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Service Manual

Nakamichi

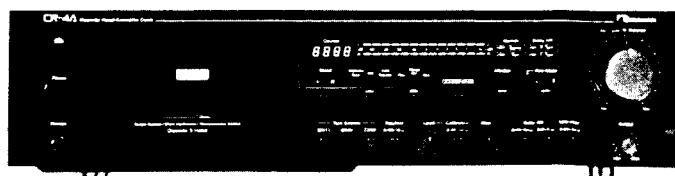
CR-4

CR-4A

CR-4E

CR-40

Discrete Head Cassette Deck



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1. GENERAL

1.1. Modification History

According to change of playback/rec. equalization, Main P.C.B. Ass'y and Cal. Osc. P.C.B. Ass'y have been changed as follows:

Serial No.	Part No.	Description
A13102451 - (CR-4A)	BA07188A	Main P.C.B. Ass'y
A13153801 - (CR-4/4E/40)	BA07192A	Cal. Osc. P.C.B. Ass'y
A13101001 - 02450 (CR-4A)	BA07030A	Main P.C.B. Ass'y
A13150001 - 53800 (CR-4/4E/40)	BA07008A	Cal. Osc. P.C.B. Ass'y

1.3. Package Ass'y and Accessory Ass'y

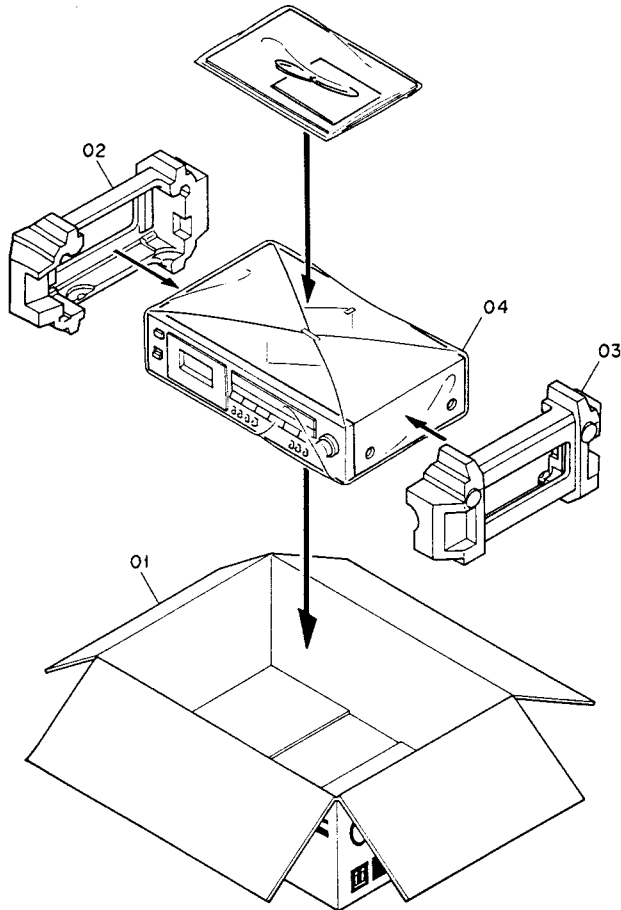


Fig. 1

1.2. Voltage Selector

Voltage selector is installed on the rear panel for Other version of the Nakamichi CR-4.

This voltage selector can select 110, 127, 220, or 240 V at customer's disposal.

Schematic Ref. No.	Part No.	Description	Qty
Package Ass'y			
01	0F04083A	Carton Box (CR-4)	1
	0F04085A	Carton Box (CR-4A)	1
	0F04084A	Carton Box (CR-4E)	1
	0F04102A	Carton Box (CR-40)	1
02	0F04087D	Packing L	1
03	0F04088D	Packing R	1
04	0F04107A	Soft-Sheet	1
—	0F04093A	Poly-Bag (CR-4A)	1
—	0M05075A	Serial Number Label (CR-4, CR-4E & CR-40)	2
—	0M05074A	Serial Number Label (CR-4A)	2
—	0M03457A	Voltage Label 240V (CR-4 (Australia) & CR-4E (UK))	2
—	0M05101A	Voltage Label 127V (CR-4 (Saudi Arabia))	2
—	0M05102A	Shipping Label LOS (CR-4A)	1
—	0M05103A	Shipping Label VAN (CR-4A)	1
—	0M05084A	Point of Sale Label (CR-40)	1
—	0D04046A	Warranty Card (CR-40)	1
—	0D04047A	User's Pack (CR-40)	1
—	0M05105A	LA Label (CR-4A)	2
—	0M05108A	UL/Canada Label (CR-4A)	2
—	0M05106A	UL Label (CR-4A)	2
—	0M05107A	Canada Label (CR-4A)	2
Accessory Ass'y			
—	0D03092B	Poly-Bag	1
—	0D04494A	Pin-Cord (OFC) (CR-40)	2
—	0D04766A	General Catalogue (CR-4A)	1
—	0D04783C	Owner's Manual (English/German/French) (CR-4, CR-4A & CR-4E)	1
—	0D04784B	Owner's Manual (Japanese) (CR-40)	1
—	DA04121A	Pin Cord Ass'y (CR-4, CR-4A & CR-4E)	1
—	0D04796A	Tape Catalogue (CR-4A)	1
—	0D04797A	Warranty Card (CR-4A)	1
—	0D04810A	Important Notice	1
—	0M03844B	Power Cord Label (CR-4E (UK))	1
—	0D04787B	Price Card (CR-40)	1
—	0D04795A	Tape Catalogue (CR-40)	1
—	0D04829A	Tape Supplement	1
—	0D04848A	Supplement (CR-4 (Other & Saudi Arabia))	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).

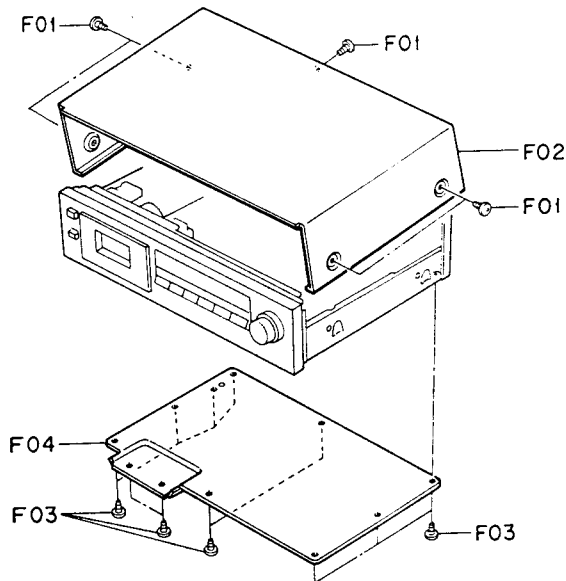


Fig. 2.1

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.

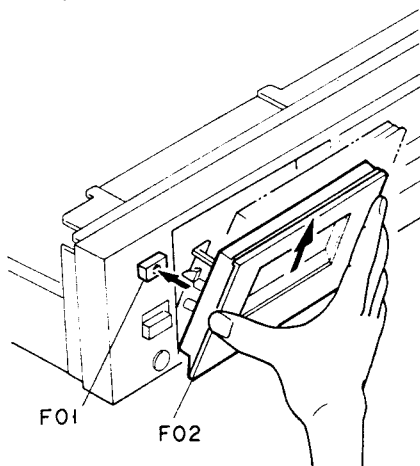


Fig. 2.2

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, cut F02 with nippers, remove F03 and F04, and disassemble F05 (Mechanism Ass'y).

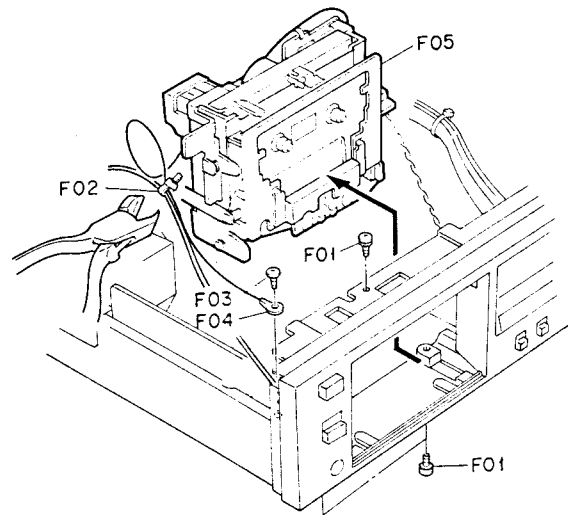


Fig. 2.3

2.4. Monitor Switch Joint

Refer to Fig. 2.4.

- (1) Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- (2) With pushing F01 (Monitor Switch Joint) in the direction of the arrow A, pull F01 (Monitor Switch Joint) in the direction of the arrow B to remove it.

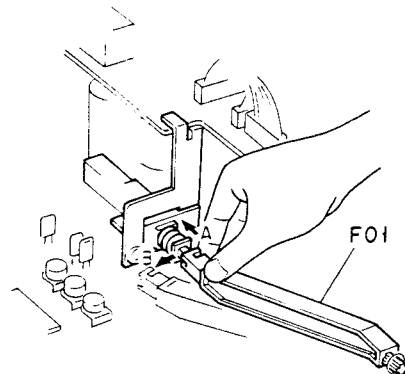


Fig. 2.4

2.5. Front Panel

Refer to Fig. 2.5.

- (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).

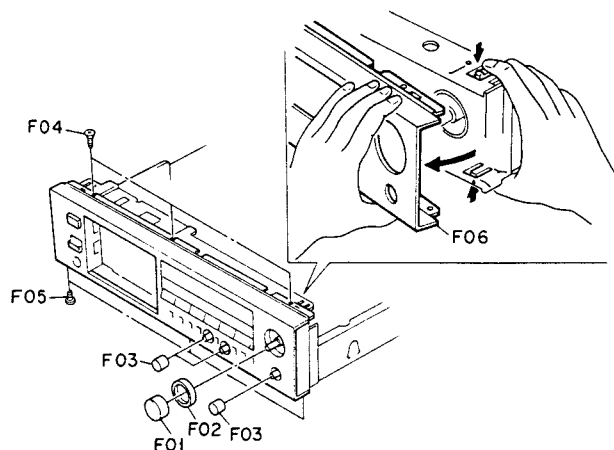


Fig. 2.5

2.6. Bias P.C.B. Ass'y and Level Adjustment P.C.B. Ass'y

(1) Move of Main P.C.B. Ass'y and Cal. Osc. P.C.B. Ass'y
Refer to Fig. 2.6.1.

- Remove the Top Cover Ass'y and the Bottom Cover Ass'y referring to item 2.1.
- Remove the Cassette Case Cover Ass'y referring to item 2.2.
- Remove the Monitor Switch Joint referring to item 2.4.
- Remove the Front Panel Ass'y referring to item 2.5.
- Loosen F01 and F02, and separate F03 (Rear Panel).
- Loosen F04 and F05, and move F06 (Cal. Osc. P.C.B. Ass'y) and F07 (Main P.C.B. Ass'y) rearward.

(2) Removal of Bias P.C.B. Ass'y and Level Adjustment P.C.B. Ass'y

Refer to Fig. 2.6.2.

- Move F06 (Cal. Osc. P.C.B. Ass'y) and F07 (Main P.C.B. Ass'y) as described above.
- Loosen F08 with a special nut driver or with pliers, and remove F09 and F10 (Bias P.C.B. Ass'y).
- Loosen F11 with a special nut driver or with pliers, and remove F12 and F13 (Level Adjustment 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 top of switches on the Main P.C.B. Ass'y come in contact with the ends of push buttons as shown in Fig. 2.7. Then fasten F01 to position the Main P.C.B. Ass'y.

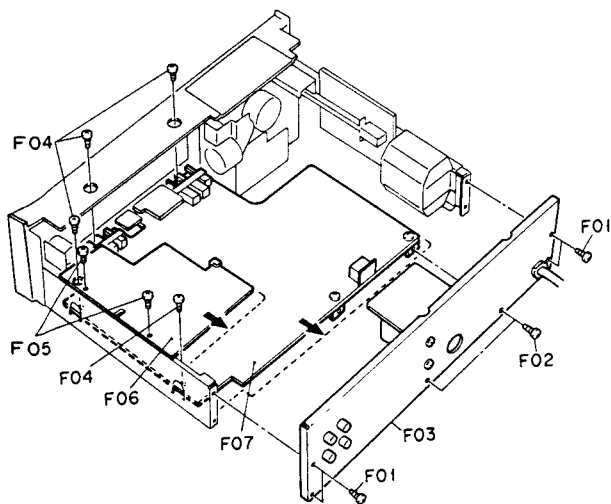


Fig. 2.6.1

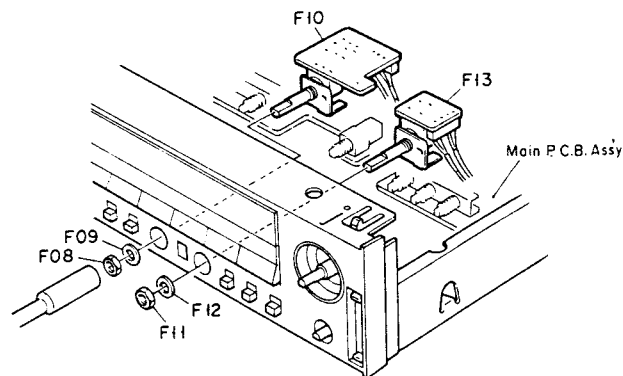


Fig. 2.6.2

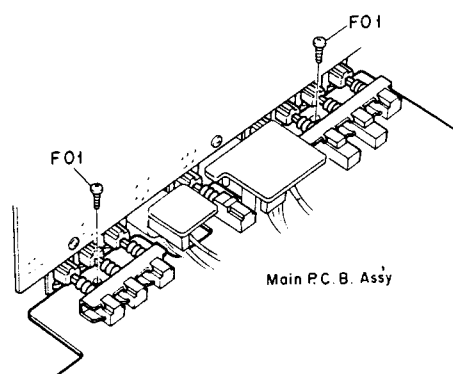


Fig. 2.7

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

Refer to Fig. 2.8.

- Remove the Bias P.C.B. Ass'y referring to item 2.6.
- Remove the Mechanism Ass'y referring to item 2.3.
- Loosen F01, unhook F02, and remove F03 (Control P.C.B. Ass'y).

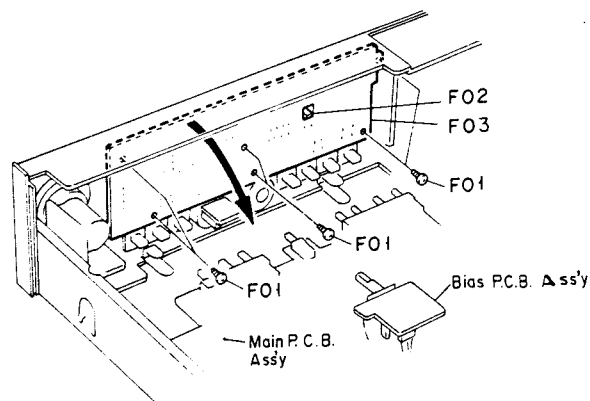


Fig. 2.8

2.8. Head Mount Base Ass'y

Refer to Fig. 2.9.

- (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) Loosen F01 and remove F02 (Head Mounting Cover).
- (4) Loosen F03, remove F04 and F05, straighten F06 (Wire Clamper), and lift F07 (Head Mount Base Ass'y).

Note: When mounting the Head Mount Base Ass'y, follow the next steps. Refer to Figs. 2.10.1 and 2.10.2.

- (a) Insert the Plate Washer into the groove of the shaft by hand as shown in Fig. 2.10.1.
- (b) Mount F07 (Head Mount Base Ass'y) and fasten F03. Then push the Plate Washer with a blade of screwdriver to set the Plate Washer free. Refer to Fig. 2.10.2.

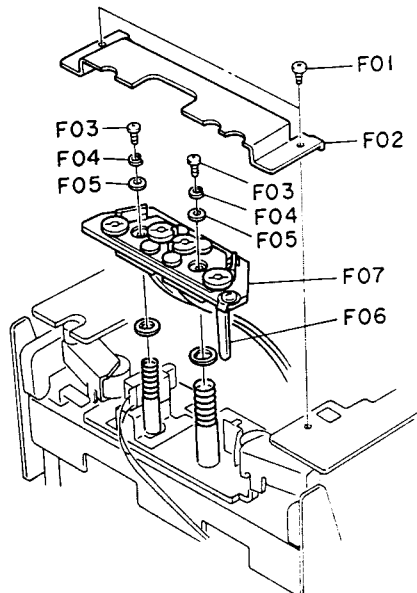


Fig. 2.9

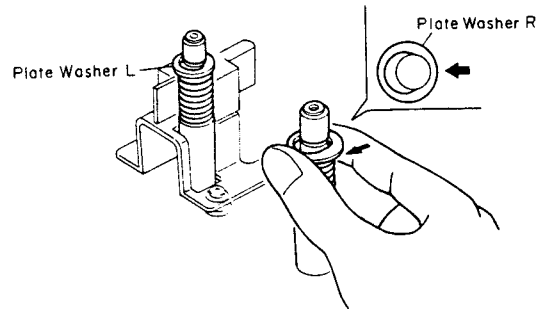


Fig. 2.10.1

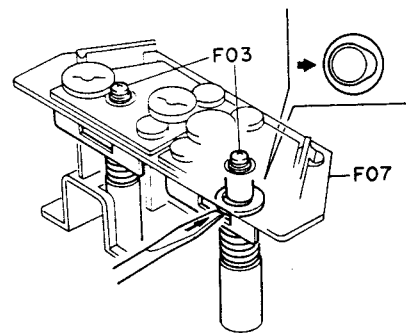


Fig. 2.10.2

2.9. Power Switch Joint

Refer to Fig. 2.11.

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

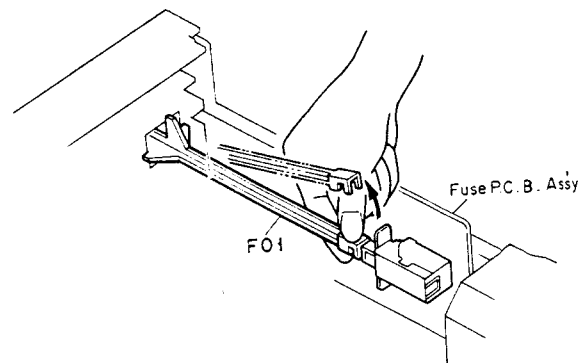


Fig. 2.11

3. TEST TAPES AND GAUGES

- (1) 400 Hz Level Tape (DA09005B)
- (2) 1 kHz Track Alignment B Tape (DA09087B)
- (3) 10 kHz PB Frequency Response Tape (DA09003B)
- (4) 15 kHz PB Frequency Response Tape (DA09002B)
- (5) 20 kHz PB Frequency Response Tape (DA09001B)
- (6) 15 kHz Azimuth Tape (DA09004B)
- (7) 3 kHz Speed and Wow/Flutter Tape (DA09006C)
- (8) Tape Travelling Cassette (DA09071A)
- (9) Reference EXII Tape (DA09111A)
- (10) Reference SX Tape (DA09110A)
- (11) Reference ZX Tape (DA09109A)
- (12) EH Tilt Check Gauge S (DA09088A)
- (13) Stroke Check Gauge S (DA09090A)
- (14) Tape Guide Height Check Gauge S (DA09091A)
- (15) Tilt Check Gauge S (DA09039B)
- (16) Torque Gauge FWD (DA09082A)

4. MECHANICAL ADJUSTMENTS

4.1. Record Head and Playback Head Tilt Adjustment

Remove the Cover Plate Ass'y by loosening two screws to gain access to the head block.

Refer to Fig. 4.1.

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

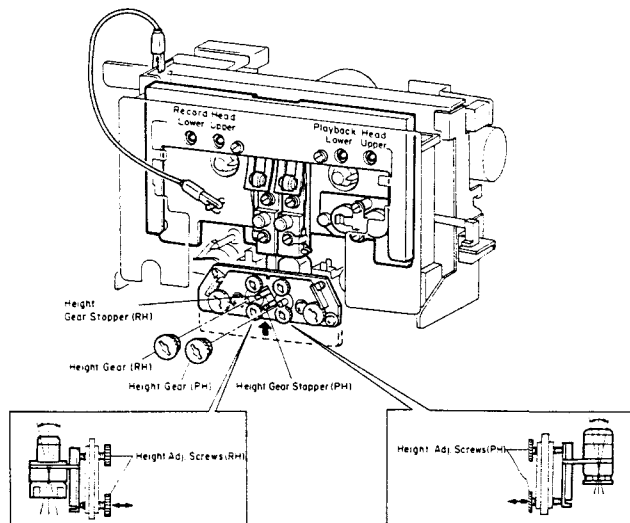


Fig. 4.1

4.2. Head Base Stroke Check

Remove the Cover Plate Ass'y.

Refer to Fig. 4.2.

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

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

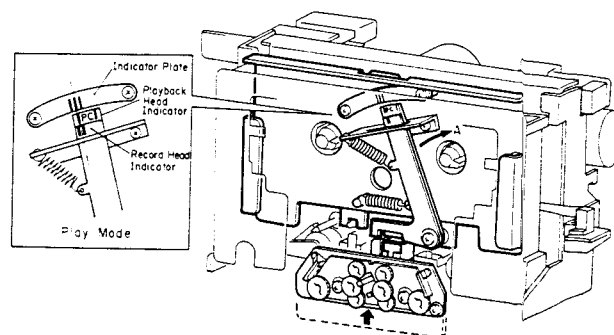


Fig. 4.2

4.3. Erase Head Stroke Adjustment and Tape Guide Height Check

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

Refer to Fig. 4.3.

(1) Erase Head Stroke Adjustment

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

(2) Supply Tape Guide Height Adjustment

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

(3) Take-up Tape Guide Height Check

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

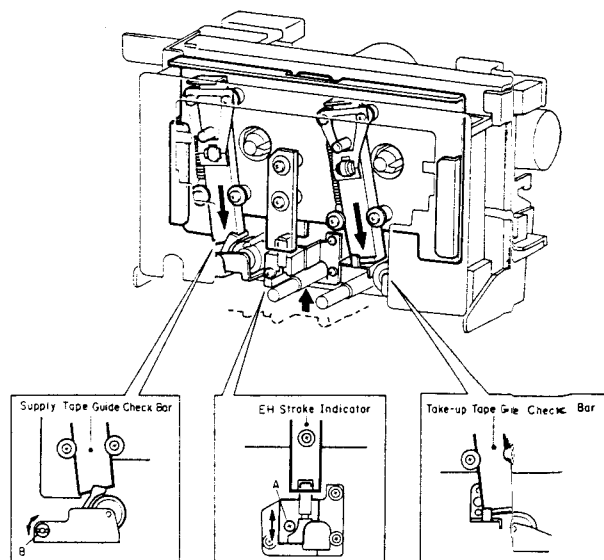


Fig. 4.3

4.4. Erase Head Height and Tilt Adjustment

Refer to Fig. 4.4.

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

Beacon to light off. Adjustments of Screw "Tilt" will therefore be conducted till both of the first and the second Beacons illuminate.

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

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

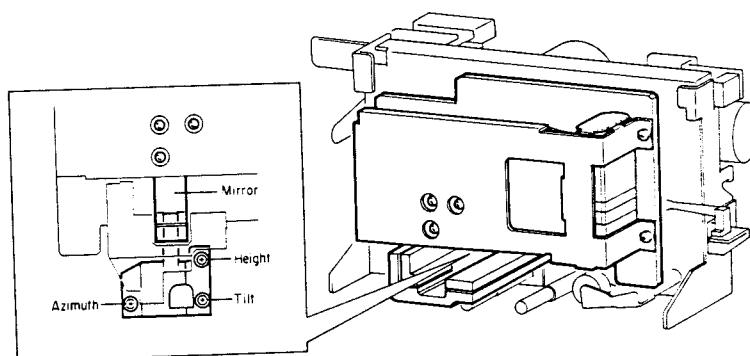


Fig. 4.4

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

Refer to Fig. 4.5.

- (1) Playback Head Height Adjustment and Azimuth Alignment
 - (a) Set the Monitor switch to Tape and connect an AC voltmeter to the Output Jacks.
 - (b) Load a 1 kHz Track Alignment B Tape (DA09087B) and set the cassette deck in Play mode.
 - (c) Turn the PH Height Gear until the outputs of both channels become minimum.
 - (d) Load a 15 kHz Azimuth Tape (DA09004B) and set the cassette deck in Play mode.
 - (e) Turn the PH Azimuth Alignment Screw until the outputs of both channels become maximum.
 - (f) Repeat above steps (b) through (e) two or three times to obtain optimum performance.

- (2) Record Head Height Adjustment and Azimuth Alignment
 - (a) Set the cassette deck in Stop mode.
 - (b) Set the Monitor switch to Tape, Eq. switch to 70 μ s and Tape Selector switch to ZX.
 - (c) Load a reference ZX tape and connect an AC voltmeter to Output Jacks.
 - (d) Feed in 400 Hz (0 dB) to the Input Jacks.
 - (e) Set the cassette deck in Record and Play mode and turn the RH Height Gear until the outputs of both channels become maximum.
 - (f) Feed in 15 kHz (-20 dB) to the Input Jacks and turn the RH Azimuth Alignment Screw until the outputs of both channels become maximum.
 - (g) Repeat (d) to (f) two or three times to obtain optimum performance.

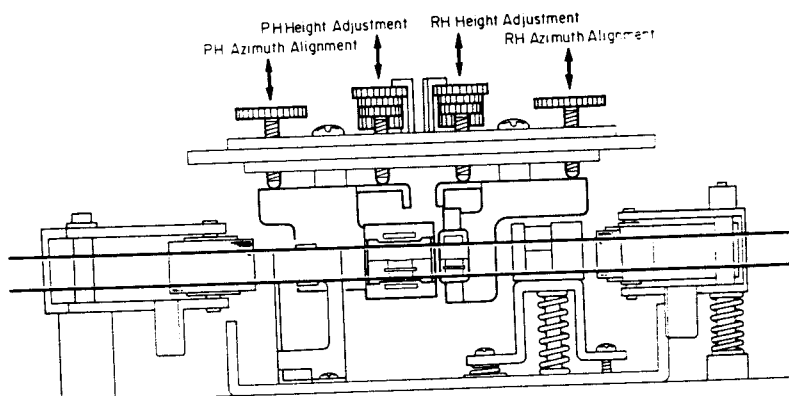


Fig. 4.5

4.6. Tape Travelling Check

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

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

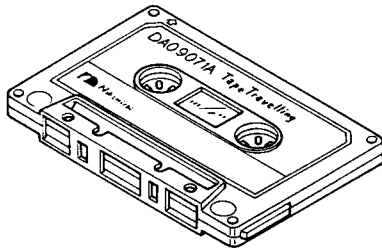


Fig. 4.6

4.7. Eject Damper Adjustment

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

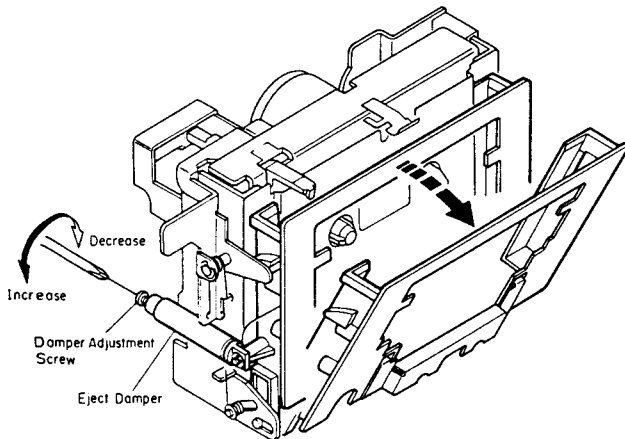


Fig. 4.7

4.8. Reel Motor Speed Adjustment in Play Mode

- (1) To warm-up the cassette deck, load a C-60 cassette tape and set the cassette deck in Play mode.
- (2) After more than four minutes, load a Torque Gauge FWD (DA09082A) and set the cassette deck in Play mode.
- (3) Adjust VR601 on the Main P.C.B. Assy to obtain exactly 50 g-cm on the torque gauge.

4.9. Tape Speed Adjustment

Refer to Fig. 4.8.

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

CCW: Motor drives slowly.

CW: Motor drives fast.

