ORDER NO. AD9803059C1
A6

Service Manual

Portable CD Player

SL-S232C

COMPACT disc DIGITAL AUDIO

MASH* multi-stage noise shaping

* MASH is a trademark of NTT.

Colour
(S) ..... Silver Type

Area
(P) ..... U.S.A.

Traverse Deck: RAE0145Z Mechanism Series

Specifications

Audio

No. of channels:	2 channels (left and right, stereo)
Frequency response:	20 to 20,000 Hz (+0.5 dB to -1.5 dB)
Output voltage:	0.6 V (50 kΩ) diameter 3.5 stereo mini jack
S/N:	more than 94 dB (Anti-shock memory OFF)
Wow and flutter:	Below measurable limit
DA converter:	1 bit, MASH*
Headphone output level:	max.9 mW+9 mW/16 Ω (adjustable) stereo mini jack diameter 3.5

Pickup

Light source:	Semiconductor laser
Wavelength:	780 nm

General

Operation temperature range:	0–40 degree (32–104 fahrenheit)
Rechargeable temperature range:	5–40 degree (41–104 fahrenheit)
Power supply:	DC 4.5 V

Power consumption:	Anti-shock memory OFF/ON
AC adaptor;	2.8 W / 3.0 W
Battery (DC 3V);	0.4 W / 0.4 W
When recharging;	3.6 W

Playing time
(When used in hold mode, at 25 degree (77 fahrenheit) temperature and on flat and stable surface.)

Battery used:	Anti-shock memory OFF/ON
Panasonic Alkaline dry cell batteries(LR6, 2pcs.);	Approx. 19 h / 19 h
Optional Rechargeable batteries (P-3GAVA/2B);	Approx. 10 h / 10 h

The play time may be less depending on the operating conditions.

Recharging time:	
P-3GAVA/2B;	Approx. 5 h
Dimensions (W × H × D):	128 × 27.8 × 144 mm ($5^{1}/_{16}$" / $1^{3}/_{32}$" / $5^{11}/_{16}$")
Weight:	265 g (9.4 ounce) with batteries 220 g (7.8 ounce) without batteries

Car kit

Cassete adaptor:	
Frequency response;	30-20,000Hz (This is the rating for the head section of the product.)
Dimensions (W × H × D);	102.4 × 12.1 × 63.8 mm
Weight / Cable length;	42 g / More than 1.4m

Car adaptor:	
Input;	DC 12 / 24 V
Output;	DC 4.5 V (0.6 A)
Dimensions (W × H × D);	104 × 32 × 33 mm
Cable length;	More than 1.5m

Note: Specifications are subject to change without notice.
Weight and dimensions are approximate.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

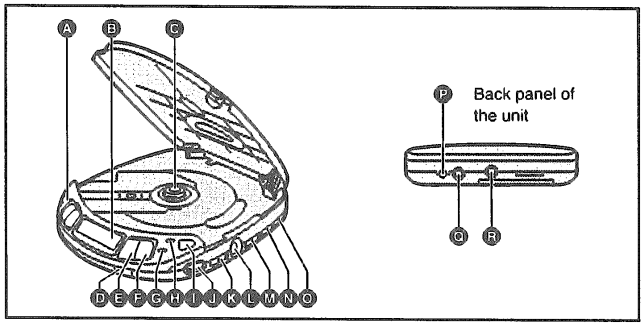
Contents

Precaution of Laser Diode

CAUTION: This unit utilizes a class 1 laser. Invisible laser radiation is emitted from the optical pickup lens when the unit is turned on :

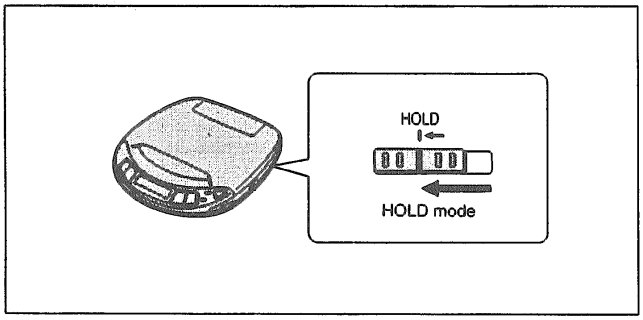
1. Do not look directly into the pickup lens.
2. Do not use optical instruments to look at the pickup lens.
3. Do not adjust the preset variable resistor on the optical pickup.
4. Do not disassemble the optical pickup unit.
5. If the optical pickup is replaced, use the manufactures specified replacement pickup only.
6. Use of control or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Location of Controls



- **Ⓐ Skip/search buttons (⏮, ⏭ •SKIP ⇔ SEARCH)**
- **Ⓑ Display**
- **Ⓒ CD release button (PUSH)**
- **Ⓓ Remote sensor (SENSOR)**
- **Ⓔ Play/pause button (▶ ❚❚)**
- **Ⓕ Stop/power off button (■, POWER OFF)**
- **Ⓖ Memory/recall button (MEMORY/RECALL)**
- **Ⓗ Repeat button (REPEAT)**
- **Ⓘ Open button (OPEN)**
- **Ⓙ Headphones volume control (VOLUME)**
- **Ⓚ XBS selector (XBS)**
- **Ⓛ Headphones jack (∩)**
- **Ⓜ Play mode selector (RESUME, NORMAL, RANDOM)**
- **Ⓝ Hold switch (HOLD)**
- **Ⓞ Anti-shock switch (ANTI-SHOCK)**
- **Ⓟ Out jack (OUT)**
- **Ⓠ DC in jack (⟡⊖⟡ DC IN 4.5 V)**
- **Ⓡ Hole for car insulator mounting screw**

HOLD Function



This function causes the unit to ignore short, accidental button presses. (The disc lid can still be opened and closed.)

The HOLD function prevents the following:

- Powering on the unit accidentally (which can cause the batteries to go dead).
- Play being cut off unexpectedly in the middle of a selection.

To use the HOLD function

Set HOLD to the HOLD position.

"hold" indication

When the unit is in hold status, pressing any button (other than the OPEN button) causes the indication "hold" to appear on the display.

When the unit is powered off

The "hold" indication appears only when ▶ ❚❚ button is pressed.

Before operating the buttons

Be sure to move HOLD to release the unit from the hold mode.

Accessories

AC adaptor (RFEA403C-S) ..... 1pc.	Stereo headphones (RFEV705P-KS) ..... 1pc.	Car adaptor (SH-CDC10PPY) ..... 1pc.
Car stereo cassette adaptor (SH-CDM10APYK) ..... 1pc.	Wireless remote control (RAK-SL927MH) ..... 1pc.	Battery for wireless remote control (CR2025-1P0D) ..... 1pc.
Velcro tape (RMF0255) ..... 1pc.		

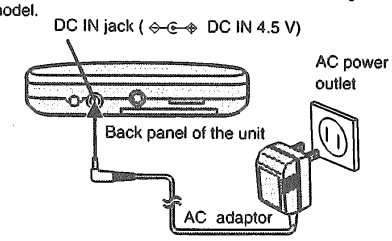
Power Supply Preparations

Refer to the specifications for information on operating times when using rechargeable batteries or dry-cell batteries.

Using the AC adaptor

Connect the AC adaptor supplied.

The configuration of the AC adaptor differs according to the model.



Using rechargeable batteries

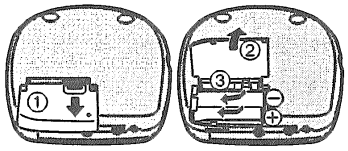
Obtain the optional rechargeable batteries for SL-S230.

Be sure to recharge the batteries before using them. The unit cannot be used to charge rechargeable batteries other than those specifically designed for it.

- Supplied batteries (RP-BP60)
- Optional batteries (P-3GAVA/2B, SH-CDB8D)

Recharging procedure

1 Insert the special rechargeable batteries into the unit.



2 Connect the AC adaptor.

Refer to "Using the AC adaptor" for connection instructions.

When recharging starts, the "⊡" charging indicator flashes on and off on the unit's display.

Length of time needed to fully recharge

Optional batteries

P-3GAVA/2B: about 5 hours
SH-CDB8D: about 3 hours

(After recharging of the batteries is complete, the "⊡" charging indicator will continue to flash.)

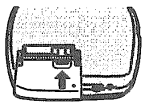
3 When recharging is complete, unplug the AC adaptor from the power outlet and the DC IN jack.

Notes

- Rechargeable batteries have a service life of approximately 300 charge-discharge cycles. If the operating time on one full charge becomes noticeably shorter than it used to be, the battery has reached the end of its service life and should be replaced.
- You can operate the unit with the AC adaptor while recharging the batteries, but it will lengthen the recharging time.
- The AC adaptor and rechargeable batteries may become warm while recharging is in progress. This is not a malfunction.

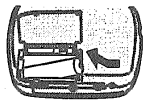
If the battery lid comes loose

Slide the lid back into place horizontally.



Removing batteries

Push up on the battery in the direction indicated by the arrow. Then lift it out.



Using the car adaptor

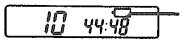
The SL-S232C come with a car adaptor.
Be sure to use the adaptor specially designed for this model. (Refer to the separate installation instructions.)

Using dry-cell batteries (not included)

After disconnecting the AC adaptor, insert two "AA" (LR6) alkaline batteries.

The procedure for inserting and removing dry-cell batteries is identical to that for rechargeable batteries.

Battery indicator



This indicator flashes on and off when the batteries are almost out of power. Power is cut off completely a short while later.

Rechargeable batteries: Recharge batteries.
Dry-cell batteries: Replace batteries with new ones.

Notes

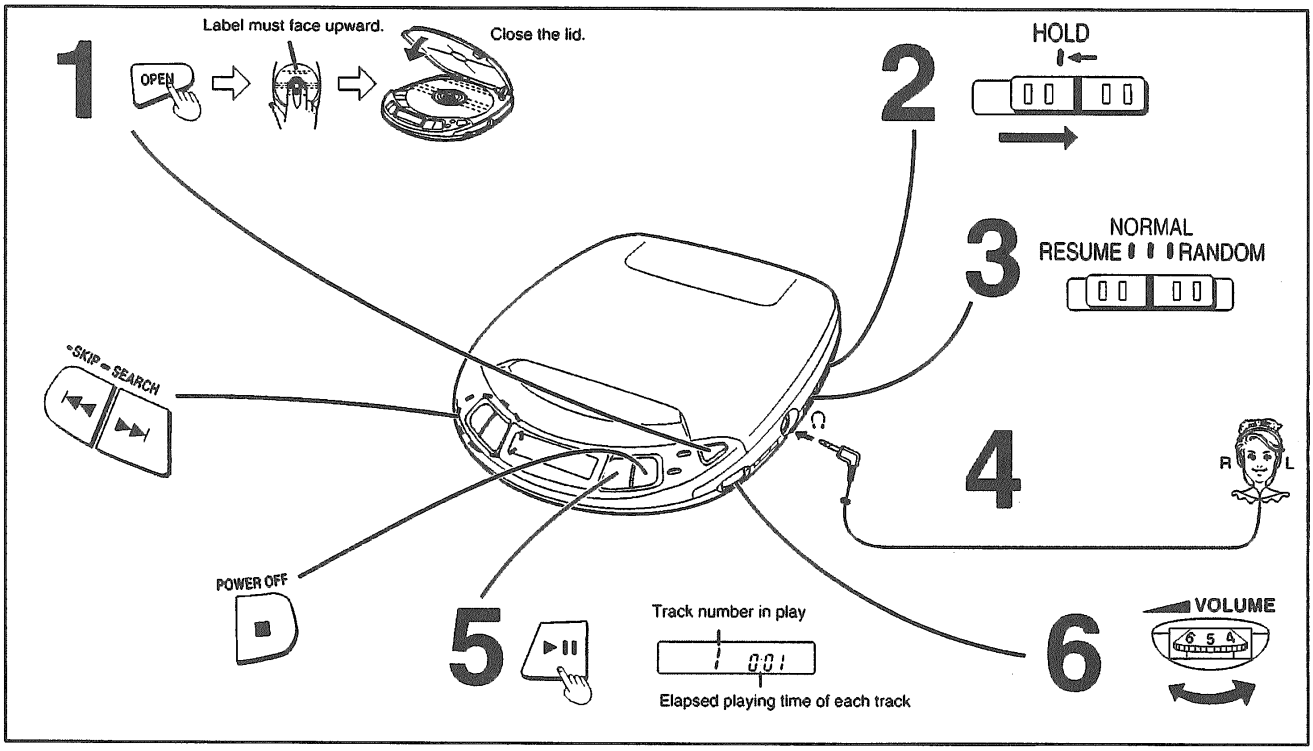
- The length of time the unit will continue to operate between when the battery indicator starts flashing and when the power is cut off differs depending on the type of batteries used.
- The battery indicator may not flash if rechargeable batteries, other than those designated by Panasonic, are used.

If the unit malfunctions or freezes during use, then disconnect the power sources (the AC adaptor and batteries).
Re-connect the power source and continue operation.

Troubleshooting Guide

Problem	Check this
Cannot close cover.	Is the disc properly secured in place?
Cannot play discs.	•Is the unit in hold status? •Is the disc properly secured in place? •Is there condensation on the lens? (Wait for about an hour and then try again.)
Cannot remove disc.	Did you press the PUSH button to release the disc?
Tracks on disc do not play in order, starting with the first track.	Is the RESUME, NORMAL, RANDOM (play mode selector) slider in the NORMAL position?
Cannot hear music—too noisy.	•Is the headphones/earphones plug inserted all the way? •Is the plug dirty? (Wipe away dirt on plug.)
TV picture is distorted. Radio reception is noisy.	Are you using the unit body too near a TV or tuner? (If the TV or tuner is connected to a simple indoor antenna, connect it to an outdoor antenna.)
No operation with wireless remote control	•Is the unit turned off while rechargeable batteries or dry cell batteries are being used? Press ▶ ❚❚ on unit and then proceed with operation. •Has lithium battery been inserted? If it has, is its voltage low?

■ Sequential Play



Following steps 1–6.

In step 4, connect the stereo headphones/earphones to the ∩ jack. **(Plug in firmly.)**

- Play stops automatically when all the tracks have been played.
- If the unit has been connected to the car audio system, adjust the volume level between 4 and 6 on the unit, then adjust the volume level on the system.

Operation	Button	Display/reference
To pause play	Press during play. ▶II	Press again to resume play.
To stop play **Stop mode**	Press during play. POWER OFF ■	Total number of tracks → Total playing time
To turn off the unit Off mode	Press during stop mode. POWER OFF ■	
Skip forward/ backward (skip function)	Press during play. (Backward) (Forward) •SKIP ⇔ SEARCH ◀◀ ▶▶	• During program play, these buttons are used to skip forward or back through the programmed sequence of tracks • During random play, the skip buttons cannot be used to skip back to tracks that were played previously in the random sequence. • During program play, random play or 1 track repeat play, search operation is limited to the current track only.
Rapid forward/ backward (search function)	Keep depressed during play.	

Backlight

The backlight comes on to illuminate the display panel when the unit is used with a AC adaptor or car adaptor.

For your reference:

"no dISC" indication

This indication appears for about 30 seconds if the ▶ II button is pressed when no disc is loaded in the unit or if the disc is not completely seated.

"OPEN" indication

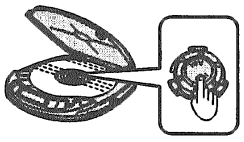
This indication appears for about 10 minutes when the cover is opened. (However, the indication does not appear when the unit is powered off.)

Note

Never insert foreign objects into the unit body.

Removing discs

After the disc has stopped rotating, press the PUSH button to release the disc. (To protect the disc, never open the cover while it is playing.)



Auto power off function

If the unit is left in stop or paused status for approximately 10 minutes, the unit powers itself off automatically in order to prevent the battery from running down.
(If no disc is loaded in the unit, it powers itself off in 30 seconds.)

■ Other Play Methods

The letter such as Ⓐ in the various illustrations in the "Location of Control" section.

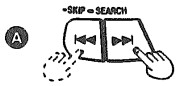
Skip play

The disc plays from the specific track through to the end, then play stops automatically.

Preparation: Put unit in stop mode.

1

2 **Select the desired track.**



3

Random play

1

2

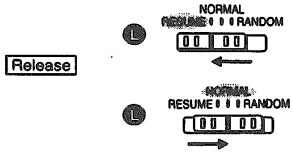
Release

For your reference:

- It is also possible to press the ▶▶| while the unit is in stop status to change the first track to be played. (All tracks are played eventually, regardless of which is played first.)
- Program play is not possible in the random mode.

Resume play

This function allows you to listen from the beginning of the track where play stopped because the unit was powered off (or switched to stop status). It is useful when listening to CDs in the car, etc.



For your reference:

- If the RESUME, NORMAL, RANDOM (play mode selector) slider is put in the RESUME position, the all-repeat function will be activated automatically as soon as the unit is powered on.
- If power is cut off near the end of a track (power off status), playback may resume from the beginning of the next track.
- If the unit is powered off while a disc was playing and then a new disc is inserted, play will begin from the middle of the new disc because the unit remembers the position where play stopped on the old disc.

Program play

Up to 24 tracks can be entered in the program.

Preparation: Put unit in stop mode.

1

2 **Select the desired track.**

3 **Register in sequence.**
(The indication "M" and the programmed sequence appear on the display panel.)

4 **Repeat steps 2 and 3 to program all the desired tracks.**

5

■ **To program the same track in the sequence more than once**
After step 3, press MEMORY/RECALL the desired number of times.

■ **If "F" is displayed**
No more tracks may be added to the sequence.

■ **To confirm the contents of the programmed sequence**
Press MEMORY/RECALL while the disc is playing. (The number of the programmed tracks appear on the display panel in sequence.)

■ **To delete the entire programmed sequence**
Press ■, POWER OFF.

Repeat function

Press REPEAT while disc is playing or when unit is in stop status.

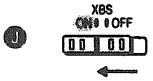
For your reference:
If REPEAT is pressed during program play, only the tracks in the program are repeated.
(The indication "ALL" is not displayed.)

The setting is switched in the sequence indicated below each time REPEAT is pressed.

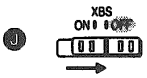
1-track repeat (1 ↻) ←
One track is repeated.
↓
All-track repeat (ALL ↻)
All the tracks on the disc are repeated.
↓
Cancel ——

Changing the sound quality

XBS ON:
Select this setting to boost the low-range response.



OFF:
Select this setting to turn off the XBS function.



■ Anti-Shock Function

Anti-shock works by reading audio data and storing it in memory (up to 10 seconds worth). The unit then fills in interruptions caused by bumps and vibrations with data from the memory. This unit also incorporates a powerful anti-shock mechanism that prevents skipping caused when play speed is changed by swining of the unit.

1

2

M.RESERVE indicator status	Unit body status	Play status (audio data status)
	Stable	Normal (plenty of data is stored)
	Bump encountered	Normal (stored data is used)
	Bumping stops	Normal (data again starts to be stored)
	Bumps continue repeatedly	Sound is interrupted (data buffer empty)

Notes

- The position of the ANTI-SHOCK slider can be changed during play. but this may cause a slight interruption in the sound because the disc's rotation speed changes.
- During anti-shock operation, the disc rotates at a higher rate than usual in order to collect extra audio data. This may cause the batteries to run out faster and could result in a slight increase in disc rotation noise.

