

A21



# Service Manual

# Nakamichi

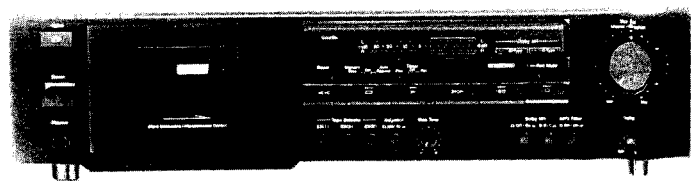
## CR-2

## CR-2A

## CR-2E

## CR-20

### 2 Head Cassette Deck



A21

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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

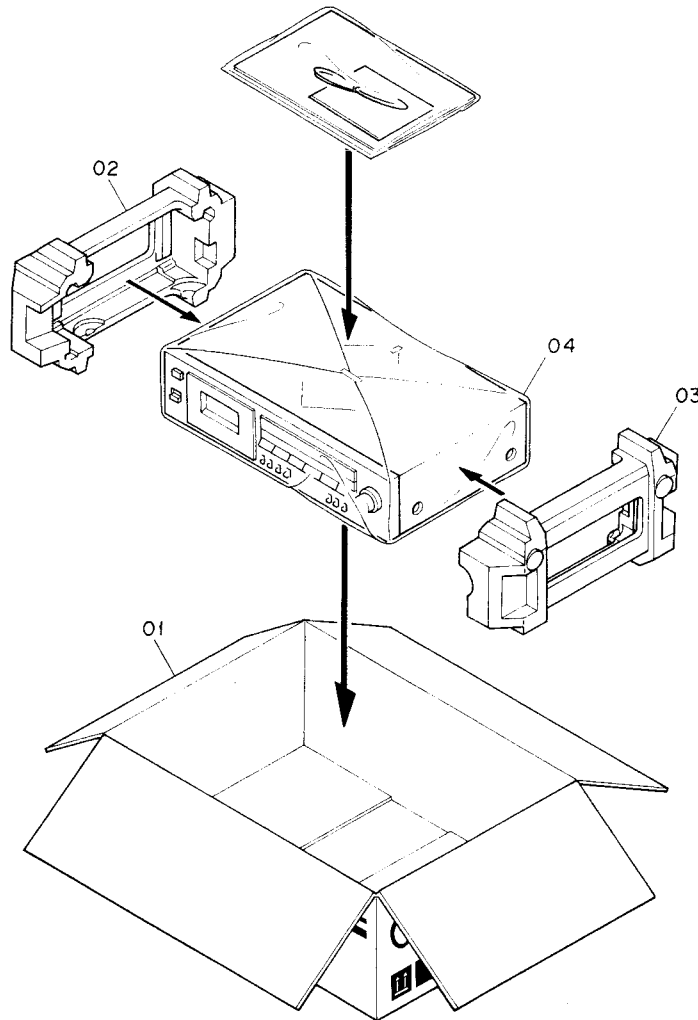


Fig. 1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
		<b>Package Ass'y</b>	<b>1</b>			<b>Accessory Ass'y</b>	<b>1</b>
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).

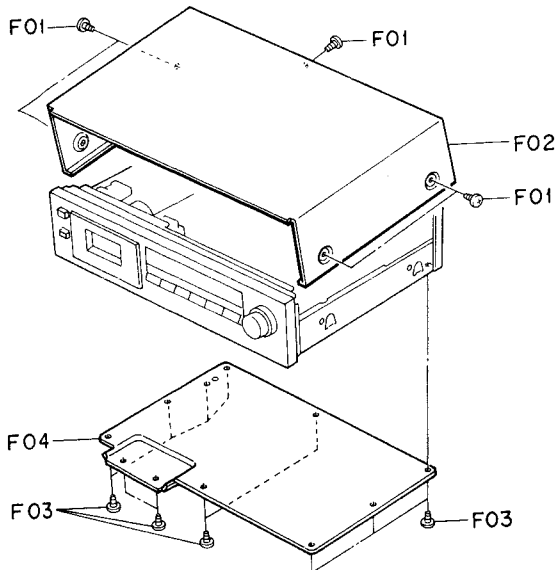


Fig. 2.1

### 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.

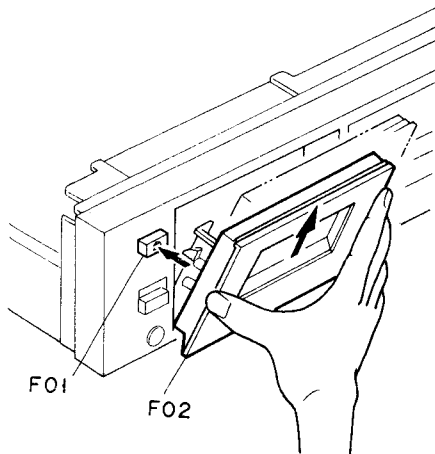


Fig. 2.2

### 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).

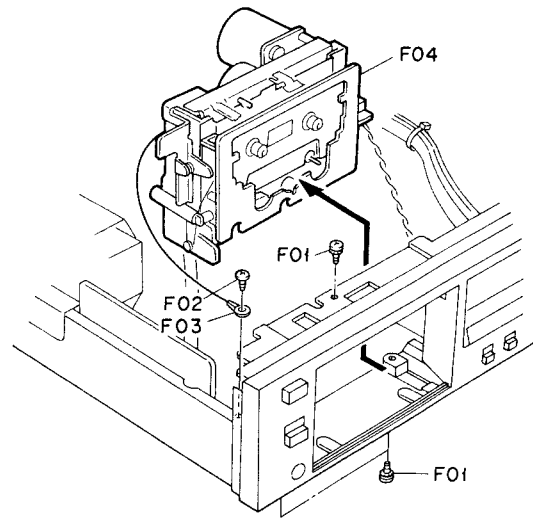


Fig. 2.3

### 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.

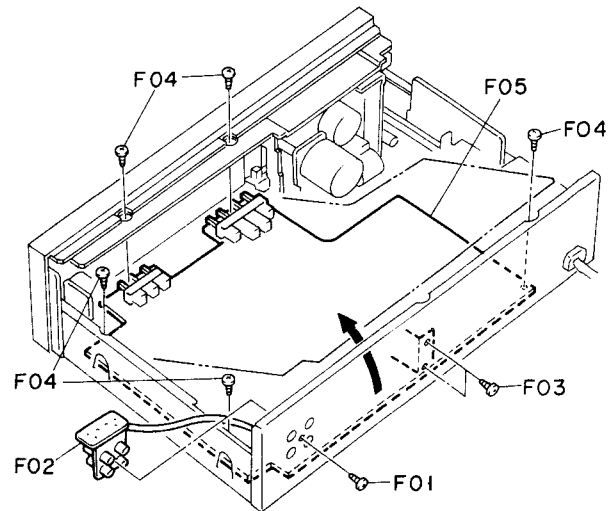


Fig. 2.4

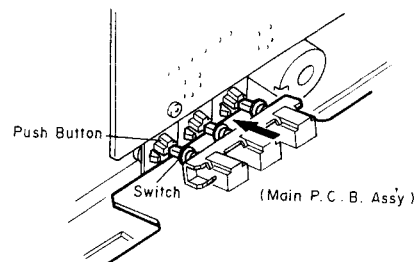


Fig. 2.5

### 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).

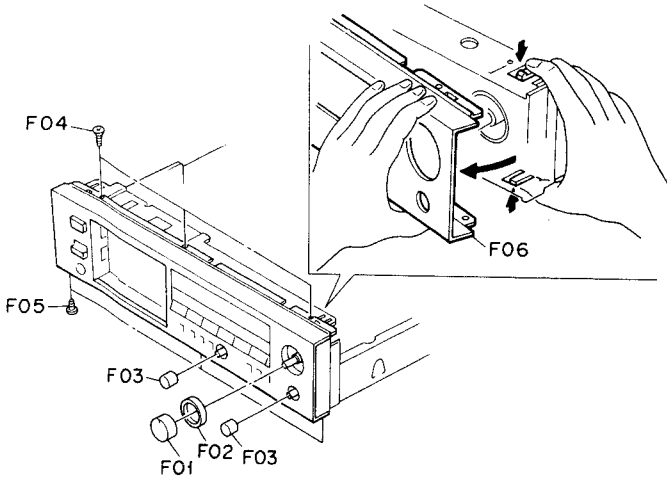


Fig. 2.6

### 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).

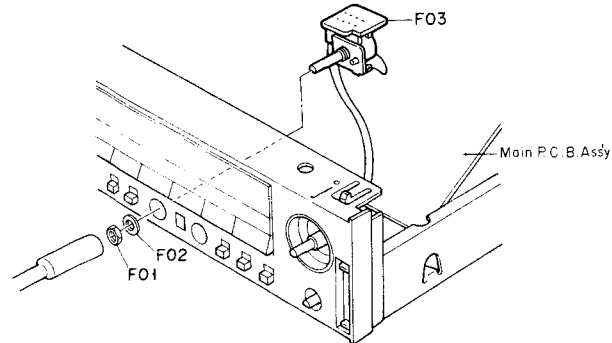


Fig. 2.7

### 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).

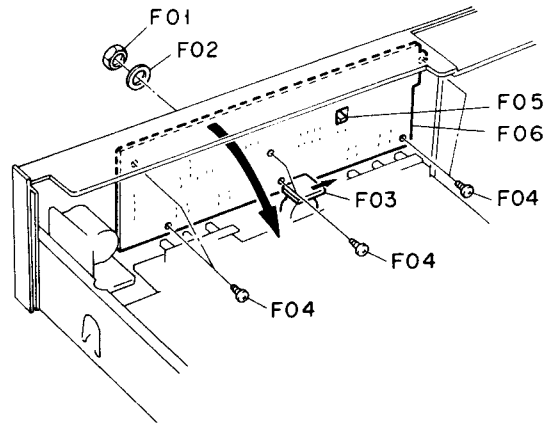


Fig. 2.8

### 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.

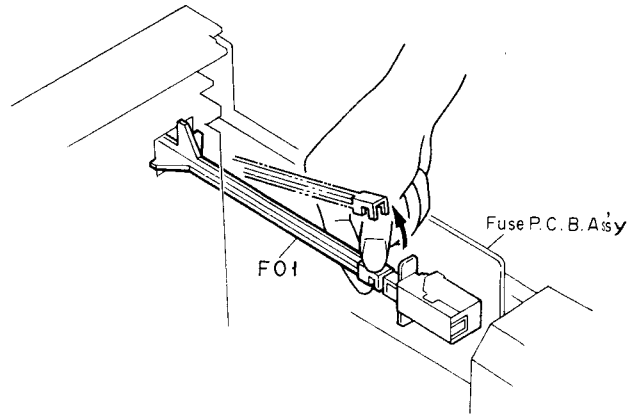


Fig. 2.9

### 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  $\mu\text{m}$  (OC80048A), 60  $\mu\text{m}$  (OC80038A), or 100  $\mu\text{m}$  (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.

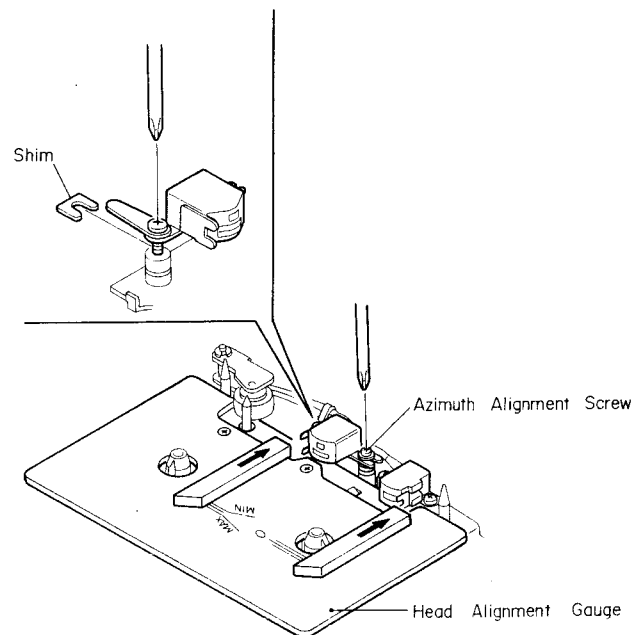


Fig. 4.1

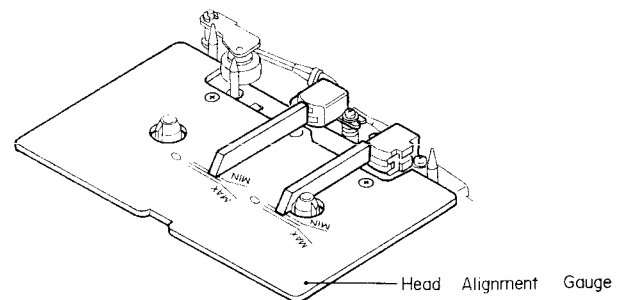


Fig. 4.2

#### 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  $320 \pm 50$  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 (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)  
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

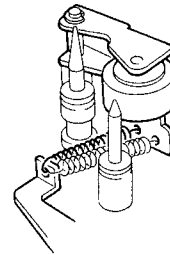


Fig. 4.3

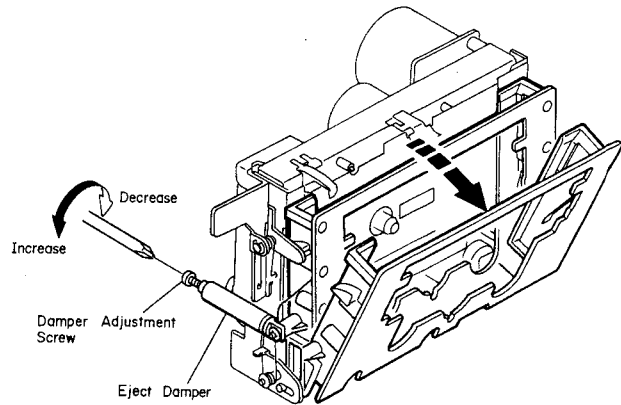


Fig. 4.4

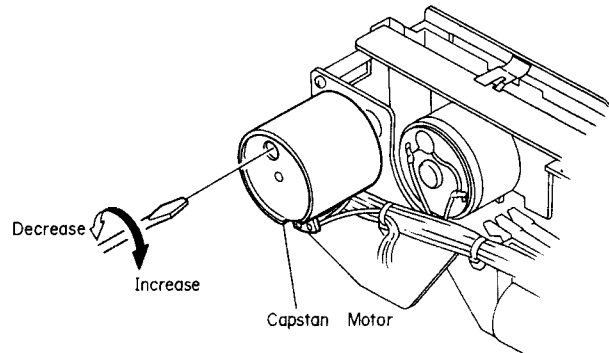


Fig. 4.5

5. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

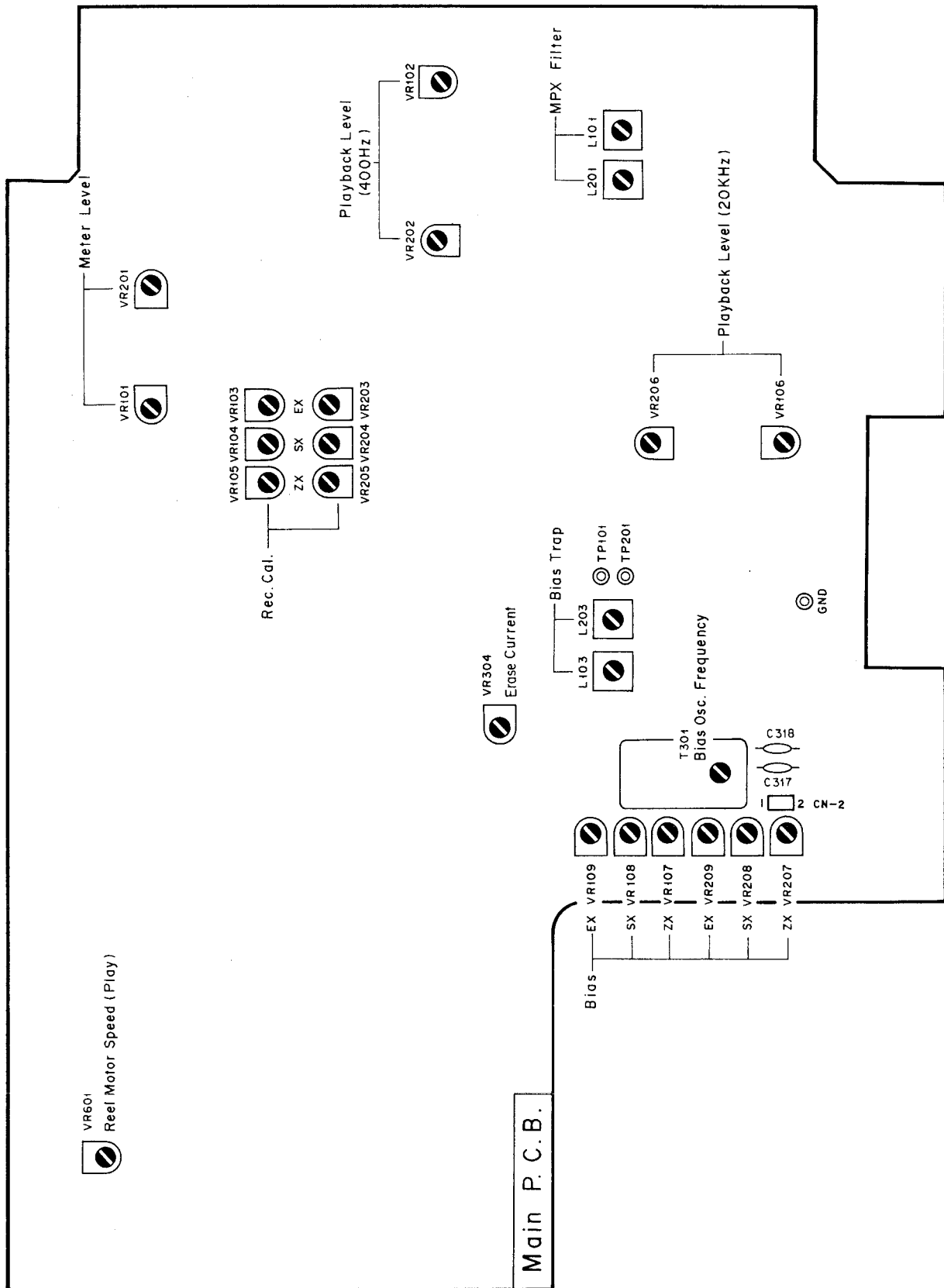


Fig. 5



## 6. ELECTRICAL ADJUSTMENTS

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Preliminary Step			<b>Output Level - Max.</b> Balance - Center <b>Bias Tune - Center</b> Eq. - 70 $\mu$ 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 $44 \pm 1$ g-cm on the Torque Gauge at 25 degrees ( $45 \pm 1$ g-cm at 20 degrees). 2. Check that the deviation of the torque value is within $\pm 10$ 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 $\mu$ s	Tape Speed Adj. Volume (Capstan Motor)	Adjust the volume incorporated in the capstan motor 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	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 $\pm 100$ Hz to Input Jacks	AC Voltmeter 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 Voltmeter to Output Jacks	Playback Eq. - 70 $\mu$ 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 Voltmeter 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 $\mu$ s Dolby NR - OFF MPX - OFF	Main P.C.B. VR106 VR206	<p>1. Load a 400 Hz level tape, play it back, and read the playback level.</p> <p>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.</p> <p>10 kHz: -20 dB -2 to +2 dB 15 kHz: -20 dB -2 to +3 dB 20 kHz: -20 dB -2 to +4 dB</p> <p>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:</p> <div style="text-align: center;"> </div> <p>3. Conduct step 6 "Record/Playback Head Azimuth Alignment".</p>
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 $\mu$ s Tape ZX Dolby NR - OFF MPX - OFF	Main P.C.B. T301 C317 C318 VR304	<p>1. Connect an additional 0.1 ohm resistor in series to the Erase Head and connect the AC voltmeter across it.</p> <p>2. Adjust T301 to obtain 105 kHz <math>\pm</math>1 kHz on the frequency counter. If bias oscillation frequency is above 106 kHz, short-circuit C317 and C318, and re-adjust T301 again.</p> <p>3. Adjust VR304 to obtain 17.5 mV (175 mA) on the AC voltmeter. (16.5 <math>\pm</math> 1 mV (165 <math>\pm</math> 10 mA will be accepted.)</p> <p>4. After completion of the erase current adjustment, re-check the bias oscillation frequency.</p> <p>5. Remove the additional 0.1 ohm resistor.</p>
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 Voltmeter and Distortion Meter to Output Jacks	Record and Playback Tape - ZX/SX/EX Eq. - 70 $\mu$ s (ZX/SX) 120 $\mu$ 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

