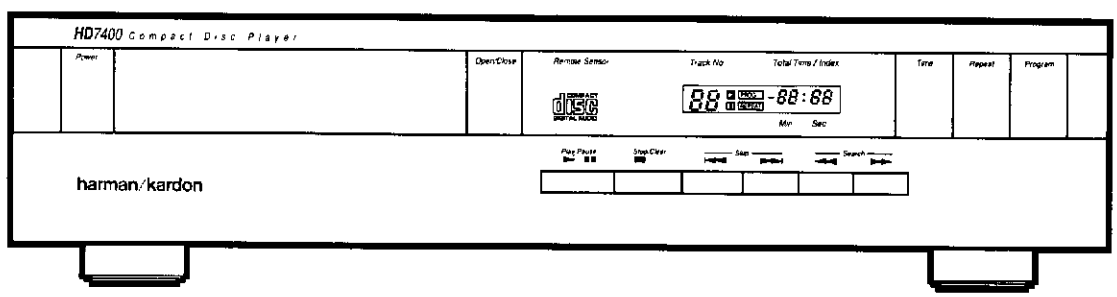
The Harman Kardon
Model HD7400
COMPACT DISC PLAYER

Manual 152A

Technical Manual



HD7400

The following marks found in the parts list of this manual identify the models as follows.

- **BK : North America area model Black version**
- **IB : International model Black version**
- **BB : Australia model Black version**

harman/kardon
240 Crossways Park West, Woodbury, N. Y. 11797
1112-3152152A5 P-1189081500 Printed in Japan

CLASS 1 LASER PRODUCT
Product complies with DHHS rules CFR subchapter J part 1040:10 at date of manufacture.

DANGER—invisible laser radiation when open and interlock failed or defeated. Avoid direct exposure to the beam.

CAUTION—use of all controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Be Careful of the Laser Pickup
Although you cannot see it from the outside, a laser pickup is located under the disc tray and a precision lens is built in it.
Since the laser pickup, including the lens element, is especially sensitive to dust, keep the disc tray closed when not in use. Also do not put your hand inside the unit.

CLASS 1
LASER PRODUCT

SPECIFICATION

System	: Compact Disc Digital Audio
Signal Detection	: 3-Beam Semiconductor Laser
Error Correction	: CIRC System
Sampling Frequency	: 176.4kHz
Quantization	: 18-bit Linear
Channels	: 2 Channel Stereo
Frequency Response	: 4Hz–20kHz ±0.2dB
Total Harmonic Distortion	: 0.008% (1kHz)
Dynamic Range	: 96dB
Signal-to-Noise Ratio	: 100dB
Channel Separation	: 88dB (1kHz)
Wow & Flutter	: Immeasurable
Line Output Level/Load Impedance	: 2.0V/10k Ohms
Power Supply	
U.S.A. and Canada models	: AC 120V, 60Hz
International model	: AC 220/240V, 50/60Hz
Power Consumption	: 15 Watts
Dimensions (WxHxD)	: 17-3/8" x 4" x 13" (443 x 103 x 330 mm)
Weight	: 11lbs. (5kg)

Specifications and components subject to change without notice.
Overall performance will be maintained or improved.

Adjustment of this unit requires following measuring instruments and jigs.

- Oscilloscope (3 or more modes, 100MHz, input Select DC range) 1740A
- Test Disc;: EIAJ CD-1
- Distortion Meter 339A

SAFETY PRECAUTIONS

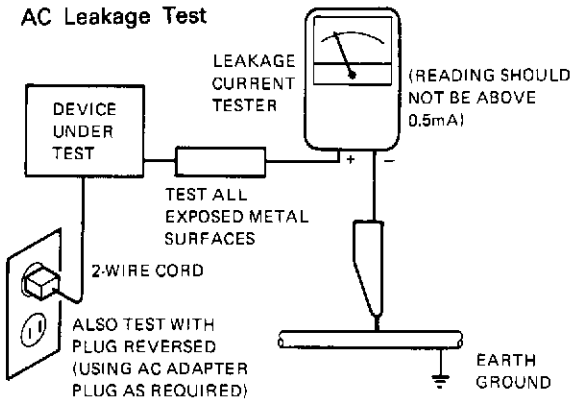
Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing.
   (1) Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
   (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks.
   Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, both are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back over.

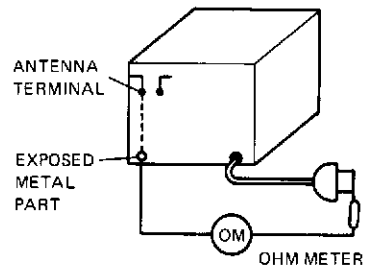
c. **Leakage Current Hot Check** — With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 "Leakage Current for Appliances" and Underwriters Laboratories (UL) 1270, (34.6). With the instrument AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle bracket, metal cabinet, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the instrument power cord plug in the outlet and repeat test. **ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER.**

AC Leakage Test



d. **Insulation Resistance Test**
   (1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug.
   (2) Turn on the power switch of the instrument.
   (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each **exposed metallic** cabinet part on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. The reading should be as shown below. If it is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer.

e. **Insulation Resistance Test Cold Check**
   (1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug.
   (2) Turn on the power switch of the instrument.
   (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each **exposed metallic** cabinet part on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 Megohm. When there is no return path to the chassis, the reading must be "infinite". If it is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer.



PRODUCT SAFETY NOTICE

Some electrical and mechanical parts have special safety related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, by (⚠) on schematics and parts listed. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire, and/or other hazards. Products Safety is under review continuously and new instructions are issued whenever appropriate.

SERVICING PRECAUTIONS

CAUTION: Before servicing instruments covered by this manual and its supplements, read and follow the SAFETY PRECAUTIONS on this page.

NOTE: If unforeseen circumstances created conflict between the following servicing precautions and any of the safety precautions, **always follow the safety precautions.** Remember: Safety First.

General Servicing Precautions

a. Always unplug the instrument AC power cord from the AC power source before:
   (1) Removing or reinstalling any component, circuit board, module, or any other instrument assembly.
   (2) Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
   (3) Connecting a test substitute in parallel with an electrolytic capacitor in the instrument.
   Caution: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

b. Do **not** defeat any plug/socket B+ voltage interlocks with which instruments covered by this manual might be equipped.

c. Do **not** apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.

d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

NOTE: Refer to Safety Precautions on Page 3.

(1) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.

(2) The Components used in the unit has a specified conflammability and dielectric strength. When replacing any components, use components which has the same ratings. Components marked (⚠) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace with the appointed components.

(3) An insulation tube or tape is sometimes used and some components are raised above the printed wiring board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install them as they were.

(4) After servicing, always check that the removed screws, components and wiring have been installed correctly and that the portion around the service part have not been damaged and so on. Further check the insulation between the blades of attachment plug and accessible conductive parts.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between the each blade of the attachment plug and accessible conductive parts (Note 1) should be more than 1M-ohm.

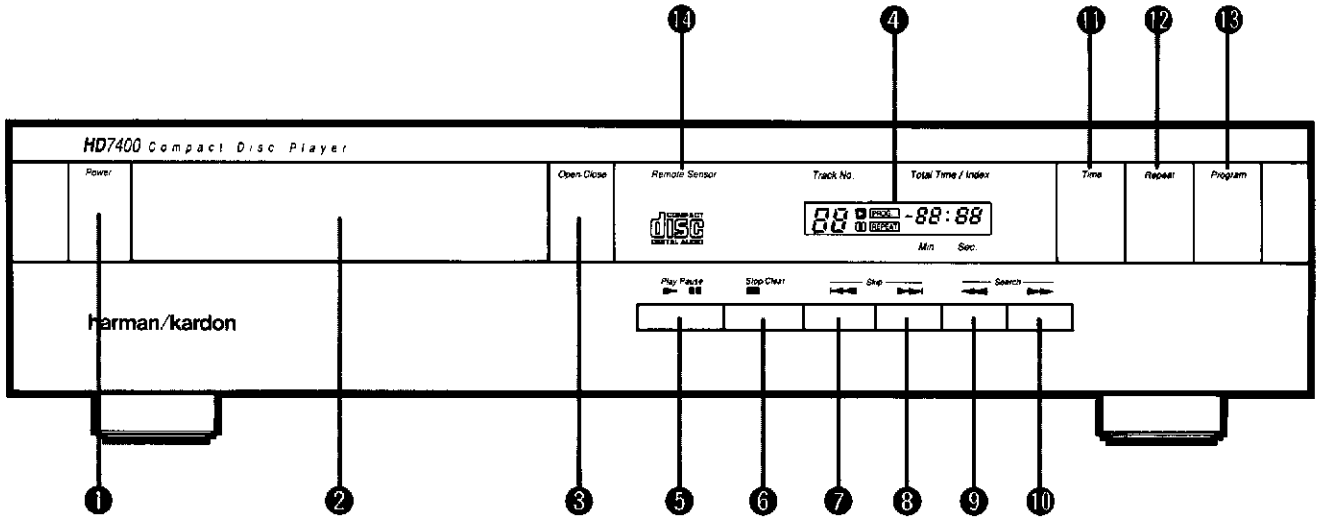
Note 1: Accessible Conductive Parts including Metal panels, Output jacks, etc.

ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some fieldeffect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charge sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

CONTROLS AND FUNCTIONS



❶ POWER SWITCH
Pressing this switch will turn on the power. Press the switch again to turn the power off.

❷ DISC TRAY
By pressing the "OPEN/CLOSE" button, the tray onto which the discs are loaded will slide out.

❸ OPEN/CLOSE BUTTON
Press this button to open or close the DISC TRAY. Press it once to make the DISC TRAY slide out, and again to make the DISC TRAY slide in.

❹ MULTI DISPLAY
Displays the track number during playback, and displays elapsed playback time from the beginning of the program being played or the index number during stop mode.

❺ PLAY/PAUSE BUTTON
Press this button to start playback. Pressing this button during playback activates the pause mode. Playback continues when when this button is pressed again.

❻ STOP/CLEAR BUTTON
Press this button to stop playing a disc or to cancel the pause mode. Press the button once again to erase the memory program.

❼ ⏮ BUTTON (SKIP)
Pressing this button once skips playback backward to the beginning of the present program. Pressing it once more skips it to the beginning of the previous program, pressing it twice it to the beginning of the program before that, and so on.

❽ ⏭ BUTTON (SKIP)
Pressing this button once skips playback forward to the beginning of the next program. Pressing it twice skips it to the beginning of the program after that, and so on.

❾ ◀◀ BUTTON (REVERSE SEARCH)
Pressing this button starts low speed reverse. Holding the button down longer than two seconds changes the reverse mode to high speed can be heard at a reduced level in this mode. Also, when this button is pressed in the stop mode, the index number is decreased.

❿ ▶▶ BUTTON (FAST-FORWARD SEARCH)
Pressing this button starts low speed fast-forwarding. Holding the button down longer than two seconds changes the fast-forward mode to high speed. Sound can be heard at a reduced level in this mode. Also, when this button is pressed in the stop mode, the index number is increased.

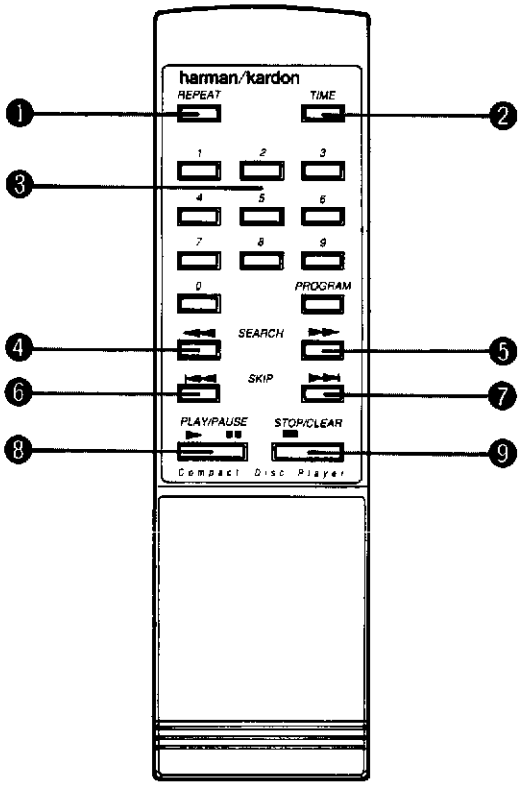
⓫ TIME BUTT
Press to change the display. When pressed, display is switched between the elapsed playback time of a track and the time remaining before the end of the last selection. The display is also switched to the remaining number of programs during program playback.

⓬ REPEAT BUTTON
Pressing this button enables continuous repeat playback of the disc. Pressing this button again disables the repeat playback mode. Pressing this button while in memory playback repeats the programs stored in the memory.

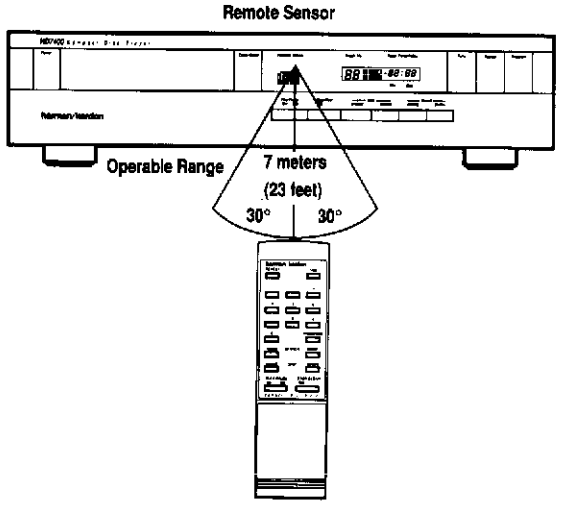
⓭ PROGRAM BUTTON
Used to program the memory for non-sequential playback of disc tracks. Up to 36 program selections can be stored in the memory.

⓮ REMOTE CONTROL SENSOR
Receives signals from the supplied remote control unit.

REMOTE CONTROL



Use the remote control unit within the range shown in the diagram below.



NOTE: When changing the batteries of the remote control, insert the batteries with their polarity aligned according to the diagram on the back of the battery case. 2 AA size (UM-3) batteries are recommended.

❶ REPEAT BUTTON
Refer to the main unit's Repeat Button section.

❷ DISPLAY BUTTON
Refer to the main unit's Display Button section.

❸ 10-KEY INPUT BUTTON
Refer these buttons to facilitate programming and track access.

❹ ◁◁ BUTTON (REVERSE)
Refer to the main unit's ◁◁ Button section.

❺ ▷▷ BUTTON (FAST-FORWARD)
Refer to the main unit's ▷▷ Button section.

❻ |◁◁ BUTTON (PROGRAM SELECTION)
Refer to the main unit's |◁◁ Button section.

❼ ▷▷| BUTTON (PROGRAM SELECTION)
Refer to the main unit's ▷▷| Button section.

❽ PLAY/PAUSE BUTTON
Refer to the main unit's play/pause Button section.

❾ STOP/CLEAR BUTTON
Refer to the main unit's Stop/Clear Button section.

DISASSEMBLY PROCEDURES (REFER TO PAGES 35, 36, 37 AND 39)

[1] CABINET TOP (123) REMOVAL

Remove 7 screws (A) and then remove the Cabinet Top (123).

[2] FRONT PANEL ASS'Y (AA) REMOVAL

1. Remove the Cabinet Top (123), referring to the previous step [1].
2. Disconnect the connector with lead wire (LCN401) from connector (CN108) on the Main P. C. Board (PCB-1).
3. Open the lid of connectors (CN105, CN106 and CN107) on the Main P. C. Board (PCB-1) and then disconnect the jumper leads (JL402, JL403 and JL404).
4. Remove 6 screws (B) and then remove the Front Panel Ass'y (AA) with the Front P. C. Board (PCB-2).
5. Remove 7 screws (C) and then remove the Front P. C. Board (PCB-2) from the Front Panel Ass'y (AA).

[3] MAIN P. C. BOARD (PCB-1) REMOVAL

1. Remove the Cabinet Top (123), referring to the previous step [1].
2. Disconnect the connector with lead wires (LCN101, LCN102, LCN103, LCN104 and LCN401) from connectors (CN101, CN102, CN103, CN104 and CN108) on the Main P. C. Board (PCB-1).
3. Open the lid of connectors (CN1, CN2, CN105, CN106 and CN107) on the Main P. C. Board (PCB-1) and then disconnect the jumper leads (JL1, JL2, JL402, JL403 and JL404).
4. Remove 5 screws (D) and then remove the Main P. C. Board (PCB-1).

[4] CD PLAYER MECHANICAL ASSEMBLY (103) REMOVAL

1. Remove the Cabinet Top (123), referring to the previous step [1].
2. Disconnect the connector with lead wires (LCN101, LCN102, LCN103 and LCN104) from connectors (CN101, CN102, CN103 and CN104) on the Main P. C. Board (PCB-1).
3. Remove 3 screws (E) and then remove the CD Player Mechanical Assembly (103) backward.

DISASSEMBLING THE CD PLAYER MECHANICAL ASSEMBLY

[5] DISC TRAY (16) REMOVAL

1. Remove the Cabinet Top (123), referring to the previous step [1].
2. Connect the Power cord and turn on the power by pressing the Power switch.
3. Open the Disc Tray (16) by pressing the Open/Close button.
4. With the Disc Tray (16) opened as it is, pull out the power plug.
5. Push the Disc Tray (16) by hand to slide it in once.
6. Loosen 2 screws (F) and then slide out the Disc Tray (16) by hand.

[6] OPTICAL PICK-UP (52) REMOVAL

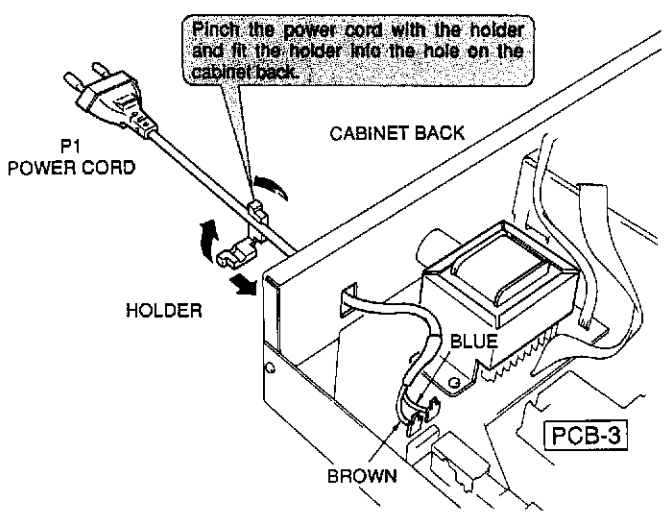
1. Remove the CD Player Mechanical Assembly (103), referring to the previous step [4].
2. Remove 4 screws (G) and then remove the Disc Motor Ass'y (63) with Pick-up, Slide Motor and etc.
3. Remove 2 screws (H) and then remove the Gears (59 and 60).
4. Remove the 2 screws (I) and then remove the Shaft Clamps (62), then remove the Pick-up (52) with shaft.

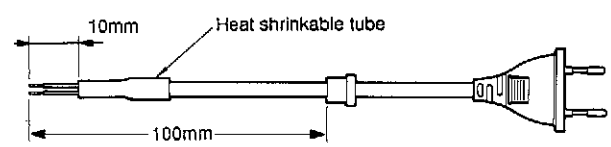
[7] SLIDE MOTOR (57) REMOVAL

1. Remove the Gears (59 and 60), referring to the previous step [6]-3.
2. Unsolder the terminal of Disc and Slide Motors, then remove the Motor P. C. Board (65).
3. Remove 2 screws (J) and then remove the Slide Motor (57).

POWER CORD REPLACEMENT (FOR SERVICE ENGINEERS OTHER THAN NORTH AMERICA)

In order to prevent fire or shock hazard when replacing the power cord, follow the procedure below to replace the part with the standard supply parts.





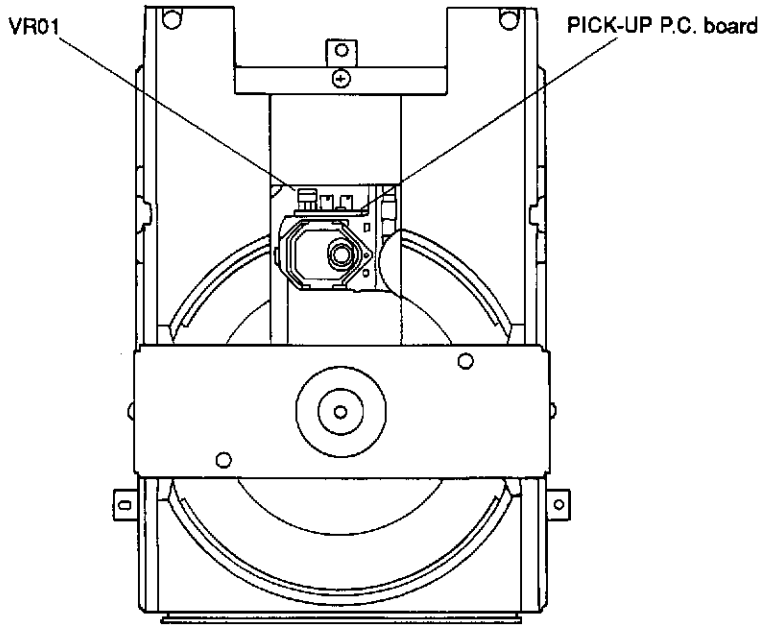
ADJUSTMENT PROCEDURE

1. Instruments required
- DC voltmeter
- Oscilloscope (3 or more modes, 100 MHz, input select DC range)
- Jitter meter
- Distortion meter
- Test disc: EIAJ CD-1

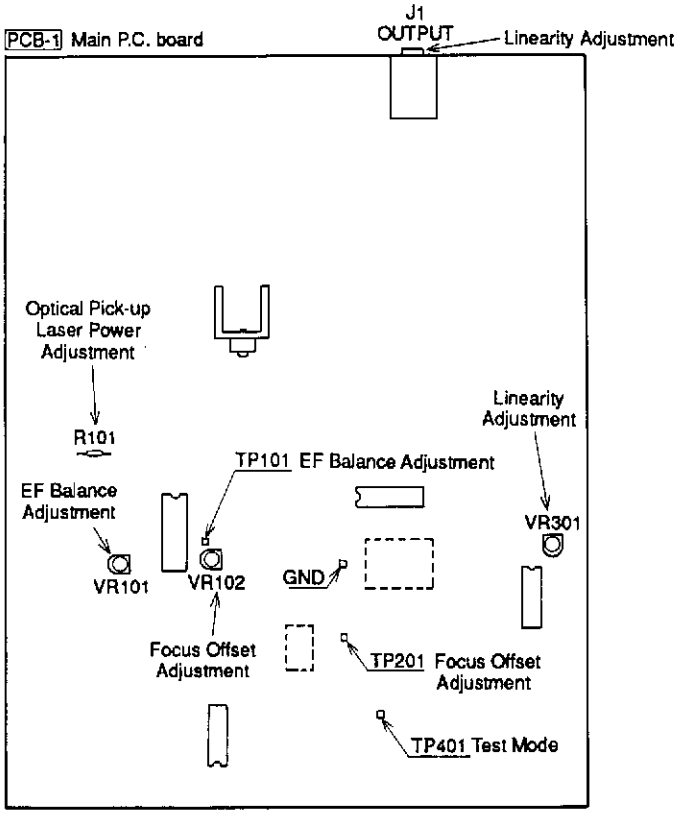
2. Adjustment points

2-1 Adjusting screw layout for CD player mechanical assembly.

Top view

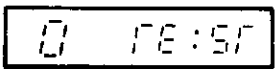
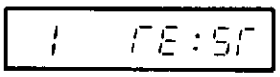
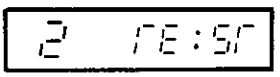
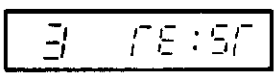
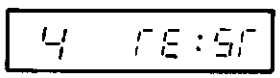
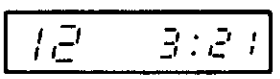
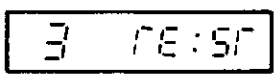


2-2 VR and test point layout for main P.C. board.



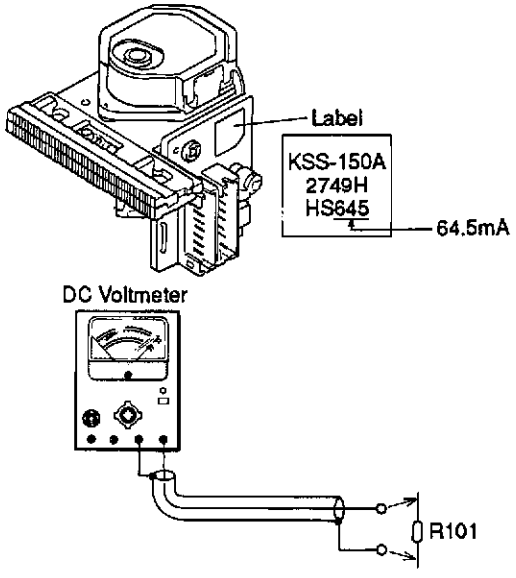
3. Test Mode

- Short-circuit TP401 and GND located on the Main P.C. board.
  Push the power switch button. (Test Mode)

Press buttons in sequence below	Test mode number	Display	Operation
POWER	0		LD OFF All servo OFF
PLAY	1		LD ON
PLAY	2		FS ON (Focus search)
PLAY (Disc must be in tray)	3		FS ON (focus ON) Disc motor rotate Mute OFF
FORWARD SKIP	4		TS (Tracking servo) ON SS (Slide servo) ON
FORWARD SKIP	5		Displays the track number and playback time.
REVERSE SKIP	6		TS (Tracking servo) OFF SS (Slide servo) OFF
F.F. or REVERSE SEARCH	7	———	Move the pick-up. (Manual)
STOP, then press OPEN/CLOSE	8	———	Disc tray open or close This function can be activated from stop mode.

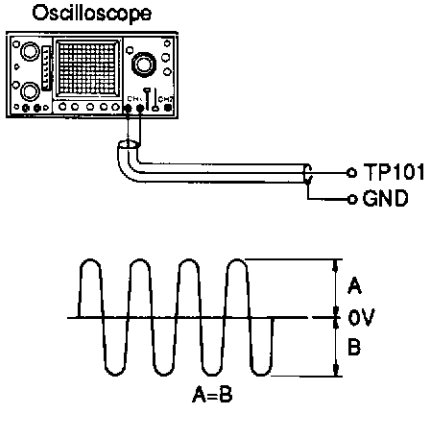
4. Optical Pick-up Laser Power Adjustment
The specified value for adjustment varies with the type of the pick-up in use. Obtain the voltage value according to the following procedure.
(a) Read the current value on the label of the pick-up P.C.board.
(b) Using the amperage of the current and the following equation, calculate the voltage value.
When the current is 64.5mA:
V=0.0645A x 22=1.419V

(1) Connect the DC voltmeter to both ends of R101.
(2) Insert EIAJ CD-1 test disc and place the unit in the Test Mode 2.
(3) Adjust VR01 in the pick-up P.C.board to the voltage obtained in step (b) above.



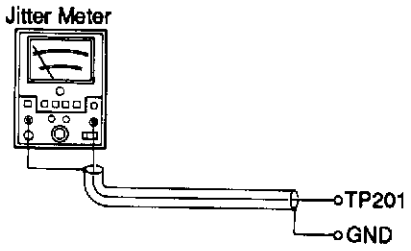
5. EF Balance Adjustment
(1) Connect the oscilloscope (0.5V/div, 5msec./div) to TP101 and GND.
(2) Insert EIAJ CD-1 test disc and place the unit in the Test Mode 3.
(3) Adjust VR101 so that the amplitude above and below the zero DC line becomes equal. (Amplitude A = Amplitude B)

NOTE: Instead of using the DC input of an oscilloscope, you may also use a DC null voltmeter for this alignment.

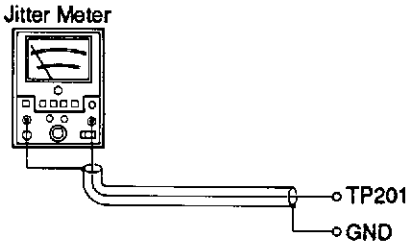


(approx. 1.5Vp-p)

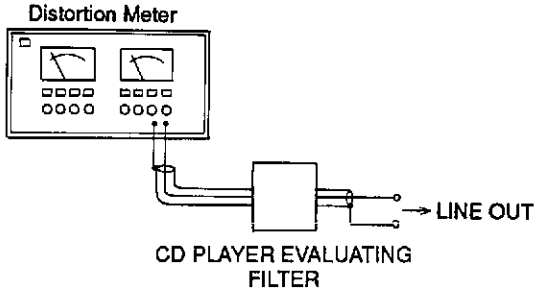
6. Focus Offset Adjustment
(1) Connect the Jitter meter to TP201 and GND.
(2) Insert EIAJ CD-1 test disc and place the unit in the play mode.
(3) Adjust VR102 until the jitter for optimum sensitivity.