Using the unit with an audio system

The ANTI-SHOCK uses digital signal compression technology. It is recommended that the ANTI-SHOCK be kept in the OFF position if the unit is connected to a home audio system.

■ Using the Unit Optional Accessories

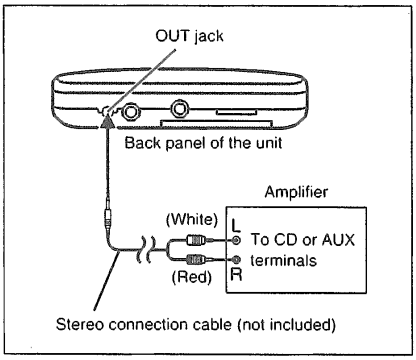
Using the unit with an audio system

Using a stereo connection cable (not included), you can hear CDs on your audio system.

- Connect the cable to the amplifier after turning off its power.
- Do not connect the cable to the PHONO jacks on the amplifier.
- Obtain the optional connecting cable if the amplifier comes with mini-phone jacks.
- Adjust the volume on the amplifier.

Note

Sound quality changes when XBS is selected, but volume is reduced by approximately fifty percent.



Using the unit with a car audio system

The SL-S232C come with the car adaptor and car stereo cassette adaptor.

Connect the car stereo cassette adaptor to the unit's headphones jack.
(When doing this, keep the unit's VOLUME control at a setting between 4 and 6.)

For securing the unit and connecting the power supply:

- Car adaptor (SH-CDC9)
- Car mounting kit (SH-CDF7)
  Car mounting arm, Car insulator

Note

It may not be possible to use the unit with some types of car stereo owing to restrictions imposed by the construction of the car stereo cassette adaptor.

For further details, refer to the instructions of the part concerned.

■ Cautions

Listening caution

Do not play your headphones or earphones at a high volume. Hearing experts advise against continuous extended play.

If you experience a ringing in your ears, reduce volume or discontinue use.

Do not use while operating a motorized vehicle. It may create a traffic hazard and is illegal in many areas.

You should use extreme caution or temporarily discontinue use in potentially hazardous situations.

Even if your headphones or earphones is an open-air type designed to let you hear outside sounds, don't turn up the volume so high that you can't hear what's around you.

Sound can be deceiving. Over time your hearing "comfort level" adapts to higher volumes of sound. So what sounds "normal" can actually be loud and harmful to your hearing.
Guard against this by setting your equipment at a safe level BEFORE your hearing adapts.
To establish a safe level:

- Start your volume control at a low setting.
- Slowly increase the sound until you can hear it comfortably and clearly, and without distortion.

Once you have established a comfortable sound level:

- Set the dial and leave it there.

Rechargeable batteries

- Only the RP-BP60, P-3GAVA/2B, SH-CDB8D batteries can be recharged.
- If the power delivered by the batteries lasts for a very short time after recharging, it means that the batteries' service life is over. Do not use them any more.
- Recharging already charged batteries will shorten their service life.
- When recharging batteries for the first time or when they have not been used for a long period of time, the play time may be shorter than usual. In a case like this, repeatedly recharge and discharge the batteries. This will restore them to their regular state.
- Do not allow any metal objects to touch the terminals of rechargeable batteries since this may cause short-circuiting which is dangerous.
- Do not peel off the plastic covering on the rechargeable batteries. Short-circuiting may occur which is dangerous.

Dry cell batteries/rechargeable batteries

To prevent damage to the batteries and electrolyte leakage, heed the following points.

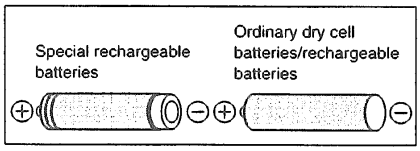
- Align the ⊕ and ⊖ polarities properly when inserting the batteries.
- Do not mix different types or makes of batteries or old and new batteries.
- Remove the batteries if you do not plan to use the unit for a long period of time.
- Do not throw batteries into a fire, and do not short-circuit, disassemble or subject them to excessive heat.
- Do not attempt to recharge dry cell batteries.

Carrying dry cell batteries/ rechargeable batteries around

When putting dry cell or rechargeable batteries in a pocket or bag, ensure that no other metal objects such as a necklace are placed together with them. Contact with metal may cause short-circuiting which, in turn, may cause a fire.
Be absolutely sure to carry the rechargeable batteries in the battery carrying case.

When purchasing rechargeable batteries

As a safety precaution, the portable CD players made by Panasonic have a construction designed to make it impossible to recharge ordinary batteries.
To use rechargeable batteries, be absolutely sure to purchase the rechargeable Ni-Cd batteries designed especially for this unit.
Special rechargeable Ni-Cd batteries: P-3GAVA/2B, SH-CDB8D (set of 2)
For details, check with your dealer.



When driving a car

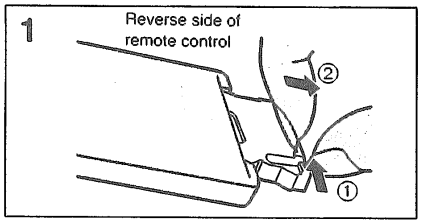
In the interest of traffic safety, do not operate the unit while driving.

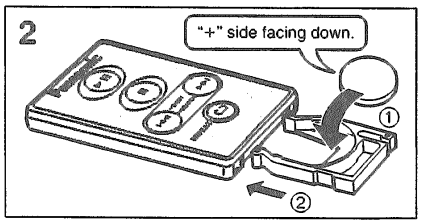
■ Using the Wireless Remote Control

The wireless remote control can be operated regardless of the hold mode of the unit.

Preparation

Installing the lithium battery





Notes

- Do not place any object which will block the path of the signals between the remote control and the unit.
- Do not allow the remote sensor or transmitter to become dusty.
- Do not leave the remote control standing in direct sunlight or in high temperature locations in a car.
- In the interest of traffic safety, do not operate the remote control while driving.
- Take every care to prevent small children from putting the lithium battery in their mouths or swallowing it. In the event that a child has swallowed a battery, consult with a physician immediately.

CAUTION:

The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge, disassemble, heat above 100°C (212°F), or incinerate. Replace battery with Panasonic part number CR 2025/1P0D only. Use of another battery may present a risk of fire or explosion.

Dispose of used battery promptly. Keep away from children.
Do not disassemble and do not dispose of in fire.

Operation

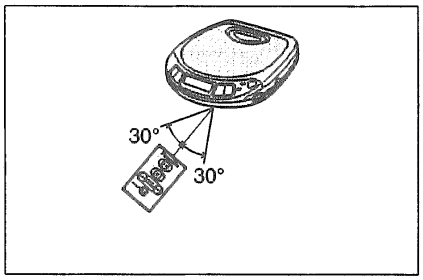
Preparation:

When the unit is to be operated using rechargeable batteries or dry cell batteries, first press ▶ ❚❚ on the unit and then use the remote control. (The unit cannot be operated by the remote control while the unit is turned off.)

	Initiates play/establishes pause mode when pressed again.
	Stops play/turns the unit off when kept depressed.
	Skip tracks (tap). Rapidly searches forward or backward during play (keep depressed).
	Repeat all track or single track.

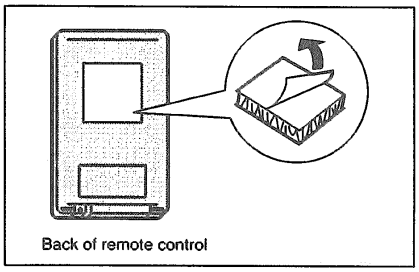
Remote control's operating range

- Point the transmitter on the remote control at the remote sensor on the unit.
- Use the remote control within a 7-meter range of the remote sensor on the unit.
  (Depending on the angle of the remote control, the signals may not reach the sensor.)



How to use the Velcro tape

To prevent misplacement of the remote control, it is recommended that the Velcro tape be used as shown in the figure below.



- Adhere the Velcro tape roughly in the center of the remote control's back surface.
- Before adhering the Velcro tape, choose a flat and even surface and wipe off any dirt.
- Avoid a location which is exposed to direct sunlight.

■ Car Kit Installation

● When the sound volume is extremely low

① **Set the play direction for the car audio system to the forward (FWD) direction.**

If the sound volume is still low:

② **Adjust the balance between the left and right channels of the car audio system**

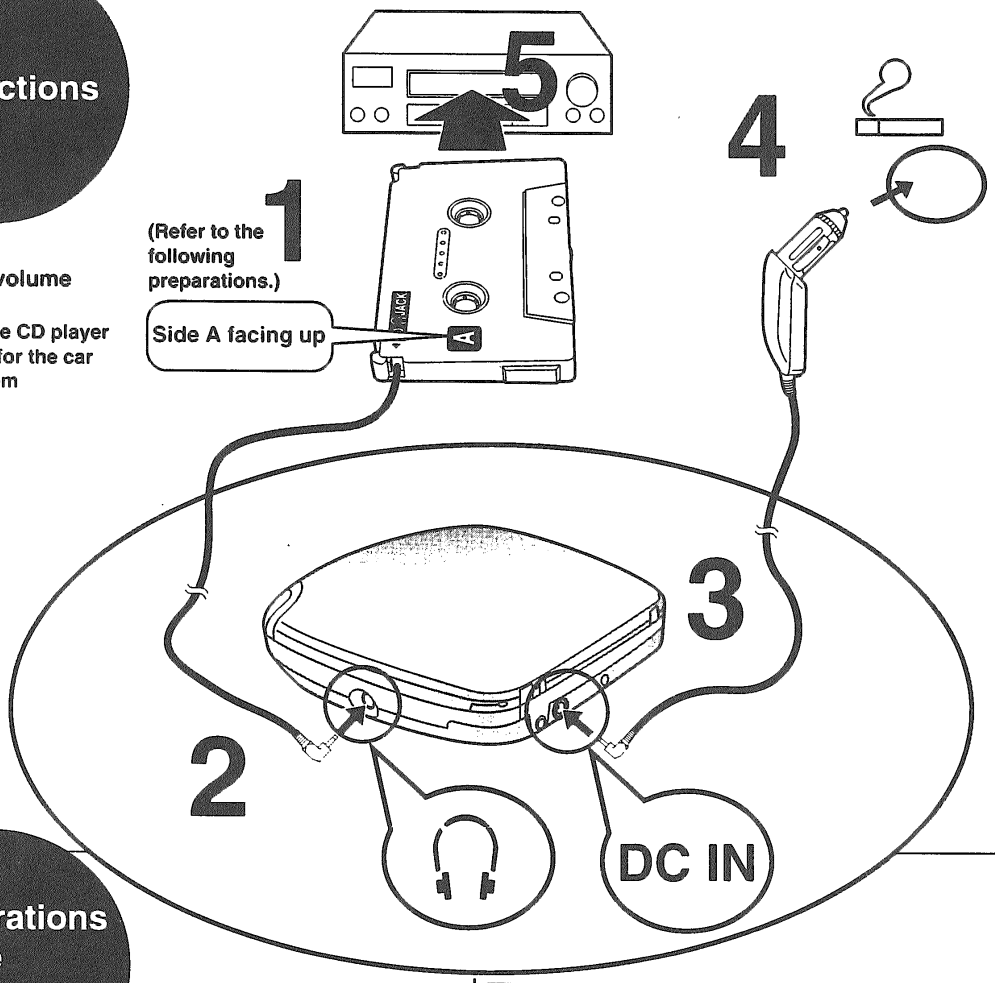
● Concerning the Car Audio System

Position the cassette adaptor with side A facing up and set the play direction for the car audio system to the forward (FWD) direction.
The head positions of the cassette adaptor and the car audio system do not match in the reverse direction, causing the sound volume from the speakers to be extremely low.

- When model SH-CDM10A is used with the auto-reverse car audio system, the play direction will be automatically set to forward (FWD).
- For manual reverse systems, switch to the side where the sound comes out.

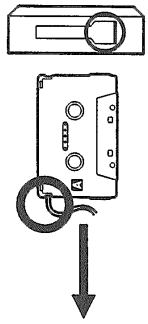
Connections

Adjust the volume level:
- 4 to 6 for the CD player
- as desired for the car audio system



Preparations for the cassette adaptor

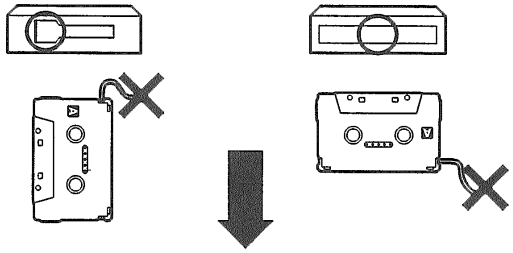
For a car audio system with the head at the right side



It can be used as it is.

For a car audio system with the head at the left side

For a car audio system in which the head is in the center at the rear



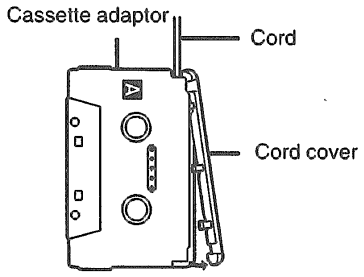
Change the direction in which the cord is led out.

Refer to the back side "To change the cord direction" for details.

● To change the cord direction

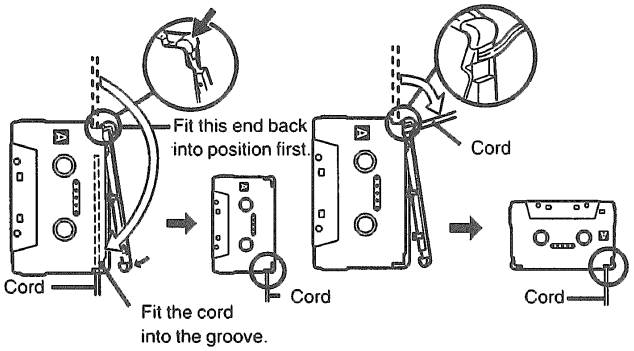
With some car audio systems it is necessary to change the direction in which the cord is led out.

1 Remove the cover of the cassette adaptor.



2 Pull out the cord, align it with the head section of the car audio system, and change the position from which it extends.

For a car audio system with the head at the left side	For a car audio system in which the head is in the center at the rear



● Car Audio System

■ When the car audio system has a blank skip function

The blank skip function may operate when the CD player stops. Therefore, be sure to set the blank skip function to off.

Note:

Depending on the type of vehicle, static may be heard if the unit is connected via line cord to the car audio system's CD IN jack or AUX IN jack. If this occurs, it is recommended that you use the provided cassette adaptor.

When you leave the car

Push the eject button to remove the cassette adaptor.

● Cautions

Please understand that we cannot take responsibility for the unit falling or any other damage that may occur as a result of faulty installation.

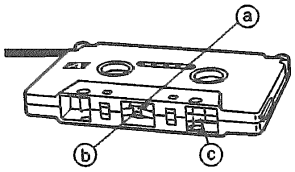
■ Car adaptor

- The provided car adaptor is made specifically for use with DC 4.5 V Panasonic portable CD players. Do not use it with other devices.
- Do not use the adaptor for a long period with the batteries left in the unit because this may shorten the life of the batteries.
- Pay attention to the car battery capacity when using this adaptor for a long period.
- Do not expose this adaptor to strong sunlight or very high temperatures.
- Be sure to remove this adaptor from the cigarette lighter socket when not using this adaptor or before leaving the automobile.
- The power source polarities of this unit are ⟐⊖⟐ , check the DC IN jack.

■ Cassette adaptor

- Bunch the excess cord together or place it so that it will not interfere with operation.
- Do not touch the head or tape.
- A protective film has been placed over the heads to prevent them from being damaged. Do not remove this film.

ⓐ Protective film ⓑ Head ⓒ Tape



- After use, remove the cassette adaptor and keep it so that no dust will adhere to the head section.
- After installing the cassette adaptor in the car audio system, do not allow its cord to make contact with the control section.
- The sound quality deteriorates when the head section of the car audio system becomes dirty. It is, therefore, a good idea to clean it periodically.
- Do not leave this adaptor in a vehicle which is exposed to direct sunlight.
- Do not bring any magnetized objects near this adaptor's head position.
- Because of the nature of its construction, the sound of something rotating can be heard in this adaptor. This is normal and not indicative of a malfunction.
- During the winter months when the temperature inside the vehicle falls to an extremely low level, there may be times when the unit cannot be used because the cord is too stiff to allow the adaptor to be installed in its proper position.
- If the pinch rollers or car audio capstan are dirty, it may not longer be possible to install the cassette adaptor in the car audio system. Clean the rollers and capstan using a cotton swab.

● Car Adaptor

The provided car adaptor must be connected.

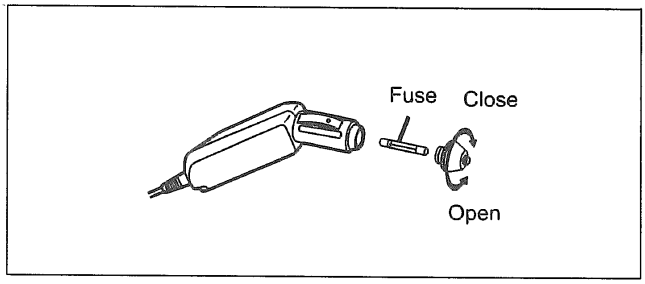
- This car adaptor can be used in an automobile which has a 12 V or 24 V battery. You can use it in a truck or other large vehicle. (This is a special-purpose negative ground car adaptor.)
- Do not connect the adaptor immediately after using the cigarette lighter.
- Leave a little slack in the car adaptor's cord, making sure that it does not run underneath the unit.

■ To replace the fuse

1 **Remove the plug cap by rotating it in the direction shown by the arrow, and take out the old fuse.**

2 **Insert the new fuse (125 V/250 V, 500 mA type) into the fuse receptacle and reinstall the plug cap.**

Note:
For continued protection against risk of fire, replace only with same type 125 V/250 V, 500 mA fuse.



If the fuse blows frequently, there may be something wrong with the adaptor. Consult your dealer.

● Troubleshooting Guide

Problem	Checkpoint	Remedy
The sound volume is extremely low.	Did you adjust the volume level of the unit?	Adjust the volume level of the unit to 4 or higher.
	Did you adjust the volume level of the car audio system?	Adjust the volume level of the car audio system to the desired level.
	Have you removed the cord cover of the cassette adaptor?	Install the cord cover properly.
	Does the car audio system have an auto-reverse function?	Set the play direction for the car audio system to the forward (FWD) direction. [The forward (FWD) direction is the side which produces sound or which has the greatest sound volume.]
The cassette adaptor cannot be inserted into the car audio system.	Did you check the position of the car audio's head?	Check the position of the head in relation to the car audio system to ensure the cassette adaptor is installed correctly.
	Have you inserted the side with the cord in first?	Remove the cord cover, and change the position from which the cord extends.
The unit cannot be turned on.	Is the fuse for the car adaptor blown?	Insert a new fuse.

