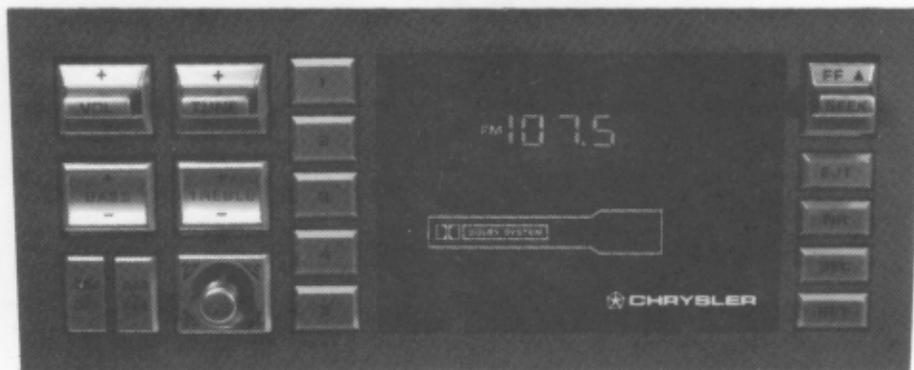


AHED-MAN-167
23 DECEMBER 1988

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

PART NUMBERS

4469106 4469107
4469108 4469109
4469198 (2 SPKR)



HUNTSVILLE ELECTRONICS DIVISION **ACUSTAR**

P.O. Box 240001 — Huntsville, Alabama 35805

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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.

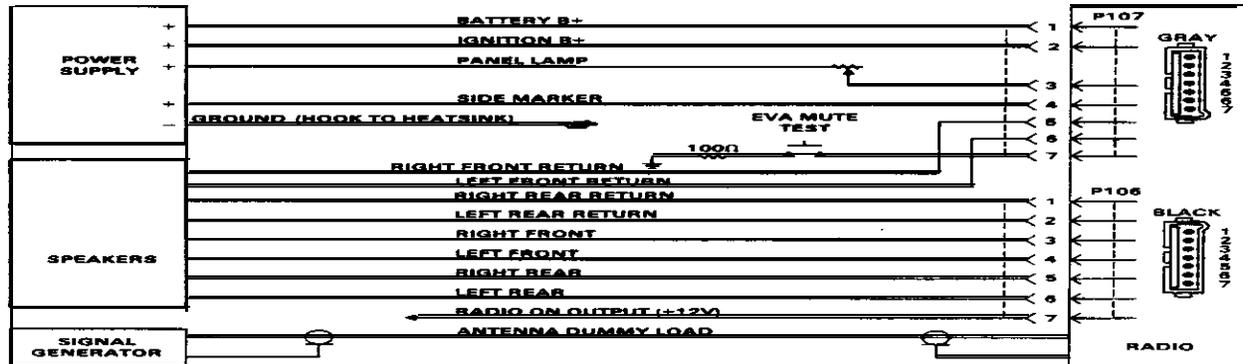


FIGURE 1-2. RADIO CONNECTION TO TEST SET-UP

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.

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 ² C Data
16	I ² 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	Cassette read enable
23	Cassette write enable
24	AM 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	Goes low for hard mute output to turn on Q101
33	Power Switch Input - Goes high for ignition on
34	Goes high for FM
35	Goes 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 I²C 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 I²C 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.

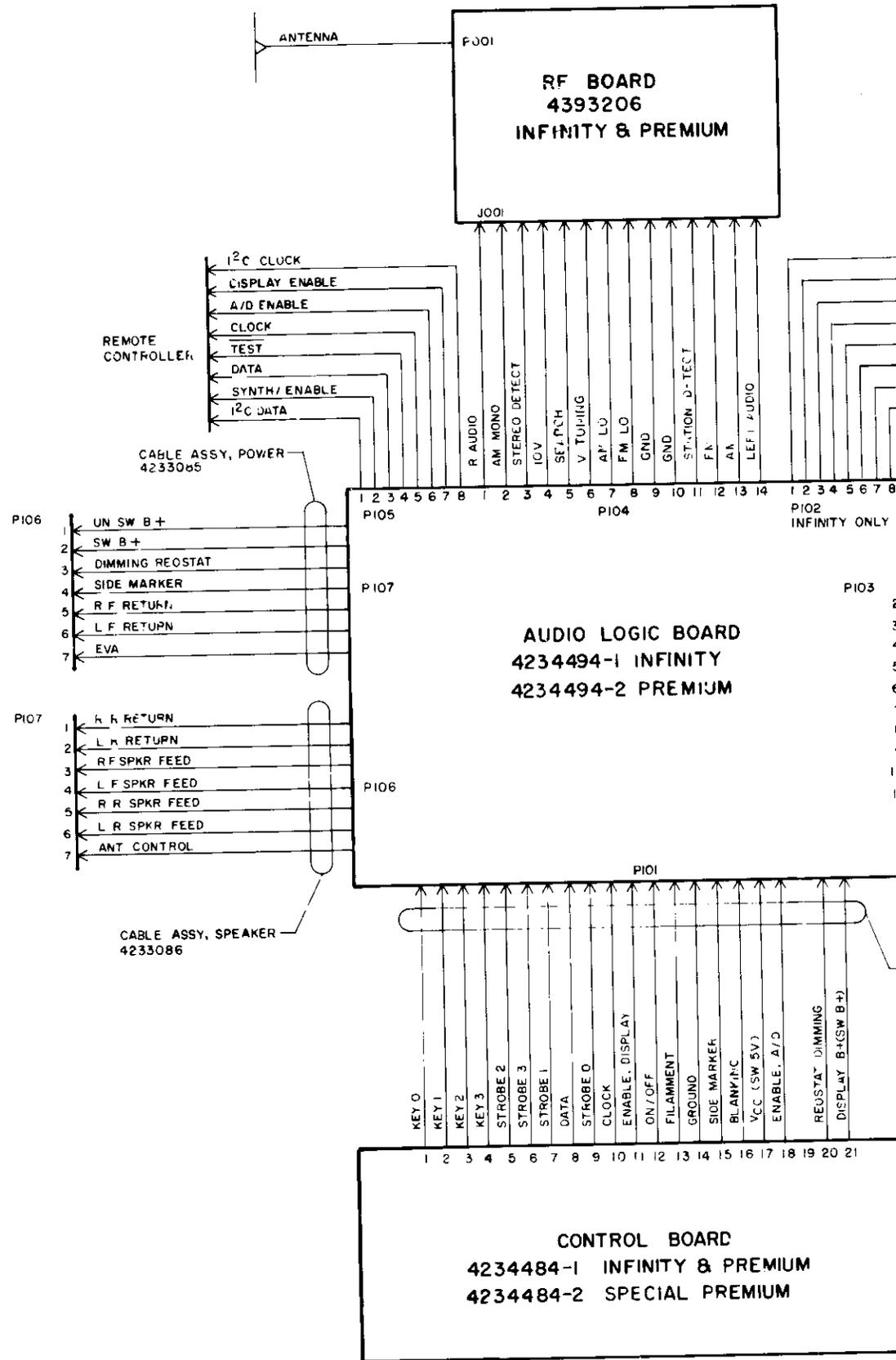
H. PREAMPLIFIER

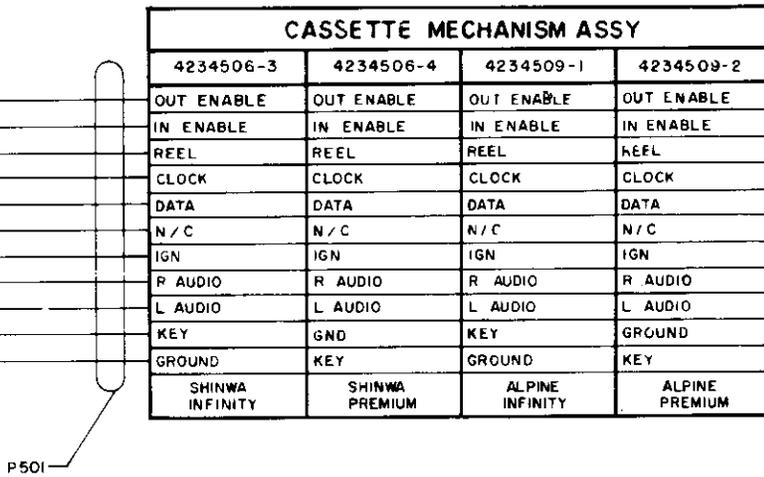
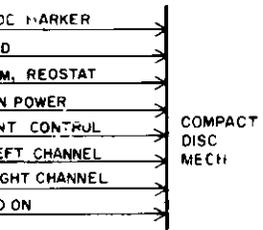
Because of the surface mounted devices/components (SMD), it is recommended that board level maintenance be performed instead of component level.

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.





