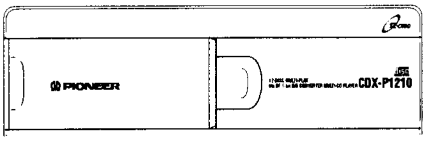
PIONEER
The Art of Entertainment

Service Manual

●CDX-P1210/UC



ORDER NO.
CRT1659

MULTI-COMPACT DISC PLAYER

CDX-P1210 UC,EW,ES

COMPACT disc DIGITAL AUDIO

- **See the separate manual CX-633 (CRT1658) for the CD mechanism description and disassembly.**
- **The CD mechanism employed in this model is one of CX-633 series.**

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 .... 92 dB (1 kHz) (IHF-A Network)
Distortion .... 0.006 %
Dynamic range .... 90 dB (1 kHz)
Output level .... 1,000 mV (1 kHz, 0 dB)
Number of channels .... 2 (stereo)

These specifications were determined and are presented in accordance with specification standards established by the Ad Hoc Committee of Car Stereo Manufacturers.
Note:
Specifications and design are subject to possible modification without prior notice due to improvements.

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K-FFS.JAN. 1995 Printed in Japan

1. SAFETY INFORMATION

1.1 CDX-P1210/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

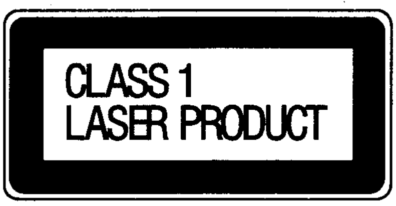
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5). When servicing or handling circuit boards and other components which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

1.2 CDX-P1210/EW

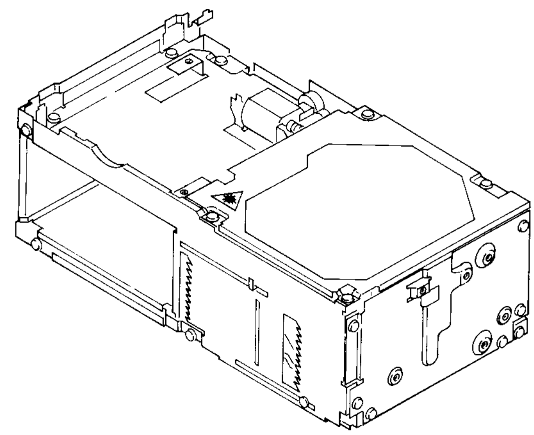
1. **Safety Precautions for those who Service this Unit.**
- **Follow the adjustment steps (see pages 5 through 14)in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.**

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.**



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)

2. OPERATIONS AND CONNECTION

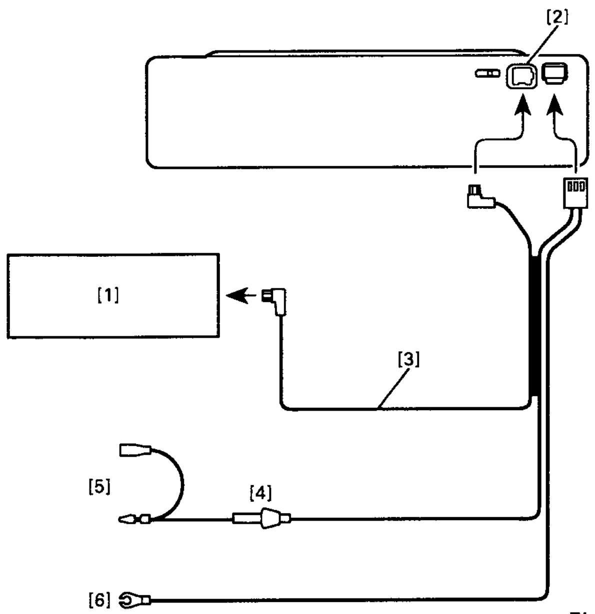


Fig.1

(Fig. 1)
[1] Multi CD controller or Multiple installation adapter (such as CD-P44)
[2] IP-BUS output (black)
Connect the black connector of the cable to this connector.
[3] IP-BUS cable
To prevent incorrect connection, the input side of the IP-BUS connector is colored in blue, and the output side in black. Connect the connectors of the same colors correctly.
[4] Fuse holder
[5] Orange
To the terminal always supplied with power regardless of ignition switch position.
[6] Black (ground)
To the vehicle (metal) body.

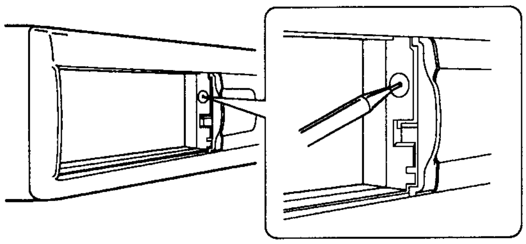


Fig.2

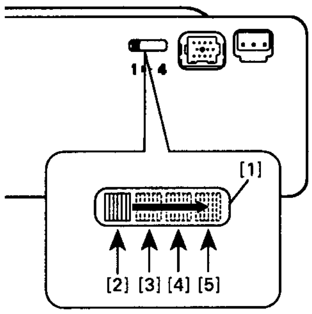


Fig.3

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 contoller, too, after pressing this button (Fig. 2).

- If the clear button is pressed when the player contains a magazine or the ignition switch is set to the ON or ACC position, the CD title display and ITS memory are cleared.

Changing the Address Switch

- This unit can be connected from the second to fourth multi-CD players by using the separately sold multiple installation adapter (CD-P44). Each multi-CD player has an address switch so that the multiple installation adapter can identify which player is which. Set the address switch for each player as shown in Fig. 3.
- See the instruction manual for the multiple installation adapter (CD-P44) when you connect multi-CD players using the adapter.

(Fig. 3)
[1] Address switch
This switch can be set to address 1, 2, 3, or 4, starting from the left.
[2] Address 1
[3] Address 2
[4] Address 3
[5] Address 4

3. DISASSEMBLY

● Removing the Case

1. Remove the five screws.
2. Remove the upper case and lower case.

● Removing the Grille Assy

1. Press the four tabs indicated by arrows and then pull out the grille assy.

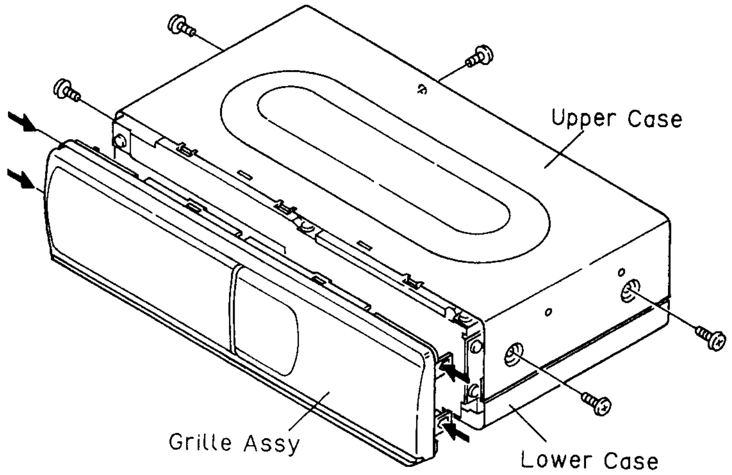


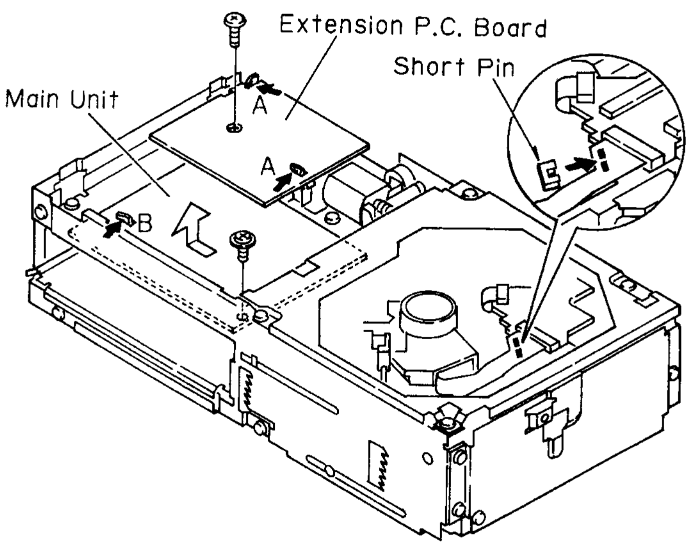
Fig.4

● Removing the Extension P.C.Board

1. Remove the one screw.
2. Unbend the tab A until straight.
3. Remove the extension p.c.board.

● Removing the Main Unit

1. Remove the one screw.
2. Unbend the tab B until straight.
3. Remove the main unit.



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

Fig.5

4. ADJUSTMENT

4.1 CD ADJUSTMENT

1)Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFO(approx. 2.5V) instead of GND.
  If REFO 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 REFO and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFO with the channel 2 negative probe connected to GND.
  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 REFO 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.

- This unit is adjusted in a combination with the CD control unit (KEH-P7000, etc.). Each regulator key should be operated at the unit.
  With the KEH-P7000 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 KEH-P7000 keys.

- How to enter into the test mode
  Switch ACC,back-up ON while pressing the 4 and 6 keys together.

- Resetting the test mode
  Switch ACC,back-up Off.

- With this system, elevation is detected by the phototransistor. Therefore, if light hits the phototransistor, elevation may operate incorrectly. Should the system be operated with the upper case removed, use some opaque material to shield the moving parts from light.

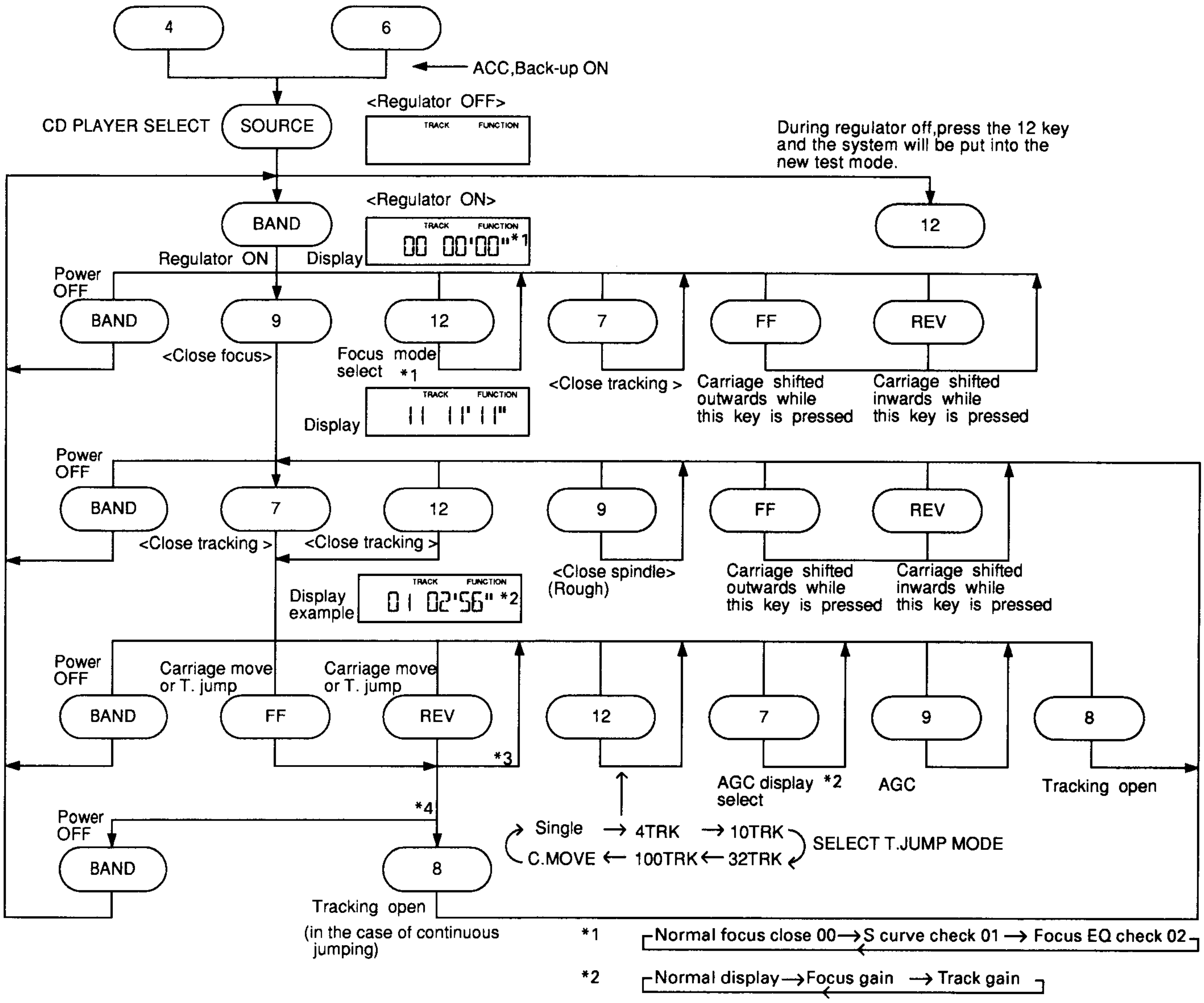
- When unloading magazine during adjustment procedures,always wait for the magazine to be properly ejected before pressing another key.

- Turn power off when pressing the button **FF** or the button **REV** key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)

- SINGLE/4TRK/10TRK/32TRK will continue to operate even after the key is released.Tracking is closed the moment C-MOVE is released.

- JUMP MODE resets to SINGLE as soon as power is switched off.

● Flow Chart



*3 100 TRK jump & carriage move continue only while the keys are pressed

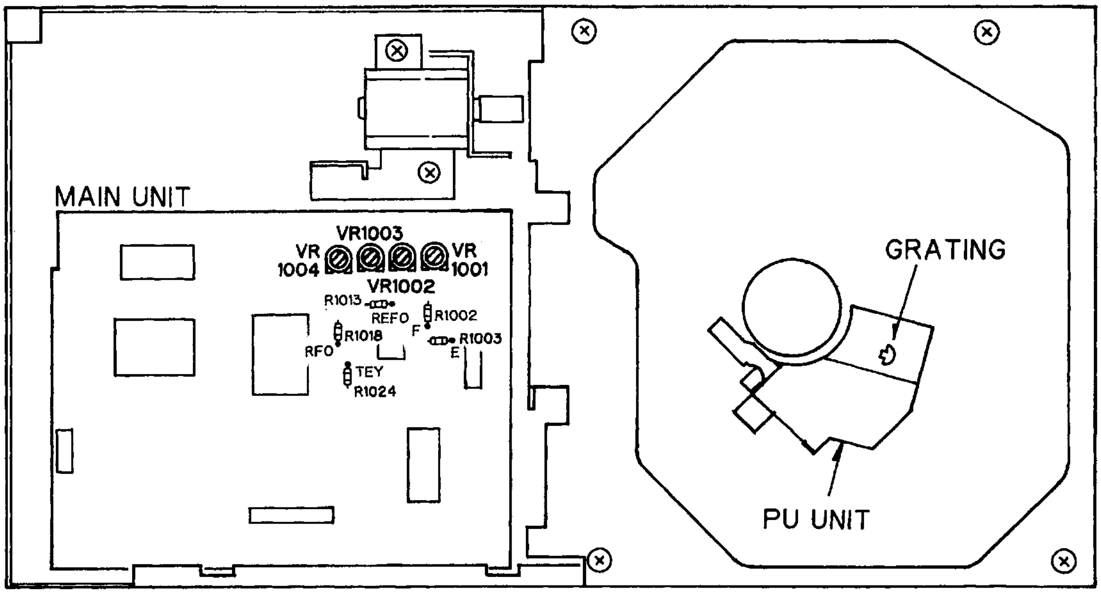
*4 SINGLE/4/10/32 → continuous even after key release

Fig.6

● Measuring Equipment and Jigs

Adjustment	Measuring equipment & jigs
1 Tracking Error Offset Adjustment 1	DC V Meter
2 Grating Check / Adjustment 1	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4), Two L.P.F., Clock Driver
3 Grating Adjustment 2	Oscilloscope, Grating Adjustment Filter (B.P.F.),mV Meter, ABEX TCD-784 (or SONY TYPE 4), Two L.P.F., Clock Driver
4 Tracking Balance Adjustment 1	Oscilloscope, Low-pass Filter, ABEX TCD-784 (or SONY TYPE 4)
5 Focus Bias Adjustment	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4)
6 RFO Offset Adjustment	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4)
7 Tracking Error Offset Adjustment 2	DC V Meter
8 Tracking Balance Adjustment 2	Oscilloscope, Low-pass Filter, ABEX TCD-784 (or SONY TYPE 4)

● **Adjustment Point and Test Point**



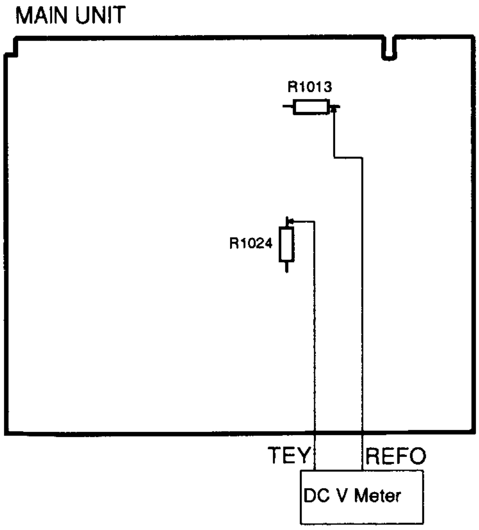
VR1001	TRACKING ERROR OFFSET
VR1002	TRACKING BALANCE
VR1003	FOCUS ERROR BIAS
VR1004	RFO OFFSET

Fig.7

1 Tracking Error Offset Adjustment 1

· **Purpose** :
To adjust the offset of the tracking pre-amp to zero.
· **Symptoms of Mal-adjustment** :
Track search NG, Carriage runaway, Poor playability.

