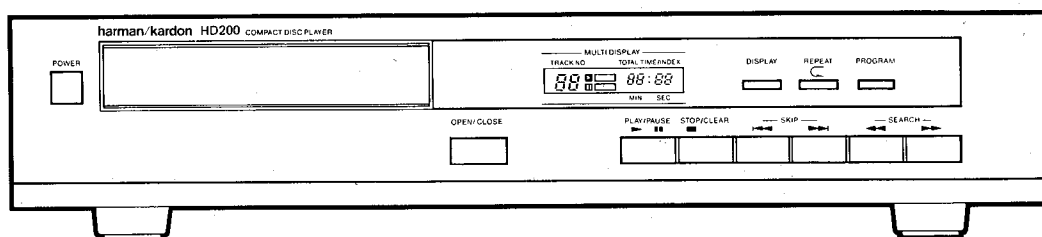


# The Harman Kardon Model HD200 COMPACT DISC PLAYER

Manual 126A

## Technical Manual



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

- UA : North America area model
- BK : North America area model Black version
- G : General model
- GB : General model Black version
- BB : Australia model Black version

**harman/kardon**

240 Crossways Park West, Woodbury, N. Y. 11797  
1112-3152126A0 P-078801 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 open and interlock failed or defeated. Avoid direct exposure to the beam.

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

**Be Careful of the Laser Pickup**

Although you cannot see it from the outside, a laser pickup is located under the disc tray and a precision lens is built in it.

Since the laser pickup, including the lens element, is especially sensitive to dust, keep the disc tray closed when not in use. Also do not put your hand inside the unit.

**CLASS 1  
LASER PRODUCT**

**SPECIFICATIONS**

|                           |                              |
|---------------------------|------------------------------|
| System                    | : Compact Disc Digital Audio |
| Signal Detection          | : 3-Beam Semiconductor Laser |
| Error Correction          | : CIRC System                |
| Sampling Frequency        | : 88.2kHz                    |
| Quantization              | : 16-bit                     |
| Channels                  | : 2 Channel Stereo           |
| Frequency Response        | : 4Hz—20kHz $\pm 0.5$ dB     |
| Total Harmonic Distortion | : 0.03% (1kHz)               |
| Dynamic Range             | : 96dB                       |
| Signal-to-Noise Ratio     | : 103dB                      |

|                                  |                                                     |
|----------------------------------|-----------------------------------------------------|
| Channel Separation               | : 83dB (1kHz)                                       |
| Wow & Flutter                    | : Immeasurable                                      |
| Line Output Level/Load Impedance | : 2.0V/10k Ohms                                     |
| Power Supply                     |                                                     |
| U.S.A. and Canada models         | : AC 120V, 60Hz                                     |
| General and Australia models     | : AC 220/240V, 50/60Hz                              |
| Power Consumption                | : 15 Watts                                          |
| Dimensions (W x H x D)           | : 17-3/8" x 3-3/4" x 10-1/8"<br>(443 x 95 x 257 mm) |
| Weight                           | : 8.5lbs. (3.9kg)                                   |

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

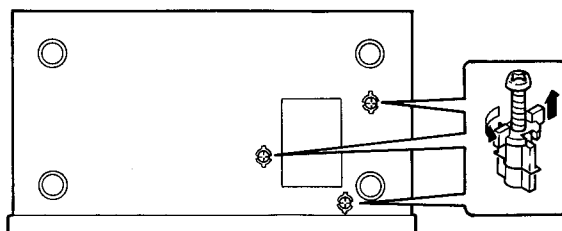
**Adjustment of this unit requires following measuring instruments and jigs.**

- Oscilloscope (3 or more modes, 100MHz, X-Y input possible) 1740A
- Distortion Meter 339A
- Test Disc:  
EIAJ CD-1

**IMPORTANT**

Before plugging the unit in, be sure to remove the transportation screws on the bottom of the unit.

1. Place a cloth under the unit in order to prevent it from being scratched.
2. Turn the unit upside down.
3. Remove the three transportation screws with a screw driver, as shown in the illustration below.



**NOTE:** Be sure to tighten screws by the reverse procedure before transporting the unit.

## SAFETY PRECAUTIONS

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

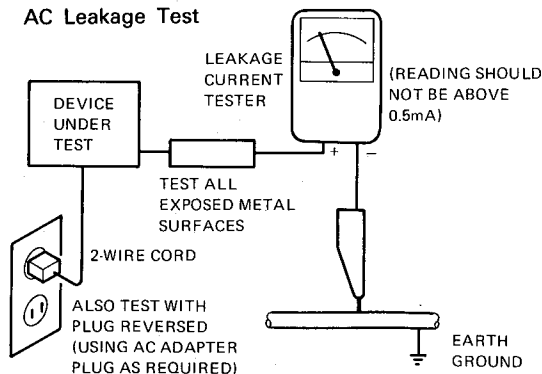
- a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing.
  - (1) Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
  - (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks.

**Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.**

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

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

### AC Leakage Test

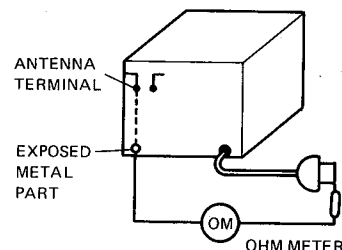


### d. Insulation Resistance Test

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

### e. Insulation Resistance Test Cold Check

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



### PRODUCT SAFETY NOTICE

Some electrical and mechanical parts have special safety related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, by ( $\Delta$ ) 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.

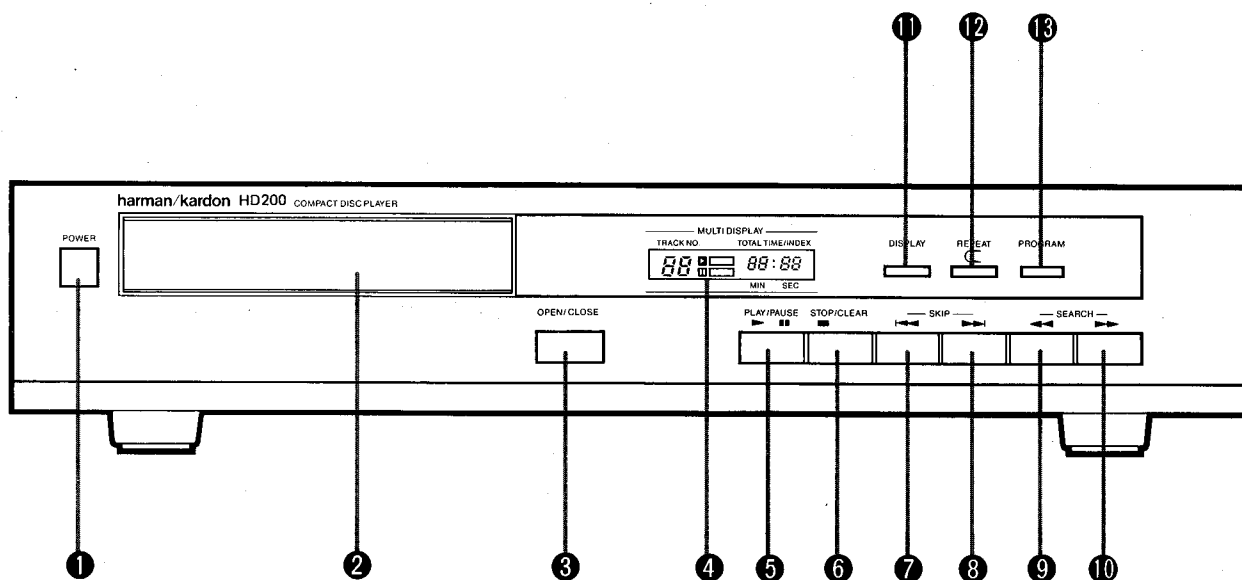
**Note 1:** Accessible Conductive Parts including Metal panels, Output jacks, etc.

### 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 fieleffect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

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

## CONTROLS AND FUNCTIONS

**❶ POWER SWITCH**

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

**❷ DISC TRAY**

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

**❸ OPEN/CLOSE BUTTON**

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

**❹ MULTI DISPLAY**

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

**❺ PLAY/PAUSE BUTTON**

Press this button to start playback. Pressing this button during playback activates the pause mode. Playback continues when this button is pressed again.

**❻ STOP/CLEAR BUTTON**

Press this button to stop playing a disc or to cancel the pause mode. Press the button once again to erase the memory program.

**❼ ⏮ ⏮ BUTTON (SKIP)**

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

**❽ ⏭ ⏭ BUTTON (SKIP)**

Pressing this button once skips playback forward to the beginning of the next program. Pressing it twice skips it to the beginning of the program after that, and so on.

**❾ ⏮ ⏮ BUTTON (REVERSE SEARCH)**

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

**❿ ⏭ ⏭ BUTTON (FAST-FORWARD SEARCH)**

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

**⓫ DISPLAY BUTTON**

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

**⓬ REPEAT BUTTON**

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

**⓭ PROGRAM BUTTON**

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

## DISASSEMBLY PROCEDURES (REFER TO PAGES 29 through 32 and 34)

### 1 CABINET TOP (122) REMOVAL

Remove 7 screws (A) and then remove the Cabinet Top (122).

### 2 FRONT PANEL ASS'Y (AC) REMOVAL

1. Remove the Cabinet Top (122), referring to the previous step 1.
2. Pull off Power button (139).
3. Remove 7 screws (B) and then remove the Front Panel Ass'y (AC) with the Front P.C. Board (PCB-2).
4. Remove 4 screws (C) and then remove the Front P.C. Board (PCB-2) from the Front Panel Ass'y (AC).

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

1. Remove the Front Panel Ass'y (AC), referring to the previous step 2.
2. Unsolder the jumper leads (JL101, JL102, JL103, JL104 and JL105) from Front P.C. Board (PCB-2) and then remove the Front P.C. Board (PCB-2).
3. Open the lid of connectors (CN101, CN102 and CN105) on the Main P.C. Board (PCB-1) and then disconnect the lead wires.

## DISASSEMBLING THE CD PLAYER MECHANICAL ASSEMBLY

### 5 DISC TRAY REMOVAL

1. Remove the Cabinet Top (122), 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 (6) by pressing the Open/Close button.
4. With the Disc Tray (6) opened as it is, pull out the power plug.
5. Push the Disc Tray (6) by hand to slide it in once and then slide it out again.
6. Pull out the Disc Tray while disengaging the Tray Lock Pawl (Shown in Adjustment Points location on next page) in the direction of arrow with screwdriver or the like.

4. Remove 2 screws (D) and then remove the Pickup Drive P.C. Board (PCB-4).
5. Open the lid of connectors (CN103 and CN104) on the Main P.C. Board (PCB-1) and then disconnect the lead wires.
6. Remove 4 screws (E) and then remove the Main P.C. Board (PCB-1).  
If necessary, unsolder the lead wires connected to the PCB-1.

### 4 CD PLAYER MECHANICAL ASSEMBLY REMOVAL

1. Remove the Front Panel Ass'y (AC), referring to the previous step 2.
2. Open the lid of connectors (CN103 and CN104) on the Main P.C. Board (PCB-1) and connector (CN502) on the Pickup Drive P.C. Board (PCB-4) and then disconnect the lead wires.
3. Remove 2 screws (D) and then remove the Pickup Drive P.C. Board (PCB-4).
4. Remove 3 screws (F) and then remove the CD Player Mechanical Assembly (103).

### 6 OPTICAL PICK-UP REMOVAL

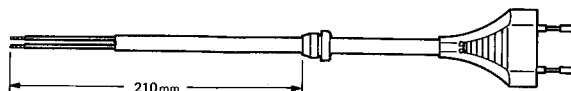
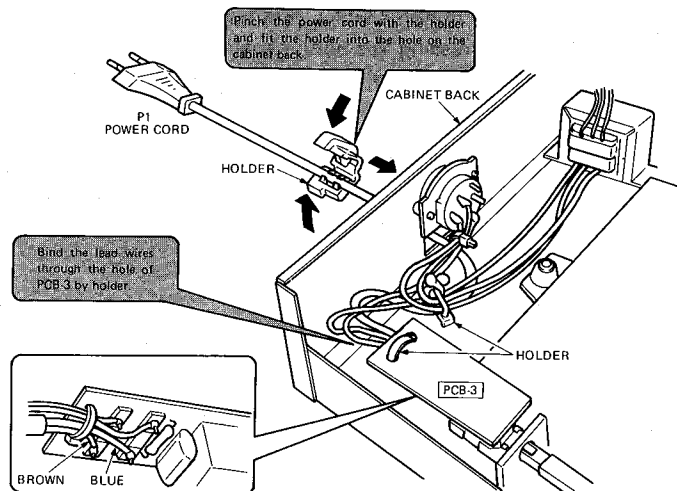
1. Remove the CD Player Mechanical Assembly (CA), referring to the previous step 4.
2. Remove 4 screws (G), then remove the Optical Pick-Up Base Assembly (2).
3. Remove 1 screw (H) and Pick-Up Base Shaft Holder (5), then remove the Pick-Up (32).

### 7 SPINDLE MOTOR ASSEMBLY REMOVAL

1. Remove the CD Player Mechanical Assembly (103), referring to the previous step 4.
2. Remove the Chuck Arm Spring (22).
3. Undo 2 catches fixing the Chuck Arm (10) to the right and left and remove the Chuck Arm (10).
4. Remove 2 screws (I) fixing the Spindle Motor Assembly (48) and then remove the Spindle Motor Assembly (48). Align the holes in the Spindle Table to the screw (I) positions for the screw removal.

## 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

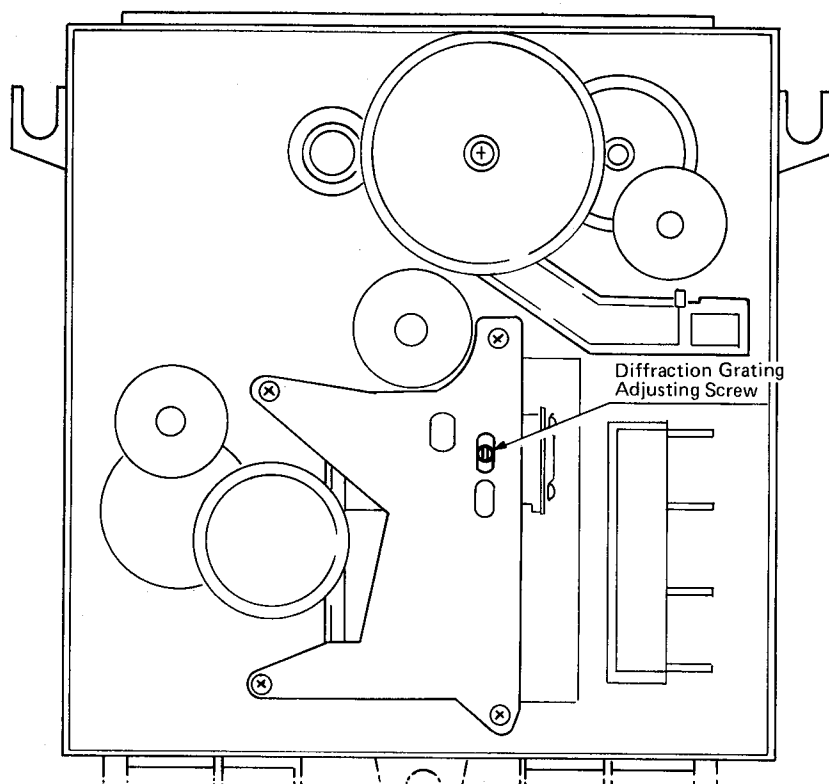
### 1. Meters and Jigs

- Oscilloscope (3 or more modes, 100 MHz, X-Y input possible)
- Distortion Meter

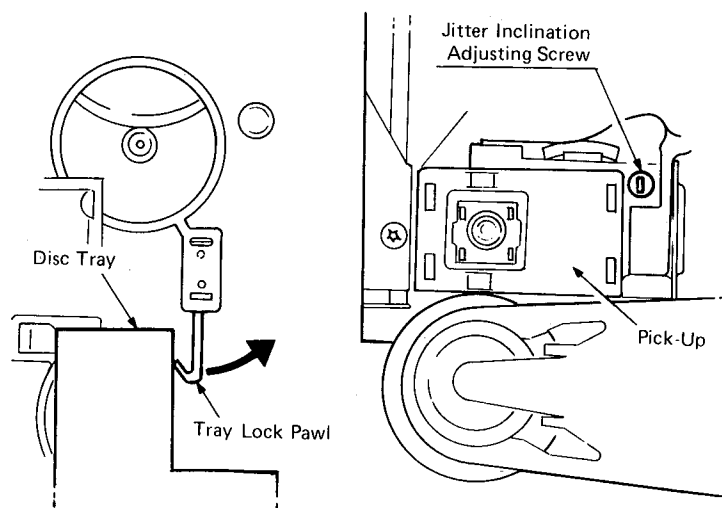
- Test Disc  
EIAJ CD-1

### 2. Adjustment Points

#### 2-1 Adjusting Screw Layout for CD Player Mechanical Assembly

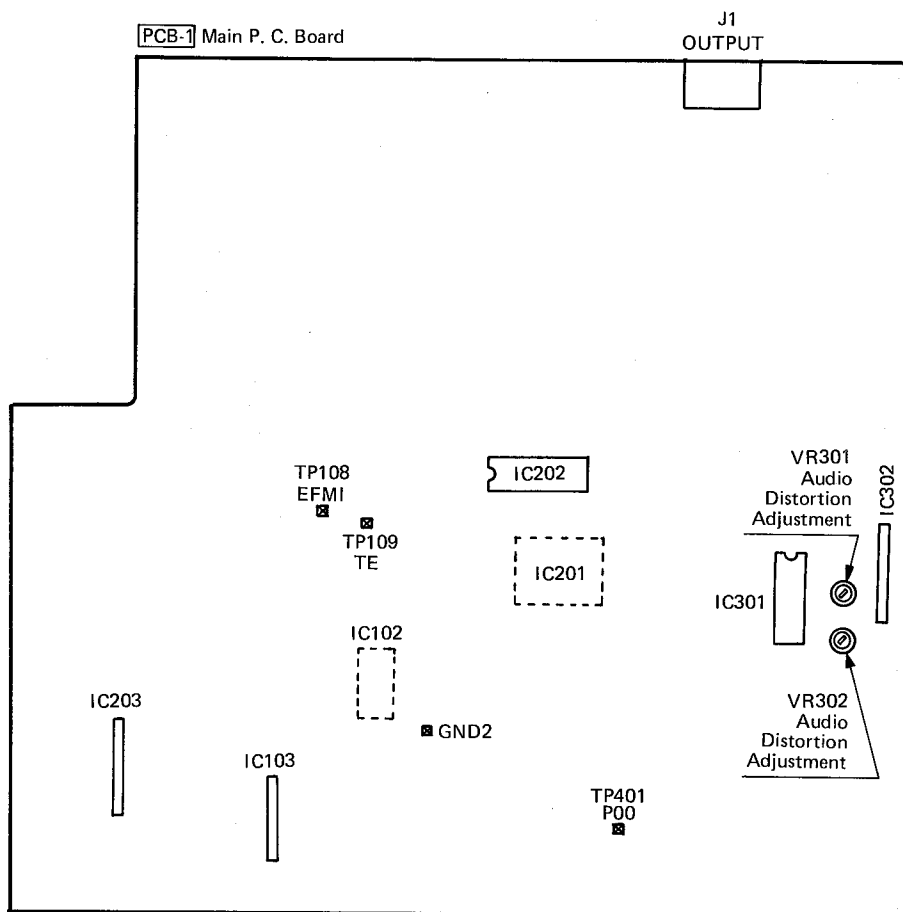


**BOTTOM VIEW**

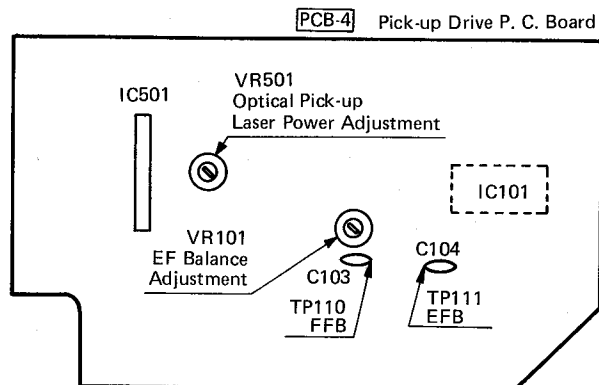


**TOP VIEW AROUND PICK-UP**

2-2 VR and TP Layout for Main P.C. Board



2-3 VR and TP Layout for Pick-up Drive P.C. Board





### 3. Test Mode

- Short-circuit TP401 and GND located on the Main P.C. Board.

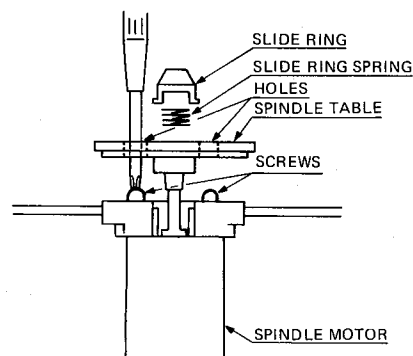
Push the power switch button. (Test Mode)

| Press buttons in sequence below | Test mode number | Display | Operation                                                                 |
|---------------------------------|------------------|---------|---------------------------------------------------------------------------|
| POWER                           | 0                | 0 RE:57 | LD OFF<br>All servo OFF                                                   |
| PLAY                            | 1                | 1 RE:57 | LD ON                                                                     |
| PLAY                            | 2                | 2 RE:57 | FS ON (Focus search)                                                      |
| PLAY<br>(Disc must be in tray)  | 3                | 3 RE:57 | FS ON (focus ON)<br>Disc motor rotate<br>Mute OFF                         |
| FORWARD SKIP                    | 4                | 4 RE:57 | TS (Tracking servo) ON<br>SS (Slide servo) ON                             |
| FORWARD SKIP                    | 5                | 12 3:21 | Displays the track number and playback time.                              |
| REVERSE SKIP                    | 6                | 3 RE:57 | TS (Tracking servo) OFF<br>SS (Slide servo) OFF                           |
| F.F. or REVERSE SEARCH          | 7                | _____   | Move the pick-up. (Manual)                                                |
| STOP, then press OPEN/CLOSE     | 8                | _____   | Disc tray open or close<br>This function can be activated from stop mode. |

### 4. Replace the Spindle Motor Assembly

- (1) Remove the CD Player Mechanical Assembly.
- (2) Remove the Spindle Motor Assembly. (Refer to page 7, "Disassembling the CD Player Mechanical Assembly [7].") To remove this, align the holes in the Spindle Table to the screw positions for the screw removal.
- (3) Attach the new Spindle Motor Assembly to CD Player Mechanical Assembly.

NOTE: Don't adjust the height of Spindle Table. Because its height has been already adjusted.



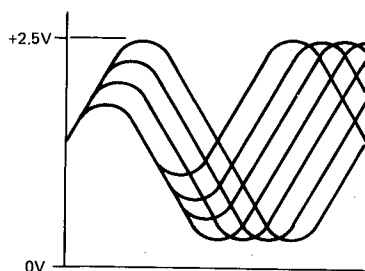
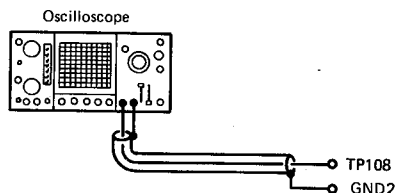
## 5. Adjustment of P.C. Boards

### 5-1 Initial Setting of Adjustment Potentiometers

Before adjusting, preset adjustment potentiometers VR101, 301, 302 and 501 for mechanical center.

### 5-2 Optical Pick-up Laser Power Adjustment

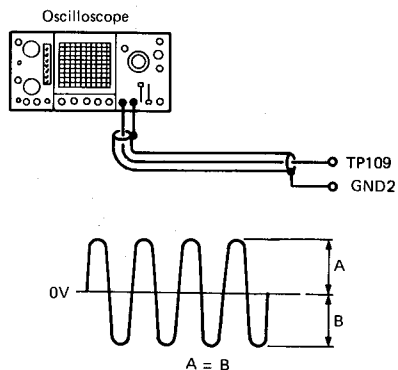
- (1) Connect the oscilloscope to TP108 and GND2.
- (2) Insert EIAJ CD-1 test disc and place the unit in the Test Mode 1.
- (3) Adjust VR501 so that the voltage becomes DC +2.5V.



### 5-3 EF Balance Adjustment

- (1) Connect the oscilloscope to TP109 and GND2.
- (2) Insert the EIAJ CD-1 test disc and place the unit in the Test Mode 3.
- (3) Adjust VR101 so that the amplitude above and below the zero DC line becomes equal. (Amplitude A = Amplitude B)

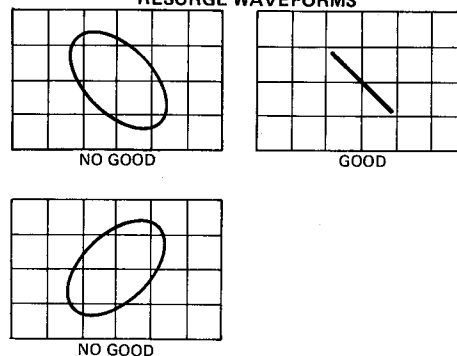
NOTE: Instead of using the DC input of a oscilloscope you may also use a DC null voltmeter for this alignment.



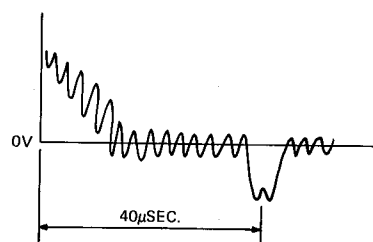
### 5-4 Diffraction Grating Adjustment

- (1) Connect the oscilloscope to TP110, GND (X input) and TP111, GND (Y input).
- (2) Insert the EIAJ CD-1 test disc and place the unit in the Test Mode 3.
- (3) Observe the resurge waveforms on the oscilloscope, and adjust the diffraction grating screw so that the phase difference of outputs X and Y is 180°.

RESURGE WAVEFORMS



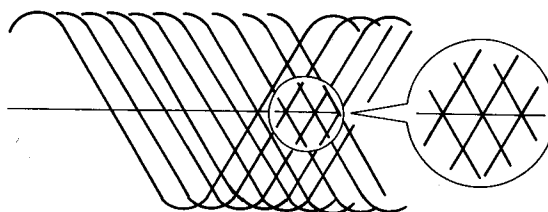
- (4) Connect the oscilloscope to TP109 and GND.
- (5) Place the unit in the Test Mode 4.
- (6) Confirm the waveform on the oscilloscope.



- (7) Repeat steps 1 through 6 for optimum sensitivity.

### 5-5 Jitter Inclination Adjustment

- (1) Remove the Disc Tray. (Refer to "Disassembling The CD Player Mechanical Assembly" on page 7)
- (2) Connect the oscilloscope to TP108 and GND2.
- (3) Insert the EIAJ CD-1 test disc and place the unit in the Test Mode 4.
- (4) Moving the pick-up assembly to adjustment the jitter inclination adjustment Screw.
- (5) Adjust the jitter inclination screw until the signal waveform (eye pattern) is distinct and clear.



