harman/kardon

Model FL8300

5 Disc Compact Disc Changer

SERVICE MANUAL

CONTENTS

harman/kardon, Inc.
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Woodbury, New York 11797

Rev1 3/2003

LASER BEAM SAFETY PRECAUTIONS

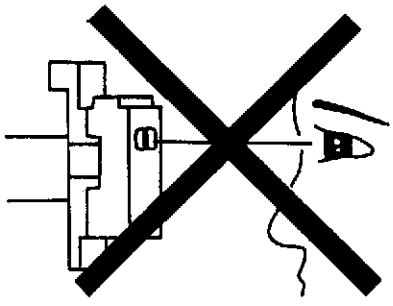
CLASS 1 LASER PRODUCT

CLASS 1
LASER PRODUCT

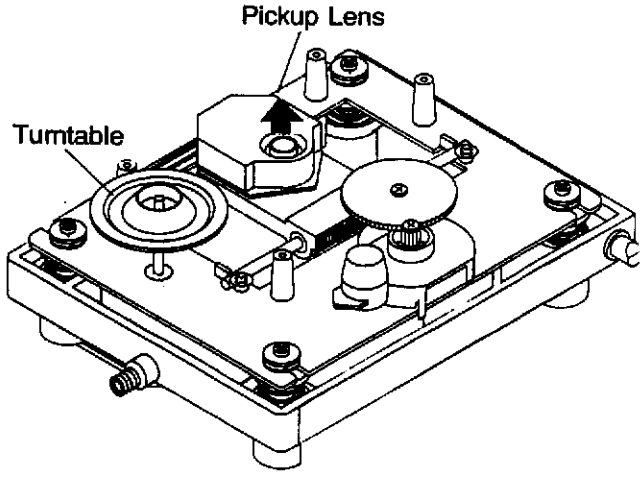
CAUTION
Invisible laser radiation when the unit is open. DO not stare into beam.

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.

Fig. 1

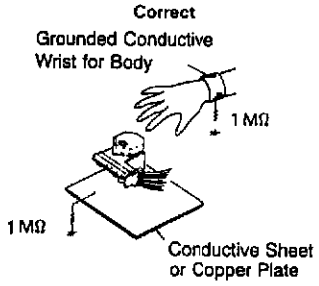


Fig. 2

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

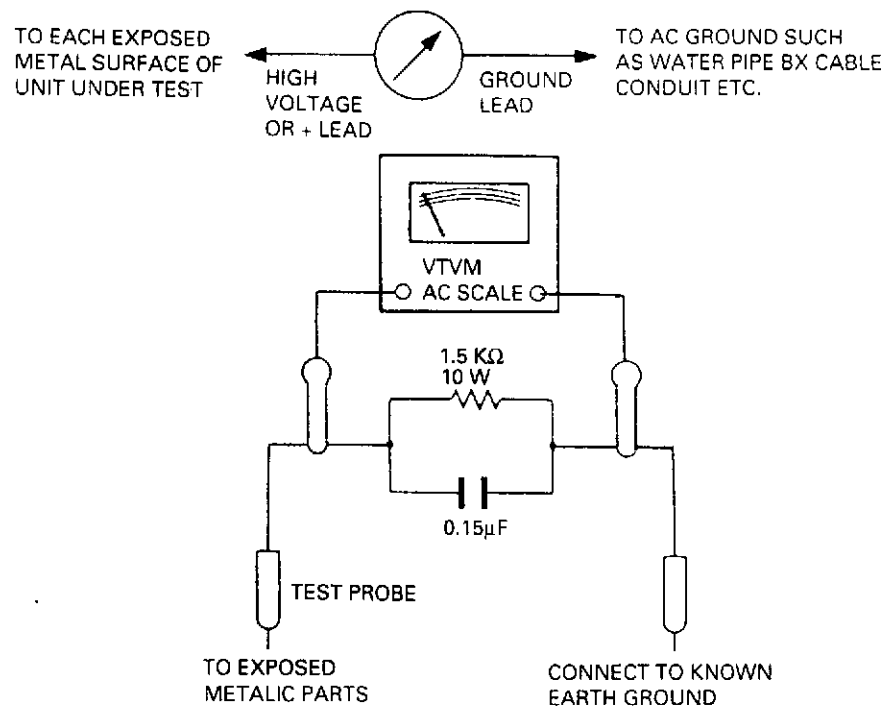
Before returning the unit to the user, perform the following safety checks:

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 120-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 rate	4.3218 Mbit/sec
Transmission on clock	16.9344 MHz
Error correction	CIRC C1, C2 Double correction

Pickup

System	Object lens drive type optical pickup
Object lens drive system	2 Dimensional parallel drive type
Optical source	Semiconductor laser
Wave length	760-800 nm
Tracking system	3 Beam tracking servo type

Others

D/A converter	1 bit (Bitstream Conversion)
Power requirements	USA and Canada Version: 120 V AC, 60 Hz Europe Version: 230 V AC, 50 Hz
Power consumption	12 W
Dimensions (HxWxD)	95 × 440 × 300 mm
Weight	6.08 kg

Electrical

*** Preparations**

- measuring methods in confirmity with EIAJ CP-307, CCIR 468-3.
- Reference level: 0 dB(LINE OUT 2 V).
- Test disc: SONY CD3 YEDS 7, A.BEX TCD 725.

Description		Signal	Track	Unit	Norminal	Limit	Test Disc
Frequancy Response		20~20000 Hz	2~13	dB	±0.5	±1	SONY CD3 YEDS 7
Signal to Noise Ratio (Weighted JIS A)		1 kHz	23	dB	>95	>90	
Dynamic Range (Weighted JIS A)		1 kHz, 60 dB	20	dB	>90	>85	
Total Harmonic Distortion at 0 dB (Filter 30 kHz)		100 Hz	4	%	≤0.08	≤0.1	
		1 kHz	7	%	≤0.04	≤0.05	
		20 kHz	13	%	≤0.1	≤0.15	
Channel Separation (Filter 30 kHz)		100 Hz	29, 33	dB	≥82	≥80	
		1 kHz	30, 34	dB	≥82	≥80	
		10 kHz	31, 35	dB	≥80	≥78	
		20 kHz	32, 36	dB	≥76	≥73	
Channel Unbalance		1 kHz	7	dB	±0.2	±0.5	
Output Voltage		1 kHz	7	V	2±0.3	2±0.5	
De-emphasis		1 kHz	39	dB	-0.37±0.2	-0.37±0.3	
		5 kHz	40	dB	-4.53±0.3	-4.53±0.5	
		16 kHz	41	dB	-9.04±0.5	-9.04±1.0	
Disc Defecte	Back Dot		10~15	μm	≥700	≥600	A.BEX TCD 725
	Inetrrupt		3~9	μm	≥800	≥700	
	Fingerprint		17~19	μm	ALL	ALL	

Environmetal

Test to specification

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

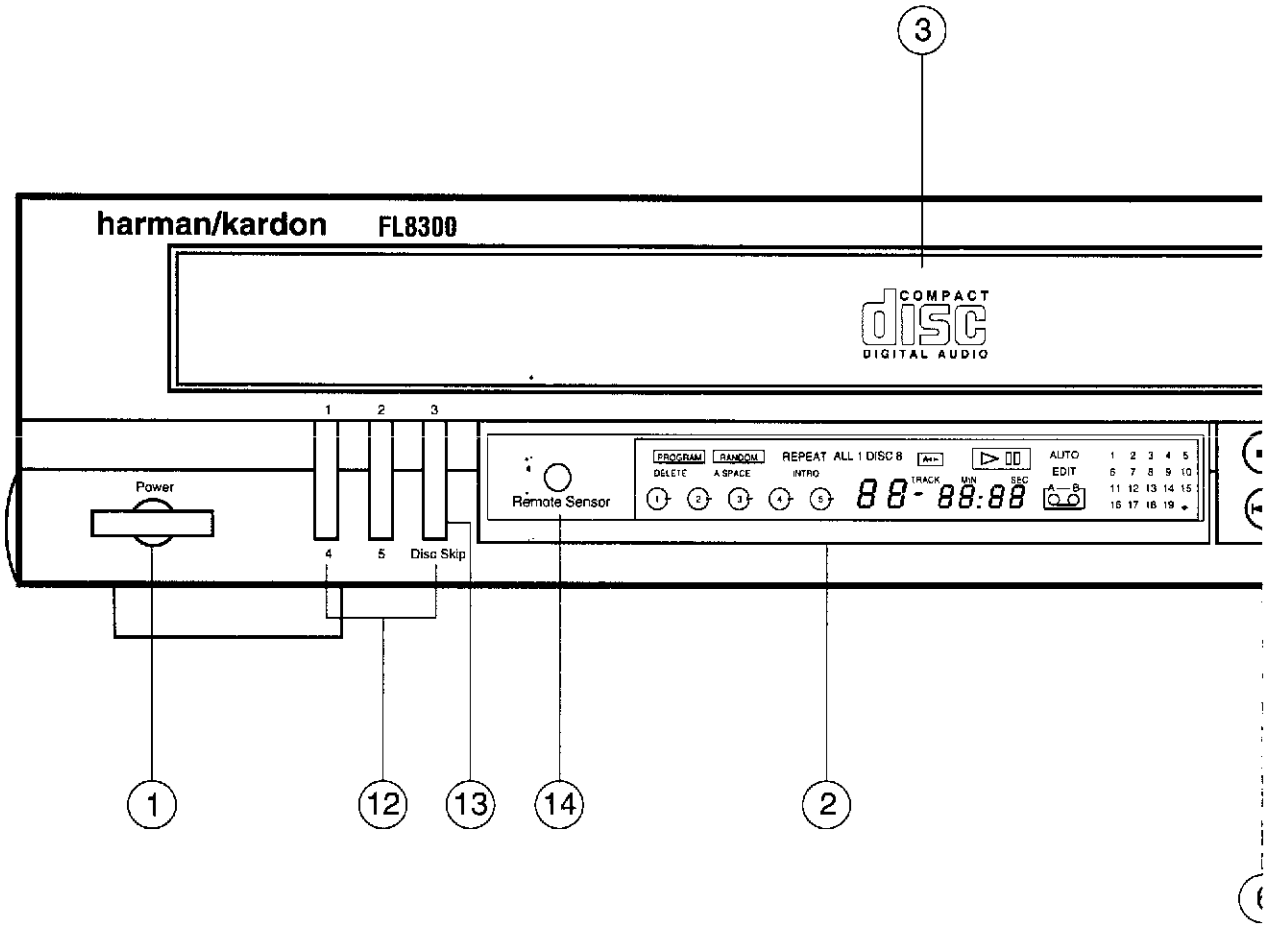
Operation

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

Storage

Temperature test : 48 hours each at -40° F (–40° C) and 149° F (65° C).
Humidity test : 40° C, 95% relative humidity.

CONTROL AND FUNCTIONS



1. POWER SWITCH
Press the POWER switch to turn this unit on and press it again to turn it off. For system operation, plug the AC input cord into the switched AC outlet, keep the power switch ON and control power ON/OFF with the main POWER switch on the amplifier or receiver.

2. MULTI-FUNCTION DISPLAY
This display shows the corresponding information according to each mode.

3. DISC TRAYS (1 - 5)
One disc per tray can be loaded with the labelled side up.

4. PLAY/PAUSE BUTTON (▶II)
This button is used for starting play, pausing play at the beginning of a track or interrupting play.

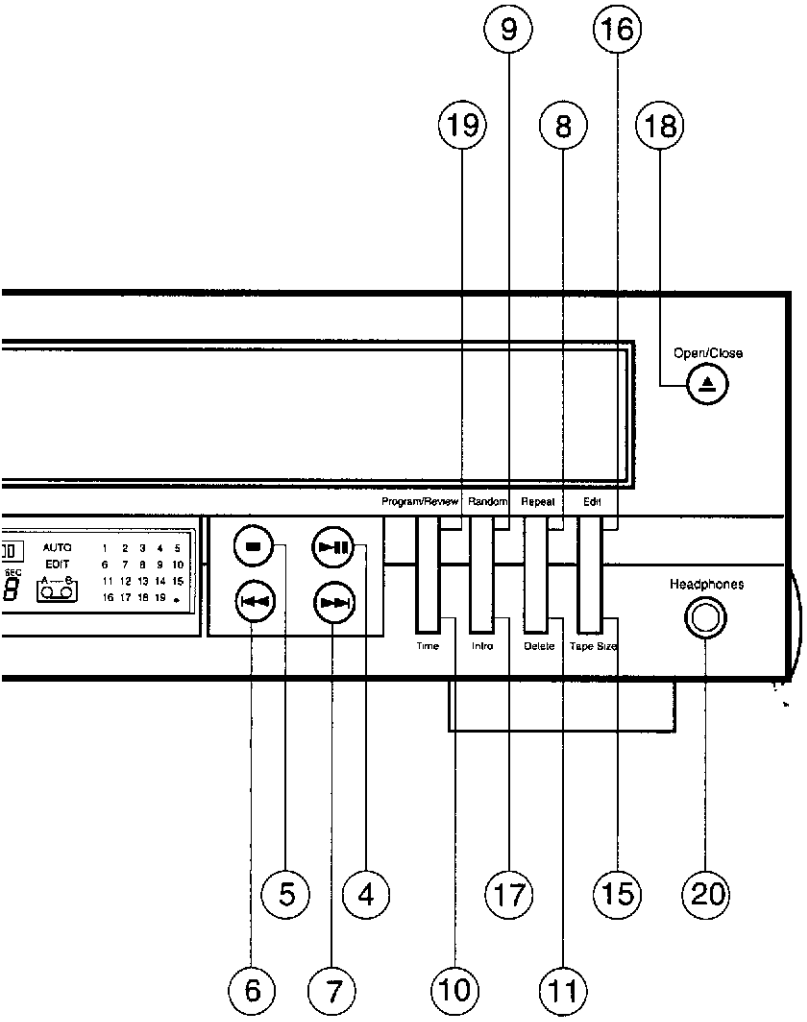
5. STOP/CLEAR BUTTON (■)
This button is used for stopping play, clearing programmed selections or recovering the deleted selections.

6. BACKWARD SKIP/ SEARCH BUTTON (I◀◀)
This button is used for replaying from the beginning of the current track, returning to a previous track or searching for a particular passage in fast reverse.

7. FORWARD SKIP/ S BUTTON (▶▶I)
This button is used for movi the next track or searching particular passage in fast fo

8. REPEAT BUTTON
This button is used for repe track, one disc or all discs.

9. RANDOM PLAY BU
This button is used to let the automatically select and pla randomly on each CD or rar between discs and tracks.



FORWARD SKIP/ SEARCH ITTON (►►I)

s button is used for moving on to next track or searching for a ticular passage in fast forward.

REPEAT BUTTON

s button is used for repeating one k, one disc or all discs.

RANDOM PLAY BUTTON

s button is used to let the unit omatically select and play tracks domly on each CD or randomly ween discs and tracks.

10. TIME BUTTON

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

11. DELETE BUTTON

This button is used for deleting the undesired tracks or discs.

12. DISC SELECTOR BUTTONS

These buttons are used for selecting the disc to be played.

13. DISC SKIP BUTTON

Each time this button is pressed to load or unload the disc, the carousel will rotate to the next tray position clockwise.

14. INFRARED RECEIVER WINDOW

This receives the infrared signals transmitted by the remote control and converts it into the electrical signal to control this unit.

15. TAPE SIZE BUTTON

This button is used for selecting the tape length.

16. EDIT BUTTON

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

17. DISC INTRO BUTTON

This button is used for playing the first 10 seconds of each track or the first track on CDs.

18. OPEN/CLOSE BUTTON

This button is used for opening and closing the tray.

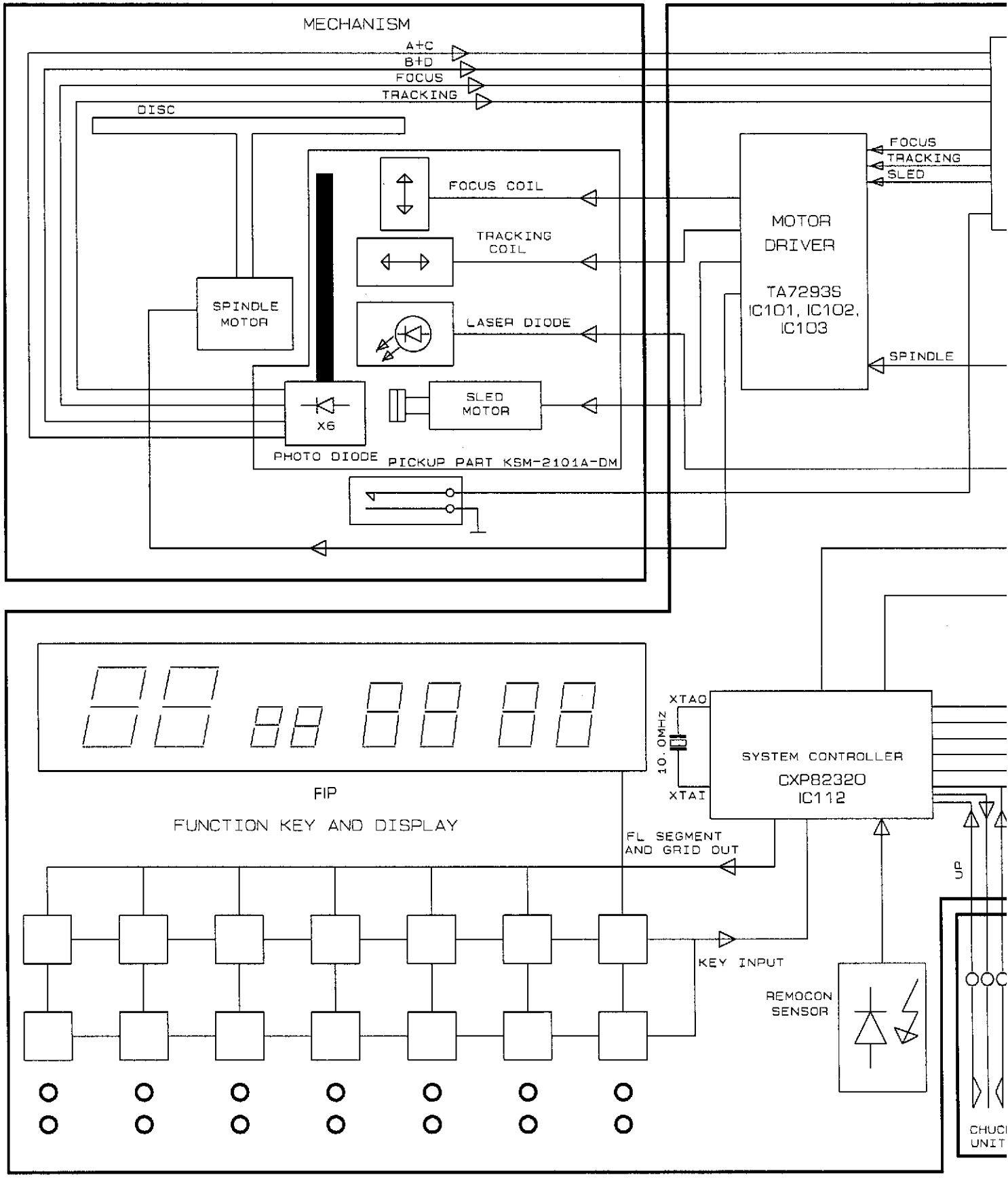
19. PROGRAM/REVIEW BUTTON

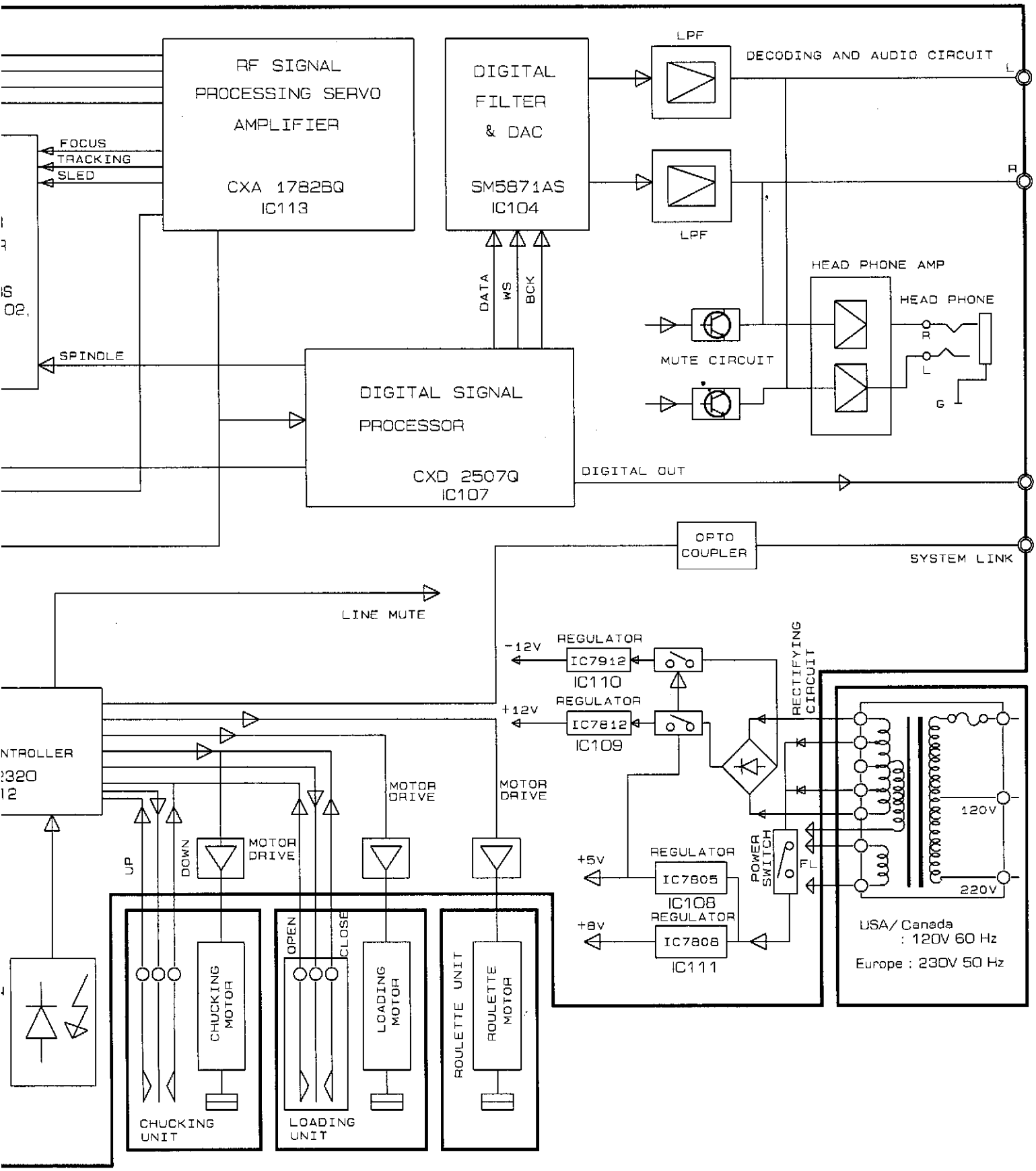
This button is used for programming your favorite tracks or discs or reviewing the programmed selections.

20. HEADPHONE JACK

This is used for listening with headphones.

BLOCK DIAGRAM





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 refering to the "EXPLODED VIEW II" on page 31 (See Fig. 3).

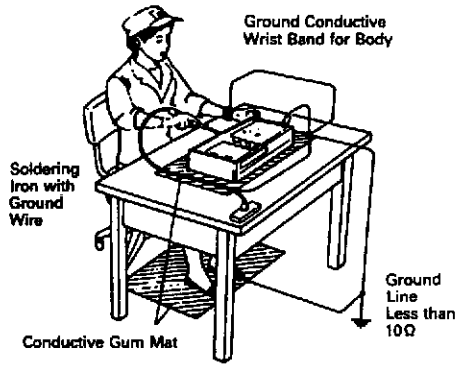


Fig. 3

2. Remove four screws S12 (See Fig. 4).

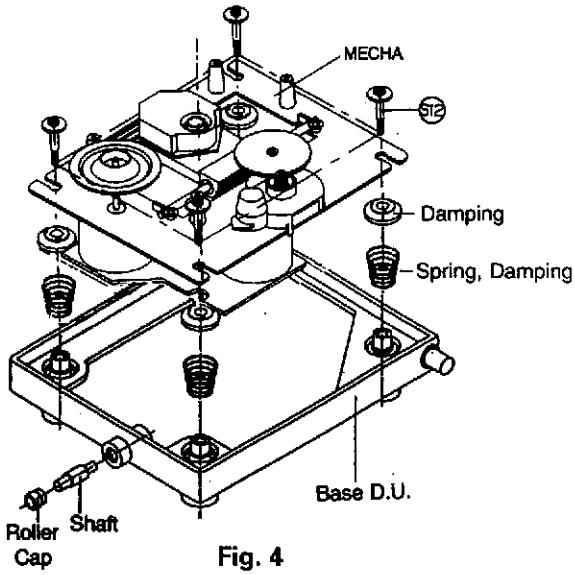


Fig. 4

3. Remove the gear A (See Fig. 5).
4. Pull out the slide shaft.

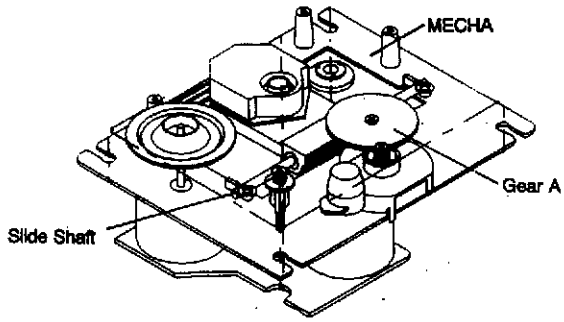


Fig. 5

5. Remove the pickup (See Fig. 6).

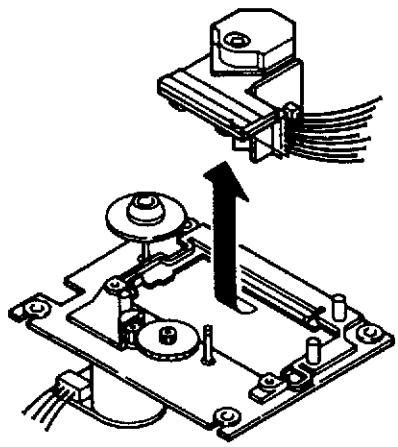


Fig. 6

6. After you connect the wire connector, desolder and remove the shorting tab (See Fig.7).

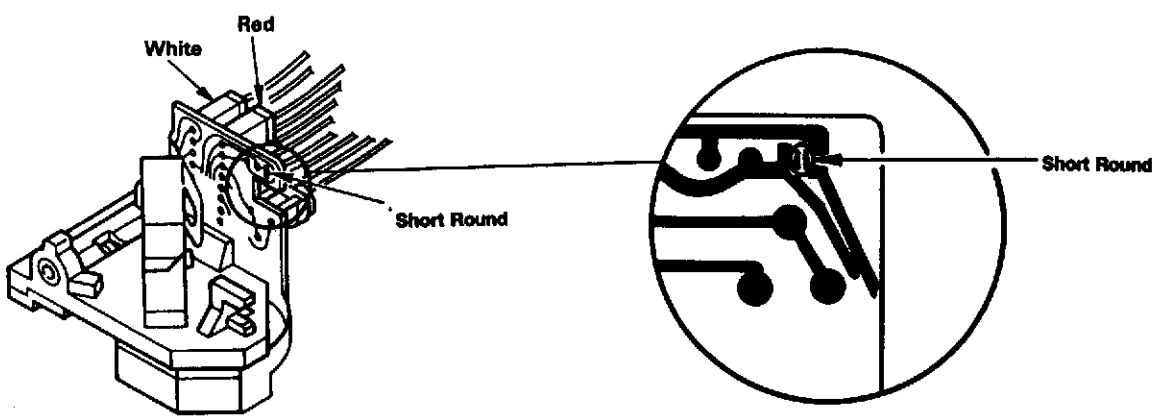


Fig. 7

7. Refer to the "EXPLODED VIEW II" of the compact disc mechanism on page 31 for detailed illustrations.

OPERATION CHECK

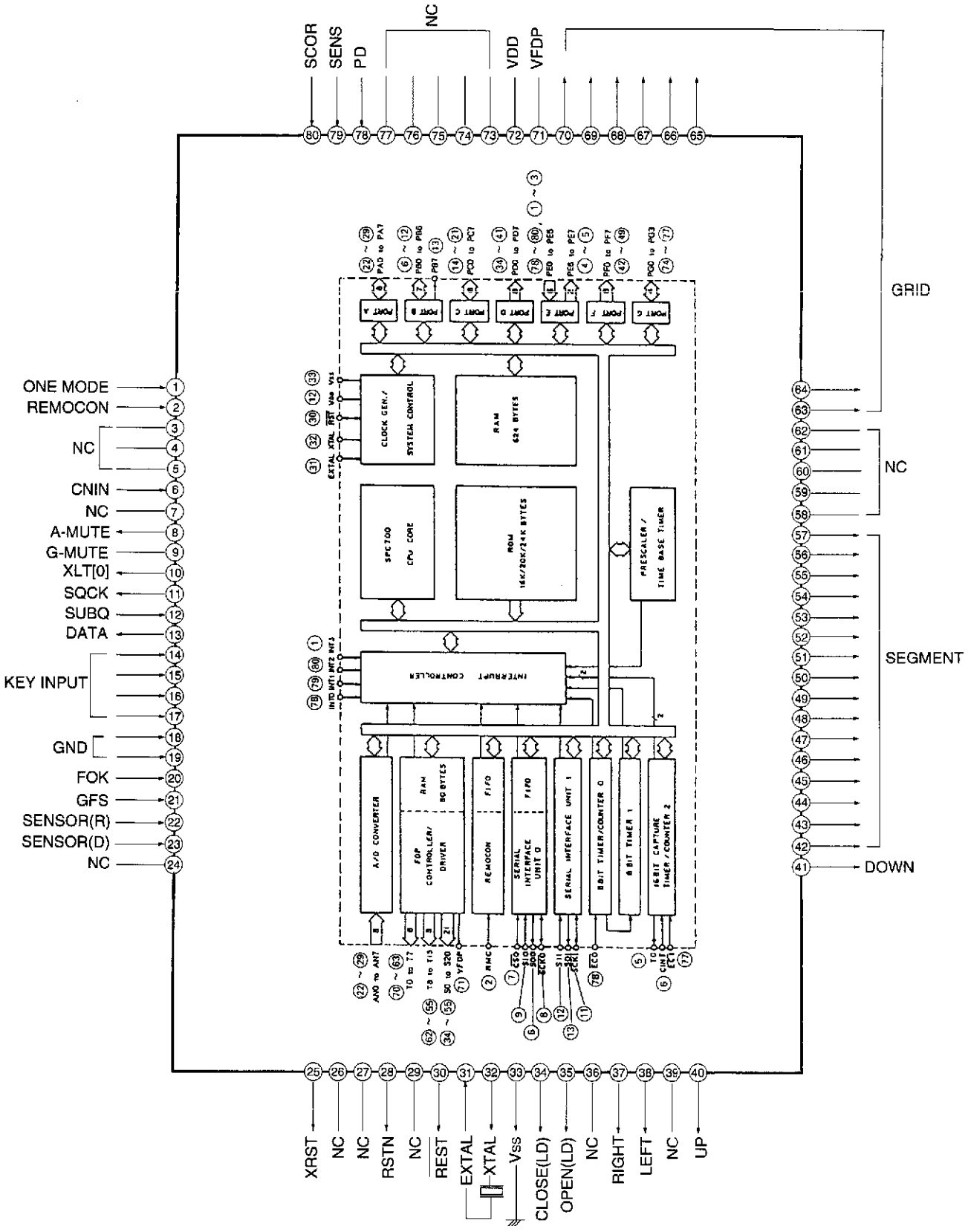
When the power switch is turned on after the chucking arm is removed, observe the objective lens and check the following. (The optical system block should be at the lead-in position when it is checked.)

