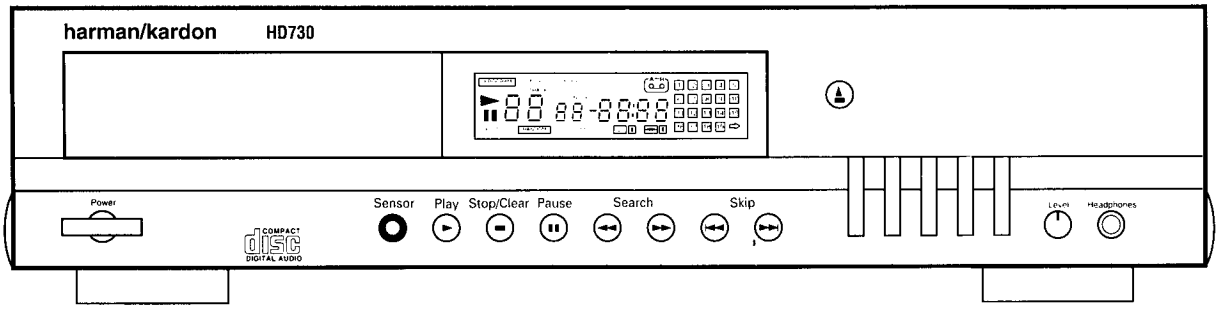
The Harman Kardon
Model HD-730

Manual A

COMPACT DISC PLAYER

Technical Manual



■ CONTENTS ■

DANGER: Invisible laser radiation when open and interlock failed or defeated.
AVOID DIRECT EXPOSURE TO BEAM.

harman/kardon

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1112-HD-730 P9603 1200 Printed in Korea

LASER BEAM SAFETY PRECAUTIONS

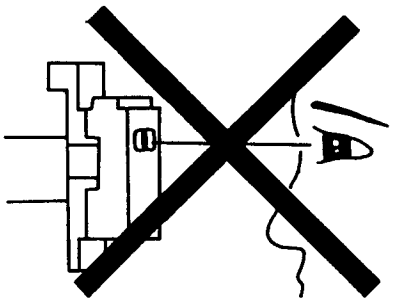
CLASS 1 LASER PRODUCT

CLASS 1
LASER PRODUCT

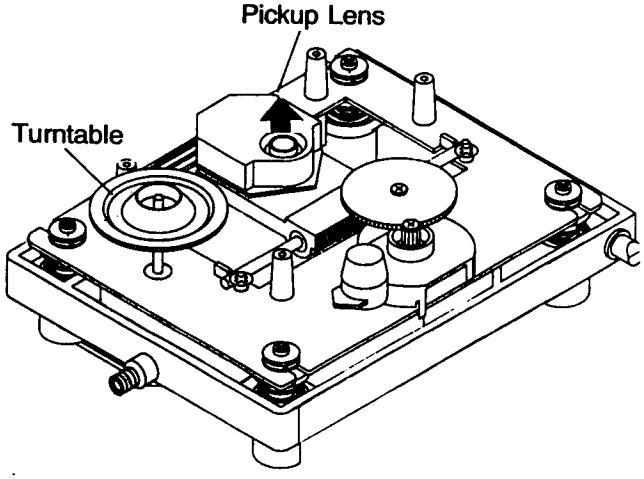
CAUTION
Invisible laser radiation when the unit is open. Do not stare into beam.

CAUTION: USE OF ANY CONTROLS, ADJUSTMENT, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Do not look directly at the laser beam coming from the pickup or allow it to strike against your skin.



This compact disc player uses a pickup that emits a laser beam. The laser beam is emitted from the location shown in the figure. When checking the laser diode, be sure to keep your eyes at least 1 foot away from the pickup lens when the diode is turned on. Do not look directly at the laser beam.



CAUTION:
Using controls and adjustment, or doing procedures other than those specified herein, may result in hazardous radiation exposure.

SAFETY PRECAUTIONS

CAUTION

RISK OF ELECTRIC SHOCK.
DO NOT OPEN.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Attention: Pour prévenir les chocs électriques ne pas utiliser cetre fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames prévent étre insérées à fond sans en laisser aucune partie à découvert.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

HANDLING LASER PICKUP

The laser diode in the optical system of this player can be damaged by electrostatic discharge from your clothes or your body. Proper electrostatic grounding for service personal is required during servicing.

BEFORE REPAIRING THE COMPACT DISC PLAYER

Preparation

- Human Body Grounding:
  Many of the components used in this compact disc player, including the laser pickup, are sensitive to electrostatic discharge. Service personal should be grounded with an electrostatic armband (1 Mohm).

- Caution:
  Static charge on clothing does not escape through a body grounding wrist band.
  Be careful not to contact the pickup or electrical components with your clothing.

- Workbench and Tool Grounding:
  A properly-grounded electroconductive plate (1 Mohm) or metal sheet should be fitted to the workbench surface. Tools and instruments (such as soldering irons and scopes) should be grounded to prevent AC leakage.

Figure 1

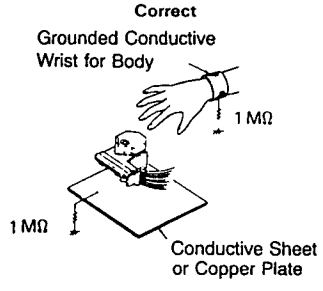


Figure 2

Note: Laser diodes are so susceptible to damage from static electricity that, even if a static discharge does not ruin a diode, it can shorten its life or cause it to work improperly.

LEAKAGE TEST

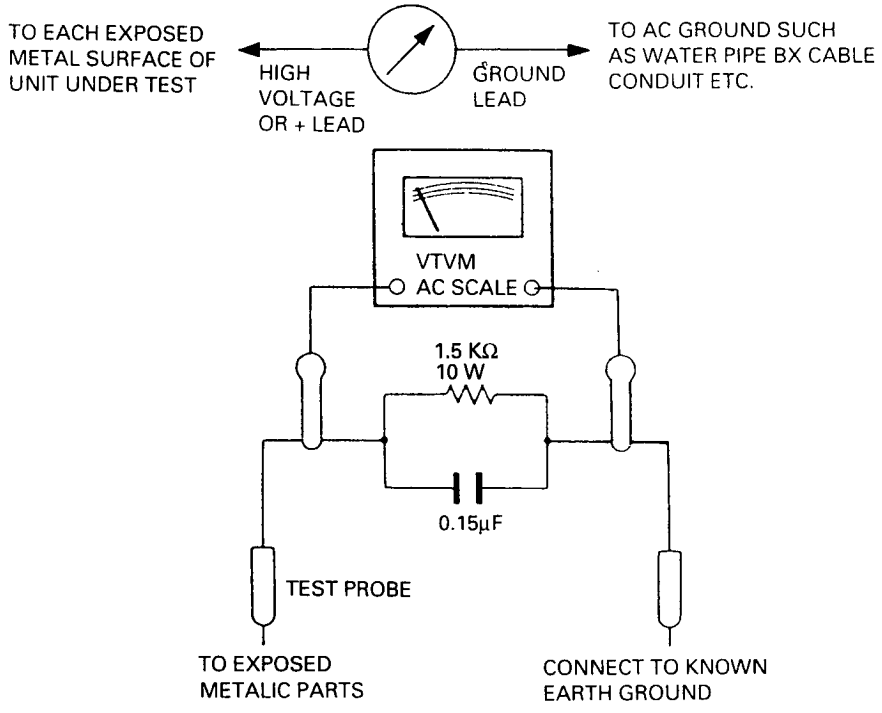
Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to makes certain that leads are not pinched or that hardware is not lodged between the chassis and other metallic parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item no. 21641, RCA model WT540A or use alternate method as follows: plug the power cord directly into a 230-volt AC receptacle (do not use an isolation transformer for this test).

Using two clip leads, connects a 1500 ohm, 10-watt resistor paralleled by a 0.15µF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 ohms per volt, or higher sensitivity to measure the AC voltage drop across the resistor. (see diagram) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the on and off positions.)

A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.

SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST



SPECIFICATIONS

GENERAL

Transmission bit ratio	4.3218 Mbit/sec
Transmission on clock	16.9344 MHz
Error correction	CIRC C1: Double correction C2: Quadruple correction

PICK-UP

System object lens type	Optical pick-up
Object lens drive system	2 Dimensional parallel drive type
Optical source	Semiconductor laser
Wave length	780 nm
Tracking system	3 Beam tracking servo type

OTHERS

D/A Converter	1 bit twin with digital filter
Power supply voltage	See type plate at rear of the unit

ELECTRICAL

- Measuring methods in confirmity with EIAJ CP-307, CCIR 468-3
- Reference level: 0 dB
- Test disc: SONY CD-3 YEDS-7, A.BEX TCD725
- Filter: 30 kHz, 18 dB/oct low pass filter

Description	Track	Nominal	Limit
Frequency Response at 20 Hz - 20 kHz	2 - 13	±0.5 dB	±1.0 dB
Signal to Noise Ratio at 1 kHz (Weighted A)	23	100 dB	95 dB
Dynamic Range at 1 kHz, 60 dB (Weighted A)	20	95 dB	92 dB
Total Harmonic Distortion at 0 dB			
100 Hz	4	0.007%	0.01%
1 kHz	7	0.007%	0.01%
20 kHz	13	0.009%	0.015%
Channel Separation at 1 kHz (Selective)	30, 34	90 dB	88 dB
Channel Unbalance at 1 kHz	7	±0.2 dB	±0.5 dB
Access Time (Track to next track)		1 sec	1.5 sec
De-emphasis	39	±0.2 dB	±0.3 dB
	40	±0.3 dB	±0.5 dB
	41	±0.5 dB	±1.0 dB
Disc Defects (Test Disc: A.BEX TCD725)			
Black dot	10 - 15	1000 uM	800 uM
Interrupt	3 - 9	1000 uM	800 uM
Fingerprint	17 - 19	ALL	ALL

ENVIRONMETAL

Test to specification

Temperature between 59℉ (15℃) and 95℉ (35℃) and relative humidity between 45% and 75%, with power supply voltage of 10% the normal supply voltage.

Test disc: SONY YEDS-7 or A.BEX TCD784, TCD725.

Operation

Unit must work properly and correctly at the temparature range from 32℉ (0℃)to 113℉ (45℃) and the relative humidity from 40% to 80%, and with the supply voltage.

Storage

Temperature test: 48 hours each at -40%℉ (-40℃) and 149℉ (65℃).

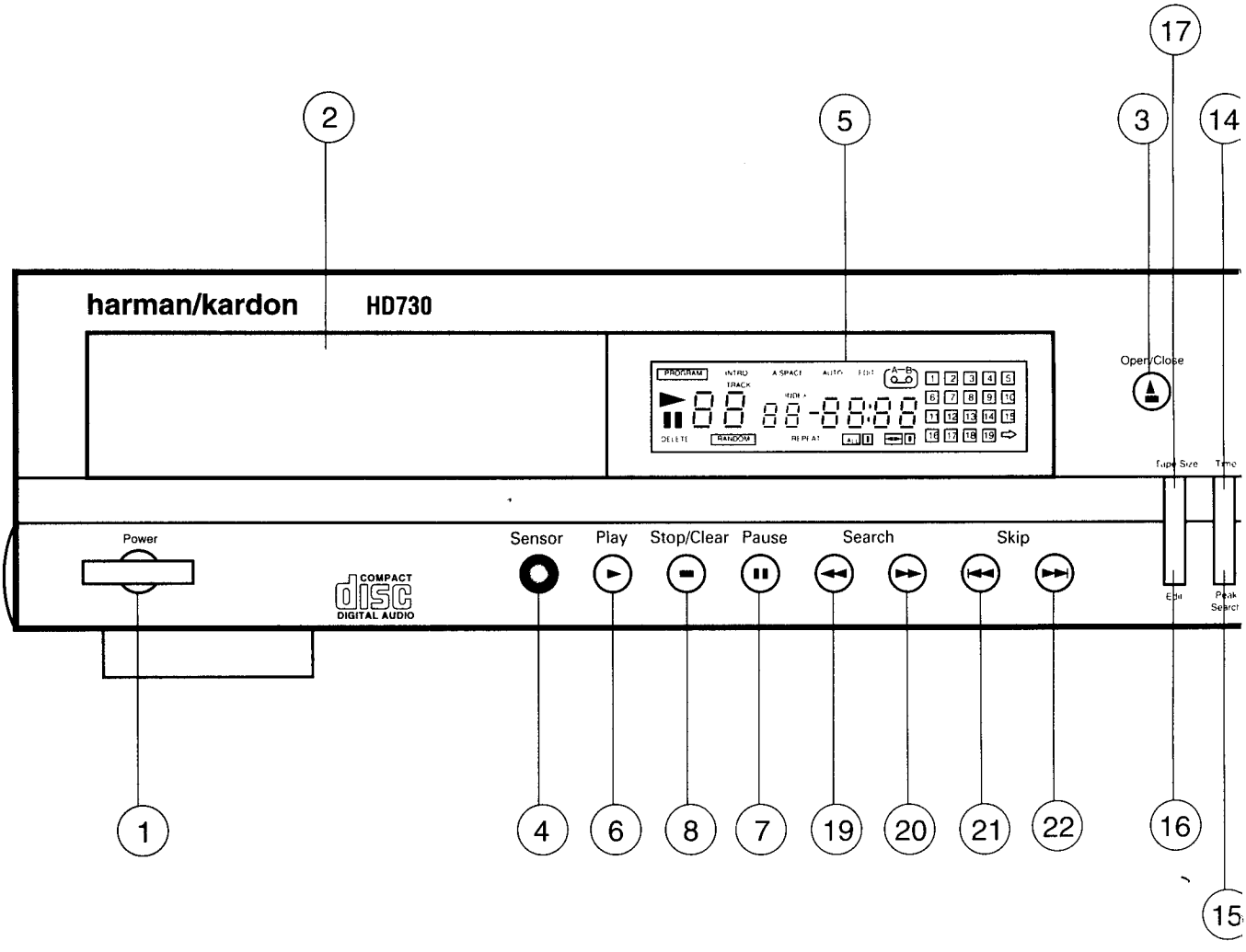
Humidity test: 40℃, 95% relative humidity.

POWER CONSUMPTION	12 W
DIMENSIONS (W × H × D)	440 × 95 × 300 mm
WEIGHT	4.8 kg (10.6 lbs)
POWER SUPPLIES	AC 230 V, 50 Hz

Specifications and components subject to change without notice.

Overall performance will be maintained or improved.

CONTROL AND FUNCTIONS



1. POWER SWITCH

The POWER switch turns the unit on and off.

2. COMPACT DISC DRAWER

Load a disc (full-size or 3-inch/8 cm) into your compact disc player by placing it in this drawer with the label side up. Open and close the drawer using the OPEN/ CLOSE button (3).

3. OPEN/CLOSE BUTTON (⏏)

Press this button to open or close the compact disc drawer. The drawer will also close if you press the PLAY button or push the drawer gently toward the chassis of the player; however, we recommend that you do not push the drawer.

4. REMOTE SENSOR

This area receives the signal from the remote control unit. Make sure this area of the front panel is kept free from dirt or other obstructions that might prevent proper reception of the infrared signal from the remote control.

5. MULTI-FUNCTION DISPLAY

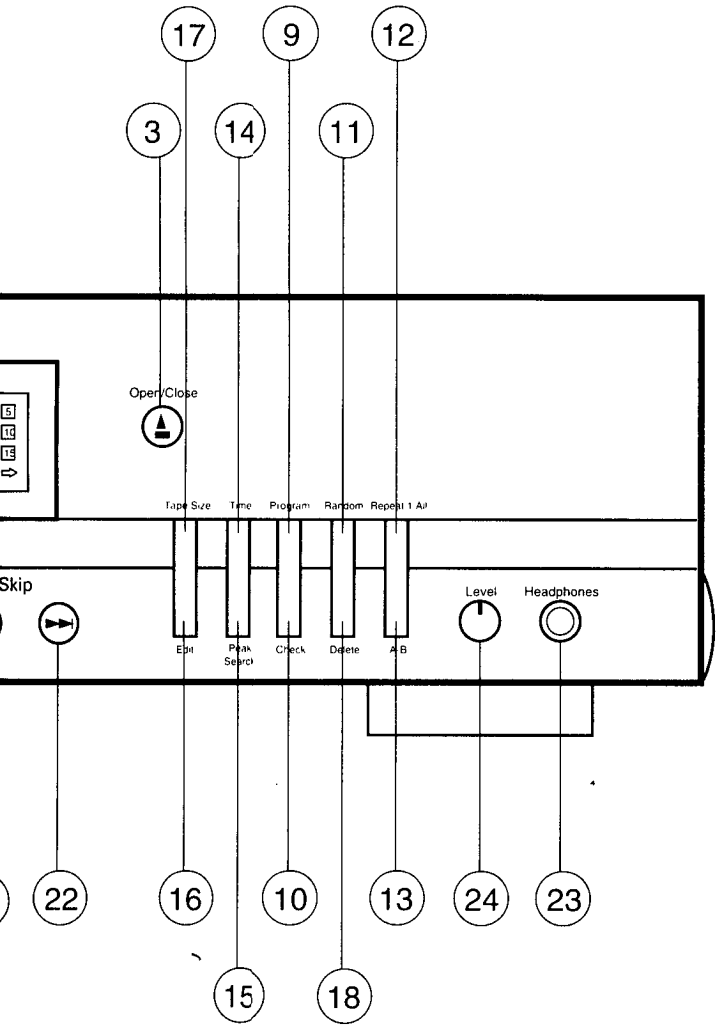
This display shows the corresponding information according to each mode.

6. PLAY BUTTON(▶)

This button is used for starting play.

7. PAUSE BUTTON(II)

This button is used for holding play at the start of a track or interrupting play.



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8. STOP/CLEAR BUTTON(■)

This button is used for stopping play, clearing programmed tracks or recovering the deleted tracks.

9. PROGRAM BUTTON

This button is used for storing the tracks in the Program mode or in the Edit mode.

10. PROGRAM/CHECK BUTTON

This button is used for checking the stored tracks.

11. RANDOM PLAY BUTTON

This button is used for playing a disc randomly.

12. REPEAT 1/ALL BUTTON

This button is used for repeating one track or all tracks.

13. REPEAT A ⌐ B BUTTON

This button is used for repeating a particular passage.

14. TIME BUTTON

This button is used for checking the elapsed playing time from the beginning of current track or remaining playing time of current track or remaining playing time of disc.

15. PEAK SEARCH BUTTON

This button is used for searching for a peak level passage on a CD to adjust record level.

16. EDIT BUTTON

This button is used for editing the tracks to be recorded onto the cassette tape.

17. TAPE SIZE BUTTON

This button is used for selecting the tape length.

18. DELETE BUTTON

This button is used for deleting the undesired tracks.

19. BACKWARD SEARCH BUTTON(◀◀)

This button is used for searching for a particular passage in fast reverse.

20. FORWARD SEARCH BUTTON(▶▶)

This button is used for searching for a particular passage in fast forward.

21. BACKWARD SKIP BUTTON(|◀◀)

This button is used for replaying from the beginning of the current track or returning to a previous track.

22. FORWARD SKIP BUTTON(▶▶|)

This button is used for moving onto the next track.

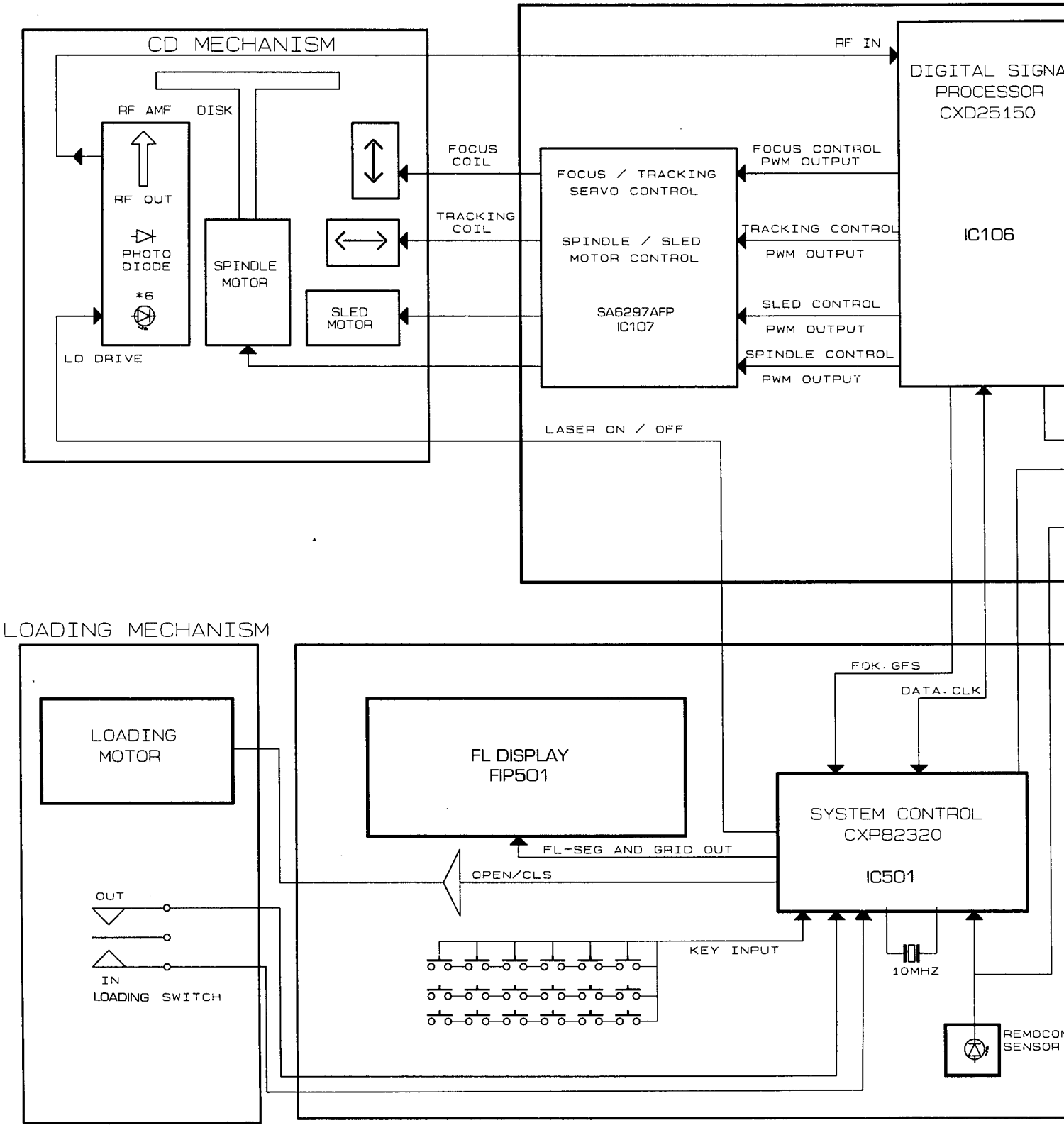
23. HEADPHONE JACK

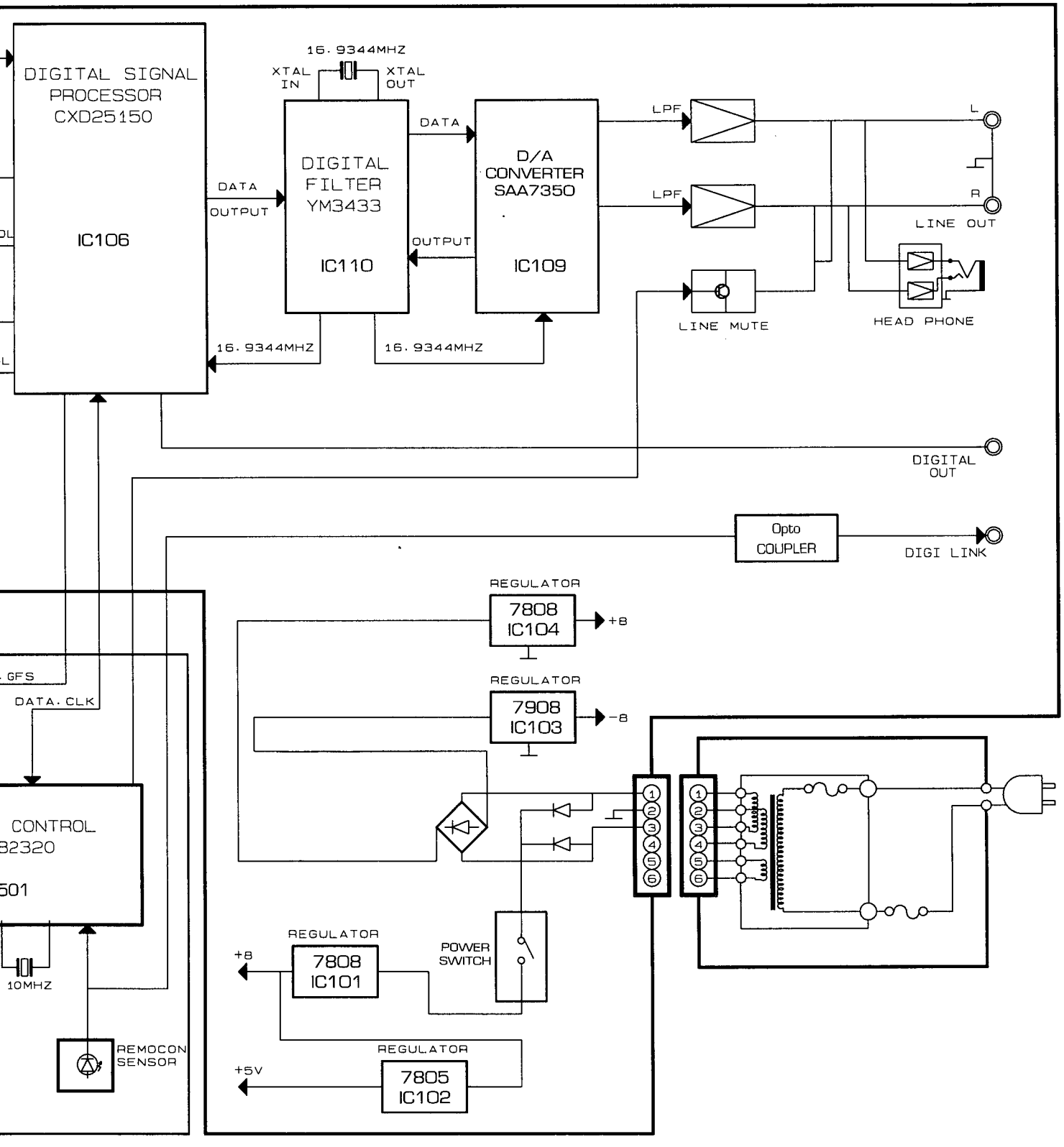
This JACK is used for listening with the headphone.

24. HEADPHONE VOLUME

This is used for the adjustment of the headphone and variable audio output level.

BLOCK DIAGRAM




DIGITAL SIGNAL PROCESSOR CXD25150
IC106
16.9344MHZ
XTAL IN
XTAL OUT
DIGITAL FILTER YM3433
IC110
DATA
OUTPUT
D/A CONVERTER SAA7350
IC109
LPF
LPF
L
R
LINE OUT
LINE MUTE
HEAD PHONE
DIGITAL OUT
Opto COUPLER
DIGI LINK
REGULATOR
7808 IC104
+8
REGULATOR
7908 IC103
-8
GFS
DATA. CLK
CONTROL
82320
501
10MHZ
REMOCON SENSOR
REGULATOR
7808 IC101
+8
POWER SWITCH
REGULATOR
7805 IC102
+5V

DISASSEMBLY PROCEDURES

[1] COVER TOP REMOVAL

1) Remove screws ① to ⑥ in Fig. 3, and then remove the cover by sliding it to its rear a little.

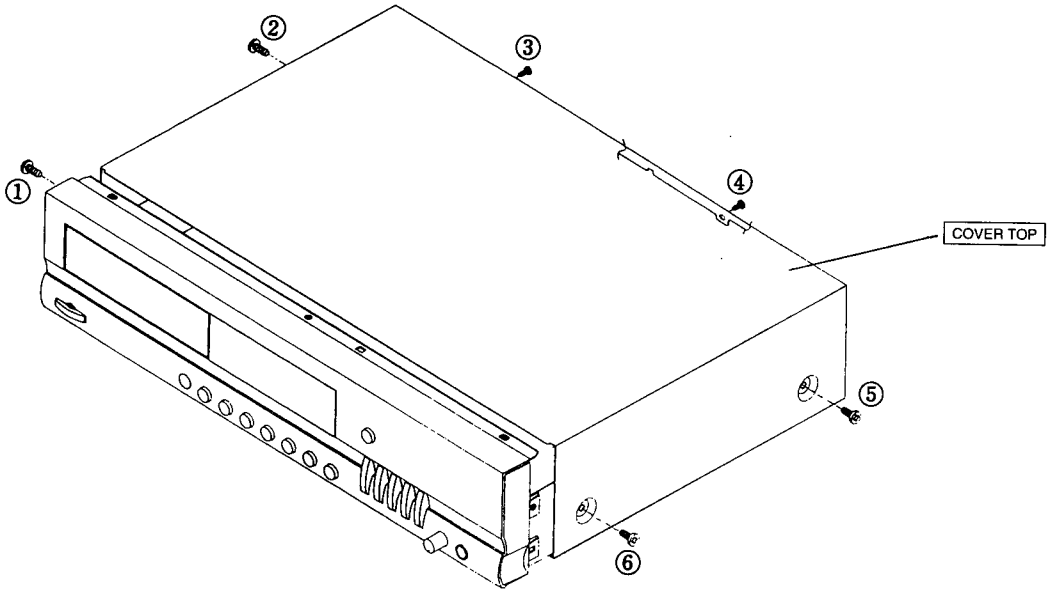


Fig. 3

[2] FRONT PANEL ASSEMBLY REMOVAL

1) Remove the cover top. (Refer to step [1])
2) Remove screws ① to ⑤ in Fig. 4.
3) Detach the connectors CNT109, and CNT107 from the PCB1.
4) Detach the connector from the PCB6.
5) Remove the front panel assembly by pressing the hooks of both sides and pulling it toward you gently.

