, 47uF, 35V      | CE22342-7      |
| C811                       | Ceramic, 0.1uF, ±35%, 100V   | C51163         |
| IC801                      | IC, Power Amplifier (18W/8Ω) | TR09023        |
| R801                       | 27K                          | RF25DC273J     |
| R802                       | 680Ω                         | RF25DC681J     |
| R803                       | 10Ω, 1/2W                    | RF50DC100J     |
| CHASSIS MOUNTED COMPONENTS |                              |                |
| F801, 802, 803, 804        | Fuse, 1A, 250V, Slo-Blo      | FL51313-3      |
| R807, 808                  | Wirewound, 2.2, 15W          | RP15W2R2J      |
| R891, 892, 893, 894        | Wirewound, 220, 2W           | RW200W221J     |
| R895, 896, 897, 898        | 100, 1/2W                    | RF50DC101J     |
| S801                       | Switch, SPEAKERS             | P/O SR4130-155 |
| -                          | Jack, PHONES - FRONT, REAR   | JK20627-5      |
| -                          | Terminal Board, Speakers     | ET51340-2      |

All resistors are deposited film, 5%, 1/4W unless otherwise noted. K = Kilohm.

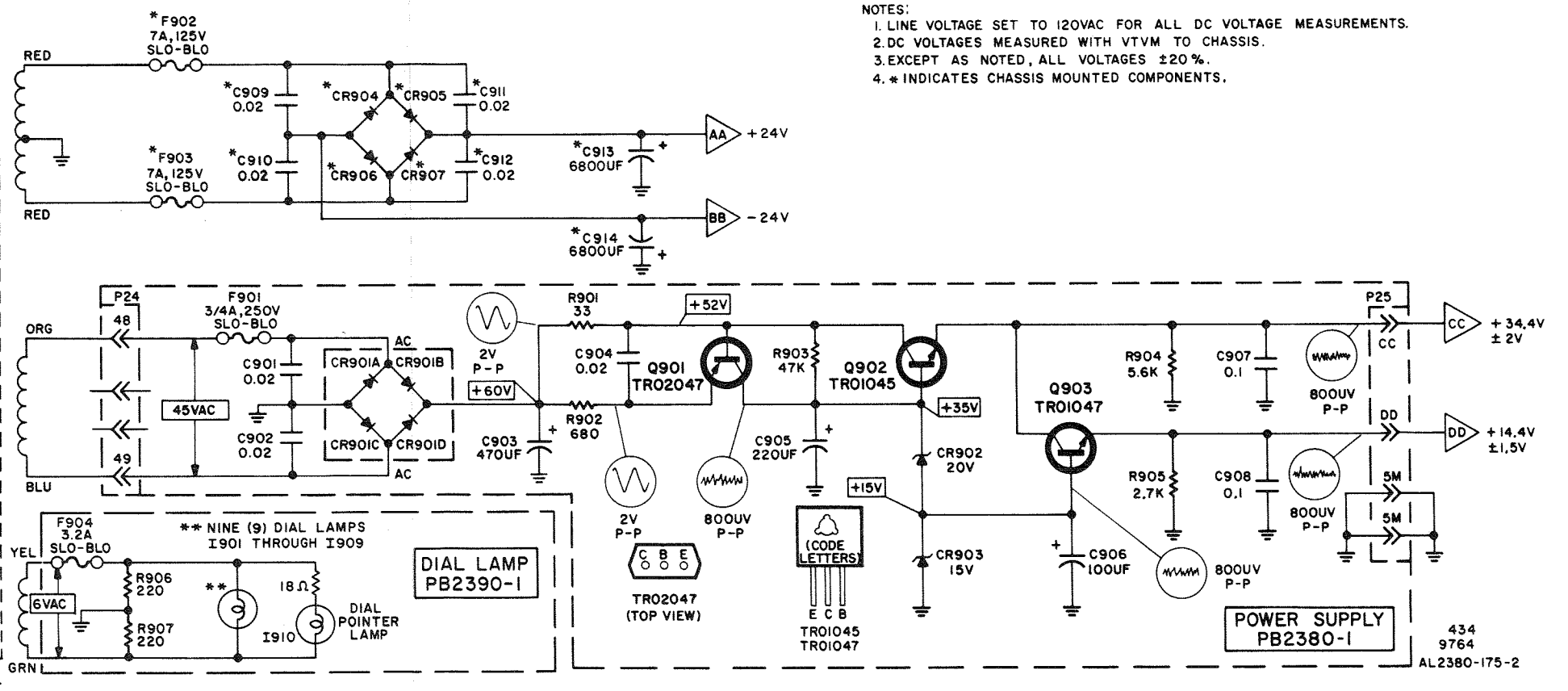
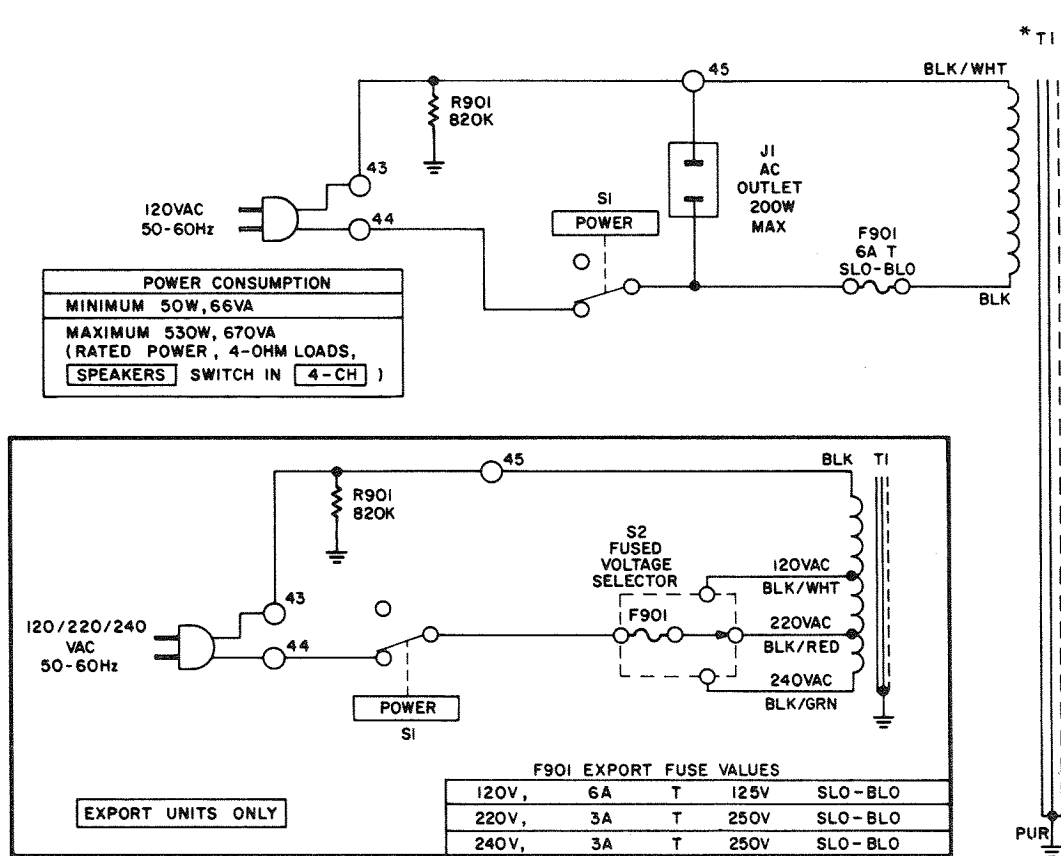
# POWER AMPLIFIER SCHEMATIC



**NOTES:**

1. LINE VOLTAGE SET TO 120 VAC FOR ALL VOLTAGE MEASUREMENTS.
2. EXCEPT AS NOTED, ALL VOLTAGES  $\pm 20\%$ .
3. [XXXDC] DENOTES DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO INPUT SIGNAL.
4. [XXXAC] DENOTES 1kHz SIGNAL LEVELS MEASURED WITH AC VTVM TO CHASSIS, ONE CHANNEL DRIVEN, SPEAKERS SWITCH SET TO [4].
5. WHEN SPEAKERS SWITCH IS SET TO [2], FRONT CHANNEL LOADS MUST 'FLOAT' TO PREVENT SERIES-CONNECTED REAR AMPLIFIERS FROM BEING SHORT-CIRCUITED.