ABLE ASSY
34571

NOTES

- 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

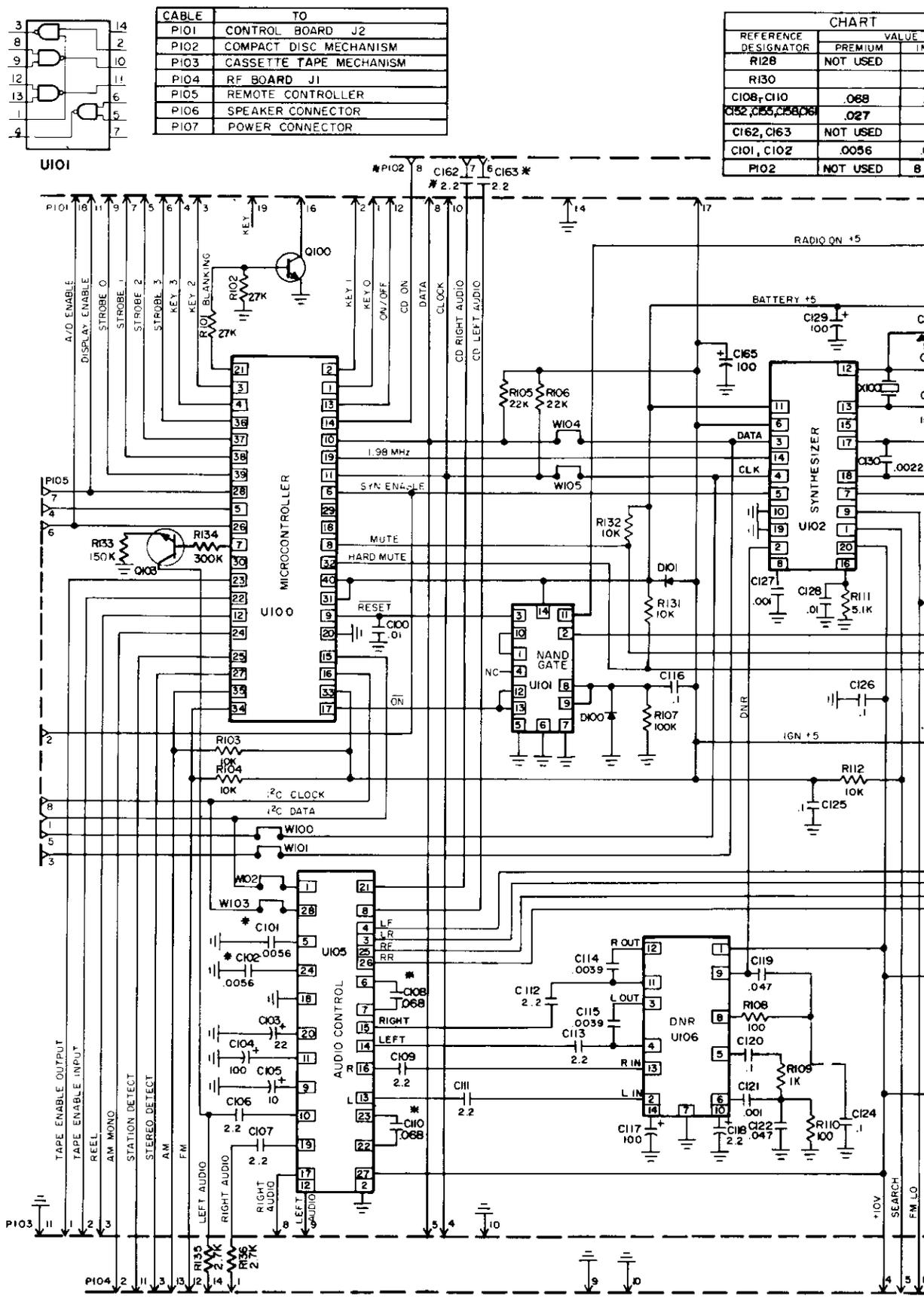
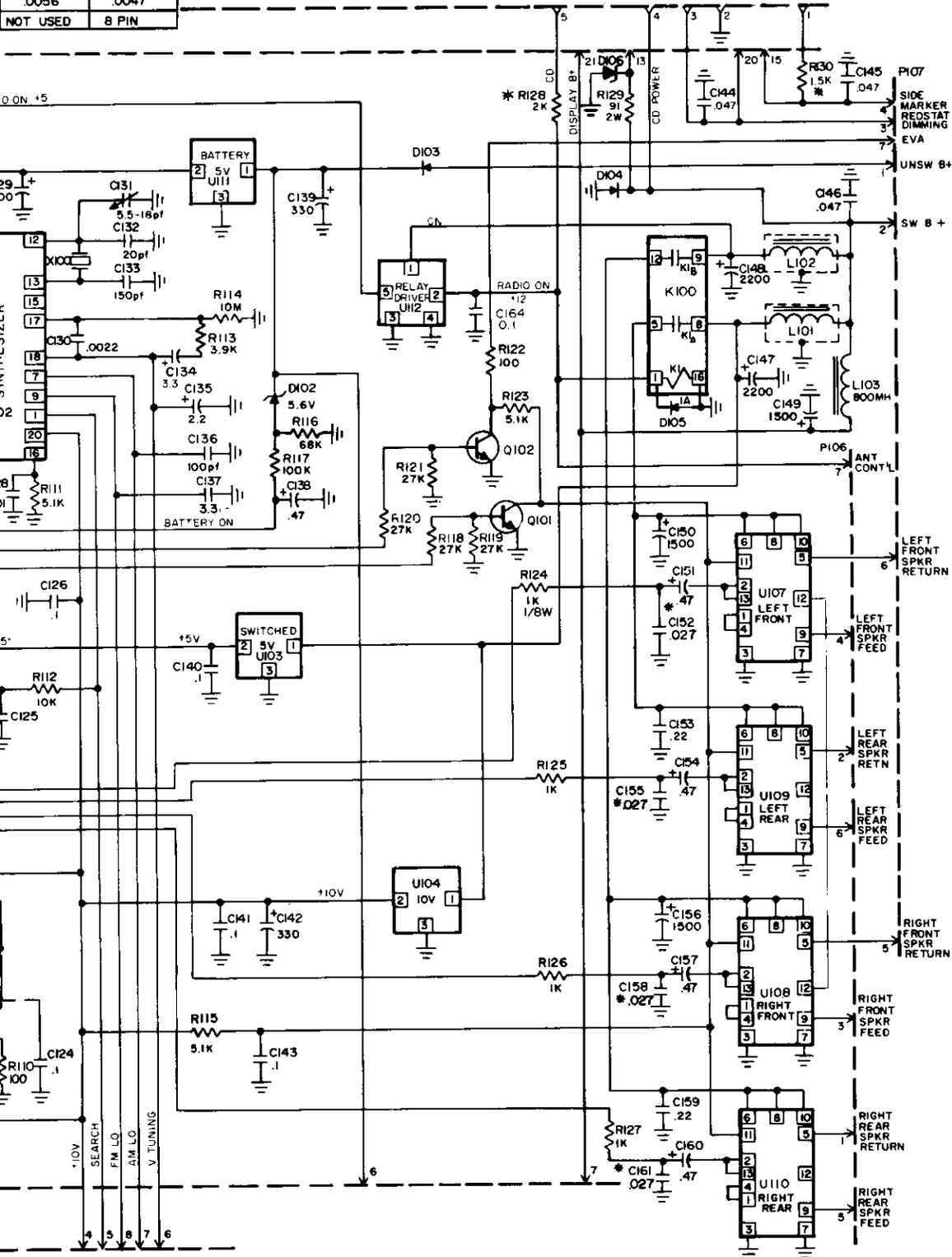


FIGURE 2-2. ELECTRONIC SCHEMATIC, AUDIO/LOGIC PC BOARD

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
12	4.50
13	4.95
14	0
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

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

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, & 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	NC
13	0.30	1.60
	with Unswitched Voltage Only	With Switches and Unswitched Voltage Applied

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

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	12.7	5.0	0

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

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, & 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	0	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

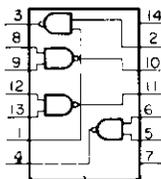
U107, U108, U109, & U110

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

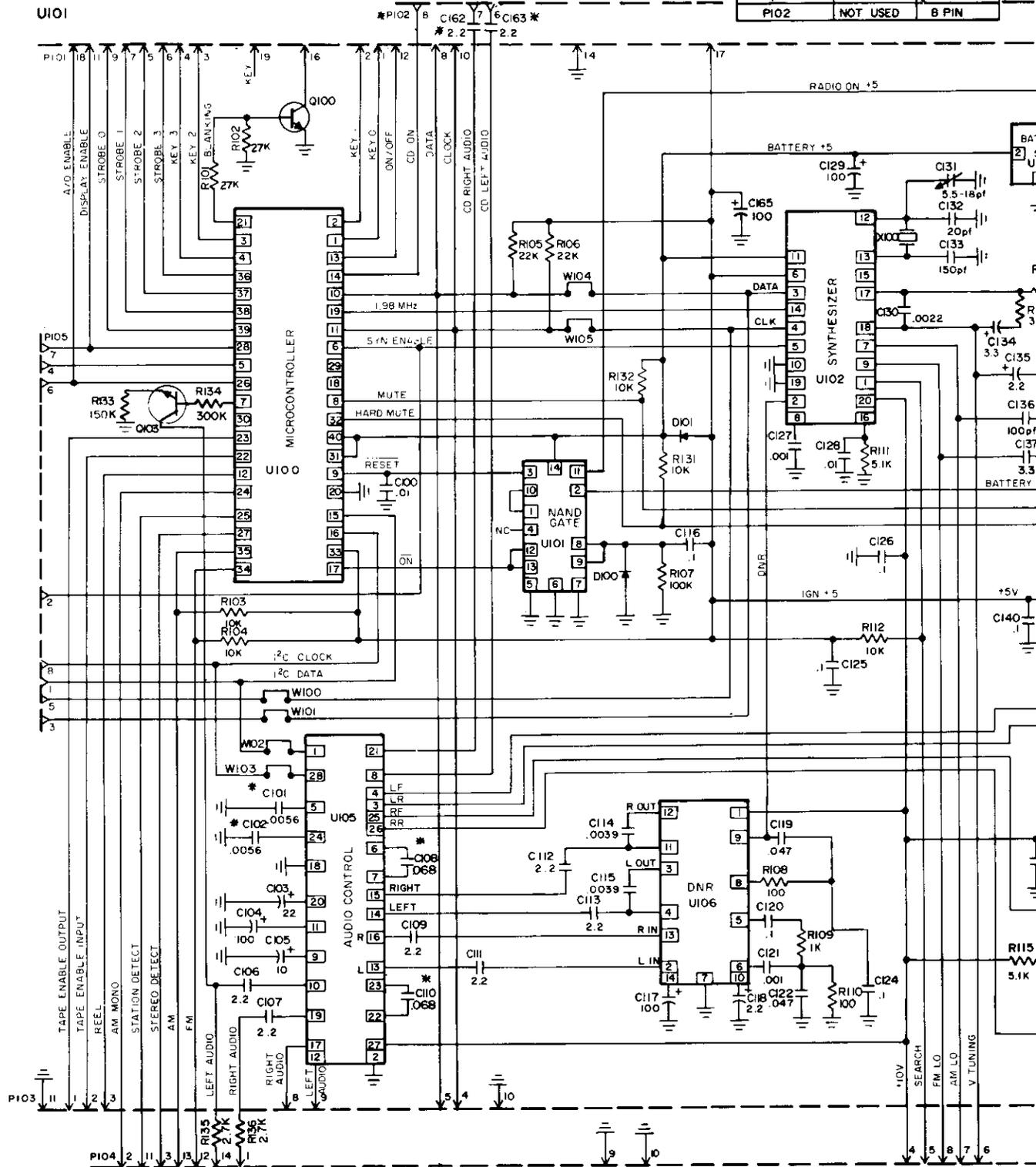
DC V					
PIN	1	2	3	4	5
	12.7	12.7	0	0	5.0

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.