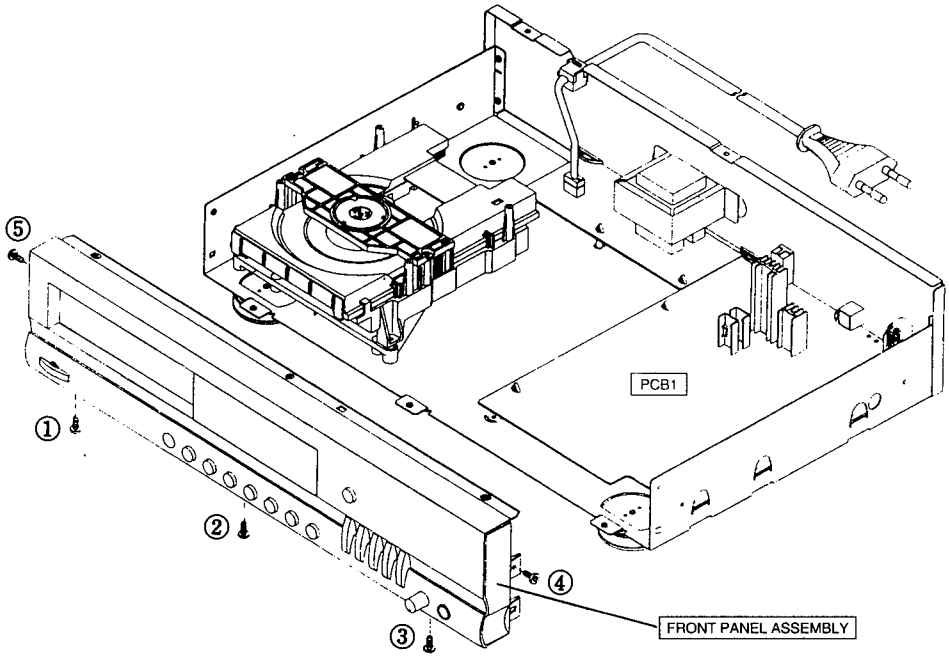


Fig. 4

[3] PCB4(FRONT) REMOVAL

1) Remove the front panel assembly (Refer to step [2]).
2) Remove screws ④ to ⑦ in Fig. 5 and remove PCB4 by Pressing the hooks arround it outward.

[4] PCB3(PHONE) REMOVAL

1) Remove the front Panel assembly (Refer to step [2]).
2) Pull out the knob(Level) in Fig. 5.
3) Remove screws ① to ③ in Fig. 5 and pull front panel toward you gently.
4) Remove the hex nuts(Level/Headphones) in Fig. 5 and then remove PCB3.

[5] PCB5(POWER SWITCH) REMOVAL

1) Remove the front panel assembly (Refer to step [2]).
2) Remove screws ⑧ and ⑨ Fig. 5 and then remove PCB5.

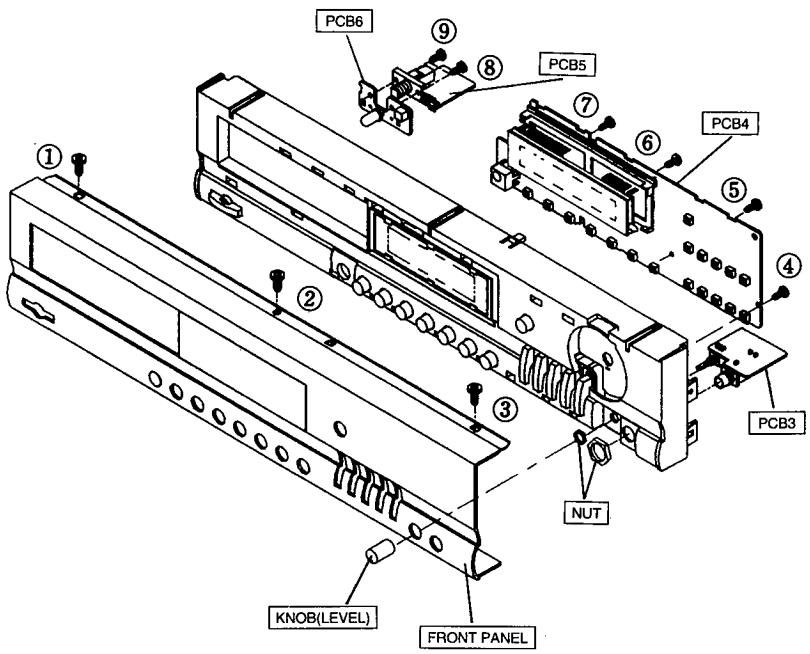


Fig. 5

[6] PCB6(LED) REMOVAL

1) Remove PCB5 (Refer to step [5]).
2) Press the hooks of both sides inward in Fig. 6.
   Then PCB6 is removed automatically.

[7] CD MECHANISM REMOVAL

1) Remove the cover top (Refer to step [1]).
2) Detach the connectors CNT103, CNT104, CNT105 from the PCB1.
3) Remove screws ⑱ to ⑳ in Fig. 6 and then remove the CD mechanism.

[8] PCB7(MECHA CONTROL) REMOVAL

1) Remove the CD mechanism (Refer to step [7]).
2) Remove screws ㉑ to ㉓ in Fig. 6 and then remove PCB7.

[9] PCB1(MAIN) REMOVAL

1) Remove the cover top (Refer to step [1]).
2) Detach the connectors CNT103, CNT104, CNT105, CNT101, CNT102, CNT107, CNT106 from the PCB1.
3) Remove screws ⑩ to ⑮ in Fig. 6 and then remove PCB1.

[10] PCB2(POWER TRANS) REMOVAL

1) Remove the cover top(Refer to Step [1])
2) Detach the connectors CNT101 and CNT102 from the PCB1.
3) Remove screws ⑯ and ⑰ in Fig. 6 and then remove PCB2.

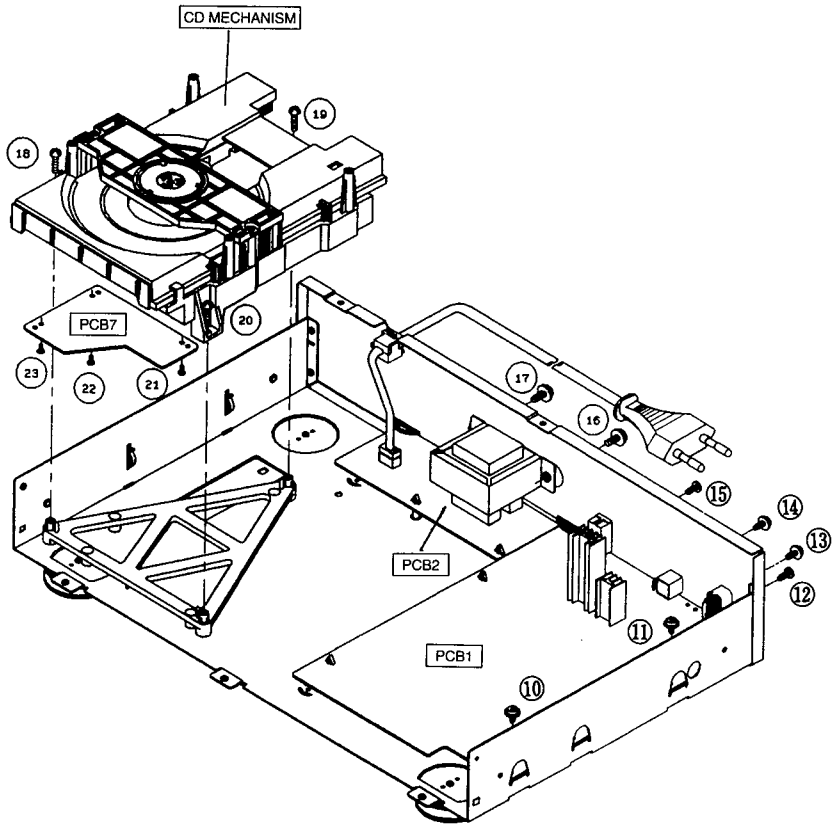


Fig. 6

PICKUP REPLACEMENT

Caution:
Laser diodes are extremely susceptible to damage from static electricity. Even if a static discharge does not ruin the diode, it can shorten its life or cause it to work improperly. When replacing the pickup, take appropriate measures, such as using a conductive mat and a grounded soldering iron, to protect the laser diode from static damage.

1. Remove the CD mechanism assembly by referring to the "EXPLODED VIEW II" on page 27 (See Fig. 7).

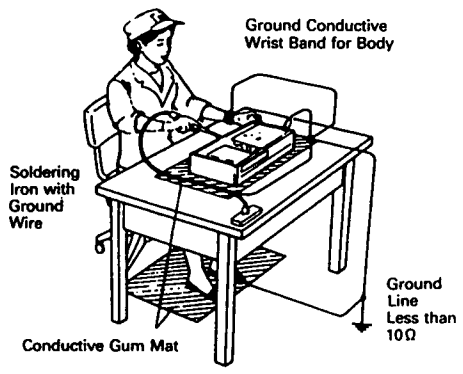


Fig. 7

2. Remove four screws S12 (See Fig. 8).

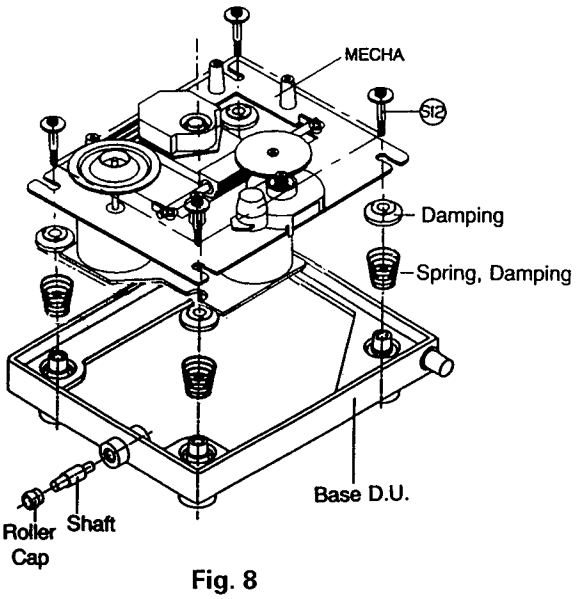


Fig. 8

3. Remove the gear A (See Fig. 9).
4. Pull out the slide shaft.

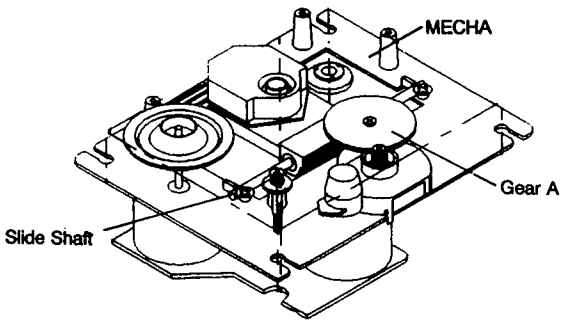


Fig. 9

5. Remove the pickup (See Fig. 10).

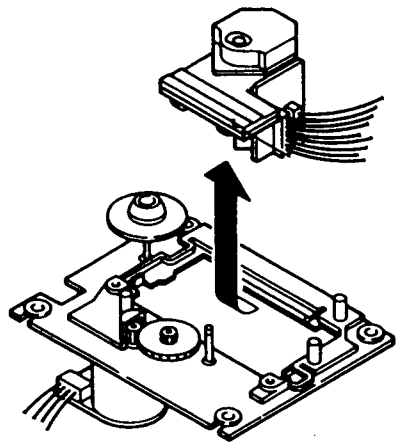


Fig. 10

6. After you connect the wire connector, desolder and remove the shorting tab (See Fig. 11).

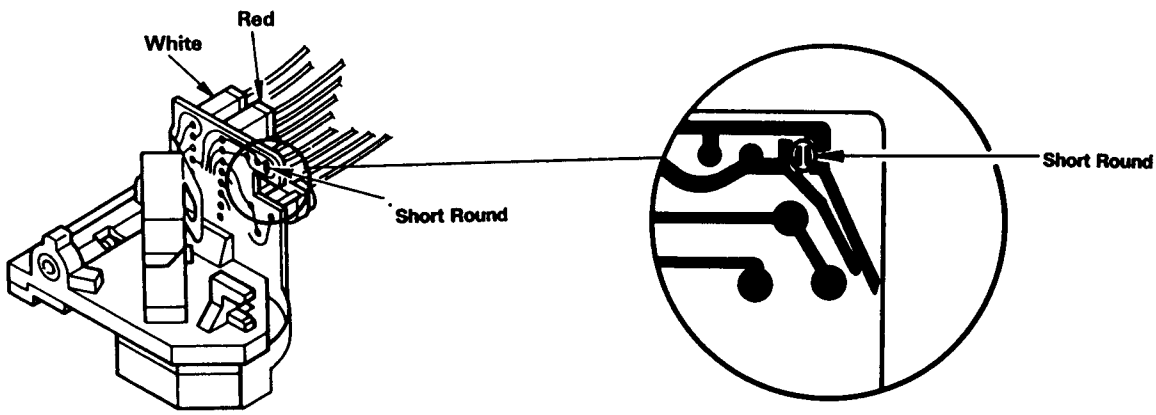


Fig. 11

7. Refer to the EXPLODED VIEW II of the compact disc mechanism on page 27 for detailed illustrations.

OPERATION CHECK

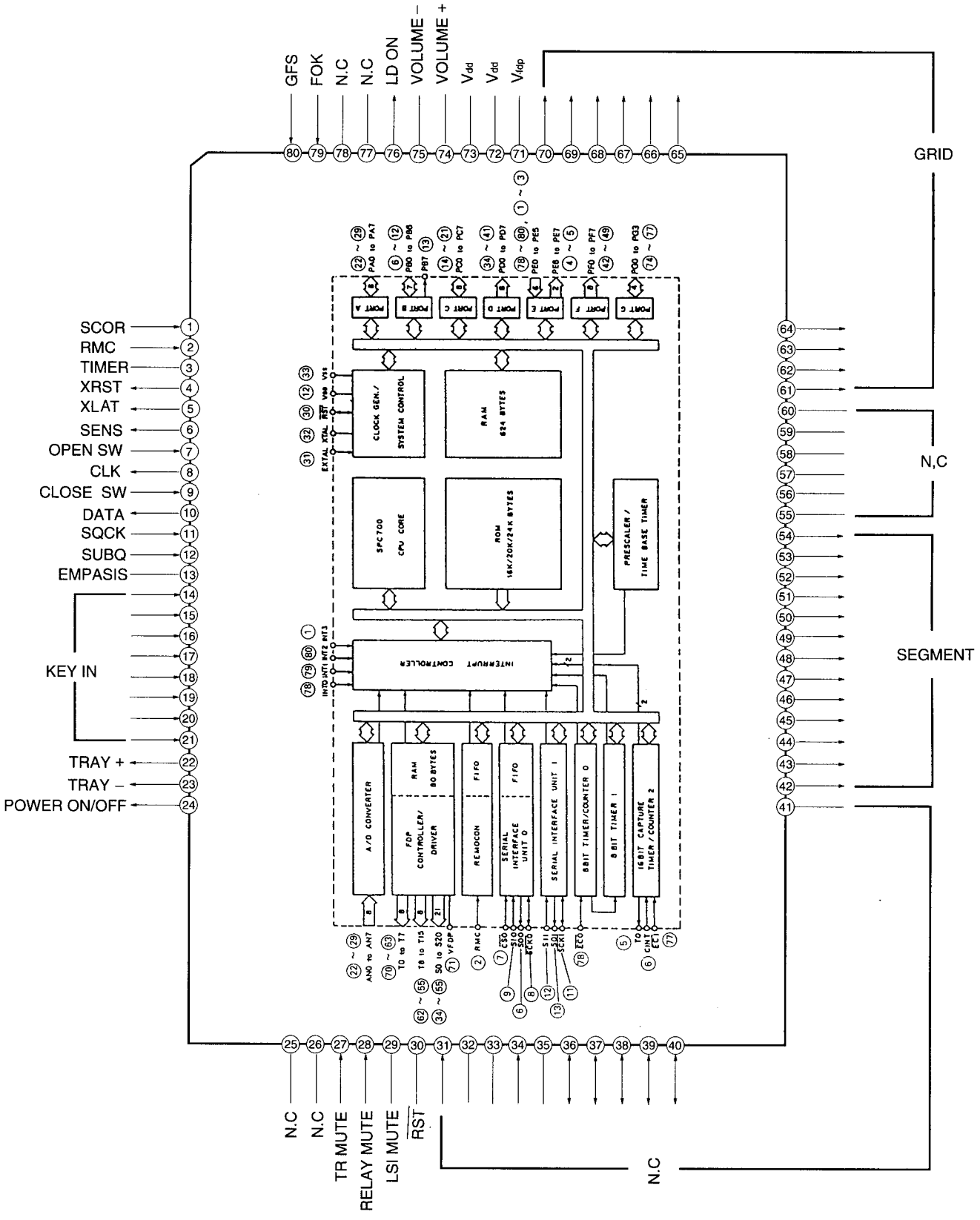
When the power switch is turned on after the chucking arm is removed, observe the objective lens and check the following. (The optical system block should be at the lead-in position when it is checked.)

1. The disc table should be at the innermost position after the chucking arm is removed.
2. The diffused light of the laser beam can be seen when the power switch is turned on.
3. Vertical (up and down) movement of the objective lens take place (2 or 3 times).

CIRCUIT DESCRIPTION

1. IC501 : CXP82320(CMOS 8bit 1-Chip Microcomputer)

1-1 Pin Description & Block Diagram



1-2 Pin Function

Pin No.	Symbol	Description
1	SCOR	Subcode-Q readout timming signal input from CXD2515Q.
2	RMC	Input for remocon data.(At "L", it is active)
3	TIMER	Not Used !
4	XRST	Output for resetting CXD2515Q.(At "L", it is active)
5	XLAT	Serial latch data output to CXD2515Q.
6	SENS	Sense signal input from CXD2515Q.
7	OPEN SW	Input to detect that tray is opened. (At "L", it is active)
8	CLK	Serial clock data output to CXD2515Q.
9	CLOSE SW	Input to detect that tray is closed. (At "H", it is active)
10	DATA	Serial data output to CXD2515Q.
11	SQCK	Clock data output for subcode-Q readout to CXD2515Q.
12	SUBQ	Subcode-Q signal input from CXD2515Q.
13	EMPASIS	Not Used !
14-21	KEY IN	Data input for key scan.
22	TRAY +	Output for driving motor to open the tray.(At "H", it is active)
23	TRAY -	Output for driving motor to close the tray.(At "H", it is active)
24	POWER ON/OFF	Output to switch on or off +8V and -8V power supply.
25/26		Not Used !
27	TR MUTE	Output for audio mute.(At "H", it is active)
28	RELAY MUTE	Not Used !
29	LSI MUTE	Not Used !
30	RST	Input for resetting CPU.(At "L", it is active)
31-41		Not Used !
42-50	SEGMENT	Segment signal output for FIP.
51-54	SEGMENT	Segment signal output for FIP and data output for key scan
55-60		Not Used !
61-70	GRID	Grid signal output of 10G - 1G for FIP.
71	VFDP	-30V power supply for FIP controller.
72,73	Vdd	+5V power supply for CPU.
74	VOLUME+	Not Used !(It should be left open)
75	VOLUME-	Not Used !(It should be left open)
76	LD ON	LD ON signal output to pick-up unit(M101).
77,78		Not Used !
79	FOK	FOK signal input from CXD2515Q.
80	GFS	GFS signal input from CXD2515Q.

2. APC CIRCUIT

A semiconductor laser is used as the light source for the optical pickup. As the laser diode has large negative temperature characteristics in its optical output when driven with a constant current, a circuit must be provided to stabilize this output. For this purpose, a monitor diode which detects the optical output of the laser diode is used in the semiconductor laser.
As the laser diode emits light from its bonded surface, light is emitted both in front and behind. The light emitted behind is monitored with the monitor diode installed on its rear surface, and the optical output is thus controlled. The light emitted in front becomes the light source for the pickup.

Fig. 12 shows the APC circuit.
When the temperature rises and the optical output decreases, the monitor diode current (Is) decreases, the electric potential of OE-IC pin 24 rises, the base current of the driving transistor increases, and the laser diode current increases. This causes the reduced optical output to return to its former level.

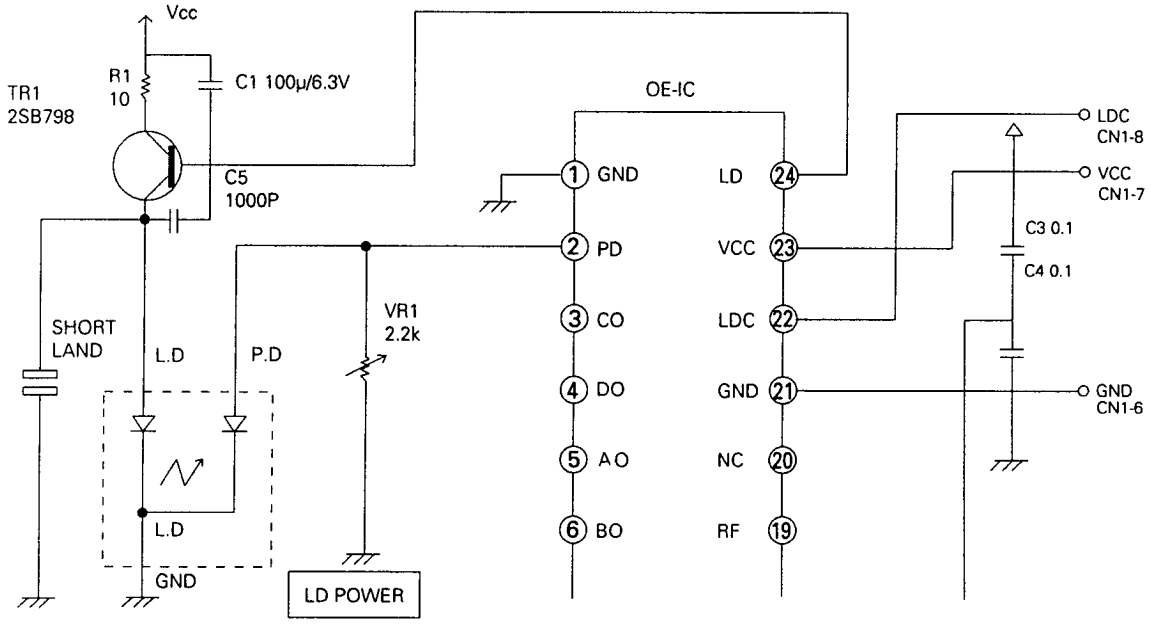
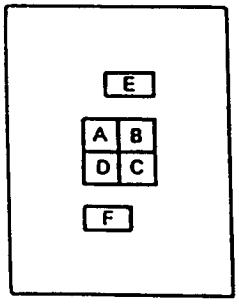


Fig. 12

3. FOCUS SERVO

3-1. Optical pickup

This set employs a three-beam optical pickup comprised of six division photodiodes, A through F as shown in Fig. 13. The four photo diodes (A through D) at the center provide focus error detection by using their property to allow the beam to focus into a round image only at a certain point.
The sums of outputs from diagonal two elements of four division photo diodes (A+C and B+D) are compared by the differential amplifier in OE-IC to detect the shape of the beam image.
The remaining two diodes (E and F) provide tracking error detection by means of sub-beam spots.



Three spotted (six-division) photo diodes

Fig. 13

3-2. Focus error detecting operation

Fig. 14 shows the reflected laser beam from a disc is polarized 90° with the beam-splitter and sent to the cylindrical lens. The beam passed through this cylindrical lens is then sent to the four division photo diodes and focuses into an image whose shape varies with the distance between the disc and the objective lens. Such change in the beam shape causes the current flowing from the photo diodes to vary.

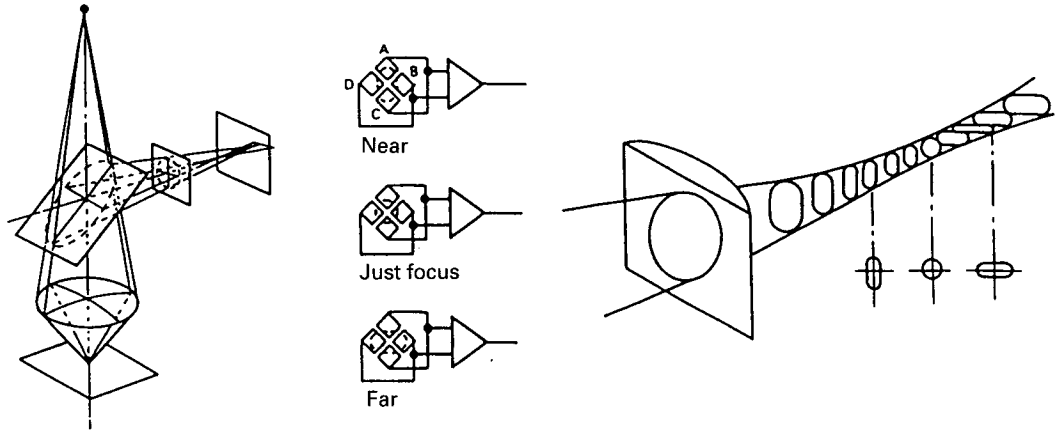


Fig. 14

3-3. Tracking error detection system

Fig. 15 shows the principle of the tracking error detection system which employs the three beam system.

The laser beam is divided into the main beam and two sub-beams by diffraction grating and they are arranged on one line. The center line connecting these three beams has a slight offset angle against the main beam. The main beam is received by photo diodes A, B, C and D and two sub-beams by E and F respectively.

Flg. 15-A shows the on-track state. As both auxiliary beams 1 and 2 are slightly on the track in this state, the outputs of photo diodes E and F are equal and the tracking signal is 0(zero). When the track is shifted to the left (Fig. 15-B), the auxiliary beam 1 is off the pit. This allows more light to be received by the photo diode E, resulting in positive (+) tracking signal output. On the other hand, when the track is shifted to the right (Fig. 15-C), the amount of light received by the photo diode F increases, resulting in negative (-) tracking signal output. And these extreme signals are detected as tracking error signals.