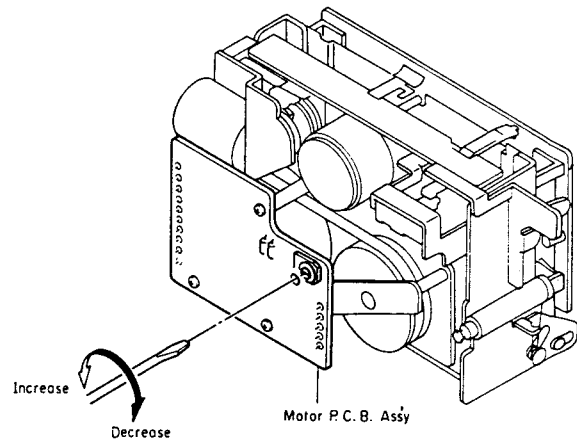


Fig. 4.8

4.10. Lubrication

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

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

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

The company dealing in the above lubricant is as follows:

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

5. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

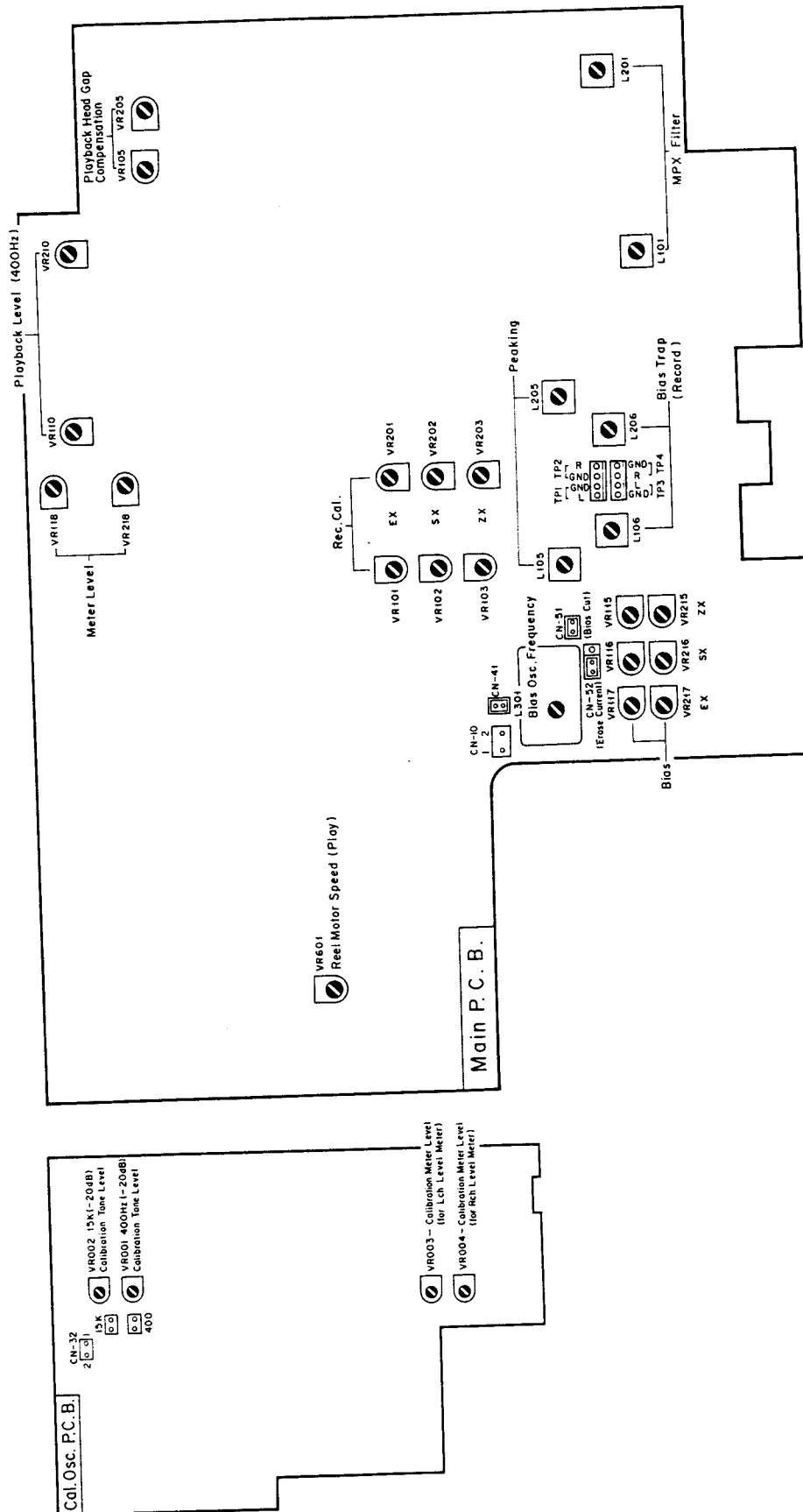


Fig. 5

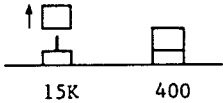
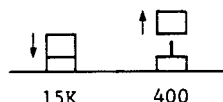
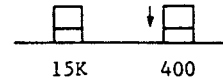
6. ELECTRICAL ADJUSTMENTS

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Preliminary Step			Output Level - Max. Balance - Center Bias Cal. - Center Level Cal. - Center Calibration - OFF Monitor - Tape Eq. - 70 μ s Tape - ZX MPX Filter - OFF Dolby NR - OFF		Set the CR-4/4A/4E/40 as shown in MODE.
2	Reel Motor Speed Adjustment (Play)	Torque Guage FWD (DA09082A)		Playback	Main VR601	Adjust VR601 to obtain 50 g-cm on the Torque Gauge. Refer to item 4.8.
3	Tape speed Adjustment	3 kHz Speed and Wow/Flutter Tape (DA09006C)	Frequency Counter to Output Jacks	Playback Monitor - Tape Eq. - 120 μ s	Tape Speed Adj. Volume (Capstan Motor)	Adjust the volume incorporated in the Capstan Motor Ass'y to obtain 3 kHz $\pm$ 15 Hz on the frequency counter. Refer to item 4.9.
4	Meter Level Calibration	400 Hz to Input Jacks	AC Voltmeter to Output Jacks	Monitor - Source	Main P.C.B. VR118 VR218	1. Feed in 400 Hz and adjust the Input Level control to obtain 500 mV -2 dB on the AC voltmeter. 2. Adjust VR118 (VR218) so that the 0 dB segment on the level meter starts illuminating.
5	MPX Filter Adjustment	19 kHz $\pm$ 100 Hz to Input Jacks	AC Voltmeter to Output Jacks	Monitor - Source MPX - OFF/ON	Main P.C.B. 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. (The minimum reading will be less than -30 dB.)
6	Playback Head Track Alignment	1 kHz Track Alignment Tape (DA09087A)	AC Voltmeter to Output Jacks	Playback Monitor - Type Eq. - 70 μ s Dolby NR - OFF	PH Height Gear	Adjust the PH Height Gear to obtain the minimum readings on the AC voltmeter for both channels. Refer to "Playback Head Height Adjustment" in item 4.5.
7	Playback Head Azimuth Alignment	15 kHz Azimuth Tape (DA09004B)	AC Voltmeter to Output Jacks	Same as above	Playback Head Azimuth Alignment Screw	Adjust the Playback Head Azimuth Alignment Screw to obtain maximum readings on the AC voltmeter for both channels. Refer to "Playback Head Height Adjustment and Azimuth Alignment" in item 4.5. Note: Repeat Steps 6 and 7 two or three times to obtain optimum performance.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
8	Playback Level Calibration	400Hz Level Tape (DA09005B)	AC Voltmeter to Output Jacks	Playback Monitor - Tape Eq. - 70 μ s Dolby NR - OFF	Main P.C.B. VR110 VR210	Adjust VR110 (VR210) to obtain 500 mV on the AC voltmeter.
9	Playback Head Gap Compensation	400Hz Level Tape (DA09005B) 10 kHz PB Frequency Response Tape (DA09003B) 15 kHz PB Frequency Response Tape (DA09002B) 20 kHz PB Frequency Response Tape (DA09001B)	AC Voltmeter to Output Jacks	Same as above	Main P.C.B. VR105 VR205	- Load a 400 Hz level tape, play it back, and read the playback level on the AC voltmeter. - Load 10 kHz, 15 kHz and 20 kHz PB frequency response tapes and adjust the playback head azimuth to obtain maximum levels on the AC voltmeter with each tape. Check that the playback levels are as follows with respect to the level for 400 Hz level tape. 10 kHz: -20 dB -2 dB to +2 dB 15 kHz: -20 dB -2 dB to +3 dB 20 kHz: -20 dB -2 dB to +4 dB If the levels are out of the ranges, play back the 20 kHz PB frequency response tape and adjust VR105 (VR205) to obtain -20 dB $\pm$ 1.0 dB. VR105 (VR205) compensates the playback frequency response at 20 kHz as shown below: - Conduct Step 7 "Playback Head Azimuth Alignment".
10	Bias Oscillation Frequency and Erase Current Adjustment	None	AC Voltmeter across the additional 0.1 ohm resistor and Frequency Counter between terminals 1 and 2 of CN-10 on Main P.C.B.	Record, Playback Monitor - Source Tape - ZX Eq. - 70 μ s Dolby NR - OFF	Main P.C.B. L301 R344 R345	- Connect an additional 0.1 ohm resistor in series to the Erase Head and connect the AC voltmeter across the resistor. - Record and playback a reference ZX tape. - Adjust L301 to obtain 105 kHz on the frequency counter. - Check the erase current by the AC voltmeter. Erase current will be within the range of 310 mA to 400 mA (typically approx. 350 mA). If erase current is less than 310 mA, plug the 2P-receptacle into CN-52 as shown below to short-circuit either R344 or R345. - After completion of the erase current adjustment, re-check the bias oscillation frequency. - Remove the additional 0.1 ohm resistor.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
11	Record Amplifier Equalizer Adjustment	23 kHz (-20 dB) to Input Jacks	AC Voltmeter across both pins of TP3 (TP4) on Main P.C.B.	Record, Playback Monitor - Source Tape - ZX Eq. - 70 μ s Dolby NR - OFF	Main P.C.B. L105 L205	1. Remove the 2P-receptacle from CN-51 to stop the bias oscillation. 2. Adjust L105 (L205) to obtain approx. 16 dB at 23 kHz on the AC voltmeter. 3. Plug the 2P-receptacle into CN-51.
12	Bias Trap Adjustment (Record Amp.)	Remove input signals	AC Voltmeter across both pins of TP1 (TP2) on Main P.C.B.	Same as above	Main P.C.B. L106 L206	Adjust L106 (L206) to obtain minimum reading on the AC voltmeter.
13	Record Head Height Adjustment	400 Hz (0 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Tape Tape - ZX Eq. - 70 μ s Dolby NR - OFF	RH Height Gear	1. Load a reference ZX tape, and record and play it back. 2. Adjust the RH Height Gear to obtain maximum readings for both channels on the AC voltmeter. Refer to "Record Head Height Adjustment and Azimuth Alignment" in item 4.5.
14	Record Head Azimuth Alignment	15 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Same as above	Record Head Azimuth Alignment Screw	Adjust the Record Head Azimuth Alignment Screw to obtain maximum readings for both channels on the AC voltmeter. Refer to "Record Head Height Adjustment and Azimuth Alignment" in item 4.5. Note: Repeat Steps 13 and 14 two or three times to obtain optimum performance.
15	Record Level Calibration and Recording Bias Current Adjustment	400 Hz (0 dB), 15 kHz (-20 dB) and 10 kHz/20 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Source/Tape ZX/SX/EX Eq. - 70 μ s (ZX/SX) 120 μ s (EX) Dolby NR - OFF/B/C	Main P.C.B. (Level) ZX:VR103 VR203 SX:VR102 VR202 EX:VR101 VR201 (Bias) ZX:VR115 VR215 SX:VR116 VR216 EX:VR117 VR217	Adjustment should be made in the order of ZX, SX and EX. 1. Set the Monitor switch to Source. 2. Feed in 400 Hz, and set the Input Level control to obtain 0 dB (500 mV) on the AC voltmeter. 3. Set the Monitor switch to tape. 4. Load a reference ZX tape, reference SX tape and reference EXII tape. 5. Set Record Cal. VR103 (VR203) for ZX, VR102 (VR202) for SX and VR101 (VR201) for EXII tape to their center position. 6. Adjust Bias VR115 (VR215) for ZX, VR116 (VR216) for SX and VR117 (VR217) for EXII tape to obtain maximum reading on the AC voltmeter. 7. Feed in 15 kHz (-20 dB) and adjust Bias VR115 (VR215), VR116 (VR216) and VR117 (VR217) to obtain the same readings as source monitor level; on the AC voltmeter. (to be continued)

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
						8. Feed in 400 Hz (0 dB) and adjust Record Cal. VR103 (VR203), VR102 (VR202) and VR101 (VR201) to obtain 0 dB (500 mV) on the AC voltmeter. 9. Repeat above 7 and 8 two or three times to obtain optimum performance. 10. Feed in 10 kHz and 20 kHz (-20 dB), record and play them back, and check whether the playback levels are within the following ranges. With Dolby NR OFF: -20 dB $\pm$ 3 dB Level difference between Dolby NR OFF and B: $\pm$ 2 dB Level difference between Dolby NR OFF and C: $\pm$ 3 dB 11. Check that the total harmonic distortion is less than 0.8% for ZX tape and 1.0% for SX and EXII tapes. If satisfactory results are not obtained, re-adjust VR105 (VR205) referring to Step 9 "Playback Head Gap Compensation" and repeat above steps.
16	Overall Frequency Response Adjustment	400 Hz (0 dB) and 20 Hz to 20 kHz (-20 dB) to Input Jacks	AC Voltmeter to Output Jacks	Record, Playback Monitor - Source/Tape - ZX/SX/EX Eq. - 70 μ s (ZX/SX) 120 μ s (EX) Dolby NR - OFF	Main P.C.B. L105 L205	1. Set the Monitor switch to Source. 2. Feed in 400 Hz and adjust the Input Level control to obtain -20 dB on the AC voltmeter. 3. Set the Monitor switch to Tape. 4. Feed in 20 Hz to 20 kHz (-20 dB) and check to insure whether the output levels are within -20 dB $\pm$ 3 dB. 5. If above is not sufficient, adjust L105 (L205) to obtain approx. -20 dB at 20 kHz. 6. Conduct step 15 "Record Level Calibration and Recording Bias Current Adjustment". 7. If above is not sufficient, precise re-adjustment of step 9 "Playback Head Gap Compensation", replacement of Playback Head or Record Head, check on item 4.6 "Tape Travelling Check" will be required.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
17	Calibration Tone Level and Meter Level Adjustment	400 Hz (0 dB)	AC Voltmeter to Output Jacks	Record, Playback Monitor - Tape Tape - ZX Eq. - 70 μ s Dolby NR - OFF Calibration - OFF/ON Timer - OFF Memory Stop/Auto Repeat - Memory Stop	Cal. Osc. P.C.B. VR001 (400Hz) VR002 (15kHz) VR003 (Lch) VR004 (Rch)	1. Make sure that the Bias Calibration and Level Calibration controls are at their center positions. 2. Set the Timer switch to OFF and the Memory Stop/Auto Repeat switch to Memory Stop. 3. Press the Reset button to clear the tape counter. 4. Feed in 400 Hz, record and play it back, and adjust the Input Level control to obtain 500 mV (0 dB) on the AC voltmeter. 5. Set the Calibration switch to ON and pull out the connector CN-32 on the Cal. Osc. P.C.B. Ass'y to cut mute output signals. 6. Remove the 2P-receptacle from the connector "15K (15 KHz)" on the Cal. Osc. P.C.B. Ass'y.  7. Adjust VR001 to obtain 400 Hz -20 dB (50 mV) on the AC voltmeter. 8. Remove the 2P-receptacle from the connector "400 (400 Hz)" and plug the 2P-receptacle into the connector "15K (15 kHz)" on the Cal. Osc. P.C.B. Ass'y.  9. Adjust VR002 to obtain 15 kHz -20 dB (50 mV) on the AC voltmeter. 10. Plug the 2P-receptacle into the connector "400 (400 Hz)".  11. Plug the CN-32 into the original place. 12. Load a reference ZX tape, and record and play it back. 13. Adjust VR003 so that the 0 dB segment of the Lch level meter comes ON. 14. Adjust VR004 so that the 0 dB segment of the Rch level meter comes ON. 15. Turn OFF the Calibration switch and check that the tape is automatically rewound and stops at the tape counter "0000".

7. MECHANISM ASS'Y AND PARTS LIST

7.1. Synthesis

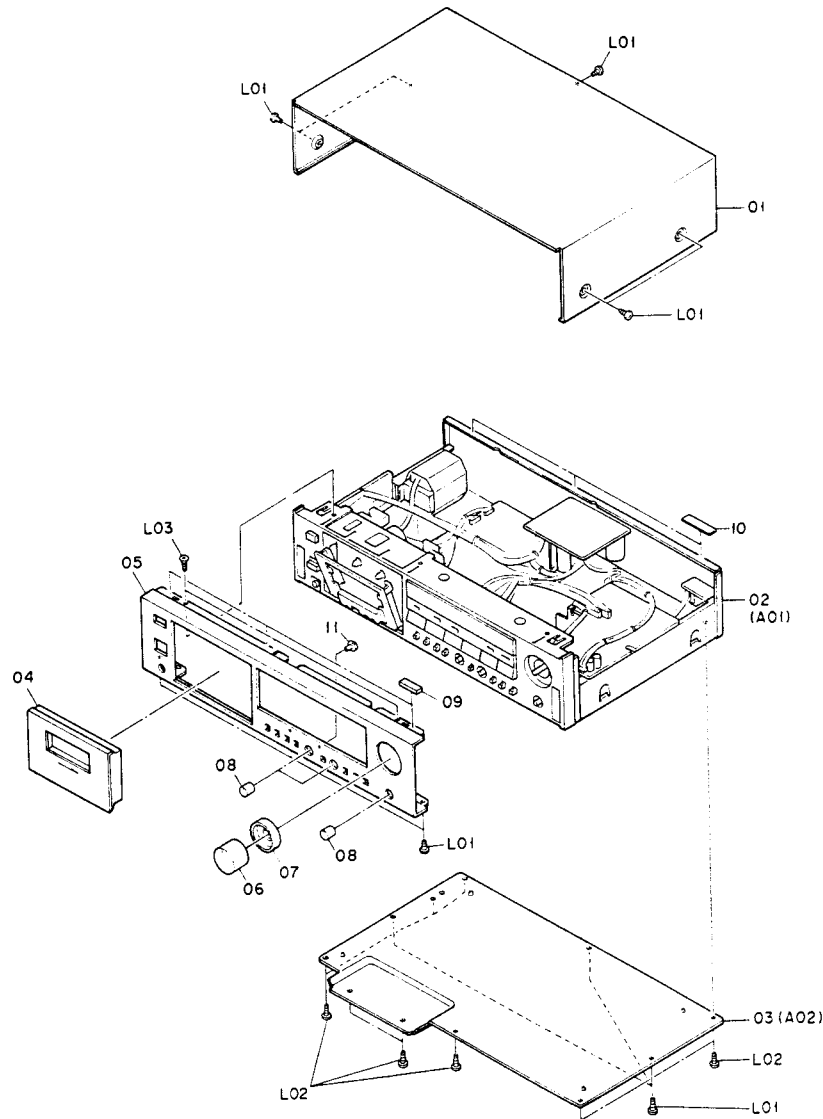


Fig. 7.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.1. Synthesis				L02	0E00921A	BT3x8 ⊕ Binding (Black Chromate)	8
				L03	0E03054A	BT3x8 ⊕ Countersunk	3
				—	0J05460A	Adhesive Tape for LED Lens	1
				—	0M03797A	Voltage Seal 240V (CR-4E (UK))	1
				—	0M03844B	Power Cord Label (CR-4E (UK))	1
				—	0M03917A	Production Date Seal (CR-4A)	1
				—	0M04381A	EP Approval Label (CR-4E (Europe))	1
				—	0M04811A	Voltage Caution Sheet (CR-4 (Other & Saudi Arabia))	1
				—	0M05065A	Pass Label (CR-4A)	1
				—	0M05067A	CSA Approval Label (CR-4A (Canada))	1
				—	0M05068A	LA Label (CR-4A (U.S.A.))	1
				—	0M05075A	Serial Number Seal (CR-4, CR-4E & CR-40)	1
				—	0M05074A	Serial Number Seal (CR-4A)	1
				—	0M05077A	Voltage Caution Label 127V (CR-4 (Saudi Arabia))	1
				—	0M05111A	F. Mark Approval Seal (CR-4E (Europe))	1
				—	0M05116A	Amp. Number Seal	1
				—	MA01001A	F. Code Labels (CR-4, CR-4E & CR-40)	1
01	0H05111A	Top Cover	1				
02	—	Chassis Ass'y	1				
03	JA04339A	Bottom Cover Ass'y (CR-4 & CR-4E)	1				
	JA04338A	Bottom Cover Ass'y (CR-4A)	1				
	JA04341A	Bottom Cover Ass'y (CR-40)	1				
04	HA05348A	Cassette Case Cover Ass'y	1				
05	0H05278A	Front Panel (CR-4)	1				
	0H05167A	Front Panel (CR-4A)	1				
	0H05280A	Front Panel (CR-4E)	1				
	0H05279A	Front Panel (CR-40)	1				
06	HA05340A	Rec. Volume Knob Ass'y	1				
07	HA05338A	Rec. Balance Knob Ass'y	1				
08	HA05339A	Bias Volume Knob Ass'y	3				
09	0J05453A	Top Cover Cushion	3				
10	0J05407A	Top Cover Sheet	3				
11	0H05103A	LED Lens B	11				
L01	0E03433A	BT3x6 ⊕ Binding Projected (Black Chromate)	11				

7.2. Chassis Ass'y (A01)

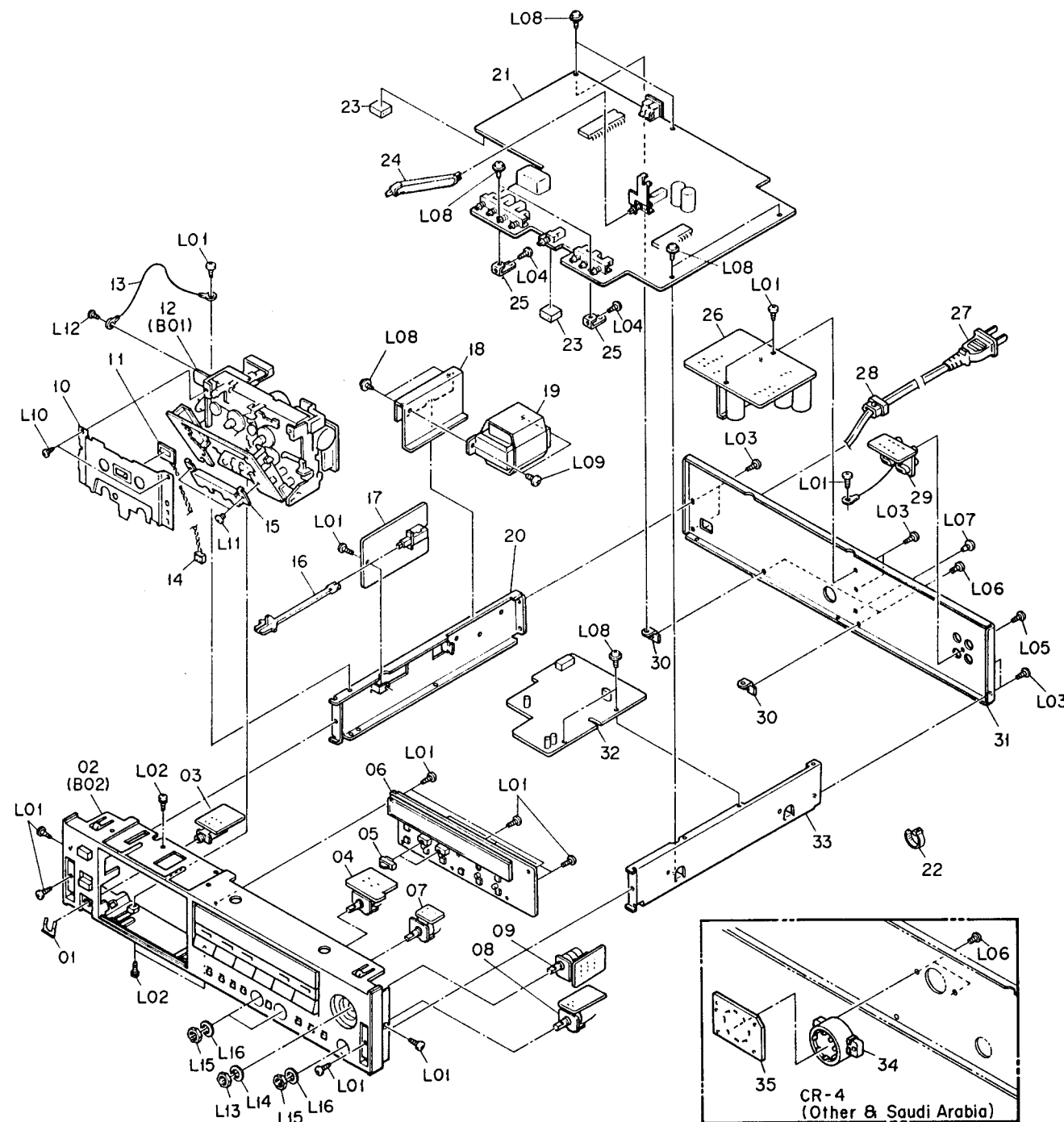


Fig. 7.2

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.2. Chassis Ass'y (A01)				L08	OE03432A	BT3x6 @ Tapping (Black Chromate)	10
A01	—	Chassis Ass'y Serial No.: A13101001 -	1	L09	OE03438A	ST4x6 @ Binding	2
01	OJ05427A	Mount Plate	1	L10	OE03437A	BT2.5x3.5 @ Fan (Black Chromate)	2
02	HA05342A	Front Escutcheon Ass'y	1	L11	OE03202A	M2.6x3 @ Binding (Black Chromate)	2
03	BA07052A	Headphone P.C.B. Ass'y (CR-4, CR-4A, CR-4E (UK) & CR-40)	1	L12	OE00859A	BT2.6x6 @ Binding	1
	BA07152A	Headphone P.C.B. Ass'y (CR-4E (Europe))	1	L13	OE03375A	Nut Hex. M9	1
04	BA07011A	Bias P.C.B. Ass'y	1	L14	OE03378A	Washer 9mm	1
05	OH05095A	Slide Button	2	L15	OE03382A	Nut Hex. M7	3
06	BA07042A	Control P.C.B. Ass'y	1	L16	OE03383A	Washer 7mm	3
07	BA07010A	Level Adjustment P.C.B. Ass'y	1	—	OB80142A	Wire (CR-4 (Other & Saudi Arabia))	1
08	BA07051A	Output Volume P.C.B. Ass'y	1	—	OJ05462A	BS Damper 15x30 (CR-40)	2
09	BA07054A	Input Volume P.C.B. Ass'y	1	—	OJ05463A	BS Damper 15x60 (CR-40)	1
10	OH05166A	Cover Plate	1	—	OJ05464A	P.C.B. Cushion B (CR-40)	1
11	OB12580A	LED P. Green SLF-7250	1	—	OM05112A	Fuse Caution Label (CR-4A)	1
12	CA08889A	Mechanism Ass'y	1	7.3. Bottom Cover Ass'y (A02)			
13	OB83255A	GND Wire Ass'y	1	A02	JA04339A	Bottom Cover Ass'y (CR-4 & CR-4E)	1
14	OB83132A	2P Connector	1		JA04338A	Bottom Cover Ass'y (CR-4A)	1
15	OH04415B	Head Mounting Cover	1		JA04341A	Bottom Cover Ass'y (CR-40) Serial No.: A13101001 -	1
16	OJ05402A	Power Switch Joint	1	01	OJ05454A	Bottom Cover	1
17	BA07045A	Fuse P.C.B. Ass'y (CR-4 & CR-4E)	1	02	OJ05420A	Leg N (CR-4, CR-4A & CR-4E)	4
	BA07044A	Fuse P.C.B. Ass'y (CR-4A)	1	03	HA05357A	Leg Ass'y (CR-40)	4
	BA07046A	Fuse P.C.B. Ass'y (CR-40)	1	L01	OM04377B	Caution Label (CR-4A)	1
18	OJ05417C	Transformer Holder	1	—	OE00888A	BT3x12 @ Binding	4
19	OB50100A	Power Transformer (CR-4 (Australia) & CR-4E)	1		OJ05461A	Leg Felt (CR-4, CR-4A & CR-4E)	4
	OB50101A	Power Transformer (CR-4 (Other & Saudi Arabia))	1	7.3. Bottom Cover Ass'y (A02)			
	OB50099A	Power Transformer (CR-4A)	1				
20	OB50102A	Power Transformer (CR-40)	1				
21	OJ05456A	Side Chassis L	1				
	BA07188A	Main P.C.B. Ass'y Serial No.: A13102451 - (CR-4A) Serial No.: A13153801 - (CR-4, CR-4E & CR-40) Serial Nos.: A13150001 - 53800 (CR-4, CR-4E & CR-40)	1				
22	OB08515A	Insu-Lock SKB80	21				
23	OJ05451A	P.C.B. Cushion	2				
24	OJ05403A	Monitor Switch Joint	1				
25	OJ05394A	P.C.B. Holder Front	2				
26	BA07041A	Power Supply P.C.B. Ass'y	1				
27	OB05241A	Power Cord (CR-4 (Australia))	1				
	OB08533A	Power Cord (CR-4 (Other & Saudi Arabia))	1				
	OB90294A	Power Cord (OFC) (CR-4A)	1				
	OB08093U	Power Cord (CR-4E (Europe))	1				
	OB08348A	Power Cord (CR-4E (UK))	1				
	OB90293A	Power Cord (OFC) (CR-40)	1				
28	OB90280A	Cord Bushing	1				
29	BA07055A	Pin Jack P.C.B. Ass'y	2				
30	OJ05395A	P.C.B. Holder Rear	1				
31	OH05172A	Rear Panel (CR-4 (Australia))	1				
	OH05174A	Rear Panel (CR-4 (Other & Saudi Arabia))	1				
	OH05171B	Rear Panel (CR-4A)	1				
	OH05173A	Rear Panel (CR-4E)	1				
	OH05175A	Rear Panel (CR-40)	1				
32	BA07192A	Cal. Osc. P.C.B. Ass'y Serial No.: A13102451 - (CR-4A) Serial No.: A13153801 - (CR-4, CR-4E & CR-40) Cal. Osc. P.C.B. Ass'y Serial Nos.: A13101001 - 02450 (CR-4A) Serial Nos.: A13150001 - 53800 (CR-4, CR-4E & CR-40)	1				
	BA07008B	Side Chassis R	1				
33	OJ05455A	Side Chassis L	1				
34	OB81771A	Voltage Selector (CR-4 (Other & Saudi Arabia))	1				
35	OB60503A	Voltage Selector P.C.B. (CR-4 (Other & Saudi Arabia))	1				
L01	OE00868A	BT3x8 @ Binding	15				
L02	OE03212A	BT2.6x6 @ Binding with Toothed Lock	3				
L03	OE03433A	BT3x6 @ Binding Projected (Black Chromate)	6				
L04	OE00846A	BT3x8 @ Pan	2				
L05	OE00921A	BT3x8 @ Binding (Black Chromate)	1				
L06	OE00985A	M3x6 @ Binding (Black Chromate) (CR-4 (Australia) & CR-4A, CR-4E & CR-40)	2				
	OE00985A	M3x6 @ Binding (Black Chromate) (CR-4 (Other & Saudi Arabia))	4				
L07	OJ05108A	Hole Plug No.9	1				

