

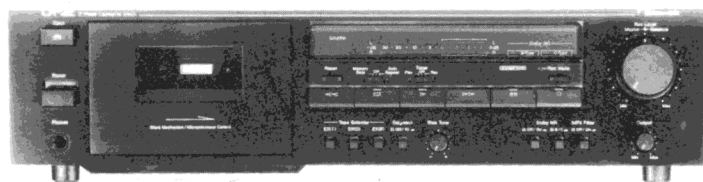


Service Manual

Nakamichi

CR-2 CR-2A CR-2E CR-20

2 Head Cassette Deck



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1. GENERAL

1.1. Voltage Selector

Voltage selector is installed on the rear panel for Other version of the Nakamichi CR-2. This voltage selector can select 110, 127, 220, or 240 V at customer's disposal.

1.2. Package Ass'y and Accessory Ass'y

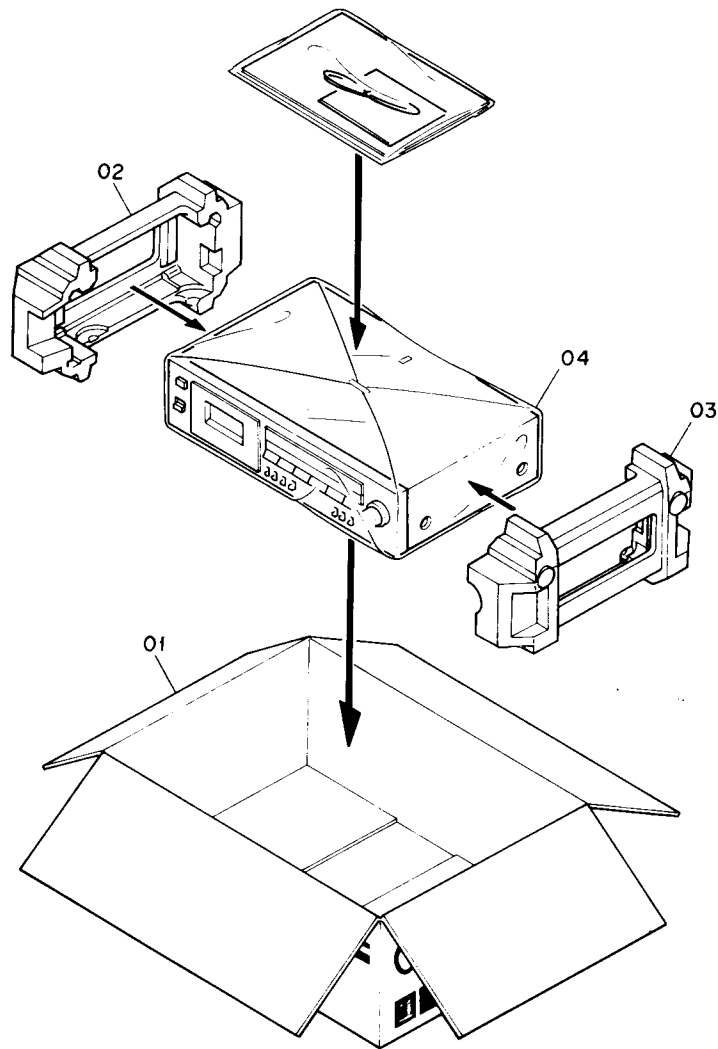


Fig. 1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
		Package Ass'y	1			Accessory Ass'y	1
01	0F04070A	Carton Box (CR-2)	1		0D03092B	Poly-Bag	1
	0F04071A	Carton Box (CR-2A)	1		0D04449A	Important Notice (CR-2, CR-2E & CR-20)	1
	0F04072A	Carton Box (CR-2E)	1		0D04810A	Important Notice (CR-2A)	1
	0F04100A	Carton Box (CR-20)	1		0D04766A	General Catalogue (CR-2A)	1
02	0F04087C	Packing L	1		0D04780B	Owner's Manual (English/German/French)	1
03	0F04088C	Packing R	1		0D04781B	Owner's Manual (Japanese)	1
04	0F03684A	Poly-Sheet S	1		0D04785B	Price Card (CR-20)	1
	0D04046A	Warranty Card (CR-20)	1		0D04796A	Tape Catalogue (CR-2A)	1
	0D04047A	User's Pack (CR-20)	1		0D04795A	Tape Catalogue (CR-20)	1
	0M03457A	Voltage Label 240V (CR-2 (Australia) & CR 2E (UK))	2		0D04797A	Warranty Card (CR-2A)	1
	0M05101A	Voltage Label (CR-2 (Saudi Arabia))	2		0D04812A	Tape Supplement	1
	0M05070A	Serial No. Label (CR-2A)	2		0M03844B	Power Cord Label (CR-2E (UK))	1
	0M05054A	Serial No. Label (CR-2, CR-2E & CR-20)	1		DA04121A	Pin Cord Ass'y	1
	0M05087A	Point of Sale Label (CR-20)	1				
	0M05106A	UL Label (CR-2A)	1				
	0M05105A	LA Label (CR-2A)	1				
	0M05107A	Canada Label (CR-2A)	1				
	0M05108A	UL/Canada Label (CR-2A)	1				
	0M05102A	Shipping Label Los (CR-2A)	1				
	0M05103A	Shipping Label VAN (CR-2A)	1				

2. REMOVAL PROCEDURES

2.1. Top Cover Ass'y and Bottom Cover Ass'y

Refer to Fig. 2.1.

- (1) Loosen F01 and remove F02 (Top Cover Ass'y).
- (2) Loosen F03 and remove F04 (Bottom Cover Ass'y).

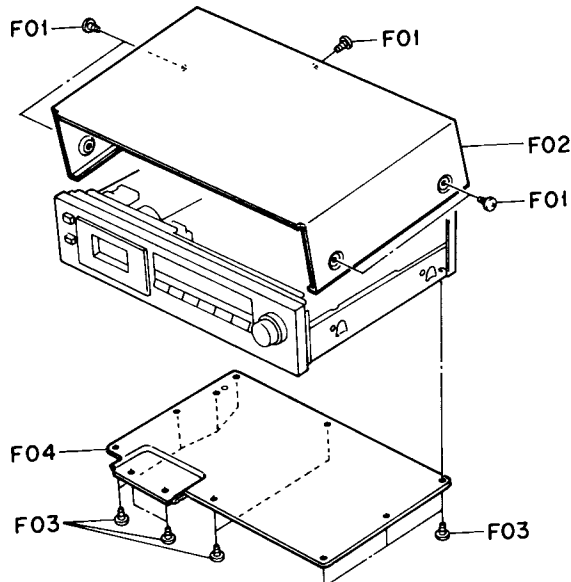


Fig. 2.1

2.2. Cassette Case Cover Ass'y

Refer to Fig. 2.2.

- (1) Press F01 (Eject Button) to open F02 (Cassette Case Cover Ass'y).
- (2) Pull F02 (Cassette Case Cover Ass'y) upward.

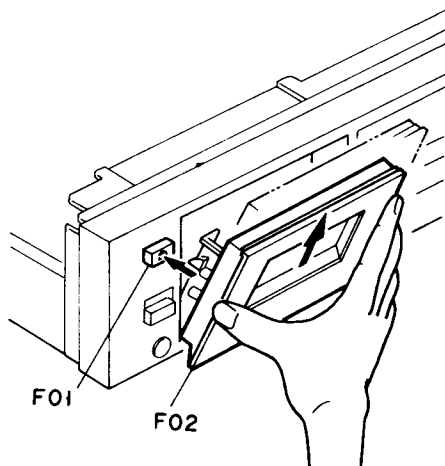


Fig. 2.2

2.3. Mechanism Ass'y

Refer to Fig. 2.3.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) Remove the Cassette Case Cover Ass'y referring to item 2.2.
- (3) Loosen F01 and F02, remove F03, and disassemble F04 (Mechanism Ass'y).

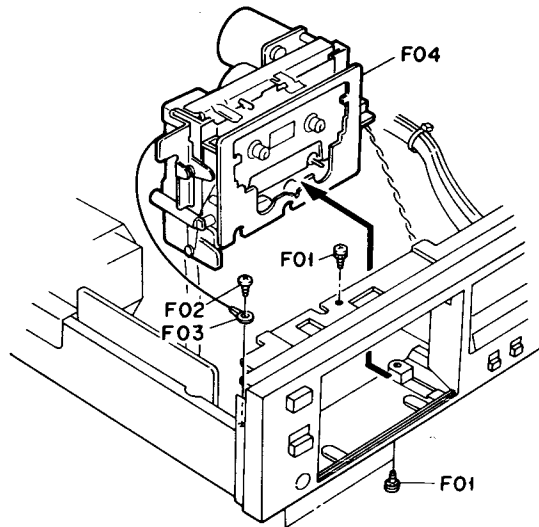


Fig. 2.3

2.4. Pin Jack P.C.B. Ass'y and Main P.C.B. Ass'y

Refer to Fig. 2.4.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) Loosen F01 and remove F02 (Pin Jack P.C.B. Ass'y).
- (3) Loosen F03 and F04, and lift F05 (Main P.C.B. Ass'y).

Note: When installing the Main P.C.B. Ass'y, to facilitate installation, place the Main P.C.B. Ass'y so that the tops of switches on the Main P.C.B. Ass'y come in contact with the ends of push buttons as shown in Fig. 2.5.

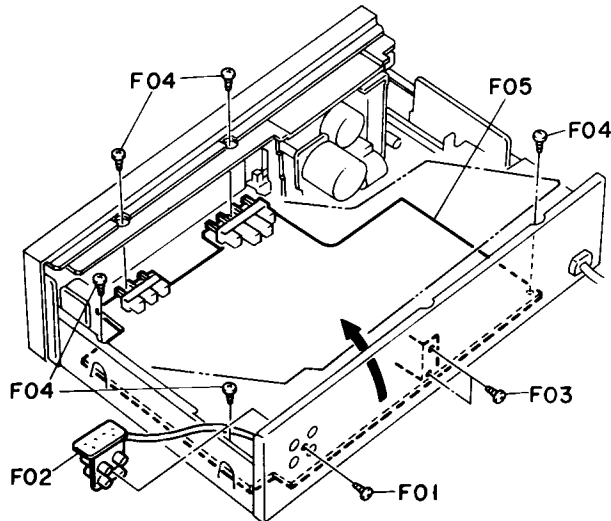


Fig. 2.4

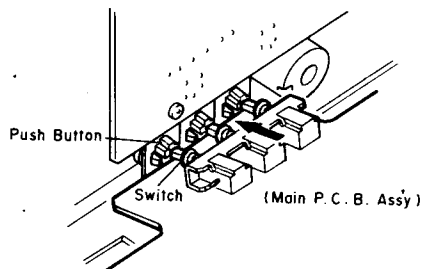


Fig. 2.5

2.5. Front Panel

Refer to Fig. 2.6.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) Remove the Cassette Case Cover Ass'y referring to item 2.2.
- (3) Pull out F01, F02 and F03, and loosen F04 and F05.
- (4) With pushing claws by hand as shown in the figure, remove F06 (Front Panel).

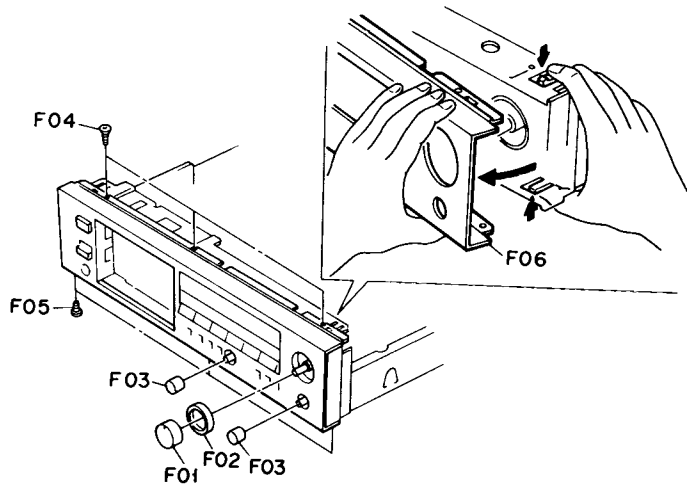


Fig. 2.6

2.6. Bias Tune Volume P.C.B. Ass'y

Refer to Fig. 2.7.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) Remove the Main P.C.B. Ass'y referring to item 2.4.
- (3) Remove the Front Panel referring to item 2.5.
- (4) Loosen F01 and F02 with a special nut driver or with pliers, and remove F03 (Bias Tune Volume P.C.B. Ass'y).

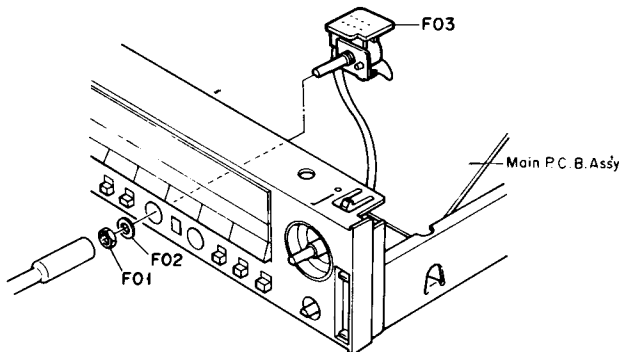


Fig. 2.7

2.7. Control P.C.B. Ass'y

Refer to Fig. 2.8.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) Remove the Mechanism Ass'y referring to item 2.3.
- (3) Remove the Front Panel referring to item 2.5.
- (4) Loosen F01 and F02 with a special nut driver or with pliers to set F03 (Bias Tune Volume P.C.B. Ass'y) free.
- (5) With pushing F03 (Bias Tune Volume P.C.B. Ass'y) in the direction of the arrow, loosen F04, unhook F05, and remove F06 (Control P.C.B. Ass'y).

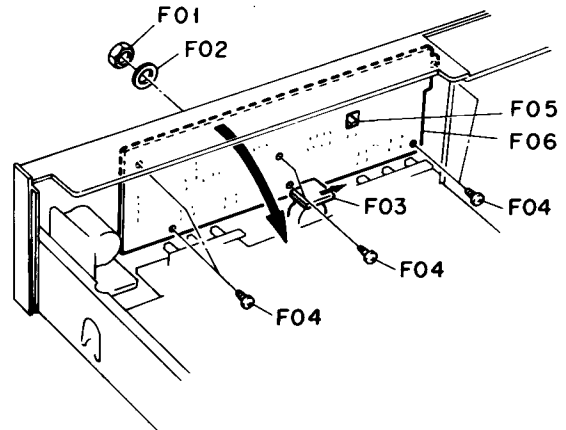


Fig. 2.8

2.8. Power Switch Joint

Refer to Fig. 2.9.

- (1) Remove the Top Cover Ass'y referring to item 2.1.
- (2) Pull F01 (Power Switch Joint) upward to remove it.

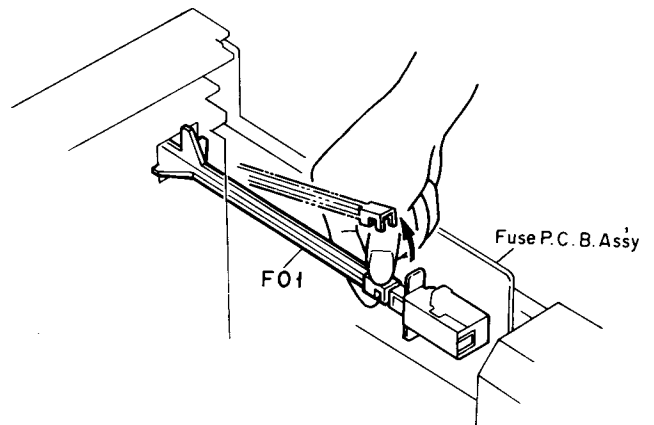


Fig. 2.9

3. TEST TAPES AND GAUGES

- (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) Head Alignment Gauge (DA09092B)
- (13) Torque Gauge FWD (DA09082A)

4. MECHANICAL ADJUSTMENTS

4.1. Tape Guide Height Check for Record/Playback Head and Erase Head

With use of a Head Alignment Gauge (DA09092B), tape guide height check for the Record/Playback and Erase Heads shall be made, wherein a small block shall be pushed straight down to the base while in use of the Head Alignment Gauge (DA09092B). Refer to Fig. 4.1.

(1) Record/Playback Head Tape Guide Height

- (a) Load the base of the Head Alignment Gauge (DA09092B) carefully and set the cassette deck in Play mode.
- (b) Place the small block of the Head Alignment Gauge (DA09092B) on the base.
- (c) Slide the small block against the tape guide of the Record/Playback Head, and check to insure that the block is accepted by the tape guide.
- (d) If not, loosen the screw and insert a shim (either 30 μm (OC80048A), 60 μm (OC80038A), or 100 μm (OC80039A)) to raise the Record/Playback Head, then tighten and apply a quantity of lock tight paint to the screw.

(2) Erase Head Tape Guide Height

- (a) Load the base of the Head Alignment Gauge (DA09092B) carefully and set the cassette deck in Play mode.
- (b) Place the small block of the Head Alignment Gauge (DA09092B) on the base.
- (c) Slide the small block against the tape guide of the Erase Head, and check whether the block is accepted by the tape guide.

4.2. Head Base Stroke Check

Refer to Fig. 4.2.

- (1) Load the base of the Head Alignment Gauge (DA09092B) carefully, then push the base toward the Record/Playback Head to eliminate the clearance between the reference pin and the base.
- (2) Set the cassette deck in Play mode.
- (3) Place the small block of the Head Alignment Gauge (DA09092B) on the base.
- (4) Contact the small block with the Record/Playback Head surface and the Erase Head surface, and check whether the end of the small block is located within the specified tolerance as shown in Fig. 4.2.

4.3. Record/Playback Head Azimuth Alignment and Height Check

Refer to Fig. 4.1.

- (1) Contact an AC voltmeter to the Output Jacks.
- (2) Load a 15 kHz Azimuth Tape (DA09004B) and set the cassette deck in Play mode.
- (3) Turn the Azimuth Alignment Screw until the outputs of both channels become maximum.
- (4) Load a 1 kHz Track Alignment Tape (DA09007B) and set the cassette deck in Play mode.
- (5) Check to insure that the readings of both channels on the AC voltmeter are below -25 dB.
If not, replacement of the Record/Playback Head will be required.
- (6) Apply a quantity of lock tight paint to the Azimuth Alignment Screw.

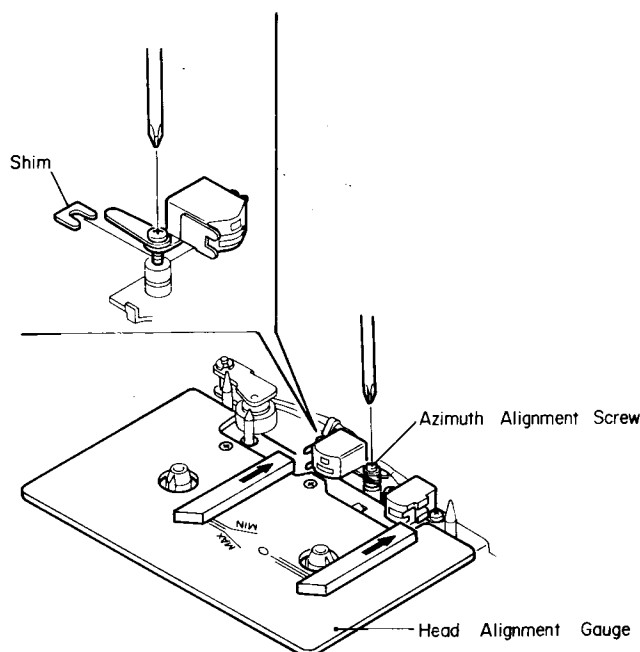


Fig. 4.1

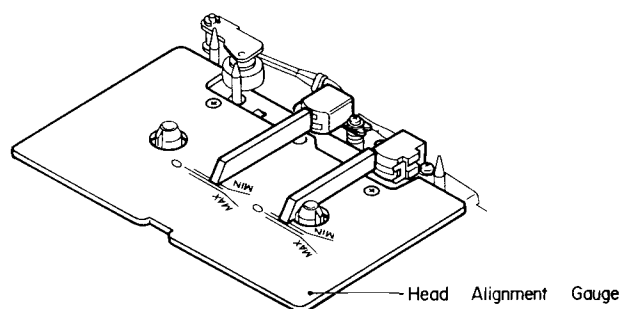


Fig. 4.2

4.4. Pressure Adjustment of Pressure Roller

Refer to Fig. 4.3.

- (1) In Play mode, measure the torque of the Pressure Roller and check whether the torque is in a range of 320 ± 50 g-cm.
- (2) If torque is out of the range, correct it by changing the installation point of the Pressure Roller Spring.

4.5. Tape Travelling Check

Load a Tape Travelling Cassette (DA09071A) and set the cassette deck in Play mode to check the followings:

- (1) After more than 2 seconds, the fluctuation of the tape travelling on the Record/Playback Head is small.
- (2) Tape is in contact with the head sufficiently.
- (3) Tape waving is small on the heads and pressure roller.

4.6. Eject Damper Adjustment

Refer to Fig. 4.4. 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 Damper Adjustment Screw.

CCW: Damper moves fast.

CW: Damper moves slowly.

4.7. Reel Motor Speed Adjustment in Play Mode

- (1) Load a Torque Gauge FWD (DA09082A) and set the cassette deck in Play mode.
- (2) After 5 to 10 seconds, adjust VR601 on the Main P.C.B. Ass'y to obtain exactly 45 g-cm on the torque gauge.

4.8. Tape Speed Adjustment

Refer to Fig. 4.5.

- (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.