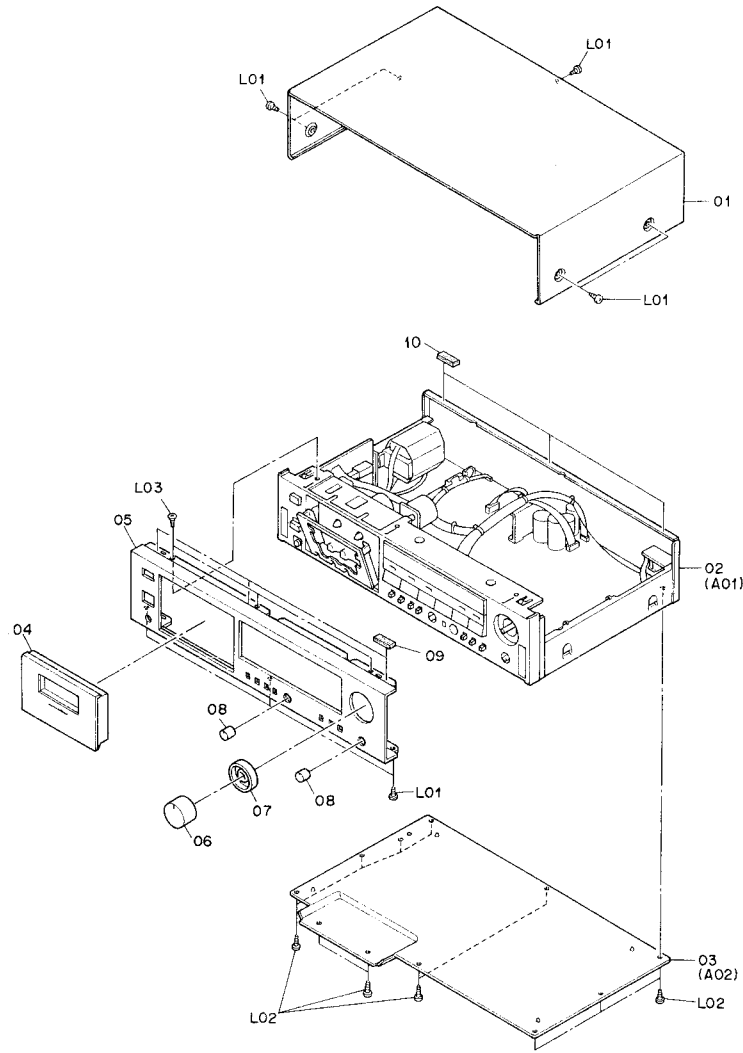


Fig. 7.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
<b>7.1. Synthesis</b>				08	HA05339A	Bias Volume Knob Ass'y	2
				09	OJ05453A	Top Cover Cushion	3
				10	OJ05407A	Top Cover Sheet	3
				L01	0E03433A	BT3x6 @ Binding Projected (Black Chromate)	8
01	OH05111A	Top Cover	1	L02	0E00868A	BT3x8 @ Binding	11
02	JA04308A	Chassis Ass'y (CR-2 (Australia))	1	L03	0E03054A	BT3x8 @ Countersunk	3
	JA04307A	Chassis Ass'y (CR-2 (Other))	1	—	0M03797A	Voltage Seal 240V (CR-2E (UK))	1
	JA04310A	Chassis Ass'y (CR-2 (Saudi Arabia))	1	—	0M03844B	Power Cord Label (CR-2E (UK))	1
	JA04311A	Chassis Ass'y (CR-2A (U.S.A.))	1	—	0M05148A	Production Date Seal (CR-2A)	1
	JA04305A	Chassis Ass'y (CR-2A (Canada))	1	—	0M04381A	EP Approval Label (CR-2E (Europe))	1
	JA04309A	Chassis Ass'y (CR-2E (Europe))	1	—	0M04732A	Voltage Label 120V (CR-2A (Canada))	1
	JA04304A	Chassis Ass'y (CR-2E (UK))	1	—	0M04811A	Voltage Caution Sheet (CR-2 (Other & Saudi Arabia))	1
	JA04306A	Chassis Ass'y (CR-20 (Japan))	1	—	0M05065A	Passed Label	1
03	JA04319A	Bottom Cover Ass'y (CR-2 & CR-2E)	1	—	0M05067A	CSA Approval Label (CR-2A (Canada))	1
	JA04329A	Bottom Cover Ass'y (CR-2A)	1	—	0M05068A	LA Label (CR-2A (U.S.A.))	1
	JA04340A	Bottom Cover Ass'y (CR-20)	1	—	0M05070A	Serial No. Seal (CR-2A)	1
04	HA05313A	Cassette Case Cover Ass'y	1	—	0M05114A	Amp. Number Seal	1
05	OH05134B	Front Panel (CR-2)	1	—	0M05111A	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	Qty
<b>7.2. Chassis Ass'y (A01)</b>			
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	OJ05427A	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	OH05095A	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	OH05165A	Cover Plate	1
10	OB12580A	LED P Green SLF-725D	1
11	CA08886A	Mechanism Ass'y	1
12	OB83255A	GND Wire Ass'y	1
13	OB83132A	2P Connector	1
14	OJ05402A	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	OJ05417C	Transformer Holder	1
17	OB50100A	Power Transformer (CR-2 (Australia) & CR-2E)	1
	OB50101A	Power Transformer (CR-2 (Other & Saudi Arabia))	1
	OB50099A	Power Transformer (CR-2A)	1
	OB50102A	Power Transformer (CR-20)	1
18	OJ05392A	Side Chassis L	1
19	BA06947A	Main P.C.B. Ass'y	1
20	OJ05451A	P.C.B. Cushion	1
21	OJ05394A	P.C.B. Holder Front	2
22	OB05241A	Power Code (CR-2 (Australia))	1
	OB08533A	Power Code (CR-2 (Other & Saudi Arabia))	1
	OB08504A	Power Code (CR-2A)	1
	OB08093U	Power Code (CR-2E (Europe))	1
	OB08348A	Power Code (CR 2E (UK))	1
	OB08219B	Power Code (CR-20)	1
23	OB90280A	Cord Bushing (CR-2 (Australia), CR-2A & CR-2E)	1
	OB90283A	Cord Bushing (CR-2 (Other & Saudi Arabia) & CR-20)	1
24	BA06970A	Pin Jack P.C.B. Ass'y	1
25	OJ05395A	P.C.B. Holder Rear	1
26	OH05146B	Rear Panel (CR-2 (Australia))	1
	OH05148B	Rear Panel (CR-2 (Other & Saudi Arabia))	1
	OH05144B	Rear Panel (CR-2A)	1
	OH05145B	Rear Panel (CR-2E)	1
	OH05147B	Rear Panel (CR-20)	1
27	OJ05393A	Side Chassis R	1
28	OB08515A	Insu-Lock	18
29	OB81771A	Voltage Selector (CR-2 (Other & Saudi Arabia))	1
30	OB60503A	Voltage Selector P.C.B. (CR-2 (Other & Saudi Arabia))	1
L01	OE00868A	BT3x8 @ Binding	10
L02	OE03212A	BT2.6x6 @ Binding with Toothed Lock Washer	3
L03	OE03433A	BT3x6 @ Binding (Black Chromate)	6
L04	OE00857A	BT3x6 @ Binding	2
L05	OE00921A	BT3x8 @ Binding (Black Chromate)	1
L06	OE00985A	M3x6 @ Binding (Black Chromate) (CR-2 (Australia), CR-2A, CR-2E & CR-20)	2
	OE00985A	M3x6 @ Binding (Black Chromate) (CR-2 (Other & Saudi Arabia))	3
L07	OJ05422A	Hole Plug	2
L08	OE03432A	BT3x6 @ Tapping (Black Chromate)	7
L09	OE03438A	ST4x6 @ Binding	2
L10	OE00859A	BT2.6x6 @ Binding	1
L11	OE03437A	FT2.5x3.5 @Pan (Black Chromate)	2
L12	OE03375A	Nut Hex. M9	1
L13	OE03376A	Washer 9mm	1
L14	OE03382A	Nut Hex. M7	2
L15	OE03383A	Washer 7mm	2
L16	OF00846A	BT3x8 @ Pan	2
-	OM05089A	Fuse Caution Label (CR-2A)	1

7.2. Chassis Ass'y (A01)

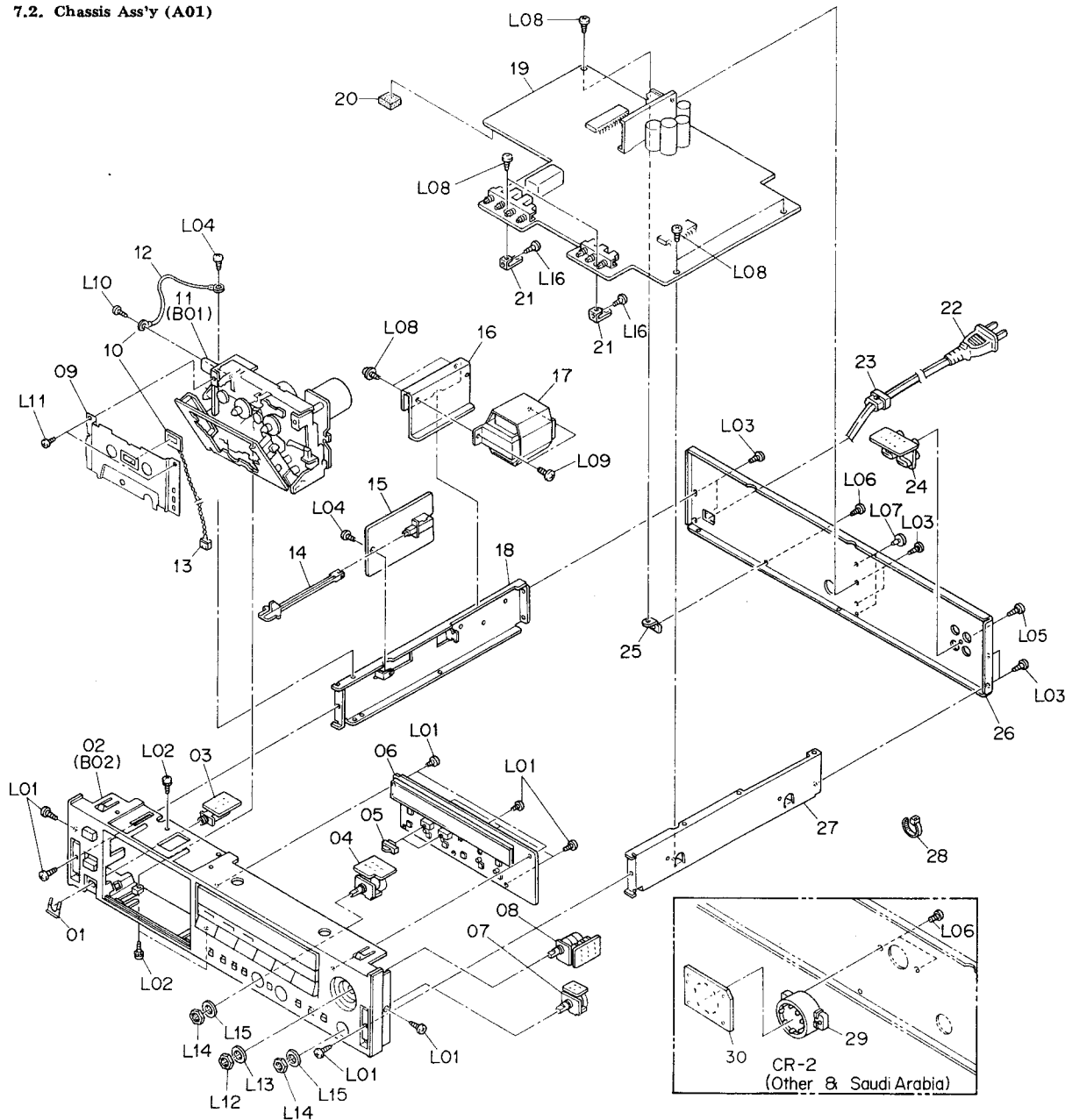


Fig. 7.2

7.3. Bottom Cover Ass'y (A02)

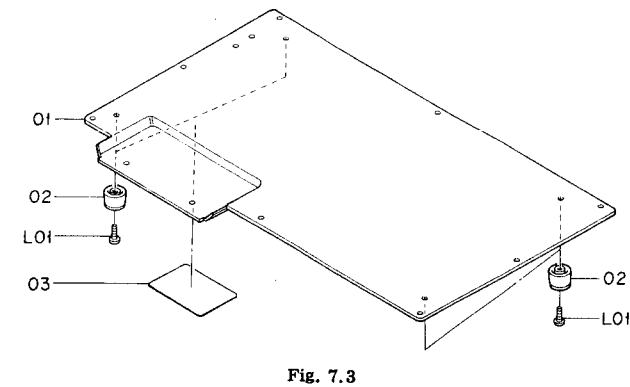


Fig. 7.3

Schematic Ref. No.	Part No.	Description	Qty
<b>7.3. Bottom Cover Ass'y</b>			
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)	1
		Serial No.: A32501001 -	
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)

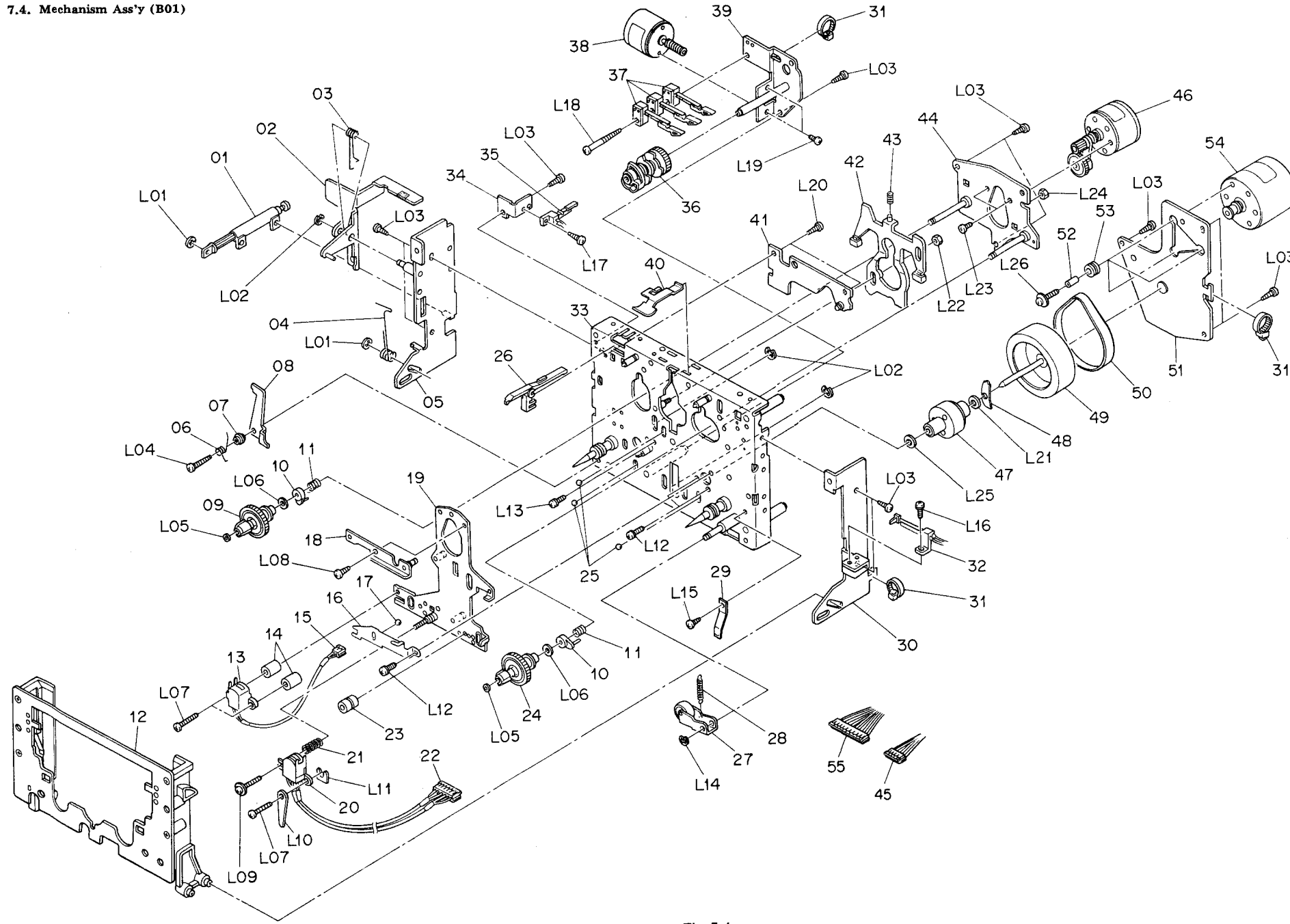


Fig. 7.4

Schematic Ref. No.	Part No.	Description	Qty
<b>7.4. Mechanism Ass'y (B01)</b>			
<b>B01</b>	<b>CA08886A</b>	<b>Mechanism Ass'y</b> 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)