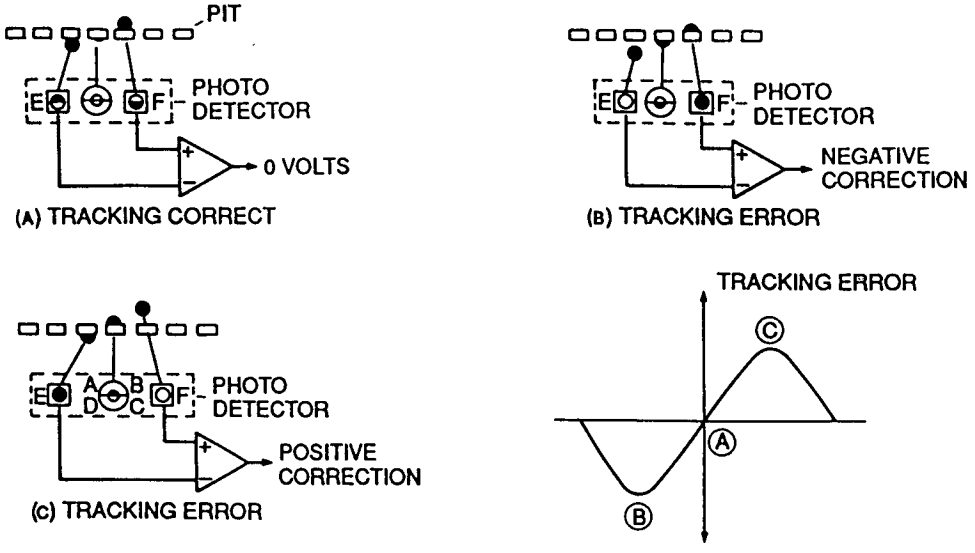


Fig. 15

4. Audio Circuit

4-1. Configuration of SAA7350

Fig. 16 shows the configuration of the SAA7350

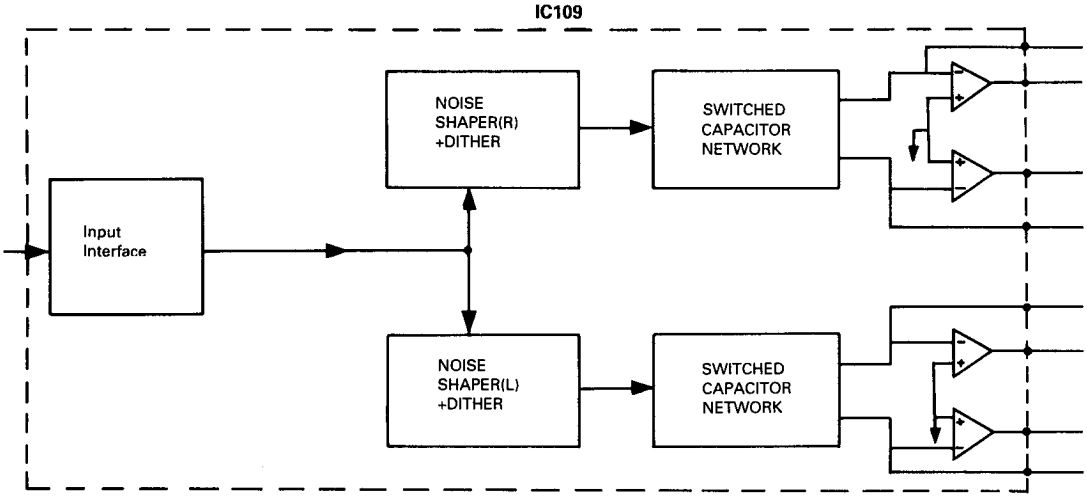


Fig. 16

The digital-to-analogue conversion in the SAA7350 is performed using the Philips Bitstream Conversion technigue. The input from the digital filter is oversampled and converted to a 1-bit pulse density modulated(PDM) signal. A switched capacitor technigue is used for the Bitstream Conversion to convert the PDM signal to an analogue signal. A fixed charge is either added or substracted from the virtual earth node of an integrator. As this output is a continous time output, a highly symmetrical operational amplifier is used to give a low distortion figure.

4.2 Audio Circuit

Fig. 17 Shows a block diagram of the audio circuit.

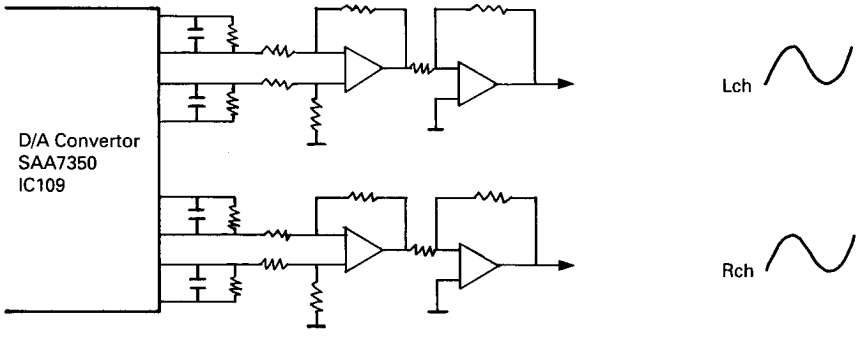


Fig. 17

The output from pin38(INTC+) and pin34 (INTL–) of the IC 109 D/A Converter SAA7350 is input to the differential input amplifier, which is symmetrical in the up and down directions, of the discrete circuit configured of the following stage, which includes Q114, Q116, Q118, Q120, Q122, Q124, Q126 and Q128. The output undergoes differential synthesis in this cirucit, and after synchronous-phase noise has been eliminated, the resulting signal is output.

To the low-pass filter of the discrete circuit configuration of the following stage as an audio signal.

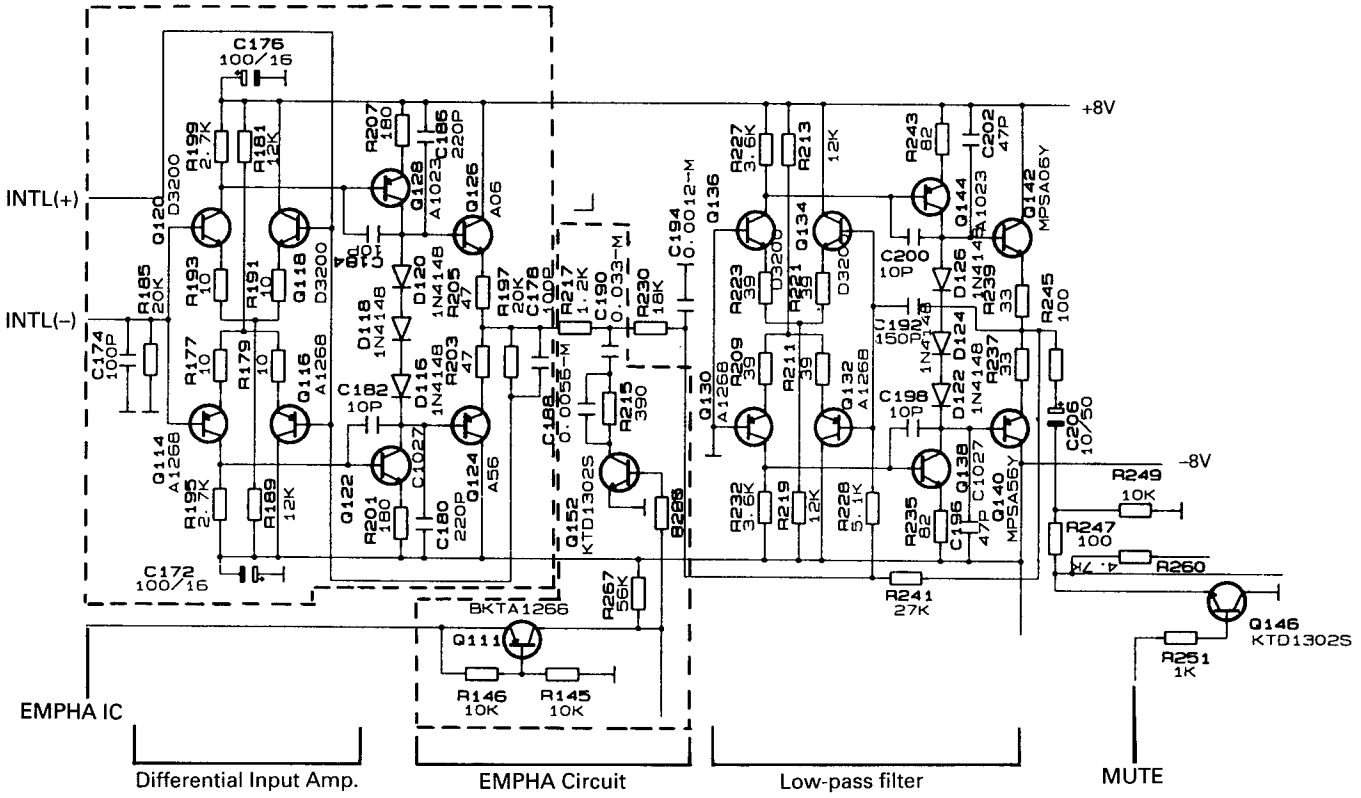
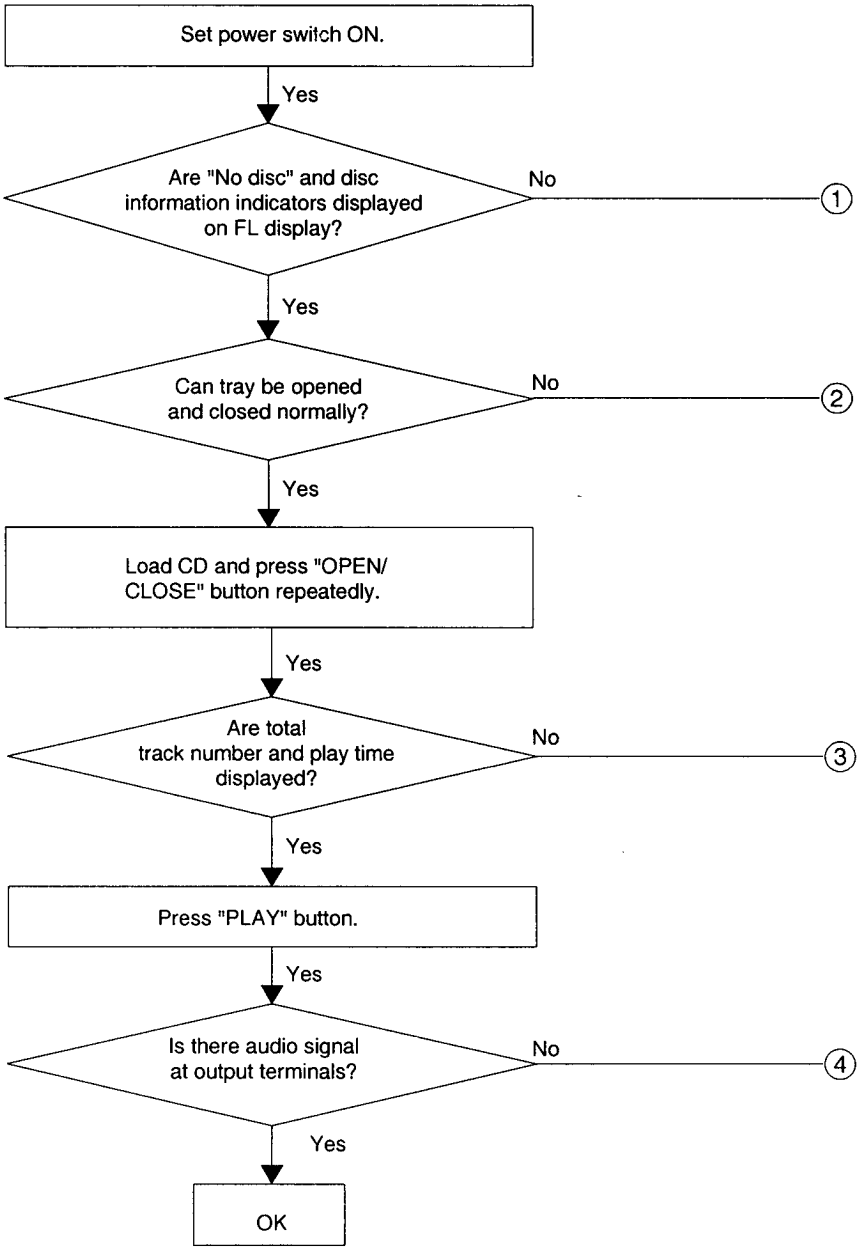
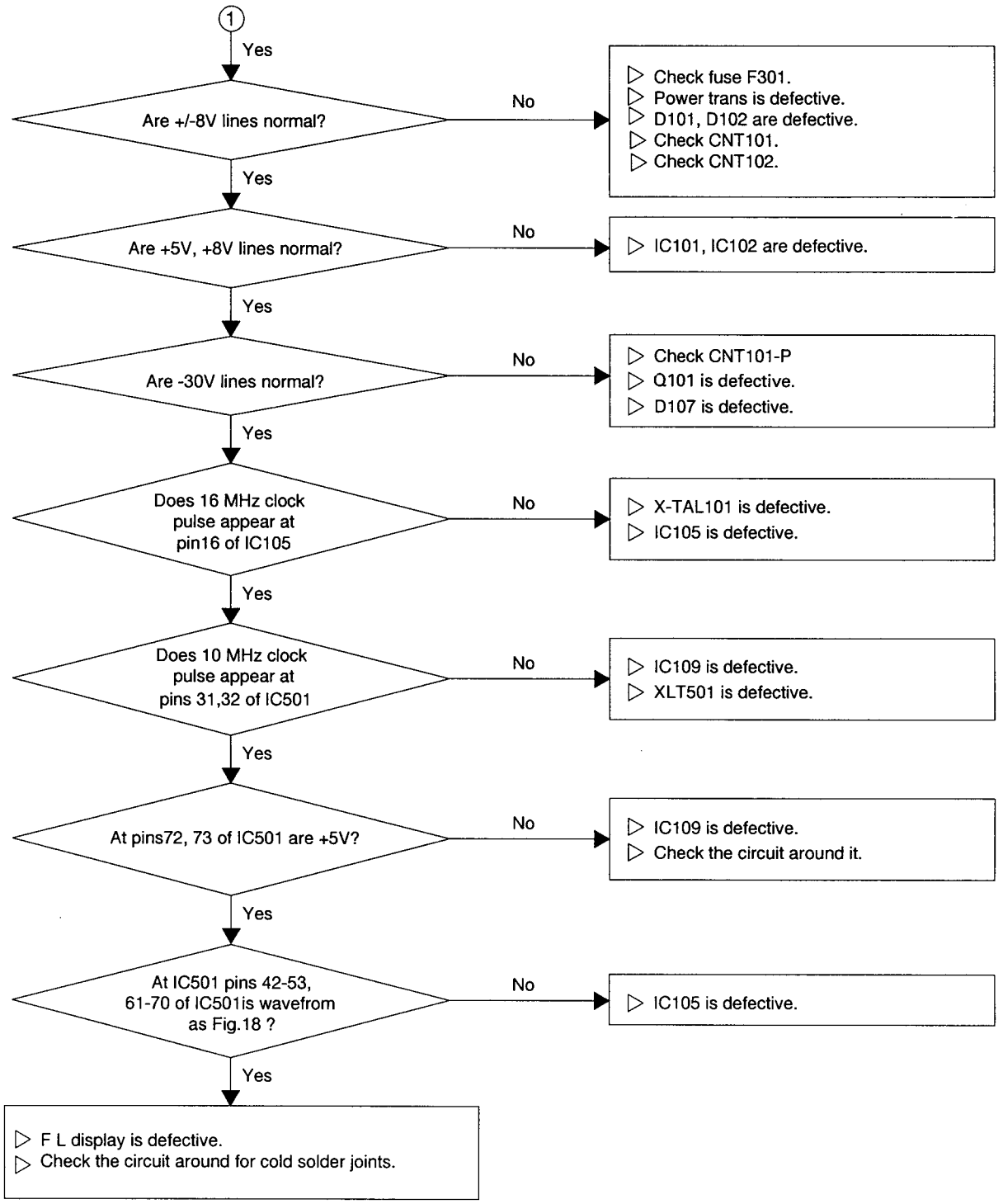


Fig. 18

TROUBLESHOOTING



[Repair item 1] At power on, "0" and some parts are not displayed.



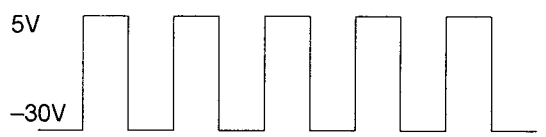
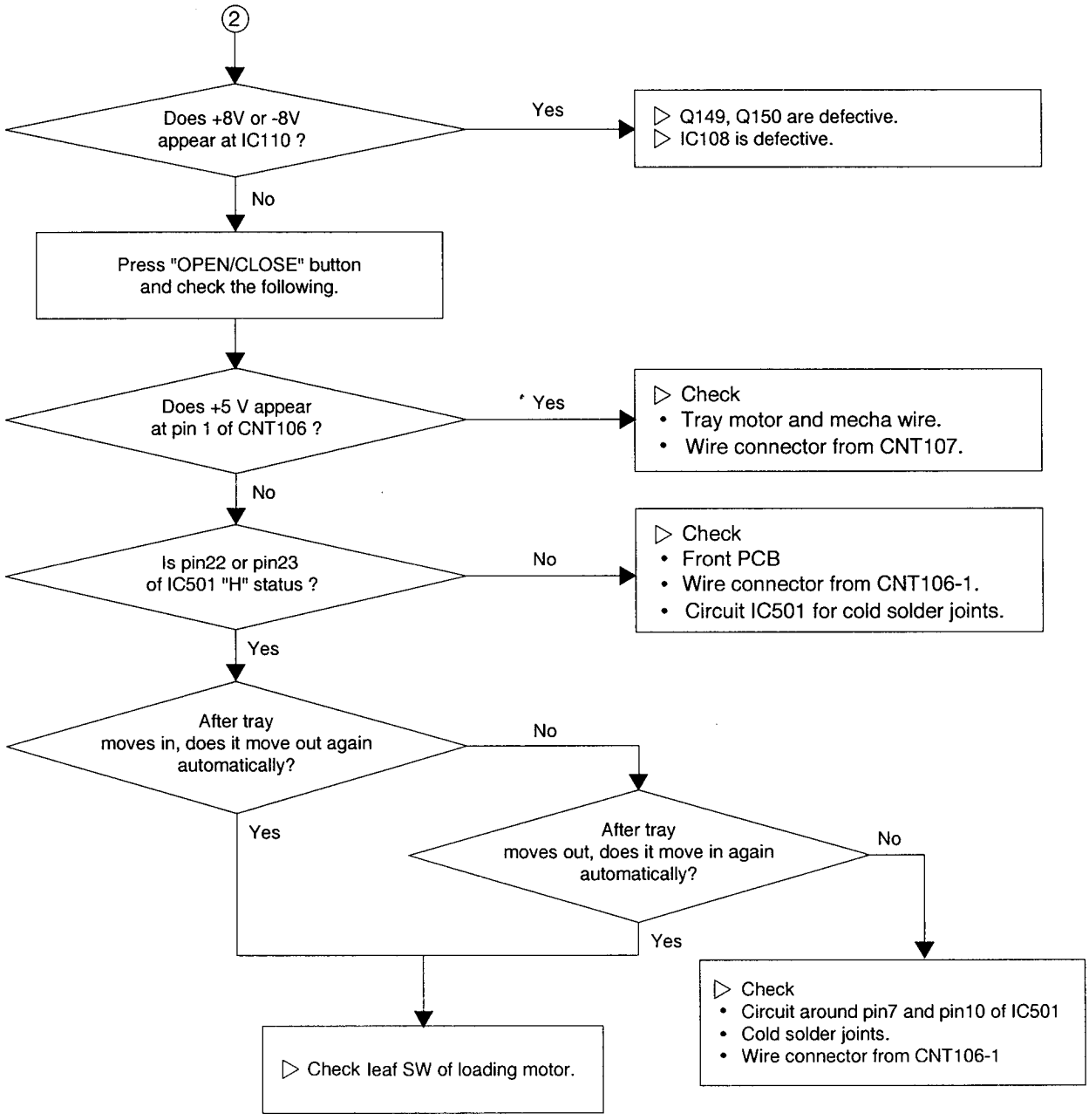
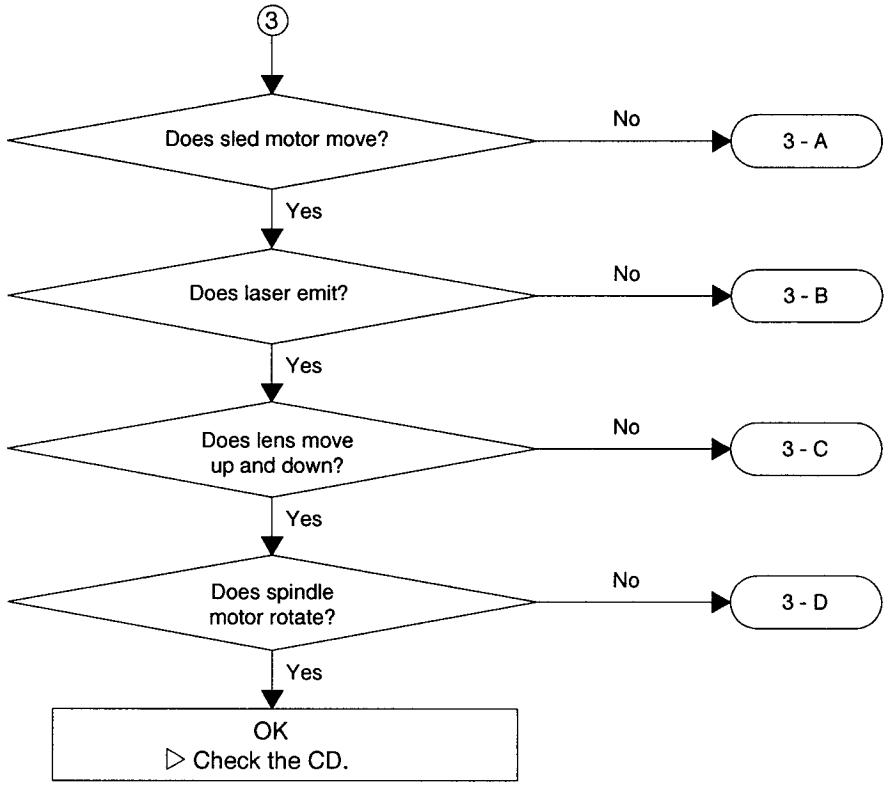


Fig.19

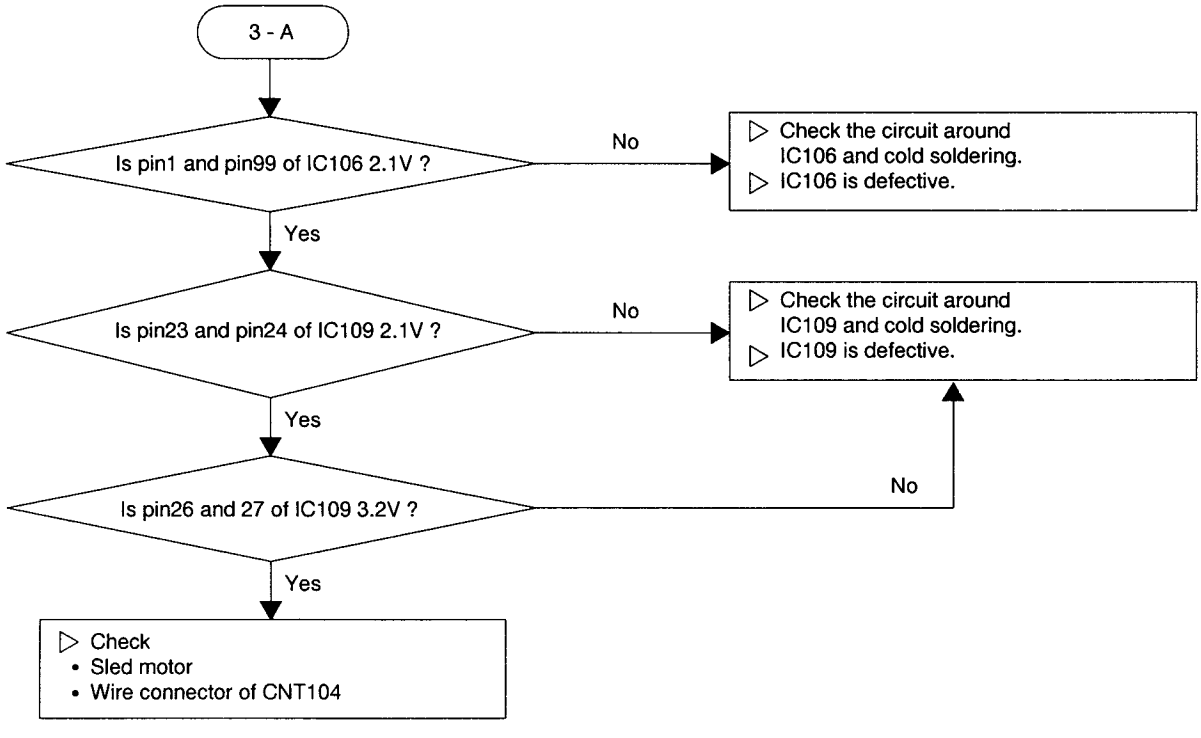
[Repair item 2] Tray cannot be opened and closed by pressing "OPEN/CLOSE" button.



[Repair item 3] "0" is displayed instead of total playing time and track number.



[Repair item 3-A] Sled motor does not move.



[Repair item 3-B] Laser does not emit.

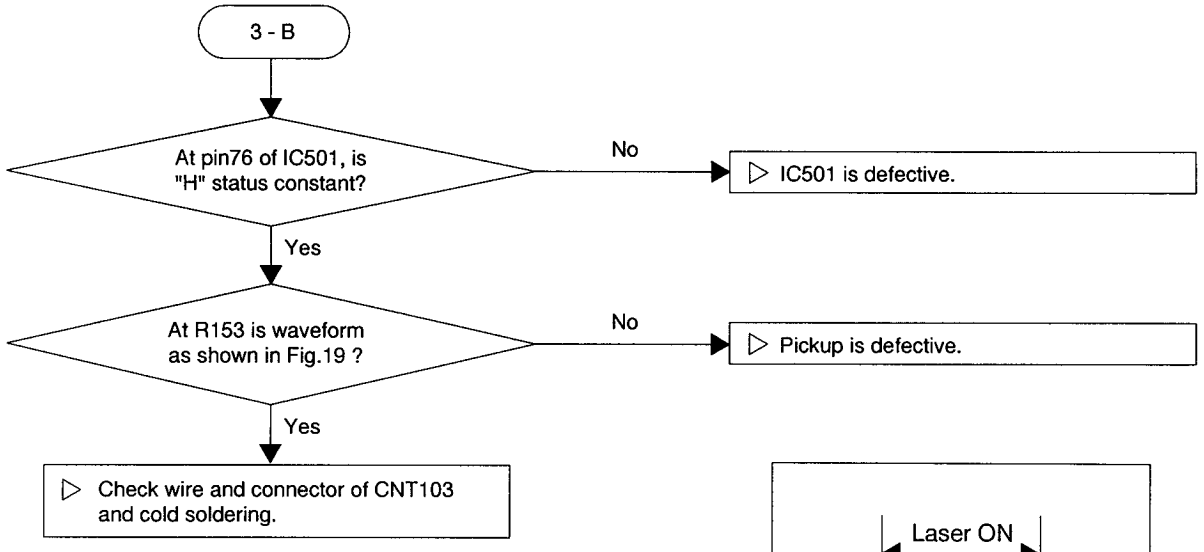


Fig. 20

[Repair item 3-C] Object lens of pickup unit does not move up and down.