4.9. Lubrication

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

- (1) Molykote [®] 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 [®] Grease (X5-6020)
Dowcorning 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

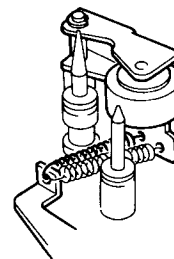


Fig. 4.3

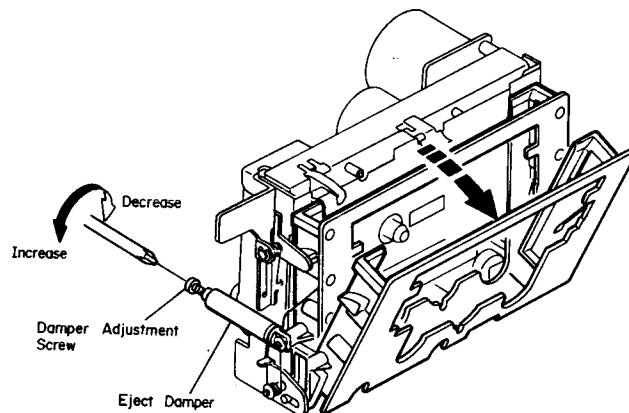


Fig. 4.4

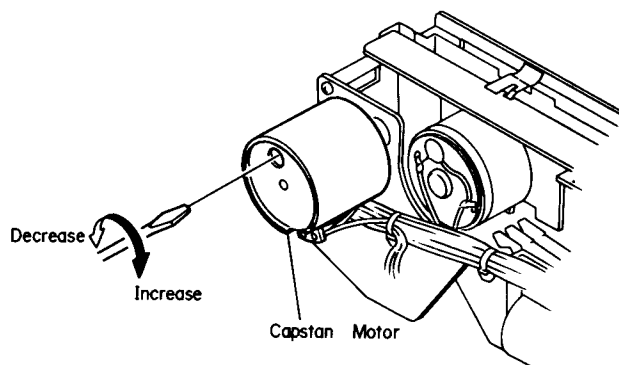


Fig. 4.5

5. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

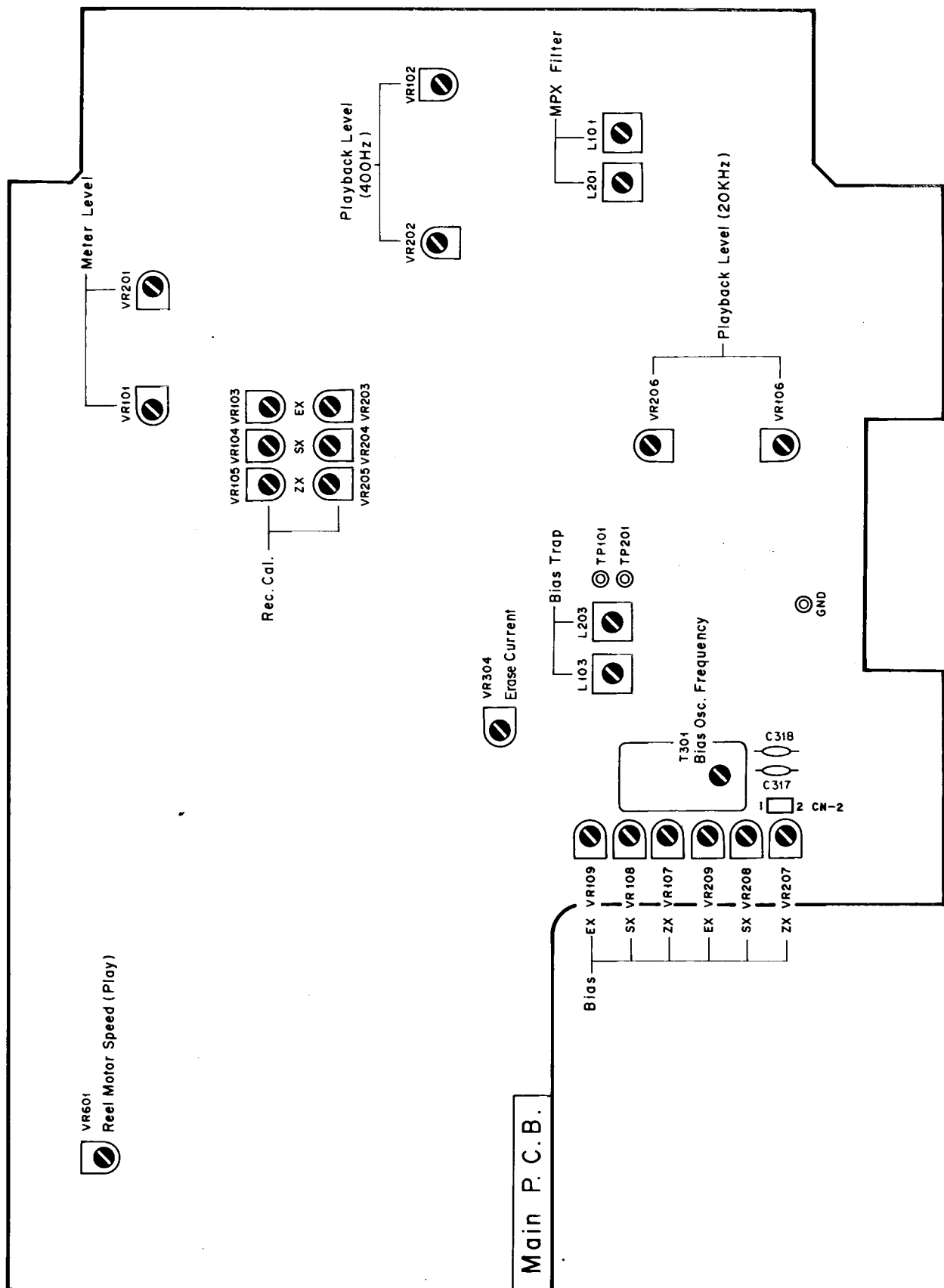


Fig. 5

6. ELECTRICAL ADJUSTMENTS

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
1	Preliminary Step			Output Level - Max. Balance - Center Bias Tune - Center Eq. - 70 μ s Tape - ZX MPX Filter - OFF Dolby NR - OFF		Set the CR-2/2A/2E/20 as shown in MODE.
2	Reel Motor Speed Adjustment (Play)	Torque Gauge FWD (DA09082A)		Playback	Main VR601	1. Play back a Torque Gauge FWD, and after 5 to 10 seconds, adjust VR601 to obtain 44 ± 1 g-cm on the Torque Gauge at 25 degrees (45 ± 1 g-cm at 20 degrees). 2. Check that the deviation of the torque value is within ± 10 g-cm of the center value. Note: Torque adjustment must be done after leaving the CR-2/2A/2E/20 for one hour with the power switch turned OFF.
3	Tape Speed Adjustment	3 kHz Speed and Wow/Flutter Tape (DA09006C)	Frequency Counter to Output Jacks	Playback Eq. - 70 μ s	Tape Speed Adj. Volume (Capstan Motor)	Adjust the volume incorporated in the capstan motor to obtain 3 kHz ± 15 Hz on the frequency counter.
4	Meter Level Calibration	400 Hz to Input Jacks	AC Volt-meter to Output Jacks	Record, Pause	Main P.C.B. VR101 VR201	1. Feed in 400 Hz and adjust the Input Level control to obtain 500 mV -1.2 dB on the AC voltmeter. 2. Adjust VR101 (VR201) so that the 0 dB segment of the level meter starts illuminating.
5	MPX Filter Adjustment	19 kHz ± 100 Hz to Input Jacks	AC Volt-meter to Output Jacks	Record, Pause MPX - OFF/ON	Main P.C.B. L101 L201	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 L101 (L201) to obtain minimum reading on the AC voltmeter (minimum reading will be less than -30 dB).
6	Record/Playback Head Azimuth Alignment	15 kHz Azimuth Tape (DA09004B)	AC Volt-meter to Output Jacks	Playback Eq. - 70 μ s Dolby NR - OFF MPX - OFF	Record/Playback Head Azimuth Alignment Screw	Adjust the Record/Playback Head Azimuth Alignment Screw to obtain maximum readings for both channels on the AC voltmeter.
7	Playback Level Calibration	400 Hz Level Tape (DA09005B)	AC Volt-meter to Output Jacks	Same as above	Main P.C.B. VR102 VR202	Adjust VR102 (VR202) to obtain 500 mV on the AC voltmeter.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
8	Playback Frequency Response Adjustment	400 Hz 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	Playback Eq. - 70 μ s Dolby NR - OFF MPX - OFF	Main P.C.B. VR106 VR206	1. Load a 400 Hz level tape, play it back, and read the playback level. 2. Load 10 kHz, 15 kHz and 20 kHz PB frequency response tapes and play them back. Adjust the record/playback head azimuth to obtain maximum readings for both channels on the AC voltmeter with each tape. Check that the playback levels are as follows with respect to the level for 400 Hz level tape. 10 kHz: -20 dB -2 to +2 dB 15 kHz: -20 dB -2 to +3 dB 20 kHz: -20 dB -2 to +4 dB If the level at 20 kHz is out of the range, adjust VR106 (VR206) to obtain satisfactory results. VR106 (VR206) compensates the playback frequency response at 20 kHz as shown below: 3. Conduct step 6 "Record/Playback Head Azimuth Alignment".
9	Bias Oscillation Frequency and Erase Current Adjustment	None	Frequency Counter between terminals 1 and 2 of CN2 on Main P.C.B. and AC Voltmeter across the additional 0.1 ohm resistor	Record, Pause Eq. - 70 μ s Tape ZX Dolby NR - OFF MPX - OFF	Main P.C.B. T301 C317 C318 VR304	1. Connect an additional 0.1 ohm resistor in series to the Erase Head and connect the AC voltmeter across it. 2. Adjust T301 to obtain 105 kHz $\pm$1 kHz on the frequency counter. If bias oscillation frequency is above 106 kHz, short-circuit C317 and C318, and re-adjust T301 again. 3. Adjust VR304 to obtain 17.5 mV (175 mA) on the AC voltmeter. (16.5 $\pm$ 1 mV (165 $\pm$ 10 mA will be accepted.) 4. After completion of the erase current adjustment, re-check the bias oscillation frequency. 5. Remove the additional 0.1 ohm resistor.
10	Bias Trap Adjustment (Record Amp.)	None (remove input signals)	AC Voltmeter to TP101, TP201 on Main P.C.B.	Same as above	Main P.C.B. L103 L203	Adjust L103 (L203) to obtain minimum reading on the AC voltmeter.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
11	Record Level Calibration and Recording Bias Current Adjustment	400 Hz (0 dB) and 18 kHz (-20 dB) to Input Jacks	AC Volt-meter and Distortion Meter to Output Jacks	Record and Playback Tape - ZX/SX/ EX Eq. - 70 μ s (ZX/SX) 120 μ s (EX) Dolby NR - OFF/C MPX - OFF	Main P.C.B. (Level) ZX: VR105 VR205 SX: VR104 VR204 EX: VR103 VR203 (Bias) ZX: VR107 VR207 SX: VR108 VR208 EX: VR109 VR209	Adjustment should be made in the order of ZX, SX and EX. 1. Set the cassette deck in Record/Pause mode. 2. Feed in 400 Hz and adjust the Input Level control to obtain 500 mV (0 dB) on the AC voltmeter. 3. Load a reference ZX tape, reference SX tape and reference EXII tape. 4. Set the Dolby NR switch to OFF. 5. Feed in 400 Hz (0 dB) and record, rewind and play it back. Adjust VR105 (VR205) for ZX tape, VR104 (VR204) for SX Tape and VR103 (VR203) for EXII tape so that the played back output levels are 500 mV (0 dB) on the AC voltmeter. 6. Set the Dolby NR switch to C. 7. Feed in 18 kHz (-20 dB) and record, rewind and play it back. Adjust VR107 (VR207) for ZX tape, VR108 (VR208) for SX tape and VR109 (VR209) for EXII tape so that the played back output levels are 50 mV (-20 dB) on the AC voltmeter. 8. Repeat above 4 to 8 two or three times. 9. Set the Dolby NR switch to OFF. 10. Feed in 400 Hz (0 dB) and record, rewind and play it back. Check to insure whether the total harmonic distortion is less than 1.0% for ZX, SX and EXII tapes. If the total harmonic distortion exceeds the specified value, re-adjust VR106 (VR206) in Step 8 "Playback Frequency Response Adjustment", and repeat above steps till satisfactory results are obtained.

7. MECHANISM ASS'Y AND PARTS LIST

7.1. Synthesis

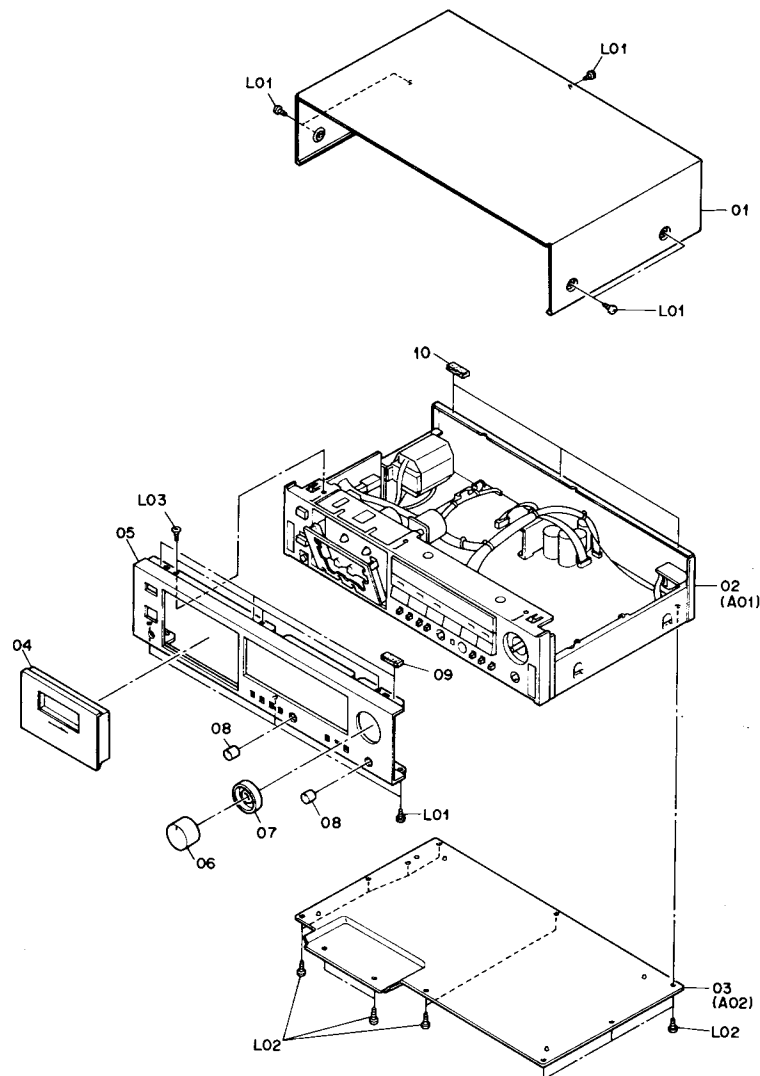


Fig. 7.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.1. Synthesis				08	HA05339A	Bias Volume Knob Ass'y	2
				09	OJ05453A	Top Cover Cushion	3
				10	OJ05407A	Top Cover Sheet	3
				L01	OE03433A	BT3x6 ⊕ Binding Projected (Black Chromate)	8
01	OH05111A	Top Cover	1	L02	OE00868A	BT3x8 ⊕ Binding	11
02	JA04308A	Chassis Ass'y (CR-2 (Australia))	1	L03	OE03054A	BT3x8 ⊕ Countersunk	3
	JA04307A	Chassis Ass'y (CR-2 (Other))	1	—	OM03797A	Voltage Seal 240V (CR-2E (UK))	1
	JA04310A	Chassis Ass'y (CR-2 (Saudi Arabia))	1	—	OM03844B	Power Cord Label (CR-2E (UK))	1
	JA04311A	Chassis Ass'y (CR-2A (U.S.A.))	1	—	OM05148A	Production Date Seal (CR-2A)	1
	JA04305A	Chassis Ass'y (CR-2A (Canada))	1	—	OM04381A	EP Approval Label (CR-2E (Europe))	1
	JA04309A	Chassis Ass'y (CR-2E (Europe))	1	—	OM04732A	Voltage Label 120V (CR-2A (Canada))	1
	JA04304A	Chassis Ass'y (CR-2E (UK))	1	—	OM04811A	Voltage Caution Sheet (CR-2 (Other & Saudi Arabia))	1
03	JA04306A	Chassis Ass'y (CR-20 (Japan))	1	—	OM05065A	Passed Label	1
	JA04319A	Bottom Cover Ass'y (CR-2 & CR-2E)	1	—	OM05067A	CSA Approval Label (CR-2A (Canada))	1
	JA04329A	Bottom Cover Ass'y (CR-2A)	1	—	OM05068A	LA Label (CR-2A (U.S.A.))	1
	JA04340A	Bottom Cover Ass'y (CR-20)	1	—	OM05070A	Serial No. Seal (CR-2A)	1
04	HA05313A	Cassette Case Cover Ass'y	1	—	OM05114A	Amp. Number Seal	1
05	OH05134B	Front Panel (CR-2)	1	—	OM05111A	F. Mark Approval Seal (CR-2E (Europe))	1
	OH05132B	Front Panel (CR-2A)	1	—	MA01001A	F. Code Label Ass'y (CR-2, CR-2E & CR-20)	1
	OH05133B	Front Panel (CR-2E)	1				
	OH05135B	Front Panel (CR-20)	1				
06	HA05340A	Rec. Volume Knob Ass'y	1				
07	HA05338A	Rec. Balance Knob Ass'y	1				

Schematic Ref. No.	Part No.	Description	Q'ty
7.2. Chassis Ass'y (A01)			
A01	JA04308A	Chassis Ass'y (CR-2 (Australia))	1
	JA04307A	Chassis Ass'y (CR-2 (Other))	1
	JA04310A	Chassis Ass'y (CR-2 (Saudi Arabia))	1
	JA04311A	Chassis Ass'y (CR-2A (U.S.A.))	1
	JA04305A	Chassis Ass'y (CR 2A (Canada))	1
	JA04309A	Chassis Ass'y (CR-2E (Europe))	1
	JA04304A	Chassis Ass'y (CR-2E (UK))	1
	JA04306A	Chassis Ass'y (CR-20 (Japan))	1
	Serial No.: A32501001 -		
01	0J05427A	Mount Plate	1
02	HA05308A	Front Escutcheon Ass'y	1
03	BA06969A	Headphone P.C.B. Ass'y	1
04	BA06968A	Bias Tune Volume P.C.B. Ass'y	1
05	0H05095A	Slide Button	2
06	BA06961A	Control P.C.B. Ass'y	1
07	BA06967A	Output Volume P.C.B. Ass'y	1
08	BA06966A	Input Volume P.C.B. Ass'y	1
09	0H05165A	Cover Plate	1
10	0B12580A	LED P Green SLF-725D	1
11	CA08886A	Mechanism Ass'y	1
12	0B83255A	GND Wire Ass'y	1
13	0B83132A	2P Connector	1
14	0J05402A	Power Switch Joint	1
15	BA06964A	Fuse P.C.B. Ass'y (CR-2 & CR-2E)	1
	BA06963A	Fuse P.C.B. Ass'y (CR-2A)	1
	BA06965A	Fuse P.C.B. Ass'y (CR-20)	1
16	0J05417C	Transformer Holder	1
17	0B50100A	Power Transformer (CR-2 (Australia) & CR-2E)	1
	0B50101A	Power Transformer (CR-2 (Other & Saudi Arabia))	1
	0B50099A	Power Transformer (CR-2A)	1
	0B50102A	Power Transformer (CR-20)	1
18	0J05392A	Side Chassis L	1
19	BA06947A	Main P.C.B. Ass'y	1
20	0J05451A	P.C.B. Cushion	1
21	0J05394A	P.C.B. Holder Front	2
22	0B05241A	Power Code (CR-2 (Australia))	1
	0B08533A	Power Code (CR-2 (Other & Saudi Arabia))	1
	0B08504A	Power Code (CR-2A)	1
	0B08093U	Power Code (CR-2E (Europe))	1
	0B08348A	Power Code (CR 2E (UK))	1
	0B08219B	Power Code (CR-20)	1
23	0B90280A	Cord Bushing (CR-2 (Australia), CR-2A & CR-2E)	1
	0B90283A	Cord Bushing (CR-2 (Other & Saudi Arabia) & CR-20)	1
24	BA06970A	Pin Jack P.C.B. Ass'y	1
25	0J05395A	P.C.B. Holder Rear	1
26	0H05146B	Rear Panel (CR-2 (Australia))	1
	0H05148B	Rear Panel (CR-2 (Other & Saudi Arabia))	1
	0H05144B	Rear Panel (CR-2A)	1
	0H05145B	Rear Panel (CR-2E)	1
	0H05147B	Rear Panel (CR-20)	1
27	0J05393A	Side Chassis R	1
28	0B08515A	Insu-Lock	18
29	0B81771A	Voltage Selector (CR-2 (Other & Saudi Arabia))	1
30	0B60503A	Voltage Selector P.C.B. (CR-2 (Other & Saudi Arabia))	1
L01	0E00868A	BT3x8 @ Binding	10
L02	0E03212A	BT2.6x6 @ Binding with Toothed Lock Washer	3
L03	0E03433A	BT3x6 @ Binding (Black Chromate)	6
L04	0E00857A	BT3x6 @ Binding	2
L05	0E00921A	BT3x8 @ Binding (Black Chromate)	1
L06	0E00985A	M3x6 @ Binding (Black Chromate) (CR-2 (Australia), CR-2A, CR-2E & CR-20)	2
	0E00985A	M3x6 @ Binding (Black Chromate) (CR-2 (Other & Saudi Arabia))	3
L07	0J05422A	Hole Plug	2
L08	0E03432A	BT3x6 @ Tapping (Black Chromate)	7
L09	0E03438A	ST4x6 @ Binding	2
L10	0E00859A	BT2.6x6 @ Binding	1
L11	0E03437A	FT2.5x3.5 @ Pan (Black Chromate)	2
L12	0E03375A	Nut Hex. M9	1
L13	0E03376A	Washer 9mm	1
L14	0E03382A	Nut Hex. M7	2
L15	0E03383A	Washer 7mm	2
L16	0F00846A	BT3x8 @ Pan	2
-	0M05089A	Fuse Caution Label (CR-2A)	1

