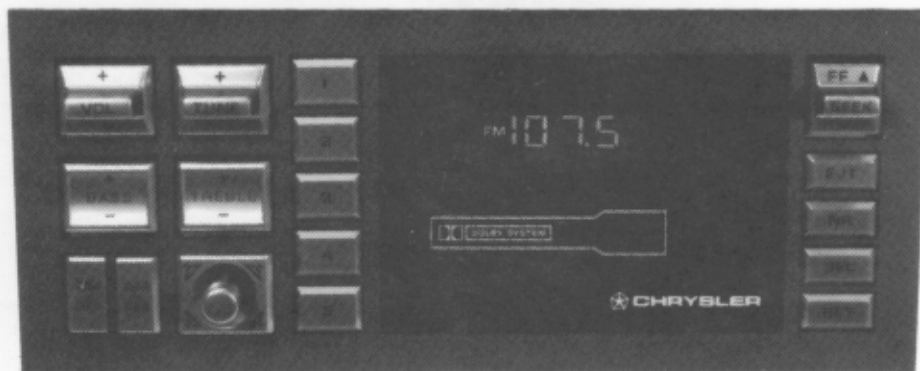


AHED-MAN-167  
23 DECEMBER 1988

**SERVICE MANUAL  
FOR MODEL YEAR 1989  
ELECTRONIC TUNED CASSETTE RADIOS**

**PART NUMBERS**

4469106    4469107  
4469108    4469109  
4469198    (2 SPKR)



HUNTSVILLE ELECTRONICS DIVISION **ACUSTAR**

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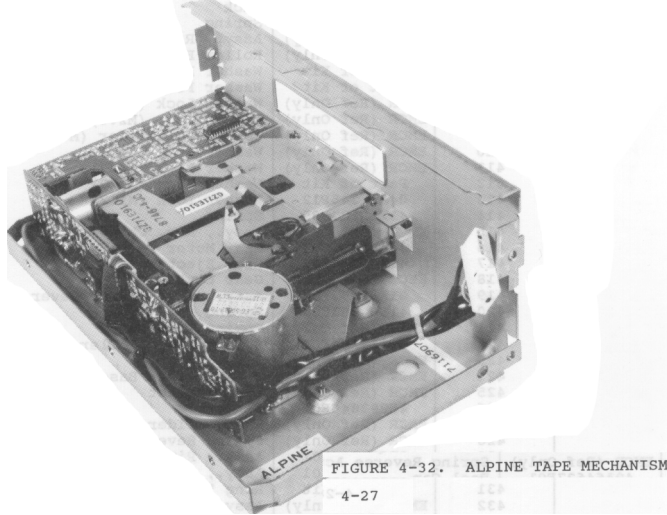
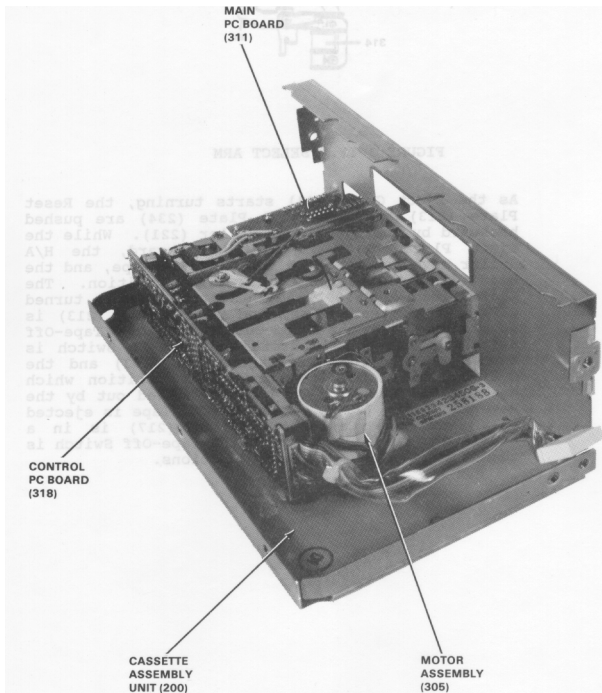


FIGURE 4-32. ALPINE TAPE MECHANISM



**FIGURE 3-13. PARTS LOCATION, SHINWA CASSETTE**

MODEL YEAR 1989 ELECTRONIC TUNED CASSETTE RADIOS

| <u>PART NUMBER</u> | <u>RADIOS</u>    |
|--------------------|------------------|
| 4469106            | PREMIUM, BLACK   |
| 4469107            | PREMIUM, BRIGHT  |
| 4469108            | INFINITY, BLACK  |
| 4469109            | INFINITY, BRIGHT |
| 4469198            | PREMIUM, SPECIAL |

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I. GENERAL INFORMATION

A. DESCRIPTION (INFINITY)

The Chrysler built Electronic Tuned Stereo AM and FM Cassette INFINITY Radio is quartz crystal controlled for accuracy and stability, and features Motorola C-Quam® system stereo AM reception, and Dolby® noise reduction for cassette operation. The radio can be tuned manually with up and down pushbutton switches, or it can be made to automatically SEEK or SCAN stations by using the up and down SEEK buttons. Up to 20 stations, 10 AM and 10 FM, may be stored for recall by the five memory buttons. An integral clock uses the same quartz crystal to derive the time-of-day. The display will show the time-of-day except for short intervals following the tuning of the radio. Dynamic noise reduction is incorporated and is effective on both radio and tape. The cassette tape direction can be reversed so as to play either program and is automatically reversed at the end of the tape. The radio provides a voltage to raise the antenna when the radio switch is on. The radio is capable of U.S. or European operation. In the European mode, the radio tunes 87.5 to 108 MHz in 100 kHz steps and 531 to 1602 kHz in 9 kHz steps. Separate bass and treble controls are provided. Four separate 10 watt bridge audio amplifiers are controlled by an electronic joystick for balance and fader functions. Capability is provided for operating a remote compact disc (CD) player through an interface connector on the rear of the radio.

B. DESCRIPTION (PREMIUM)

The Chrysler built Electronic Tuned Stereo AM and FM Cassette PREMIUM Radio is quartz crystal controlled for accuracy and stability, and features Motorola C-Quam® system stereo AM reception, and Dolby® noise reduction for cassette operation. The radio can be tuned manually with up and down pushbutton switches, or it can be made to automatically SEEK or SCAN stations by using the up and down SEEK buttons. Up to 20 stations, 10 AM and 10 FM may be stored for recall by the five memory buttons. An integral clock uses the same quartz crystal to derive the time-of-day. The display will show the time-of-day except for short intervals following the tuning of the radio. Dynamic noise reduction is incorporated and is effective on both radio and tape. The cassette tape direction can be reversed so as to play either program and is automatically reversed at the end of the tape. The radio provides a voltage to raise the antenna when the radio switch is on. The radio is capable of U.S. or European operation. In the European mode, the radio tunes 87.5 to 108 MHz in 100 kHz steps and 531 to 1602 kHz in 9 kHz steps. Separate bass and treble controls are provided. Four separate 10 watt bridge audio amplifiers are controlled by an electronic joystick for balance and fader functions.

C. LOCATION OF CONTROLS

See Figure 1-1 for the location of the Electronic Tuned Stereo AM and FM Cassette Tape Radio controls.

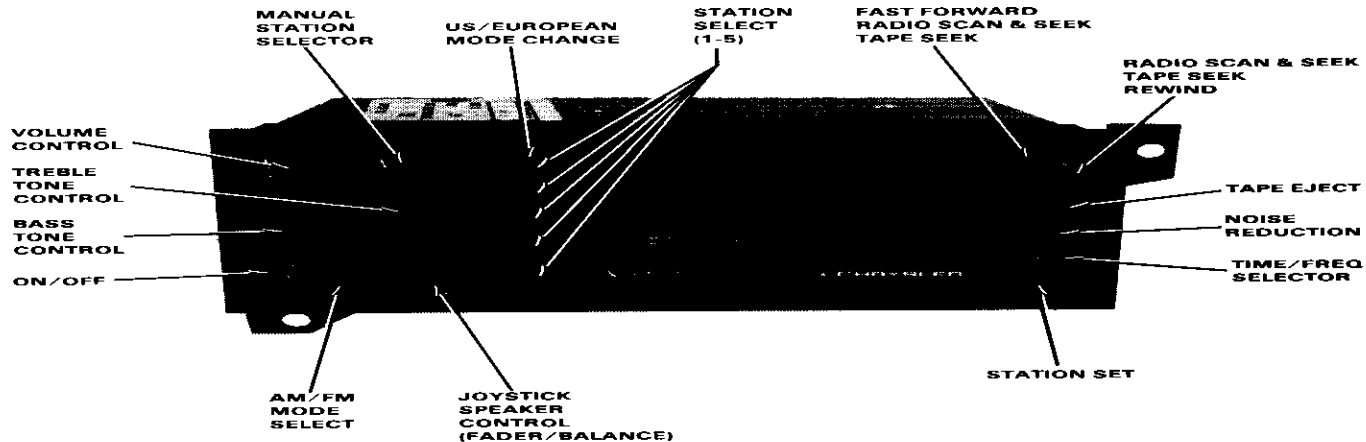


FIGURE 1-1. FRONT PANEL CONTROLS

D. DESCRIPTION OF CONTROLS

Table 1-1 explains the function of the radio controls.

TABLE 1-1. DESCRIPTION OF RADIO CONTROLS

| CONTROLS     | FUNCTIONAL DESCRIPTION   |
|--------------|--|
| VOL +        | Increases Volume Level.  |
| VOL -        | Decreases Volume Level.  |
| BASS +       | Boosts the Bass Response.  |
| BASS -       | Attenuates the Bass Response.  |
| TREBLE +     | Boosts the Treble Response.  |
| TREBLE -     | Attenuates the Treble Response.  |
| 1            | U.S./European Mode Change Button.<br>Station Select Memory Button #1 for recall of stations programmed into memory.  |
| 2, 3, 4, & 5 | Station Select Memory Buttons 2-5 for recall of stations programmed into memory.   |
| AM/FM        | Selects Am or FM band.   |
| TUNE +       | Increases the Tuned Frequency.   |
| TUNE -       | Decreases the Tuned Frequency.   |
| ON/OFF       | Turns Radio Off and On.<br>Enables Tape or C.D. to be played in the Off position.  |
| FF or ▲      | Fast Forward Tape Control.<br>Initiates Memory Scan in conjunction with the SET Key.<br>Initiates Radio Scan (Key held > 2 seconds).<br>Initiates Radio Seek (Key stroked < 2 seconds).<br>Initiates Tape Seek (Key stroked > 1 second). |



TABLE 1-1. DESCRIPTION OF RADIO CONTROLS (Cont.)

| CONTROLS            | FUNCTIONAL DESCRIPTION  |
|---------------------|---|
| RW or ▼             | <p>Fast Rewind Tape Control.<br/>                     Initiates Memory Scan in conjunction with the SET Key.<br/>                     Initiates Radio Can (Key held &gt; 2 seconds).<br/>                     Initiates Radio Seek (Key stroked &lt; 2 seconds).<br/>                     Initiates Tape Seek (Key stroked &gt; 1 second).</p>  |
| EJT                 | <p>Ejects Tape in the Tape Player Mode.</p>   |
| NR                  | <p>Switch for Activating the noise reduction circuit.</p>   |
| SEL                 | <p>Switch for selecting the Time or Frequency display.<br/>                     Changes direction of Play in the Tape mode.<br/>                     Stops Fast Forward or Rewind in the Tape mode.<br/>                     Stops the SEEK function.<br/>                     Unmutes the Radio during FM Manual Tune.<br/>                     Used in U.S./European Mode changes.</p>  |
| SET                 | <p>Sets the Time of Day.<br/>                     Sets stations in the Memory Buttons.<br/>                     Sets volume to a pre-determined level (1m W relative to FM) in conjunction with TUNE + or TUNE -.<br/>                     Sets BASS to a 0 db (neutral position) if followed by pressing BASS+ or BASS-<br/>                     Sets TREBLE to a 0 db (neutral position) if followed by pressing TREBLE + or TREBLE -.<br/>                     Initiates Memory Scan if up or down Key is pressed.</p> |
| Electronic Joystick | <p>Provides Speaker Control from Front to Back, Left to Right and Diagonally.<br/>                     Performs Speaker and Fader control functions.</p>  |

E. OPERATING INSTRUCTIONS

1. Tuning Switch - Pressing the TUNE + will cause the radio to increase in tuned frequency at the rate of 300 m sec. As the tuned frequency increases to the upper limit, it will revert to the lower frequency limit. Conversely pressing the TUNE - will decrease the tuned frequency, and when the tuned frequency reaches the lower limit, it will revert to the high limit. If either key is held continually, the tuning rate will increase to 74 m sec. per tuned frequency. The AM band will be unmuted when the tuning key is released if no valid station is tuned. However, the FM band will be muted when the tuning key is released if no valid station is present. Pressing the SEL key will unmute the FM, and also change the display from frequency to time.
2. Memory Key Programming - Each of the five memory keys can store two AM and two FM stations. When a memory button is pressed, the AM or FM station frequency will be displayed, depending on the mode the radio is in. To set stations in memory, perform the following steps:
  - a. Select stations to store.
  - b. Press the SET key once to utilize the first storage level. The display will show a "P1" for 5 seconds during which a memory key may be pressed to store a station.
  - c. The same procedure may be utilized to set the other four memory keys.
  - d. Press the SET key twice to utilize the second storage level. The display will show a "P2" for 5 seconds during which a memory key may be pressed to store a station.
  - e. The same procedure may be utilized to set the other four memory keys in the second storage level.

To recall stations stored in memory, press the desired memory key and if the station in the other memory level is the one desired, press the memory key again.
3. Seek (Radio) - Press the up ▲ or down ▼ key for less than 2 seconds. The radio will mute and begin seeking the next listenable station. When the next

3. Seek (Radio) (Cont.)

listenable station is detected, the radio will unmute after 100 m sec. The SEEK operation functions the same on AM and FM. The tuning rate is 74 m sec. per tuned frequency. The SEEK operation will continue if the AM/FM key is pressed on the alternate band. To terminate the SEEK operation within a +1 and a -1 tuned frequency, press any of the buttons as follows:

TUNE (+) or (-)  
T/F  
SET  
▲ up  
▼ down

4. Scan (Radio) - Pressing the up ▲ or the down ▼ key for 2 seconds or more will cause the radio to go into the SCAN mode. The radio is muted in the SCAN mode until a valid station is received. The valid station will be received for 5 seconds then the SCAN function will resume. During the time the SCAN function is in operation, the "MS" will be displayed. The rate of tuning will be 74 m sec. per tuned frequency for both the AM and FM bands. Pressing the AM/FM key will cause the SCAN operation to continue in the other band. Termination of the SCAN operation can be accomplished by pressing up ▲, down ▼, SEL, TUNE + or TUNE -. If a station detect does not occur during the SCAN operation prior to termination, the radio will revert back to the tuned frequency which was selected at the time the SCAN mode was initiated.
5. Memory Scan - Press the SET key ("P1" will be displayed) and then either the up ▲ or down ▼ key. This will cause the radio to SCAN the station frequencies that are stored in memory. The radio will pause and unmute for 5 seconds on the stations stored in memory, and then continue to the next stored station. Pressing the AM/FM key will cause the stored stations in the alternate band to be scanned. Pressing the SEL key, up ▲ key or down ▼ key will terminate the memory SCAN operation.
6. Frequency or Time Mode - The select (SEL) switch selects either the time or frequency mode. Also, the SEL switch will unmute the radio on FM during FM manual tuning. The frequency mode locks out the clock.

7. Time Setting - To set the clock perform the following:
- a. Insure that the radio is in the time mode (use SEL key if necessary).
  - b. Press the SET key.
  - c. Press the SEL key and the display will indicate hours and a flashing colon.
  - d. To change the hours, use the TUNE + or up ▲ key to set the hours forward or the TUNE - or down ▼ key to set the hours backwards.
  - e. Press the SEL key and the display will indicate minutes and a non-flashing colon.
  - f. To change the minutes, use the TUNE + or up ▲ key to set the minutes forward or the TUNE - or down ▼ key to set the minutes backwards. The seconds are reset to zero during the minutes set procedure.
  - g. Press the SEL key again to restart the clock.

NOTE

STEPS CAN BE SKIPPED AND THE TIME SET MODE CAN BE TERMINATED BY TURNING OFF THE RADIO, INSERTING A TAPE, OR SUCCESSIVE USE OF THE SEL, SET, OR MEMORY KEYS. IF THE MINUTES ARE NOT ADJUSTED, THE CLOCK WILL CONTINUE TO RUN DURING THE TIME SETTING PROCEDURE. THIS ALLOWS TIME ZONE ADJUSTMENTS OF THE HOURS WHILE MAINTAINING THE CORRECT MINUTES.

8. Tape Mode - With the switched voltage present (Ignition P107 pin 2) and the radio in the OFF mode, a cassette may be inserted and it will play normally. If the ignition voltage is switched OFF the cassette pinch roller will release and the cassette will stop playing. The cassette tape will not eject until the EJECT key is pressed. The fast forward and rewind modes are activated by depressing the FF or RW keys for less than a second. The tape player will be muted and the proper indicating arrow will flash in these modes. When in the fast forward or rewind modes, the operation will continue until the end of the tape is reached or stopped by a second pressing of the FF or RW key.

8. Tape Mode (Cont.)

In that case, the tape player will start playing in the current position.

9. Seek (Tape) - Press the up ▲ or down ▼ key to initiate the tape SEEK operation. The key must be held for more than 1 second. When the key is released, the tape player will begin seeking the next selection. When the tape player detects the next selection, it will begin playing at the start of this selection. The tape player is muted during the SEEK operation. Pressing the key for the opposite direction of play (FF or RW) will cause the tape to return to the start of the currently playing selection and begin playing. Pressing the up ▲ or down ▼ key a second time will cause the tape player to exit the SEEK mode and begin playing at this tape location. During the SEEK operation, "MS" will be displayed.

10. Compact Disc (Infinity Radio Only) - The compact disc has priority over the radio and tape mode; however, if there is a tape in the cassette player, the cassette symbol will be displayed. If the switched voltage is present (Ignition P107 pin 2) and a CD is in the player, the CD will play and the display will show the time-of-day. The radio volume control will control the CD volume. If the switched voltage is turned OFF, the CD will stop but not eject (pause mode). When the radio is turned OFF and a CD disc is inserted to get the radio active, eject the CD disc and press the ON/OFF switch.

The CD will not eject until the EJECT/PAUSE on the CD is actuated.

11. European Mode

- a. Activate the radio mode with the power switch.
- b. Insure that the radio is in the FM band (use AM/FM switch if needed).
- c. Press the SET key.
- d. Press the SEL key.
- e. Press the memory #1 button five times in succession. To return to the U.S. mode, follow the same procedure.

F. DIGITAL DISPLAYS

The digital display features a vacuum fluorescent display that matches instrument panel lighting. Table 1-2 explains the digital displays.

TABLE 1-2. DIGITAL DISPLAYS AND DEFINITIONS

| CHARACTER DISPLAY | DISPLAY DEFINITIONS                               |
|-------------------|---|
| Frequency or Time | Frequency to which radio is tuned or time-of-day. |
| AM or FM          | Mode of operation.                                |
| ST                | A stereo station has been selected.               |
| NR                | Noise reduction.                                  |
| ▶◀                | Direction of tape play.                           |
| ◻◻                | Cassette tape inserted in the radio.              |
| MS                | Displayed during SCAN or SEEK.                    |
| 70                | Displayed if 70 usec tape is used.                |

II. SERVICE NOTES

A. GENERAL

1. Power Supply Requirements - A fully charged 12-volt automotive storage battery or a low impedance well filtered and regulated power supply set at 13.2 vdc nominal and capable of delivering 5 amperes of current or more should be used when operating the radio on a service bench. Overload protection should be provided by connecting a 5 ampere fast blow fuse in the plus lead.

NOTE

DO NOT USE SCR CHOPPED TYPE REGULATOR POWER SUPPLIES. THESE SUPPLIES GENERATE SWITCHING TRANSIENTS THAT ARE HEARD AS A STRONG RASPING HISS IN THE RADIO OUTPUT. SERVICING NEAR FLUORESCENT LIGHTS, A SOURCE OF SIMILAR NOISE, IS NOT RECOMMENDED.

2. Audio Integrated Circuits - Extreme care should be exercised when troubleshooting the audio integrated circuits. As these are DC amplifiers as well as AC, with essentially no current limiting, they may be destroyed by a short circuit to ground as the output of the IC.

B. TESTING

1. Radio Polarity - The positive outputs of the power supply must be connected to the radio as shown in Figure 1-2. The radio will not operate properly if connected otherwise.

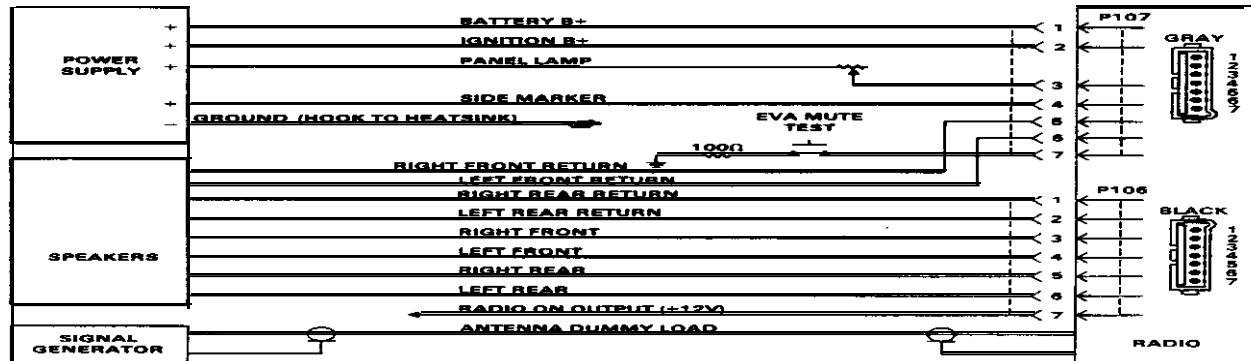


FIGURE 1-2. RADIO CONNECTION TO TEST SET-UP

2. Output Load - A radio speaker or an 8 ohm resistive load should be connected across the radio speaker leads when voltage measurements are being made.

3. Signal Injection - If signals are injected at points on the PC board, a suitable blocking capacitor should be used to prevent DC supply shorts through the signal generator. Exercise care when using clip leads not to short points on the PC board.
4. Capacitor Bridging - Extreme caution should be exercised when troubleshooting for open or low value capacitors by capacitor bridging. To avoid possible breakdown of signal transistors and integrated circuits, the bridging capacitor should be completely discharged each time it is used. A 0.1 MFD capacitor charged to 30 volts contains enough energy to break down most signal transistors and IC's when connected in the reverse direction, base to emitter.
5. Voltage and Resistance Measurements - A multimeter with a sensitivity of 20,000 ohms per volt or greater should be used for voltage and resistance measurements. Resistance measurements should be made with a meter which has a voltage source less than 4 volts.

#### C. TROUBLESHOOTING

With the use of two extender cables, the Premium/Infinity cassette tape radio can be disassembled for troubleshooting (see Figure 1-3).

#### D. REPLACEMENT

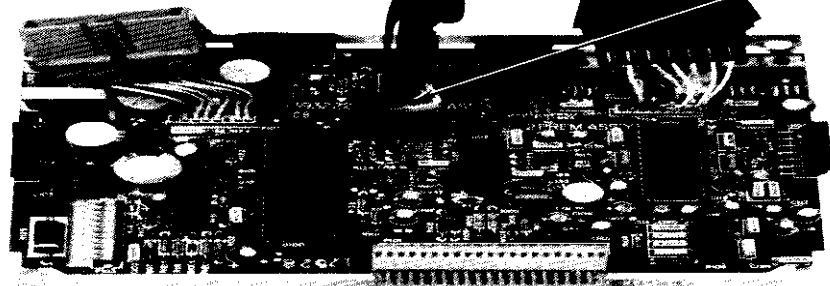
1. Transistor Identification - Each transistor is marked for identification with the last three or four digits of the applicable Chrysler part number.
2. Component Replacement - When replacing transistors, diodes, or other components on the PC board that may be damaged by excessive heat, a pencil type grounded soldering iron of not more than 27 1/2 watts is recommended. In any event, do not use a higher wattage iron than is necessary, as excessive heat will cause lifting of conductor pads. Only rosin core radio type solder should be used. Use of a temperature controlled solder station is encouraged.
3. PC Board Replacement - When desoldering the PC board tabs from the chassis, the soldering iron should be placed on the chassis and not the tab.



**RF BOARD TO  
AUDIO/LOGIC  
BOARD EXTENDER**



**PLUG EXTENDER  
CABLE IN SO THAT  
COAX CABLES PLUG  
INTO PINS 7 & 8**



**CONTROL BOARD TO  
AUDIO/LOGIC EXTENDER  
(NOT SHOWN)**



**FIGURE 1-3. CASSETTE RADIO TROUBLESHOOTING SET-UP**

4. Voltage Tuned AM Circuits - The capacitances of varactors D1, D2, and D3, in the AM tuner module U2, change when the DC voltage applied across them changes and the resonant frequencies of their associated L-C circuits are changed. When a varactor fails, replace the U2 module.
5. Voltage Tuned FM Circuits - The capacitances of the FM varactors, located in module U4, change when the DC voltage applied across them changes and the resonant frequencies of their associated L-C circuits are changed. When a varactor fails, replace the U4 module.

#### E. CLEANING

Because of the inaccessibility of the Tape Mechanism, a combination head and capstan cleaning tape should be used. If the radio is disassembled, the heads, pinch rollers and capstan shafts may be cleaned with isopropyl (rubbing) alcohol.

### III. CIRCUIT DESCRIPTION

#### A. LOGIC AND CONTROL CIRCUITS

The logic and control functions of the receiver are performed primarily on the Audio/Logic PC Board, by the microprocessor U100 (see Table 1-3), and the frequency synthesizer U102. The microprocessor accepts commands from the pushbutton switches located on the front of the radio and status signals from the RF board, cassette module and compact disc (CD) player (INFINITY ONLY). It processes the information and generates instructions to the display module and the frequency synthesizer. The display driver controls the vacuum fluorescent display and is located in the VF display module on the control PC board. The frequency synthesizer controls the local oscillator frequency and, thereby, the tuning of the radio. The synthesizer will tune either 200 kHz/10 kHz for U.S. use or 100 kHz/9 kHz steps for European use. European or U.S. mode selection is accomplished by software. To change the operating mode, press the SET key then the SEL key and press the memory one button three times in succession. For a description of synthesizer pin functions, see Table 1-4.

TABLE 1-3. MICROPROCESSOR (U100) PIN DESCRIPTIONS

| PIN NUMBER | DESCRIPTION  |
|------------|--|
| 1          | Key Input K0   |
| 2          | Key Input K1   |
| 3          | Key Input K2   |
| 4          | Key Input K3   |
| 5          | Radio Test Pin   |
| 6          | Frequency Synthesizer Enable - Allows data transfer to the Frequency Synthesizer                     |
| 7          | Beep Output  |
| 8          | Soft mute goes low to turn on Q102   |
| 9          | Reset Input - A high on this pin for 6 usec while the oscillator is running resets the device.       |
| 10         | Serial data input and output - Provides serial data to the display driver and frequency synthesizer. |
| 11         | Serial Clock - The serial data clock.  |
| 12         | Tape Reel Input - Internally pulled up.  |
| 13         | Off/On Key Input   |
| 14         | CD "On" Input - Goes low for CD in.  |
| 15         | I <sup>2</sup> C Data  |
| 16         | I <sup>2</sup> C Clock   |
| 17         | Power antenna on   |
| 18         | N/C  |
| 19         | External Oscillator 1.98 MHz fed from the synthesizer  |
| 20         | Ground   |
| 21         | Used for display blanking  |

TABLE 1-3. MICROPROCESSOR (U100) PIN DESCRIPTIONS (Cont.)

| PIN NUMBER | DESCRIPTION   |
|------------|---|
| 22         | <b>Cassette read enable</b>   |
| 23         | <b>Cassette write enable</b>  |
| 24         | <b>AM</b> Mono - Goes low for force to mono   |
| 25         | Station detect - goes low for station   |
| 26         | Joystick enable   |
| 27         | Stereo Detect - goes low for stereo   |
| 28         | Display Driver Enable - Allows data to be transferred to the vacuum fluorescent display driver. |
| 29         | N/C   |
| 30         | W C   |
| 31         | External access connected to Vcc  |
| 32         | <b>Goes</b> low for hard mute output to turn on Q101  |
| 33         | Power Switch Input - Goes high for ignition on  |
| 34         | Goes high for <b>FM</b>   |
| 35         | <b>Goes</b> high for AM   |
| 36         | Strobe 3  |
| 37         | Strobe 2  |
| 38         | Strobe 1  |
| 39         | Strobe 0  |
| 40         | Voltage Supply, Vcc + 5VDC  |

TABLE 1-4. SYNTHESIZER (U102) PIN DESCRIPTIONS

| PIN NUMBER | DESCRIPTION   |
|------------|---|
| 1          | Goes high during the search mode, to desensitize the front end to very weak stations.   |
| 2          | Noise Reduction (high = NR on)  |
| 3          | Serial data from the microprocessor   |
| 4          | Data clock from the microprocessor  |
| 5          | Data enable from the microprocessor   |
| 6          | Switched supply voltage which is regulated by U103, a 5 volt regulator.   |
| 7          | Input from the AM local oscillator  |
| 8          | External bypass capacitor for the phase detector  |
| 9          | Input from the FM local oscillator  |
| 10         | Ground  |
| 11         | Unswitched supply voltage (Vcc) for the clock keep alive. Keeps the synthesizer oscillator and dividing chain active when the remaining functions of the synthesizer are powered down. Provides a low power microprocessor clock driver and a time-of-day indication. |
| 12, 13     | Reference oscillator which is controlled for stability by a quartz crystal (X101), capacitors and trimmer capacitor, for accurate setting of the clock.   |
| 14         | Reference oscillator frequency divided by two from which the microprocessor derives the instruction time.   |
| 15         | Clock signal (50 Hz) used in the program loop timing.   |
| 16         | Resistor R124 sets the gain of the phase locked loop.   |

TABLE 1-4. SYNTHESIZER (U102) PIN DESCRIPTIONS (CONT.)

| PIN NUMBER | DESCRIPTION   |
|------------|---|
| 17         | Charge pump output develops tuning voltages and op-amp input.                   |
| 18         | Operational amplifier output - Supplies the tuning voltage for the RF circuits. |
| 19         | Operational amplifier ground.   |
| 20         | Switched supply voltage, 10 volts.  |

1. Power-On-Reset - The power-on-reset is controlled by U101, see Table 1-5. Input pin 2 is always high except when the battery voltage is disconnected. When the ignition voltage is applied, the RC time constant of C116 and R107 causes a pulse to be applied to pins 8 and 9, which causes pin 10 to go to a logic low. Pin 10 is hard wired to pin 1. With a logic high on pin 2 and a logic low on pin 1, the output pin 3 goes high. When pin 3 goes high, the microprocessor resets and pins 8 and 32 of the microprocessor go high. This turns on Q101 and Q102, which causes the mute pin 11 of the audio output IC'S to go low, therefore, muting the output.

TABLE 1-5. QUAD 2 INPUT NAND SCHMITT-TRIGGER

| INPUT A | INPUT B | OUTPUT |
|---------|---------|--------|
| 0       | 0       | 1      |
| 0       | 1       | 1      |
| 1       | 0       | 1      |
| 1       | 1       | 0      |

TRUTH TABLE  
 0 = Logic Low  
 1 = Logic High

2. Analog to Digital Converter - The joystick provides a balance and fader input to A/D converter U202 which places information on the Bus to allow the microcomputer to control U105 for these functions.

## B. AM CIRCUIT

1. RF Stage - The AM signals received by the antenna are coupled through the series choke L1, which presents a high impedance to FM and shortwave broadcast frequencies, and C1 to AM antenna coil T1 which transformer couples the RF signal to the gate of Q1 a J-FET RF amplifier. Transistor Q2 the second RF amplifier has its conduction controlled by the RF amplifier AGC pin 1 of U1. The RF output of Q2 is applied to pin 1 of U2 which contains a varactor diode, fixed capacitor, trimmer capacitor and transformer tuned to resonate at the selected frequency.
2. Local Oscillator - The local oscillator tuning is accomplished through pin 20 of U1. The local oscillator is controlled by the synthesizer and tuned by the combination of fixed capacitors, trimmer capacitor, transformer and a varactor diode in U2. The output of the oscillator goes directly to the mixer and also the synthesizer.
3. Mixer Stage - The mixer input is tuned by a varactor diode, fixed capacitor, trimmer capacitor and transformer contained in U2. The RF and oscillator are heterodyned in the mixer. The mixer output pin 7 of U1 is tuned to resonate at the IF or difference frequency by FL1 and applied to the IF input pin 9 of U1 through C8.
4. IF Stage - Pin 9 of U1 is the IF input which is amplified internally in U1, and outputted on pin 10 of U1. The stage gain of the IF amplifier is controlled by the IF AGC pin 17 of U1. The IF out is tuned by T2 and coupled by C17 to the base of Q3. Transistor Q3 and Q4 are in the cascade configuration with the output being taken off the collector of Q4 and applied to the AM stereo decoder U3.
5. AM Station Detect - When an AM signal is received, the signal meter or station detect output pin 16 of U1 will cause Q7 to conduct which will result in J1-11 going low. When an AM station is not received, Q7 will be cut off and J1-11 will go high.
6. Detector and AM Stereo Decoder - The AM stereo decoder chip, U3, contains circuitry to detect and decode AM stereo from stations using the Motorola C-Quam AM stereo system. This system uses a modified form of quadrature modulation which is

6. Detector and AM Stereo Decoder (Cont.)

compatible with monaural receivers. The phase modulation components of a quadrature signal are extracted and used to phasemodulate the broadcast transmitter. The (L-R) information is contained in this quadrature phase modulation. The (L+R) is transmitted as normal AM. The chip automatically switches to decode stereo when a 25 Hz, 4% modulated pilot signal is received. Stations transmitting other systems of AM stereo are received in monaural, as are non-stereo stations.

The 450 kHz AM intermediate frequency is applied to pin 3 of u3. The chip contains an envelope detector which detects the (L+R) portion of the signal. A phase locked loop (PLL) detector, utilizing an external resonator controlled oscillator, which operates at eight times the IF frequency, to detect the (L-R) portion of the signal. The frequency of the oscillator is 3600 kHz and is applied to pin 17 with pin 18 being the feedback pin.

The stereo pilot signal is contained in the phase modulated (L-R) portion of the signal. This signal is controlled by an internal AGC and outputted on pin 11. A low pass filter is formed by R19 and C20, from which point the signal goes to pin 13, the input of a 25 Hz bandpass filter. The output of the bandpass filter appears at pin 14, which is also the pilot detector input. The pilot detector has two modes of operation. With a good signal it will switch to stereo after seven consecutive cycles of the 25 Hz pilot. When interference is present the pilot detector requires 37 consecutive cycles of pilot to switch to stereo. Pin 12 of U3 is the interference detector input. If the detected low frequency phase modulated interference exceeds a certain level, the pilot detector will be prevented from switching to stereo. A greater level of interference is required to switch back to monaural if the pilot detector is already in stereo. The most common type of interference that would require the circuitry to switch to monaural mode, would be the reception of more than one station on the selected frequency. Pin 15 goes low to indicate stereo. The decoder can be forced to monaural by holding pin 9 low. When any tuning function is operated, pin 9 is hold low by the microprocessor to switch the decoder to monaural for approximately 1 second.



## 6. Detector and AM Stereo Decoder (Cont.)

During AM operation, transistors Q5 and Q6 conduct to apply the regulated 10 volts to pin 6 of U3. The AM audio outputs pin 7 (left) and pin 8 (right) are applied to the filter/Amp IC (U7).

## C. FM CIRCUIT

1. FM Front End - The completely integrated FM front end, U4, performs the following functions AGC, RF amp, mixer, oscillator and IF. Increased quality and reliability are achieved by integrating the discrete components. The signal from the antenna is hard wired to pin 13 and the output on pin 6 is the intermediate frequency. Tuning voltage is applied to pin 10 to determine the resonant frequencies of the varactor diodes, capacitor and coil combinations, for the RF, mixer and oscillator stages. Search sensitivity is controlled by pin 4 and the AGC input is applied to pin 3. Pin 1 supplies the IF output to the synthesizer. During FM operation, switched supply voltage will be applied to pin 5 because of the conduction of Q9 and Q8.
2. Audio Detection and Station Detector - The IF output out of the front end is applied to pin 2 of u5. The IF amplifier output has two outputs, one to the level detector for AGC output pin 6 and the other to a buffer amplifier. The buffered IF output on pin 16 is connected to pin 15 by R37. Pins 14 and 15 are the inputs to the peak detector which has two outputs, one for the AF amplifier and the other to the frequency change detector. The detected audio is amplified and outputting on pin 10. Operation of the frequency change detector is determined by R39, C48 and C49. Station detect sensitivity is determined by R36 and C47. The station detect output pin 7 turns on Q7 when a station is detected. An internal regulator regulates the Vcc voltage level.
3. Stereo Decoder and Blend - The separation of the left and right audio is accomplished in the FM stereo decoder U6. The multiplexed audio signal goes in on pin 3 and is outputted as left and right audio pins 4 and 6. The frequency of the PLL 19 kHz pilot detector is set at pin 16. The internal Vco frequency can be measured at pin 11 with a sufficiently high impedance counter through a 56K resistor or greater. The IC also contains a stereo

3. Stereo Decoder and Blend (Cont.)

blend and high frequency rolloff circuit controlled by the IF AGC voltage at pins 7 and 5. This feature improves the S/N of a very weak stereo station by gradually reducing the separation and high frequency response. The blend threshold is set by R43.

D. AUDIO CIRCUIT

1. Filter/Amplifier - The filter/amplifier IC, U7, contains an active high pass-low pass filter which is utilized in the AM mode using input pins 15 and 17. Internal diodes allow the chosen audio to pass but the other mode is blocked by reverse biased diodes. The dual audio amplifier is used for both AM and **FM**.
2. Dynamic Noise Reduction - The noise reduction is accomplished in U106. The IC contains circuitry which gives up to 10 db of effective noise reduction by varying the audio bandwidth. When there is no program material present, the audio bandwidth is electronically narrowed to cut out the mid and high frequency component of the noise. When music or speech with high frequency material is present, the audio bandwidth is widened so that the audio fidelity is not noticeably affected. The opening of the bandwidth takes only 500 usec. When the bandwidth is open, the noise is masked by the program material. The bandwidth closes back down 60 msec after the high frequency material in the program is removed. The program material is distinguished from the noise by a dynamic level threshold detector. Resistors R132 and R133 set the threshold at which the desired audio is separated from noise. When noise reduction is turned off, pin 2 of U102 pulls pin 9 of U106 to ground, causing a constantly wide audio bandwidth, and no noise reduction. The effect of the noise reduction is greatest on program material containing quiet spots and low modulation.
3. Electronic - Volume, Tone, Balance and Fader - The audio inputs to the Audio Control Circuit, U105, come from three sources. The internal source selector selects the proper source and rejects the others. The input source from the CD player (Infinity only) is applied through C163 to pin 8 and through C162 to pin 21. The input source from the tape player is applied direct to pin 12 and to pin 17. The input **source** for the radio is applied

3. Electronic - Volume, Tone, Balance and Fader (Cnt)

through C106 to pin 10 and through C107 to pin 19. The chosen input source is passed through external capacitors and on pins 13 and 16 to the DNR chip and it comes back in on pins 14 and 15 through C120, C122; and C119, C121. The operation of U105 is software controlled using a two wire I<sup>2</sup>C Bus connected to pins 1 and 28. Capacitor C117 is the Bass control capacitor for the left channel as C118 is for the right. Capacitor C105 is the treble control capacitor for the left channel as C106 is for the right. Capacitors C107 and C108 are for supply voltage filtering. The internal volume, tone and balance stages are variable depending on the data on the I<sup>2</sup>C Bus sent by the microprocessor. The U105 has two outputs for the left channel pins 3 and 4 and two outputs for the right channel pins 25 and 26 and the variable fader control in the IC responds to the data from the microprocessor.

4. Power Amplifiers - The audio power amplifiers U107, U108, U109 and U110 have their inputs capacitively coupled to pins 2 and 13. Muting is accomplished by the DC voltage level on pin 11. The switched power is applied to pins 6 and 8 for bootstrapping a feedback technique to improve linearity and also pin 10 for +vp (supply voltage). The devices are dual audio integrated Class B hi-fi power amplifiers to be used in the Bridge-Tied-Load (BTL) configuration. Pin 9 is the output feed and pin 5 is the output return.

E. POWER

There are four power inputs to the radio. The battery line P107 pin 1 maintains the memory and clock functions.

NOTE

ANY INTERRUPTION OF THE UNSWITCHED POWER WILL CAUSE THE CLOCK TO REVERT BACK TO 12:00 AND THE RADIO TO REVERT TO 530 kHz IN THE U.S. MODE.

The switched voltage is applied to P107 pin 2. Chokes L101 and L102 provide filtering and isolate power for the left side audio outputs from the right side audio outputs. The switched voltage is necessary to get a clock display and operate the radio. The rheostat dimming line P107 pin 3 provides a controllable dimming of the incandescent lamps and vacuum fluorescent display by varying the voltage. The side marker input P107 pin 4 is used to lower the brightness of the vacuum fluorescent display.

#### F. CLOCK

The clock function is derived from the synthesizer on-chip oscillator which is stabilized by a 3.96 MHz quartz crystal (X100). Capacitor C131 is a fine tuning trimmer for setting the clock accuracy. As an example, if the oscillator frequency was 392 Hz low (196 Hz low at U102 pin 14), this would cause the clock to lose one minute per week. This same degree of error would show up as only 79 Hz low on the AM local oscillator. See Section IV for the oscillator alignment procedure.

#### G. MECHANISM CONTROL BOARD

Because of the surface mounted devices/components (**SMD**), it is recommended that board level maintenance be performed instead of component level.

#### H. PREAMPLIFIER

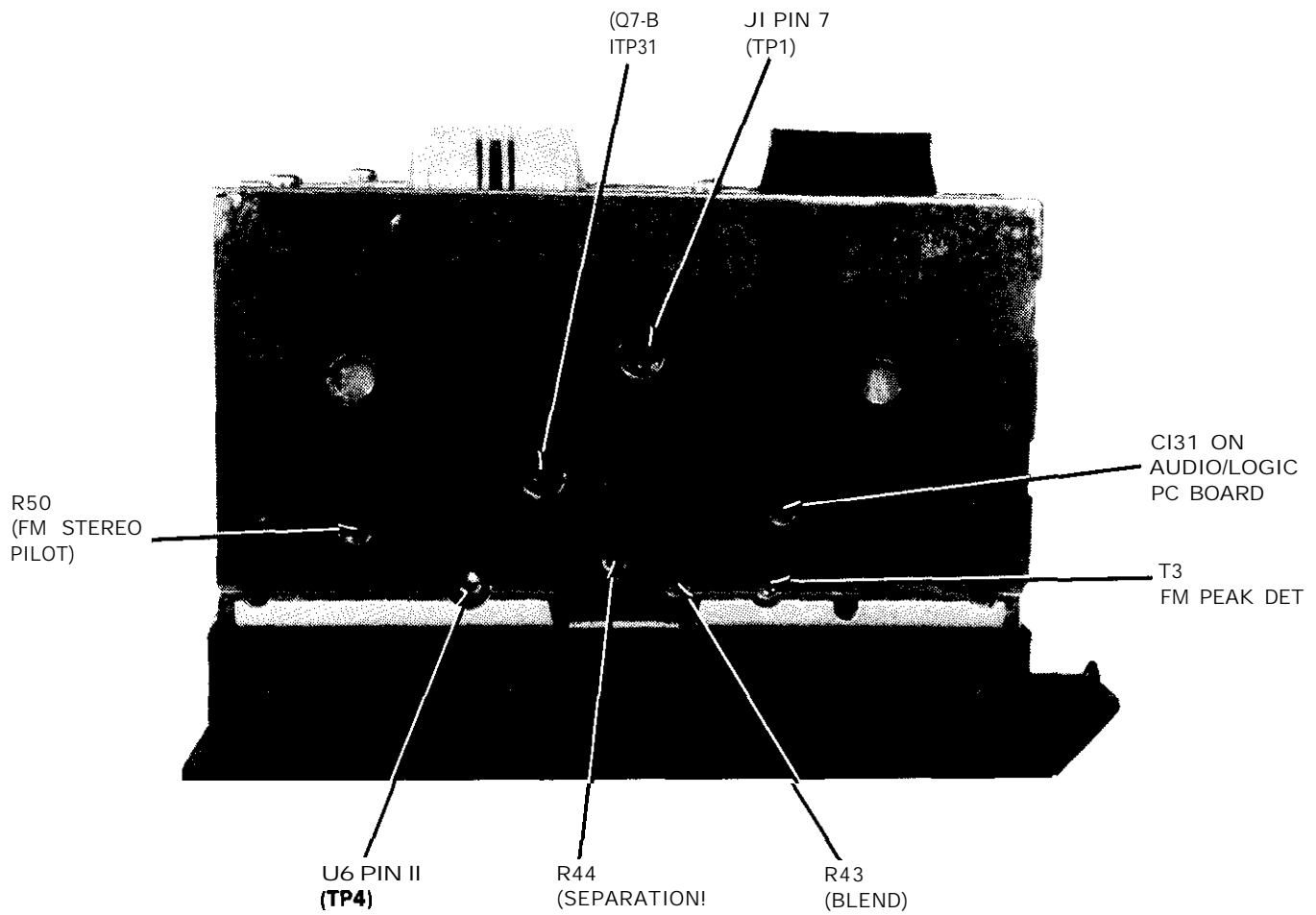
Because of the surface mounted devices/components (SMD), it is recommended that board level maintenance be performed instead of component level.

### IV. ALIGNMENT

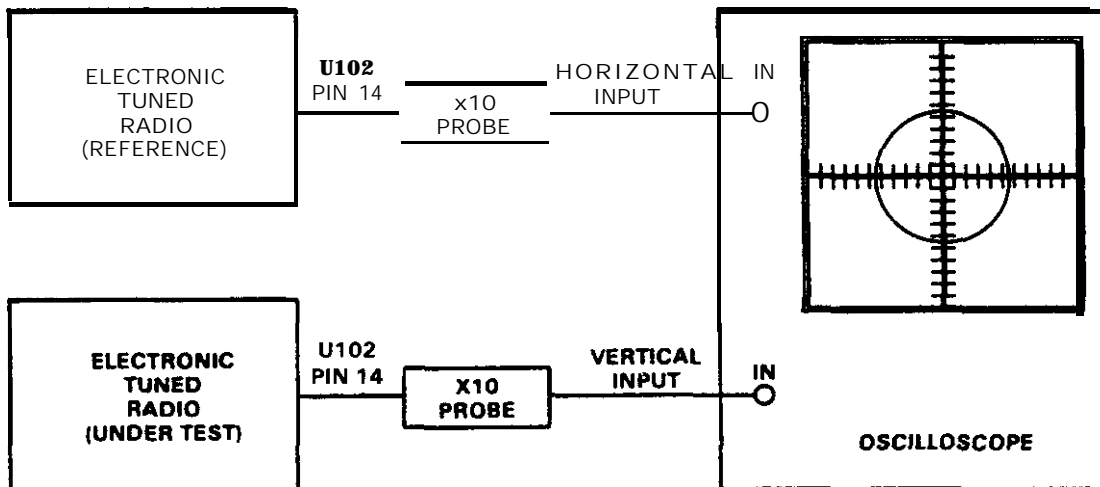
#### A. CLOCK REFERENCE FREQUENCY SETTING

1. Standard Method - The reference oscillator can be set without opening the radio by following this method.
  - a. Turn the radio on and tune to 540 on the display.
  - b. Connect an accurately calibrated counter to J1 pin 7 (TP1) which is accessible through the top cover, see Fig. 1-4. This should display the AM local oscillator frequency, 990 kHz when the radio is tuned to 540.
  - c. Adjust C131 to give a local oscillator frequency of exactly 990 kHz  $\pm$  Hz. Trimmer capacitor C131, which is on the audio logic board, can be adjusted with a long tuning tool through a hole in the top cover and RF board, see Fig. 1-4.

