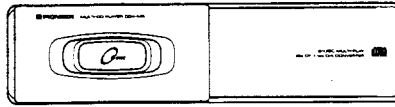


# Service Manual

**PIONEER**  
The Art of Entertainment

• CDX-M6/UC



ORDER NO.  
CRT1522

MULTI-COMPACT DISC PLAYER

# CDX-M6

UC, EW

COMPACT  
**disc**  
DIGITAL AUDIO

● See the separate manual CX-613 (CRT1518) for the CD mechanism description.

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## SPECIFICATIONS

### General

System ..... Compact disc audio system  
Usable discs ..... Compact Disc  
Signal format ..... Sampling frequency: 44.1 kHz  
Number of quantization bits: 16; linear  
Power source ..... 14.4 V DC (10.8 — 15.6 V allowable)  
Max. current consumption ..... 1.0 A  
Weight ..... 2.4 kg (5.3 lbs.)  
Dimensions ..... 275 (W) × 69 (H) × 155 (D) mm  
[10-7/8 (W) × 2-3/4 (H) × 6-1/8 (D) in.]

### Audio

Frequency characteristics ..... 5 — 20,000 Hz (±1 dB)  
Signal-to-noise ratio . 97 dB (1 kHz) (IHF-A Network)(UC)  
97 dB (1 kHz) (IEC-A Network)(EW)  
Dynamic range ..... 94 dB (1 kHz)  
Output level ..... 500 mV (1 kHz, 0 dB)  
Number of channels ..... 2 (stereo)

### Note:

Specifications and the design are subject to possible modification without prior notice due to improvements.

### ● CD Player Service Precautions

1. Since these screws protect the mechanism during transport, be sure to affix it when it is transported for repair, etc.
2. For pick-up unit handling, please refer to "Disassembly". During replacement, handling precautions shall be taken to prevent an electrostatic discharge (protection by a short pin).
3. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.

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## 1. SAFETY INFORMATION

### 1.1 CDX-M6/EW

#### 1. Safety Precautions for those who Service this Unit.

- Follow the adjustment steps (see pages 7 through 25) in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.

#### Caution:

1. During repair or tests, minimum distance of 13cm from the focus lens must be kept.
2. During repair or tests, do not view laser beam for 10 seconds or longer.
2. A "CLASS 1 LASER PRODUCT" label is affixed to the rear of the player.
3. The triangular label is attached to the mechanism unit frame.



Fig.1

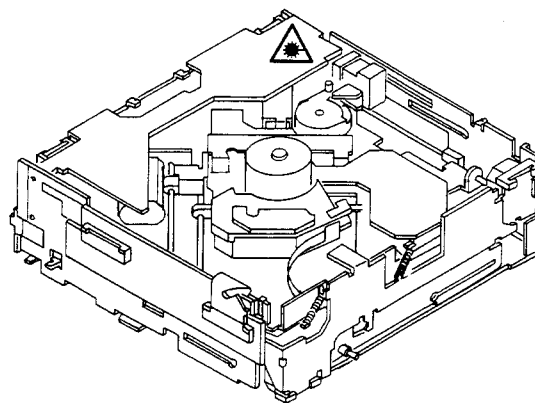


Fig.2

#### 4. Specifications of Laser Diode

Specifications of laser radiation fields to which human access is possible during service.

Wavelength = 785 nanometers

Radiant power = 69.7 microwatts (Through a circular aperture stop having a diameter of 80 millimeters)  
0.55 microwatts (Through a circular aperture stop having a diameter of 7 millimeters)

### 1.2 CDX-M6/UC

#### **CAUTION**

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual. Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely; you should not risk trying to do so and refer the repair to a qualified service technician.

#### **WARNING**

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5). When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

## 2. DISASSEMBLY

### ●Case

- 1.Unfasten six screws A and then remove the upper case.
- 2.Unfasten four screws B and then remove the lower case.

### ●Grille Assy

- 1.Unlock four catches and dismount the grille assy.

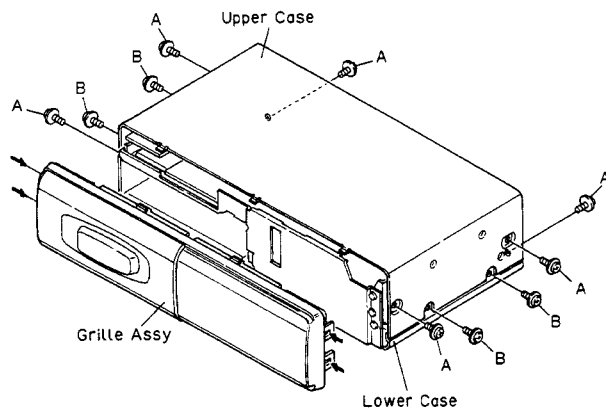


Fig.3

### ●Bracket L,R

- 1.Unfasten eight screws.
- 2.Remove bracket L.
- 3.Remove bracket R.

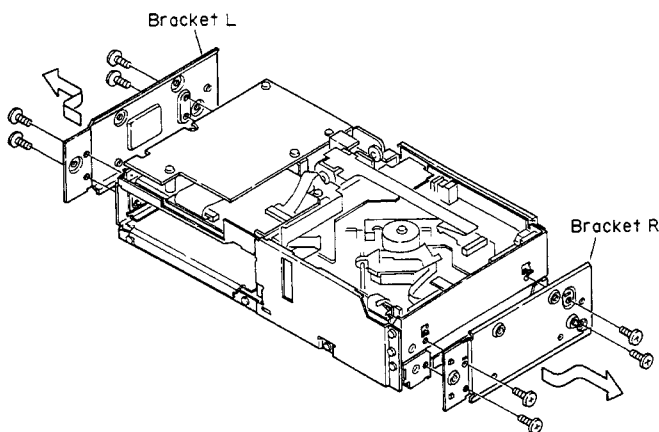


Fig.4

### ●Extension P.C.Board

- 1.Unfasten five screws.
- 2.Remove the connector.
- 3.Remove the extension P.C.Board.

#### NOTE:

Be sure to screw in order of 1-5.

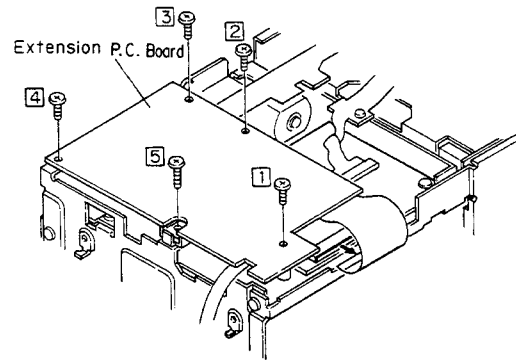


Fig.5

### ●CN351

Before disconnecting the CN351 connector (PU unit connector), attach a short pin as illustrated.

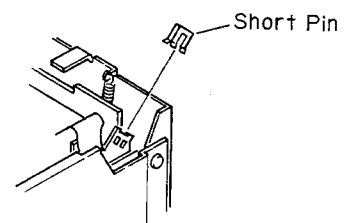


Fig.6

# CDX-M6

## ●Main Unit

- 1.Unfasten four screws.
- 2.Remove the three connectors.
- 3.Remove the main unit.

### NOTE:

Be sure to screw in order of 1-4.

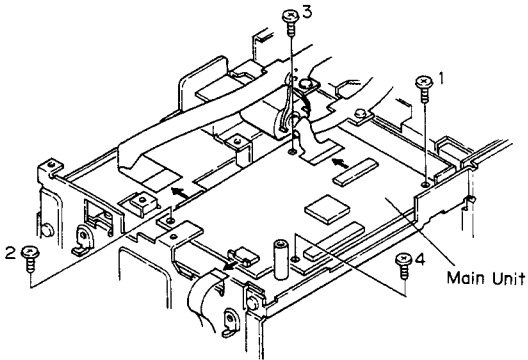


Fig.7



3. BLOCK DIAGRAM

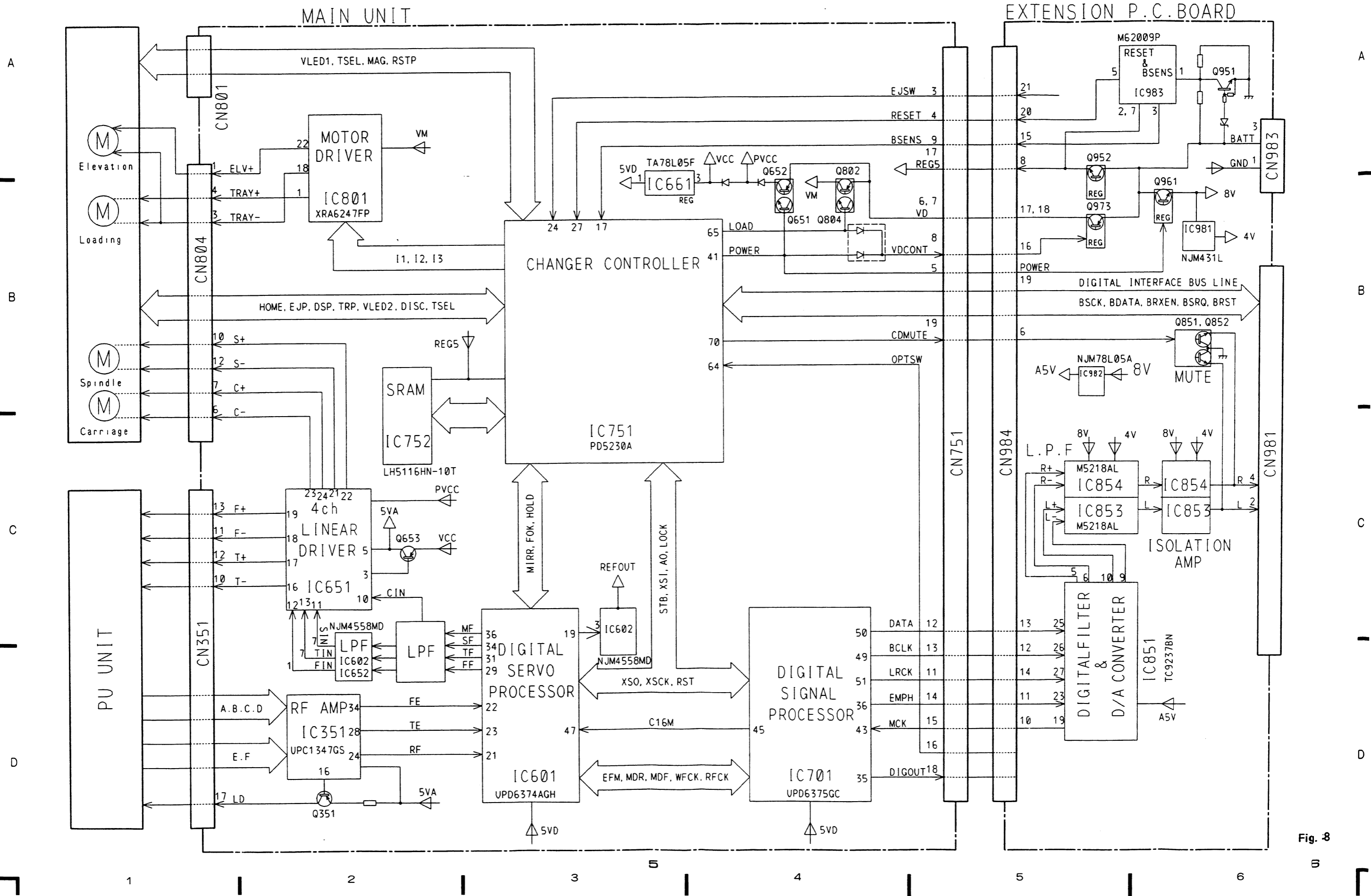


Fig. 8

### 4. ADJUSTMENT

#### 1) Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFOUT (approx. 2.5V) instead of GND. If REFOUT and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following. Do not connect the negative probe of the measuring equipment to REFOUT and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFOUT with the channel 2 negative probe connected to GND. And since the frame of the measuring instrument is usually at the same potential as the negative probe, change the frame of the measuring instrument to floating status. If by accident REFOUT comes in contact with GND, immediately switch the regulator or power OFF.
- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.
- Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.
- Since the protective systems in the unit's software are rendered inoperative in test mode, be very careful to avoid mechanical and / or electrical shocks to the system when making adjustment.
- When loading and unloading discs during adjustment procedures, always wait for the disc to be properly clamped or ejected before pressing the another key. Otherwise, there is risk of the actuator being destroyed.
- Turn power off when pressing the button **▶▶** or the button **◀◀** key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)

#### 2) Test mode

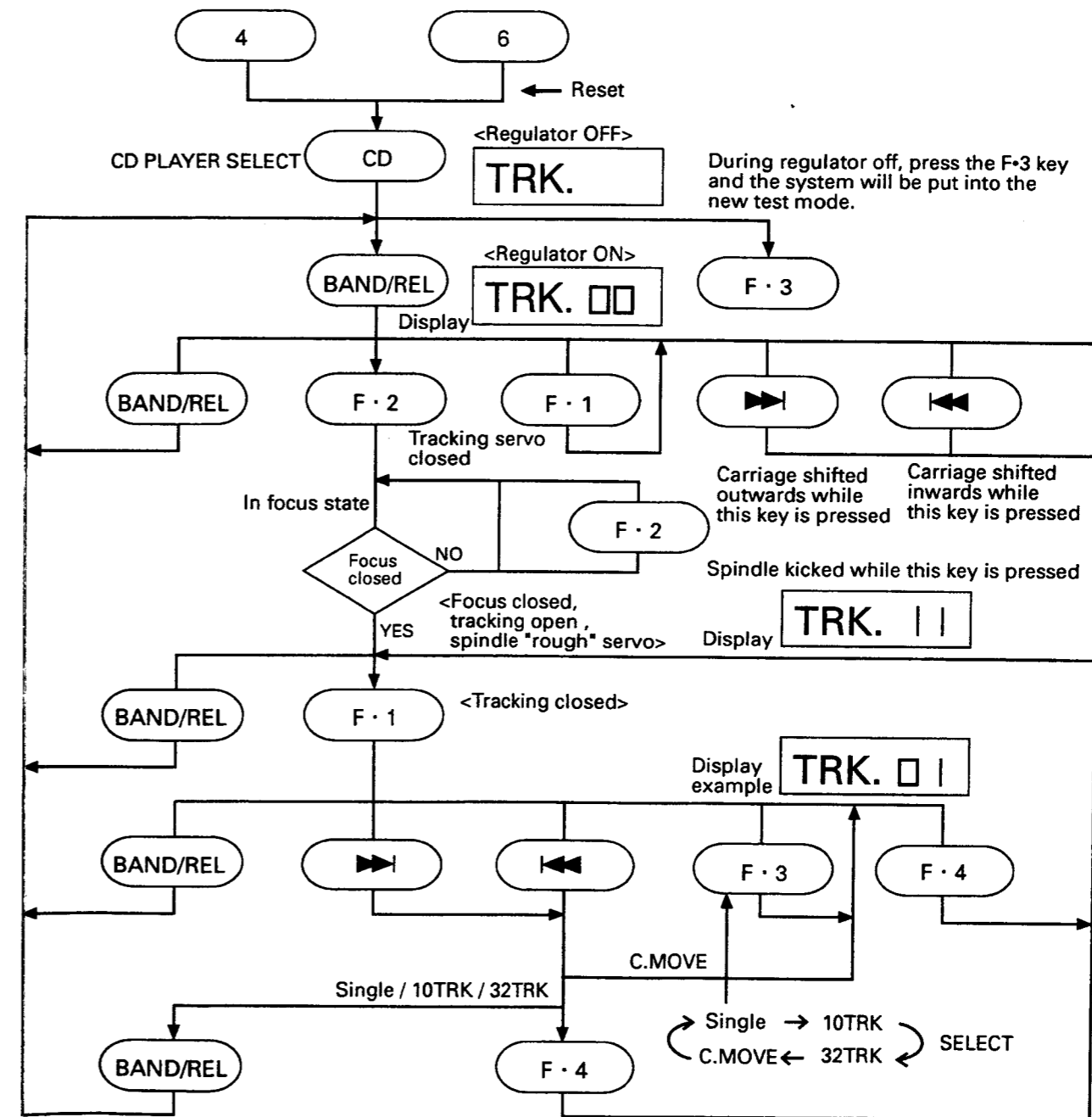
- The model CDX-M6 is adjusted in a combination with the multiple CD control head (FH-M75, FH-M70, DEH-M980RDS, etc.). Each regulator key should be operated at the head. With the FH-M75, M70 taken up for reference, a description will be given below concerning how to enter into the test mode, including key operations. The key in the adjustment text is also one of the FH-M75, M70 keys.
- How to enter into the test mode  
While pressing keys 4 and 6 at a time, press the back-up ON or clear button ON the FH-M75, M70.
- Resetting the test mode  
Press the clear button ON the FH-M75, M70. Subsequently press the clear button ON the CDX-M6. Or turn off the CDX-M6 and the FH-M75, M70 back-up and wait for about one minute.
- Role to be played by each key in the test mode

A function key permits you to select the CD multi-player or single CD player.

Key	Function
BAND/REL	RegulatorON/OFF
▶▶	FWD Kick
◀◀	REV Kick
EJECT	EJECT
F·3	Jump mode
F·1	Tracking close
F·4	Tracking open
F·2	Focus close
CD	CD ON/OFF

- SINGLE/10TRK/32TRK will continue to operate even after the key is released. Tracking closed the moment C-MOVE is released.
- JUMP MODE resets to SINGLE as soon as power is off.

#### ●Flow Chart



● **Measuring Equipment and Jigs**

Adjustment	• Measuring equipment&jigs
<b>1. Grating Adjustment-1 (Rough adjustment)</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, clock driver, grating adjustment filter (bandpass filter)(GGF-133), AC milli-voltmeter</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>2. Tangential Skew Check</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, screwdriver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 ; DIN Cord:GGF1159</li> </ul>
<b>3. Grating Adjustment-1 (Fine adjustment)</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, clock driver, two low-pass filters</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>4. Grating Adjustment-2</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, grating adjustment driver, low-pass filter</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>5. FE Bias Adjustment</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>6. RF Offset Adjustment</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>7. TE Offset Adjustment-1</b>	<ul style="list-style-type: none"> <li>• DC voltmeter or oscilloscope, volume adjustment driver</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>8. Tracking Balance Adjustment-1</b>	<ul style="list-style-type: none"> <li>• Oscilloscope, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>9. Focus Servo Loop Gain Adjustment-1</b>	<ul style="list-style-type: none"> <li>• Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>10. Focus Servo Loop Gain Adjustment-2</b>	<ul style="list-style-type: none"> <li>• Oscillator, gain adjustment filter, oscilloscope, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>11. Tracking Servo Loop Gain Adjustment-1</b>	<ul style="list-style-type: none"> <li>• Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>12. Tracking Servo Loop Gain Adjustment-2</b>	<ul style="list-style-type: none"> <li>• Oscillator, gain adjustment filter, oscilloscope, volume adjustment driver</li> <li>• SONY TYPE 4 (or ABEX TCD-782)</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>
<b>13. TE Offset Adjustment-2</b>	<ul style="list-style-type: none"> <li>• DC voltmeter or oscilloscope, volume adjustment driver</li> <li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li> </ul>

<b>Adjustment</b>	<b>• Measuring equipment&amp;jigs</b>
<b>14. Checking FEY Level</b>	<ul style="list-style-type: none"><li>• Oscilloscope</li><li>• SONY TYPE 4 (or ABEX TCD-782)</li><li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li></ul>
<b>15. Tracking Balance Adjustment-2 And Checking TEY Level</b>	<ul style="list-style-type: none"><li>• Oscilloscope, volume adjustment driver</li><li>• SONY TYPE 4 (or ABEX TCD-782)</li><li>• Extension Cable:GGD1023 • DIN Cord:GGF1159</li></ul>

● Adjustment Points

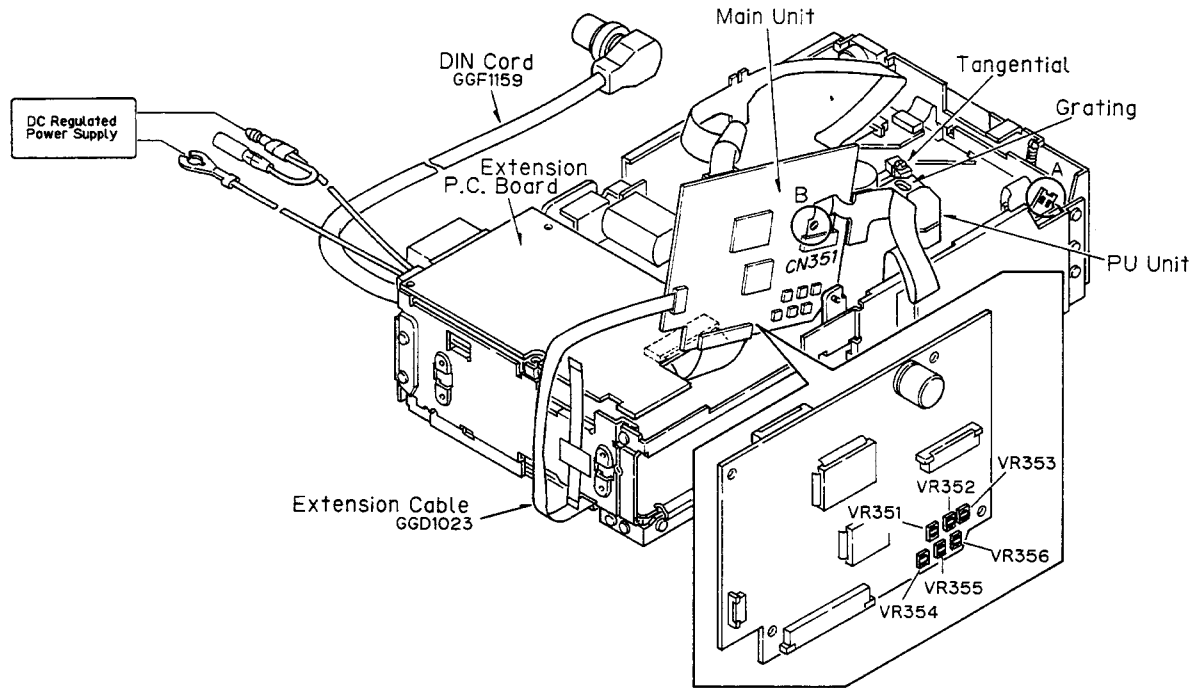


Fig. 9

VR351	FE BIAS
VR352	RF OFFSET
VR353	TE OFFSET
VR354	TRACKING BALANCE
VR355	FOCUS SERVO LOOP GAIN
VR356	TRACKING SERVO LOOP GAIN

**Note:** When pulling out the connector CN351, be sure to install a short pin in section A. Alternatively, the land in section B may be short-circuited (by soldering or the like). When the connector is inserted, be sure to disconnect it before the power is turned on.

● Test Point

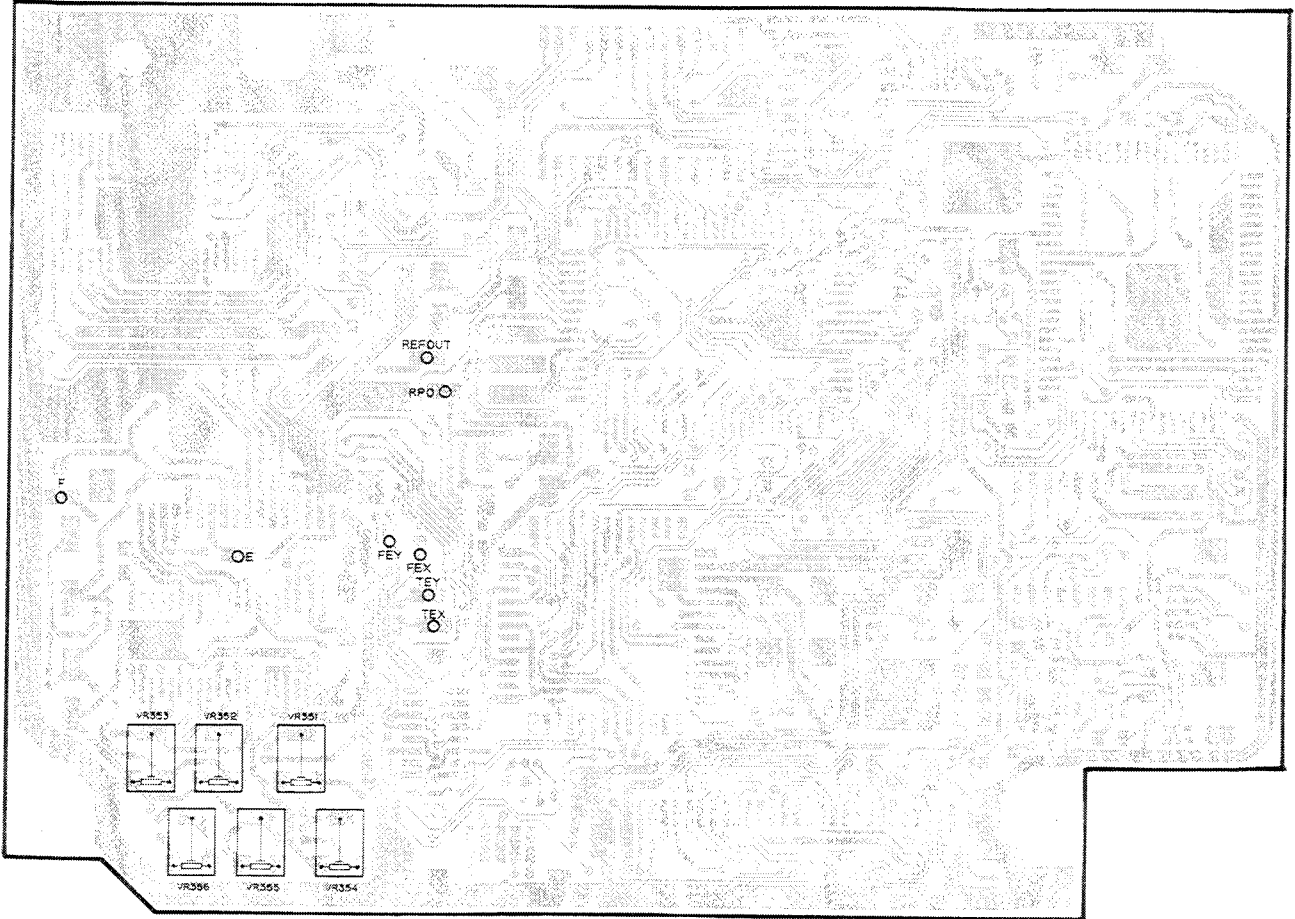
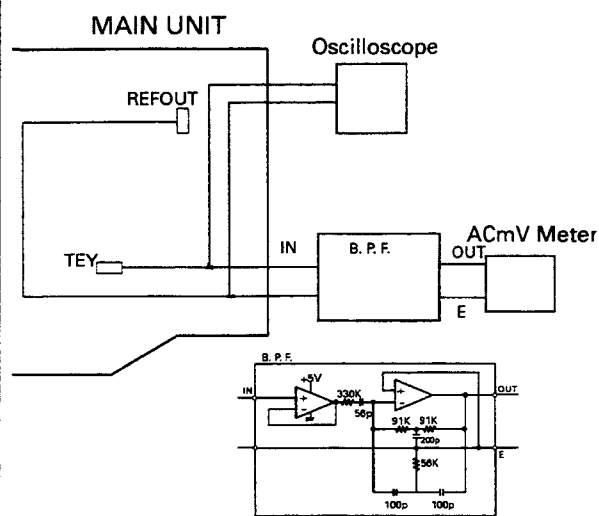


Fig. 10

### 1 Grating Adjustment-1 (Rough adjustment)

- Grating Adjustment-1 (rough adjustment and fine adjustment) may be performed in Grating Adjustment-2.
- **Purpose:**  
The grating may need adjustment in a replaced pick-up unit.
- **Maladjustment symptoms:**  
No disc playback, track jumping.

- **Measuring equipment / jigs:**  
Oscilloscope, clock driver, grating adjustment filter (bandpass filter) (GGF-133), AC milli-voltmeter
- **Measuring point:**  
TEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**  
Pick-up grating adjustment hole



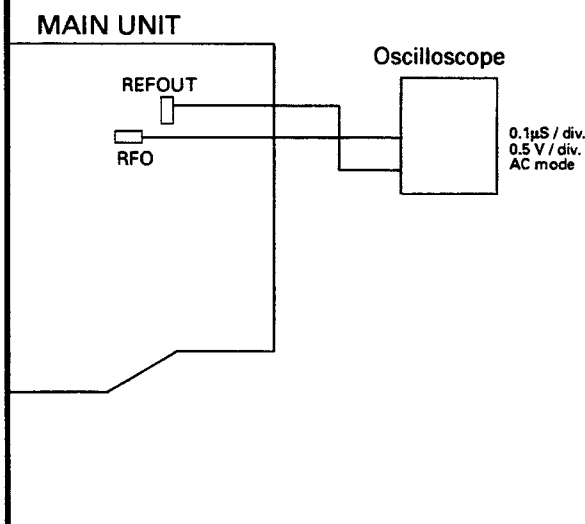
#### Adjustment Procedure

1. In the test mode, set a test disc-loaded magazine and select the tray with a test disc.
2. Switch regulator ON .
3. Using the ►► or ◀◀ key, move the pick-up to about the center of the test disc.
4. Press the F•2 key to close focus.
5. While monitoring the TEY filter output by AC millivoltmeter, turn the grating adjustment hole slowly. The AC voltage increases and decreases while turning the screw. Search for the minimum voltage level. (This corresponds to the position where the grating is on a track, and is referred to as the null point.)
6. Then while monitoring TEY by oscilloscope, turn the driver slowly clockwise from the null point (as seen from under the pick-up) until the first wave-form peak amplitude is reached.

### 2 Tangential Skew Check

- **Purpose:**  
To check whether tangential skew has been misaligned or not when replacing the pick-up unit.
- **Maladjustment symptoms:**  
No disc playback, track jumping.

- **Measuring equipment / jigs:**  
Oscilloscope, screwdriver
- **Measuring point:**  
RFO
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
Pick-up tangential adjustment screw



#### Adjustment Procedure

1. Play tune TNO 12 in normal mode. (ABEX TCD-782:TNO19)
2. Adjust the tangential adjustment screw so that the RF wave-form will have a level maximized and an eye pattern clearly viewed. Turn the adjustment screw both clockwise and counterclockwise to points where the eye pattern deteriorates, and take the midway point as the adjustment point. As a general guide, look for an overall clear waveform, and one of the diamond shapes in the eye pattern. The diamond shapes should appear in fine lines at the point of optimum adjustment. Take care not to knock the pick-up with the screwdriver at this stage. (This kind of accident can result in loss of focus.) (See Waveform.1,2)
3. Apply "screw-lock" to the tangential adjustment screw.
4. After adjusting tangential skew, also adjust the grating.

### 3 Grating Adjustment-1(Fine adjustment)

• **Purpose:**  
The grating may need adjustment in a replaced pick-up unit.

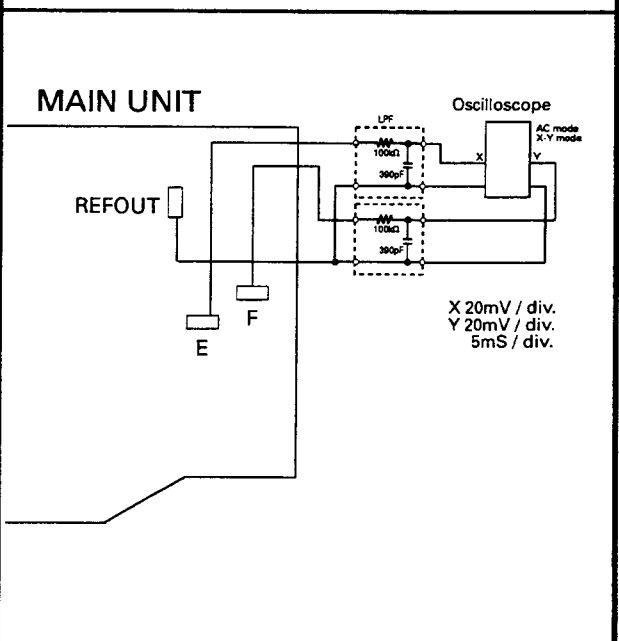
• **Maladjustment symptoms:**  
No disc playback, track jumping.

• **Measuring equipment / jigs:**  
Oscilloscope, clock driver, two low-pass filters

• **Measuring point:**  
E LPF output, F LPF output

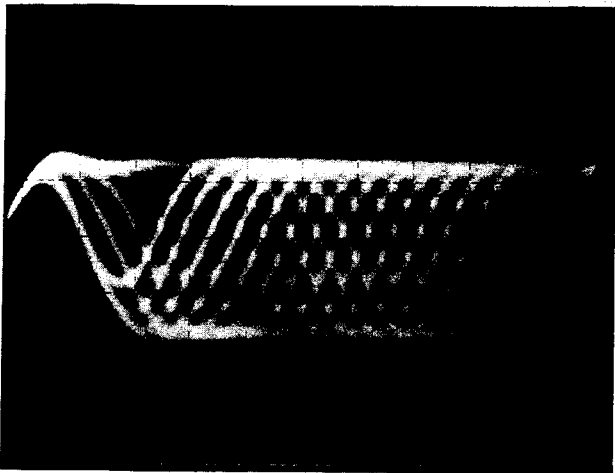
• **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode

• **Adjustment position:**  
Pick-up grating adjustment hole



#### Adjustment Procedure

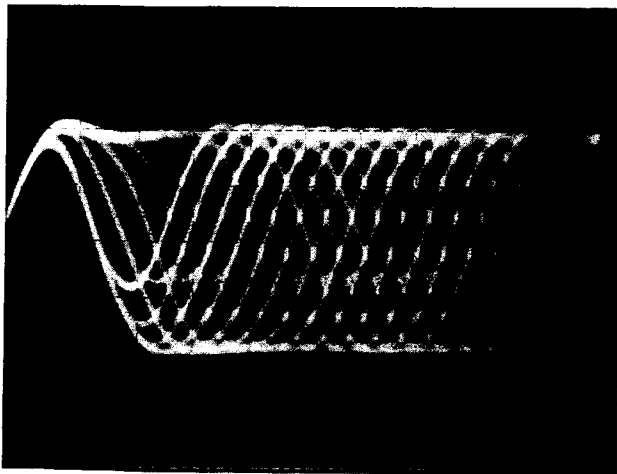
1. Connect a low-pass filter as shown in the above diagram.
2. Switch regulator ON in test mode, and load a disc.
3. Using the  $\blacktriangleright$  or  $\blacktriangleleft$  key, move the pick-up to about the center of the test disc.
4. Press the F•2 key to close focus.
5. Using the driver, adjust the Lissajous figure to a single line (or as close as possible).  
(See Waveform.8)
6. Switch regulator OFF and remove the filters.



Waveform.1

REFOUT

NG



Waveform.2

REFOUT

OK

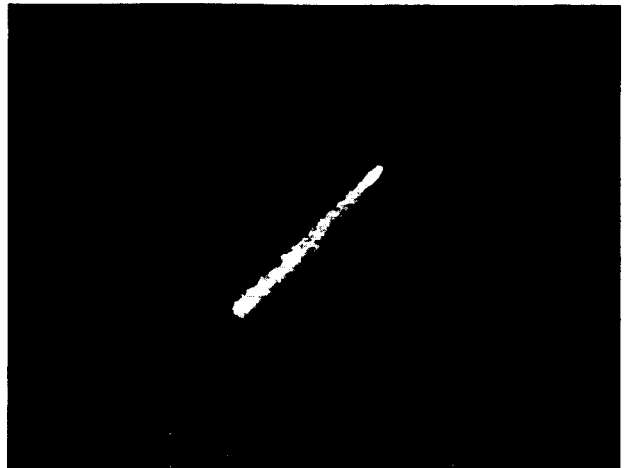
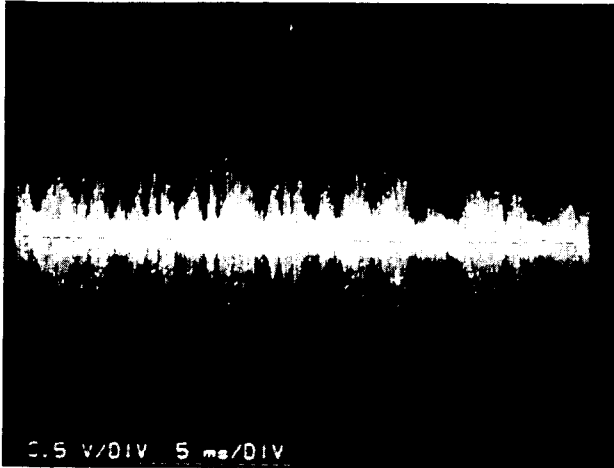
0.5V/div.  
0.5μs/div.  
DC mode



TEY waveform 5ms/div., 500mV/div.

**Nul Point**

Lissajous figure (AC input)  
Horizontal axis E 20mV/div.  
Vertical axis F 20mV/div.

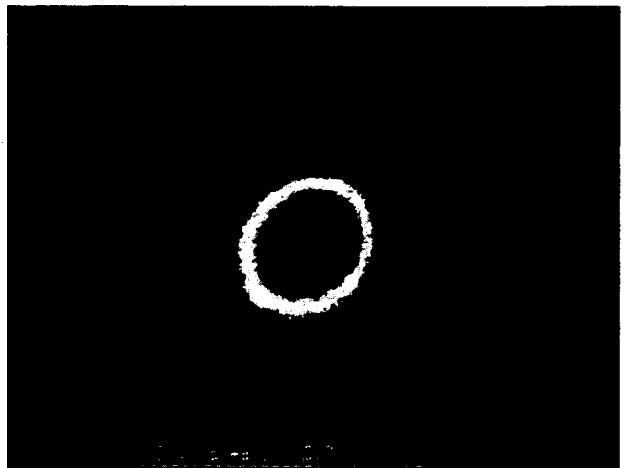
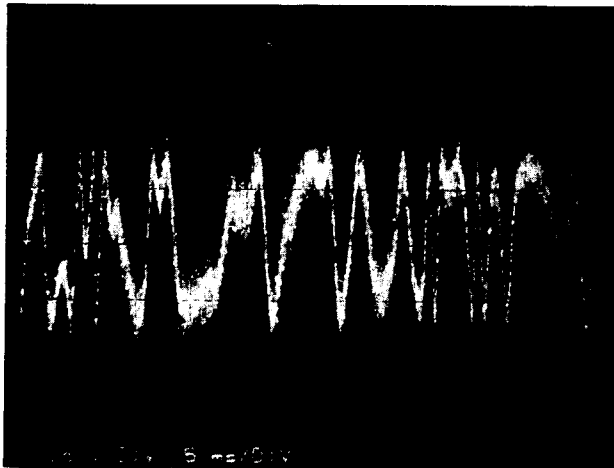


Waveform.3

Waveform.4



**"Rough" adjustment**

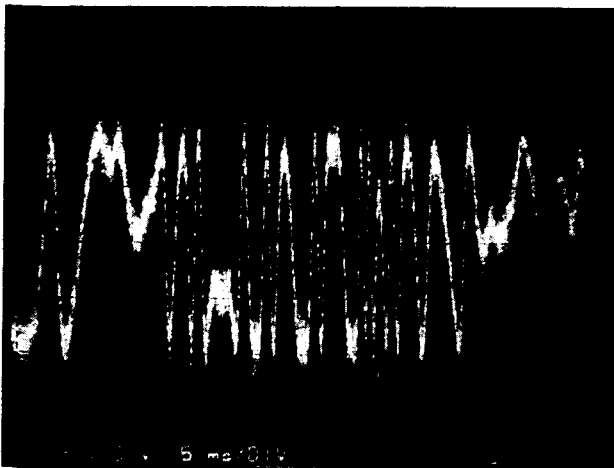


Waveform.5

Waveform.6



**Final adjustment**



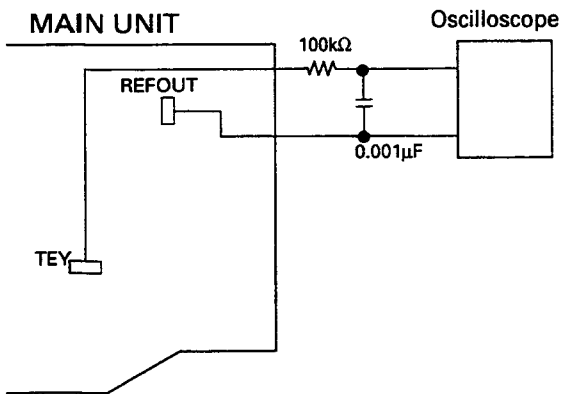
Waveform.7

Waveform.8

**4 Grating Adjustment-2**

- Grating Adjustment-2 may be performed in Grating Adjustment-1 (rough adjustment and fine adjustment).
- **Purpose:**  
The grating may need adjustment in a replaced pick-up unit.
- **Maladjustment symptoms:**  
No disc playback, track jumping.

- **Measuring equipment / jigs:**  
Oscilloscope, grating adjustment driver, low-pass filter
- **Measuring point:**  
TEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**  
Pick-up grating adjustment hole



**Adjustment Procedure**

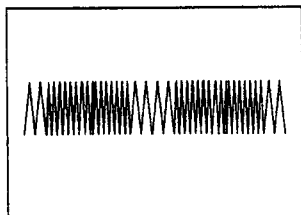
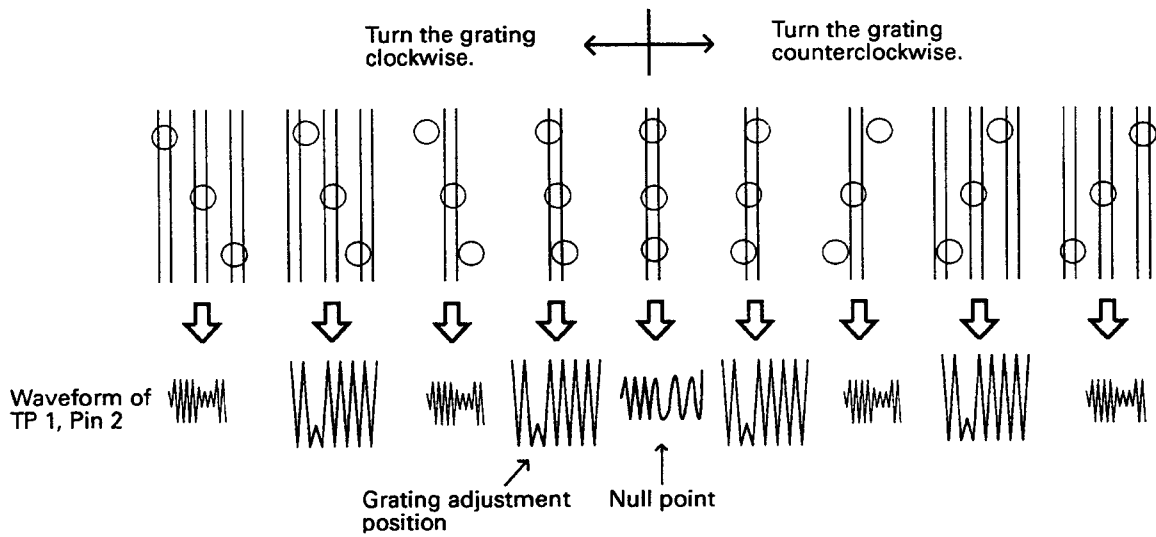
1. In the test mode, set a test disc-loaded magazine and select the tray with a test disc.
2. Switch regulator ON .
3. Using the ►► or ◄◄ key, move the pick-up to center of the test disc.
4. Press the F•2 key to close focus.
5. Insert the adjusting screwdriver in the slit for the pick-up grating adjustment and adjust the grating to seek out the null point. For details, see following page.
6. As the screwdriver is slowly turned clockwise from the null point, the amplitude of the waveform increases gradually. As the screwdriver continues to be turned, the amplitude of the waveform decreases again. Adjust the grating to a point at which the amplitude of the waveform first reaches the maximum while the screwdriver is turned clockwise from the null point.

