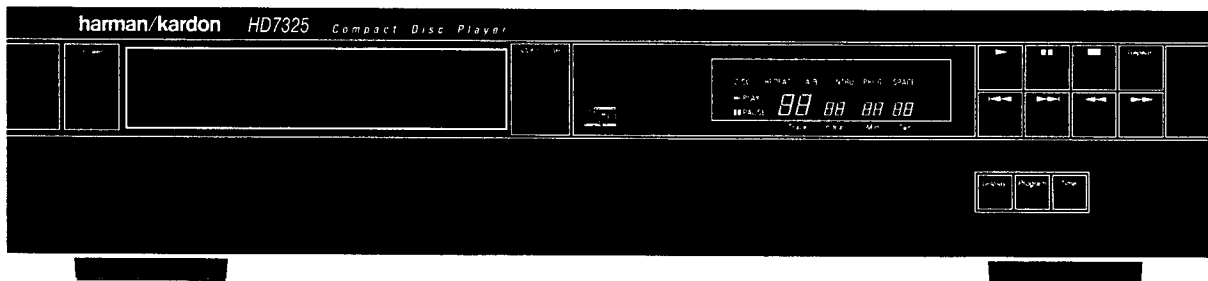


# The Harman Kardon Model HD7325/HD7225A COMPACT DISC PLAYER

Manual 192A

## Technical Manual



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

- HD7325 **BK** : North America area model Black version  
HD7225A/HD7325 **IB** : International model Black version  
HD7225A/HD7325 **I** : International model

### CONTENTS

|                              |    |                                  |    |
|------------------------------|----|----------------------------------|----|
| SPECIFICATION .....          | 2  | IC BLOCK DIAGRAMS .....          | 24 |
| SAFETY PRECAUTIONS .....     | 3  | CD MECHANISM EXPLODED VIEW ..... | 27 |
| CONTROLS AND FUNCTIONS ..... | 5  | CD MECHANISM PARTS LIST .....    | 27 |
| DISASSEMBLY PROCEDURES ..... | 7  | GENERAL UNIT .....               | 28 |
| POWER CORD REPLACEMENT ..... | 7  | GENERAL UNIT PARTS LIST .....    | 29 |
| ADJUSTMENT PROCEDURE .....   | 8  | P.C. BOARDS .....                | 30 |
| TROUBLE SHOOTING .....       | 10 | ELECTRICAL PARTS LIST .....      | 31 |
| IC TERMINAL FUNCTIONS .....  | 14 | WIRING DIAGRAM .....             | 35 |
| CIRCUIT DESCRIPTION .....    | 19 | SCHEMATIC DIAGRAMS .....         | 36 |

**harman/kardon**

Parts and Service Office  
80 Crossways Park West, Woodbury, N.Y. 11797  
1112-0570A152 A9403 1500 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 opened 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.

**ADVARSEL:**

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

**VAROITUS!**

Laite sisältää laseriodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilyä.

**SPECIFICATION**

System : Compact Disc Digital Audio  
 D/A Converter : Linear, Pulse Width Modulated 3D Bit Stream  
 Clock Rate : 33.8688MHz, 18Bit/4Fs  
 Digital Filter  
 Signal Detection : 3-Beam Semiconductor  
 Optical Laser Pickup  
 Error Correction : CIRC System  
 Low Level Linearity : +/-1.0dB @-90dB  
 Frequency Response : 4Hz to 20kHz +0dB/-1.5dB  
 Total Harmonic Distortion (THD) : 0.006%  
 Dynamic Range : 95dB  
 Signal to Noise Ratio : 100dB

Channel Separation : 93dB  
 Line Output Level/Impedance : 2.2V@10kΩ  
 Digital Output Level/Impedance : 0.5Vp-p @75Ω  
 (Coaxial)  
 Power Supply  
 U.S.A. and Canada models : AC120V, 60Hz  
 International model : AC230/240V, 50/60Hz  
 Power Consumption : 20Watts  
 Dimensions (W x H x D) : 17-3/8" x 3-5/8" x 13"  
 442mm x 92mm x 326mm  
 Weight : 10.1lbs/4.6kg

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:

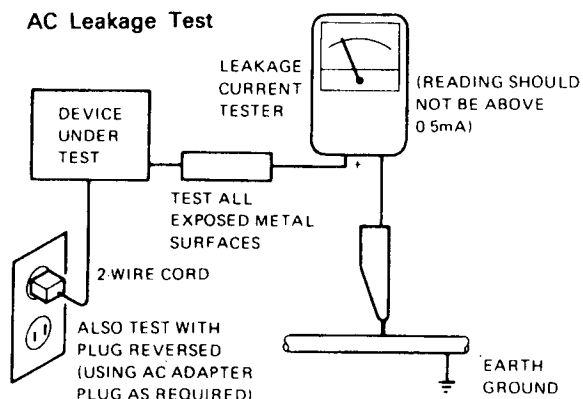
a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing.

- (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 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.**

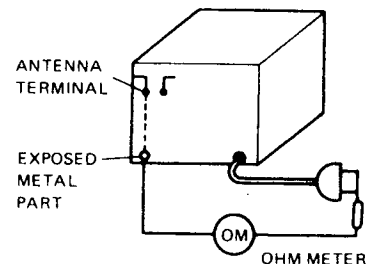


### d. Insulation Resistance Test

- (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 (  $\Delta$  ) 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.

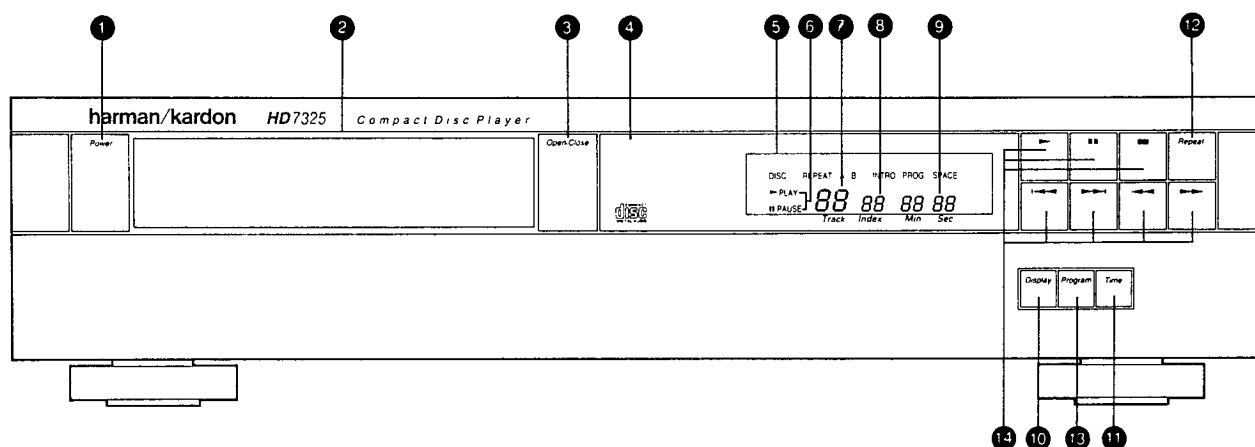
## ELECTROSTATICALLY SENSITIVE (ES) DEVICES

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



### 1 POWER switch

The POWER switch turns the unit on and off.

### 2 Compact disc drawer

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

### 3 OPEN/CLOSE button

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

### 4 REMOTE SENSOR

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

### 5 FUNCTION indicator

**DISC** - This indicator lights when the disc drawer is open, and when a disc is loaded. It does not light when there is no disc.

**REPEAT** - When this indicator is lit, the unit is in REPEAT mode and will continuously repeat either the entire disc or the programmed sequence.

**A-B** - When this indicator is lit steadily, the unit is set to repeat a specified section of the disc (from A to B). When REPEAT indicator is lit, you have already programmed the starting point (point A) of a section, and the unit is waiting for you to program the ending point of the section (point B).

**INTRO** - When this indicator is lit, the unit is in INTRO SCAN mode and will play only the first 15 seconds of each selection on the disc or in the selected program.

**PROG** - When this indicator is lit, the unit is in PROGRAM mode, in which you can program a sequence of tracks in the order you'd like to hear them, then play back your programmed sequence.

**SPACE** - When this indicator is lit, the unit is in SPACE mode and will insert 4 seconds of space between tracks.

### 6 PLAYBACK mode

**PLAY** - This indicator is lit when the unit is playing a track.

**PAUSE** - This indicator is lit when the unit is PAUSE mode (i.e., you have pressed PAUSE to temporarily stop playback).

### 7 TRACK indicator

When a disc is loaded but not playing, the TRACK indicator displays the total number of tracks on that disc. During playback, the indicator displays the number of the track currently being played. During programming, it displays the number of the track most recently selected.

### 8 INDEX indicator

Some discs that contain very long track may have those tracks subdivided into shorter sections. For example, a long classical piece may be divided into movements, each of which may have an index number. The INDEX indicator displays the number of the subdivision of a track currently being played. If the track has no subdivisions, the INDEX indicator will display a 1 during playback. During programming, the INDEX light goes out and the indicator displays the total number of tracks selected in the programmed sequence.

### 9 TIME indicator

When a disc is loaded but not playing, the TIME indicator displays the total amount of playback time on that disc. During playback, depending on the state of the TIME button (11), the indicator displays one of the following

- The time that has elapsed since the beginning of the current track.
- The time that remains on the currently selected track. The mark - (minus) will be displayed if the indicator is in this mode.
- The time that remains on either the entire disc or on the programmed selections. The mark - (minus) will be displayed if the indicator is in this mode. Note that if you have programmed more than 99 minutes in your selection, only dashes will appear in this mode.

### 10 DISPLAY button

This button turns the display on and off. When you turn the display off in PLAY mode, the entire display goes off. In PAUSE mode, most of the display goes off, but the track number is still displayed. In STOP mode, most of the display goes off, but the total number of tracks on the disc is still displayed. In some systems, turning the fluorescent display off may provide the purest possible sound quality during playback.

### 11 TIME button

During playback or programming, the button cycles through the three TIME display modes

- The time that has elapsed since the beginning of the current track.
- The time that remains on the currently selected track.
- The time that remains on either the entire disc or the programmed sequence.

### 12 REPEAT button

This button puts your compact disc player in and out of REPEAT mode. In REPEAT mode, the unit will continually play back either the entire disc or the programmed sequence of tracks. Press the button once to turn on REPEAT mode; press again to turn off REPEAT mode. When the unit is in REPEAT mode, the FUNCTION indicator (5) will display the word REPEAT.

**13 PROGRAM button**

This button puts your compact disc player in and out of PROGRAM mode. Press the button once to turn on PROGRAM mode; press again to turn it off. In PROGRAM mode, you can program a set of tracks to play in any sequence. (For instructions on programming a sequence of tracks, see the Operations section of this manual.) When the unit is in PROGRAM mode, the FUNCTION indicator (5) will display the word PROG in red.

**14 Playback controls**

**PLAY-** ► The PLAY button starts playback of a track.

**PAUSE -** ■■ Pressing the PAUSE button temporarily stops playback. Pressing the PAUSE button again, or pressing PLAY, resumes playback at the precise point where playback left off.

**STOP-** ■ The STOP button stops playback. When you press PLAY, playback will start either at the beginning of the disc or programmed sequence, or at any track you select.

**SKIP BACK-** ◀ Pressing this button once skips back to the beginning of the present track. If you are in PLAY mode, playback will resume. Holding the button down skips backward to the beginning of each preceding track until the first track on the disc is reached.

**SKIP FORWARD-** ▶ Pressing this button once skips forward to the beginning of the next track. If you are in PLAY mode, playback will resume. Holding the button down skips forward to the beginning of each subsequent track until the last track on the disc is reached.

**SEARCH BACK-** ◀◀ Holding down this button during playback reverses rapidly through the disc. This function is similar to the "Rewind" function on a tape deck.

**SEARCH FORWARD-** ▶▶ Holding down this button during playback speeds rapidly forward through the disc. This function is similar to the "Fast forward" function on a tape deck.

**Remote control**

The remote control for the HD7325 provides the same functions found on the front panel of the compact disc player itself. In addition, the remote control provides some functions that are not found on the front panel.

The functions found on the remote control that are not found on the front panel are INTRO, A-B, CLEAR, CHECK, SPACE, and the 1-10 and +10 keys. These five functions are described below (for other functions, see the descriptions above).

**15 CLEAR button**

The CLEAR button removes tracks from your programmed sequence one by one starting with the last track entered. Each time you clear a track from the programmed sequence, that track's time is deleted from the total time displayed. This button is used only in PROGRAM mode.

**16 CHECK button**

When a disc is loaded but not playing (STOP mode), you can press the CHECK button to see the playback time of each track on the disc. Each time you press the CHECK button, the next track is displayed along with its playback time. When you have stepped sequentially through all the tracks on the disc, another press of the CHECK button displays the total playback time of the entire disc. In PROGRAM mode, the CHECK button displays the cumulative time of the tracks in the programmed sequence. That is, the first press displays the time of the first programmed track, the second press displays the cumulative playback time of the first and second tracks, and so on.

**17 A-B button**

This button puts your compact disc player in and out of A-B mode. In A-B mode, the unit will continually play back a "phrase" or section of your disc beginning at point A and ending at point B. (For instructions on repeating a section of a disc, see the Operations section of this manual.) When the unit is in A-B mode, the FUNCTION indicator (5) will display REPEAT A-B.

**18 INTRO button**

This button puts your compact disc player in and out of INTRO SCAN mode. When INTRO SCAN is on and you press PLAY, the unit plays only the first 15 seconds of each track before moving on to the next. Press the button once to turn on INTRO SCAN mode; press again to turn it off and stop the scanning. When the unit is in INTRO SCAN mode, the FUNCTION indicator (5) will display the word INTRO.

**19 SPACE button**

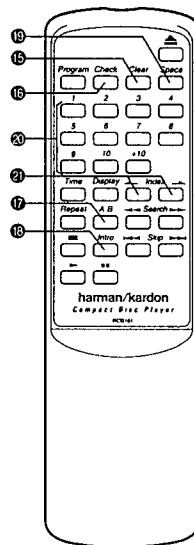
This button puts your compact disc player in and out of SPACE mode. Press the button once to turn on SPACE mode; press again to turn it off. In SPACE mode, the unit inserts 4 seconds of blank space between tracks. This is particularly useful if you are recording music from a compact disc onto a tape. Tape decks with a Music Search feature will be able to use the 4 seconds of space to correctly identify the beginning of each selection on the tape. When the unit is in SPACE mode, the FUNCTION indicator (5) will display the word SPACE.

**20 Track selection buttons**

This set of buttons (numbered 1 through 10 and +10) enables you to directly select the track you want to play. To select a track with a number higher than 10, press the +10 button, then press the button that will add up to the number of the track you want. For example, to select track 14, press +10, then press 4. If you select a track number that does not exist on your disc, the TRACK indicator will continue to display the number of the last track on the disc. When PROGRAM mode is off, pressing a track button plays the track you select. When PROGRAM mode is on, pressing a track button programs that track into your sequence.

**21 INDEX buttons**

Some discs contain long selections that may be subdivided into shorter sections (for example, operas). Just as the tracks are marked by the track number, these shorter sections may be marked by index numbers. When you have started playback of the desired track, you can use the INDEX UP and INDEX DOWN buttons to jump to a desired index selection. Each time you press an INDEX button, the INDEX indicator displays the next higher or lower index number. If you continue pressing the button until the indicated index number is higher than the actual number of index selections on the disc, playback will start from the nearest index selection.



**DISASSEMBLY PROCEDURES** (REFER TO PAGES 27 THROUGH 29 AND 35)

**[1] CABINET TOP (124) REMOVAL**

Remove 6 screws (A) and then remove the Cabinet Top (124).

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

1. Remove the Cabinet Top (124), referring to the previous step [1].
2. Disconnect the jumper lead (JL401) from connector (CN201) on the Main P.C. Board (PCB-1).
3. Open the lid of connector (CN103) on the Main P.C. Board (PCB-1), then disconnect the jumper lead (JL103).
4. Connect the power cord and turn on the power by pressing the power switch.
5. Open the Disc Tray (1) by pressing the Open/Close button.
6. With the Disc Tray (1) opened as it is, pull out the power plug.
7. Remove the Lid (130) from the both side rails on the disc tray.
8. Remove 5 screws (B) and then remove the Front Panel Ass'y (AA) with the Front P.C. Board (PCB-2).
9. Remove 9 screws (C) and then remove the Front P.C. Board (PCB-2) from the Front Panel Ass'y (AA).
10. Remove 2 screws (D) and then remove the Power Switch P.C. Board (PCB-3) from the Front Panel Ass'y (AA).

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

1. Remove the Cabinet Top (124), referring to the previous step [1].
2. Disconnect the jumper lead (JL401) from connector (CN201) on the Main P.C. Board (PCB-1).
3. Open the lid of connector (CN103) on the Main P.C. Board (PCB-1), then disconnect the jumper lead (JL103).
4. Disconnect the connector with lead wires (LCN113, LCN114, LCN115 and LCN117) from connectors (CN113, CN114, CN115 and CN117) on the CD Player Mechanical Assembly (104).
5. Remove 14 screws (E) and then remove the Main P.C. Board (PCB-1).

**[4] CD PLAYER MECHANICAL ASSEMBLY (104) REMOVAL**

1. Remove the Cabinet Top (124), referring to the previous step [1].
2. Disconnect the connector with lead wires (LCN113, LCN114, LCN115 and LCN117) from connectors (CN113, CN114, CN115 and CN117) on the CD Player Mechanical Assembly (104).
3. Remove 4 screws (F) and then remove the CD Player Mechanical Assembly (104) backward.

**DISASSEMBLING THE CD PLAYER MECHANICAL ASSEMBLY**

**[5] DISC TRAY (1) REMOVAL**

1. Remove the Cabinet Top (124), 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 (1) by pressing the Open/Close button.
4. With the Disc Tray (1) opened as it is, pull out the power plug.
5. Pull out Holder with Tray.
6. Pull out the Disc Tray (1) while pulling clamps A and B outward. (Refer to Top View of page 8)

**[6] OPTICAL PICK-UP (57) REMOVAL**

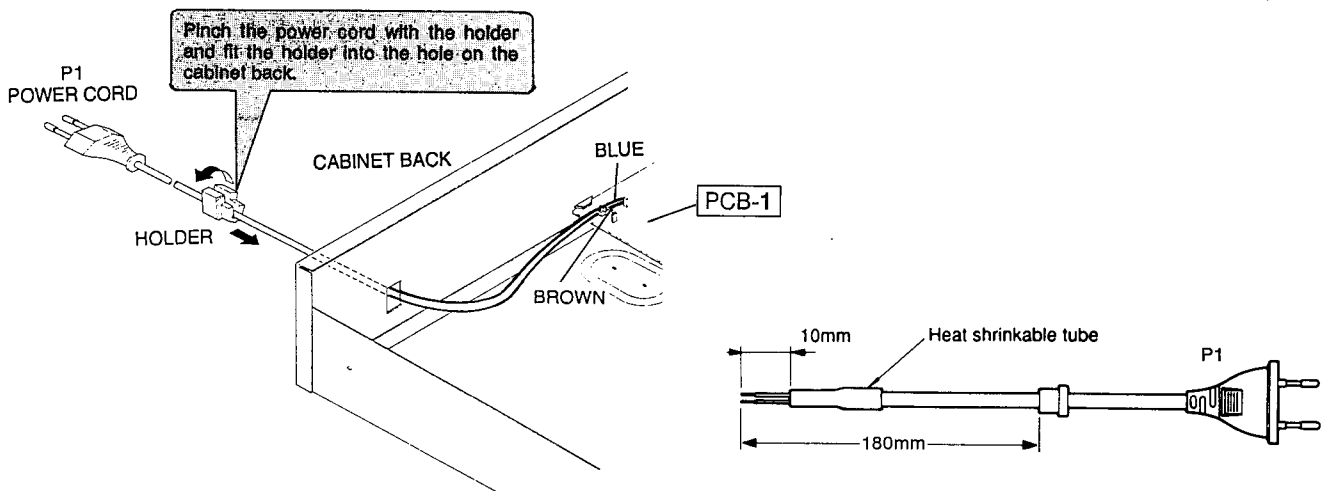
1. Remove the CD Player Mechanical Assembly (104), referring to the previous step [4].
2. Remove 4 screws (G) and then remove the Disc Motor Ass'y (59) with Pick-up, Slide Motor and etc.
3. Remove the Gear (58).
4. Remove the Shaft (51) and then remove the Pick-up (57).

**[7] SLIDE MOTOR (57) REMOVAL**

1. Remove the CD Player Mechanical Ass'y (104), referring to the previous step [4].
2. Unsolder the terminal of Disc and Slide Motors, then remove the Motor P.C. Board (61).
3. Remove 2 screws (H) and then remove the Slide Motor (60).