2. Alternate Method - This method is used when a frequency counter is unavailable, and uses lissajous patterns. A standard laboratory oscilloscope with two low capacitance (X10) probes and a known good electronic tuned radio with (3.96 MHz XTAL), for a frequency standard, are required for this procedure (see Fig. 1-5).
  - a. Gain access to U102 pin 14 of the frequency standard radio and connect it to the oscilloscope horizontal input.
  - b. Connect U102 pin 14 of the radio under test to the oscilloscope vertical input.
  - c. Connect both radios to a power source of switched and unswitched voltage, as described in the service notes. (13.2V)
  - d. With oscilloscope horizontal sweep, set to external, adjust the oscilloscope vertical and horizontal gain controls to obtain a rectangular or circular pattern (see Fig. 1-5).
  - e. Slowly adjust the trimmer capacitor C131 on the radio under test to obtain as near as possible, a stationary pattern. One complete revolution of the pattern per second indicates a difference in frequency of 1 HZ.



**FIGURE 1-4. ALIGNMENT LOCATIONS**



**FIGURE 1-5. LISSAJOLIS PATTERN TEST SET-UP**

B. AM ALIGNMENT PROCEDURE

The AM tuned circuits are factory aligned and alignment is not recommended. However, the AM dummy antenna detail is shown in Figure 1-6 for an aid in diagnosis.

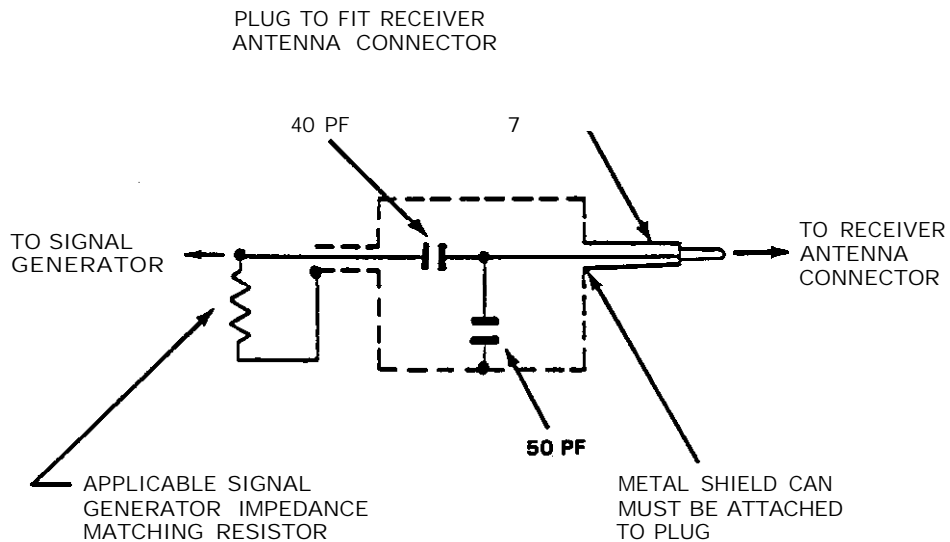


FIGURE 1-6. AM DUMMY ANTENNA DETAIL

C. FM ALIGNMENT PROCEDURE

Connect an 8 Ohm, 20 watt, resistive load in place of each speaker and connect an audio voltmeter across each of the front speaker loads.

CAUTION

BOTH INPUT TERMINALS OF THE VOLTMETER MUST BE ISOLATED FROM GROUND.

Connect a signal generator through an FM dummy antenna, (see Figure 1-7), to the receiver antenna connector, adjust the signal generator for 22.5 kHz deviation at 400 Hz. Connect a 13.2 volt power supply to the receiver power leads.

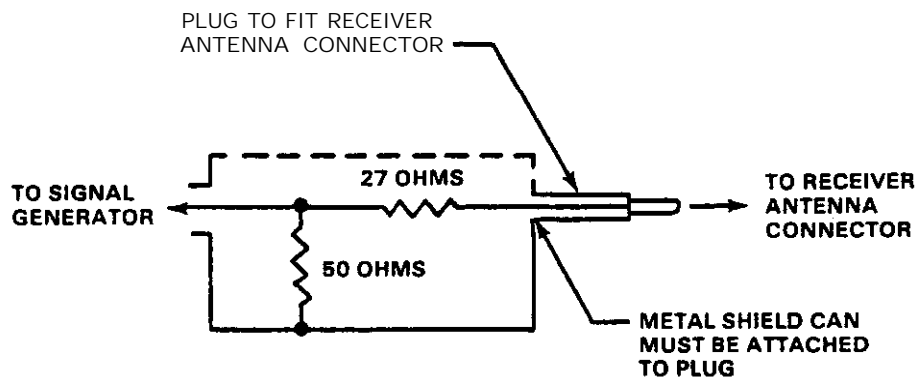


FIGURE 1-7. FM DUMMY ANTENNA DETAIL

| FM ALIGNMENT                       |  |                   |  |
|------------------------------------|--|-------------------|--|
| Step                               | Test Signal  | Receiver Tuned To | Adjustments, see Figure 4.   |
| STATION DETECTOR - FINE ADJUSTMENT |  |                   |  |
| 1.                                 | 97.9 MHz   | 97.9 MHz          | Set the signal generator output to 5 uv. Adjust T3 so that the radio is unmuted at 97.9 MHz and mutes when tuned to either 97.7 MHz or 98.1 MHz. |
| FM STEREO ALIGNMENT                |  |                   |  |
| 2.                                 | Set the signal generator output to 1 mv for quieting. Do not modulate. Do not use stereo pilot. Connect a frequency counter through a 56K Ohm series resistor to TP4 (pin 11 of U6). |                   |  |
|                                    | 97.9 MHz   | 97.9 MHz          | Adjust R65 for 19 kHz signal at U6-pin 11.   |
| STEREO BLEND                       |  |                   |  |
| 3.                                 | Set the signal generator output to 15 uv. Modulate with 400 Hz, 22.5 kHz deviation. Turn the stereo pilot on.  |                   |  |
|                                    | 97.9 MHz   | 97.9 MHz          | Begin with R43 and R44 adjusted to the full clockwise position.  |
| 4.                                 | 97.9 MHz   | 97.9 MHz          | Adjust R43 for 10 db of stereo separation at 400 Hz.   |
| 5.                                 | 97.9 MHz   | 97.9 MHz          | Increase the signal generator output to 3 mv and adjust R44 for maximum stereo separation.   |
| 6.                                 | 97.9 MHz   | 97.9 MHz          | Recheck the stereo separation at 15 uv. If it does not fall between 11 db and 15 db, readjust R43 for 13 db of stereo separation.                |



V. DISASSEMBLY AND ASSEMBLY PROCEDURE

A. DISASSEMBLY PROCEDURE

In order to replace components in the Electronic Tune Cassette Radio, the following removal steps must be performed (see Table 1-6 for removal sequence).

TABLE 1-6. ELECTRONIC TUNE RADIO REMOVAL SEQUENCE

| Part                           | Steps To Be Performed | Part Location Figures |
|--------------------------------|-----------------------|-----------------------|
| Escutcheon/Switch Assembly     | 1                     | 1-8 and 1-10          |
| Control Board                  | 1 and 2               | 1-10                  |
| Top Cover                      | 3                     | 1-16                  |
| Tape Mechanism Assembly        | 1 and 4               | 1-14                  |
| RF PC Board Assembly           | 1,3,4 and 5           | 1-13                  |
| Audio/Logic PC Board Assembly  | 1,3,4,5 and 6         | 1-15                  |
| Static Display Module Assembly | 1 and 2               | 1-11                  |
| Tape Mechanism Sub-Assembly    | 4 and 8               |                       |

1. Escutcheon/Switch Assembly Removal - To remove the Escutcheon/Switch Assembly, perform the following steps (see Figure 1-8).
  - a. Remove two screws from the left side front and two screws from the right side front of the chassis.
  - b. Pull assembly forward sufficiently to unplug the Audio-Control Cable Assembly (W202), (see Figure 1-10). Place a flat blade screwdriver blade under flange of the connector and pry the connector out.
2. Control PC Board Assembly Removal - To remove the Control PC Board Assembly (117), depress the six retainer tabs, and remove from the escutcheon (see Figure 1-10).

### NOTE

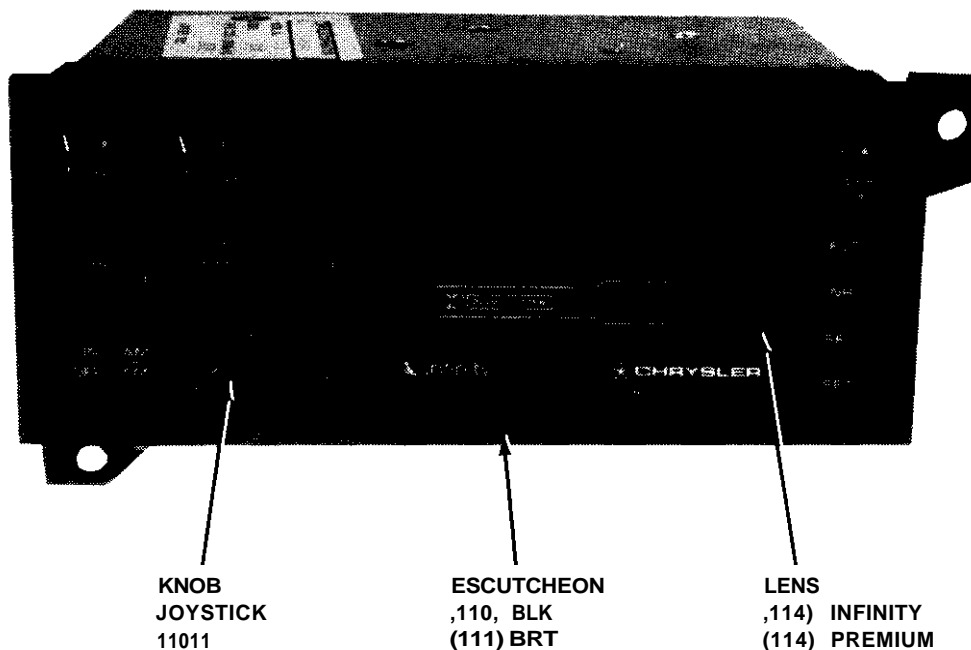
WHEN RE-INSTALLING THE CONTROL BOARD,  
PLACE THE JOYSTICK IN THE CENTER AND  
LAY THE BOARD STRAIGHT INTO THE ESCUTCHEON.  
GENTLY PRESS IN WITH THUMBS IN CLEAR AREAS  
OF THE BOARD UNTIL IT SNAPS IN. EXERCISE  
EACH SWITCH FOR PROPER SWITCH SHAFT SEATING.

3. Top Cover Removal - To remove the Top Cover (107), remove two screws from top rear of radio and lift cover off, remove the Top Cover Insulator (103), (see Figure 1-16).
4. Tape Mechanism Assembly Removal - To remove the Tape Mechanism Assembly, perform the following steps:
  - a. Remove two screws on rear.
  - b. Disconnect the Radio/Tape Interface Cable from Header P103 (see Figure 1-14).
5. RF PC Board Assembly Removal - To remove the RF PC Board Assembly (115), perform the following steps:
  - a. Desolder the five tabs from the chassis to free the board (see Figure 1-13).
  - b. Lift the RF PC board assembly gently out. P104 will unplug from J1 as the board is lifted out.
6. Audio/Logic PC Board Assembly Removal - To remove the Audio/Logic PC Board Assembly (116), perform the following steps:
  - a. Desolder five ground tabs located two on each end and one in back of the PC board (see Figure 1-15).
  - b. Remove four screws that hold the audio IC's to the heatsink, one on each end and two in the back.
  - c. Drop the audio/logic board down and out of the heat sink.

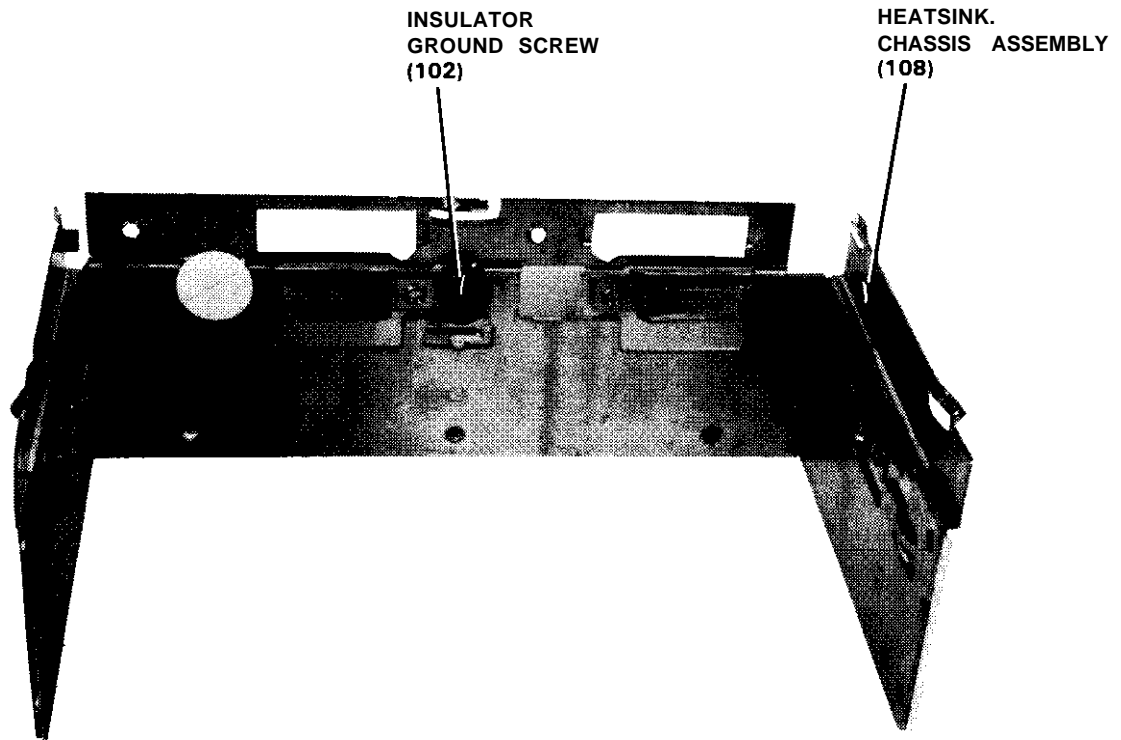
7. Static Display Module Removal - To remove the static display module (U201). (see Figure 1-11), desolder the static display module from the control PC board. As with all components on the control board, care must be taken to preserve the copper tracts on top of the PC board, as well as the bottom. When installing a new display board, make sure of a good top side connection as well as bottom. Damaged tracts may be repaired with a thin gage, solid conductor wire.
8. Cassette Tape Mechanism Subassembly Removal - To remove the Cassette Tape Mechanism Subassembly, remove the four Phillips head screws on the bottom cover. The tape mechanism subassembly should now be free.

B. ASSEMBLY PROCEDURE

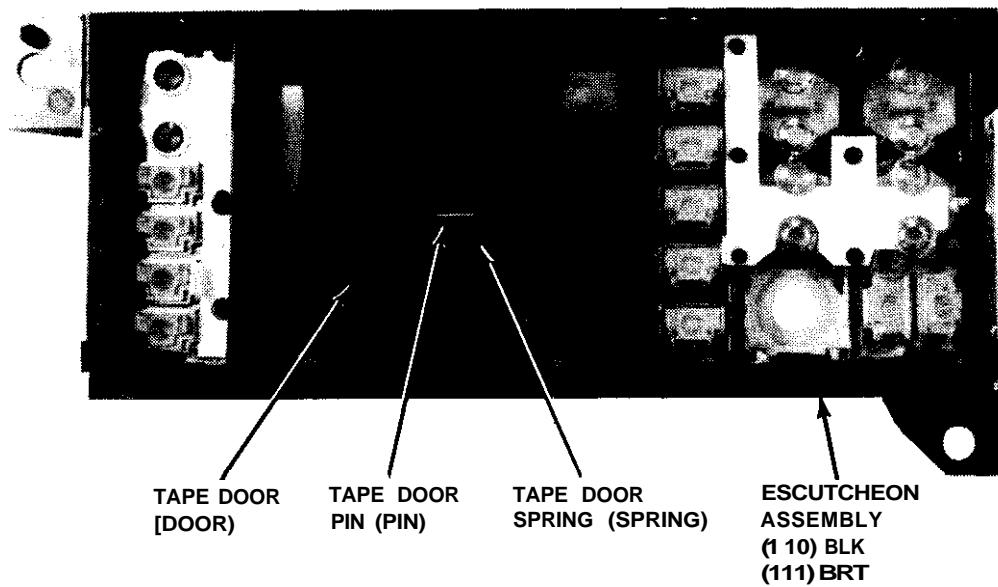
Reverse the component removal sequence to reassemble the radio.



**FIGURE 1-8. PARTS LOCATION, ESCUTCHEON ASSEMBLY**



**FIGURE 1-9. PARTS LOCATION, HEAT SINK/CHASSIS ASSEMBLY**



**FIGURE 1-10. PARTS LOCATION, BACK OF ESCUTCHEON ASSEMBLY**

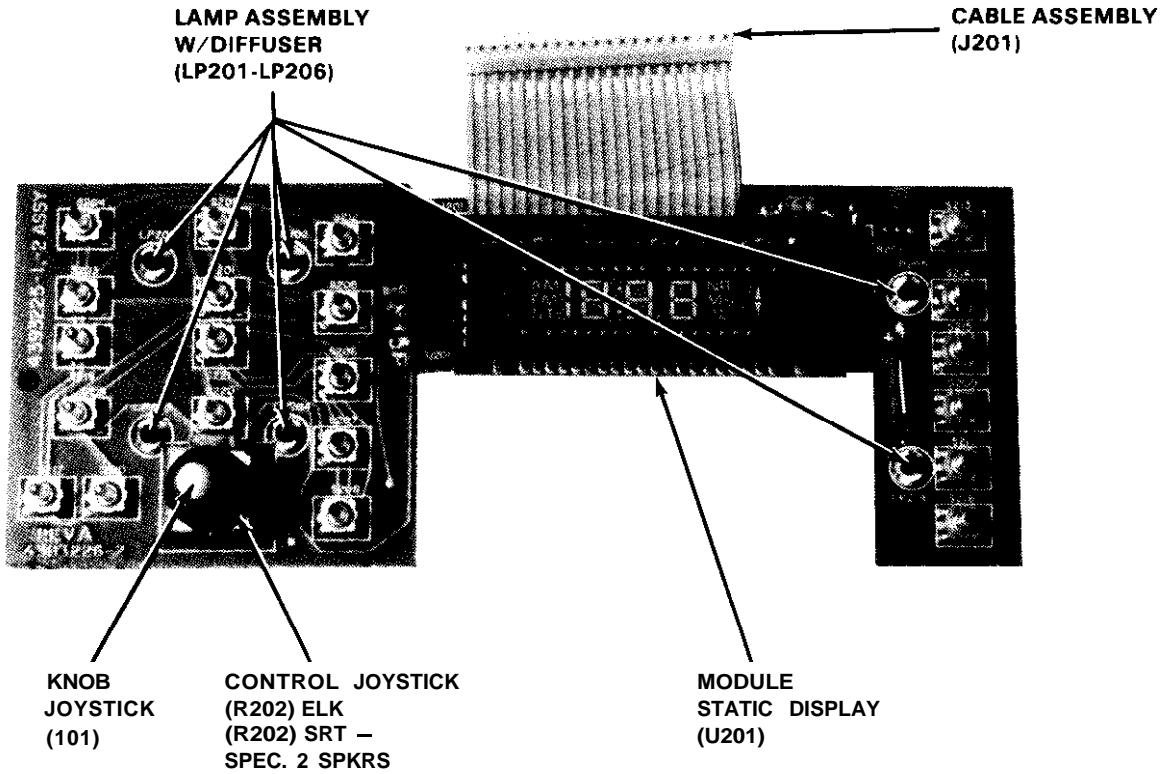


FIGURE 1-11. PARTS LOCATION, CONTROL PC BOARD

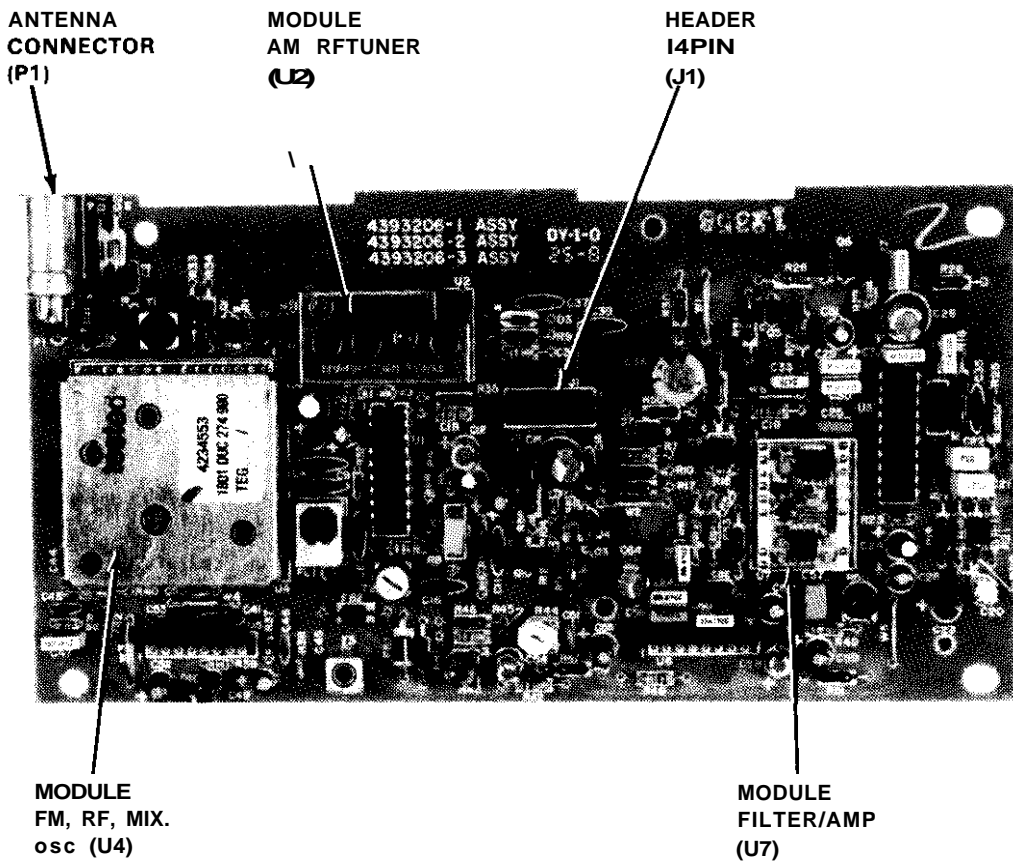


FIGURE 1-12. PARTS LOCATION, RF PC BOARD

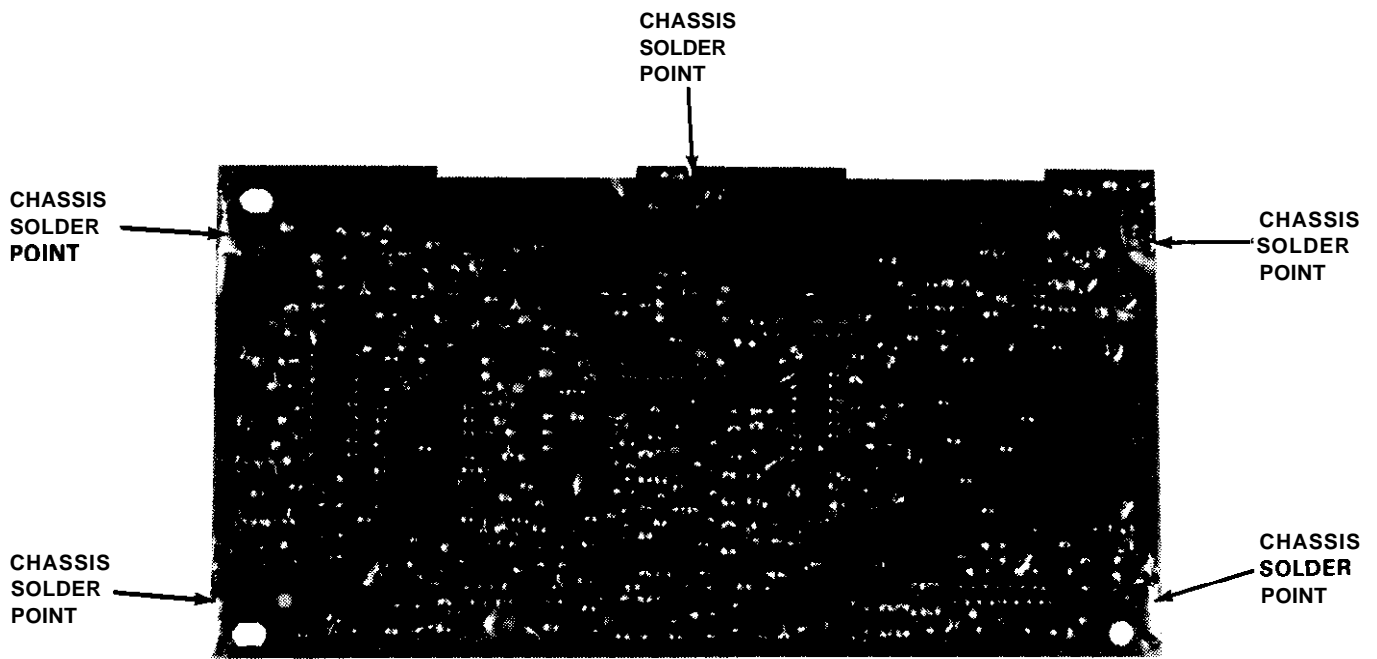


FIGURE 1-13. PARTS LOCATION, RF BOARD

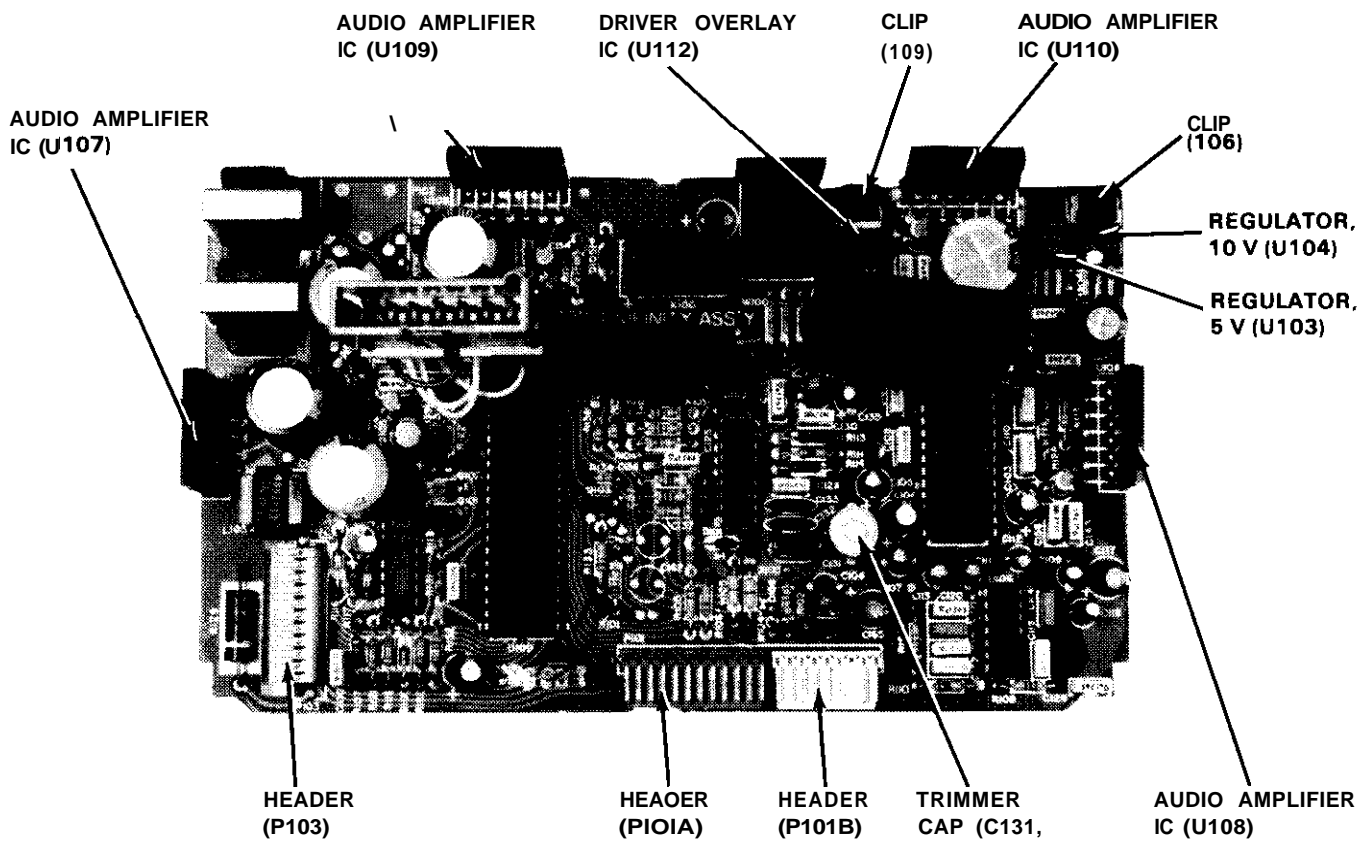
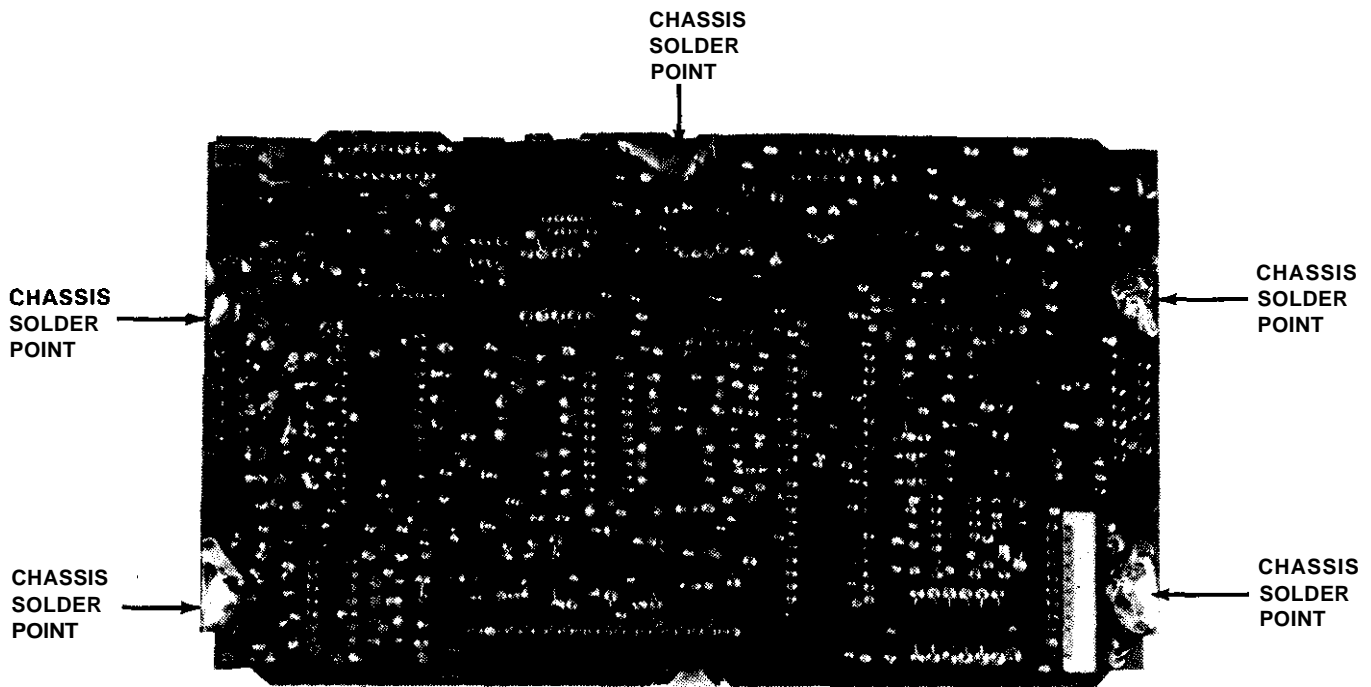
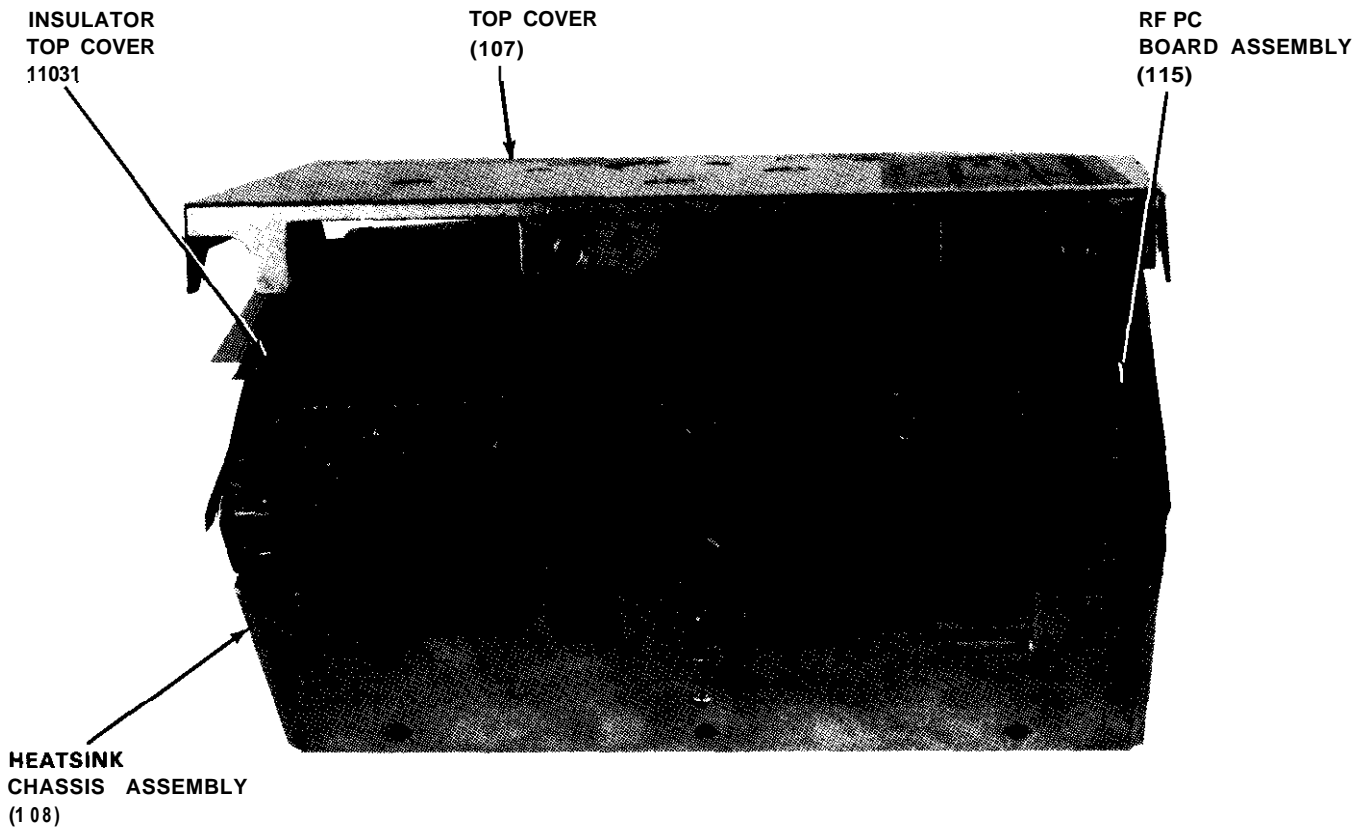


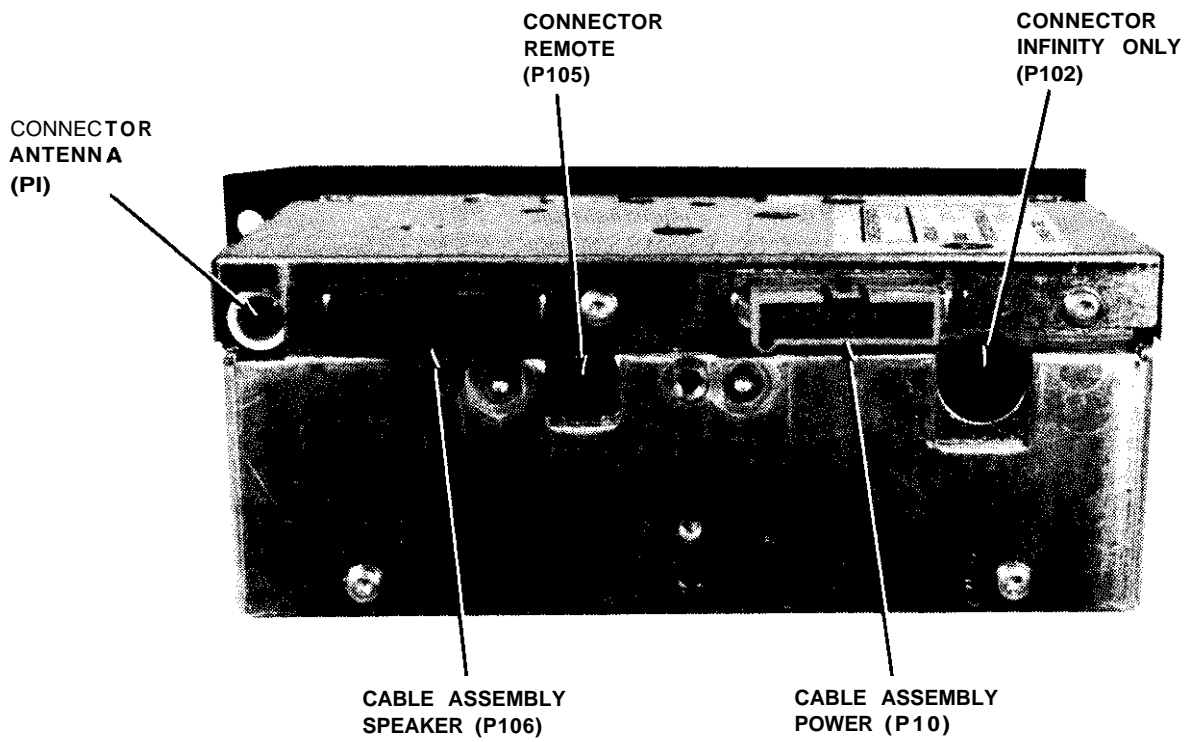
FIGURE 1-14. PARTS LOCATION, AUDIO/LOGIC PC BOARD