● **How to seek the null point**

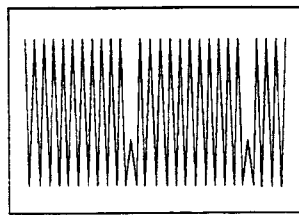
When the screwdriver is inserted in the slit for grating adjustment while the angle of the grating is varied, the amplitude of the TEY tracking error signal varies.

There are 5 or 6 positions where the amplitude of the waveform is decreased in the grating variable range. In only one of the waveform amplitude diminishing positions, the envelope is made smooth. This position denotes the state where three laser beams divided by the grating are aligned right on the same track.

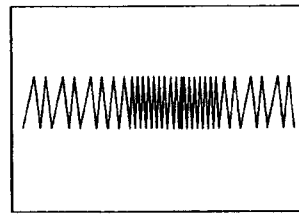
This position is referred to as the null point. Adjust the grating to seek out the null point which is used as a reference position in performing the grating adjustment.



Waveform at null point



Waveform of maximum amplitude



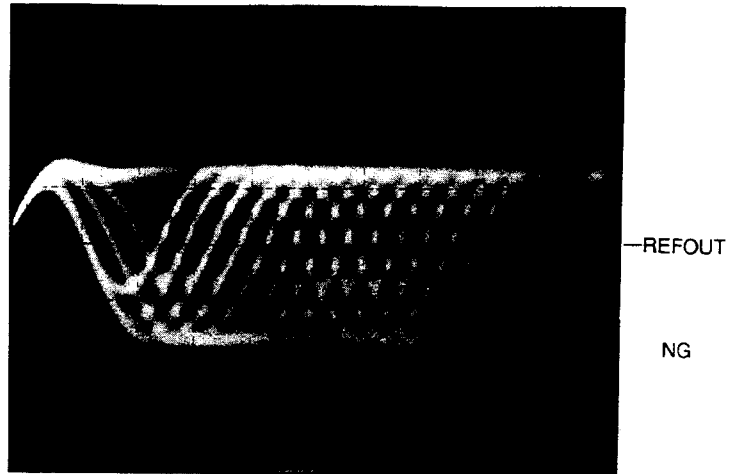
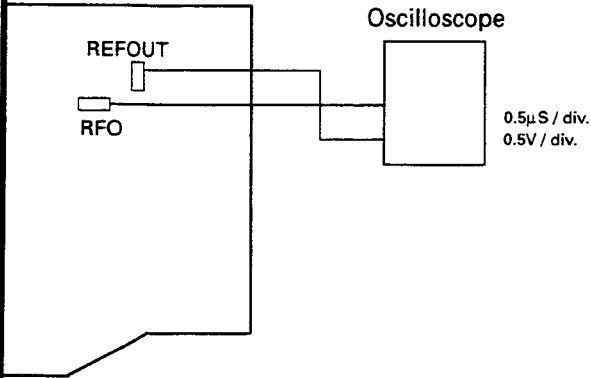
Waveform in positions other than null point

**5 FE Bias Adjustment**

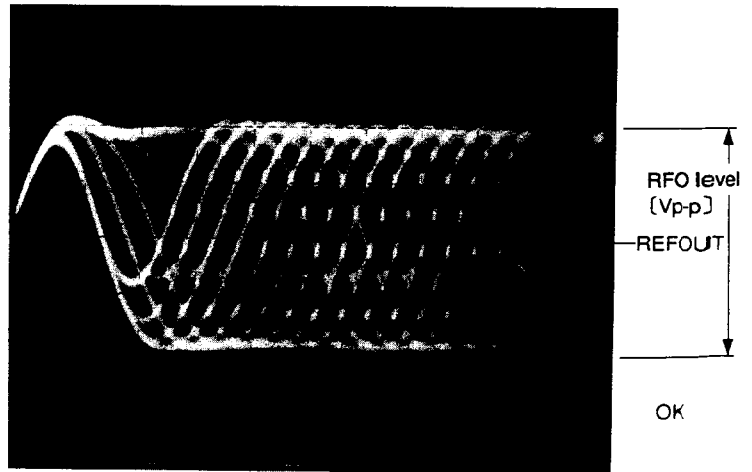
- **Purpose:**  
To adjust the focus servo bias to an optimum value.
- **Maladjustment symptoms:**  
Focus closing difficulty, poor playability.

- **Measuring equipment / jigs:**  
Oscilloscope, volume adjustment driver
- **Measuring point:**  
RFO
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
VR351 (FEB)

**MAIN UNIT**



Waveform.9



Waveform.10

**Adjustment Procedure**

1. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO 19)
2. Observe RFO in respect to REFOUT in the oscilloscope, and adjust VR351 (FEB) to obtain maximum RF and optimum eye pattern.(See Waveform. 9,10)
3. After adjustment, measure the RFO output level shown in Waveform.10 and take actions shown below.

Output level	Action
2.8Vp-p more than	Replace the pick-up
1.2Vp-p - 2.6Vp-p	Normal
1.2Vp-p less than	Replace the pick-up

0.5V/div.  
0.5µs/div.  
DC mode



NG



OK

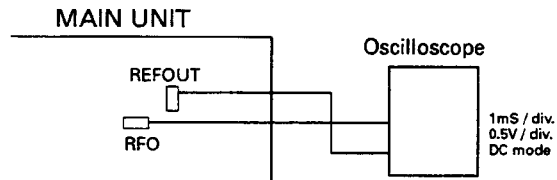


NG

**6 RF Offset Adjustment**

- **Purpose:**  
To adjust the RF amplifier offset to a suitable value.
- **Maladjustment symptoms:**  
Focus closure fails readily.

- **Measuring equipment / jigs:**  
Oscilloscope, volume adjustment driver
- **Measuring point:**  
RFO
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
VR352 (RFO)



When using a multi-channel oscilloscope, do not connect the other negative probe to ground.

**Adjustment Procedure**

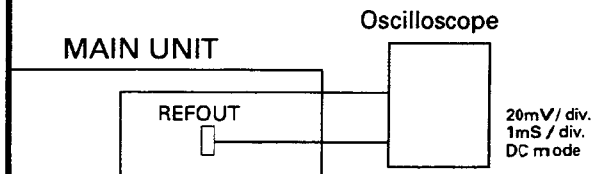
1. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO 19)
2. Using VR352 to adjust the RFO waveform so that REFOUT appears at the center.(A-B must not exceed 100 mV.)



**7 TE Offset Adjustment-1**

- **Purpose:**  
To adjust the electrical offset of the tracking servo to zero.
- **Maladjustment symptoms:**  
Search times too long, carriage run-away.

- **Measuring equipment / jigs:**  
DC voltmeter or oscilloscope, volume adjustment driver
- **Measuring point:**  
TEY
- **Test disc and setting:**  
Empty magazine Test mode
- **Adjustment position:**  
VR353



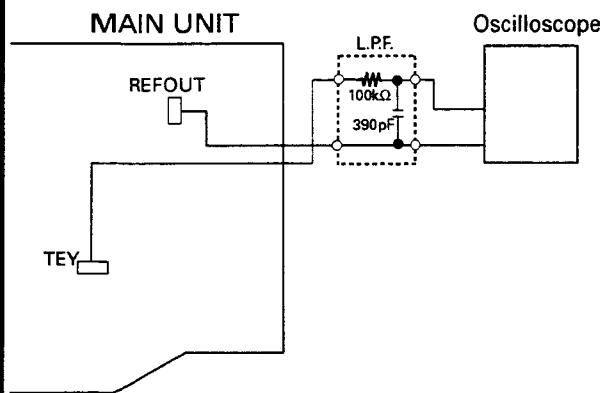
**Adjustment Procedure**

1. Select a tray without a disk, while in test mode.
2. Switch regulator ON.
3. Using VR353, adjust the TEY output DC voltage in reference to REFOUT to a value of  $0 \pm 25\text{mV}$ .
4. Switch regulator OFF.

## 8 Tracking Balance Adjustment-1

- **Purpose:**  
To adjust the tracking servo offset to zero.
- **Maladjustment symptoms:**  
Search times too long, poor playability, carriage run-away.

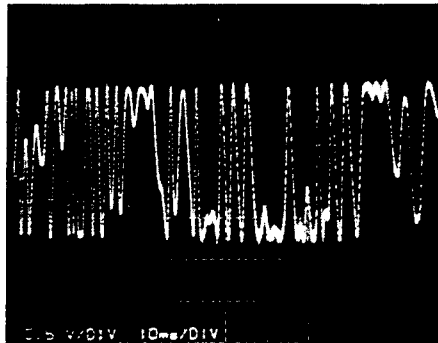
- **Measuring equipment / jigs:**  
Oscilloscope, volume adjustment driver
- **Measuring point:**  
TEY (Tracking error signal)
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**  
VR354 (T.BAL)



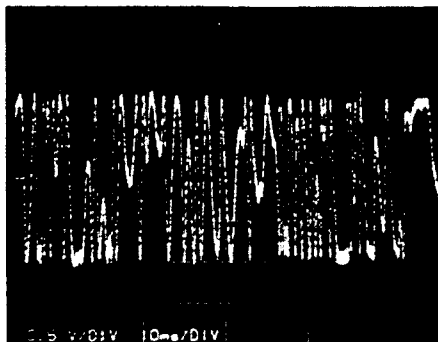
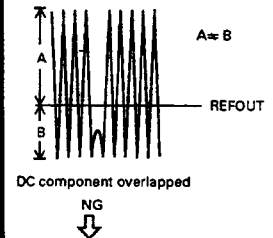
### Adjustment Procedure

1. After checking that regulator is OFF, connect the low-pass filter as shown in the diagram.
2. Set the test disc. Switch regulator ON.
3. Using the ►► or ◄◄ key, move the pick-up to about the center of the signal surface.
4. Press the F-2 key to close focus.
5. Using an oscilloscope, observe the TEY signal in respect to REFOUT.  
Then adjust VR354 (T.BAL) to set the positive and negative amplitudes to the same levels.  
(See Waveform.11-13)
6. Switch the power OFF.

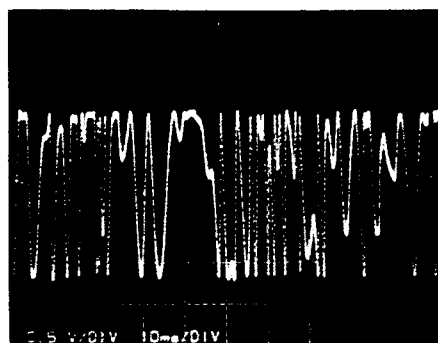
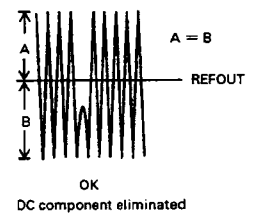
TEY waveform  
0.5V/div.  
10ms/div.



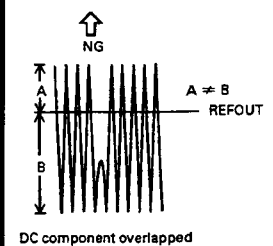
Waveform.11



Waveform.12



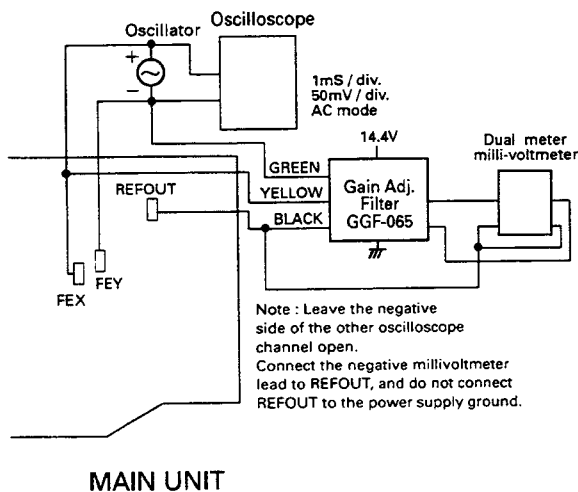
Waveform.13



### 9 Focus Servo Loop Gain Adjustment-1

- Focus Servo Loop Gain Adjustment-1 may be performed in Focus Servo Loop Gain Adjustment-2.
- **Purpose:**  
To adjust the focus servo loop gain to an optimum value.
- **Maladjustment symptoms:**  
Poor playability, reduced resistance to vibration, focus closure fails readily.

- **Measuring equipment / jigs:**  
Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver
- **Measuring point:**  
FEX, FEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
VR355



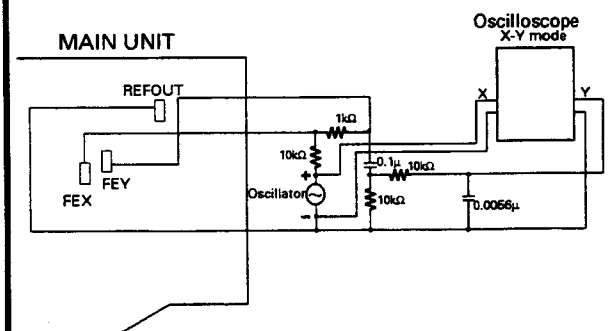
#### Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode. (ABEX TCD-782 :TNO 19)
3. Set the oscillator to 1kHz, and observe the FEX/FEY output in the oscilloscope. Adjust the oscillator output to obtain a FEX/FEY output of 100mVp-p.
4. Adjust VR355 to obtain a milli-voltmeter difference of  $0 \pm 0.5\text{dB}$ .

### 10 Focus Servo Loop Gain Adjustment-2

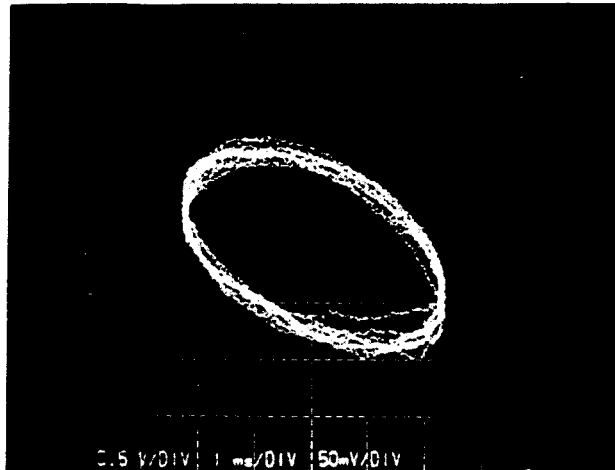
- **Purpose:**  
To adjust the focus servo loop gain to an optimum value.
- **Maladjustment symptoms:**  
Poor playability, reduced resistance to vibration, focus closure fails readily.

- **Measuring equipment / jigs:**  
Oscillator, gain adjustment filter, oscilloscope
- **Measuring point:**  
FEX, FEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
VR355

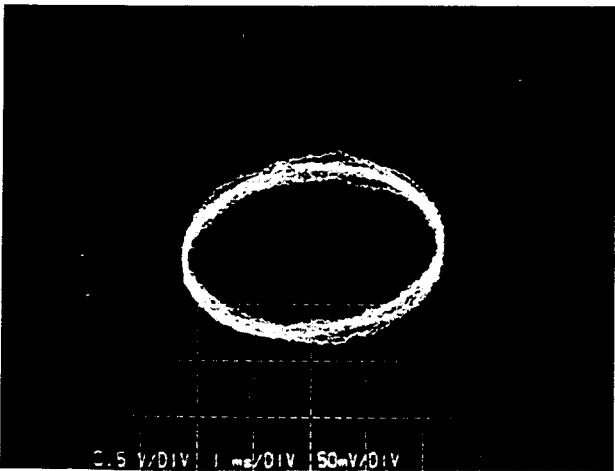


#### Adjustment Procedure

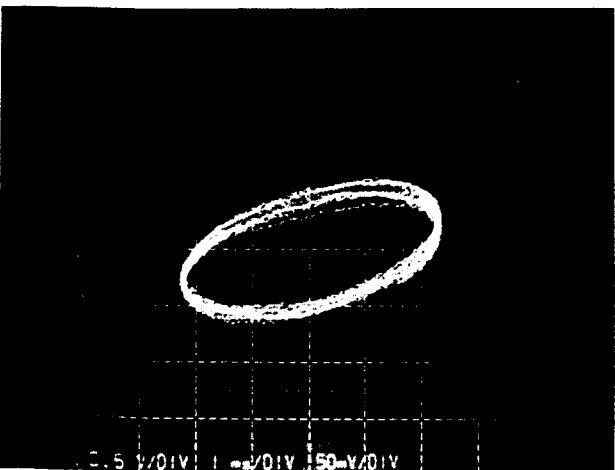
1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode. (ABEX TCD-782:TNO 19)
3. Set the oscillator at 1kHz and adjust the output of the oscillator to 2Vp-p.
4. Adjust VR355 to make the Lissajou's figure of waveform symmetrical about X and Y axes respectively.



Waveform.14



Waveform.15

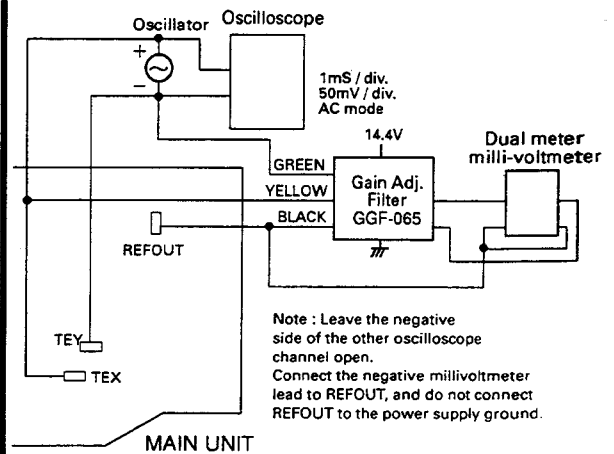


Waveform.16

### 11 Tracking Servo Loop Gain Adjustment-1

- Tracking Servo Loop Gain Adjustment-1 may be performed in Tracking Servo Loop Gain Adjustment-2.
- **Purpose:**  
To adjust the tracking servo loop gain to an optimum value.
- **Maladjustment symptoms:**  
Poor playability, reduced resistance to vibration.

- **Measuring equipment / jigs:**  
Oscillator, gain adjustment filter(GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver
- **Measuring point:**  
TEX, TEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**  
VR356



#### Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO19)
3. Set the oscillator to 1.4kHz, and observe the TEX,TEY output in the oscilloscope. Adjust the oscillator output to obtain a TEX/TEY output of 300mVp-p.
4. Adjust VR356 to obtain a milli-voltmeter difference of  $0 \pm 0.5$ dB.



12 Tracking Servo Loop Gain Adjustment-2

• **Purpose:**  
To adjust the tracking servo loop gain to an optimum value.

• **Maladjustment symptoms:**  
Poor playability, reduced resistance to vibration.

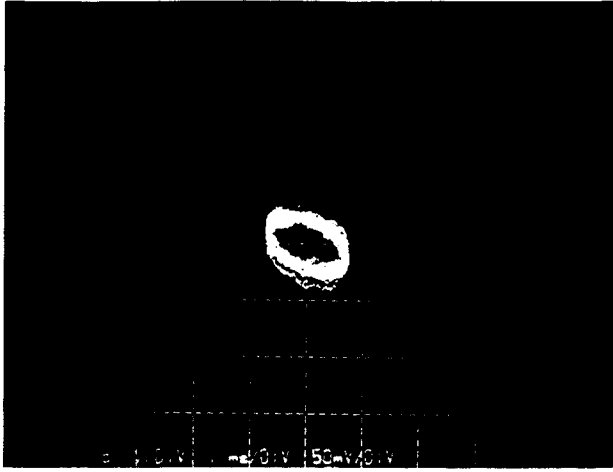
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• **Measuring equipment / jigs:**  
Oscillator, gain adjustment filter, oscilloscope

• **Measuring point:**  
TEX, TEY

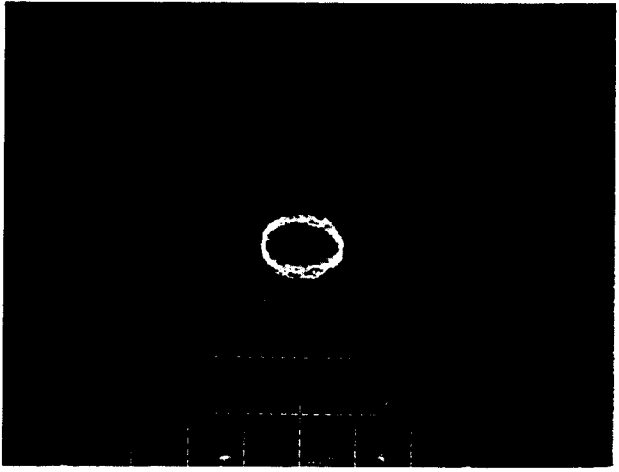
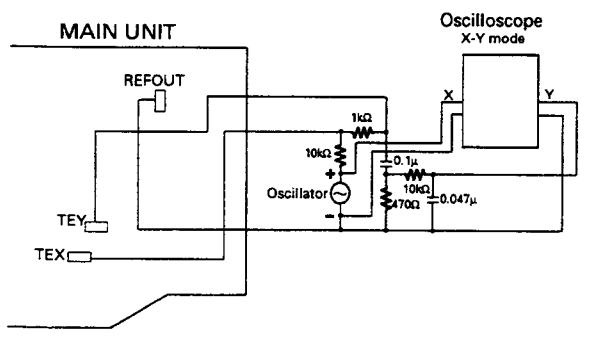
• **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Normal mode

• **Adjustment position:**  
VR356



High-level gain  
Tracking  
X=5V/div.  
Y=50mV/div.  
2ms/div.

Waveform.17

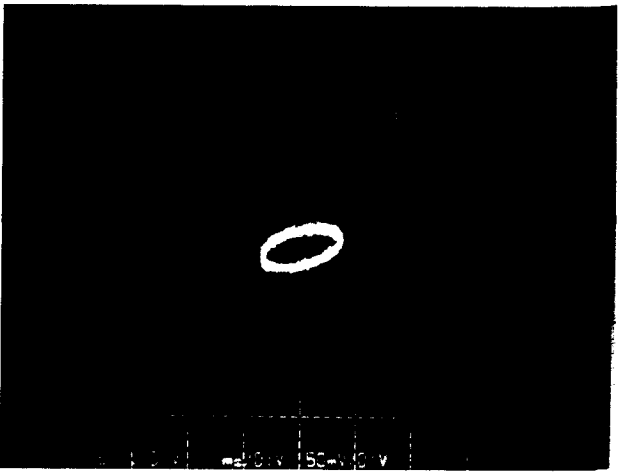


Optimum gain

Waveform.18

**Adjustment Procedure**

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO19)
3. Set the oscillator at 1.4kHz and adjust the output of the oscillator to 5Vp-p.
4. Adjust VR356 to make the Lissajou's figure of waveform symmetrical about X and Y axes respectively.



Low-level gain

Waveform.19

**13 TE Offset Adjustment-2**

- **Purpose:**  
To adjust the electrical offset of the tracking servo to zero.
- **Maladjustment symptoms:**  
Search times too long, carriage run-away.

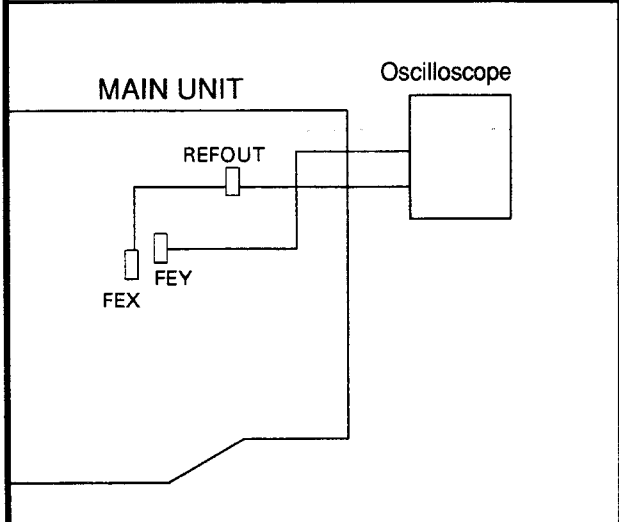
- **Measuring equipment / jigs:**  
DC voltmeter or oscilloscope,  
volume adjustment driver
- **Measuring point:**  
TEY
- **Test disc and setting:**  
No Disc Test mode
- **Adjustment position:**  
VR353

**Adjustment Procedure**  
Same as for TE offset adjustment-1, but with the DC voltage of the TEY output adjusted to  $0 \pm 50\text{mV}$ . The purpose of this additional adjustment is to correct any deviations generated when carrying out the tracking balance and tracking servo loop gain adjustments after completing TE offset adjustment-1.

**14 Checking FEY Level**

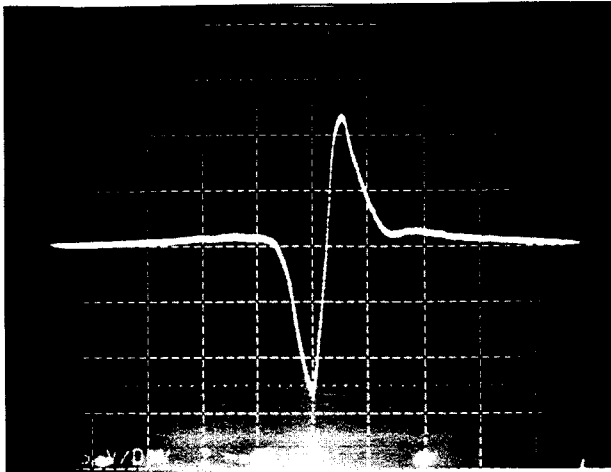
- **Purpose:**  
Check the focus error level.
- **If the level is insufficient:**  
Focus is hard to close and the playability is worsened.

- **Measuring equipment / jigs:**  
Oscilloscope
- **Measuring point:**  
FEY
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode



- Checkout Procedure (This checkout always must be performed after gain adjustment.)**
1. Connect the oscilloscope to REFOUT and FEY. Connect FEX to REFOUT.
  2. In the test mode, set a test disc-loaded magazine and select a tray with a test disc.
  3. Switch regulator ON.
  4. Using the **▶▶** or **◀◀** key, move the pick-up to the center of the test disc.
  5. Press the **F•2** key to close focus. During this action, the disc repeats acceleration and deceleration.
  6. Observe the FEY waveform and measure the FEY level.
  7. Switch regulator OFF.
  8. Disconnect FEX and REFOUT.
- Normal level of FEY: 2.0Vp-p more than**  
If the level is less than the above, examine the peripheral circuits of the unit or replace the pick-up.

### 15 Tracking Balance Adjustment-2 and Checking TEY Level



0.5V/div.  
2ms/div.

REFOUT

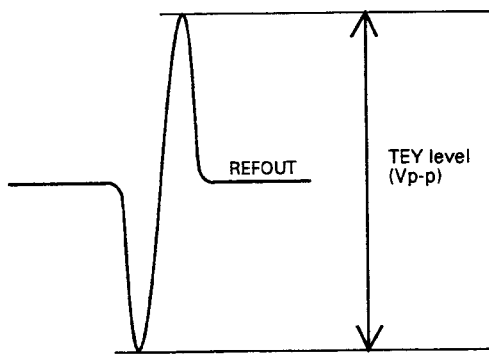
Waveform.20


- **Purpose:**  
To adjust the tracking servo offset to zero.
- **Maladjustment symptoms:**  
Search times too long, poor playability, carriage run-away.

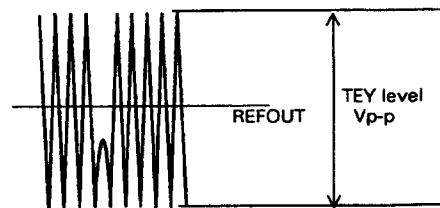
- **Measuring equipment / jigs:**  
Oscilloscope,  
volume adjustment driver
- **Measuring point:**  
TEY (Tracking error signal) L.P.F. output
- **Test disc and setting:**  
SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**  
VR354

**Adjustment Procedure**

- Steps 1 through 5 are the same as the steps taken in the tracking balance adjustment-1.
6. Check to see that the level of positive and negative amplitudes of TEY signal. If there is deviation, make adjustment using VR354.
  7. After adjustment measure the TEY level. (Measurement always should be made after the tracking gain adjustment is completed. Before the adjustment, normal level measurement cannot be achieved.)



In addition to the waveform shown above, the FEY level output produces another waveform like . However, take measurement only of the above figure of waveform.



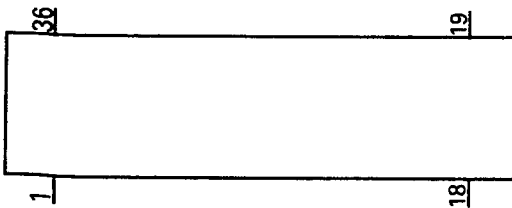
**Normal range of TEY level:  $2.0 \pm 0.5V_{p-p}$**

If the level is out of the above range, examine the peripheral circuits of the unit or replace the pick-up.

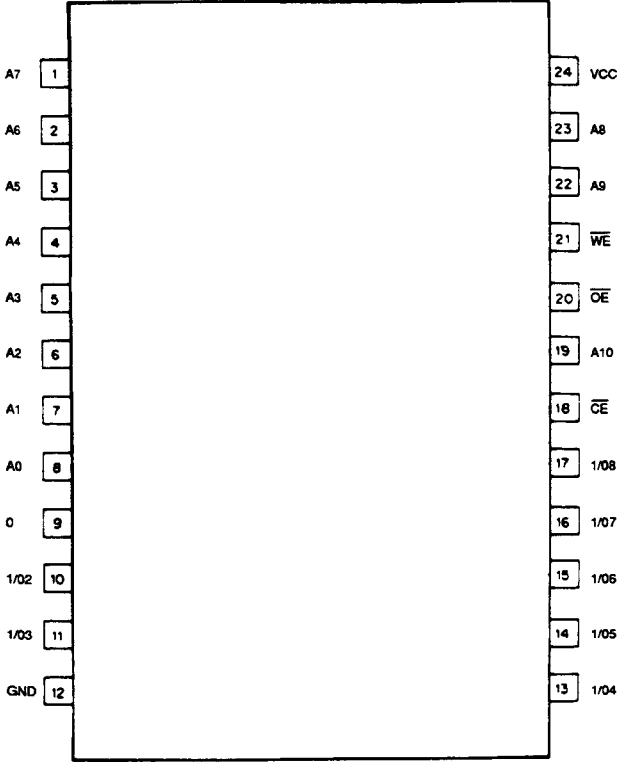
- ICs
- Pin Functions (UPC1347GS)

Pin No.	Pin Name	I/O	Function and Operation
1	VCC		
2	BP-	I	Vibration detect amplifier 1 inverter input
3	BPO	O	Vibration detect amplifier 1 output
4	WC+	I	Window comparator non-inverting input
5	WC-	I	Window comparator inverting input
6	GND		GND
7	QDH	I	Vibration detect amplifier 3 non-inverting input
8	QDO	O	Vibration detect amplifier 3 output
9	A	I	A signal input
10	C	I	C signal input
11	B	I	B signal input
12	D	I	D signal input
13	E	I	E signal input
14	F	I	F signal input
15	PIN	I	APC circuit PD amplifier input
16	LA	O	APC circuit LD amplifier output
17	LAON		Laser diode ON/OFF switching
18	VREF1		Reference voltage
19	GND2		GND
20	RF+	I	RF amplifier non-inverting input
21	RFS	O	RF summing virtual output
22	RF-	I	RF amplifier inverting input
23	NC		Not used
24	RFO	O	RF amplifier output
25	APC-	I	APC circuit PD amplifier inverting
26	TE2+	I	Tracking error amplifier 2 non-inverting input
27	APCO	O	APC circuit PD amplifier output
28	TE1O	O	Tracking error amplifier 1 output
29	TE2-	I	Tracking error amplifier 2 inverting input
30	TE2O	O	Tracking error amplifier 2 output
31	VREF2		Reference voltage
32	FE2+	I	Focus error amplifier 2 non-inverting input
33	FE1+	I	Focus error amplifier 1 non-inverting input
34	FE1O	O	Focus error amplifier 1 output
35	FE2-	I	Focus error amplifier 2 inverter input
36	FE2O	O	Focus error amplifier 2 output

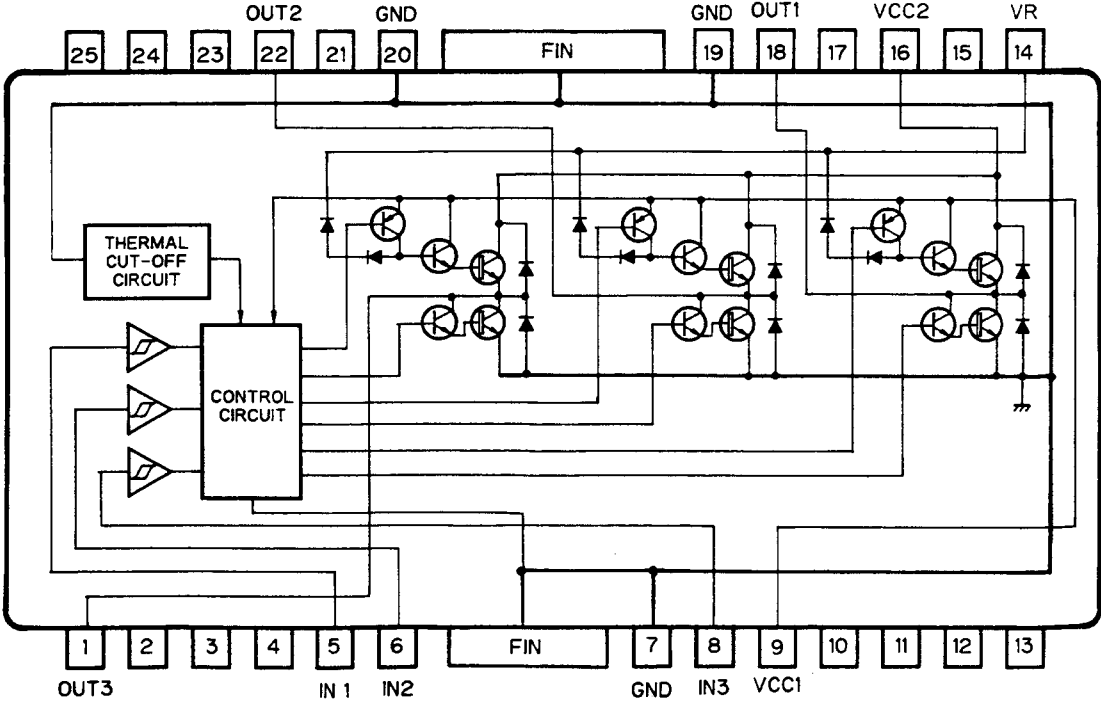
IC351:UPC1347GS



IC752:LH5116HN-10T



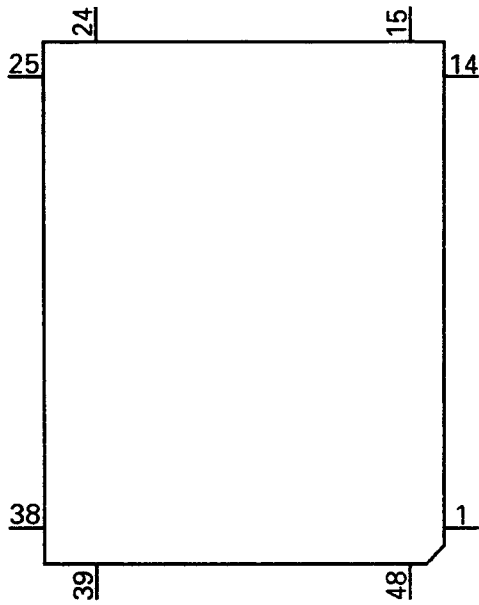
IC801:XRA6247FP



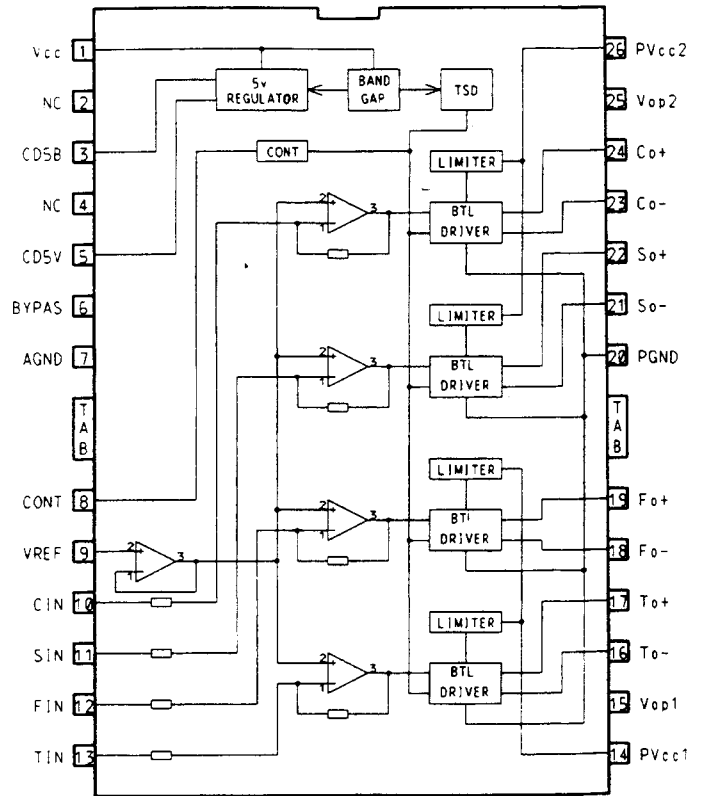
**● Pin Functions (UPD6374AGH)**

Pin No.	Pin Name	I/O	Function and Operation
1	VDD		Power supply
2	OUTSEL	I	Sets PWM output mode for the motor system
3	SCK	I	Clock input terminal for serial data input and output
4	SI	I	Serial data input
5	SO	O	Serial data and status signal output
6	STB	I	Signal latching serial data inside LSI
7	A0	I	Used in combination with stb
8	RST	I	System reset
9	DGND		Logic circuit GND terminal
10	LOCK	I	Input terminal for detection of spindle servo error signal
11	MDR	I	Input terminal for detection of spindle servo error signal
12	MDF	I	Input terminal for detection of spindle servo error signal
13	WFCK	I	Input terminal for detection of spindle servo error signal
14	RFCK	I	Input terminal for detection of spindle servo error signal
15	AVDD		Positive power supply terminal for analog circuit
16	EFM	O	EFM signal output terminal
17	ASI	I	Level comparing input for RF signal comparison
18	RFI	I	Analog input terminal for EFM comparator
19	REFOUT	O	A/D converter midpoint output terminal inside LSI
20	AGND		Analog circuit GND
21	RF	O	RF signal input terminal
22	FE	I	Focus error terminal
23	TE	I	Tracking error input terminal
24	VR	I	Input signal is quantified as follows:FS=88.2kHz,Resolution:6 bits The output takes place directly at microcomputer interface, that is, not via the filter block within LSI.
25	AVDD		Positive power supply terminal for analog circuit
26	TECO	I	Tracking comparator input terminal
27	TECI	I	Tracking comparator input terminal
28	DVDD		Positive power supply terminal for logic circuit
29	FF	O	PWM positive output terminal for the focus loop filter
30	FR	O	PWM negative output terminal for the focus loop filter
31	TF	O	PWM positive output terminal for the tracking loop filter
32	TR	O	PWM negative output terminal for the tracking loop filter
33	DGND		Logic circuit GND terminal
34	SF	O	PWM positive output terminal for the thread loop filter
35	SR	O	PWM negative output terminal for the thread loop filter
36	MF	O	PWM positive output terminal for the spindle loop filter
37	MR	O	PWM negative output terminal for the spindle loop filter
38	DVDD		Positive power supply terminal for logic circuit
39	T7	I	Sets tracking PWM output mode
40	T6	I	Sets focus PWM output mode
41	T5	I	Selects motor modulation mode
42	T4	I	Selects between focus and tracking modulation mode
43	MIRR	O	MIRR detection signal output terminal
44	RFOK	O	RFOK detection signal terminal
45	HOLD	I	Hold control signal input terminal
46	TBC		Tracking bank switching terminal
47	CKIN	I	System clock input terminal
48	TEST	I	Test terminal