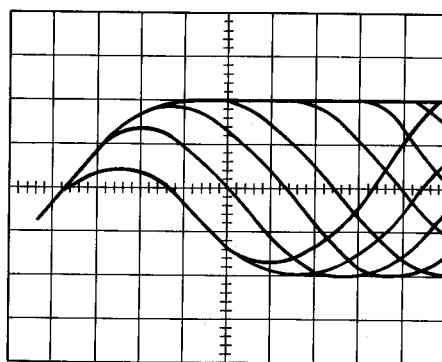
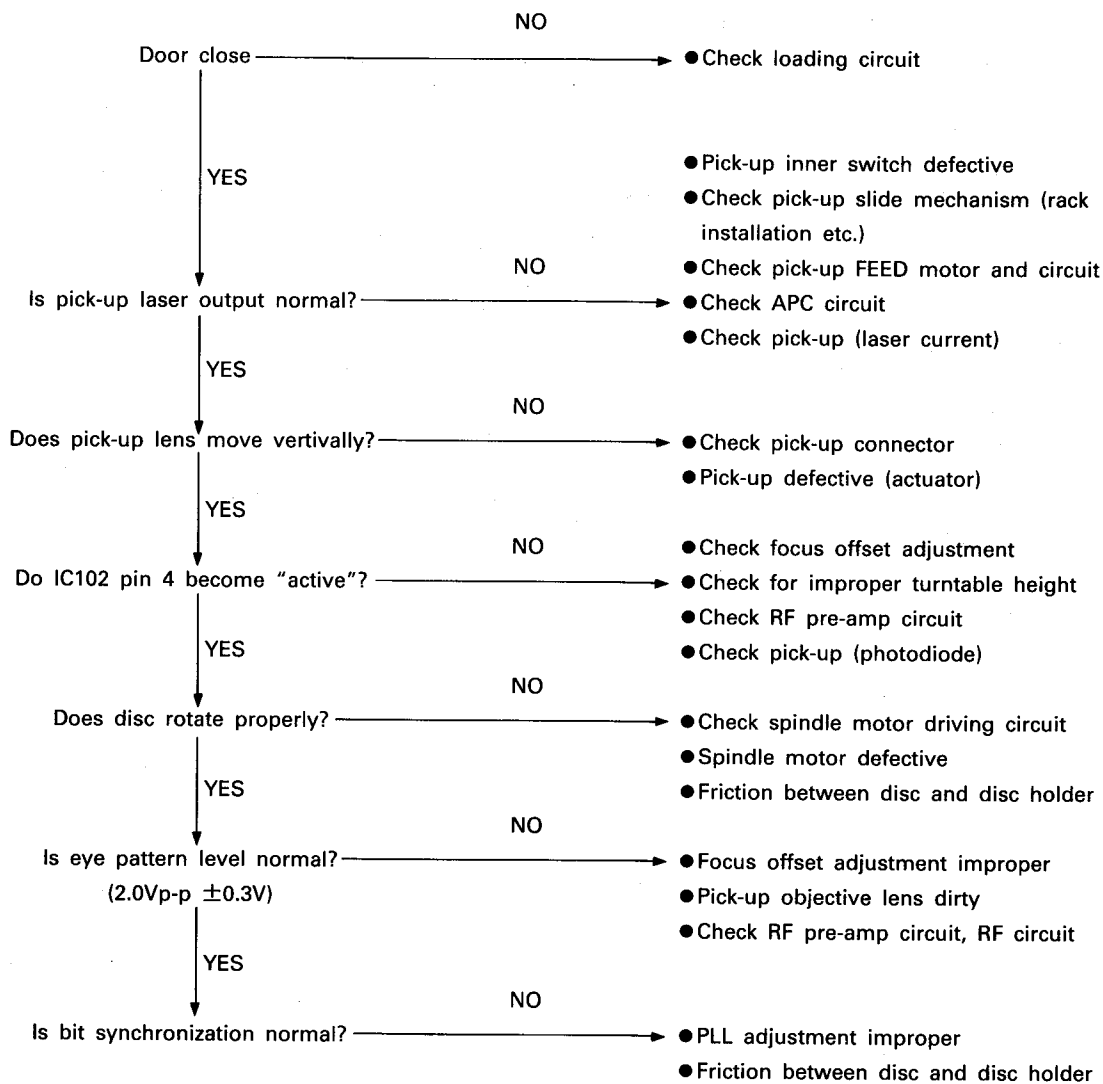
NOTE: Repeat Diffraction Grating Adjustment and Jitter Inclination Adjustment for optimum sensitivity.

### 5-6 Audio Distortion Adjustment

- (1) Connect the distortion meter to Output jacks (J1).
- (2) Insert the EIAJ CD-1 test disc and place the unit in the play mode on track number 1.
- (3) Adjust VR301 and VR302 each so that the distortion is minimized.

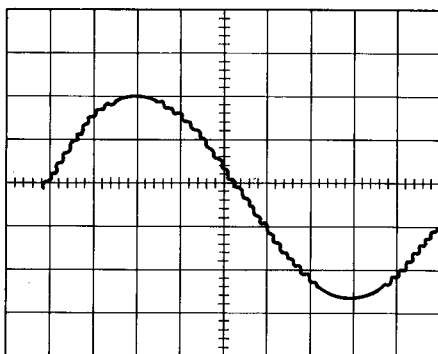
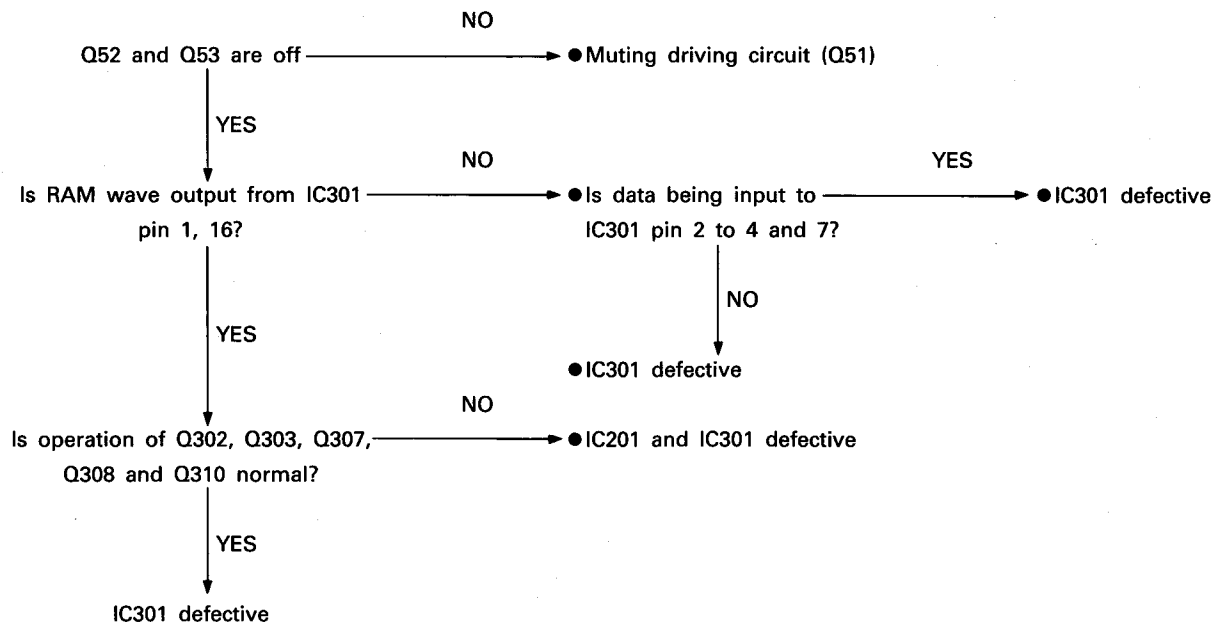
## TROUBLE SHOOTING

## 1. Does not initialize

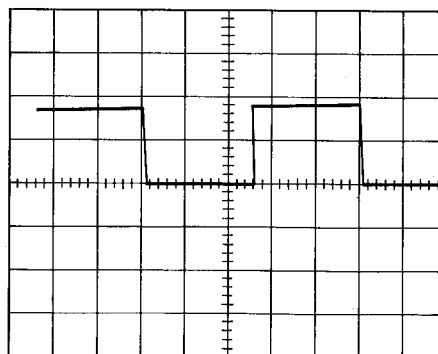


Eye Pattern (TP108)

## 2. No sound is produced



RAM Waveform (Pin 1 and 16 of IC301)  
(Test Disc: EIAJ CD-1, 1st selection)



IC301 Pin 4 Waveform  
(Test Disc: EIAJ CD-1, 1st selection)

## 3. IC Terminal Functions

| IC number | Terminal number | Port name                | Terminal code   | I/O | Outline of functions                                                                                                                      |
|-----------|-----------------|--------------------------|-----------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------|
| IC102     | 1               | TE IN                    | Pre. amp. input | I   | Tracking error signal input terminal                                                                                                      |
|           | 2               | TC IN                    | Pre. amp. input | I   | Track cross signal input terminal                                                                                                         |
|           | 3               | SHOCK IN                 | Pre. amp. input | I   | Shock detection circuit input terminal                                                                                                    |
|           | 4               | HF OK                    | Pre. amp. input | I   | HF OK signal input                                                                                                                        |
|           | 5               | MR                       | Pre. amp. input | I   | Disc mirror surface detection signal input signal terminal                                                                                |
|           | 6               | Jump Flag                | Mi-com I/O      | O   | Outputs "1" in jump mode, e.g. TS OFF, JFJR, BRAKE.                                                                                       |
|           | 7               | $\overline{\text{HFD}}$  | Mi-com I/O      | O   | "1" indicates that MR input is "1" and track servo loop is off (TS OFF, JF, JR).                                                          |
|           | 8               | T-HLD                    | Track servo     | I   | Direct control terminal for TS1 switch. "1" indicates that TS1 switch is "b". "0" indicates that priority is given to controller command. |
|           | 9               | DATAOUT                  | Mi-com I/O      | O   | Outputs internal state corresponding to microcomputer command.                                                                            |
|           | 10              | $\overline{\text{JP1}}$  | Mi-com I/O      | I   | 1 track jump control signal. Normally "1".                                                                                                |
|           | 11              | MSD                      | Mi-com I/O      | I   | Microcomputer serial data. Transfers serial data from microcomputer to servo IC. LSB forced. 8-bit data.                                  |
|           | 12              | $\overline{\text{MLA}}$  | Mi-com I/O      | I   | Latches serial data from microcomputer to servo IC. Transfers data on trailing edge.                                                      |
|           | 13              | MCK                      | Mi-com I/O      | I   | Clock for transferring serial data from microcomputer to servo IC. Receives data on leading edge.                                         |
|           | 14              | $\overline{\text{ACLR}}$ | Mi-com I/O      | I   | All clear. Clears all internal register flip-flops. Resets when "0" signal is given.                                                      |
|           | 15              | Bias                     | Power supply    | O   | Vcc/2 bias power supply output when single-pole power supply is used.                                                                     |
|           | 16              | COM                      | Power supply    | I   | Common terminal. Connect to GND when double-pole power supply is used and to BIAS when single-pole power supply is used.                  |
|           | 17              | GND                      | Power supply    | I   | GND terminal.                                                                                                                             |
|           | 18              | V <sub>EE</sub>          | Power supply    | I   | Negative power terminal. Connect to GND when single-pole power supply is used.                                                            |
|           | 19              | SS OUT                   | Slide servo     | O   | Operation amplifier SS output                                                                                                             |
|           | 20              | SS $\ominus$             | Slide servo     | I   | Operation amplifier SS reverse input                                                                                                      |

| IC number | Terminal number | Port name        | Terminal code | I/O | Outline of functions                                                                    |
|-----------|-----------------|------------------|---------------|-----|-----------------------------------------------------------------------------------------|
| IC102     | 21              | SS ⊕             | Slide servo   | I   | Operation amplifier SS non-reverse input                                                |
|           | 22              | TS OUT           | Track servo   | O   | Operation amplifier TA output                                                           |
|           | 23              | TS ⊖             | Track servo   | I   | Operation amplifier TA reverse input                                                    |
|           | 24              | TG2              | Track servo   | —   | Track gain select switch TG2 output. Set to open or common level.                       |
|           | 25              | TS ⊕             | Track servo   | I   | Operation amplifier TA non-reverse input                                                |
|           | 26              | TG1              | Track servo   | —   | Track gain select switch TG1 output. Set to open or common level.                       |
|           | 27              | TE OUT           | Track servo   | O   | Operation amplifier TE output                                                           |
|           | 28              | TE ⊖             | Track servo   | I   | Operation amplifier TE reverse input                                                    |
|           | 29              | FSR IN           | Focus servo   | I   | Focus search voltage level detector input                                               |
|           | 30              | FS OUT           | Focus servo   | O   | Operation amplifier FA output                                                           |
|           | 31              | FS ⊖             | Focus servo   | I   | Operation amplifier FA reverse input                                                    |
|           | 32              | FS ⊕             | Focus servo   | I   | Operation amplifier FA non-reverse input                                                |
|           | 33              | FG               | Focus servo   | —   | Focus gain select switch FG output. Set to open or common level.                        |
|           | 34              | C-FSR            | Focus servo   | —   | Connect capacitor which determines time constant of focus search waveform.              |
|           | 35              | I-Ref            | Power supply  | I   | Terminal for connecting resistor for setting current value of reference current source. |
|           | 36              | Vcc              | Power supply  | I   | Positive power terminal                                                                 |
| IC201     | 1               | DWDCK            |               | O   | D-A converter mode 3 word clock                                                         |
|           | 2               | NC               |               | —   |                                                                                         |
|           | 3               | EMP              |               | O   | Emphasis code output. "1" indicates emphasis.                                           |
|           | 4               | PWM <sub>1</sub> |               | O   | Disc motor drive PWM output 1. —                                                        |
|           | 5               | PWM <sub>2</sub> |               | O   | Disc motor drive PWM output 2. +                                                        |
|           | 6               | TEST             |               | I   | Test mode select input. Normally "0" indicates play.                                    |

| IC number | Terminal number | Port name                | Terminal code | I/O | Outline of functions                                                                                                       |
|-----------|-----------------|--------------------------|---------------|-----|----------------------------------------------------------------------------------------------------------------------------|
| IC201     | 7               | DASEL <sub>1</sub>       |               | I   | D-A interface control input 1                                                                                              |
|           | 8               | DFPAS                    |               | I   | Digital filter control input.<br>"1" indicates digital filter pass.                                                        |
|           | 9               | DASEL <sub>2</sub>       |               | I   | D-A interface control input 2                                                                                              |
|           | 10              | MSD                      |               | I   | Microcomputer interface serial data input                                                                                  |
|           | 11              | MCK                      |               | I   | Microcomputer interface shift clock input                                                                                  |
|           | 12              | $\overline{\text{MLA}}$  |               | I   | Microcomputer interface data latch clock input                                                                             |
|           | 13              | $\overline{\text{ACLR}}$ |               | I   | Microcomputer interface register clear input. "0" indicates that register has been cleared and MUTE, S/S, BCON set to "0". |
|           | 14              | $\overline{\text{HFD}}$  |               | I   | Play signal absence signal input                                                                                           |
|           | 15              | HF                       |               | I   | Play signal input                                                                                                          |
|           | 16              | IREF                     |               | I   | Detection/PLL circuit reference current input                                                                              |
|           | 17              | TLC                      |               | O   | Slice level control output                                                                                                 |
|           | 18              | LPF                      |               | I/O | PLL loop filter connection terminal                                                                                        |
|           | 19              | SYCLK                    |               | O   | Frame synchronous state output. "1" indicates synchronization.                                                             |
|           | 20              | V <sub>DD2</sub>         |               | I   | 5V power supply used for detection/PLL circuit analog area only                                                            |
|           | 21              | NC                       |               | —   |                                                                                                                            |
|           | 22              | DRD                      |               | O   | Low disc circuit state output                                                                                              |
|           | 23              | EFFK                     |               | O   | EFM frame clock output. Duty = approx. 50%.                                                                                |
|           | 24              | SCOR                     |               | O   | Sub-code synchronous signal output. S0 + S1.                                                                               |
|           | 25              | CRCF                     |               | O   | Sub-code Q CRC check result output. "1" indicates CRCOK.                                                                   |
|           | 26              | SCCK                     |               | I   | Shift clock input for sub-code serial output                                                                               |
|           | 27              | SCOE <sub>2</sub>        |               | I   | Sub-code parallel output channel P to S enable input. "0" indicates high impedance.                                        |
|           | 28              | SCOE <sub>1</sub>        |               | I   | Sub-code parallel output channel T to W enable input. "0" indicates high impedance.                                        |
|           | 29              | V <sub>SS2</sub>         |               | I   | GND. Same potential as VSS1.                                                                                               |
|           | 30              | SBCW                     |               | O   | Sub-code channel W output                                                                                                  |
|           | 31              | SBCV                     |               | O   | Sub-code channel V output                                                                                                  |
|           | 32              | SBCU                     |               | O   | Sub-code channel U output                                                                                                  |
|           | 33              | SBCT                     |               | O   | Sub-code channel T output                                                                                                  |

| IC number | Terminal number | Port name               | Terminal code | I/O | Outline of functions                                                                     |
|-----------|-----------------|-------------------------|---------------|-----|------------------------------------------------------------------------------------------|
| IC201     | 34              | SBCS                    |               | O   | Sub-code channel S output                                                                |
|           | 35              | SBCR                    |               | O   | Sub-code channel R output                                                                |
|           | 36              | SBCQ                    |               | O   | Sub-code channel Q output                                                                |
|           | 37              | SBCP                    |               | O   | Sub-code channel P output                                                                |
|           | 38              | $\overline{\text{RAS}}$ |               | O   | Row address strobe signal output                                                         |
|           | 39              | NC                      |               | —   |                                                                                          |
|           | 40              | RDB <sub>2</sub>        |               | I/O | External memory data I/O 2                                                               |
|           | 41              | NC                      |               | —   |                                                                                          |
|           | 42              | RDB <sub>1</sub>        |               | I/O | External memory data I/O 1                                                               |
|           | 43              | RDB <sub>4</sub>        |               | I/O | External memory data I/O 4                                                               |
|           | 44              | $\overline{\text{CAS}}$ |               | O   | Column address strobe signal output                                                      |
|           | 45              | RDB <sub>3</sub>        |               | I/O | External memory data I/O 3                                                               |
|           | 46              | $\overline{\text{WE}}$  |               | O   | Write enable signal output                                                               |
|           | 47              | NC                      |               | —   |                                                                                          |
|           | 48              | RAD <sub>1</sub>        |               | O   | External memory address output 1                                                         |
|           | 49              | RAD <sub>2</sub>        |               | O   | External memory address output 2                                                         |
|           | 50              | RAD <sub>3</sub>        |               | O   | External memory address output 3                                                         |
|           | 51              | RAD <sub>7</sub>        |               | O   | External memory address output 7                                                         |
|           | 52              | RAD <sub>4</sub>        |               | O   | External memory address output 4                                                         |
|           | 53              | RAD <sub>5</sub>        |               | O   | External memory address output 5                                                         |
|           | 54              | RAD <sub>6</sub>        |               | O   | External memory address output 6                                                         |
|           | 55              | RAD <sub>0</sub>        |               | O   | External memory address output 0                                                         |
|           | 56              | V <sub>DD1</sub>        |               | I   | 5V power supply                                                                          |
|           | 57              | EST <sub>2</sub>        |               | O   | Error status 2. "1" indicates detection of data which cannot be corrected by C2 decoder. |
|           | 58              | EST <sub>1</sub>        |               | O   | Error status 1. "1" indicates detection of C1 decoder error.                             |
|           | 59              | C846                    |               | O   | Clock output. 8.4672MHz.                                                                 |
|           | 60              | C423                    |               | O   | Clock output. 4.2336MHz. Duty = 50%.                                                     |
|           | 61              | C16MI                   |               | I   | 1/2 divider input. With built-in feedback resistor for generating 1/2 VDD bias voltage.  |



| IC number | Terminal number | Port name               | Terminal code | I/O | Outline of functions                                                                   |
|-----------|-----------------|-------------------------|---------------|-----|----------------------------------------------------------------------------------------|
| IC201     | 62              | C8MO                    |               | O   | 1/2 divider output                                                                     |
|           | 63              | X <sub>1</sub>          |               | I   | Quartz oscillator input. External clock may be input. With built-in feedback resistor. |
|           | 64              | X <sub>0</sub>          |               | O   | Quartz oscillator output                                                               |
|           | 65              | V <sub>SS1</sub>        |               | I   | GND. Same potential as VSS2.                                                           |
|           | 66              | DOFK                    |               | O   | OSC frame clock output. 7.35kHz. Duty = 50%.                                           |
|           | 67              | DO                      |               | O   | D-A converter serial data output                                                       |
|           | 68              | NC                      |               | —   |                                                                                        |
|           | 69              | WDCK                    |               | O   | D-A converter word clock or APTL                                                       |
|           | 70              | LRCK                    |               | O   | D-A converter left/right clock or APTR                                                 |
|           | 71              | NC                      |               | —   |                                                                                        |
|           | 72              | DSCK                    |               | O   | D-A converter data shift clock                                                         |
| IC202     | 1               | $\overline{\text{OE}}$  |               | I   | Output enable input                                                                    |
|           | 2               | DQ1                     |               | I/O | Data I/O                                                                               |
|           | 3               | DQ2                     |               | I/O | Data I/O                                                                               |
|           | 4               | $\overline{\text{W}}$   |               | I   | Write designation input                                                                |
|           | 5               | $\overline{\text{RAS}}$ |               | I   | Row address strobe input                                                               |
|           | 6               | A6                      |               | I   | Address input                                                                          |
|           | 7               | A5                      |               | I   | Address input                                                                          |
|           | 8               | A4                      |               | I   | Address input                                                                          |
|           | 9               | V <sub>CC</sub>         |               | —   | Power supply (5V)                                                                      |
|           | 10              | A7                      |               | I   | Address input (row address only)                                                       |
|           | 11              | A3                      |               | I   | Address input                                                                          |
|           | 12              | A2                      |               | I   | Address input                                                                          |
|           | 13              | A1                      |               | I   | Address input                                                                          |
|           | 14              | A0                      |               | I   | Address input (row address only)                                                       |
|           | 15              | DQ3                     |               | I/O | Data I/O                                                                               |
|           | 16              | $\overline{\text{CAS}}$ |               | I   | Column address strobe input                                                            |
|           | 17              | DQ4                     |               | I/O | Data I/O                                                                               |
|           | 18              | V <sub>SS</sub>         |               | —   | Power supply (0V)                                                                      |

| IC number | Terminal number | Port name       | Terminal code           | I/O | Outline of functions                                                                                                                                                                                                                                                                                                              |
|-----------|-----------------|-----------------|-------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC301     | 1               | CH1             | V <sub>OUT</sub><br>CH1 | O   | Sample hold analog switch output for CH1                                                                                                                                                                                                                                                                                          |
|           | 2               | SMP1            | SMP1                    | I   | Interval "1" becomes sampling time for CH1.                                                                                                                                                                                                                                                                                       |
|           | 3               | SMP2            | SMP2                    | I   | Interval "1" becomes sampling time for CH2.<br>The internal signal for latching serial data is produced by using SMP1 and SMP2 fall. The longer the SMP1 and SMP2 time is, the more improved the level frequency response is.                                                                                                     |
|           | 4               | SD              | SD                      | I   | Serial input of digital signal to be converted                                                                                                                                                                                                                                                                                    |
|           | 5               | FORM SELECT     | FORM SELECT             | I   | Capable of processing binary input format at "1" and 2's complement input format at "0".                                                                                                                                                                                                                                          |
|           | 6               | V <sub>SS</sub> | V <sub>SS</sub>         | —   | Low electric potential side power source (GND)                                                                                                                                                                                                                                                                                    |
|           | 7               | CLOCK           | CLOCK                   | I   | Clock to operate shift register and timing generator (φ4)                                                                                                                                                                                                                                                                         |
|           | 8               | V <sub>DD</sub> | V <sub>DD</sub>         | —   | High electric potential side standard power source                                                                                                                                                                                                                                                                                |
|           | 9               | V <sub>SS</sub> | V <sub>SS</sub>         | —   | Low electric potential side standard power source (GND)                                                                                                                                                                                                                                                                           |
|           | 10              | RBH             | RBH                     | O   | As the same resistor is used between the RBH pin and internal V <sub>DD</sub> power source and between the RBL pin and internal V <sub>SS</sub> (GND) power source, connecting both pins will provide highly accurate 1/2 V <sub>DD</sub> voltage. The voltage is applied to the MP pin through the buffer operational amplifier. |
|           | 11              | RBL             | RBL                     | O   | As shown in the standard circuit example, deviation from the 1/2 V <sub>DD</sub> can be corrected by adding a suitable resistor externally.                                                                                                                                                                                       |
|           | 12              | MP              | MP                      | I   | Exponential analog shift is carried out with the electric potential applied to the MP as a standard. Normally it is biased to the 1/2 V <sub>DD</sub> .                                                                                                                                                                           |
|           | 13              | To BUFF         | To BUFF                 | O   | DAC analog output, input to the buffer operational amplifier                                                                                                                                                                                                                                                                      |
|           | 14              | COM             | COM                     | I   | Common input to analog switches for CH1 and CH2                                                                                                                                                                                                                                                                                   |
|           | 15              | ICL             | ICL                     | I   | The signal "1" - normal operation and "0" - zero signal operation regardless of the signal SD.                                                                                                                                                                                                                                    |
|           | 16              | CH2             | CH2                     | O   | Sample hold analog switch output for CH2                                                                                                                                                                                                                                                                                          |
| IC401     | 1               | P27             | OPEN                    | I/O | Disc tray opening direction driving output                                                                                                                                                                                                                                                                                        |
|           | 2               | P26             | CLOSE                   | I/O | Disc tray closing direction driving output                                                                                                                                                                                                                                                                                        |
|           | 3               | P25             | JP1                     | I/O |                                                                                                                                                                                                                                                                                                                                   |
|           | 4               | P24             | MSD                     | I/O | Serial data output                                                                                                                                                                                                                                                                                                                |
|           | 5               | P23             | MCK                     | I/O | Shift clock output                                                                                                                                                                                                                                                                                                                |
|           | 6               | P22             | MLA                     | I/O | Data latch clock output                                                                                                                                                                                                                                                                                                           |
|           | 7               | P21             | MUTE                    | I/O | Mute output                                                                                                                                                                                                                                                                                                                       |
|           | 8               | P20             | ACK                     | I/O |                                                                                                                                                                                                                                                                                                                                   |

| IC number | Terminal number | Port name                 | Terminal code | I/O | Outline of functions                           |
|-----------|-----------------|---------------------------|---------------|-----|------------------------------------------------|
| IC401     | 9               | NC                        | NC            | —   |                                                |
|           | 10              | P07                       | DATA IN       | I/O | Serial data input                              |
|           | 11              | P06                       | SYCLK         | I/O | Frame synchronization signal output            |
|           | 12              | P05                       | DRD           | I/O |                                                |
|           | 13              | P04                       | SCOR          | I/O | Sub code synchronization signal output S0 + S1 |
|           | 14              | P03                       | CRCF          | I/O | Sub code Q CRCOK = 1                           |
|           | 15              | P02                       | SUBQ          | I/O | Sub code Q Channel output                      |
|           | 16              | P01                       | KD4           | I/O |                                                |
|           | 17              | P00                       | TEST          | I/O |                                                |
|           | 18              | $\overline{\text{INT2}}$  | STB           | I   |                                                |
|           | 19              | $\overline{\text{INT1}}$  | EFFK          | I   | EFM frame clock output                         |
|           | 20              | NC                        | NC            | —   |                                                |
|           | 21              | CNVss                     | GND           | —   | CNVss input                                    |
|           | 22              | $\overline{\text{RESET}}$ | RESET         | I   | Reset input                                    |
|           | 23              | XIN                       | XIN           | I   | Clock input                                    |
|           | 24              | XOUTF                     | XOUTF         | O   | Clock output F                                 |
|           | 25              | XOUTS                     | XOUTS         | O   | Clock output S                                 |
|           | 26              | Vss                       | GND           | —   | Power supply                                   |
|           | 27              | XCIN                      | DATA IN       | I   | Serial data input                              |
|           | 28              | XCOUT                     | —             | O   | Clock output for timer                         |
|           | 29              | R3                        | KD3           | I   | Key input 3                                    |
|           | 30              | R2                        | KD2           | I   | Key input 2                                    |
|           | 31              | R1                        | KD1           | I   | Key input 1                                    |
|           | 32              | R0                        | KD0           | I   | Key input 0                                    |
|           | 33              | $\phi$                    | —             | O   | Timing output                                  |
|           | 34              | VP                        | VP            | —   | Pull down voltage input                        |
|           | 35              | P17                       | LD ON         | O   | Laser diode control output                     |
|           | 36              | P16                       | G7            | O   | Figure output 7                                |
|           | 37              | P15                       | G6            | O   | Figure output 6                                |

| IC number | Terminal number | Port name | Terminal code | I/O | Outline of functions |
|-----------|-----------------|-----------|---------------|-----|----------------------|
| IC401     | 38              | P14       | G5            | O   | Figure output 5      |
|           | 39              | P13       | G4            | O   | Figure output 4      |
|           | 40              | P12       | G3            | O   | Figure output 3      |
|           | 41              | P11       | G2            | O   | Figure output 2      |
|           | 42              | P10       | G1            | O   | Figure output 1      |
|           | 43              | P37       | i             | O   | Segment output i     |
|           | 44              | P36       | g             | O   | Segment output g     |
|           | 45              | P35       | f             | O   | Segment output f     |
|           | 46              | P34       | e             | O   | Segment output e     |
|           | 47              | P33       | d             | O   | Segment output d     |
|           | 48              | P32       | c             | O   | Segment output c     |
|           | 49              | P31       | b             | O   | Segment output b     |
|           | 50              | P30       | a             | O   | Segment output a     |
|           | 51              | Vcc       | Vcc           | —   | Power supply         |
|           | 52              | Vcc       | Vcc           | —   | Power supply         |

## 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 from the rear is monitored with the monitor diode installed on its rear surface, and the optical output is thus controlled. The light emitted from the 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 current ( $I_S$ ) decreases, the electric potential of IC501 pin 1 rises, the base current of the driving transistor increases, and the laser current increases. This causes the reduced optical power to return to its former level.