7.2. Chassis Ass'y (A01)

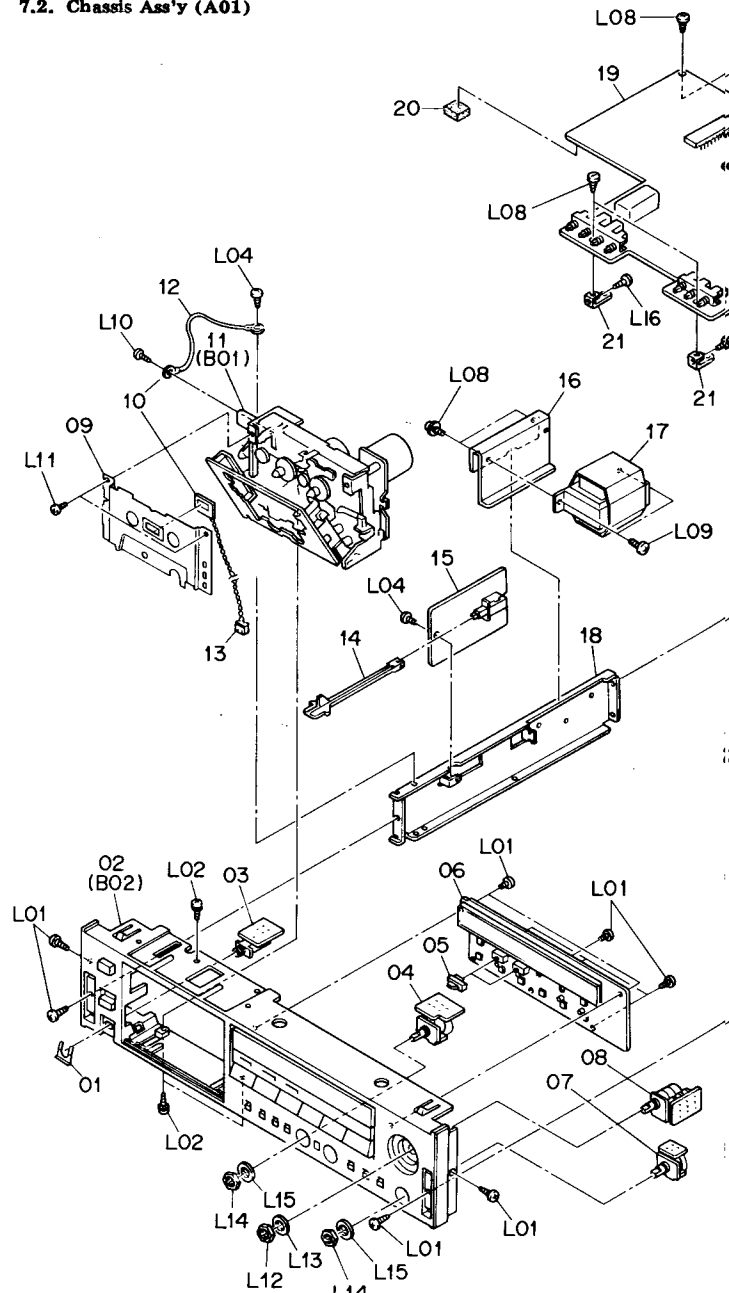


Fig. 7.2

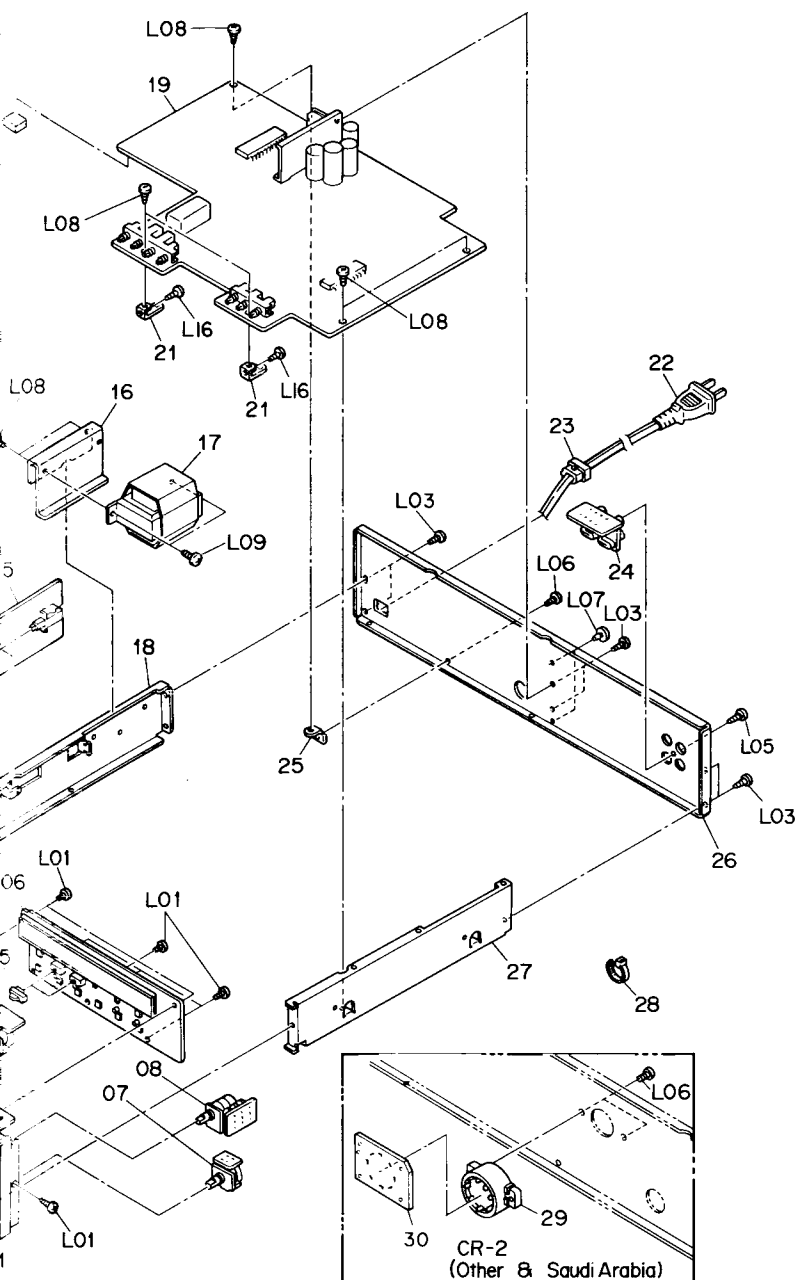


Fig. 7.2

7.3. Bottom Cover Ass'y (A02)

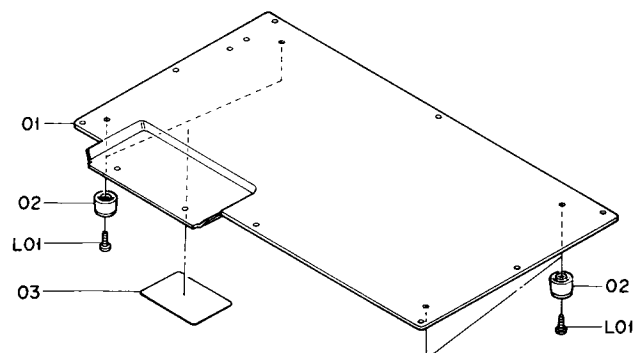


Fig. 7.3

Schematic Ref. No.	Part No.	Description	Qty
7.3. Bottom Cover Ass'y			
A02	JA04319A	Bottom Cover Ass'y (CR-2 & CR-2E)	1
	JA04329A	Bottom Cover Ass'y (CR-2A)	1
	JA04340A	Bottom Cover Ass'y (CR-20) Serial No.: A32501001 -	1
01	OJ05401A	Bottom Cover	1
02	OJ05420A	Leg N (CR-2, CR-2A & CR-2E)	4
	HA05357A	Leg Ass'y (CR-20)	4
03	OM04377B	Caution Label (CR-2A)	1
L01	OE00888A	BT3x12 @ Binding	4
-	OJ05461A	Leg Felt N (CR-2, CR-2A & CR-2E)	4

7.4. Mechanism Ass'y (B01)

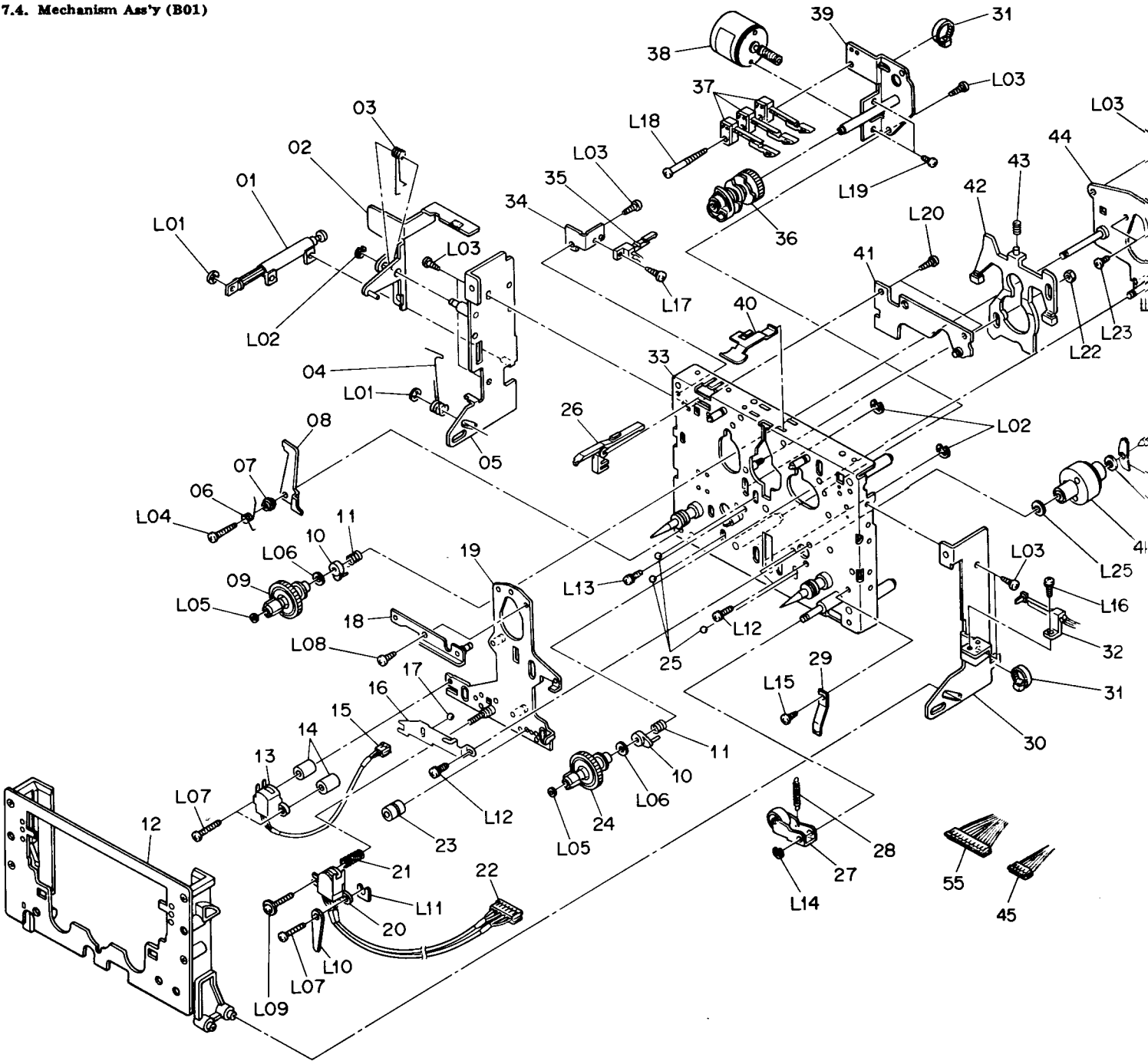
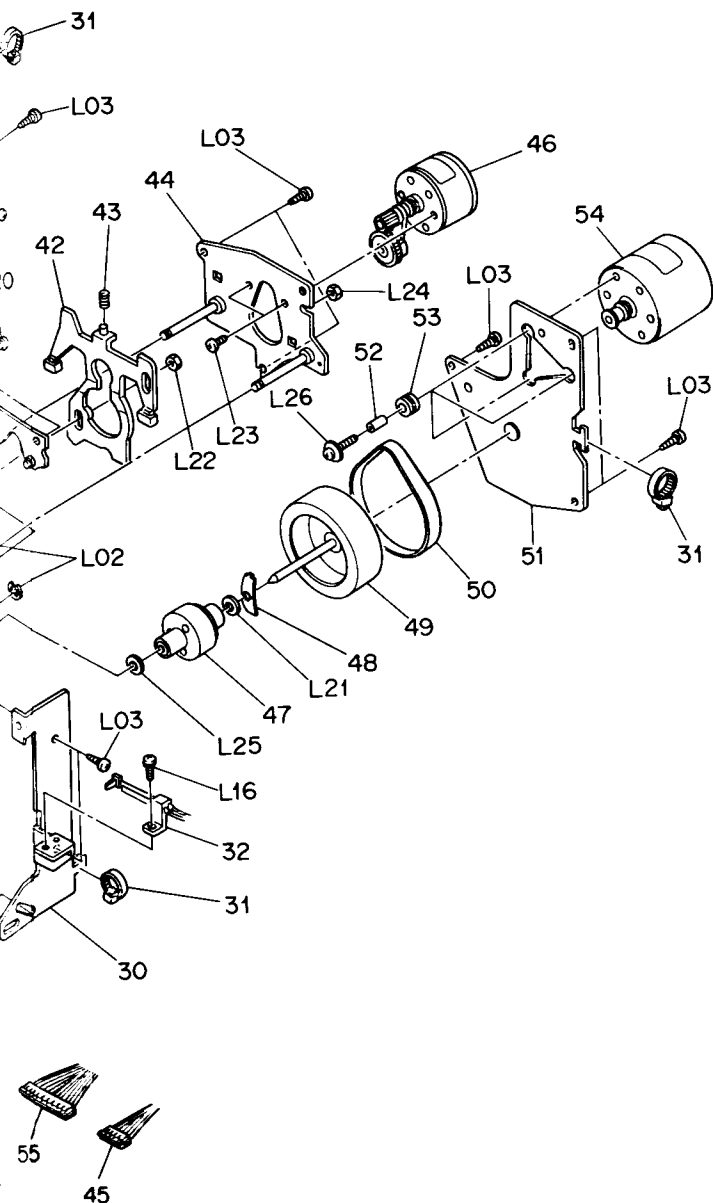


FIG. 7.4



Schematic Ref. No.	Part No.	Description	Qty
7.4. Mechanism Ass'y (B01)			
B01	CA08886A	Mechanism Ass'y Serial No.: A32501001 -	
01	CA80006A	Damper Ass'y	1
02	OC80021A	Eject Lever	1
03	OC82720A	Eject Lever Spring	1
04	OC80019B	Eject Spring	1
05	OC80018B	Cassette Case Holder L	1
06	OC80013A	Lock Lever Spring	1
07	OC80014A	Lock Lever Collar	1
08	OC82719A	Lock Lever B	1
09	CA80725A	Take-up Reel Hub Ass'y	1
10	OC80612A	Spring Holder	2
11	OC80613A	Reel Hub Spring	2
12	CA80001A	Cassette Case Ass'y	1
13	OG01365A	Erase Head E2D	1
14	OC80044A	Erase Head Collar	2
15	OC82704A	2P Connector for Erase Head	1
16	OC82710A	Head Base Hold Plate	1
17	OC80004A	Steel Ball 3mm	1
18	OC80005A	Reinforce Plate	1
19	OC82697A	Head Base B	1
20	OG01371A	Record/Playback Head 2G	1
21	OC82703A	Azimuth Adjust Spring	1
22	OC82705A	6P Connector for R/P Head	1
23	OC80045A	Record/Playback Head Collar	1
24	CA80726A	Supply Reel Hub Ass'y	1
25	OC80007A	Steel Ball 2mm	3
26	OC80017B	Record Protector Lever	1
27	CA80005A	Pressure Roller Ass'y	1
28	OC80008A	Pressure Roller Spring	1
29	OC80009A	Cassette Case Spring	1
30	OC80010D	Cassette Case Holder R	1
31	OC80037A	Insu-Lock	4
32	OC80012A	Eject Sensor Switch	1
33	OC82721A	Mechanism Chassis B	1
34	OC80025A	Record Protector Holder	1
35	OC80024A	Record Protector Switch	1
36	OC80026A	Cam	1
37	OC80027A	Mode Switch	3
38	CA80007A	Control Motor Ass'y	1
39	OC80028A	Control Motor Holder	1
40	OC82709A	Cassette Holder Spring	1
41	CA80011A	Shut-off P.C.B. Ass'y	1
42	CA80204A	Brake Ass'y B	1
43	OC80628A	Brake Spring	1
44	OC82722A	Reel Motor Holder B	1
45	OC82707A	5P Connector	1
46	CA80728A	Reel Motor Ass'y	1
47	OC80031A	Capstan Flange	1
48	OC80029A	Back Tension Spring	1
49	OC80033A	Flywheel	1
50	OC80034A	Capstan Belt	1
51	CA80009A	Flywheel Holder Ass'y	1
52	OC80035A	Sleeve	3
53	OC80036A	Floating Rubber	3
54	CA80010A	Capstan Motor Ass'y	1
55	OC82706A	9P Connector	1
L01	OE03052A	CS Stopper 2.4mm	2
L02	OE00181A	E-Ring 3mm	3
L03	OE03042A	FT2.5x5 @Pan	11
L04	OE03043A	FT2.5x10 @Pan	1
L05	OE03049A	Washer 1.8x3.2x0.5	2
L06	OE03226A	Washer 2.1x4.5x0.1	2
L07	OE03038A	M2x12 @Binding	3
L08	OE03040A	FT2.5x3.5 @Pan	1
L09	OE03436A	TP2x6	1
L10	OE03053A	Wire Holder	1
L11	OC80038A	Shim 0.06T	1
	OC80039A	Shim 0.1T	1
	OC80048A	Shim 0.03T	1
L12	OE03046A	M2.6x6 @Pan (2A)	3
L13	OE03036A	M2x4 @Pan (2A)	1
L14	OE00222A	E-Ring 2mm	1
L15	OE03035A	M2x3.2 @Truss	1
L16	OE03037A	M2x5 @Pan (2A)	1
L17	OE03048A	FT2.6x6 @Pan	1
L18	OE03044A	FT2.5x20 @Pan	1
L19	OE00691A	M2x3 @Pan	2
L20	OE03041A	FT2.5x4 @Pan	2
L21	OE03245A	Plastic Washer 1.3x3.3x0.3	1
L22	OE03237A	Nut Hex. M2.6	1
L23	OE03045A	M2.6x3 @Binding	2
L24	OE00694A	Nut Hex. M2	1
L25	OE03051A	Washer 2.5x7x0.8	1
L26	OE03047A	M2.6x9 @Pan	3

7.5 Front Escutcheon Ass'y (B02)

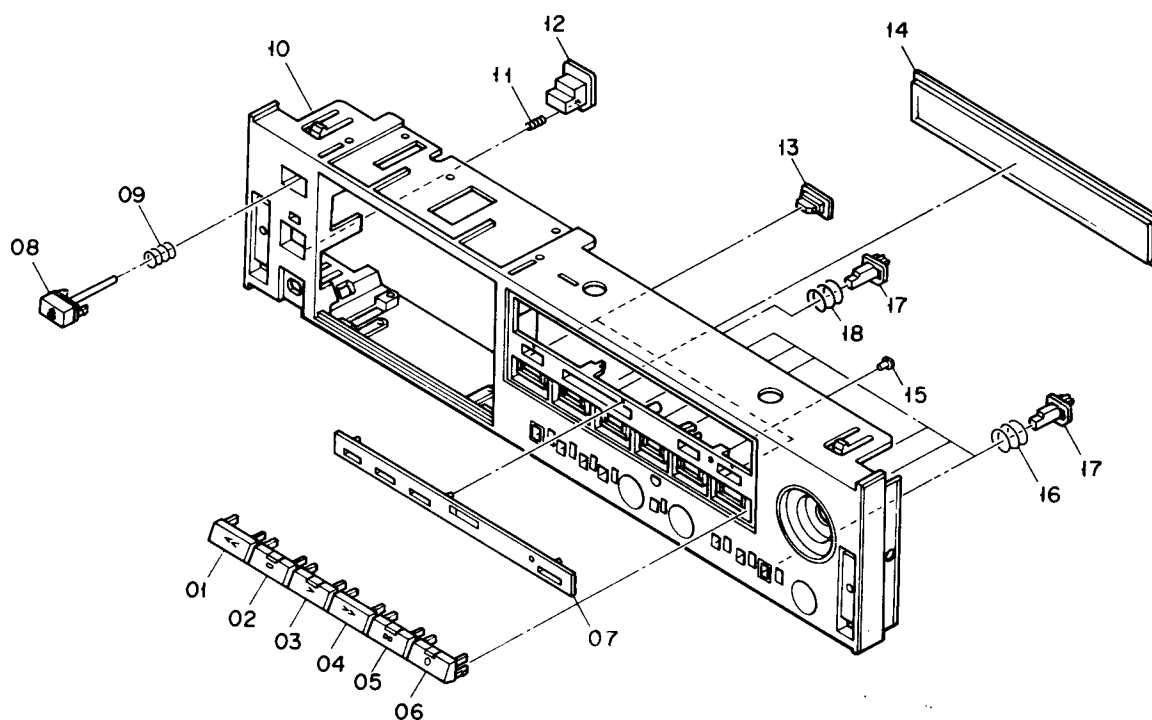


Fig. 7.5

Schematic Ref. No.	Part No.	Description	Q'ty
7.5. Front Escutcheon Ass'y (B02)			
B02	HA05308A	Front Escutcheon Ass'y Serial No.: A32501001 -	1
01	OH05126A	Rewind Button	1
02	HA05359A	Stop Button Ass'y	1
03	HA05343A	Play Button Ass'y	1
04	OH05129A	F.F. Button	1
05	HA05361A	Pause Button Ass'y	1
06	HA05360A	Rec. Button Ass'y	1
07	OH05100B	Function Plate	1
08	HA05344A	Eject Button Ass'y	1
09	OJ05404A	Eject Spring	1
10	OH05122B	Front Escutcheon	1
11	OJ05405A	Power Switch Spring	1
12	OH05125B	Power Switch Knob	1
13	OH05094A	Function Button	2
14	OH05101A	Display Lens	1
15	OH05103A	LED Lens B	1
16	OJ05406A	Push Switch Spring	6
17	OH05097A	Push Button	7
18	OJ05452B	EX Switch Spring	1
—	OJ05458B	LED Lens Adhesive Tape	2
—	OJ05459A	F. Plate Adhesive Tape	2

8. MOUNTING DIAGRAMS AND PARTS LIST

- 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. Following transistors are interchangeable with each other.
 a. 2SA733, 2SA608SP, 2SA1048, 2SA1175
 b. 2SC945, 2SC536SP, 2SC2458, 2SC2785
 4. Abbreviation for part name:
 TR — Transistor, SiD — Silicon Diode, ZD — Zener Diode
 RK — Carbon Resistor, RM — Metal Film Resistor, RF — Fail Safe Type Resistor
 CE — Electrolytic Capacitor, CML — Mylar Capacitor, CC — Ceramic Capacitor, CPP — PP Capacitor,
 CMM — Metalized Mylar Capacitor, CSP — Polystyrene Capacitor, C — Mica Capacitor

8.1. Fuse P.C.B. Ass'y

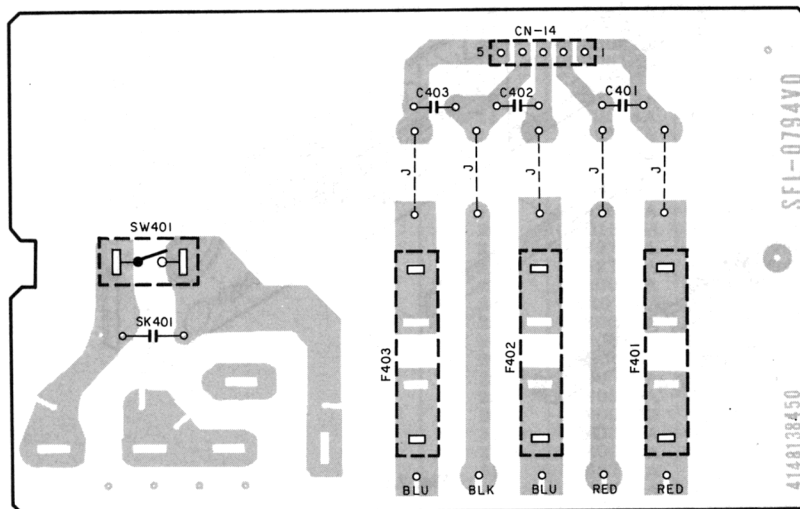


Fig. 8.1

8.2. Pin Jack P.C.B. Ass'y

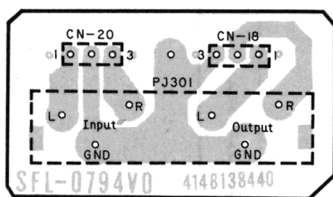


Fig. 8.2

8.3. Input Volume P.C.B. Ass'y

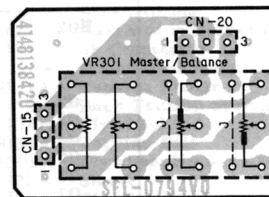


Fig. 8.3

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.1. Fuse P.C.B. Ass'y			SK401	OB41826A	CC 4700P 250V (CR-20)	8.2. Pin Jack P.C.B. Ass'y		
C401,402 C403 F401 F401 F402,403 F402,403 SK401	BA06964A	Fuse P.C.B. Ass'y (CR-2 & CR-2E)	CN14 SW401	OB83161A	5P Connector	PJ301 CN20	BA06970A	Pin Jack P.C.B. Ass'y
	BA06963A	Fuse P.C.B. Ass'y (CR-2A)		OB71006A	Power Switch SDL1P (1) (6)		OB60497A	Pin Jack P.C.B.
	BA06965A	Fuse P.C.B. Ass'y (CR-20)		OB08349B	Fuse ChP		OB81755A	4P Pin Jack
	OB60502A	Fuse P.C.B.		OM04131B	Fuse Label T1A 250Vx2 (CR-2 & CR-2E) (1)	8.3. Input Volume P.C.B. Ass'y		
	OB09292A	CC 0.1μ 50V Z		OM05082A	Fuse Label T800mA 250V (CR-2 & CR-2E) (1)	VR301	OB60966A	Input Volume P.C.B. Ass'y
	OB09292A	CC 0.1μ 50V Z		OB81776A	Contact Pin (CR-2 & CR-2E) (5)		OB60498A	Input Volume P.C.B
	OB90287A	Fuse T800mA (CR-2 & CR-2E)					OB30077A	Volume 100Kx2
	OB90286A	Fuse 1.0A (CR-2A)					OJ05419A	Volume Ground Plate (1)
	OB90290A	Fuse 1A (CR-20)					OV10050C	Wire 1007 26 Twisted 52 BLK C (1)
	OB90289A	Fuse T1A (CR-2 & CR-2E)						
	OB90285A	Fuse 1.6A (CR-2A)						
	OB90291A	Fuse 1.6A (CR-20)						
	OB41829A	CC 4700P 400V (CR-2, CR-2A & CR-2E))						

