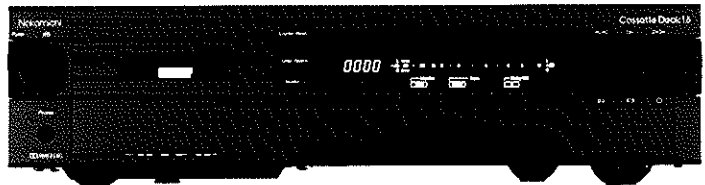


Service Manual

Nakamichi Cassette Deck 1.5



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1. GENERAL

1.1. Product Code

A134 (Silver Version)
A135 (Black Version)

1.2. Destinations


USA, CAN, EP, UK, AUS, OTR, SAU, JPN

Abbreviation

USA — U.S.A.	AUS — Australia
CAN — Canada	OTR — Other
EP — Europe	SAU — Saudi Arabia
UK — United Kingdom	JPN — Japan

1.3. CAUTIONS/WARNINGS

(1) Product Safety Notice

Parts marked with the symbol  in the schematic diagram have critical characteristics.

Use **ONLY** replacement parts recommended by the manufacturer.

It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedures.

(2) Leakage Current Check/Resistance Check

Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective.

WARNING — DO NOT return the unit to the customer until the problem is located and corrected.

1.4. Voltage Selector

Voltage selector is installed on the Rear Panel of the Nakamichi Cassette Deck 1 (Other & Saudi Arabia). The voltage selector can select either 110V/127V or 220V/240V at customer's disposal.

1.5. Package Ass'y and Accessory Ass'y

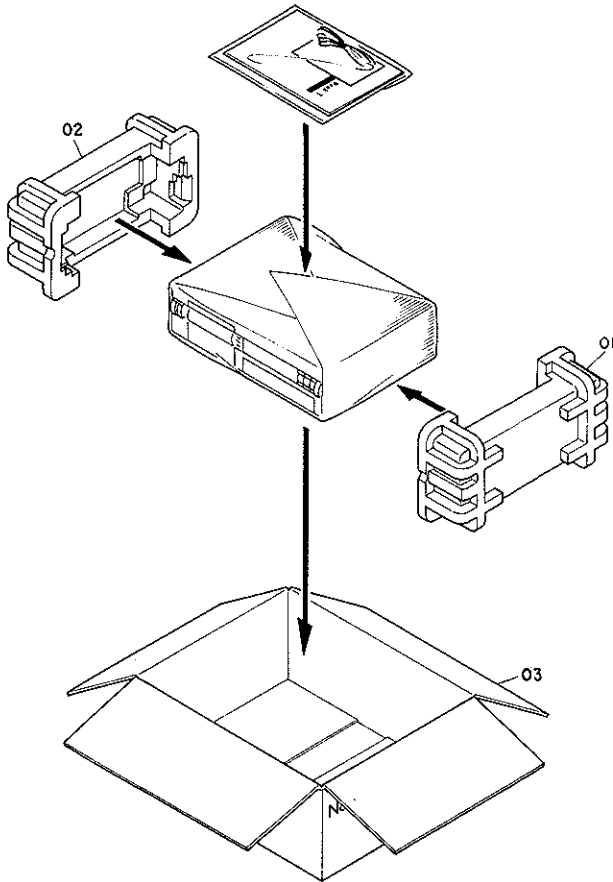


Fig. 1

Schematic Ref. No.	Part No.	Description	Q'ty
	—	Package Ass'y	
01	0F04497A	Packing R	1
02	0F04483B	Packing L	1
03	0F04583A	Carton Box	1
—	0F04458A	Soft Sheet	1
	DA04535A	Accessory Ass'y (USA, CAN)	1
	DA04530A	Accessory Ass'y (UK)	1
	DA04534A	Accessory Ass'y (EP)	1
	DA04532A	Accessory Ass'y (AUS, OTR, SAU)	1
	DA04541A	Accessory Ass'y (JPN)	1
	0D06219A	Onwer's Manual (Japanese)	1
	0D06218A	Onwer's Manual (English/French/Germany)	1
	DA04388A	Pin-Pin Cord	1

2. REMOVAL PROCEDURES

2.1. Top Cover

Refer to Fig. 2.1.

- (1) Loosen screws F01 (2 pcs.) and F02 (4 pcs.), and remove F03 (Top Cover).

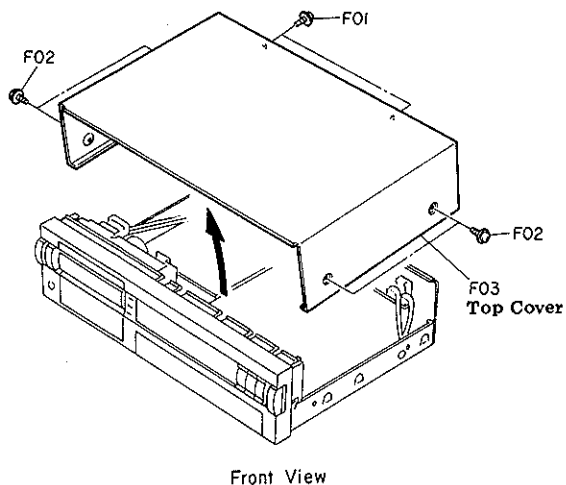


Fig. 2.1

2.2. Cassette Case Cover Ass'y

Refer to Fig. 2.2.

- (1) Press the Eject button to open F01 (Cassette Case Cover Ass'y).
- (2) Pull F01 (Cassette Case Cover Ass'y) upward.

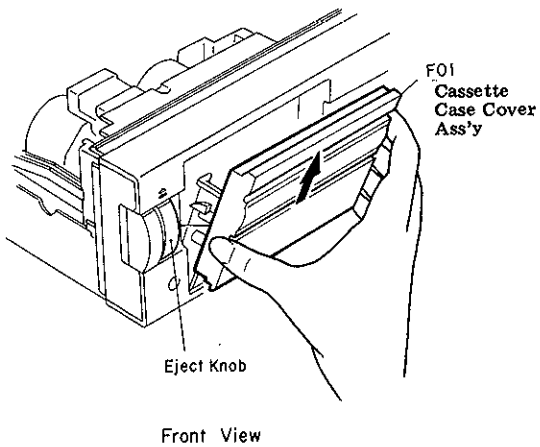


Fig. 2.2

2.3. Sealing Panel Ass'y

Refer to Fig. 2.3.

- (1) Open F01 (Sealing Panel Ass'y).
- (2) Hold by hand and pull F01 (Sealing Panel Ass'y) in the direction of the arrow.

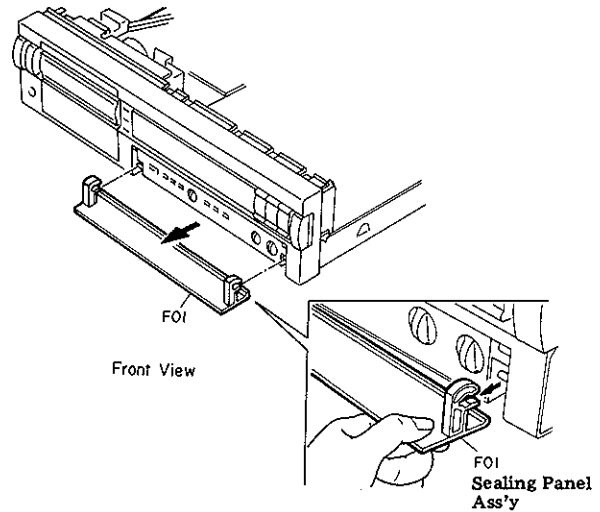


Fig. 2.3

2.4. Front Panel

Refer to Fig. 2.4.

- (1) Remove the Top Cover referring to item 2.1.
- (2) Loosen screws F01 (2 pcs.), F02 (1 pce.) and F03 (2 pcs.).
- (3) With pressing claws A (3 pcs.), remove F04 (Front Panel).

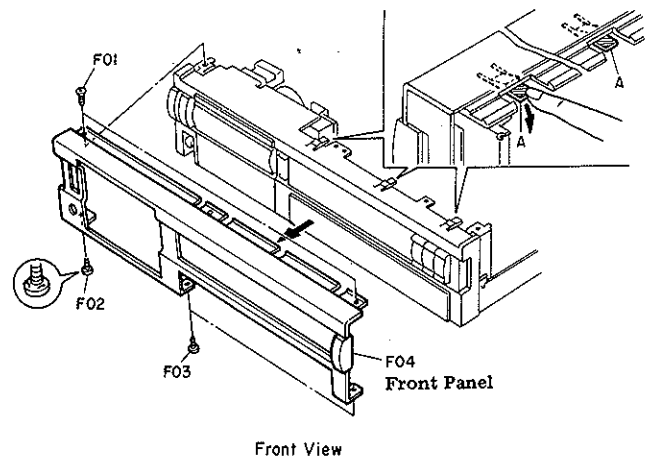


Fig. 2.4

2.5. Mechanism Ass'y

Refer to Fig. 2.5.

- (1) Remove the Top Cover and Cassette Case Cover Ass'y referring to item 2.1 and 2.2.
- (2) Loosen screws F01 (2 pcs.), F02 (1 pce.) and F03.
- (3) Remove F04 (Mechanism Ass'y) in the direction of the arrow.

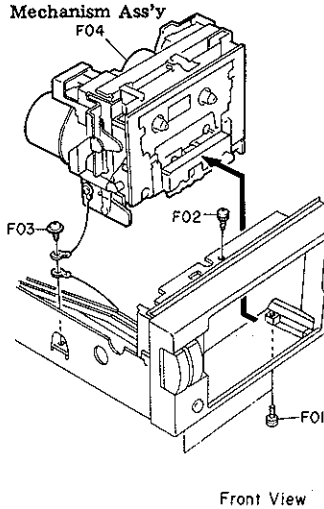


Fig. 2.5

2.6. Main P.C.B. Ass'y

Refer to Fig. 2.6.

- (1) Remove the Top Cover and Sealing Panel Ass'y referring to items 2.1 and 2.3.
- (2) Loosen screws F01 (1 pce.) and F02 (1 pce.), and remove F03 (Pin Jack P.C.B. Ass'y).
- (3) Loosen screws F04 (2 pcs.) and remove F05 (Inner Panel).
- (4) Loosen screws F06 (2 pcs.) and F07 (4 pcs.), and remove F08 (Main P.C.B. Ass'y) in the direction of the arrow.

Note: When installing F05 (Inner Panel), insert protrusions A (3 pcs.) into the claws of F05 (Inner Panel) and fasten F05 (Inner Panel) with screws F04 (2 pcs.).

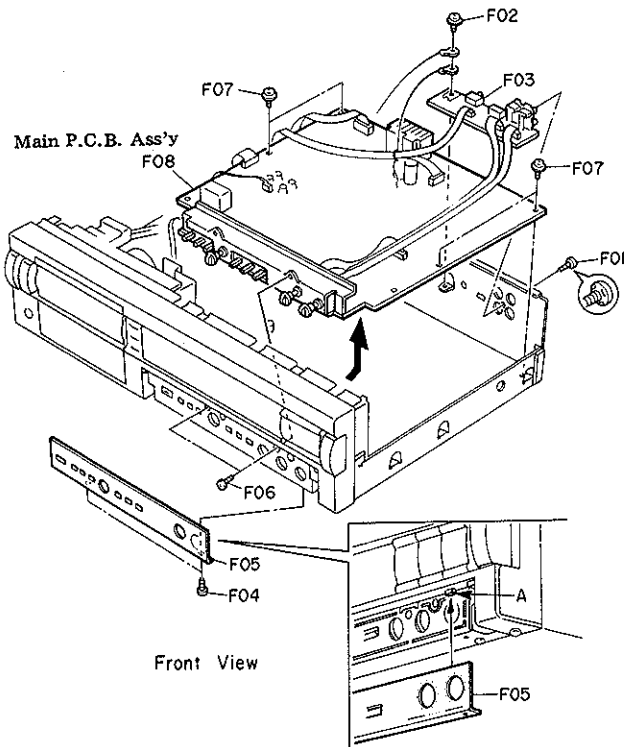


Fig. 2.6

2.7. Power Switch Joint and Power Supply and Logic P.C.B. Ass'y
Refer to Fig. 2.7.

- (1) Remove the Top Cover Ass'y referring to item 2.1.
- (2) Push F01 (Power Switch Joint) backward (in the direction of (A)).
- (3) Pull F01 (Power Switch Joint) forward (in the direction of (B)).
- (4) Pull F01 (Power Switch Joint) upward (in the direction of (c)) to remove it.
- (5) Loosen screws F02 (6 pcs.) and remove F03 (Power Supply and Logic P.C.B. Ass'y) in the direction of the arrow.

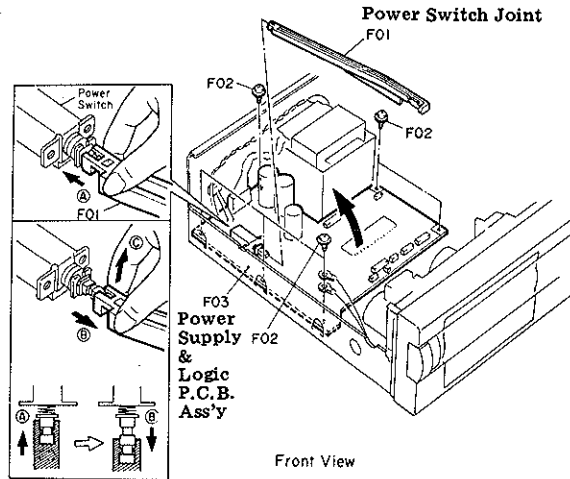


Fig. 2.7

2.8. Control Switch & Display P.C.B. Ass'y

Refer to Fig. 2.8.

- (1) Remove the Mechanism Ass'y referring to item 2.5 to gain access to the fastening screw.
- (2) Loosen screws F01 (2 pcs.), unhook the claws (6 pcs.), and remove F02 (Control Switch & Display P.C.B. Ass'y).

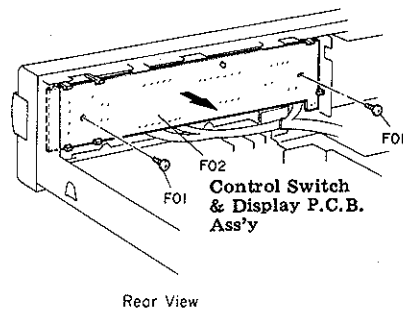


Fig. 2.8

3. TEST TAPES AND GAUGES

2.9. Head Mount Base Ass'y

Refer to Fig. 2.9.1.

- (1) Remove the Mechanism Ass'y referring to item 2.5.
- (2) Loosen screws F01 (2 pcs.) and remove F02 (Head Mount Cover).
- (3) Loosen screws F03 (2 pcs.), straighten F04, and remove F05 (Head Mount Base Ass'y).

Note: When installing the Head Mount Base Ass'y, follow the next steps. Refer to Figs. 2.9.2 and 2.9.3.

- (a) Insert the Plate Washers into the grooves of the shafts by hand. See Fig. 2.9.2.
- (b) Install F05 (Head Mount Base Ass'y) and fasten F03 (2 pcs.). Push the Plate Washers with a blade of the screwdriver so that the Plate Washers come off the grooves. See Fig. 2.9.3.

- (1) 400 Hz Level Tape (DA09005B)
- (2) 1 kHz Track Alignment Tape (DA09007B)
- (3) 10 kHz PB Frequency Response Tape (DA09003B)
- (4) 15 kHz PB Frequency Response Tape (DA09002B)
- (5) 20 kHz PB Frequency Response Tape (DA09001B)
- (6) 15 kHz Azimuth Tape (DA09004B)
- (7) 3 kHz Speed and Wow/Flutter Tape (DA09006C)
- (8) Tape Travelling Cassette (DA09071A)
- (9) Reference EXII Tape (DA09111A)
- (10) Reference SX Tape (DA09110A)
- (11) Reference ZX Tape (DA09109A)
- (12) EH Tilt Check Gauge S (DA09088A)
- (13) Stroke Check Gauge S (DA09090A)
- (14) Tape Guide Height Check Gauge S (DA09091A)
- (15) Tilt Check Gauge S (DA09039B)
- (16) Torque Gauge FWD (DA09082A)

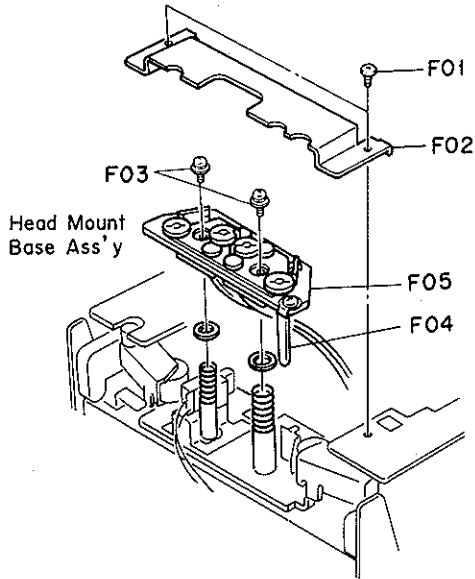


Fig. 2.9.1

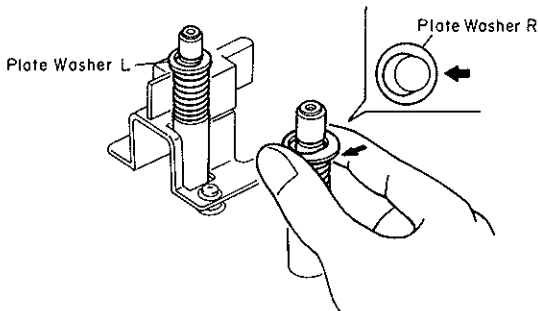


Fig. 2.9.2

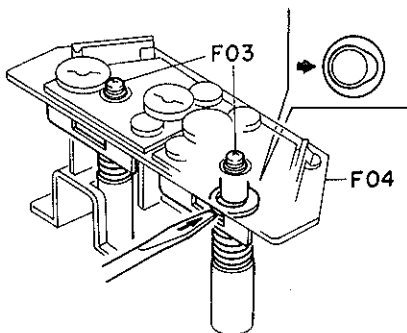


Fig. 2.9.3

4. MECHANICAL ADJUSTMENTS

4.1. Record Head and Playback Head Tilt Adjustment

Note: Before adjusting items 4.1 to 4.5, pull out the Cassette Case Cover Ass'y referring to item 2.2 and remove the Head Mount Cover by loosening two screws.

Refer to Fig. 4.1.

- (1) Remove the pad lifter from the playback head.
- (2) Load a Tilt Check Gauge S (DA09039B) in the cassette deck.
- (3) Clip the grounding terminal of the Tilt Check Gauge with one end of the cord with clip, and the chassis of the cassette deck with the other end.
- (4) Remove both of the Height Gears.
- (5) Set the cassette deck in Play mode. Check to insure whether the Beacons Playback Head "Upper" or "Lower" and Record Head "Upper" or "Lower" are illuminating. In order not to give damages onto the head surfaces, push both of slide knobs of the Gauge to away from the heads, then return them to the original place to be in contact with record head and playback head surfaces after Play mode is securely locked.
- (6) Beacon Playback Head "Lower" will light on when height adjustment screw (PH) turned counterclockwise but playback Head "Upper" when clockwise. Adjust so that both "Upper" and "Lower" will light on even when you move the slide knob away from the heads and then return it to the original place.
- (7) Same procedures will apply to the Beacons Record Head "Upper" and "Lower", except for the height adjustment screw (RH).
- (8) Set the cassette deck in Stop mode and fit both of the serrated Height Gears. Then set the cassette deck again in Play mode and insure all of the 4 Beacons are illuminating. If not, (4) through (7) will have to be repeated till satisfactory results are obtained.
- (9) Mount the pad lifter on the playback head.

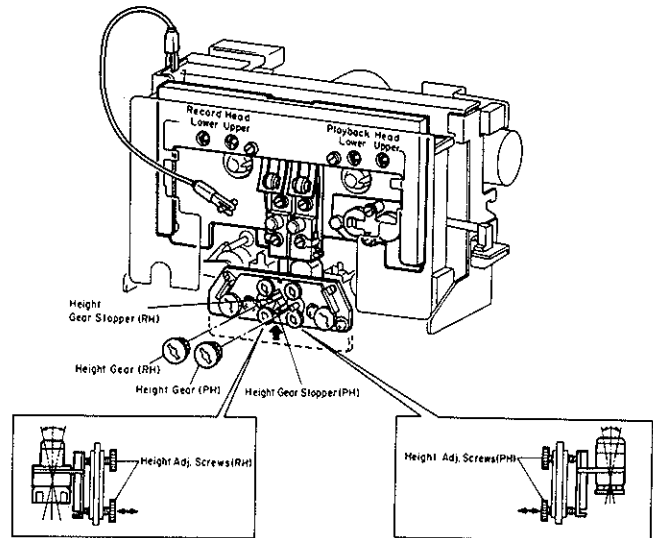


Fig. 4.1

4.2. Head Base Stroke Check

Remove the Cover Plate Ass'y.

Refer to Fig. 4.2.

Note: Before you conduct this adjustment, adjust with a "Tilt Check Gauge S" to insure freedom from tilt on the playback head and record head.

- (1) Load a Stroke Check Gauge S (DA09090A) in the cassette deck.
- (2) Move Record Head Indicator and Playback Head Indicator to the direction of arrow mark "A" with your finger tip and then set the cassette deck in Play mode. Then slowly release the Indicators and insure whether each of the Indicators is in contact with record and playback heads.
- (3) Check to insure whether the line "P" on the Playback Head Indicator meets the central line on the Indicator Plate.
- (4) Check to insure whether the line "P" on the Playback Head Indicator locates between the 2 lines on the Record Head Indicator, thus check can be made on record head stroke.

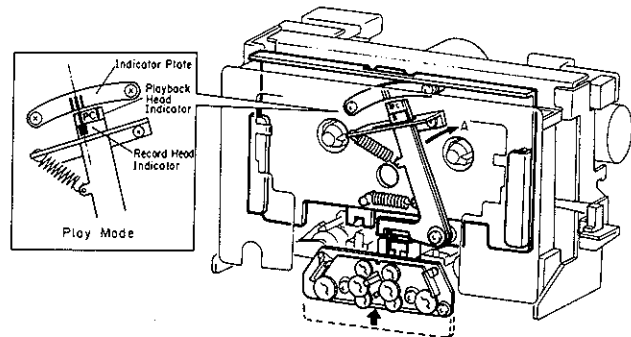


Fig. 4.2

4.3. Erase Head Stroke Adjustment and Tape Guide Height Check

Remove the Cover Plate Ass'y and the Head Mount Base Ass'y.

Refer to Fig. 4.3.

(1) Erase Head Stroke Adjustment

- (a) Load a Tape Guide Height Check Gauge S (DA09091A) in the cassette deck.
- (b) Set the cassette deck in Play mode, thus check can be made on erase head stroke through the EH Stroke Indicator.
- (c) Check to insure whether the erase head surface is aligned with red line on the EH Stroke Indicator. If not, adjust the erase head stroke by loosening screw A that assembles erase head with erase head plate.
- (d) After completion of adjustment, screw A shall be locked with lock tight paint.