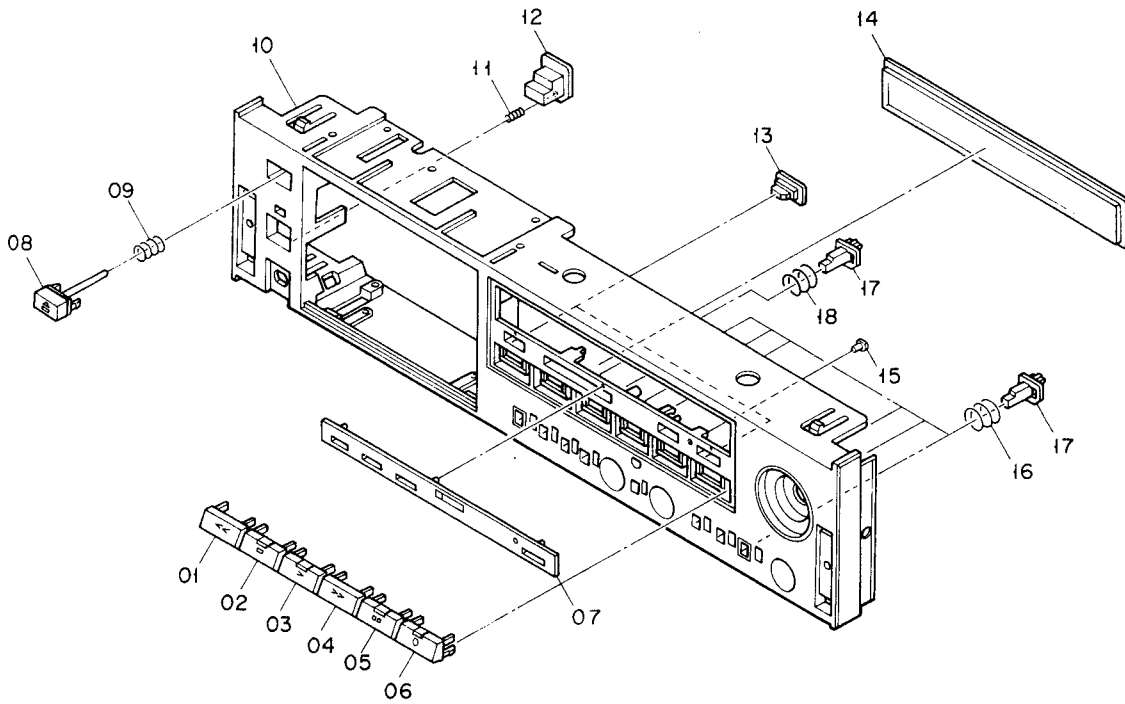


Fig. 7.5

Schematic Ref. No.	Part No.	Description	Q'ty
<b>7.5. Front Escutcheon Ass'y (B02)</b>			
<b>B02</b>	<b>HA05308A</b>	<b>Front Escutcheon Ass'y</b> Serial No.: A32501001 -	<b>1</b>
01	0H05126A	Rewind Button	1
02	HA05359A	Stop Button Ass'y	1
03	HA05343A	Play Button Ass'y	1
04	0H05129A	F.F. Button	1
05	HA05361A	Pause Button Ass'y	1
06	HA05360A	Rec. Button Ass'y	1
07	0H05100B	Function Plate	1
08	HA05344A	Eject Button Ass'y	1
09	0J05404A	Eject Spring	1
10	0H05122B	Front Escutcheon	1
11	0J05405A	Power Switch Spring	1
12	0H05125B	Power Switch Knob	1
13	0H05094A	Function Button	2
14	0H05101A	Display Lens	1
15	0H05103A	LED Lens B	1
16	0J05406A	Push Switch Spring	6
17	0H05097A	Push Button	7
18	0J05452B	EX Switch Spring	1
—	0J05458B	LED Lens Adhesive Tape	2
—	0J05459A	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

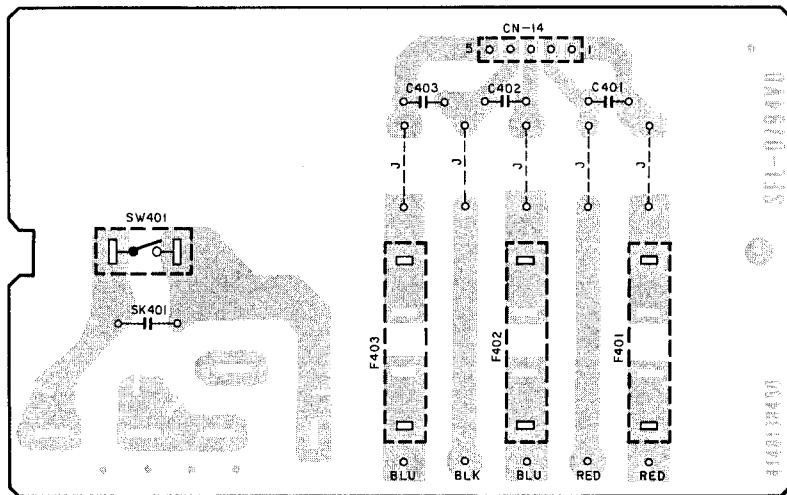


Fig. 8.1

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

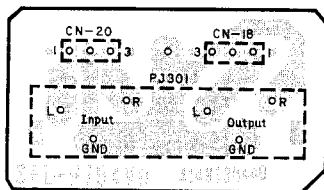


Fig. 8.2

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

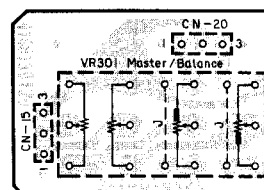


Fig. 8.3

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		
	BA06964A	Fuse P.C.B. Ass'y (CR-2 & CR-2E)	CN14	OB83161A	5P Connector		BA06970A	Pin Jack P.C.B. Ass'y
	BA06963A	Fuse P.C.B. Ass'y (CR-2A)	SW401	OB71006A	Power Switch SDL1P		OB60497A	Pin Jack P.C.B.
	BA06965A	Fuse P.C.B. Ass'y (CR-20)		OB08349B	Fuse CHP (1)	PJ301	OB81755A	4P Pin Jack
C401,402	OB60502A	Fuse P.C.B. CC 0.1μ 50V Z		OM04131B	Fuse Label T1A 250Vx2 (CR-2 & CR-2E) (1)	CN20	OW19300A	Wire 2791 24 300 WHT with Shrink Tube
C403	OB09292A	CC 0.1μ 50V Z		OM05082A	Fuse Label T800mA 250V (CR-2 & CR-2E) (1)		8.3. Input Volume P.C.B. Ass'y	
F401	OB90287A	Fuse T800mA (CR-2 & CR-2E)		OB81776A	Contact Pin (CR-2 & CR-2E) (5)		BA06966A	Input Volume P.C.B. Ass'y
F401	OB90286A	Fuse 1.0A (CR-2A)				VR301	OB60498A	Input Volume P.C.B.
F401	OB90290A	Fuse 1A (CR-20)					OB30077A	Volume 100KAx2
F402,403	OB90289A	Fuse T1A (CR-2 & CR-2E)					OJ05419A	Volume Ground Plate (1)
F402,403	OB90285A	Fuse 1.6A (CR-2A)					OV10050C	Wire 1007 26 Twisted 52 BLK C (1)
F402,403	OB90291A	Fuse 1.6A (CR-20)						
SK401	OB41829A	CC 4700P 400V (CR-2, CR-2A & CR-2E)						



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

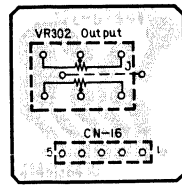


Fig. 8.4

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

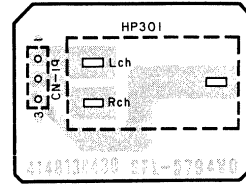


Fig. 8.5

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

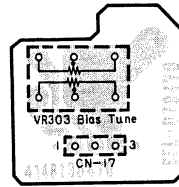


Fig. 8.6

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

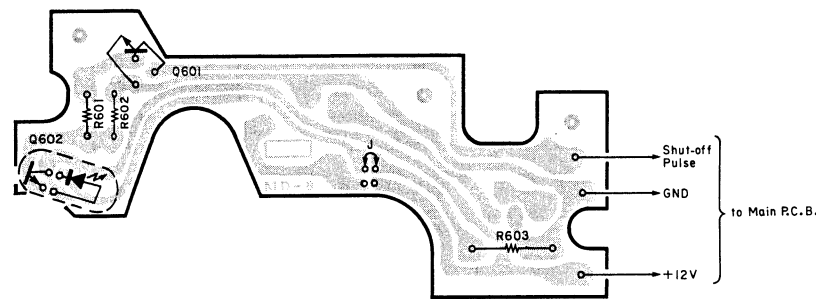


Fig. 8.7

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

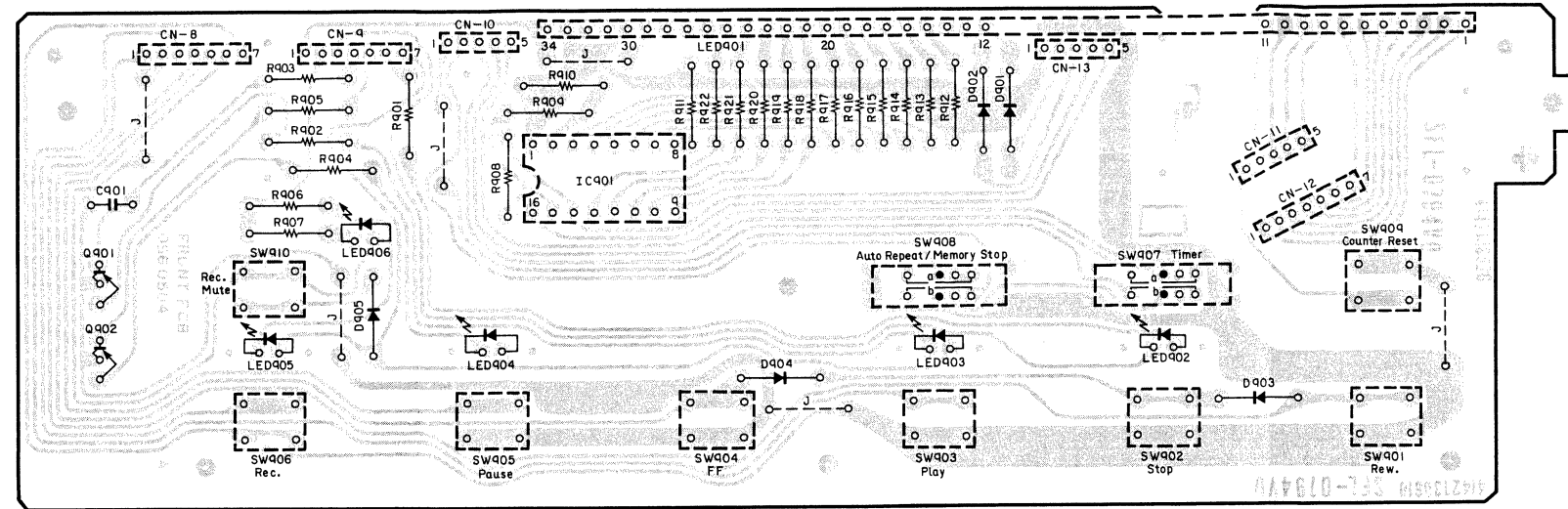


Fig. 8.8

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
	OB60499A	Output Volume P.C.B.		OB60500A	Bias Tune Volume P.C.B.
	OB30078A	Volume 10Kx2		OB30079A	Volume 100Kx2
	OJ05419A	Volume Ground Plate (1)		OJ05419A	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
	OB60501A	Headphone P.C.B.		OC80047A	Shut-off P.C.B. TR 2SC2812
OB81757A	Headphone Jack	OB06388A		Photo Reflector NJL5141	
		OB06389A		RK 680	
				RK 15K	
				RM 750	
			OV13130N		
			OV10115N		

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.8. Control P.C.B. Ass'y			SW901,902	OB70043A	Tact Switch SKHHPM
	BA06961A	Control P.C.B. Ass'y	SW903,904	OB70043A	Tact Switch SKHHPM
IC901	OB60504A	Control P.C.B. IC TA7612AP	SW905,906	OB70043A	Tact Switch SKHHPM
Q901,902	OB06013A	TR 2SA733 (P,Q)	SW907,908	OB07437A	Slide Switch ESD-14150
D901,902	OB12584A	SiD 1N4148	SW909,910	OB70043A	Tact Switch SKHHPM
D903,904	OB12584A	SiD 1N4148			
D905	OB12584A	SiD 1N4148	CN8	OB83155A	7P Connector
LED901	OB12575A	Display Unit SL-7663-03	CN9	OB83156A	7P Connector
LED902,903	OB12578A	LED SLR-34PC4F	CN10	OB83157A	5P Connector
LED904	OB12578A	LED SLR-34PC4F	CN11	OB83159A	5P Connector
LED905	OB12577A	LED SLR-34DC4F	CN12	OB83160A	7P Connector
LED906	OB12579A	LED SLR-320DC4F	CN13	OB83158A	5P Connector
R901	OB05578A	RK 180 1/4W J		OJ05416A	LED Reflector (4)
R902	OB09797A	RK 120 1/4W J			
R903	OB01846A	RK 4.7K 1/4W J			
R904	OB09797A	RK 120 1/4W J			
R905	OB01846A	RK 4.7K 1/4W J			
R906	OB20416A	RK 110 1/4W J			
R907	OB01706A	RK 47 1/4W J			
R908	OB09314A	RK 5.1K 1/4W J			
R909	OB01857A	RK 1K 1/4W J			
R910	OB20430A	RK 160 1/4W J			
R911	OB01888A	RK 10K 1/4W J			
R912	OB05795A	RK 150 1/4W J			
R913,914	OB01679A	RK 100 1/4W J			
R915,916	OB01679A	RK 100 1/4W J			
R917,918	OB01679A	RK 100 1/4W J			
R919,920	OB01679A	RK 100 1/4W J			
R921,922	OB01679A	RK 100 1/4W J			
C901	OB05557A	CML 0.015μ 50V J			

