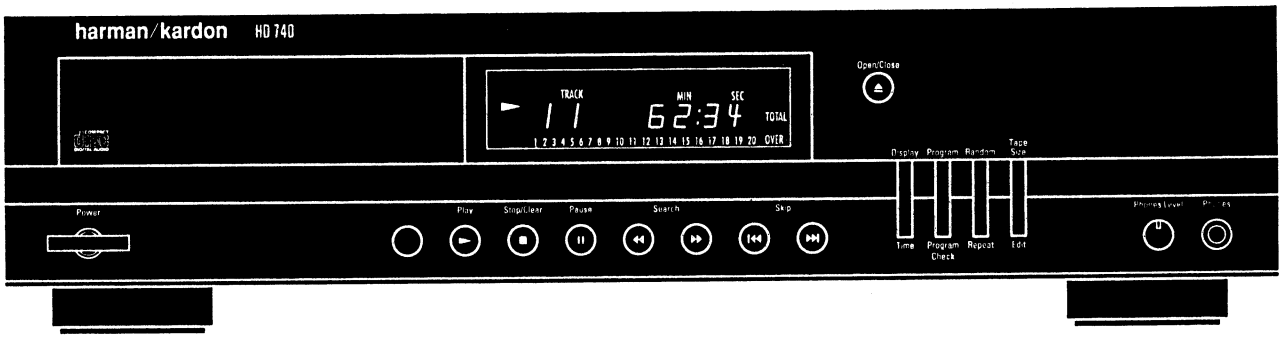
The harman kardon
Model *HD 740*

Manual A

COMPACT DISC PLAYER

Technical Manual



230V.....for EUR

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harman/kardon
Parts and Service Office
250 Crossways Park Dr. Woodbury, N.Y. 11797
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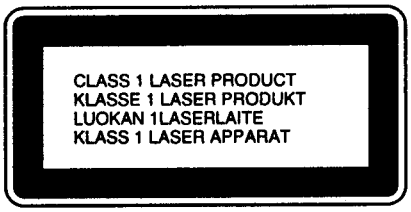
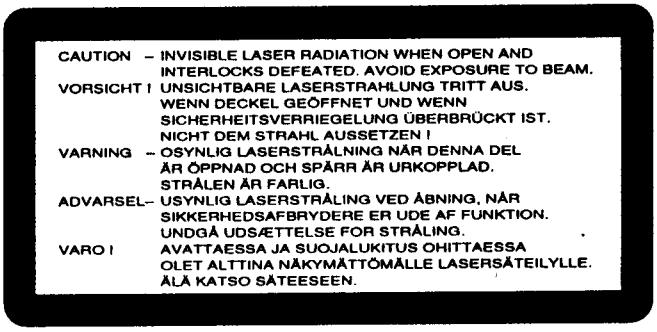
CLASS 1 LASER PRODUCT
Product complies with DHHS rules CFR subchapter J part 1040: 10 at date of manufacture.

DANGER –Invisible laser radiation when opened and interlock filed or defeated. Avoid direct exposure to the beam.

CAUTION – use of all controls, 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.



SPECIFICATIONS

System	: Compact disc Digital Audio
D/A Converter	: 20-bits
Signal Detection	: 3-Beam Semiconductor Optical Laser Pickup
Error Correction	: CIRC System
Low Level Linearity	: ±1dB(1KHz/-90dB)
Frequency Response	: 8Hz-20KHz ±1dB
Total Harmonic Distortion(THD)	: 0.005%
Dynamic Range	: 98dB
Signal to Noise Ratio	: 106dB

Channel Separation	: 98dB
Line Output Level/Impedance	: 2V 10kΩ
Digital Output Level/Impedance (Coaxial)	: 0.5v p-p 75Ω
Power Supply	
International model	: AC230V,50Hz
Power Consumption	: 12W
Dimensions(WxHxD)	: 17.3" X 12.7" X 4.3" 440mm X 323mm X 110mm
Weight	: 4.5kg/9.9lbs

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

SAFETY PRECAUTIONS

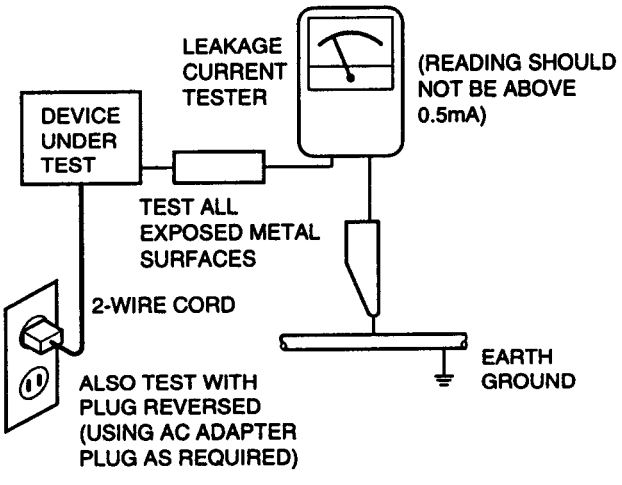
Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

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 fishpaper, adjustment and compartment cover/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, but are not limited to excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back cover.

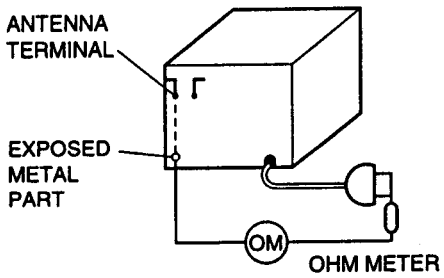
c. **Leakage Current Hot Check** - With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute(ANSI) 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 parrs 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 Service Precautions

a. Always unplug the instrument AC Power cord from the AC power souce before:
   (1) Removing or reinstalling any component, circuit board, module, or any other instrument assemdly.
   (2) Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
   Connecting a test substitute in parallel with an electrolytic capacitor in the instrument.
   (3) **Caution:** A wrong part substitution or interlocks 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 beequipped.

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 gground 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) or components. When servicing, follow the printed or indicated service precautions and service materials.
The Components used in the unit have a specified
(2) conflammability and dielectric stength. When replacing any components, use components which has the same ratings. Components marked (⚠) in the circuit diagram are important for safety or for the characteritics 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) A fter 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.

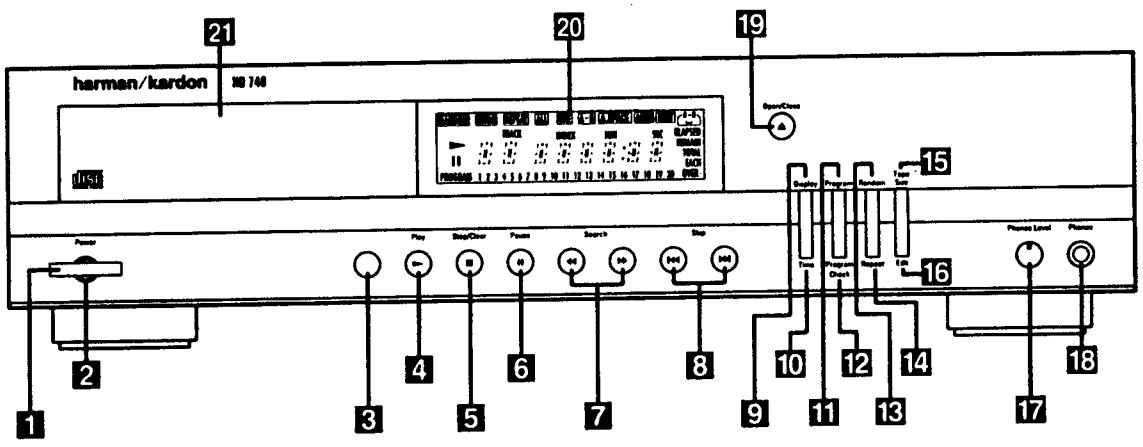
Note 1: Accessible Conductive parts including Metal panels, Output jacks, etc.

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 Examplles of typical ES devices are integrated circuits and some field effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by stsatic 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 potintial 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 wil 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 yuor 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



1 Power Switch:
Press this switch to apply powr to the HD740. When the switchis first turned on, the **Status Mode Indicator** light surrounding the switch will turn green. Once the unit has been turned on with this switch it may be operated from either the front panel or remote control. Press the switch again to turn the unit completely off.

2 Status Mode Indicator:
When the HD740 is the ON mode, this indicator will glow green. When the unit has been placed in the Standby mode by pressing the **Off** button ❶ on the remote, the indicator will glow amber, indicating that the unit is still connected to the AC main supply and is ready to be turned on from the remote control.

3 Remote Sensor Window:
The sensor behind this window receives commands from the remote control. Keep this area clear if you wish to use the HD740 with a remote control.

4 Play Button:
Press this button to start the playback of a CD. If the CD drawer is open, pressing this button will automatically close the drawer.

5 Stop/Clear:
Press this button to stop the disc currently being played.During programming functions, this button is also used to clear the system memory.

6 Pause Button:
Press this button once to momentarily stop a disc. When the button is pressed again, the disc will resume play at the point it was stopped.

7 Search Buttons:
Press one of these buttons to search forward ►► or backwards ◄◄ through a disc to locate a particular portion of the selection.

8 Skip Buttons:
Press one of these buttons to move to the next track ►►|, or to move back to the previous track |◄◄.

9 Display Button:
Press this button to dim the brightness of the display. Press it again to turn the display off completely. An additional press of the button will return the display to normal brightness.

10 Time Button:
Press this button to select the time display.In normal operation,the display will show the running time of a track being played. Press the button once to check the time remaining for the track in play. Press the button again to view the total time remaining for the disc in play.

11 Program Button:
This button is used to program the playback of a disc in a particular order.

12 Program Check Button:
Press this button to check the order of tracks programmed into the HD740's memory.

13 Random Button:
Press this button to put a disc into play, and to have all of the tracks played in a random order.

14 Repeat Button:
Press this button once to continually repeat all tracks on a disc. Press it again to repeat only the track currently being played.

15 Tape Size Button:
Use this button to select the cassette size when programming the HD740 for use with a cassette recorder.

16 Edit Button:
Press this button to begin the programming sequence that matches the lenght of a CD's tracks to the size of an audio-cassette when recording a CD to tape.

17 Headphones Level:
Turn this knob to increase or decrease the volime level for headphones connected to the HD740's **Headphones Jack** 18. Note that changing this level will not change the sound level for the unit's main output, as that remains constant.

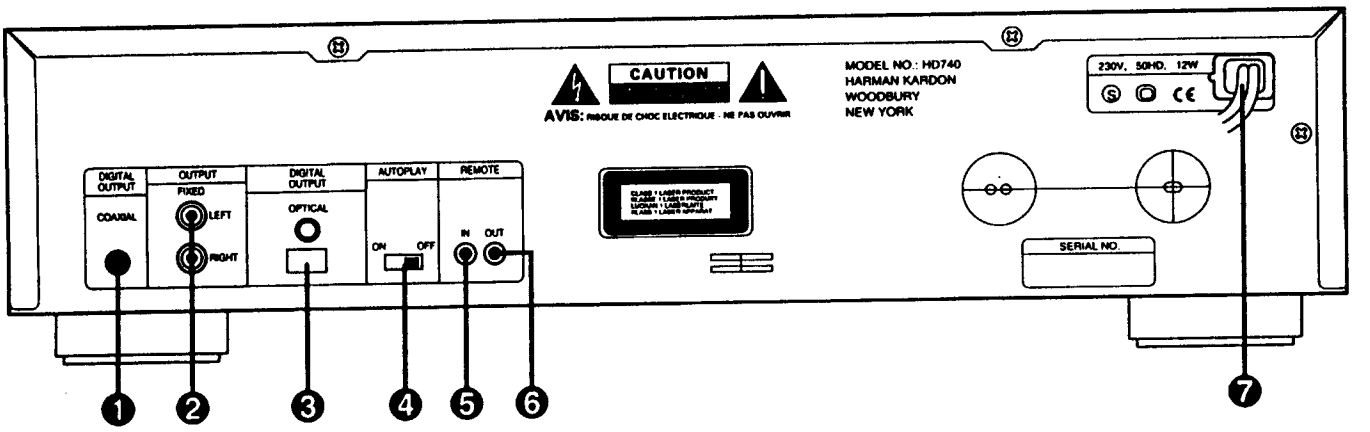
18 Headphones Jack:
Connect a set of standard headphones to this jack for private listening

19 Open/Close:
Press this button to open or close the disc drawer. The drawer may also be closed by pressing the **play** button 4 ⑩, or by gently pressing the edge of the drawer. However, we do not recommend pushing the drawer, as damage to the transport mechanism may result.

20 Information Display:
This display provides details about the operation of the HD740.

21 Disc Drawer:
To play a disc, open the drawer by pressing the **Open/Close** button 19 and place a full-size (12cm) or CD single (8cm) disc in the drawer with the printed side facing upwards. Press the **Play** button 4 ⑩ to close the drawer and begin playback.

REAR PANEL CONNECTIONS



❶ Coaxial Digital Output:
Connect this jack to the coaxial digital input of an external digital-to-analog converter for direct access to the digital signals of the HD740. DO NOT connect this jack to the standard audio inputs of any device.

❷ Fixed Audio Outputs:
Connect these jacks to the CD audio inputs of yuor receiver, surround processor or preamplifier.

❸ Optical Digital Output:
Connect this jack to the optical digital input of an external digital-to-analog converter for direct access to the digital signals of the HD740.

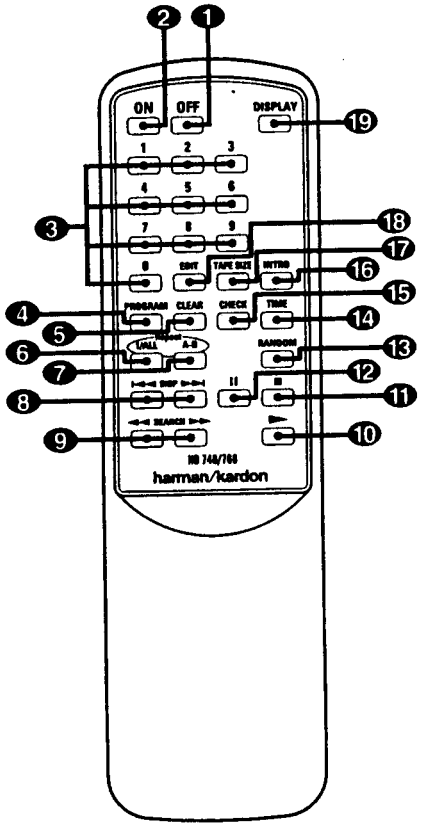
❹ Autoplay Switch:
When this switch is in the "ON" position, the HD740 will automatically go into the Play mode whenever the power is turned on and a disc is in the CD drawer. To disable the Autoplay function, put the switch in the OFF position.

❺ Remote Cotrol Input:
Connect the output of a remote infrared sensor or the remote control output of another compatible Harman Kardon product. This will enable the remote control system to operate even when the front panel Remote Sensor 3 is blocked. It will also allow use of the HD740 with optional, external control systems.

❻ Remote Cotrol Output:
Connect this jack to the input of another compatible Harman Kardon remote controlled device to have the remote sensor on the HD740 provide signals to other products.

❼ AC Power Cord:
Connect this plug to an AC outlet. If the outlet is switch controlled, make certain that the switch is in the ON position.

REMOTE CONTROL



1. Power Off
2. Power On
3. Numeric Controls
4. Program Button
5. Cier Bottan
6. Repeat 1/All Button
7. Repeat A-B Button
8. Skip Button
9. Search Button
10. Play Button
11. Stop
12. Pause Button
13. Random Button
14. Time Button
15. Check Button
16. Intro Button
17. Tape Sizu Button
18. Edit Button
19. Display Button

1 Power Off:
Press this button to put the unit in the Standby mode.

2 Power On:
Press this button to turn on theHD740. Note that in order for the Power On button to perate, the front panel **Power Switch** 1 must be pressed, and the **Status Mode Indicator** 2 should glow amber.

3 Numeric Controls:
Press these buttons to select a specific track on a disc. The unit will immediately search for the track and begin to play it. For tracks 1 through 9 on a disc, you need only press the desired number. For tracks 10 and above, the second digit of the number must be entered within two seconds of the first digit. These buttons are also used to enter track numbers into the memory for pre-programmed play lists.

4 Program Button:
Press this button to begin the process of programming the HD740 to play the tracks on a disc in a specific order. Once the button is pressed, enter each of the desired track numbers in quick succession using the **Numeric Controls** 3 . When you have entered the tracks to be played, press the **play** button 10 to begin the programmed sequence.

5 Clear Button:
Press this button to remove tracks from a programmed sequence. Each press of the button will remove one track, starting with the last track programmed to play.

6 Repeat 1/All Button:
Press this button once so that the **REPEAT** and **ALL** indicators are illuminated to repeat all tracks on the disc. Press the button a second time to repeat only the track that is currently being played, and note that the **REPEAT** and **ONE** indicators will light in the **Information Display.**

7 Repeat A-B Button:
Press this button to repeat a segment of the disc. Press the button once to mark the start of the portion to be repeated. Press it again at the end of the desired sequence. The marked passage will play continuously until the **Stop** button is pressed.

8 Skip Buttons:
Press one of these buttons to move to the next track ▶|, or to move back to the previous track |◀.

9 Search Buttons:
Press one of these buttons to search forward ▶▶ or backwards ◀◀ through a disc to locate a particular portion of the selection.

10 Play Button:
Press this button to start the playback of a CD. If the CD drawer is open, pressing this button will automatically close the drawer.

11 Stop:
Press this button to stop the disc currently being played.

12 Pause Button:
Press this button once to momentarily stop a disc. When the button is pressed again, the disc will resume play at the point it was stopped.

13 Random Button:
Press this button to put a disc into play, and to have all of the tracks played in a random order.

14 Time Button:
Press this button to select the time display. In normal operation, the display will show the running time of a track being played. Press the button once to check the time remaining for the track in play. Press the button a second time to view the total play time remaining for the disc in play.

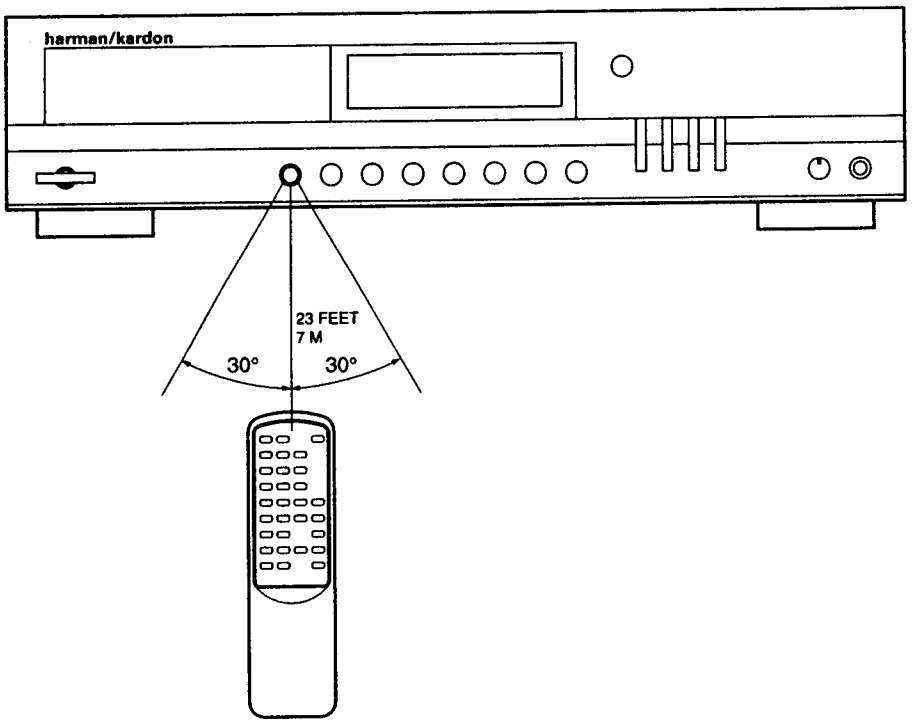
15 Check Button:
Press this button to check the order of tracks programmed into the HD740's memory.

16 Intro Button:
Press this button to put the HD740 in the intro Scan mode. When you press the button, the unit will play the first 15 seconds of each track on the disc, and then move to the next track. Press the button again to defeat the function and continue full play of the current track.

17 Tape Size Button:
Use this button to select the cassette size when programming the HD740 for use with a cassette recorder.

18 Edit Button:
Press this button to begin the programming sequence that matches the lenght of a CD's tracks to the size of an audio-cassette when recording a CD to tape.

19 Display Button:
Press this button once to dim the front panel display to half brightness. Press it again to turn the display lights off completely. Another press will return the display to normal brightness.



REMOTE CONTROL UNIT

HD740 REMOTE CONTROL OPERATION

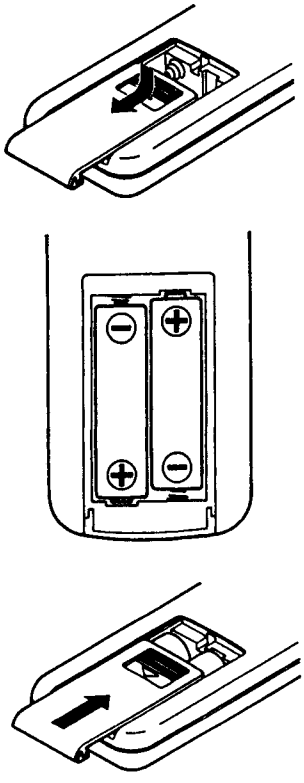
The remote control operates within a 30° angle and 23ft. (7m) range of the remote sensor on the front panel of the unit. Make sure that the remote's front projection "lens" as well as the REMOTE SENSOR area on the front panel of the unit are kept free from dirt to ensure proper transmission and reception of the infrared beam. Also make sure that no objects (e.g., stereo cabinet doors, end tables) block the path from the remote control to the REMOTE SENSOR area.

Avoid using the remote control near fluorescent lamps, as they may shorten its operating range.

If your remote control will sit unused for a long period of time, remove the batteries to prevent damage from corrosion.

REAR PANEL REMOTE JACKS

The remote control input jack allows remote control of this unit via a cable. This cable can be connected to the remote control output jack of another Harman Kardon product. Alternatively, it can be connected to an accessory device that converts infrared remote control signals into detected pulses. While all Harman Kardon products with remote control jacks are compatible with one another, not all accessory devices or other manufactuer's products are. However, it is safe to experiment.



CONCERNING USE OF BATTERIES

Two batteries are provided with your remote control. To load batteries.

1. Locate the cover over the battery compartment on the back of the remote control. Remove the cover by sliding it in the direction of the embossed arrow.
2. Insert the two AA (1.5V/R6/UM3) batteries. Make sure you insert the batteries according to the + and – polarity symbols at the bottom of the battery compartment.
3. Replace the cover of the battery compartment.

NOTE :

1. When you replace weak batteries, replace both at the same time.
2. Remove the batteries if the remote is not to be used for an extended period of time.
3. Do not use rechargeable batteries (Ni-Cd-type)

DISASSEMBLY PROCEDURES (REFER TO PAGES 49 & 50)

[1] CABINET TOP (51-15) REMOVAL

Remove 6 screws (SE01)(SA05) and then remove the Cabinet Top (51-15).

[2] FRONT PANEL ASS'Y REMOVAL

1. Remove the Cabinet Top (51-15), referring to the previous step [1].
2. Disconnect the connector with lead wire (CN05,CN401) from Connector (CN06,CN101) on the Main P.C. Board (45-01).
3. Press the POWER button to turn on.
   Press the OPEN/CLOSE button. The tray will slide out.
   Pull the TRAY COVER (51-16) upward to remove.
4. Remove 8 screws (SA07,SA08) and then remove the Front Panel (51-01) with the Front P.C. Board (45-03)
5. Remove 7 screws (SC01) and then remove the Front P.C. Board (45-03) from the Front panel Ass'y (51-01).

[3] MAIN P.C. BOARD (45-01) REMOVAL

1. Remove the Cabinet Top (51-15), referring to the previous step [1].
2. Remove 10 screws (SA01, SB01, SB04) and then remove the Main P.C. Board (45-01).

[4] CD PLAYER MECHANICAL ASSEMBLY REMOVAL

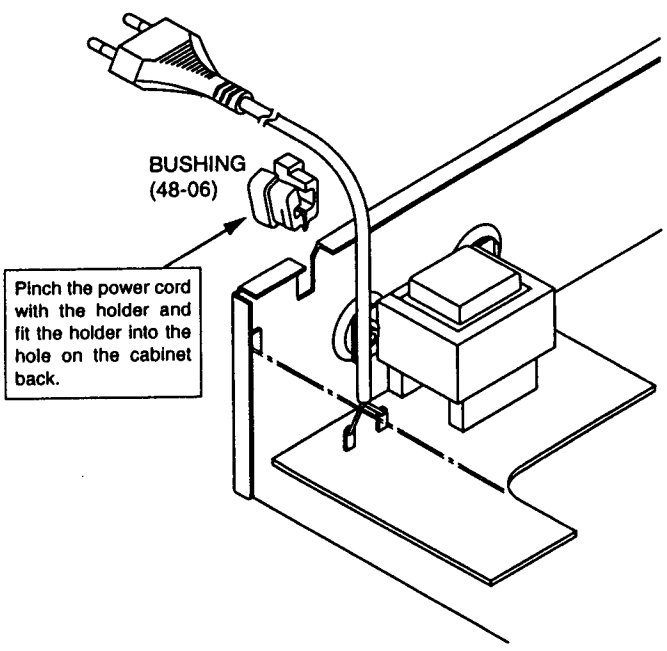
1. Remove the cover (51-15). Refer to the step [1].
2. Plug the power cord into the AC outlet. Press the power button to turn on.
3. Press the OPEN/CLOSE button. The CD TRAY (31-23) will slide out.
4. Pull the TRAY COVER (51-16) upward to remove from the table loading (31-23).
5. Pull out the power cord from the AC outlet.
6. Push the table loading back half.
7. Remove 4 screws (SA03, SF01).
8. Remove the connectors (CN01, CN02, CN03, CN04) from the Main PCB.
9. Remove the CD MECHANISM (31-00) backward pulling upward.
10. Remove the screw (31-30).
11. Remove the CD PLAYER MECHANISM.