**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.



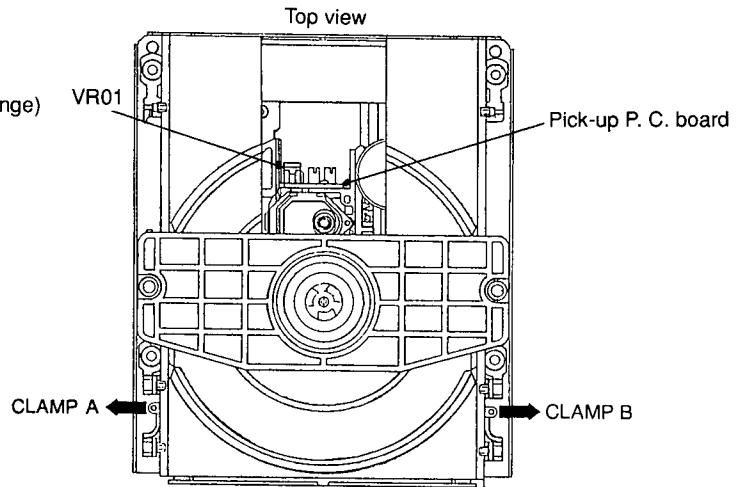
## ADJUSTMENT PROCEDURE

### 1. Instruments required

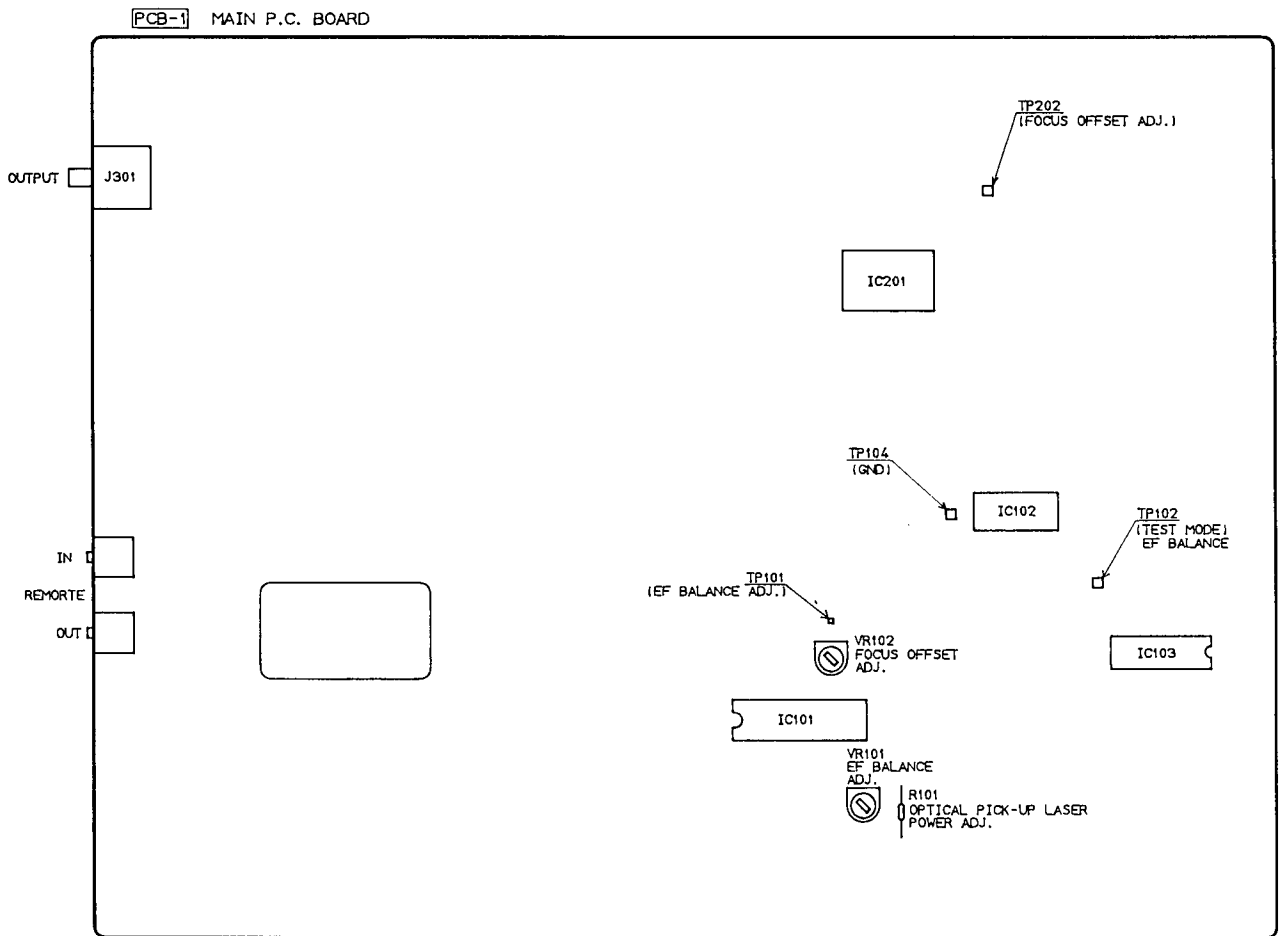
- DC voltmeter
- Oscilloscope (3 or more modes, 100 MHz, input select DC range)
- Jitter meter
- Test disc: EIAJ CD-1

### 2. Adjustment points

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



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



ADJUSTMENT POINT



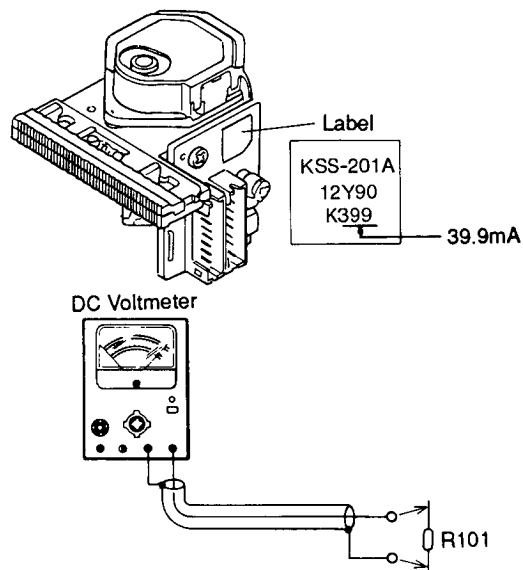
### 3. Optical Pick-up Laser Power Adjustment

The specified value for adjustment varies with the type of the pick-up in use. Obtain the voltage value according to the following procedure.

- Read the current value on the label of the pick-up P.C.board.
- Using the amperage of the current and the following equation, calculate the voltage value.

When the current is 39.9mA:  
 $V=0.0399A \times 22=0.8778V$

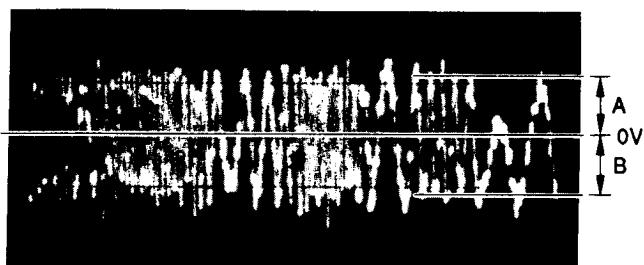
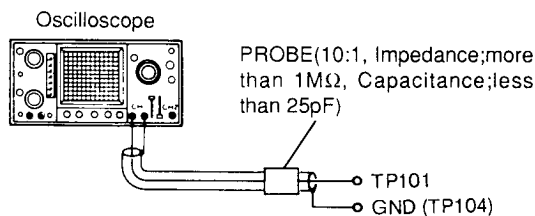
- Connect the DC voltmeter to both ends of R101.
- Insert EIAJ CD-1 test disc and place the unit in the Play mode.
- Adjust VR01 in the pick-up P.C.board to the voltage obtained in step (b) above.



### 4. EF Balance Adjustment

- Connect the oscilloscope (0.5V/div, 5 msec./div, DC mode) to TP101 and GND (TP104). Short-circuit TP102 and GND.
- Insert EIAJ CD-1 test disc and place the unit in the Play mode.
- 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.

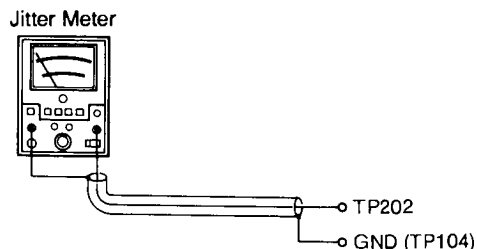


A=B

(approx. 1.5Vp-p)

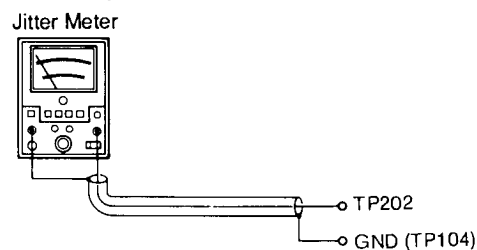
### 5. Focus Offset Adjustment

- Connect the Jitter meter to TP202 and GND (TP104).
- Insert EIAJ CD-1 test disc and place the unit in the play mode.
- Adjust VR102 until the jitter for optimum sensitivity.



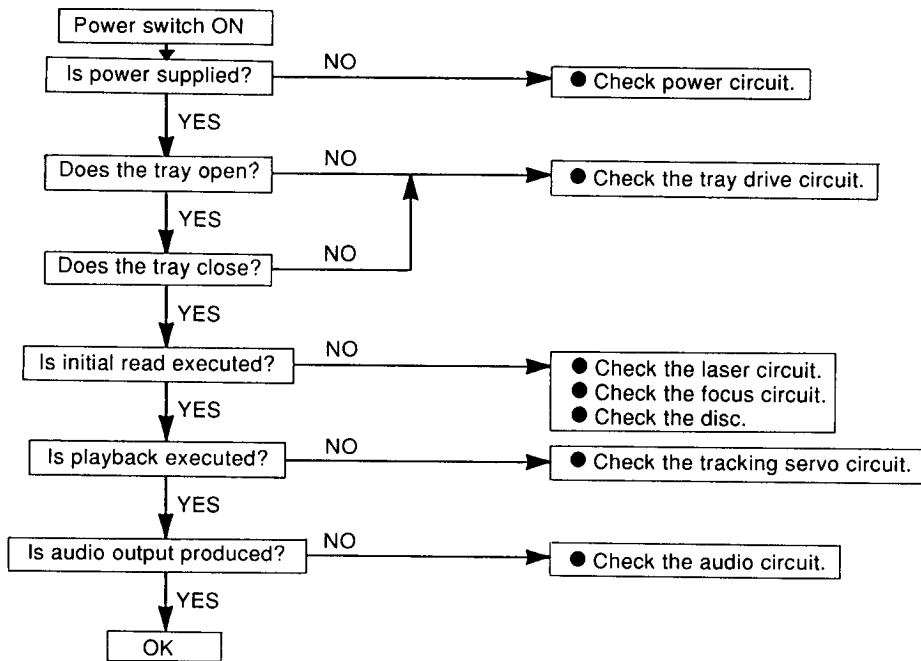
### 6. Jitter Inclination Confirmation

- Connect the Jitter meter (sigma range) to TP202 and GND (TP104).
- Insert EIAJ CD-1 test disc and place the unit in the Play mode.
- Confirm the jitter meter reading is less than 30ns.

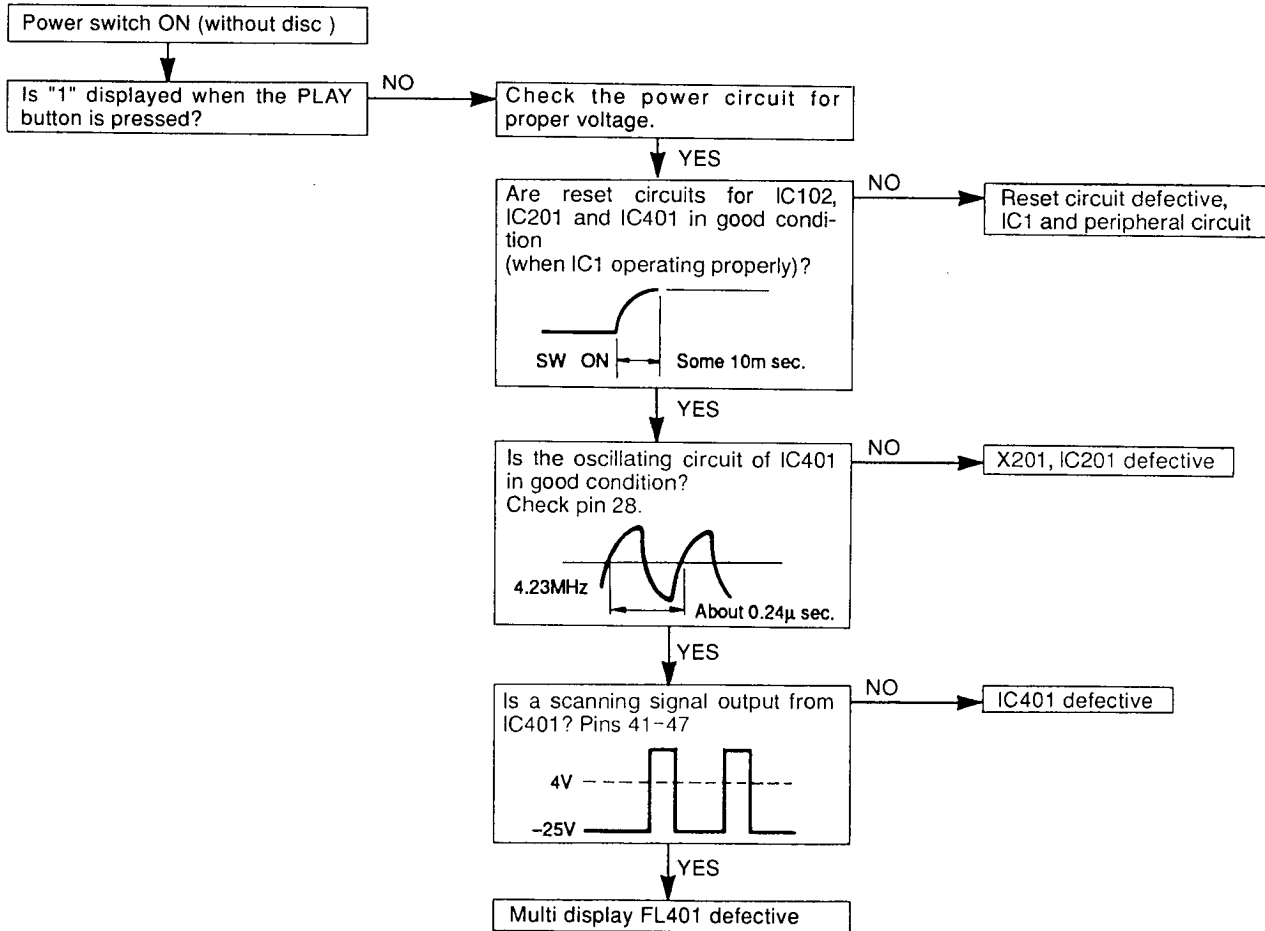


## TROUBLE SHOOTING

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.

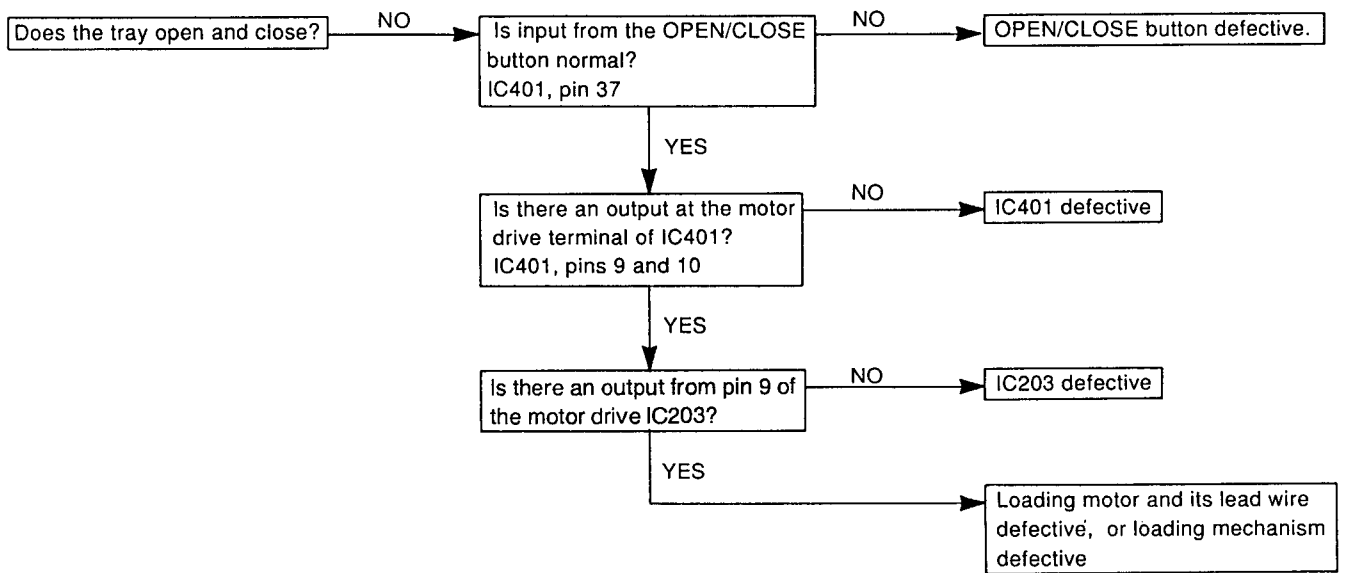


(1) When Multi Display fails to light properly.



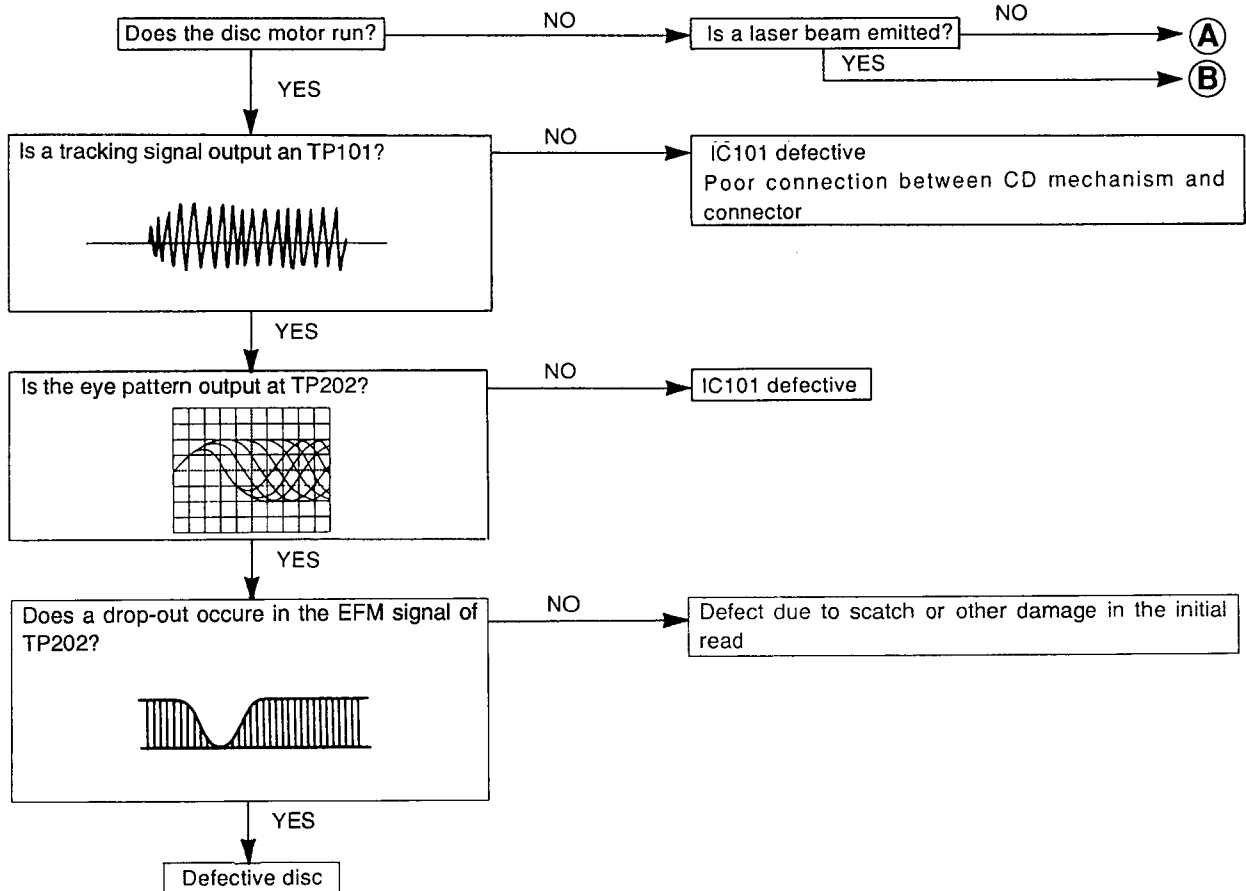
When a problem occurs, first check the pick-up lens for dirt and each connector for tight and secure connection. If the problem persists after checking both of these items, use the following check procedures.

**(2) When the tray fails to operate properly.**

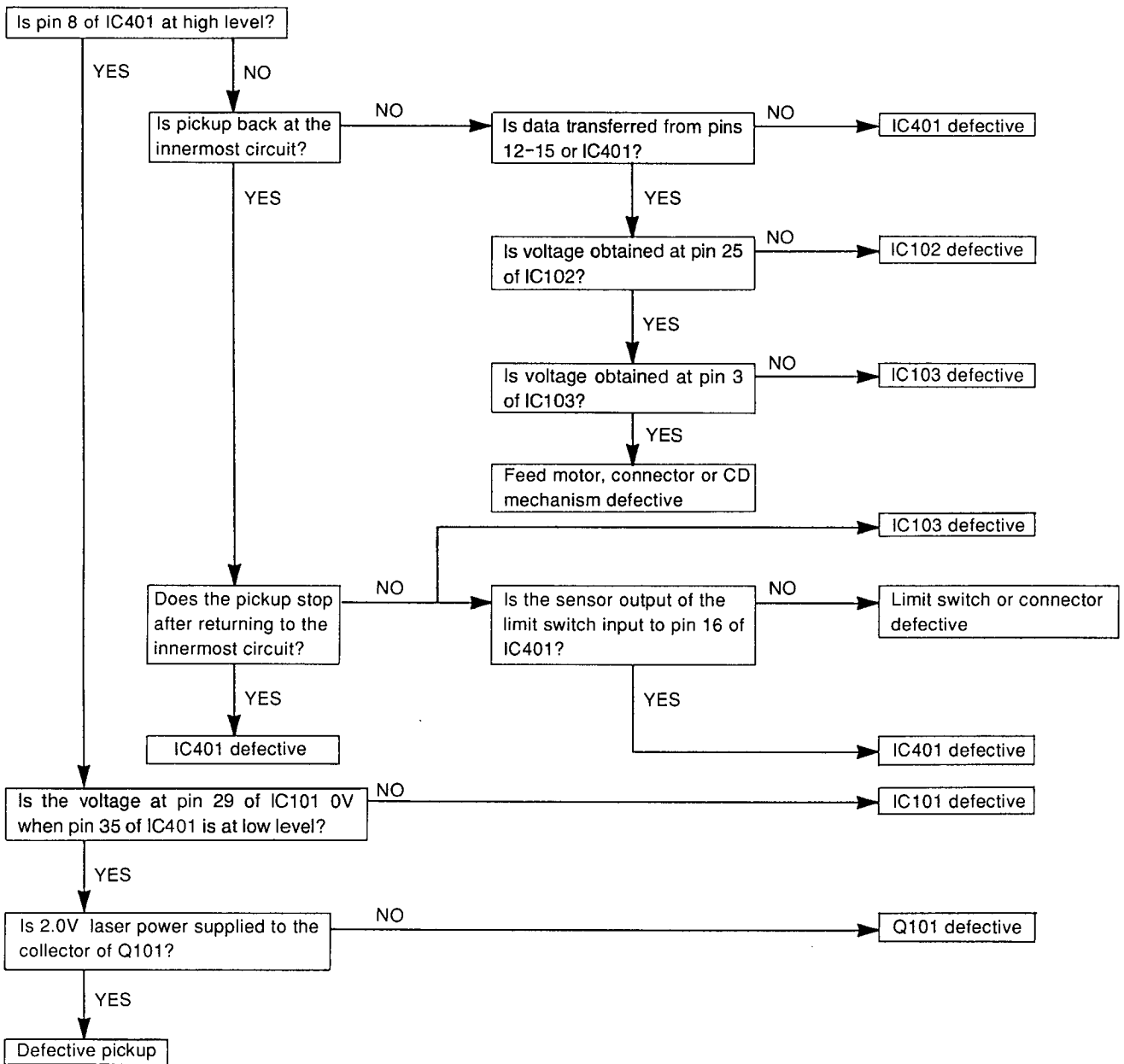


**(3) When initial read cannot be executed.**

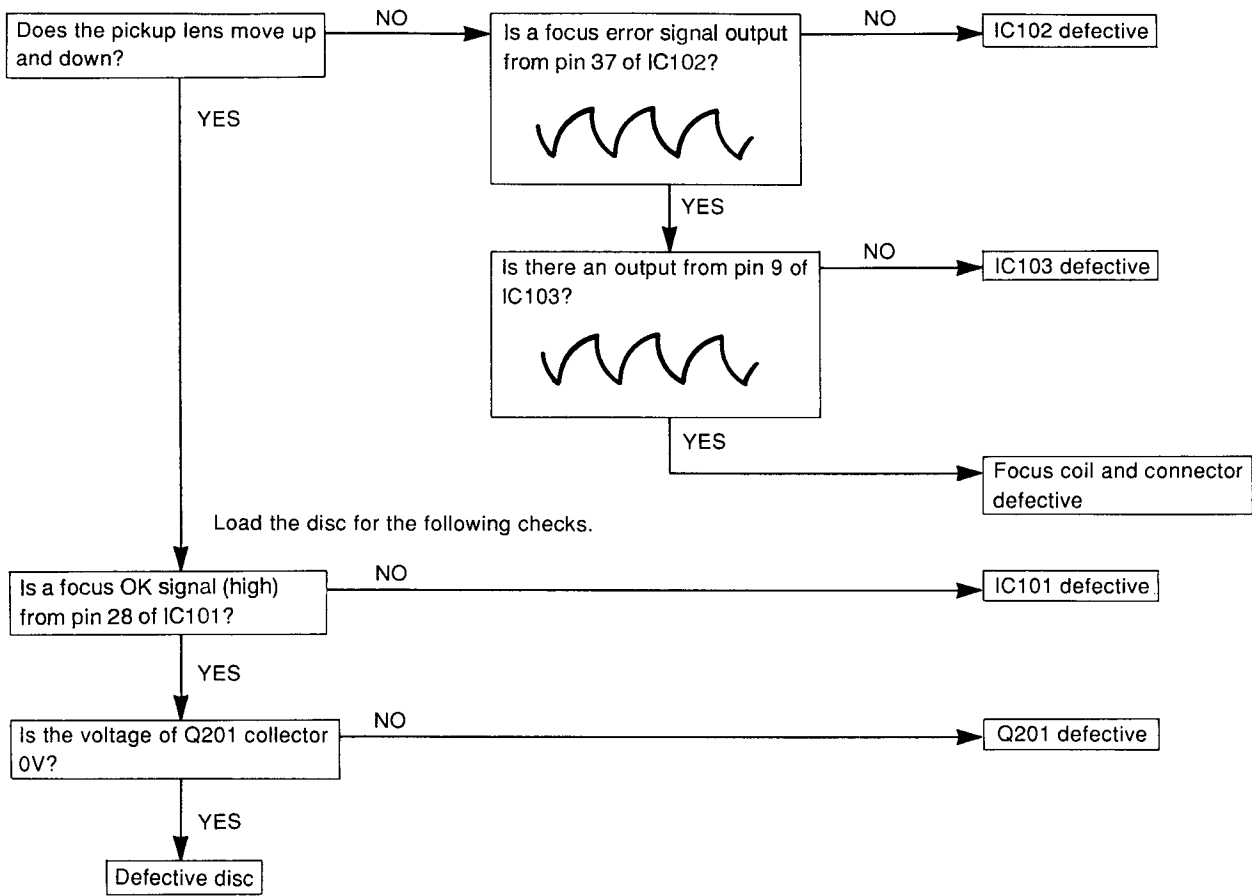
The following checks can be done without a disc loaded.