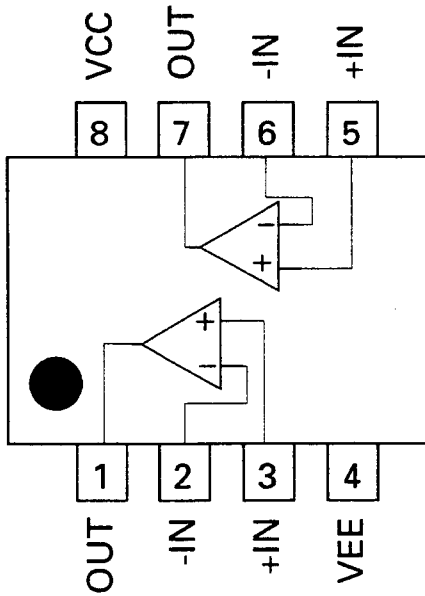
IC601:UPD6374AGH



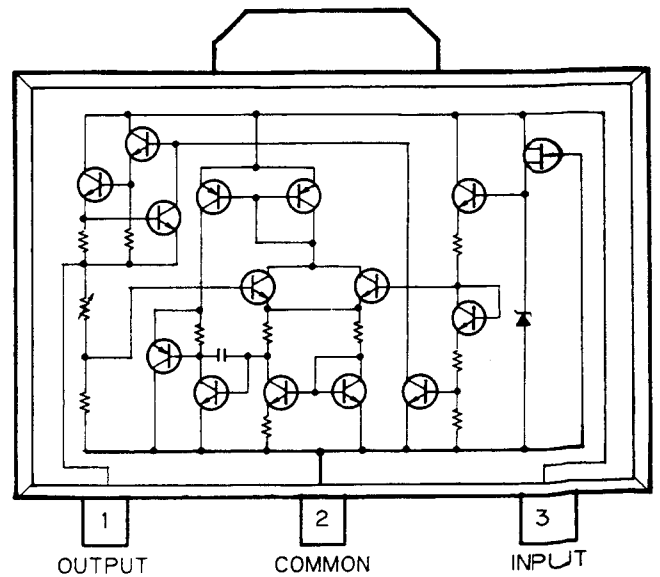
IC651:PA3026



IC602,652:NJM4558MD



IC661:TA78L05F

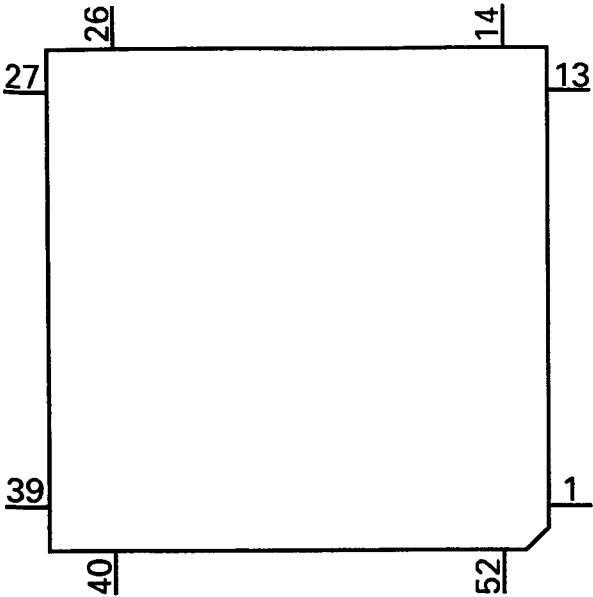


## ● Pin Functions (UPD6375GC)

Pin No.	Pin Name	I/O	Function and Operation
1	NC		Not used
2	WDCK	O	Output terminal for signal having double the frequency of LRCK
3	C4LR	O	Output terminal for signal having four the frequency of LRCK
4	RFCK	O	Oscillation clock divider signal, output pin for signal giving 1-frame sync.
5	EFMI	I	EFM signal input terminal
6	TEST		Test terminal
7	VSS		Gnd
8	C1D1	O	Output terminal indicating C1 error correction status
9	C1D2	O	Output terminal indicating C1 error correction status
10	C2D1	O	Output terminal indicating C2 error correction status
11	C2D2	O	Output terminal indicating C2 error correction status
12,13	NC		Not used
14	STBY	I	Standby input terminal
15	NC		Not used
16	PLK1	O	VCO output terminal for use in analog PLL selection
17	VDD		5V
18	PLK8	I	VCO output terminal for use in analog PLL selection
19	PLCK	O	Bit clock monitor terminal
20	VSS		Gnd
21	POUT	O	Output terminal for phase comparison between EFM signal and bit clock
22	WFCK	O	Signal issuing one-frame period by bit clock dividing signal
23	VDD		5V
24	MDS	O	Signal indicating spindle motor CLV servo control output status
25	MDF	O	Spindle motor CLV servo control positive direction output terminal
26	MDR	O	Spindle motor CLV servo control negative direction output terminal
27	LOCK	O	"H" when synchronisation signal & frame counter output coincide at EFM demodulator.
28	RST	I	Reset signal input terminal
29	A0	O	Control signal distinguishing data from microcomputer
30	STB	I	Signal latching serial data inside LSI
31	SO		Serial data input terminal
32	SI	I	Input terminal for data from microcomputer
33	VSS		Gnd
34	SCK	I	Clock input terminal serial data input
35	TX	O	Digital audio interface data output terminal
36	MUT/EMP	O	Output for mute command decoding signal or sub-Q command pre-emphasis data
37	SFSY	O	Signal indicating subcode one-frame synchronisation
38	SBSY	O	Signal indicating head of subcode block
39	SBCK	I	Subcode data read clock input terminal
40	SBSO	O	Subcode data output terminal
41	VDD		5V
42	XTAL	O	Oscillation continuation terminal
43	XTAL	I	Oscillation continuation terminal
44	VSS		Gnd
45	C16M	O	Oscillation clock output terminal
46	VDD		5V
47	C4M	O	1/4 cycle output terminal for oscillation clock signals
48	FLAG	O	Flag sig. indicating that the current audio data output of incorrectable data
49	SCKO	O	Clock output terminal for audio serial data
50	DOUT	O	Serial audio data output terminal
51	LRCK	O	Signal distinguishing between left and right channel DOUT terminal output
52	NC		Not used



IC701:UPD6375GC



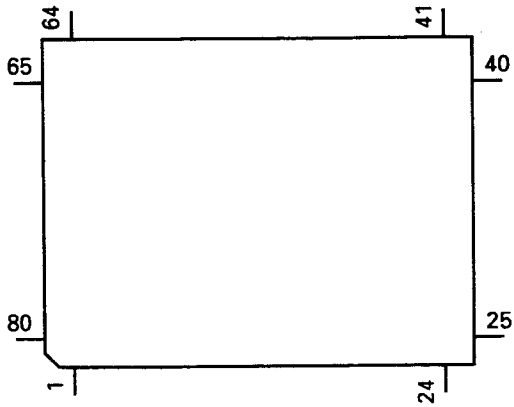
● Pin Functions (PD5230A)

Pin No.	Pin Name	I/O	Output Format	Function and Operation
1	TIN	I	C	Tray position input
2	TEMP			Temperature detector
3	VDIN			Power supply short sensor input
4	C/D	O	NM	Command/data appointment output
5	DCS	O	NM	Chip select output
6	DRDY	I	C	Ready input
7	DRST	O	NM	Reset
8	A0	O	NM	LSI data control signal
9	XSCK	I/O	NM	LSI clock input/output
10	XSO	O	NM	LSI data output
11	XSI	I	C	LSI data input
12	STB	O	C	LSI Strobe output
13	RST	O	C	LSI reset output
14-16	NC			Not used
17	BSENS	I		Back up power sense input
18	BRST	I		P-BUS reset input
19	BSRQ	O	C	P-BUS service request output pin
21	BSCK	I/O	C	P-BUS serial clock input/output
22	BSO	O	C	P-BUS serial data output
23	BSI	I		P-BUS serial data input
24	EJSW	I		Eject signal input
25	MAG	I		Magazine lock switch
26	CNVSS	I		GND
27	RESET	I		Reset input
28	EJLED	O	C	LED output for Eject
29	DCLOSE	I	C	Door close SW input
30	XIN	I		Crystal oscillating element connection pin
31	XOUT	O	C	Crystal oscillating element connection pin
32	VSS			GND
32-40	D7-D0	I/O	C	External RAM data line
41	POWER	O	C	CD +5V control
42	CONT	O	C	Servo driver power supply control
43	WE	O	C	External RAM write enable
44	PROT	O	C	External RAM output enable
45	CS	O	C	External RAM chip select
46-56	A10-A0	O	C	External RAM address line
57	EJP	I	C	Eject position switch
58	6/12	I	C	6/12 switching input
59	FECNT	I/O	C	DEFECT port
60	MIRR	I	C	Mirror detector input
61	LOCK	I	C	Spindle lock detector input
62	FOK	I	C	FOK signal input
63	HOME	I	C	Home position detector input
64	OPTSW	I	C	Digital output ON/OFF input
65	LOAD	O	C	Mechanism power supply control
66	I3	O	C	Motor driver control output
67	I1	O	C	Motor driver control output
68	I2	O	C	Motor driver control output
69	ENDOUT	O	C	Digital output enable signal
70	CDMUTE	O	C	CD mute output
71	ADENA	O	C	A/D reference voltage output
72	TESTIN	I	C	Test program mode input
73	VCC			
74	VREF	I		A/D reference voltage input
75	AVSS			A/D GND

Pin No.	Pin Name	I/O	Output Format	Function and Operation
76	CSEL	I		Compression select
77	NC			Not used
78	DISK			Disc detector input
79	TSEL	I	C	Tray position detector photo sensor
80	TOUT	I	C	Disc sensor timing input

Output Format	Meaning
C	CMOS output
NM	Middle resistivity N channel open drain

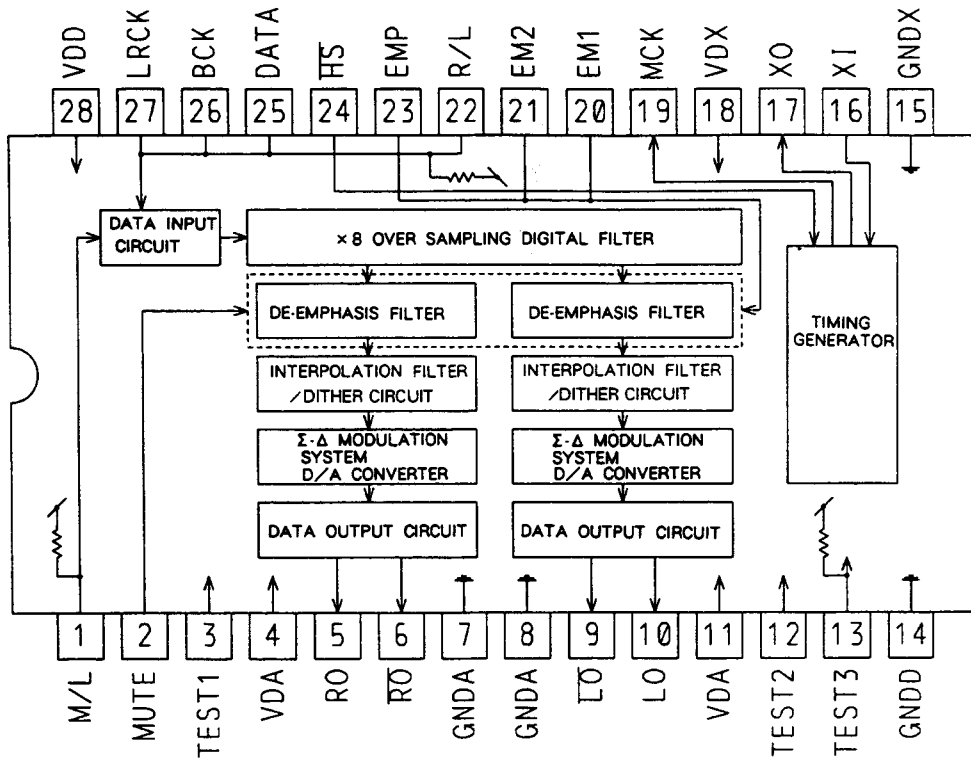
\*IC751:PD5230A



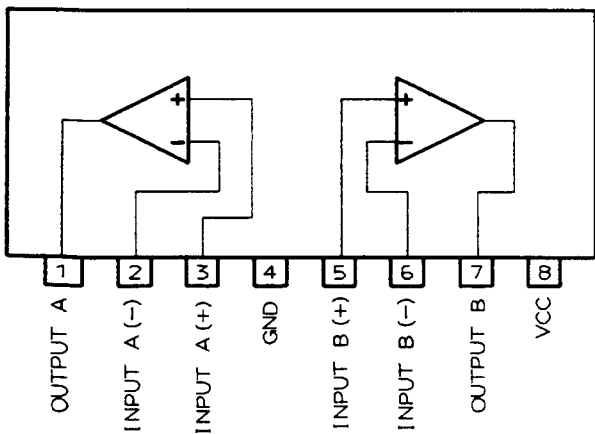
IC's marked by\* are MOS type.  
Be careful in handing them because they are very liable to be damaged by electrostatic induction.

# CDX-M6

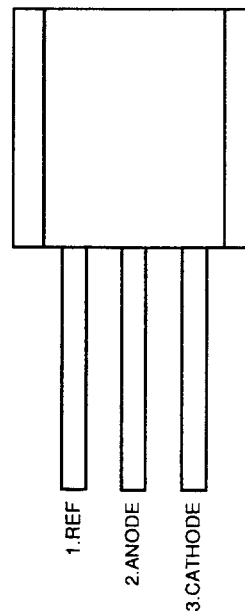
IC851:TC9237BN



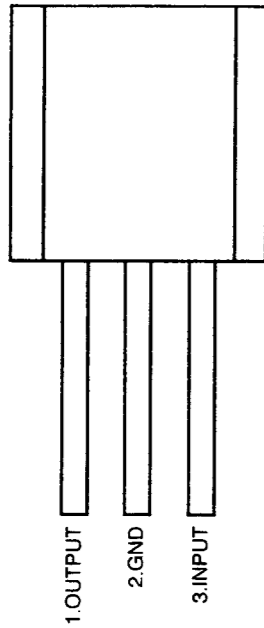
IC853,854:M5218AL



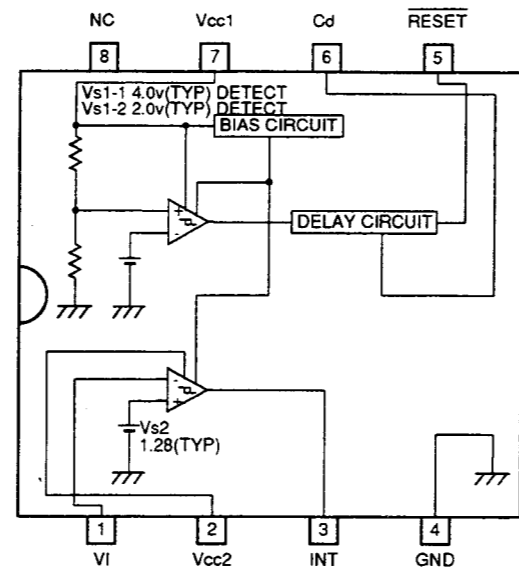
IC981:NJM431L



IC982:NJM78L05A

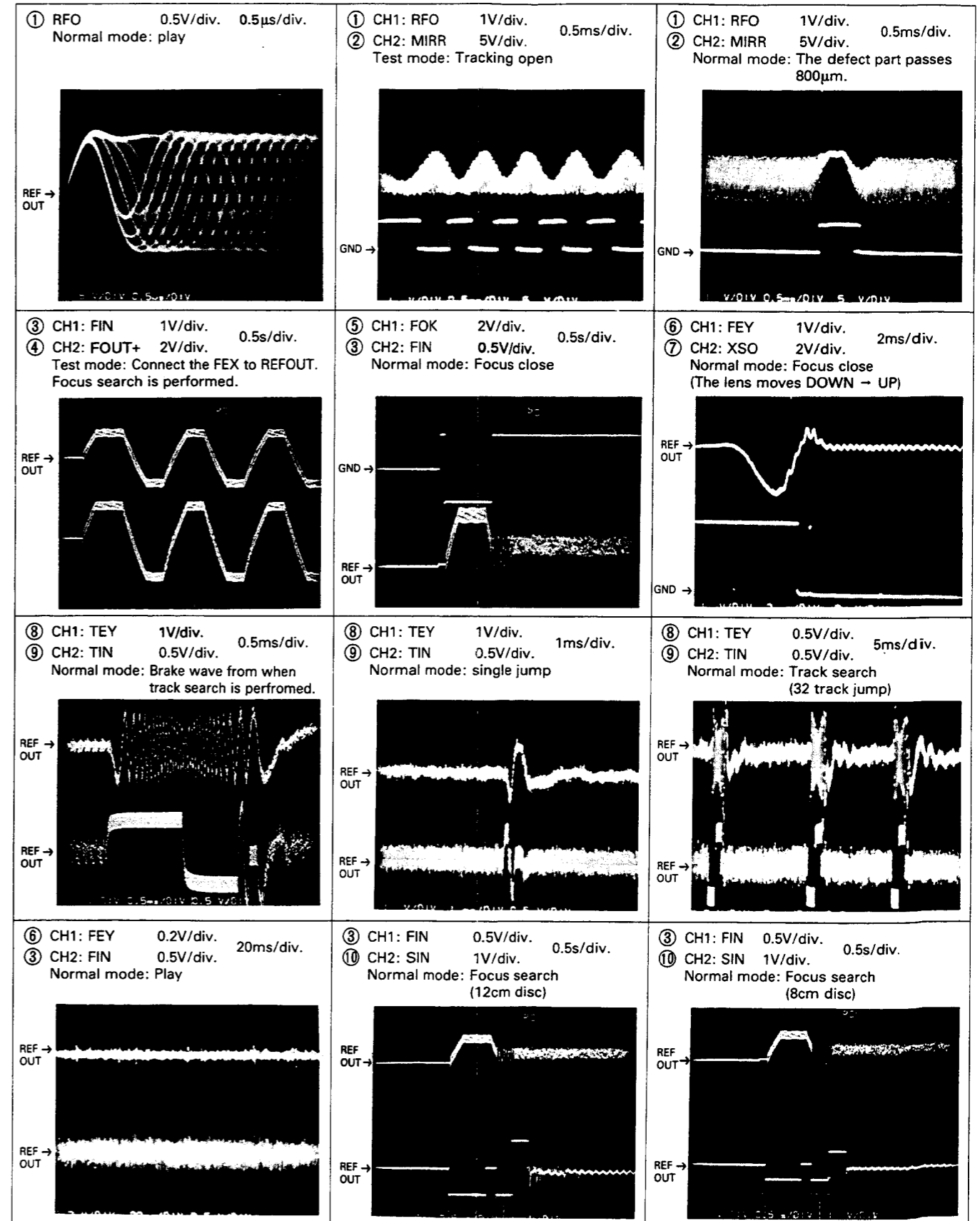


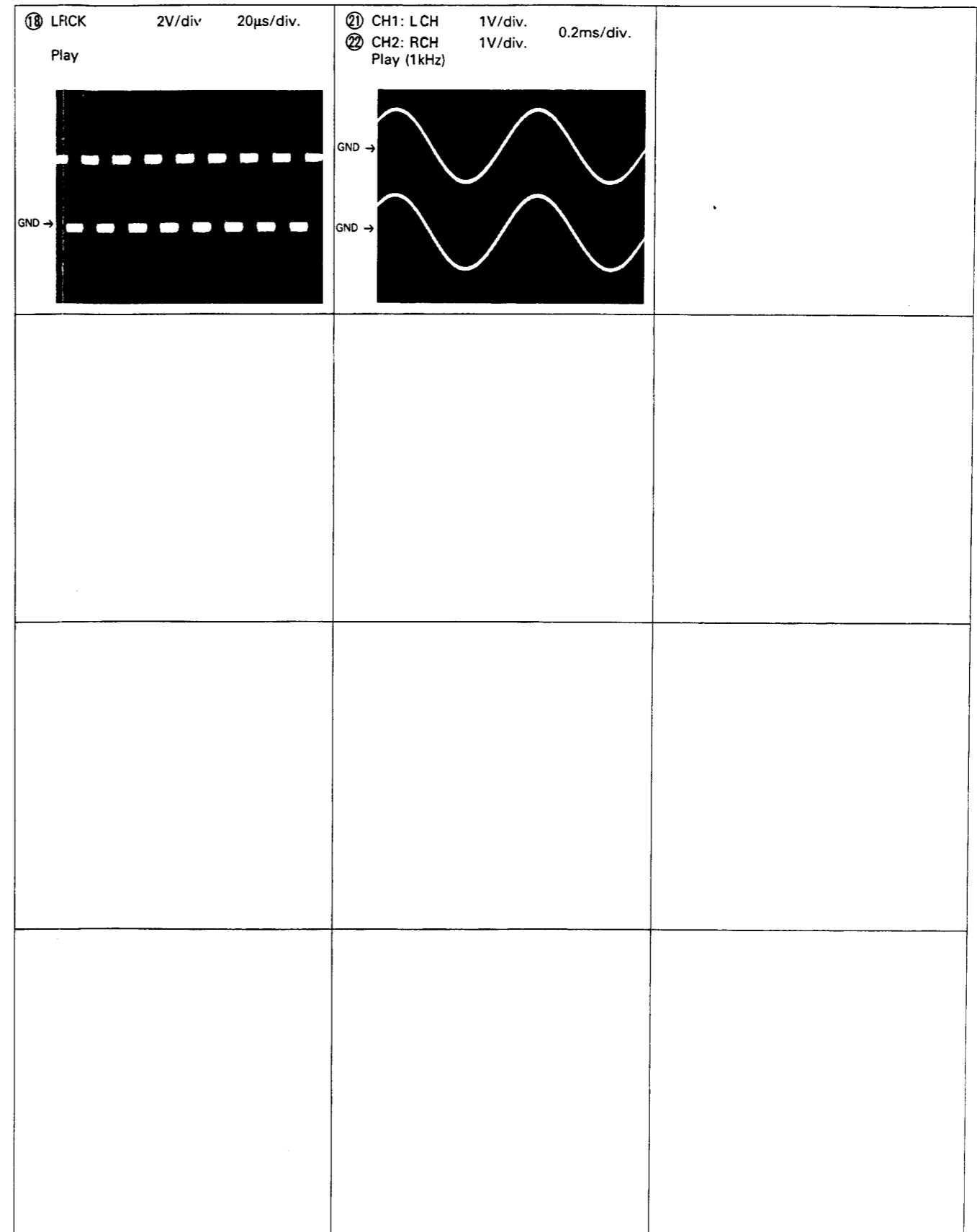
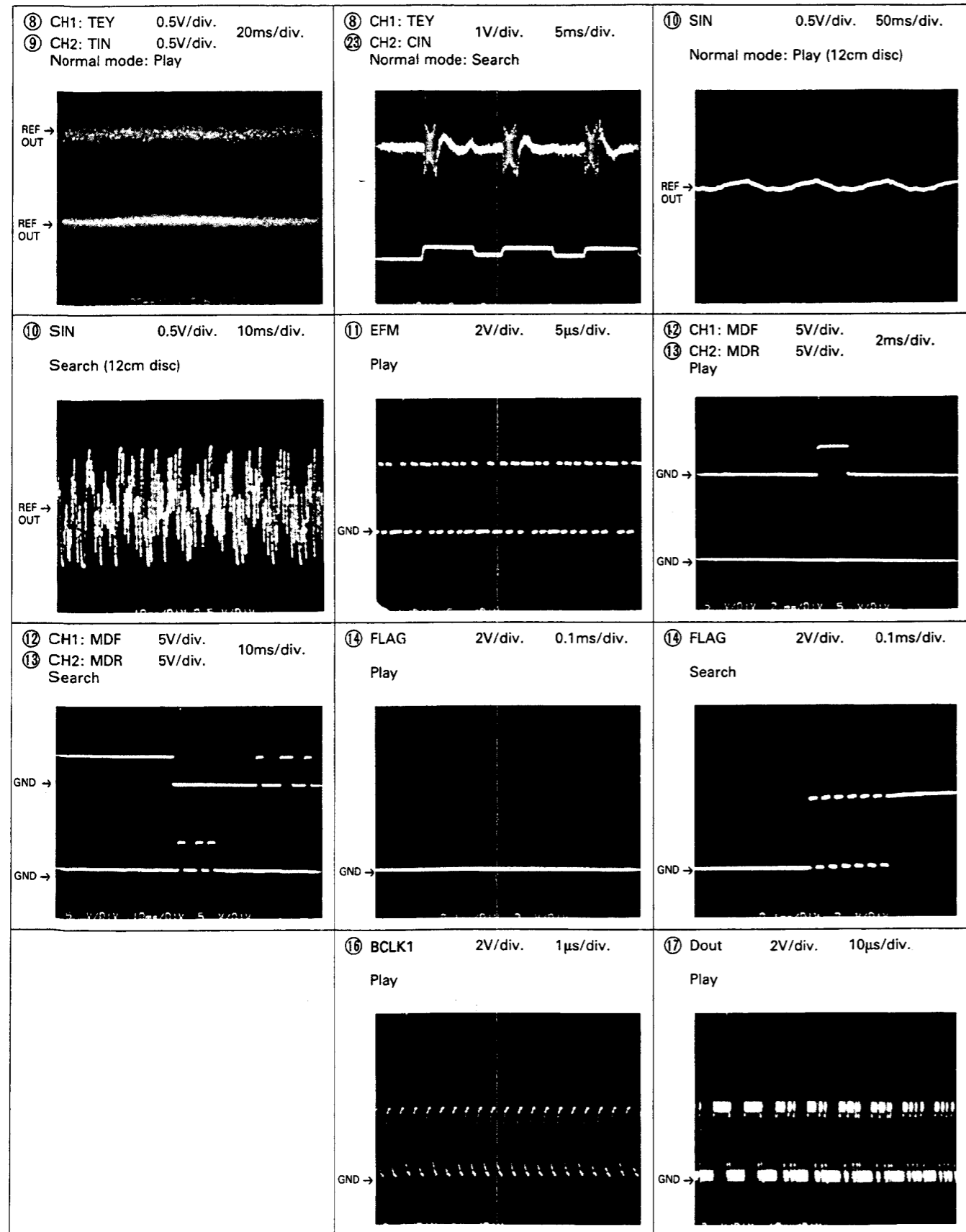
IC983:M62009P



●Wave Forms

Note: 1. The encircled numbers denote measuring points in the circuit diagram.  
2. Reference voltage REFOUT: 2.5V





5. CONNECTION DIAGRAM(1)

MAIN UNIT

IC, Q	Q351	IC651	IC652	IC351	Q653	Q601	IC602	IC601	Q781	IC752	IC751	Q751	Q802	Q652	IC661	Q651
ADJ		VR353	VR352	VR351												
		VR356	VR355	VR354												

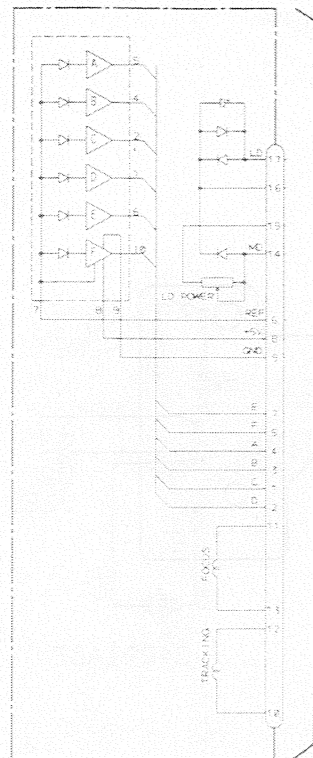
A

B

C

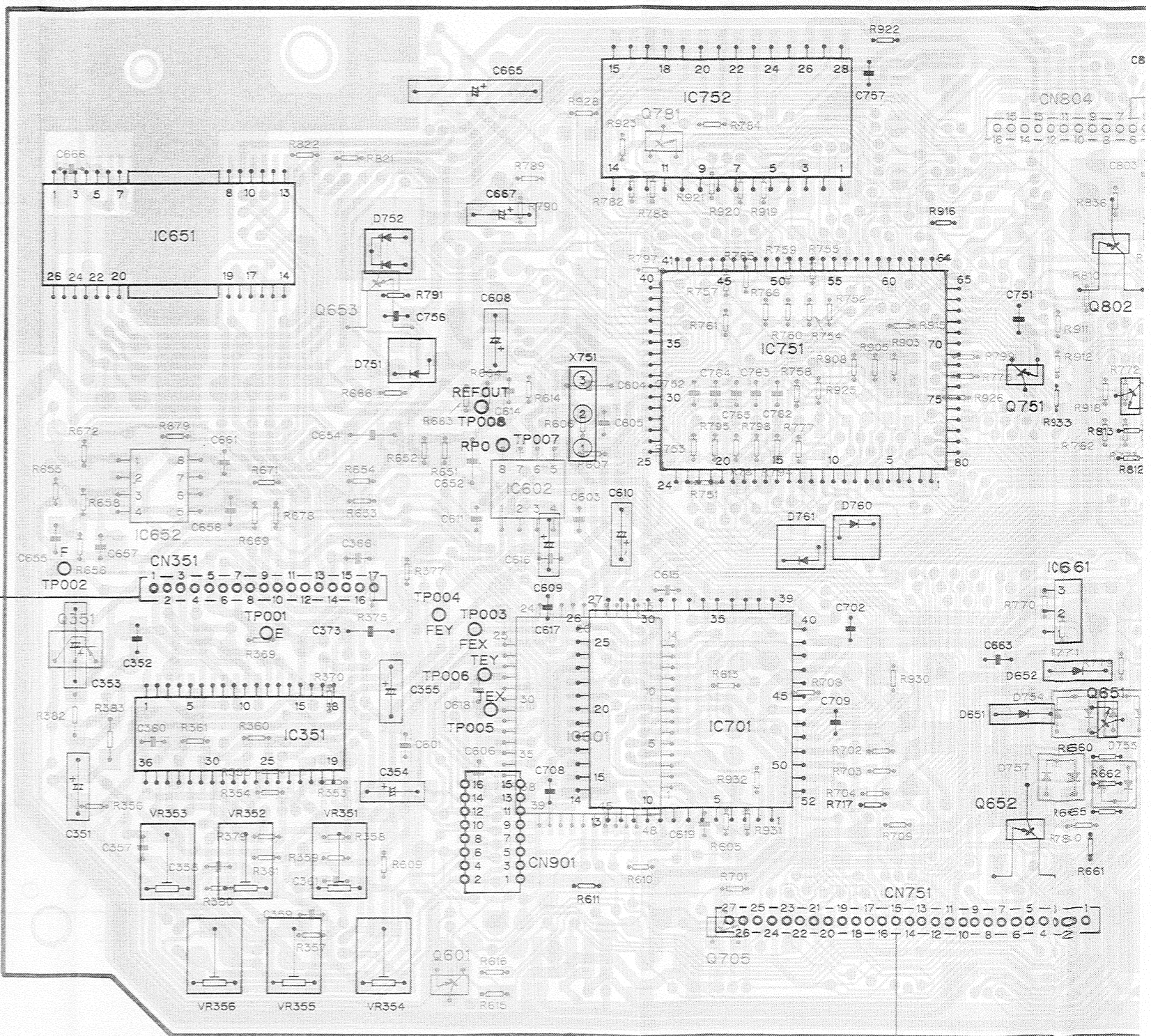
D

PU UNIT



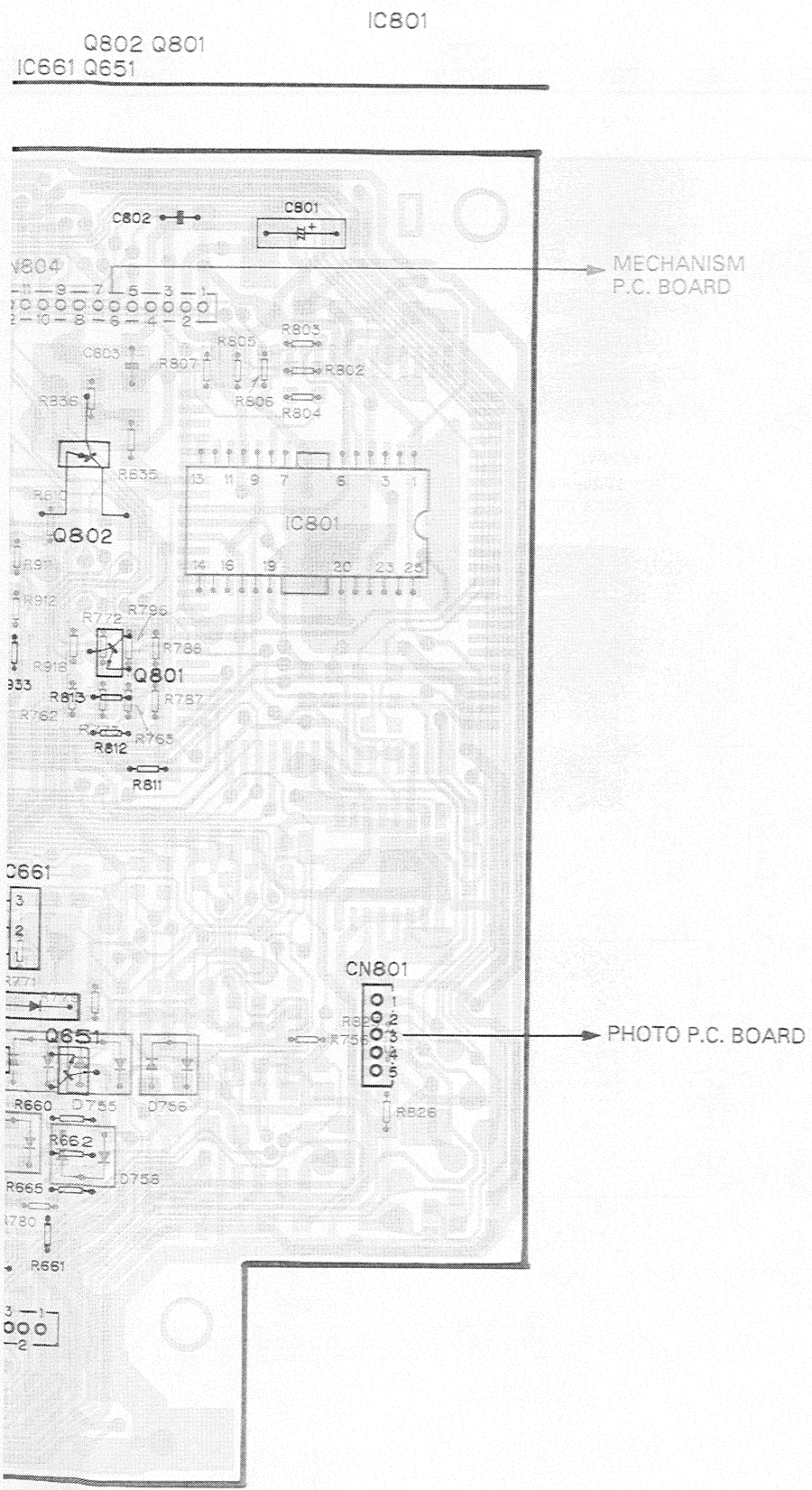
MAIN UNIT  
CN351

PU UNIT



EXTENSION P.C. BOARD  
CN984





MECHANISM P.C. BOARD

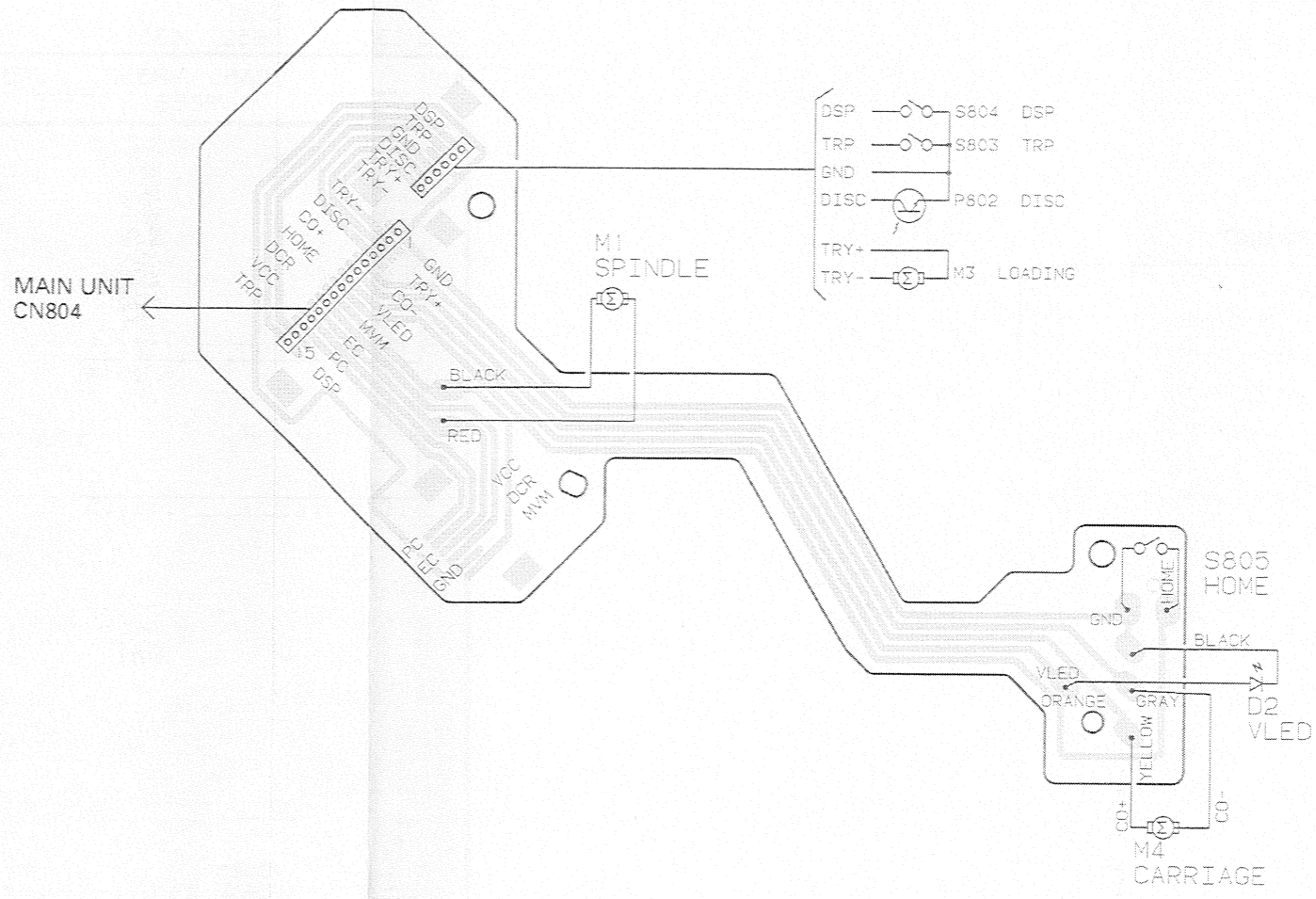
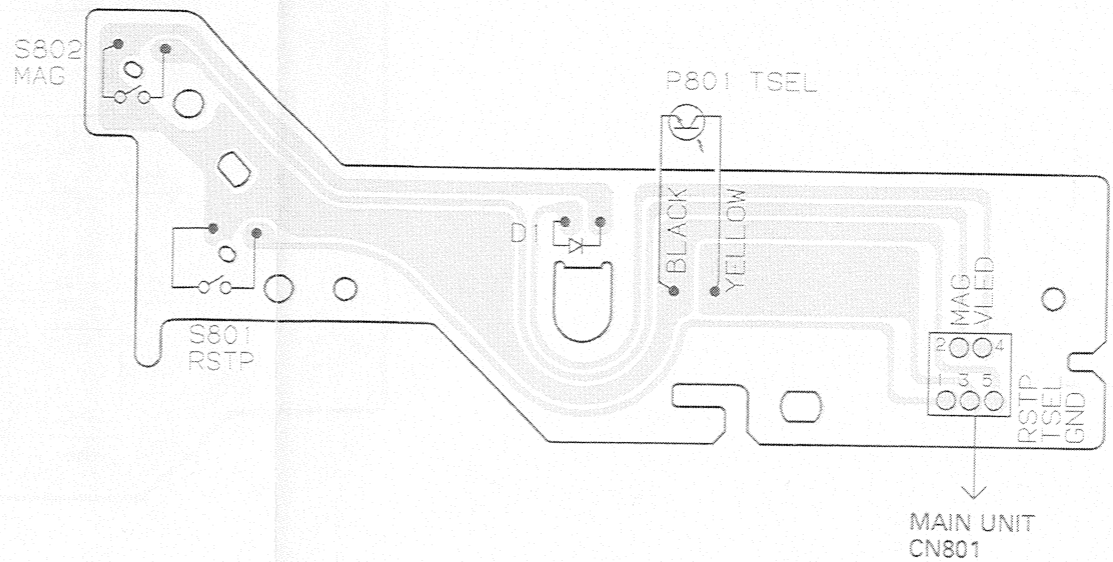


PHOTO P.C. BOARD



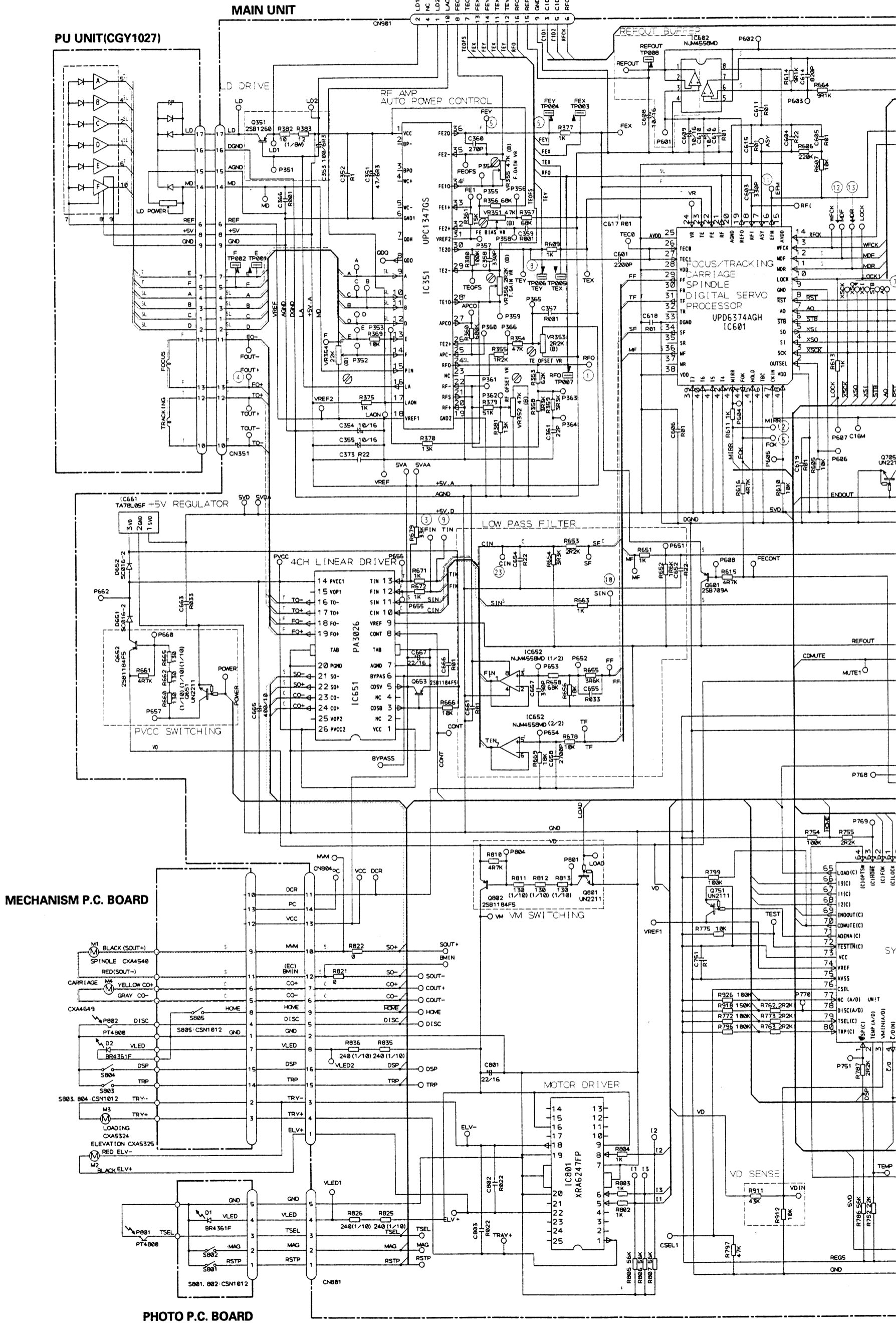
I.P.C. BOARD

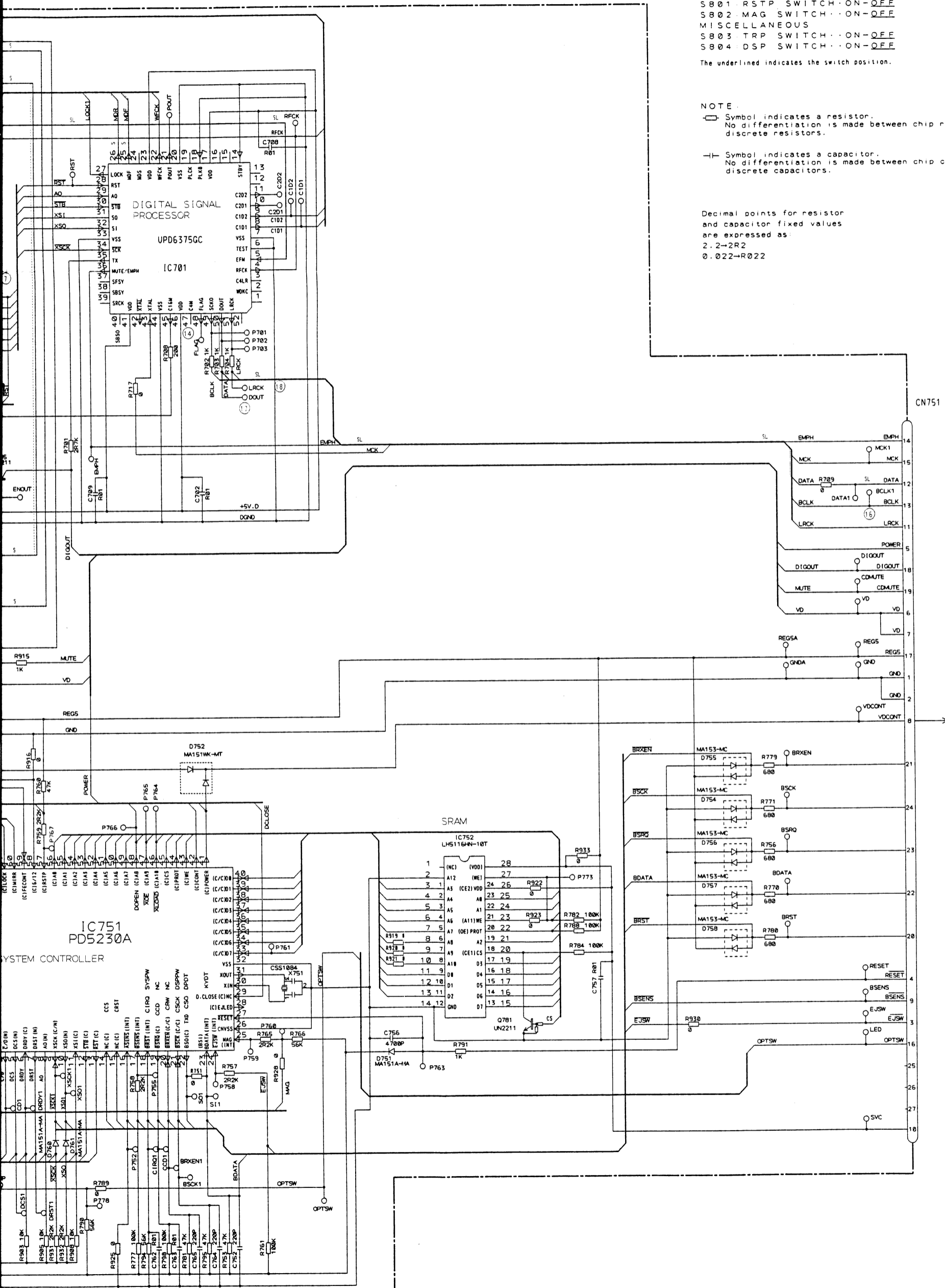
Fig. 11



# 6. SCHEMATIC CIRCUIT DIAGRAM(1)

- SIGNAL LINE
- - - FOCUS SERVO LINE
- · - · TRACKING SERVO LINE
- · - · CARRIAGE SERVO LINE
- · - · SPINDLE SERVO LINE





SWITCHES  
 MECHANISM P.C. BOARD  
 S805 HOME SWITCH ON-OFF  
 PHOTO P.C. BOARD  
 S801 RSTP SWITCH ON-OFF  
 S802 MAG SWITCH ON-OFF  
 MISCELLANEOUS  
 S803 TRP SWITCH ON-OFF  
 S804 DSP SWITCH ON-OFF

The underlined indicates the switch position.