(2) Supply Tape Guide Height Adjustment

- (a) Load a Tape Guide Height Check Gauge S (DA09091A) in the cassette deck.
- (b) Set the cassette deck in Play mode.
- (c) Slide the Supply Tape Guide Check Bar down against the supply tape guide, and check to insure that the Supply Tape Guide Check Bar is accepted by the supply tape guide. If not, adjust the supply tape guide height by turning screw B.

(3) Take-up Tape Guide Height Check

- (a) Load a Tape Guide Height Check Gauge S (DA09091A) in the cassette deck.
- (b) Set the cassette deck in Play mode.
- (c) Slide the Take-up Tape Guide Check Bar down against the take-up tape guide, and check to insure that the Take-up Tape Guide Check Bar is accepted by the take-up tape guide.

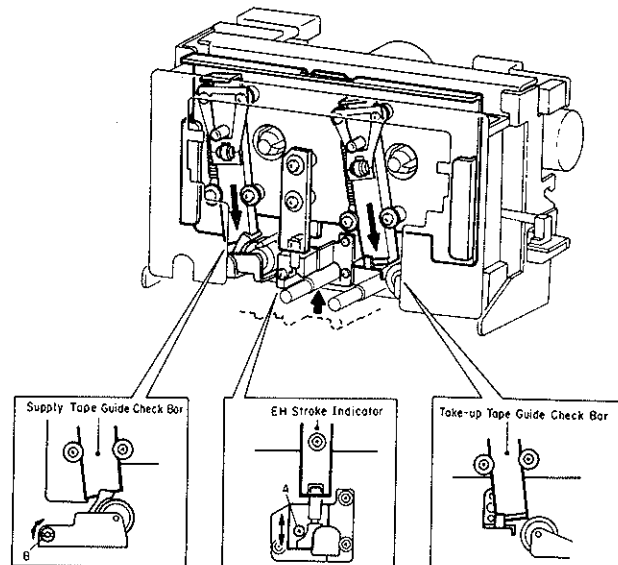


Fig. 4.3

4.4. Erase Head Height and Tilt Adjustment

Refer to Fig. 4.4.

- (1) Remove the Cassette Case Cover Ass'y, Cover Plate Ass'y, and Head Mount Base Ass'y.
- (2) Load an EH Tilt Check Gauge S (DA09088A) in the cassette deck.
- (3) Set the cassette deck in Stop mode.
- (4) Check to insure whether one of the 3 Beacons is illuminating. Look down the mirror and slowly turn the Screw "Height" counterclockwise (or clockwise) so that the two horizontal lines on the mirror will become superposed on the line (in different color) of the erase head, and check to insure whether the first Beacon is illuminating.
- (5) Turn Screw "Tilt" counterclockwise (or clockwise) to light on the second Beacon. Excessive turning will cause the first Beacon to light off. Adjustments of Screw "Tilt" will therefore be conducted till both of the first and the second Beacons illuminate.

- (6) Turn Screw "Azimuth" counterclockwise (or clockwise) to light on the third Beacon. Excessive turning will cause either the first or the second Beacon to light off, and therefore adjust Screw "Azimuth" until all of the 3 Beacons illuminate.
- (7) Check to insure whether the horizontal line on the mirror corresponds to that on the erase head. If not, (4) through (7) will have to be repeated till satisfactory results are obtained.
- (8) After completion of adjustment, 3 pcs. of screws shall be locked with lock tight paint.

Note: Before use of this gauge, check to insure freedom from dust or dirt, or overflow in the groove of the erase head surface.

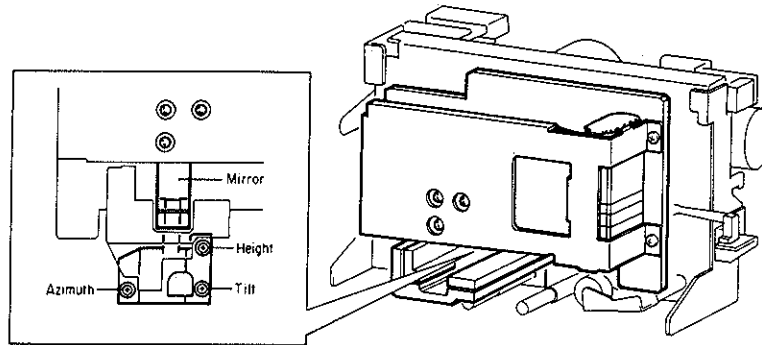


Fig. 4.4

4.5. Playback Head and Record Head Height Adjustment and Azimuth Alignment

Refer to Fig. 4.5.

(1) Playback Head Height Adjustment and Azimuth Alignment

- (a) Press the Monitor button to select TAPE indication.
- (b) Connect an AC voltmeter to the Output Jacks.
- (c) Load a 1 kHz Track Alignment Tape (DA09007B) and set the cassette deck in Play mode.
- (d) Turn the PH Height Gear until the outputs of both channels become minimum.
- (e) Load a 15 kHz Azimuth Tape (DA09004B) and set the cassette deck in Play mode.
- (f) Turn the PH Azimuth Alignment Screw until the outputs of both channels become maximum.
- (g) Repeat above steps (c) through (f) two or three times to obtain optimum performance.

(2) Record Head Height Adjustment and Azimuth Alignment

- (a) Connect an AC voltmeter to Output Jacks.
- (b) Press the Monitor button to select TAPE indication.

(c) Press the Type IV button.

(d) Load a reference ZX tape.

(e) Feed in 400 Hz (0 dB) to the Input Jacks.

(f) Set the cassette deck in Record and Play mode and turn the RH Height Gear until the outputs of both channels become maximum.

(g) Feed in 15 kHz (-20 dB) to the Input Jacks and turn the RH Azimuth Alignment Screw until the outputs of both channels become maximum.

(h) Repeat (e) to (g) two or three times to obtain optimum performance.

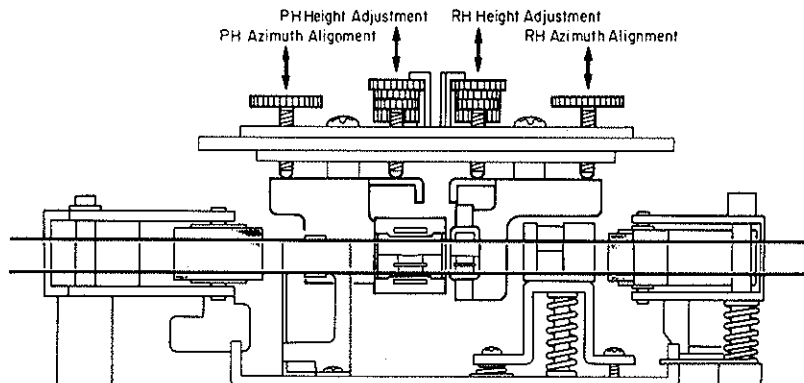


Fig. 4.5

4.6. Tape Travelling Check

Load and play back a Tape Travelling Cassette and check the following:

- (1) Tape is in contact with heads sufficiently.
- (2) Tape waving is small on the heads and pressure rollers.
- (3) Tape is free from waving or slippage from the tape guides.

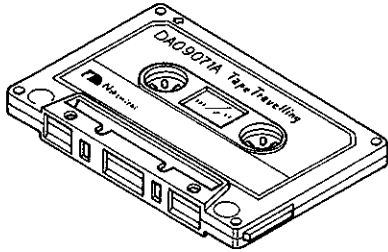


Fig. 4.6

4.7. Eject Damper Adjustment

Refer to Fig. 4.7. Load a cassette tape, and with opening the Cassette Case by pressing the Eject button and closing it by hand, adjust the speed of damper action by the Adjustment Screw.

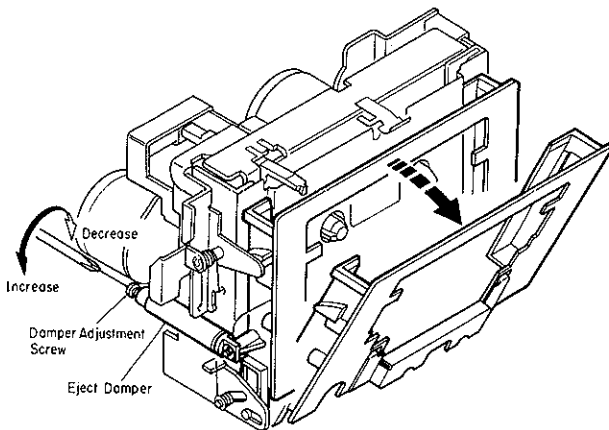


Fig. 4.7

4.8. Reel Motor Speed Adjustment in Play Mode

- (1) To warm-up the cassette deck, load a C-60 cassette tape and set the cassette deck in Play mode.
- (2) After more than four minutes, load a Torque Gauge FWD (DA09082A) and set the cassette deck in Play mode.
- (3) Adjust VR501 on the Power Supply & Logic P.C.B. Ass'y to obtain 4.7 ± 1 g-cm on the torque gauge.

4.9. Tape Speed Adjustment

Refer to Fig. 4.8.

- (1) Connect a frequency counter to the Output Jacks.
- (2) Load a 3 kHz Speed and Wow/Flutter Tape (DA09006C) and play it back.
- (3) Adjust the Tape Speed Adjustment Volume incorporated in the Capstan Motor to obtain 3,000 Hz on the frequency counter.

CCW: Motor drives slowly.

CW: Motor drives fast.

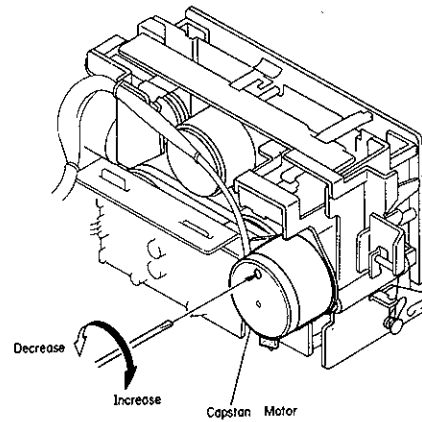


Fig. 4.8

4.10. Lubrication

The tape transport is of a lubrication-free type mechanism. When the following parts are replaced, apply the specified lubricant.

- (1) Molykote (R) Grease (X5-6020)
Cam Motor Pulley
Thrust portion on the Capstan Shaft
- (2) FLOIL GB-TS-1
Washer between Reel Hub Ass'y and Back Tension Spring
- (3) Diamond Oil (EP-56)
Reel Hub Shaft
- (4) Anderol 456
Capstan Shaft

Note: We suggest that you use the above specified lubricant or equivalent type.

The company dealing in the above lubricant is as follows:

- (a) Molykote (R) Grease (X5-6020)
Dowcoming Co., Ltd., 1-15-1 Nishishinbashi, Minato-ku, Tokyo, Japan
- (b) FLOIL GB-TS-1
Kanto Chemicals Co., Ltd., 2-7 Kanda Sakuma-cho, Chiyoda-ku, Tokyo, Japan
- (c) Diamond Oil (EP-56)
Mitsubishi Oil Co., Ltd., 1-2-4 Toranomom, Minato-ku, Tokyo, Japan
- (d) Anderol 456
Toyo Kokusai Oil Co., Ltd., 3-3-5 Hatchobori, Chuo-ku, Tokyo, Japan

5. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

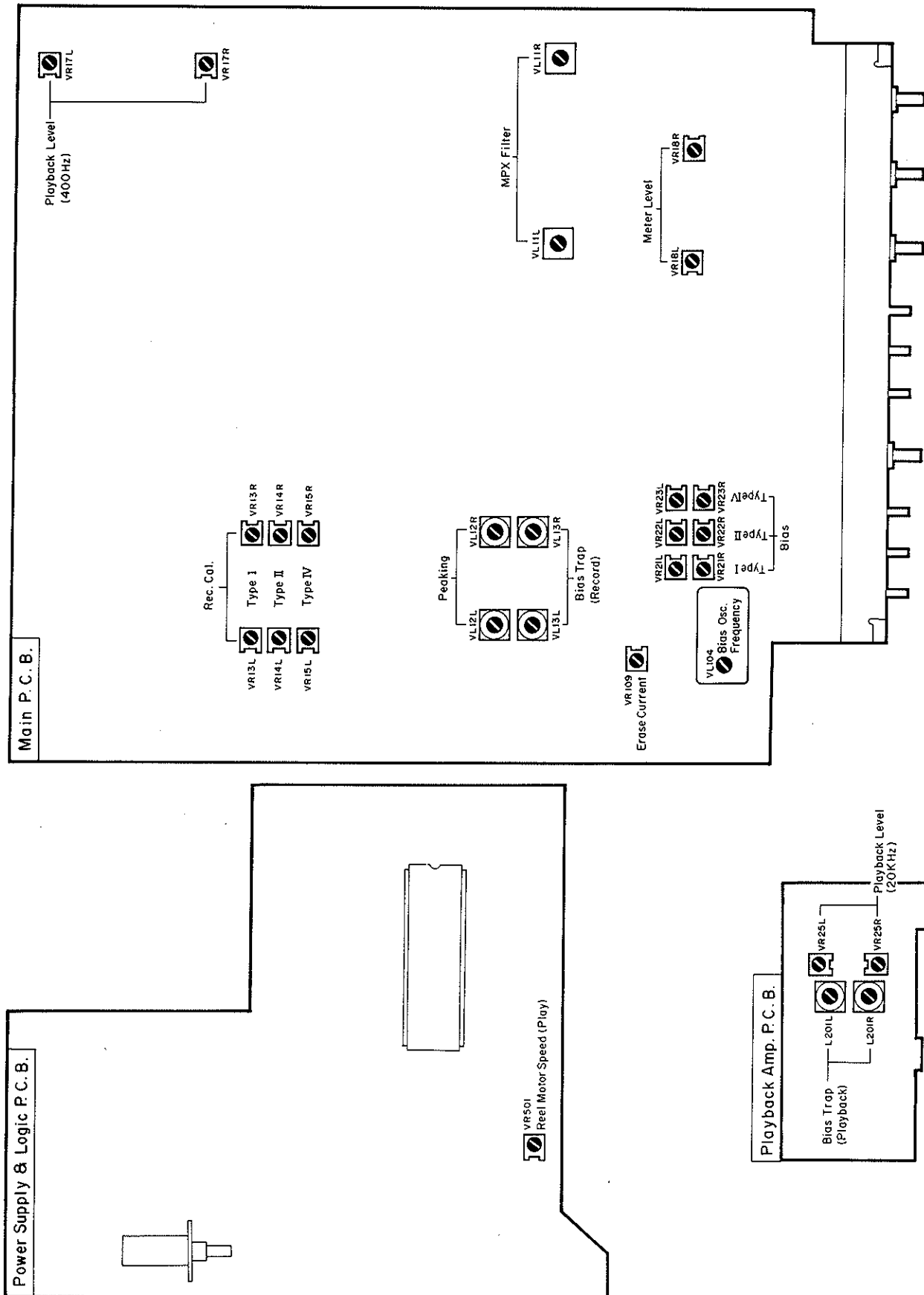
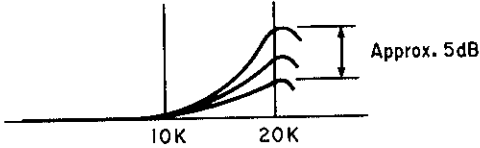


Fig. 5

6. ELECTRICAL ADJUSTMENTS

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Preliminary Step			Output Level - Max. Balance - Center Bias Tune - Center Monitor - Tape Tape - IV MPX Filter - OFF Dolby NR - OFF		Set the Cassette Deck as shown in MODE.
2	Reel Motor Speed Adjustment (Play)	Torque Guage FWD (DA09082A)		Playback	Power Supply & Logic P.C.B. VR501	Adjust VR501 to obtain 47 ± 1 g-cm on the torque gauge.
3	Tape Speed Adjustment	3 kHz Speed and Wow/Flutter Tape (DA09006C)	Frequency Counter to Output Jacks	Playback Monitor - Tape Tape - I	Tape Speed Adj. Volume (Capstan Motor)	Adjust the volume incorporated in the Capstan Motor Ass'y to obtain 3 kHz \pm 15 Hz on the frequency counter.
4	Meter Level Calibration	400 Hz to Input Jacks	AC Voltmeter to Output Jacks	Monitor - Source	Main P.C.B. VR18L VR18R	1. Feed in 400 Hz and adjust the Record Level control to obtain 500 mV -2 dB on the AC voltmeter. 2. Adjust VR18L (VR18R) so that the 0 dB segment on the level meter starts illuminating.
5	MPX Filter Adjustment	19 kHz \pm 100 Hz to Input Jacks	AC Voltmeter to Output Jacks	Monitor - Source MPX - OFF/ON	Main P.C.B. VL11L VL11R	1. Adjust the Input Level control to obtain 500 mV (0 dB) on the AC voltmeter. 2. Set the MPX Filter switch to ON and adjust VL11L (VL11R) to obtain minimum reading on the AC voltmeter. (The minimum reading will be less than -30 dB.)
6	Playback Head Track Alignment	1 kHz Track Alignment Tape (DA09007A)	AC Voltmeter to Output Jacks	Playback Monitor - Tape Tape - IV Dolby NR - OFF	PH Height Gear	Adjust the PH Height Gear to obtain the minimum readings on the AC voltmeter for both channels. Refer to "Playback Head Height Adjustment" in item 4.5.
7	Playback Head Azimuth Alignment	15 kHz Azimuth Tape (DA09004B)	AC Voltmeter to Output Jacks	Same as above	Playback Head Azimuth Alignment Screw	Adjust the Playback Head Azimuth Alignment Screw to obtain maximum readings on the AC voltmeter for both channels. Refer to "Playback Head Height Adjustment and Azimuth Alignment" in item 4.5. Note: Repeat Steps 6 and 7 two or three times to obtain optimum performance.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARK
8	Playback Level Calibration	400Hz Level Tape (DA09005B)	AC Voltmeter to Output Jacks	Playback Monitor - Tape - IV Dolby NR - OFF	Main P.C.B. VR17L VR17R	Adjust VR17L (VR17R) to obtain 500 mV on the AC voltmeter.
9	Playback Frequency Response Adjustment	400Hz Level Tape (DA09005B) 10 kHz PB Frequency Response Tape (DA09003B) 15 kHz PB Frequency Response Tape (DA09002B) 20 kHz PB Frequency Response Tape (DA09001B)	AC Voltmeter to Output Jacks	Same as above	Playback Amp. P.C.B. VR25L VR25R	<p>1. Load a 400 Hz level tape, play it back, and read the playback level on the AC voltmeter.</p> <p>2. Load 10 kHz, 15 kHz and 20 kHz PB frequency response tapes and adjust the playback head azimuth to obtain maximum levels on the AC voltmeter with each tape.</p> <p>Check that the playback levels are as follows with respect to the level for 400 Hz level tape.</p> <p>10 kHz: -20 dB -2 dB to +2 dB 15 kHz: -20 dB -2 dB to +3 dB 20 kHz: -20 dB -2 dB to +4 dB</p> <p>If the levels are out of the ranges, play back the 20 kHz PB frequency response tape and adjust VR25L (VR25R) to obtain -20 dB +1.0 dB. VR25L (VR25R) compensates the playback frequency response at 20 kHz as shown below:</p>  <p>3. Conduct Step 7 "Playback Head Azimuth Alignment".</p>
10	Bias Oscillation Frequency and Erase Current Adjustment	None	AC Voltmeter across the additional 0.1 ohm resistor and Frequency Counter between terminals 1 and 2 of CN-102 (i.e., across Erase Head) on Main P.C.B.	Record, Playback Monitor - Source Tape - IV Dolby NR - OFF	Main P.C.B. VL104 VR109	<p>1. Connect an additional 0.1 ohm resistor in series to the Erase Head and connect the AC voltmeter across the resistor.</p> <p>2. Record and playback a reference ZX tape.</p> <p>3. Adjust VL104 to obtain 105 kHz on the frequency counter.</p> <p>4. Check the erase current by the AC voltmeter. Erase current will be within the range of 310 mA to 380 mA (typically approx. 350 mA). If erase current is less than 310 mA, adjust VR109 to obtain satisfactory results.</p> <p>5. If erase current is adjusted with VR109, re-check the bias oscillation frequency.</p> <p>6. Remove the additional 0.1 ohm resistor.</p>

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
11	Bias Trap Adjustment (Record Amp.)	Remove input signals	AC Voltmeter between emitter of Q111L/R and GND on Main P.C.B.	Record, Playback Monitor - Source Tape - IV Dolby NR - OFF	Main P.C.B. VL13L VL13R	1. Load a cassette without tape inside. 2. Adjust VL13L (VR13R) to obtain minimum reading on the AC voltmeter.
12	Record Head Height Adjustment	400 Hz (0 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Tape Tape - II Dolby NR - OFF	RH Height Gear	1. Load a reference SX tape, and record and play it back. 2. Adjust the RH Height Gear to obtain maximum readings for both channels on the AC voltmeter. Refer to "Record Head Height Adjustment and Azimuth Alignment" in item 4.5.
13	Record Head Azimuth Alignment	15 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Same as above	Record Head Azimuth Alignment Screw	Adjust the Record Head Azimuth Alignment Screw to obtain maximum readings for both channels on the AC voltmeter. Refer to "Record Head Height Adjustment and Azimuth Alignment" in item 4.5. Note: Repeat Steps 12 and 13 two or three times to obtain optimum performance.
14	Bias Trap Adjustment (Playback Amp.)	None	AC Voltmeter to Output Jacks	Record, Playback Monitor - Tape Tape - IV Dolby NR - OFF	Playback Amp. P.C.B. L201L L201R	1. Load a cassette without tape inside. 2. Adjust L201L (L201R) to obtain minimum reading on the AC voltmeter.
15	Record Level Calibration and Recording Bias Current Adjustment	400 Hz (0 dB), 20 kHz (-20 dB) and 10 kHz/20 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Source/Tape Tape - I/II/IV Dolby NR - OFF/B/C	Main P.C.B. (Level) IV:VR15L VR15R II:VR14L VR14R I:VR13L VR13R (Bias) IV:VR23L VR23R II:VR22L VR22R I:VR21L VR21R	Adjustment should be made in the order of tape type IV, II, and I. 1. Set the Monitor switch to Source and Dolby NR switch to OFF. 2. Feed in 400 Hz, and set the Input Level control to obtain 0 dB (500 mV) on the AC voltmeter. 3. Set the Monitor switch to tape. 4. Load a reference ZX tape, reference SX tape and reference EXII tape. 5. Feed in 400 Hz (0 dB) record and play back, and adjust the following semi-fixed volumes to obtain 0 dB on the AC voltmeter. ZX tape (IV): VR15L, VR15R SX tape (II): VR14L, VR14R EX tape (I): VR13L, VR13R 6. Set the Dolby NR Switch to C. 7. Feed in 20 kHz (-20 dB) and adjust Bias VR23L (VR23R), VR22L (VR22R) and VR21L (VR21R) to obtain the same readings as source monitor levels on the AC voltmeter. (to be continued)