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. CPU(IC112 : CXP82320-322) EXPLANATION

1-1. Pin Description & Block Diagram



1-2. Pin Functions

Pin No.	Symbol	Description
1	ONE MODE	Test mode for production.
2	REMOCON	Input for remocon data.
3 - 5	NC	Not used ! (It should be left to open.)
6	CNIN	Signal input for automatic tracking adjustment from CXD2507.
7	NC	Not used ! (It should be left to open.)
8	A-MUTE	Output for audio mute.
9	G-MUTE	Not used ! (It should be left to open.)
10	XLT-0	Serial latch data output to CXD2507.
11	SQCK	Clock data output for subcode-Q readout to CXD2507.
12	SUBQ	Subcode-Q data input from CXD2507.
13	DATA	Serial data output to CXD2507.
14 - 17	KEY INPUT	Data input for key scan.
18 - 19	GND	Ground.
20	FOK	FOK data from CXA1782BQ.
21	GFS	GFS data from CXA1782BQ.
22	SENSOR-R	Roulette sensor data input from mecha.
23	SENSOR-D	Disc sensor data input from mecha.
24	NC	Not used ! (It should be left open.)
25	XRST	Output fot resetting CXD2507.
26 - 27	NC	Not used ! (It should be left open.)
28	RSTN	Output for resetting SM5871AS.
29	NC	Not used ! (It should be left open.)
30	RST	Input for resetting CPU.
31	EXTAL	Input of 10 MHz oscillator crystal.
32	XTAL	output of 10 MHz oscillator crystal.
33	VSS	Ground
34	CLOSE-LD	Output for driving motor to close the tray.
35	OPEN-LD	Output for driving motor to open the tray.
36	NC	Not used ! (It should be left open.)
37	RIGHT	Output for roulette motor to rotate the disc platter right.
38	LEFT	Output for roulette motor to rotate the disc platter left.
39	NC	Not used ! (It should be left open.)
40	UP	Output for chucking motor.
41	DOWN	Output for chucking motor.
42 - 57	SEGMENT	Segment signal output.
58 - 62	NC	Not used ! (It should be left open.)
63 - 70	GRID	Grid signal output.
71	VFDP	-35 V power supply for F1 controller.
72	VDD	+5 V power supply for CPU.
73~77	NC	Not used ! (It should be left open.)
78	PD	Input signal for power down.
79	SENS	Sens signal input from CXD2507.
80	SCOR	Subcode-Q readout timing input from CXD2507.

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. 8 shows the APC circuit.
When the temperature rises and the optical output decreases, the monitor diode current (Is) decreases, the electric potential of IC113 pin 33 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.

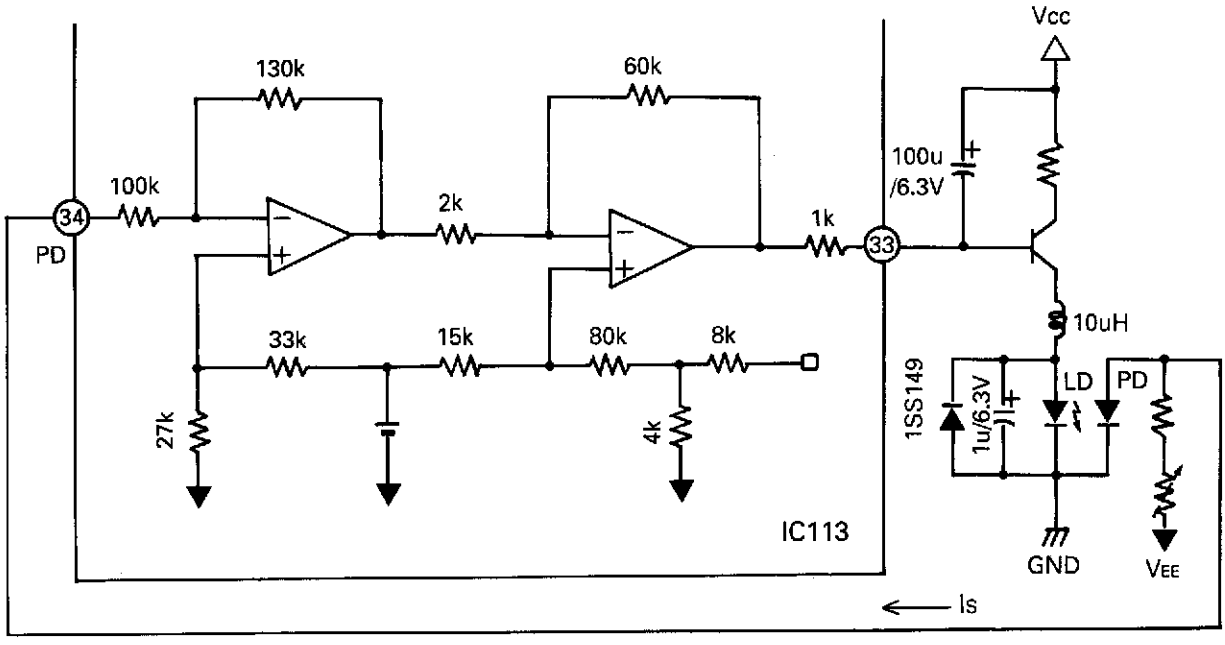
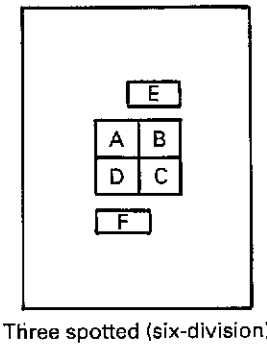


Fig. 8

3. FOCUS SERVO

3-1. Optical pickup (Fig. 9)

This set employs a three-beam optical pickup comprised of six division photodiodes, A through F as shown in Fig. 9. The four photodiodes (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 photodiodes (A+C and B+D) are compared by the differential amplifier in IC113 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. 9

3-2. Focus error detecting operation (Fig. 10)

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 photodiodes 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 photodiodes to vary.

Shown in Fig. 10 is the principle of the focus error detection.
The currents from the photodiodes (A+C and B+D) are applied to pins 35 and 36 of IC113 and converted to voltage by RF I-V amplifiers (1) and (2) included in IC113.

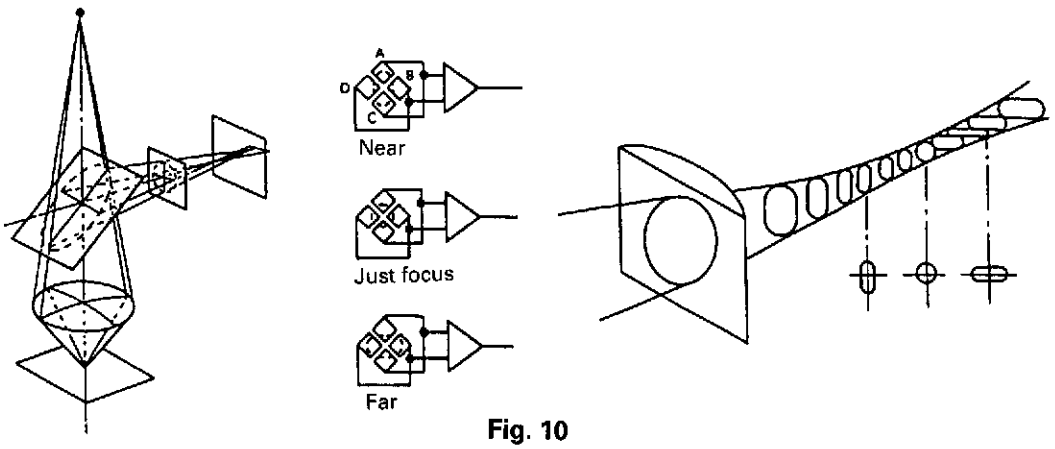


Fig. 10

3-3. Focus servo control operation (Fig. 11)

The focus error signal, after being converted to voltage by the RF I-V amplifier, is transmitted to the operation amplifier in the IC113 and output from pin 1.
When the disc to objective lens distance is in focus, the beam forms a true round. In this state, the beams applied to four elements of four division photodiodes become equal and thus the output provided then is 0(zero). When the disc to objective lens distance is too close (near focus), the beam is reflected divergently to form an oval in crosswise direction. In this state, the outputs provided from photodiodes A and C are higher than those from B and D, resulting in negative (–) output voltage. On the other hand, when the distance is too far (far focus), the beam is reflectd convergently to form an oval in longitudinal direction. Then the outputs from photodiodes B and D are higher, resulting in positive (+) output.
The focus error amplifier calculates the difference between output VA and VB of the RF I-V amplifier, and output current-voltage converted voltage of the photo diode (A+C-B-D). Fig. 11

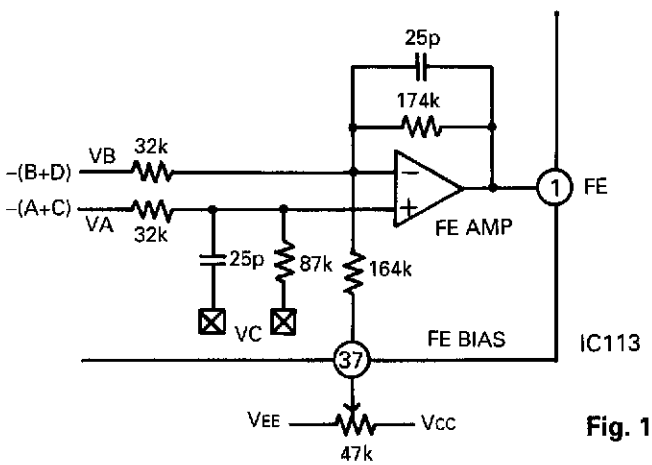


Fig. 11

The FE output voltage (low frequency) is VFE=5.4×(VA-VB)=(iPD2-iPD1)×315 kΩ.
Be aware that the rotation of the focus bias volume has reversed for the usual CD RF IC.

3-4. Tracking error detection system (Fig. 12)

Fig. 12 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 photodiodes A, B, C and D and two sub-beams by E and F respectively.

Fig. 12-A shows the on-track state. As both auxiliary beams 1 and 2 are slightly on the track in this state, the outputs of photodiodes E and F are equal and the tracking signal is 0(zero). When the track is shifted to the left (Fig. 12-B), the auxiliary beam 1 is off the pit. This allows more light to be received by the photodiode E, resulting in positive (+) tracking signal output. On the other hand, when the track is shifted to the right (Fig. 12-C), the amount of light received by the photodiode F increases, resulting in negative (-) tracking signal output. And these extreme signals are detected as tracking error signals.

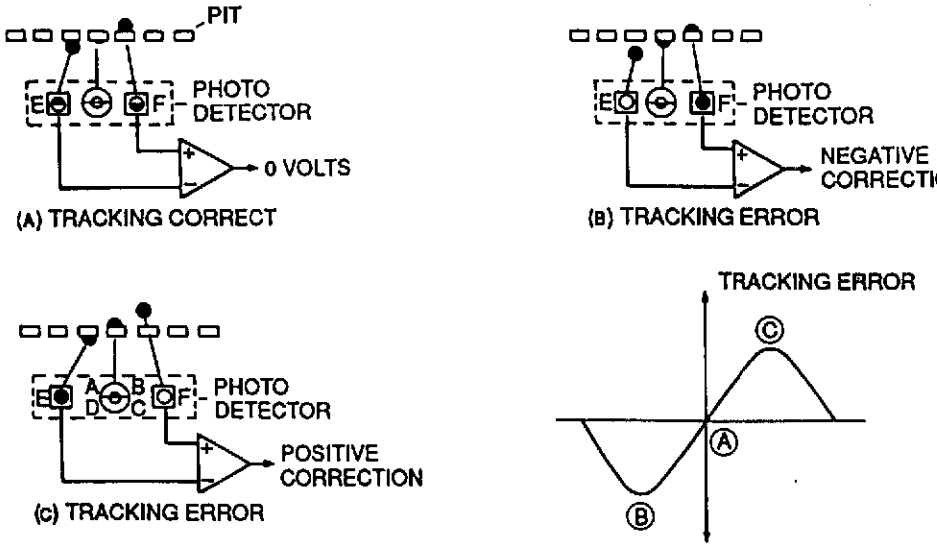


Fig. 12

3-5. Tracking servo control operation (Fig. 13)

The photo diode currents input at E and F pins are each current-voltage converted by the E I-V and F I-V amplifiers.

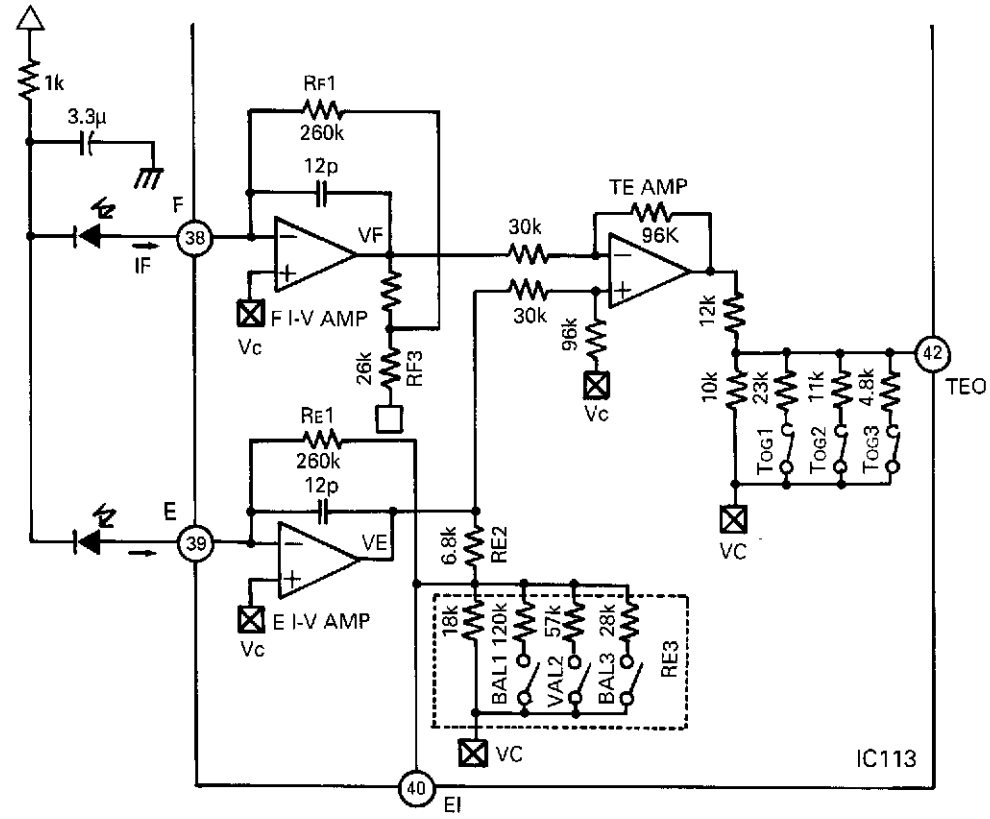


Fig. 13

IC113 tracking block has built-in circuits for balance and gain adjustments to enable software based automatic adjustment.

The balance adjustment is performed by varying the combined resistance value of the T-configured feedback resistance at E I-V AMP.

F I-V AMP feedback resistance = $R_{F1}+R_{F2}+(R_{F1}\times R_{F2})/R_{F3}=403\ k\Omega$

E I-V AMP feedback resistance = $R_{E1}+R_{E2}+(R_{E1}\times R_{E2})/R_{E3}$.

Vary the value of RE3 in the formula above by using the balance adjustment switches (BAL 1 to BAL 3).

For the gain adjustment, resistance divide the TE AMP output with the gain adjustment switches (GOG 1 to TOG 3), and output at Pin 42.

These balance and gain adjustment switches are controlled through software commands.

3-6. Tracking automatic adjustment for gain/balance (Fig. 14)

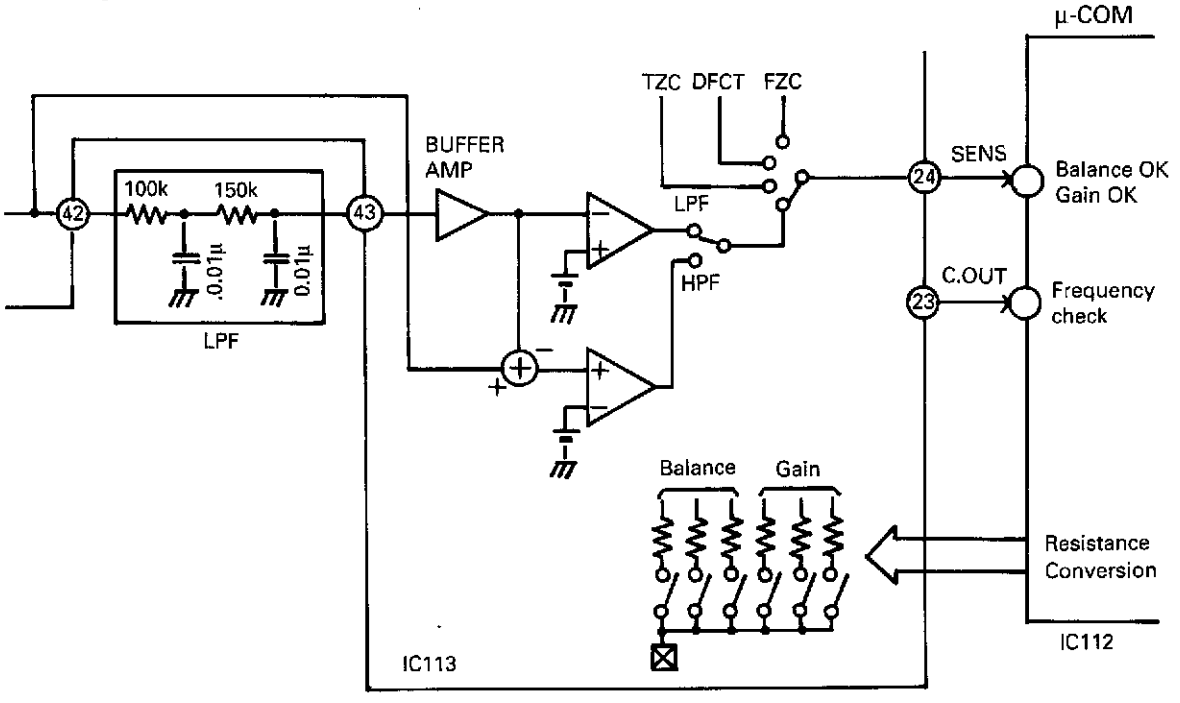


Fig. 14

IC113 has Balance control, Gain control, and comparator circuit required to perform tracking automatic adjustment. LPF is set externally at approximately 100 Hz.

4. Regenerative Circuit

4-1. RF circuit (Fig. 15)

The currents from photodiodes (A, B, C and D) are fed to IC113 through pins 35 and 36 and converted to voltage by RF I-V amplifiers (1) and (2) respectively there, added by the RF summing amplifier and output from pin 31 as a signal. It can be checked at the test point (RF T.P.) provided on its way by means of the eye pattern check.

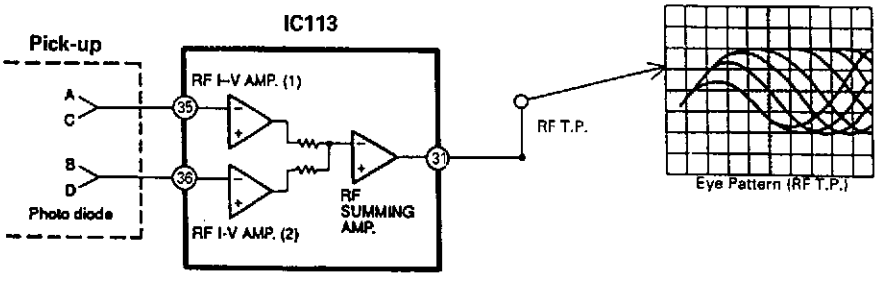


Fig. 15

4-2. Digital Signal Processor (Fig. 16)

The EFM signals from pin 31 of IC113 are sent to pin 14 of IC107, then demodulated from 14 bits to 8 bits by EFM readjustment. At the same time any error, if found, is corrected (CIRC) and the signals are sent to the D/A converter interface. After that they are output as 16-bit digital signals from pins 20, 21 and 22 of IC104. In this case, EFM demodulation, error correction and serial/parallel conversion are performed by the internal circuitry of IC107.

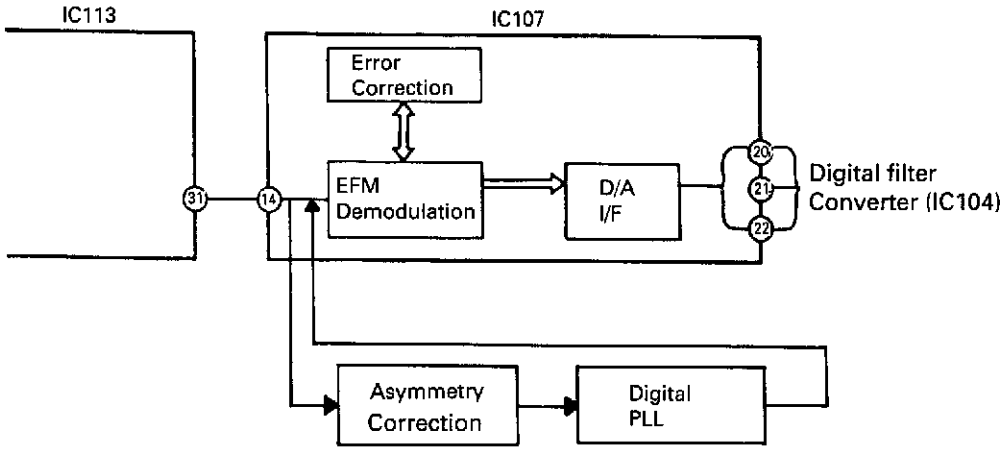


Fig. 16

5. Audio Circuit

5-1. Configuration of SM5871AS

Fig. 17 shows the configuration of the SM5871AS.

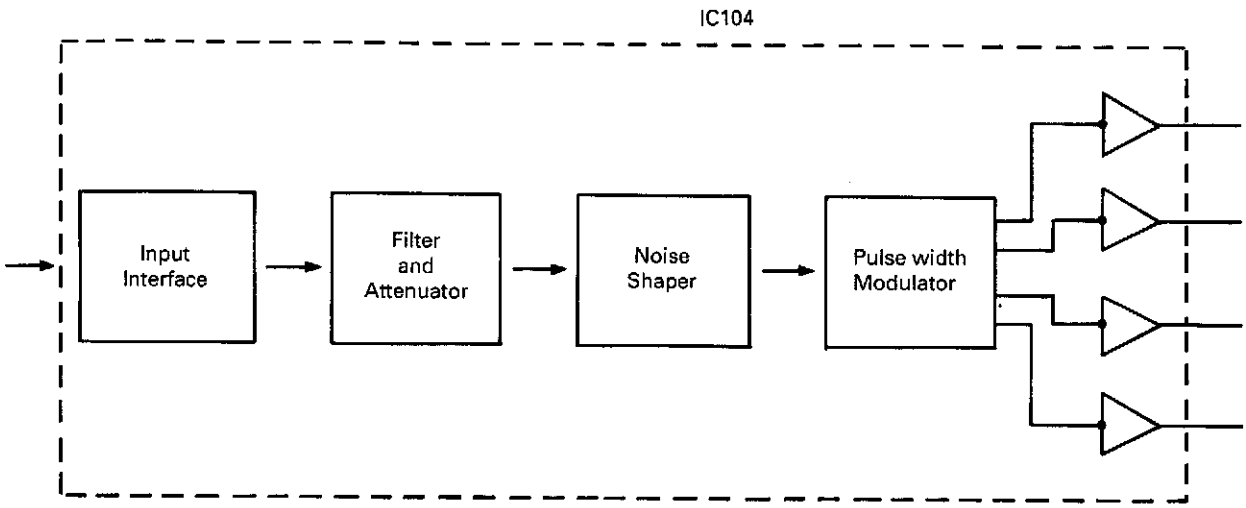


Fig. 17

IC104 is a highspeed converter for digital audio systems fabricated using NPC's molybdenum-gate CMOS process. It incorporates a two-channel, 16-bit D/A converter and a four-times digital oversampling filter.

IC104 can operate at three different sampling frequencies and incorporates deemphasis, attenuation and soft mute functions.

Double-speed dubbing is supported without any change in clock frequency.

IC104 linearly interpolates the input signal at a high multiple of the original sampling frequency, and then requantizes the resulting signal. A third-order noise shaper is used to remove most of the quantizing noise before the signal is output as a pulsewidth-modulated (PWM) waveform.

5-2. Audio Circuit

Fig. 18 shows a block diagram of the audio circuit.

The output from pin18(LO) (INTC+) and pin20(LON) (INTL-) of the IC104 D/A Converter SM5871AS 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 Q113, Q115, Q123, Q127, Q117, Q119, Q121, and Q125. The output undergoes differential synthesis in this ciruit, 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.

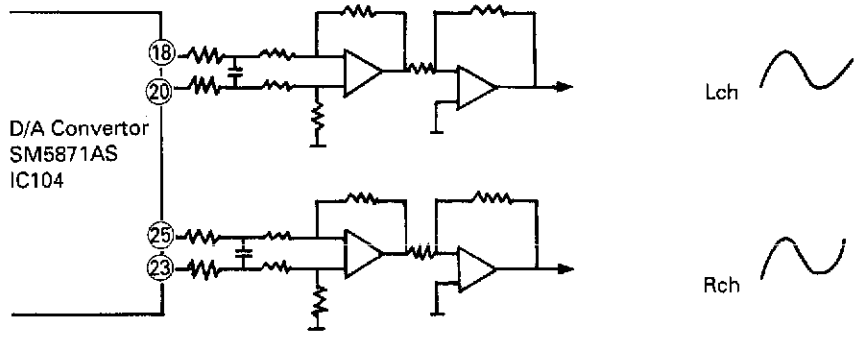


Fig. 18

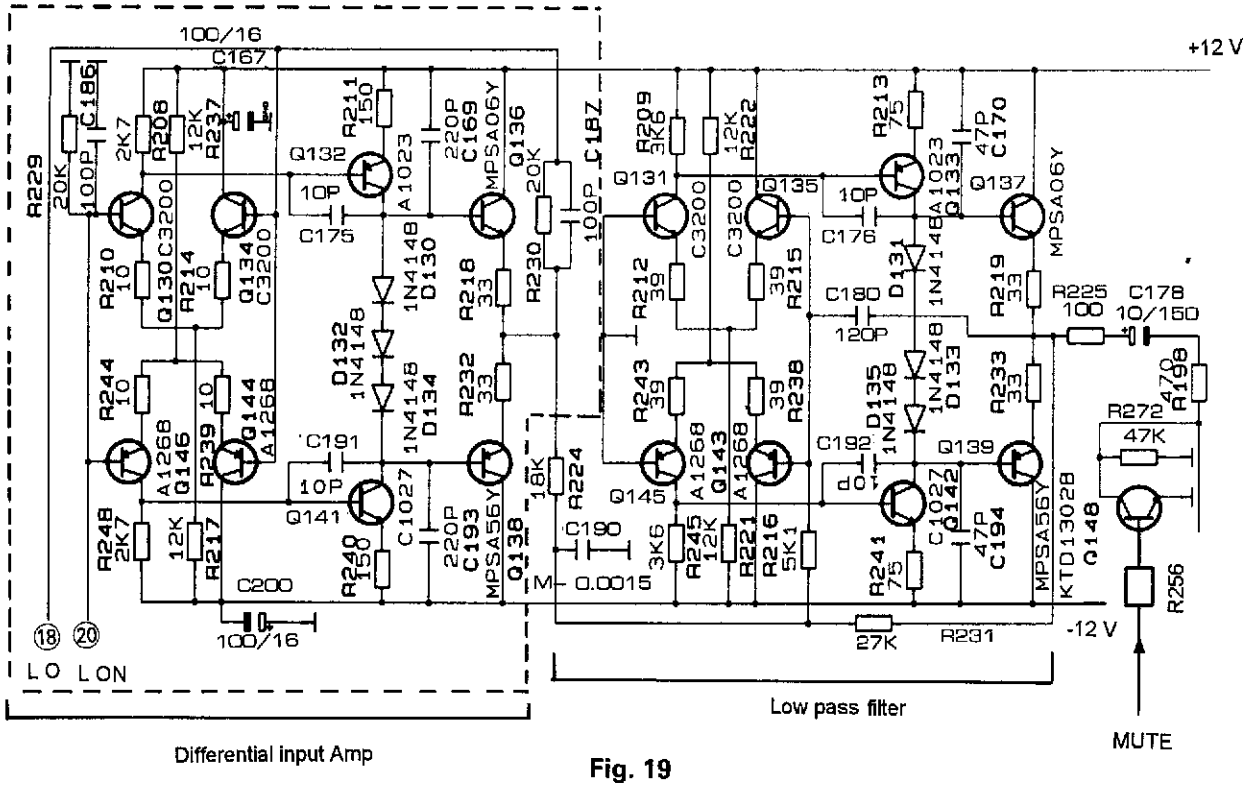


Fig. 19

harman/kardon Service Bulletin

Service bulletin # 9604 rev1 - October 1998 This is considered a Minor Repair

To: All harman/kardon Service Centers

Models: FL8300

Subject: Digital Output Level

The Digital Interface Standard recommends D/A converters have a minimum Input sensitivity of 200 mV.
In early FL8300 production units, the Digital Output level was 240 mV ±10% peak to peak. Based on our research, we found that some D/A converters require more than 240 mV for intermittent free operation.