8.4. Output Volume P.C.B. Ass'y

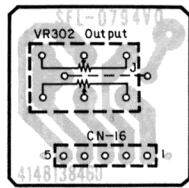


Fig. 8.4

8.5. Headphone P.C.B. Ass'y

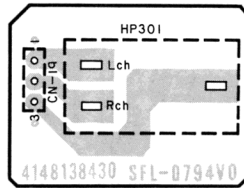


Fig. 8.5

8.6. Bias Tune Volume P.C.B. Ass'y

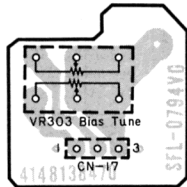


Fig. 8.6

8.7. Shut-off P.C.B. Ass'y

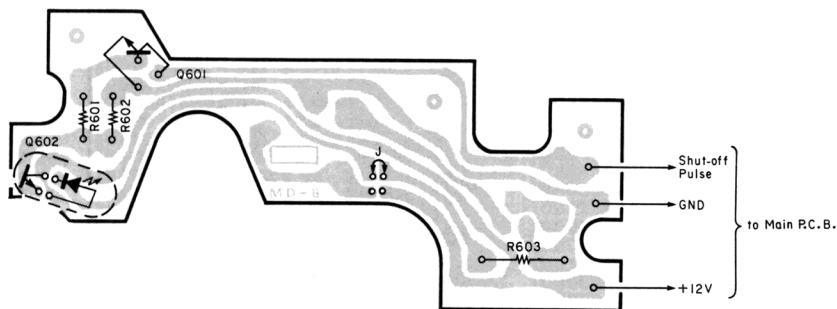
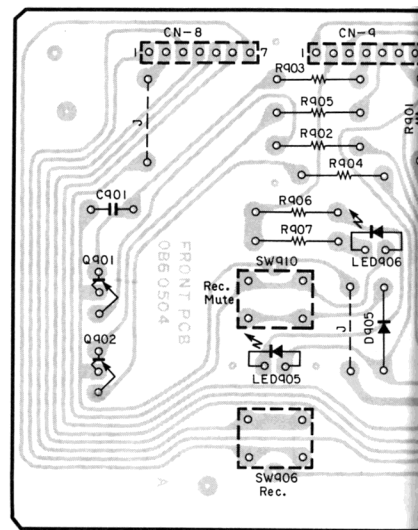


Fig. 8.7

8.8. Control P.C.B. Ass'y



Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.4. Output Volume P.C.B. Ass'y			8.6. Bias Tune Volume P.C.B. Ass'y		
VR302	BA06967A	Output Volume P.C.B. Ass'y	VR303	BA06968A	Bias Tune Volume P.C.B. Ass'y
	0B60499A	Output Volume P.C.B.		0B60500A	Bias Tune Volume P.C.B.
	0B30078A	Volume 10KAx2		0B30079A	Volume 100KAx2
	0J05419A	Volume Ground Plate (1)		0J05419A	Volume Ground Plate (1)
	0V10050C	Wire 1007 26 Twisted 52 BLK C (1)		0V10050C	Wire 1007 26 Twisted 52 BLK C (1)
8.5. Headphone P.C.B. Ass'y			8.7. Shut-off P.C.B. Ass'y		
HP301	BA06969A	Headphone P.C.B. Ass'y	Q601 Q602 R601 R602 R603	CA80011A	Shut-off P.C.B. Ass'y
	0B60501A	Headphone P.C.B.		0C80047A	Shut-off P.C.B. TR 2SC2812
	0B81757A	Headphone Jack		0B06388A	Photo Reflector NJL5141
				0B06389A	RK 680
				0B09840A	RK 15K
				0B09841A	RM 750
				0C81330A	OV13130N
				0C81334A	OV10115N
				0C81335A	

Schen
Ref.

8.8. C

IC901
Q901,3
D901,3
D903,3
D905
LED90

LED90
LED90
LED90
LED90
R901
R902
R903
R904
R905
R906
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R917,3
R919,3
R921,3
C901

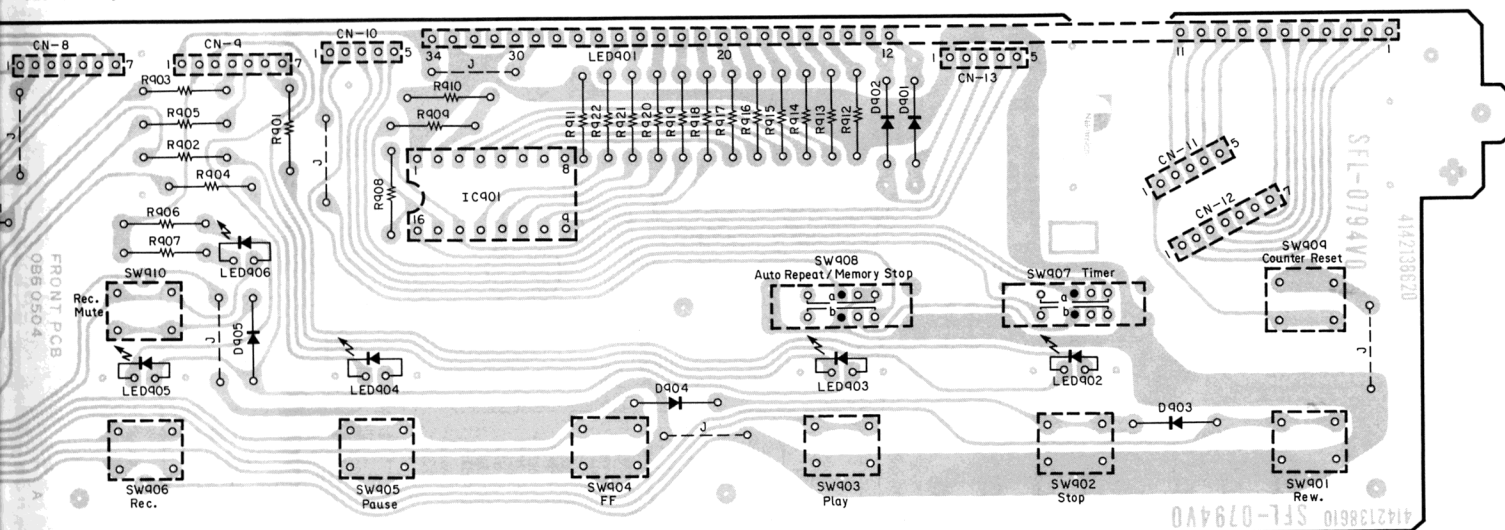


Fig. 8.8

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.8. Control P.C.B. Ass'y			SW901,902	0B70043A	Tact Switch SKHHPM
			SW903,904	0B70043A	Tact Switch SKHHPM
			SW905,906	0B70043A	Tact Switch SKHHPM
			SW907,908	0B07437A	Slide Switch ESD-14150
			SW909,910	0B70043A	Tact Switch SKHHPM
			CN8	0B83155A	7P Connector
			CN9	0B83156A	7P Connector
			CN10	0B83157A	5P Connector
			CN11	0B83159A	5P Connector
			CN12	0B83160A	7P Connector
			CN13	0B83158A	5P Connector
				0J05416A	LED Reflector (4)
IC901	BA06961A	Control P.C.B. Ass'y			
Q901,902	0B60504A	Control P.C.B.			
D901,902	0B06369A	IC TA7612AP			
D903,904	0B06013A	TR 2SA733 (P,Q)			
D905	0B12584A	SiD 1N4148			
LED901	0B12584A	SiD 1N4148			
	0B12584A	SiD 1N4148			
	0B12575A	Display Unit			
LED902,903	0B12578A	SL-7663-03			
LED904	0B12578A	LED SLR-34PC4F			
LED905	0B12577A	LED SLR-34PC4F			
LED906	0B12579A	LED SLR-320DC4F			
R901	0B05578A	RK 180 1/4W J			
R902	0B09797A	RK 120 1/4W J			
R903	0B01846A	RK 4.7K 1/4W J			
R904	0B09797A	RK 120 1/4W J			
R905	0B01846A	RK 4.7K 1/4W J			
R906	0B20416A	RK 110 1/4W J			
R907	0B01706A	RK 47 1/4W J			
R908	0B09314A	RK 5.1K 1/4W J			
R909	0B01857A	RK 1K 1/4W J			
R910	0B20430A	RK 160 1/4W J			
R911	0B01888A	RK 10K 1/4W J			
R912	0B05795A	RK 150 1/4W J			
R913,914	0B01679A	RK 100 1/4W J			
R915,916	0B01679A	RK 100 1/4W J			
R917,918	0B01679A	RK 100 1/4W J			
R919,920	0B01679A	RK 100 1/4W J			
R921,922	0B01679A	RK 100 1/4W J			
C901	0B05557A	CML 0.015μ 50V J			