7. Jitter Inclination Confirmation
(1) Connect the Jitter meter (sigma range) to TP201 and GND.
(2) Insert EIAJ CD-1 test disc and place the unit in the test mode 4.
(3) Confirm the jitter meter reading is less than 30ns.

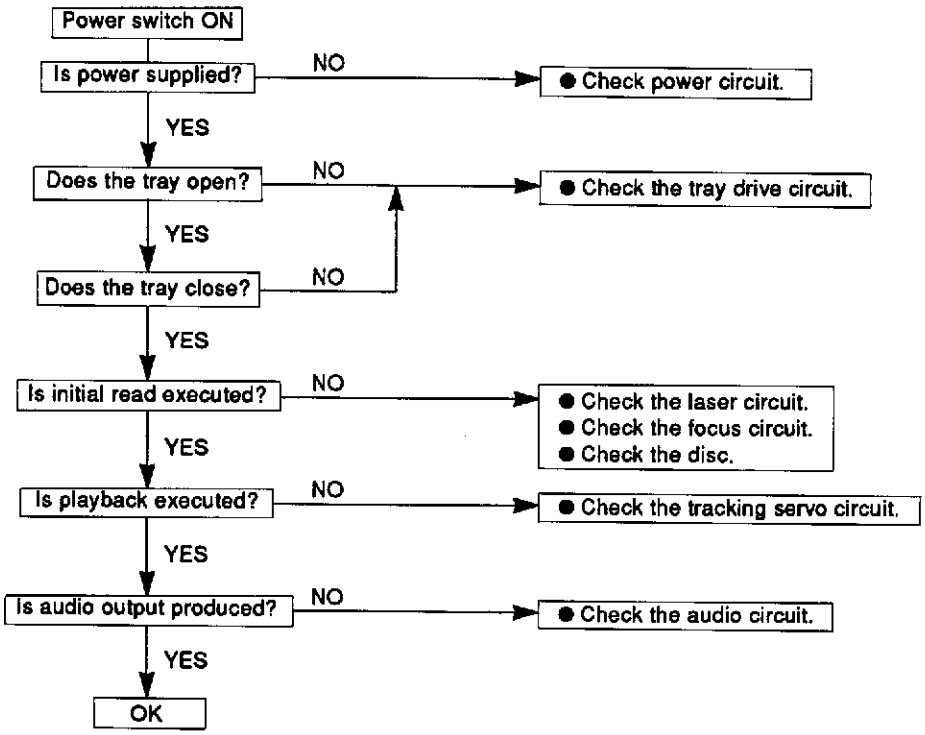


8. Linearity Adjustment
(1) Connect the distortion meter to line out jacks.
(2) Insert EIAJ CD-1 test disc track number 5 (recorded level –60 dB) and place the unit in the play mode.
(3) Adjust VR301 so that the distortion is minimized.

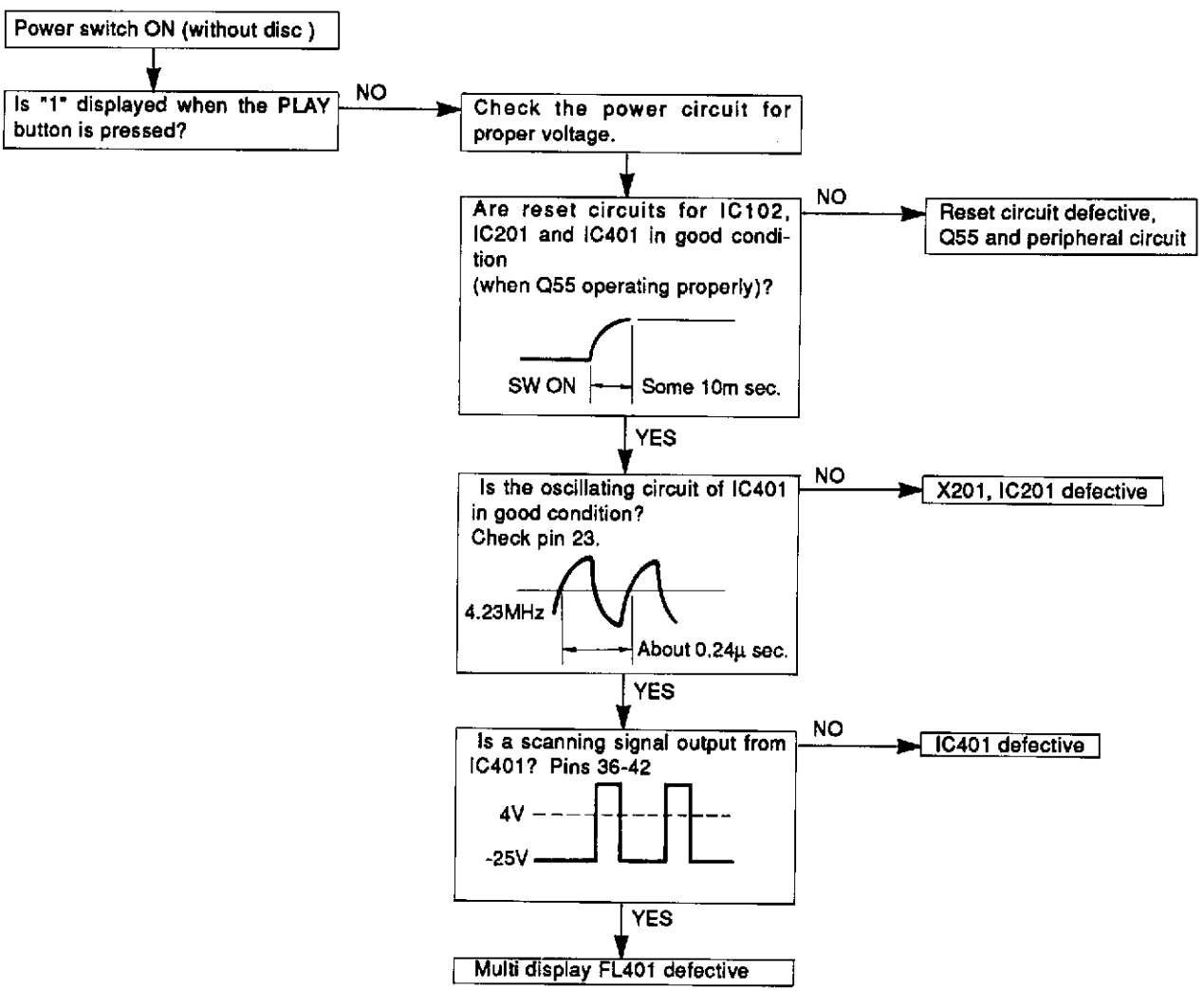


TROUBLE SHOOTING

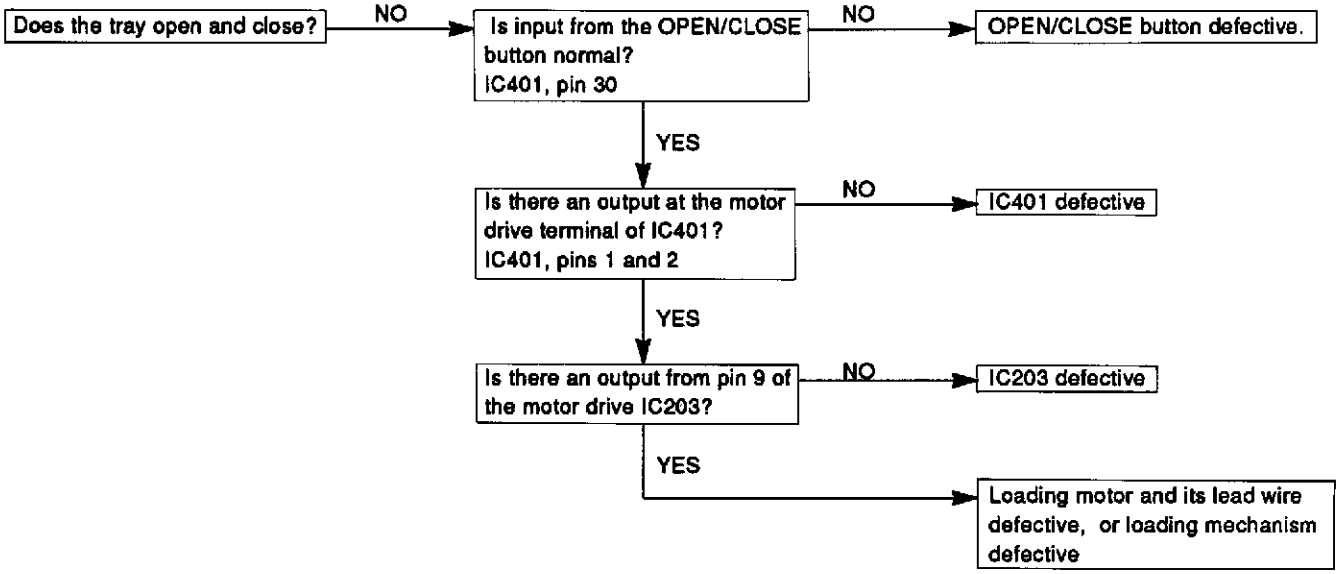
When a trouble has occurred, first check the pick-up lens for dirt and each connector for tight and secure connection. If the problem persists after checking both of these items, use the following check procedures.



(1) When Multi Display fails to light properly

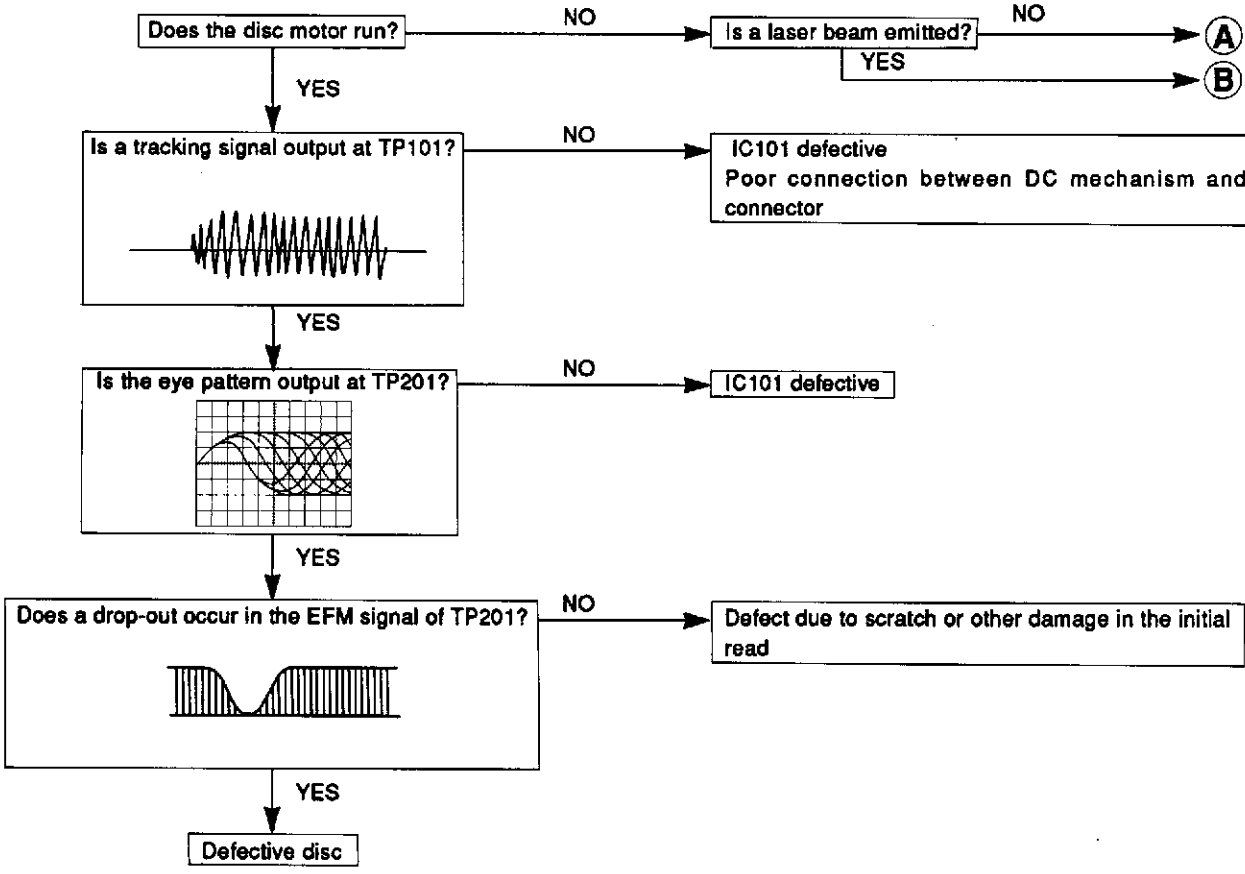


(2) When the tray fails to operate properly

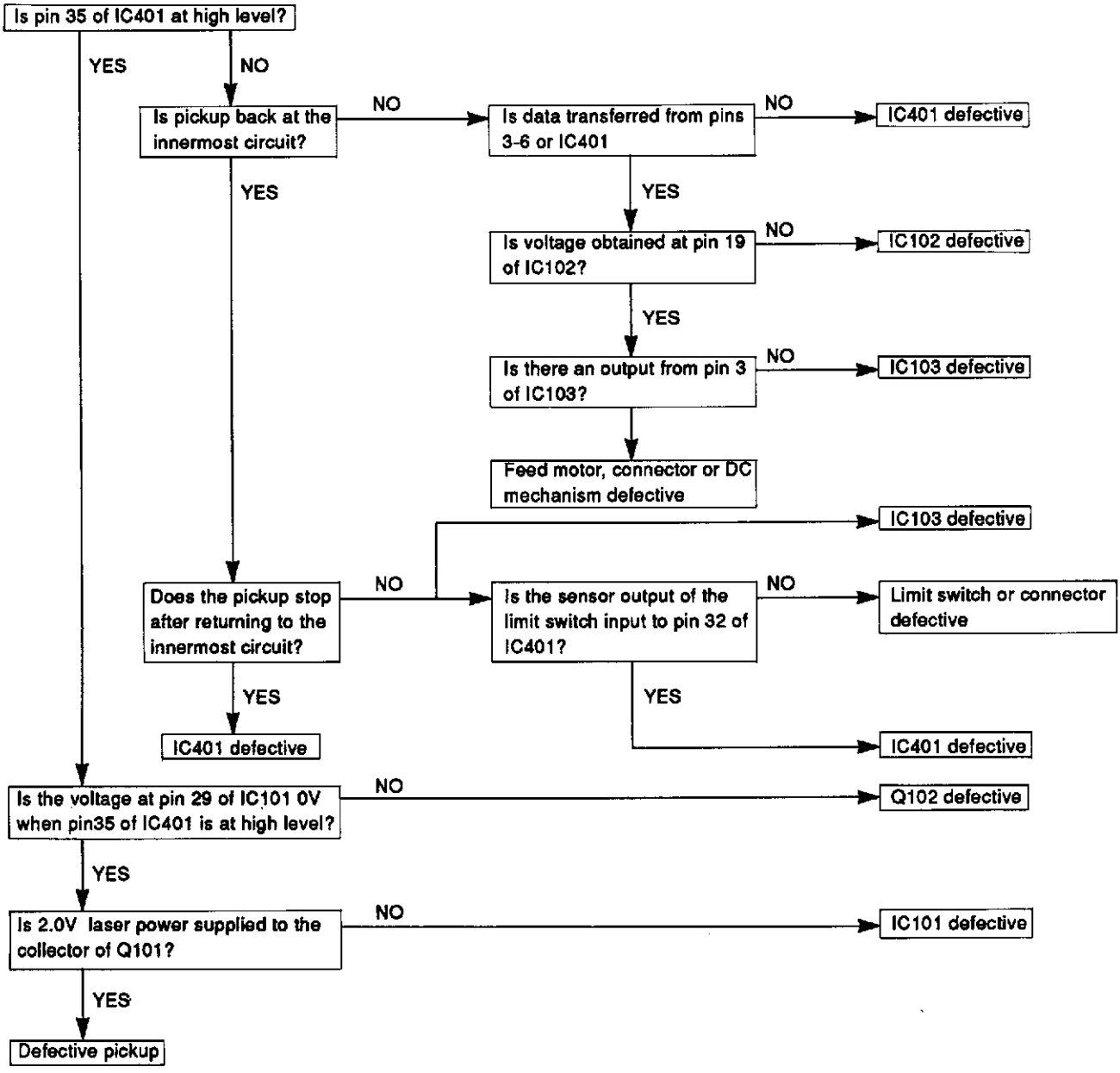


(3) When initial read cannot be executed

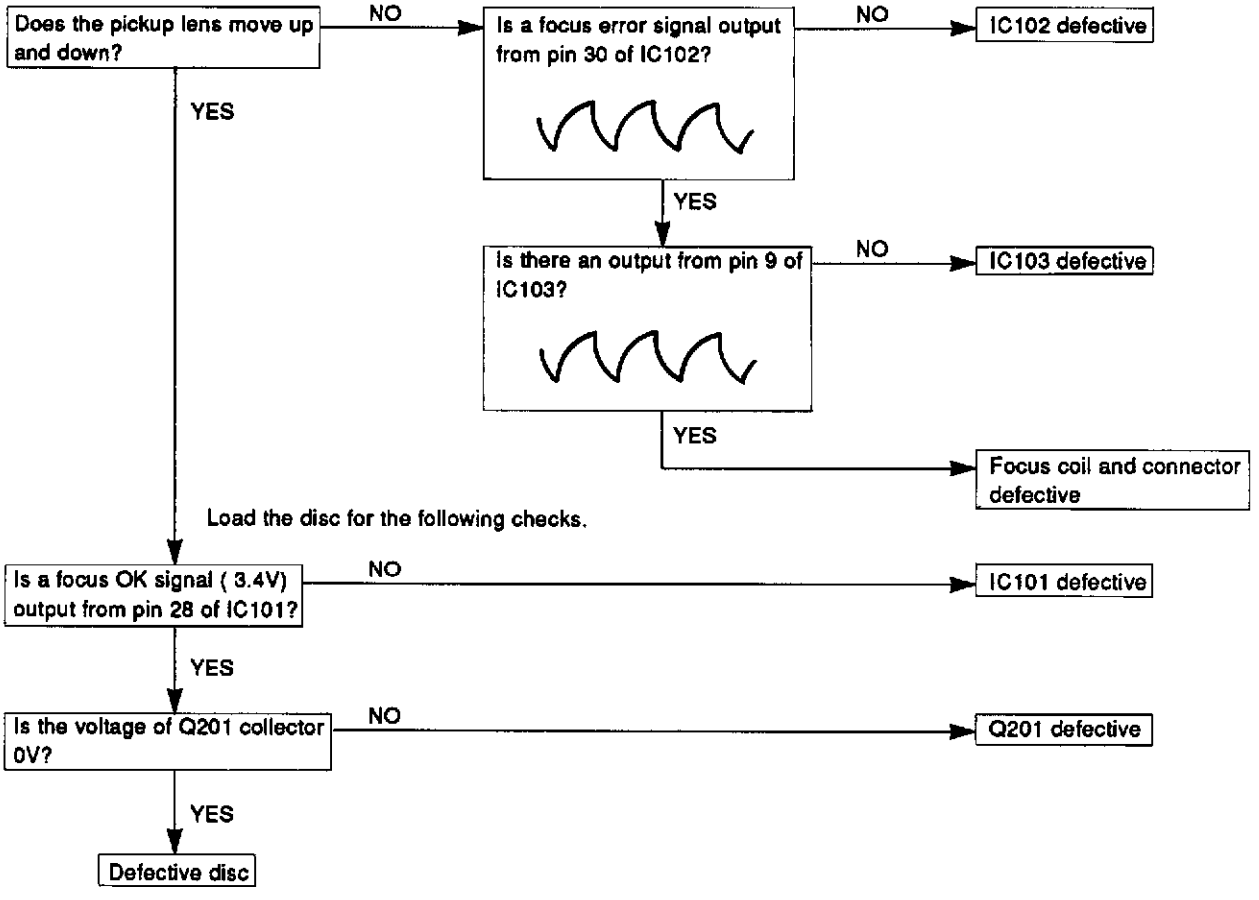
The following checks can be done without a disc loaded.



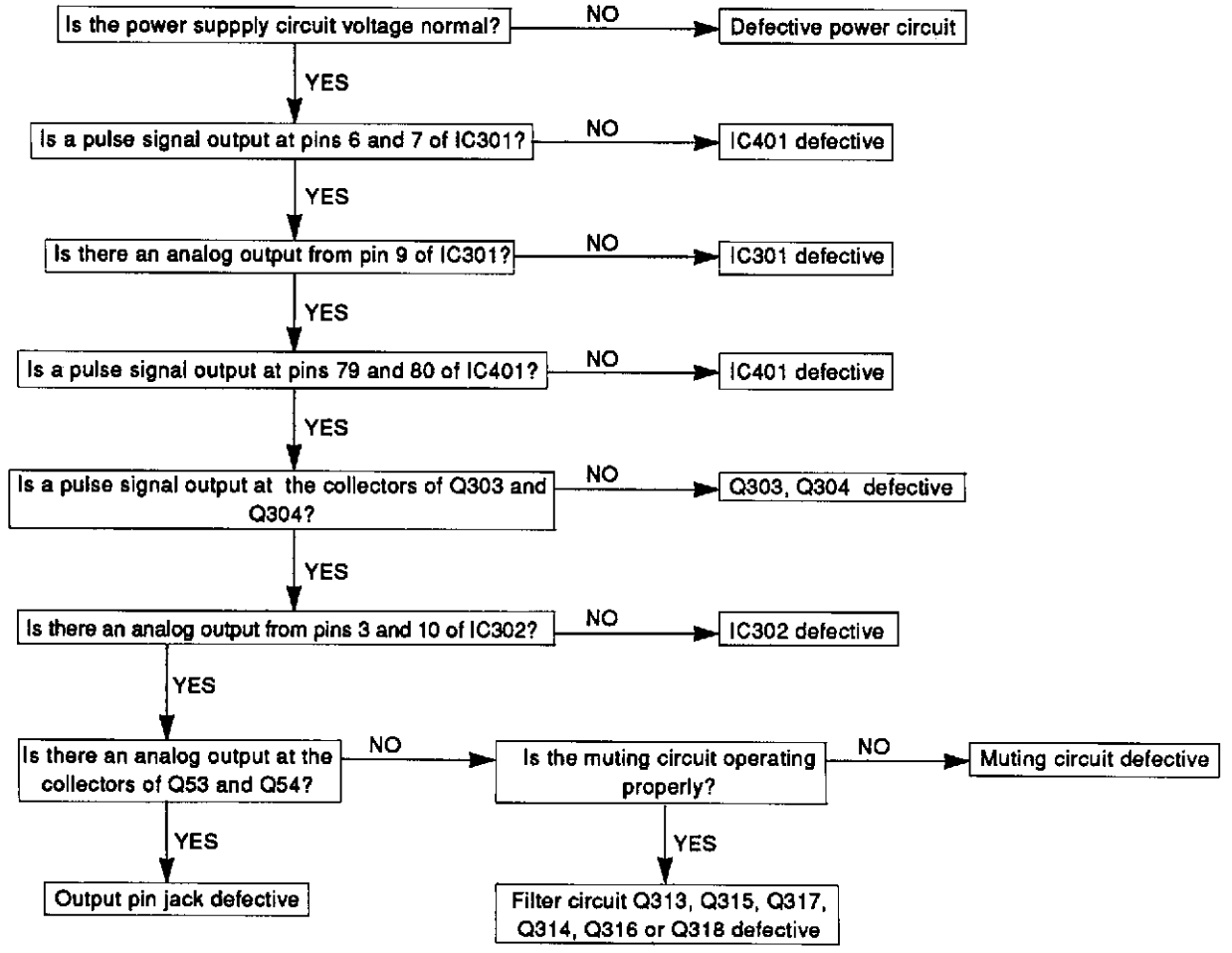
Ⓐ When laser beam is not emitted



Ⓑ When laser beam is emitted



When there is no audio output



IC TERMINAL FUNCTIONS

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC101	1	RFI		I	RF summing amp. input terminal.
	2	RFO		O	RF summing amp. output terminal.
	3	RF-		I	RF summing amp. return input terminal.
	4	P/N		I	Laser diode P/N select terminal.
	5	LD		O	APC LD amp. output terminal.
	6	PD		I	APC PD amp. input terminal.
	7	PD1		I	RF I-V amp. (1) invert input terminal.
	8	PD2		I	RF I-V amp. (2) invert input terminal.
	9	VC		—	GND terminal.
	10	F		I	F I-V amp. invert input terminal.
	11	E		I	E I-V amp. invert input terminal.
	12	EO		O	E I-V amp. output terminal.
	13	EI		I	E I-V amp. return input terminal.
	14	VR		O	DC voltage output terminal.
	15	CC2		I	DEFECT signal input terminal.
	16	CC1		O	DEFECT signal output terminal.
	17	VEE		—	Negative power terminal.
	18	FE BIAS		I	Focus error amp. bias terminal.
	19	FE		O	Focus error amp. output terminal.
	20	TE		O	Tracking error amp. output terminal.
	21	DEFECT		O	DEFECT comparator output terminal.
	22	MIRR		O	MIRR comparator output terminal.
	23	CP		I	MIRR hold capacitor connect terminal.
	24	CB		I	DEFECT hold capacitor connect terminal
	25	DGND		—	GND terminal.
	26	ASY		I	Auto asymmetry control input terminal.
	27	EFM		O	EFM comparator output terminal.
	28	FOK		O	Focus OK comparator output terminal.
	29	$\overline{\text{LD ON}}$		I	Laser diode on/off select terminal.
	30	VCC		—	Positive power terminal.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC102	1	TE IN	Pre amp. input	I	Tracking error signal input terminal.
	2	TC IN	Pre amp. input	I	Track cross signal input terminal.
	3	SHOCK IN	Pre amp. input	I	Shock detector signal input terminal.
	4	HF OK	Pre amp. input	I	HF OK signal input terminal.
	5	MR	Pre amp. input	I	Mirror detected signal input terminal.
	6	Jump Flag	Mi-com I/O	O	Outputs "H" under jump function.
	7	$\overline{\text{HFD}}$	Mi-com I/O	O	"1" indicates that MR input is "1" and track servo loop is off (TS OFF, JF, JR).
	8	T•HLD	Track servo	I	Direct control terminal for TS1 switch. "1" indicates that TS1 switch is "b". "0" indicates that priority is given to controller command.
	9	DATA OUT	Mi-com I/O	O	Inner condition output changed by command modes.
	10	$\overline{\text{JP1}}$	Mi-com I/O	I	1 track jump control signal. Usually "H".
	11	MSD	Mi-com I/O	I	Serial data input terminal (LSB first, 8-bit data).
	12	$\overline{\text{MLA}}$	Mi-com I/O	I	Latch signal of serial data from mi-com to servo IC.
	13	MCK	Mi-com I/O	I	Clock signal of serial data from mi-com to servo IC. Receives data on leading edge.
	14	$\overline{\text{ACLR}}$	Mi-com I/O	I	All clear input. (Clear inner registors and flip-flops by "L" signal.)
	15	Bias	Power supply	O	Vcc/2 bias power supply output when single-pole power supply is used.
	16	COM	Power supply	I	Common terminal. Connect to GND when double-pole power supply is used and to BIAS when single-pole power supply is used.
	17	GND	Power supply	I	GND terminal.
	18	V_{EE}	Power supply	I	Negative power terminal. Connect to GND when single-pole power supply is used.
	19	SS OUT	Slide servo	O	Operation amplifier SS output.
	20	SS ⊖	Slide servo	I	Operation amplifier SS reverse input.
	21	SS ⊕	Slide servo	I	Operation amplifier SS non-reverse input.
	22	TS OUT	Track servo	O	Operation amplifier TA output.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC102	23	TS⊖	Track servo	I	Operation amplifier TA reverse input.
	24	TG2	Track servo	—	Track gain select switch TG2 output. Set to open or common level.
	25	TS⊕	Track servo	I	Operation amplifier TA non-reverse input.
	26	TG1	Track servo	—	Track gain select switch TG1 output. Set to open or common level.
	27	TE OUT	Track servo	O	Operation amplifier TE output.
	28	TE⊖	Track servo	I	Operation amplifier TE reverse input.
	29	FSR IN	Focus servo	I	Focus search voltage level detector input.
	30	FS OUT	Focus servo	O	Operation amplifier FA output.
	31	FS⊖	Focus servo	I	Operation amplifier FA reverse input.
	32	FS⊕	Focus servo	I	Operation amplifier FA non-reverse input.
	33	FG	Focus servo	—	Focus gain select switch FG output. Set to open or common level.
	34	C•FSR	Focus servo	—	Connect capacitor which determines time constant of focus search waveform.
	35	I-Ref	Power supply	I	Terminal for connecting resistor for setting current value of reference current source.
	36	Vcc	Power supply	I	Positive power terminal.
IC103	1	+VIN 1		I	Positive input terminal 1 for amp. 1.
	2	-VIN 1		I	Negative input terminal 1 for amp. 1.
	3	OUT 1		O	Output terminal 1.
	4	OUT 2		O	Output terminal 2.
	5	-VIN 2		I	Negative input terminal 2 for amp. 2.
	6	+VIN 2		I	Positive input terminal 2 for amp. 2.
	7	+VIN 3		I	Positive input terminal 3 for amp. 3.
	8	-VIN 3		I	Negative input terminal 3 for amp. 3.
	9	OUT 3		O	Output terminal 3.
	10	NC		—	