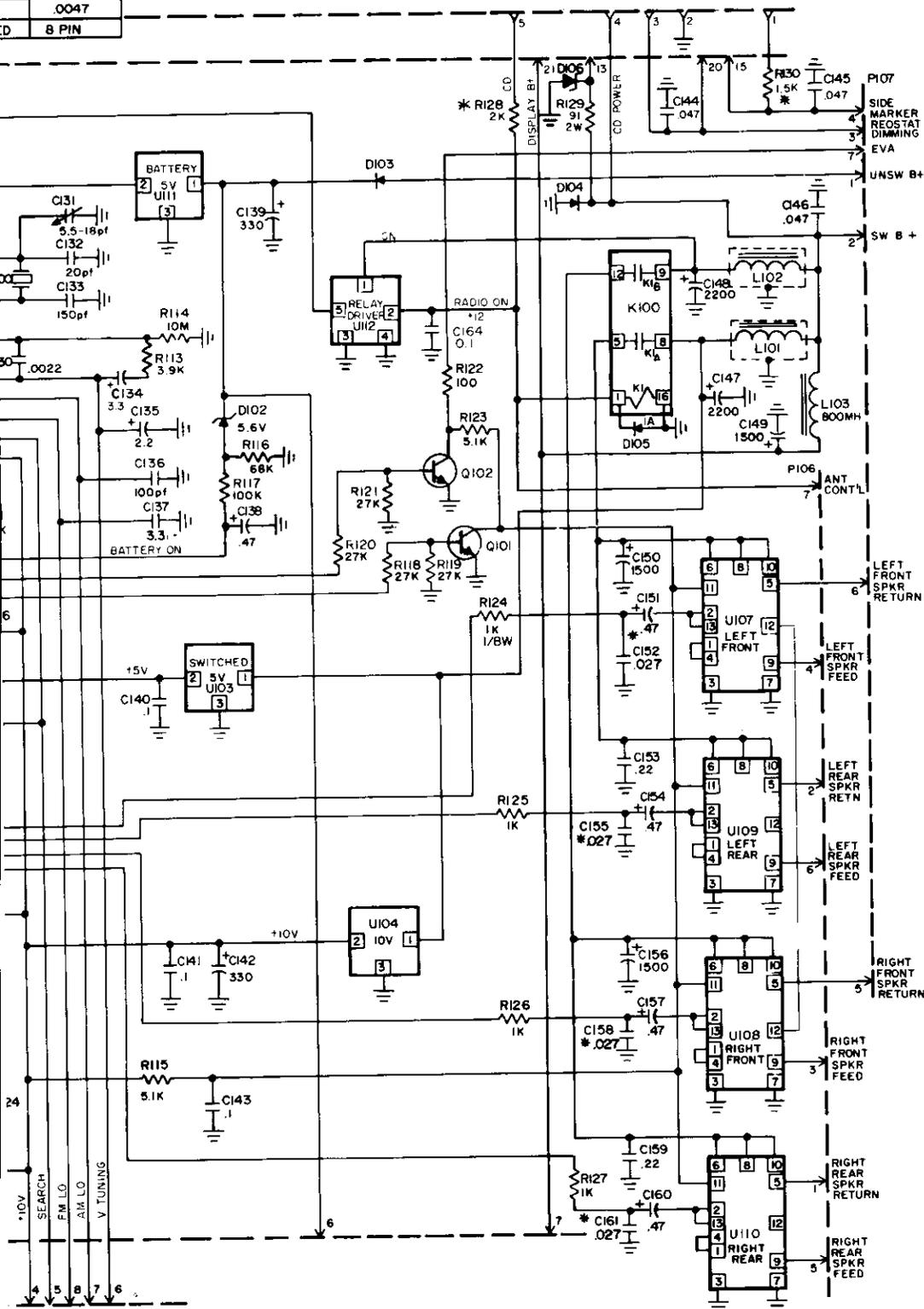


FIGURE 2-5. ELECTRICAL SCHEMATIC, AUDIO/LOGIC PC BOARD

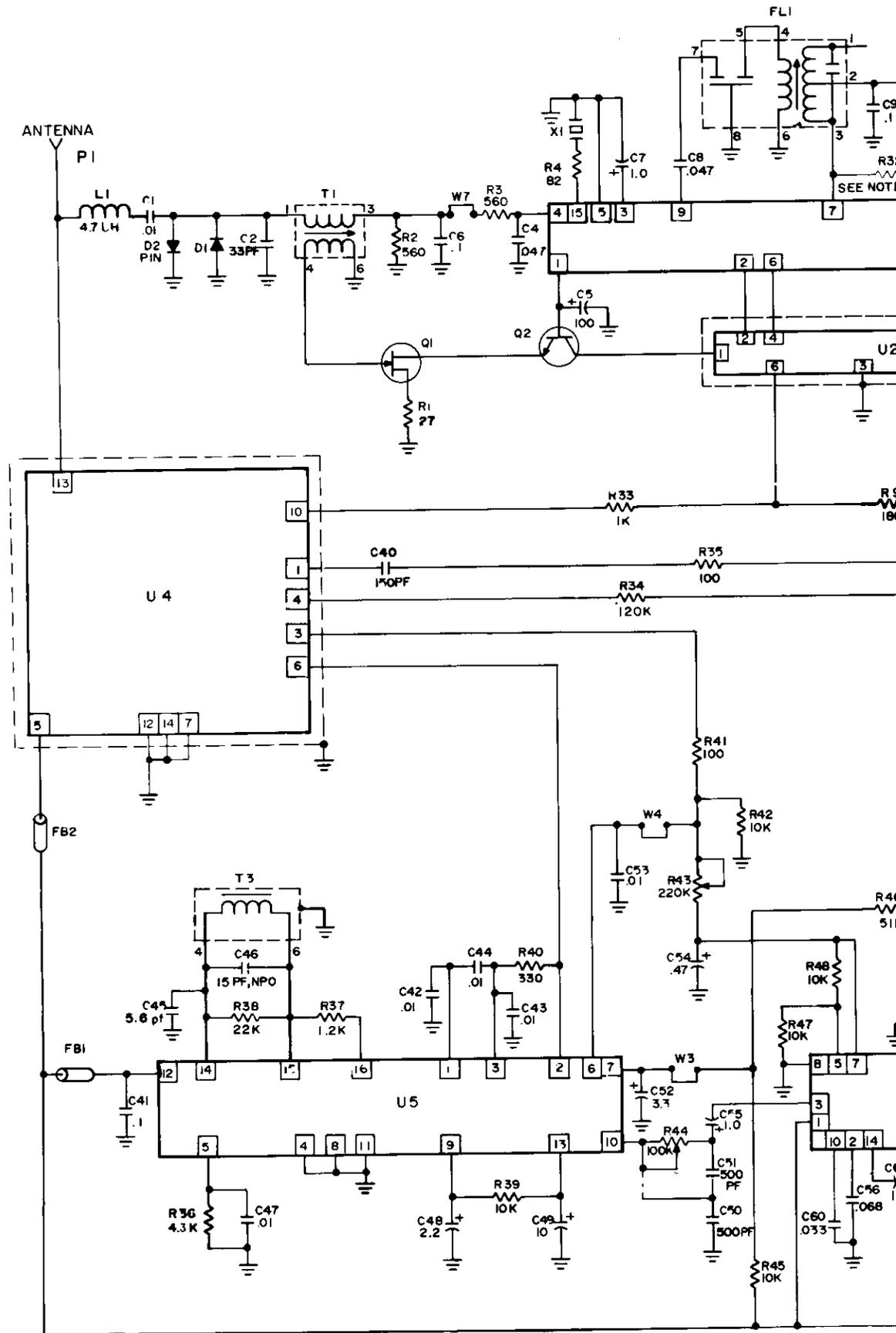
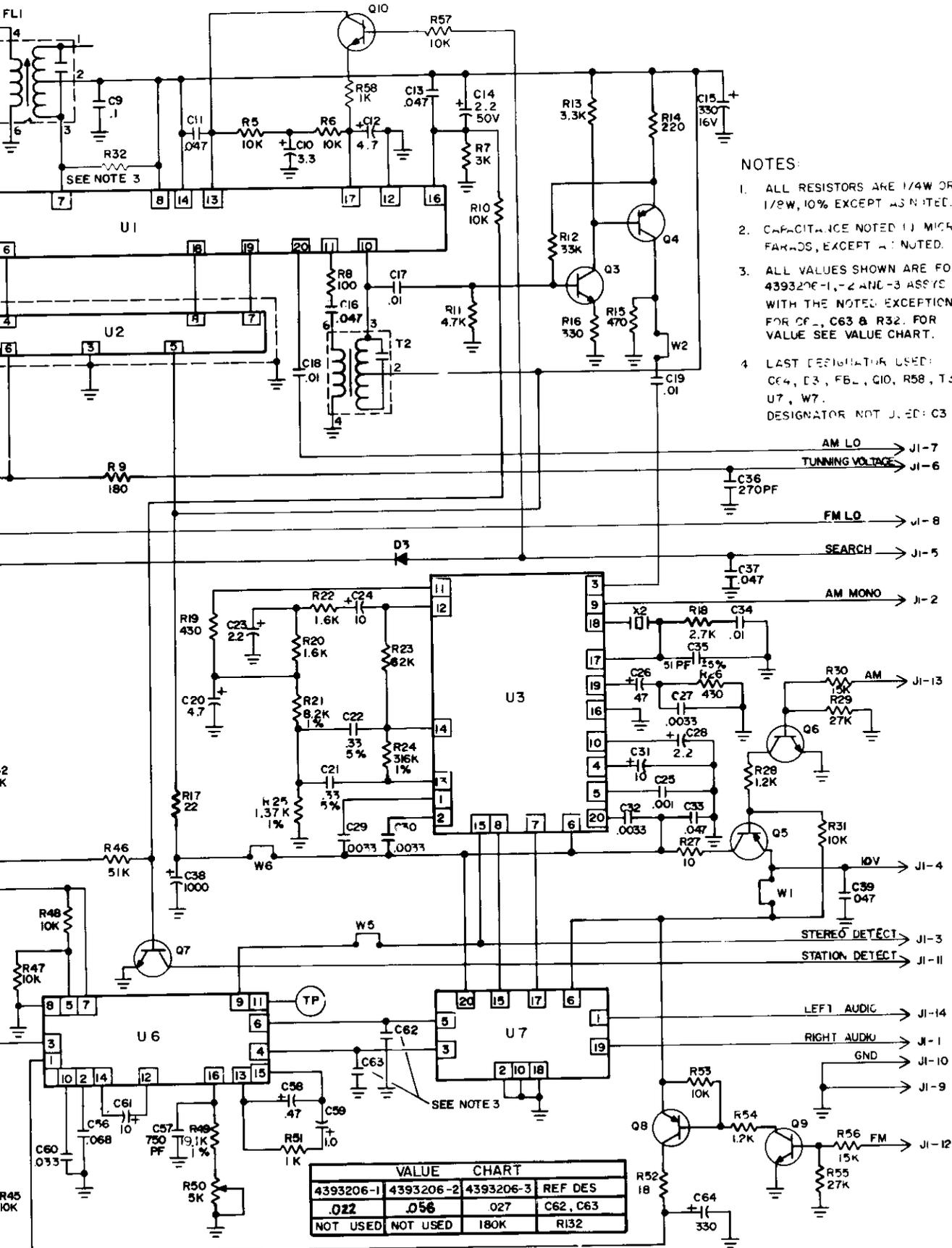


FIGURE 2-6. ELECTRICAL SCHEMATIC, RF PC BOARD



- NOTES:**
1. ALL RESISTORS ARE 1/4W OR 1/8W, 10% EXCEPT AS NOTED.
 2. CAPACITANCE NOTED IN 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, FL1, Q10, R58, T1, 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	DC V	600 kHz @ 1,000 mV 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 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. 0 Off Sta.
6	1.5 - 6.2
7	7.3 On Sta. 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 DC V	FM 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 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 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 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. 0 Off Sta.
6	1.5 - 6.2
7	7.3 On Sta. 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 DC V	FM 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 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 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 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. 0 Off Sta.
6	1.5 - 6.2
7	7.3 On Sta. 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 DC V	FM 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 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 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 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. 0 Off Sta.
6	1.5 - 6.2
7	7.3 On Sta. 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 DC V	FM 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

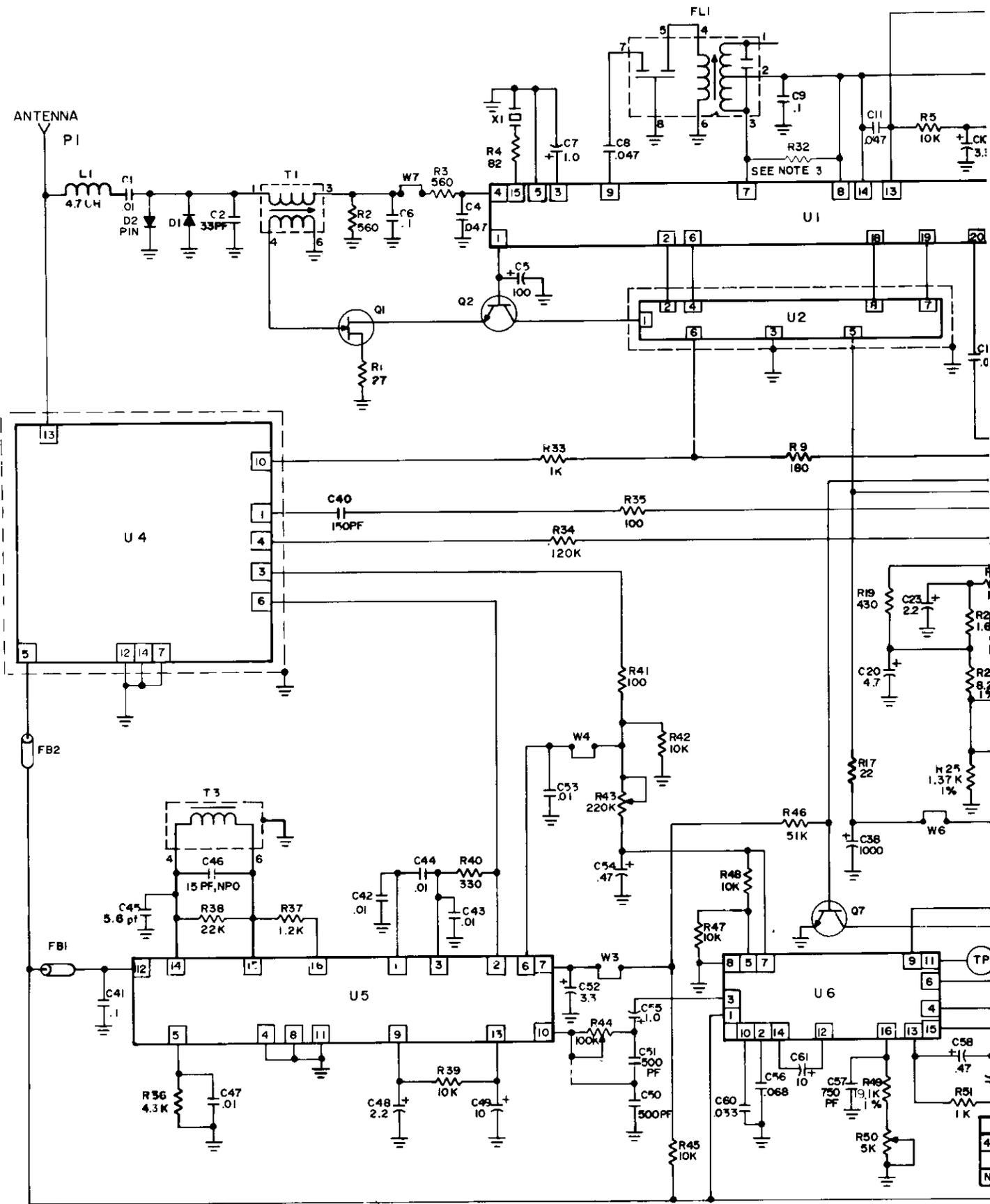
U6

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 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