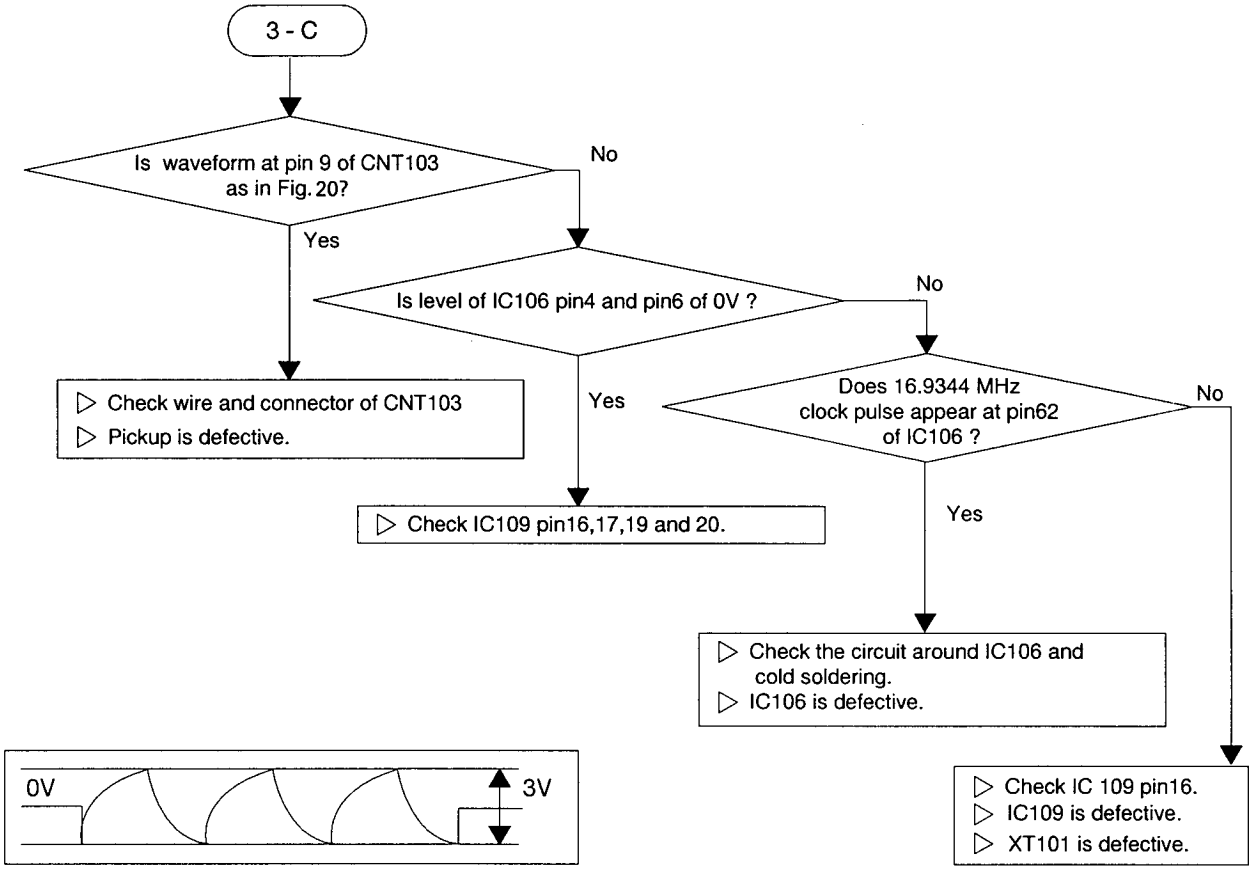
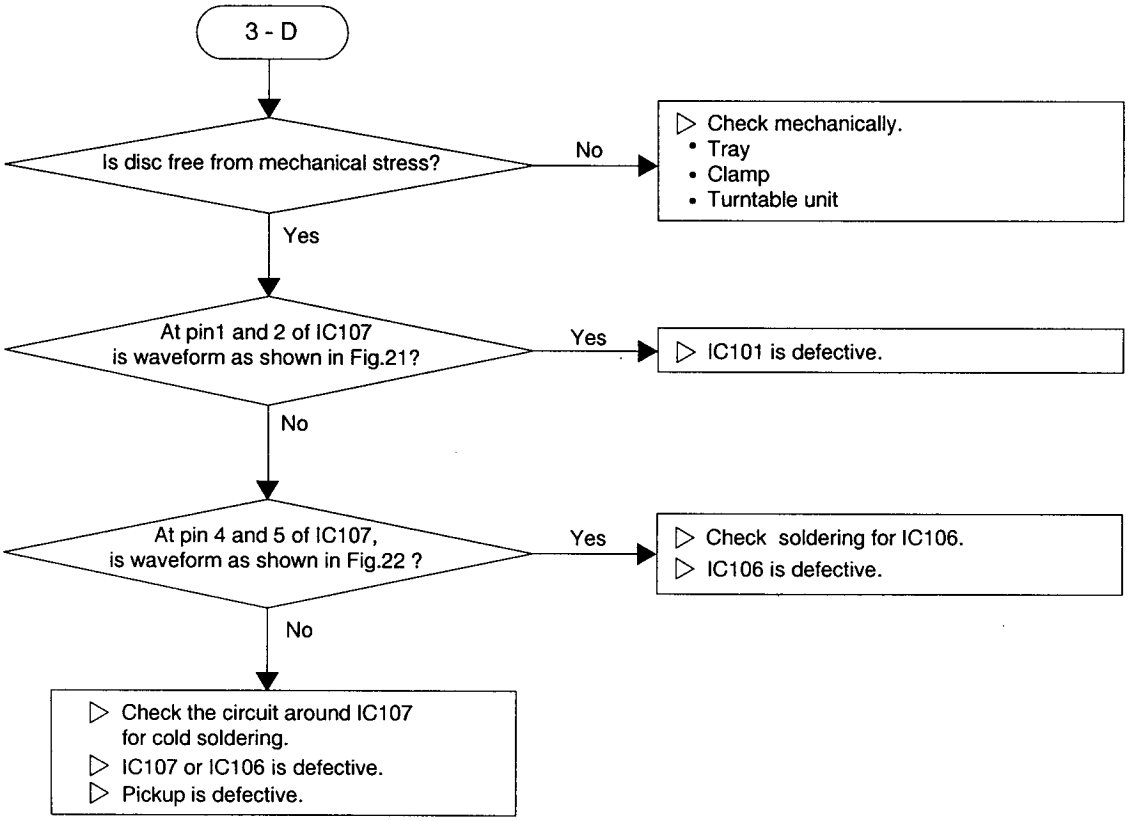


Fig.21

[Repair item 3-D] Spindle motor does not rotate.



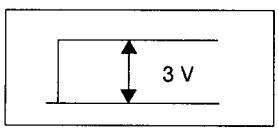


Fig.22

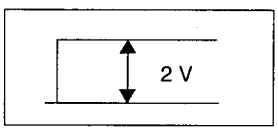
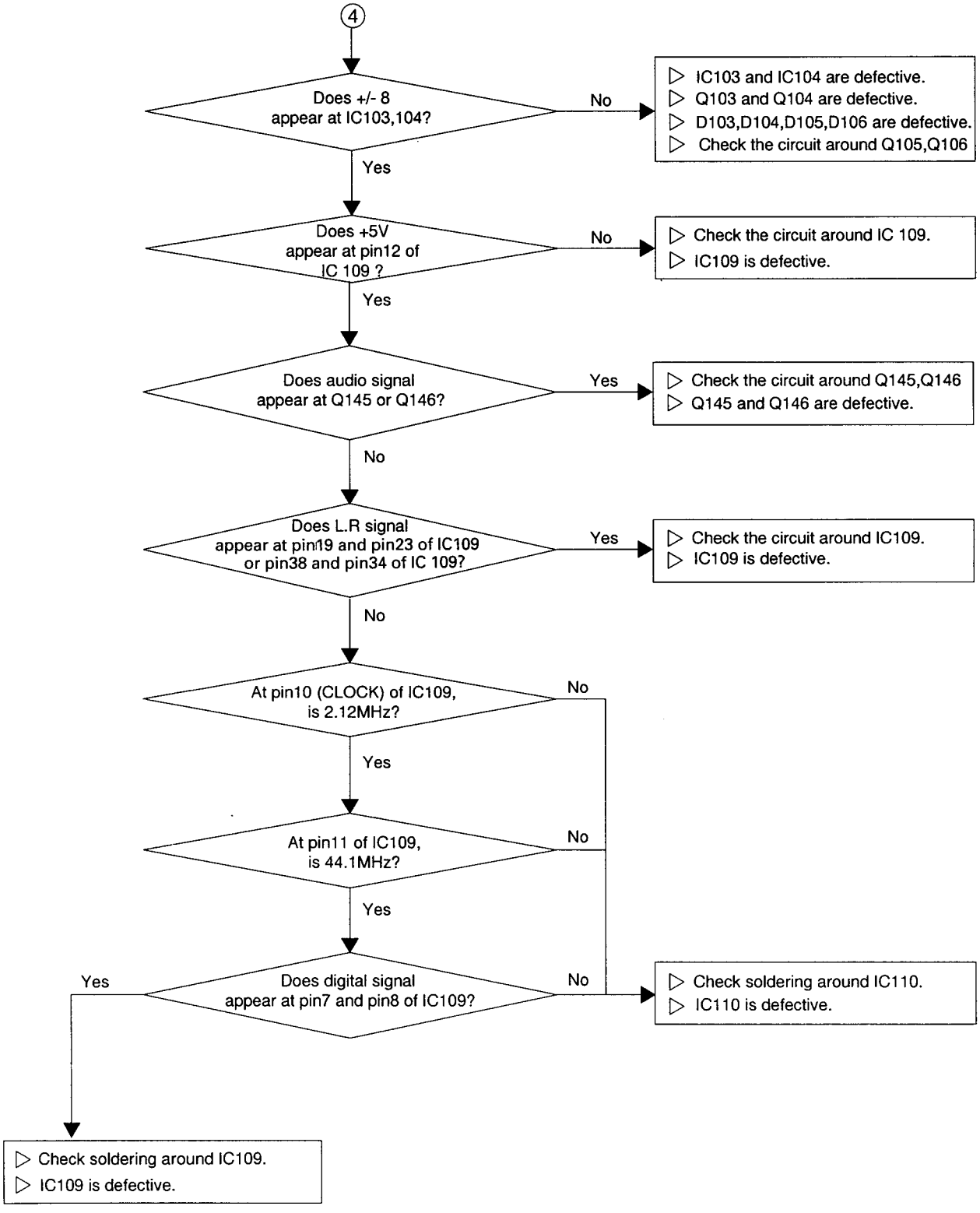
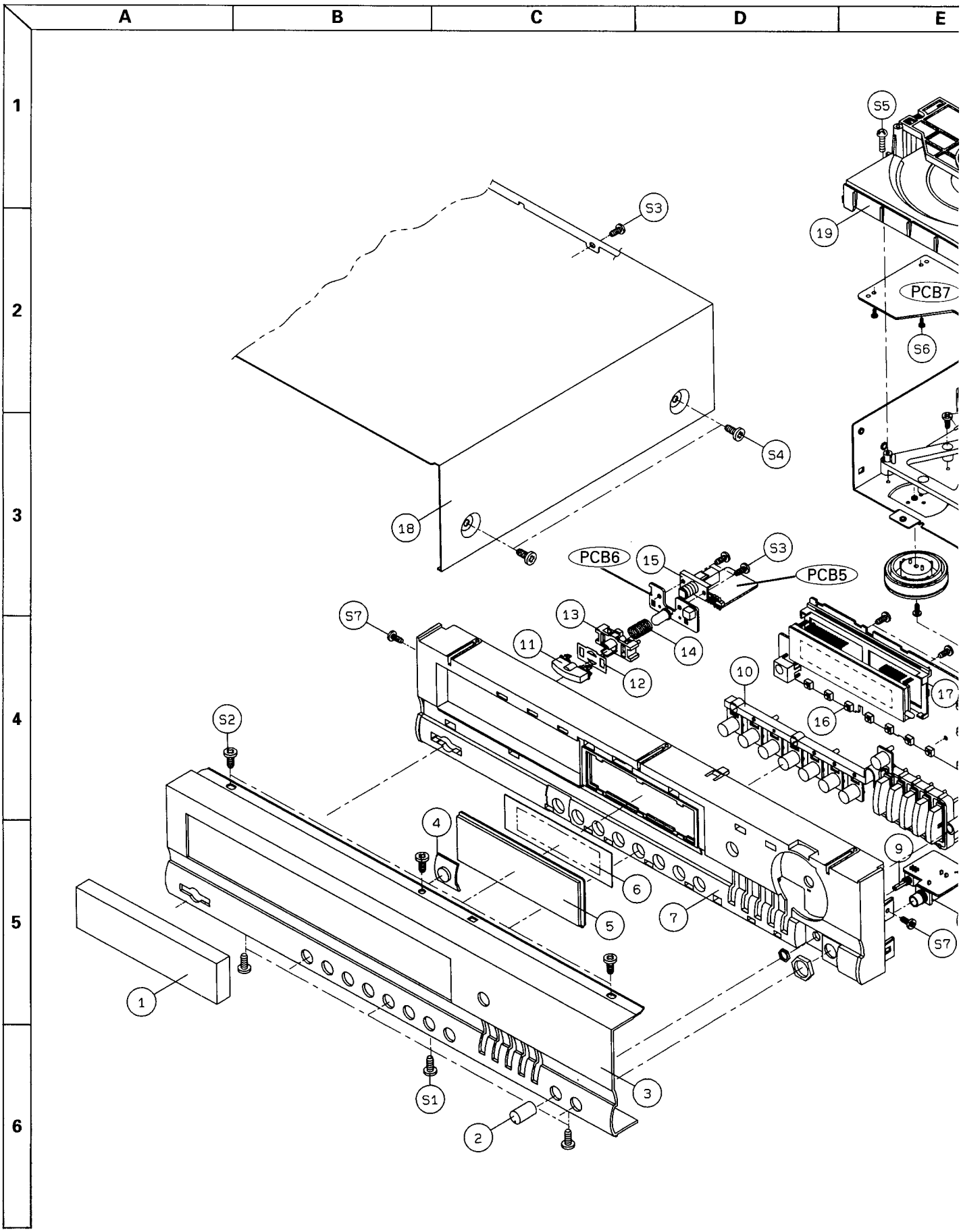


Fig.23

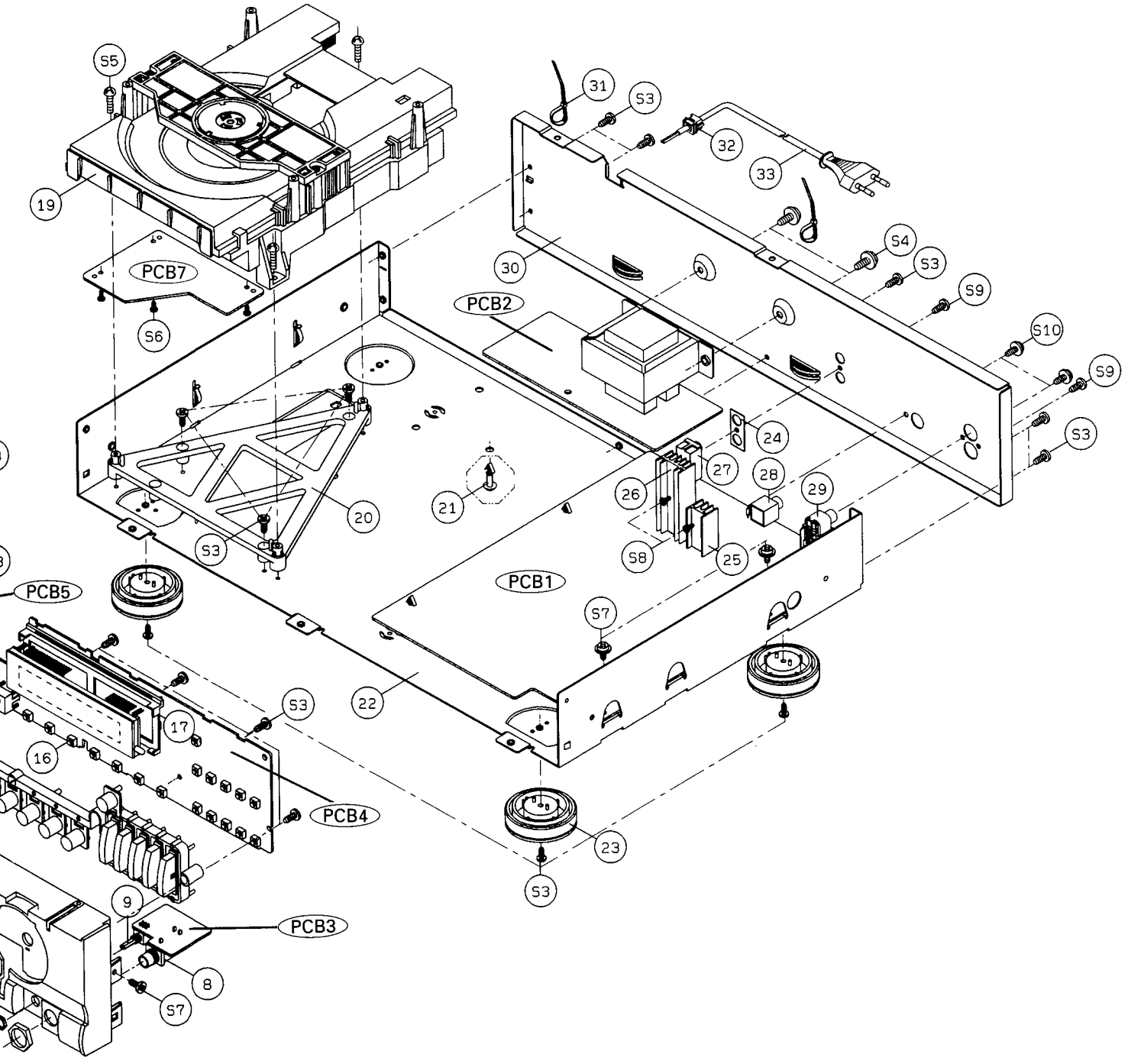
[Repair item 4] No sound signal.



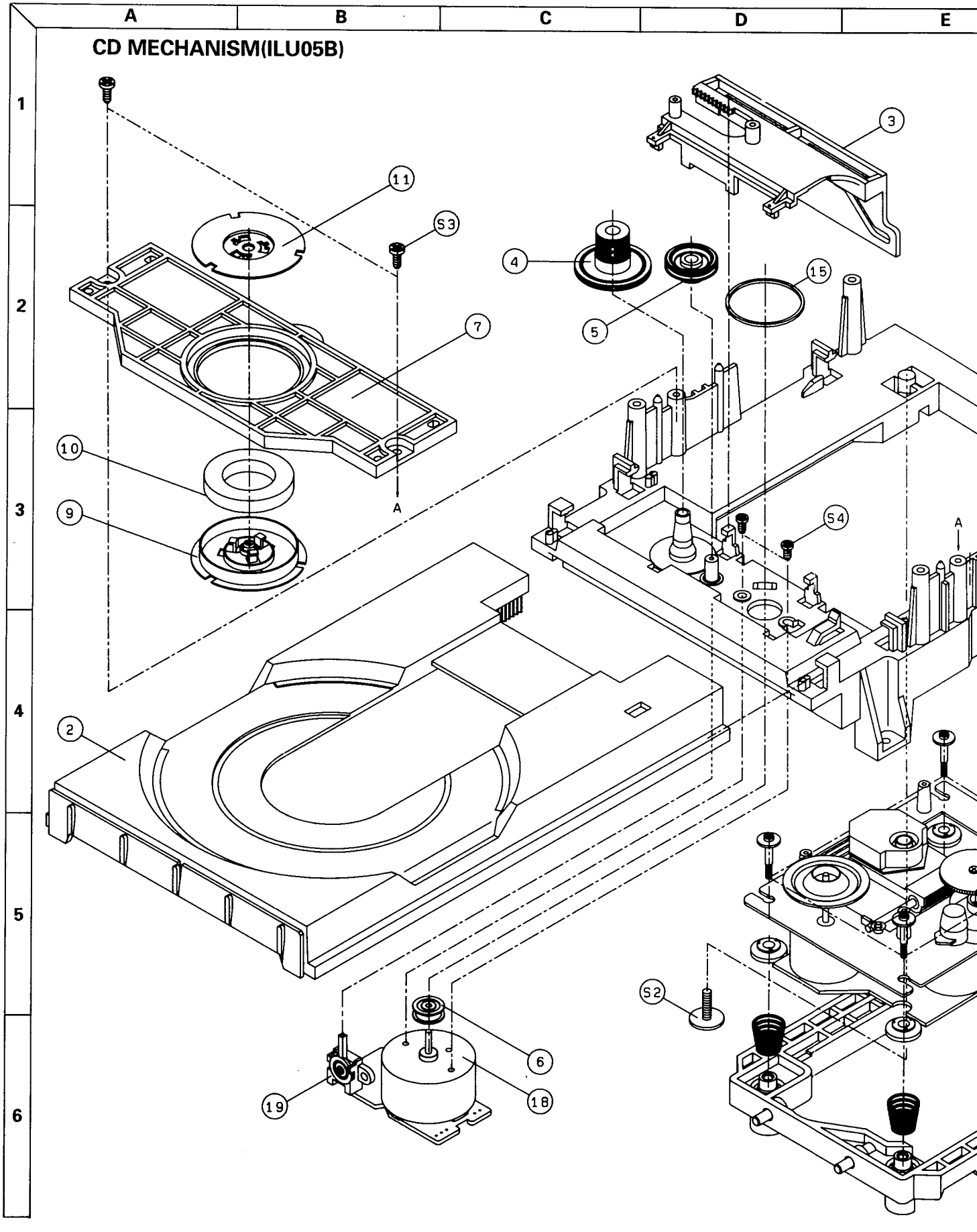
GENERAL UNIT EXPLODED VIEW I



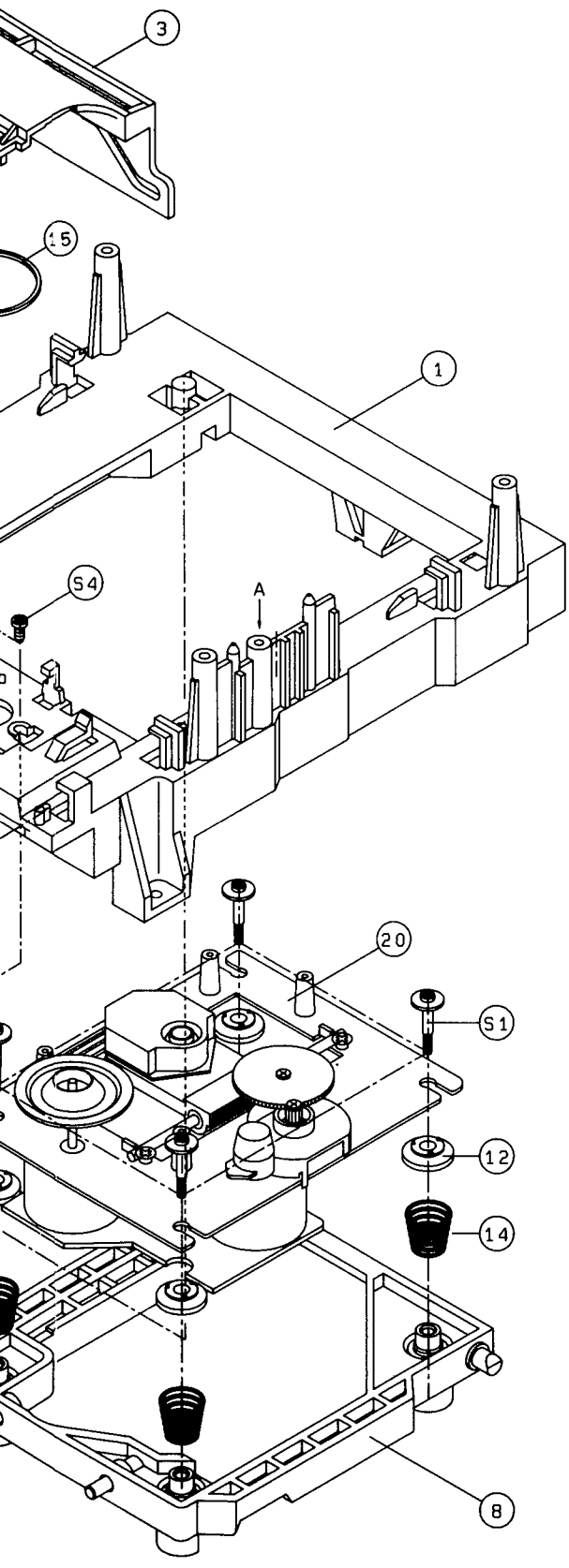
	E	F	G	H	I


S5
19
PCB7
S6
31
S3
32
33
30
S4
S3
S9
S10
S9
PCB2
24
27
28
29
26
S8
25
21
20
S3
PCB1
S7
PCB5
22
S3
17
16
PCB4
23
S3
9
PCB3
8
S7

EXPLODED VIEW II



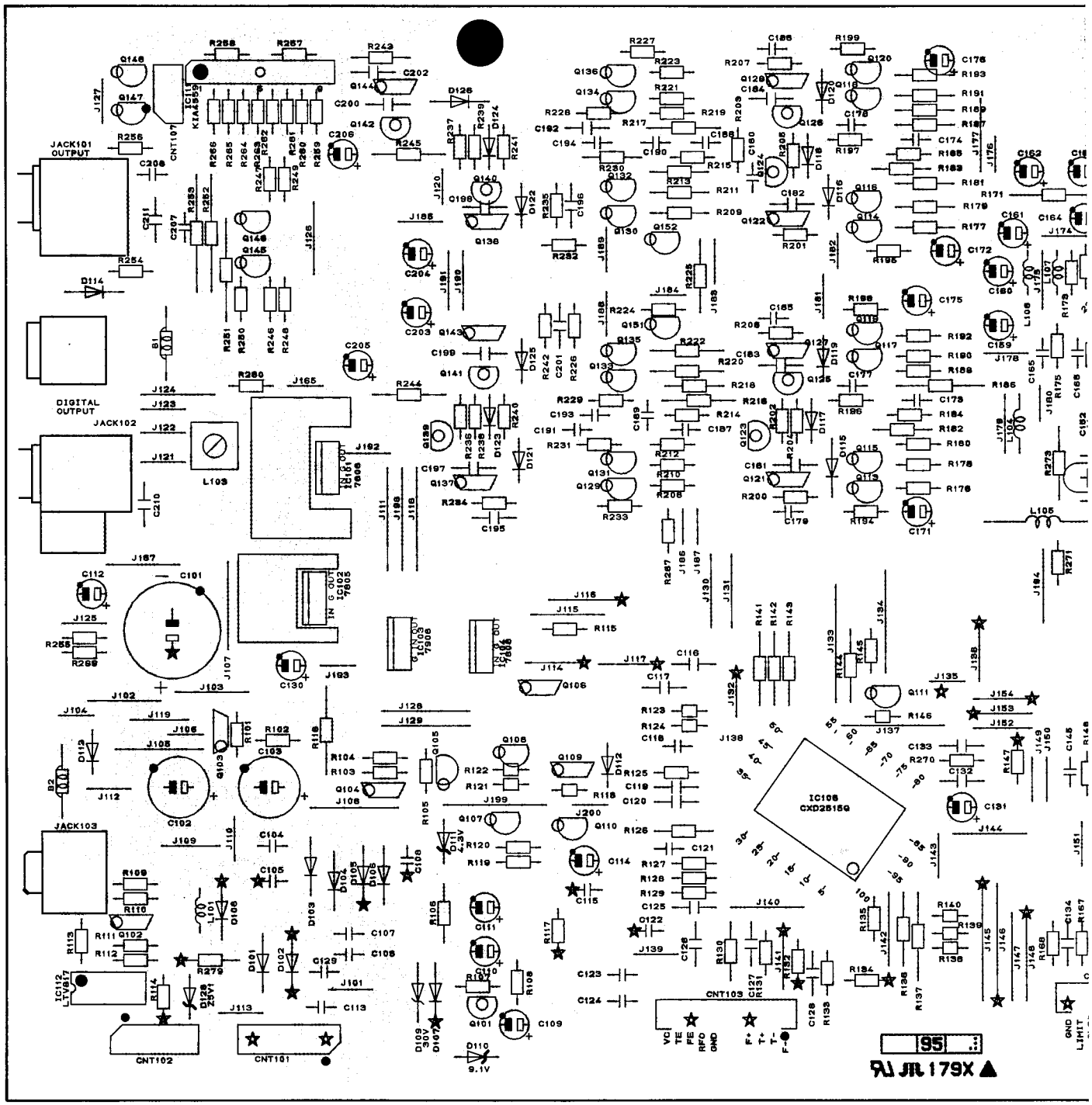
	E	F



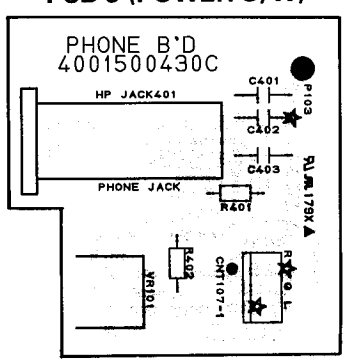
No.	Part No.	REV	Description	Q'ty	Remark
1	6021601220		BODY MECHA	1	
2	6021800330		TRAY DISC	1	
3	7142000420		CAM SLIDE	1	
4	7103001620		GEAR LOADING	1	
5	7103001810		GEAR PULLEY	1	
6	7113001310		PULLEY MOTOR	1	
7	6023601220		CHUCK FRAME	1	
8	6062000320		BASE DRIVE UNIT	1	A'ssy SHAFT
9	6063103010		BASE MAGNET	1	
10	5125000910		MAGNET	1	
11	6023408610		COVER MAGNET	1	
12	6715024510		RUBBER DAMPING	4	
13					
14	6555014010		SPRING DAMPING	4	
15	7165002620		BELT (ø24 × 1.1 × 1.2)	1	
16					
17					
18	5558001810		MOTOR RF 500TB-12560	1	
19	4638003210		S/W LEVER (SSCF-21)	1	
20	5728001110		CD DRIVE UNIT	1	KSM-2401ABM
Screws					
S1	8155001120		SCREW DAMPING	4	
S2	8155001210		SCREW MECHA	1	
S3	8159626081		SCREW #2WPT 2.6 × 8Y	2	
S4	8009126051		SCREW BM 2.6 × 5	2	

PRINTED CIRCUIT BOARDS

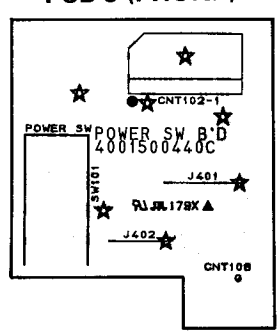
PCB 1 (MAIN)

