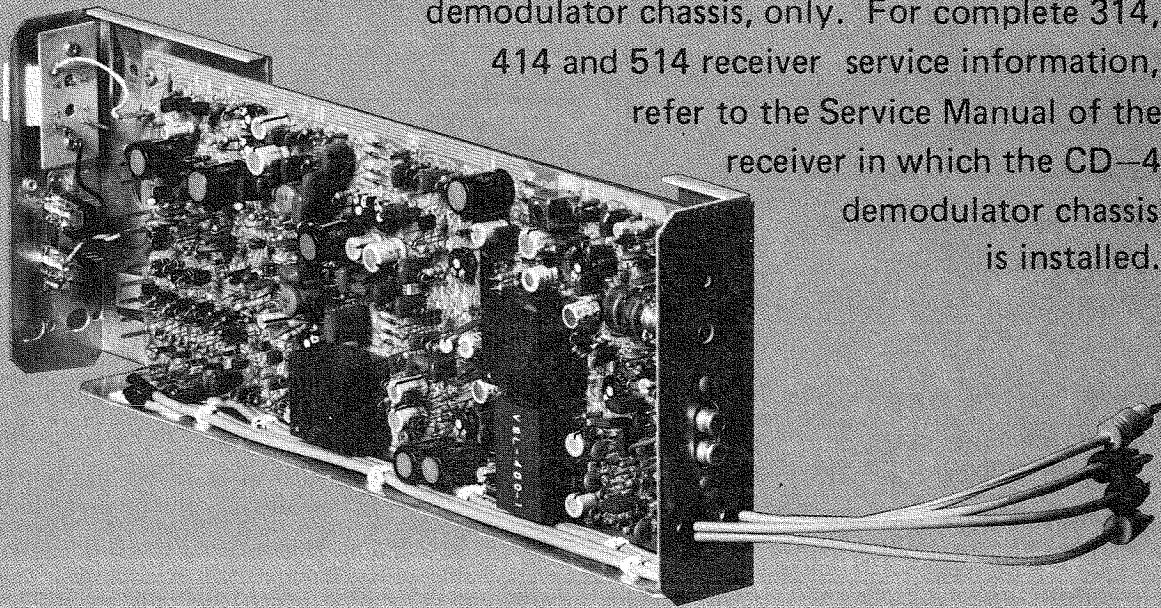


The Fisher[®]
CD-4 DEMODULATOR
CHASSIS

INSTALLATION AND
SERVICE MANUAL

This manual provides the information necessary to install the CD-4 demodulator chassis into 304X, 404X and 504X receivers for conversion of these receivers to 314, 414 and 514 units. This manual also provides complete service information for the CD-4 demodulator chassis, only. For complete 314, 414 and 514 receiver service information, refer to the Service Manual of the receiver in which the CD-4 demodulator chassis is installed.



WORLD LEADER IN HIGH QUALITY STEREO

TEST EQUIPMENT and SERVICE TIPS

The following equipment is required to completely test and align the CD-4 demodulator:

- Line Voltage Autotransformer or Voltage Regulator
- DC Vacuum Tube Voltohmmeter
- Accurately Calibrated AC Vacuum Tube Voltmeter.
- Oscilloscope
- Low-Distortion Audio Oscillator
- CD-4 Generator (Fisher 3109)
- RCA Shorting Plugs (2)
- 4-inch jumper with alligator clips
- 10 uF Electrolytic Capacitor
- Soldering Iron with Small Tip,
Fully Insulated from AC Line
- Suction Desoldering Tool

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

Many of these items are included only as a reminder — they are normal procedures for experienced technicians. Shortcuts may be taken, but these often cause additional damage to transistors, circuit components, or printed circuit boards.

SOLDERING: A well-tinned, hot, clean soldering iron tip will make soldering easier, without causing damage to the printed circuit board or the components mounted on it. Regular use of a sponge cleaner will maintain a clean soldering surface. The heat available at the tip, (not the wattage of the iron) is important. Some 50-watt irons reach temperatures of 1,000° F, while others will hardly melt solder. Small-diameter tips should be used for single solder connections, pyramid and chisel tips for large areas.

Always disconnect the AC power cord from the line when soldering. Turning the power switch OFF is not sufficient. Power-line leakage paths, through the heating element of the iron, may destroy transistors.

PARTS REMOVAL: If a part is not being returned for in-warranty factory replacement, it may be cut in half (with diagonal cutting pliers) to make removal easier. Multiple terminal parts, such as IF transformers, or electrolytic capacitors, should be removed using special de-soldering tips made especially for this purpose. Removing solder from terminals, reduces the possibility of breaking the printed circuit board when the part is removed.

ACCIDENTAL SHORTS: A clean working area, free of metal particles, screws, etc., is an important preventive in avoiding servicing problems. Screws, removed from the chassis during servicing, should be stored in a box until needed. While a set is operating, it takes only an instant for a base-to-collector short to destroy a transistor (and others direct-coupled to it). In the time it takes for a dropped screw, washer, or screwdriver, to contact a pair of terminals (or terminal and chassis), a transistor can be ruined.

SOLID-STATE DEVICES: Integrated Circuits contain the equivalent of many circuit parts, including transistors, diodes, resistors, and capacitors. The preferred troubleshooting procedure requires isolating the trouble to one stage using AC signal tracing methods. Once the suspected stage is located, the DC voltages at the input and output leads are measured to give an accurate indication of the operating conditions of the IC. DO NOT use an ohmmeter to check continuity with the IC mounted on the printed circuit board. Forward biasing the internal junctions within the IC may burn out the transistors. Do not replace a defective IC until all external resistors, capacitors, and transformers are checked first, to prevent the replacement IC from failing immediately due to a defect in the connecting components. Solder and unsolder each lead separately using a pliers or other heat sink on the lead to prevent damage from excessive heat. Check that the leads are connected to the correct locations on the printed circuit board before turning the set on.

Whenever possible, a transistor tester should be used to determine the condition of a transistor or diode. Ohmmeter checks do not provide conclusive data, and many even destroy the junction(s) within the device.

In some applications, replacement of transistors must be made from the same beta group as the original type. The beta group is indicated by a colored marking on the transistor. Include this information when ordering replacements.

VOLTAGE MEASUREMENTS: All voltages are measured with the line voltage adjusted to 120 volts. All measured voltages are $\pm 10\%$. DC voltages are measured to ground with a VTVM, with no signal input unless otherwise noted. AC signal voltages are measured under the conditions specified on the schematic.

ALIGNMENT PROCEDURES: DO NOT attempt realignment unless the required test equipment is available, and the alignment procedure is thoroughly understood.