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC103	11	NC		—	
	12	VCC		—	Positive power supply.
IC201	1	EMP		O	Emphasis code output. Emphasis = "1"
	2	PWM1		O	Disc motor drive PWM output 1. -
	3	PWM2		O	Disc motor drive PWM output 2. +
	4	DOTX		O	Digital output.
	5	ACRCY		I	Channel status clock input.
	6	TEST1		I	Test mode select input.
	7	DOBSEL		I	Output data bit select.
	8	DASEL1		I	D/A converter interface select input 1.
	9	DASEL2		I	D/A converter interface select input 2.
	10	DASEL3		I	D/A converter interface select input 3.
	11	DASEL4		I	D/A converter interface select input 4.
	12	MSD		I	Microconputer interface serial data input.
	13	MCK		I	Microconputer interface shift clock input.
	14	$\overline{\text{MLA}}$		I	Microconputer interface data latch clock input
	15	$\overline{\text{ACLR}}$		I	Microconputer interface register clear input.
	16	$\overline{\text{HFD}}$		I	Play signal absence signal input.
	17	HF		I	Play signal input.
	18	IREF		I	Detection/PLL circuit reference current input.
	19	TLC		O	Slice level control output.
	20	LPF		I/O	PLL loop filter connection terminal.
	21	LOCK/DRD		O	Synchronous/low disc rotate status output.
	22	SYCLK		O	Frame synchronous status output.
	23	VDD2		I	5V power supply used for Detection/PLL circuit analog area only.
	24	DRD		O	Low disc rotate status output.
	25	EFFK		O	EFM frame clock output.
	26	SCINT		O	Subcode Q interrupted signal output.
	27	SQRO		O	Subcode Q register output.
	28	SQRCK		I	Subcode Q register data shift clock input.
	29	SCOR		O	Subcode synchronous signal output.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
	30	CRCF		O	Subcode Q CRC check result output.
	31	SCCK		I	Shift clock input for serial subcode data output.
	32	VSS2		I	GND terminal.
	33	SCOE2		I	Subcode parallel output channel P to S enable input.
	34	SCOE1		I	Subcode parallel output channel T to W enable input.
	35	SBCW		O	Subcode channel W output.
	36	SBCV		O	Subcode channel V output.
	37	SBCU		O	Subcode channel U output.
	38	SBCT		O	Subcode channel T output.
	39	SBCS		O	Subcode channel S output.
	40	SBCR		O	Subcode channel R output.
	41	SBCQ		O	Subcode channel Q output.
	42	SBCP		O	Subcode channel P output.
IC201	43	$\overline{RAS}$		O	Row address strobe signal output.
	44	NC		—	
	45	RDB2		I/O	External memory data I/O 2.
	46	NC		—	
	47	RDB1		I/O	External memory data I/O 1.
	48	RDB4		I/O	External memory data I/O 4.
	49	$\overline{CAS}$		O	Column address strobe signal output.
	50	RDB3		I/O	External memory data I/O 3.
	51	$\overline{WE}$		O	Write enable signal output.
	52	NC		—	
	53	RAD1		O	External memory address output 1.
	54	RAD2		O	External memory address output 2.
	55	RAD3		O	External memory address output 3.
	56	RAD7		O	External memory address output 7.
	57	RAD4		O	External memory address output 4.
	58	RAD5		O	External memory address output 5.
	59	RAD6		O	External memory address output 6.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC201	60	RAD0		O	External memory address output 0.
	61	EST2		O	Error status 2.
	62	EST1		O	Error status 1.
	63	VDD1		I	5V power supply.
	64	DOFK		O	OSC frame clock output.
	65	FSCK		O	Clock output. 44.1kHz
	66	C846		O	Clock output. 8.4672MHz
	67	C423		O	Clock output. 4.2336MHz
	68	C16MI		I	1/2 divider input.
	69	C8MO		O	1/2 divider output.
	70	XI		I	Crystal oscillator input.
	71	XO		O	Crystal oscillator output.
	72	DO1		O	D/A converter serial data output.
	73	VSS1		I	GND terminal.
	74	DSCK		O	D/A converter data shift clock output.
	75	LRCK		O	D/A converter left/right clock output.
	76	DO2		O	Dual D/A converter serial data output.
	77	WDCK		O	D/A converter word clock.
	78	DLRCK		O	D/A converter left/right clock output.
	79	APTL		O	D/A converter deglitch clock L.
	80	APTR		O	D/A converter deglitch clock R.
IC202	1	$\overline{OE}$		I	Output enable input.
	2	DQ1		I/O	Data I/O.
	3	DQ2		I/O	Data I/O.
	4	$\overline{W}$		I	Write control input.
	5	$\overline{RAS}$		I	Row address strobe input.
	6	A6		I	Address input.
	7	A5		I	Address input.
	8	A4		I	Address input.
	9	Vcc		—	Power supply (5V).
	10	A7		I	Address input (row address only).

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC202	11	A3		I	Address input.
	12	A2		I	Address input.
	13	A1		I	Address input.
	14	A0		I	Address input (row address only)
	15	DQ3		I/O	Data I/O.
	16	$\overline{CAS}$		I	Column address strobe input.
	17	DQ4		I/O	Data I/O.
	18	Vss		—	Power supply (0V).
IC203	1	VSENCE1			
	2	OUT1		O	Output terminal 1.
	3	-VIN1		I	Negative input 1.
	4	+VIN1		I	Positive input 1.
	5	VEE			Negative power supply.
	6	+VIN2		I	Positive input 2.
	7	-VIN2		I	Negative input 2.
	8	OUT2		O	Output terminal 2.
	9	VSENCE2			
	10	VCC			Positive power supply.
IC301	1	- Vs		—	Negative analog power supply.
	2	DIG GND		—	Digital ground.
	3	+ VI		—	Positive logic power supply.
	4	NC		—	
	5	CLK		I	Clock input.
	6	LEC		I	Latch enable control input.
	7	DATA		I	Data input.
	8	- VI		—	Negative logic power supply.
	9	VOUT		O	Voltage output.
	10	RF		I	Feedback resistor.
	11	SJ		I	Summing junction.
	12	ANA GND		—	Analog ground.
	13	IOUT		O	Current output.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC301	14	MSB ADJ		—	MSB adjustment terminal.
	15	V POT		—	Potentiometer terminal.
	16	+ Vcc		—	Positive analog power terminal.
IC302	1	SW1 I/O		I/O	SW1 input/output terminal.
	2	SW1 O/I		I/O	SW1 output/input terminal.
	3	SW2 O/I		I/O	SW2 output/input terminal.
	4	SW2 I/O		I/O	SW2 input/output terminal.
	5	CONT2		I	Control input 2 terminal.
	6	CONT3		I	Control input 3 terminal.
	7	VSS			Negative power supply.
	8	SW3 I/O		I/O	SW3 input/output terminal.
	9	SW3 O/I		I/O	SW3 output/input terminal.
	10	SW4 O/I		I/O	SW4 output/input terminal.
	11	SW4 I/O		I/O	SW4 input/output terminal.
	12	CONT4		I	Control input 4 terminal.
	13	CONT1		I	Control input 1 terminal.
	14	VDD			Positive power supply.
IC401	1	$P2_7$	I/O port	I/O	Disc tray open direction driving output.
	2	$P2_6$	I/O port	I/O	Disc tray close direction driving output.
	3	$P2_5$	I/O port	I/O	
	4	$P2_4$	I/O port	I/O	Serial data output.
	5	$P2_3$	I/O port	I/O	Shift clock output.
	6	$P2_2$	I/O port	I/O	Data latch clock output.
	7	$P2_1$	I/O port	I/O	
	8	$P2_0$	I/O port	I/O	
	9	NC		—	
	10	$P0_7$	I/O port	I/O	Serial data input.
	11	$P0_6$	I/O port	I/O	Frame synchronous state output.
	12	$P0_5$	I/O port	I/O	Low disc rotate state output.
	13	$P0_4$	I/O port	I/O	Sub-code synchronous signal output.
	14	$P0_3$	I/O port	I/O	Sub-code Q check.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
IC401	15	$P0_2$	I/O port	I/O	Sub-code channel Q output.
	16	$P0_1$	I/O port	I/O	Interrupt input.
	17	$P0_0$	I/O port	I/O	
	18	INT2		I/O	
	19	INT1		I	EFM frame clock output.
	20	NC		—	
	21	CNVss			Usually connected to Vss.
	22	RESET		I	Reset input.
	23	XIN	CLOCK IN	I	Clock input.
	24	XOUTF	CLOCK OUT	O	Clock output.
	25	XOUTS	CLOCK OUT	O	Clock output.
	26	VSS			Power supply.
	27	XCIN	CLOCK IN	I	Serial data input.
	28	XCOUT	CLOCK OUT	O	Clock output.
	29	R_3	IN PORT	I	Key input 3.
	30	R_2	IN PORT	I	Key input 2.
	31	R_1	IN PORT	I	Key input 1.
	32	R_0	IN PORT	I	Key input 0.
	33	Ø		O	Timing output.
	34	VP		I	Pull down voltage input.
	35	$P1_7$	OUT PORT	O	Laser diode control output.
	36	$P1_6$	OUT PORT	O	Display output 7.
	37	$P1_5$	OUT PORT	O	Display output 6.
	38	$P1_4$	OUT PORT	O	Display output 5.
	39	$P1_3$	OUT PORT	O	Display output 4.
	40	$P1_2$	OUT PORT	O	Display output 3.
	41	$P1_1$	OUT PORT	O	Display output 2.
	42	$P1_0$	OUT PORT	O	Display output 1.
	43	$P3_7$	OUT PORT	O	Display output i.
	44	$P3_6$	OUT PORT	O	Display output g.
	45	$P3_5$	OUT PORT	O	Display output f.

IC number	Terminal number	Port name	Terminal code	I/O	Outline of functions
	46	$P3_4$	OUT PORT	O	Display output e.
IC401	47	$P3_3$	OUT PORT	O	Display output d.
	48	$P3_2$	OUT PORT	O	Display output c.
	49	$P3_1$	OUT PORT	O	Display output b.
	50	$P3_0$	OUT PORT	O	Display output a.
	51	NC			
	52	VCC			Power supply.
IC402	1	I/O PORT D	D3	I/O	9-bit terminal having output function on an independent bit basis. Output is open drain circuit for N channel transistor. Port D0 to D3 terminals have 4-bit input function. Programming output latch to "1" sets the output to floating (high impedance) state so that the terminals may be used as input port.
	17		D0	I/O	
	18		D1	I/O	
	19		D2	I/O	
	2	OUT PORT D	D4	O	
	3		D5	O	
	6		D6	O	
	7		D7	O	
	8		D8	O	
	4	CNVss	CNVss	—	Connect to VSS. Low input (0V) must be applied.
	5	Vss	Vss	—	GND terminal.
	9	I/O PORT F	F0	I/O	4-bit I/O terminal with output latch. Output is open drain circuit for N channel transistor. Programming port F output latch to "1" sets the output to floating (high impedance) state so that port F may be used as input port.
	10		F1	I/O	
	11		F2	I/O	
	12		F3	I/O	
	13	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$	I	Sets to reset state by applying low level signal for two or more machine cycles.
	14	XOUT	CLOCK OUT	O	Connect external resistor R for oscillating CR in the clock generation circuit. Ceramic resonator may be connected.
	15	XIN	CLOCK IN	I	
	16	SENSE INPUT S	SENSE INPUT S	I	Sense input terminal active on leading edge. Sets flag to "1" when terminal S signal changes from low to high. Allows test and flag clear to be performed by command.
	20	VDD (5V)	VDD	—	Positive power supply terminal.

CIRCUIT DESCRIPTION

1. APC CIRCUIT

A semiconductor laser is used as the light source for the optical pickup. As the output from the semiconductor laser changes radically with changes in temperature, 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. 1 shows the APC circuit.
When the temperature rises and the optical output decreases, the monitor diode current (IS) decreases, the electric potential of IC101 pin 5 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.

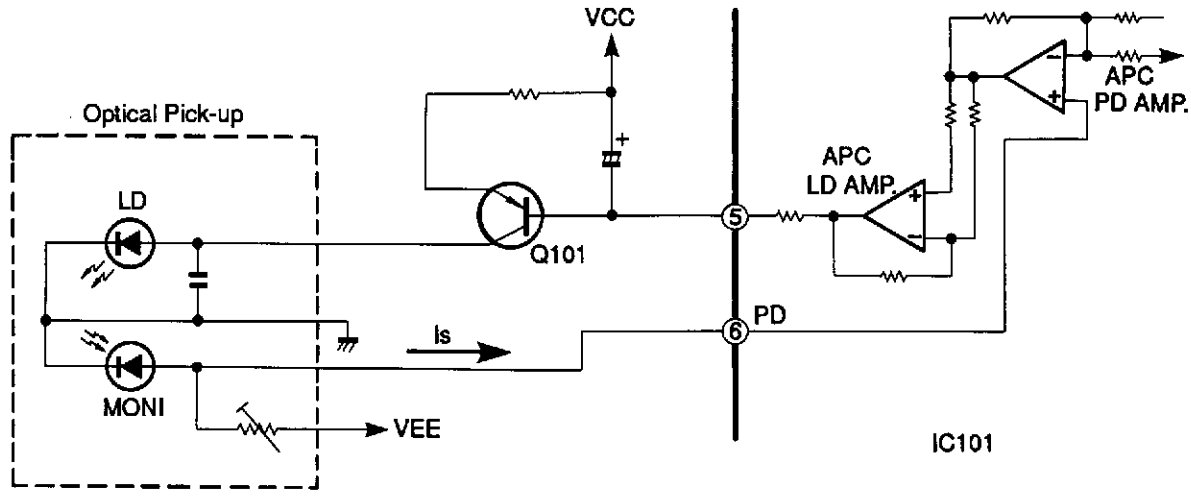
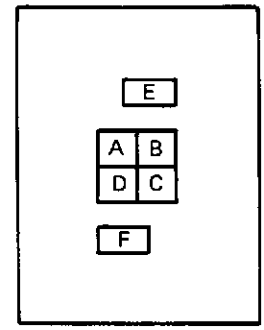


Fig. 1

2. FOCUS SERVO

2-1. Optical pickup

This set employs a three-beam optical pickup comprised of six division photodiodes, A through F as shown in Fig. 2. 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 IC101 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. 2

2-2. Focus error detecting operation

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. 3 is the principle of the focus error detection.
The currents from the photodiodes (A+C and B+D) are applied to pins 7 and 8 of IC101 and converted to voltage by RF I-V amplifiers (1) and (2) included in IC101.

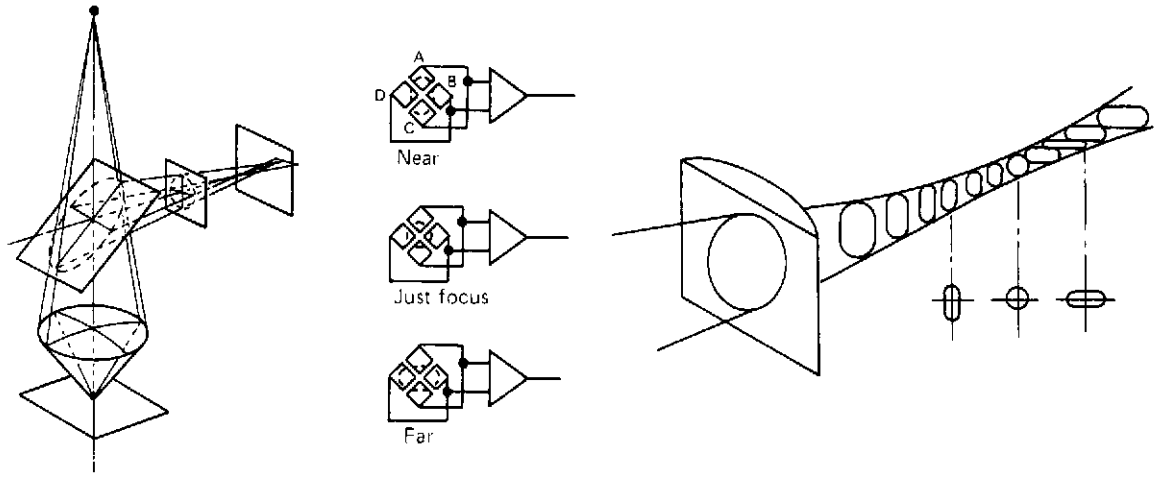


Fig.3

2-3. Focus servo control operation

The focus error signal, after being converted to voltage by the RF I-V amplifier, is transmitted to the operation amplifier in the IC and output from pin 19.

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 output voltage(focus error signal) from pin 19 of IC101 passes through IC102 , in from pin 32 and out from pin 30, and IC103, in from pin 7 out from pin 9 as shown in Fig. 4. It is amplified in each IC and fed to the focus coil which then drives the objective lens of the pickup.

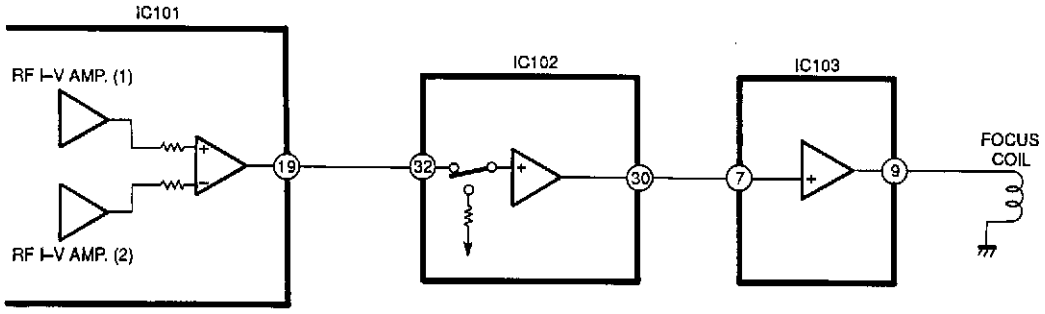


Fig. 4

2-4. Tracking error detection system

Fig. 5 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. 5-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. 5-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. 5-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.

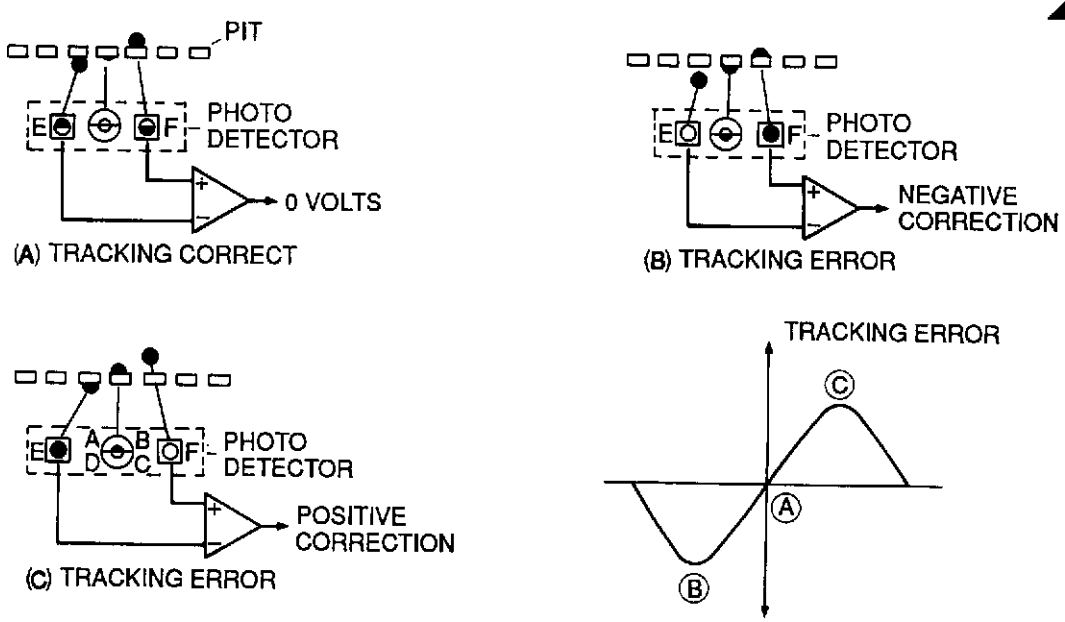


Fig. 5

2-5. Tracking servo control operation

When a tracking error signal is detected by photodiodes E and F, it is fed to pins 11 and 10 of IC101 respectively as shown in Fig. 6. In IC101, the signal is converted into voltage by the E I-V amplifier and F I-V amplifier, transmitted to the tracking error amplifier and output through pin 20. While it passes through IC102, in from pin 1 and out from pin 22, and IC103, in from pin 6 and out from 4, it is amplified in each IC and sent to the tracking coil to adjust pickup so that the amount of track shift is reduced as closely to none as possible.

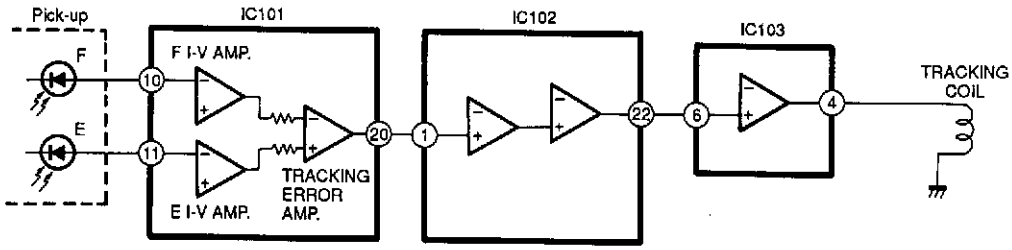


Fig. 6

3. Regenerative Circuit

3-1. RF circuit

The currents from photodiodes (a, b, c and d) are fed to IC101 through pins 7 and 8 and converted to voltage by RF I-V amplifiers (1) and (2) respectively there, added by the RF summing amplifier and output from pin 2 as a signal. As it is sent to pin 7 of IC201, it can be checked at the test point (TP201) provided on its way by means of the eye pattern check.

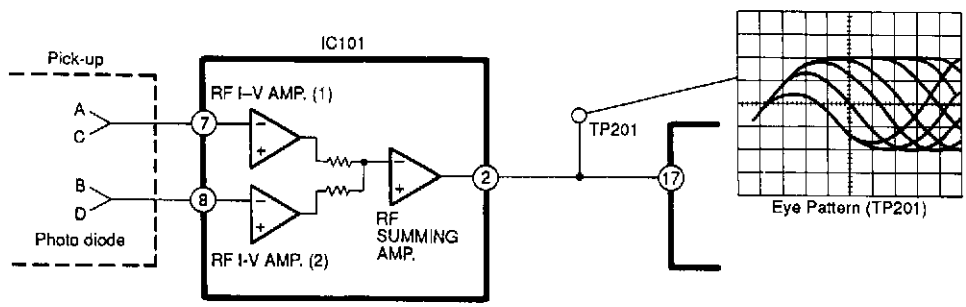


Fig. 7

3-2. EFM demodulation, error correction, serial/parallel conversion

EFM demodulation, error correction and serial/parallel conversion are performed by the internal circuitry of IC201. The eye-pattern signals from pin 2 of IC101 are sent to pin 17 of IC201, 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 digital filter where they undergo quadruple oversampling conversion and move on to the D/A converter interface. After that, they are output as 18-bit digital signals from pins 72, 74 and 77 of IC201 and fed to the D/A converter of IC301. Also, deglitch pulse signals are output from D/A converter interface of IC201 (through pins 79 and 80). After their levels are shifted in the deglitcher circuit consisting of Q301, Q302, Q303 and Q304, they are sent to IC302.

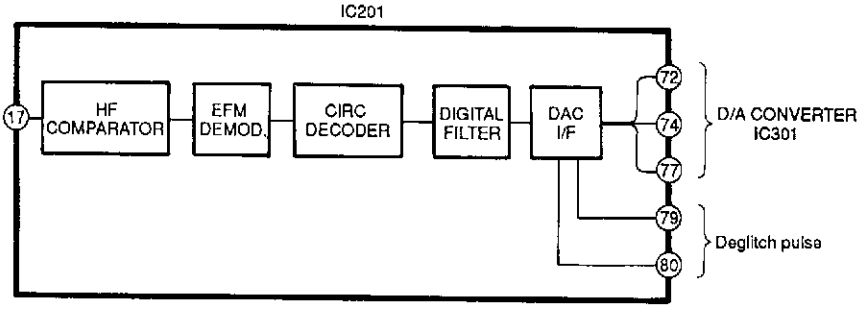


Fig. 8

3-3. Digital filter

Fig. 9 shows the signal data of an audio signal up to 20kHz that has been digitalized, along with the frequency distribution of the signal data. The graphs show the conditions for a sampling frequency of 44.1kHz, plus its doubled frequency, 88.2kHz, and its quadrupled frequency, 176.4kHz.

As the figure shows, for the same signal up to 20kHz, the noise portion of the digitalized signal component tends to shift toward the higher range of the signal if the sampling frequency is increased. However, at any sampling frequency, the volume of necessary audio signal information remains constant up to 20kHz. This allows certain important results to be derived; that is, if the information represented in section (a) is obtained, then it should be possible to create a signal in the form shown in (b) or (c).

When the noise caused by sampling shifts to the higher frequency range, as shown in (b) or (c), the low pass filter characteristic to eliminate noise during re-conversion to an audio signal needs not be steep but can be rather gradual as shown. It is comparatively simple to provide a high audio quality low pass filter of such characteristic with little phase fluctuation or distortion.

The question now becomes how to make a signal sampled at 44.1kHz resemble one sampled at a much higher frequency. Fig. 10 shows the signal sequence sampled at the same 44.1kHz as in Fig. 9 and its frequency distribution.