■ Handling Precautions for Traverse Deck

The laser diode in the traverse deck (optical pickup) may break down due to potential difference caused by static electricity of clothes or human body.
So, be careful of electrostatic breakdown during repair of the traverse deck (optical pickup).

• Handling of traverse deck (optical pickup)

1. Do not subject the traverse deck (optical pickup) to static electricity as it is extremely sensitive to electrical shock.
2. To protect the laser diode against electrostatic breakdown, short the flexible board (FFC board) with a clip or similar object.
3. Take care not to apply excessive stress to the flexible board (FFC board).
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

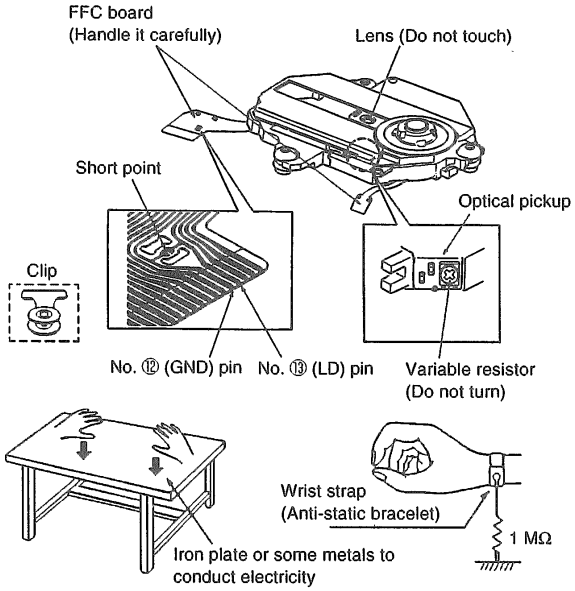
• Grounding for electrostatic breakdown prevention

1. Human body grounding
   Use the anti-static wrist strap to discharge the static electricity from your body.
2. Work table grounding
   Put a conducive material (sheet) or steel sheet on the area where the traverse deck (optical pickup) is placed, and ground the sheet.

Caution:
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the traverse deck (optical pickup).

Caution when Replacing the Traverse Deck:

The traverse deck has a short point shorted with solder to protect the laser diode against electrostatic breakdown. Be sure to remove the solder from the short point before making connections.



■ Outline of 10 - Second Sound Keeper Technique Used for Prevention of Sound from Skipping

1. Conventional Shockproofing Technique

Input information read out of the CD at double speed is demodulated, stored in the memory, and while sound-marking signal is supplied at normal speed from the memory to the D/A converter, the residual data is accumulated in the memory.

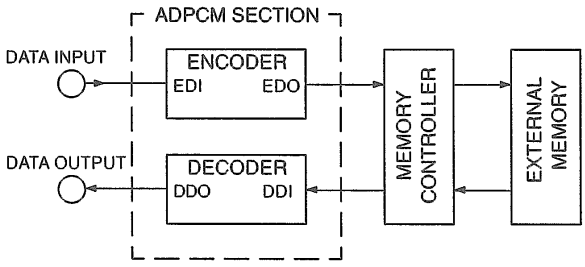
If reaccess to the break point is accomplished before the memory becomes empty, apparent playback sound is entirely kept free from breaking even when information pauses due to vibration, etc. It was necessary to use the 4M bits memory for securing the accumulation time of about 10 seconds.

2. Compression-shockproofing [Outline]

Fig. 1 is a block diagram showing the compression-shockproofing mechanism, the difference of which from the conventional mechanism is as follows: Input information read out at double speed undergoes data compression (16 bits → 4 bits) by the encoder in the ADPCM (Adaptive Difference PCM) and stored in the external memory; the stored memory information undergoes data elongation (4 bits → 16 bits) by the decoder in the ADPCM and supplied at the normal speed to the D/A converter

The data compression technique has conducted to reduction of required memory capacity from 4M bits to 1M bit for securing the accumulation time equivalent to the conventional.

All-inclusive Block Diagram



■ Operation Checks and Component Replacement Procedures

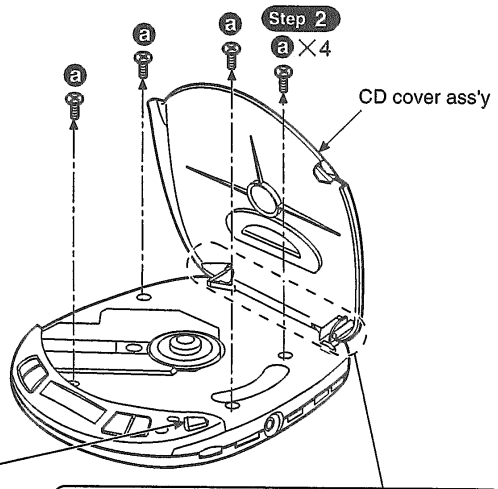
NOTE **1. This section describes procedures for checking the operation of the major printed circuit boards and replacing the main components.**

2. For reassembly after operation checks or replacement, reverse the respective procedures. Special reassembly procedures are described only when required.

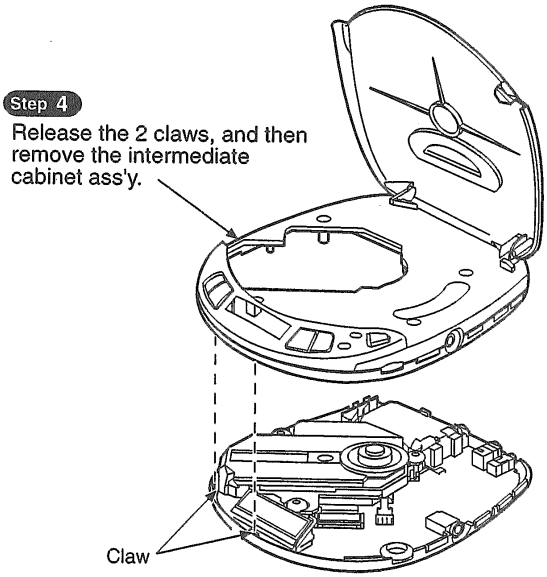
3. [ ] indicates parts No.

1. Checking for the P.C.B.

〈Checking for the P.C.B. (A side)〉

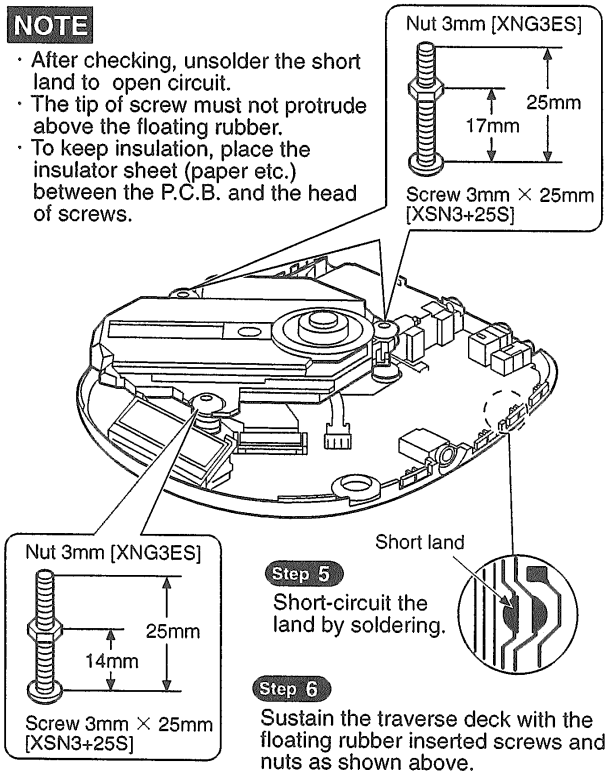


Step 3
Lift the intermediate cabinet ass'y with holding the rear part of bottom cabinet ass'y, and then release the claw.

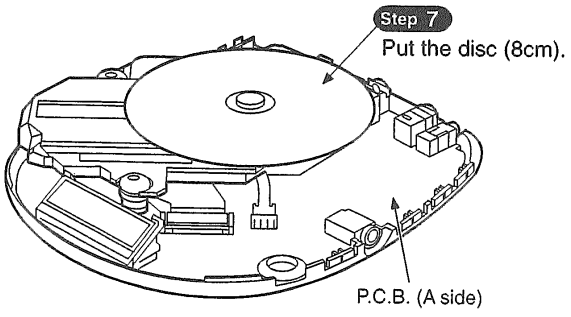


NOTE

- After checking, unsolder the short land to open circuit.
- The tip of screw must not protrude above the floating rubber.
- To keep insulation, place the insulator sheet (paper etc.) between the P.C.B. and the head of screws.



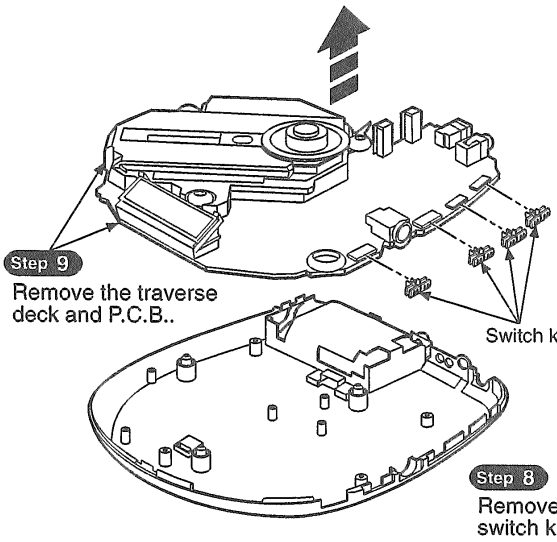
· Check the P.C.B. (A side) as shown below.

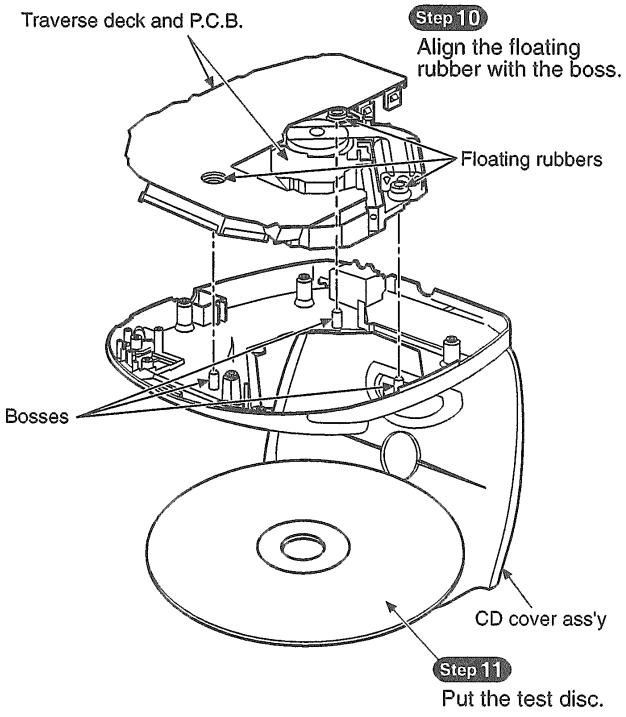


NOTE

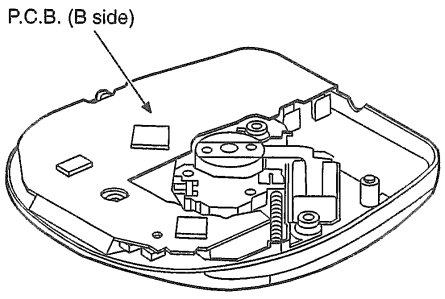
After checking, unsolder the short land to open circuit.

〈Checking for the P.C.B. (B side)〉





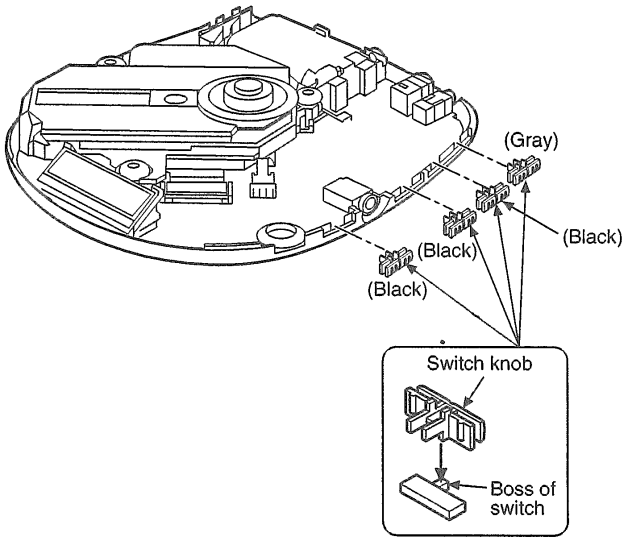
· Check the P.C.B. (B side) as shown below.



NOTE

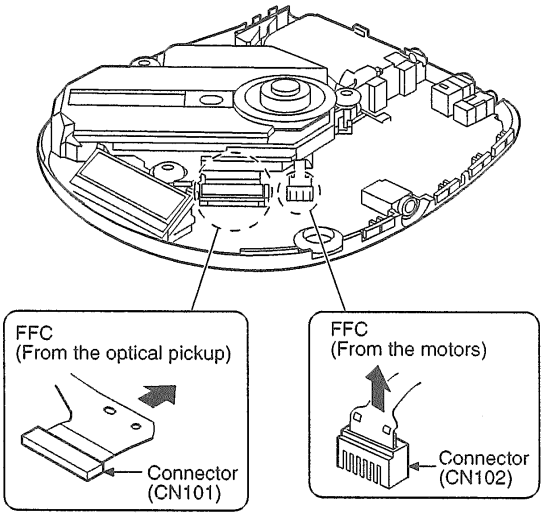
After checking, unsolder the short land to open circuit.

Notice for installation of switch knobs



2. Replacement for the traverse deck

· Follow the Step 1 ~ Step 4 in item 1 on page 12.



Step 1
Pull out the FFC from connector (CN101).

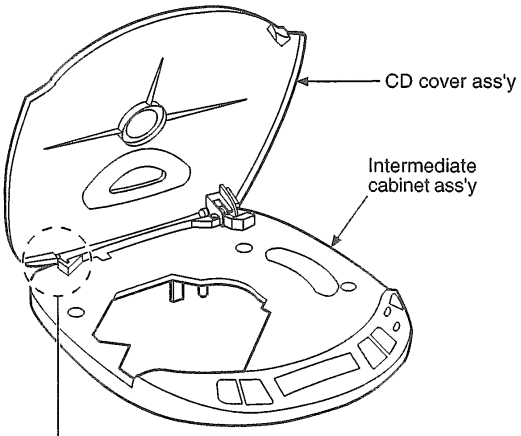
Step 2
Pull out the FFC from connector (CN102).

NOTE

Solder the point between pin ⑫ (LD GND) and pin ⑬ (LD) of FFC board.
(Refer to "Handling Precautions for Traverse Deck" on page 11.)

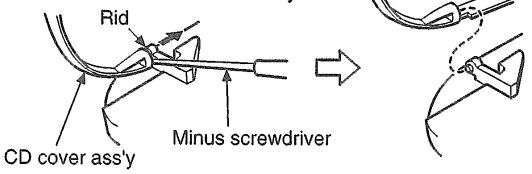
3. Replacement for the CD cover ass'y

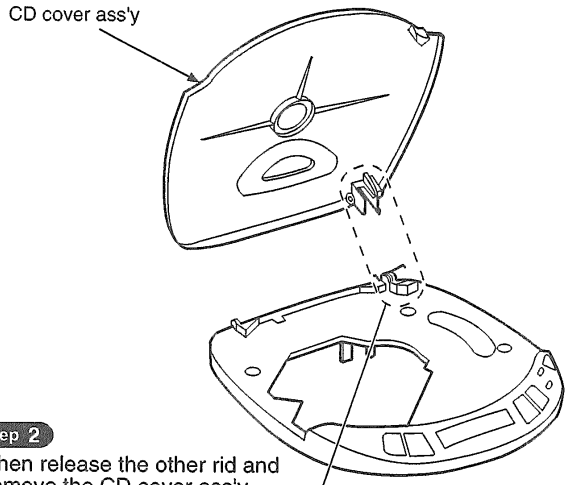
· Follow the Step 1 ~ Step 4 in item 1 on page 12.



Step 1

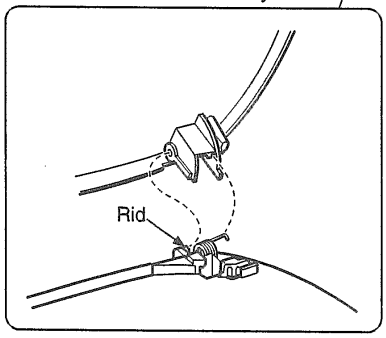
Push the rid in the direction of arrow with thin tip of minus screwdriver, and then remove the CD cover ass'y.





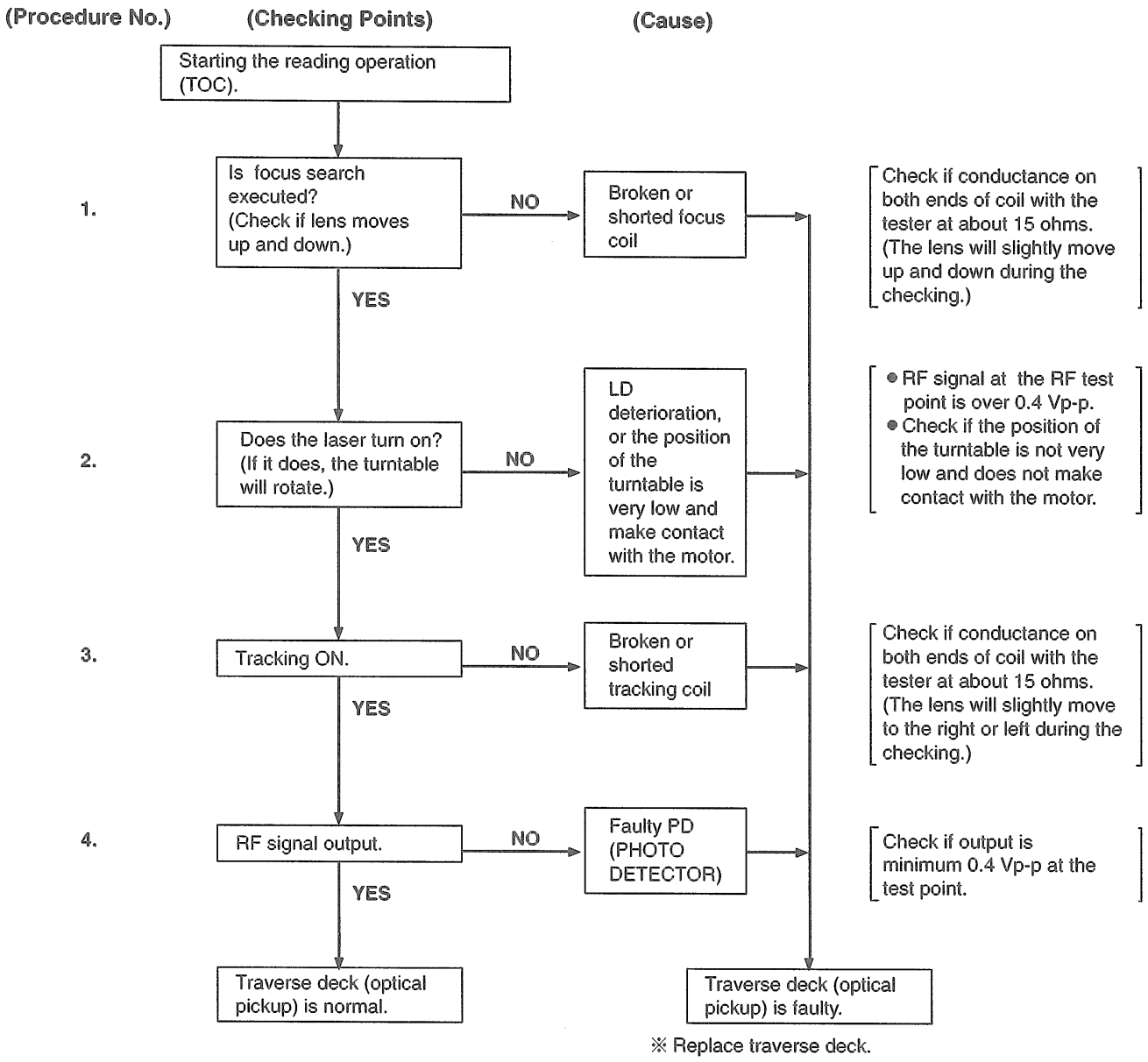
Step 2

Then release the other rid and remove the CD cover ass'y.