· **Measuring Equipment / Jig**	· DC V Meter
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· No disc, TEST MODE
· **Adjustment Point**	· VR1001(TE OFFSET VR)

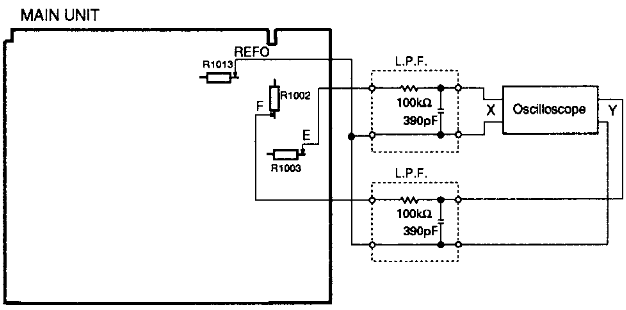


Adjustment Procedure
1.Switch the regulator on.
2.Using VR1001, adjust TEY to 0 ± 25mV w.r.t. REFO.

2 Grating Check / Adjustment 1

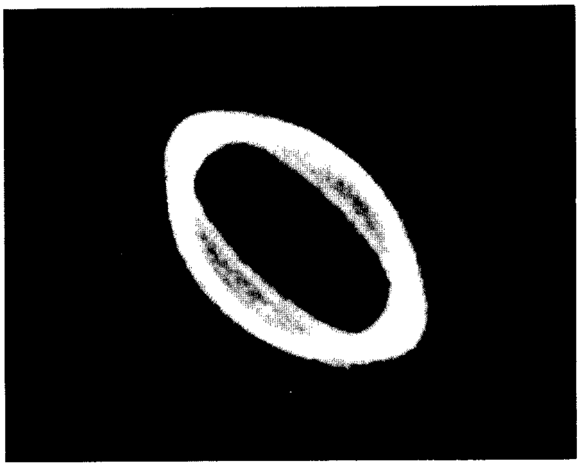
· **Purpose** :
To check that the PU grating is correctly aligned after the PU unit has been replaced.
· **Symptoms of Mal-adjustment** :
Unable to play disc, track skip during search, search NG.

· **Measuring Equipment / Jig**	· Oscilloscope, Two L.P.F., Clock Driver
· **Measuring Point**	· E, F
· **Test Disc , Mode**	· ABEX TCD-784 (or SONY TYPE 4), TEST MODE
· **Adjustment Point**	· Grating hole



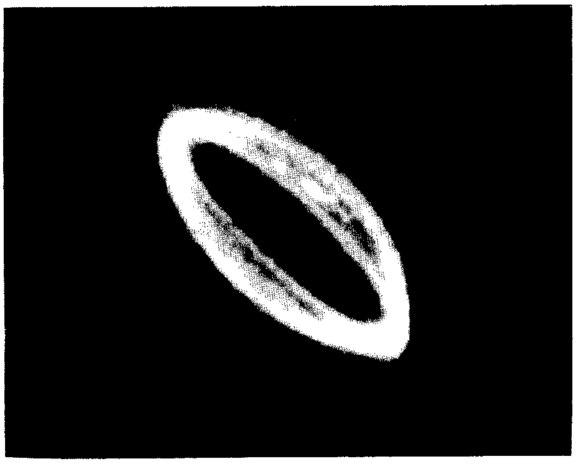
Adjustment Procedure
1.Load disc and switch regulator on.
2.Position the PU unit in the center of the disc using the **FF & REV** keys.
3.Press key **9** to close focus and press once more to close spindle.
4.Refering to the photographs given check that the grating is within ±45°. If not, it should be possible to make a fine adjustment to the grating by slowly tuning the grating screw. If, however during the adjustment the lissajous figure is seen to "FLIP" then the null point must be found and the adjustment made from there(see next section).

Lissajous figure (AC input)
Horizontal axis E 10mV/div.
Vertical axis F 10mV/div.



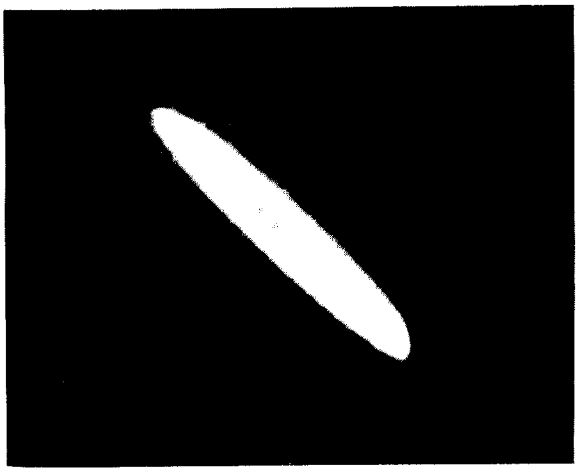
60°=NG

Waveform 1



45°=OK
(Limit)

Waveform 2



0°=BEST
(Doesn't become a single line due to eccentricity)

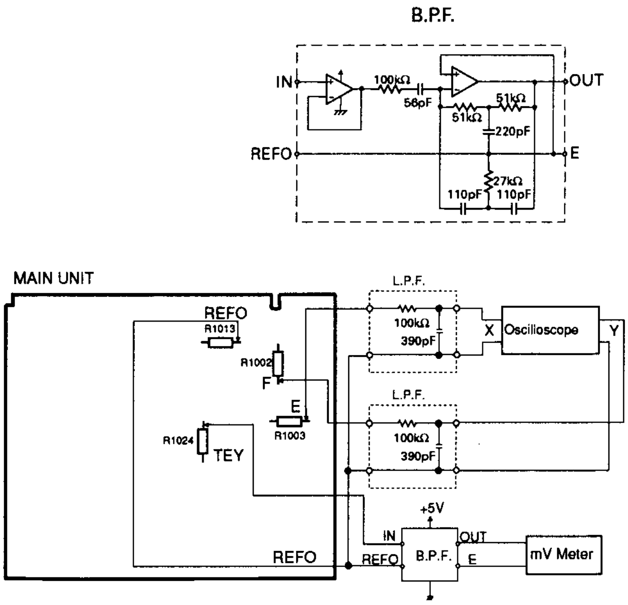
Waveform 3

3 Grating Adjustment 2

·Purpose :
This needs to be done if the previous adjustment was unsuccessful.

·Symptoms of Mal-adjustment :
Unable to play disc, track skipping, track search NG.

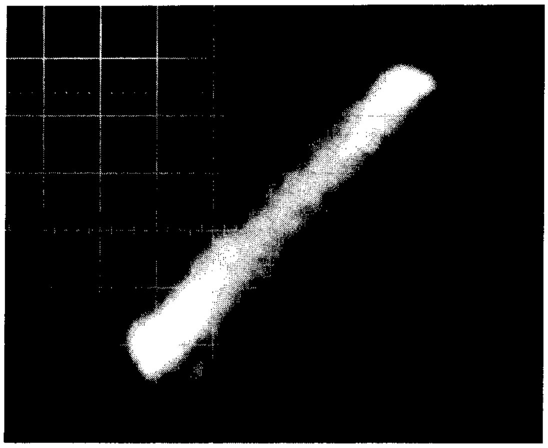
·Measuring Equipment / Jig	·Oscilloscope, Grating Adjustment filter (B.P.F.), mV Meter, Two L.P.F., Clock Driver
·Measuring Point	·TEY, E, F
·Test Disc , Mode	·ABEX TCD-784 (or SONY TYPE 4), TEST MODE
·Adjustment Point	·Grating hole



Adjustment Procedure
1. Load disc and switch regulator on.
2. Position the PU unit in the center of the disc using the **FF & REV** keys.
3. Press key **9** to close focus and press once more to close spindle.
4. While monitoring the output of the B.P.F. connected to TEY, slowly turn the grating screw. The output voltage should pass through many minimums; search for the minimum which is clearly smaller than the rest - this is the "null point", where the E & F sub-beams are lined up with the tracks on the disc.
5. From this null point, turn the grating screw clockwise (as seen from the underside of the PU unit) until the lissajous waveform is a single line (or close as possible) as shown in the photograph.

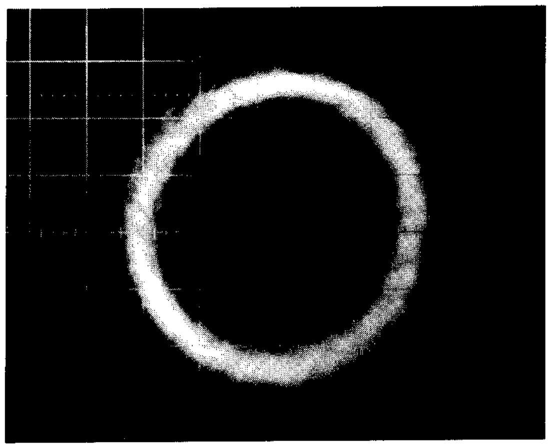
Lissajous figure (AC input)
Horizontal axis E 10mV/div.
Vertical axis F 10mV/div.

Null Point=180°



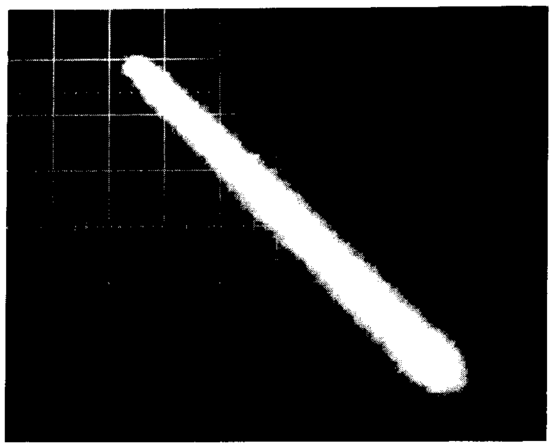
Waveform 4

"Rough" adjustment=90°



Waveform 5

Final adjustment=0°



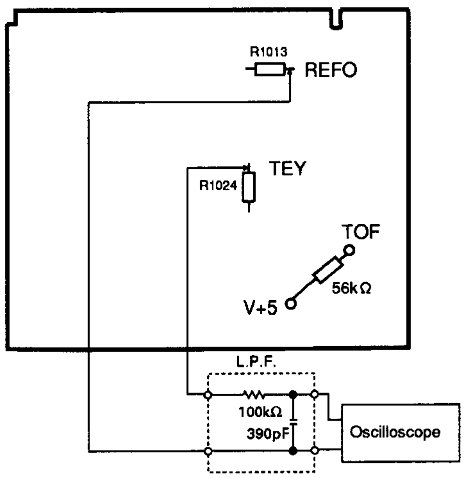
Waveform 6

4 Tracking Balance Adjustment 1

· **Purpose :**
To equate the sensitivity of the F channel to that of the E channel.

· **Symptoms of Mal-adjustment :**
Track search NG, Poor playability carriage runaway.

· **Measuring Equipment / Jig**	· Oscilloscope, L.P.F.
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· ABEX TCD-784 (or SONY TYPE 4), TEST MODE
· **Adjustment Point**	· VR1002 (T.BAL VR)



Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor.
(This is in order to cancel lens offset in the tracking direction.)

Adjustment Procedure

1. Load disc and switch the regulator on.
2. Position the PU unit in the center of the disc using the **FF & REV** keys.
3. Close focus by pressing key **9**.
4. Observing the TEY waveform on the oscilloscope, adjust VR1002 until the positive and negative halves have the same amplitude (see waveform 7–9).

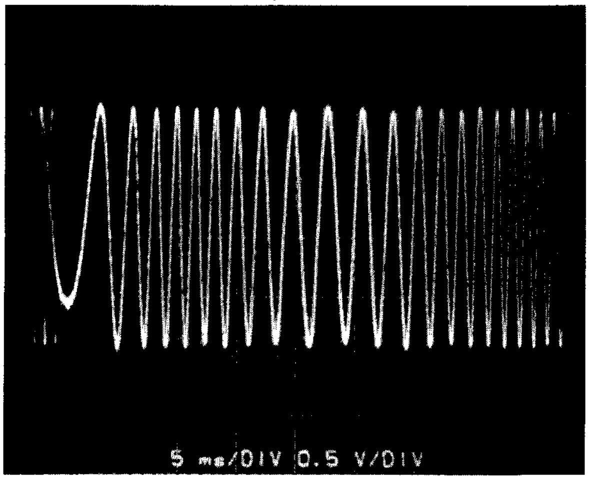
Check

After adjustment the TEY waveform should have an amplitude of 1.5±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)
(Providing focus bias is OK)

DC Mode
0.5V/div.
5ms/div.

+5% NG

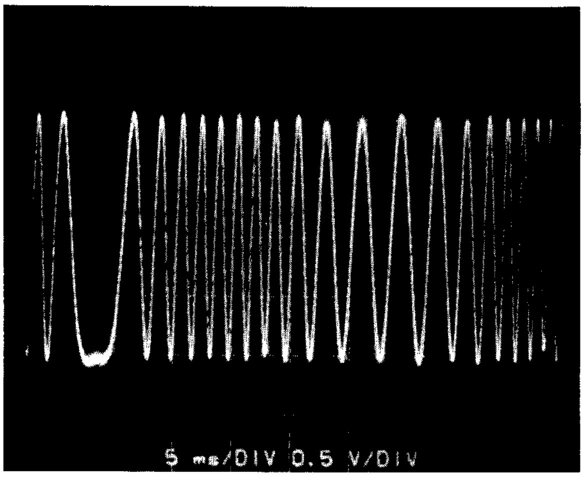
REFO →



Waveform 7

±0% OK

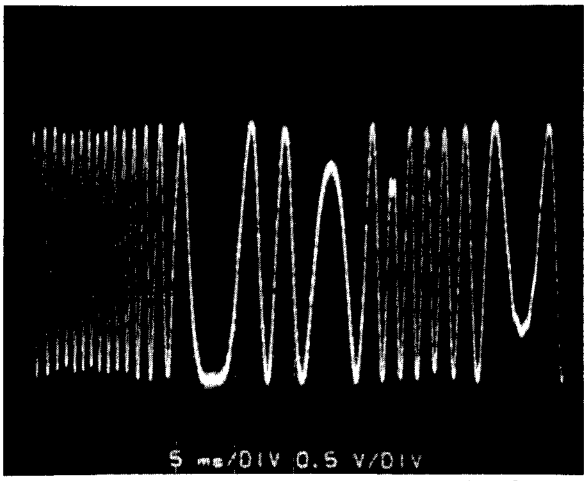
REFO →



Waveform 8

-5% NG

REFO →

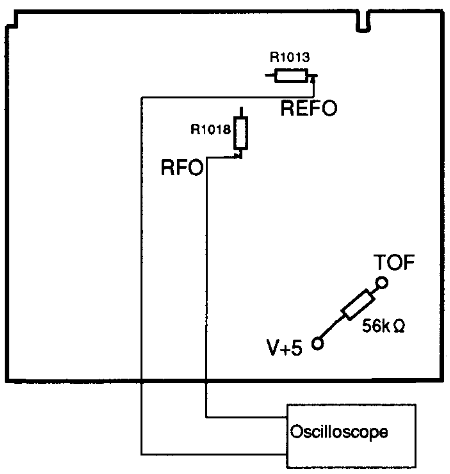


Waveform 9

5 Focus Bias Adjustment

·**Purpose :**
To adjust the focus servo reference so that the RF waveform is an optimum.
·**Symptoms of Mal-adjustment :**
Difficulty in closing focus, poor playability.