In the event you receive a FL8300 from a consumer with the a complaint "Intermittent Sound from External D/A converter", check the serial number in the table below.

If the FL8300 has a serial number *higher* than indicated in the table below, connect a properly working D/A converter to the Digital Output and verify interruption free operation. Also confirm the Digital Output level of the FL8300 is 500 mV ±10% Peak to Peak. If the FL8300 passes these two tests, advise the customer to have their external D/A converter and connecting cables checked.

If the FL8300 has a serial number *lower* than indicated in the table below, perform the following modification:

1) With the unit plugged in and turned on, push the "open/close" button to extend the drawer fully; then turn the unit off and unplug it.
2) Open the top cover (6 screws).
3) Remove output board PCB3 from the rear panel (4 screws). This board can be pulled back and modified without completely removing it from the chassis.
4) Locate resistor R901, it may be a 680 ohm resistor or a jumper wire; replace in either case with a 0.47 uf capacitor h/k part# 5354-474593.
5) Locate R903 and change from 680Ω to a 4.7kΩ resistor – h/k part # 3029472970. Re-attach output PCB3 to the unit.
6) Connect a 75 Ohms cable to the digital output jack. Terminate this cable with a 75 Ohm load; connect an oscilloscope to the 75 Ohm termination resistor. While playing a CD, confirm the output of the signal is now 500 mV ±10% peak to peak.
7) Reassemble the FL8300 and test all functions.

Model	Serial number 120V	Serial number 230V	Status	Action
FL8300	IN0019-01001 to IN0019-19393	IN0020-01001 to IN0020-04500	May have low digital output for some applications	Replace R901 with 0.47 uf mylar capacitor h/k part# 5354-474593 Replace R903 with 4.7k ohm resistor h/k part# 3029472970
FL8300	IN0019-19394	IN0020-04501	Factory Installed *	NONE REQUIRED

* Factory modification of the FL8300 starting with the serial numbers indicated in the above table consisted of:
R236: 1k Ohm
R901: Jumper or 680 Ohm
R903: Changed from 680 Ohm to 4.7k Ohm.
Digital output level into 75 Ohms: 500 mV ±10% peak to peak.

harman/kardon Service Bulletin

Service bulletin # 9607-January 97

This is considered a Major Repair

To: All harman/kardon Service Centers

Models: FL8300 Compact disc changer

Subject: Failure to play Multi-media CDs or skip data tracks

Early FL8300 CD Players used a micro-computer which could not read the table of contents (TOC) of certain multimedia CD's or skip data tracks on multimedia CD's. During two running production changes, new Microprocessor were installed which performs as shown in the table below:

Description IC112	Part Number	Serial number Range120V	Serial number Range230V	Processor action	Year/Month first used
CXP21320-322 DWP325	2138322197	IN0019-01001 to IN0019-29000	IN0020-01001 to IN0020-05500	Does not play Multimedia CD	95 October
CXP82320-352Q DWP325A	2139322710	IN0019-29001 to IN0019-53790	IN0020-05501 to IN0020-08510	Plays Multimedia CD, Mutes at data track	96 July
CXP82320-367Q DWP325B	2139322722	IN0019-53791 to present production	IN0020-08511 to present production	Plays Multimedia CD, Skips data tracks	96 November

In the event you receive a FL8300 from a consumer with a complaint "Player will not read or, loudspeakers make strange noise while playing multimedia CDs", replace IC112 with H/K Part number 2139322722.
The IC can be identified by CXP82320-367Q DPW 325B printed on its case.

harman/kardon Service Bulletin

Service bulletin # 9703 June 1997 This is considered a Major Repair

To: All harman/kardon Service Centers

Models: FL8300

Subject: Dead unit, no display; Service upgrade

In the event you receive an FL8300 that is dead, and upon inspection R701 is damaged or an otherwise open circuit, perform the necessary steps listed below:

Due to current surges, early models of the FL8300 could repeatedly damage R701 (either a 1 ohm resistor or 1.5A micro fuse depending on version). Along with the replacement of R701, the positive lead should be relocated on C125 to suppress any future current surges.

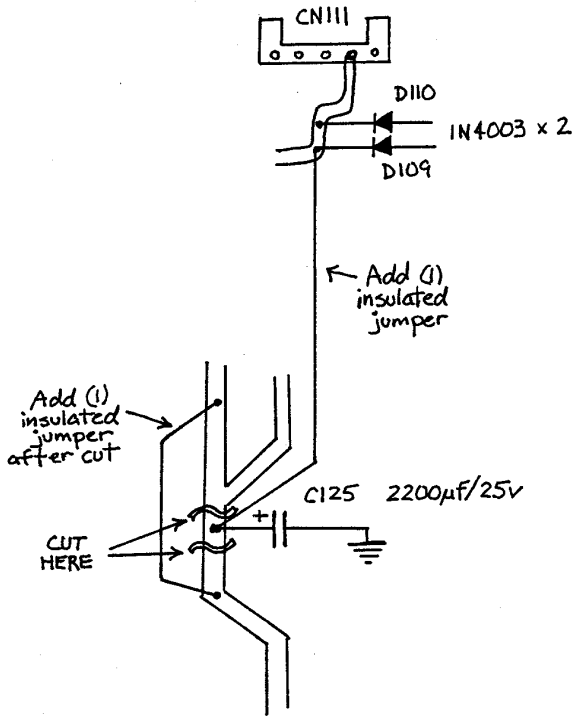
Additionally, two capacitors, now designated as C907 & C908, (1uf/50v) should be added to the power supply output pins on regulator IC108 & IC111 on a unit serviced for any reason; these will add stability to help prevent oscillation.

PROCEDURE:

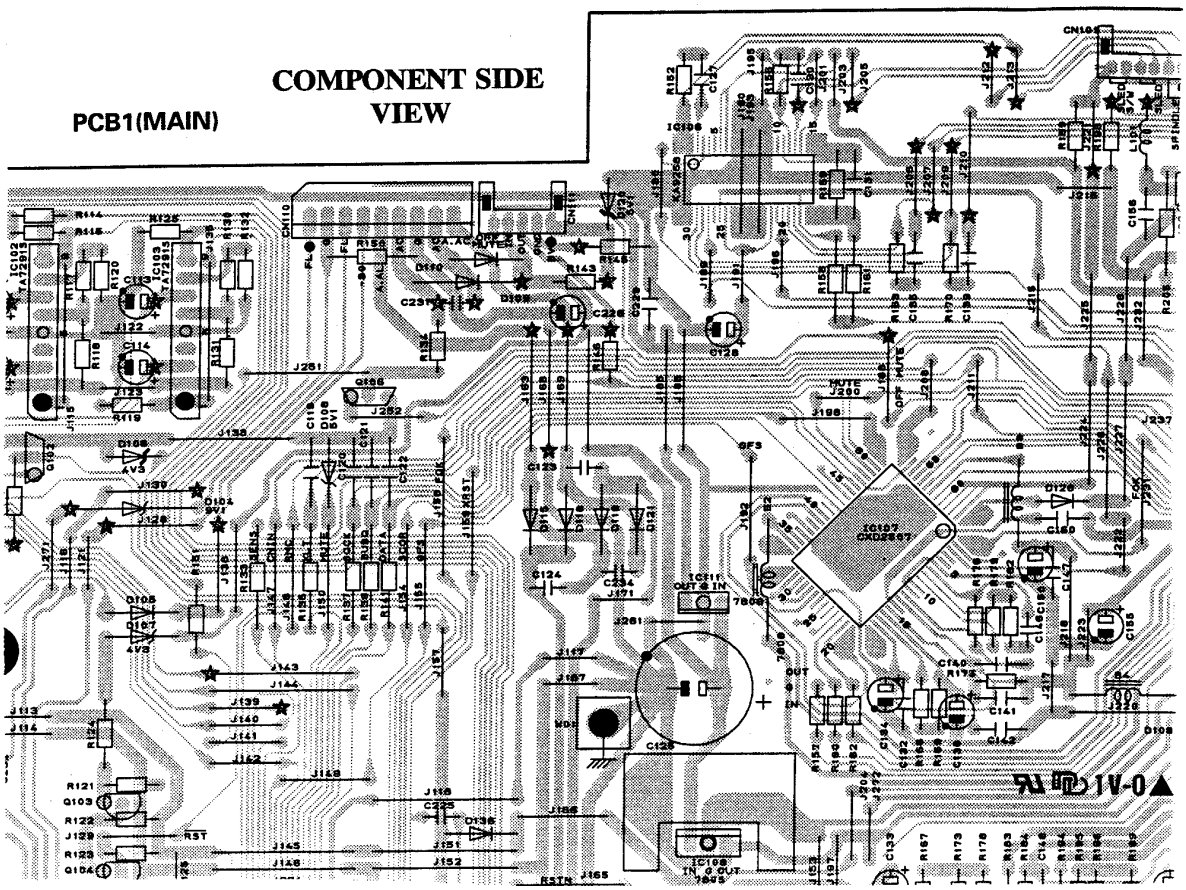
1) Replace R701 with micro-fuse H/K # 5508722221, this component is on PCB7.
2) A PCB trace should be cut on the C125 (2200 uf/25v) positive lead on the main circuit board and an insulated jumper wire attached from that lead to the junction of D109/110. Additionally another insulated jumper will need to replace the trace that was cut. (see drawing)
3) Add C907 & 908, 1uf/50v , H/K/ # 3479310971, one on each output pin to ground on regulators IC108 and IC111. This is most easily accomplished by:
   Soldering one 1uf cap to the jumpers 153 & 197. Observe polarity; J153 is ground.
   Soldering one 1uf cap to the jumpers 185 & 186. Observe polarity; J186 is ground.

Model	Serial number 120V	Serial number 230V	Action	Correction
FL8300	IN0019-72213 and below	NOT REQUIRED	R701 is damaged or an open circuit	Replace R701, re-route positive connection on C125, Add C907/908
FL8300	IN0019-72214 and above	NOT REQUIRED	Modified by factory	NONE REQUIRED

PCB1 (MAIN) BOTTOM VIEW



PCB1(MAIN) COMPONENT SIDE VIEW



harman/kardon TECH TIPS

Troubleshooting tips and solutions to common service problems

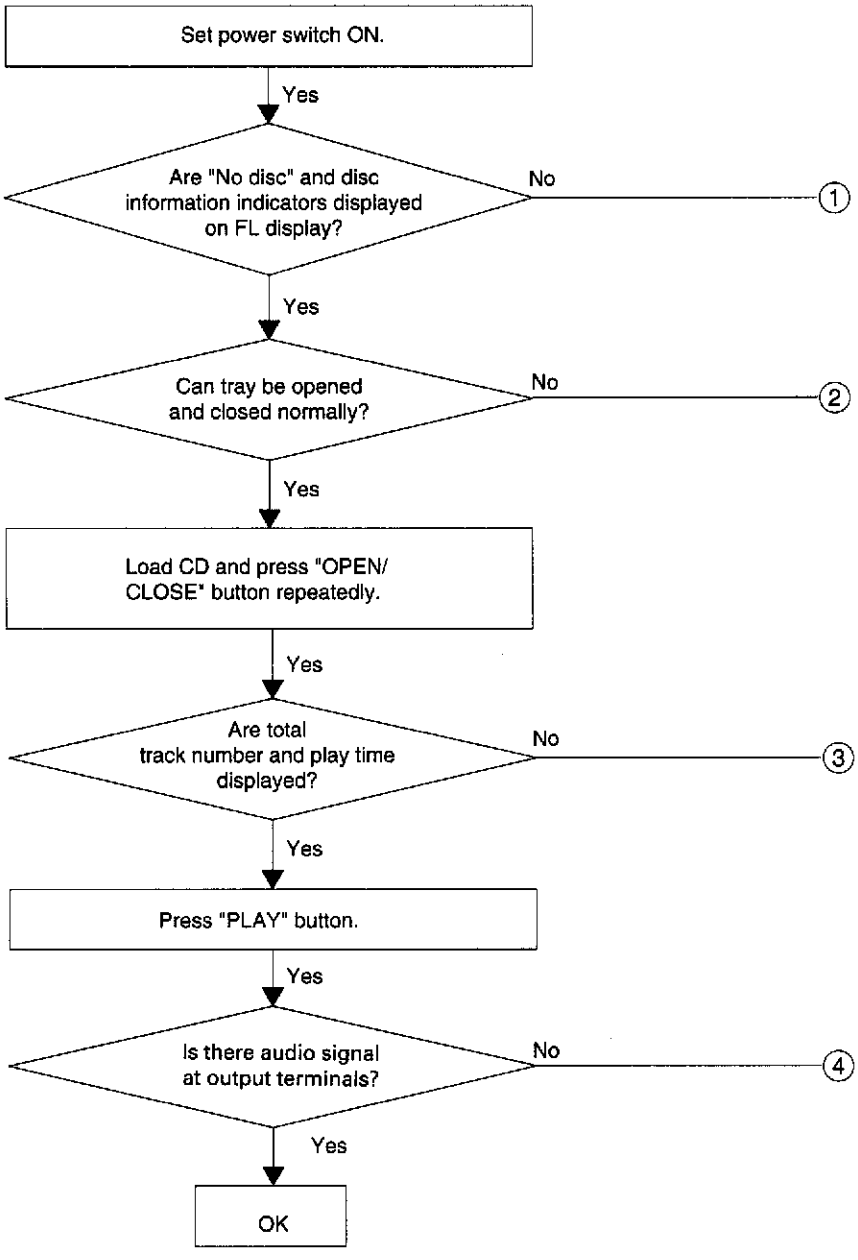
For models: FL8300 **TIP# HKTT2003-02**

Problem: "Carousel not stopping in the correct position, so disc can be clamped correctly".

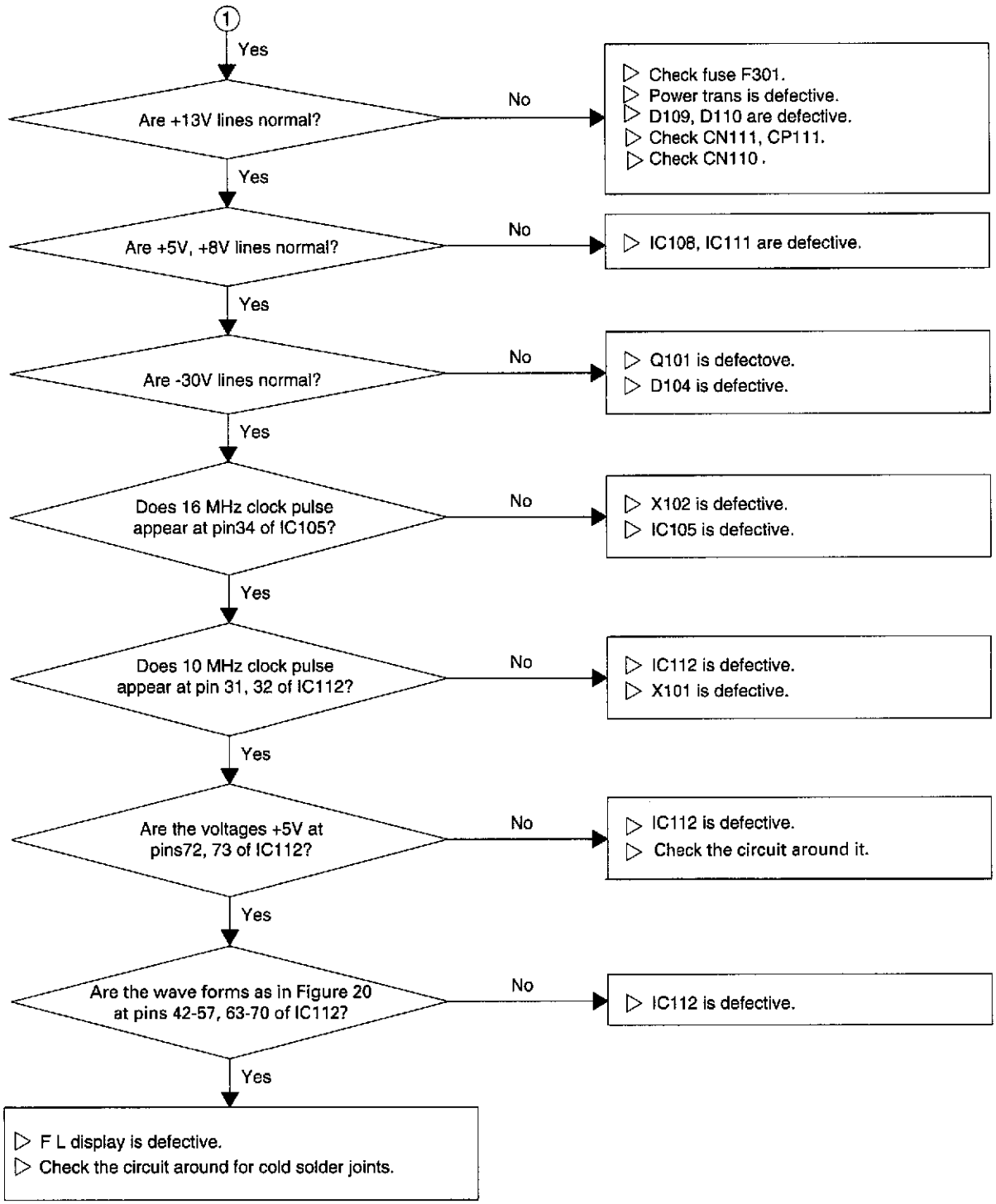
Check:

1) 6-conductor Ribbon cable connection to sensor board - check cable; clean, re-seat at both ends.
2) There is a post/standoff underneath the single center screw in the center of the carousel (under the plastic 1,2,3,4,5 cap). If that post/standoff is too long, it can cause the symptom. If the part is higher than the surface of the carousel in that area, the part needs to be shaved down so it's shorter.
3) Defective Roulette sensor (part# 2408001111) or Disc sensor (part# 2408210001).

TROUBLESHOOTING



[Repair item 1] At power on, "No disc" and some parts are not displayed.



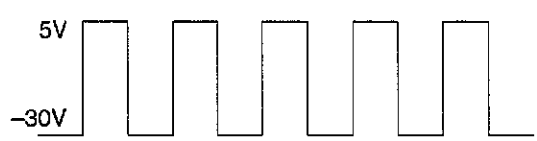
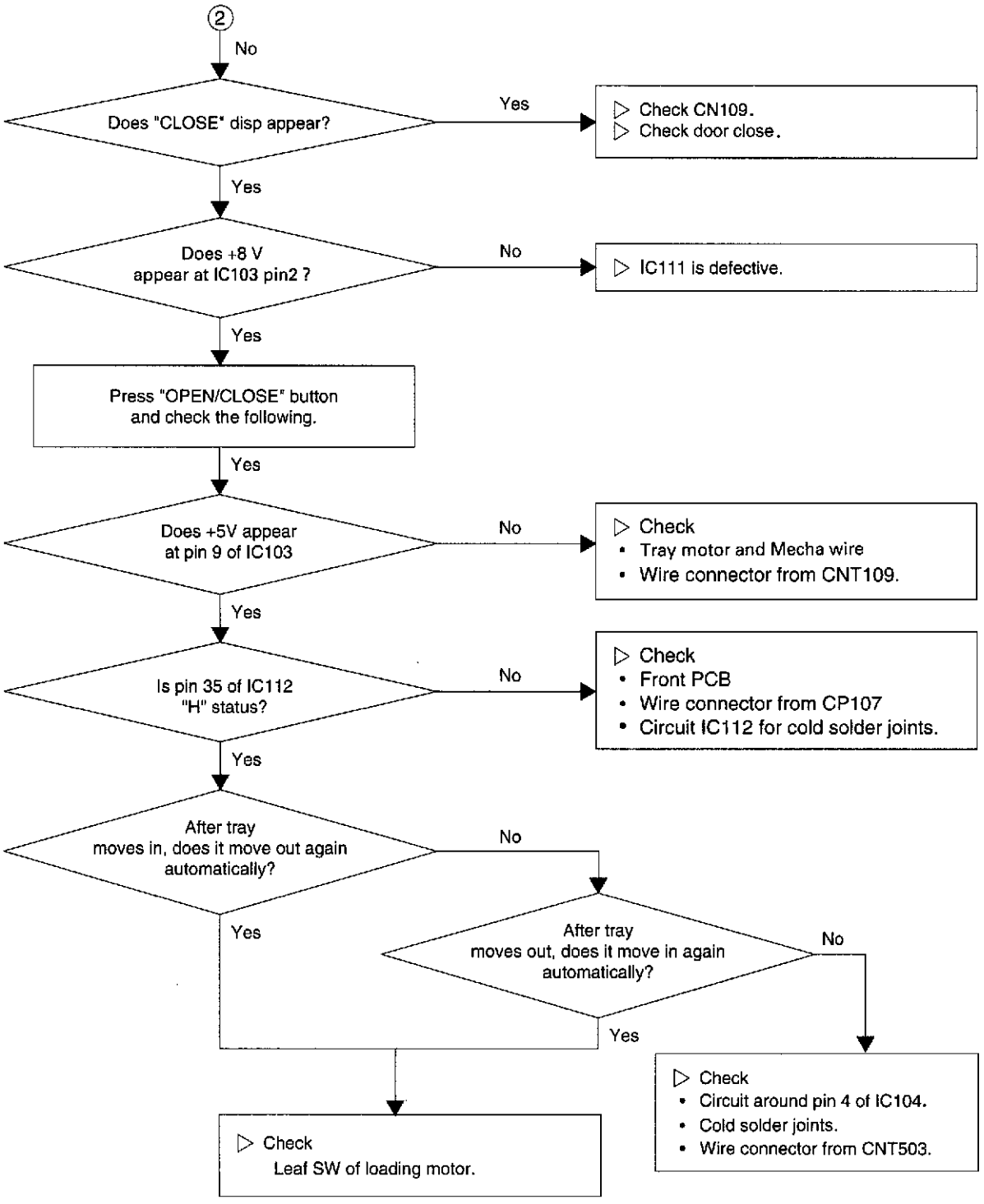
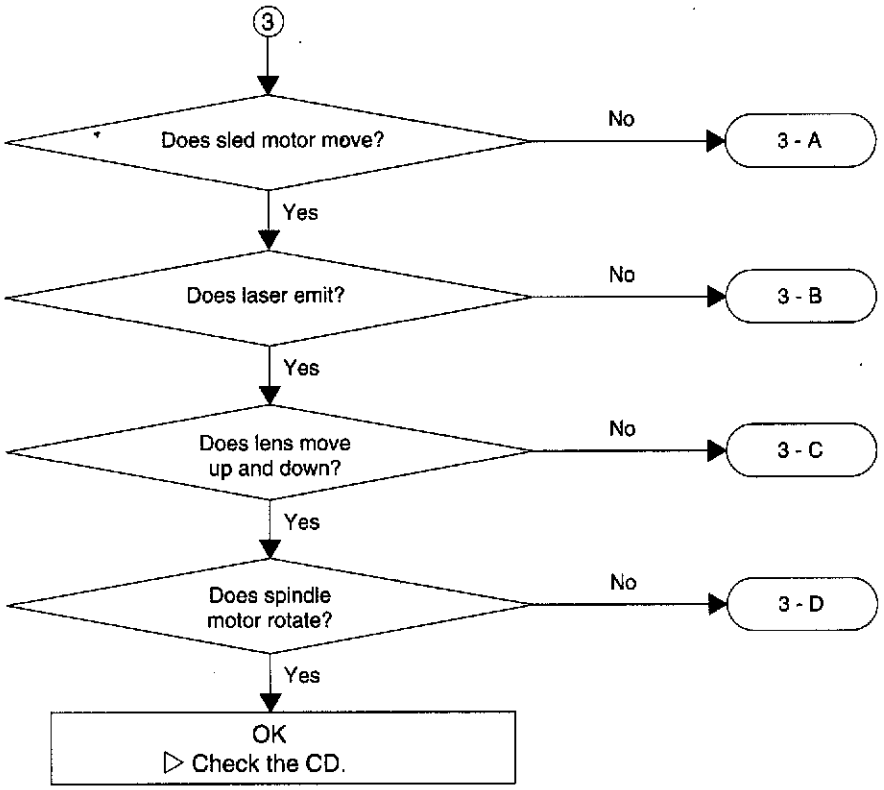


Fig. 20

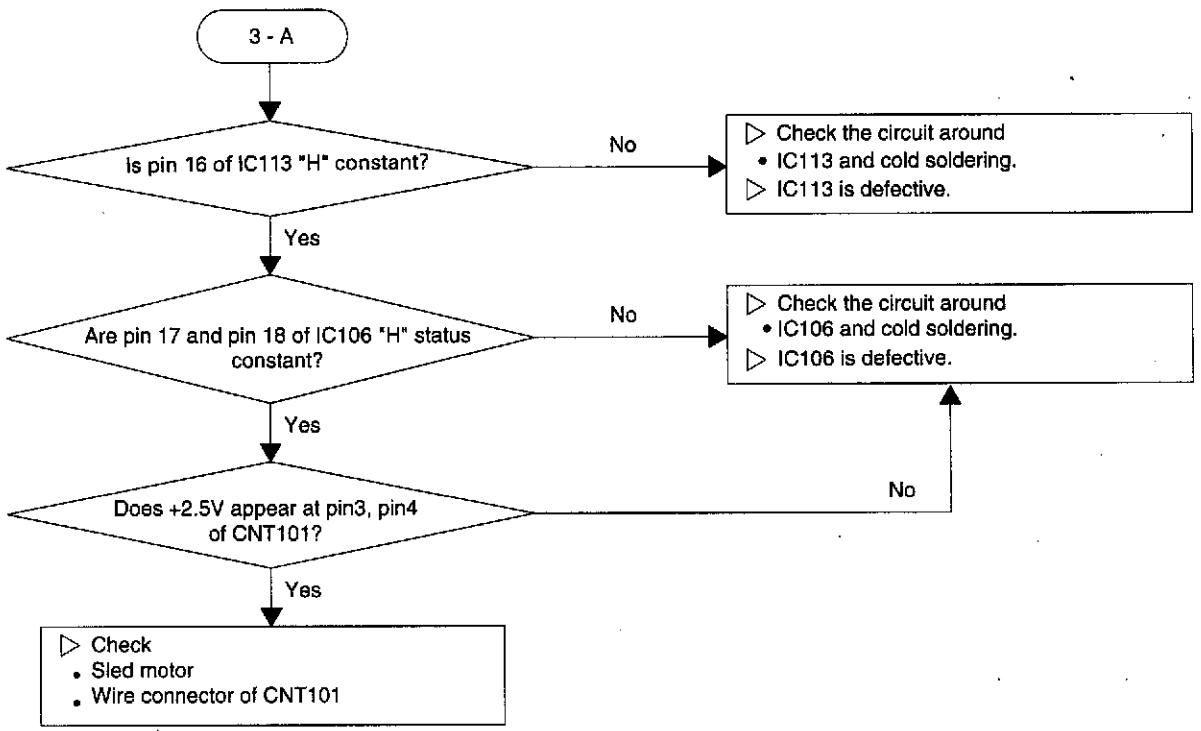
[Repair item 2] Tray cannot opened and closed by pressing "OPEN/CLOSE" button.



[Repair item 3] " 8 " 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.