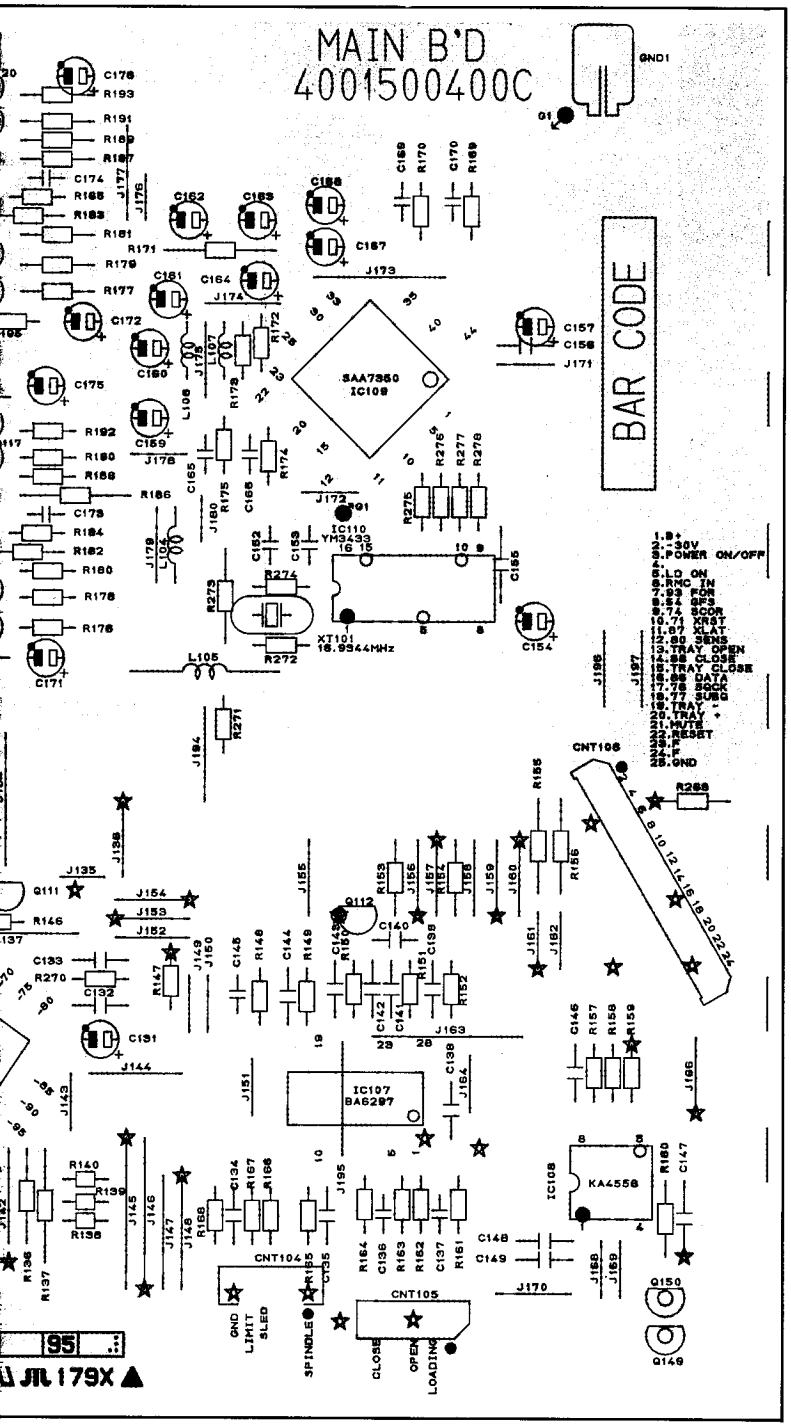


PCB 5 (POWER S/W)

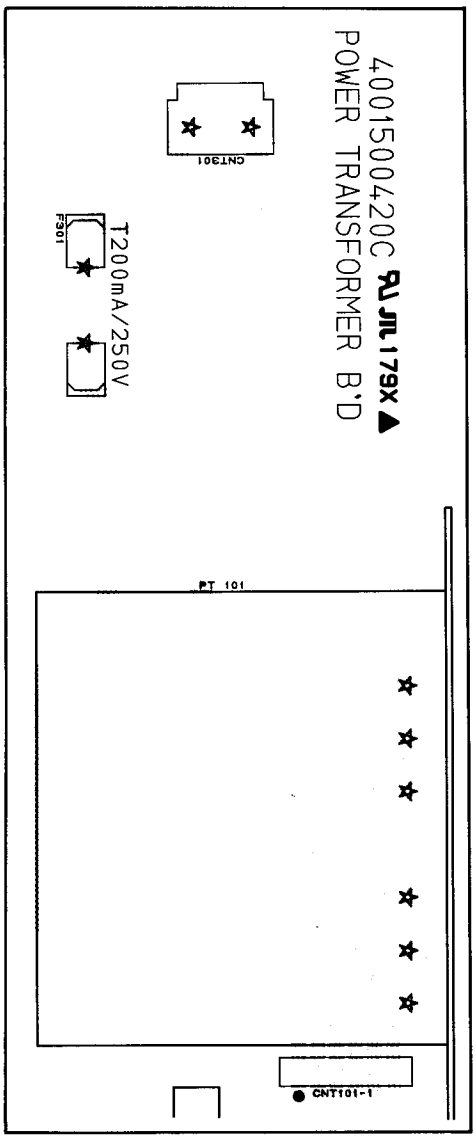


PCB 3 (PHONE)

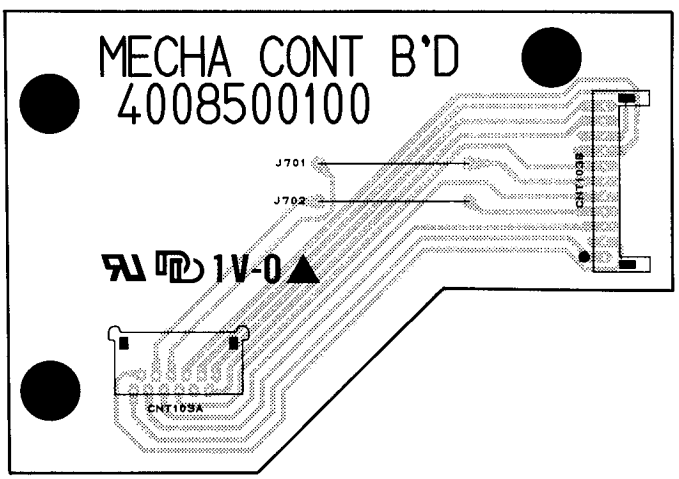




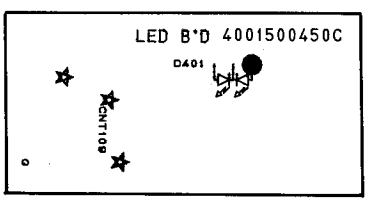
PCB 2 (POWER TRANS)

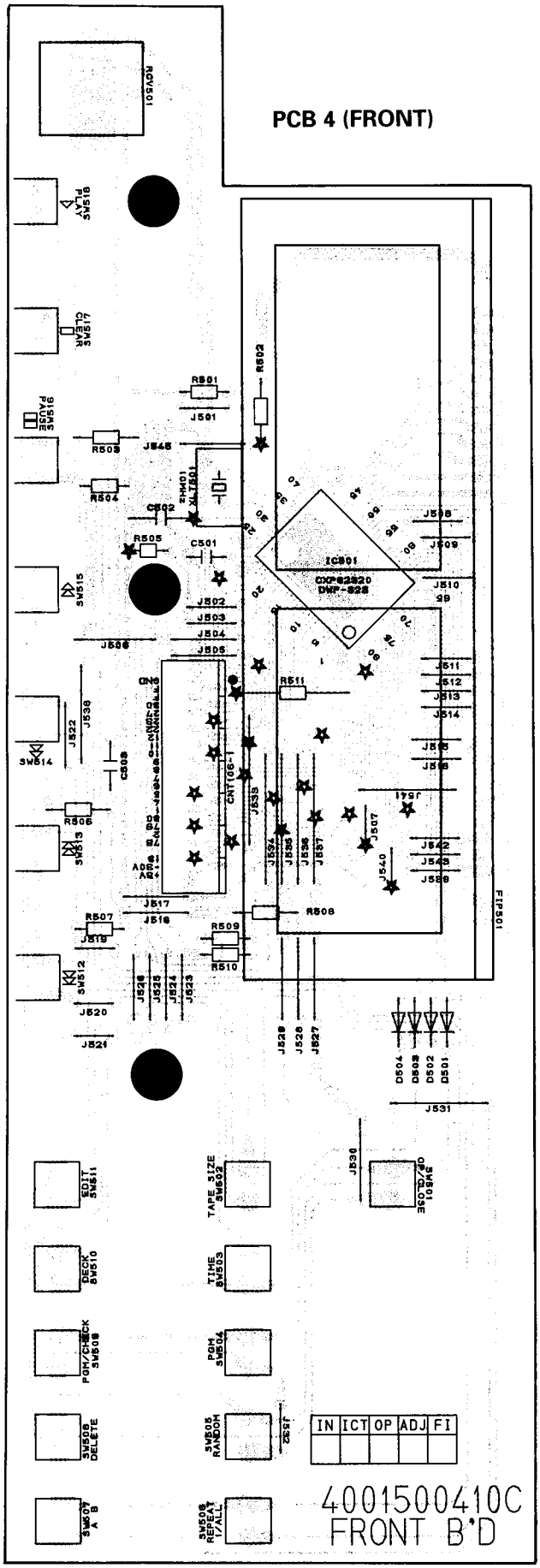


PCB 7 (MECHA CONTROL)



PCB 6 (LED)





GENERAL UNIT PARTS LIST

Ref. No.	Description	Mfr.Part No.
	CABINET & CHASSIS	
1	Door Tray, ABS, Black	048563007611
2	Knob, Volume, ABS, Black	048545130911
3	Panel, Front	048602019711
4	Window, Remote	8555052410
5	Window, Display	8553023310
6	Filter, FL	048555052311
7	Body Front, ABS, Black	8521009410
8	Jack, Phone	4438005010
9	Volume, Phone, RK0971220A0112C R0B98	3228015910
10	Button, Tact 18key, ABS, Black	048542007911
11	Button, Power, ABS, Black	048545130811
12	Light Shield, Black	8535076020
13	Indicator, Power	8555052110
14	Spring, Power	6555010720
15	Switch Push, Power	4628058310
16	Switch Tact	4658003710
17	Holder, FL, ABS, Black	8543069710
18	Cover Top	6122030020
19	Ass'y CD Mecha, ILU05B	5728000720
20	Base, Mecha, ABS, Black	6703002910
21	Fastener	6528301710
22	Chassis, Main	6121614710
23	Foot, ABS, Gold	046033102511
24	Cover Plate	8535046310
25	Heatsink Regulator TR.	7505206210
26	Heatsink Regulator TR.	7505206130
27	Jack, Remote	4438007520
28	Jack, RCA 1P	4438111020
29	Jack, RCA 2P	4438111310
30	Chassis, Back	046102044121
31	Cable Tie	6528000410
32	Holder, Stopper	6518002310
33	⚠ Cord, AC Power	4308009510
	HARDWARE KIT	
S1	Screw, #2FTC 3x12B	8129230123
S2	Screw, #2FTC 3x8B	8129230083
S3	Screw, #2BTC 3x8B	8109230083
S4	Screw, WSAM 4x8B	8159440083
S5	Screw, #2BTC 3x14Y	8109230141
S6	Screw, #2PTC 2.6x6Y	8119226061
S7	Screw, #2WPTC 3x6Y	8159230061
S8	Screw, #2BTC 3x6B	8109230063
S9	Screw, #1PT 3x10B	8119130103
S10	Screw, Ground	8155000710
	MISCELLANEOUS	
	Card Cable, 25P, 160mm, Front B'D to Main B'D	4118625165
	Card Cable, 12P, 100mm, Mecha to Mecha Control	4118512100
	WIRE ASS'Y 6P,160mm, 2mm, Mecha to Main B'D	436206162092
	WIRE ASS'Y 11P,160mm, 2mm, Mecha to Main B'	436211162092
	WIRE ASS'Y 5P,600mm, 2.5mm, LED B'D to Main	436105603021

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing
Components identified with the IEC symbol ⚠ in the part list are o
special significance to safety. When replacing a componen
identified with ⚠ , use only the replacement parts designated, o
parts with the same ratings of resistance, wattage or voltage tha
are designated in the parts list in this manual. Leakage-current o
resistance measurements must be made to determine that exposed
parts are acceptably insulated from the supply circuit befor
returning the product to the customer.

ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTICE : Products marked with ⚠ have special characteristics important to safety.
If you replace any of these components, read carefully the product safety notice in this manual.
Don't degrade the safety of the product through improper servicing.
Resistor/Capacitor tolerance – D : (±0.5%), J : (±5%), K : (±10%), M : (±20%), Z : +80, – 20%)

Ref. No.	Description					Mfr.Part No.	Q'ty
PCB1	**ASS'Y P.C.BOARD MAIN**					**054002009848**	
	CAPACITORS						
C101	Electrolytic SG	4700	uF	16 V	M	3409347239	1
C102/C103	Electrolytic SG	1000	uF	25 V	M	3409310249	2
C104-C108	Mylar	0.047	uF	100 V	J	3679473120	5
C109-C111	Electrolytic SG	22	uF	50 V	M	3479322071	3
C112	Electrolytic SG	10	uF	50 V	M	3479310071	1
C113/C114	Mylar	0.047	uF	100 V	J	3679473120	2
C115	Electrolytic SG	10	uF	50 V	M	3479310071	1
C116	Mylar	0.022	uF	100 V	J	3679223120	1
C117	Mylar	0.01	uF	100 V	J	3679103120	1
C118	Mylar	0.68	uF	63 V	K	3679684297	1
C119	Ceramic Tubular	100	pF	50 V	J	3519101935	1
C120	Ceramic Tubular	4700	pF	16 V	K	3519472935	1
C121	Mylar	0.002	uF	100 V	J	3679152120	3
C122-C124	Mylar	0.68	uF	63 V	K	3679684297	1
C125	CeramicTubular	0.1	uF	50 V	Z	3519104935	1
C126	CeramicTubular	470	pF	50 V	J	3519471935	1
C127	Ceramic Tubular	0.022	uF	50 V	Z	3519223935	1
C128	CeramicTubular	470	pF	50 V	J	3519471935	1
C129	Mylar	0.047	uF	100 V	J	3679473120	1
C130	Electrolytic SG	10	uF	50 V	M	3479310071	1
C131	Electrolytic SG	100	uF	16 V	M	3479310131	1
C132/C133	Ceramic Tubular	0.022	uF	50 V	Z	3519223935	2
C134/C135	CeramicTubular	680	pF	50 V	J	3519681935	2
C136	Mylar	0.015	uF	100 V	J	3679153120	1
C137	Mylar	0.007	uF	100 V	J	3679682120	1
C138-C142	Ceramic Tubular	0.022	uF	50 V	Z	3519223935	5
C143/C144	CeramicTubular	680	pF	50 V	J	3519681935	2
C145	Mylar	0.33	uF	63 V	K	3679334297	1
C146/C147	CeramicTubular	470	pF	50 V	J	3519471935	2
C148/C149	Ceramic Tubular	0.022	uF	50 V	Z	3519223935	2
C152/C153	Ceramic Disc CH	22	pF	50 V	J	3528220210	1
C154	Electrolytic SG	100	uF	10 V	M	3479310121	2
C155/C156	Ceramic Tubular	0.022	uF	50 V	Z	3519223935	1
C157	Electrolytic SG	100	uF	10 V	M	3479310121	2
C159/C160	Electrolytic SG	47	uF	16 V	M	3479347031	2
C161/C162	Electrolytic SG	100	uF	10 V	M	3479310121	2
C163/C164	Electrolytic SG	47	uF	16 V	M	3479347031	2
C165/C166	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C167/C168	Electrolytic SG	47	uF	16 V	M	3479347031	2
C169/C170	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C171/C172	Electrolytic SG	100	uF	16 V	M	3479310131	2
C173/C174	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C175/C175	Electrolytic SG	100	uF	16 V	M	3479310131	2
C177/C178	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C179/C180	CeramicTubular	220	pF	50 V	J	3519221935	2
C181-C184	Ceramic Tubular	10	pF	50 V	J	3519100935	4
C185/C186	CeramicTubular	220	pF	50 V	J	3519221935	2
C187/C188	Mylar	0.006	uF	100 V	J	3679562120	2
C189/C190	Mylar	0.033	uF	100 V	J	3679333120	2
C191/C192	Ceramic Tubular	150	pF	50 V	J	3519151935	2
C193/C194	Mylar	0.001	uF	100 V	J	3679122120	2
C195/C196	CeramicTubular	47	pF	50 V	J	3519470935	2
C197-C200	Ceramic Tubular	10	pF	50 V	J	3519100935	4
C201/C202	CeramicTubular	47	pF	50 V	J	3519470935	2
C203/C204	Electrolytic SG	100	uF	16 V	M	3479310131	2
C205/C206	Electrolytic SG	10	uF	50 V	M	3479310071	2
C207/C208	Mylar	0.004	uF	100 V	J	3679392120	2
C210	CeramicTubular	68	pF	50 V	J	3519680935	1
C211	CeramicTubular	0.047	uF	50 V	J	3519473935	1
	CONNECTORS						
CNT101	Wafer, 6P					4428505810	1
CNT102	Wafer, 5P					4428506910	1
CNT103	Wafer, 11P					4428517010	1
CNT104	Wafer, 6P					4428516510	1
CNT105	Wafer, 5P					4428506910	1
CNT106	Wafer, FPC, 25P					4426001025	1
CNT107	Wafer, 3P					4428505710	1
	DIODES						
D101-D107	IN4002, Rectifier					2258100135	7
D109	Zener, UZ 30.0 BSD					2258599128	1
D110	Zener, UZ 9.1 BSC					2258599107	1
D111	Zener, UZ 4.3 BSB					2258599102	1
D112-D216	1N4148, Switching					2258322101	5
D128	Zener, UZ 5.1 BSB					2258599103	1
	INTEGRATED CIRCUITS						
IC101	KA7808, Regulator					2168602101	1
IC102	KA7805, Regulator					2168602105	1
IC103	KA7908, Regulator					2168602102	1
IC104	KA7808, Regulator					2168602101	1
IC106	CXD2515Q					2138022116	1
IC107	BA6297AFP					2168027202	1
IC108	KA4558					2168000114	1
IC109	SAA7350GP/M3					2138000194	1
IC110	YM3433					2138000149	1
IC111	KIA4559S/KIA75559S, OP Amp					2168206103	1
IC112	LTV-817, Optocoupler					2408000136	1

Ref. No.	Description	Mfr.Part No.	Q'ty
	COILS		
L101	Inductor, 10 uH	2648610082	1
L103	Coil, Matching Trans	2638710020	1
L104	Inductor, 100 uH	2648610182	1
L105-L107	Inductor, 10 uH	2648610082	3
	TRANSISTORS		
Q101	MPSA56Y, PNP, Silicon	2208206113	1
Q102	DTA114YS, PNP, Silicon	2208222105	1
Q103	BKTC2235/KTC1027Y, PNP, Silicon	2228406120	1
Q104	KTA1023Y/BKTA965, PNP, Silicon	2228106107	1
Q105	BKTA1266Y/KTA1015Y, PNP, Silicon	2208206105	1
Q106	DTC114YS, NPN, Silicon	2208622106	1
Q107	KTD1302S, NPN, Silicon	2208606112	1
Q108	BKTA1266Y/KTA1015Y, PNP, Silicon	2208206105	1
Q109	DTC114YS, NPN, Silicon	2208622106	1
Q110	KTD1302S, NPN, Silicon	2208606112	1
Q111	BKTA1266Y/KTA1015Y, PNP, Silicon	2208206105	1
Q112	KTD1302S, NPN, Silicon	2208606112	1
Q113-Q11	KTA1268/KTA970, PNP, Silicon	2208206104	4
Q117-Q12	BKTC3200/KTC2240BL, NPN, Silicon	2208606108	4
Q121/Q12	BKTC2235/KTC1027Y, PNP, Silicon	2228406120	2
Q123/Q12	MPSA56Y, PNP, Silicon	2208206113	2
Q125/Q12	MPSA06Y, NPN, Silicon	2208606114	2
Q127/Q12	KTA1023Y/BKTA965, PNP, Silicon	2228106107	2
Q129-Q13	KTA1268/KTA970, PNP, Silicon	2208206104	4
Q133-Q13	BKTC3200/KTC2240BL, NPN, Silicon	2208606108	4
Q137/Q13	BKTC2235/KTC1027Y, PNP, Silicon	2228406120	2
Q139/Q14	MPSA56Y, PNP, Silicon	2208206113	2
Q141/Q41	MPSA06Y, NPN, Silicon	2208606114	2
Q143/Q14	KTA1023Y/BKTA965, PNP, Silicon	2228106107	2
Q145-Q14	KTD1302S, NPN, Silicon	2208606112	4
Q149	MPSA06Y, NPN, Silicon	2208606114	1
Q150	MPSA56Y, PNP, Silicon	2208206113	1
Q151/Q15	KTD1302S, NPN, Silicon	2208606112	2
	RESISTORS		
R101	Carbon Film 10 kohm 1/5 W J	3069103970	1
R102	Metal Film 2.2 kohm 1/5 W J	3029222970	1
R103	Carbon Film 10 kohm 1/5 W J	3069103970	1
R104	Metal Film 2.2 kohm 1/5 W J	3029222970	1
R105	Carbon Film 47 kohm 1/5 W J	3069473970	1
R106	Carbon Film 10 kohm 1/5 W J	3069103970	1
R107/R108	Metal Film 4.7 kohm 1/5 W J	3029472970	2
R109	Carbon Film 47 kohm 1/5 W J	3069473970	1
R110	Metal Film 47 ohm 1/5 W J	3029470970	1
R111	Metal Film 100 ohm 1/5 W J	3029101970	1
R112	Metal Film 3.9 kohm 1/5 W J	3029392970	1
R113	Metal Film 270 ohm 1/5 W J	3029271970	1
R114	Metal Film 120 ohm 1/5 W J	3029121970	1
R115	Metal Film 3.3 kohm 1/5 W J	3029332970	1
R116	Metal Film 1 kohm 1/5 W J	3029102970	1
R117	Carbon Film 10 kohm 1/5 W J	3069103970	1
R118	Metal Film 1 kohm 1/5 W J	3029102970	1
R119	Carbon Film 47 kohm 1/5 W J	3069473970	1
R120	Metal Film 1 kohm 1/5 W J	3029102970	1
R121	Metal Film 3.3 kohm 1/5 W J	3029332970	1
R122	Carbon Film 15 kohm 1/5 W J	3069153970	1
R123	Carbon Film 10 kohm 1/5 W J	3069103970	1
R124	Carbon Film 100 kohm 1/5 W J	3069104970	1
R125	Carbon Film 1 Mohm 1/5 W J	3069105970	1
R126	Metal Film 100 ohm 1/5 W J	3029101970	1
R127/R128	Metal Film 3.3 kohm 1/5 W J	3029332970	2
R129	Carbon Film 10 kohm 1/5 W J	3069103970	1
R130	Carbon Film 15 kohm 1/5 W J	3069153970	1
R131	Carbon Film 100 kohm 1/5 W J	3069104970	1
R132	Carbon Film 15 kohm 1/5 W J	3069153970	1
R133	Carbon Film 33 kohm 1/5 W J	3069333970	1
R134	Carbon Film 100 kohm 1/5 W J	3069104970	1
R135	Carbon Film 15 kohm 1/5 W J	3069153970	1
R136	Carbon Film 33 kohm 1/5 W J	3069333970	1
R137	Carbon Film 12 kohm 1/5 W J	3069123970	1
R138-R140	Carbon Film 15 kohm 1/5 W J	3069153970	3
R141-R143	Metal Film 680 ohm 1/5 W J	3029681970	3
R144	Metal Film 1 kohm 1/5 W J	3029102970	1
R145/R146	Carbon Film 10 kohm 1/5 W J	3069103970	2
R147	Metal Film 1 kohm 1/5 W J	3029102970	1
R148	Metal Film 4.7 ohm 1/5 W J	3029479970	1
R149-R152	Carbon Film 7.5 kohm 1/5 W J	3069752970	3
R153	Metal Film 1 kohm 1/5 W J	3029102970	1
R154	Carbon Film 10 kohm 1/5 W J	3069103970	1
R155/R156	Carbon Film 33 kohm 1/5 W J	3069333970	2
R157-R160	Carbon Film 100 kohm 1/5 W J	3069104970	4
R161	Carbon Film 68 kohm 1/5 W J	3069683970	1
R162	Carbon Film 22 kohm 1/5 W J	3069223970	1
R163/R164	Carbon Film 68 kohm 1/5 W J	3069683970	2
R165	Carbon Film 7.5 kohm 1/5 W J	3069752970	1
R166	Carbon Film 15 kohm 1/5 W J	3069153970	1
R167	Carbon Film 7.5 kohm 1/5 W J	3069822970	1
R168	Carbon Film 15 kohm 1/5 W J	3069153970	1
R169/R170	Carbon Film 27 kohm 1/5 W J	3069273970	2
R171	Carbon Film 22 kohm 1/5 W J	3069223970	1

Mfr.Part No.	Q'ty
048563007611	1
048545130911	1
048602019711	1
8555052410	1
8553023310	1
048555052311	1
8521009410	1
4438005010	1
3228015910	1
048542007911	1
048545130811	1
8535076020	1
8555052110	1
6555010720	1
4628058310	1
4658003710	18
8543069710	1
6122030020	1
5728000720	1
6703002910	1
6528301710	4
6121614710	1
046033102511	4
8535046310	1
7505206210	1
7505206130	1
4438007520	1
4438111020	1
4438111310	1
046102044121	1
6528000410	1
6518002310	1
4308009510	1
8129230123	3
8129230083	3
8109230083	21
8159440083	6
8109230141	3
8119226061	3
8159230061	4
8109230063	2
8119130103	2
8155000710	2
4118625165	1
4118512100	1
436206162092	1
436211162092	1
436105603021	1

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part list are of
a component
designated, or
or voltage that
age-current or
e that exposed
circuit before