·**Measuring Equipment / Jig**	·Oscilloscope
·**Measuring Point**	·RFO
·**Test Disc , Mode**	·ABEX TCD-784 (or SONY TYPE 4), NORMAL MODE
·**Adjustment Point**	·VR1003 (FE BIAS VR)

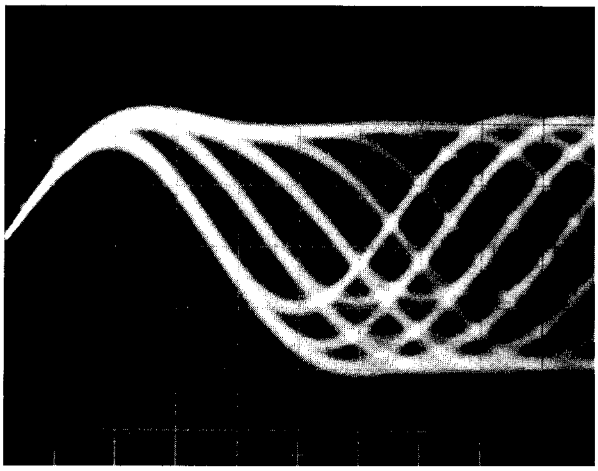


Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor. (This is in order to cancel lens offset in the tracking direction.)

Adjustment Procedure
1. Play track number 18.
2. Adjust VR1003 so that the RFO waveform amplitude is a maximum and eye pattern is optimum.

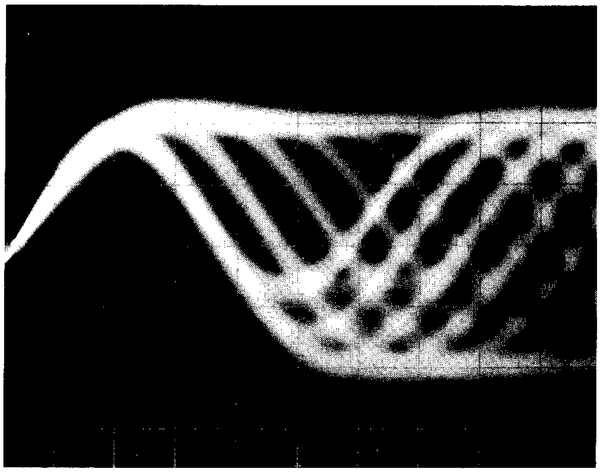
Check
After adjustment the RFO waveform should have an amplitude of 1.7±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)

3. Remove the pull-up resistor after completing adjustment.



OK

Waveform 10



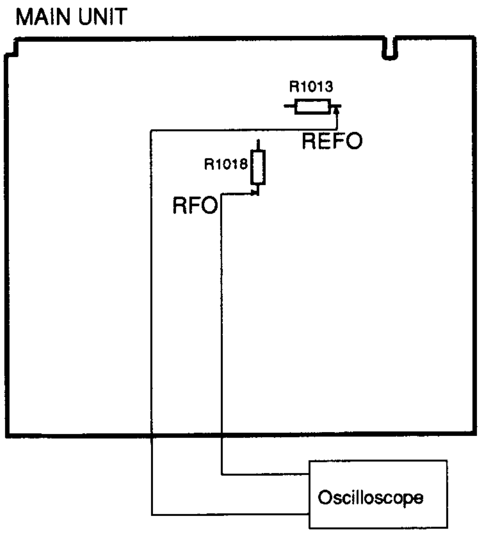
NG

AC Mode Before adjustment Waveform 11

6 RFO Offset Adjustment

·Purpose
To adjust the RFO waveform offset to an optimum.
·Symptoms of Mal-adjustment
Difficulty in closing focus, poor playability.

·Measuring Equipment / Jig	·Oscilloscope
·Measuring Point	·RFO
·Test Disc , Mode	·ABEX TCD-784 (or SONY TYPE 4), NORMAL MODE
·Adjustment Point	·VR1004 (RFO OFFSET VR)

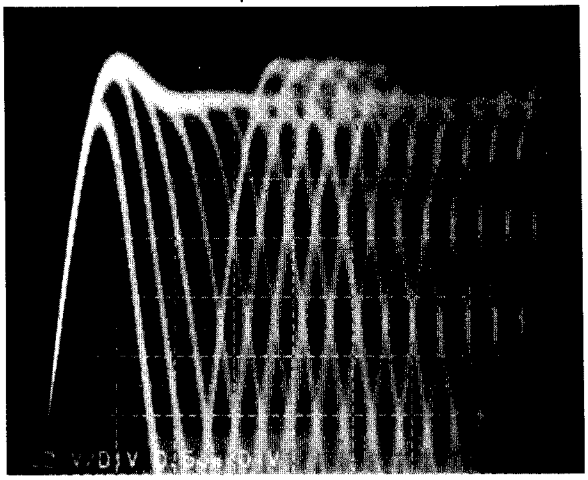


Adjustment Procedure

1. Make sure the TOF terminal's pull-up resistor has been disconnected.
2. Play track number 18.
3. Adjust VR1004 so that the peak value of the upper envelope of the RFO waveform is at +1.1VDC w.r.t. REFO(See waveform 12–14).

DC Mode
0.2V/div.
0.5μs/div.

+100mV NG

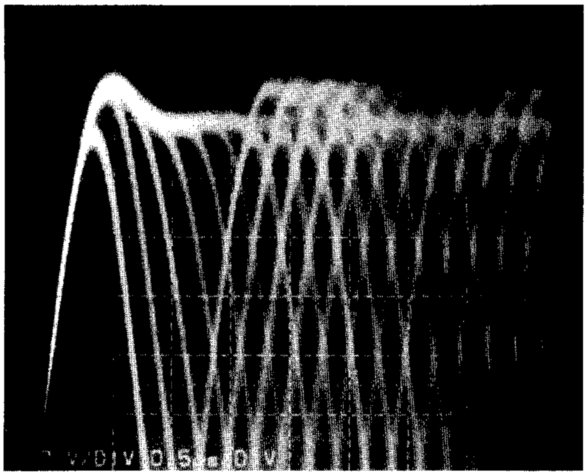


REFO →

Waveform 12

OK

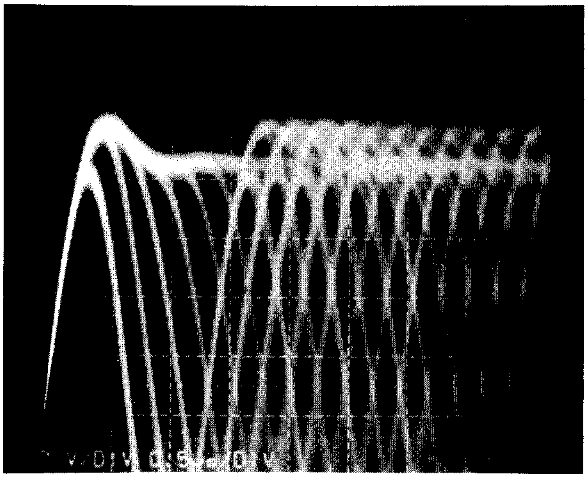
1.1V



REFO →

Waveform 13

−100mV NG



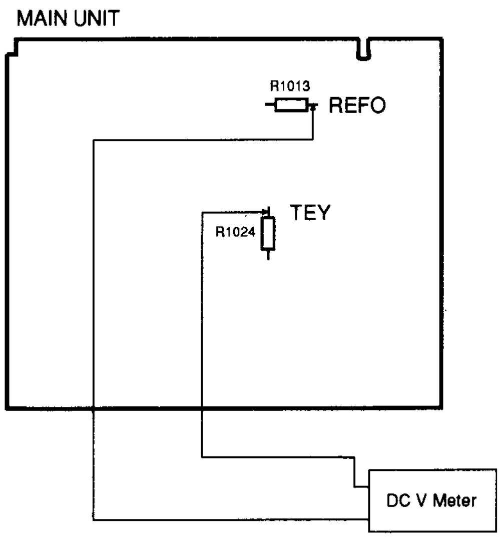
REFO →

Waveform 14

7 Tracking Error Offset Adjustment 2

· **Purpose :**
To check the offset of the tracking pre-amp is zero and adjust if necessary.
· **Symptoms of Mal-adjustment :**
Track search NG, Carriage runaway, Poor playability.

· **Measuring Equipment / Jig**	· DC V Meter
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· No disc, TEST MODE
· **Adjustment Point**	· VR1001(TE OFFSET VR)

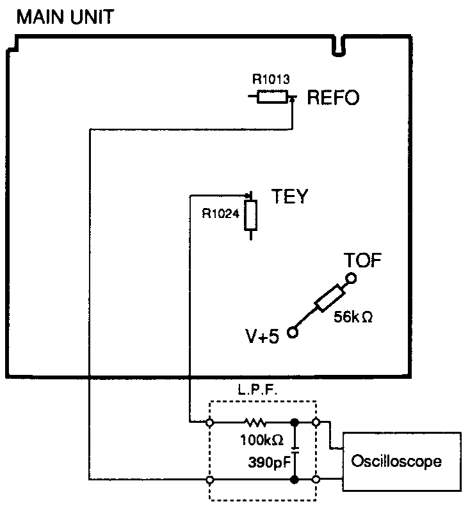


Adjustment Procedure
1.Switch the regulator on.
2.Using VR1001, adjust TEY to 0 ± 25mV w.r.t. REFO.

8 Tracking Balance Adjustment 2

· **Purpose :**
To equate the sensitivity of the F channel to that of the E channel.This needs only be done if the TE OFFSET volume was re-adjusted in the previous step.
· **Symptoms of Mal-adjustment:**
Track search NG,Poor playability, carriage runaway.

· **Measuring Equipment / Jig**	· Oscilloscope, L.P.F.
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· ABEX TCD-784 (or SONY TYPE 4), TEST MODE
· **Adjustment Point**	· VR1002 (T.BAL VR)



Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor. (This is in order to cancel lens offset in the tracking direction.)

Adjustment Procedure
1.Load disc and switch the regulator on.
2.Position the PU unit in the center of the disc using the **FF & REV** keys.
3.Close focus by pressing key **9**.
4.Observing the TEY waveform on the oscilloscope, adjust VR1002 until the positive and negative halves have the same amplitude (See waveform 7–9).

Check
After adjustment the TEY waveform should have an amplitude of 1.5±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)

5. Remove the pull-up resistor after completing adjustment.

4.2 NEW TEST MODE

● New Test Mode(aging operation and setup analysis)

The single CD player plays in 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)

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

(1) How to enter NEW TEST Mode

See the test mode flow chart Page 6.

(2) Relations of keys between TEST and NEW TEST Modes

Keys	Test Mode		New Test Mode	
	Regulator OFF	Regulator ON	PLAY in progress	Error Occurred, Protection Activated
BAND	Regulator ON	Regulator OFF	—	Time of occurrence/ cause of error select
FF	—	FWD-Kick	FF/TR+	—
REV	—	REV-Kick	REV/TR-	—
7	—	Tracking close	SCAN	—
8	—	Tracking open	MODE	—
9	—	Focus close	—	—
12	To New Test Mode	Jump Mode Select	AUTO/MANU	TRACK No./ time of occurrence select

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

(3) Error Cause (Error Number) Code

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

(4) Indicating an Operation Status During Setup

Status No.	Description	Protection operation
01	Carriage home mode started	None
02	Carriage moving inwards	10-second time out, Home switch failed
03	Carriage moving outwards	10-second time out, Home switch failed
05	Carriage moving outwards	None
11	Setup started	None
12	Spindle turn/Focus search started	None
13	Waiting for focus closure (XSI=L)	Failure to close focus
10,14	Waiting for focus closure (FOK=H)	Failure to close focus
15, 16, 17	Focus closed, Tracking open	Focus disrupted
18	During focus AGC	Focus disrupted
19	During tracking AGC	Disrupted focus
20	Waiting for MIRR, LOCK or subcode read Carriage closed, SPINDLE=ADAPTIVE	Focus disrupted, MIRR NG, Failure to lock, Failed to read subcode

(5) Example of Display.

·SET UP in progress

8 digits display LCD 4 digits display LCD(Auto) 4 digitsdisplay LCD(Manual)

8 digits display LCD	4 digits display LCD(Auto)	4 digitsdisplay LCD(Manual)
TNo. Min Sec 11 11 11	TNo. 11	Min Sec 11 11

·Operation (PLAY, SEARCH, etc.) in progress perfectly identical with that in the normal mode.

·Protection/Error upon occurrence(4 digits display LCD)

(a) Error number indicated

E–xx

Select the display with the BAND key.

(b) Track number indicated

TNo.
10

(c) Absolute time indicated

Min Sec
40 05

Select the display with the 12 key.

·Protection/Error upon occurrence(8 digits display LCD)

(a) Error number indicated

ERROR–xx

Select the display with the BAND key.

(b) Track number and
absolute time indicated

TNo. Min Sec
10 40 05

● Error Number Indication

If the CD should fail to operate or if an error has taken place during operation the player will enter into the error mode, and the cause of the error will be numerically indicated.
This is aimed at assisting in analysis or repair.

(1) Basic Means of Display

·Examples of Display E-XX

(2) Error Codes

Error Code	Classification	Description	Cause/Detail
10	ELECTRIC	Carriage home failure	Carriage doesn't move to or from the innermost position →Home switch failed and/or carriage immobile
11	ELECTRIC	Focus failure	Focus failed →Defects, disc upside-down, severe vibration
12	ELECTRIC	SETUP failure Subcode failure	Spindle failed to lock or subcode unreadable →Spindle defective, defect, severe vibration
14	ELECTRIC	Mirror failure	Unrecorded CD-R The disc is upside-down, defects, vibration
17	ELECTRIC	Set up failure	AGC protect failed →Defects, disc upside-down, severe vibration
30	ELECTRIC	Search time out	Failed to reach target address →Carriage/tracking defective and/or defects
A0	SYSTEM	Power failure	Power overvoltage or short circuit detected →Switching transistor defective and/or power abnormal
50	MECHANISM	An error upon ejection	MAG switch release time has time out Elevation time out when eject
60	MECHANISM	An error while putting in and out the tray	Tray in / out time has time out Tray is caught when put in
70	MECHANISM	An error upon elevation	Elevation time has time out
80	MECHANISM	An error with an empty magazine inserted	No disc is available

5. CIRCUIT DESCRIPTION

5.1 PRE-AMPLIFIER STAGE (UPC2571GS)

The optical signals are converted to voltage signals using an i/v amplifier inside the PU unit.
These voltage signals (A - F) are further processed by this pre-amp stage.
The pre-amplifier performs the following tasks

- Automatic power control of the PU unit's laser diode.
- Generation of an equalized RF signal from the photo-detector outputs (A - D).
- Generation of a focus error signal from the photo-detector outputs (A - D).
- Generation of a tracking error signal from the photo-detector outputs (E & F).
- Generation of a tracking zero crossing signal from the photo-detector outputs (E & F).

This IC runs from a single voltage supply (+5V). The reference voltage for this IC, the PU unit, and all the servo circuitry is REFO. This is obtained from pin 19 of the pre-amp ; which in turn is derived from the output REFOUT of the servo LSI, IC1201, UPD63700GF. The voltages REFOUT and REFO should be at +2.5V DC with respect to GND. All measurements and observations should be made using REFO as the reference as this is a buffered output. Care should be taken not to inadvertently short REFO to GND.