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
						<p>8. Repeat above 6 and 7 two or three times to obtain optimum performance.</p> <p>9. Feed in 10 kHz and 20 kHz (-20 dB), record and play them back, and check whether the playback levels are within the following ranges.</p> <p>With Dolby NR OFF: -20 dB \pm3 dB Level difference between Dolby NR OFF and B: \pm2 dB Level difference between Dolby NR OFF and C: \pm3 dB</p> <p>10. Check that the total harmonic distortion is less than 0.8% for ZX and EXII tapes and 1.0% for SX tape. If satisfactory results are not obtained, re-adjust VR21L (VR21R) referring to Step 9 "Playback Frequency Response Adjustment" and repeat above steps.</p>
16	Overall Frequency Response Adjustment	400 Hz (0 dB) and 20 Hz to 20 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Source/Tape - I/II/IV Dolby NR - OFF	Main P.C.B. VL12L VL12R	<p>1. Set the Monitor switch to Source.</p> <p>2. Feed in 400 Hz and adjust the Input Level control to obtain -20 dB on the AC voltmeter.</p> <p>3. Set the Monitor switch to Tape.</p> <p>4. Feed in 20 Hz to 20 kHz (-20 dB) and check to insure whether the output levels are within -20 dB \pm3 dB.</p> <p>5. If above is not sufficient, adjust L12L (L12R) to obtain approx. -20 dB at 20 kHz.</p> <p>6. Conduct step 15 "Record Level Calibration and Recording Bias Current Adjustment".</p> <p>7. If above is not sufficient, precise re-adjustment of step 9 "Playback Frequency Response", replacement of Playback Head or Record Head, and check on item 4.7 "Tape Travelling Check" will be required.</p>

7. MECHANISM ASS'Y AND PARTS LIST

7.1. Synthesis

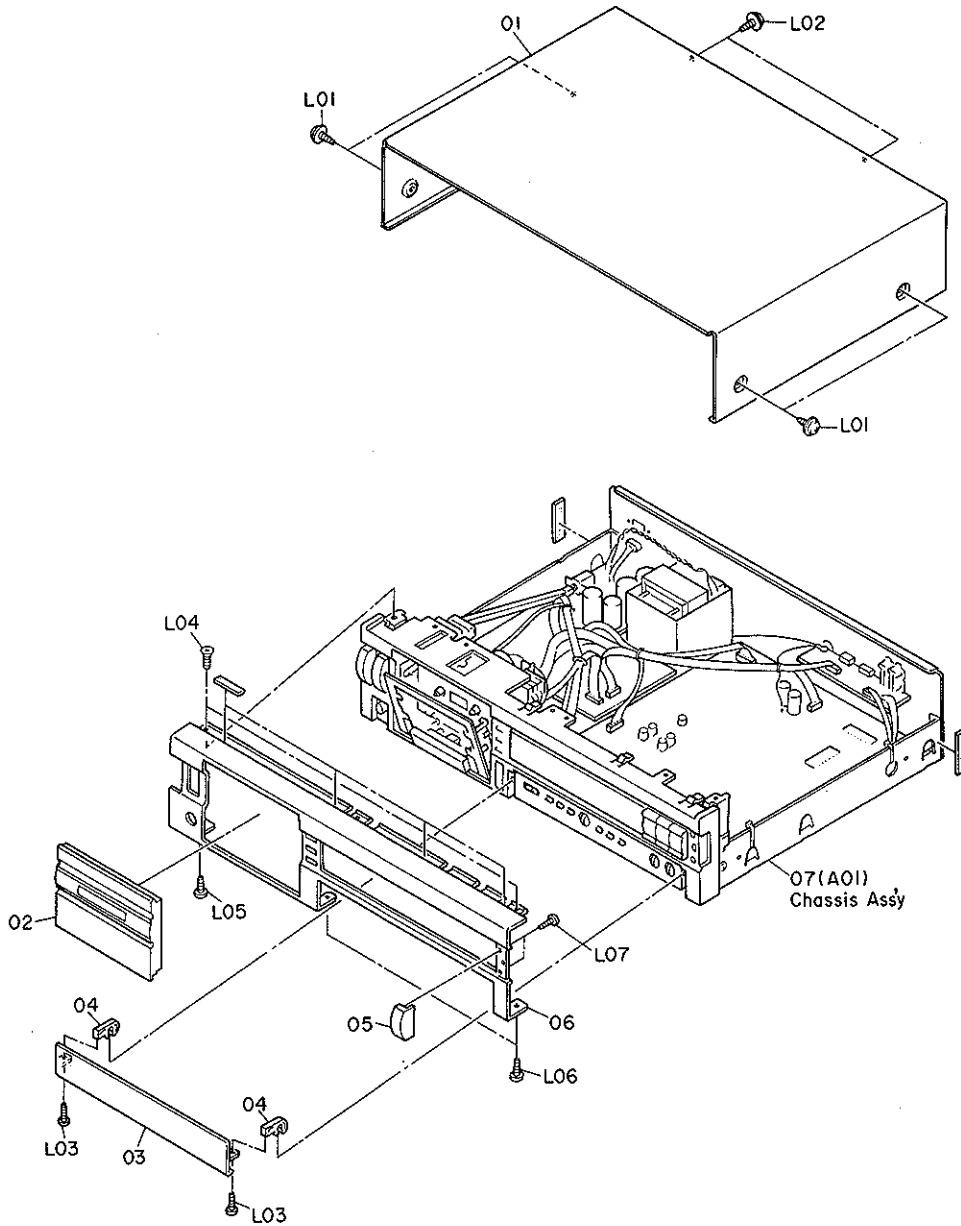


Fig. 7.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.1. Synthesis				07	—	Chassis Ass'y	1
		Synthesis		L01	OE03032A	BT 4x8 ♂ Pan Washer Faced (Black Chromate) (Black)	
01	OH05710A	Top Cover (Black)	1		OE03590A	BT 4x8 ♂ Pan Washer Faced (Silver)	
	OH06132A	Top Cover (Silver)	1	L02	OE03632A	BT 3x8 ♂ Binding with Washer (Black Chromate) (Black)	
02	HA05935B	Cassette Case Cover Ass'y (Black)	1		OE03591A	BT 3x8 ♂ Binding with Washer (Silver)	
	HA06179A	Cassette Case Cover Ass'y (Silver)	1	L03	OE03641A	BT 3x6 ♂ Pan (Black Chromate)	
03	OH05833A	Sealing Panel (Black)	1	L04	OE03054A	BT 3x8 ♂ Countersunk	
	OH06120A	Sealing Panel (Silver)	1	L05	OE03366A	BT 3x8 ♂ Binding Projected (Black Chromate)	
04	OJ06261C	Sealing Arm (Black)	2	L06	OE00921A	BT 3x8 ♂ Binding (Black Chromate)	
	OH06129A	Sealing Arm (Silver)	2	L07	OE00855A	BT 2x6 ♂ Binding	
05	OH05714A	Dummy Cap (Black)	1				
	OH06134A	Dummy Cap (Silver)	1				
06	OH06114A	Front Panel (Black)	1				
	OH06118A	Front Panel (Silver)	1				

7.2. Chassis Ass'y (A01)

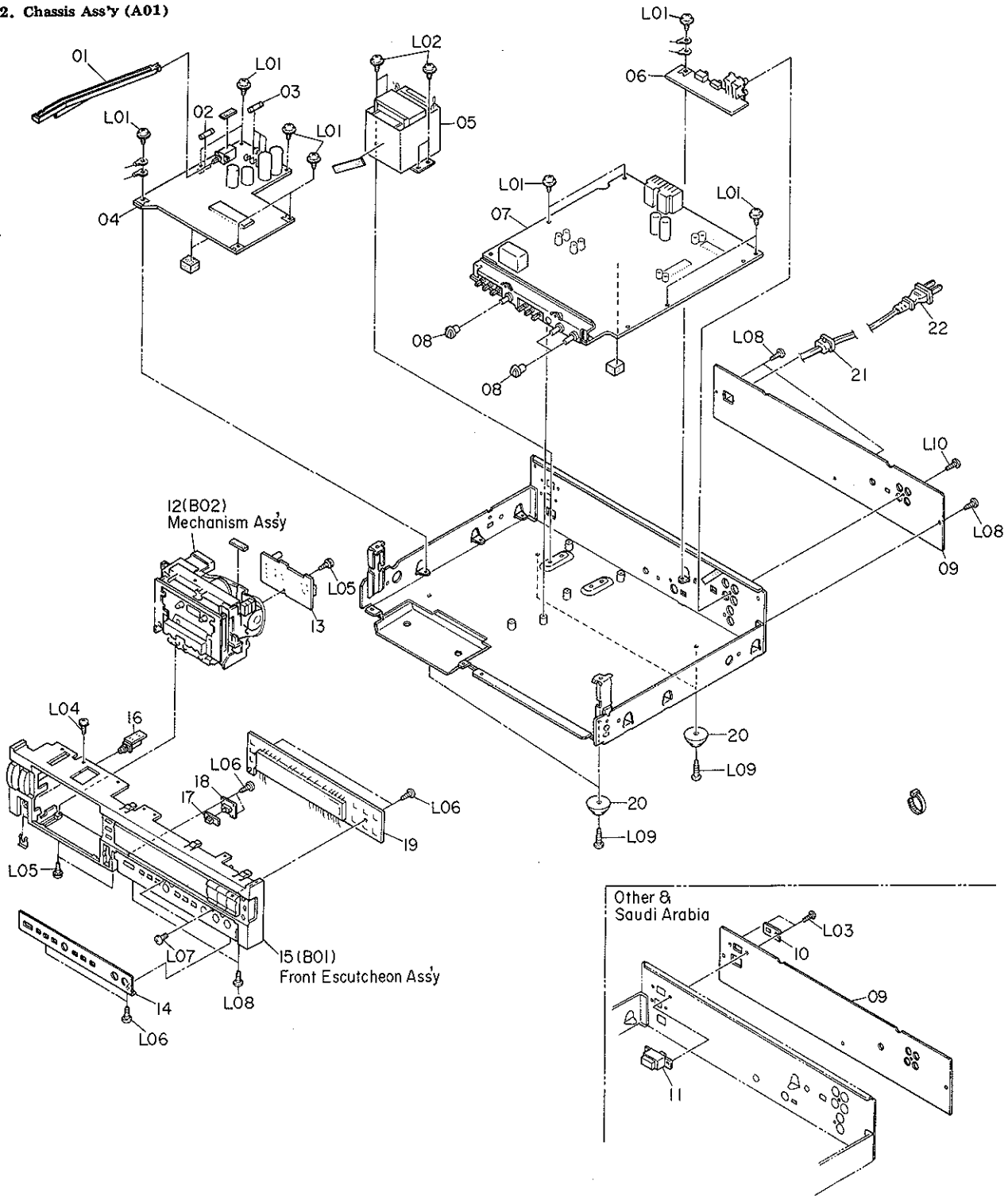


Fig. 7.2

7.3. Front Escutcheon Ass'y (B01)

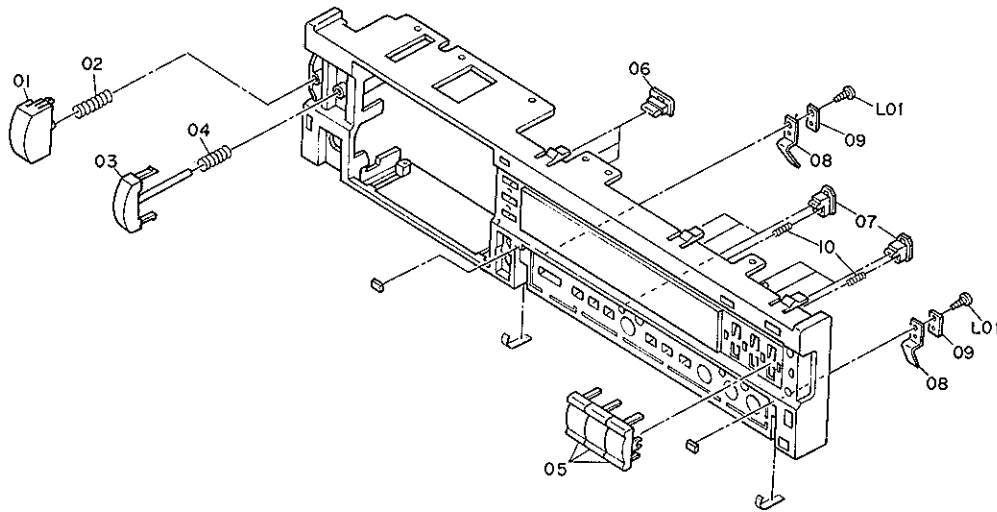


Fig. 7.3

Schematic Ref. No.	Part No.	Description	Qty	Schematic Ref. No.	Part No.	Description	Qty
7.2. Chassis Ass'y				L02	0E03592A	BT4x6 @ Binding Washer Faced (Black Chromate)	
A01	—	Chassis Ass'y	1	L03	0E00985A	M3x6 @ Binding (Black Chromate) (OTR, SAU)	
01	0J06258B	Power Switch Joint	1	L04	0E03212A	BT2.6x6 @ Binding Toothed Lock	
02	0B90493A	Fuse 500mA [F404] (USA, CAN, JPN)	1	L05	0E03435A	M2.6x6 @ Binding With Toothed Lock	
	0B08505A	Fuse F500mA [F404] (EP, UK, AUS, OTR, SAU)	1	L06	0E00921A	BT3x8 @ Binding (Black Chromate)	
03	0B90375A	Fuse 1.6A [F401-403] (USA, CAN, JPN)	3	L07	0E00896A	M3x6 @ Binding	
	0B90382A	Fuse T1.25A [F401-403] (EP, UK, AUS, OTR, SAU)	3	L08	0E00860A	BT3x6 @ Binding (Black Chromate)	
04	BA08386A	Power Supply & Logic P.C.B. Ass'y (Except JPN)	1	L09	0E03012A	BT3x12 @ Binding (Black Chromate)	
	BA08383A	Power Supply & Logic P.C.B. Ass'y (JPN)	1	L10	0E03366A	BT3x8 @ Binding Projected (Black Chromate)	
05	0B50183A	Power Transformer 120V (USA, CAN)	1	7.3. Front Escutcheon Ass'y (B01)			
	0B50182A	Power Transformer 230V (EP)	1	B01	—	Front Escutcheon Ass'y	1
	0B50179A	Power Transformer 240V (UK, AUS)	1	01	0H05723A	Power Switch Button (Black)	1
	0B50181A	Power Transformer 115-230V (OTR, SAU)	1		0H06124A	Power Switch Button (Silver)	1
	0B50180A	Power Transformer 100V (JPN)	1	02	0C09392A	Power Switch Spring	1
06	BA08381A	Pin Jack P.C.B. Ass'y	1	03	HA05929A	Eject Knob Ass'y (Black)	1
07	BA08380A	Main P.C.B. Ass'y (Except EP)	1		HA06181A	Eject Knob Ass'y (Silver)	1
	BA08492A	Main P.C.B. Ass'y (EP)	1	04	0J06252A	Eject Spring	1
08	0H05821A	Input & Bias Tuning Volume Knob	3	05	0H05716A	Control Knob A (Black)	3
09	0H06117A	Rear Panel (USA, CAN, EP, UK, AUS, JPN)	1		0H06127A	Control Knob A (Silver)	3
	0H06116A	Rear Panel (OTR, SAU)	1	06	0H05825B	Tact Knob (Black)	3
10	0M05611A	Voltage Lock Plate (OTR, SAU)	1		0H06126A	Tact Knob (Silver)	3
11	0B07092U	Voltage Selector (OTR, SAU)	1	07	0H05819A	Push Knob (Black)	6
12	CA09161A	Mechanism Ass'y	1		0H06131A	Push Knob (Silver)	6
13	BA08477A	Playback Amp. P.C.B. Ass'y	1	08	0J06262A	Sealing Spring	2
14	0H06115A	Inner Panel (Black)	1	09	0J06334A	Lock Plate	2
	0H06119A	Inner Panel (Silver)	1	10	0J06253A	Push Knob Spring	6
15	—	Front Escutcheon Ass'y	1	L01	0E00921A	BT3x8 @ Binding (Black Chromate)	
16	BA07986A	Headphone P.C.B. Ass'y	1				
17	0H05823A	Slide Knob (Black)	1				
	0H06130A	Slide Knob (Silver)	1				
18	BA07983A	Timer Switch P.C.B. Ass'y	1				
19	BA08384A	Control Switch & Display P.C.B. Ass'y	1				
20	HA05833A	Leg Ass'y	4				
21	0B90280A	Cord Bushing (USA, CAN, EP, UK, AUS)	1				
	0B90283A	Cord Bushing (OTR, SAU, JAN)	1				
22	0B08504A	Power Cord (USA, CAN)	1				
	0B08093U	Power Cord (EP)	1				
	0B08348A	Power Cord (UK)	1				
	0B05241A	Power Cord (AUS)	1				
	0B08533A	Power Cord (OTR, SAU)	1				
	0B08219B	Power Cord (JPN)	1				
L01	0E03157A	BT3x8 @ Binding With Washer					

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.4. Mechanism Ass'y (B02)				83	0C80027A	Mode Switch	3
				84	0C81415A	Warm Thrust Bush	1
				85	CA81646A	Control Motor Ass'y 30	1
				86	0C86111A	Mechanism GND Ass'y	1
				87	CA81673A	5P Connector Ass'y	1
				88	CA81672A	9P Connector Ass'y	1
				L01	0E00698A	E-Ring 2.5mm	
				L02	0E00181A	E-Ring 3mm	
				L03	0E00222A	E-Ring 2mm	
				L04	0E00866A	M2.6x4 @ Binding	
				L05	0E00912A	Washer FT25	
				L06	0E03052A	CS Stopper 2.4mm	
				L07	0E03042A	FT2.5x5 @ Pan	
				L08	0E03043A	FT2.5x10 @ Pan	
				L09	0E03202A	M2.6x3 @ Binding (Black Chromate)	
				L10	0E03437A	FT2.5x3.5 @ Pan (Black Chromate)	
				L11	0E03654A	M2x4 @ Pan (3A)	
				L12	0E03509A	Washer 1.3x3.4x0.5	
				L13	0E03232A	M1.7x7 @ Pan	
				L14	0E03222A	Washer 1.8x3.8x0.3	
				L15	0E03655A	M2x5 @ Pan (2A)	
				L16	0E03234A	M2x3 @ Pan	
				L17	0E03228A	FT3x4 @ Pan	
				L18	0E03236A	M2x5 @ Pan (2A)	
				L19	0E03231A	M2x30 @ Pan	
				L20	0E03041A	FT2.5x4 @ Pan	
				L21	0E03233A	Washer 2.6x8x1	
				L22	0E03230A	ST2.6x12 @ Pan	
				L23	0E03045A	M2.6x3 @ Binding	
				L24	0E03229A	FT5x6 @ Pan	
				L25	0C82725A	M2.6x9 Washer Faced	
				L26	0E00691A	M2x3 @ Pan	
				L27	0E03044A	FT2.5x20 @ Pan	
				L28	0E03653A	Washer 1.6x4x0.25	
				L29	0E03508A	Washer 1.7x6x0.25	
				L30	0E03035A	M2x3.2 @ Truss	
				L31	0E03235A	Washer 2x5x0.25	
				L32	0E03225A	Washer 1.8x3.8x0.5	
				L33	0E03226A	Washer 2.1x4.5x0.1	
				L34	0C85423A	S. Thrust Spring Washer	
				L35	0E03049A	Washer 1.8x3.2x0.5	
				L36	0C82716A	Capstan Washer S	
				L37	0C82717A	Capstan Washer T	
				L38	0E03227A	Washer 2.7x5x0.5	
				L39	0E03237A	Nut Hex. M2.6	
				L40	0E00694A	Nut M2	
				L41	0C08774A	Plate Washer L	
				L42	0C08773A	Plate Washer R	
B02	CA09161A	Mechanism Ass'y	1				
01	0C85309A	Eject Arm	1				
02	0C85310A	Eject Arm Spring	1				
03	CA80006A	Pneumatic Damper Ass'y	1				
04	0C82720A	Eject Lever Spring	1				
05	0C85414A	Eject Lever	1				
06	0C85301A	Cassette Case Holder L	1				
07	0C80019B	Eject Spring	1				
08	0C80620A	Back Tension Arm Pulley	1				
09	0C80621A	Back Tension Arm Belt	1				
10	0C80617A	Back Tension Arm Spring	1				
11	0C80618A	Back Tension Arm Collar	1				
12	0C80619A	Back Tension Arm	1				
13	0C85425A	Lock Lever Spring	1				
14	0C85426A	Lock Lever Collar	1				
15	0C85427A	Lock Lever	1				
16	CA80726A	Supply Reel Hub Ass'y	1				
17	0C80612A	Spring Holder	2				
18	0C80614A	Supply Reel Hub Spring	1				
19	0C81421A	Supply Pressure Roller Arm Adjustment Nut	1				
20	CA80366A	Supply Pressure Roller Arm Ass'y	1				
21	0C81420A	Supply Pressure Roller Arm Spring	1				
22	0C81422A	Supply Pressure Roller Arm Track Spring	1				
23	0H04415C	Head Mount Cover	1				
24	CA80200B	Cassette Case Ass'y	1				
25	HA05937A	Cover Plate Ass'y	1				
26	0C08762A	Head Height Adjustment Gear	2				
27	0C08761A	Head Height Adjustment Screw	4				
28	0C08763A	Azimuth Alignment Screw	1				
29	CA08637A	Head Mount Base Sub Ass'y	1				
30	CA08659B	R-3L Record Head Ass'y	1				
31	0C08776A	Head Plate Spring L	1				
32	CA81676A	RH 4P Connector Ass'y	1				
33	0C80605A	Wire Clamper	1				
34	0C80610A	Cassette Case Spring	1				
35	0C80010D	Cassette Case Holder R	1				
36	0C80012A	Sensor Switch	1				
37	CA08658A	P2H-3L Playback Head Ass'y	1				
38	0C08775A	Head Plate Spring R	1				
39	CA81675A	PH 4P Connector Ass'y	1				
40	CA81674A	EH 2P Connector Ass'y	1				
41	GA02201A	E-4F Erase Head	1				
42	0C08768A	E.H. Hold Plate	1				
43	0C08889A	E.H. Hold Plate Tapering Spring	2				
44	0C08886A	E.H. Hold Plate Spring	1				
45	0C82710A	Head Base Hold Plate	1				
46	0C80004A	Steel Ball 3mm	1				
47	0C08771A	Tape Guide Plate	1				
48	CA80365A	Head Base Ass'y	1				
49	0C80007A	Steel Ball 2mm	3				
50	CA80725A	Take-up Reel Hub Ass'y	1				
51	0C80613A	Take-up Reel Hub Spring	1				
52	CA80368A	Take-up Pressure Roller Arm Ass'y	1				
53	0C81423A	Take-up Pressure Roller Arm Spring	1				
54	0C85429A	Switch Hold Plate	1				
55	0C80623A	Switch Plate	2				
56	0C80624A	Switch Collar A	2				
57	0C80626A	Leaf Switch	1				
58	0C80625A	Switch Collar B	2				
59	0C80017B	Record Protector Lever	1				
60	0C80022B	Cassette Hold Spring	1				
61	CA80736A	Mechanism Chassis Ass'y	1				
62	CA80011B	Shut-off P.C.B. Ass'y	1				
63	CA80204A	Brake Ass'y	1				
64	0C80628A	Brake Spring B	1				
65	0C80630A	Brake Arm Collar	1				
66	0C80629A	Brake Arm	1				
67	0C82724A	Reel Motor Holder	1				
68	CA81699A	Reel Motor Ass'y	1				
69	0C83380A	Idle Gear	1				
70	0C82701A	Supply Capstan Flange	1				
71	0C82700A	Take-up Capstan Flange	1				
72	0C80428A	Hold Spring	2				
73	0C82699A	Supply Flywheel	1				
74	0C82698A	Take-up Flywheel	1				
75	0C82702A	Capstan Belt	1				
76	0C82718A	Thrust Plate	2				
77	0C82726A	Floating Rubber	3				
78	CA81698A	Capstan Motor Ass'y	1				
79	0C85320A	Flywheel Holder	1				
80	0C81417A	Cam Gear B	1				
81	0C81418A	Control Motor Holder	1				
82	0C81416A	Thrust Spring B	1				