7.3. Bottom Cover Ass'y (A02)

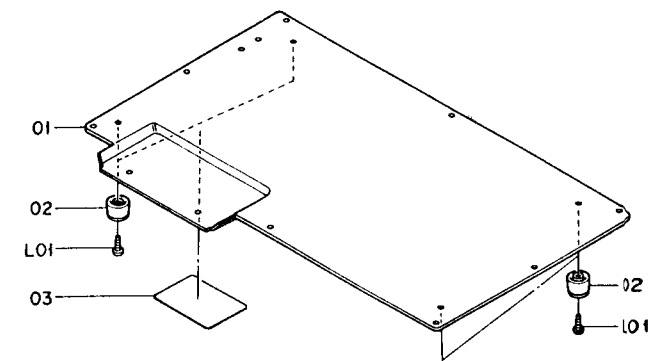


Fig. 7.3

7.4. Mechanism Ass'y (B01)

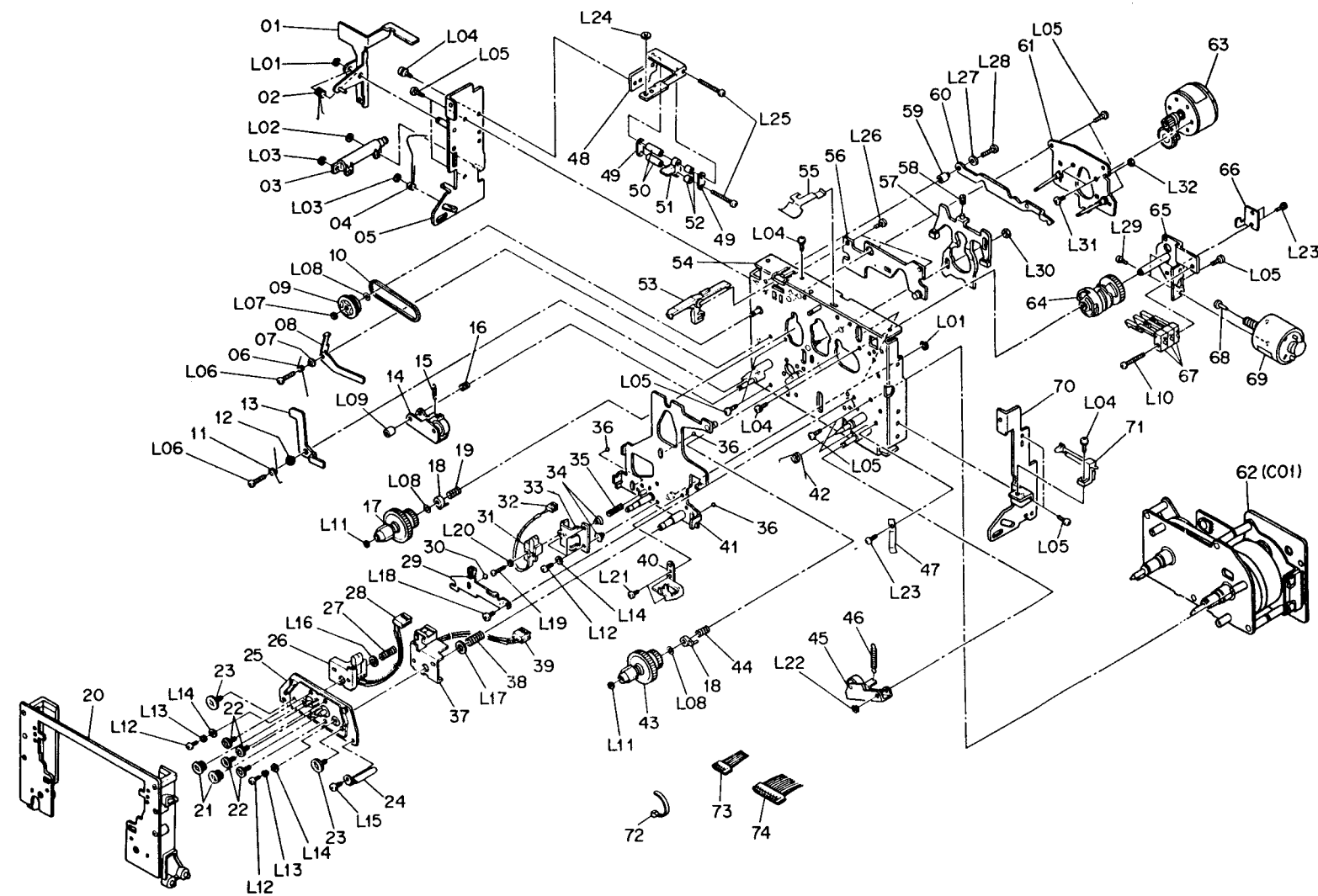


Fig. 7.4

7.5. Front Escutcheon Ass'y (B02)

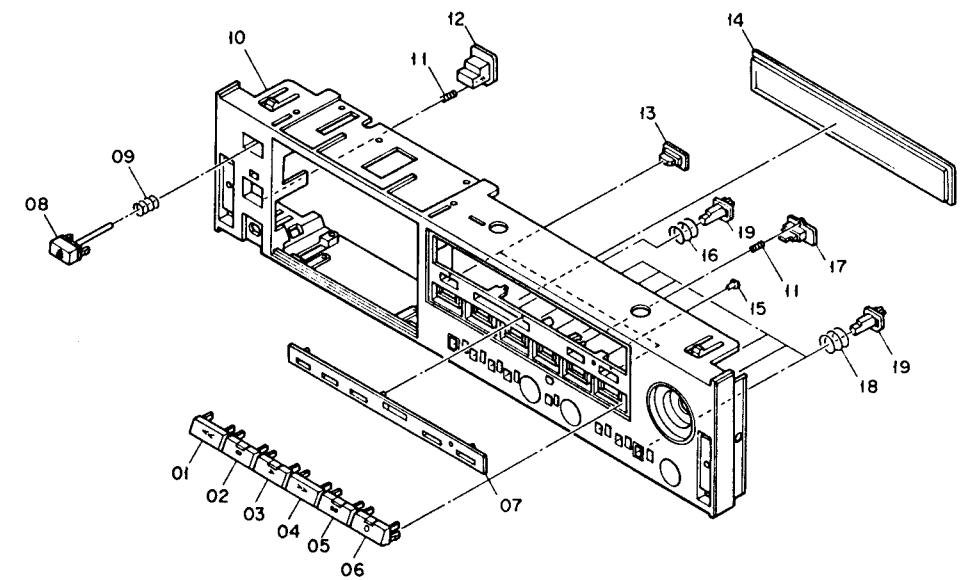


Fig. 7.5

7.6. D.D. Motor Ass'y (C01)

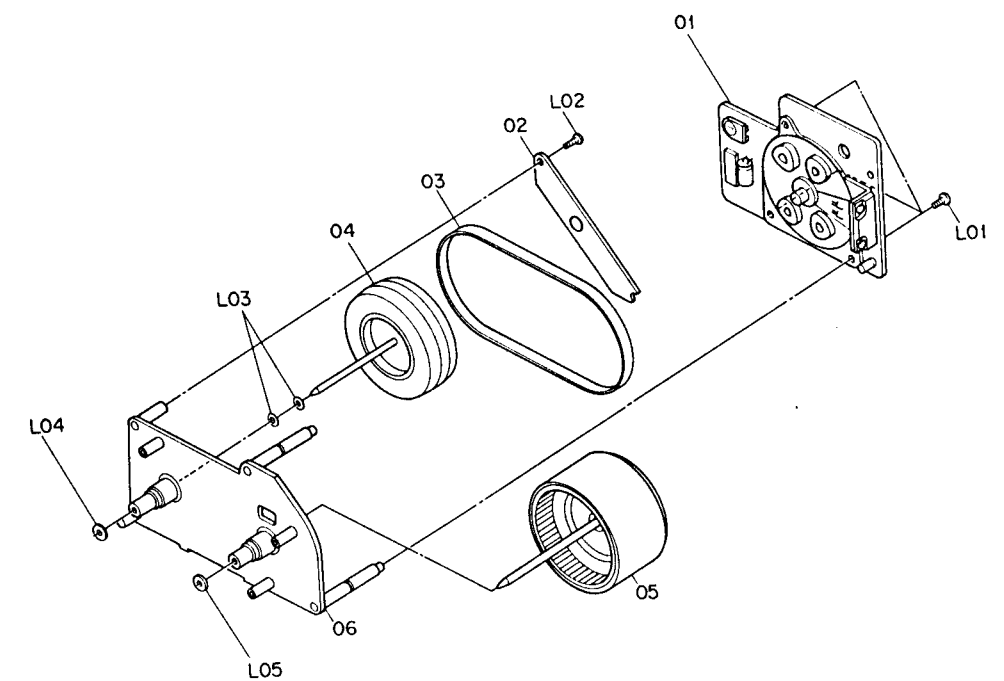


Fig. 7.6

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
7.4. Mechanism Ass'y (B01)				L05	OE03229A	FT2.5x6 @ Pan	10
B01	CA08889A	Mechanism Ass'y Serial No.: A13101001 -	1	L06	OE03043A	FT2.5x10 @ Pan	2
01	OC80021A	Eject Lever	1	L07	OE03225A	Washer 1.8x3.8x0.5	1
02	OC80020A	Eject Lever Spring	1	L08	OE03226A	Washer 2.1x4.5x0.1	3
03	CA80006A	Pneumatic Damper Ass'y	1	L09	OC81421A	Supply Tape Guide	1
04	OC80019B	Eject Spring	1			Adjustment Nut	
05	OC80018B	Cassette Case Holder L	1	L10	OE03044A	FT2.5x20 @ Pan	1
06	OC80617A	Back Tension Arm Spring	1	L11	OE03049A	Washer 1.8x3.2x0.5	2
07	OC80618A	Back Tension Arm Collar	1	L12	OE00976A	M2x5 @ Binding	5
08	OC80619A	Back Tension Arm	1	L13	OE00025A	Spring Washer 2mm	2
09	OC80620A	Back Tension Pulley	1	L14	OE00117A	Washer 2x4.3x0.4	5
10	OC80621A	Back Tension Belt	1	L15	OE00866A	M2.6x4 @ Binding	1
11	OC80013A	Lock Lever Spring	1	L16	OC08774A	Plate Washer L	1
12	OC80014A	Lock Lever Collar	1	L17	OC08773A	Plate Washer R	1
13	OC80015B	Lock Lever	1	L18	OE03228A	FT3x4 @ Pan	1
14	CA80366A	Supply Pressure Roller Arm Ass'y	1	L19	OE03232A	M1.7x7 @ Pan	1
15	OC81420A	Supply Pressure Roller Arm Spring	1	L20	OE03222A	Washer 1.8x3.8x0.3	1
16	OC81422A	Supply Pressure Roller Arm Thrust Spring	1	L21	OE03234A	M2x3 @ Pan	2
17	CA80726A	Supply Reel Hub Ass'y	1	L22	OE00222A	E-Ring 2mm	1
18	OC80612A	Spring Holder	2	L23	OE03035A	M2x3.2 @ Truss	3
19	OC80614A	Supply Reel Hub Spring	1	L24	OE03227A	Washer 2.7x5x0.5	2
20	CA80200A	Cassette Case Ass'y	1	L25	OE03231A	M2x30 @ Pan	2
21	OC08762A	Head Height Adjustment Gear	2	L26	OE03041A	FT2.5x4 @ Pan	2
22	OC08761A	Head Height Adjustment Screw	4	L27	OE03233A	Washer 2.6x8x1	1
23	OC08763A	Azimuth Alignment Screw	2	L28	OE03230A	FT2.6x12 @ Pan	1
24	OC80605A	Wire Clamper	1	L29	OE00691A	M2x3 @ Pan (Nickel)	2
25	CA08637A	Head Mount Base Sub Ass'y	1	L30	OE03237A	Nut Hex. M2.6	1
26	CA08659B	R-3L Record Head Ass'y	1	L31	OE03045A	M2.6x3 @ Binding	2
27	OC08776A	Head Plate Spring (L)	1	L32	OE00694A	Nut Hex. M2	1
28	CA80731A	4P Connector	1	7.5. Front Escutcheon Ass'y (B02)			
29	OC80003A	Head Base Hold Plate	1	B02	HA05342A	Front Escutcheon Ass'y Serial No.: A13101001 -	1
30	OC80004A	Steel Ball 3mm	1	01	OH05126A	Rewind Button	1
31	GA02201A	E-4F Erase Head	1	02	HA05359A	Stop Button Ass'y	1
32	CA80733A	2P Connector	1	03	HA05343A	Play Button Ass'y	1
33	OC08768A	Erase Head Hold Plate	1	04	OH05129A	FF Button	1
34	OC08889A	Erase Head Hold Plate Tapering Spring	2	05	HA05361A	Pause Button Ass'y	1
35	OC08886A	Erase Head Hold Plate Spring	1	06	HA05360A	Rec. Button Ass'y	1
36	OC80007A	Steel Ball 2mm	3	07	OH05098A	Function Plate	1
37	CA08658B	P2H-L Playback Head Ass'y	1	08	HA05344A	Eject Button Ass'y	1
38	OC08775A	Head Plate Spring (R)	1	09	OJ05404A	Eject Knob Spring	1
39	CA80732A	4P Connector	1	10	OH05122B	Front Escutcheon	1
40	OC08771A	Tape Guide Plate	1	11	OJ05405A	Power Switch Knob Spring	2
41	CA80365A	Head Base Sub Ass'y	1	12	OH05125B	Power Switch Knob	2
42	OC80611A	Head Base Spring	1	13	OH05094A	Function Button	1
43	CA80725A	Take-up Reel Hub Ass'y	1	14	OH05101A	Display Lens	1
44	OC80613A	Take-up Reel Hub Spring	1	15	OH05103A	LED Lens B	1
45	CA80368A	Take-up Pressure Roller Arm Ass'y	1	16	OJ05452B	EX Switch Spring	1
46	OC81423A	Supply Pressure Roller Arm Spring	1	17	OH05096A	Button (Monitor)	1
47	OC80610A	Cassette Case Spring	1	18	OJ05406A	Push Switch Button Spring	7
48	OC80622A	Switch Hold Plate	1	19	OH05097A	Push Button	8
49	OC80623A	Switch Plate	2	—	OJ05458A	LED Lens Adhesive Tape	1
50	OC80624A	Switch Collar A	2	—	OJ05459A	F. Plate Adhesive Tape	1
51	OC80626A	Leaf Switch	1	7.6. D.D. Motor Ass'y (C01)			
52	OC80625A	Switch Collar B	2	C01	CA80364A	D.D. Motor Ass'y Serial No.: A13101001 -	1
53	OC80017B	Record Protect Lever	1	01	CA80444A	Flywheel Holder Ass'y	1
54	CA80367A	Mechanism Chassis	1	02	OC81464A	Supply Flywheel Holder	1
55	OC80022B	Cassette Hold Spring	1	03	OC80634A	Capstan Belt	1
56	CA80011A	Shut-off P.C.B. Ass'y	1	04	OC81429A	Supply Flywheel Ass'y	1
57	CA80204A	Brake Ass'y	1	05	OC81427A	Take-up Flywheel Ass'y	1
58	OC80628A	Brake Spring B	1	06	OC81426A	Motor Plate	1
59	OC80630A	Brake Arm Collar	1	L01	OE03349A	FT3x5 @ Pan	3
60	OC80629A	Brake Arm	1	L02	OE03229A	FT2.5x6 @ Pan	1
61	OC80030A	Reel Motor Holder	1	L03	OE00912A	Washer 2.6x4.7x0.25 (Polyslider)	2
62	CA80364A	D.D. Motor Ass'y	1	L04	OE03348A	Capstan Washer S	1
63	CA80730A	Reel Motor Ass'y	1	L05	OE03051A	Washer 2.5x7x0.8	1
64	OC81417A	Cam Gear	1				
65	OC81418A	Control Motor Holder	1				
66	OC81416A	Thrust Spring B	1				
67	OC80027A	Mode Switch	1				
68	OC81415A	Warm Thrust Bush	1				
69	CA80007A	Control Motor Ass'y	1				
70	OC80010D	Cassette Case Holder R	1				
71	OC80012A	Eject Sensor	1				
72	OC80037A	Insu-Lock	3				
73	OC82935A	5P Connector	1				
74	OC82936A	9P Connector	1				
L01	OE00181A	E-Ring 3mm	3				
L02	OE03235A	Plastic Washer 2x5x0.25	1				
L03	OE03052A	CS Stopper Ring 2.4mm	2				
L04	OE03236A	M2x5 @ Pan (2A)	4				

8. MOUNTING DIAGRAMS AND PARTS LIST

Notes: 1. Mounting diagram shows a dip side view of the printed circuit board.
2. 1SS155 or 1SS176 unless otherwise specified.

1. Mounting diagram shows a dip side view of the package.
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

b. 2SC945, 2SC536SP, 2SC2458, 2SC2785

4. Abbreviation for part name:

TR — Transistor, SiD — Silicon Diode, ZD — Zener Diode

TR — Transistor, SiD — Silicon Diode, ZD — Zener Diode
RK — Carbon Resistor, RM — Metal Film Resistor, RF — Fail Safe Type Resistor
C — Capacitor, CM — Mylar Capacitor, CC — Ceramic Capacitor, C

RK — Carbon Resistor, RM — Metal Film Resistor, Rr — Full Scale 1% Resistor
CE — Electrolytic Capacitor, CML — Mylar Capacitor, CC — Ceramic Capacitor, CPP — PP Capacitor
CMM — Metalized Mylar Capacitor, CSP — Polystyrene Capacitor, C — Mica Capacitor

CE — Electrolytic Capacitor, CML — Mylar Capacitor, CSP — Polystyrene Capacitor, C — Mica Capacitor
CMM — Metalized Mylar Capacitor, CSP — Polystyrene Capacitor, C — Mica Capacitor

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

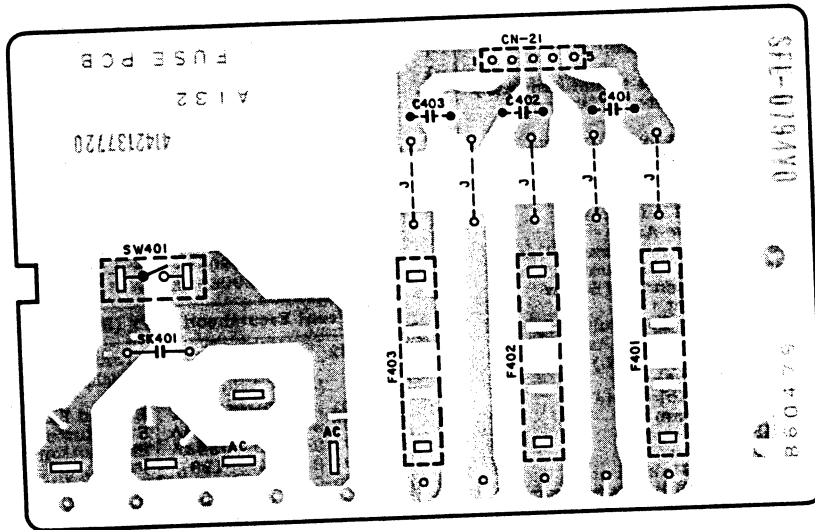


Fig. 8.1

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

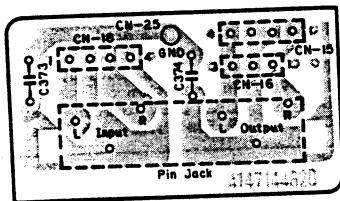


Fig. 8.2

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

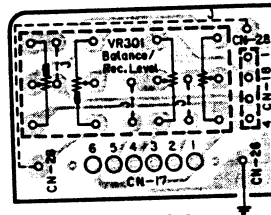


Fig. 8.3

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.1. Fuse P.C.B. Assy			CN21 SW401	OB83122A OB71008A	5P Connector Power Switch (CR-4, CR-4A & CR-4E)	8.2. Pin Jack P.C.B. Assy		
C401,402 C403 F401 F401 F401 F402,403 F402,403 F402,403 SK401 SK401	BA07045A	Fuse P.C.B. Assy (CR-4 & CR-4E)	SW401	OB71006A	Power Switch (CR-40)	C373,374 CN16 CN18	BA07055A	Pin Jack P.C.B. Assy
	BA07044A	Fuse P.C.B. Assy (CR-4A)		OB81776A	Contact Pin (CR-4 & CR-4E) (5)		OB60521A OB41007A	Pin Jack P.C.B. CC 100OP 25V M
	BA07046A	Fuse P.C.B. Assy (CR-40)		OB81848A OM04131B	Fuse Holder (6)		OB83121A OB83120A OB81756A	3P Connector 4P Connector 4P Pin/Jack GOLD (1)
	OB60479A	Fuse P.C.B.		OM04191A	Fuse Label T1A 250Vx2 (CR-4 & CR-4E) (1)	OB83133A	Ground Assy (1)	
	OB09292A	CC 0.1μ 50V Z			Fuse Label T1A 250V (CR-4 & CR-4E) (1)	8.3. Input Volume P.C.B. Assy		
	OB09292A	CC 0.1μ 50V Z			VR301 CN28	OB60522A OB30077A OB02362B OJ05419A OV10050C	BA07054A	Input Volume P.C.B. Assy
	OB90285A	Fuse 1.6A (CR-4A)					OB60522A	Input Volume P.C.B.
	OB90289A	Fuse T1A 250V (CR-4 & CR-4E)					OB30077A	Volume 100Kx2
	OB90291A	Fuse 1.6A (CR-40)					OB02362B	PD Connector
	OB90285A	Fuse 1.6A (CR-4A)					OJ05419A	Volume Earth Plate (1)
OB90289A	Fuse T1A 250V (CR-4 & CR-4E)	OV10050C	Wire 2mm BLK (1)					
OB90291A	Fuse 1.6A (CR-40)							
OB41929A	CC 4700P (CR-4, CR-4A & CR-4E)							
OB41826A	CC 4700P (CR-40)							

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.4. Output Volume P.C.B. Ass'y			8.6. Level Adjustment P.C.B. Ass'y			8.8. Shut-off P.C.B. Ass'y		
Q017,018 VR302 R084,085 R086,087 R729 R829	BA07051A	Output Volume P.C.B. Ass'y	VR006 CN38	BA07010A	Level Adjustment P.C.B. Ass'y	Q601 Q602 R601 R602 R603	CA80011A	Shut-off P.C.B. Ass'y
	OB60523A	Output Volume P.C.B.		OB60513A	Level Adjustment P.C.B.		OC80047A	Shut-off P.C.B.
	OB06299A	TR 2SC2878		OB30086A	Volume 10KBx2		OB06388A	TR 2SC2812
	OB30078A	Volume 10KAx2		OB83143A	7P Connector		OB06389A	Photo Reflector
	OB22233A	RM 1.10K 1/6W F		OJ05419A	Volume Earth Plate (1)			NJL5141
	OB09701A	RK 10K 1/6W J			Jumper Wire 52 BLK (1)		OB09840A	RK 680 Leadless
	OB22233A	RM 1.10K 1/6W F					OB09841A	RK 15K Leadless
	OB22233A	RM 1.10K 1/6W F					OC81330A	RM 750
	OB22233A	Volume Earth Plate (1)					OC81334A	Wire OV131 30N (1)
	OJ05419A	Wire 52mm BLK (1)					OC81335A	Wire OV101 15N (1)
	OV10050C	Wire 450mm GRN (1)						
8.5. Headphone P.C.B. Ass'y			8.7. Bias P.C.B. Ass'y					
	BA07052A	Headphone P.C.B. Ass'y (CR-4, CR-4A, CR-4E (UK) & CR-40)	Q011 Q012 Q013 Q017 D022 L001 VR005 R062 R063 R064 R065 R066 R067 R068 R088 C028 C029 CN41 CN42 CN44	BA07011A	Bias P.C.B. Ass'y			
	BA07152A	Headphone P.C.B. Ass'y (CR-4E (Europe))		OB60514A	Bias P.C.B.			
	OB60526A	Headphone P.C.B.		OB06069A	TR 2SB564 (L,M)			
	OB81777A	Headphone Jack GOLD (1)		OB01872A	TR 2SC945L (P,Q)			
	OB83133A	GND Ass'y 80 (1) (CR-4E (Europe))		OB10023A	TR 2SC2002 (K)			
				OB10053A	TR DTA144ES R1,R2=47K			
				OB12249A	SiD 1SS133			
				OB51254A	Coil 105K			
				OB30085A	Volume 10KB			
				OB09653A	RK 100 1/6W J			
				OB09665A	RK 330 1/6W J			
				OB09701A	RK 10K 1/6W J			
				OB09733A	RK 220K 1/6W J			
				OB09753A	RK 4.7 1/4W J			
				OB09701A	RK 10K 1/6W J			
				OB09709A	RK 22K 1/6W J			
				OB19006A	Thermistor 3.3K			
				OB41092A	CML 6800P 50V			
				OB41259A	CPP 0.027μ 100V J			
				OB83146A	2P Connector			
				OB83147A	3P Connector			
				OB83199A	2P Connector			
				OJ05419A	Volume Earth Plate (1)			
				OV10050C	Jumper Wire 52 BLK (1)			

8.9. Power Supply P.C.B. Ass'y

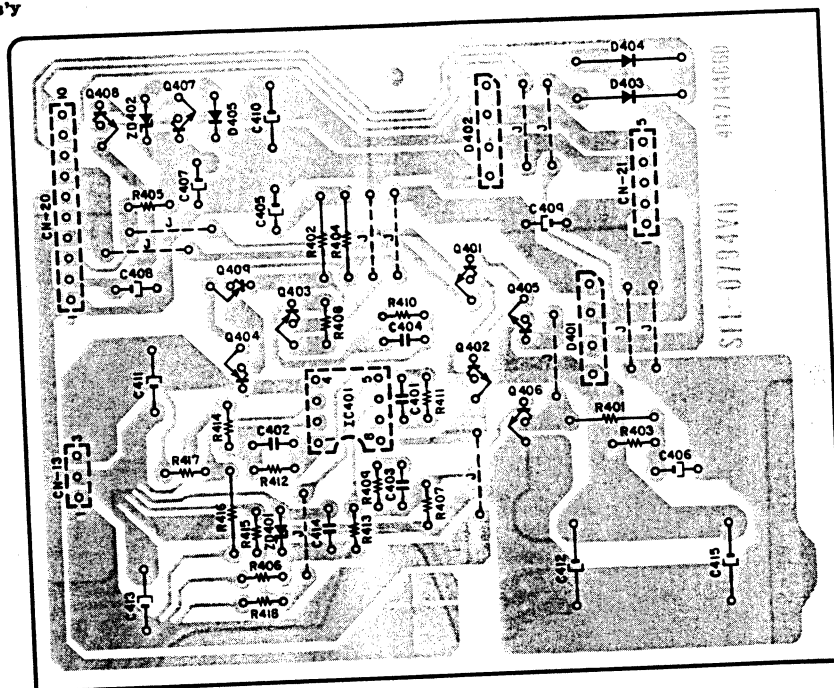


Fig. 8.9

8.10. Cal. Osc. P.C.B. Ass'y

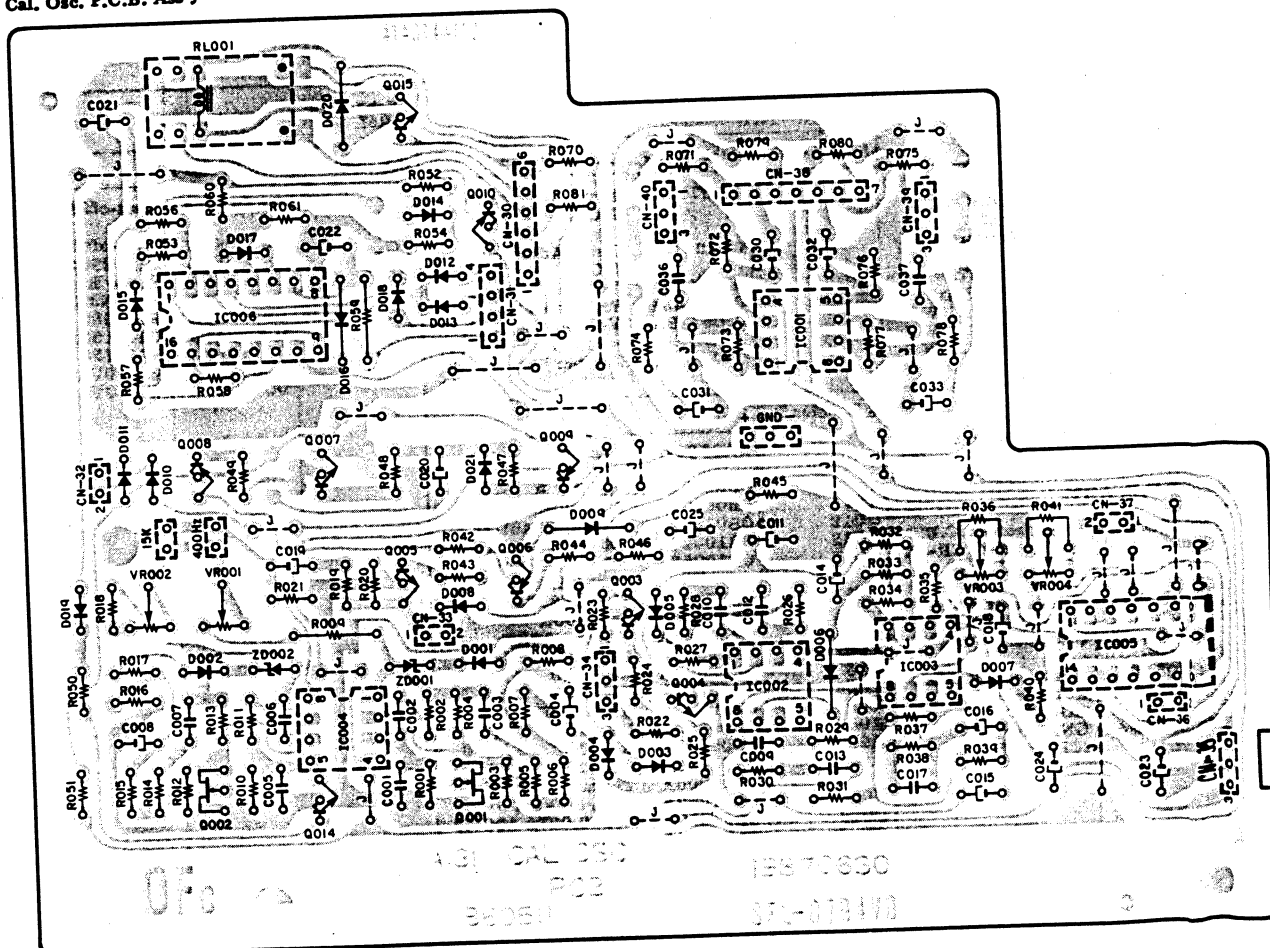


Fig. 8.10.1 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/40)