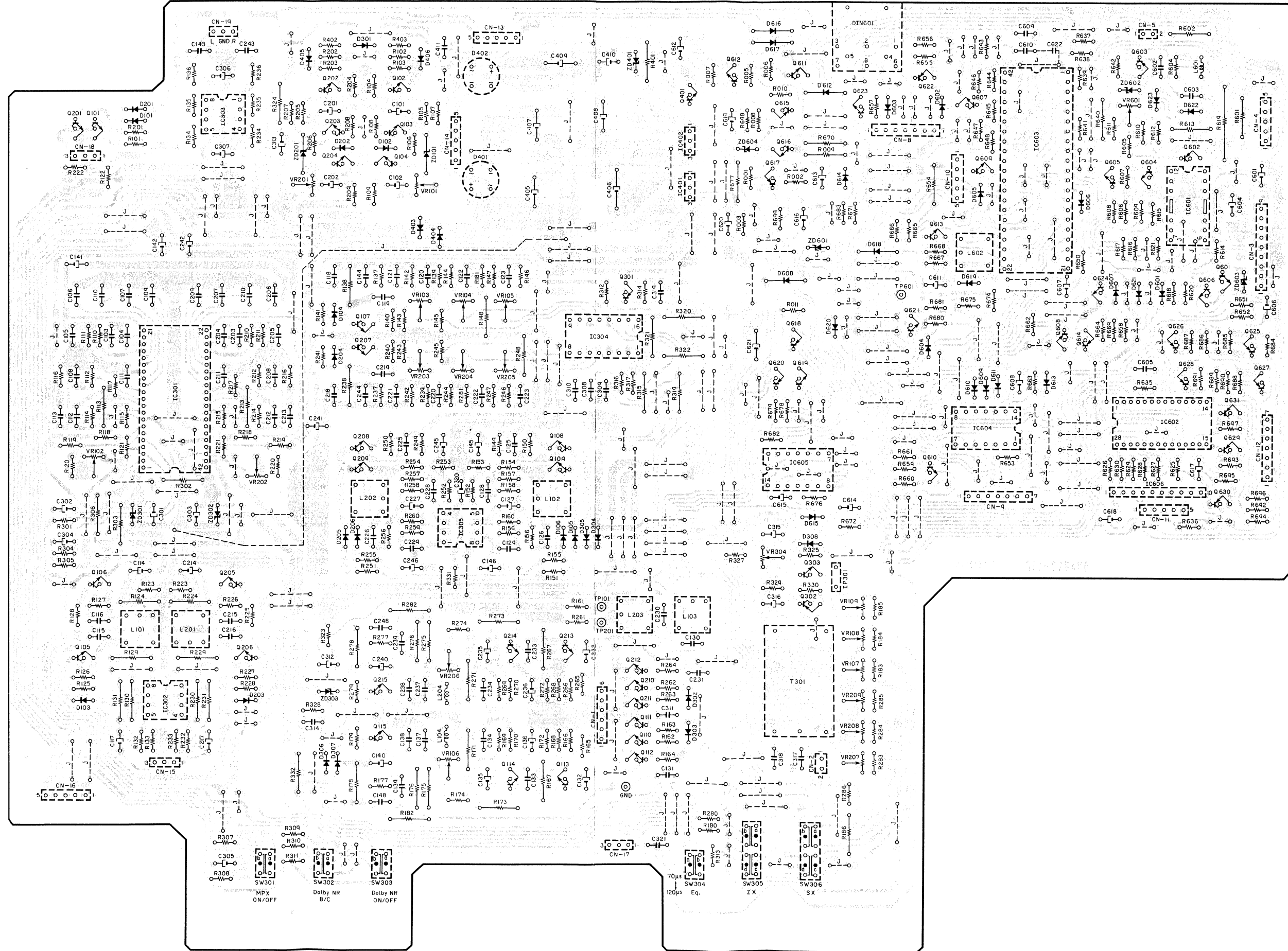


Fig. 8.9

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description			
8.9. Main P.C.B. Ass'y																										
BA06947A Main P.C.B. Ass'y			IC301 ZD301,302			Dolby NR			L103			L202			L203			IC303			IC601			IC602		
-- PB Eq. Amp. --			VR102			OB11363A IC CX20188			R230			OB09424A RM 4.75K 1/4W F			L103			OB51257A L-C Block TF10			-- Headphone Amp. --			-- Logic --		
Q110,111	OB06142A	TR 2SC2240 (BL)	VR202	OB32126A	Semi VR 5K	R231	OB09203A	RM 10K 1/4W F	L104	OB09711A	RK 27K 1/6W J	IC303	OB06370A	IC 4556D	IC601	OB11368A	IC LB1649	R637,638	OB09725A	RK 10	R639	OB09725A	RK 10			
Q112	OB01872A	TR 2SC945L (P,Q)	R110	OB32126A	ZD 10V	R232	OB09653A	RM 100 1/6W J	L202	OB09719A	RK 56K 1/6W J	IC602	OB09717A	RK 47K 1/6W J	IC602	OB06368A	IC LM6416E-106	R640	OB01889A	RK 10	R641	OB09725A	RK 10			
Q113,114	OB06142A	TR 2SC2240 (BL)	R111	OB12168A	RD10JS-T1B2	R233	OB09725A	RK 100K 1/6W J	L203	OB51257A	L-C Block TF10	IC603	OB09701A	RK 10K 1/6W J	IC603	OB11020A	IC	R642	OB09677A	RK 1K	R643,644	OB09717A	RK 47			
Q115	OB01872A	TR 2SC945L (P,Q)	R112			C114	OB09332A	CE 2.2μ 50V (LN)					OB05579A	RK 22 1/4W J			TMP4315BP-1814	R645,646	OB09717A	RK 47	R646,648	OB09717A	RK 47			
Q210,211	OB06142A	TR 2SC2240 (BL)	R113			C115	OB05687A	CML 1200P 50V J	R149	OB09711A	RK 27K 1/6W J		OB05579A	RK 22 1/4W J					OB09713A	RK 33	R651	OB09687A	RK 2.7			
Q212	OB01872A	TR 2SC945L (P,Q)	R114			C116	OB09189A	CML 2700P 50V J	R150	OB09719A	RK 56K 1/6W J		OB05579A	RK 47K 1/6W J	IC604	OB06214A	IC μPD4071BC	R652	OB09725A	RK 10	R653	OB09713A	RK 10			
Q213,214	OB06142A	TR 2SC2240 (BL)	R115			C117	OB09223A	CE 1μ 50V (LN)	R151	OB09703A	RK 12K 1/6W J		OB05582A	CML 0.022μ 50V J	IC605	OB06066A	TR 2SD471 (L,M)	R654	OB09737A	RK 33	R655	OB09725A	RK 33			
Q215	OB01872A	TR 2SC945L (P,Q)	R116			C118	OB09332A	CE 2.2μ 50V (LN)	R152	OB09677A	RK 1K 1/6W J		OB01400A	CML 0.022μ 50V J	IC606	OB06013A	TR 2SA733 (P,Q)	R655,656	OB09725A	RK 10	R656,607	OB09725A	RK 10			
ZD303	OB12168A	ZD 10V	R117			C216	OB09189A	CML 2700P 50V J	R153	OB09741A	RK 470K 1/6W J			CE 100μ 16V	Q601	OB08066A	TR 2SA733 (P,Q)	R657	OB09725A	RK 10	R658	OB09725A	RK 10			
			R118			C217	OB09223A	CE 1μ 50V (LN)	R154	OB09671A	RK 560 1/6W J				Q602,603	OB06013A	TR 2SC945L (P,Q)	R658	OB09725A	RK 10	R659	OB09725A	RK 10			
			R119						R155	OB09705A	RK 15K 1/6W J				Q604,605	OB01872A	TR 2SC945L (P,Q)	R659	OB09725A	RK 10	R660	OB09725A	RK 10			
D302,303	OB06398A	SiD 1SS176	R120						R156	OB09699A	RK 470 1/6W J				Q606,607	OB01872A	TR 2SC945L (P,Q)	R660	OB09725A	RK 10	R661	OB09725A	RK 10			
D306,307	OB06398A	SiD 1SS176	R121						R157	OB09699A	RK 470 1/6W J				Q608	OB06013A	TR 2SA733 (P,Q)	R661	OB09725A	RK 10	R662	OB09725A	RK 10			
L104	OB51264A	Inductor 36mH	R122						R158	OB09699A	RK 3.3K 1/6W J				Q609	OB06013A	TR 2SA733 (P,Q)	R662	OB09725A	RK 10	R663	OB09725A	RK 10			
L204	OB51264A	Inductor 36mH	R123						R159	OB09719A	RK 56K 1/6W J				Q610	OB06013A	TR 2SA733 (P,Q)	R663	OB09725A	RK 10	R664	OB09725A	RK 10			
VR106	OB32125A	Semi VR 2K	R124						R160	OB09735A	RK 270K 1/6W J				Q611,612	OB06013A	TR 2SA733 (P,Q)	R664	OB09725A	RK 10	R665	OB09725A	RK 10			
VR206	OB32125A	Semi VR 2K	R125						R161	OB09735A	RK 270K 1/6W J				Q613	OB06069A	TR 2SB564 (L,M)	R665	OB09725A	RK 10	R666	OB09725A	RK 10			
R162,163	OB09695A	RK 5.6K 1/6W J	R126						R162	OB09735A	RK 270K 1/6W J				Q614	OB06299A	TR 2SC2878	R666	OB09725A	RK 10	R667	OB09725A	RK 10			
R164	OB09695A	RK 5.6K 1/6W J	R127						R163	OB09735A	RK 270K 1/6W J				Q615	OB06299A	TR 2SC2878	R667	OB09725A	RK 10	R668	OB09725A	RK 10			
R165	OB09629A	RK 10K 1/6W J	R128						R164	OB09735A	RK 270K 1/6W J				Q616	OB06299A	TR 2SC2878	R668	OB09725A	RK 10	R669	OB09725A	RK 10			
R166	OB09741A	RK 470K 1/6W J	R129						R165	OB09735A	RK 270K 1/6W J				Q617,618	OB06299A	TR 2SC2878	R669	OB09725A	RK 10	R670	OB09725A	RK 10			
R167	OB09330A	RK 100K 1/4W J	R130						R166	OB09735A	RK 270K 1/6W J				Q619	OB06299A	TR 2SC2878	R670	OB09725A	RK 10	R671	OB09725A	RK 10			
R168	OB09651A	RK 82 1/6W J	R131						R167	OB09735A	RK 270K 1/6W J				Q620	OB06299A	TR 2SC2878	R671	OB09725A	RK 10	R672	OB09725A	RK 10			
R169	OB09711A	RK 27K 1/6W J	R132						R168	OB09735A	RK 270K 1/6W J				Q621	OB06299A	TR 2SC2878	R672	OB09725A	RK 10	R673	OB09725A	RK 10			
R170	OB09731A	RK 180K 1/6W J	R133						R169	OB09735A	RK 270K 1/6W J				Q622	OB06299A	TR 2SC2878	R673	OB09725A	RK 10	R674	OB09725A	RK 10			
R171	OB09432A	RM 8.25K 1/4W F	R134						R170	OB09735A	RK 270K 1/6W J				Q623,624	OB06299A	TR 2SC2878	R674	OB09725A	RK 10	R675	OB09725A	RK 10			
R172	OB09685A	RK 2.2K 1/6W J	R135						R171	OB09735A	RK 270K 1/6W J				Q625,626	OB06299A	TR 2SC2878	R675	OB09725A	RK 10	R676	OB09725A	RK 10			
R173	OB09330A	RK 100K 1/4W J	R136						R172	OB09735A	RK 270K 1/6W J				Q627,628	OB06299A	TR 2SC2878	R676	OB09725A	RK 10	R677	OB09725A	RK 10			
R174	OB09655A	RK 120 1/6W J	R137						R173	OB09735A	RK 270K 1/6W J				Q629,630	OB06299A	TR 2SC2878	R677	OB09725A	RK 10	R678	OB09725A	RK 10			
R175	OB22758A	RM 14.0K 1/4W F	R138						R174	OB09735A	RK 270K 1/6W J				Q631	OB06299A	TR 2SC2878	R678	OB09725A	RK 10	R679	OB09725A	RK 10			
R176	OB09534A	RM 12.7K 1/4W F	R139						R175	OB09735A	RK 270K 1/6W J				Q631	OB06299A	TR 2SC2878	R679	OB09725A	RK 10	R680	OB09725A	RK 10			
R177	OB09749A	RK 1M 1/6W J	R140						R176	OB09735A	RK 270K 1/6W J				ZD601	OB12168A	ZD 10V	R680	OB09725A	RK 10	R681	OB09725A	RK 10			
R178	OB22416A	RM 44.2K 1/6W F	R141						R177	OB09735A	RK 270K 1/6W J				ZD602	OB12150A	ZD 5.6V	R681	OB09725A	RK 10	R682	OB09725A	RK 10			
R179	OB09703A	RK 12K 1/6W J	R142						R178	OB09735A	RK 270K 1/6W J				ZD603	OB12153A	ZD 6.2V	R682	OB09725A	RK 10	R683	OB09725A	RK 10			
R182	OB22416A	RM 44.2K 1/6W F	R143						R179	OB09735A	RK 270K 1/6W J				ZD604	OB12174A	ZD 12V	R683	OB09725A	RK 10	R684	OB09725A	RK 10			
R262,263	OB09695A	RK 5.6K 1/6W J	R144						R180	OB09735A	RK 270K 1/6W J				D601,602	OB06398A	SiD 1SS176	R684	OB09725A	RK 10	R685	OB09725A	RK 10			
R264	OB09695A	RK 5.6K 1/6W J	R145						R181	OB09735A	RK 270K 1/6W J				D603,604	OB06398A	SiD 1SS176	R685	OB09725A	RK 10	R686	OB09725A	RK 10			
R265	OB09629A	RK 10K 1/6W J	R146						R182	OB09735A	RK 270K 1/6W J				D605,606	OB06398A	SiD 1SS176	R686	OB09725A	RK 10	R687	OB09725A	RK 10			
R266	OB09741A	RK 470K 1/6W J	R147						R183	OB09735A	RK 270K 1/6W J				D607	OB06398A	SiD 1SS176	R687	OB09725A	RK 10	R688	OB09725A	RK 10			
R267	OB09330A	RK 100K 1/4W J	R148						R184	OB09735A	RK 270K 1/6W J				D608	OB06398A	SiD 1SS176	R688	OB09725A	RK 10	R689	OB09725A	RK 10			
R268	OB09651A	RK 82 1/6W J	R149						R185	OB09735A	RK 270K 1/6W J				D609,610	OB06398A	SiD 1SS176	R689	OB09725A	RK 10	R690	OB09725A	RK 10			
R269	OB09711A	RK 27K 1/6W J	R150						R186	OB09735A	RK 270K 1/6W J				D611	OB06398A	SiD 1SS176	R690	OB09725A	RK 10	R691	OB09725A	RK 10			
R270	OB09731A	RK 180K 1/6W J	R151						R187	OB09735A	RK 270K 1/6W J				D612	OB06398A	SiD 1SS176	R691	OB09725A	RK 10	R692	OB09725A	RK 10			
R271	OB09432A	RM 8.25K 1/4W F	R152						R188	OB09735A	RK 270K 1/6W J				D613,614	OB06398A	SiD 1SS176	R692	OB09725A	RK 10	R693	OB09725A	RK 10			
R272	OB09685A	RK 2.2K 1/6W J	R153						R189	OB09735A	RK 270K 1/6W J				D615	OB06398A	SiD 1SS176	R693	OB09725A	RK 10	R694	OB09725A	RK 10			
R273	OB09330A	RK 100K 1/4W J	R154						R190	OB09735A	RK 270K 1/6W J				D616,617	OB06398A	SiD 1SS176	R694	OB09725A	RK 10	R695	OB09725A	RK 10			
R274	OB09655A	RK 120 1/6W J	R155						R191	OB09735A	RK 270K 1/6W J				D618	OB06398A	SiD 1SS176	R695	OB09725A	RK 10	R696	OB09725A	RK 10			
R275	OB22758A	RM 14.0K 1/4W F	R156						R192	OB09735A	RK 270K 1/6W J				D619,620	OB06398A	SiD 1SS176	R696	OB09725A	RK 10	R697	OB09725A	RK 10			
R276	OB																									



	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	
			- Dolby NR -																	
A	Main P.C.B. Ass'y	IC301	OB11363A	IC CX20188	R230	OB09424A	RM 4.75K 1/4W F	L103	OB51257A	L-C Block TF10 42-1274										
		ZD301,302	OB12168A	ZD 10V	R231	OB09203A	RM 10K 1/4W F	L202	OB51259A	Trap Coil 10.5mH	IC303	OB06370A	IC 4556D	IC601	OB11368A	IC LB1649	R637,638	OB09725A	RK 100K 1/6W J	
				RD10JS-T1B2	R232	OB09653A	RK 100 1/6W J	L203	OB51257A	L-C Block TF10 42-1274	R134	OB09717A	RK 47K 1/6W J	IC602	OB06368A	IC LM6416E-106	R639	OB09725A	RK 100K 1/6W J	
	Amp. -	VR102	OB32126A	Semi VR 5K	R233	OB09725A	RK 100K 1/6W J				R135	OB09701A	RK 10K 1/6W J	IC603	OB11020A	IC	R640	OB09725A	RK 100K 1/6W J	
		VR202	OB32126A	Semi VR 5K	C114	OB09332A	CE 2.2μ 50V (LN)				R136	OB05579A	RK 22 1/4W J			TMP4315BP-1814	R642	OB09677A	RK 1K 1/6W J	
	TR 2SC2240 (BL)	R110	OB09673A	RK 680 1/6W J	C115	OB05687A	CML 1200P 50V J	R149	OB09711A	RK 27K 1/6W J	R136	OB05579A	RK 22 1/4W J	IC604	OB06214A	IC μPD4071BC	R643,644	OB09717A	RK 47K 1/6W J	
	TR 2SC945L (P,Q)	R111	OB09700A	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 J	IC605	OB06178A	IC μPD4011BC	R645,646	OB09717A	RK 47K 1/6W J	
	TR 2SC2240 (BL)	R112	OB09698A	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 J	IC606	OB11369A	IC TA64	R647,648	OB09717A	RK 47K 1/6W J	
	TR 2SC945L (P,Q)	R113	OB22380A	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 J	Q601	OB06066A	TR 2SD471 (L,M)	R651	OB09713A	RK 33K 1/6W J	
	TR 2SC2240 (BL)	R114	OB22201A	RM 562 1/6W F	C215	OB05687A	CML 1200P 50V J	R153	OB09741A	RK 470K 1/6W J	C143	OB05582A	CML 0.022μ 50V J	Q602	OB06013A	TR 2SA733 (P,Q)	R652	OB09687A	RK 2.7K 1/6W J	
	TR 2SC945L (P,Q)	R115	OB22294A	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 J	Q603	OB06013A	TR 2SA733 (P,Q)	R653	OB09725A	RK 100K 1/6W J	
	TR 2SC2240 (BL)	R116	OB22285A	RM 3.24K 1/6W F	C217	OB09223A	CE 1μ 50V (LN)	R155	OB09705A	RK 15K 1/6W J	C306,307	OB01400A	CME 100μ 16V	Q604,605	OB01872A	TR 2SC945L (P,Q)	R654	OB09737A	RK 330K 1/6W J	
	TR 2SC945L (P,Q)	R117	OB09749A	RK 1M 1/6W J				R156	OB09669A	RK 470 1/6W J			Q606,607	OB01872A	TR 2SC945L (P,Q)	R655,656	OB05509A	RK 33K 1/4W J		
	ZD 10V	R118	OB22716A	RM 9.09K 1/4W F				R157	OB09691A	RK 3.9K 1/6W J			Q608	OB06013A	TR 2SA733 (P,Q)	R657	OB09725A	RK 100K 1/6W J		
	RD10JS-T1B2	R119	OB09707A	RK 18K 1/6W J	IC304	OB11027A	IC TC9145P	R158	OB09689A	RK 3.3K 1/6W J	IP301	OB11335A	IC Protector	Q610	OB01872A	TR 2SC945L (P,Q)	R658	OB09725A	RK 100K 1/6W J	
	SID 1SS176	R120	OB09681A	RK 1.5K 1/6W J	Q107	OB01872A	TR 2SC945L (P,Q)	R159	OB09719A	RK 56K 1/6W J	Q302	OB06069A	IC ICP-N15-T104	Q611,612	OB01872A	TR 2SC945L (P,Q)	R659	OB09703A	RK 12K 1/6W J	
	SID 1SS176	R121	OB22229A	RM 1.00K 1/6W F	Q207	OB01872A	TR 2SC945L (P,Q)	R160	OB09735A	RK 270K 1/6W J	Q303	OB06299A	TR 2SC2878	Q613	OB01872A	TR 2SC945L (P,Q)	R660,661	OB09693A	RK 4.7K 1/6W J	
	Inductor 36mH	R122	OB09673A	RK 680 1/6W J	Q301	OB06013A	TR 2SA733 (P,Q)	R161	OB09697A	RK 6.8K 1/6W J	D308	OB06398A	SID 1SS176	Q614	OB06069A	TR 2SB564 (L,M)	R662	OB09735A	RK 220K 1/6W J	
	Inductor 36mH	R210	OB09673A	RK 680 1/6W J	D104	OB06398A	SID 1SS176	R249	OB09711A	RK 27K 1/6W J	D308	OB06398A	SID 1SS176	Q615	OB06013A	TR 2SA733 (P,Q)	R663	OB09733A	RK 220K 1/6W J	
	Semi VR 2K	R211	OB09700A	RK 9.1K 1/6W J	D204	OB06398A	SID 1SS176	R250	OB09719A	RK 56K 1/6W J	T301	OB51255A	Bias Osc. Unit	Q616	OB01872A	TR 2SC945L (P,Q)	R664	OB09657A	RK 150 1/6W J	
	Semi VR 2K	R212	OB09698A	RK 7.5K 1/6W J	VR103,104	OB32127A	Semi VR 10K	R252	OB09677A	RK 1K 1/6W J	VR107,108	OB32128A	Semi VR 20KB	Q617,618	OB06013A	TR 2SA733 (P,Q)	R665	OB09725A	RK 100K 1/6W J	
	RK 5.6K 1/6W J	R213	OB22380A	RM 22.1K 1/6W F	VR105	OB32128A	Semi VR 20K	R253	OB09741A	RK 470K 1/6W J	VR109	OB32128A	Semi VR 20KB	Q619	OB01872A	TR 2SC945L (P,Q)	R666	OB09693A	RK 4.7K 1/6W J	
	RK 5.6K 1/6W J	R214	OB22201A	RM 562 1/6W F	VR203,204	OB32127A	Semi VR 10K	R254	OB09671A	RK 560 1/6W J	VR207,208	OB32128A	Semi VR 20KB	Q620	OB10050A	TR 2SA970 (BL)	R667	OB09719A	RK 56K 1/6W J	
	RK 10 1/6W J	R215	OB22294A	RM 3.83K 1/6W F	VR205	OB32128A	Semi VR 20K	R255	OB09705A	RK 15K 1/6W J	VR209	OB32128A	Semi VR 20KB	Q621	OB01872A	TR 2SC945L (P,Q)	R668	OB09719A	RK 56K 1/6W J	
	RK 470K 1/6W J	R216	OB22285A	RM 3.24K 1/6W F	R137	OB09705A	RK 15K 1/6W J	R256	OB09669A	RK 470 1/6W J	VR304	OB32126A	Semi VR 5K	Q622	OB06013A	TR 2SA733 (P,Q)	R669	OB09713A	RK 33K 1/6W J	
	RK 100K 1/4W J	R217	OB09749A	RK 1M 1/6W J	R138	OB09577A	RM 7.15K 1/4W F	R257	OB09691A	RK 3.9K 1/6W J	R180	OB09701A	RK 10K 1/6W J	Q623,624	OB01872A	TR 2SC945L (P,Q)	R670	OB01889A	RK 100K 1/4W J	
	RK 82 1/6W J	R218	OB22716A	RM 9.09K 1/4W F	R139	OB09689A	RK 3.3K 1/6W J	R258	OB09689A	RK 3.3K 1/6W J	R183	OB09653A	RK 100 1/6W J	Q625,626	OB06013A	TR 2SA733 (P,Q)	R671	OB09713A	RK 33K 1/6W J	
	RK 27K 1/6W J	R219	OB09707A	RK 18K 1/6W J	R140	OB09749A	RK 1M 1/6W J	R259	OB09719A	RK 56K 1/6W J	R184	OB09695A	RK 5.6K 1/6W J	Q627,628	OB06013A	TR 2SA733 (P,Q)	R672	OB09749A	RK 1M 1/6W J	
	RK 180K 1/6W J	R220	OB09681A	RK 1.5K 1/6W J	R141	OB09697A	RK 6.8K 1/6W J	R260	OB09735A	RK 270K 1/6W J	R185	OB09703A	RK 12K 1/6W J	Q629,630	OB06013A	TR 2SA733 (P,Q)	R673	OB09725A	RK 100K 1/6W J	
	RM 8.25K 1/4W F	R221	OB22294A	RM 3.83K 1/6W F	R142	OB09707A	RK 18K 1/6W J	R261	OB09697A	RK 6.8K 1/6W J	R186	OB09705A	RK 15K 1/6W J	R674	OB06013A	TR 2SA733 (P,Q)	R674	OB09689A	RK 3.3K 1/6W J	
	RK 2.2K 1/6W J	R301	OB09709A	RK 22K 1/6W J	R143	OB09687A	RK 2.7K 1/6W J	R331	OB09663A	RK 270 1/6W J	R280	OB09701A	RK 10K 1/6W J	R675	OB09705A	RK 15K 1/6W J	R675	OB09705A	RK 15K 1/6W J	
	RK 100K 1/4W J	R302	OB09466A	RM 130K 1/4W F	R144	OB09701A	RK 10K 1/6W J	C125	OB01804A	CML 3900P 50V J	R283	OB09653A	RK 100 1/6W J	R676	OB09701A	RK 10K 1/6W J	R676	OB09705A	RK 100K 1/6W J	
	RK 120 1/6W J	R303	OB24146A	RF 62 1/4W J	R145	OB09687A	RK 2.7K 1/6W J	C126	OB05659A	CML 5600P 50V J	R284	OB09695A	RK 5.6K 1/6W J	R677	OB09701A	RK 10K 1/6W J	R677	OB09705A	RK 15K 1/6W J	
	RM 14.0K 1/4W F	R304,305	OB09701A	RK 10K 1/6W J	R146	OB09693A	RK 4.7K 1/6W J	C127	OB09218A	CE 47μ 16V (LN)	R285	OB09703A	RK 12K 1/6W J	ZD602	OB12150A	ZD 5.6V	R678	OB09749A	RK 1M 1/6W J	
	RM 12.7K 1/4W F	R306	OB24146A	RF 62 1/4W J	R147	OB09705A	RK 15K 1/6W J	C128	OB01802A	CML 2200P 50V J	R286	OB09705A	RK 15K 1/6W J	ZD603	OB12153A	ZD 6.2V	R679	OB09725A	RK 100K 1/6W J	
	RK 1M 1/6W J	C103	OB05681A	CML 0.01μ 50V J	R148	OB01846A	RK 4.7K 1/4W J	C129	OB05796A	CML 0.047μ 50V J	R325	OB09670A	RK 510 1/6W J	ZD604	OB12174A	ZD 12V	R680	OB09737A	RK 330K 1/6W J	
	RM 44.2K 1/6W F	C104	OB41143A	CPP 5600P 100V G	R181	OB09677A	RK 1K 1/6W J	C130	OB09280A	CE 47P 50V J	R327	OB09705A	RK 15K 1/6W J			RD12JS-T1B2	R681	OB09725A	RK 100K 1/6W J	
	RK 12K 1/6W J	C105	OB05813A	CML 0.056μ 50V J	R237	OB09705A	RK 15K 1/6W J	C145	OB01405A	CE 1μ 50V	R329	OB01683A	RK 15K 1/4W J				R682	OB09749A	RK 1M 1/6W J	
	RM 44.2K 1/6W F	C106	OB05682A	CML 0.068μ 50V J	R238	OB09577A	RM 7.15K 1/4W F	C146	OB01412A	CE 10μ 16V	R330	OB09701A	RK 10K 1/6W J	D601,602	OB06398A	SID 1SS176	R683	OB09713A	RK 33K 1/6W J	
	RK 5.6K 1/6W J	C107	OB09872A	CMM 0.22μ 50V J	R239	OB09689A	RK 3.3K 1/6W J	C225	OB01804A	CML 3900P 50V J	C315	OB01674A	CE 10μ 25V	D603,604	OB06398A	SID 1SS176	R684	OB09635A	RK 18 1/6W J	
	RK 5.6K 1/6W J	C108	OB05557A	CML 0.015μ 50V J	R240	OB09749A	RK 1M 1/6W J	C226	OB05659A	CML 5600P 50V J	C316	OB01405A	CE 1μ 50V	D605,606	OB06398A	SID 1SS176	R685	OB09701A	RK 10K 1/6W J	
	RK 10 1/6W J	C109	OB09870A	CMM 0.15μ 50V J	R241	OB09697A	RK 6.8K 1/6W J	C227	OB09218A	CE 47μ 16V (LN)	C317	OB09828A	CPP 8200P 100V J	D607	OB06398A	SID 1SS176	R686	OB09701A	RK 10K 1/6W J	
	RK 470K 1/6W J	C110	OB09876A	CMM 0.47μ 50V J	R242	OB09707A	RK 18K 1/6W J	C228	OB01802A	CML 2200P 50V J	C318	OB41229A	CPP 1500P 100V J	D608	OB12586A	SID 1N4148	R687	OB09701A	RK 10K 1/6W J	
	RK 100K 1/4W J	C111	OB41139A	CPP 3900P 100V G	R243	OB09687A	RK 2.7K 1/6W J	C229	OB05796A	CML 0.047μ 50V J	CN2	OB81759A	2P-T Post	D609,610	OB06398A	SID 1SS176	R688	OB09635A	RK 18 1/6W J	
	RK 82 1/6W J	C112,113	OB41133A	CPP 2200P 100V G	R244	OB09701A	RK 10K 1/6W J	C230	OB09280A	CE 47P 50V J				D611	OB06398A	SID 1SS176	R689	OB09701A	RK 10K 1/6W J	
	RK 27K 1/6W J	C141,142	OB01674A	CE 10μ 25V	R245	OB09687A	RK 2.7K 1/6W J	C245	OB01405A	CE 1μ 50V				D612	OB12584A	SID 1N4148	R690	OB09635A	RK 18 1/6W J	
	RK 180K 1/6W J	C203	OB05681A	CML 0.01μ 50V J	R246	OB09693A	RK 4.7K 1/6W J	C246	OB01412A	CE 10μ 16V				D613,614	OB06398A	SID 1SS176	R691	OB09701A	RK 10K 1/6W J	
	RM 8.25K 1/4W F	C204	OB41143A	CPP 5600P 100V G	R247	OB09687A	RK 2.7K 1/6W J													