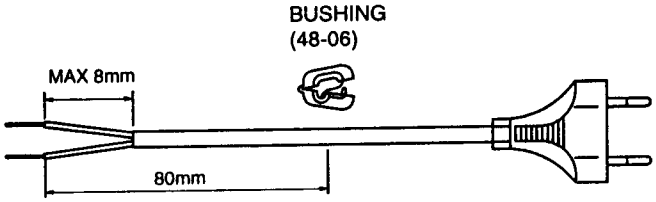
[5] SLIDE MOTOR REMOVAL

1. Remove 4 screws (31, 31SA2).
2. Remove the SUPPORT, MAGNET (08).
3. Pull out the table loading (23).
4. Remove the belt square (19).
5. Unsolder the terminal of the loading motor.
6. Remove 2 screws (33) .
7. Remove the loading motor (24).

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.





TROUBLESHOOTING GUIDE

NO LIGHTS ON THE FRONT PANEL
- Power cord is not plugged into power outlet.
- Wall outlet or extension cord is faulty. Check for poor connections.
- Breaker on plug strip has tripped. Reset breaker.

FRONT PANEL LIGHTS ARE ON, BUT THE CD DOES NOT PLAY
- The disc may have been inserted upside down. Make sure the label side is facing up.
- Moisture may have formed on the laser/receptor inside the unit. This sometimes occurs in damp climates or when the unit is moved from a cold to a warm area. Leave the unit turned on at room temperature for 30 minutes to allow the moisture to evaporate, then play your disc.

THE PLAY INDICATOR LIGHTS, BUT NO SOUND IS HEARD
- The wrong SOURCE has been selected on your integrated amplifier/ receiver/ preamplifier. Make sure you have selected the SOURCE where your CD player is connected.

THE SOUND SKIPS OR STUTTERS DURING PLAYBACK
- The disc may be dirty or damaged.
- The unit may have been placed on an unstable surface. Isolate the unit from excessive vibration by placing it on a firmer surface or farther away from your speakers.

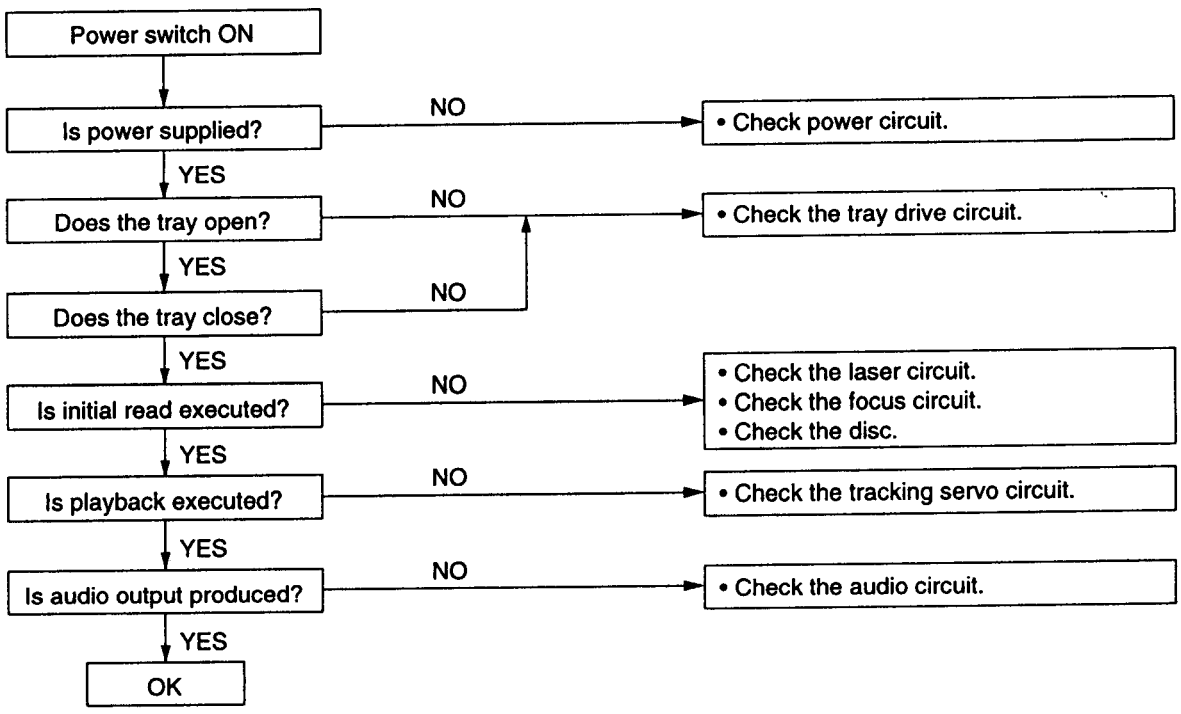
THE SOUND IS CONTINUOUSLY DISTORTED
- The cables from the HD720 have been plugged into the wrong input jacks on your integrated amplifier/receiver/ preamplifier. Make sure you have not plugged the unit into the PHONO jacks.

NOTHING HAPPENS WHEN FUNCTION KEYS ARE PRESSED
- Turn the power to the unit off, then back on again.

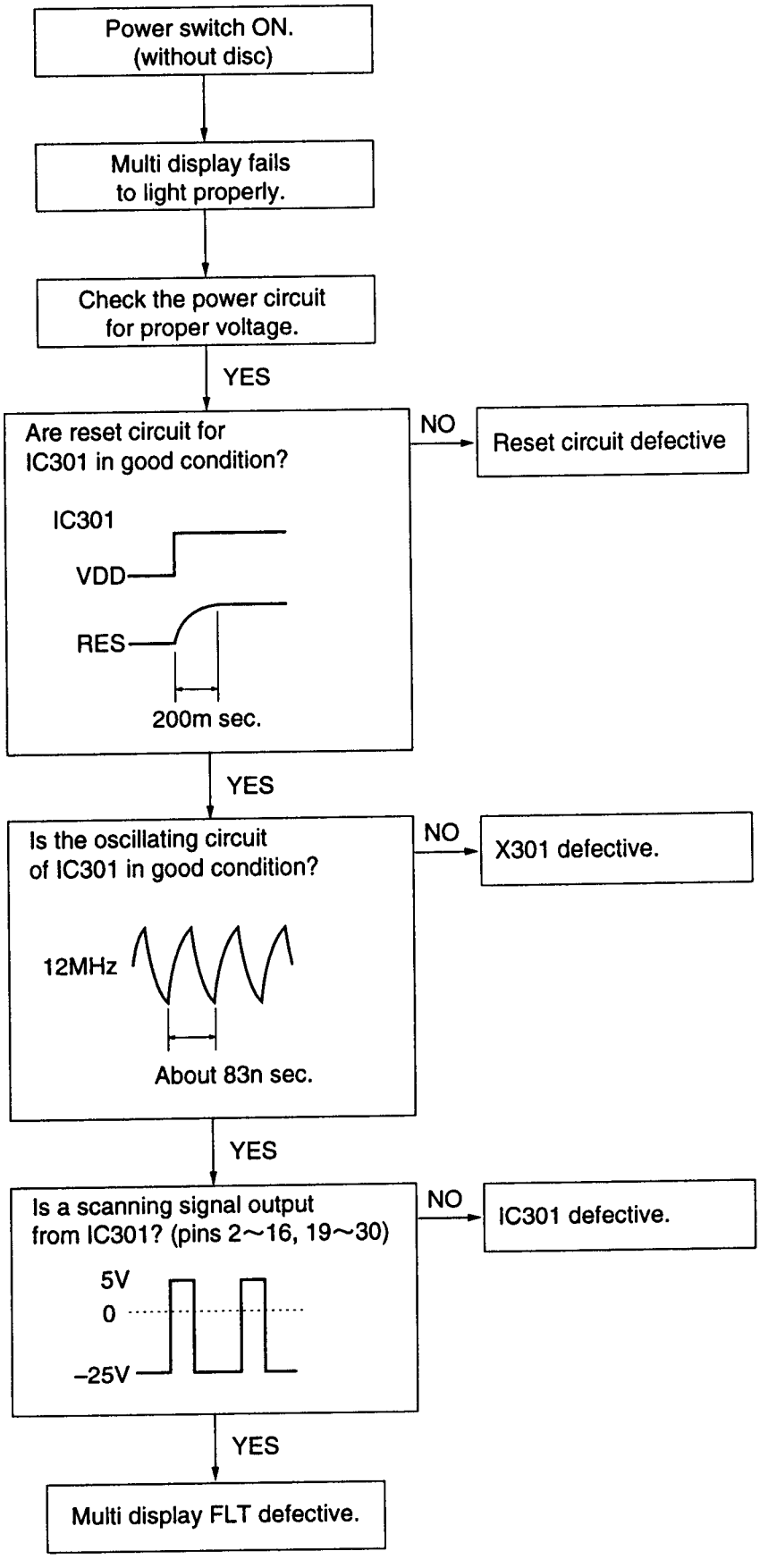
THE DISPLAY SHOWS BROKEN CHARACTERS
- Turn the power to the unit off, then back on again.

THE REMOTE CONTROL DOES NOT FUNCTION CORRECTLY
- Make sure you are using the remote control within the 30° angle and 23ft.(7m) range described in this manual.
- Make sure the remote transmitter lens and the front panel REMOTE SENSOR window are clean and that no objects are blocking the path from the remote control to the REMOTE SENSOR area on the front panel.
- Make sure that no strong fluorescent lights are being used in the listening room.
- Check that the batteries inside the remote control are fresh.

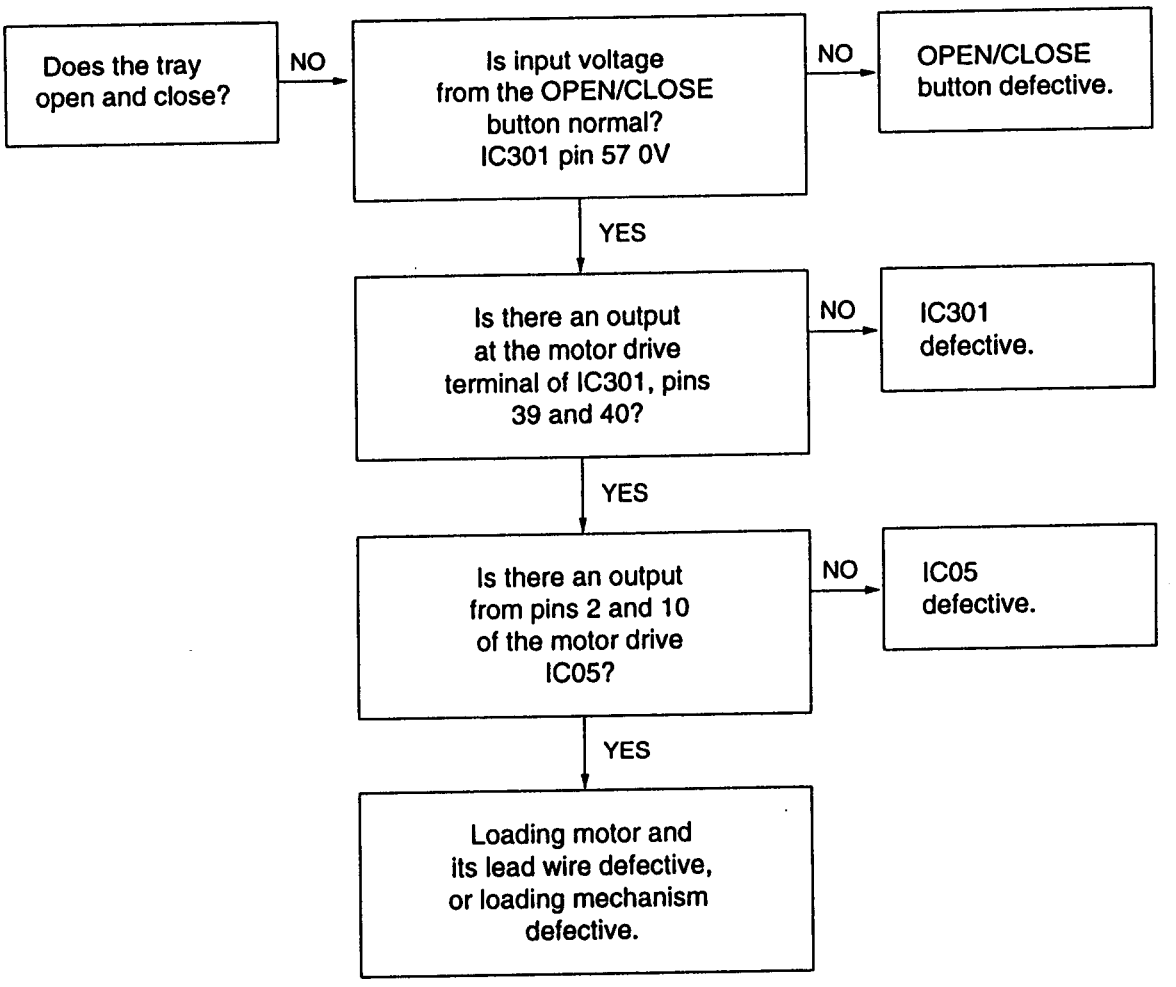
When a trouble has occurred, first check the pick-up lens for dirt and each connector for tight and secure connection.
If the problem persists after checking both of these items, use the following check procedures.



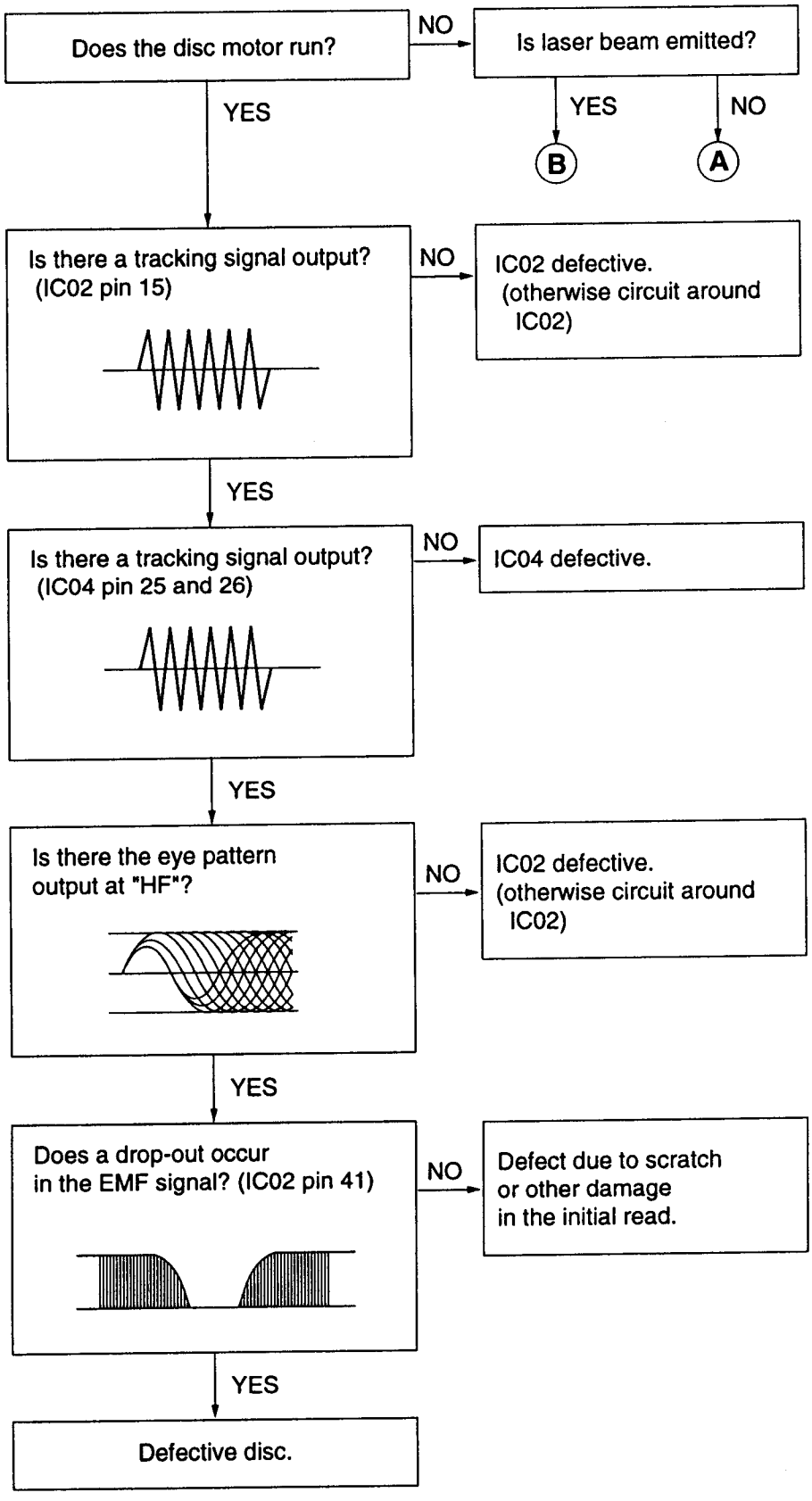
(1) When Multi Display fails to light properly.



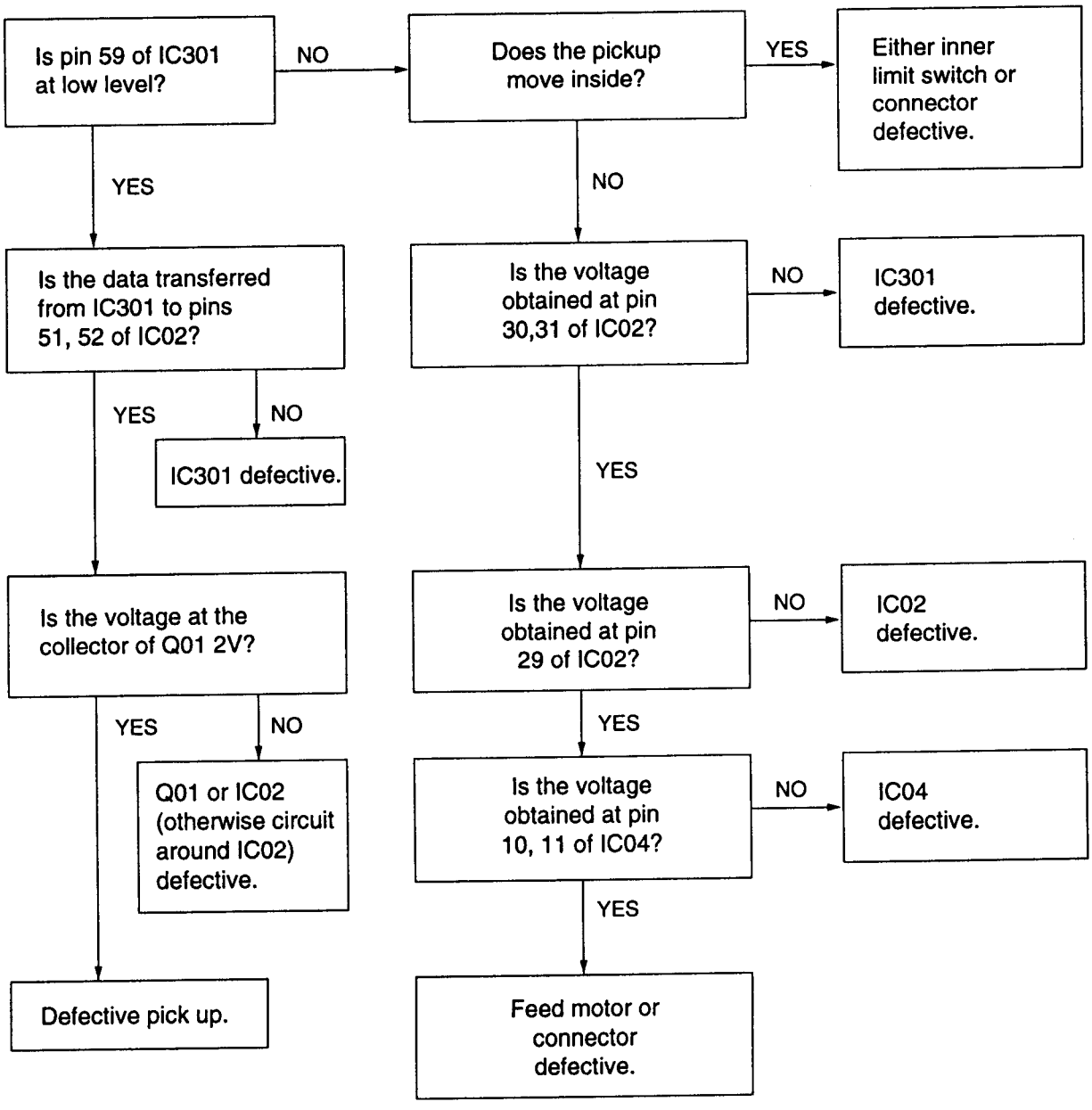
(2) When the tray fails to operate properly.



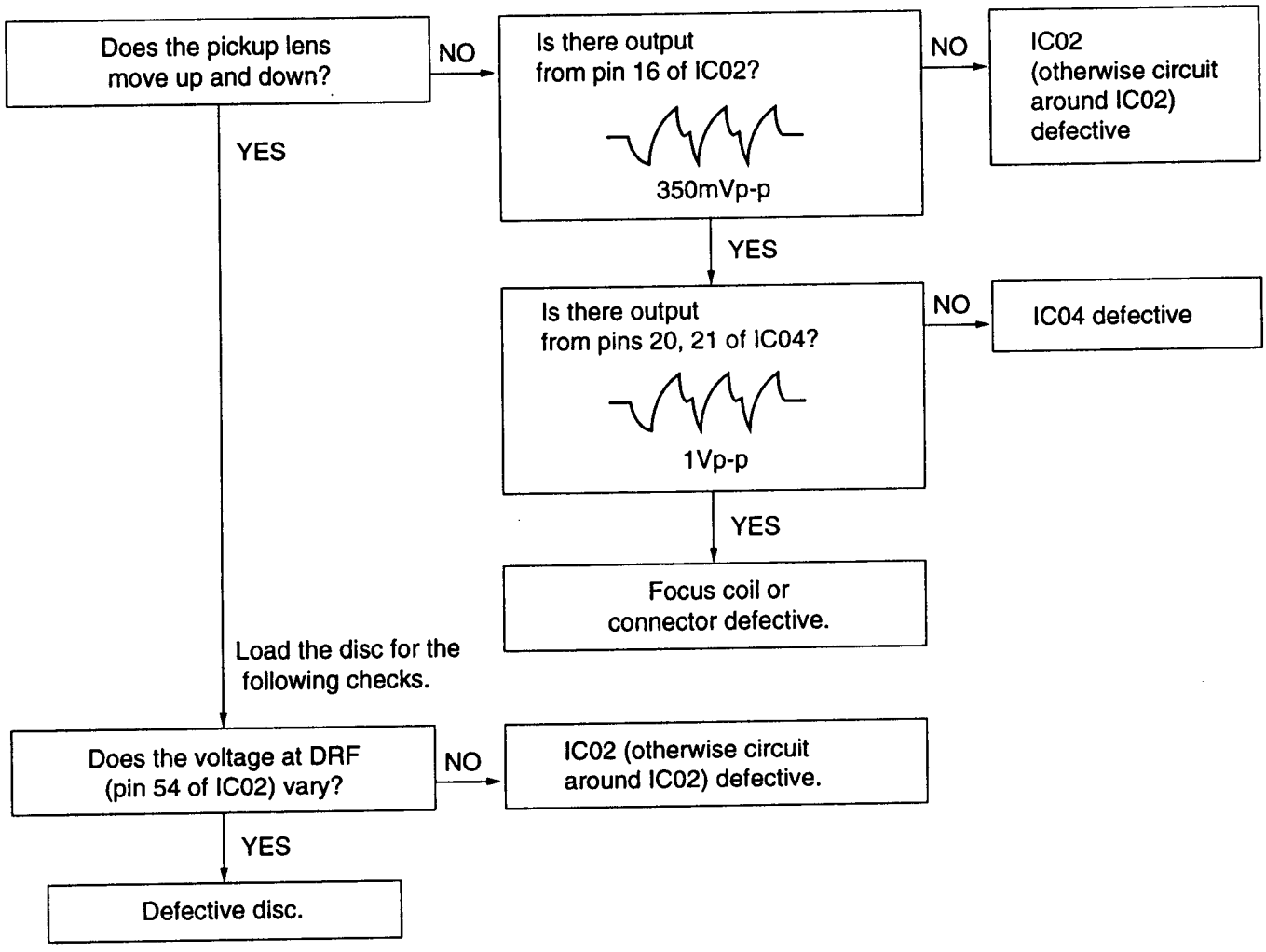
(3) When initial read cannot be executed.