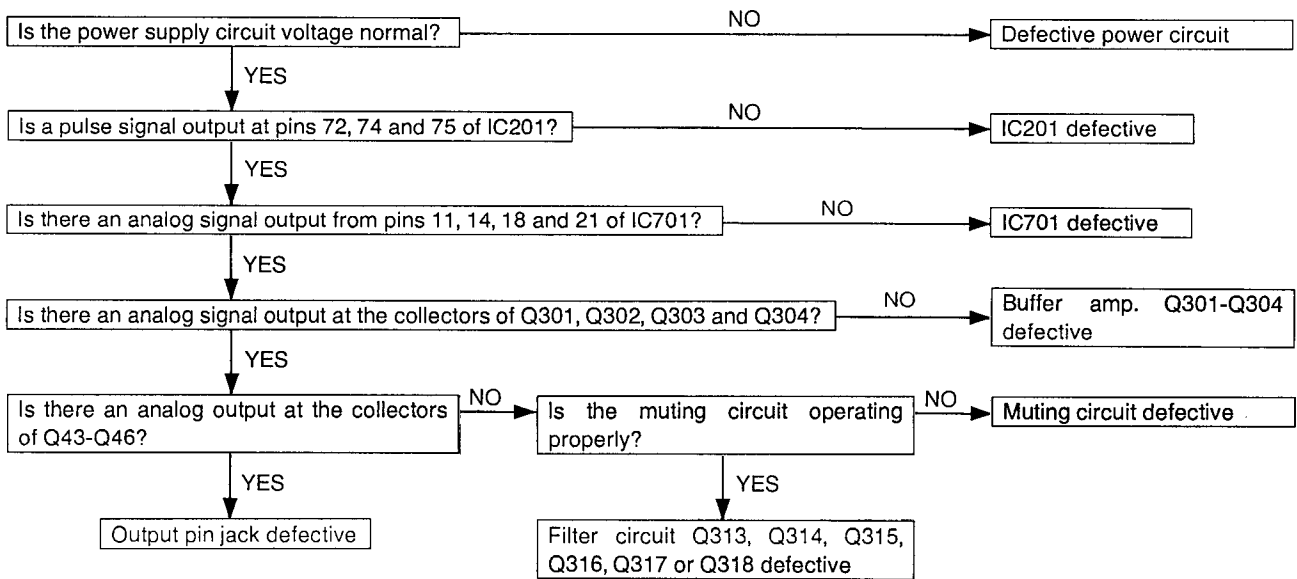
**A** When laser beam is not emitted.



**B** 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              | V <sub>EE</sub>  |                | -   | 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              | LD ON            |                | I   | Laser diode on/off select terminal.  |
|           | 30              | V <sub>CC</sub>  |                | -   | Positive power terminal.   |
| IC102     | 1               | ALPC SW OUT      | ALPC output    | O   | Auto laser power control output terminal.  |
|           | 2               | ALPC SW IN       | ALPC input     | I   | Auto laser power control input terminal.   |
|           | 3               | TE IN            | Pre amp. input | I   | Tracking error signal input terminal.  |
|           | 4               | TC IN            | Pre amp. input | I   | Track cross 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.   |
|           | 8               | HF OK IN         | Pre amp. input | I   | HF OK signal input terminal.   |
|           | 9               | HFD              | Mi-com I/O     | O   | "1" indicates that MR input is "1" and track servo loop is off (TS OFF, JF, JR).   |
|           | 10              | DATA OUT         | Mi-com I/O     | O   | Inner condition output changed by command modes.   |
|           | 11              | JP1              | Mi-com I/O     | I   | 1 track jump control signal. Usually "H".  |
|           | 12              | MSD              | Mi-com I/O     | I   | Serial data input terminal (LSB first, 8-bit data).  |
|           | 13              | MLA              | Mi-com I/O     | I   | Latch signal of serial data from mi-com to servo IC.   |
|           | 14              | MCK              | Mi-com I/O     | I   | Clock signal of serial data from mi-com to servo IC. Receives data on leading edge.                                      |
|           | 15              | ACL <sub>R</sub> | Mi-com I/O     | I   | All clear input. (Clear inner registers and flip-flops by "L" signal.)   |
|           | 18              | Bias             | Power supply   | O   | V <sub>CC</sub> /2 bias power supply output when single-pole power supply is used.                                       |
|           | 19              | 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. |
|           | 20              | GND              | Power supply   | I   | GND terminal.  |
|           | 21              | V <sub>EE</sub>  | Power supply   | I   | Negative power terminal. Connect to GND when single-pole power supply is used.   |
|           | 22              | C-FSR            | Focus servo    | -   | Connect capacitor which determines time constant of focus search waveform.   |
|           | 23              | I-Ref            | Power supply   | I   | Terminal for connecting resistor for setting current value of reference current source.                                  |
|           | 24              | V <sub>CC</sub>  | Power supply   | I   | Positive power terminal.   |
|           | 25              | SS OUT           | Slide servo    | O   | Operation amplifier SS output.   |
|           | 26              | SS <sub>⊖</sub>  | Slide servo    | I   | Operation amplifier SS reverse input.  |
|           | 27              | SS <sub>⊕</sub>  | Slide servo    | I   | Operation amplifier SS non-reverse input.  |
|           | 28              | TS OUT           | Track servo    | O   | Operation amplifier TA output.   |
|           | 29              | TS <sub>⊖</sub>  | Track servo    | I   | Operation amplifier TA reverse input.  |
|           | 30              | TG2              | Track servo    | -   | Track gain select switch TG2 output. Set to open or common level.  |
|           | 31              | TS <sub>⊕</sub>  | Track servo    | I   | Operation amplifier TA non-reverse input.  |
|           | 32              | TG1              | Track servo    | -   | Track gain select switch TG1 output. Set to open or common level.  |
|           | 33              | TE OUT           | Track servo    | O   | Operation amplifier TE output.   |
|           | 34              | TE <sub>⊖</sub>  | Track servo    | I   | Operation amplifier TE reverse input.  |

| IC NUMBER | TERMINAL NUMBER | PORT NAME        | TERMINAL CODE | I/O | OUTLINE OF FUNCTIONS   |
|-----------|-----------------|------------------|---------------|-----|--|
| IC102     | 35              | FSR IN           | Focus servo   | I   | Focus search voltage level detector input.                       |
|           | 36              | FG               | Focus servo   | -   | Focus gain select switch FG output. Set to open or common level. |
|           | 37              | FS OUT           | Focus servo   | O   | Operation amplifier FA output.                                   |
|           | 38              | FS $\ominus$     | Focus servo   | I   | Operation amplifier FA reverse input.                            |
|           | 39              | FS $\oplus$      | Focus servo   | I   | Operation amplifier FA non-reverse input.                        |
| IC103     | 1               | +VIN1            |               | I   | Positive input terminal 1 for amp. 1.                            |
|           | 2               | -VIN1            |               | I   | Negative input terminal 1 for amp. 1.                            |
|           | 3               | OUT1             |               | O   | Output terminal 1.   |
|           | 4               | OUT2             |               | O   | Output terminal 2.   |
|           | 5               | -VIN2            |               | I   | Negative input terminal 2 for amp. 2.                            |
|           | 6               | +VIN2            |               | I   | Positive input terminal 2 for amp. 2.                            |
|           | 7               | +VIN3            |               | I   | Positive input terminal 3 for amp. 3.                            |
|           | 8               | -VIN3            |               | I   | Negative input terminal 3 for amp. 3.                            |
|           | 9               | OUT3             |               | O   | Output terminal 3.   |
|           | 10              | NC               |               | -   |  |
|           | 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   | Microcomputer interface serial data input.                       |
|           | 13              | MCK              |               | I   | Microcomputer interface shift clock input.                       |
|           | 14              | MLA              |               | I   | Microcomputer interface data latch clock input.                  |
|           | 15              | ACLR             |               | I   | Microcomputer interface register clear input.                    |
|           | 16              | 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              | V <sub>DD2</sub> |               | 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.                               |
|           | 30              | CRCF             |               | O   | Subcode Q CRC check result output.                               |
|           | 31              | SCCK             |               | I   | Shift clock input for serial subcode data output.                |
|           | 32              | V <sub>SS2</sub> |               | 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.  |
|           | 43              | RA $\bar{S}$     | RT1           | O   | Row address strobe signal output.                                |
|           | 44              | TEST2            | TEST2         | I   | Test mode select input.  |
|           | 45              | ROB2             | RT2           | I/O | External memory data I/O 2.                                      |
|           | 46              | NC               |               | -   |  |
|           | 47              | RT3              |               | I/O | External memory data I/O 1.                                      |
|           | 48              | RT4              |               | I/O | External memory data I/O 4.                                      |

| IC NUMBER | TERMINAL NUMBER | PORT NAME         | TERMINAL CODE | I/O                             | OUTLINE OF FUNCTIONS                      |
|-----------|-----------------|-------------------|---------------|---------------------------------|---|
| IC201     | 49              | RT5               |               | O                               | Column address strobe signal output.      |
|           | 50              | RT6               |               | I/O                             | External memory data I/O 3.               |
|           | 51              | RT7               |               | O                               | Write enable signal output.               |
|           | 52              | RT8               |               | I                               | External memory address output 7.         |
|           | 53              | RT9               |               | O                               | External memory address output 1.         |
|           | 54              | RT10              |               | O                               | External memory address output 2.         |
|           | 55              | RT11              |               | O                               | External memory address output 3.         |
|           | 56              | NC                |               | -                               |   |
|           | 57              | RT12              |               | O                               | External memory address output 4.         |
|           | 58              | RT13              |               | O                               | External memory address output 5.         |
|           | 59              | RT14              |               | O                               | External memory address output 6.         |
|           | 60              | RT15              |               | O                               | External memory address output 0.         |
|           | 61              | EST2              |               | O                               | Error status 2.                           |
|           | 62              | EST1              |               | O                               | Error status 1.                           |
|           | 63              | V <sub>DD</sub> 1 |               | I                               | 5V power supply.                          |
|           | 64              | DOFK              |               | O                               | OSC frame clock output.                   |
|           | 65              | F <sub>S</sub> CK |               | O                               | Clock output. 44.1kHz                     |
|           | 66              | C846              |               | O                               | Clock output. 8.4672MHz                   |
|           | 67              | C423              |               | O                               | Clock output. 4.2336MHz                   |
|           | 68              | CKSEL             |               | I                               | 1/2 divider input.                        |
|           | 69              | DFSEL             |               | 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              | V <sub>SS</sub> 1 |               | 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. |   |
| IC203     | 1               | VSENCE1           |               |                                 |   |
|           | 2               | OUT1              |               | O                               | Output terminal 1.                        |
|           | 3               | -VIN1             |               | I                               | Negative input 1.                         |
|           | 4               | +VIN1             |               | I                               | Positive input 1.                         |
|           | 5               | V <sub>EE</sub>   |               |                                 | Negative power supply.                    |
|           | 6               | +VIN2             |               | I                               | Positive input 2.                         |
|           | 7               | -VIN2             |               | I                               | Negative input 2.                         |
|           | 8               | OUT2              |               | O                               | Output terminal 2.                        |
|           | 9               | VSENCE2           |               |                                 |   |
|           | 10              | V <sub>CC</sub>   |               |                                 | Positive power supply.                    |
| IC401     | 1               | V <sub>CC</sub>   |               |                                 | Positive power supply.                    |
|           | 2               | P6 <sub>5</sub>   |               | I/O                             |   |
|           | 3               | P6 <sub>4</sub>   |               | I/O                             |   |
|           | 4               | P6 <sub>3</sub>   |               | I/O                             |   |
|           | 5               | P6 <sub>2</sub>   |               | I/O                             |   |
|           | 6               | P6 <sub>1</sub>   |               | I/O                             |   |
|           | 7               | P6 <sub>0</sub>   |               | I/O                             |   |
|           | 8               | P2 <sub>7</sub>   | I/O port      | I/O                             | Disc tray open direction driving output.  |
|           | 9               | P2 <sub>6</sub>   | I/O port      | I/O                             | Disc tray close direction driving output. |
|           | 10              | P2 <sub>5</sub>   | I/O port      | I/O                             |   |
|           | 11              | P2 <sub>4</sub>   | I/O port      | I/O                             | Serial data output.                       |
|           | 12              | P2 <sub>3</sub>   | I/O port      | I/O                             | Serial data output.                       |
|           | 13              | P2 <sub>2</sub>   | I/O port      | I/O                             | Data latch clock output.                  |
|           | 14              | P2 <sub>1</sub>   | I/O port      | I/O                             |   |
|           | 15              | P2 <sub>0</sub>   | I/O port      | I/O                             |   |
|           | 16              | P3 <sub>7</sub>   | OUT PORT      | O                               | Display output i.                         |
|           | 17              | P3 <sub>6</sub>   | OUT PORT      | O                               | Display output g.                         |
|           | 18              | P3 <sub>5</sub>   | OUT PORT      | O                               | Display output f.                         |
|           | 19              | P3 <sub>4</sub>   | OUT PORT      | O                               | Display output e.                         |
|           | 20              | P3 <sub>3</sub>   | OUT PORT      | O                               | Display output d.                         |
|           | 21              | P3 <sub>2</sub>   | OUT PORT      | O                               | Display output c.                         |
|           | 22              | P3 <sub>1</sub>   | OUT PORT      | O                               | Display output b.                         |
|           | 23              | P3 <sub>0</sub>   | OUT PORT      | O                               | Display output a.                         |



| TERMINAL NUMBER | TERMINAL NAME     | TERMINAL CODE | I/O | OUTLINE OF FUNCTIONS   |
|-----------------|-------------------|---------------|-----|--|
| 24              | P5 <sub>3</sub>   |               |     |  |
| 25              | P5 <sub>2</sub>   |               |     |  |
| 26              | CNV <sub>SS</sub> |               |     | Usually connected to V <sub>SS</sub> .                           |
| 27              | RESET             |               | I   | Reset input.   |
| 28              | XIN               | CLOCK IN      | I   | Clock input.   |
| 29              | XOUT              | CLOCK OUT     | O   | Clock output.  |
| 30              | XCIN              | CLOCK IN      | I   | Serial data input.   |
| 31              | XCOU              | CLOCK OUT     | O   | Clock output.  |
| 32              | V <sub>SS</sub>   |               |     | Power supply.  |
| 33              | ∅                 |               | O   | Timing output.   |
| 34              | P5 <sub>7</sub>   |               |     |  |
| 35              | P5 <sub>6</sub>   |               |     |  |
| 36              | P5 <sub>5</sub>   |               |     |  |
| 37              | P5 <sub>4</sub>   |               |     |  |
| 38              | VP                |               | I   | Pull down voltage input.   |
| 39              | P5 <sub>1</sub>   |               |     |  |
| 40              | P5 <sub>0</sub>   |               |     |  |
| 41              | P1 <sub>7</sub>   | OUT PORT      | O   | Laser diode control output.                                      |
| 42              | P1 <sub>6</sub>   | OUT PORT      | O   | Display output 7.  |
| 43              | P1 <sub>5</sub>   | OUT PORT      | O   | Display output 6.  |
| 44              | P1 <sub>4</sub>   | OUT PORT      | O   | Display output 5.  |
| 45              | P1 <sub>3</sub>   | OUT PORT      | O   | Display output 4.  |
| 46              | P1 <sub>2</sub>   | OUT PORT      | O   | Display output 3.  |
| 47              | P1 <sub>1</sub>   | OUT PORT      | O   | Display output 2.  |
| 48              | P1 <sub>0</sub>   | OUT PORT      | O   | Display output 1.  |
| 49              | P0 <sub>7</sub>   | I/O port      | I/O | Serial data input.   |
| 50              | P0 <sub>6</sub>   | I/O port      | I/O | Frame synchronous state output.                                  |
| 51              | P0 <sub>5</sub>   | I/O port      | I/O | Low disc rotate state output.                                    |
| 52              | P0 <sub>4</sub>   | I/O port      | I/O | Sub-code synchronous signal output.                              |
| 53              | P0 <sub>3</sub>   | I/O port      | I/O | Sub-code Q check.  |
| 54              | P0 <sub>2</sub>   | I/O port      | I/O | Sub-code channel Q output.                                       |
| 55              | P0 <sub>1</sub>   | I/O port      | I/O | Interrupt input.   |
| 56              | P0 <sub>0</sub>   | I/O port      | I/O |  |
| 57              | P4 <sub>7</sub>   |               |     |  |
| 58              | P4 <sub>6</sub>   |               |     |  |
| 59              | P4 <sub>5</sub>   |               |     |  |
| 60              | P4 <sub>4</sub>   |               |     |  |
| 61              | P4 <sub>3</sub>   |               |     |  |
| 62              | P4 <sub>2</sub>   |               |     |  |
| 63              | P4 <sub>1</sub>   |               |     |  |
| 64              | P4 <sub>0</sub>   |               |     |  |
| 1               | MLD               |               | I   | Mi-com command of load input terminal. Low level = load          |
| 2               | RSTB              |               |     | Reset terminal. Low level = active                               |
| 3               | IE                |               | I   | Low level = LSI format. High level = I2S format.                 |
| 4               | TP1               |               | O   | Digital filter test output terminal 1.                           |
| 5               | TP2               |               | O   | Digital filter test output terminal 2.                           |
| 6               | TEST1             |               | I   | Digital filter test signal input terminal 1. Nominal = Low level |
| 7               | TEST2             |               | I   | Digital filter test signal input terminal 2. Nominal = Low level |
| 8               | NC                |               |     |  |
| 9               | NC                |               |     |  |
| 10              | AVDD4             |               |     | Analog power supply terminal 4. (+5V)                            |
| 11              | OUTL(-)           |               | O   | L ch. negative PWM output terminal.                              |
| 12              | AVSS4             |               |     | Analog ground terminal 4.  |
| 13              | AVSS3             |               |     | Analog ground terminal 3.  |
| 14              | OUTL(+)           |               | O   | L ch. positive PWM output terminal.                              |
| 15              | AVDD3             |               |     | Analog power supply terminal 3. (+5V)                            |
| 16              | NC                |               |     |  |
| 17              | AVDD2             |               |     | Analog power supply terminal 2. (+5V)                            |
| 18              | OUTR(+)           |               | O   | R ch. positive PWM output terminal.                              |
| 19              | AVSS2             |               |     | Analog ground terminal 2.  |
| 20              | AVSS1             |               |     | Analog ground terminal 1.  |
| 21              | OUTR(-)           |               | O   | R ch. negative PWM output terminal.                              |
| 22              | AVDD1             |               |     | Analog power supply terminal 1. (+5V)                            |
| 23              | DVDD1             |               |     | Digital power supply terminal 1 for oscillator. (+5V)            |
| 24              | DVSS1             |               |     | Digital ground terminal 1 for oscillator.                        |

| IC NUMBER | TERMINAL NUMBER | PORT NAME | TERMINAL CODE | I/O                    | OUTLINE OF FUNCTIONS  |
|-----------|-----------------|-----------|---------------|------------------------|---|
| IC701     | 25              | X2        |               |                        | Crystal oscillator.   |
|           | 26              | X1        |               |                        | Crystal oscillator (external clock input terminal).                 |
|           | 27              | NC        |               |                        |   |
|           | 28              | DVDD2     |               |                        | Digital power supply terminal 2. (+5V)                              |
|           | 29              | DVSS2     |               |                        | Digital ground terminal 2.  |
|           | 30              | NSUB      |               |                        | Connect to the D-VDD terminal.                                      |
|           | 31              | ZFLGB     |               | O                      | Zero signal detect output terminal.                                 |
|           | 32              | 192FS     |               | O                      | Clock output 9.216MHz   |
|           | 33              | LRPOL     |               |                        | Polarity (L ch. and R ch.) select terminal. L level = R H level = L |
|           | 34              | LRCLK     |               | I                      | LRCLK input terminal.   |
|           | 35              | BCLK      |               | I                      | Serial input bit clock.   |
|           | 36              | SRDATA    |               | I                      | Serial data input terminal.   |
|           | 37              | DVSS3     |               |                        | Digital ground terminal 3.  |
|           | 38              | DVDD      |               |                        | Digital power supply terminal. (+5V)                                |
| IC801     | 39              | 384FS     |               | O                      | Clock output. 18.432MHz   |
|           | 40              | PD        |               |                        | Power down terminal. High level = active                            |
|           | 41              | MDATA     |               | I                      | Mi-com command data input terminal.                                 |
|           | 42              | MCLK      |               | I                      | Clock input terminal for mi-com command.                            |
|           | 1               | 1Y        |               | O                      | Output terminal 1.  |
|           | 2               | 1A        |               | I                      | Input terminal 1.   |
|           | 3               | 1B        |               | I                      | Input terminal 1.   |
|           | 4               | 2Y        |               | O                      | Output terminal 2.  |
|           | 5               | 2A        |               | I                      | Input terminal 2.   |
|           | 6               | 2B        |               | I                      | Input terminal 2.   |
|           | 7               | GND       |               |                        | Ground terminal.  |
|           | 8               | 3A        |               | I                      | Input terminal 3.   |
|           | 9               | 3B        |               | I                      | Input terminal 3.   |
|           | 10              | 3Y        |               | O                      | Output terminal 3.  |
| 11        | 4A              |           | I             | Input terminal 4.      |   |
| 12        | 4B              |           | I             | Input terminal 4.      |   |
| 13        | 4Y              |           | O             | Output terminal 4.     |   |
| 14        | Vcc             |           |               | 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 ( $I_S$ ) 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.