The CD-4 system contains four independent audio channels in one record groove. The record groove carries the signals for Left Front (Lf) and Left Rear (Lr) in one wall with the signals for Right Front (Rf) and Right Rear (Rr) in the other wall. In addition to the sum (Lf+Lr) in the left channel and (Rf+Rr) in the right channel, each wall carries a 30 KHz FM carrier signal. The carrier in the left wall is frequency modulated by an (Lf-Lr) signal while the carrier in the right wall is frequency modulated by an (Rf-Rr) signal. The CD-4 demodulator recovers the four channels from the left sum and right sum signals by electrically adding each difference signal (Lf-Lr and Rf-Rr) to the corresponding sum signal. If the record is played through a stereo amplifier without a CD-4 demodulator, standard stereo (left and right sum signals only) will be heard.

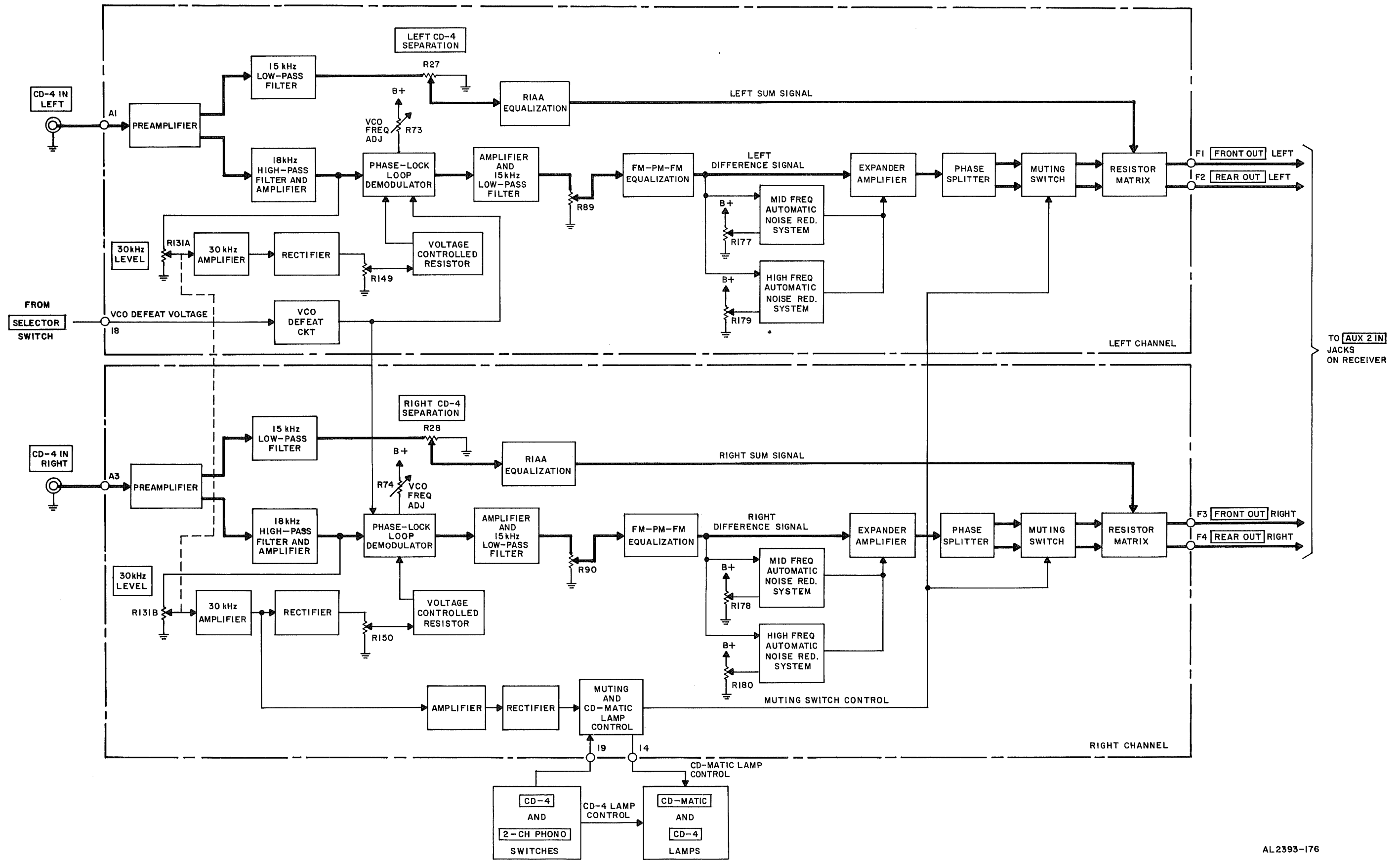
Since signal processing for the left and right channels is identical, only the right channel is discussed. The CD-4 signal for the right channel enters the CD-4 demodulator through the CD-4 IN RIGHT jack. The right input composite signal is preamplified and applied to a 15 KHz low-pass filter which passes only the Rf+Rr sum signal. The Rf+Rr signal is then fed to an RIAA network through the RIGHT CD-4 SEPARATION control. This control permits adjustment of the separation between the right front and right rear channels. The RIAA network provides the necessary amount of turnover and rolloff equalization compatible with existing standards. The output of the RIAA network is then applied to a resistor matrix which provides the FRONT OUT right and REAR OUT right signals.

The preamplified right input composite signal is also applied to an 18 KHz high-pass filter. The output of the filter is amplified and fed to a phase-lock-loop (PLL) demodulator. The PLL demodulator contains a voltage controlled oscillator (VCO) which free-runs at 30 KHz. The setting of R74 determines the frequency of the free-running oscillator. The frequency of the VCO is synchronized by the incoming FM carrier signal. As a result, the output of the PLL demodulator yields the Rf-Rr signal. The output of the PLL demodulator is filtered by a 15 KHz low-pass filter to remove any 30 KHz carrier component. The Rf-Rr signal is applied to an FM-PM-FM equalization network. This network equalizes the demodulated audio signal which was frequency modulated and phase modulated in the recording process for the purpose of improved signal-to-noise ratio. The signal then enters an expander amplifier which decreases the gain of low level signals to compensate for boosted gain of these signals in the recording system. The expander amplifier is controlled by two Automatic Noise Reduction System (ANRS) circuits; one covering the mid-frequency band and the other, the high-frequency band. The output of the expander amplifier goes to a phase splitter which provides two signals 180 degrees out of phase with each other. These two signals are then applied to the resistor matrix through a muting switch. The resistor matrix mixes the two out-of-phase signals with the sum signals to provide the total right channel output.

The muting switch is turned off by the presence of the 30 KHz carrier. The 30 KHz carrier signal is taken from the output of the 30 KHz amplifier, amplified, rectified and fed to the muting and CD-MATIC lamp control circuit. This circuit generates, in addition to the muting switch control signal, a signal for turning on the CD-MATIC lamp.