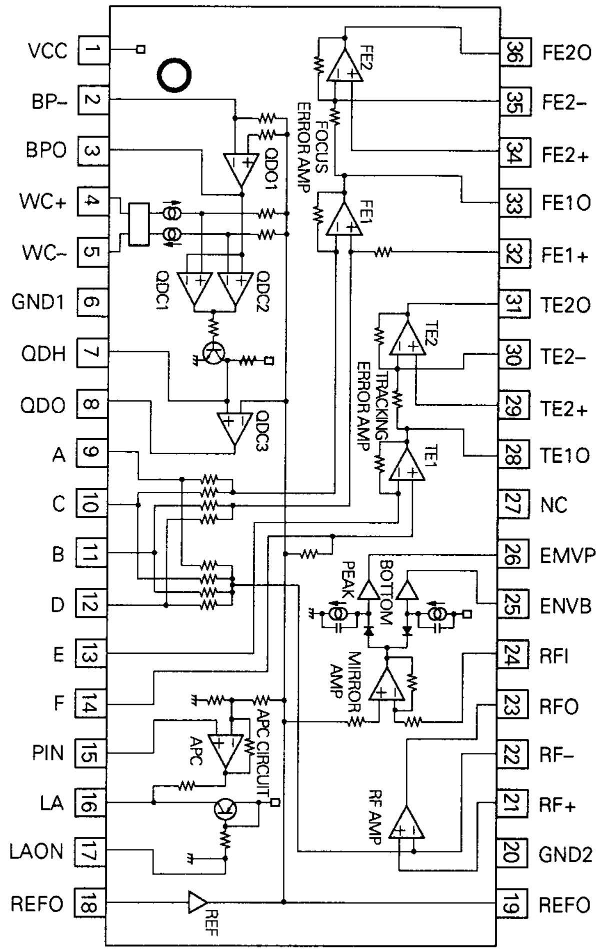


Fig.8 : UPC2571GS BLOCK DIAGRAM

1) Automatic Power Control (APC)

The laser diode's junction voltage varies greatly with temperature ; causing large output variations in optical power. To avoid this, a monitor diode is used in a feedback circuit to keep the optical power constant. As two different manufacturer's laser diodes are used the LD current falls into two broad bands : approx. 40mA and approx. 60mA.

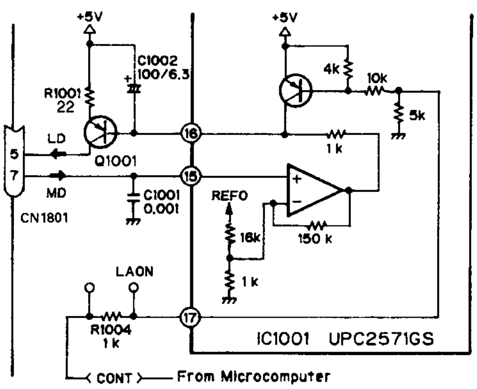


Fig.9 : APC CIRCUIT

2) RF Amplifier

This performs a simple summation of the photo-detector outputs A,B,C & D, amplifies, and equalizes to produce the RF signal at RFO. The RF eye pattern may be monitored here. The RFO OFFSET volume is used to ensure that the RFO waveform has the correct offset relative to the FOK threshold level inside the servo LSI UPD63700GF. The FOK signal is used in the focus close sequence, and during play to control the defect circuit inside the UPD63700GF.

The AC coupled RFO signal, RFI, is used by the UPD63700GF to generate the EFM signal which is used in turn by the DSP spindle CLV control sections.

For low frequency signals :

VRFO = (A+B+C+D) x (R1018+R1019)/10k = (A+B+C+D) x 6.22

The RFO waveform should have an amplitude of approx. 1.9Vpp, with it's upper envelope at +1.1V DC w.r.t. REFO.

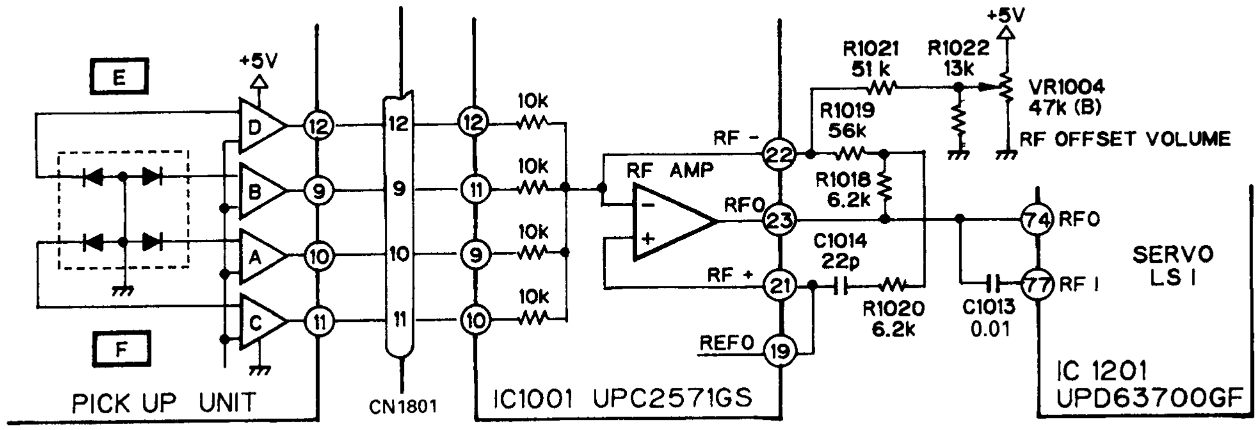


Fig.10 : RFO AMPLIFIER

3) Focus Error Amplifier

This produces a focus error signal used as the basis for the focus servo.

VFEY = ((A+C)-(B+D)) x 5 x (R1007//20k)/10k

= FE x 6.23 (FE = PU unit focus error)

The S-Curve at FEY should have an amplitude of approx. 1.9Vpp.

The second amplifier stage is also a low pass filter, fc=11kHz, and has a bias volume adjustment. This adjustment is used to vary the reference bias level of the focus servo loop and is adjusted to obtain an optimum eye pattern at RFO.

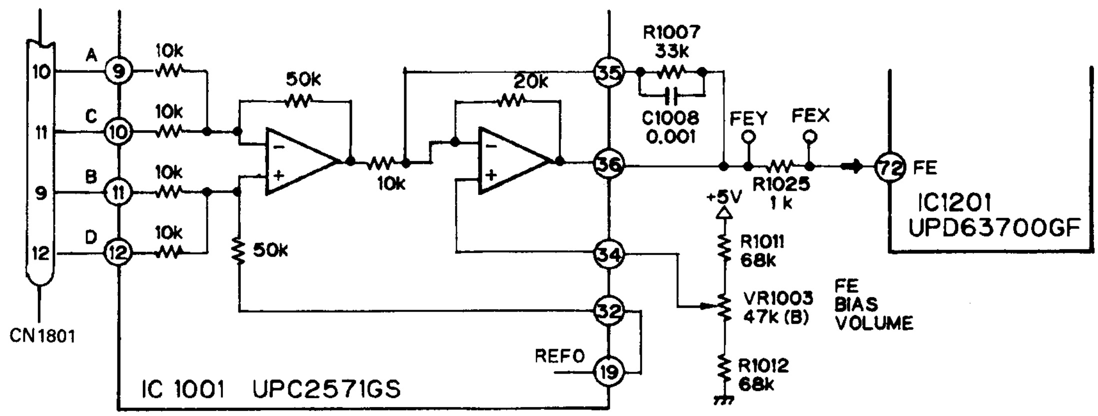


Fig.11 : FOCUS ERROR AMPLIFIER

4) Tracking Error Amplifier

This produces the tracking error signal used in the tracking servo loop.

VTEY = (25 x E) - (25 x F x 2 x 10k / (T.BAL+10k))

Normally, the sensitivity of E & F are the same and T.BAL=10k

=> VTEY = 25 x (E-F)

If, however, the E and F sensitivities are different the T.BAL volume can be used to cancel out the unbalance. The offset adjustment TE OFFSET is to cancel any DC offsets from the photo-detectors or op-amps to ensure the reference bias for the servo loop is at zero. Maladjustment of either of these pre-sets will result in poor tracking performance and susceptibility to skipping.

For a typical unit, the TEY level should be approx. 1.8 Vpp.

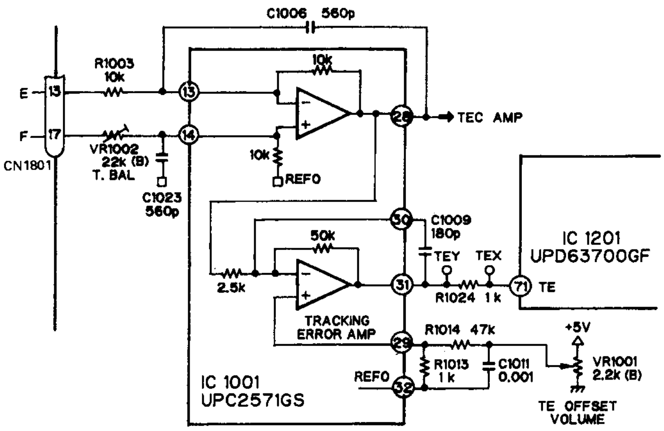


Fig.12 : TRACKING ERROR AMPLIFIER

5) Tracking Zero Crossing Amplifier

TEC1 is basically an amplified, AC coupled, version of the TEY waveform. It is used by the servo LSI IC1201, UPD63700GF to located the zero crossing points of the TEY signal to :

1) Determine how many tracks have been crossed during track jumping or a carriage move operation.
2) Determine in which direction the lens is moving when attempting to close tracking. This is used in the "tracking brake" circuit described later.

For signals in the range 500Hz - 5kHz :

VTEC1 = R1005/R1006 x (E-F) = 45.5 x (E-F)

Typically TEC1 is around 4.2Vpp, this means that the TEC1 signal level may be greater than the saturation limit of the op-amp and the signal will clip. However, since the servo LSI only uses the zero-crossing points, this is not critical.

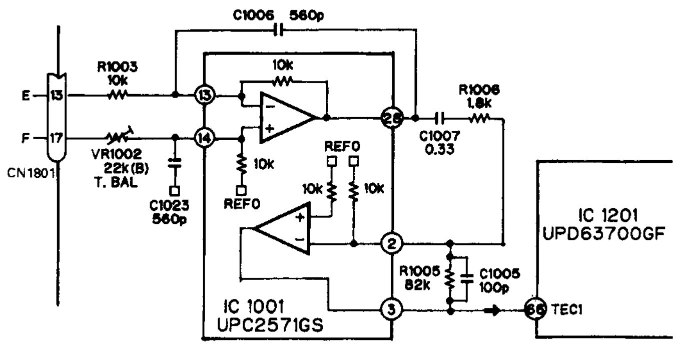


Fig.13 : TRACKING ZERO CROSSING AMPLIFIER

5.2 SERVO STAGE (UPD63700GF)

All the servo equalization & sequencing, such as focus closing, track jumping, carriage moving etc. are performed in this LSI, as well as all the DSP functions : data decoding, error protection, interpolation etc. The signals FE & TE are digitized and processed by the servo block to produce the focus, tracking & carriage drive signals, in a PWM format.

The RFI signal is converted to the EFM signal which is decoded by the DSP block to produce an audio signal ; during this process, a spindle servo error signal is also generated and used by the servo block to produce a spindle drive signal, again in PWM form.
The PWM waveforms are filtered, to remove the PWM carrier, amplified by the driver IC1401 XRA6797FP, and output to the corresponding actuators.

1) Focus Servo System

The main focus equalization takes place inside the UPD63700GF (Fig. 14). The equalizer response can be measured between FEX and FIN and has the shape shown in figure 15.

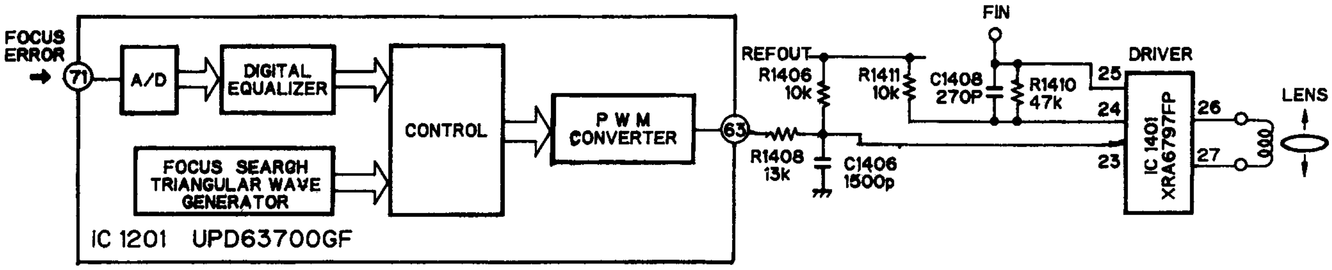


Fig.14 : FOCUS SERVO BLOCK DIAGRAM

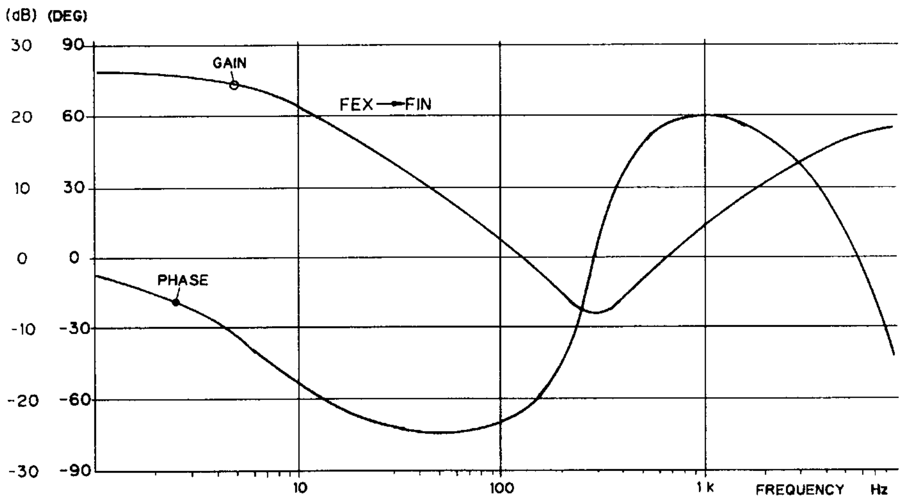


Fig.15 : FOCUS EQUALIZER

In order to smoothly close focus the lens must first be within approx. 5µm of the "just focused" position. This position is achieved by a focus search sequence. The lens is moved up and down using a triangular wave search voltage while the spindle motor is kicked and kept rotating at an appropriate speed. The servo LSI monitors the FE and RFO signals and, at an appropriate point, automatically closes focus.

The conditions for focus close are :

1) The lens is moving from a far to a near position relative to the disc,
2) FOK = HIGH (5V),
3) FZD (IC internal signal) was latched high and
4) FE = 0 (w.r.t. REFO).

When the focus servo closes, the servo LSI's serial data output port, XSO, will show a high-low transition. This is received by the microcomputer as an indication that the servo loop was closed and after about 25mS it begins monitoring the FOK output, via a LPF, to verify that focus is still closed ; in the event of FOK becoming low for an appreciable time, the microcomputer will take appropriate action.

The various signal levels which contribute to focus close are shown in figure 16, which shows the case where focus close has been inhibited.

In TEST MODE, using FOCUS CLOSE MODE 1, conditions 2 & 3 can be inhibited to allow the S-Curve, focus search voltage and the actual lens movement to be observed at ease.

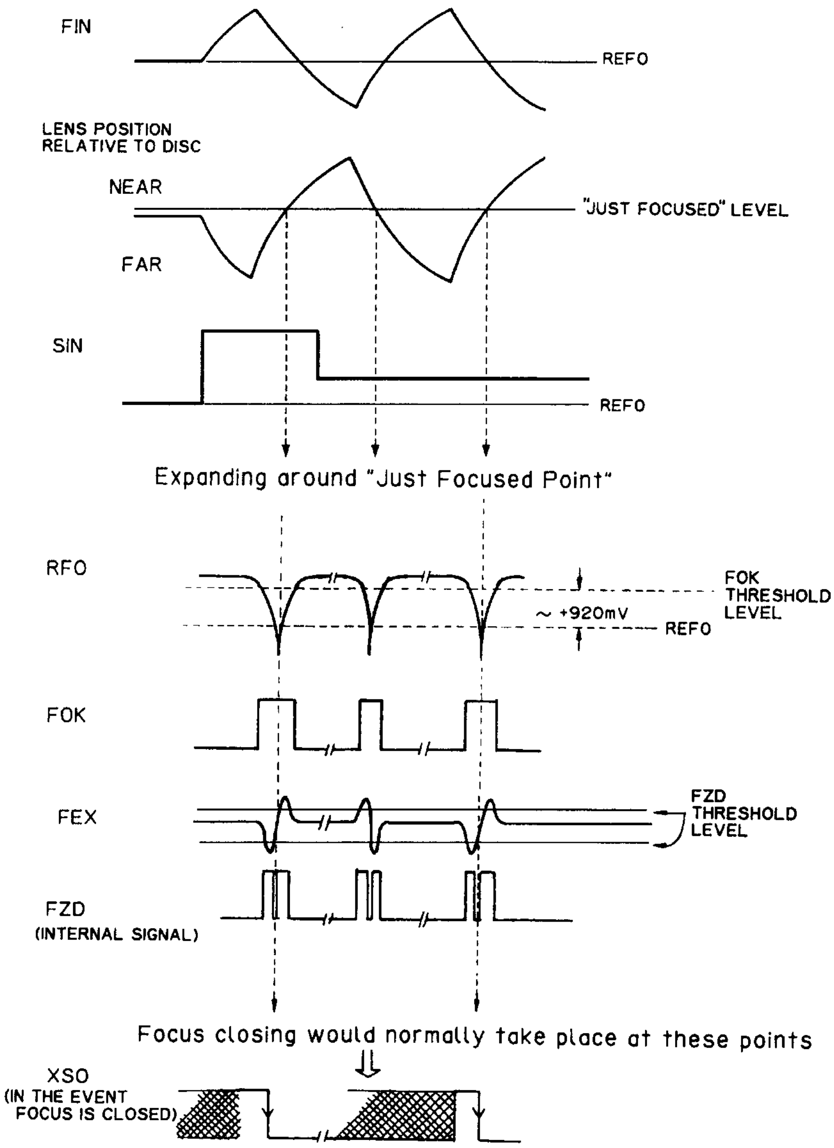


Fig.16 : FOCUS CLOSING SEQUENCE

a) FOK CIRCUIT

The FOK circuit inside the servo LSI compares the lower envelope of the RFO signal with a threshold level fixed by the microcomputer. Should the envelope level fall below this FOK level then FOK becomes high. This is used during focus close as stated and also during play to control a defect circuit, which switches the focus & tracking servos into a hold mode should the RFO envelope become disrupted by dirt, grease etc, thus increasing the player's defect response (Fig. 17).