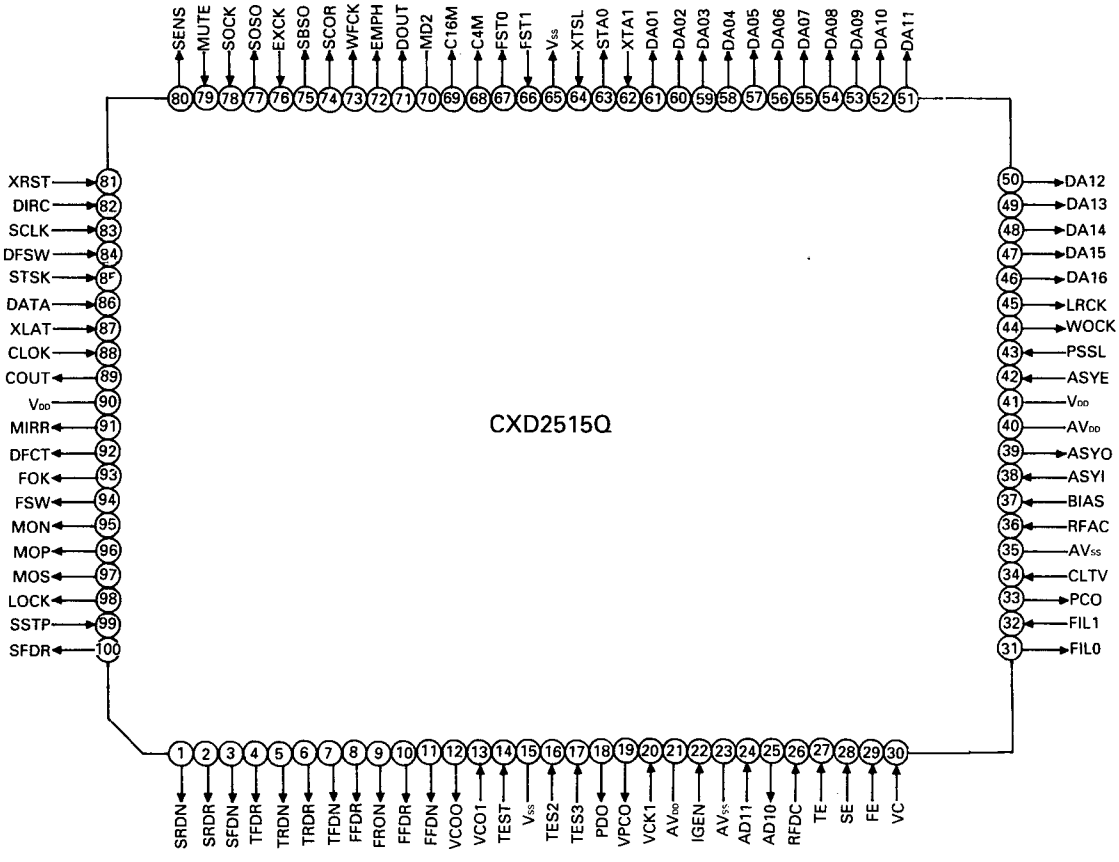
Ref. No.	Description						Mfr.Part No.	Q'ty
R172/R173	Metal Film	100	ohm	1/5 W	J		3029101970	2
R174/R175	Carbon Film	27	kohm	1/5 W	J		3069273970	2
R176/R179	Metal Film	10	ohm	1/5 W	J		3029100970	2
R180/R181	Carbon Film	12	kohm	1/5 W	J		3069123970	2
R182-R187	Carbon Film	20	kohm	1/5 W	J		3069203970	6
R188/R189	Carbon Film	12	kohm	1/5 W	J		3069123970	2
R190-R193	Metal Film	10	ohm	1/5 W	J		3029100970	4
R194/R195	Metal Film	2.7	kohm	1/5 W	J		3029272970	2
R196/R197	Carbon Film	20	kohm	1/5 W	J		3069203970	2
R198/R199	Metal Film	2.7	kohm	1/5 W	J		3029272970	2
R200/R201	Metal Film	180	ohm	1/5 W	J		3029181970	2
R202-R205	Metal Film	47	ohm	1/5 W	J		3029470970	4
R206/R207	Metal Film	180	ohm	1/5 W	J		3029181970	2
R208-R211	Metal Film	39	ohm	1/5 W	J		3029390970	4
R212/R213	Carbon Film	12	kohm	1/5 W	J		3069123970	2
R214/R215	Metal Film	390	ohm	1/5 W	J		3029391970	2
R216/R217	Metal Film	1.2	kohm	1/5 W	J		3029122970	2
R218/R219	Carbon Film	12	kohm	1/5 W	J		3069123970	2
R220-R223	Metal Film	39	ohm	1/5 W	J		3029390970	4
R224/R225	Carbon Film	5.6	kohm	1/5 W	J		3069562970	2
R226/R227	Carbon Film	3.6	kohm	1/5 W	J		3069362970	2
R228	Carbon Film	5.1	kohm	1/5 W	J		3069512970	1
R229/R230	Carbon Film	18	kohm	1/5 W	J		3069183970	2
R231	Carbon Film	5.1	kohm	1/5 W	J		3069512970	1
R232/R233	Carbon Film	3.6	kohm	1/5 W	J		3069362970	2
R234/R235	Metal Film	82	ohm	1/5 W	J		3029820970	2
R236-R239	Metal Film	33	ohm	1/5 W	J		3029330970	3
R240/R241	Carbon Film	27	kohm	1/5 W	J		3069273970	2
R242/R243	Metal Film	82	ohm	1/5 W	J		3029820970	2
R244-R247	Metal Film	100	ohm	1/5 W	J		3029101970	4
R248/R249	Carbon Film	10	kohm	1/5 W	J		3069103970	2
R250-R253	Metal Film	1	kohm	1/5 W	J		3029102970	4
R254	Metal Film	100	ohm	1/5 W	J		3029101970	1
R255	Carbon Film	10	kohm	1/5 W	J		3069103970	1
R256	Metal Film	100	ohm	1/5 W	J		3029101970	1
R257/R258	Carbon Film	10	kohm	1/5 W	J		3069103970	2
R259	Metal Film	22	ohm	1/5 W	J		3029220970	1
R260	Metal Film	4.7	kohm	1/5 W	J		3029472970	1
R261	Metal Film	2.7	kohm	1/5 W	J		3029272970	1
R262	Carbon Film	10	kohm	1/5 W	J		3069103970	1
R263	Metal Film	4.7	kohm	1/5 W	J		3029472970	1
R264	Carbon Film	10	kohm	1/5 W	J		3069103970	1
R265	Metal Film	2.7	kohm	1/5 W	J		3029272970	1
R266	Metal Film	22	ohm	1/5 W	J		3029220970	1
R267	Metal Film	56	kohm	1/5 W	J		3029563970	1
R268	Metal Film	1	kohm	1/5 W	J		3029102970	1
R269	Carbon Film	100	kohm	1/5 W	J		3069104970	1
R270	Metal Film	1	kohm	1/5 W	J		3029102970	1
R271	Metal Film	680	ohm	1/5 W	J		3029681970	1
R272	Metal Film	10	ohm	1/5 W	J		3029100970	1
R273	Metal Film	680	ohm	1/5 W	J		3029681970	1
R274	Carbon Film	1	Mohm	1/5 W	J		3069105970	1
R275-R278	Metal Film	680	ohm	1/5 W	J		3029681970	4
R279	Metal Film	150	ohm	1/5 W	J		3029151470	1
R280	Metal Film	1	kohm	1/5 W	J		3029102970	1
	MISCELLANEOUS							
25	Heatsink Regulator TR.						7505206210	1
26	Heatsink Regulator TR.						7505206130	1
27	Jack, Remote						4438007520	1
28	Jack, RCA 1P						4438111020	1
29	Jack, RCA 2P						4438111310	1
XT101	Crystal, 16.9344 MHz						3938101500	1
GND1	Terminal, Ground						4235007310	1
B1/B2	Bead Core, 3580						2648702130	2
PCB2	**ASS'Y P.C.BOARD POWER TRANS**						**054002009852**	
CNT301	Wafer, AC, 1P						4428100291	1
CNT101-1	CNT ASS'Y 6P 2.5mm						436106103321	1
⚠ F301	T 200 mA, 250 V						5508301135	1
⚠ PT101	Power Transformer, 230 V, 50 Hz						2828100837	1
	Clip, Fuse						4255001010	2
PCB3	**ASS'Y P.C.BOARD PHONE**						**054002009857**	
C401	Ceramic Tubular	0.022	uF	50 V	Z		3519223935	1
C402/C403	Ceramic Tubular	4700	pF	16 V	K		3519472935	2
CNT107-1	Lead Ass'y, 3P, 300mm						436103303131	1
R401/R402	Metal Film	56	ohm	1/5 W	J		3029560970	2
8	Jack, Phone						4438005010	1
9	Volume, Phone, RK0971220A0112C R0B98						3228015910	1
PCB4	**ASS'Y P.C.BOARD FRONT**						**054002009850**	
C501-C503	Ceramic Tubular	0.022	uF	50 V	Z		3519223935	3
CNT106-1	CNT PLUG 52575-2530						4428525826	1
D501-D504	1N4148, Switching						2258322101	4
IC501	CXP82320-333Q, DWP323						2138322196	1
R501	Carbon Film	33	kohm	1/5 W	J		3069333970	1
R502	Carbon Film	2.2	ohm	1/5 W	J		3069229970	1
R503-R510	Carbon Film	33	kohm	1/5 W	J		3069333970	8
R511	Carbon Film	2.2	ohm	1/5 W	J		3069229970	1
XLT501	Resonator, CST10 MHz						3938131750	1
FIP501	FIP, 10CBM8						2328130313	1
RCV501	Remote Sensor, KRM-34LI						2408000131	1
16	Switch Tact						4658003710	18
17	Holder, FL, ABS, Black						8543069710	1

Ref. No.	Description	Mfr.Part No.	Q'ty
PCB5	**ASS'Y P.C.BOARD POWER SWITCH**	**054002009855**	
CNT108	Wafer, 3P	4428851103	1
CNT102-1	Wafer, 5P	4428513450	1
15	Switch Push, Power	4628058310	1
PCB6	**ASS'Y P.C.BOARD LED**	**054002009854**	
D401	LED, SPR-54MDW3 Green/Amber	2308222205	1
CNT109	Wafer, 3P	4428861003	1
PCB7	**ASS'Y P.C.BOARD MECHA CONTROL**	**054002009860**	
CNT103A	CNT PLUG 6200-127 FPC DIP	4428527170	1
CNT103B	Wafer, 11P	4428525610	1

IC'S LEAD IDENTIFICATION & BLOCK DIAGRAMS

IC106 : CXD2515Q (Digital signal processor with CD digital servo)

1. Pin Configuration



2. Pin Function

Pin No.	Symbol	I/O	Description
1	SRON	O	Sled drive output
2	SRDR	O	Sled drive output
3	SFON	O	Sled drive output
4	TFDR	O	Tracking drive output
5	TRON	O	Tracking drive output
6	TRDR	O	Tracking drive output
7	TFON	O	Tracking drive output
8	FFDR	O	Focus drive output
9	FRON	O	Focus drive output
10	FRDR	O	Focus drive output
11	FFON	O	Focus drive output
12	VCOO	O	Analog EFM PLL oscillator circuit output
13	VCOI	I	Analog EFM PLL oscillator circuit input (LOCK=8.6436MHz)
14	TEST	I	Test pin, normally GND
15	VSS	–	Digital GND

Pin No.	Symbol	I/O	Description
16	TES2	I	Test pin, normally GND
17	TES3	I	Test pin, normally GND
18	PDO	O	Charge pump output for analog EFM PLL
19	VPCO	O	PLL charge pump output for variable pitch
20	VCKI	I	Clock input from external VCO for variable pitch fcenter=16.9344MHz
21	AV_{DD}	—	Analog power supply
22	IGEN	I	Current source reference resistance connector for OP amp.
23	AV_{SS}	—	Analog GND
24	ADII	I	A/D converter input
25	ADIO	O	OP amp. output
26	RFDC	I	RF signal input. Input range 2.15 to 5.0V (when V_{DD}=AV_{DD}=5.0V)
27	TE	I	Tracking error signal input. Input range 2.5V±1.0V (when V_{DD}=AV_{DD}=5.0V)
28	SE	I	Sled error signal input. Input range 2.5V±1.0V (when V_{DD}=AV_{DD}=5.0V)
29	FE	I	Focus error signal input. Input range 2.5V±1.0V (when V_{DD}=AV_{DD}=5.0V)
30	VC	I	Center voltage input
31	FILO	O	Master PLL filter output
32	FILI	I	Master PLL filter input
33	PCO	O	Master PLL charge pump output
34	CLTV	I	Master VCO control voltage input
35	AV_{SS}	—	Analog GND
36	RFAC	I	EFM signal input
37	BIAS	I	Asymmetry circuit constant current input
38	ASYI	I	Asymmetry comparator voltage input
39	ASYO	O	EFM full-swing output (Low=Vss, High=V_{DD}
40	AV_{DD}	—	Analog power supply
41	V_{DD}	—	Digital power supply
42	ASYE	I	Asymmetry circuit ON/OFF (Low=OFF; High=ON)
43	PSSL	I	Audio data ouput mode switching input. Low for serial output; High for parallel output
44	WDCK	O	48-bit slot D/A interface. Word clock f=Fs
45	LRCK	O	48-bit slot D/A interface. LR clock f=2Fs
46	DA16	O	DA16 output when PSSL=1. 48-bit slot serial data when PSSL=0.
47	DA15	O	DA15 output when PSSL=1. 48-bit slot bit clock when PSSL=0.
48	DA14	O	DA14 output when PSSL=1. 64-bit slot serial data when PSSL=0.
49	DA13	O	DA13 output when PSSL=1. 64-bit slot bit clock when PSSL=0.
50	DA12	O	DA12 output when PSSL=1. 64-bit slot LR clock when PSSL=0.
51	DA11	O	DA11 output when PSSL=1. GTOP output when PSSL=0.
52	DA10	O	DA10 output when PSSL=1. XUGF output when PSSL=0.

Pin No.	Symbol	I/O	Description
53	DA09	O	DA09 ouput when PSSL=1. XPLCK output when PSSL=0.
54	DA08	O	DA08 ouput when PSSL=1. GFS output when PSSL=0.
55	DA07	O	DA07 ouput when PSSL=1. RFCK output when PSSL=0.
56	DA06	O	DA06 ouput when PSSL=1. C2PO output when PSSL=0.
57	DA05	O	DA05 ouput when PSSL=1. XRAOF output when PSSL=0.
58	DA04	O	DA04 ouput when PSSL=1. MNT3 output when PSSL=0.
59	DA03	O	DA03 ouput when PSSL=1. MNT2 output when PSSL=0.
60	DA02	O	DA02 ouput when PSSL=1. MNT1 output when PSSL=0.
61	DA01	O	DA01 ouput when PSSL=1. MNT0 output when PSSL=0.
62	XTAI	I	Crystal oscillator circuit input. 16.9344 MHz or 33.8688MHz input.
63	XTA0	O	Crystal oscillator circuit output.
64	XTSL	I	Crystal selection input. Low for 16.9344MHz crystal; High for 33.8688MHz crystal.
65	V_{SS}	—	Digital GND
66	FSTI	I	2/3 frequency divider input of Pins 62 and 63
67	FSTO	O	2/3 frequency divider output of Pins 62 and 63. Does not change with variable pitch.
68	C4M	O	4.2336MHz output. Changes simultaneously when variable pitched.
69	C16M	O	16.9344MHz output. Changes simultaneously when variable pitched.
70	MD2	I	Digital Out ON/OFF control (Low=OFF, High=ON).
71	DOUT	O	Digital Out output.
72	EMPH	O	Playback disc emphasis mode output (Low for no emphasis applied; High for emphasis applied).
73	WFCK	O	WFCK output.
74	SCOR	O	Subcode sync ouput (High for subcode sync S0 or S1 detected).
75	SBSO	O	SubP to W serial output.
76	EXCK	I	SBSO readout clock input.
77	SQSO	O	SubQ 80-bit output : PCM peak data and level data 16-bit output.
78	SQCK	I	SQSO readout clock input.
79	MUTE	I	Mute switching input (High for mute).
80	SENS	O	SENS output (Output to CPU).
81	XRST	I	System reset (Low for reset).
82	DIRC	I	Used when 1 track jumped.
83	SCLK	I	SENS serial data read clock.
84	DFSW	I	DFCT switching input (High for defect prvention circuit turned OFF).
85	ATSK	I	Anti-shock input.
86	DATA	I	Serial data input from CPU.
87	XLAT	I	Latch input from CPU.
88	CLOK	I	Serial data transfer clock input from CPU.
89	COUT	O	Track count signal output

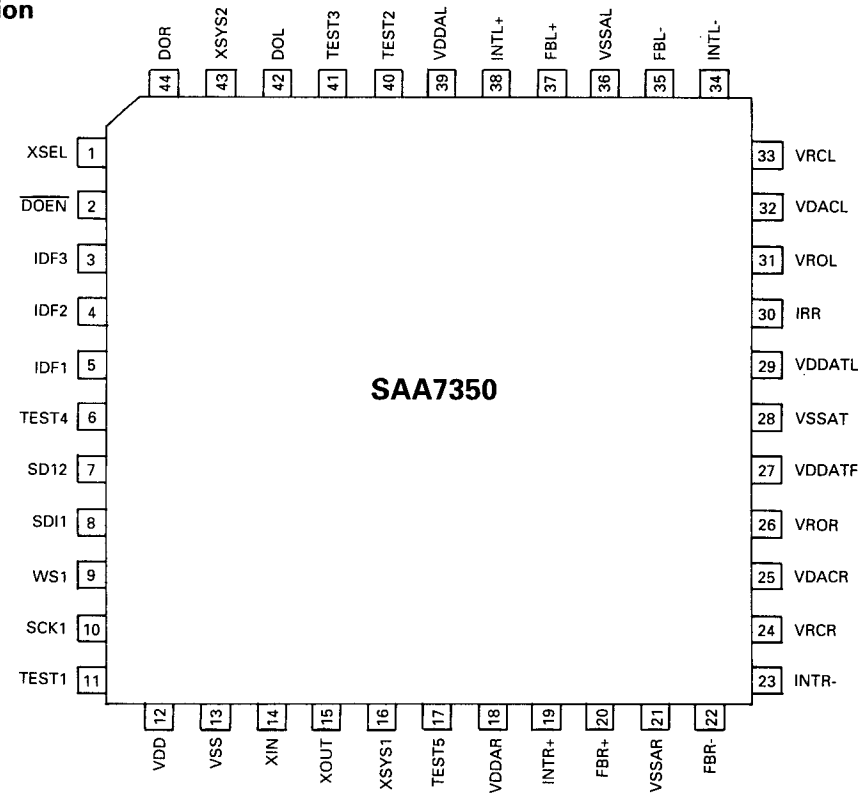
Pin No.	Symbol	I/O	Description
90	V_{DD}	—	Digital power supply.
91	MIRR	O	Mirror signal output.
92	DFCT	O	Defect signal output.
93	FOK	O	Focus OK output.
94	FSW	O	Output filter switching output for spindle motor.
95	MON	O	ON/OFF control output for spindle motor.
96	MDP	O	Spindle motor servo control.
97	MDS	O	Spindle motor servo control.
98	LOCK	O	HIgh output GFS is sampled at 460Hz and that is High; Low output when GFS is sampled 8 times and that is Low.
99	SSTP	I	Disc innermost track detection signal input.
100	SFDR	O	Sled drive output.

Notes :

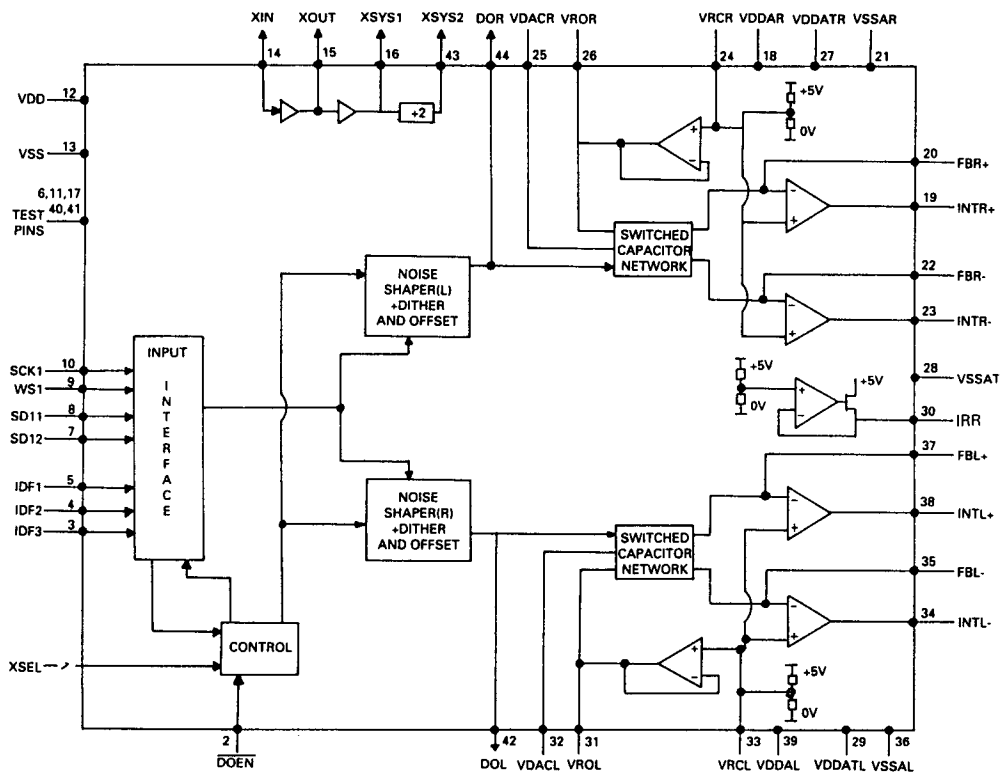
- The 64-bit slot is a 2's complement output beginning with LSB. The 48-bit slot is a 2's complement output beginning with MSB.
- GTOP is used to monitor the protection condition of frame sync. (High: sync protection window open)
- XUGF is a negative-pulse frame sync derived from the EFM signal. It precedes sync protection.
- XPLCK is an inverse of the EFM PLL clock. PLL is generated in such a way that its falling edges are synchronous with change points of the EFM signal.
- The GFS signal goes High when frame sync matches the timing of interpolation protection.
- RFCK is a 136 µs cycle signal having the same clock accuracy as the crystal oscillator frequency.
- C2PO indicates an error condition of DATA.
- XRAOF is generated when the 32k RAM exceeds its ± 28 frame jitter margin.

SAA-7350GP/M3 : IC109

1. Pin Configration



2. Block Diagram



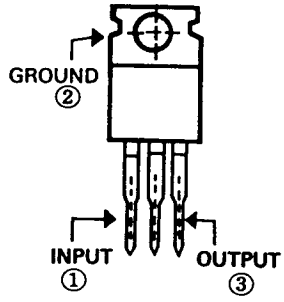
3. Pin Function

Pin No.	Mnemonic	Description
1	XSEL	Crystal frequency select. This pin is used to select the master crystal frequency as follows:- XSEL HIGH = 384fs XSEL LOW = 256fs This pin defaults to XSEL HIGH when not connected.
2	DOEN	One-bit Digital Output Enable. When LOW, the one-bit code outputs are made available for TDA 1547 (DACZ). If unconnected the pin will default HIGH.
3	IDF3	Input data format. These three pins determine the input format the device.
4	IDF2	is to operate in (see functional description). If unconnected these pins.
5	IDF1	will default HIGH (i.e. burst clock mode).
6	TEST4	Test 4: This pin should be left open circuit.
7	SD12	Serial Data Input. Used in simultaneous mode only (for the right channel signal). When not used, this pin will be internally pulled high.
8	SDI1	Serial Data Input. This should be a 16, 18 or 20-bit linear 2's complement PCM signal. In simultaneous mode this pin is used for the left channel signal.
9	WSI	Serial input Word Select signal. Signifies whether data word is for the left or right channel. Can be either fs, 2fs, 4fs or 8fs where fs is the system sampling frequency. fs can lie between 16kHz and 53kHz.
10	SCKI	Bit clock input for the serial input interface.
11	TEST1	Test 1. This pin should be left open circuit.
12	VDD	+5V power supply for the digital section.
13	VSS	Ground connection for the digital section.
14	XIN	Crystal Oscillator Input.
15	XOUT	Crystal Oscillator Output.
16	XSYS1	Buffered Oscillator Output.
17	TEST5	Test 5. In normal operation this pin should be tied LOW.
18	VDDAR	Analogue 5V supply for right channel.
19	INTR+	Output from the Right Positive switched-capacitor integrator. Input to differential op-amp.
20	FBR+	Feedback connection for the Right positive switched-capacitor integrator.
21	VSSAR	0V supply for right channel.
22	FBR-	Feedback connection for the Right Negative switched-capacitor integrator.
23	INTR-	Output from the Right Negative switched-capacitor integrator. Input to differential op-amp
24	VRCR	High impedance voltage reference for right channel inputs. Typically VDDAR/2.

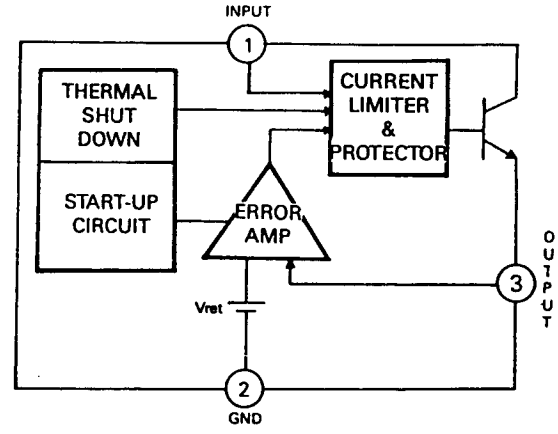
Pin No.	Mnemonic	Description
25	VDACR	Reference voltage Supply for Right channel DAC's. Normally this will be Connected to VSS.
26	VROR	Right channel voltage Reference Output. Typically VDDAR/2.
27	VDDATR	5V supply for right channel analogue timing.
28	VSSAT	0V supply for left and right channel analogue.
29	VDDATL	5V supply for left channel analogue timing.
30	IRR	24kohm bias resistor connection for the reference current generator circuit.
31	VROL	Left channel Voltage Reference Output. Typically VDDAL/2.
32	VDACL	Reference Voltage Supply for Left channel DAC. Normally this will be connected to VSS.
33	VRCL	High impedance voltage reference for left channel inputs and for bias current generator. Typically VDDAL/2.
34	INTL-	Output from the Left Negative switched-capacitor integrator. Input to differential op-amp.
35	FBL-	Feedback connection for the Left Negative switched-capacitor integrator.
36	VSSAL	0v supply for left channel.
37	FBL+	Feedback connection for the Left Positive switched-capacitor integrator.
38	INTL+	Output from the Left Positive switched-capacitor integrator. Input to differential op-amp.
39	VDDAL	Analogue 5V supply for left channel.
40	TEST2	Test2: This pin should be left open circuit.
41	TEST3	Tset3: This pin should be left open circuit.
42	DOL	Digital Output Left. Left channel one-bit code for TDA 1547 (DAC7), when disabled this pin will be driven LOW.
43	XSYS2	Output clock at a frequency of half the master clock frequency.
44	DOR	Digital Output Right. Right channel one-bit code for TDA1547 (DAC7). When disabled this pin will be driven LOW.

GD78XX : IC101, IC102, IC104

1. Package Outline

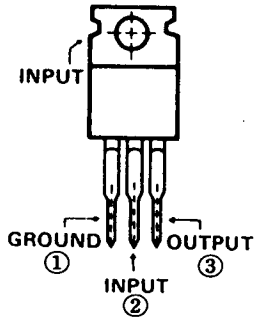


2. Block Diagram

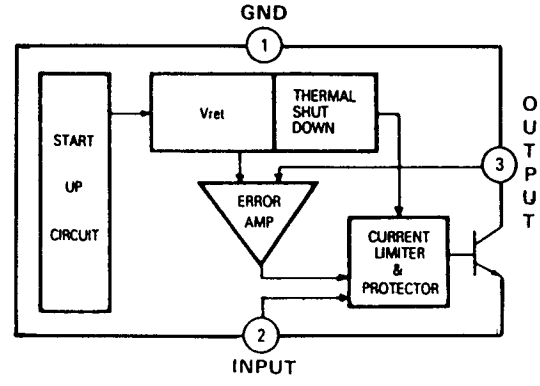


GD79XX : IC103

1. Package Outline

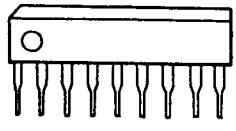


2. Block Diagram

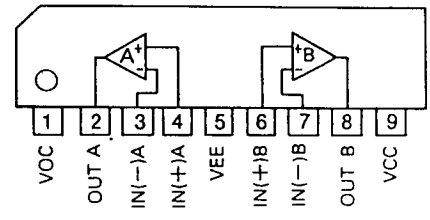


NJM4560S
KIA4559S : IC111

1. Package Outline

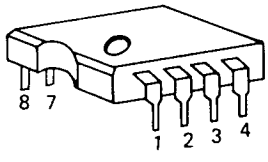


2. Block Diagram

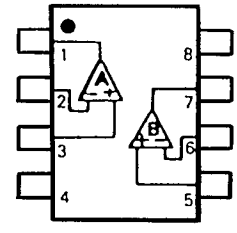


KA4558 (Op amp) : IC108

1. Package Outline



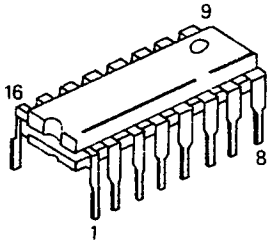
2. Block Diagram



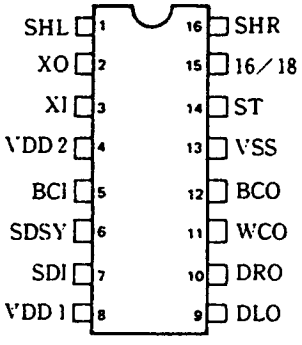
1. A OUTPUT
2. A −INPUT
3. A +INPUT
4. V−
5. B+ INPUT
6. B− INPUT
7. B OUTPUT
8. V+

IC110 YM3433 (8-times oversampling digital filter)

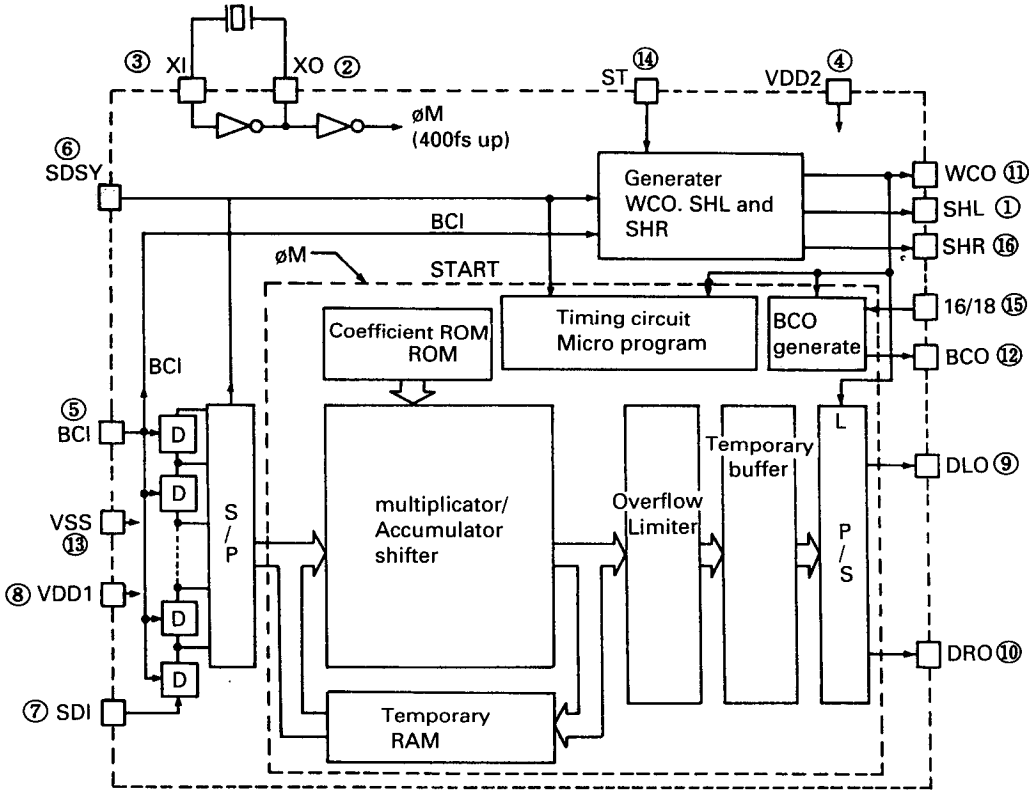
1. Package Outline



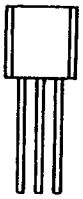
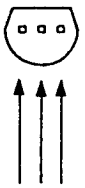
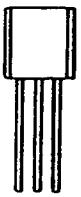
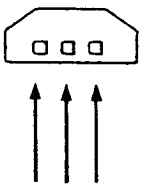
2. Pin Configration