The 30 KHz LEVEL control feeds a portion of the 30 KHz carrier signal to the PLL demodulator through a 30 KHz amplifier, a rectifier, R150 and a voltage controlled resistor. R150 is a bandwidth adjustment which permits the 30 KHz carrier to be demodulated without significant distortion when the CD-4 record has been played many times.

The VCO is disabled when the receiver's SELECTOR switch is set to either AM or FM. In either switch position, a VCO defeat voltage is applied to the VCO defeat circuit in the left channel which turns off the VCO to prevent interference with AM or FM reception.



ALIGNMENT

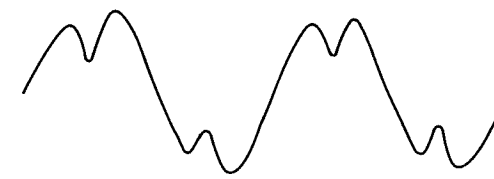
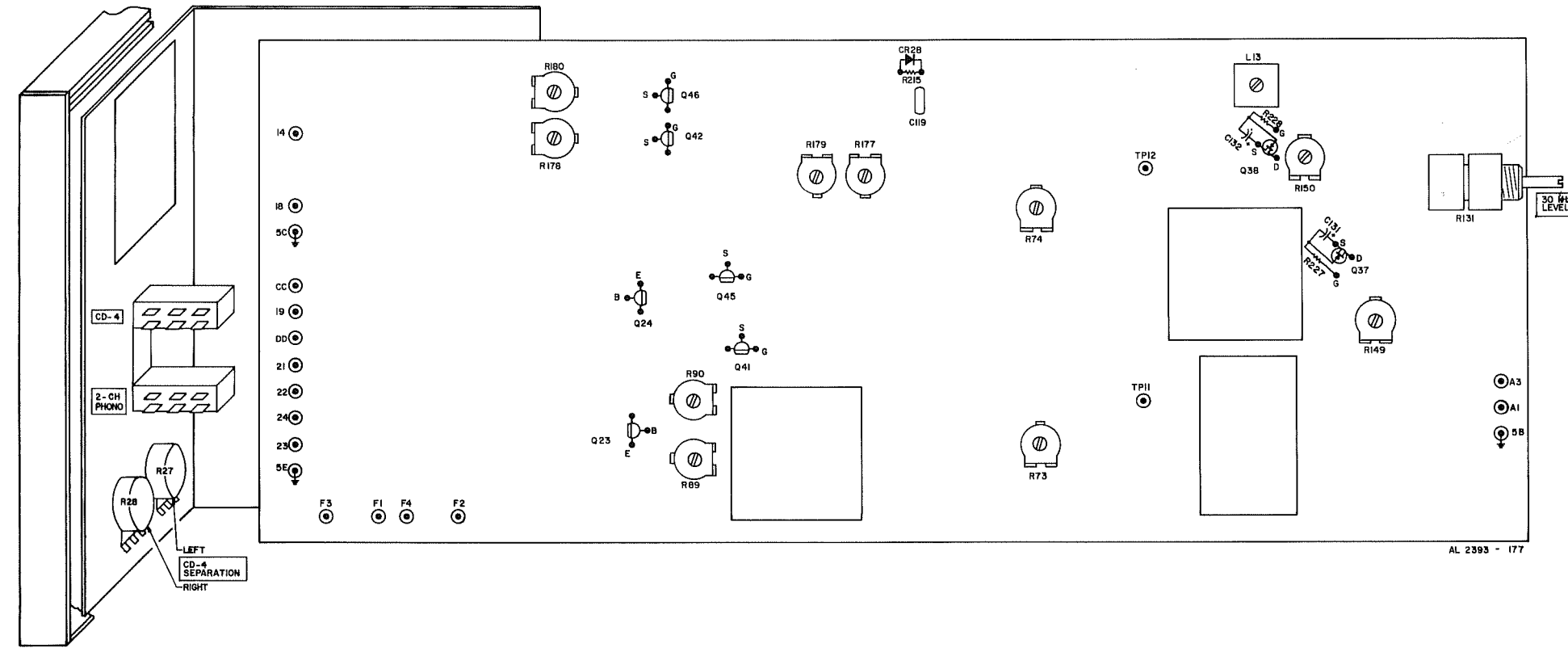
RECEIVER SWITCHES AND CONTROLS SETTING: MODE/MONITOR to TAPE MONITOR, MASTER VOLUME to MIN, SELECTOR to CD-4, CD-4 PUSHBUTTON SWITCH DEPRESSED

| ITEM | GENERATOR | INDICATOR | PROCEDURE |
|--|---|--|--|
| 1. PRELIMINARY ANRS ALIGNMENT | | DC VTVM to sources of Q41, Q45, Q42 and Q46 in turn. | Adjust R177, R179, R178 and R180, respectively, for $2.5V \pm 0.2V$. |
| 2. FINAL ANRS ALIGNMENT (LEFT CHANNEL). | Audio oscillator to base of Q23 through 10UF electrolytic capacitor (+ side facing circuit). Set oscillator output to 220 mV and frequency to 30 Hz. | AC VTVM and scope vertical input to OUT TO RCDR FRONT LEFT jack on receiver rear panel. | Defeat muting circuit by connecting pin 14 to chassis ground. Short CD-4 IN LEFT and RIGHT jacks. Set LEFT CD-4 SEPARATION control to maximum counterclockwise position. VTVM should indicate $250mV \pm 50mV$. Record this reading as 0 dB. |
| 3. | Decrease audio oscillator output to 2.2 mV. | AC VTVM | VTVM should indicate $-40 dB \pm 1 dB$. |
| 4. | Increase audio oscillator frequency to 600 Hz. | AC VTVM | VTVM should indicate $-52dB \pm 3dB$. Slowly adjust R177 until VTVM indication increases approximately 0.3 dB. |
| 5. | Increase audio oscillator frequency to 10 KHz. | AC VTVM | VTVM should indicate $-54 dB \pm 3 dB$. Slowly adjust R179 counterclockwise until VTVM indication increases approximately 0.3 dB. |
| 6. FINAL ANRS ALIGNMENT (RIGHT CHANNEL). | Audio oscillator to base of Q24. Set output to 220 mV and frequency to 30 Hz. | AC VTVM and scope vertical input to OUT TO RCDR FRONT RIGHT jack on receiver rear panel. | Maintain ground to pin 14 and short to CD-4 IN LEFT and RIGHT jacks. Set RIGHT CD-4 SEPARATION control to maximum counterclockwise position. VTVM should indicate $250 mV \pm 50 mV$. Record this reading as 0 dB. |
| 7. | Decrease audio oscillator output to 2.2 mV. | AC VTVM | VTVM should indicate $-40 dB \pm 1 dB$. |
| 8. | Increase audio oscillator frequency to 600 Hz. | AC VTVM | VTVM should indicate $-52 dB \pm 3 dB$. Slowly adjust R178 counterclockwise until VTVM indication increases approximately 0.3 dB. |
| 9. | Increase audio oscillator frequency to 10 KHz. | AC VTVM | VTVM should indicate $-54 dB \pm 3 dB$. Slowly adjust R180 counterclockwise until VTVM indication increases approximately 0.3 dB. |
| 10. MUTING ALIGNMENT. | Setup CD-4 generator as follows: Sub-channel carrier level - 180 uV. Channel Selector - FRONT Deviation - 1 KHz Base Channel - OFF Input Freq. - 1 KHz | DC VTVM to junction of R215 and C119. | Connect CD-4 generator to CD-4 IN RIGHT input. Set 30 KHz LEVEL control to its maximum clockwise position. VTVM should indicate $1.6 \pm 0.4V$. CD-MATIC lamp should light. If correct indications are not obtained, adjust slug at top of L13 until indications are correct. |