■ Checking the Operation Problems on the Traverse Deck (Optical Pickup)

Make sure to follow the procedures below to check the operation problems of the traverse deck (optical pickup) before replacing it. Replace the traverse deck only after the problem is identified.



- Check electrical circuit.
- Check for flaws on disc or if it is wrapped or not centered.
- **Check the operations described below on the traverse deck after replacing it.**

* Checking Skip Search

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

* Checking Manual Search

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

* Checking Playability

1. Play the 0.7 mm black dot and the 0.7 mm wedge on the playability test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc (SZZP1056C) and verify that no sound skip or noise occurs.

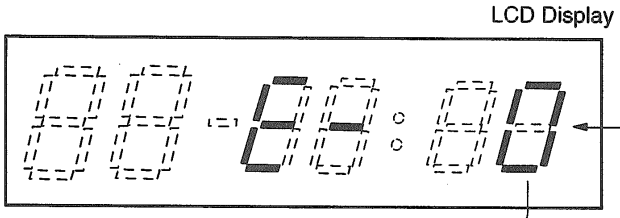
■ Automatic Adjustment Results Display Function (Self-check Function)

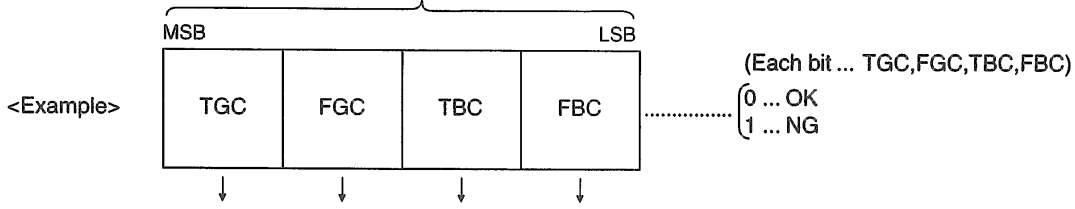
On the unit (SL-S232C), each automatic adjustment result are displayed on the LCD. This function is convenient to check or identify which automatic adjustment circuit is incorrect. The followings are the contents of the automatic adjustment result displays (self-check function).

• How to display automatic adjustment results

1. Load the test disc (SZZP1054C).
2. Press the ⏮ (SKIP/SEARCH) and ⏭ (SKIP/SEARCH) Buttons simultaneously and hold them, and additionally press the ▶/II (PLAY/PAUSE) Button.
3. Press the ■ (STOP/POWER OFF) Button once.
4. An automatic adjustment result is displayed on the LCD.

• Display of automatic adjustment results (self-check function)





1) 0 0 0 0 ⇨ "E—0" is displayed.
(All adjustments are OK.) ..... Normal

2) 0 0 0 1 ⇨ "E—1" is displayed.
(OK) (OK) (OK) (NG)
(Focus balance adjustment is NG (incorrect).)

3) 0 1 0 0 ⇨ "E—4" is displayed.
(OK) (NG) (OK) (OK)
(Focus gain adjustment is NG.)

4) 1 1 1 1 ⇨ "E—F" is displayed.
(All adjustments is NG.)

5) 1 0 0 0 ⇨ "E—8" is displayed.
(NG) (OK) (OK) (OK)
(Tracking gain adjustment is NG.)

Note: If any other disc than the test disc (SZZP1054C) is used, an "E—8" may be displayed.

<Example> **Follow the below steps when "E—1" is displayed.**
(Cause: Focus balance (FBC) is set beyond the limit.)
- Check if

(1) the waveform or voltage of the focus servo circuit is correct, and
(2) the optical pickup returns to the normal state by exchanging the traverse deck.

Follow the below steps when "E—4" is displayed.
(Cause: Focus gain (FGC) is set beyond the limit.)
- Check if

(1) the waveform or voltage of the focus servo circuit is correct,
(2) the focus coil of the optical pickup is correct (around 15 ohms), and
(3) the optical pickup returns to the normal state by exchanging the traverse deck.

Follow the below steps when "E—F" is displayed.

(Cause: All adjustments (TGC,FGC,TBC,FBC) are set beyond the limit.)
- Check if

(1) the optical pickup returns to the normal state by exchanging the traverse deck, and
(2) the waveform or voltage of the servo IC's(IC101,501) are correct.

Note:
It is not always necessary to exchange the traverse deck when an error message is displayed.
Be sure to check if the circuit is defective or not before exchanging the traverse deck.

Note:
If any other disc than the test disc (SZZP1054C) is used, an error message may be displayed. This is not a malfunction.

Schematic Diagram

(This schematic diagram may be modified at any time with the development of new technology.)

Notes:

- S201 : Laser ON/OFF switch in "OFF" position. (It turns "ON" with disc holder closed.)
- S202 : Rest detector in "OFF" position. (It turns "ON" when optical pickup comes to innermost periphery.)
- S301 : Memory/recall (MEMORY/RECALL) switch.
- S302 : Repeat (REPEAT) switch.
- S303, 304: Skip/search (I◀◀ •SKIP/ ▬ SEARCH ▶▶I) switches. (S303:I◀◀ ,S304:▶▶I)
- S305 : Stop/power off (■ POWER OFF) switch.
- S306 : Play/pause (▶ II) switch.
- S307 : Play mode selector (MODE) in "RESUME" position. (RANDOM↔NORMAL↔RESUME)
- S308 : Hold (HOLD) switch in "OFF" position.
- S501 : Anti-shock (ANTI-SHOCK) switch in "OFF" position.
- S701 : XBS Selector (XBS) switch in "OFF" position.
- VR11 : Power supply voltage adjustment VR.
- VR701-1, VR701-2 : Volume control VR.

- The voltage value and waveforms are the reference voltage of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of GND terminal (DC IN Jack). Accordingly, there may arise some errors in the voltage values and waveforms depending upon the internal impedance of the tester or measuring unit.
- The parenthesized is the voltage for test disc (1kHz, L+R, 0 dB) in play mode, and the other, for no disc in stop mode.
- AC adaptor is used for power supply.
- ⟹ : Positive voltage lines.
- ⟹ : Audio signal lines.
- Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used. When replacing any of components, be sure to use only manufacture's specified parts shown in the parts list.

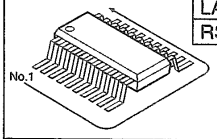
Caution!

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

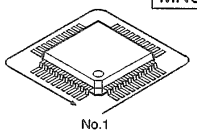
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.

Type Illustration of IC's, Transistors and Diodes

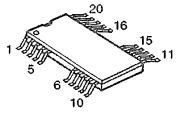
AN8839NSBE1	28PIN
BH6508FSE2	32PIN
LA4534M-TE-L	10PIN
RS10002E2	40PIN



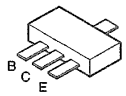
SC502168CPB	52PIN
MN662780RPS2	80PIN



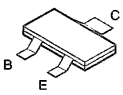
MNV4400-T8T



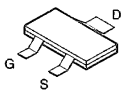
2SB766ATX



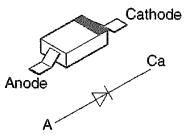
2SD1328TX
DTA114YUA106
DTC114TUA106
DTC144TUA106
MSB709RST1
UN5115TX



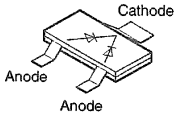
2SK2158T1



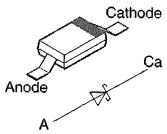
MA110TX



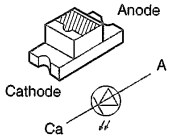
M1MA141WKT1



MA2ZD0200L

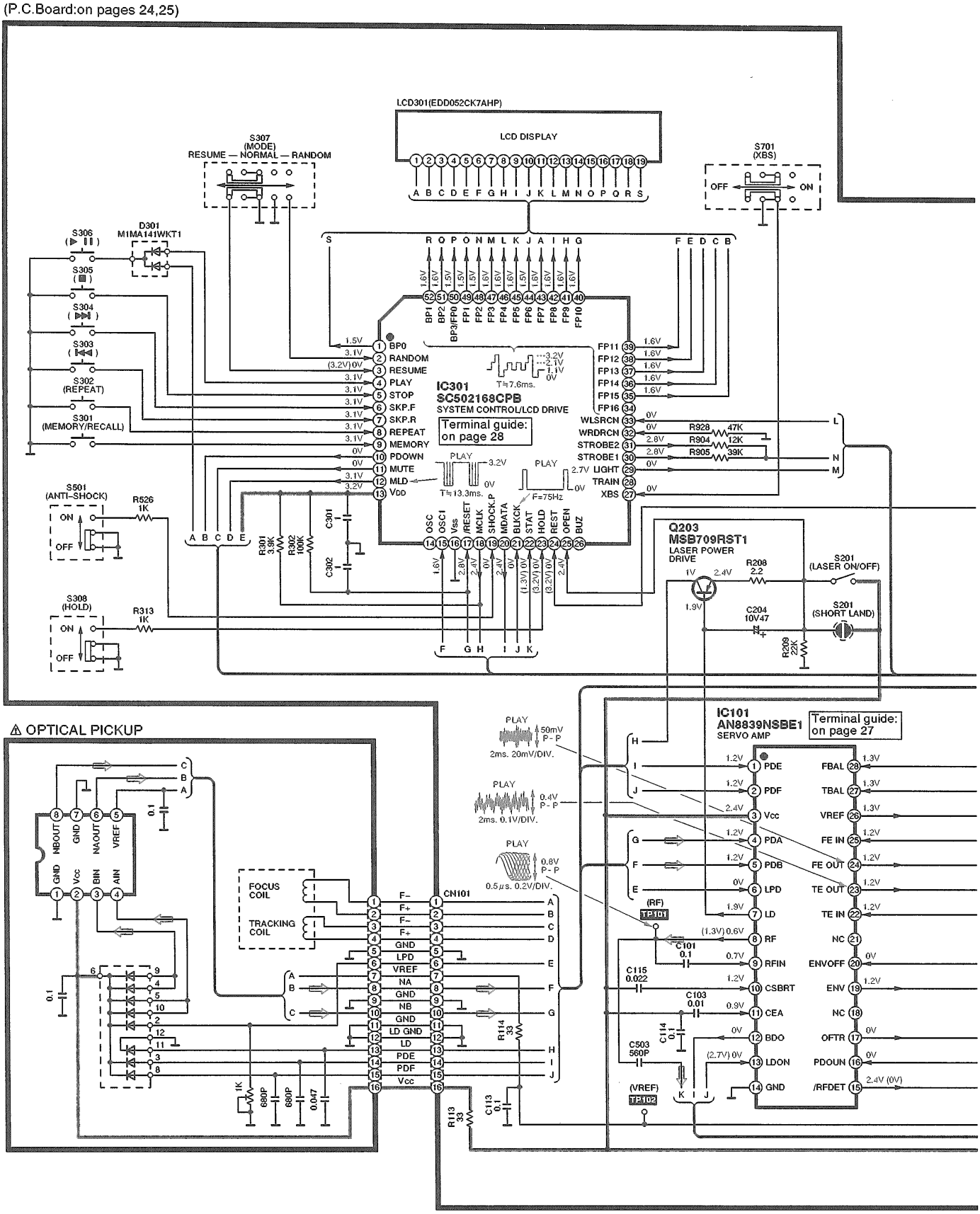


HSMGH670-OKL

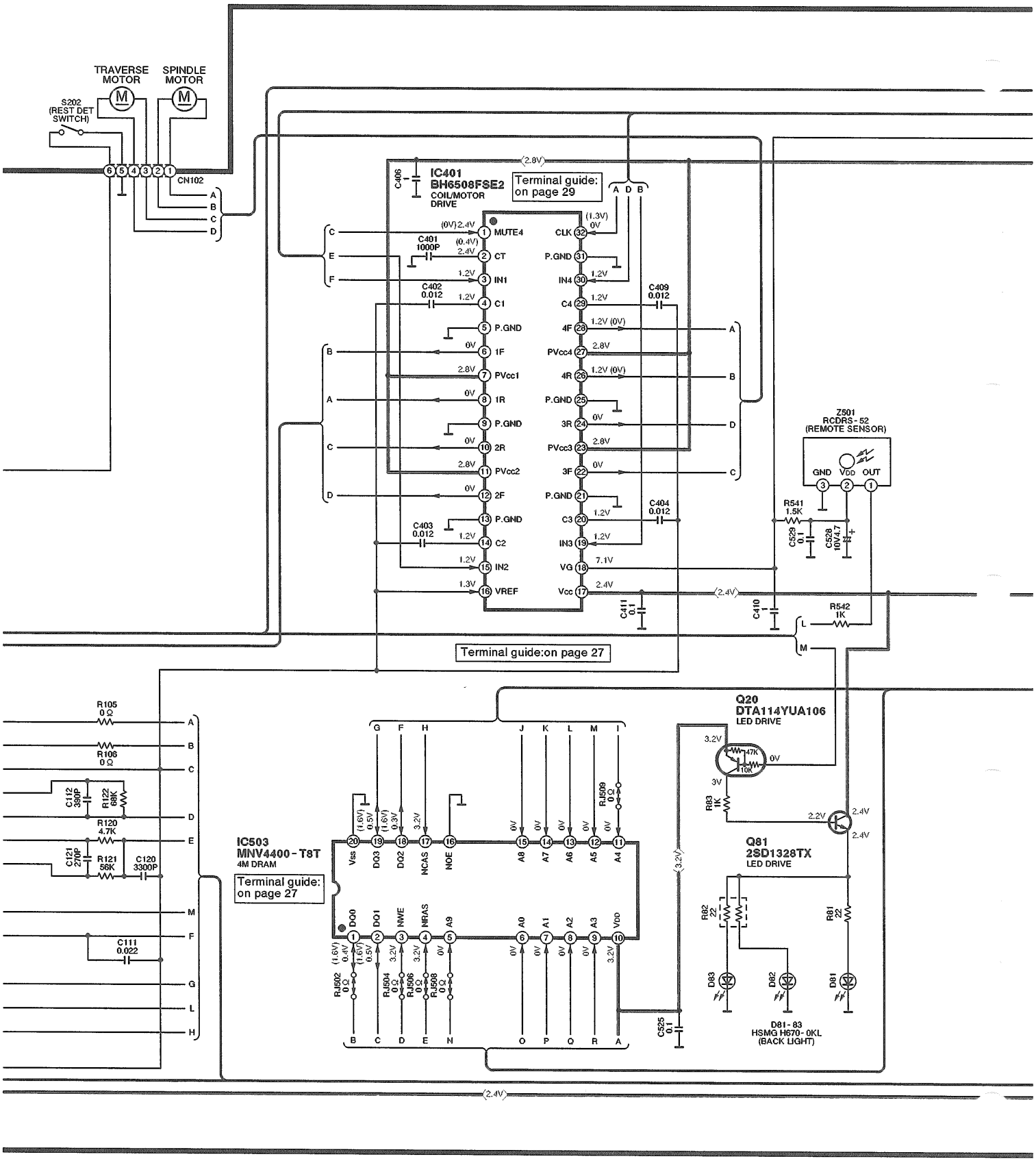


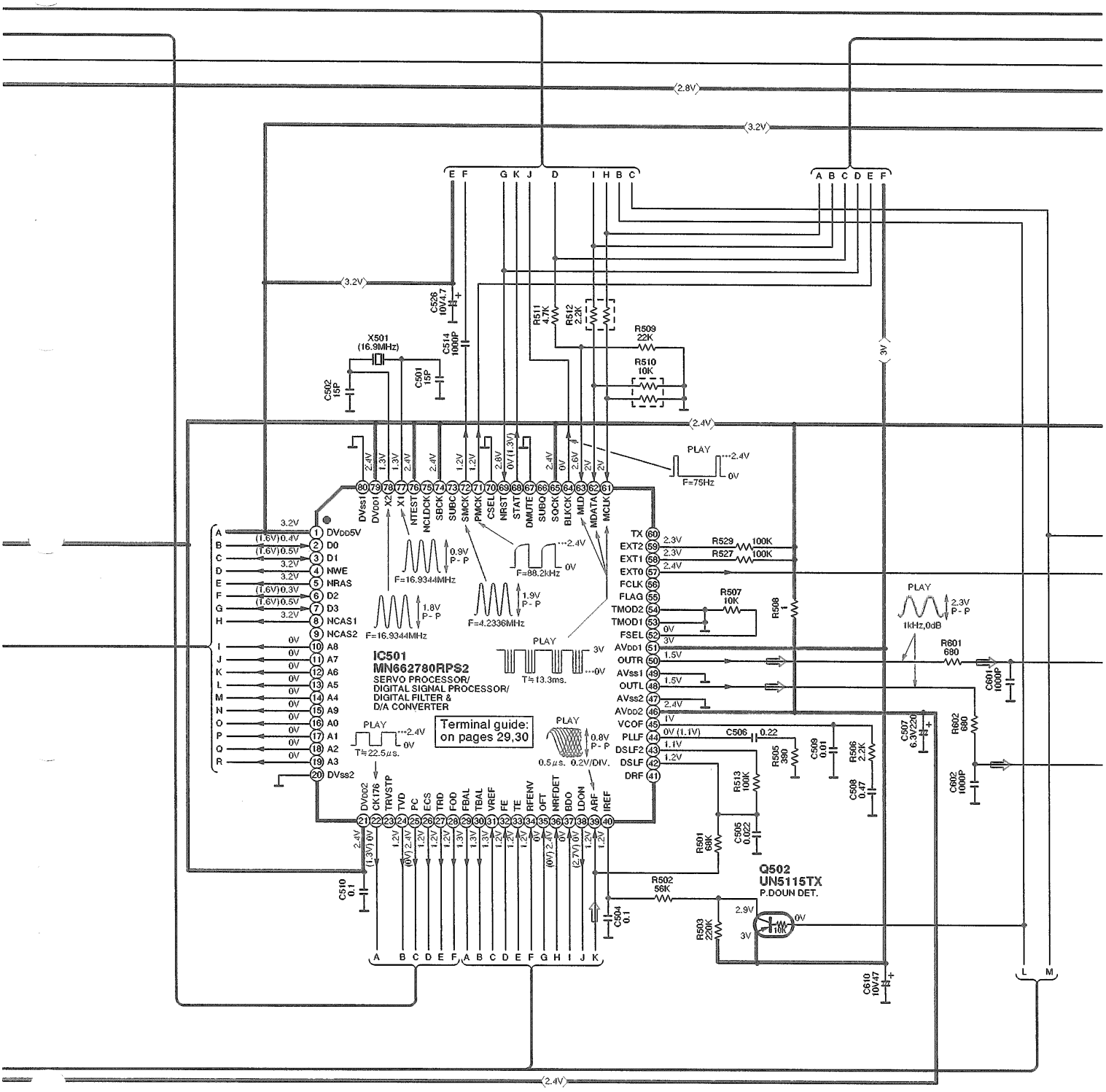
: Positive voltage lines. : Audio signal lines.