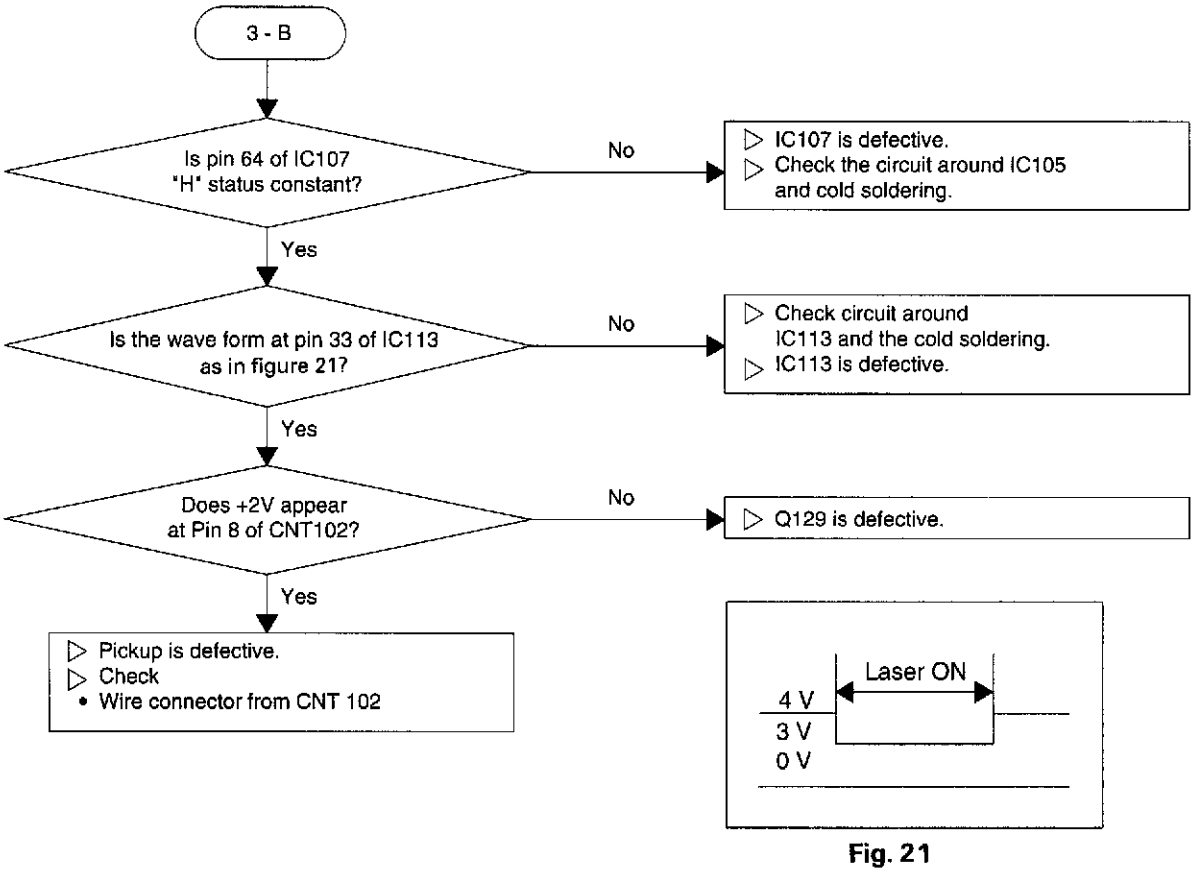
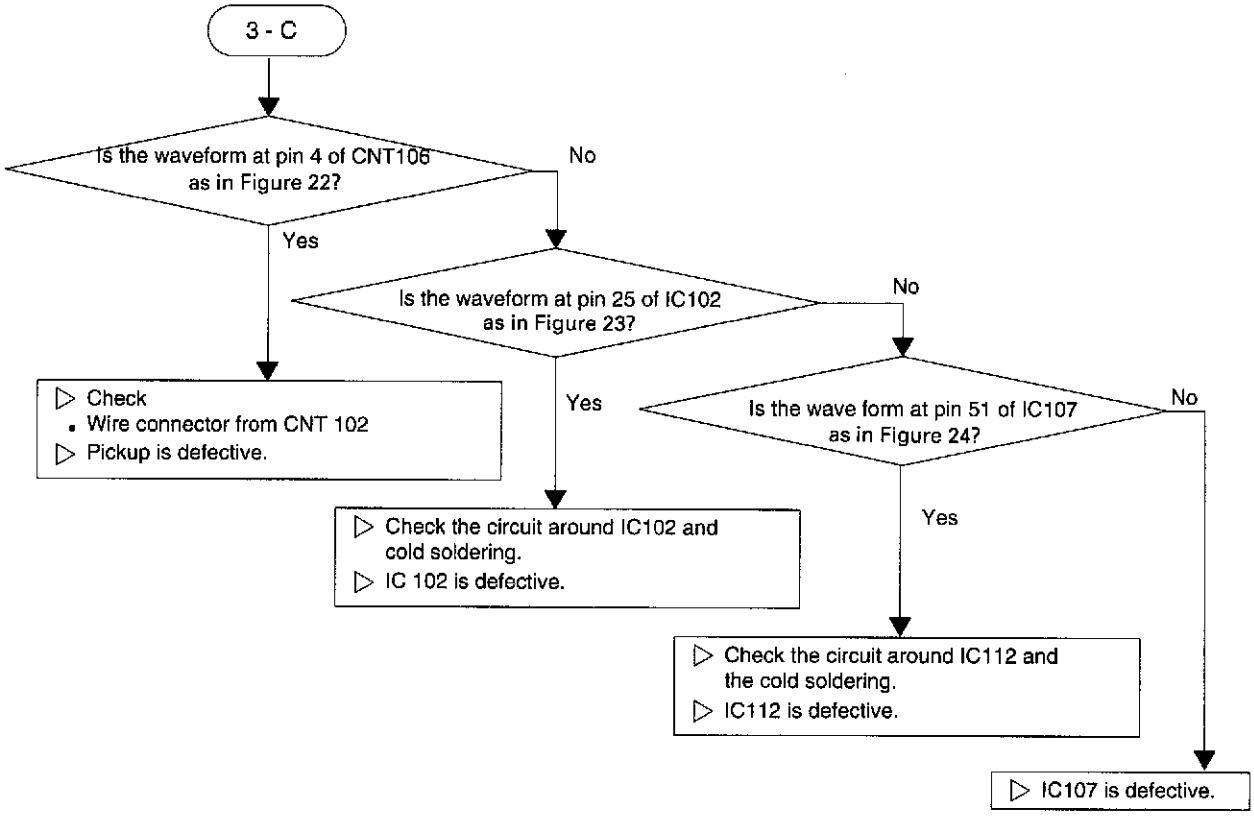


Fig. 21

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



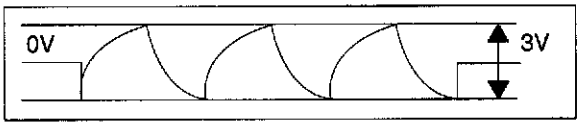


Fig. 22

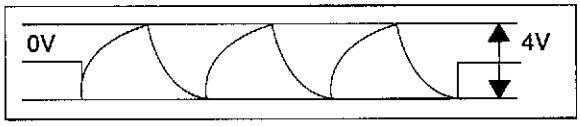


Fig. 23

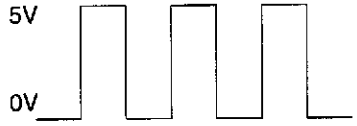
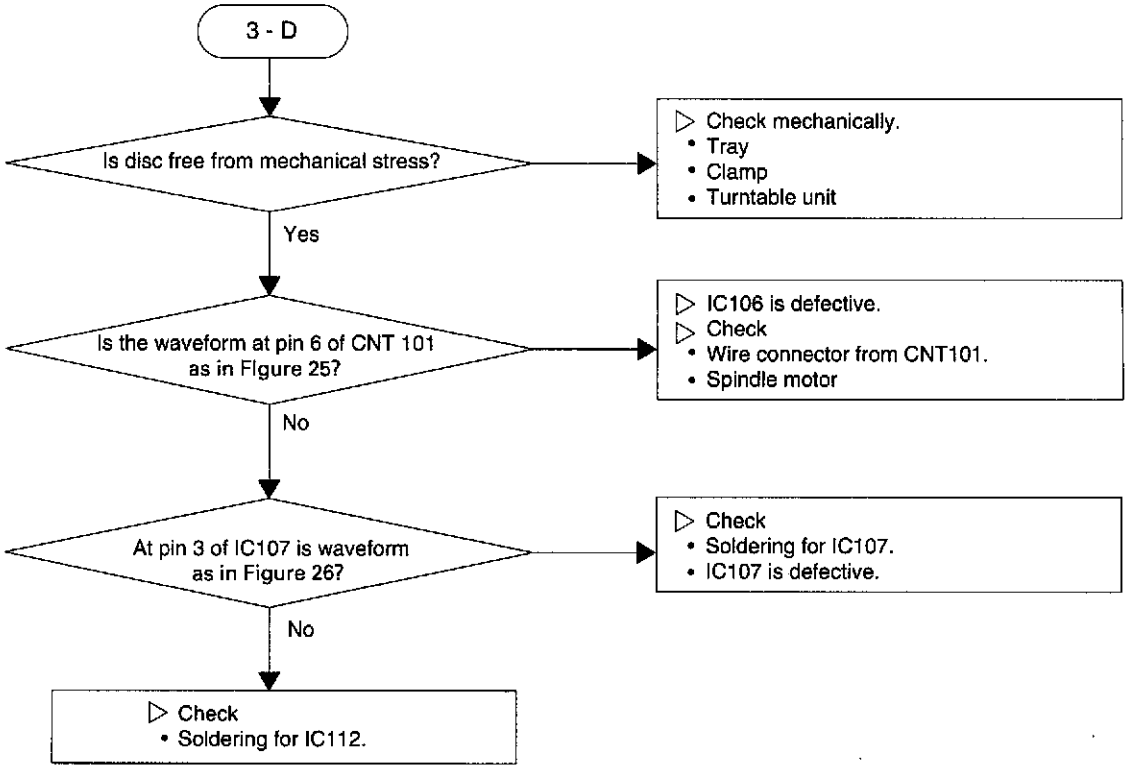


Fig. 24

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



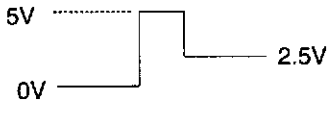


Fig. 25

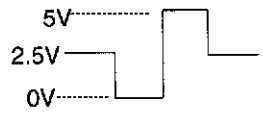
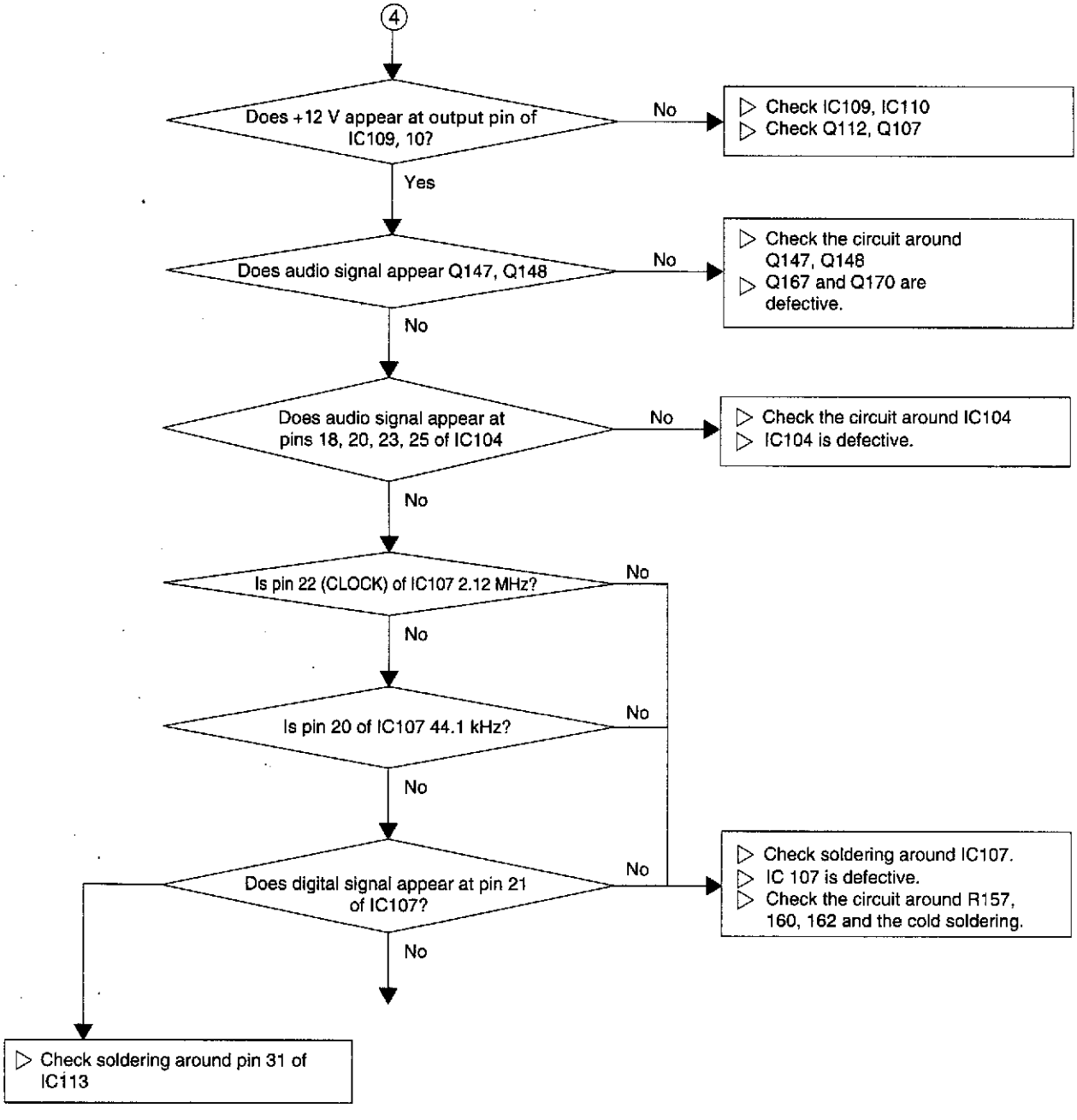
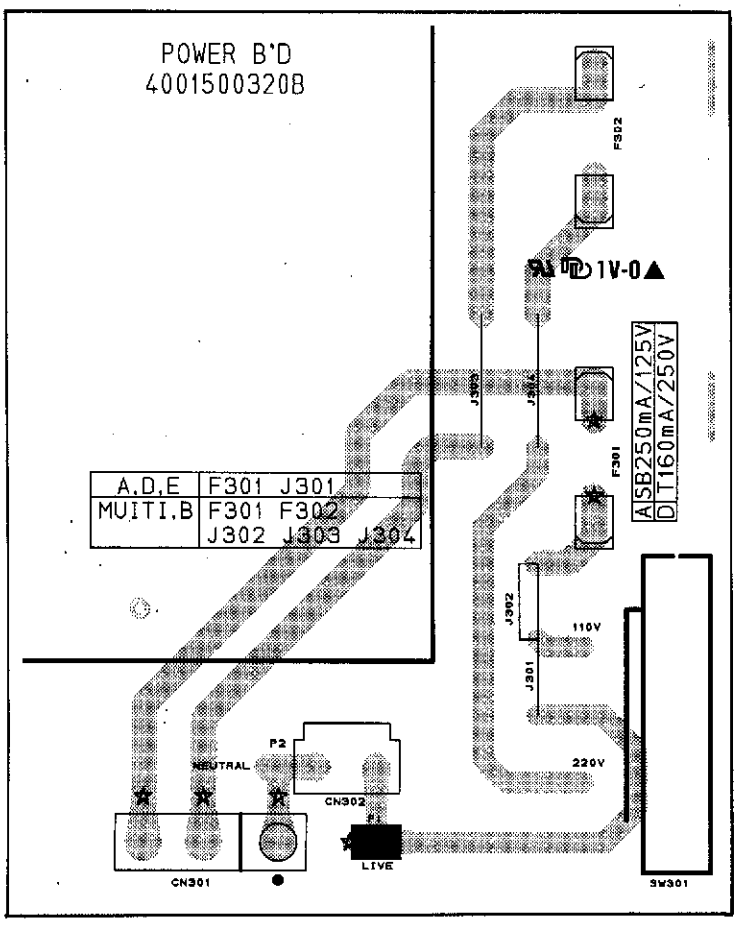


Fig. 26

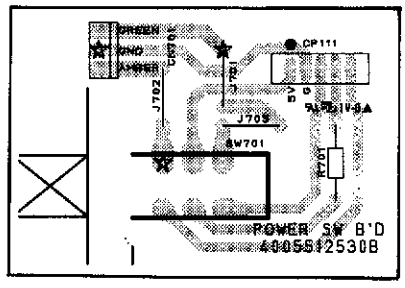


PRINTED CIRCUIT BOARDS

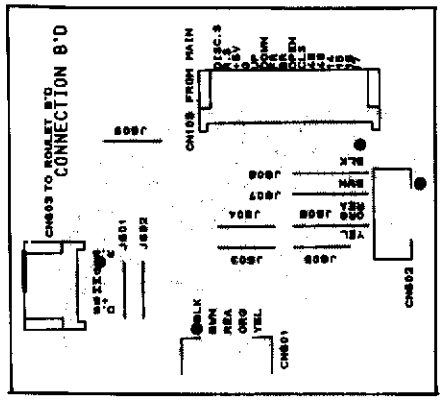
PCB2(POWER)



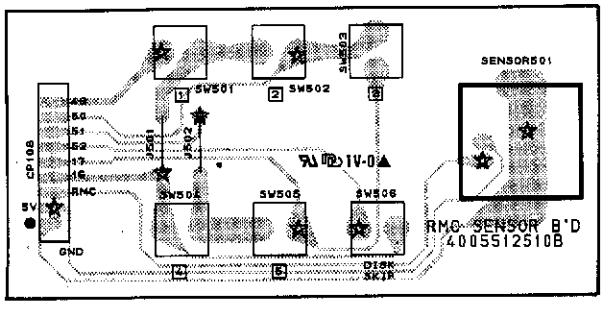
PCB7(POWER S/W)



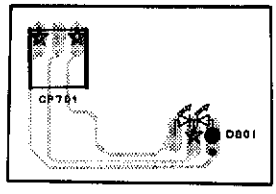
PCB9(CONNECTION)



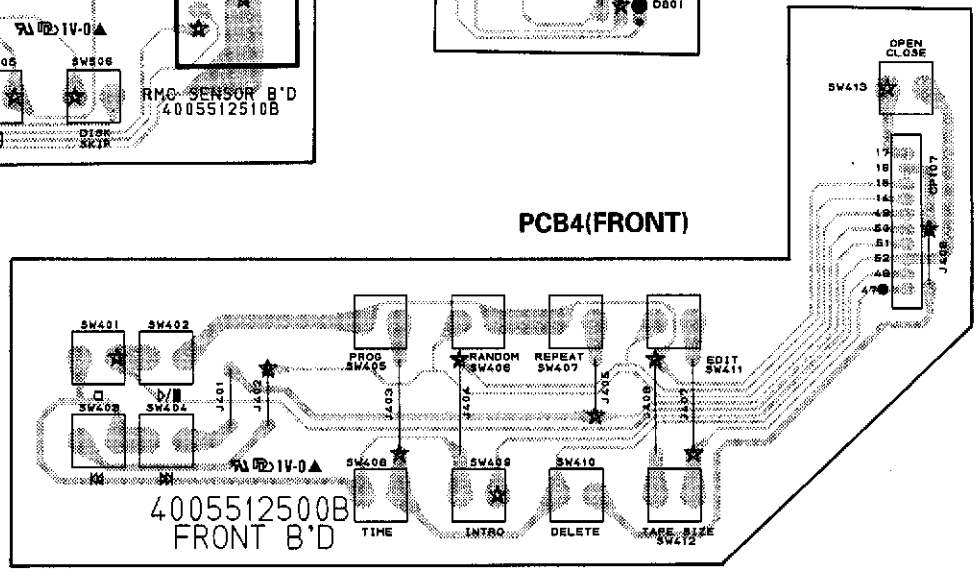
PCB5(RMC SENSOR)

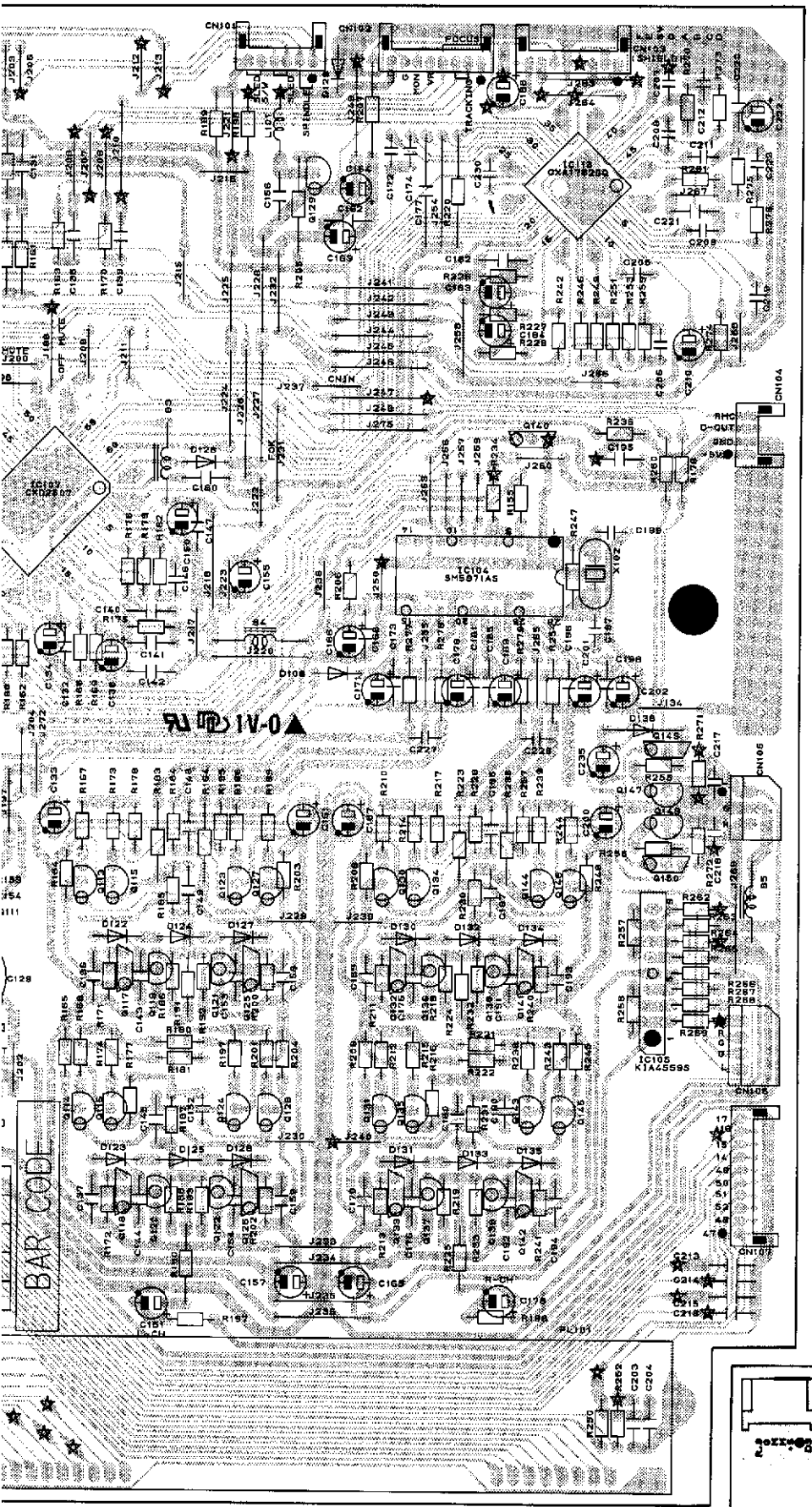


PCB8(LED)

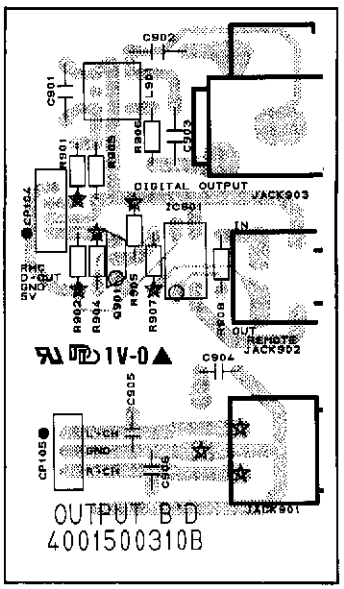


PCB4(FRONT)

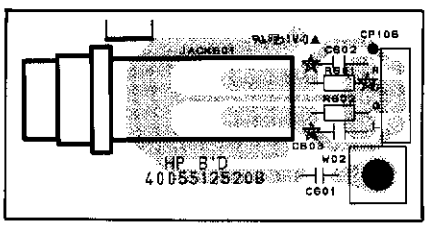




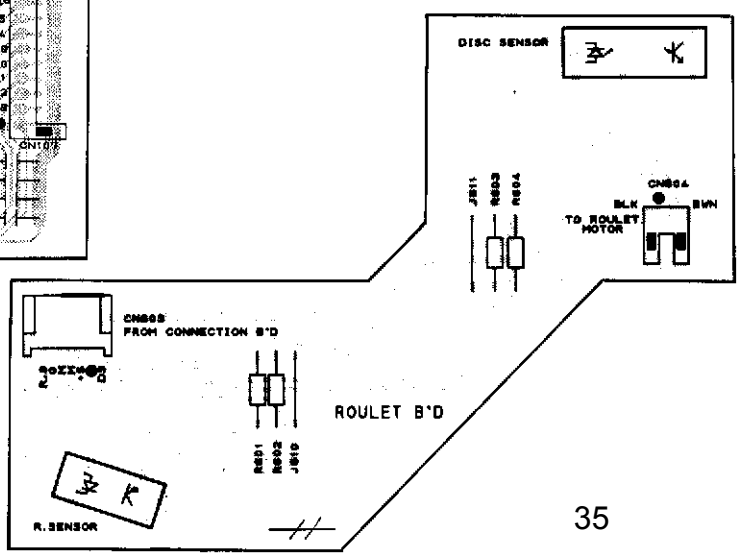
PCB3(OUTPUT)



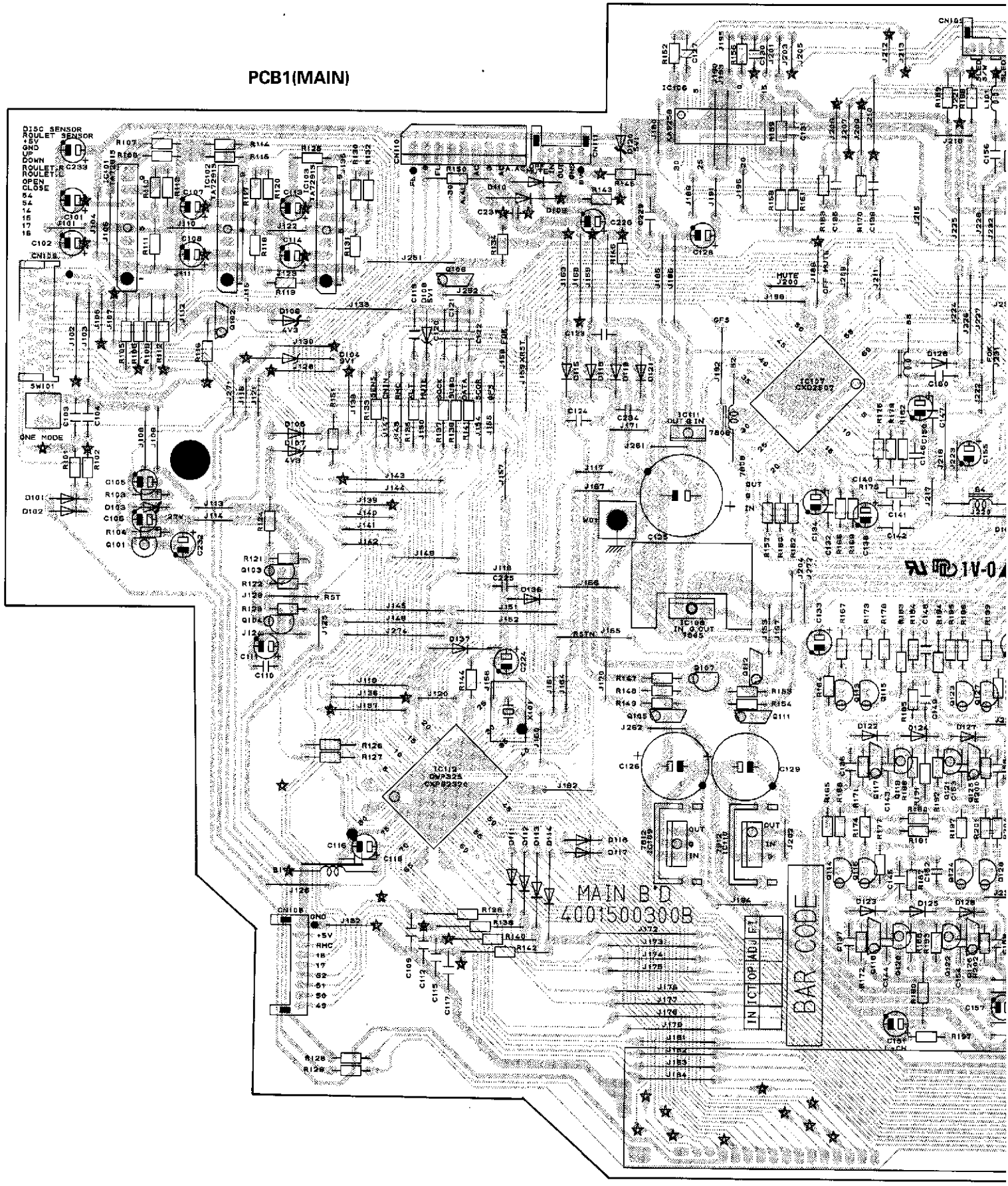
PCB6(HEADPHONE)



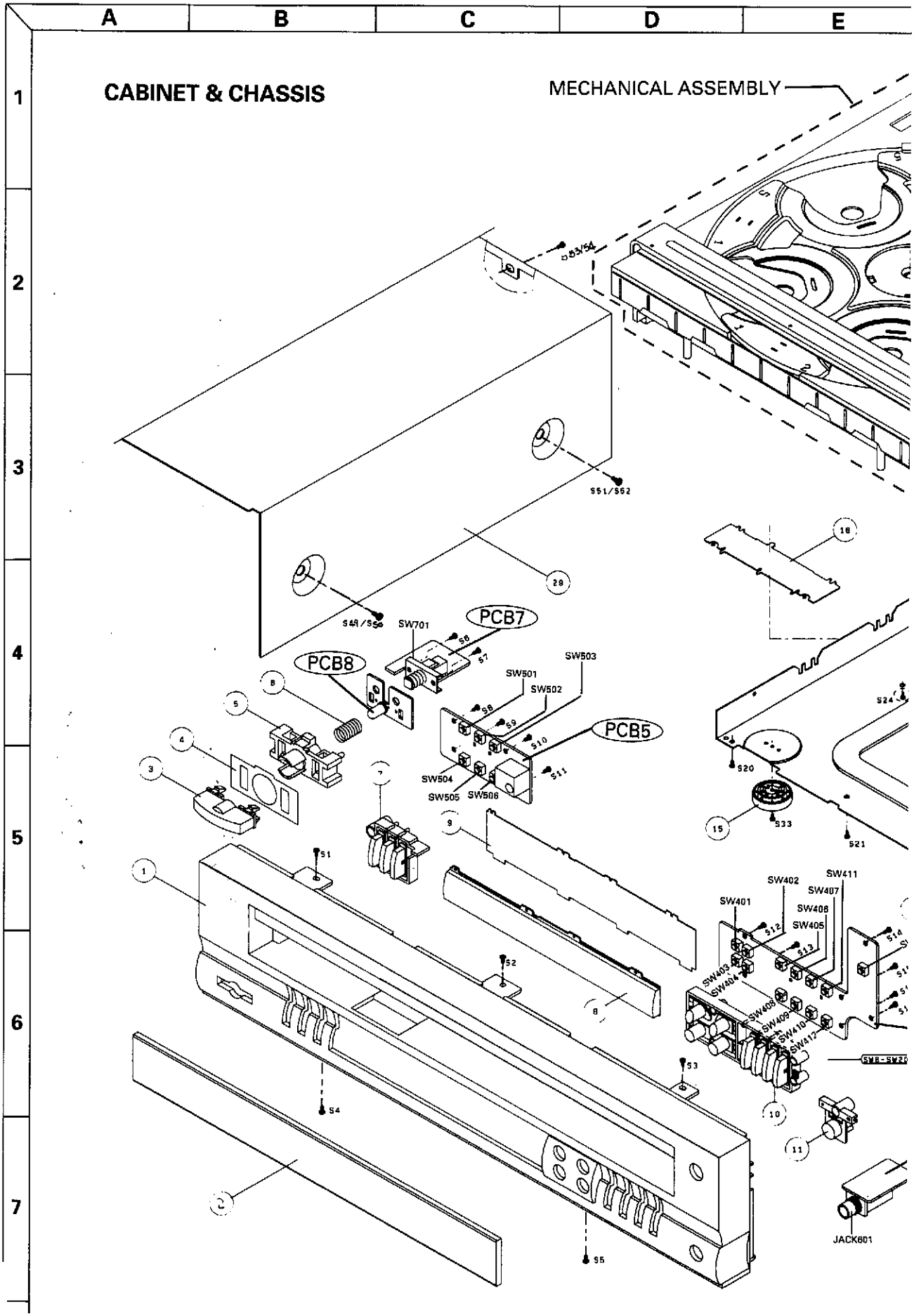
PCB10(ROULETTE SENSOR)