The FOK threshold is approx. +920mV w.r.t. REFO. It is for this reason that the upper envelope should be adjusted to +1.1V DC w.r.t. REFO.

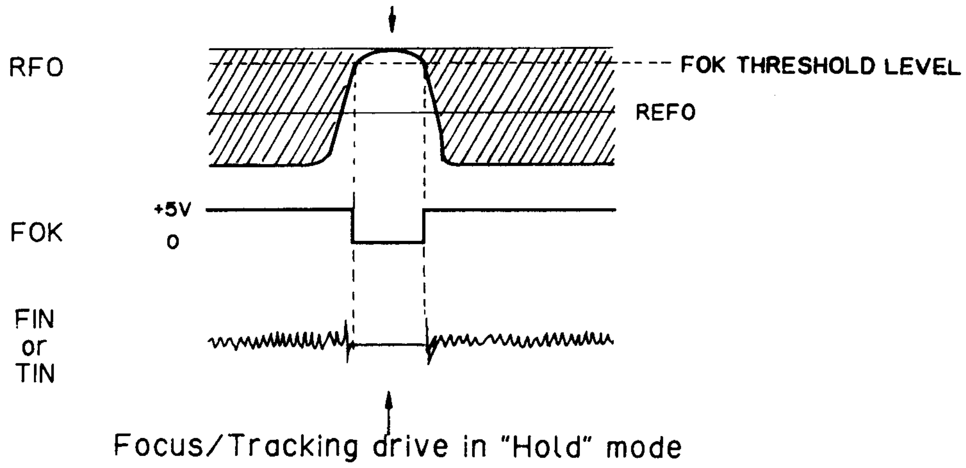


Fig.17 : DEFECT CIRCUIT

b) FZD CIRCUIT

The FZD circuit inside the servo IC compares the absolute value of the FE signal to a threshold value and outputs a high/low signal which is then used in the focus close sequence as stated.

At power on, the microcomputer switches the laser diode off and reads the value of the FE bias via the servo LSI's A/D port. The FZD threshold is set 200mV above this bias level.

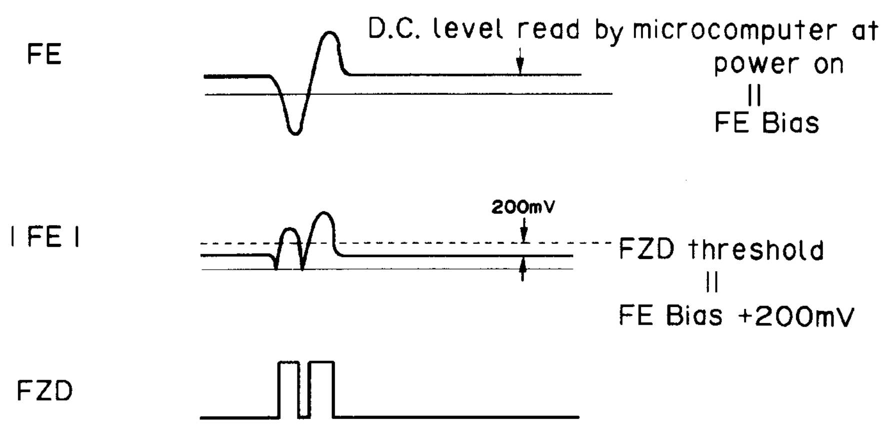


Fig.18 : FZD CIRCUIT

2) Tracking Servo System

The main tracking equalization takes place inside the UPD63700GF (Fig. 19). The equalizer response can be measured between TEX and TIN and will have the shape shown in figure 20.

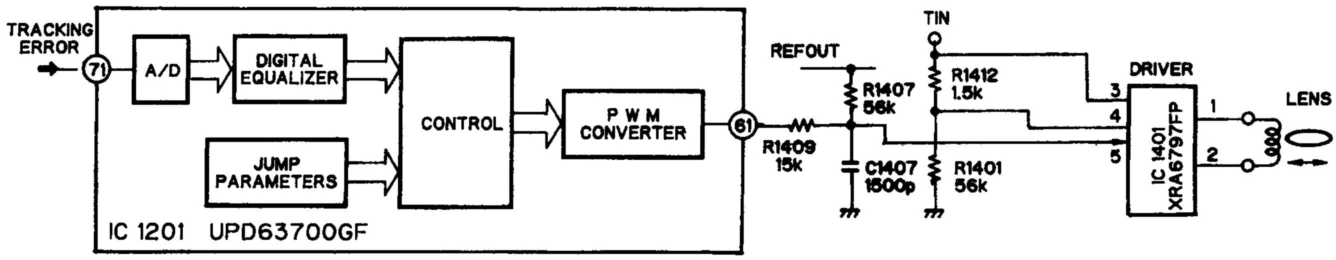


Fig.19 : TRACKING SERVO BLOCK DIAGRAM

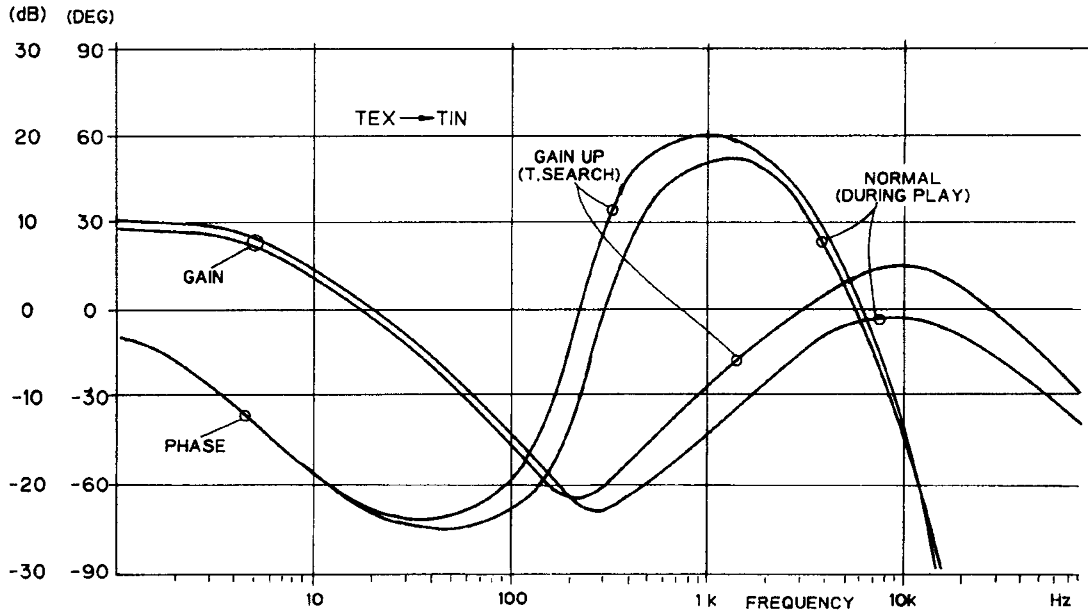


Fig.20 : TRACKING EQUALIZER

a) Track Jumping

Track jumping is performed automatically by the servo LSI upon receipt of the appropriate command from the microcomputer. The present microcomputer is programmed to use 1,4,10 & 32 track jump commands to achieve searching. The 32 track jump command may be used in pairs (64 tracks) or triplets (100 track) as required. In TEST MODE the 1,4,10,32 & 100 track jump and carriage move sequences may be observed by selecting the appropriate mode.

Note that the number of tracks jumped is controlled by setting an internal counter to half the total value and then counting this down using the zero crossing edges of TEC1. Once the counter is at zero, a brake pulse of fixed duration is output to bring the lens to a halt; allowing tracking to be closed and normal play to continue.

For a fixed period of time after a multi-track jump has been performed, a "tracking brake" circuit is activated in conjunction with a "gain-up" equalizer to ensure that the servo achieves stabilization before entering normal play.

Manual track search, in normal mode, uses a group of single track jumps to achieve FWD/REV at approx. ten times normal play speed.

The figures 21 & 22 show the timing charts for the single-track jump and multiple-track jump commands.

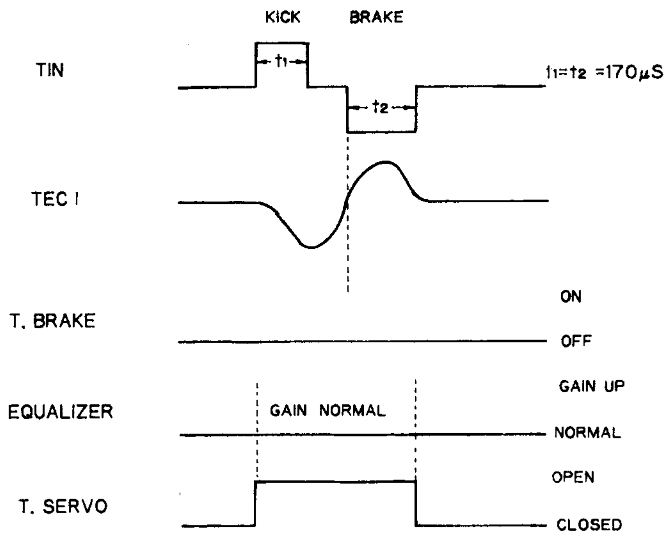


Fig.21 : SINGLE TRACK JUMP

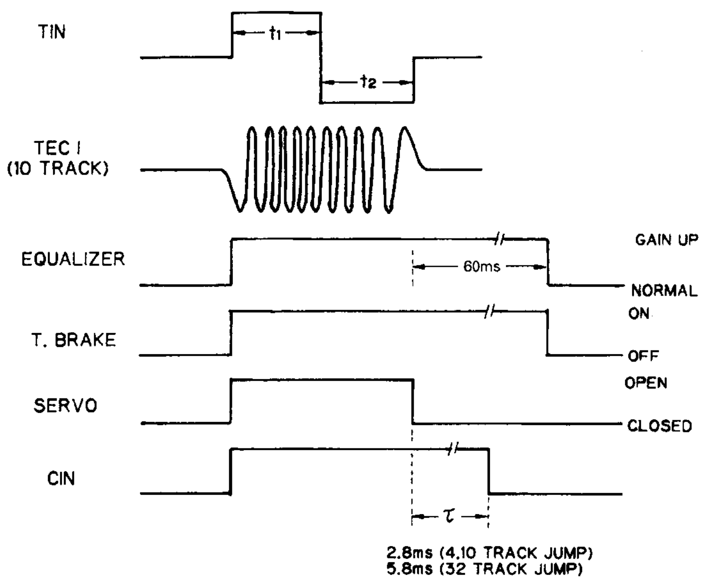
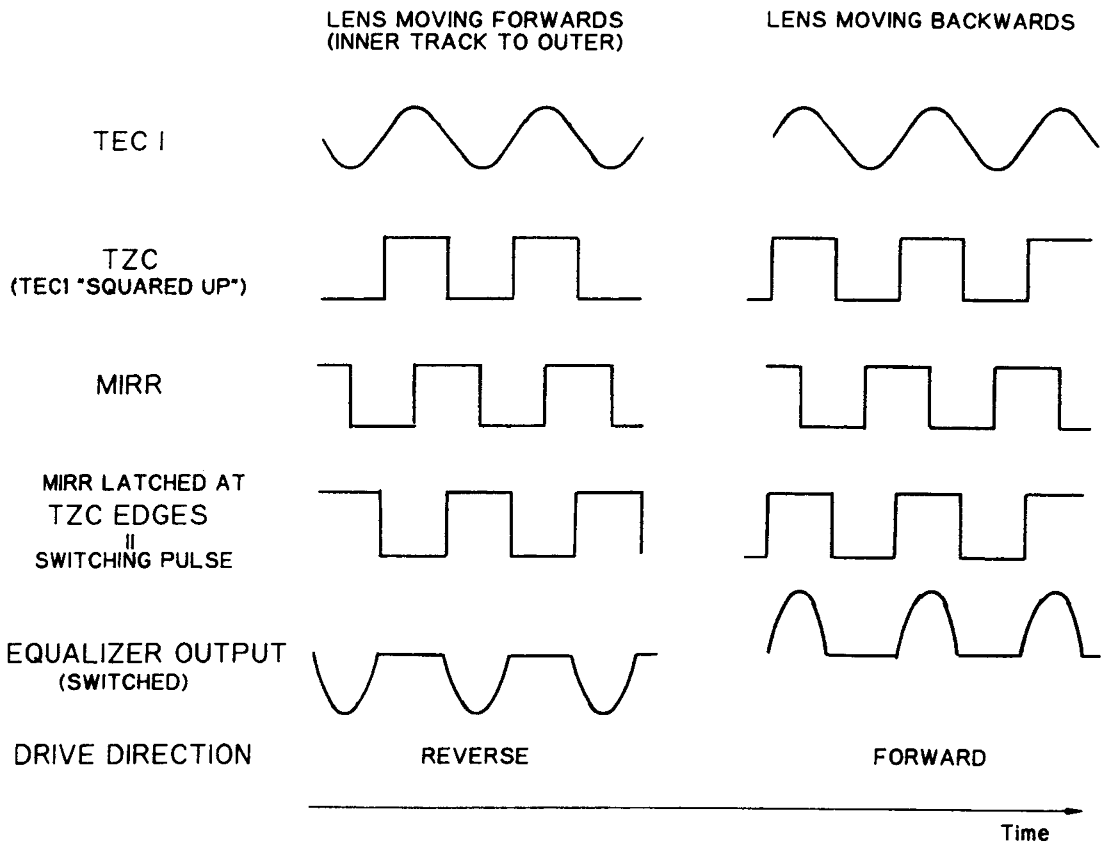


Fig.22 : MULTI TRACK JUMP

b) Tracking Brake Circuit (Fig. 23)

This relies on determining which direction the lens is moving and only outputting the portion of the drive waveform which acts to oppose this motion. Direction of motion is deduced from TEC1 and the MIRR signal and knowledge of their phase relation.



Note : Equalizer output assumed to have same phase as TEC1.

Fig.23 : TRACKING BRAKE CIRCUIT

c) MIRROR Circuit

The MIRR circuit indicates if the laser beam is on or off track.

MIRR = 'H' => off track, MIRR = 'L' => on track.

MIRR is generated by detecting the upper and lower envelopes of the RFO waveform and producing a difference signal which is then compared with a peak-hold version of itself to determine if the envelope size has dropped below a certain percentage.

If so, this is assumed to be due to the beam going off-track ; in practice dirt on the disc can also give the same effect (see Fig. 24).