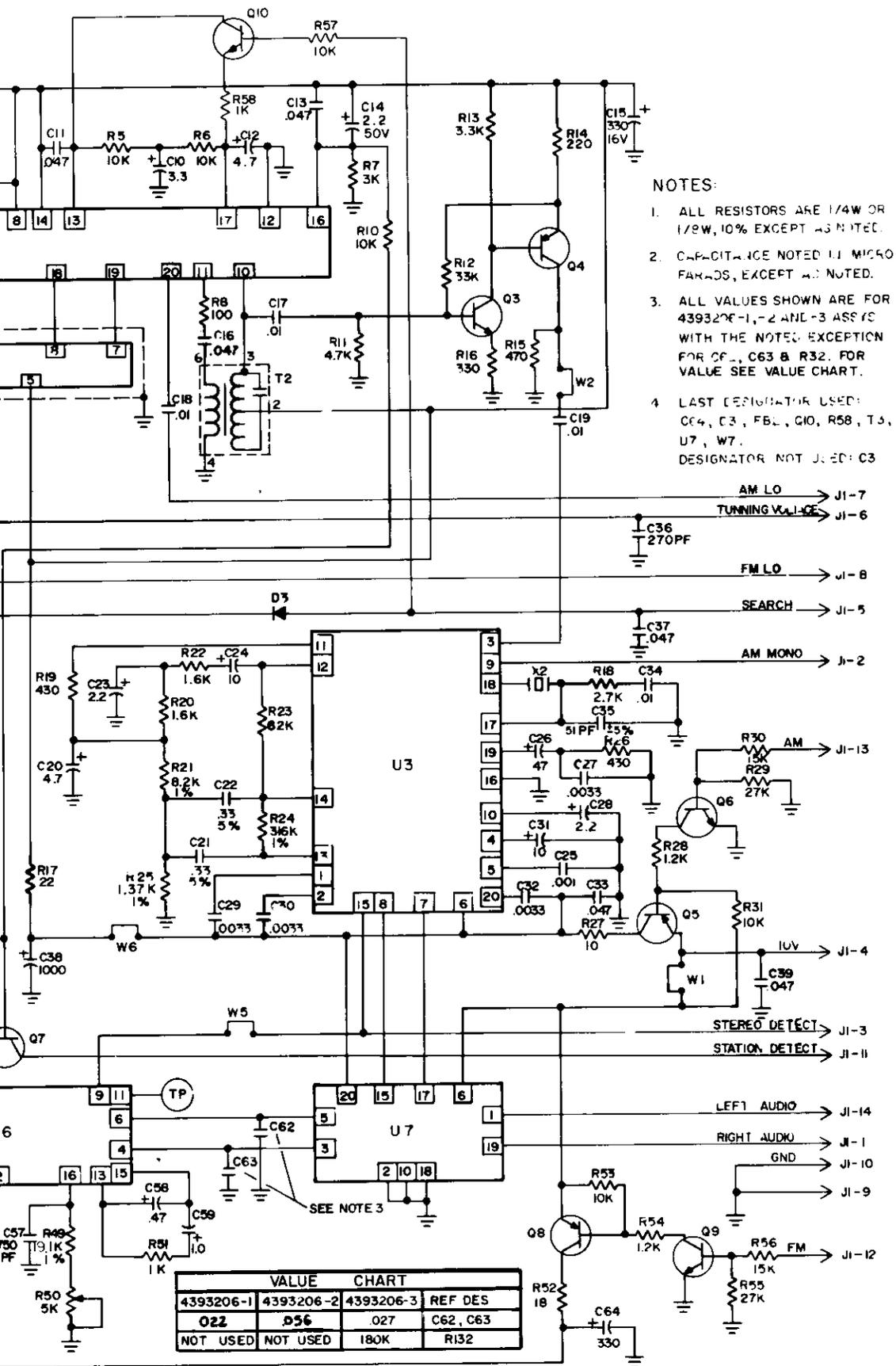
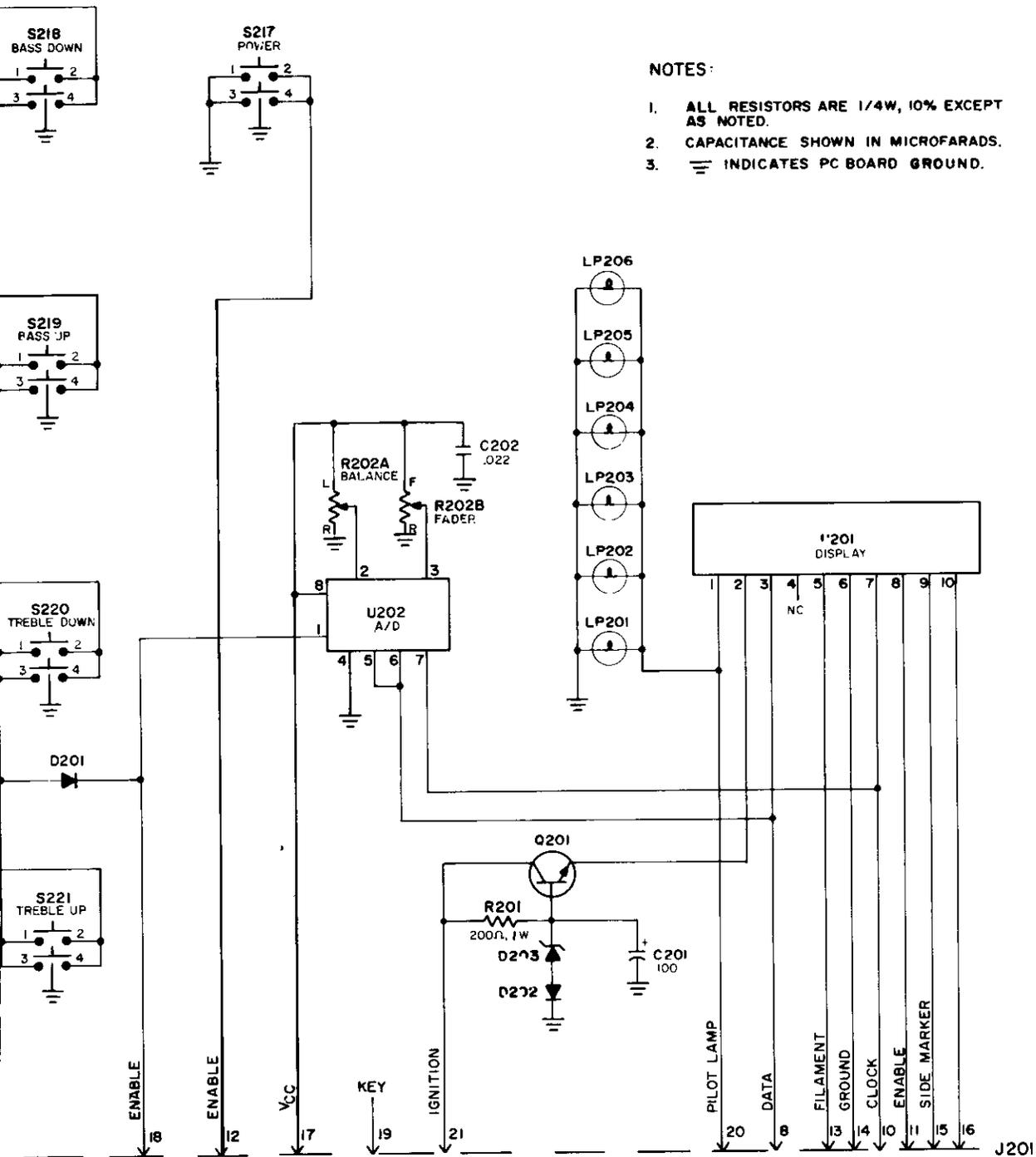
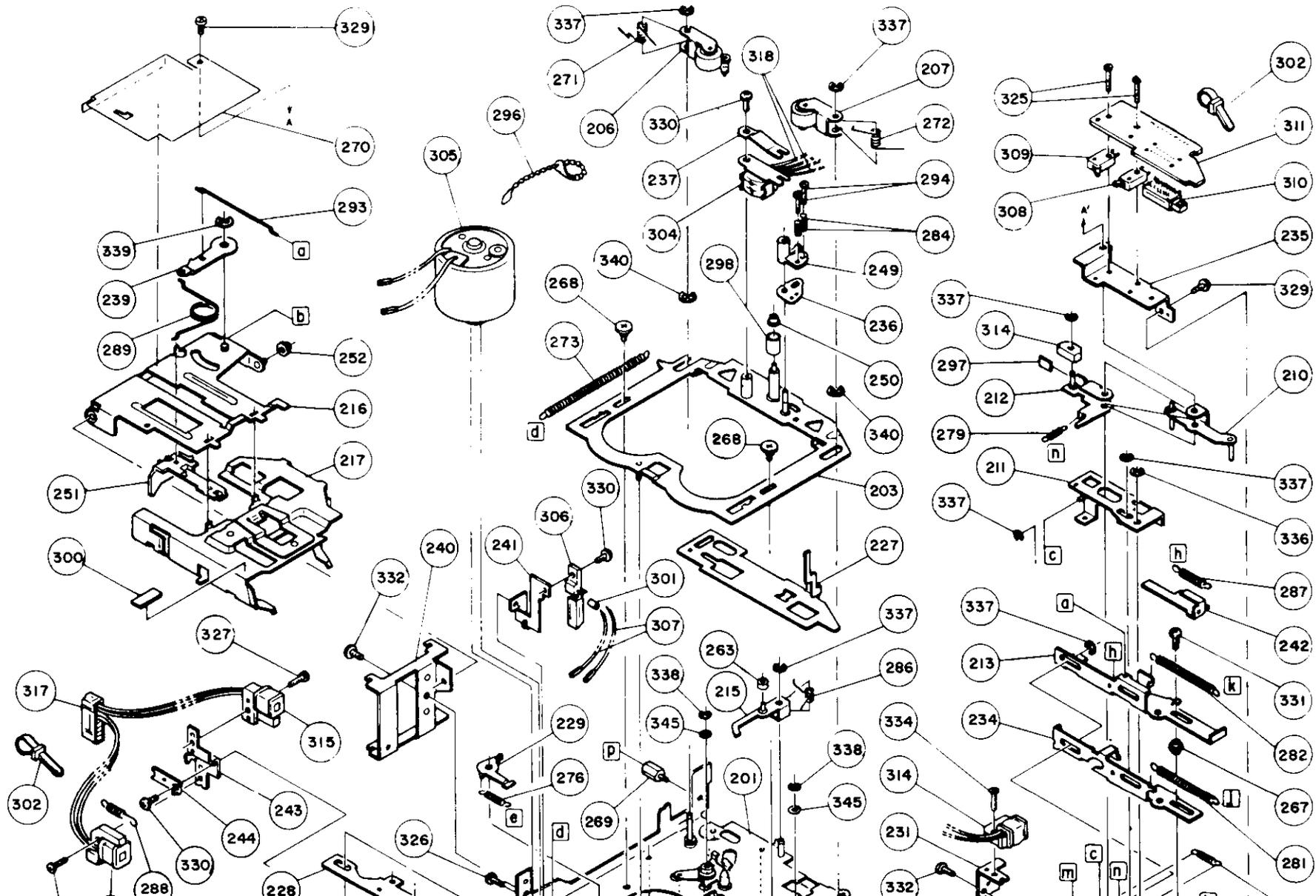