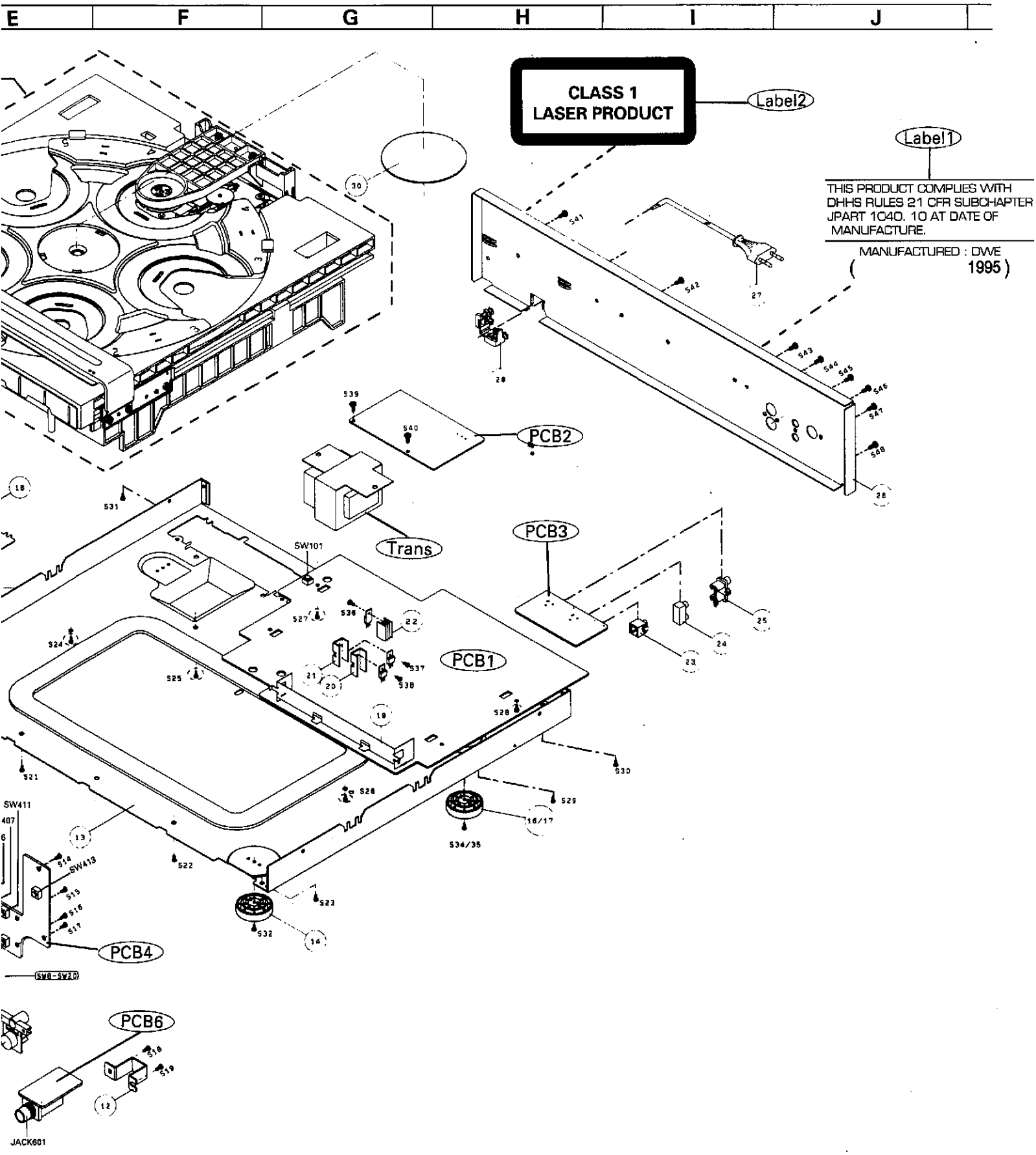


PCB1(MAIN)

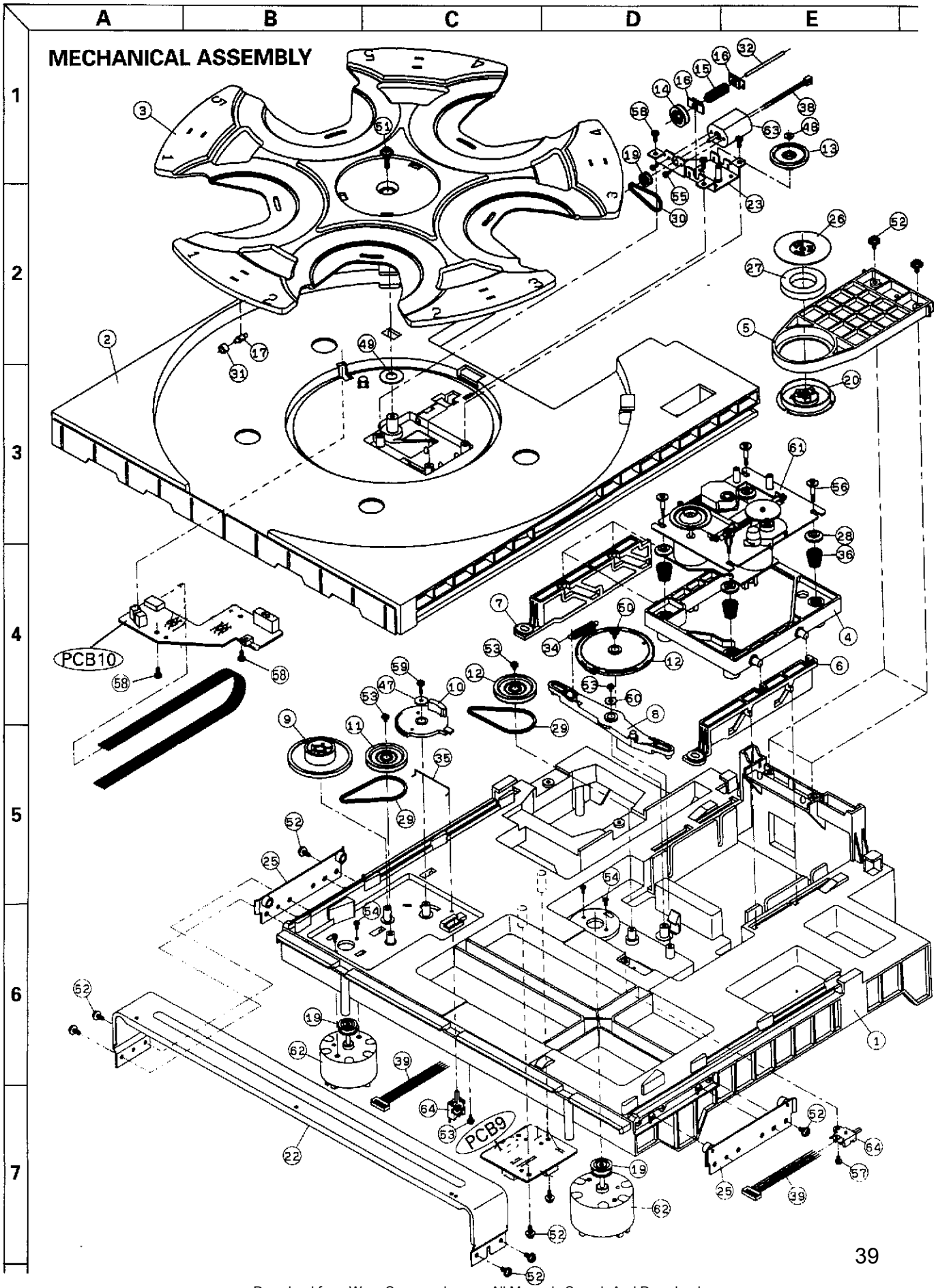


GENERAL UNIT EXPLODED VIEW I





GENERAL UNIT EXPLODED VIEW II



GENERAL UNIT PARTS LIST

Ref. No.	Description	Mfr. Part No.	Q'ty
	CABINET & CHASSIS		
1	Panel, Front, ABS, Black	048501036211	1
2	Door, Tray, ABS, Black	048562006511	1
3	Button, Power	048545130811	1
4	Light Shield	8535046020	1
5	Indicator, Power	8555052110	1
6	Spring, Button	6555010720	1
7	Button Function, 3key	048543068811	1
8	Window, Display	8553022810	1
9	Filter, FL	048553022911	1
10	Button Function, 8key	048543068911	1
11	Button, Open/Close	048545130611	1
12	Bracket, Phone	6505110210	1
13	Chassis, Main	6121614510	1
14	Foot PL(H.S)	046033102511	1
15	Foot PL(H.S)	046033102511	1
16	Foot Base	046035101511	1
17	Foot Base	046035101511	1
18	Cover Chassis Fuse	8123017710	1
19	Holder, FL	6513004420	1
20	Heatsink Regulator TR.	7505202410	1
21	Heatsink Regulator TR.	7505202410	1
22	Heatsink Regulator TR.	7505206110	1
23	Jack RCA, 1P	4438111020	1
24	Jack, Multi, 2P	4438007510	1
25	Jack RCA, 2P	4438111320	1
26	Chassis, Back	046102044021	1
27 ⚠	Cord, AC Power	4308001410	1
28	Holder, Power Cord	6516002310	1
29	Cover, Top	6122022030	1
30	Cover Roulette	048583005911	1
SW701	Switch, Push, Power	4628056310	1
SW101	Switch, Tact	4658003710	1
SW401-413	Switch, Tact	4658003710	13
SW501-506	Switch, Tact	4658003710	6
JACK601	Jack, Phone	4438005010	1
	HARDWARE KIT		
S1-S5	Screw, #2BTC 3x8B	8109230083	5
S6/S7	Screw, #2BTC 3x10B	8109230103	2
S8-S19	Screw, #2BTC 3x8B	8109230083	12
S20-S29	Screw, #1WPTC 3x12Y	8159130121	10
S30-S40	Screw, #2BTC 3x8B	8109230083	11
S41-S43	Screw, #1WPT 3x10B	8119130103	1
S44	Screw, #2BTC 3x8B	8109230083	1
S45	Screw, Ground	8155000710	1
S46	Screw, #1WPT 3x10B	8119130103	1
S47	Screw, Ground	8155000710	1
S48	Screw, #2BTC 3x8B	8109230083	1
S49-S52	Screw, WSAM 4x8B	8159440083	4
S53/S54	Screw, #2BTC 3x8B	8109230083	2
	MISCELLANEOUS		
CP101	Lead Ass'y, 6P, 120mm, Mecha to Main B'D	435206122042	1
CP102	Lead Ass'y, 5P 200mm, Mecha to Main B'D	4358508202	1
CP103	Ass'y Wire, Shield, 8P 200mm, Mecha to Main B'D	4358508201	1
CP109	Cable FPC, 16P, 120mm, Mecha to Main B'D	4118616125	1
Trans ⚠	Power Transformer, 120 V, 60 Hz	2828100647	1
Label1	Label, DHHS	9057069130	1
Label2	Label, Class1	9057067300	1
	MECHANICAL ASSEMBLY	**5728001210**	
1	Body Mecha	6220600210	1
2	Tray	6020800110	1
3	Roulette	7121400410	1
4	Base D.U	6022604310	1
5	Clamp Chuck	7143104610	1
6	Slider Right	7143202410	1
7	Slider Left	7143202510	1
8	Lever Chuck	7143104510	1
9	Gear Loading	7103002110	1
10	Gear Stopper	7103002210	1
11	Gear Pulley	7103002310	2
12	Gear Cam	7103002410	1
13	Gear Skip	7103002510	1
14	Pulley Skip	7115003510	1
15	Worm	7105001010	1
16	Bushing Skip	7015005010	2
17	Roller Skip	7115003610	5
18	Not Used !		
19	Pulley Motor	7113001310	3
20	Base Magnet	6063103010	1
21	Not Used !		
22	Frame Body	6122622810	1
23	Bracket Skip Ass'y	6503031710	1
24	Not Used !		
25	Guide Tray Ass'y	6143001310	2
26	Cover magnet	6023408610	1
27	Magnet	5125000910	1
28	Rubber Damping	6715024510	4
29	Belt Loading	7165002810	2
30	Belt Skip	7165002820	1
31	Rubber Wheel	6715026210	5
32	Shaft Skip	7005008010	1
33	Not Used !		
34	Spring Chuck	6555307610	1
35	Spring Bar	6555900810	1
36	Spring Damping	6555014010	4
37	Not Used !		
38	Connector, Skip Ass'y 2P	5798100310	1
39	Connector, Load Ass'y 5P	5798100309	2
40	Wire FPC 6P	5798100308	1
41-46	Not Used !		
47	Washer, Poly	8338301210	1
48	Washer, Poly	8338300810	1
49	Washer, Plain	8305003810	1
50	Screw, Mecha	8155001210	1
51	Screw, # 1 WPT 3x12Y	8159130121	1
52	Screw, # 1 WPT 3x10Y	8159130101	10
53	Screw, # 1 WPT 2.6x8Y	8159126081	3
54	Screw, BM 2.6x5Y	8009126051	4
55	Screw, BM 2x3Y	8009120031	2
56	Screw, Damping	8155001610	4
57	Screw, # 1 BT 2.6x8Y	8109126081	1
58	Screw, # 1 BT 3x8Y	8109130081	5
59	Screw, # 1 WPT 2.6x14Y	8159126141	1
60	Washer Plain	8305001810	1
61	Drive Unit, KSM 2101 ABM	5728001010	1
62	Motor, RF-500TB-14415	5558200310	2
63	Motor, RF-130SH-14230	5558200410	1
64	Switch, Lever, SSCF-21004A	4638003410	2
65/66	Not Used !		

1. This parts list based on American version is for European version.
2. Each Initial in the Remark is denoted as follows.
C: Changed, D: Deleted, A: Added

Ref. No.	Description	Mfr. Part No.	Q't	Remark
	CABINET & CHASSIS			
26	Chassis Back, SECC, Black	046102044051	1	C
27 ⚠	Cord AC Power	4308000430	1	C
	MISCELLANEOUS			
Trans ⚠	Power Transformer, 230 V, 50 Hz	2828100657	1	C

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol ⚠ in the part list are of special significance to safety. When replacing a component identified with ⚠ , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before 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	**ASSEMBLY P.C.B MAIN**						
	CAPACITORS						
C101/C102	Electrolytic SG	100	uF	10 V	M	3479310121	2
C105	Electrolytic SG	22	uF	50 V	M	3479322071	1
C106-C108	Electrolytic SG	100	uF	10 V	M	3479310121	3
C110	Electrolytic SG	0.47	uF	50 V	M	3479347871	1
C111	Mylar	0.002	uF	100 V	J	3679222120	1
C113/C114	Electrolytic SG	100	uF	10 V	M	3479310121	2
C116	Electrolytic SG	100	uF	10 V	M	3479310121	1
C118	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C119-C122	Not Used !						
C123/C124	Mylar	0.047	uF	100 V	J	3679473120	2
C125	Electrolytic SG	2200	uF	25 V	M	3409322249	1
C126	Electrolytic SG	1000	uF	25 V	M	3409310249	1
C128	Electrolytic SG	100	uF	10 V	M	3479310121	1
C129	Electrolytic SG	1000	uF	25 V	M	3409310249	1
C131	Ceramic Tubular	0.01	uF	50 V	J	3519103935	1
C132	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C133/134	Electrolytic SG	100	uF	16 V	M	3479310131	2
C136	Ceramic Tubular	220	pF	50 V	J	3519221935	1
C137	Ceramic Tubular	47	pF	50 V	J	3519470935	1
C138	Electrolytic SG	4.7	uF	50 V	M	3479347971	1
C140	Ceramic Tubular	1000	pF	50 V	J	3519102935	1
C141	Ceramic Tubular	220	pF	50 V	J	3519221935	1
C142	Ceramic Tubular	0.01	uF	50 V	J	3519103935	1
C143/C144	Ceramic Tubular	10	pF	50 V	J	3519100935	2
C145	Ceramic Tubular	120	pF	50 V	J	3519121935	1
C146	Mylar	0.047	uF	100 V	J	3679473120	1
C147	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C148/C149	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C150	Electrolytic SG	100	uF	10 V	M	3479310121	1
C151	Electrolytic SG	10	uF	50 V	M	3479310071	1
C152	Mylar	0.002	uF	100 V	J	3679152120	1
C153/C154	Ceramic Tubular	10	pF	50 V	J	3519100935	2
C156	Ceramic Tubular	2200	uF	16 V	J	3519222915	1
C157	Electrolytic SG	100	uF	16 V	M	3479310131	1
C158	Ceramic Tubular	220	pF	50 V	J	3519221935	1
C159	Ceramic Tubular	47	pF	50 V	J	3519470935	1
C160	Ceramic Tubular	0.01	uF	50 V	J	3519103935	1
C161	Electrolytic SG	100	uF	16 V	M	3479310131	1
C162	Electrolytic SG	22	uF	50 V	M	3479322071	1
C163	Electrolytic SG	100	uF	10 V	M	3479310121	1
C164	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C165	Electrolytic SG	100	uF	16 V	M	3479310131	1
C166	Electrolytic SG	47	uF	16 V	M	3479347031	1
C167	Electrolytic SG	100	uF	16 V	M	3479310131	1
C168	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C169	Ceramic Tubular	220	pF	50 V	J	3519221935	1
C170	Ceramic Tubular	47	pF	50 V	J	3519470935	1
C171	Electrolytic SG	0.47	uF	50 V	M	3479347871	1
C172	Mylar	0.01	uF	100 V	J	3679103120	1
C173	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C174	Mylar	0.033	uF	100 V	J	3679333120	1
C175/C176	Ceramic Tubular	10	pF	50 V	J	3519100935	2
C177	Ceramic Tubular	0.01	uF	50 V	J	3519103935	1
C178	Electrolytic SG	10	uF	50 V	M	3479310071	1
C179	Electrolytic SG	0.47	uF	50 V	M	3479347871	1
C180	Ceramic Tubular	120	pF	50 V	J	3519121935	1
C181	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C182	Not Used !						
C183	Electrolytic SG	3.3	uF	50 V	M	3479333971	1
C184	Electrolytic SG	22	uF	25 V	M	3479322041	1
C185	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C186/C187	Ceramic Tubular	100	pF	50 V	J	3519101935	2
C188	Electrolytic SG	33	uF	16 V	M	3479333031	1
C189	Electrolytic SG	0.47	uF	50 V	M	3479347871	1
C190	Mylar	0.002	uF	100 V	J	3679152120	1
C191/C192	Ceramic Tubular	10	pF	50 V	J	3519100935	2
C193	Ceramic Tubular	220	pF	50 V	J	3519221935	1
C194	Ceramic Tubular	47	pF	50 V	J	3519470935	1
C196	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C197	Ceramic Disc CH	33	pF	50 V	J	3528330210	1
C198	Ceramic Tubular	0.022	uF	50 V	J	3519223935	1
C199	Ceramic Disc CH	33	pF	50 V	J	3528330210	1
C200	Electrolytic SG	100	uF	16 V	M	3479310131	1
C201/C202	Electrolytic SG	0.47	uF	50 V	M	3479347871	2
C205	Mylar	0.033	uF	100 V	J	3679333120	1
C206	Mylar	0.047	uF	100 V	J	3679473120	1
C207	Mylar	0.01	uF	100 V	J	3679103120	1
C208	Mylar	0.022	uF	100 V	J	3679223120	1
C209	Mylar	0.1	uF	100 V	J	3679104120	1
C210	Electrolytic SG	4.7	uF	50 V	M	3479347971	1
C211	Mylar	0.1	uF	100 V	J	3679104120	1
C212	Mylar	0.01	uF	100 V	J	3679103120	1
C219	Mylar	0.1	uF	100 V	J	3679104120	1
C220	Ceramic Tubular	0.022	uF	50 V	K	3519223520	1
C221	Ceramic Tubular	0.002	uF	50 V	K	3519222915	1
C222	Electrolytic SG	100	uF	10 V	M	3479310121	1
C223	Mylar	0.1	uF	100 V	J	3679104120	1
C224	Electrolytic SG	1	uF	50 V	M	3479310971	1
C225	Ceramic Tubular	0.022	uF	50 V	K	3519223520	1
C226	Electrolytic SG	47	uF	25 V	M	3479347041	1
C227/C228	Ceramic Tubular	220	pF	50 V	K	3519221935	2

Ref. No.	Description					Mfr. Part No.	Q'ty
C229	Ceramic Tubular	0.022	uF	50 V	K	3519223520	1
C230	Mylar	0.033	uF	100 V	J	3679333120	1
C231	Mylar	0.047	uF	100 V	J	3679473120	1
C232	Electrolytic SG	22	uF	50 V	M	3479322071	1
C234	Mylar	0.047	uF	100 V	J	3679473120	1
	CONNECTORS						
CN101	Wafer, 6P					4428525560	1
CN102	Wafer, 8P					4428525580	1
CN103	Wafer, 8P					4428525580	1
CN104	Wafer, 4P					4428525540	1
CN105	Wafer, 3P					4428513430	1
CN106	Wafer, 4P					4428513440	1
CN107	Wafer, 10P					4428525600	1
CN108	Wafer, 9P					4428525590	1
CN109	Wafer, 16P, FPC, Angle					4426001116	1
CN110	Wafer, 9P					4428513490	1
CN111	Wafer, 5P					4428525550	1
	DIODES						
D101/D102	1N4148,Switching					2058322101	2
D103	Zener, UZ 27BSC					2258599115	1
D104	Zener, UZ 9.1BSC					2258599128	1
D105	1N4002, Rectifier					2258100135	1
D106/D107	Zener, UZ 4.3BSB					2258599102	2
D108	Zener, UZ 5.1BSB					2258599103	1
D109/D110	1N4002, Rectifier					2258100135	2
D111-D114	1N4148,Switching					2058322101	4
D115	1N4002, Rectifier					2258100135	1
D116/D117	1N4148,Switching					2058322101	2
D118/D119	1N4002, Rectifier					2258100135	2
D120	Zener, UZ 5.1BSB					2258599103	1
D121	1N4002, Rectifier					2258100135	1
D122	1N4148,Switching					2058322101	1
D123-D138	1N4148,Switching					2058322101	16
	INTEGRATED CIRCUITS						
IC101-IC103	TA7293S, Motor Control					2168007204	3
IC104	SM5871AP					2138099120	1
IC105	KIA4559S/KIA75559S, Op Amp					2168206103	1
IC106	KA9258D					2168202120	1
IC107	CXD2507Q					2138022120	1
IC108	KA7805, Regulator					2168602105	1
IC109	KA7812, Regulator					2168602108	1
IC110	KA7912, Regulator					2168602113	1
IC111	KA7808, Regulator					2168602101	1
IC112	CXP82320-322, DWP325					2138322197	1
IC113	CXA1782BQ					2138022117	1
	TRANSISTORS						
Q101	MPSA56Y, PNP, Silicon					2208206113	1
Q102	DTC114YS					2208622106	1
Q103/Q104	KTD1302B, NPN, Silicon					2208606112	2
Q105	KTA1023/BKTA965, PNP, Silicon					2228106107	1
Q106	DTC114YS					2208622106	1
Q107	BKTA1266Y/KTA1015Y, PNP, Silicon					2208206105	1
Q111	BKTC2235/KTC1027, NPN, Silicon					2228406120	1
Q112	DTC114YS					2208622106	1
Q113-Q116	KTC2240BL/BKTC3200, NPN, PNP					2208606108	4
Q117/Q118	KTA1023/BKTA965, PNP, Silicon					2228106107	2
Q119/Q120	MPSA06Y, NPN, Silicon					2208606114	2
Q121/Q122	MPSA56Y, PNP, Silicon					2208206113	2
Q123/Q124	KTA970/KTA1268, PNP, Silicon					2208206104	2
Q125/Q126	BKTC2235/KTC1027, NPN, Silicon					2228406120	2
Q127/Q128	KTA970/KTA1268, PNP, Silicon					2208206104	2
Q129	BKTA1266Y/KTA1015Y, PNP, Silicon					2208206105	1
Q130/Q131	KTC2240BL/BKTC3200, NPN, PNP					2208606108	2
Q132/Q133	KTA1023/BKTA965, PNP, Silicon					2228106107	2
Q134/Q135	KTC2240BL/BKTC3200, NPN, PNP					2208606108	2
Q136/Q137	MPSA06Y, NPN, Silicon					2208606114	2
Q138	MPSA56Y, PNP, Silicon					2208206113	1
Q140	DTC114YS					2208622106	1
Q141/Q142	BKTC2235/KTC1027, NPN, Silicon					2228406120	2
Q143-Q146	KTA970/KTA1268, PNP, Silicon					2208206104	4
Q147/Q148	KTD1302B, NPN, Silicon					2208606112	2
Q149/Q150	DTA114YS, PNP, Silicon					2208222105	2
	RESISTORS						
R101/R102	Metal Film	1	kohm	1/5 W	J	3029102970	2
R103	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R104	Metal Film	4.4	kohm	1/5 W	J	3029472970	1
R105-R109	Carbon Film	47	kohm	1/5 W	J	3069473970	5
R110	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R111	Metal Film	2.2	ohm	1/5 W	J	3029229970	1
R112	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R113	Carbon Film	7.5	kohm	1/5 W	J	3069752970	1
R116	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R117	Carbon Film	3	kohm	1/5 W	J	3069302970	1
R118	Metal Film	2.2	ohm	1/5 W	J	3029229970	1
R120	Metal Film	2.2	kohm	1/5 W	J	3029222970	1
R121/R122	Metal Film	1	kohm	1/5 W	J	3029102970	2
R123	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R124	Metal Film	1	kohm	1/5 W	J	3029102970	1

Ref. No.	Description					Mfr. Part No.	Q'ty
R126	Metal Film	1	kohm	1/5 W	J	3029102970	1
R127	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R128/R129	Metal Film	2.2	ohm	1/5 W	J	3029229970	2
R130	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R131	Metal Film	2.2	ohm	1/5 W	J	3029229970	1
R132	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R133-R142	Metal Film	1	kohm	1/5 W	J	3029102970	10
R143	Metal Film	470	ohm	1/5 W	J	3029471970	1
R144	Metal Film	1	kohm	1/5 W	J	3029102970	1
R145	Metal Film	330	ohm	1/5 W	J	3029331970	1
R146	Metal Film	4.7	kohm	1/5 W	J	3029472970	1
R147	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R148	Metal Film	2.2	kohm	1/5 W	J	3029222970	1
R149	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R150	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R151	Metal Film	680	ohm	1/5 W	J	3029681970	1
R153	Metal Film	2.2	kohm	1/5 W	J	3029222970	1
R154	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R155	Metal Film	680	ohm	1/5 W	J	3029681970	1
R157	Metal Film	470	ohm	1/5 W	J	3029471970	1
R158/R159	Carbon Film	10	kohm	1/5 W	J	3069103970	2
R160	Metal Film	470	ohm	1/5 W	J	3029471970	1
R161	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R162	Metal Film	470	ohm	1/5 W	J	3029471970	1
R164	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R165	Carbon Film	3.6	kohm	1/5 W	J	3069362970	1
R166	Carbon Film	100	kohm	1/5 W	J	3069104970	1
R167	Metal Film	10	ohm	1/5 W	J	3029100970	1
R168	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R169	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R171	Metal Film	150	ohm	1/5 W	J	3029151970	1
R172	Metal Film	75	ohm	1/5 W	J	3029750970	1
R173	Metal Film	10	ohm	1/5 W	J	3029100970	1
R174	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R175	Carbon Film	1	Mohm	1/5 W	J	3069105970	1
R176	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R177	Carbon Film	5.1	kohm	1/5 W	J	3069512970	1
R178	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R179	Metal Film	3.3	kohm	1/5 W	J	3029332970	1
R180/R181	Carbon Film	12	kohm	1/5 W	J	3069123970	2
R182	Metal Film	3.3	kohm	1/5 W	J	3029332970	1
R183	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R184/R185	Carbon Film	20	kohm	1/5 W	J	3069203970	2
R186	Metal Film	33	ohm	1/5 W	J	3029330970	1
R187	Carbon Film	27	kohm	1/5 W	J	3069273970	1
R188	Metal Film	33	ohm	1/5 W	J	3029330970	1
R189	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R190	Metal Film	100	ohm	1/5 W	J	3029101970	1
R191	Carbon Film	18	kohm	1/5 W	J	3069183970	1
R192/R193	Metal Film	33	ohm	1/5 W	J	3029330970	2
R194	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R195	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R196	Metal Film	10	ohm	1/5 W	J	3029100970	1
R197	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R198	Metal Film	100	ohm	1/5 W	J	3029101970	1
R199	Metal Film	10	ohm	1/5 W	J	3029100970	1
R200	Metal Film	150	ohm	1/5 W	J	3029151970	1
R201	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R202	Metal Film	75	ohm	1/5 W	J	3029750970	1
R203	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R204	Carbon Film	3.6	kohm	1/5 W	J	3069362970	1
R205	Metal Film	22	ohm	1/5 W	J	3029220970	1
R206	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R207	Metal Film	1	kohm	1/5 W	J	3029102970	1
R208	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R209	Carbon Film	3.6	kohm	1/5 W	J	3069362970	1
R210	Metal Film	10	ohm	1/5 W	J	3029100970	1
R211	Metal Film	150	ohm	1/5 W	J	3029151970	1
R212	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R213	Metal Film	75	ohm	1/5 W	J	3029750970	1
R214	Metal Film	10	ohm	1/5 W	J	3029100970	1
R215	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R216	Carbon Film	5.1	kohm	1/5 W	J	3069512970	1
R217	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R218/R219	Metal Film	33	ohm	1/5 W	J	3029330970	2
R220	Carbon Film	39	kohm	1/5 W	J	3069393970	1
R221/R222	Carbon Film	12	kohm	1/5 W	J	3069123970	2
R223	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R224	Carbon Film	18	kohm	1/5 W	J	3069183970	1
R225	Metal Film	100	ohm	1/5 W	J	3029101970	1
R226	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R227	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R228	Carbon Film	15	kohm	1/5 W	J	3069153970	1
R229/R230	Carbon Film	20	kohm	1/5 W	J	3069203970	2
R231	Carbon Film	27	kohm	1/5 W	J	3069273970	1
R232/R233	Metal Film	33	ohm	1/5 W	J	3029330970	2
R234	Metal Film	1	kohm	1/5 W	J	3029102970	1
R235	Carbon Film	8.2	kohm	1/5 W	J	3069822970	1
R236	Metal Film	1	kohm	1/5 W	J	3029102970	1
R237	Carbon Film	12	kohm	1/5 W	J	3069123970	1
R238	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R239	Metal Film	10	ohm	1/5 W	J	3029100970	1
R240	Metal Film	150	ohm	1/5 W	J	3029151970	1
R241	Metal Film	75	ohm	1/5 W	J	3029750970	1
R242	Carbon Film	82	kohm	1/5 W	J	3069823970	1
R243	Carbon Film	39	ohm	1/5 W	J	3069390970	1
R244	Metal Film	10	ohm	1/5 W	J	3029100970	1
R245	Carbon Film	3.6	kohm	1/5 W	J	3069362970	1
R246	Carbon Film	120	kohm	1/5 W	J	3069124970	1
R247	Carbon Film	1	Mohm	1/5 W	J	3069105970	1
R248	Metal Film	2.7	kohm	1/5 W	J	3029272970	1
R249	Carbon Film	24	kohm	1/5 W	J	3069243970	1