| ITEM | GENERATOR | INDICATOR | PROCEDURE |
|---|--|---|---|
| 11. VCO FREQUENCY AND HOLD RANGE ALIGNMENT (LEFT CHANNEL) | Setup CD-4 generator as follows: Sub-channel carrier level - 1 mV Channel Selector - FRONT Deviation - 6 KHz Base Channel - OFF Input Freq. - 1 KHz | DC VTVM to gate of Q37; AC VTVM and scope to OUT TO RCDR FRONT LEFT jack on receiver rear panel. | Set R149 to its extreme counterclockwise position. DC VTVM should indicate $-6.5 \pm 1V$. Adjust R89 to its mechanical center position. Connect CD-4 generator output to both the CD-4 IN RIGHT and CD-4 IN LEFT inputs. |
| 12. | Increase CD-4 generator deviation output to 8 KHz. | Scope | Adjust R73 until scope display is distorted symmetrically. See VCO WAVEFORM. Reduce deviation on CD-4 generator until scope display is no longer distorted. At this point deviation should be $7.5KHz \pm 2 KHz$. |
| 13. | Decrease CD-4 generator Sub channel carrier level to 500 uV and deviation to 4 KHz. | Scope | Slowly adjust R149 until scope display is distorted. Slightly readjust R149 until scope display is no longer distorted. Reduce CD-4 generator Sub-channel carrier level to 450 uV. Scope display should again be distorted. |
| 14. VCO FREQUENCY AND HOLD RANGE ALIGNMENT (RIGHT CHANNEL). | Setup CD-4 generator as indicated in step 11. | DC VTVM to gate of Q38; AC VTVM and scope to OUT TO RCDR FRONT RIGHT jack on receiver rear panel. | Set R150 to its extreme counterclockwise position. DC VTVM should indicate $-6.5V \pm 1V$. Adjust R90 to its mechanical center position. |
| 15. | Increase CD-4 generator deviation output to 8 KHz. | Scope | Adjust R74 until scope display is distorted symmetrically. See VCO WAVEFORM. Reduce deviation on CD-4 generator until scope display is no longer distorted. At this point deviation should be $7.5KHz \pm 2 KHz$. |
| 16. | Decrease CD-4 generator Sub-channel carrier level to 500 uV and deviation to 4 KHz. | Scope | Slowly adjust R150 until scope display is distorted. Slightly readjust R150 until scope display is no longer distorted. Reduce CD-4 generator Sub-channel carrier level to 450 uV. Scope display should again be distorted. |
| 17. FM-PM-FM EQUALIZER ALIGNMENT (LEFT CHANNEL). | Setup CD-4 generator outputs as follows: Sub-channel carrier level - 1.5 mV. Channel Selector - FRONT Deviation - 2.2 KHz Base Channel - OFF Input Freq. - 1 KHz. | AC VTVM and scope to emitter of Q23. | AC VTVM should indicate $200 mV \pm 10 mV$. If indication is not correct, adjust R89 until correct indication is obtained. |
| 18. FM-PM-FM EQUALIZER ALIGNMENT (RIGHT CHANNEL). | Maintain same setup of CD-4 generator as indicated in previous step. | AC VTVM and scope to emitter of Q24. | AC VTVM should indicate $200 mV \pm 10 mV$. If indication is not correct, adjust R90 until correct indication is obtained. |

| ITEM | GENERATOR | INDICATOR | PROCEDURE |
|--|--|---|---|
| 19. LEFT CHANNEL SEPARATION TEST | Setup CD-4 generator outputs as follows: Sub-channel carrier level - 1.5 mV. Channel Selector - REAR Deviation - 2.2 KHz Base Channel carrier level - 2.8 mV Delay - 40 usec Input Freq. - 1 KHz | AC VTVM to OUT TO RCDR FRONT LEFT jack on receiver rear panel. | Adjust LEFT CD-4 SEPARATION control for lowest reading on VTVM. |
| 20. | Set CD-4 generator Channel Selector to FRONT | AC VTVM | VTVM should indicate $500 mV \pm 120 mV$. Record this reading as 0 dB. |
| 21. | Set CD-4 generator Channel Selector to REAR. | AC VTVM | VTVM should indicate at least 20 dB below 0 dB reference of preceding step. |
| 22. | | AC VTVM to OUT TO RCDR REAR LEFT jack on receiver rear panel. | VTVM should indicate $450 mV \pm 100 mV$. Record this reading as 0 dB. |
| 23. | Set CD-4 generator Channel Selector to FRONT | AC VTVM | VTVM should indicate at least 20 dB below 0 dB reference of preceding step. |
| 24. RIGHT CHANNEL SEPARATION TEST AND ALIGNMENT. | Setup CD-4 generator outputs as indicated in Step 19. | AC VTVM to OUT TO RCDR FRONT RIGHT jack on receiver rear panel. | Adjust RIGHT CD-4 SEPARATION control for lowest reading on VTVM. |
| 25. | Set CD-4 generator Channel Selector to FRONT. | AC VTVM | VTVM should indicate $500 mV \pm 120 mV$. Record this reading as 0 dB. |
| 26. | Set CD-4 Channel Selector to REAR. | AC VTVM | VTVM should indicate at least 20 dB below 0 dB reference of preceding step. |
| 27. | | AC VTVM to OUT TO RCDR REAR RIGHT jack on receiver rear panel. | VTVM should indicate $450 mV \pm 100 mV$. Record this reading as 0 dB. |
| 28. | Set CD-4 generator Channel Selector to FRONT. | AC VTVM | VTVM should indicate at least 20 dB below 0 dB reference of preceding step. |