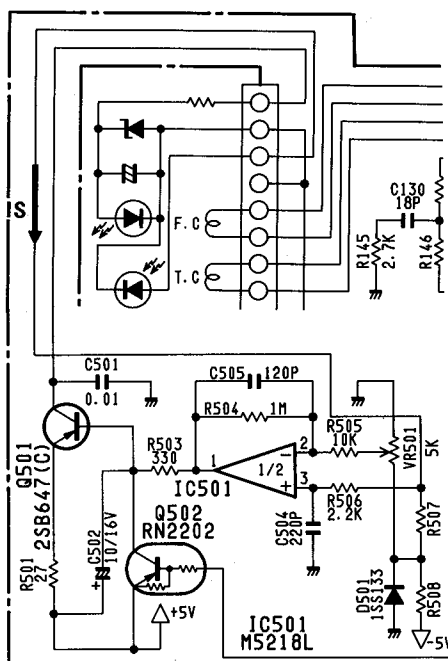
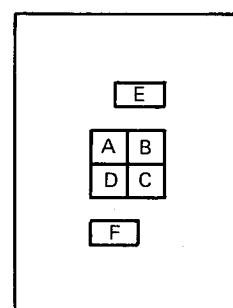


Fig. 1

### 2. FOCUS SERVO

#### 2-1. Optical pickup

This set employs a three-spot optical pickup comprised of six division photodiodes, A through F. The four photodiodes at the center, i.e., (A + C) and (B + D), provide both focus error detection by means of a main beam spot and main signal pickup. The remaining two diodes, (E and F), provide tracking error detection by means of sub-beam spots.



Three spotted (six-division) photo diodes

Fig. 2-1

#### 2-2. Focus error detecting operation

The reflected laser beam from a disc is polarized 90° with the beam-splitter and sent to the photodiodes via the cylindrical lens. The beam passed through this cylindrical lens gradually varies its shape along its path - as an oval in a longitudinal direction, then as a circle, and finally as an oval in a transverse direction. (See Fig. 2-2)

The beam shape varies with the distance from the disc, and when "just-focus" the photosensor (photo-diodes) is positioned at the center of the circular beam. The photodiode is divided into four sections, all of which provide outputs when in focus. However, when the disc is too close the longitudinal direction oval beam rays on the upper and lower photodiodes, causing only these two diodes to provide outputs, and if, on the other hand, the disc is too far only the left and right diodes provide outputs. Therefore, by amplifying the difference in output derived from these four-division diodes a focus error signal can be obtained. The focus error signal is amplified and fed to the objective lens for focus correction, thereby always maintaining an in-focus state. The focus correction is performed in the focus servo control circuit.

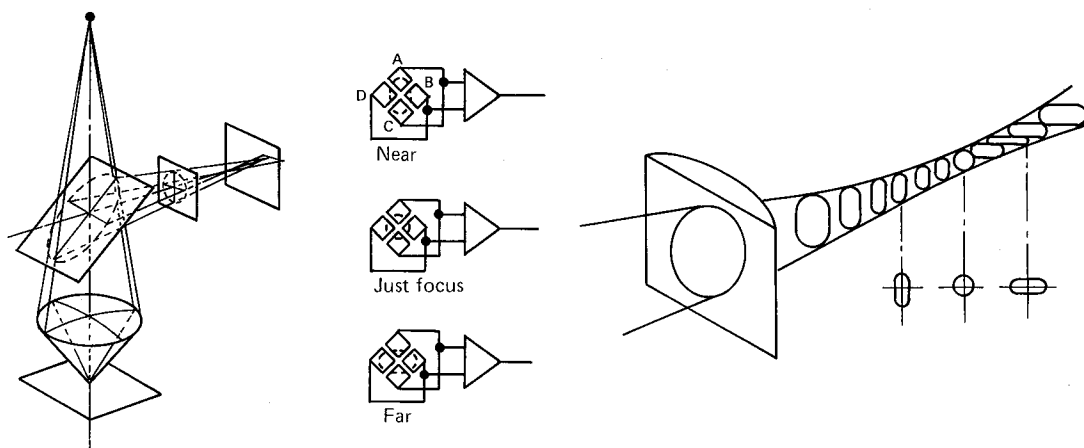


Fig. 2-2

### 2-3. Focus servo control operation

The optical pickup outputs,  $(A + C)$  and  $(B + D)$ , are input to pin 5 and pin 6 of IC101, where the photodiode current is converted to voltage by RF-V Amplifier. The difference between  $(A + C)$  and  $(B + D)$  is derived and a focus error signal is output from pin 16 of IC101 (detection amplifier stage) in such a manner that if  $(A + C) > (B + D)$  the focus error is positive (focus too close), and if  $(A + C) < (B + D)$  the focus error is negative (focus too far).

If "near-focus" then output to pin 16 of IC101 is + voltage. And if "far focus" then output to pin 16 of IC101 is - voltage. This focus error signal input to pin 32 of IC102, after being amplified by the preamplifier (IC102). Output to pin 30. Output signal of + voltage or - voltage (pin 30 of IC102) input to pin 2 of IC103 and output to pin 8 of IC103, drives the objective lens for automatic focus correction (adjustment). (Fig. 2-3)

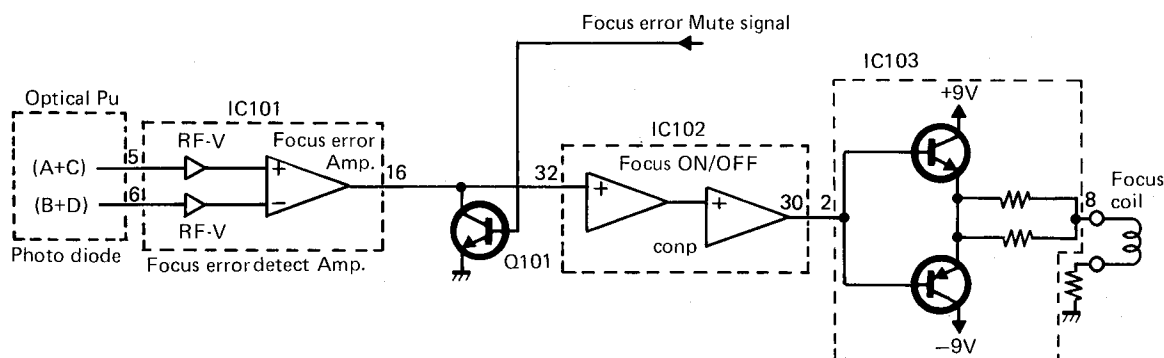


Fig. 2-3

### 2-4. The Tracking Error Detection System

The laser beam must follow the spiral path of the disc. The detection system employs the 3 beam system.

Fig. 2-4 illustrates the 3 beam system. Fig. 2-4-A depicts the condition under which the tracking is deemed to be correct. Two additional lights detectors (E and F), also a part of the Pick-Up Assembly, are used in the Auto Tracking circuit. When tracking is correct the amount of light reflected from the Disc for both outer beams is equal, therefore, the same amount of light is sensed by both the E and F light detectors and both detectors develop equal amplitude output voltages. The output of the E detector applied to the (-) input of an OP-AMP, and the output of the F detector is directed to the (+) input of the same OP-AMP. Since the (+) and (-) inputs are equal, the output of OP-AMP, when tracking is correct, is 0v.

Fig. 2-4-B illustrates a tracking error in one direction. In this case the E detector receiving reflected light from the mirrored surface of the Disc, receives more reflected light than the F detector, therefore, the (-) OP-AMP input receives a higher voltage than the (+) input. The OP-AMP outputs a negative Tracking Error voltage which is directed to the Tracking Servo circuit in order to make the adjustments necessary to achieve optimum tracking. Fig. 2-4-C illustrates tracking error in the opposite direction. Now the F detector receives more reflected light, the positive input of the OP-AMP is higher than the (-) input, resulting in a positive Tracking Error voltage from the OP-AMP.

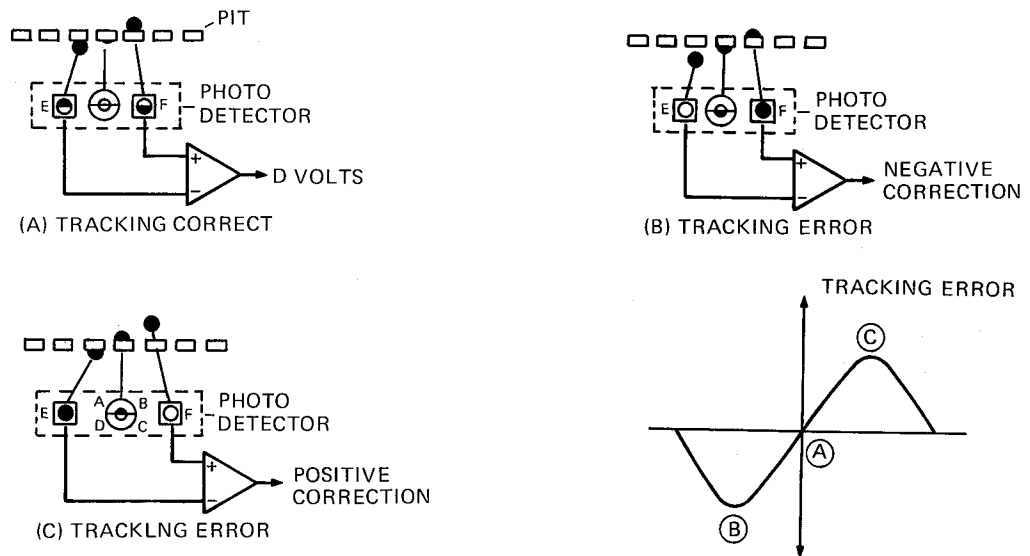
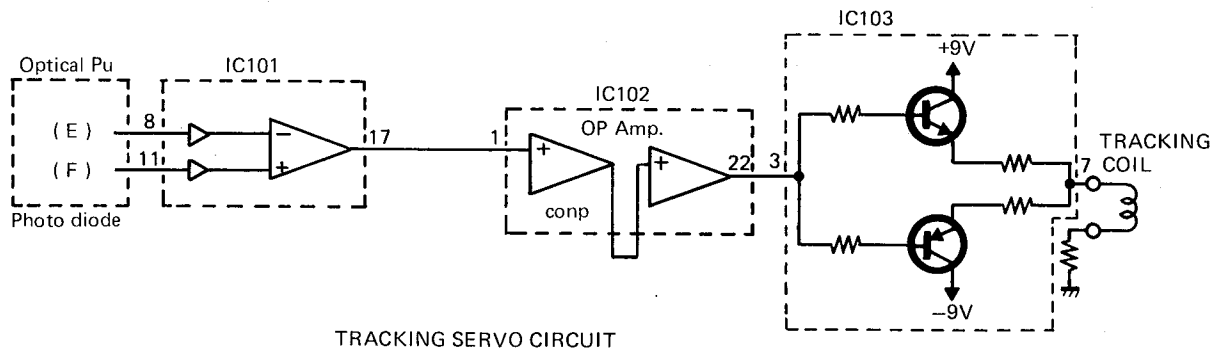


Fig. 2-4



### 3. REGENERATIVE CIRCUIT

#### 3-1. RF circuit

Photo diode current input to Pin 5 (PD1) and Pin 6 (PD2) of IC101 is converted from current to voltage by RF I-V amplifiers. Next, (A + C) and (B + D) signals are mixed in and output from pin 4 of IC101.

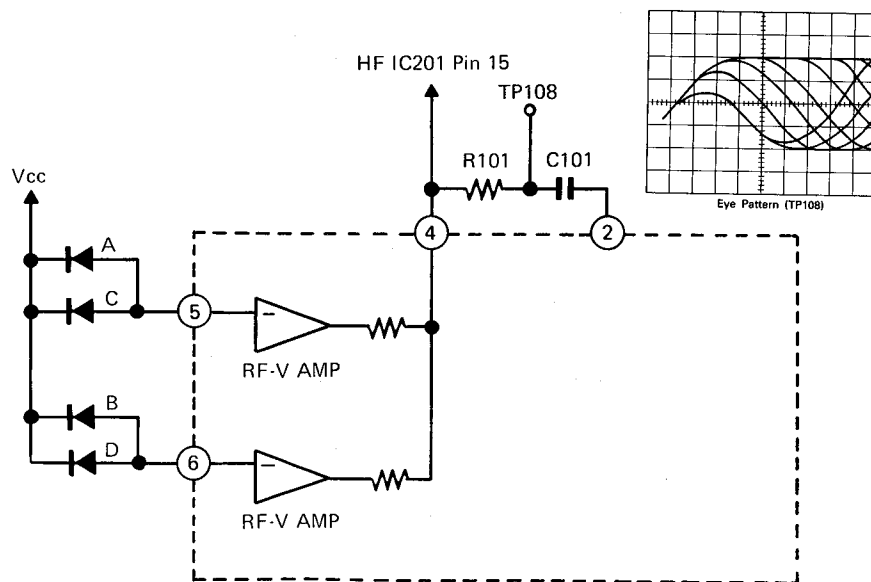


Fig. 3-1

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

EFM demodulation, error correction and serial/parallel conversion are performed by internal circuitry of IC201. The eye-pattern signals from Pin 4 of IC101 are sent to Pin 15 of IC201, then demodulated from 14 bit into 8 bit by EFM readjustment.

If an error occurs at this point, it undergoes error correction (CIRC). The signals are then output as serial signals.

The digital signal of the CD is decoded by IC201 and then enters D/A converter (IC301), and converted from digital to analog by IC301.

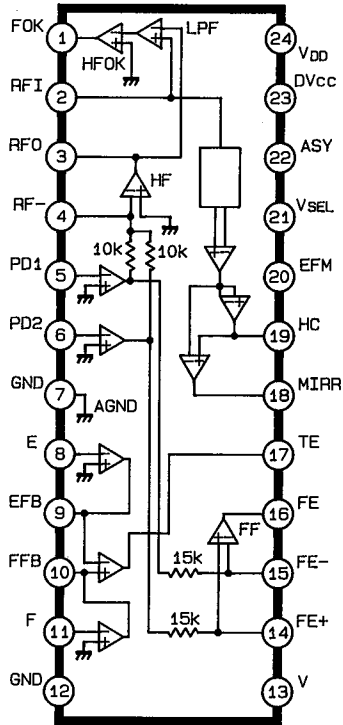
Q301, Q302, Q303 and Q304 configure a buffer circuit which prevents the D/A converter from interfering with the next LPF. Q311 and Q312 comprise a switch driver that drives the deemphasis switch of Q309 and Q310 if an emphasis is given to the CD software by IC201.

Q52 and Q53 make up a muting switch used when the power circuit is switched on.

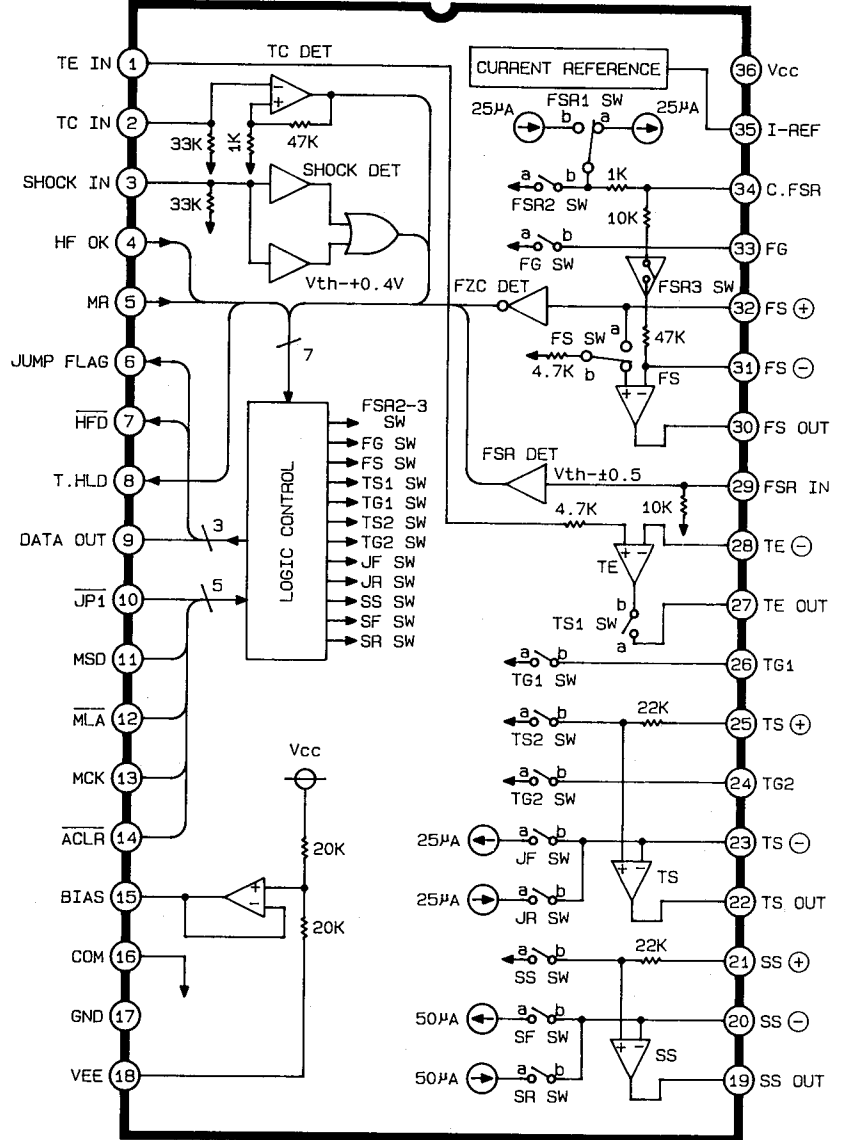


# IC BLOCK DIAGRAM

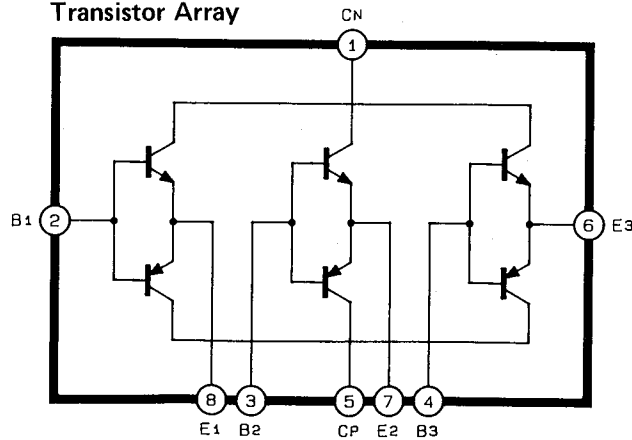
**IC101**  
**CX20109**  
**RF Pre Amplifier**



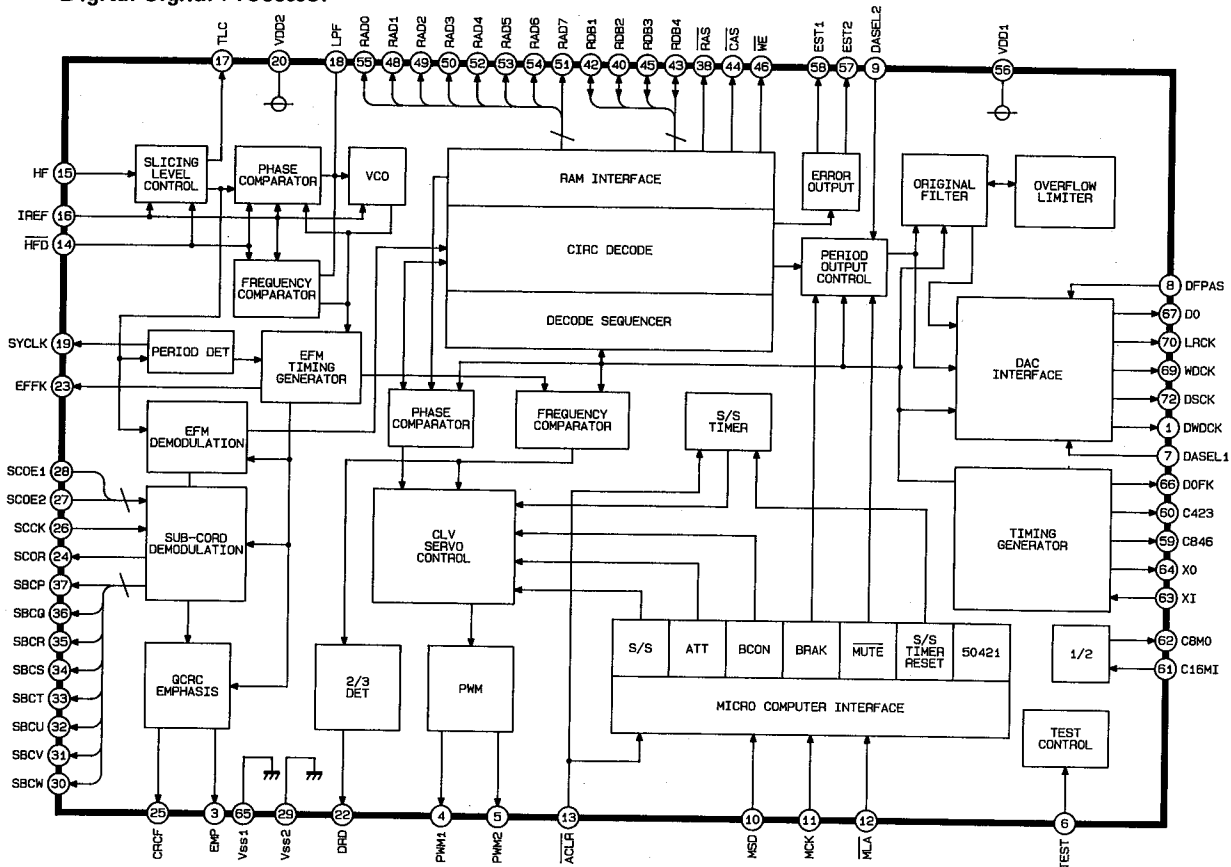
**IC102**  
**M51564P**  
**Optical Pick-up Servo Control**



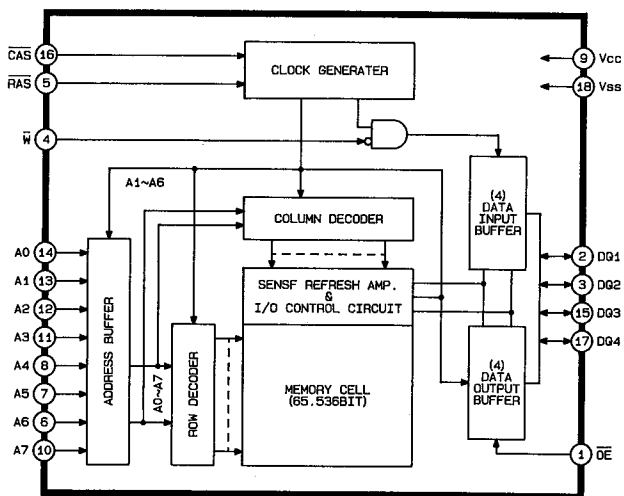
**IC103**  
**STA341M**  
**Transistor Array**



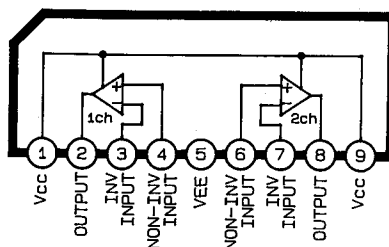
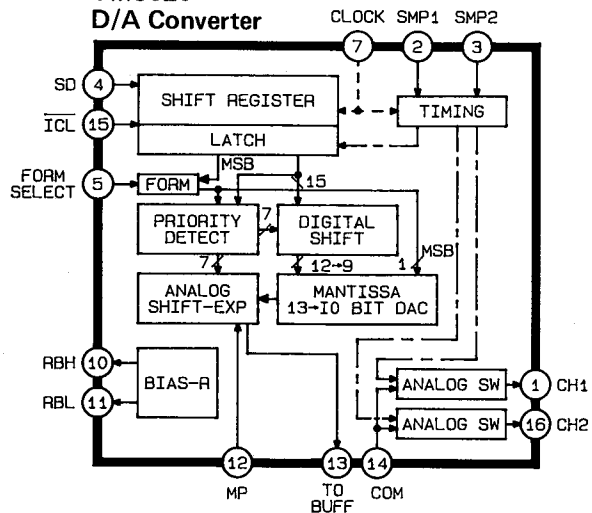
**IC201  
M50422P  
Digital Signal Processor**



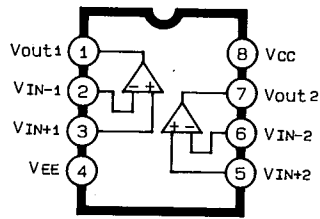
**IC202  
M5M4416P  
65636-Bit (16384-Word by 4-Bit)  
Dynamic RAM**



**IC301  
YM3020  
D/A Converter**

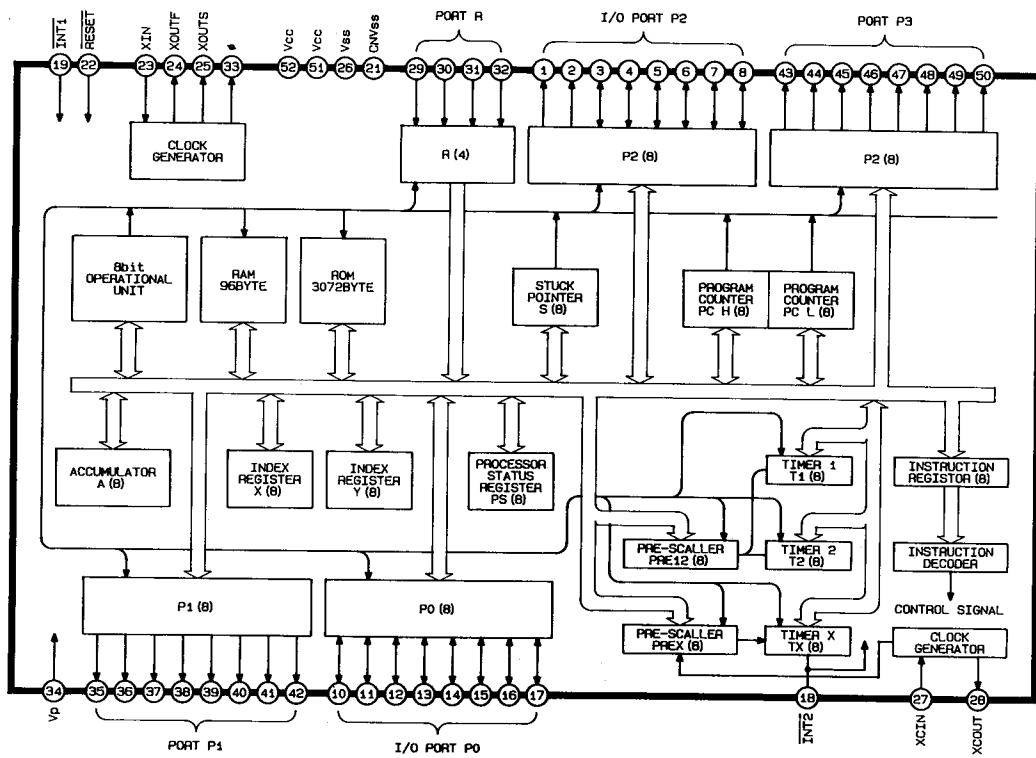


**IC203  
BA715  
Dual Operation Amplifier**

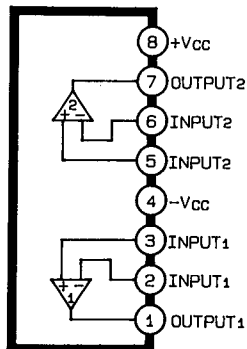


**IC302**  
**NJM4560SB**  
**Dual Operational Amplifier**

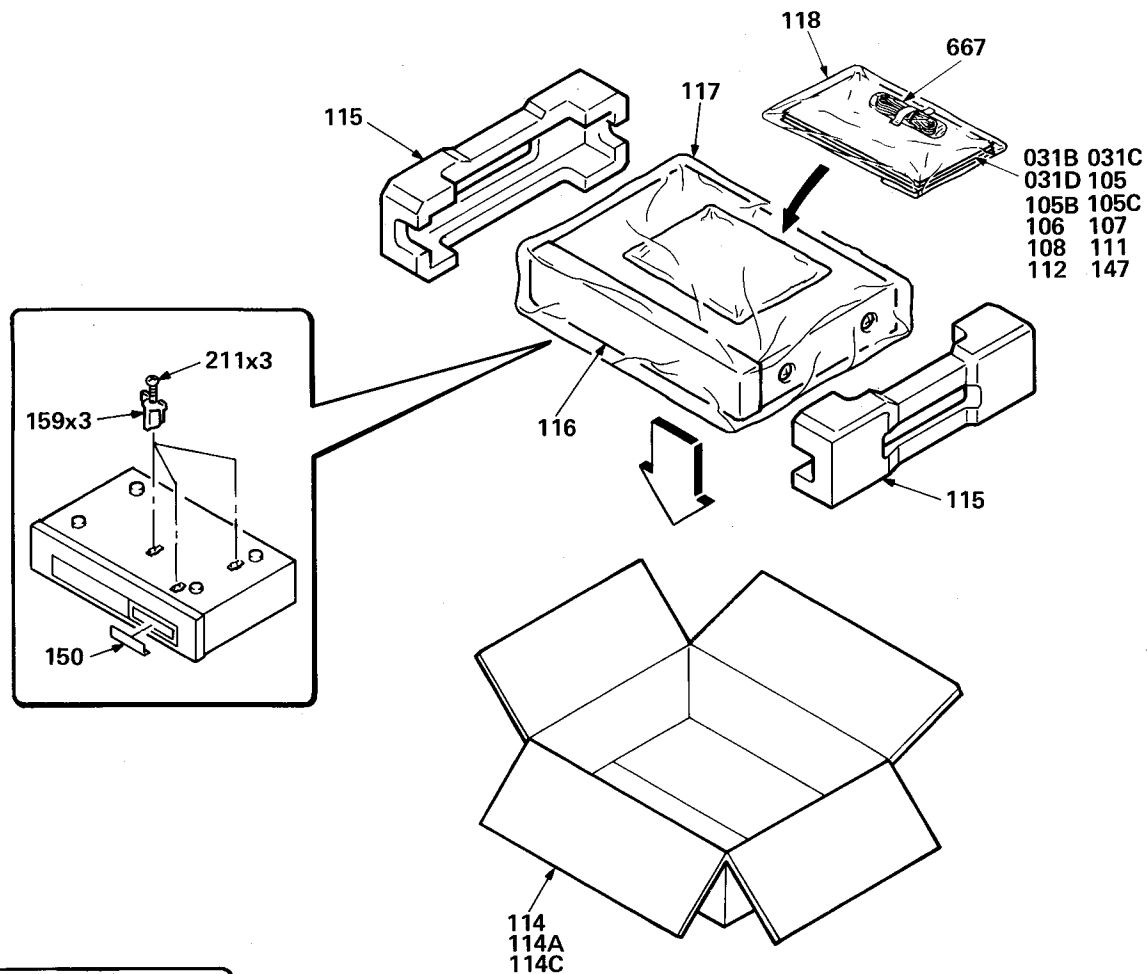
**IC401**  
**M50752-402SP**  
**Microcomputer**