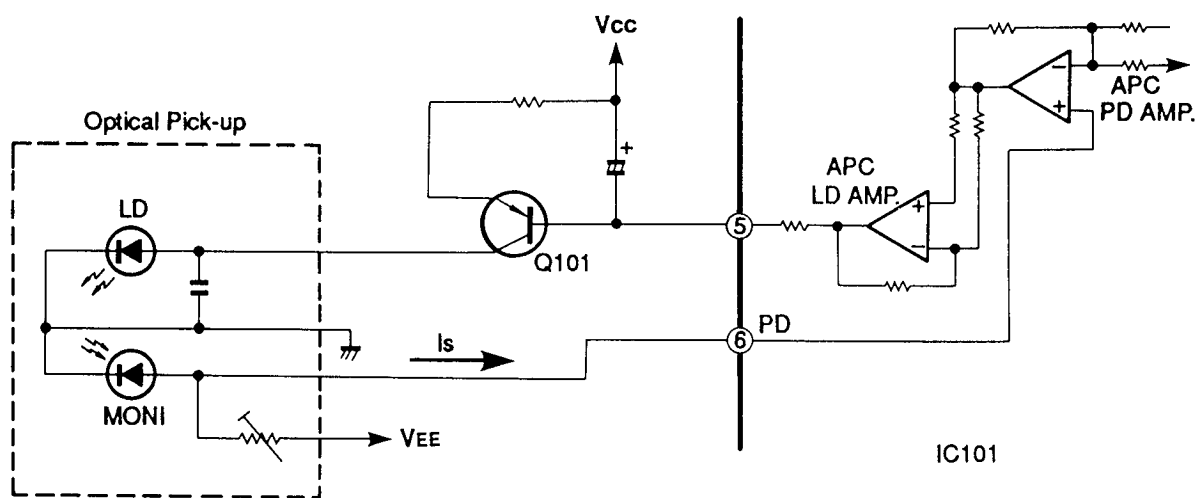


Fig. 1

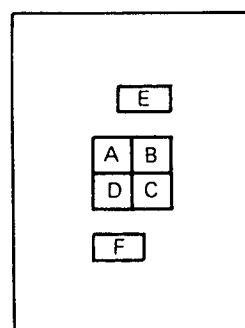
### 2. FOCUS SERVO

#### 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.

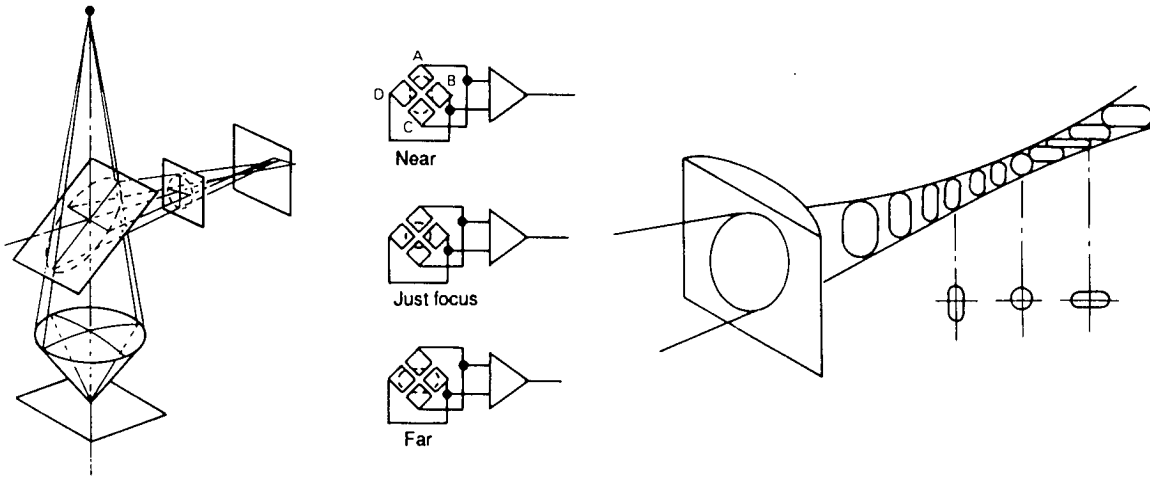


Fig.3

**2-3. Focus servo control operation**

The focus error signal, after begin 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 just 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 39 and out from pin 37, 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.

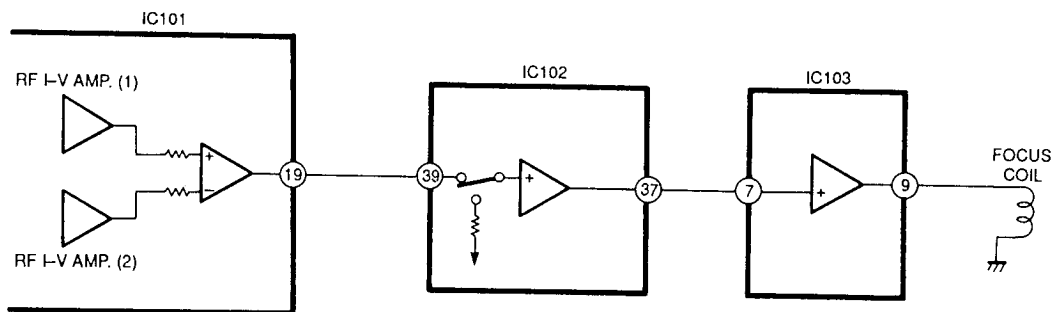


Fig. 4

**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.

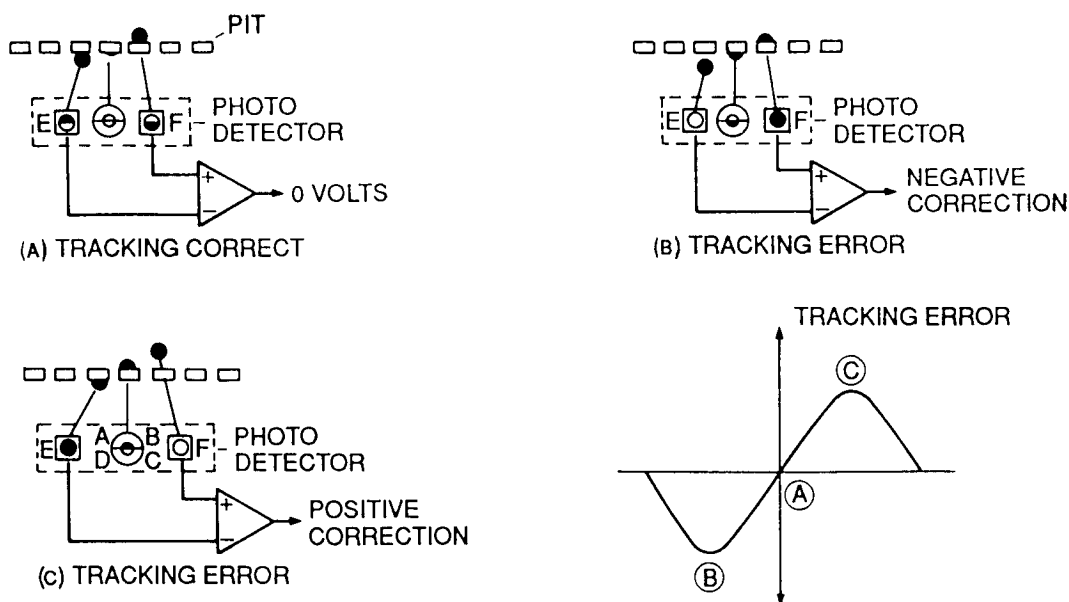


Fig. 5

**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 3 and out from pin 28, 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.

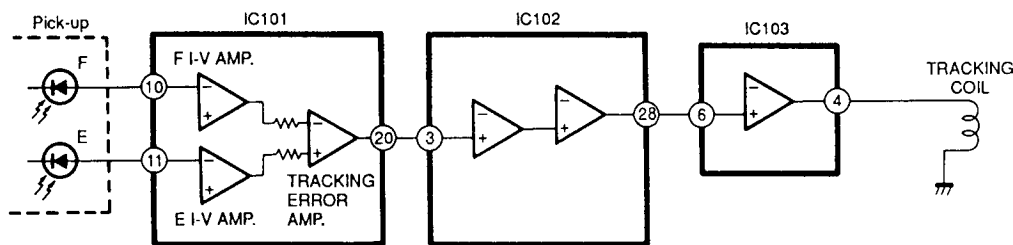


Fig. 6

### 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 17 of IC201, it can be checked at the test point (TP202) either by means of the eye pattern check.

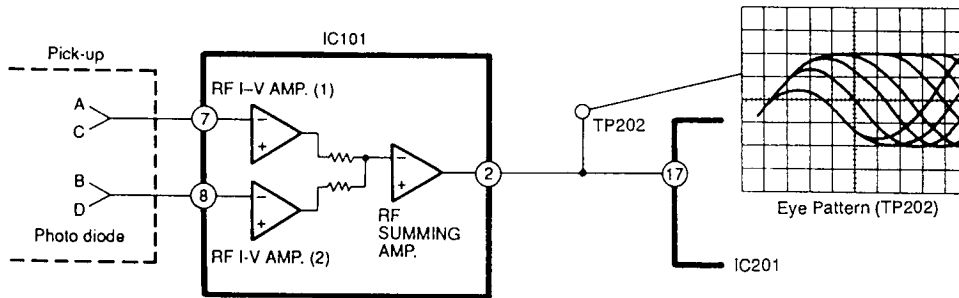


Fig. 7

#### 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 D/A converter interface. After that, they are output as 18-bit digital signals from pins 72, 74 and 75 of IC201 and fed to the D/A converter of IC701.

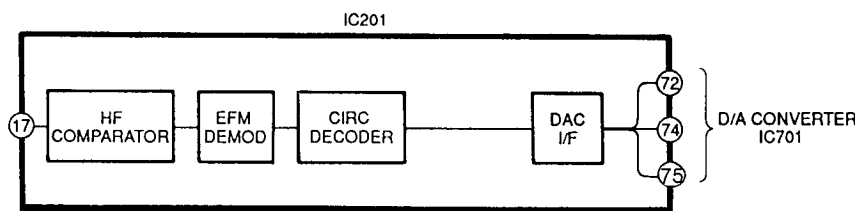


Fig. 8

### 4. 1-BIT D/A CONVERTER

Conventionally, high-precision D/A conversion was mainly carried out using resistor ladder systems. There was, however, one main drawback with these systems, which was that zero cross distortion was likely to be generated. To achieve production of a high-precision D/A converter with a minimum amount of zero cross distortion, it would be necessary to carry out complicated and bothersome processes such as laser trimming processing. In addition, use of such D/A converter would require a sampling-and-hold circuits (or de-glitcher circuit) and an intricate analog filter with special characteristics when mounting it.

To solve these difficulties, we used a 1-bit D/A converter with 3rd order noise shaping technology (IC701: MN6474AM).

#### 4-1. Features and Configuration of MN6474AM

- |          |   |   |
|----------|---|---|
| Features | 1. No zero cross distortion                     | 4. 2 channels (left and right) built in |
|          | 2. No non linear distortion                     | 5. 4DAC configuration possible          |
|          | 3. Built-in 4 times oversampling digital filter | 6. Single 5V power supply operation     |

The block diagram is shown in Fig. 9. The MN6474AM is configured of a digital filter, a 3rd order noise shaping circuit, and a PWM.

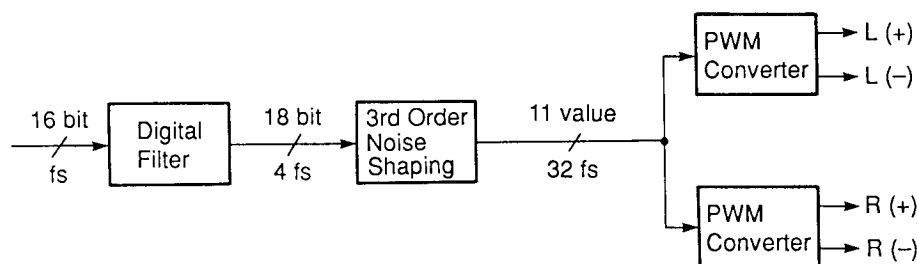


Fig. 9

#### 4-2. Configuration of MN6474AM

Fig. 10 shows the configuration of the MN6474AM. The sampling frequency of the input data is expressed in fs, so the 3rd order noise shaping circuit operates at 32fs. This means that a 32-times oversampling filter is required. In this LSI, however, oversampling is carried out first at 4fs in the first digital filter, and following that, a 0 order hold takes place in the 3rd order noise shaping circuit. This enables conversion of the 4fs signal to a 32fs signal.

The digital filter, using 384fs as clock signals, and the noise shaping section, uses 64fs, carry out time division processing on the data for the left and right channels. The PWM section, using 768fs as a clock signal, carries out signal processing for the left and right channels independently.

In the noise shaping section, the 19-bit 32fs signal is converted to 11 values and pulse width modulation (PWM) is carried out on these signals in the PWM section. D/A conversion is carried out in this way. Following are the descriptions of the various blocks.

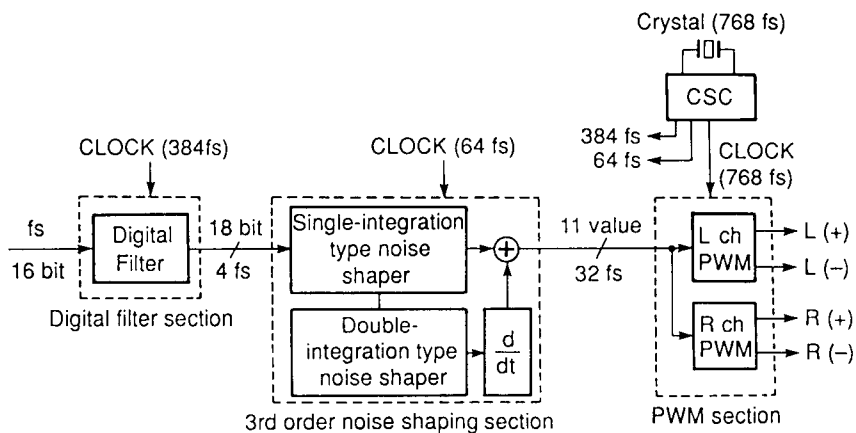
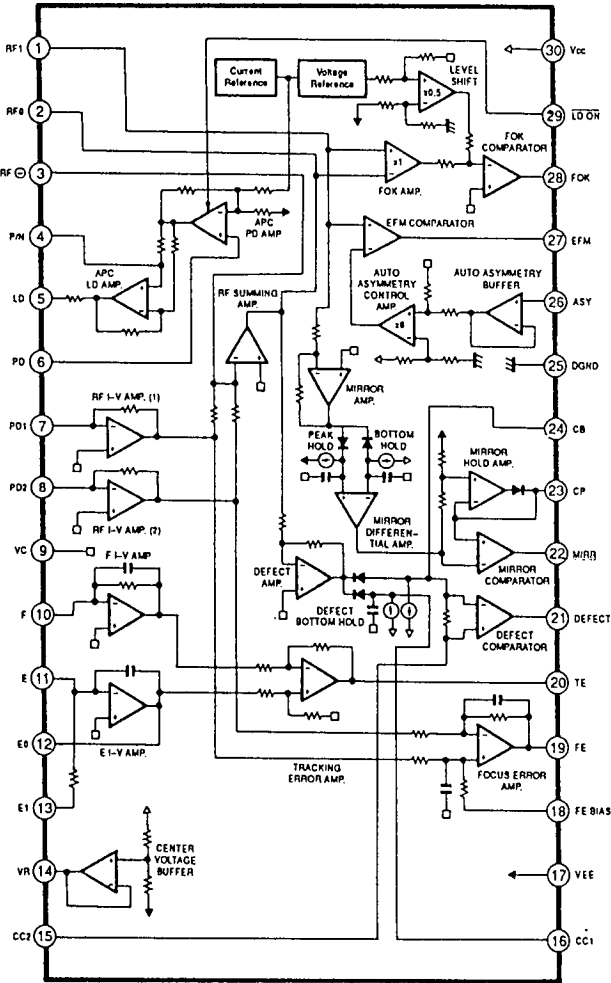


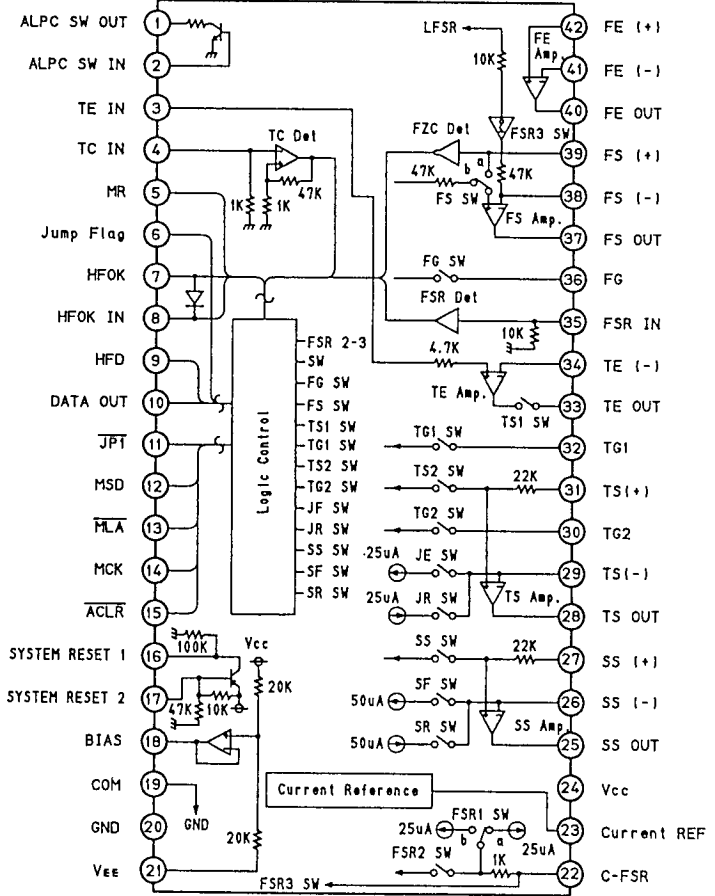
Fig. 10

IC BLOCK DIAGRAMS

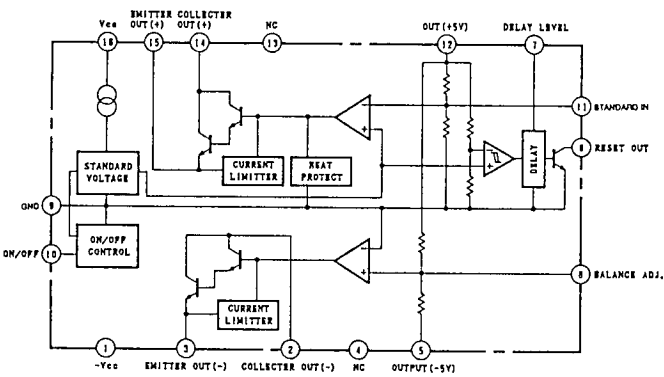
IC101 : CXA1081S  
RF Amp.



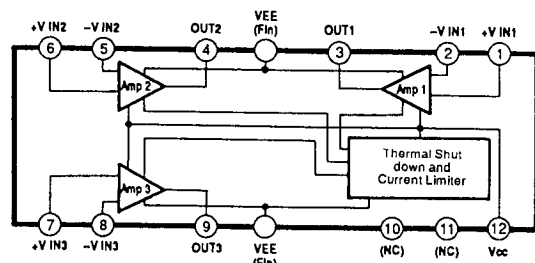
IC102  
M51594AFP  
Optical Pick-up Servo Control



IC1 :  
M5290P  
Voltage Regulator

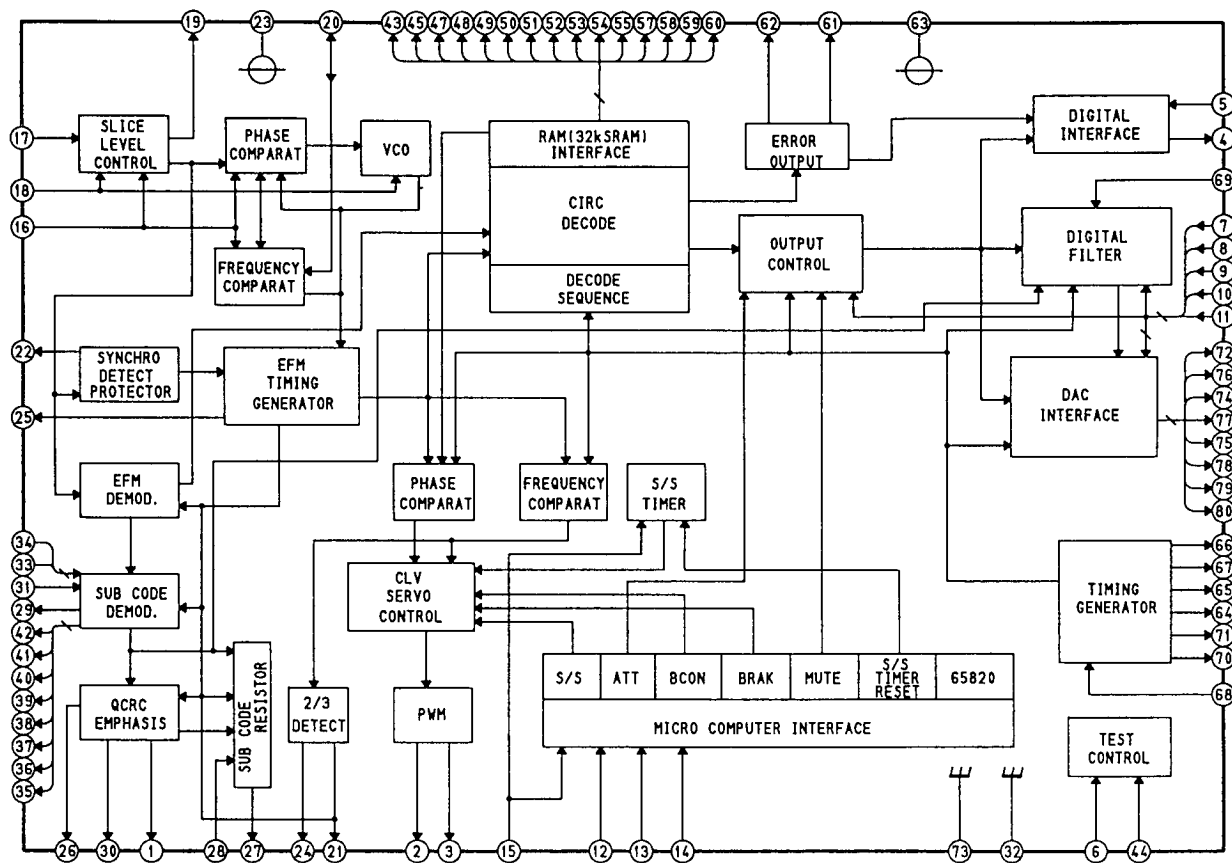


IC103 : LA6520  
3 channel Power OP-Amp.