NOTE  
 □ Symbol indicates a resistor.  
 No differentiation is made between chip resistors and discrete resistors.  
 ⊕ Symbol indicates a capacitor.  
 No differentiation is made between chip capacitors and discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as:  
 2.2→2R2  
 0.022→R022

EXTENSION P.C. BOARD

Fig. 12

7. SCHEMATIC CIRCUIT DIAGRAM(2)

A

B

C

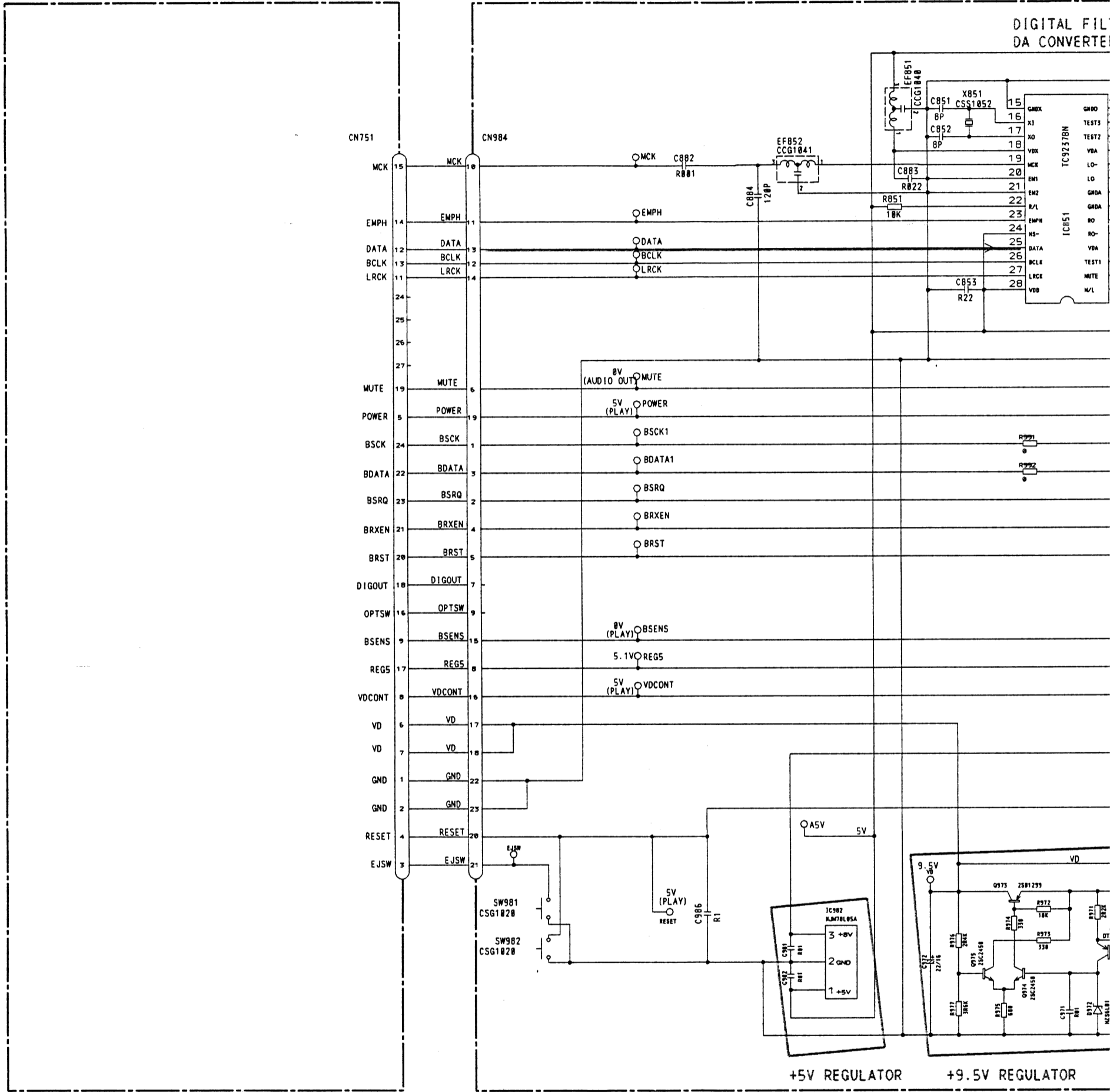
D

E

F

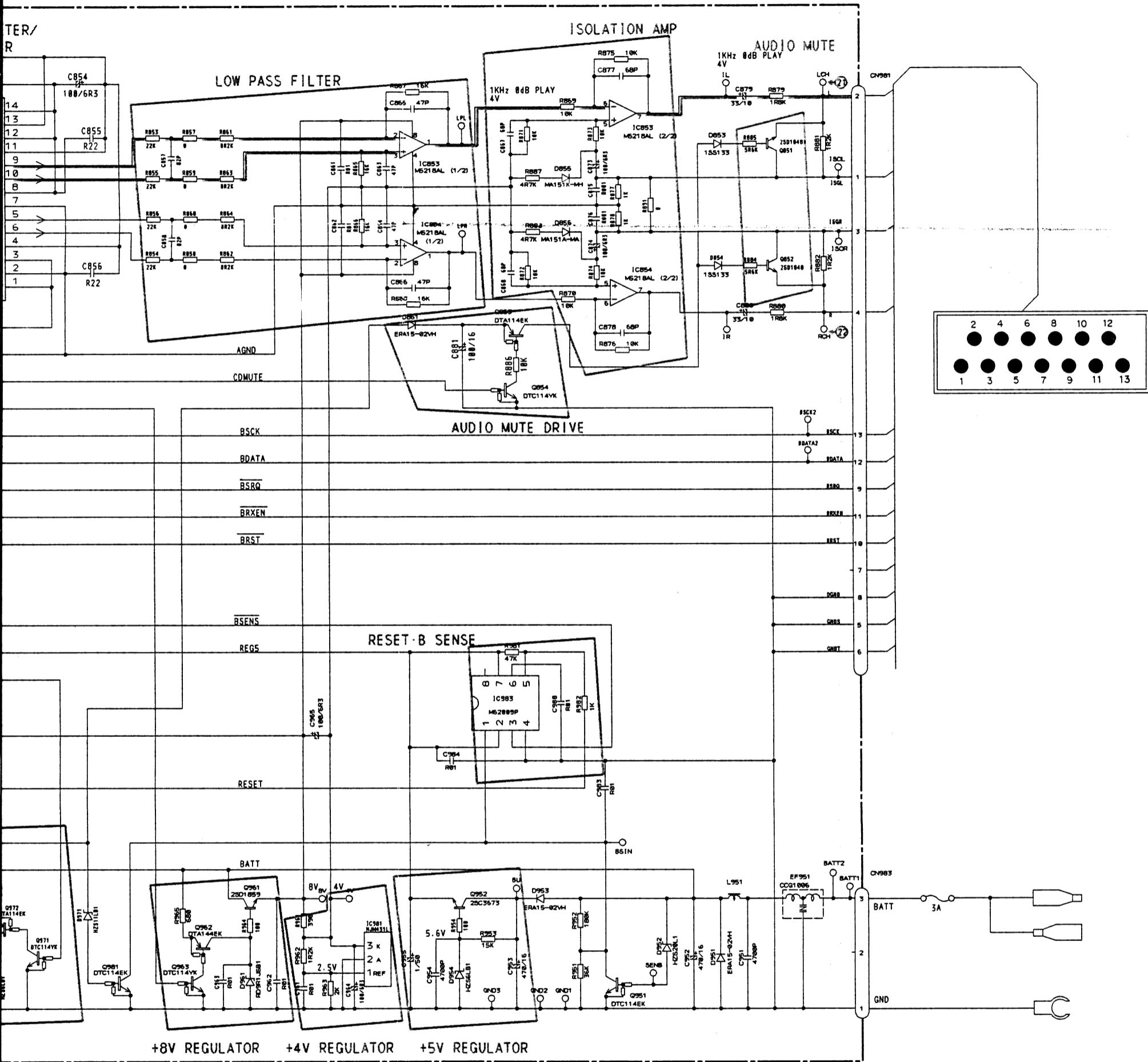
MAIN UNIT

EXTENSION UNIT



NOTE :

- Symbol indicates a resistor.  
No differentiation is made between chip resistors and discrete resistors.
- |— Symbol indicates a capacitor.  
No differentiation is made between chip capacitors and discrete capacitors.



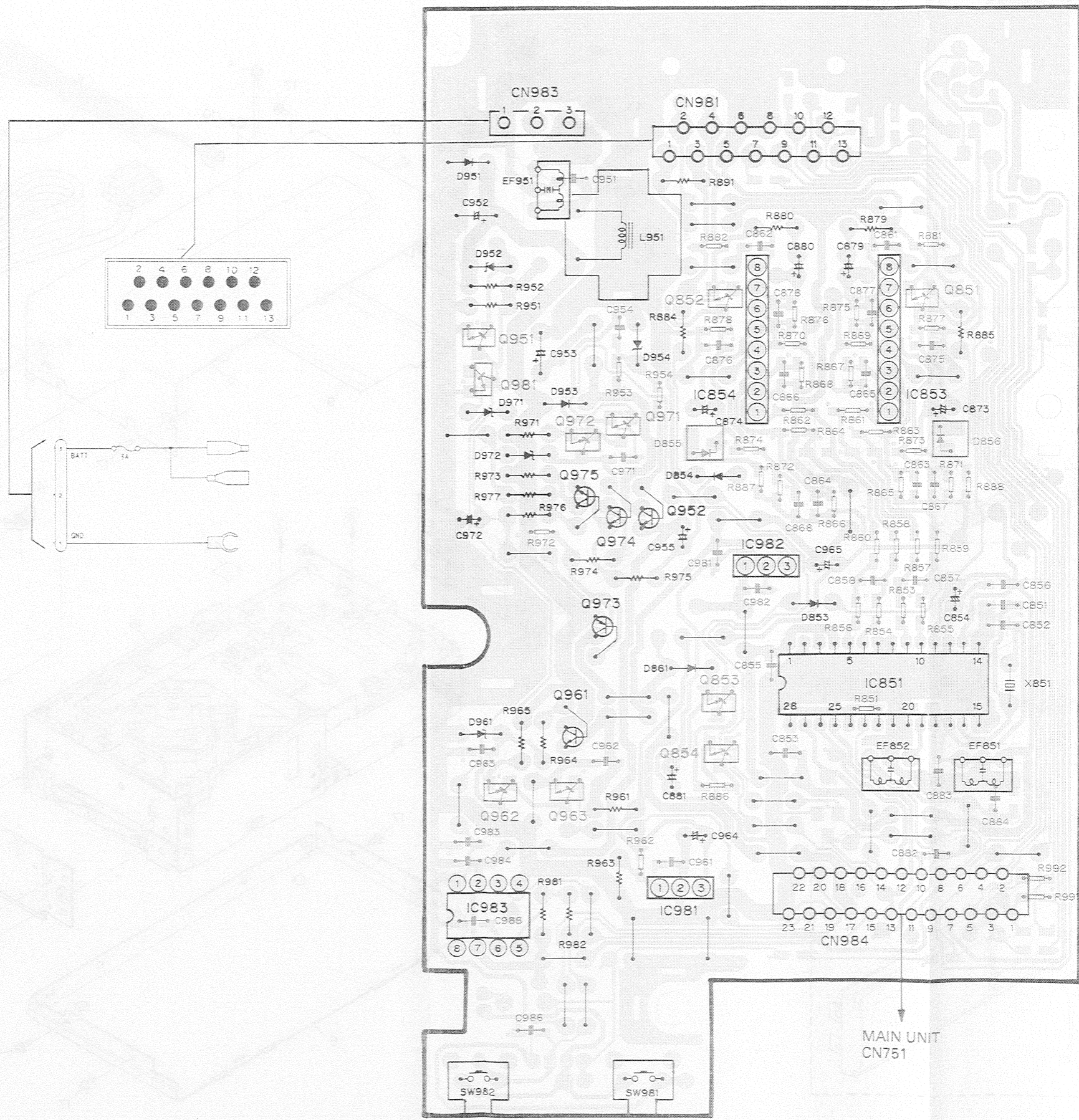
Decimal points for resistor and capacitor fixed values are expressed as:  
 2.2→2R2  
 0.022→R022

Fig. 13



8. CONNECTION DIAGRAM(2)

EXTENSION P.C. BOARD



IC. Q
Q852 Q851
Q951
Q981
IC854 IC853
Q971
Q972
Q975
Q974 Q952
IC982
Q973
IC851
Q853
Q961
Q854
Q962 Q963
IC981
IC983

Fig. 14

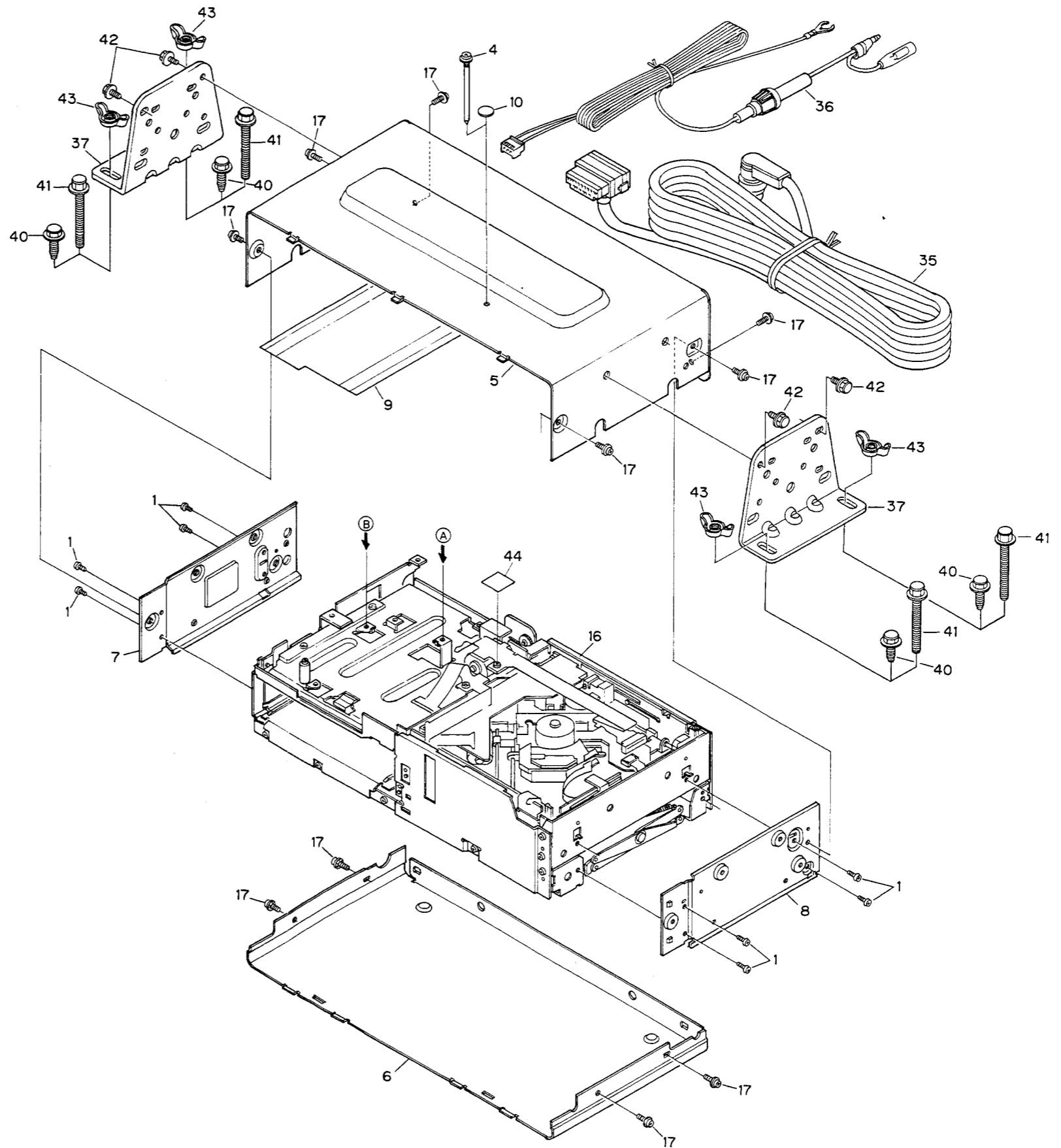
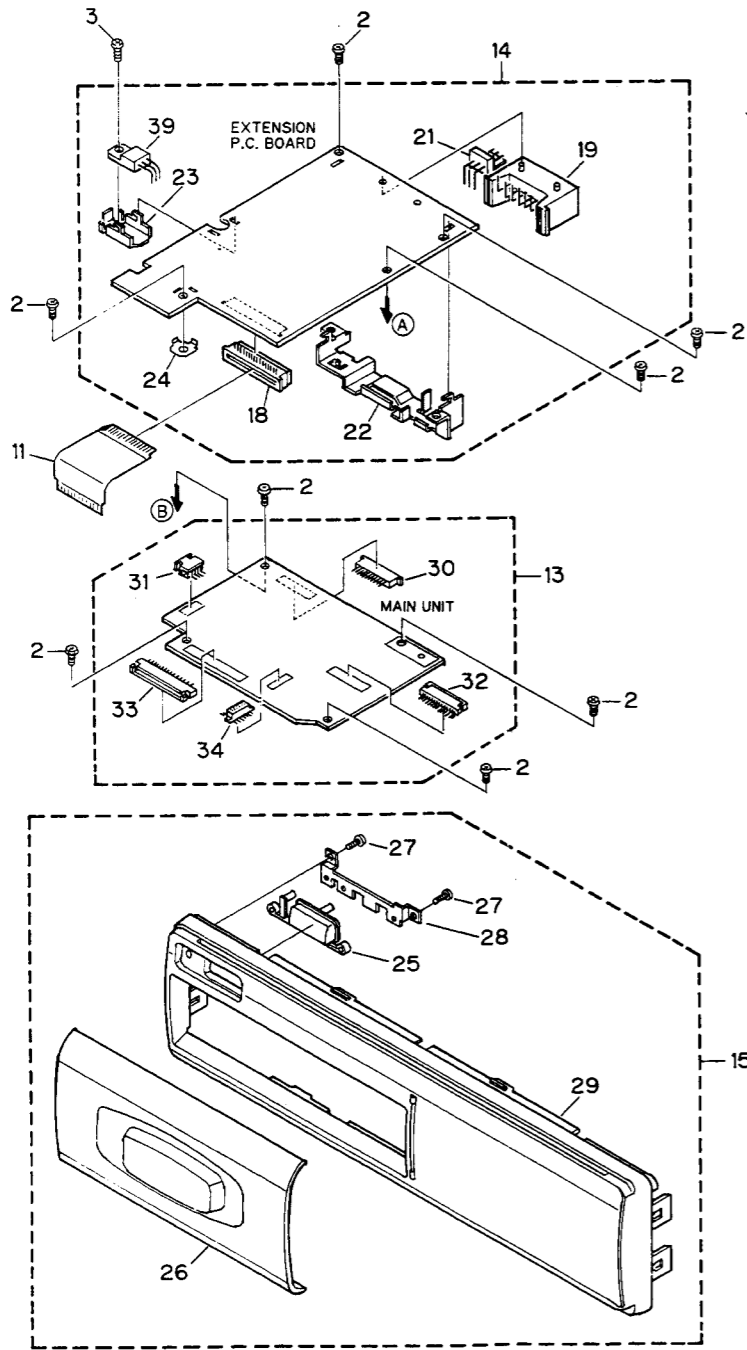
9. CHASSIS EXPLODED VIEW

A

B

C

D



A

B

C

D

Fig. 15

NOTES:

- Parts marked by "\*"are generally unavailable because they are not in our Master Spare Parts List.
- Parts marked by "⊙"are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

● Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Screw	BMZ26P030FMC		26	Door	CAT1493
	2	Screw	PMS26P040FMC		27	Screw(M2.6x8)	CBA1161
	3	Screw(M2.6x8)	CBA1186		28	Holder	CNC5043
	4	Pin	CLA2163		29	Grille	CNS2550
	5	Upper Case	CNB1653		30	Connector(15P)(CN804)	CKS1954
	6	Lower Case	CNB1654		31	Connector(5P)(CN801)	CKS1943
	7	Bracket L	CNC4444		32	Connector(17P)(CN351)	CKS1955
	8	Bracket R	CNC4445		33	Connector(27P)(CN751)	CKS1965
*	9	Insulator	CNM3628		34	Connector(16P)(CN901)	CKS2495
*	10	Seal	CNM3648		35	DIN Cord	CDE4125
	11	P.C.Board	CNP3138		36	Cord(UC)	CDE3741
	12	*****				Cord(EW)	CDE3742
⊙	13	Main Unit	CWX1512		37	Angle	CNB1765
⊙	14	Extension Unit	CWX1566		38	*****	
	15	Grille Assy(UC)	CXA6006		39	Transistor(Q973)	2SB1299
		Grille Assy(EW)	CXA5519		40	Screw	CBA1069
⊙	16	CD Mechanism Unit	CXK2750		41	Screw	HMB60P500FZK
	17	Screw	PMS30P040FZK		42	Screw	HMF40P080FZK
	18	Connector(23P)(CN984)	CKS1543		43	Nut	NR60FZK
	19	Connector(13P)(CN981)	CKS2101		44	Insulator	CNM3779
	20	*****					
	21	Plug(3P)(CN983)	CKS2372				
	22	Connector Bracket	CNC4446				
*	23	Heat Sink	CNC4447				
*	24	Earth Plate	CNC4650				
	25	Button	CAC3356				

10. MAGAZINE ASSY (CXA5483) EXPLODED VIEW

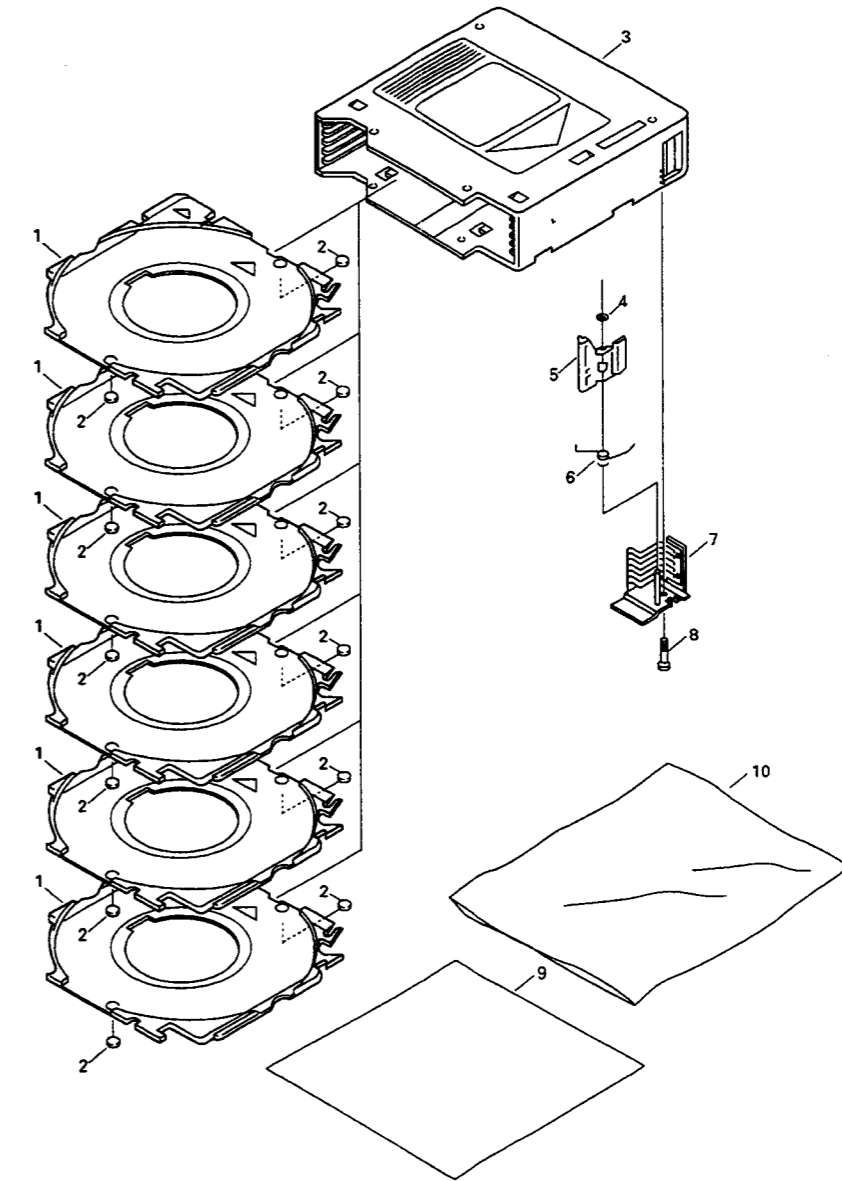


Fig.16

● Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
*	1	Tray	CNV3469	*	6	Spring	CBH1522
*	2	Cushion	CNM3622	*	7	Bracket Unit	CXA5481
*	3	Case Unit	CXA5479	*	8	Screw (M2x13)	CBA1272
*	4	Washer	CBF1039	*	9-1	Owner's Manual	CRD1639
*	5	Arm	CNV3468	*	9-2	Label	CRW1248
					10	Polyethylene Bag	E36-618

**11. CD MECHANISM UNIT EXPLODED VIEW**

● Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.	Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Screw	BMZ20P025FMC		41	Spring	CBL1181		81	Spacer	CNM1787		121	Gear	CNV3382
	2	Screw	BMZ20P030FMC		42	Spring	CBL1156		82	Sheet	CNM3567		122	Gear	CNV3383
	3	*****			43	Spring	CBL1157		83	*****			123	Gear	CNV3384
	4	Screw	BMZ26P030FMC		44	Spring	CBL1158		84	P.C.Board	CNP3223		124	Guide	CNV3385
	5	Screw	BMZ26P050FMC		45	Connector(5P)	CDE3905		85	P.C.Board	CNP3225		125	Arm	CNV3386
	6	LED (D1,2)	BR4361F		46	PU Unit	CGY1027		86	P.C.Board	CNP3226		126	Roller	CNV3387
	7	Screw (M2x4)	CBA1015		47	Connector (6P)	CKS1944		87	Ball	CNR1189		127	Wheel	CNV3526
	8	Screw (M2x2.5)	CBA1037		48	Connector (15P)	CKS1953		88	Gear	CNR1289		128	Arm	CNV3546
	9	Screw (M2x7)	CBA1060		49	Connector (17P)	CKS1955		89	Gear	CNR1290		129	Cover	CNV3547
	10	Screw (M2x3)	CBA1062		50	Connector (5P)	CKS2208		90	Gear	CNR1304		130	Holder	CNV3548
	11	Screw (M1.7x5.5)	CBA1070		51	Shaft	CLA2027		91	Guide	CNR1309		131	Damper	CNV3353
	12	Screw (M2x3)	CBA1077		52	Shaft	CLA2123		92	Holder	CNR1310		132	Holder	CNV3584
	13	*****			53	Shaft	CLA2126		93	Holder	CNR1311		133	Plate	CNV3629
	14	Screw (M2x6)	CBA1229		54	Roller	CLA2127		94	Belt	CNT1047		134	P.C.Board	CNP3227
	15	Screw (M2x2.5)	CBA1251		55	Roller	CLA2159		95	Holder	CNV3622		135	P.C.Board	CNP3393
	16	Washer	CBF1037		56	Shaft	CLA2160		96	Arm	CNV3354		136	P.C.Board	CNP3540
	17	Washer	CBF1038		57	Collar	CLA2161		97	Lock	CNV3355		137	P.C.Board	CNP3217
	18	Spring	CBH1430		58	Shaft	CLA2210		98	Screw Bearing	CNV3356		138	P.C.Board	CNP3218
	19	Spring	CBH1488		59	Shaft	CLA2213		99	Holder	CNV3357		139	P.C.Board	CNP3219
	20	Spring	CBH1489		60	Shaft	CLA2239		100	Roller	CNV3358		140	P.C.Board	CNP3220
	21	Spring	CBH1490		61	Holder	CNC4073		101	Cam	CNV3359		141	P.C.Board	CNP3221
	22	Spring	CBH1491		62	Weight	CNC4551		102	Guide	CNV3360		142	Switch (S801,802,803,804,805)	CSN1012
	23	Spring	CBH1492		63	Bracket	CNC4602		103	Guide	CNV3361		143	Motor Unit (Spindle) (M1)	CXA4540
	24	Spring	CBH1493		64	Arm	CNC4606		104	Holder	CNV3362		144	Motor Unit (Carriage) (M4)	CXA4649
	25	Spring	CBH1494		65	Holder	CNC4626		105	Holder	CNV3363		145	Stage Chassis Unit	CXA5287
	26	Spring	CBH1495		66	Side Frame (L)	CNC4649		106	*****			146	*****	
	27	Spring	CBH1497		67	R Frame	CNC4646		107	Gear	CNV3366		147	Mode Ring Unit	CXA5288
	28	Spring	CBH1498		68	Scale	CNC4647		108	Gear	CNV3367		148	Steer R Unit	CXA5289
	29	Spring	CBH1499		69	Bracket	CNC4630		109	Gear	CNV3368		149	LM Bracket Unit	CXA5290
	30	Spring	CBH1500		70	CM Bracket	CNC4631		110	Gear	CNV3371		150	Rink Unit	CXA5291
	31	Spring	CBH1501		71	Bracket	CNC4632		111	TRYD Gear	CNV3372		151	Lever Unit	CXA5292
	32	Spring	CBH1507		72	Arm	CNC4634		112	CUPM Gear	CNV3373		152	Arm Unit	CXA5293
	33	Spring	CBH1504		73	Arm	CNC4635		113	Clamper UP Gear	CNV3374		153	Gear Arm Unit	CXA5294
	34	Spring	CBH1505		74	Arm	CNC4636		114	Guide	CNV3375		154	Arm Unit	CXA5295
	35	Spring	CBH1506		75	TG Plate	CNC4637		115	Guide	CNV3376		155	Plate Unit	CXA5296
	36	Spring	CBH1537		76	Bracket	CNC4642		116	Arm	CNV3377		156	TG Bracket Unit	CXA5297
	37	Spring	CBH1538		77	Frame	CNC4851		117	Arm	CNV3378		157	CRG Chassis Unit	CXA5298
	38	Spring	CBH1563		78	Frame	CNC4854		118	Guide	CNV3379		158	Bracket Unit	CXA5299
	39	Spring	CBH1569		79	Cover	CNC4955		119	Guide	CNV3380		159	Arm Unit	CXA5300
	40	Spring	CBL1138		80	Frame	CNC4967		120	*****			160	Arm Unit	CXA5301



Mark	No. Description	Part No.	Mark	No. Description	Part No.
	161 Screw Unit	CXA5302	186	Screw	JFZ14P016FNI
	162 Arm Unit	CXA5303	187	.....	
	163 Bracket Unit	CXA5304	188	.....	
	164 Bracket Unit	CXA5305	189	.....	
	165 Holder Unit	CXA5308	190	Screw	JFZ20P025FNI
	166 Frame Unit	CXA5320	191	Screw	JGZ20P070FNI
	167 Arm Unit	CXA5311	192	Screw	PMS20P025FMC
	168 Arm Unit	CXA5313	193	Photo Transistor (P801,802)	PT4800
	169 Bracket Unit	CXA5314	194	Washer	YE15FUC
	170 Arm Unit	CXA5315	195	Washer	YE20FUC
	171 Main Frame Unit	CXA5316	196	Washer	YE25FUC
	172 Lever Unit	CXA5317	197	Sheet	CNM3798
	173 Magazine Holder Unit	CXA5321	198	Bracket	CNC5028
	174 Upper Frame Unit	CXA5319	199	Insulator	CNM3786
	175 Bracket Unit	CXA5322	200	Sheet	CNM3817
	176 Motor Unit (Loading) (M3)	CXA5324	201	Screw	BMZ26P040FMC
	177 Gear	CNV3365	202	Screw (M2x2.5)	CBA1041
*	178 Motor	CXM1069	203	Screw (M2.6x3)	CBA1065
	179 Motor Unit (Elevation) (M2)	CXA5325	204	.....	
	180 Gear	CNV3381	205	Screw	JFZ17P025FNI
*	181 Motor	CXM1061	206	Screw	JFZ17P035FNI
	182 Whom Bracket Unit	CXA5326	207	Screw	JFZ20P030FNI
	183 Arm Unit	CXA5561	208	Sheet	CNM3826
	184 Damper Unit	CXA5631	209	Roller	CLA2266
	185 Clamper	HEF-102	210	Spring	CBH1579
			211	Washer	CBE-112