ALIGNMENT



VCO WAVEFORM

CHASSIS PARTS LIST/LAMP REPLACEMENT

CD-4 DEMODULATOR CHASSIS

| SYMBOL | DESCRIPTION | PART NUMBER |
|---------|---|--------------|
| | PCB, CD-4 Disc Demodulator | PB2393-1 |
| | Cable Assembly, REAR OUT | AS25011-1 |
| | Cable Assembly, FRONT OUT | AS25011-2 |
| | Connector, Double Jack, Female | J20608 |
| R27, 28 | Control, CD-4 SEPARATION LEFT, CD-4 SEPARATION RIGHT | RP50160-317 |
| | Knob, Pushbutton | EK20046-3 |
| | PCB, Lamp | PB2404-1 |
| 111, 12 | Lamp, CD-4, CD-MATIC | LM21421-7 |
| | Lamp Housing | EA51461 |
| | Strain Relief | EM21116-2 |
| S11 | 2-Switch Assembly, 2 CH PHONO, CD-4 | SP50200-73-1 |

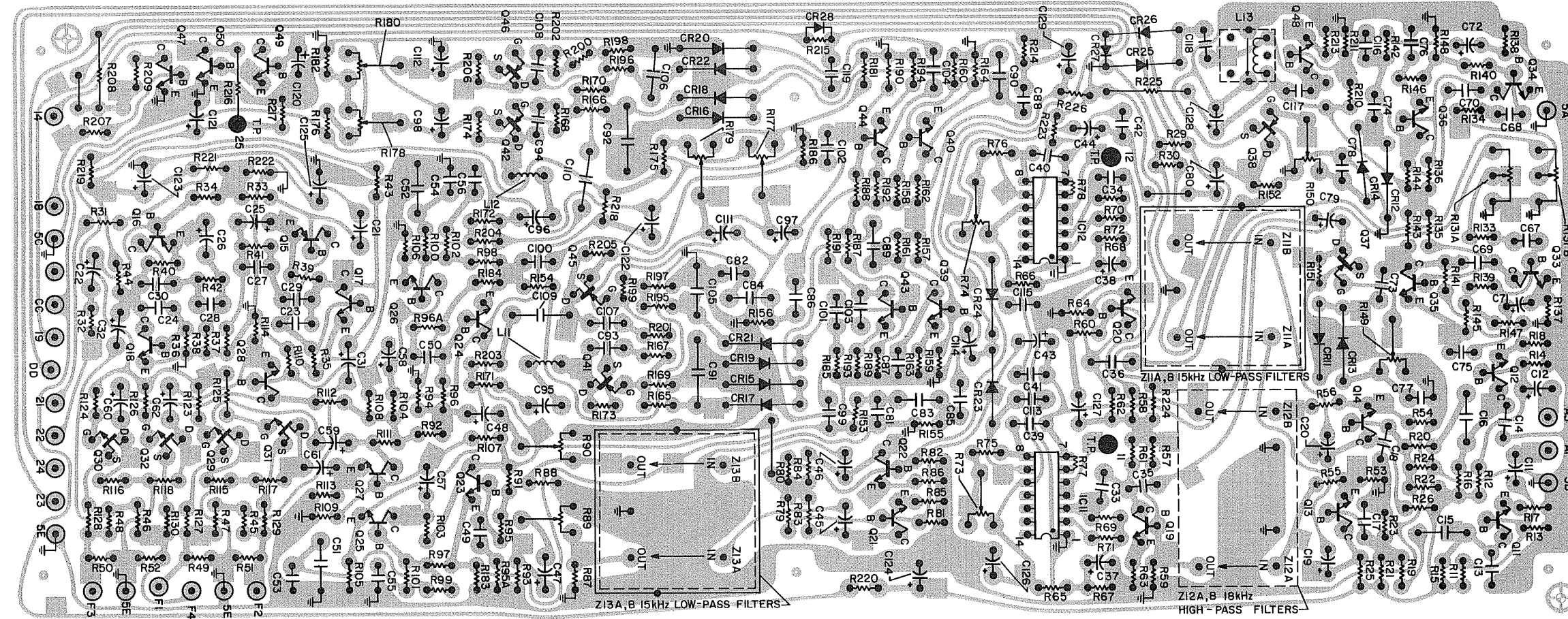
REPLACING CD-MATIC OR CD-4 LAMP

- (1) Unplug AC power cord and remove cabinet.
- (2) Remove lamp PCB by removing two screws securing it to the front panel of the Demodulator.
- (3) Gently pull back the lamp PCB until the lamps clear the holes in the plastic lamp housings.
- (4) Unsolder and remove defective lamp and solder replacement lamp on lamp PCB.

PCB PARTS LIST

SYMBOL DESCRIPTION PART NUMBER

| | | |
|--|---------------------------------|-------------|
| C11, 12, 21, 22, 57, 58, 131, 132 | Tantalum, 1 UF, 35V | CL22305-3 |
| C13, 14, 17, 18, 23, 24, 69, 70 | Ceramic, 21 pF, 10%, 50V | CK22345-15 |
| C15, 16, 51, 52, 75, 76, 93, 94 | 0.1 UF | CY22335-18 |
| C19, 20, 43, 44, 45, 46, 111, 112 | Electrolytic, 4.7 UF, 50V | CE22342-3 |
| C25, 26 | Tantalum, 10 UF, 25V | CL22305-17 |
| C27, 28 | 6800 pF | CY22335-9 |
| C29, 30 | 0.015 UF | CY22335-2 |
| C31, 32, 59, 60, 61, 62 | Tantalum, 2.7 UF, 35V | CL22305-4 |
| C33, 34, 35, 36, 55, 56, 73, 74, 101, 102, 107, 108, 117 | 4700 pF | CY22335-8 |
| C113, 115 | 2700 pF | CY22335-6 |
| C116 | 1000 pF | CY22335-3 |
| C120 | Tantalum, 4.7 UF, 25V | CL22305-6 |
| C122, 123, 124, 126 | Electrolytic, 100 UF, 35V | CE22342-10 |
| C125, 129 | Electrolytic, 100 UF, 16V | CE22342-12 |
| CR11, 12, 13, 14 | Diode, Germanium | TR12001-4 |
| CR15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28 | Diode, Silicon | TR13006-2 |
| CR27 | Stabister Module, Silicon | SIT51096-6 |
| IC11, 12 | FM Demodulator, Phase-Lock-Loop | TR09026 |
| L11, 12 | Inductor, Audio, 100 mH | LC21834-1 |
| L13 | Coil, Adjustable | ZZ50210-185 |
| Q11, 12, 13, 14, 21, 22, | Transistor, NPN (BC414C) | TR01015 |