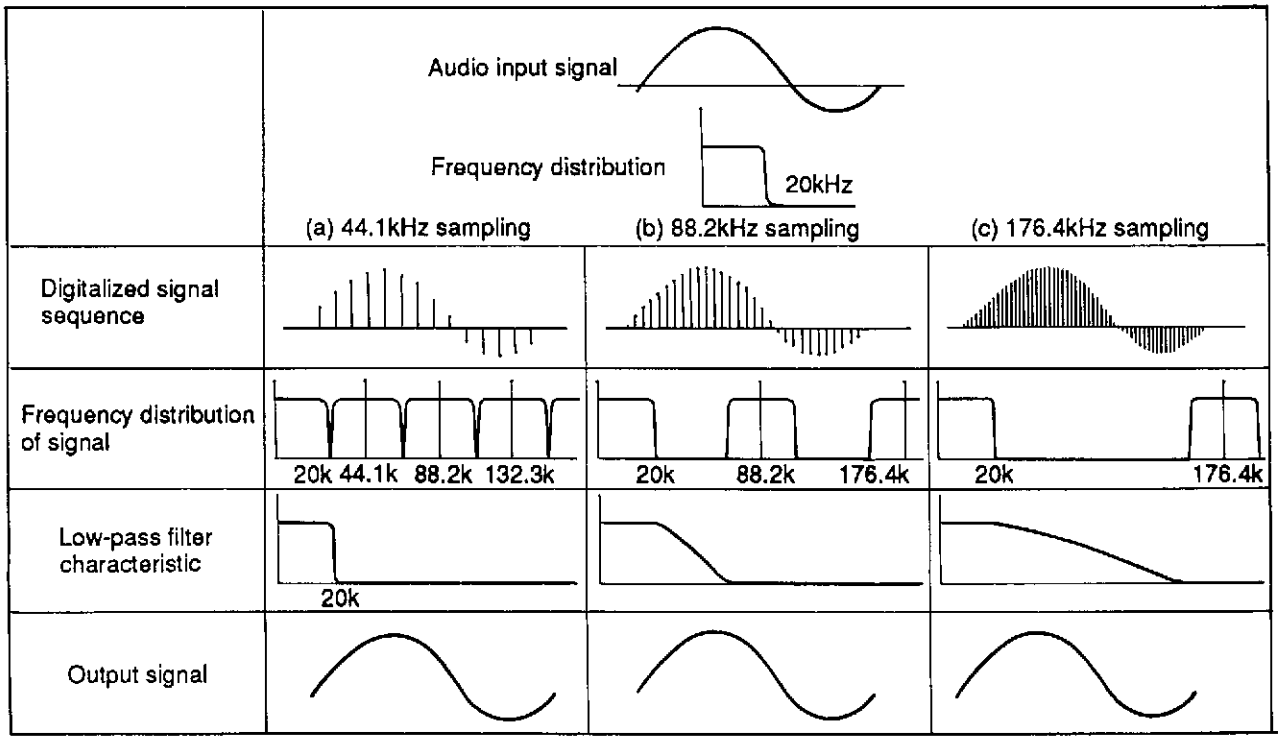


Fig. 9

If the frequency is to be doubled as the first step in increasing the sampling frequency of the signal, zero-level data is added between the data marked with **X** in Fig. 10(b). In the original signal sequence sampled at 44.1kHz, there are data only at the points of the sampling timing, while the intervals between those points have all been made zero-level. Introducing zero data in these intervals does not change the original data in any way, nor is the frequency distribution altered. Only the sampling frequency is doubled.

Passing this data in its modified form through a digital filter with the characteristic as shown in Fig.10(c) causes the portion corresponding to **N1** to be eliminated, resulting in a signal sequence with the frequency distribution shown in (d). This signal sequence possesses exactly the same shape as that obtained for the signal in Fig. 9(b), sampled at 88.2kHz.

In other words, this method enables the sampling frequency to be doubled.

The digital filter used in this unit is a non-cyclic type. Its circuit diagram is shown in Fig. 11.

The sampling frequency of this unit has been quadrupled, and the phase characteristic has been improved by using a softer analog low-pass filter.

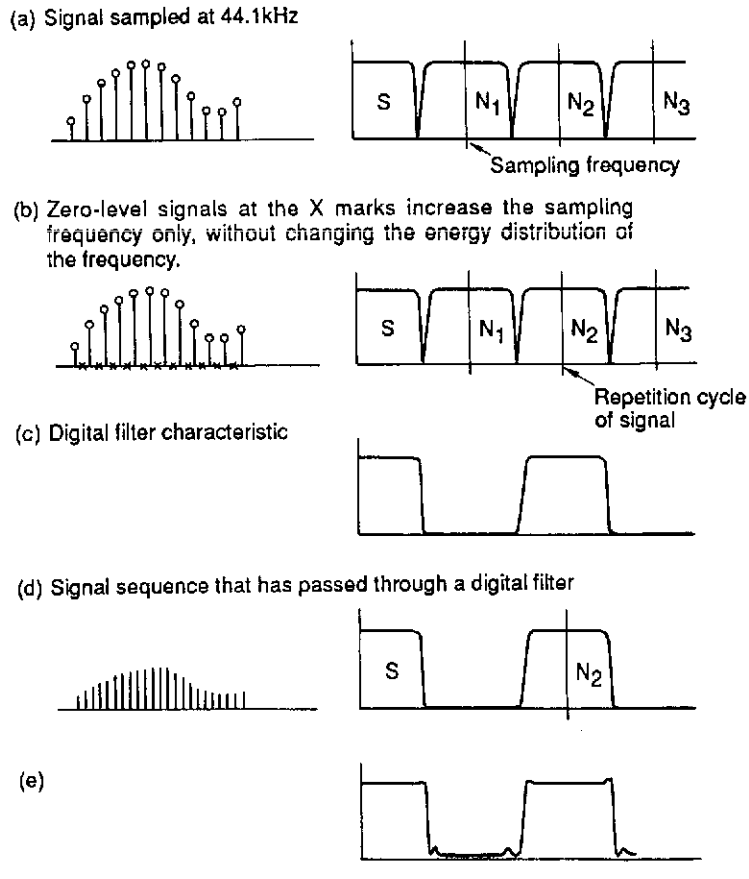


Fig. 10

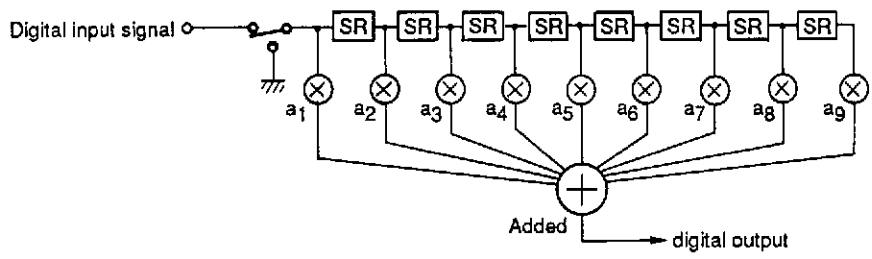


Fig. 11

3-4. Sampling and hold circuit

Because not all of the switches of the D/A converter are turned on at the same time, the output waveform of the D/A converter contains a kind of transient noise known as "glitch". In addition, the settling time (the time required to arrive at the true value) of the current/voltage converter amplifier of the output must also be added, making it fairly impossible to obtain an ideal waveform. If the waveform is input to the filter as it is, the error within itself generates a beat with a fraction of sampling frequency divided by an odd number, and this in turn creates a terrible sound.

The waveform demodulated by the D/A converter must be an ideal impulse with no width as a principle. However, there are cases where such ideal impulse is difficult to obtain or the S/N ratio can not be measured. And to cope with such difficulties and others, demodulation is actually carried out on a pulse with a width.

As shown in Fig. 12, a circuit in which the distortion and error in the output waveform converted by the D/A converter are discarded and only the portion indicating the true value is used is called "deglitcher".

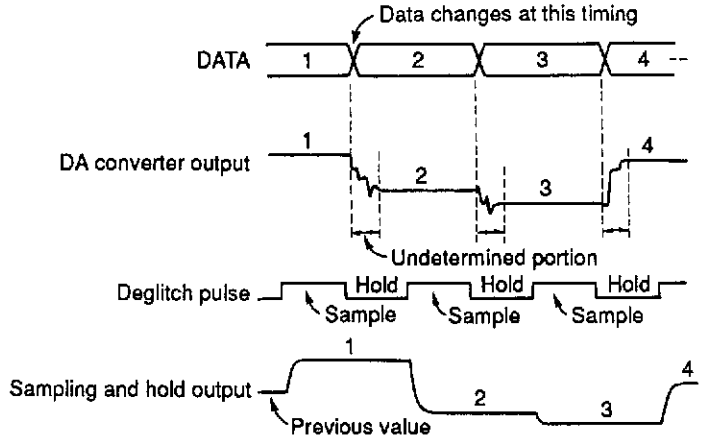


Fig. 12

Fig. 13 shows the sampling and hold circuit used in this unit.

C305 and C304 are capacitors for boosting the speed. The deglitch pulse signal outputs from the APTR(pin 80) and APTL(pin79) terminals of DSP IC201 are added to the bases of Q301 (left channel) and Q302 (right channel) respectively. Q301 and Q302 are switching transistors which are turned on when biased in the forward direction. When Q301 and Q302 are turned on, Q303 and Q304 are also turned on, and the collectors of these latter two are connected to V. As they are connected to -V through R313 and R312, a deglitch pulse signal which has been level shifted here is input to the control terminals (pin 5 and pin 12) of IC302. This signal turns the analog switch of IC302 on and off, so that the sampling and hold operations are carried out. C308 and C309 are capacitors for hold operation.

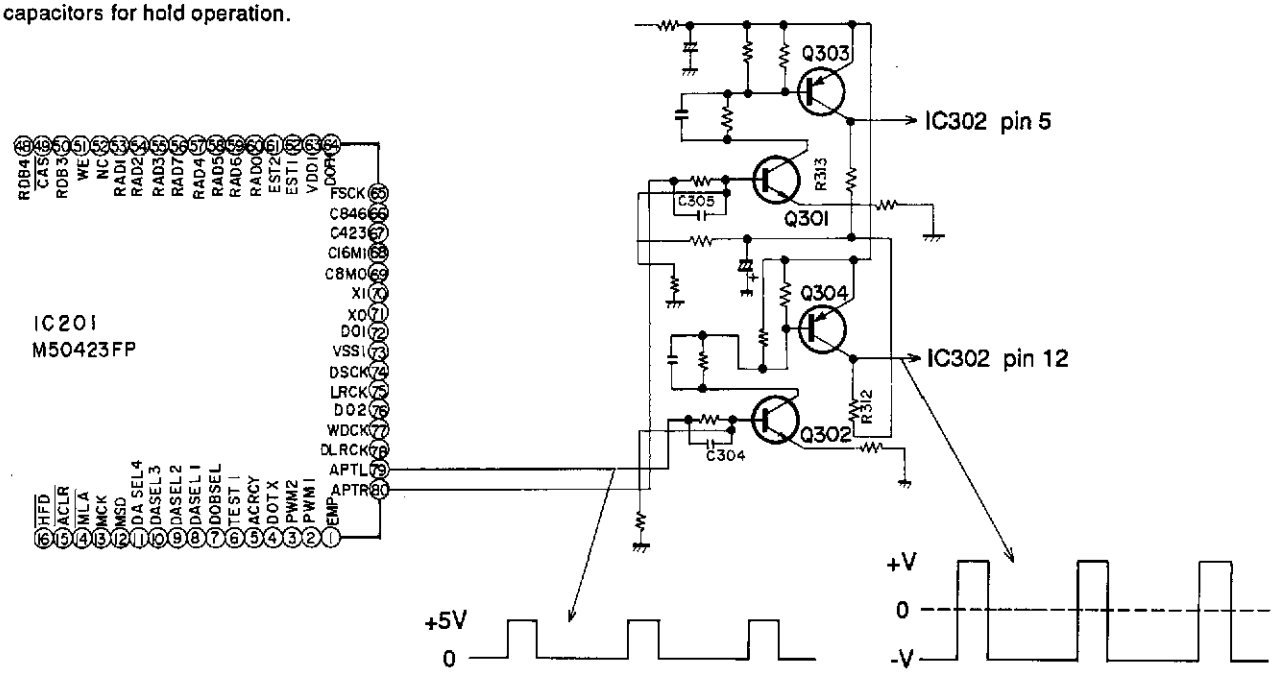


Fig. 13

3-5. Buffer amplifier and low-pass filter

Fig. 14 shows a final-stage circuit which includes a buffer, a low-pass filter and other elements. Q305, Q307 and Q309 (left channel), and Q306, Q308 and Q310 (right channel) are buffer circuits of inverted darlington configuration, and Q309 and Q310 are FET controlled constant-current circuits. The purpose of this circuit is to prevent an interference from occurring between the hold circuit in the previous stage and the de-emphasis circuit or LPF (low pass filter) in the following stage.

The emphasis data from the disc is output through the EMP terminal (pin 1) of IC201. When a disc to which emphasis is applied is played back, this terminal is set high and Q319 turns on. Following this, Q311 (left channel) and Q312 (right channel) are also turned on. Then connecting C317 (left channel) and C316 (right channel) to the ground provides the de-emphasis characteristic.

The portion of Fig. 14 enclosed by the broken line is a 3rd-order active LPF. This LPF causes noise in the high range to be cut. Q315 and Q317 (left channel) and Q316 and Q318 (right channel) are buffer circuits of inverted darlington configuration. Q313 and Q314 are FET controlled constant current circuits.

Q51, Q52 and Q53 are power muting circuits.

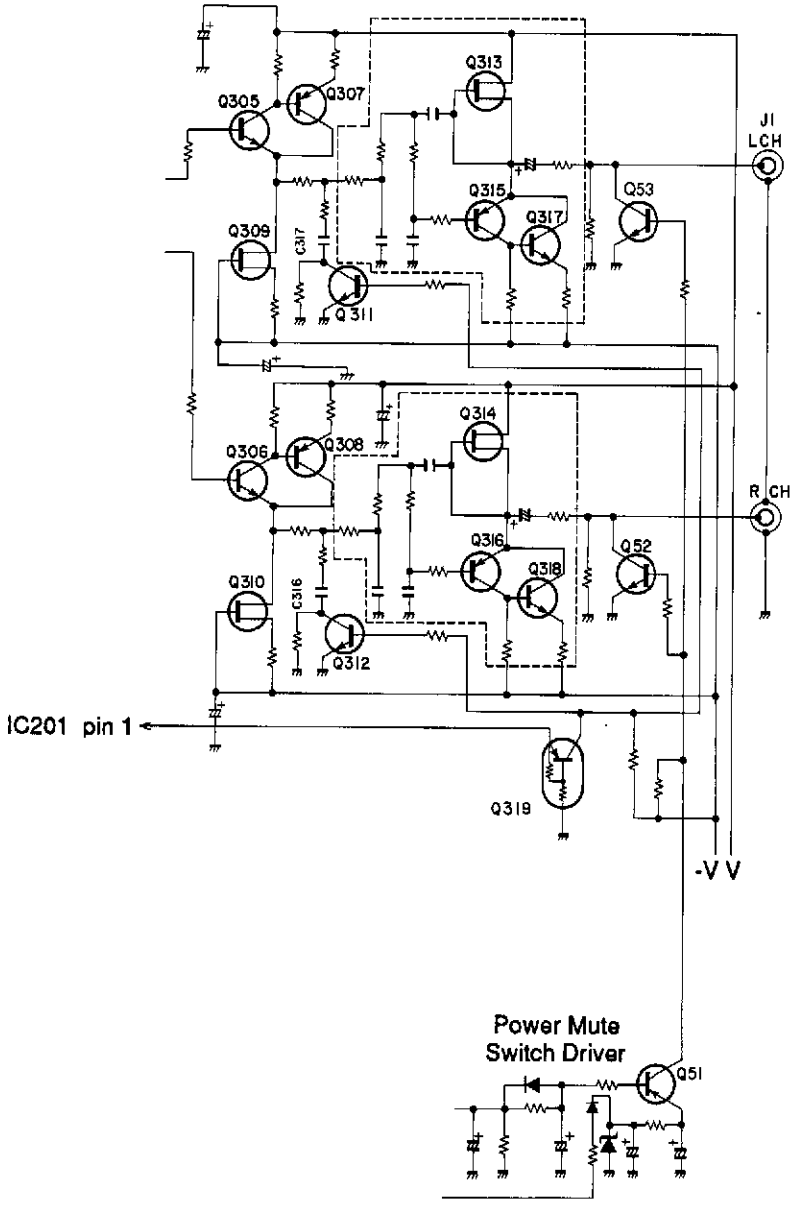
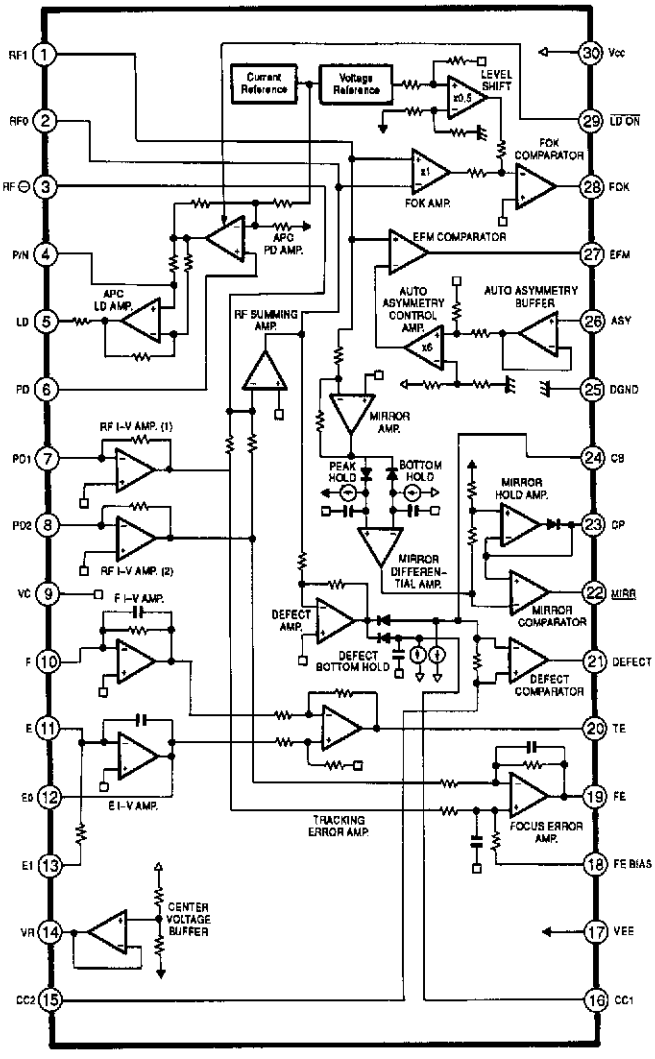


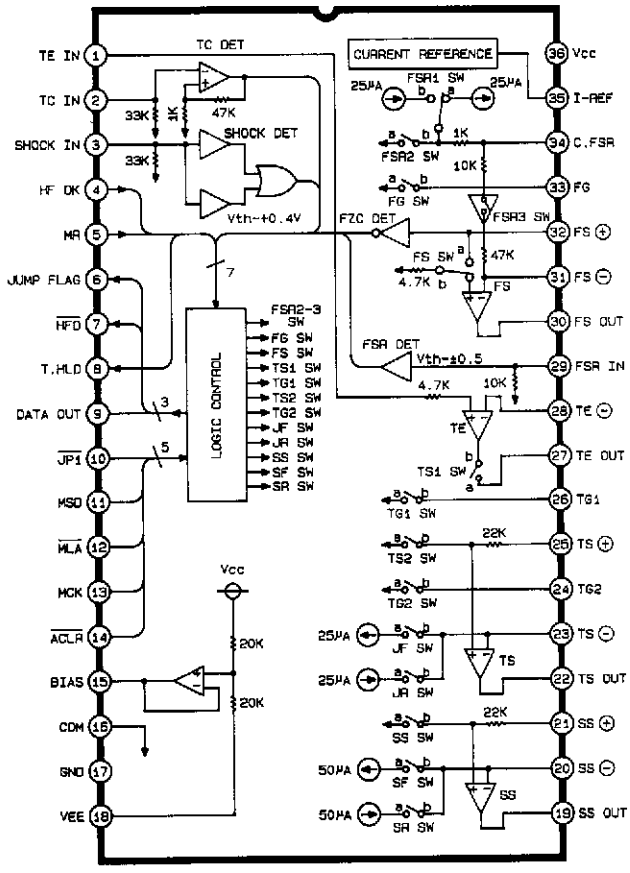
Fig. 14

IC BLOCK DIAGRAM

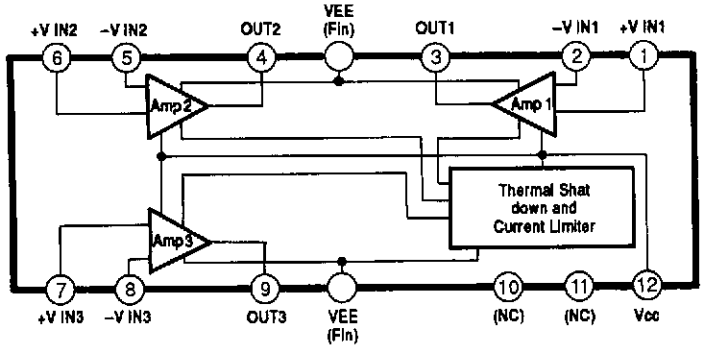
IC101 : CXA1081S
RF Amp.



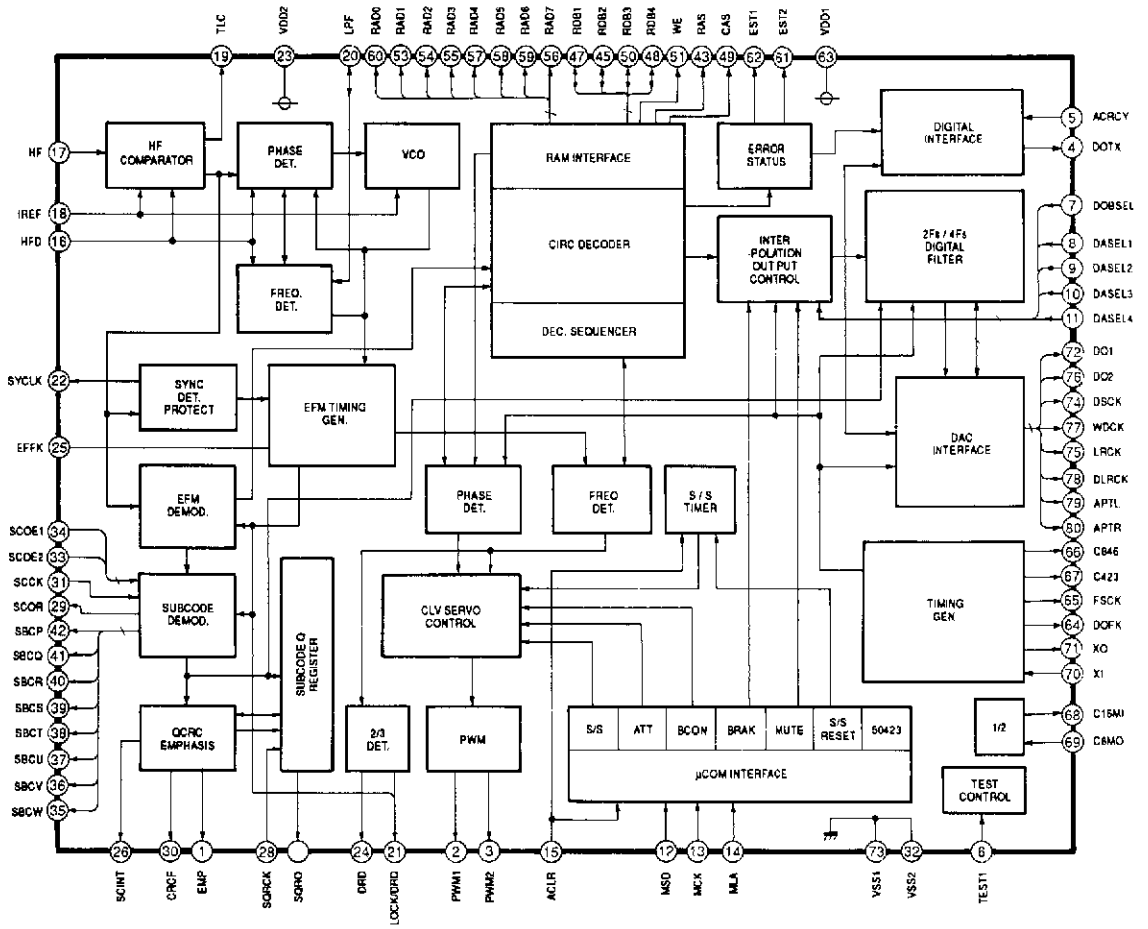
IC102
M51564P
Optical Pick-up Servo Control



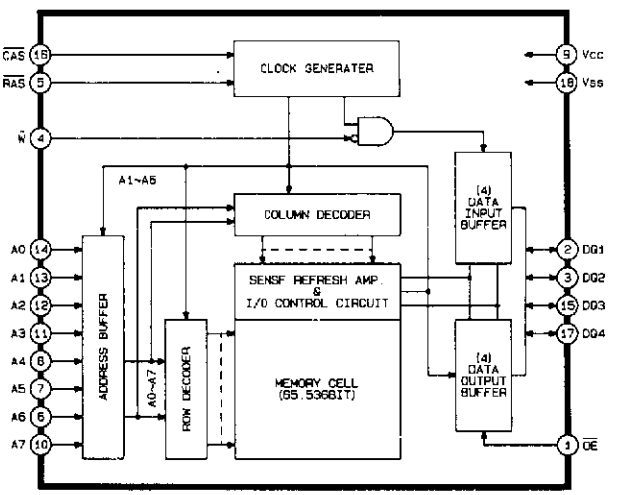
IC103 : LA6520
3 channel Power OP-Amp.



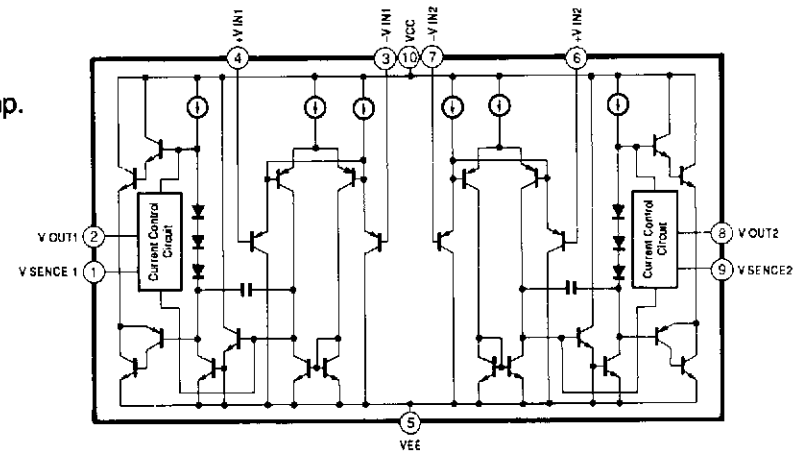
IC201 : M50423FP
Digital Signal Processor



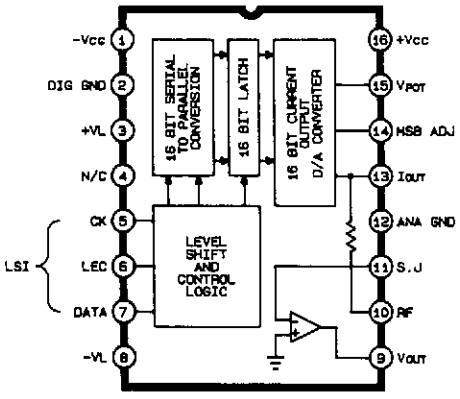
IC202
M5M4416P
65536-Bit (16384-Word by 4-Bit)
Dynamic RAM



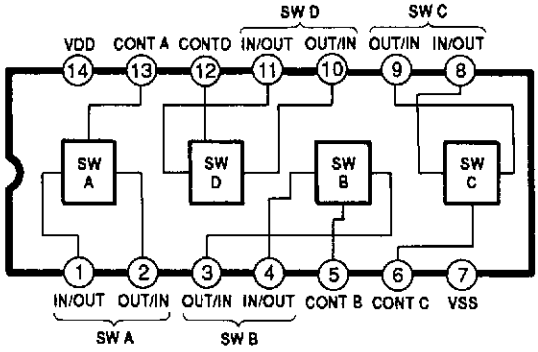
IC203 : LA6515
2 channel Power OP-Amp.