FIGURE 2-9. ELECTRICAL SCHEMATIC, RF PC BOARD



NOTES:

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



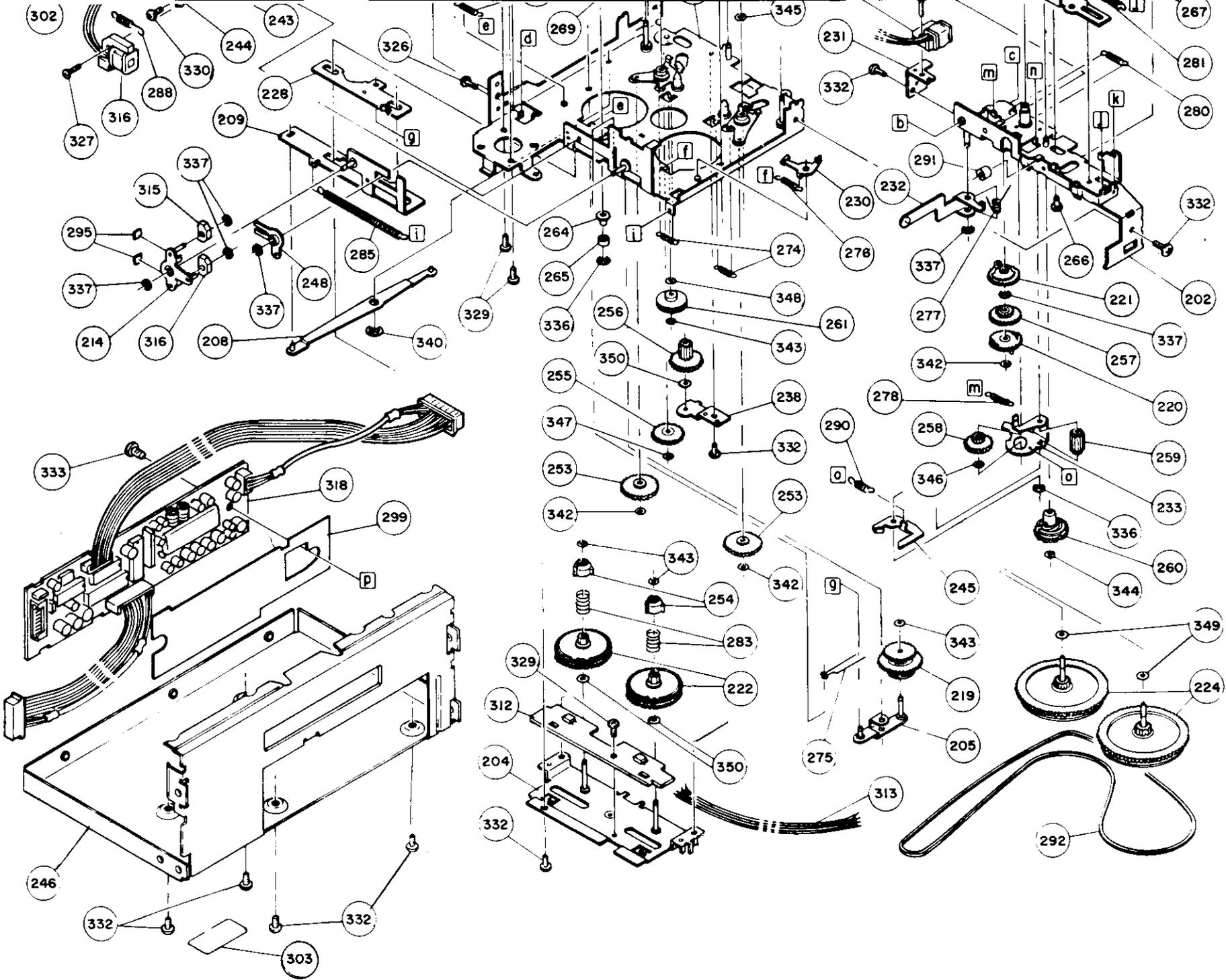


FIGURE 3-14. SHINWA CASSETTE MECHANISM

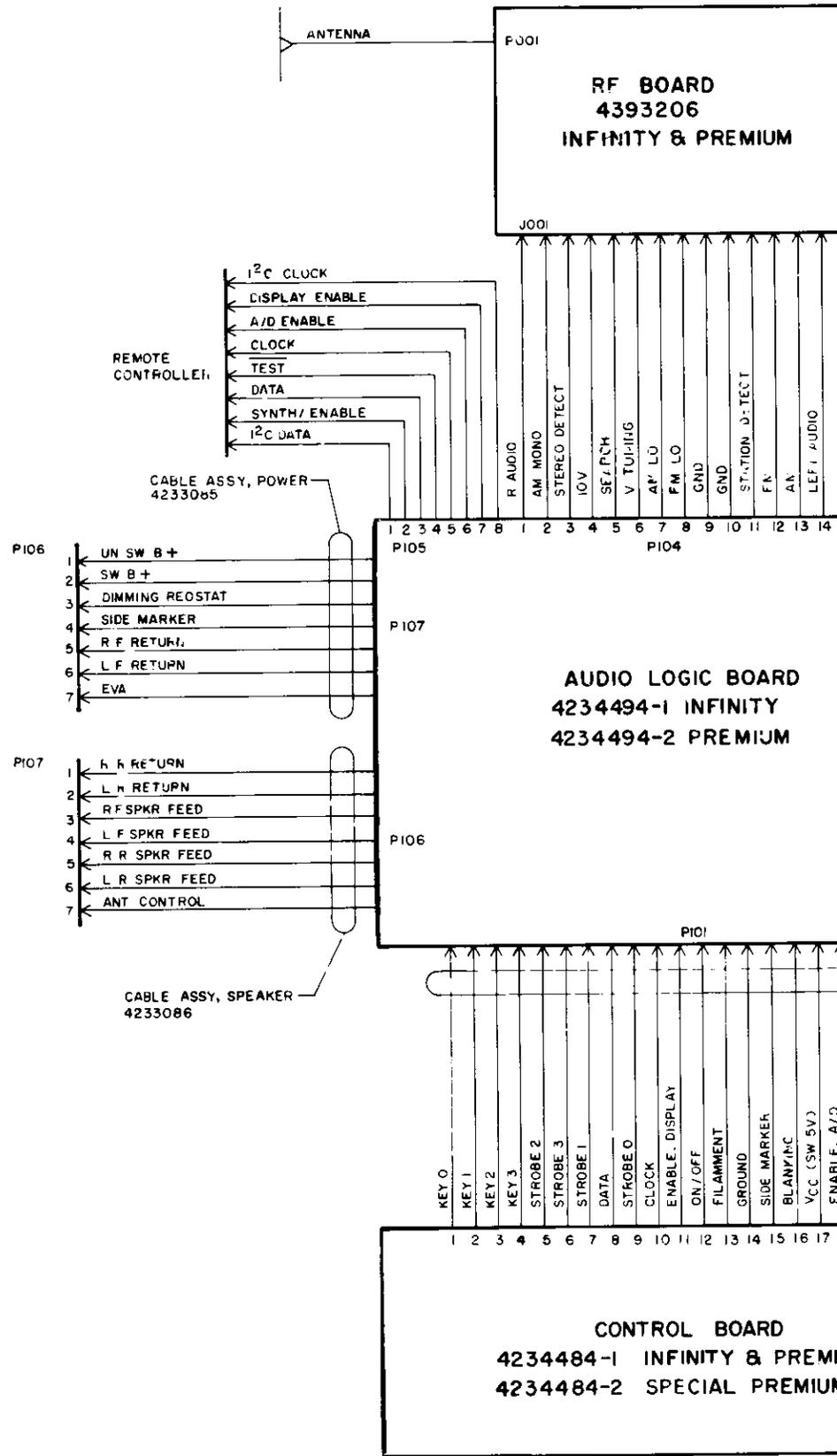
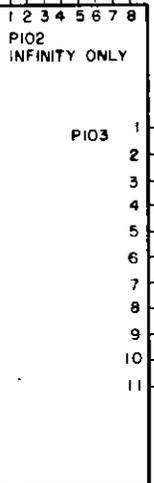
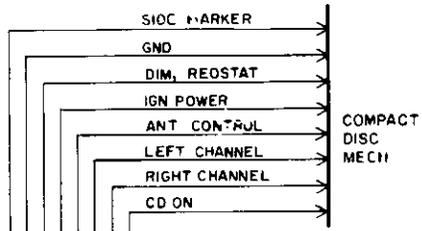


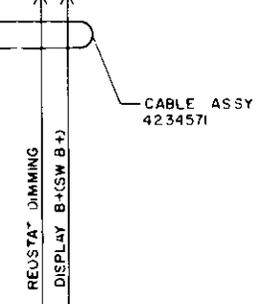
FIGURE 3-15. ELECTRONIC TUNED CASSETTE RADIO WITH SHINWA, BLOCK WIRING DIAGRAM



CASSETTE MECHANISM ASSY

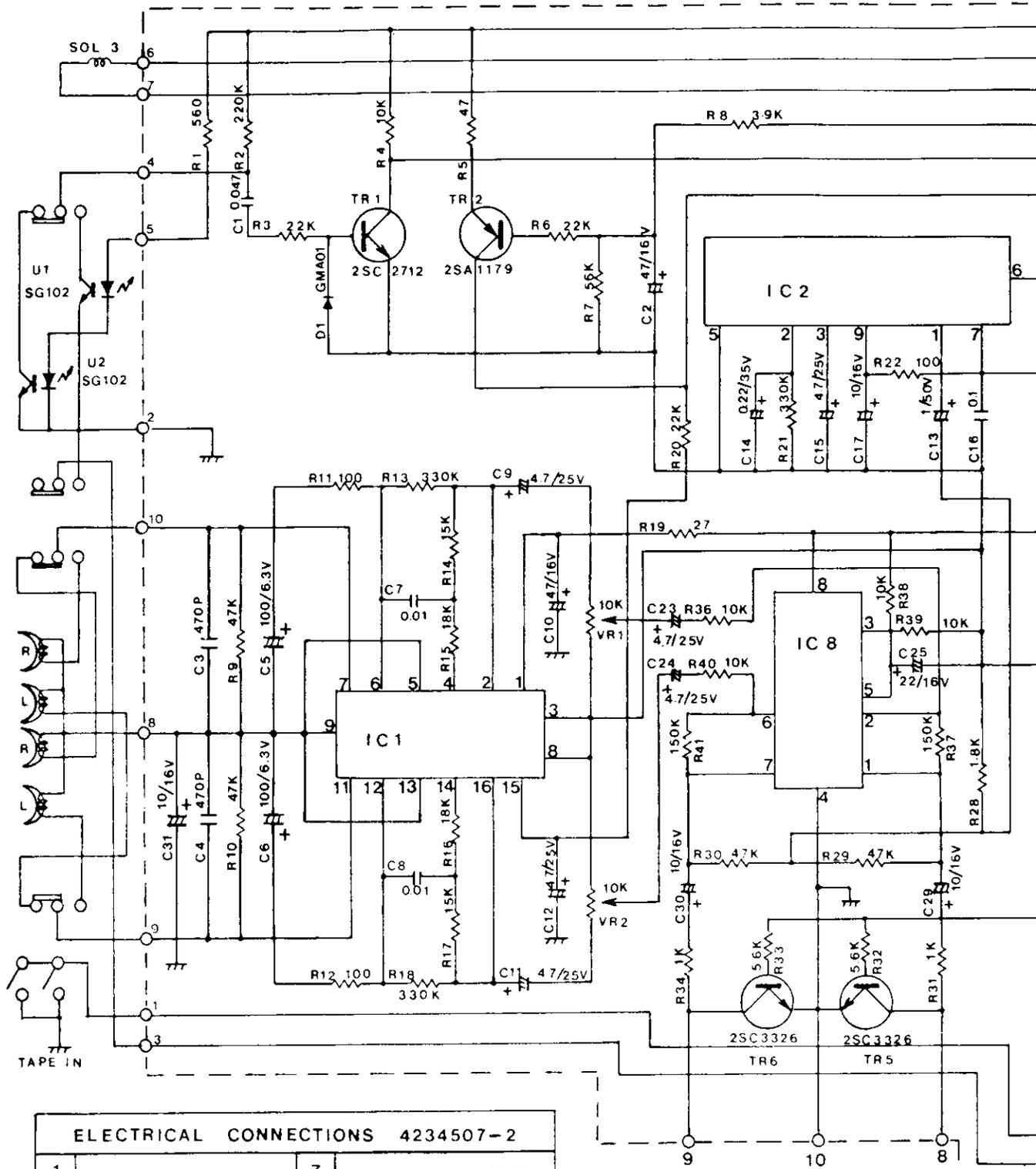
4234506-3
OUT ENABLE
IN ENABLE
REEL
CLOCK
DATA
N / C
IGN
R AUDIO
L AUDIO
KEY
GROUND
SHINWA INFINITY