7.4. Mechanism Assy (B02)

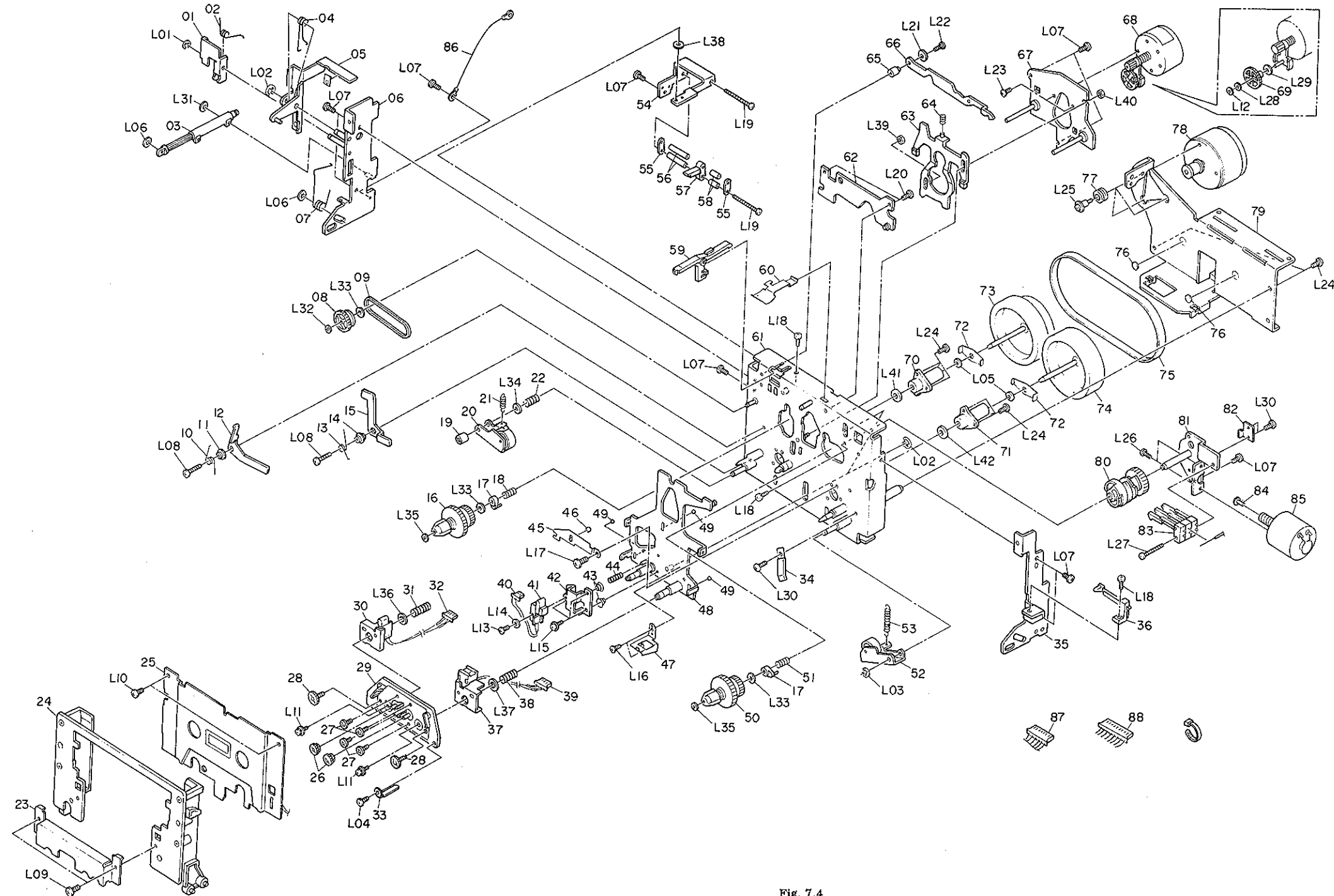


Fig. 7.4

8. MOUNTING DIAGRAMS AND PARTS LIST

8.1. Main P.C.B. Ass'y
8.1.1. Main P.C.B. Ass'y (Except EP)

Notes:

1. Mounting diagram shows a dip side view of the printed circuit board.
2. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
3. Abbreviation for part name:
TR - Transistor, SiD - Silicon Diode,
ZD - Zener Diode, Varicap - Variable Capacitance Diode
RK - Carbon Resistor, RM - Metal Film Resistor, RF - Fail Safe Type Resistor, RC - Cement Resistor
CE - Electrolytic Capacitor, CML - Mylar Capacitor, CC - Ceramic Capacitor, CPP - PP Capacitor, CMM - Metallized Mylar Capacitor, CSP - Polystyrene Capacitor, C - Mica Capacitor, CT - Tantalum Capacitor

• Semiconductor Location

Ref. No.	Location	Ref. No.	Location
U101	I-8	Q405	F-2
U102	H-5	Q406	F-2
U103	C-3	Q407	F-2
U104	C-4	Q930	A-3
U105	I-10	Q960L	F-9
U106	I-2	Q960R	H-9
U107	C-6	Q980	B-9
U108	H-10	ZD15L	G-10
Q101L	B-3	ZD15R	H-10
Q101R	D-3	ZD96L	G-10
Q102	B-3	ZD96R	H-10
Q105	B-8	ZD301	I-6
Q106L	B-6	ZD302	H-6
Q106R	D-6	ZD303	G-2
Q107L	B-7	ZD304	G-2
Q107R	D-7	ZD305	G-2
Q108L	B-7	ZD306	G-2
Q108R	D-7	ZD401	E-2
Q109L	B-6	D101L	B-2
Q109R	D-6	D101R	B-2
Q110L	B-6	D103L	B-6
Q110R	D-6	D103R	D-5
Q111L	B-7	D104L	B-5
Q111R	D-7	D104R	E-6
Q112	B-8	D105L	B-5
Q115L	G-5	D105R	E-6
Q115R	G-5	D106L	B-5
Q116L	G-5	D106R	E-6
Q116R	G-4	D107L	B-5
Q117L	G-8	D107R	E-6
Q117R	G-7	D108L	B-7
Q118L	G-8	D108R	D-7
Q118R	G-7	D109	B-8
Q119	B-9	D110L	G-10
Q120	D-9	D110R	H-10
Q121	D-9	D111L	G-10
Q122	D-9	D111R	H-10
Q123	B-9	D112L	G-5
Q124	C-9	D112R	G-5
Q125	C-9	D113L	G-8
Q401	D-2	D113R	G-7
Q402	E-2	D114	B-9
Q403	E-2	D115	E-9
Q404	E-2	D960L	G-10
		D960R	H-9

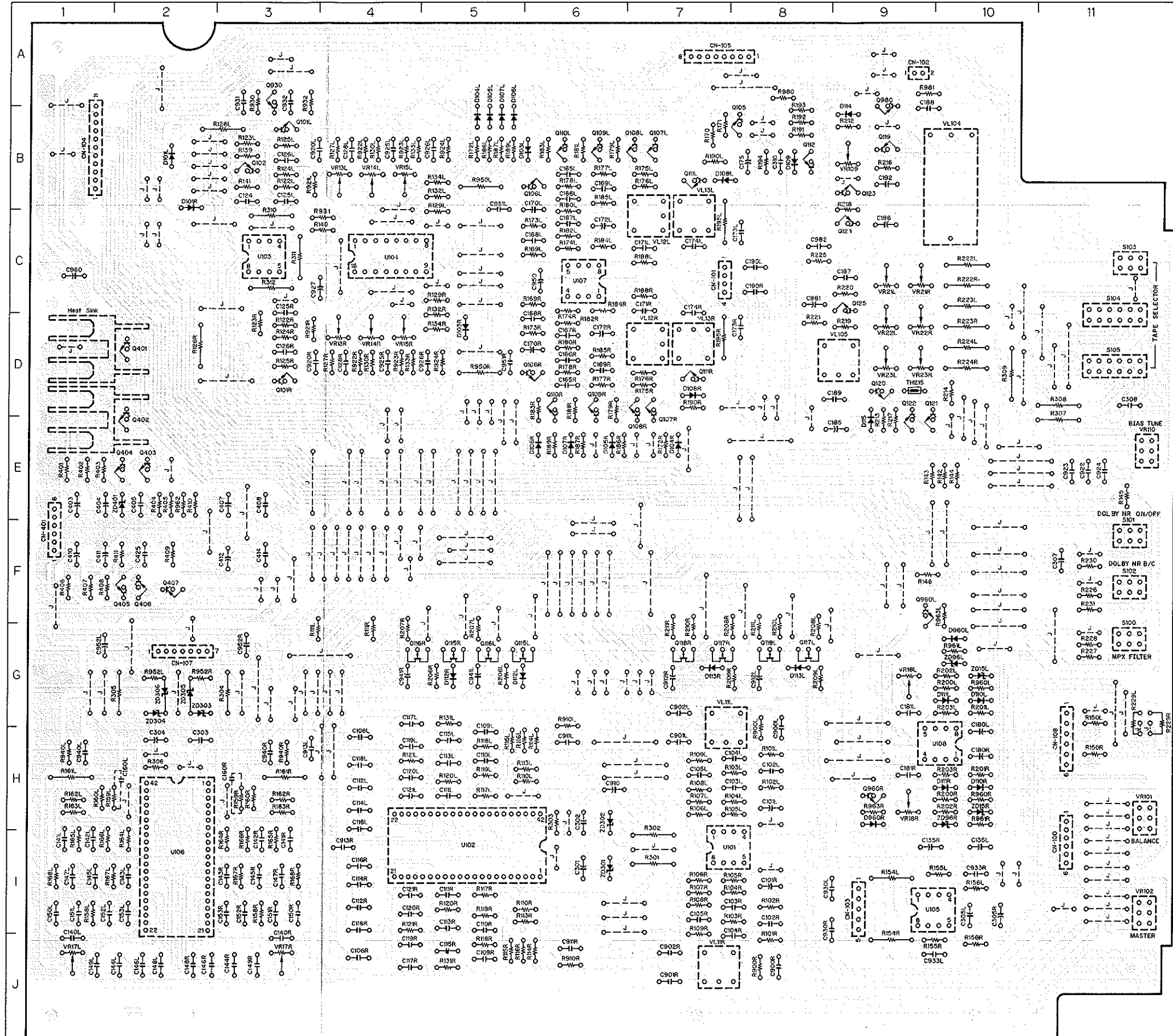


Fig. 8.1.1 Main P.C.B. Ass'y (Except EP)

8.1.2. Main P.C.B. Ass'y (EP)

Schematic Ref. No.	Part No.	Description
8.1.2. Main P.C.B. Ass'y (EP)		
	BA08492A	Main P.C.B. Ass'y (EP)
(The following parts are different from the Main P.C.B. Ass'y (Except EP). For parts other than the following, please refer to parts list on preceding page.)		
— Tape/Source Switch —		
U109	OB06124A	IC NJM4558D
D112	OB06398A	SID 1SS176
R207L,R	OB09725A	RK 100K 1/6W J
R208L,R	OB09677A	RK 1K 1/6W J
R209L,R	OB09701A	RK 10K 1/6W J
R210L,R	OB09701A	RK 10K 1/6W J
C912L,R	OB40610A	CE 10μ 25V (BP)
C941L,R	OB40610A	CE 10μ 25V (BP)
RY301	OB90279A	DS Relay
— Miscellaneous —		
	OB61002A	Main P.C.B. (Other parts stay the same.)

• Semiconductor Location

Ref. No.	Location	Ref. No.	Location
U101	I-8	Q405	F-2
U102	H-5	Q406	F-2
U103	C-3	Q407	F-2
U104	C-4	Q930	A-3
U105	I-10	Q960L	F-9
U106	I-2	Q960R	H-9
U107	C-6	Q980	B-9
U108	H-10	ZD15L	G-10
U109	F-8	ZD15R	H-10
Q101L	B-3	ZD96L	G-10
Q101R	D-3	ZD96R	H-10
Q102	B-3	ZD301	I-6
Q105	B-8	ZD302	H-6
Q106L	B-6	ZD303	G-2
Q106R	D-6	ZD304	G-2
Q107L	B-7	ZD305	G-2
Q107R	D-7	ZD306	G-2
Q108L	B-7	ZD401	E-2
Q108R	D-7	D101L	B-2
Q109L	B-6	D101R	B-2
Q109R	D-6	D103L	B-6
Q110L	B-6	D103R	D-5
Q110R	D-6	D104L	B-5
Q111L	B-7	D104R	E-6
Q111R	D-7	D105L	B-5
Q112	B-8	D105R	E-6
Q119	B-9	D106L	B-5
Q120	D-9	D106R	E-6
Q121	D-9	D107L	B-5
Q122	D-9	D107R	E-6
Q123	B-9	D108L	B-7
Q124	C-9	D108R	D-7
Q125	C-9	D109	B-8
Q401	D-2	D110L	G-10
Q402	E-2	D110R	H-10
Q403	E-2	D111L	G-10
Q404	E-2	D111R	H-10
		D112	F-5
		D114	B-9
		D115	E-9
		D960L	G-10
		D960R	H-9

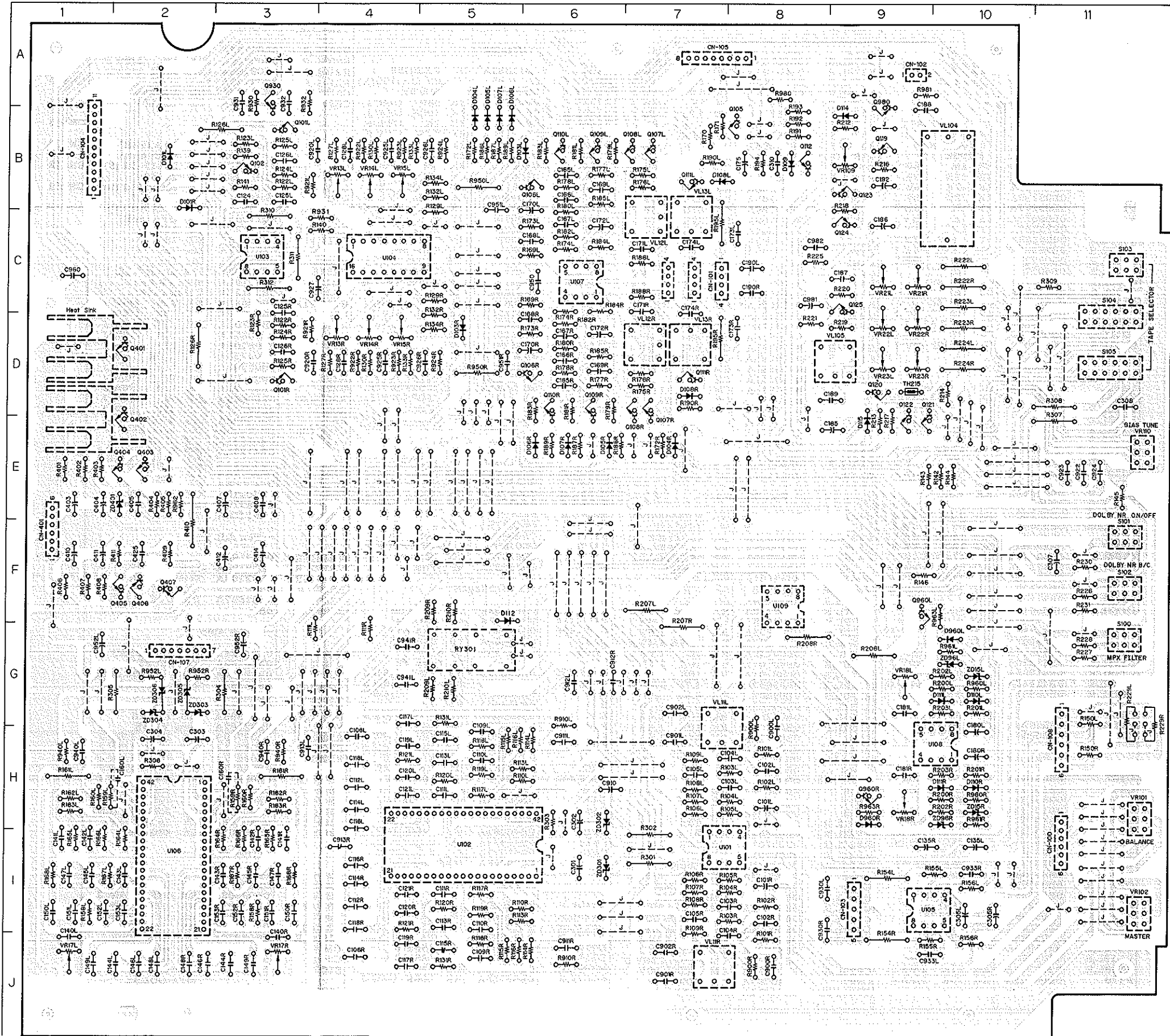


Fig. 8.1.2 Main P.C.B. Ass'y (EP)

8.2. Power Supply & Logic P.C.B. Ass'y

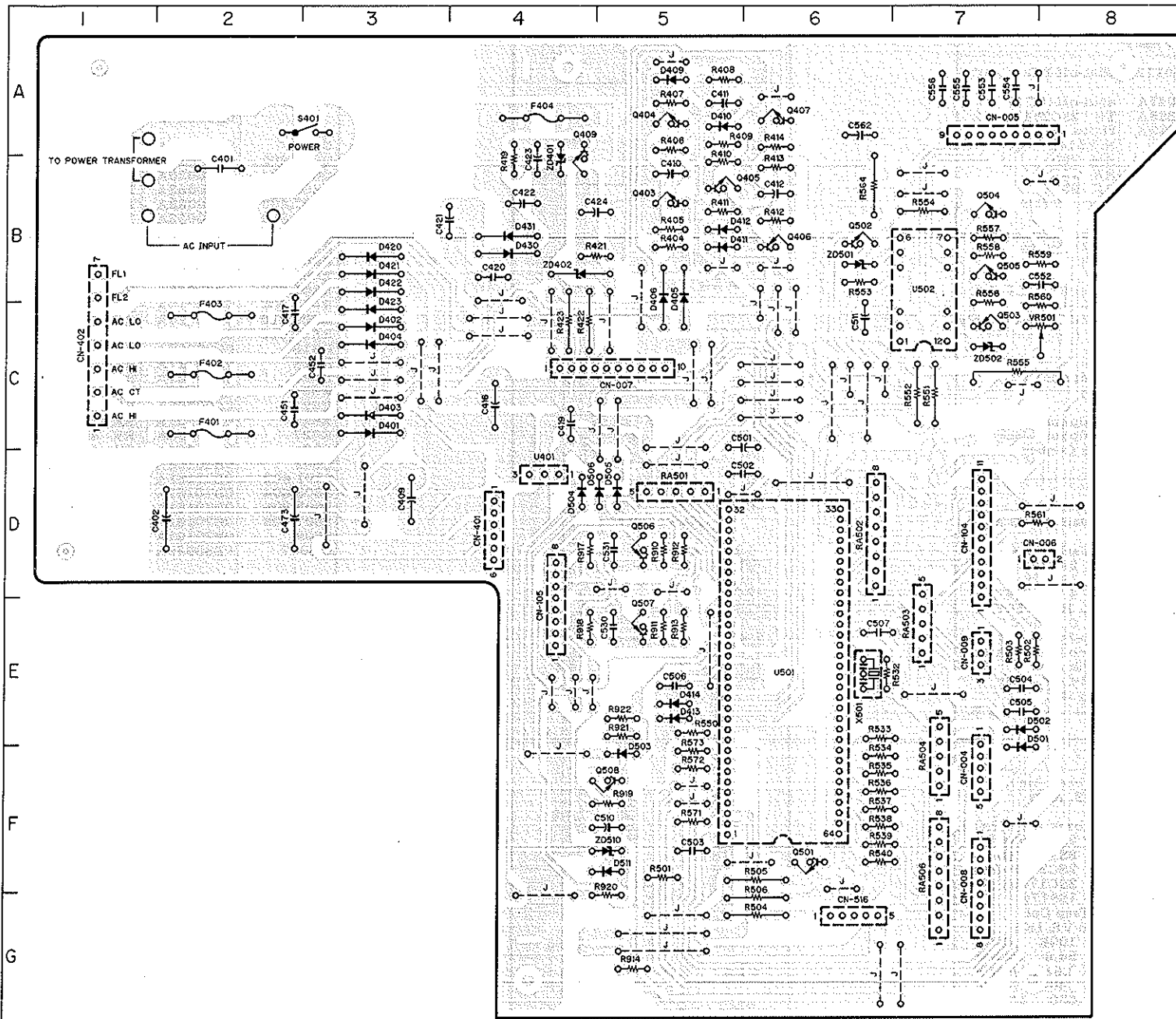


Fig. 8.2

• Semiconductor Location

Ref. No.	Location	Ref. No.	Location	Ref. No.	Location	Ref. No.	Location	Ref. No.	Location
U401	D-4	Q503	C-7	ZD502	C-7	D412	B-5	D503	F-5
U501	E-6	Q504	B-7	ZD510	F-5	D413	E-5	D504	D-4
U502	B-7	Q505	B-7	D401	C-3	D414	E-5	D505	D-5
Q403	B-5	Q506	D-5	D402	C-3	D420	B-3	D506	D-4
Q404	A-5	Q507	E-5	D403	C-3	D421	B-3	D511	F-5
Q405	B-5	Q508	F-5	D404	C-3	D422	B-3		
Q406	B-6	ZD401	B-4	D405	B-5	D423	B-3		
Q407	A-6	ZD402	B-4	D406	B-5	D430	B-4		
Q409	A-4	ZD501	B-6	D409	A-5	D431	B-4		
Q501	F-6			D410	A-5	D501	E-7		
Q502	B-6			D411	B-5	D502	E-7		