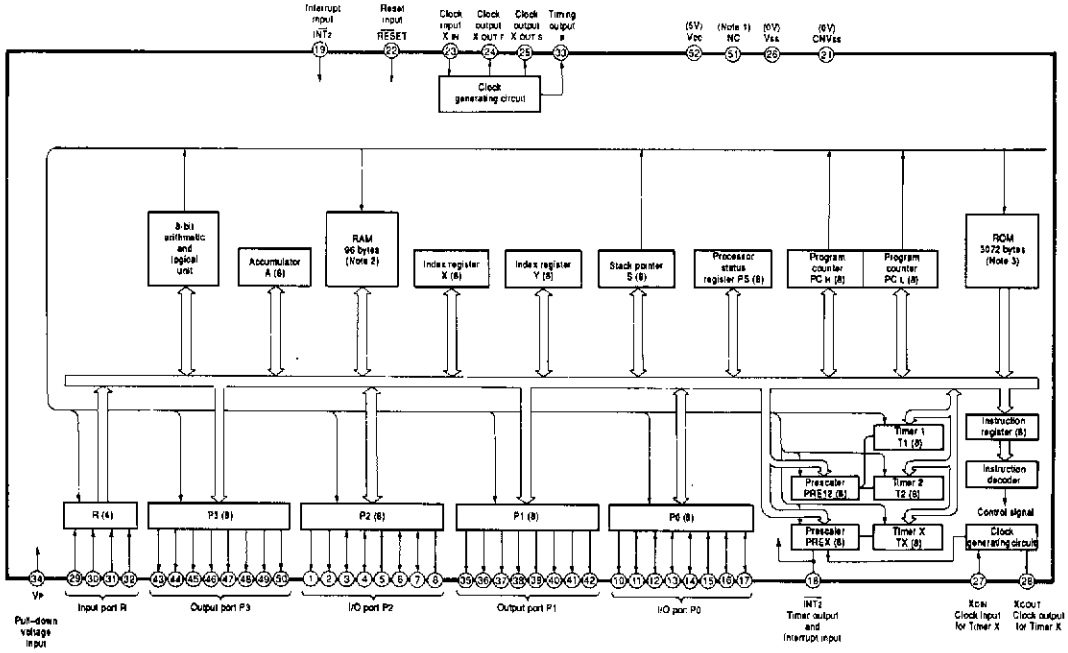
IC301 : PCM61P
D/A Converter



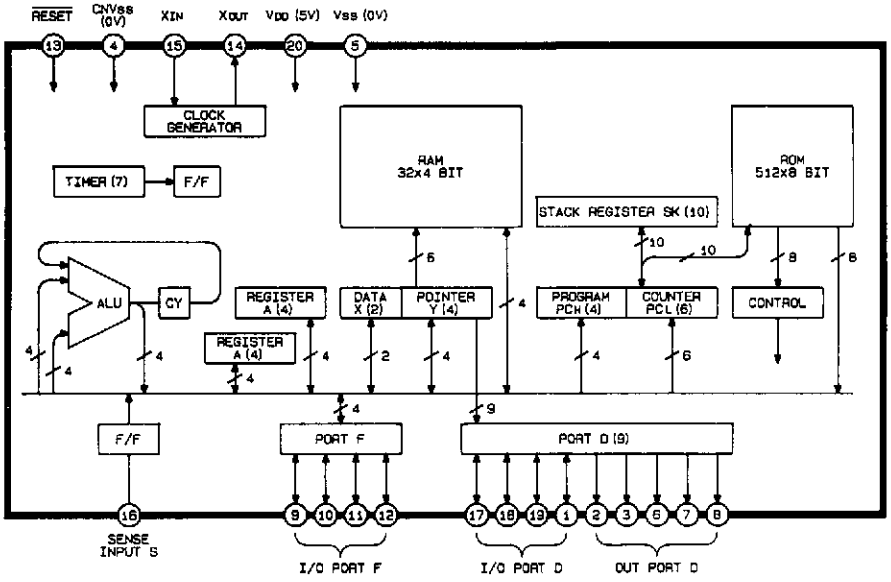
IC302 : LC4966
Sample and Hold



IC401 : M50752-103SP
Microcomputer

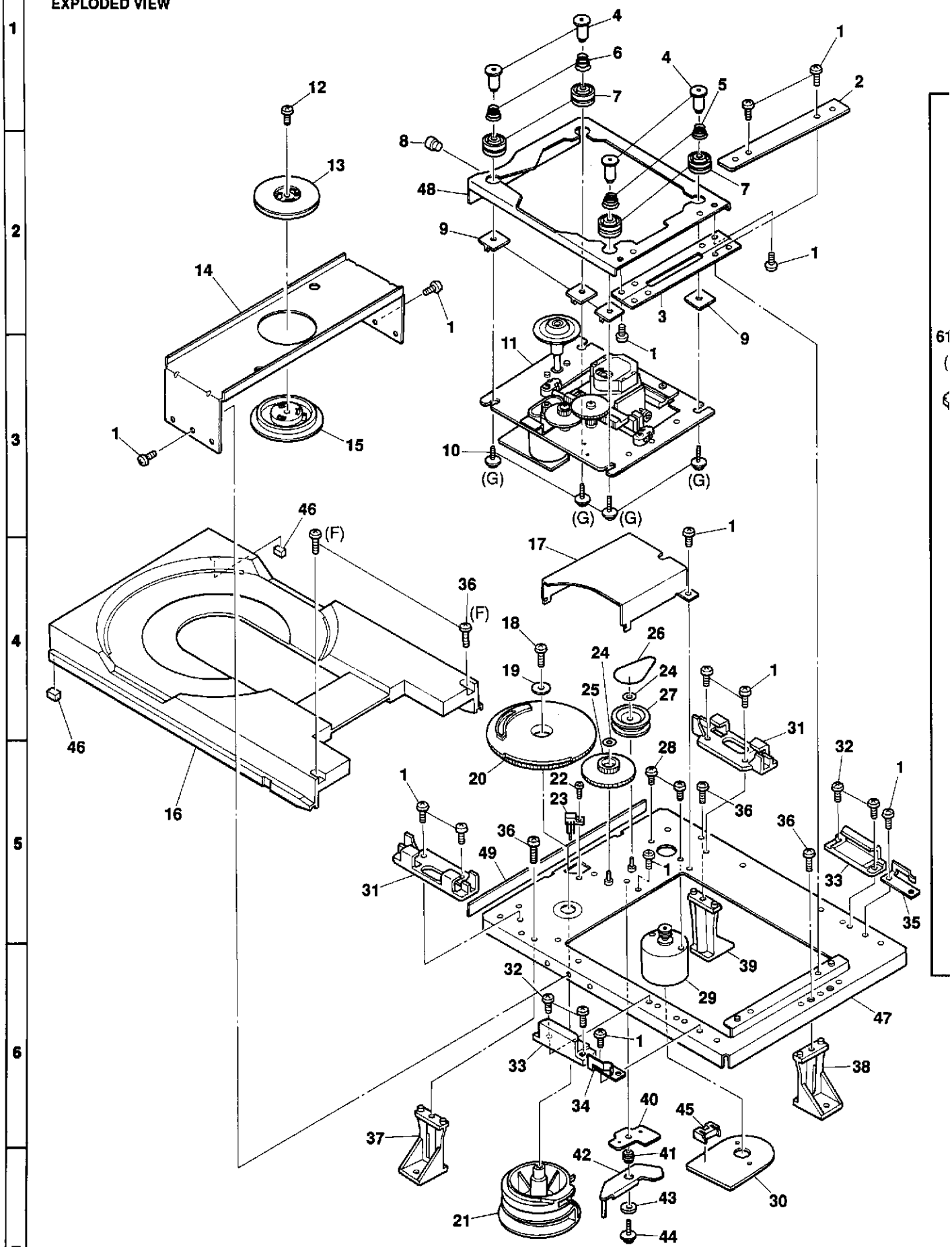


IC402 : M50761-430P
Microcomputer



CD MECHANISM

EXPLODED VIEW



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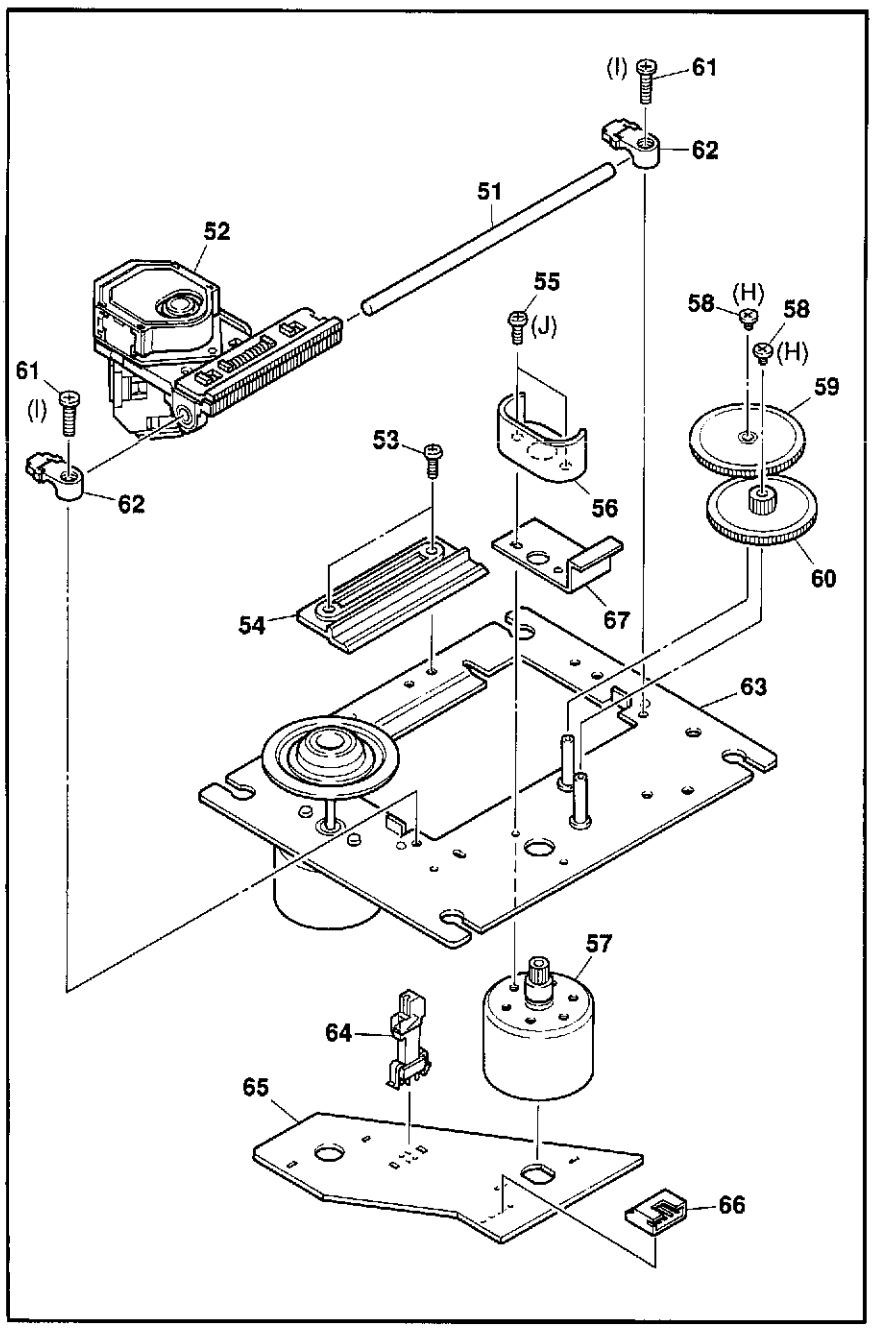
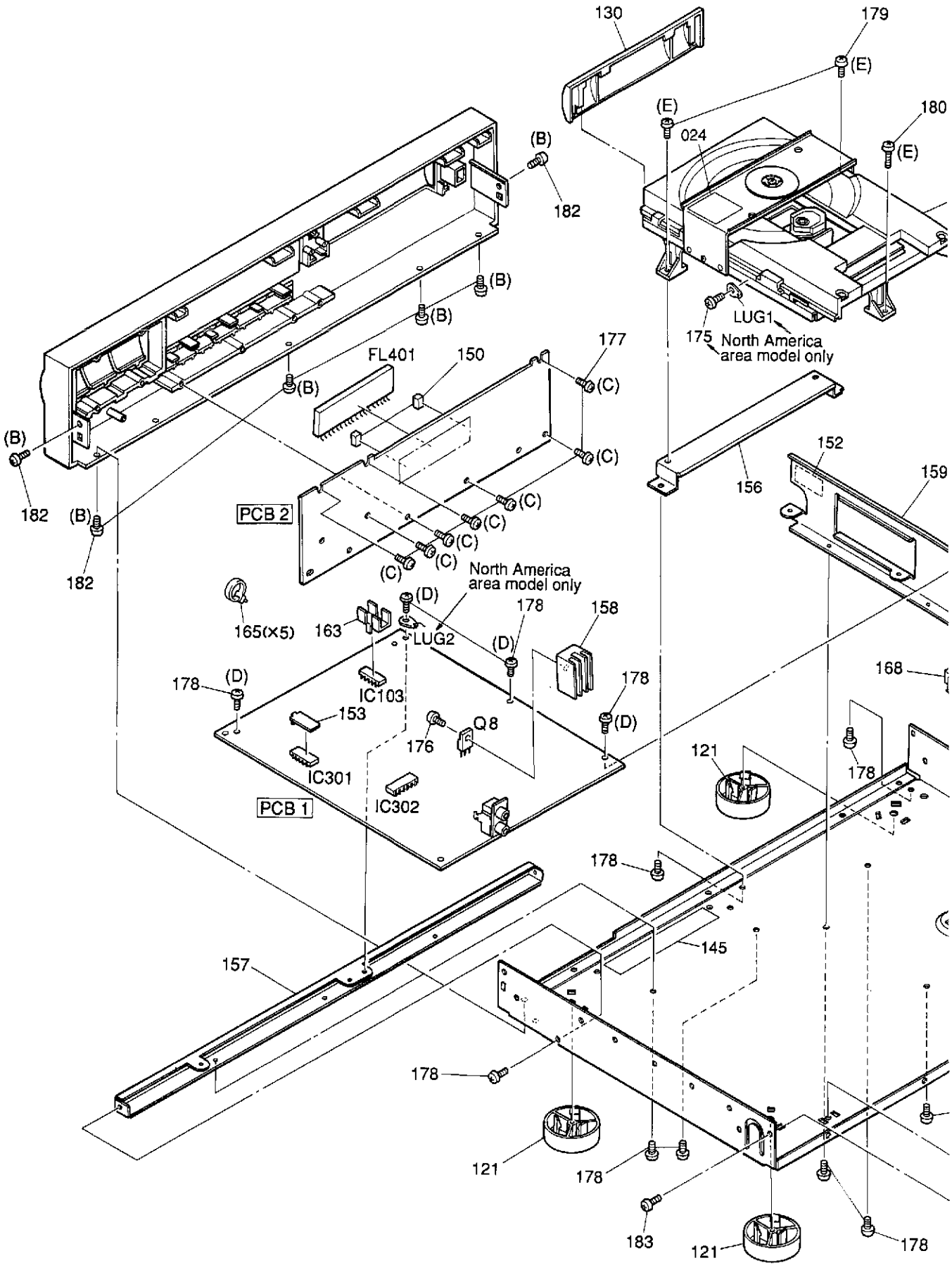


PARTS LIST

Ref. No.	Part No.	Description
1	7-685-862-(01)	SCREW (+)(2.6x6mm)
2	2-642-170-(01)	HINGE HOLDER
3	2-642-164-(01)	HINGE
4	2-642-160-(01)	SHAFT
5	2-642-137-(02)	COIL SPRING (B)
6	2-642-139-(02)	COIL SPRING (A)
7	2-642-158-(01)	INSULATOR (C)
8	2-642-169-(01)	ROLLER
9	2-642-159-(01)	PLATE (T)
10	2-642-142-(01)	SCREW
11	8-848-097-(01)	CD PLAYER SUB UNIT ASS'Y
12	7-685-532-(19)	SCREW (+)(2.6x5mm)
13	X-2642-108-(1)	MAGNET ASS'Y
14	2-642-165-(01)	CHACK CHASSIS
15	2-642-432-(01)	CHACKING PULLEY
16	2-642-156-(01)	TRAY
17	2-642-149-(02)	GEAR COVER
18	7-685-535-(19)	SCREW (+)(2.6x10mm)
19	4-812-554-(01)	WASHER
20	2-642-154-(02)	DRIVE GEAR
21	2-642-153-(01)	CONTROL CAM
22	7-685-851-(01)	SCREW (+)(2x4mm)
23	1-571-312-(11)	LEAF SWITCH
24	3-558-708-(21)	LOCK WASHER
25	2-642-148-(01)	CENTER GEAR
26	3-653-387-(01)	LM BELT
27	4-913-731-(01)	LOADING PULLEY
28	7-621-775-(00)	SCREW (+)(2.6x3mm)
29	X-2641-336-(1)	MOTOR ASS'Y
30	1-624-793-(21)	MOTOR P. C. BOARD
31	2-642-161-(01)	TRAY HOLDER, FRONT
32	7-685-781-(01)	SCREW (+)(2x4mm)
33	2-642-162-(02)	TRAY HOLDER, REAR
34	2-642-146-(01)	TRAY GUIDE, RIGHT
35	2-642-147-(01)	TRAY GUIDE, LEFT
36	7-685-547-(19)	SCREW (+)(3x10mm)
37	2-642-178-(01)	HOLDER, RIGHT
38	2-642-177-(01)	HOLDER, REAR
39	2-642-176-(01)	HOLDER, LEFT
40	2-642-173-(01)	LINK PLATE
41	2-642-133-(02)	BOSS
42	X-2642-107-(1)	STOPPER LINK ASS'Y
43	2-642-172-(01)	SPACER
44	3-319-501-(11)	SCREW (+)(2.6x8mm)
45	1-564-721-(11)	CONNECTOR, 5 PIN
46	2-642-125-(01)	DAMPER
47	X-2642-106-(1)	MAIN CHASSIS ASS'Y
48	X-2642-105-(1)	SUB CHASSIS ASS'Y
49	2-642-157-(03)	FRONT TAPE
51	4-910-431-(02)	SLIDE SHAFT
52	8-848-046-(51)	PICK-UP ASS'Y
53	2-641-386-(01)	SPECIAL SCREW (2x5mm)
54	2-641-443-(02)	SLIDE HOLDER
55	7-621-255-(35)	SCREW (+)(2x5mm)
56	2-641-434-(01)	GEAR COVER
57		SLIDE MOTOR ASS'Y (*See Note below.)
	X-2640-770-(1)	-for type RF-310T-11400 MOTOR made by Mabuchi
	X-2641-344-(1)	-for type MDN-4RA3_ _ MOTOR made by Matsushita
58	3-303-809-(31)	SPECIAL SCREW (M1.7x3mm)
59	2-641-404-(02)	GEAR (A)
60	2-641-403-(06)	GEAR (B)
61	2-641-447-(01)	SCREW (+)(2.6x8mm)
62	2-641-448-(02)	SHAFT CLAMP
63		DISC MOTOR ASS'Y (*See Note below.)
	X-2641-337-(1)	-for type RF-310T-11400 MOTOR made by Mabuchi
	X-2641-348-(1)	-for type MDN-4RA3_ _ MOTOR made by Matsushita
64	1-570-822-(22)	LEAF SWITCH
65		MOTOR P. C. BOARD (*See Note below.)
	1-625-848-(11)	MOTOR P. C. BOARD made by Mabuchi
	1-628-263-(11)	MOTOR P. C. BOARD made by Matsushita
66	1-564-720-(11)	CONNECTOR, 4 PIN
67	2-641-371-(01)	STOPPER

* Note: When replacing Ref. No. 57 SLIDE MOTOR ASS'Y, Ref. No. 63 DISC MOTOR ASS'Y, or Ref. No. 65 MOTOR P. C. BOARD, be certain to check the motor type number marked on the side of each of the motors, and then order an appropriate part number which corresponds with each of the motors.

GENERAL UNIT
EXPLODED VIEW



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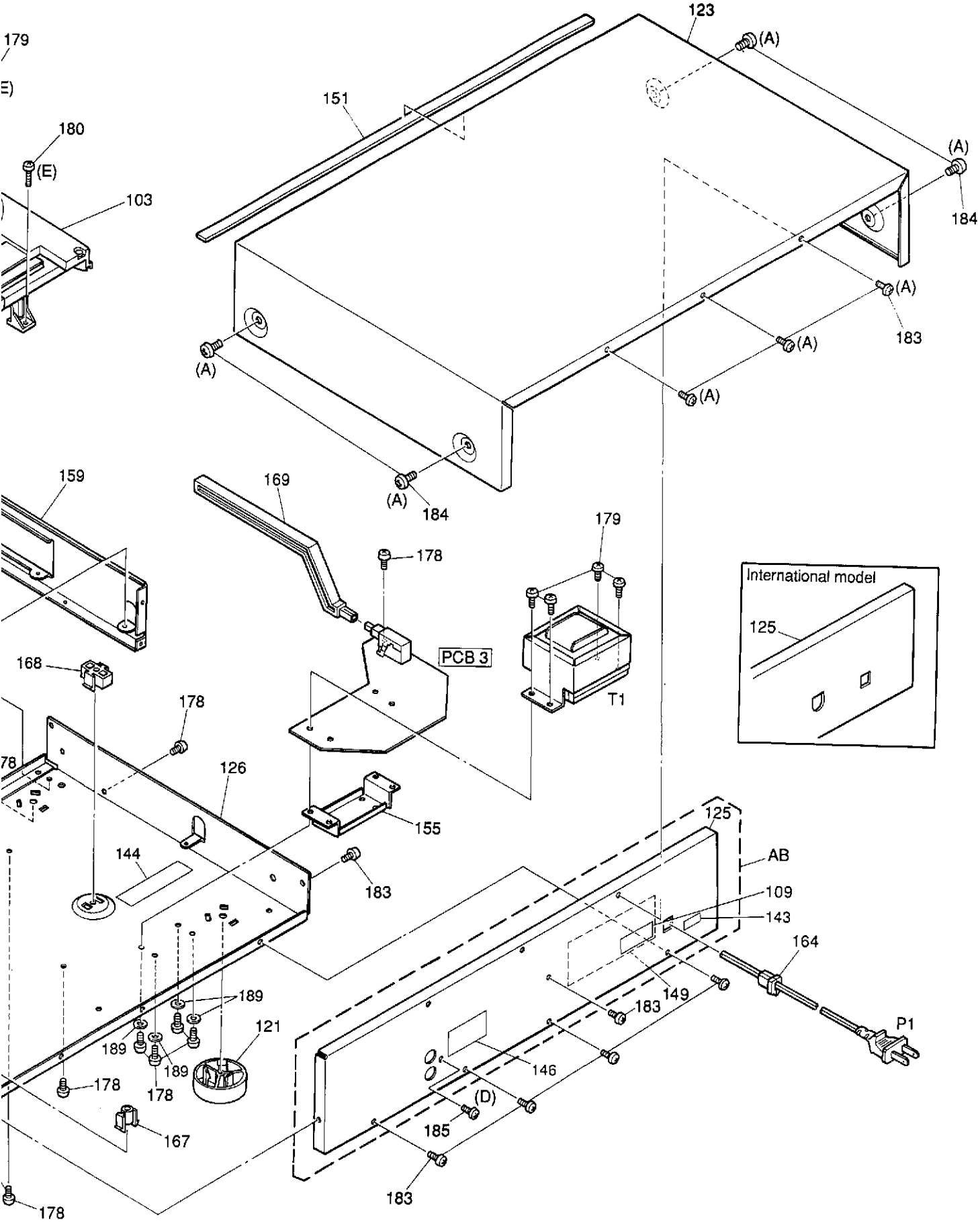
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159
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179
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PCB 3
T1
International model
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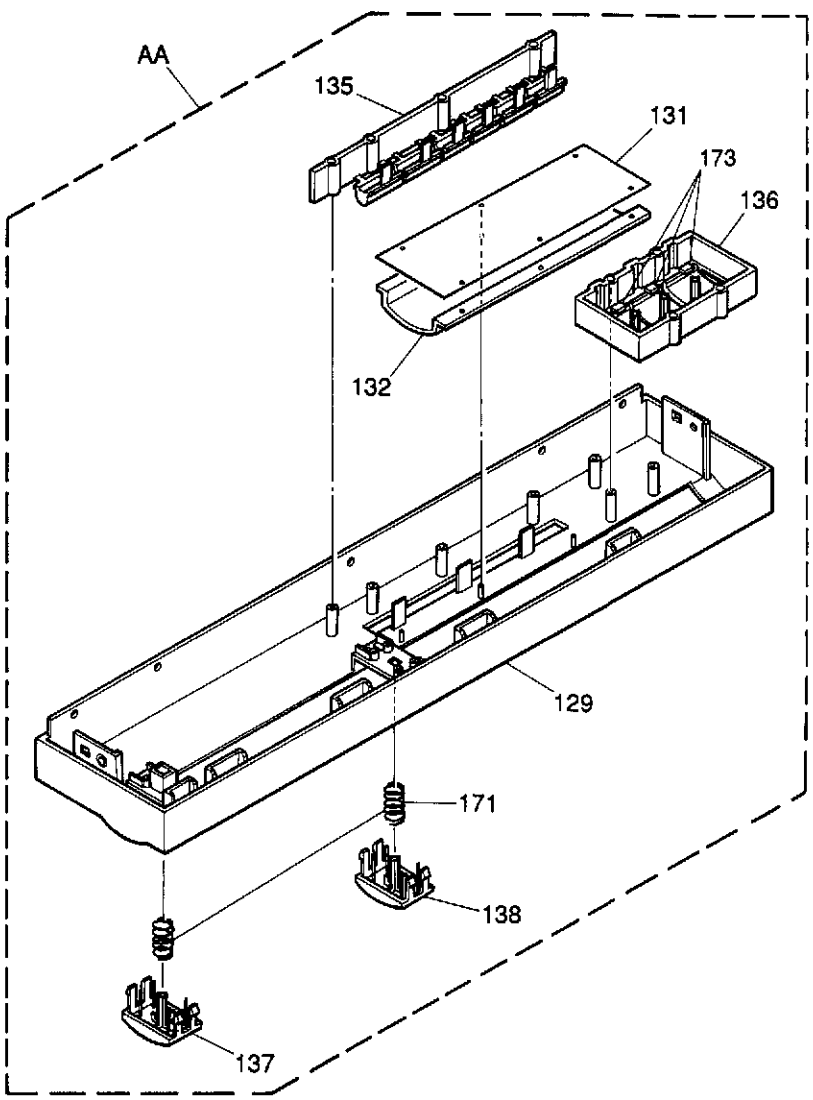
168
178
126
155
144
183
125
AB
109
143
164
149
183
P1
189
189
189
121
178
178
146
(D)
185
167
183
178