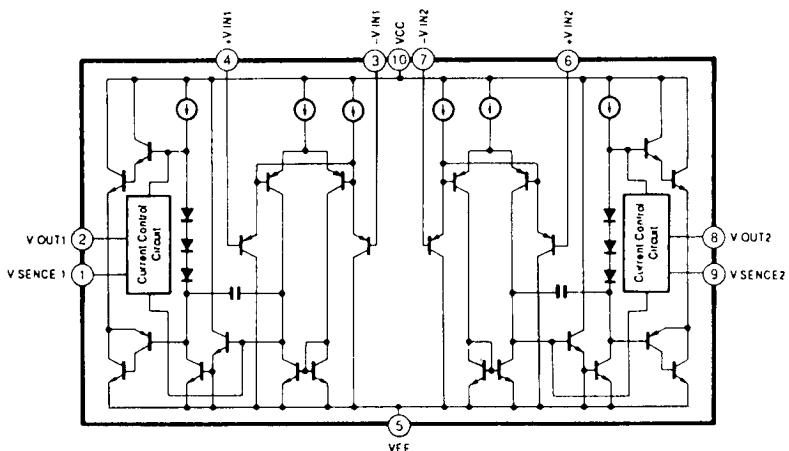




IC201 : M65820FP  
Digital Signal Processor



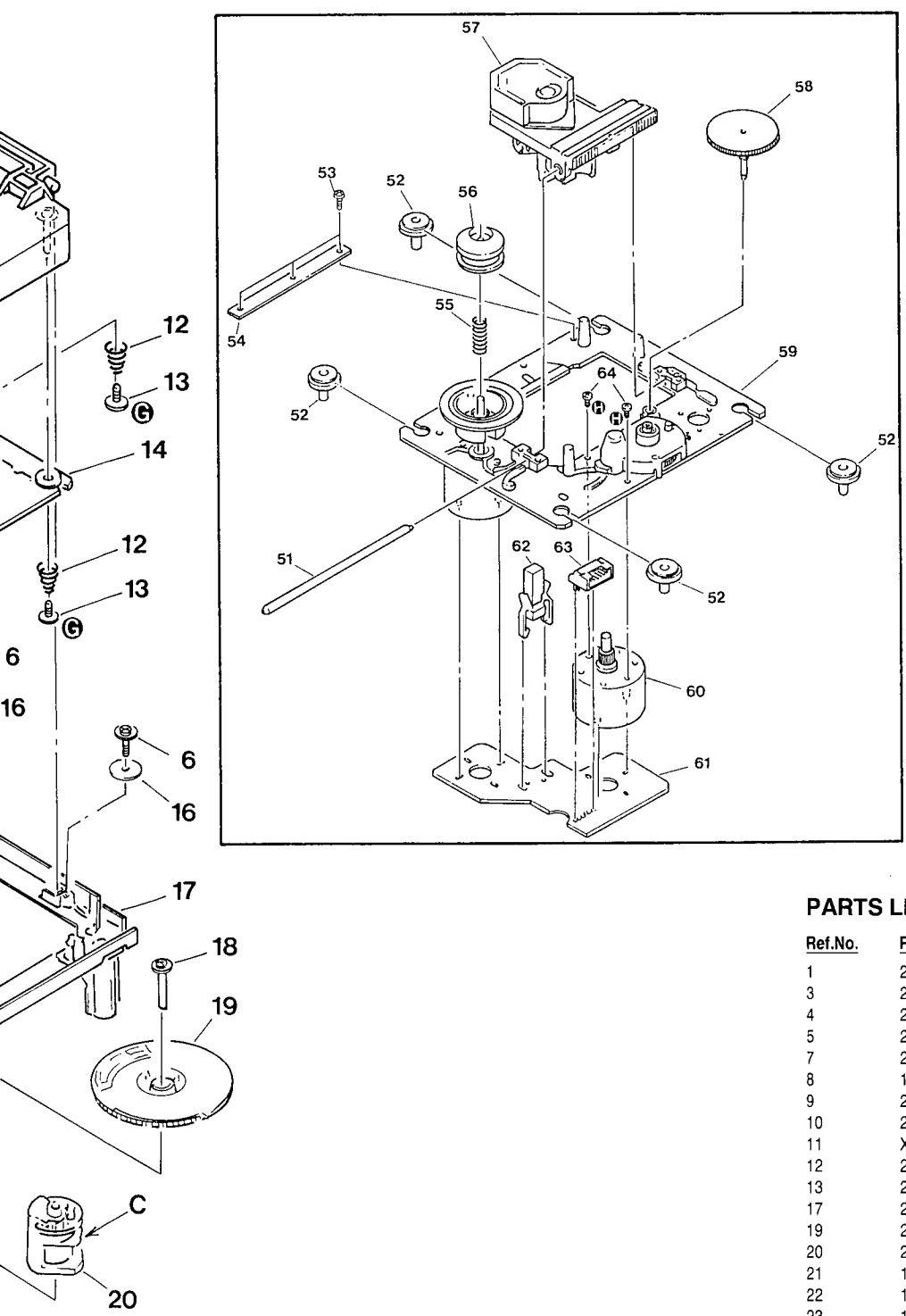
IC203 : LA6515  
2 channel Power OP-Amp.





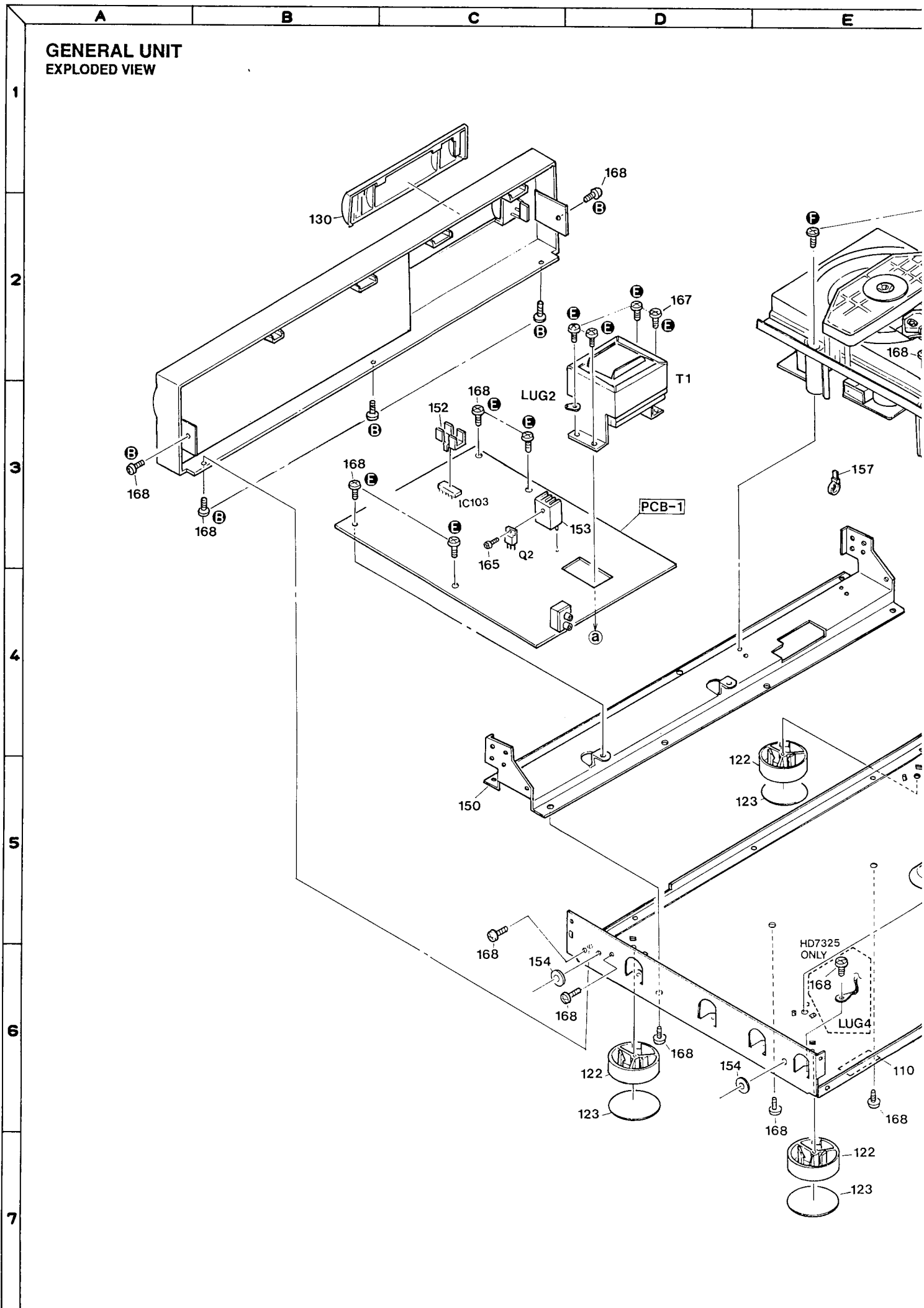


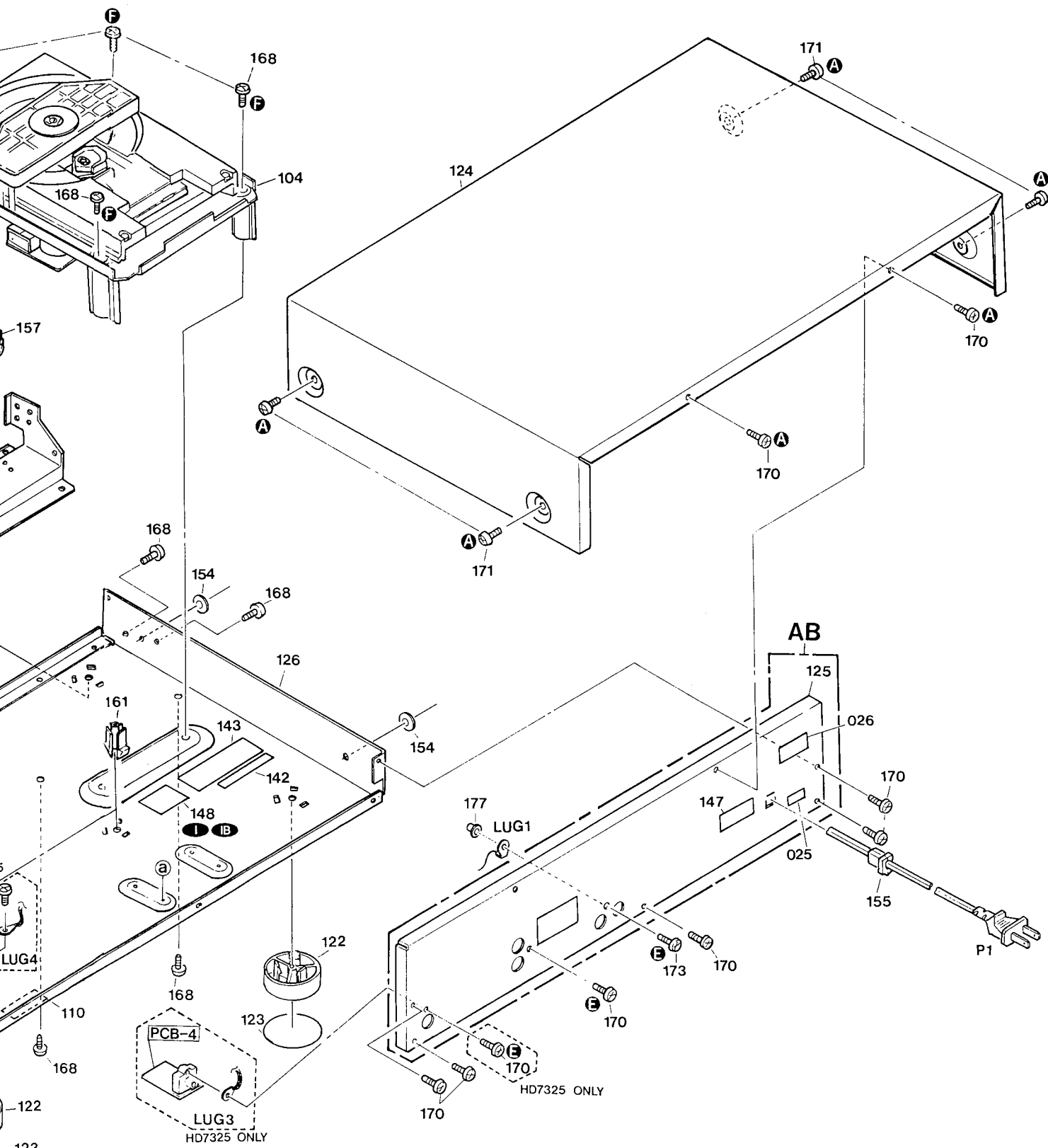
E F G H I J



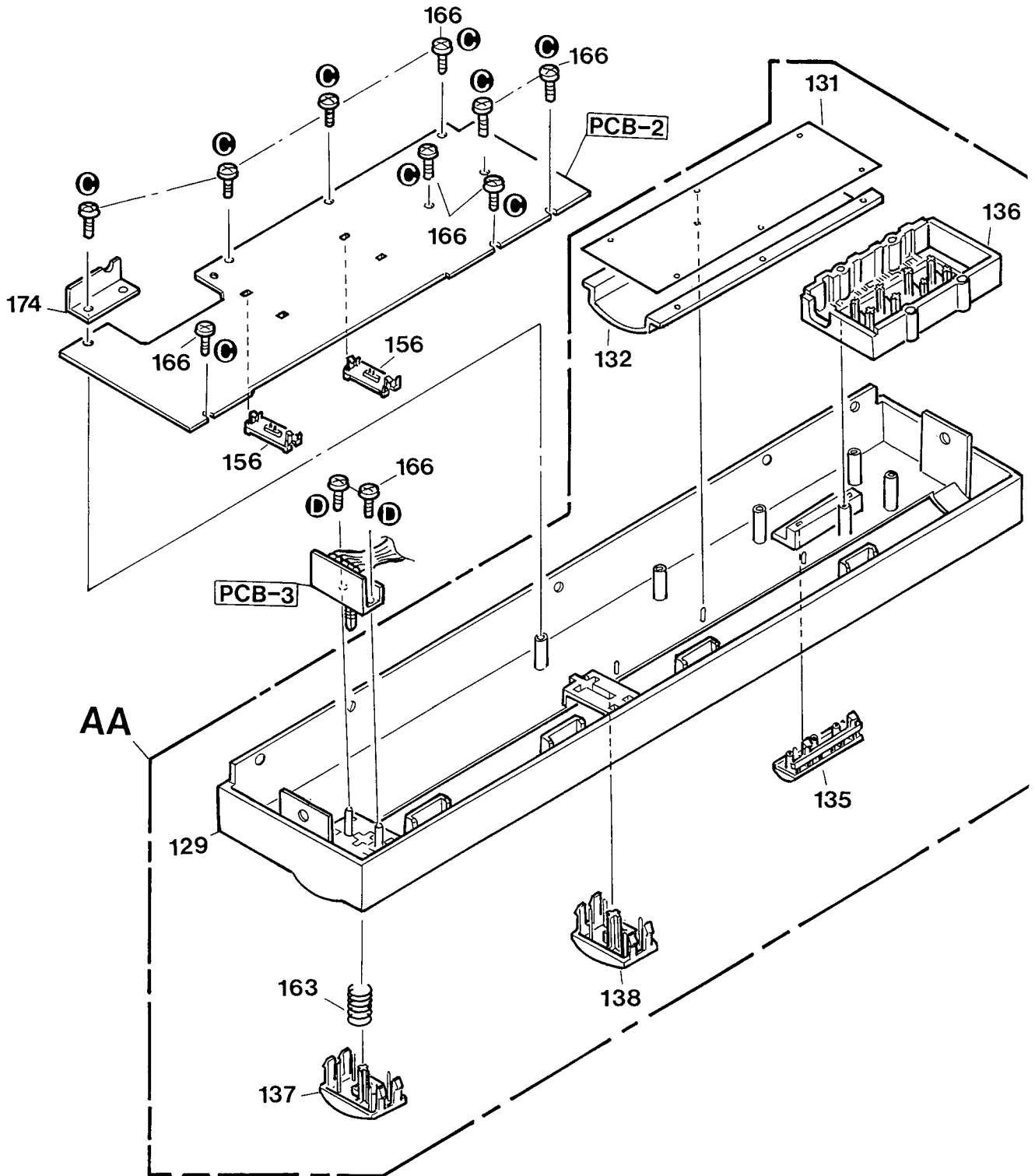
**PARTS LIST**

| Ref.No. | Part No.     | Description                     |
|---------|--------------|---------------------------------|
| 1       | 2-625-550-02 | TRAY (G)                        |
| 3       | 2-625-544-01 | COVER (G), GEAR                 |
| 4       | 2-625-535-01 | GEAR (G), TRAY                  |
| 5       | 2-625-546-01 | PLATE (G), CHUCKING             |
| 7       | 2-625-537-01 | YOKE (S), CHUCKING              |
| 8       | 1-452-493-21 | MAGNET                          |
| 9       | 2-625-541-02 | DAMPER (S)                      |
| 10      | 2-625-548-01 | PULLEY (G), CHUCKING            |
| 11      | X-2625-227-1 | CHASSIS ASS'Y (G), SUB          |
| 12      | 2-625-539-01 | SPRING (S) (X4)                 |
| 13      | 2-625-730-01 | WASHER BASED SCREW (X4)         |
| 17      | 2-625-552-06 | CHASSIS (G), OUTSERT MAIN       |
| 19      | 2-625-547-01 | GEAR (G), DRIVE                 |
| 20      | 2-625-545-04 | CAM (G), CONTROL                |
| 21      | 1-572-086-11 | SWITCH, LEAF (X2)               |
| 22      | 1-564-721-11 | PIN, CONNECTOR 5P               |
| 23      | 1-640-523-11 | PC BOARD, LOADING               |
| 24      | X-2625-117-1 | MOTOR ASS'Y, LOADING            |
| 25      | 2-625-534-02 | GEAR (G), MIDWAY                |
| 26      | 2-625-536-02 | PULLEY (G), LOADING             |
| 27      | 3-653-387-00 | BELT, LM                        |
| 51      | 4-917-565-01 | SHAFT (S), SLED                 |
| 52      | 2-625-538-01 | INSULATOR (S) (X4)              |
| 53      | 2-641-386-01 | SCREW (2x5mm), TAPPING (S) (X3) |
| 55      | 2-625-191-01 | SPRING (S), COMPRESSION         |
| 56      | 2-625-477-01 | RING (LO) (S), CENTER           |
| 57      | 8-848-127-11 | PICK UP KSS-210A (S) (RP)       |
| 58      | 2-625-188-02 | GEAR (A) (S)                    |
| 59      | X-2625-133-1 | CHASSIS ASS'Y (MB), TT          |
| 60      | X-2625-132-1 | GEAR ASS'Y (MB), MOTOR          |
| 61      | 1-639-678-12 | PC BOARD, MOTOR (6P) (S)        |
| 62      | 1-572-085-11 | SWITCH, LEAF                    |
| 63      | 1-564-722-11 | PIN, CONNECTOR 6P               |



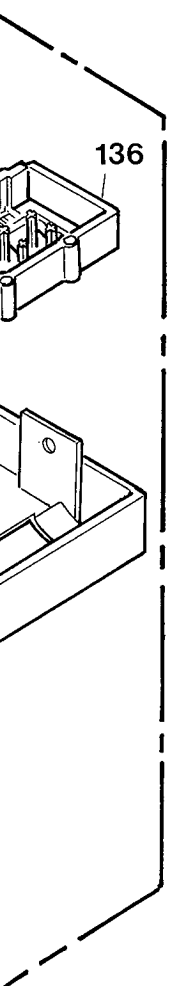


**GENERAL UNIT  
EXPLODED VIEW**



**GENERAL UNIT PARTS LIST**

| Ref.No. | Part No.     | Description   | Ref.No. | Part No.      | Description                                    |
|---------|--------------|---|---------|---------------|--|
| AA      | A442-HD7325A | FRONT PANEL ASSEMBLY (Model:HD7325)<br>BK IB  | 150     | 2219-8394     | METAL FITTG, CD MECHA                          |
| AA      | A442-HD7325B | FRONT PANEL ASSEMBLY (Model:HD7325)<br>I  | 152     | 2222-7264     | HEAT SINK, IC103                               |
| AA      | A442-HD7226A | FRONT PANEL ASSEMBLY (Model:HD7225A)<br>IB  | 153     | 2222-7217     | HEAT SINK, Q2                                  |
| AA      | A442-HD7226B | FRONT PANEL ASSEMBLY (Model:HD7225A)<br>I   | 154     | 2111-1389     | FELT, CABINET BUTTOM (X4)                      |
| AB      | A424-HD7325B | CABINET BACK ASSEMBLY (Model:HD7325)<br>BK  | 155     | 2240-364      | HOLDER, AC CORD                                |
| AB      | A424-HD7325A | CABINET BACK ASSEMBLY (Model:HD7325)<br>IB I  | 156     | 2240-7370     | HOLDER, FL401 (X2)                             |
| 025     | 1341-**568   | NAME PLATE, PRODUCTION DATE<br>(Model:HD7325) BK  | 157     | 2240-R0101    | HOLDER, WIRING (X2)                            |
| 026     | 1756-CSA     | LABEL, CSA LABEL (Model:HD7325) BK  | 161     | 2360-7022     | SPECIAL BOSS, MAIN PCB (X2)                    |
| 104     | 3119-02301   | CD MECHA ASSEMBLY   | 163     | 2651-2101732  | SPRING, POWER BUTTON                           |
| 110     | 1117-78      | SERIAL LABEL, CABINET BUTTOM  | 165     | 2327-R0130082 | SCREW,BND+ (3X8 mm)                            |
| 122     | 1319-04302   | LEG (X4)  | 166     | 2347-R0126082 | SCREW,BND T+ (2.6X8 mm) (X11)                  |
| 123     | 1319-04601   | LEG, RUBBER (X4)  | 167     | 2347-R0130062 | SCREW,BND T+ (3X6 mm) (X4)                     |
| 124     | 1414-17001   | CABINET, TOP COVER  | 168     | 2347-R0130082 | SCREW,BND T+ (3X8 mm) (X22)<br>(Model:HD7325)  |
| 125     | 1424-36401   | CABINET BACK, REAR (Model:HD7325) BK  | 168     | 2347-R0130082 | SCREW,BND T+ (3X8 mm) (X21)<br>(Model:HD7225A) |
| 125     | 1424-36402   | CABINET BACK, REAR (Model:HD7325)<br>IB I   | 170     | 2347-R0130084 | SCREW,BND T+ (3X8 mm) (X9)<br>(Model:HD7325)   |
| 125     | 1424-36405   | CABINET BACK, REAR (Model:HD7225A)<br>IB I  | 170     | 2347-R0130084 | SCREW,BND T+ (3X8 mm) (X8)<br>(Model:HD7225A)  |
| 126     | 1424-36301   | CABINET BACK, BOTTOM  | 171     | 2347-R0140064 | SCREW,BND T+ (4X6 mm) (X4)                     |
| 129     | 1442-28502   | FRONT PANEL (Model:HD7325) BK IB  | 173     | 2327-R0130064 | SCREW,BND+ (3X6 mm)                            |
| 129     | 1442-28506   | FRONT PANEL (Model:HD7225A) IB  | 174     | 2216-7187     | SHIELD PLATE, FRONT PCB EARTH                  |
| 129     | 1442-28501   | FRONT PANEL (Model:HD7325) I  | 177     | 2440-7016     | SPECIAL NUT                                    |
| 129     | 1442-28505   | FRONT PANEL (Model:HD7225A) I   |         |               |  |
| 130     | 1452-10002   | LID, CD MECHA (Model:HD7325) BK IB<br>(Model:HD7225A) IB  |         |               |  |
| 130     | 1452-10001   | LID, CD MECHA (Model:HD7325/7225A) I  |         |               |  |
| 131     | 1511-19810   | PANEL, FL FILTER  |         |               |  |
| 132     | 1532-17507   | WINDOW, FRONT   |         |               |  |
| 135     | 1662-68202   | PUSH BUTTON, DISPLAY/PROGRAM/TIME<br>(Model:HD7325) BK IB<br>(Model:HD7225A) IB                             |         |               |  |
| 135     | 1662-68201   | PUSH BUTTON, DISPLAY/PROGRAM/TIME<br>(Model:HD7325/7225A) I   |         |               |  |
| 136     | 1662-52404   | PUSH BUTTON, PLAY/PAUSE/STOP/<br>REPEAT/SKIP(F,R)/SEARCH(F,R)<br>(Model:HD7325) BK IB<br>(Model:HD7225A) IB |         |               |  |
| 136     | 1662-52403   | PUSH BUTTON, PLAY/PAUSE/STOP/<br>REPEAT/SKIP(F,R)/SEARCH(F,R)<br>(Model:HD7325/7225A) I                     |         |               |  |
| 137     | 1662-52001   | PUSH BUTTON, POWER<br>(Model:HD7325) BK IB<br>(Model:HD7225A) IB  |         |               |  |
| 137     | 1662-52003   | PUSH BUTTON, POWER<br>(Model:HD7325/7225A) I  |         |               |  |
| 138     | 1662-52002   | PUSH BUTTON, OPEN/CLOSE<br>(Model:HD7325) BK IB<br>(Model:HD7225A) IB                                       |         |               |  |
| 138     | 1662-52004   | PUSH BUTTON, OPEN/CLOSE<br>(Model:HD7325/7225A) I   |         |               |  |
| 142     | 1756-03305   | LABEL, LASER CAUTION, CD MECHA  |         |               |  |
| 143     | 1756-09602   | LABEL, LASER CAUTION, CD MECHA<br>(Model:HD7325) BK   |         |               |  |
| 143     | 1756-12101   | LABEL, LASER CAUTION, CD MECHA<br>(Model:HD7325/7225A) IB I   |         |               |  |
| 147     | 1756-11801   | LABEL, LASER PRODUCT, REAR  |         |               |  |
| 148     | 1756-11802   | LABEL, LASER CAUTION, CD MECHA<br>(Model:HD7325/7225A) IB I   |         |               |  |