(P.C.Board:on pages 24,25)

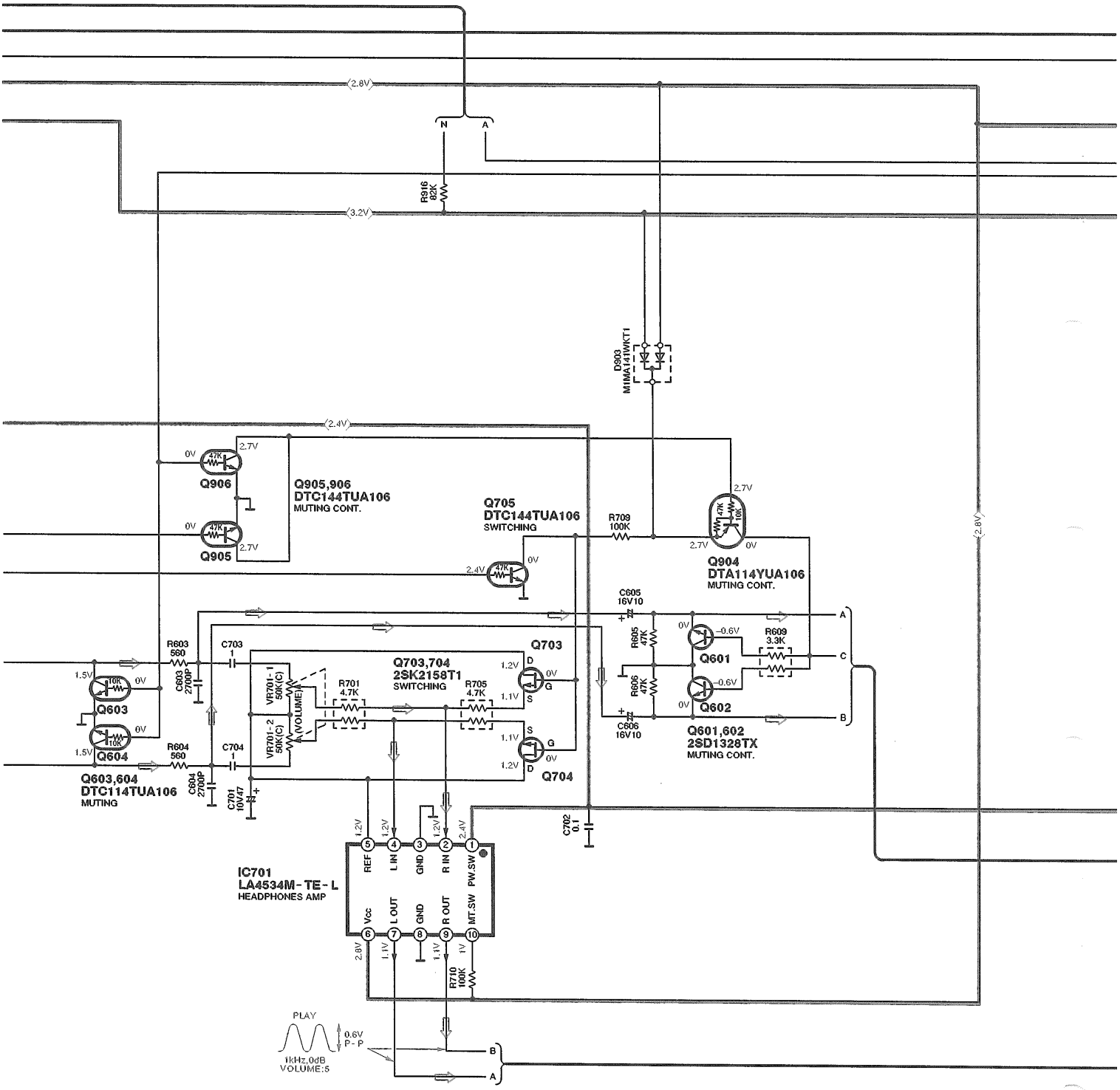


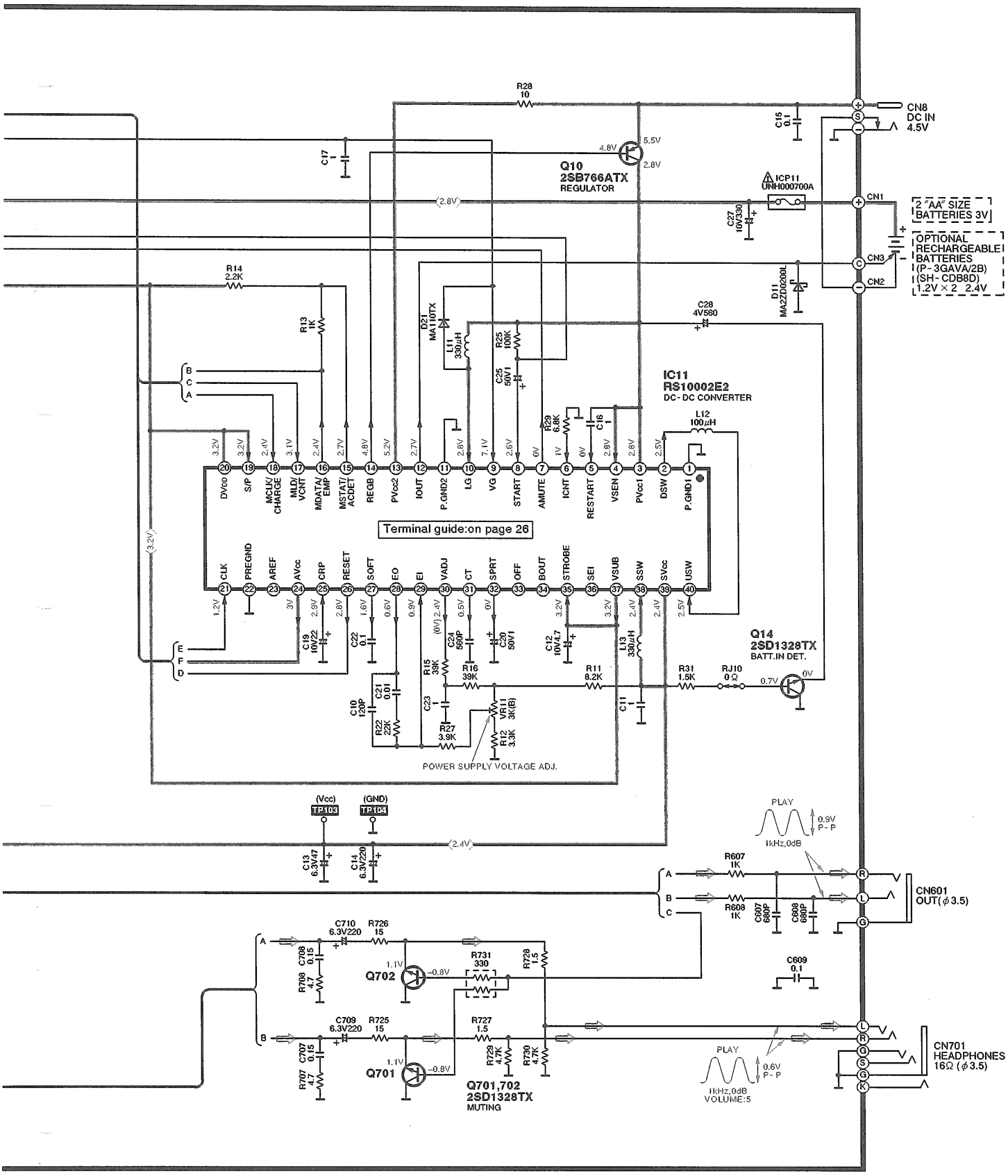
: Positive voltage lines. : Audio signal lines.




IC501
MN662780RPS2
SERVO PROCESSOR/
DIGITAL SIGNAL PROCESSOR/
DIGITAL FILTER &
D/A CONVERTER
Terminal guide:
on pages 29,30
Q502
UN5115TX
P.DOUN DET.
X501
(16.9MHz)
F=16.9344MHz
F=88.2kHz
F=4.2336MHz
F=75Hz
T≒22.5μs.
T≒13.3ms.
0.5μs. 0.2V/DIV.
1kHz,0dB
PLAY

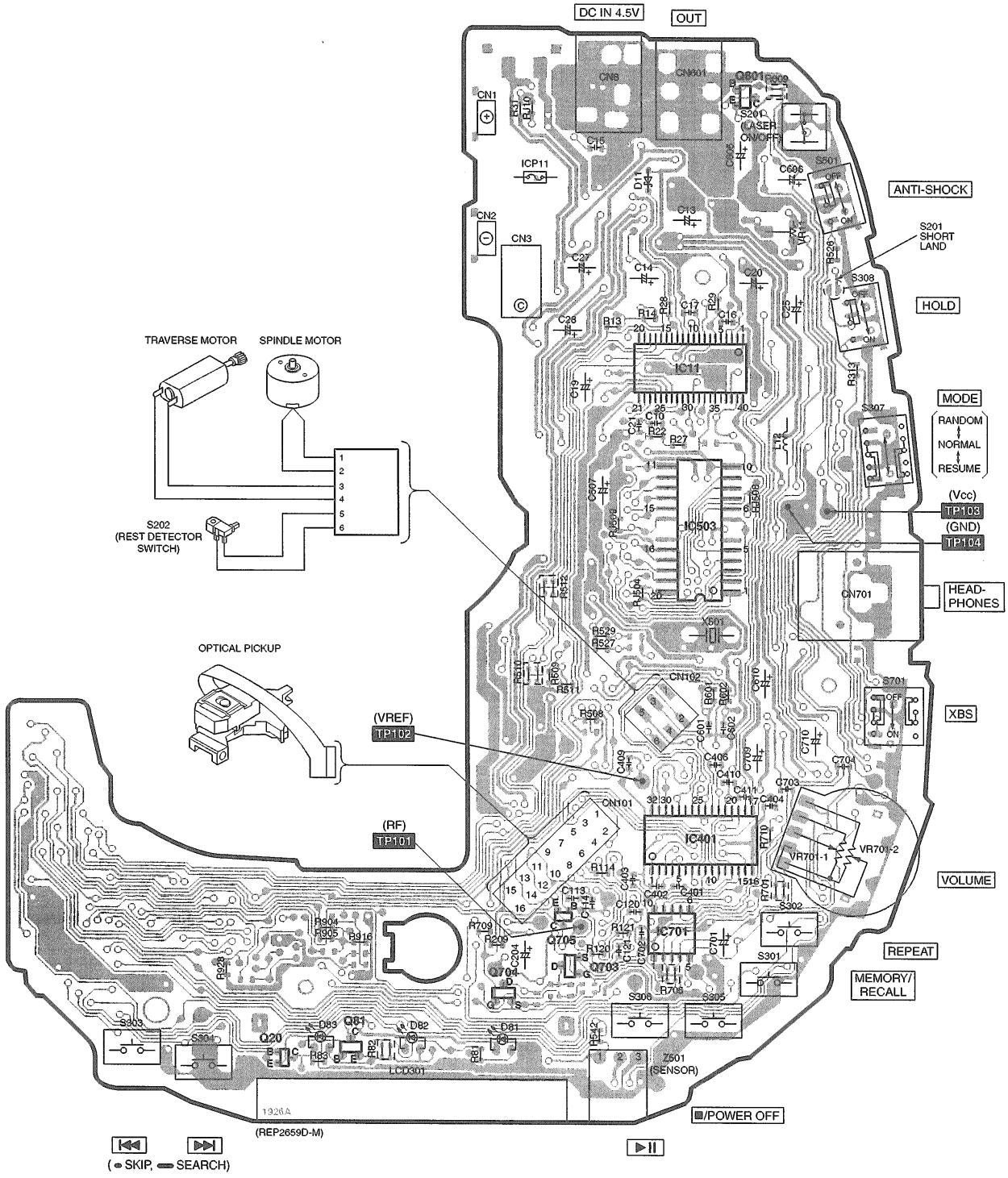
: Positive voltage lines. : Audio signal lines.

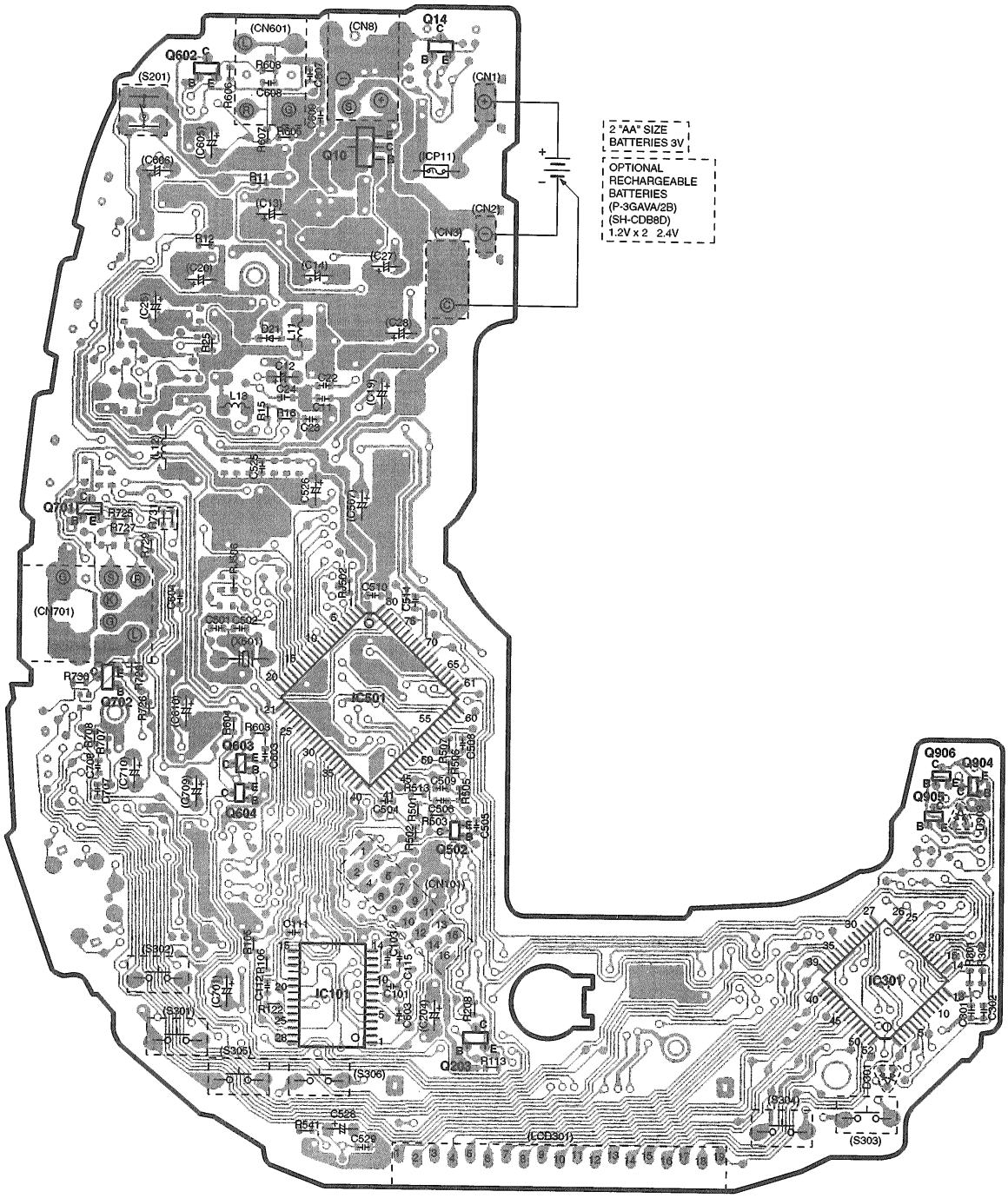



R28
10
C17
4.8V
5.5V
2.8V
Q10
2SB766ATX
REGULATOR
C15
0.1
CN8
DC IN
4.5V
ICP11
UNH000700A
CN1
2 "AA" SIZE
BATTERIES 3V
C27
10V330
CN3
CN2
OPTIONAL
RECHARGEABLE
BATTERIES
(P-3GAVA/2B)
(SH-CDB8D)
1.2V × 2 2.4V
D11
MA2ZD0200L
R14
2.2K
R13
1K
D21
MA110TX
L11
330μH
R25
100K
C25
50V1
C28
4V560
IC11
RS10002E2
DC-DC CONVERTER
L12
100μH
R29
6.8K
C16
1
DVDD
S/P
MCLK/
CHARGE
MLD/
VCNT
MDATA/
EMP
MSTAT/
ACDET
REGB
PVcc2
IOUT
P.GND2
LG
VG
START
AMUTE
ICNT
RESTART
VSEN
PVcc1
DSW
P.GND1
Terminal guide:on page 26
CLK
PREGND
AREF
AVcc
CRP
RESET
SOFT
EO
EI
VADJ
CT
SPRT
OFF
BOUT
STROBE
SEI
VSUB
SSW
SVcc
USW
C19
10V22
C22
0.1
C24
560P
C20
50V1
C12
10V4.7
L13
330μH
Q14
2SD1328TX
BATT.IN DET.
R15
39K
R16
39K
R11
8.2K
R31
1.5K
RJ10
0Ω
C10
120P
C21
0.01
C23
1
R22
22K
R27
3.9K
VR11
3K(B)
R12
3.3K
C11
1
POWER SUPPLY VOLTAGE ADJ.
(Vcc)
TP103
(GND)
TP104
C13
6.3V47
C14
6.3V220
PLAY
0.9V
P-P
1kHz,0dB
R607
1K
R608
1K
C607
680P
C608
680P
CN601
OUT(φ3.5)
C609
0.1
C710
6.3V220
R726
15
C708
0.15
R708
4.7
Q702
R731
330
R728
1.5
C709
6.3V220
R725
15
C707
0.15
R707
4.7
Q701
R727
1.5
R729
4.7K
R730
4.7K
Q701,702
2SD1328TX
MUTING
PLAY
0.6V
P-P
1kHz,0dB
VOLUME:5
CN701
HEADPHONES
16Ω (φ3.5)

■ Printed Circuit Board and Wiring Connection Diagram

• This circuit board diagram may be modified at any time with the development of new technology.