PARTS LIST

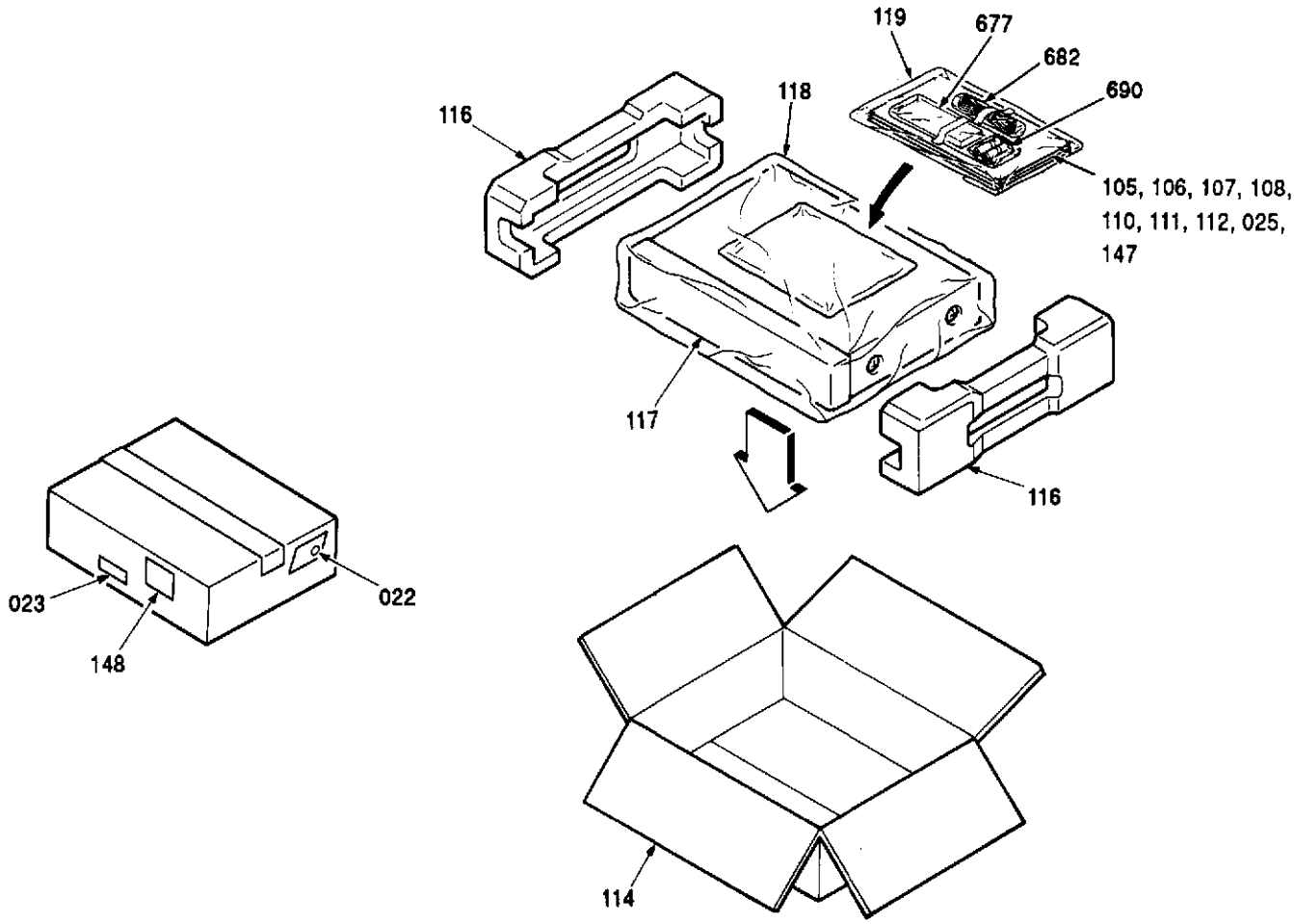
Ref. No.	Part No.	Description
AA	A442-HD7400A	PANEL, FRONT ASS'Y
AB	A424-HD7400A	CABI BACK, REAR ASS'Y (BK)
AB	A424-HD7400B	CABI BACK, REAR ASS'Y (B)
AB	A424-HD7400C	CABI BACK, REAR ASS'Y (BB)
024	1756-11802	LABEL (B) (BB)
103	3119-01201	CD MECHA
109	1117-78	SERIAL LABEL (x2)
121	1319-02201	LEG (x4)
123	1414-14501	CABINET, TOP
125	1424-29503	CABI BACK, REAR (BK)
125	1424-29504	CABI BACK, REAR (B) (BB)
126	1424-29601	CABI BACK, BOTTOM
129	1442-21902	PANEL, FRONT
130	1452-08301	LID, MECHA
131	1511-19802	PLATE, FL FILTER
132	1532-17503	WINDOW, FRONT
135	1662-51801	PUSH BUTTON, PLAY/PAUSE, STOP/CLEAR, SKIP, SEARCH
136	1662-51901	PUSH BUTTON, TIME, REPEAT, PROGRAM
137	1662-52001	PUSH BUTTON, POWER
138	1662-52002	PUSH BUTTON, OPEN/CLOSE
143	1341-**568	NAME PLATE (BK)
144	1756-03305	LABEL
145	1756-09602	LABEL (BK)
145	1756-12101	LABEL (B) (BB)
146	1756-CSA	LABEL (BK)
147	1756-11601	LABEL (BK)
149	1756-11801	LABEL
150	2114-85143	BUSHING (x2)
151	2111-11769	FELT
152	2111-1197	FELT
153	2216-7181	SHIELD PLATE, IC301
155	2219-8260	METAL FITTG, TRANS
156	2219-8261	METAL FITTG, CD MECHA
157	2219-8275	METAL FITTG
158	2222-7217	HEAT SINK, Q8
159	2219-8264	METAL FITTG
163	2222-7264	HEAT SINK, IC103
164	2240-364	HOLDER, AC CORD
165	2240-R0101	HOLDER (x5)
167	2360-7021	BOSS, SPECIAL
168	2360-7018	BOSS, SPECIAL
169	2601-7187	SHAFT, POWER SWITCH
171	2651-2101732	SPRING (x2)
173	2112-11799	SPONGE (x3)
175	2347-R0130062	SCREW, BNTO T+ (B)
176	2327-R0130082	SCREW (+)(3x8mm)
177	2347-R0126082	SELF-TAPPING SCREW (+)(x7)(2.6x8mm)
178	2347-R0130062	SELF-TAPPING SCREW (+)(x13)(3x6mm)
179	2347-R0130082	SELF-TAPPING SCREW (+)(x10)(3x8mm)
180	2347-R0130162	SELF-TAPPING SCREW (+)(3x16mm)
182	2347-R0130084	SELF-TAPPING SCREW (+)(x6)(3x8mm)
183	2347-R0130084	SELF-TAPPING SCREW (+)(x9)(3x8mm)
184	2347-R0140064	SELF-TAPPING SCREW (+)(x4)(4x6mm)
185	2347-R0130104	SELF-TAPPING SCREW (+)(3x10mm)
189	2401-035	WASHER, METAL (x4)
⚠ P1	4161-03601202	CORD W/PLUG (BK)
⚠ P1	4161-03701220	CORD W/PLUG (B)
⚠ P1	4161-04100	CORD W/PLUG (BB)
⚠ T1	5584-S6201	XFORMER, POWER
⚠ T1	5584-S6202	XFORMER, POWER (B) (BB)

EXPLODED VIEW



F G H I J

PACKAGE

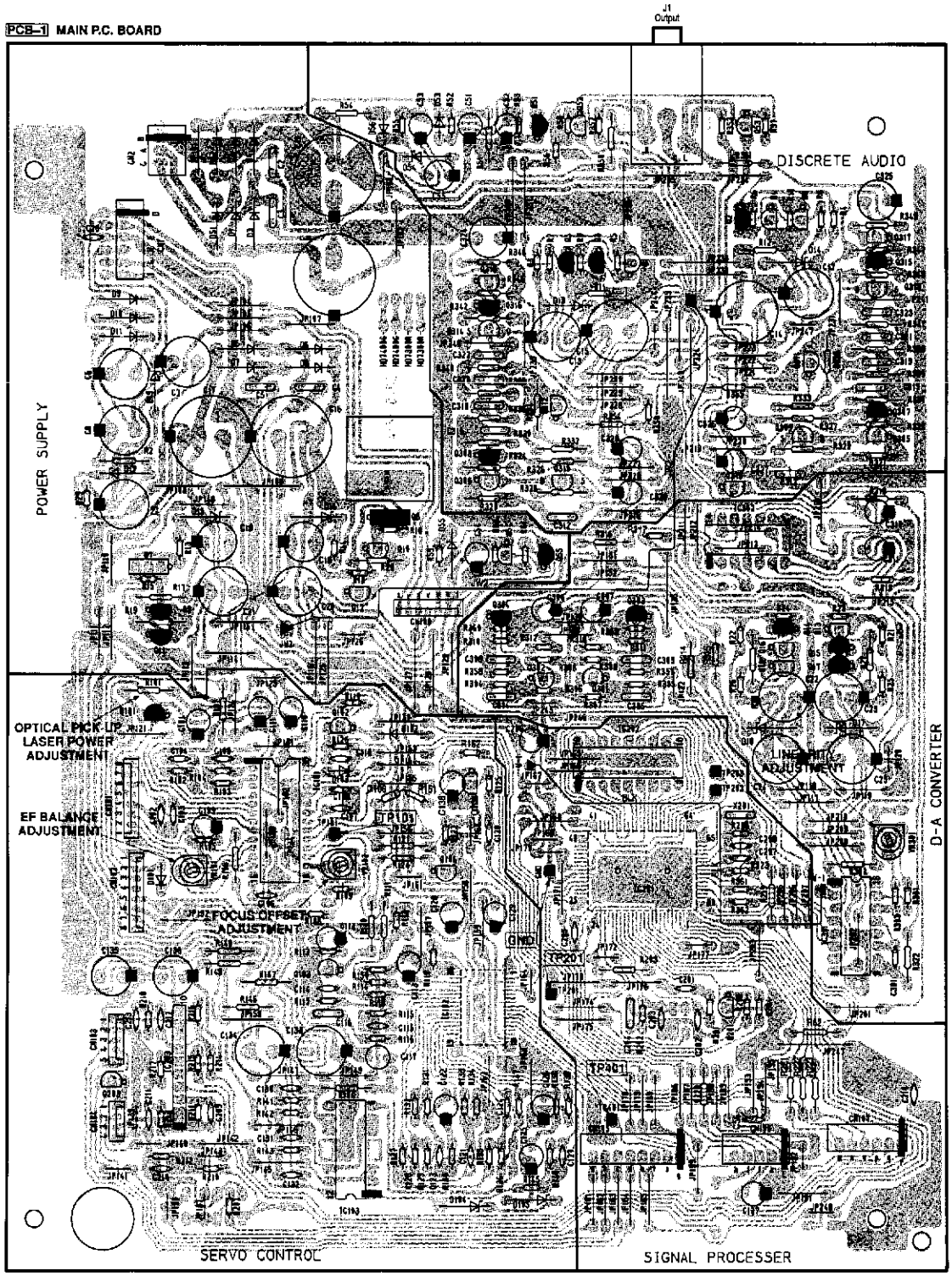


Ref. No.	Part No.	Description
022	1756-03108	LABEL (x2) (IB)
022	1756-03111	LABEL (x2) (BR)
023	1756-06303	LABEL (IB) (BR)
025	1111-F30253	OWNER GUIDE (IB)
105	1111-J30307	OWNER GUIDE (BK)
105	1111-F30308	OWNER GUIDE (IB) (BR)
106	1119-01201	ATTACH SHEET (BK)
107	1113-717004	OWNER CARD (BK)
108	1111-J30254	OWNER GUIDE (BK)
110	1111-J30297	OWNER GUIDE (BK)
111	1119-047	ATTACH SHEET (BK)

Ref. No.	Part No.	Description
112	1119-0137	ATTACH SHEET (BK)
114	1221-7027144	CARTON BOX
116	1222-7216	CUSHION (x2)
117	1223-11729	SOFT SHEET
118	1241-C1491	POLYETHY BAG
119	1241-R0123350	POLYETHY BAG
147	1756-11601	LABEL (BK)
148	1756-11701	LABEL (BK)
677	6142-01106	REMOTE CONTROL UNIT
682	4161-71184	CORD W/PLUG (ACCESSORY)
690	4191-0355	BATTERY

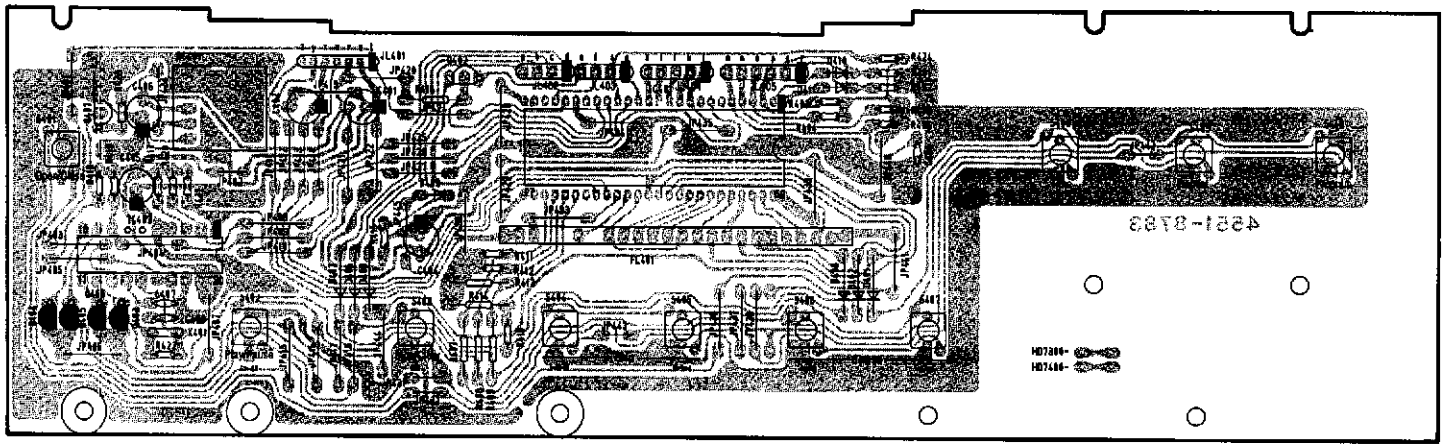
P.C. BOARDS

PCB-1 MAIN P.C. BOARD

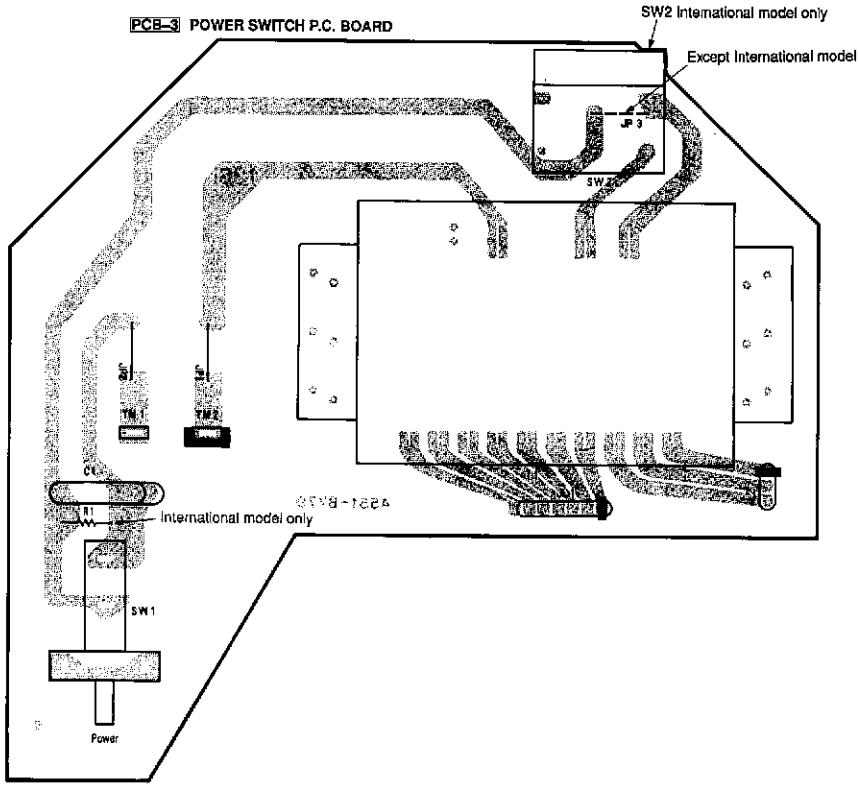


PCB-2 FRO

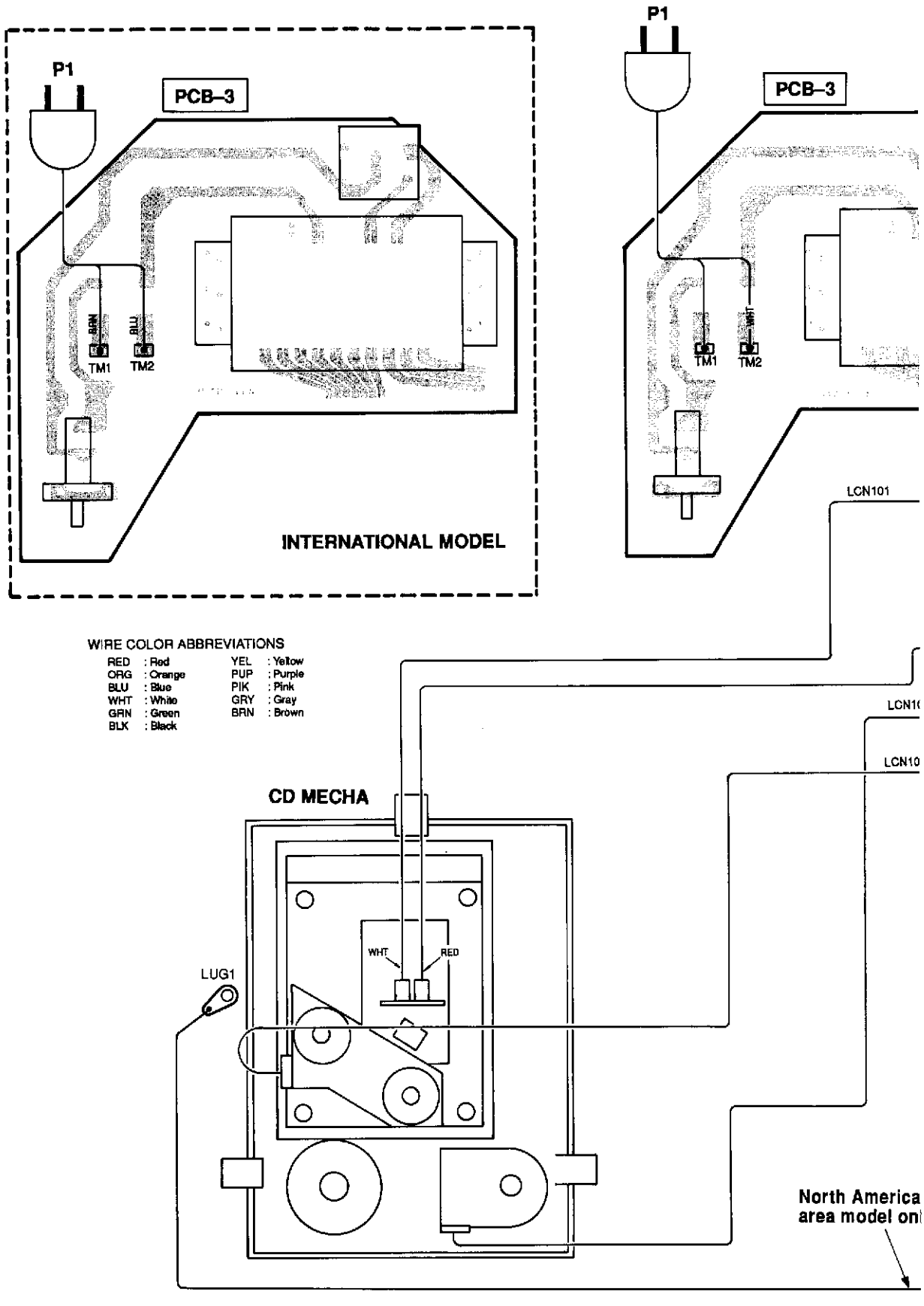
PCB-2 FRONT P.C. BOARD



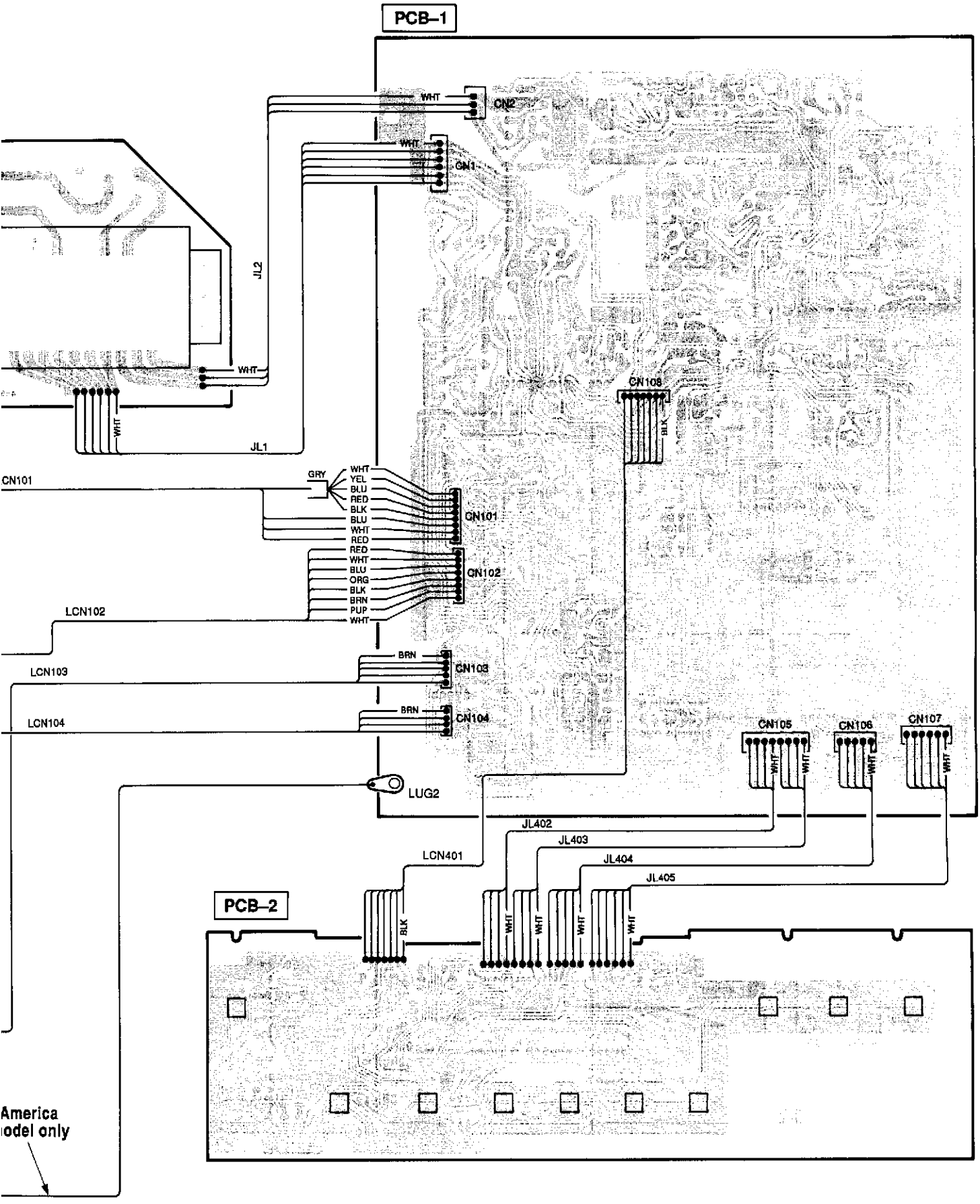
PCB-3 POWER SWITCH P.C. BOARD



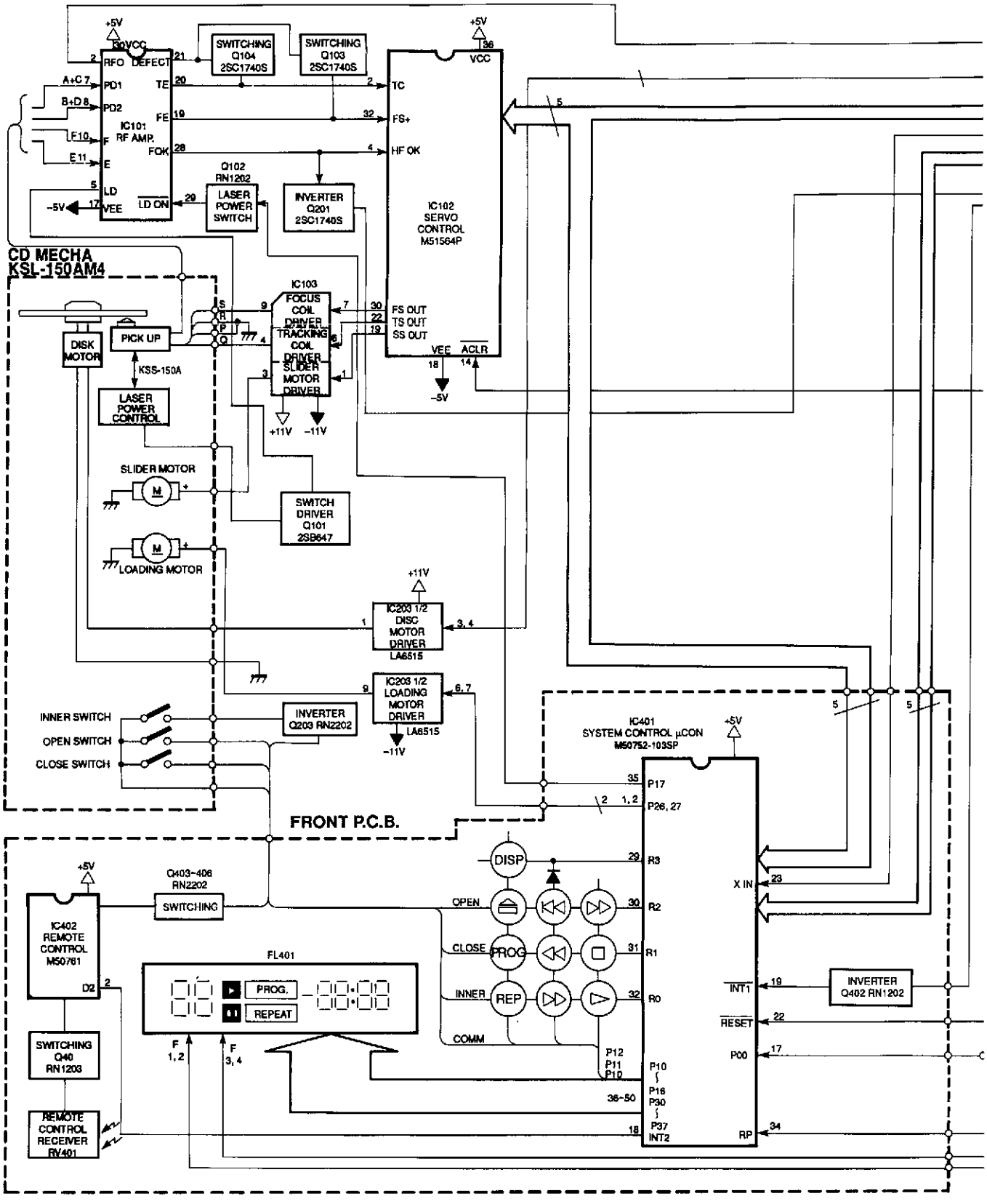
WIRING DIAGRAM

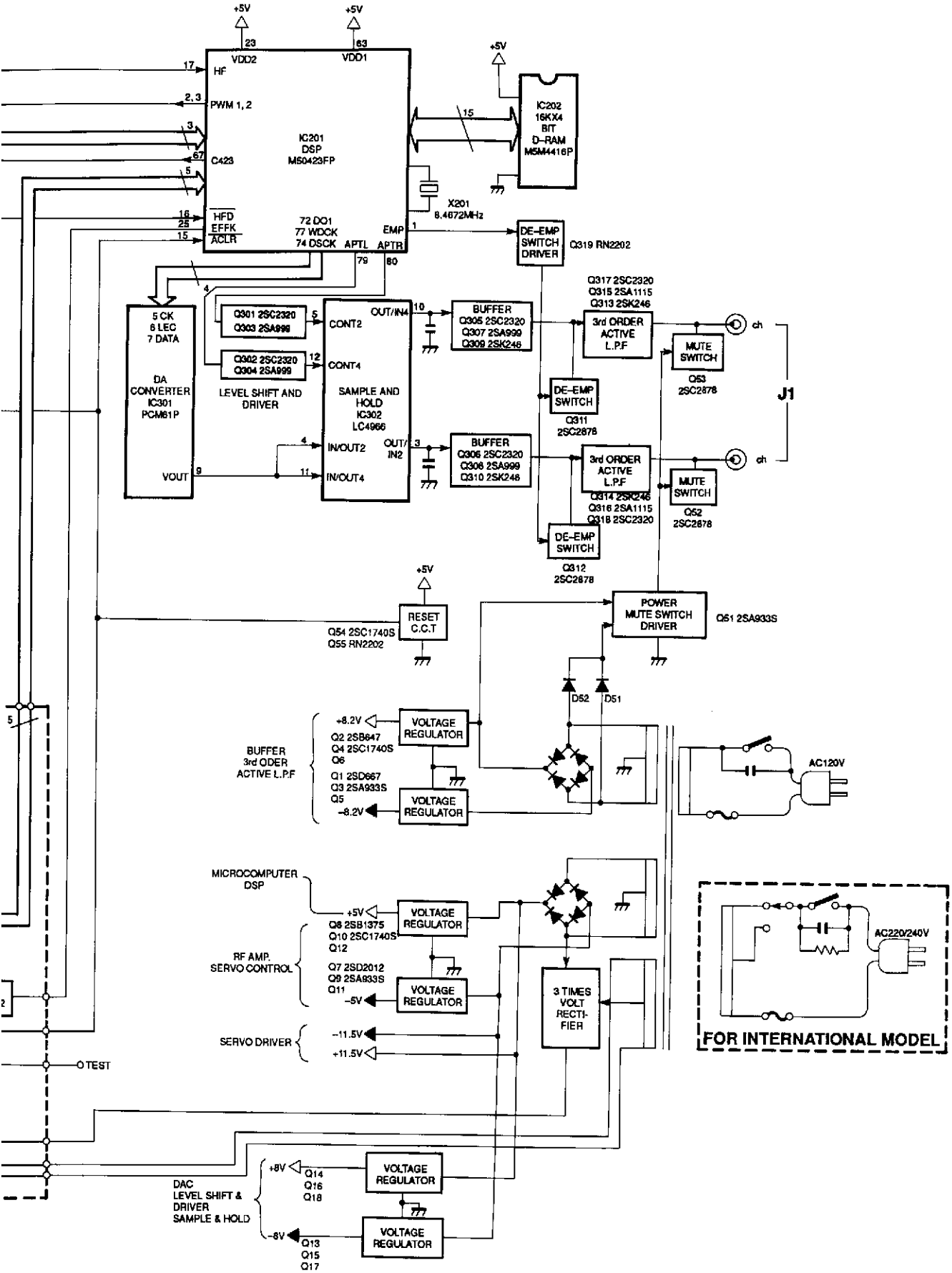


E	F	G	H	I	J


PCB–1
CN2
WHT
CN1
JL2
JL1
CN108
BLK
CN101
GRY
WHT
YEL
BLU
RED
BLK
CN102
ORG
BRN
PUP
LCN102
LCN103
CN103
LCN104
CN104
CN105
CN106
CN107
LUG2
JL402
JL403
JL404
JL405
LCN401
PCB–2
America
odel only