**IC501**  
**M5218L**  
**Dual Operational Amplifier**

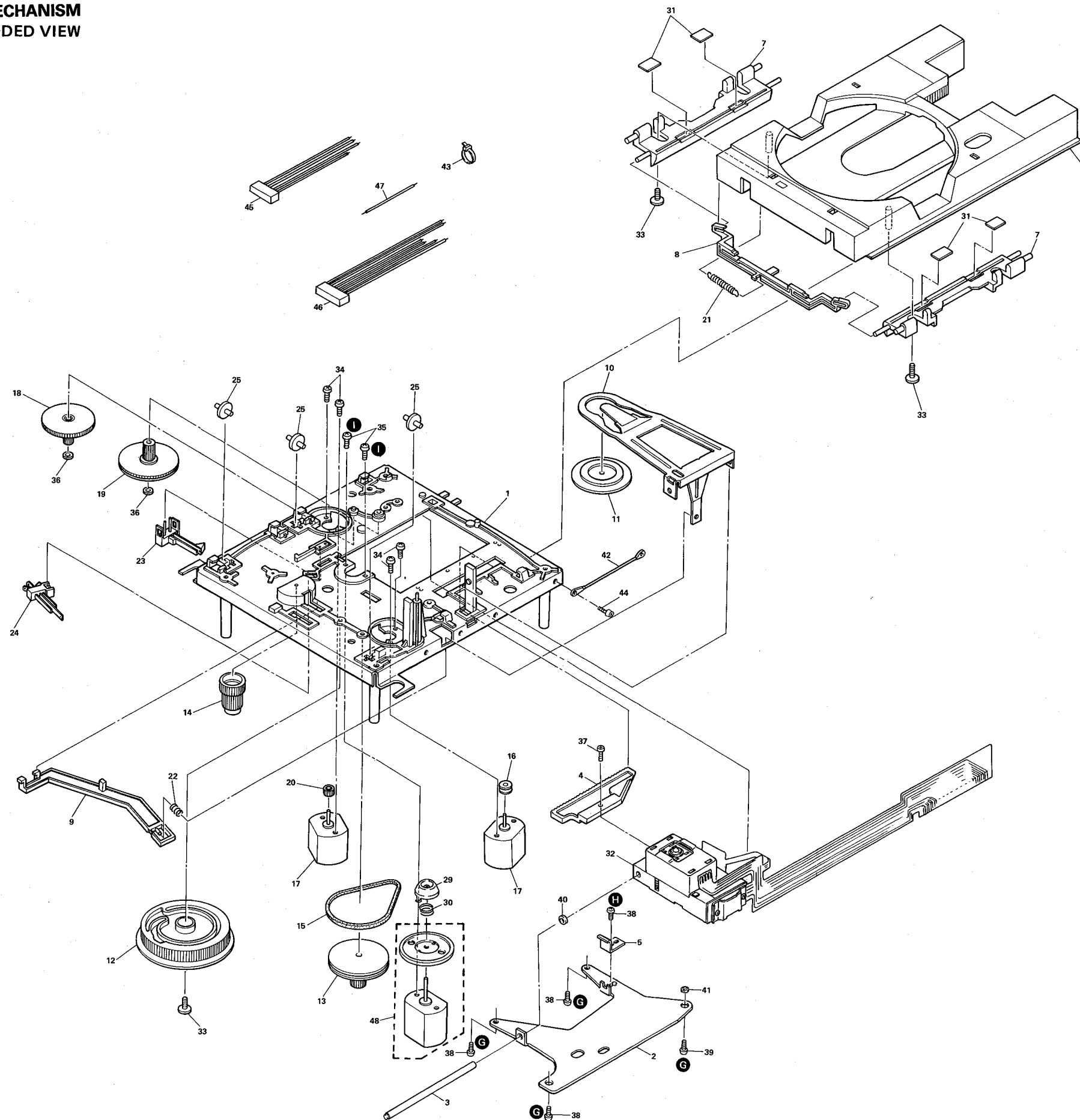


## PACKAGE



| Ref. No. | Part No.      | Description                         |
|----------|---------------|-------------------------------------|
| 022B     | 1756-06303    | LABEL <b>G</b>                      |
| 022C     | 1756-03124    | LABEL <b>GB</b>                     |
| 022D     | 1756-03111    | LABEL <b>BB</b>                     |
| 023C     | 1756-06303    | LABEL <b>GB</b>                     |
| 023D     | 1756-06303    | LABEL <b>BB</b>                     |
| 031B     | 1111-J30253   | OWNER GUIDE <b>G</b>                |
| 031C     | 1111-J30253   | OWNER GUIDE <b>GB</b>               |
| 031D     | 1111-J30253   | OWNER GUIDE <b>BB</b>               |
| 105      | 1111-J30285   | OWNER GUIDE <b>UA</b> <b>BK</b>     |
| 105B     | 1111-J30286   | OWNER GUIDE <b>G</b>                |
| 105C     | 1111-J30286   | OWNER GUIDE <b>GB</b>               |
| 106      | 1111-J90195   | UL SAFETY GUIDE <b>UA</b> <b>BK</b> |
| 107      | 1113-717004   | OWNER CARD <b>UA</b> <b>BK</b>      |
| 108      | 1111-J30254   | OWNER GUIDE <b>UA</b> <b>BK</b>     |
| 111      | 1119-047      | GUARANTY CARD <b>UA</b> <b>BK</b>   |
| 112      | 1119-0137     | GUARANTY GUIDE <b>UA</b> <b>BK</b>  |
| 114      | 1221-787194   | CARTON BOX <b>UA</b> <b>G</b>       |
| 114A     | 1221-797194   | CARTON BOX <b>BK</b>                |
| 114C     | 1221-797194   | CARTON BOX <b>GB</b>                |
| 115      | 1222-7306     | CUSHION                             |
| 116      | 1223-R0220055 | SOFT SHEET                          |
| 117      | 1241-R0155500 | POLYETHY BAG, SET                   |
| 118      | 1241-R0123350 | POLYETHY BAG, IB                    |
| 147      | 1756-11601    | LABEL <b>UA</b> <b>BK</b>           |
| 148      | 1756-11701    | LABEL <b>UA</b> <b>BK</b>           |
| 150      | 1756-12001    | TRANSPORTATION CAUTION FOR LID      |
| 159      | 2132-7148     | SPACER, TRANSPORTATION              |
| 211      | 2347-R0130252 | SCREW BND T+, TRANSPORTATION        |
| 667      | 4161-71184    | CORD W/PLUG, CONNECTION             |

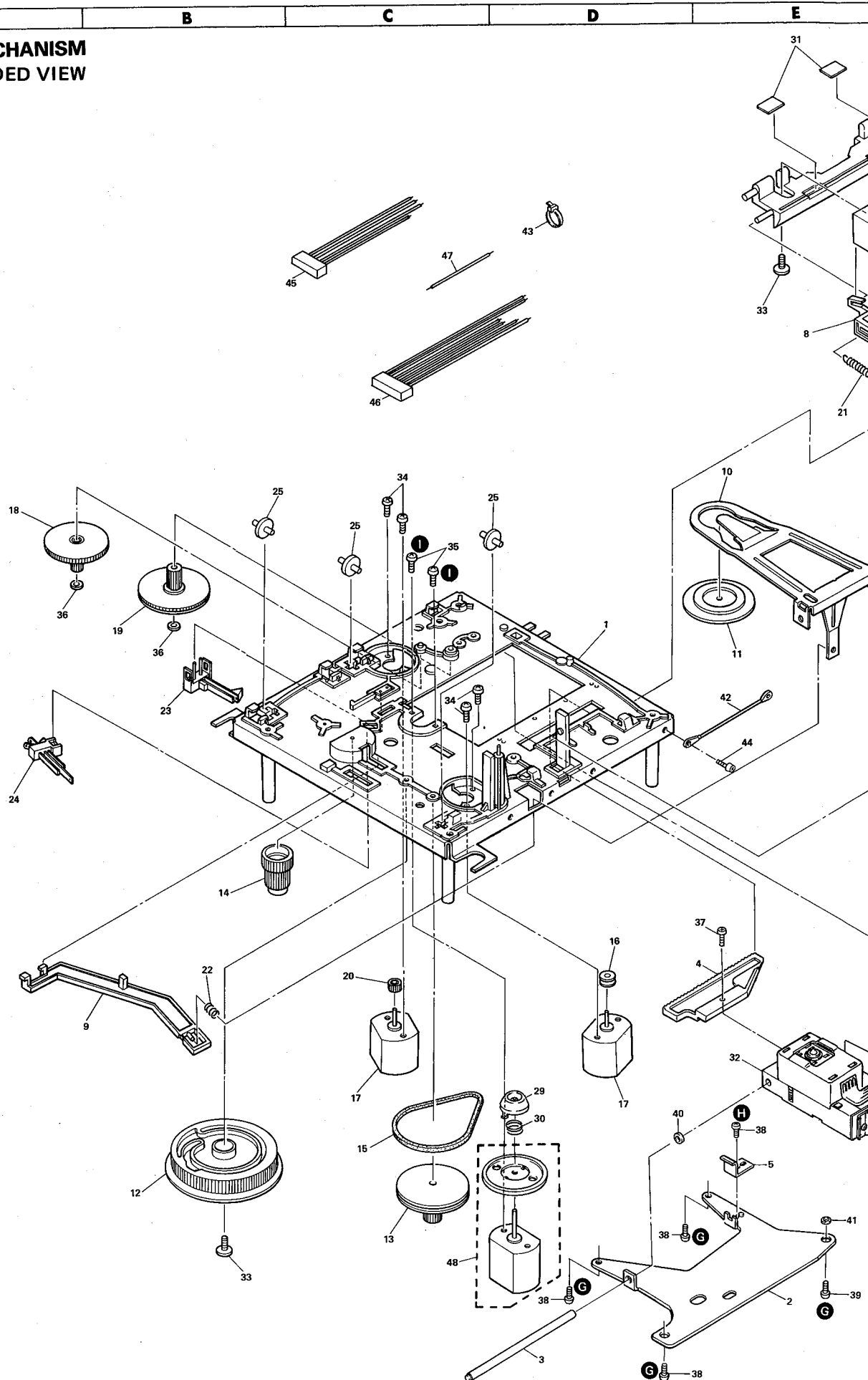
# CD MECHANISM EXPLODED VIEW

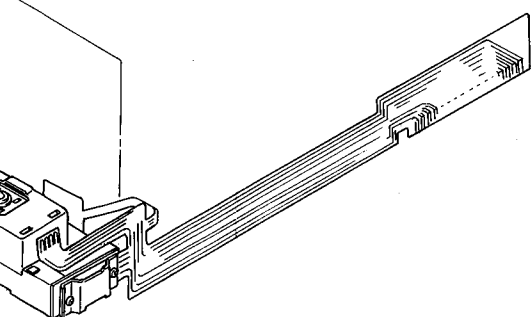
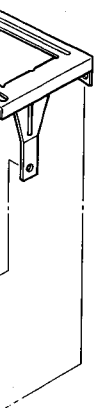
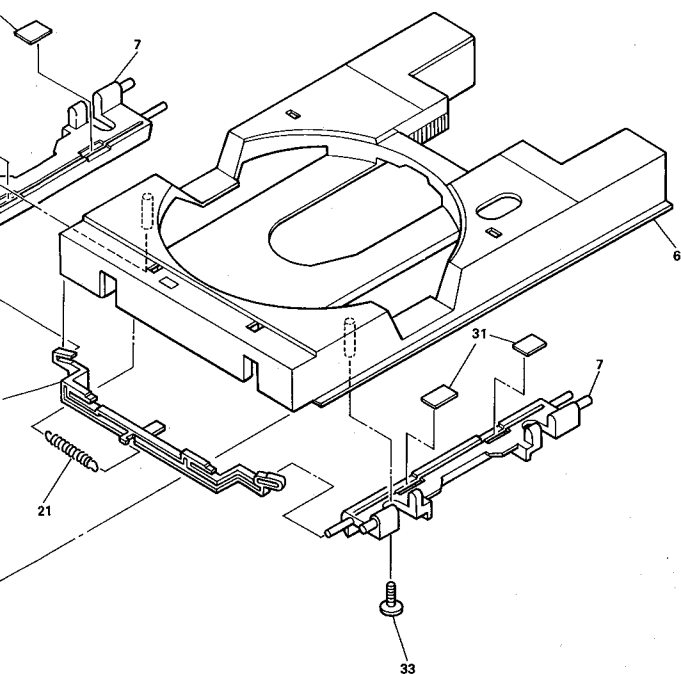
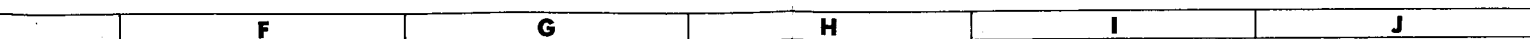


## PARTS LIST

| Ref. No. | Part No. | Description                                |
|----------|----------|--------------------------------------------|
| 1        | A81A189  | CHASSIS ASS'Y                              |
| 2        | A81P203  | PICK-UP BASE ASS'Y                         |
| 3        | A81H023  | PICK-UP BASE SHAFT                         |
| 4        | A81G079  | PICK-UP GEAR                               |
| 5        | A81P018  | PICK-UP BASE SHAFT HOLDER                  |
| 6        | A81G236  | DISC TRAY                                  |
| 7        | A81G002  | TABLE                                      |
| 8        | A81G003  | SLIDER                                     |
| 9        | A81G507  | LOCK LEVER                                 |
| 10       | A81P004  | CHUCK ARM                                  |
| 11       | A81G004  | DISK HOLDER                                |
| 12       | A81G005  | LOADING CAM                                |
| 13       | A81G006  | LOADING GEAR A                             |
| 14       | A81G007  | LOADING GEAR B                             |
| 15       | A81G070  | LOADING BELT                               |
| 16       | A81G235  | MOTOR PULLEY                               |
| 17       | M01T061  | MOTOR, LOADING SLIDER                      |
| 18       | A81G008  | PICK-UP GEAR A                             |
| 19       | A81G009  | PICK-UP GEAR B                             |
| 20       | A81G010  | MOTOR GEAR                                 |
| 21       | A81S001  | TABLE UP SPRING                            |
| 22       | A81S002  | CHUCK ARM SPRING                           |
| 23       | S01W050  | LEAF SWITCH                                |
| 24       | S01W051  | LEAF SWITCH                                |
| 25       | A81G023  | GUIDE ROLLER                               |
| 29       | A81G012  | SLIDE RING                                 |
| 30       | A81S013  | SLIDE RING SPRING                          |
| 31       | A81P051  | DISK GUARD                                 |
| 32       | A81G576  | PICK-UP                                    |
| 33       | A81H005  | SCREW (M3 x 8 mm)                          |
| 34       | M20B003  | SCREW (M2 x 3 mm)                          |
| 35       | M20S006  | SCREW (M2 x 6 mm)                          |
| 36       | P16C325  | WASHER (1.6 $\phi$ x 3.2 $\phi$ x 0.25 mm) |
| 37       | B20B004  | SCREW (M2 x 4 mm)                          |
| 38       | B26T005  | SCREW (M2.6 x 5 mm)                        |
| 39       | P26B005  | SCREW (M2.6 x 6 mm)                        |
| 40       | P31W805  | WASHER (3.1 $\phi$ x 8 $\phi$ x 0.5 mm)    |
| 41       | P41W825  | WASHER (4.1 $\phi$ x 8 $\phi$ x 0.25 mm)   |
| 42       | A81B395  | EARTH LEAD WIRE (W/LUG 3)                  |
| 43       | M01N035  | BAND                                       |
| 44       | M30T005  | SCREW (M3 x 5 mm)                          |
| 45       | A81G327  | CONNECTOR WITH LEAD WIRE                   |
| 46       | A81G328  | CONNECTOR WITH LEAD WIRE                   |
| 47       | A81G317  | LEAD WIRE                                  |
| 48       | A81A214  | SPINDLE MOTOR ASS'Y                        |

# CD MECHANISM EXPLODED VIEW

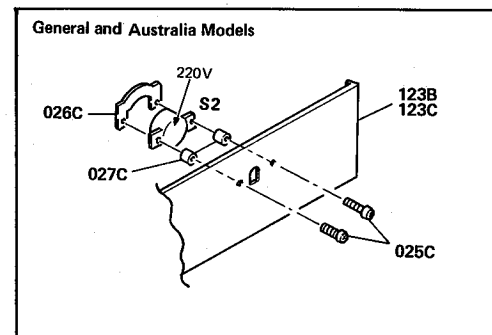
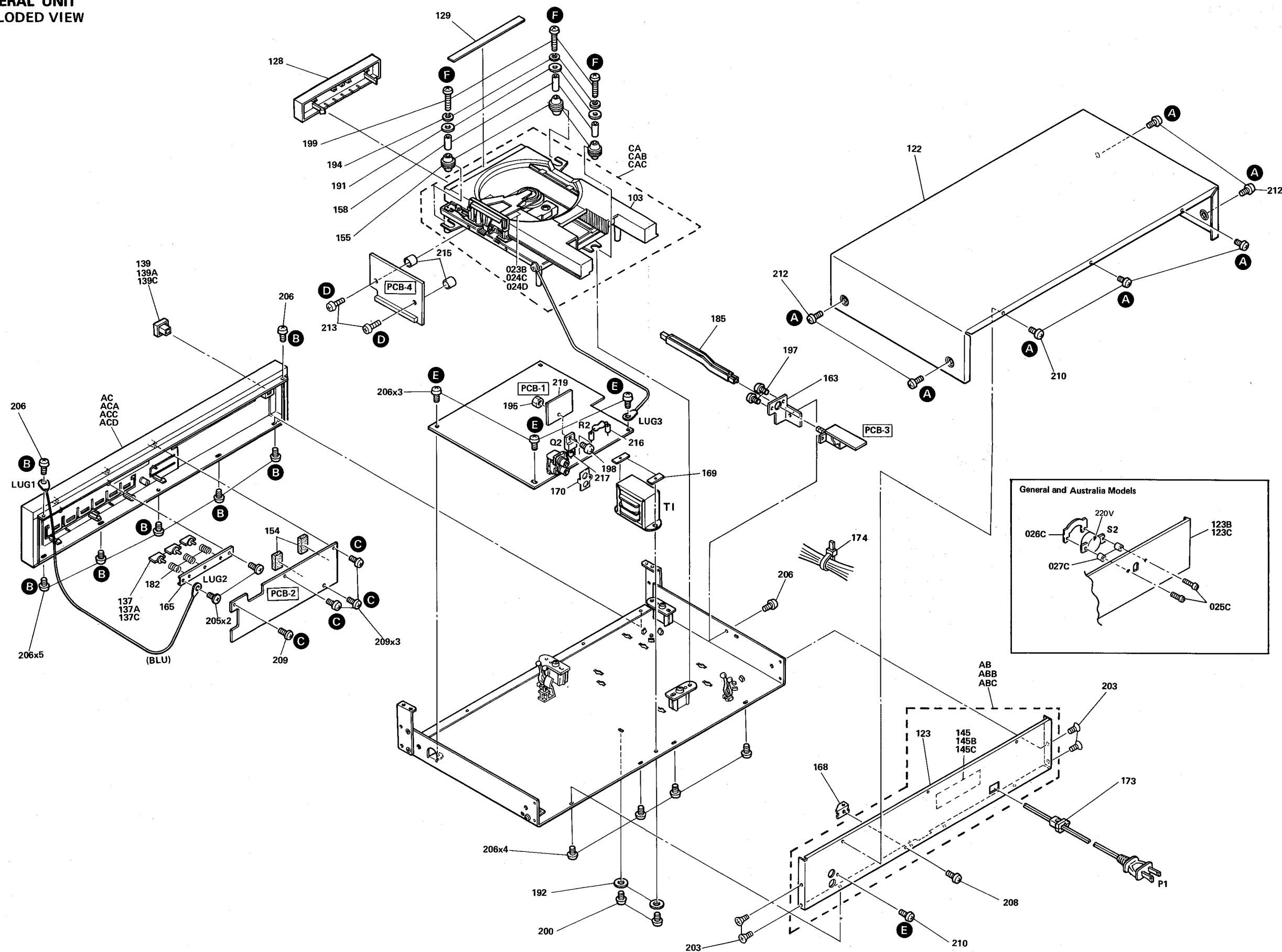




## PARTS LIST

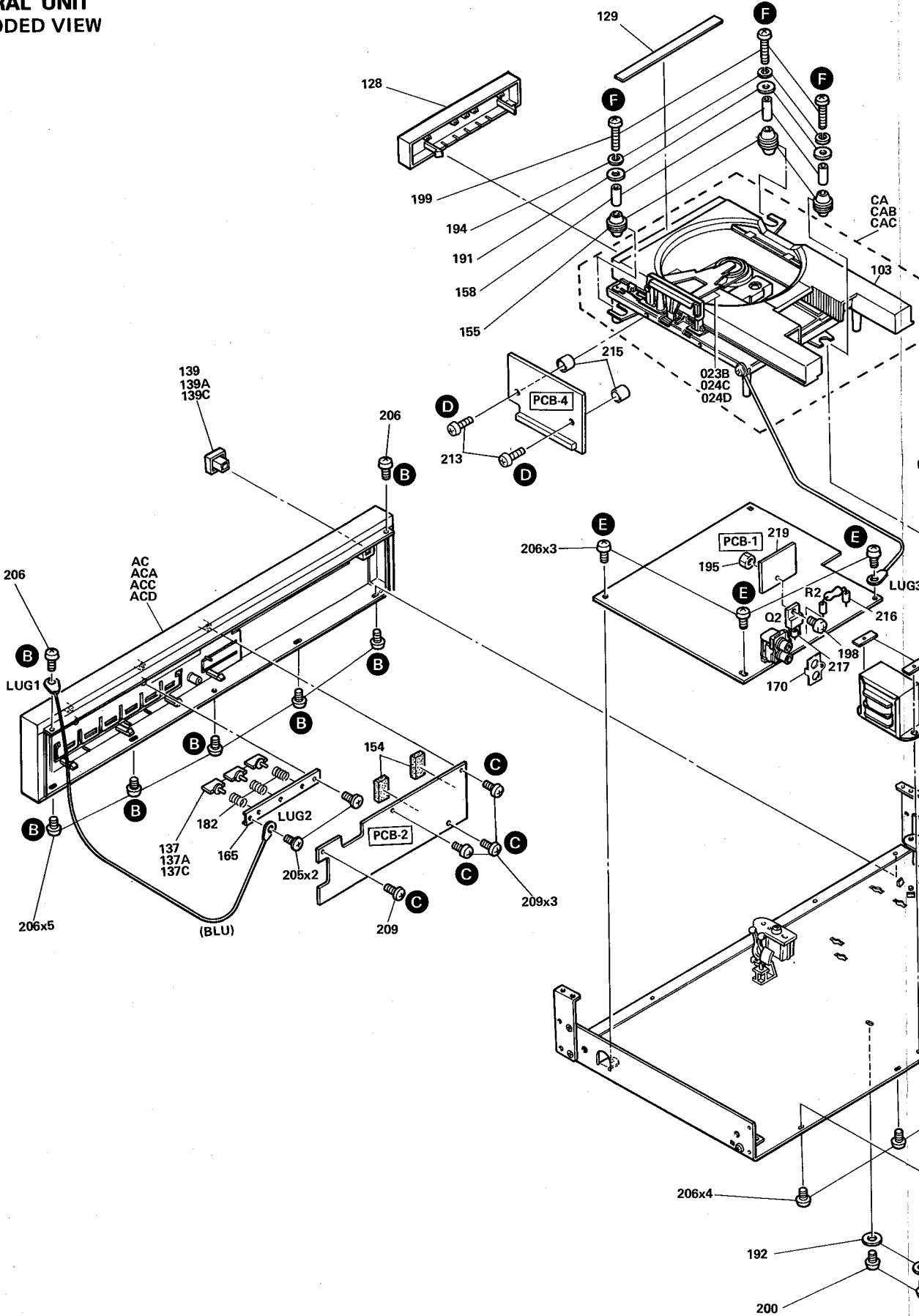
| Ref. No. | Part No. | Description                                |
|----------|----------|--------------------------------------------|
| 1        | A81A189  | CHASSIS ASS'Y                              |
| 2        | A81P203  | PICK-UP BASE ASS'Y                         |
| 3        | A81H023  | PICK-UP BASE SHAFT                         |
| 4        | A81G079  | PICK-UP GEAR                               |
| 5        | A81P018  | PICK-UP BASE SHAFT HOLDER                  |
| 6        | A81G236  | DISC TRAY                                  |
| 7        | A81G002  | TABLE                                      |
| 8        | A81G003  | SLIDER                                     |
| 9        | A81G507  | LOCK LEVER                                 |
| 10       | A81P004  | CHUCK ARM                                  |
| 11       | A81G004  | DISK HOLDER                                |
| 12       | A81G005  | LOADING CAM                                |
| 13       | A81G006  | LOADING GEAR A                             |
| 14       | A81G007  | LOADING GEAR B                             |
| 15       | A81G070  | LOADING BELT                               |
| 16       | A81G235  | MOTOR PULLEY                               |
| 17       | M01T061  | MOTOR, LOADING SLIDER                      |
| 18       | A81G008  | PICK-UP GEAR A                             |
| 19       | A81G009  | PICK-UP GEAR B                             |
| 20       | A81G010  | MOTOR GEAR                                 |
| 21       | A81S001  | TABLE UP SPRING                            |
| 22       | A81S002  | CHUCK ARM SPRING                           |
| 23       | S01W050  | LEAF SWITCH                                |
| 24       | S01W051  | LEAF SWITCH                                |
| 25       | A81G023  | GUIDE ROLLER                               |
| 29       | A81G012  | SLIDE RING                                 |
| 30       | A81S013  | SLIDE RING SPRING                          |
| 31       | A81P051  | DISK GUARD                                 |
| 32       | A81G576  | PICK-UP                                    |
| 33       | A81H005  | SCREW (M3 x 8 mm)                          |
| 34       | M20B003  | SCREW (M2 x 3 mm)                          |
| 35       | M20S006  | SCREW (M2 x 6 mm)                          |
| 36       | P16C325  | WASHER (1.6 $\phi$ x 3.2 $\phi$ x 0.25 mm) |
| 37       | B20B004  | SCREW (M2 x 4 mm)                          |
| 38       | B26T005  | SCREW (M2.6 x 5 mm)                        |
| 39       | P26B005  | SCREW (M2.6 x 6 mm)                        |
| 40       | P31W805  | WASHER (3.1 $\phi$ x 8 $\phi$ x 0.5 mm)    |
| 41       | P41W825  | WASHER (4.1 $\phi$ x 8 $\phi$ x 0.25 mm)   |
| 42       | A81B395  | EARTH LEAD WIRE (W/LUG 3)                  |
| 43       | M01N035  | BAND                                       |
| 44       | M30T005  | SCREW (M3 x 5 mm)                          |
| 45       | A81G327  | CONNECTOR WITH LEAD WIRE                   |
| 46       | A81G328  | CONNECTOR WITH LEAD WIRE                   |
| 47       | A81G317  | LEAD WIRE                                  |
| 48       | A81A214  | SPINDLE MOTOR ASS'Y                        |