AL 2393 - 099

AL 2393 - III

SYMBOL DESCRIPTION PART NUMBER

| | | |
|--|---------------------------|------------|
| 23, 24, 25, 26 | | |
| Q15, 16 | Transistor, PNP | TR02020-2 |
| Q17, 18, Q27, 28, 49 | Transistor, NPN | TR01016 |
| Q19, 20, 33, 34, 35, 36, 39, 40, 43, 44, 47, 48 | Transistor, NPN (BC239C) | TR01014 |
| Q29, 30, 31, 32 | Transistor, P-Channel FET | TR06016 |
| Q37, 38, 41, 42, 45, 46 | Transistor, N-Channel FET | TR06015 |
| Q50 | Transistor, NPN | TR01053-5 |
| R11, 12, 13, 14, 115, 116, 117, 118, 139, 140, 151, 152, 199, 200, 201, 202, 211 | 1.5M | RB25DC155J |

SYMBOL DESCRIPTION PART NUMBER

| | | |
|--|------|------------|
| R15, 16, 95, 96, 135, 136, 159, 160 | 47K | RB25DC473J |
| R17, 18, 59, 60, 213, 226 | 2.7K | RB25DC272J |
| R19, 20, 25, 26, 61, 62, 83, 84, 183, 184, 191, 192, 209 | 4.7K | RB25DC472J |
| R21, 22 | 430K | RB25DC434J |
| 23, 24, 81, 82 | 56K | RB25DC563J |
| R29, 30, 45, 46, 47, 48, 65, 66, 67, 68, 87, 88, 129, 130, 133, 134, 207 | 10K | RB25DC103J |

SYMBOL DESCRIPTION PART NUMBER

| | | |
|--|------|------------|
| R31, 32, 111, 112, 113, 114, R33, 34, 167, 168 | 1K | RB25DC102J |
| R35, 36, 41, 42, 101, 102 | 120K | RB25DC124J |
| R37, 38 | 12K | RB25DC123J |
| R39, 40 | 1.2K | RB25DC122J |
| R43, 44 | 180K | RB25DC184J |
| R49, 50, 51, 52 | 5.1K | RB25DC512J |
| R53, 54 | 1M | RB25DC105J |
| R55, 56, 143, 144 | 820 | RB25DC821J |
| R57, 58, 195, 196, 214 | 2.2K | RB25DC222J |
| R63, 64 | 33K | RB25DC333J |
| R69, 70, 71, 72, 105, 106 | 220 | RB25DC221J |
| | 3.3K | RB25DC332J |

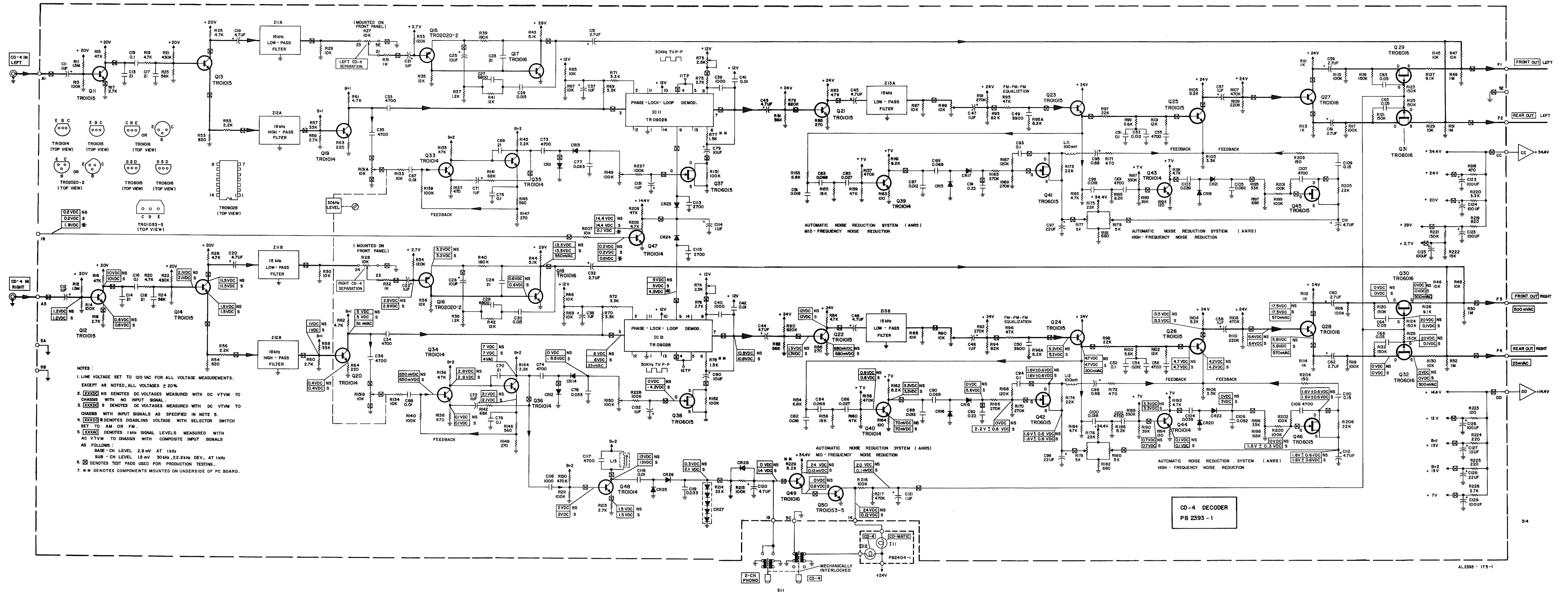
SYMBOL DESCRIPTION PART NUMBER

| | | |
|---|-----------------------------|--------------|
| R73, 74 | Potentiometer, 2.5K, 20% | RV50150-23-2 |
| R75, 76 | Composition, 2.7K, 5%, 1/4W | RC07BF272J |
| R77*, 78* | 1.5K (Insulated Leads) | RF25DC152J |
| R79, 80 | 820K | RB25DC824J |
| R85, 86, 147, 148 | 270 | RB25DC271J |
| R89, 90 | Potentiometer, 10K, 20% | RV50150-23-7 |
| R91, 92, 165, 166, 169, 170 | 270K | RB25DC274J |
| R93, 94 | 82K | RB25DC823J |
| R95A, 96A, 103, 104, 161, 162, 185, 186 | 8.2K | RB25DC822J |
| R97, 98, 173, 174, 175, 176, 205, 206 | 22K | RB25DC223J |
| R99, 100 | 5.6K | RB25DC562J |
| R107, 108, 157, 158, 210, 217 | 470K | RB25DC474J |