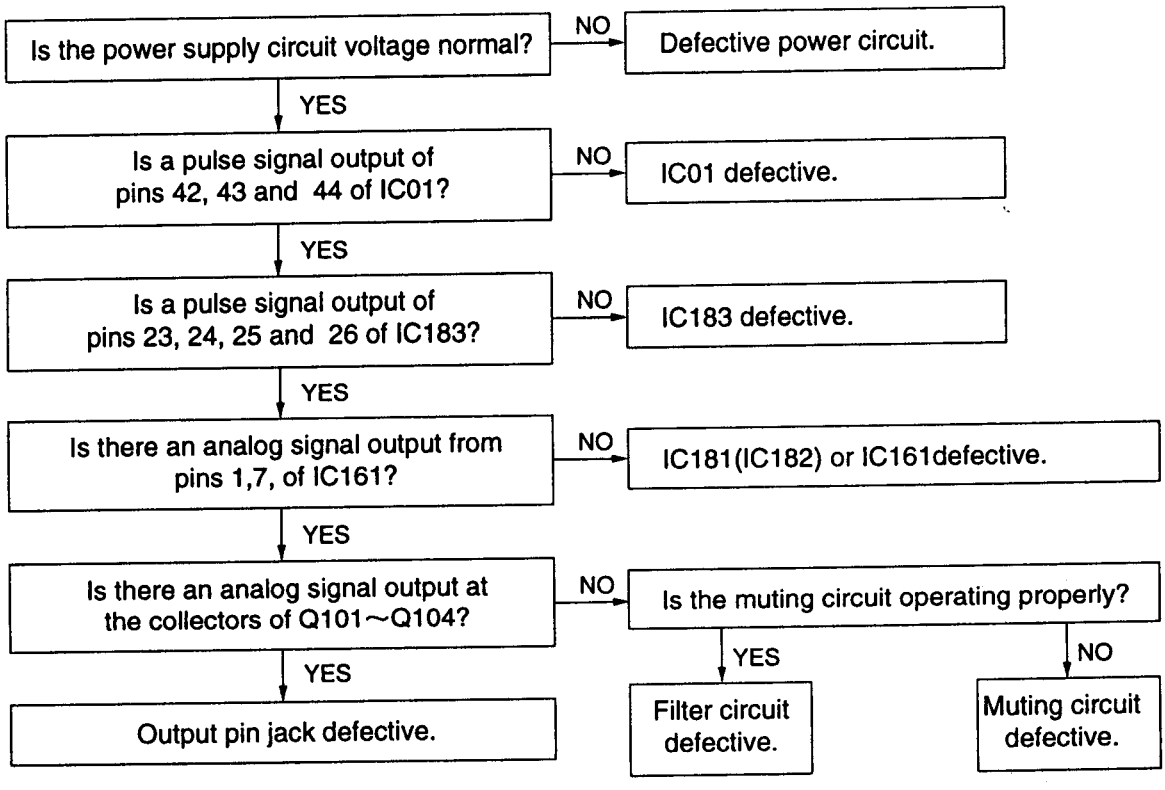
(A) When laser beam is not emitted.



(B) When laser beam is not emitted.



When there is no audio output.



TERMINAL FUNCTIONS

IC01 LC78621ED RF AMP + Signal Servo Processor

IC No.	Pin No.	Symbol	I/O	Function		
IC01	1	DEFI	I	Defect detection signal (DEF) input (Must be tied low if unused.)		
	2	TAI	I	PLL pins	Test input. A pull-down resistor is built in.	
	3	PDO	O		External VCO control phase comparator output.	
	4	VVSS			Internal VCO ground. Normally 0V.	
	5	ISET	AI		PDO output current adjustment resistor connection.	
	6	VVDD			Internal VCO power supply.	
	7	FR	AI		VCO frequency range adjustment.	
	8	VSS		Digital system ground. Normally 0V.		
	9	$\overline{EFMO}$	O	Slice level control	EFM signal inverted output.	
	10	EFMO	O		EFM signal output.	
	11	EFMIN	I		EFM signal input.	
	12	TEST2	I	Test input. A pull-down resistor is built in.		
	13	CLV+	O	Spindle servo control output. Acceleration when CLV+ is high, deceleration when CLV- is high		
	14	CLV-	O	Three-value output is also possible when specified by microprocessor command.		
	15	V/$\overline{P}$	O	Rough servo/phase control automatic switching monitor output. Outputs a high level during servo and low level during phase control.		
	16	FOCS	O	Focus servo on/off output. Foucs servo is on when the output is low.		
	17	FST	O	Focus start pulse output. This is an open-drain output.		
	18	$\overline{FZD}$	I	Focus error zero cross signal input. (Must be tied low if unused.)		
	19	HFL	I	Track detection signal input. This is a Schmitt input.		
	20	TES	I	Tracking error signal input. This is a Schmitt input.		
	21	PCK	O	EFM data playback clock monitor.Outputs 4.3218 MHz when the phase is locked.		
	22	FSEQ	O	Synchronization signal detection output. Outputs a high level when the synchronization signal detected from the EFM signal and the internally generated synchronization signal agree.		
	23	TOFF	O	Tracking off output.		
	24	TGL	O	Tracking gain switching output. Increase the gain when low.		
	25	THLD	O	Tracking hold output.		
	26	TEST3	I	Test input. A pull-down resistor is built in.		
	27	VDD		Digital system power supply.		
	28	JP+	O	Track jump output.A high level output JP+ indicates acceleration during an outward jump or deceleration during an inward jump. A high level output from JP- indicates acceleration during an inward jump or deceleration during an outward jump. Three-value output is also possible when specified by microprocessor command.		
	29	JP-	O			
	30	DEMO	I	Sound output function input used for end product adjustment manufacturing steps. A pull-down resistor is built in.		
	31	TEST4	I	Test input. A pull-down resistor is built in.		
	32	EMPH	O	De-emphasis monitor pin. A high level indicates playback of a de-emphasis disk.		
	33	LRCKO	O	Digital filter output.	Word clock output.	
	34	DFORO	O		Right channel data output.	
	35	DFOLO	O		Left channel data output.	
	36	DACKO	O		Bit clock output.	
	37	TST10	O	Test output. Leave open. (Normally outputs a low level.)		
	38	ASDACK	I	Antishock system inputs. (Must be tied low if unused.)	Bit clock input.	
	39	ASDFIN	I		Left/right channel data input.	
	40	ASDFIR	I		Test input. (Should be tied low for normal operation.)	
	41	ASLRCK	I		Word clock input.	
	42	LRSY	O	ROMXA application output signals.	Left/right clock output.	
	43	CK2	O		Bit clock output. (after reset)	Inverted polarity clock output. (During CK2CON mode.)
	44	ROMXA	O		Interpolation data output (after reset)	ROM data output (During ROMXA mode.)
	45	C2F	O		C2 flag output.	

IC No.	Pin No.	Symbol	I/O	Function	
IC01	46	MUTEL	O	One-bit D/A converter	Left channel mute output.
	47	LVDD			Left channel power supply.
	48	LCHP	O		Left channel P output.
	49	LCHN	O		Left channel N output.
	50	LVSS			Left channel ground. Normally 0V.
	51	RVSS			Right channel ground. Normally 0V.
	52	RCHN	O		Right channel N output.
	53	RCHP	O		Right channel P output.
	54	RVDD			Right channel power supply.
	55	MUTER	O		Right channel mute output.
	56	DOUT	O	Digital output.	
	57	SBSY	O	Subcode block synchronization signal.	
	58	EFLG	O	C1, C2, signal and double error conection monitor pin.	
	59	PW	O	Subcode P, Q, R, S, T, U, V and W output.	
	60	SFSY	O	Subcode frame synchronization signal output. This signal falls when the subcodes are in the standby state.	
	61	SBCK	I	Subcode readout clock input. This is a Schmitt input. (Must be tied low when unused.)	
	62	FSX	O	Output for the 7.35 kHz synchronization signal divided from the crystal oscillator.	
	63	WRQ	O	Subcode Q output standby output.	
	64	RWC	I	Read/write control input. This is a Schmitt input.	
	65	SQOUT	O	Subcode Q output.	
	66	COIN	I	Command input from the control microprocessor.	
	67	$\overline{COCK}$	I	Input for both the command input acquisition clock and the SQOUT pin subcode readout clock input. This is a Schmitt input.	
	68	RES	I	Chip reset input. This pin must be set low briefly after power is first applied.	
	69	TST11	O	Test output. Leave open. (Nomally outputs a low level.)	
	70	$\overline{LASER}$	O	Laser on/off output. Controlled by serial data commands from the control microprocessor.	
	71	16M	O	16.9344 MHz output.	
	72	4.2M	O	4.2336 MHz output.	
	73	CONT	O	Supplementary control output. Controlled by serial data commands from the control microprocessor.	
	74	TEST5	I	Test input. A pull-down resistor is built in.	
	75	$\overline{CS}$	I	Chip select input. A pull-down resistor is built in.	
	76	XVSS		Crystal oscillator ground. Normally 0V.	
	77	XIN	I	Connections for a 16.9344 MHz crystal oscillator.	
	78	XOUT	O		
	79	XVDD		Crystal oscillator power supply.	
	80	TEST1	I	Test input. A pull-down resistor is built in.	

IC02 LA9240M Digital Signal Processor

IC No.	Pin No.	Symbol	Contents
IC02	1	FIN2	Pickup photodiode connection pin. Added to FIN1 pin to generate the RF signal, subtracted from FIN1 pin to generate the FE signal.
	2	FIN1	Pickup photodiode connection pin.
	3	E	Pickup photodiode connection pin. Subtracted from F pin to generate the TE signal.
	4	F	Pickup photodiode connection pin.
	5	TB	TE signal DC component input pin.
	6	TE-	Pin which connects the TE signal gain setting resistor between this pin and TE pin.
	7	TE	TE signal output pin.
	8	TESI	TES (Track Error Sense) comparator input pin. The TE signal is input through a handpass filter.
	9	SCI	Shock detection input pin.
	10	TH	Tracking gain time constant setting pin.
	11	TA	TA amplifier output pin.
	12	TD-	Pin for configuring the tracking phase compensation constant between the TD snd VR pins.
	13	TD	Tracking phase compensation setting pin.
	14	JP	Tracking jump signal (kick pulse) amplitude setting pin.

IC No.	Pin No.	Symbol	Contents
IC02	15	TO	Tracking control signal output pin.
	16	FD	Focusing control signal output pin.
	17	FD-	Pin for configuring the focusing phase compensation constant between the FD and FA pins.
	18	FA	Pin for configuring the focusing phase compensation constant between the FD- and FA- pins.
	19	FA-	Pin for configuring the focusing phase compensation constant between the FA and FE pins.
	20	FE	FE signal output pin.
	21	FE-	Pin which connects the FE signal gain setting resistor between this pin and FE pins.
	22	AGND	Analog signal GND.
	23	SP	CV+ and CV- pins input signal single-end output.
	24	SPI	Spindle amplifier input.
	25	SPG	12-cm spindle mode gain setting resistor connection pin.
	26	SP-	Spindle phase compensation constant connestion pin, along with the SPD pin.
	27	SPD	Spindle control signal output pin.
	28	SLEQ	Sled phase compensation constant connection pin.
	29	SLD	Sled control signal output pin.
	30	SL-	Input pin for seld movement signal from microprocessor.
	31	SL+	Input pin for seld movement signal from microprocessor.
	32	JP-	Input pin for tracking jump signal from DSP.
	33	JP+	Input pin for tracking jump signal from DSP.
	34	TGL	Input pin for tracking gain control signal from DSP. Gain is low when TGL is high.
	35	TOFF	Input pin for tracking off control signal from DSP. Tracking servo is off when TOFF is high.
	36	TES	Output pin for TES signal to DSP.
	37	HFL	The High Frequency Level is used to determine whether the main beam is positioned over a bit or over the mirrored surface.
	38	SLOF	Sled servo off control input pin.
	39	CV-	Input pin for CLV error signal from DSP.
	40	CV+	Input pin for CLV error signal from DSP.
	41	RFSM	RF output in.
	42	RFS-	RF gain setting and EFM signal 3T compensation constant setting pin, along with the RFSM pin.
	43	SLC	Slice Level Control is an output pin that controls the data slice level used by the DSP for the RF waveform.
	44	SLI	Input pin used by DSP for controlling the data slice level.
	45	DGND	Digital system GND pin.
	46	FSC	Focus search smoothing capacitor output pin.
	47	TBC	Tracking balance control; EF balance adjustment variable range setting pin.
	48	NC	No connection.
	49	DEF	Disc defect detection output pin.
	50	CLK	Reference clock input pin. 4.23 MHz signal from the DSP is input.
	51	CL	Microprocessor command clock input pin.
	52	DAT	Microprocessor command data input pin.
	53	CE	Microprocessor command chip enable input pin.
	54	DRF	RF level detection output (Detect RF).
	55	FSS	Focus search select; focus search mode (±search /+search vs. the reference voltage)switching pin.
	56	Vcc2	Servo system and digital system Vcc pin.
	57	REFI	By-pass capacitor connection pin for reference voltage.
	58	VR	Reference voltage output pin.
	59	LF2	Disc defect detection time constant setting pin.
	60	PH1	RF signal peak hold capacitor connection pin.
	61	BH1	RF signal bottom hold capacitor connection pin.
	62	LDD	APC circuit output pin.
	63	LDS	APC circuit input pin.
	64	Vcc1	RF system Vcc pin.

IC301 LC866012C Micro Computer					
PIN	PORT	#	STATE	NAME	REMARK
1	SO	–		–	NC
2~11	S1/T1~S11/T11	G	O	–	GRID
12~16	S11/T11~S15/T15			SEG	SEG
17	VDDVPP	–			
18	VP	–			
19	S16	G	O	SEG	SEG
20	S17	G	O	SEG	SEG
21	S18	G	O	SEG	SEG
22	S19	G	O	SEG	SEG
23	S20	G	O	SEG	SEG
24	S21	G	O	SEG	SEG
25	S22	G	O	SEG	SEG
26	S23	G	O	SEG	SEG
27	S24	G	O	SEG	SEG
28	S25	G	O	SEG	SEG
29	S26	G	O	SEG	SEG
30	S27	G	O	SEG	SEG
31	S28	G	O	–	NC
32	S29	G	O	–	NC
33	P00	E	I/O	OPEN SW	TRAY OPEN DETECTION
34	P01	E	I/O	CLOSE SW	TRAY CLOSE DETECTION
35	P02	E	I/O	AUTO PLAY	AUTO PLAY ON/OFF "H"=ON
36	P03	E	I/O	720/740	MODEL "H"=740 "L"=720
37	P04	E	I/O	SLED+	OUT WARD SLED KICK
38	P05	E	I/O	SLED–	IN WARD SLED KICK
39	P06	E	I/O	TRAY–	TRAY CLOSE "H"=CLOSE
40	P07	E	I/O	TRAY+	TRAY OPEN "H"=OPEN
41	P10/SO0	F	I/O	COIN	DSP
42	P11/SIO/SB0	F	I/O	SQOUT	DSP
43	P12/SCK0	F	I/O	CQCK	DSP
44	P13/SO1	F	I/O	RWC	DSP
45	P14/S11/SB1	F	I/O	POWER	POWER ON/OFF "H"=ON
46	P15/SCK1	F	I/O	–	NC
47	P16/BUZ	F	I/O	DMUTE	DRIVE MUTE
48	P17/PWM	F	I/O	AUDIO-MUTE	AUDIO MUTE "L"=MUTE ON
49	TEST1	–		–	μ-COM TEST
50	RES	–			
51, 52	XT1, XT2	–		–	
53	VSS	–		–	
54, 55	CF1, CF2	–		–	
56	VDD	–		–	
57	P80/AN0	B	I	*KEY2	KEY INPUT :1OP/CL, 2DISP, 3TIME, 4PROG, 5CHECK, 6RANDOM, 7REPEAT, 8TAPE, 9EDIT
58	P81/AN1	B	I	*KEY1	KEY INPUT :1STOP, 2PLAY, 3PAUSE, 4B-SEARCH, 5F-SEARCH, 6B-SKIP, 7F-SKIP, 8TEST
59	P82/AN2	B	I	PUIN	PICK SW IN INPUT
60	P83/AN3	B	I	–	(GND)
61	P70/INT0	D	I/O	WRQ	DSP
62	P71/INT1	C	I	DRF	ASP
63	P72/INT2/TOI	C	I	–	NC
64	P73/INT3/TOI	C	I	REMOCON	REMOCON INPUT

CIRCUIT DESCRIPTION

-CDP-

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 IC02 pin 62 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.

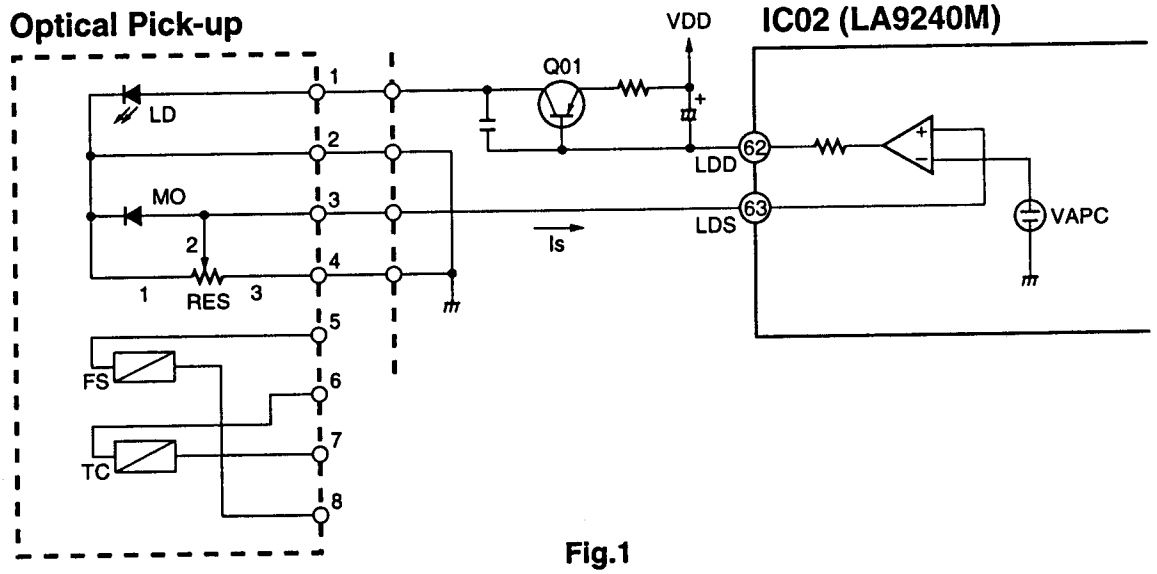


Fig.1

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.

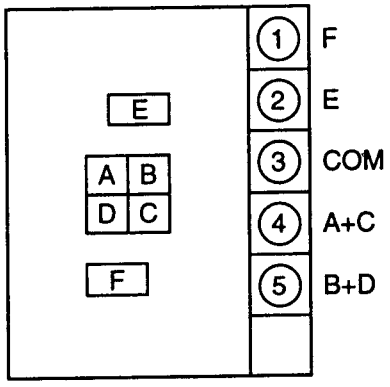
The four photodiodes (A through D) at the center provide focus into a round image only at a certain point.

The sums of outputs from diagonal two elements of four division photodiodes (A+C and B+D) are compared by the differential amplifier in IC02 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.

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.



Three spotted (six-division) photo diodes

Fig.2

The currents from the photodiodes (A+C and B+D) are applied to pins 1 and 2 of IC02 and converted to voltage by RF I-V amplifiers (1) and (2) included in IC02

3. TRACKING ERROR AMPLIFIER

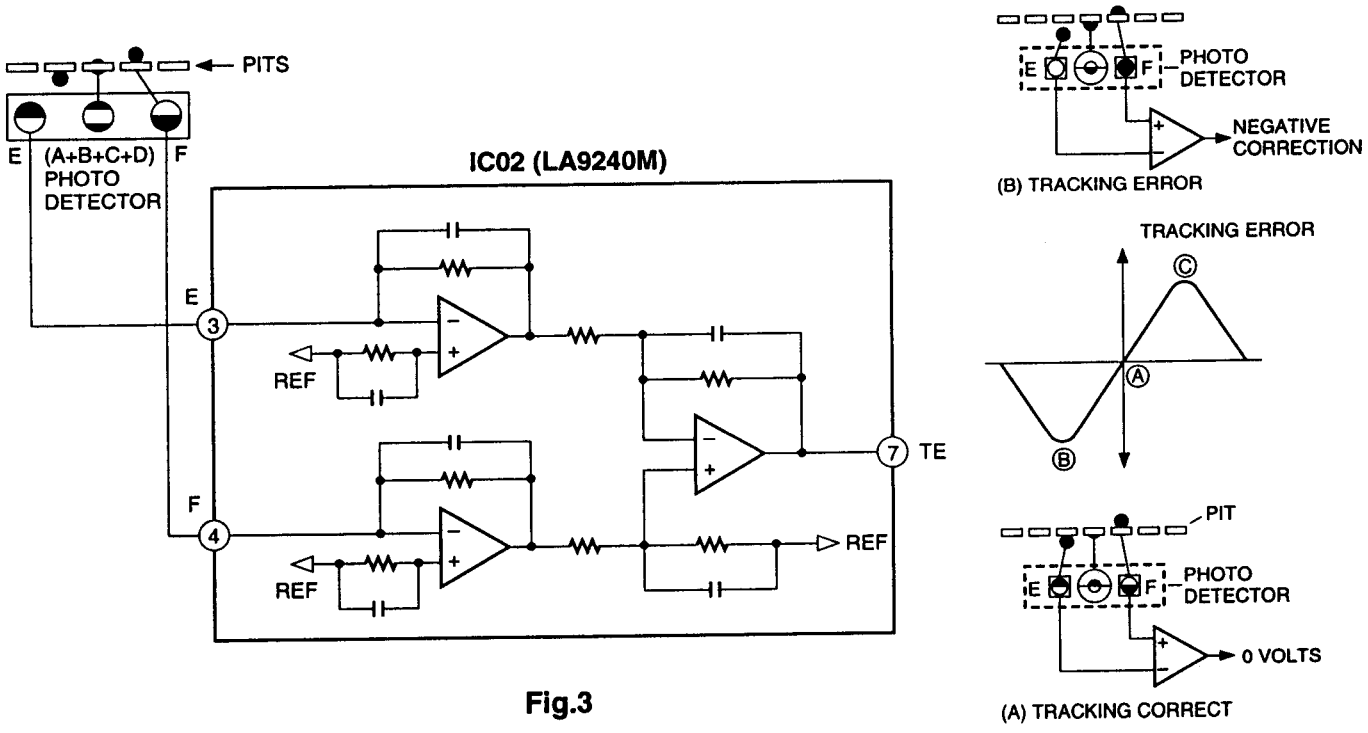


Fig.3

The output of photo detector F is directed to the (–) input of F I-V AMP A and out of photo detector E is directed to the (–) input of E I-V AMP.
These input signals are current.
E I-V AMP and F I-V AMP are converted into voltage from the current signal. When correct tracking, two input (VF, VE) Signals are equal. The occurrence of tracking error is due to difference between F I-V AMP output and E I-V AMP output.

4.FOCUS ERROR AMPLIFIER

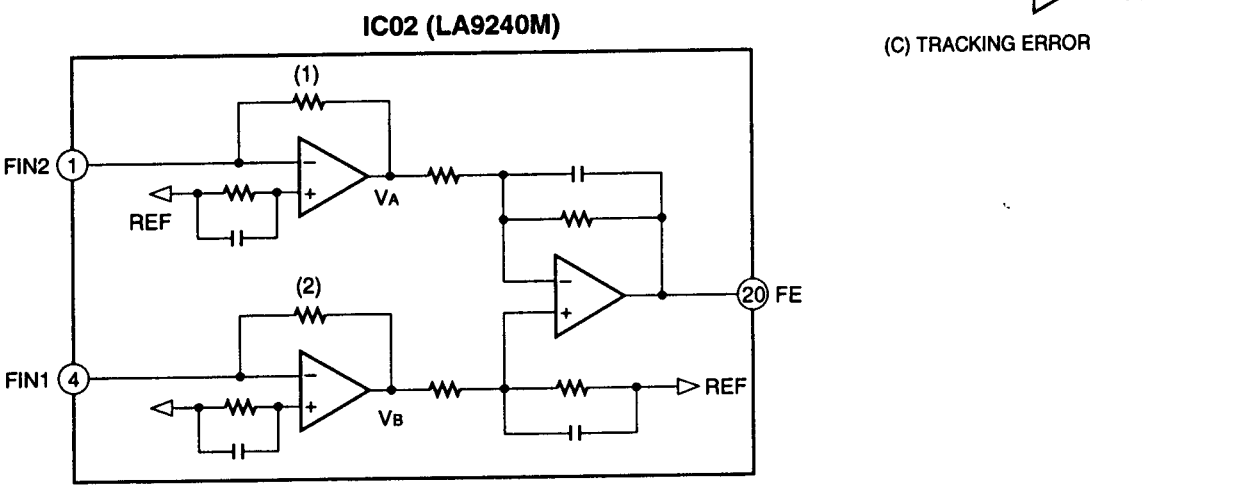
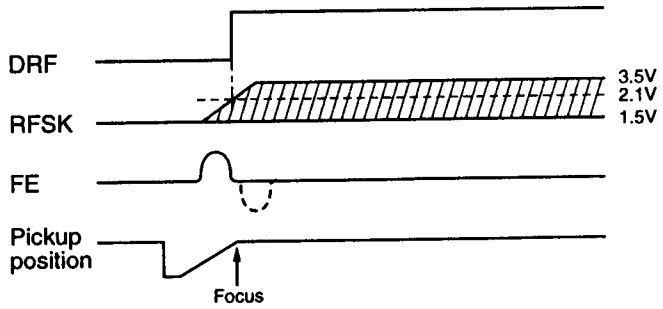


Fig.4

The focus error amp is the difference between RF I-V AMP (1) output VA and RF I-V AMP (2) output VB.
This two (VA, VB) Signals are each applied to the (–) and (+) input of focus error amp.
As the result of differential voltage. Focus error signal appears at FE Pin(Pin 20).
This FE Output Voltage (low frequency) becomes (A+C)–(B+D).
The focus error voltage is directed to the focus servo Block, to maintain optimum focusing at all times.

5. FOCUS OK GENERATION CIRCUIT

DRF(luminous energy determination)
DRF goes high when the peak of the EFM signal (RFSM output) held by the PHI (pin 60) capacitor exceeds approximately 2.1 V.
The PHI (pin 60) capacitor affects the DRF detection time constant and the RFAGC response bidirectional setting.
The DRF output is driven by a constant current (250 µA).