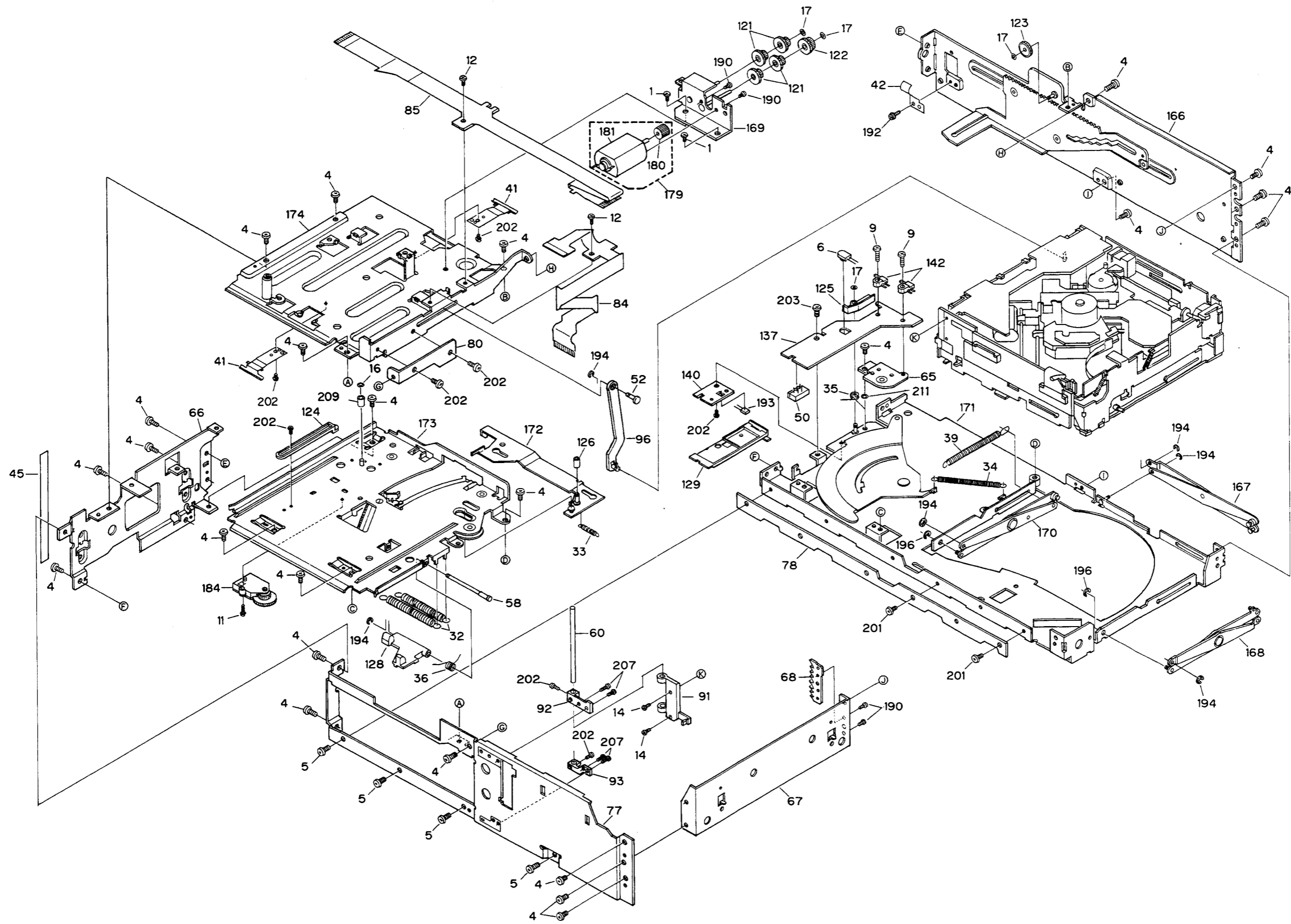
●CD Mechanism Unit

A

B

C

D



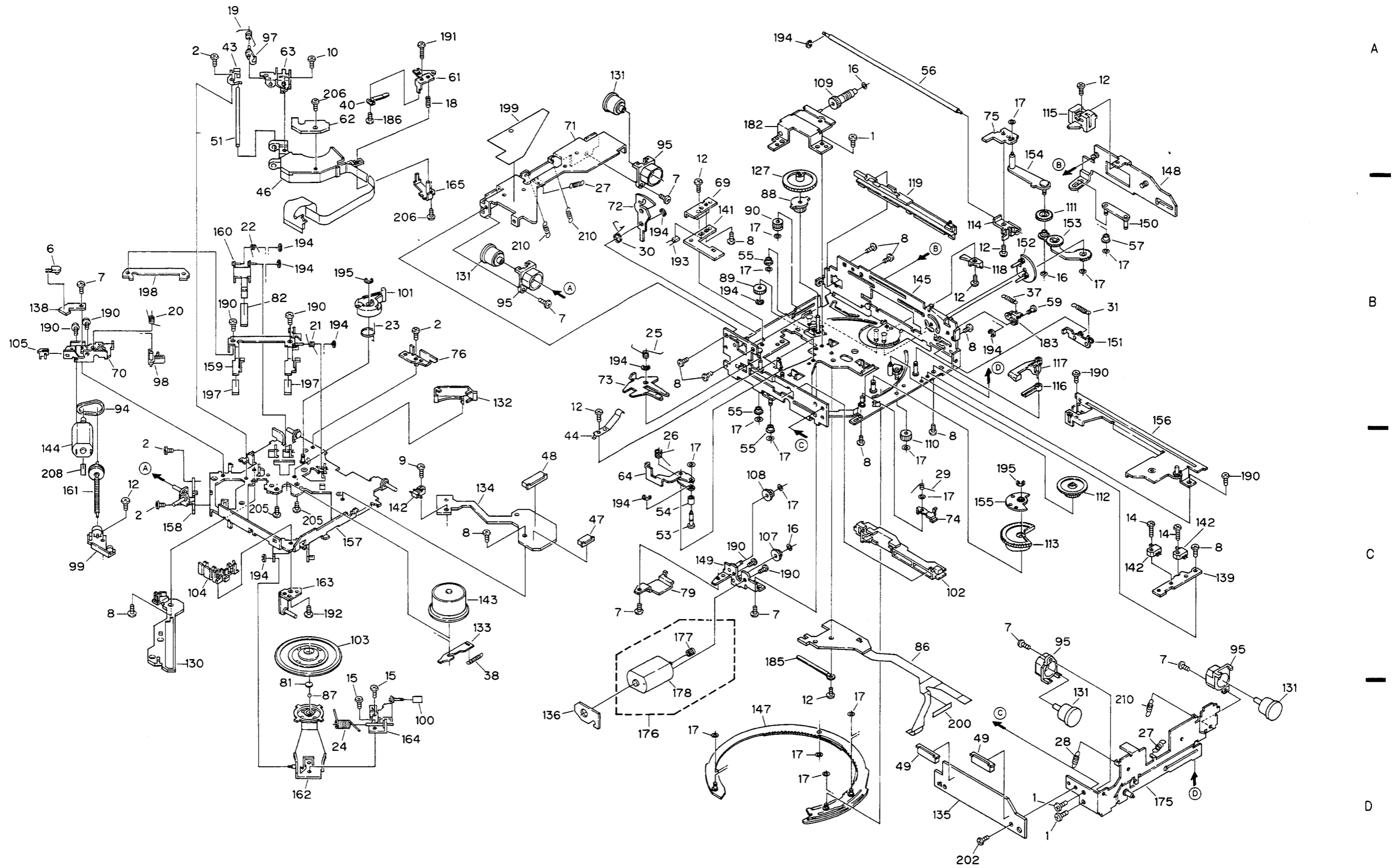


Fig. 17

12. PACKING METHOD

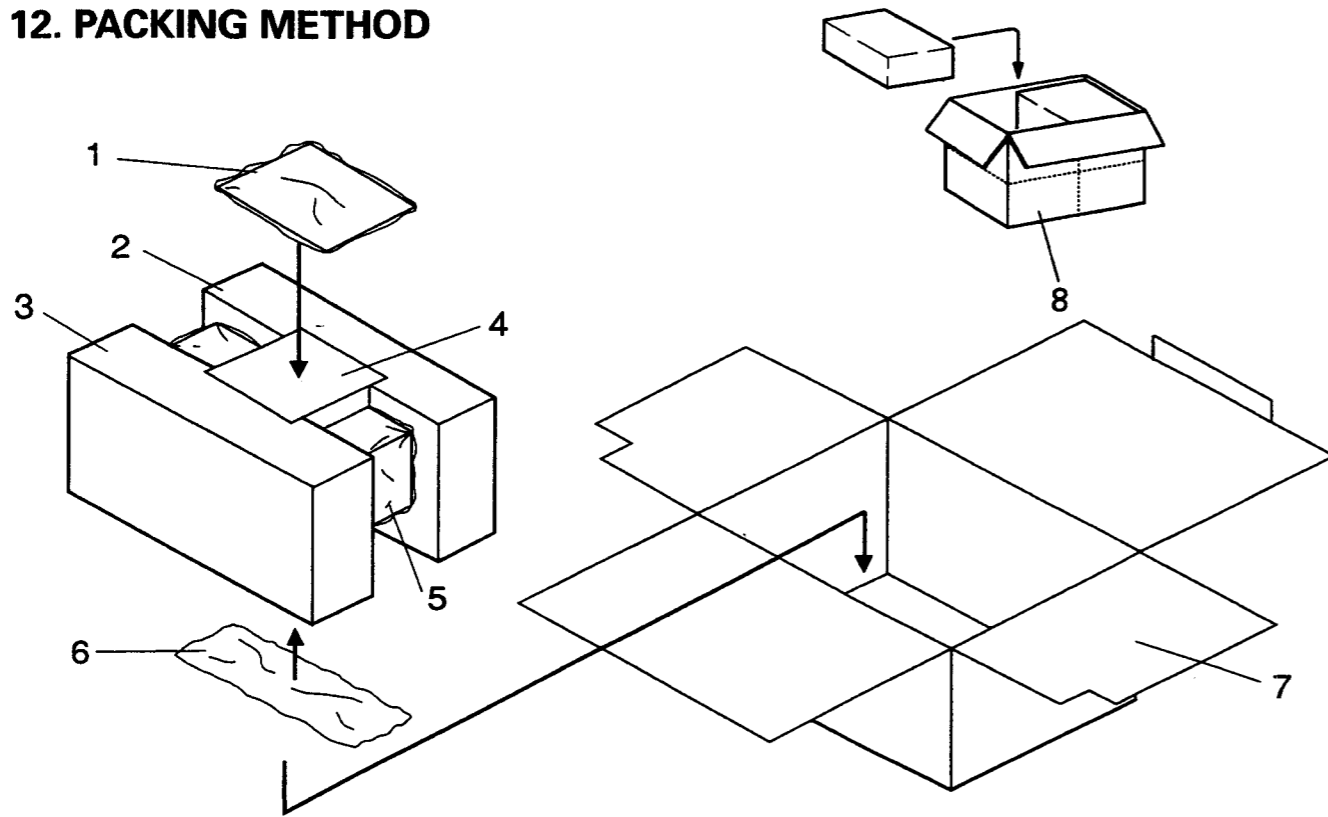


Fig.18

● Parts List

Mark	No.	Description	Part No.
	1-1	Owner's Manual(UC)	CRD1645
		Owner's Manual(EW)	CRD1643
		Owner's Manual(EW)	CRD1644
*	1-2	Card	ARY1048
*		Card	CRY-062
	2	Protector	CHP1539
	3	Protector	CHP1538
	4	Magazine Assy	CXA5483
	5	Cover	CEG1082
		Caution Card	CRP1112
*		Seal	CNM3648
	6	Accessory Assy(UC)	CEA1810
		Accessory Assy(EW)	CEA1790
	6-1	DIN Cord	CDE4125
	6-2	Cord(UC)	CDE3741
		Cord(EW)	CDE3742

* Non Spare Part			
Mark	No.	Description	Part No.
	6-3	Screw Assy	CEA1788
	6-3-1	Screw(x4)	CBA1069
*	6-3-2	Polyethylene Bag	E36-615
	6-3-3	Screw(x4)	HMB60P500FZK
	6-3-4	Screw(x4)	HMF40P080FZK
	6-3-5	Nut(x4)	NR60FZK
	6-4	Angle(x2)	CNB1765
*	6-5	Polyethylene Bag	E36-622
	7	Carton(UC)	CHG2304
		Carton(EW)	CHG2303
	8	Contain Box(UC)	CHL2304

1-1 Owner's Manual		
Part No.	Model	Language
CRD1645	CDX-M6/UC	English,French
CRD1643	CDX-M6/EW	English,Italian,French, German,Dutch
CRD1644	CDX-M6/EW	Spanish,Portuguese, Swedish,Norwegian, Finnish

13. ELECTRICAL PARTS LIST

NOTE:

● Parts whose parts numbers are omitted are subject to being not supplied.

● The part numbers shown below indicate chip components.

Chip Resistor

RS1/OS0000J,RS1/OOS0000J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

====Circuit Symbol & No. Part Name====	Part No.	====Circuit Symbol & No. Part Name====	Part No.
Unit Number :		R 654	RS1/16S332J
Unit Name : Main Unit		R 655	RS1/16S362J
MISCELLANEOUS		R 656	RS1/16S183J
IC 351	UPC1347GS	R 660 662 665 811 812 813	RS1/10S131J
IC 601	UPD6374AGH	R 661	RS1/16S472J
IC 602 652	NJM4558MD	R 669	RS1/16S183J
IC 651	PA3026	R 678	RS1/16S103J
IC 661	TA78L05F	R 679	RS1/16S333J
		R 701	RS1/16S272J
		R 702 703 704 802 803 804 915	RS1/16S102J
IC 701	UPD6375GC	R 708	RS1/16S201J
IC 751	PD5230A	R 709 751 789 821 822 919 920 921 923	RS1/16S0R0J
IC 752	LH5116HN-10T	R 717 922 933	RS1/16S0R0J
IC 801	XRA6247FP	R 752	RS1/16S223J
Q 351	2SB1260	R 755 757 758 759 762 763 765 773 787 931	RS1/16S222J
Q 601	2SB709A	R 756 770 771 779 780	RS1/16S681J
Q 651 801	UN2211	R 766 786 794 805 806 807	RS1/16S563J
Q 652	2SB1184F5	R 790	RS1/16S563J
Q 653	2SB1184F5	R 799 926	RS1/16S104J
Q 705 781	UN2211	R 825 826 835 836	RS1/10S241J
Q 751	UN2111	R 905 908 912	RS1/16S103J
Q 802	2SB1184F5	R 911	RS1/16S433J
D 651 652	SC016-2	R 916	RS1/16S0R0J
D 751 760 761	MA151A-MA	R 918	RS1/16S154J
D 752	MA151WK-MT	R 925 928 930	RS1/16S0R0J
D 754 755 756 757 758	MA153-MC	R 932	RS1/16S222J
X 751	CSS1084		
VR 351 352 355	CCP1023		
VR 353 356	CCP1015		
VR 354	CCP1021		
	Checker Chip	CKF1025	
RESISTORS			
R 353	RS1/16S623J	C 351	CEV470M6R3
R 354 753 760 781 795 797	RS1/16S473J	C 352 751	CISQYB104K1
R 355	RS1/16S122J	C 353	CEV101M6R3
R 356 357 658	RS1/16S683J	C 354 355 609 610	CEV100M16
R 358 359	RS1/16S332J	C 357 359 366	CISRYB102K5
R 360	RS1/16S684J	C 358 603	CISRYB331K5
R 361	RS1/16S153J	C 360	CISRYB271K5
R 369 605 607 610 666 775 903	RS1/16S103J	C 361	CISRCH220J5
R 370 381	RS1/16S133J	C 373	CISYB224K16
R 375 377 609 613 651 663 671 672	RS1/16S102J	C 601	CISRYB222K5
R 379	RS1/16S513J	C 604 652 654	CISYB224K16
R 380 754 761 772 777 782 784 788 796 798	RS1/16S104J	C 605 606 611 615 616 618 619 661 666 762	CISRYB103K5
R 382	RS1/8S100J	C 608	CEV100M16
R 383	RS1/8S120J	C 614	CISRYB821K5
R 606	RS1/16S224J	C 617 702 708 709 757	CISRYB103K5
R 611 791	RS1/16S102J	C 655	CISQYB333K2
R 614 664	RS1/16S912J	C 657	CISRYB391K5
R 615 616 810	RS1/16S472J	C 658	CISQYB272K5
R 652	RS1/16S162J	C 663	CISQYB333K2
R 653	RS1/16S222J	C 665	CC-1120
			400μF/10V
		C 667	CE/220M16
		C 752 764 765	CISRCH221J5
		C 756	CISRYB472K5
		C 763	CISRYB103K5
		C 801	CE/220M16

====Circuit Symbol & No. Part Name====	Part No.	====Circuit Symbol & No. Part Name====	Part No.
C 802	CKSQYB223K25	R 976	RD1/4PS242JL
C 803	CKSQYB223K25	R 977	RD1/4PS362JL
Unit Number :		R 981	RD1/4PS473JL
Unit Name : Extension P.C.Board		R 982	RD1/4PS102JL
		R 991 992	RS1/10S0R0J
MISCELLANEOUS		CAPACITORS	
IC 851	TC9237BN	C 851 852	CCSCH080D50
IC 853 854	M5218AL	C 853 855 856	CKSYB224K25
IC 981	NJM431L	C 854	CEA101M6R3LS
IC 982	NJM78L05A	C 857 858	CCSQCH820J50
IC 983	M62009P	C 861 862 961 962 963 971 981 982 983 984	CKSQYB103K25
Q 851 852	2SD1048	C 863 864	CCSQCH470J50
Q 853	DTA114EK	C 865 866	CCSQCH470J50
Q 854 963 971	DTC114YK	C 867 868	CCSQCH680J50
Q 951	DTC114EK	C 873 874	CEA101M6R3LL
Q 952	2SC3673	C 875 876 882	CCSQSL102J50
Q 961	2SD1859	C 877 878	CCSQCH680J50
Q 962	DTA144EK	C 879 880	CEA330M10LL
Q 972	DTA114EK	C 881	CEA101M16LL
Q 973	2SB1299	C 883	CKSQYB223K50
Q 974 975	2SC2458	C 884	CCSQCH121J50
Q 981	DTC114EK	C 951 954	CKSQYB472K50
D 853 854	1SS133	C 952 953	CEAS471M16
D 855	MA151K-MH	C 955	CEA010M50LS
D 856	MA151A-MA	C 964 965	CEA101M6R3LL
D 861 951 953	ERA15-02VH	C 972	CEA220M16LL
D 952	HZS20L1	C 986	CKSQYB104K25
D 954 972	HZS6LB1	C 988	CKSYB103K25
D 961	RD9R1JSB1		
D 971	HZS11LB1	Unit Number :	
L 951	CTH1047	Unit Name: Mechanism P.C.Board	
X 851	Crystal Resonator	S 805	Switch
SW 981 982	Switch (EJECT,RESET)		CSN1012
EF 851	EMI Filter	Unit Number :	
EF 852	EMI Filter	Unit Name: Photo P.C.Board	
EF 951	EMI Filter		
RESISTORS		D 1	LED
R 851 972	RS1/10S103J	S 801 802	Switch
R 853 854 855 856	RS1/10S223J		BR4361F
R 857 858 859 860	RS1/8S0R0J		CSN1012
R 861 862 863 864	RS1/8S822J	Miscellaneous Parts List	
R 865 866	RS1/10S163J	D 2	LED
R 867 868	RS1/10S163J	S 803 804	Switch
R 869 870 871 872 873 874 875 876	RN1/10SE103D	P 801 802	Photo Transistor
R 877 878	RS1/10S102J	M 1	Motor Unit (Spindle)
R 879 880	RD1/4PS182JL	M 2	Motor Unit (Elevation)
R 881 882	RS1/10S122J	M 3	Motor Unit (Loading)
R 884 885	RD1/4PS562JL	M 4	Motor Unit (Carriage)
R 886	RS1/8S103J		PU Unit
R 887 888	RS1/10S472J		CGY1027
R 891	RD1/4PS0R0JL		
R 951	RD1/4PS363JL		
R 952	RD1/4PS184JL		
R 953	RS1/10S153J		
R 954	RS1/10S101J		
R 961	RD1/4PS391JL		
R 962	RS1/10S122J		
R 963	RD1/4PS202JL		
R 964	RD1/4PS101JL		
R 965 975	RD1/4PS681JL		
R 971	RD1/4PS222JL		
R 973 974	RD1/4PS331JL		

## 14. CIRCUIT DESCRIPTION

### 1. Pre-amplifier Stage

This unit processes a pickup output signal to make signals for subsequent stages, i.e. servo unit, modulator unit and control unit. The signal from the pickup is converted on an I-V basis in a photodetector-builtin pre-amplifier inside the pickup.

Besides, an addition is made to the signal in an RF amplifier (IC351) to obtain RF, FE and TE signals.

The pre-amplifier unit has a configuration with one-chip IC UPD1347GS mainly employed. It is described in detail below.

The present system, which is of single power (+5 V) type, has 2.5 volts available for both RF Amplifier Reference Voltage Vref and other signal circuit reference voltage REFOUT. Voltages referred to below are to be expressed in Unit [REFOUT]. (A voltage based on a reference value of 0 (V) is to be expressed in Unit [V].)

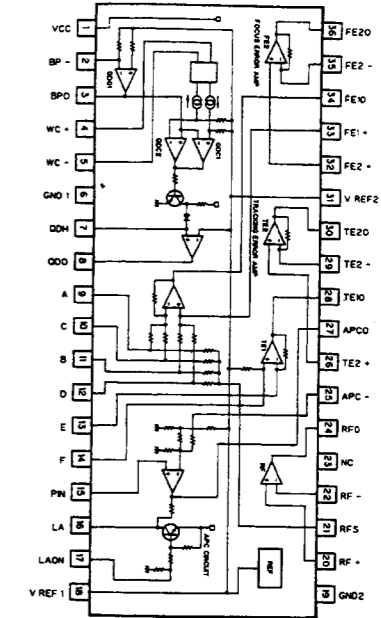
The IC is a 36-pin flat package, which has an internal configuration as shown in Fig. 19.

This IC is described below concerning its internal component parts.

(NOTE) Pin ⑩ on IC351 has Vref (2.5 V), which in turn serves as the reference voltage in the RF amplifier. For measurements, adjustments, etc., apply REFOUT obtained by passing REFO of Pin ⑨ on IC601 through a buffer.

#### (1) RF amplifier

Photodetector Outputs A, B, C and D are added in amplifier (1) so that (A + B + C + D) will be outputted to RFO. (This terminal permits an eye pattern to be checked.) RFO output voltage VRFO has lowfrequency components as follows:

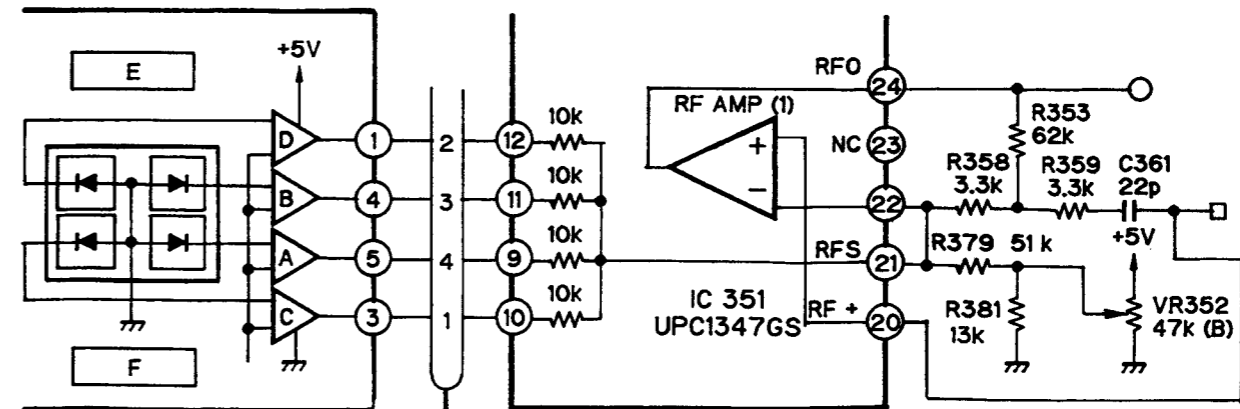


Block diagram

Fig. 19

$$VRFO_{[REFOUT]} = -[(R358 + R353)/10k] \times (A + B + C + D)$$

For RFO output (Pin ⑫), an RF output at a level of  $VRFO = 1.9 V_{p-p}$ , AC., is available, with REFOUT at the center.



Block diagram

Fig. 20

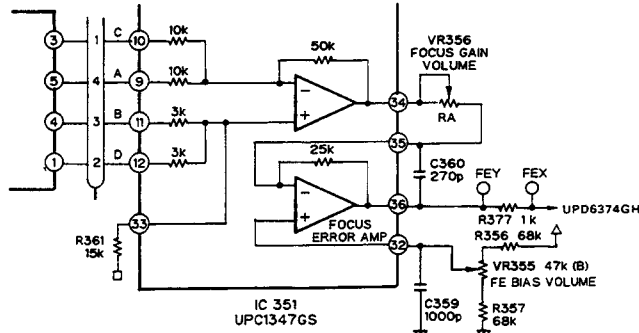
**(2) Focus error amplifier**

Photodetector outputs A, B, C and D are inputted to both differential and focus-error amplifiers so that  $A + C - B - D$  will be outputted.

An FE output voltage (low frequency) will be :

$$V_{FE} = 5 \times 25 \text{ k} / R_A \times (A + C - B - D)_{[REFOUT]}$$

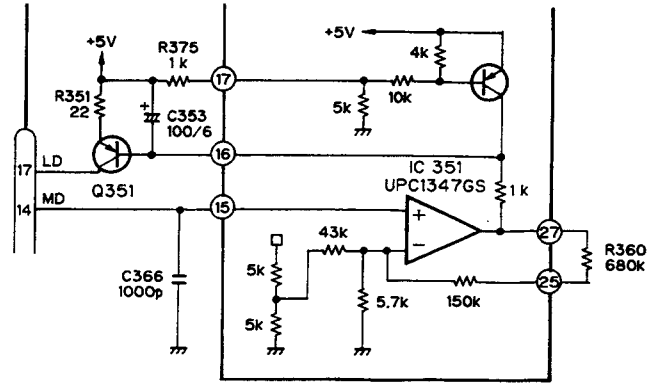
An FE output (Pin 36) of about 2.5 (V) is available as an S-shaped curve.



Focus error amplifier Fig. 21

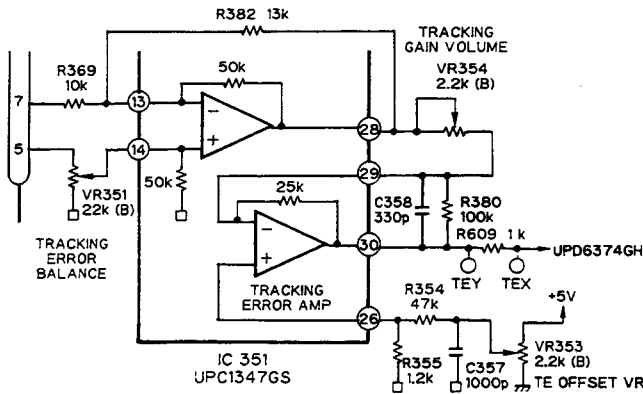
**(4) APC circuit**

A laser diode, if driven at a constant current, will have a negative temperature curve with a large optical output. It is necessary, therefore, to control the current with a monitor photodiode so that a constant output will be available. This is an APC circuit. The present system has LDI set to approximately 50 thru 60 mA.



APC circuit Fig. 23

**(3) Tracking error amplifier**



Tracking error amplifier Fig. 22

The side-spot voltages inputted to E and F are amplified in differential and tracking-error amplifiers so that an output (E-F) can be obtained.

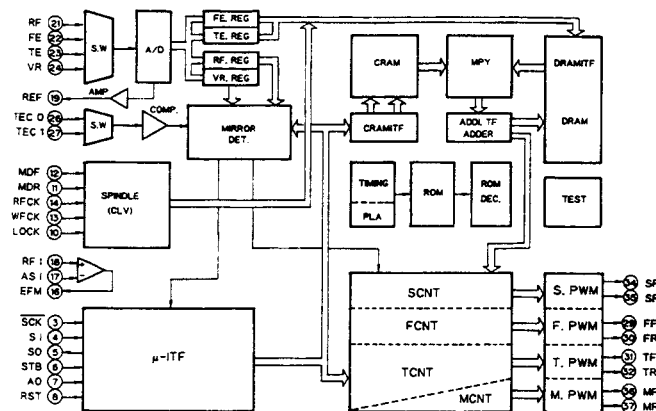
$$V_{TE} =$$

$$50 \text{ k} / 13 \text{ k} / 10 \text{ k} \times 100 \text{ k} / 25 \text{ k} / R_B \times (E-F)_{[REFOUT]}$$

The TE offset VR, moreover, is to cancel a DC offset from the preamplifier to the servo amplifier while the TE balance VR is to adjust the tracking signal symmetry. These are the prerequisites to mainly perform an operation of tracking normally. A tracking error of approximately 2 (v) p-p' is available as an output of pin 30.

2. Servo Stage

This unit has FE, TE and RF outputs received as its inputs from the RF amplifier. And the analog signals are converted to the digital ones, which are in turn used to execute the servo operations of focus tracking, carriage and spindle and the servo control of in-focus track jump, etc. subject to an instruction from the system microcomputer. IC UPD6374AGH (48 pins, flat package) is mainly employed, with the block diagram given in Fig. 24. In addition, this IC has an automatic sequencer built in to perform track jumps, etc; based on the serial data transferred from the system microcomputer. The servo unit is described below on a component by component basis.

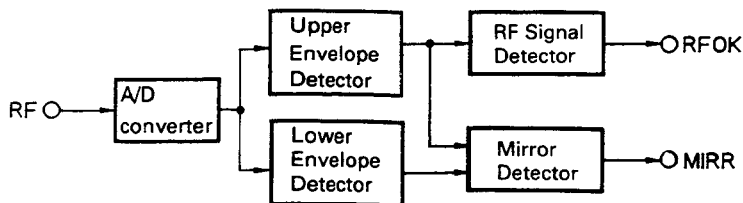
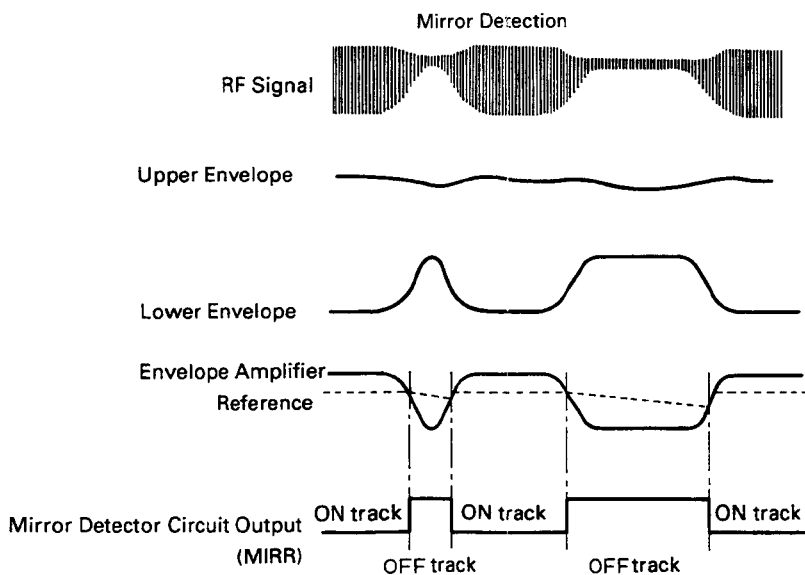


UPD6374AGH Block diagram Fig. 24

(1) Mirror circuit

The mirror detector circuit is to determine an on-track or off-track status by detecting a mirror status, with an envelope amplitude extracted from an RF signal. For the reference to detect a lack of amplitude, the envelope amplitude is held at the peak with a sufficient

large time constant and multiplied by two-thirds to obtain the reference value. Should an RF signal have no amplitude available (with the focus servo removed), the mirror detector circuit has an output (MIRR) go "H."



RF detector / mirror detector circuit block diagram

Mirror circuit

Fig. 25

**(2) Focus OK circuit**

The FOK circuit compares the upper envelope of an RF signal with the value set by the microcomputer and outputs a result of such comparison at the FOK terminal. ("H" is outputted, with [RF signal's upper envelope] > [set value].)

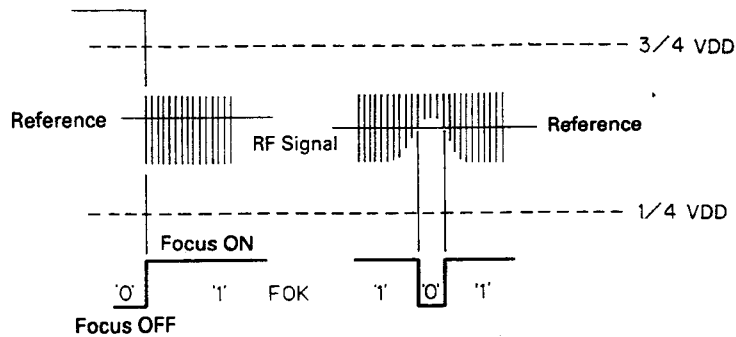
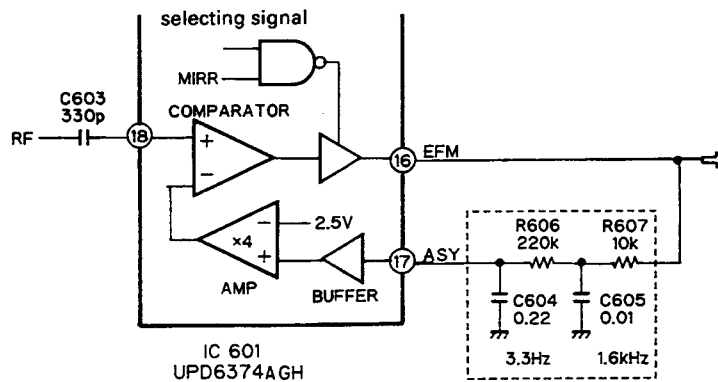


Fig. 26

**(3) EFM comparator**

The EFM comparator is to digitize an RF signal. Since its error rate increases under the influence of an asymmetry generated, the EFM output signal is made to pass through a low-pass filter by making use of the fact that a bit is generated at a probability of 50%. And the signal so filtered is taken for a comparison level. The present system has a low-pass filter cut off  $f_c = 3.3$  (Hz) for C604 and R606 and  $f_c = 1.6$  (kHz) for C605 and R607.



EFM comparator

Fig. 27



**(4) Command code**

A list of the commands used in the present system is given below.

10H	SK	TM	TEH	FR	TK	TB	T CNT	BRK
11H	FON	TON	SON	MON	FST	DFCT	JSK	TAB
12H	SLED NON-SENSITIVE AREA				HSL	SCV	RFP	TFP
13H	FOK LEVEL				FSPV 1	FSPV 0	T1	T0
14H	00 (h)							
15H	0	0	0	0	0	TCS	CV2	E3EN
16H	0	0	0	0	FPW	TPW	SPW	MPW

20H	TRACK KICK LEVEL a			
21H	TRACK KICK LEVEL b			
22H	TRACK KICK TIME A			
23H	TRACK KICK TIME B		TRAVERSE COUNTER N (H)	
24H	TRAVERSE COUNTER N (L)			
25H	SLED KICK LEVEL	SL1	SL0	0 0

**<Description of Functions>**

- SK:** sled kick control; the sled is kicked at a value set in 25 H, when SK is set to "1."
- TM:** tracking mute control  
With TM = "1," the tracking output is put by TEH into either PRECEDING VALUE HOLD or REFERENCE HOLD (Data 00 value) mode.  
With TM "0," a result of tracking and filtration is outputted (in the normal mode).
- TEH:** error hold control upon track jump  
With SK = TM = "1," the tracking output has PRECEDING VALUE HOLD or REFERENCE HOLD mode selected.  
REFERENCE HOLD, with TEH = "0" and PRECEDING VALUE HOLD, with TEH = "1"
- FR:** output level polarity control upon tracking and upon sled kicking  
With FR = "0," a value available at output level registers (20,21 and 25 H) is multiplied by -1 and outputted.  
With FR = "1," an output level register is outputted unchangedly.
- TK:** controlling both track jump trigger and traverse counter load; it has two meanings according to the T. CNT bit.  
With T.CNT = "0," set the TK bit to "1" and the track jump sequencer will start.  
With T.CNT = "1," set the TK bit to "1" and the traverse counter will be loaded with Values 23 H and 24 H.
- BRK:** half-wave brake circuit control  
With BRC = "1," the half-wave brake is ON.
- TB:** selecting a tracking filter coefficient bank:  
With TB = "0," the tracking filter bank goes 0.  
With TB = "1," the tracking filter bank goes 1.  
FON, TON, SON and MON: servo output (PWM output) on/off control  
With any = "1," the PWM output is on.  
With any = "0," the PWM output has stopped.  
With PWM output stopped, a high impedance is outputted with the PWM in the single-phase 3-value output mode.

- FST:** focus search control  
With FST = "1," a focus search will be started if FON = 1.
- DFCT:** tracking output hold control with flaw detected  
With DFCT = "1," the tracking hold is outputted upon detection of flaw.
- JSK:** sled kick control upon jump  
With JSK = "1," the sled is kicked at a level set in 25 H for a duration of the track jump.
- TAB:** track jump sequencer operation abort control  
With TAB = "1," the track jump sequencer stops operating.  
SLED NON-SENSITIVE AREA: A sled dead zone is controlled at an absolute vale of 4 bits.
- HSL:** selecting the tracking output hold control  
With HSL = "0," the tracking output hold is controlled by a missing FOK signal.  
With HSL = "1," the tracking output hold is controlled by means of an external hold.
- SCV:** selecting a sled servo control with CLV lock  
With SCV = "0," the sled servo is turned off (with PWM output stopped) to unlock CLV.  
With SCV = "1," the sled servo is normally on, irrespective of whether or not CLV is locked.
- RFP:** selecting the polarity of data to an RF processor system (circuits to generate FOK, MIRR, et..)
- TFP:** selecting the polarity of a tracking error zero cross (TEC) signal
- FOK LEVEL:** setting a reference value in the RF detector circuit
- FSPW1, FSPW0:** selecting a PWM output carrier  
FSPW0: changing a motor system PWM carrier 88.2 kHz with FSPW0 = "0" and 22.05 kHz with FSPW0 = "1."  
FSPW1: changing an actuator system PWM carrier 88.2 kHz with FSPW1 = "0" and 17.4 kHz with FSPW1 = "1."

T1, T0: square wave cycle upon focus search

SETTING		CYCLE
T0	T1	
0	0	approx. 0.74 sec. ( $2^{16}/Fs$ )
0	1	approx. 1.49 sec. ( $2^{17}/Fs$ )
1	0	approx. 2.97 sec. ( $2^{18}/Fs$ )
1	1	approx. 5.94 sec. ( $2^{19}/Fs$ )

20 H, 21 H: register to set a kick level upon track jump

22 H, 23 H: register to set a kick time upon track jump  
 Kick Time = (set value + 1) × 1/Fs (11.3 μs)

23H, 24H: traverse counter setting register

25H: sled kick setting register

SLED KIK LEVEL: sled kick level setting register

SL1, SL0: selecting SLED FULL KICK or SHORT mode

SL1	SL0	MODE
0	1	short
1	0	full kick
0	0	normal kick

TCS: selecting the tracking zero cross comparator  
 TEC0 input, with TCS = "0" and  
 TEC1 input, with TCS = "1"

CV2: selecting the sensitivity of CLV error detector  
 with speed doubled  
 Normal speed selected, with CV2 = "0" and  
 Double speed selected, with CV2 = "1"

E3EN: controlling the function of protecting EFM ≤ 3T upon high-speed access  
 protector off, with E3EN = "0" and Protector on, with E3EN = "1."

**(5) Focus servo system**

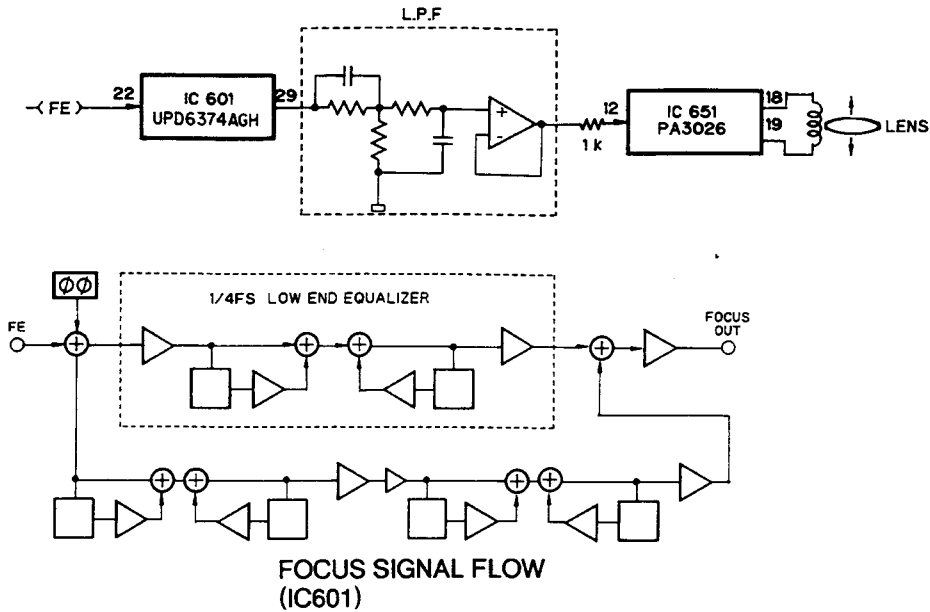


Fig. 28

The digital loop filter is built in the interior of the IC. Sending a coefficient from the microcomputer will allow you to obtain a desired equalizer curve. The present system has an equalizer curve shown in Fig. 32.

**a) In-focus**

In the in-focus sequence, the lens is driven into a focus S-curve (approx. 10  $\mu\text{m}$ ) to close the servo loop on an in-focus basis. A flow of signals in focus is shown in Fig. 29.

The search voltage is designed to fall within a range of the lens drive distance  $\pm 1.0\text{ mm}$ , being entirely dependent upon the sensitivity of a focus actuator. In the present system, both gain (voltage) and time constant are determined according to a coefficient from the microcomputer, based on the pulse in a specified cycle, which has been set in a register. The timing in which a focus is to be closed, moreover, is generated, based on the value which has been set as referred to in a signal flow shown in Fig. 30.

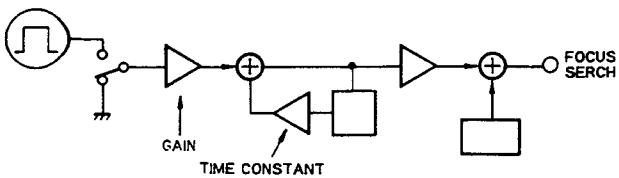


Fig. 29

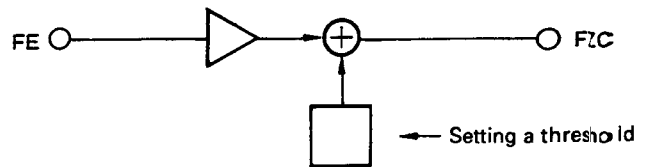


Fig. 30

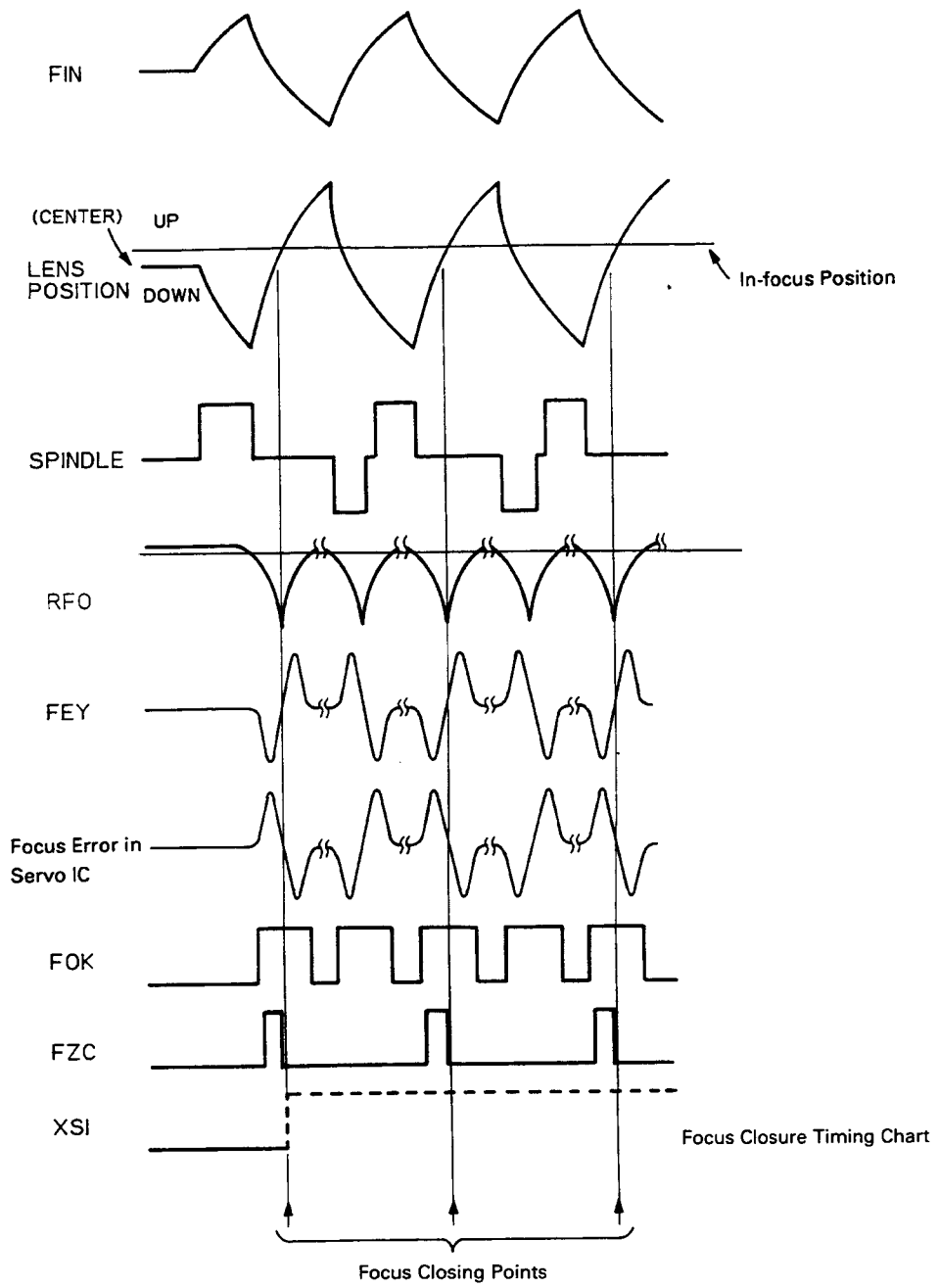
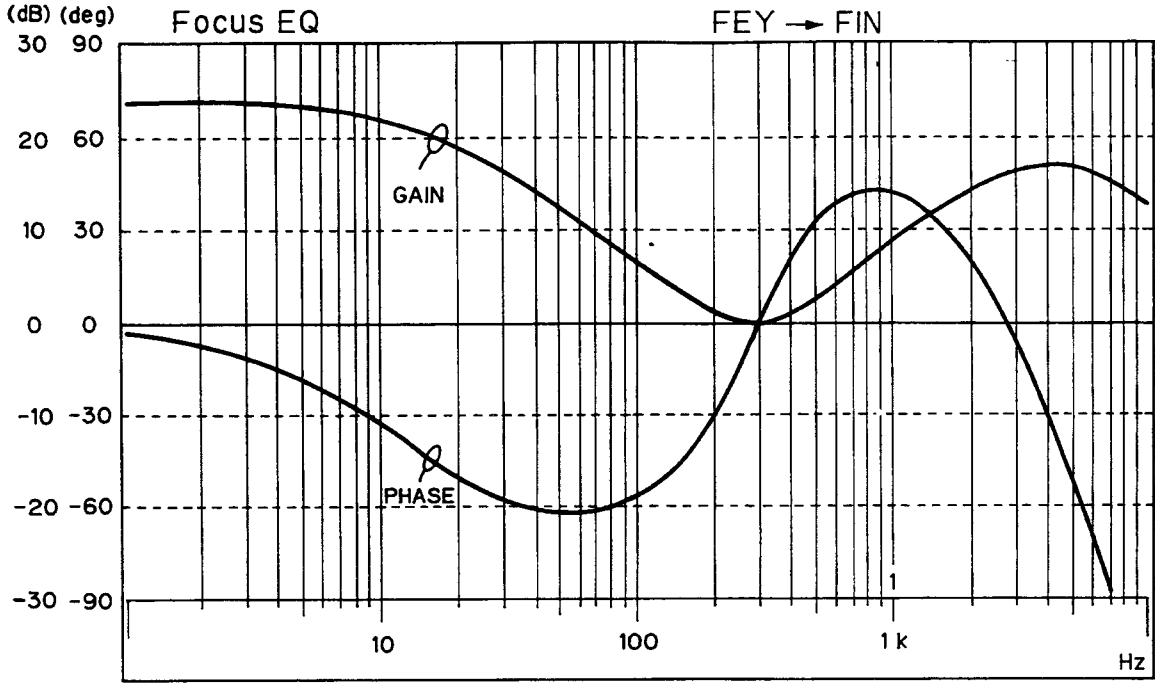


Fig. 31

**(6) Focus equalizer**

The present system permits a specific equalizer curve to be obtained according to the coefficient sent from the microcomputer. A digital filter built in IC UPD6374AGH and an active filter mounted in the exterior are used to obtain a specified equalizer curve.