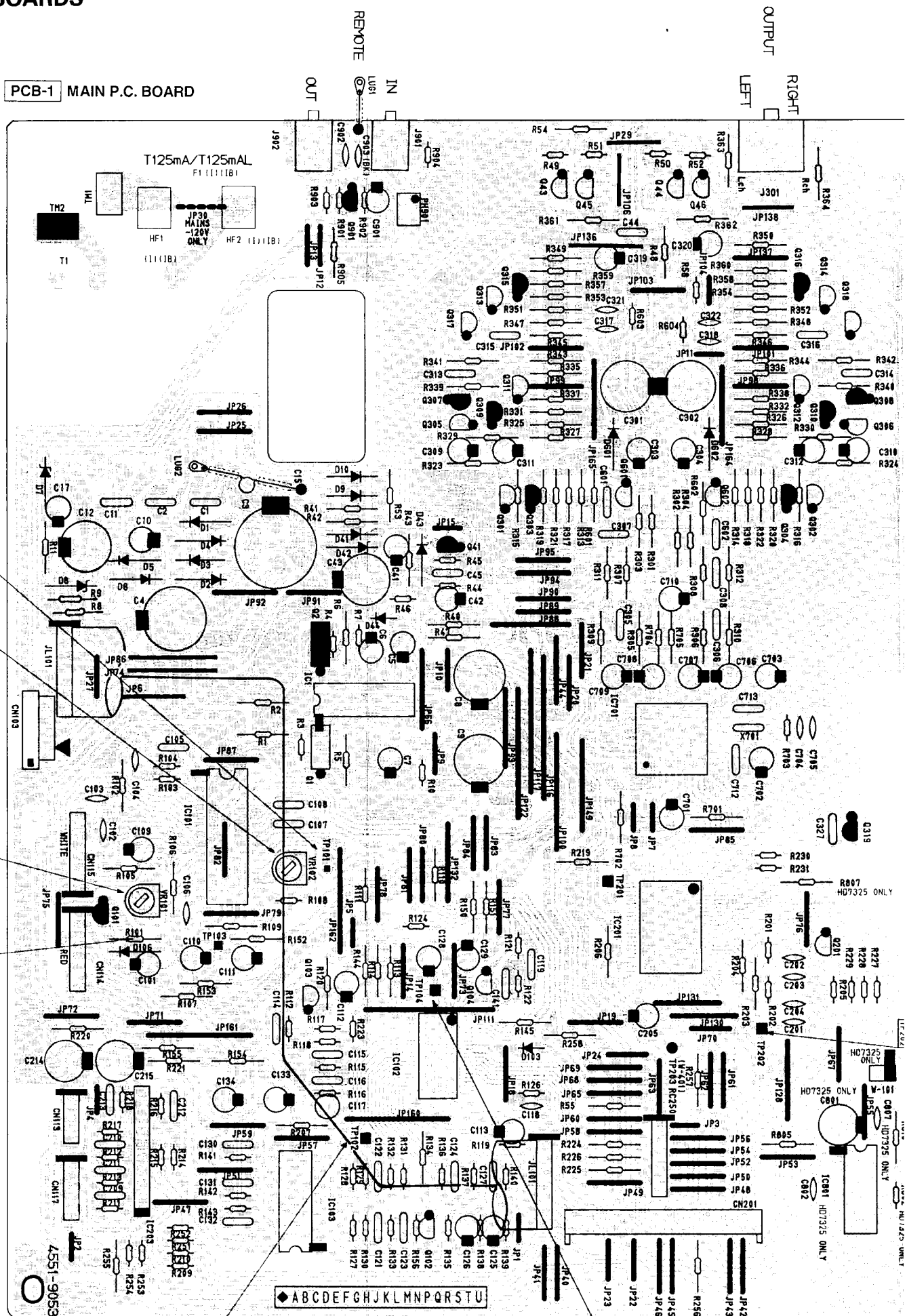




# P.C. BOARDS

PCB-1 MAIN P.C. BOARD

TP101 FOCUS OFFSET ADJ.  
TP102 EF BALANCE ADJ.  
R101 OPTICAL PICK-UP LASER POWER ADJ.



◆ ABCDEFGHJKLMPQRTU



**ELECTRICAL PARTS LIST**

| Ser. No.                     | Ref. No. | Part No.      | Description            | Ser. No.         | Ref. No. | Part No.      | Description                                     |
|------------------------------|----------|---------------|------------------------|------------------|----------|---------------|---|
| <b>PCB-1 MAIN P.C. BOARD</b> |          |               |                        |                  |          |               |   |
| <b>CAPACITORS</b>            |          |               |                        |                  |          |               |   |
| 511                          | C1       | 5354-104593   | CAP,MYL .1U            | 698              | C305     | 5359-8205851  | CAP,PPP 82P                                     |
| 511                          | C2       | 5354-104593   | CAP,MYL .1U            | 698              | C306     | 5359-8205851  | CAP,PPP 82P                                     |
| 520                          | C3       | 5345-478C0962 | CAP,MINI ELE 4700U/16V | 697              | C307     | 5359-3905851  | CAP,PPP 39P                                     |
| 519                          | C4       | 5345-228C0962 | CAP,MINI ELE 2200U/16V | 697              | C308     | 5359-3905851  | CAP,PPP 39P                                     |
| 514                          | C5       | 5345-106F0962 | CAP,MINI ELE 10U/50V   | 692              | C309     | 5345-336C0962 | CAP,MINI ELE 33U/16V                            |
| 514                          | C6       | 5345-106F0962 | CAP,MINI ELE 10U/50V   | 692              | C310     | 5345-336C0962 | CAP,MINI ELE 33U/16V                            |
| 513                          | C7       | 5345-225F0962 | CAP,MINI ELE 22U/50V   | 691              | C311     | 5345-106F0962 | CAP,MINI ELE 10U/50V                            |
| 518                          | C8       | 5345-477B0962 | CAP,MINI ELE 470U/10V  | 691              | C312     | 5345-106F0962 | CAP,MINI ELE 10U/50V                            |
| 518                          | C9       | 5345-477B0962 | CAP,MINI ELE 470U/10V  | 696              | C313     | 5353-100534   | CAP,MCA 10P (Model:HD7325)                      |
| 515                          | C10      | 5345-226F0962 | CAP,MINI ELE 22U/50V   | 696              | C313     | 5353-100933   | CAP,MCA 10P (Model:HD7225A)                     |
| 511                          | C11      | 5354-104593   | CAP,MYL .1U            | 696              | C314     | 5353-100534   | CAP,MCA 10P (Model:HD7325)                      |
| 517                          | C12      | 5345-227E0962 | CAP,MINI ELE 220U/35V  | 696              | C314     | 5353-100933   | CAP,MCA 10P (Model:HD7225A)                     |
| 510                          | C15      | 5354-152J1HM  | CAP,MYL 1500P          | 703              | C315     | 5359-S010J562 | CAP,PPP 5600P                                   |
| 516                          | C17      | 5345-107B0962 | CAP,MINI ELE 100U/10V  | 703              | C316     | 5359-S010J562 | CAP,PPP 5600P                                   |
| 754                          | C41      | 5345-226D0962 | CAP,MINI ELE 22U/25V   | 702              | C317     | 5359-S010J152 | CAP,PPP 1500P                                   |
| 753                          | C42      | 5345-106F0962 | CAP,MINI ELE 10U/50V   | 702              | C318     | 5359-S010J152 | CAP,PPP 1500P                                   |
| 755                          | C43      | 5345-108B0962 | CAP,MINI ELE 1000U/10V | 693              | C319     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 756                          | C44      | 5354-224593   | CAP,MYL .22U           | 693              | C320     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 770                          | C45      | 5354-104J1HM  | CAP,MYL .1U            | 702              | C321     | 5359-S010J152 | CAP,PPP 1500P                                   |
| 550                          | C101     | 5345-107B0962 | CAP,MINI ELE 100U/10V  | 702              | C322     | 5359-S010J152 | CAP,PPP 1500P                                   |
| 569                          | C102     | 5361-330JCH   | CAP,CER 33P            | 706              | C327     | 5354-104J1HM  | CAP,MYL .1U                                     |
| 569                          | C103     | 5361-330JCH   | CAP,CER 33P            | 701              | C601     | 5359-S010J122 | CAP,PPP 1200P                                   |
| 570                          | C104     | 5361-100DCH   | CAP,CER 10P            | 701              | C602     | 5359-S010J122 | CAP,PPP 1200P                                   |
| 555                          | C105     | 5354-332J1HM  | CAP,MYL 3300P          | 657              | C701     | 5345-227B0962 | CAP,MINI ELE 220U/10V                           |
| 560                          | C106     | 5354-333J1HM  | CAP,MYL .033U          | 655              | C702     | 5345-106F0962 | CAP,MINI ELE 10U/50V                            |
| 560                          | C107     | 5354-333J1HM  | CAP,MYL .033U          | 655              | C703     | 5345-106F0962 | CAP,MINI ELE 10U/50V                            |
| 557                          | C108     | 5354-103J1HM  | CAP,MYL .01U           | 660              | C704     | 5361-050DCH   | CAP,CER 5P                                      |
| 549                          | C109     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | 660              | C705     | 5361-050DCH   | CAP,CER 5P                                      |
| 549                          | C110     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | 658              | C706     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 549                          | C111     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | 658              | C707     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 546                          | C112     | 5345-474F0962 | CAP,MINI ELE .47U/50V  | 658              | C708     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 548                          | C113     | 5345-226D0962 | CAP,MINI ELE 22U/25V   | 658              | C709     | 5345-476B0951 | CAP,MINI ELE 47U/10V                            |
| 562                          | C114     | 5354-823J1HM  | CAP,MYL .082U          | 656              | C710     | 5345-107B0962 | CAP,MINI ELE 100U/10V                           |
| 574                          | C115     | 5361-681KB    | CAP,CER 680P           | 663              | C712     | 5354-473J1HM  | CAP,MYL .047U                                   |
| 565                          | C116     | 5354-274593   | CAP,MYL .27U           | 663              | C713     | 5354-473J1HM  | CAP,MYL .047U                                   |
| 544                          | C117     | 5342-105F0951 | CAP,ELE BP 1U/50V      | 808              | C801     | 5345-476B0962 | CAP,MINI ELE 47U/10V<br>(Model:HD7325)          |
| 563                          | C118     | 5354-104J1HM  | CAP,MYL .1U            | 812A             | C802     | 5361-331KB    | CAP,CER 330P (Model:HD7325) <b>BK</b>           |
| 556                          | C119     | 5354-472J1HM  | CAP,MYL 4700P          | 812              | C802     | 5361-101KB    | CAP,CER 100P (Model:HD7325/7225A)<br><b>B I</b> |
| 559                          | C121     | 5354-183J1HM  | CAP,MYL .018U          | 816              | C807     | 5359-3905851  | CAP,PPP 39P (Model:HD7325)                      |
| 564                          | C122     | 5354-184593   | CAP,MYL .18U           | 777              | C901     | 5345-226D0962 | CAP,MINI ELE 22U/25V                            |
| 558                          | C123     | 5354-123J1HM  | CAP,MYL .012U          | 780              | C902     | 5361-470KSL   | CAP,CER 47P                                     |
| 572                          | C124     | 5361-391KB    | CAP,CER 390P           | 041A             | C903     | 5361-221KB    | CAP,CER 220P (Model:HD7325) <b>BK</b>           |
| 549                          | C125     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | <b>RESISTORS</b> |          |               |   |
| 546                          | C126     | 5345-474F0962 | CAP,MINI ELE .47U/50V  | 522              | △ R1     | 5102-4R74713  | RES,FUSE 4.7                                    |
| 561                          | C127     | 5354-563J1HM  | CAP,MYL .056U          | 522              | △ R2     | 5102-4R74713  | RES,FUSE 4.7                                    |
| 549                          | C128     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | 528              | R3       | 5232-471J16P  | RES,CBN 1/6P 470                                |
| 549                          | C129     | 5345-476D0962 | CAP,MINI ELE 47U/25V   | 528              | R4       | 5232-471J16P  | RES,CBN 1/6P 470                                |
| 563                          | C130     | 5354-104J1HM  | CAP,MYL .1U            | 523              | △ R5     | 5102-1015116  | RES,FUSE 100                                    |
| 563                          | C131     | 5354-104J1HM  | CAP,MYL .1U            | 523              | △ R6     | 5102-1015116  | RES,FUSE 100                                    |
| 563                          | C132     | 5354-104J1HM  | CAP,MYL .1U            | 529              | R7       | 5232-153J16P  | RES,CBN 1/6P 15K                                |
| 551                          | C133     | 5345-107D0962 | CAP,MINI ELE 100U/25V  | 524              | R8       | 5134-121J25P  | RES,CBN 1/4P 120                                |
| 551                          | C134     | 5345-107D0962 | CAP,MINI ELE 100U/25V  | 526              | R9       | 5134-223J25P  | RES,CBN 1/4P 22K                                |
| 554                          | C141     | 5354-102J1HM  | CAP,MYL 1000P          | 525              | R10      | 5232-152J16P  | RES,CBN 1/6P 1.5K                               |
| 662                          | C201     | 5354-222J1HM  | CAP,MYL 2200P          | 527              | R11      | 5134-331J25P  | RES,CBN 1/4P 330                                |
| 628                          | C202     | 5354-223J1HM  | CAP,MYL .022U          | 759              | R40      | 5134-222J25P  | RES,CBN 1/4P 2.2K                               |
| 632                          | C203     | 5361-471KB    | CAP,CER 470P           | 763              | R41      | 5135-271J50P  | RES,CBN 1/2P 270                                |
| 629                          | C204     | 5354-154593   | CAP,MYL .15U           | 758              | R42      | 5134-682J25P  | RES,CBN 1/4P 6.8K                               |
| 625                          | C205     | 5345-476B0951 | CAP,MINI ELE 47U/10V   | 761              | R43      | 5134-224J25P  | RES,CBN 1/4P 220K                               |
| 573                          | C209     | 5361-471KB    | CAP,CER 470P           | 768              | R44      | 5232-473J16P  | RES,CBN 1/6P 47K                                |
| 573                          | C210     | 5361-471KB    | CAP,CER 470P           | 768              | R45      | 5232-473J16P  | RES,CBN 1/6P 47K                                |
| 563                          | C211     | 5354-104J1HM  | CAP,MYL .1U            | 765              | R46      | 5232-101J16P  | RES,CBN 1/6P 100                                |
| 571                          | C212     | 5361-220JCH   | CAP,CER 22P            | 767              | R47      | 5134-103J25P  | RES,CBN 1/4P 10K                                |
| 563                          | C213     | 5354-104J1HM  | CAP,MYL .1U            | 760              | R48      | 5134-154J25P  | RES,CBN 1/4P 150K                               |
| 551                          | C214     | 5345-107D0962 | CAP,MINI ELE 100U/25V  | 766              | R49      | 5232-103J16P  | RES,CBN 1/6P 10K                                |
| 551                          | C215     | 5345-107D0962 | CAP,MINI ELE 100U/25V  | 766              | R50      | 5232-103J16P  | RES,CBN 1/6P 10K                                |
| 695                          | C301     | 5345-338B0962 | CAP,MINI ELE 3300U/10V | 766              | R51      | 5232-103J16P  | RES,CBN 1/6P 10K                                |
| 695                          | C302     | 5345-338B0962 | CAP,MINI ELE 3300U/10V | 766              | R52      | 5232-103J16P  | RES,CBN 1/6P 10K                                |
| 694                          | C303     | 5345-227B0962 | CAP,MINI ELE 220U/10V  | 763              | R53      | 5135-271J50P  | RES,CBN 1/2P 270                                |
| 694                          | C304     | 5345-227B0962 | CAP,MINI ELE 220U/10V  | 757              | R54      | 5134-102J25P  | RES,CBN 1/4P 1K                                 |
|                              |          |               |                        | 762              | R55      | 5134-103J25P  | RES,CBN 1/4P 10K                                |

| Ser. No. | Ref. No. | Part No.     | Description       | Ser. No. | Ref. No. | Part No.     | Description       |
|----------|----------|--------------|-------------------|----------|----------|--------------|-------------------|
| 733      | R58      | 5232-154J16P | RES,CBN 1/6P 150K | 641      | R227     | 5232-222J16P | RES,CBN 1/6P 2.2K |
| 585      | R101     | 5134-220J25P | RES,CBN 1/4P 22   | 641      | R228     | 5232-222J16P | RES,CBN 1/6P 2.2K |
| 588      | R102     | 5134-222J25P | RES,CBN 1/4P 2.2K | 641      | R229     | 5232-222J16P | RES,CBN 1/6P 2.2K |
| 604      | R103     | 5232-163J16P | RES,CBN 1/6P 16K  | 644      | R230     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 601      | R104     | 5232-822J16P | RES,CBN 1/6P 8.2K | 644      | R231     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 591      | R105     | 5134-223J25P | RES,CBN 1/4P 22K  | 602      | R251     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 587      | R106     | 5134-102J25P | RES,CBN 1/4P 1K   | 602      | R252     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 586      | R107     | 5134-221J25P | RES,CBN 1/4P 220  | 602      | R253     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 605      | R108     | 5232-183J16P | RES,CBN 1/6P 18K  | 602      | R254     | 5232-103J16P | RES,CBN 1/6P 10K  |
| 590      | R109     | 5134-183J25P | RES,CBN 1/4P 18K  | 589      | R255     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 587      | R110     | 5134-102J25P | RES,CBN 1/4P 1K   | 587      | R256     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 589      | R111     | 5134-103J25P | RES,CBN 1/4P 10K  | 637      | R257     | 5134-472J25P | RES,CBN 1/4P 4.7K |
| 611      | R112     | 5232-104J16P | RES,CBN 1/6P 100K | 589      | R258     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 590      | R113     | 5134-183J25P | RES,CBN 1/4P 18K  | 711      | △ R301   | 5102-1004713 | RES,FUSE 10       |
| 591      | R114     | 5134-223J25P | RES,CBN 1/4P 22K  | 711      | △ R302   | 5102-1004713 | RES,FUSE 10       |
| 610      | R115     | 5232-683J16P | RES,CBN 1/6P 68K  | 711      | △ R303   | 5102-1004713 | RES,FUSE 10       |
| 603      | R116     | 5232-153J16P | RES,CBN 1/6P 15K  | 711      | △ R304   | 5102-1004713 | RES,FUSE 10       |
| 600      | R117     | 5232-682J16P | RES,CBN 1/6P 6.8K | 723      | R305     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 596      | R118     | 5232-221J16P | RES,CBN 1/6P 220  | 723      | R306     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 609      | R119     | 5232-473J16P | RES,CBN 1/6P 47K  | 723      | R307     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 589      | R120     | 5134-103J25P | RES,CBN 1/4P 10K  | 723      | R308     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 602      | R121     | 5232-103J16P | RES,CBN 1/6P 10K  | 723      | R309     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 607      | R122     | 5232-273J16P | RES,CBN 1/6P 27K  | 723      | R310     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 602      | R124     | 5232-103J16P | RES,CBN 1/6P 10K  | 723      | R311     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 611      | R126     | 5232-104J16P | RES,CBN 1/6P 100K | 723      | R312     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 611      | R127     | 5232-104J16P | RES,CBN 1/6P 100K | 726      | R313     | 5134-473J25P | RES,CBN 1/4P 47K  |
| 602      | R128     | 5232-103J16P | RES,CBN 1/6P 10K  | 726      | R314     | 5134-473J25P | RES,CBN 1/4P 47K  |
| 602      | R129     | 5232-103J16P | RES,CBN 1/6P 10K  | 721      | R315     | 5134-222J25P | RES,CBN 1/4P 2.2K |
| 612      | R130     | 5232-224J16P | RES,CBN 1/6P 220K | 721      | R316     | 5134-222J25P | RES,CBN 1/4P 2.2K |
| 611      | R131     | 5232-104J16P | RES,CBN 1/6P 100K | 726      | R317     | 5134-473J25P | RES,CBN 1/4P 47K  |
| 599      | R132     | 5232-562J16P | RES,CBN 1/6P 5.6K | 726      | R318     | 5134-473J25P | RES,CBN 1/4P 47K  |
| 597      | R133     | 5232-102J16P | RES,CBN 1/6P 1K   | 719      | R319     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 592      | R134     | 5134-563J25P | RES,CBN 1/4P 56K  | 719      | R320     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 603      | R135     | 5232-153J16P | RES,CBN 1/6P 15K  | 719      | R321     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 603      | R136     | 5232-153J16P | RES,CBN 1/6P 15K  | 719      | R322     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 608      | R137     | 5232-393J16P | RES,CBN 1/6P 39K  | 722      | R323     | 5134-562J25P | RES,CBN 1/4P 5.6K |
| 606      | R138     | 5232-223J16P | RES,CBN 1/6P 22K  | 722      | R324     | 5134-562J25P | RES,CBN 1/4P 5.6K |
| 598      | R139     | 5232-332J16P | RES,CBN 1/6P 3.3K | 727      | R325     | 5134-913J25P | RES,CBN 1/4P 91K  |
| 607      | R140     | 5232-273J16P | RES,CBN 1/6P 27K  | 727      | R326     | 5134-913J25P | RES,CBN 1/4P 91K  |
| 595      | R141     | 5232-100J16P | RES,CBN 1/6P 10   | 729      | R327     | 5134-184J25P | RES,CBN 1/4P 180K |
| 595      | R142     | 5232-100J16P | RES,CBN 1/6P 10   | 729      | R328     | 5134-184J25P | RES,CBN 1/4P 180K |
| 595      | R143     | 5232-100J16P | RES,CBN 1/6P 10   | 716      | R329     | 5134-101J25P | RES,CBN 1/4P 100  |
| 593      | R144     | 5134-474J25P | RES,CBN 1/4P 470K | 716      | R330     | 5134-101J25P | RES,CBN 1/4P 100  |
| 592      | R145     | 5134-563J25P | RES,CBN 1/4P 56K  | 718      | R331     | 5134-561J25P | RES,CBN 1/4P 560  |
| 581      | R150     | 5135-220J50P | RES,CBN 1/2P 22   | 718      | R332     | 5134-561J25P | RES,CBN 1/4P 560  |
| 581      | R151     | 5135-220J50P | RES,CBN 1/2P 22   | 714      | R335     | 5134-2R2J25P | RES,CBN 1/4P 2.2  |
| 580      | R152     | 5134-2R2J25P | RES,CBN 1/4P 2.2  | 714      | R336     | 5134-2R2J25P | RES,CBN 1/4P 2.2  |
| 580      | R153     | 5134-2R2J25P | RES,CBN 1/4P 2.2  | 720      | R337     | 5134-182J25P | RES,CBN 1/4P 1.8K |
| 582      | △ R154   | 5102-4R75116 | RES,FUSE 4.7      | 720      | R338     | 5134-182J25P | RES,CBN 1/4P 1.8K |
| 582      | △ R155   | 5102-4R75116 | RES,FUSE 4.7      | 723      | R339     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 615      | R156     | 5232-105J16P | RES,CBN 1/6P 1M   | 723      | R340     | 5134-103J25P | RES,CBN 1/4P 10K  |
| 642      | R201     | 5232-333J16P | RES,CBN 1/6P 33K  | 717      | R341     | 5134-471J25P | RES,CBN 1/4P 470  |
| 641      | R202     | 5232-222J16P | RES,CBN 1/6P 2.2K | 717      | R342     | 5134-471J25P | RES,CBN 1/4P 470  |
| 639      | R203     | 5134-104J25P | RES,CBN 1/4P 100K | 718      | R343     | 5134-561J25P | RES,CBN 1/4P 560  |
| 638      | R204     | 5134-103J25P | RES,CBN 1/4P 10K  | 718      | R344     | 5134-561J25P | RES,CBN 1/4P 560  |
| 643      | R205     | 5232-104J16P | RES,CBN 1/6P 100K | 719      | R345     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 634      | R206     | 5135-330J50P | RES,CBN 1/2P 33   | 719      | R346     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 591      | R207     | 5134-223J25P | RES,CBN 1/4P 22K  | 719      | R347     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 611      | R209     | 5232-104J16P | RES,CBN 1/6P 100K | 719      | R348     | 5134-102J25P | RES,CBN 1/4P 1K   |
| 611      | R210     | 5232-104J16P | RES,CBN 1/6P 100K | 716      | R349     | 5134-101J25P | RES,CBN 1/4P 100  |
| 613      | R211     | 5232-104J16P | RES,CBN 1/6P 100K | 716      | R350     | 5134-101J25P | RES,CBN 1/4P 100  |
| 613      | R212     | 5232-104J16P | RES,CBN 1/6P 100K | 716      | R351     | 5134-101J25P | RES,CBN 1/4P 100  |
| 595      | R213     | 5232-100J16P | RES,CBN 1/6P 10   | 716      | R352     | 5134-101J25P | RES,CBN 1/4P 100  |
| 611      | R214     | 5232-104J16P | RES,CBN 1/6P 100K | 725      | R353     | 5134-183J25P | RES,CBN 1/4P 18K  |
| 611      | R215     | 5232-104J16P | RES,CBN 1/6P 100K | 725      | R354     | 5134-183J25P | RES,CBN 1/4P 18K  |
| 610      | R216     | 5232-683J16P | RES,CBN 1/6P 68K  | 717      | R357     | 5134-471J25P | RES,CBN 1/4P 470  |
| 610      | R217     | 5232-683J16P | RES,CBN 1/6P 68K  | 717      | R358     | 5134-471J25P | RES,CBN 1/4P 470  |
| 595      | R218     | 5232-100J16P | RES,CBN 1/6P 10   | 714      | R359     | 5134-2R2J25P | RES,CBN 1/4P 2.2  |
| 636      | R219     | 5134-152J25P | RES,CBN 1/4P 1.5K | 714      | R360     | 5134-2R2J25P | RES,CBN 1/4P 2.2  |
| 582      | △ R220   | 5102-4R75116 | RES,FUSE 4.7      | 715      | R361     | 5134-470J25P | RES,CBN 1/4P 47   |
| 582      | △ R221   | 5102-4R75116 | RES,FUSE 4.7      | 715      | R362     | 5134-470J25P | RES,CBN 1/4P 47   |
| 614      | R223     | 5232-474J16P | RES,CBN 1/6P 470K | 728      | R363     | 5134-104J25P | RES,CBN 1/4P 100K |
| 588      | R224     | 5134-222J25P | RES,CBN 1/4P 2.2K | 728      | R364     | 5134-104J25P | RES,CBN 1/4P 100K |
| 588      | R225     | 5134-222J25P | RES,CBN 1/4P 2.2K | 724      | R601     | 5134-123J25P | RES,CBN 1/4P 12K  |
| 588      | R226     | 5134-222J25P | RES,CBN 1/4P 2.2K | 724      | R602     | 5134-123J25P | RES,CBN 1/4P 12K  |