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

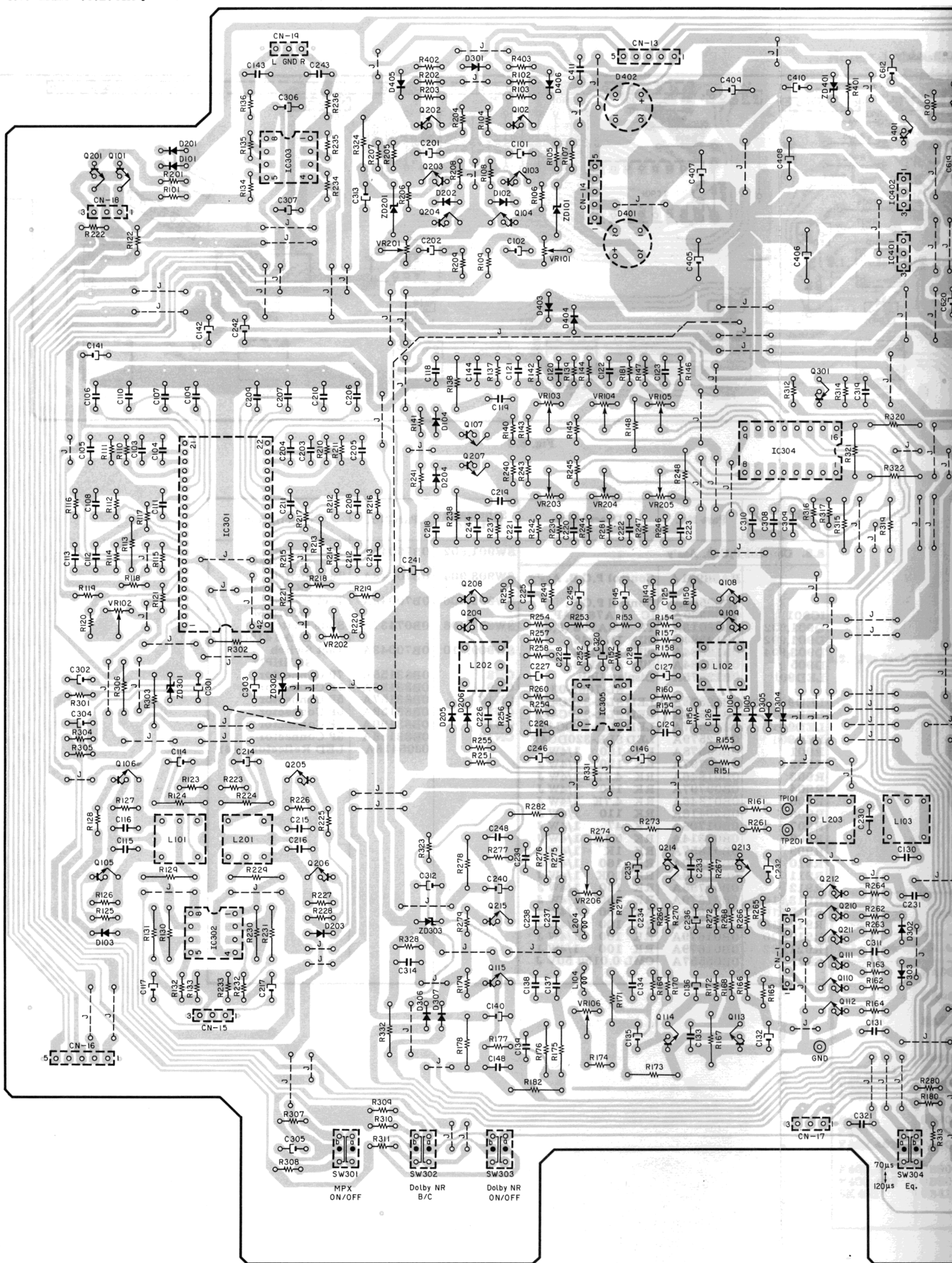


Fig. 8.9

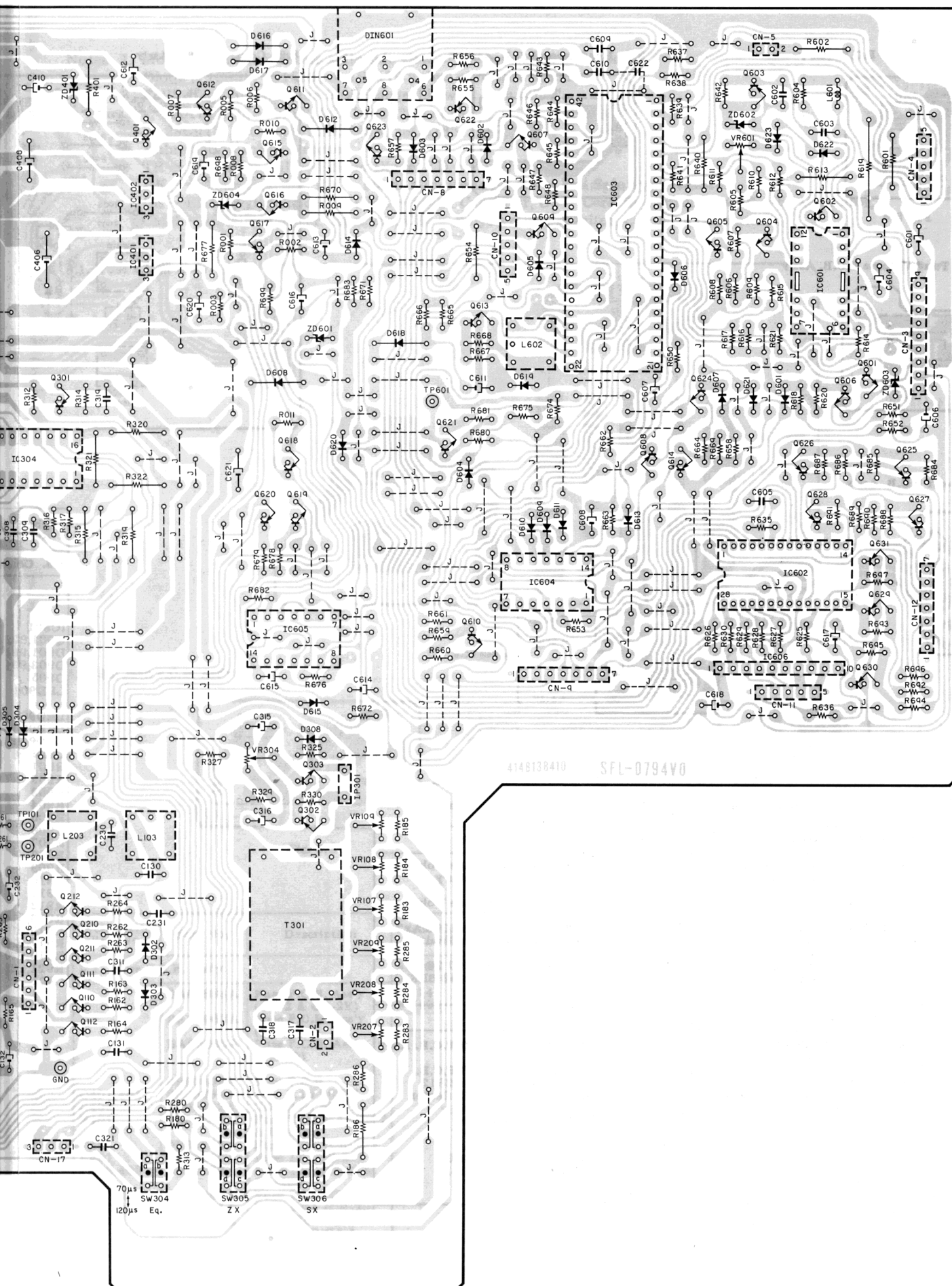


Fig. 8.9

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.
8.9. Main P.C.B. Assy			— Dolby NR —						
	BA06947A	Main P.C.B. Assy	IC301	OB11363A	IC CX20188	R230	OB09424A	RM 4.75K 1/4W F	L103
	— PB Eq. Amp. —		ZD301,302	OB12168A	ZD 10V	R231	OB09203A	RM 10K 1/4W F	L202
Q110,111	OB06142A	TR 2SC2240 (BL)	VR102	OB32126A	RD10JS-T1B2	R232	OB09653A	RK 100 1/6W J	L203
Q112	OB01872A	TR 2SC945L (P,Q)	VR202	OB32126A	Semi VR 5K	C114	OB09332A	CE 2.2μ 50V (LN)	R149
Q113,114	OB06142A	TR 2SC2240 (BL)	R110	OB09673A	Semi VR 5K	C115	OB05687A	CML 1200P 50V J	R150
Q115	OB01872A	TR 2SC945L (P,Q)	R111	OB09700A	RK 680 1/6W J	C116	OB09189A	CML 2700P 50V J	R151
Q210,211	OB06142A	TR 2SC2240 (BL)	R112	OB09698A	RK 9.1K 1/6W J	C117	OB09223A	CE 1μ 50V (LN)	R152
Q212	OB01872A	TR 2SC945L (P,Q)	R113	OB22380A	RK 7.5K 1/6W J	C214	OB09332A	CE 2.2μ 50V (LN)	R153
Q213,214	OB06142A	TR 2SC2240 (BL)	R114	OB22201A	RM 562 1/6W F	C215	OB05687A	CML 1200P 50V J	R154
Q215	OB01872A	TR 2SC945L (P,Q)	R115	OB22294A	RM 3.83K 1/6W F	C216	OB09189A	CML 2700P 50V J	R155
ZD303	OB12168A	ZD 10V	R116	OB22285A	RM 3.24K 1/6W F	C217	OB09223A	CE 1μ 50V (LN)	R156
D302,303	OB06398A	SID 1SS176	R117	OB09749A	RK 1M 1/6W J		— Rec. Level —		R157
D306,307	OB06398A	SID 1SS176	R118	OB22716A	RM 9.09K 1/4W F	IC304	OB11027A	IC TC9145P	R158
L104	OB51264A	Inductor 36mH	R119	OB09707A	RK 18K 1/6W J	Q107	OB01872A	TR 2SC945L (P,Q)	R159
L204	OB51264A	Inductor 36mH	R120	OB09681A	RK 1.5K 1/6W J	Q207	OB01872A	TR 2SC945L (P,Q)	R160
VR106	OB32125A	Semi VR 2K	R121	OB22229A	RM 1.00K 1/6W F	Q301	OB06013A	TR 2SA733 (P,Q)	R161
VR206	OB32125A	Semi VR 2K	R210	OB09673A	RK 680 1/6W J	D104	OB06398A	SID 1SS176	R249
R162,163	OB09695A	RK 5.6K 1/6W J	R211	OB09700A	RK 9.1K 1/6W J	D204	OB06398A	SID 1SS176	R250
R164	OB09695A	RK 5.6K 1/6W J	R212	OB09698A	RK 7.5K 1/6W J	VR103,104	OB32127A	Semi VR 10K	R251
R165	OB09629A	RK 10 1/6W J	R213	OB22380A	RM 22.1K 1/6W F	VR105	OB32128A	Semi VR 20K	R252
R166	OB09741A	RK 470K 1/6W J	R214	OB22201A	RM 562 1/6W F	VR203,204	OB32127A	Semi VR 10K	R253
R167	OB09330A	RK 100K 1/4W J	R215	OB22294A	RM 3.83K 1/6W F	VR205	OB32128A	Semi VR 20K	R254
R168	OB09651A	RK 82 1/6W J	R216	OB22285A	RM 3.24K 1/6W F	R137	OB09705A	RK 15K 1/6W J	R255
R169	OB09711A	RK 27K 1/6W J	R217	OB09749A	RK 1M 1/6W J	R138	OB09577A	RM 7.15K 1/4W F	R256
R170	OB09731A	RK 180K 1/6W J	R218	OB22716A	RM 9.09K 1/4W F	R139	OB09689A	RK 3.3K 1/6W J	R257
R171	OB09432A	RM 8.25K 1/4W F	R219	OB09707A	RK 18K 1/6W J	R140	OB09749A	RK 1M 1/6W J	R258
R172	OB09685A	RK 2.2K 1/6W J	R220	OB09681A	RK 1.5K 1/6W J	R141	OB09697A	RK 6.8K 1/6W J	R259
R173	OB09330A	RK 100K 1/4W J	R221	OB22229A	RM 1.00K 1/6W F	R142	OB09707A	RK 18K 1/6W J	R260
R174	OB09655A	RK 120 1/6W J	R301	OB09709A	RK 22K 1/6W J	R143	OB09687A	RK 2.7K 1/6W J	R261
R175	OB22758A	RM 14.0K 1/4W F	R302	OB09466A	RM 130K 1/4W F	R144	OB09701A	RK 10K 1/6W J	R262
R176	OB09534A	RM 12.7K 1/4W F	R303	OB24146A	RF 62 1/4W J	R145	OB09687A	RK 2.7K 1/6W J	R263
R177	OB09749A	RK 1M 1/6W J	R304,305	OB09701A	RK 10K 1/6W J	R146	OB09693A	RK 4.7K 1/6W J	R264
R178	OB22416A	RM 44.2K 1/6W F	R306	OB24146A	RF 62 1/4W J	R147	OB09705A	RK 15K 1/6W J	R265
R179	OB09703A	RK 12K 1/6W J	C103	OB05681A	CML 0.01μ 50V J	R148	OB01846A	RK 4.7K 1/4W J	R266
R182	OB22416A	RM 44.2K 1/6W F	C104	OB41143A	CPP 5600P 100V G	R148	OB09677A	RK 1K 1/6W J	R267
R262,263	OB09695A	RK 5.6K 1/6W J	C105	OB05813A	CML 0.056μ 50V J	R237	OB09705A	RK 15K 1/6W J	R268
R264	OB09695A	RK 5.6K 1/6W J	C106	OB05682A	CML 0.068μ 50V J	R238	OB09577A	RM 7.15K 1/4W F	R269
R265	OB09629A	RK 10 1/6W J	C107	OB09872A	CMM 0.22μ 50V J	R239	OB09689A	RK 3.3K 1/6W J	R270
R266	OB09741A	RK 470K 1/6W J	C108	OB05557A	CML 0.015μ 50V J	R240	OB09749A	RK 1M 1/6W J	R271
R267	OB09330A	RK 100K 1/4W J	C109	OB09870A	CMM 0.15μ 50V J	R241	OB09697A	RK 6.8K 1/6W J	R272
R268	OB09651A	RK 82 1/6W J	C110	OB09876A	CMM 0.47μ 50V J	R242	OB09707A	RK 18K 1/6W J	R273
R269	OB09711A	RK 27K 1/6W J	C111	OB41139A	CPP 3900P 100V G	R243	OB09687A	RK 2.7K 1/6W J	R274
R270	OB09731A	RK 180K 1/6W J	C112,113	OB41133A	CPP 2200P 100V G	R244	OB09701A	RK 10K 1/6W J	R275
R271	OB09432A	RM 8.25K 1/4W F	C141,142	OB01674A	CE 10μ 25V	R245	OB09687A	RK 2.7K 1/6W J	R276
R272	OB09685A	RK 2.2K 1/6W J	C203	OB05681A	CML 0.01μ 50V J	R246	OB09693A	RK 4.7K 1/6W J	R277
R273	OB09330A	RK 100K 1/4W J	C204	OB41143A	CPP 5600P 100V G	R247	OB09705A	RK 15K 1/6W J	R278
R274	OB09655A	RK 120 1/6W J	C205	OB05813A	CML 0.056μ 50V J	R248	OB01846A	RK 4.7K 1/4W J	R279
R275	OB22758A	RM 14.0K 1/4W F	C206	OB05682A	CML 0.068μ 50V J	R281	OB09677A	RK 1K 1/6W J	R280
R276	OB09534A	RM 12.7K 1/4W F	C207	OB09872A	CMM 0.22μ 50V J	R312	OB09725A	RK 100K 1/6W J	R281
R277	OB09749A	RK 1M 1/6W J	C208	OB05557A	CML 0.015μ 50V J	R314	OB09725A	RK 100K 1/6W J	R282
R278	OB22416A	RM 44.2K 1/6W F	C209	OB09870A	CMM 0.15μ 50V J	R315	OB05625A	RK 220K 1/4W J	R283
R279	OB09703A	RK 12K 1/6W J	C210	OB09876A	CMM 0.47μ 50V J	R316,317	OB09733A	RK 220K 1/6W J	R284
R282	OB22416A	RM 44.2K 1/6W F	C211	OB41139A	CPP 3900P 100V G	R319	OB05626A	RK 150K 1/4W J	R285
R323	OB09677A	RK 1K 1/6W J	C212,213	OB41133A	CPP 2200P 100V G	R320	OB05622A	RK 2.2K 1/4W J	R286
R328	OB09725A	RK 100K 1/6W J	C241,242	OB01674A	CE 10μ 25V	R321	OB01681A	RK 3.3K 1/4W J	R287
R332	OB01889A	RK 100K 1/4W J	C301	OB01391A	CE 220μ 25V	R322	OB05622A	RK 2.2K 1/4W J	R288
C131	OB09282A	CC 100P 50V K	C302	OB01402A	CE 4.7μ 25V	C118	OB09783A	CPP 820P 100V J	R289
C132	OB09137A	CE 22μ 25V	C303	OB01391A	CE 220μ 25V	C119	OB05814A	CML 8200P 50V J	R290
C133	OB09283A	CC 220P 50V K	C304	OB01409A	CE 47μ 25V	C120	OB09189A	CML 2700P 50V J	R291
C134	OB05832A	CML 0.018μ 50V J		— Input Amp. —		C121	OB05550A	CML 1000P 50V J	R292
C135	OB01863A	CE 3.3μ 50V	IC302	OB06146A	IC NJM4558DD	C122	OB05814A	CML 8200P 50V J	R293
C136	OB01403A	CE 47μ 16V	Q105,106	OB01872A	TR 2SC945L(P,Q)	C123	OB05659A	CML 5600P 50V J	R294
C137	OB41002A	CPP 390P 100V J	Q205,206	OB01872A	TR 2SC945L(P,Q)	C144	OB09323A	CPP 560P 100V J	R295
C138	OB05550A	CML 1000P 50V J	D103	OB06398A	SID 1SS176	C218	OB09783A	CPP 820P 100V J	R296
C139	OB05530A	CML 6800P 50V J	D203	OB06398A	SID 1SS176	C219	OB05814A	CML 8200P 50V J	R297
C140	OB09332A	CE 2.2μ 50V (LN)	L101	OB51262A	L-C Block Blu (MPX)	C220	OB09189A	CML 2700P 50V J	R298
C148	OB09270A	CPP 470P 100V J	L201	OB51262A	L-C Block Blu (MPX)	C221	OB05550A	CML 1000P 50V J	R299
C231	OB09282A	CC 100P 50V K	R123	OB09709A	RK 22K 1/6W J	C222	OB05814A	CML 8200P 50V J	R300
C232	OB09137A	CE 22μ 25V	R124	OB22551A	RM 7.68K 1/4W F	C223	OB05659A	CML 5600P 50V J	R301
C233	OB09283A	CC 220P 50V K	R125	OB09689A	RK 3.3K 1/6W J	C244	OB09323A	CPP 560P 100V J	R302
C234	OB05832A	CML 0.018μ 50V J	R126,127	OB09749A	RK 1M 1/6W J	C308,309	OB05681A	CML 0.01μ 50V J	R303
C235	OB01863A	CE 3.3μ 50V	R128	OB09689A	RK 3.3K 1/6W J	C310	OB05681A	CML 0.01μ 50V J	R304
C236	OB01403A	CE 47μ 16V	R129	OB09421A	RM 2.67K 1/4W F	C319	OB05550A	CML 1000P 50V J	R305
C237	OB41002A	CPP 390P 100V J	R130	OB09424A	RM 4.75K 1/4W F		— Rec. Amp. —		R306
C238	OB05550A	CML 1000P 50V J	R131	OB09203A	RM 10K 1/4W F	IC305	OB06387A	IC NJM2043DD	R307
C239	OB05530A	CML 6800P 50V J	R132	OB09653A	RK 100 1/6W J	Q108	OB06299A	TR 2SC2878	R308
C240	OB09332A	CE 2.2μ 50V (LN)	R133	OB09725A	RK 100K 1/6W J	Q109	OB01872A	TR 2SC945L (P,Q)	R309
C248	OB09270A	CPP 470P 100V J	R223	OB09709A	RK 22K 1/6W J	Q208	OB06299A	TR 2SC2878	R310
C311	OB09282A	CC 100P 50V K	R224	OB22551A	RM 7.68K 1/4W F	Q209	OB01872A	TR 2SC945L (P,Q)	R311
C312	OB01400A	CE 100μ 16V	R225	OB09689A	RK 3.3K 1/6W J	D105,106	OB06398A	SID 1SS176	R312
C314	OB01780A	CML 0.1μ 50V J	R226,227	OB09749A	RK 1M 1/6W J	D205,206	OB06398A	SID 1SS176	R313
CN1	OB81763A	6P-T Post	R228	OB09689A	RK 3.3K 1/6W J	D304,305	OB06398A	SID 1SS176	
			R229	OB09421A	RM 2.67K 1/4W F	L102	OB51259A	Trap Coil 10.5mH	

Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
1363A	IC CX20188	R230	OB09424A	RM 4.75K 1/4W F	L103	OB51257A	L-C Block TF10		— Headphone Amp. —	
2168A	ZD 10V	R231	OB09203A	RM 10K 1/4W F			42-1274			
	RD10JS-T1B2	R232	OB09653A	RK 100 1/6W J	L202	OB51259A	Trap Coil 10.5mH	IC303	OB06370A	IC 4556D
2126A	Semi VR 5K	R233	OB09725A	RK 100K 1/6W J	L203	OB51257A	L-C Block TF10	R134	OB09717A	RK 47K 1/6W
2126A	Semi VR 5K	C114	OB09332A	CE 2.2μ 50V (LN)			42-1274	R135	OB09701A	RK 10K 1/6W
9673A	RK 680 1/6W J	C115	OB05687A	CML 1200P 50V J	R149	OB09711A	RK 27K 1/6W J	R136	OB05579A	RK 22 1/4W
9700A	RK 9.1K 1/6W J	C116	OB09189A	CML 2700P 50V J	R150	OB09719A	RK 56K 1/6W J	R234	OB09717A	RK 47K 1/6W
9698A	RK 7.5K 1/6W J	C117	OB09223A	CE 1μ 50V (LN)	R151	OB09703A	RK 12K 1/6W J	R235	OB09701A	RK 10K 1/6W
2380A	RM 22.1K 1/6W F	C214	OB09332A	CE 2.2μ 50V (LN)	R152	OB09677A	RK 1K 1/6W J	R236	OB05579A	RK 22 1/4W
2201A	RM 562 1/6W F	C215	OB05687A	CML 1200P 50V J	R153	OB09741A	RK 470K 1/6W J	C143	OB05582A	CML 0.022μ 50V
2294A	RM 3.83K 1/6W F	C216	OB09189A	CML 2700P 50V J	R154	OB09671A	RK 560 1/6W J	C243	OB05582A	CML 0.022μ 50V
2285A	RM 3.24K 1/6W F	C217	OB09223A	CE 1μ 50V (LN)	R155	OB09705A	RK 15K 1/6W J	C306,307	OB01400A	CE 100μ 16V
9749A	RK 1M 1/6W J		— Rec. Level —		R156	OB09669A	RK 470 1/6W J			
2716A	RM 9.09K 1/4W F	IC304	OB11027A	IC TC9145P	R157	OB09691A	RK 3.9K 1/6W J	— Bias Osc. —		
9707A	RK 18K 1/6W J	Q107	OB01872A	TR 2SC945L (P,Q)	R158	OB09689A	RK 3.3K 1/6W J	IP301	OB11335A	IC Protector
9681A	RK 1.5K 1/6W J	Q207	OB01872A	TR 2SC945L (P,Q)	R159	OB09719A	RK 56K 1/6W J	Q302	OB06069A	ICP-N15-T104
2229A	RM 1.00K 1/6W F	Q301	OB06013A	TR 2SA733 (P,Q)	R160	OB09735A	RK 270K 1/6W J	Q303	OB06299A	TR 2SC2878
9673A	RK 680 1/6W J	D104	OB06398A	SID 1SS176	R249	OB09697A	RK 6.8K 1/6W J	D308	OB06398A	SID 1SS176
9700A	RK 9.1K 1/6W J	D204	OB06398A	SID 1SS176	R250	OB09711A	RK 27K 1/6W J	T301	OB51255A	Bias Osc. Unit
9698A	RK 7.5K 1/6W J	VR103,104	OB32127A	Semi VR 10K	R251	OB09703A	RK 12K 1/6W J	VR107,108	OB32128A	Semi VR 20KB
2380A	RM 22.1K 1/6W F	VR105	OB32128A	Semi VR 20K	R252	OB09677A	RK 1K 1/6W J	VR109	OB32128A	Semi VR 20KB
2201A	RM 562 1/6W F	VR203,204	OB32127A	Semi VR 10K	R253	OB09741A	RK 470K 1/6W J	VR207,208	OB32128A	Semi VR 20KB
2294A	RM 3.83K 1/6W F	VR205	OB32128A	Semi VR 20K	R254	OB09671A	RK 560 1/6W J	VR209	OB32128A	Semi VR 20KB
2285A	RM 3.24K 1/6W F		OB09705A	RK 15K 1/6W J	R255	OB09705A	RK 15K 1/6W J	VR304	OB32126A	Semi VR 5K
9749A	RK 1M 1/6W J	R138	OB09577A	RM 7.15K 1/4W F	R256	OB09669A	RK 470 1/6W J	R180	OB09701A	RK 10K 1/6W
2716A	RM 9.09K 1/4W F	R139	OB09689A	RK 3.3K 1/6W J	R257	OB09691A	RK 3.9K 1/6W J	R183	OB09653A	RK 100 1/6W
9707A	RK 18K 1/6W J	R140	OB09749A	RK 1M 1/6W J	R258	OB09689A	RK 3.3K 1/6W J	R184	OB09695A	RK 5.6K 1/6W
9681A	RK 1.5K 1/6W J	R141	OB09697A	RK 6.8K 1/6W J	R259	OB09719A	RK 56K 1/6W J	R185	OB09703A	RK 12K 1/6W
2229A	RM 1.00K 1/6W F	R142	OB09707A	RK 18K 1/6W J	R260	OB09735A	RK 270K 1/6W J	R186	OB09705A	RK 15K 1/6W
9709A	RK 22K 1/6W J	R143	OB09687A	RK 2.7K 1/6W J	R261	OB09697A	RK 6.8K 1/6W J	R280	OB09701A	RK 10K 1/6W
9466A	RM 130K 1/4W F	R144	OB09701A	RK 10K 1/6W J	R331	OB09663A	RK 270 1/6W J	R283	OB09653A	RK 100 1/6W
146A	RF 62 1/4W J	R145	OB09687A	RK 2.7K 1/6W J	C125	OB01804A	CML 3900P 50V J	R284	OB09695A	RK 5.6K 1/6W
9701A	RK 10K 1/6W J	R146	OB09693A	RK 4.7K 1/6W J	C126	OB05659A	CML 5600P 50V J	R285	OB09703A	RK 12K 1/6W
146A	RF 62 1/4W J	R147	OB09705A	RK 15K 1/6W J	C127	OB09218A	CE 47μ 16V (LN)	R286	OB09695A	RK 15K 1/6W
9681A	CML 0.01μ 50V J	R148	OB01846A	RK 4.7K 1/4W J	C128	OB05796A	CML 0.047μ 50V J	R325	OB09705A	RK 15K 1/6W
143A	CPP 5600P 100V G	R181	OB09677A	RK 1K 1/6W J	C129	OB09280A	CC 47P 50V J	R327	OB09705A	RK 15K 1/6W
813A	CML 0.056μ 50V J	R237	OB09705A	RK 15K 1/6W J	C130	OB01405A	CE 1μ 50V	R329	OB01683A	RK 15K 1/4W
9682A	CML 0.068μ 50V J	R238	OB09577A	RM 7.15K 1/4W F	C145	OB01412A	CE 10μ 16V	R330	OB09701A	RK 10K 1/6W
9872A	CMM 0.22μ 50V J	R239	OB09689A	RK 3.3K 1/6W J	C146	OB01804A	CML 3900P 50V J	C315	OB01674A	CE 10μ 25V
9557A	CML 0.015μ 50V J	R240	OB09749A	RK 1M 1/6W J	C226	OB05659A	CML 5600P 50V J	C316	OB01405A	CE 1μ 50V
870A	CMM 0.15μ 50V J	R241	OB09697A	RK 6.8K 1/6W J	C227	OB09218A	CE 47μ 16V (LN)	C317	OB09828A	CPP 8200P 100V
876A	CMM 0.47μ 50V J	R242	OB09707A	RK 18K 1/6W J	C228	OB01802A	CML 2200P 50V J	C318	OB41229A	CPP 1500P 100V
139A	CPP 3900P 100V G	R243	OB09687A	RK 2.7K 1/6W J	C229	OB05796A	CML 0.047μ 50V J	CN2	OB81759A	2P-T Post
133A	CPP 2200P 100V G	R244	OB09701A	RK 10K 1/6W J	C230	OB09280A	CC 47P 50V J			
674A	CE 10μ 25V	R245	OB09687A	RK 2.7K 1/6W J	C245	OB01405A	CE 1μ 50V		— Switch —	
9681A	CML 0.01μ 50V J	R246	OB09693A	RK 4.7K 1/6W J	C246	OB01412A	CE 10μ 16V	Q101	OB06299A	TR 2SC2878
143A	CPP 5600P 100V G	R247	OB09705A	RK 15K 1/6W J	C320	OB01403A	CE 47μ 16V	Q201	OB06299A	TR 2SC2878
813A	CML 0.056μ 50V J	R248	OB01846A	RK 4.7K 1/4W J				D101	OB06398A	SID 1SS176
9682A	CML 0.068μ 50V J	R281	OB09677A	RK 1K 1/6W J				D201	OB06398A	SID 1SS176
9872A	CMM 0.22μ 50V J	R312	OB09725A	RK 100K 1/6W J	Q102	OB01872A	TR 2SC945L (P,Q)	R101	OB09697A	RK 6.8K 1/6W
9557A	CML 0.015μ 50V J	R314	OB09725A	RK 100K 1/6W J	Q103,104	OB01003A	TR 2SC1740S	R122	OB09685A	RK 2.2K 1/6W
870A	CMM 0.15μ 50V J	R315	OB05625A	RK 220K 1/4W J	Q203,204	OB01872A	TR 2SC945L (P,Q)	R201	OB09697A	RK 6.8K 1/6W
876A	CMM 0.47μ 50V J	R316,317	OB09733A	RK 220K 1/6W J	ZD101	OB01003A	TR 2SC1740S	R222	OB09685A	RK 2.2K 1/6W
139A	CPP 3900P 100V G	R319	OB05622A	RK 2.2K 1/4W J	ZD201	OB06230A	ZD 5.1V RD5.1EB2	R307,308	OB09683A	RK 1.8K 1/6W
133A	CPP 2200P 100V G	R320	OB01681A	RK 3.3K 1/4W J	D102	OB06230A	ZD 5.1V RD5.1EB2	R309	OB09689A	RK 3.3K 1/6W
674A	CE 10μ 25V	R321	OB05622A	RK 2.2K 1/4W J	D202	OB06398A	SID 1SS176	R310,311	OB09673A	RK 680 1/6W
9391A	CE 220μ 25V	R322	OB09783A	CPP 820P 100V J	D301	OB06398A	SID 1SS176	R313	OB09733A	RK 220K 1/6W
402A	CE 4.7μ 25V	C118	OB05814A	CML 8200P 50V J	D405,406	OB06398A	SID 1SS176	C305	OB01402A	CE 4.7μ 25V
9391A	CE 220μ 25V	C119	OB09189A	CML 2700P 50V J	VR101	OB06398A	SID 1SS176	C321	OB09292A	CC 0.1μ 50V J
409A	CE 47μ 25V	C120	OB05550A	CML 1000P 50V J	VR201	OB32130A	Semi VR 100K	SW301,302	OB70113A	Push Switch SPUI
		C121	OB05814A	CML 8200P 50V J	R102	OB32130A	Semi VR 100K	303		
		C122	OB05659A	CML 5600P 50V J	R103	OB09725A	RK 100K 1/6W J	SW304,305	OB70114A	Push Switch SPUI
		C123	OB09323A	CPP 560P 100V J	R104,105	OB09719A	RK 56K 1/6W J	306		
		C124	OB09783A	CPP 820P 100V J	R106	OB09725A	RK 100K 1/6W J		— DC Supply —	
		C218	OB05814A	CML 8200P 50V J	R107	OB09743A	RK 560K 1/6W J	IC401	OB06380A	IC NJM7812
		C220	OB09189A	CML 2700P 50V J	R108	OB09729A	RK 150K 1/6W J	IC402	OB11029A	IC NJM7912
		C221	OB05550A	CML 1000P 50V J	R109	OB09725A	RK 100K 1/6W J	Q401	OB06452A	TR 2SD1406 (Y)
		C222	OB05814A	CML 8200P 50V J	R203	OB09719A	RK 56K 1/6W J	ZD401	OB12150A	ZD 5.6V
		C223	OB05659A	CML 5600P 50V J	R206	OB09725A	RK 100K 1/6W J			RD5.6JS-T11
		C244	OB09323A	CPP 560P 100V J	R207	OB09743A	RK 560K 1/6W J	D401,402	OB12585A	SID WL01
		C308,309	OB05681A	CML 0.01μ 50V J	R208	OB09729A	RK 150K 1/6W J	D403,404	OB06398A	SID 1SS176
		C310	OB05681A	CML 0.01μ 50V J	R209	OB09725A	RK 100K 1/6W J	R401	OB09914A	RF 330 1/2W
		C319	OB05550A	CML 1000P 50V J	R224	OB09713A	RK 33K 1/6W J	C405	OB40197A	CE 4700μ 25V
			— Rec. Amp. —		R324	OB09216A	RF 10 1/4W J	C406	OB40362A	CE 6800μ 16V
		IC305	OB06387A	IC NJM2043DD	R402,403	OB09719A	RK 56K 1/6W J	C407	OB40363A	CE 2200μ 25V
		Q108	OB06299A	TR 2SC2878	C101	OB09148A	CE 10μ 25V (LN)	C408	OB40361A	CE 2200μ 16V
		Q109	OB01872A	TR 2SC945L (P,Q)	C102	OB09394A	CE 0.15μ 50V (LN)	C409	OB09377A	CE 4700μ 16V
		Q208	OB06299A	TR 2SC2878	C201	OB09148A	CE 10μ 25V (LN)	C410	OB01403A	CE 47μ 16V
		Q209	OB01872A	TR 2SC945L (P,Q)	C202	OB09394A	CE 0.15μ 50V (LN)	C411	OB09283A	CC 220P 50V J
		D105,106	OB06398A	SID 1SS176	C313	OB01400A	CE 100μ 16V	CN13,14	OB81762A	5P-T Post
		D205,206	OB06398A	SID 1SS176					OJ05415A	Heat Sink
		D304,305	OB06398A	SID 1SS176					OE00868A	BT3x8 ⊕ Binding
		L102	OB51259A	Trap Coil 10.5mH					OE00985A	BT3x6 ⊕ Binding (Black Chromate)

Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
Block TF10 42-1274									
Coil 10.5mH	IC303	0B06370A	IC 4556D	IC601	OB11368A	IC LB1649	R637,638	OB09725A	RK 100K 1/6W J
Block TF10 42-1274	R134	OB09717A	RK 47K 1/6W J	IC602	OB06368A	IC LM6416E-106	R639	OB09725A	RK 100K 1/6W J
	R135	OB09701A	RK 10K 1/6W J	IC603	OB11020A	IC	R640	OB09725A	RK 100K 1/6W J
27K 1/6W J	R136	OB05579A	RK 22 1/4W J			IC	R641	OB09725A	RK 100K 1/6W J
56K 1/6W J	R234	OB09717A	RK 47K 1/6W J	IC604	OB06214A	IC	R642	OB09725A	RK 100K 1/6W J
12K 1/6W J	R235	OB09701A	RK 10K 1/6W J	IC605	OB06178A	IC	R643,644	OB09717A	RK 47K 1/6W J
1K 1/6W J	R236	OB05579A	RK 22 1/4W J	IC606	OB11369A	IC	R645,646	OB09717A	RK 47K 1/6W J
470K 1/6W J	C143	OB05582A	CML 0.022μ 50V J	Q601	OB06066A	TR 2SD471 (L,M)	R647,648	OB09717A	RK 47K 1/6W J
560 1/6W J	C243	OB05582A	CML 0.022μ 50V J	Q602,603	OB06013A	TR 2SA733 (P,Q)	R650	OB09713A	RK 33K 1/6W J
15K 1/6W J	C306,307	OB01400A	CE 100μ 16V	Q604,605	OB01872A	TR 2SC945L (P,Q)	R651	OB09687A	RK 2.7K 1/6W J
470 1/6W J				Q606,607	OB01872A	TR 2SC945L (P,Q)	R652	OB09725A	RK 100K 1/6W J
3.9K 1/6W J				Q608	OB06013A	TR 2SA733 (P,Q)	R653	OB09737A	RK 330K 1/6W J
3.3K 1/6W J				Q609	OB01872A	TR 2SC945L (P,Q)	R654	OB05509A	RK 33K 1/4W J
56K 1/6W J	IP301	OB11335A	IC Protector	Q610	OB06299A	TR 2SC2878	R655,656	OB09725A	RK 100K 1/6W J
270K 1/6W J			ICP-N15-T104	Q611,612	OB01872A	TR 2SC945L (P,Q)	R657	OB09725A	RK 100K 1/6W J
6.8K 1/6W J	Q302	OB06069A	TR 2SB564 (L,M)	Q613	OB01872A	TR 2SC945L (P,Q)	R658	OB09701A	RK 10K 1/6W J
27K 1/6W J	Q303	OB06299A	TR 2SC2878	Q614	OB06069A	TR 2SB564 (L,M)	R659	OB09703A	RK 12K 1/6W J
56K 1/6W J	D308	OB06398A	SiD 1SS176	Q615	OB06013A	TR 2SA733 (P,Q)	R660,661	OB09693A	RK 4.7K 1/6W J
12K 1/6W J	T301	OB51255A	Bias Osc. Unit	Q616	OB01872A	TR 2SC945L (P,Q)	R662	OB09735A	RK 270K 1/6W J
1K 1/6W J	VR107,108	OB32128A	Semi VR 20KB	Q617,618	OB06013A	TR 2SA733 (P,Q)	R663	OB09733A	RK 220K 1/6W J
470K 1/6W J	VR109	OB32128A	Semi VR 20KB	Q619	OB01872A	TR 2SC945L (P,Q)	R664	OB09657A	RK 150 1/6W J
560 1/6W J	VR207,208	OB32128A	Semi VR 20KB	Q620	OB10050A	TR 2SA970 (BL)	R665	OB09725A	RK 100K 1/6W J
15K 1/6W J	VR209	OB32128A	Semi VR 20KB	Q621	OB01872A	TR 2SC945L (P,Q)	R666	OB09693A	RK 4.7K 1/6W J
470 1/6W J	VR304	OB32126A	Semi VR 5K	Q622	OB06013A	TR 2SA733 (P,Q)	R667	OB09719A	RK 56K 1/6W J
3.9K 1/6W J	R180	OB09701A	RK 10K 1/6W J	Q623,624	OB01872A	TR 2SC945L (P,Q)	R668	OB09713A	RK 33K 1/6W J
3.3K 1/6W J	R183	OB09653A	RK 100 1/6W J	Q625,626	OB06013A	TR 2SA733 (P,Q)	R669	OB09701A	RK 10K 1/6W J
56K 1/6W J	R184	OB09695A	RK 5.6K 1/6W J	Q627,628	OB06013A	TR 2SA733 (P,Q)	R670	OB01889A	RK 100K 1/4W J
270K 1/6W J	R185	OB09703A	RK 12K 1/6W J	Q629,630	OB06013A	TR 2SA733 (P,Q)	R671	OB09713A	RK 33K 1/6W J
6.8K 1/6W J	R186	OB09705A	RK 15K 1/6W J	Q631	OB06013A	TR 2SA733 (P,Q)	R672	OB09749A	RK 1M 1/6W J
270 1/6W J	R280	OB09701A	RK 10K 1/6W J	ZD601	OB12168A	ZD 10V	R673	OB09725A	RK 100K 1/6W J
3900P 50V J	R283	OB09653A	RK 100 1/6W J				R674	OB09689A	RK 3.3K 1/6W J
5600P 50V J	R284	OB09695A	RK 5.6K 1/6W J				R675	OB09705A	RK 15K 1/

9.1. IC Block Diagrams

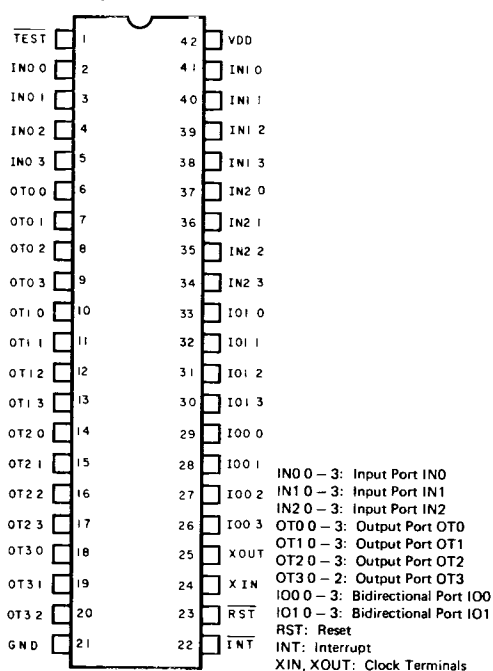
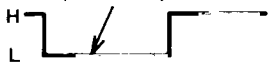
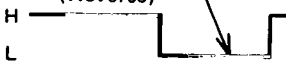
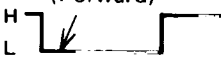
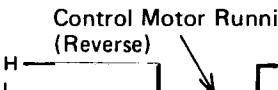
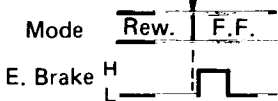
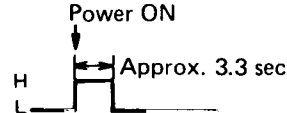
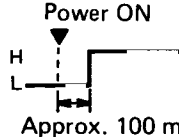


Fig. 9.1.1 4-Bit Micro-processor TMP4315BP-1814

Pin No.	Signal Name	In/Out	Function
1	Test	—	Not used.
2	Cam (0)	In	Mechanism possible
3	Cam (1)	In	Mechanism moving to states of
4	Cam (2)	In	Cam (2).
5	Eject	In	Eject signal. Active when the door is open. When the door is open in this condition, the eject mode and no eject mode are enabled.
6	R.M. Fwd.	Out	Reel Motor Forward Reel Motor Forward (Forward)
7	R.M. Rev.	Out	Reel Motor Reverse Reel Motor Reverse (Reverse)
8	C.M. Fwd.	Out	Control Motor Forward Control Motor Forward (Forward)
9	C.M. Rev.	Out	Control Motor Reverse Control Motor Reverse (Reverse)
10	R.M. Play	Out	Reel Motor Play In Play mode, the R.M. Play is active. C.M. Fwd. R.M. Play Reel Motor Play
11	Capstan M	Out	Capstan Motor In Play, Pause, and Stop modes, Capstan M is High. In other modes, Capstan Motor is Low. Capstan Motor
12	E. Brake	Out	Electric Brake sense Generates H pulse when the door is open. E. Brake

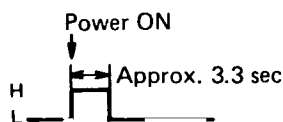
IC603 (TMP4315BP-1814)

Pin No.	Signal Name	In/Out	Function
1	Test	—	Not used.
2	Cam (0)	In	Mechanism position detecting signals.
3	Cam (1)	In	Mechanism mode can be sensed according to states of Cam (0), Cam (1) and Cam (2).
4	Cam (2)	In	
5	Eject	In	Eject signal. Active L. Used to detect whether the Cassette Case is open. When it is open, this signal is L. In this condition, the CR-2 is in Stop mode and no pushbutton operation is enabled.
6	R.M. Fwd.	Out	Reel Motor Forward signal. Active L. Reel Motor Running (Forward) 
7	R.M. Rev.	Out	Reel Motor Reverse signal. Active L. Reel Motor Running (Reverse) 
8	C.M. Fwd.	Out	Control Motor Forward signal. Active L. Control Motor Running (Forward) 
9	C.M. Rev.	Out	Control Motor Reverse signal. Active L. Control Motor Running (Reverse) 
10	R.M. Play	Out	Reel Motor Play signal. Active H. In Play mode, C.M. Fwd. becomes L, and R.M. Play becomes H. C.M. Fwd.  R.M. Play Reel Motor Running (Play)
11	Capstan M	Out	Capstan Motor Run signal. Active H. In Play, Pause, or Rec./Play mode, Capstan M is H and Capstan Motor runs. In other modes, Capstan M is L, so Capstan Motor is stopped. Capstan Motor Running (Play, Pause, Rec./Play) 
12	E. Brake	Out	Electric Brake signal. Active H. Generates H pulse upon change in mode. F.F. Button ON Mode  E. Brake

Pin No.	Signal Name	In/Out	Function
13	Source Mute	Out	Source Mute signal. Active H. Issues H pulse for 3.3 sec after power is turned ON. Used for timer recording circuit. 
14	Line Mute	Out	Line Output Mute signal. Active H. Stays at L only in Play or Rec./Play mode. Deactivates mute of line outputs.
15	Rec. Mute	Out	Record Mute signal. Active H. Stays at L only in Rec./Play mode. Releases record mute.
16	Rew. Mode	Out	Rewind Mode signal. Active L.
17	F.F. Mode	Out	F.F. Mode signal. Active L.
18	Pause Mode	Out	Pause Mode signal. Active L. Used for lighting of Pause lamp.
19	Play Mode	Out	Play Mode signal. Active L. Used for lighting of Play lamp.
20	Rec. Mode	Out	Record Mode signal. Active L. Used for lighting of Record lamp.
21	Vss	In	GND.
22	INT	In	Interrupt signal. Active L. Allows input of shut-off pulse train. Detects tape running, i.e., rotation of Take-up Reel Hub.
23	Reset	In	Reset signal. Active L. Held at L for approx. 100 msec after power is turned ON. Upon change of this signal to H, IC603 starts operation. 
24	EXtal	In	External circuit for clock oscillation.
25	Xtal	In	Oscillating frequency = 550 kHz.
26	Rec.	—	Not used.
27	AMS	—	Not used.
28	Zero	In	Not used.
29	Memory	In	Memory Switch ON signal. Active H. Held at H when Memory switch is set to ON. (With this switch set to ON, tape will stop automatically when the tape counter indication "000" is reached during rewind or fast-forward.)

Pin No.	Signal Name	In/Out
30	A. Rew.	In
31	A. Play	In
32	T. Rec.	In
33	T. Play	In
34	K. Pause	In
35	K. Rec.	In
36	R. Mute	—
37	SEA	—
38	K. Play	In
39	K. F.F.	In
40	K. Rew.	In
41	K. Stop	In
42	VDD	In

Pin No.	Signal Name	In/Out	Function
13	Source Mute	Out	Source Mute signal. Active H. Issues H pulse for 3.3 sec after power is turned ON. Used for timer recording circuit.



14	Line Mute	Out	Line Output Mute signal. Active H. Stays at L only in Play or Rec./Play mode. Deactivates mute of line outputs.
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15	Rec. Mute	Out	Record Mute signal. Active H. Stays at L only in Rec./Play mode. Releases record mute.
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16	Rew. Mode	Out	Rewind Mode signal. Active L.
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17	F.F. Mode	Out	F.F. Mode signal. Active L.
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18	Pause Mode	Out	Pause Mode signal. Active L. Used for lighting of Pause lamp.
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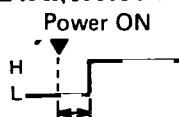
19	Play Mode	Out	Play Mode signal. Active L. Used for lighting of Play lamp.
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20	Rec. Mode	Out	Record Mode signal. Active L. Used for lighting of Record lamp.
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21	Vss	In	GND.
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22	INT	In	Interrupt signal. Active L. Allows input of shut-off pulse train. Detects tape running, i.e., rotation of Take-up Reel Hub.
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23	Reset	In	Reset signal. Active L. Held at L for approx. 100 msec after power is turned ON. Upon change of this signal to H, IC603 starts operation.
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24	EXtal	In	External circuit for clock oscillation.
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25	Xtal	In	Oscillating frequency = 550 kHz.
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26	Rec.	—	Not used.
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27	AMS	—	Not used.
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28	Zero	In	Not used.
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29	Memory	In	Memory Switch ON signal. Active H. Held at H when Memory switch is set to ON. (With this switch set to ON, tape will stop automatically when the tape counter indication "000" is reached during rewind or fast-forward.)
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Pin No.	Signal Name	In/Out	Function
30	A. Rew.	In	Auto Rewind and Auto Play signals. Active L. These signals are L when Timer switch is set to OFF and, at the same time, Auto Repeat switch is set to ON. (With these signals set to L, auto repeat function is performed and the playback/rewind cycle is continuously repeated between the tape end and the tape start. Furthermore, if Memory switch is set to ON, the playback/rewind cycle is continuously repeated between the tape end and the tape counter indication "000".)
31	A. Play	In	
32	T. Rec.	In	Timer Recording signal. Active L. When power is turned ON with Timer switch in Record position, becomes L for approx. 3.3 sec, causing unattended recording to start.
33	T. Play	In	Timer Play signal. Active L. Held at L upon setting of Timer switch to the Play position.
34	K. Pause	In	Pause button input terminal. Becomes L upon push of Pause button.
35	K. Rec.	In	Record button input terminal. Becomes L upon push of Record button.
36	R. Mute	—	Not used.
37	SEA	—	Not used.
38	K. Play	In	Play button input terminal. Becomes L upon push of Play button.
39	K. F.F.	In	F.F. button input terminal. Becomes L upon push of F.F. button.
40	K. Rew.	In	Rewind button input terminal. Becomes L upon push of Rewind button.
41	K. Stop	In	Stop signal input terminal. At L, stops all operations.
42	VDD	In	+5 V.

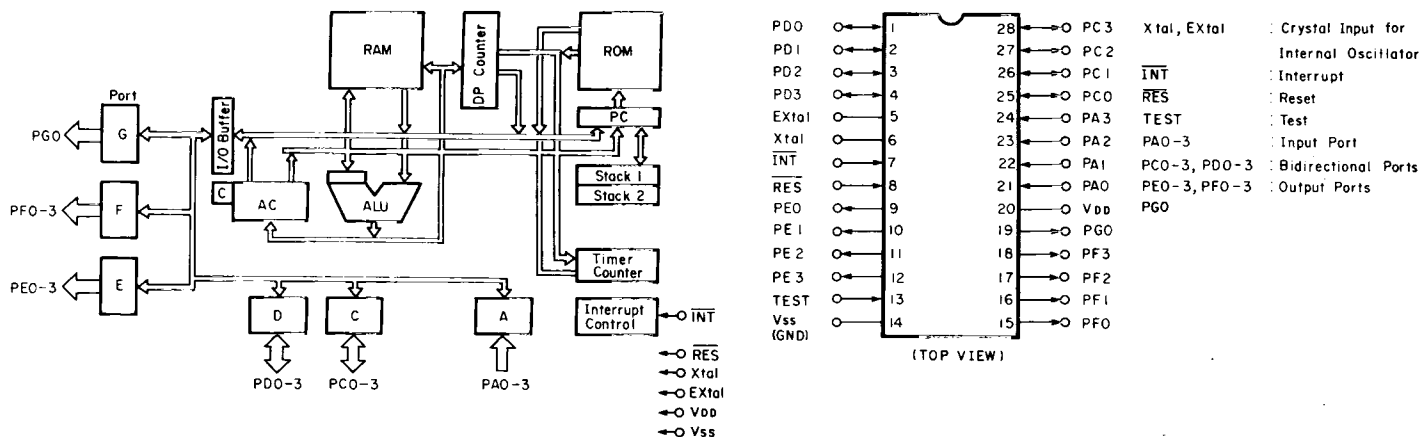
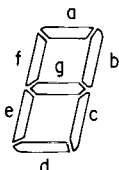


Fig. 9.1.2 4-Bit Micro-processor LM6416E-106

IC602 (LM6416E-106)

Pin No.	Signal Name	In/Out	Function
1	CLR	In	Reset button input terminal. Upon push of Reset button, Reset signal becomes L and counter is cleared to "0000".
2	K. Play	In	Play button input terminal. Becomes L upon push of Play button.
3	K. F.F.	In	F.F. button input terminal. Becomes L upon push of F.F. button.
4	K. Rew.	In	Rewind button input terminal. Becomes L upon push of Rewind button.
5	EXtal	In	Terminals for clock oscillation. RC circuit is connected.
6	Xtal	In	
7	INT	In	Interrupt signal. Active L. Shut-off pulse train is input. Input pulse train is counted for tape counter display.
8	Reset	In	Reset signal. Active L. Held at L for approx. 100 msec after power is turned ON.
9	f	Out	Display segment drive signals. Segment lights at L.
10	b	Out	
11	a	Out	
12	d	Out	

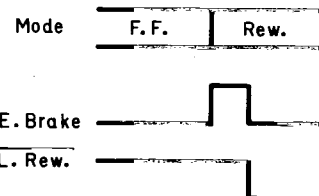


13	Test	In	Not used.
14	Vss	In	GND.
15	g	Out	Display segment drive signals. Segment lights at L.
16	a	Out	
17	c	Out	
18	D4	Out	The 4th (rightmost) digit select signal. Active L.

Pin No.	Signal Name	In/Out	Function
19	Motor Slow	Out	Motor Slow signal. Active L. When Motor Slow signal is L, reel motor speed is reduced.



20	VDD	In	+5 V
21	L. Rew.	In	LED Rewind signal. Active L. When mode is changed to Rewind, L. Rew. signal becomes L after H period of E. Brake signal ended.



22	L. F.F.	In	LED F.F. signal. Active L. Timing is similar to L. Rew. signal.
23	L. Stop	In	LED Stop signal. Active L. Timing is similar to L. Rew. signal.
24	Memory Stop	In	Memory Stop switch input terminal of Memory Stop/Auto Repeat switch. Memory Stop signal is L when Memory Stop is selected.
25	Memory Play	In	Not used.
26	D3	Out	The 3rd, 2nd, and 1st (leftmost) digit select signals. Active L.
27	D2	Out	
28	D1	Out	

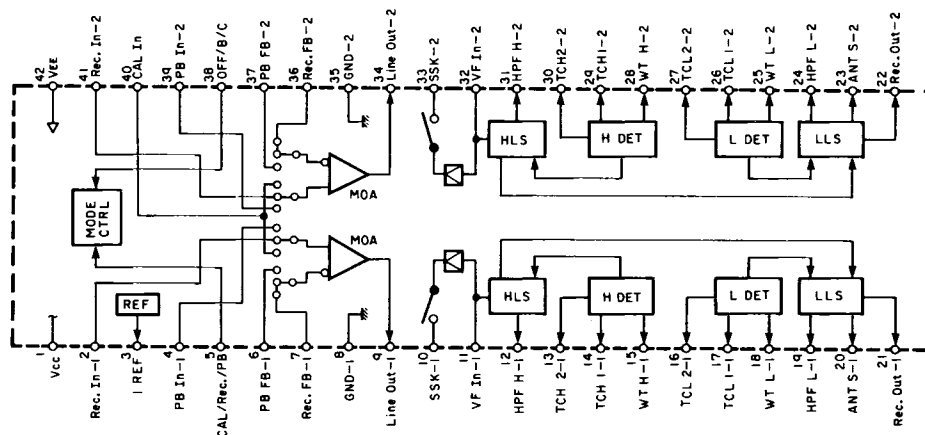


Fig. 9.1.3 Dolby NR IC CX20188

IC301 (CX20188)

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.
14,29	TCH 1	HLS detector time constant determination terminal 1.
15,28	WT H	HLS weighting terminal.
16,27	TCL 2	LLS detector time constant determination terminal 2.
17,26	TCL 1	LLS detector time constant determination terminal 1.
18,25	WT L	LLS weighting terminal.
19,24	HPF L	LLS high-pass filter terminal.
20,23	ANT S	Anti-saturation terminal.
21,22	Rec. Out	Record signal (encoded signal) output terminal.
38	OFF/B/C	Dolby NR OFF/B-type/C-type select terminal.
40	CAL In	Calibration input terminal. Not used.
42	VEE	Negative power supply input terminal.