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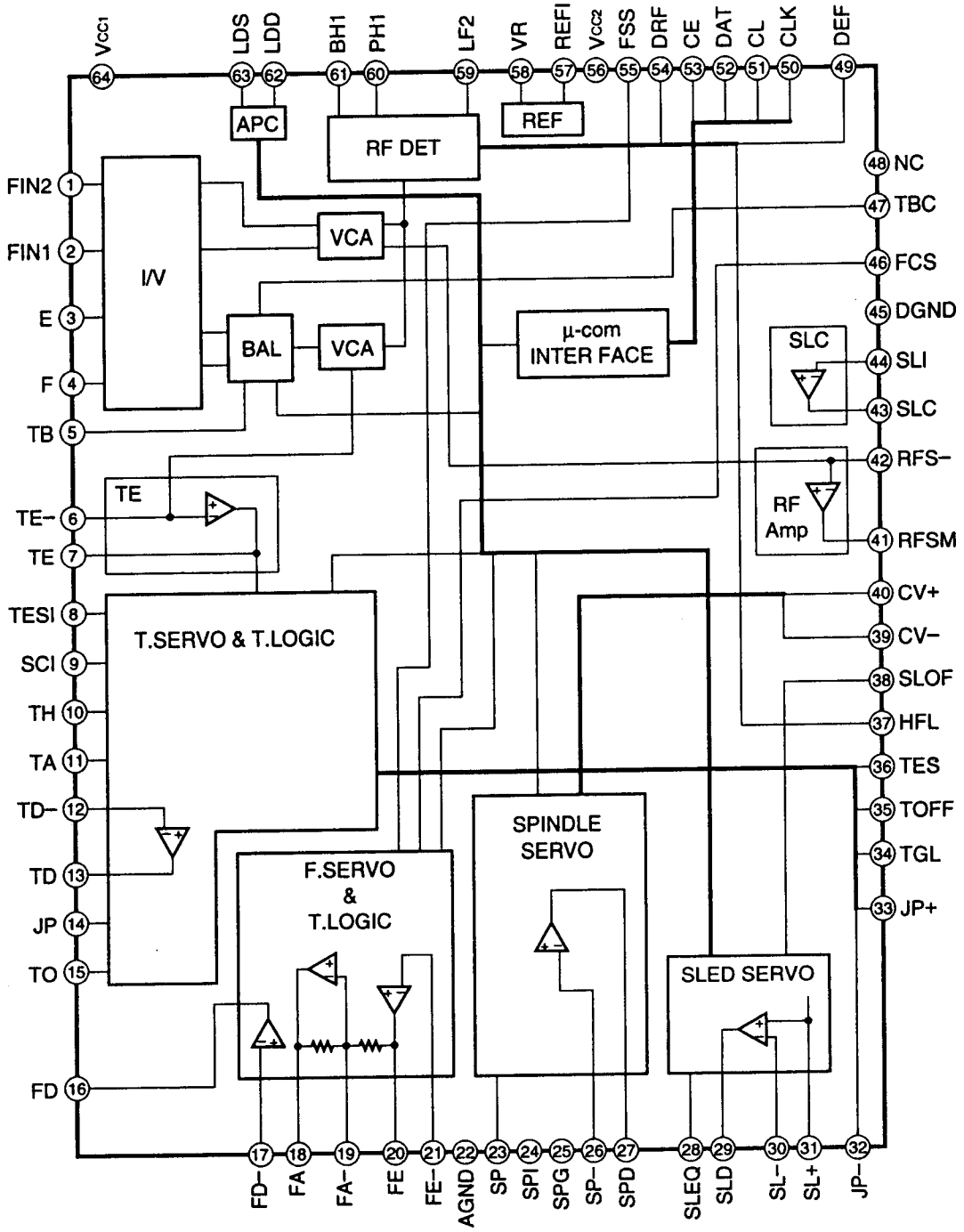
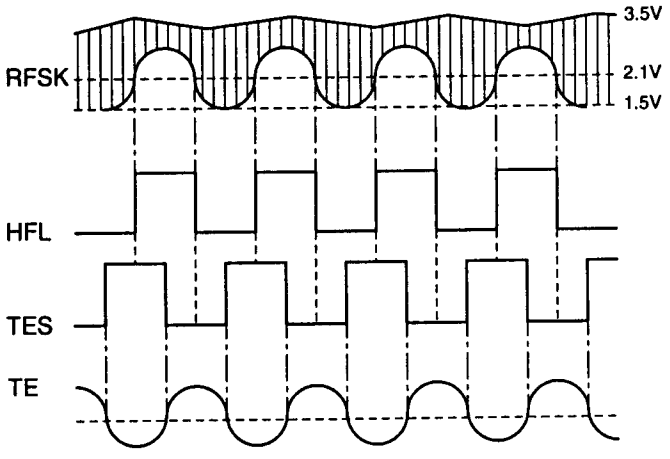
IC02 (LA9240M)



6. MIRROR CIRCUIT

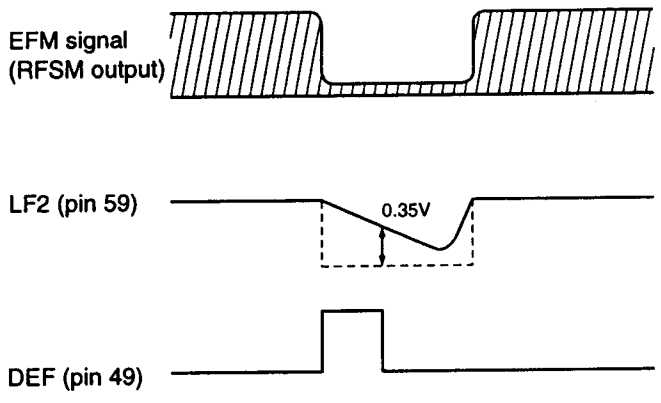
TES and HFL (traverse signals)
When moving the pickup from the outer track to the inner track, the EF output from the pickup must be connected so that the phase relationship of TES and HFL is as shown in the diagram below. For the TESI input, the TES comparator has negative polarity and hysteresis of approximately ±100 mV. An external bandpass filter is needed in order to extract only the required signal from the TE signal.



A6015

7. DEFECT CIRCUIT

DEFECT
The mirrored surface level is maintained by the capacitor for LF2 (pin 59); when a drop in the EFM signal (RFSM output) reaches 0.35 V or more, a high signal is output to DEF (pin 49). If DEF(pin 49) goes high, the tracking servo enters THLD mode. In order to prevent the tracking servo from entering THLD mode when a defect is detected, prevent DEFECT from being output by either shorting DEF (pin 49) to GND, or shorting LF2 (pin 59) to GND. The DEFECT output is driven by constant current (approximately 100 μ A).



A6018

8. EFM COMPARATOR

SLC (slice level control)
The SLC sets the duty ratio for the EFM signal that is input to the DSP to 50%. The DC level is determined by integrating the EFMO signal output from the DSP to determine the duty factor.

9. APC (AUTOMATIC POWER CONTROL) CIRCUIT

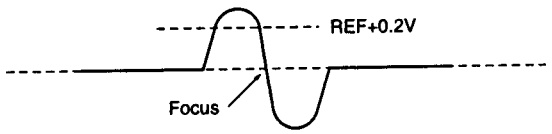
A. +5V single Power Supply P-sub Laser

APC (auto laser power control)
This circuit controls the pickup laser power. The laser is turned on and off by commands from the microprocessor.

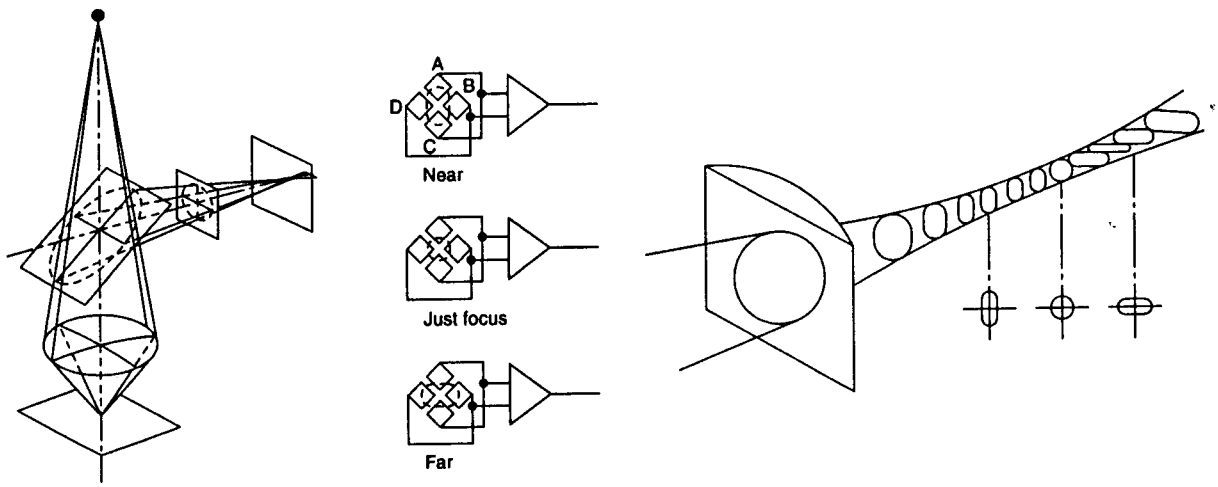
10. SERVO BLOCK

10-1. FOCUS SERVO BLOCK

Focus determination
Focus is assumed to be obtained when the focus error signal S curve reaching REF + 0.2V is detected, and the S curve subsequently returns to REF.



A6017



Foundamental Drawing

10-2. TRACKING AND SLED SERVO LOOP

Tracking servo
The pickup photodiode output current is input to E (pin 3) and F (pin 4). The current that is input is converted to the voltage, passes through the balance adjustment VCA circuit and then the VCA circuit that follows the gain in the RFAGC circuit, and is then output from TE (pin 7). The tracking error gain is set by the resistance between TE^- (pin 6) and TE (pin 7).
Offset cancellation is performed by the TE amplifier. Offset cancellation terminates after about 30 ms. The TRACK-OFFSET ADJUST OFF command is used to return to the state before the offset.
The TH amplifier alters the servo response characteristics according to the THLD signal, etc., generated internally after detection of the TGL signal from the DSP or the JP signal. When a defect is detected, the THLD mode goes into effect internally. To avoid this, short DEF (pin 49) to L=GND. By inserting an external bandpass filter to remove the shock component from the tracking error signal at SCI (pin 9), the gain is automatically boosted when a defect is detected.
The TA output (pin 11) has a built-in resistance to allow configuration of a low-pass filter.
The TD amplifier performs servo loop phase compensation; the characteristics are set by external CR. Furthermore, this amplifier has a mute function, which is applied when VCC is turned on or the TRACK-SERVO OFF command is issued. The muting function is released by the TRACK-SERVO ON command.
The TOFF amplifier that is positioned immediately after TD (pin 13) functions to turn off the servo in response to the TOFF signal from the DSP.
The TO amplifier has a JP pulse composition function. The JP pulse is set by JP (pin 14). (THLD detection is performed internally.)

10-3. SPINDLE SERVO AND LOW PASS FILTER

Spindle servo
This configures the servo circuit, which maintains the linear velocity of the disc at a constant speed, along with the DSP.
This circuit accepts signals from the DSP through CV^- (pin 39) and CV^+ (pin 40) and sets the equalizer characteristics through SP (pin 23), SP^- (pin 36), and SPD (pin 27), which are output to SPD (pin 27). The 12-cm mode amplifier gain is set by the resistor connected between SPG (pin 25) and the reference voltage. In 8-cm mode, this amplifier serves as an internal buffer, and SPG (pin 25) is ignored. Note that the gain setting is made for 8-cm mode first, and then 12-cm mode. If SPG (pin 25) is left open, the gain is forcibly set for 8-cm mode, regardless of whether 8-cm or 12-cm mode is in effect.

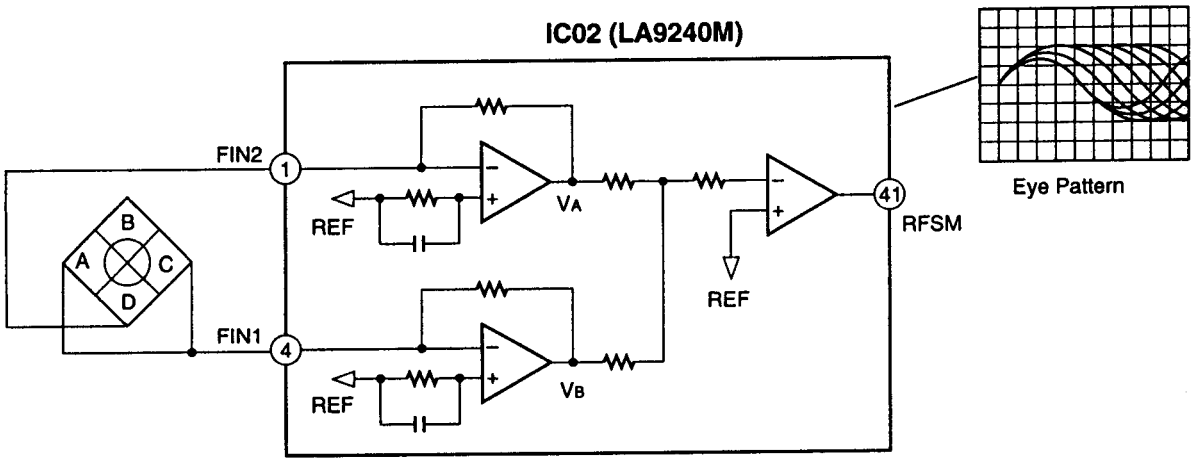
11. RF AMP BLOCK

RF amplifier (eye pattern output)
The pickup photodiode output current (A+C) is input to FIN2 (pin 1), and (B+D) is input to FINI (pin 2). The current that is input is converted to the voltage, passes through the AGC circuit, and is then output from the RFSM amplifier output RFSM (pin 41).
The internal AGC circuit has a variable range of ±3 dB, and the time constant can be changed through the external capacitor connected to PHI (pin 60). In addition, this circuit also controls the bottom level of the EFM signal (RFSM output), and the response can be changed through external capacitor connect to BHI (pin 61). The center gain setting for the AGC variable range is set by the resistance between RFSM (pin 41) and RFS^- (pin 42); if necessary, this resistance is also used for 3T compensation for the EFM signal.

11-1. Description

The photo detector is composed of 6 light sensor (A through F). The photo detector A, B, C, and D detect audio modulation signal on the disc and generate focus error signal.
The E and F photo detectors generate tracking error signal.

11-2. RF AMPLIFIER



RF I-V AMP (1) and RF I-V AMP (2) are converted current of PD1 (A+C) and PD2(B+D) through the internal resistor into Voltage. Furthermore, they are added to RF Summing amplifier.
This signal (A+B+C+D) is output from RFO (Pin 41).

11-3. EFM demodulation, error correction, serial/parallel conversion

EFM demodulation error correction and serial parallel conversion are performed by the internal circuitry of IC01.
The eye-pattern signals from pin 41 of IC02 are sent to pin 11 of IC01 then demodulated from 14 bits to 8 bits by EFM readjustment. At the same time any error, if found, is corrected (CIRC) and the signals are sent to the D/A converter interface. After that, they are output as digital signals from pins 42, 43 and 44 of IC01 and fed to the digital filter of IC183.

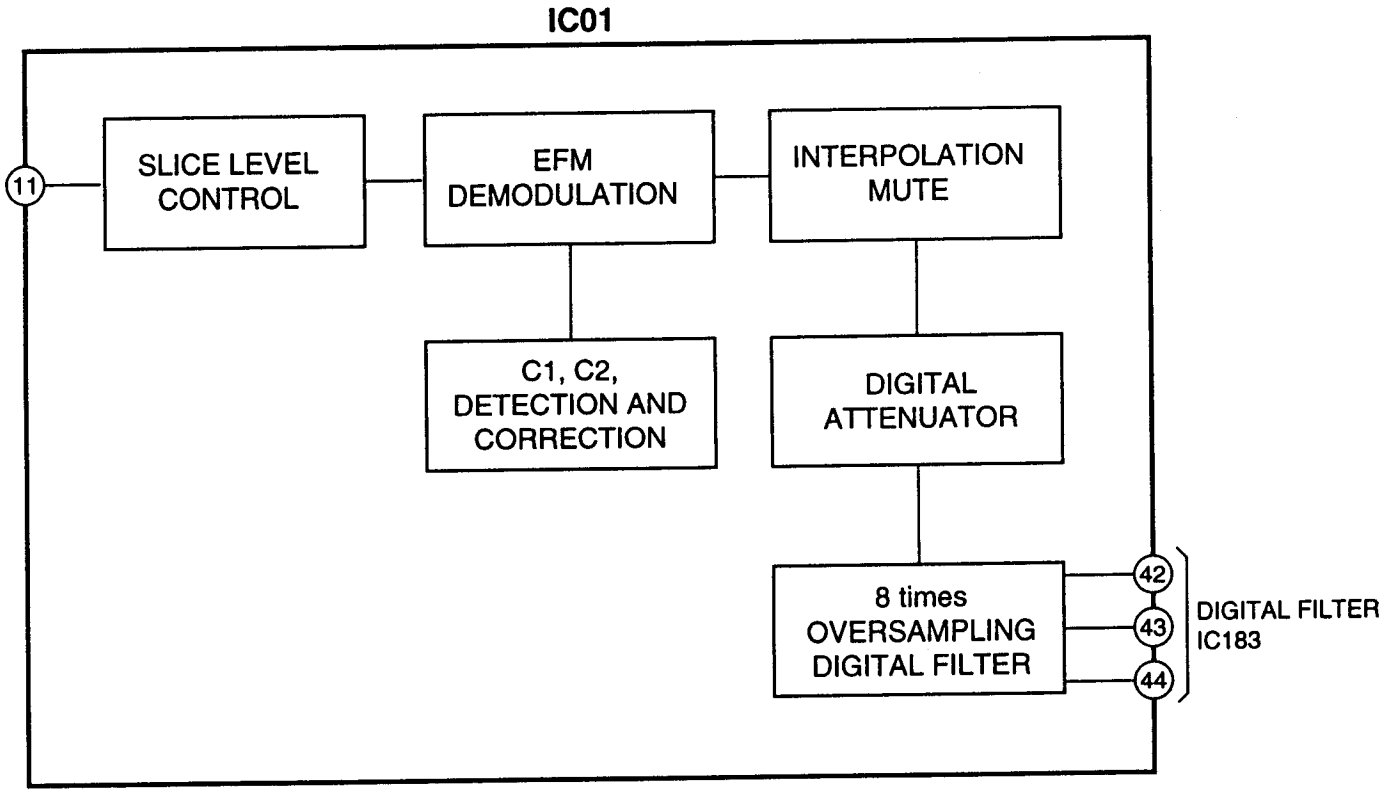


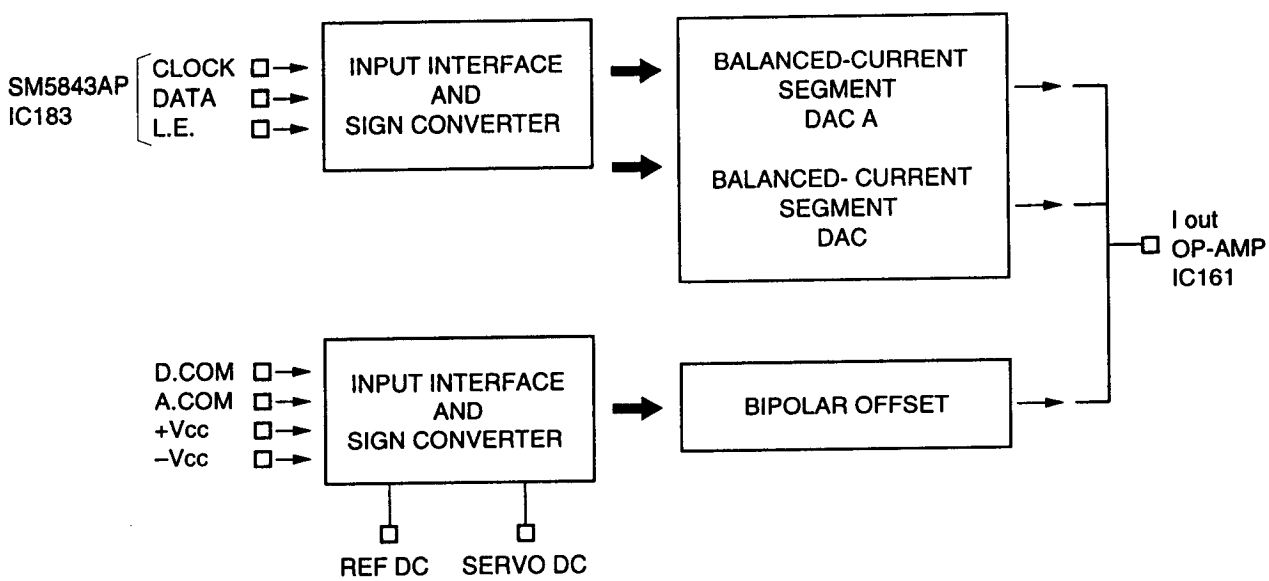
Fig.7

12. D/A Converter

D/A Converter PCM1702

Features.

1. Advanced sign magnitude type
2. 20-bit DACs
3. Low distortion
4. High SNR
5. Non- zero-cross distortion
6. For 8 times oversampling
7. Low power consumption



The PCM 1710 is a high-performance complete stereo audio digital-to-analog converter, including multi-level delta sigma DAC, digital interpolation filter and output op-amp. The PCM1710 allows, with an output op-amp incorporated, direct and clean analog voltage output excellent in anti-jitter performance, RFI and the like.

Audio Circuit

The output from Pin 7 of IC161 passes through the 1-step L.P.F. which consists of C117 and R153. The high frequency component of the output from DAC is removed. And the signal passes through the discrete circuit amplifier consisting of Q115, Q117, Q113 and Q111.

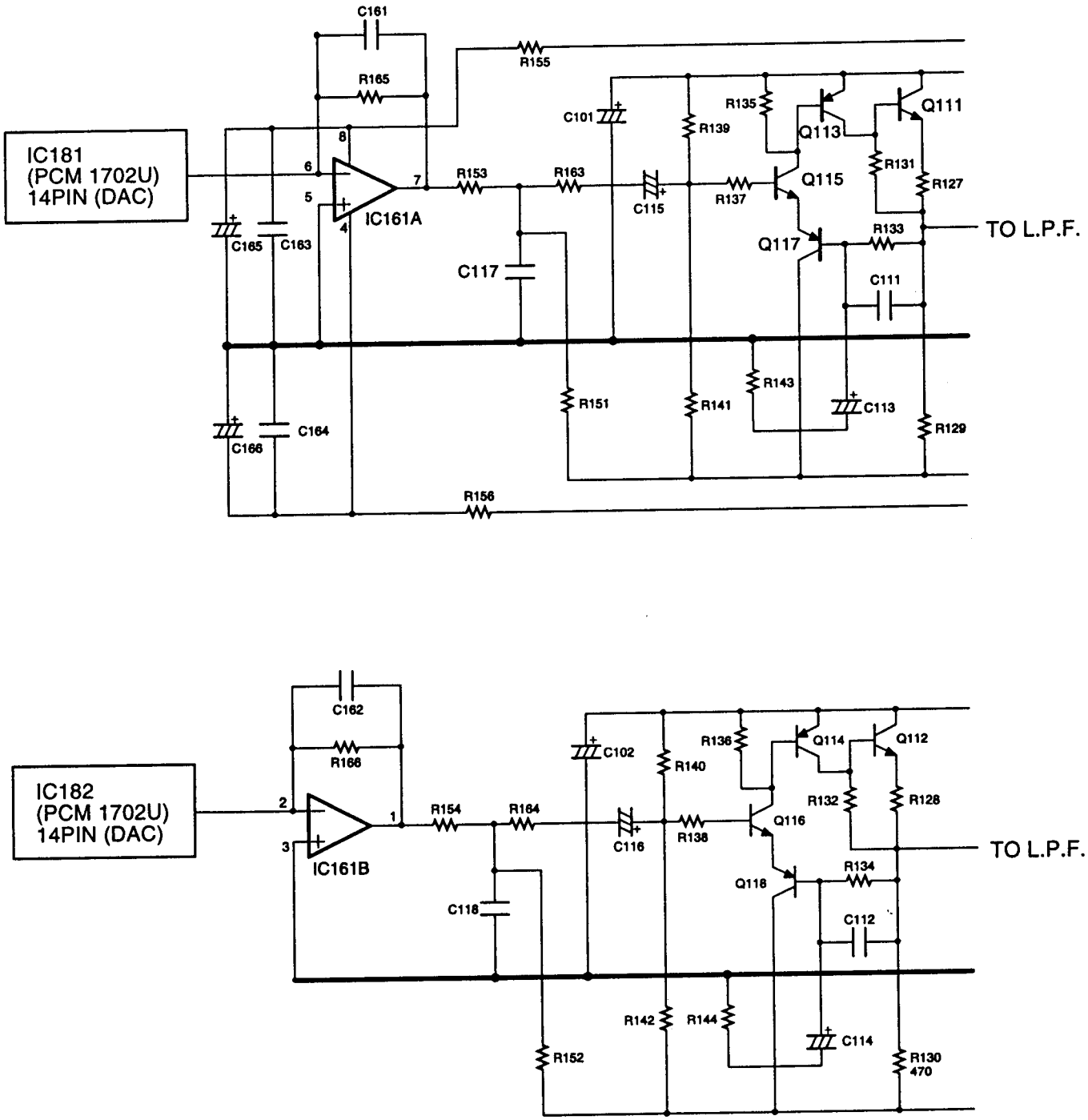


Fig.9

Low-Pass filter

Fig.10 shows a final-stage circuit which includes a low-pass filter and other elements.

The portion of Fig.10 enclosed by the broken line is 3rd-other active LPF. This LPF causes noise in the high range to be cut. Q105 and Q107 (Left channel) and Q106 and Q108 (Right channel) are buffer circuit of inverted darlington configuration. Q109 and Q110 are FET controlled constant current circuits. Q110, Q109, Q103, Q104, Q101 and Q102 is power muting circuit.