Focus equalizer (Example)

Fig. 12



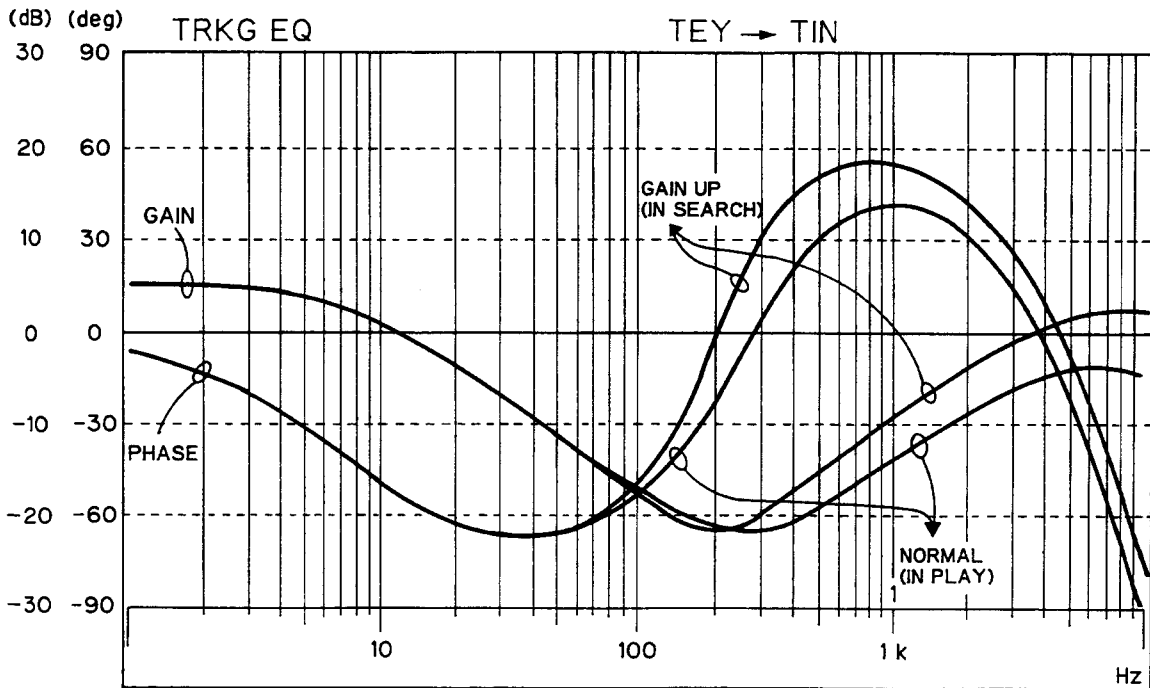
Shown in Fig. 33, 34 are a block diagram of the tracking carriage servo system and a flow of signals in IC UPD6374AGH. To make a track jump either forward or reverse, tracking kick and brake voltages and carriage kick and brake voltages are set in related registers beforehand. A jump forward or reverse is made at the voltage which has been set in an instruction from the microcomputer.

**a) Tracking equalizer**

In the present system, a digital filter is built in IC UPD6374AGH, allowing a specific equalizer curve to be obtained according to the coefficient sent from the microcomputer. And a passive filter is externally mounted. These two filters are used to obtain a specified equalizer curve. To allow a stable pull-in throughout

the search, moreover, the equalizer curve applied is so set as to obtain a higher level of gain than that during the play.

Fig. 35 shows the tracking equalizer curves observed during both play and search.



Tracking equalizer (Example)

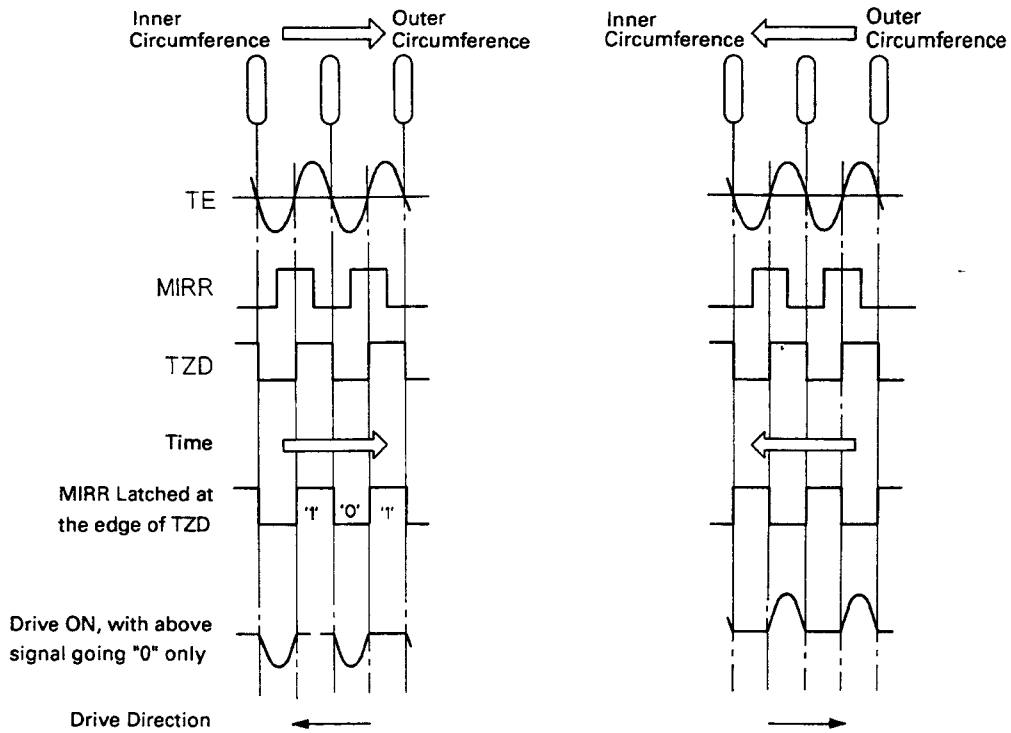
Fig. 35

**b) Brake Circuit (Fig. 36)**

Since the actuator is put into a non-linear status in the in-focus mode or in the track-jump mode, the pull in the servo loop turns out very poor after completion of a jump. While both pickup and disc are relatively moving, the brake circuit permits tracking to be closed smoothly. The direction in which both pickup and disc are moving is detected, based on a phase relation between MIRR

and tracking error signals. With an accelerating component only cut off the tracking error, the decelerating component only is used while repeating the ON/OFF operations of servo on a chopper basis.

Thus, a stable pull in the servo loop is performed. This circuit's ON/OFF operations are controlled by the microcomputer.



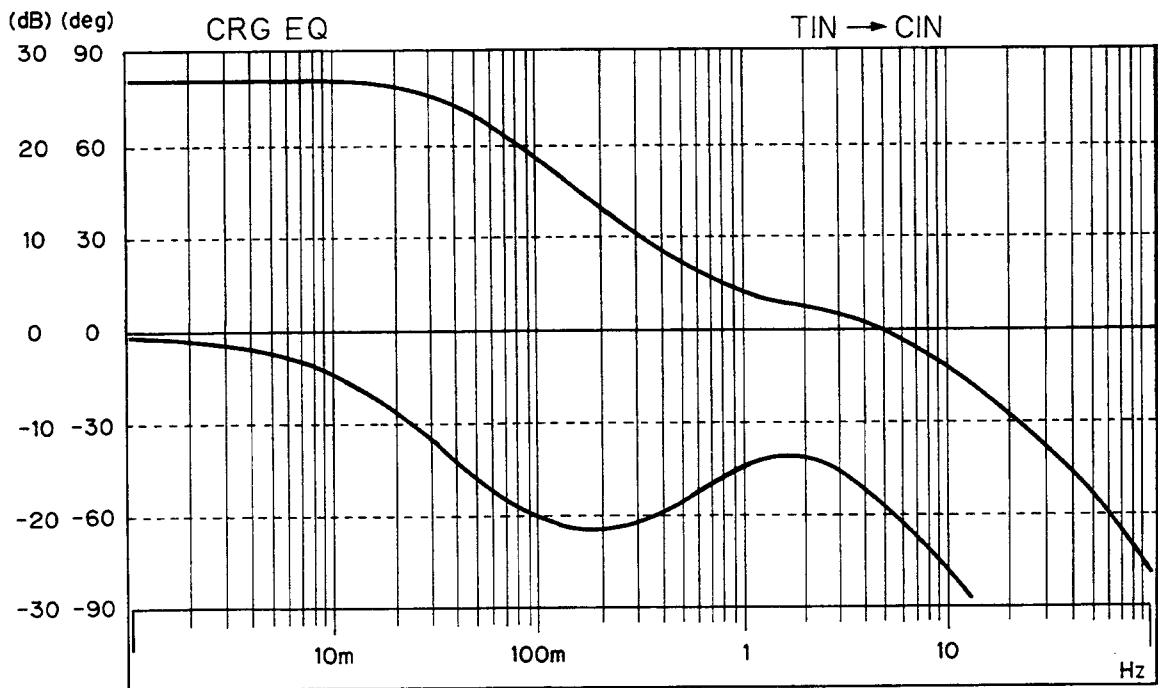
Brake circuit operation

Fig. 36

c) Carriage equalizer

As shown in the signal flow, the carriage servo system takes for an input the voltage at which the tracking actuator is driven. Based on the equalizer curves shown in Fig. 37, moreover, the system obtains those components which are required to feed the carriage. In the

present system, a threshold voltage is set beforehand so as to turn on the carriage servo when the tracking actuator has a lens deflection fall outside the range of approximately  $\pm 30$  tracks in relation to the low-pass filter output at the tracking drive voltage.



Carriage equalizer (Example)

Fig. 37



**(8) Track Jump**

The present system is jumping tracks 1, 10 and 32 subject to an automatic sequence of the UPD6374AGH. The 64, 80 track jumps conventionally available have been substituted for 32TRK × 2 and 32TRK × 3, accordingly. Fig. 38, 39 shows a timing chart of the 1, 10 and 32 track jumps.

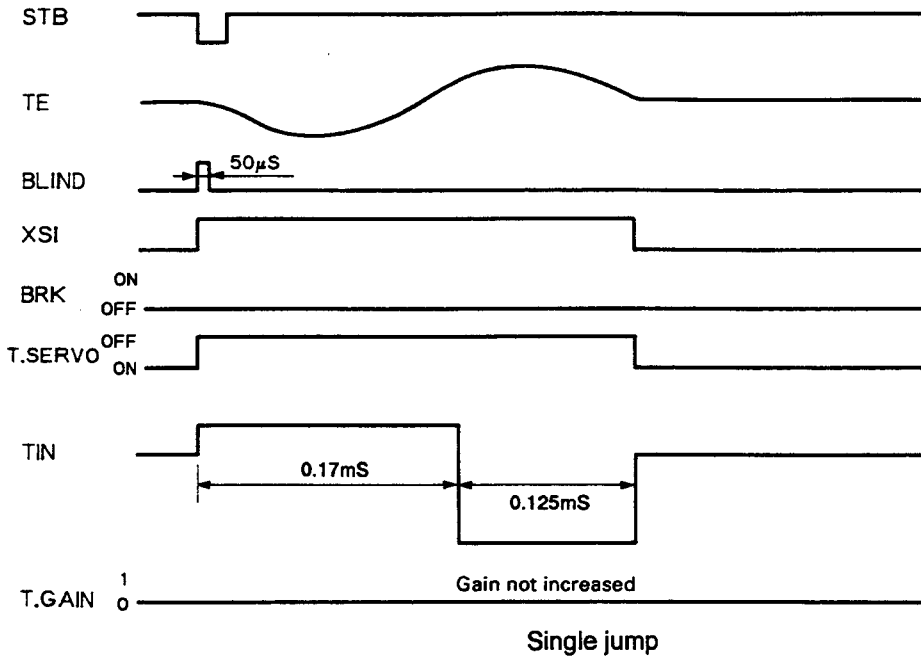


Fig 38

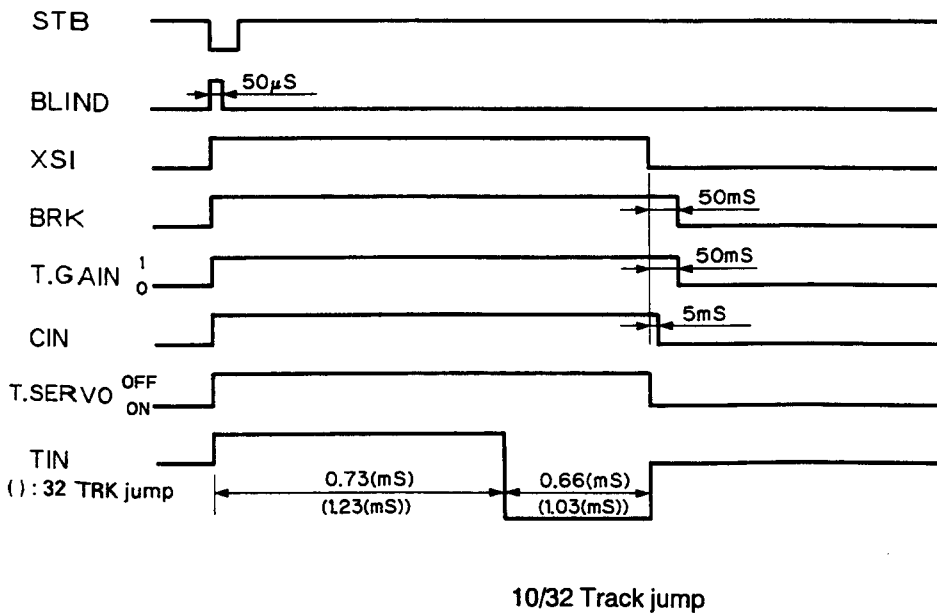
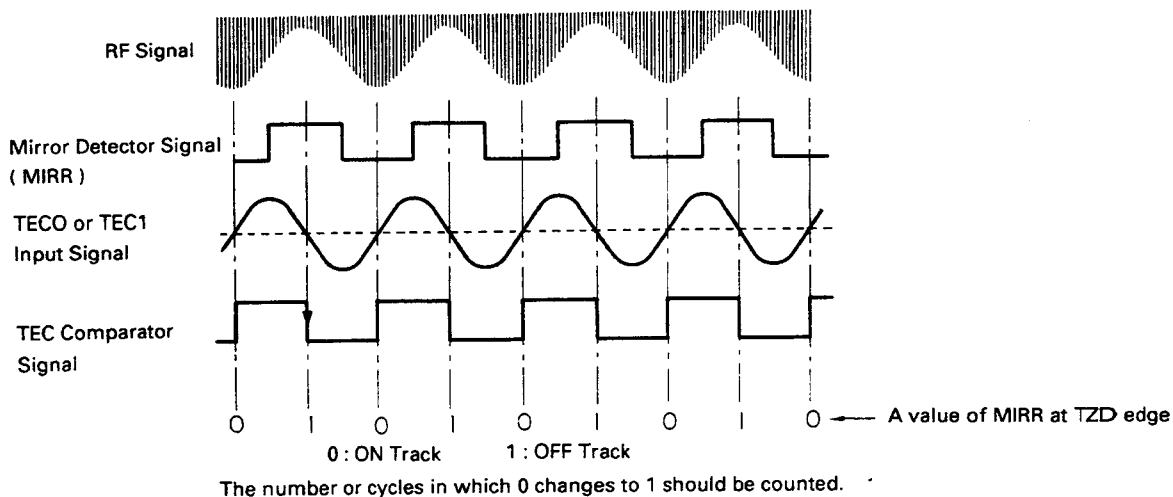


Fig 39

**a) Track jump counter**

When tracks are consecutively crossed, a tracking error signal will not fail to cross the DC offset point in both on- and off-track modes as shown in Fig. 40. This point, therefore, is used to determine either on- or off-track so as to count the number of cycles in which the on-track is switched over to the off-track. A count value is set by the microcomputer. And this count value is given priority to the kick-setting time.

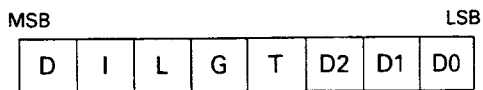


Track count jump

Fig. 40

**3. CLV Control Stage**

**(1) CLV control command and CLV mode command**



D	0	RFCK/4 and WFCK/4	Select a steady servo phase comparison signal.
	1	RFCK/8 and WFCK/8	
I	0	RFCK/16	Select a bottom hold cycle of pull-in and rough servos.
	1	RFCK/32	
L	0	MDF, MDR (H, Z) outputs	Select an MDF/MDR output terminal selecting method.
	1	MDF, MDR (H, L) outputs	
G	0	-12 dB	Select the gain of pull-in and rough servos.
	1	0 dB	
T	0	RFCK/2	Select a peak hold cycle of pull-in servo.
	1	RFCK/4	

D2	D1	D0	MDF	MDR	Control Status
0	0	0	L	L	stop
0	0	1	H	L	kick
0	1	0	L	H	brake
0	1	1	L	L	stop
1	0	0	L/H	L/H	pull-in servo
1	0	1	L/H	L/H	rough servo
1	1	0	L/H	L/H	steady servo
1	1	1	L/H	L/H	applied servo

### • Pull-in Servo

This servo is used to pull the spindle motor speed into a specified number of revolutions. With a cycle of 8.6436 MHz reckoned as T, we can get "22T" (synchronous signal) as the maximum inversion interval of an EFM signal at the specified number of revolutions. Therefore, determine the EFM signal's maximum inversion interval and compare it with "22T" so that we can detect whether the motor speed is higher or lower than the specified number of revolution.

EFM SIGNAL MAX. INVERSION INTERVAL	MDF TERMINAL	MDR TERMINAL	MOTOR SPEED
"21T" and below	L(Z)	H	high
"22T"	L(Z)	L(Z)	
"23T" and above	H	L(Z)	low

Z: High impedance

### • Rough Servo

This servo is used for the high-speed access in which the carriage is moved at a high speed, with focus servo ON and tracking servo OFF.

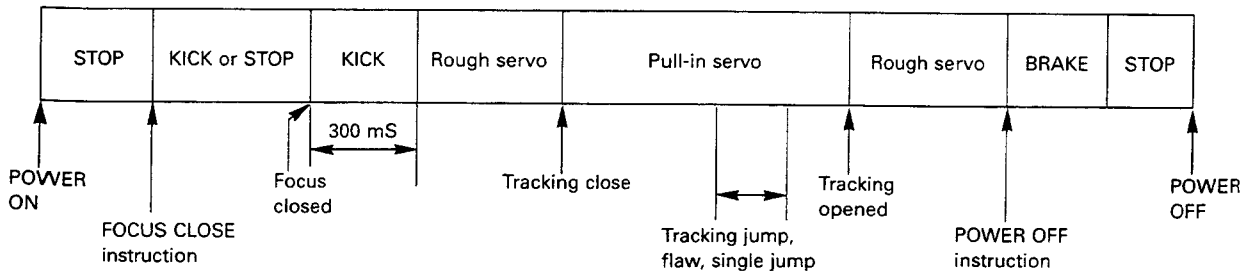
### • Steady Servo

This servo is used to maintain the spindle motor speed at a specified number of revolutions. It is outputted as a result of comparing the phase between WFCK/4 and RFCK/4 or between WFCK/8 and RFCK/8.

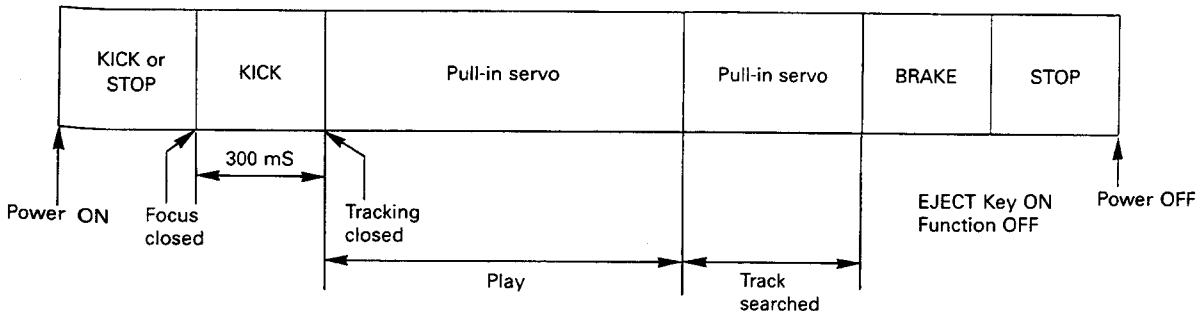
### • Application Servo

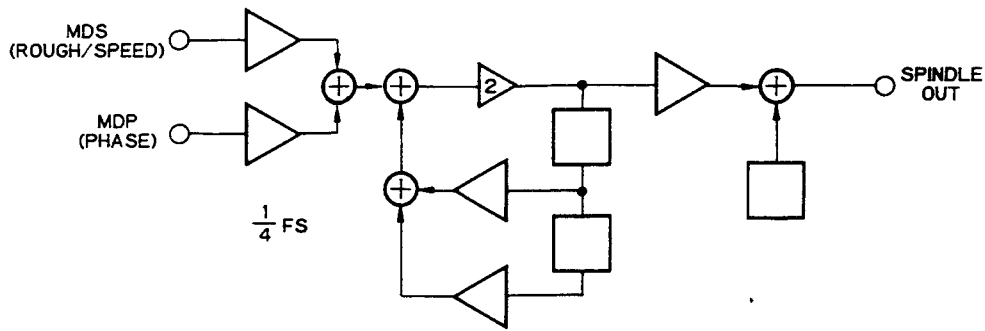
This is the CLV servo mode available during the normal operation. In the EFM demodulator block, every WFCK/16 is sampled to determine whether or not the frame synchronizing signal coincides with an output of the internal frame counter. As a result, a signal is generated to show whether or not they are coincident. Once this signal has been found not coincident in eight consecutive cycles, the status is first determined asynchronous. Under any other conditions, the status is deemed synchronous. The CLV application servo mode automatically selects the pull-in servo in the asynchronous status and the steady servo in the synchronous status. This feature is not employed in the present system.

### • Test Mode



### • Normal Mode



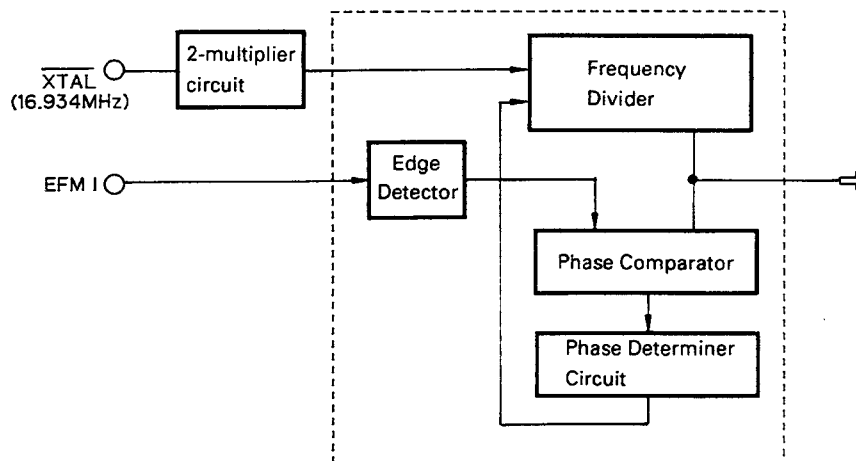


Spindle signal flow chart (IC601)

Fig. 41

**(2) PLL stage**

The present system employs a digital PLL circuit illustrated below. This PLL circuit operates so as to lock the rising edge of a PLCK and the edge of an EFM signal. And it has a resolution of as high as approximately eight times  $1T$  ( $T = \text{EFM signal's bit rate} = 1/4.3218 \text{ MHz}$ ). Both frequency divider output frequency and EFM bit rate have their errors automatically regulated to adjust the mean free-run frequency to the bit rate.



Digital PLL block diagram (IC701)

Fig. 42

**4. Power Supply Stage**

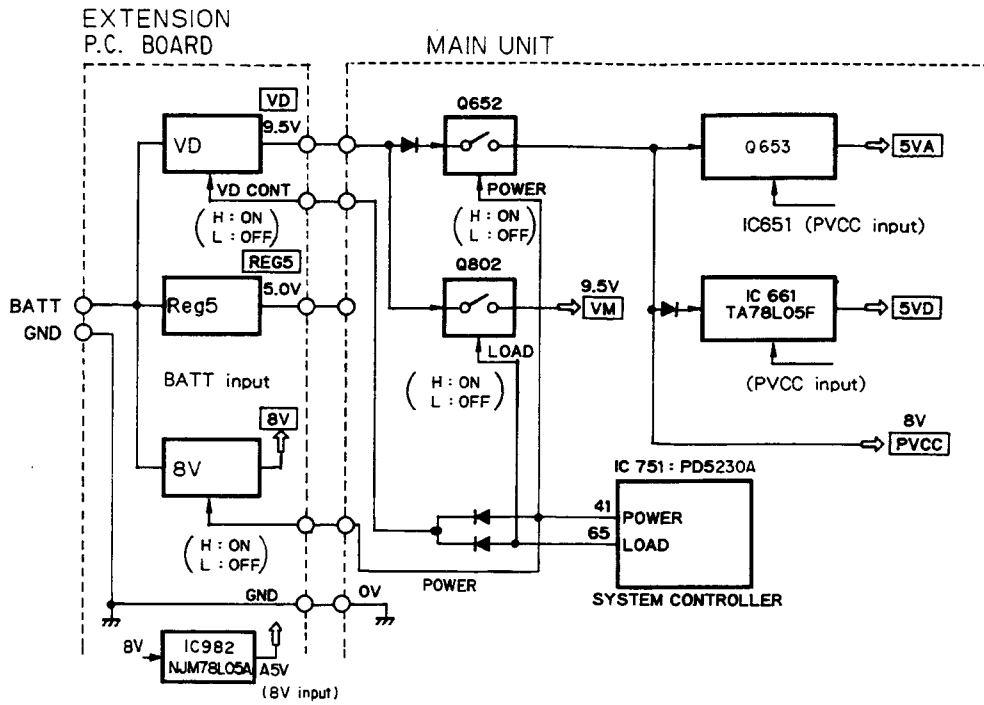


Fig. 43

The -5V power in the main unit is available in two types; 5VA and 5VD. The 5VA is used to supply power to the pickup LD and to the preamplifier system and the 5VD to other LSIs.

The VM is used to supply power to the mechanism-driver IC (IC801). No output is available as long as mechanisms are operating.

The REG5 is used to supply power to the system controller (IC751 and 755) while outputting normally. The 8V is used for the auto system circuit (amplifier and isolator) in the extended unit and not supplied to the main unit. From this 8V, IC982 generates the power supply (A5V) to the D/A converter in the extension unit.

It should be noted that the Q973 in the VD circuit has a very high temperature.

**5. New Test Mode (FH-M70+CDX-M6)**

The new test mode performs more or less the same operations as the normal mode PLAY, but is able to carry out a more detailed analysis of error stop causes. During setup, it displays the operation status of the CD control software. After setup, it displays the causes, time of occurrence, and disc number of protection operations, errors, and time-out of FOK, LOCK, sub-code readability and un-readability, sound dropping, mechanism error, etc.

The following new test mode keys are examples when combined with FH-M70.

**• New Test Mode (aging operation and setup analysis)**

The CD, either single or multiple, plays in the normal mode. After being set up, it will display FOK (focus), LOCK (spindle), subcode, sound skip, protection against a mechanical error or the like, occurrence of an error, cause and time of an expiry, if any, (and disc number in the multi-mode).

During the setup, the CD software operation status (internal RAM and C-point) is displayed.

Since it is necessary to cope with the error number display function.

- (1) How to Put in the NEW TEST Mode  
See the test mode flow chart Page 8.
- (2) Relations of keys between TEST and NEW TEST Modes.

P-BUS Commands	Keys	Test Mode	Regulator ON	New Test Mode	New Test Mode
		Regulator OFF	Regulator ON	Play in progress	Error Protection } Talking place
B0	BAND/REL	Regulator ON	Regulator OFF	BAND/REL	Time of occurrence } Selected Cause of error }
B1	▶▶	—	FWD-KICK	▶▶	—
B2	◀◀	—	REV-KICK	◀◀	—
B3	F·1	—	TRACKING CLOSE	F·1	—
B4	F·4	—	TRACKING OPEN	F·4	—
B5	F·2	—	FOCUS CLOSE	F·2	—
B6	—	—	FOCUS OPEN	—	—
B7	—	—	Jump-OFF	—	—
B8	F·3	To new Test Mode	Jump-Mode selected	F·3	Occurrence TNo } Selected Time of occurrence }

Operations, such as EJECT, CD ON/OFF, etc. are to be performed normally

(3) Error Cause (Error Number) Code

Error Code	Classification	Mode	Description	Cause/Detail
40	ELECTRIC	PLAY	FOK = L 100 ms	Put out of focus Spindle unlocked Subcode failes to read Last address memory operated Scar, Stain, Vibration, Servo defect, etc...
41	↑	↑	LOCK = L 150 ms	
42	↑	↑	Subcode unacceptable 500 ms	
43	↑	↑	Sound skipped	

\*With CD single, no mechanical error is displayed while aging. The error code is identical with those in the normal mode.

(4) Indicating an Operation Status During Setup

Status No.	Description	Protection operation
01	Carriage home mode started	None
02	Carriage moving on the internal circumference	10-second time out
03	Carriage moving on the external circumference	10-second time out
11	Setup started	None
12	Spindle turn/Focus search started	None
13	Waiting for focus closing	Failure to focus closing
14	Spindle kicked and focus checked	Out of focus
15	Tracking closed and focus checked	Out of focus
17	Carriage closed and focus checked	Out of focus
18	Lock subcode } Waiting	Failure to lock, Subcode failed to read out of focus
19	End	None

**(5) Example of 7-segment Display**

(a) SET UP in progress

TRACK	MIN	SEC	
11	11	11	While in the TEST MODE, a status number is indicated in TNO, MIN and SEC.
TRACK			
11			
MIN	SEC		
11	11		

(b) Operation (PLAY, SEARCH, etc.) in progress Perfectly identical with that in the multi mode.

(c) Protection/Error upon occurrence

ERROR-XX		While in the error mode, an error number is displayed in MIN and SEC.
Err-XX, ERR-XX		
E-XX		

Select the display with the BAND/REL key.

TRACK	MIN	SEC	
10	40	05	While in the PLAY MODE, an absolute time is indicated in TNO, MIN and SEC.
TRACK			
10			
MIN	SEC	} Select the display with the F · 3 key.	
40	05		



15. OPERATIONS AND CONNECTION

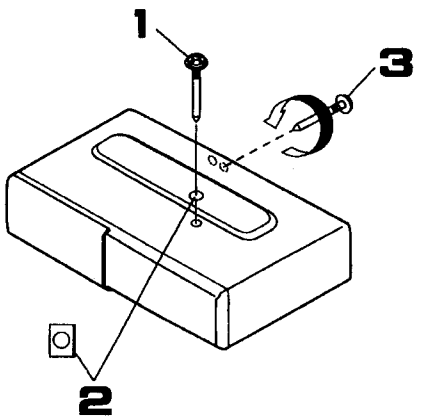


Fig. 44

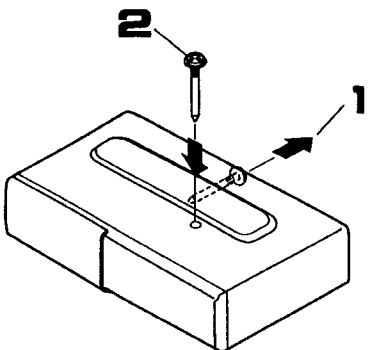


Fig. 45

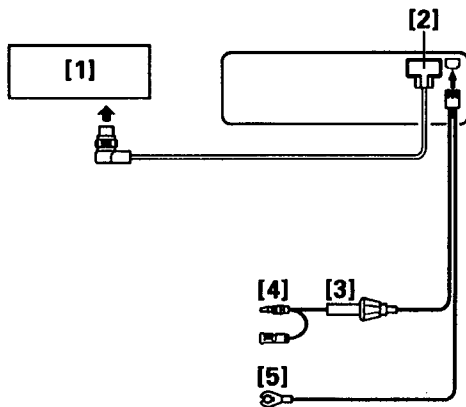
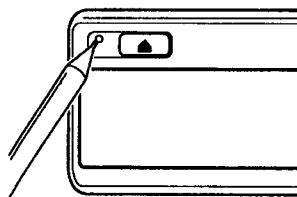


Fig. 46



**Pressing the clear button**

If the power does not switch on or if the compact disc player does not operate when the button on the multi-CD controller is pressed, or if the multi-CD controller display is incorrect, press this button on the player with the tip of a pencil to restore normal operation. (This button is located inside the door.) **Always press the clear button on the multi-CD controller, too, after pressing this button.**

## Transportation pin

### Removing the transportation pin (Fig. 44)

A transportation pin is installed to protect the player during transportation. Before mounting the player, remove the transportation pin and cover the hole with the supplied adhesive seal. Screw the removed transportation pin into the specified hole; it will be needed if you retransport the player.

1. Peel off adhesive tape and remove the pin.
2. Cover the hole with the seal provided.
3. Screw the pin into the left-side hole of the 2 holes.

### Reinstalling the pin (Fig. 45)

To transport the player, reinstall the transportation pin as follows:

#### Before removing the player

Play back the first track of a disc, and stop within 10 seconds. Remove the magazine, wait about 10 seconds, then remove the player.

1. Remove the pin.
2. Insert the pin in its original position, and fix it with Scotch tape.

## Connecting the Units

- Before mounting, remove the transportation pin and connect the units temporarily. Check that the units are connected correctly by operating the multi-CD controller.
- After connection is complete, press the clear buttons on the player and the multi-CD controller with the tip of a pencil.
- *Be sure to connect the ground lead (black) to the vehicle body or some other metal part that is properly grounded to the chassis. If the ground lead is not properly connected, noise may occur or the player or multi-CD controller may not operate correctly.*
- *This unit is for vehicles with a 12-volt battery and negative grounding. Before installing it in a recreational vehicle, truck, or bus, check the battery voltage.*
- *To avoid shorts in the electrical system, be sure to disconnect the battery ⊖ cable before beginning installation.*
- *Check whether installation and wiring have been completed correctly. Replace the removed car components, then connect the end of the cable to the negative ⊖ terminal of the battery.*
- *Secure the wiring with cable clamps or adhesive tape. To protect the wiring, wrap adhesive tape around them where they lie against metal parts.*
- *Route and secure all wiring so it cannot touch any moving parts, such as the gear shift, handbrake, and seat rails. Do not route wiring in places that get hot, such as near the heater outlet. If the insulation*

*of the wiring melts or gets torn, there is a danger of the wiring short-circuiting to the vehicle body.*

- *Don't pass the orange lead through a hole into the engine compartment to connect to the battery. This will damage the lead insulation and cause a very dangerous short.*
- *Do not shorten any leads. If you do, the protection circuit may fail to work when it should.*
- *Never feed power to other equipment by cutting the insulation of the power supply lead of the unit and tapping into the lead. The current capacity of the lead will be exceeded, causing over heating.*
- *Replace fuses only with the types stipulated on the fuse holder.*

### (Fig. 46)

- [1] Multi-CD controller
- [2] Insert the 13-pin connector cord plug into the socket of the set.
- [3] Fuse holder
- [4] Orange  
To terminal always supplied with power regardless of ignition switch position.
- [5] Black (ground)  
To vehicle (metal) body.

## Using the Compact Disc Magazine

### Precautions when handling magazines

- Do not put the magazine in a place where it will be exposed to high temperatures or direct sunlight.
- Do not disassemble the magazine.
- Take care not to drop the magazine or knock it against anything.
- Do not use cracked or warped trays.
- Never insert anything other than discs. Do not attach a label or tape to a disc.
- The use of benzene, thinner, insecticide, or other volatile chemicals may damage the magazine surface.

### Extra magazines

If you need more magazines, please ask your nearest dealer for magazine JD-T612.

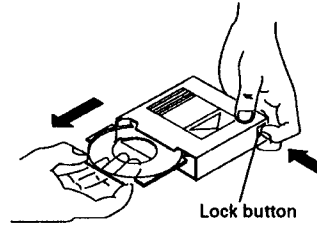
### Notes on 8-cm (3-inch) CDs

- Do not use an 8-cm CD adapter. If it is used, the player may fail. To load an 8-cm CD, you need a special 8-cm CD tray (Part No. CXA5485).

### Inserting discs

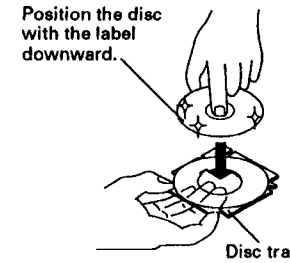
Load the discs in the magazine supplied. Up to 6 discs can be loaded in the magazine. The discs are numbered 1 to 6 from the bottom disc tray.

1. Hold down the magazine lock button and, pull the tray out.



- Pull the tray out by holding it from underneath as shown in the figure. The tray is detached from the magazine. Do not drop the tray or disc and so damage it.

2. Put 1 disc on the disc tray, label downward.



- If the disc is loaded upside down, it will not play. The label side must face downward.
- Do not touch the recorded side of a disc when inserting or removing it.

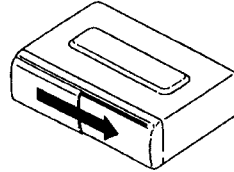
3. Insert the tray horizontally along the right and left grooves of the magazine until it clicks. (The disc must not lift from the tray.)



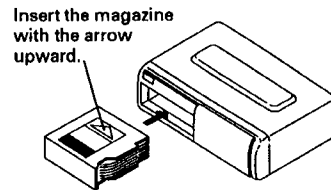
- If the tray is not aligned with the right and left grooves, it cannot be pushed to the end. Do not bend or force the tray.
- Always load 6 trays in a magazine to prevent loss or warping of trays.
- This compact disc player recognizes which magazine is in use from the bottom disc. Always keep a disc in the bottom disc tray.
- If you load a disc with the label generally printed in black facing up, not only will the player not be able to recognize whether the disc is set or not, but also, if you have a multi-CD controller, the controller will not display an error message to let you know about it. So make sure all the discs in each magazine have their label sides facing down.

### Loading and removing the magazine

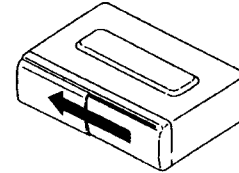
1. Slide and open the door. Open it fully until it locks with a click.



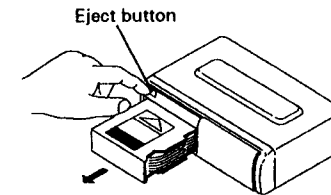
2. Insert the magazine.
  - Make sure that the magazine is loaded with discs before inserting it into the player.
  - Be careful to insert the magazine into the player with the mark facing upward.
  - If the label on the magazine is coming off or wrinkled up, it may damage the eject mechanism, and in some cases, the magazine may not be ejected. Therefore, remove a damaged label completely before use.



3. Slide and close the door.
  - Never leave the door open while playing discs. The entry of dirt, dust, or any other foreign matter into the player may cause it to fail.



4. To remove the magazine, open the door and press the eject button. If the door is not fully open, the magazine will not be ejected.



## How to use the multi-CD player

How to use the multi-CD player is explained in the instruction manual supplied with the multi-CD controller. The operation method of this player is not described in the owner's manual for some models, or it may be different from the description. See the following items.

### Note on last position memory

The owner's manuals for the CD-M1 and KEX-M700 controllers say that the last track memory restarts play from the beginning of the track being played when the disc was stopped. But when you use one of these controllers with this player, the last position memory restarts play around the position at which the disc was stopped.

The owner's manuals for the KEX-M700B and KEX-M700SDK controllers say that the last track memory restarts play from the beginning of the track being played when the disc was stopped. But when you use one of these controllers with this player, the last position memory restarts play around the position at which the disc was stopped.

### Note on random play

When using the random play feature of this player, you can get random play using up to 6 discs in the magazine. The owner's manuals for the CD-M1 and KEX-M700 controllers say that random play works with only one disc. But when you use one of these controllers with this player, all 6 discs are available.

When using the random play feature of this player, you can get random play using up to 6 discs in the magazine. The owner's manuals for the KEX-M700B and KEX-M700SDK controllers say that random play works with only one disc. But when you use one of these controllers with this player, all 6 discs are available.