SYMBOL DESCRIPTION PART NUMBER

| | | |
|--------------------------|-----------------------------|--------------|
| R109, 110 | 220K | RB25DC224J |
| R119, 120, 121, 122 | 150K (Insulated Leads) | RF25DC154J |
| R123, 124, 125, 126, 221 | 105K | RB25DC154J |
| R127, 128 | 9.1K | RB25DC912J |
| R131A, 131B | Potentiometer, Dual 10K | RP50160-318 |
| R137, 138 | 470 | RB25DC471J |
| R141, 142, 197, 198 | 68K | RB25DC683J |
| R145, 146 | 560 | RB25DC561J |
| R149, 150 | Potentiometer, 5K, 20% | RV50150-23-8 |
| R153, 154 | 6.8K | RB25DC682J |
| R155, 156 | 18K | RB25DC183J |
| R163, 164 | 100 | RB25DC101J |
| R171, 172 | 470 | RB25DC471J |
| R177, 178, 179, 180 | Potentiometer, 5K, 20% | RV50150-23-3 |
| R181, 182 | 680 | RB25DC681J |
| R187, 188 | 330K | RB25DC334J |
| R189, 190 | 39K | RB25DC393J |
| R193, 194 | 120 | RB25DC121J |
| R203, 204 | 150 | RB25DC151J |
| R208 | 47K (Insulated Leads) | RF25DC473J |
| R215, 216, 227, 228 | 100K (Insulated Leads) | RF25DC104J |
| R218 | Wirewound, 470, 2W | RW200W471J |
| R219 | Wirewound, 820, 2W | RW200W821J |
| R220 | Composition, 3.3K, 5%, 1/2W | RC20BF332J |
| R222 | 15K | RB25DC153J |
| R223 | Composition, 120, 5%, 1/2W | RC20BF121J |
| R224, 225 | Composition, 220, 5%, 1/2W | RC20BF221J |
| R229* | 8.2K (Insulated Leads) | RF25DC822J |
| Z11A, 11B, Z13A, 13B | Filter, Dual, Low Pass | ZZ50210-193 |
| Z12A, 12B | Filter, Dual, High Pass | ZZ50210-194 |

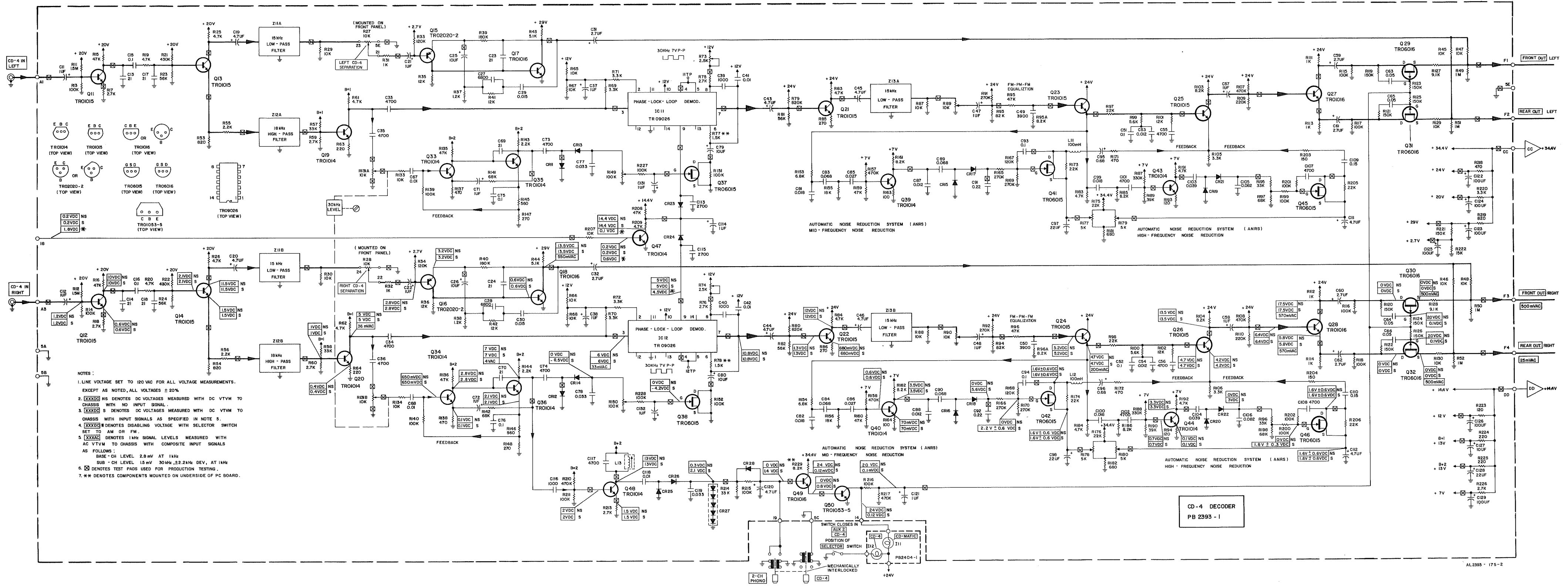
Unless otherwise specified:
Resistors are Deposited Carbon, 5%, 1/4W. K=Kilohm, M=Megohm
Capacitors are Mylar, 10%, 100V
* Denotes components mounted on underside of Board



- NOTES:
1. LINE VOLTAGE SET TO 120 VAC FOR ALL VOLTAGE MEASUREMENTS. EXCEPT AS NOTED, ALL VOLTAGES $\pm 20\%$.
 2. [XXXX] NS DENOTES DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO INPUT SIGNAL.
 3. [XXXX] S DENOTES DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH INPUT SIGNALS AS SPECIFIED IN NOTE 5.
 4. [XXXX] DENOTES DISABLING VOLTAGE WITH SELECTOR SWITCH SET TO AM OR FM.
 5. [XXXX] DENOTES 1kHz SIGNAL LEVELS MEASURED WITH AC VTVM TO CHASSIS WITH COMPOSITE INPUT SIGNALS AS FOLLOWS:
 - BASE-CH LEVEL 2.8 mV AT 1kHz
 - SUB-CH LEVEL 15 mV 30kHz $\pm 2.24\%$ DEV. AT 1kHz
 6. [] DENOTES TEST PADS USED FOR PRODUCTION TESTING.
 7. ** DENOTES COMPONENTS MOUNTED ON UNDERSIDE OF PC BOARD.