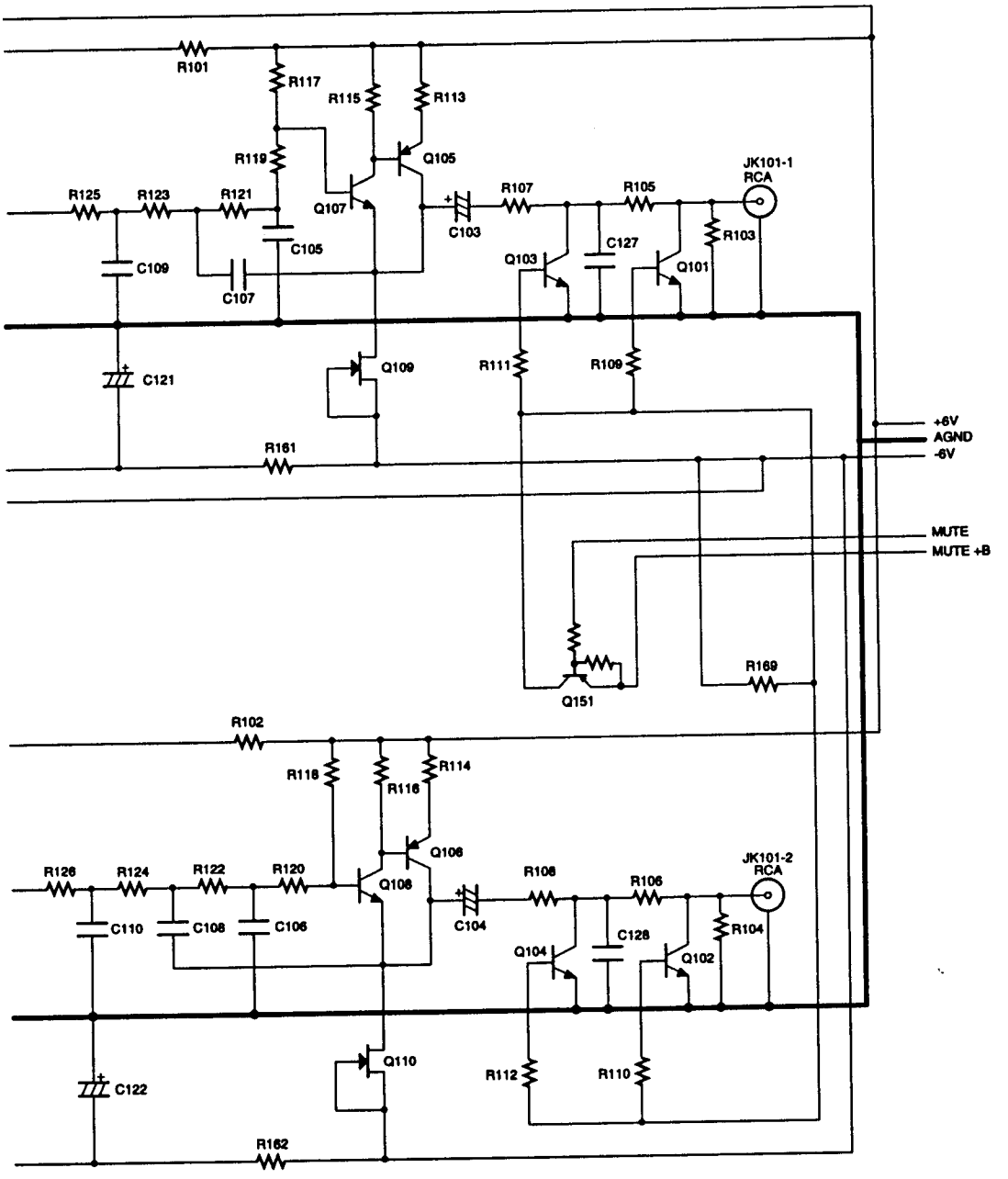
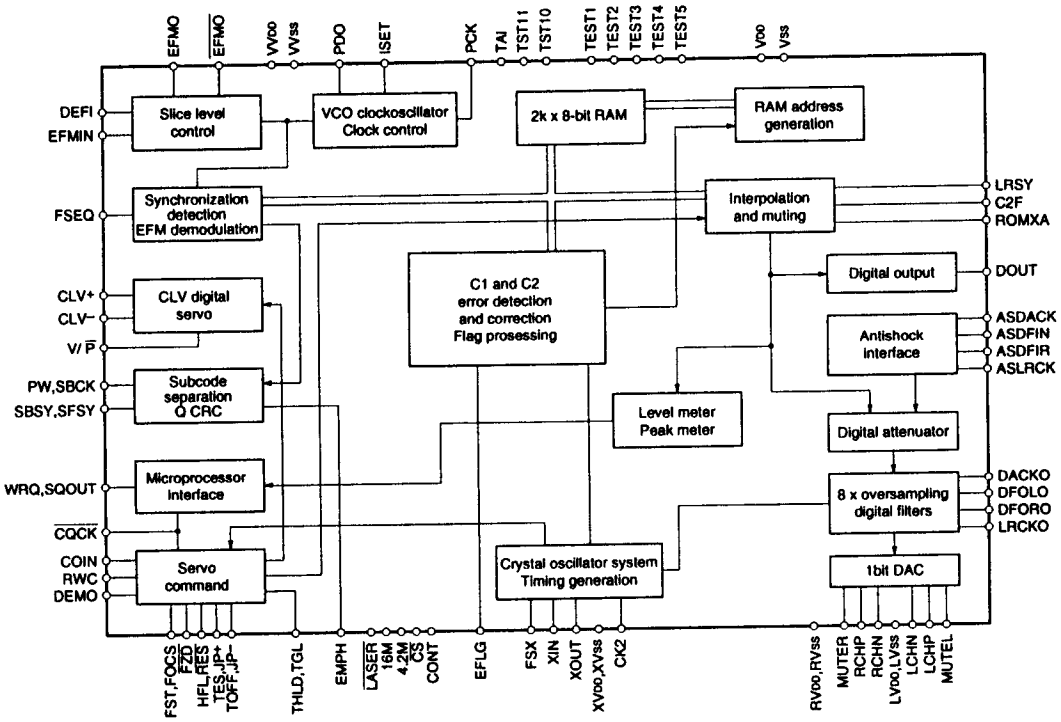


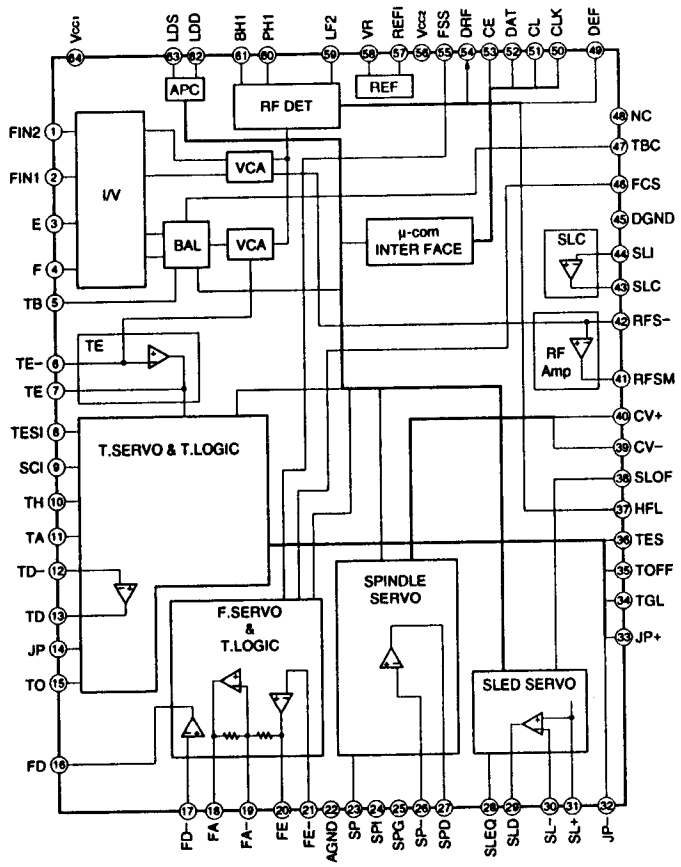
Fig. 10

IC BLOCK DIAGRAM

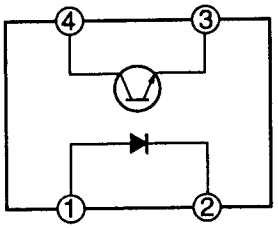
IC01 IC LC78621E RF AMP+SSP (Signal Servo processor)



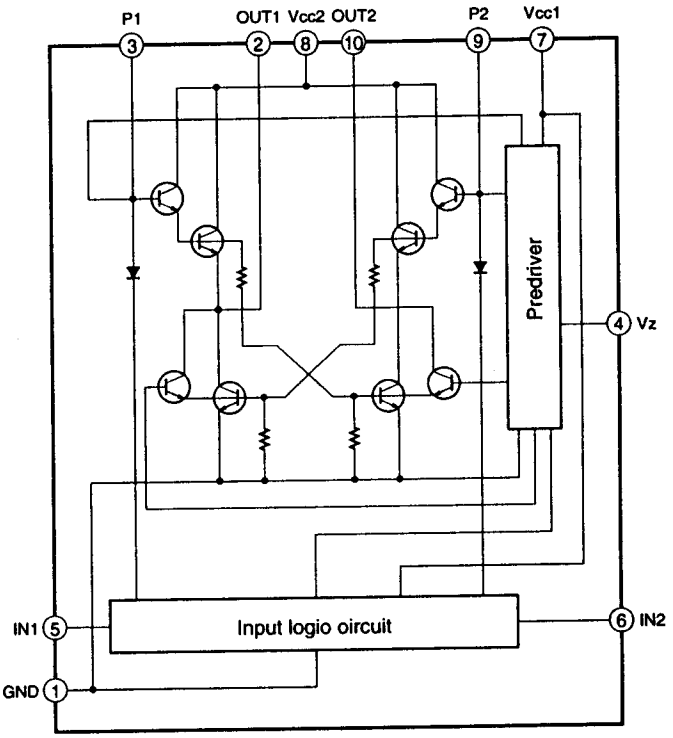
IC02 IC LA9240M Digital Signal processor



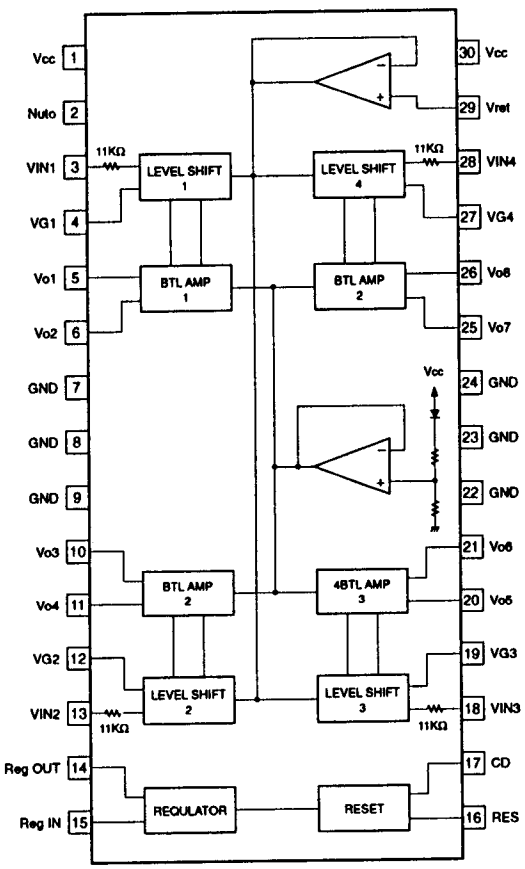
IC03 IC PC817B
Photo Coupler



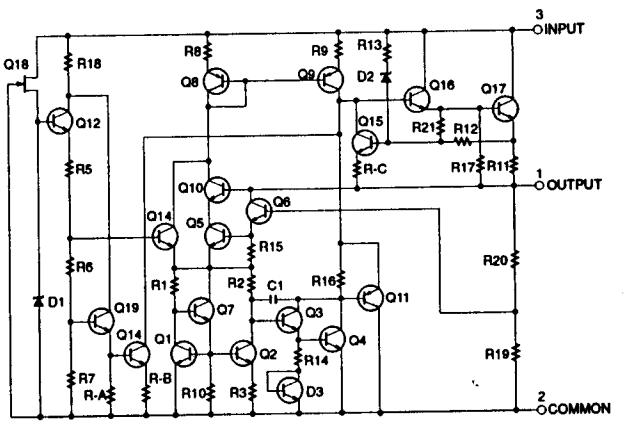
IC05 IC LB1641
Motor Driver



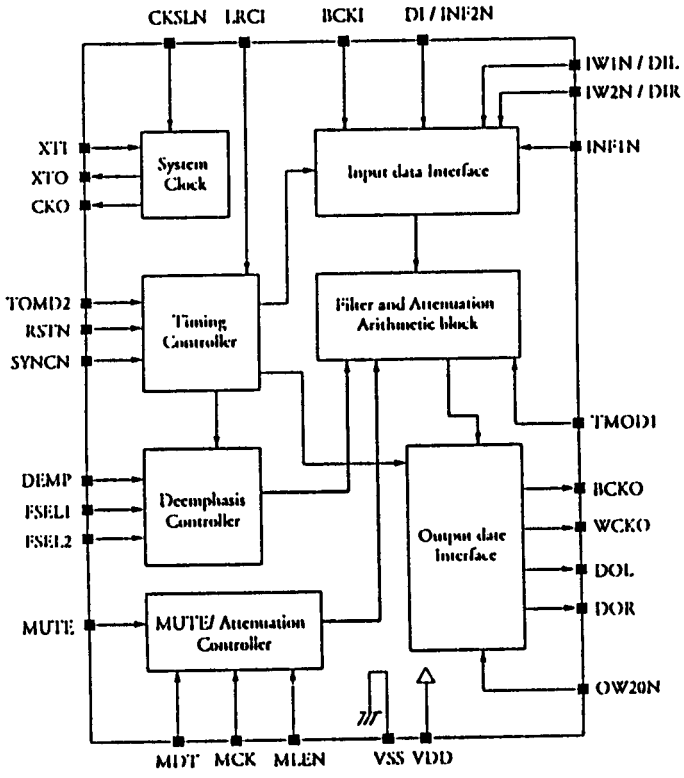
IC04 IC LA6541D
4ch Bridge Driver



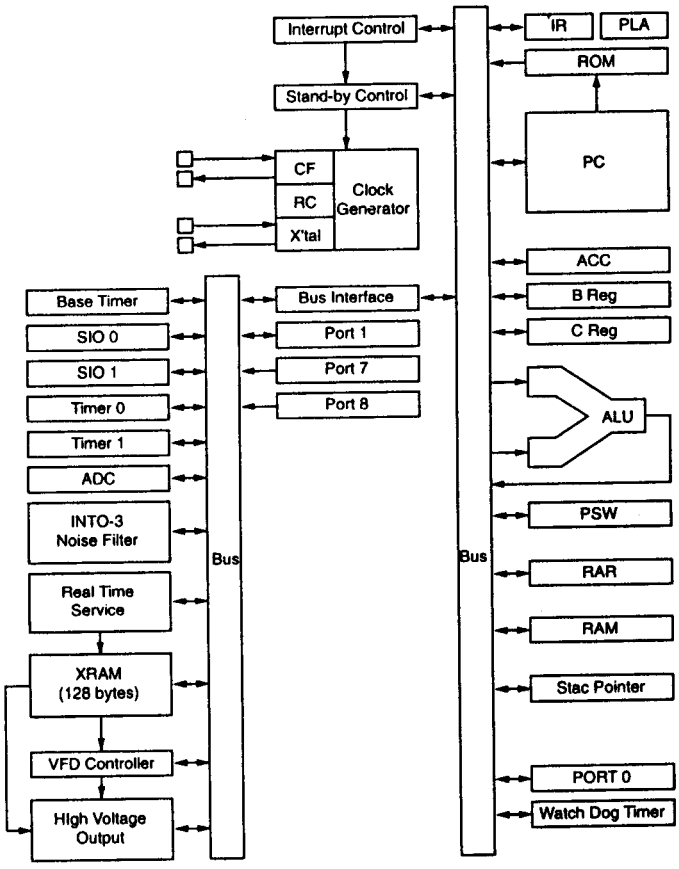
IC10 IC NJM7805FA or IC L7805CV
Voltage Regulator



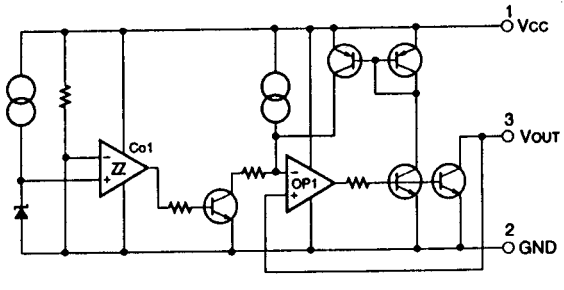
IC183 IC SM5843AP
Digital Filter



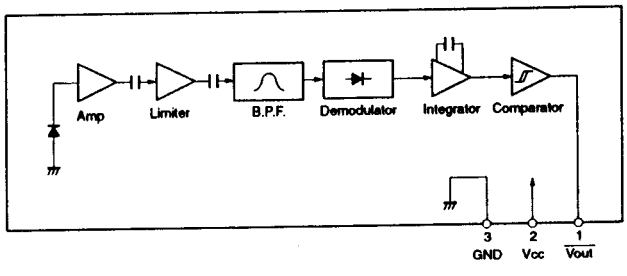
IC301 IC LC866012C-5H37 (5K25)
Micro computer



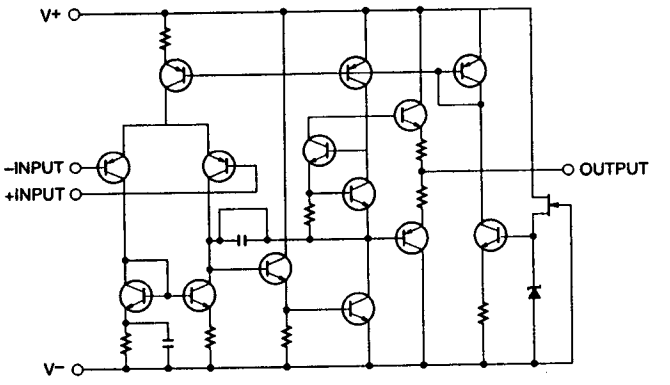
IC302 IC PST600D-2
Reset IC

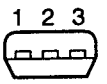
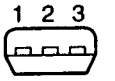
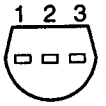
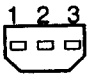
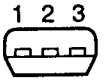
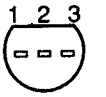
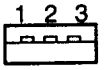
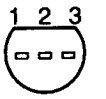
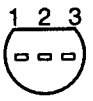
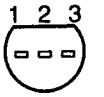


U301 GP-281



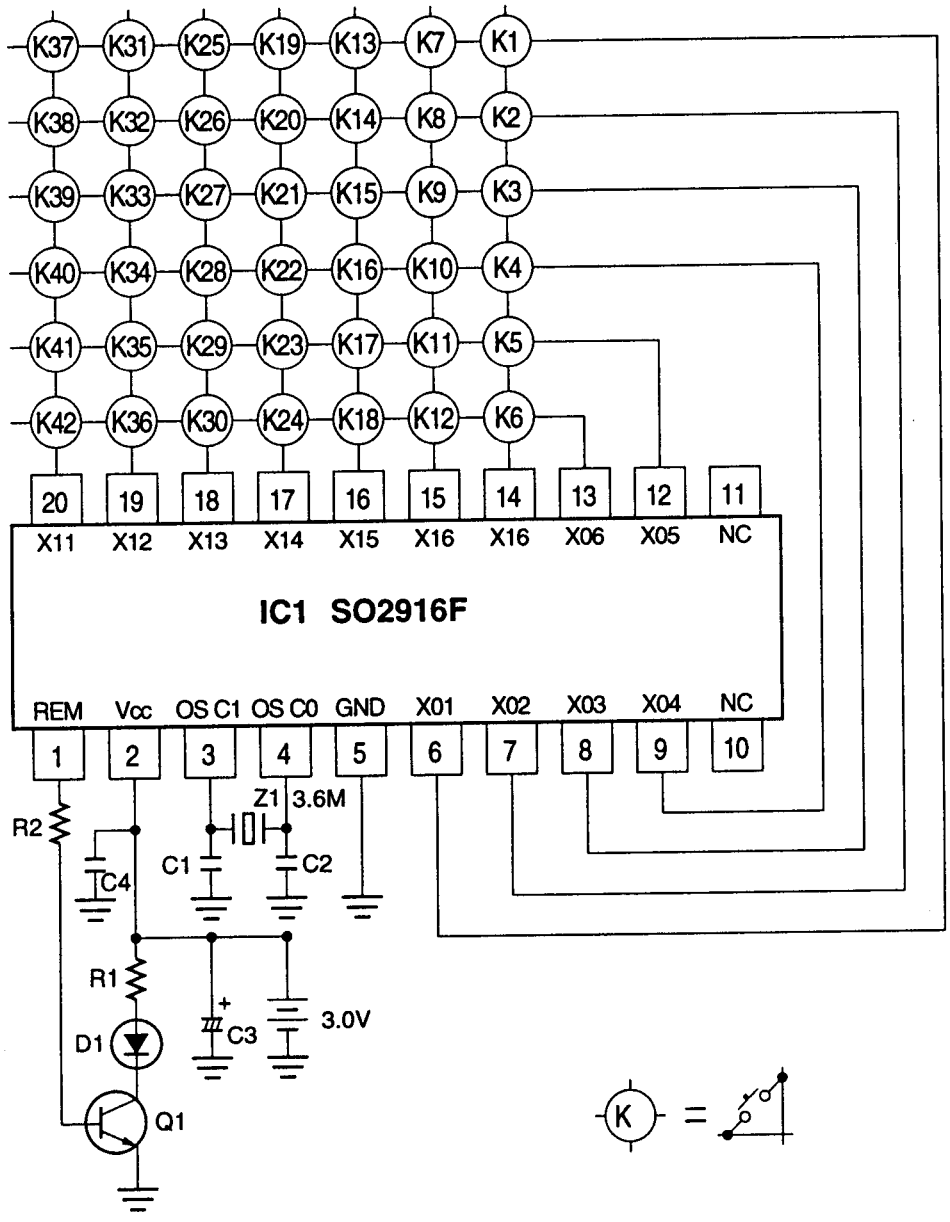
IC401 IC NJM4560D or M5218P
OP AMP



TR 2SA933AS-TP-R		TR 2SC1740S-TP-R	
	Q01 Q105 Q106		Q08 Q107 Q108
TR 2SB892-T		**TR 2SD1936-T-AC**	
	Q03		Q101 Q102 Q103 Q104
TR DTC124-ES-TP		**TR 2SK246-GR (TPE2)**	
	Q04 Q151		Q109 Q110
TR 2SB1142-T		**TR 2SC3382-T-AA**	
	Q05		Q111 Q112 Q115 Q116
TR DTA143-ES-TP		**TR 2SA1391S**	
	Q07		Q113 Q114 Q117 Q118

1→ Emitter 2→ Collector 3→ Base

REMOTE CONTROL SCHEMATIC DIAGRAM



KEY No.	NAME
1	SKIP ⏭
2	
3	
4	
5	0
6	1
7	SKIP ⏮
8	3
9	4
10	5
11	6
12	7
13	8
14	9
15	EDIT
16	TAPE SIZE
17	INTRO
18	REPEAT
19	A – B
20	TIME
21	CLEAR
22	CHECK
23	PROGRAM
24	RANDOM
25	DISPLAY
26	
27	
28	
29	PLAY
30	PAUSE
31	STOP
32	
33	SEARCH ◀◀
34	SEARCH ▶▶
35	
36	2
37	
38	
39	
40	
41	POWER ON
42	POWER OFF

ELECTRICAL PARTS LIST

45-01 CEC0B10028400 ASSY,PCB,MAIN

Ref No	Parts Number	Description
CONNECTOR		
GND1	CEC4J13007105	CONNECTOR 1P ASSY
GND2	CEC4J13007106	CONECTOR 1P ASSY
L90	CEC0J13003000	ASSY,CONNECTOR,CORE
CR-01	CEC4Z21000700	CORE,BP53RB120070060M] OR USE
CR02	CEC4Z21000800	CORE,E04RA120070060]
TWS-01	7503000075030	TWS UL1007 AWG26 BK
CN-3P	CEC4J13014401	CONNECTOR 3P SAN ASSY
HEAT SINK		
HS-02	1312620128000	PLATE HEAT SINK
SCR-01	SFBDN308R0SM-SCR	S-TPG BIN 3X8
HS-01	CEC2425001200	HEAT SINK