**FIGURE 1-15. PARTS LOCATION, AUDIO/LOGIC PC BOARD**



**FIGURE 1-16. PARTS LOCATION, R/F BOARD, WITH INSULATOR**



**FIGURE 1-17. PARTS LOCATION, REAR VIEW**



REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER  | DESCRIPTION  |
|------------------|--------------|--|
|                  |              | DIODES, TRANSISTORS, IC'S<br>(RF BOARD ASSEMBLY, P/N 4393206-1:<br>4393206-2)          |
| D1               | 4231205-A    | Diode, Switch  |
| D2               | 3600875      | Diode, Pin   |
|                  | 4231205-A    | Diode, Switch  |
| Q1               | 4234554-R    | Transistor, NPN, JFET  |
| Q2               | 4234555-R    | Transistor, NPN  |
| Q3               | 4234555-R    | Transistor, NPN  |
| Q4               | 4234556-R    | Transistor, PNP  |
| Q5               | 4232198-R92  | Transistor, PNP  |
| Q6               | 3596339-R    | Transistor, NPN  |
| Q7               | 4230891-R    | Transistor, NPN  |
| <b>Q8</b>        | 4232198-R92  | Transistor, PNP  |
| <b>Q9</b>        | 3596339-R    | Transistor, NPN  |
| <b>Q10</b>       | 3596339-R    | Transistor, NPN  |
| U1               | 4234550      | IC, AM Signal Processor  |
| u2               | 4234422      | Module, AM RF Tuner  |
| u3               | 4233034      | IC, AM Stereo Decoder  |
| u4               | 4234553      | Module, FM RF/MIX/OSC  |
| u5               | 4393690,     | IC, FM Detector  |
| U6               | 4230078      | IC, FM Stereo Decoder  |
| u7               | 4234423      | Module, Filter - Amplifier   |
|                  |              | DIODES, TRANSISTORS, IC'S<br>(AUDIO/LOGIC BOARD ASSEMBLY,<br>P/N 4393222-1; 4393222-2) |
| D100             | 4231205-A    | Diode, Switch  |
| D101             | 4231205-A    | Diode, Switch  |
| D102             | 4230853-A    | Diode, Zener, 5.6V   |
| D103             | 4231204-A201 | Diode, Rectifier, 200V   |
| D104             | 4234567      | Diode, Rectifier, 400V   |
| D105             | 4231204-A201 | Diode, Rectifier, 200V   |
| D106             | 4233049-R    | Diode, Stabilizer, 2.38V   |
| Q100             | 4232553-R92  | Transistor, NPN  |
| Q101             | 4232553-R92  | Transistor, NPN  |
| Q102             | 4232553-R92  | Transistor, NPN  |
| Q103             | 3600963-R    | Transistor, NPN  |
| U100             | 4516271      | IC, Microprocessor   |
| U101             | 4234590      | IC, Quad 2-Input NAND  |
| U102             | 4234412      | IC, Synthesizer  |
| U103             | 4234592      | IC, Regulator 5V   |
| U104             | 4233042      | IC, Regulator 10V  |
| U105             | 4234545      | IC, Audio Control 6300   |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER  | DESCRIPTION   |
|------------------|--------------|---|
|                  |              | <u>DIODES, TRANSISTORS, IC'S<br/>(AUDIO/LOGIC BOARD ASSEMBLY,<br/>P/N 4393222-1: 4393222-2)</u>     |
| U106             | 4230862      | IC, DNR   |
| U107             | 4234547      | IC, Audio Amplifier   |
| U108             | 4234547      | IC, Audio Amplifier   |
| U109             | 4234547      | IC, Audio Amplifier   |
| U110             | 4234547      | IC, Audio Amplifier   |
| U111             | 4392808-R    | IC, Regulator, 5V   |
| U112             | 4392807      | IC, Driver Overlay  |
|                  |              | <u>DIODES, TRANSISTORS, IC'S<br/>(CONTROL BOARD ASSEMBLY, P/N<br/>4234484)</u>                      |
| D201             | 4231205-A    | Diode, Switch   |
| D202             | 4231205-A    | Diode, Switch   |
| D203             | 4231200-A140 | Diode, Zener 14V  |
| Q201             | 4234414-N    | Transistor, NPN   |
| U201             | 4392399      | Module, Static Display  |
| U202             | 4234546      | IC, A/D Converter   |
|                  |              | <u>CRYSTALS, COILS, TRANSFORMERS,<br/>FILTERS (RF BOARD ASSEMBLY,<br/>P/N 4393206-1: 4393206-2)</u> |
| L2               | 4233116-A1   | Inductor, Fixed 4.7 uHy   |
| T1               | 4234551      | Transformer, AM Antenna   |
| T2               | 4234552      | Transformer, AM IF  |
| T3               | 4234558      | Transformer, FM Detector  |
| X1               | 4234539      | Resonator, AM, Stop DET   |
| x2               | 4393274-R    | Resonator, AM, Radial   |
| FL1              | 4234549      | Filter, AM IF   |
| FB1              | 3599705      | Ferrite Bead  |
| FB2              | 3599705      | Ferrite Bead  |
| X100             | 4232720      | Crystal, 3.96 MHz   |
| L101             | 4234577      | Inductor, Supply Filter, 600 uH   |
| L102             | 4234577      | Inductor, Supply Filter, 600 uH   |
| L103             | 4393213      | Inductor, Audio Filter, 800 uH  |
| K100             | 4393212      | Relay, DPDT   |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER            | DESCRIPTION  |
|------------------|------------------------|--|
|                  |                        | <u>CAPACITORS, (RF BOARD ASSEMBLY, P/N 4393206-1; 4393206-Z)</u> |
| C1               | 4231063<br>RAY5S103M2  | Capacitor, Disc, 0.01 MF, 25V                                    |
| C2               | 4231061-<br>RACOG330J3 | Capacitor, Disc, 33 PF, 50V                                      |
| C4               | 4231063-<br>RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                                   |
| c5               | 4230650-23             | Capacitor, Elect., 100 MF, 16V                                   |
| C6               | 4231063-<br>RAY5S104M1 | Capacitor, Disc, 0.1 MF, 16V                                     |
| C7               | 4230650-16             | Capacitor, Elect., 1.0 MF, 50V                                   |
| C8               | 4231063-<br>RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                                   |
| C9               | 4231063-<br>RAY5S104M1 | Capacitor, Disc, 0.1 MF, 16V                                     |
| C10              | 4230650-18             | Capacitor, Elect., 3.3 MF, 50V                                   |
| C11              | 4231063-<br>RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                                   |
| C12              | 4230650-19             | Capacitor, Elect., 4.7 MF, 50V                                   |
| C13              | 4231063-<br>RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                                   |
| C14              | 4230650-17             | Capacitor, Elect., 2.2 MF, 50V                                   |
| C15              | 4234411-2              | Capacitor, Elect., 330 MF, 16V                                   |
| C16              | 4231063-<br>RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                                   |
| C17              | 4231072-<br>AY5R103M   | Capacitor, Tubular Ceramic, 0.01 MF, 25V                         |
| C18              | 4231072-<br>AY5R103M   | Capacitor, Tubular Ceramic, 0.01 MF, 25V                         |
| cl.9             | 4231072-<br>AY5R103M   | Capacitor, Tubular Ceramic, 0.01 MF, 25V                         |
| C20              | 4230650-19             | Capacitor, Elect., 4.7 MF, 50V                                   |
| C21              | 4231059-<br>R334J0     | Capacitor, Poly., 0.33 MF, 50V                                   |
| C22              | 4231059-<br>R334J0     | Capacitor, Poly., 0.33 MF, 50V                                   |
| C23              | 4230650-17             | Capacitor, Elect., 2.2 MF, 50V                                   |
| C24              | 4230650-25             | Capacitor, Elect., 10 MF, 16V                                    |
| C25              | 4231059-<br>R102K1     | Capacitor, Poly., 0.001 MF, 63V                                  |
| C26              | 4230650-22             | Capacitor, Elect., 47 MF, 16V                                    |
| C27              | 4231059-<br>R332J1     | Capacitor, Poly., 0.0033 MF, 63V                                 |
| C28              | 4230650-17             | Capacitor, Elect., 2.2 MF, 50V                                   |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER        | DESCRIPTION   |
|------------------|--------------------|---|
|                  |                    | CAPACITORS, (RF BOARD ASSEMBLY, P/N 4393206-1; 4393206-2) |
| c29              | 4231059-R332J1     | Capacitor, Poly., 0.0033 MF, 63V                          |
| c30              | 4231059-R332J1     | Capacitor, Poly., 0.0033 MF, 63V                          |
| c31              | 4230650-25         | Capacitor, Elect., 10 MF, 16V                             |
| C32              | 4231059-R332J1     | Capacitor, Poly., 0.9033 MF, 63V                          |
| c33              | 4231059-R473X2     | Capacitor, Poly., 0.047 MF, 100V                          |
| c34              | 4232777-R103KO     | Capacitor, Poly., 0.01 MF, 50V                            |
| c35              | 4231061-RACOG510J3 | Capacitor, Disc, 51 PF, 50V                               |
| C36              | 4231071-AY5P271K   | Capacitor, Tubular Ceramic, 270 PF, 50v                   |
| c37              | 4231063-RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                            |
| C38              | 4234569-1          | Capacitor, Elect., 1000 MF, 10V                           |
| c39              | 4231063-RAY5S473M1 | Capacitor, Disc, 0.047 MF, 16V                            |
| C40              | 4231072-AY5P151M   | Capacitor, Tubular Ceramic, 150 PF, 50v                   |
| c41              | 4231063-RAY5S104M1 | Capacitor, Disc, 0.1 MF, 16V                              |
| C42              | 4231063-RAY5S103M2 | Capacitor, Disc, 0.01 MF, 25V                             |
| c43              | 4231063-RAY5S103M2 | Capacitor, Disc, 0.01 MF, 25V                             |
| c44              | 4231063-RAY5S103M2 | Capacitor, Disc, 0.01 MF, 25V                             |
| c45              | 4231061-RACOH5R6J4 | Capacitor, Disc, 5.6 PF, 100V                             |
| C46              | 4231061-RACOG150J3 | Capacitor, Disc, 15 PF, 50V                               |
| c47              | 4232777-R103KO     | Capacitor, Poly. 0.01 MF, 50V                             |
| C48              | 4230650-17         | Capacitor, Elect., 2.2 MF, 50V                            |
| c49              | 4230650-25         | Capacitor, Elect., 10 MF, 16V                             |
| C50              | 4231062-RAY5S501M4 | Capacitor, Disc, 500 PF, 100V                             |
| c51              | 4231062-RAY5S501M4 | Capacitor, Disc, 500 PF, 100V                             |
| C52              | 4230650-18         | Capacitor, Elect., 3.3 MF, 50V                            |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER            | DESCRIPTION  |
|------------------|------------------------|--|
|                  |                        | CAPACITORS, (RF BOARD ASSEMBLY, P/N 4393206-1: 4393206-2)          |
| c53              | 4231063-<br>RAY5S103M2 | Capacitor, Disc, 0.01 MF, 25V                                      |
| c54              | 4230650-15             | Capacitor, Elect., 0.47 MF, 50V                                    |
| c55              | 4230650-16             | Capacitor, Elect., 1.0 MF, 50V                                     |
| C56              | 4231059-<br>R683X1     | Capacitor, Poly., 0.068 MF, 63V                                    |
| c57              | 4231064-<br>R751JO     | Capacitor, Polyprop., 750 PF, 50v                                  |
| C58              | 4230650-15             | Capacitor, Elect., 0.47 MF, 50V                                    |
| c59              | 4230650-16             | Capacitor, Elect., 1.0 MF, 50V                                     |
| C60              | 4231059-<br>R333J1     | Capacitor, Poly., 0.033 MF, 63V                                    |
| C61              | 4230650-25             | Capacitor, Elect., 10 MF, 16V                                      |
| C62              | 4232777-<br>R273K2     | Capacitor, Poly. 0.027 MF, 100V                                    |
| C63              | 4232777-<br>R273K2     | Capacitor, Poly. 0.027 MF, 100V                                    |
| C64              | 4234411-2              | Capacitor, Elect., 330 MF, 16V                                     |
|                  |                        | CAPACITORS, (AUDIO/LOGIC BOARD ASSEMBLY, P/N 4393222-1, 4393222-2) |
| C100             | 4231059-<br>R103KO     | Capacitor, Poly., 0.01 MF, 50V                                     |
| C101             | 4232777-<br>R562K2     | Capacitor, Poly., 0.0056 MF, 100V (Premium)                        |
| C101             | 4232777-<br>R472K2     | Capacitor, Poly., 0.0047 MF, 100V (Infinity)                       |
| C102             | 4232777-<br>R562K2     | Capacitor, Poly., 0.0056 MF, 100V                                  |
| C102             | 4232777-<br>R472K2     | Capacitor, Poly., 0.0047 MF, 100V (Infinity)                       |
| C103             | 4230650-20             | Capacitor, Elect., 22 MF, 16V                                      |
| C104             | 4230650-23             | Capacitor, Elect., 100 MF, 16V                                     |
| C105             | 4230650-25             | Capacitor, Elect., 10 MF, 16V                                      |
| C106             | 4230835-R4             | Capacitor, Bi-Polar, 2.2 MF, 16V                                   |
| C107             | 4230835-R4             | Capacitor, Bi-Polar, 2.2 MF, 16V                                   |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER          | DESCRIPTION  |
|------------------|----------------------|--|
|                  |                      | CAPACITORS, (AUDIO/LOGIC ASSEMBLY, P/N 4393222-1; 4393222-2) |
| C108             | 4232777-<br>R683K1   | Capacitor, Poly., .068 MF, 63V (Premium)                     |
| C1.08            | 4232777-<br>R823K1   | Capacitor, Poly., .082 MF, 63V (Infinity)                    |
| C109             | 4230835-R4           | Capacitor, Bi-Polar, 2.2 MF, 16V                             |
| C110             | 4232777-<br>R683K1   | Capacitor, Poly., .068 MF, 63V (Premium)                     |
| C110             | 4232777-<br>R823K1   | Capacitor, Poly., .082 MF, 63V (Infinity)                    |
| C111             | 4230835-R4           | Capacitor, Bi-Polar, 2.2 MF, 16V                             |
| C112             | 4230835-R4           | Capacitor, Bi-Polar, 2.2 MF, 16V                             |
| C113             | 4230835-R4           | Capacitor, Bi-Polar, 2.2 MF, 16V                             |
| C114             | 4232777-<br>R392KO   | Capacitor, Poly., .0039 MF, 50V                              |
| C115             | 4232777-<br>R392KO   | Capacitor, Poly., .0039 MF, 50V                              |
| C116             | 4231059-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C117             | 4230650-23           | Capacitor, Elect., 100 MF, 16V                               |
| C118             | 4230650-17           | Capacitor, Elect., 2.2 MF, 50V                               |
| C119             | 4232777-<br>R473K2   | Capacitor, Poly., .047 MF, 100V                              |
| C120             | 4232777-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C121             | 4231059-<br>R102K1   | Capacitor, Poly., .001 MF, 63V                               |
| C122             | 4232777-<br>R473K2   | Capacitor, Poly., .047 MF, 100V                              |
| C124             | 4232777-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C125             | 4232777-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C126             | 4232777-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C127             | 4231071-<br>AY5P102K | Capacitor, Tubular Ceramic, .001 MF 50v                      |
| C128             | 4232777-<br>R103KO   | Capacitor, Poly., 0.01 MF, 50V                               |
| C129             | 4230650-23           | <b>Capacitor</b> , Elect., 0.001 MF, 16V                     |
| C130             | 4231059-<br>R222J1   | Capacitor, Poly., .0022 MF, 63V                              |
| C131             | 4232682              | Capacitor, Trimmer, 5.5-18 PF, 30v                           |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER        | DESCRIPTION  |
|------------------|--------------------|--|
|                  |                    | CAPACITORS, (AUDIO/LOGIC ASSEMBLY, P/N 4393222-1: 4393222-Z) |
| C132             | 4231061-RACOG200J4 | Capacitor, Disc, 20 PF, 100V                                 |
| C133             | 4231061-RACOG151J4 | Capacitor, Disc, 150 PF, 100V                                |
| C134             | 4230650-18         | Capacitor, Elect., 3.3 MF, 50V                               |
| C135             | 4230650-17         | Capacitor, Elect., 2.2 MF, 50V                               |
| C136             | 4231070-AS2L101J   | Capacitor, Tubular Ceramic, 100 PF, 50v                      |
| C137             | 4231070-ACOH3R3K   | Capacitor, Tubular Ceramic, 3.3 PF, 50v                      |
| C138             | 4230650-15         | Capacitor, Elect., 0.47 MF, 50V                              |
| C139             | 4234411-2          | Capacitor, Elect., 330 MF, 16V                               |
| C140             | 4232777-R104KO     | Capacitor, Poly., 0.1 MF, 50V                                |
| C141             | 4232777-R104KO     | Capacitor, Poly., 0.1 MF, 50V                                |
| C142             | 3600689            | Capacitor, Elect., 330 MF, 16V                               |
| C143             | 4231059-R104KO     | Capacitor, Poly., 0.1 MF, 50V                                |
| C144             | 4231059-R473M2     | Capacitor, Poly., 0.047 MF, 100V                             |
| C145             | 4231059-R473M2     | Capacitor, Poly., 0.047 MF, 100V                             |
| C146             | 4231059-R473M2     | Capacitor, Poly., 0.047 MF, 100V                             |
| C147             | 4393214-1          | Capacitor, Elect., 2200 MF, 16V                              |
| C148             | 4393214-1          | Capacitor, Elect., 2200 MF, 16V                              |
| C149             | 3600599            | Capacitor, Elect., 1500 MF, 16V                              |
| C150             | 3600599            | Capacitor, Elect., 1500 MF, 16V                              |
| C151             | 3230650-37         | Capacitor, Elect., 0.47 MF, 50V                              |
| C152             | 4232777-R273K2     | Capacitor, Poly., 0.027 MF, 100V (Premium)                   |
| C152             | 4232777-R103KO     | Capacitor, Poly., 0.01 MF, 100V (Infinity)                   |
| C153             | 4231059-R224KO     | Capacitor, Poly., 0.22 MF, 50V                               |
| C154             | 4230650-37         | Capacitor, Elect., 0.47 MF, 50V                              |
| C155             | 4232777-R273K2     | Capacitor, Poly., 0.027 MF, 100V (Premium)                   |
| C155             | 4232777-R103KO     | Capacitor, Poly., 0.01 MF, 100V (Infinity)                   |
| C156             | 3600599            | Capacitor, Elect., 1500 MF, 16V                              |
| C157             | 4230650-37         | Capacitor, Elect., 0.47 MF, 50V                              |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER          | DESCRIPTION  |
|------------------|----------------------|--|
|                  |                      | CAPACITORS, (AUDIO/LOGIC ASSEMBLY, P/N 4393222-1; 4393222-2) |
| C158             | 4232777-<br>R273K2   | Capacitor, Poly., 0.027 MF, 100V<br>(Premium)                |
| C158             | 4232777-<br>R103KO   | Capacitor, Poly., 0.01 MF, 100V<br>(Infinity)                |
| C159             | 4231059-<br>R224KO   | Capacitor, Poly., 0.22 MF, 50V                               |
| C160             | 4230650-37           | Capacitor, Elect., 0.47 MF, 50V                              |
| C161             | 4232777-<br>R273K2   | Capacitor, Poly., 0.027 MF, 100V<br>(Premium)                |
| C161             | 4232777-<br>R103KO   | Capacitor, Poly., 0.01 MF, 100V<br>(Infinity)                |
| C162             | 4232835-R4           | Capacitor, Bi-Polar, 2.2 .MF, 16V<br>(Infinity)              |
| C163             | 4232835-R4           | Capacitor, Bi-Polar, 2.2 MF, 16V<br>(Infinity)               |
| C164             | 4232777-<br>R104KO   | Capacitor, Poly., 0.1 MF, 50V                                |
| C165             | 4230650-23           | Capacitor, Elect., 100 MF, 16V                               |
|                  |                      | CAPACITORS, (CONTROL BOARD ASSEMBLY, P/N 4234484)            |
| c201             | 4393208-1            | Capacitor, Elect., 100 MF, 16V                               |
| c202             | 4231072-<br>AY5R223M | Capacitor, Tubular Ceramic, .022 MF<br>25V                   |
|                  |                      | RESISTORS, (RF BOARD ASSEMBLY, P/N 4393206-1; 4393206-2)     |
| R1               | 4231017-R270         | Resistor, 1/8 W, 27 Ohm, $\pm$ 5%                            |
| R2               | 4231017-R561         | Resistor, 1/8 W, 560 Ohm, $\pm$ 5%                           |
| R3               | 4231017-R561         | Resistor, 1/8 W, 560 Ohm, $\pm$ 5%                           |
| R4               | 4231017-R680         | Resistor, 1/8 W, 68 Ohm, + 5%                                |
| R5               | 4231017-R103         | Resistor, 1/8 W, 10K, $\pm$ 5%                               |
| R6               | 4231017-R103         | Resistor, 1/8 W, 10K, $\pm$ 5%                               |
| R7               | 3597091-302          | Resistor, 1/4 W, 3.0K, $\pm$ 5%                              |
| R8               | 4231017-R101         | Resistor, 1/8 W, 100 Ohm, + 5%                               |
| R9               | 3597091-181          | Resistor, 1/4 W, 180 Ohm, $\pm$ 5%                           |
| R10              | 3597091-103          | Resistor, 1/4 W, 10K, $\pm$ 5%                               |
| R11              | 4231017-R472         | Resistor, 1/8 W, 4.3K, $\pm$ 5%                              |



REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER   | DESCRIPTION  |
|------------------|---------------|--|
|                  |               | RESISTORS, (RF BOARD ASSEMBLY, P/N 4393206-1: 4393206-2) |
| R12              | 4231017-R333  | Resistor, 1/8 W, 33K, $\pm 5\%$                          |
| R13              | 4231017-R332  | Resistor, 1/8 W, 3.3K, $\pm 5\%$                         |
| R14              | 4231017-R221  | Resistor, 1/8 W, 220 Ohm, $\pm 5\%$                      |
| R15              | 4231017-R471  | Resistor, 1/8 W, 470 Ohm, $\pm 5\%$                      |
| R16              | 4231017-R331  | Resistor, 1/8 W, 330 Ohm, $\pm 5\%$                      |
| R17              | 3597091-220   | Resistor, 1/4 W, 22 Ohm, $\pm 5\%$                       |
| R 1 8            | 3597091-272   | Resistor, 1/4 W, 2.7K, $\pm 5\%$                         |
| R19              | 3597091-431   | Resistor, 1/4 W, 430 Ohm, $\pm 5\%$                      |
| R20              | 3597091-162   | Resistor, 1/4 W, 1.6K, $\pm 5\%$                         |
| R21              | 3597347-8251  | Resistor, 1/4 W, 8.25K, $\pm 5\%$                        |
| R22              | 3597091-162   | Resistor, 1/4 W, 1.6K, $\pm 5\%$                         |
| R23              | 4231017-R623  | Resistor, 1/8 W, 62K, $\pm 5\%$                          |
| R24              | 4231020-R3163 | Resistor, 1/8 W, 316K, $\pm 1\%$                         |
| R25              | 3597347-1371  | Resistor, 1/4 W, 1.37K, $\pm 1\%$                        |
| R26              | 3597091-431   | Resistor, 1/4 W, 430 Ohm, $\pm 5\%$                      |
| R27              | 3597091-100   | Resistor, 1/4 W, 10 Ohm, $\pm 5\%$                       |
| R28              | 3597091-122   | Resistor, 1/4 W, 1.2K, $\pm 5\%$                         |
| R29              | 3597091-273   | Resistor, 1/4 W, 27K, $\pm 5\%$                          |
| R30              | 3597091-153   | Resistor, 1/4 W, 15K, $\pm 5\%$                          |
| R31              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R33              | 3597091-102   | Resistor, 1/4 W, 1K, $\pm 5\%$                           |
| R34              | 3597091-124   | Resistor, 1/4 W, 120K, $\pm 5\%$                         |
| R35              | 3597091-101   | Resistor, 1/4 W, 100 Ohm, $\pm 5\%$                      |
| R36              | 4231017-R472  | Resistor, 1/8 W, 4.3K, $\pm 5\%$                         |
| R37              | 4231017-R122  | Resistor, 1/8 W, 1.2K, $\pm 5\%$                         |
| R38              | 4231017-R223  | Resistor, 1/8 W, 22K, $\pm 5\%$                          |
| R39              | 4231017-R512  | Resistor, 1/8 W, 5.1K, $\pm 5\%$                         |
| R40              | 3597091-331   | Resistor, 1/4 W, 330 Ohm, $\pm 5\%$                      |
| R41              | 3597091-101   | Resistor, 1/4 W, 100 Ohm, $\pm 5\%$                      |
| R42              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R43              | 4234582-224   | Resistor, Variable, 220K                                 |
| R44              | 4234582-104   | Resistor, Variable, 100K                                 |
| R45              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R46              | 3597091-513   | Resistor, 1/4 W, 51K, $\pm 5\%$                          |
| R47              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R48              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R49              | 3597347-1912  | Resistor, 1/4 W, 19.1K, $\pm 1\%$                        |
| R50              | 4234582-502   | Resistor, Variable, 5K                                   |
| R51              | 3597091-102   | Resistor, 1/4 W, 1K, $\pm 5\%$                           |
| R52              | 3597091-180   | Resistor, 1/4 W, 18 Ohm, $\pm 5\%$                       |
| R53              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm 5\%$                          |
| R54              | 3597091-122   | Resistor, 1/4 W, 1.2K, $\pm 5\%$                         |
| R55              | 3597091-273   | Resistor, 1/4 W, 27K, $\pm 5\%$                          |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

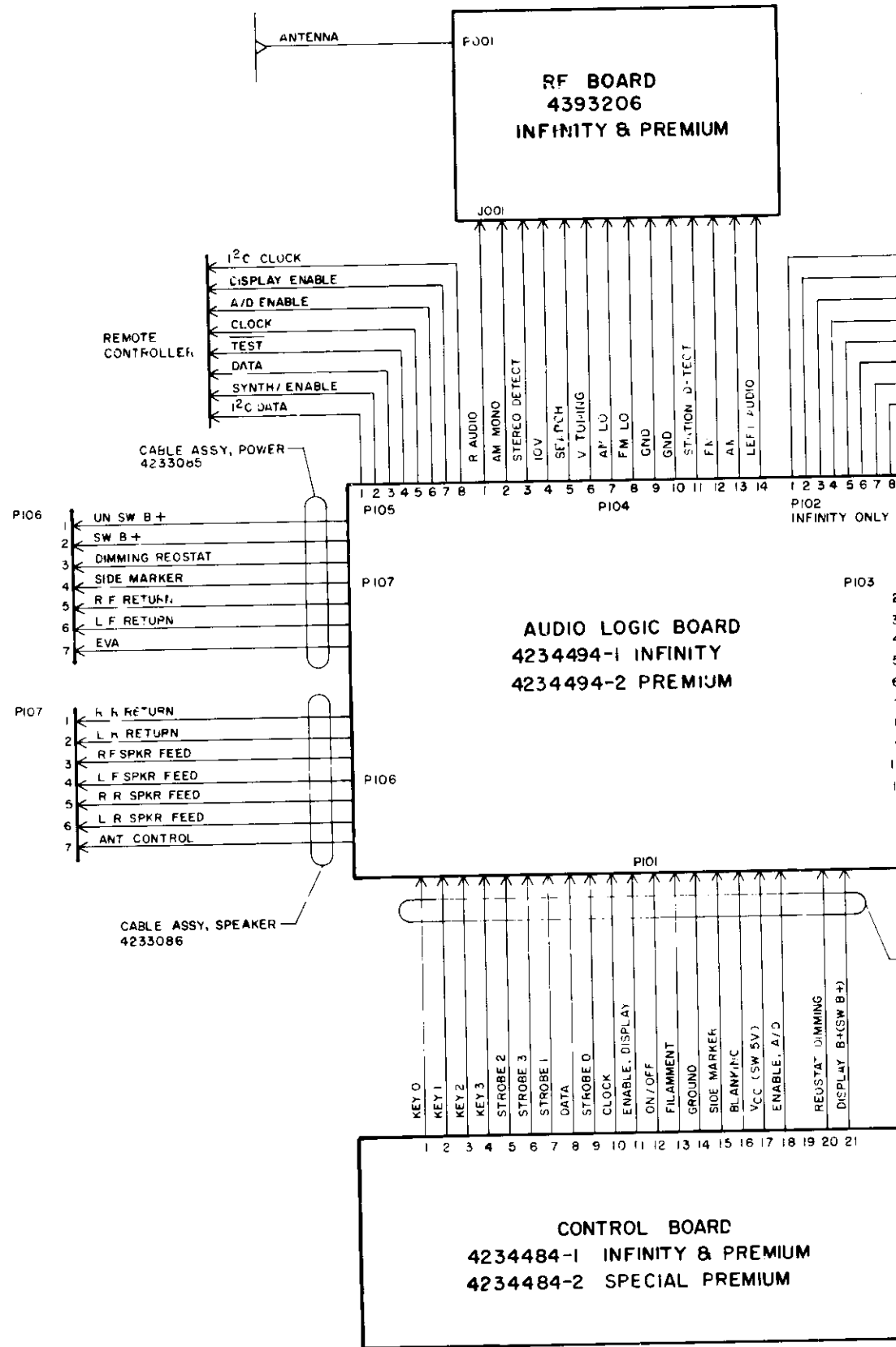
| REFERENCE NUMBER | PART NUMBER   | DESCRIPTION   |
|------------------|---------------|---|
|                  |               | RESISTORS, (RF BOARD ASSEMBLY, P/N 4393206-1; 4393206-2)          |
| R56              | 3597091-153   | Resistor, 1/4 W, 15K, $\pm$ 5%                                    |
| R57              | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R58              | 3597091-102   | Resistor, 1/4 W, 1K, $\pm$ 5%                                     |
|                  |               | RESISTORS, (AUDIO/LOGIC BOARD ASSEMBLY; P/N 4393222-1: 4393222-2) |
| R101             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R102             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R103             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R104             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R105             | 3597091-223   | Resistor, 1/4 W, 22K, $\pm$ 5%                                    |
| R106             | 3597091-223   | Resistor, 1/4 W, 22X, $\pm$ 5%                                    |
| R107             | 3597091-104   | Resistor, 1/4 W, 100K, $\pm$ 5%                                   |
| R108             | 3597091-101   | Resistor, 1/4 W, 100 Ohm, $\pm$ 5%                                |
| R109             | 3597091-102   | Resistor, 1/4 W, 1K, $\pm$ 5%                                     |
| R110             | 3597091-101   | Resistor, 1/4 W, 100 Ohm, $\pm$ 5%                                |
| R111             | 3597091-512   | Resistor, 1/4 W, 5.1K, $\pm$ 5%                                   |
| R112             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R113             | 3597091-392   | Resistor, 1/4 W, 3.9K, $\pm$ 5%                                   |
| R114             | 3597091-106   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R115             | 3597091-512   | Resistor, 1/4 W, 5.1K, $\pm$ 5%                                   |
| R116             | 4231017-R683  | Resistor, 1/8 W, 68K, $\pm$ 5%                                    |
| R117             | 4231017-R104  | Resistor, 1/8 W, 100K, $\pm$ 5%                                   |
| R118             | 4231017-R273  | Resistor, 1/8 W, 27K, $\pm$ 5%                                    |
| R119             | 3597091-273   | Resistor, 1/4 W, 27K, $\pm$ 5%                                    |
| R120             | 3597091-273   | Resistor, 1/4 W, 27K, $\pm$ 5%                                    |
| R121             | 3597091-273   | Resistor, 1/4 W, 27K, $\pm$ 5%                                    |
| R122             | 3597091-101   | Resistor, 1/4 W, 100 Ohm, $\pm$ 5%                                |
| R123             | 4231017-R512  | Resistor, 1/8 W, 5.1K, $\pm$ 5%                                   |
| R124             | 4231017-R102  | Resistor, 1/8 W, 1K, $\pm$ 5%                                     |
| R125             | 3597091-102   | Resistor, 1/4 W, 1K, $\pm$ 5%                                     |
| R126             | 3597091-102   | Resistor, 1/4 W, 1K, $\pm$ 5%                                     |
| R127             | 3597091-102   | Resistor, 1/4 W, 1K, $\pm$ 5%                                     |
| R128             | 4231017-R202  | Resistor, 1/8 W, 2K, $\pm$ 5%(Infinity)                           |
| R129             | 4231016-A2F91 | Resistor, WW_Fusible, 2W, 91 Ohm, $\pm$ 5%                        |
| R130             | 4231017-R152  | Resistor, 1/8 W, 1.5K, $\pm$ 5% (Infinity)                        |
| R131             | 4231017-R103  | Resistor, 1/8 W, 10K, $\pm$ 5%                                    |
| R132             | 3597091-103   | Resistor, 1/4 W, 10K, $\pm$ 5%                                    |
| R133             | 3597091-154   | Resistor, 1/4 W, 150K, $\pm$ 5%                                   |
| R134             | 4231017-R304  | Resistor, 1/8 W, 300K, $\pm$ 5%                                   |

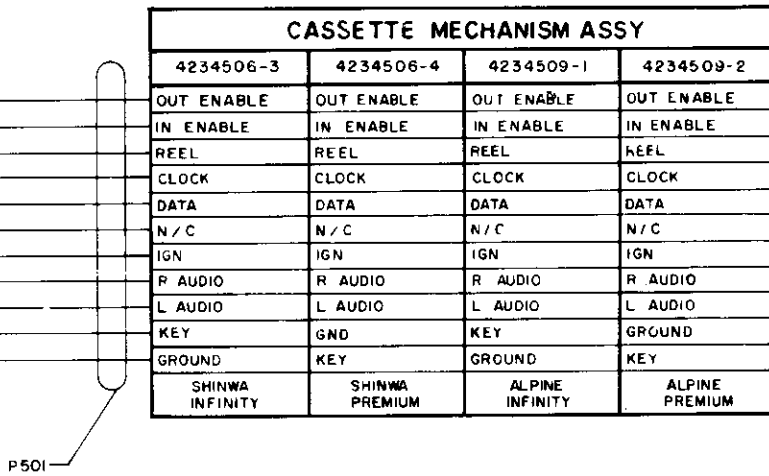
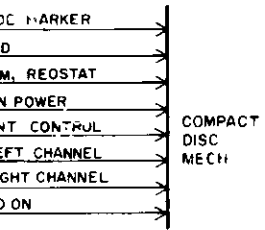
REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER  | DESCRIPTION   |
|------------------|--|---|
|                  |  | RESISTORS, (AUDIO/LOGIC BOARD ASSEMBLY, P/N 4393222-1: 4393222-2' |
| R135             | 4231017-R272   | Resistor, 1/8 W, 2.7K, $\pm$ 5%                                   |
| R136             | 4231017-R272   | Resistor, 1/8 W, 2.7K, $\pm$ 5%                                   |
| R202             | 4392343  | Control, Joystick, Yellow (Special Premium)                       |
| R202             | 4234568  | Control, Joystick (Premium)                                       |
| R203             | 4231106-ALF20  | Resistor, 1W, 200 Ohm, $\pm$ 5%                                   |
|                  |  | <u>MISCELLANEOUS PARTS</u>  |
| 101              | 4234514-1  | Knob, Joystick (Black)  |
| 101              | 4234514-2  | Knob, Joystick (Bright)   |
| 102              | 4233144  | Insulator, Ground Screw   |
| 103              | 4233051  | Insulator, Top Cover  |
| 104              | 4234531  | Insulator, Audio Board  |
| 105              | 4234588  | Seal, Joystick  |
| 106              | 4234595  | Clip, (U103 & U104)   |
| 107              | 4234520  | Cover, Top  |
| 108              | 4234589  | Heatsink, Chassis Assembly  |
| 109              | 4234591  | Clip, (U112)  |
| 110              | 4393220-1  | Escutcheon Assembly Blk, Less Lens                                |
| 111              | 4393220-2  | Escutcheon Assembly Brt, Less Lens                                |
| 114              | 4234519-1  | Lens, Display, (Infinity)   |
| 114              | 4234519-2  | Lens, Display, (Premium)  |
| 115              | 4393206-3  | PC Board Assembly, RF   |
| 116              | 4393222-1  | PC Board Assembly, Audio/Logic, (Infinity)                        |
| 116              | 4393222-2  | PC Board Assembly, Audio/Logic, (Premium)                         |
| 117              | 4393225-1  | PC Board Assembly, Control  |
| 117              | 4393225-2  | PC Board Assembly, Control (Special Premium)                      |
| NOTE:            | THE CONTROL PC BOARD ASSEMBLY IS REPAIRABLE. REPLACE BOARD WHEN IT IS PHYSICALLY DAMAGED <del>ONLY</del> |   |
| Door             | 4393271-1  | Tape Door Kit   |
| J1               | 4233055  | Header, Dual, 14 Pin  |

REPLACEMENT PARTS LIST, ELECTRONIC TUNED MULTIPLEX, CASSETTE RADIO

| REFERENCE NUMBER | PART NUMBER | DESCRIPTION                          |
|------------------|-------------|--------------------------------------|
|                  |             | <u>MISCELLANEOUS</u>                 |
| J201             | 4393209     | Cable, 21 Wires                      |
| P1               | 4233024     | Connector, Antenna                   |
| P101A            | 4233106     | Header, Right Angle, Brown, 12 Pin   |
| P101B            | 4393210     | Header, Right Angle, White, 9 Pin    |
| P102             | 4234587     | Connector, CD, (Infinity)            |
| P103             | 4233056-11A | Connector, Header, 11 Pin (Infinity) |
| P103             | 4233056-11B | Connector, Header, 11 Pin (Premium)  |
| P104             | 4234573     | Connector, Dual Row. 14 Pin          |
| P105             | 4234586     | Connector; Remote, 8 Pin             |
| P106             | 4233085     | Cable Assembly, Speaker, 7 Pin       |
| P107             | 4233086     | Cable Assembly, Power, 7 Pin         |
| LP201            | 4391426-2   | Lamp Assembly w/Diffuser             |
| LP202            | 4391426-2   | Lamp Assembly w/Diffuser             |
| LP203            | 4391426-2   | Lamp Assembly w/Diffuser             |
| LP204            | 4391426-2   | Lamp Assembly w/Diffuser             |
| LP205            | 4391426-2   | Lamp Assembly w/Diffuser             |
| LP206            | 4391426-2   | Lamp Assembly w/Diffuser             |
| s201             | 4234528     | Switch, Tuning -                     |
| S 2 0 2          | 4234528     | Switch, Tuning +                     |
| S203             | 4234528     | Switch, Volume -                     |
| S204             | 4234528     | Switch, Volume +                     |
| S205             | 4234528     | Switch, Memory #2                    |
| S206             | 4234528     | Switch, Memory, #3                   |
| S207             | 4234528     | Switch, Memory #4                    |
| S208             | 4234528     | Switch, Memory, #5                   |
| s209             | 4234528     | Switch, N/R                          |
| s210             | 4234528     | Switch, AM/FM                        |
| S211             | 4234528     | Switch, SELECT                       |
| s212             | 4234528     | Switch, Memory #1                    |
| S213             | 4234528     | Switch, F/F                          |
|                  |             | Seek                                 |
| S214             | 4234528     | Switch, RW                           |
| S215             | 4234528     | Switch, EJECT                        |
| S216             | 4234528     | Switch, SET                          |
| S217             | 4234528     | Switch, Power, On/Off                |
| S218             | 4234528     | Switch, Bass -                       |
| s219             | 4234528     | Switch, Bass +                       |
| s220             | 4234528     | Switch, Treble -                     |
| S221             | 4234528     | Switch, Treble +                     |





ABLE ASSY  
34571

**NOTES**

- 1 REFERENCE DRAWINGS, ELECTRICAL SCHEMATICS
  - 4593206 RF BOARD ASSY
  - 4234494 AUDIO LOGIC BOARD ASSY
  - 4234484 CONTROL BOARD ASSY
  - 4234507 SHINWA CASSETTE MECHANISM
  - 4234510 ALPINE CASSETTE MECHANISM

FIGURE 2-1. ELECTRONIC TUNED CASSETTE RADIO, BLOCK WIRING DIAGRAM

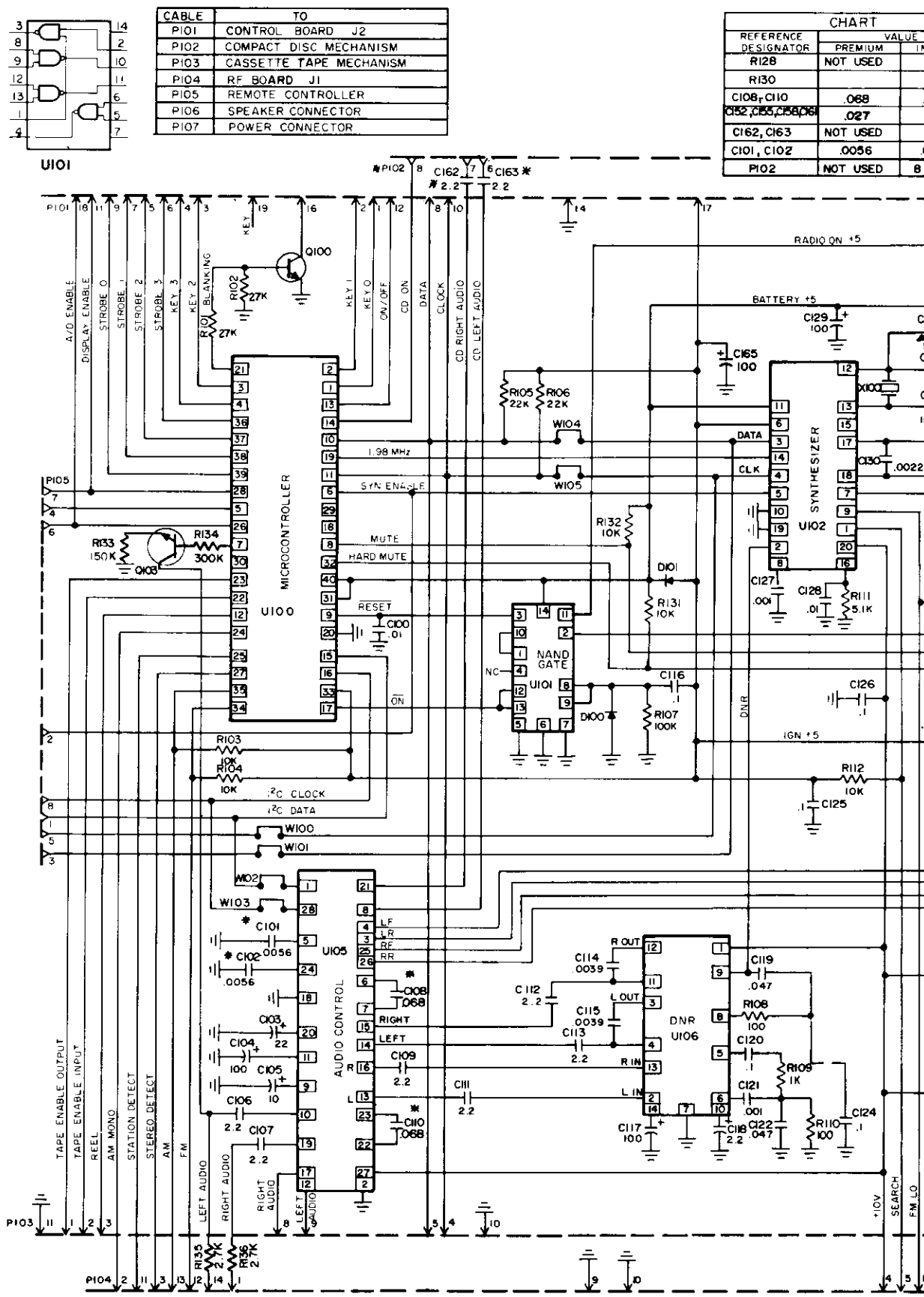
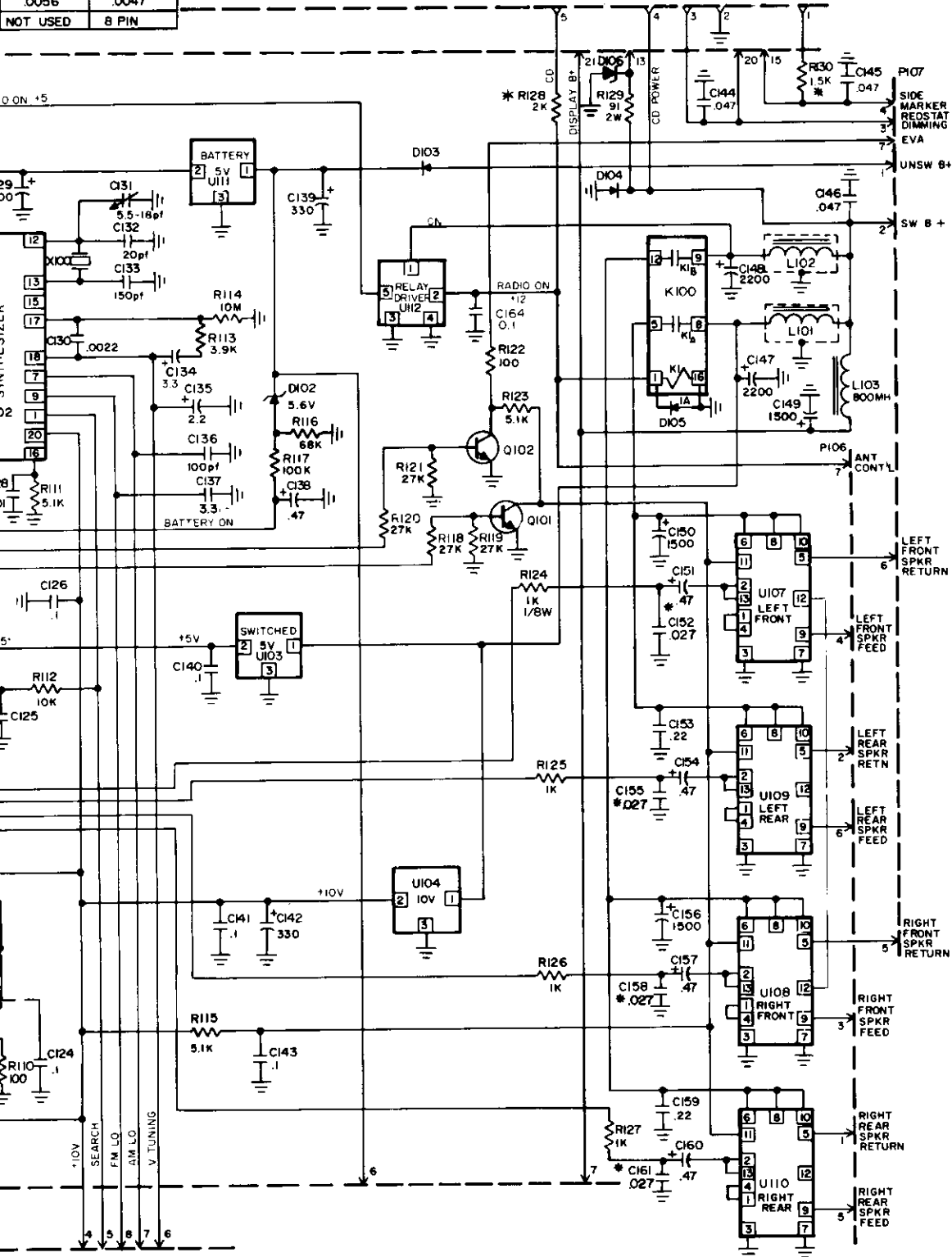


FIGURE 2-2. ELECTRONIC SCHEMATIC, AUDIO/LOGIC PC BOARD

| CHART    |          |
|----------|----------|
| PREMIUM  | INFINITY |
| NOT USED | 2 K      |
|          | 1.5K     |
| .068     | .082     |
| .027     | .0       |
| NOT USED | 2.2      |
| .0056    | .0047    |
| NOT USED | 8 PIN    |

NOTES:

- 1 ALL RESISTORS ARE 1/4W OR 1/8W, ±10% EXCEPT AS NOTED.
- 2 CAPACITANCE IN MICROFARADS, EXCEPT AS NOTED.
- 3 EXCEPT AS NOTED, VALUES SHOWN ARE FOR PREMIUM RADIO.
- 4 FOR PART VALUES REQUIRED FOR INFINITY RADIO, SEE CHART.





| U   |      |
|-----|------|
| PIN | DCV  |
| 1   | 4.95 |
| 2   | 4.95 |
| 3   | 4.95 |
| 4   | 4.95 |
| 5   | 4.9s |
| 6   | 4.95 |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.30 |
| 11  | 2.50 |
| 12  | 4.95 |
| 13  | 4.9s |
| 14  | 4.9s |
| 15  | 3.70 |
| 16  | 3.70 |
| 17  | 0    |
| 18  | 3.90 |
| 19  | 1.80 |
| 20  | 0    |
| 21  | 0    |
| 22  | 0.30 |
| 23  | 0    |
| 24  | 4.9s |
| 25  | 4.95 |
| 26  | 4.95 |
| 27  | 4.9s |
| 28  | 0    |
| 29  | 4.9s |
| 30  | 1.65 |
| 31  | 4.9s |
| 32  | 0    |
| 33  | 5.00 |
| 34  | 0    |
| 35  | 3.30 |
| 36  | 0    |
| 37  | 0    |
| 38  | 0.40 |
| 39  | 0    |
| 40  | 4.9s |

| U101 |      |
|------|------|
| PIN  | DC V |
| 1    | 4.70 |
| 2    | 5.27 |
| 3    | 0    |
| 4    | 4.70 |
| 5    | 0    |
| 6    | 0    |
| 7    | 0    |
| 8    | 0    |
| 9    | 0    |
| 10   | 4.70 |
| 11   | 0    |
|      | 4.50 |
| 12   | 4.95 |
|      | 0    |
| 13   | 4.7  |
| 14   | 4.7  |

| U102 |        |           |
|------|--------|-----------|
| PIN  | AM DCV | FM DCV    |
| 1    | 0      | 0         |
| 2    | 0      | 0         |
| 3    | 1.65   | 1.65      |
| 4    | 1.85   | 1.85      |
| 5    | 3.85   | 3.85      |
| 6    | 4.9s   | 4.95      |
| 7    | 3.80   | 4.90      |
| 8    | 1.40   | 1.40      |
| 9    | 4.3s   | 2.85      |
| 10   | 0      | 0         |
| 11   | 4.70   | 4.70      |
| 12   | 0.50   | 0.50      |
| 13   | 0.60   | 0.60      |
| 14   | 1.80   | 1.80      |
| 15   | 3.40   | 3.40      |
| 16   | 2.40   | 3.40      |
| 17   | 0.10   | 2.30      |
| 18   |        | 1.7 - 7.0 |
| 19   | 0      | 0         |
| 20   | 10.00  | 10.00     |

| DC V |      |      |   |
|------|------|------|---|
| PIN  | 1    | 2    | 3 |
| U103 | 12.7 | 5.0  | 0 |
| U104 | 12.7 | 10.5 | 0 |
| U111 | 12.7 | 5.0  | 0 |

| U105 |       |
|------|-------|
| PIN  | DC "  |
| 1    | 1.65  |
| 2    | 0     |
| 3    | 5.00  |
| 4    | 5.00  |
| 5    | 5.00  |
| 6    | 5.00  |
| 7    | 5.00  |
| 8    | 5.00  |
| 9    | 0.05  |
| 10   | 5.00  |
| 11   | 10.00 |
| 12   | 5.00  |
| 13   | 5.00  |
| 14   | 5.00  |
| 15   | 5.00  |
| 16   | 5.00  |
| 17   | 5.00  |
| 18   | 0     |
| 19   | 5.00  |
| 20   | 5.00  |
| 21   | 5.00  |
| 22   | 5.00  |
| 23   | 5.00  |
| 24   | 5.00  |
| 25   | 5.00  |
| 26   | 5.00  |
| 27   | 10.00 |
| 28   | 1.85  |

| U106 |      |
|------|------|
| PIN  | DCV  |
| 1    | 0.00 |
| 2    | 4.9s |
| 3    | 4.95 |
| 4    | 5.00 |
| 5    | 4.00 |
| 6    | 0.80 |
| 7    | 0    |
| 8    | 5.00 |
| 9    | 0    |
| 10   | 3.50 |
| 11   | 5.00 |
| 12   | 5.00 |
| 13   | 5.00 |
| 14   | 5.00 |

| U107, U108, U109, & U110 |                              |  |
|--------------------------|------------------------------|--|
| PIN                      | DCV                          | DCV  |
| 1                        | 0.16                         | 3.20   |
| 2                        | 0.16                         | 3.30   |
| 3                        | 0                            | 0  |
| 4                        | 0.16                         | 3.20   |
| 5                        | 0                            | 6.00   |
| 6                        | 13.20                        | 13.70  |
| 7                        | 0                            | 0  |
| 8                        | 13.20                        | 13.70  |
| 9                        | 0                            | 6.00   |
| 10                       | 13.30                        | 12.70  |
| 11                       | 0                            | 9.85   |
| 12                       | NC                           |  |
| 13                       | 0.30                         | 1.60   |
|                          | with Unswitched Voltage Only | With Switches and Unswitched Voltage Applied |

| U112 |      |      |   |   |     |
|------|------|------|---|---|-----|
| DC V |      |      |   |   |     |
| PIN  | 1    | 2    | 3 | 4 | 5   |
|      | 12.7 | 12.7 | 0 | 0 | 5.0 |

**AUDIO/LOGIC PC BOARD ASSEMBLY VOLTAGES**

U100

| PIN | DCV  |
|-----|------|
| 1   | 4.95 |
| 2   | 4.95 |
| 3   | 4.95 |
| 4   | 4.95 |
| 5   | 4.95 |
| 6   | 4.95 |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.20 |
| 11  | 2.50 |
| 12  | 4.95 |
| 13  | 4.95 |
| 14  | 4.95 |
| 15  | 3.70 |
| 16  | 3.70 |
| 17  | 0    |
| 18  | 2.90 |
| 19  | 1.80 |
| 20  | 0    |
| 21  | 0    |
| 22  | 0.30 |
| 23  | 0    |
| 24  | 4.95 |
| 25  | 4.95 |
| 26  | 4.95 |
| 27  | 4.95 |
| 28  | 0    |
| 29  | 4.95 |
| 30  | 1.65 |
| 31  | 4.95 |
| 32  | 0    |
| 33  | 5.00 |
| 34  | 0    |
| 35  | 3.30 |
| 36  | 0    |
| 37  | 0    |
| 38  | 0.40 |
| 39  | 0    |
| 40  | 4.95 |

U101

| PIN | DCV  |
|-----|------|
| 1   | 4.70 |
| 2   | 5.27 |
| 3   | 0    |
| 4   | 4.70 |
| 5   | 0    |
| 5   | 0    |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.70 |
| 11  | 0    |
| 12  | 4.50 |
| 12  | 4.95 |
| 13  | 0    |
| 13  | 4.1  |
| 14  | 4.7  |

"102

| PIN | AM DC " | FM DCV    |
|-----|---------|-----------|
| 1   | 0       | 0         |
| 2   | 0       | 0         |
| 3   | 1.55    | 1.65      |
| 4   | 1.85    | 1.85      |
| 5   | 3.85    | 3.85      |
| 6   | 4.95    | 4.95      |
| 7   | 2.80    | 4.90      |
| 8   | 1.40    | 1.40      |
| 9   | 4.35    | 2.85      |
| 10  | 0       | 0         |
| 11  | 4.70    | 4.70      |
| 12  | 0.50    | 0.50      |
| 13  | 0.60    | 0.60      |
| 14  | 1.80    | 1.80      |
| 15  | 2.40    | 2.40      |
| 16  | 2.40    | 2.40      |
| 17  | 0.10    | 2.30      |
| 18  |         | 1.7 - 7.0 |
| 19  | 0       | 0         |
| 20  | 10.00   | 10.00     |

U106

| PIN | DCV  |
|-----|------|
| 1   | 0.00 |
| 2   | 4.95 |
| 3   | 4.95 |
| 4   | 5.00 |
| 5   | 4.00 |
| 6   | 0.80 |
| 7   | 0    |
| 8   | 5.00 |
| 9   | 0    |
| 10  | 3.50 |
| 11  | 5.00 |
| 12  | 5.00 |
| 13  | 5.00 |
| 14  | 5.00 |