Ref. No.	Description					Mfr. Part No.	Q'ty
R250	Metal Film	1	kohm	1/5 W	J	3029102970	1
R251	Carbon Film	24	kohm	1/5 W	J	3069243970	1
R252	Metal Film	1	kohm	1/5 W	J	3029102970	1
R253	Carbon Film	75	kohm	1/5 W	J	3069753970	1
R254	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R255/R256	Metal Film	1	kohm	1/5 W	J	3029102970	2
R257R258	Carbon Film	10	kohm	1/5 W	J	3069103970	2
R259	Carbon Film	470	kohm	1/5 W	J	3069474970	1
R260	Carbon Film	6.8	kohm	1/5 W	J	3069682970	1
R261	Carbon Film	20	kohm	1/5 W	J	3069203970	1
R262	Metal Film	22	ohm	1/5 W	J	3029220970	1
R263	Carbon Film	18	kohm	1/5 W	J	3069183970	1
R264	Carbon Film	5.1	kohm	1/5 W	J	3069512970	1
R265	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R266	Carbon Film	18	kohm	1/5 W	J	3069183970	1
R267	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R268	Carbon Film	5.1	kohm	1/5 W	J	3069512970	1
R269	Metal Film	22	ohm	1/5 W	J	3029220970	1
R270	Carbon Film	100	kohm	1/5 W	J	3069104970	1
R271/R272	Carbon Film	47	kohm	1/5 W	J	3069473970	2
R273	Carbon Film	100	kohm	1/5 W	J	3069104970	1
R274	Carbon Film	68	kohm	1/5 W	J	3069683970	1
R275	Carbon Film	10	kohm	1/5 W	J	3069103970	1
R276	Carbon Film	680	kohm	1/5 W	J	3069684970	1
R277-R279	Carbon Film	10	kohm	1/5 W	J	3069103970	3
	MISCELLANEOUS						
W01	Wire Lug, 200mm, to Chassis					4359971020	1
X101	Resonator, CST10.00MTW					3938131750	1
X102	Crystal, 16.9344 Mhz					3938101500	1
B1-B5	Bead Cord, 3560					2648702130	5
FL	FIP 4EM6					2328130311	1
L101	Inductor, 10 uH					2648610082	1
19	Holder, FL					6513004420	1
20	Heatsink Regulator TR.					7505202410	1
21	Heatsink Regulator TR.					7505202410	1
22	Heatsink Regulator TR.					7505206110	1
SW101	Switch, Tact					4658003710	1
PCB2	**ASSEMBLY PCB POWER**						
CNT301	LV BASE 3P					4428525790	1
⚠ F301	Fuse, SB 250 mA, 125 V					5508101221	1
CN302	Wafer, AC, 2P					4428100281	1
	Clip Fuse, PFC5000-0202					4255001010	2
PCB3	**ASSEMBLY PCB OUTPUT**						
	CAPACITORS						
C901	Ceramic Tubular	100	pF	50 V	K	3519101935	1
C902	Ceramic Tubular	0.022	uF	50 V	K	3519223520	1
C903	Ceramic Tubular	220	pF	50 V	K	3519221935	1
C904	Ceramic Tubular	0.1	uF	50 V	K	3519104935	1
C905/C906	Mylar	0.005	uF	100 V	J	3679472120	2
	CONNECTORS						
CP104	Lead Ass'y, 4P, 240mm, to Main B'D CN104					436204243332	1
CP105	Lead Ass'y, 3P, 280mm, to Main B'D CN105					436103283331	1
	Coil						
L901	Matching Trans					2638710020	1
	INTEGRATED CIRCUIT						
IC901	LTV-817, Optocoupler					2408000136	1
	TRANSISTOR						
Q901	DTA114YS, PNP, Silicon					2208222105	1
	RESISTORS						
R901	Metal Film	680	ohm	1/5 W	J	3029681970	1
R902	Metal Film	3.9	kohm	1/5 W	J	3029392970	1
R903	Metal Film	680	ohm	1/5 W	J	3029681970	1
R904	Metal Film	100	ohm	1/5 W	J	3029101970	1
R905	Carbon Film	47	kohm	1/5 W	J	3069473970	1
R906	Metal Film	68	ohm	1/5 W	J	3029680970	1
R907	Metal Film	47	ohm	1/5 W	J	3029470970	1
R908	Metal Film	270	ohm	1/5 W	J	3029271970	1
	MISCELLANEOUS						
23	Jack RCA, 1P					4438111020	1
24	Jack, Multi, 2P					4438007510	1
25	Jack RCA, 2P					4438111320	1
PCB4	**ASSEMBLY PCB FRONT**						
CP107	Lead Ass'y, 10P, 200mm, to Main B'D CN107					436210203332	1
SW401-413	Switch, Tact					4658003710	13
PCB5	**ASSEMBLY PCB RMC SENSOR**						
CP108	Lead Ass'y, 9P,100mm, to Main B'D CN108					436209103332	1
SENSOR501	KRM63M, Remocon Module					2408001140	1
SW501-506	Switch, Tact					4658003710	6
PCB6	**ASSEMBLY PCB HEADPHONE**						
C601	Ceramic Tubular	0.1	uF	50 V	K	3519104935	1
C602/C603	Ceramic Tubular	0.001	uF	50 V	K	3519102935	2
CP106	Lead Ass'y, 4P, 180mm, to Main B'D CN106					436104183331	1
R601/R602	Metal Film	1	kohm	1/5 W	J	3029102970	2
R602	Metal Film	1	kohm	1/5 W	J	3029102970	1
W02	Wire Lug 160mm, to Chassis					4359971016	1
JACK1	Jack, Phone					4438005010	1

Ref. No.	Description	Part No.	Q'ty
PCB7	**ASSEMBLY PCB POWER SWITCH**		
CN701	Plug, 3P, Angle	4428851103	1
CP111	Lead Ass'y, 5P, 350mm, to Main B'D CN111	436205353332	1
R701	Metal Film 1 ohm 1/5 W J	3029109970	1
SW701	Switch, Push, Power	4628058310	1
PCB8	**ASSEMBLY PCB LED**		
CP701	Plug, BOT. 3P	4428861003	1
D801	LED, SPR-54MDW3, Green/Amber	2308222205	1
PCB9	**ASSEMBLY PCB CONNECTION**		
CN601	Connector, Wafer, 5P	4428516140	1
CN602	Connector, Wafer, 5P	4428516140	1
CN603	Connector, Wafer, 6P, FPC	4428606965	1
CN103	Connector, Wafer, 16P, FPC	4428616965	1
PCB10	**ASSEMBLY PCB ROULETTE SENSOR**		
R601	RES, Carbon Film 150 ohm 1/5 W J	3069151970	1
R602	RES, Carbon Film 10 kohm 1/5 W J	3069103970	1
R603	RES, Carbon Film 100 ohm 1/5 W J	3069101970	1
CN603	Connector, Wafer, 6P, FPC	4428606965	1
CN604	Connector, Wafer, 2P	4428525520	1
R.SENSOR	Sensor, Photo, SG-23F1	2408001111	1
DISC SENSOR	Sensor, Photo, ON2173-R,S	2408210001	1

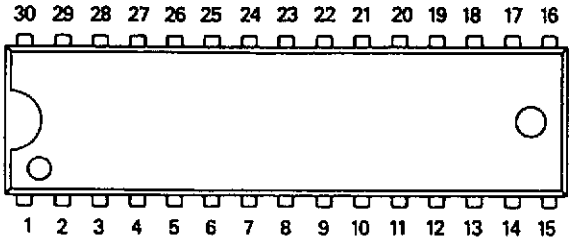
1. This parts list based on American version is for European version.
2. Each initial in the Remark is denoted as follows.
   C: Changed, D: Deleted, A: Added

Ref. No.	Description	Mfr. Part No.	Q't	Remark
PCB2	**ASSEMBLY PCB POWER**	054002009359		
⚠F301	Fuse, T 250 V, 160 m	5508301035	1	C
CN302	Wafer, AC, 2P	4428100291	1	C

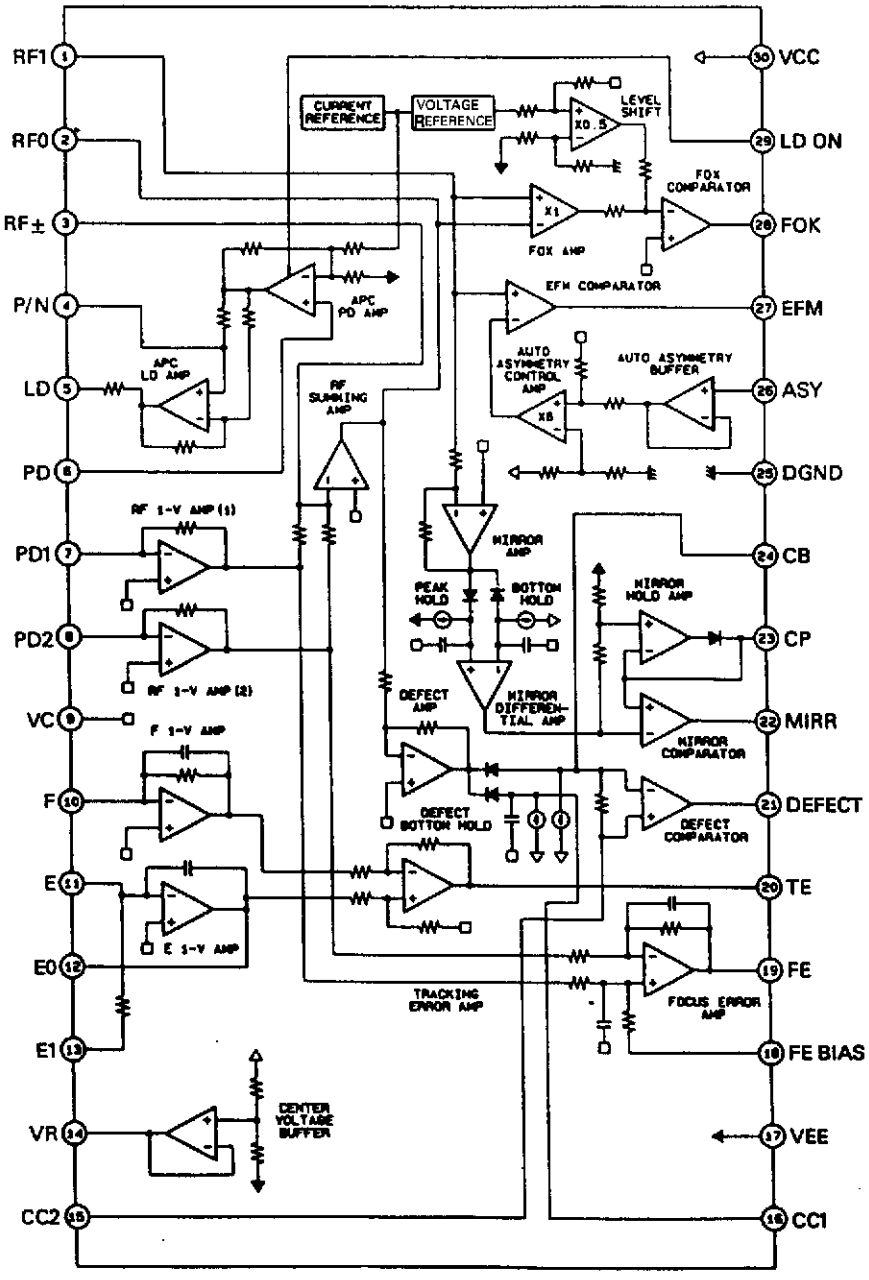
IC'S LEAD IDENTI FICATION & INTERNAL DIAGRAMS

CXA1081S : IC108 (RF AMP)

1. Package Outline

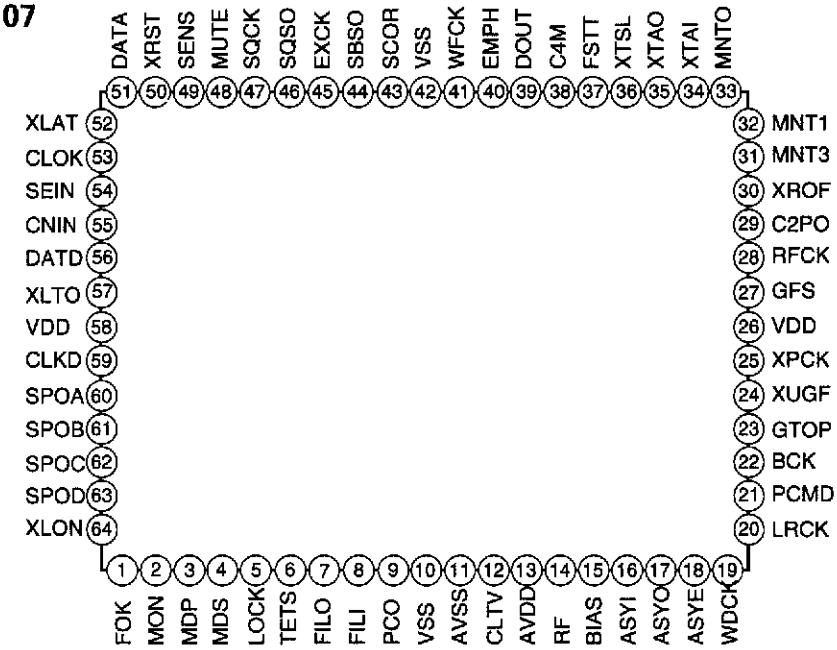


2. Block Diagram

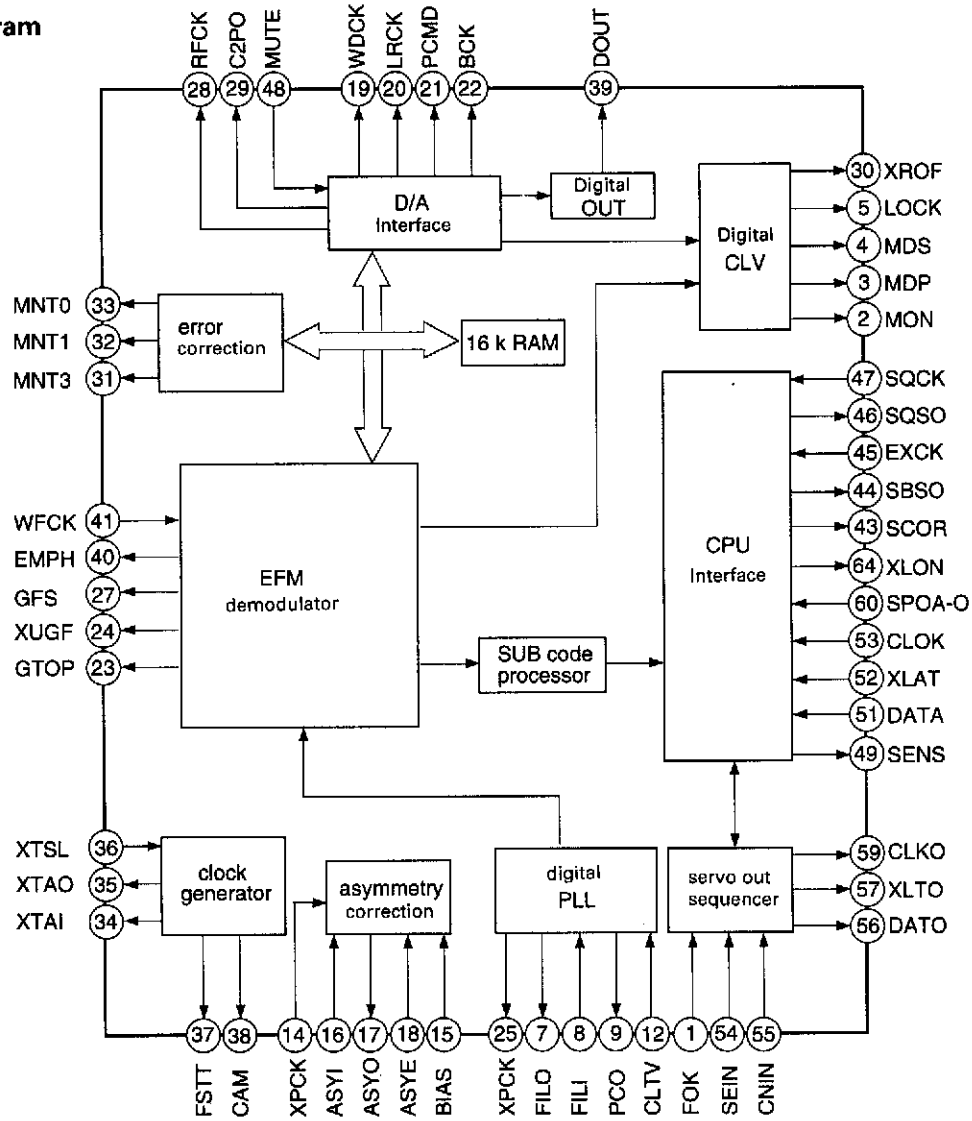


CXD 2607Q : IC107

1. Pin Diagram



2. Block Diagram



3. Pin Description

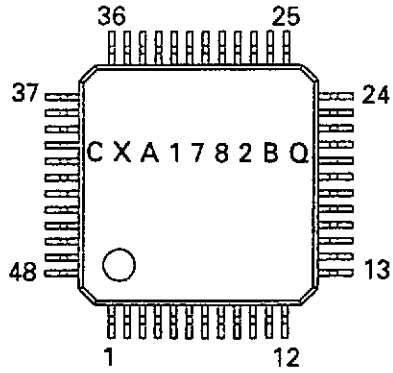
Pin No.	Symbol	I/O		Description
1	FOK	I		Focus OK input. Used for SENS output and the servo auto sequencer.
2	MON	O	1, 0	Spindle motor on/off control output.
3	MDP	O	1, Z, 0	Spindle motor servo control.
4	MDS	O	1, Z, 0	Spindle motor servo control.
5	LOCK	O	1, 0	GFS is sampled at 460 Hz; when GFS is high, this pin outputs a high signal. If GFS is low eight consecutive samples, this pin outputs low.
6	TEST	I		TEST pin. Normally GND.
7	FILO	O	Analog	Master PLL (slave=digital PLL) filter output.
8	FILI	I		Master PLL filter input.
9	PCO	O	1, Z, 0	Master PLL charge pump output.
10	V_{SS}	—	—	GND.
11	AV_{SS}	—	—	Analog GND.
12	CLTV	I		Master VCO control voltage input.
13	AV_{DD}	—	—	Analog power supply (+5 V)
14	RF	I		EFM signal input.
15	BIAS	I		Constant current input of asymmetry circuit.
16	ASYI	I		Asymmetry comparator voltage input.
17	ASYO	O	1, 0	EFM full-swing output (low=VSS, high=VDD).
18	ASYE	I		Low: asymmetry circuit off; high: asymmetry circuit on.
19	WDCK	O	1, 0	D/A interface. Word clock f=2Fs.
20	LRCK	O	1, 0	D/A interface. LR clock f=Fs.
21	PCMD	O	1, 0	D/A interface. Seria' data (two's complement, MSB first).
22	BCK	O	1, 0	D/A interface. Bit clock.
23	GTOP	O	1, 0	GTOP output.
24	XUGF	O	1, 0	XUGF output.
25	XPCK	O	1, 0	XPLCK output.
26	V_{DD}	—	—	Power supply (+5 V).
27	GFS	O	1, 0	GFS output.
28	RFCK	O	1, 0	RFCK output.
29	C2PO	O	1, 0	C2PO output.
30	XROF	O	1, 0	XRAOF output.
31	MNT3	O	1, 0	MNT 3 output.
32	MNT1	O	1, 0	MNT 1 output.
33	MNT0	O	1, 0	MNT 0 output.
34	XTAI	I		16.9344 MHz crystal oscillation circuit input, or 33.8688 MHz input.
35	XTAO	O	1, 0	16.9344 MHz crystal oscillation circuit output.
36	XTSL	I		Crystal selection input. Set low when the crystal is 16.9344 MHz, high when 33.8688 MHz.
37	FSTT	O	1, 0	2/3 frequency divider output for Pins 34 and 35.
38	C4M	O	1, 0	4.2336 MHz output.

Pin No.	Symbol	I/O		Description
39	DOUT	O	1, 0	Digital Out output.
40	EMPH	O	1, 0	Outputs high signal when the playback disc has emphasis, low signal when no emphasis.
41	WFCK	O	1, 0	WFCK output.
42	V_{SS}	—	—	GND.
43	SCOR	O	1, 0	Outputs high signal when either subcode sync S0 or S1 is detected.
44	SBSO	O	1, 0	Sub P to W serial output.
45	EXCK	I		SBSO readout clock input.
46	SQSO	O	1, 0	SubQ 80-bit serial output.
47	SQCK	I		SQSO readout clock input.
48	MUTE	I		High: mute; low: release
49	SENS	O	1, 0	SENS output to CPU.
50	XRST	I		System reset. Reset when low.
51	DATA	I		Serial data input from CPU.
52	XLAT	I		Latch input from CPU. Serial data is latched at the falling edge.
53	CLOK	I		Serial data transfer clock input from CPU.
54	SEIN	I		Sense input from SSP.
55	CNIN	I		Track jump count signal input.
56	DATO	O	1, 0	Serial data output to SSP.
57	XLTO	O	1, 0	Serial data latch output to SSP. Latched at the falling edge.
58	V_{DD}	—	—	Power supply (+5 V).
59	CLKO	O	1, 0	Serial data transfer clock output to SSP.
60	SPOA	I		Microcomputer extended interface (input A).
61	SPOB	I		Microcomputer extended interface (input B).
62	SPOC	I		Microcomputer extended interface (input C).
63	SPOD	I		Microcomputer extended interface (input D).
64	XLON	O	1, 0	Microcomputer extended interface (output).

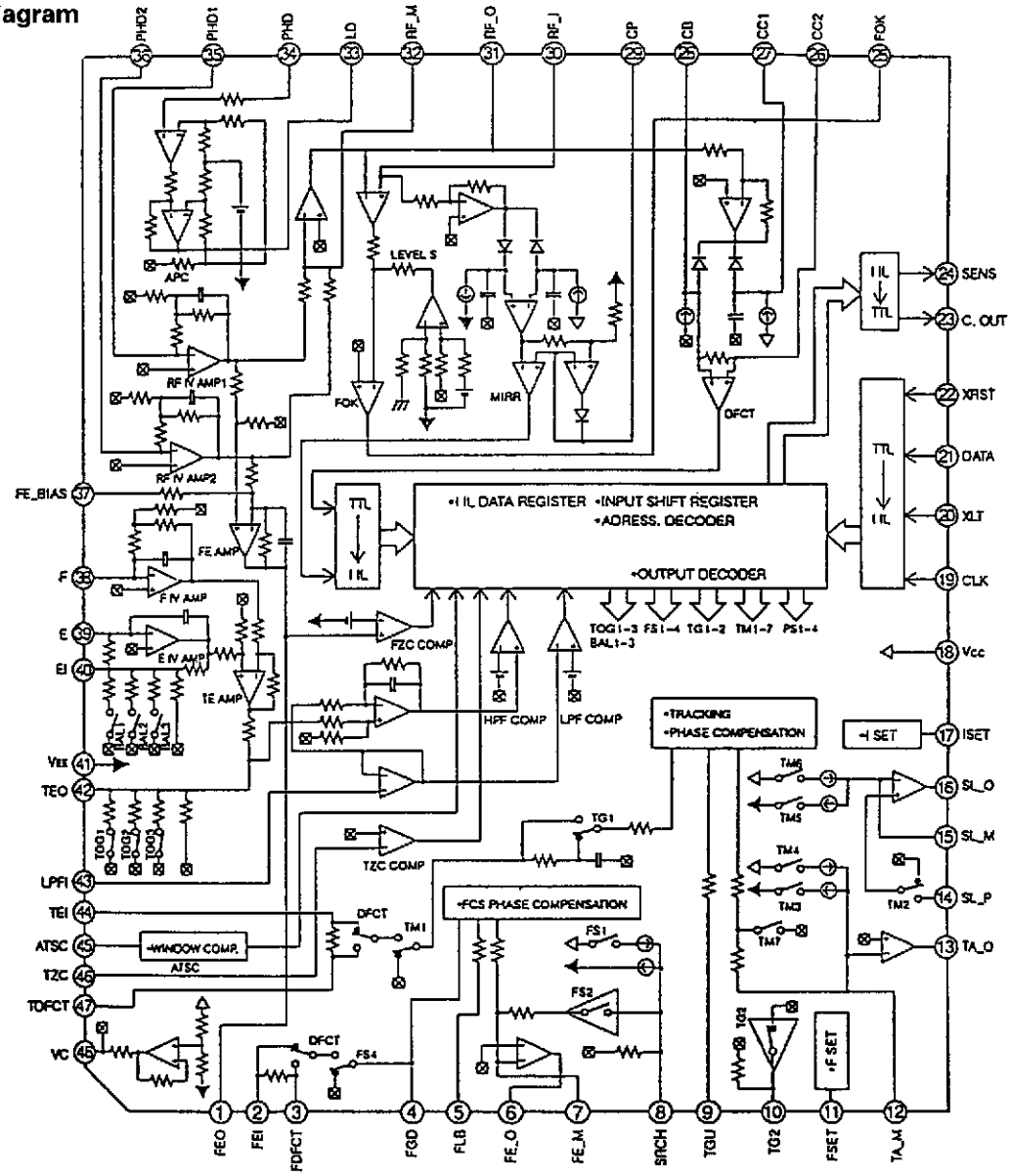
Notes:
- PCMD is two's complement output of MSB first.
- GTOP is used to monitor the frame sync protection status.
- XUGF is the negative pulse for the frame sync derived from the EFM signal. It is the signal before sync protection.
- XPLCK is the inverse of the EFM PLL clock. The PLL is designed so that the falling edge and the EFM signal transition point coincide.
- GFS goes high when the frame sync and the insertion protection timing match.
- RFCK is derived from the crystal accuracy. This signal has a cycle of 136μ.
- C2PO represents the data error status.
- XRAOF is generated when the 16K RAM exceeds the ± 4F jitter margin.

CXA 1782BQ : IC113

1. Package Outline



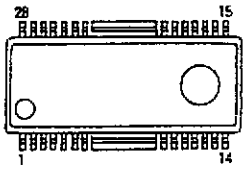
2. Block Diagram



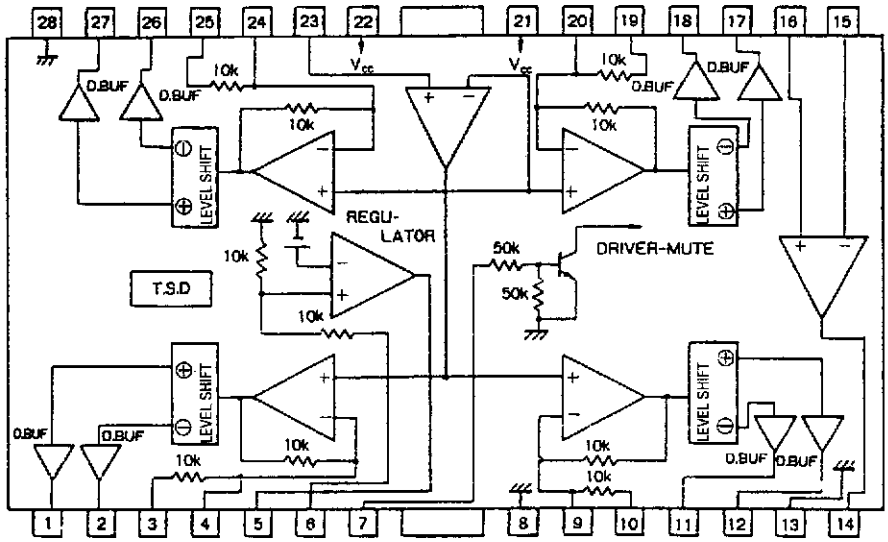
* The switch state in Block Diagram is for initial resetting.
* Switch turns to ○ side for 1 and to ● side for 0 in Serial Data Truth Table on pages 30 and 31.
* DFCT switch turns to ○ side when defect signal generates for DEFECT=E in Serial Data Truth Table.
* TG1 switch turns to ○ side and TG2 switch is left open when TG1 and TG2 (address 1 : D3) is 1.