CAPACITORS

Ref No	Parts Number	Description			
C001	CK1H102KFABNA	CERAMIC	1000P	K	50V
C002	CF1H104KADALC	POLYESTER	0.1U	K	50V
C004	CF1H333KADALC	POLYESTER	0.033U	K	50V
C006	CK1H331KFABNA	CERAMIC	330P	K	50V
C007	CE1HR10MDFALC	ELECT	0.1U	M	50V
C008	CB1C332MFARNA	CERAMIC	3300P	M	16V
C009	CF1H154KADALC	POLYESTER	0.15U	K	50V
C010	CF1H473KADALC	POLYESTER	0.047U	K	50V
C011	CE1H2R2MDFALC	ELECT	2.2U	M	50V
C012	CF1H183KADALC	POLYESTER	0.018U	K	50V
C013	CF1H153KADALC	POLYESTER	0.015U	K	50V
C014	CF1H104KADALC	POLYESTER	0.1U	K	50V
C015	CK1H102KFABNA	CERAMIC	1000P	K	50V
C016	CB1C332MFARNA	CERAMIC	3300P	M	16V
C017	CK1H101KFABNA	CERAMIC	100P	K	50V
C018	CE1HR22MDFALC	ELECT	0.22U	M	50V
C019	CE1H4R7MDFALC	ELECT	4.7U	M	50V
C020	CE1A220MAWALC	ELECT	22U	M	10V
C021	CB1C332MFARNA	CERAMIC	3300P	M	16V
C022	CB1C103MFAGNA	CERAMIC	0.01U	M	16V
C023	CF1H473KADALC	POLYESTER	0.047U	K	50V
C024	CE1HR33MDFALC	ELECT	0.33U	M	50V
C025	CF1H333KADALC	POLYESTER	0.033U	K	50V
C026	CC1H1R0MFAGNA	CERAMIC	1P	M	50V
C027	CC1H150JFAGNA	CERAMIC	15P	J	50V
C028	CB1C332MFARNA	CERAMIC	3300P	M	16V
C029	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C030	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C031	CC1H120JFAGNA	CERAMIC	12P	J	50V
C032	CC1H120JFAGNA	CERAMIC	12P	J	50V
C033	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C034	CE1A101MDFALC	ELECT	100U	M	10V
C035	CE1A101MDFALC	ELECT	100U	M	10V
C036	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C037	CE1A101MDFALC	ELECT	100U	M	10V
C038	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C039	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C040	CE1E100MDFALC	ELECT	10U	M	25V
C041	CE1A470MDFALC	ELECT	47U	M	10V
C042	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C043	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C044	CE1A471MAEANN	ELECT	470U	M	10V
C045	CE1H1R0MAEALC	ELECT	1U	M	50V
C046	CE1A101MDFALC	ELECT	100U	M	10V
C047	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C048	CB1C103MFAGNA	CERAMIC	0.01U	M	16V
C049	CE1H1R0MAEALC	ELECT	1U	M	50V
C050	CE1C100MDFALC	ELECT	10U	M	16V
C051	CE1A101MDFALC	ELECT	100U	M	10V
C052	CE1A101MDFALC	ELECT	100U	M	10V
C053	CE1A470MDFALC	ELECT	47U	M	10V
C054	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C055	CK1H102KFABNA	CERAMIC	1000P	K	50V
C056	CK1H181KFABNA	CERAMIC	180P	K	50V
C057	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C058	CE1A102MAEANN	ELECT	1000U	M	10V
C059	CE1A470MDFALC	ELECT	47U	M	10V
C061	CE1A331MAEALC	ELECT	330U	M	10V
C062	CE1A221MAEALC	ELECT	220U	M	0V
C063	CE1E472MDFANN	ELECT	4700U	M	25V
C064	CE1H1R0MAEALC	ELECT	1U	M	50V
C065	CE1H220MAEALC	ELECT	22U	M	50V
C066	CE1V470MAEALC	ELECT	47U	M	35V
C067	CE1H101MAEALC	ELECT	100U	M	50V
C068	CE1H1R0MAEALC	ELECT	1U	M	50V
C069	CE1H1R0MAEALC	ELECT	1U	M	50V
C070	CE1E222MGXANN	ELECT	2200U	M	25V
C071	CE1E222MGXANN	ELECT	2200U	M	25V
C072	CE1A102MAEANN	ELECT	1000U	M	10V
C073	CE1A102MAEANN	ELECT	1000U	M	10V
C074	CE1H1R0MAEALC	ELECT	1U	M	50V
C080	CE1A470MAEALC	ELECT	47U	M	10V
C087	CE1A101MDFALC	ELECT	100U	M	10V
C091	CE1A470MAEALC	ELECT	47U	M	10V
C092	CK1H221KFABNA	CERAMIC	220P	K	50V
C093	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C094	CB1C122MFARNA	CERAMIC	1200P	M	16V
C095	CB1C822MFAGNA	CERAMIC	8200P	M	16V
C096	CE1A101MAEALC	ELECT	100U	M	10V
C097	CK1H102KFABNA	CERAMIC	1000P	K	50V
C101	CE1A331MAEANN	ELECT	330U	M	10V
C102	CE1A331MAEANN	ELECT	330U	M	10V
C103	CE1C100MGWALC	ELECT	10U	M	16V
C104	CE1C100MGWALC	ELECT	10U	M	16V
C105	CF1H222KADALC	POLYESTER	2200P	K	50V
C106	CF1H222KADALC	POLYESTER	2200P	K	50V
C107	CF1H822KADALC	POLYESTER	8200P	K	50V
C108	CF1H822KADALC	POLYESTER	8200P	K	50V
C109	CF1H152KADALC	POLYESTER	1500P	K	50V
C110	CF1H152KADALC	POLYESTER	1500P	K	50V
C111	CC1H100JFACNA	CERAMIC	10P	J	50V
C112	CC1H100JFACNA	CERAMIC	10P	J	50V
C113	CE1A330MAEALC	ELECT	33U	M	10V
C114	CE1A330MAEALC	ELECT	33U	M	10V
C115	CE1H2R2MDFALC	ELECT	2.2U	M	50V
C116	CE1H2R2MDFALC	ELECT	2.2U	M	50V
C117	CK1H331KFABNA	CERAMIC	330P	K	50V
C118	CK1H331KFABNA	CERAMIC	330P	K	50V
C121	CE1A331MAEANN	ELECT	330U	M	10V
C122	CE1A331MAEANN	ELECT	330U	M	10V
C127	CC1H101JFAGNA	CERAMIC	100P	J	50V
C128	CC1H101JFAGNA	CERAMIC	100P	J	50V
C163	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C164	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C165	CE1A101MDFALC	ELECT	100U	M	10V
C166	CE1A101MDFALC	ELECT	100U	M	10V
C175	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C176	CE1A101MDFALC	ELECT	100U	M	10V
C177	CE1A220MAWALC	ELECT	22U	M	10V
C178	CE1A220MAWALC	ELECT	22U	M	10V
C179	CE1A101MDFALC	ELECT	100U	M	10V
C180	CE1A101MDFALC	ELECT	100U	M	10V
C181	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C182	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C183	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C184	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C185	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C186	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C187	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C188	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C189	CE1A330MAEALC	ELECT	33U	M	10V

ELECTRICAL PARTS LIST

Ref No	Parts Number	Description			
C190	CE1A330MAEALC	ELECT	33U	M	10V
C191	CE1A330MAEALC	ELECT	33U	M	10V
C192	CE1A330MAEALC	ELECT	33U	M	10V
C193	CE1A330MAEALC	ELECT	33U	M	10V
C194	CE1A330MAEALC	ELECT	33U	M	10V
C195	CE1A330MAEALC	ELECT	33U	M	10V
C196	CE1A330MAEALC	ELECT	33U	M	10V
C197	CE1A470MAEALC	ELECT	47U	M	10V
C198	CE1A470MAEALC	ELECT	47U	M	10V
C200	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
PLUG					
CN01	42369749100	PLUG 5P			
CN02	42369749900	PLUG 8P,PH,V			
CN03	42369749200	PLUG 6P,PH,V			
CN04	42369749100	PLUG 5P			
CN05	42369731500	PLUG 5P			
CN06	CEC4J10005429	PLUG			
CN101	42369749100	PLUG 5P			
DIODE					
D01	DD1A3-I-----C	DIODE 1A3-I			
D02	DD1A3-I-----C	DIODE 1A3-I			
D03	DD1A3-I-----C	DIODE 1A3-I			
D04	DD1A3-I-----C	DIODE 1A3-I			
D05	DD1A3-I-----C	DIODE 1A3-I			
D06	DD1A3-I-----C	DIODE 1A3-I			
D07	DD1A3-I-----C	DIODE 1A3-I			
D08	DD1A3-I-----C	DIODE 1A3-I			
D09	DD1A3-I-----C	DIODE 1A3-I			
D10	DD1A3-I-----C	DIODE 1A3-I			
D11	DZGZB24B----N	ZENER DIODE GZB24B			
D12	DZMTZJ6.2A--A	ZENER DIODE MTZJ6.2A			
D13	DZMTZJ7.5B--A	ZENER DIODE MTZJ7.5B			
D14	DD1SS133----A	DIODE 1SS133-T-77			
D15	DD1SS133----A	DIODE 1SS133-T-77			
D18	DZMTZJ5.1B--A	ZENER DIODE MTZJ5.1B-T-77			
D31	DD1SS133----A	DIODE 1SS133-T-77			
D32	DD1SS133----A	DIODE 1SS133-T-77			
D58	DD1SS133----A	DIODE 1SS133-T-77			
INTEGRATED CIRCUITS					
IC01	QLC78621ED--N	IC LC78621ED			
C02	QLA9240M----N	IC LA9240M			
IC03	CECDCPC80000N	PHOTO COUPLE PC817B			
IC04	QLA6541D----N	IC LA6541D			
IC05	QLB1641-----N	IC LB1641			
IC06	QM5294P-----N	IC M5294P			
IC10	QNJM7805FA--N	IC NJM7805FA] OR USE			
IC10	CEC4D61006200	IC L7805CV]			
IC161	QNJM2068D---N	IC NJM2068D			
IC181	CECQPCM17001N	IC,PCM1702U			
IC182	CECQPCM17001N	IC,PCM1702U			
IC183	CECQSM584300N	IC,SM5843AP			
JACKS					
JK01	CEC4J12002800	JACK REM			
JK02	CEC4J12002800	JACK REM			
JK03	CEC4J12001202	JACK,VIDEO			
JK04	CEC4U23000800	CONVERTOR GP1F32T			
JK101	CEC4J12000801	JACK RCA 2P			
TRANSISTORS					
Q01	T2SA933AS-R-C	TR 2SA933AS-TP-R			
Q03	T2SB892-T---N	TR 2SB892-T			
Q04	TDTC124-ES--C	TR DTC124-ES-TP			
Q05	T2SB1142-T--N	TR 2SB1142-T			
Q07	TDTA143-ES--C	TR DTA143-ES-TP			
Q08	T2SC1740S-R-C	TR 2SC1740S-TP-R			
Q101	T2SD1936-T--C	TR 2SD1936-T-AC			

Ref No	Parts Number	Description
Q102	T2SD1936-T--C	TR 2SD1936-T-AC
Q103	T2SD1936-T--C	TR 2SD1936-T-AC
Q104	T2SD1936-T--C	TR 2SD1936-T-AC
Q105	T2SA933AS-R-C	TR 2SA933AS-TP-R
Q106	T2SA933AS-R-C	TR 2SA933AS-TP-R
Q107	T2SC1740S-R-C	TR 2SC1740S-TP-R
Q108	T2SC1740S-R-C	TR 2SC1740S-TP-R
Q109	T2SK246-GR--C	TR 2SK246-GR(TPE2)
Q110	T2SK246-GR--C	TR 2SK246-GR(TPE2)
Q111	T2SC3382-T--C	TR 2SC3382-T-AA
Q112	T2SC3382-T--C	TR 2SC3382-T-AA
Q113	T2SA1391----C	TR 2SA1391S
Q114	T2SA1391----C	TR 2SA1391S
Q115	T2SC3382-T--C	TR 2SC3382-T-AA
Q116	T2SC3382-T--C	TR 2SC3382-T-AA
Q117	T2SA1391----C	TR 2SA1391S
Q118	T2SA1391----C	TR 2SA1391S
Q151	TDTA124-ES--C	TR DTA124-ES-TP

RESISTORS					
R001	RDD1001JPAANA	CARBON	1K	JA	1/6W
R002	RDD10R0JPAANA	CARBON	10	JA	1/6W
R003	RDD1503JPAANA	CARBON	150K	JA	1/6W
R005	RDD6801JPAANA	CARBON	6.8K	JA	1/6W
R005	RDD3302JPAANA	CARBON	33K	JA	1/6W
R006	RDD5602JPAANA	CARBON	56K	JA	1/6W
R006	RDD2201JPAANA	CARBON	2.2K	JA	1/6W
R007	RDD3901JPAANA	CARBON	3.9K	JA	1/6W
R008	RDD4701JPAANA	CARBON	4.7K	JA	1/6W
R010	RDD1003JPAANA	CARBON	100K	JA	1/6W
R011	RDD1502JPAANA	CARBON	15K	JA	1/6W
R012	RDD2702JPAANA	CARBON	27K	JA	1/6W
R013	RDD3300JPAANA	CARBON	330	JA	1/6W
R014	RDD3301JPAANA	CARBON	3.3K	JA	1/6W
R015	RDD6801JPAANA	CARBON	6.8K	JA	1/6W
R017	RDD1202JPAANA	CARBON	12K	JA	1/6W
R018	RDD1501JPAANA	CARBON	1.5K	JA	1/6W
R019	RDD3302JPAANA	CARBON	33K	JA	1/6W
R020	RDD1202JPAANA	CARBON	12K	JA	1/6W
R021	RDD1802JPAANA	CARBON	18K	JA	1/6W
R022	RDD2202JPAANA	CARBON	22K	JA	1/6W
R023	RDD6801JPAANA	CARBON	6.8K	JA	1/6W
R027	RDD1001JPAANA	CARBON	1K	JA	1/6W
R028	RDD5602JPAANA	CARBON	56K	JA	1/6W
R029	RDD5601JPAANA	CARBON	5.6K	JA	1/6W
R032	RDD1002JPAANA	CARBON	10K	JA	1/6W
R033	RDD6801JPAANA	CARBON	6.8K	JA	1/6W
R034	RDD5601JPAANA	CARBON	5.6K	JA	1/6W
R036	RDD1003JPAANA	CARBON	100K	JA	1/6W
R037	RDD1003JPAANA	CARBON	100K	JA	1/6W
R038	RDD4701JPAANA	CARBON	4.7K	JA	1/6W
R039	RDD1003JPAANA	CARBON	100K	JA	1/6W
R040	RDD1002JPAANA	CARBON	10K	JA	1/6W
R041	RDD1802JPAANA	CARBON	18K	JA	1/6W
R042	RDD1802JPAANA	CARBON	18K	JA	1/6W
R043	RDD1001JPAANA	CARBON	1K	JA	1/6W
R044	RDD3300JPAANA	CARBON	330	JA	1/6W
R045	RDD6800JPAANA	CARBON	680	JA	1/6W
R046	RDD5602JPAANA	CARBON	56K	JA	1/6W
R047	RDD1201JPAANA	CARBON	1.2K	JA	1/6W
R048	RDD4701JPAANA	CARBON	4.7K	JA	1/6W
R049	RDD4701JPAANA	CARBON	4.7K	JA	1/6W
R053	RDD1001JPAANA	CARBON	1K	JA	1/6W
R054	RDD2202JPAANA	CARBON	22K	JA	1/6W
R055	RDD1003JPAANA	CARBON	100K	JA	1/6W
R056	RDD1002JPAANA	CARBON	10K	JA	1/6W
R057	RDD1002JPAANA	CARBON	10K	JA	1/6W
R058	RDD2200JPAANA	CARBON	220	JA	1/6W
R060	RDD1201JPAANA	CARBON	1.2K	JA	1/6W
R061	RDD4700JPAANA	CARBON	470	JA	1/6W

ELECTRICAL PARTS LIST

Ref No	Parts Number	Description
R062	RDD4701JPAANA	CARBON 4.7K JA 1/6W
R063	RDB6800JPAANA	CARBON 680 JA 1/4W
R064	RDD3302JPAANA	CARBON 33K JA 1/6W
R065	RDB47R0JPAANA	CARBON 47 JA 1/4W
R066	RDB2R20JPAANA	CARBON 2.2 JA 1/4W
R067	RDB47R0JPAANA	CARBON 47 JA 1/4W
R068	RDD1002JPAANA	CARBON 10K JA 1/6W
R069	RDD1002JPAANA	CARBON 10K JA 1/6W
R070	RDD1001JPAANA	CARBON 1K JA 1/6W
R080	1EA4W3JP1000T	LEAD JUMPER P 10.0
R081	RFXEA01610R0N	FUSIBLE RES 10 JA 1/4W
R082	RFXEA01610R0N	FUSIBLE RES 10 JA 1/4W
R083	RFXEA01610R0N	FUSIBLE RES 10 JA 1/4W
R085	RDD75R0JPAANA	CARBON 75 JA 1/6W
R086	RDD1500JPAANA	CARBON 150 JA 1/6W
R091	1EA4W3JP0500T	LEAD JUMPER P 5.0
R092	RDD3901JPAANA	CARBON 3.9K JA 1/6W
R093	RDD4702JPAANA	CARBON 47K JA 1/6W
R094	RDD3300JPAANA	CARBON 330 JA 1/6W
R095	RDD47R0JPAANA	CARBON 47 JA 1/6W
R101	RDD22R0JPAANA	CARBON 22 JA 1/6W
R102	RDD22R0JPAANA	CARBON 22 JA 1/6W
R103	RDD2202JPAANA	CARBON 22K JA 1/6W
R104	RDD2202JPAANA	CARBON 22K JA 1/6W
R105	RDD47R0JPAANA	CARBON 47 JA 1/6W
R106	RDD47R0JPAANA	CARBON 47 JA 1/6W
R107	RDD1000JPAANA	CARBON 100 JA 1/6W
R108	RDD1000JPAANA	CARBON 100 JA 1/6W
R109	RDD3301JPAANA	CARBON 3.3K JA 1/6W
R110	RDD3301JPAANA	CARBON 3.3K JA 1/6W
R111	RDD3301JPAANA	CARBON 3.3K JA 1/6W
R112	RDD3301JPAANA	CARBON 3.3K JA 1/6W
R113	RDD2R20JPAANA	CARBON 2.2 JA 1/6W
R114	RDD2R20JPAANA	CARBON 2.2 JA 1/6W
R115	RDD4700JPAANA	CARBON 470 JA 1/6W
R116	RDD4700JPAANA	CARBON 470 JA 1/6W
R117	RDD1802JPAANA	CARBON 18K JA 1/6W
R118	RDD1802JPAANA	CARBON 18K JA 1/6W
R119	RDD1000JPAANA	CARBON 100 JA 1/6W
R120	RDD1000JPAANA	CARBON 100 JA 1/6W
R121	RDD1001JPAANA	CARBON 1K JA 1/6W
R122	RDD1001JPAANA	CARBON 1K JA 1/6W
R123	RDD1001JPAANA	CARBON 1K JA 1/6W
R124	RDD1001JPAANA	CARBON 1K JA 1/6W
R125	RDD5600JPAANA	CARBON 560 JA 1/6W
R126	RDD5600JPAANA	CARBON 560 JA 1/6W
R127	RDD2R20JPAANA	CARBON 2.2 JA 1/6W
R128	RDD2R20JPAANA	CARBON 2.2 JA 1/6W
R129	RDD4700JPAANA	CARBON 470 JA 1/6W
R130	RDD4700JPAANA	CARBON 470 JA 1/6W
R131	RDD1801JPAANA	CARBON 1.8K JA 1/6W
R132	RDD1801JPAANA	CARBON 1.8K JA 1/6W
R133	RDD1002JPAANA	CARBON 10K JA 1/6W
R134	RDD1002JPAANA	CARBON 10K JA 1/6W
R135	RDD5600JPAANA	CARBON 560 JA 1/6W
R136	RDD5600JPAANA	CARBON 560 JA 1/6W
R137	RDD1000JPAANA	CARBON 100 JA 1/6W
R138	RDD1000JPAANA	CARBON 100 JA 1/6W
R139	RDD9102JPAANA	CARBON 91K JA 1/6W
R140	RDD9102JPAANA	CARBON 91K JA 1/6W
R141	RDD1803JPAANA	CARBON 80K JA 1/6W
R142	RDD1803JPAANA	CARBON 180K JA 1/6W
R143	RDD6801JPAANA	CARBON 6.8K JA 1/6W
R144	RDD6801JPAANA	CARBON 6.8K JA 1/6W
R151	RDD4702JPAANA	CARBON 47K JA 1/6W
R152	RDD4702JPAANA	CARBON 47K JA 1/6W
R153	RDD1002JPAANA	CARBON 10K JA 1/6W
R154	RDD1002JPAANA	CARBON 10K JA 1/6W
R155	RDD47R0JPAANA	CARBON 47 JA 1/6W
R156	RDD47R0JPAANA	CARBON 47 JA 1/6W

Ref No	Parts Number	Description
R161	RDD33R0JPAANA	CARBON 33 JA 1/6W
R162	RDD33R0JPAANA	CARBON 33 JA 1/6W
R163	RDD6801JPAANA	CARBON 6.8K JA 1/6W
R164	RDD6801JPAANA	CARBON 6.8K JA 1/6W
R165	RDD1801JPAANA	CARBON 1.8K JA 1/6W
R166	RDD1801JPAANA	CARBON 1.8K JA 1/6W
R167	RDD3902JPAANA	CARBON 39K JA 1/6W
R168	RDD3902JPAANA	CARBON 39K JA 1/6W
R169	RDD1004JPAANA	CARBON 1M JA 1/6W
R179	1EA4W3JP0500T	LEAD JUMPER P 5.0
R180	1EA4W3JP0500T	LEAD JUMPER P 5.0
R181	RDD8200JPAANA	CARBON 820 JA 1/6W
R182	RDD1000JPAANA	CARBON 100 JA 1/6W
R183	RDD1000JPAANA	CARBON 100 JA 1/6W
R184	RDD1000JPAANA	CARBON 100 JA 1/6W
SWITCH		
SW01	CEC4S10001000	SWITCH,SLIDE
TRANS		
T01	1EA4L13A00100	TRANS,PULSE
CRYSTAL		
X01	42259711010	CRYSTAL 16.9344MHZ

45-02 CEC0B10027140 ASSY,PCB,POWER,230V

Ref No	Parts Number	Description	
CAPACITORS			
C501	CEC4C10002000	CAPACITOR	] OR USE
C501	42239709700	CAPACITOR 0.01MF400V	
CONNECTOR			
W501	CEC4J13012252	CONNECTOR,5P,ASSY	
TERMINALS			
EC501	42372008300	EC TERMINAL 1P	
EC502	42372008300	EC TERMINAL 1P	
FUSE, HOLDER			
FUH01	CEC4J20000500	FUSE, HOLDER	
POWER,CORDS			
PWC-01	CEC4W10005400	POWER CORD	] OR USE
PWC-02	CEC4W10004000	POWER CORD	
TRANS			
T501	CEC4L50005840	POWER TRANS	
SWITCH			
SW501	CEC4S11002000	SWITCH,PUSH,POWER	

45-03 CEC0B10026901 ASSY,PCB,DISPLAY

Ref No	Parts Number	Description
RESISTORS		
R300	RDD1002JPAANA	CARBON 10K JA 1/6W
R301	RDD1101JPAANA	CARBON 1.1K JA 1/6W
R302	RDD1501JPAANA	CARBON 1.5K JA 1/6W
R303	RDD1801JPAANA	CARBON 1.8K JA 1/6W
R304	RDD2401JPAANA	CARBON 2.4K JA 1/6W
R305	RDD3301JPAANA	CARBON 3.3K JA 1/6W
R306	RDD5101JPAANA	CARBON 5.1K JA 1/6W
R307	RDD2702JPAANA	CARBON 27K JA 1/6W
R310	RDD1002JPAANA	CARBON 10K JA 1/6W
R311	RDD1101JPAANA	CARBON 1.1K JA 1/6W
R312	RDD1501JPAANA	CARBON 1.5K JA 1/6W

ELECTRICAL PARTS LIST

Ref No	Parts Number	Description			
R313	RDD1801JPAANA	CARBON	1.8K	JA	1/6W
R314	RDD2401JPAANA	CARBON	2.4K	JA	1/6W
R315	RDD3301JPAANA	CARBON	3.3K	JA	1/6W
R316	RDD5101JPAANA	CARBON	5.1K	JA	1/6W
R317	RDD8201JPAANA	CARBON	8.2K	JA	1/6W
R318	RDD1802JPAANA	CARBON	18K	JA	1/6W
R321	RDD1800JPAANA	CARBON	180	JA	1/6W
R322	RDD1500JPAANA	CARBON	150	JA	1/6W
R323	RDD2202JPAANA	CARBON	22K	JA	1/6W
R324	RDD2202JPAANA	CARBON	22K	JA	1/6W
R325	RDD2202JPAANA	CARBON	22K	JA	1/6W
R326	RDD2202JPAANA	CARBON	22K	JA	1/6W
R327	RDD4702JPAANA	CARBON	47K	JA	1/6W
R328	RDD1001JPAANA	CARBON	1K	JA	1/6W
R329	RDD2200JPAANA	CARBON	220	JA	1/6W
R330	RDD1000JPAANA	CARBON	100	JA	1/6W
R331	RDD1000JPAANA	CARBON	100	JA	1/6W
R332	RDD1000JPAANA	CARBON	100	JA	1/6W
R333	RDD1000JPAANA	CARBON	100	JA	1/6W
R334	RDD1000JPAANA	CARBON	100	JA	1/6W
R335	RDD1000JPAANA	CARBON	100	JA	1/6W
R336	RDD2203JPAANA	CARBON	220K	JA	1/6W
R337	RDD2203JPAANA	CARBON	220K	JA	1/6W
R338	RDD2203JPAANA	CARBON	220K	JA	1/6W
R339	RDD2203JPAANA	CARBON	220K	JA	1/6W
R340	RDD2203JPAANA	CARBON	220K	JA	1/6W
R341	RDD2203JPAANA	CARBON	220K	JA	1/6W
R342	RDD2203JPAANA	CARBON	220K	JA	1/6W
R343	RDD2203JPAANA	CARBON	220K	JA	1/6W
R344	RDD2203JPAANA	CARBON	220K	JA	1/6W
R345	RDD2203JPAANA	CARBON	220K	JA	1/6W
R346	RDD4701JPAANA	CARBON	4.7K	JA	1/6W
R347	RDD2202JPAANA	CARBON	22K	JA	1/6W
R348	RDD6801JPAANA	CARBON	6.8K	JA	1/6W
R349	RDD1800JPAANA	CARBON	180	JA	1/6W
CAPACITORS					
C301	CE1A470MAEANN	ELECT	47	M	10V
C302	CB1E223ZFAFNA	CERAMIC	0.022U	Z	25V
C303	CE1A470MAEANN	ELECT	47U	M	10V
C304	CE1H1R0MAEANN	ELECT	1U	M	50V
C305	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C306	CK1H104ZFAFNA	CERAMIC	0.1U	Z	50V
C310	CC1H330JFAGNA	CERAMIC	33P	J	50V
C311	CC1H330JFAGNA	CERAMIC	33P	J	50V
C312	CE1A470MAEANN	ELECT	47U	M	10V
PLUG					
CN301	CEC4J10005469	PLUG 29P R			
DIODE					
D303	DD1SS133----A	DIODE 1SS133-T-77			
FL TUBE					
FLT-01	CEC4T41000900	FLT 10-BT-204GK			
PD-01	CEC2448001401	PAD			
INTGRATED CIRCUITS					
IC301	QXXGA0041756N	IC LC866012C-5H37			
IC302	QPST600D-2--C	IC PST600D-2			
U301	CEC4D61005900	IC GP1U281X			
RESONATOR					
X301	CEC4V10000900	RESONATOR,CSA12.0MTZ			
SWITCH					
SW301	CEC4S14000400	SWITCH,TACT			
SW302	CEC4S14000400	SWITCH,TACT			
SW303	CEC4S14000400	SWITCH,TACT			
SW304	CEC4S14000400	SWITCH,TACT			