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.2. Power Supply & Logic P.C.B. Ass'y					
	BA08386A	Power Supply & Logic P.C.B. Ass'y (Except JPN)	R560	OB09677A	RK 1K 1/6W J
	BA08383A	Power Supply & Logic P.C.B. Ass'y (JPN)	R561	OB09669A	RK 470 1/6W J
- Power Supply -					
U401	OB11753A	IC NJM7805FA	R564	OB09217A	RF 5.6 1/4W J
Q403,404	OB10033A	TR 2SC1740S (S)	C551	OB40078A	CE 100μ 16V
Q405	OB10033A	TR 2SC1740S (S)	C552	OB41286A	CML 0.01μ 50V J
Q406	OB10058A	TR DTA114ES	C553,554	OB41298A	CML 0.1μ 50V J
Q407	OB10033A	TR 2SC1740S (S)	C555,556	OB41298A	CML 0.1μ 50V J
Q409	OB10015A	TR 2SA1020	C562	OB40079A	CE 220μ 16V
ZD401	OB12708A	ZD 24V MA4240N-H	CN005	OB84084A	9P T-Post
ZD402	OB12707A	ZD 4.7V MA4047N	CN006	OB84278A	2P T-Post
D401,402	OB12365A	SID 1SR35-100A	- MFU -		
D403,404	OB12365A	SID 1SR35-100A	U501	OB11884A	IC μPD75106CW
D405,406	OB12365A	SID 1SR35-100A	Q501	OB10068A	TR DTC114ES
D409,410	OB06398A	SID 1SS176	Q506,507	OB10029A	TR 2SA933S (S)
D411,412	OB06398A	SID 1SS176	Q508	OB10029A	TR 2SA933S (S)
D420,421	OB12365A	SID 1SR35-100A	ZD510	OB12659A	ZD 10V MA4100(N)
D422,423	OB12365A	SID 1SR35-100A	D501,502	OB06398A	SID 1SS176
D430,431	OB12365A	SID 1SR35-100A	D511	OB06398A	SID 1SS176
R404	OB09709A	RK 22K 1/6W J	X501	OB92045A	Crystal 4.0MHZ
R405	OB09703A	RK 12K 1/6W J	RA501	OB21101A	R Network 10Kx3
R406	OB09701A	RK 10K 1/6W J	RA502	OB21102A	R Network 10Kx6
R407,408	OB09693A	RK 4.7K 1/6W J	RA503	OB21101A	R Network 10Kx3
R409	OB09719A	RK 56K 1/6W J	RA504	OB21101A	R Network 10Kx3
R410	OB09713A	RK 33K 1/6W J	RA506	OB21102A	R Network 10Kx6
R411,412	OB09693A	RK 4.7K 1/6W J	R501	OB09689A	RK 3.3K 1/6W J
R413	OB09719A	RK 56K 1/6W J	R502,503	OB09701A	RK 10K 1/6W J
R414	OB09713A	RK 33K 1/6W J	R504,505	OB09701A	RK 10K 1/6W J
R419	OB09685A	RK 2.2K 1/6W J	R506	OB09701A	RK 10K 1/6W J
R421	OB09701A	RK 10K 1/6W J	R532,533	OB09677A	RK 1K 1/6W J
R422,423	OB09653A	RK 100 1/6W J	R534,535	OB09677A	RK 1K 1/6W J
C401	OB41825A	CC 4700P AC400V (USA, CAN, EP, UK, AUS, OTR, SAU)	R536,537	OB09677A	RK 1K 1/6W J
			R538,539	OB09677A	RK 1K 1/6W J
			R540	OB09677A	RK 1K 1/6W J
			R550	OB09701A	RK 10K 1/6W J
			R571	OB09677A	RK 1K 1/6W J
			R572,573	OB09701A	RK 10K 1/6W J
			R910,911	OB09709A	RK 22K 1/6W J
			R912,913	OB09725A	RK 100K 1/6W J
			R914	OB09701A	RK 10K 1/6W J
			R917,918	OB09725A	RK 100K 1/6W J
			R919	OB09721A	RK 68K 1/6W J
			R920	OB09669A	RK 470 1/6W J
			R921	OB09725A	RK 100K 1/6W J
			R922	OB09701A	RK 10K 1/6W J
C402	OB40801A	CE 6800μ 25V	C501	OB40077A	CE 47μ 16V
C409	OB40363A	CE 2200μ 25V	C502	OB41298A	CML 0.1μ 50V J
C410	OB40630A	CE 22μ 10V (LN)	C503	OB41302A	CML 0.22μ 50V J
C411,412	OB40255A	CE 1μ 50V (LN)	C504,505	OB41286A	CML 0.01μ 50V J
C416	OB40362A	CE 6800μ 16V	C506,507	OB41274A	CML 1000P 50V J
C417	OB41298A	CML 0.1μ 50V J	C510	OB40756A	CE 1μ 50V (LN)
C419	OB40067A	CE 470μ 10V	C530,531	OB41290A	CML 0.022μ 50V J
C420	OB41298A	CML 0.1μ 50V J	CN004	OB81462A	5P T-Post
C421	OB40798A	CE 330μ 35V	CN007	OB84302A	10P T-Post
C422	OB40120A	CE 100μ 50V	CN008	OB84296A	8P T-Post
C423	OB40100A	CE 10μ 35V	CN009	OB84281A	3P T-Post
C424	OB40802A	CE 1000μ 35V	CN104	OB84305A	11P T-Post
C451,452	OB41298A	CML 0.1μ 50V J	CN105	OB81465A	8P T-Post
C473	OB40801A	CE 6800μ 25V	CN516	OB84286A	5P T-Post
S401	OB71012A	Power Switch 1P TV-4	- Miscellaneous -		
CN401	OB81463A	6P T-Post			
CN402	OB81574A	7P T-Post			
	OB08349B	Fuse Clip (8)			
	OJ06668A	Earth Lug for P.C.B. (4)			
- Motor Driver -					
U502	OB11368A	IC IC LB1649			
Q502	OB10062A	TR DTC144ES			
Q503	OB10029A	TR 2SA933S (S)			
Q504	OB10062A	TR DTC144ES			
Q505	OB10033A	TR 2SC1740S (S)			
ZD501	OB12290A	ZD 5.6V MTZ5.6A			
ZD502	OB12288A	ZD 5.1V MTZ5.1B			
D413,414	OB06398A	SID 1SS176			
D503,504	OB06398A	SID 1SS176			
D505,506	OB06398A	SID 1SS176			
VR501	OB32192A	Semi VR 5K			
R551,552	OB01857A	RK 1K 1/4W J			
R553,554	OB09677A	RK 1K 1/6W J			
R555	OB24361A	RF 27 1W			
R556	OB09701A	RK 10K 1/6W J			
R557	OB09681A	RK 1.5K 1/6W J			
R558	OB09695A	RK 5.6K 1/6W J			
R559	OB09717A	RK 47K 1/6W J			
			OB60846A	Power Supply & Logic P.C.B.	

9. SCHEMATIC DIAGRAM

9.1. IC Block Diagrams

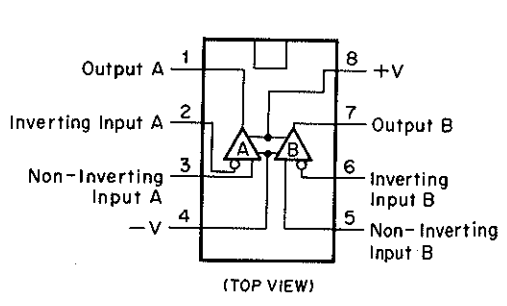


Fig. 9.1.1 Operational Amp. IC 4558D, 2043DD, 5216

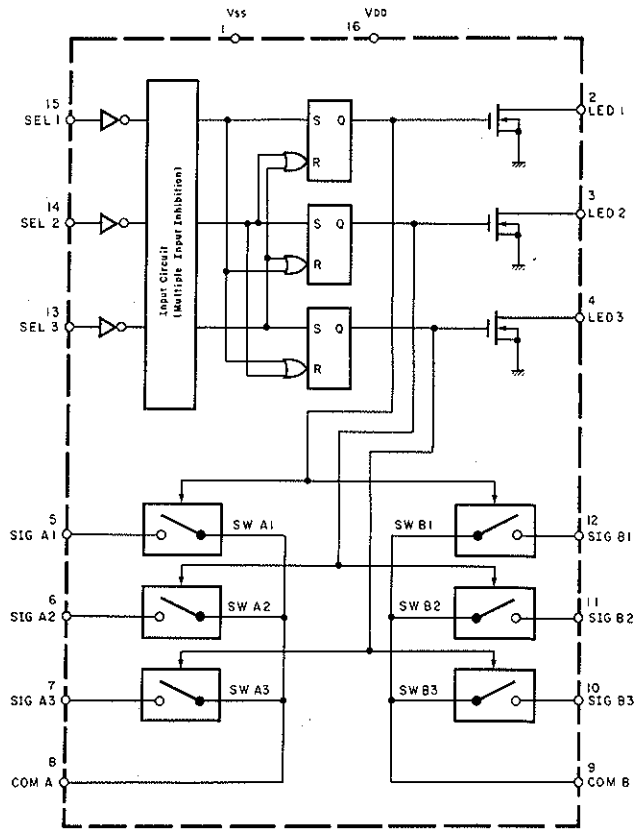
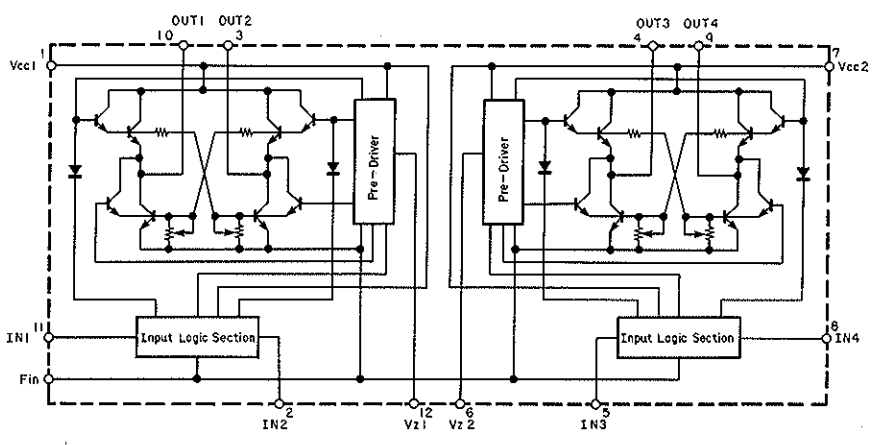



Fig. 9.1.2 Analog Switch Selector TC9145P

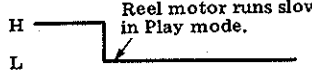
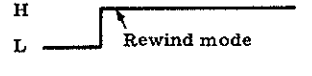
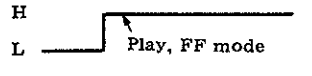
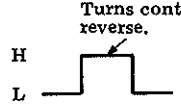
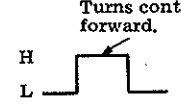


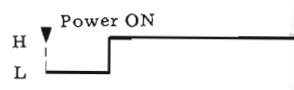
INPUT		OUTPUT		OPERATION
IN1/3	IN2/4	OUT1/3	OUT2/4	
0	0	0	0	Braking
1	0	1	0	Forward (Reverse)
0	1	0	1	Reverse (Forward)
1	1	0	0	Braking

Fig. 9.1.3 Motor Driver IC LB1649

U501 μ PD75106CW (Microprocessing Unit (MPU))

Pin No.	Signal Name	In/Out	Function
1	—	I	Not used. Connected to GND.
2	AZCT	I	Playback azimuth control center detect switch is connected. Becomes "H" when the Playback Azimuth control on the Front Panel is set to the center position. (Not used.)
3	REM	I	Remote control receiver signal input.
4	RELP	I	Reel motor pulse input. Pulse train is input while take-up reel hub is rotating, i.e., tape is running.
5	LVR	I	Rch input for level meter. Input level is A/D-converted in this IC and the converted result is transferred to the Display Control IC (U601) via pin 13 (DDAT).
6	LVL	I	Lch input for level meter. The function is the same as above LVR (Rch).
7	KS1	I	Record/Monitor switch input. Record switch ON: 0 V Monitor switch ON: 1.6 V
8	KS0	I	Stop/Counter Search/Counter Reset switch input. Stop switch ON: 0 V Counter Search switch ON: 1.6 V Counter Reset switch ON: 3.3 V
9	MREM	I	System remote mode signal input. "L": "Tape 1" is selected. "H": "Tape 2" is selected.
10	HD2/3	I	Fixed to "H".
11	—	O	Not used.
12	DCLK	O	Clock for serial data DDAT at pin 13.
13	DDAT	O	Serial data for Display Control IC (U601), which includes display data and control information.
14	DEN	O	Enable signal to Display Control IC (U601). Active "H".
15	—	I	Not used. Connected to GND.
16	—	I	Not used. Connected to GND.
17	—	I	Not used. Connected to GND.
18	POFF	I	Power OFF signal input. Becomes "L" when power is turned OFF. 
19	LMUT	O	Line mute signal output. Active "L".
20	RMUT	O	Record mute signal output. Active "L". Record mute is released only in Record/Play mode.
21	BIAS	O	Bias ON/OFF signal output. "L": Bias ON.
22	—	O	Not used. (Open).
23	—	O	Not used. (Open).
24	—	O	Not used. (Open).
25	HPLY	O	Source signal output. Active "L".
26	HREC	O	Tape signal output. Active "L".

Pin No.	Signal Name	In/Out	Function												
27	RMSP	O	Reel motor speed select signal output. Becomes "L" in play mode. 												
28	—	O	Not used.												
29	RMR	O	Reel motor drive control signal output. Becomes "H" in Rewind mode. 												
30	RMF	O	Reel motor drive control signal output. Becomes "H" in Play or Fast Forward mode. 												
31	NC	—	No connection.												
32	VDD	—	Supplied with +5 V.												
33	AZRD	O	Off center position indication signal of the Playback Azimuth control. Drives red LED in Rec./Play or Rec./Pause mode. (Not used.)												
34	AZGR	O	Center position indication signal of the Playback Azimuth control. Drives Green LED in Playback mode. (Not used.) <table border="1" data-bbox="1015 1018 1421 1123"> <thead> <tr> <th>Mode</th> <th>Center</th> <th>Out of Center</th> </tr> </thead> <tbody> <tr> <td>Play</td> <td>Green</td> <td>—</td> </tr> <tr> <td>Rec./Play</td> <td>Green</td> <td>Red</td> </tr> <tr> <td>Rec./Pause</td> <td>Green</td> <td>Red</td> </tr> </tbody> </table>	Mode	Center	Out of Center	Play	Green	—	Rec./Play	Green	Red	Rec./Pause	Green	Red
Mode	Center	Out of Center													
Play	Green	—													
Rec./Play	Green	Red													
Rec./Pause	Green	Red													
35	ASMR	O	Control motor reverse drive signal output. Becomes "H" when turning the control motor reverse (in the direction of Play-Pause-Stop-FF/REW). 												
36	ASMF	O	Control motor forward drive signal output. Becomes "H" when turning the control motor forward (in the direction of FF/REW-Stop-Pause-Play). 												
37	TAP B	I	Tape type select signal input. <table border="1" data-bbox="1047 1564 1364 1680"> <thead> <tr> <th>Type</th> <th>TAP A</th> <th>TAP B</th> </tr> </thead> <tbody> <tr> <td>Type I</td> <td>H</td> <td>H</td> </tr> <tr> <td>Type II</td> <td>L</td> <td>H</td> </tr> <tr> <td>Type IV</td> <td>H/L</td> <td>L</td> </tr> </tbody> </table>	Type	TAP A	TAP B	Type I	H	H	Type II	L	H	Type IV	H/L	L
Type	TAP A	TAP B													
Type I	H	H													
Type II	L	H													
Type IV	H/L	L													
38	TAP A	I													
39	B/C	I	Dolby NR mode select signal input. <table border="1" data-bbox="1031 1732 1388 1848"> <thead> <tr> <th>Mode</th> <th>DLBY</th> <th>B/C</th> </tr> </thead> <tbody> <tr> <td>Dolby NR OFF</td> <td>H</td> <td>H/L</td> </tr> <tr> <td>Dolby NR B</td> <td>L</td> <td>H</td> </tr> <tr> <td>Dolby NR C</td> <td>L</td> <td>L</td> </tr> </tbody> </table>	Mode	DLBY	B/C	Dolby NR OFF	H	H/L	Dolby NR B	L	H	Dolby NR C	L	L
Mode	DLBY	B/C													
Dolby NR OFF	H	H/L													
Dolby NR B	L	H													
Dolby NR C	L	L													
40	DOLBY NR	I													
41	MPX	I	MPX filter switch signal input. "L": MPX Filter ON, "H"—OFF												

Pin No.	Signal Name	In/Out	Function															
42 43	TIM B TIM A	I	Repeat/Timer switch signal input. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Mode</th> <th>TIM A</th> <th>TIM B</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>H</td> <td>H</td> </tr> <tr> <td>Auto Repeat</td> <td>L</td> <td>H</td> </tr> <tr> <td>Timer Play</td> <td>H</td> <td>L</td> </tr> <tr> <td>Timer Record</td> <td>L</td> <td>L</td> </tr> </tbody> </table>	Mode	TIM A	TIM B	OFF	H	H	Auto Repeat	L	H	Timer Play	H	L	Timer Record	L	L
Mode	TIM A	TIM B																
OFF	H	H																
Auto Repeat	L	H																
Timer Play	H	L																
Timer Record	L	L																
44	REC PRO	I	Record protect switch signal input. "H": Recording is allowed.															
45	RESET	I	System reset signal input. Active "L". 															
46 47	X2 X1	I	4 MHz oscillator is connected.															
48 49 50 51	—	O	Not used. (Open)															
52	RREM	O	System remote return signal output.															
53 54 55	—	O	Not used. (Open)															
56	EJC	I	Cassette In switch signal input. Becomes "L" while the Cassette Cover Ass'y is open.															
57 58 59	CAM2 CAM1 CAM0	I	Cam switch signal input. Mode of the mechanism can be sensed according to states of CAM0, CAM1 and CAM2.															
60	KFF	I	FF switch signal input. "L" when pressed.															
61	KREW	I	REW switch signal input. "L" when pressed.															
62	KPUS	I	Pause switch signal input. "L" when pressed.															
63	KPLY	I	Play switch signal input. "L" when pressed.															
64	VSS	—	Grounded.															

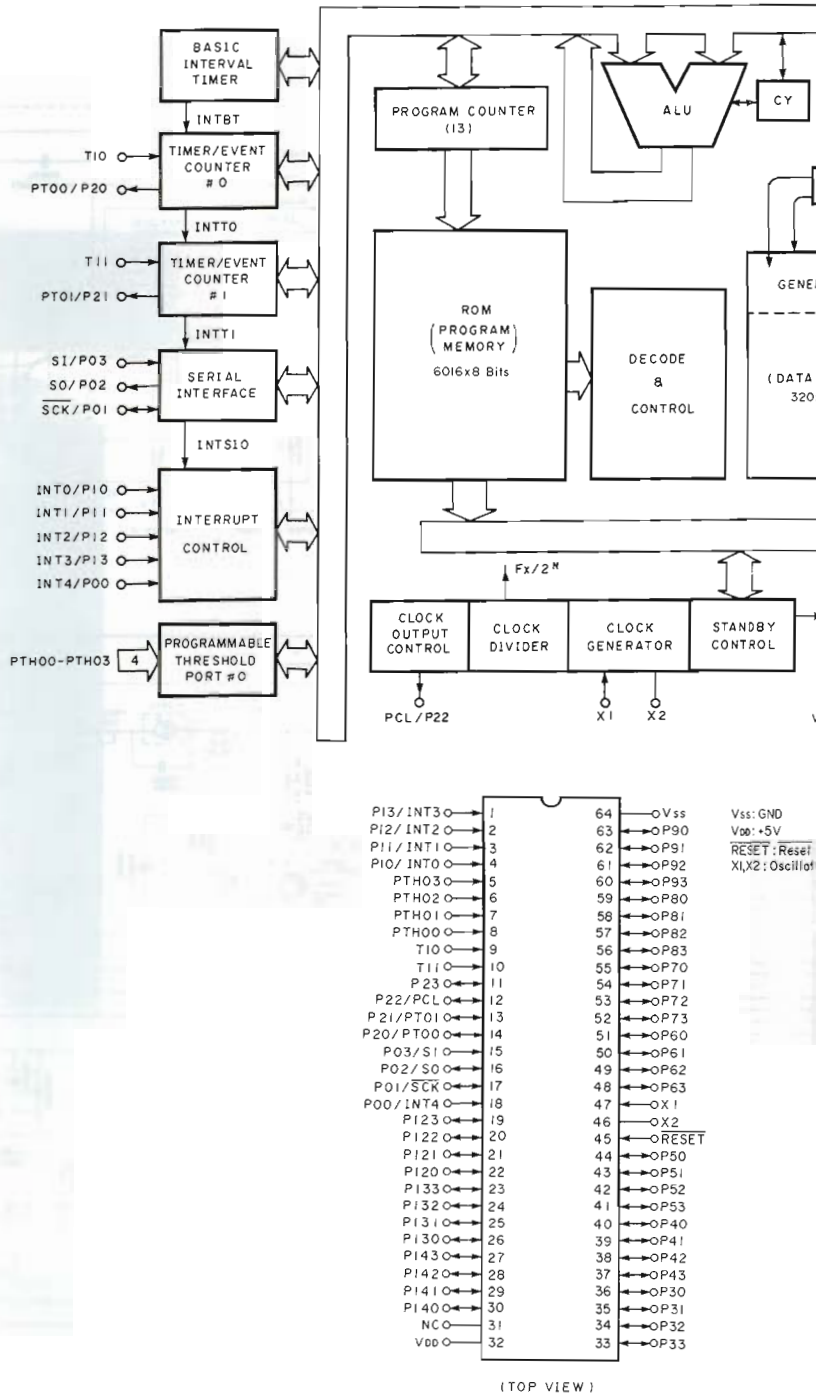
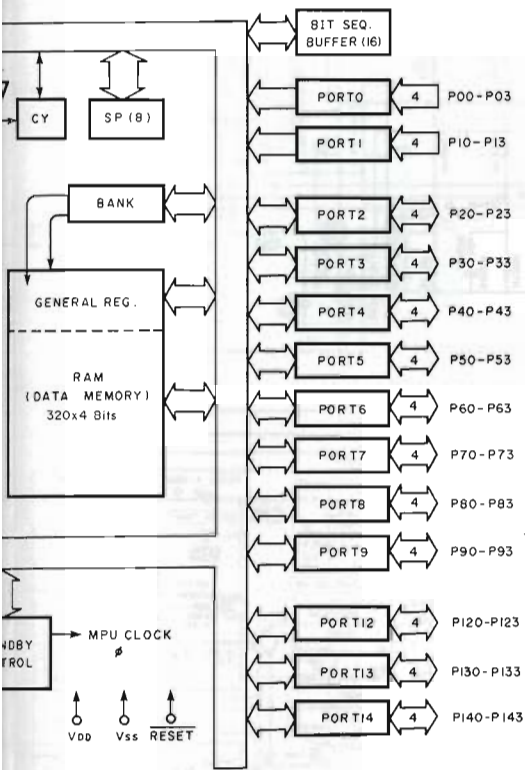


Fig. 9.1.4 Microprocessing Unit (MPU) μPD75



1: GND
 2: +5V
 3: Reset
 X2: Oscillator In/Out

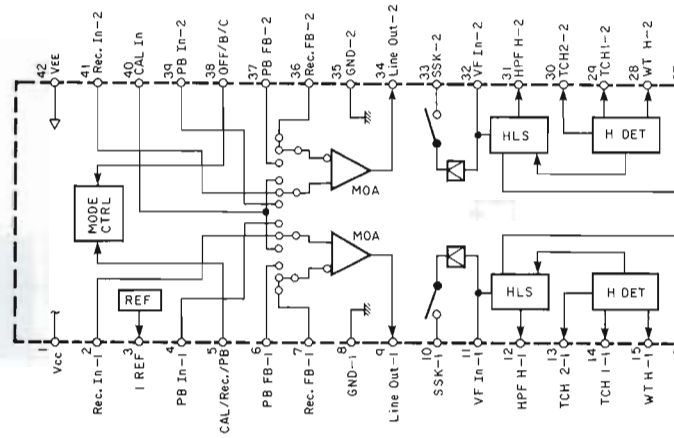


Fig. 9.1.5 Dolby NR IC CX20188

U102/U106 CX20188 (Dolby NR IC)

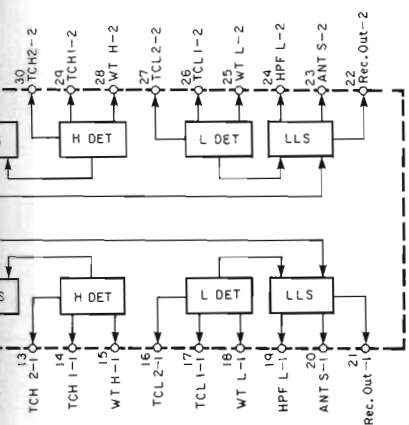
Pin No.	Signal Name	Function
1	Vcc	Positive power supply input terminal.
2,41	Rec. In	Record signal input terminal.
3	I Ref.	Reference current input terminal.
4,39	PB In	PB signal input terminal.
5	CAL/Rec./PB	Calibration/Recording/Playback select terminal.
6,37	PB FB	Playback signal feedback terminal.
7,36	Rec. FB	Record signal feedback terminal.
8,35	GND	GND terminal.
9,34	Line Out	Line signal (decoded signal) output terminal.
10,33	SSK	Spectral skewing switch terminal.
11,32	VF In	Encode circuit input terminal.
12,31	HPF H	HLS high-pass filter terminal.
13,30	TCH 2	HLS detector time constant determination terminal 2.