| Ser. No. | Ref. No. | Part No.     | Description                     |
|----------|----------|--------------|---------------------------------|
| 730      | R603     | 5232-105J16P | RES,CBN 1/6P 1M                 |
| 730      | R604     | 5232-105J16P | RES,CBN 1/6P 1M                 |
| 669      | R701     | 5134-102J25P | RES,CBN 1/4P 1K                 |
| 666      | R702     | 5135-220J50P | RES,CBN 1/2P 22                 |
| 672      | R703     | 5232-472J16P | RES,CBN 1/6P 4.7K               |
| 668      | R704     | 5134-101J25P | RES,CBN 1/4P 100                |
| 668      | R705     | 5134-101J25P | RES,CBN 1/4P 100                |
| 824      | R802     | 5232-221J16P | RES,CBN 1/6P 220 (Model:HD7325) |
| 819      | R805     | 5134-101J25P | RES,CBN 1/4P 100 (Model:HD7325) |
| 821      | R807     | 5134-331J25P | RES,CBN 1/4P 330 (Model:HD7325) |
| 820      | R810     | 5134-221J25P | RES,CBN 1/4P 220 (Model:HD7325) |
| 785      | R901     | 5232-392J16P | RES,CBN 1/6P 3.9K               |
| 786      | R902     | 5232-473J16P | RES,CBN 1/6P 47K                |
| 783      | R903     | 5232-470J16P | RES,CBN 1/6P 47                 |
| 784      | R904     | 5232-331J16P | RES,CBN 1/6P 330                |
| 787      | R905     | 5134-220J25P | RES,CBN 1/4P 22                 |

**INTEGRATED CIRCUITS**

|     |       |               |                           |
|-----|-------|---------------|---------------------------|
| 501 | △ IC1 | 5653-M5290P   | IC,LINEAR                 |
| 531 | IC101 | 5653-CXA1081S | IC,LINEAR                 |
| 534 | IC102 | 5654-M51594FP | IC,DIGITAL                |
| 533 | IC103 | 5653-LA6520   | IC,LINEAR                 |
| 621 | IC201 | 5654-M65820FP | IC,DIGITAL                |
| 532 | IC203 | 5653-LA6515   | IC,LINEAR                 |
| 651 | IC701 | 5654-MN6474AM | IC,DIGITAL                |
| 801 | IC801 | 5654-H74H02P  | IC,DIGITAL (Model:HD7325) |

**TRANSISTORS**

|     |      |                |              |
|-----|------|----------------|--------------|
| 504 | △ Q1 | 5614-2012      | XISTOR,NPN A |
| 503 | △ Q2 | 5612-1375      | XISTOR,PNP A |
| 741 | Q41  | 5611-1015(GR)  | XISTOR,PNP R |
| 745 | Q43  | 5613-2878(B)   | XISTOR,NPN R |
| 745 | Q44  | 5613-2878(B)   | XISTOR,NPN R |
| 745 | Q45  | 5613-2878(B)   | XISTOR,NPN R |
| 745 | Q46  | 5613-2878(B)   | XISTOR,NPN R |
| 536 | Q101 | 5612-647(C)    | XISTOR,PNP A |
| 537 | Q102 | 5613-1815(GR)  | XISTOR,NPN R |
| 537 | Q103 | 5613-1815(GR)  | XISTOR,NPN R |
| 537 | Q104 | 5613-1815(GR)  | XISTOR,NPN R |
| 623 | Q201 | 5613-1815(GR)  | XISTOR,NPN R |
| 684 | Q301 | 5613-1815L(GR) | XISTOR,NPN R |
| 684 | Q302 | 5613-1815L(GR) | XISTOR,NPN R |
| 681 | Q303 | 5611-950(Y)    | XISTOR,PNP R |
| 681 | Q304 | 5611-950(Y)    | XISTOR,PNP R |
| 684 | Q305 | 5613-1815L(GR) | XISTOR,NPN R |
| 684 | Q306 | 5613-1815L(GR) | XISTOR,NPN R |
| 682 | Q307 | 5611-1015L(GR) | XISTOR,PNP R |
| 682 | Q308 | 5611-1015L(GR) | XISTOR,PNP R |
| 681 | Q309 | 5611-950(Y)    | XISTOR,PNP R |
| 681 | Q310 | 5611-950(Y)    | XISTOR,PNP R |
| 684 | Q311 | 5613-1815L(GR) | XISTOR,NPN R |
| 684 | Q312 | 5613-1815L(GR) | XISTOR,NPN R |
| 684 | Q313 | 5613-1815L(GR) | XISTOR,NPN R |
| 684 | Q314 | 5613-1815L(GR) | XISTOR,NPN R |
| 681 | Q315 | 5611-950(Y)    | XISTOR,PNP R |
| 681 | Q316 | 5611-950(Y)    | XISTOR,PNP R |
| 686 | Q317 | 5616-SK246GR2  | FET,N-CH     |
| 686 | Q318 | 5616-SK246GR2  | FET,N-CH     |
| 683 | Q319 | 5611-A114ES    | XISTOR,PNP R |
| 686 | Q601 | 5616-SK246GR2  | FET,N-CH     |
| 686 | Q602 | 5616-SK246GR2  | FET,N-CH     |
| 771 | Q901 | 5611-A143ES    | XISTOR,PNP R |

**DIODES**

|     |       |             |              |
|-----|-------|-------------|--------------|
| 506 | △ D1  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D2  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D3  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D4  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D5  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D6  | 5632-S5566B | DIODE,RECT   |
| 508 | △ D7  | 5635-HZ5B2  | DIODE,ZENER  |
| 507 | D8    | 5635-HZ27-2 | DIODE,ZENER  |
| 506 | △ D9  | 5632-S5566B | DIODE,RECT   |
| 506 | △ D10 | 5632-S5566B | DIODE,RECT   |
| 749 | D41   | 5636-1S2473 | DIODE,SWITCH |

| Ser. No. | Ref. No. | Part No.    | Description  |
|----------|----------|-------------|--------------|
| 751      | △ D42    | 5635-HZ7B2L | DIODE,ZENER  |
| 749      | D43      | 5636-1S2473 | DIODE,SWITCH |
| 748      | D44      | 5636-1SS133 | DIODE,SWITCH |
| 541      | D103     | 5636-1SS133 | DIODE,SWITCH |
| 540      | D106     | 5636-1S2473 | DIODE,SWITCH |
| 689      | D601     | 5636-1S2473 | DIODE,SWITCH |
| 689      | D602     | 5636-1S2473 | DIODE,SWITCH |

**TRANSFORMERS**

|      |      |            |   |
|------|------|------------|---|
| 861A | △ T1 | 5584-T1701 | XFORMER,POWER (Model:HD7325)<br>BK          |
| 861  | △ T1 | 5584-T1702 | XFORMER,POWER<br>(Model:HD7325/7225A) IB IL |

**CONTROLS**

|     |       |               |                  |
|-----|-------|---------------|------------------|
| 578 | VR101 | 5101-22301934 | RES,SEMI FIX 22K |
| 577 | VR102 | 5101-50201934 | RES,SEMI FIX 5K  |

**MISCELLANEOUS**

|     |        |               |                                    |
|-----|--------|---------------|------------------------------------|
| 882 | CN103  | 4443-040185   | CONNECTOR, 4 PIN                   |
| 876 | CN201  | 4443-05501029 | CONNECTOR, 29 PIN                  |
| 868 | △ F1   | 5732-01601121 | FUSE, T125mA/T125mAL 250V<br>IB IL |
| 867 | △ HF1  | 4472-04901    | FUSE HOLDER, F1 IB IL              |
| 867 | △ HF2  | 4472-04901    | FUSE HOLDER, F1 IB IL              |
| 872 | △ J301 | 4489-04003002 | MLT PIN JACK, OUTPUT LEFT/RIGHT    |
| 874 | J901   | 4451-00184    | 1P PIN JACK, REMOTE IN             |
| 874 | J902   | 4451-00184    | 1P PIN JACK, REMOTE OUT            |
| 891 | JL101  | 4242-R0107181 | JUMPER LEAD                        |
| 892 | JL103  | 4242-R0504451 | JUMPER LEAD                        |
| 884 | LCN113 | 4163-S5305121 | CONNECTOR W/W                      |
| 886 | LCN114 | 4163-01526008 | CONNECTOR W/W                      |
| 887 | LCN115 | 4163-01527008 | CONNECTOR W/W                      |
| 885 | LCN117 | 4163-S5306800 | CONNECTOR W/W                      |
| 896 | LUG1   | 4211-4        | LUG, W-1                           |
| 896 | LUG2   | 4211-4        | LUG, C15                           |
| 774 | PH901  | 5624-PC817    | PHOTO COUPLR                       |
| 646 | RC250  | 5212-S0305103 | R COMPOSITE, 10K X5                |
| 865 | △ TM1  | 4214-245      | TERMINAL, AC CORD                  |
| 865 | △ TM2  | 4214-245      | TERMINAL, AC CORD                  |
| 866 | TP101  | 4214-132      | TERMINAL, TEST PIN                 |
| 866 | TP102  | 4214-132      | TERMINAL, TEST PIN                 |
| 866 | TP104  | 4214-132      | TERMINAL, TEST PIN                 |
| 866 | TP201  | 4214-132      | TERMINAL, TEST PIN                 |
| 866 | TP202  | 4214-132      | TERMINAL, TEST PIN                 |
| 866 | TP203  | 4214-132      | TERMINAL, TEST PIN                 |
| 889 | W101   | 4141-00158291 | 1C SHIELD WIRE (Model:HD7325)      |
| 888 | W401   | 4163-0122020  | CONNECTOR W/W                      |
| 653 | X701   | 5691-S0901343 | XTAL,OSC, 33.8688MHz               |
| 158 |        | 2240-Z021     | HOLDER, W-101 (Model:HD7325)       |

**PCB-2 FRONT P.C. BOARD**

**CAPACITORS**

|     |      |               |                       |
|-----|------|---------------|-----------------------|
| 833 | C401 | 5345-106F0962 | CAP,MINI ELE 10U/50V  |
| 835 | C402 | 5354-104J1HM  | CAP,MYL .1U           |
| 833 | C403 | 5345-106F0962 | CAP,MINI ELE 10U/50V  |
| 850 | C404 | 5345-107B0962 | CAP,MINI ELE 100U/10V |
| 837 | C405 | 5361-471KB    | CAP,CER 470P          |
| 837 | C406 | 5361-471KB    | CAP,CER 470P          |
| 835 | C407 | 5354-104J1HM  | CAP,MYL .1U           |
| 835 | C408 | 5354-104J1HM  | CAP,MYL .1U           |

**RESISTORS**

|     |      |              |                  |
|-----|------|--------------|------------------|
| 858 | R401 | 5135-220J50P | RES,CBN 1/2P 22  |
| 854 | R402 | 5134-102J25P | RES,CBN 1/4P 1K  |
| 852 | R403 | 5134-100J25P | RES,CBN 1/4P 10  |
| 855 | R404 | 5134-103J25P | RES,CBN 1/4P 10K |
| 855 | R405 | 5134-103J25P | RES,CBN 1/4P 10K |
| 855 | R406 | 5134-103J25P | RES,CBN 1/4P 10K |
| 855 | R407 | 5134-103J25P | RES,CBN 1/4P 10K |
| 856 | R408 | 5134-220J25P | RES,CBN 1/4P 22  |
| 853 | R409 | 5134-221J25P | RES,CBN 1/4P 220 |

Ser. No. Ref. No. Part No. Description

**INTEGRATED CIRCUIT**

831 IC401 5654-M957-243 IC,DIGITAL

**DIODES**


848 D401 5636-1S2473 DIODE,SWITCH  
848 D402 5636-1S2473 DIODE,SWITCH  
848 D403 5636-1S2473 DIODE,SWITCH  
848 D404 5636-1S2473 DIODE,SWITCH  
848 D405 5636-1S2473 DIODE,SWITCH  
848 D406 5636-1S2473 DIODE,SWITCH  
848 D407 5636-1S2473 DIODE,SWITCH  
848 D408 5636-1S2473 DIODE,SWITCH

**MISCELLANEOUS**

877 CN401 4443-05401029 CONNECTOR, 29 PIN  
841 FL401 5722-062 TUBE DISPLAY  
843 RCV401 6143-00802 RECEIVER UNIT (Model:HD7325)  
845 SW401 4437-01201 SWITCH,PU-TC, OPEN/CLOSE  
845 SW402 4437-01201 SWITCH,PU-TC, PLAY  
845 SW403 4437-01201 SWITCH,PU-TC, PAUSE  
845 SW404 4437-01201 SWITCH,PU-TC, STOP  
845 SW405 4437-01201 SWITCH,PU-TC, R.SKIP  
845 SW406 4437-01201 SWITCH,PU-TC, F.SKIP  
845 SW407 4437-01201 SWITCH,PU-TC, R.SERACH  
845 SW408 4437-01201 SWITCH,PU-TC, F.SERACH  
846 SW409 4437-01202 SWITCH,PU-TC, DISPLAY  
846 SW410 4437-01202 SWITCH,PU-TC, TIME  
845 SW411 4437-01201 SWITCH,PU-TC, REPEAT  
846 SW412 4437-01202 SWITCH,PU-TC, PROGRAM

**PCB-3 POWER SWITCH P.C. BOARD**

**MISCELLANEOUS**

870  SW1 4431-S2202102 PUSH SWITCH, POWER

**PCB-4 DIGITAL OUTPUT P.C. BOARD (Model:HD7325)**


**CAPACITORS**

811 C803 5361-560JCH CAP,CER 56P (Model:HD7325)  
807 C804 5345-336C0962 CAP,MINI ELE 33U/16V (Model:HD7325)  
814 C806 5354-104J1HM CAP,MYL .1U (Model:HD7325)

**RESISTORS**

818 R801 5134-750J25P RES,CBN 1/4P 75 (Model:HD7325)  
823 R809 5232-101J16P RES,CBN 1/6P 100 (Model:HD7325)

**MISCELLANEOUS**







873  J801 4481-00501 1P PIN JACK, DIGITAL OUT (Model:HD7325)  
895 LUG3 4211-4 LUG, W-3 (X2) (Model:HD7325)  
895 LUG4 4211-4 LUG, W-3 (X2) (Model:HD7325)  
160 2240-Z042 HOLDER, JL103 (Model:HD7325)

**COIL**

804 T801 5933-S0801 COIL CASE,10 (Model:HD7325)













**CHASSIS MISCELLANEOUS**

**MISCELLANEOUS**

893  JL401 4242-S0329161 JUMPER LEAD  
863A  P1 4161-03601202 CORD W/PLUG, AC CORD (Model:HD7325)   
863  P1 4161-03701220 CORD W/PLUG, AC CORD (Model:HD7325/7225A)  

Ser. No. Ref. No. Part No. Description

**PACKING PARTS LIST**

021A 1119-05301 ATTACH SHEET, UL SAFETY (Model:HD7325)   
022A 1113-02501 OWNER CARD, REPLY CARD (Model:HD7325)   
023A 1119-04502 ATTACH SHEET, SERVICE SHOP GUIDE (Model:HD7325)   
024A 1116-03802 GUARANTY CARD, WARRANTY (Model:HD7325)   
030B 1756-23601 LABEL, CHAMPAGNE   
105A 1111-1200M152 OWNER GUIDE, IB (Model:HD7325)   
105 1111-1430M152 OWNER GUIDE, IB (Model:HD7325)    
105 1111-1430M152 OWNER GUIDE, IB (Model:HD7225A)    
114 1221-31802 CARTON BOX (Model:HD7325)  
114 1221-31805 CARTON BOX (Model:HD7225A)  
115 1222-7394 CUSHION, R  
116 1222-7393 CUSHION, L  
117 1223-R0420055 SOFT SHEET, FRONT  
118 1223-00207018 SOFT SHEET, CD LID  
119 1241-R0160601 POLYETHY BAG, SET  
120 1241-R0123351 POLYETHY BAG, IB  
145 1756-03108 LABEL, (I) LABEL, CARTON BOX (X2)    
864 4161-04602102 CORD W/PLUG, RCA CORD  
900 6142-07802 REMOTE CONTROL ASS'Y (Model:HD7325)  
901 1135-00301 ACCESSORY BAT (Model:HD7325)

**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  
470U : 470µF  
6800P : 6800pF  
.047U : 0.047µF

**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**

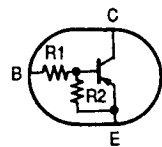
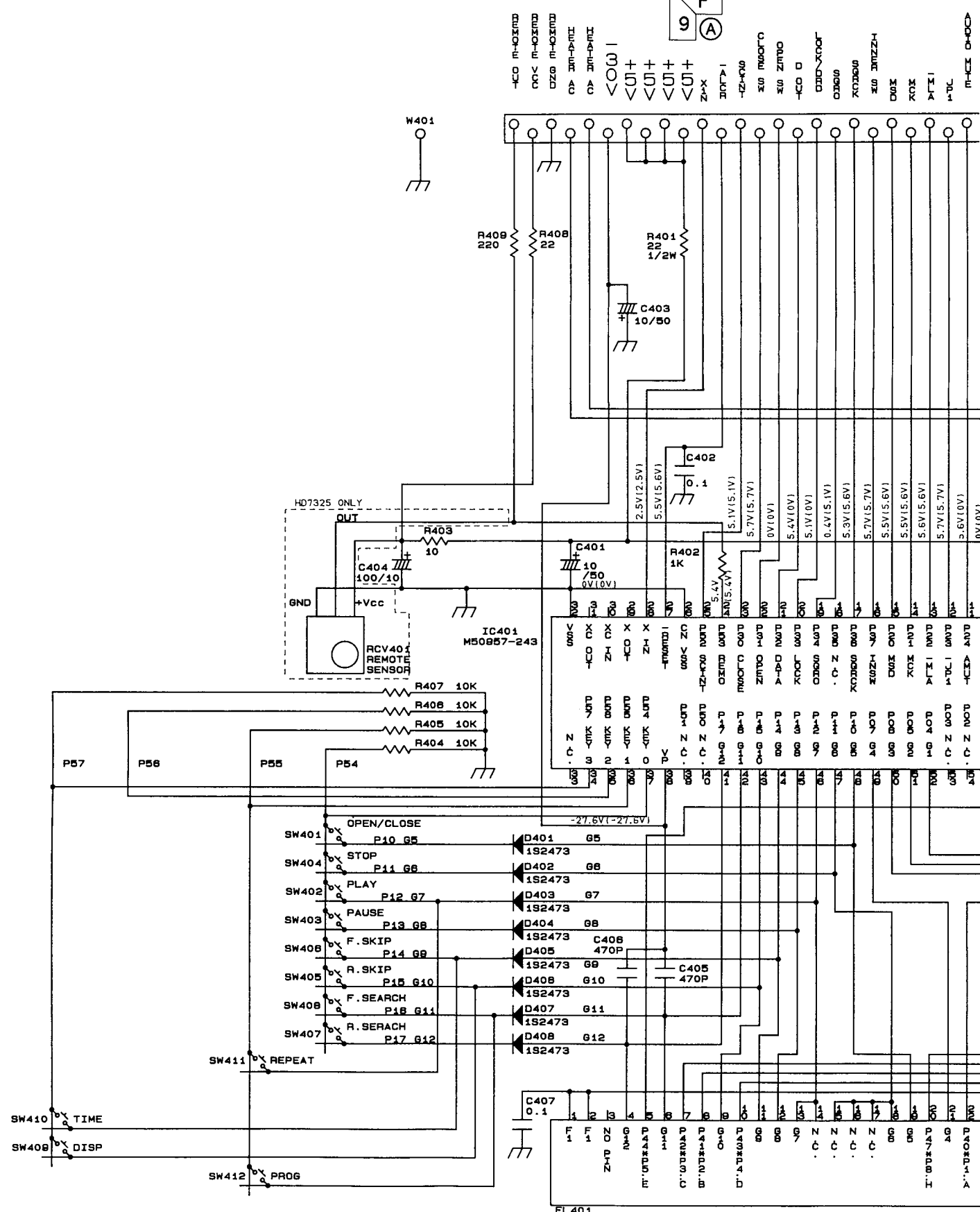


SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

**SCHEMATIC DIAGRAM**



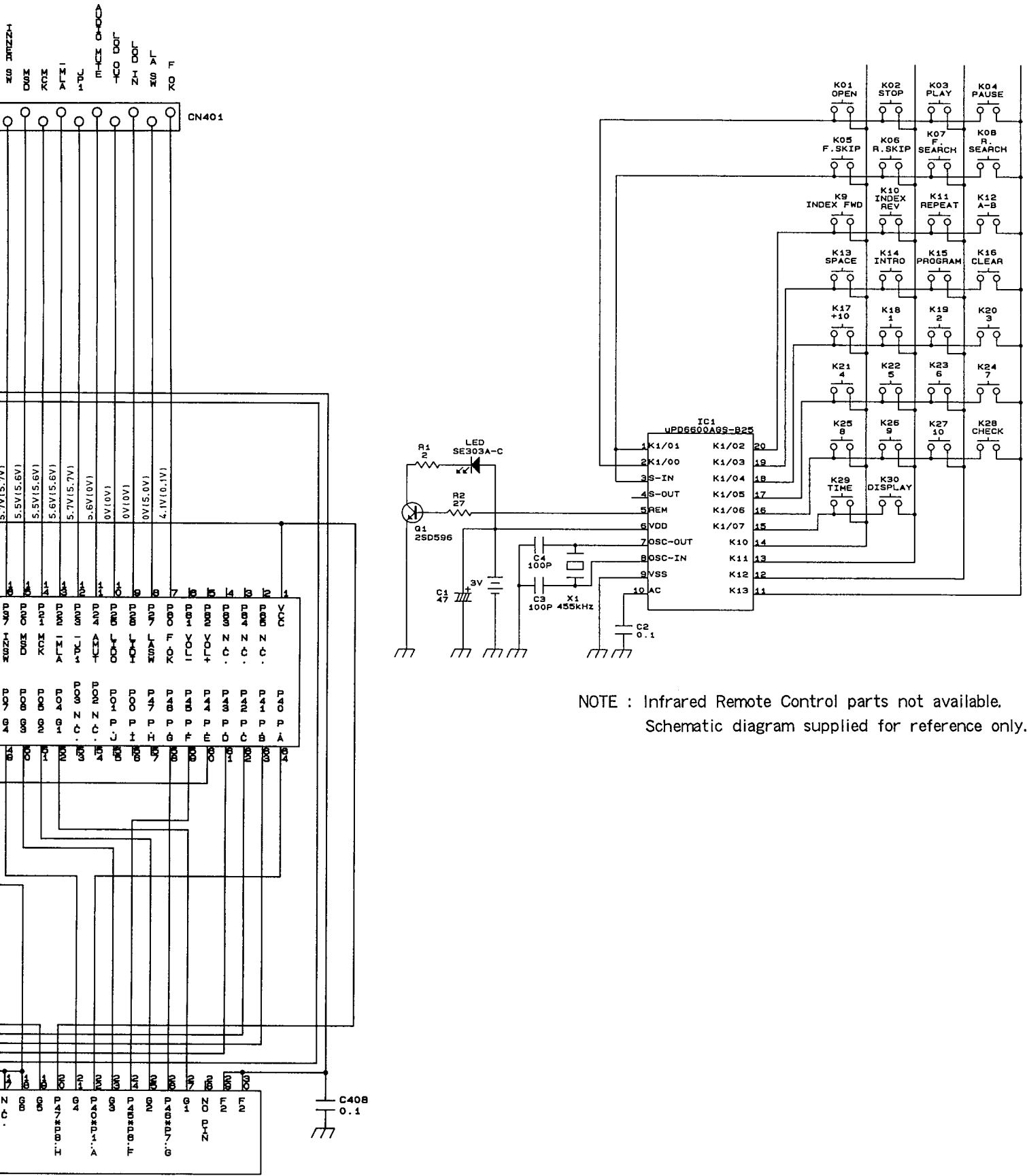
1  
2  
3  
4  
5  
6  
7



| Type     | R1   | R2   |
|----------|------|------|
| DTA143ES | 4.7k | 4.7k |
| DTA114ES | 10k  | 10k  |

- NOTE:**
1. ALL RESISTANCES VALUES ARE IN Ω. KΩ=1000Ω, MΩ=1000KΩ.
  2. ALL CAPACITANCES VALUE ARE IN μF
  3. (... V : DC VOLTAGE AT PLAY MODE.  
(... V) : DC VOLTAGE AT STOP MODE.
  4. SAFETY REQUIREMENTS COMP SAFETY REGULATIONS, THESE BY ORIGINAL PARTS.

# INFRA-RED REMOTE CONTROL SCHEMATIC DIAGRAM



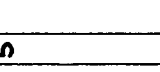
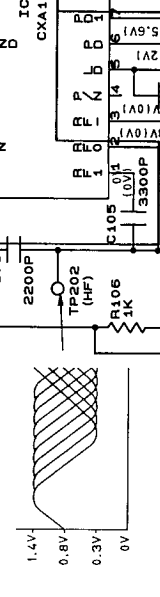
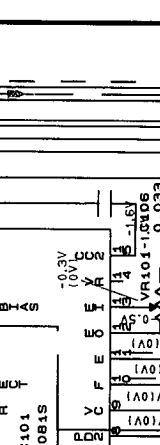
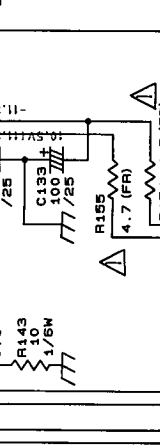
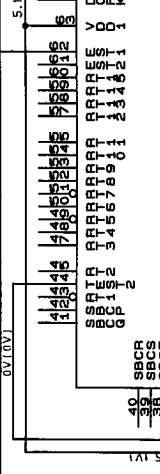
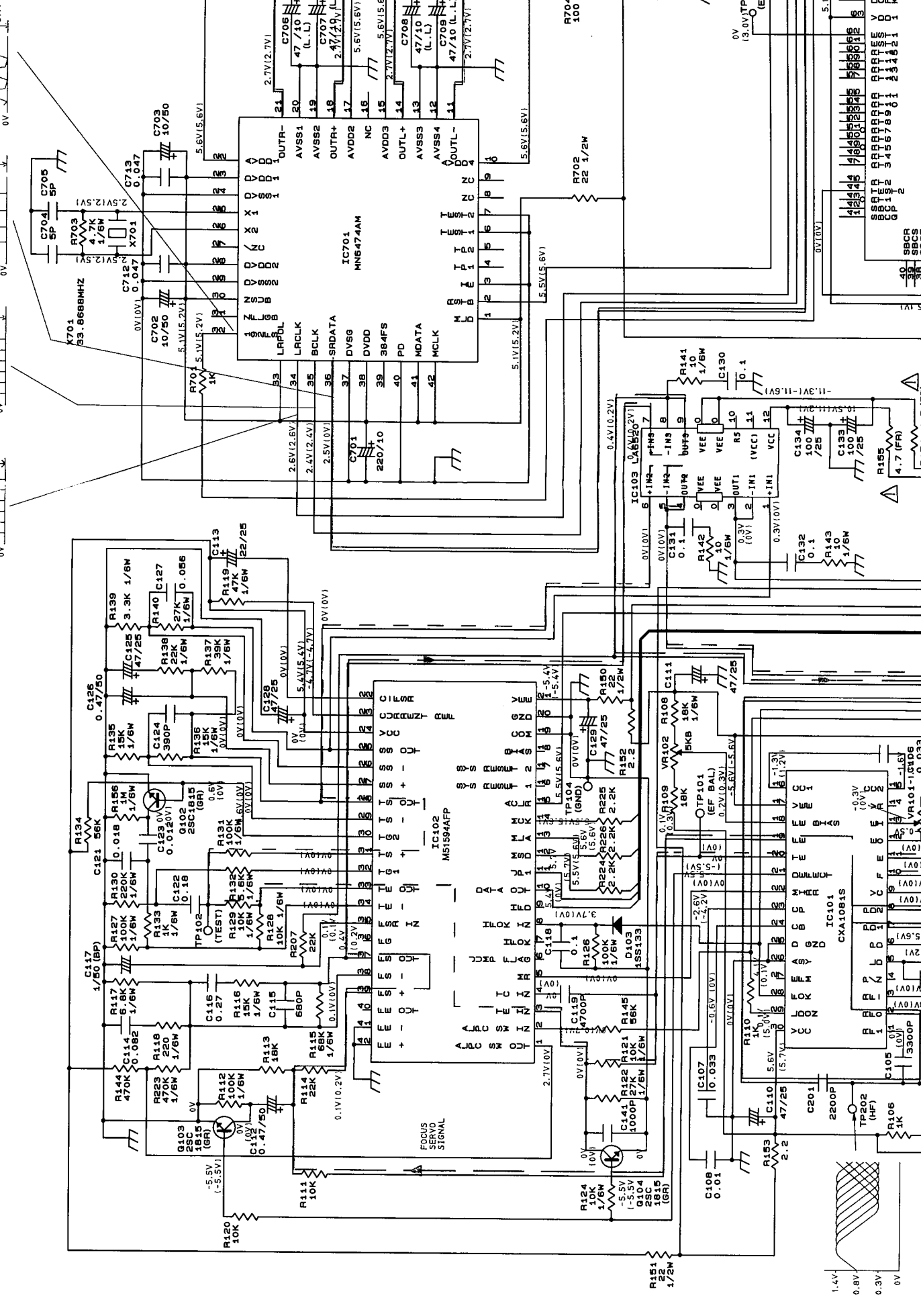
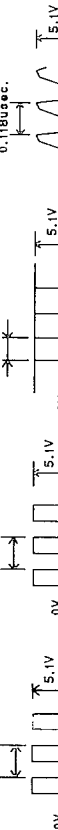
NOTE : Infrared Remote Control parts not available.  
Schematic diagram supplied for reference only.

RESISTOR VALUES ARE IN Ω.  
RESISTOR VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μF.  
CAPACITOR VALUES ARE IN μF UNLESS OTHERWISE NOTED.  
RESISTOR VALUES ARE IN Ω UNLESS OTHERWISE NOTED.  
RESISTOR VALUES ARE IN μF UNLESS OTHERWISE NOTED.  
RESISTOR VALUES ARE IN Ω UNLESS OTHERWISE NOTED.

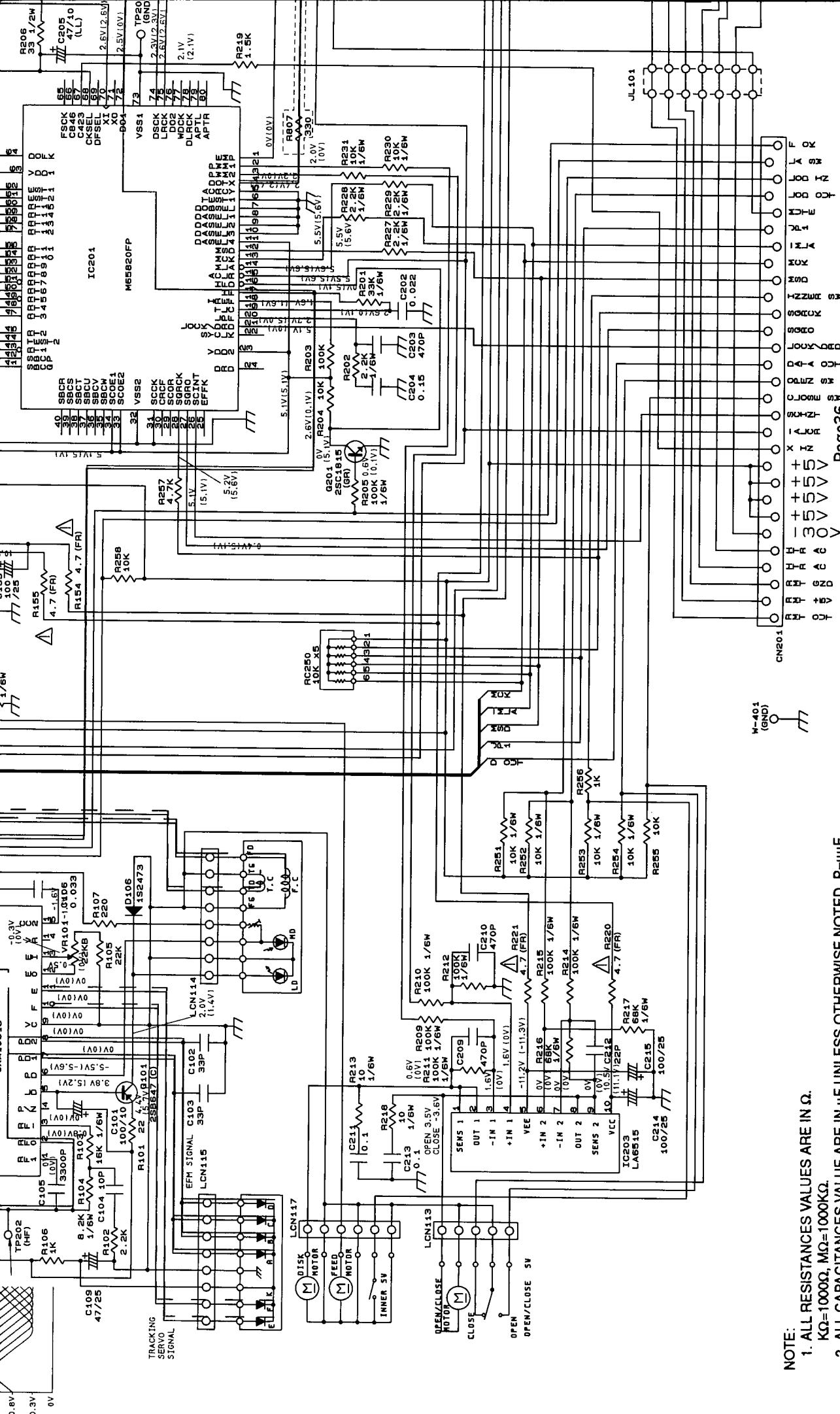


# SCHEMATIC DIAGRAM

LCK 22.5µsec.  
 BCLK 0.48µsec.  
 SRDATA 0.48µsec.  
 0.118µsec.

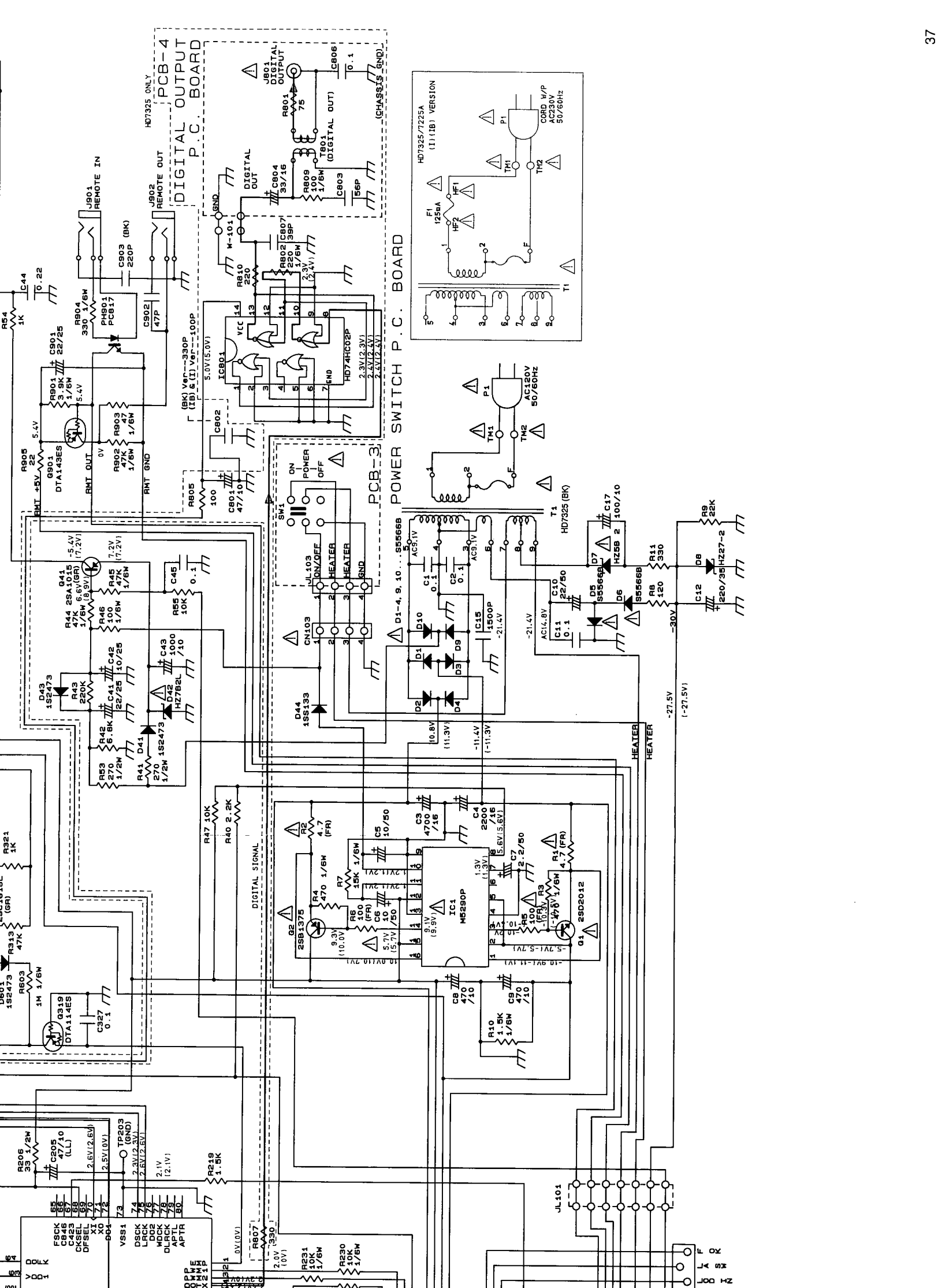






- NOTE:
1. ALL RESISTANCES VALUES ARE IN  $\Omega$ .  
K $\Omega$ =1000 $\Omega$ , M $\Omega$ =1000K $\Omega$ .
  2. ALL CAPACITANCES VALUE ARE IN  $\mu$ F UNLESS OTHERWISE NOTED. P= $\mu$ F.
  3. ... V : DC VOLTAGE AT PLAY MODE.  
(... V) : DC VOLTAGE AT STOP MODE.
  4. SAFETY REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.





PCB-4  
DIGITAL OUTPUT  
P.C. BOARD

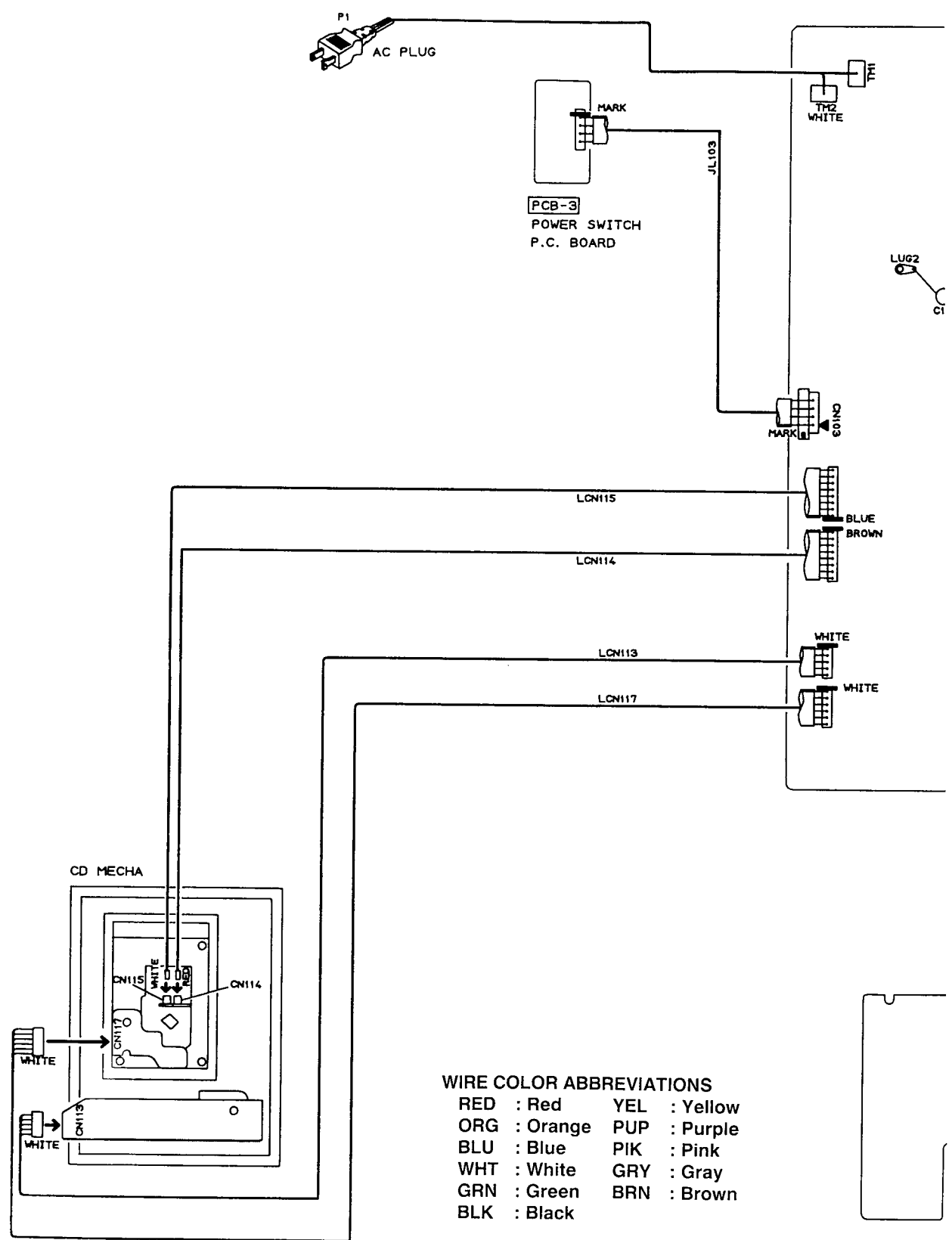
PCB-3  
POWER SWITCH  
P.C. BOARD

PCB-4  
DIGITAL OUTPUT  
P.C. BOARD

# WIRING DIAGRAM

1  
2  
3  
4  
5  
6  
7

A B C D E



**WIRE COLOR ABBREVIATIONS**

|              |              |
|--------------|--------------|
| RED : Red    | YEL : Yellow |
| ORG : Orange | PUP : Purple |
| BLU : Blue   | PIK : Pink   |
| WHT : White  | GRY : Gray   |
| GRN : Green  | BRN : Brown  |
| BLK : Black  |              |

F

G

H

I

J