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.9. Power Supply P.C.B. Ass'y			8.10.1. Cal. Osc. P.C.B. Ass'y			R060,061	OB09725A	RK 100K 1/6W J
IC401	BA07041A	Power Supply P.C.B. Ass'y	IC001,002	BA07192A	Cal. Osc. P.C.B. Ass'y Serial No.: A13102451-(CR-4A) A13153801-(CR-4/4E/40)	R070,071	OB09701A	RK 10K 1/6W J
	OB60525A	Power Supply P.C.B. IC NJM4560M		OB60511A	Cal. Osc. P.C.B. IC NJM4558D	R072	OB09733A	RK 220K 1/6W J
Q401,402	OB06452A	TR 2SD1406 (Y)	IC003,004	OB06124B	IC NJM4558D	R073	OB09725A	RK 100K 1/6W J
Q403	OB06013A	TR 2SA733 (P,Q)	IC005	OB06144A	IC μ PD4066BC	R074	OB09723A	RK 82K 1/6W J
Q405,406	OB06451A	TR 2SB1015 (Y)	IC006	OB11066A	IC LC4049B	R075	OB09701A	RK 10K 1/6W J
Q407	OB01872A	TR 2SC945L (P,Q)	Q001,002	OB10022A	FET 2SK246 (GR)	R076	OB09733A	RK 220K 1/6W J
Q408	OB06452A	TR 2SD1406 (Y)	Q003,004	OB01872A	TR 2SC945L (P,Q)	R077	OB09725A	RK 100K 1/6W J
Q409	OB06013A	TR 2SA733 (P,Q)	Q005	OB01872A	TR 2SC945L (P,Q)	R078	OB09723A	RK 82K 1/6W J
ZD401	OB12147A	ZD 5.1V	Q006	OB10058A	TR DTA114ES	R079,080	OB09701A	RK 10K 1/6W J
ZD402	OB12150A	ZD RD5.1JS-T1B2	Q007	OB01872A	TR 2SC945L (P,Q)	R081	OB09677A	RK 1K 1/6W J
		ZD RD5.6JS-T1B2	Q008	OB06013A	TR 2SA733 (P,Q)	C001	OB41306A	CMM 0.47 μ 50V J
D401,402	OB06282A	SiD DBA10B.C.	Q009,010	OB10053A	TR DTA144ES	C002	OB41288A	CML 0.015 μ 50V J
D403,404	OB12586A	SiD 1N4002	Q014	OB01872A	TR 2SC945L (P,Q)	C003	OB41098A	CML 0.022 μ 50V J
D405	OB06398A	SiD 1SS176	Q015	OB10023A	ZD 7.5V UTZJ7.5B	C004	OB01405A	CE 1 μ 50V
R401,402	OB01679A	RK 100 1/4W J	ZD001,002	OB12249A	SiD 1SS133	C005	OB09856A	CML 0.01 μ 50V J
R403	OB09677A	RK 1K 1/6W J	D001,002	OB12249A	SiD 1SS133	C006	OB41215A	CPP 390P 100V J
R404	OB01857A	RK 1K 1/4W J	D003,004	OB12249A	SiD 1SS133	C007	OB41098A	CML 0.022 μ 50V J
R405	OB09677A	RK 1K 1/6W J	D005	OB12249A	SiD 1SS133	C008	OB01405A	CE 1 μ 50V
R406	OB09681A	RK 1.5K 1/6W J	D006	OB12584A	SiD 1N4148	C009	OB41221A	CPP 680P 100V J
R407,408	OB09693A	RK 4.7K 1/6W J	D007,008	OB12249A	SiD 1SS133	C010	OB41287A	CML 0.012 μ 50V J
R409,410	OB09701A	RK 10K 1/6W J	D009	OB12584A	SiD 1N4148	C011	OB01862A	CE 22 μ 16V
R411,412	OB09749A	RK 1M 1/6W J	D010,011	OB12249A	SiD 1SS133	C012	OB41221A	CPP 680P 100V J
R413,414	OB22310A	RM 5.11K 1/6W F	D012,013	OB12249A	SiD 1SS133	C013	OB41287A	CML 0.012 μ 50V J
R415	OB22343A	RM 10.0K 1/6W F	D014,015	OB12249A	SiD 1SS133	C014	OB01862A	CE 22 μ 16V
R416	OB09504A	RM 11K 1/4W F	D016	OB12584A	SiD 1N4148	C015,016	OB01405A	CE 1 μ 50V
R417	OB22347A	RM 11.0K 1/6W F	D017,018	OB12249A	SiD 1SS133	C017	OB41221A	CPP 680P 100V J
R418	OB22357A	RM 13.7K 1/6W F	D019	OB12249A	SiD 1SS133	C018,019	OB01412A	CE 10 μ 16V
C401,402	OB09393A	CC 68P 50V J	D020	OB12584A	SiD 1N4148	C020	OB40076A	CE 33 μ 16V
C403,404	OB05652A	CML 4700P 50V J	D021	OB12249A	SiD 1SS133	C021	OB01412A	CE 10 μ 16V
C405,406	OB01272A	CE 100 μ 25V	VR001,002	OB32130A	Semi VR 100KB	C022	OB01405A	CE 1 μ 50V
C407	OB01400A	CE 100 μ 16V	VR003,004	OB32127A	Semi VR 10KB	C023,024	OB01397A	CE 1000 μ 16V
C408	OB05899A	CE 220 μ 10V	R001	OB09676A	RK 910 1/6W J	C025	OB01412A	CE 10 μ 16V
C409	OB01401A	CE 470 μ 25V	R002	OB09711A	RK 27K 1/6W J	C030,031	OB09814A	CE 1 μ 50V (LN)
C410	OB40362A	CE 6800 μ 16V	R003	OB09733A	RK 220K 1/6W J	C032,033	OB09814A	CE 1 μ 50V (LN)
C411	OB40361A	CE 2200 μ 16V	R004	OB09719A	RK 56K 1/6W J	C036,037	OB40473A	CE 10 μ 16V (BF)
C412	OB40476A	CE 8200 μ 25V M	R005	OB09749A	RK 1M 1/6W J	RL001	OB90301A	Relay 12V MR5 2-12S
C413	OB09377A	CE 4700 μ 16V	R006	OB09699A	RK 8.2K 1/6W J	CN30	OB81638A	6P-T Post
C414	OB41386A	CPP 100P 50V J	R007	OB09741A	RK 470K 1/6W J	CN31	OB81636A	4P-T Post
C415	OB40476A	CE 8200 μ 25V M	R008	OB09701A	RK 10K 1/6W J	CN32	OB83137A	2P-T Post
CN21	OB81762A	5P-T Post	R009	OB05626A	RK 150K 1/4W J	CN33	OB83138A	2P Connector
MJ	OB80151B	Wire 80mm BLK	R010	OB09676A	RK 910 1/6W J	CN34	OB83139A	3P Connector
	OB90297A	Isolation Sheet (1)	R011	OB09709A	RK 22K 1/6W J	CN35	OB83140A	3P Connector
	OE00037A	Earth Lug (1)	R012	OB09733A	RK 220K 1/6W J	CN36,37	OB81634A	2P-T Post
	OE00985A	M3x6 @ Binding (Black Chromate)(2)	R013	OB09719A	RK 56K 1/6W J	CN38	OB81639A	7P-T Post
	OJ05415A	Heat Sink (1)	R014	OB09749A	RK 1M 1/6W J	CN39	OB83144A	3P Connector
			R015	OB09699A	RK 8.2K 1/6W J	CN40	OB83145A	3P Connector
			R016	OB09741A	RK 470K 1/6W J		OB81773A	Receptacle 2P Female
			R017	OB09701A	RK 10K 1/6W J		OB81774A	Receptacle 2P Male
			R018	OB09729A	RK 150K 1/6W J			
			R019	OB09685A	RK 2.2K 1/6W J			
			R020	OB09709A	RK 22K 1/6W J			
			R021	OB09653A	RK 100 1/6W J			
			R022,023	OB09701A	RK 10K 1/6W J			
			R024,025	OB09709A	RK 22K 1/6W J			
			R026	OB09725A	RK 100K 1/6W J			
			R027	OB09729A	RK 150K 1/6W J			
			R028	OB09679A	RK 1.2K 1/6W J			
			R029	OB09725A	RK 100K 1/6W J			
			R030	OB09729A	RK 150K 1/6W J			
			R031	OB09679A	RK 1.2K 1/6W J			
			R032,033	OB09701A	RK 10K 1/6W J			
			R034	OB09694A	RK 5.1K 1/6W J			
			R035	OB09689A	RK 3.3K 1/6W J			
			R036	OB09701A	RK 10K 1/6W J			
			R037	OB09725A	RK 100K 1/6W J			
			R038	OB09729A	RK 150K 1/6W J			
			R039	OB09679A	RK 1.2K 1/6W J			
			R040	OB09657A	RK 150 1/6W J			
			R041	OB09701A	RK 10K 1/6W J			
			R042	OB09725A	RK 100K 1/6W J			
			R043,044	OB09701A	RK 10K 1/6W J			
			R045,046	OB09725A	RK 100K 1/6W J			
			R047,048	OB09709A	RK 22K 1/6W J			
			R049	OB09677A	RK 1K 1/6W J			
			R050	OB09701A	RK 10K 1/6W J			
			R051	OB09725A	RK 100K 1/6W J			
			R052	OB09741A	RK 470K 1/6W J			
			R053	OB09669A	RK 470 1/6W J			
			R054	OB09741A	RK 470K 1/6W J			
			R056,057	OB09725A	RK 100K 1/6W J			
			R058	OB09749A	RK 1M 1/6W J			
			R059	OB05676A	RK 390K 1/4W J			

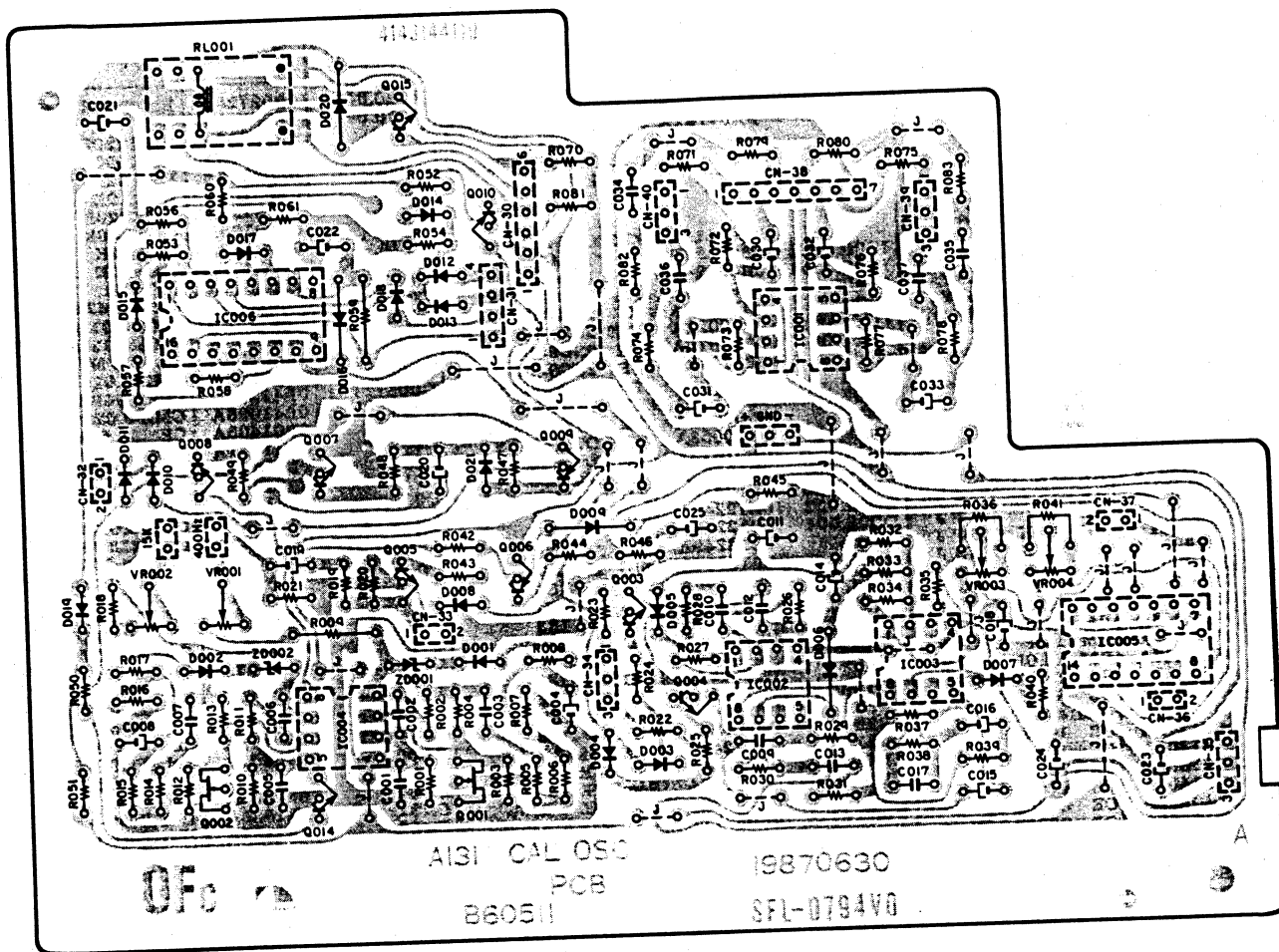


Fig. 8.10.2 Serial Nos.: A13101001 - 02450 (CR-4A)
A13150001 - 53800 (CR-4/4E/40)

8.11. Flywheel Holder Ass'y

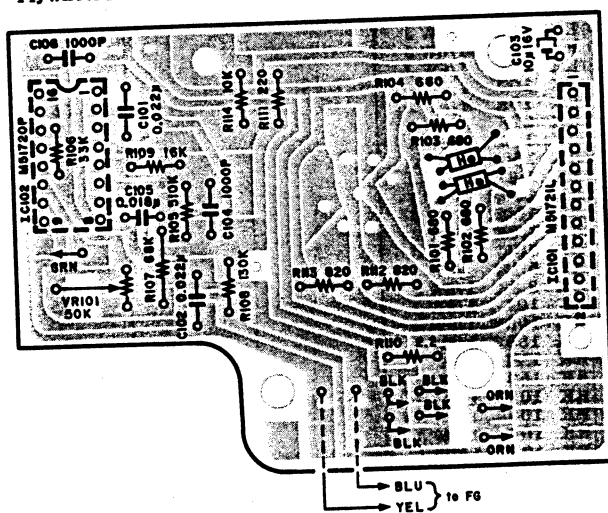


Fig. 8.11

Schematic Ref. No.	Part No.	Description
8.11. Flywheel Holder Ass'y		
	CA80444A	Flywheel Holder Ass'y
IC101	0C81951A	IC M51721L
IC102	0C81952A	IC M51720P
VR101	0B32109A	Semi VR 50K
R101,102	0B23154A	RK 680 1/4W J
103,104		
R105	0B23155A	RK 510K 1/4W J
R106	0B23156A	RK 33K 1/4W J
R107	0B22737A	RM 68K 1/8W J
R108	0B23161A	RK 130K 1/4W J
R109	0B23157A	RK 16K 1/4W J
R110	0B23158A	RK 2.2 1/4W J
R111	0B23164A	RK 220 1/4W J
R112,113	0B23159A	RK 820 1/4W J
R114	0B23160A	RK 10K 1/4W J
C101,102	0B23163A	CC 0.022μ 25V (N)
C103	0B01412A	CE 10μ 16V
C104,106	0B23162A	CC 1000P 50V K
C105	0B41748A	C Polystyrene 0.018μ 50V J
	0B11271A	Hall Sensor E5231-1

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
8.10.2. Cal. Osc. P.C.B. Ass'y			R060,061	OB09725A	RK 100K 1/6W J
	BA07008B	Cal. Osc. P.C.B. Ass'y	R070,071	OB09701A	RK 10K 1/6W J
		Serial Nos:	R072	OB09733A	RK 220K 1/6W J
		A13101001 - 02450	R073	OB09725A	RK 100K 1/6W J
		(CR-4A)	R074	OB09723A	RK 82K 1/6W J
		A13150001 - 53800	R075	OB09701A	RK 10K 1/6W J
		(CR-4/E/40)	R076	OB09733A	RK 220K 1/6W J
			R077	OB09725A	RK 100K 1/6W J
			R078	OB09723A	RK 82K 1/6W J
IC001,002	OB0511A	Cal. Osc. P.C.B.	R079,080	OB09701A	RK 10K 1/6W J
IC003,004	OB06124B	IC NJM4558D	R081	OB09677A	RK 1K 1/6W J
IC005	OB06124B	IC NJM4558D	R082,083	OB09749A	RK 1M 1/6W J
IC006	OB06144A	IC μ PD4066BC	C001	OB41306A	CMM 0.47 μ 50V J
Q001,002	OB11066A	IC LC4049B	C002	OB41288A	CML 0.015 μ 50V J
Q003,004	OB10022A	FET 2SK246 (GR)	C003	OB41098A	CML 0.022 μ 50V J
Q005	OB01872A	TR 2SC945L (P,Q)	C004	OB01405A	CE 1 μ 50V
Q006	OB01872A	TR 2SC945L (P,Q)	C005	OB09856A	CML 0.01 μ 50V J
Q007	OB10058A	TR DTA114ES	C006	OB41215A	CPP 390P 100V J
Q008	OB01872A	TR 2SC945L (P,Q)	C007	OB41098A	CML 0.022 μ 50V J
Q009,010	OB06013A	TR 2SA733 (P,Q)	C008	OB01405A	CE 1 μ 50V
Q014	OB10053A	TR DTA144ES	C009	OB41221A	CPP 680P 100V J
Q015	OB01872A	TR 2SC945L (P,Q)	C010	OB41287A	CML 0.012 μ 50V J
ZD001,002	OB10023A	TR 2SC2002 (K)	C011	OB01862A	CE 22 μ 16V
D001,002	OB12442A	ZD 7.5V UTZJ7.5B	C012	OB41221A	CPP 680P 100V J
D003,004	OB12249A	SID 1SS133	C013	OB41287A	CML 0.012 μ 50V J
D005	OB12249A	SID 1SS133	C014	OB01862A	CE 22 μ 16V
D006	OB06181A	SID 1SS53	C015,016	OB01405A	CE 1 μ 50V
D007,008	OB12249A	SID 1SS133	C017	OB41221A	CPP 680P 100V J
D009	OB06181A	SID 1SS53	C018,019	OB01412A	CE 10 μ 16V
D010,011	OB12249A	SID 1SS133	C020	OB40076A	CE 33 μ 16V
D012,013	OB12249A	SID 1SS133	C021	OB01412A	CE 10 μ 16V
D014,015	OB12249A	SID 1SS133	C022	OB01405A	CE 1 μ 50V
D016	OB06181A	SID 1SS53	C023,024	OB01397A	CE 1000 μ 16V
D017,018	OB12249A	SID 1SS133	C025	OB01412A	CE 10 μ 16V
D019	OB12249A	SID 1SS133	C030,031	OB09814A	CE 1 μ 50V (LN)
D020	OB06181A	SID 1SS53	C032,033	OB09814A	CE 1 μ 50V (LN)
D021	OB12249A	SID 1SS133	C034,035	OB41390A	CPP 150P 50V J
VR001,002	OB32130A	Semi VR 100KB	C036,037	OB40473A	CE 10 μ 16V (BP)
VR003,004	OB32127A	Semi VR 10KB	RL001	OB90301A	Relay 12V
R001	OB09676A	RK 910 1/6W J			MR52-12S
R002	OB09711A	RK 27K 1/6W J	CN30	OB81638A	6P-T Post
R003	OB09733A	RK 220K 1/6W J	CN31	OB81636A	4P-T Post
R004	OB09719A	RK 56K 1/6W J	CN32	OB83137A	2P-T Post
R005	OB09749A	RK 1M 1/6W J	CN33	OB83138A	2P Connector
R006	OB09699A	RK 8.2K 1/6W J	CN34	OB83139A	3P Connector
R007	OB09741A	RK 470K 1/6W J	CN35	OB83140A	3P Connector
R008	OB09701A	RK 10K 1/6W J	CN36,37	OB81634A	2P-T Post
R009	OB05626A	RK 150K 1/4W J	CN38	OB81639A	7P-T Post
R010	OB09676A	RK 910 1/6W J	CN39	OB83144A	3P Connector
R011	OB09709A	RK 22K 1/6W J	CN40	OB83145A	3P Connector
R012	OB09733A	RK 220K 1/6W J		OB81773A	Receptacle 2P
R013	OB09719A	RK 56K 1/6W J			Female (2)
R014	OB09749A	RK 1M 1/6W J		OB81774A	Receptacle 2P Male (2)
R015	OB09699A	RK 8.2K 1/6W J			
R016	OB09741A	RK 470K 1/6W J			
R017	OB09701A	RK 10K 1/6W J			
R018	OB09729A	RK 150K 1/6W J			
R019	OB09685A	RK 2.2K 1/6W J			
R020	OB09709A	RK 22K 1/6W J			
R021	OB09653A	RK 100 1/6W J			
R022,023	OB09701A	RK 10K 1/6W J			
R024,025	OB09709A	RK 22K 1/6W J			
R026	OB09725A	RK 100K 1/6W J			
R027	OB09729A	RK 150K 1/6W J			
R028	OB09679A	RK 1.2K 1/6W J			
R029	OB09725A	RK 100K 1/6W J			
R030	OB09729A	RK 150K 1/6W J			
R031	OB09679A	RK 1.2K 1/6W J			
R032,033	OB09701A	RK 10K 1/6W J			
R034	OB09694A	RK 5.1K 1/6W J			
R035	OB09689A	RK 3.3K 1/6W J			
R036	OB09701A	RK 10K 1/6W J			
R037	OB09725A	RK 100K 1/6W J			
R038	OB09729A	RK 150K 1/6W J			
R039	OB09679A	RK 1.2K 1/6W J			
R040	OB09657A	RK 150 1/6W J			
R041	OB09701A	RK 10K 1/6W J			
R042	OB09725A	RK 100K 1/6W J			
R043,044	OB09701A	RK 10K 1/6W J			
R045,046	OB09725A	RK 100K 1/6W J			
R047,048	OB09709A	RK 22K 1/6W J			
R049	OB09677A	RK 1K 1/6W J			
R050	OB09701A	RK 10K 1/6W J			
R051	OB09725A	RK 100K 1/6W J			
R052	OB09741A	RK 470K 1/6W J			
R053	OB09669A	RK 470 1/6W J			
R054	OB09741A	RK 470K 1/6W J			
R056,057	OB09725A	RK 100K 1/6W J			
R058	OB09749A	RK 1M 1/6W J			
R059	OB05676A	RK 390K 1/4W J			

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

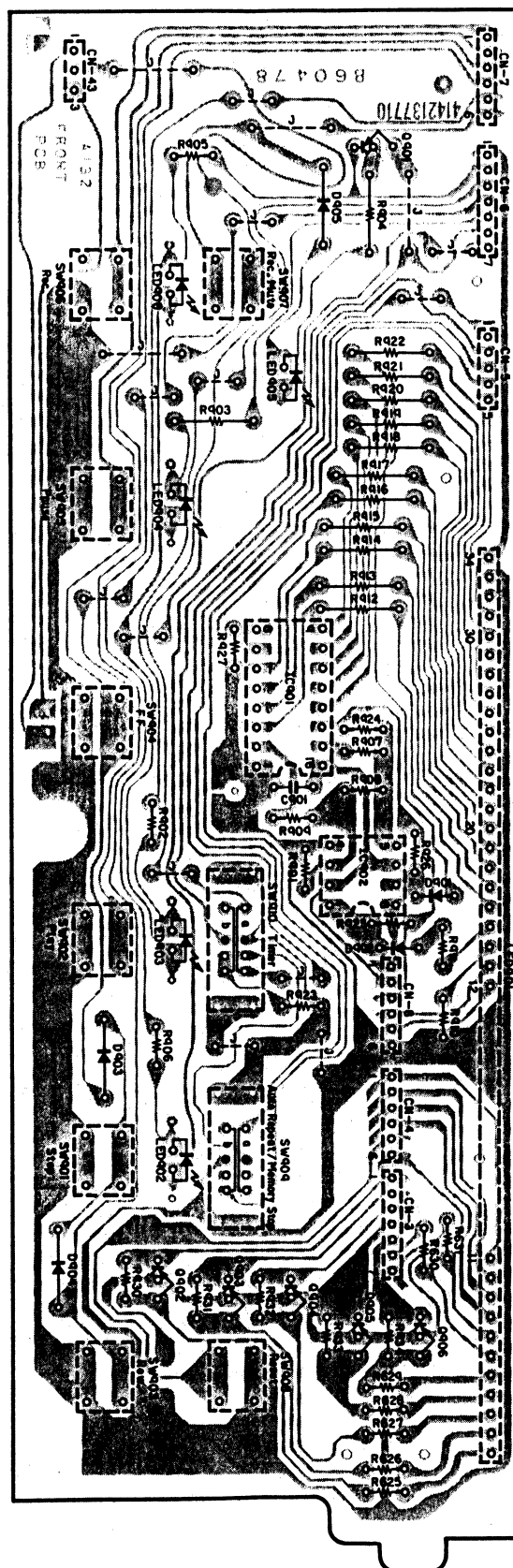


Fig. 8.12

Schematic Ref. No.	Part No.	Description
8.12. Control P.C.B. Ass'y		
	BA07042A	Control P.C.B. Ass'y
IC901	OB60478A	Control P.C.B.
IC902	OB06369A	IC TA7612P
Q901	OB11372A	IC NJM2408D
Q902,903	OB10003A	TR 2SA1345
Q904,905	OB10029A	TR 2SA933S
Q906	OB10029A	TR 2SA933S
LED901	OB12587A	Display Unit
		SL-7663-40
LED902,903	OB12578A	LED SLR-34DC4F
		Green
LED904	OB12578A	LED SLR-34DC4F
		Green
LED905	OB12577A	LED SLR-34DC4F
LED906,907	OB12579A	LED SLR-320DC4F
D901,902	OB06398A	SID 1SS176
D903,904	OB12584A	SID 1N4148
D905	OB12584A	SID 1N4148
R625,626	OB09641A	RK 33 1/6W J
R627,628	OB09641A	RK 33 1/6W J
R629,630	OB09641A	RK 33 1/6W J
R631	OB09641A	RK 33 1/6W J
R901	OB09661A	RK 220 1/6W J
R902	OB09657A	RK 150 1/6W J
R903	OB05795A	RK 150 1/4W J
R904	OB05645A	RK 270 1/4W J
R905	OB09659A	RK 180 1/6W J
R906	OB09661A	RK 220 1/6W J
R907,908	OB09677A	RK 1K 1/6W J
R909	OB09677A	RK 1K 1/6W J
R910	OB09659A	RK 180 1/6W J
R911	OB09655A	RK 120 1/6W J
R912,913	OB01679A	RK 100 1/4W J
R914,915	OB01679A	RK 100 1/4W J
R916,917	OB01679A	RK 100 1/4W J
R918,919	OB01679A	RK 100 1/4W J
R920,921	OB01679A	RK 100 1/4W J
R922	OB09797A	RK 120 1/4W J
R923	OB09687A	RK 2.7K 1/6W J
R924	OB09694A	RK 5.1K 1/6W J
R925,926	OB09701A	RK 10K 1/6W J
R927	OB09701A	RK 10K 1/6W J
R930,931	OB09701A	RK 10K 1/6W J
R932,933	OB09701A	RK 10K 1/6W J
R934	OB09701A	RK 10K 1/6W J
C901	OB09281A	CC 150P 50V K
CN3	OB83123A	7P Connector
CN4	OB83128A	6P Connector
CN5	OB83124A	5P Connector
CN6	OB83127A	7P Connector
CN7	OB83126A	6P Connector
CN8	OB83263A	6P Connector
CN43	OB83148A	3P Connector
SW901,902	OB70043A	Tact Switch
		SKHHPM
SW903,904	OB70043A	Tact Switch
		SKHHPM
SW905,906	OB70043A	Tact Switch
		SKHHPM
SW907,908	OB70043A	Tact Switch
		SKHHPM
SW909,910	OB07437A	Slide Switch
		ESD 14150
	OJ05416A	LED Reflector (4)