# GENERAL UNIT EXPLODED VIEW





## GENERAL UNIT EXPLODED VIEW

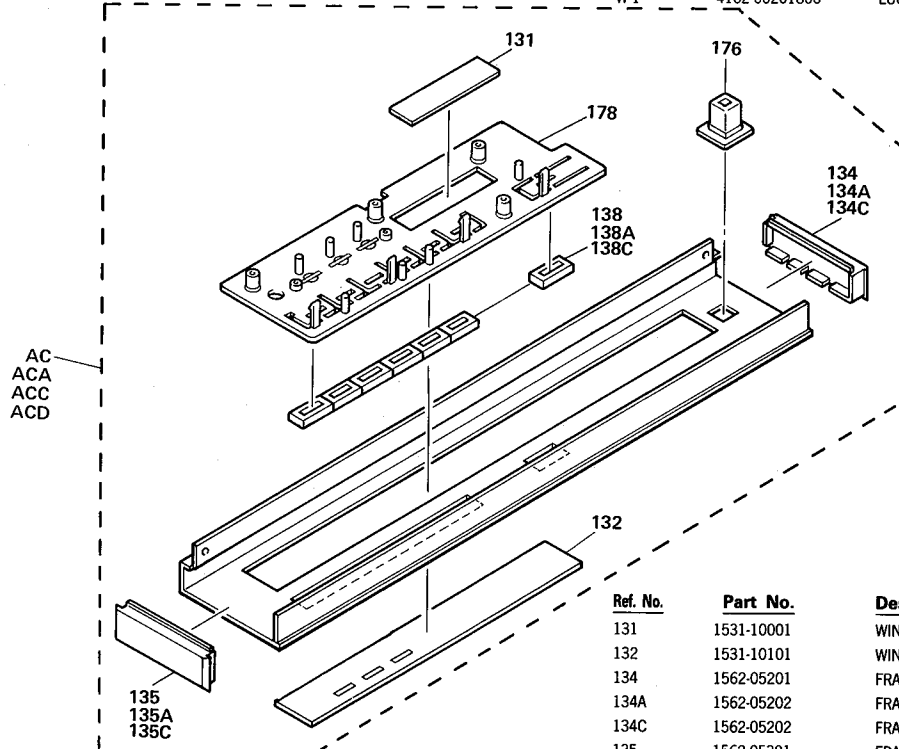




## PARTS LIST

| Ref. No. | Part No.     | Description                                               | Ref. No. | Part No.      | Description                                 |
|----------|--------------|-----------------------------------------------------------|----------|---------------|---------------------------------------------|
| AB       | A424-HD200B  | CABI BACK, REAR ASS'Y <b>UA</b> <b>BK</b>                 | 163      | 2215-7010     | BRACKET, POWER SWITCH                       |
| ABB      | A424-HD200D  | CABI BACK, REAR ASS'Y <b>G</b>                            | 165      | 2219-8140     | METAL FITTG                                 |
| ABC      | A424-HD200F  | CABI BACK, REAR ASS'Y <b>GB</b>                           | 168      | 2219-8096     | METAL FITTG                                 |
| ABD      | A424-HD200H  | CABI BACK, REAR ASS'Y <b>BB</b>                           | 169      | 2219-7091     | METAL FITTG, TRANS                          |
| CA       | C119-HD200A  | CD MECHA ASS'Y <b>UA</b> <b>BK</b>                        | 170      | 2219-8208     | METAL FITTG                                 |
| CAB      | C119-HD200B  | CD MECHA ASS'Y <b>G</b>                                   | 173      | 2240-364      | HOLDER, AC CORD                             |
| CAC      | C119-HD200C  | CD MECHA ASS'Y <b>GB</b>                                  | 174      | 2240-7120     | HOLDER, WIRING                              |
| CAD      | C119-HD200D  | CD MECHA ASS'Y <b>BB</b>                                  | 182      | 2651-210192   | SPRING                                      |
| 023B     | 1756-11802   | LABEL <b>G</b>                                            | 185      | 2601-7161     | SHAFT, POWER SWITCH                         |
| 024C     | 1756-11802   | LABEL <b>GB</b>                                           | 191      | 2401-0373     | WASHER METAL, MECHA                         |
| 024D     | 1756-11802   | LABEL <b>BB</b>                                           | 192      | 2401-0476     | WASHER METAL, TRANS                         |
| 025C     | 2327-301449  | SCREW BND+, VOLTAGE SELECTOR <b>G</b> <b>GB</b> <b>BB</b> | 194      | 2412-3022     | WASHER SPRING, MECHA                        |
| 026C     | 2440-7017    | NUT SPE, VOLTAGE SELECTOR <b>G</b> <b>GB</b> <b>BB</b>    | 195      | 2440-7016     | NUT, SPE                                    |
| 027C     | 2132-01406   | SPACER, VOLTAGE SELECTOR <b>G</b> <b>GB</b> <b>BB</b>     | 197      | 2327-R0130062 | SCREW BND+, POWER SWITCH                    |
| 103      | 3119-00801   | CD MECHA                                                  | 198      | 2327-R0130082 | SCREW, BND+                                 |
| 122      | 1414-09101   | CABINET                                                   | 199      | 2327-R0130202 | SCREW BND+, MECHA                           |
| 123      | 1424-21009   | CABI BACK, REAR <b>UA</b> <b>BK</b>                       | 200      | 2327-R0140102 | SCREW BND+                                  |
| 123B     | 1424-21010   | CABI BACK, REAR <b>G</b>                                  | 203      | 2343-300627   | SCREW CSK T+                                |
| 123C     | 1424-21010   | CABI BACK, REAR <b>GB</b> <b>BB</b>                       | 205      | 2347-200626   | SCREW BND T+                                |
| 128      | 1452-04701   | LID, MECHA                                                | 206      | 2347-R0130062 | SCREW BND T+                                |
| 129      | 1511-09701   | PLATE, MECHA                                              | 208      | 2347-R0130064 | SCREW BND T+                                |
| 137      | 1662-08502VN | PUSH BUTTON <b>UA</b> <b>G</b>                            | 209      | 2347-R0130102 | SCREW BND T+                                |
| 137A     | 1662-08503   | PUSH BUTTON <b>BK</b>                                     | 210      | 2347-R0130084 | SCREW BND T+                                |
| 137C     | 1662-08503   | PUSH BUTTON <b>GB</b>                                     | 212      | 2347-R0140064 | SCREW BND T+, CABINET                       |
| 139      | 1662-25401VN | PUSH BUTTON <b>UA</b> <b>G</b>                            | 213      | 2347-R0130122 | SCREW BND T+                                |
| 139A     | 1662-25402   | PUSH BUTTON <b>BK</b>                                     | 215      | 2132-01406    | SPACER                                      |
| 139C     | 1662-25402   | PUSH BUTTON <b>GB</b>                                     | 216      | 2132-7049     | SPACER, R2                                  |
| 145      | 1756-09602   | LABEL <b>UA</b> <b>BK</b>                                 | 217      | 2132-5049     | SPACER, Q2                                  |
| 145B     | 1756-12101   | LABEL <b>G</b>                                            | 219      | 2222-7231     | HEAT SINK, Q2                               |
| 145C     | 1756-12101   | LABEL <b>GB</b>                                           | △P1      | 4161-01401232 | CORD W/PLUG <b>UA</b> <b>BK</b>             |
| 154      | 2114-106143  | BUSHING, FL FILTER                                        | △P1      | 4161-7256     | CORD W/PLUG <b>G</b> <b>GB</b>              |
| 155      | 2114-01303   | BUSHING, MECHA                                            | △P1      | 4161-04100    | CORD W/PLUG <b>BB</b>                       |
| 158      | 2132-3014021 | SPACER, MECHA                                             | △S2      | 4411-102729   | SWITCH, ROTARY <b>G</b> <b>GB</b> <b>BB</b> |
|          |              |                                                           | △T1      | 5584-701548   | XFORMER, POWER <b>UA</b> <b>BK</b>          |
|          |              |                                                           | △T1      | 5584-702548   | XFORMER, POWER <b>G</b> <b>GB</b> <b>BB</b> |
|          |              |                                                           | W-1      | 4162-00201800 | LUG W/WIRE                                  |

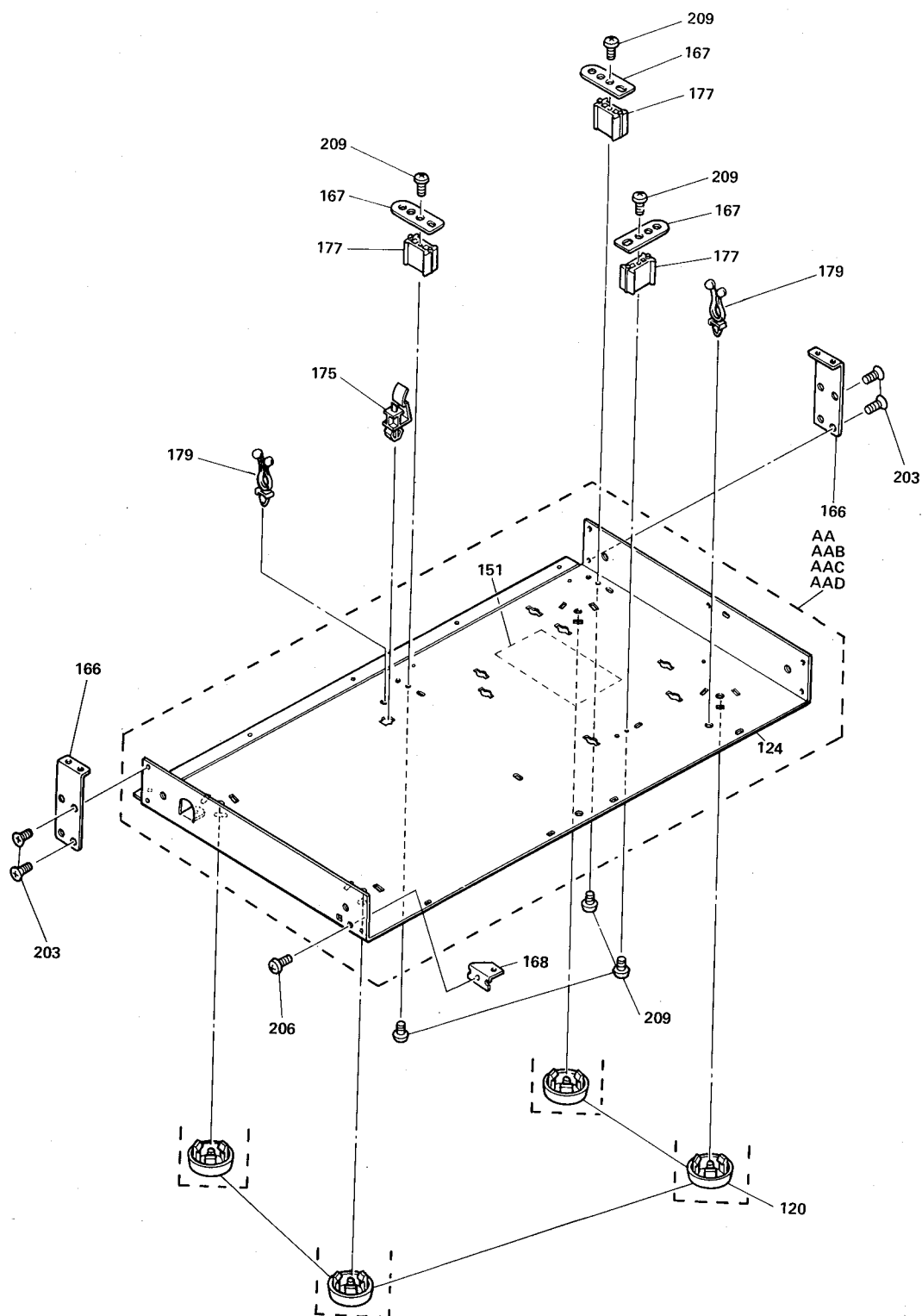
## EXPLODED VIEW



## PARTS LIST

| Ref. No. | Part No.    | Description                           | Ref. No. | Part No.   | Description                     |
|----------|-------------|---------------------------------------|----------|------------|---------------------------------|
| AC       | A443-HD200A | PANEL, FRONT ASS'Y <b>UA</b> <b>G</b> | 131      | 1531-10001 | WINDOW, FL FILTER               |
| ACA      | A443-HD200B | PANEL, FRONT ASS'Y <b>BK</b>          | 132      | 1531-10101 | WINDOW                          |
| ACC      | A443-HD200C | PANEL, FRONT ASS'Y <b>GB</b>          | 134      | 1562-05201 | FRAME, LEFT <b>UA</b> <b>G</b>  |
| ACD      | A443-HD200D | PANEL, FRONT ASS'Y <b>BB</b>          | 134A     | 1562-05202 | FRAME, LEFT <b>BK</b>           |
|          |             |                                       | 134C     | 1562-05202 | FRAME, LEFT <b>GB</b>           |
|          |             |                                       | 135      | 1562-05301 | FRAME, RIGHT <b>UA</b> <b>G</b> |
|          |             |                                       | 135A     | 1562-05302 | FRAME, RIGHT <b>BK</b>          |
|          |             |                                       | 135C     | 1562-05302 | FRAME, RIGHT <b>GB</b>          |
|          |             |                                       | 138      | 1662-21101 | FRAME, RIGHT <b>UA</b> <b>G</b> |
|          |             |                                       | 138A     | 1662-21102 | PUSH BUTTON <b>BK</b>           |
|          |             |                                       | 138C     | 1662-21102 | PUSH BUTTON <b>GB</b>           |
|          |             |                                       | 176      | 2240-7266  | HOLDER                          |
|          |             |                                       | 178      | 2240-7286  | HOLDER                          |

## EXPLODED VIEW

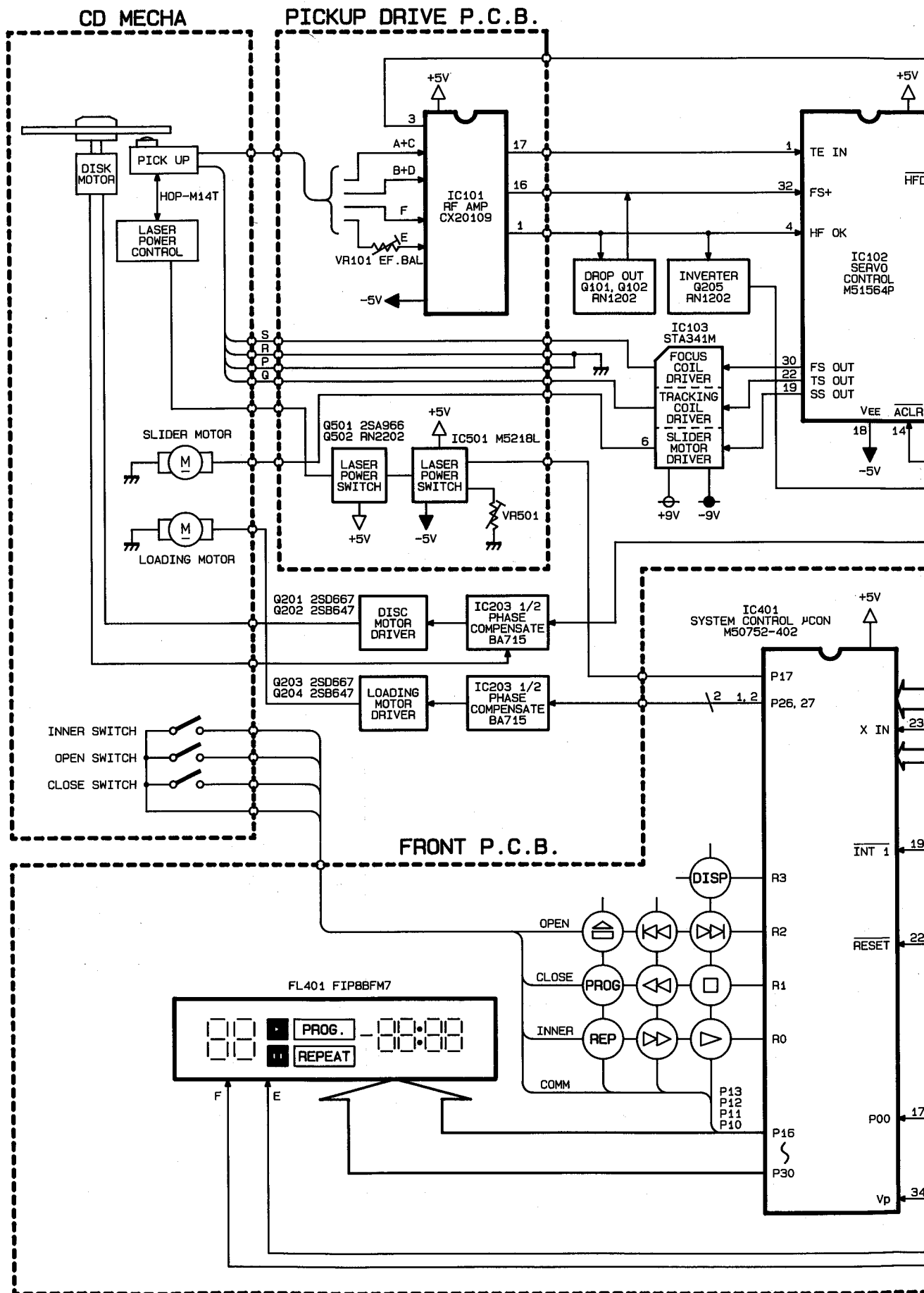


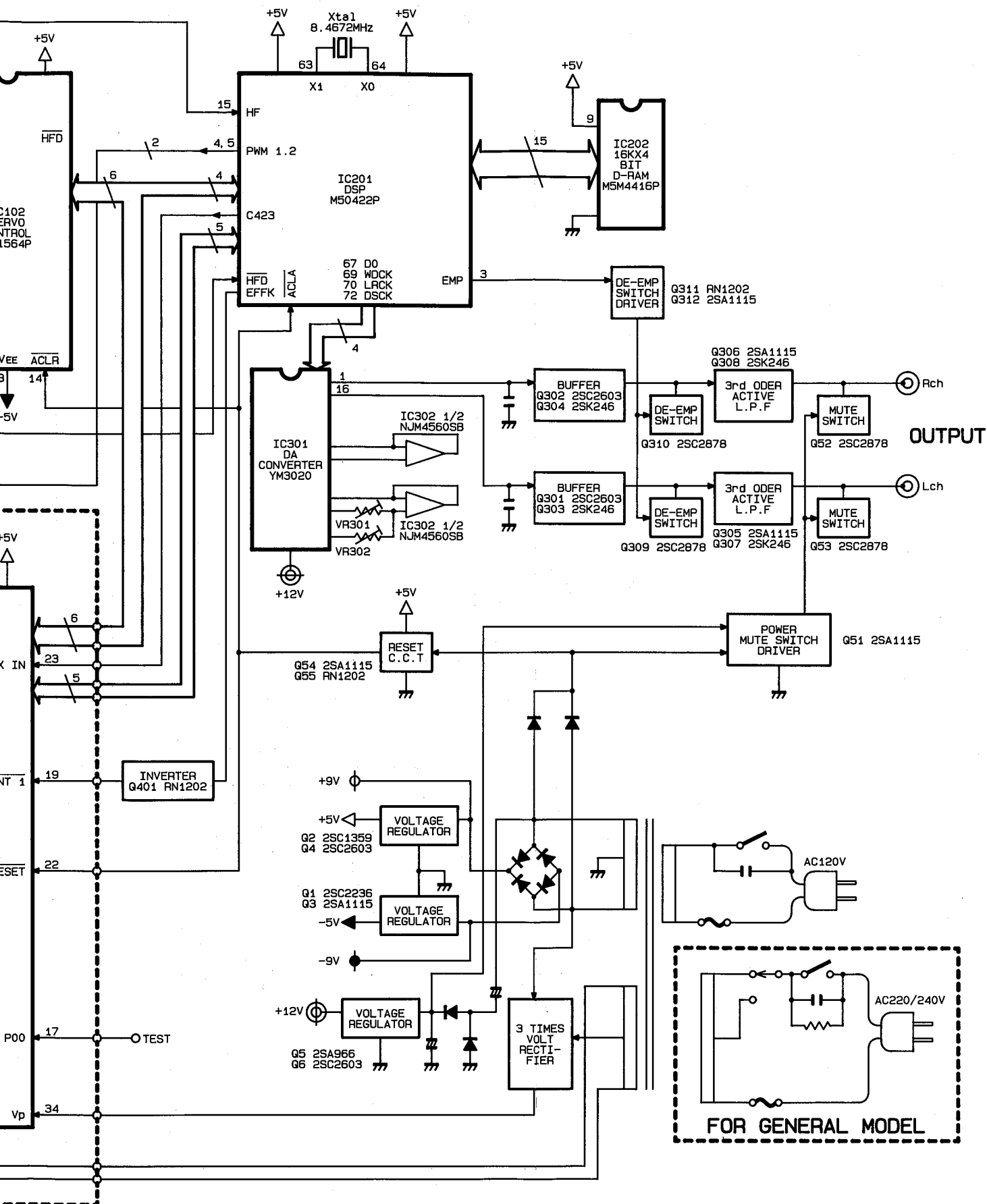
| Ref. No. | Part No.    | Description                          |
|----------|-------------|--------------------------------------|
| AA       | A424-HD200A | CABI BACK, BOTTOM ASS'Y <b>UA BK</b> |
| AAB      | A424-HD200C | CABI BACK, BOTTOM ASS'Y <b>G</b>     |
| AAC      | A424-HD200E | CABI BACK, BOTTOM ASS'Y <b>GB</b>    |
| AAD      | A424-HD200G | CABI BACK, BOTTOM ASS'Y <b>BB</b>    |
| 120      | 1319-0139   | LEG                                  |
| 124      | 1424-21101  | CABI BACK, BOTTOM                    |
| 151      | 1756-11111  | LABEL                                |
| 166      | 2219-8141   | METAL FITTG, SIDE                    |

| Ref. No. | Part No.      | Description         |
|----------|---------------|---------------------|
| 167      | 2219-8142     | METAL FITTG, MECHA  |
| 168      | 2219-8096     | METAL FITTG, P.C.B. |
| 175      | 2240-7264     | HOLDER, P.C. BOARD  |
| 177      | 2240-7285     | HOLDER, MECHA       |
| 179      | 2240-7049     | HOLDER, LEAD CRAMP  |
| 203      | 2343-300627   | SCREW CSK T+        |
| 206      | 2347-R0130062 | SCREW BND T+        |
| 209      | 2347-R0130102 | SCREW BND T+        |

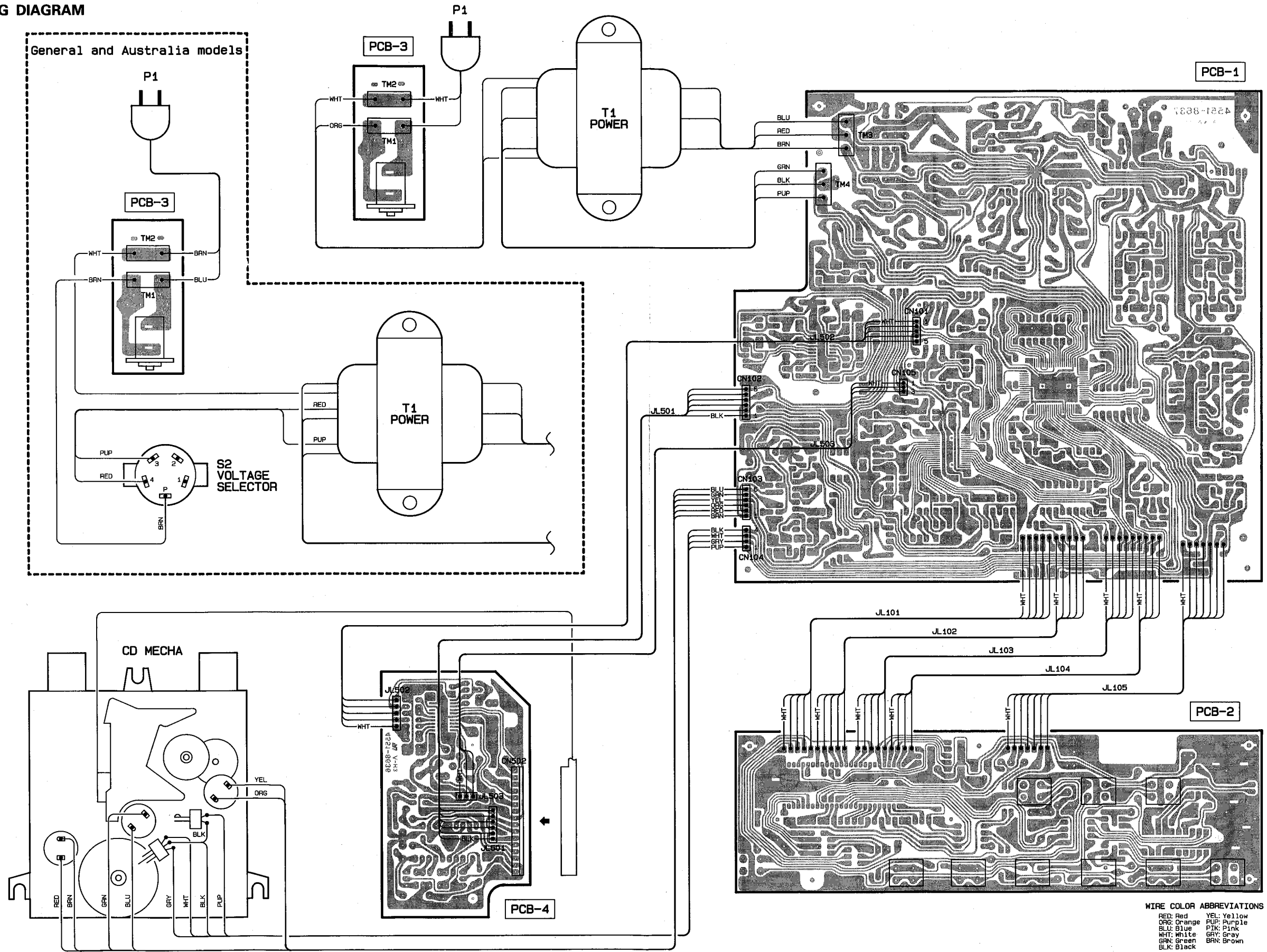


# BLOCK DIAGRAM





WIRING DIAGRAM

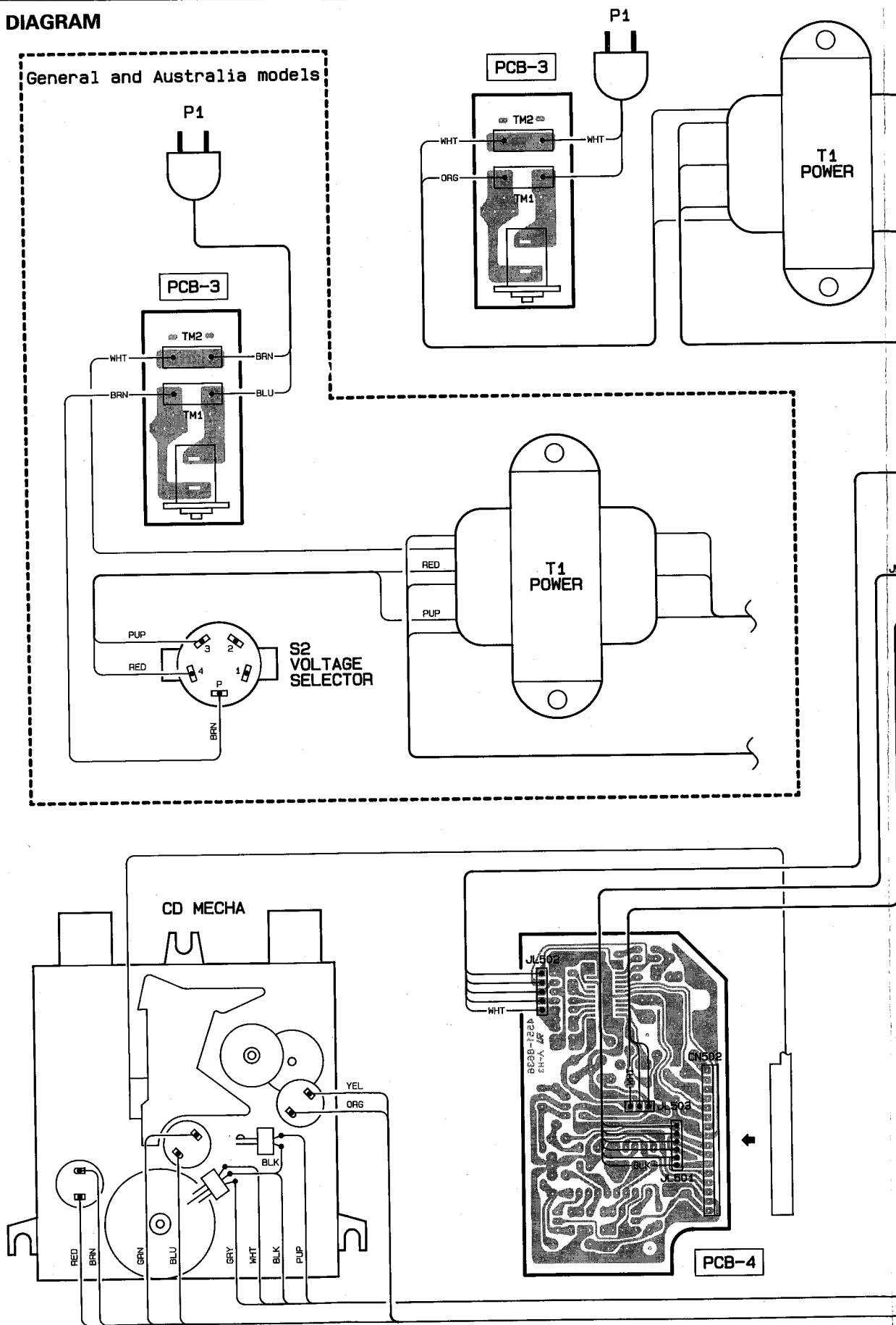


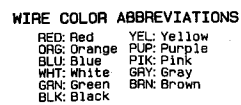
WIRE COLOR ABBREVIATIONS  
 RED: Red YEL: Yellow  
 ORG: Orange PUP: Purple  
 BLU: Blue PPK: Pink  
 WHT: White GRN: Gray  
 GRN: Green BRN: Brown  
 BLK: Black