9. SCHEMATIC DIAGRAM

9.1. IC Block Diagrams

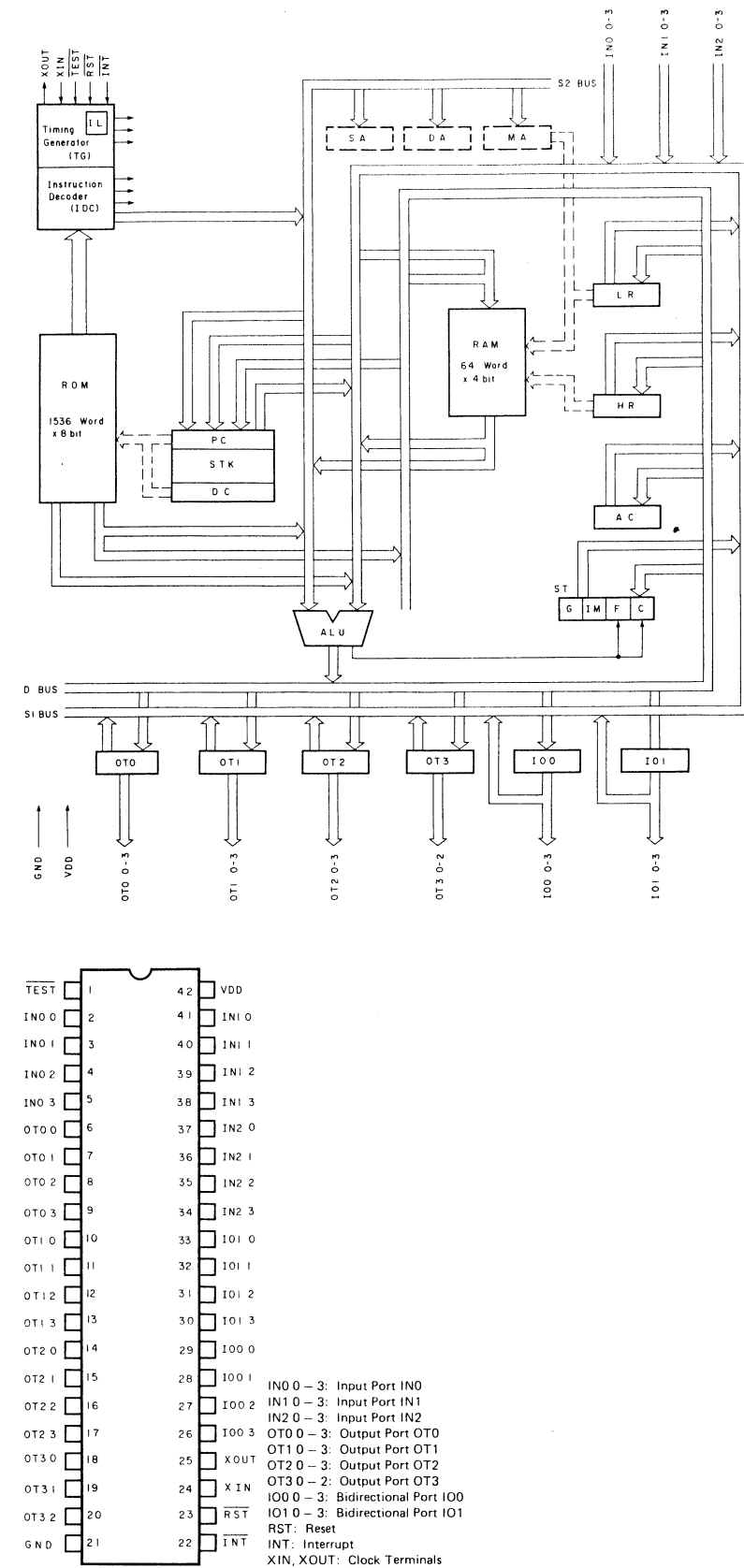


Fig. 9.1.1 4-Bit Micro-processor TMP4315BP-1814

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. 
7	R.M. Rev.	Out	Reel Motor Reverse signal. Active L. 
8	C.M. Fwd.	Out	Control Motor Forward signal. Active L. 
9	C.M. Rev.	Out	Control Motor Reverse signal. Active L. 
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. 
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. 
12	E. Brake	Out	Electric Brake signal. Active H. Generates H pulse upon change in mode. 

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. 
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	Function
30	A. Rew.	In	Auto Rewind and Auto Play signal. Active L.
31	A. Play	In	These signals are L when Timer set to OFF and, at the same time Repeat switch is set to ON. (With these signals set to L, auto function is performed and the rewind cycle is continuously repeated between the tape end and the timer. Furthermore, if Memory switch ON, the play/rewind cycle is continuously repeated between end and the tape counter in "000".)
32	T. Rec.	In	Timer Recording signal. Active L. When power is turned ON with switch in Record position, be for approx. 3.3 sec, causing un recording to start.
33	T. Play	In	Timer Play signal. Active L. Held at L upon setting of Timer to the Play position.
34	K. Pause	In	Pause button input terminal. Be upon push of Pause button.
35	K. Rec.	In	Record button input terminal. L upon push of Record button.
36	R. Mute	—	Not used.
37	SEA	—	Not used.
38	K. Play	In	Play button input terminal. Be upon push of Play button.
39	K. F.F.	In	F.F. button input terminal. Be upon push of F.F. button.
40	K. Rew.	In	Rewind button input terminal. L upon push of Rewind button.
41	K. Stop	In	Stop signal input terminal. At all operations.
42	VDD	In	+5 V.

9. SCHEMATIC DIAGRAM

9.1. IC Block Diagrams

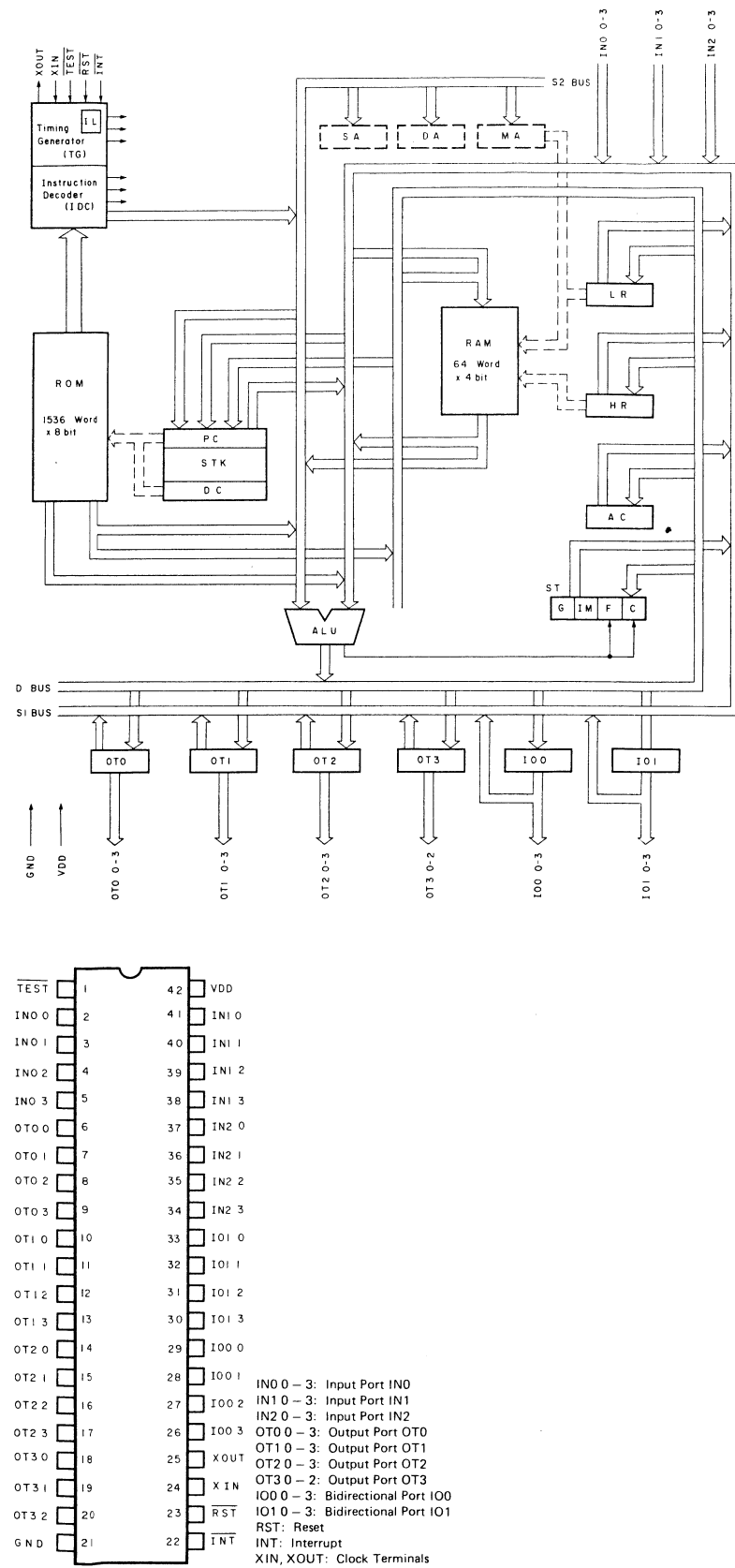


Fig. 9.1.1 4-Bit Micro-processor TMP4315BP-1814

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. L R.M. Play H 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 Rew. F.F. E. Brake H

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. Power ON H Approx. 3.3 sec L
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. Power ON H Approx. 100 msec L
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	Function
30	A. Rew.	In	Auto Rewind and Auto Play signals. Active L.
31	A. Play	In	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".)
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.

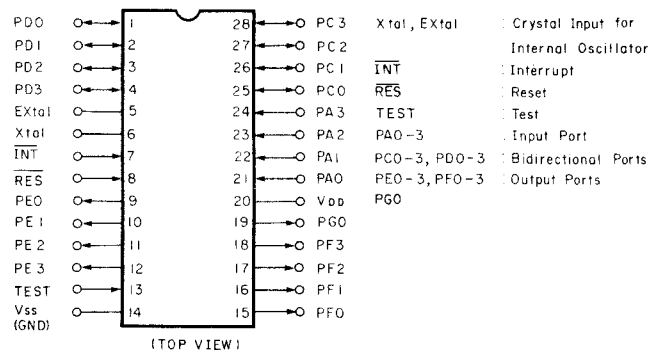
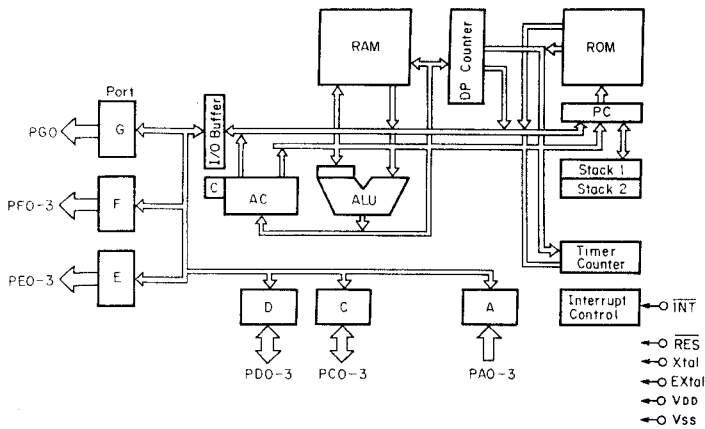
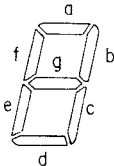


Fig. 9.1.2 4-Bit Micro-processor LM6416E-106

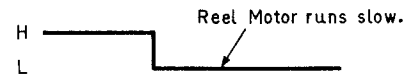
IC602 (LM6416E-106)

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		
11	a		
12	d		

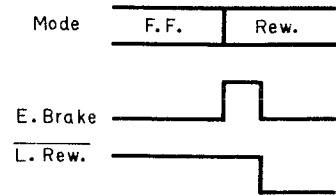


13	Test	In	Not used.
14	Vss	In	GND.
15	g	Out	Display segment drive signals. Segment lights at L.
16	a		
17	c		
18	D4	Out	The 4th (rightmost) digit select signal. Active L.