2 "AA" SIZE BATTERIES 3V
OPTIONAL RECHARGEABLE BATTERIES (P-3GAVA/2B) (SH-CDB8D) 1.2V x 2 2.4V
(CN601)
(CN8)
Q14
Q602
(S201)
(CN1)
(C606)
Q10
(ICP11)
(CN2)
(CN3)
Q701
(CN701)
(X601)
IC501
Q603
Q604
Q502
(CN101)
IC101
Q202
Q906
Q904
Q905
IC301
(S302)
(S301)
(S305)
(S306)
(S304)
(S303)
(LCD301)

Terminal Function of IC's

• IC11 (RS10002E2): DC-DC Converter

Pin No.	Terminal Name	I/O	Function
1	PGND1	–	GND terminal
2	DSW	O	DC/DC converter coil drive terminal
3	PVCC1	I	Power supply terminal
4	VSEN	I	Enpty supply terminal (Power supply terminal)
5	RESTART	I	DC/DC converter drive terminal
6	ICNT	I	Charge current setting terminal
7	AMUTE	O	Muting signal output terminal
8	START	I	DC/DC converter start terminal
9	VG	I	Power supply terminal
10	LG	I	Connected to power supply
11	PGND2	–	GND terminal
12	IOUT	O	Charge signal output terminal
13	PVCC2	I	Power supply terminal
14	PEGB	O	Regulator drive signal output terminal
15	MSTAT/ AC DET	O	DC jack detect signal output terminal
16	M DATA/ EMP	O	Decline voltage detect output terminal
17	MLD/VCNT	I	Regulator voltage select input terminal
18	MCLK/ CHARGE	I	Charge ON/OFF terminal
19	S/P	I	Serial/Parallel select terminal (Connected power supply)
20	DVDD	I	Power supply terminal

Pin No.	Terminal Name	I/O	Function
21	CLK	I	Clock signal input terminal
22	PREGND	–	GND terminal
23	AREF	O	Audio refarence output terminal
24	AVCC	O	Ripple filter output terminal
25	CRP	I	Connected to capacitor
26	RESET	O	Reser detect signal output terminal
27	SOFT	O	Soft start setting terminal (Connected to capacitor)
28	EO	O	DC/DC converter error amp output terminal
29	EI	I	DC/DC converter error amp input terminal
30	VADJ	O	DC/DC converter variable output terminal
31	CT	O	Triangular wave output terminal (Connected to capacitor)
32	SPRT	O	Power off time-constat setting terminal (Connected to capacitor)
33	OFF	I	DC/DC converter off terminal (Not used, open)
34	BOUT	O	Amp output terminal
35	STROBE	I	Strobe input terminal
36	SEI	I	Sub DC/DC converter, error amp input terminal (Not used, open)
37	VSUB	I	Power suplly terminal
38	SSW		
39	SVCC		
40	USW	I	DC/DC converter coil drive terminal

● IC101 (AN8839NSBE1): Servo Amp

Pin No.	Terminal Name	I/O	Function
1	PDE	I	Tracking signal input terminal (1)
2	PDF	I	Tracking signal input terminal (2)
3	Vcc	I	Power supply terminal
4	PDA	I	Focus signal input terminal (1)
5	PDB	I	Focus signal input terminal (2)
6	LPD	I	APC amp input terminal
7	LD	O	APC amp output terminal
8	RF	O	RF summing output terminal
9	RF IN	I	RF signal input terminal
10	CSBRT	I	Capacitor connection terminal for OFTR
11	CEA	I	Capacitor connection terminal for H.P.F. amp
12	BDO	O	Dropout signal output terminal ("H" : Dropout)
13	LDON	I	APC control input terminal
14	GND	–	GND terminal

Pin No.	Terminal Name	I/O	Function
15	/RFDET	O	RF det. signal output terminal ("L" : Det.)
16	PDOWN	O	Power down input terminal
17	OFTR	O	Off track signal output terminal ("H" : Off track)
18	NC	–	Not used, open
19	ENV	O	RF envelope signal output terminal
20	ENV OFF	I	ENV control input terminal
21	NC	–	Not used, open
22	TE IN	I	Tracking error amp input terminal
23	TE OUT	O	Tracking error amp output terminal
24	FE OUT	O	Focus error amp output terminal
25	FE IN	I	Focus error amp input terminal
26	VREF	O	Reference voltage output terminal
27	TBAL	I	Tracking balance signal input terminal
28	FBAL	I	Focus balance signal input terminal

● IC503 (MNV4400-T8T): 4M DRAM

Pin No.	Terminal Name	I/O	Function
1	DQ0	I/O	Data 0 input/output terminal
2	DQ1	I/O	Data 1 input/output terminal
3	NWE	I	Write enable terminal
4	NRAS	I	Row address strobe input terminal
5	A9	I	Address 9 input terminal
6	A0	I	Address 0 input terminal
7 ~ 9	A1 ~ A3	I	Address 1~3 input terminal

Pin No.	Terminal Name	I/O	Function
10	VCC	I	Power supply terminal
11 ~ 15	A4 ~ A8	I	Address 4~8 output terminal
16	NOE	I	Output enable terminal
17	NCAS	I	Column address strobe terminal
18	DQ2	I/O	Data 2 input/output terminal
19	DQ3	I/O	Data 3 input/output terminal
20	VSS	–	GND terminal

● IC301 (SC502168CPB): System Control / LCD Drive

Pin No.	Terminal Name	I/O	Function
1	BP0	O	LCD segment signal output terminal
2	RANDOM	I	RANDOM switch input terminal
3	RESUME	I	RESUME switch input terminal
4	PLAY	I	PLAY key input terminal
5	STOP	I	STOP key input terminal
6	SKP.F	I	SKIP.F key input terminal
7	SKP.R	I	SKIP.R key input terminal
8	REPEAT	I	REPEAT key input terminal
9	MEMORY	I	MEMORY key input terminal
10	PDOWN	O	Head amp OFF output terminal
11	MUTE	O	Hard muting output terminal
12	MLD	O	Serial command latch output terminal
13	VDD	I	Power supply terminal
14	OSC	–	Not used, open
15	OSC1	I	System clock input terminal
16	VSS	–	GND terminal
17	/RESET	O	Reset signal output terminal
18	MCLK	O	Serial command output terminal
19	SHOCK.P	I	SHOCK.P key input terminal
20	MDATA	I	Command data output terminal

Pin No.	Terminal Name	I/O	Function
21	BLKCK	I	Block clock input terminal
22	STAT	I	Status signal input terminal
23	HOLD	I	HOLD switch input terminal
24	REST	I	REST (innermost position) detection input terminal
25	OPEN	I	CD cover open detection terminal
26	BUZ	O	Beep control output terminal
27	XBS	I	XBS switch input terminal
28	TRAIN	–	Not used, open
29	LIGHT	–	Not used, open
30	STROBE1	O	Remote control data signal output terminal
31	STROBE2		
32	WRDRCN	–	Not used, connected to GND
33	WLSRCN	I	Remote control sensor signal input terminal
34	FP16	–	Not used, open
35 ~ 49	FP15 ~ FP1	O	LCD segment signal output terminal
50	BP3/FP0	O	LCD segment signal output terminal
51	BP2	O	LCD segment signal output terminal
52	BP1		

• IC401 (BH6508FSE2): Motor Drive

Pin No.	Terminal Name	I/O	Function
1	MUTE4	I	CH4 muting terminal
2	CT	O	Triangular wave output terminal (Connected to capacitor)
3	IN1	I	CH1 input terminal
4	C1	O	CH1 filter terminal (Connected to capacitor)
5	PGND	–	GND terminal
6	1F	O	Focus coil driver output terminal
7	PVCC1	I	Power supply terminal
8	1R	O	Focus coil driver output terminal
9	PGND	–	GND terminal
10	2R	O	Tracking coil driver output terminal
11	PVCC2	I	Power supply terminal
12	2F	O	Tracking coil driver output terminal
13	PGND	–	GND terminal
14	C2	O	CH2 filter terminal (Connected to capacitor)
15	IN2	I	CH2 input terminal
16	VREF	I	Reference voltage output terminal

Pin No.	Terminal Name	I/O	Function
17	VCC	I	Power supply terminal
18	VG	I	Power supply terminal
19	IN3	I	CH3 input terminal
20	C3	O	CH3 filter terminal (Connected to capacitor)
21	PGND	–	GND terminal
22	3F	O	Traverse motor drive output terminal
23	PVCC3	I	Power supply terminal
24	3R	O	Traverse motor drive output terminal
25	PGND	–	GND terminal
26	4R	O	Spindle motor drive output terminal
27	PVCC4	I	Power supply terminal
28	4F	O	Spindle motor drive output terminal
29	C4	O	CH4 filter terminal (Connected to capacitor)
30	IN4	I	CH4 input terminal
31	GND	–	GND terminal
32	CLK	I	Clock input terminal

• IC501 (MN662780RPS2): Servo Processor / Digital Signal Processor / Digital Filter / D/A Converter

Pin No.	Terminal Name	I/O	Function
1	DVDD	I	Power supply terminal
2	D0	I/O	Data 0 input/output terminal
3	D1	I/O	Data 1 input/output terminal
4	NWE	O	Write enable output terminal
5	NRAS	O	RAS control signal output terminal
6	D2	I/O	Data 2 input/output terminal
7	D3	I/O	Data 3 input/output terminal
8	NCAS0	O	CAS control 0 signal output terminal
9	NCAS1	O	Address/0 signal output terminal
10 ~ 14	A8 ~ A4	O	Address 8~4 output terminal

Pin No.	Terminal Name	I/O	Function
15	A9	O	Address 9 output terminal
16 ~ 19	A0 ~ A3	O	Address 0~3 output terminal
20	VSS2	–	GND terminal
21	DVDD2	I	Power supply terminal
22	CK176	O	Clock output terminal (88.2kHz/44.1kHz)
23	TRVSTP	O	Traverse motor stop control terminal ("H" : Stop mode) (Not used, open)
24	TVD	O	Traverse drive signal output terminal
25	PC	O	Spindle motor drive signal output terminal ("L" : ON)
26	ECS	O	Spindle motor drive signal output terminal
27	TRD	O	Tracking drive kick pulse output terminal

Pin No.	Terminal Name	I/O	Function
28	FOD	O	Focus drive output terminal
29	FBAL	O	Focus balance adj. output terminal
30	TBAL	O	Tracking balance adj. output terminal
31	VREF	I	Reference voltage input terminal
32	FE	I	Focus error signal input terminal
33	TE	I	Tracking error signal input terminal
34	RFENV	I	RF envelope signal input terminal
35	OFT	I	OFF track signal input terminal ("H" : off track)
36	NRFDET	I	RF detect signal input terminal ("L" : detect)
37	BD0	I	Drop out signal input terminal ("H" : drop out)
38	LDON	O	Laser on signal output terminal ("H" : ON)
39	ARF	I	RF signal input terminal
40	IREF	I	Reference current input terminal
41	DRF	I	DSL bias terminal (Not used, open)
42	DSLF	O	DSL loop filter output terminal
43	DSLF2	O	DSL anbalance current correction output terminal
44	PLLF	O	PLL loop filter output terminal
45	VCOF	O	Loop filter output terminal
46	AVDD2	I	Power supply terminal
47	AVSS2	–	GND terminal
48	OUTL	O	Audio Lch output terminal
49	AVSS1	–	GND terminal
50	OUTR	O	Audio Rch output terminal
51	AVDD1	I	Power supply terminal
52	FSEL	–	Noise filter select terminal ("H" : ON, "L" : OFF)
53	TMOD1	–	Terminal mode select 1 terminal ("L" : nomal)
54	TMOD2	–	Terminal mode select 2 terminal ("L" : nomal)

Pin No.	Terminal Name	I/O	Function
55	FLAG	–	Flag signal output terminal (Not used, open)
56	PCLK	–	Crystal frame clock signal output terminal (Not used, open)
57	EXT0	O	Expansion port 0 output terminal
58	EXT1	–	Expansion port 1 output terminal (Not used, open)
59	EXT2	–	Expansion port 2 output terminal (Not used, open)
60	TX	O	Digital audio interface signal output terminal (Not used, open)
61	MCLK	I	Micon command clock signal input terminal
62	MDATA	I	Micon command data input terminal
63	MLD	I	Micon command load signal input terminal ("L" : load)
64	BLKCK	O	Sub code block clock signal output terminal (fBLKCK=75kHz)
65	SQCK	I	Sub code Q resistor clock input terminal
66	SUBQ	–	Sub code Q data output terminal (Not uesd, open)
67	DMUTE	–	Muting input terminal ("H" : mute) (Not used, connected to GND)
68	STAT	O	Status signal output terminal (RESY,CLVS,NTTSTOP,SQCK,FLAG6, SENSE,NTLOCK,BSSEL,SUBQ DATA, CD TEXT DATA,ANTISHOCK LOAD DATA)
69	NRST	I	Reset input terminal ("L" : reset)
70	ARST	–	Test terminal ("L" : nomal)
71	PMCK	O	Clock signal output terminal (88.2kHz)
72	SMCK	O	Clock signal output terminal (4.2336MHz)
73	SUBC	O	Sub code output terminal (Not used, open)
74	SBCK	I	Sub code output clock input terminal
75	NCLDCK	O	Sub code frame clock output terminal (f CLOCK=7.35kHz) (Not used, open)
76	NTEST	I	Test terminal ("H" : nomal)
77	X1	I	Crystal oscillator input terminal (f=16.9344MHz)
78	X2	O	Crystal oscillator output terminal (f=16.9344MHz)
79	DVDD1	I	Power supply terminal
80	DVSS1	–	GND terminal

■ Measurements and Adjustments

Warning: This product uses a laser diode. Refer to caution statements on frontcover.

• Measuring instruments and special tools

- **Test discs**
  1. Playability test disc (SZZP1054C)
  2. Uneven test disc (SZZP1056C)
- Musical program disc (ordinary)
- DC voltmeter
- Lead wire (for test points)

• Test short land

Short-circuit the lands of the laser ON/OFF switch (S201) by soldering them. It turns "ON" position. (Refer to below **Fig. 1.** or printed circuit board and wiring connection diagram for short land location on page 24.)

Note: Remove the solders from the lands after adjustment.

• Adjustment point

Notes: 1. Please refer to the printed circuit board and wiring connection diagram for test point locations.
2. Take care to connect CN101 (as shown in **Fig.1**).

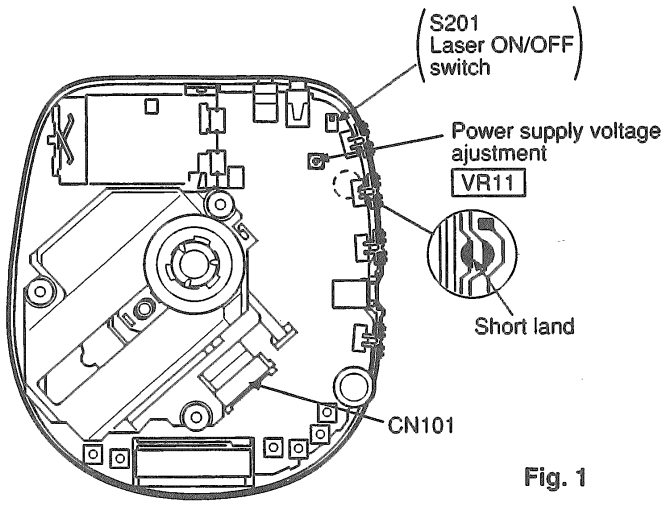


Fig. 1

• Adjustment procedure

(1) POWER SUPPLY VOLTAGE ADJUSTMENT

1. Connect the DC voltmeter to TP103 (VCC) (+) and TP104 (GND) on the P.C.B.
2. Connect the AC adaptor cord to the DC (IN) port and move the PLAY switch to the ON position. Anti-shock is set in OFF position. (Use a new dry cell battery or a rechargeable battery that is full charged.)
3. Insert the test disc, and switch the player power ON.
4. Adjust **VR11** on the P.C.B.at **2.50 ± 0.02V**,as shown in Fig.1.

(2) CHECK OF PLAY OPERATION

*** Checking Skip Search**

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and backward directions).