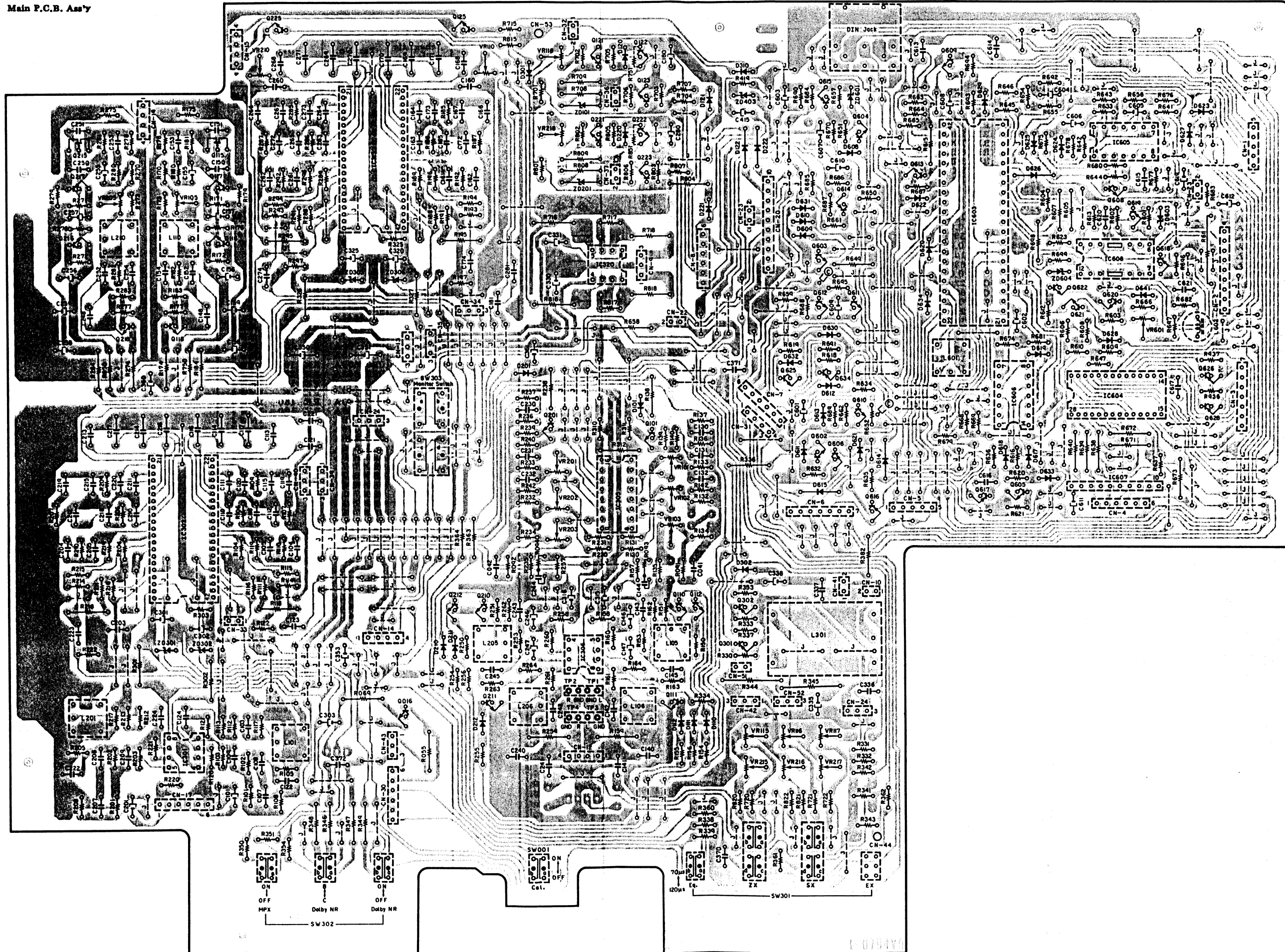
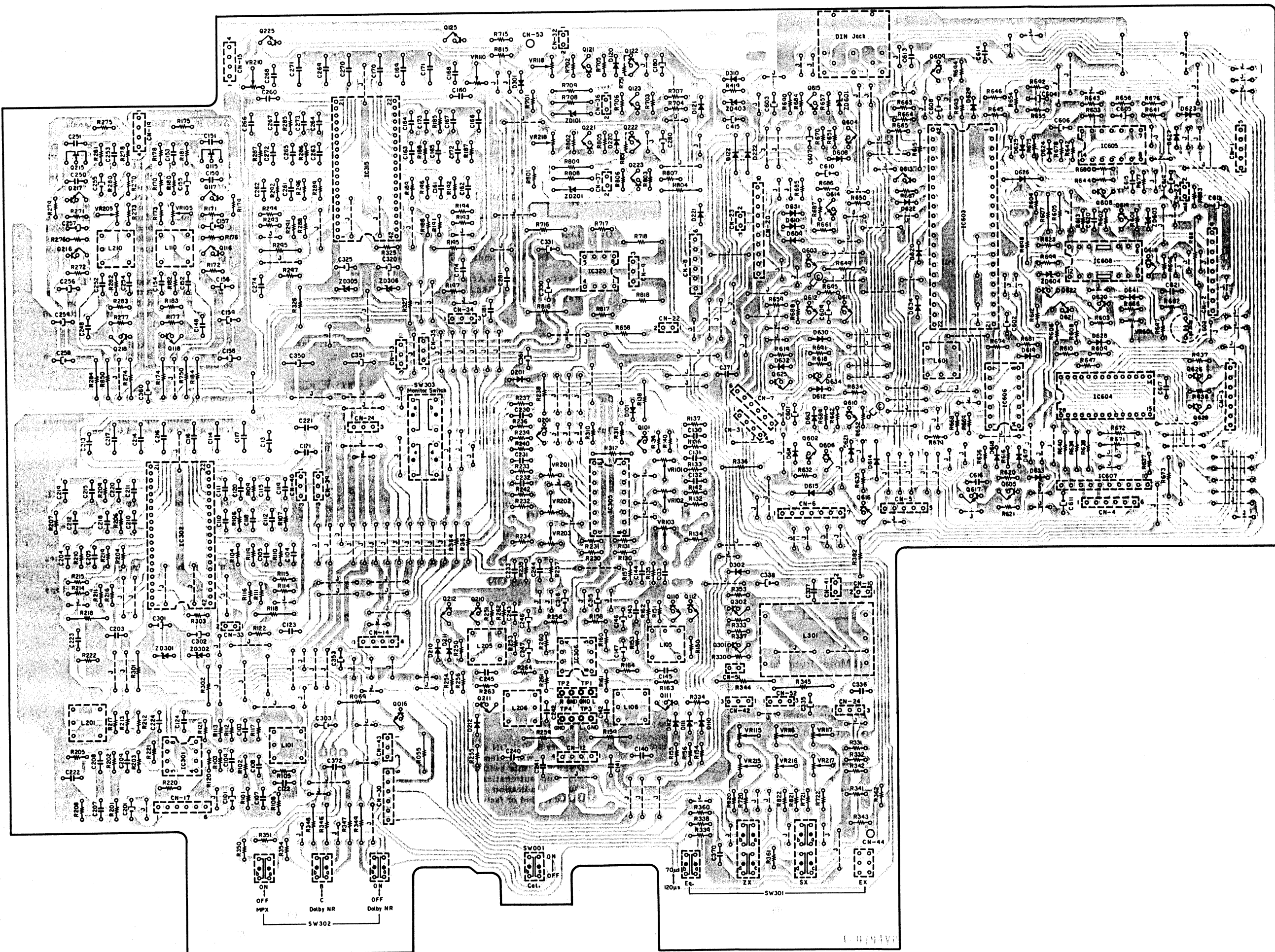


Fig. 8.13.1 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/40)

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
R194	OB22294A	RM 3.83K 1/6W F	R218	OB09523A	RM 13.7K 1/4W F				R804	OB05508A	RK 56K 1/4W J	C353	OB01409A	CE 47μ 25V	R640	OB05575A	RK 560 1/4W J
R195	OB09547A	RM 2.21K 1/4W F	R219	OB22380A	RM 22.1K 1/6W F				R805,806	OB09725A	RK 100K 1/6W J	C372	OB01780A	CML 0.1μ 50V J	R641	OB09687A	RK 2.7K 1/6W J
R196	OB22380A	RM 22.1K 1/6W F	R220,221	OB09677A	RK 1K 1/6W J	IC306	OB06387A	IC NJM2043DD	R807	OB09725A	RK 100K 1/6W J	SW001	OB070121A	Push Switch SPUJ19	R642,643	OB09701A	RK 10K 1/6W J
R197	OB09717A	RK 47K 1/6W J	R222	OB09733A	RK 220K 1/6W J	Q110,111	OB06299A	TR 2SC2878	R808	OB05692A	RK 68K 1/4W J	SW301	OB070114A	Push Switch SPUJ42	R644,645	OB09701A	RK 10K 1/6W J
R285	OB09673A	RK 680 1/6W J	R301,302	OB24156A	RF 62 1/4W J	Q112	OB10033A	TR 2SC1740S	R809	OB05776A	RK 1M 1/4W J	SW302	OB070113A	Push Switch SPUJ32	R646,647	OB09701A	RK 10K 1/6W J
R286	OB09698A	RK 7.5K 1/6W J	R303	OB22469A	RM 130K 1/6W F	Q210,211	OB06299A	TR 2SC2878	R851	OB09749A	RK 1M 1/6W J	SW303	OB070122A	Push Switch SPUL12	R649	OB01888A	RK 10K 1/4W J
R287	OB09700A	RK 9.1K 1/6W J	C101	OB09148A	CE 10μ 25V (LN)	D110,111	OB10033A	TR 2SC1740S	C180	OB09148A	CE 10μ 25V (LN)	CN30	OB83135A	6P Connector	R650,651	OB09701A	RK 10K 1/6W J
R288	OB09725A	RK 100K 1/6W J	C103	OB09404A	CPP 1000P 100V J	D112	OB06398A	SID 1SS176	C181	OB01780A	CML 0.1μ 50V J	CN43	OB81635A	3P-T Post	R652	OB09701A	RK 10K 1/6W J
R289	OB09749A	RK 1M 1/6W J	C104,105	OB41133A	CPP 2200P 100V G	D210,211	OB06398A	SID 1SS176	C280	OB01780A	CML 0.1μ 50V J	CN44	OB81117A	1P Contact Pin	R654,655	OB09725A	RK 100K 1/6W J
R291	OB22229A	RM 1.00K 1/6W F	C107,108	OB09792A	CC 33P 50V J	D212	OB06398A	SID 1SS176	C281	OB81763A	6P-T Post		OJ05418B	P.C.B. Holder (1)	R656,657	OB09725A	RK 100K 1/6W J
R292	OB22201A	RM 562 1/6W F	C109	OB09393A	CC 68P 50V J	L105	OB51260A	L-C Block 42-5025	CN8	OB83137A	2P Connector		OJ05575A	Rivet 3x3.5 (2)	R658	OB05576A	RK 470 1/4W J
R293	OB22285A	RM 3.24K 1/6W F	C110	OB41139A	CPP 3900P 100V G	L106	OB51258A	Trap Coil 1.05mH	CN32	OB83141A	2P Connector				R659	OB09725A	RK 100K 1/6W J
R294	OB22294A	RM 3.83K 1/6W F	C111	OB41143A	CPP 5600P 100V G	L205	OB51260A	L-C Block 42-5025	CN36	OB83142A	2P Connector				R661,662	OB09713A	RK 33K 1/6W J
R295	OB09547A	RM 2.21K 1/4W F	C112	OB05557A	CML 0.015μ 50V J	L206	OB51260A	Trap Coil 1.05mH	CN37						R663,664	OB09717A	RK 47K 1/6W J
R296	OB22380A	RM 22.1K 1/6W F	C113	OB05682A	CML 0.068μ 50V J	R093,094	OB09723A	RK 82K 1/6W J				IC603	OB11020A	IC TMP4315BP-1814	R665	OB09717A	RK 47K 1/6W J
R297	OB09717A	RK 47K 1/6W J	C114	OB41300A	CMM 0.15μ 50V J	R150	OB09681A	RK 1.5K 1/6W J				IC604	OB06368A	IC LM6416E-106	R666	OB09664A	RK 300 1/6W J
R325	OB22469A	RM 130K 1/6W F	C115	OB05813A	CML 0.056μ 50V J	R151	OB09675A	RK 820 1/6W J				IC605	OB06317A	IC μPD4030BC	R667,668	OB09717A	RK 47K 1/6W J
R326,327	OB24156A	RF 62 1/4W J	C116	OB41302A	CMM 0.22μ 50V J	R153	OB09703A	RK 12K 1/6W J				IC606	OB06214A	IC μPD4071BC	R669,670	OB09717A	RK 47K 1/6W J
C160	OB41386A	CPP 100P 50V J	C117	OB09876A	CE 1μ 50V (BP)	R154,155	OB09701A	RK 10K 1/6W J	IC320	OB06370A	IC NJM4556D	IC607	OB11369A	IC TA64	R671,672	OB05625A	RK 220K 1/4W J
C161,162	OB41133A	CPP 2200P 100V G	C118,119	OB09187A	CE 1μ 50V (BP)	R156	OB09709A	RK 22K 1/6W J	Q125	OB06299A	TR 2SC2878	IC608	OB11368A	IC LB1649	R673	OB05625A	RK 220K 1/4W J
C163	OB41139A	CPP 3900P 100V G	C120	OB05681A	CML 0.01μ 50V J	R157	OB09713A	RK 33K 1/6W J	Q225	OB06299A	TR 2SC2878	Q602,603	OB10007A	TR 2SC3399	R674	OB09733A	RK 220K 1/6W J
C164	OB41143A	CPP 5600P 100V G	C121	OB40473A	CE 10μ 16V (BP)	R158	OB09733A	RK 220K 1/6W J	D310	OB06398A	SID 1SS176	Q604	OB10007A	TR 2SC3399	R675,676	OB09737A	RK 330K 1/6W J
C165,166	OB09187A	CE 1μ 50V (BP)	C122	OB41388A	CPP 120P 50V J	R159	OB05936A	RK 10 1/4W J	R715	OB09693A	RK 4.7K 1/6W J	Q605	OB06299A	TR 2SC2878	R677,678	OB09737A	RK 330K 1/6W J
C167	OB05813A	CML 0.056μ 50V J	C123,124	OB40473A	CE 10μ 16V (BP)	R160	OB22229A	RM 1.00K 1/6W F	R716	OB01889A	RK 100K 1/4W J	Q606	OB10003A	TR 2SA1345	R679	OB09701A	RK 10K 1/6W J
C168	OB05682A	CML 0.068μ 50V J	C201	OB09148A	CE 10μ 25V (LN)	R161	OB22248A	RM 1.54K 1/6W F	R717	OB09725A	RK 100K 1/6W J	Q608,609	OB10003A	TR 2SC1740S	R680	OB09749A	RK 1M 1/6W J
C169	OB41300A	CMM 0.15μ 50V J	C203	OB09404A	CPP 1000P 100V J	R162	OB22296A	RM 3.92K 1/6W F	R815	OB01889A	RK 100K 1/4W J	Q610,611	OB10033A	TR 2SC1740S	R681	OB09735A	RK 270K 1/6W J
C170	OB41302A	CMM 0.22μ 50V J	C204,205	OB41133A	CPP 2200P 100V G	R163	OB22431A	RM 59.0K 1/6W F	R816	OB09725A	RK 100K 1/6W J	Q612,613	OB10033A	TR 2SC1740S	R682	OB09611A	RK 1.8 1/6W J
C171	OB09876A	CMM 0.47μ 50V J	C207,208	OB09792A	CC 33P 50V J	R164	OB09733A	RK 220K 1/6W J	R817	OB09725A	RK 100K 1/6W J	Q614,615	OB10029A	TR 2SA933S	R683	OB09623A	RF 5.6 1/6W J
C172	OB05557A	CML 0.015μ 50V J	C209	OB09393A	CC 68P 50V J	R250	OB09681A	RK 1.5K 1/6W J	R818	OB24155A	RF 12 1/4W J	Q616,617	OB10029A	TR 2SA933S	R684	OB09669A	RK 470 1/6W J
C173	OB05681A	CML 0.01μ 50V J	C210	OB41139A	CPP 3900P 100V G	R251	OB09675A	RK 820 1/6W J	C330,331	OB01403A	CE 47μ 16V	Q618,619	OB06013A	TR 2SA733 (P,Q)	R685	OB09689A	RK 3.3K 1/6W J
C174	OB40473A	CE 10μ 16V (BP)	C211	OB41143A	CPP 5600P 100V G	R253	OB09703A	RK 12K 1/6W J				Q620,621	OB01872A	TR 2SC945L (P,Q)	R686	OB09697A	RK 6.8K 1/6W J
C260	OB41386A	CPP 100P 50V J	C212	OB05557A	CML 0.015μ 50V J	R254,255	OB09701A	RK 10K 1/6W J				Q622	OB10033A	TR 2SC1740S	R687	OB09689A	RK 3.3K 1/6W J
C261,262	OB41133A	CPP 2200P 100V G	C213	OB05682A	CML 0.068μ 50V J	R256	OB09709A	RK 22K 1/6W J	Q301	OB06202A	TR 2SA562TM (Y)	Q625	OB10033A	TR 2SC1740S	R688	OB09707A	RK 18K 1/6W J
C263	OB41139A	CPP 3900P 100V G	C214	OB41300A	CMM 0.15μ 50V J	R257	OB09713A	RK 33K 1/6W J	Q302	OB10029A	TR 2SA933S	Q626	OB10029A	TR 2SA933S	R689	OB09719A	RK 56K 1/6W J
C264	OB41143A	CPP 5600P 100V G	C215	OB05813A	CML 0.056μ 50V J	R258	OB09733A	RK 220K 1/6W J	D302	OB06398A	SID 1SS176	Q628	OB10029A	TR 2SA933S	R690	OB09721A	RK 68K 1/6W J
C265,266	OB09187A	CE 1μ 50V (BP)	C216	OB41302A	CMM 0.22μ 50V J	R259	OB05936A	RK 10 1/4W J	L301	OB51256A	Bias Osc. B01-JF	Q634	OB10097A	TR 2SA952 (K,L)	R691	OB09681A	RK 1.5K 1/6W J
C267	OB05813A	CML 0.056μ 50V J	C217	OB09876A	CMM 0.47μ 50V J	R260	OB22229A	RM 1.00K 1/6W F	VR115	OB32127A	Semi VR 10K	ZD403	OB12179A	ZD 15V	R692,693	OB09713A	RK 33K 1/6W J
C268	OB05682A	CML 0.068μ 50V J	C218,219	OB05681A	CML 0.01μ 50V J	R261	OB22248A	RM 1.54K 1/6W F	VR116	OB32128A	Semi VR 20K				R694	OB09713A	RK 33K 1/6W J
C269	OB41300A	CMM 0.15μ 50V J	C220	OB40473A	CE 10μ 16V (BP)	R262	OB22296A	RM 3.92K 1/6W F	VR117	OB32129A	Semi VR 50K	ZD601	OB12167A	ZD 10V	R695	OB09695A	RK 5.6K 1/6W J
C270	OB41302A	CMM 0.22μ 50V J	C221	OB40473A	CE 10μ 16V (BP)	R263	OB22431A	RM 59.0K 1/6W F	VR215	OB32127A	Semi VR 10K				R696,697	OB09670A	RK 510 1/6W J
C271	OB09876A	CMM 0.47μ 50V J	C222	OB41388A	CPP 120P 50V J	R264	OB09733A	RK 220K 1/6W J	VR216	OB32128A	Semi VR 20K	ZD603	OB12150A	ZD 5.6V	R698	OB01857A	RK 1K 1/4W J
C272	OB05557A	CML 0.015μ 50V J	C223,224	OB40473A	CE 10μ 16V (BP)	R266	OB09322A	CPP 330P 100V J	VR217	OB32129A	Semi VR 50K				R699	OB09677A	RK 1K 1/6W J
C273	OB05681A	CML 0.01μ 50V J	C301,302	OB01391A	CE 220μ 25V	C140	OB09270A	CPP 470P 100V J	R330	OB09669A	RK 470 1/6W J	ZD604	OB12153A	ZD 6.2V	R936,937	OB09701A	RK 10K 1/6W J
C274	OB40473A	CE 10μ 16V (BP)	C303	OB01674A	CE 10μ 25V	C141	OB09834A	CPP 2200P 100V J	R331,332	OB09693A	RK 4.7K 1/6W J				C415	OB01403A	CE 47μ 16V
C320	OB01391A	CE 220μ 25V	CN33	OB81634A	2P-T Post	C142	OB09993A	CML 820P 50V J	R333,334	OB09701A	RK 10K 1/6W J	D608	OB06398A	SID 1SS176	C601,602	OB09223A	CE 1μ 50V (LN)
C325	OB01391A	CE 220μ 25V	CN39,40	OB81635A	3P-T Post	C143	OB09828A	CPP 8200P 100V J	R336	OB05622A	RK 2.2K 1/4W J	D609,610	OB06398A	SID 1SS176	C603	OB09223A	CE 1μ 50V (LN)
CN34	OB81635A	3P-T Post				C144	OB05685A	CML 0.082μ 50V J	R337	OB09721A	RK 68K 1/6W J	D611,612	OB06398A	SID 1SS176	C604	OB09327A	CE 0.33μ 50V (LN)
						C145	OB09814A	CE 1μ 50V (LN)	R338,339	OB09725A	RK 100K 1/6W J	D613	OB06398A	SID 1SS176	C605	OB09222A	CE 0.47μ 50V (LN)
						C146	OB40154A	CE 47μ 16V (LN)	R341,342	OB09733A	RK 220K 1/6W J	D614,615	OB12584A	SID 1N4148	C606	OB09332A	CE 2.2μ 50V (LN)
						C147	OB09322A	CPP 330P 100V J	R343	OB09737A	RK 220K 1/6W J	D617	OB06398A	SID 1SS176	C607	OB09148A	CE 10μ 25V (LN)
						C240	OB09270A	CPP 470P 100V J	R344	OB24158A	RF 10 1W J	D618,619	OB06398A	SID 1SS176	C608,609	OB09150A	CE 33μ 25V (LN)
						C241	OB09834A	CPP 2200P 100V J	R345	OB24159A	RF 22 1W J	D620,621	OB06398A	SID 1SS176	C610	OB01412A	CE 10μ 16V
						C242	OB09993A	CML 820P 50V J	R353	OB09717A	RK 47K 1/6W J	D622,623	OB06398A	SID 1SS176	C611	OB05841A	CE 330μ 10V
						C243	OB09828A	CPP 8200P 100V J	R360	OB09711A	RK 27K 1/6W J	D624,625	OB06398A	SID 1SS176	C612	OB40079A	CE 220μ 16V
						C244	OB05685A	CML 0.082μ 50V J	R361,362	OB09725A	RK 100K 1/6W J	D626	OB06398A	SID 1SS176	C613,614	OB09286A	CC 470P 50V K
						C245	OB09814A	CE 1μ 50V (LN)	R720	OB09653A	RK 100 1/6W J	D627,628	OB06398A	SID 1SS176	C615	OB09290A	CC 0.01μ 50V Z
						C246	OB40154A	CE 47μ 16V (LN)	R721	OB09697A	RK 6.8K 1/6W J	D629,630	OB06398A	SID 1SS176	C616	OB05557A	CML 0.015μ 50V J
						C247	OB40154A	CE 47μ 16V (LN)	R722	OB09705A	RK 15K 1/6W J	D631,632	OB06398A	SID 1SS176	C617	OB05892A	CC 100P 50V K
						C315,316	OB81761A	4P-T Post	R820	OB09653A	RK 100 1/6W J	D633,634	OB06398A	SID 1SS176	C619	OB01403A	CE 47