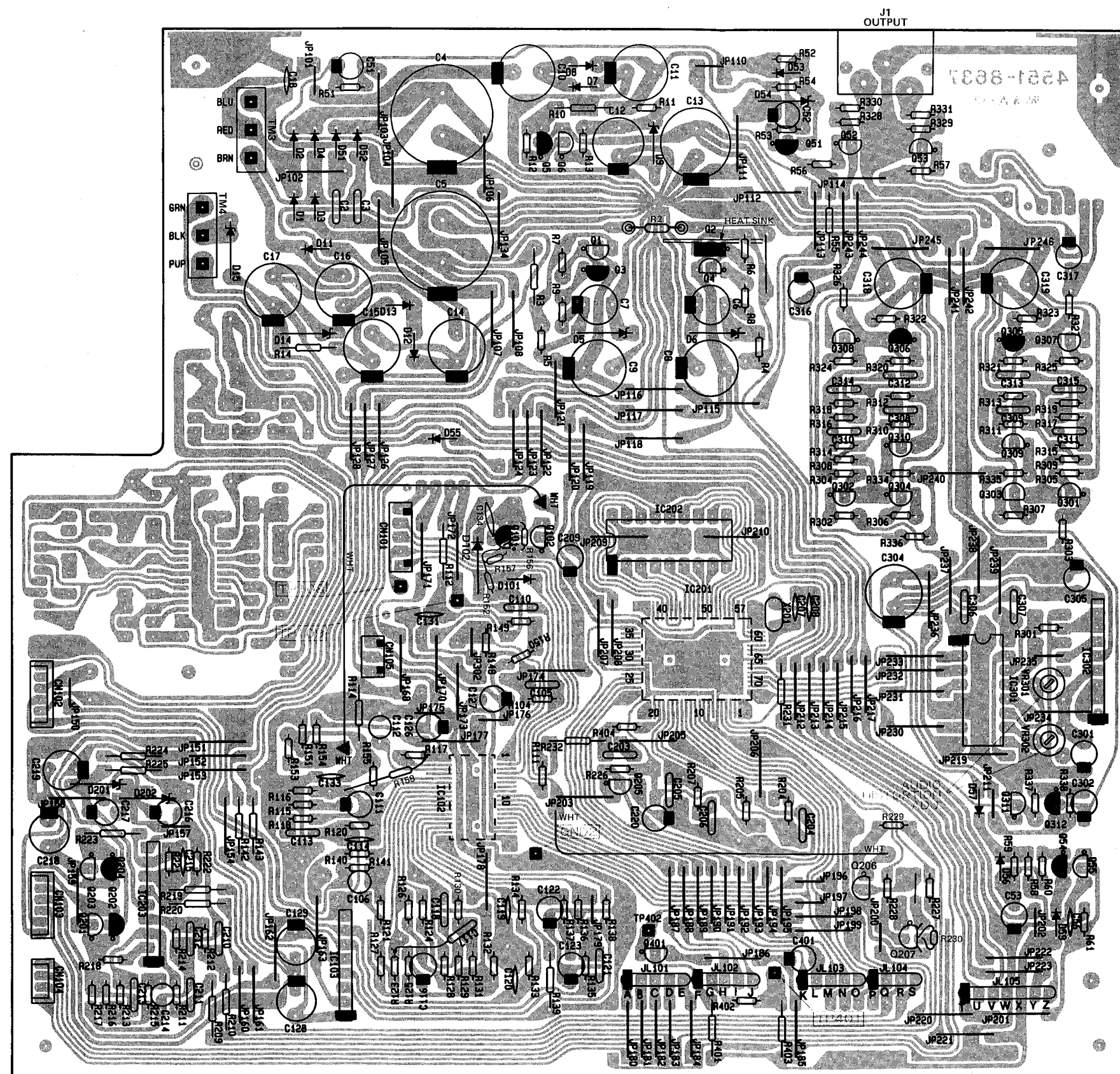
# WIRING DIAGRAM

General and Australia models



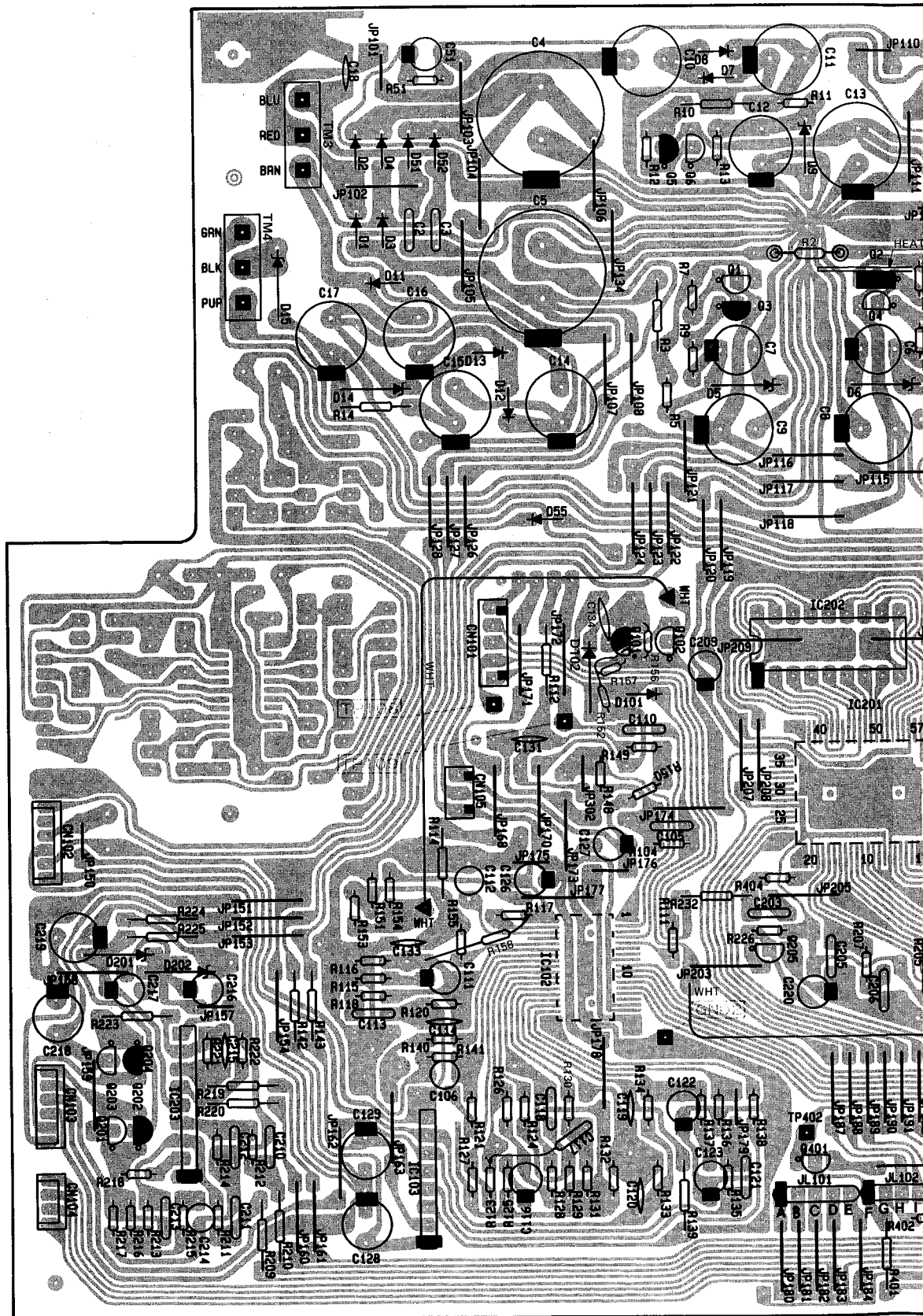


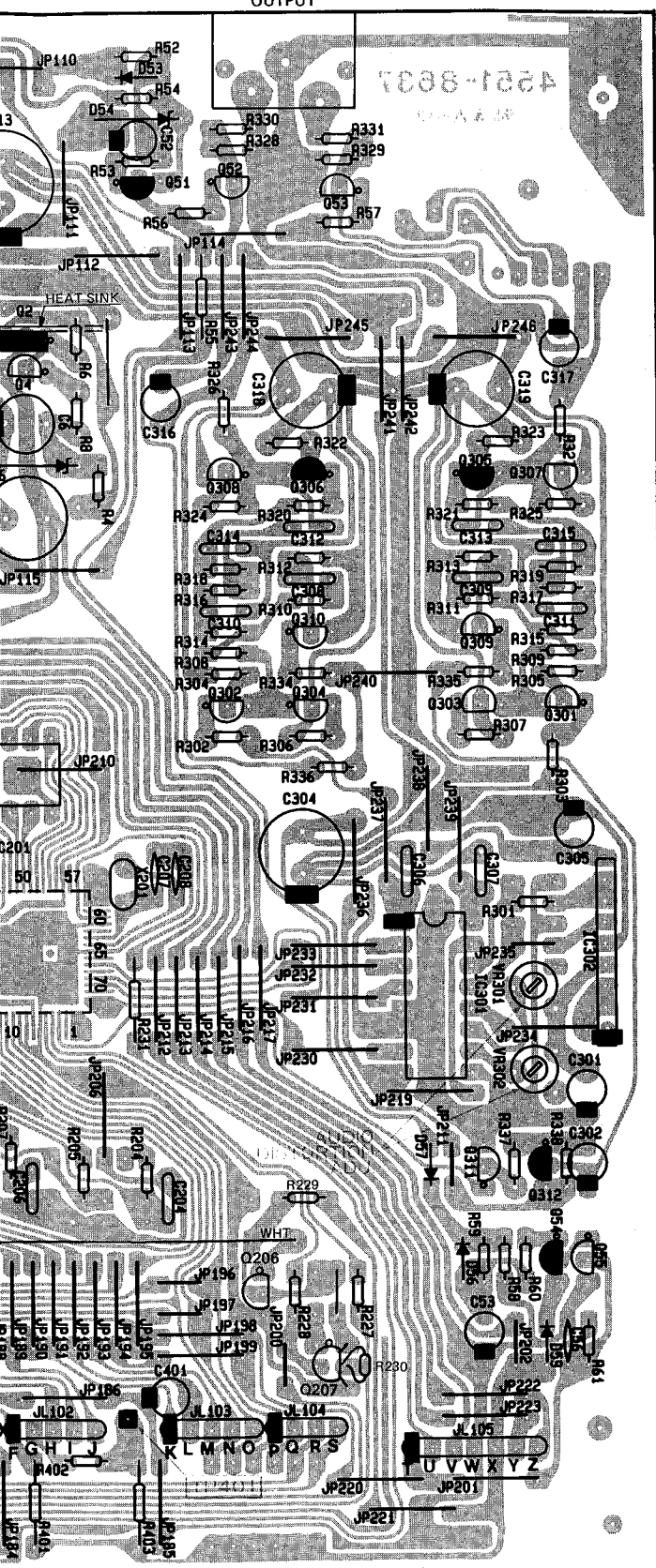
**PCB-1** Main P. C. Board

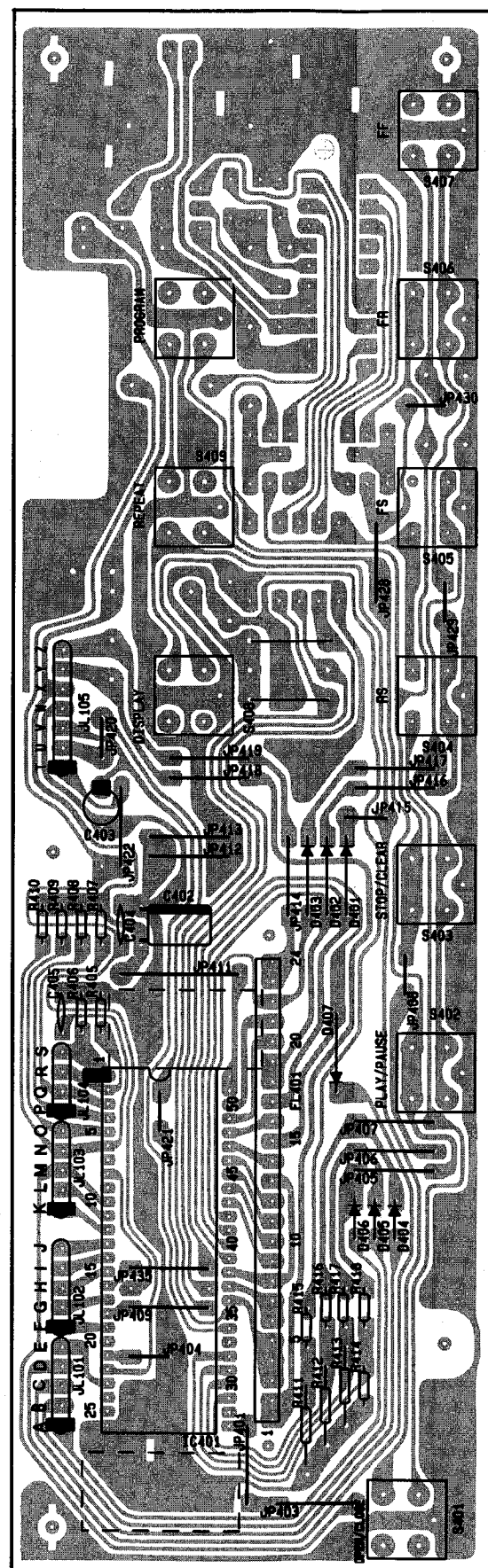


3308-1232A  
34-A

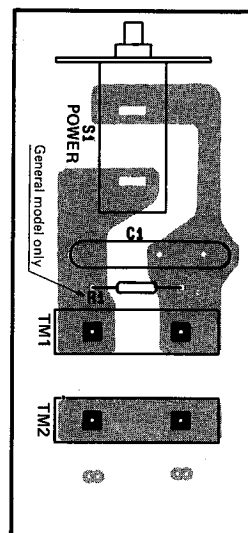




J1  
OUTPUT



**PCB-3**  
**Power Switch P. C. Board**



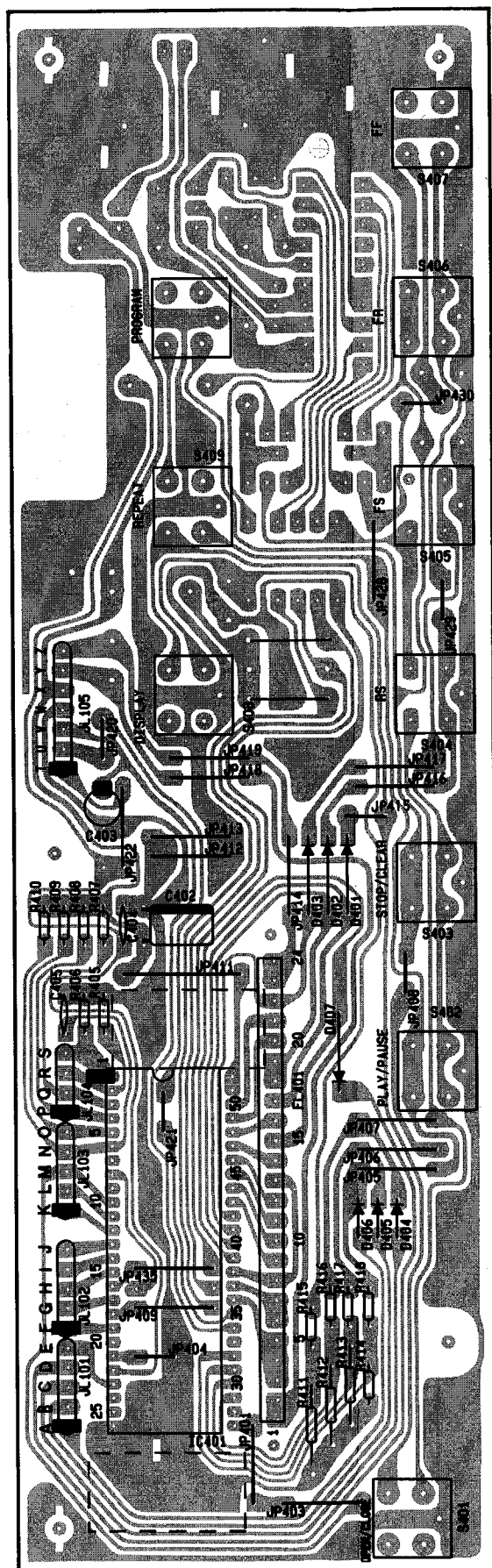
| Ser. No. | Ref. No. | Part No. | Description |
|----------|----------|----------|-------------|
|----------|----------|----------|-------------|

| PCB-1 MAIN P.C. BOARD |               |               |                               |
|-----------------------|---------------|---------------|-------------------------------|
| CAPACITORS            |               |               |                               |
| 571                   | C2            | 5354-104593   | CAP, MYL .1 $\mu$             |
| 571                   | C3            | 5354-104593   | CAP, MYL .1 $\mu$             |
| 544                   | C4            | 5345-478C0351 | CAP, MINI ELE 4700 $\mu$ /16V |
| 544                   | C5            | 5345-478C0351 | CAP, MINI ELE 4700 $\mu$ /16V |
| 549                   | C6            | 5345-227A041  | CAP, MINI ELE 220 $\mu$ /6.3V |
| 549                   | C7            | 5345-227A041  | CAP, MINI ELE 220 $\mu$ /6.3V |
| 545                   | C8            | 5345-477A041  | CAP, MINI ELE 470 $\mu$ /6.3V |
| 545                   | C9            | 5345-477A041  | CAP, MINI ELE 470 $\mu$ /6.3V |
| 548                   | C10           | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 546                   | C11           | 5345-227D041  | CAP, MINI ELE 220 $\mu$ /25V  |
| 547                   | C12           | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 547                   | C13           | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 548                   | C14           | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 550                   | C15           | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 550                   | C16           | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 550                   | C17           | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 565                   | C18           | 5361-223ZF    | CAP, CER .022 $\mu$           |
| 554                   | C51           | 5345-226C041  | CAP, MINI ELE 22 $\mu$ /16V   |
| 556                   | C52           | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 556                   | C53           | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 578                   | C56           | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 571                   | C105          | 5354-104593   | CAP, MYL .1 $\mu$             |
| 582                   | C106          | 5342-336C041  | CAP, ELE BP 33 $\mu$ /16V     |
| 579                   | C110          | 5361-472KB    | CAP, CER 4700p                |
| 572                   | C111          | 5345-684F0951 | CAP, MINI ELE .68 $\mu$ /50V  |
| 564                   | C112          | 5342-226B041  | CAP, ELE BP 22 $\mu$ /10V     |
| 574                   | C113          | 5354-274593   | CAP, MYL .27 $\mu$            |
| 591                   | C114          | 5359-S010J822 | CAP, PPP 8200p                |
| 572                   | C116          | 5345-684F0951 | CAP, MINI ELE .68 $\mu$ /50V  |
| 575                   | C117          | 5359-S010J273 | CAP, PPP .027 $\mu$           |
| 562                   | C118          | 5354-124593   | CAP, MYL .12 $\mu$            |
| 567                   | C119          | 5361-470KSL   | CAP, CER 47p                  |
| 583                   | C120          | 5361-151KSL   | CAP, CER 150p                 |
| 577                   | C121          | 5361-473ZF    | CAP, CER .047 $\mu$           |
| 557                   | C122          | 5345-105F041  | CAP, MINI ELE 1 $\mu$ /50V    |
| 556                   | C123          | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 551                   | C126          | 5345-107B041  | CAP, MINI ELE 100 $\mu$ /10V  |
| 551                   | C127          | 5345-107B041  | CAP, MINI ELE 100 $\mu$ /10V  |
| 561                   | C128          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 561                   | C129          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 599                   | C131          | 5361-122KB    | CAP, CER 1200p                |
| 594                   | C133          | 5361-182KB    | CAP, CER 1800p                |
| 577                   | C134          | 5361-473ZF    | CAP, CER .047 $\mu$           |
| 586                   | C203          | 5359-S010J182 | CAP, PPP 1800p                |
| 576                   | C204          | 5359-S010J103 | CAP, PPP .01 $\mu$            |
| 585                   | C205          | 5359-S010J561 | CAP, PPP 560p                 |
| 573                   | C206          | 5354-334593   | CAP, MYL .33 $\mu$            |
| 566                   | C207          | 5361-300JCH   | CAP, CER 30p                  |
| 566                   | C208          | 5361-300JCH   | CAP, CER 30p                  |
| 555                   | C209          | 5345-476B041  | CAP, MINI ELE 47 $\mu$ /10V   |
| 578                   | C210          | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 578                   | C211          | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 578                   | C212          | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 580                   | C213          | 5361-152KB    | CAP, CER 1500p                |
| 563                   | C214          | 5342-105F041  | CAP, ELE BP 1 $\mu$ /50V      |
| 569                   | C215          | 5361-220KSL   | CAP, CER 22p                  |
| 552                   | C216          | 5345-227B041  | CAP, MINI ELE 220 $\mu$ /10V  |
| 552                   | C217          | 5345-227B041  | CAP, MINI ELE 220 $\mu$ /10V  |
| 543                   | C218          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 543                   | C219          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 581                   | C220          | 5345-336B041  | CAP, MINI ELE 33 $\mu$ /10V   |
| 556                   | C301          | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 558                   | C302          | 5345-335D041  | CAP, MINI ELE 3.3 $\mu$ /25V  |
| 547                   | C304          | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 554                   | C305          | 5345-226C041  | CAP, MINI ELE 22 $\mu$ /16V   |
| 587                   | C306          | 5359-3325851  | CAP, PPP 3300p                |
| 587                   | C307          | 5359-3325851  | CAP, PPP 3300p                |
| 590                   | C308          | 5359-S010J223 | CAP, PPP .022 $\mu$           |
| 590                   | C309          | 5359-S010J223 | CAP, PPP .022 $\mu$           |
| 589                   | C310          | 5359-S010J152 | CAP, PPP 1500p                |
| 589                   | C311          | 5359-S010J152 | CAP, PPP 1500p                |
| 588                   | C312          | 5359-S010J392 | CAP, PPP 3900p                |
| 588                   | C313          | 5359-S010J392 | CAP, PPP 3900p                |
| 584                   | C314          | 5359-2215851  | CAP, PPP 220p                 |
| 584                   | C315          | 5359-2215851  | CAP, PPP 220p                 |
| 553                   | C316          | 5345-476C0951 | CAP, MINI ELE 47 $\mu$ /16V   |
| 553                   | C317          | 5345-476C0951 | CAP, MINI ELE 47 $\mu$ /16V   |
| 561                   | C318          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 561                   | C319          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 557                   | C401          | 5345-105F041  | CAP, MINI ELE 1 $\mu$ /50V    |
| RESISTORS             |               |               |                               |
| 600                   | $\Delta$ R2   | 5102-4R74715  | RES, FUSE 4.7                 |
| 600                   | $\Delta$ R3   | 5102-4R74715  | RES, FUSE 4.7                 |
| 614                   | R4            | 5232-152J16P  | RES, CBN 1/6P 1.5K            |
| 614                   | R5            | 5232-152J16P  | RES, CBN 1/6P 1.5K            |
| 610                   | R6            | 5232-47J116P  | RES, CBN 1/6P 470             |
| 610                   | R7            | 5232-47J116P  | RES, CBN 1/6P 470             |
| 606                   | R8            | 5232-101J16P  | RES, CBN 1/6P 100             |
| 606                   | R9            | 5232-101J16P  | RES, CBN 1/6P 100             |
| 601                   | $\Delta$ R10  | 5102-1004715  | RES, FUSE 10                  |
| 617                   | R11           | 5232-332J16P  | RES, CBN 1/6P 3.3K            |
| 610                   | R12           | 5232-47J116P  | RES, CBN 1/6P 470             |
| 606                   | R13           | 5232-101J16P  | RES, CBN 1/6P 100             |
| 603                   | $\Delta$ R14  | 5102-1514715  | RES, FUSE 150                 |
| 614                   | R51           | 5232-152J16P  | RES, CBN 1/6P 1.5K            |
| 637                   | R52           | 5232-564J16P  | RES, CBN 1/6P 560K            |
| 633                   | R53           | 5232-104J16P  | RES, CBN 1/6P 100K            |
| 614                   | R54           | 5232-152J16P  | RES, CBN 1/6P 1.5K            |
| 649                   | R55           | 5135-154522   | RES, CBN 1/2P 150K            |
| 615                   | R56           | 5232-182J16P  | RES, CBN 1/6P 1.8K            |
| 615                   | R57           | 5232-182J16P  | RES, CBN 1/6P 1.8K            |
| 622                   | R58           | 5232-103J16P  | RES, CBN 1/6P 10K             |
| 634                   | R59           | 5232-274J16P  | RES, CBN 1/6P 270K            |
| 633                   | R60           | 5232-104J16P  | RES, CBN 1/6P 100K            |
| 622                   | R61           | 5232-103J16P  | RES, CBN 1/6P 10K             |
| 633                   | R104          | 5232-104J16P  | RES, CBN 1/6P 100K            |
| 611                   | R111          | 5232-102J16P  | RES, CBN 1/6P 1K              |
| 620                   | R112          | 5135-123522   | RES, CBN 1/2P 12K             |
| 644                   | R114          | 5135-822522   | RES, CBN 1/2P 8.2K            |
| 605                   | R115          | 5232-470J16P  | RES, CBN 1/6P 47              |
| 657                   | R116          | 5232-562J16P  | RES, CBN 1/6P 5.6K            |
| 629                   | R117          | 5232-473J16P  | RES, CBN 1/6P 47K             |
| 615                   | R118          | 5232-182J16P  | RES, CBN 1/6P 1.8K            |
| 632                   | R120          | 5232-823J16P  | RES, CBN 1/6P 82K             |
| 614                   | R121          | 5232-152J16P  | RES, CBN 1/6P 1.5K            |
| 629                   | R123          | 5232-473J16P  | RES, CBN 1/6P 47K             |
| 643                   | R124          | 5232-183J16P  | RES, CBN 1/6P 18K             |
| 624                   | R125          | 5232-153J16P  | RES, CBN 1/6P 15K             |
| 624                   | R126          | 5232-153J16P  | RES, CBN 1/6P 15K             |
| 643                   | R127          | 5232-183J16P  | RES, CBN 1/6P 18K             |
| 629                   | R128          | 5232-473J16P  | RES, CBN 1/6P 47K             |
| 633                   | R129          | 5232-104J16P  | RES, CBN 1/6P 100K            |
| 596                   | R130          | 5232-821J16P  | RES, CBN 1/6P 820             |
| 596                   | R131          | 5232-821J16P  | RES, CBN 1/6P 820             |
| 626                   | R132          | 5232-273J16P  | RES, CBN 1/6P 27K             |
| 627                   | R133          | 5232-333J16P  | RES, CBN 1/6P 33K             |
| 628                   | R134          | 5232-153J16P  | RES, CBN 1/6P 15K             |
| 629                   | R135          | 5232-473J16P  | RES, CBN 1/6P 47K             |
| 623                   | R136          | 5232-123J16P  | RES, CBN 1/6P 12K             |
| 622                   | R137          | 5232-223J16P  | RES, CBN 1/6P 22K             |
| 605                   | R138          | 5232-470J16P  | RES, CBN 1/6P 47              |
| 640                   | R139          | 5135-470522   | RES, CBN 1/2P 47              |
| 605                   | R140          | 5232-470J16P  | RES, CBN 1/6P 47              |
| 611                   | R141          | 5232-102J16P  | RES, CBN 1/6P 1K              |
| 600                   | $\Delta$ R142 | 5102-4R74715  | RES, FUSE 4.7                 |
| 600                   | $\Delta$ R143 | 5102-4R74715  | RES, FUSE 4.7                 |
| 625                   | R148          | 5232-822J16P  | RES, CBN 1/6P 8.2K            |
| 641                   | R149          | 5232-335J16P  | RES, CBN 1/6P 3.3M            |
| 641                   | R150          | 5232-335J16P  | RES, CBN 1/6P 3.3M            |
| 622                   | R151          | 5232-103J16P  | RES, CBN 1/6P 10K             |
| 619                   | R152          | 5232-102J16P  | RES, CBN 1/6P 1K              |
| 618                   | R153          | 5232-472J16P  | RES, CBN 1/6P 4.7K            |
| 568                   | R154          | 5232-274J16P  | RES, CBN 1/6P 270K            |
| 620                   | R155          | 5232-223J16P  | RES, CBN 1/6P 22K             |
| 636                   | R156          | 5232-223J16P  | RES, CBN 1/6P 22K             |