# POWER SUPPLY/DIAL LAMP SCHEMATIC

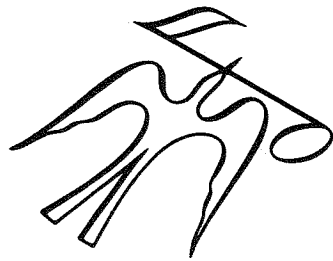


# POWER SUPPLY/DIAL LAMP PARTS LIST

| Ref. Des.                             | Description                        | Part Number    |
|---------------------------------------|------------------------------------|----------------|
| C901, 902,<br>904                     | Ceramic, .02 ± 20%, 500V           | CK22359-3      |
| C903                                  | Electrolytic, 470uF, 100V<br>Axial | CE22343-44     |
| C905                                  | Electrolytic, 220uF, 50V<br>Axial  | CE22343-28     |
| C906                                  | Electrolytic, 100uF, 25V<br>Axial  | CE22343-26     |
| C907, 908                             | Mylar, 0.1uF, 10%, 100V            | CY22373-1      |
| CR901A,<br>B, C & D                   | Bridge Rectifier, 1.5A, 200V       | BR51400-1      |
| CR902                                 | Zener, 20V, 5%, 1W                 | TR14002-4      |
| CR903                                 | Zener, 15V, 5%, 1W                 | TR14002-2      |
| F901                                  | Fuse, 3/4A, 250V, Slo-Blo          | FL51313-7      |
| Q901                                  | Transistor, PNP                    | TR02047        |
| Q902                                  | Transistor, NPN                    | TR01045        |
| Q903                                  | Transistor, NPN                    | TR01047        |
| R901                                  | Wirewound, 33, 5%, 5W              | RW5W330J       |
| R902                                  | 680                                | RF50DC681J     |
| R903                                  | 47K                                | RF50DC473J     |
| R904                                  | 5.6K                               | RF50DC562J     |
| R905                                  | 2.7K                               | RF50DC272J     |
| <b>PB2390-1</b>                       |                                    |                |
| F904                                  | Fuse, 3.2A, 125V, Slo-Blo          | FL51313-14     |
| I901                                  | Lamp, Dial (2112D)                 | LM21421-6      |
| through<br>I909                       |                                    |                |
| R906, 907                             | Composition, 220, 10%, 1/2W        | RC20BF221K     |
| <b>CHASSIS MOUNTED<br/>COMPONENTS</b> |                                    |                |
| C909, 910,<br>911, 912                | Ceramic, .02uF, 20%, 500V          | CK22359-3      |
| C913, 914                             | Electrolytic, 6800uF, 35V          | CE22372-3      |
| CR904,<br>905, 906,<br>907            | Bridge Rectifier, Silicon          | BR51401-3      |
| F101                                  | Fuse, 1-1/2A, 125V, Slo-Blo        | FL51313-20     |
| F901                                  | Fuse, 3/4A, 250V, Slo-Blo          | FL5313-7       |
| F902, 903                             | Fuse, 7A, 125V, Slo-Blo            | FL5313-9       |
| J1                                    | AC Outlet                          | JK25009        |
| R901                                  | Composition, 820K, 10%,<br>1/2W    | RC20BF824K     |
| S801                                  | Switch, SPEAKERS                   | P/O SR4130-155 |
| *S1                                   | Switch, Fused Voltage Selector     | EA51449        |
| T1                                    | Transformer, Power                 | TD4130-115     |
| *T1                                   | Transformer, Power                 | TE4130-215     |

\*Used in Export Units Only.

All resistors are deposited film, 5%, 1/2W unless otherwise noted. K = Kilohm.



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