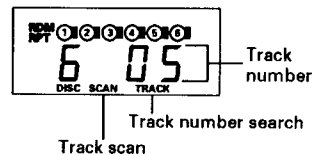
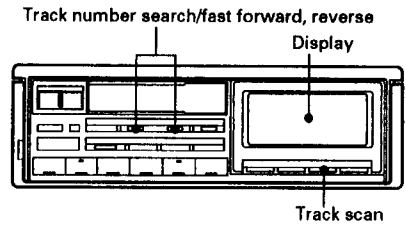
### Highlight scan

KEH-M7000QR	KEX-M800
KEX-M700	

If this player is combined with one of the models of mentioned above car stereo, it will offer highlight scan instead of track scan. In this case, ignore the section on track scan in the owner's manuals for the player, and read the following information on highlight scan instead. (This information refers to the KEH-M7000QR player, but applied to other players, too.)

KEH-M7000SDK	KEH-M7001B
KEH-M7000B	KEH-M5000SDK
KEH-M5001B	KEH-M5000B
KEX-M800SDK	KEX-M801
KEX-M800	KEX-M700SDK
KEX-M700B	

If this player is combined with one of the models of mentioned above car stereo, it will offer highlight scan instead of track scan. In this case, ignore the section on track scan in the owner's manuals for the player, and read the following information on highlight scan instead. (This information refers to the KEH-M7000B player, but applied to other players, too.)



### Using highlight scan

The highlight scan function plays one track after another for about 10 seconds each, beginning at a particular start time. Use it when searching for a piece you like. If you don't set the start time yourself, 10-second playback of each track starts one minute into each track.

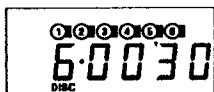
1. Press the track scan button. (SCAN appears on the display).
  2. Tracks will be played one after another for about 10 seconds, starting one minute into each track.
  3. When you hear a track you like, press the track scan button again; the player will cancel highlight scan and continue playing the track.
- When highlight scan arrives back at the track at which it began, it is automatically cancelled and normal play resumes.

### Changing the start time

Example: Setting the start time to 30 seconds into each track

1. Press the + and - sides of the track number search button at the same time. (This causes TRACK to disappear and the start time to appear on the display.)
- On the KEX-M700 model, press the track scan/fast forward and reverse button (manual) to ready the player for fast forward and reverse.
  - On the KEX-M700SDK and KEX-M700B models, press the track scan/fast forward and reverse button (manual) to ready the player for fast forward and reverse.

2. Using the + and - sides of the track number search button, set the time to 30 seconds.



3. Hold the track scan button down for more than 2 seconds. (SCAN appears on the display.) The next and subsequent tracks will be played with highlight scan, starting 30 seconds into each track.
- The start time can be set in 10-second steps. A time less than 10 seconds is taken as zero.
  - If the total time of a track is less than the start time, the track is played from the beginning for about 10 seconds.
  - If a track lasts for less than 10 seconds after highlight scan starts, the track is just played to the end, resulting in a shorter playing time.
  - It is impossible to set a start time greater than the playing time for a particular track. If you want to start a long way into each track, make sure that you use a disc with long track.

## Products with which the player cannot be used

This player does not work with the following products:

DEX-M300	DPX-M200WC
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This player does not work with the following products:

DEX-M300	DEX-M300SDK
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## Error Mode

If an error occurs—for example, if the CD player will not work or if it stops while playing—“ERROR” followed by an error number appears on the CD controller display. The error number indicates the cause of the error; check the items listed below.

- Some multi-CD controllers display only “ERROR”, without the error number; in this case, check items 11, 14, 30 and 80 below.

### Multi-CD controller display example

E-11      Err-11      ERR-11      ERROR-11

Error No.	Cause	Treatment
11, 12	Dirt or a scratch on the disc stops the laser beam from being able to focus.	Wipe off the dirt. Exchange the disc if it has been scratched.
	The disc has been inserted upside down.	Confirm that the disc has been inserted right side up.
14	The disc has been inserted upside down.	Confirm that the disc has been inserted right side up.
	An unrecorded compact disc (CD-R), which can be recorded on once is being used.	When you use a CD-R, load one that has been recorded on.
30	Dirt or a scratch on the disc hinders the track number search function.	Wipe the dirt off the disc. Exchange the disc if it is scratched.
80	There is no disc in the magazine.	Load a disc into the magazine.
A0, 10, 12, 50, 60, 70	Electrical or mechanical system fault.	See Note (*).

\* Turn the car ignition switch off and on again, or press the source switch on the multi-CD controller to set CD playback again.

# Service Manual

ORDER NO.  
CRT1518

CD MECHANISM UNIT

# CX-612

## CX-613

**NOTE**

- This service manual describes operation of the CD mechanism incorporated in models listed in the table below.
- When performing repairs use this manual together with the specific manual for the model under repair.

Model	Service Manual	CD Mechanism Unit	
CDX-M12/UC,EW	CRT1521	CXK2700	CX-612
CDX-M6/UC,EW	CRT1522	CXK2750	CX-613



# 1. DISASSEMBLY

● CN351

Before disconnecting the connector CN351 (connector to the PU unit), install short pins as shown.

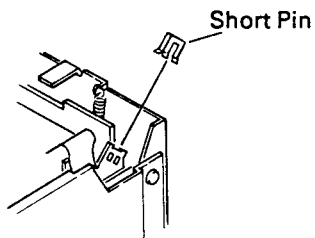


Fig. 1

● How to Remove the PU Unit

1. Disconnect the connector and detach the P.C. Board. (Fig. 2)
2. Raise the spring and hook it over the projection. (Fig. 2)
3. Remove the screw and detach the spring. (Fig. 2)
4. Remove the PU unit. (Fig. 2)

Note: When assembling the PU unit, place the PU unit as shown. (Fig. 2)

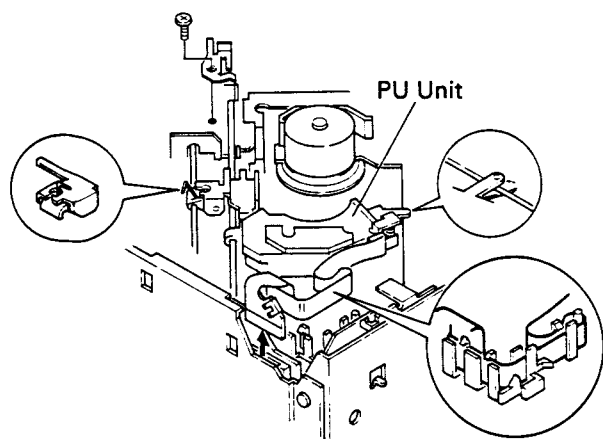


Fig. 2

● How to Remove the Spindle Motor

5. Detach the washer and remove the spring. (Fig. 3)
6. Remove the clamber arm assy while slipping it off. (Fig. 3)
7. Turn the main body over.
8. Remove screw A and detach the P.C. Board. (Fig. 3)
9. Remove two screws B and detach the spindle motor. (Fig. 3)

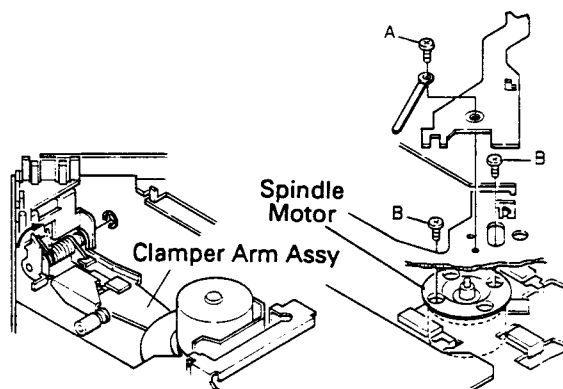


Fig. 3

● How to Remove the Carriage Assy

1. By moving the elevation on the back, make alignment so two screws A are visible through two holes on the front. Remove two screws A. (The elevation can be operated when the stage mechanism part (going up and down) is put in the state of tray return completion.) (Fig. 4 and 5)

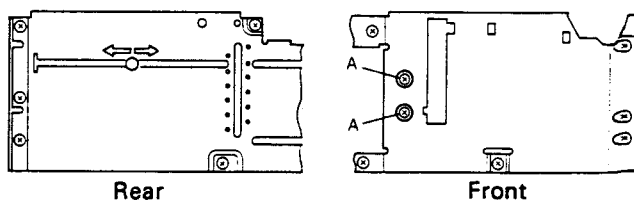


Fig. 4

2. Remove four screws B seven screws C and detach the frame. (Fig. 5)
3. Remove screw D and detach the P.C. Board. (Fig. 5)
4. Disconnect the connector and detach the P.C. Board. (Fig. 5)

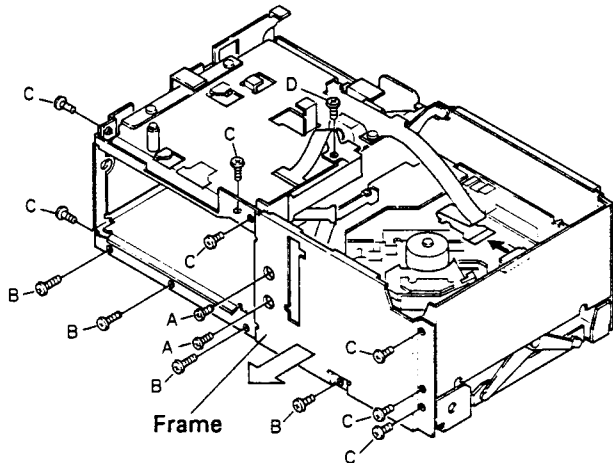


Fig. 5

9. Remove four springs A (silver) and two springs B (black). (Fig. 7)

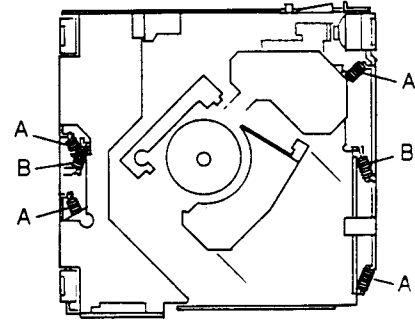


Fig. 7

5. Remove the washer. (Fig. 6)
6. Remove four screws A and detach the upper frame unit. (Fig. 6)
7. Remove screw B. (Fig. 6)
8. Disconnect the connector in two places and detach the P.C. Board. (Fig. 6)

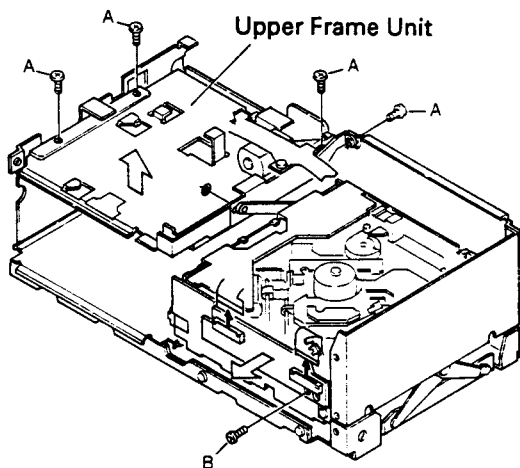


Fig. 6

10. Lower the carriage assy to the lowest position by moving the elevation on the back.
11. Detach the washer and remove the gear. (Fig. 8)
12. Turn the mode ring unit as far as possible in the direction of the arrow. (Fig. 8)

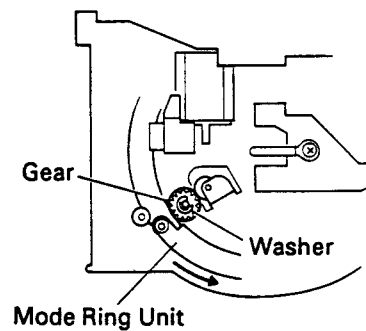


Fig. 8

- 13. Disconnect the connector and detach the P.C. Board. (Fig. 9)
- 14. Remove four screws and detach the damper assy. (Fig. 9)

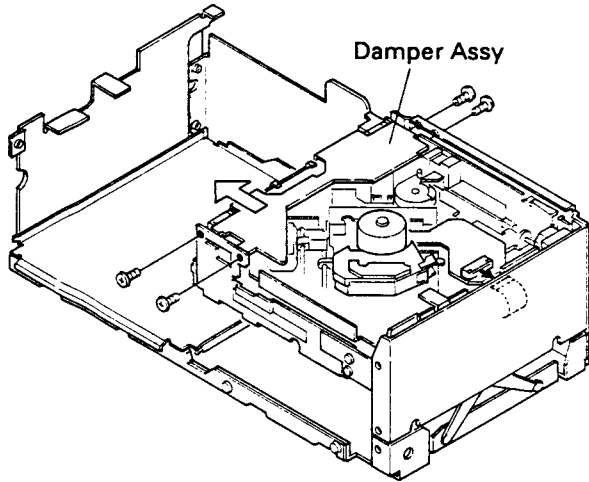


Fig. 9

- How to Remove the Carriage Motor
- 16. Remove two screws and detach the carriage motor. (Fig. 11)

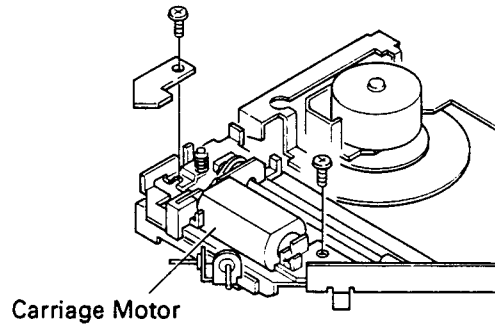


Fig. 11

- 15. Remove the carriage assy. (Fig. 10)

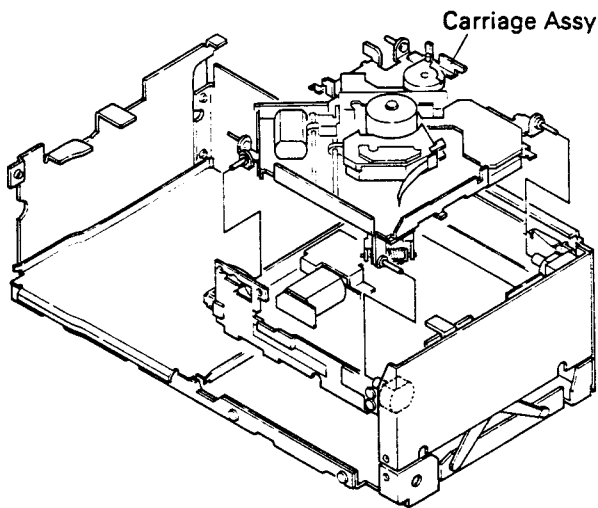


Fig. 10

- How to Remove the Magazine Holder Unit
- 17. Remove four screws and detach the magazine holder unit. (Fig. 12)

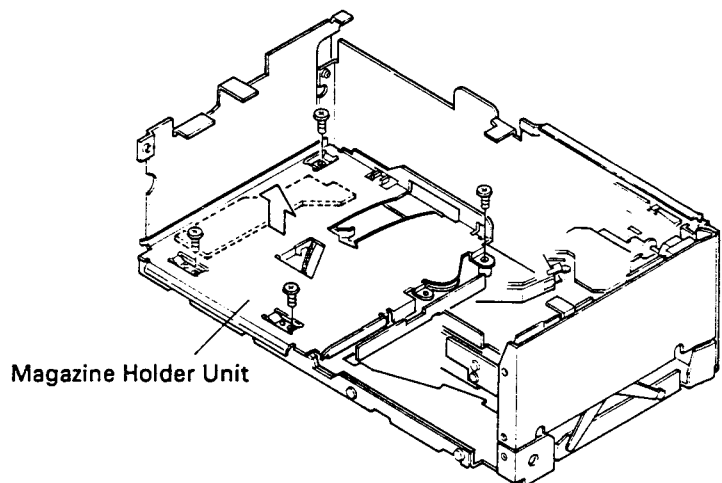


Fig. 12

**● How to Remove the Cover**

1. Detach the detent and remove the cover. (Fig. 13)

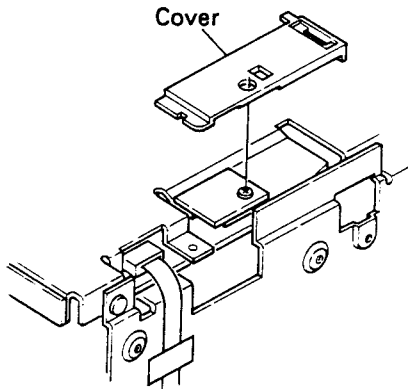


Fig. 13

**● How to Remove the Loading Motor**

1. Remove two screws and detach the loading motor. (Fig. 15)

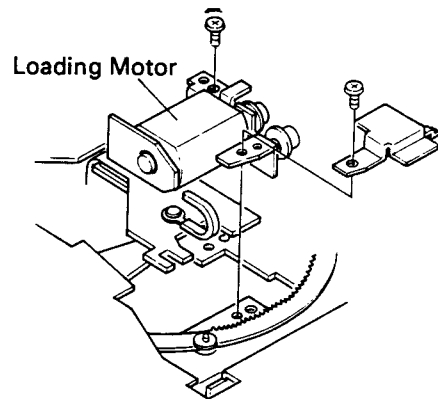


Fig. 15

**● How to Remove the Elevation Motor**

1. Remove three screws and detach the elevation motor. (Fig. 14)

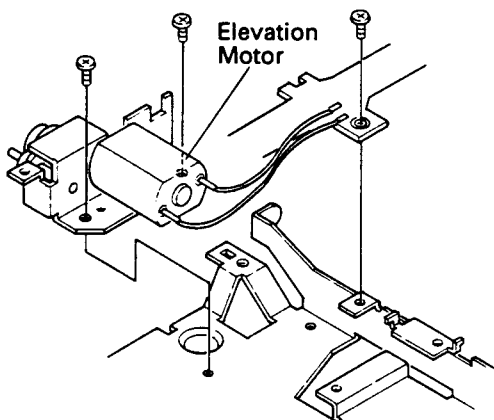


Fig. 14

**● How to Assemble the Magazine Holder Unit**

1. Move the elevation on the back in the direction of the arrow. (Fig. 16)
2. Install the magazine holder unit with four screws. (Fig. 16)

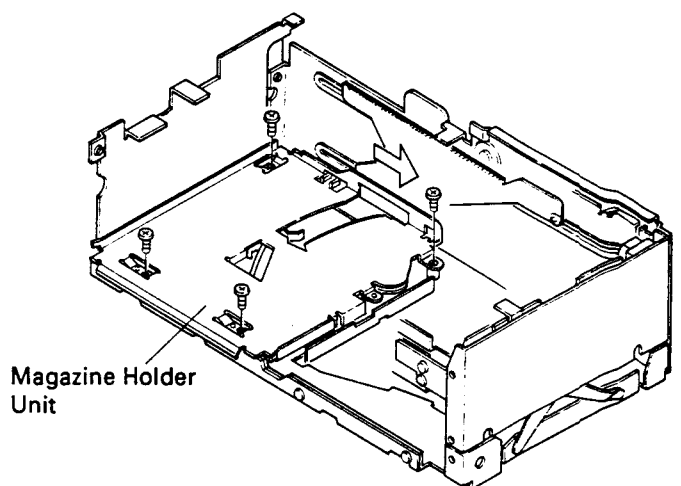


Fig. 16

● **How to Assemble the Carriage Assy**

1. Make the carriage assy pass the dampers in two places. As shown in the section A in the figure, make the carriage assy pass between two shafts. As shown in the section B in the figure, make the carriage assy pass under the arm. (Fig. 17)
2. Put the two dampers of the damper assy, through the carriage assy. (Fig. 17)
3. Install the damper assy with four screws. (Fig. 17)

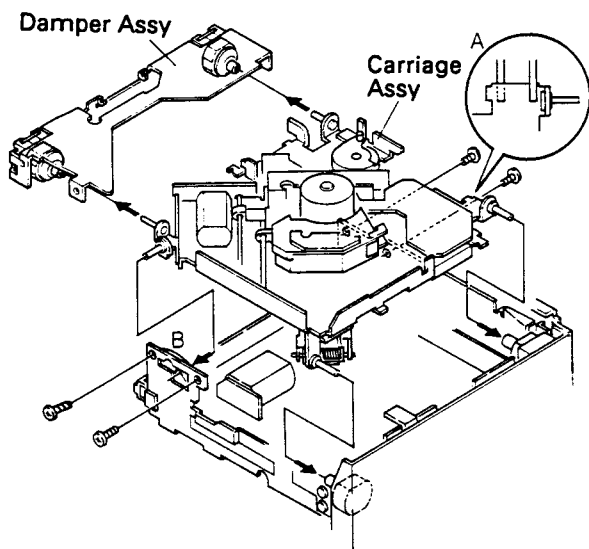


Fig. 17

4. Install the P.C. Board on the connector. (Fig. 9)
5. Turn the mode ring unit as far as possible in the direction reverse to the arrow. (Fig. 8)
6. Install the gear and put the washer in place. (Fig. 8)
7. Install four springs A (silver) and two springs B (black). (Fig. 7)
8. Install the two connectors of the P.C. Board on the P.C. Board. (Fig. 6)
9. Install screw B. (Fig. 6)
10. Install the shaft of the elevation motor in the hole of the frame unit.
11. Install the upper frame unit with four screws A. (Fig. 6)
12. Put the washer in place. (Fig. 6)
13. Install the P.C. Board on the connector. (Fig. 5)
14. Fix the P.C. Board with screw D. (Fig. 5)

15. By moving the elevation, adjust the position to the sixth step from the top as shown in section A in the figure. (CX-612) (Fig. 18)  
By moving the elevation, adjust the position to the highest step. (CX-613) (Fig. 18)
16. Install the frame with two screws A, four screws B and seven screws C. (Fig. 18)

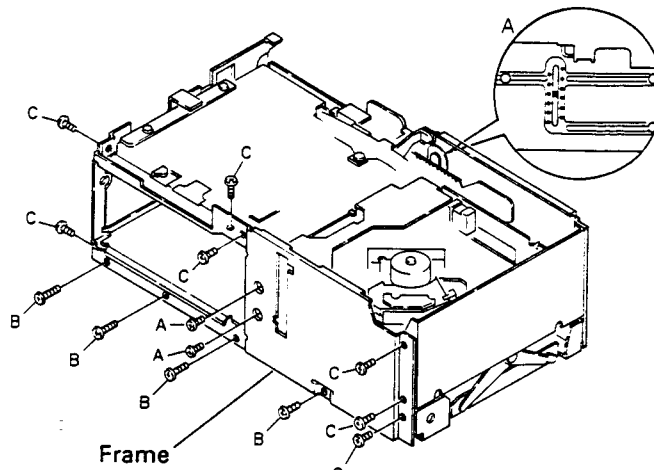


Fig. 18

● **Greasing**

1. After the unit is assembled, apply grease (C paste) to the shaft indicated by the arrow. (Fig. 19)

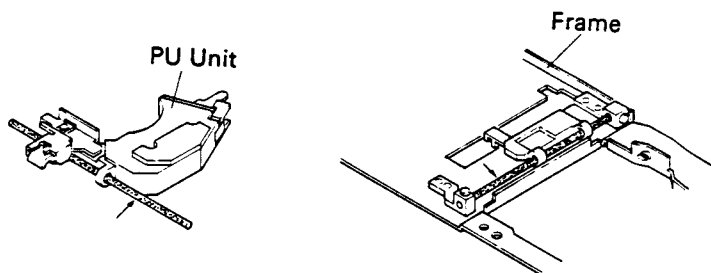


Fig. 19

Note: For alignment of gear positions when the components are assembled, refer to 3. Gear Position Alignment on page 20.

## 2. GENERAL DESCRIPTION OF MECHANISM

### 2.1 INSERTION OF MAGAZINE

- ① When a magazine is inserted against the force of a spring of the EJECT arm, the magazine lock lever is released from the restraint by the cam of the EJECT arm just before the magazine lock position and moves toward the locking direction by the spring force.

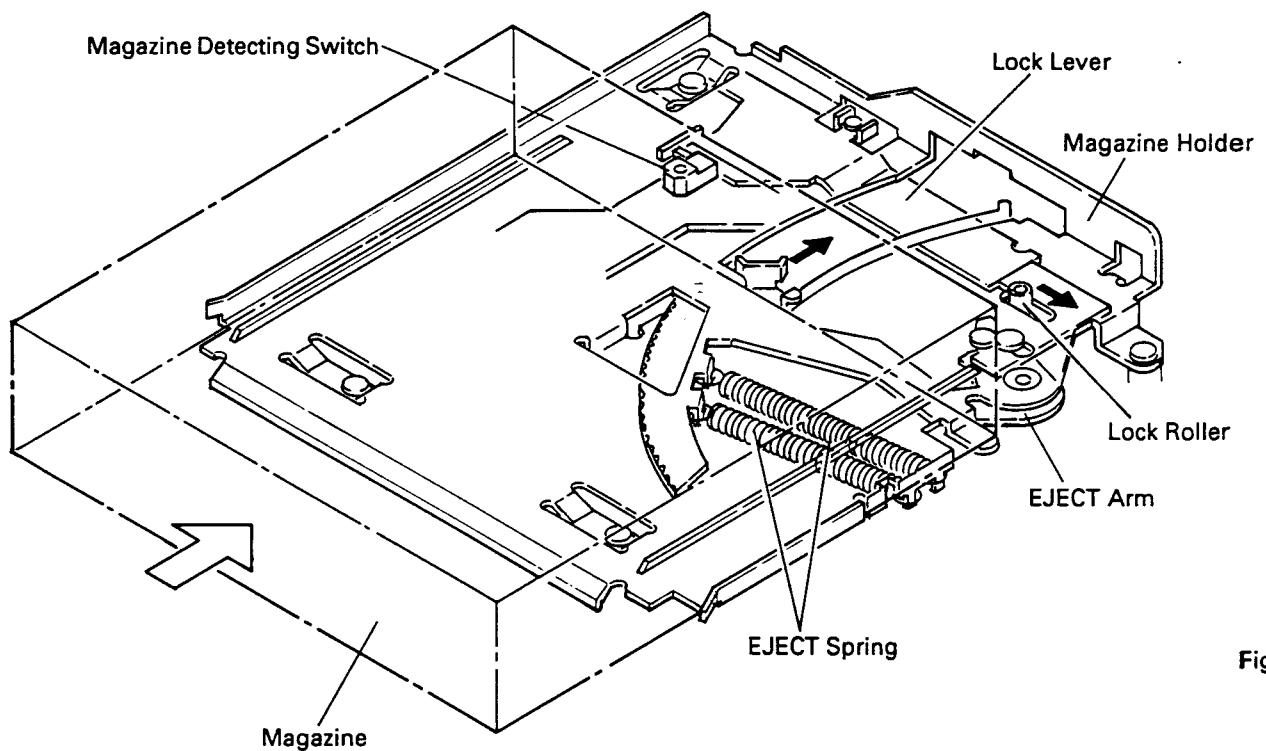


Fig. 20

- ② When a magazine is inserted up to the lock position, the lock roller is put into the lock groove to lock the magazine, and at the same time, the lock lever turns the magazine detecting switch ON.

## 2.2 DISC CLAMPING OPERATION

- ① As the rotation of the tray motor makes the mode ring rotate, the intermittent gear for taking out a tray is rotated first. The tray taking-out arm is turned by this gear to draw out a tray.

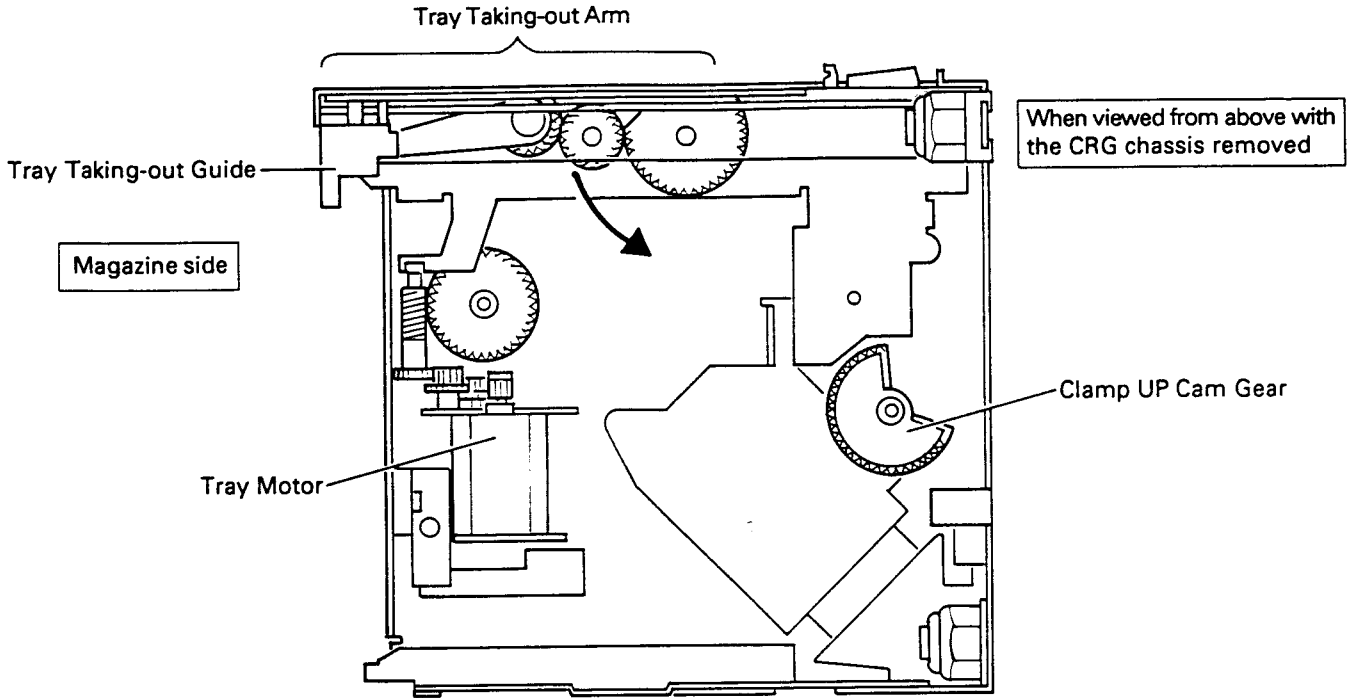


Fig. 21

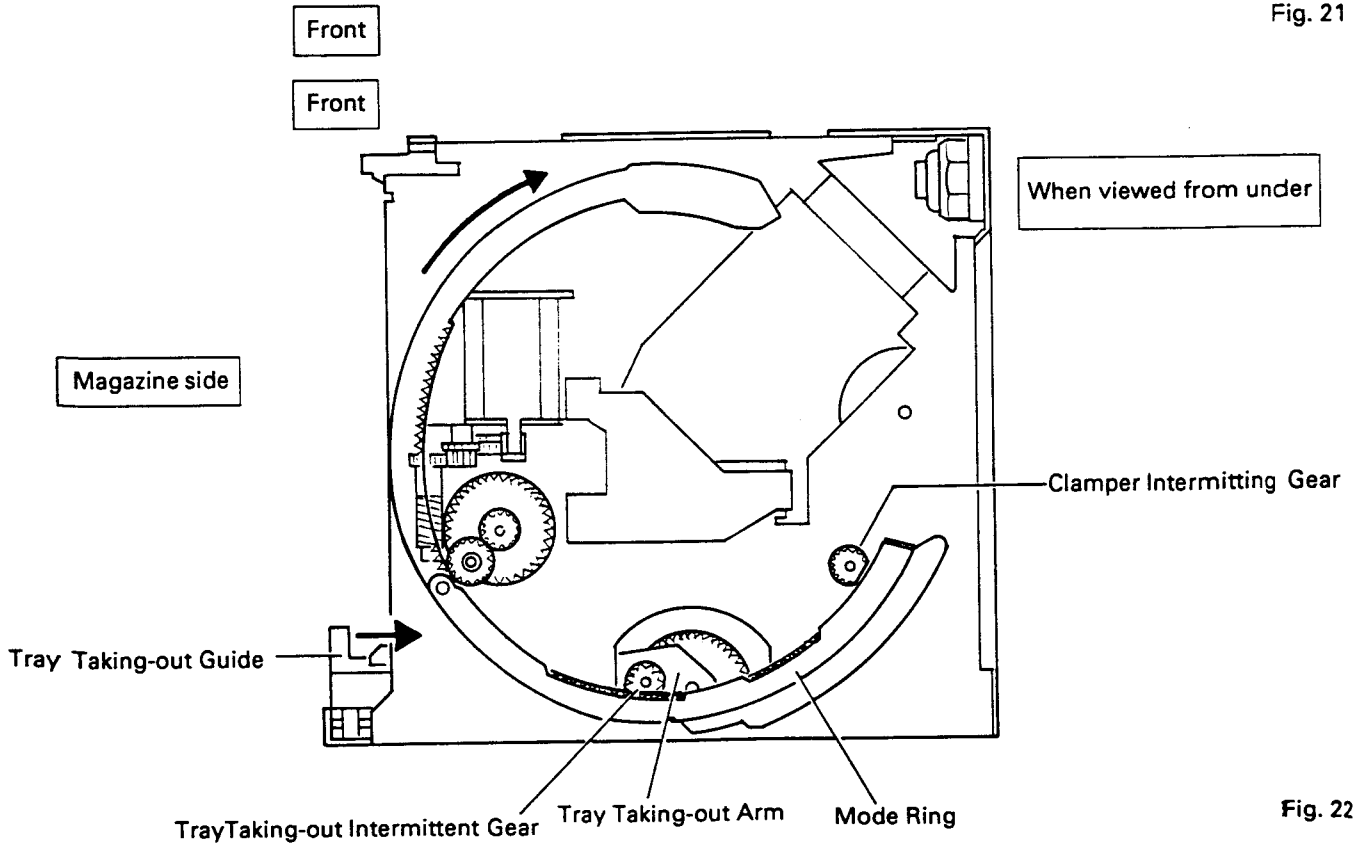


Fig. 22

② When a tray is drawn out completely by 180° turn of the tray taking-out arm, the clamber intermittent gear is rotated next. The clamp UP cam gear is turned by this gear and the clamber arm worked by the force of a spring rises.

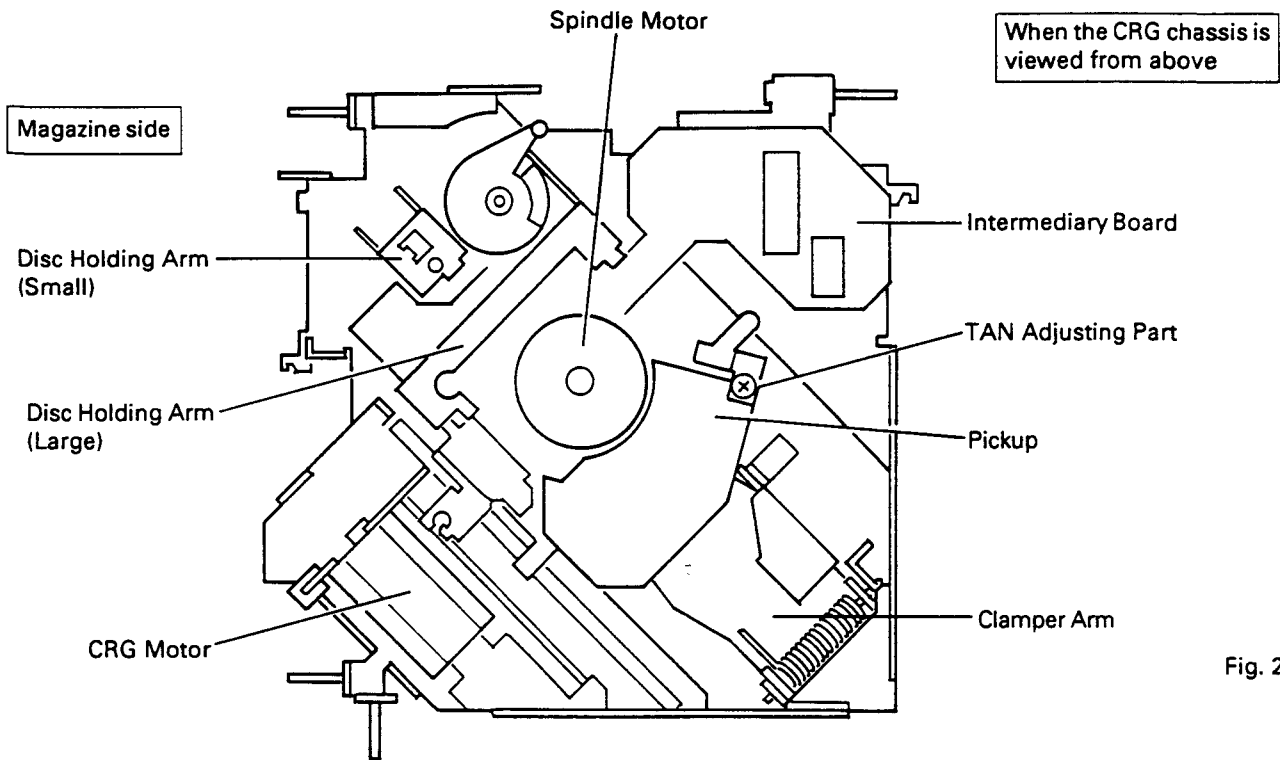


Fig. 23

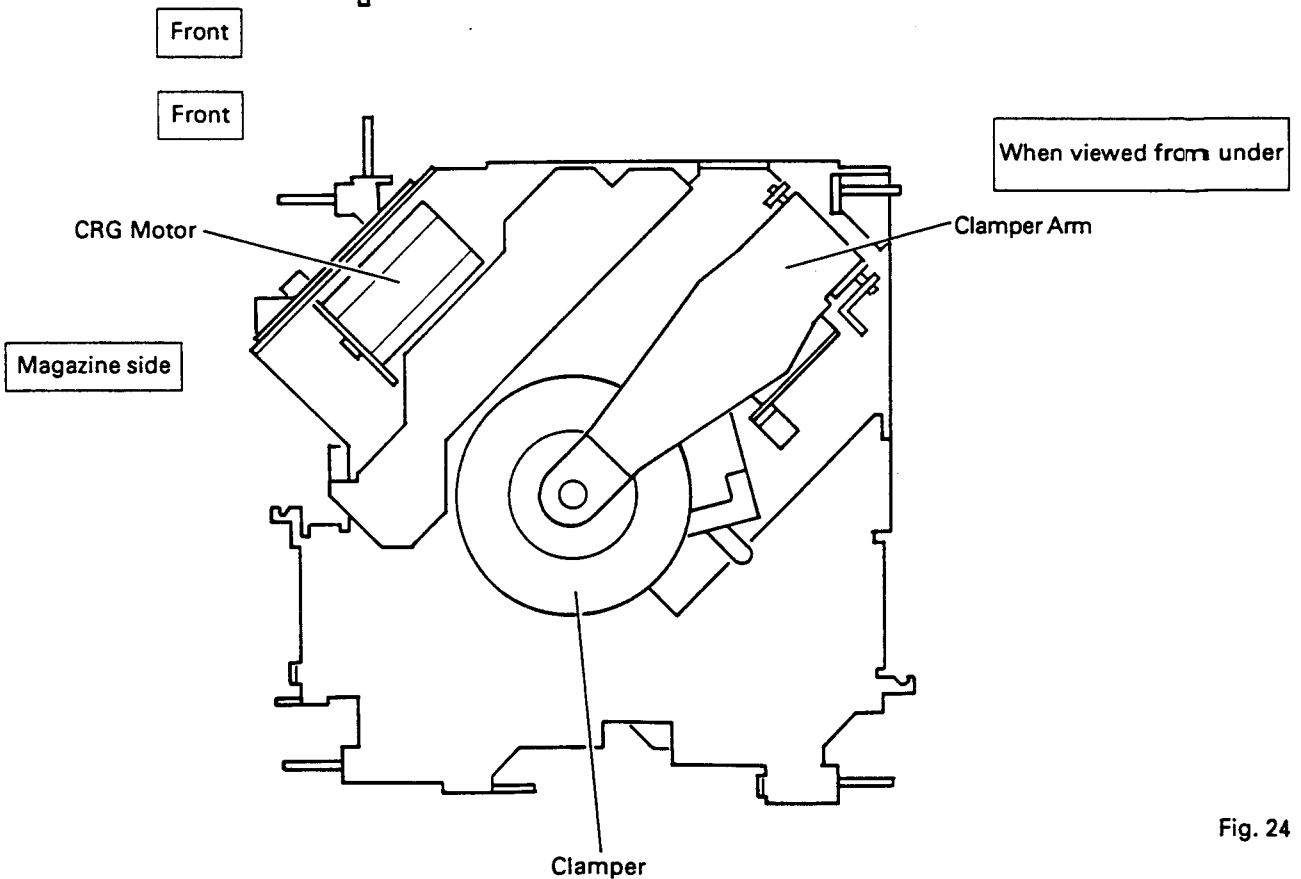


Fig. 24



②' In the case of 8-cm Disc trays, at the end of the tray drawing-out action, the disc holding detent is released.

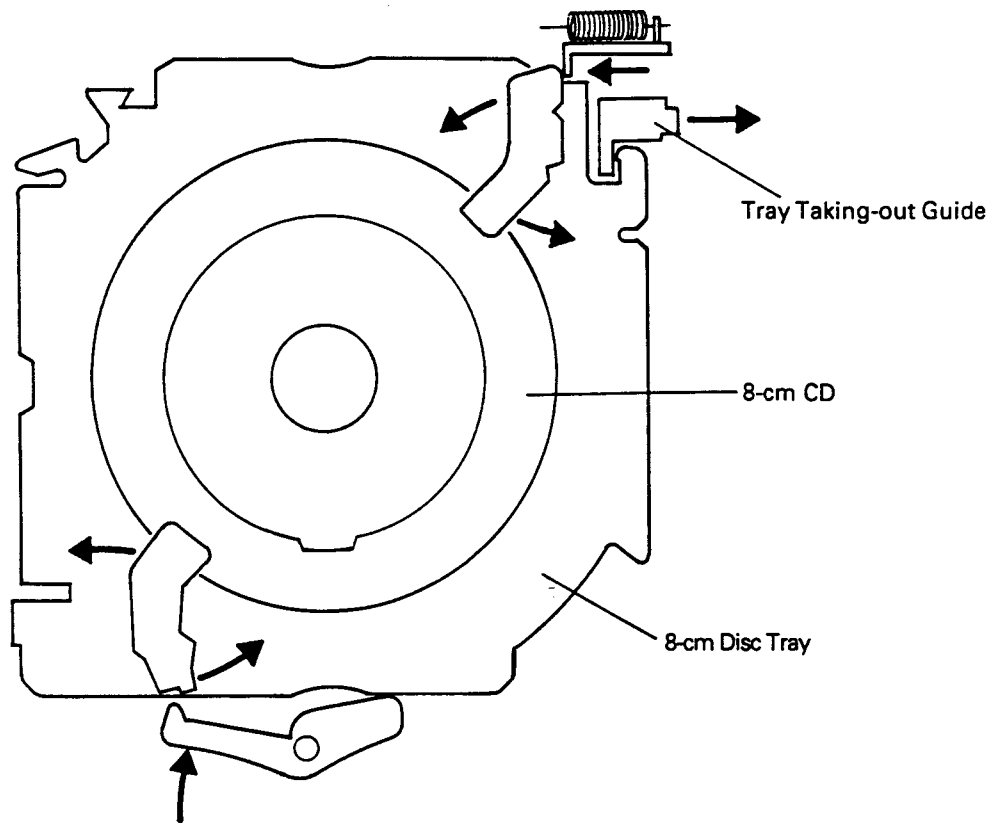


Fig. 25

③ In a disc clamping operation, the large and small disc holding arms (made of leaf springs) coated with sheet will move so as to put a disc between itself and the clamper.