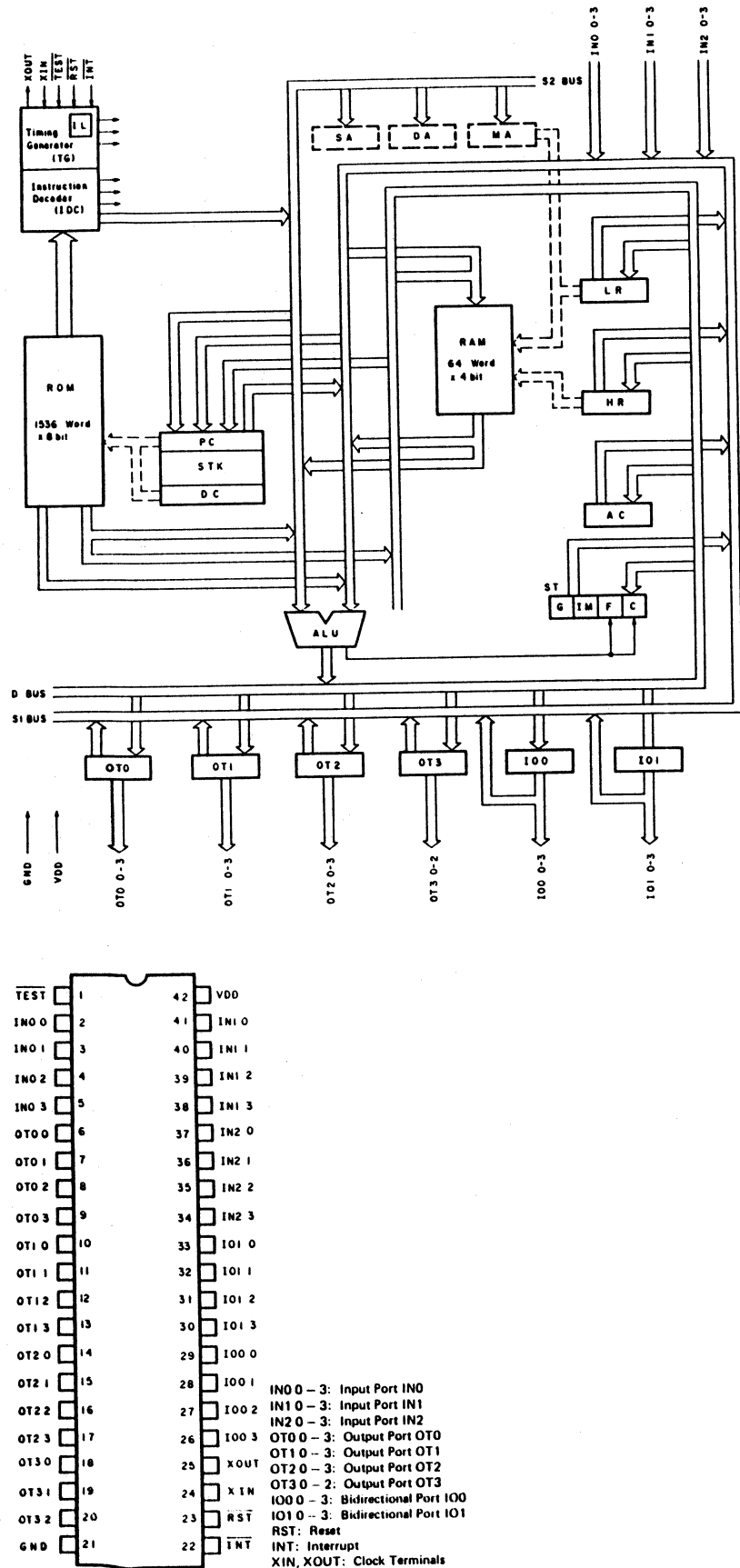
Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.			
8.13.2. Main P.C.B. Ass'y			R193	OB22285A	RM 3.24K 1/6W F	R218	OB09523A	RM 13.7K 1/4W F	— Rec. Amp. —			R804	OB05508A	RK 56K 1/4W J	C353	OB01409A	CE 47μ 25V	R640	OB01409A	CE 47μ 25V	
	BA07030A	Main P.C.B. Ass'y	R194	OB22294A	RM 3.83K 1/6W F	R219	OB22380A	RM 22.1K 1/6W F				R805,806	OB09725A	RK 100K 1/6W J	C372	OB01780A	CML 0.1μ 50V J	R641	OB01780A	CML 0.1μ 50V J	
		Serial Nos.:	R195	OB09547A	RM 2.21K 1/4W F	R220,221	OB09677A	RK 1K 1/6W J	IC306	OB06387A	IC NJM2043DD	R807	OB09725A	RK 100K 1/6W J	SW001	OB070121A	Push Switch SPUJ19	R642,643	OB070121A	Push Switch SPUJ19	
		A13101001 - 02450	R196	OB22380A	RM 22.1K 1/6W F	R222	OB09733A	RK 220K 1/6W J	Q110,111	OB06299A	TR 2SC2878	R808	OB05692A	RK 68K 1/4W J	SW301	OB070114A	Push Switch SPUJ42	R644,645	OB070114A	Push Switch SPUJ42	
		(CR-4A)	R197	OB09717A	RK 47K 1/6W J	R301,302	OB24156A	RF 62 1/4W J	Q112	OB10033A	TR 2SC1740S	R809	OB05776A	RK 1M 1/4W J	SW302	OB070113A	Push Switch SPUJ32	R646,647	OB070113A	Push Switch SPUJ32	
		A13150001 - 53800	R285	OB09673A	RK 680 1/6W J	R303	OB22469A	RM 130K 1/6W F	Q210,211	OB06299A	TR 2SC2878	R851	OB09749A	RK 1M 1/6W J	SW303	OB070122A	Push Switch SPUL12	R649	OB070122A	Push Switch SPUL12	
		(CR-4/4E/40)	R286	OB09698A	RK 7.5K 1/6W J	C101	OB09148A	CE 10μ 25V (LN)	D110,111	OB10033A	TR 2SC1740S	C180	OB09148A	CE 10μ 25V (LN)	CN30	OB83135A	6P Connector	R650,651	OB83135A	6P Connector	
			R287	OB09700A	RK 9.1K 1/6W J	C103	OB09404A	CPP 1000P 100V J	D112	OB06398A	SID 1SS176	C181	OB01780A	CML 0.1μ 50V J	CN43	OB81635A	3P-T Post	R652	OB81635A	3P-T Post	
			R288	OB09725A	RK 100K 1/6W J	C104,105	OB09792A	CC 33P 50V J	D210,211	OB06398A	SID 1SS176	C280	OB09148A	CE 10μ 25V (LN)	CN44	OB81117A	1P Contact Pin	R654,655	OB81117A	1P Contact Pin	
			R289	OB09749A	RK 1M 1/6W J	C107,108	OB09393A	CC 68P 50V J	D212	OB06398A	SID 1SS176	C281	OB01780A	CML 0.1μ 50V J		OJ05575A	P.C.B. Holder	R656,657	OJ05575A	P.C.B. Holder	
			R291	OB22229A	RM 1.00K 1/6W F	C109	OB09187A	CE 1μ 50V (BP)	L105	OB51260A	L-C Block 42-5025	CN8	OB81763A	6P-T Post			Rivet 3x3.5	R658		Rivet 3x3.5	
			R292	OB22201A	RM 562 1/6W F	C110	OB41139A	CPP 3900P 100V G	L106	OB51258A	Trap Coil 1.05mH	CN32	OB83137A	2P Connector	— Logic —			R659	— Logic —		
			R293	OB22285A	RM 3.24K 1/6W F	C111	OB41143A	CPP 5600P 100V G	L205	OB51260A	L-C Block 42-5025	CN36	OB83141A	2P Connector				R661,662			
			R294	OB22294A	RM 3.83K 1/6W F	C112	OB05557A	CML 0.015μ 50V J	L206	OB51258A	Trap Coil 1.05mH	CN37	OB83142A	2P Connector				R663,664			
			R295	OB09547A	RM 2.21K 1/4W F	C113	OB05682A	CML 0.068μ 50V J	R150	OB09681A	RK 1.5K 1/6W J	— Headphone Amp. —			IC603	OB11020A	IC	R665	— Headphone Amp. —		
			R296	OB22380A	RM 22.1K 1/6W F	C114	OB41300A	CMM 0.15μ 50V J	R151	OB09675A	RK 820 1/6W J	IC320	OB06370A	IC NJM4556D	IC604	OB06368A	IC	R666	IC320	OB06370A	IC NJM4556D
			R297	OB09717A	RK 47K 1/6W J	C115	OB05813A	CMM 0.056μ 50V J	R153	OB09703A	RK 12K 1/6W J	Q125	OB06299A	TR 2SC2878	IC605	OB06317A	IC μPD4030BC	R667,668	Q125	OB06299A	TR 2SC2878
			R298	OB22469A	RM 130K 1/6W F	C116	OB41302A	CMM 0.22μ 50V J	R154,155	OB09701A	RK 10K 1/6W J	Q225	OB06299A	TR 2SC2878	IC606	OB06214A	IC μPD4071BC	R669,670	Q225	OB06299A	TR 2SC2878
			R325	OB24156A	RF 62 1/4W J	C117	OB09876A	CMM 0.47μ 50V J	R156	OB09709A	RK 22K 1/6W J	D310	OB06398A	SID 1SS176	IC607	OB11369A	IC TA64	R671,672	D310	OB06398A	SID 1SS176
			R326,327	OB41386A	CPP 100P 50V J	C120	OB05681A	CML 0.01μ 50V J	R157	OB09713A	RK 33K 1/6W J	R715	OB09693A	RK 4.7K 1/6W J	IC608	OB11368A	IC LB1649	R674	R715	OB09693A	RK 4.7K 1/6W J
			C160	OB41139A	CPP 2200P 100V G	C121	OB40473A	CE 10μ 16V (BP)	R158	OB09733A	RK 220K 1/6W J	R716	OB09725A	RK 100K 1/4W J	Q602,603	OB10007A	TR 2SC3399	R675,676	Q602,603	OB10007A	TR 2SC3399
			C161,162	OB41139A	CPP 2200P 100V G	C122	OB41388A	CPP 120P 50V J	R159	OB05936A	RK 10 1/4W J	R717	OB01889A	RK 100K 1/4W J	Q604	OB10007A	TR 2SC3399	R677,678	Q604	OB01889A	RK 100K 1/4W J
			C163	OB41139A	CPP 3900P 100V G	C123,124	OB40473A	CE 10μ 16V (BP)	R160	OB22229A	RM 1.00K 1/6W F	R718	OB09725A	RK 100K 1/6W J	Q605	OB06299A	TR 2SC2878	R679	Q605	OB06299A	TR 2SC2878
			C164	OB41143A	CPP 5600P 100V G	C201	OB09148A	CE 10μ 25V (LN)	R161	OB22248A	RM 1.54K 1/6W F	R718	OB24155A	RF 12 1/4W J	Q606	OB10003A	TR 2SA1345	R680	Q606	OB10003A	TR 2SA1345
			C165,166	OB09187A	CE 1μ 50V (BP)	C203	OB09404A	CPP 1000P 100V J	R162	OB22296A	RM 3.92K 1/6W F	R815	OB09693A	RK 4.7K 1/6W J	Q608,609	OB10033A	TR 2SC1740S	R681	Q608,609	OB10033A	TR 2SC1740S
			C167	OB05813A	CML 0.056μ 50V J	C204,205	OB41133A	CPP 2200P 100V G	R163	OB22431A	RM 59.0K 1/6W F	R816	OB01889A	RK 100K 1/4W J	Q610,611	OB10033A	TR 2SC1740S	R682	Q610,611	OB10033A	TR 2SC1740S
			C168	OB05682A	CML 0.068μ 50V J	C207,208	OB09792A	CC 33P 50V J	R164	OB09733A	RK 220K 1/6W J	R817	OB09725A	RK 100K 1/6W J	Q612,613	OB10033A	TR 2SC1740S	R683	Q612,613	OB10033A	TR 2SC1740S
			C169	OB41300A	CMM 0.15μ 50V J	C209	OB09393A	CC 68P 50V J	R250	OB09681A	RK 1.5K 1/6W J	R818	OB24155A	RF 12 1/4W J	Q614,615	OB10029A	TR 2SA933S	R684	R818	OB24155A	RF 12 1/4W J
			C170	OB41302A	CMM 0.22μ 50V J	C210	OB41139A	CPP 3900P 100V G	R251	OB09675A	RK 820 1/6W J	— Bias Osc. —			Q616,617	OB10029A	TR 2SA933S	R685	— Bias Osc. —		
			C171	OB09876A	CMM 0.47μ 50V J	C211	OB41143A	CPP 5600P 100V G	R253	OB09703A	RK 12K 1/6W J	Q301	OB06202A	TR 2SA562TM (Y)	Q618,619	OB06013A	TR 2SA733 (P,Q)	R686	Q301	OB06202A	TR 2SA562TM (Y)
			C172	OB05557A	CML 0.015μ 50V J	C212	OB05557A	CML 0.015μ 50V J	R254,255	OB09701A	RK 10K 1/6W J	Q302	OB10029A	TR 2SA933S	Q622	OB01872A	TR 2SC945L (P,Q)	R687	Q302	OB10029A	TR 2SA933S
			C173	OB05681A	CML 0.01μ 50V J	C213	OB05682A	CML 0.068μ 50V J	R256	OB09709A	RK 22K 1/6W J	D302	OB06398A	SID 1SS176	Q626	OB01872A	TR 2SC945L (P,Q)	R688	D302	OB06398A	SID 1SS176
			C174	OB40473A	CE 10μ 16V (BP)	C214	OB41300A	CMM 0.15μ 50V J	R257	OB09713A	RK 33K 1/6W J	VR115	OB32127A	Semi VR 10K	Q628	OB10033A	TR 2SC1740S	R689	VR115	OB32127A	Semi VR 10K
			C260	OB41386A	CPP 100P 50V J	C215	OB05813A	CMM 0.056μ 50V J	R258	OB09733A	RK 220K 1/6W J	VR116	OB32128A	Semi VR 20K	Q634	OB10029A	TR 2SA933S	R690	VR116	OB32128A	Semi VR 20K
			C261,262	OB41133A	CPP 2200P 100V G	C216	OB41302A	CMM 0.22μ 50V J	R259	OB05936A	RK 10 1/4W J	VR117	OB32129A	Semi VR 50K	ZD403	OB10029A	TR 2SA933S	R691	VR117	OB32129A	Semi VR 50K
			C263	OB41139A	CPP 3900P 100V G	C217	OB09876A	CMM 0.47μ 50V J	R260	OB22229A	RM 1.00K 1/6W F	VR215	OB32127A	Semi VR 10K	ZD601	OB12167A	ZD 15V	R692,693	VR215	OB32127A	Semi VR 10K
			C264	OB41143A	CPP 5600P 100V G	C218,219	OB09187A	CE 1μ 50V (BP)	R261	OB22248A	RM 1.54K 1/6W F	VR216	OB32128A	Semi VR 20K	ZD603	OB12150A	ZD 5.6V	R694	VR216	OB32128A	Semi VR 20K
			C265,266	OB09187A	CE 1μ 50V (BP)	C220	OB05681A	CML 0.01μ 50V J	R262	OB22296A	RM 3.92K 1/6W F	VR217	OB32129A	Semi VR 50K	ZD604	OB12153A	ZD 6.2V	R695	VR217	OB32129A	Semi VR 50K
			C267	OB05813A	CML 0.056μ 50V J	C221	OB40473A	CE 10μ 16V (BP)	R263	OB22431A	RM 59.0K 1/6W F	R330	OB09669A	RK 470 1/6W J	D608	OB06398A	SID 1SS176	R696	R330	OB09669A	RK 470 1/6W J
			C268	OB05682A	CML 0.068μ 50V J	C222	OB41302A	CMM 0.22μ 50V J	R264	OB09733A	RK 220K 1/6W J	R331,332	OB09693A	RK 4.7K 1/6W J	D609,610	OB06398A	SID 1SS176	R697	R331,332	OB09693A	RK 4.7K 1/6W J
			C269	OB41300A	CMM 0.15μ 50V J	C223,224	OB40473A	CE 10μ 16V (BP)	R265	OB09322A	CPP 330P 100V J	R333,334	OB09701A	RK 10K 1/6W J	D611,612	OB06398A	SID 1SS176	R698	R333,334	OB09701A	RK 10K 1/6W J
			C270	OB41302A	CMM 0.22μ 50V J	C301,302	OB01391A	CE 220μ 25V	R266	OB09733A	RK 220K 1/6W J	R336	OB05622A	RK 2.2K 1/4W J	D613	OB06398A	SID 1SS176	R699	R336	OB05622A	RK 2.2K 1/4W J
			C271	OB09876A	CMM 0.47μ 50V J	C303	OB01674A	CE 10μ 25V	R267	OB09703A	RK 12K 1/6W J	R337	OB09721A	RK 68K 1/6W J	D614,615	OB06398A	SID 1SS176	R700	R337	OB09721A	RK 68K 1/6W J
			C272	OB05557A	CML 0.015μ 50V J	CN33	OB81634A	2P-T Post	R268	OB09701A	RK 10K 1/6W J	R338,339	OB09725A	RK 100K 1/6W J	D617	OB06398A	SID 1SS176	R701	R338,339	OB09725A	RK 100K 1/6W J
			C273	OB05681A	CML 0.01μ 50V J	CN39,40	OB81635A	3P-T Post	R269	OB09709A	RK 22K 1/6W J	R341,342	OB09733A	RK 220K 1/6W J	D618,619	OB06398A	SID 1SS176	R702	R341,342	OB09733A	RK 220K 1/6W J
			C274	OB40473A	CE 10μ 16V (BP)				R270	OB09703A	RK 12K 1/6W J	R343	OB09737A	RK 220K 1/6W J	D620,621	OB06398A	SID 1SS176	R703	R343	OB09737A	RK 220K 1/6W J
			C275	OB41391A	CE 220μ 25V				R271	OB09701A	RK 10K 1/6W J	R344	OB24158A	RF 10 1W J	D622,623	OB06398A	SID 1SS176	R704	R344	OB24158A	RF 10 1W J
			C320	OB01391A	CE 220μ 25V				R272	OB09709A	RK 22K 1/6W J	R345	OB24159A	RF 22 1W J	D624,625	OB06398A	SID 1SS176	R705	R345	OB24159A	RF 22 1W J
			C325	OB01391A	CE 220μ 25V				R273	OB09703A	RK 12K 1/6W J	R353	OB09717A	RK 47K 1/6W J	D626	OB06398A	SID 1SS176	R706	R353	OB09717A	RK 47K 1/6W J
			CN34	OB81635A	3P-T Post				R274	OB09701A	RK 10K 1/6W J	R360	OB09711A	RK 27K 1/6W J	D627,628	OB06398A	SID 1SS176	R707	R360	OB09711A	RK 27K 1/6W J
									R275	OB09709A	RK 22K 1/6W J	R361,362	OB09725A	RK 100K 1/6W J	D629,630	OB06398A	SID 1SS176	R708	R361,362	OB09725A	RK 100K 1/6W J
									R276	OB09721A	RK 68K 1/6W J	R720	OB09653A	RK 100 1/6W J	D631,632	OB06398A	SID 1SS176	R709	R720	OB09653A	RK 100

	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
	R193	OB22285A	RM 3.24K 1/6W F	R218	OB09523A	RM 13.7K 1/4W F		— Rec. Amp. —	R804	OB05508A	RK 56K 1/4W J	C353	OB01409A	CE 47μ 25V	R640	OB05575A	RK 560 1/4W J	
	R194	OB22294A	RM 3.83K 1/6W F	R219	OB22380A	RM 22.1K 1/6W F	IC306	OB06387A	IC NJM2043DD	R805,806	OB09725A	RK 100K 1/6W J	C372	OB01780A	CML 0.1μ 50V J	R641	OB09687A	RK 2.7K 1/6W J
	R195	OB09547A	RM 2.21K 1/4W F	R220,221	OB09677A	RK 1K 1/6W J	Q110,111	OB06299A	TR 2SC2878	R807	OB09725A	RK 100K 1/6W J	SW001	OB070121A	Push Switch SPUJ19	R642,643	OB09701A	RK 10K 1/6W J
	R196	OB22380A	RM 22.1K 1/6W F	R222	OB09733A	RK 220K 1/6W J	Q112	OB10033A	TR 2SC1740S	R808	OB05692A	RK 68K 1/4W J	SW301	OB070114A	Push Switch SPUJ42	R644,645	OB09701A	RK 10K 1/6W J
	R197	OB09717A	RK 47K 1/6W J	R301,302	OB24156A	RF 62 1/4W J	Q210,211	OB06299A	TR 2SC2878	R809	OB05776A	RK 1M 1/4W J	SW302	OB070113A	Push Switch SPUJ32	R646,647	OB09701A	RK 10K 1/6W J
	R285	OB09673A	RK 680 1/6W J	R303	OB22469A	RM 130K 1/6W F	Q212	OB10033A	TR 2SC1740S	R851	OB09148A	CE 10μ 25V (LN)	SW303	OB070122A	Push Switch SPUL12	R649	OB01888A	RK 10K 1/4W J
	R286	OB09698A	RK 7.5K 1/6W J	C101	OB09148A	CE 10μ 25V (LN)	D110,111	OB06398A	SID 1SS176	C180	OB09148A	CML 0.1μ 50V J	CN30	OB83135A	6P Connector	R650,651	OB09701A	RK 10K 1/6W J
	R287	OB09700A	RK 9.1K 1/6W J	C103	OB09404A	CPP 1000P 100V J	D112	OB06398A	SID 1SS176	C181	OB01780A	CML 0.1μ 50V J	CN43	OB81635A	3P-T Post	R652	OB09701A	RK 10K 1/6W J
	R288	OB09725A	RK 100K 1/6W J	C104,105	OB41133A	CPP 2200P 100V G	D210,211	OB06398A	SID 1SS176	C280	OB09148A	CE 10μ 25V (LN)	CN44	OB81117A	1P Connector Pin	R654,655	OB09725A	RK 100K 1/6W J
	R289	OB09749A	RK 1M 1/6W J	C107,108	OB09792A	CC 33P 50V J	D212	OB06398A	SID 1SS176	C281	OB01780A	CML 0.1μ 50V J		OJ05418B	P.C.B. Holder (1)	R656,657	OB09725A	RK 100K 1/6W J
	R291	OB22229A	RM 1.00K 1/6W F	C109	OB09393A	CC 68P 50V J	L206	OB06398A	SID 1SS176	CN8	OB81763A	6P-T Post		OJ05575A	Rivet 3x3.5 (2)	R658	OB05576A	RK 470 1/4W J
	R292	OB22201A	RM 562 1/6W F	C110	OB41139A	CPP 3900P 100V G	L205	OB06398A	SID 1SS176	CN32	OB83137A	2P Connector				R659	OB09725A	RK 100K 1/6W J
	R293	OB22285A	RM 3.24K 1/6W F	C111	OB41139A	CPP 5600P 100V G	L205	OB51260A	L-C Block 42-5025	CN36	OB83141A	2P Connector				R661,662	OB09713A	RK 33K 1/6W J
	R294	OB22294A	RM 3.83K 1/6W F	C112	OB05557A	CML 0.015μ 50V J	L205	OB51260A	L-C Block 42-5025	CN37	OB83142A	2P Connector				R663,664	OB09717A	RK 47K 1/6W J
	R295	OB09547A	RM 2.21K 1/4W F	C113	OB05682A	CML 0.068μ 50V J	L206	OB51258A	Trap Coil 1.05mH				IC603	OB11020A	IC TMP4315BP-1814	R666	OB09664A	RK 300 1/6W J
	R296	OB22380A	RM 22.1K 1/6W F	C114	OB41300A	CMM 0.15μ 50V J	R150	OB09681A	RK 1.5K 1/6W J				IC604	OB06368A	IC LM6416E-106	R667,668	OB09717A	RK 47K 1/6W J
	R297	OB09717A	RK 47K 1/6W J	C115	OB05813A	CML 0.056μ 50V J	R151	OB09675A	RK 820 1/6W J	IC320	OB06370A	IC NJM4556D	IC605	OB06317A	IC μPD4030BC	R669,670	OB09717A	RK 47K 1/6W J
	R325	OB22469A	RM 130K 1/6W F	C116	OB41302A	CMM 0.22μ 50V J	R153	OB09703A	RK 12K 1/6W J	Q125	OB06299A	TR 2SC2878	IC606	OB06214A	IC μPD4071BC	R671,672	OB05625A	RK 220K 1/4W J
	R326,327	OB24156A	RF 62 1/4W J	C117	OB09876A	CMM 0.47μ 50V J	R154,155	OB09709A	RK 22K 1/6W J	Q225	OB06299A	TR 2SC2878	IC607	OB11369A	IC TA64	R673	OB05625A	RK 220K 1/4W J
	C160	OB41386A	CPP 100P 50V J	C118,119	OB05681A	CML 0.01μ 50V J	R156	OB09713A	RK 33K 1/6W J	D310	OB06398A	SID 1SS176	IC608	OB11368A	IC LB1649	R674	OB09733A	RK 220K 1/6W J
	C161,162	OB41133A	CPP 2200P 100V G	C120	OB40473A	CE 10μ 16V (BP)	R157	OB09733A	RK 220K 1/6W J	R715	OB09693A	RK 4.7K 1/6W J	Q602,603	OB10007A	TR 2SC3399	R675,676	OB09737A	RK 330K 1/6W J
	C163	OB41139A	CPP 3900P 100V G	C121	OB41388A	CPP 120P 50V J	R158	OB05936A	RK 10 1/4W J	R716	OB01889A	RK 100K 1/4W J	Q604	OB10007A	TR 2SC3399	R677,678	OB09737A	RK 330K 1/6W J
	C164	OB41143A	CPP 5600P 100V G	C122	OB40473A	CE 10μ 16V (BP)	R159	OB05936A	RK 10 1/4W J	R717	OB09725A	RK 100K 1/6W J	Q605	OB06299A	TR 2SC2878	R679	OB09701A	RK 10K 1/6W J
	C165,166	OB09187A	CE 1μ 50V (BP)	C123,124	OB40473A	CE 10μ 16V (BP)	R160	OB22229A	RM 1.00K 1/6W F	R718	OB024155A	RF 12 1/4W J	Q606	OB10003A	TR 2SA1345	R680	OB09749A	RK 1M 1/6W J
	C167	OB05813A	CML 0.056μ 50V J	C201	OB09148A	CE 10μ 25V (LN)	R161	OB22248A	RM 1.54K 1/6W F	R815	OB09693A	RK 4.7K 1/6W J	Q608,609	OB10033A	TR 2SC1740S	R681	OB09735A	RK 270K 1/6W J
	C168	OB05682A	CML 0.068μ 50V J	C203	OB09404A	CPP 1000P 100V J	R162	OB22296A	RM 3.92K 1/6W F	R816	OB01889A	RK 100K 1/4W J	Q610,611	OB10033A	TR 2SC1740S	R682	OB09611A	RK 1.8 1/6W J
	C169	OB41300A	CMM 0.15μ 50V J	C204,205	OB41133A	CPP 2200P 100V G	R163	OB22431A	RM 59.0K 1/6W F	R817	OB09725A	RK 100K 1/6W J	Q612,613	OB10033A	TR 2SC1740S	R683	OB09623A	RF 5.6 1/6W J
	C170	OB41302A	CMM 0.22μ 50V J	C207,208	OB09792A	CC 33P 50V J	R164	OB09733A	RK 220K 1/6W J	R818	OB24155A	RF 12 1/4W J	Q614,615	OB10029A	TR 2SA933S	R684	OB09669A	RK 470 1/6W J
	C171	OB09876A	CMM 0.47μ 50V J	C209	OB09393A	CC 68P 50V J	R250	OB09681A	RK 1.5K 1/6W J				Q616,617	OB10029A	TR 2SA933S	R685	OB09689A	RK 3.3K 1/6W J
	C172	OB05557A	CML 0.015μ 50V J	C210	OB41139A	CPP 3900P 100V G	R251	OB09675A	RK 820 1/6W J				Q618,619	OB06013A	TR 2SA733 (P,Q)	R686	OB09697A	RK 6.8K 1/6W J
	C173	OB05681A	CML 0.01μ 50V J	C211	OB41143A	CPP 5600P 100V G	R253	OB09703A	RK 12K 1/6W J				Q620,621	OB01872A	TR 2SC945L (P,Q)	R687	OB09689A	RK 3.3K 1/6W J
	C174	OB40473A	CE 10μ 16V (BP)	C212	OB05557A	CML 0.015μ 50V J	R254,255	OB09701A	RK 10K 1/6W J				Q622	OB01872A	TR 2SC945L (P,Q)	R688	OB09707A	RK 18K 1/6W J
	C260	OB41386A	CPP 100P 50V J	C213	OB05682A	CML 0.068μ 50V J	R256	OB09709A	RK 22K 1/6W J	Q301	OB06202A	TR 2SA562TM (Y)	Q625	OB10033A	TR 2SC1740S	R689	OB09719A	RK 56K 1/6W J
	C261,262	OB41133A	CPP 2200P 100V G	C214	OB41300A	CMM 0.15μ 50V J	R257	OB09713A	RK 33K 1/6W J	Q302	OB10029A	TR 2SA933S	Q626	OB10029A	TR 2SA933S	R690	OB09721A	RK 68K 1/6W J
	C263	OB41139A	CPP 3900P 100V G	C215	OB05813A	CML 0.056μ 50V J	R258	OB09733A	RK 220K 1/6W J	D302	OB06398A	SID 1SS176	Q628	OB10029A	TR 2SA933S	R691	OB09681A	RK 1.5K 1/6W J
	C264	OB41143A	CPP 5600P 100V G	C216	OB41302A	CMM 0.22μ 50V J	R259	OB05936A	RK 10 1/4W J	L301	OB51256A	Bias Osc. B01-JF	Q634	OB10097A	TR 2SA952 (K,L)	R692,693	OB09713A	RK 33K 1/6W J
	C265,266	OB09187A	CE 1μ 50V (BP)	C217	OB09876A	CMM 0.47μ 50V J	R260	OB22229A	RM 1.00K 1/6W F	VR115	OB32127A	Semi VR 10K	ZD403	OB12179A	ZD 15V	R694	OB09713A	RK 33K 1/6W J
	C267	OB05813A	CML 0.056μ 50V J	C218,219	OB09187A	CE 1μ 50V (BP)	R261	OB22248A	RM 1.54K 1/6W F	VR116	OB32128A	Semi VR 20K	ZD601	OB12167A	ZD 10V	R695	OB09695A	RK 5.6K 1/6W J
	C268	OB05682A	CML 0.068μ 50V J	C220	OB05681A	CML 0.01μ 50V J	R262	OB22296A	RM 3.92K 1/6W F	VR117	OB32129A	Semi VR 50K	ZD603	OB12150A	ZD 5.6V	R696,697	OB09670A	RK 510 1/6W J
	C269	OB41300A	CMM 0.15μ 50V J	C221	OB40473A	CE 10μ 16V (BP)	R263	OB22431A	RM 59.0K 1/6W F	VR215	OB32127A	Semi VR 10K	ZD604	OB12153A	ZD 6.2V	R698	OB01857A	RK 1K 1/4W J
	C270	OB41302A	CMM 0.22μ 50V J	C222	OB41388A	CPP 120P 50V J	R264	OB09733A	RK 220K 1/6W J	VR216	OB32128A	Semi VR 20K				R699	OB09677A	RK 1K 1/6W J
	C271	OB09876A	CMM 0.47μ 50V J	C223,224	OB40473A	CE 10μ 16V (BP)	C140	OB09322A	CPP 330P 100V J	VR217	OB32129A	Semi VR 50K				R936,937	OB09701A	RK 10K 1/6W J
	C272	OB05557A	CML 0.015μ 50V J	C301,302	OB01391A	CE 220μ 25V	C141	OB09270A	CPP 470P 100V J	R330	OB09669A	RK 470 1/6W J				C415	OB01403A	CE 47μ 16V
	C273	OB05681A	CML 0.01μ 50V J	C303	OB01674A	CE 10μ 25V	C142	OB09834A	CPP 2200P 100V J	R331,332	OB09693A	RK 4.7K 1/6W J				C601,602	OB09223A	CE 1μ 50V (LN)
	C274	OB40473A	CE 10μ 16V (BP)	CN33	OB81634A	3P-T Post	C143	OB05687A	CML 1200P 50V J	R336	OB09701A	RK 10K 1/6W J	D608	OB06398A	SID 1SS176	C603	OB09223A	CE 1μ 50V (LN)
	C320	OB01391A	CE 220μ 25V	CN34	OB81635A	3P-T Post	C144	OB09828A	CPP 8200P 100V J	R337	OB05622A	RK 2.2K 1/4W J	D609,610	OB06398A	SID 1SS176	C604	OB09327A	CE 0.33μ 50V (LN)
	C325	OB01391A	CE 220μ 25V				C145	OB05936A	CML 0.082μ 50V J	R338,339	OB09721A	RK 68K 1/6W J	D611,612	OB06398A	SID 1SS176	C605	OB09222A	CE 0.47μ 50V (LN)
	CN34						C146	OB09814A	CE 1μ 50V (LN)	R341,342	OB09725A	RK 100K 1/6W J	D613	OB06398A	SID 1SS176	C606	OB09332A	CE 2.2μ 50V (LN)
							C147	OB40154A	CE 47μ 16V (LN)	R343	OB09733A	RK 220K 1/6W J	D614,615	OB06398A	SID 1SS176	C607	OB09148A	CE 10μ 25V (LN)
							C240	OB09322A	CPP 330P 100V J	R344	OB09737A	RK 220K 1/6W J	D617	OB06398A	SID 1SS176	C608,609	OB09150A	CE 33μ 25V (LN)
							C241	OB09270A	CPP 470P 100V J	R345	OB09711A	RK 27K 1/6W J	D618,619	OB06398A	SID 1SS176	C610	OB01412A	CE 10μ 16V
							C242	OB09834A	CPP 2200P 100V J	R346	OB09725A	RK 100K 1/6W J	D620,621	OB06398A	SID 1SS176	C611	OB05841A	CE 330μ 10V
							C243	OB05687A	CML 1200P 50V J	R347	OB09653A	RK 100 1/6W J	D622,623	OB06398A	SID 1SS176	C612	OB40079A	CE 220μ 16V
							C244	OB09828A	CPP 8200P 100V J	R353	OB09705A	RK 15K 1/6W J	D624,625	OB06398A	SID 1SS176	C613,614	OB09286A	CC 470P 50V K
							C245	OB05685A	CML 0.082μ 50V J	R360	OB09705A	RK 15K 1/6W J	D626	OB12584A	SID 1N4148	C615	OB09290A	CC 0.01μ 50V Z
							C246	OB09814A	CE 1μ 50V (LN)	R361,362	OB09697A	RK 6.8K 1/6W J	D627,628	OB06398A	SID 1SS176	C616	OB05557A	CML 0.015μ 50V J
							C247	OB40154A	CE 47μ 16V (LN)	R720	OB09705A	RK 15K 1/6W J	D629,630	OB06398A	SID 1SS176	C617	OB05892A	CC 100P 50V K
							C315,316	OB4015										



9. SCHEMATIC DIAGRAMS

9.1. IC Block Diagrams



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-4 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.
11	Capstan M	Out	Not used.
12	E. Brake	Out	Electric Brake signal. Active H. Generates H pulse upon change in mode. F.F. Button ON

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. Oscillating frequency = 550 kHz.
25	Xtal	In	
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.