DC V

| PIN  | 1      | 2     | 3   |
|------|--------|-------|-----|
| U103 | 12.7   | 5.0   | 0   |
| U104 | 12.7   | 10.5  | 0   |
| U111 | I 12.7 | I 5.0 | 0 I |

U105

| PIN | DC V  |
|-----|-------|
| 1   | 1.65  |
| 2   | 0     |
| 3   | 5.00  |
| 4   | 5.00  |
| 5   | 5.00  |
| 6   | 5.00  |
| 7   | 5.00  |
| 8   | 5.00  |
| 9   | 0.05  |
| 10  | 5.00  |
| 11  | 10.00 |
| 12  | 5.00  |
| 13  | 5.00  |
| 14  | 5.00  |
| 15  | 5.00  |
| 16  | 5.00  |
| 17  | 5.00  |
| 18  | 0     |
| 19  | 5.00  |
| 20  | 5.00  |
| 21  | 5.00  |
| 22  | 5.00  |
| 23  | 5.00  |
| 24  | 5.00  |
| 25  | 5.00  |
| 25  | 5.00  |
| 27  | 10.00 |
| 28  | 1.85  |

U107 U108, U109, & U110

| PIN | DC V                         | DC V   |
|-----|------------------------------|--|
| 1   | 0.15                         | 2.20   |
| 2   | 0.15                         | 2.20   |
| 3   | 0                            | 0  |
| 4   | 0.16                         | 2.20   |
| 5   | 0                            | 6.00   |
| 6   | 13.20                        | 12.70  |
| 7   | 0                            | 0  |
| 8   | 13.20                        | 12.70  |
| 9   | 0                            | 5.00   |
| 10  | 13.20                        | 12.70  |
| 11  | 0                            | 9.85   |
| 12  | NC                           | NC   |
| 13  | 0.30                         | 1.60   |
|     | with Unswitched Voltage Only | With Switched and Unswitched Voltage Applied |

U112

| DC V |      |      |   |   |     |
|------|------|------|---|---|-----|
| PIN  | 1    | 2    | 3 | 4 | 5   |
|      | 12.7 | 12.7 | 0 | 0 | 5.0 |

**AUDIO/LOGIC PC BOARD ASSEMBLY VOLTAGES**

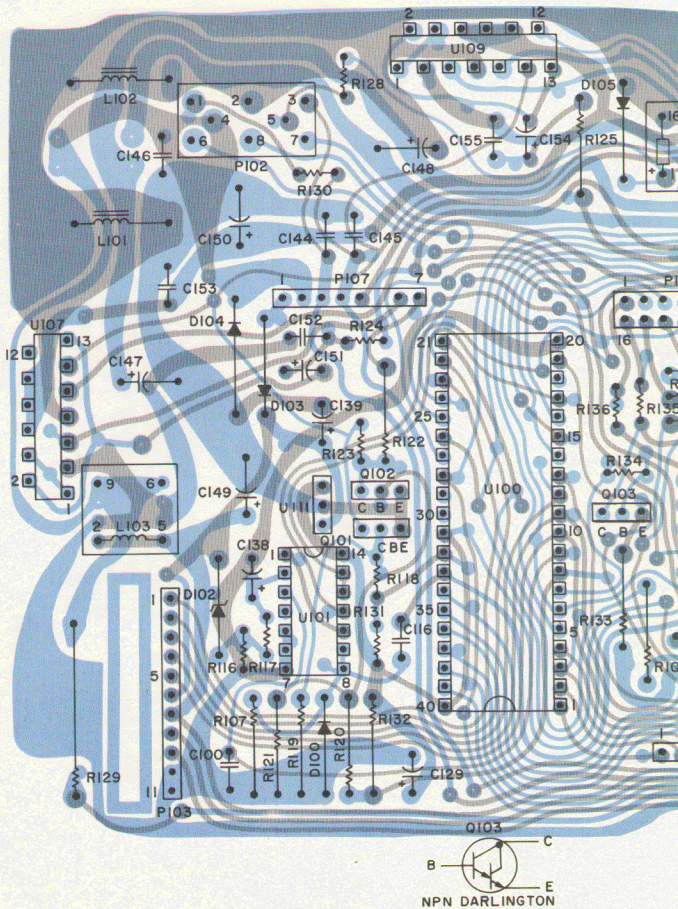
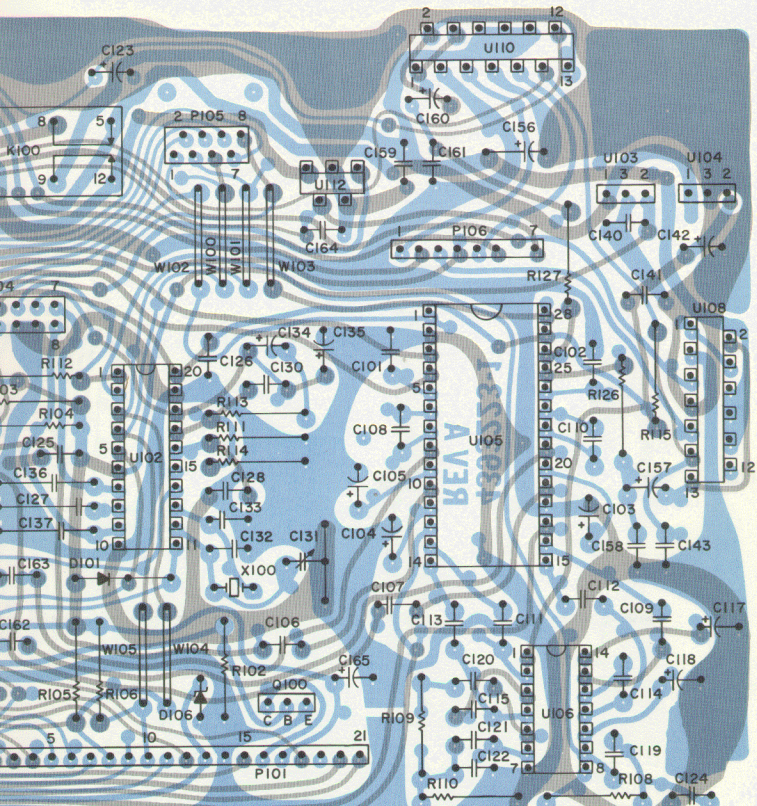
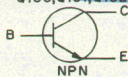


FIGURE 2-4. PARTS LOCATION, AUDIO/LOGIC PC BOARD, COMPONENT SIDE



Q100, Q101, Q102



NPN

4393223-2 RE VA

U100

| PIN | DC V |
|-----|------|
| 1   | 4.95 |
| 2   | 4.95 |
| 3   | 4.95 |
| 4   | 4.95 |
| 5   | 4.95 |
| 6   | 4.95 |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.20 |
| 11  | 2.50 |
| 12  | 4.95 |
| 13  | 4.95 |
| 14  | 4.95 |
| 15  | 3.70 |
| 16  | 3.70 |
| 17  | 0    |
| 18  | 2.90 |
| 19  | 1.80 |
| 20  | 0    |
| 21  | 0    |
| 22  | 0.30 |
| 23  | 0    |
| 24  | 4.95 |
| 25  | 4.95 |
| 26  | 4.95 |
| 27  | 4.95 |
| 28  | 0    |
| 29  | 4.95 |
| 30  | 1.65 |
| 31  | 4.95 |
| 32  | 0    |
| 33  | 5.00 |
| 34  | 0    |
| 35  | 3.30 |
| 36  | 0    |
| 37  | 0    |
| 38  | 0.40 |
| 39  | 0    |
| 40  | 4.95 |

U106

| PIN | DC V  |
|-----|-------|
| 1   | 10.00 |
| 2   | 4.95  |
| 3   | 4.95  |
| 4   | 5.00  |
| 5   | 4.00  |
| 6   | 0.80  |
| 7   | 0     |
| 8   | 5.00  |
| 9   | 0     |
| 10  | 3.50  |
| 11  | 5.00  |
| 12  | 5.00  |
| 13  | 5.00  |
| 14  | 5.00  |

U101

| PIN | DC V |
|-----|------|
| 1   | 4.70 |
| 2   | 5.27 |
| 3   | 0    |
| 4   | 4.70 |
| 5   | 0    |
| 6   | 0    |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.70 |
| 11  | 0    |
|     | 4.50 |
| 12  | 4.95 |
|     | 0    |
| 13  | 4.7  |
| 14  | 4.7  |

U102

| PIN | AM    | FM        |
|-----|-------|-----------|
|     | DC V  | DC V      |
| 1   | 0     | 0         |
| 2   | 0     | 0         |
| 3   | 1.65  | 1.65      |
| 4   | 1.85  | 1.85      |
| 5   | 3.85  | 3.85      |
| 6   | 4.95  | 4.95      |
| 7   | 2.80  | 4.90      |
| 8   | 1.40  | 1.40      |
| 9   | 4.35  | 2.85      |
| 10  | 0     | 0         |
| 11  | 4.70  | 4.70      |
| 12  | 0.50  | 0.50      |
| 13  | 0.60  | 0.60      |
| 14  | 1.80  | 1.80      |
| 15  | 2.40  | 2.40      |
| 16  | 2.40  | 2.40      |
| 17  | 0.10  | 2.30      |
| 18  |       | 1.7 - 7.0 |
| 19  | 0     | 0         |
| 20  | 10.00 | 10.00     |

U105

| PIN | DC V  |
|-----|-------|
| 1   | 1.65  |
| 2   | 0     |
| 3   | 5.00  |
| 4   | 5.00  |
| 5   | 5.00  |
| 6   | 5.00  |
| 7   | 5.00  |
| 8   | 5.00  |
| 9   | 0.05  |
| 10  | 5.00  |
| 11  | 10.00 |
| 12  | 5.00  |
| 13  | 5.00  |
| 14  | 5.00  |
| 15  | 5.00  |
| 16  | 5.00  |
| 17  | 5.00  |
| 18  | 0     |
| 19  | 5.00  |
| 20  | 5.00  |
| 21  | 5.00  |
| 22  | 5.00  |
| 23  | 5.00  |
| 24  | 5.00  |
| 25  | 5.00  |
| 26  | 5.00  |
| 27  | 10.00 |
| 28  | 1.85  |

| DC V |      |      |   |
|------|------|------|---|
| PIN  | 1    | 2    | 3 |
| U103 | 12.7 | 5.0  | 0 |
| U104 | 12.7 | 10.5 | 0 |
| U111 | 12.7 | 5.0  | 0 |

U107, U108, U109, &amp; U110

| PIN | DC V                         | DC V   |
|-----|------------------------------|--|
| 1   | 0.16                         | 2.20   |
| 2   | 0.16                         | 2.20   |
| 3   | 0                            | 0  |
| 4   | 0.16                         | 2.20   |
| 5   | 0                            | 6.00   |
| 6   | 13.20                        | 12.70  |
| 7   | 0                            | 0  |
| 8   | 13.20                        | 12.70  |
| 9   | 0                            | 6.00   |
| 10  | 13.20                        | 12.70  |
| 11  | 0                            | 9.85   |
| 12  | NC                           | NC   |
| 13  | 0.30                         | 1.60   |
|     | With Unswitched Voltage Only | With Switched and Unswitched Voltage Applied |

U112

| DC V |      |      |   |   |     |
|------|------|------|---|---|-----|
| PIN  | 1    | 2    | 3 | 4 | 5   |
|      | 12.7 | 12.7 | 0 | 0 | 5.0 |

AUDIO/LOGIC PC BOARD ASSEMBLY VOLTAGES

U100

| PIN | DC V |
|-----|------|
| 1   | 4.95 |
| 2   | 4.95 |
| 3   | 4.95 |
| 4   | 4.95 |
| 5   | 4.95 |
| 6   | 4.95 |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.20 |
| 11  | 2.50 |
| 12  | 4.95 |
| 13  | 4.95 |
| 14  | 4.95 |
| 15  | 3.70 |
| 16  | 3.70 |
| 17  | 0    |
| 18  | 2.90 |
| 19  | 1.80 |
| 20  | 0    |
| 21  | 0    |
| 22  | 0.30 |
| 23  | 0    |
| 24  | 4.95 |
| 25  | 4.95 |
| 26  | 4.95 |
| 27  | 4.95 |
| 28  | 0    |
| 29  | 4.95 |
| 30  | 1.65 |
| 31  | 4.95 |
| 32  | 0    |
| 33  | 5.00 |
| 34  | 0    |
| 35  | 3.30 |
| 36  | 0    |
| 37  | 0    |
| 38  | 0.40 |
| 39  | 0    |
| 40  | 4.95 |

U106

| PIN | DC V  |
|-----|-------|
| 1   | 10.00 |
| 2   | 4.95  |
| 3   | 4.95  |
| 4   | 5.00  |
| 5   | 4.00  |
| 6   | 0.80  |
| 7   | 0     |
| 8   | 5.00  |
| 9   | 0     |
| 10  | 3.50  |
| 11  | 5.00  |
| 12  | 5.00  |
| 13  | 5.00  |
| 14  | 5.00  |

U101

| PIN | DC V |
|-----|------|
| 1   | 4.70 |
| 2   | 5.27 |
| 3   | 0    |
| 4   | 4.70 |
| 5   | 0    |
| 6   | 0    |
| 7   | 0    |
| 8   | 0    |
| 9   | 0    |
| 10  | 4.70 |
| 11  | 0    |
| 12  | 4.50 |
| 13  | 4.95 |
| 14  | 0    |
| 15  | 4.7  |
| 16  | 4.7  |

U102

| PIN | AM DC V | FM DC V   |
|-----|---------|-----------|
| 1   | 0       | 0         |
| 2   | 0       | 0         |
| 3   | 1.65    | 1.65      |
| 4   | 1.85    | 1.85      |
| 5   | 3.85    | 3.85      |
| 6   | 4.95    | 4.95      |
| 7   | 2.80    | 4.90      |
| 8   | 1.40    | 1.40      |
| 9   | 4.35    | 2.85      |
| 10  | 0       | 0         |
| 11  | 4.70    | 4.70      |
| 12  | 0.50    | 0.50      |
| 13  | 0.60    | 0.60      |
| 14  | 1.80    | 1.80      |
| 15  | 2.40    | 2.40      |
| 16  | 2.40    | 2.40      |
| 17  | 0.10    | 2.30      |
| 18  |         | 1.7 - 7.0 |
| 19  | 0       | 0         |
| 20  | 10.00   | 10.00     |

U105

| PIN | DC V  |
|-----|-------|
| 1   | 1.65  |
| 2   | 0     |
| 3   | 5.00  |
| 4   | 5.00  |
| 5   | 5.00  |
| 6   | 5.00  |
| 7   | 5.00  |
| 8   | 5.00  |
| 9   | 0.05  |
| 10  | 5.00  |
| 11  | 10.00 |
| 12  | 5.00  |
| 13  | 5.00  |
| 14  | 5.00  |
| 15  | 5.00  |
| 16  | 5.00  |
| 17  | 5.00  |
| 18  | 0     |
| 19  | 5.00  |
| 20  | 5.00  |
| 21  | 5.00  |
| 22  | 5.00  |
| 23  | 5.00  |
| 24  | 5.00  |
| 25  | 5.00  |
| 26  | 5.00  |
| 27  | 10.00 |
| 28  | 1.85  |

| DC V |      |      |   |
|------|------|------|---|
| PIN  | 1    | 2    | 3 |
| U103 | 12.7 | 5.0  | 0 |
| U104 | 12.7 | 10.5 | 0 |
| U111 | 12.7 | 5.0  | 0 |

U107, U108, U109, &amp; U110

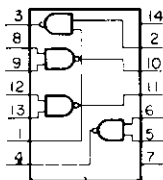
| PIN | DC V                         | DC V   |
|-----|------------------------------|--|
| 1   | 0.16                         | 2.20   |
| 2   | 0.16                         | 2.20   |
| 3   | 0                            | 0  |
| 4   | 0.16                         | 2.20   |
| 5   | 0                            | 6.00   |
| 6   | 13.20                        | 12.70  |
| 7   | 0                            | 0  |
| 8   | 13.20                        | 12.70  |
| 9   | 0                            | 6.00   |
| 10  | 13.20                        | 12.70  |
| 11  | 0                            | 9.85   |
| 12  | NC                           | NC   |
| 13  | 0.30                         | 1.60   |
|     | With Unswitched Voltage Only | With Switched and Unswitched Voltage Applied |

U112

| DC V |      |      |   |   |     |
|------|------|------|---|---|-----|
| PIN  | 1    | 2    | 3 | 4 | 5   |
|      | 12.7 | 12.7 | 0 | 0 | 5.0 |

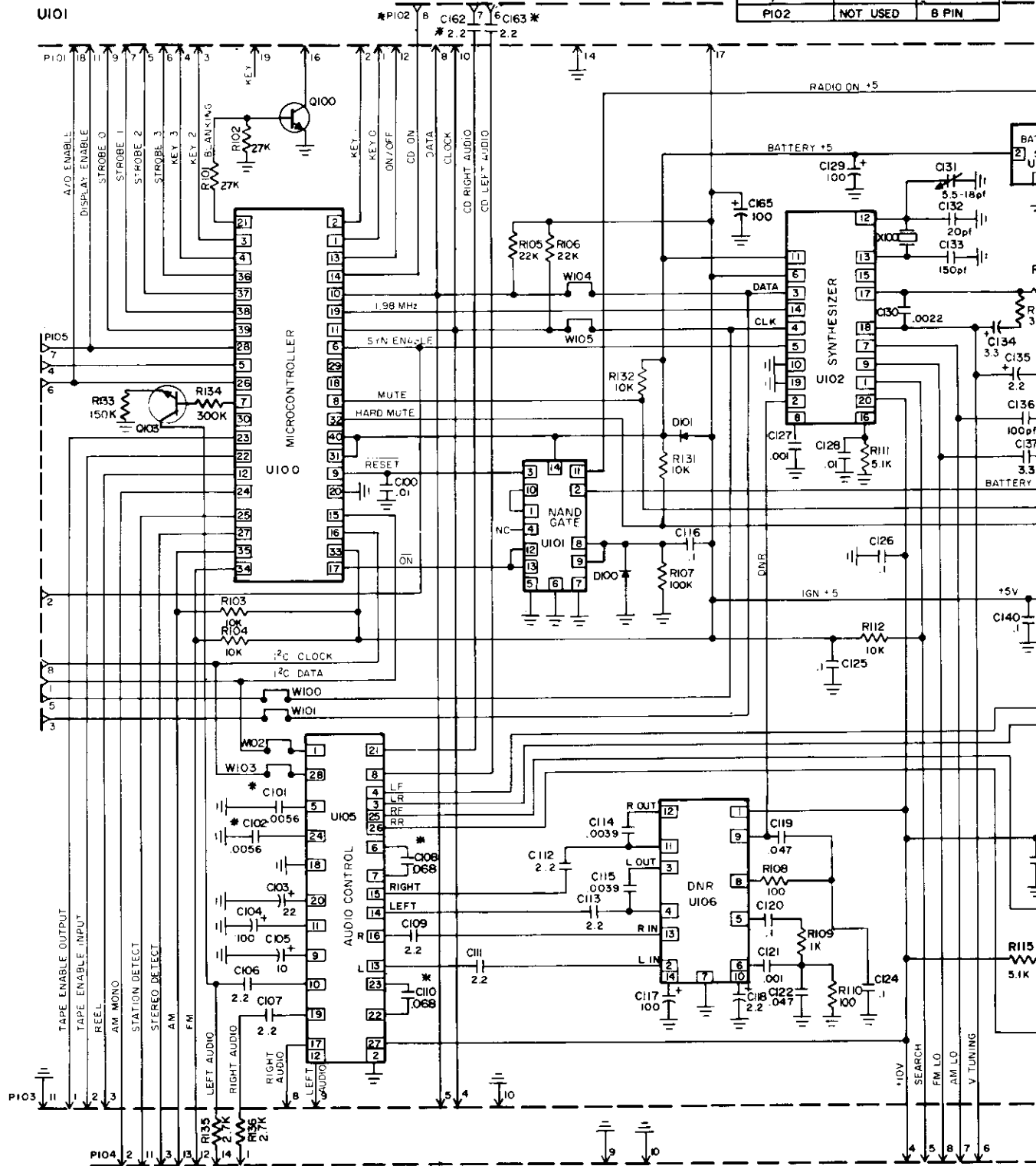
AUDIO/LOGIC PC BOARD ASSEMBLY VOLTAGES





| CABLE | TO                      |
|-------|-------------------------|
| PI01  | CONTROL BOARD J2        |
| PI02  | COMPACT DISC MECHANISM  |
| PI03  | CASSETTE TAPE MECHANISM |
| PI04  | RF BOARD J1             |
| PI05  | REMOTE CONTROLLER       |
| PI06  | SPEAKER CONNECTOR       |
| PI07  | POWER CONNECTOR         |

| REFERENCE DESIGNATOR   | VALUE    |          |
|------------------------|----------|----------|
|                        | PREMIUM  | INFINITY |
| R128                   | NOT USED | 2K       |
| R130                   |          | 1.5K     |
| C108, C110             | .068     | .082     |
| C152, C155, C158, C161 | .027     | .0       |
| C162, C163             | NOT USED | 2.2      |
| C101, C102             | .0056    | .0047    |
| PI02                   | NOT USED | 8 PIN    |



| VALUE |          |
|-------|----------|
| M     | INFINITY |
| D     | 2K       |
|       | 1.5K     |
|       | .082     |
|       | .0       |
| D     | 2.2      |
|       | .0047    |
| D     | 8 PIN    |

NOTES:

- 1 ALL RESISTORS ARE 1/4W OR 1/8W, ±10% EXCEPT AS NOTED
- 2 CAPACITANCE IN MICROFARADS, EXCEPT AS NOTED
- 3 EXCEPT AS NOTED, VALUES SHOWN ARE FOR PREMIUM RADIO.
- 4 FOR PART VALUES REQUIRED FOR INFINITY RADIO, SEE CHART.

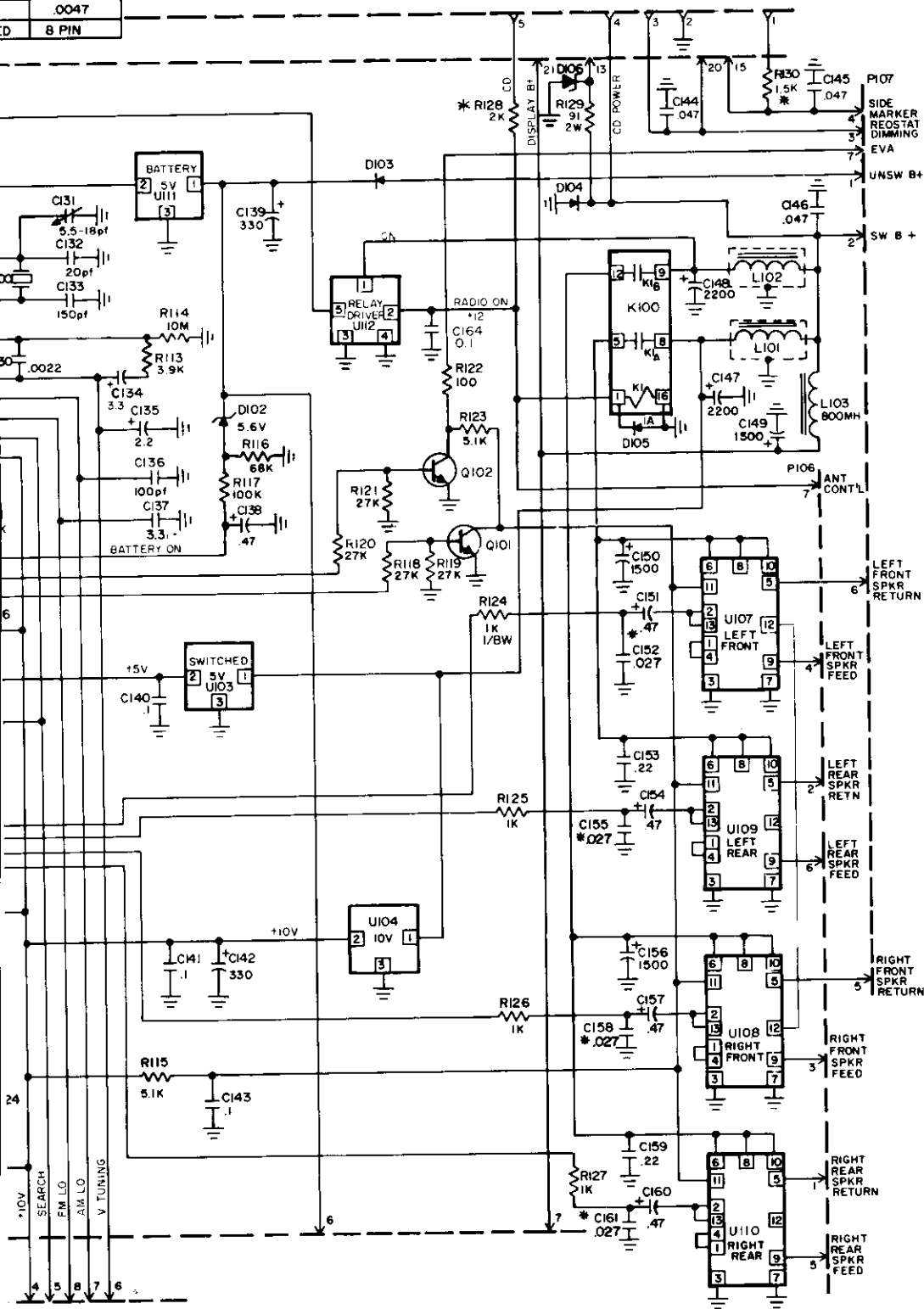


FIGURE 2-5. ELECTRICAL SCHEMATIC, AUDIO/LOGIC PC BOARD



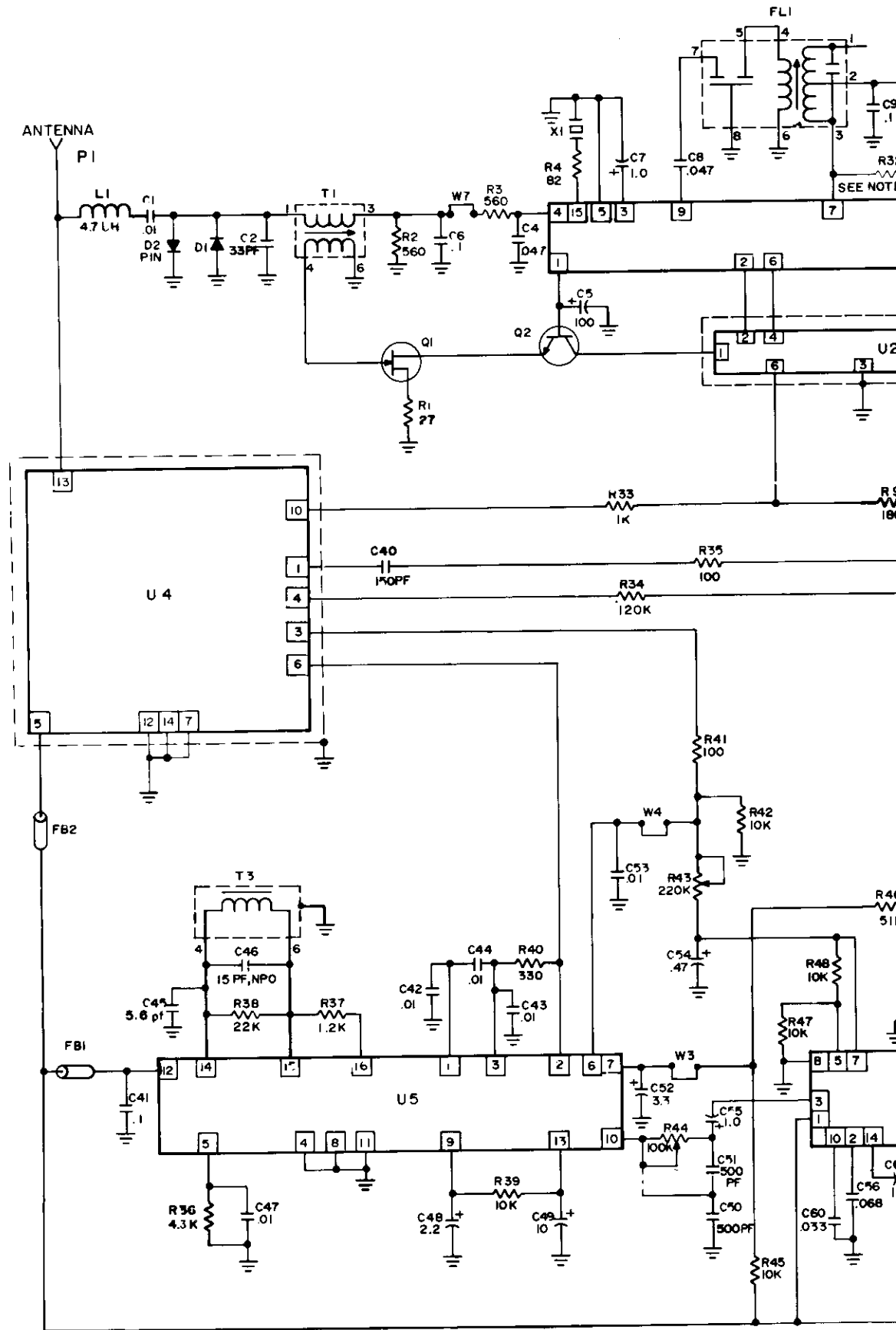
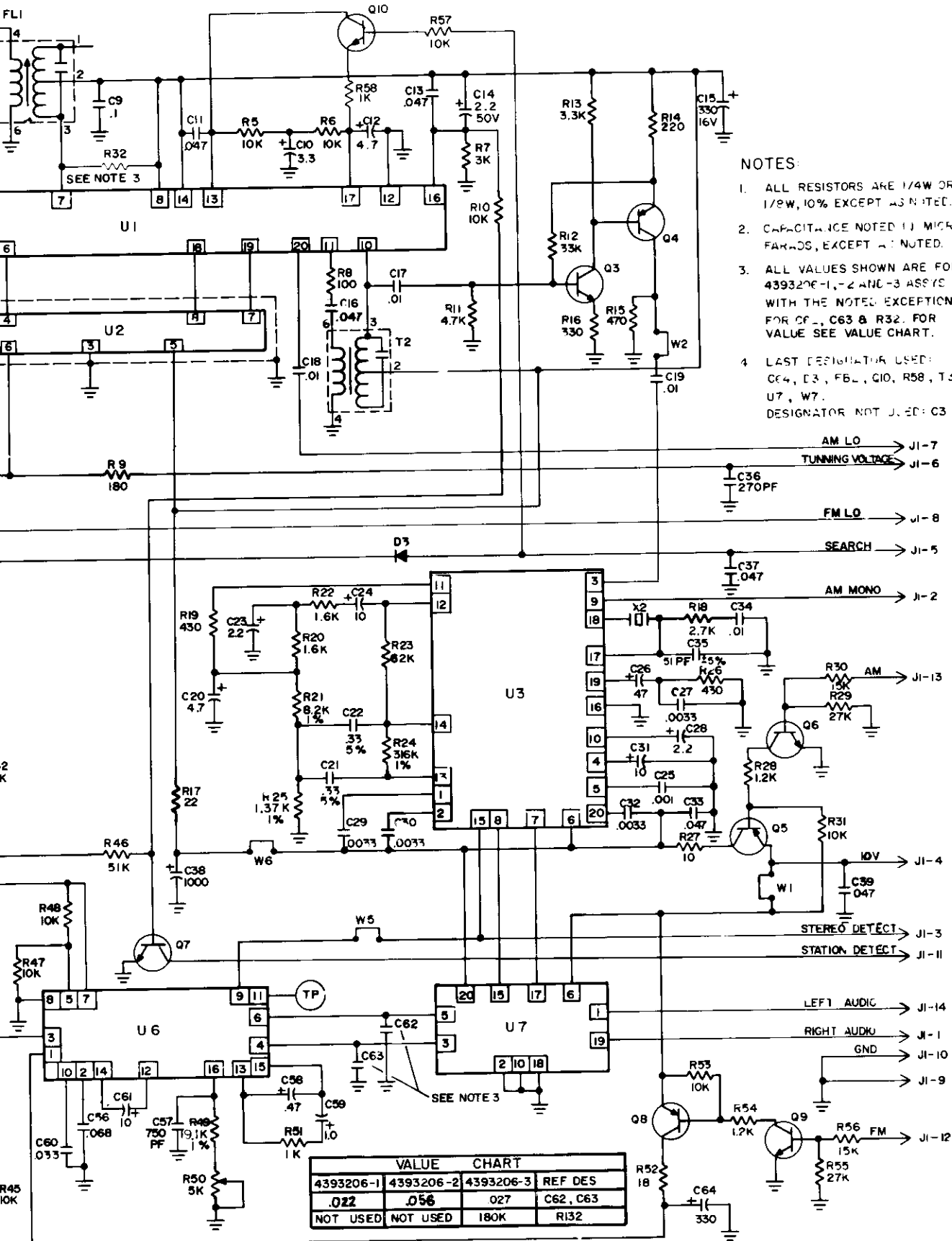


FIGURE 2-6. ELECTRICAL SCHEMATIC, RF PC BOARD



- NOTES:**
1. ALL RESISTORS ARE 1/4W OR 1/8W, 10% EXCEPT AS NOTED.
  2. CAPACITANCE NOTED (1) MICRO-FARADS, EXCEPT AS NOTED.
  3. ALL VALUES SHOWN ARE FOR 4393206-1, -2 AND -3 ASSYS WITH THE NOTED EXCEPTION FOR C1, C63 & R32. FOR VALUE SEE VALUE CHART.
  4. LAST DESIGNATOR USED: C64, R3, FBL, Q10, R58, T3, U7, W7. DESIGNATOR NOT USED: C3

| VALUE CHART |           |           |          |
|-------------|-----------|-----------|----------|
| 4393206-1   | 4393206-2 | 4393206-3 | REF DES  |
| .022        | .056      | 027       | C62, C63 |
| NOT USED    | NOT USED  | 180K      | R132     |

U1

| PIN | DV C | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 5.36 | 1.75                                    |
| 2   | 2.03 |   |
| 3   | 0.55 | 0.87                                    |
| 4   | 0.10 | 0.30                                    |
| 5   | 0    |   |
| 6   | 2.03 |   |
| 7   | 8.15 |   |
| 8   | 8.17 |   |
| 9   | 0.82 |   |
| 10  | 8.17 |   |
| 11  | 0.68 |   |
| 12  | 0    |   |
| 13  | 2.30 | 3.01                                    |
| 14  | 8.17 |   |
| 15  | 1.25 |   |
| 16  | 0.04 | 1.47                                    |
| 17  | 2.27 | 2.98                                    |
| 18  | 5.71 |   |
| 19  | 5.71 |   |
| 20  | 3.06 |   |

U2

| PIN | DC V |
|-----|------|
| 1   | 7.98 |
| 2   | 2.03 |
| 3   | 0    |
| 4   | 2.03 |
| 5   | 8.15 |
| 6   | 2.23 |
| 7   | 5.71 |
| 8   | 5.71 |

U4

| PIN | DC V        |
|-----|-------------|
| 1   | 0           |
| 3   | 0-6         |
| 4   | 0 on Sta.   |
|     | 0.85 Search |
| 5   | 8.60        |
| 6   | 3.15        |
| 7   | 0           |
| 10  | 1.7 - 7.0   |
| 12  | 0           |
| 13  | 0           |
| 14  | 0           |

U3

| PIN | DC V | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 8.50 | 7.56                                    |
| 2   | 8.54 | 7.57                                    |
| 3   | 3.58 |   |
| 4   | 1.66 | 2.41                                    |
| 5   | 1.50 | 2.22                                    |
| 6   | 9.14 |   |
| 7   | 0.85 | 1.19                                    |
| 8   | 0.78 | 1.11                                    |
| 9   | 0.69 |   |
| 10  | 2.67 | 9.06                                    |
| 11  | 2.05 |   |
| 12  | 0.57 |   |
| 13  | 0.57 |   |
| 14  | 0.59 |   |
| 15  | 4.81 |   |
| 16  | 0    |   |
| 17  | 2.92 |   |
| 18  | 8.07 |   |
| 19  | 4.82 | 4.00                                    |
| 20  | 8.50 | 7.24                                    |

U5

| PIN | DC V                      |
|-----|---------------------------|
| 1   | 3.30                      |
| 2   | 3.30                      |
| 3   | 3.30                      |
| 4   | 0                         |
| 5   | 2.3 On Sta.<br>0 Off Sta. |
| 6   | 1.5 - 6.2                 |
| 7   | 7.3 On Sta.<br>0 Off Sta. |
| 8   | 0                         |
| 9   | 5.0                       |
| 10  | 5.0                       |
| 11  | 0                         |
| 12  | 8.6                       |
| 13  | 4.9                       |
| 14  | 2.6                       |
| 15  | 2.6                       |
| 16  | 2.6                       |

U7

| PIN | AM<br>DC V | FM<br>DC V |
|-----|------------|------------|
| 1   | 6.50       | 6.50       |
| 2   | 0          | 0          |
| 3   | 0.15       | 4.66       |
| 4   | 4.91       | 0          |
| 5   | 0.26       | 4.57       |
| 6   | 10.00      | 10.00      |
| 7   |            |            |
| 8   |            |            |
| 9   | 4.61       | 0          |
| 10  | 0          | 0          |
| 11  |            |            |
| 12  | 0          | 0          |
| 13  |            |            |
| 14  |            |            |
| 15  | 0.76       | 0          |
| 16  | 5.00       | 0          |
| 17  | 0.82       | 0          |
| 18  | 0          | 0          |
| 19  | 6.50       | 6.50       |
| 20  | 9.12       | 0          |

U6

| PIN | DC V                 |
|-----|----------------------|
| 1   | 8.60                 |
| 2   | 3.70                 |
| 3   | 3.60                 |
| 4   | 3.80                 |
| 5   | 0 - 0.30             |
| 6   | 3.8                  |
| 7   | 0 - 0.50             |
| 8   | 0                    |
| 9   | 0 Mono<br>5.0 Stereo |
| 10  | 3.40                 |
| 11  | 3.50                 |
| 12  | 2.20                 |
| 13  | 2.00                 |
| 14  | 2.20                 |
| 15  | 2.05                 |
| 16  | 3.20                 |

|    | E    | B    | C    |
|----|------|------|------|
| Q2 | 4.70 | 5.36 | 8.00 |
| Q3 | 3.57 | 5.84 | 6.48 |
| Q4 | 6.50 | 5.80 | 3.60 |

|    | S    | G | D    |
|----|------|---|------|
| Q1 | 0.41 | 0 | 4.70 |

## RF PC BOARD ASSEMBLY VOLTAGES

U1

| PIN | DV C | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 5.36 | 1.75                                    |
| 2   | 2.03 |   |
| 3   | 0.55 | 0.87                                    |
| 4   | 0.10 | 0.30                                    |
| 5   | 0    |   |
| 6   | 2.03 |   |
| 7   | 8.15 |   |
| 8   | 8.17 |   |
| 9   | 0.82 |   |
| 10  | 8.17 |   |
| 11  | 0.68 |   |
| 12  | 0    |   |
| 13  | 2.30 | 3.01                                    |
| 14  | 8.17 |   |
| 15  | 1.25 |   |
| 16  | 0.04 | 1.47                                    |
| 17  | 2.27 | 2.98                                    |
| 18  | 5.71 |   |
| 19  | 5.71 |   |
| 20  | 3.06 |   |

U2

| PIN | DC V |
|-----|------|
| 1   | 7.98 |
| 2   | 2.03 |
| 3   | 0    |
| 4   | 2.03 |
| 5   | 8.15 |
| 6   | 2.23 |
| 7   | 5.71 |
| 8   | 5.71 |

U4

| PIN | DC V        |
|-----|-------------|
| 1   | 0           |
| 3   | 0-6         |
| 4   | 0 on Sta.   |
|     | 0.85 Search |
| 5   | 8.60        |
| 6   | 3.15        |
| 7   | 0           |
| 10  | 1.7 - 7.0   |
| 12  | 0           |
| 13  | 0           |
| 14  | 0           |

U3

| PIN | DC V | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 8.50 | 7.56                                    |
| 2   | 8.54 | 7.57                                    |
| 3   | 3.58 |   |
| 4   | 1.66 | 2.41                                    |
| 5   | 1.50 | 2.22                                    |
| 6   | 9.14 |   |
| 7   | 0.85 | 1.19                                    |
| 8   | 0.78 | 1.11                                    |
| 9   | 0.69 |   |
| 10  | 2.67 | 9.06                                    |
| 11  | 2.05 |   |
| 12  | 0.57 |   |
| 13  | 0.57 |   |
| 14  | 0.59 |   |
| 15  | 4.81 |   |
| 16  | 0    |   |
| 17  | 2.92 |   |
| 18  | 8.07 |   |
| 19  | 4.82 | 4.00                                    |
| 20  | 8.50 | 7.24                                    |

U5

| PIN | DC V                      |
|-----|---------------------------|
| 1   | 3.30                      |
| 2   | 3.30                      |
| 3   | 3.30                      |
| 4   | 0                         |
| 5   | 2.3 On Sta.<br>0 Off Sta. |
| 6   | 1.5 - 6.2                 |
| 7   | 7.3 On Sta.<br>0 Off Sta. |
| 8   | 0                         |
| 9   | 5.0                       |
| 10  | 5.0                       |
| 11  | 0                         |
| 12  | 8.6                       |
| 13  | 4.9                       |
| 14  | 2.6                       |
| 15  | 2.6                       |
| 16  | 2.6                       |

U7

| PIN | AM<br>DC V | FM<br>DC V |
|-----|------------|------------|
| 1   | 6.50       | 6.50       |
| 2   | 0          | 0          |
| 3   | 0.15       | 4.66       |
| 4   | 4.91       | 0          |
| 5   | 0.26       | 4.57       |
| 6   | 10.00      | 10.00      |
| 7   |            |            |
| 8   |            |            |
| 9   | 4.61       | 0          |
| 10  | 0          | 0          |
| 11  |            |            |
| 12  | 0          | 0          |
| 13  |            |            |
| 14  |            |            |
| 15  | 0.76       | 0          |
| 16  | 5.00       | 0          |
| 17  | 0.82       | 0          |
| 18  | 0          | 0          |
| 19  | 6.50       | 6.50       |
| 20  | 9.12       | 0          |

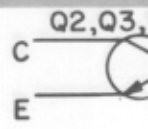
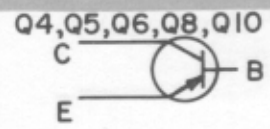
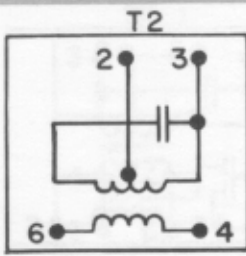
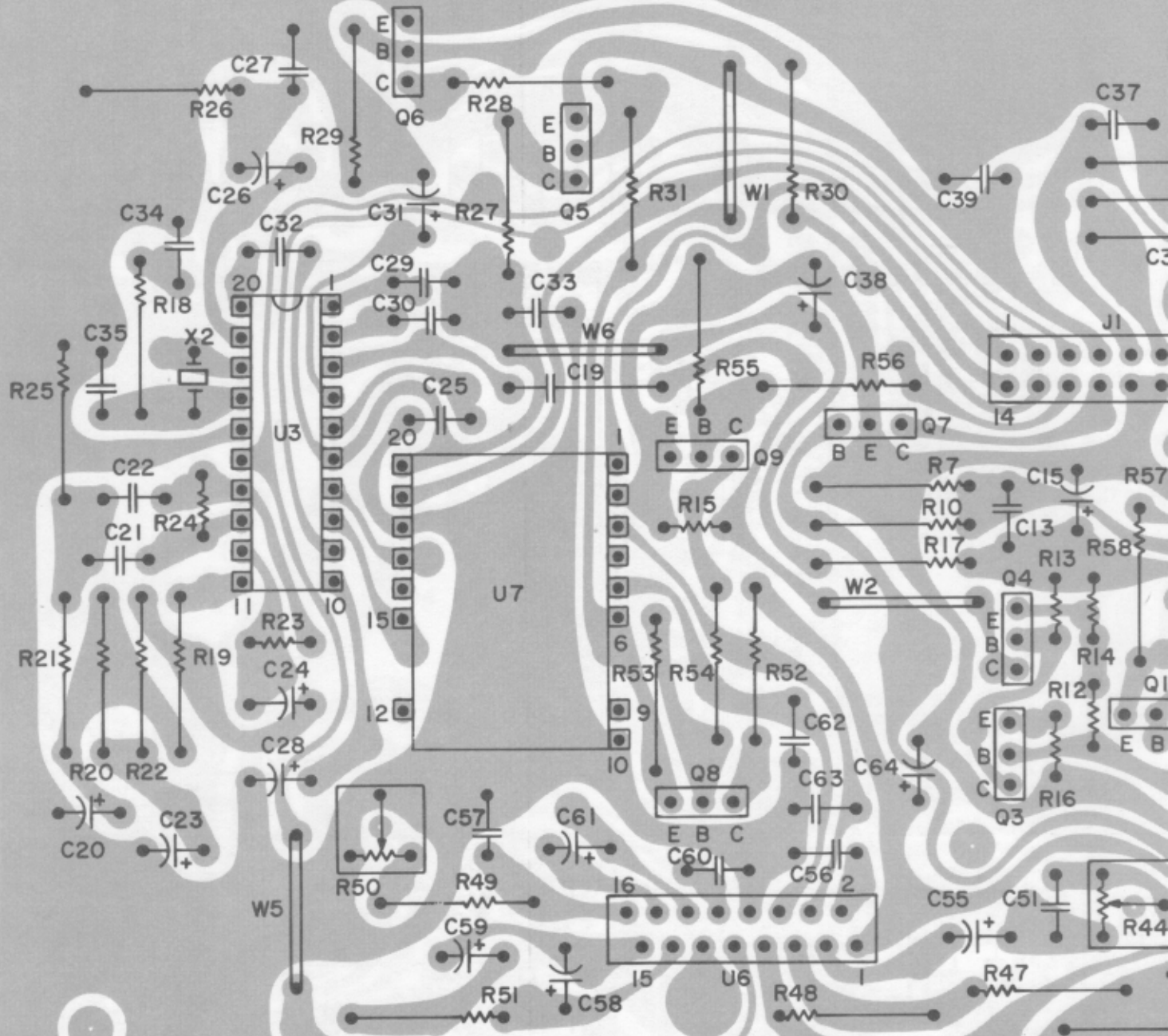
U6

| PIN | DC V                 |
|-----|----------------------|
| 1   | 8.60                 |
| 2   | 3.70                 |
| 3   | 3.60                 |
| 4   | 3.80                 |
| 5   | 0 - 0.30             |
| 6   | 3.8                  |
| 7   | 0 - 0.50             |
| 8   | 0                    |
| 9   | 0 Mono<br>5.0 Stereo |
| 10  | 3.40                 |
| 11  | 3.50                 |
| 12  | 2.20                 |
| 13  | 2.00                 |
| 14  | 2.20                 |
| 15  | 2.05                 |
| 16  | 3.20                 |

|    | E    | B    | C    |
|----|------|------|------|
| Q2 | 4.70 | 5.36 | 8.00 |
| Q3 | 3.57 | 5.84 | 6.48 |
| Q4 | 6.50 | 5.80 | 3.60 |

|    | S    | G | D    |
|----|------|---|------|
| Q1 | 0.41 | 0 | 4.70 |

RF PC BOARD ASSEMBLY VOLTAGES



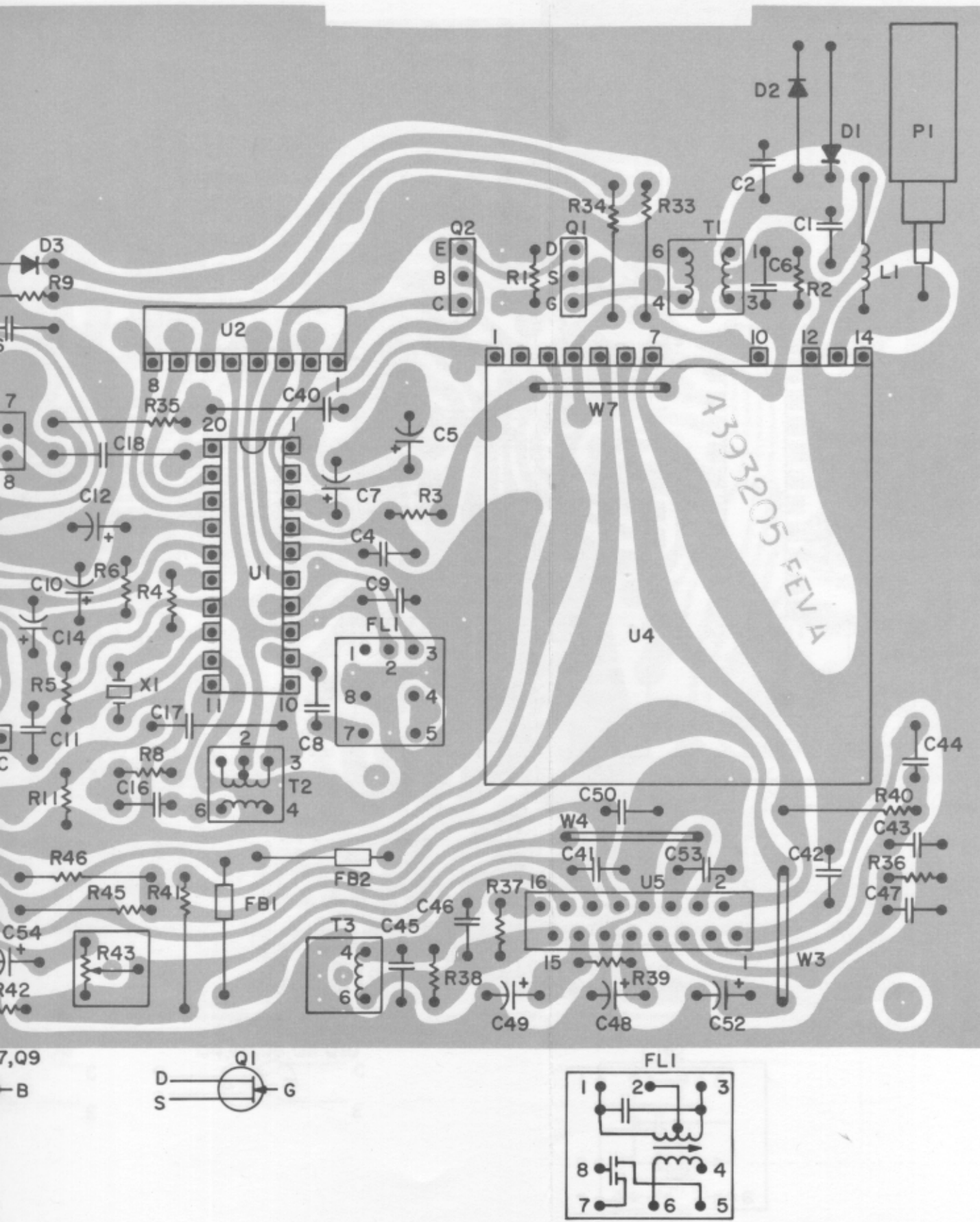


FIGURE 2-7. PARTS LOCATION, RF PC BOARD, CIRCUIT SIDE

U1

| PIN | DV C | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 5.36 | 1.75                                    |
| 2   | 2.03 |   |
| 3   | 0.55 | 0.87                                    |
| 4   | 0.10 | 0.30                                    |
| 5   | 0    |   |
| 6   | 2.03 |   |
| 7   | 8.15 |   |
| 8   | 8.17 |   |
| 9   | 0.82 |   |
| 10  | 8.17 |   |
| 11  | 0.68 |   |
| 12  | 0    |   |
| 13  | 2.30 | 3.01                                    |
| 14  | 8.17 |   |
| 15  | 1.25 |   |
| 16  | 0.04 | 1.47                                    |
| 17  | 2.27 | 2.98                                    |
| 18  | 5.71 |   |
| 19  | 5.71 |   |
| 20  | 3.06 |   |