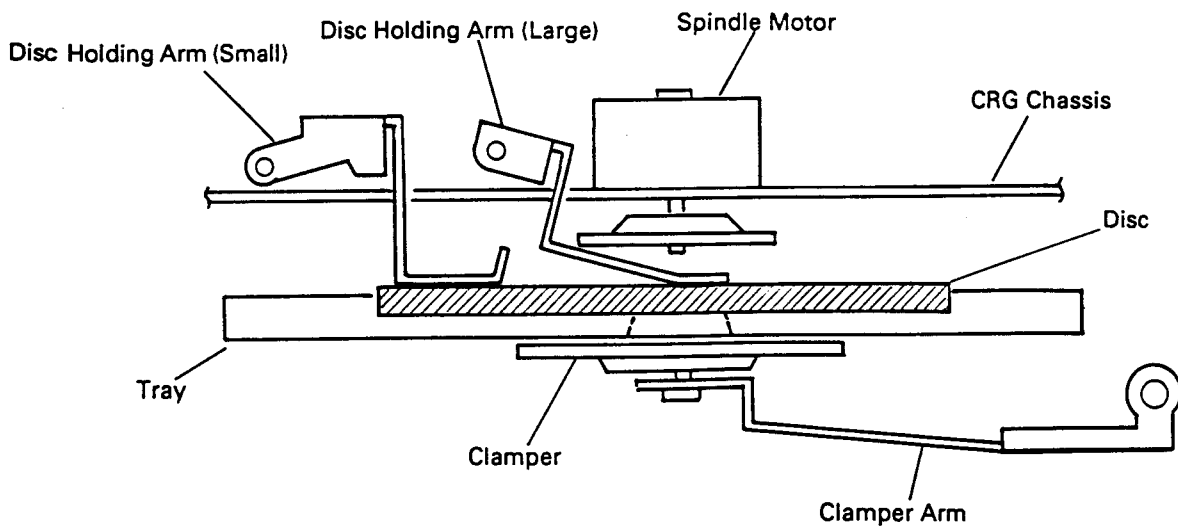


Fig. 26

Rotation of the mode ring draws the link and makes the steering R slide. As the steering R slides, the CRG lock guide placed on it causes the disk holding arm UP cam to rotate. The movement of the disc holding arms is controlled by this cam.

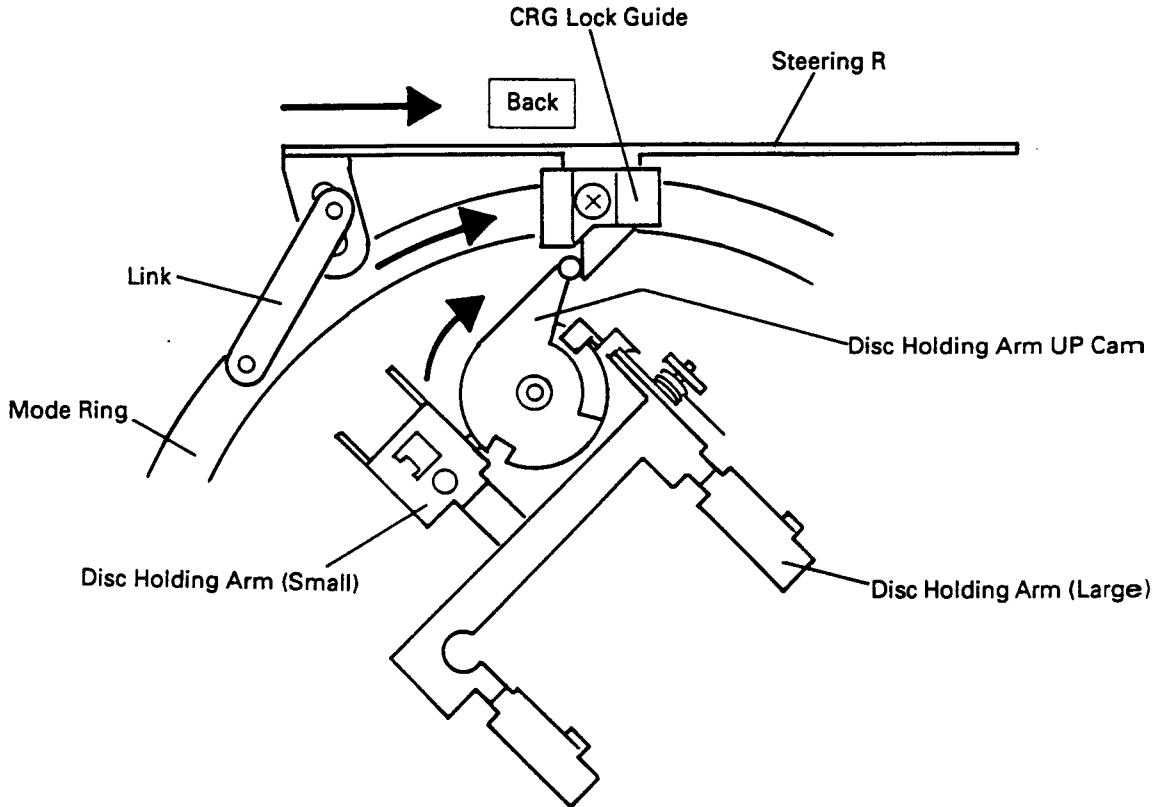


Fig. 27

### 2.3 RELEASE OF THE CRG CHASSIS LOCK

- ① After the clamping operation ends, the tray motor is still rotated, drawing the link and making the steering R slide. When the steering R slides further, the lock located in the innermost recess of the CRG chassis is released.

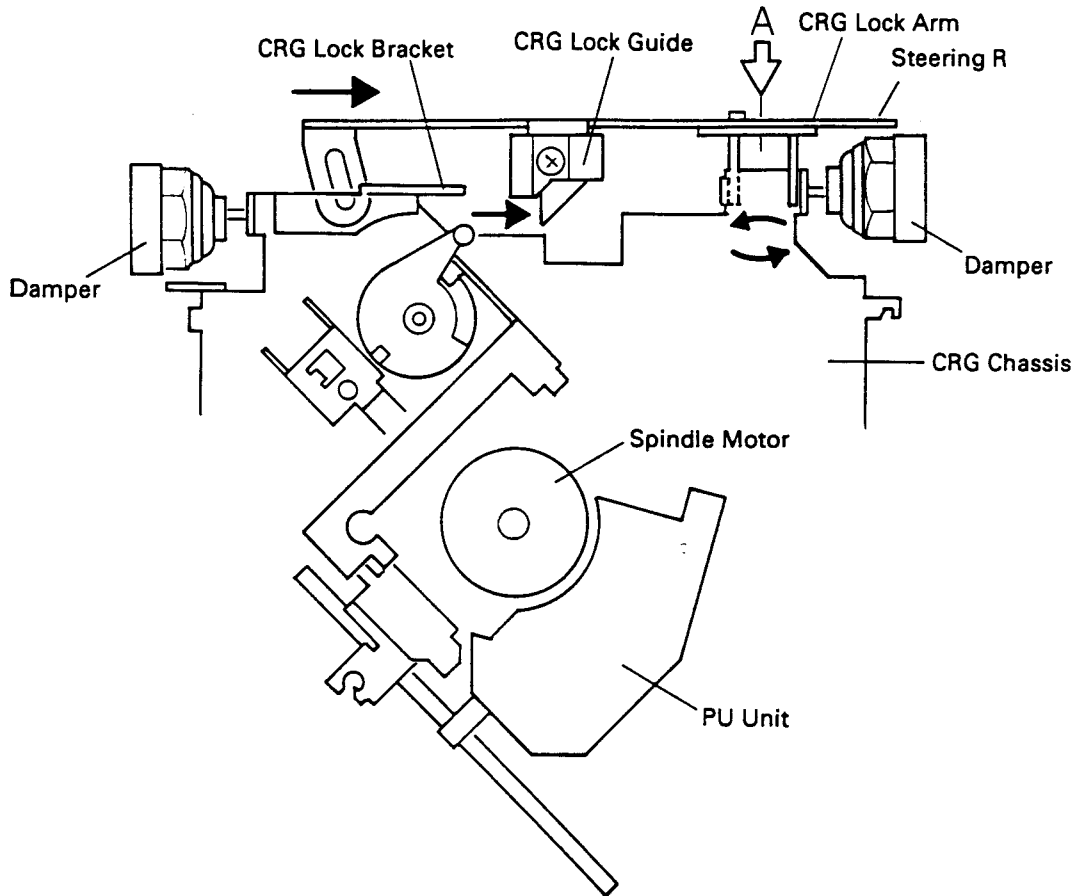


Fig. 28

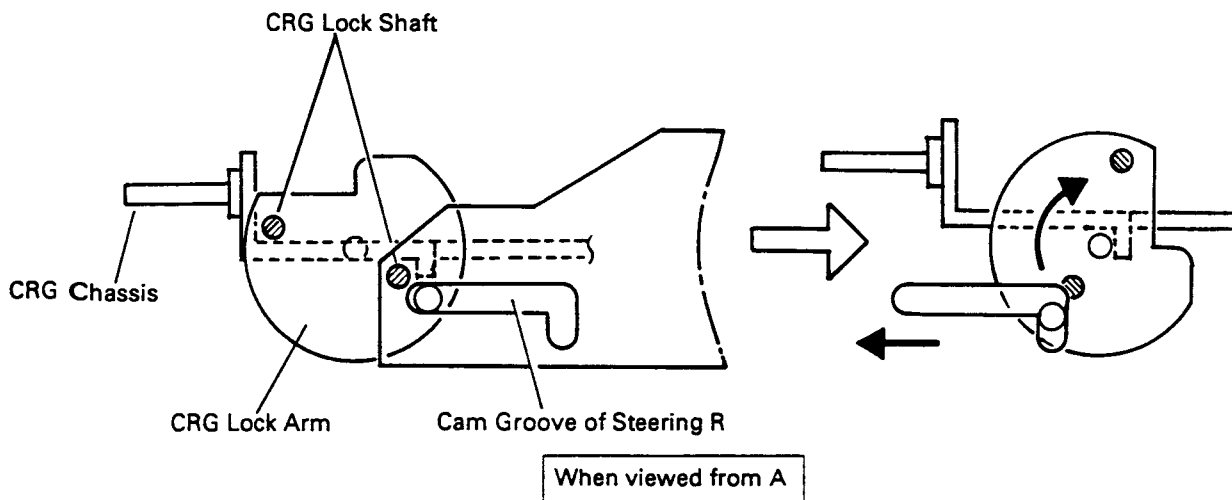


Fig. 29

When the CRG lock guide is dismantled from the CRG lock bracket, the restraints are released in two directions: up and down; and back and forth. Also, as the CRG lock arm is rotated, the CRG chassis is put out of the pinched state. This releases the restraints in two directions: right and left; and up and down.

①' In almost the same manner as ①, the arm (usually called dog arm) is rotated by the shaft located near the edge of the mode ring. As the CRG lock arm ② is rotated by the groove at the other end of the dog arm, the locks on the front side are released. (The restraints are released in two directions: up and down; and right and left.)

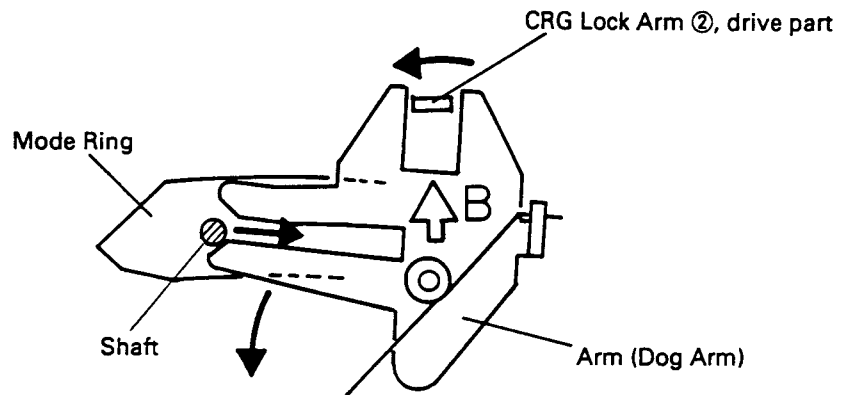


Fig. 30

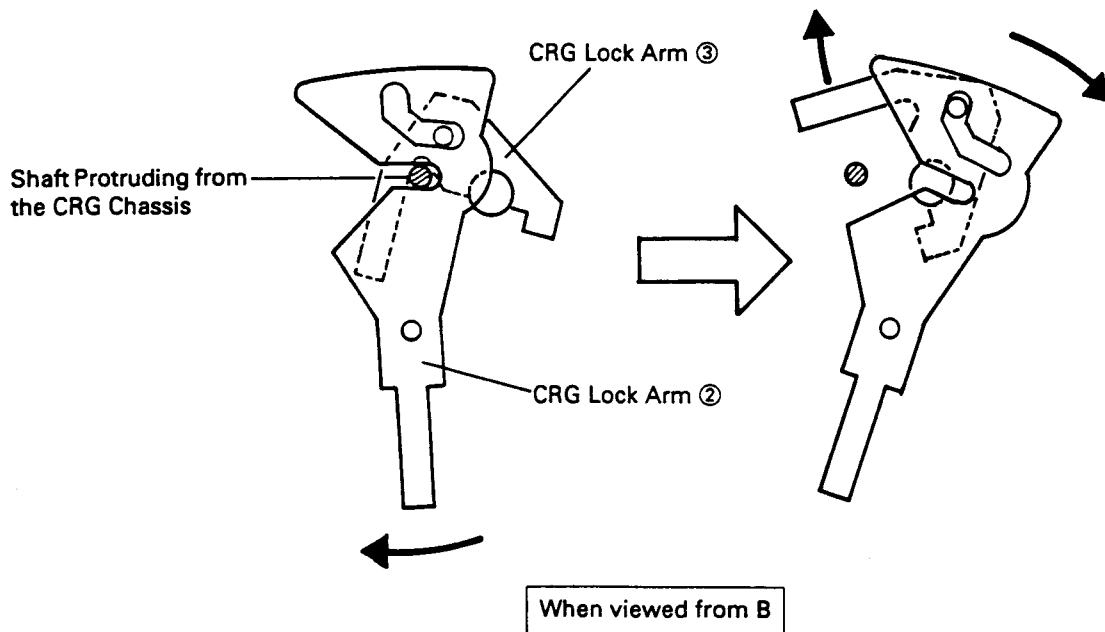


Fig. 31

By the actions ① and ①', the locks set on the CRG mechanical parts are released and the CRG is put in the floating state that can make the CRG vibration-proof.

- ② When the rotation of the mode ring is completed, the clamp UP cam gear described under 2.2-① is rotated additionally. Also, the CRG restraining arm is rotated on the end face of the mode ring. This arm keeps the attitude of the CRG mechanism by controlling the vibration-proof strokes during a disc clamping operation. In this way, the operation of the vibration-proof strokes of the CRG mechanism is ensured.

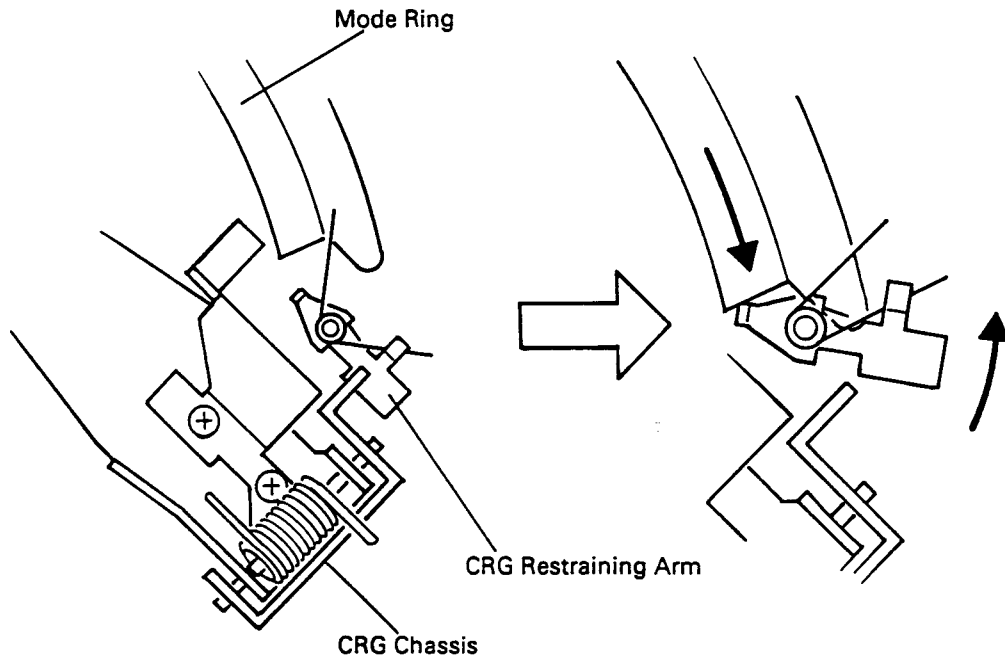
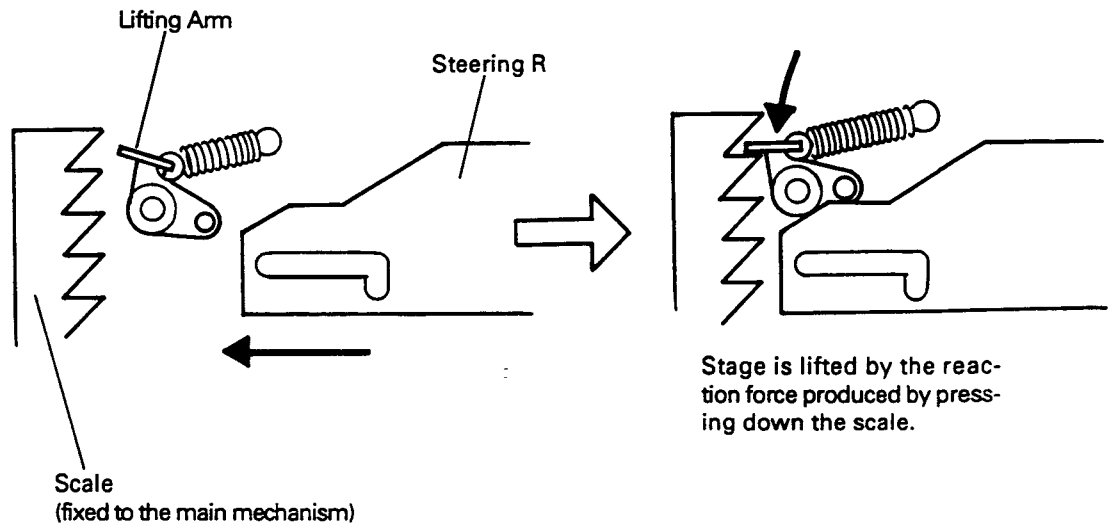


Fig. 32

## 2.4 STAGE LOCK

Immediately before the rotation of the mode ring stops, the stage lifting arm begins to be rotated by the cam of the steering R. When the stage lifting arm reaches the scale provided in the main mechanism part, the stage mechanism is lifted by pushing the scale. The looseness of the elevation mechanism is eliminated and the vibration resistance is increased.



When viewed from A shown under 2.3-①

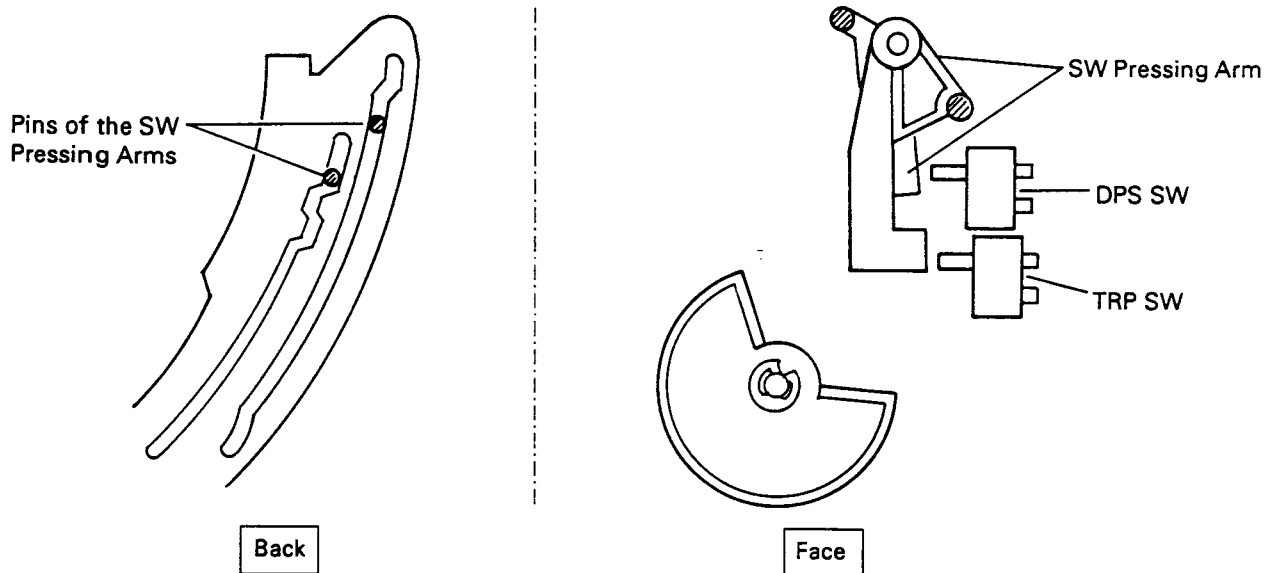
Fig. 33

## 2.5 PLAY ENABLE STATE → STORING A TRAY IN PLACE

Basically, the operations 2.2 to 2.4 reverses.

## 2.6 DETECTION OF DISCS AND DETECTION OF COMPLETION OF TAKING OUT AND RETURNING A TRAY

- ① A series of movement is controlled by the action of the mode ring. Besides, a TRP switch, controlled by the cam hole of the mode ring, is activated at start and end of movement. This switch detects the completion of returning a tray and if the mechanism is put in the PLAY enable state.
- ② Whether or not a disc is placed in a tray and whether a disc size is 8 cm or 12 cm are detected by the photo sensor located at lower left on the face. The detection timing depends on turning ON or OFF of a DSP switch that is controlled by the cam hole of the mode ring during a tray taking-out operation.



**Photo Sensor**  
 (The photo Tr. is located on the stage mechanism side, and the LED is located on the CRG mechanism side. A tray containing a disc travels across them.)

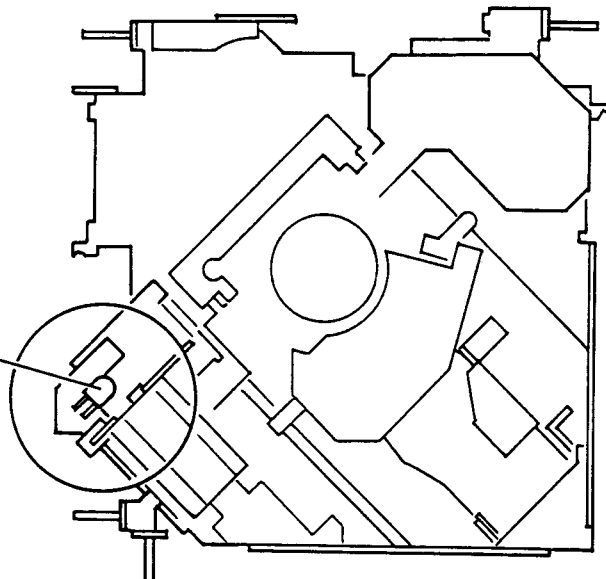


Fig. 34

## 2.7 OPERATION OF ELEVATION

- ① The steering, located in the innermost recess of the chassis, slides by the driving force of the elevation motor. The stage mechanism part is put in the motion of elevation when the shaft protruding from the stage mechanism part is engaged with the steps-like hole of the steering. 3 sets of pantographs and one guide shaft are provided to keep the attitude. Furthermore, in order to mitigate the difference in load caused by gravity during rise and fall, the pantograph on the magazine side is equipped with a spring for cancelling gravity.

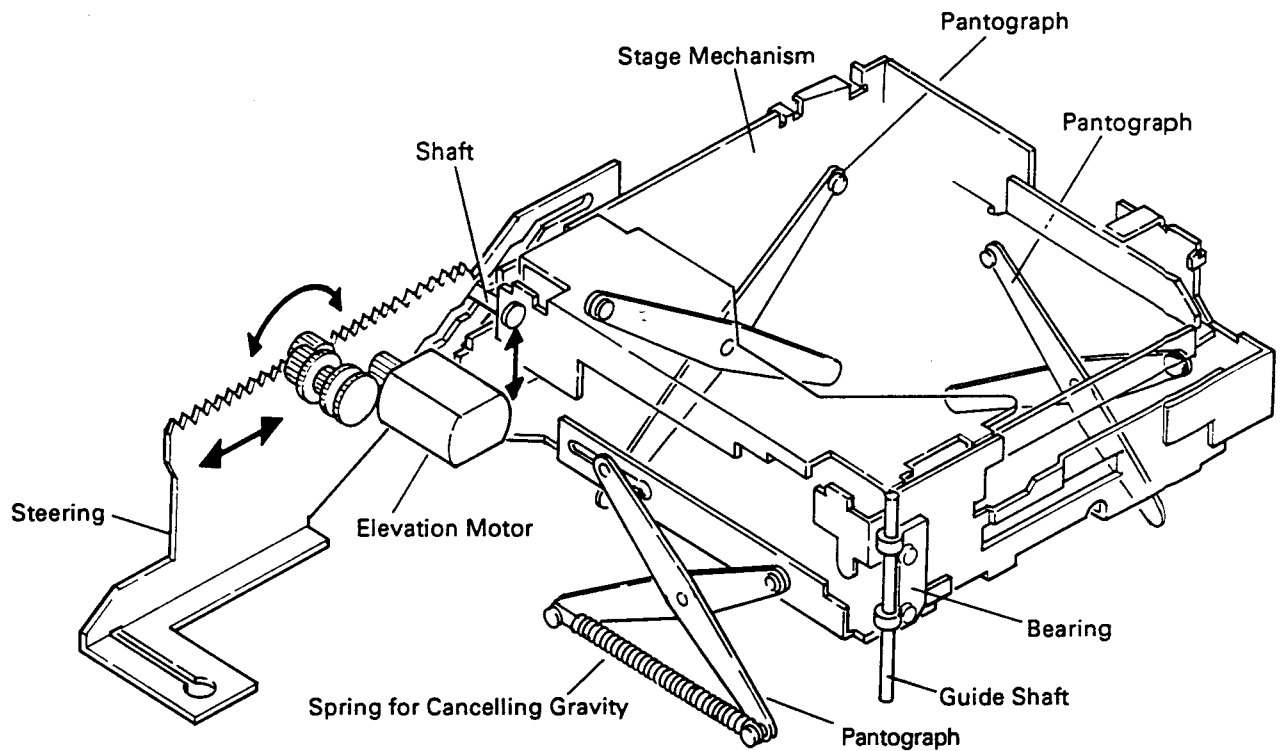


Fig. 35



**2.8 DETECTION OF ELEVATION**

- ① As the steering slides, the elevation detecting arm is turned around the oblong hole. The elevation detecting arm has holes in places corresponding to the straight sections of the steps-like hole of the steering. The photo sensor (photo Tr & LED) will detect these holes.

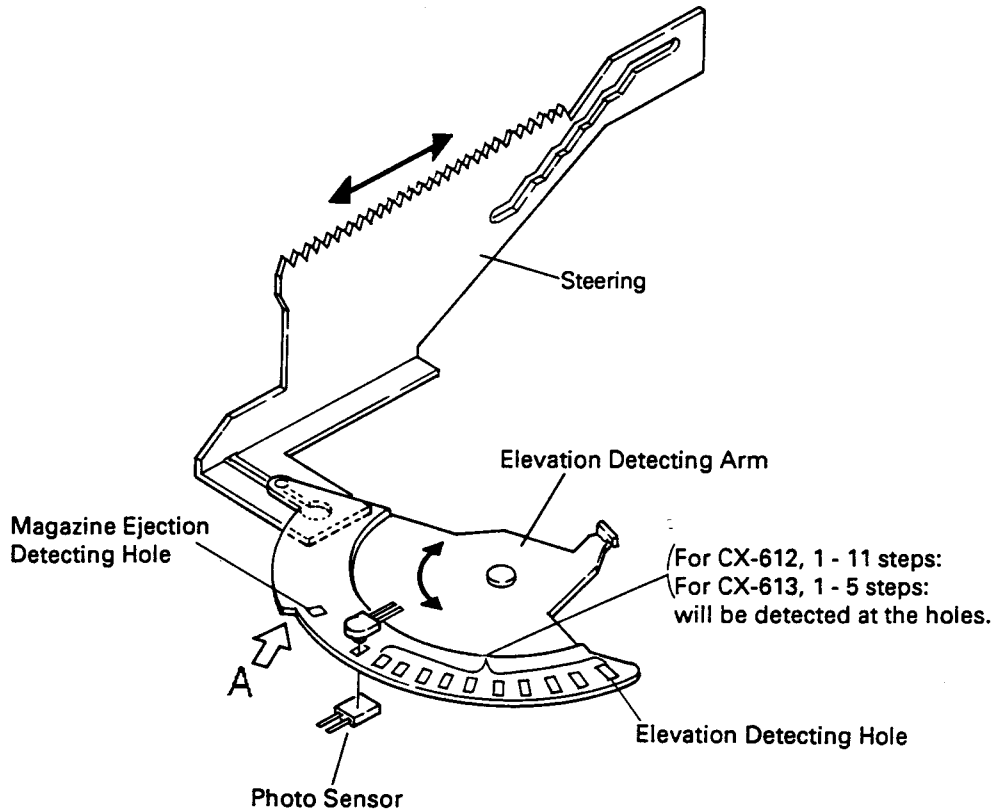


Fig. 36

- ② At the highest step elevation, detection is carried out by turning ON the elevation reset switch. When the steering is moved further, the position of a hole of the elevation detecting arm is detected by the photo sensor as the position of magazine ejection. (Description about ejection will be described on the following page.)

The mechanism is reset when the elevation reset switch is turned ON.

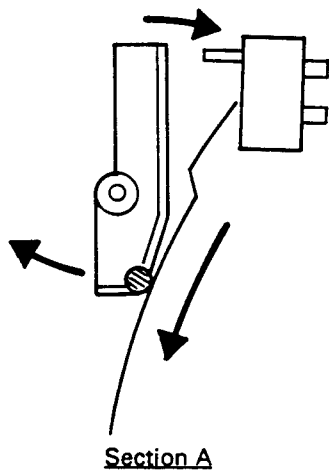


Fig. 37

## 2.9 UNLOADING OF MAGAZINE

- ① When the steering is moved further from where the highest-step elevation is detected, bending of the steering pushes the bending portion of the lock lever described under 2.1-① to slide the lock lever until the lock of a magazine is released. A magazine is unloaded from the EJECT arm.

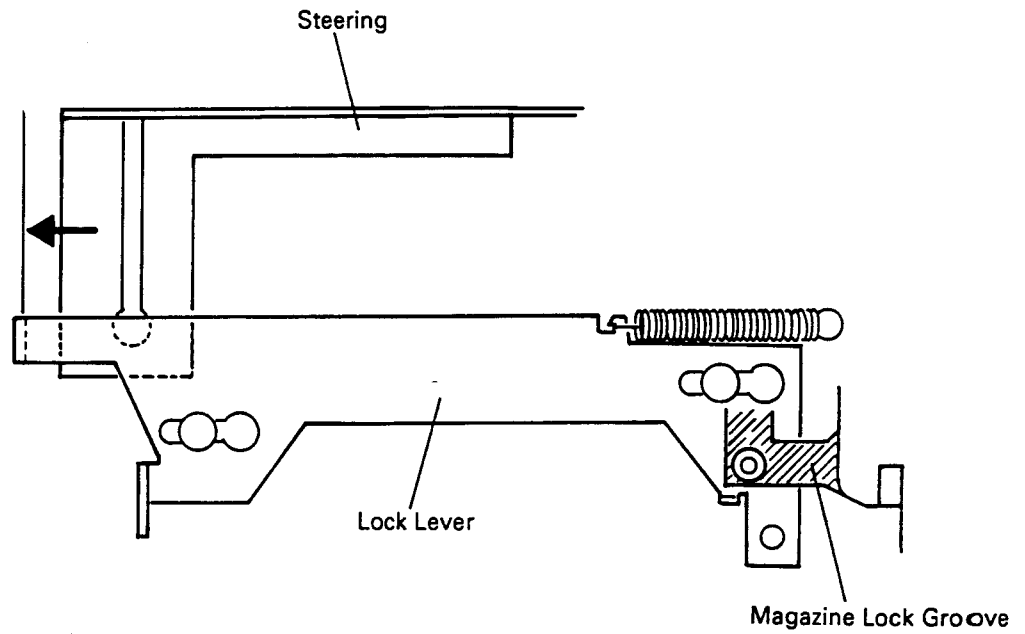


Fig. 38

### 3. GEAR POSITION ALIGNMENT

#### 3.1 TRAY TAKING-OUT ARM SECTION

a) Tray taking-out arm to tray taking-out gear

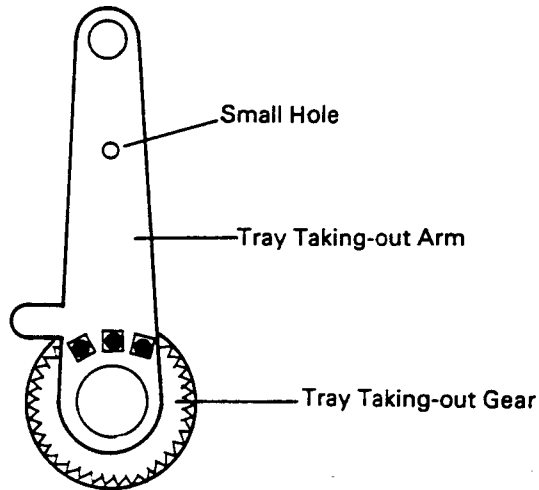


Fig. 39

When the mechanism is viewed from above, 3 bosses are put in the hole of the arm as shown above.

b) Tray taking-out gear to tray taking-out intermediate gear

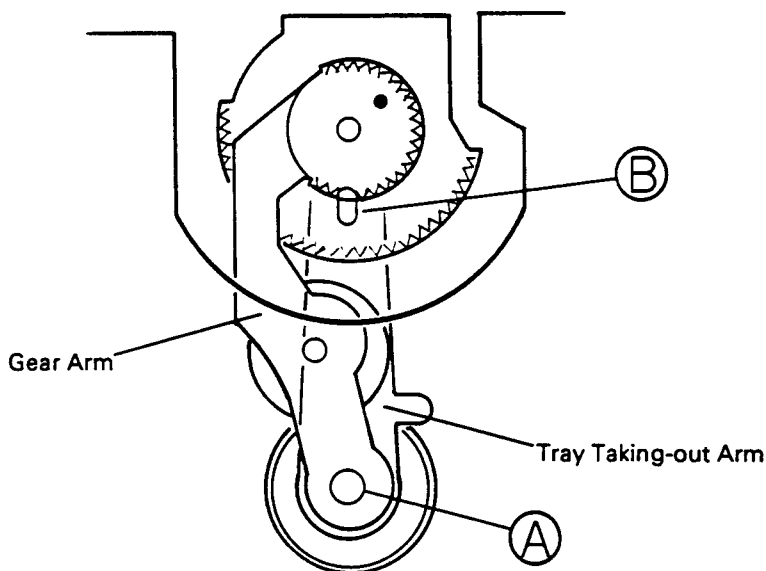


Fig. 40

They should be assembled in such a manner that : when the end of the gear arm is moved to the center of hole ④ of the stage, the small hole (shown in the figure 39) may be visible from the hole ⑤ of the stage.

\* Because gear backlash should be taken into consideration, bring the tray taking-out arm snugly to either side with the gear arm fixed and see if the small hole is visible at the center of each position.

c) Gear arm to intermittent gear

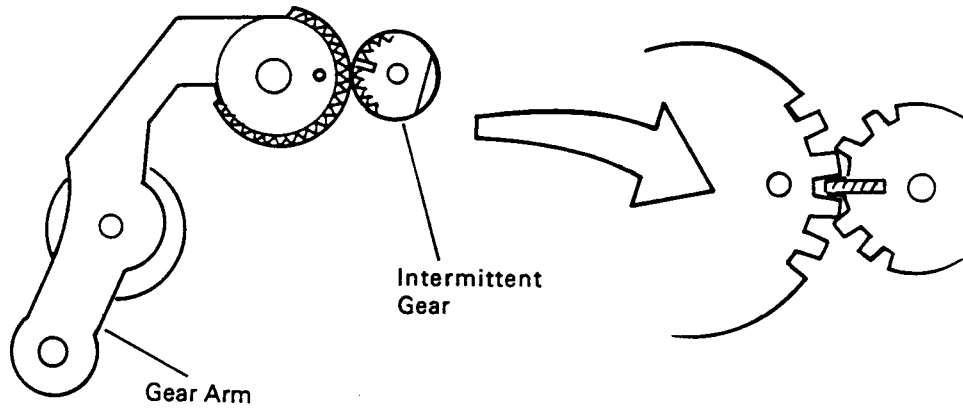


Fig. 41

They should be assembled in such a manner that: the bottom having a mark (hole) of the gear arm meshes with the tip having a mark (concave) of the intermittent gear.

d) Intermittent gear to mode ring

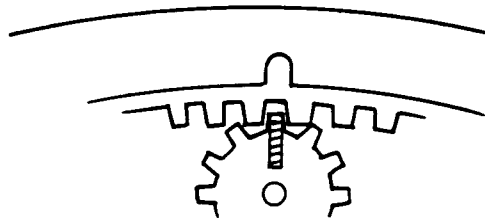


Fig. 42

They should be assembled in such a manner that: the bottom having a mark (U-shape notch) of the mode ring meshes with the tip having a mark (concave) of the intermittent gear.

### 3.2 CLAMP UP CAM GEAR

a) Clamp UP cam gear to clamp UP idler gear.

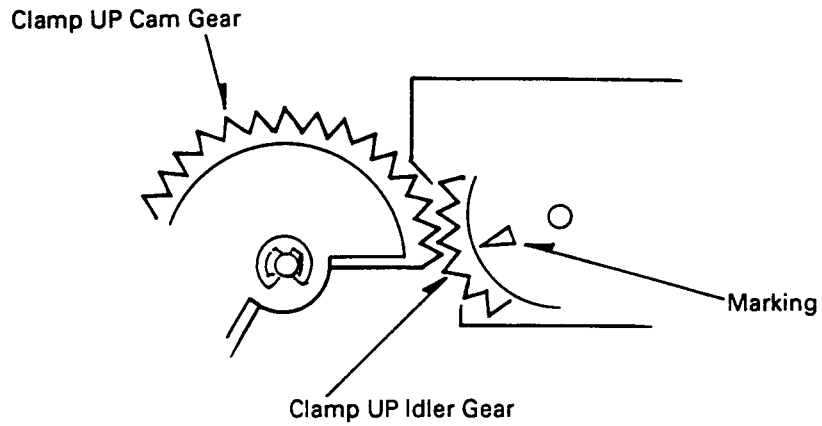


Fig. 43

They should be assembled so the first tooth of the clamp UP cam gear is aligned with the marking of the clamp UP idler gear.

b) Mode ring to stage chassis; clamp UP cam gear to stage chassis

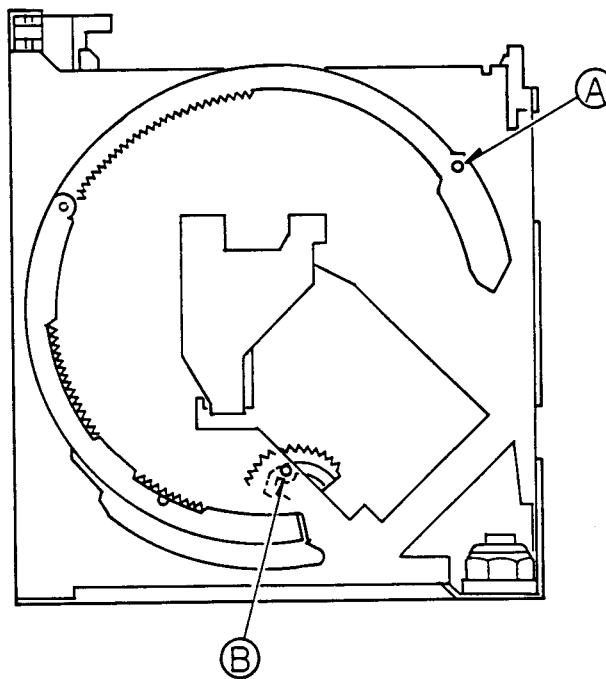


Fig. 44

Align hole A of the mode ring with hole A of the stage chassis, while align hole B of the clamp UP cam gear with hole B of the stage chassis.

## c) Mode ring to intermittent gear

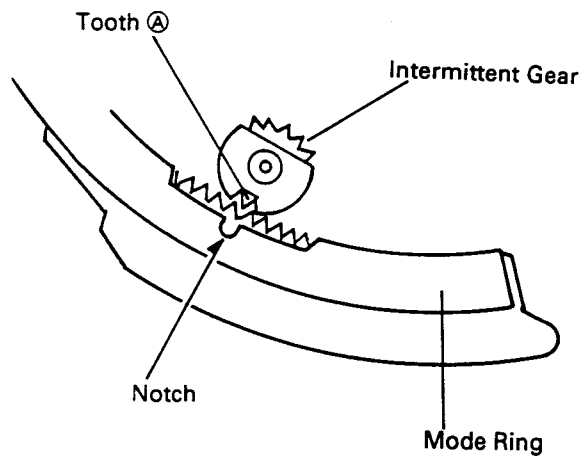


Fig. 45

They should be assembled so that tooth ④ of the intermittent gear is aligned with the notch the mode ring.