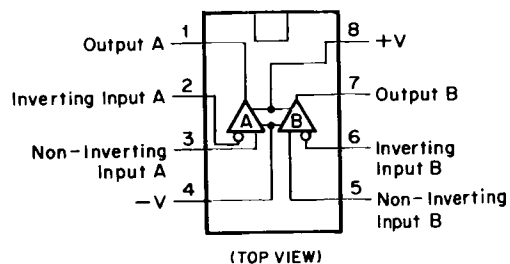


Fig. 9.1.4 Operational Amp. IC 4556D, 4558DD, 2043DD

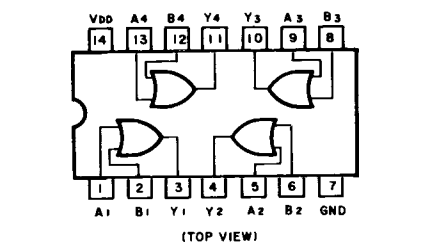


Fig. 9.1.5 OR Gate C-MOS IC μ PD4071BC

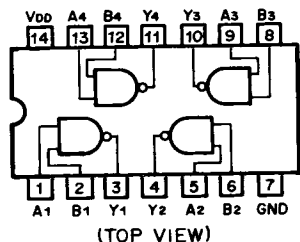


Fig. 9.1.6 NAND Gate C-MOS IC μ PD4011BC

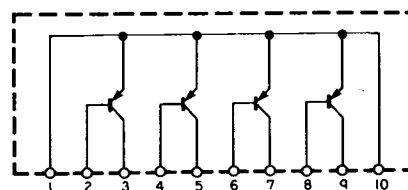
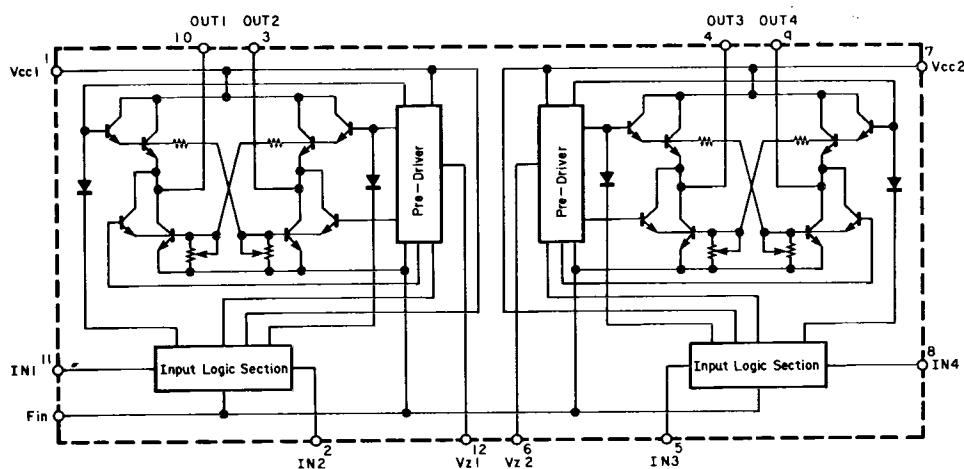


Fig. 9.1.7 Transistor Array TA64



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. 9.1.8 Motor Driver IC LB1649

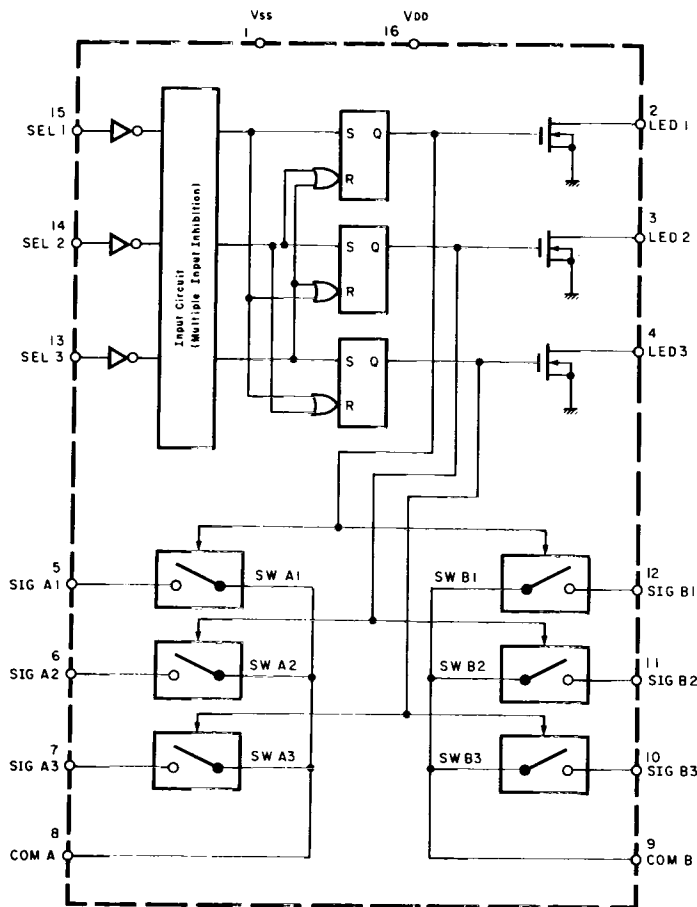


Fig. 9.1.9 Analog Switch Selector TC9145P

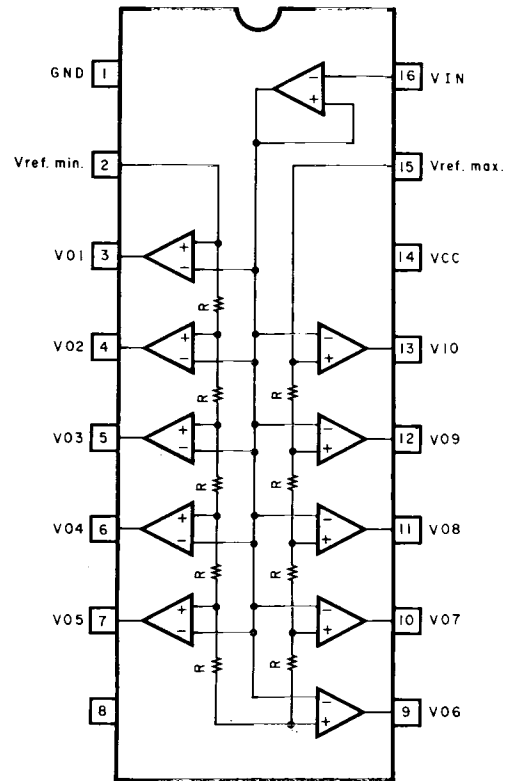
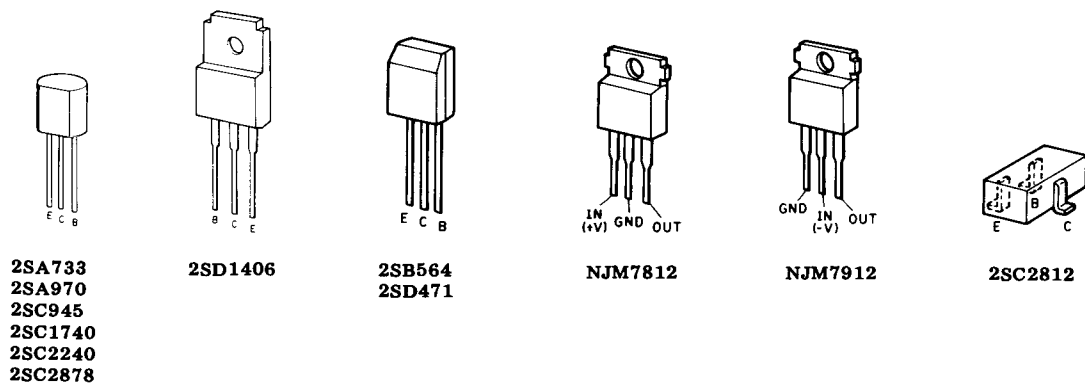
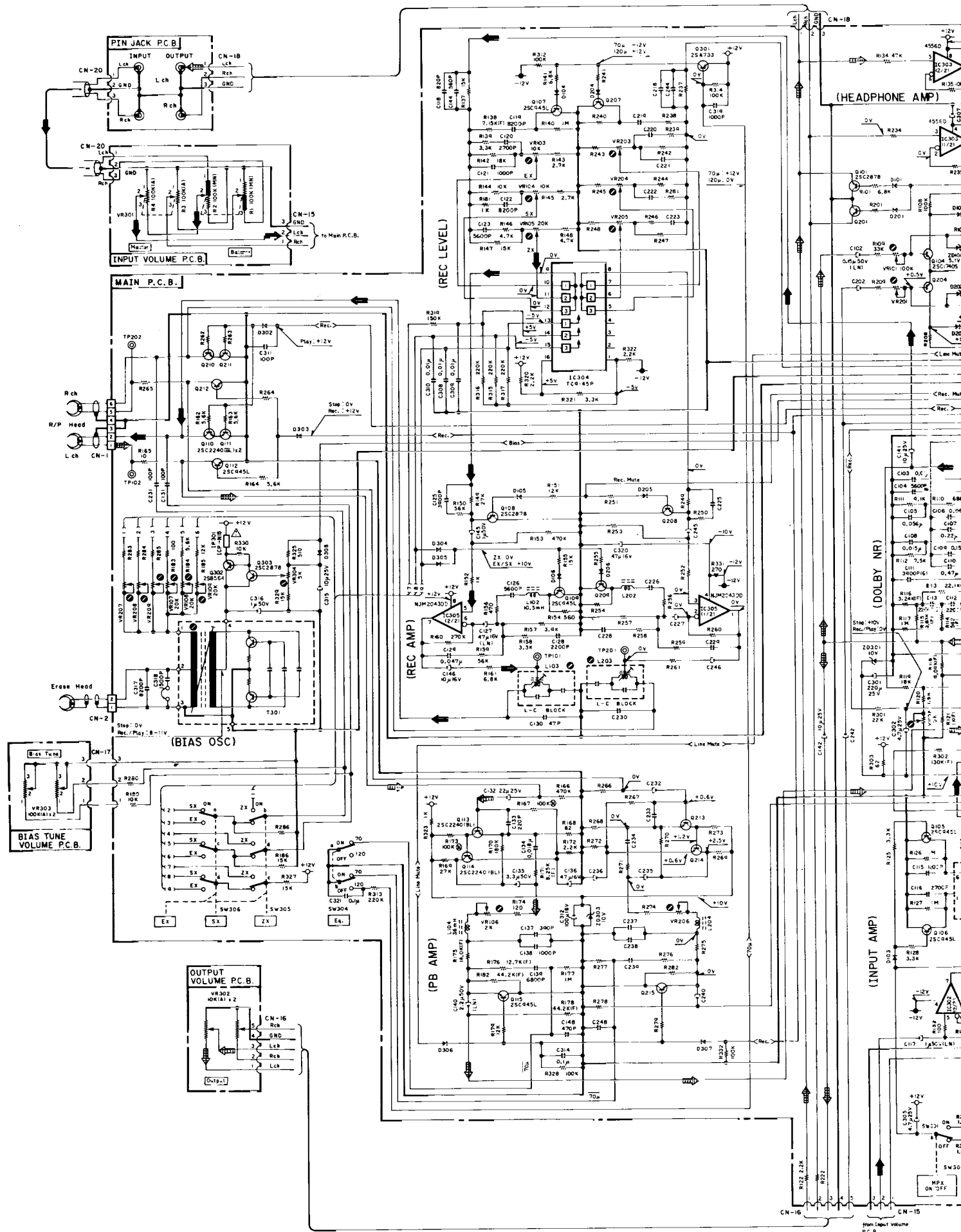


Fig. 9.1.10 Level Meter Driver TA7612AP



9.2. Schematic Diagram



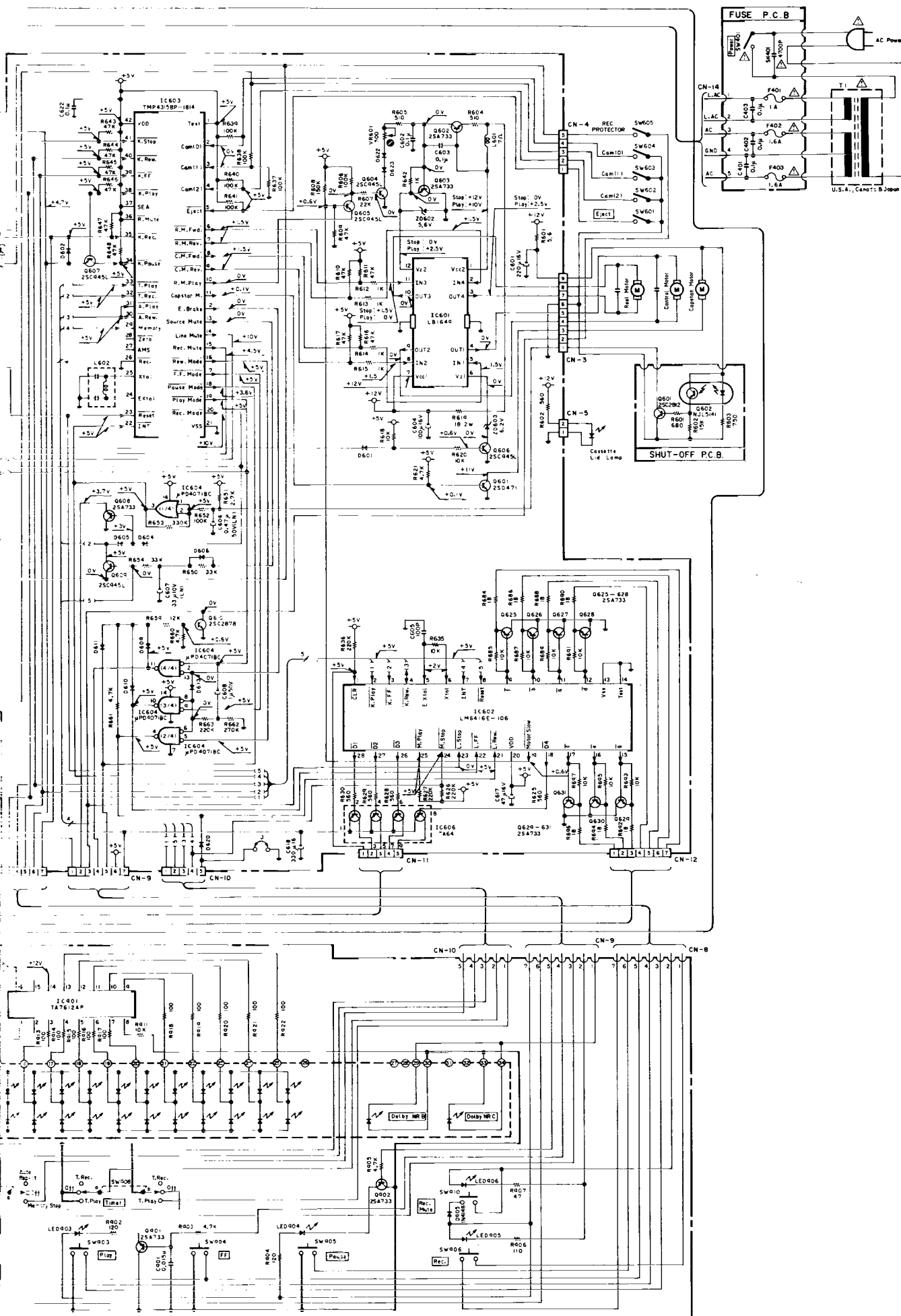
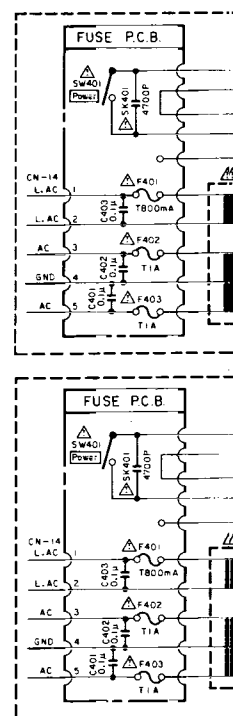


Fig. 9.2

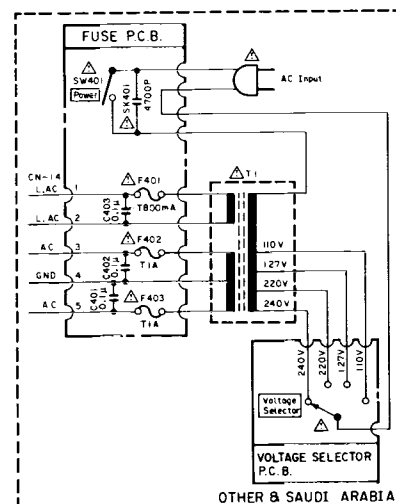
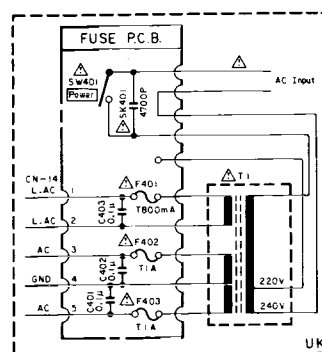
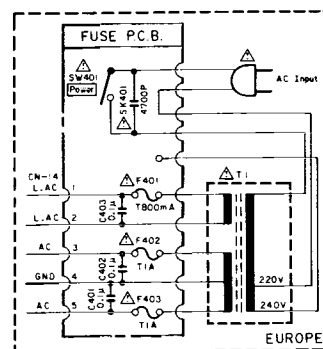
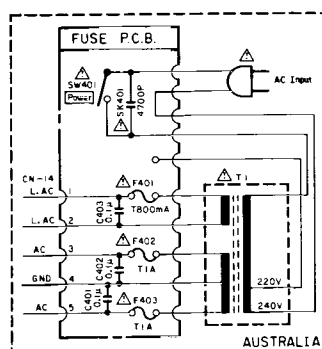
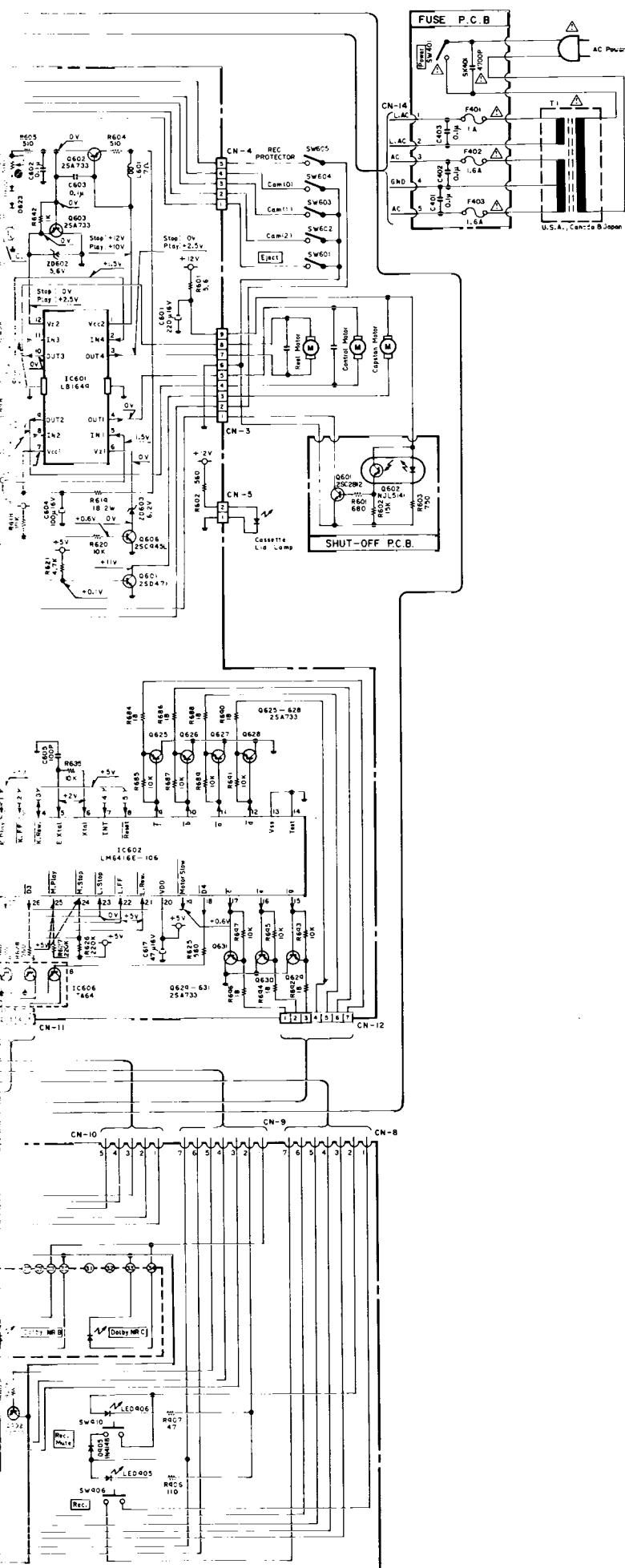


WARNING
Parts may have different characteristics. Use ONLY the manufacturer's specifications. It is recommended that you follow the suitable procedure.

CAUTION
Before retesting, make either a chassis resistor or milliamper, the power is not sufficient. **WARNING** until the power is sufficient.

Notes:

1. Diode other than 2SA733 are intended for use.
2. 2SA733 are intended for use.
3. 2SC945 are intended for use.
4. Voltage:
 - Stop: 0.5V
 - Bias: 0.5V
 - Time: 0.5V
 - Mem: 0.5V
 - Play: 0.5V
 - Back: 0.5V



WARNING:

Parts marked with the symbol  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.

CAUTION:

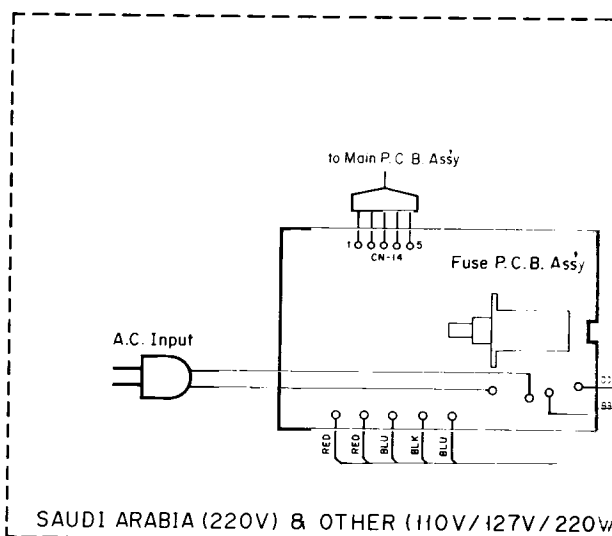
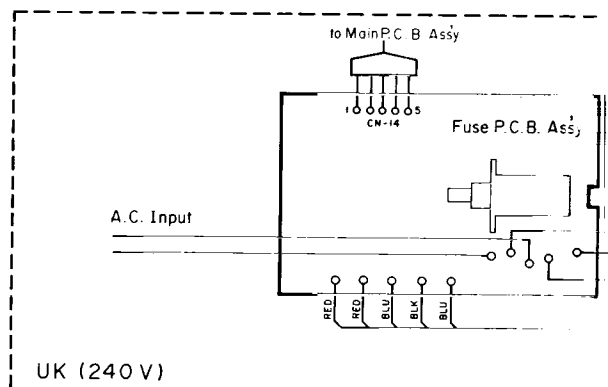
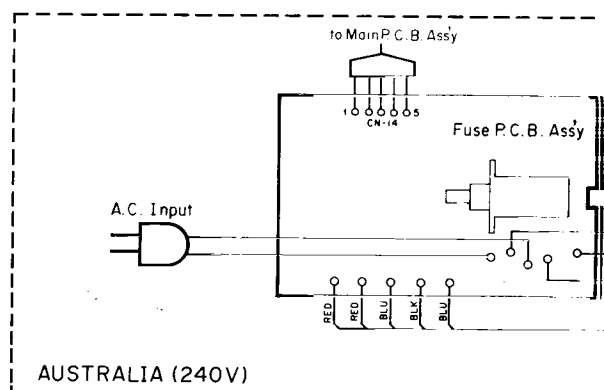
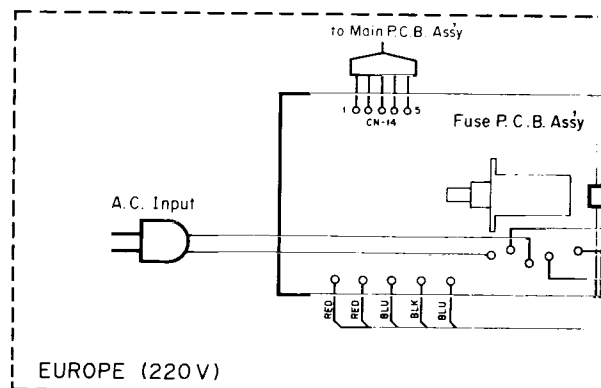
Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective.

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

Notes:

1. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
2. 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
3. 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.
4. Voltage measuring condition:
 - Stop mode (with no input signal) unless otherwise specified.
 - Bias: ZX position, Eq: 70 μ s
 - Timer Switch: OFF
 - Memory Stop/Auto Repeat Switch: OFF
 - Play mode: Cassette with no tape played back.

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 ().