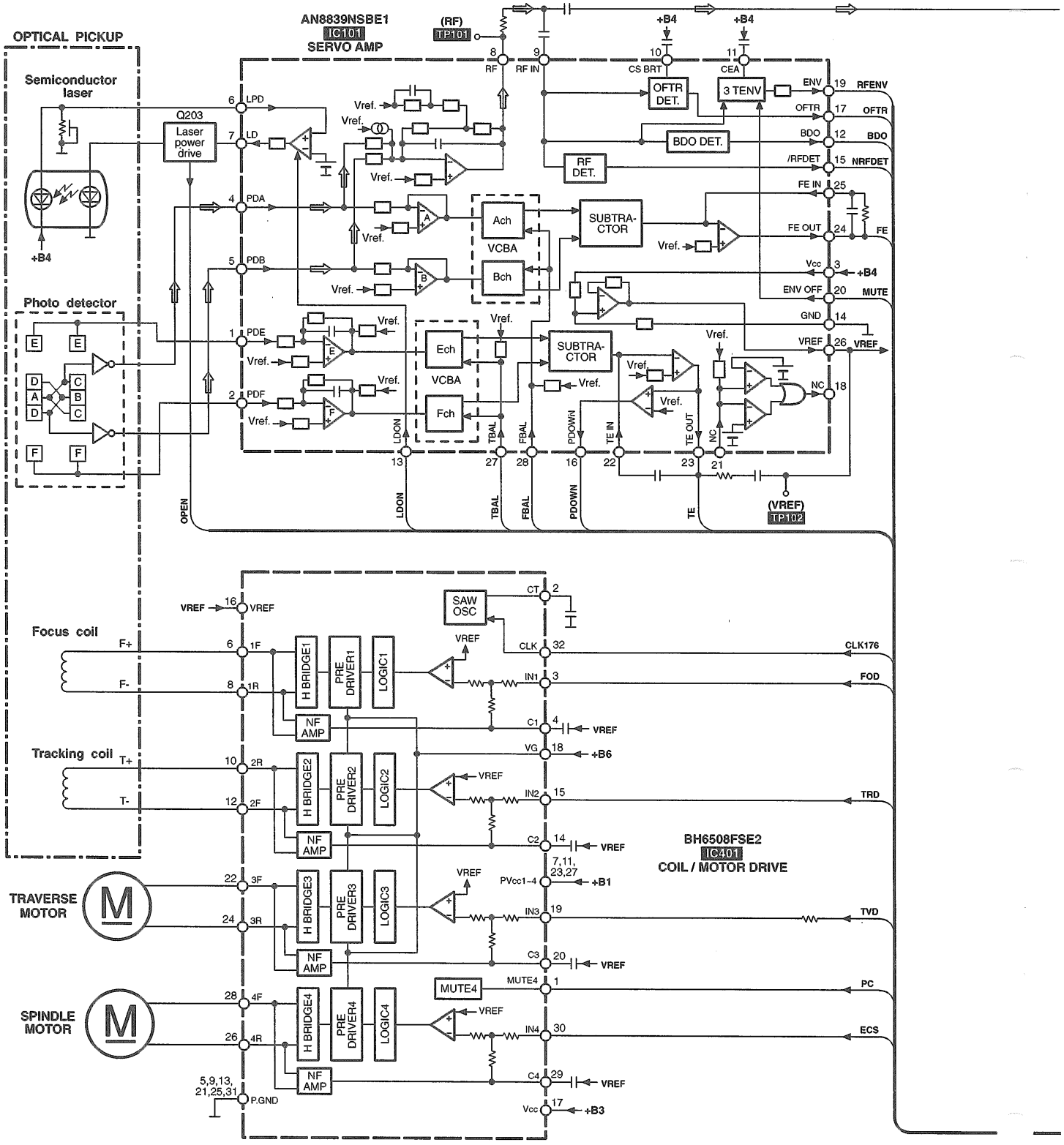
*** Checking Manual Search**

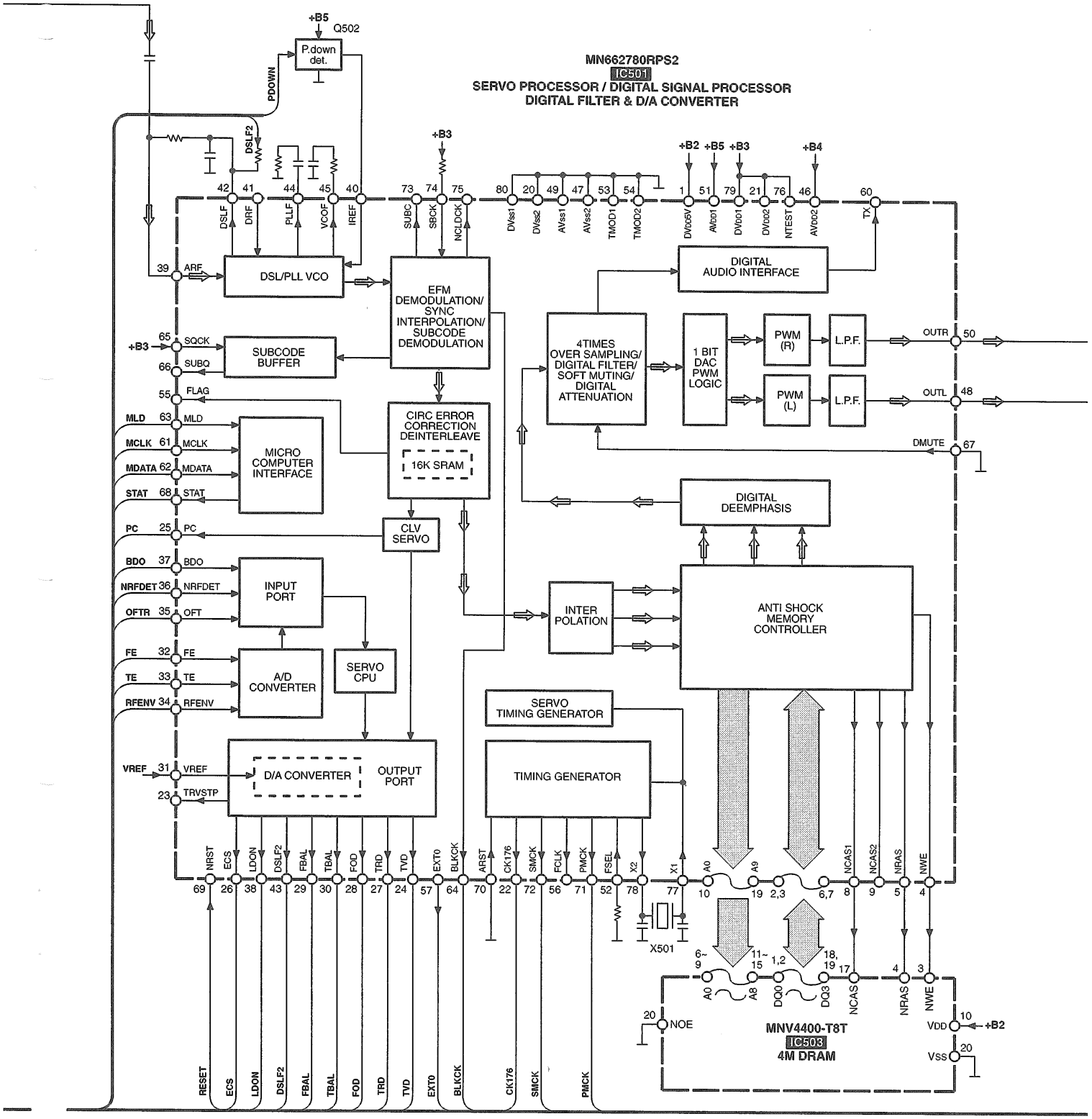
1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and backward directions).

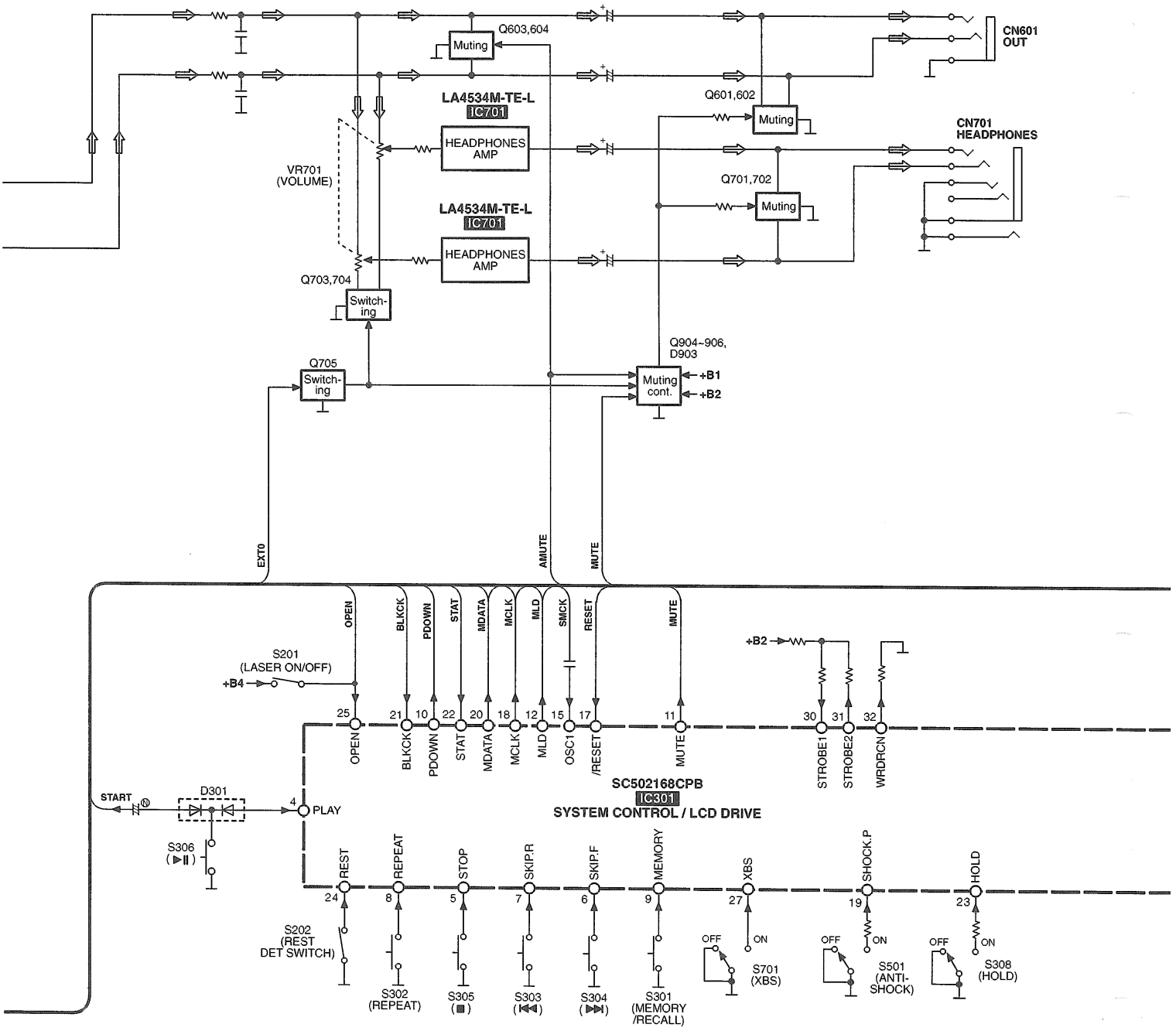
*** Checking Playability**

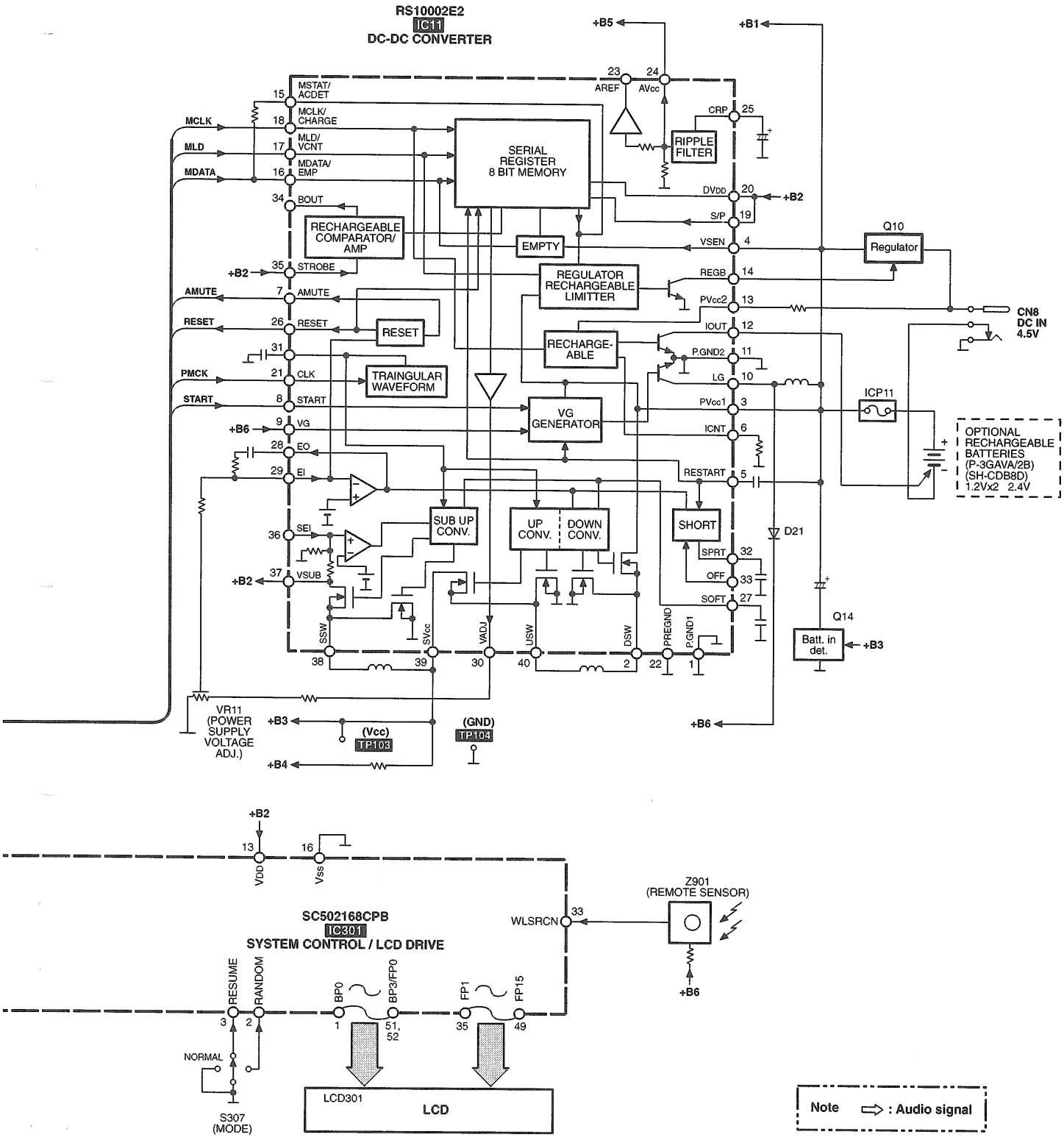
1. Play the 0.7 mm black dot and the 0.7 mm wedge on the playability test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc (SZZ1056C) and verify that no sound skip or noise occurs.

■ Block Diagram




MN662780RPS2
IC501
SERVO PROCESSOR / DIGITAL SIGNAL PROCESSOR
DIGITAL FILTER & D/A CONVERTER
+B5
Q502
P.down det.
PDOWN
DSLF2
+B3
+B2 +B5 +B3 +B4
DSLF
DRF
PLLF
VCOF
IREF
SUBC
SBCK
NCLDCK
DVss1
DVss2
AVss1
AVss2
TMOD1
TMOD2
DVDD5V
AVDD1
DVDD1
DVDD2
NTEST
AVDD2
TX
ARF
DSL/PLL VCO
EFM DEMODULATION/ SYNC INTERPOLATION/ SUBCODE DEMODULATION
DIGITAL AUDIO INTERFACE
SQCK
SUBQ
SUBCODE BUFFER
FLAG
4TIMES OVER SAMPLING/ DIGITAL FILTER/ SOFT MUTING/ DIGITAL ATTENUATION
1 BIT DAC PWM LOGIC
PWM (R)
PWM (L)
L.P.F.
OUTR
OUTL
DMUTE
MLD
MCLK
MDATA
STAT
MICRO COMPUTER INTERFACE
CIRC ERROR CORRECTION DEINTERLEAVE
16K SRAM
DIGITAL DEEMPHASIS
PC
CLV SERVO
BDO
NRFDET
OFTR
INPUT PORT
INTER POLATION
ANTI SHOCK MEMORY CONTROLLER
FE
TE
RFENV
A/D CONVERTER
SERVO CPU
SERVO TIMING GENERATOR
VREF
TRVSTP
D/A CONVERTER
OUTPUT PORT
TIMING GENERATOR
NRST
ECS
LDON
DSLF2
FBAL
TBAL
FOD
TRD
TVD
EXTO
BLKCK
ARST
CK176
SMCK
FCLK
PMCK
FSEL
X2
X1
A0
A9
NCAS1
NCAS2
NRAS
NWE
X501
A8
DQ0
DQ3
NCAS
NOE
MNV4400-T8T
IC503
4M DRAM
VDD
VSS
RESET


Q603,604
Muting
CN601
OUT
LA4534M-TE-L
IC701
Q601,602
Muting
CN701
HEADPHONES
HEADPHONES AMP
VR701
(VOLUME)
Q701,702
Muting
LA4534M-TE-L
IC701
HEADPHONES AMP
Q703,704
Switch-ing
Q904~906,
D903
Q705
Switch-ing
Muting cont.
+B1
+B2
EXT0
AMUTE
MUTE
OPEN
BLKCK
PDOWN
STAT
MDATA
MCLK
MLD
SMCK
RESET
MUTE
+B2
S201
(LASER ON/OFF)
+B4
25
21
10
22
20
18
12
15
17
11
30
31
32
OPEN
BLKCK
PDOWN
STAT
MDATA
MCLK
MLD
OSC1
/RESET
MUTE
STROBE1
STROBE2
WRDRCN
SC502168CPB
IC301
SYSTEM CONTROL / LCD DRIVE
START
D301
4
PLAY
S306
(▶II)
REST
REPEAT
STOP
SKIP.R
SKIP.F
MEMORY
XBS
SHOCK.P
HOLD
24
8
5
7
6
9
27
19
23
S202
(REST
DET SWITCH)
S302
(REPEAT)
S305
(■)
S303
(⏮)
S304
(⏭)
S301
(MEMORY
/RECALL)
OFF
ON
S701
(XBS)
OFF
ON
S501
(ANTI-
SHOCK)
OFF
ON
S308
(HOLD)


RS10002E2
IC11
DC-DC CONVERTER
+B5
+B1
AREF
AVcc
MSTAT/ ACDET
MCLK/ CHARGE
MLD/ VCNT
MDATA/ EMP
MCLK
MLD
MDATA
SERIAL REGISTER 8 BIT MEMORY
CRP
RIPPLE FILTER
DVDD
+B2
S/P
BOUT
RECHARGEABLE COMPARATOR/ AMP
EMPTY
VSEN
Q10
Regulator
STROBE
REGULATOR RECHARGEABLE LIMITTER
REGB
PVcc2
CN8 DC IN 4.5V
AMUTE
RESET
IOUT
RECHARGE-ABLE
P.GND2
PMCK
CLK
TRAINGULAR WAVEFORM
LG
ICP11
START
PVcc1
VG GENERATOR
VG
ICNT
OPTIONAL RECHARGEABLE BATTERIES (P-3GAVA/2B) (SH-CDB8D) 1.2Vx2 2.4V
EO
EI
RESTART
SUB UP CONV.
UP CONV.
DOWN CONV.
SHORT
D21
SEI
VSUB
SPRT
OFF
SOFT
Q14
Batt. in det.
+B3
SSW
SVcc
VADJ
USW
DSW
PREGND
P.GND1
VR11 (POWER SUPPLY VOLTAGE ADJ.)
(Vcc)
TP103
(GND)
TP104
+B4
+B6
SC502168CPB
IC301
SYSTEM CONTROL / LCD DRIVE
VDD
Vss
WLSRCN
Z901 (REMOTE SENSOR)
RESUME
RANDOM
BP0
BP3/FP0
FP1
FP15
NORMAL
S307 (MODE)
LCD301
LCD
Note
: Audio signal

■ Replacement Parts List

Notes: * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.
When replacing any of components, be sure to use only manufacture's specified parts shown in the parts list.
* ALL parts are supplied by MESA.