KA 9258D : IC106

1. Package Outline



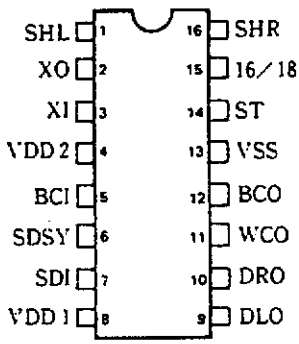
2. Block Diagram



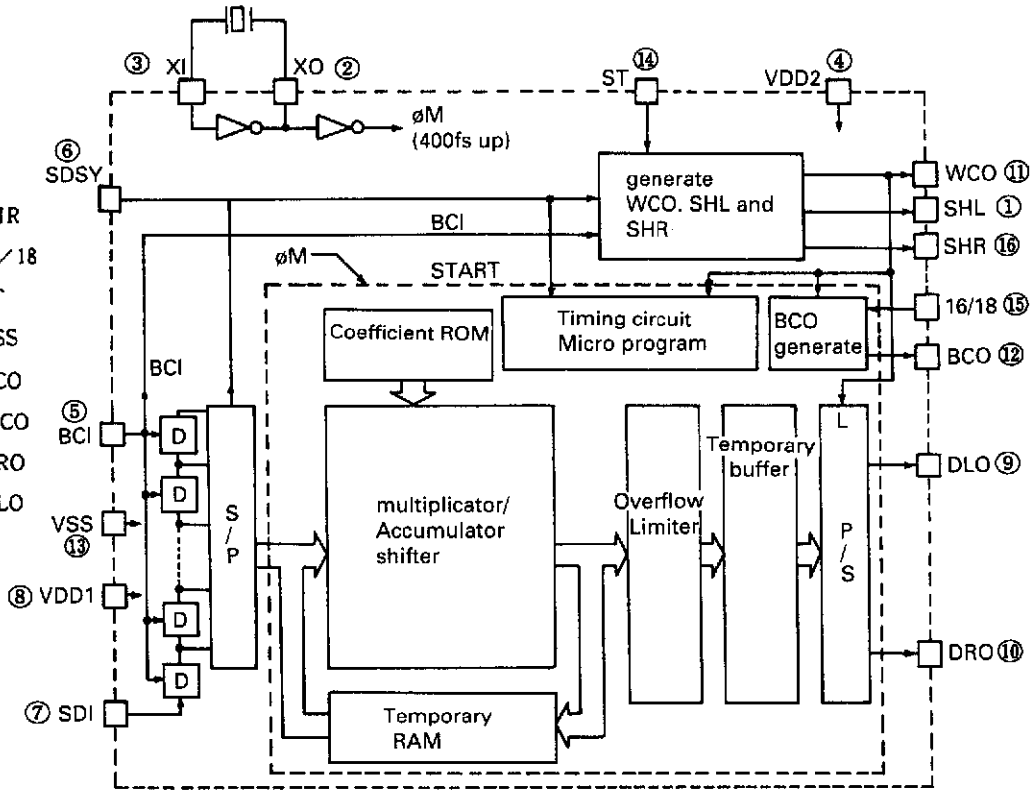
D.BUF : Drive Buffer T.S.D : Thermal Shutdown.

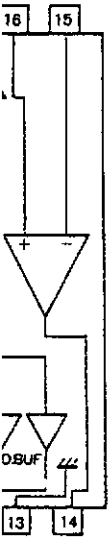
YM3433B-D : IC103

1. Package Outline



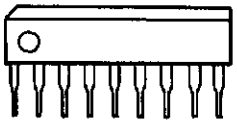
2. Block Diagram



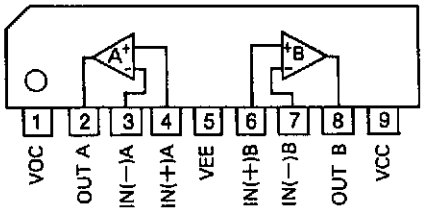


KIA4559S/KIA75559S : IC105

1. Package Outline

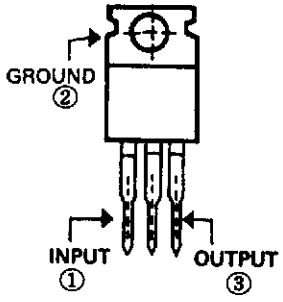


2. Block Diagram

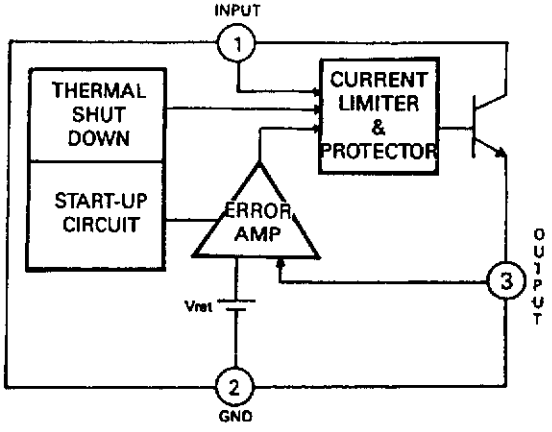


KA78XX : IC111, IC108, IC109

1. Package Outline

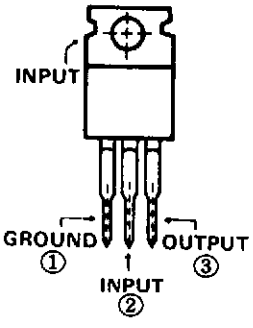


2. Block Diagram

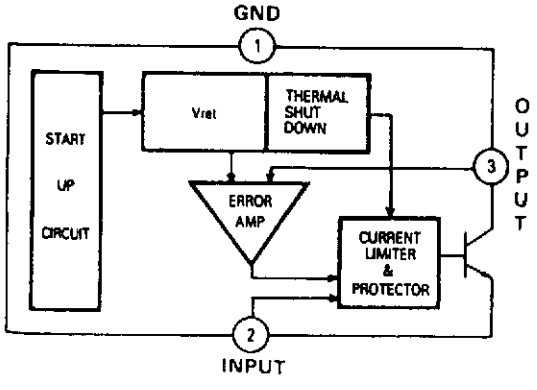


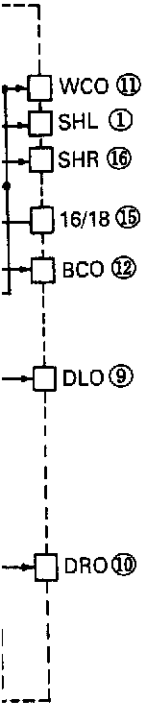
KA79XX : ICT110

1. Package Outline



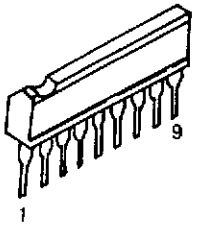
2. Block Diagram



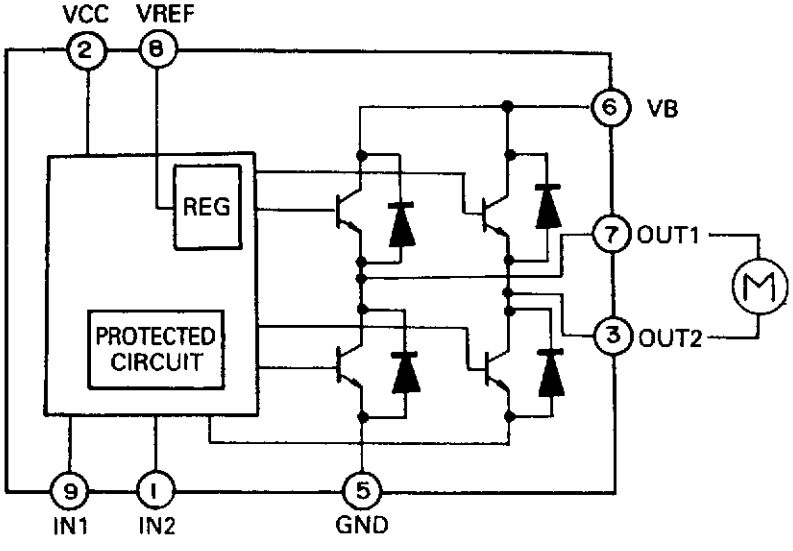


TA7291S ; IC101, IC102, IC103

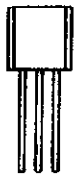
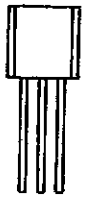
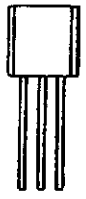
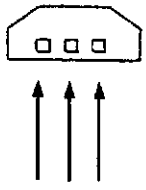
1. Package Outline

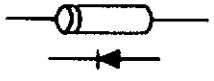


2. Block Diagram



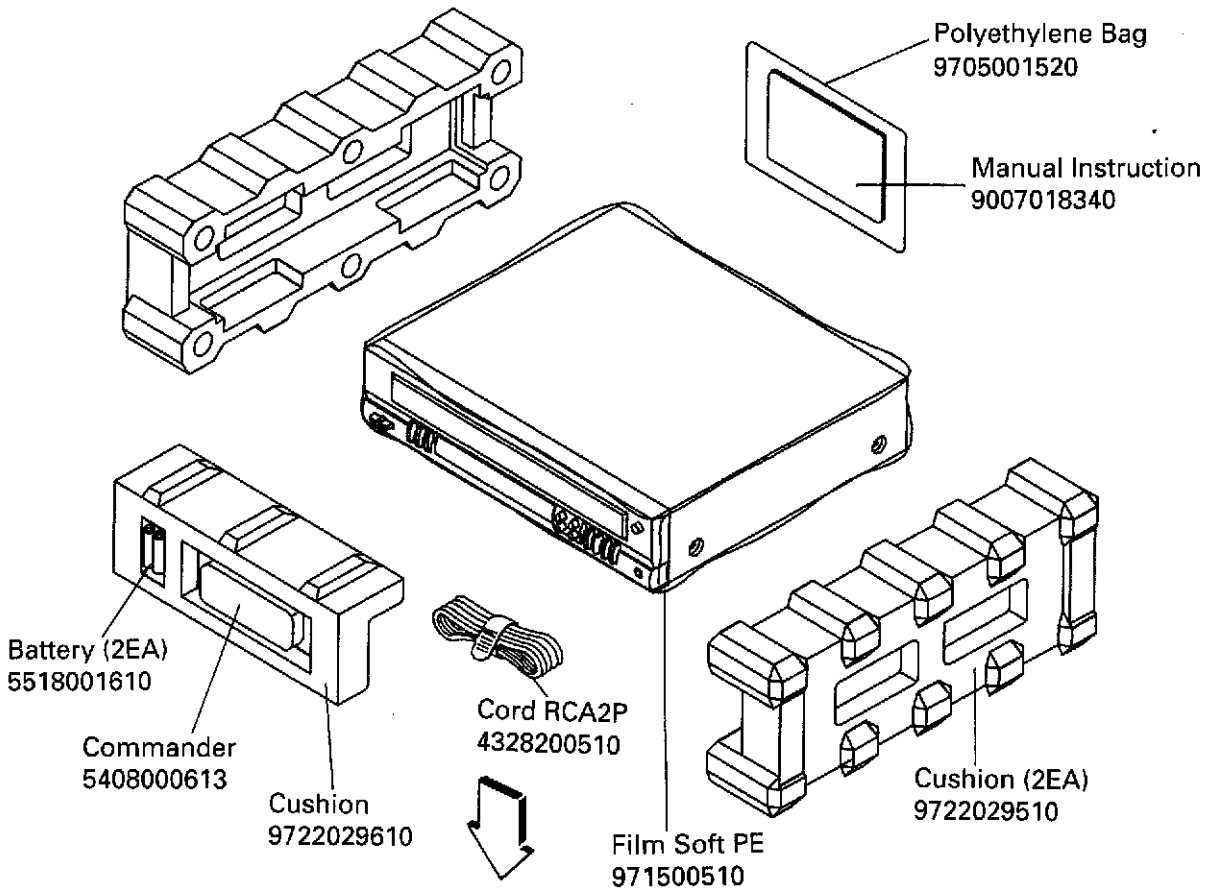
TRANSISTOR AND DIODE LEAD IDENTIFICATION

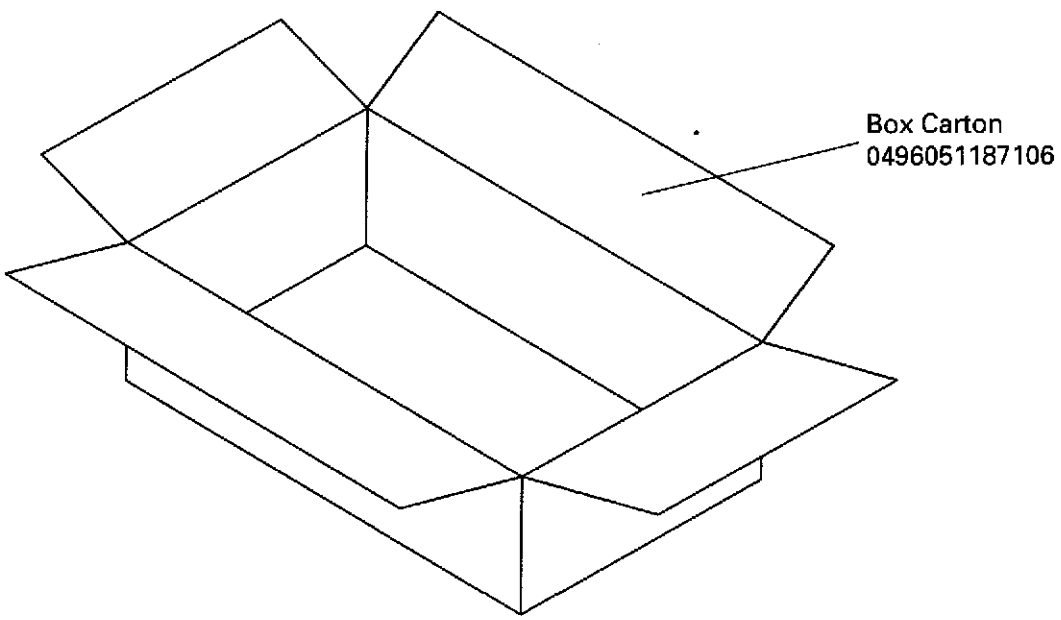
TRANSISTOR	FRONT VIEW	BOTTOM VIEW
KTA 1268BL KTC 2240B/KTC3200BL KTC 1815Y/KTC 3198Y KTA 1015Y/KTA 1266Y 2SD 1302S KTC 2235Y/KTC1027 KTC 2236AY KTA965Y/KTA1023	 ECB	 ECB
MPSA 06 MPSA56	 EBC	 EBC
DTA 114YS/KRA107M DTC 114YS	 ECB	 ECB