Ref No	Parts Number	Description
SW305	CEC4S14000400	SWITCH,TACT
SW306	CEC4S14000400	SWITCH,TACT
SW307	CEC4S14000400	SWITCH,TACT
SW309	CEC4S14000400	SWITCH,TACT
SW310	CEC4S14000400	SWITCH,TACT
SW311	CEC4S14000400	SWITCH,TACT
SW312	CEC4S14000400	SWITCH,TACT
SW313	CEC4S14000400	SWITCH,TACT
SW314	CEC4S14000400	SWITCH,TACT
SW315	CEC4S14000400	SWITCH,TACT
SW317	CEC4S14000400	SWITCH,TACT
TRANSISTORS		
Q301	T2SA933AS-R-C	TR 2SA933AS-TP-R
Q302	TDTA124ESA--C	TR DTA124ESA-TP

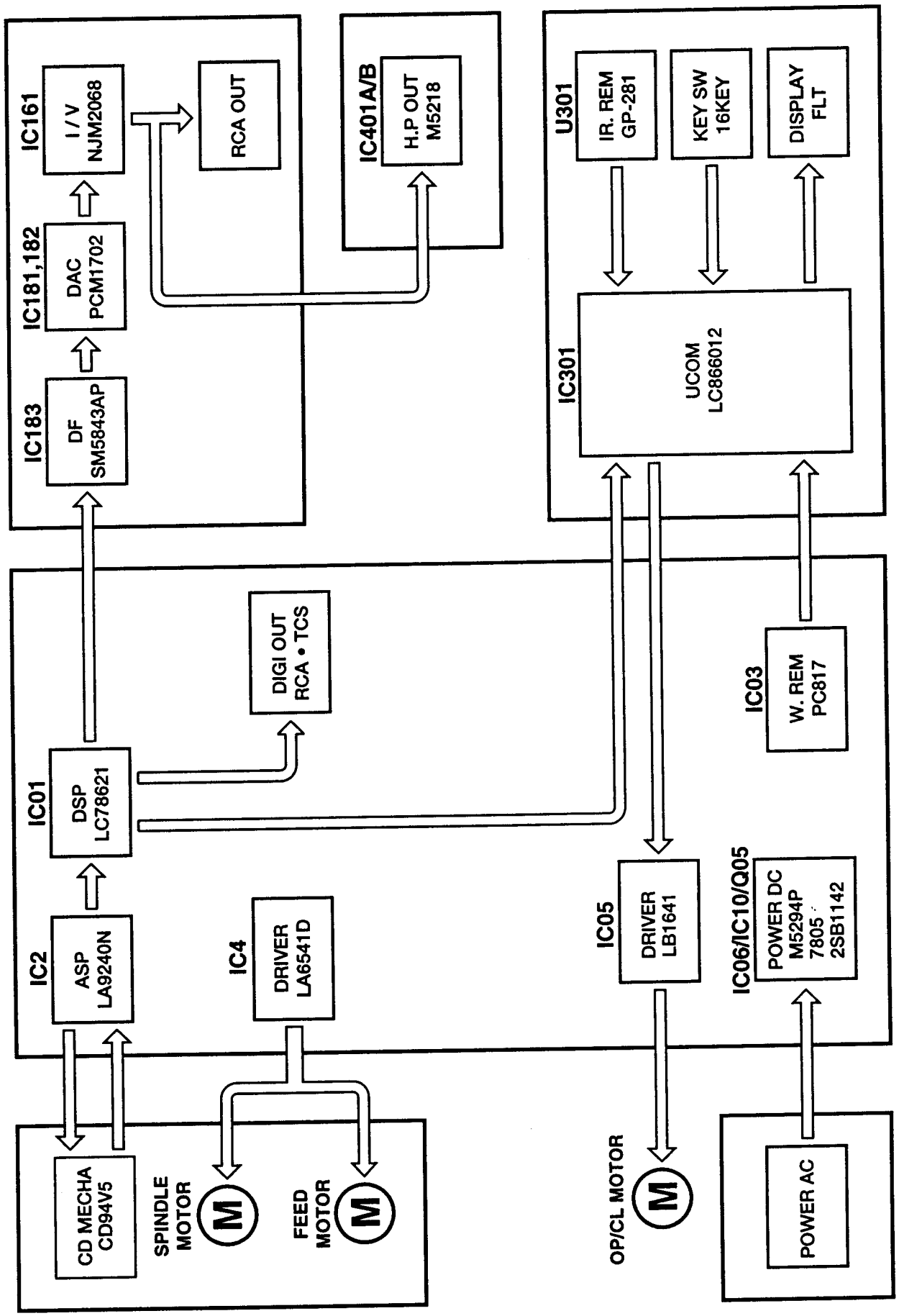
45-04 CEC0B10026910 ASSY,PCB,LED

Ref No	Parts Number	Description
JUMPER		
	CEC4W30008308	WIRE,JUMPER,3P,UL2651
LED		
D305	CECDLSPR-300N	LED SPR-39MVWF

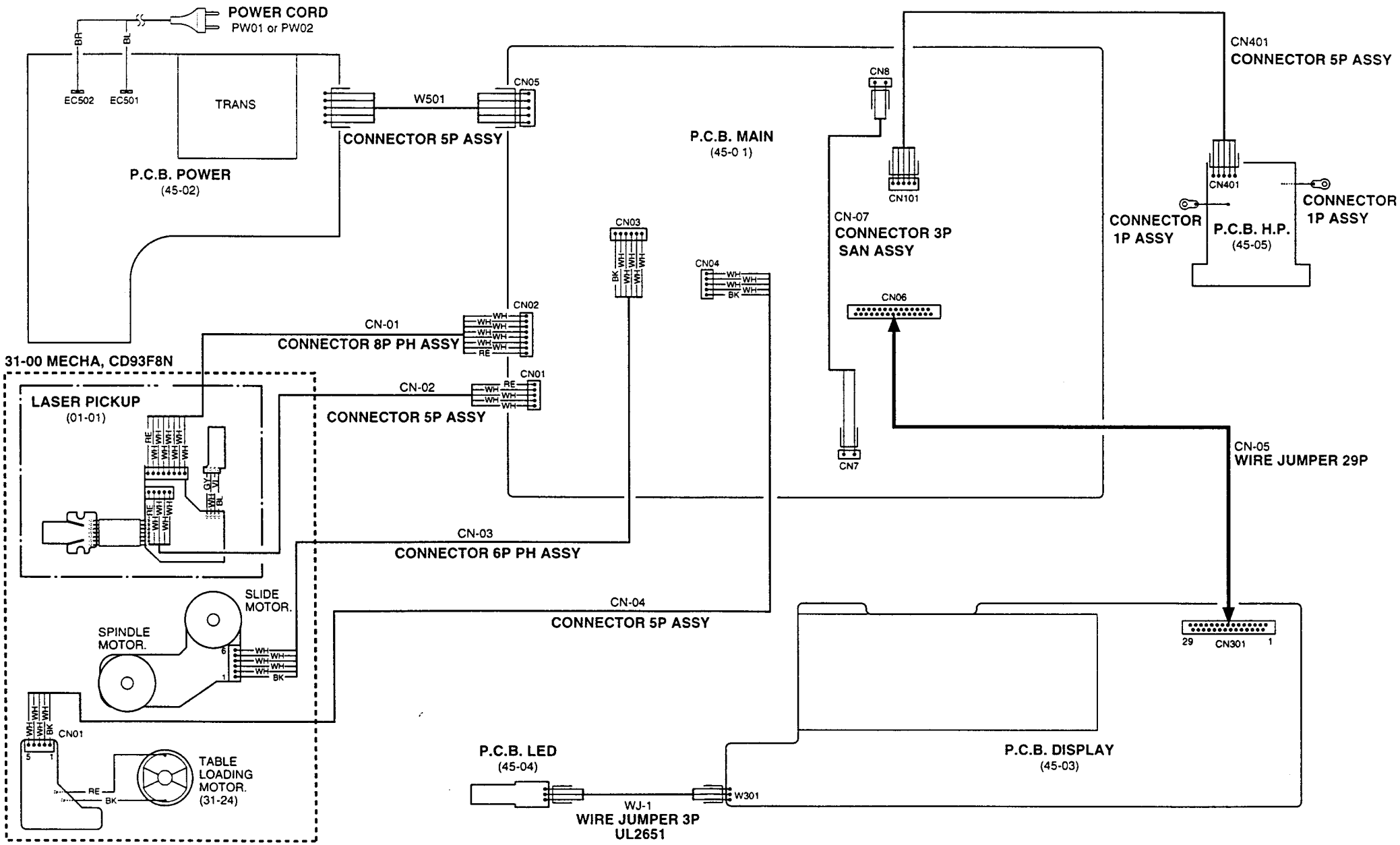
45-05 CEC0B10027002 ASSY,PCB,H.P.

Ref No	Parts Number	Description			
CONNECTORS					
CN401	CEC4J13012801	CONNECTOR,5P,ASSY			
GND2	CEC4J13007101	CONNECTOR 1P ASSY			
	CEC0J13002300	ASSY,CONNECTOR,1P			
C416	CK1H102KFABNN	CERAMIC	1000P	K	50V
	CEC4J13007100	CONNECTOR 1P ASSY			
RESISTORS					
R403	RDD1000JPAANA	CARBON	100	JA	1/6W
R404	RDD1000JPAANA	CARBON	100	JA	1/6W
R407	RDD4703JPAANA	CARBON	470K	JA	1/6W
R408	RDD4703JPAANA	CARBON	470K	JA	1/6W
R409	RDD1001JPAANA	CARBON	1K	JA	1/6W
R410	RDD1001JPAANA	CARBON	1K	JA	1/6W
R411	RDD1201JPAANA	CARBON	1.2K	JA	1/6W
R412	RDD1201JPAANA	CARBON	1.2K	JA	1/6W
CAPACITORS					
C407	CF1H473KADALC	POLYESTER	0.047U	K	50V
C408	CF1H473KADALC	POLYESTER	0.047U	K	50V
C409	CE1A101MAEALC	ELECT	100U	M	10V
C411	CE1A101MAEALC	ELECT	100U	M	10V
C413	CK1H102KFABNA	CERAMIC	1000P	K	50V
C414	CK1H102KFABNA	CERAMIC	1000P	K	50V
INTEGRATED CIRCUIT					
IC401	QNJM4560D---N	IC NJM4560D] OR USE			
IC401	QM5218P-----N	IC M5218P]			
JACK					
JK401	CEC4J12001501	JACK,HP,GO			
VR					
VR401	CEC4R20001300	VR ROTARY 50K			

FUNCTIONAL BLOCK DIAGRAM

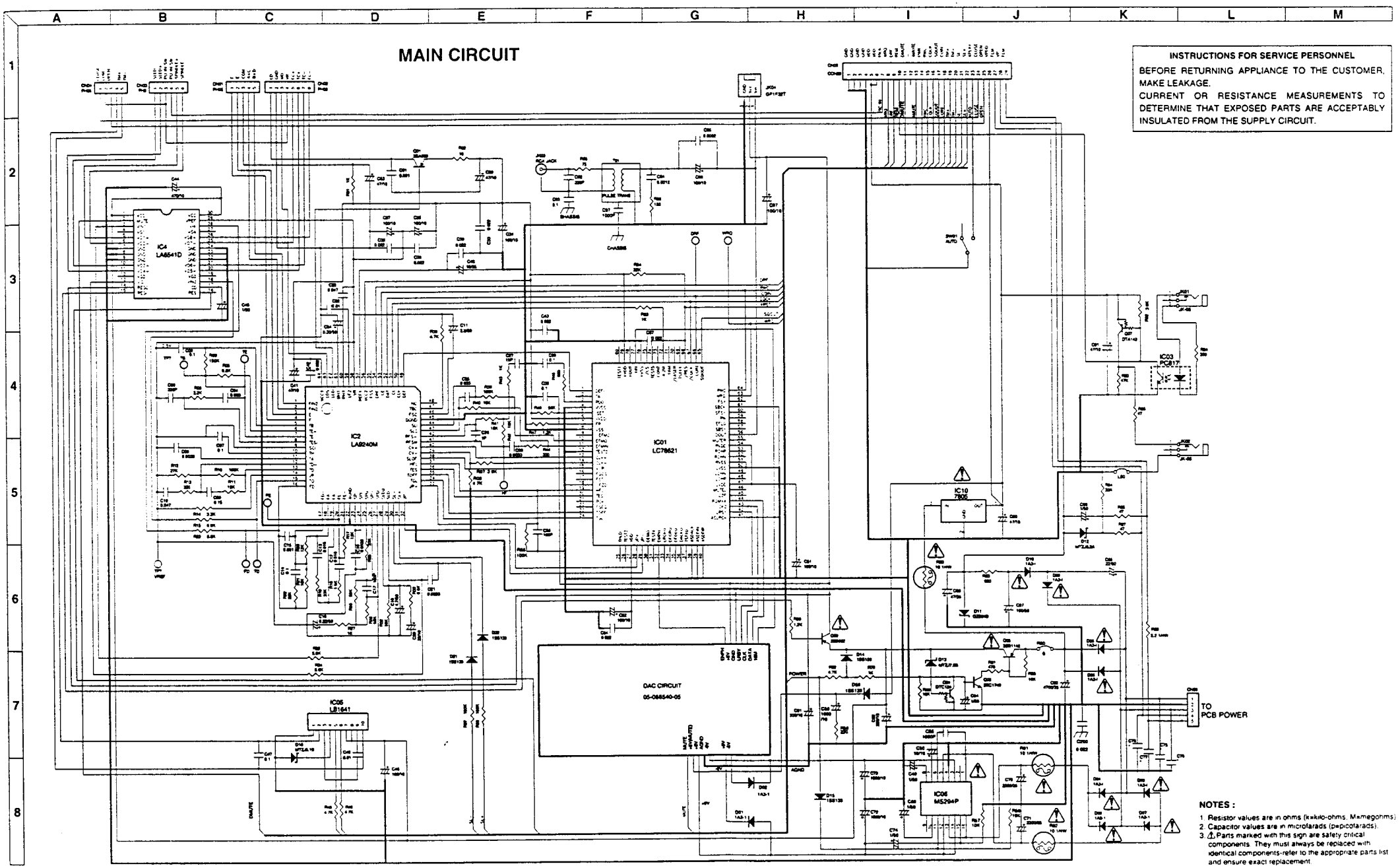


POINT TO POINT WIRING DIAGRAM



SCHEMATIC DIAGRAMS

MAIN CIRCUIT



INSTRUCTIONS FOR SERVICE PERSONNEL

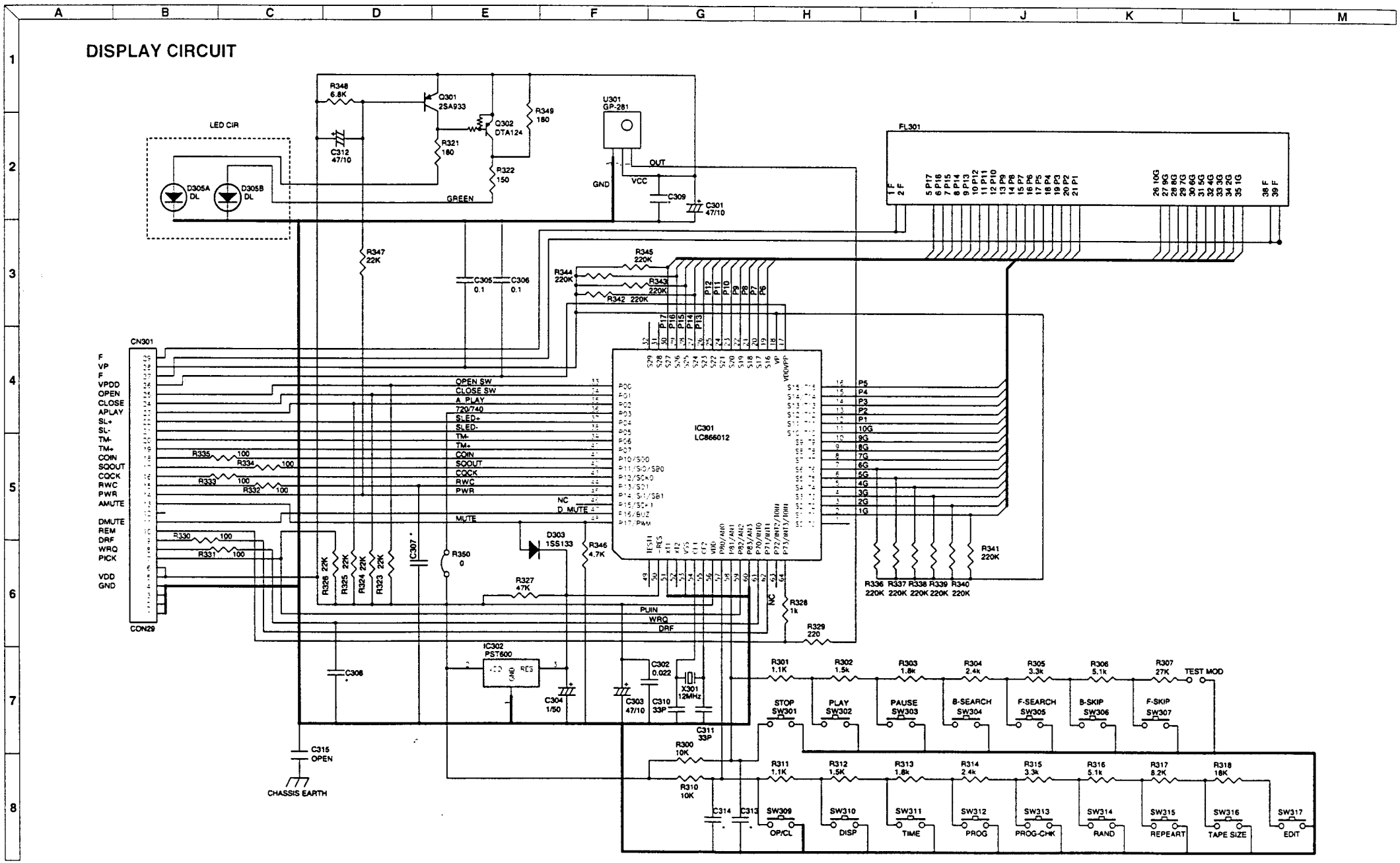
BEFORE RETURNING APPLIANCE TO THE CUSTOMER, MAKE LEAKAGE.
CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

NOTES :

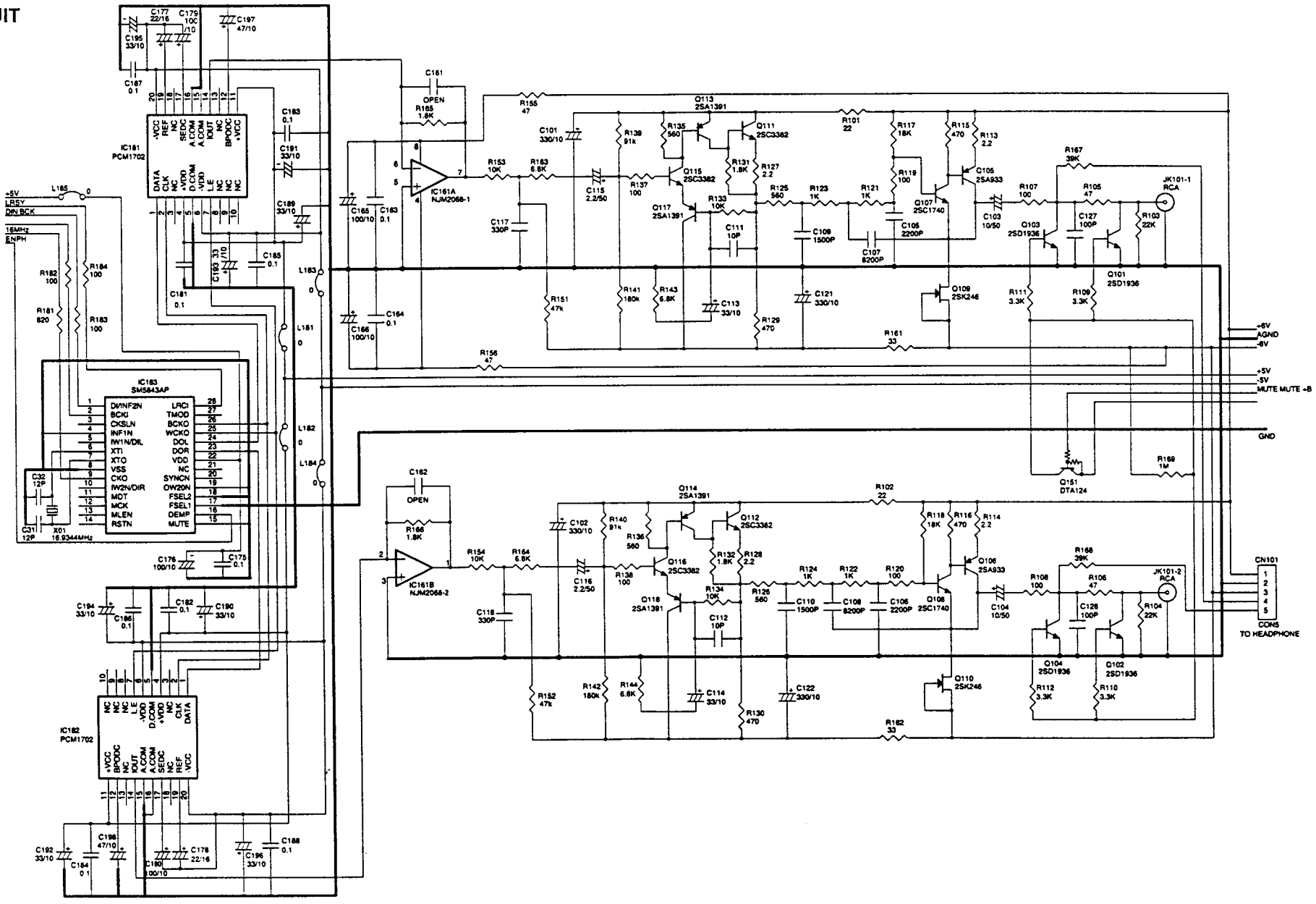
1. Resistor values are in ohms (k=kilo-ohms, M=megohms).
2. Capacitor values are in microfarads (p=picofarads).
3. ⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components-refer to the appropriate parts list and ensure exact replacement.