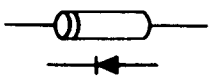
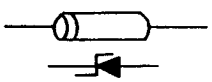


3. Block Diagram

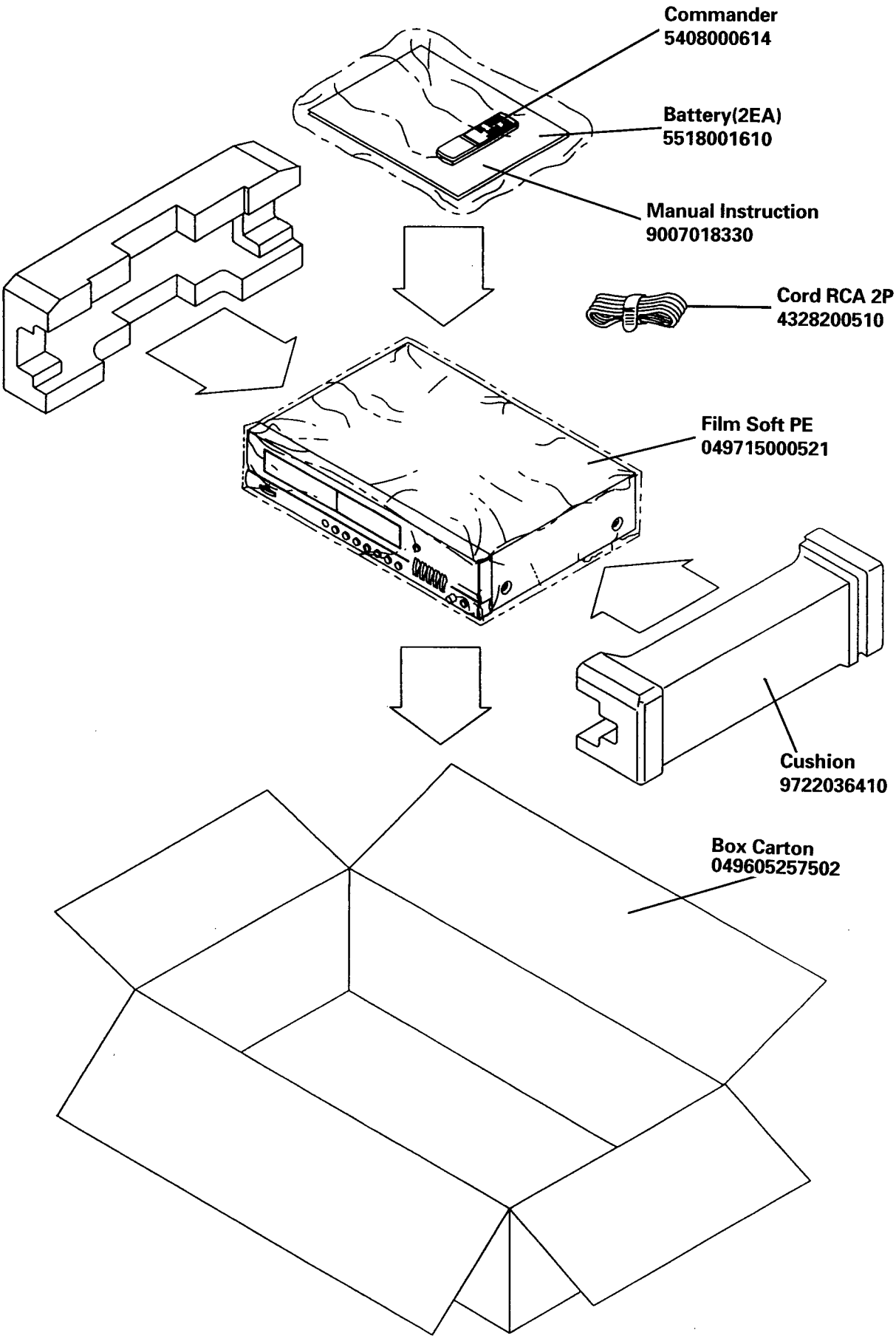


TRANSISTOR AND DIODE LEAD IDENTIFICATION

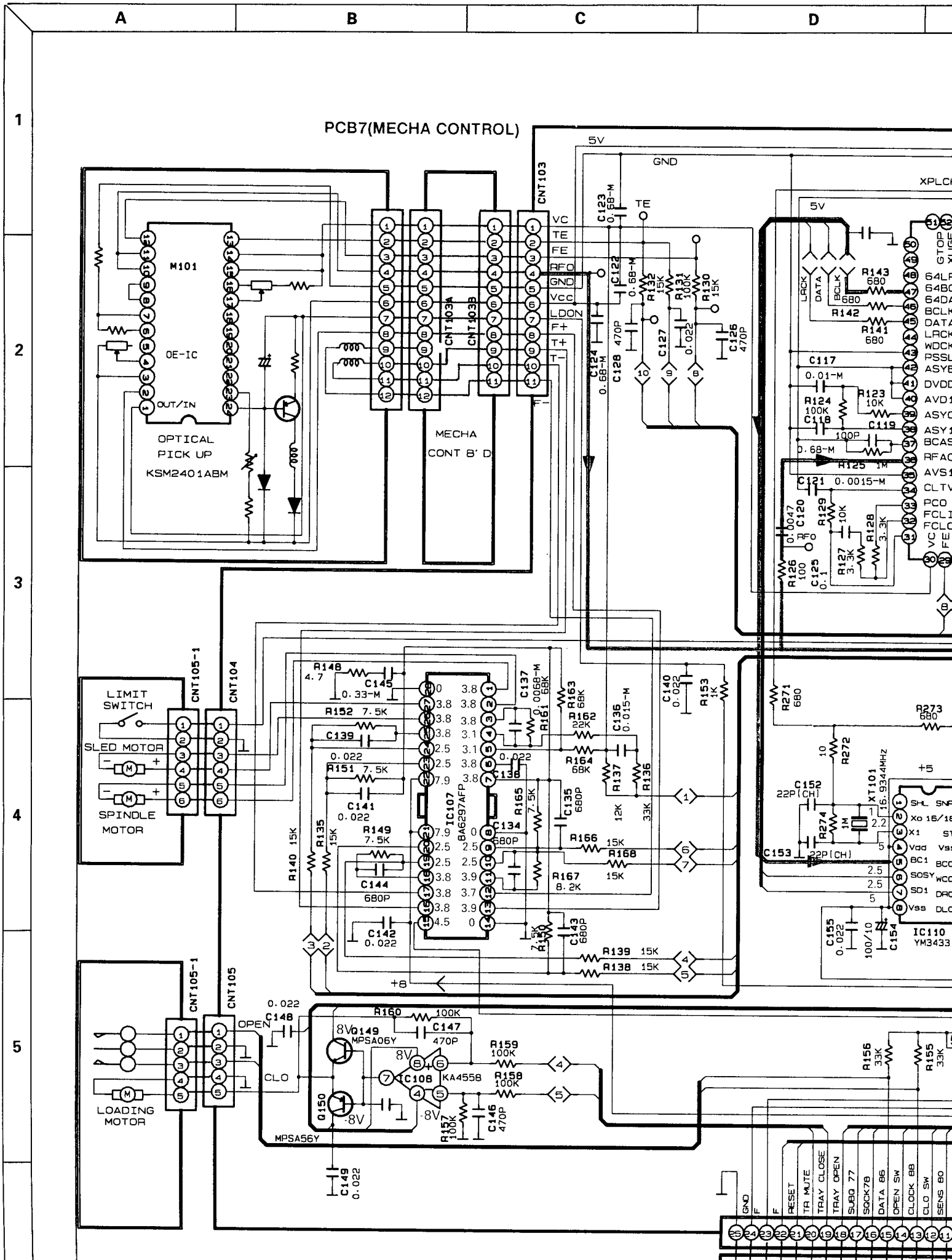
TRANSISTOR	FRONT VIEW	BOTTOM VIEW
KTA 1268BL KTC 2240B/KTC3200BL KTC 1815Y/KTC 3198Y KTA 1015Y/KTA 1266Y KTA 1302B 2SD 1302S KTC 2235Y/KTC1027 KTC 2236AY KTA965Y/KTA1023	 ECB	 ECB
MPSA 06 MPSA56	 EBC	 EBC
DTA 114YS/KRA107M DTC 114YS DTC 114TS DTC 144E	 ECB	 ECB

DIODE	PACKAGE VIEW
1N 4148 1N 4002	
ZENER	
TERMINAL NAME	
B : BASE C : COLLECTOR E : EMITTER	

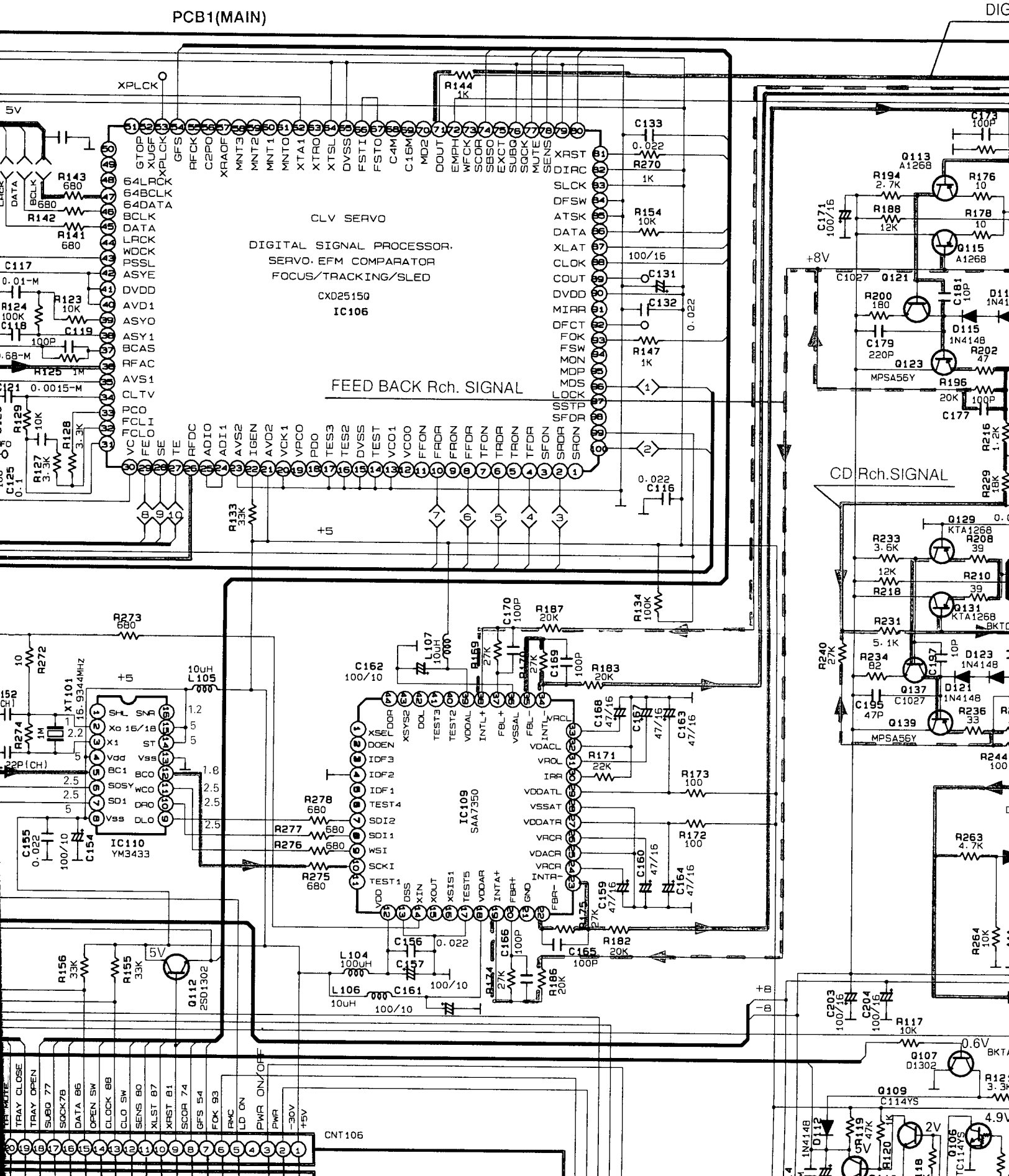
PACKAGE


Commander
5408000614
Battery(2EA)
5518001610
Manual Instruction
9007018330
Cord RCA 2P
4328200510
Film Soft PE
049715000521
Cushion
9722036410
Box Carton
049605257502

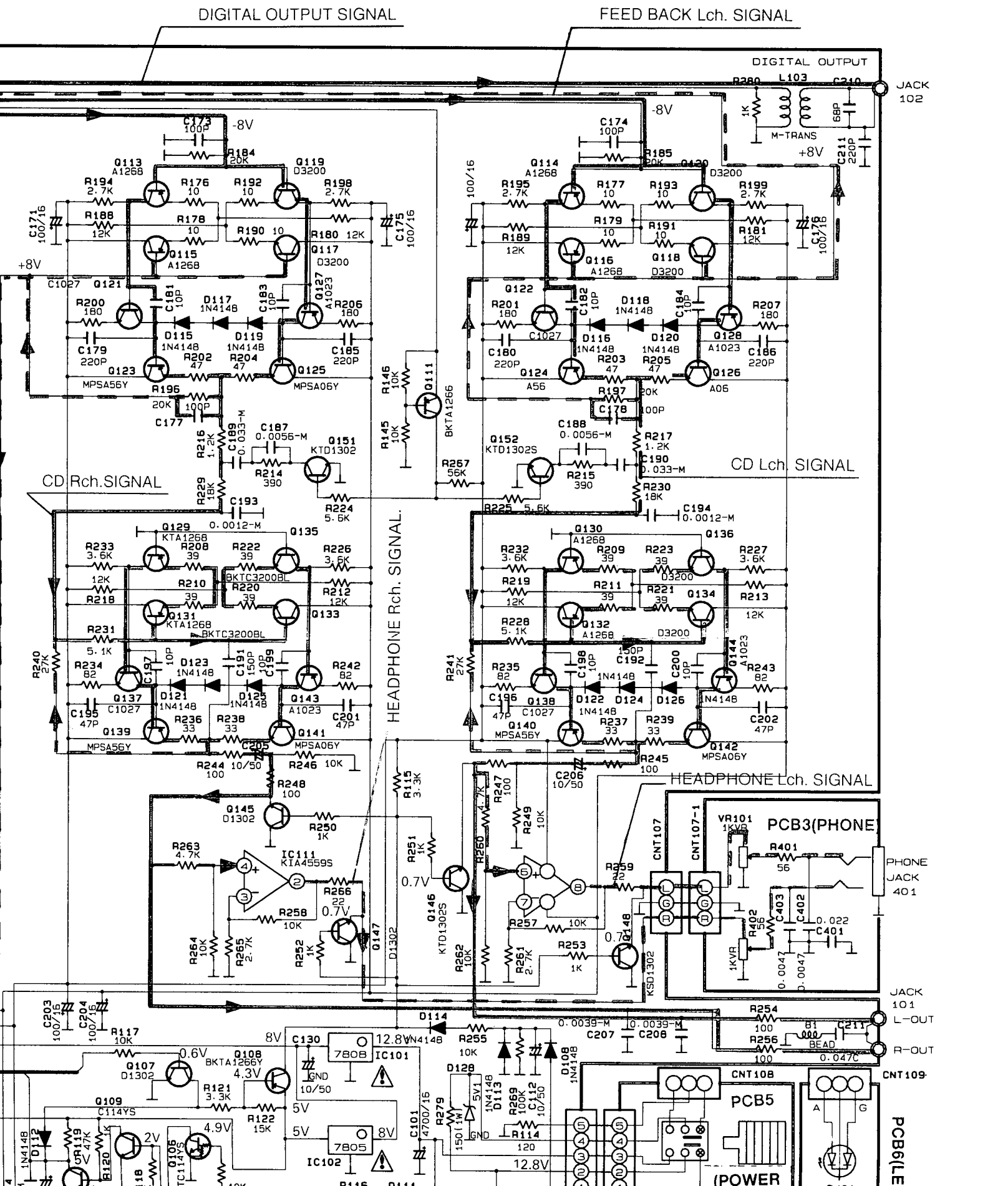
SCHEMATIC DIAGRAM

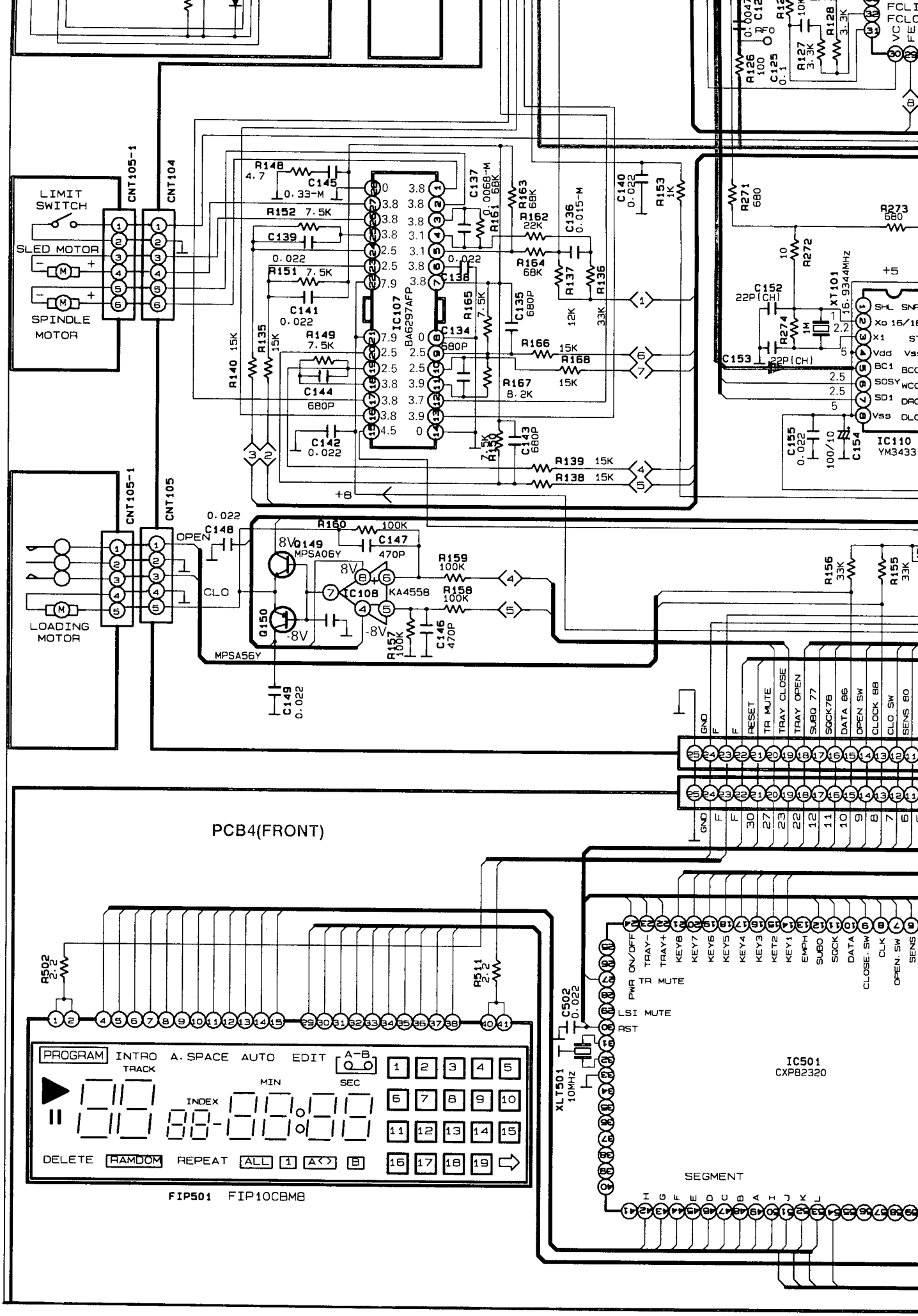


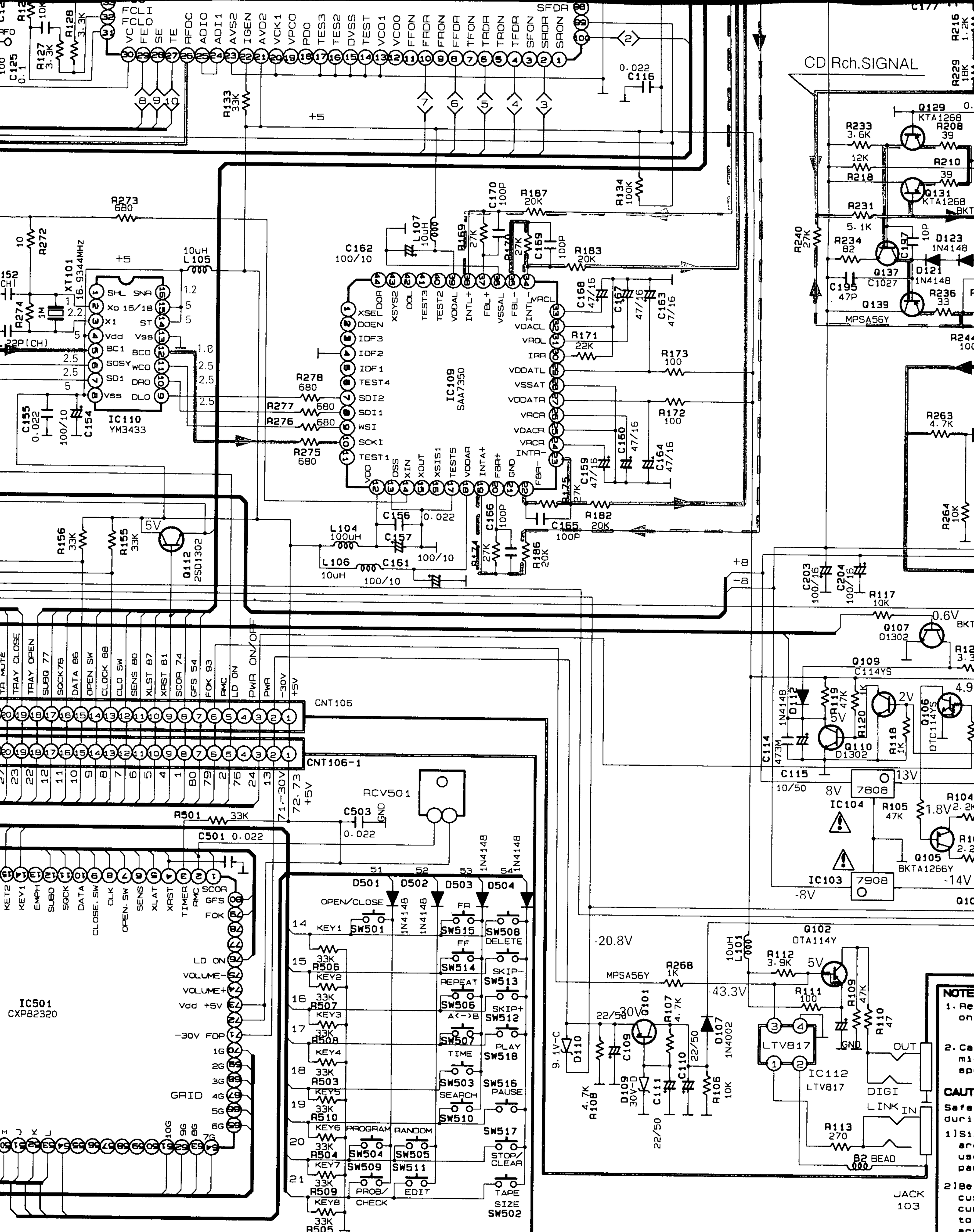
D	E	F	G	H


PCB1(MAIN)
DIG
CLV SERVO
DIGITAL SIGNAL PROCESSOR.
SERVO. EFM COMPARATOR
FOCUS/TRACKING/SLED
CXD2515Q
IC106
FEED BACK Rch. SIGNAL
CD Rch.SIGNAL
IC109
SAA7350
IC110
YM3433
CNT106

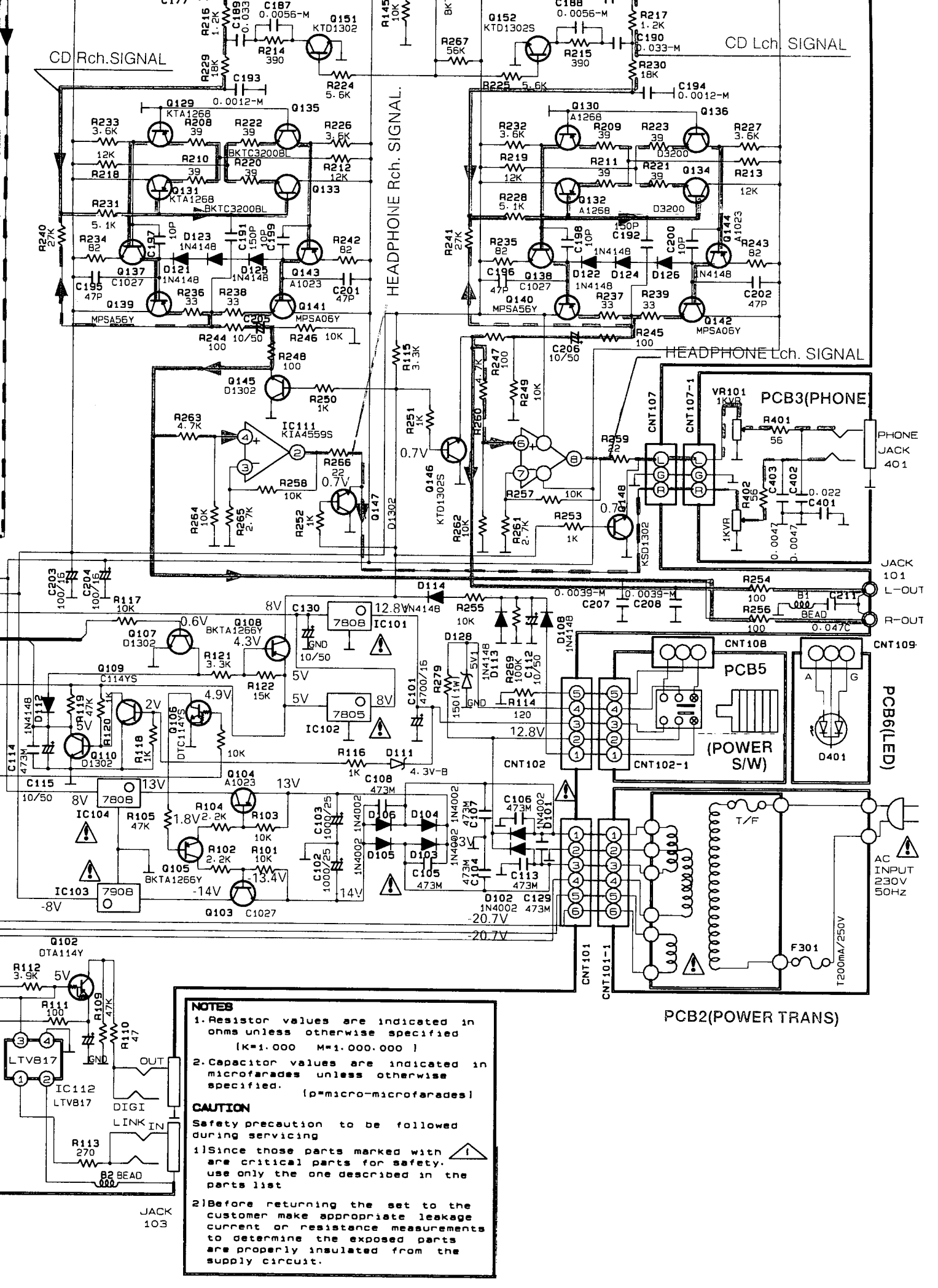
	H	I	J	K


DIGITAL OUTPUT SIGNAL
FEED BACK Lch. SIGNAL
DIGITAL OUTPUT
JACK 102
M-TRANS
CD Rch.SIGNAL
CD Lch. SIGNAL
HEADPHONE Rch. SIGNAL
HEADPHONE Lch. SIGNAL
PCB3(PHONE)
PHONE JACK 401
JACK 101
L-OUT
R-OUT
PCB5
CNT107
CNT107-1
CNT108
CNT109
IC101
IC102
IC111
7808
7805
-8V
+8V
8V
5V
0.6V
0.7V
2V
4.9V
4.3V
12.8V