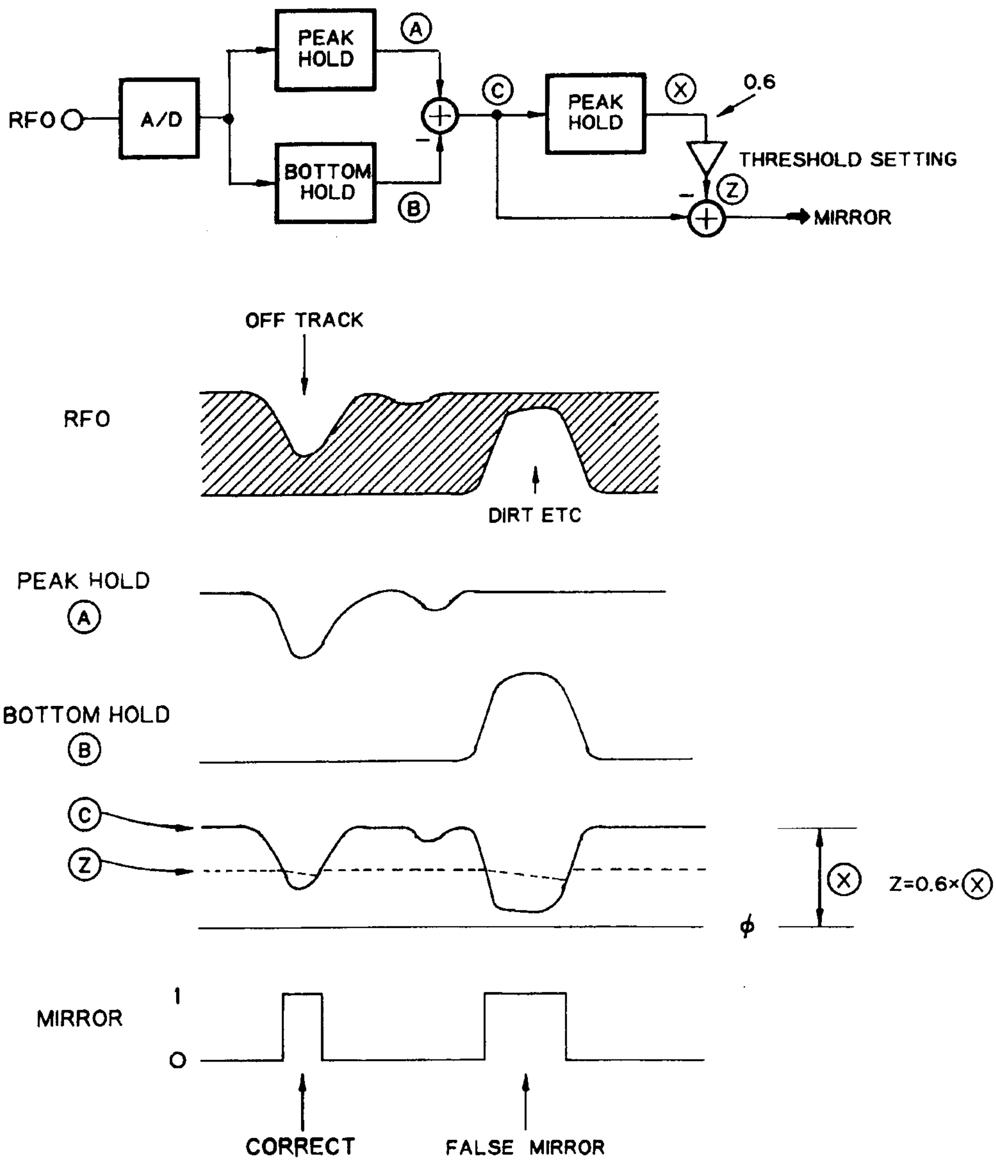


Fig.24 : MIRROR CIRCUIT & SIGNAL DIAGRAM

3) Carriage Servo System

The carriage servo system takes it's input from the low frequency component of the tracking equalizer output. This is amplified and equalized, and the output fed to the carriage motor via the PWM converter, LPF and driver IC. The gain of the equalizer is set so that when the lens is offset from it's center by a set amount the voltage at the carriage motor is enough to overcome friction and move the carriage forward.

Because the carriage motor will only begin moving when the applied voltage is great enough to overcome friction the drive voltage is cut-off inside the servo LSI until it reaches an appropriate level ; thus saving on wasted power dissipation.
Due to eccentricity of the disc etc. the threshold level may be crossed several times before the carriage assembly actually moves. This can result in a series of pulses being applied to the carriage motor.

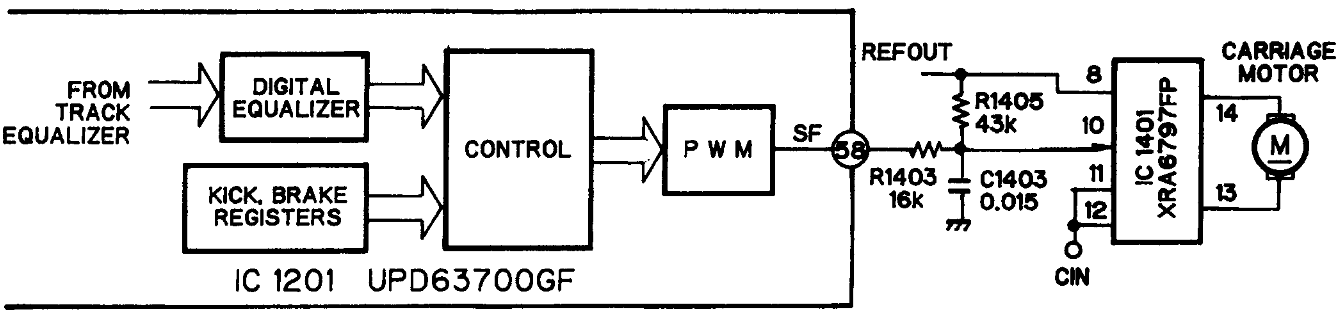


Fig.25 : CARRIAGE SERVO CIRCUIT

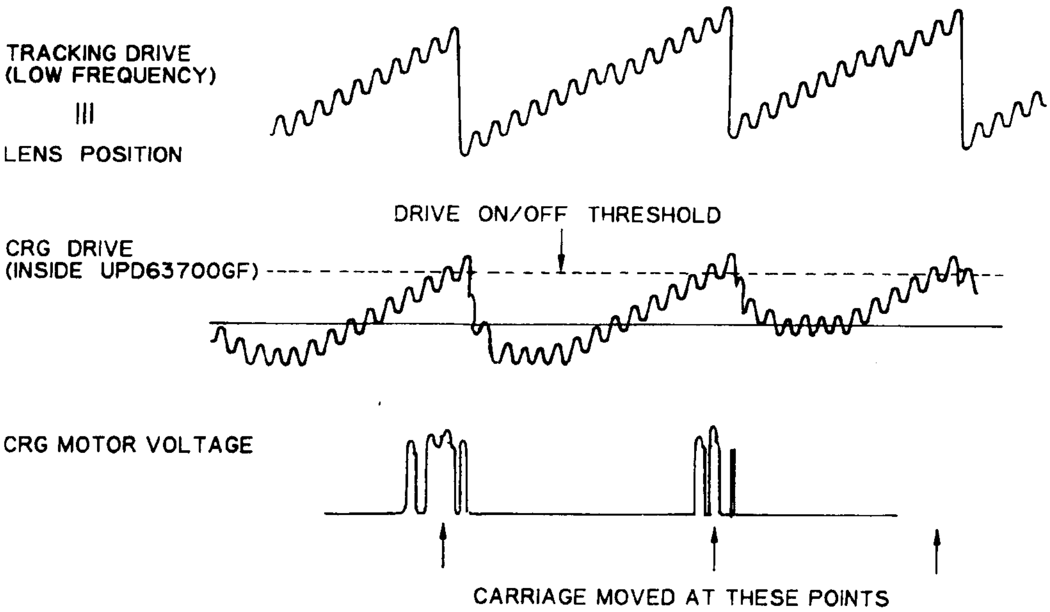


Fig.26 : CARRIAGE WAVEFORM

4) Spindle Servo

The spindle servo has a number of different modes :

(i) Kick : Used at set-up to bring the spindle up to speed from stand-still.

(ii) Offset : This is used i) At set-up, after spindle kick and before AGC has finished.
ii) During play if focus is suddenly disrupted.

(iii) Adaptive Servo : This is the CLV mode which ensures that the linear velocity of the disc as seen by the laser spot is kept constant. During play, a timing signal is extracted from the EFM signal and used to generate speed and phase error signals. These error signals are summed and fed into a servo equalizer to produce a drive signal via the PWM converter.

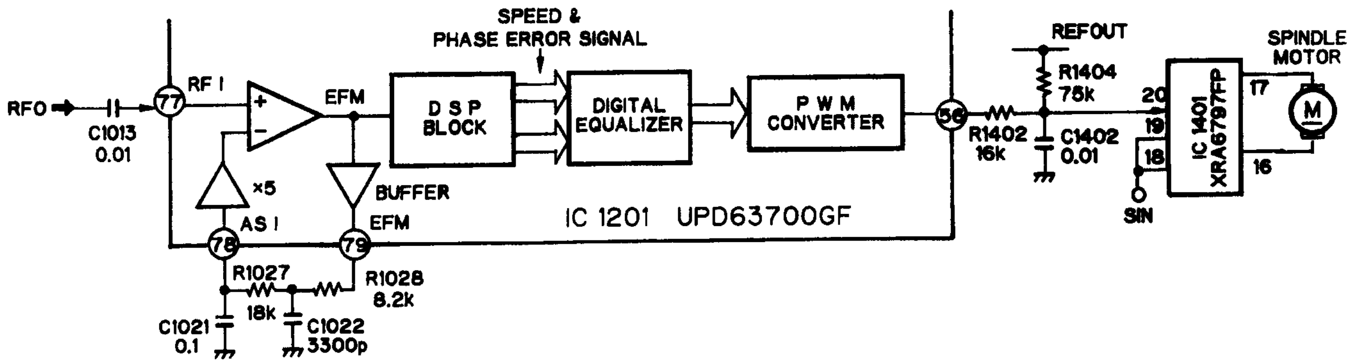
(iv) Brake : This is used to bring the disc to a stop quickly, for ejection or when CD source is de-selected or for any other reason. The servo LSI puts out a brake level and monitors the EFM signal. When the longest pattern in the EFM signal is longer than a fixed amount an internal flag is set. By monitoring this flag the microcomputer can judge when the disc has stopped and proceed to eject etc. If this flag is not set within a certain time limit the servo is switched to STOP mode and eject is implemented after a wait period.

(v) Stop : This occurs at power on or during disc eject. The spindle motor voltage is zero.

(vi) Rough : This is used in normal mode to control the linear velocity of the disc when the carriage is being moved for fast access. A speed signal is deduced from the EFM waveform and input to the spindle equalizer. This mode should be used in TEST MODE to perform the grating adjustment.

a) EFM Comparator

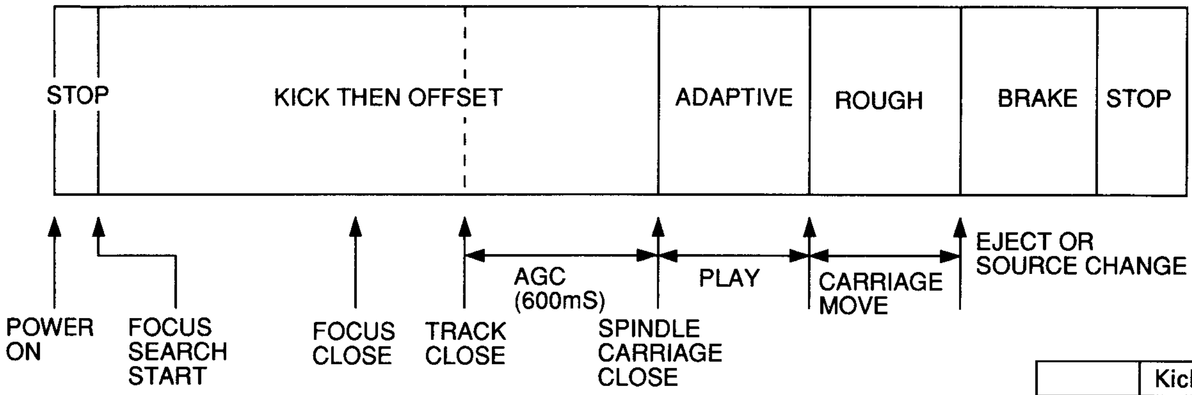
This circuit 'squares' up the analog RF signal into a digital EFM signal. In order to ensure minimum errors it is necessary to use a feedback circuit to match the DC level of the threshold to the center of the RF waveform. This circuit (shown in the spindle servo block diagram) uses the fact that the EFM signal should have no DC component. By feeding back the EFM signal's DC level the threshold level changes until the DC level is zero and the threshold, by definition, is at the exact center of the RFI waveform. The filtering in the feedback has been adjusted to ensure minimum error.



(EFM Compalator Circuit)

Fig.27 : SPINDLE CIRCUIT

● **Normal Mode**



	Kick Time
12cm	800mS
8cm	300mS

● **Test Mode**

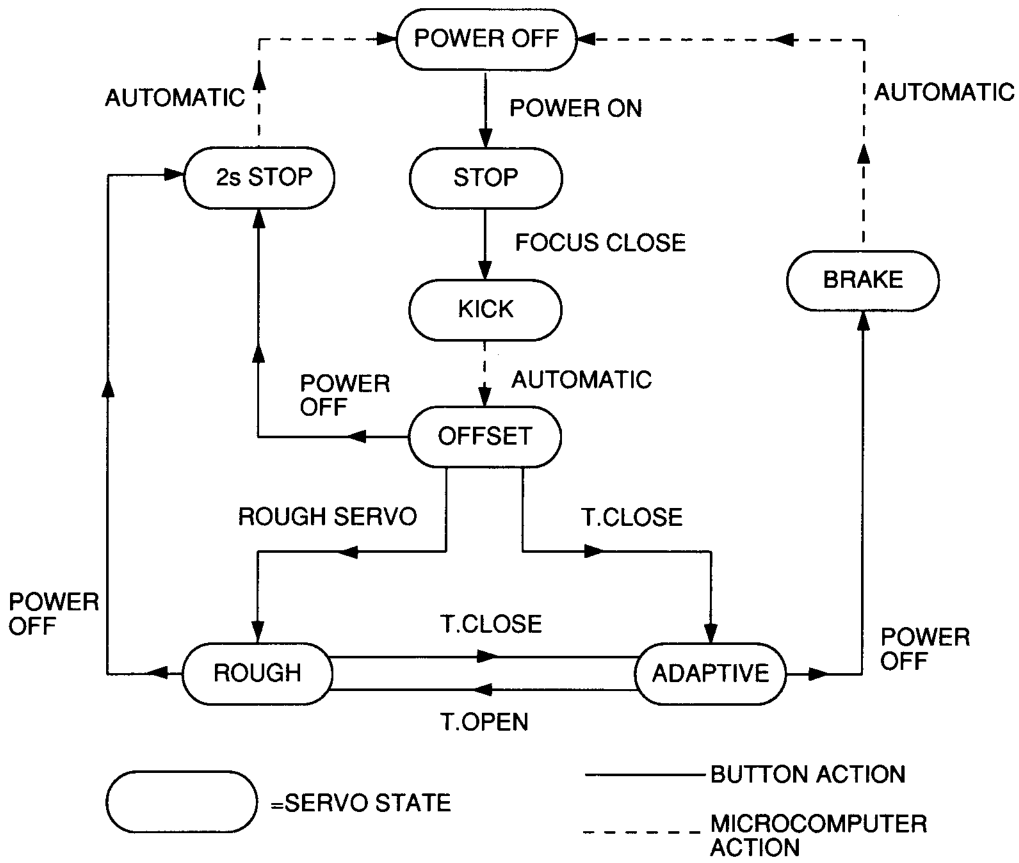


Fig.28 : SPINDLE SERVO MODES

5) Automatic Gain Control (AGC)

The servo LSI UPD63700GF contains a new function which allows the microcomputer to automatically adjust the gain of the focus and tracking servos every time a new disc is inserted or the CD source is selected. The block diagram of the AGC circuit is shown in figure 29. Basically, a small disturbance signal is inserted into the servo loop at a fixed frequency and the response of the loop is measured via the filtered signals G1 and G2. For a properly adjusted servo loop the amplitudes of G1 and G2 should be equal. The microcomputer reads in these values, does a simply calculation and adjusts the loop gain appropriately.
In order to achieve a high degree of accuracy this adjustment is performed a number of times.
As long as there is power supplied to the microcomputer it remembers the previous adjustment point and uses this as a starting point. Thus, should the system degrade with time (actuator sensitivity, dirt build-up, circuit degradation etc.) the microcomputer can follow this trend and keep the loop gain optimized.
If power to the microcomputer is removed, it forgets the previous adjustment point and assumes a default value.
At shipping the CD player will be within 5dB of this default and no problems should occur. For an older player however this is not so and it is possible that servo closure may not take place immediately. In this case, the microcomputer adjusts the gain 'blind', searching for a stable point.
In TEST MODE, the result of the AGC can be monitored. Once tracking close (with AGC) has been performed the set can be made to display the present value of the gain block. The default value is displayed as '20', which is the value a typical PU unit, PCB & test disc would result in. If for some reason the loop gain had dropped by, say, 6dB (1/2 the typical value) then the gain block will be adjusted during AGC to twice it's default value ; resulting in a gain of '40'. Similarly a set with a loop gain twice the typical will display '10' as the present gain.
Using this, it is possible to 'measure' the loop gain of the servo without the need for any instrumentation. The players shipped from the factory are checked with a test disc so that the value of the gain block after AGC is within the range 11 - 45.