WIRING DIAGRAM

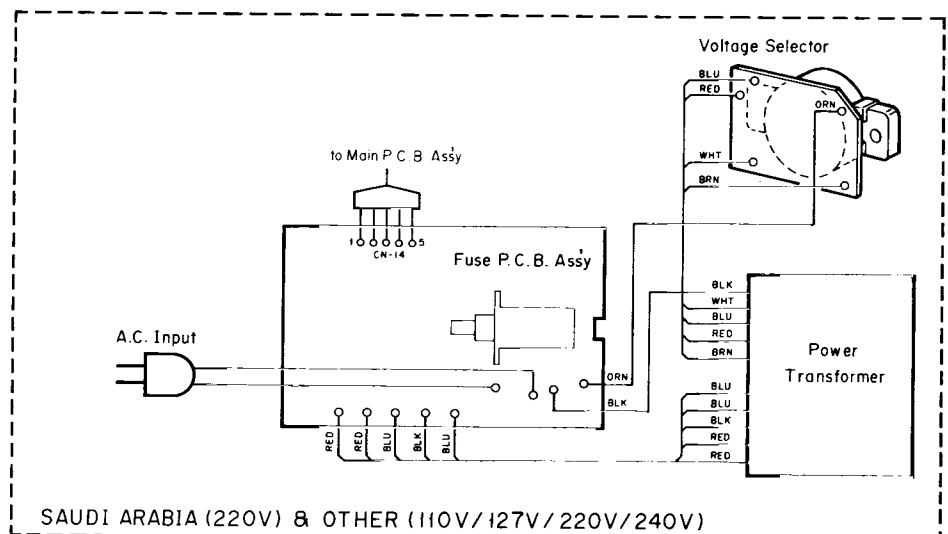
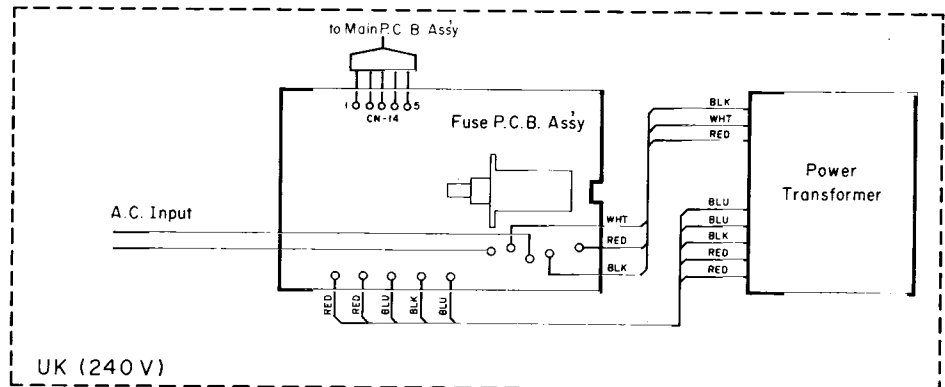
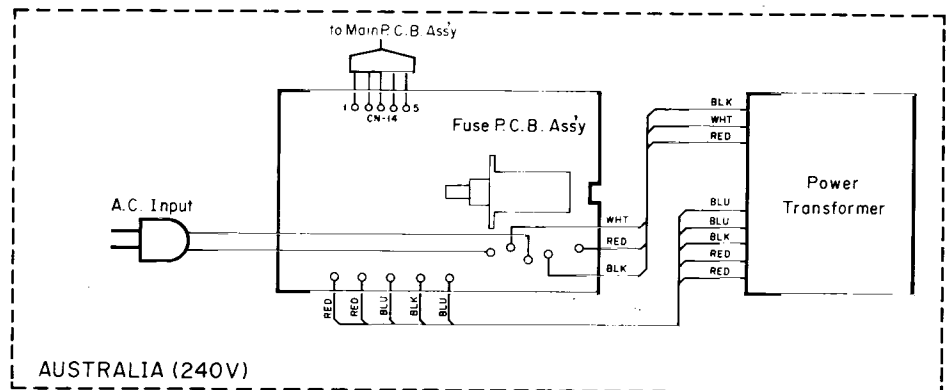
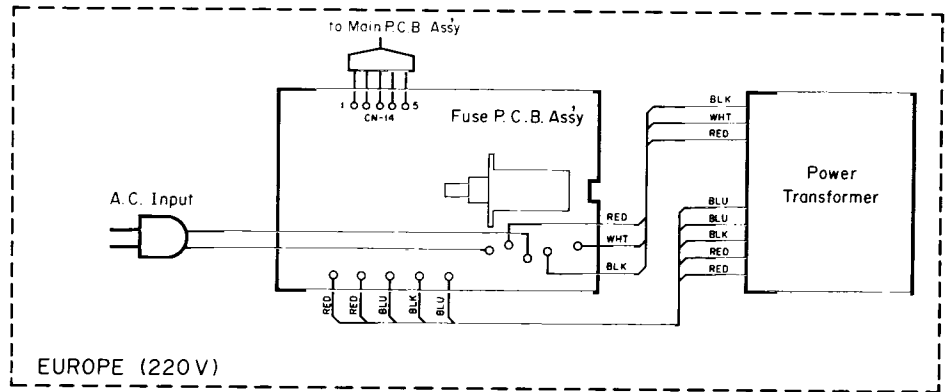
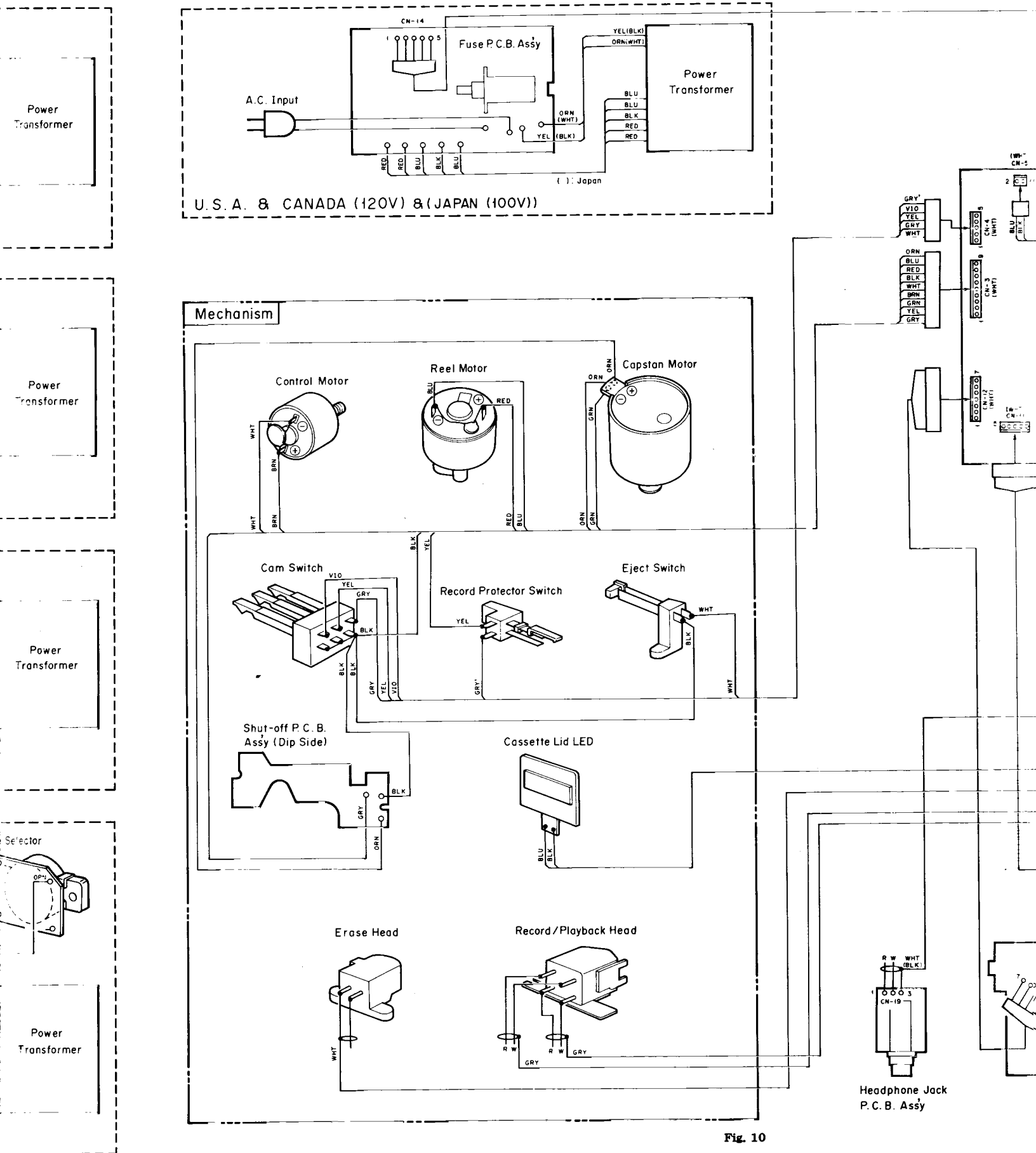


Table of wire colors

BRN — Brown	BLU — Blue
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Component side view of the P.C.B. is illustrated unless otherwise specified.

Wire tube color is shown in ().



11.1. Amplifier Section



11.2. Mechanism Control Section

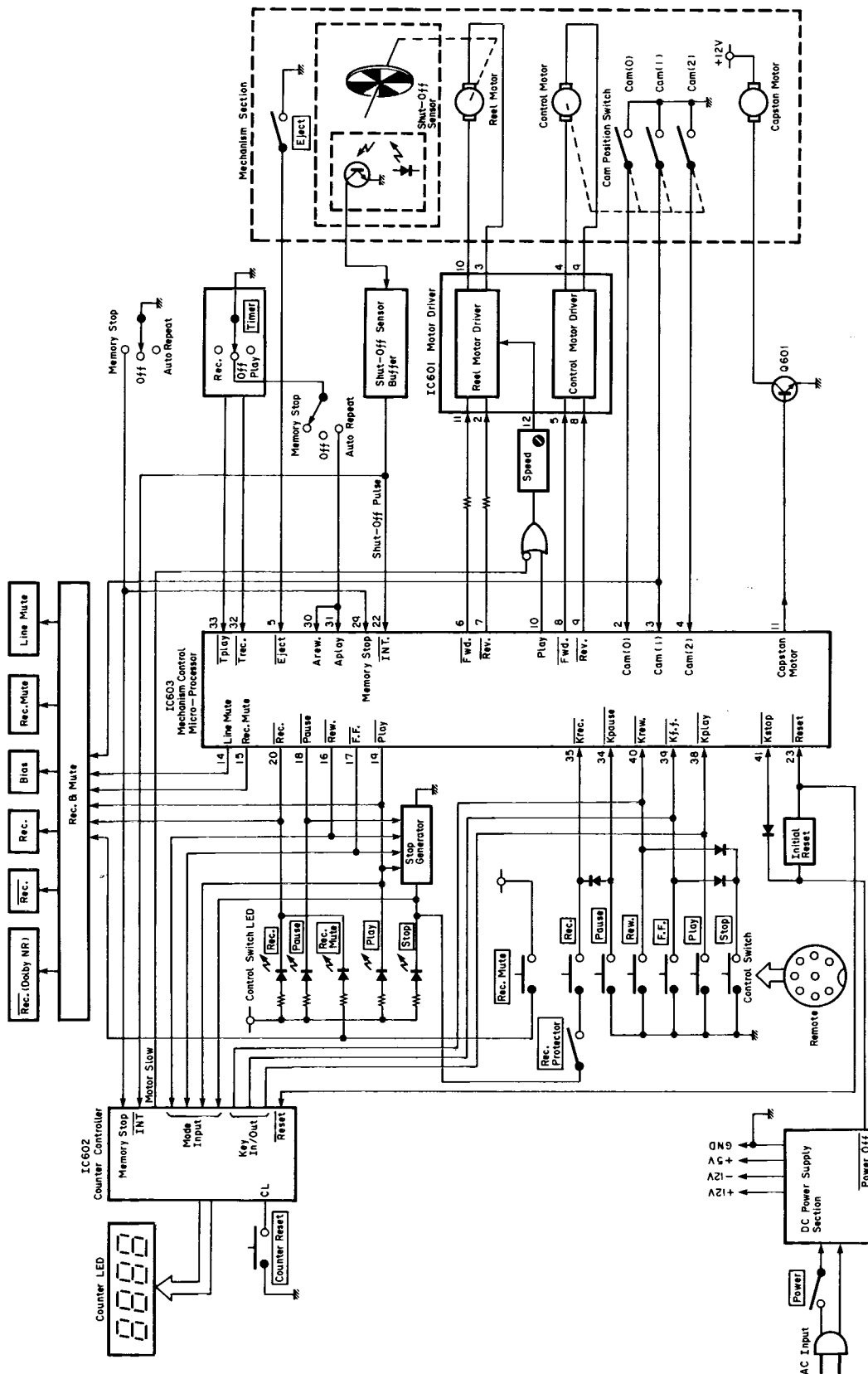


Fig. 11.2

12. TIMING CHARTS AND EQ. AMP. FREQUENCY RESPONSE

12.1. Timing Charts

(1) Overall Timing Chart

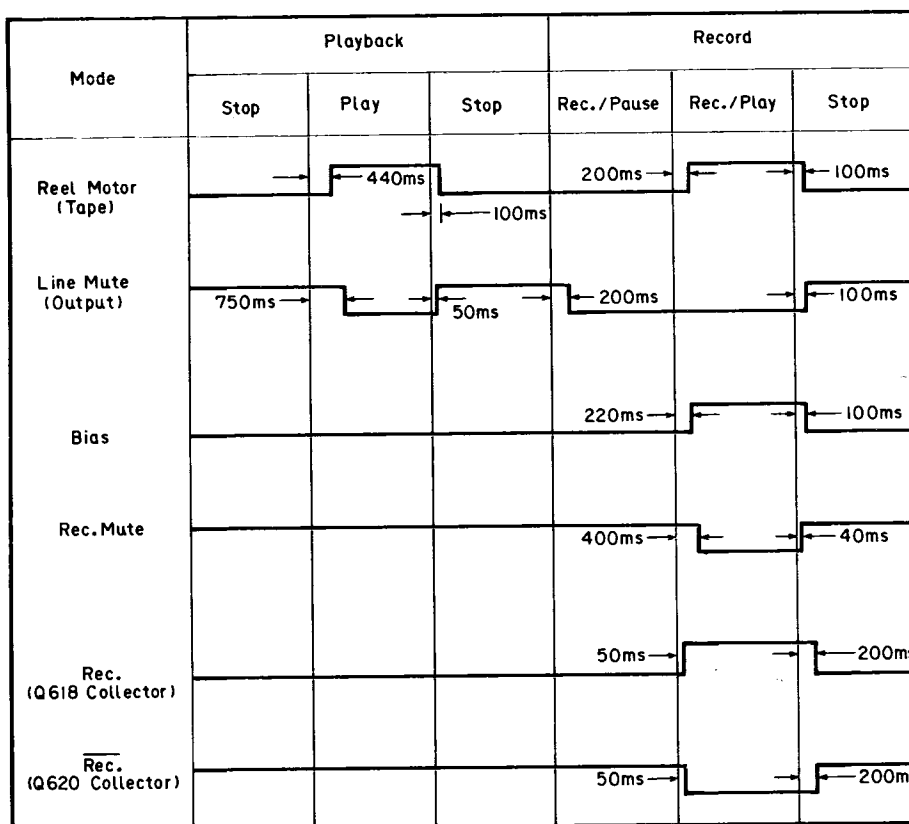


Fig. 12.1.1

(2) Mechanism Control Timing Chart

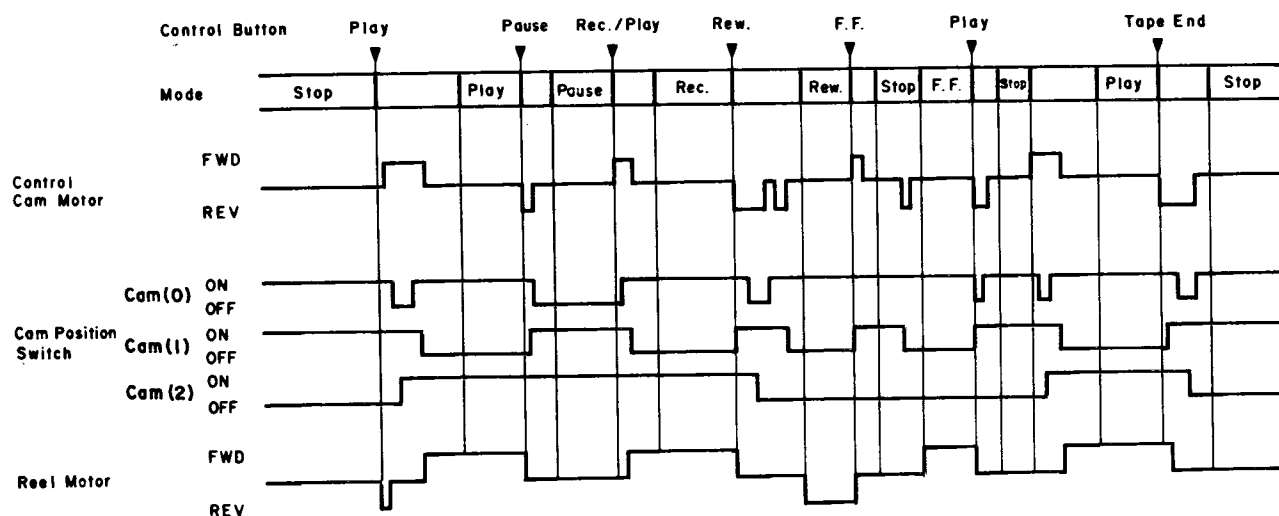


Fig. 12.1.2

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

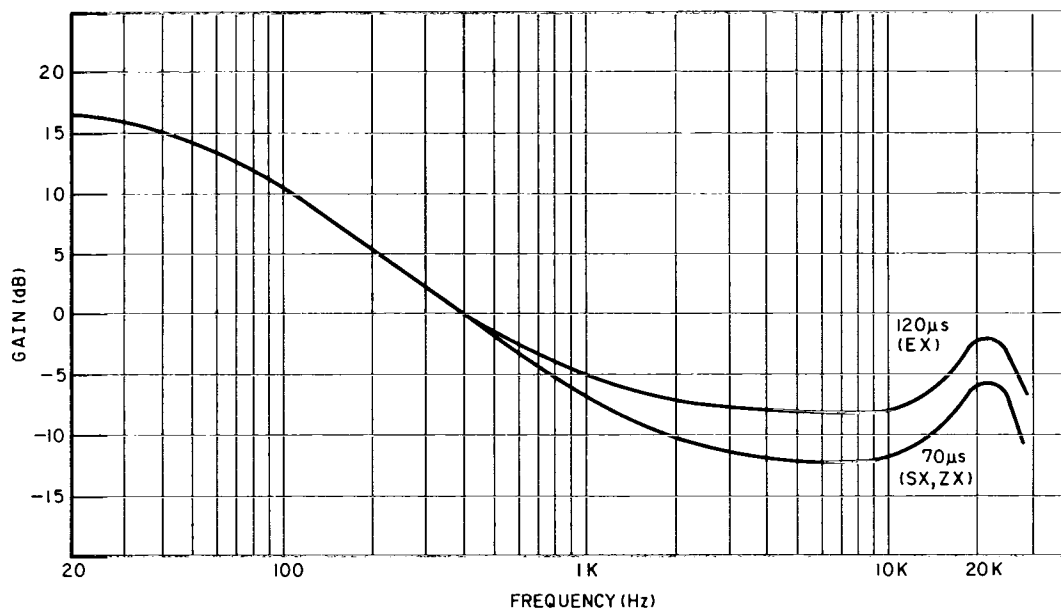


Fig. 12.2.1

(2) Record Current Frequency Response

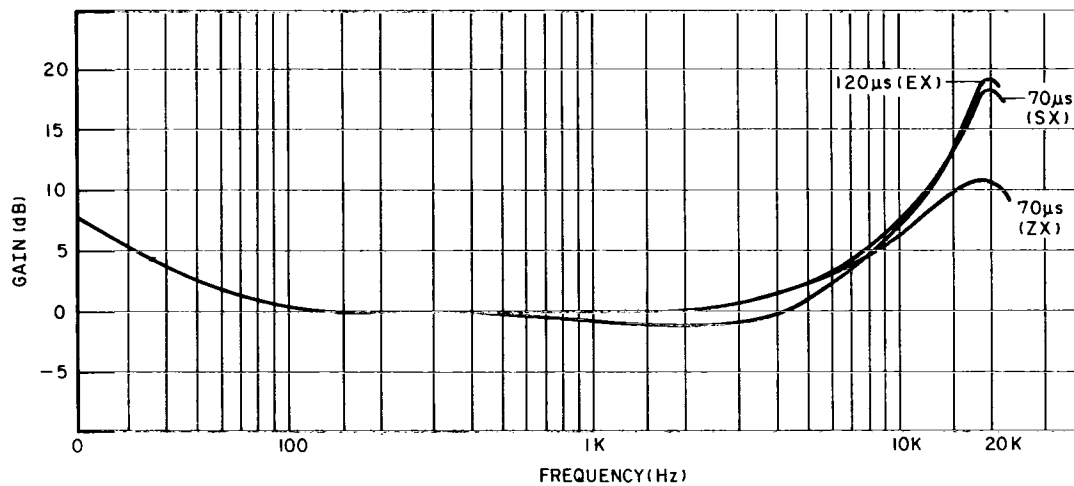


Fig. 12.2.2

13. SPECIFICATIONS

Track Configuration	4 tracks/2-channel stereo
Heads	2 (erase head x 1, record/playback head x 1)
Motors	DC servo motor (capstan drive) x 1 DC motor (reel drive x 1, cam drive x 1)
Power Source	120, 220, 240 or 110/127/220/240 V AC, 50/60 Hz (According to country of sale)
Power Consumption	30 W max.
Tape Speed	1-7/8 ips (4.8 cm/sec.) $\pm 0.5\%$
Wow and Flutter	Less than 0.11% WTD Peak Less than 0.06% WTD RMS
Frequency Response	20 Hz—20,000 Hz ± 3 dB (recording level —20 dB, ZX [Type IV], SX [Type II], EXII [Type I] tape)
Signal to Noise Ratio	Dolby C-Type NR on <70 μ s, ZX [Type IV] tape> Better than 70 dB (400 Hz, 3% THD, IHF A-WTD RMS) Dolby B-Type NR on <70 μ s, ZX [Type IV] tape> Better than 64 dB (400 Hz, 3% THD, IHF A-WTD RMS)
Total Harmonic Distortion	Less than 1.0% (400 Hz, 0 dB, ZX [Type IV], SX [Type II], EXII [Type I] tape)
Erasure	Better than 60 dB (100 Hz, +10 dB)
Separation	Better than 36 dB (1 kHz, 0 dB)
Crosstalk	Better than 60 dB (1 kHz, 0 dB)
Bias Frequency	105 kHz
Input (Line)	50 mV/30k ohms
Output (Line)	0.5 V (400 Hz, 0 dB, output level control at max.) 2.2k ohms
(Headphones)	2.2 mW into 8 ohms (400 Hz, 0 dB, output level control at max.)
Fast-Wind Time	Approx. 80 seconds (with C-60 cassette)
Dimensions	430 (W) x 100 (H) x 265 (D) mm 16-15/16 (W) x 3-15/16 (H) x 10-7/16 (D) inches
Approximate Weight	5.4 kg, 11 lbs, 14 oz.

- Specifications and design are subject to change for further improvement without notice.
- Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.
- The word "DOLBY" and the Double-D-Symbol are trademarks of Dolby Laboratories Licensing Corporation.

Service Manual

Nakamichi

CR-2, CR-2A, CR-2E, CR-20

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Nakamichi America Corporation
Nakamichi Canada
Nakamichi GmbH

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