U2

| PIN | DC V |
|-----|------|
| 1   | 7.98 |
| 2   | 2.03 |
| 3   | 0    |
| 4   | 2.03 |
| 5   | 8.15 |
| 6   | 2.23 |
| 7   | 5.71 |
| 8   | 5.71 |

U4

| PIN | DC V        |
|-----|-------------|
| 1   | 0           |
| 3   | 0-6         |
| 4   | 0 on Sta.   |
|     | 0.85 Search |
| 5   | 8.60        |
| 6   | 3.15        |
| 7   | 0           |
| 10  | 1.7 - 7.0   |
| 12  | 0           |
| 13  | 0           |
| 14  | 0           |

U3

| PIN | DC V | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 8.50 | 7.56                                    |
| 2   | 8.54 | 7.57                                    |
| 3   | 3.58 |   |
| 4   | 1.66 | 2.41                                    |
| 5   | 1.50 | 2.22                                    |
| 6   | 9.14 |   |
| 7   | 0.85 | 1.19                                    |
| 8   | 0.78 | 1.11                                    |
| 9   | 0.69 |   |
| 10  | 2.67 | 9.06                                    |
| 11  | 2.05 |   |
| 12  | 0.57 |   |
| 13  | 0.57 |   |
| 14  | 0.59 |   |
| 15  | 4.81 |   |
| 16  | 0    |   |
| 17  | 2.92 |   |
| 18  | 8.07 |   |
| 19  | 4.82 | 4.00                                    |
| 20  | 8.50 | 7.24                                    |

U5

| PIN | DC V                      |
|-----|---------------------------|
| 1   | 3.30                      |
| 2   | 3.30                      |
| 3   | 3.30                      |
| 4   | 0                         |
| 5   | 2.3 On Sta.<br>0 Off Sta. |
| 6   | 1.5 - 6.2                 |
| 7   | 7.3 On Sta.<br>0 Off Sta. |
| 8   | 0                         |
| 9   | 5.0                       |
| 10  | 5.0                       |
| 11  | 0                         |
| 12  | 8.6                       |
| 13  | 4.9                       |
| 14  | 2.6                       |
| 15  | 2.6                       |
| 16  | 2.6                       |

U7

| PIN | AM<br>DC V | FM<br>DC V |
|-----|------------|------------|
| 1   | 6.50       | 6.50       |
| 2   | 0          | 0          |
| 3   | 0.15       | 4.66       |
| 4   | 4.91       | 0          |
| 5   | 0.26       | 4.57       |
| 6   | 10.00      | 10.00      |
| 7   |            |            |
| 8   |            |            |
| 9   | 4.61       | 0          |
| 10  | 0          | 0          |
| 11  |            |            |
| 12  | 0          | 0          |
| 13  |            |            |
| 14  |            |            |
| 15  | 0.76       | 0          |
| 16  | 5.00       | 0          |
| 17  | 0.82       | 0          |
| 18  | 0          | 0          |
| 19  | 6.50       | 6.50       |
| 20  | 9.12       | 0          |

U6

| PIN | DC V                 |
|-----|----------------------|
| 1   | 8.60                 |
| 2   | 3.70                 |
| 3   | 3.60                 |
| 4   | 3.80                 |
| 5   | 0 - 0.30             |
| 6   | 3.8                  |
| 7   | 0 - 0.50             |
| 8   | 0                    |
| 9   | 0 Mono<br>5.0 Stereo |
| 10  | 3.40                 |
| 11  | 3.50                 |
| 12  | 2.20                 |
| 13  | 2.00                 |
| 14  | 2.20                 |
| 15  | 2.05                 |
| 16  | 3.20                 |

|    | E    | B    | C    |
|----|------|------|------|
| Q2 | 4.70 | 5.36 | 8.00 |
| Q3 | 3.57 | 5.84 | 6.48 |
| Q4 | 6.50 | 5.80 | 3.60 |

|    | S    | G | D    |
|----|------|---|------|
| Q1 | 0.41 | 0 | 4.70 |

RF PC BOARD ASSEMBLY VOLTAGES

U1

| PIN | DC V | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 5.36 | 1.75                                    |
| 2   | 2.03 |   |
| 3   | 0.55 | 0.87                                    |
| 4   | 0.10 | 0.30                                    |
| 5   | 0    |   |
| 6   | 2.03 |   |
| 7   | 8.15 |   |
| 8   | 8.17 |   |
| 9   | 0.82 |   |
| 10  | 8.17 |   |
| 11  | 0.68 |   |
| 12  | 0    |   |
| 13  | 2.30 | 3.01                                    |
| 14  | 8.17 |   |
| 15  | 1.25 |   |
| 16  | 0.04 | 1.47                                    |
| 17  | 2.27 | 2.98                                    |
| 18  | 5.71 |   |
| 19  | 5.71 |   |
| 20  | 3.06 |   |

U2

| PIN | DC V |
|-----|------|
| 1   | 7.98 |
| 2   | 2.03 |
| 3   | 0    |
| 4   | 2.03 |
| 5   | 8.15 |
| 6   | 2.23 |
| 7   | 5.71 |
| 8   | 5.71 |

U4

| PIN | DC V        |
|-----|-------------|
| 1   | 0           |
| 3   | 0-6         |
| 4   | 0 on Sta.   |
| 5   | 0.85 Search |
| 5   | 8.60        |
| 6   | 3.15        |
| 7   | 0           |
| 10  | 1.7 - 7.0   |
| 12  | 0           |
| 13  | 0           |
| 14  | 0           |

U3

| PIN | DC V | 600 kHz @ 1,000 mV<br>Mod. 400 Hz @ 30% |
|-----|------|---|
| 1   | 8.50 | 7.56                                    |
| 2   | 8.54 | 7.57                                    |
| 3   | 3.58 |   |
| 4   | 1.66 | 2.41                                    |
| 5   | 1.50 | 2.22                                    |
| 6   | 9.14 |   |
| 7   | 0.85 | 1.19                                    |
| 8   | 0.78 | 1.11                                    |
| 9   | 0.69 |   |
| 10  | 2.67 | 9.06                                    |
| 11  | 2.05 |   |
| 12  | 0.57 |   |
| 13  | 0.57 |   |
| 14  | 0.59 |   |
| 15  | 4.81 |   |
| 16  | 0    |   |
| 17  | 2.92 |   |
| 18  | 8.07 |   |
| 19  | 4.82 | 4.00                                    |
| 20  | 8.50 | 7.24                                    |

U5

| PIN | DC V                      |
|-----|---------------------------|
| 1   | 3.30                      |
| 2   | 3.30                      |
| 3   | 3.30                      |
| 4   | 0                         |
| 5   | 2.3 On Sta.<br>0 Off Sta. |
| 6   | 1.5 - 6.2                 |
| 7   | 7.3 On Sta.<br>0 Off Sta. |
| 8   | 0                         |
| 9   | 5.0                       |
| 10  | 5.0                       |
| 11  | 0                         |
| 12  | 8.6                       |
| 13  | 4.9                       |
| 14  | 2.6                       |
| 15  | 2.6                       |
| 16  | 2.6                       |

U7

| PIN | AM<br>DC V | FM<br>DC V |
|-----|------------|------------|
| 1   | 6.50       | 6.50       |
| 2   | 0          | 0          |
| 3   | 0.15       | 4.66       |
| 4   | 4.91       | 0          |
| 5   | 0.26       | 4.57       |
| 6   | 10.00      | 10.00      |
| 7   |            |            |
| 8   |            |            |
| 9   | 4.61       | 0          |
| 10  | 0          | 0          |
| 11  |            |            |
| 12  | 0          | 0          |
| 13  |            |            |
| 14  |            |            |
| 15  | 0.76       | 0          |
| 16  | 5.00       | 0          |
| 17  | 0.82       | 0          |
| 18  | 0          | 0          |
| 19  | 6.50       | 6.50       |
| 20  | 9.12       | 0          |

U6

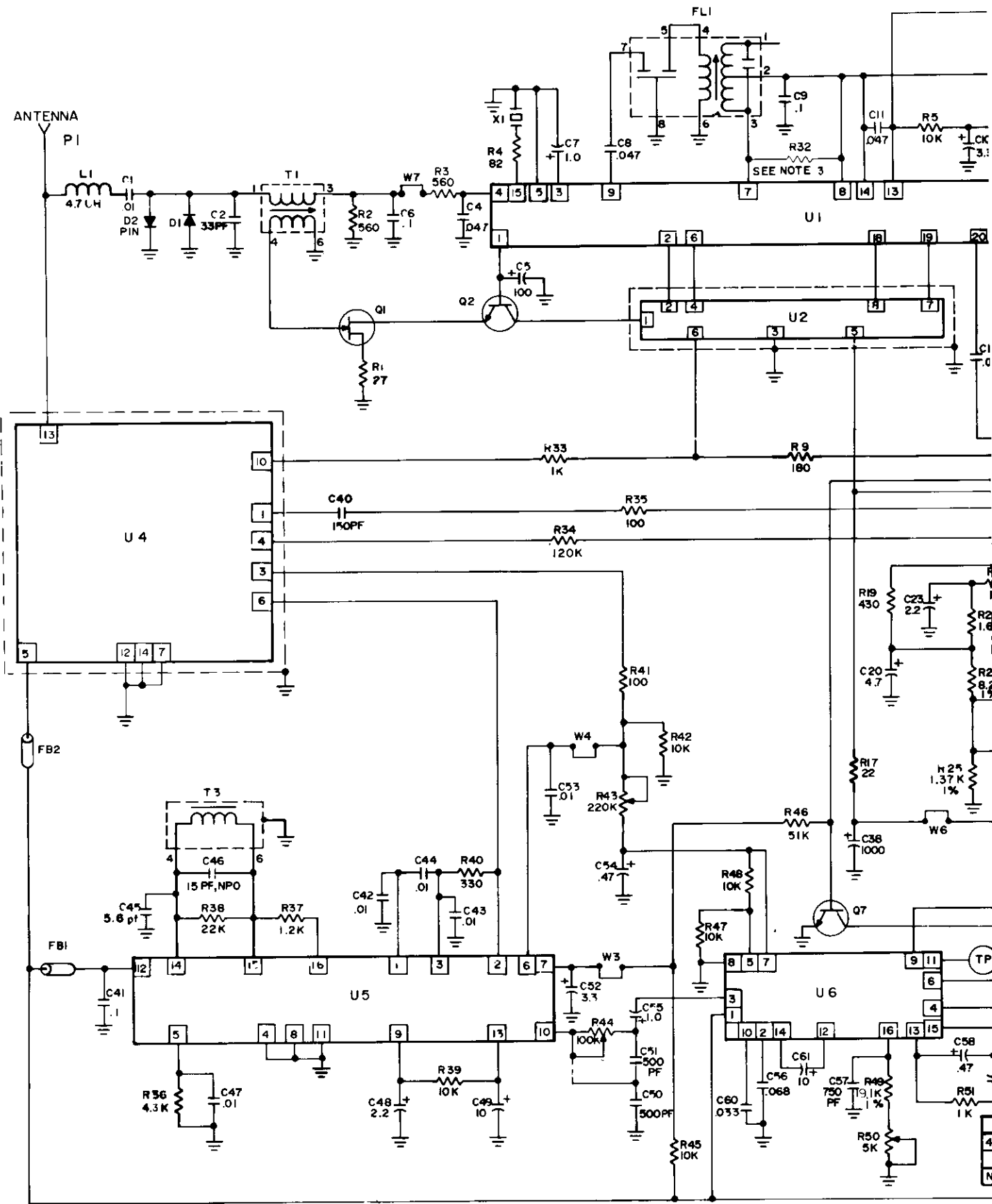
| PIN | DC V                 |
|-----|----------------------|
| 1   | 8.60                 |
| 2   | 3.70                 |
| 3   | 3.60                 |
| 4   | 3.80                 |
| 5   | 0 - 0.30             |
| 6   | 3.8                  |
| 7   | 0 - 0.50             |
| 8   | 0                    |
| 9   | 0 Mono<br>5.0 Stereo |
| 10  | 3.40                 |
| 11  | 3.50                 |
| 12  | 2.20                 |
| 13  | 2.00                 |
| 14  | 2.20                 |
| 15  | 2.05                 |
| 16  | 3.20                 |

|    | E    | B    | C    |
|----|------|------|------|
| Q2 | 4.70 | 5.36 | 8.00 |
| Q3 | 3.57 | 5.84 | 6.48 |
| Q4 | 6.50 | 5.80 | 3.60 |

|    | S    | G | D    |
|----|------|---|------|
| Q1 | 0.41 | 0 | 4.70 |

## RF PC BOARD ASSEMBLY VOLTAGES





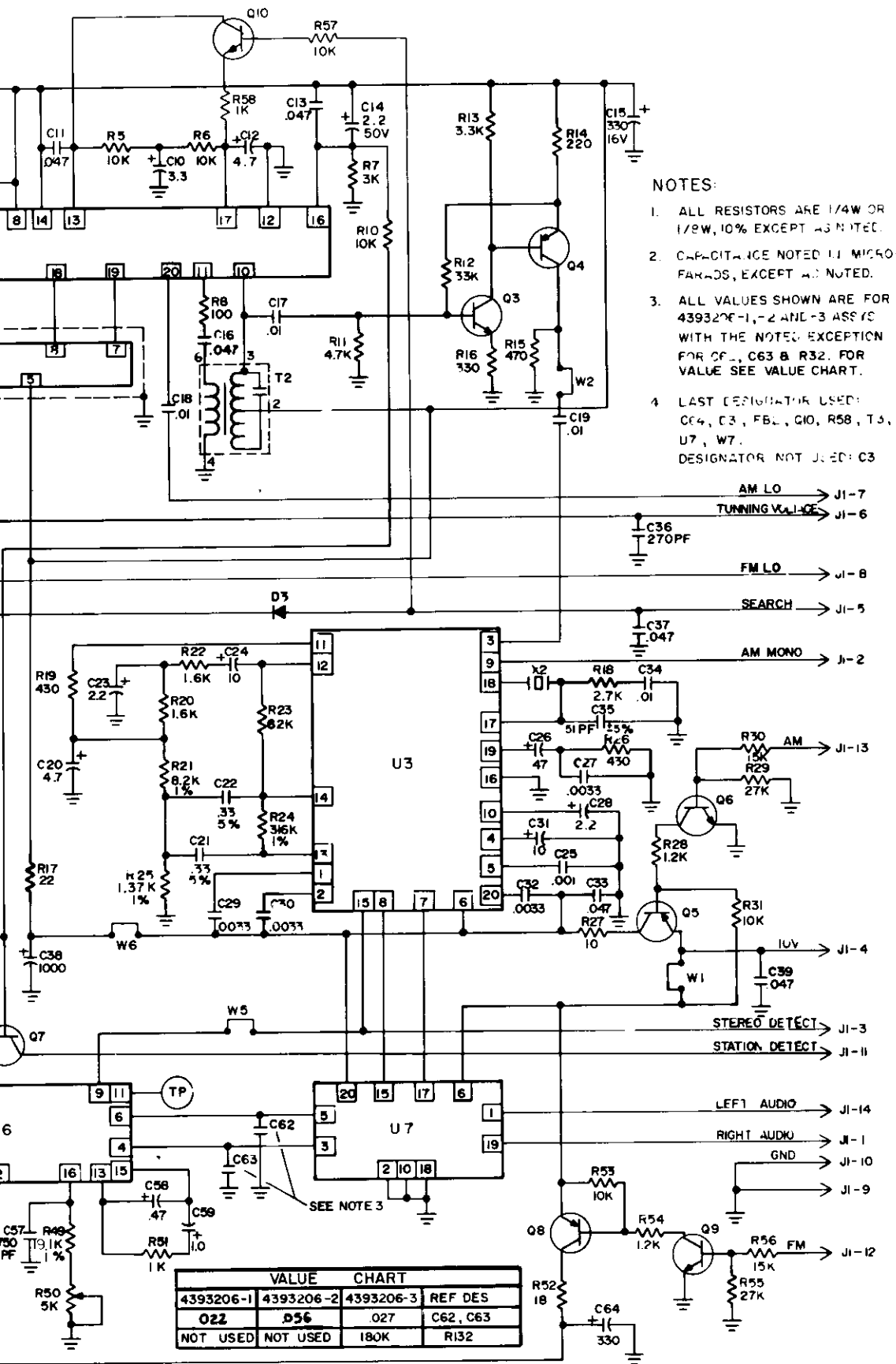


FIGURE 2-9. ELECTRICAL SCHEMATIC, RF PC BOARD

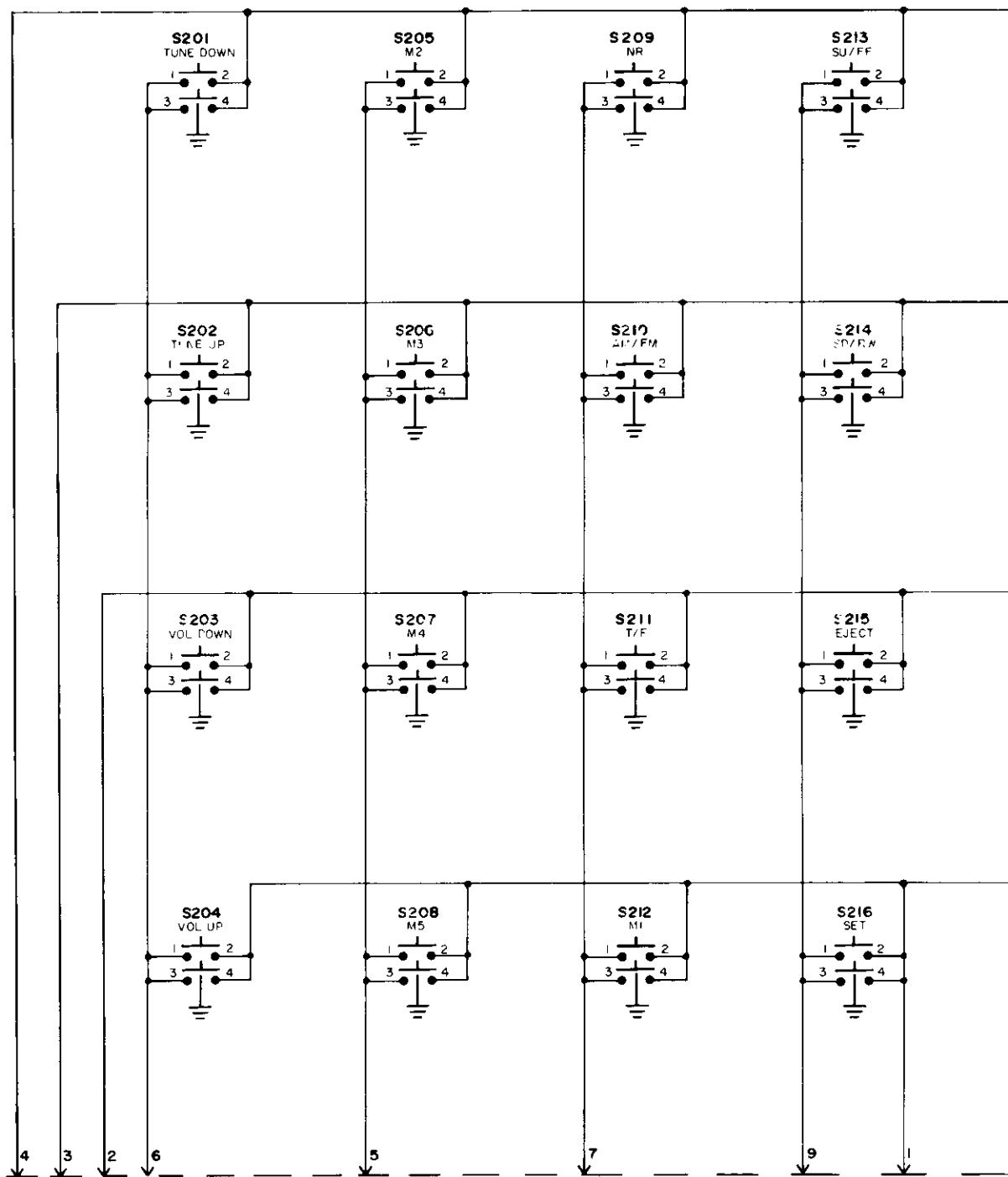
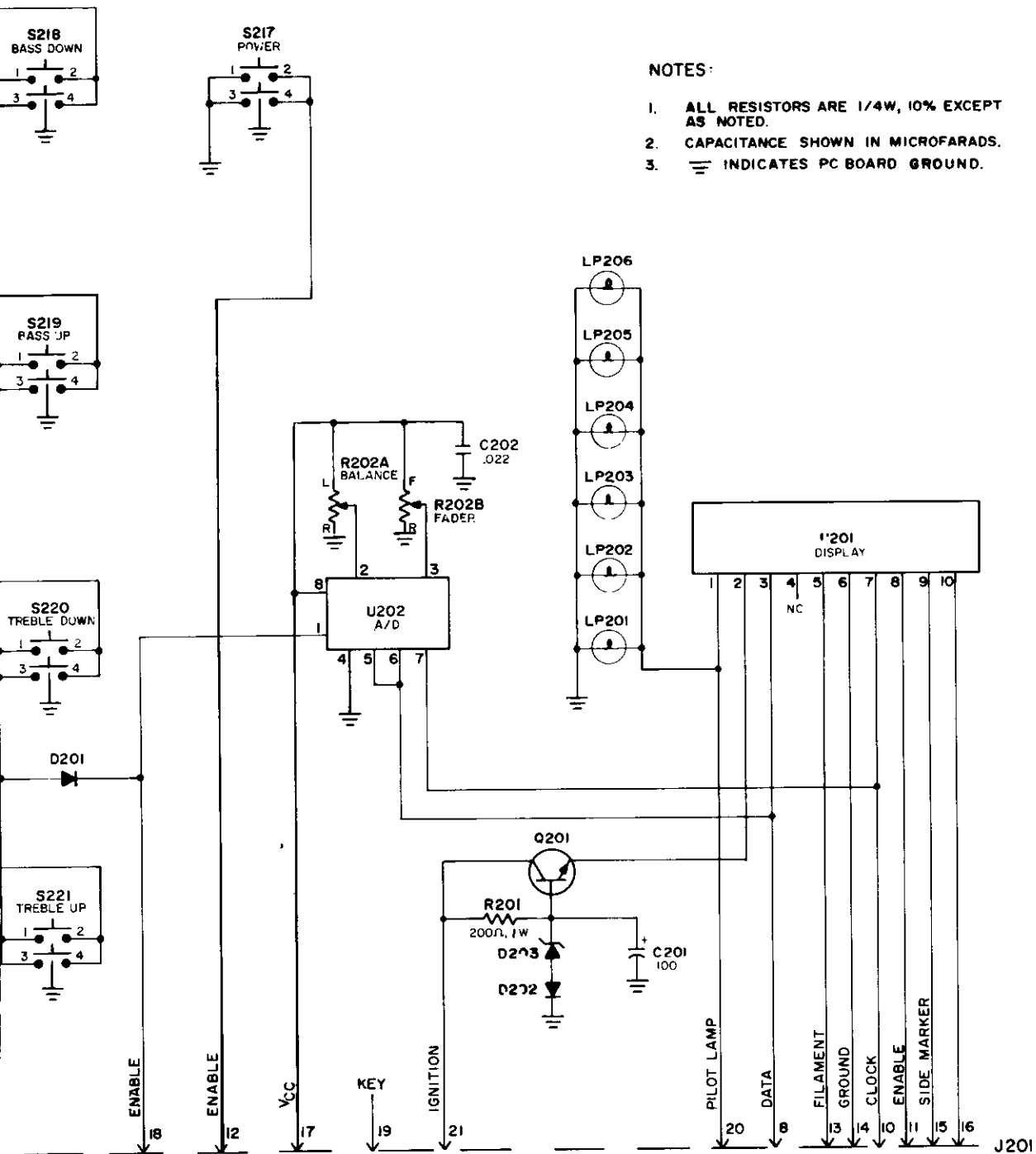


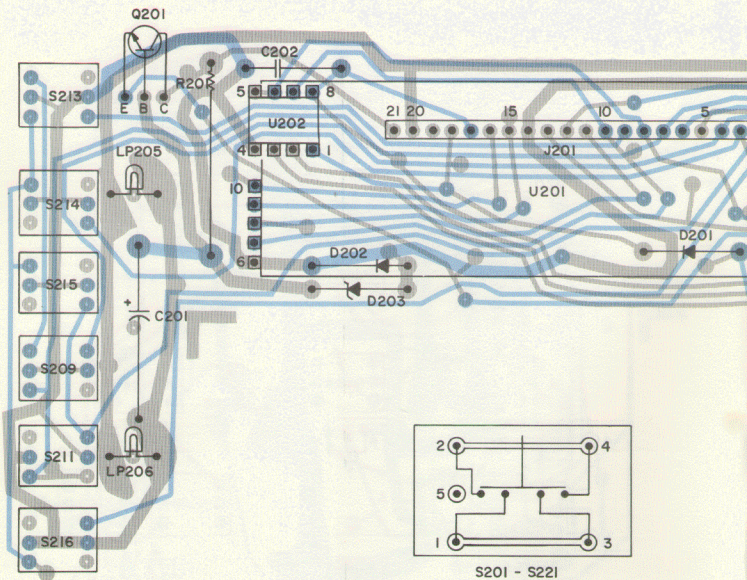
FIGURE 2-10. ELECTRICAL SCHEMATIC, CONTROL PC BOARD



NOTES:

1. ALL RESISTORS ARE 1/4W, 10% EXCEPT AS NOTED.
2. CAPACITANCE SHOWN IN MICROFARADS.
3. ≡ INDICATES PC BOARD GROUND.

J201



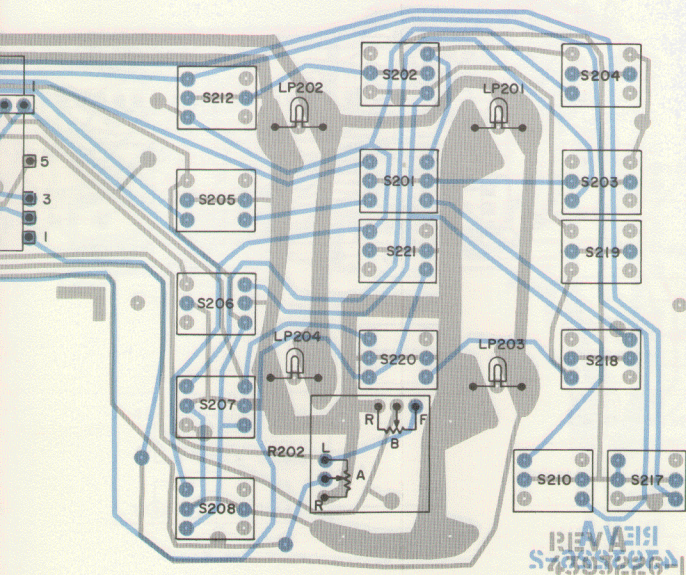


FIGURE 2-11. PARTS LOCATION, CONTROL PC BOARD, CIRCUIT SIDE

## SHINWA CASSETTE TAPE PLAYER

### A. LOGIC FUNCTIONS

The mechanism contains logic IC's to interface with the radio data bus via serial data. All functions are controlled by soft-touch buttons on the radio escutcheon. The serial data is converted by IC5 (8-bit serial input/parallel output shift register) and IC6 (8-bit serial input/serial output shift register), to control the functions which were initiated by the escutcheon buttons. Voltage regulator IC10 supplies the Vcc voltage to IC5 and IC6.

### B. TAPE DIRECTION

Photocoupled sensors U1 and U2 are comprised of a light-emitter and a photodetector. The reel-bush assemblies on which the spindles are mounted have discs with alternating shiny and dark areas, eight equal sections, on their undersides. As the spindles turn, the discs spin over the photocoupler IC's and the photodetector alternates between its on/off state as light is reflected, on/off from the shiny/dark sections on the discs. When the spindles stop, this action ceases and the radio microcomputer recognizes this and signals IC5 and IC6 to initiate a change of direction.

### C. AUTOMATIC MUSIC SEARCH

Blank portions of tape between selections are detected by IC2. This function enables a user to quickly skip from one recorded selection to the next in fast-forward or rewind mode by picking out the end/beginning of one selection and the beginning/end of the next. The music search IC (IC2) samples a combined audio output from IC7. The value of R28 is chosen to give IC2 a sensitivity of -38 db below the reference level of 0 db. Software delays in the radio microcomputer provide optimum music search performance which compensates for variations in tape speed and quality by controlling IC2 and related circuitry.

### D. DOLBY NOISE REDUCTION (INFINITY ONLY)

The Dolby® B-type circuit acts as a frequency-and-level-sensitive compander. Noise objectionable to the listener is usually in the 500 Hz to 15 kHz range and IC7 is manufactured to be effective within this frequency range. The radio microcomputer sends a signal to IC7 to activate the noise-reduction circuit when the NR button is pressed on the radio.



#### E. SOLENOIDS, (FF, REW & PROGRAM)

When the radio notifies IC3 a high current, NPN Darlington transistor array by its input going high, the corresponding output will go low. The FF output is pin 11 (Solenoid 315), REW output is pin 12 (Solenoid 316) and the program output (Solenoid 314) is pin 10.

#### F. MOTOR

Because of the high current required for the motor, a separate transistor TR3 is used to drive it. Pin 13 of IC3 has to sink current for the motor to operate.

#### G. BELT REPLACEMENT

The drive belt is made of carbon-impregnated synthetic rubber and is designed to outlast the mechanism. However, the very fine particles of carbon in and around the flywheel grooves should be cleaned periodically to prevent build-ups, which may cause other problems.

#### H. TAPE PLAYBACK HEAD

The tape deck uses a four-track head in which the two lower tracks are used for forward play and the upper two for reverse play direction. A mechanically actuated head switch, is used to switch from forward to reverse play mode.

#### I. HEAD ALIGNMENT

The alignment of the Head is factory-set using dual-directional Azimuth adjustment screws. In Forward Play mode, one screw is accessible from the top of the deck. When tape direction is reversed, another screw automatically becomes accessible. Optimum Frequency Response is achieved by adjusting Head alignment, with precision separately in Forward and Reverse Play modes.

When there is a perceptible change in quality of sound - such as poor treble response - or high-frequency signal loss during normal playback, it is possible that the Azimuth (Head Alignment) may need adjustment. Before proceeding to adjust the Azimuth, it is always a good idea to clean the Head thoroughly and check Frequency Response. In many cases oxide deposits from continuous tape playing are the cause of the complaint and proper cleaning solves the problem.



TABLE 3-1. HEAD ALIGNMENT PROCEDURE

| STEP | ACTION   |
|------|--|
| 1.   | Clean the tape head vigorously using a cotton swab dipped in alcohol or a good quality head cleaner.   |
| 2.   | Using a good quality test tape - 10 kHz or 12.5 kHz - check the Frequency Response in both directions to determine if the Azimuth needs adjustment. Step 1 may have already corrected the problem. |
| 3.   | Using a fine star-head, Phillips-type screwdriver, carefully adjust the Azimuth screw for maximum Frequency Response on both channels.   |
| 4.   | Activate auto-reverse to access the second Azimuth screw and carefully adjust it for maximum Frequency Response on both channels.  |
| 5.   | Verify Frequency Response using a good quality test tape.  |

To ensure that all Frequency Response testing and adjustment is of uniformly good quality, Shinwa recommends the use of high-quality test-tapes like the TEAC MTT series.

Tapes should also be date-stamped and periodically replaced as per manufacturer's recommendations to ensure failsafe results. Adjusting the Azimuth is a precise procedure that should only be done when absolutely necessary using only the proper equipment and test-media.

#### J. PREAMPLIFIER

The high-gain stereo preamplifier IC1, in conjunction with the related external circuitry, provides the initial amplification of the signal from the playback head. A tape-sensor switch, and a transistor (TR2) are used to automatically select the correct equalization of the preamplifier for normal or Metal/CR02 tape. The tape-sensor switch will be closed for a normal tape (+5V) which will turn off TR2. A metal tape will open the switch and turn on TR2. The tape-sensor switch action is controlled by using the slots in the industry-standard cassette tapes.

The audio levels of the two channel outputs of the preamp are controlled by two easily accessible trim-pots which are factory adjusted to compensate for differences in pickup level from the playback head, and to provide the correct output level to the Dolby® noise reduction circuit (IC7).

J. PREAMPLIFIER (Cont.)

The pots are located just slightly right-of-center on the Control PC Board, as one looks down at the assembly, after removing the Cassette Mechanism from the Radio. These pots are factory-set to 280 millivolts RMS at the Dolby® test points.

K. PROCEDURE FOR ADJUSTING PREAMPLIFIER OUTPUT LEVELS

Each channel of the tape Preamplifier IC must be adjusted to obtain the correct output signal levels for the left and right channels, to compensate for variations in Head pick-up and establish the Dolby® specified levels for proper operation of the Noise Reduction circuits.

The Dolby® reference-level test tape -400 Hz, 200 namowebers/meter-(TEAC #MMT-150 or equivalent) is required for proper Preamplifier adjustment. If a Dolby® reference-level tape is not available, use a standard SRL test tape. Note that the Dolby® test tape is definitely preferred, because it provides the correct signal reference for setting the gain of the Preamplifier.

TABLE 3-2. PREAMPLIFIER ALIGNMENT PROCEDURE

| STEP | ACTION  |
|------|---|
| 1.   | Connect a VTVM/DVM to the left channel audio test point P103 pin 9. Adjust VR2 to obtain an output of 380 mV RMS on the left channel.       |
| 2.   | Connect the VTVM/DVM to the right channel audio test point P103 pin 8. Adjust VR1 to obtain an output of 280 mV P.M.5 on the right channel. |

L. RECOMMENDED TEST AND REPAIR ENVIRONMENT

The TTL IC's used on both Cassette Assemblies are CMOS devices. The sensitivity of these components to electro-static discharge (ESD) has prompted the establishment of more rigorous standards for ESD controls wherever the new Radios - and the Cassette Mechanism Assemblies used in them - are handled for any purpose.

Damage caused by ESD is normally catastrophic since it directly impacts those very Logic components on which modern electronics depends so heavily. Never has prevention been more meaningful, than cure. As a fundamental common-sense requirement, Acustar

L. RECOMMENDED TEST AND REPAIR ENVIRONMENT (Cont.)

will expect all Service Centers to install ESD controls prior to attempting to service these new Radios and/or Cassette Mechanisms. We have reproduced a drawing from an Acustar specification for ESD control that may help you in equipping yourself suitably.

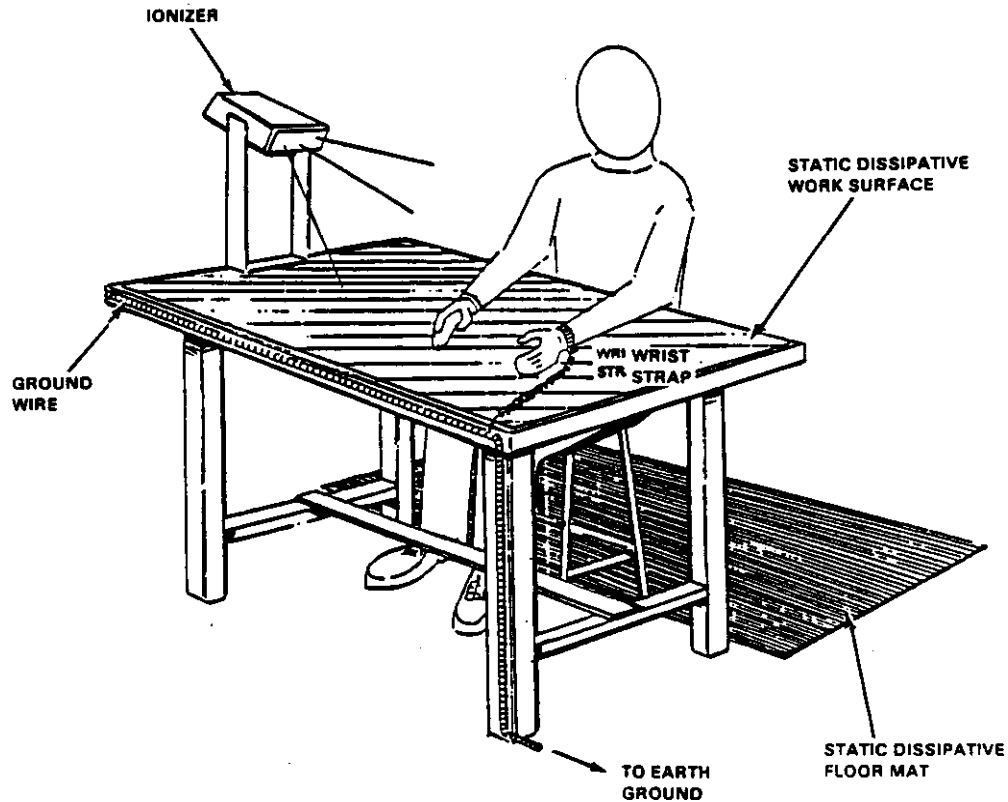


FIGURE 3-1. TYPICAL WORK STATION WITH ESD PROTECTION

RECOMMENDED EQUIPMENT

- 0 Power Supply - 14.0 VDC @ 7.5 Amperes minimum
- 0 AC Voltmeter (high impedance - 10 megohms or more)
- 0 General Purpose Oscilloscope
- 0 Frequency Counter
- 0 Audio Oscillator

M. MECHANISM SEQUENCE OF OPERATION

1. Play Mode - Load a Cassette Tape into the Cassette Housing (217). It will engage and push against the Catch (251) which will move back. The cassette is drawn inside by the Reverse Spring (289), (see Figure 3-2).

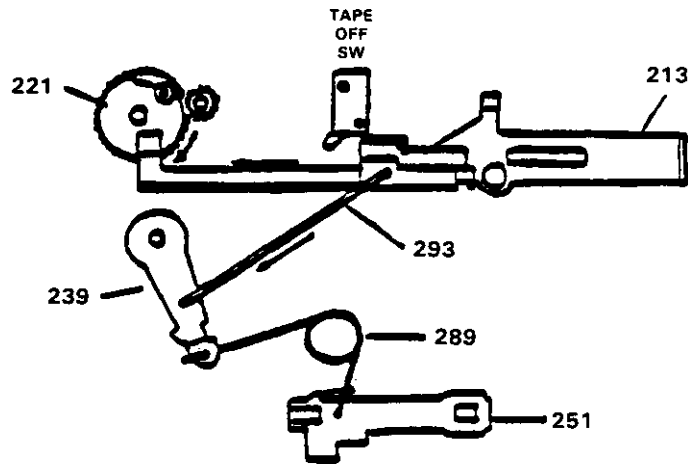


FIGURE 3-2. REVERSE SPRING OPERATION

The cassette pushes back the Trigger Plate (232), (see Figure 3-3.) The Eject Plate (234) is unlocked and slides forward. As the Eject Plate (234) moves, the Leaf Switches (tape-in switches 308/309) are turned ON, the H/P Roller (250) moves to the stop position, the H/A Roller (252) moves down, and the Cassette Housing (217) comes down to mount the Cassette Tape on the Reel Drivers (254).

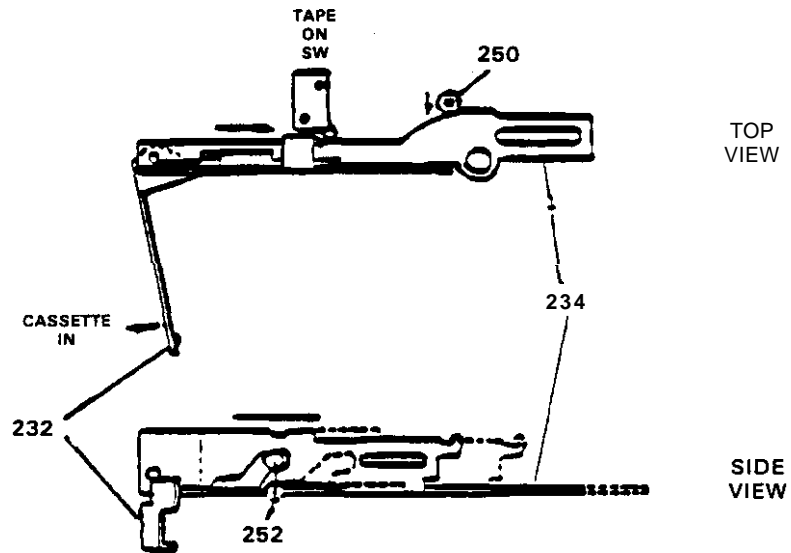


FIGURE 3-3. CASSETTE MOUNTING

1. Play Mode (Cont.)

When the tape-in switch is pushed to ON, the Motor (305) starts and the Program-Change Solenoid (314) and FF/REW Solenoid (315 and 316) are all energized. The Mode Gear (260) then starts turning and the Power Plate (211), Power Arm (208) and Mode Plate (209) move to PLAY position, (see Figure 3-4).

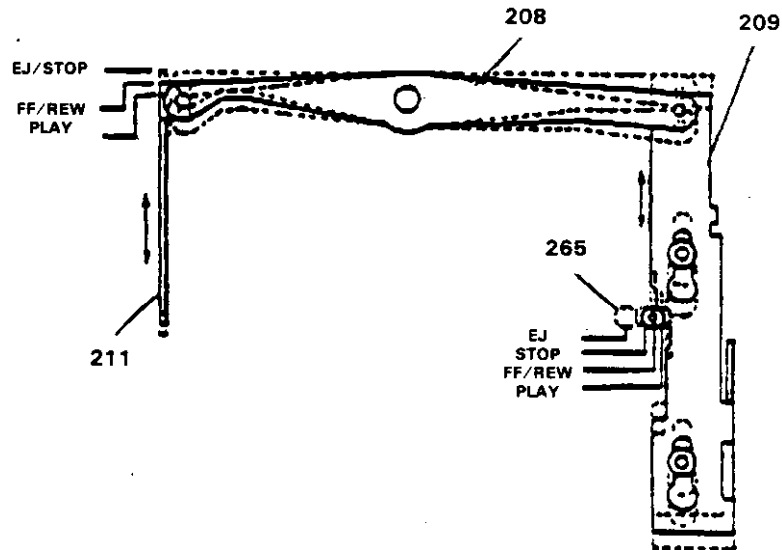


FIGURE 3-4. PLAY MODE

The FF/REW Solenoid Armature is held by Solenoids (315 and 316), and the Head Plate (203) moves forward. The Timing Arm (215) then lifts off the Head Plate Shaft to lock the Mode Gear (260), and the Cassette Tape begins to play. As soon as the Motor starts turning, the Eject Gear (221) also turns, and the Stopper Groove of the Eject Gear moves to the position of the Select Arm Pin (210), (see Figure 3-5). The Select Arm Pin locks the Eject Gear (221), and the Chip Arm (212) is held in place by the Program Solenoid (314). The Mode Gear (260) starts turning, and the Power Plate (211) is moved by the cam on the gear to PLAY position (see Figure 3-6). As the Power Plate (211) moves, the Power Arm (208) and the Mode Plate (209) move to the PLAY position, and the Mode Gear (260) comes to a stop.