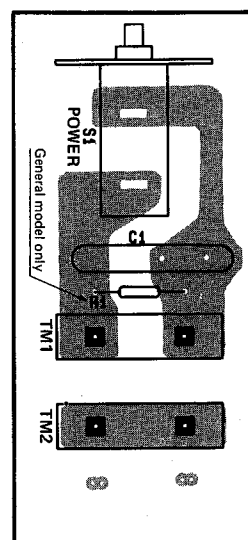
P.C. BOARDS (2)

PCB-2 Front P. C. Board



PCB-3

Power Switch P. C. Board



# ELECTRICAL PARTS LIST

| Ser. No.                     | Ref. No. | Part No.      | Description                   |
|------------------------------|----------|---------------|-------------------------------|
| <b>PCB-1 MAIN P.C. BOARD</b> |          |               |                               |
| <b>CAPACITORS</b>            |          |               |                               |
| 571                          | C2       | 5354-104593   | CAP, MYL .1 $\mu$             |
| 571                          | C3       | 5354-104593   | CAP, MYL .1 $\mu$             |
| 544                          | C4       | 5345-478C0351 | CAP, MINI ELE 4700 $\mu$ /16V |
| 544                          | C5       | 5345-478C0351 | CAP, MINI ELE 4700 $\mu$ /16V |
| 549                          | C6       | 5345-227A041  | CAP, MINI ELE 220 $\mu$ /6.3V |
| 549                          | C7       | 5345-227A041  | CAP, MINI ELE 220 $\mu$ /6.3V |
| 545                          | C8       | 5345-477A041  | CAP, MINI ELE 470 $\mu$ /6.3V |
| 545                          | C9       | 5345-477A041  | CAP, MINI ELE 470 $\mu$ /6.3V |
| 548                          | C10      | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 546                          | C11      | 5345-227D041  | CAP, MINI ELE 220 $\mu$ /25V  |
| 547                          | C12      | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 547                          | C13      | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 548                          | C14      | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 550                          | C15      | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 550                          | C16      | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 550                          | C17      | 5345-107E041  | CAP, MINI ELE 100 $\mu$ /35V  |
| 565                          | C18      | 5361-223ZF    | CAP, CER .022 $\mu$           |
| 554                          | C51      | 5345-226C041  | CAP, MINI ELE 22 $\mu$ /16V   |
| 556                          | C52      | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 556                          | C53      | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 578                          | C56      | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 571                          | C105     | 5354-104593   | CAP, MYL .1 $\mu$             |
| 582                          | C106     | 5342-336C041  | CAP, ELE BP 33 $\mu$ /16V     |
| 579                          | C110     | 5361-472KB    | CAP, CER 4700p                |
| 572                          | C111     | 5345-684F0951 | CAP, MINI ELE .68 $\mu$ /50V  |
| 564                          | C112     | 5342-226B041  | CAP, ELE BP 22 $\mu$ /10V     |
| 574                          | C113     | 5354-274593   | CAP, MYL .27 $\mu$            |
| 591                          | C114     | 5359-S010J822 | CAP, PPP 8200p                |
| 572                          | C116     | 5345-684F0951 | CAP, MINI ELE .68 $\mu$ /50V  |
| 575                          | C117     | 5359-S010J273 | CAP, PPP .027 $\mu$           |
| 562                          | C118     | 5354-124593   | CAP, MYL .12 $\mu$            |
| 567                          | C119     | 5361-470KSL   | CAP, CER 47p                  |
| 583                          | C120     | 5361-151KSL   | CAP, CER 150p                 |
| 577                          | C121     | 5361-473ZF    | CAP, CER .047 $\mu$           |
| 557                          | C122     | 5345-105F041  | CAP, MINI ELE 1 $\mu$ /50V    |
| 556                          | C123     | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 551                          | C126     | 5345-107B041  | CAP, MINI ELE 100 $\mu$ /10V  |
| 551                          | C127     | 5345-107B041  | CAP, MINI ELE 100 $\mu$ /10V  |
| 561                          | C128     | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 561                          | C129     | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 599                          | C131     | 5361-122KB    | CAP, CER 1200p                |
| 594                          | C133     | 5361-182KB    | CAP, CER 1800p                |
| 577                          | C134     | 5361-473ZF    | CAP, CER .047 $\mu$           |
| 586                          | C203     | 5359-S010J182 | CAP, PPP 1800p                |
| 576                          | C204     | 5359-S010J103 | CAP, PPP .01 $\mu$            |
| 585                          | C205     | 5359-S010J561 | CAP, PPP 560p                 |
| 573                          | C206     | 5354-334593   | CAP, MYL .33 $\mu$            |
| 566                          | C207     | 5361-300JCH   | CAP, CER 30p                  |
| 566                          | C208     | 5361-300JCH   | CAP, CER 30p                  |
| 555                          | C209     | 5345-476B041  | CAP, MINI ELE 47 $\mu$ /10V   |
| 578                          | C210     | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 578                          | C211     | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 578                          | C212     | 5361-103ZF    | CAP, CER .01 $\mu$            |
| 580                          | C213     | 5361-152KB    | CAP, CER 1500p                |
| 563                          | C214     | 5342-105F041  | CAP, ELE BP 1 $\mu$ /50V      |
| 569                          | C215     | 5361-220KSL   | CAP, CER 22p                  |
| 552                          | C216     | 5345-227B041  | CAP, MINI ELE 220 $\mu$ /10V  |
| 552                          | C217     | 5345-227B041  | CAP, MINI ELE 220 $\mu$ /10V  |
| 543                          | C218     | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 543                          | C219     | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V  |
| 581                          | C220     | 5345-336B041  | CAP, MINI ELE 33 $\mu$ /10V   |
| 556                          | C301     | 5345-106C041  | CAP, MINI ELE 10 $\mu$ /16V   |
| 558                          | C302     | 5345-335D041  | CAP, MINI ELE 3.3 $\mu$ /25V  |
| 547                          | C304     | 5345-227C041  | CAP, MINI ELE 220 $\mu$ /16V  |
| 554                          | C305     | 5345-226C041  | CAP, MINI ELE 22 $\mu$ /16V   |
| 587                          | C306     | 5359-3325851  | CAP, PPP 3300p                |
| 587                          | C307     | 5359-3325851  | CAP, PPP 3300p                |
| 590                          | C308     | 5359-S010J223 | CAP, PPP .022 $\mu$           |
| 590                          | C309     | 5359-S010J223 | CAP, PPP .022 $\mu$           |
| 589                          | C310     | 5359-S010J152 | CAP, PPP 1500p                |
| 589                          | C311     | 5359-S010J152 | CAP, PPP 1500p                |

| Ser. No.         | Ref. No.      | Part No.      | Description                  |
|------------------|---------------|---------------|------------------------------|
| 588              | C312          | 5359-S010J392 | CAP, PPP 3900p               |
| 588              | C313          | 5359-S010J392 | CAP, PPP 3900p               |
| 584              | C314          | 5359-2215851  | CAP, PPP 220p                |
| 584              | C315          | 5359-2215851  | CAP, PPP 220p                |
| 553              | C316          | 5345-476C0951 | CAP, MINI ELE 47 $\mu$ /16V  |
| 553              | C317          | 5345-476C0951 | CAP, MINI ELE 47 $\mu$ /16V  |
| 561              | C318          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V |
| 561              | C319          | 5345-107C041  | CAP, MINI ELE 100 $\mu$ /16V |
| 557              | C401          | 5345-105F041  | CAP, MINI ELE 1 $\mu$ /50V   |
| <b>RESISTORS</b> |               |               |                              |
| 600              | $\Delta$ R2   | 5102-4R74715  | RES, FUSE 4.7                |
| 600              | $\Delta$ R3   | 5102-4R74715  | RES, FUSE 4.7                |
| 614              | R4            | 5232-152J16P  | RES, CBN 1/6P 1.5K           |
| 614              | R5            | 5232-152J16P  | RES, CBN 1/6P 1.5K           |
| 610              | R6            | 5232-47J16P   | RES, CBN 1/6P 470            |
| 610              | R7            | 5232-47J16P   | RES, CBN 1/6P 470            |
| 606              | R8            | 5232-101J16P  | RES, CBN 1/6P 100            |
| 606              | R9            | 5232-101J16P  | RES, CBN 1/6P 100            |
| 601              | $\Delta$ R10  | 5102-1004715  | RES, FUSE 10                 |
| 617              | R11           | 5232-332J16P  | RES, CBN 1/6P 3.3K           |
| 610              | R12           | 5232-47J16P   | RES, CBN 1/6P 470            |
| 606              | R13           | 5232-101J16P  | RES, CBN 1/6P 100            |
| 603              | $\Delta$ R14  | 5102-1514715  | RES, FUSE 150                |
| 614              | R51           | 5232-152J16P  | RES, CBN 1/6P 1.5K           |
| 637              | R52           | 5232-564J16P  | RES, CBN 1/6P 560K           |
| 633              | R53           | 5232-104J16P  | RES, CBN 1/6P 100K           |
| 614              | R54           | 5232-152J16P  | RES, CBN 1/6P 1.5K           |
| 649              | R55           | 5135-154522   | RES, CBN 1/2P 150K           |
| 615              | R56           | 5232-182J16P  | RES, CBN 1/6P 1.8K           |
| 615              | R57           | 5232-182J16P  | RES, CBN 1/6P 1.8K           |
| 622              | R58           | 5232-103J16P  | RES, CBN 1/6P 10K            |
| 634              | R59           | 5232-274J16P  | RES, CBN 1/6P 270K           |
| 633              | R60           | 5232-104J16P  | RES, CBN 1/6P 100K           |
| 622              | R61           | 5232-103J16P  | RES, CBN 1/6P 10K            |
| 633              | R104          | 5232-104J16P  | RES, CBN 1/6P 100K           |
| 611              | R111          | 5232-102J16P  | RES, CBN 1/6P 1K             |
| 620              | R112          | 5135-123522   | RES, CBN 1/2P 12K            |
| 644              | R114          | 5135-822522   | RES, CBN 1/2P 8.2K           |
| 605              | R115          | 5232-470J16P  | RES, CBN 1/6P 47             |
| 657              | R116          | 5232-562J16P  | RES, CBN 1/6P 5.6K           |
| 629              | R117          | 5232-473J16P  | RES, CBN 1/6P 47K            |
| 615              | R118          | 5232-182J16P  | RES, CBN 1/6P 1.8K           |
| 632              | R120          | 5232-823J16P  | RES, CBN 1/6P 82K            |
| 614              | R121          | 5232-152J16P  | RES, CBN 1/6P 1.5K           |
| 629              | R123          | 5232-473J16P  | RES, CBN 1/6P 47K            |
| 643              | R124          | 5232-183J16P  | RES, CBN 1/6P 18K            |
| 624              | R125          | 5232-153J16P  | RES, CBN 1/6P 15K            |
| 624              | R126          | 5232-153J16P  | RES, CBN 1/6P 15K            |
| 643              | R127          | 5232-183J16P  | RES, CBN 1/6P 18K            |
| 629              | R128          | 5232-473J16P  | RES, CBN 1/6P 47K            |
| 633              | R129          | 5232-104J16P  | RES, CBN 1/6P 100K           |
| 596              | R130          | 5232-821J16P  | RES, CBN 1/6P 820            |
| 596              | R131          | 5232-821J16P  | RES, CBN 1/6P 820            |
| 626              | R132          | 5232-273J16P  | RES, CBN 1/6P 27K            |
| 627              | R133          | 5232-333J16P  | RES, CBN 1/6P 33K            |
| 628              | R134          | 5232-153J16P  | RES, CBN 1/6P 15K            |
| 629              | R135          | 5232-473J16P  | RES, CBN 1/6P 47K            |
| 623              | R136          | 5232-123J16P  | RES, CBN 1/6P 12K            |
| 622              | R137          | 5232-223J16P  | RES, CBN 1/6P 22K            |
| 605              | R138          | 5232-470J16P  | RES, CBN 1/6P 47             |
| 640              | R139          | 5135-470522   | RES, CBN 1/2P 47             |
| 605              | R140          | 5232-470J16P  | RES, CBN 1/6P 47             |
| 611              | R141          | 5232-102J16P  | RES, CBN 1/6P 1K             |
| 600              | $\Delta$ R142 | 5102-4R74715  | RES, FUSE 4.7                |
| 600              | $\Delta$ R143 | 5102-4R74715  | RES, FUSE 4.7                |
| 625              | R148          | 5232-822J16P  | RES, CBN 1/6P 8.2K           |
| 641              | R149          | 5232-335J16P  | RES, CBN 1/6P 3.3M           |
| 641              | R150          | 5232-335J16P  | RES, CBN 1/6P 3.3M           |
| 622              | R151          | 5232-103J16P  | RES, CBN 1/6P 10K            |
| 619              | R152          | 5232-102J16P  | RES, CBN 1/6P 1K             |
| 618              | R153          | 5232-472J16P  | RES, CBN 1/6P 4.7K           |
| 568              | R154          | 5232-274J16P  | RES, CBN 1/6P 270K           |
| 620              | R155          | 5232-223J16P  | RES, CBN 1/6P 22K            |
| 636              | R156          | 5232-223J16P  | RES, CBN 1/6P 22K            |



| Ser. No.                   | Ref. No. | Part No.      | Description        | Ser. No.             | Ref. No. | Part No.             | Description       |
|----------------------------|----------|---------------|--------------------|----------------------|----------|----------------------|-------------------|
| 598                        | R157     | 5232-332J16P  | RES, CBN 1/6P 3.3K | 511                  | IC203    | 5653-BA715           | IC, LINEAR        |
| 708                        | R158     | 5232-225J16P  | RES, CBN 1/6P 2.2M | 505                  | IC301    | 5654-YM3020          | IC, DIGITAL       |
| 627                        | R204     | 5232-333J16P  | RES, CBN 1/6P 33K  | 509                  | IC302    | 5653-NJ4560SB        | IC, LINEAR        |
| 639                        | R205     | 5232-124J16P  | RES, CBN 1/6P 120K | <b>TRANSISTORS</b>   |          |                      |                   |
| 607                        | R207     | 5232-392J16P  | RES, CBN 1/6P 3.9K | 520                  | Q1       | 5614-667 (C)         | XISTOR, NPN A     |
| 648                        | R209     | 5135-823522   | RES, CBN 1/2P 82K  | 514                  | Q2       | 5612-1375            | XISTOR, PNP A     |
| 648                        | R210     | 5135-823522   | RES, CBN 1/2P 82K  | 513                  | Q3       | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 637                        | R211     | 5232-564J16P  | RES, CBN 1/6P 560K | 519                  | Q4       | 5613-2603 (F) or (E) | XISTOR, NPN R     |
| 637                        | R212     | 5232-564J16P  | RES, CBN 1/6P 560K | 515                  | Q5       | 5611-966 (Y)         | XISTOR, PNP R     |
| 630                        | R213     | 5232-563J16P  | RES, CBN 1/6P 56K  | 519                  | Q6       | 5613-2603 (F) or (E) | XISTOR, NPN R     |
| 631                        | R214     | 5232-683J16P  | RES, CBN 1/6P 68K  | 513                  | Q51      | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 626                        | R215     | 5232-273J16P  | RES, CBN 1/6P 27K  | 522                  | Q52      | 5613-2878 (B)        | XISTOR, NPN R     |
| 623                        | R216     | 5232-123J16P  | RES, CBN 1/6P 12K  | 522                  | Q53      | 5613-2878 (B)        | XISTOR, NPN R     |
| 604                        | R217     | 5232-2R2J16P  | RES, CBN 1/6P 2.2  | 513                  | Q54      | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 605                        | R218     | 5232-470J16P  | RES, CBN 1/6P 47   | 521                  | Q55      | 5613-RN1202          | XISTOR, NPN R     |
| 647                        | R219     | 5135-104522   | RES, CBN 1/2P 100K | 530                  | Q101     | 5611-1115 (F)        | XISTOR, PNP R     |
| 647                        | R220     | 5135-104522   | RES, CBN 1/2P 100K | 525                  | Q102     | 5613-RN1203          | XISTOR, NPN R     |
| 639                        | R221     | 5232-124J16P  | RES, CBN 1/6P 120K | 524                  | Q201     | 5614-667 (C)         | XISTOR, NPN A     |
| 639                        | R222     | 5232-124J16P  | RES, CBN 1/6P 120K | 518                  | Q202     | 5612-647 (C)         | XISTOR, PNP A     |
| 640                        | R223     | 5135-470522   | RES, CBN 1/2P 47   | 524                  | Q203     | 5614-667 (C)         | XISTOR, NPN A     |
| 602                        | △R224    | 5102-1014715  | RES, FUSE 100      | 518                  | Q204     | 5612-647 (C)         | XISTOR, PNP A     |
| 602                        | △R225    | 5102-1014715  | RES, FUSE 100      | 521                  | Q205     | 5613-RN1202          | XISTOR, NPN R     |
| 627                        | R226     | 5232-333J16P  | RES, CBN 1/6P 33K  | 703                  | Q206     | 5613-RN1203          | XISTOR, NPN R     |
| 643                        | R227     | 5232-183J16P  | RES, CBN 1/6P 18K  | 704                  | Q207     | 5613-RN1203          | XISTOR, NPN R     |
| 643                        | R228     | 5232-183J16P  | RES, CBN 1/6P 18K  | 519                  | Q301     | 5613-2603 (F) or (E) | XISTOR, NPN R     |
| 706                        | R229     | 5232-183J16P  | RES, CBN 1/6P 18K  | 519                  | Q302     | 5613-2603 (F) or (E) | XISTOR, NPN R     |
| 707                        | R230     | 5232-183J16P  | RES, CBN 1/6P 18K  | 526                  | Q303     | 5616-2SK246 (Y)      | FET, N-CH         |
| 646                        | R231     | 5135-471522   | RES, CBN 1/2P 470  | 526                  | Q304     | 5616-2SK246 (Y)      | FET, N-CH         |
| 650                        | R232     | 5135-102522   | RES, CBN 1/2P 1K   | 513                  | Q305     | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 609                        | R301     | 5232-181J16P  | RES, CBN 1/6P 180  | 513                  | Q306     | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 610                        | R302     | 5232-471J16P  | RES, CBN 1/6P 470  | 527                  | Q307     | 5616-SK246GR1        | FET, N-CH         |
| 610                        | R303     | 5232-471J16P  | RES, CBN 1/6P 470  | 527                  | Q308     | 5616-SK246GR1        | FET, N-CH         |
| 608                        | R304     | 5232-221J16P  | RES, CBN 1/6P 220  | 522                  | Q309     | 5613-2878 (B)        | XISTOR, NPN R     |
| 608                        | R305     | 5232-221J16P  | RES, CBN 1/6P 220  | 522                  | Q310     | 5613-2878 (B)        | XISTOR, NPN R     |
| 606                        | R306     | 5232-101J16P  | RES, CBN 1/6P 100  | 521                  | Q311     | 5613-RN1202          | XISTOR, NPN R     |
| 606                        | R307     | 5232-101J16P  | RES, CBN 1/6P 100  | 513                  | Q312     | 5611-1115 (F) or (E) | XISTOR, PNP R     |
| 612                        | R308     | 5232-122J16P  | RES, CBN 1/6P 1.2K | 521                  | Q401     | 5613-RN1202          | XISTOR, NPN R     |
| 612                        | R309     | 5232-122J16P  | RES, CBN 1/6P 1.2K | <b>DIODES</b>        |          |                      |                   |
| 621                        | R310     | 5232-391J16P  | RES, CBN 1/6P 390  | 531                  | △D1      | 5632-S5566B          | DIODE, RECT       |
| 621                        | R311     | 5232-391J16P  | RES, CBN 1/6P 390  | 531                  | △D2      | 5632-S5566B          | DIODE, RECT       |
| 638                        | R312     | 5232-105J16P  | RES, CBN 1/6P 1M   | 531                  | △D3      | 5632-S5566B          | DIODE, RECT       |
| 638                        | R313     | 5232-105J16P  | RES, CBN 1/6P 1M   | 531                  | △D4      | 5632-S5566B          | DIODE, RECT       |
| 616                        | R314     | 5232-222J16P  | RES, CBN 1/6P 2.2K | 540                  | D5       | 5635-HZ6B1L          | DIODE, ZENER      |
| 616                        | R315     | 5232-222J16P  | RES, CBN 1/6P 2.2K | 540                  | D6       | 5635-HZ6B1L          | DIODE, ZENER      |
| 618                        | R316     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 531                  | △D7      | 5632-S5566B          | DIODE, RECT       |
| 618                        | R317     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 531                  | △D8      | 5632-S5566B          | DIODE, RECT       |
| 618                        | R318     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 539                  | D9       | 5635-HZ12B3L         | DIODE, ZENER      |
| 618                        | R319     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 531                  | △D11     | 5632-S5566B          | DIODE, RECT       |
| 613                        | R320     | 5232-331J16P  | RES, CBN 1/6P 330  | 531                  | △D12     | 5632-S5566B          | DIODE, RECT       |
| 613                        | R321     | 5232-331J16P  | RES, CBN 1/6P 330  | 531                  | △D13     | 5632-S5566B          | DIODE, RECT       |
| 608                        | R322     | 5232-221J16P  | RES, CBN 1/6P 220  | 537                  | D14      | 5635-HZ27-2          | DIODE, ZENER      |
| 608                        | R323     | 5232-221J16P  | RES, CBN 1/6P 220  | 538                  | D15      | 5635-HZ5B-2          | DIODE, ZENER      |
| 606                        | R324     | 5232-101J16P  | RES, CBN 1/6P 100  | 531                  | △D51     | 5632-S5566B          | DIODE, RECT       |
| 606                        | R325     | 5232-101J16P  | RES, CBN 1/6P 100  | 531                  | △D52     | 5632-S5566B          | DIODE, RECT       |
| 608                        | R326     | 5232-221J16P  | RES, CBN 1/6P 220  | 533                  | D53      | 5631-1SS133          | DIODE, DET        |
| 608                        | R327     | 5232-221J16P  | RES, CBN 1/6P 220  | 541                  | D54      | 5635-HZ6A1L          | DIODE, ZENER      |
| 622                        | R328     | 5232-103J16P  | RES, CBN 1/6P 10K  | 533                  | D55      | 5631-1SS133          | DIODE, DET        |
| 622                        | R329     | 5232-103J16P  | RES, CBN 1/6P 10K  | 533                  | D56      | 5631-1SS133          | DIODE, DET        |
| 606                        | R330     | 5232-101J16P  | RES, CBN 1/6P 100  | 533                  | D57      | 5631-1SS133          | DIODE, DET        |
| 606                        | R331     | 5232-101J16P  | RES, CBN 1/6P 100  | 533                  | D59      | 5631-1SS133          | DIODE, DET        |
| 618                        | R334     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 533                  | D101     | 5631-1SS133          | DIODE, DET        |
| 618                        | R335     | 5232-472J16P  | RES, CBN 1/6P 4.7K | 536                  | D102     | 5631-1S2473          | DIODE, DET        |
| 635                        | R336     | 5232-154J16P  | RES, CBN 1/6P 150K | 542                  | D201     | 5635-HZ9A1L          | DIODE, ZENER      |
| 632                        | R337     | 5232-823J16P  | RES, CBN 1/6P 82K  | 542                  | D202     | 5635-HZ9A1L          | DIODE, ZENER      |
| 627                        | R338     | 5232-333J16P  | RES, CBN 1/6P 33K  | <b>CONTROLS</b>      |          |                      |                   |
| 642                        | R401     | 5135-103522   | RES, CBN 1/2P 10K  | 595                  | VR301    | 5101-20101937        | RES, SEMI FIX 200 |
| 606                        | R402     | 5232-101J16P  | RES, CBN 1/6P 100  | 595                  | VR302    | 5101-20101937        | RES, SEMI FIX 200 |
| 645                        | R403     | 5135-473522   | RES, CBN 1/2P 47K  | <b>MISCELLANEOUS</b> |          |                      |                   |
| 629                        | R404     | 5232-473J16P  | RES, CBN 1/6P 47K  | 528                  | X201     | 5691-00846731        | XTAL, OSC         |
| <b>INTEGRATED CIRCUITS</b> |          |               |                    | 672                  | CN101    | 4443-0501102         | CONNECTOR         |
| 502                        | IC102    | 5654-M51564P  | IC, DIGITAL        | 671                  | CN102    | 4443-0601140         | CONNECTOR         |
| 508                        | IC103    | 5653-STA341M  | IC, LINEAR         | 671                  | CN103    | 4443-0601140         | CONNECTOR         |
| 503                        | IC201    | 5654-M50422P  | IC, DIGITAL        | 670                  | CN104    | 4443-0401140         | CONNECTOR         |
| 504                        | IC202    | 5654-M5M4416P | IC, DIGITAL        |                      |          |                      |                   |

| Ser. No. | Ref. No. | Part No.     | Description  |
|----------|----------|--------------|--------------|
| 669      | CN105    | 4443-0301102 | CONNECTOR    |
| 687      | TM3      | 4214-11031   | TERMINAL     |
| 687      | TM4      | 4214-11031   | TERMINAL     |
| 686      | TP1      | 4214-132     | TERMINAL     |
| 686      | TP101    | 4214-132     | TERMINAL     |
| 686      | TP102    | 4214-132     | TERMINAL     |
| 686      | TP103    | 4214-132     | TERMINAL     |
| 686      | TP104    | 4214-132     | TERMINAL     |
| 686      | TP105    | 4214-132     | TERMINAL     |
| 686      | TP106    | 4214-132     | TERMINAL     |
| 686      | TP107    | 4214-132     | TERMINAL     |
| 686      | TP108    | 4214-132     | TERMINAL     |
| 686      | TP109    | 4214-132     | TERMINAL     |
| 686      | TP401    | 4214-132     | TERMINAL     |
| 686      | TP402    | 4214-132     | TERMINAL     |
| 664      | J1       | 4482-0131    | PIN JACK, 2P |
| 216      |          | 2132-7049    | SPACER, R2   |
| 217      |          | 2132-5049    | SPACER, Q2   |

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

|     |      |               |                              |
|-----|------|---------------|------------------------------|
| 559 | C402 | 5345-226A0961 | CAP, MINI ELE 22 $\mu$ /6.3V |
| 560 | C403 | 5345-226E0961 | CAP, MINI ELE 22 $\mu$ /35V  |
| 592 | C404 | 5361-103ZF    | CAP, CER .01 $\mu$           |
| 570 | C405 | 5361-102KB    | CAP, CER 1000p               |

**RESISTORS**

|     |      |              |                   |
|-----|------|--------------|-------------------|
| 652 | R405 | 5232-103J16P | RES, CBN 1/6P 10K |
| 652 | R406 | 5232-103J16P | RES, CBN 1/6P 10K |
| 652 | R407 | 5232-103J16P | RES, CBN 1/6P 10K |
| 652 | R408 | 5232-103J16P | RES, CBN 1/6P 10K |
| 652 | R409 | 5232-103J16P | RES, CBN 1/6P 10K |
| 652 | R410 | 5232-103J16P | RES, CBN 1/6P 10K |
| 654 | R411 | 5135-103522  | RES, CBN 1/2P 10K |
| 654 | R412 | 5135-103522  | RES, CBN 1/2P 10K |
| 654 | R413 | 5135-103522  | RES, CBN 1/2P 10K |
| 652 | R414 | 5232-103J16P | RES, CBN 1/6P 10K |
| 651 | R415 | 5232-101J16P | RES, CBN 1/6P 100 |
| 651 | R416 | 5232-101J16P | RES, CBN 1/6P 100 |
| 651 | R417 | 5232-101J16P | RES, CBN 1/6P 100 |
| 651 | R418 | 5232-101J16P | RES, CBN 1/6P 100 |

**INTEGRATED CIRCUIT**

|     |       |               |             |
|-----|-------|---------------|-------------|
| 501 | IC401 | 5654-M752-402 | IC, DIGITAL |
|-----|-------|---------------|-------------|

**DIODES**

|     |      |             |            |
|-----|------|-------------|------------|
| 535 | D401 | 5631-1S2473 | DIODE, DET |
| 535 | D402 | 5631-1S2473 | DIODE, DET |
| 535 | D403 | 5631-1S2473 | DIODE, DET |
| 534 | D404 | 5631-1SS133 | DIODE, DET |
| 534 | D405 | 5631-1SS133 | DIODE, DET |
| 534 | D406 | 5631-1SS133 | DIODE, DET |
| 535 | D407 | 5631-1S2473 | DIODE, DET |