BLOCK DIAGRAM




+5V
+5V
23
63
VDD2
VDD1
17
HF
2, 3
PWM 1, 2
3
67
C423
5
IC201
DSP
M50423FP
15
IC202
16KX4
BIT
D-RAM
M5M4416P
X201
8.4672MHz
16
25
15
HFD
EFFK
ACLR
72 DO1
77 WDCK
74 DSCK
APTL
APTR
EMP
1
DE-EMP
SWITCH
DRIVER
Q319 RN2202
79
80
4
5 CK
6 LEC
7 DATA
DA
CONVERTER
IC301
PCM61P
VOUT
9
Q301 2SC2320
Q303 2SA999
Q302 2SC2320
Q304 2SA999
LEVEL SHIFT AND
DRIVER
5
12
CONT2
CONT4
SAMPLE AND
HOLD
IC302
LC4966
OUT/IN4
IN/OUT2
IN/OUT4
OUT/
IN2
10
4
11
3
BUFFER
Q305 2SC2320
Q307 2SA999
Q309 2SK246
BUFFER
Q306 2SC2320
Q308 2SA999
Q310 2SK246
Q317 2SC2320
Q315 2SA1115
Q313 2SK246
3rd ORDER
ACTIVE
L.P.F
MUTE
SWITCH
Q53
2SC2878
ch
J1
DE-EMP
SWITCH
Q311
2SC2878
3rd ORDER
ACTIVE
L.P.F
Q314 2SK246
Q316 2SA1115
Q318 2SC2320
MUTE
SWITCH
Q52
2SC2878
ch
DE-EMP
SWITCH
Q312
2SC2878
+5V
RESET
C.C.T
Q54 2SC1740S
Q55 RN2202
POWER
MUTE SWITCH
DRIVER
Q51 2SA933S
D52
D51
+8.2V
VOLTAGE
REGULATOR
Q2 2SB647
Q4 2SC1740S
Q6
BUFFER
3rd ODER
ACTIVE L.P.F
Q1 2SD667
Q3 2SA933S
Q5
-8.2V
VOLTAGE
REGULATOR
AC120V
MICROCOMPUTER
DSP
+5V
VOLTAGE
REGULATOR
Q8 2SB1375
Q10 2SC1740S
Q12
RF AMP.
SERVO CONTROL
Q7 2SD2012
Q9 2SA933S
Q11
-5V
VOLTAGE
REGULATOR
3 TIMES
VOLT
RECTI-
FIER
SERVO DRIVER
-11.5V
+11.5V
AC220/240V
FOR INTERNATIONAL MODEL
TEST
DAC
LEVEL SHIFT &
DRIVER
SAMPLE & HOLD
+8V
Q14
Q16
Q18
VOLTAGE
REGULATOR
-8V
Q13
Q15
Q17
VOLTAGE
REGULATOR

PARTS LIST

PCB-1 MAIN P.C. BORD

CAPACITORS

Ser. No.	Ref. No.	Part No.	Description
569	C2	5354-104593	CAP, MYL .1µ
569	C3	5354-104593	CAP, MYL .1µ
569	C4	5354-104593	CAP, MYL .1µ
569	C5	5354-104593	CAP, MYL .1µ
545	C6	5345-107E041	CAP, MINI ELE 100µ/35V
549	C7	5345-227C041	CAP, MINI ELE 220µ/16V
545	C8	5345-107E041	CAP, MINI ELE 100µ/35V
545	C9	5345-107E041	CAP, MINI ELE 100µ/35V
546	C10	5345-228C041	CAP, MINI ELE 2200µ/16V
546	C11	5345-228C041	CAP, MINI ELE 2200µ/16V
549	C12	5345-227C041	CAP, MINI ELE 220µ/16V
549	C13	5345-227C041	CAP, MINI ELE 220µ/16V
547	C14	5345-108C041	CAP, MINI ELE 1000µ/16V
547	C15	5345-108C041	CAP, MINI ELE 1000µ/16V
546	C16	5345-228C041	CAP, MINI ELE 2200µ/16V
546	C17	5345-228C041	CAP, MINI ELE 2200µ/16V
551	C18	5345-227B041	CAP, MINI ELE 220µ/10V
551	C19	5345-227B041	CAP, MINI ELE 220µ/10V
548	C20	5345-108A041	CAP, MINI ELE 1000µ/6.3V
548	C21	5345-108A041	CAP, MINI ELE 1000µ/6.3V
551	C22	5345-107D041	CAP, MINI ELE 100µ/25V
551	C23	5345-107D041	CAP, MINI ELE 100µ/25V
549	C24	5345-227C041	CAP, MINI ELE 220µ/16V
549	C25	5345-227C041	CAP, MINI ELE 220µ/16V
588	C26	5361-223ZF	CAP, CER 0.022µ
556	C51	5345-226D041	CAP, MINI ELE 22µ/25V
556	C52	5345-226D041	CAP, MINI ELE 22µ/25V
552	C53	5345-107B041	CAP, MINI ELE 100µ/10V
552	C54	5345-107B041	CAP, MINI ELE 100µ/10V
557	C55	5345-106F041	CAP, MINI ELE 10µ/50V
593	C56	5361-103ZF	CAP, CER 0.01µ
577	C102	5361-100DSL	CAP, CER 10p
577	C103	5361-100DSL	CAP, CER 10p
586	C104	5361-100DCH	CAP, CER 10p
583	C105	5361-332KB	CAP, CER 3300p
574	C106	5369-333144	CAP, SCD .033µ
574	C107	5369-333144	CAP, SCD .033µ
575	C108	5369-103144	CAP, SCD .01µ
555	C109	5345-476B041	CAP, MINI ELE 47µ/10V
555	C110	5345-476B041	CAP, MINI ELE 47µ/10V
555	C111	5345-476B041	CAP, MINI ELE 47µ/10V
558	C112	5345-474F041	CAP, MINI ELE .47µ/50V
556	C113	5345-226C0951	CAP, MINI ELE 22µ/16V
572	C114	5369-683144	CAP, SCD .068µ
581	C115	5361-681KSL	CAP, CER 680p
567	C116	5354-274593	CAP, MYL .27µ
560	C117	5342-105F041	CAP, ELE BP 1µ/50V
571	C118	5369-104144	CAP, SCD .1µ
585	C119	5361-472KB	CAP, CER 4700p
582	C120	5361-472KB	CAP, CER 4700p
575	C121	5369-103144	CAP, SCD .01µ
562	C122	5345-684F0951	CAP, MINI ELE 0.68µ/50V
584	C123	5361-392KB	CAP, CER 3900p
579	C124	5361-151KSL	CAP, CER 150p
557	C125	5345-106F041	CAP, MINI ELE 10µ/50V
558	C126	5345-474F041	CAP, MINI ELE .47µ/50V
573	C127	5369-563144	CAP, SCD .056µ
555	C128	5345-476B041	CAP, MINI ELE 47µ/10V
555	C129	5345-476B041	CAP, MINI ELE 47µ/10V
571	C130	5369-104144	CAP, SCD .1µ
571	C131	5369-104144	CAP, SCD .1µ
571	C132	5369-104144	CAP, SCD .1µ
549	C133	5345-227C041	CAP, MINI ELE 220µ/16V
549	C134	5345-227C041	CAP, MINI ELE 220µ/16V
550	C135	5345-107D041	CAP, MINI ELE 100µ/25V
550	C136	5345-107D041	CAP, MINI ELE 100µ/25V
559	C137	5345-105F041	CAP, MINI ELE 1µ/50V
559	C138	5345-105F041	CAP, MINI ELE 1µ/50V
583	C201	5361-332KB	CAP, CER 3300p
584	C202	5361-562KB	CAP, CER 5600p
580	C203	5361-471KSL	CAP, CER 470p
568	C204	5354-154593	CAP, MYL .15µ
571	C205	5369-104144	CAP, SCD .1µ
561	C206	5345-476B0951	CAP, MINI ELE 47µ/10V
587	C207	5361-330JCH	CAP, CER 33p
587	C208	5361-330JCH	CAP, CER 33p
580	C209	5361-471KSL	CAP, CER 470p
580	C210	5361-471KSL	CAP, CER 470p
571	C211	5369-104144	CAP, SCD .1µ
578	C212	5361-220KSL	CAP, CER 22p
571	C213	5369-104144	CAP, SCD .1µ
590	C214	5361-223ZF	CAP, CER 0.022µ
591	C301	5353-030934	CAP, MCA 3p
598	C304	5359-6815851	CAP, PPP 680p
598	C305	5359-6815851	CAP, PPP 680p
552	C306	5345-107B041	CAP, MINI ELE 100µ/10V
552	C307	5345-107B041	CAP, MINI ELE 100µ/10V
592	C308	5359-1025851	CAP, PPP 1000P
592	C309	5359-1025851	CAP, PPP 1000P
552	C310	5345-107B041	CAP, MINI ELE 100µ/10V
552	C311	5345-107B041	CAP, MINI ELE 100µ/10V
594	C312	5359-5625851	CAP, PPP 5600p
594	C313	5359-5625851	CAP, PPP 5600p
597	C316	5359-2735851	CAP, PPP .027µ
597	C317	5359-2735851	CAP, PPP .027µ
595	C318	5359-5115851	CAP, PPP 510p
595	C319	5359-5115851	CAP, PPP 510p
595	C320	5359-5115851	CAP, PPP 510p
595	C321	5359-5115851	CAP, PPP 510p
596	C322	5359-1825851	CAP, PPP 1800p
596	C323	5359-1825851	CAP, PPP 1800p
564	C324	5345-476C0951	CAP, MINI ELE 47µ/16V
564	C325	5345-476C0951	CAP, MINI ELE 47µ/16V
564	C326	5345-476C041	CAP, MINI ELE 47µ/16V
564	C327	5345-476C041	CAP, MINI ELE 47µ/16V
564	C328	5345-476C041	CAP, MINI ELE 47µ/16V
564	C329	5345-476C041	CAP, MINI ELE 47µ/16V

RESISTORS

Ser. No.	Ref. No.	Part No.	Description
609	R2	5135-151522	RES, CBN 1/2P 150
633	R3	5232-222J16P	RES, CBN 1/6P 2.2K
633	R4	5232-222J16P	RES, CBN 1/6P 2.2K
628	R5	5232-471J16P	RES, CBN 1/6P 470
628	R6	5232-471J16P	RES, CBN 1/6P 470
626	R7	5232-101J16P	RES, CBN 1/6P 100
626	R8	5232-101J16P	RES, CBN 1/6P 100
625	R9	5232-100J16P	RES, CBN 1/6P 10
625	R10	5232-100J16P	RES, CBN 1/6P 10
612	R11	5135-152522	RES, CBN 1/2P 1.5K
612	R12	5135-152522	RES, CBN 1/2P 1.5K
631	R13	5232-152J16P	RES, CBN 1/6P 1.5K
631	R14	5232-152J16P	RES, CBN 1/6P 1.5K
628	R15	5232-471J16P	RES, CBN 1/6P 470
628	R16	5232-471J16P	RES, CBN 1/6P 470
606	R17	5135-101522	RES, CBN 1/2P 100
626	R18	5232-101J16P	RES, CBN 1/6P 100
601	R19	5135-6R8522	RES, CBN 1/2P 6.8
600	R20	5135-2R2522	RES, CBN 1/2P 2.2
633	R21	5232-222J16P	RES, CBN 1/6P 2.2K
633	R22	5232-222J16P	RES, CBN 1/6P 2.2K
628	R23	5232-471J16P	RES, CBN 1/6P 470
628	R24	5232-471J16P	RES, CBN 1/6P 470
626	R25	5232-101J16P	RES, CBN 1/6P 100
626	R26	5232-101J16P	RES, CBN 1/6P 100
602	R27	5135-100522	RES, CBN 1/2P 10
602	R28	5135-100522	RES, CBN 1/2P 10
621	R29	5232-273J16P	RES, CBN 1/6P 27K
599	R51	5135-821522	RES, CBN 1/2P 820
651	R52	5232-224J16P	RES, CBN 1/6P 220K
643	R53	5232-223J16P	RES, CBN 1/6P 22K
631	R54	5135-102522	RES, CBN 1/2P 1K
626	R55	5232-101J16P	RES, CBN 1/6P 100

Ser. No.	Ref. No.	Part No.	Description
654	R56	5232-154J16P	RES, CBN 1/6P 150K
632	R57	5232-182J16P	RES, CBN 1/6P 1.8K
632	R58	5232-182J16P	RES, CBN 1/6P 1.8K
629	R59	5232-102J16P	RES, CBN 1/6P 1K
628	R60	5232-471J16P	RES, CBN 1/6P 470
639	R61	5232-103J16P	RES, CBN 1/6P 10K
610	R62	5135-102522	RES, CBN 1/2P 1K
603	R101	5135-220522	RES, CBN 1/2P 22
633	R102	5232-222J16P	RES, CBN 1/6P 2.2K
641	R103	5232-163J16P	RES, CBN 1/6P 16K
638	R104	5232-822J16P	RES, CBN 1/6P 8.2K
643	R105	5232-223J16P	RES, CBN 1/6P 22K
610	R106	5135-102522	RES, CBN 1/2P 1K
605	R107	5135-910522	RES, CBN 1/2P 91
642	R108	5232-183J16P	RES, CBN 1/6P 18K
642	R109	5232-183J16P	RES, CBN 1/6P 18K
639	R110	5232-103J16P	RES, CBN 1/6P 10K
615	R111	5135-103522	RES, CBN 1/2P 10K
650	R112	5232-104J16P	RES, CBN 1/6P 100K
644	R113	5232-273J16P	RES, CBN 1/6P 27K
643	R114	5232-223J16P	RES, CBN 1/6P 22K
648	R115	5232-683J16P	RES, CBN 1/6P 68K
640	R116	5232-153J16P	RES, CBN 1/6P 15K
636	R117	5232-682J16P	RES, CBN 1/6P 6.8K
627	R118	5232-221J16P	RES, CBN 1/6P 220
647	R119	5232-473J16P	RES, CBN 1/6P 47K
615	R120	5135-103522	RES, CBN 1/2P 10K
615	R121	5135-103522	RES, CBN 1/2P 10K
644	R122	5232-273J16P	RES, CBN 1/6P 27K
615	R124	5135-103522	RES, CBN 1/2P 10K
639	R125	5232-472J16P	RES, CBN 1/6P 4.7K
650	R126	5232-104J16P	RES, CBN 1/6P 100K
650	R127	5232-104J16P	RES, CBN 1/6P 100K
647	R128	5232-473J16P	RES, CBN 1/6P 47K
639	R129	5232-103J16P	RES, CBN 1/6P 10K
637	R130	5232-822J16P	RES, CBN 1/6P 8.2K
650	R131	5232-104J16P	RES, CBN 1/6P 100K
650	R132	5232-104J16P	RES, CBN 1/6P 100K
635	R133	5232-562J16P	RES, CBN 1/6P 5.6K
634	R134	5232-332J16P	RES, CBN 1/6P 3.3K
639	R135	5232-153J16P	RES, CBN 1/6P 15K
645	R136	5232-333J16P	RES, CBN 1/6P 33K
646	R137	5232-393J16P	RES, CBN 1/6P 39K
643	R138	5232-223J16P	RES, CBN 1/6P 22K
634	R139	5232-332J16P	RES, CBN 1/6P 3.3K
644	R140	5232-273J16P	RES, CBN 1/6P 27K
625	R141	5232-100J16P	RES, CBN 1/6P 10
625	R142	5232-100J16P	RES, CBN 1/6P 10
625	R143	5232-100J16P	RES, CBN 1/6P 10
616	R144	5135-223522	RES, CBN 1/2P 22K
628	R145	5232-102J16P	RES, CBN 1/6P 1K
663	⚠ R146	5102-4R75116	RES, FUSE 4.7
663	⚠ R147	5102-4R75116	RES, FUSE 4.7
663	⚠ R148	5102-4R75116	RES, FUSE 4.7
663	⚠ R149	5102-4R75116	RES, FUSE 4.7
659	R150	5232-225J16P	RES, CBN 1/6P 2.2M
664	R151	5232-103J16P	RES, CBN 1/6P 10K
639	R152	5232-103J16P	RES, CBN 1/6P 10K
643	R201	5232-223J16P	RES, CBN 1/6P 22K
633	R202	5232-222J16P	RES, CBN 1/6P 2.2K
617	R203	5135-124522	RES, CBN 1/2P 120K
647	R204	5232-473J16P	RES, CBN 1/6P 47K
647	R205	5232-473J16P	RES, CBN 1/6P 47K
653	R206	5232-105J16P	RES, CBN 1/6P 1M
642	R207	5232-104J16P	RES, CBN 1/6P 100K
650	R210	5232-104J16P	RES, CBN 1/6P 100K
652	R211	5232-474J16P	RES, CBN 1/6P 470K
652	R212	5232-474J16P	RES, CBN 1/6P 470K
625	R213	5232-100J16P	RES, CBN 1/6P 10
650	R214	5232-104J16P	RES, CBN 1/6P 100K
650	R215	5232-104J16P	RES, CBN 1/6P 100K
650	R216	5232-104J16P	RES, CBN 1/6P 100K
650	R217	5232-104J16P	RES, CBN 1/6P 100K
625	R218	5232-100J16P	RES, CBN 1/6P 10
607	R219	5135-471522	RES, CBN 1/2P 470
624	R220	5135-473522	RES, CBN 1/2P 47K
614	R221	5135-472522	RES, CBN 1/2P 4.7K
614	R222	5135-472522	RES, CBN 1/2P 4.7K
614	R223	5135-472522	RES, CBN 1/2P 4.7K
652	R301	5232-105J16P	RES, CBN 1/6P 1M
619	R302	5135-394522	RES, CBN 1/2P 390K
653	R303	5232-105J16P	RES, CBN 1/6P 1M
643	R304	5232-223J16P	RES, CBN 1/6P 22K
643	R305	5232-223J16P	RES, CBN 1/6P 22K
638	R306	5232-822J16P	RES, CBN 1/6P 8.2K
638	R307	5232-822J16P	RES, CBN 1/6P 8.2K
627	R308	5232-331J16P	RES, CBN 1/6P 330
627	R309	5232-331J16P	RES, CBN 1/6P 330
626	R310	5232-101J16P	RES, CBN 1/6P 100
626	R311	5232-101J16P	RES, CBN 1/6P 100
630	R312	5232-102J16P	RES, CBN 1/6P 1K
630	R313	5232-102J16P	RES, CBN 1/6P 1K
606	R314	5135-101522	RES, CBN 1/2P 100
606	R315	5135-101522	RES, CBN 1/2P 100
606	R316	5135-101522	RES, CBN 1/2P 100
606	R317	5232-101J16P	RES, CBN 1/6P 100
602	R318	5135-100522	RES, CBN 1/2P 10
602	R319	5135-100522	RES, CBN 1/2P 10
603	R320	5135-220522	RES, CBN 1/2P 22
603	R321	5135-220522	RES, CBN 1/2P 22
606	R322	5135-101522	RES, CBN 1/2P 100
655	R323	5232-151J16P	RES, CBN 1/6P 150
610	R324	5135-102522	RES, CBN 1/2P 1K
610	R325	5135-102522	RES, CBN 1/2P 1K
604	R326	5135-470522	RES, CBN 1/2P 47
604	R327	5135-470522	RES, CBN 1/2P 47
604	R328	5135-470522	RES, CBN 1/2P 47
604	R329	5135-470522	RES, CBN 1/2P 47
611	R330	5135-122522	RES, CBN 1/2P 1.2K
611	R331	5135-122522	RES, CBN 1/2P 1.2K
608	R332	5135-561522	RES, CBN 1/2P 560
608	R333	5135-561522	RES, CBN 1/2P 560
620	R334	5135-105522	RES, CBN 1/2P 1M
620	R335	5135-105522	RES, CBN 1/2P 1M
612	R336	5135-152522	RES, CBN 1/2P 1.5K
612	R337	5135-152522	RES, CBN 1/2P 1.5K
613	R338	5135-332522	RES, CBN 1/2P 3.3K
613	R339	5135-332522	RES, CBN 1/2P 3.3K
613	R340	5135-332522	RES, CBN 1/2P 3.3K
613	R341	5135-332522	RES, CBN 1/2P 3.3K
606	R342	5135-101522	RES, CBN 1/2P 100
606	R343	5135-101522	RES, CBN 1/2P 100
610	R346	5135-102522	RES, CBN 1/2P 1K
610	R347	5135-102522	RES, CBN 1/2P 1K
606	R348	5135-101522	RES, CBN 1/2P 100
606	R349	5135-101522	RES, CBN 1/2P 100
606	R350	5135-101522	RES, CBN 1/2P 100
606	R351	5135-101522	RES, CBN 1/2P 100
650	R352	5232-104J16P	RES, CBN 1/6P 100K
650	R353	5232-104J16P	RES, CBN 1/6P 100K
614	R354	5135-472522	RES, CBN 1/2P 4.7K
614	R355	5135-472522	RES, CBN 1/2P 4.7K
618	R356	5232-154J16P	RES, CBN 1/6P 150K
627	R357	5232-331J16P	RES, CBN 1/6P 330
627	R358	5232-331J16P	RES, CBN 1/6P 330
656	R359	5232-681J16P	RES, CBN 1/6P 680
656	R360	5232-681J16P	RES, CBN 1/6P 680
655	R361	5232-151J16P	RES, CBN 1/6P 150
655	R362	5232-151J16P	RES, CBN 1/6P 150

INTEGRATED CIRCUITS

509	IC101	5653-CXA1081S	IC, LINEAR
502	IC102	5654-M51564P	IC, DIGITAL
510	IC103	5653-LA6520	IC, LINEAR
501	IC201	5654-M50423FP	IC, DIGITAL
505	IC202	5654-M5M4416P	IC, DIGITAL
511	IC203	5653-LA6515	IC, LINEAR
503	IC301	5654-PCM61P	IC, DIGITAL

Ser. No.	Ref. No.	Part No.	Description
504	IC302	5654-LC4966	IC, DIGITAL
		TRANSISTORS	
521	Q1	5614-667(C)	XISTOR, NPN A
514	Q2	5612-647(C)	XISTOR, PNP A
515	Q3	5611-933S(S)	XISTOR, PNP R
522	Q4	5613-1740S(S)	XISTOR, NPN R
515	Q5	5611-933S(S)	XISTOR, PNP R
522	Q6	5613-1740S(S)	XISTOR, NPN R
520	Q7	5614-2012	XISTOR, NPN A
513	Q8	5612-1375	XISTOR, PNP A
515	Q9	5611-933S(S)	XISTOR, PNP R
522	Q10	5613-1740S(S)	XISTOR, NPN R
515	Q11	5611-933S(S)	XISTOR, PNP R
522	Q12	5613-1740S(S)	XISTOR, NPN R
521	Q13	5614-667(C)	XISTOR, NPN A
514	Q14	5612-647(C)	XISTOR, PNP A
515	Q15	5611-933S(S)	XISTOR, PNP R
522	Q16	5613-1740S(S)	XISTOR, NPN R
515	Q17	5611-933S(S)	XISTOR, PNP R
522	Q18	5613-1740S(S)	XISTOR, NPN R
515	Q51	5611-933S(S)	XISTOR, PNP R
524	Q52	5613-2878(B)	XISTOR, NPN R
524	Q53	5613-2878(B)	XISTOR, NPN R
522	Q54	5613-1740S(S)	XISTOR, NPN R
517	Q55	5611-RN2202	XISTOR, PNP R
514	Q101	5612-647(C)	XISTOR, PNP A
525	Q102	5613-RN1202	XISTOR, NPN R
522	Q103	5613-1740S(S)	XISTOR, NPN R
522	Q104	5613-1740S(S)	XISTOR, NPN R
522	Q105	5613-1740S(S)	XISTOR, NPN R
522	Q201	5613-1740S(S)	XISTOR, NPN R
525	Q202	5613-RN1202	XISTOR, NPN R
517	Q203	5611-RN2202	XISTOR, PNP R
528	Q301	5613-2320L(F)	XISTOR, NPN R
528	Q302	5613-2320L(F)	XISTOR, NPN R
516	Q303	5611-999L(F)	XISTOR, PNP R
516	Q304	5611-999L(F)	XISTOR, PNP R
528	Q305	5613-2320L(F)	XISTOR, NPN R
528	Q306	5613-2320L(F)	XISTOR, NPN R
516	Q307	5611-999L(F)	XISTOR, PNP R
516	Q308	5611-999L(F)	XISTOR, PNP R
529	Q309	5616-SK246GR2	FET, N-CH
529	Q310	5616-SK246GR2	FET, N-CH
524	Q311	5613-2878(B)	XISTOR, NPN R
524	Q312	5613-2878(B)	XISTOR, NPN R
529	Q313	5616-SK246GR2	FET, N-CH
529	Q314	5616-SK246GR2	FET, N-CH
516	Q315	5611-999L(F)	XISTOR, PNP R
516	Q316	5611-999L(F)	XISTOR, PNP R
528	Q317	5613-2320L(F)	XISTOR, NPN R
528	Q318	5613-2320L(F)	XISTOR, NPN R
517	Q319	5611-RN2202	XISTOR, PNP R
		DIODES	
531	⚠ D1	5632-GP10E	DIODE, RECT
531	⚠ D2	5632-GP10E	DIODE, RECT
531	⚠ D3	5632-GP10E	DIODE, RECT
531	⚠ D4	5632-GP10E	DIODE, RECT
531	⚠ D5	5632-GP10E	DIODE, RECT
531	⚠ D6	5632-GP10E	DIODE, RECT
531	⚠ D7	5632-GP10E	DIODE, RECT
531	⚠ D8	5632-GP10E	DIODE, RECT
531	⚠ D9	5632-GP10E	DIODE, RECT
531	⚠ D10	5632-GP10E	DIODE, RECT
531	⚠ D11	5632-GP10E	DIODE, RECT
543	D12	5635-HZ27-2	DIODE, ZENER
541	D13	5635-HZ9B2L	DIODE, ZENER
541	D14	5635-HZ9B2L	DIODE, ZENER
540	D15	5635-HZ6B1L	DIODE, ZENER
540	D16	5635-HZ6B1L	DIODE, ZENER
544	D17	5635-HZ9A1L	DIODE, ZENER
544	D18	5635-HZ9A1L	DIODE, ZENER
542	D19	5635-HZ5B-2	DIODE, ZENER

Ser. No.	Ref. No.	Part No.	Description
531	⚠ D51	5632-GP10E	DIODE, RECT
531	⚠ D52	5632-GP10E	DIODE, RECT
532	D53	5631-1SS133	DIODE, DET
540	D54	5635-HZ6B1L	DIODE, ZENER
539	D55	5635-HZ3B-2	DIODE, ZENER
534	D56	5631-1SS133	DIODE, DET
532	D101	5631-1SS133	DIODE, DET
534	D102	5631-1SS133	DIODE, DET
532	D103	5631-1SS133	DIODE, DET
538	D104	5635-HZ3A-3	DIODE, ZENER
538	D105	5635-HZ3A-3	DIODE, ZENER
536	D106	5631-1SS133	DIODE, DET
		CONTROLS	
667	VR101	5101-22301934	RES, SEMI FIX 22K
666	VR102	5101-50201934	RES, SEMI FIX 5K
665	VR301	5101-10401934	RES, SEMI FIX 100K
		MISCELLANEOUS	
704	CN1	4443-060185	CONNECTOR
702	CN2	4443-030185	CONNECTOR
696	CN101	4443-0801140	CONNECTOR
697	CN102	4443-03901008	CONNECTOR
698	CN103	4443-0501140	CONNECTOR
699	CN104	4443-0401140	CONNECTOR
705	CN105	4443-080185	CONNECTOR
703	CN106	4443-050185	CONNECTOR
704	CN107	4443-060185	CONNECTOR
700	CN108	4443-0701140	CONNECTOR
692	GND1	4214-132	TERMINAL
679	⚠ J1	4489-02501002	PIN JACK, 2P
716	JW2	4163-0117024	CONNECTOR W/W
692	TP101	4214-132	TERMINAL
692	TP201	4214-132	TERMINAL
692	TP202	4214-132	TERMINAL
692	TP203	4214-132	TERMINAL
692	TP401	4214-132	TERMINAL
670	X201	5691-00846731	XTAL, OSC