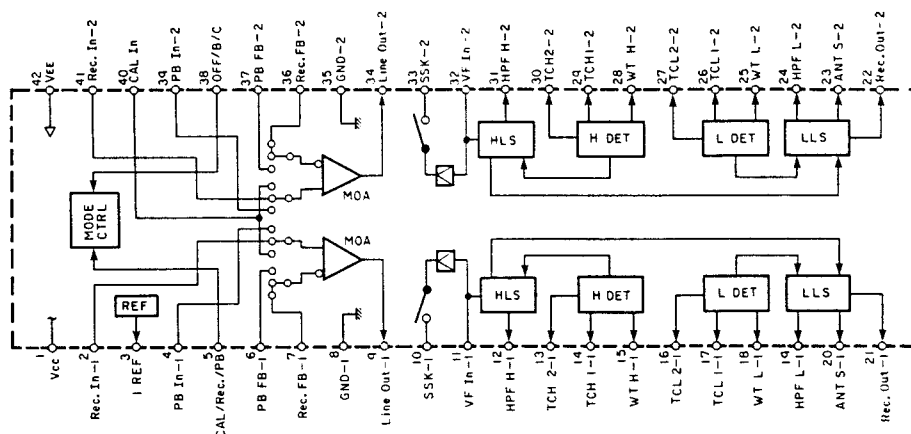


Fig. 9.1.3 Dolby NR IC CX20188

IC302/IC315 (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.

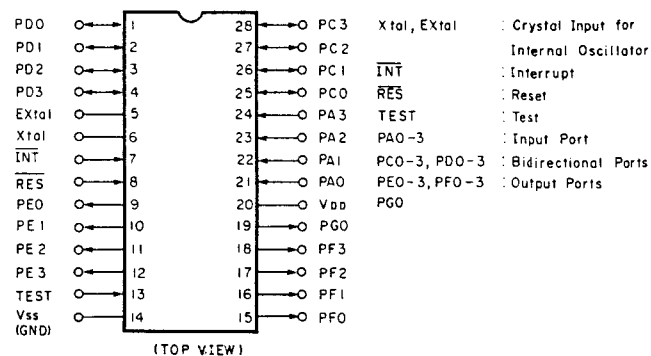
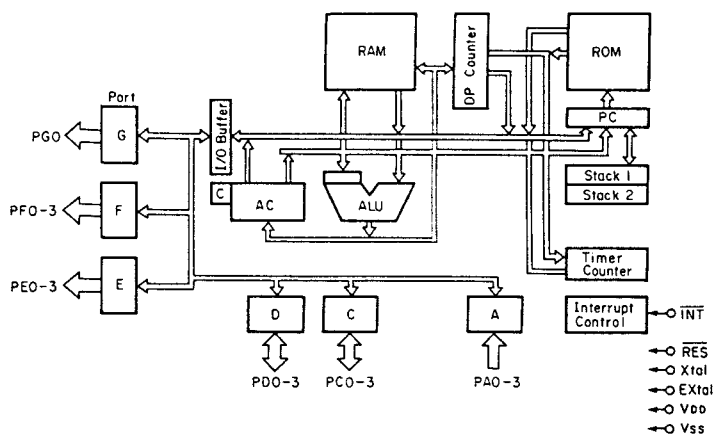
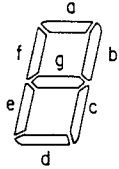
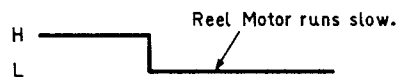


Fig. 9.1.2 4-Bit Micro-processor LM6416E-106

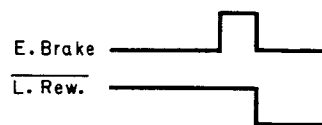
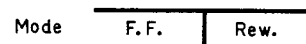
IC604 (LM6416E-106)

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	

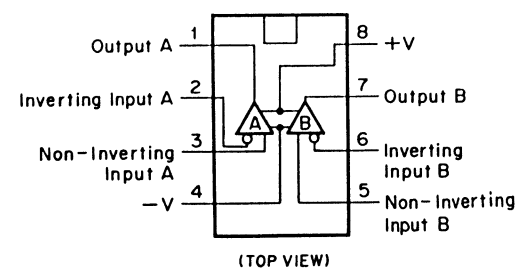


Fig. 9.1.4 Operational Amp. IC 4556D, 4558D, 4560M, 2043DD, 2403D, 072DE

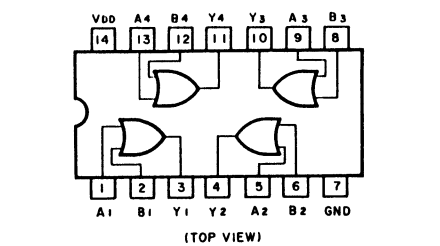


Fig. 9.1.5 OR Gate C-MOS IC μPD4071BC

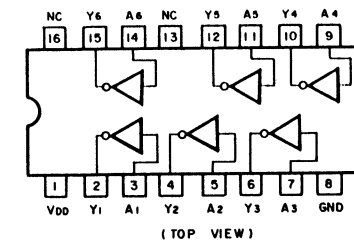


Fig. 9.1.9 Inverter C-MOS IC LC4049B

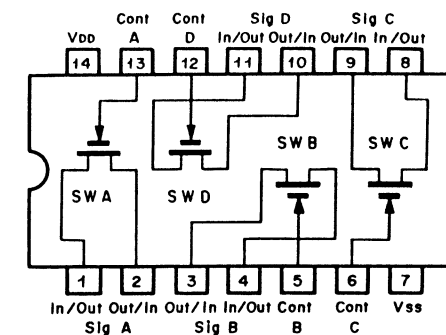


Fig. 9.1.10 Bilateral Switch μPD4066BC

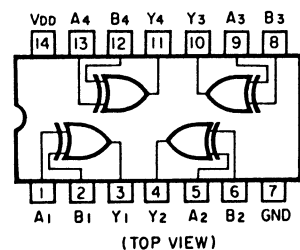


Fig. 9.1.6 Exclusive OR Gate C-MOS IC μPD4030BC

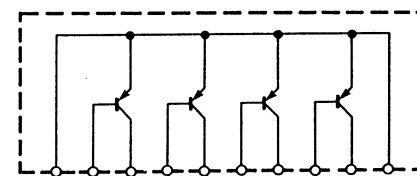
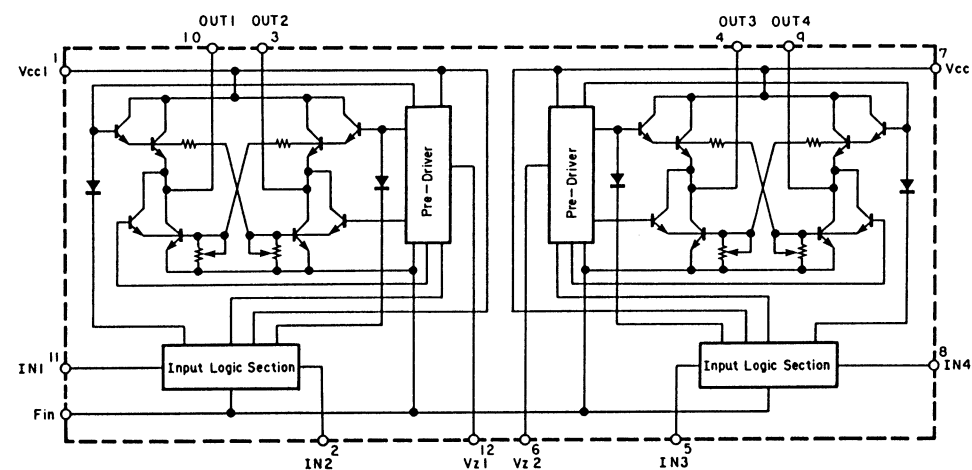


Fig. 9.1.7 Transistor Array TA64



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

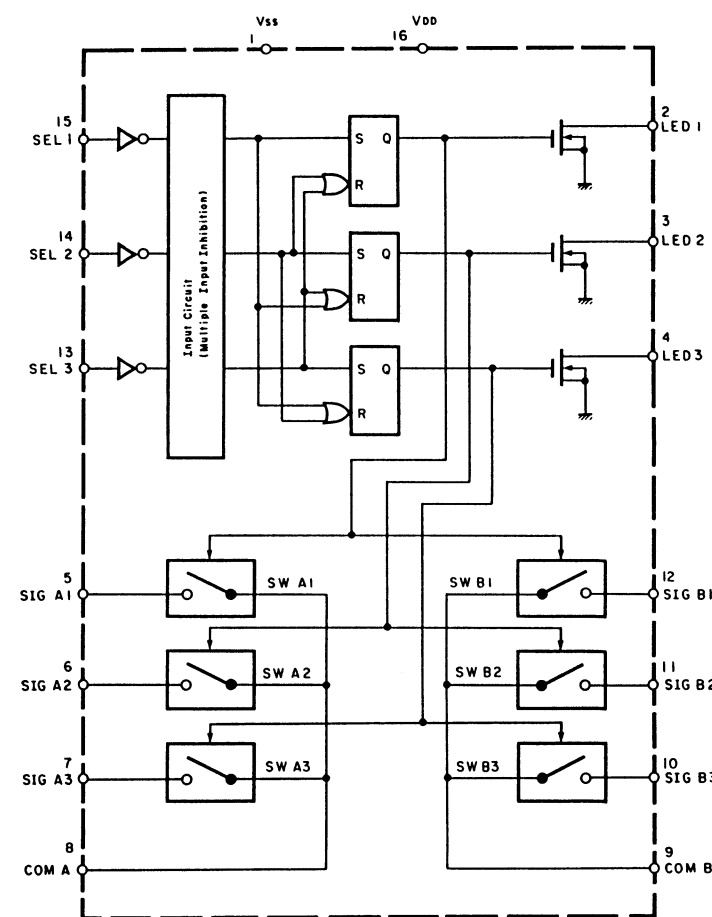


Fig. 9.1.11 Analog Switch Selector TC9145P

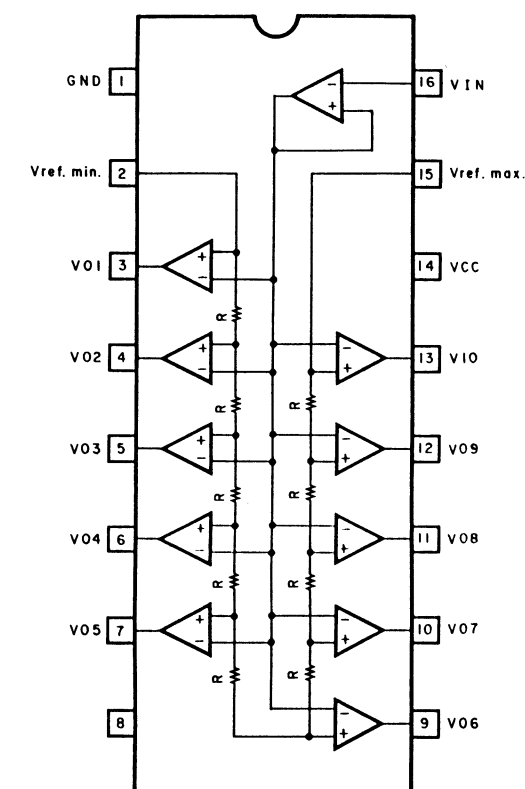


Fig. 9.1.12 Level Meter Driver TA7612AP

9.2. Schematic Diagrams

(1) For Serial No.: A13102451 - (CR-4A)/A13153801 - (CR-4/4E/40)

CR-4/4A/4E/40

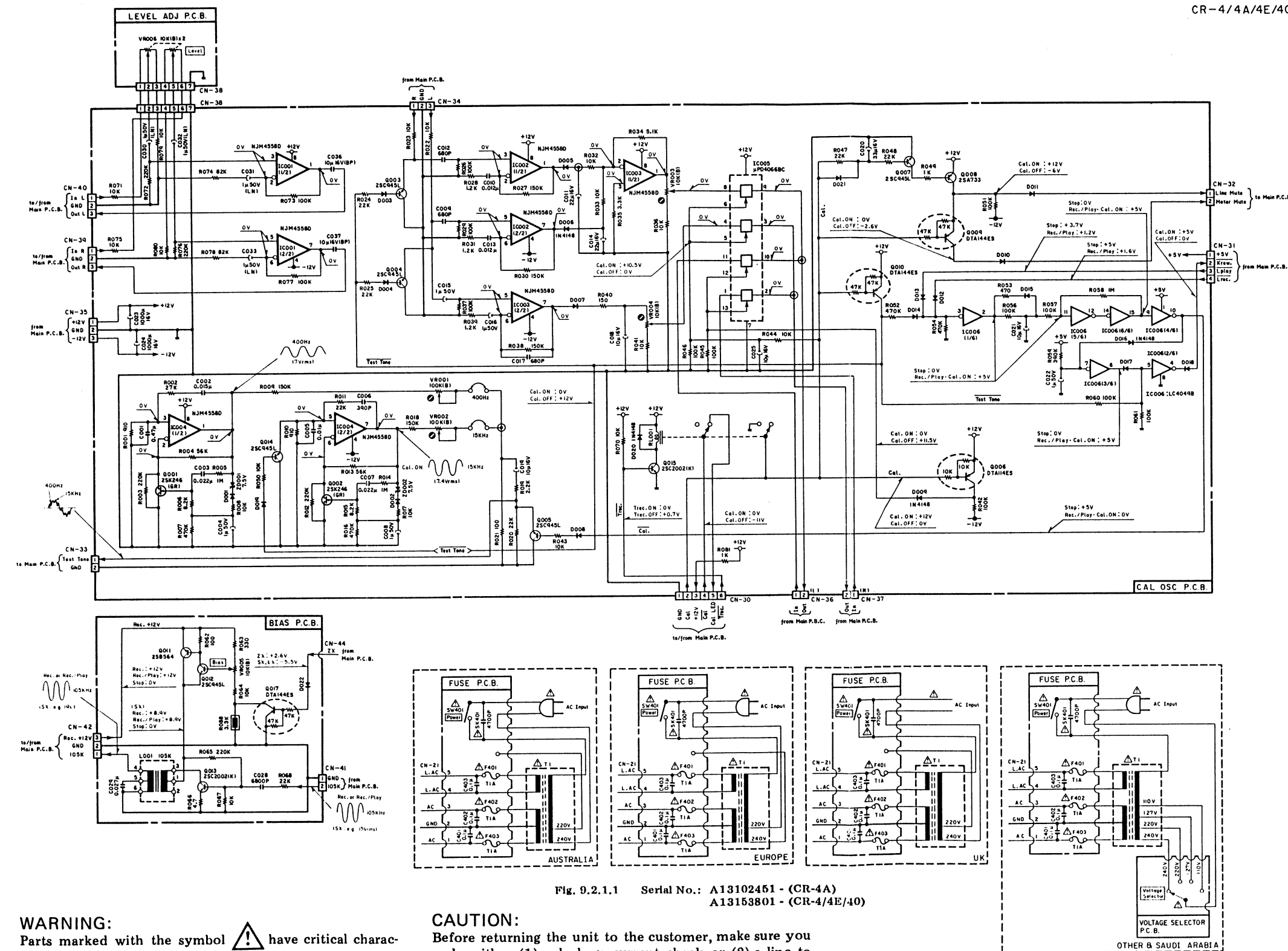


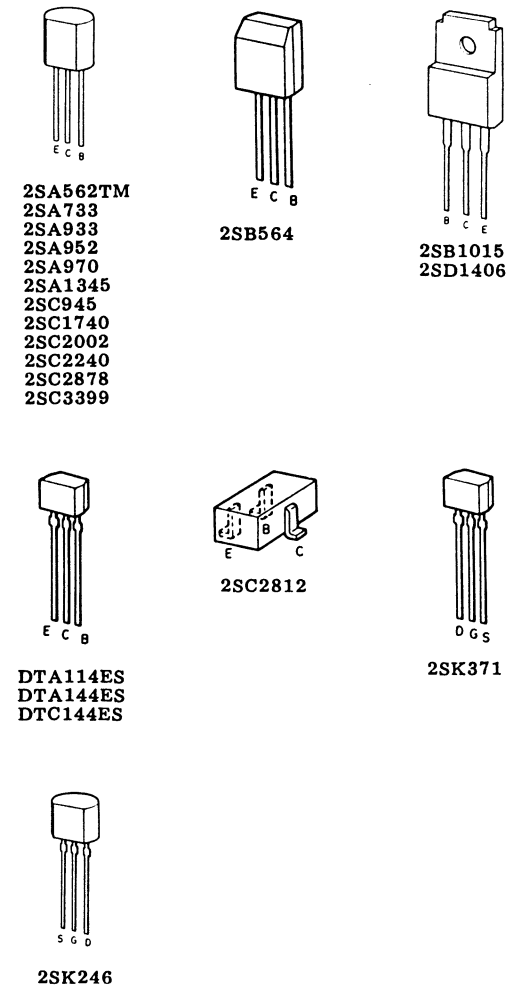
Fig. 9.2.1.1 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/40)

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:

- Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
- 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
- 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.
- Voltage measuring condition:
 - Stop mode (with no input signal) unless otherwise specified.
 - Tape: SX position, Eq.: 70 μ s
 - Monitor Switch: Tape
 - Timer Switch: OFF
 - Memory Stop/Auto Repeat Switch: OFF
 - MPX Switch: OFF
 - Dolby NR Switch: OFF
 - Cal. Switch: OFF
 - Play mode: Cassette with no tape played back.
- : Indicates record signal flow.
: Indicates playback signal flow.

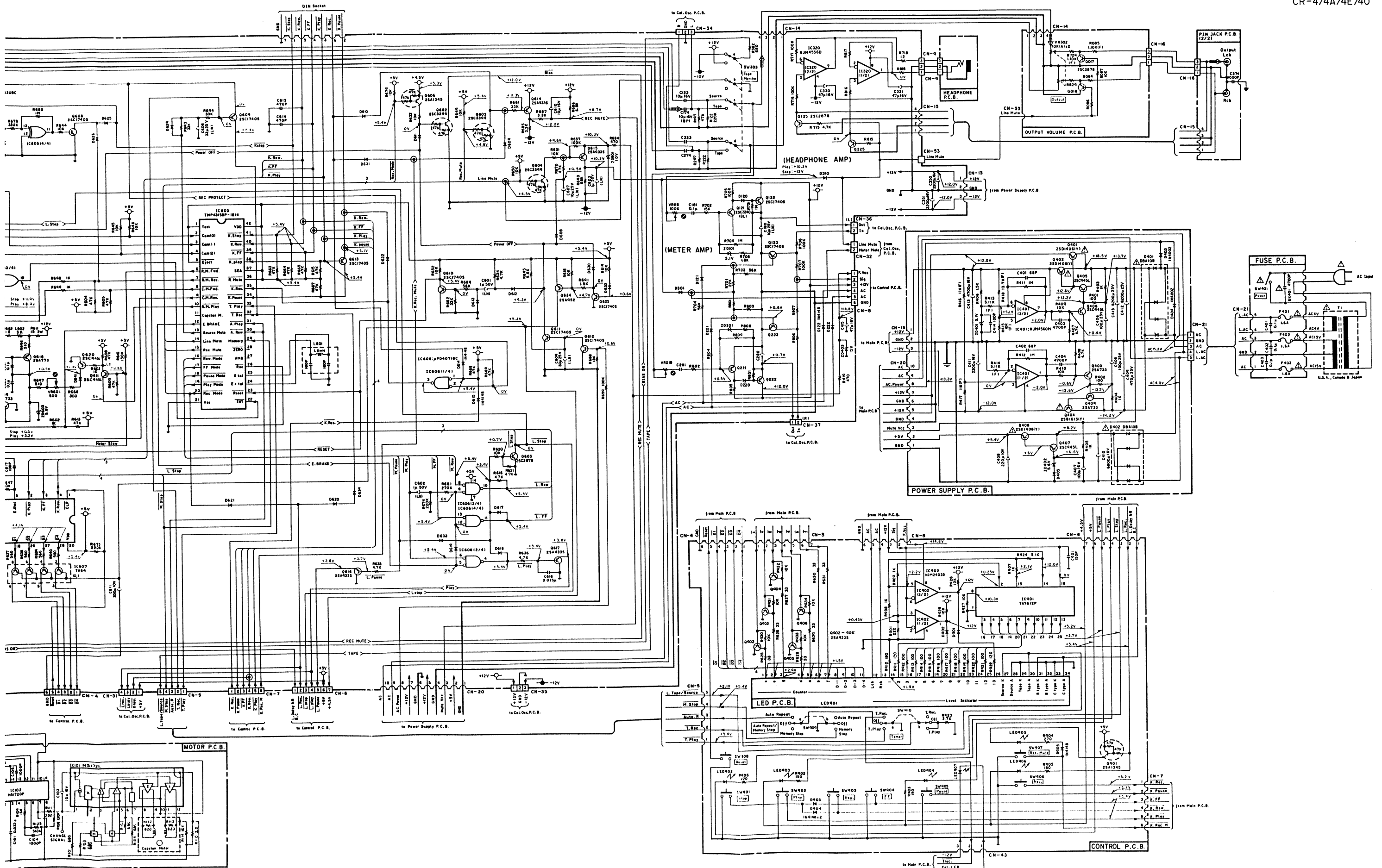


Fig. 9.2.1.2 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/4O)

(2) For Serial Nos.: A13101001 - 02450 (CR-4A)/A13150001 - 53800 (CR-4/E/40)

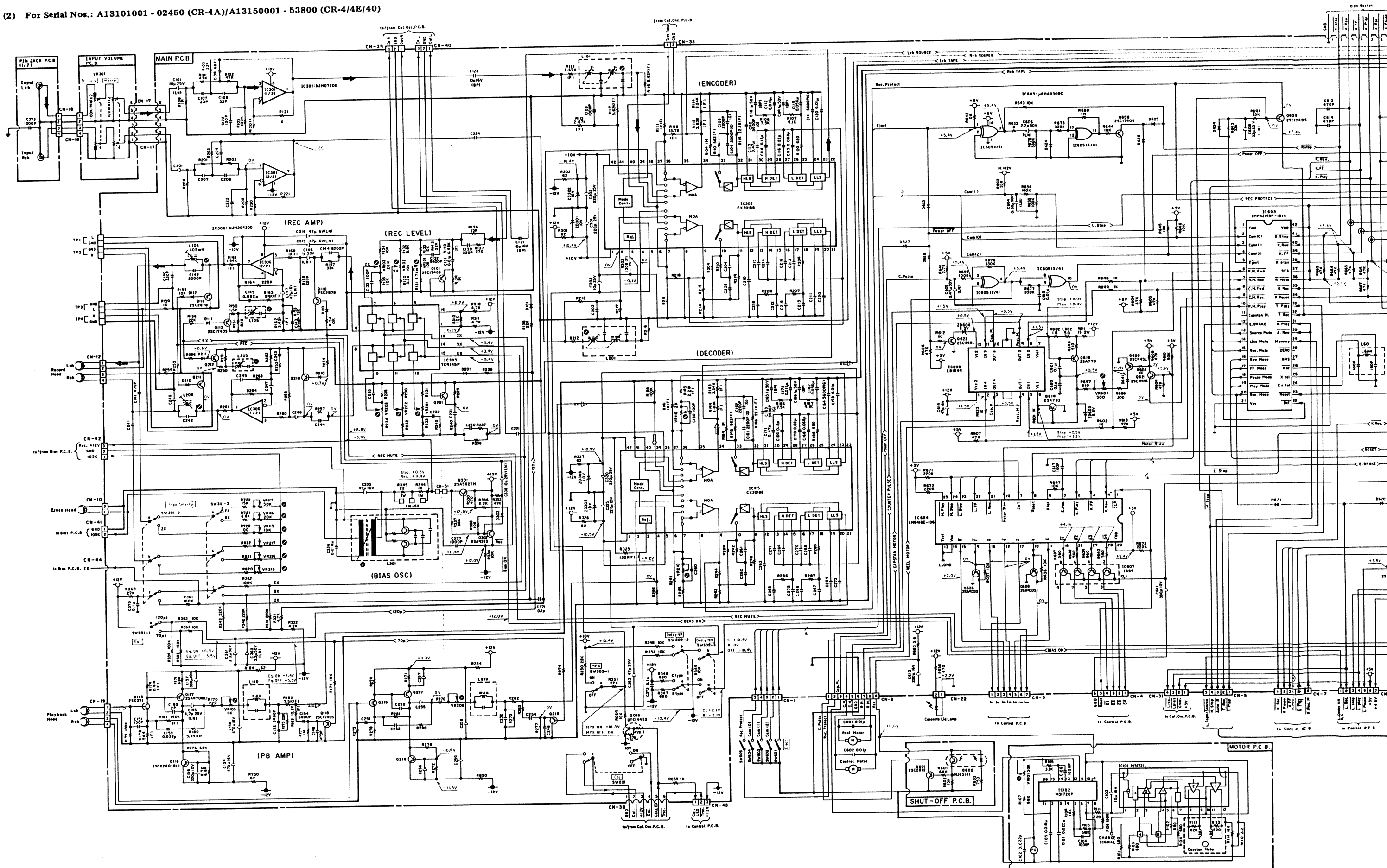


Fig. 9.2.2.1 Serial Nos.: A13101001 - 04 50 (CR-4A)
A13150001 - 58 00 (CR-4/E/40)

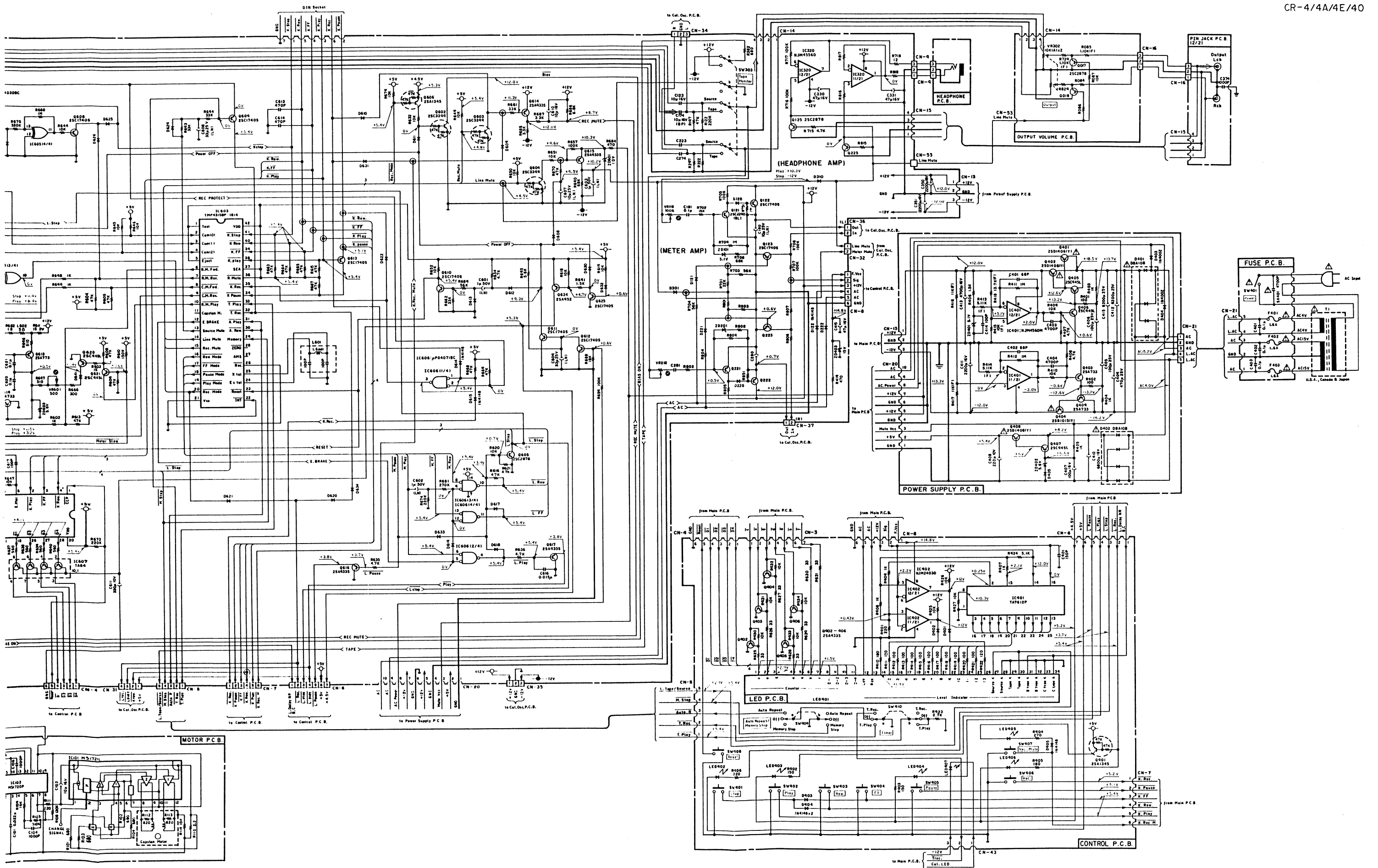
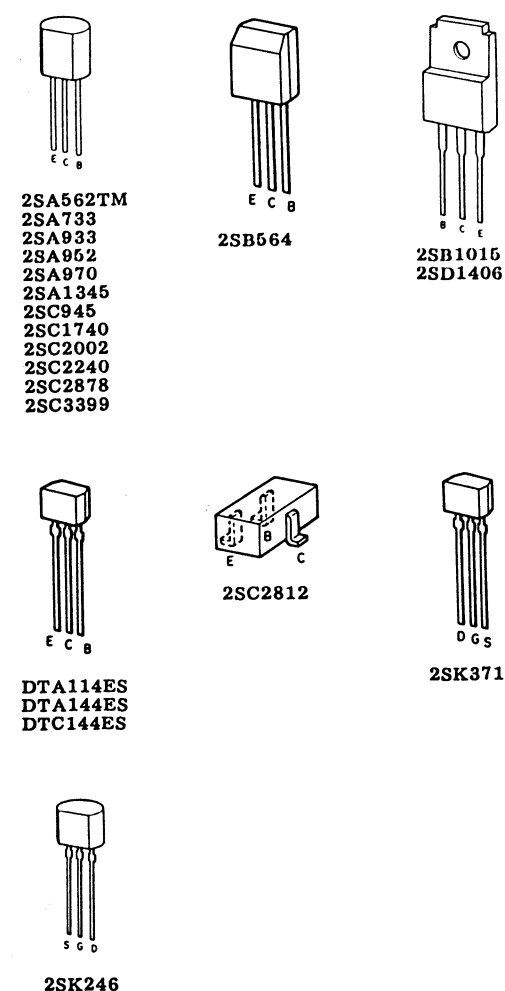


Fig. 9.2.2.1 Serial Nos.: A13101001 - 02450 (CR-4A)
 A13150001 - 53800 (CR-4/4E/40)



Notes:

- Diode is 1S853, 1S1555, or 1SS176 unless otherwise specified.
- 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
- 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.
- Voltage measuring condition:
 - Stop mode (with no input signal) unless otherwise specified.
 - Tape: SX position, Eq.: 70 μ s
 - Monitor Switch: Tape
 - Timer Switch: OFF
 - Memory Stop/Auto Repeat Switch: OFF
 - MPX Switch: OFF
 - Dolby NR Switch: OFF
 - Cal. Switch: OFF
 - Play mode: Cassette with no tape played back.
- ➡: Indicates record signal flow.
 - ⬅: Indicates playback signal flow.