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			

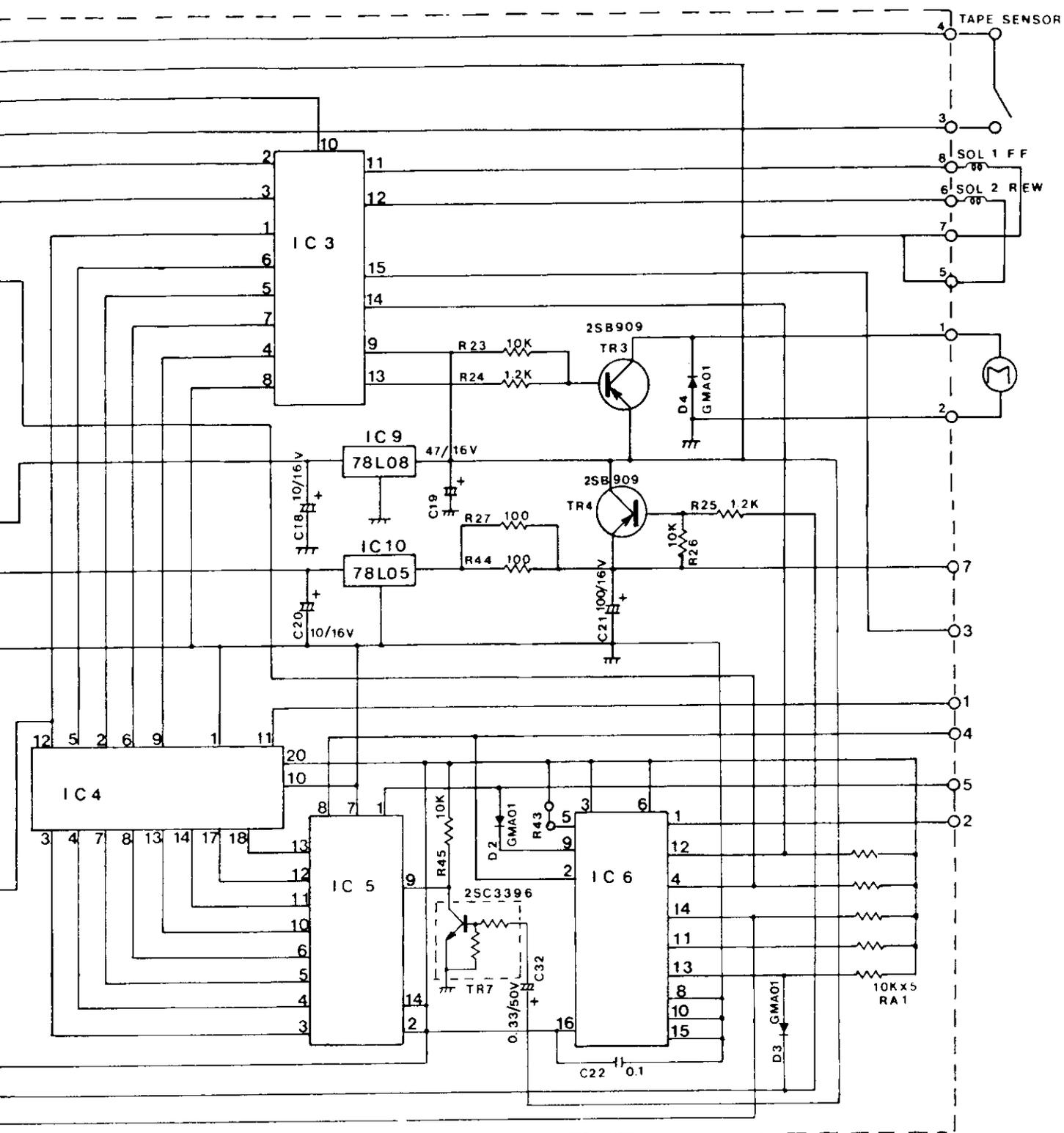


FIGURE 3-16. ELECTRICAL SCHEMATIC, SHINWA CASSETTE CONTROL PC BOARD (DOLBY)

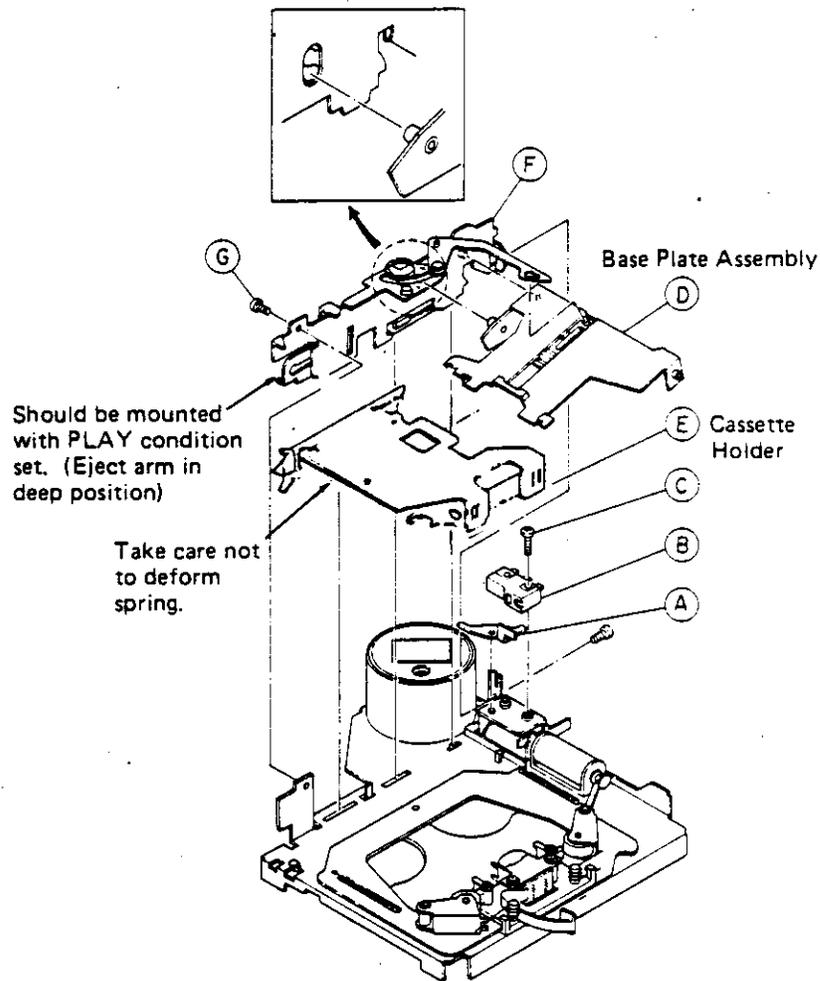


FIGURE 4-26. CASSETTE HOLDER & BASE PLATE

- 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).

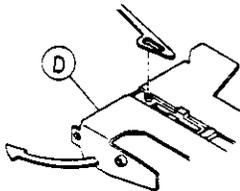


FIGURE 4-27. EJECT ARM

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

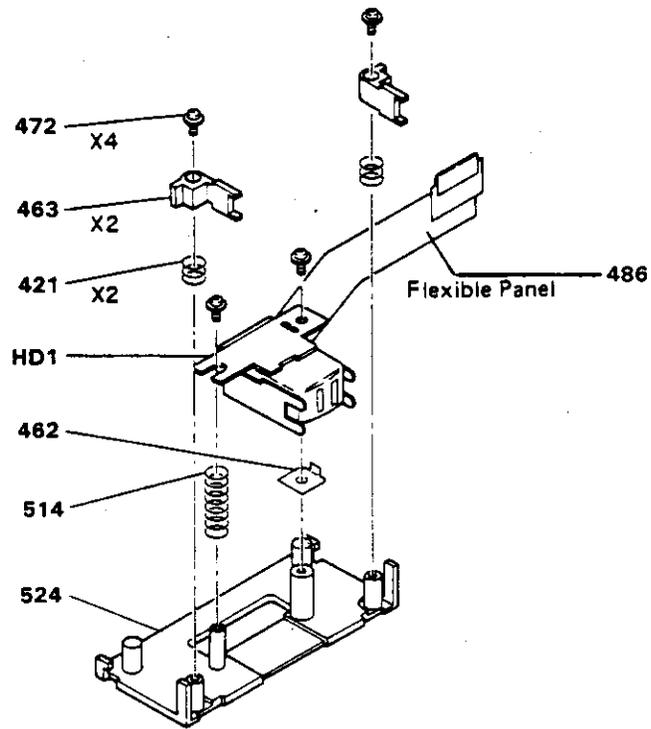


FIGURE 4-28. HEAD BASE ASSEMBLY

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

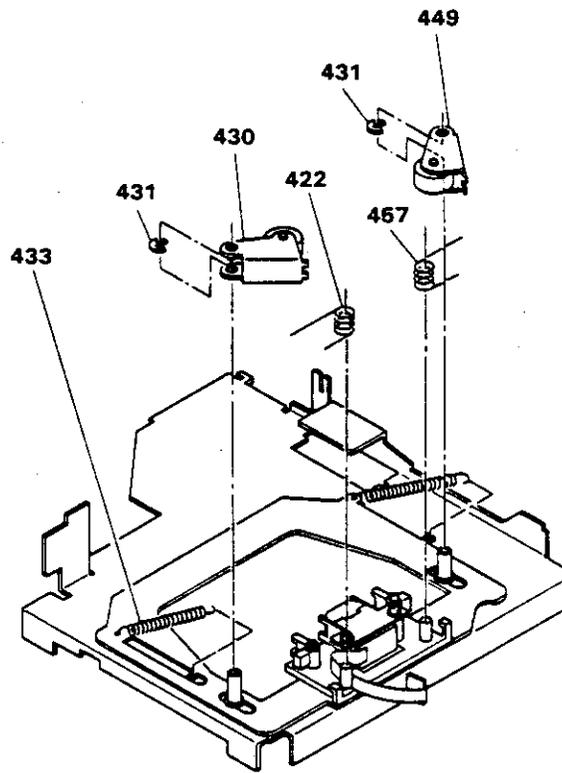


FIGURE 4-29. PINCH ROLLER ASSEMBLY

Photo-Transistor Mounting

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

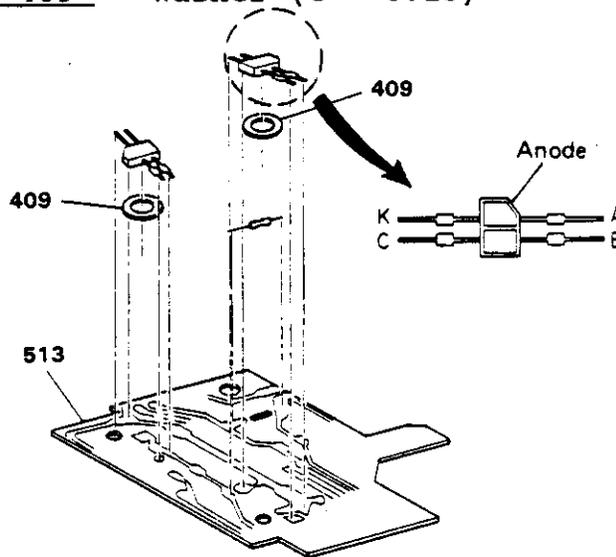


FIGURE 4-30. REEL PANEL ASSEMBLY (513)