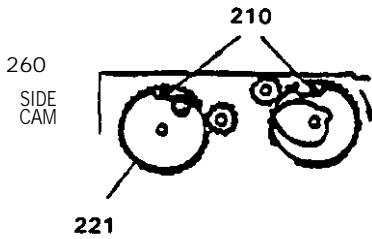


FIGURE 3-5. EJECT GEAR

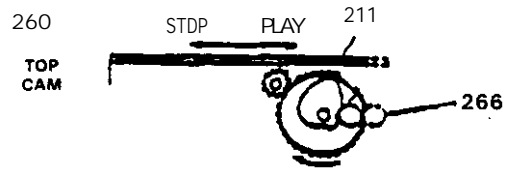


FIGURE 3-6. PAUSE MODE

2. Pause Mode (Radio Mode - Power OFF With Cassette Loaded)-In the pause mode, the FF/REW and Program Solenoids (314, 315, & 316) and the Motor are all de-energized. As the Mode Plate (209), Power Arm (208), Power Plate (211) move to STOP position, the Head Plate (203) also moves backward to the STOP position. All movement then comes to a stop.
3. Program Change Mode - When the Program switch is pushed, the Program Solenoid (314) is de-energized momentarily, and the Chip Arm (212) is released. The Reverse Trigger (233) and the Reverse Trigger Arm (245) are positioned to unlock the Reverse Gear (220). The Reverse Gear rotates to move the Reverse Plate (227), (see Figure 3-7 & 3-8).

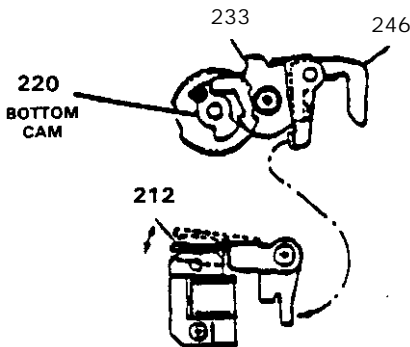


FIGURE 3-7. PROGRAM CHANGE MODE

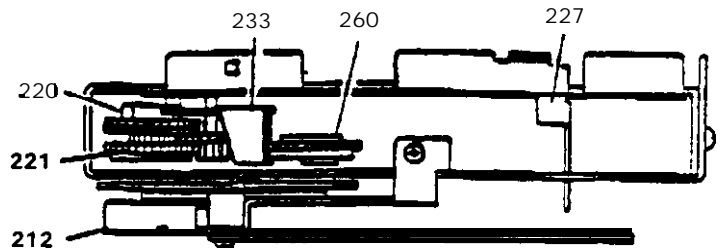


FIGURE 3-8. REVERSE GEAR ASSEMBLY

Transfer of the Reverse Plate moves Pinch Rollers (206 and 207), Idler Gear (253), and Azimuth Arm (249) for FWD/REV switching, (see Figure 3-9).

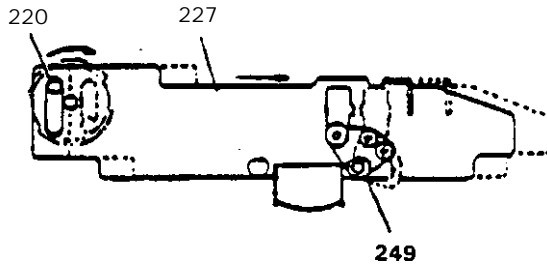


FIGURE 3-9. FORWARD/REVERSE SWITCHING

4. Auto Reverse Function - As the Cassette Tape in PLAY mode reaches the end of the tape, the Reel Gear (222) stops turning. This is detected by the Photo-interrupter (312), and the Program Solenoid (314) is then de-energized momentarily for FWD/REV switching.
5. FF/REW Mode - When the FF or REW switch is pushed, the FF/REW Solenoids (315 and/or 316) are de-energized, the T-Crank (214), FF Crank (248), FF Plate (228), and FF Arm (205) all move to interlock the FF Gear (219) with Reel Gear (222) for FF or REW of the Cassette Tape, (see Figure 3-10).

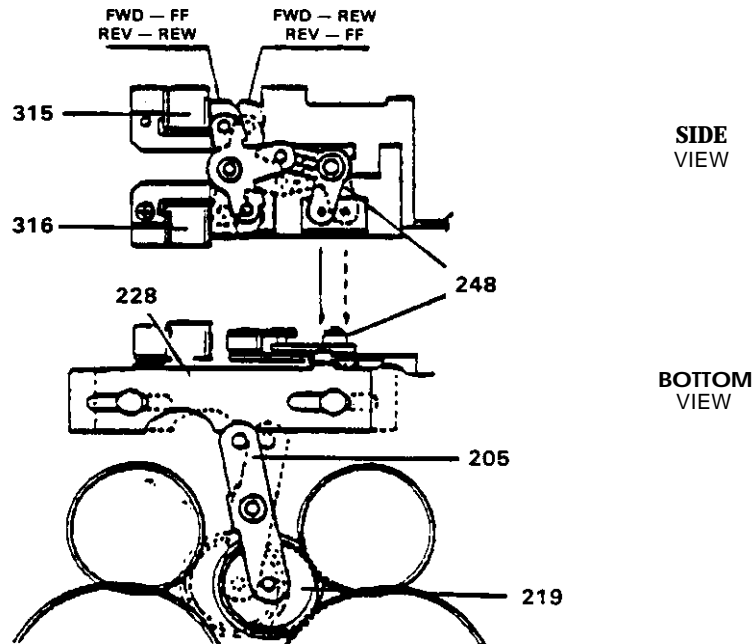


FIGURE 3-10. FF/REWIND MODE

6. FF/REW to Play Mode - When the PLAY switch is pushed in FF or REW mode, a Solenoid (315 REW in FF mode or 316 FF in REW mode) is de-energized momentarily. Next, the FF/REW Solenoids (315/316) are energized at the same time, and the Mode Plate (209), Power Arm (208), and Power Plate (211), move to STOP position. The Mode Gear (260) starts turning and the Power Plate (211), Power Arm (208), and Mode Plate (209) all move to the PLAY position. The FF/REW Solenoid Armatures (315/316) are Positioned to move the Head Plate (203) forward. Then, as the Timing Arm (215) lifts off the Head Plate Shaft to lock the Mode Gear (260), the Cassette Tape returns to PLAY mode.
7. Auto Replay Function - When the Cassette Tape in either FF or REW mode, reaches the end of tape, the Reel Gears (222) stop turning, which is detected by the Photointerrupter (312). A Solenoid (315 in FF mode or 316 in REW mode) is then momentarily de-energized. Next, the FF/REW Solenoids (315/316) are energized at the same time, and FF/REW changes to PLAY.
8. Eject Function - When the eject switch is pushed, Solenoids (314, 315 & 316) are de-energized. First, FF/REW Solenoids (315 & 316) are de-energized, which causes the Mode Plate (209), Power Arm (208), and Power Plate (211) to move the EJECT position, (see Figure 3-11).

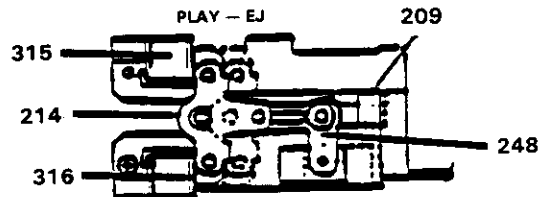


FIGURE 3-11. EJECT MODE

Then the Mode Gear (260) is unlocked and turns until the Stopper Groove of the Mode Gear is positioned at the Select Arm Pin (210). When the Program Solenoid (314) is de-energized, the Chip Arm (212) lifts up, the Select Arm (210) moves to lock the Mode Gear (260), and the Eject Gear (221) is unlocked, (see Figure 3-12).



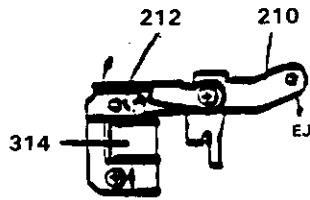


FIGURE 3-12. SELECT ARM

As the Eject Gear (221) starts turning, the Reset Plate (213) and the Eject Plate (234) are pushed backward by the Eject Gear Roller (221). While the Eject Plate (234) is moving backward, the H/A Roller moves up to raise the Cassette Tape, and the Head Plate (203) slides into EJECT position. The Leaf Switch (308-309 Tape-In Switch) is then turned OFF. At the same time, the Reset Plate (213) is moving to turn the Tape-Out Switch ON (Tape-Off Switch is turned ON before the Tape-In Switch is turned OFF). The Over-Center Rod (293) and the Over-Center Plate (239) move to a position which enables the Cassette Tape to be pushed out by the Reverse Spring (289). The Cassette Tape is ejected only when the Cassette Housing (217) is in a completely raised position. The Tape-Off Switch is then turned OFF to stop all functions.

REPLACEMENT PARTS LIST, SHINWA CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER     | DESCRIPTION                 |
|------------------|-----------------|-----------------------------|
| 200              | 4234506-3       | Cassette Unit with Dolby    |
| 201              | EMCR (Ref Only) | Main Chassis Assy           |
| 202              | EMCR (Ref Only) | Sub Chassis Assy            |
| 203              | EMCR (Ref Only) | Head Plate Assy             |
| 204              | 3-0050-108      | Reel Spindle Bracket Assy   |
| 205              | 3-0050-107      | FF Arm Assy                 |
| 206              | 3-0050-108-5    | PR Arm (F) Assy             |
| 207              | 3-0050-109-5    | PR Arm (R) Assy             |
| 208              | 3-0050-110      | Power Arm Assy              |
| 209              | 3-0050-111      | Mode Plate Assy             |
| 210              | 3-0050-117      | Select Arm Assy             |
| 211              | 3-0050-118      | Power Plate Assy            |
| 212              | 3-0050-119      | Chip Arm Assy               |
| 213              | 3-0050-124      | Reset Plate Assy            |
| 214              | 3-0050-128      | T Crank Assy                |
| 215              | 3-0050-129      | Timing Arm Assy             |
| 216              | 3-0050-149      | Housing Arm (FTN) Assy      |
| 217              | 3-0050-150      | Cassette Housing (SAN) Assy |
| 218              | N/A             |                             |
| 219              | 3-0050-211      | FF Gear Assy                |
| 220              | 3-0050-219      | RVS Gear Assy               |
| 221              | 3-00550-221     | EJ Gear Assy                |
| 222              | 1-0050-223-5    | Reel Bush (Ph) Assy         |
| 223              | N/A             |                             |
| 224              | 1-0050-800      | Flywheel Assy               |
| 225              | N/A             |                             |
| 226              | N/A             |                             |
| 227              | 1-0050-112      | RVS Plate                   |
| 228              | 1-0050-113      | FF Plate                    |
| 229              | 1-0050-114      | Brake Plate (F)             |
| 230              | 1-0050-115      | Brake Plate (R)             |
| 231              | 1-0050-120      | Solenoid Bracket (B)        |
| 232              | 1-0050-121      | Trigger Plate               |
| 233              | 1-0050-122      | RVS Trigger                 |
| 234              | 1-0050-123      | EJ Plate                    |
| 235              | 1-0050-125      | Switch Bracket              |
| 236              | 1-0050-126      | Adjuster Shim               |
| 237              | 1-0050-127      | Azimuth Plate SPG           |
| 238              | 1-0050-132      | Gear Shaft Guide            |
| 239              | 1-0050-134      | Over Center Plate           |
| 240              | 1-0050-136      | Bracket (S)                 |
| 241              | 1-0050-139      | Switch Plate                |
| 242              | 1-0050-141      | Slide Plate                 |
| 243              | 1-0050-146      | Solenoid Bracket (AT) 20    |

REPLACEMENT PARTS LIST, SHINWA CASSETTE MECHANISM

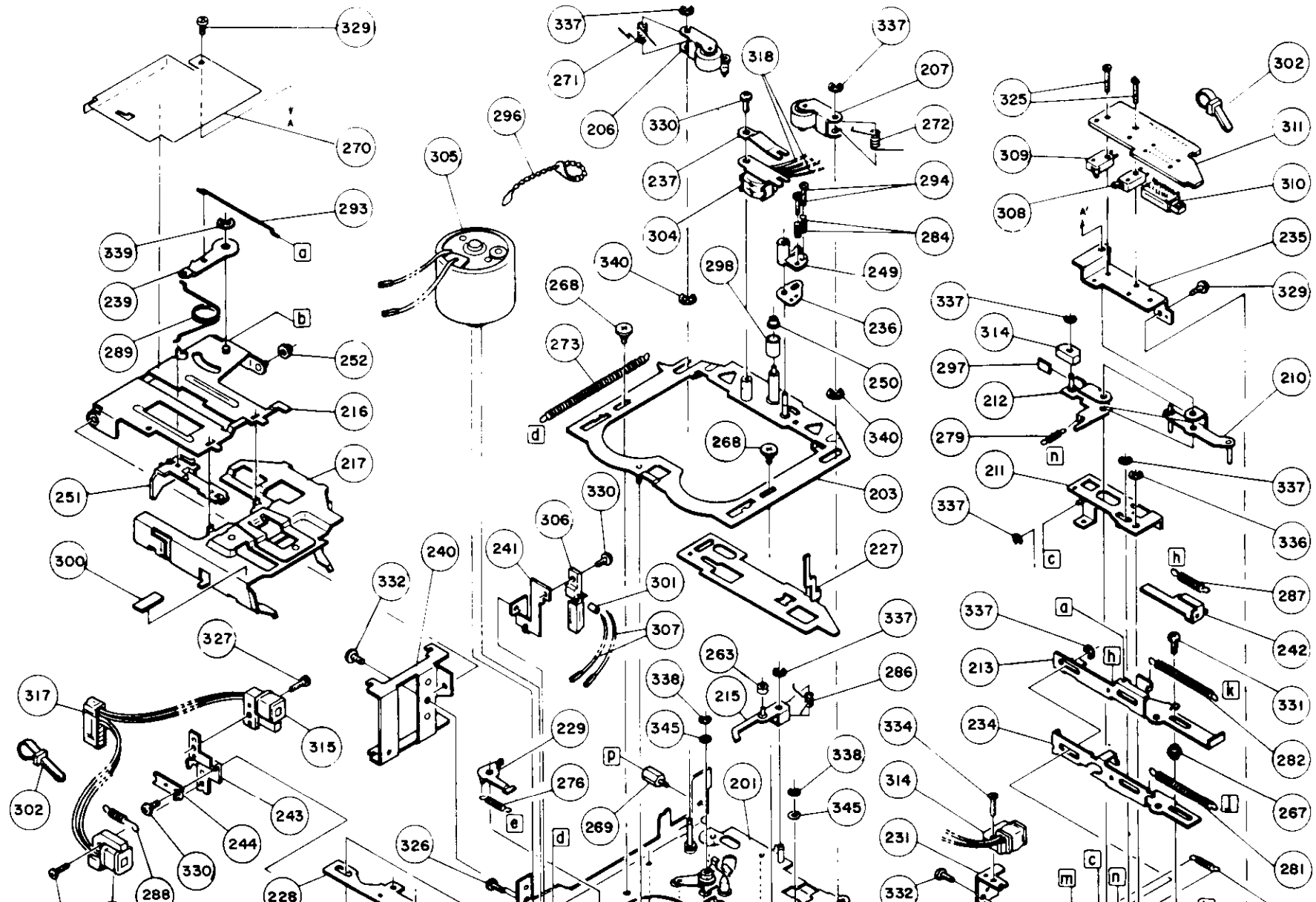
| REFERENCE NUMBER | PART NUMBER | DESCRIPTION                 |
|------------------|-------------|-----------------------------|
| 244              | 1-0050-147  | Solenoid Deaden Shock Plate |
| 245              | 1-0050-153  | RVS Trigger Arm             |
| 246              | 1-0050-154  | RVS Trigger Arm             |
| 247              | N/A         |                             |
| 248              | 1-0050-200  | FF Crank                    |
| 249              | 1-0050-201  | Azimuth Arm                 |
| 250              | Part of Kit | H/P Roller (C)              |
| 251              | 1-0050-204  | Catch                       |
| 252              | Part of Kit | H/A Roller                  |
| 253              | 1-0050-206  | Idler Gear                  |
| 254              | 1-0050-210  | Reel Driver                 |
| 255              | 1-0050-214  | 0 15.2 Gear                 |
| 256              | 1-0050-215  | Input Gear                  |
| 257              | 1-0050-216  | Gear (A)                    |
| 258              | 1-0050-217  | Gear (B)                    |
| 259              | 1-0050-218  | Gear (C)                    |
| 260              | 1-0050-220  | Mode Gear                   |
| 261              | 1-0050-222  | Tension Pulley              |
| 262              | N/A         |                             |
| 263              | 1-0050-323  | Timing/A Roller             |
| 264              | 1-0050-331  | H/P Roller (A)              |
| 265              | 1-0050-332  | H/P Roller (B)              |
| 266              | 1-0050-342  | Mode Roller                 |
| 267              | 1-0050-343  | Space                       |
| 268              | Part of Kit | Screw                       |
| 269              | Part of Kit | Special Stud (S)            |
| 270              | 1-0050-529  | Top Spacer                  |
| 271              | 1-0050-400  | PR Arm (F) SPG              |
| 272              | 1-0050-401  | PR Arm (R) SPG              |
| 273              | 1-0050-402  | H/P SPG                     |
| 274              | 1-0050-403  | Idler SPG                   |
| 275              | 1-0050-404  | FF Arm SPG                  |
| 276              | 1-0050-405  | Brake SPG                   |
| 277              | 1-0050-406  | Trigger SPG                 |
| 278              | 1-0050-407  | RVS/T SPG                   |
| 279              | 1-0050-408  | Chip Arm SPG                |
| 280              | 1-0050-409  | Starter SPG                 |
| 281              | 1-0050-410  | EJ/P SPG                    |
| 282              | 1-0050-411  | Reset/P SPG                 |
| 283              | 1-0050-412  | Sleeve SPG                  |
| 284              | 1-0050-415  | Azimuth Lock SPG            |
| 285              | 1-0050-416  | Power SPG                   |
| 286              | 1-0050-417  | Timing Arm SPG              |
| 287              | 1-0050-420  | Slide Plate SPG             |
| 288              | 1-0050-422  | Deaden Shock Plate SPG      |

REPLACEMENT PARTS LIST, SHINWA CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER   | DESCRIPTION                     |
|------------------|---------------|---------------------------------|
| 289              | 1-0050-423    | Reverse SPG (SAN)               |
| 290              | 1-0050-424    | RVS Trigger Arm SPG             |
| 291              | 1-0050-530    | Spacer Tube                     |
| 292              | 1-0050-501    | Belt                            |
| 293              | 1-0050-502    | Over Center Rod                 |
| 294              | 1-0050-503    | Azimuth Screw                   |
| 295              | 1-0050-508    | Spacer (T)                      |
| 296              | 1-0050-512    | Wire Clamper                    |
| 297              | 1-0050-513    | Cushion                         |
| 298              | 1-0050-519    | Tube                            |
| 299              | 1-0050-520    | Spacer (HP)                     |
| 300              | 1-0050-509    | CH Cushion                      |
| 301              | 1-0010-543    | Insulation Tube                 |
| 302              | Part of Kit   | Wire Clamper (L)                |
| 303              | N/A           |                                 |
| 304              | 3-0050-745    | Head Assy                       |
| 305              | 1-0050-365    | Motor Assy                      |
| 306              | 1-0050-736    | Chrome Tape Detective Switch    |
| 307              | 1-0150-715    | Detective Switch Wire (LOU)     |
| 308              | 1-0050-749    | Leaf Switch (MLS-2AU)           |
| 309              | 1-0050-750    | Leaf Switch (MLS-4AU)           |
| 310              | 1-0025-704    | Slide Switch                    |
| 311              | 3-0050-727    | Main P.W.B. (RP) Assy           |
| 312              | 1-0050-613    | Photointerrupter (B) Assy       |
| 313              | 1-0050-729    | Ribbon Reeder (Ph)              |
| 314              | 1-0050-731    | Solenoid B (DMO5-200-16)        |
| 315              | 1-0150-707-20 | Solenoid (DMO5W-200A)           |
| 316              | 1-0150-707-40 | Solenoid (DMO5W-200B)           |
| 317              | 1-0150-716    | Connect Housing                 |
| 318              | 1-0050-610-3  | Control P.W.B (RP) Assy         |
| 319              | 1-0050-717    | Head Wire                       |
| 320              | N/A           |                                 |
| 321              | N/A           |                                 |
| 322              | N/A           |                                 |
| 323              | N/A           |                                 |
| 324              | N/A           |                                 |
| 325              | Part of Kit   | +Machine Screw Plain #1 M1 7X7  |
| 326              | 2-1012-030-H2 | +Machine Screw Plain #1 M 2X3   |
| 327              | Part of Kit   | +Machine Screw Plain #1 M 2X5.5 |
| 328              | 2-101L-030-H2 | +Machine Screw Plain #1 M2 6X3  |
| 329              | Part of Kit   | +Bind Screw M 2X3               |
| 330              | Part of Kit   | +Bind Screw M 2X4               |
| 331              | 2-1112-050-B1 | +Bind Screw M 2X5               |
| 332              | Part of Kit   | +Bind Screw M 2.6X3             |
| 333              | Part of Kit   | +Bind Screw M 2.6X4             |

REPLACEMENT PARTS LIST, SHINWA CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER   | DESCRIPTION                              |
|------------------|---------------|--|
| 334              | Part of Kit   | Screw M 2X5 P=0.25                       |
| 335              | N/A           |  |
| 336              | Part of Kit   | E-Ring 0 1.2                             |
| 337              | Part of Kit   | E-Ring 0 1.5                             |
| 338              | Part of Kit   | E-Ring 0 1.6X 0 3.2                      |
| 339              | Part of Kit   | E-Ring 0 2.5                             |
| 340              | Part of Kit   | E-Ring 0 3                               |
| 341              | N/A           |  |
| 342              | 2-1821-030-D2 | Polywasher 0 1.2 X 0 3Xt0.25 With Notch  |
| 343              | Part of Kit   | Polywasher 0 1.6X 0 3.2Xt0.25 With Notch |
| 344              | 2-1816-032-52 | Polywasher 0 1.6X 0 3.2Xt0.5 With Notch  |
| 345              | Part of Kit   | Polywasher 0 2.1X 0 3.5Xt0.3             |
| 346              | 2-1816-040-D1 | Polywasher 0 2.1X 0 4Xt0.25              |
| 347              | 2-1821-040-D2 | Polywasher 0 2.1X 0 4Xt0.25 With Notch   |
| 348              | 2-1821-050-D1 | Polywasher 0 2.1X 0 5Xt0.25              |
| 349              | 2-1821-035-D1 | Polywasher 0 2.1X 0 3.5Xt0.25            |
| 350              | Part of Kit   | Polywasher 0 2.1X 0 4Xt0.1               |
|                  | 20-212        | Service Parts Kit Shinwa CDS50           |
| 351              | CDS-50        | Mechanism Replacement                    |



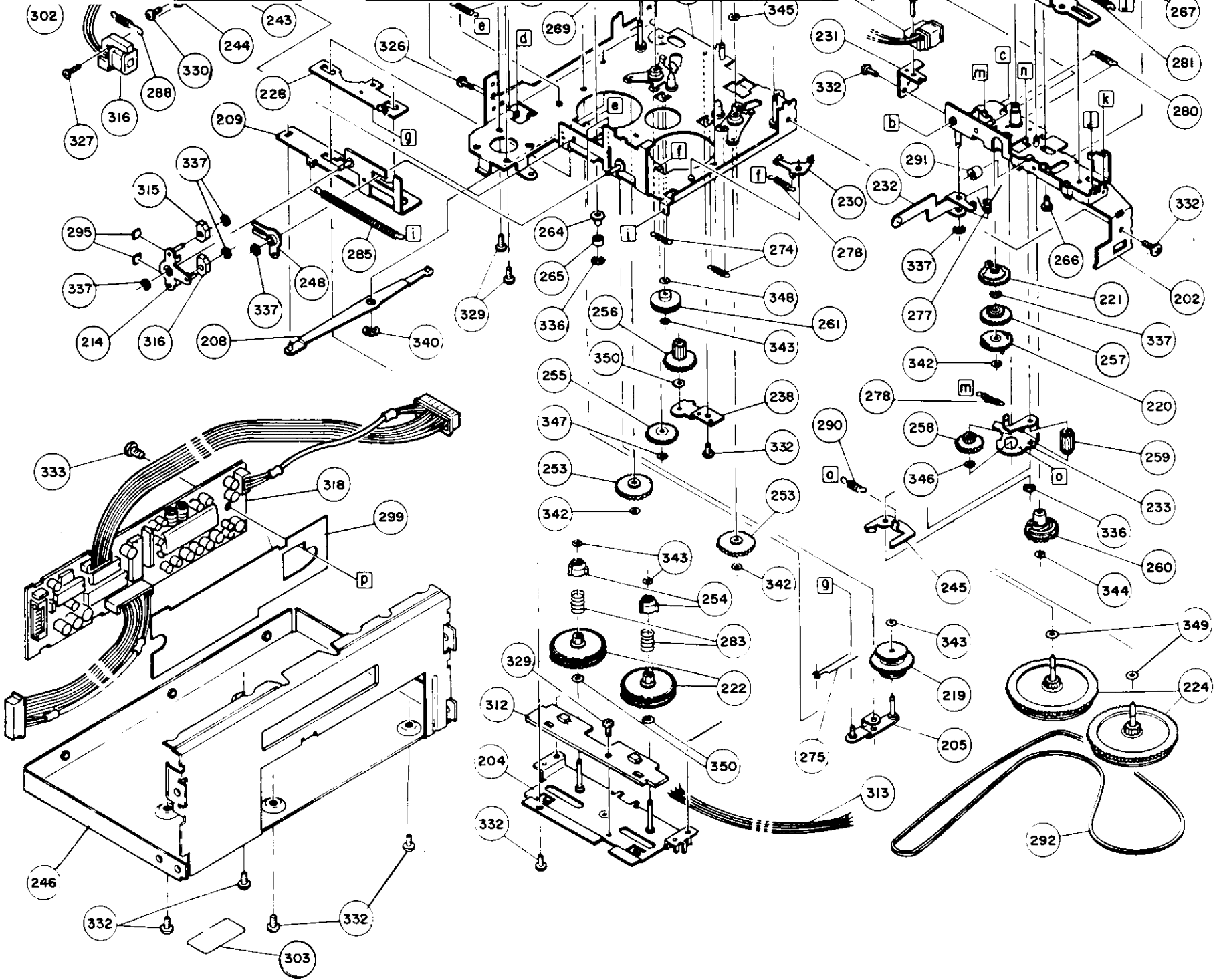


FIGURE 3-14. SHINWA CASSETTE MECHANISM

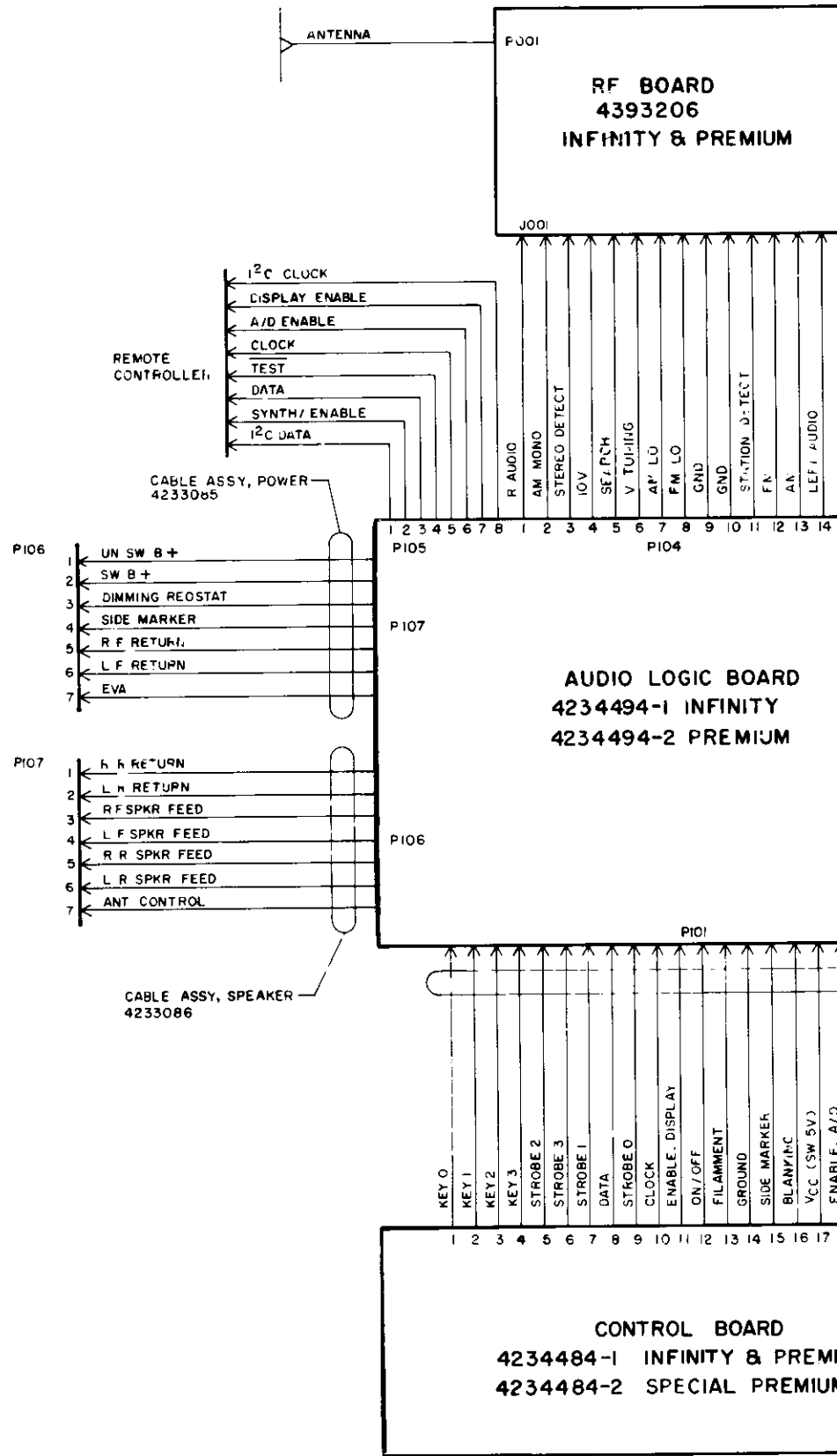
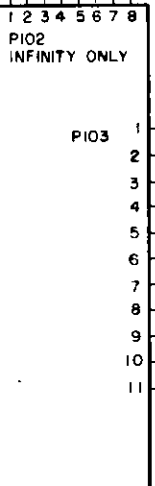
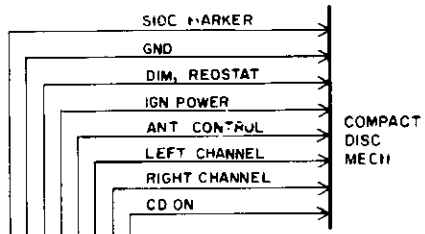


FIGURE 3-15. ELECTRONIC TUNED CASSETTE RADIO WITH SHINWA, BLOCK WIRING DIAGRAM

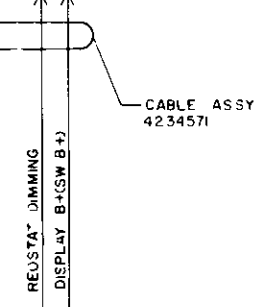




**CASSETTE MECHANISM ASSY**

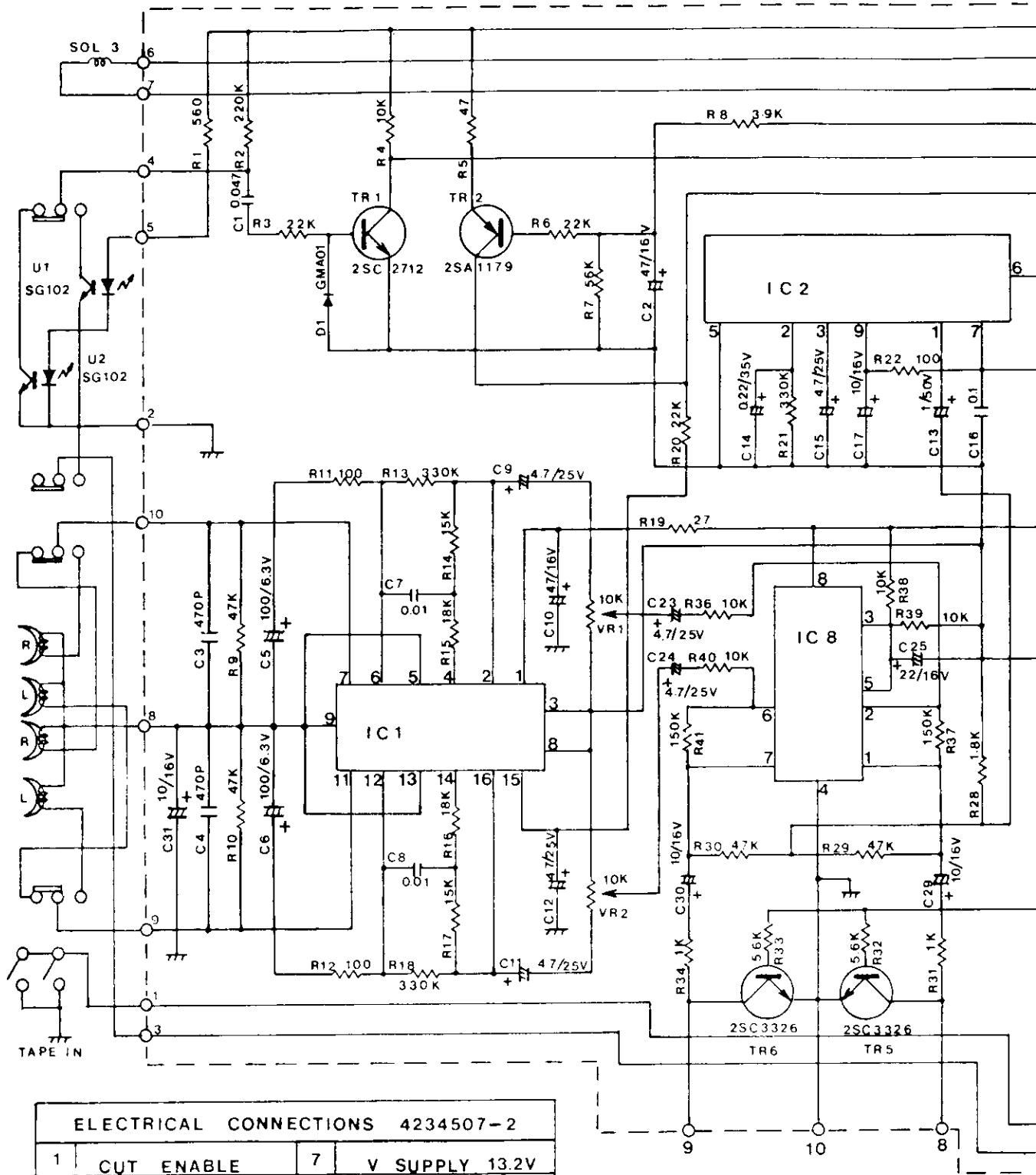
|                 |
|-----------------|
| 4234506-3       |
| OUT ENABLE      |
| IN ENABLE       |
| REEL            |
| CLOCK           |
| DATA            |
| N / C           |
| IGN             |
| R AUDIO         |
| L AUDIO         |
| KEY             |
| GROUND          |
| SHINWA INFINITY |

P501



**NOTES**

- 1 REFERENCE DRAWINGS, ELECTRICAL SCHEMATICS
- 4393206 RF BOARD ASSY
- 4234494 AUDIO LOGIC BOARD ASSY
- 4234484 CONTROL BOARD ASSY
- 4234507 SHINWA CASSETTE MECHANISM
- 4234510 ALPINE CASSETTE MECHANISM



ELECTRICAL CONNECTIONS 4234507-2

|   |            |    |                |
|---|------------|----|----------------|
| 1 | CUT ENABLE | 7  | V SUPPLY 13.2V |
| 2 | IN ENABLE  | 8  | RIGHT AUDIO    |
| 3 | REEL       | 9  | LEFT AUDIO     |
| 4 | CLOCK      | 10 | AUDIO GND      |
| 5 | DATA       | 11 | KEY            |
| 6 |            |    |                |

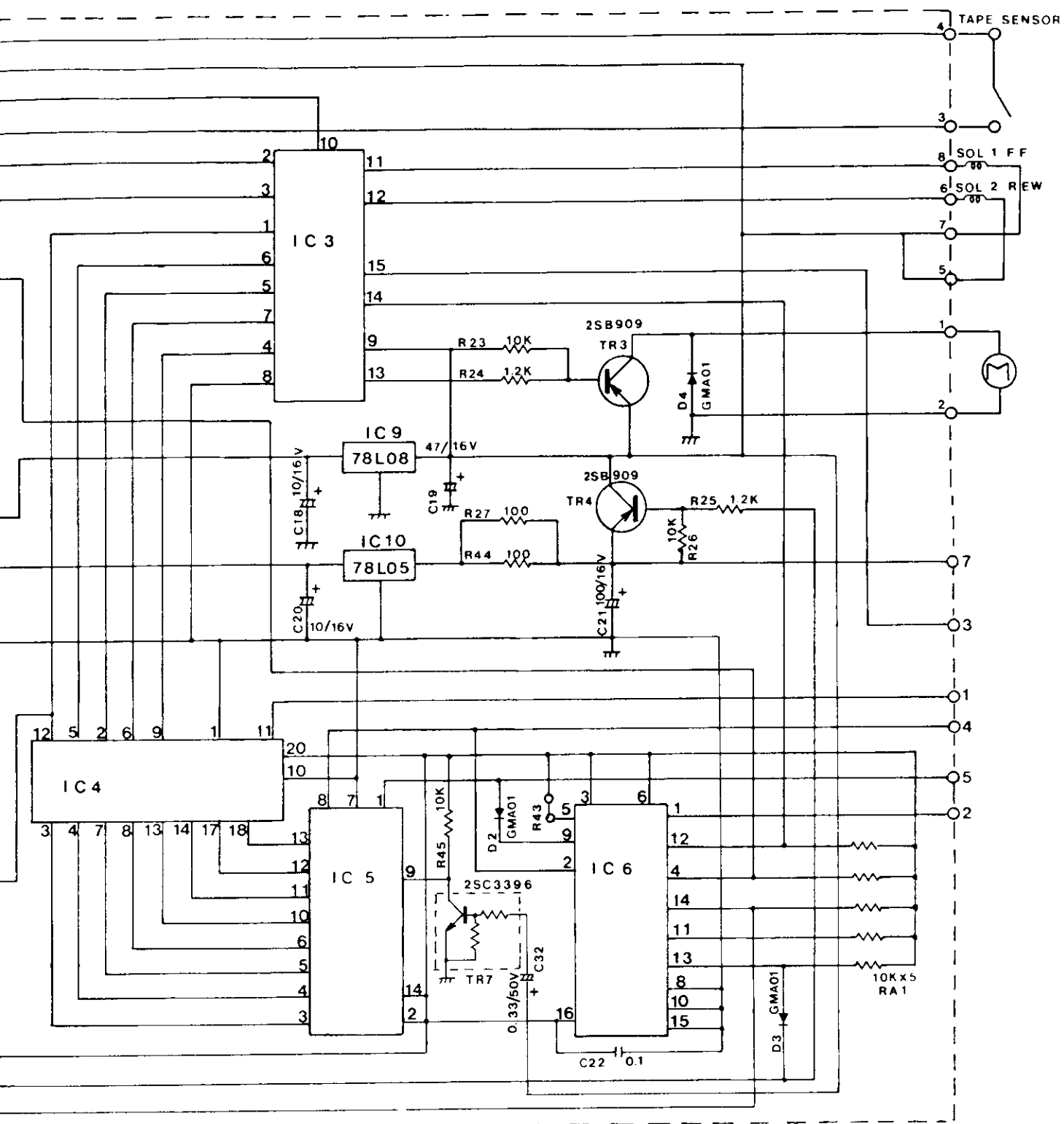


FIGURE 3-16. ELECTRICAL SCHEMATIC, SHINWA CASSETTE CONTROL PC BOARD (DOLBY)

## ALPINE CASSETTE TAPE PLAYER

### DESCRIPTION

The "GZ" mechanism is a soft-touch type car stereo playback cassette deck featuring front operation, side-loading, slot-in, auto-eject, key-off-pause and auto-tape select having 2-motors, 1-head, 4-tracks, 2-channels, auto-reverse, music sensor functions controlled by advanced IC logic circuits.

#### A. LOGIC FUNCTIONS

The mechanism contains logic IC's to interface with the radio data bus via serial data. All functions are controlled by soft-touch buttons on the radio escutcheon. The serial data is converted by IC5 (8-bit serial input/parallel output shift register) and IC6 (8-bit serial input/serial output shift register), to control the functions which were initiated by the escutcheon buttons. Voltage regulator IC10 supplies the Vcc voltage to IC5 and IC6.

#### B. TAPE DIRECTION

Photocoupled sensors U1 and U2 are comprised of a light-emitter and a photodetector. The reel-bush assemblies on which the spindles are mounted have discs with alternating shiny and dark areas, six equal sections, on their undersides. As the spindles turn, the discs spin over the photocoupler IC's and the photodetector alternates between its on/off state as light is reflected, on/off from the shiny/dark sections on the discs. When the spindles stop, this action ceases and the radio microcomputer recognizes this and signals IC5 and IC6 to initiate a change of direction.

#### C. AUTOMATIC MUSIC SEARCH

Blank portions of tape between selections are detected by IC2. This function enables a user to quickly skip from one recorded selection to the next in fast-forward or rewind mode by picking out the end/beginning of one selection and the beginning/end of the next. The music search IC (IC2) samples a combined audio output from IC7. The value of R28 is chosen to give IC2 a sensitivity of -38 db below the reference level of 0 db. Software delays in the radio microcomputer provide optimum music search performance which compensates for variations in tape speed and quality by controlling IC2 and related circuitry.

D. DOLBY NOISE REDUCTION

The Dolby® B-type circuit acts as a frequency-and-level-sensitive compander. Noise objectionable to the listener is usually in the 500 Hz to 15 kHz range and IC7 is manufactured to be effective within this frequency range. The radio microcomputer sends a signal to IC7 to activate the noise-reduction circuit when the NR button is pressed on the Infinity radio.

E. TAPE PLAYBACK HEAD

The tape deck uses a four-track head in which the two lower tracks are used for forward play and the upper two for reverse play direction. A switching IC is used to switch from forward to reverse play mode.

H. HEAD ALIGNMENT

See the details of the Replacement of Audio PC Board and Heads.

When there is a perceptible change in quality of sound - such as poor treble response - or high-frequency signal loss during normal playback, it is possible that the Azimuth (Head alignment) may need adjustment. Before proceeding to adjust the Azimuth, it is always a good idea to clean the Head thoroughly and check Frequency Response. In many cases oxide deposits from continuous tape playing are the cause of the complaint and proper cleaning solves the problem.

TABLE 4-1. HEAD ALIGNMENT PROCEDURE

| STEP | ACTION   |
|------|--|
| 1.   | Clean the tape head vigorously using a cotton swab dipped in alcohol or a good quality head cleaner.   |
| 2.   | Using a good quality test tape - 12.5 kHz or 14 kHz (TEAC MTT series) - check the Frequency Response in both directions to determine if the Azimuth needs adjustment. Step 1 may have already corrected the problem. |
| 3.   | Using a fine ALPS-head, Phillips-type screwdriver, carefully adjust the Azimuth screw for maximum Frequency Response on both channels.   |

## G. PREAMPLIFIER

The high-gain stereo preamplifier IC1, in conjunction with the related external circuitry, provides the initial amplification of the signal from the playback head. A tape-sensor switch, and a transistor (TR2) are used to automatically select the correct equalization of the preamplifier for normal or Metal/CR02 tape. The tape-sensor switch will be closed for a normal tape (+5V) which will turn off TR2. A metal tape will open the switch and turn on TR2. The tape-sensor switch action is controlled by using the slots in the industry-standard cassette tapes.

The audio levels of the two channel outputs of the preamp are controlled by two easily accessible trim-pots which are factory adjusted to compensate for differences in pickup level from the playback head, and to provide the correct output level to the Dolby® noise reduction circuit (IC7).

The volumes are located just to the right of the Audio PC Board, after removing the Cassette Mechanism from the Radio. These volumes are factory-set to 300 millivolts RMS at the Dolby® test points.

## H. PROCEDURE FOR ADJUSTING PREAMPLIFIER OUTPUT LEVELS

Each channel of the tape Preamplifier IC must be adjusted to obtain the correct output signal levels for the left and right channels, to compensate for variations in Head pick-up and establish the Dolby® specified levels for proper operation of the Noise Reduction circuits.

The Dolby® reference-level test tape -400 Hz, 200 namowebers/meter-(TEAC #MMT-150 or equivalent) is required for proper Preamplifier adjustment. If a Dolby® reference-level tape is not available, use a standard SRL test tape. Note that the Dolby® test tape is definitely preferred, because it provides the correct signal reference for setting the gain of the Preamplifier.

TABLE 4-2. PREAMPLIFIER ALIGNMENT PROCEDURE

| STEP | ACTION  |
|------|---|
| 1.   | Connect a VTVM/DVM to the left channel audio test point P103 pin 9. Adjust VR2 to obtain an output of 380 mV RMS on the left channel.     |
| 2.   | Connect the VTVM/DVM to the right channel audio test point P103 pin 8. Adjust VR1 to obtain an output of 300 mV RMS on the right channel. |

I. RECOMMENDED TEST AND REPAIR ENVIRONMENT

The TTL IC's used on both Cassette Assemblies are CMOS devices. The sensitivity of these components to electro-static discharge (ESD) has prompted the establishment of more rigorous standards for ESD controls wherever the new Radios - and the Cassette Mechanism Assemblies used in them - are handled for any purpose.

Damage caused by ESD is normally catastrophic since it directly impacts those very Logic components on which modern electronics depends so heavily. Never has prevention been more meaningful than cure. As a fundamental common-sense requirement, Acustar will expect all Service Centers to install ESD controls prior to attempting to service these new Radios and/or Cassette Mechanisms. We have reproduced a drawing from an Acustar specification for ESD control that may help you in equipping yourself suitably.