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		
28	D1		

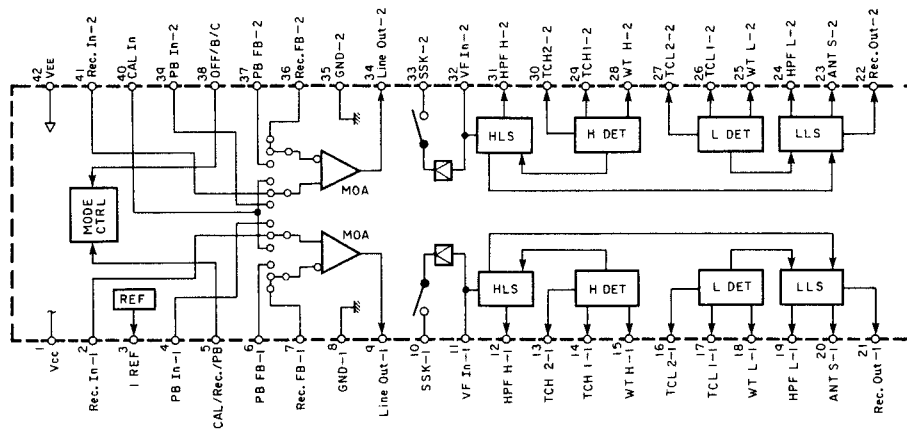


Fig. 9.1.3 Dolby NR IC CX20188

**IC301 (CX20188)**

<u>Pin No.</u>	<u>Signal Name</u>	<u>Function</u>
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.



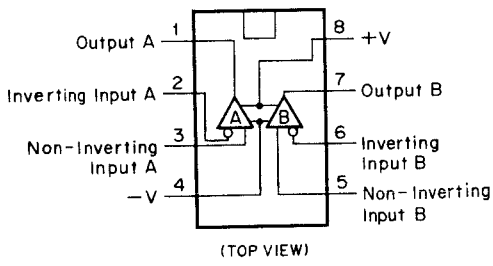


Fig. 9.1.4 Operational Amp. IC 4556D, 4558DD, 2043DD

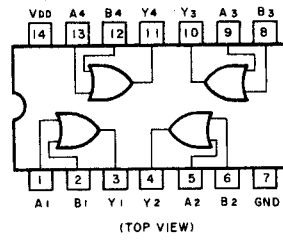


Fig. 9.1.5 OR Gate C-MOS IC μPD4071BC

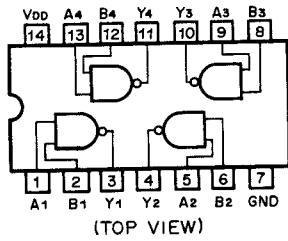


Fig. 9.1.6 NAND Gate C-MOS IC μPD4011BC

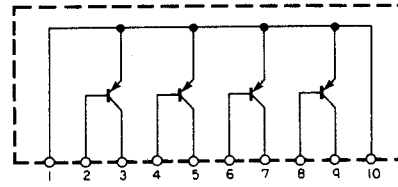
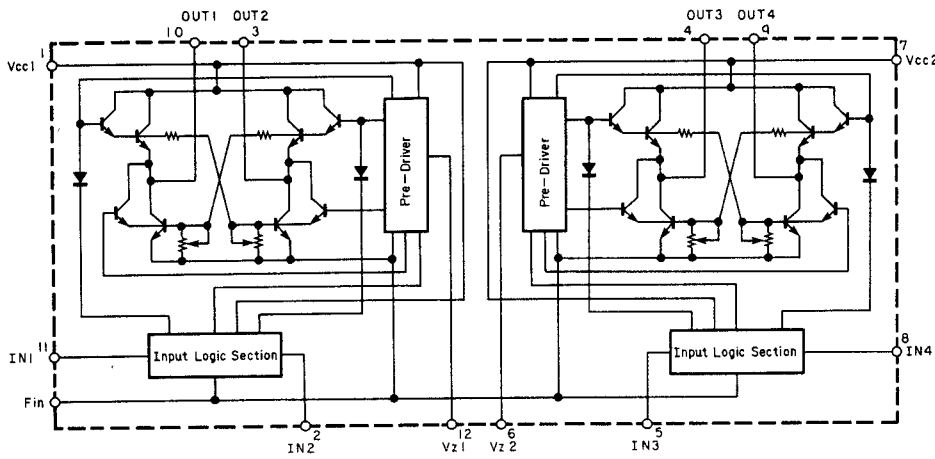


Fig. 9.1.7 Transistor Array TA64



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

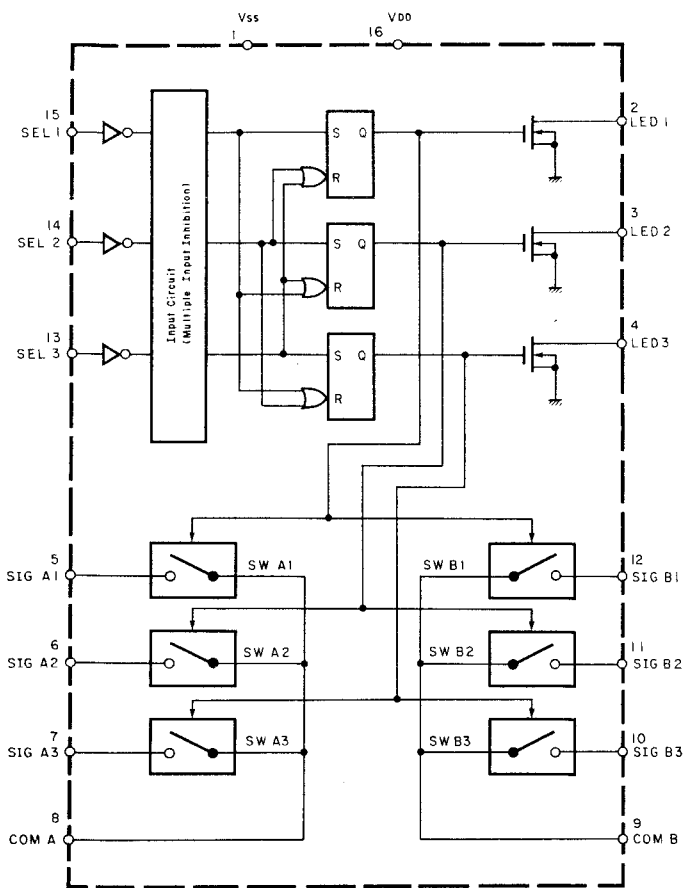


Fig. 9.1.9 Analog Switch Selector TC9145P

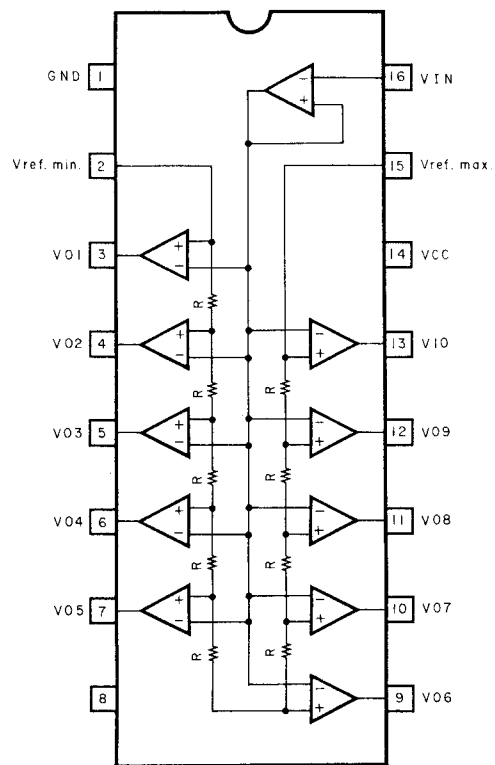
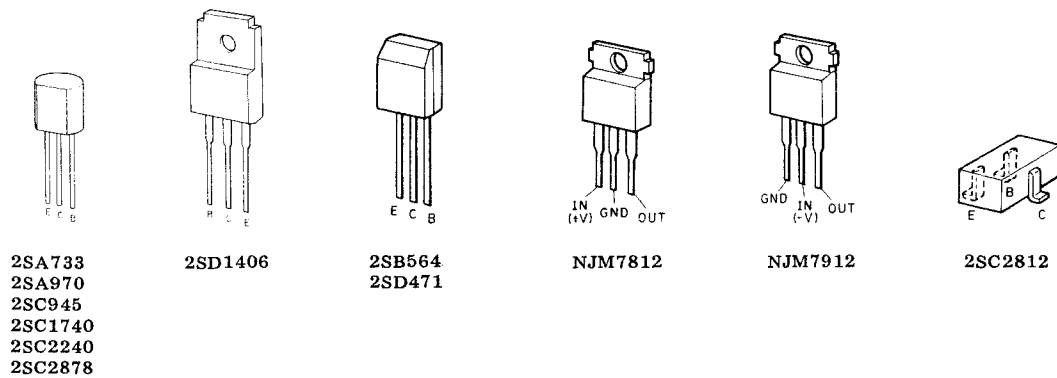
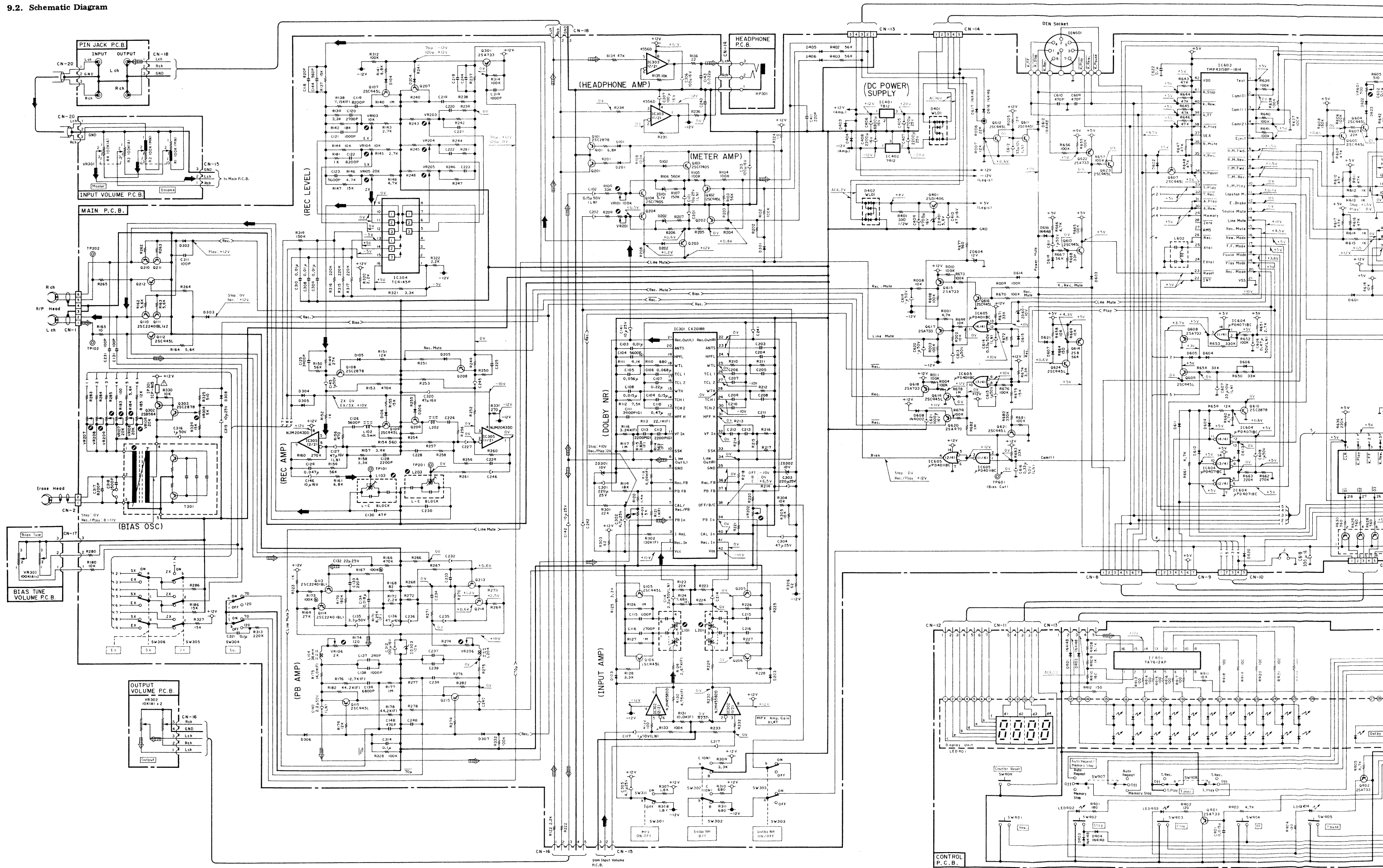
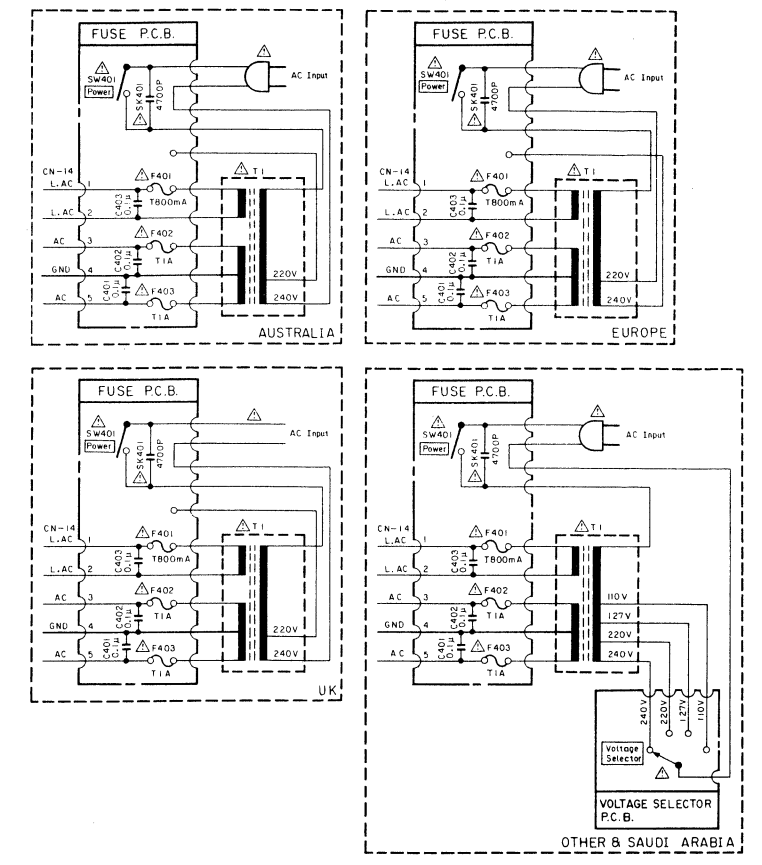
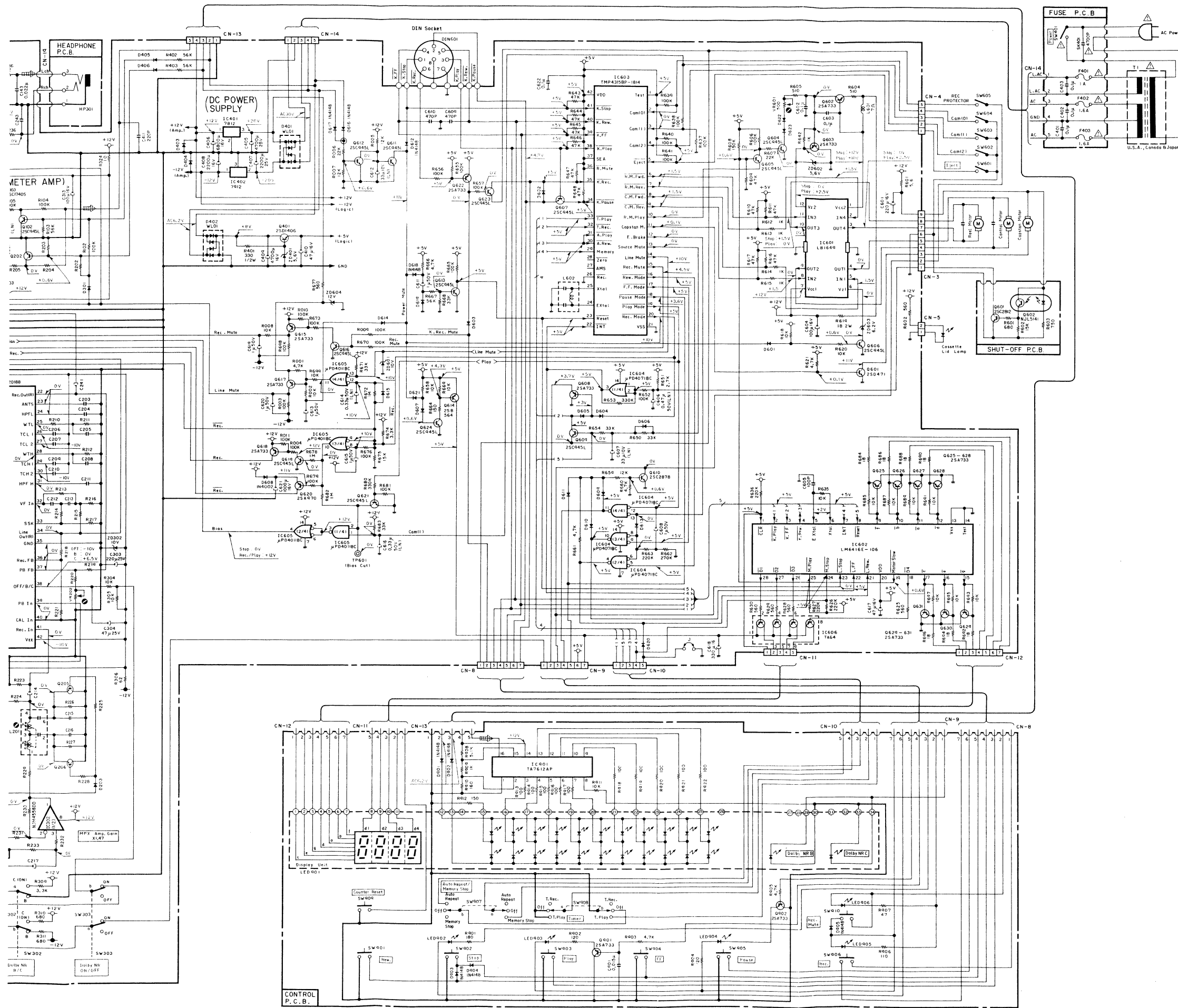