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

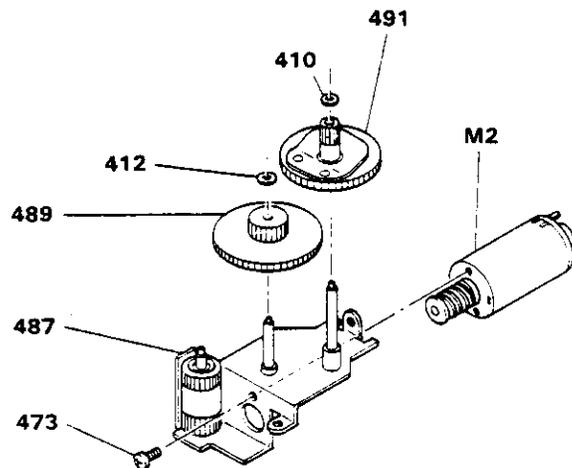
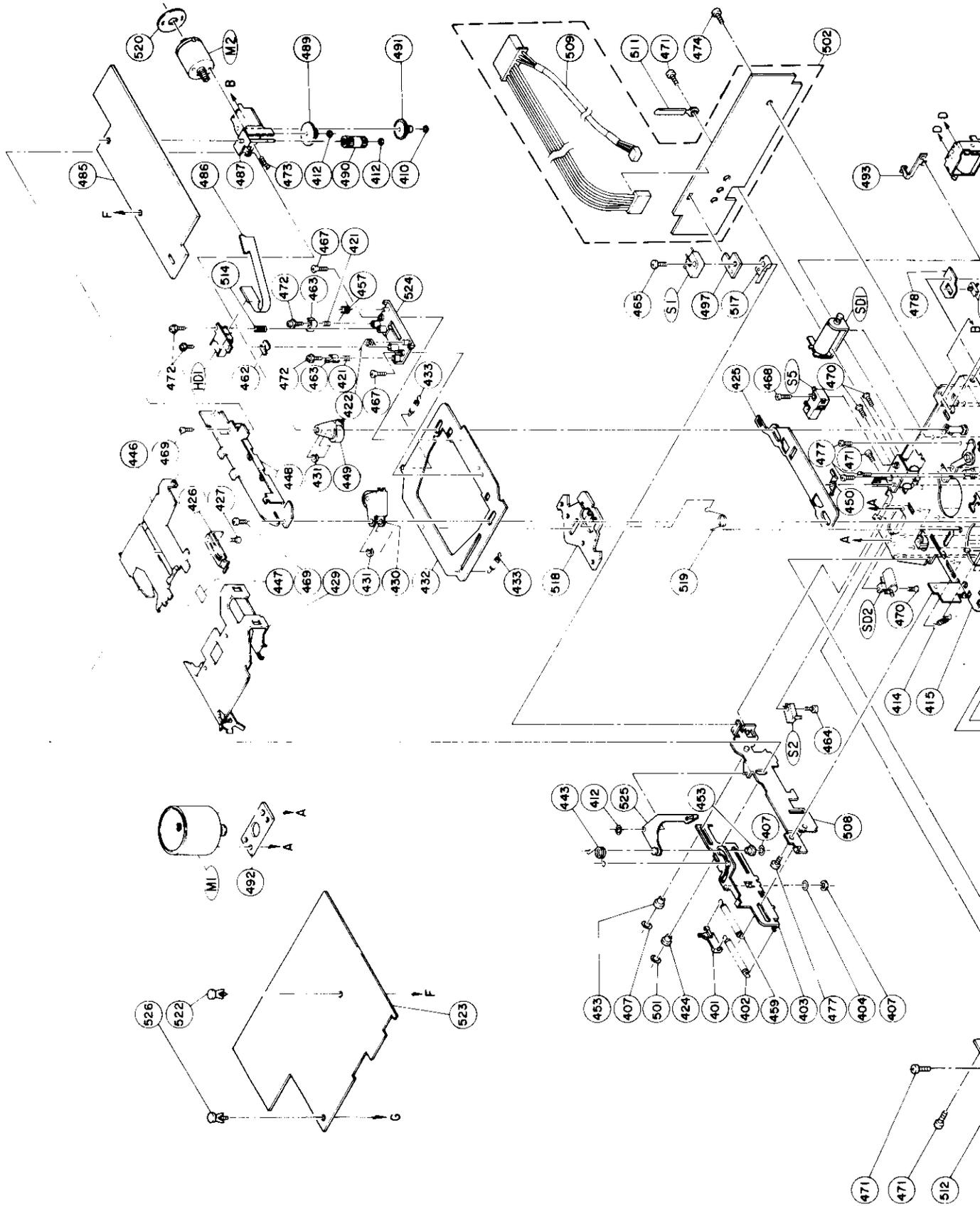