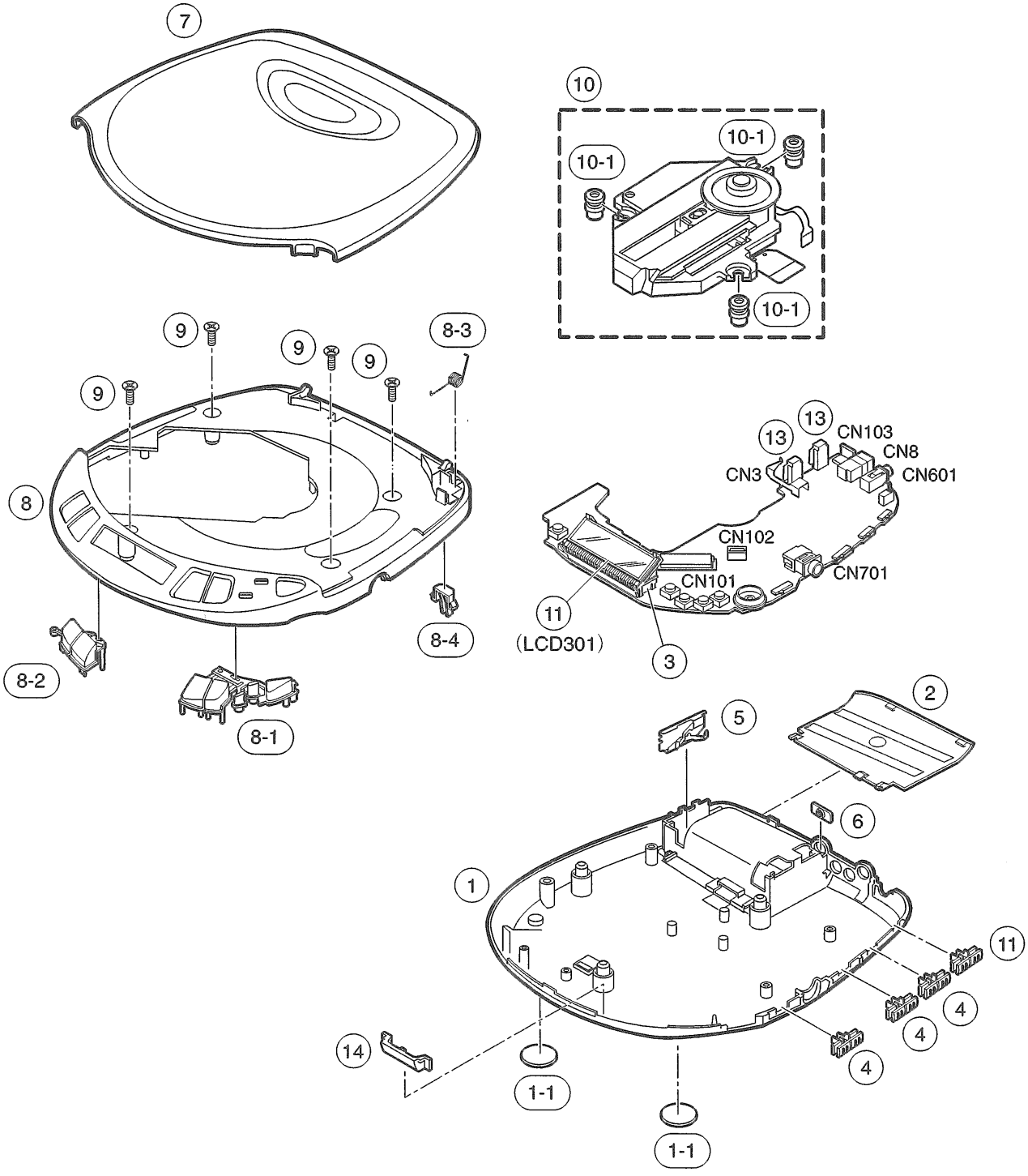
Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
1	RFKJLS232CPS	BOTTOM CABINET ASS'Y	1	
1-1	RKA0063-K	FOOT	2	
2	RKK0102-K	BATTERY COVER	1	
3	RJF0030	LCD HOLDER	1	
4	RGV0200-K	KNOB, XBS ETC	3	
5	RJC93020	BATTERY TERMINAL	1	
6	RMA0677	FIXER	1	
7	RYF0460C-S	CD COVER ASS'Y	1	
8	RYK0718A-H	MIDDLE CABINET UNIT	1	
8-1	RGU1494-H	BUTTON, SKIP/SEARCH	1	
8-2	RGU1495-H	BUTTON, PLAY/PAUSE	1	
8-3	RME0241	SPRING	1	
8-4	RML0472	STOPPER	1	
9	XTN17+6GFZ	SCREW	4	
10	RAE0145Z	TRAVERSE UNIT	1	
10-1	RMG0449-H	FLOATING RUBBER	3	
11	EDD052CK7AHP	LCD	1	
12	RGV0200-H	KNOB, ANTI SHOCK	1	
13	RJC93015-1	BATTERY TERMINAL (CN1, 2)	2	
14	RKW0500-K	LCD PANEL	1	
A1	CR2025-1P0D	LITHIUM BATTERY	1	
A2	RAK-SL927WH	REMOTE CONTROLLER	1	
⚠ A3	RFEA403C-S	AC ADAPTOR	1	
A4	RFEV705P-KS	STEREO HEADPHONES	1	
A5	RMF0255	TAPE	1	
A6	RQT3825-3P	INSTRUCTION MANUAL	1	FOR CAR-MOUNT
A7	RQT4322-P	INSTRUCTION MANUAL	1	
A8	SH-CDC10PPY	CAR ADAPTOR	1	
⚠ A8-1	XBA2C05NB10	FUSE	1	
A9	SH-CDM10APYK	CASSETTE ADAPTOR	1	
C10	ECUV1H121KCV	50V 120P	1	
C11	ECUVNA105ZFV	10V 1U	1	
C12	RCST1AY475RE	10V 4.7U	1	
C13	RCE0JSC470IX	6.3V 47U	1	
C14	RCE0JKA221IG	6.3V 220U	1	
C15	ECUZNC104ZFV	16V 0.1U	1	
C16, 17	ECUVNA105ZFV	10V 1U	2	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
C19	ECEA1AKA220I	10V 22U	1	
C20	ECEA1HKA010I	50V 1U	1	
C21	ECUV1E103KBV	25V 0.01U	1	
C22	ECUZNC104ZFV	16V 0.1U	1	
C23	ECUVNA105ZFV	10V 1U	1	
C24	ECUV1H561KBV	50V 560P	1	
C25	ECEA1HKA010I	50V 1U	1	
C27	RCE1AMT331IV	10V 330U	1	
C28	RCE0GMT561IV	4V 560U	1	
C101	ECUV1C104KBV	16V 0.1U	1	
C103	ECUV1E103KBV	25V 0.01U	1	
C111	ECUV1C223KBV	16V 0.022U	1	
C112	ECUV1H391KBV	50V 390P	1	
C113, 14	ECUZNC104ZFV	16V 0.1U	2	
C115	ECUV1C223KBV	16V 0.022U	1	
C120	ECUV1H332KBV	50V 3300P	1	
C121	ECUV1H271KBV	50V 270P	1	
C204	RCE1AKA470IG	10V 47U	1	
C301, 02	ECUVNA105ZFV	10V 1U	2	
C401	ECUV1H102KBV	50V 1000P	1	
C402-04	ECUV1E123KBV	25V 0.012U	3	
C406	ECUVNA105ZFV	10V 1U	1	
C409	ECUV1E123KBV	25V 0.012U	1	
C410	ECUVNA105ZFV	10V 1U	1	
C411	ECUZNC104ZFV	16V 0.1U	1	
C501, 02	ECUV1H150KCV	50V 15P	2	
C503	ECUV1H561KBV	50V 560P	1	
C504	ECUZNC104ZFV	16V 0.1U	1	
C505	ECUV1C223KBV	16V 0.022U	1	
C506	ECUVNA224KBV	10V 0.22U	1	
C507	RCE0JKA221IG	6.3V 220U	1	
C508	ECUV0J474KBV	6.3V 0.47U	1	
C509	ECUV1E103KBV	25V 0.01U	1	
C510	ECUZNC104ZFV	16V 0.1U	1	
C514	ECUV1H102KBV	50V 1000P	1	
C525	ECUZNC104ZFV	16V 0.1U	1	
C526	RCST1AY475RE	10V 4.7U	1	
C528	RCST1AY475RE	10V 4.7U	1	
C529	ECUZNC104ZFV	16V 0.1U	1	
C601, 02	ECUV1H102KBV	50V 1000P	2	
C603, 04	ECUV1H272KBV	50V 2700P	2	
C605, 06	ECEA1CKA100I	16V 10U	2	
C607, 08	ECUV1H681KBV	50V 680P	2	
C609	ECUZNC104ZFV	16V 0.1U	1	
C610	RCE1AKA470IG	10V 47U	1	
C701	RCE1AKA470IG	10V 47U	1	
C702	ECUZNC104ZFV	16V 0.1U	1	
C703, 04	ECUVNA105ZFV	10V 1U	2	
C707, 08	ECUVNA154KBV	10V 0.15U	2	
C709, 10	ECA0JAK221XH	6.3V 220U	2	
CN1, N2	RJC93015-1	BATTERY TERMINAL	2	
CN3	RJH5104	RECHARGE. BATT. TERMINAL	1	
CN8	RJJ43K09-C	DC IN JACK	1	
CN101	RJS2A4716M1	CONNECTOR (16P)	1	
CN102	RJS2A5106T1	CONNECTOR (6P)	1	
CN601	RJJD3S5ZB-C	OUT PUT JACK	1	
CN701	RJJ33TK07-C	HEADPHONES JACK	1	
D11	MA2ZD0200L	DIODE	1	
D21	MA110TX	DIODE	1	
D81-83	HSMGH670-0KL	LED	3	
D301	M1MA141WKT1	DIODE	1	
D903	M1MA141WKT1	DIODE	1	
IC11	RS10002E2	IC	1	
IC101	AN8839NSBE1	IC	1	
IC301	SC502168CPB	IC	1	
IC401	BH6508FSE2	IC	1	
IC501	MN662780RPS2	IC	1	
IC503	MNV4400-T8T	IC	1	
IC701	LA4534M-TE-L	IC	1	
⚠ ICP11	UNH000700A	IC PROTECTOR	1	

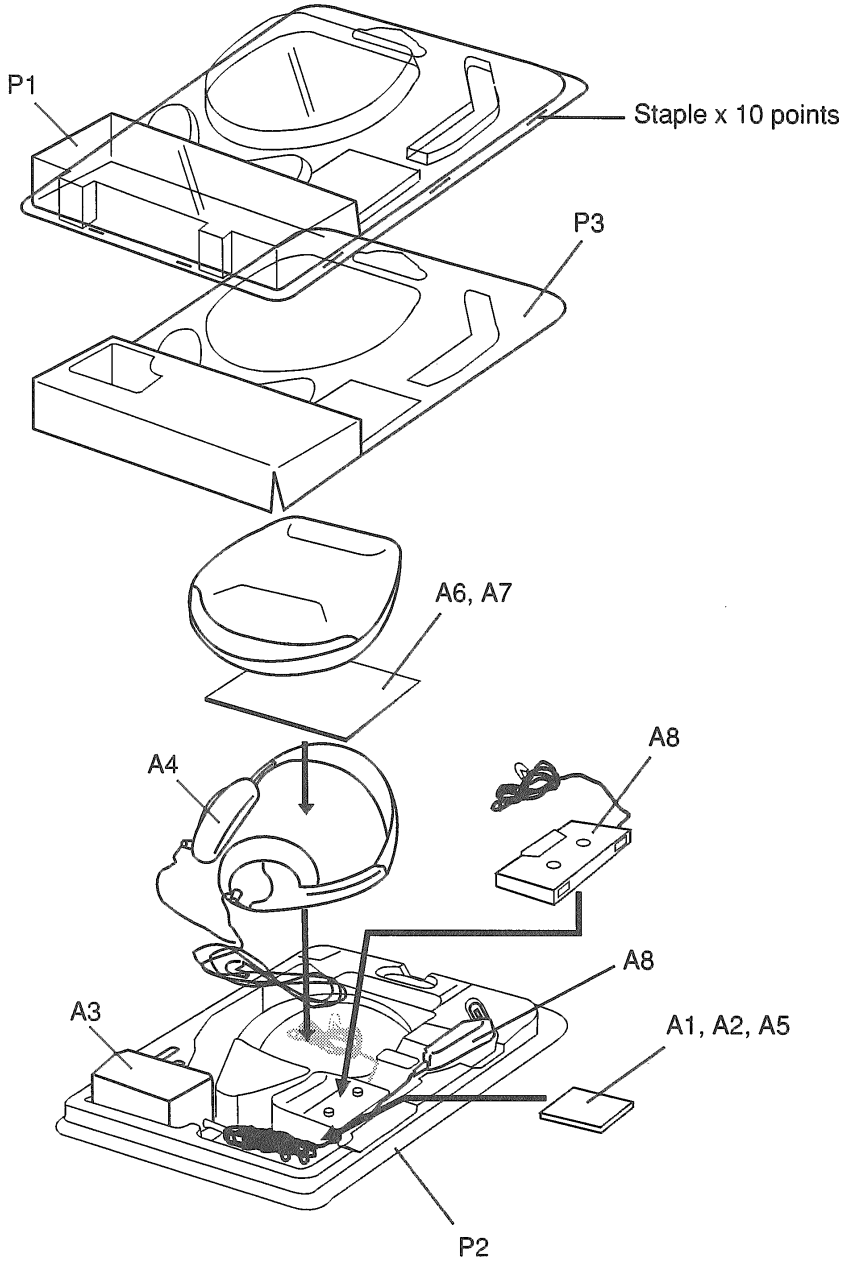
Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
L11	RLQU331KT-W	COIL	1	
L12	RLQB101KT-O	COIL	1	
L13	RLQU331KT-W	COIL	1	
P1	RPN1068	COVER	1	
P2	RPN1133	TRAY	1	
P3	RPQ0852	PASTEBOARD	1	
Q10	2SB766ATX	TRANSISTOR	1	
Q14	2SD1328TX	TRANSISTOR	1	
Q20	DTA114YUA106	TRANSISTOR	1	
Q81	2SD1328TX	TRANSISTOR	1	
Q203	MSB709RST1	TRANSISTOR	1	
Q502	UN5115TX	TRANSISTOR	1	
Q601,02	2SD1328TX	TRANSISTOR	2	
Q603,04	DTC114TUA106	TRANSISTOR	2	
Q701,02	2SD1328TX	TRANSISTOR	2	
Q703,04	2SK2158T1	TRANSISTOR	2	
Q705	DTC144TUA106	TRANSISTOR	1	
Q904	DTA114YUA106	TRANSISTOR	1	
Q905,06	DTC144TUA106	TRANSISTOR	2	
R11	ERJ3GEYJ822V	1/16W 8.2K	1	
R12	ERJ3GEYJ332V	1/16W 3.3K	1	
R13	ERJ3GEYJ102Z	1/16W 1K	1	
R14	ERJ3GEYJ222V	1/16W 2.2K	1	
R15,16	ERJ3GEYJ393V	1/16W 39K	2	
R22	ERJ3GEYJ223V	1/16W 22K	1	
R25	ERJ3GEYJ104Z	1/16W 100K	1	
R27	ERJ3GEYJ392V	1/16W 3.9K	1	
R28	ERJ3GEYJ100V	1/16W 10	1	
R29	ERJ3GEYJ682V	1/16W 6.8K	1	
R31	ERJ3GEYJ152V	1/16W 1.5K	1	
R81	ERJ3GEYJ220V	1/16W 22	1	
R82	EXBV4V220JV	22	1	
R83	ERJ3GEYJ102Z	1/16W 1K	1	
R105,06	ERJ3GEY0R00V	1/16W 0	2	
R113,14	ERJ3GEYJ330V	1/16W 33	2	
R120	ERJ3GEYJ472V	1/16W 4.7K	1	
R121	ERJ3GEYJ563V	1/16W 56K	1	
R122	ERJ3GEYJ683V	1/16W 68K	1	
R208	ERJ3GEYJ2R2V	1/16W 2.2	1	
R209	ERJ3GEYJ223V	1/16W 22K	1	
R301	ERJ3GEYJ392V	1/16W 3.9K	1	
R302	ERJ3GEYJ104Z	1/16W 100K	1	
R313	ERJ3GEYJ102Z	1/16W 1K	1	
R501	ERJ3GEYJ683V	1/16W 68K	1	
R502	ERJ3GEYJ563V	1/16W 56K	1	
R503	ERJ3GEYJ224V	1/16W 220K	1	
R505	ERJ3GEYJ391V	1/16W 390	1	
R506	ERJ3GEYJ222V	1/16W 2.2K	1	
R507	ERJ3GEYJ103Z	1/16W 10K	1	
R508	ERJ3GEYJ1R0V	1/16W 1	1	
R509	ERJ3GEYJ223V	1/16W 22K	1	
R510	EXBV4V103JV	10K	1	
R511	ERJ3GEYJ472V	1/16W 4.7K	1	
R512	EXBV4V222JV	2.2K	1	
R513	ERJ3GEYJ104Z	1/16W 100K	1	
R526	ERJ3GEYJ102Z	1/16W 1K	1	
R527	ERJ3GEYJ104Z	1/16W 100K	1	
R529	ERJ3GEYJ104Z	1/16W 100K	1	
R541	ERJ3GEYJ152V	1/16W 1.5K	1	
R542	ERJ3GEYJ102Z	1/16W 1K	1	
R601,02	ERJ3GEYJ681V	1/16W 680	2	
R603,04	ERJ3GEYJ561V	1/16W 560	2	
R605,06	ERJ3GEYJ473V	1/16W 47K	2	
R607,08	ERJ3GEYJ102Z	1/16W 1K	2	
R609	EXBV4V332JV	3.3K	1	
R701	EXBV4V472JV	4.7K	1	
R705	EXBV4V472JV	4.7K	1	
R707,08	ERJ3GEYJ4R7V	1/16W 4.7	2	
R709,10	ERJ3GEYJ104Z	1/16W 100K	2	
R725,26	ERJ3GEYJ150V	1/16W 15	2	
R727,28	ERJ3GEYJ1R5V	1/16W 1.5	2	
R729,30	ERJ3GEYJ472V	1/16W 4.7K	2	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
R731	EXBV4V331JV	330	1	
R904	ERJ3GEYJ123V	1/16W 12K	1	
R905	ERJ3GEYJ393V	1/16W 39K	1	
R916	ERJ3GEYJ823V	1/16W 82K	1	
R928	ERJ3GEYJ473V	1/16W 47K	1	
RJ10	ERJ3GEY0R00V	CHIP JUMPER	1	
RJ502	ERJ3GEY0R00V	CHIP JUMPER	1	
RJ504	ERJ3GEY0R00V	CHIP JUMPER	1	
RJ506	ERJ3GEY0R00V	CHIP JUMPER	1	
RJ508,09	ERJ3GEY0R00V	CHIP JUMPER	2	
S201	ESE11SV6	SW	1	
S301-06	EVQ11G05R	SW	6	
S307	RSS3A007-1A	SW	1	
S308	RSS2A010-1A	SW	1	
S501	RSS2A010-1A	SW	1	
S701	RSS2A010-1A	SW	1	
VR11	RRN3A05B33WL	VR	1	
VR701	EVUTUFB11C54	VR	1	
X501	RSXZ16M9M01T	OSCILLATOR	1	
Z501	RCDRS-52	REMOTE SENSOR	1	

■ Cabinet Parts Location



Packaging



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