DIODE	PACKAGE VIEW
1N 4148 1N 4002 1N 4003	
UN XX. XBSX	
TERMINAL NAME	
B : BASE C : COLLECTOR E : EMITTER	

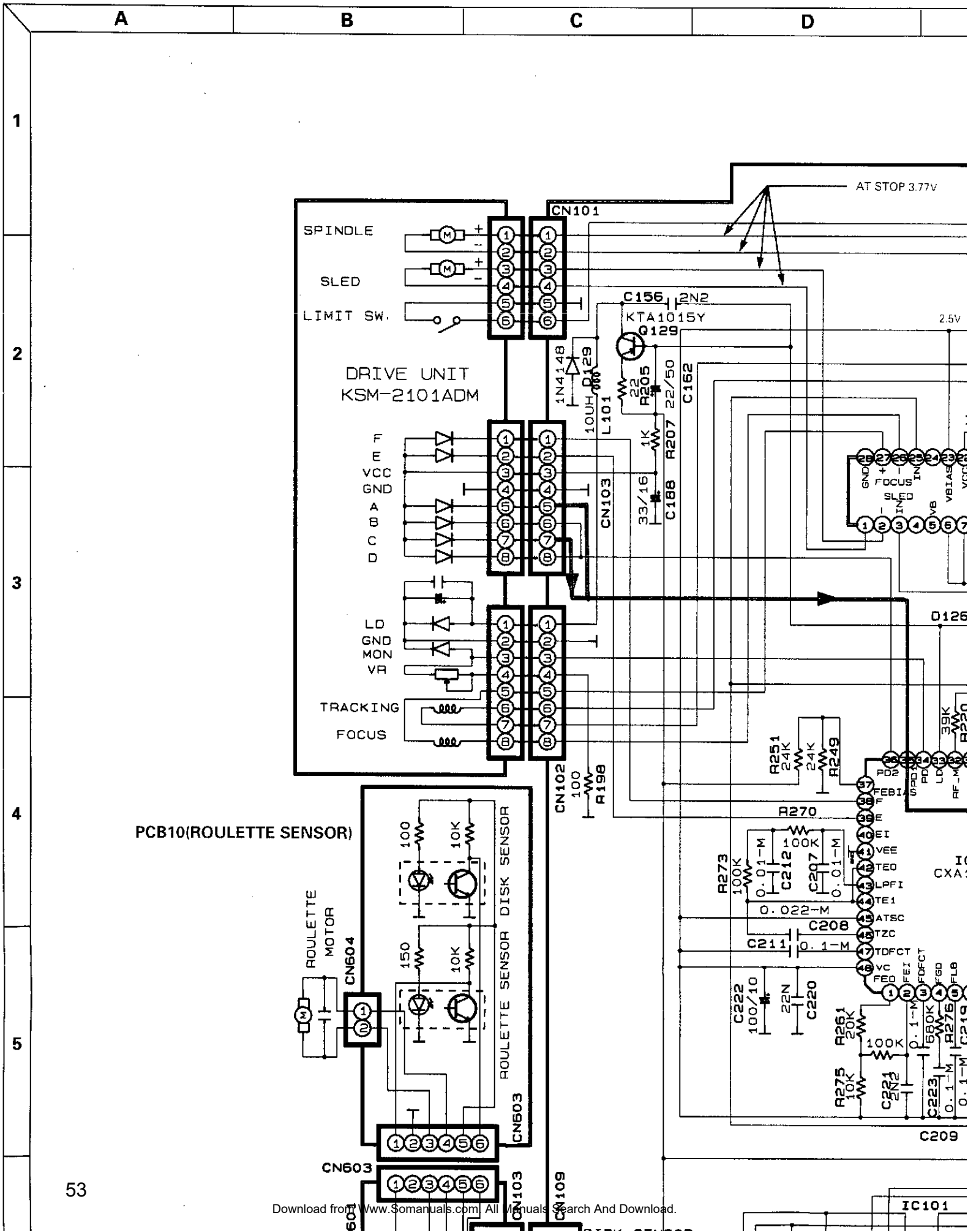
EW

PACKAGE

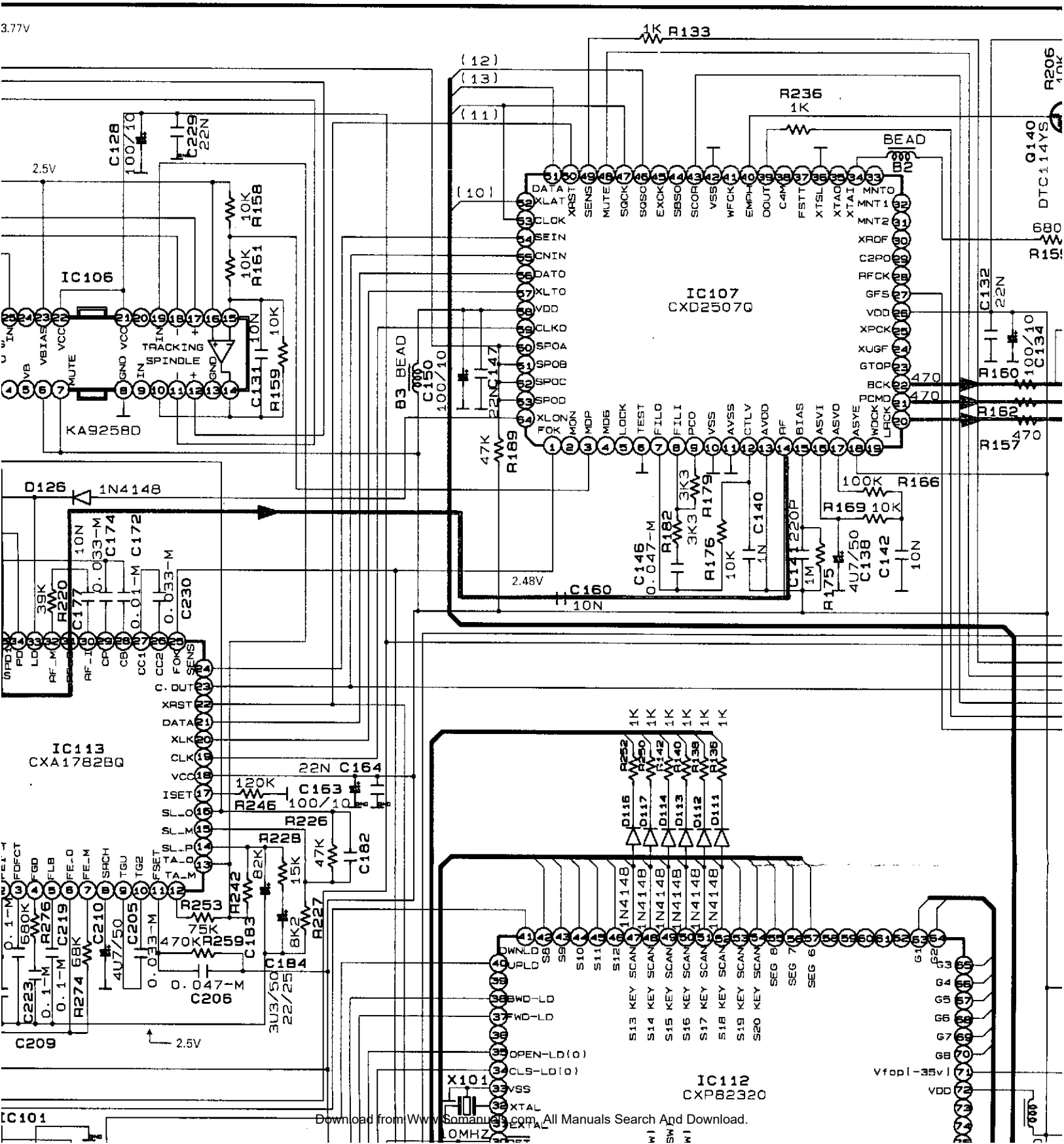




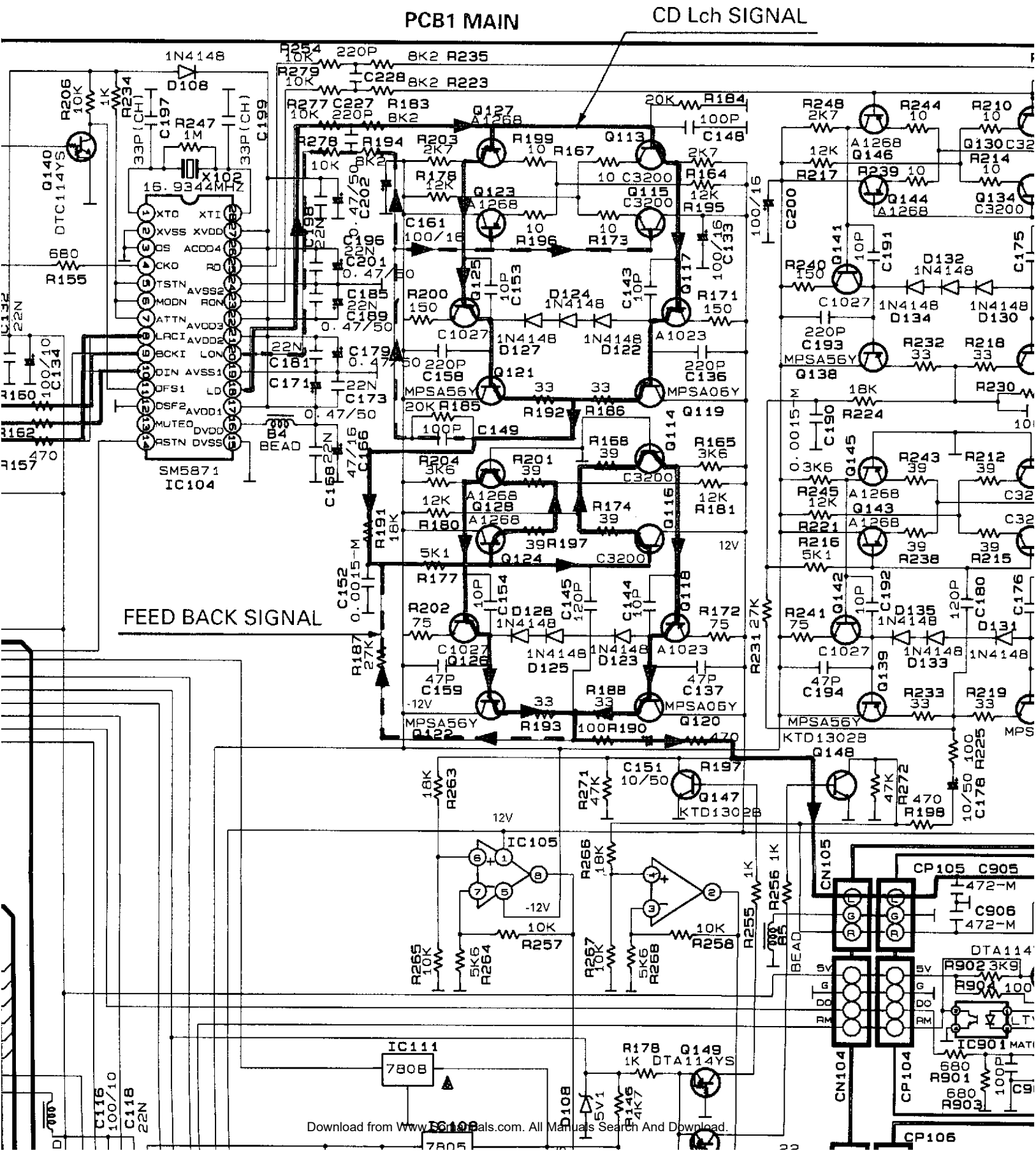
SCHEMATIC DIAGRAM



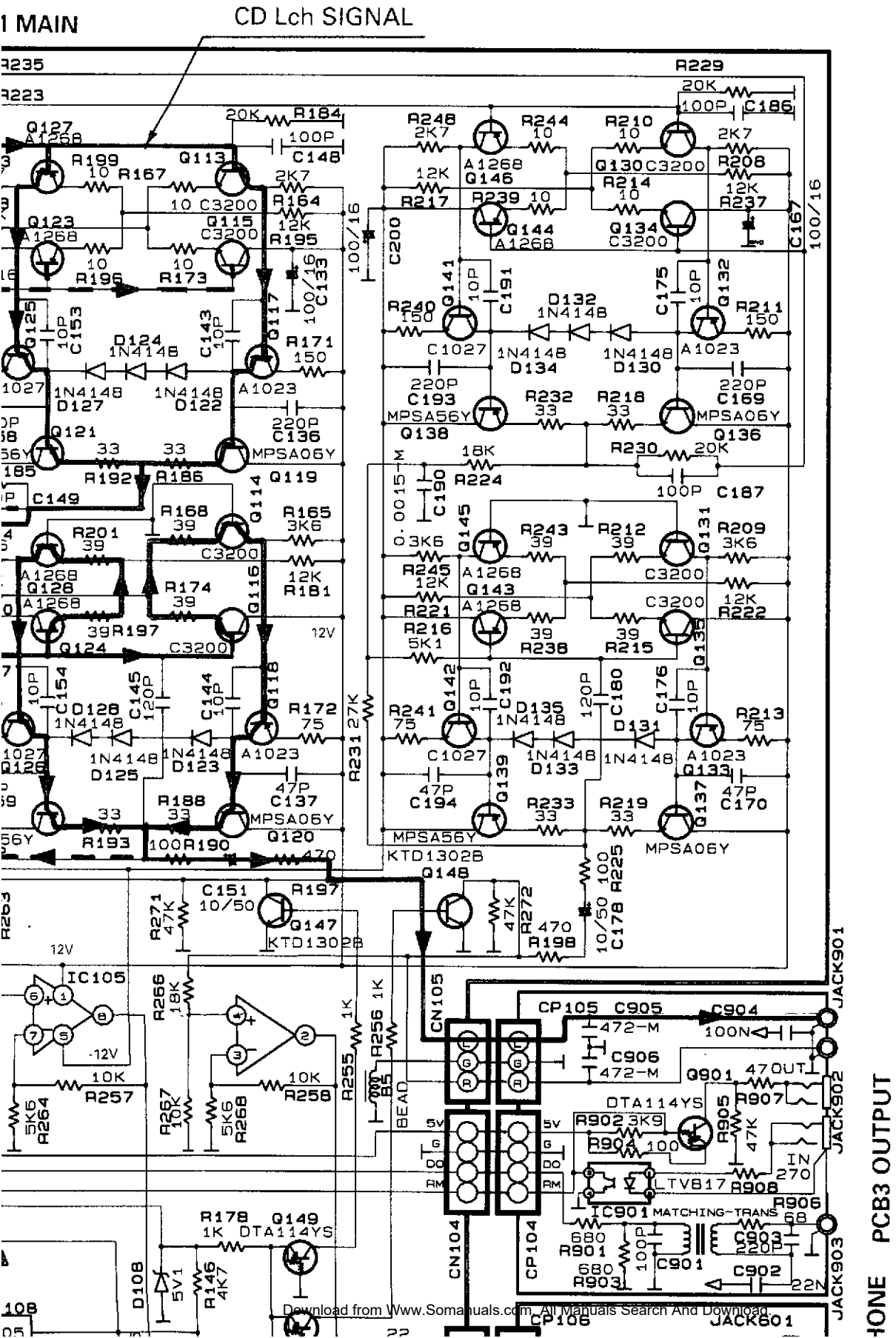
E	F	G	H

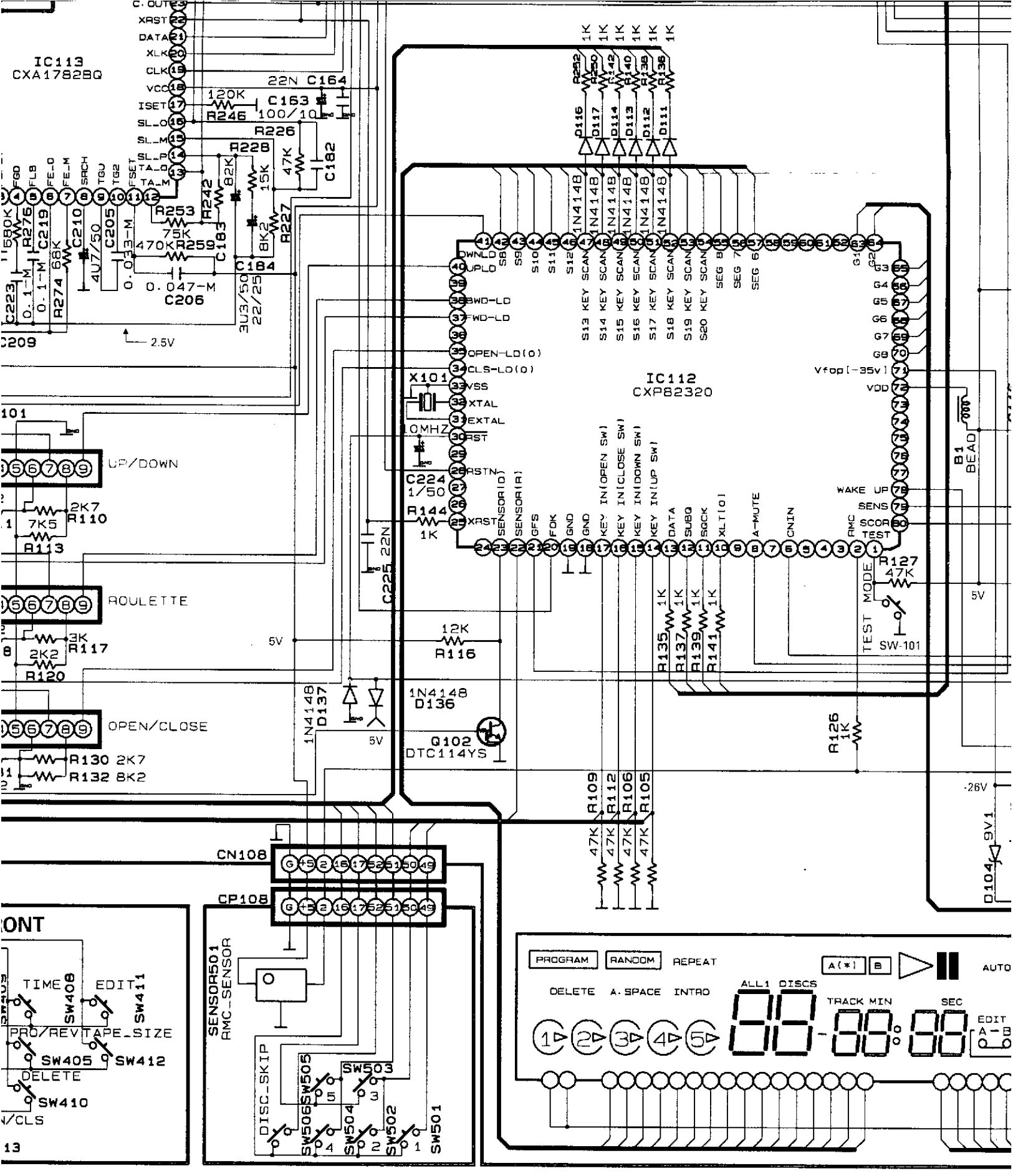


I	J	K	L	

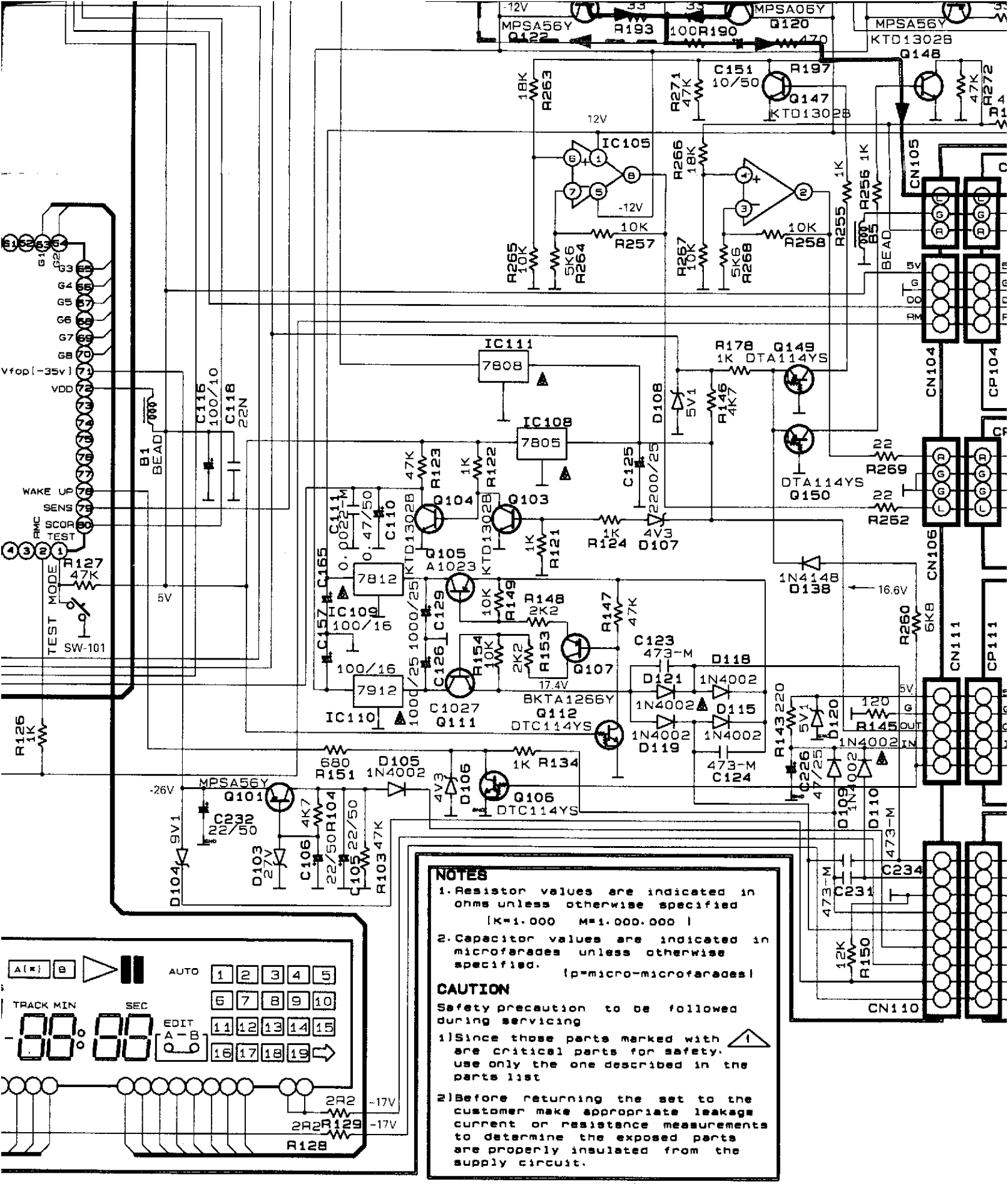


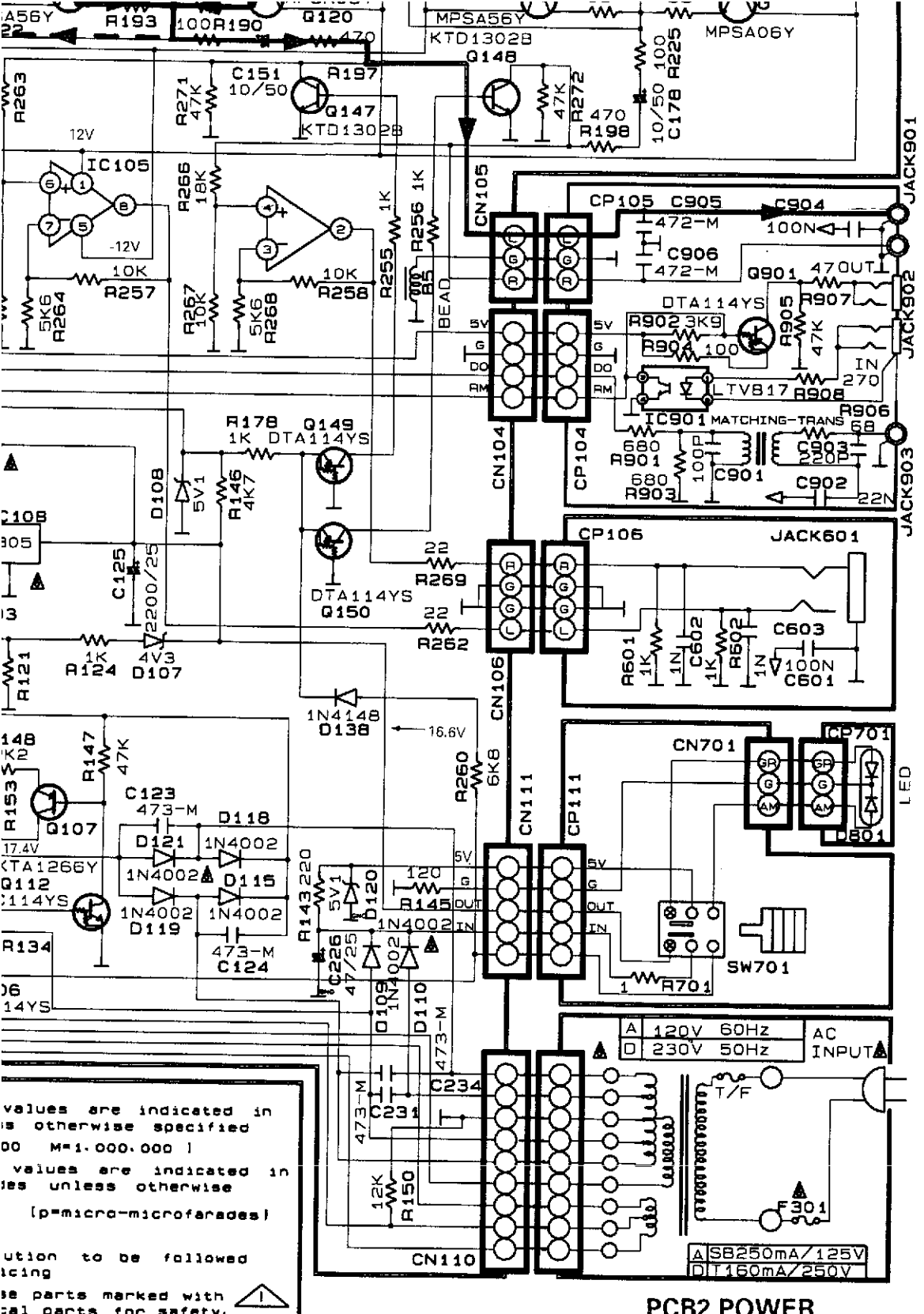
	K	L	M	N





PCB5 RMC SENSOR





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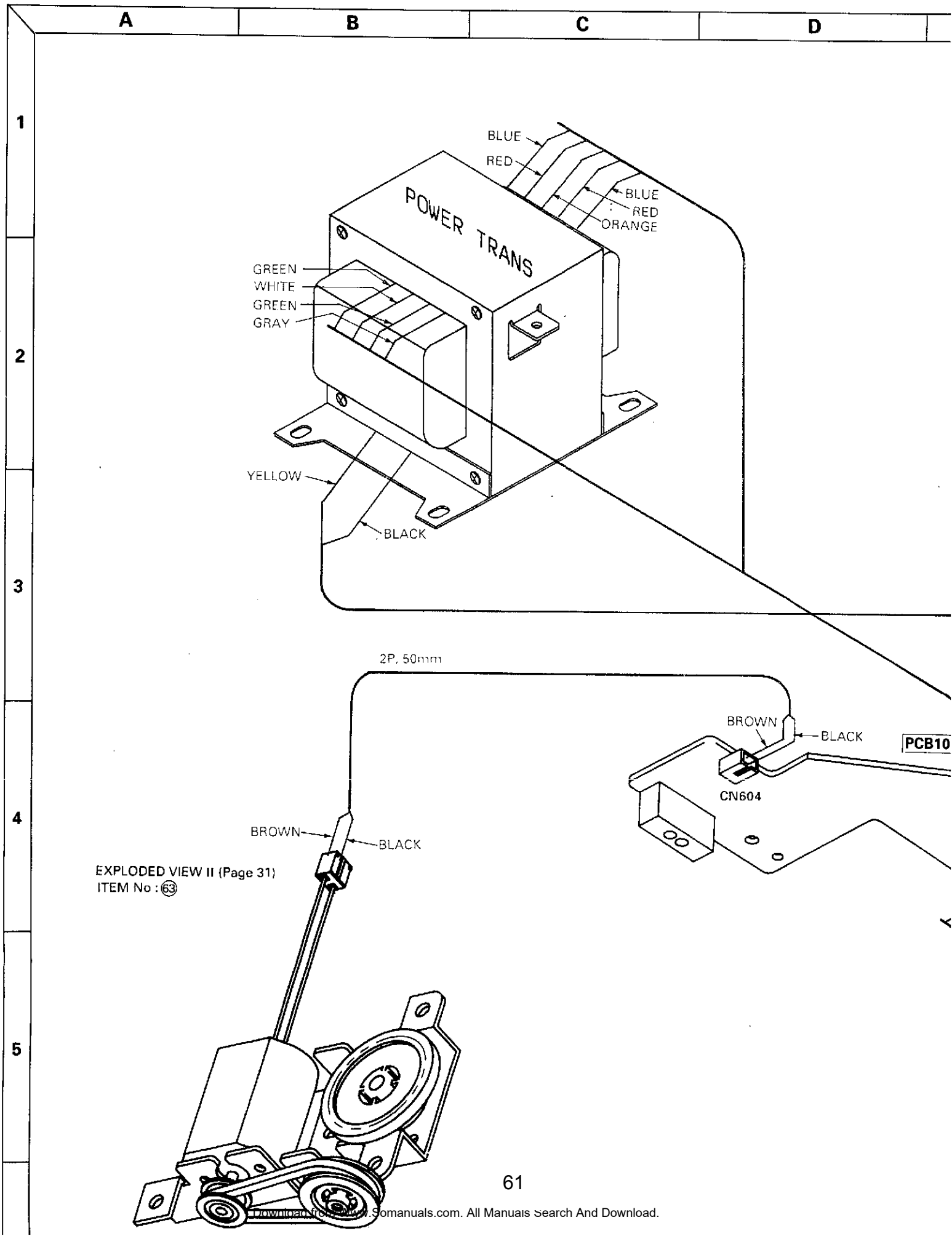
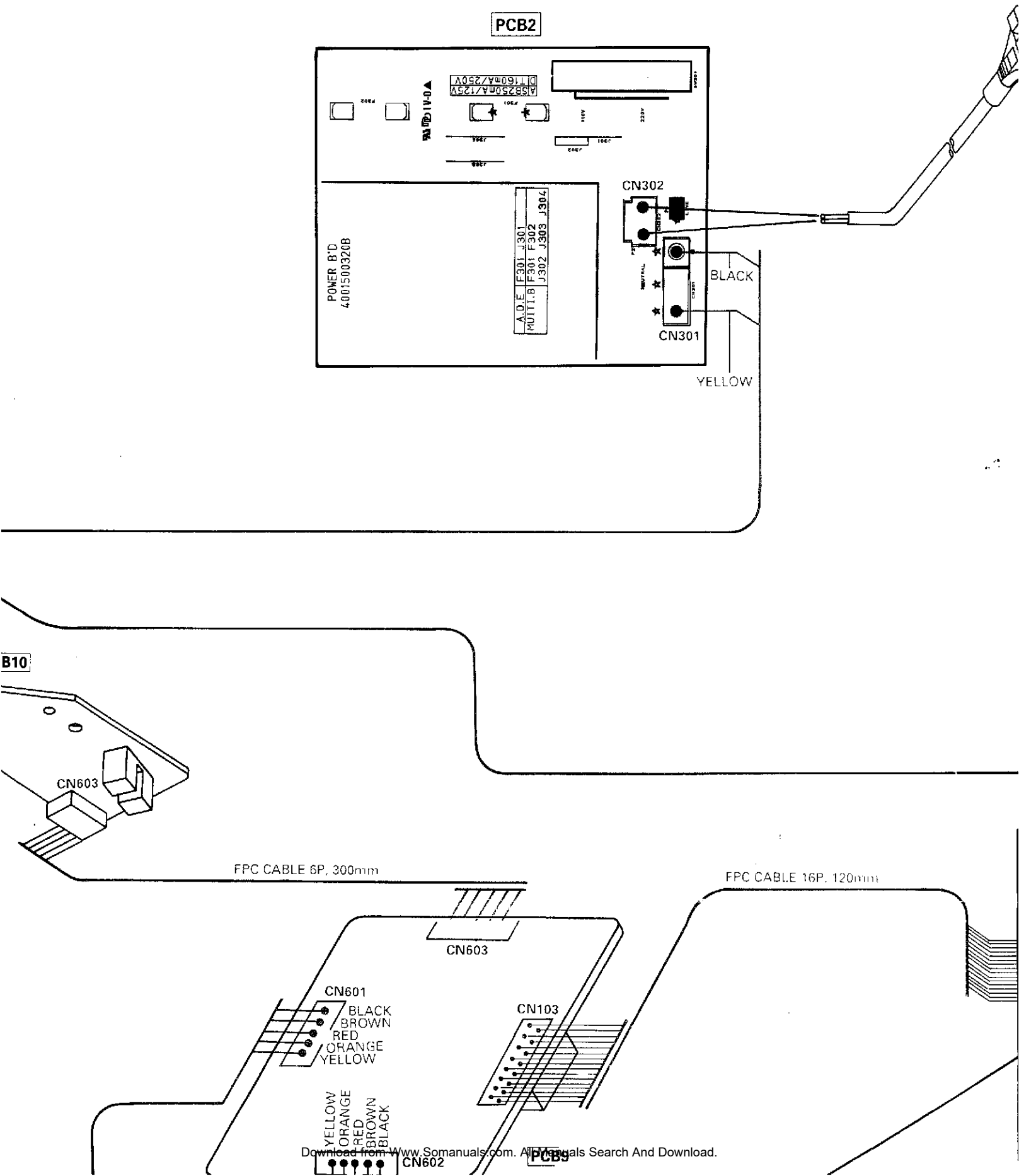
WIRING DIAGRAM

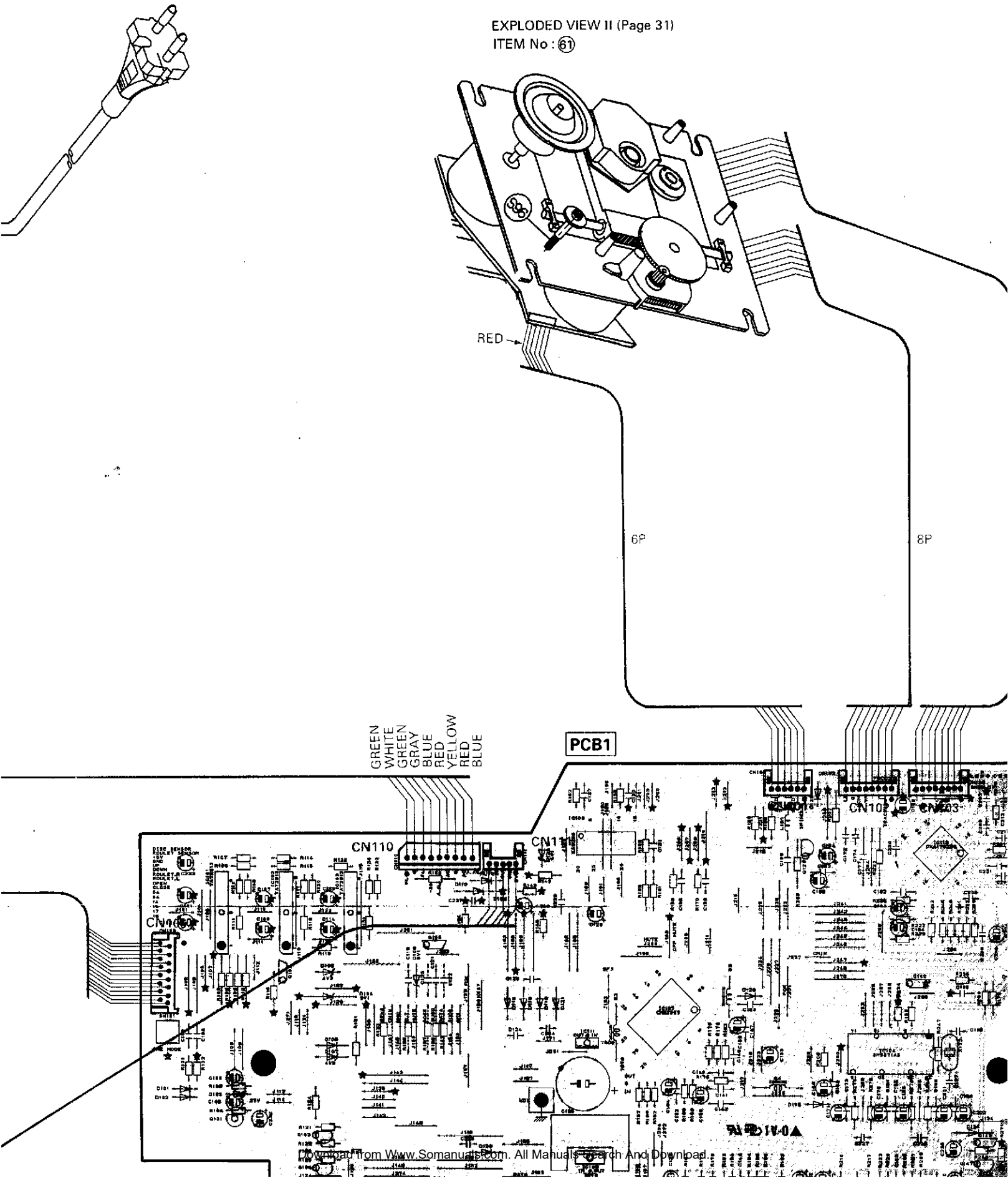


E	F	G	H



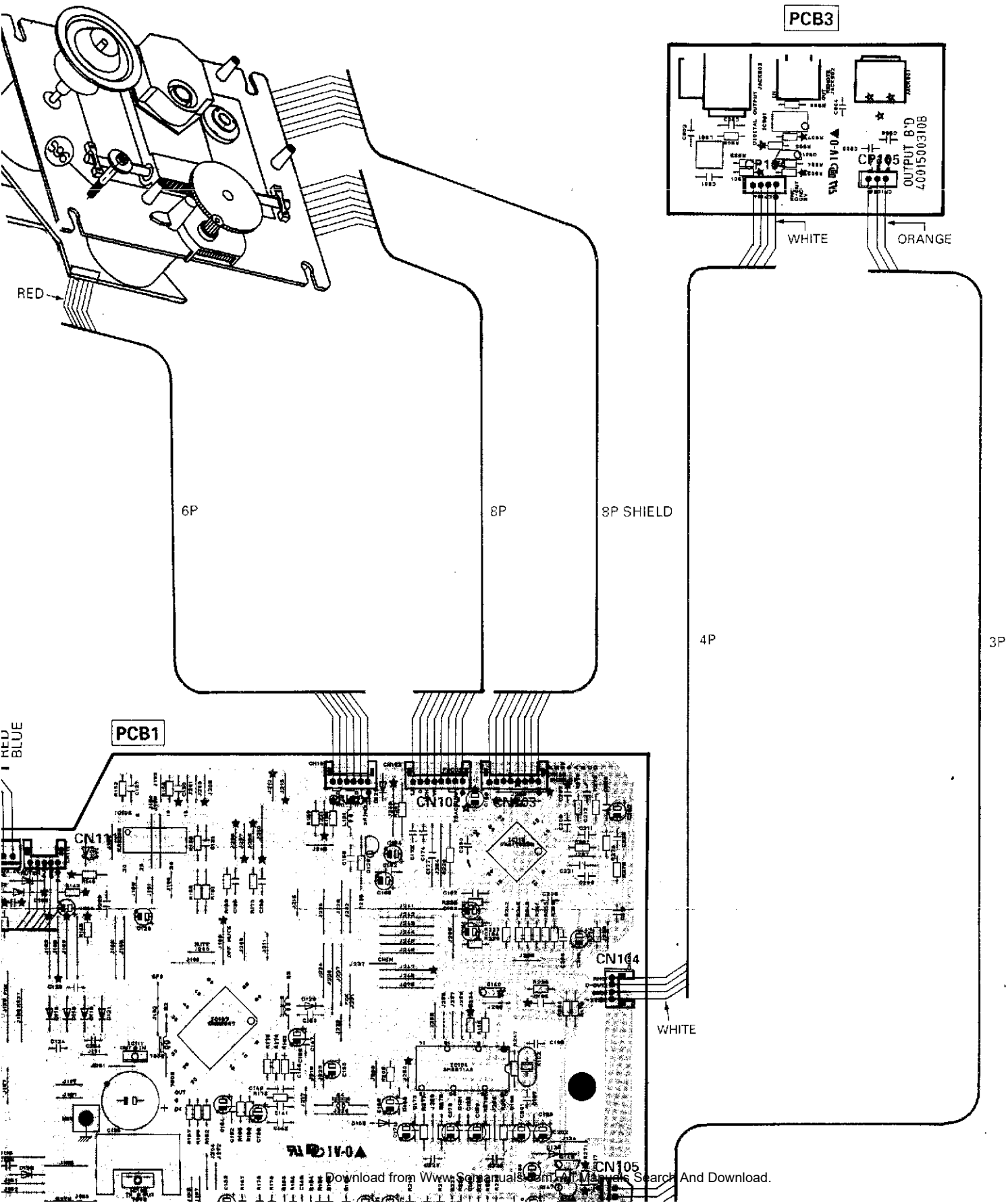
	I	J	K	L

EXPLODED VIEW II (Page 31)
ITEM No : (61)

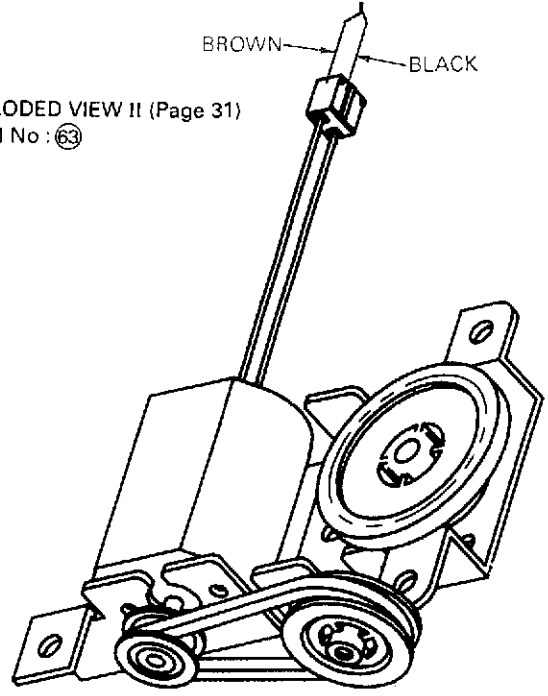


	K	L	M	N

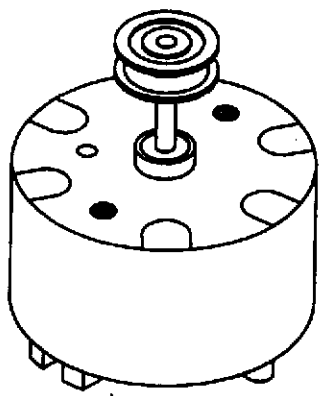
EXPLODED VIEW II (Page 31)
ITEM No : 61



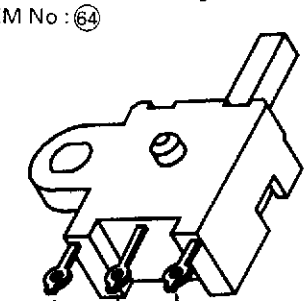
EXPLODED VIEW II (Page 31)
ITEM No : 63

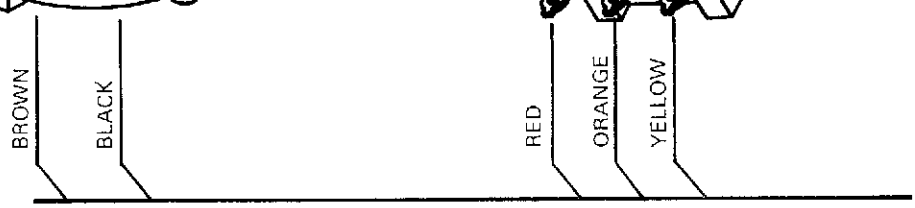


EXPLODED VIEW II (Page 31)
ITEM No : 62



EXPLODED VIEW II (Page 31)
ITEM No : 64





EXPLODED VIEW II (Page 31)
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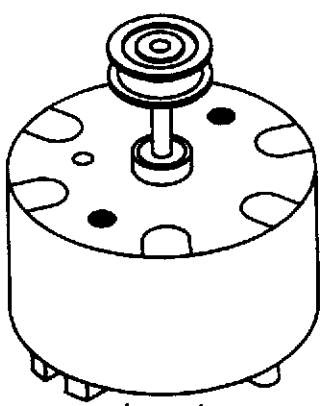

EXPLODED VIEW II (Page 31)
ITEM No : 64