Pin No.	Signal
14,29	TCH 1
15,28	WT H
16,27	TCL 2
17,26	TCL 1
18,25	WT L
19,24	HPF L
20,23	ANT S
21,22	Rec. C
38	OFF/B
40	CAL I
42	VEE

U601 MSC7112 (Display Controller)

Pin No.	Signal Name	In/Out	Function
1	OSC1	I	An RC circuit is connected for making an oscillation circuit.
2	OSC0	O	
3	POR	I	Reset signal input at power ON. The IC is reset when "L".
4	VDD	-	Supplied with +5 V.
5 to 16	D1 to D12	O	FL tube grid drive output. (D8-D12 are not used.)
17 to 21	LED1 to LED5	O	Not used. (Open)
22	VSS	-	Grounded.

Pin No.	Signal Name	In/Out
23	VEE	-
24 to 39	SEG P to SEG A	O
40	SCLK	I
41	DATAIN	I
42	LOAD	I

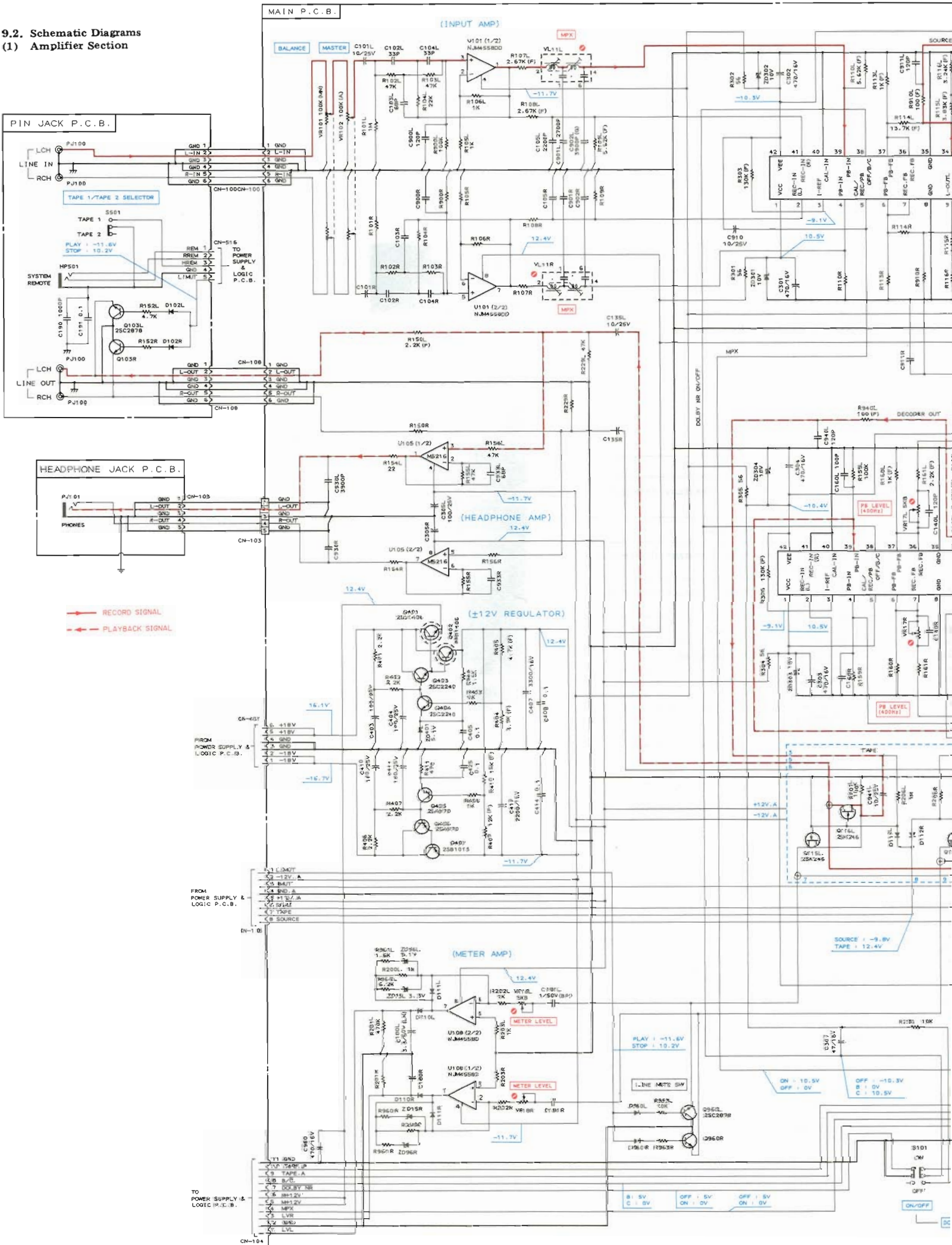


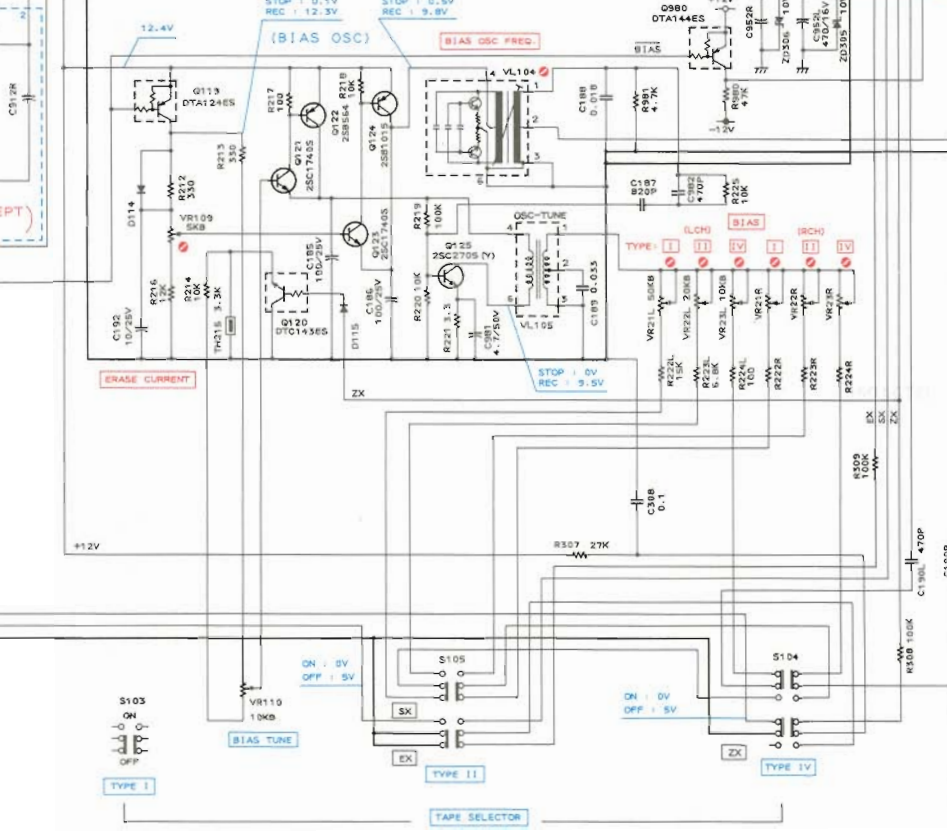
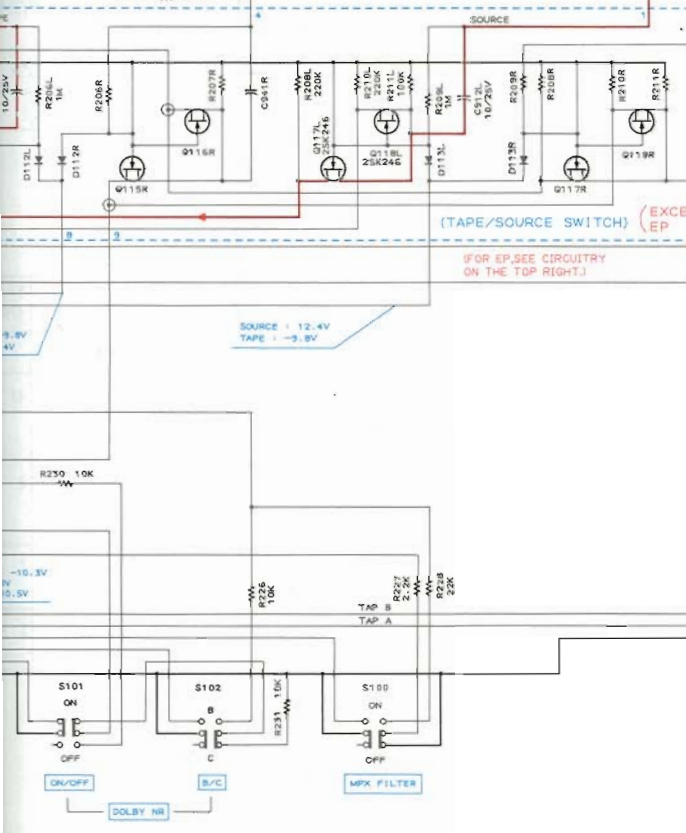
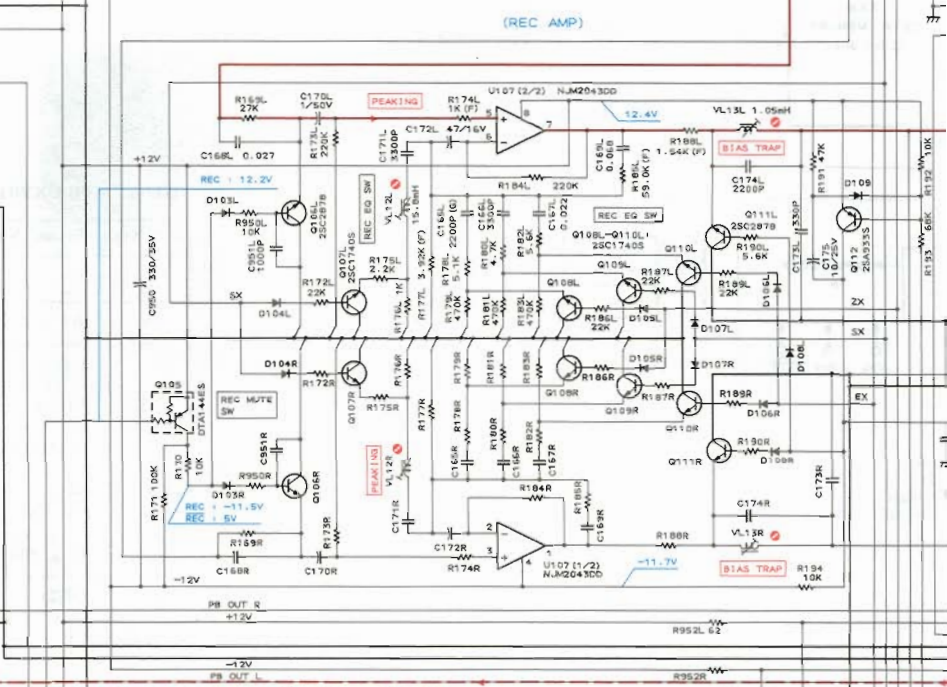
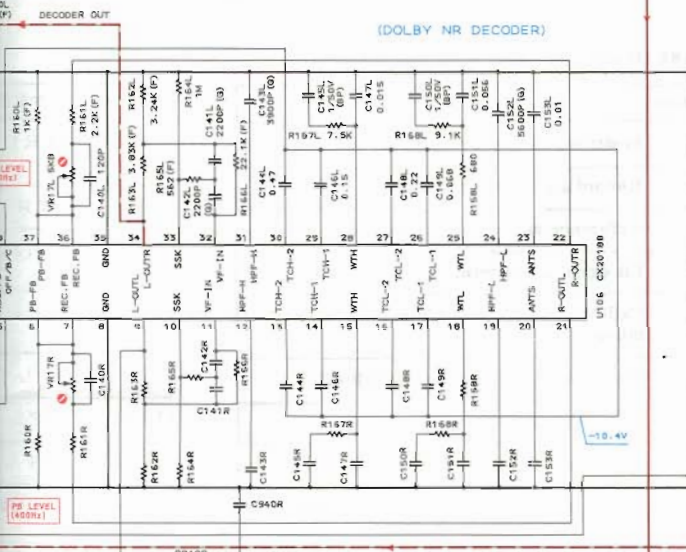
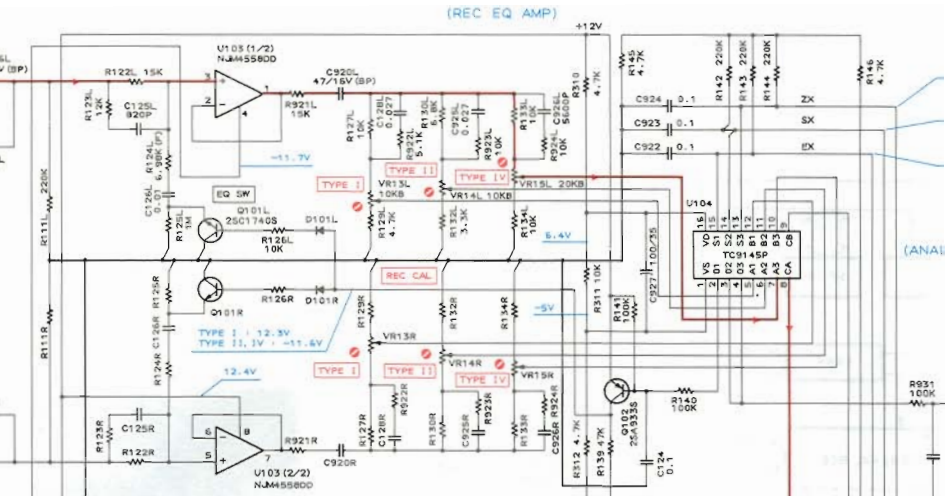
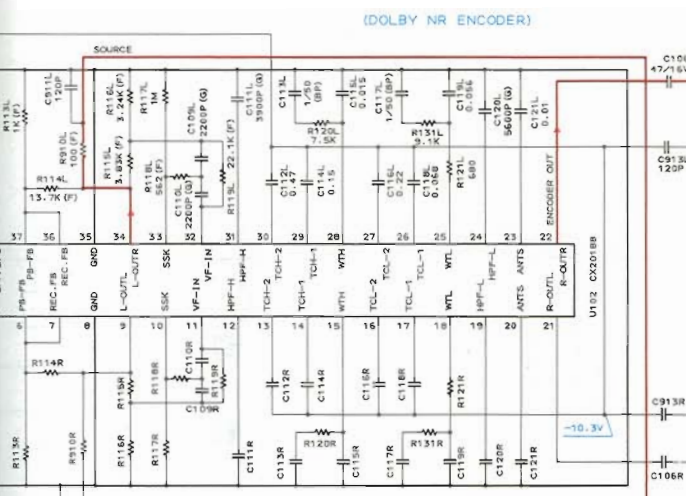
C CX20188

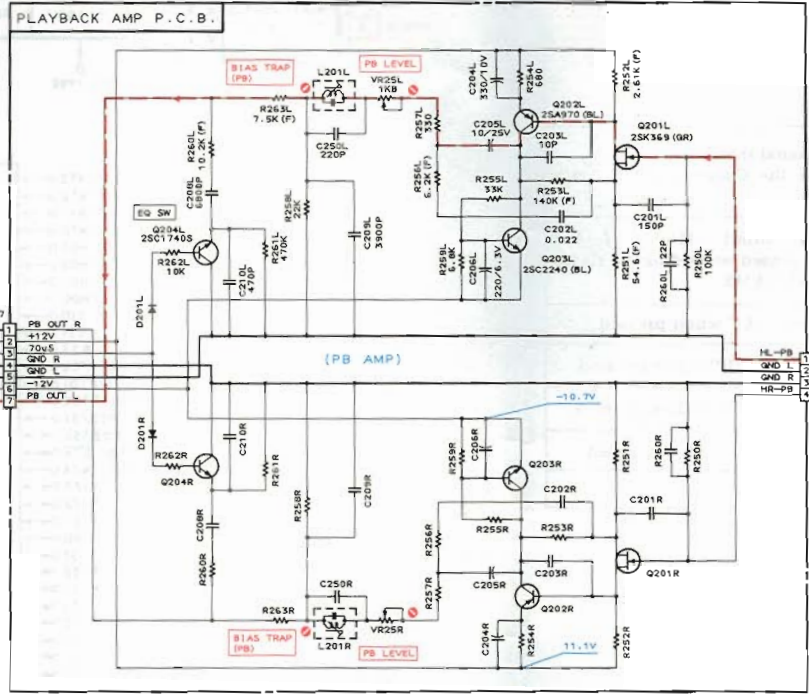
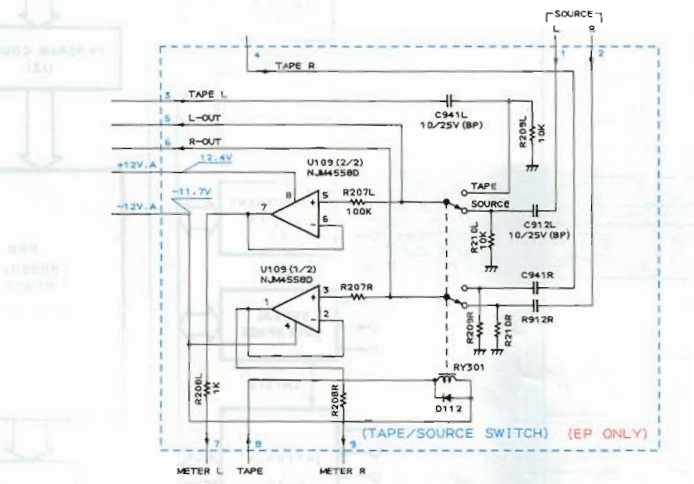
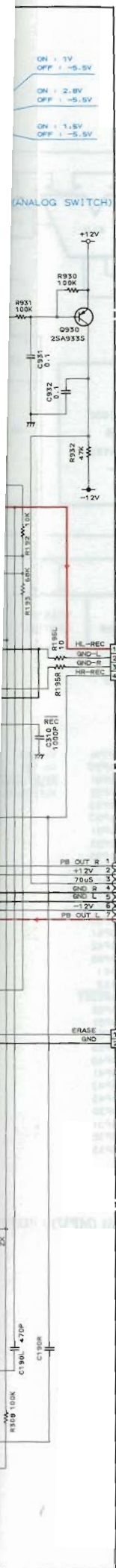
Pin No.	Signal Name	Function
4,29	TCH 1	HLS detector time constant determination terminal 1.
5,28	WT H	HLS weighting terminal.
6,27	TCL 2	LLS detector time constant determination terminal 2.
7,26	TCL 1	LLS detector time constant determination terminal 1.
8,25	WT L	LLS weighting terminal.
9,24	HPF L	LLS high-pass filter terminal.
20,23	ANT S	Anti-saturation terminal.
21,22	Rec. Out	Record signal (encoded signal) output terminal.
8	OFF/B/C	Dolby NR OFF/B-type/C-type select terminal.
0	CAL In	Calibration input terminal. Not used.
2	VEE	Negative power supply input terminal.

Pin No.	Signal Name	In/Out	Function
3	VEE	—	Supplied with approx. -25 V.
4 to 9	SEG P to SEG A	O	FL tube anode drive output. Active "H". (SEGP — SEGN are not used.)
0	SCLK	I	Shift clock input for internal shift register. Shifts the data at pin 41 (DATAIN) at every rising edge.
1	DATAIN	I	Control & display serial data sent from the mechanism control MPU (U501). MSB first.
2	LOAD	I	Data latch pulse. The data is latched to the internal register at the falling edge.