FIGURE 4-31. R/F FRAME MOUNTING



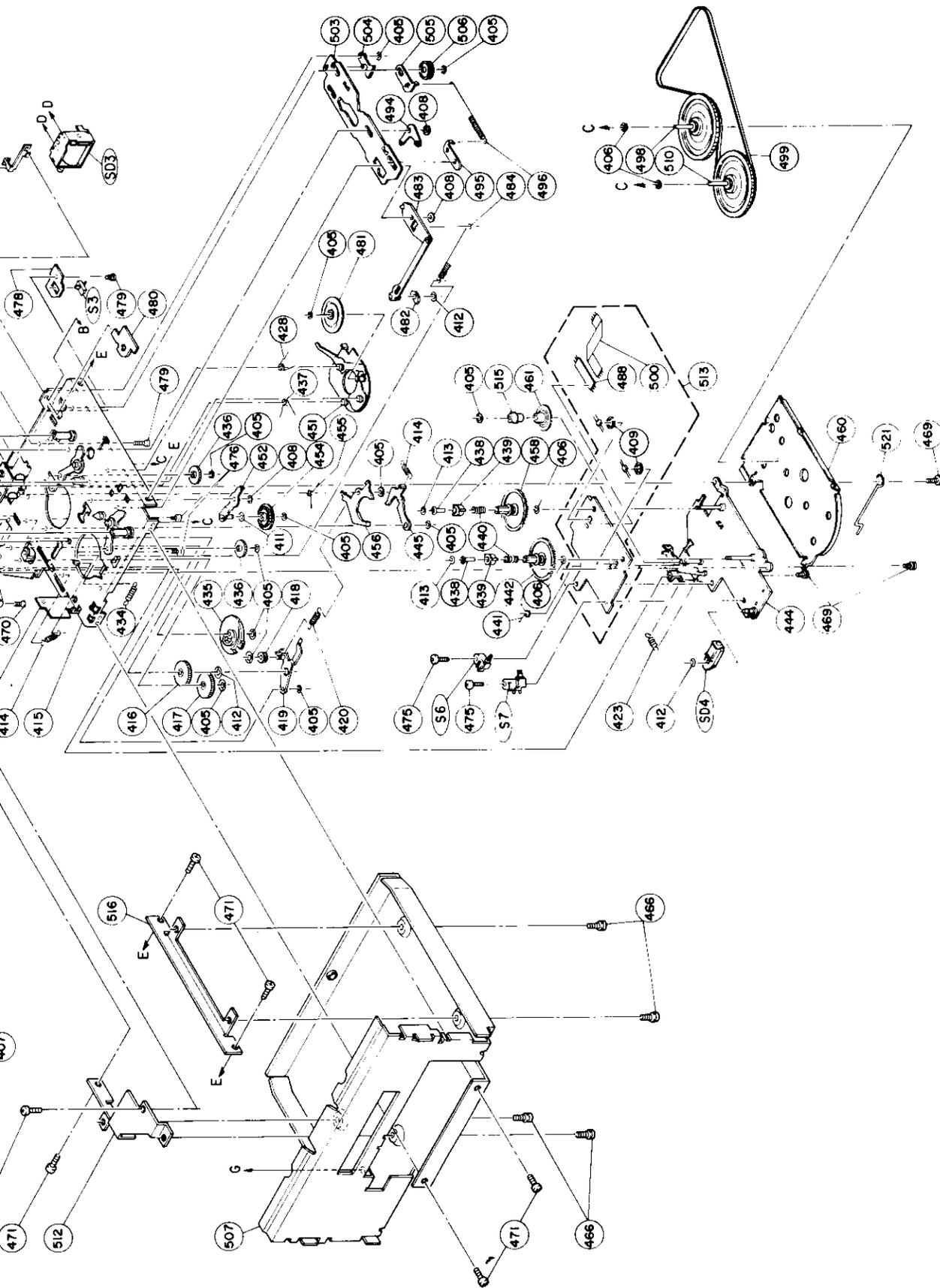


FIGURE 4-33. ALPINE CASSETTE MECHANISM

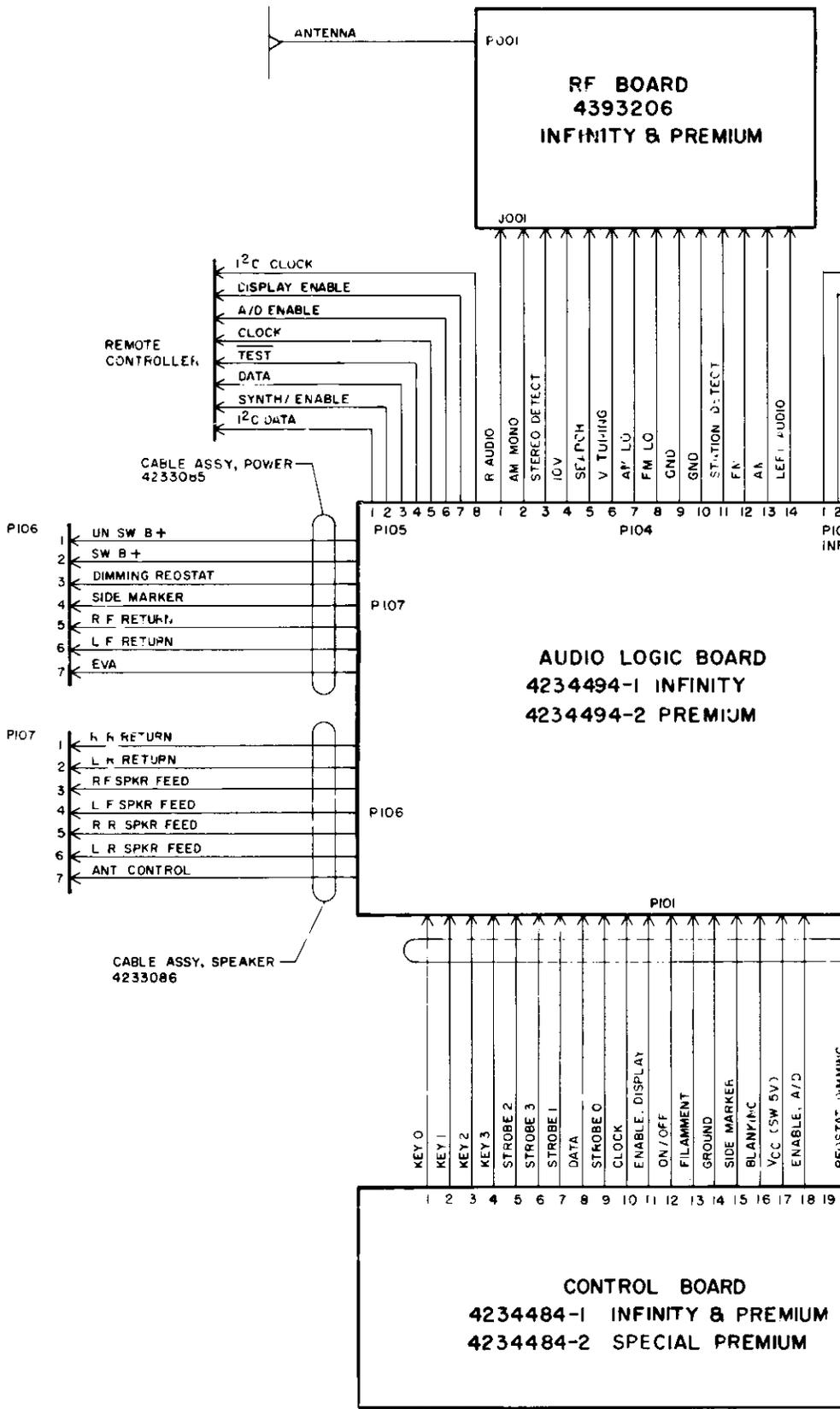
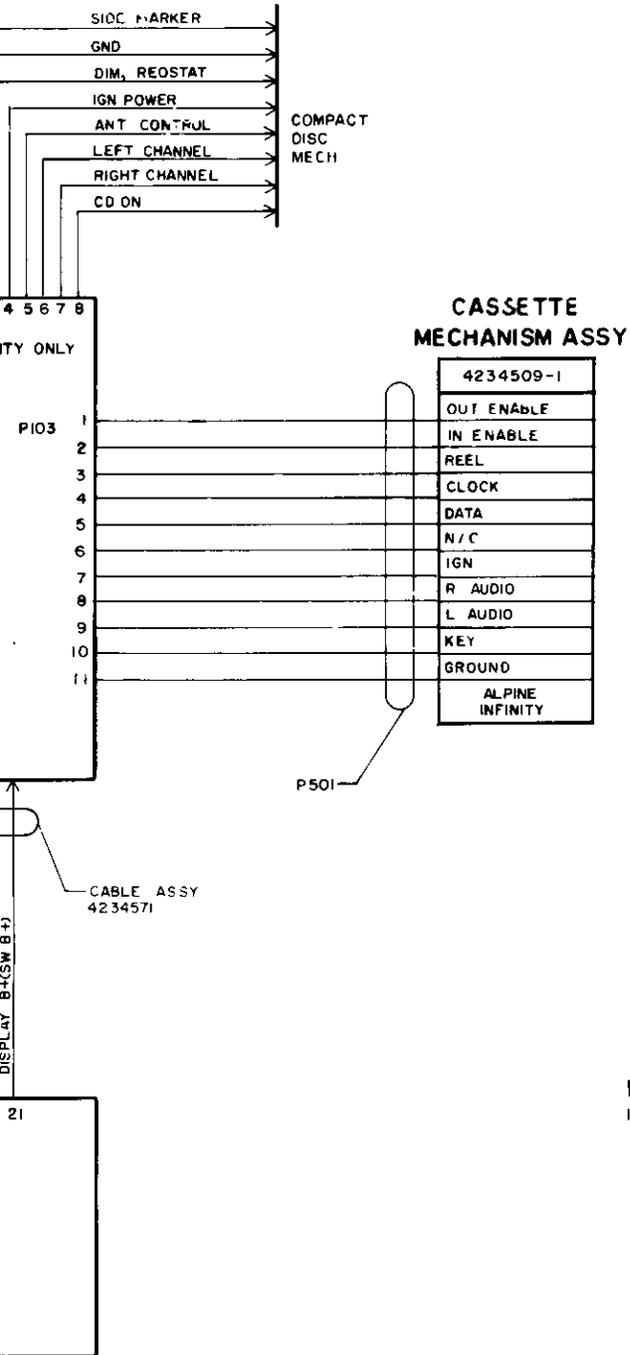


FIGURE 4-34. ELECTRONIC TUNED CASSETTE RADIO, BLOCK WIRING DIAGRAM

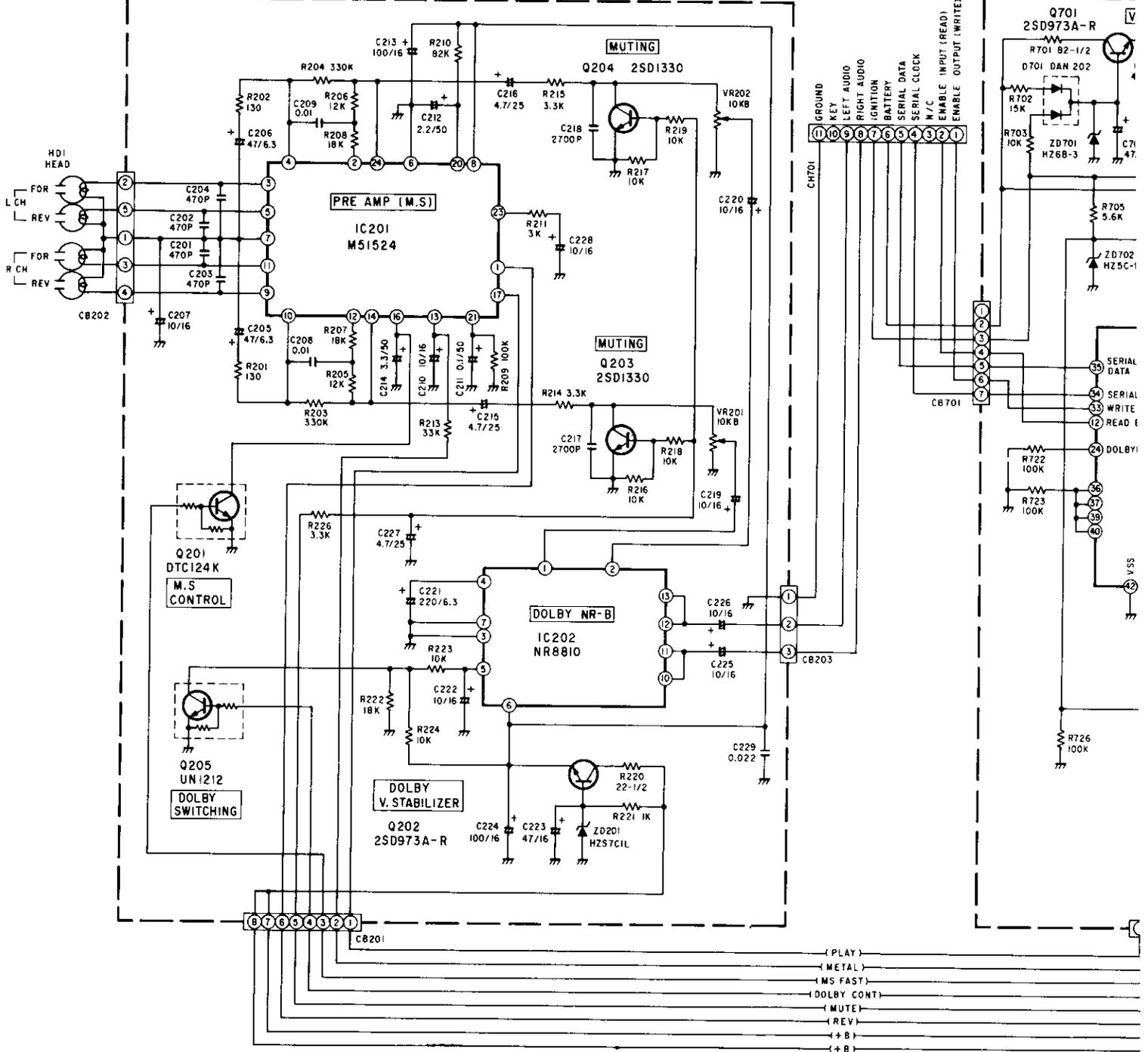


NOTES

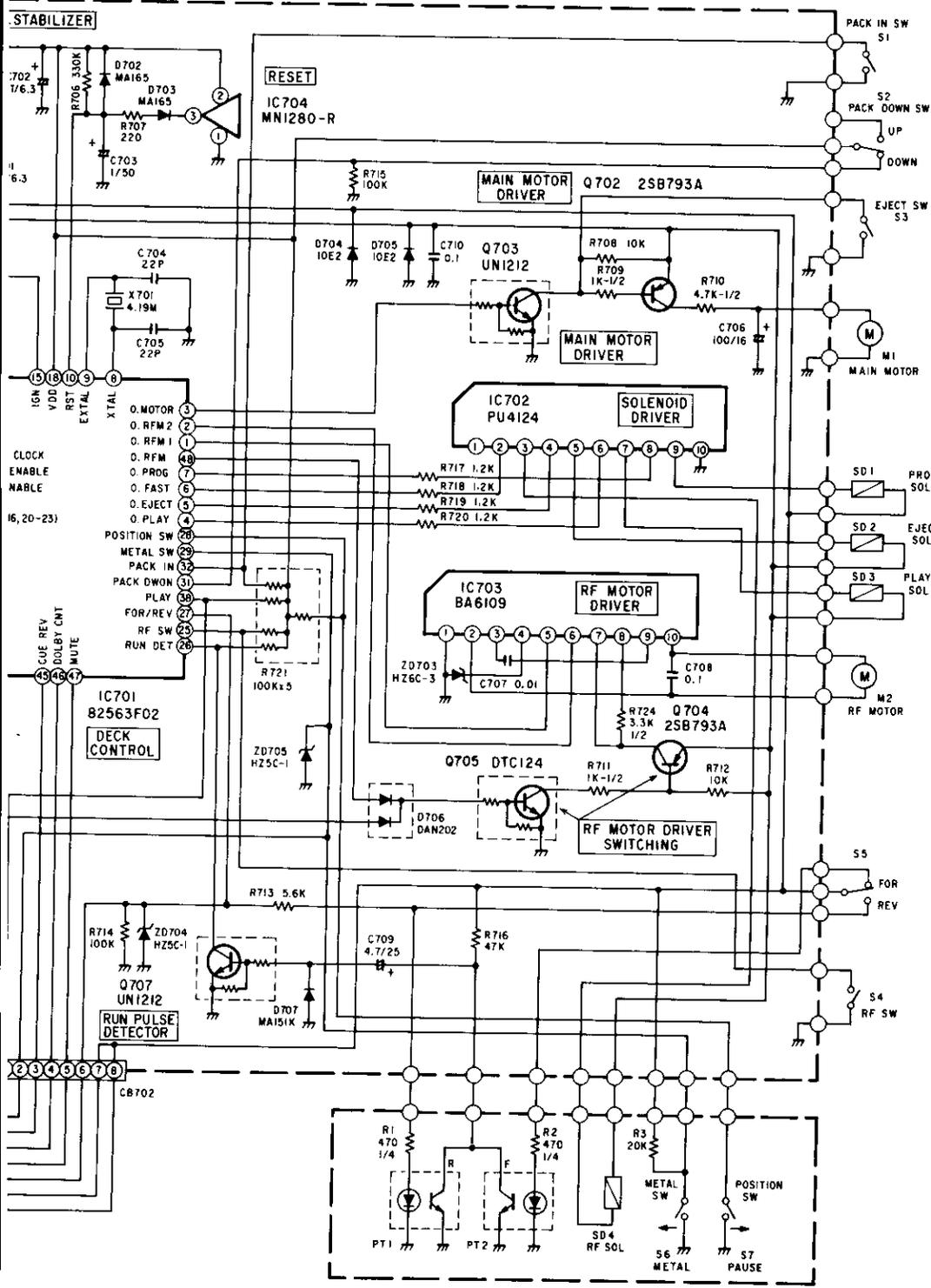
- 1 REFERENCE DRAWINGS, ELECTRICAL SCHEMATICS
- 4393206 RF BOARD ASSY
- 4234494 AUDIO LOGIC BOARD ASSY
- 4234484 CONTROL BOARD ASSY
- 4234507 SHINWA CASSETTE MECHANISM
- 4234510 ALPINE CASSETTE MECHANISM

AUDIO P.C. BOARD

CONTROL P.C. BOARD



RD



	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