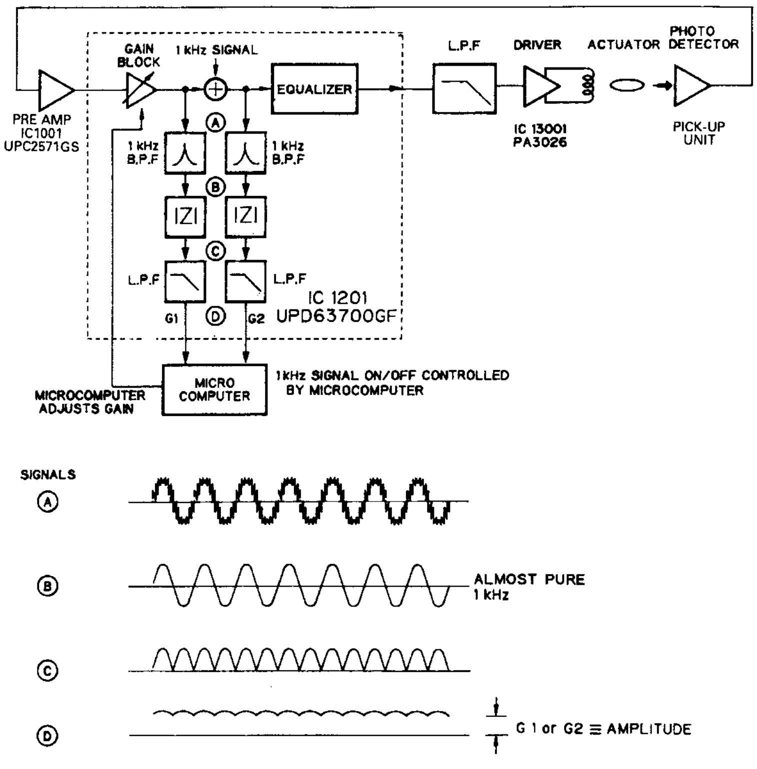


Fig.29 : AGC BLOCK DIAGRAM

5.3 Power Source Configuration

The power source for this system consists of seven separate sources which are the SVC (5.2V), VDD (5.0V), VLED (8.5V), 5VA (5.0V), DAC5 (5.0V), VD (8.6V), and POW5 (5.0V) power sources.

SVC: Power source for SRAM (IC1702). Even if BU is cut off by diode switching, the charge voltage of C1704 (electrolytic capacitor) maintains SRAM's power supply for one day (minimum 2 V) and saves data of the ITS and title memories.

VDD: Power source for the microcomputer (IC1701). Constantly outputs power as long as the BU created by the IC power source PAJ002A is connected.

VLED: Power supply for the two LEDs for the elevation (vertical movement) sensor and disc sensor. The LEDs light during mechanical movement, and are controlled by LOAD.

5VA: Consists of power source for IC1001, IC1201 and the LD of the PU unit, plus the regulator circuit for IC1401 (XRA6797FP) and an external transistor. The 5VA power supply outputs power when VD is turned on.

DAC5: Consists of the IC1601 (D/A converter IC) and audio midpoint voltage, plus regulator IC from VD. The DAC5 power supply outputs power when VD is turned on.

VD: Main power supply for the system. Power is output when POW5, having switched VDD by POWER, reaches the reference voltage and is triggered.

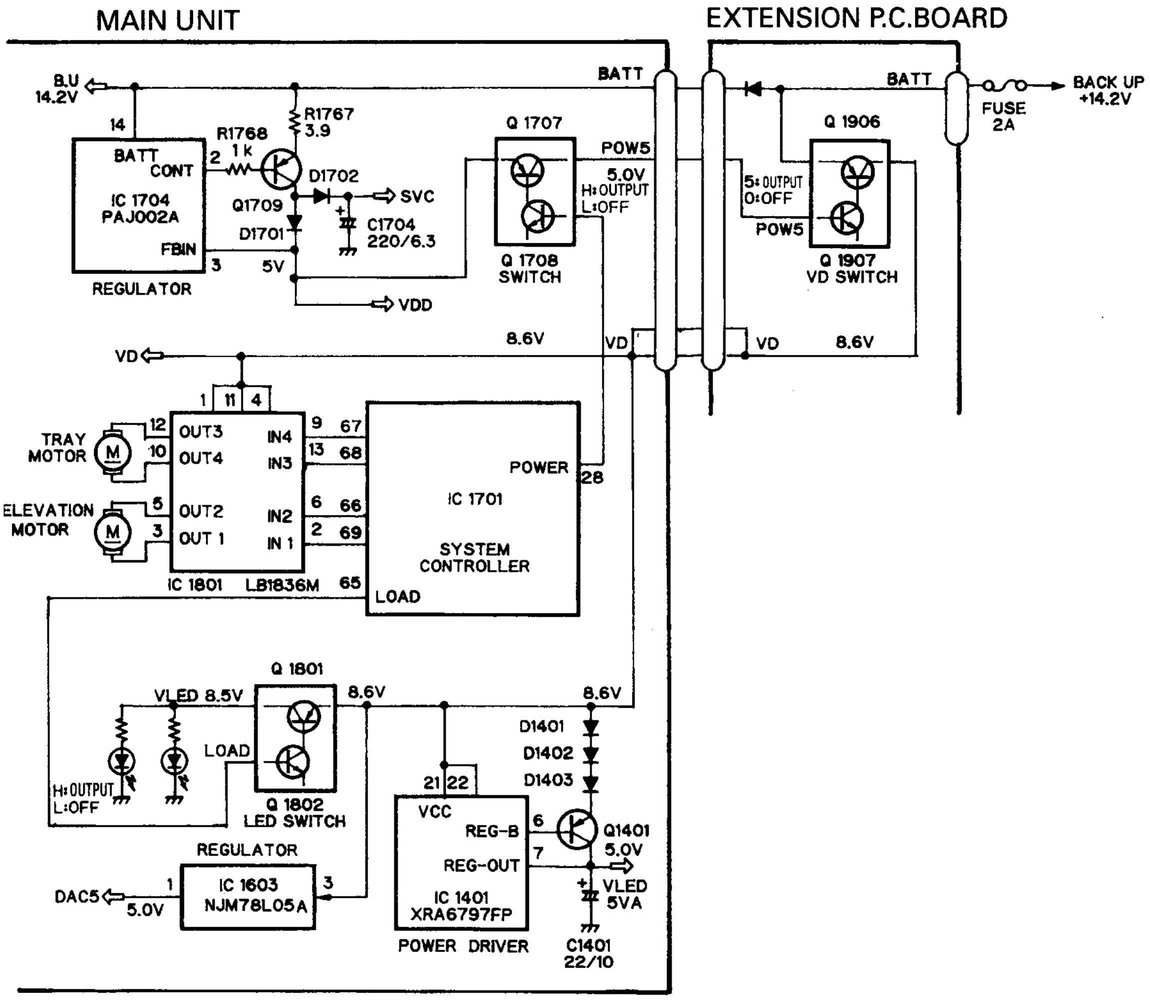


Fig.30

5.4 Mechanical Function

1) Elevation (Fig. 31)

Elevation operation is system counts the number of L in the tray position (TSEL) and moves upwards/downwards to the position of the requested disc (position where TSEL is L). The system detects the position through the TSEL waveforms produced by the LED and phototransistor. When a magazine is inserted, the system interprets this that the magazine (MAG) is L If no magazine exists, MAG becomes H.

When the elevation motor rotates further from the position of the twelfth disc, the eject mechanism is activated and the magazine is ejected. At this time, the MAG switch disconnects and MAG becomes H, whereby the microprocessor judges that eject operation is finished. After that, the microprocessor judges that operation is finished. After that, the system moves to and stops at the position of the twelfth disc.

If the system does not return to the position of the twelfth disc, it does not lock the magazine in place, but simply ejects it, even if the magazine is inserted again. For protection, elevation will be operated only when a tray is loaded in the magazine (DSP is H and TRP is L).

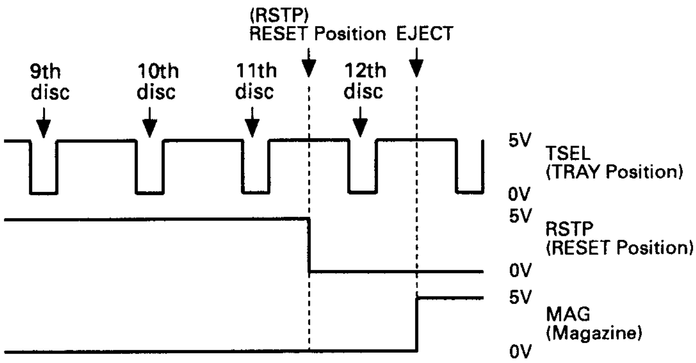
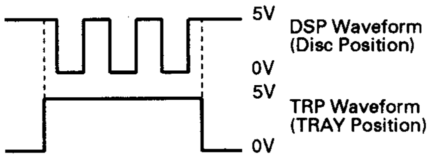


Fig.31

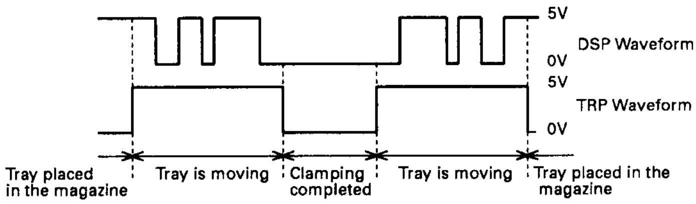
2) Loading/Unloading the Tray (Fig. 32-1-a and 32-2)

According to the disc position (DSP) and tray position (TRP) waveforms, the microprocessor of the system decides on a series of operations in the magazine, such as storing the tray, removing the tray or completion of clamping. Fig. 32-1 shows when no disc is loaded. Fig. 32-2 shows when a disc is loaded. DSP and TRP are detected through switches. For the elevation and tray operations, the motors are driven by the 2-circuit motor driver IC 1801 (LB1836M). The drive instructions are given by the microcomputer through a combination of H and L of the four lines, namely I1, I2, I3 and I4, to perform normal and reverse operations.



No disc

Fig.32-1



Disc (12 or 8 cm)

Fig.32-2

3) Disc detection (Fig. 33)

DSP is not only used for the previously mentioned extension and retreat of trays, but is also used for timing of decisions of whether the tray contains a disc or not, and whether the disc is a 12 or 8 cm disc. A series of disc detection operations are carried out while trays are pulled out of the magazine. For disc detection, an LED and photo transistor are provided above and below the tray. Presence of the disc is determined according to whether the light passes through the tray (disc waveform is L) or is blocked by the disc (disc waveform is H).

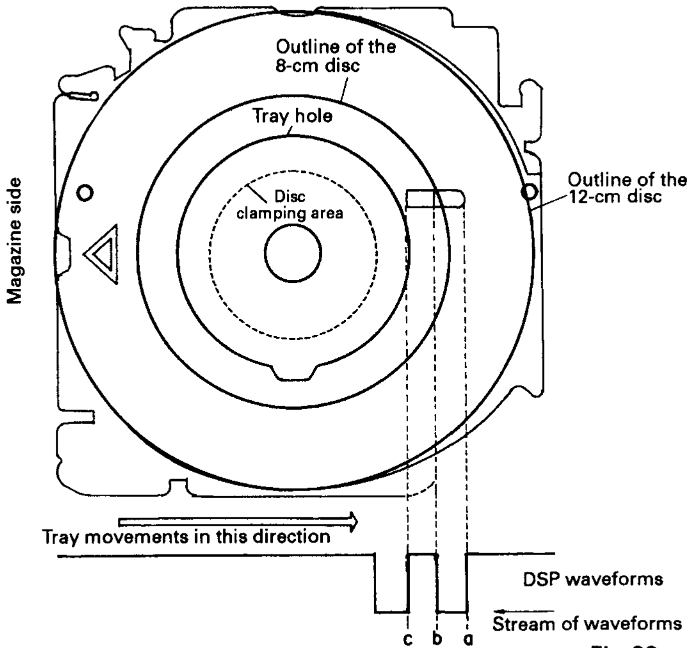


Fig.33

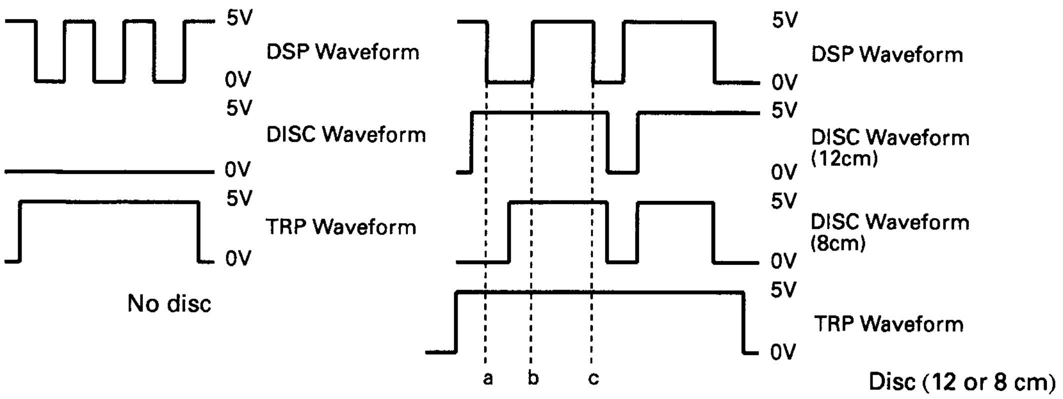


Fig.34

The flow of the waveform is opposite that of the previously mentioned DSP waveform.

Disc waveform is continuously detected during the periods of a-b and b-c:
If L is detected at least once, that period is L.
If L is not detected at least once, that period is H.

	a-b	b-c
12Cm	H	H
8Cm	L	H
Disc (nothing)	L	L

However, regardless of whether a-b is H or L, if b-c is L, all trays are determined to be empty.

4) Mechanical Reset (Fig. 35):

When the backup power of the changer is switched to ON, mechanical reset will be performed to initialize mechanical operations as well as to inform the microprocessor of the position of the twelfth disc.

(1) Existence of the tray in the magzine:

The system detects the existence of the tray in the magazine by using the TRP and DSP switches (Fig. 32). If TRP is L and DSP is H, the tray is judged to exist in the magazine. Otherwise, the system judges that the tray is removed from the magazine, and returns the tray to the magazine. After confirming that TRP is L and DSP is H, the system proceeds to the next operation.

(2) Searching the RSTP (reset position):

The reset position is located between the eleventh and twelfth discs (Fig. 31). The operation depends on the initial status of RSTP.

If RSTP is L.

The elevation system moves downward until RSTP becomes H, and stops at that position.

If RSTP is H.

The elevation system moves upward and it stops once RSTP becomes L.

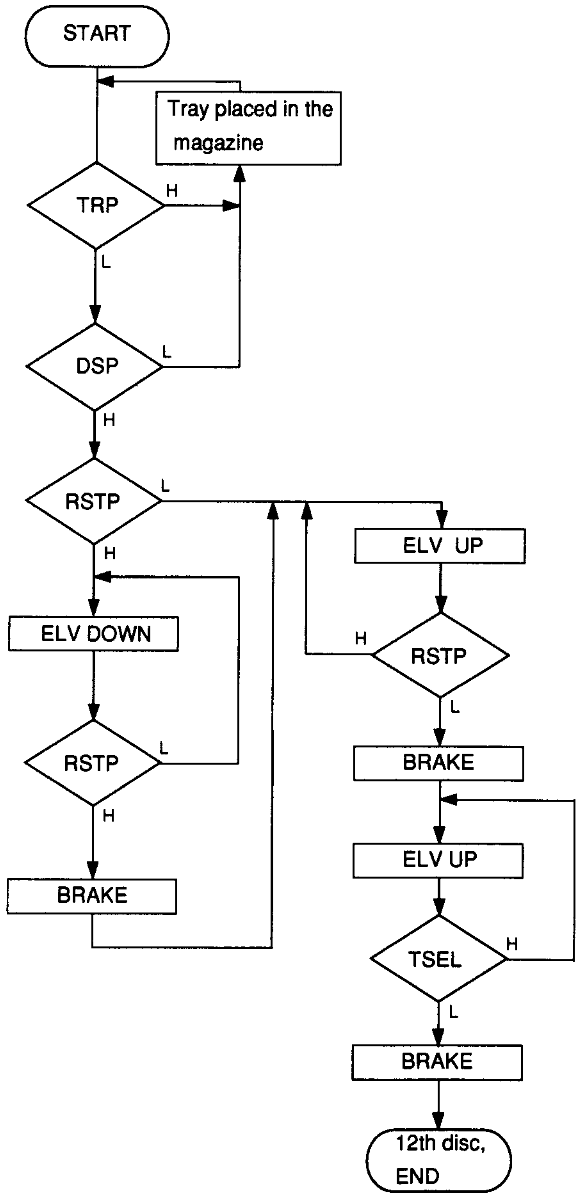


Fig.35

(3) Moving to the position of the twelfth disc:
Once the absolute position is known, the elevation system moves upward from that position. The system locates the position of the twelfth disc once it detects that TSEL becomes L and stops at that position.