**MISCELLANEOUS**

|     |       |               |              |
|-----|-------|---------------|--------------|
| 660 | S401  | 4431-A017240  | SWITCH, PUSH |
| 660 | S402  | 4431-A017240  | SWITCH, PUSH |
| 660 | S403  | 4431-A017240  | SWITCH, PUSH |
| 660 | S404  | 4431-A017240  | SWITCH, PUSH |
| 660 | S405  | 4431-A017240  | SWITCH, PUSH |
| 660 | S406  | 4431-A017240  | SWITCH, PUSH |
| 660 | S407  | 4431-A017240  | SWITCH, PUSH |
| 661 | S408  | 4431-A010196  | SWITCH, PUSH |
| 661 | S409  | 4431-A010196  | SWITCH, PUSH |
| 661 | S410  | 4431-A010196  | SWITCH, PUSH |
| 658 | FL401 | 5722-26       | TUBE DISPLAY |
| 680 | JL101 | 4242-R0105181 | JUMPER LEAD  |
| 680 | JL102 | 4242-R0105181 | JUMPER LEAD  |
| 680 | JL103 | 4242-R0105181 | JUMPER LEAD  |
| 681 | JL104 | 4242-R0104181 | JUMPER LEAD  |
| 679 | JL105 | 4242-R0107181 | JUMPER LEAD  |

| Ser. No. | Ref. No. | Part No. | Description |
|----------|----------|----------|-------------|
|----------|----------|----------|-------------|

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

|     |             |               |                    |
|-----|-------------|---------------|--------------------|
| 593 | $\Delta$ C1 | 5352-S010M103 | CAP, MTL .01 $\mu$ |
|-----|-------------|---------------|--------------------|

**RESISTORS**

|      |             |              |                              |
|------|-------------|--------------|------------------------------|
| 042B | $\Delta$ R1 | 5135-335J50P | RES, CBN 1/2P 3.3M <b>G</b>  |
| 042C | $\Delta$ R1 | 5135-335J50P | RES, CBN 1/2P 3.3M <b>GB</b> |
| 042D | $\Delta$ R1 | 5135-335J50P | RES, CBN 1/2P 3.3M <b>BB</b> |

**MISCELLANEOUS**

|     |             |            |               |
|-----|-------------|------------|---------------|
| 662 | $\Delta$ S1 | 4433-00702 | SWITCH, POWER |
| 685 | TM1         | 4214-11024 | TERMINAL      |
| 685 | TM2         | 4214-11024 | TERMINAL      |

**PCB-4 PICK-UP DRIVE P.C. BOARD****CAPACITORS**

|     |      |              |                              |
|-----|------|--------------|------------------------------|
| 733 | C101 | 5361-103ZF   | CAP, CER .01 $\mu$           |
| 734 | C103 | 5361-101KSL  | CAP, CER 100p                |
| 734 | C104 | 5361-101KSL  | CAP, CER 100p                |
| 712 | C107 | 5361-680KSL  | CAP, CER 68p                 |
| 713 | C108 | 5361-333ZF   | CAP, CER .033 $\mu$          |
| 712 | C109 | 5361-680KSL  | CAP, CER 68p                 |
| 729 | C124 | 5345-107B041 | CAP, MINI ELE 100 $\mu$ /10V |
| 729 | C125 | 5345-107B041 | CAP, MINI ELE 100 $\mu$ /10V |
| 714 | C130 | 5361-180JCH  | CAP, CER 18p                 |
| 733 | C501 | 5361-103ZF   | CAP, CER .01 $\mu$           |
| 728 | C502 | 5345-106C041 | CAP, MINI ELE 10 $\mu$ /16V  |
| 731 | C504 | 5361-221KSL  | CAP, CER 220p                |
| 732 | C505 | 5361-121KSL  | CAP, CER 120p                |
| 729 | C506 | 5345-107B041 | CAP, MINI ELE 100 $\mu$ /10V |
| 729 | C507 | 5345-107B041 | CAP, MINI ELE 100 $\mu$ /10V |
| 729 | C508 | 5345-107B041 | CAP, MINI ELE 100 $\mu$ /10V |

**RESISTORS**

|     |      |              |                    |
|-----|------|--------------|--------------------|
| 715 | R101 | 5232-183J16P | RES, CBN 1/6P 18K  |
| 716 | R102 | 5232-563J16P | RES, CBN 1/6P 56K  |
| 726 | R103 | 5232-104J16P | RES, CBN 1/6P 100K |
| 739 | R105 | 5232-683J16P | RES, CBN 1/6P 68K  |
| 739 | R109 | 5232-683J16P | RES, CBN 1/6P 68K  |
| 722 | R110 | 5232-103J16P | RES, CBN 1/6P 10K  |
| 717 | R145 | 5232-272J16P | RES, CBN 1/6P 2.7K |
| 725 | R146 | 5232-562J16P | RES, CBN 1/6P 5.6K |
| 727 | R501 | 5135-270522  | RES, CBN 1/2P 27   |
| 718 | R503 | 5232-331J16P | RES, CBN 1/6P 330  |
| 724 | R504 | 5232-105J16P | RES, CBN 1/6P 1M   |
| 722 | R505 | 5232-103J16P | RES, CBN 1/6P 10K  |
| 719 | R506 | 5232-222J16P | RES, CBN 1/6P 2.2K |
| 720 | R507 | 5232-821J16P | RES, CBN 1/6P 820  |
| 719 | R508 | 5232-222J16P | RES, CBN 1/6P 2.2K |
| 726 | R509 | 5232-104J16P | RES, CBN 1/6P 100K |
| 721 | R510 | 5232-332J16P | RES, CBN 1/6P 3.3K |
| 722 | R511 | 5232-103J16P | RES, CBN 1/6P 10K  |
| 723 | R513 | 5135-103522  | RES, CBN 1/2P 10K  |

**INTEGRATED CIRCUITS**

|     |       |              |            |
|-----|-------|--------------|------------|
| 507 | IC101 | 5653-CX20109 | IC, LINEAR |
| 510 | IC501 | 5653-M5218L  | IC, LINEAR |

**TRANSISTORS**

|     |      |              |               |
|-----|------|--------------|---------------|
| 517 | Q501 | 5612-647 (C) | XISTOR, PNP A |
| 512 | Q502 | 5611-RN2202  | XISTOR, PNP R |

**DIODE**

|     |      |             |            |
|-----|------|-------------|------------|
| 737 | D501 | 5631-1SS133 | DIODE, DET |
|-----|------|-------------|------------|

**CONTROLS**

|     |       |               |                    |
|-----|-------|---------------|--------------------|
| 597 | VR101 | 5101-10401933 | RES, SEMI FIX 100K |
| 735 | VR501 | 5101-50201933 | RES, SEMI FIX 5K   |

**MISCELLANEOUS**

|     |       |               |               |
|-----|-------|---------------|---------------|
| 676 | CN502 | 4443-01301016 | CONNECTOR     |
| 677 | JL501 | 4163-01409006 | CONNECTOR W/W |
| 673 | JL502 | 4163-01701005 | CONNECTOR W/W |
| 674 | JL503 | 4163-01702003 | CONNECTOR W/W |

| Ser. No. | Ref. No. | Part No. | Description |
|----------|----------|----------|-------------|
|----------|----------|----------|-------------|

**ABBREVIATIONS IN PARTS LIST****CAPACITORS**

CAP, MINI ELE : Electrolytic  
 CAP, CER : Ceramic  
 CAP, PPP : Polypropylene  
 CAP, MYL : Mylar  
 CAP, MCA : Mica  
 CAP, MINI BP : Bipolar  
 CAP, ELE BP : Electrolytic Bipolar  
 470  $\mu$  : 470  $\mu$  F  
 6800p : 6800pF  
 .047  $\mu$  : 0.047  $\mu$  F

**RESISTORS**

RES, CBN 1/6P : Carbon 1/6W  
 RES, FUSE : Fuse  
 RES, CEM 5P : Cement 5W  
 RES, MTL 1P : Metal 1W  
 2.2K : 2.2k $\Omega$   
 220 : 220 $\Omega$

**TRANSISTORS**

XISTOR : Transistor  
 FET : Field Effect Transistor

**CONTROLS**

RES, SEMI FIX : Semi-fixed Resistor

**CHASSIS MISCELLANEOUS**

|                  |               |                                    |
|------------------|---------------|------------------------------------|
| 666 $\Delta$ P1  | 4161-01401232 | CORD W/PLUG <b>UA</b> <b>BK</b>    |
| 666B $\Delta$ P1 | 4161-7256     | CORD W/PLUG <b>G</b>               |
| 666C $\Delta$ P1 | 4161-7256     | CORD W/PLUG <b>GB</b>              |
| 666D $\Delta$ P1 | 4161-04100    | CORD W/PLUG <b>BB</b>              |
| 041B $\Delta$ S2 | 4411-102729   | SWITCH, ROTARY <b>G</b>            |
| 041C $\Delta$ S2 | 4411-102729   | SWITCH, ROTARY <b>GB</b>           |
| 041D $\Delta$ S2 | 4411-102729   | SWITCH, ROTARY <b>BB</b>           |
| 683 $\Delta$ T1  | 5584-701548   | XFORMER, POWER <b>UA</b> <b>BK</b> |
| 683B $\Delta$ T1 | 5584-702548   | XFORMER, POWER <b>G</b>            |
| 683C $\Delta$ T1 | 5584-702548   | XFORMER, POWER <b>GB</b>           |
| 683D $\Delta$ T1 | 5584-702548   | XFORMER, POWER <b>BB</b>           |

**NOTE**

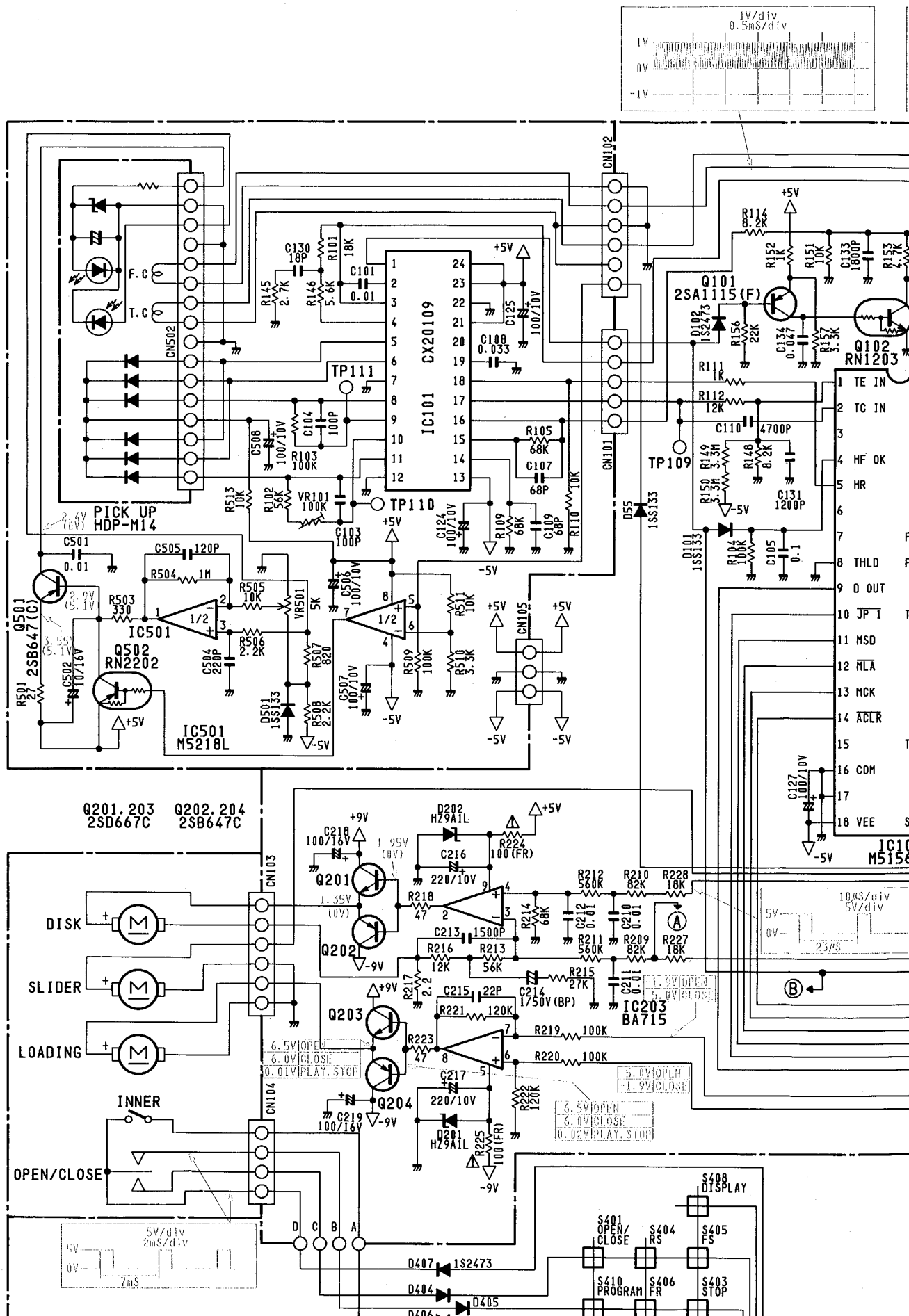
SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

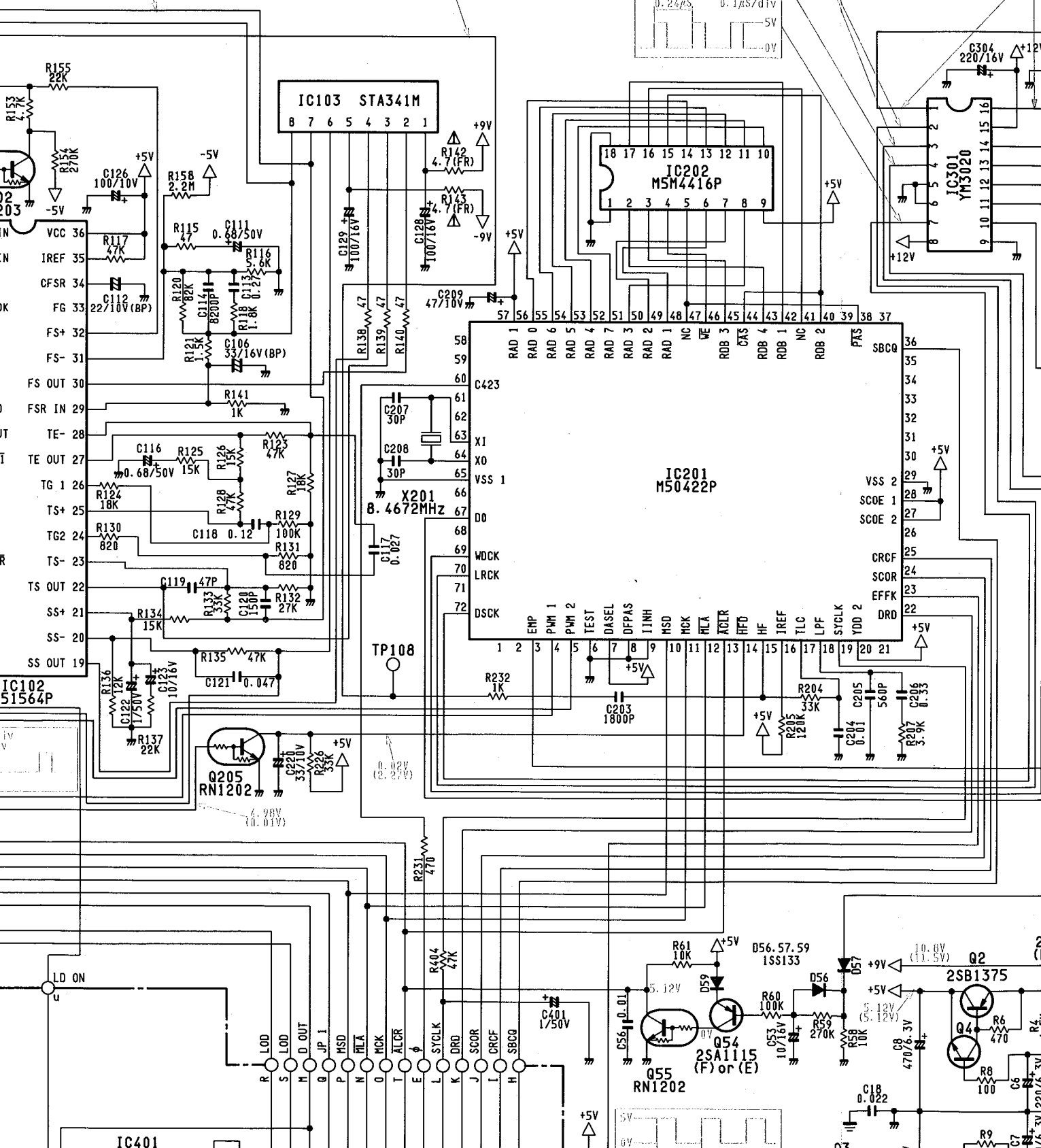
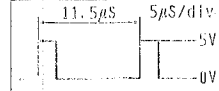


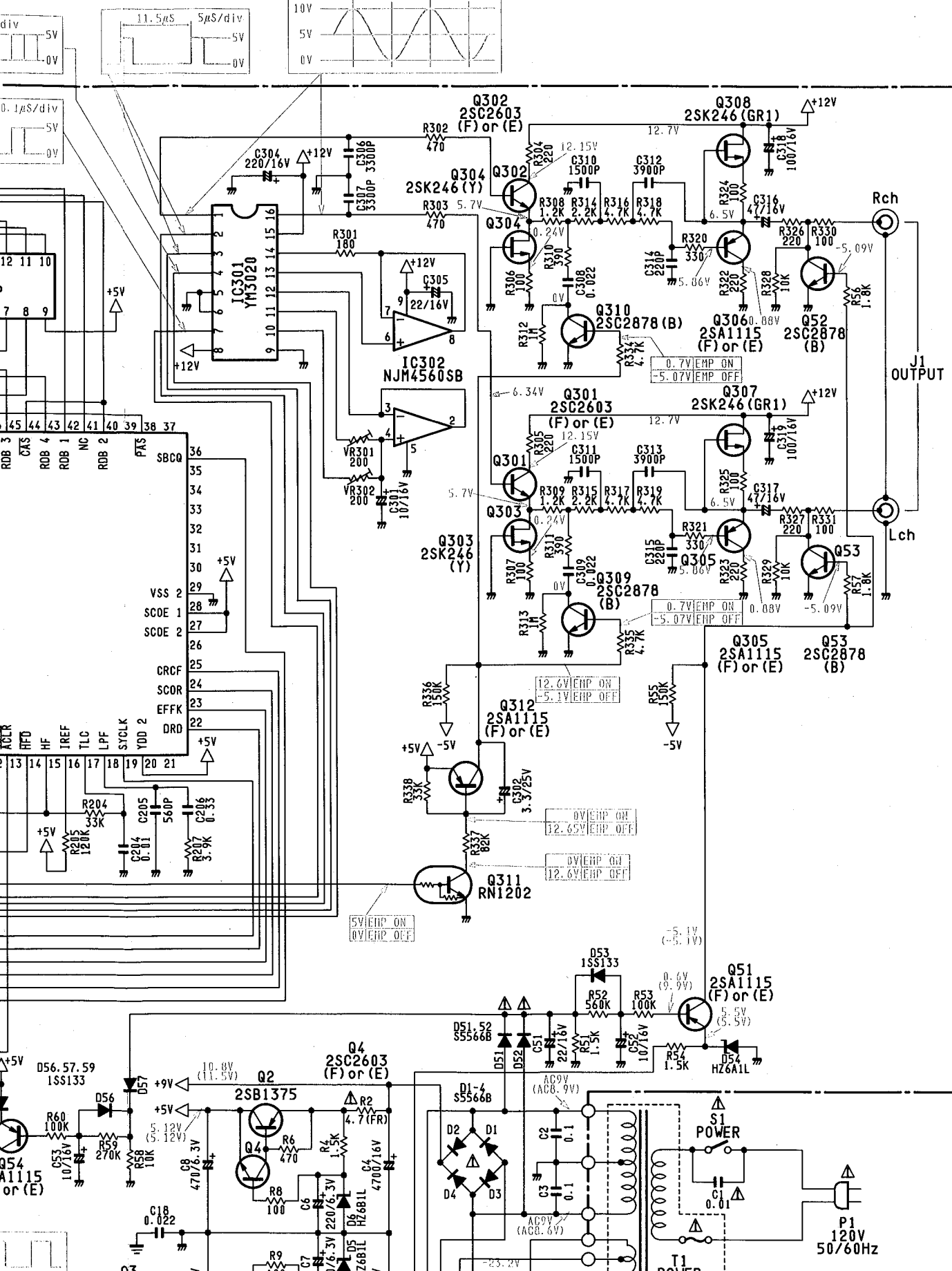
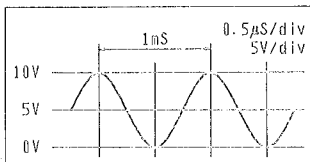
NOTE:

1. ALL RESISTANCES VALUES ARE IN  $\Omega$ , K $\Omega$ =1000 $\Omega$ , M $\Omega$ =1000K $\Omega$ .
2. ALL CAPACITANCES VALUES ARE IN  $\mu$ F UNLESS OTHERWISE NOTED. P=PPF.
3. ...V:DC VOLTAGE AT NO SIGNAL UNLESS OTHERWISE NOTED.
4. SAFETY REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

# SCHEMATIC DIAGRAM

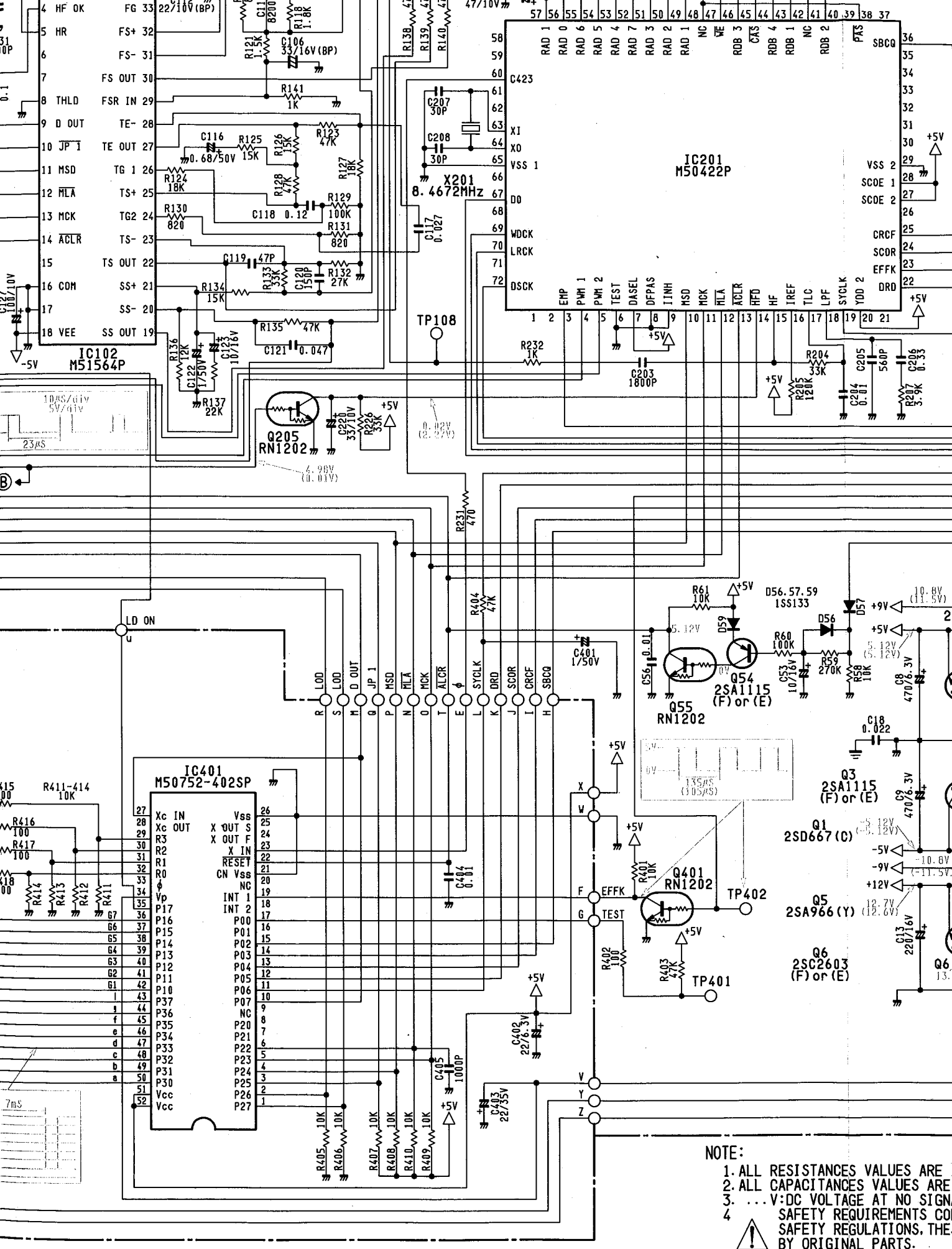


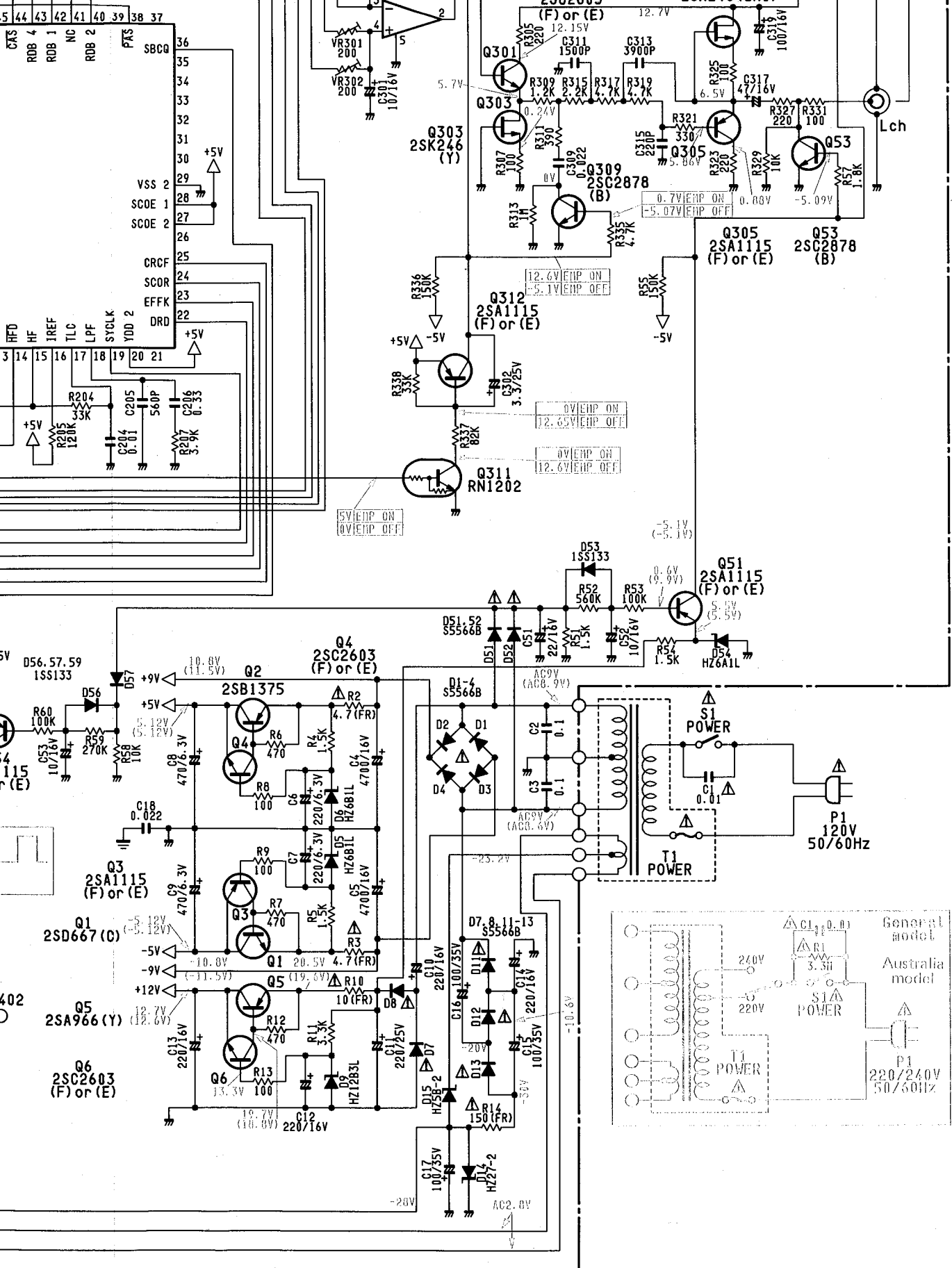












ALL RESISTANCES VALUES ARE IN  $\Omega$ , K $\Omega$ =1000 $\Omega$ , M $\Omega$ =1000K $\Omega$ .  
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 SAFETY REGULATIONS THESE COMPONENTS MUST ONLY BE REPLACED  
 BY ORIGINAL PARTS.