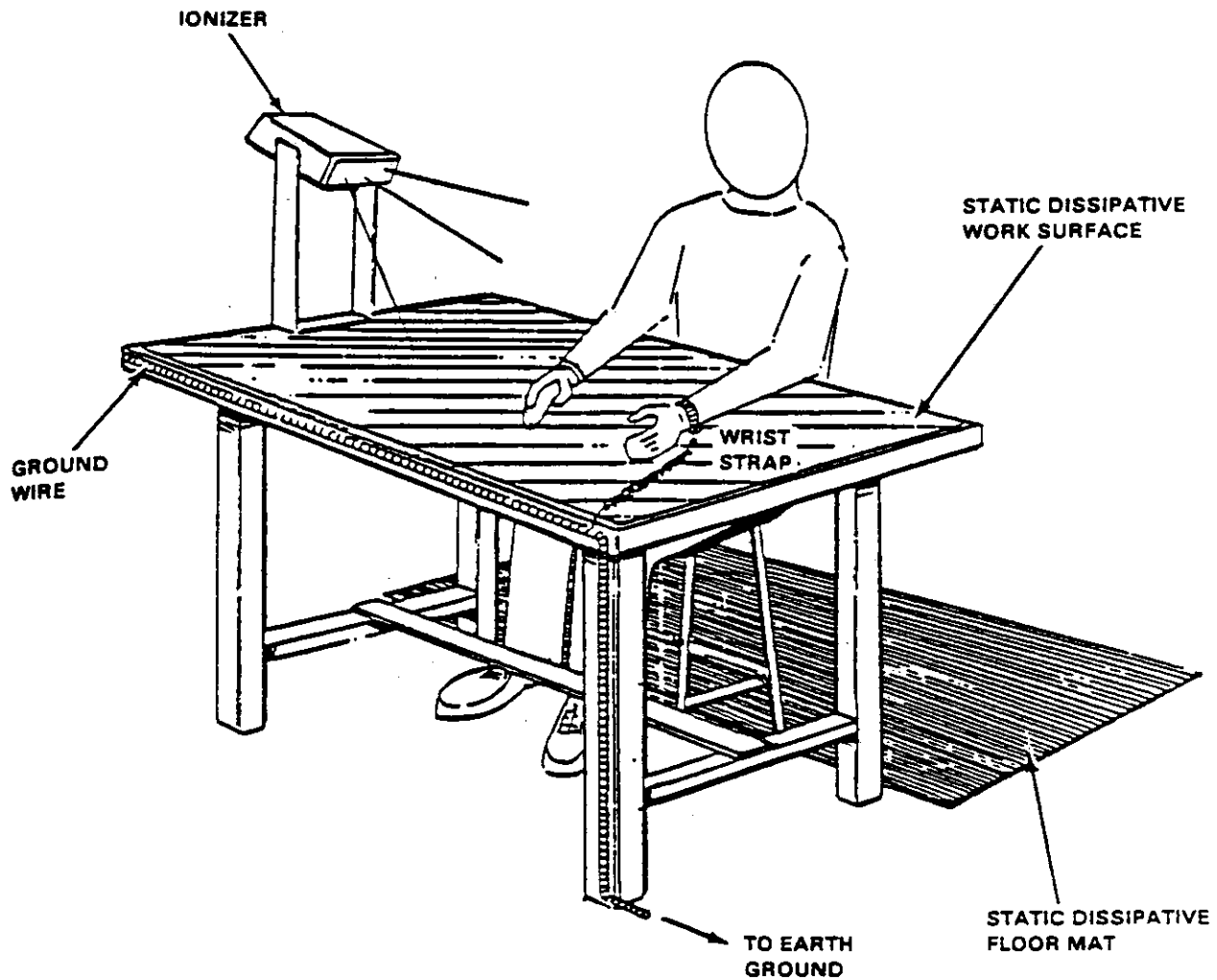


FIGURE 4-1. TYPICAL WORK STATION WITH ESD PROTECTION

J. RECOMMENDED EQUIPMENT

- o Power Supply - 14.0 VDC @ 7.5 Amperes minimum
- o AC Voltmeter (high impedance - 10 megohms or more)
- o General Purpose Oscilloscope
- o Frequency Counter
- o Audio Oscillator

K. OPERATION THEORY

1. Play - When a cassette is inserted to the tape slot, it is pulled inside the slot by approx. 59mm from the reel center. The cassette is then automatically held in the playback condition with location poles which function as guides on the chassis. At the same time, a micro switch provided on the right of the motor closes, and then the Play Solenoid (SD3) is energized, moving Play Solenoid Lever (493) which in turn moves Pause Gear (416) thus engaging the Gear (416) (rotating with the motor) with the Idler (417) (see Figure 4-2).

NOTE

CLUTCH LEVER (419) IS LIFTED UP  
TO ENGAGE WITH MOTOR GEAR (416), THUS  
ROTATING EJECT IDLER GEAR (417).

During playback mode, the Gear (416) does not rotate, so no gear noise will be heard. The Motor (M1) rotates Pause Gear (416) by approx. one turn so that the cam drives the head base and to lock the head base at the play position with Play Lock Lever (445). Above operations are conducted as soon as the cassette is loaded (cassette-in or cassette-down), and the playback operation starts immediately.



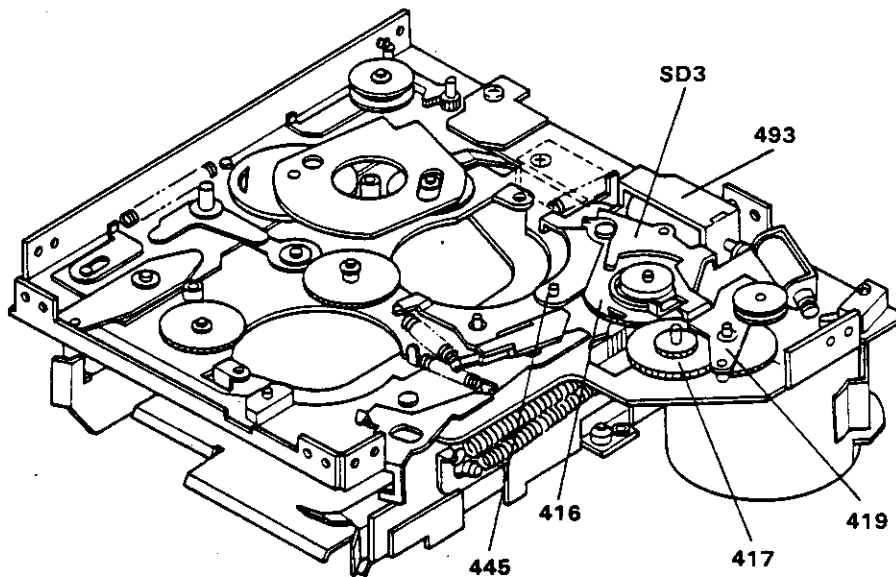


FIGURE 4-2. PLAY MODE

2. Key-Off Pause - When Key-Off or Pause SW is turned off in the playback mode, Play Solenoid (SD3) is energized, and Play Solenoid Lever (493) and Play Lock Lever (445) are released. Then, Pause Gear (416) engages with Eject Idler Gear (417), and this returns to HD Base (432) to Eject position, thus stopping the motor (see Figure 4-2). Playback operations mentioned above takes place with Key-On.
  
3. Reverse Operation - Tape travel direction can be reversed at any time in the play mode by simply turning the Program Button (SW) on. When Program Solenoid (SD1) is energized, Reverse Lock Lever (451) is pulled and Lock of Change Gear (481) is released, allowing the Change Gear (481) pressed by Reverse Act Lever (451) to engage with Flywheel's gear. A boss provided on Change Gear (481) moves Select Lever (425) up (or down) to move the Pinch Roller Shaft (444), thereby changing Pinch Roller's (430/449) pressure direction, thus reversing direction of tape travel (see Figures 4-3 & 4-4).

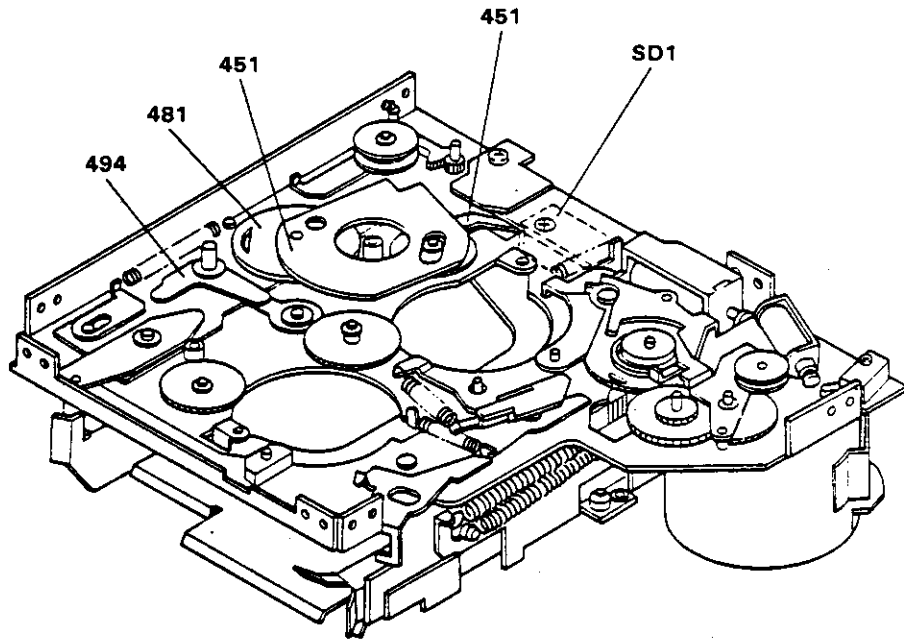


FIGURE 4-3. REVERSE OPERATION MODE

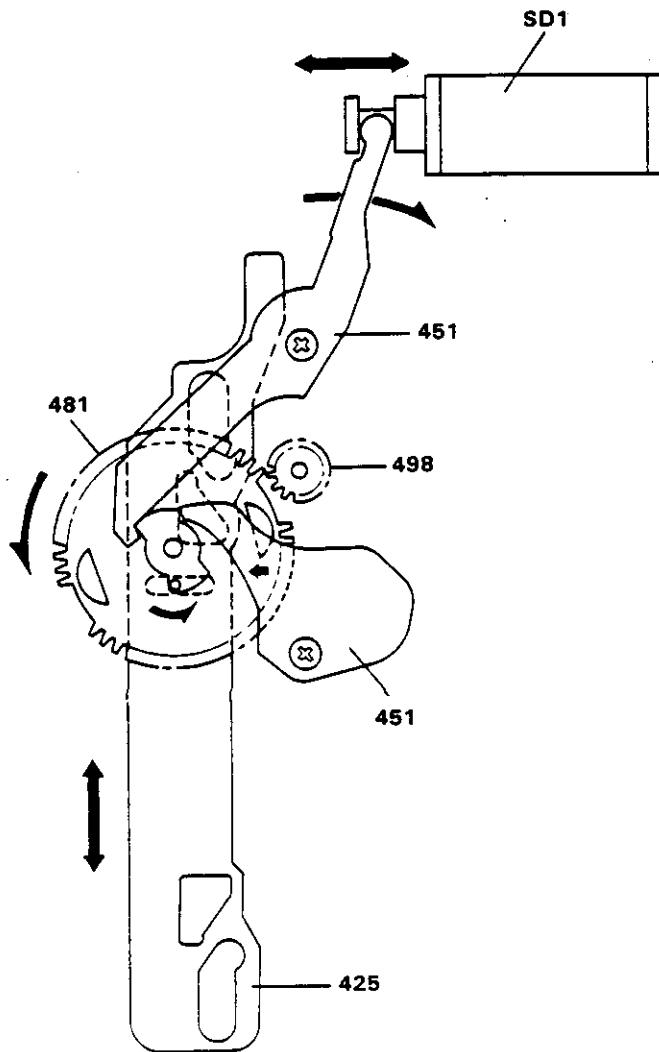


FIGURE 4-4. REVERSE OPERATION MODE

4. Auto Reverse - When rotation of reels stops at Play End, a photo-transistor senses this end, and actuates the Auto-Reverse circuit which automatically changes direction of tape travel, thus allowing the tape to travel in reverse direction.

In the similar way, when the tape travel direction is automatically reversed. The End detection signal is inverted when the take-up reel stops.

In the REW End, the Prog signal is not inverted and the deck enters the play mode if REW button is not pushed.

When the REW button is being pushed, the Prog signal is inverted and the deck enters play mode with the opposite tracks selected. However, as the input is confirmed immediately after, the deck becomes REW condition.

The End detection signal is inverted when only the take-up reels stops.

5. True FF/REW - During playback operation in normal direction the tape is wound in forward direction rapidly when FF button is pushed, or the tape is rewound rapidly when REW button is pushed.

During playback operation in reverse direction the tape is wound in reverse direction rapidly (playback direction) when FF button is pushed; and the tape is wound in normal direction rapidly when REW button is pushed. That is, the tape is always fed in the playback direction when the FF button is pushed, or fed in reverse direction when the REW button is pushed.

6. FF/REW Operation - When FF or REW button is pushed during playback operation, the deck enters FF/REW mode and is locked to the mode. To release the lock in the FF/REW mode, push Play, Eject, Pause, or IGN button, and the deck directly enters the mode specified by the button pushed.

When REW button is pushed during FF mode, the deck directly enters REW mode. When FF button is pushed during REW mode the deck enters the FF mode directly. FF or REW time is approx. 75 sec ( $\pm 20^{\circ}\text{C}$ ) for C-60 tape, and may not vary largely due to environmental change because of a gear drive system employed.

FF/REW Operation Theory - When FF/REW button is pushed during playback mode of operation, Play Solenoid (SD3) is energized as mentioned in Key-Off Pause operation, and Head Base (432) moves backward up to Eject condition. At the same time, R/F C Motor (M2) (which is a submotor) rotates and R/F C Gear (454) rotates by approximately one turn through reduction gears. The R/F Motor (M2) can rotate in either forward or reverse direction. This rotating direction is controlled by the signal developed in the Reverse circuit.

R/F rotating R/F C Gear determines swing direction of Gear R/F Swing (504) or FF/REW Mode. (R/F Lever (503) moves up and down, and this makes R/F Idler Gear (454) engage (disengage) with Flywheel (438)).

FF/REW Lock is continuously held with Chip (482) of R/F Lock Riv. (483) (moving left and right simultaneously) energized by R/F Solenoid (SD4). Releasing the operation is made by de-energizing the R/F Solenoid (SD4). That is, when the Chip (482) is released, R/F Lock Riv. (483) is returned to the neutral position by force of Spring (484).

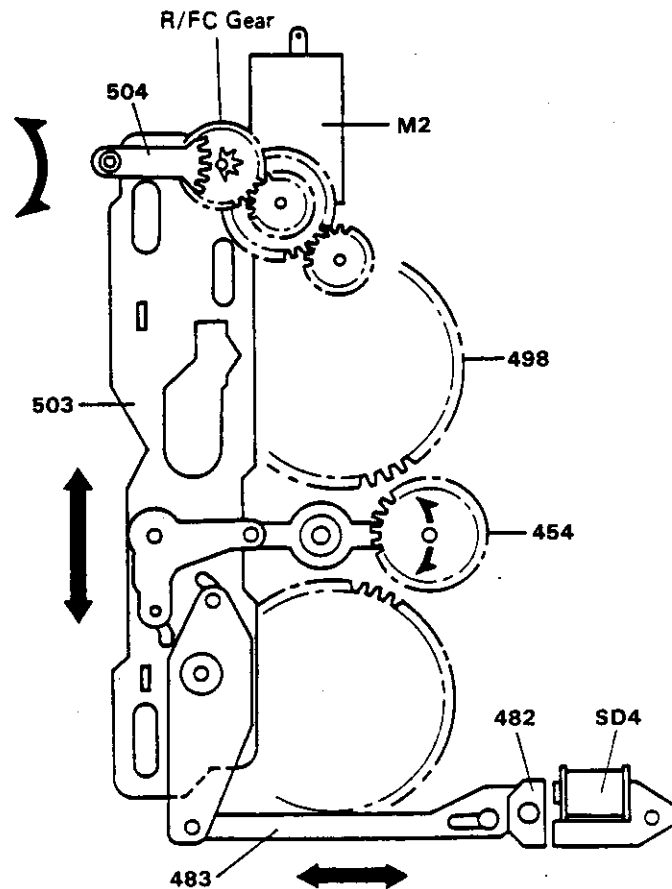


FIGURE 4-5. FF/REW OPERATION THEORY

7. FF/REW Operations at Music Sensor On - When MS (Music Sensor) function is actuated in FF/REW mode to detect a signal blank between tunes, the playback head is moved forward to contact running tape or CUE/REV mode is set (see Figure 4-6).

In CUE/REV mode with the MS function actuated, Play Solenoid (SD3) is not energized but Head Base (432) is driven by the cam of R/F Lever (503) which in turn is driven up or downward by R/F Lever (503).

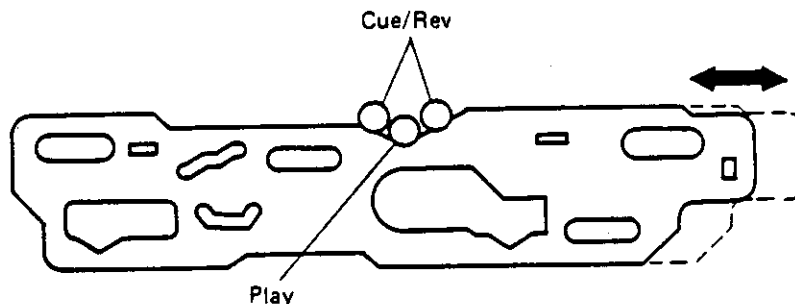


FIGURE 4-6. FF/REW OPERATIONS AT MUSIC SENSOR ON

8. Muting - Muting operation is controlled inside the IC and no mechanism is concerned. The circuit is designed to mute signals over time range starting from 50 msec before initiation of each mode to end of the transitional operation of the mode.
9. Auto Metal - When a cassette with a cutout (opening) for identifying a metal tape, the claw of Auto Metal Lever slides into the cutout, and #1 and #2 of SW Slide opens, thus indicating "metal". While, when a normal tape is loaded, the claw of the Lever is pressed outward, shorting #1 and #2, thus operating the circuits related to the normal tape. That is, the switch is used to automatically switch equalizer circuits for the metal/chromium tapes (see Figure 4-7).

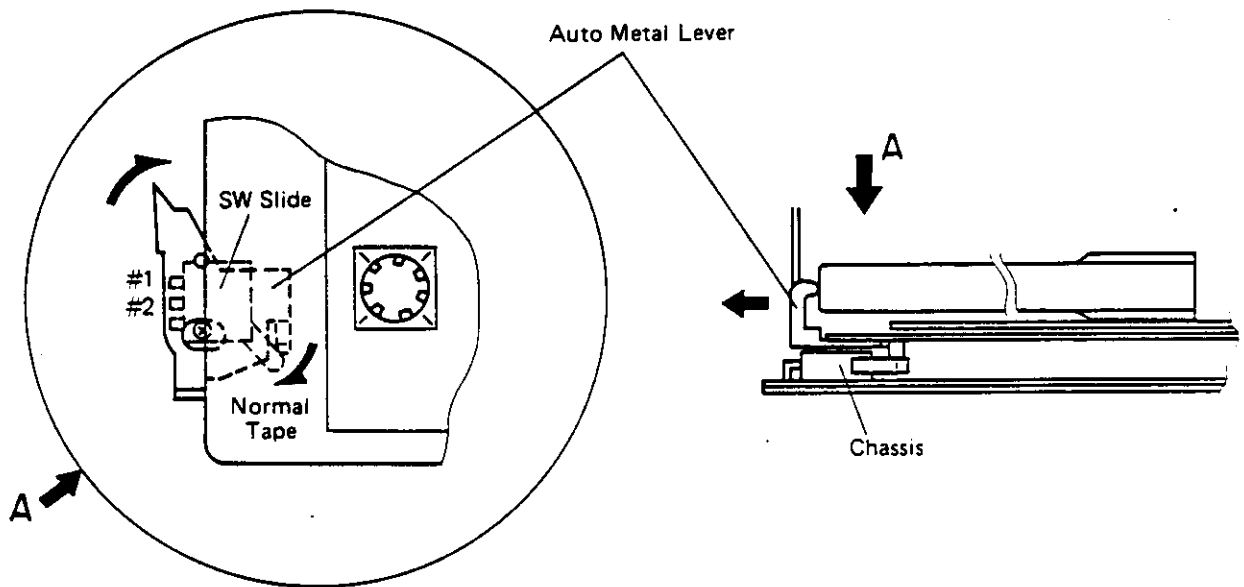


FIGURE 4-7. AUTO METAL IDENTIFICATION

10. Auto Eject - When Eject button is pushed, Main Motor (M1) actuates the power assist mechanism and slowly ejects the cassette. The Eject button is enabled for IGN Off period.

Eject Mechanism - When the Eject button is pushed, Play Solenoid (SD3) is energized and this releases the Play Lock Lever (445) and allows the Play Solenoid Lever (493) to move for releasing lock of the Pause Gear (416).

The Pause Gear (416) is rotated clockwise by side pressure (of Head Base Spring) (433) of the Play Lever ganged with Head Base (432).

Then the CAM pushes up the Clutch Lever (419), and Clutch Gear mounted on the Clutch engages with the Motor Gear. Idler Gears (417) rotate through gear transmission mechanism. At this time, the Head Base (432) moves backward and reaches the position for Eject, Pause mode.

The Eject Idler Gear (417) rotates and makes the Pause Gear (416) rotate up to the cutout position.

After a specified time elapsed from Play Solenoid (SD3) operation (after HD Base (432) has been returned), the Eject Solenoid (SD2) is energized, then the Lock section of the Eject Lock Lever and

Eject Mechanism (Cont.)

the Eject Gear is released, and the Gear Eject rotates clockwise by being pushed with the Eject Act Lever, and engages with the Eject Idler Gear (417). With the Eject Gear rotated, the Rack attached on the Eject Lever (403) is pulled, and this moves the Eject Arm (525) in reverse direction in addition to reverse force of Turn EJ Spring (443) thus ejecting the cassette.

Cassette Holder is raised by moving Rack with CAM of Eject Lever (403) (see Figures 4-8 & 4-9).

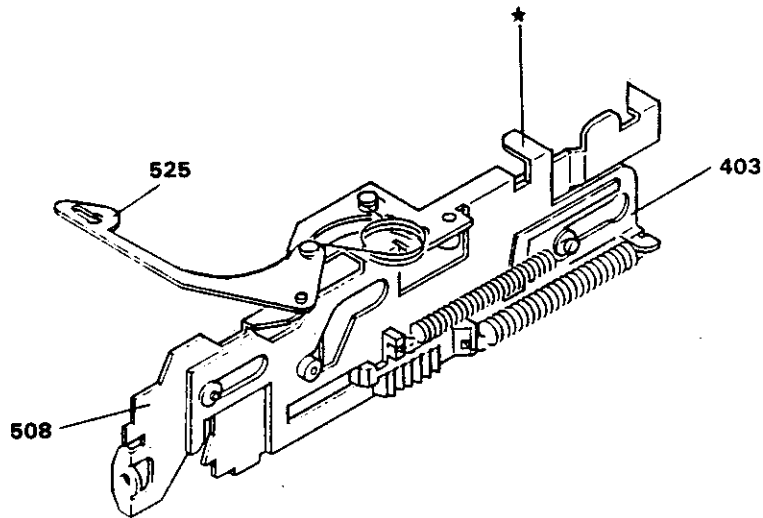


FIGURE 4-8. PLAY MODE

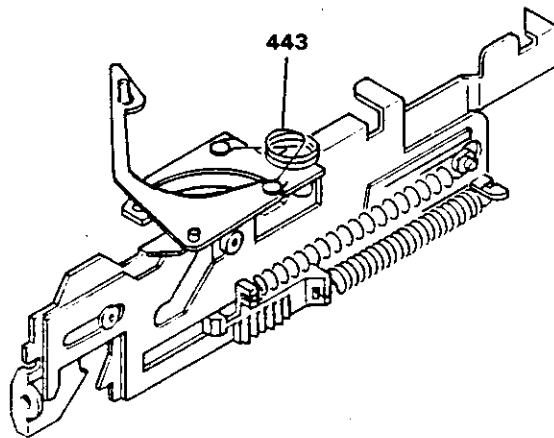


FIGURE 4-9. AUTO EJECT MODE

11. Eject Safety Mechanism - If a cassette is jammed during Eject operation, or ejected by foreign matter inserted, Rack is pulled by Eject Gear, as can be seen from the above illustration. However, the coil spring is expanded and this completes the Eject operation without ejecting the cassette, thus preventing the mechanism from possible damage.
12. Urgent Eject Mechanism - If the cassette is not ejected with Eject button pushed, the cassette can be manually removed by pushing the part marked \* on Eject Lever with a fine, long bar through the cassette slot as illustrated (see Figure 4-8).
13. Music Sensor - As mentioned previously, Head Base (432) is moved backward by moving R/F Lever (503) to touch the head with tape while feeding the tape rapidly in forward or reverse direction. The signals thus picked up are used to detect a blank between tunes for performing the One Music Scan operations.

L. HOW TO HANDLE CASSETTE DECK

Do not hold the cassette deck at/around the motor pulley (see Figure 4-10). Do not hold the cassette deck at/around the R/F motor. If held, R/F motor's gear engagement may be upset and cause undesirable troubles (see Figure 4-11). Do not hold the cassette deck as shown (see Figure 4-12). If held, brakes may be damaged or the pinch roller deformation may be caused. It may cause breakdown of parallel wire leads. Holding as shown is recommendable (see figure 4-13).

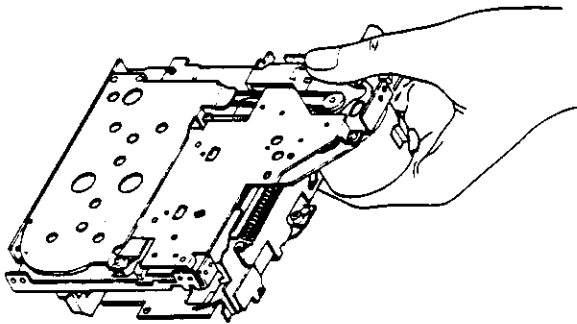


FIGURE 4-10. UNDESIRABLE HANDLING

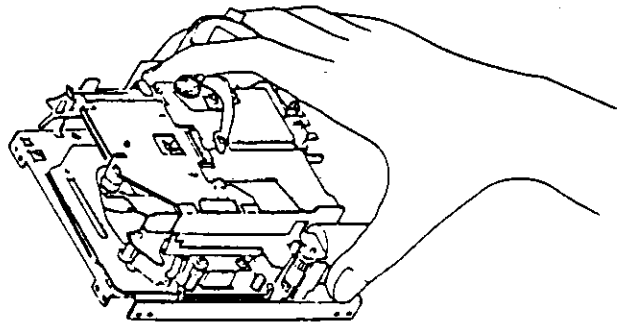


FIGURE 4-11. UNDESIRABLE HANDLING



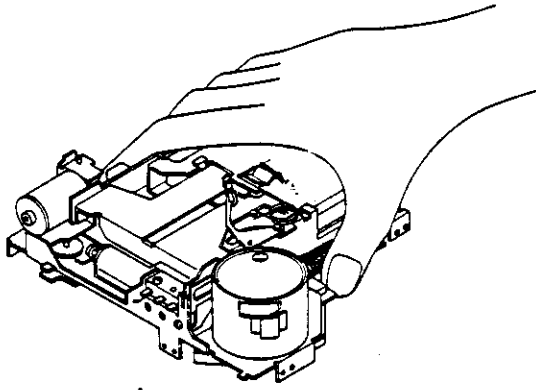


FIGURE 4-12. UNDESIRABLE HANDLING

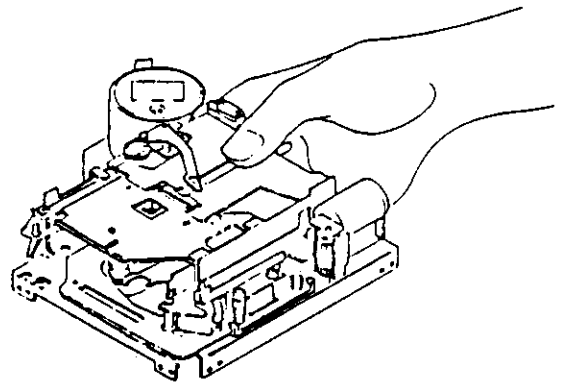


FIGURE 4-13. DESIRABLE HANDLING

#### CAUTIONS ON MECHANISM DISASSEMBLING

IF THE DECK PLACED WITH THE CASSETTE HOLDER FACING DOWNWARD IS PUSHED FROM TOP TO SIDE, THE CASSETTE HOLDER MAY CAUSE UNDESIRABLE CLEARANCE OR LOOSENESS. ALWAYS PLACE THE DECK SO THAT THE CASSETTE HOLDER IS FREE FROM ANY PRESSURE (SEE FIGURE 4-14).

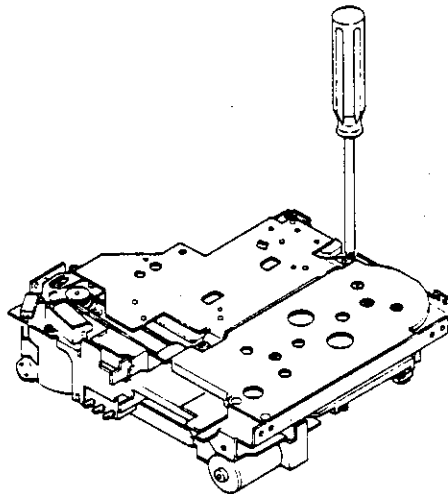


FIGURE 4-14. CASSETTE MECHANISM DAMAGE

#### M. MECHANICAL PARTS REPLACEMENT

##### 1. Motor Replacement

- a. Remove 2 screws (marked O) (see Figure 4-15).
- b. Remove the belt (see Figure 4-15).
- c. Remove the wire leads from the motor terminal and the motor will be removed.

1. Motor Replacement (Cont.)

- d. Install a good motor, taking care not to damage gear teeth. To mount the motor perform the above steps in reverse order.
- e. After completion of the replacement, adjust the tape speed, using the test tape (MTT-111). (Refer to the tape speed adjustment).

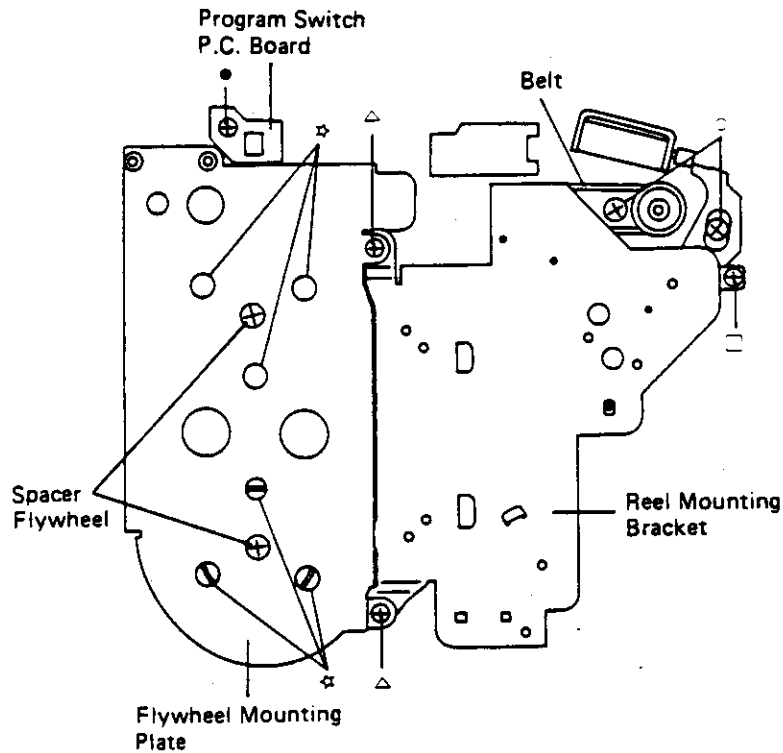


FIGURE 4-15. MOTOR REPLACEMENT

2. Belt Replacement

- a. Remove 2 screws (marked Δ ) and remove the flywheel mounting bracket (see Figure 4-15).
- b. Clean a good belt with alcohol and thread the belt. Assemble the unit, performing above steps in reverse order (see Figure 4-16).

NOTE

1. Take care the belt is not stained with oil.
2. When tightening screws for the flywheel bracket, apply tightening torque of 4.5 kg/cm.
3. When applying screw lock adhesive to the flywheel spacer, take care that the cross-recessed screw hole is free from the adhesive.

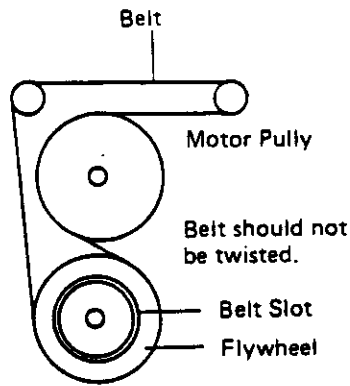


FIGURE 4-16. BELT REPLACEMENT

3. Control PC Board Replacement

- a. Desolder 9 locations and one screw (marked \* ) (see Figure 4-17).
- b. Remove the flexible wire leads and wire leads connected to the PC board, and the control PC board will be removed.
- c. Replace the board with a good one and assemble the board, using above steps in reverse order.

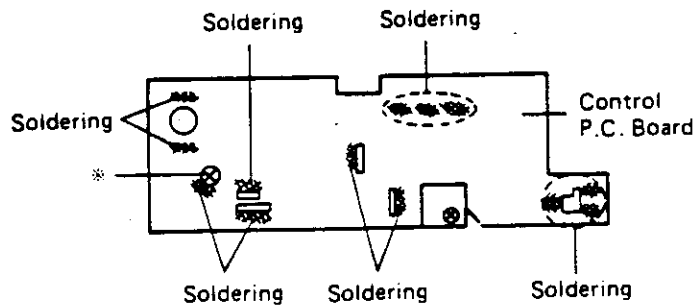


FIGURE 4-17. CONTROL PC BOARD REPLACEMENT

4. Program Switch PC Board Replacement

- a. First remove the control PC board as mentioned above and then remove one screw (marked ● ), and the program PC board will be removed.
- b. Replace the board with a good one and assemble the board, using above steps in reverse order.

5. Replacement of Audio PC Board and Heads

- a. Desolder two locations and the audio PC board will be removed (see Figure 4-18).

5. Replacement of Audio PC Board and Heads (Cont.)

- b. Remove the head flexible PC board connected to the audio PC board.
- c. Remove two screws (marked ▲ ) and remove the guide holder (see Figure 4-19).
- d. Remove one washer and remove the cassette holder and the base plate (see Figure 4-20).

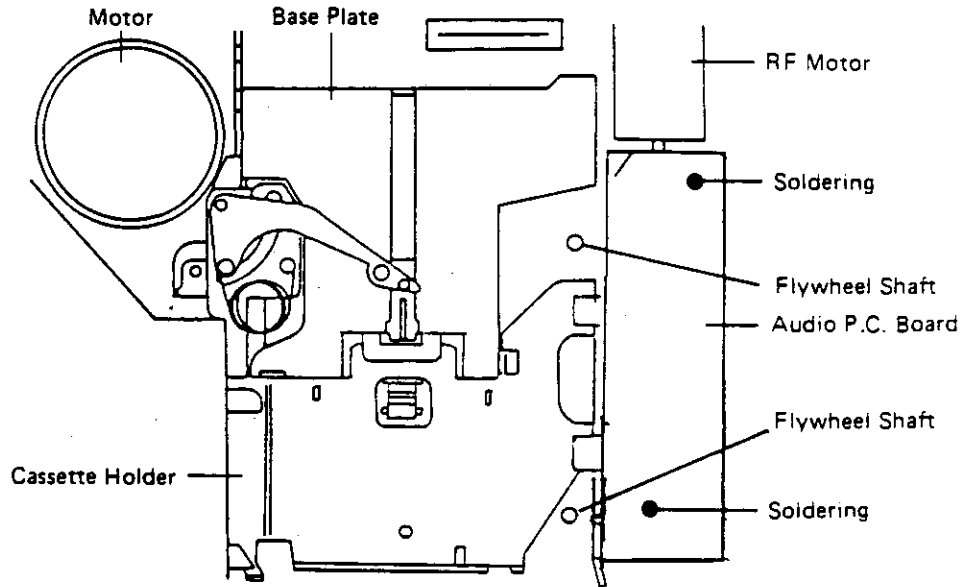


FIGURE 4-18. AUDIO PC BOARD REMOVAL

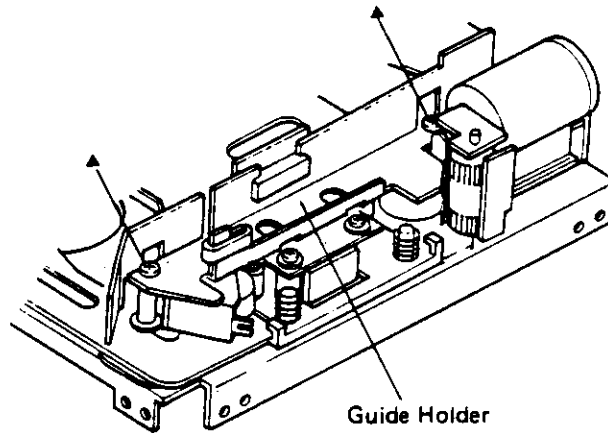


FIGURE 4-19. HEAD REMOVAL

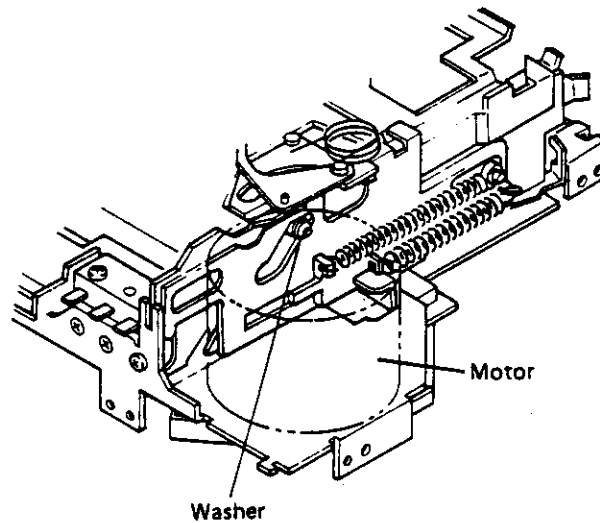


FIGURE 4-20. CASSETTE HOLDER & BASE PLATE REMOVAL

- e. Remove two screws (marked ■ ) and the head flexible PC board will be removed. (In this case take care not to miss the spacer and the coil spring.) (see Figure 4-21).
- f. Remove the head from the PC board.
- g. Replace the head with a good one and mount the head with two screws (marked ■ ). (In this case, insert the spacer to the fixed side screw and the coil spring to azimuth adjustment side screw).

NOTE

SINCE THE FLEXIBLE PC BOARD IS APT TO BE DAMAGED, HANDLE IT WITH SUFFICIENT CARE.

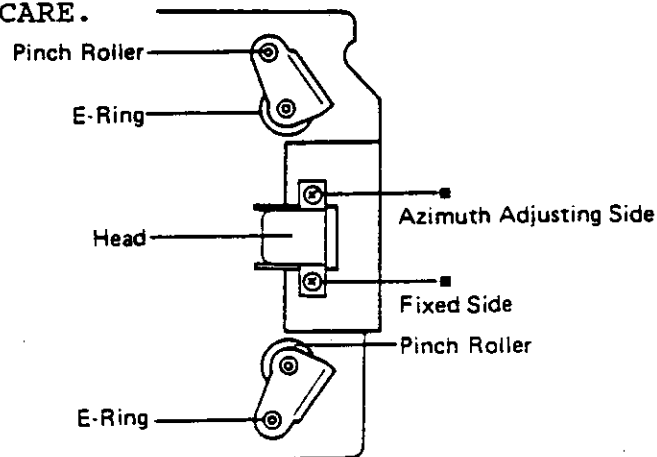


FIGURE 4-21. HEAD PC BOARD REMOVAL

5. Replacement of Audio PC Board and Heads (Cont.)

h. Perform the Head Height Adjustment.

- 1) Place the height adjustment gauge (M-300 or AI-500) on the head base, and adjust the gauge height so that the check bar can enter the tape head guide smoothly (see Figures 4-22, 4-23, & 4-24).
  - 2) When the check bar touches top or bottom guide of the tape guide, insert a spacer (of 0.1mm thickness or a polyslider washer of 0.13mm in thickness). (Or remove the spacer to adjust the height.)
- i. After mounting the head, reassemble using the above steps in reverse order.
- j. Next, adjust head angle, using the test tape (MTT-113C). (Refer to the "Head Angle Adjustment".) After completion of the adjustment apply screw lock adhesive to the adjusting screw. In this case, take care so that the adhesive does not stain the pinch roller.

NOTE

IF THE HEIGHT GAUGE IS NOT AVAILABLE, RUN A TAPE AS USUAL AND ADJUST THE HEIGHT (HEAD AND SMALL GUIDE WINDOW) SO THAT NO TAPE CURLING IS OBSERVED (SEE FIGURE 4-23).

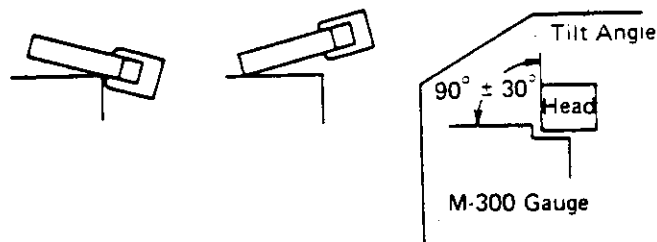


FIGURE 4-22. HEIGHT ADJUSTMENT GAUGE PLACEMENT

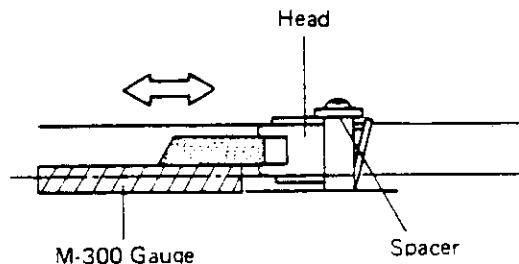


FIGURE 4-23. HEAD HEIGHT ADJUSTMENT

## 6. Pinch Roller Replacement

- a. Remove the control PC board and guide holder, and then the RF motor will be removed.
- b. Remove two E-rings securing the pinch roller and the pinch roller will be removed (see Figure 4-21).
- c. Replace the pinch roller with a good one, clean the pinch roller with alcohol, and then assemble it, using the above steps in reverse order.
- d. After assembling, make sure performance of tape speed and wow-flutter, using the test tape (MTT-111).

## 7. Flywheel Replacement

- a. Remove the flywheel mounting bracket and the belt.
- b. Remove the flywheel by moving it straight up. (In this case, a washer on opposite chassis will also be removed together, so taking care not to miss the washer.)
- c. Mount a good flywheel. (In this case, also insert the flywheel washer and apply a drop of "mobile 1" oil.)
- d. Mount the belt and the flywheel mounting bracket. Make sure flywheel's thrust clearance by pushing tip of the flywheel shaft and by pushing the flywheel through the opening on the flywheel mounting bracket (marked ) (see Figure 4-15).

Turn the spacer flywheel until the thrust clearance becomes minimum and then fix the spacer with screw adhesive lock.

- e. Finally, mount the oil seal washer to the shaft.
- f. After assembling, make sure of the tape speed and wow-flutter, using a test tape (MTT-111).

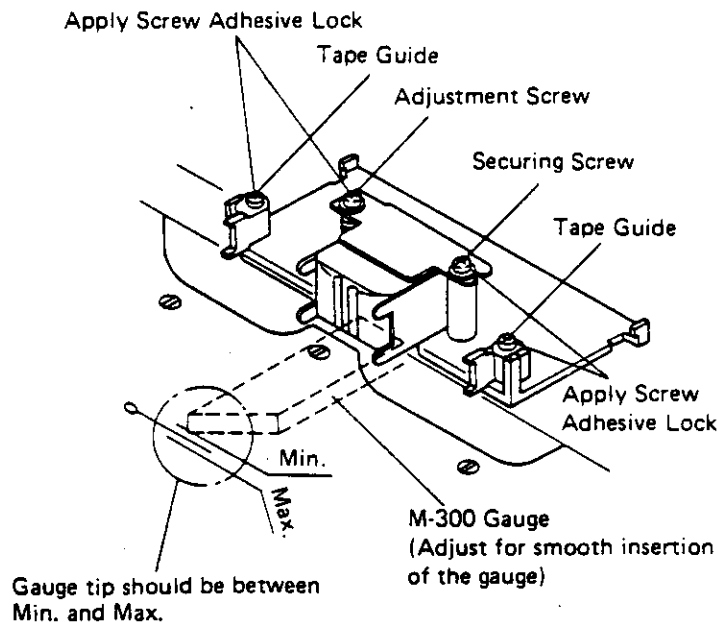


FIGURE 4-24. HEAD HEIGHT ADJUSTMENT

8. Replacement of Reverse PC Board and Reels

- a. Remove two flywheels.
- b. Remove one screw (marked ) and remove the flexible wire leads mounted on the PC board (see Figure 4-15).
- c. Remove two lock washers and the two reels will be removed.
- d. After removal of the reels, desolder two locations and remove two screws (marked X) and one lock washer. Desolder leads from the RF solenoid (see Figure 4-25).
- e. Replace with good reel(s) and/or reverse PC board. Assemble them using above steps in reverse order.
- f. After the replacement, make sure of the tape speed and wow-flutter, using a test tape (MTT-111).



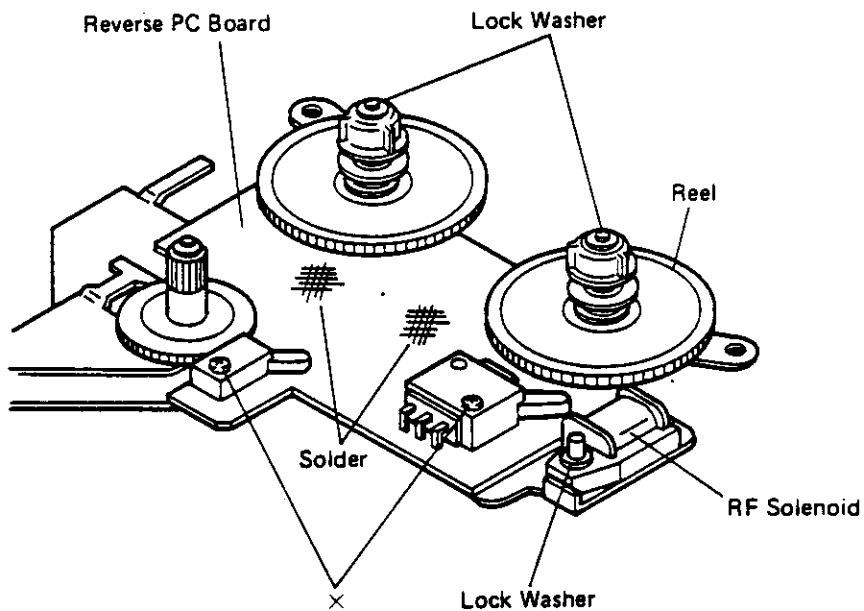


FIGURE 4-25. REVERSE PC BOARD & REELS

N. DECK DISASSEMBLING DIAGRAM

1. Methods - Disassembling and assembling methods of the cassette holder and the base plate.
  - a. Mount the switch lever A.
  - b. Mount the micro switch B and fix it with screw C.
  - c. Mount the cassette holder assembly E on the base plate assembly D (see Figure 4-26).
  - d. Mount the eject frame assembly F (see Figure 4-27).
  - e. Mount them on the chassis.
  - f. Place the chassis vertically and fix with screw G (see Figure 4-26).

CAUTION

1. WHEN MOUNTING THE BASE PLATE ASSEMBLY D AND EJECT FRAME ASSEMBLY E, TAKE CARE NOT TO BEND THE EJECT ARM.
2. WHEN INSTALLING F, PRESS DOWN THE CAS.PUSH LEVER.
3. WHEN MOUNTING THE EJECT FRAME ASSEMBLY F ON THE CHASSIS, DO NOT APPLY EXCESSIVE FORCE TO THE FRAME.