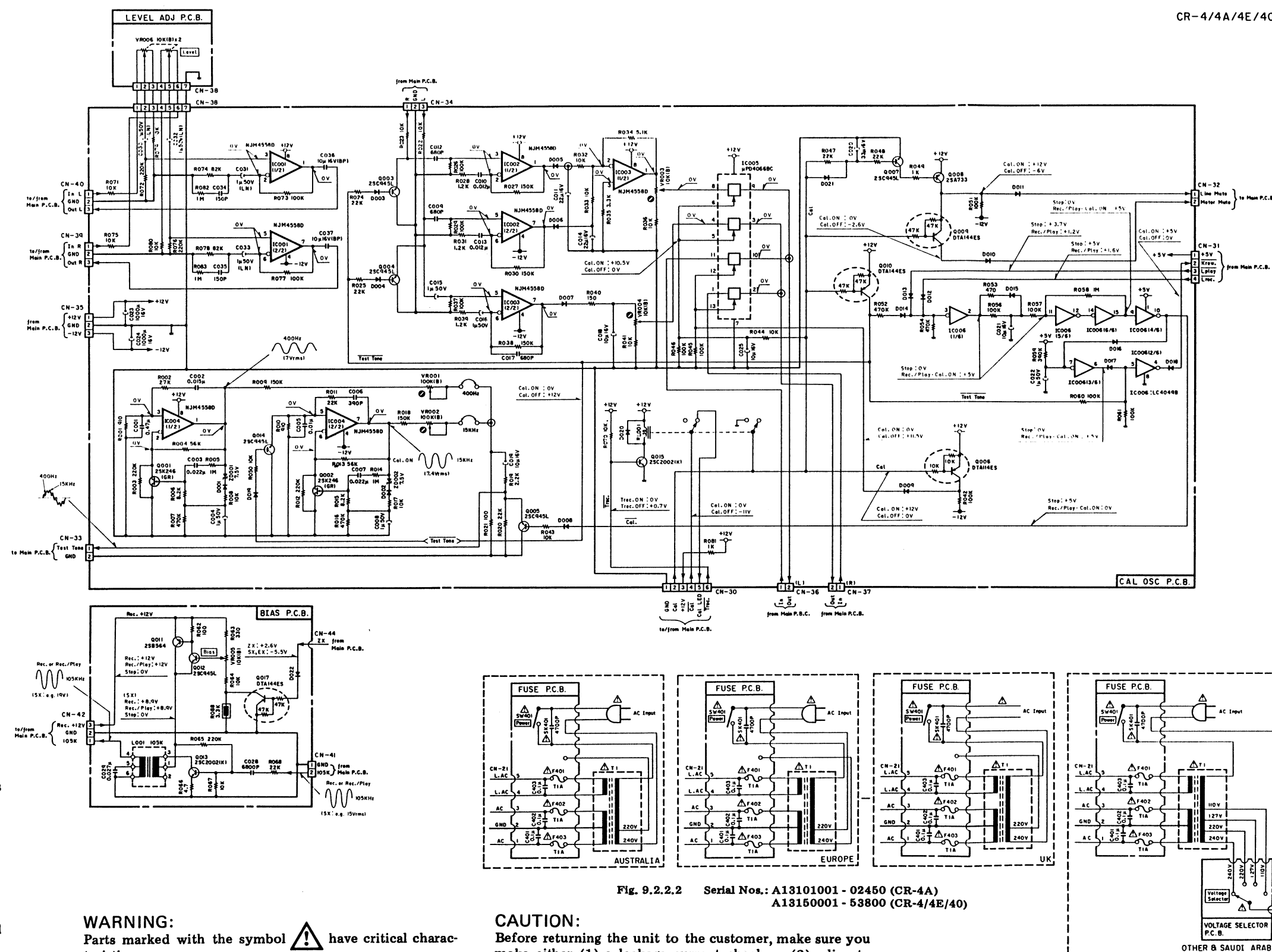


Fig. 9.2.2.2 Serial Nos.: A13101001 - 02450 (CR-4A)
A13150001 - 53800 (CR-4/4E/4O)

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.

10. WIRING DIAGRAM

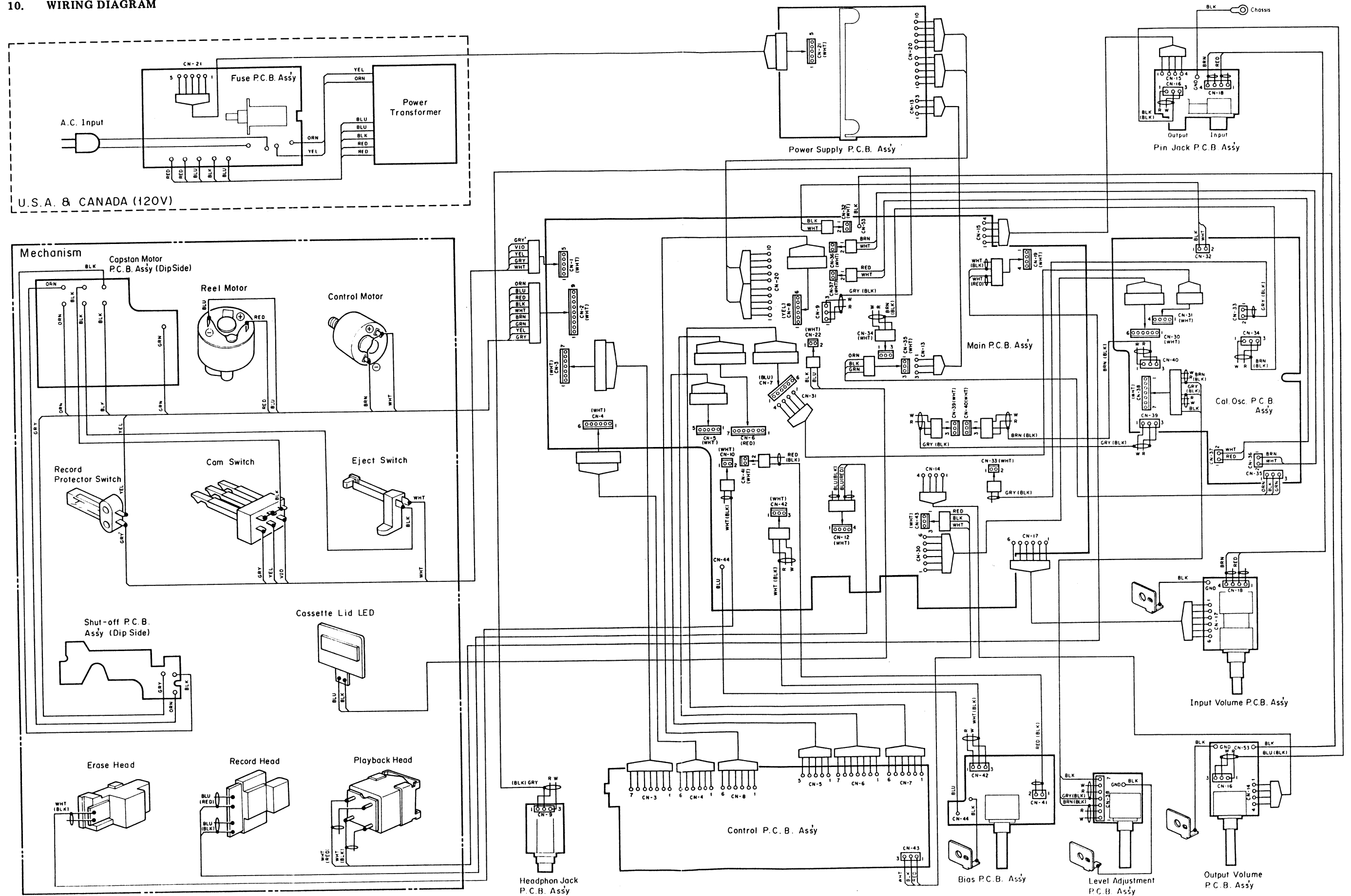
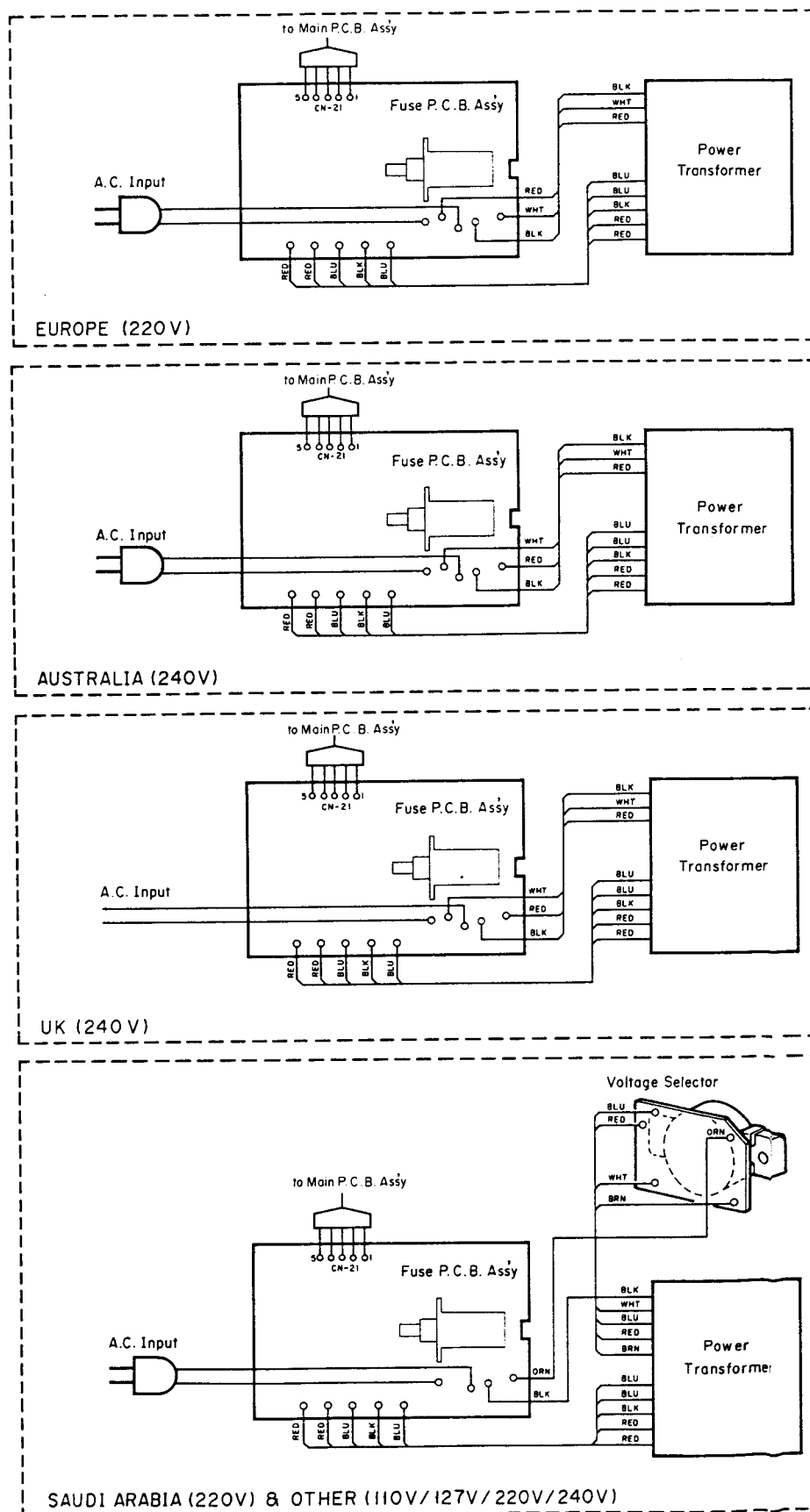


Fig. 10.1



Notes: 1. Table of wire colors

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

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

Fig. 10.2

11. BLOCK DIAGRAMS

11.1. Amplifier Section

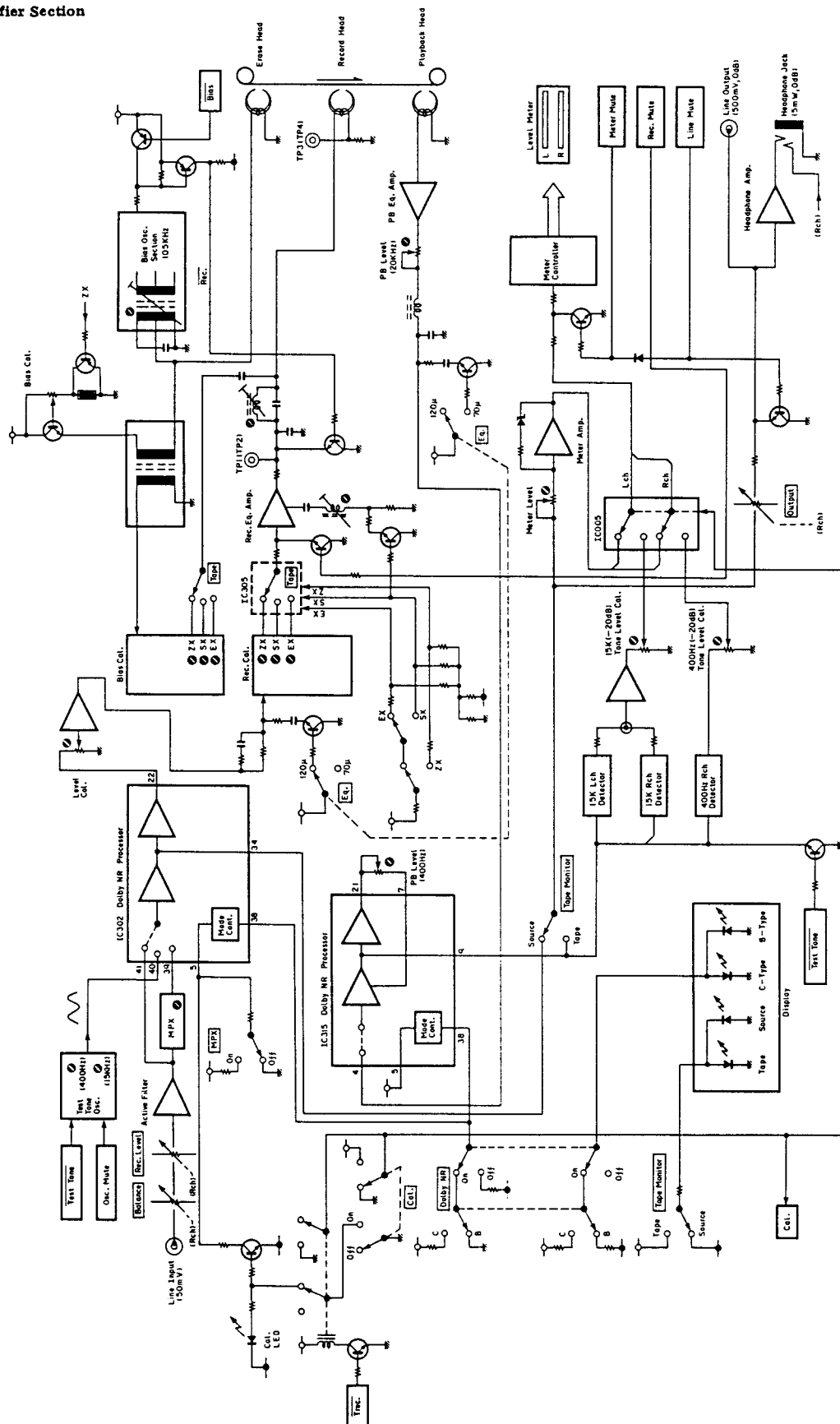


Fig. 11.1

11.2. Mechanism Control Section

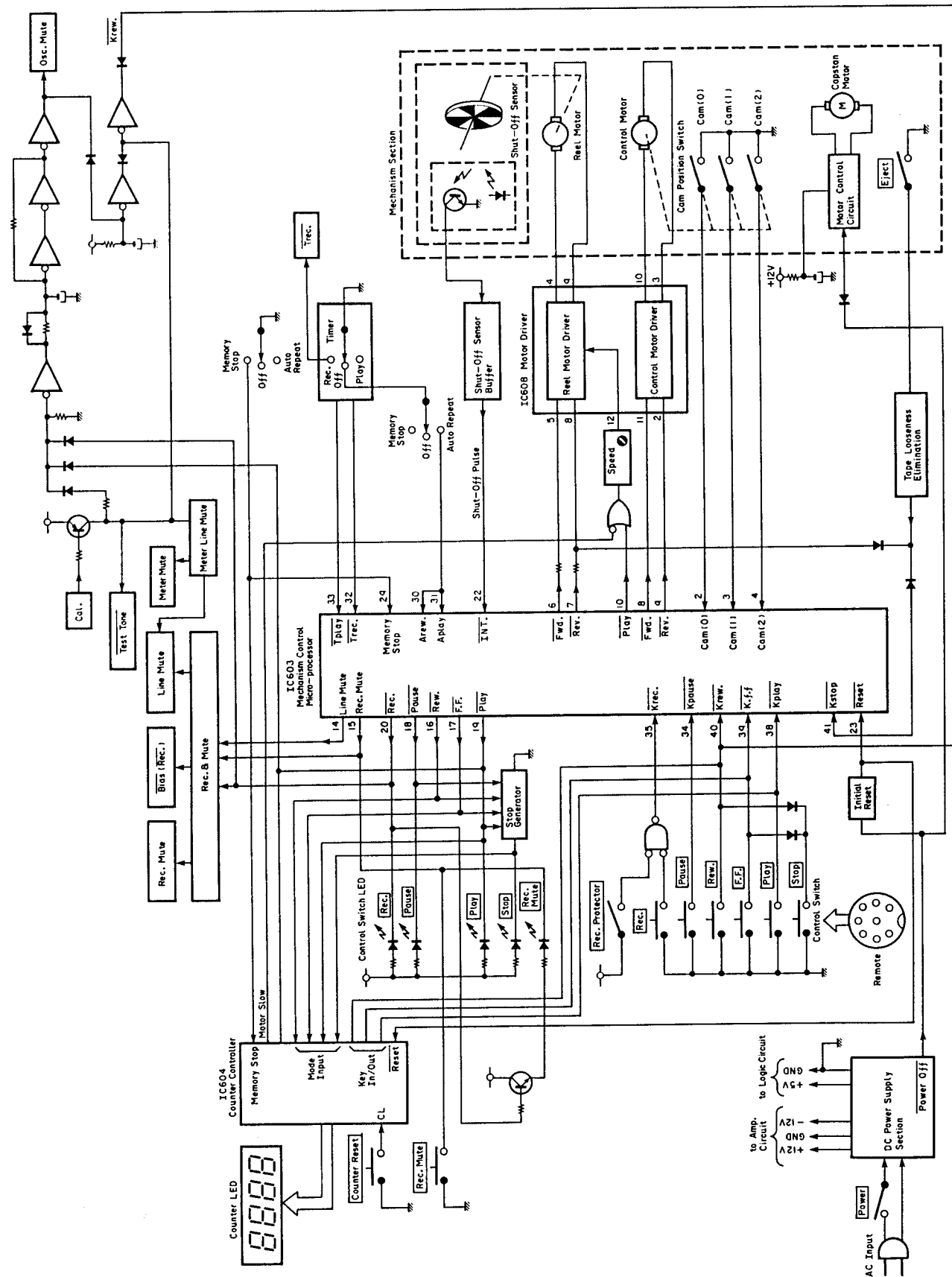


Fig. 11.2

12. TIMING CHARTS AND EQ. AMP. FREQUENCY RESPONSE

12.1. Timing Charts

(1) Overall Timing Charts

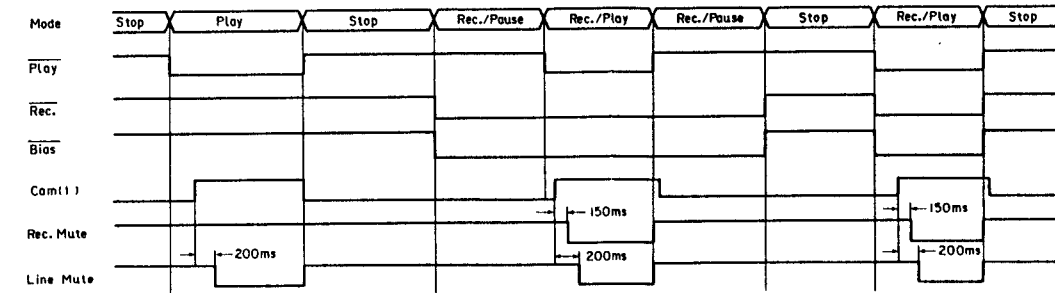


Fig. 12.1.1

(2) Mechanism Control Timing Charts

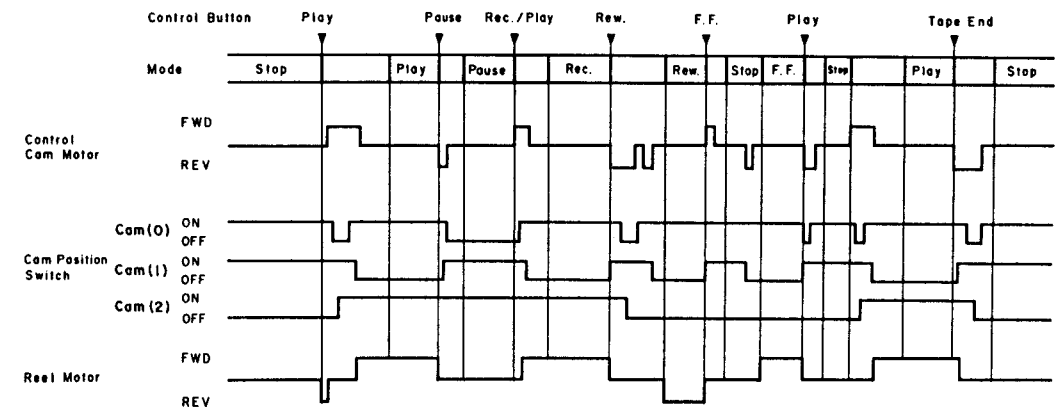


Fig. 12.1.2

12.2. Eq. Amp. Frequency Response
 (1) For Serial No.: A13102451 - (CR-4A)/A13153801 - (CR-4/4E/40)
 (a) Playback Frequency Response

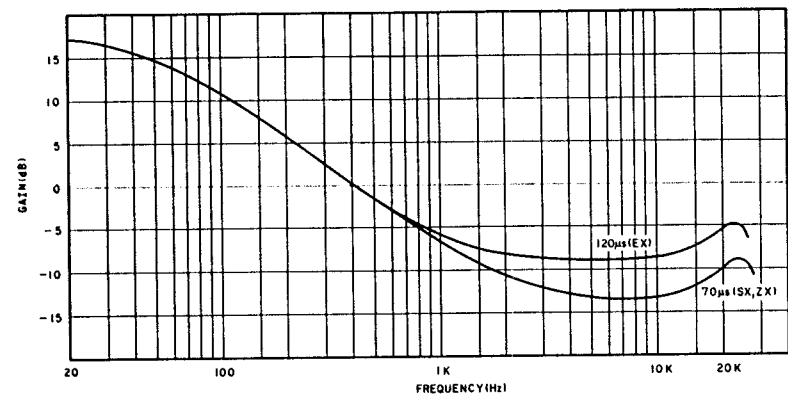


Fig. 12.2.1.1 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/40)

(2) For Serial Nos.: A13101001 - 02450 (CR-4A)/A13150001 - 53800 (CR-4/4E/40)
 (a) Playback Frequency Response

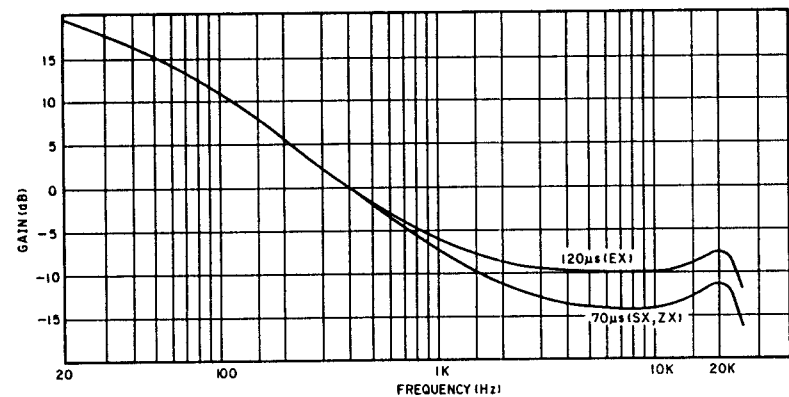


Fig. 12.2.2.1 Serial Nos.: A13101001 - 02450 (CR-4A)
A13150001 - 53800 (CR-4/4E/40)

(b) Record Current Frequency Response

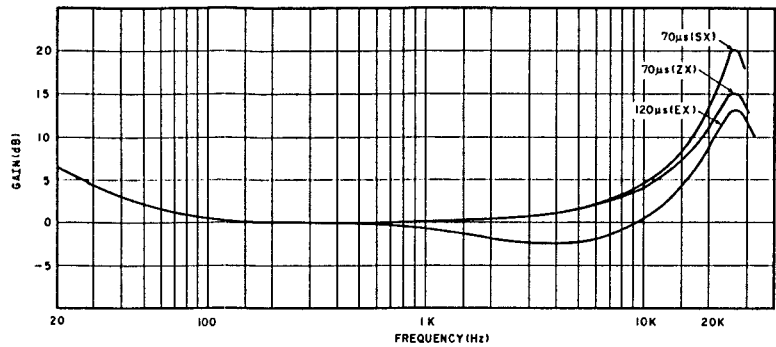


Fig. 12.2.1.2 Serial No.: A13102451 - (CR-4A)
A13153801 - (CR-4/4E/40)

(b) Record Current Frequency Response

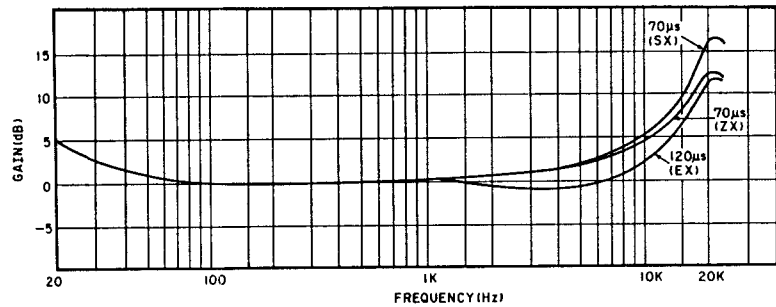


Fig. 12.2.2.2 Serial Nos.: A13101001 - 02450 (CR-4A)
A13150001 - 53800 (CR-4/4E/40)

13. SPECIFICATIONS

Track Configuration	4 tracks/2-channel stereo
Heads	3 (erase head x 1, record head x 1, playback head x 1)
Motors	<Tape Transport> FG servo brushless, slotless, coreless DD motor (capstan drive) x 1 DC motor (reel drive) x 1 <Mechanism> DC motor (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	38 W max.
Tape Speed	1-7/8 ips (4.8 cm/sec.) $\pm 0.5\%$
Wow and Flutter	Less than $\pm 0.048\%$ WTD Peak Less than 0.027% WTD RMS
Frequency Response	20 Hz—21,000 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 72 dB (400 Hz, 3% THD, IHF A-WTD RMS) Dolby B-Type NR on <70 μ s, ZX [Type IV] tape> Better than 66 dB (400 Hz, 3% THD, IHF A-WTD RMS)
Total Harmonic Distortion	Less than 0.8% (400 Hz, 0 dB, ZX [Type IV] tape) Less than 1.0% (400 Hz, 0 dB, SX [Type II], EXII [Type I] tape)
Erasure	Better than 60 dB (100 Hz, +10 dB)
Separation	Better than 37 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)	5 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	5.9 kg, 13 lbs.

- 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-4, CR-4A, CR-4E, CR-40

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