Fig. 9.1.10 Level Meter Driver TA7612AP







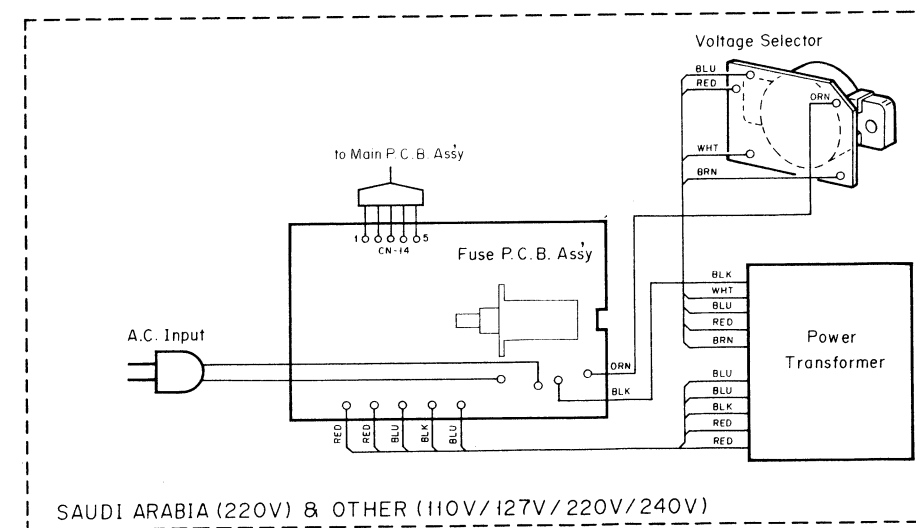
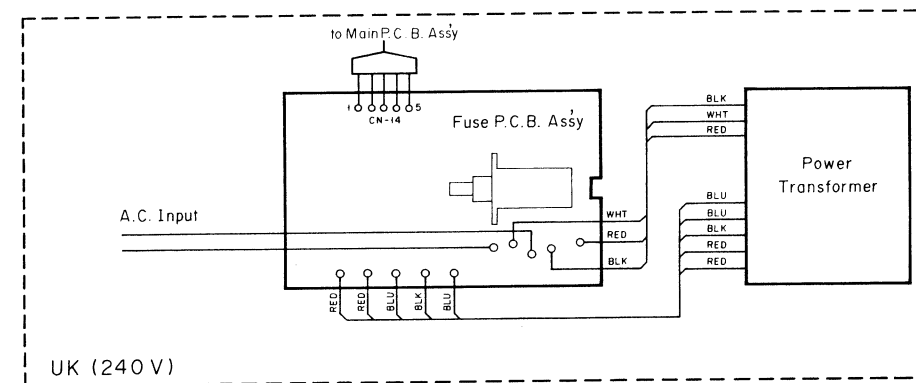
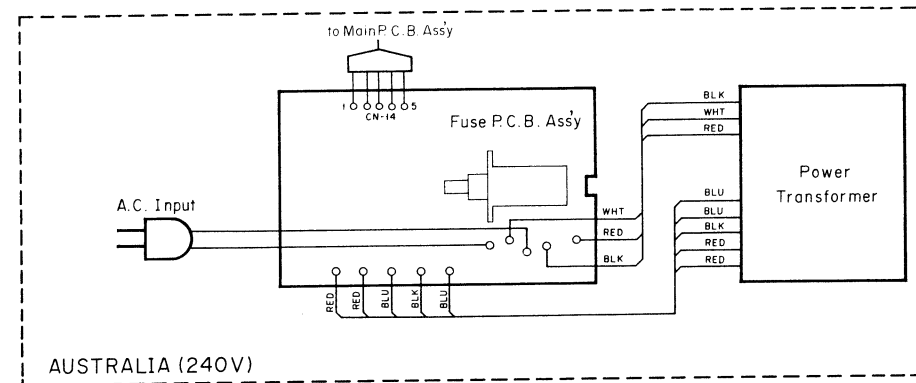
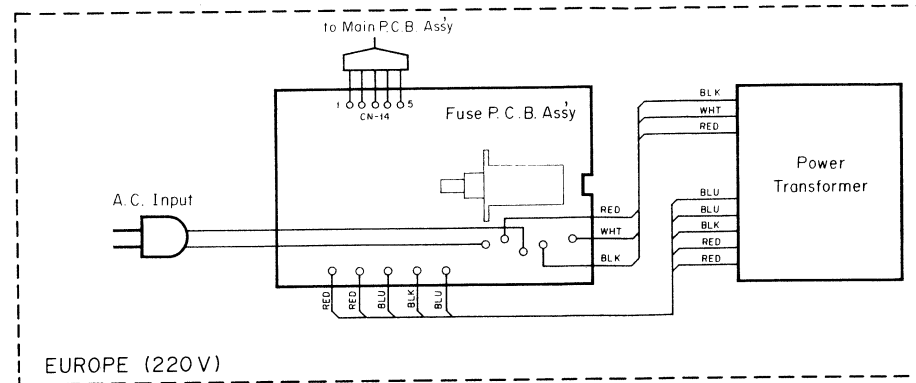
**WARNING:**  
 Parts marked with the symbol  have critical characteristics. Use **ONLY** replacement parts recommended by the manufacturer. It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedures.

**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.

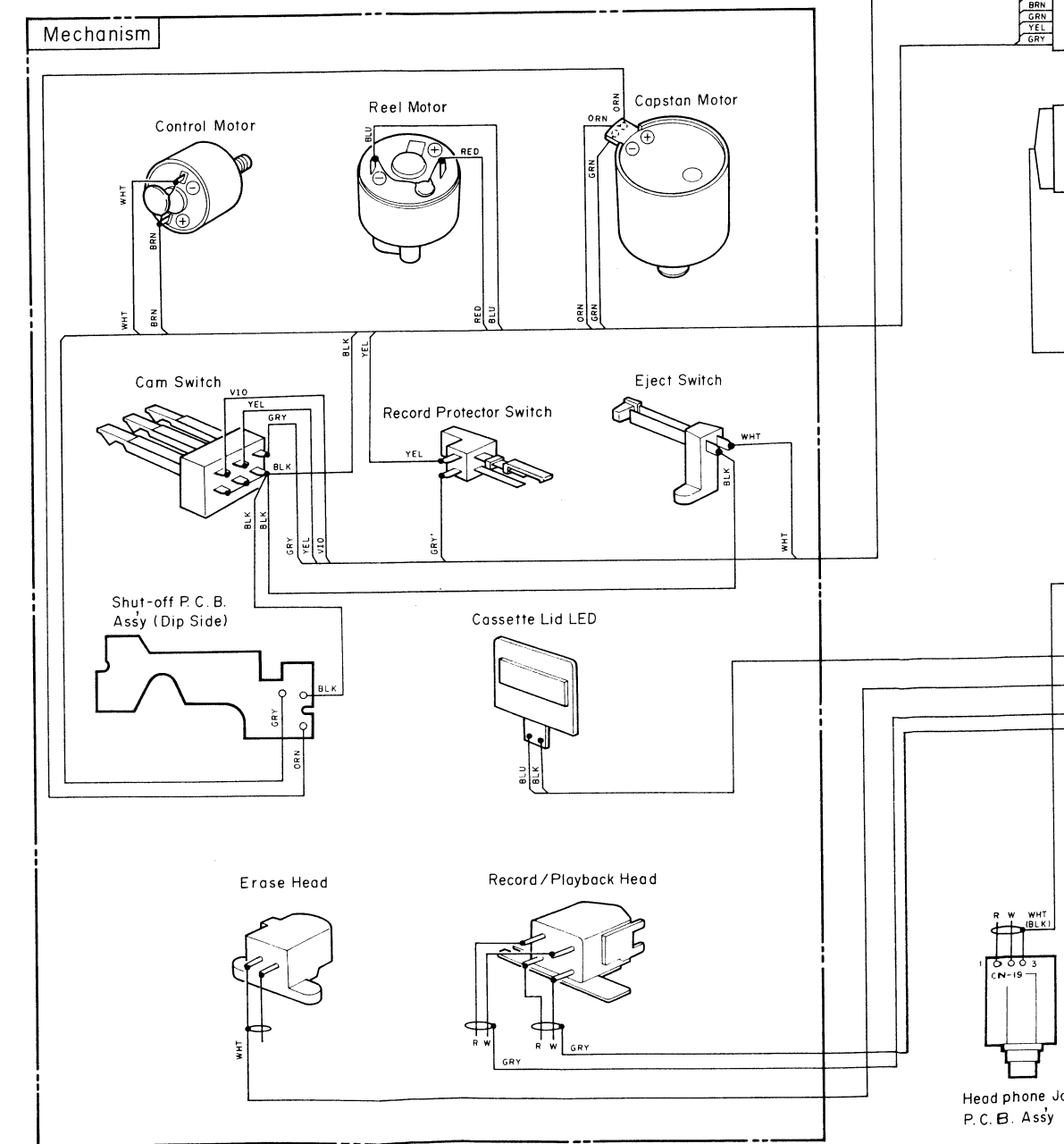
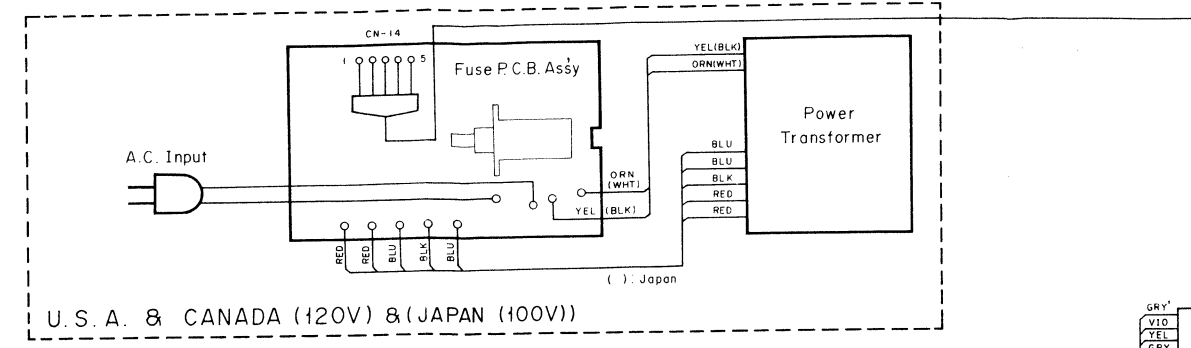
- Notes:**
1. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
  2. 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
  3. 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.
  4. Voltage measuring condition:
    - Stop mode (with no input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

Fig. 9.2

10. WIRING DIAGRAM



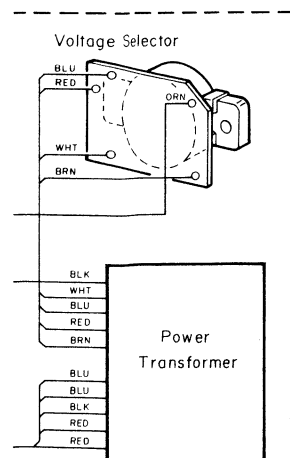
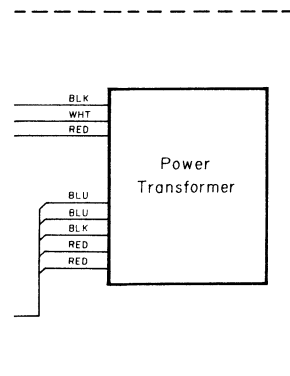
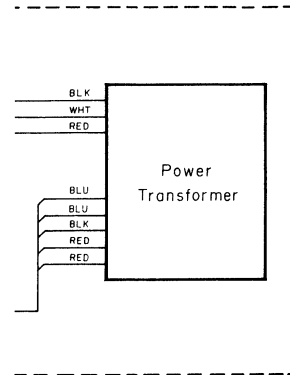
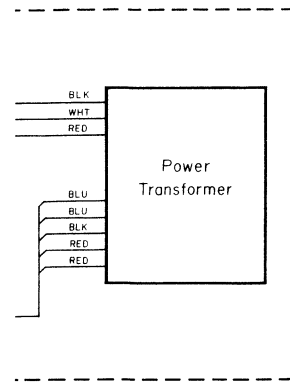
- Notes: 1. Table of wire colors  
 BRN - Brown      BLU - Blue  
 RED - Red        VIO - Violet  
 ORN - Orange    GRY - Gray  
 YEL - Yellow    WHT - White  
 GRN - Green     BLK - Black
2. Component side view of the P.C.B. is illustrated unless otherwise specified.
3. Wire tube color is shown in ( ).



- GRY'
- VIO
- YEL
- GRY
- WHT
- ORN
- BLU
- RED
- BLK
- WHT
- BRN
- GRN
- YEL
- GRY

Head phone Jo  
P.C.B. Assy

Fig. 10



10V)

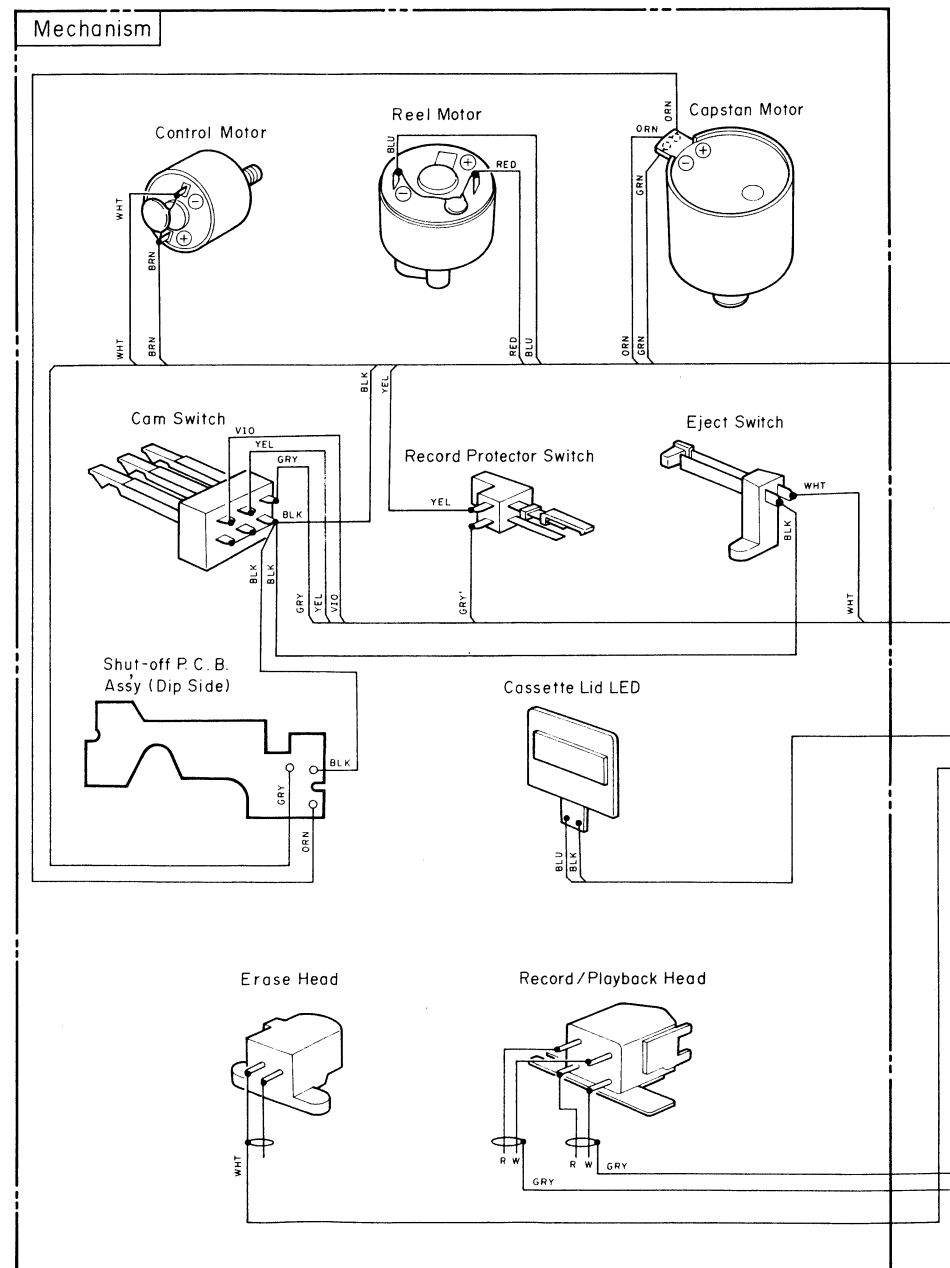
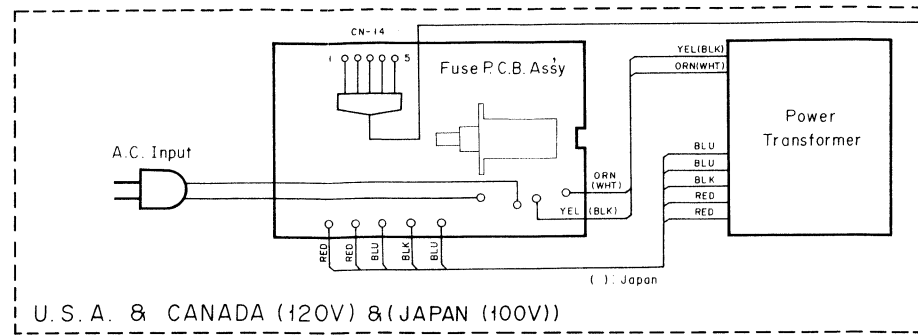
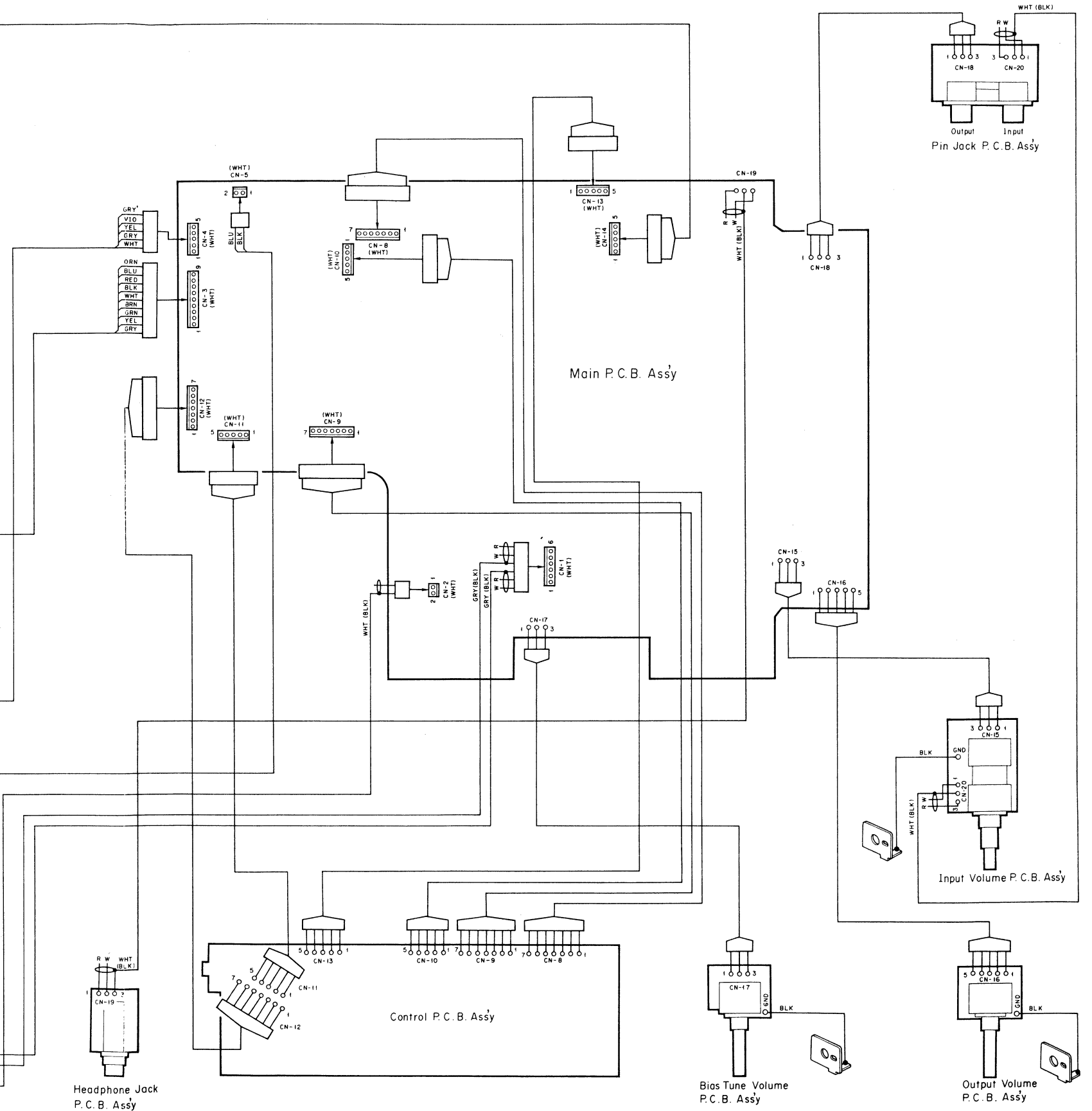