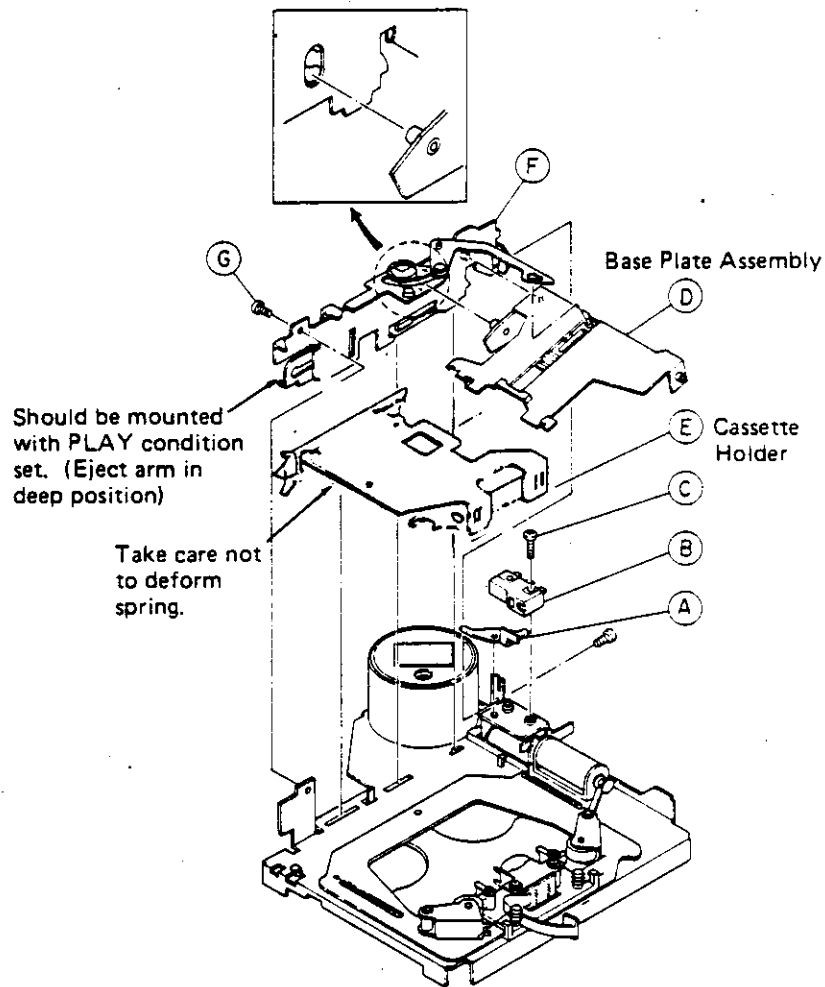


FIGURE 4-26. CASSETTE HOLDER & BASE PLATE

- g. Under cassette-in condition, insert the slider shaft F into the eject arm, and mount it as illustrated by rotating it in direction shown by the arrow (see Figure 4-27).

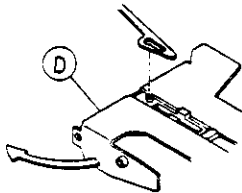


FIGURE 4-27. EJECT ARM

## Head Base Assembly

|            |                            |
|------------|----------------------------|
| <u>524</u> | Head Frame                 |
| <u>HD1</u> | Head Assembly              |
| <u>472</u> | SCR F-LOKS                 |
| <u>514</u> | Head Spring                |
| <u>421</u> | Tape Guide Spring          |
| <u>463</u> | Tape Guide                 |
| <u>462</u> | Shim (option)              |
|            | For head height adjustment |

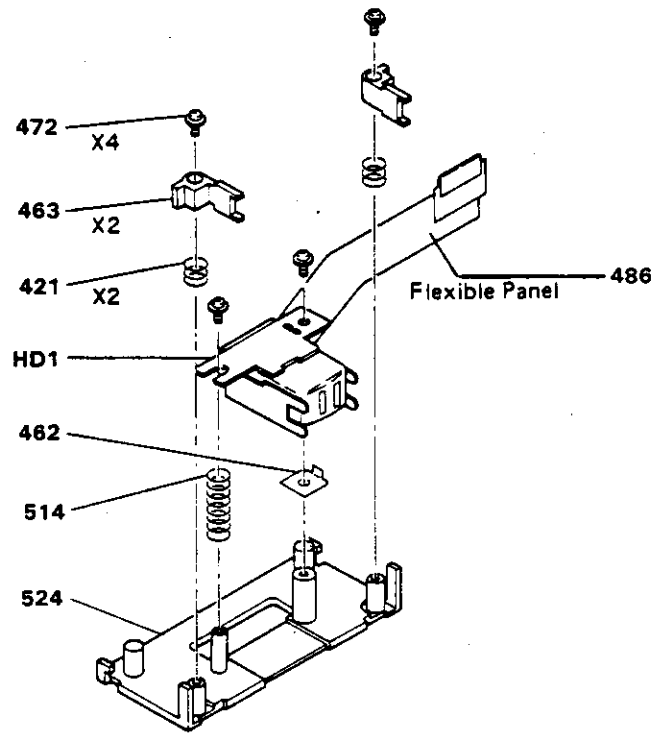


FIGURE 4-28. HEAD BASE ASSEMBLY

# Pinch Roller Assembly

|            |                       |
|------------|-----------------------|
| <u>430</u> | Pinch Roller Assembly |
| <u>449</u> | Pinch Roller Assembly |
| <u>431</u> | E-Ring                |
| <u>457</u> | Pinch Roller Spring   |
| <u>422</u> | Pinch Roller Spring   |
| <u>433</u> | Head Base Spring      |

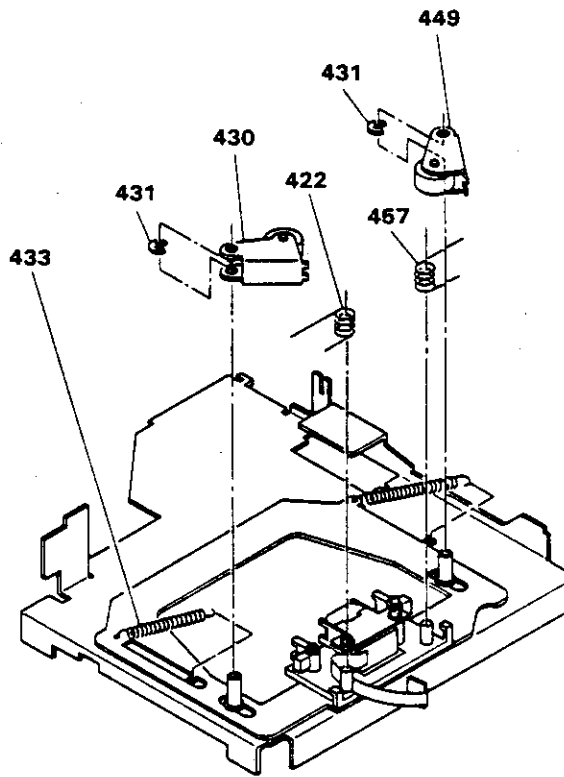


FIGURE 4-29. PINCH ROLLER ASSEMBLY

### Photo-Transistor Mounting

|                    |                                     |
|--------------------|-------------------------------------|
| <u>513</u>         | Reverse Panel                       |
| <u>RES 20K-1/6</u> | Photo-Transistor                    |
|                    | (Take care for mounting direction.) |
| <u>409</u>         | Washer (t = 0.13)                   |

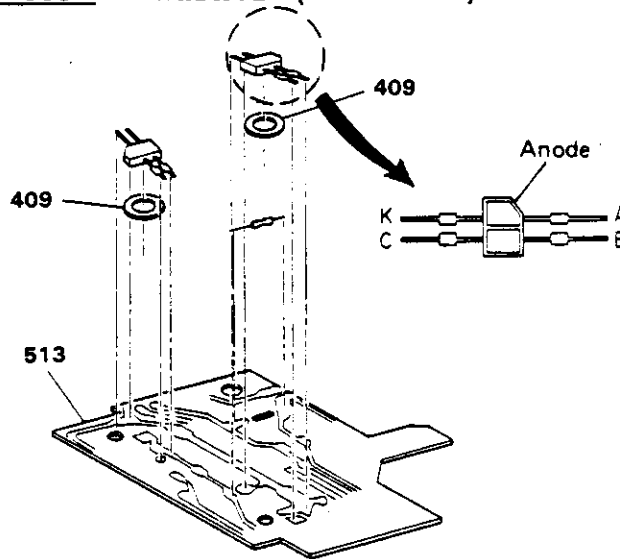


FIGURE 4-30. REEL PANEL ASSEMBLY (513)

### R/F Frame Mounting

|            |                    |
|------------|--------------------|
| <u>487</u> | R/F Frame          |
| <u>412</u> | Washer             |
| <u>489</u> | Gear, R/F (B)      |
| <u>491</u> | R/F Gear Assembly  |
| <u>410</u> | Washer             |
| <u>M2</u>  | R/F Motor Assembly |
| <u>473</u> | Screw              |

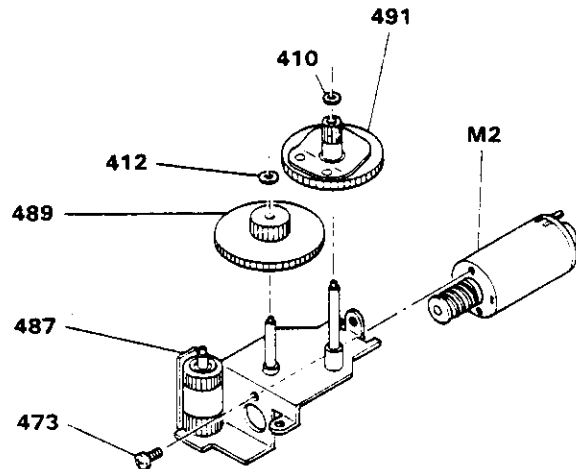


FIGURE 4-31. R/F FRAME MOUNTING

REPLACEMENT PARTS LIST, ALPINE CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER     | DESCRIPTION                 |
|------------------|-----------------|-----------------------------|
| 401              | EMCR (Ref Only) | Rack                        |
| 402              | EMCR (Ref Only) | Spring                      |
| 403              | EMCR (Ref Only) | Assy., Riv. Eject Lever     |
| 404              | EMCR (Ref Only) | Roller Eject (C)            |
| 405              | Part of Kit     | Washer Lock (M1.2)          |
| 406              | Part of Kit     | Washer Polyslider (M2.1)    |
| 407              | EMCR (Ref Only) | Washer Lock (M1.2)          |
| 408              | EMCR (Ref Only) | Washer Lock (M2.6)          |
| 409              | EMCR (Ref Only) | Washer Polyslider (M4.1)    |
| 410              | EMCR (Ref Only) | Washer Lock (M1.2)          |
| 411              | EMCR (Ref Only) | Washer Lock (M2.3)          |
| 412              | Part of Kit     | Washer Lock (M1.7)          |
| 413              | 04A41345P12     | Washer Lock (M1.7)          |
| 414              | 41B63283F05     | Spring                      |
| 415              | EMCR (Ref Only) | Assy., Riv. Chas.           |
| 416              | 44A63189F01     | Gear Motor Idler            |
| 417              | 44A63190F01     | Gear Eject Idler            |
| 418              | EMCR (Ref Only) | Gear Clutch                 |
| 419              | 01A63497F02     | Assy., Riv. Clutch Lever    |
| 420              | 41B63283F08     | Spring                      |
| 421              | EMCR (Ref Only) | Spring Tape Guide           |
| 422              | 41A63286F02     | Spring Pinch Roller         |
| 423              | EMCR (Ref Only) | Spring                      |
| 424              | EMCR (Ref Only) | Roller Plate Base           |
| 425              | EMCR (Ref Only) | Lever Select                |
| 426              | 45B82846F01     | Slider                      |
| 427              | EMCR (Ref Only) | Shaft Slider                |
| 428              | EMCR (Ref Only) | Spring Reverse Lock         |
| 429              | 07C82556F01     | Assy., Riv. Cassette Holder |
| 430              | 01T83741F01     | Assy., Pinch Roller         |
| 431              | Part of Kit     | Ring "E" (M3)               |
| 432              | EMCR (Ref Only) | Assy., Riv. Head Base       |
| 433              | 41B63283F03     | Spring                      |
| 434              | EMCR (Ref Only) | Spring                      |
| 435              | 01V68400F39     | Assy., Gear Pause           |
| 436              | 44A63196F01     | Gear Take Up                |
| 437              | EMCR (Ref Only) | Spring Reverse Act.         |
| 438              | 49A64627F01     | Reel Cap                    |
| 439              | 49A64626F01     | Reel Ring                   |
| 440              | 41A64628F01     | Spring Reel                 |
| 441              | EMCR (Ref Only) | Spring Eject Lock           |
| 442              | 01T72396F01     | Assy., Reel                 |
| 443              | 41A63284F01     | Spring Turn Eject           |

REPLACEMENT PARTS LIST, ALPINE CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER     | DESCRIPTION                  |
|------------------|-----------------|------------------------------|
| 444              | 01A63495F04     | Assy., Riv. Reel Bkt.        |
| 445              | 45A63173F01     | Lever Play Lock              |
| 446              | 01A82275F01     | Assy., Riv. Plate Base       |
| 447              | Part of Kit     | Cushion Holder (B)           |
| 448              | 07C82478F01     | Frame, Holder                |
| 449              | 01T83741F02     | Assy., Pinch Roller          |
| 450              | EMCR (Ref Only) | Lever, Sw. Micro             |
| 451              | 01A63496F01     | Assy., Riv. Reverse Frame    |
| 452              | 01A63483F02     | Assy., Riv. RF Idler         |
| 453              | EMCR (Ref Only) | Roller Eject Arm             |
| 454              | 44A63197F01     | Gear RF Idler                |
| 455              | EMCR (Ref Only) | Spring Play Act.             |
| 456              | 45A63179F01     | Lever Play Solenoid          |
| 457              | 41A63286F01     | Spring Pinch Roller          |
| 458              | 01T72396F02     | Assy., Reel                  |
| 459              | EMCR (Ref Only) | Spring                       |
| 460              | 01V71800F19     | Assy., Flywheel Bkt.         |
| 461              | 44B63188F01     | Gear Eject                   |
| 462              | Part of Kit     | Spacer Head                  |
| 463              | 43B63198F01     | Tape Guide                   |
| 464              | Part of Kit     | Scr., Pan (M1.7X6)           |
| 465              | EMCR (Ref Only) | Scr., Countersink (M2.6X6.5) |
| 466              | Part of Kit     | Scr., W/Washer (M3X5)        |
| 467              | EMCR (Ref Only) | Scr., Countersink (2.6X3)    |
| 468              | Part of Kit     | Scr., Bind (M2.3X8)          |
| 469              | Part of Kit     | Scr., W/Washer (M2.6X4)      |
| 470              | Part of Kit     | Scr., Countersink (2.6X3)    |
| 471              | Part of Kit     | Scr., Pan (M2.6X4)           |
| 472              | Part of Kit     | Scr., F-Locks (M2X4)         |
| 473              | EMCR (Ref Only) | Scr., Pan (M2X2.5)           |
| 474              | Part of Kit     | Scr., Pan (M2.6X4)           |
| 475              | EMCR (Ref Only) | Scr., Pan (M2X6)             |
| 476              | Part of Kit     | Scr., Pan (M2.6X4.5)         |
| 477              | Part of Kit     | Scr., Pan (M1.7X2)           |
| 478              | EMCR (Ref Only) | Panel Program Sw.            |
| 479              | Part of Kit     | Scr., Pan (M2.6X3)           |
| 480              | EMCR (Ref Only) | Panel R/F Sw.                |
| 481              | 44B63187F01     | Gear Change                  |
| 482              | EMCR (Ref Only) | Chip                         |
| 483              | EMCR (Ref Only) | Assy., Riv. RF Lock          |
| 484              | EMCR (Ref Only) | Spring                       |
| 485              | EMCR (Ref Only) | Assy., Audio Panel           |
| 486              | 84T63477F01     | Panel Head                   |

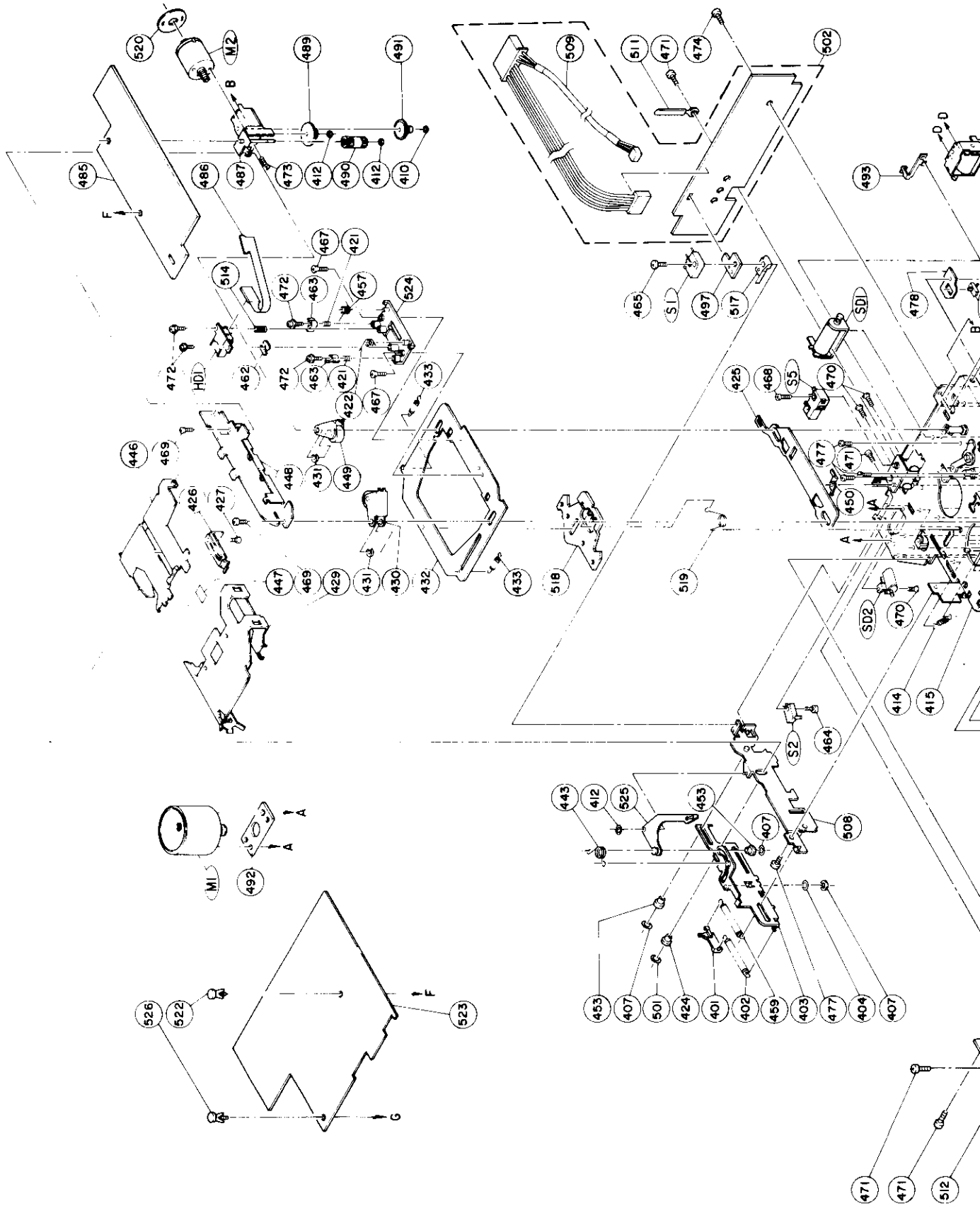
REPLACEMENT PARTS LIST, ALPINE CASSETTE MECHANISM

| REFERENCE NUMBER | PART NUMBER     | DESCRIPTION           |
|------------------|-----------------|-----------------------|
| 487              | EMCR (Ref Only) | Assy., Riv. RF Frame  |
| 488              | EMCR (Ref Only) | Wire PC               |
| 489              | 44A63194F01     | Gear RF (B)           |
| 490              | 44A63193F01     | Gear RF (A)           |
| 491              | 01A63493F01     | Assy., Riv. RF gear   |
| 492              | EMCR (Ref Only) | Spacer Motor          |
| 493              | EMCR (Ref Only) | Lever, Solenoid Link  |
| 494              | EMCR (Ref Only) | Lever, RF Link        |
| 495              | EMCR (Ref Only) | Lever, RF Spring (B)  |
| 496              | 41B63283F06     | Spring                |
| 497              | EMCR (Ref Only) | Panel Pack in Sw.     |
| 498              | 01T63210F04     | Assy., Flywheel       |
| 499              | 42A40969F01     | Belt                  |
| 500              | EMCR (Ref Only) | Wire PC               |
| 501              | EMCR (Ref Only) | Ring "E" (M1.2)       |
| 502              | 01V83500F24     | Assy., Control Panel  |
| 503              | EMCR (Ref Only) | Lever R/F             |
| 504              | EMCR (Ref Only) | Gear RF Swing         |
| 505              | EMCR (Ref Only) | Lever RF Spring (A)   |
| 506              | EMCR (Ref Only) | Pulley Idler          |
| 507              | EMCR (Ref Only) | Cover Bottom          |
| 508              | EMCR (Ref Only) | Assy., Riv. Side Bkt. |
| 509              | EMCR (Ref Only) | Assy., GZ Out Cable   |
| 510              | 01T63210F03     | Assy., Flywheel       |
| 511              | Part of Kit     | Lug Wrap Around       |
| 512              | EMCR (Ref Only) | Bkt., Deck (A)        |
| 513              | 01V83600F37     | Assy., Reel Panel     |
| 514              | EMCR (Ref Only) | Spring Head           |
| 515              | 44B70362F01     | Gear Eject (A)        |
| 516              | 07A81324F01     | Bkt., Deck (B)        |
| 517              | EMCR (Ref Only) | Lever Pack Sw.        |
| 518              | EMCR (Ref Only) | Lever Reel Brake      |
| 519              | 41A70517F01     | Spring Reel Brake     |
| 520              | EMCR (Ref Only) | Spacer Motor          |
| 521              | EMCR (Ref Only) | Spring PC             |
| 522              | Part of Kit     | Rivet Push            |
| 523              | EMCR (Ref Only) | Insulator Cover       |
| 524              | EMCR (Ref Only) | Frame Head            |
| 525              | 01A82108F01     | Assy., Riv. Eject Arm |
| 526              | Part of Kit     | Rivet Push            |
| 439              | 49A64626F01     | Reel Ring             |
| HD1              | 88T74130F01     | Head                  |
| M1               | 01V83800F37     | Assy., Motor          |



REPLACEMENT PARTS LIST, ALPINE CASSETTE MECHANISM

| REFERENCE<br>NUMBER | PART<br>NUMBER | DESCRIPTION             |
|---------------------|----------------|-------------------------|
| M2                  | 01V83500F82    | Assy., RF Motor         |
| S1                  | 40T71025F03    | Sw. Detector            |
| S2                  | 40T60239F02    | Sw. Leaf                |
| S3                  | 40T63432F01    | Sw. Slide               |
| S5                  | 40T52216F01    | Sw. Micro               |
| S6                  | 40T71025F03    | Sw. Detector            |
| S7                  | 40T71025F03    | Sw. Detector            |
| SD1                 | 01A63213F01    | Assy., Program Solenoid |
| SD2                 | 01A63215F01    | Assy., Eject Solenoid   |
| SD3                 | 01A63212F01    | Assy., Play Solenoid    |
| SD4                 | 01A63214F01    | Assy., RF Solenoid      |



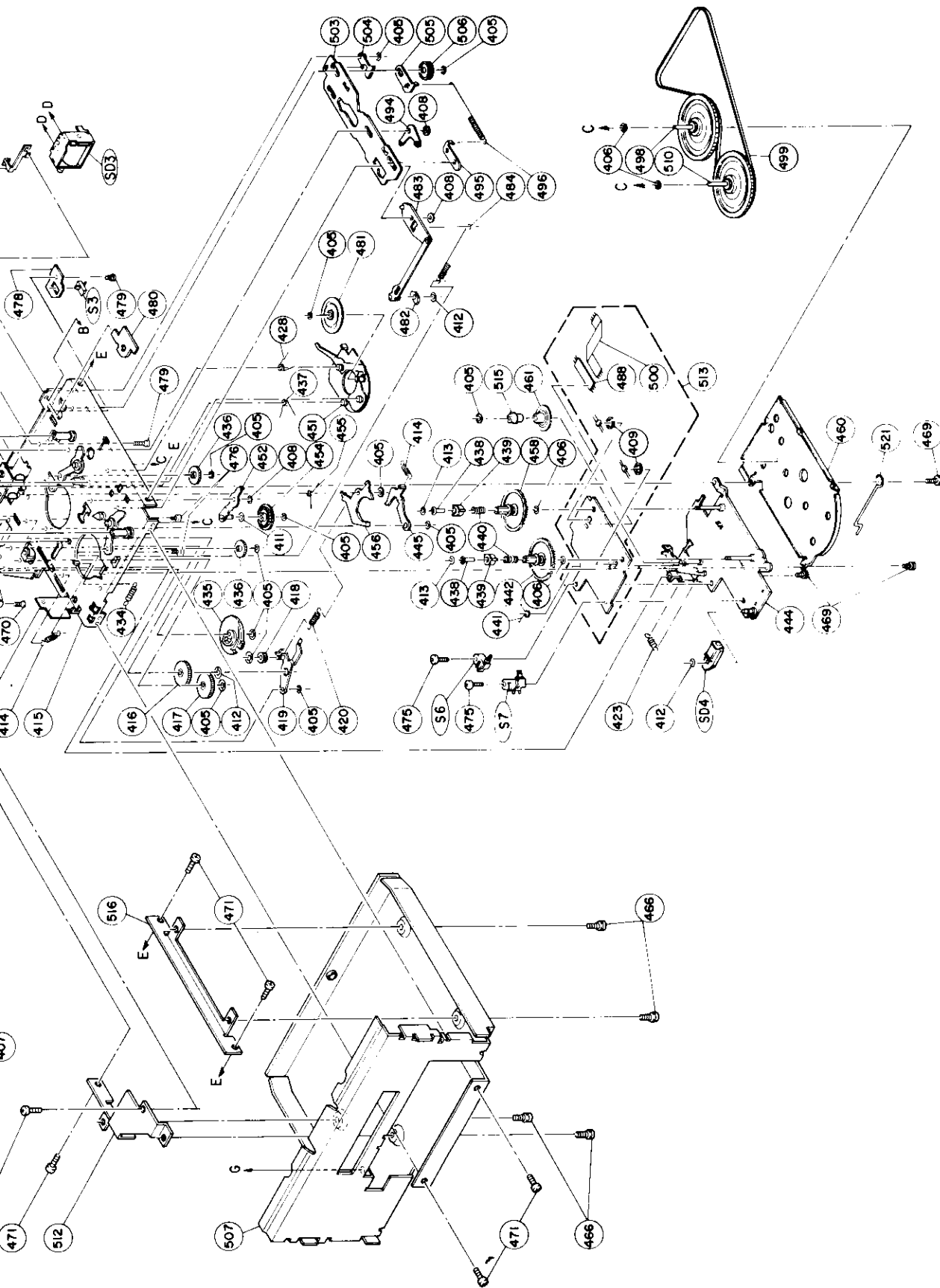


FIGURE 4-33. ALPINE CASSETTE MECHANISM

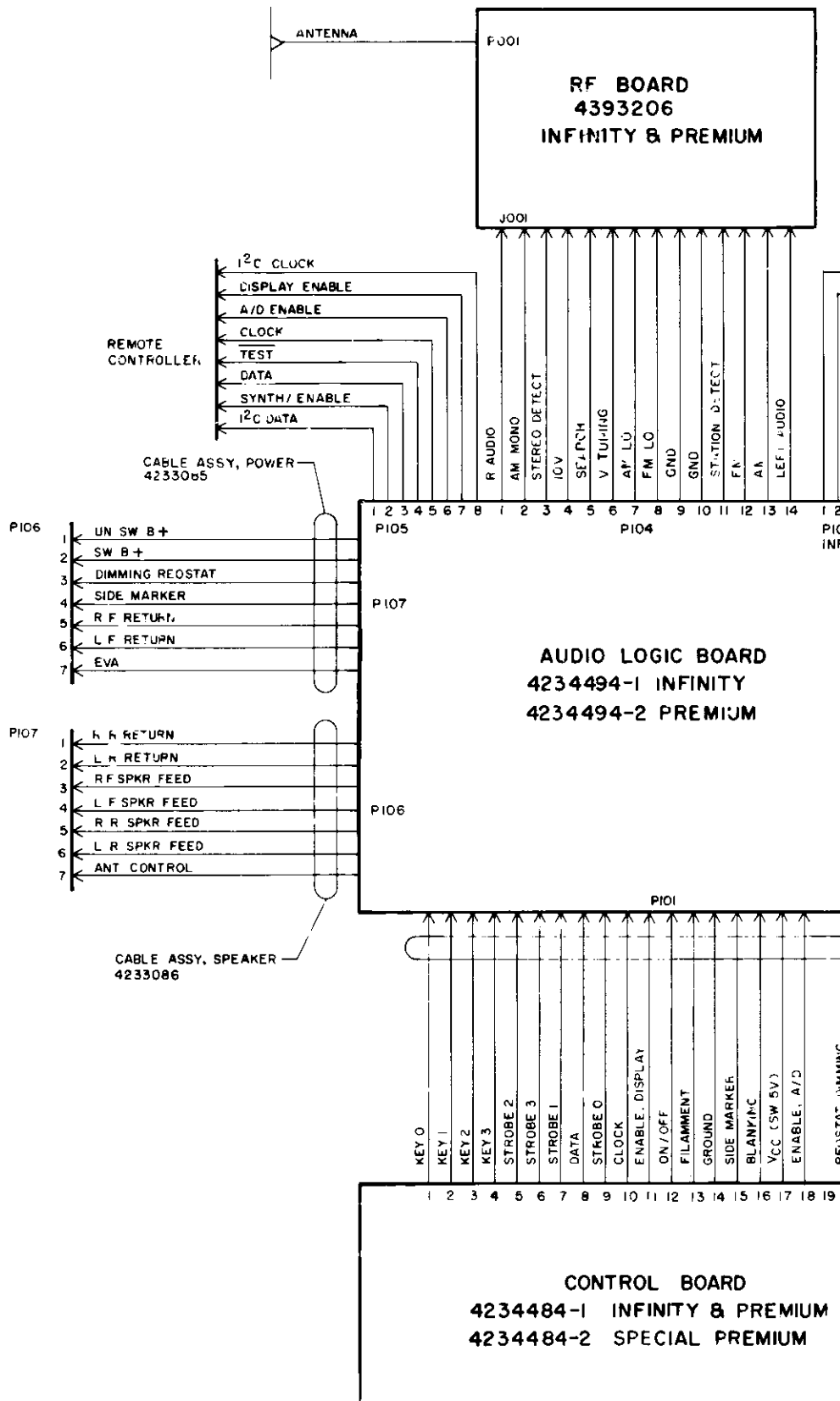
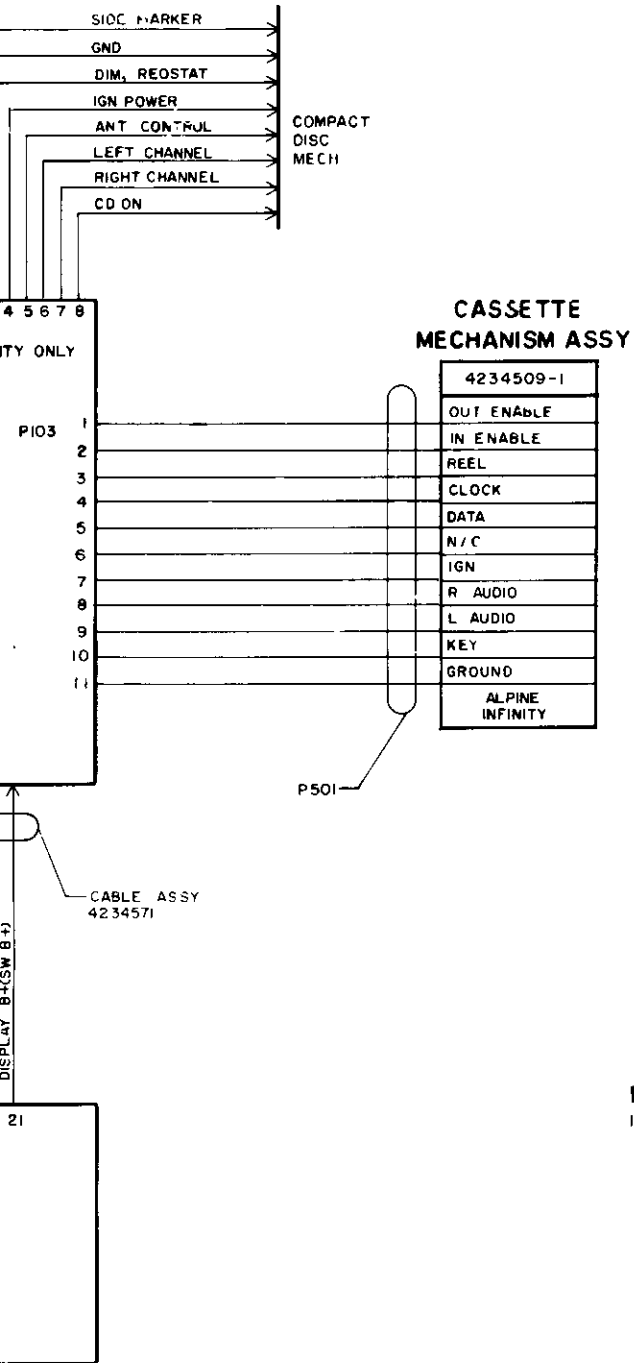


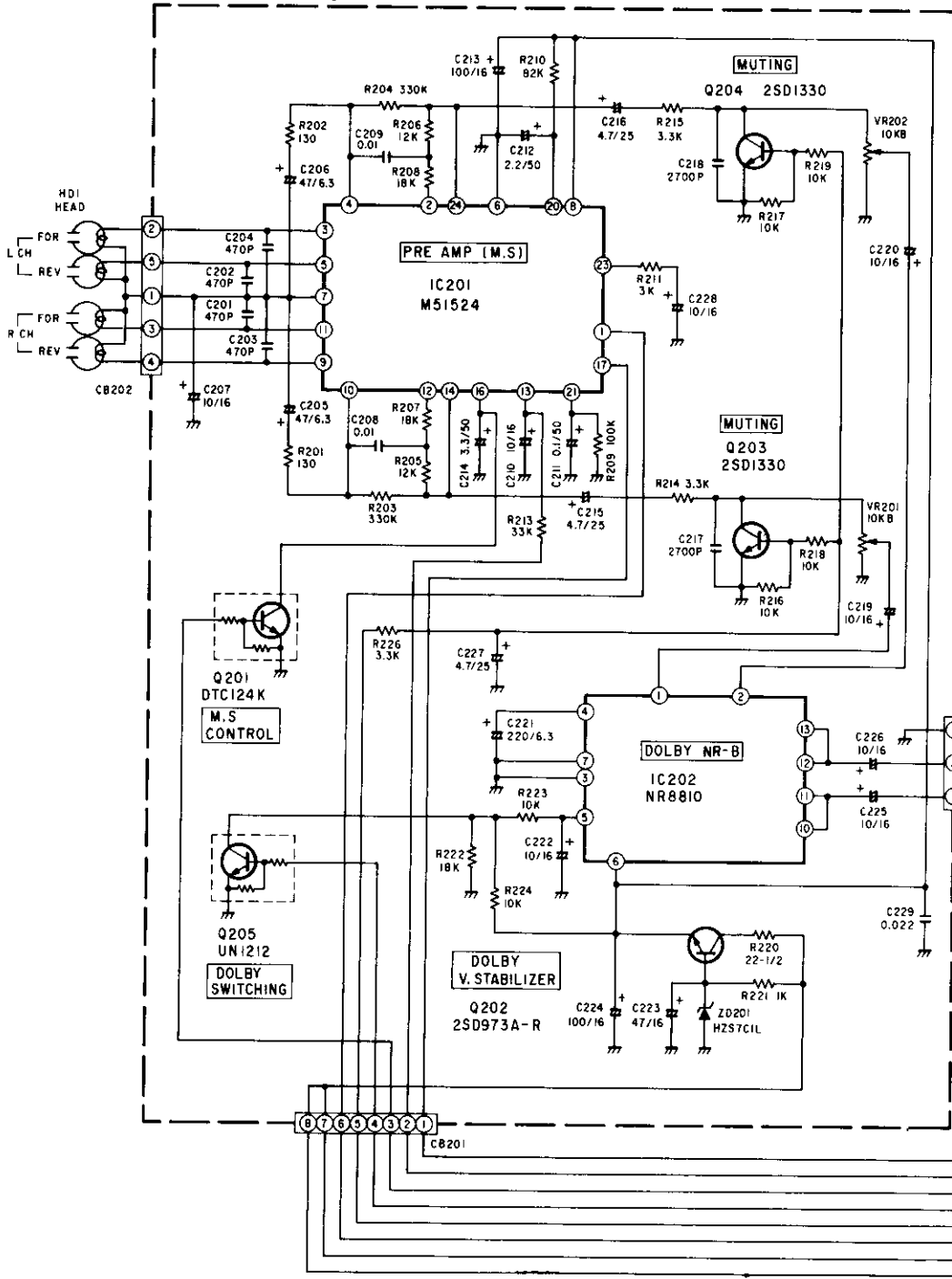
FIGURE 4-34. ELECTRONIC TUNED CASSETTE RADIO, BLOCK WIRING DIAGRAM



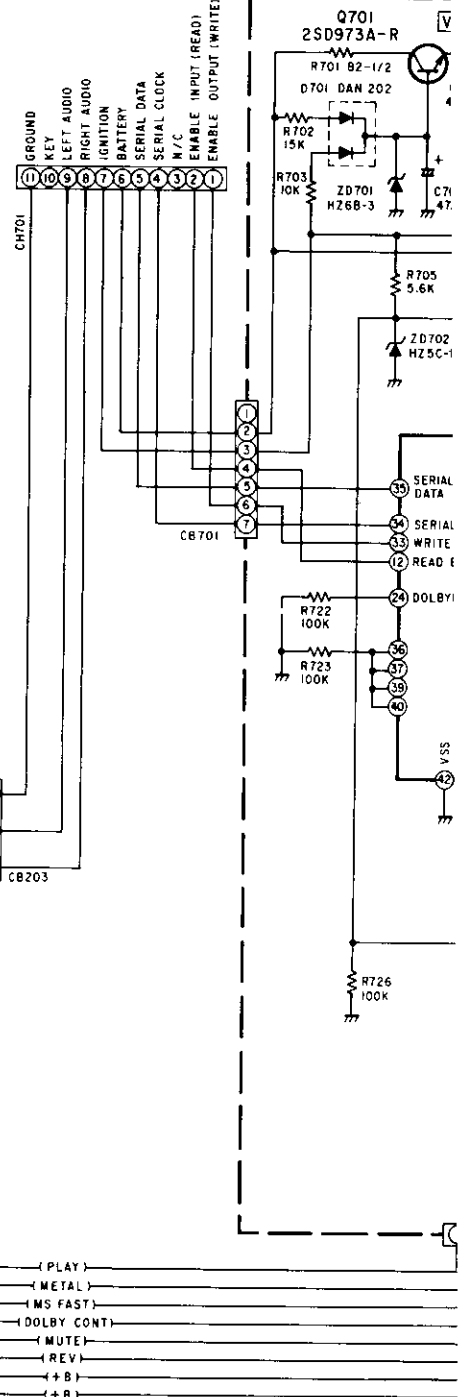
**NOTES**

- 1 REFERENCE DRAWINGS, ELECTRICAL SCHEMATICS
- 4393206 RF BOARD ASSY
- 4234494 AUDIO LOGIC BOARD ASSY
- 4234484 CONTROL BOARD ASSY
- 4234507 SHINWA CASSETTE MECHANISM
- 4234510 ALPINE CASSETTE MECHANISM

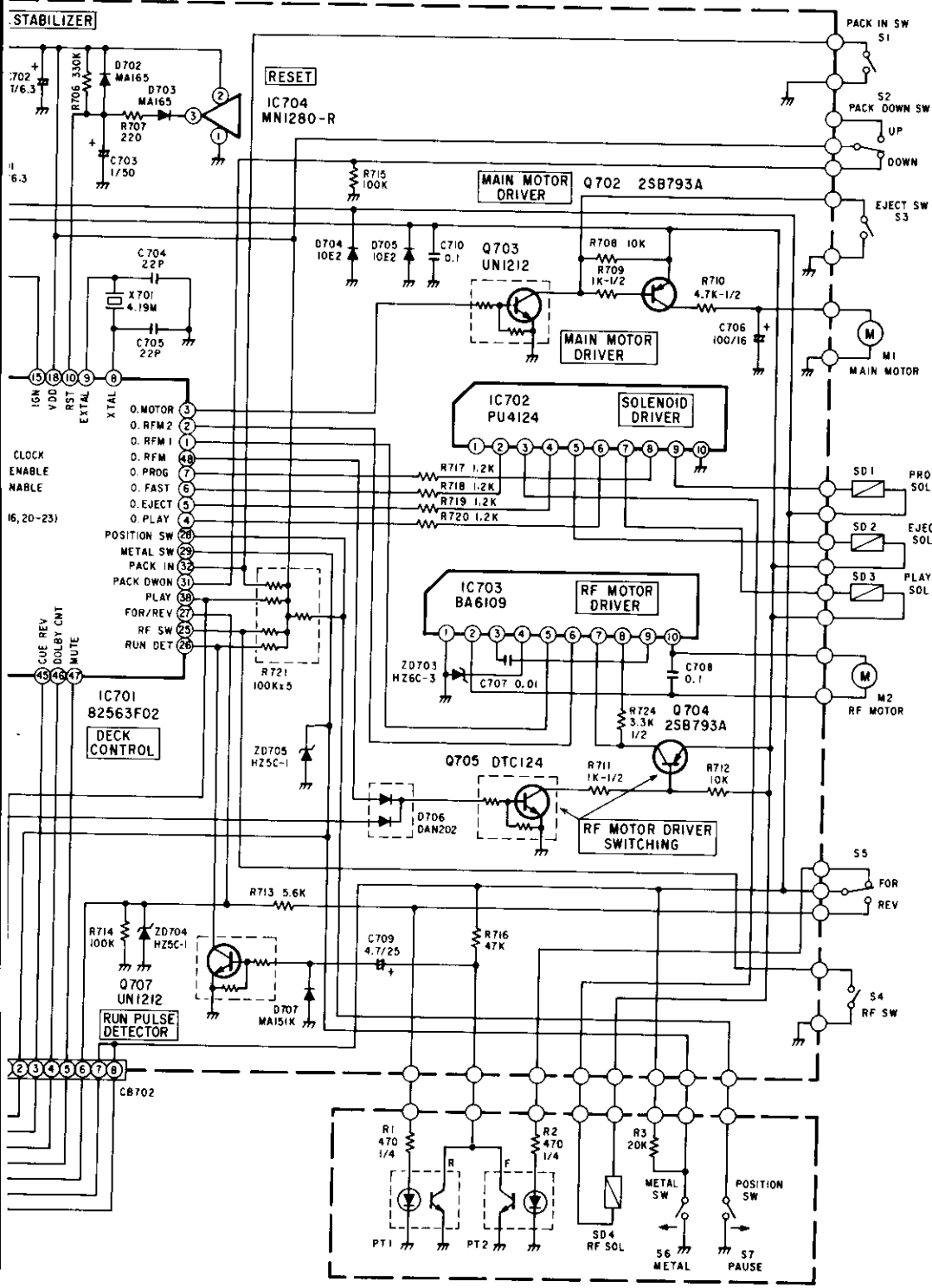
AUDIO P.C. BOARD



CONTROL P.C. BOARD



- (PLAY)
- (METAL)
- (MS FAST)
- (DOLBY CONT)
- (MUTE)
- (REV)
- (+B)
- (-B)



|      | E     | C     | B     |
|------|-------|-------|-------|
| Q201 | 0V    | 0V    | 5V    |
| Q202 | 6.7V  | 12.5V | 8.3V  |
| Q203 | 0V    | 0V    | -     |
| Q204 | 0V    | 0V    | -     |
| Q205 | 0V    | 0V    | 5V    |
| Q701 | 5V    | 12.2V | 5.8V  |
| Q702 | 13.2V | 12.9V | 12.4V |
| Q703 | 0V    | 0.1V  | 5V    |
| Q704 | 13.2V | 13.2V | 12.5V |
| Q705 | 0V    | 0.1V  | 4.4V  |
| Q707 | 0V    | PS    | -     |

| IC 2 0 1 |      |    |      |
|----------|------|----|------|
| 1        | 0V   | 13 | 0V   |
| 2        | 3V   | 14 | 3V   |
| 3        | 2.9V | 15 | 0V   |
| 4        | 2.9V | 16 | 0V   |
| 5        | 2.9V | 17 | 0V   |
| 6        | 0V   | 18 | 0V   |
| 7        | 2.9V | 19 | 0V   |
| 8        | 6.7V | 20 | 0V   |
| 9        | 2.9V | 21 | 0V   |
| 10       | 2.9V | 22 | 0V   |
| 11       | 2.9V | 23 | 2.3V |
| 12       | 3V   | 24 | 3V   |

| IC 2 0 2 |      |  |  |
|----------|------|--|--|
| 1        | 3.8V |  |  |
| 2        | 3.8V |  |  |
| 3        | 0V   |  |  |
| 4        | 3.8V |  |  |
| 5        | 0V   |  |  |
| 6        | 6.7V |  |  |
| 7        | 0V   |  |  |
| 8        | 3.7V |  |  |
| 9        | 3.7V |  |  |
| 10       | 4V   |  |  |
| 11       | 4V   |  |  |
| 12       | 4V   |  |  |
| 13       | 4V   |  |  |

| IC 7 0 1 |      |    |      |    |      |    |      |  |  |  |  |
|----------|------|----|------|----|------|----|------|--|--|--|--|
| 1        | 4.1V | 13 | 5V   | 25 | 0V   | 37 | 0V   |  |  |  |  |
| 2        | 4.1V | 14 | 5V   | 26 | * 1  | 38 | 0V   |  |  |  |  |
| 3        | 5V   | 15 | 4.8V | 27 | 0V   | 39 | 0V   |  |  |  |  |
| 4        | 0V   | 16 | 0V   | 28 | 0V   | 40 | 0V   |  |  |  |  |
| 5        | 0V   | 17 | -    | 29 | 4.5V | 41 | -    |  |  |  |  |
| 6        | 0V   | 18 | 5V   | 30 | -    | 42 | 0V   |  |  |  |  |
| 7        | 0V   | 19 | 3.1V | 31 | 5V   | 43 | 2.3V |  |  |  |  |
| 8        | OSC  | 20 | 0V   | 32 | 5V   | 44 | 0V   |  |  |  |  |
| 9        | OSC  | 21 | 0V   | 33 | * 3  | 45 | 5V   |  |  |  |  |
| 10       | 5.4V | 22 | 0V   | 34 | * 4  | 46 | 5V   |  |  |  |  |
| 11       | -    | 23 | 0V   | 35 | * 5  | 47 | 0V   |  |  |  |  |
| 12       | * 2  | 24 | 0V   | 36 | 0V   | 48 | 5V   |  |  |  |  |

| IC 7 0 2 |       |  |  |
|----------|-------|--|--|
| 1        | 0V    |  |  |
| 2        | 0V    |  |  |
| 3        | 13.2V |  |  |
| 4        | 0V    |  |  |
| 5        | 13.2V |  |  |
| 6        | 0V    |  |  |
| 7        | 13.2V |  |  |
| 8        | 0V    |  |  |
| 9        | 13.2V |  |  |
| 10       | 0V    |  |  |

| IC 7 0 3 |       |  |  |
|----------|-------|--|--|
| 1        | 0V    |  |  |
| 2        | 0.5V  |  |  |
| 3        | 0V    |  |  |
| 4        | 2.2V  |  |  |
| 5        | 4V    |  |  |
| 6        | 4V    |  |  |
| 7        | 13.2V |  |  |
| 8        | 13.2V |  |  |
| 9        | 0.1V  |  |  |
| 10       | 0.5V  |  |  |

| IC 7 0 4 |    |  |  |
|----------|----|--|--|
| 1        | 0V |  |  |
| 2        | 5V |  |  |
| 3        | 5V |  |  |

\* 1 RUN DETECT PULSE 0-5(V)  
 \* 2 ~ 5 SERIAL LINE  
 { CONDITION: PLAY  
 : NORMAL TAPE DIRECTION  
 : NORMAL EQUALIZER  
 : DOLBY-B OFF }

FIGURE 4-35. ELECTRICAL SCHEMATIC WITH AUDIO/CONTROL PC BOARD, ALPINE MECHANISM