PCB-2 FRONT P.C. BOARD

		CAPACITORS	
554	C401	5345-336D0951	CAP, MINI ELE 33µ/25V
553	C402	5345-107E041	CAP, MINI ELE 100µ/35V
589	C403	5361-102KB	CAP, CER 1000p
554	C404	5345-336D0951	CAP, MINI ELE 33µ/25V
554	C405	5345-336D0951	CAP, MINI ELE 33µ/25V
554	C406	5345-336D0951	CAP, MINI ELE 33µ/25V
590	C407	5361-101JCH	CAP, CER 100p
590	C408	5361-101JCH	CAP, CER 100p
		RESISTORS	
658	R401	5232-103J16P	RES, CBN 1/6P 10K
658	R402	5232-103J16P	RES, CBN 1/6P 10K
658	R403	5232-103J16P	RES, CBN 1/6P 10K
658	R404	5232-103J16P	RES, CBN 1/6P 10K
658	R405	5232-103J16P	RES, CBN 1/6P 10K
658	R406	5232-103J16P	RES, CBN 1/6P 10K
622	R407	5135-101522	RES, CBN 1/2P 100
622	R408	5135-101522	RES, CBN 1/2P 100
622	R409	5135-101522	RES, CBN 1/2P 100
657	R410	5232-101J16P	RES, CBN 1/6P 100
657	R411	5232-103J16P	RES, CBN 1/6P 10K
657	R412	5232-103J16P	RES, CBN 1/6P 10K
623	R413	5135-103522	RES, CBN 1/2P 10K
623	R414	5135-103522	RES, CBN 1/2P 10K
658	R415	5232-103J16P	RES, CBN 1/6P 10K
661	R416	5135-103522	RES, CBN 1/2P 10K
658	R417	5232-103J16P	RES, CBN 1/6P 10K
658	R418	5232-103J16P	RES, CBN 1/6P 10K
658	R419	5232-103J16P	RES, CBN 1/6P 10K
658	R420	5232-103J16P	RES, CBN 1/6P 10K
658	R421	5232-103J16P	RES, CBN 1/6P 10K

Ser. No.	Ref. No.	Part No.	Description
660	R422	5232-105J16P	RES, CBN 1/6P 1M
658	R423	5232-103J16P	RES, CBN 1/6P 10K
658	R424	5232-103J16P	RES, CBN 1/6P 10K
		INTEGRATED CIRCUITS	
506	IC401	5654-M752-103	IC, DIGITAL
507	IC402	5654-M761-430	IC, DIGITAL
		TRANSISTORS	
526	Q402	5613-RN1202	XISTOR, NPN R
518	Q403	5611-RN2202	XISTOR, PNP R
518	Q404	5611-RN2202	XISTOR, PNP R
518	Q405	5611-RN2202	XISTOR, PNP R
518	Q406	5611-RN2202	XISTOR, PNP R
527	Q407	5613-RN1203	XISTOR, NPN R
		DIODES	
535	D401	5631-1SS133	DIODE, DET
535	D402	5631-1SS133	DIODE, DET
535	D403	5631-1SS133	DIODE, DET
535	D406	5631-1SS133	DIODE, DET
535	D407	5631-1SS133	DIODE, DET
535	D408	5631-1SS133	DIODE, DET
535	D409	5631-1SS133	DIODE, DET
533	D410	5631-1SS133	DIODE, DET
533	D411	5631-1SS133	DIODE, DET
		MISCELLANEOUS	
673	FL401	5722-26	TUBE DISPLAY
720	JL402	4242-R0204151	JUMPER LEAD
720	JL403	4242-R0204151	JUMPER LEAD
718	JL404	4242-R0205151	JUMPER LEAD
719	JL405	4242-R0206151	JUMPER LEAD
715	LCN401	4163-S0107251	CONNECTOR W/W
675	RC401	6143-00901	RECEIVE UNIT
686	S401	4437-00604	SWITCH, PUSH
686	S402	4437-00604	SWITCH, PUSH
686	S403	4437-00604	SWITCH, PUSH
686	S404	4437-00604	SWITCH, PUSH
686	S405	4437-00604	SWITCH, PUSH
686	S406	4437-00604	SWITCH, PUSH
686	S407	4437-00604	SWITCH, PUSH
686	S408	4437-00604	SWITCH, PUSH
686	S409	4437-00604	SWITCH, PUSH
686	S410	4437-00604	SWITCH, PUSH
671	X401	5693-CSB400P	OSC, CER

PCB-3 POWER SWITCH P. C. BOARD

		CAPACITORS	
566	⚠ C1	5352-S010M103	CAP, MTL .01μ BK
566B	⚠ C1	5352-1030958	CAP, MTL .01μ IB BB
		RESISTOR	
027B	⚠ R1	5135-335J50P	RES, CBN 1/2P 3.3M IB BB
		TRANSFORMERS	
688	⚠ T1	5584-S6201	XFORMER, POWER BK
688B	⚠ T1	5584-S6202	XFORMER, POWER IB BB
		MISCELLANEOUS	
722	JL1	4242-R0206181	JUMPER LEAD
721	JL2	4242-R0203161	JUMPER LEAD
685	⚠ SW1	4431-A017191	SWITCH, PUSH
026B	⚠ SW2	4411-1047111	SWITCH, ROTARY IB BB
693	⚠ TM1	4214-122	TERMINAL
693	⚠ TM2	4214-122	TERMINAL

Ser. No.	Ref. No.	Part No.	Description
		CHASSIS MISCELLANEOUS PARTS LIST	
711	LCN101	4163-03211008	CONNECTOR W/W
712	LCN102	4163-03210008	CONNECTOR W/W
713	LCN103	4163-03212005	CONNECTOR W/W
714	LCN104	4163-03207004	CONNECTOR W/W
724	LUG1/2	4162-00201800	LUG W/WIRE BK
681	⚠ P1	4161-03601202	CORD W/PLUG
681B	⚠ P1	4161-03701220	CORD W/PLUG IB
681C	⚠ P1	4161-04100	CORD W/PLUG BB
677		6142-01106	REMOTE CONTROL ASSEMBLY (ACCESSORY)
682		4161-71184	CORD W/PLUG, RCA TYPE (ACCESSORY)

ABBREVIATIONS IN PARTS LIST

CAPACITORS

CAP, MINI ELE	: Electrolytic
CAP, CER	: Ceramic
CAP, PPP	: Polypropylene
CAP, MYL	: Mylar
CAP, MCA	: Mica
CAP, MINI BP	: Bipolar
CAP, ELE BP	: Electrolytic Bipolar
470 μ	: 470 μF
6800p	: 6800pF
.047 μ	: 0.047 μF

RESISTORS

RES, CBN 1/6P	: Carbon 1/6W
RES, FUSE	: Fuse
RES, CEM 5P	: Cement 5W
RES, MTL 1P	: Metal 1W
2.2K	: 2.2kΩ
220	: 220Ω

TRANSISTORS

XISTOR	: Transistor
FET	: Field Effect Transistor

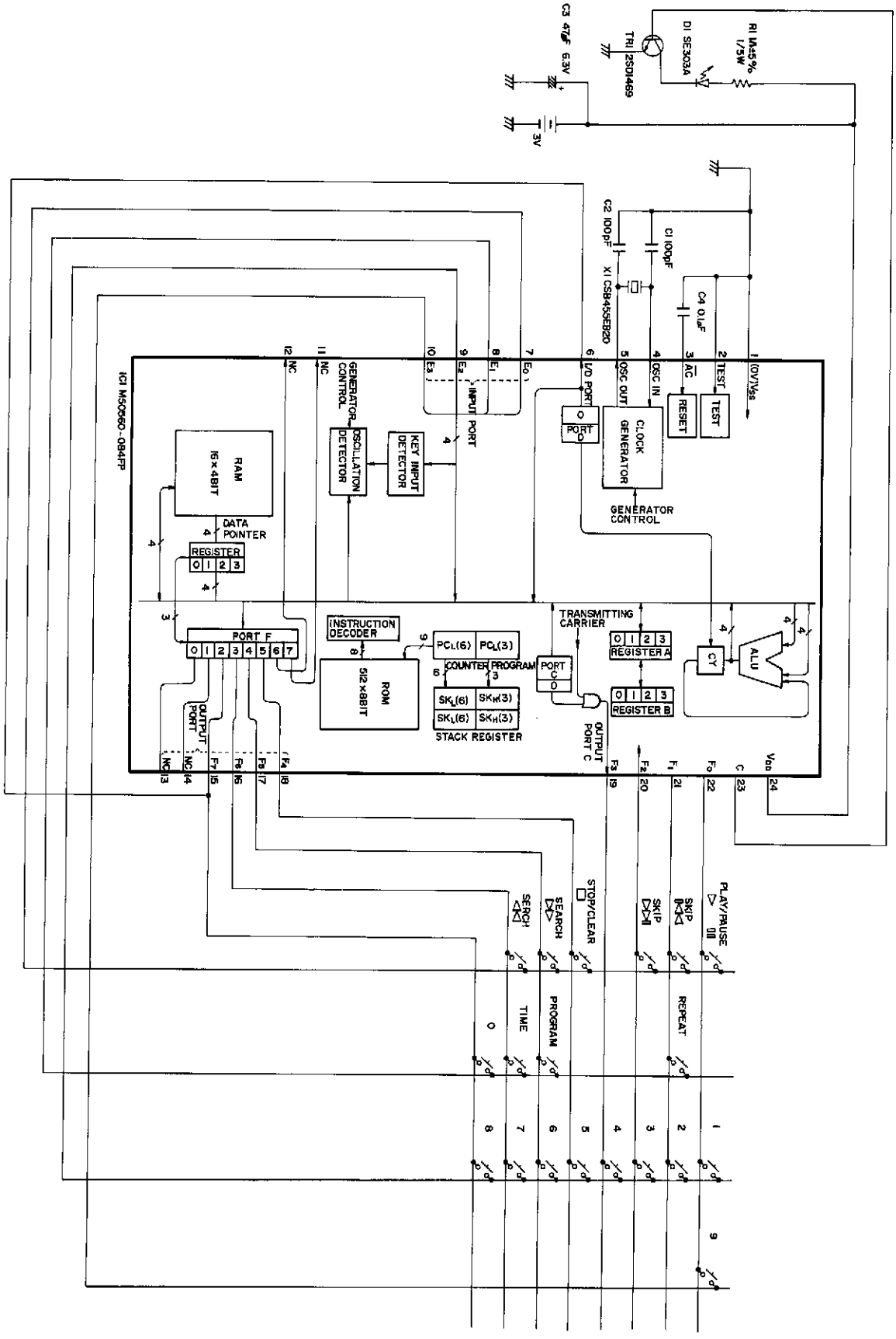
CONTROLS

RES, SEMI FIX	: Semi-fixed Resistor

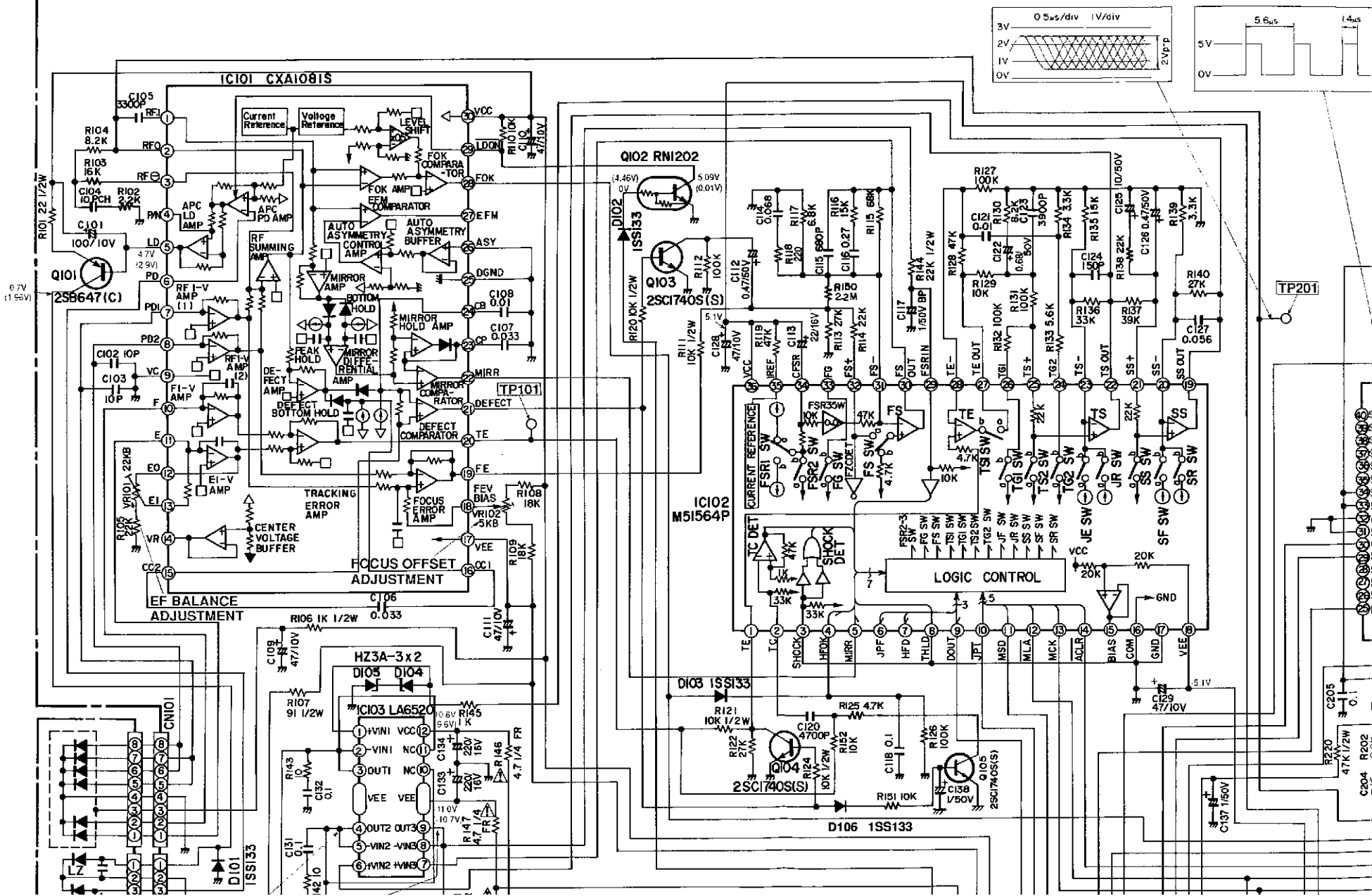
NOTE

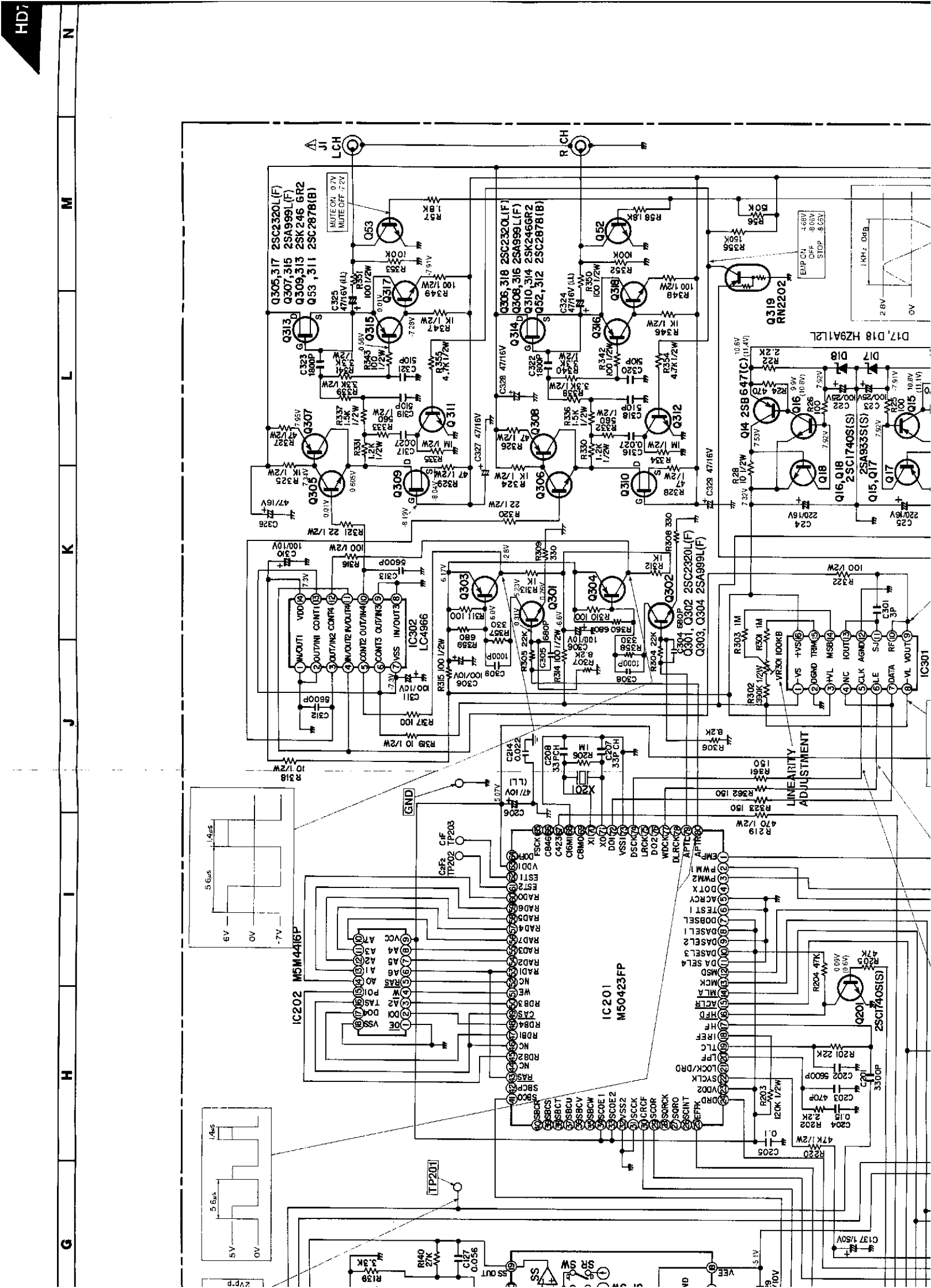
⚠ SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

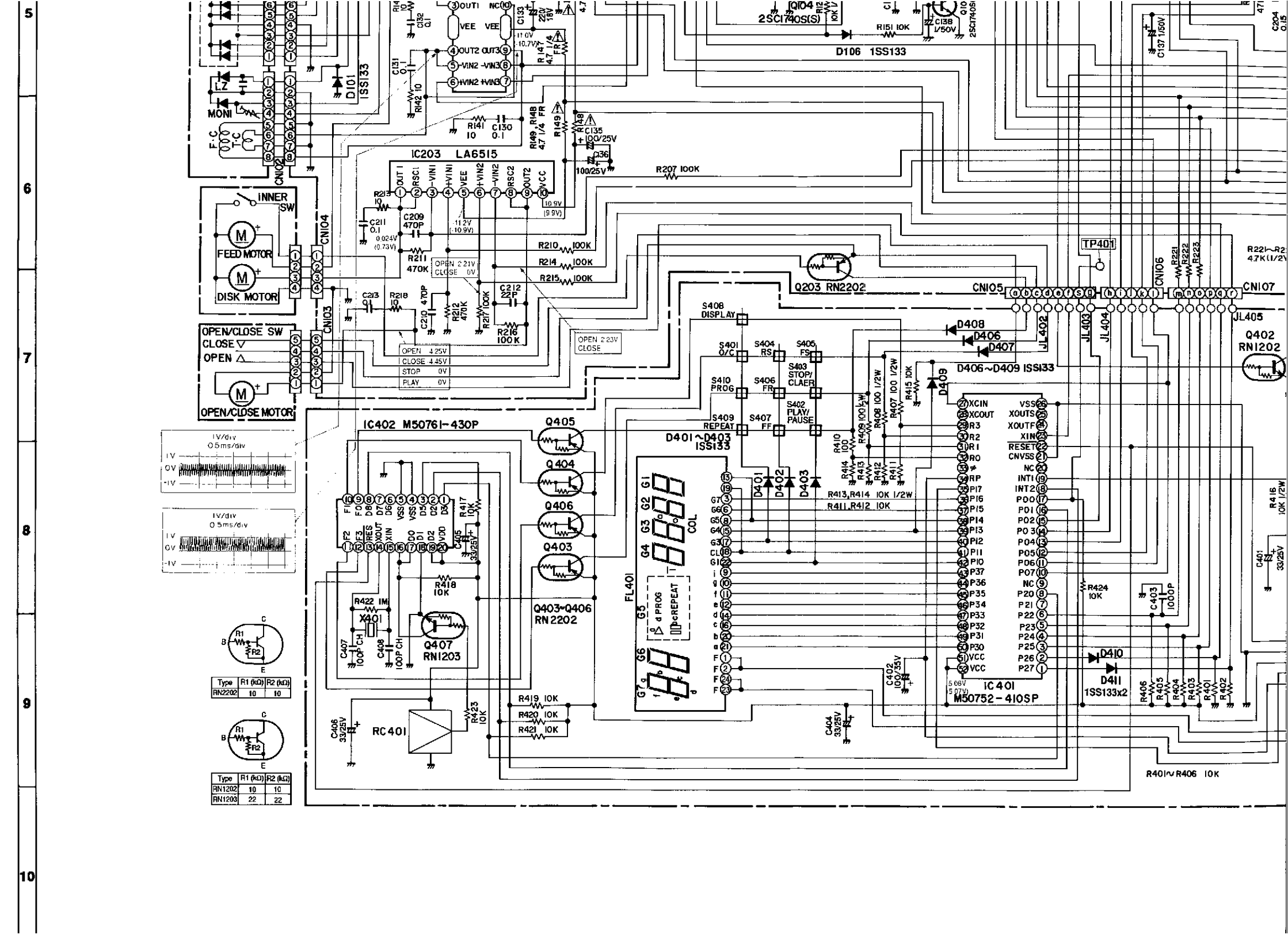
INFRARED REMOTE CONTROL SCHEMATIC DIAGRAM

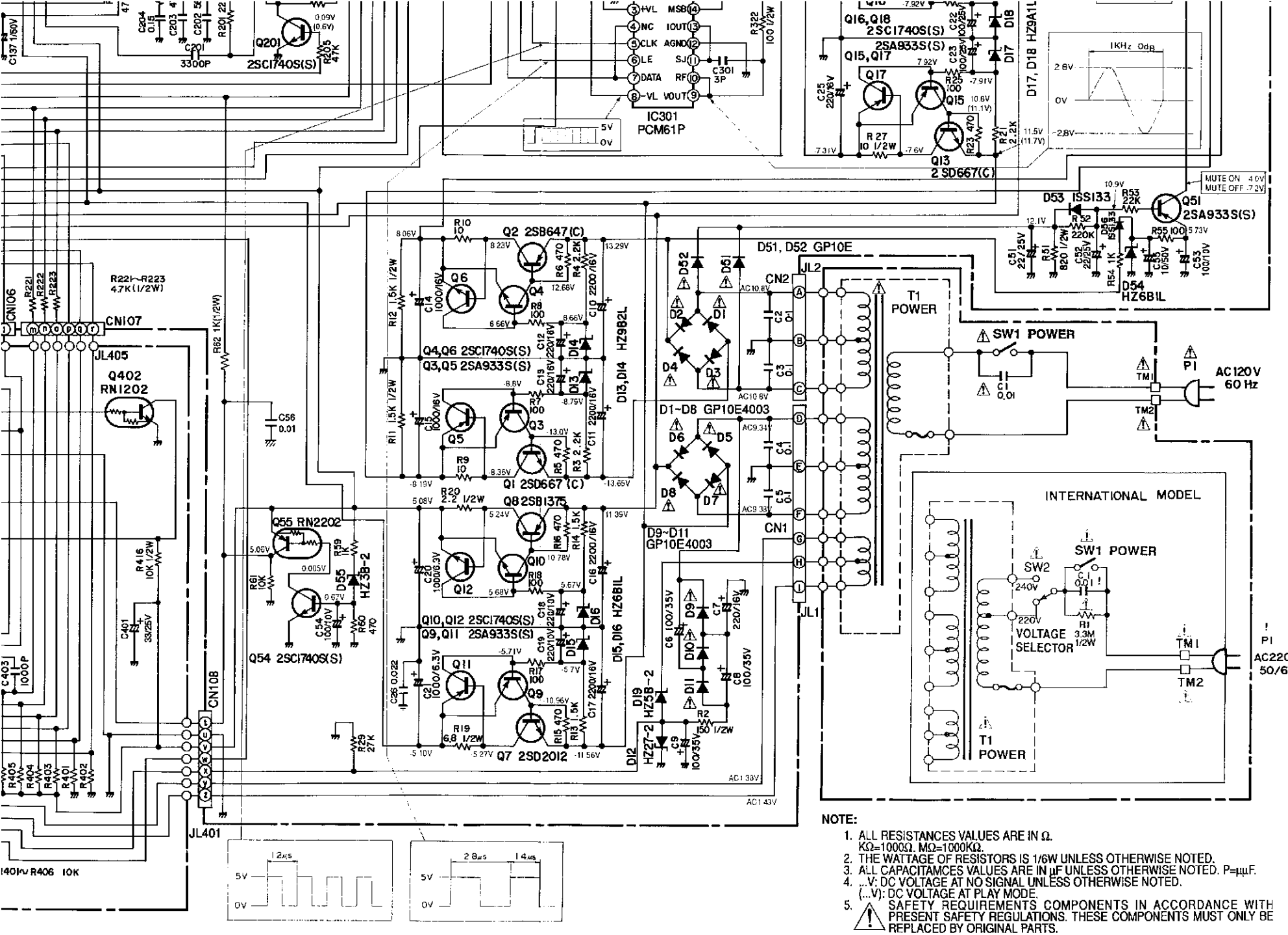


SCHEMATIC DIAGRAM




LINEARITY ADJUSTMENT
IC201 M50423FP
IC202 M5M4416P
IC302 LC4966
IC301
Q305,317 2SC2320L(F)
Q307,315 2SA999L(F)
Q309,313 2SK246 GR2
Q53 ,311 2SC2878(B)
Q306,318 2SC2320L(F)
Q308,316 2SA999L(F)
Q310,314 2SK246GR2
Q52,312 2SC2878(B)
Q301, Q302 2SC2320L(F)
Q303, Q304 2SA999L(F)
Q15,Q17 2SA933S(S)
Q16,Q18 2SC1740S(S)
Q4 2SB647(C)
Q319 RN2202
Q201 2SC1740S(S)
D17, D18 HZ9A1L2L
LCH
RCH
GND
TP201
SR SW
MUTE ON 0.7V
MUTE OFF 7.2V
EMPH ON -4.6dB
OFF -8.0dB
STOP -8.6dB
1KHz 0dB
5.6μs
1.4μs
6V
0V
-7V
5V


IC203 LA6515
OUT1
RSC1
-VIN1
+VIN1
VEE
+VIN2
-VIN2
RSC2
OUT2
VCC
INNER SW
FEED MOTOR
DISK MOTOR
OPEN/CLOSE SW
CLOSE
OPEN
OPEN/CLOSE MOTOR
CNI01
CNI02
CNI03
CNI04
CNI05
CNI06
CNI07
IC402 M50761-430P
IC401
M50752-410SP
FL401
RC401
X401
Q203 RN2202
Q403~Q406
RN2202
Q407
RN1203
Q402
RN1202
D106 1SS133
D101 1SS133
D401~D403
1SS133
D406~D409 1SS133
D410
D411
1SS133x2
S401 O/C
S402 PLAY/PAUSE
S403 STOP/CLAER
S404 RS
S405 FS
S406 FR
S407 FF
S408 DISPLAY
S409 REPEAT
S410 PROG
TP401
JL402
JL403
JL404
JL405
R401~R406 10K
Type | R1 (kΩ) | R2 (kΩ)
RN2202 | 10 | 10
RN1202 | 10 | 10
RN1203 | 22 | 22



NOTE:

1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω. MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/6W UNLESS OTHERWISE NOTED.
3. ALL CAPACITAMCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF.
4. ...V: DC VOLTAGE AT NO SIGNAL UNLESS OTHERWISE NOTED.
   (...V): DC VOLTAGE AT PLAY MODE.
5. ⚠ SAFETY REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.