9.2. Schematic Diagrams
(1) Amplifier Section





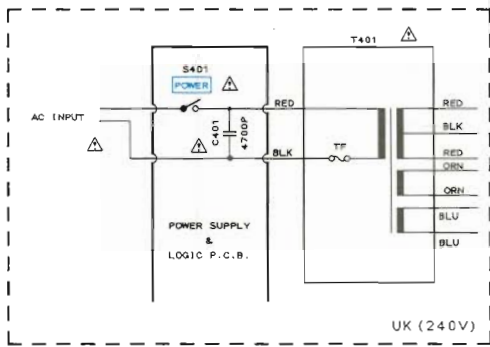
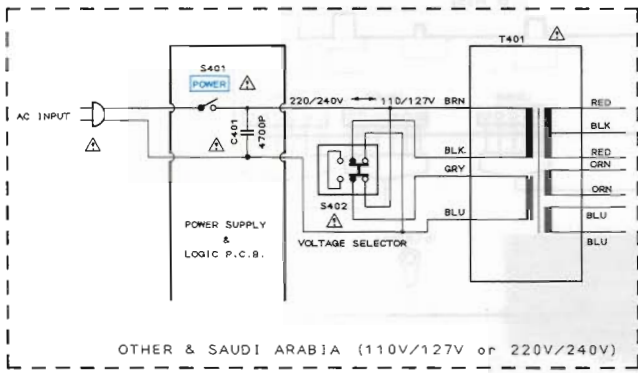


- 2SA933S
2SC1740S
DTA114ES
DTA124ES
DTA144ES
DTC143ES
DTC144ES
- 2SA970
2SA1020
2SC2240
2SC2878
- 2SC2705
- 2SB564
- 2SC2812
- 2SB1015
2SD1406
- 7805
- 2SK246
- 2SK369

Notes:
 1. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
 2. Description of the electrolytic capacitor:
 100/16V = 100μ 16V

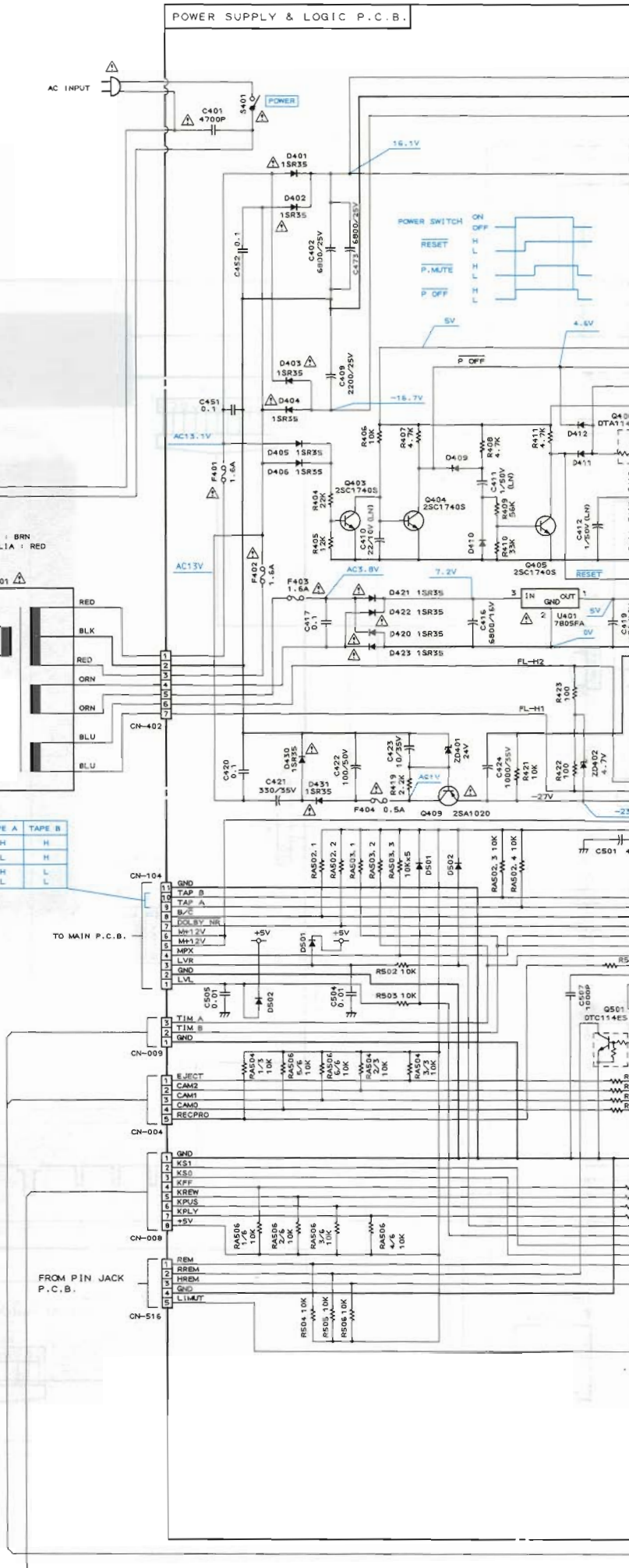
Fig. 9.2.1

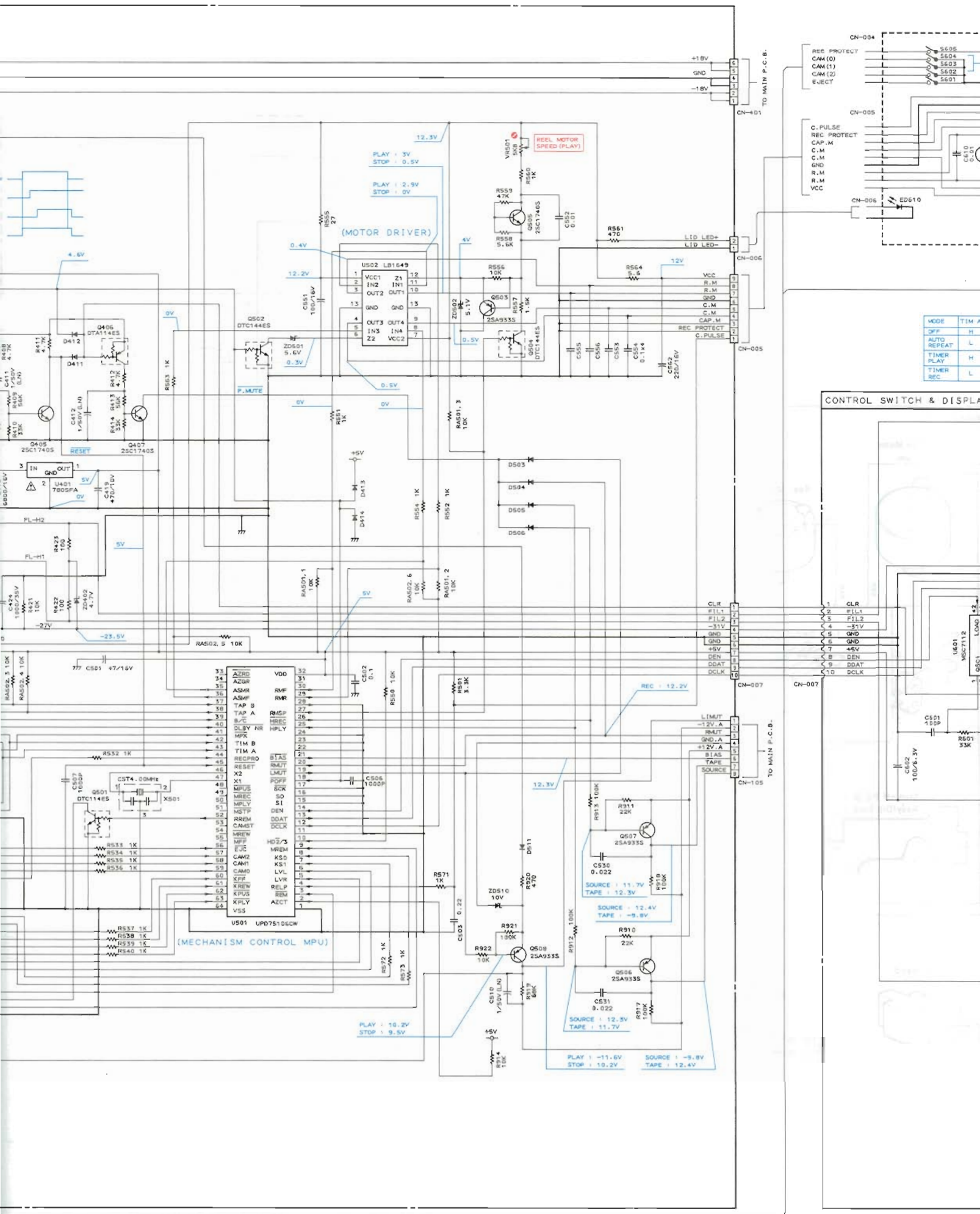
(2) Mechanism Control Section



U.S.A., CANADA : BRN
 EUROPE, AUSTRALIA : RED
 JAPAN : WHT

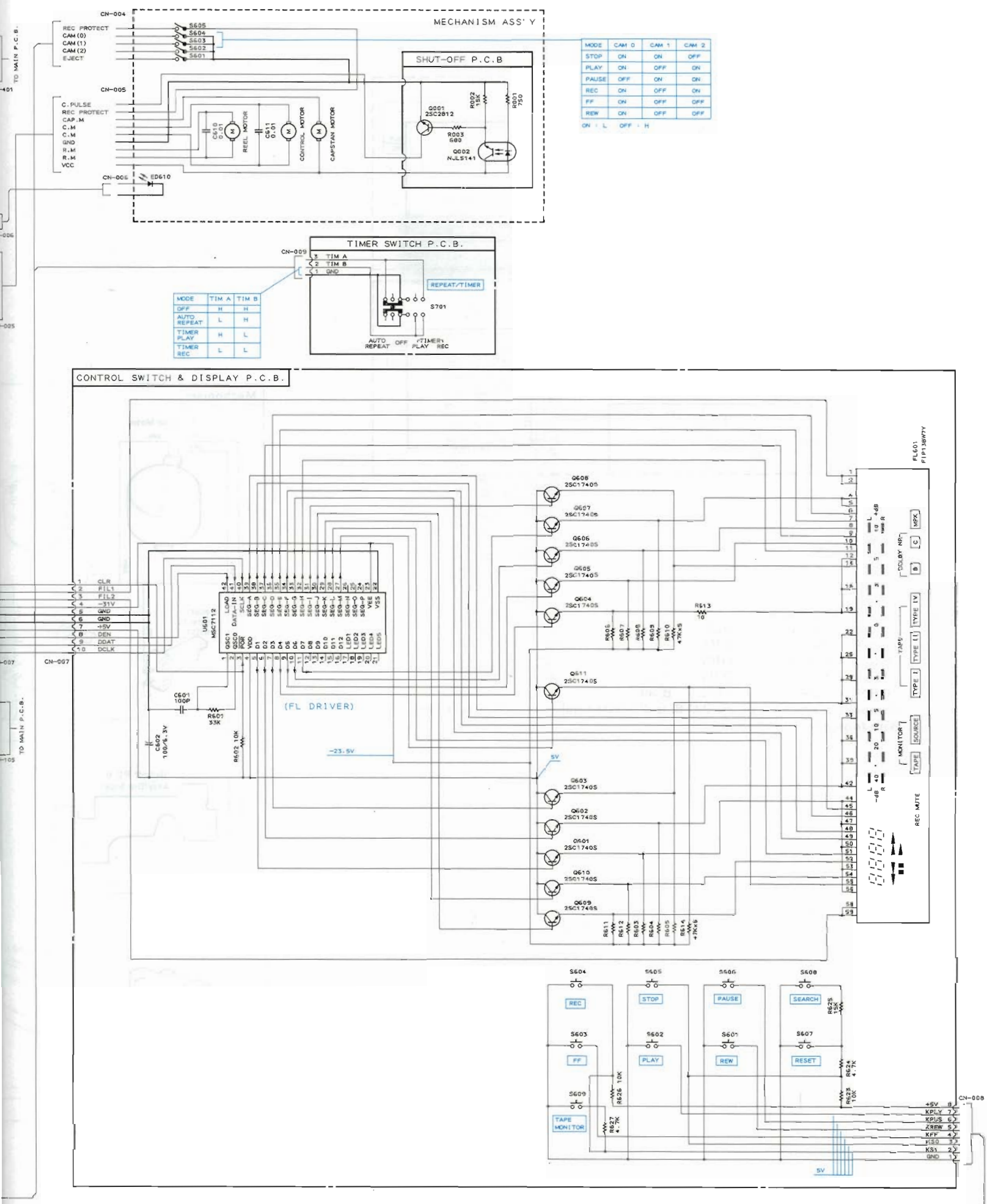
TAPE	TAPE A	TAPE B
TYPE I	H	H
TYPE II	L	H
TYPE IV	H	L





MODE	TIM
QRF	H
AUTO REPEAT	L
TIMER PLAY	H
TIMER REC	L

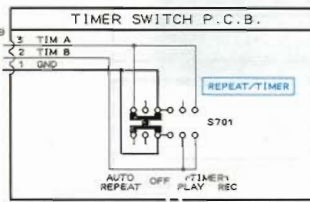
Fig. 9.2.2



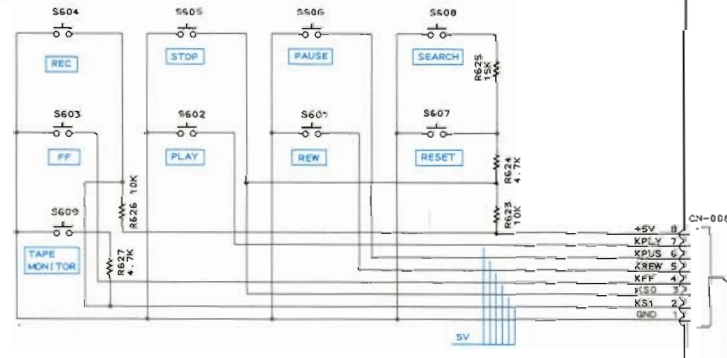
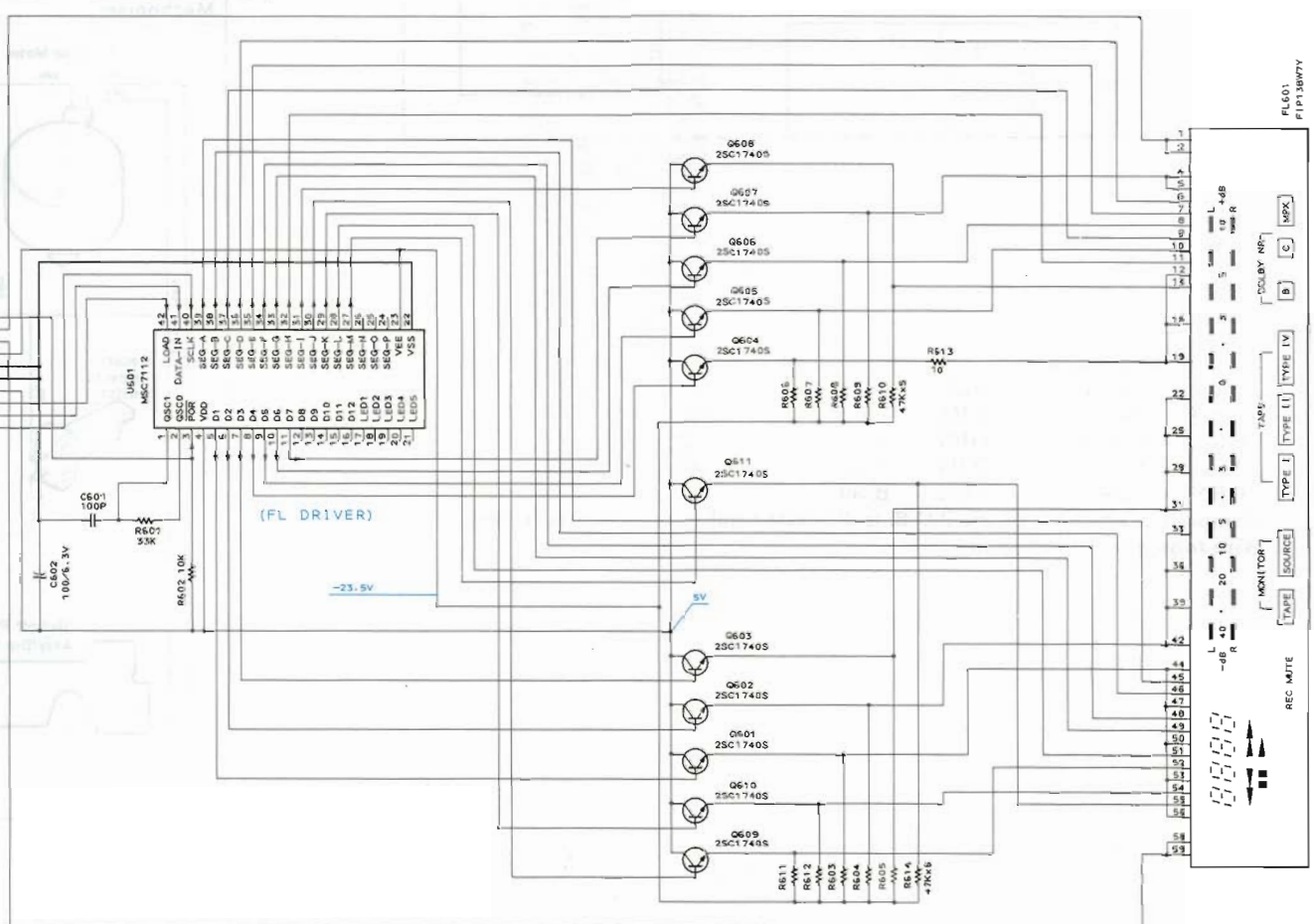
MODE	CAM 0	CAM 1	CAM 2
STOP	ON	ON	OFF
PLAY	ON	OFF	ON
PAUSE	OFF	ON	ON
REC	ON	OFF	ON
FF	ON	OFF	OFF
REW	ON	OFF	OFF

ON = L OFF = H

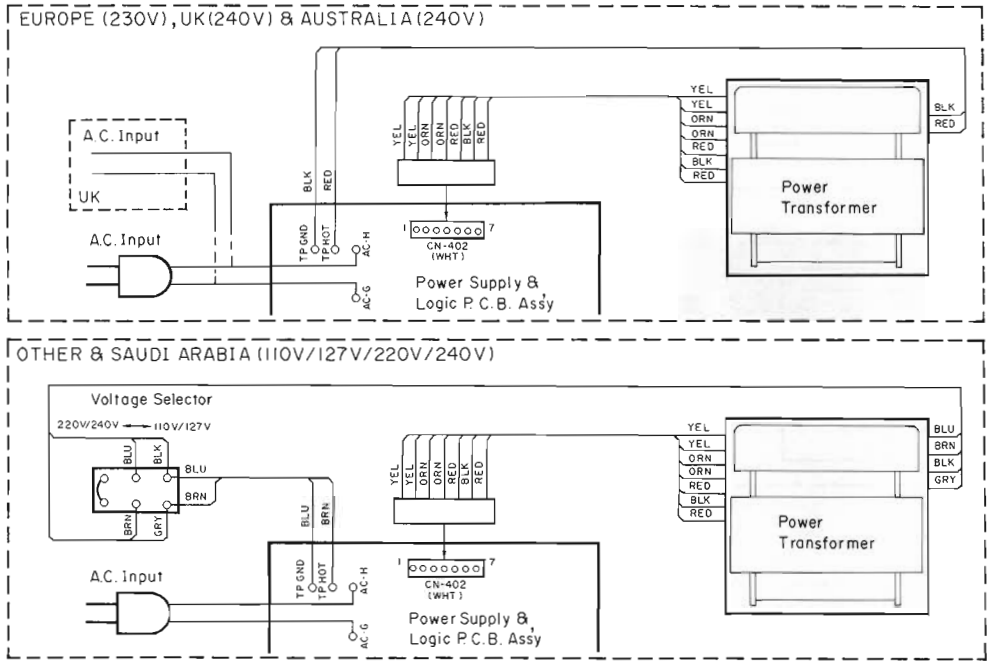
MODE	TIM A	TIM B
OFF	H	H
AUTO REPEAT	L	H
TIMER PLAY	H	L
TIMER REC	L	L



CONTROL SWITCH & DISPLAY P.C.B.



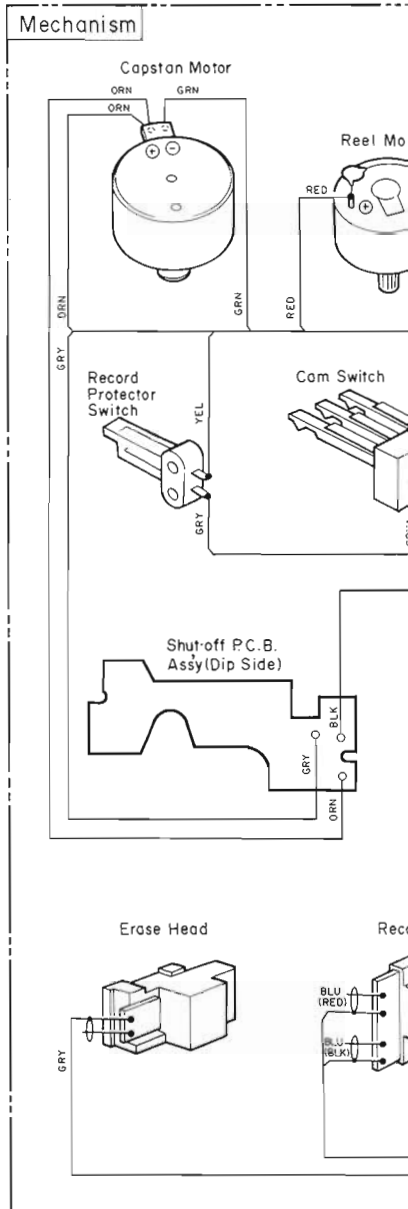
10. WIRING DIAGRAM



Notes: 1. Table of wire colors

BRN — Brown	BLU — Blue
RED — Red	VIO — Violet
ORN — Orange	GRY — Gray
YEL — Yellow	WHT — White
GRN — Green	BLK — Black