SCHEMATIC DIAGRAMS

DISPLAY CIRCUIT

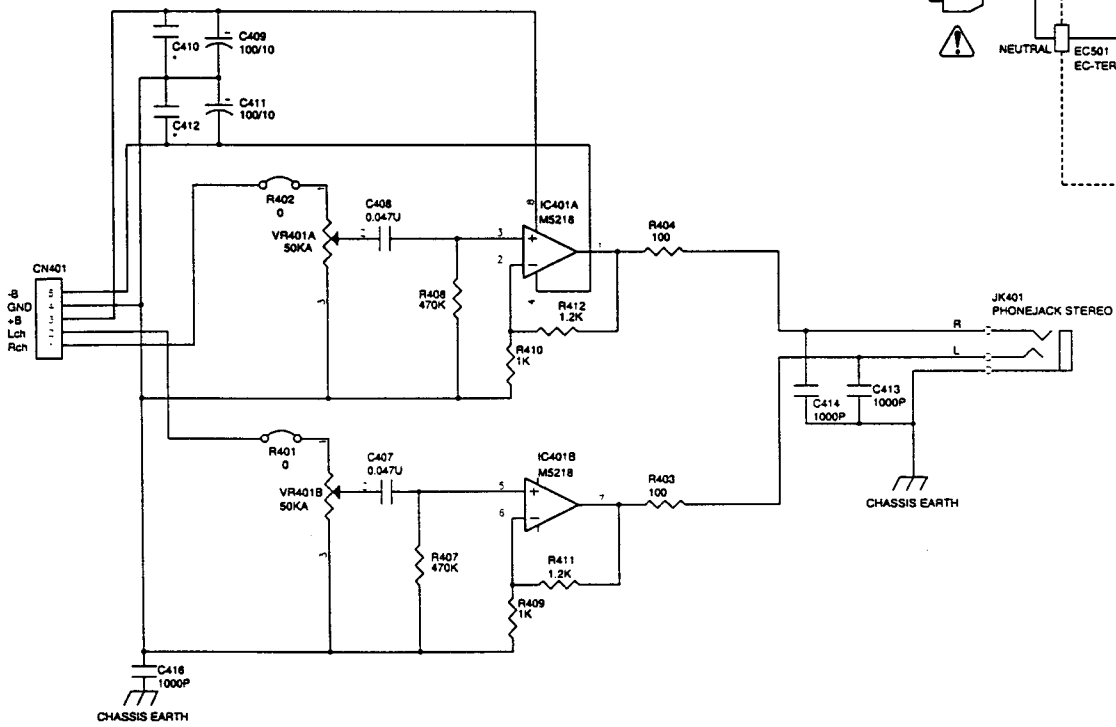


DAC CIRCUIT

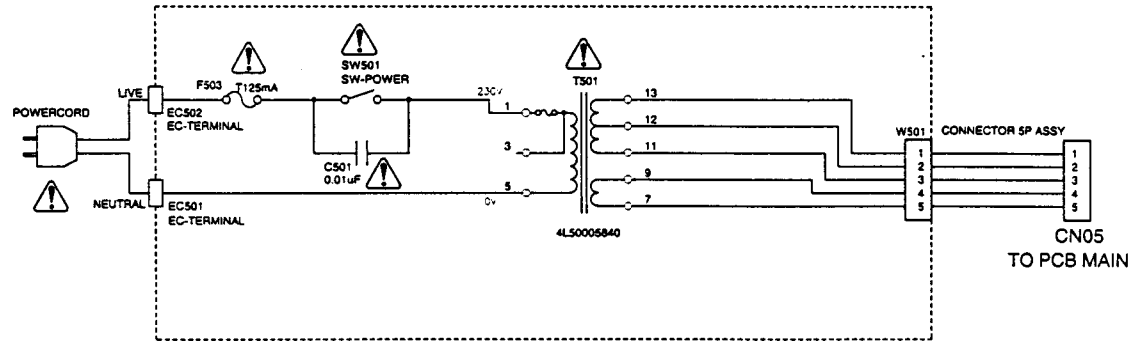

IC181 PCM1702
IC182 PCM1702
IC183 SM5843AP
IC161A NJM2068-1
IC161B NJM2068-2
X01 16.9344MHz
Q151 DTA124
CN101
CONS
TO HEADPHONE
JK101-1 RCA
JK101-2 RCA
+5V
AGND
-5V
MUTE MUTE +B
GND

SCHEMATIC DIAGRAMS

HEAD PHONE CIRCUIT



POWER CIRCUIT



INSTRUCTIONS FOR SERVICE PERSONNEL

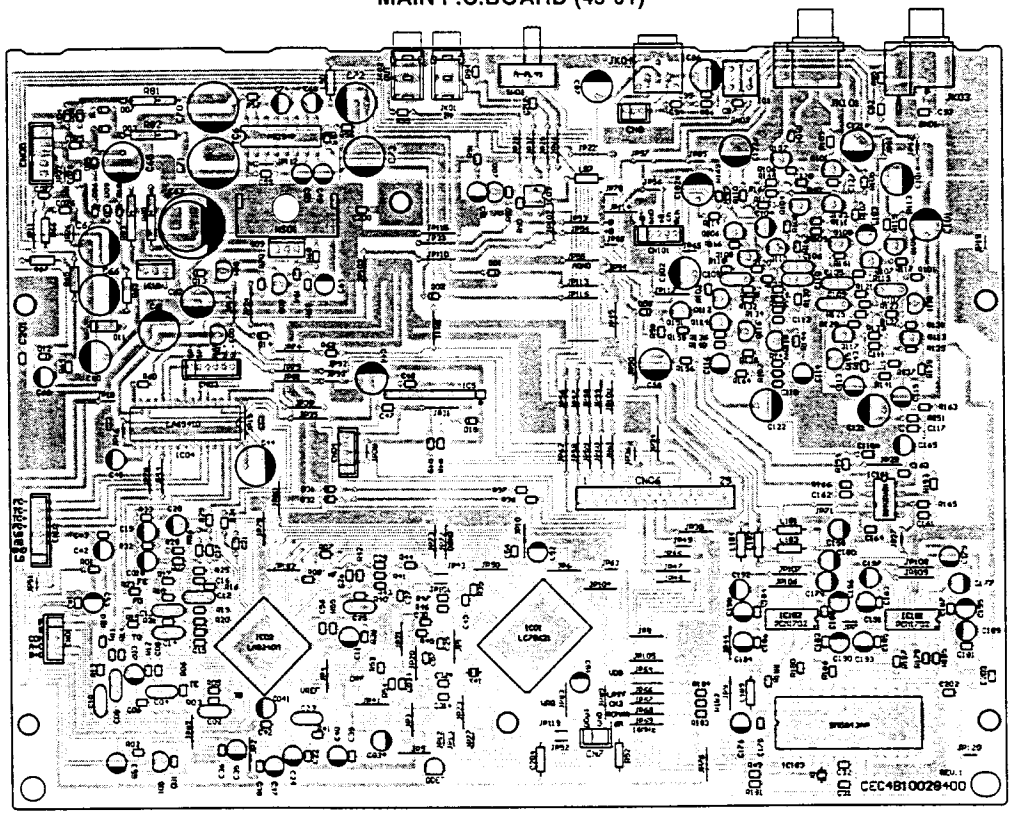
BEFORE RETURNING APPLIANCE TO THE CUSTOMER, MAKE LEAKAGE CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

NOTES :

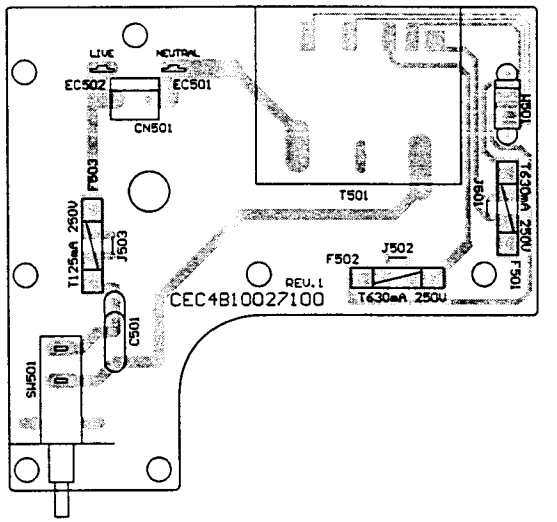
1. Resistor values are in ohms (k=kilo-ohms, M=megohms)
2. Capacitor values are in microfarads (p=picofarads).
3. ⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components-refer to the appropriate parts list and ensure exact replacement.

P.C.BOARDS

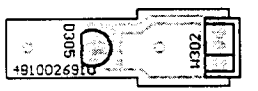
MAIN P.C.BOARD (45-01)



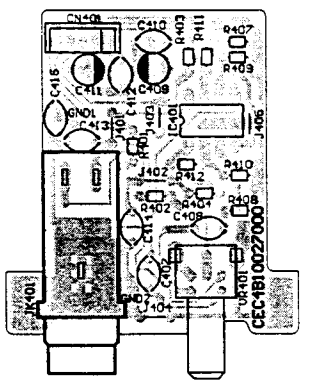
POWER P.C.BOARD (45-02)



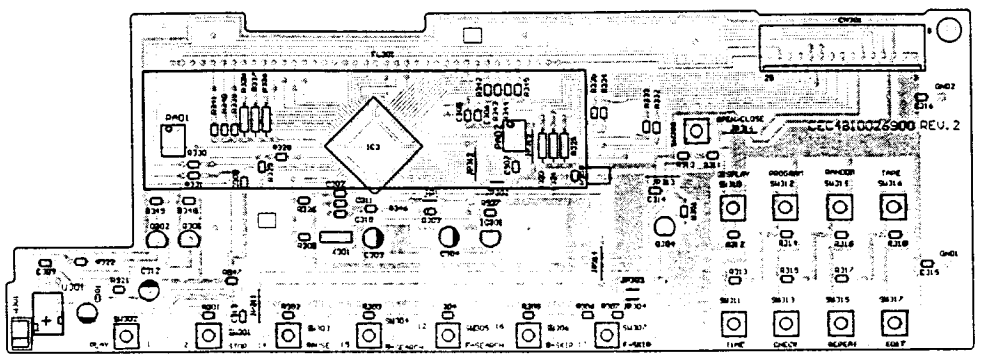
LED P.C.BOARD (45-04)



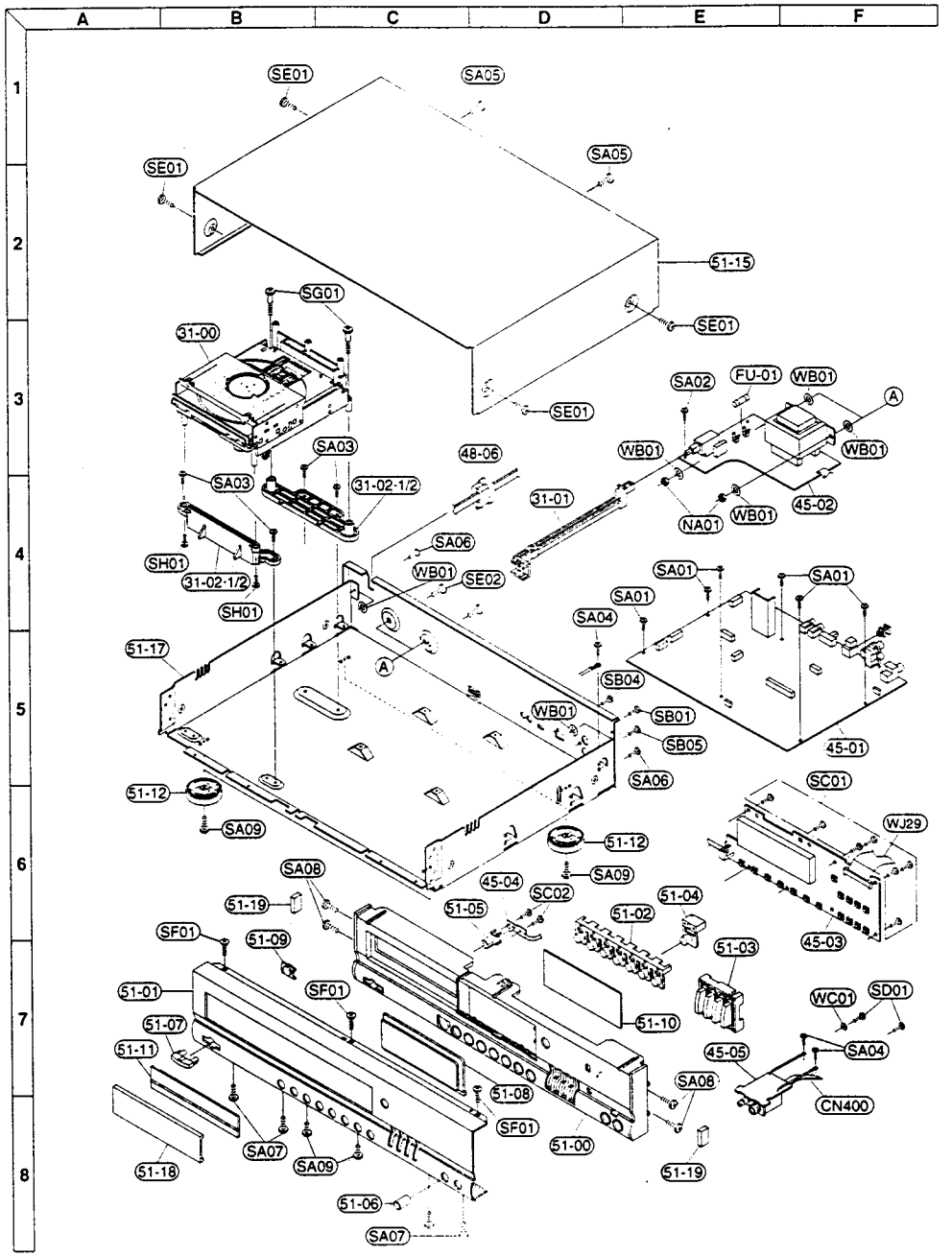
H.P. P.C.BOARD (45-05)



DISPLAY P.C.BOARD (45-03)



EXPLODED VIEW



PARTS LIST

CABINET

Ref No	Parts Number	Description
30-00	CEC0991004200	MECHA,CD93F8N
31-01	CEC2351001800	JOINT
31-02	CEC2441008100	SPACER,MECHA
48-06	CEC2446000200	BUSHING,NIFCO 2271
51-00	CEC2141003200	ESCUTCHEON,INNER
51-01	CEC2152006110	PANEL,FRONT
51-02	CEC2175011610	BUTTON,7KEY
51-03	CEC2175011710	BUTTON,4KEY
51-04	CEC2175012400	BUTTON,EJECT
51-05	CEC2212000600	INDICATOR,POWER
51-06	CEC2171001900	KNOB,ROTARY
51-07	CEC2174005100	KNOB,POWER
51-08	CEC2164006200	WINDOW
51-09	CEC2431001400	FILTER,IR
51-10	CEC2431001500	FILTER,FL
51-12	CEC0251001900	ASSY,LEG
51-15	CEC2121004000	COVER
51-16	CEC2144003800	DECORATION,CD
51-17	CEC2311006820	CHASSIS
51-18	CEC2151001510	PANEL,DECORATION
51-19	CEC2448003300	PAD
80-05	CEC2571002000	FELT
CN-01	CEC4J13005037	CONNECTOR 8P PH ASSY
CN-02	CEC4J13005038	CONNECTOR 5P PH ASSY
CN-03	CEC4J13005039	CONNECTOR 6P PH ASSY
CN-04	CEC4J13005040	CONNECTOR 5P PH ASSY
CN05	CEC4W30004796	WIRE JUMPER 29P
CN401	CEC4J13012801	CONNECTOR, 5P, ASSY

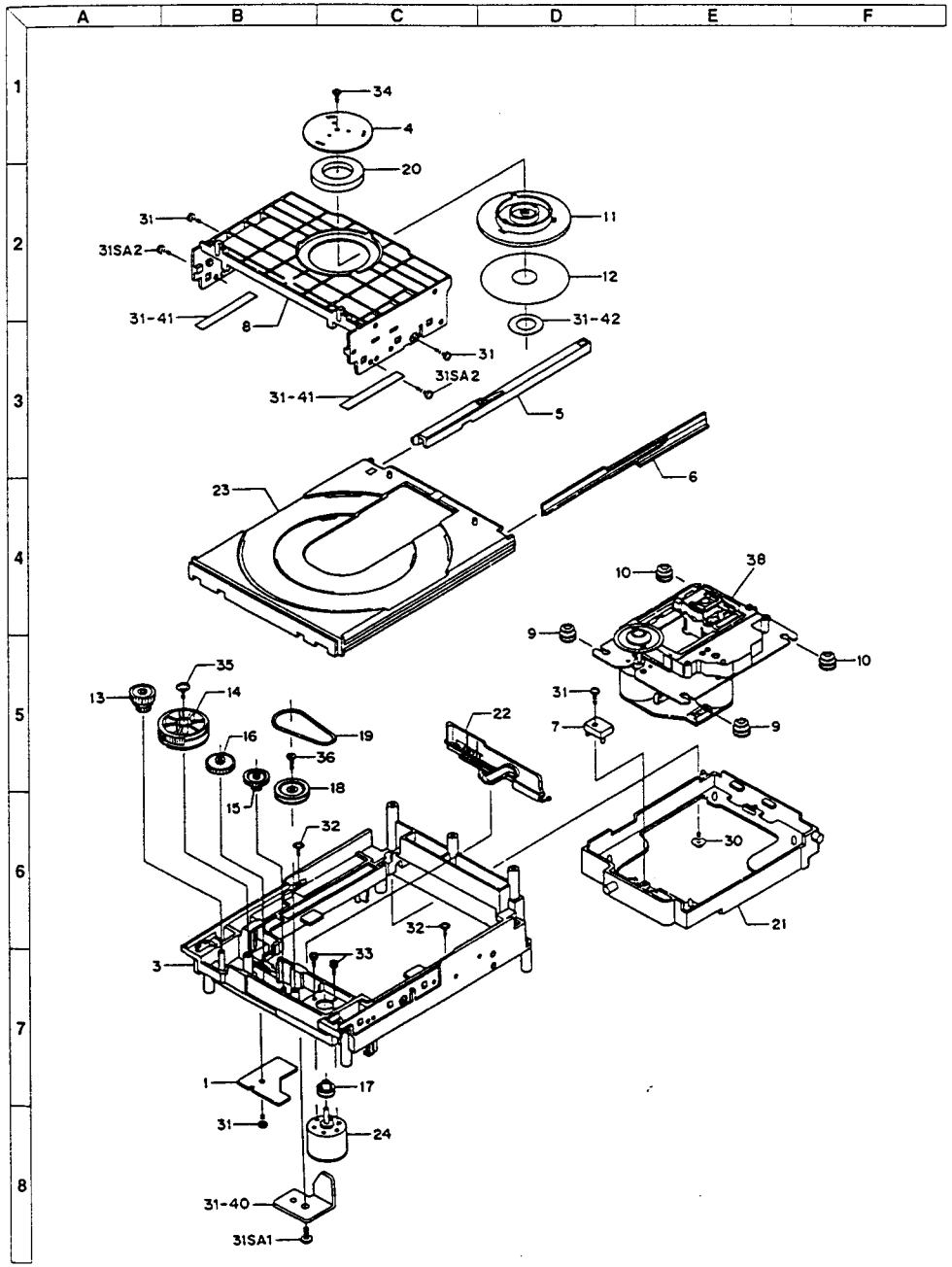
ASSY PCB

Ref No	Parts Number	Description
45-01	CEC0B10028400	ASSY, PCB, MAIN
45-02	CEC0B10027140	ASSY, PCB, MAIN
45-03	CEC0B10026901	ASSY, PCB, MAIN
45-04	CEC0B10026910	ASSY, PCB, MAIN
45-05	CEC0B10027002	ASSY, PCB, MAIN
FU01	F31SS12C2SCTX	FUSE 250V 125mA] OR USE
FU01	CEC4S30000900	FUSE 250V 125mA]

SCREW

Ref No	Parts Number	Description
NA01	SN2HNN40SM---	NUT HEX M4
SA01	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA02	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA03	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA04	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA05	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA06	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA07	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA08	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SA09	SFBDN306R0SM-	SCR S-TPG BIN 3X6
SB01	SFBDN308R0SM-	SCR S-TPG BIN 3X8
SB04	SFBDN308R0SM-	SCR S-TPG BIN 3X8
SB05	SFBDN308R0SM-	SCR S-TPG BIN 3X8
SC01	SFBDN266R0SE-	SCR S-TPG BIN 2.6X6
SC02	SFBDN266R0SE-	SCR S-TPG BIN 2.6X6
SD01	14124219427000	SCREW WASHER
SE01	SFSDN408R0SM-	SCR S-TPG BIN 4X8
SE02	SFSDN408R0SM-	SCR S-TPG BIN 4X8
SF01	SFBFN306R0SM-	SCR S-TPG FLT 3X6
SG01	SFBAN30300SE-	SCR S-TPG BRZ 3X30
SH01	SFBDN30120SE-	SCR S-TPG BIN 3X12
WB01	SWP401001R0SM	WASHER T M4X10X1T
WC01	SWZ321000R5SE	WASHER Z 3.2X10X0.5
WD01	CEC2383005200	WASHER,PVC 4.2X20X0.3BK
WE01	CEC2383005100	WASHER(CHASSIS REAR)

MECHANISM EXPLODED VIEW



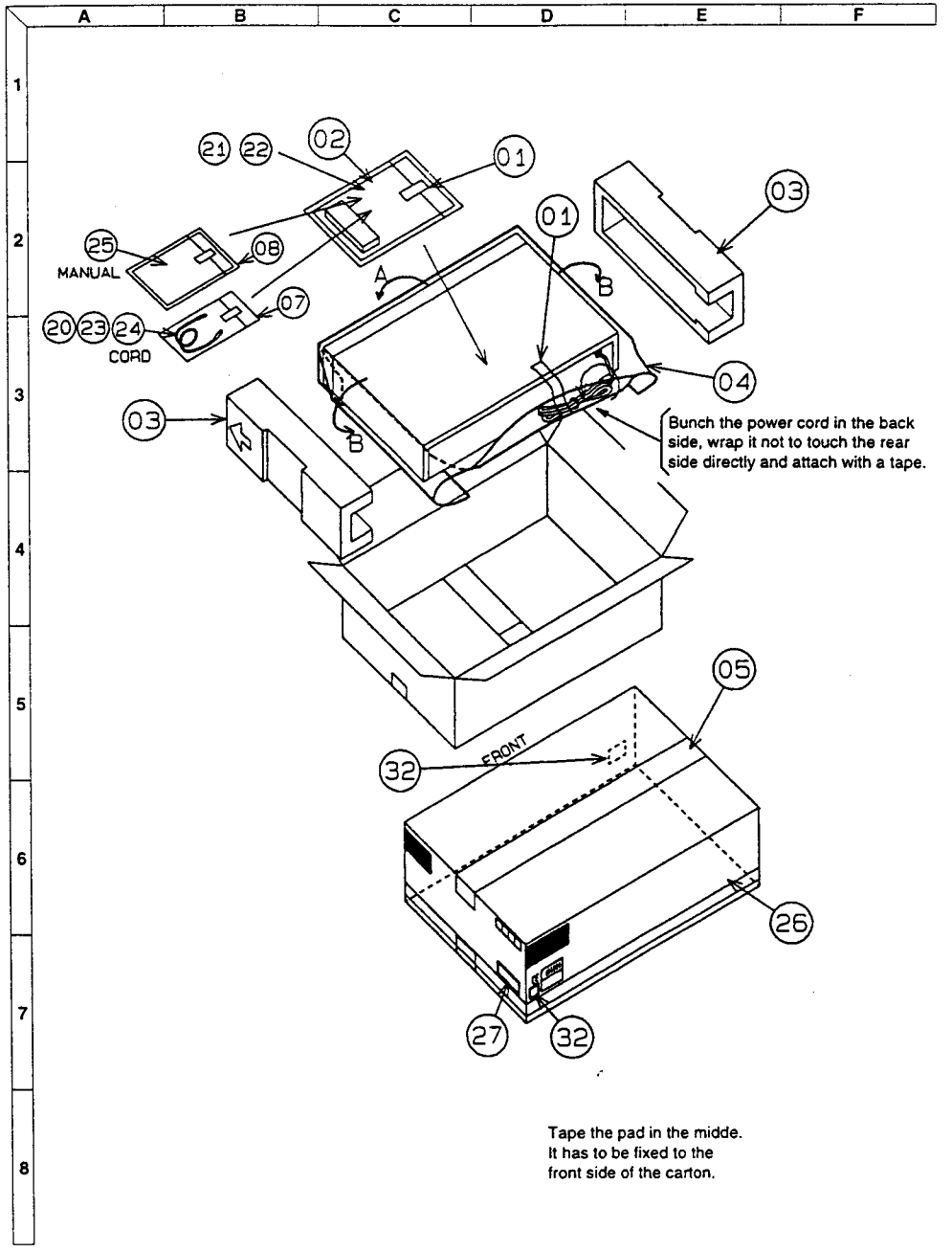
PARTS LIST

31-00 MECHA,CD93F8N

Ref No	Parts Number	Description
01	1EA0B10A98100	ASSY,PCB SWITCH
03	1EA2311A06600	CHASSIS,FRAME
04	1EA2336A05300	PLATE,MAGNET
05	1EA0363A00100	ASSY,RAIL,LEFT
06	1EA2363A00300	RAIL,RIGHT
07	1EA2366A01200	STOPPER,CHASSIS
08	1EA2413A01700	SUPPORT,MAGNET
09	1EA2443A07504	CUSHION,RUBBER(BLUE)
10	1EA2443A07503	CUSHION,RUBBER(PURPLE)
11	1EA2451A09000	HOLDER,MAGNET
12	1EA2462A13200	SHEET
13	1EA2511A10900	GEAR,LOADING
14	1EA2511A11000	GEAR,LIFTER
15	1EA2511A11100	GEAR,IDLER,A
16	1EA2511A11200	GEAR,IDLER,B
17	1EA2523A01700	PULLEY,MOTOR
18	1EA2524A01600	PULLEY,GEAR
19	1EA2563A02200	BELT,SQUARE
20	1EA2641A01300	MAGNET,DISC CLAMP
21	1EA2713A00600	LIFTER,MECHA
22	1EA2741A01300	SLIDE,LIFTER
23	1EA2761A00700	TABLE,LOADING
24	1EA4M10A02100	MOTOR,3.0V,0.3W
30	SFBAY308R0SE-	SCR S-TPG BRZ+FLG 3X8
31	SFBDN268R0SE-	SCR S-TPG BIN 2.6X8
32	SFBPY206R0SE-	SCR S-TPG PAN+FLG 2X6
33	SM2PS173R5SE-	SCR PAN+SW 1.7X3.5
34	SGXEA00201---	SPECIAL SCREW
35	SFBAY308R0SM-	SCR S-TPG BRZ+FLG 3X8
36	SFBDN268R0SM-	SCR S-TPG BIN 2.6X8
38	13927800	CD95V5
31-40	CEC2322001300	BRACKET
31-41	CEC2462011200	SHEET, MECHA
31-42	CEC2571001900	FELT, FLAP
31SA1	SFBDN308ROSE-	SCR S-TPG BIN 3X8
31SA2	SFBDN308ROSE-	SCR S-TPG BIN 3X8

IF CD MECHANISM IS DEFECTIVE, PLEASE ORDER ENTIRE MECHANISM # CEC0991004200 FOR SERVICE INDIVIDUAL PARTS MAY NOT BE AVAILABLE.

PACKING



PARTS LIST

PACKING

Ref No	Parts Number	Description
	CEC2448003300	PAD
01	CEC6K60000300	TAPE,18MM,BLUE
02	13162719104010	BAG FAN(poly,cover)
03	CEC6K41009600	PAD
04	CEC6K31003600	POLY,COVER
05	CEC6K60001200	TAPE 50MM
07	CEC6K31003700	POLY,COVER
08	CEC6K31003701	POLY,COVER
20	CEC4W20004000	PLUG,CORD,RCA
21	CEC4U10002208	REMOCON
22	CEC4D10000700	BATTERY
23	CEC4W20004300	PLUG,CORD,RCA,1P
24	CEC4W20004400	PLUG,CORD
25	CEC6P10068540	MANUAL
26	CEC6K21017100	CARTON
27	CEC6P42005041	LABEL,BAR CODE
32	CEC6P49018000	LABEL,CHINA