Fig. 10



# 11. BLOCK DIAGRAMS

## 11.1. Amplifier Section

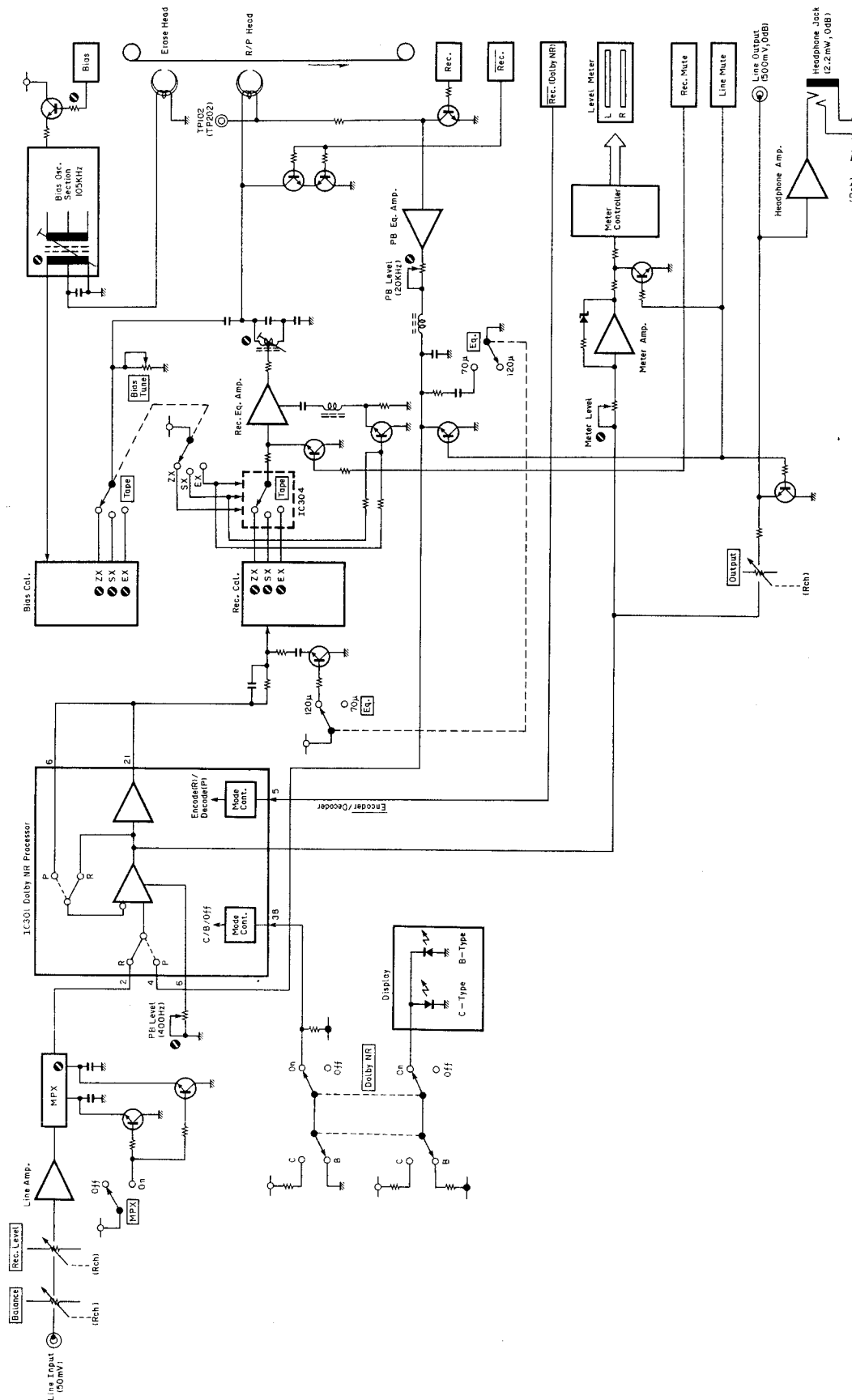


Fig. 11.1

11.2. Mechanism Control Section

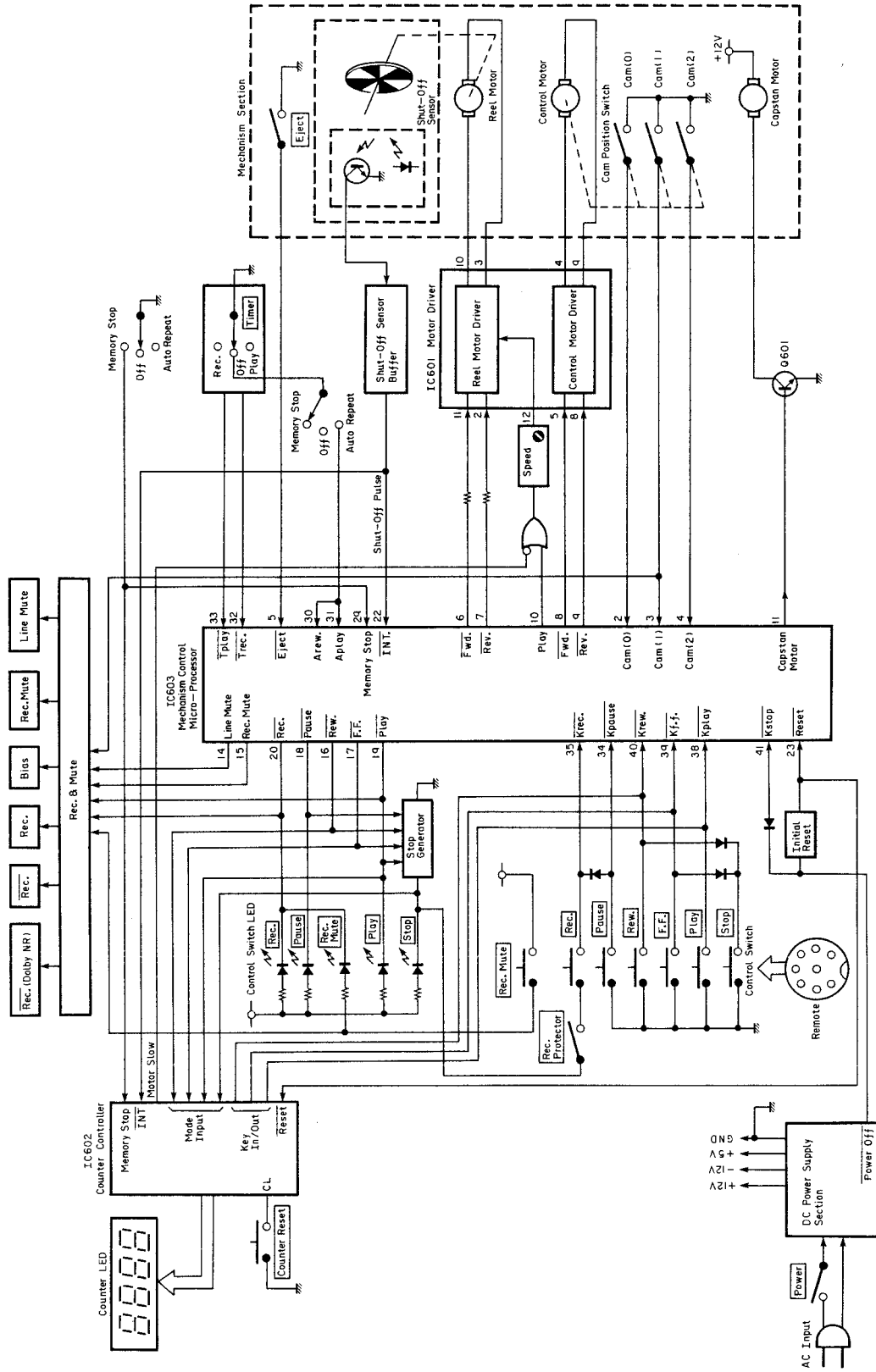


Fig. 11.2



## 12. TIMING CHARTS AND EQ. AMP. FREQUENCY RESPONSE

### 12.1. Timing Charts

#### (1) Overall Timing Chart

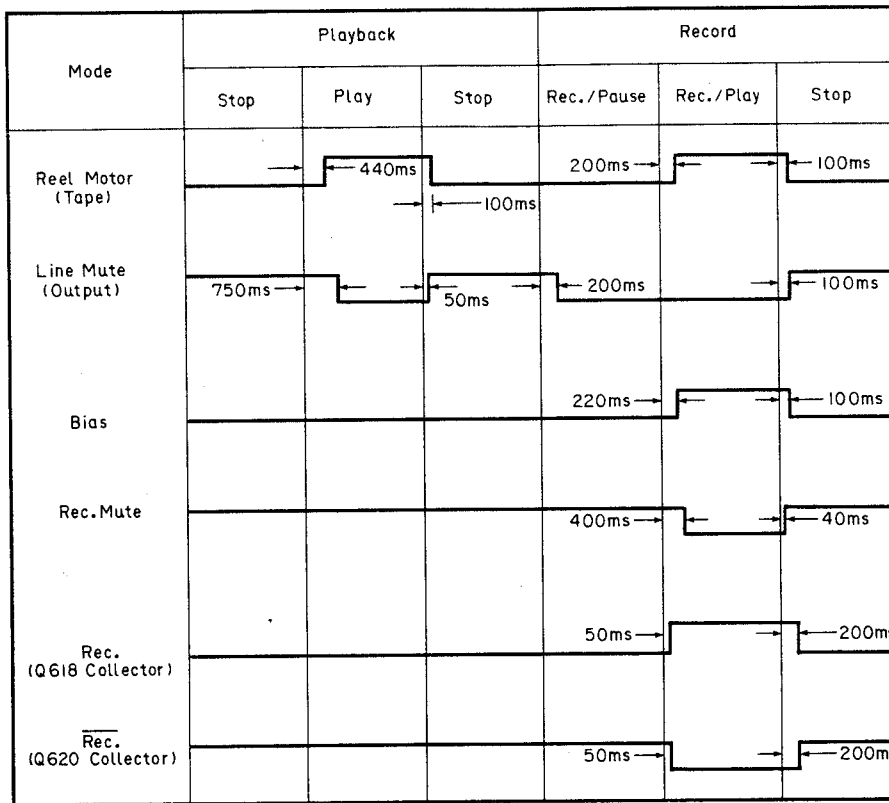


Fig. 12.1.1

#### (2) Mechanism Control Timing Chart

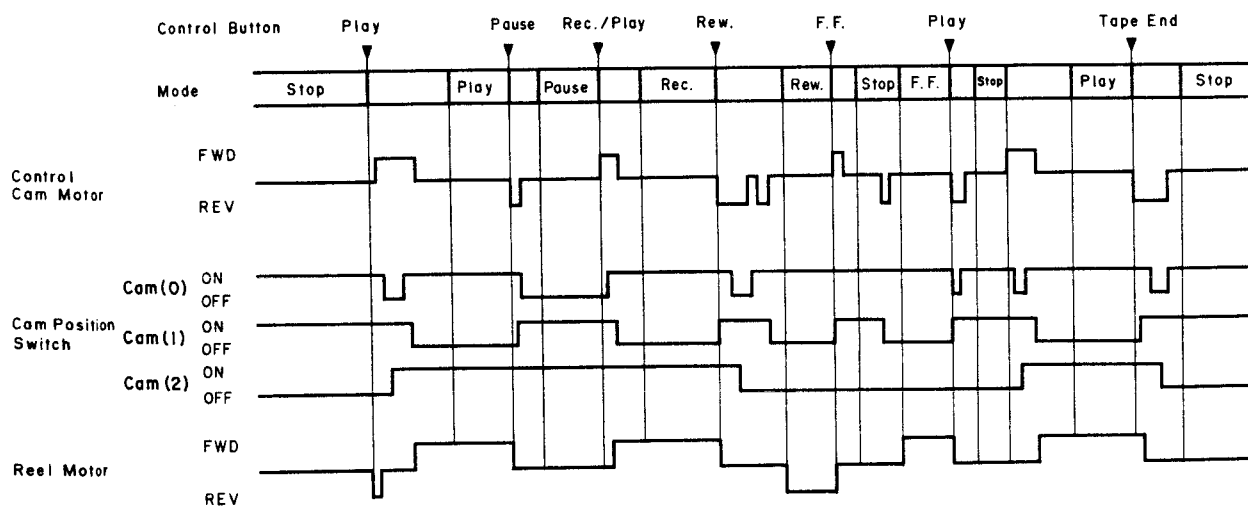


Fig. 12.1.2

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

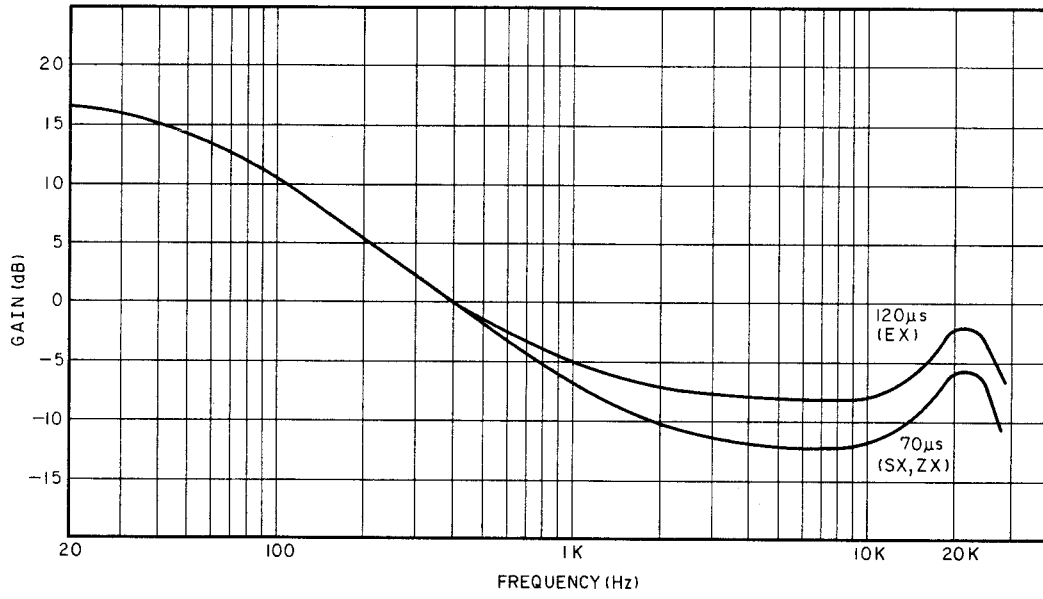


Fig. 12.2.1

**(2) Record Current Frequency Response**

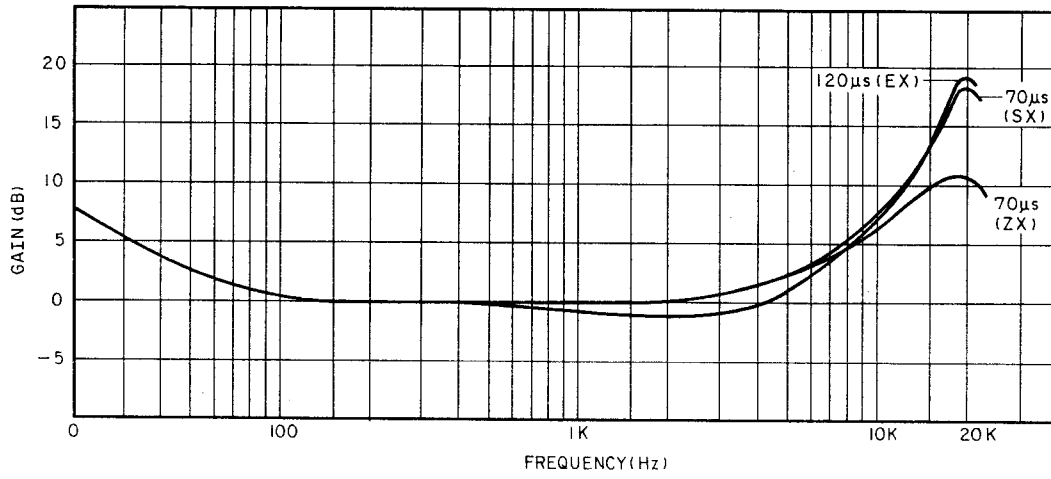


Fig. 12.2.2

### 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 $\pm 3$ dB (recording level -20 dB, ZX [Type IV], SX [Type II], EXII [Type I] tape)
Signal to Noise Ratio	Dolby C-Type NR on $<70 \mu\text{s}$ , ZX [Type IV] tape> Better than 70 dB (400 Hz, 3% THD, IHF A-WTD RMS) Dolby B-Type NR on $<70 \mu\text{s}$ , 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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