2. Component side view of the P.C.B. is illustrated unless otherwise specified.
 3. Wire tube color is shown in ().



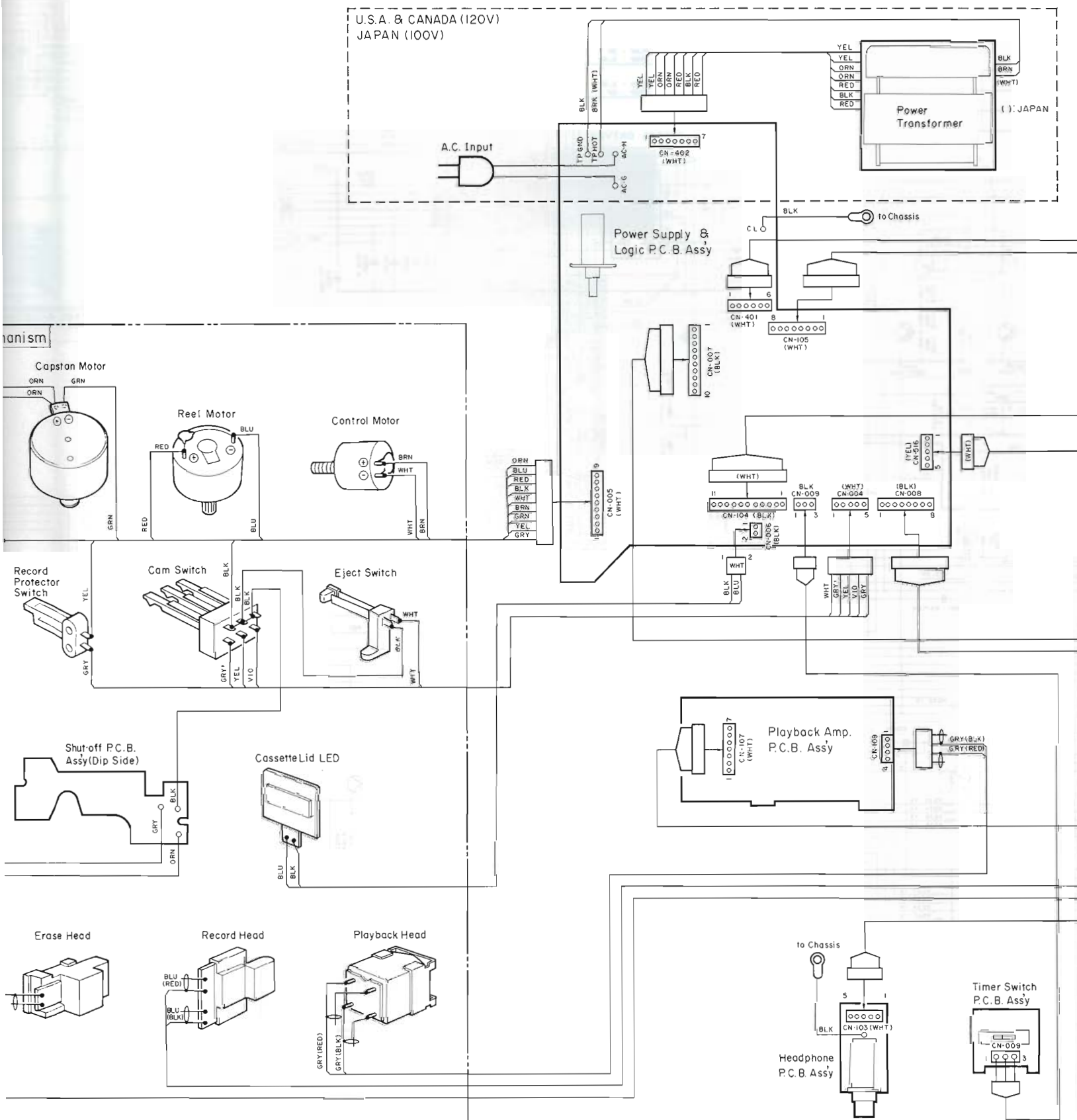
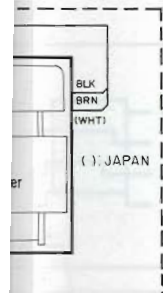
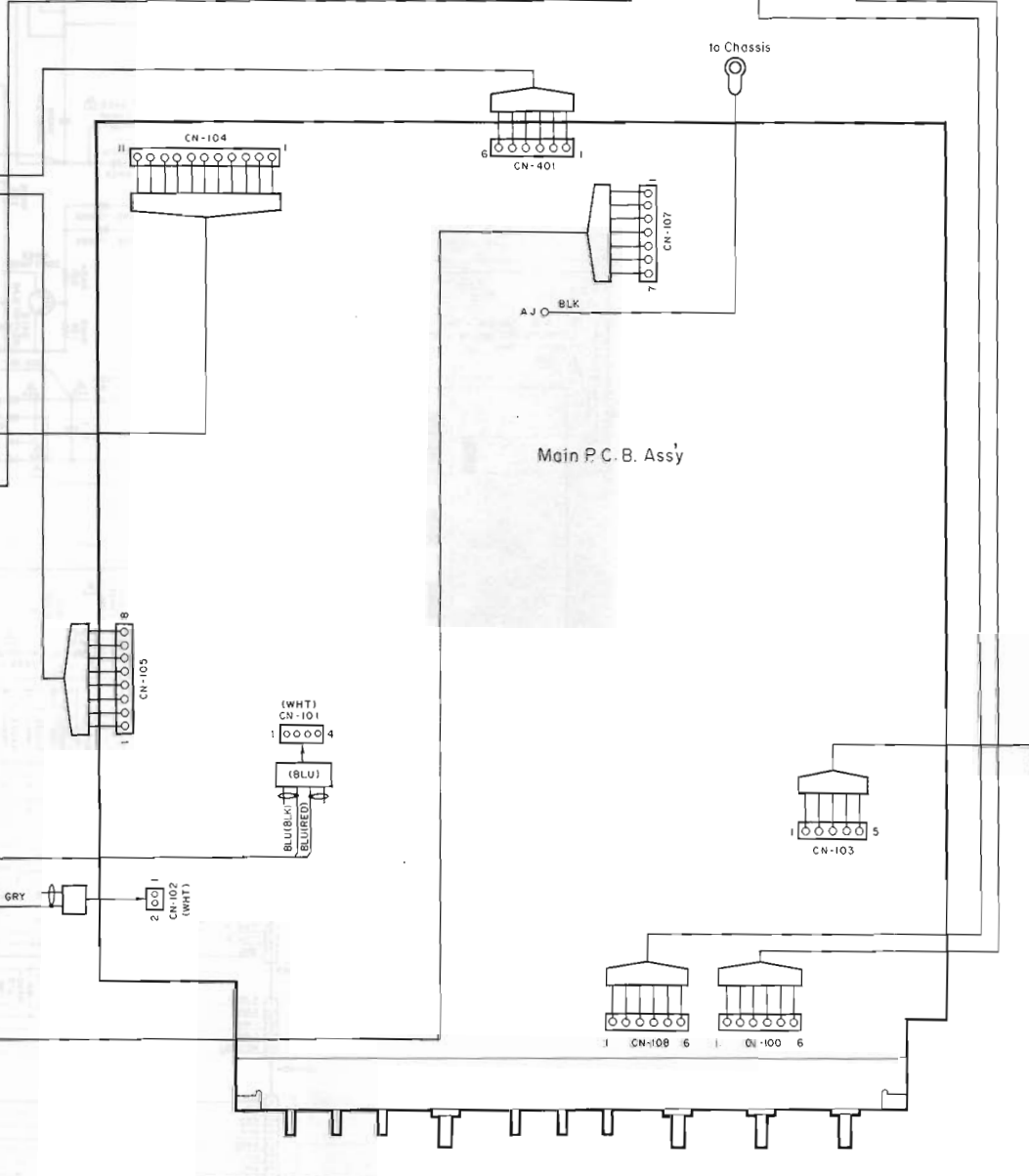
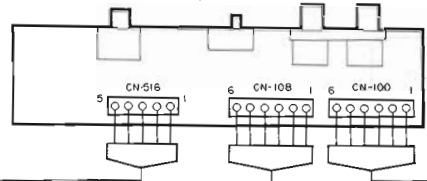


Fig. 10



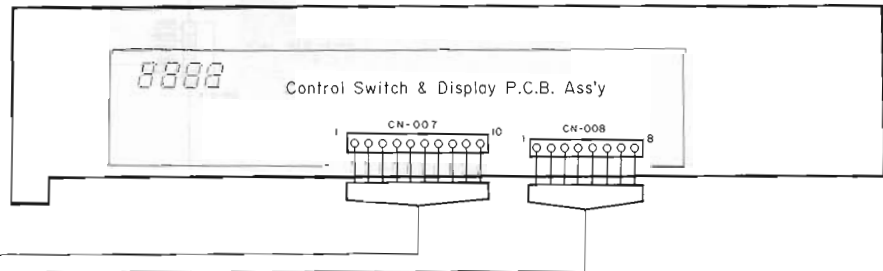
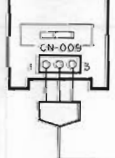
Pin Jack P.C.B. Assy



Main P.C.B. Assy



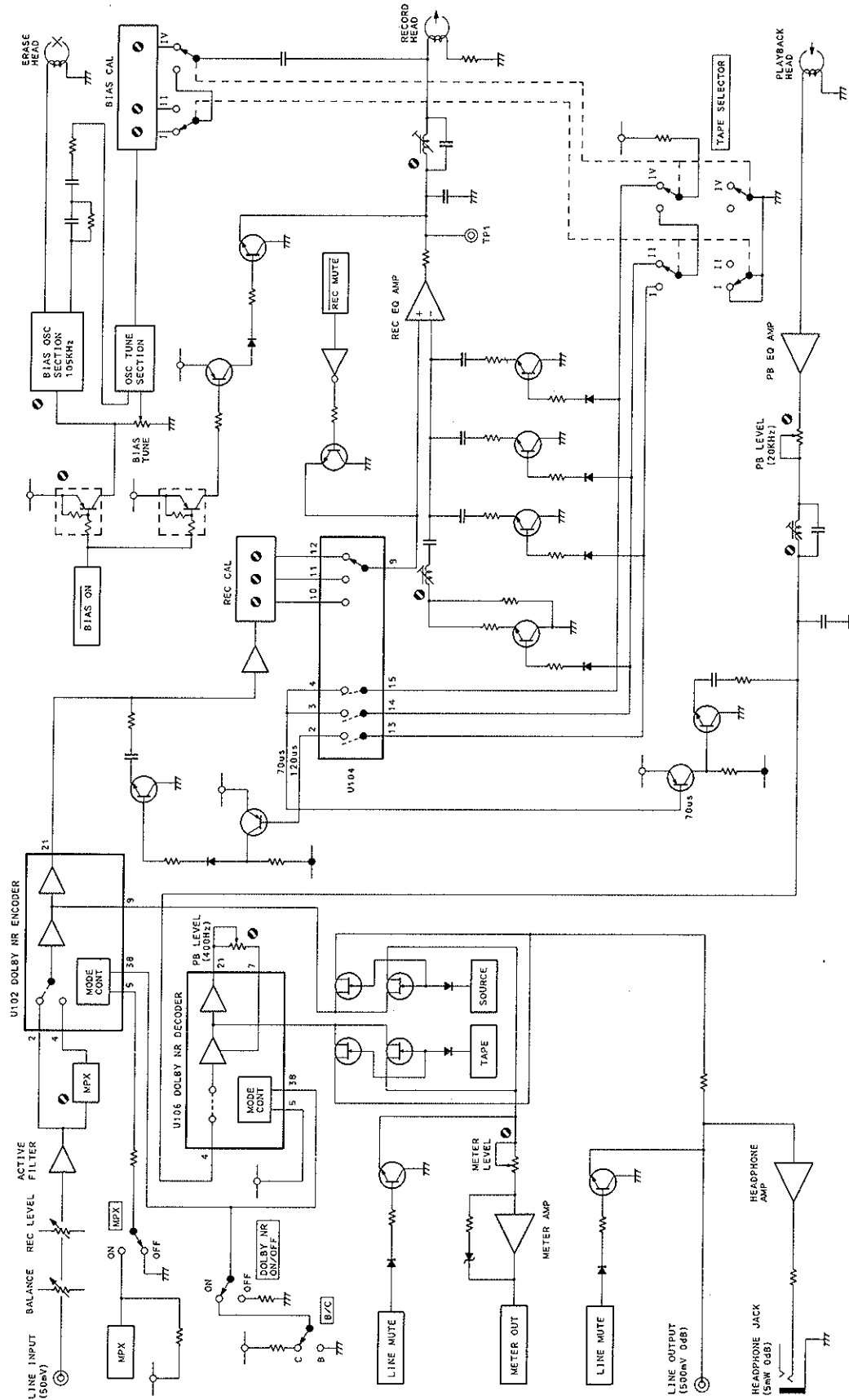
Timer Switch P.C.B. Assy



Control Switch & Display P.C.B. Assy

11. BLOCK DIAGRAMS

11.1. Amplifier Section



11.2. Mechanism Control Section

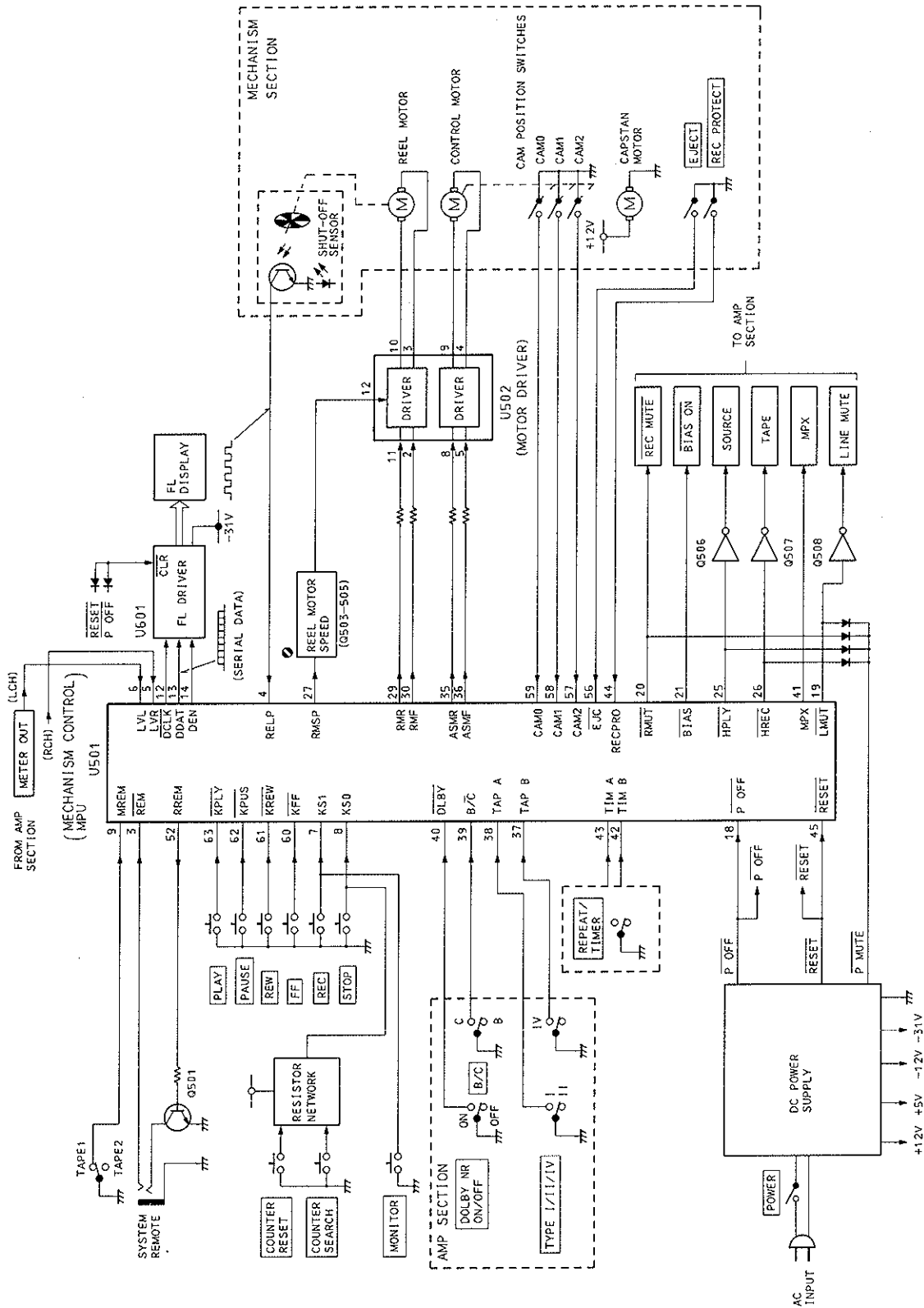


Fig. 11.2

12. TIMING CHARTS AND EQ. AMP. FREQUENCY RESPONSE

12.1. Timing Charts

(1) Overall Timing Chart

Mode	Playback			Record		
	Stop	Play	Stop	Rec./Pause	Rec./Play	Stop
Reel Motor	Low	High	Low	Low	High	Low
Line Mute	Low	High	High	High	Low	Low
Bias	Low	Low	Low	High	Low	Low
Rec. Mute	Low	Low	Low	Low	High	Low

Fig. 12.1.1

(2) Mechanism Control Timing Chart

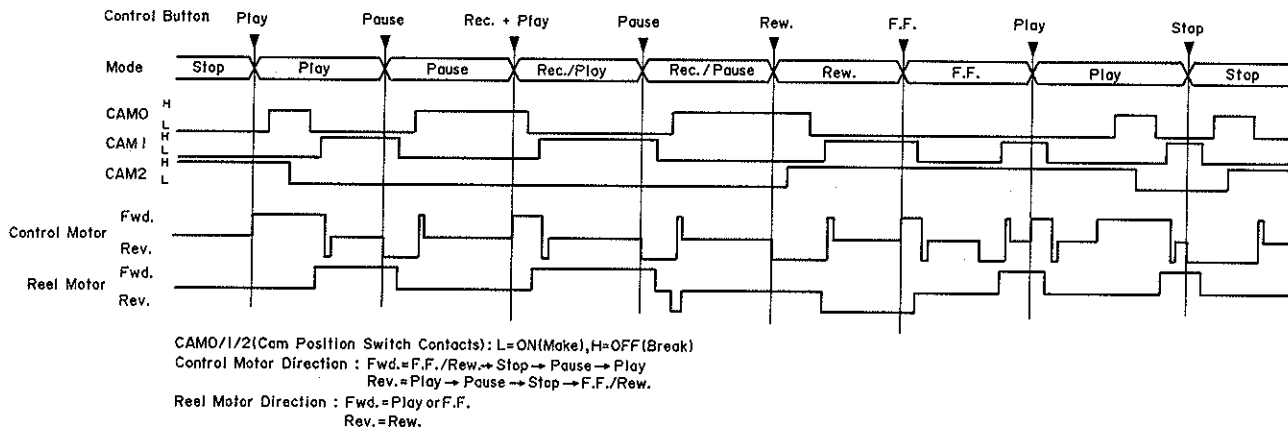


Fig. 12.1.2

12.2. Eq. Amp. Frequency Response
(1) Playback Frequency Response

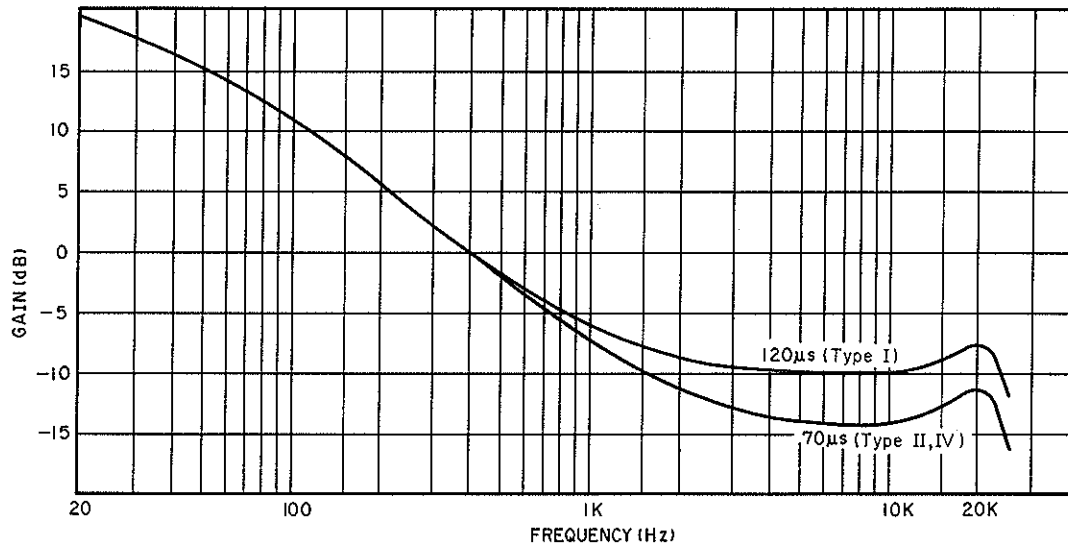


Fig. 12.2.1

(2) Record Current Frequency Response

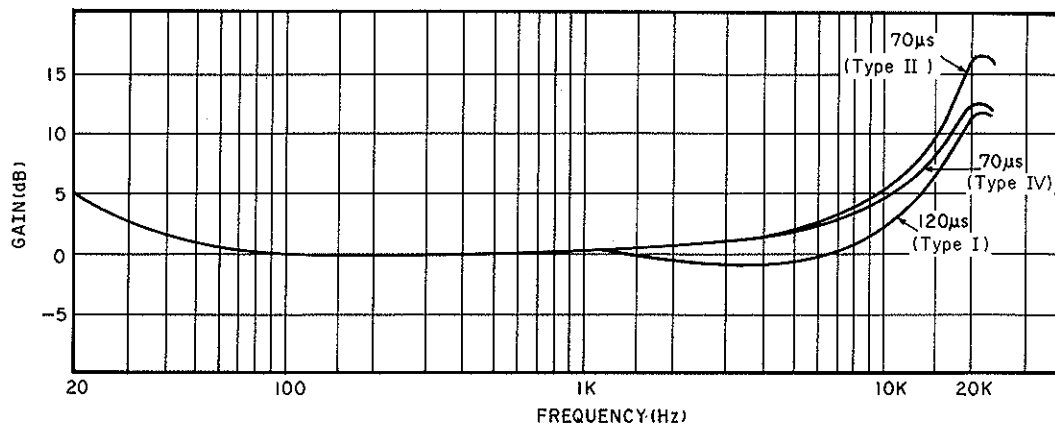



Fig. 12.2.2

13. SPECIFICATIONS

Track Configuration	4 tracks/2-channel stereo
Heads	3 (erase head x 1, record head x 1, playback head x 1)
Motors	
<Tape Transport>	DC servo motor (capstan drive) x 1 DC motor (reel drive) x 1
<Mechanism>	DC motor (cam drive) x 1
Wow and Flutter	Less than $\pm 0.06\%$ WTD Peak Less than 0.035% WTD RMS
Tape Speed	1-7/8 ips. (4.8 cm/sec.) $\pm 0.5\%$
Fast-Wind Time	Approx. 95 seconds (with C-60 cassette)
Frequency Response	20-21,000 Hz ± 3 dB (recording level -20 dB, Type I/II/IV)
Signal to Noise Ratio	
Dolby C-Type NR On	Better than 72 dB (400 Hz, 3% THD, IHF A-WTD RMS)
<70 μ s, Type IV>	
Dolby B-Type NR On	Better than 66 dB (400 Hz, 3% THD, IHF A-WTD RMS)
<70 μ s, Type IV>	
Total Harmonic Distortion	Less than 0.8% (400 Hz, 0 dB, Type I/IV) Less than 1.0% (400 Hz, 0 dB, Type II)
Channel Separation	Better than 37 dB (1 kHz, 0 dB)
Crosstalk	Better than 60 dB (1 kHz, 0 dB)
Erasure	Better than 60 dB (100 Hz, +10 dB)
Bias Frequency	105 kHz
Input (Line)	50 mV/40 k Ω
Output	
Line	0.5 V/2.2 k Ω (400 Hz, 0 dB, output level control at max.)
Headphones	5.0 mW/8 Ω (400 Hz, 0 dB, output level control at max.)
Power Source	120, 230, 240 V or 110-127/220-240 VAC, 50/60 Hz
Power Consumption	25 W max.
Dimensions*	430 (W) x 100 (H) x 320 (D) mm 16-15/16 (W) x 3-15/16 (H) x 12-5/8 (D) inches
Approximate Weight	5.4 kg/11 lbs. 14 oz.

*: Dimensions do not include protruding parts. Height is the panel height.

- Specifications and Design are subject to change for further improvement without notice.
- Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.
- "DOLBY" and the double-D-symbol  are trademarks of Dolby Laboratories Licensing Corporation.

Service Manual

Cassette Deck 1.5

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Nakamichi Canada
Nakamichi Australia
Nakamichi GmbH

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