CD-4 DECODER
PB 2393-1

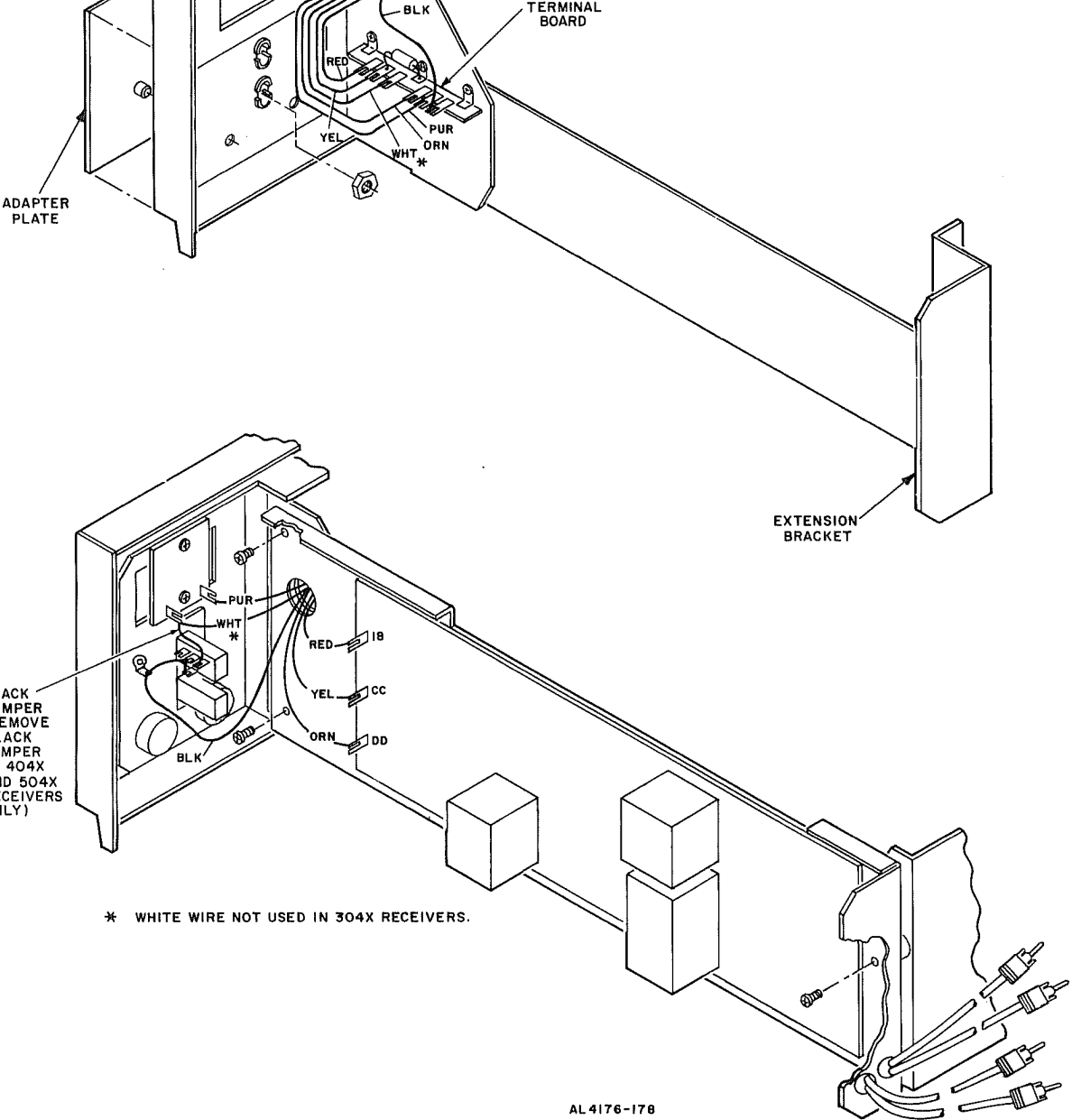
PB 2393-1 (404X/504X)



- NOTES:
1. LINE VOLTAGE SET TO 120 VAC FOR ALL VOLTAGE MEASUREMENTS. EXCEPT AS NOTED, ALL VOLTAGES $\pm 20\%$.
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 4. [XXXX] * DENOTES DISABLING VOLTAGE WITH SELECTOR SWITCH SET TO AM OR FM.
 5. [XXXX] DENOTES 1kHz SIGNAL LEVELS MEASURED WITH AC VTVM TO CHASSIS WITH COMPOSITE INPUT SIGNALS AS FOLLOWS:
 BASE - CH LEVEL 2.8 mV AT 1kHz
 SUB - CH LEVEL 15 mV 30kHz ± 2.2 Hz DEV. AT 1kHz
 6. [] DENOTES TEST PADS USED FOR PRODUCTION TESTING.
 7. * DENOTES COMPONENTS MOUNTED ON UNDERSIDE OF PC BOARD.

CD-4 DECODER
PB 2393 - 1

INSTALLATION



INSTALLING THE CD-4 DEMODULATOR CHASSIS

- (1) Remove receiver cabinet.
- (2) Disconnect the red, yellow, orange, purple, white and black wires from the terminal board.

NOTE: The white wire is not used in 304X receivers.

- (3) Remove terminal board and 1K resistor by removing three screws securing terminal board to receiver chassis.
- (4) Remove extension bracket by removing the screw securing it to the receiver chassis. Retain the screw for use in mounting the demodulator chassis.

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INSTALLATION (Continued)

(5) Remove adapter plate from the right side of receiver front panel by removing nut attached to plate stud at rear of front panel.

(6) With demodulator chassis oriented as shown, mount it to the right side of receiver using two self-tapping screws in the front mounting holes and the screw removed in step (4), in the rear mounting hole. Tighten screws.

NOTE: For installation in 404X and 504X receivers only, remove the black jumper connected between the CD-4 switch and the lamp PCB on the demodulator chassis.

(7) Reconnect the wires from the terminal board as follows:

| <u>Wire</u> | <u>Connection Point on Demodulator</u> |
|-----------------------------|---|
| Red | Pin 18 |
| Yellow | Pin CC |
| Orange | Pin DD |
| Purple | Inner pin on lamp PCB |
| White (404X and 504X, only) | Outer pin on lamp PCB |
| Black | Solder to ground lug adjacent to pushbutton switches. |

(8) Attach knobs to the CD-4 and 2-CH PHONO pushbutton switches at the front of the receiver.

(9) Connect the output cables at the rear of the demodulator chassis to the receiver as follows:

FRONT OUT gray plug to AUX 2 IN FRONT LEFT jack

FRONT OUT red plug to AUX 2 IN FRONT RIGHT jack

REAR OUT gray plug to AUX 2 IN REAR LEFT jack

REAR OUT red plug to AUX 2 IN REAR RIGHT jack