LIMIT SWITCH
SLED MOTOR
SPINDLE MOTOR
LOADING MOTOR
CNT105-1
CNT104
CNT105
IC107 BA6297AFP
IC108 KA4558
IC110 YM3433
IC501 CXP82320
XT101 16.9344MHz
XLT501 10MHz
Q149 MPSA06Y
Q150 MPSA56Y
OPEN
CLO
+8
+5
-8V
PCB4(FRONT)
FIP501 FIP10CBM8
PROGRAM
INTRO
A. SPACE
AUTO
EDIT
A-B
TRACK
MIN
SEC
INDEX
DELETE
RANDOM
REPEAT
ALL
PWR ON/OFF
TR MUTE
LSI MUTE
RST
SEGMENT



CD Rch.SIGNAL
IC109
SAA7350
IC110
YM3433
XT101
16.9344MHz
Q112
2SD1302
CNT106
CNT106-1
RCV501
IC501
CXP82320
GRID
D501
D502
D503
D504
OPEN/CLOSE
SW501
FR
SW515
SW508
DELETE
FF
SW514
SKIP-
REPEAT
SW513
SW506
SKIP+
A<->B
SW512
SW507
PLAY
TIME
SW518
SW503
SW516
SEARCH
PAUSE
SW510
PROGRAM
RANDOM
SW517
SW504
SW505
STOP/
CLEAR
SW509
SW511
PROG/
CHECK
EDIT
TAPE
SIZE
SW502
KEY1
KEY2
KEY3
KEY4
KEY5
KEY6
KEY7
KEY8
Q129
KTA1268
Q131
KTA1268
Q137
C1027
Q139
MPSA56Y
D123
1N4148
D121
1N4148
Q107
D1302
Q109
C114YS
Q110
D1302
Q106
DTC114YS
IC104
7808
IC103
7908
Q105
BKTA1266Y
Q102
DTA114Y
MPSA56Y
Q101
D110
9.1V-C
D109
30V-D
D107
1N4002
IC112
LTV817
LTV817
OUT
DIGI
LINK
IN
JACK
103
B2 BEAD
-20.8V
-43.3V
+8
-8
-8V
-14V
13V
8V
NOTE
CAUT



NOTES

1. Resistor values are indicated in ohms unless otherwise specified
   [K=1.000 M=1.000.000]
2. Capacitor values are indicated in microfarades unless otherwise specified.
   [p=micro-microfarades]

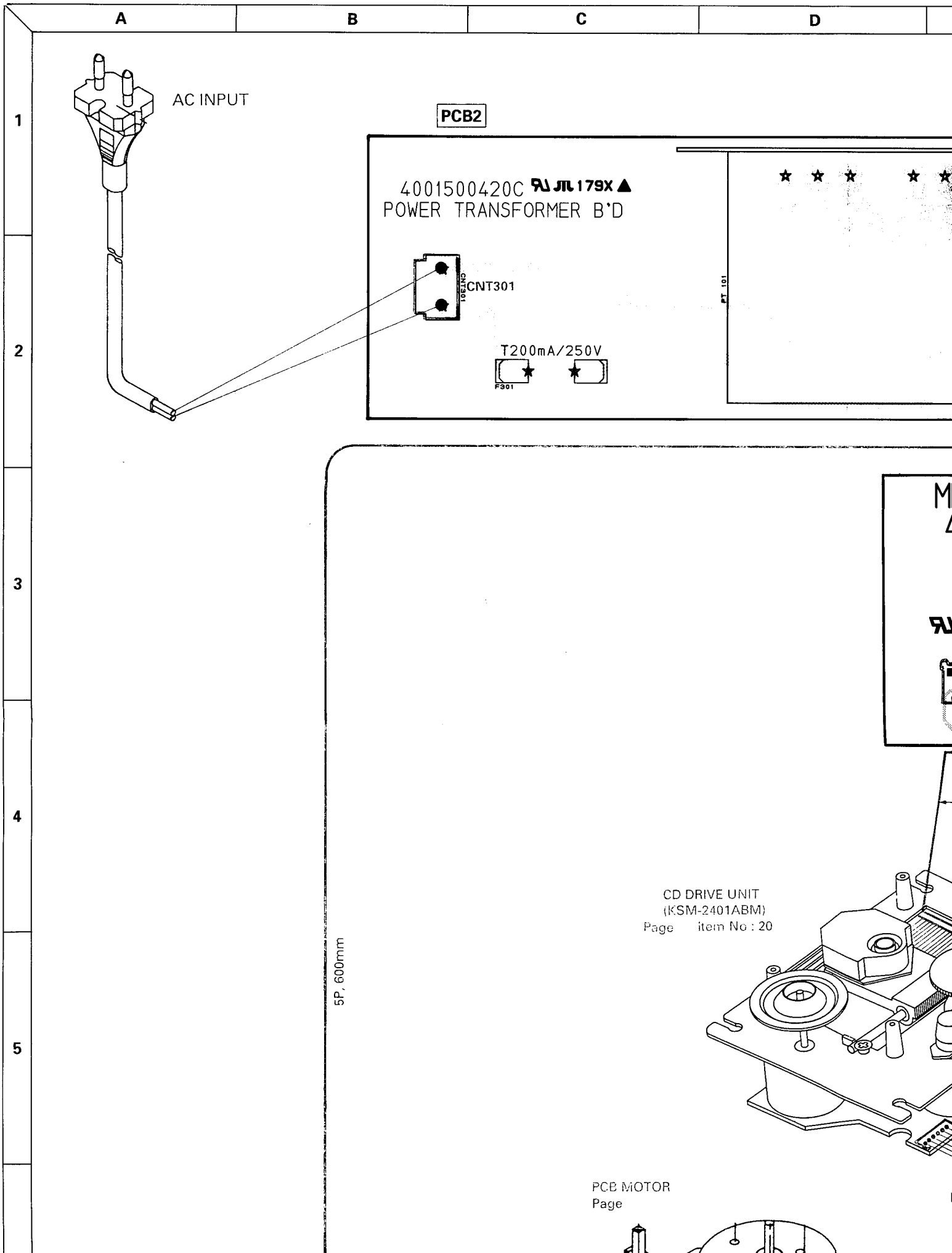
CAUTION

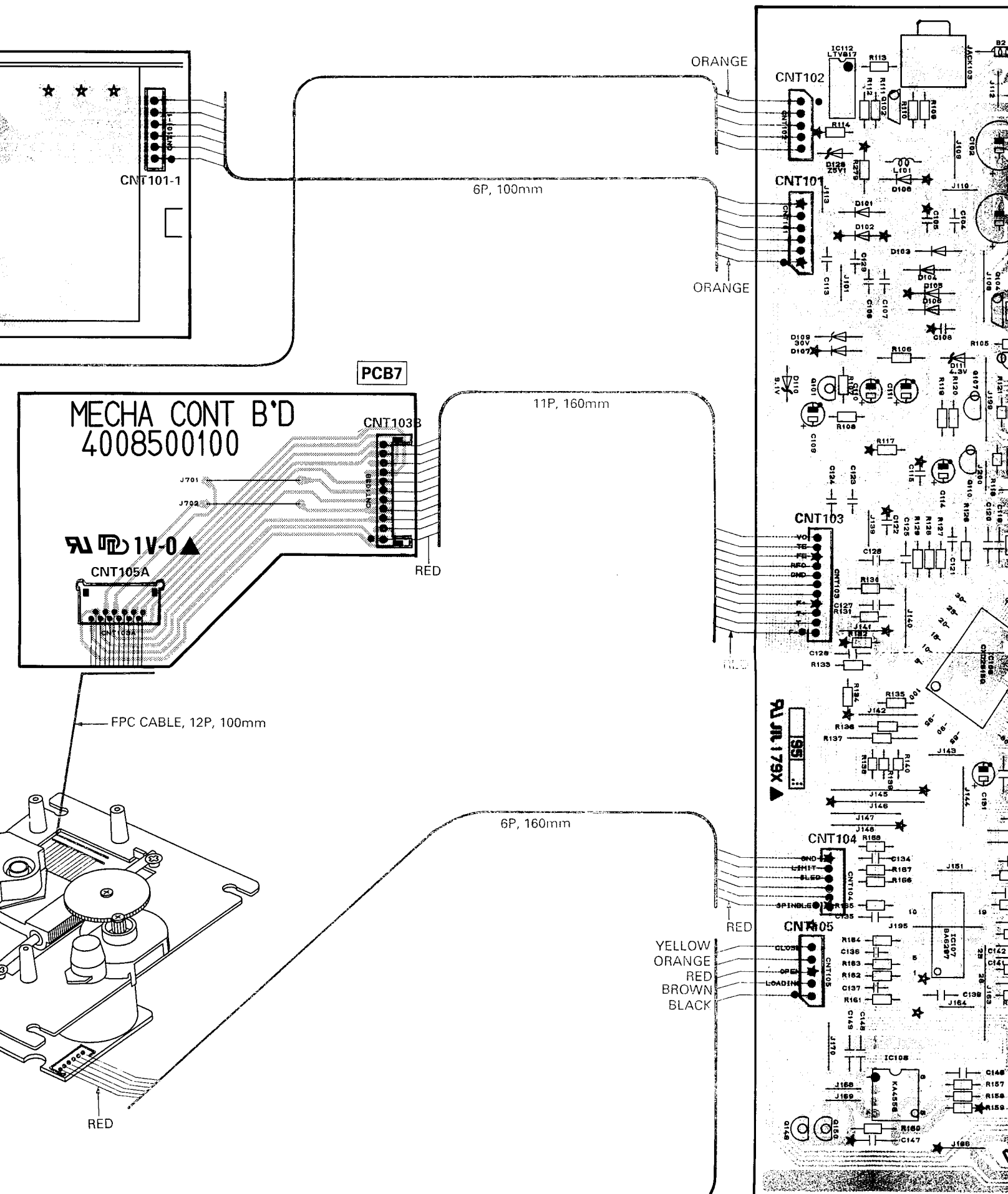
Safety precaution to be followed during servicing

1) Since those parts marked with ⚠ are critical parts for safety. use only the one described in the parts list

2) Before returning the set to the customer make appropriate leakage current or resistance measurements to determine the exposed parts are properly insulated from the supply circuit.

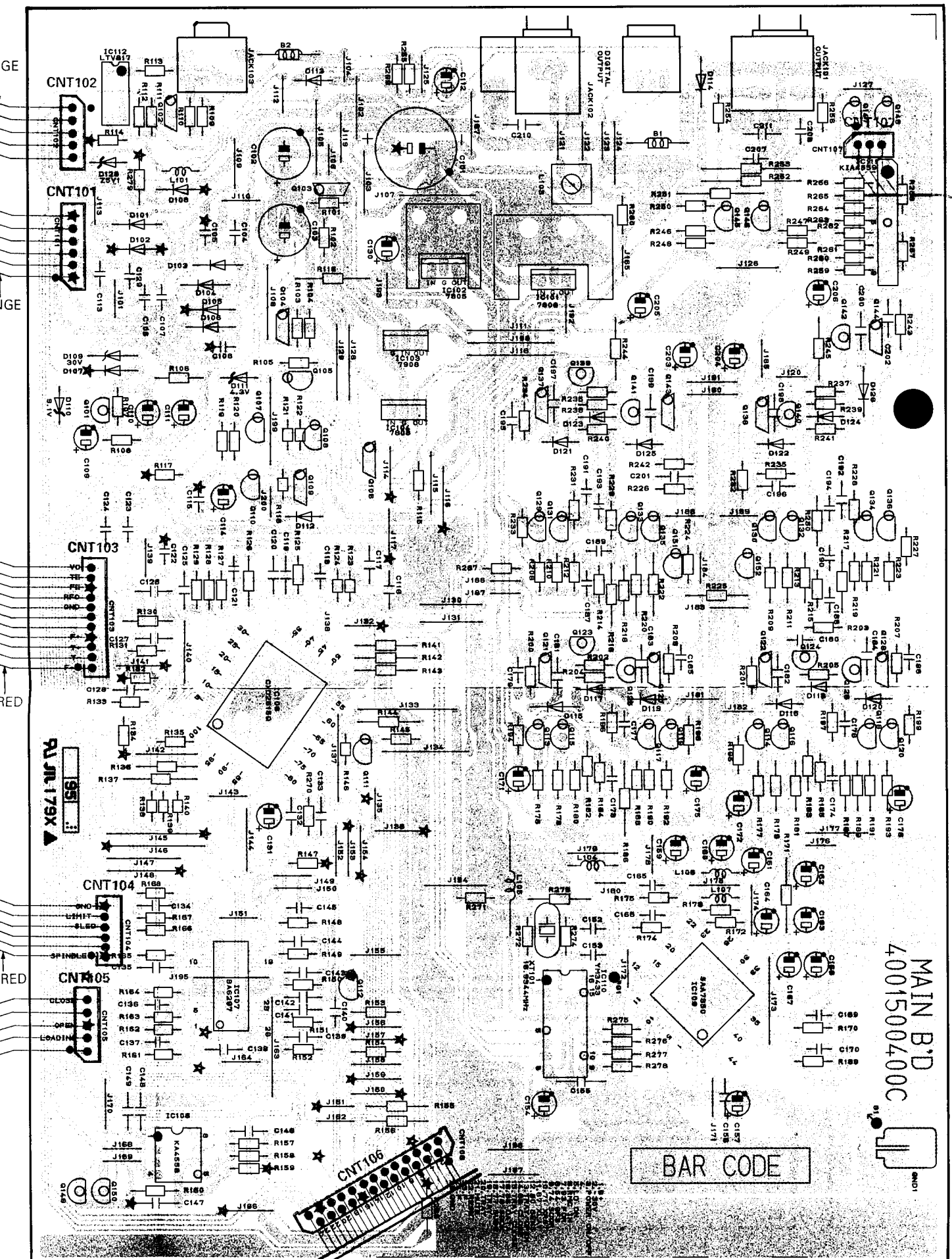
WIRING DIAGRAM

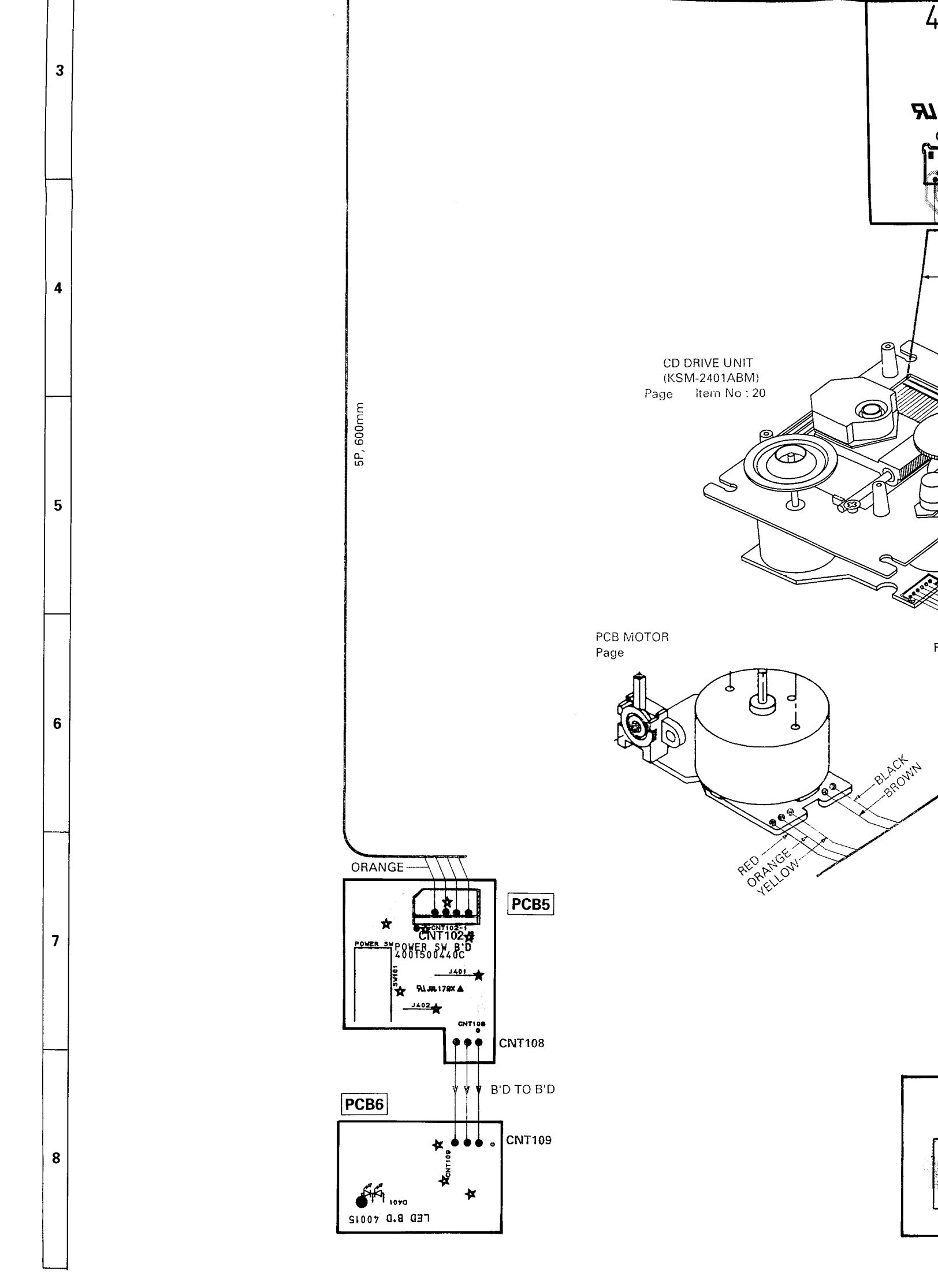


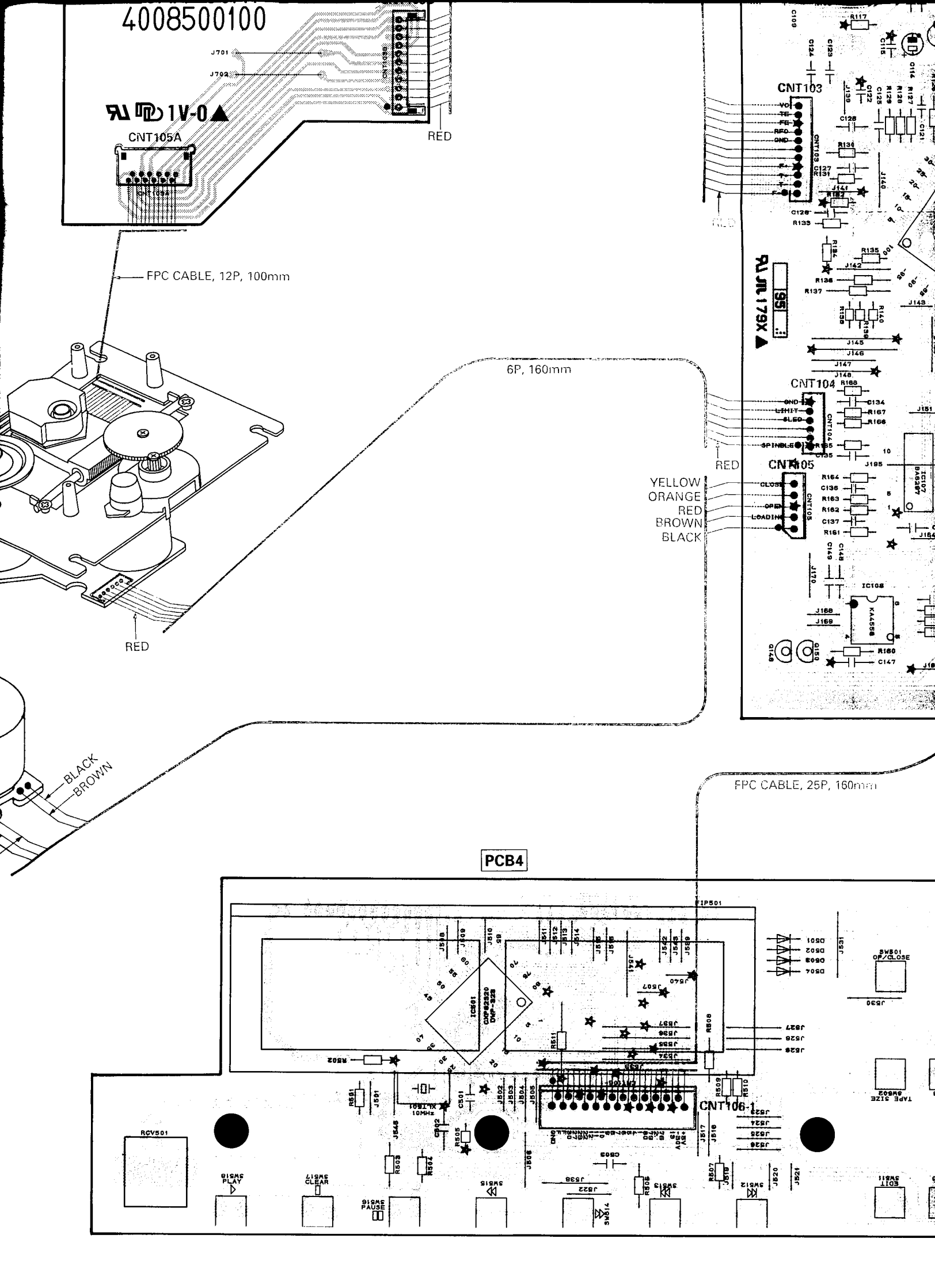

CNT101-1
ORANGE
6P, 100mm
ORANGE
CNT102
CNT101
PCB7
MECHA CONT B'D
4008500100
CNT103B
J701
J702
1V-0
CNT105A
11P, 160mm
RED
CNT103
FPC CABLE, 12P, 100mm
6P, 160mm
RED
CNT104
CNT105
YELLOW
ORANGE
RED
BROWN
BLACK
RED

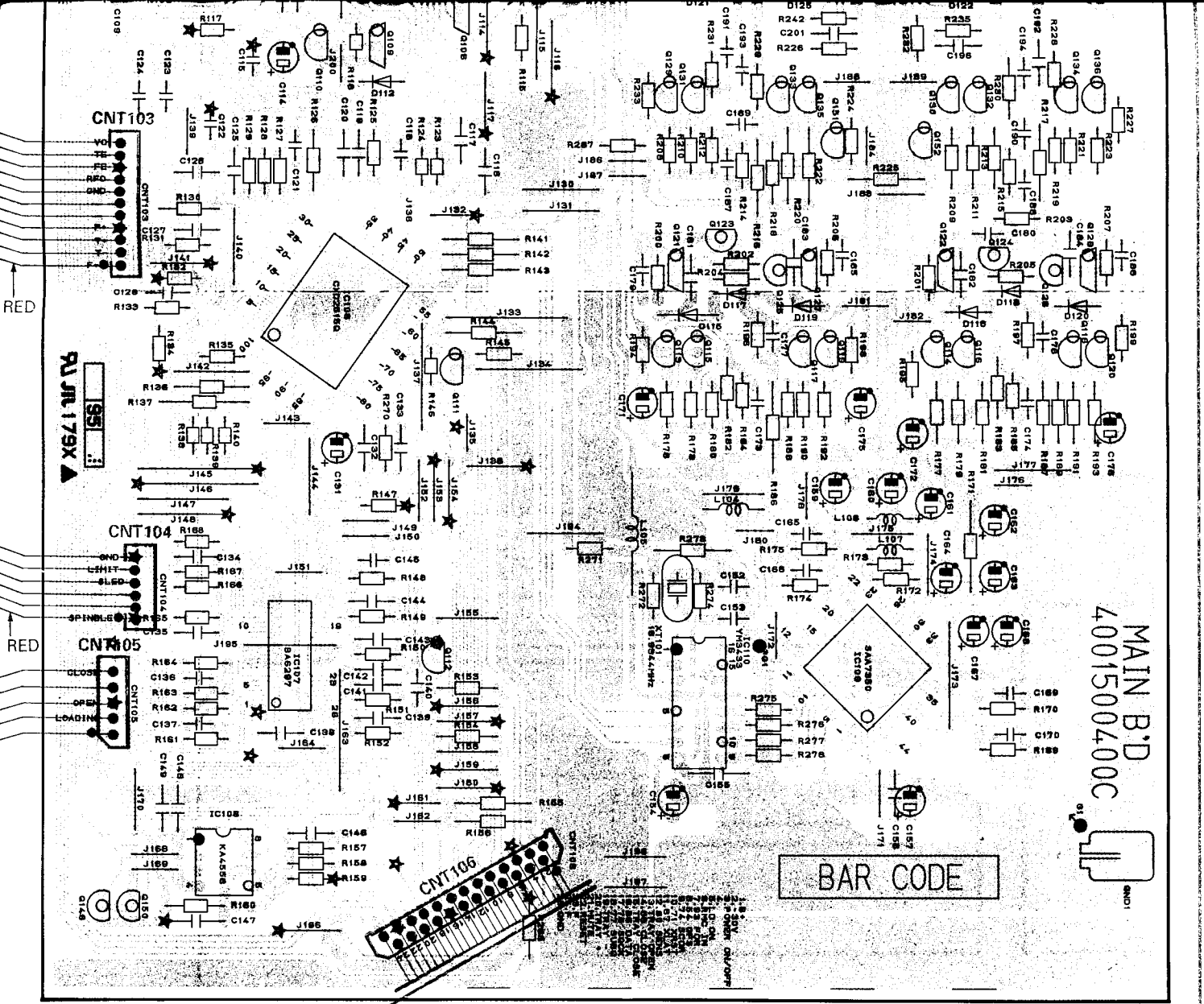
	H	I	J	K

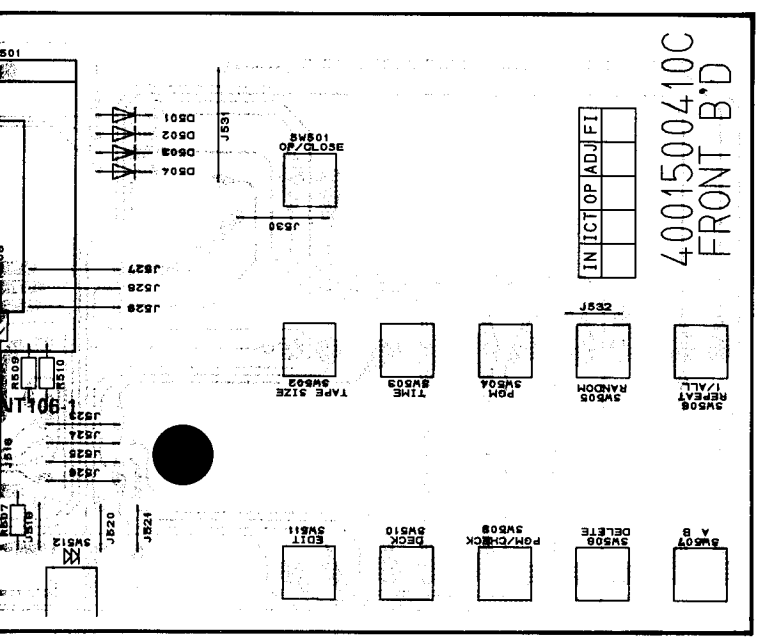
PCB1

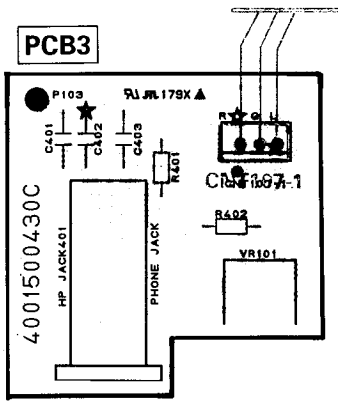

CNT102
CNT101
CNT103
CNT104
CNT105
CNT106
BAR CODE
MAIN B'D
400150040OC


CD DRIVE UNIT
(KSM-2401ABM)
Page Item No : 20
PCB MOTOR
Page
5P, 600mm
ORANGE
PCB5
CNT102
POWER SW B'D
4001500440C
CNT108
B'D TO B'D
PCB6
CNT109
BLACK
BROWN
RED
ORANGE
YELLOW


4008500100
J701
J702
CN7103B
94V-0
CNT105A
RED
FPC CABLE, 12P, 100mm
6P, 160mm
RED
YELLOW
ORANGE
RED
BROWN
BLACK
CNT103
CNT104
CNT105
RED
BLACK
BROWN
FPC CABLE, 25P, 160mm
PCB4
FIP501
CNT106-1
RCV501
SW516 PLAY
SW517 CLEAR
SW518 PAUSE
SW515
SW513
SW512
SW511 EJECT
SW502 TAPE SIZE
SW503 OPEN/CLOSE


MAIN B'D
4001500400C
CNT103
CNT104
CNT105
CNT106
BAR CODE
RED
RED
FPC CABLE, 25P, 160mm
3P, 300mm


FRONT B'D
4001500410C
SW501
OP/CLOSE
IN
ICT
OP
ADJ
F1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P103
CNT107-1
PHONE JACK
VR101