The operation of steps (1) to (3) is called mechanical reset. Mechanical reset is performed when the BU power supply is switched to ON, when the magazine is inserted/ejected, or when the system is reset. Mechanical reset will be performed even if no magazine is loaded.

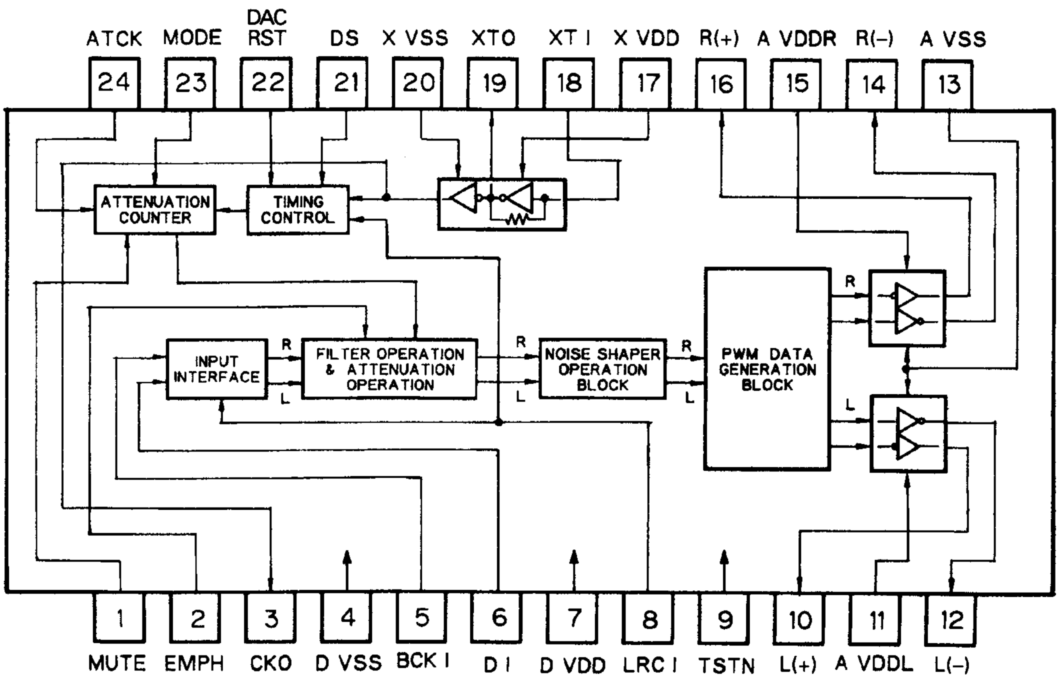
● **ICs**

● **Pin Functions (SM5874AM)**

Pin No.	Pin Name	I/O	Function and Operation
1	MUTE	I	Mode H: Soft mute ON/OFF Mode L: Attenuator level DOWN/UP
2	EMPH	I	De-emphasis ON/OFF terminal
3	CKO	O	Oscillation output clock
4	DVSS		Digital GND (0V)
5	BCKI	I	Input data bit clock
6	DI	I	Serial data input
7	DVDD		Digital VDD (5V)
8	LRCI	I	Input data sample rate (fs) clock
9	TSTN	I	Test
10	L(+)	O	Lch analogue output (+)
11	AVDDL		Analogue VDD
12	L(–)	O	Lch analogue output (-)
13	AVSS	I	Analogue VSS
14	R(–)	O	Rch analogue output (-)
15	AVDDR		Analogue VDD
16	R(+)	O	Rch analogue output (+)
17	XVDD		Crystal VDD (5V)
18	XTI	I	Oscillation input
19	XTO	O	Oscillation output
20	XVSS		Crystal VSS (0V)
21	DS	I	Normal / high-speed play mode select
22	DACRST	O	Reset output
23	MODE	I	Soft mute / attenuator mode select
24	ATCK	I	Attenuator level clock

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

*SM5874AM

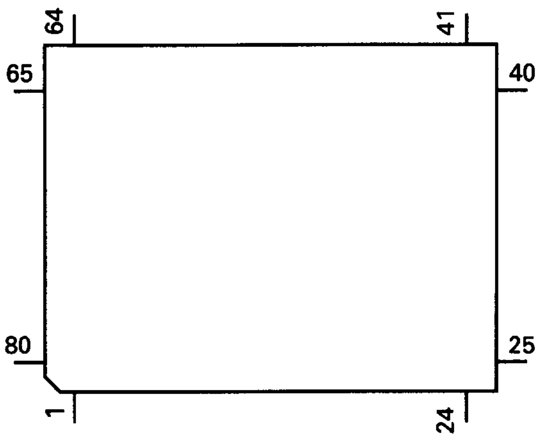


● Pin Functions (PD5327A)

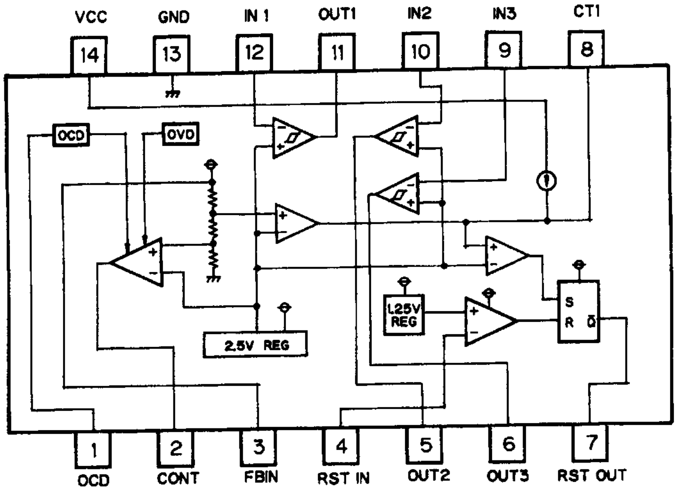
Pin No.	Pin Name	I/O	I/O Format	Function and Operation
1	TIN	I	C	Tray position input
2	TEMP	I		Temperature detector
3	VDIN	I		Power supply short sensor input
4	TOUT	I	C	Disc sensor timing input
5	CSI	I	C	IP-BUS data input
6	CSO	O	C	IP-BUS data output
7	APPW	O	C	IP-BUS driver power supply control output
8	AO	O	C	Control signal distingshing from LSI
9	XSCK	I/O	C	LSI clock input/output
10	XSO	O	C	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	DCE	O	C	Chip enable output
15	DACRST	O	C	D/A converter reset output
16	ASENS	I		ACC power sense input
17	BSENS	I		Back up power sense input
18	DMUTE	O	C	Mute output
19	DRST	O	C	Reset output
20-23	NC			Not used
24	EJSW	I		Eject key switch interrupt input
25	MAG	I		Magazine lock switch interrupt input
26	NC			Not used
27	RESET	I		Reset input
28	POWER	O	C	CD +5V control
29	CONT	O	C	Servo driver power supply control
30	XIN	I		Crystal oscillating element connection pin
31	XOUT	O		Crystal oscillating element connection pin
32	VSS			GND
33-40	D7-D0	I/O	C	External RAM data
41	WE	O	C	External RAM write enable
42	PROT	O	C	External RAM output enable
43	CS	O	C	External RAM chip select
44-56	A12-A0	O	C	External RAM address
57	EJP	I	C	Reset position switch
58,59	NC			Not used
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	I4	O	C	Motor driver control output
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			Back up 5V
74	VREF	I		A/D converter reference voltage input
75	AVSS	I		A/D GND
76	UNIT	I		Unit input
77	6/12	I	C	6/12 switching input
78	DISK			Disc detector input
79	TSEL	I		Tray position detector photo sensor
80	CSEL	I	C	Compression select

I/O Format	Meaning
C	C MOS

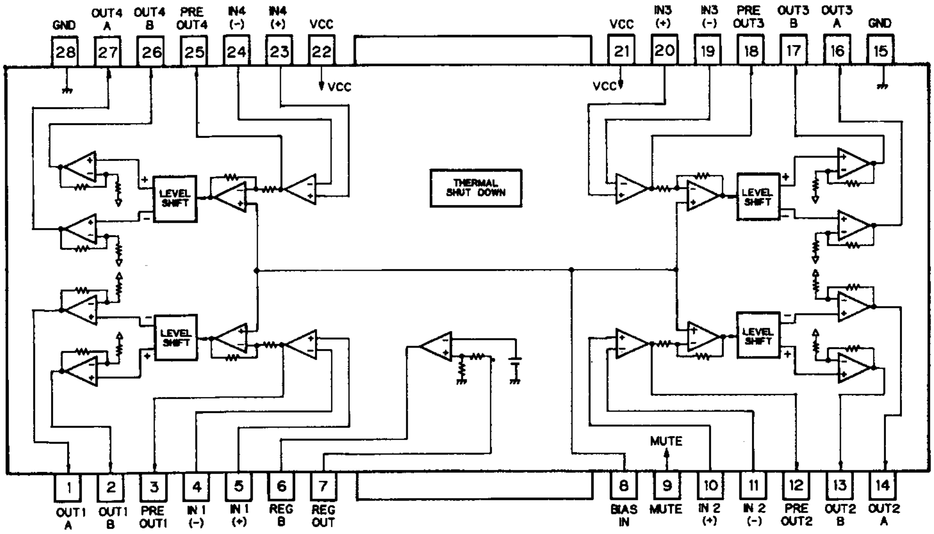
*PD5327A



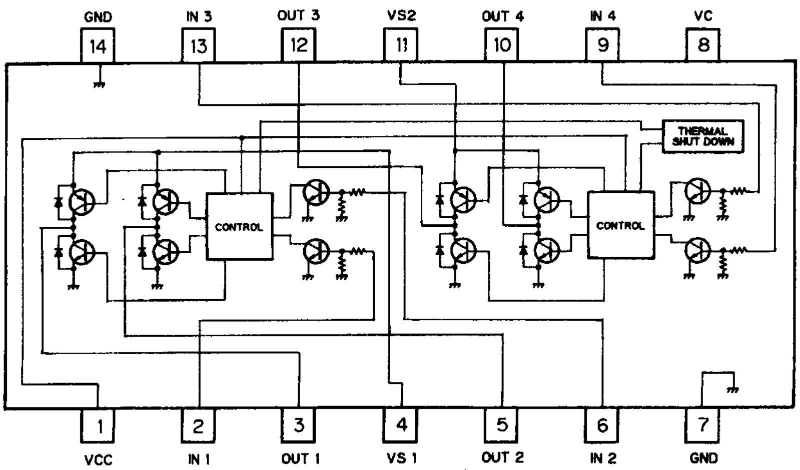
PAJ002A



XRA6797FP



LB1836M



6. 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/○S○○○J,RS1/○○S○○○J

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

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

=====Circuit Symbol & No.	Part Name=====	Part No.
Unit Number : CWX1722		
Unit Name : Main Unit		
MISCELLANEOUS		
IC 1001		UPC2571GS
IC 1201		UPD63700GF1
IC 1401		XRA6797FP
IC 1601		SM5874AM
IC 1602		XRA4560F
IC 1603		NJM78L05A
IC 1701		PD5327A
IC 1702		LH5160HN-10L
IC 1703		PA0051AM
IC 1704		PAJ002A
IC 1801		LB1836M
Q 1001		2SA1015
Q 1401 1709		2SB1238
Q 1701		DTA144ES
Q 1703		DTC144ES
Q 1704 1707 1801		DTA123JS
Q 1708,1802		DTC114YS
D 1401 1402 1403		ERA15-02VH
D 1701		1SS133
D 1702		1SS292
X 1601		CSS1328
X 1701	Ceramic Resonator	CSS1310
VR1001	Semi-fixed 2.2kΩ (B)	CCP1177
VR1002	Semi-fixed 22kΩ (B)	CCP1183
VR1003 1004	Semi-fixed 47kΩ (B)	CCP1185
RESISTORS		
R 1001		RD1/4PS220JL
R 1002		RD1/4PS0R0JL
R 1003		RD1/4PS103JL
R 1004 1768		RS1/16S102J
R 1005		RS1/16S823J
R 1006		RS1/16S182J
R 1007		RS1/16S333J
R 1011 1012		RS1/16S683J
R 1013 1024 1025		RD1/4PS102JL
R 1014 1410		RS1/16S473J
R 1018		RD1/4PS622JL
R 1019 1401 1407 1716		RS1/16S563J
R 1020		RS1/16S622J
R 1021 1701		RS1/16S513J
R 1022 1408		RS1/16S133J
R 1027		RS1/16S183J
R 1028		RS1/16S822J
R 1201 1406 1411 1605 1606 1607 1608 1702 1712 1741		RS1/16S103J
R 1402 1403 1613 1614 1615 1616		RS1/16S163J
R 1404		RS1/16S753J

=====Circuit Symbol & No.	Part Name=====	Part No.
R 1405 1708		RS1/16S433J
R 1409		RS1/16S153J
R 1412		RS1/16S152J
R 1601 1742 1766		RS1/16S0R0J
R 1602		RS1/16S471J
R 1609 1610 1611 1612		RS1/16S752J
R 1617 1618 1769		RS1/16S101J
R 1704		RS1/16S154J
R 1705 1706 1713 1715 1718 1721 1730 1731 1732 1733		RS1/16S104J
R 1709 1710 1714 1722 1729 1735 1744 1745		RS1/16S222J
R 1717		RS1/16S123J
R 1720		RS1/16S104J
R 1734 1737		RS1/16S104J
R 1747 1748		RS1/16S104J
R 1756		RS1/16S104J
R 1767		RD1/4PS3R9JL
R 1771		RS1/16S102J
R 1801 1802		RD1/4PS391JL
CAPACITORS		
C 1001 1008 1010 1011 1708 1709		CKSRYB102K50
C 1002		CEAS101M10
C 1003 1021 1602 1603 1604 1605		CKSQYB104K16
C 1004		CEAS470M10
C 1005		CCSRCH101J50
C 1006 1023		CKSRYB561K50
C 1007		CKSYB334K16
C 1009		CCSRCH181J50
C 1013 1701 1702 1705 1707		CKSRYB103K25
C 1014		CCSRCH220J50
C 1015 1201 1202		CKSYF105Z16
C 1018		CEA220M6R3LL
C 1022		CKSRYB332K50
C 1203		CKSRYB471K50
C 1401		CSZA220M10
C 1402		CKSQYB103K50
C 1403		CKSQYB153K50
C 1404 1405		CEAS221M10
C 1406		CKSRYB152K50
C 1407		CKSRYB821K50
C 1408		CKSRYB271K50
C 1606 1607		CCSRCH470J50
C 1608		CEA101M6R3LL
C 1609 1610		CCSRCH221J50
C 1611 1612 1613 1614		CCSRCH680J50
C 1616		CKSYB224K16
C 1617 1618		CKSRYB103K25
C 1703		CASA330M10
C 1704		CEA221M6R3LL
C 1706		CKSRYB103K50
C 1710		CKSRYB103K25
C 1802		CEA220M16LL

=====Circuit Symbol & No. Part Name===== Part No.

Unit Number :
Unit Name : Extension P.C.Board

MISCELLANEOUS

Q 1693 1697		DTA144ES
Q 1696		DTC114YS
Q 1698 1699		DTC343TS
Q 1799		2SC2458
Q 1906		2SB942
Q 1907 1908		2SD1859
D 1698 1699		1SS133
D 1798 1799		RD18JSB1
D 1901 1903		ERA15-02VH
L 1901	Choke Coil	CTH1129
SW1799	Switch(Adress)	CSH1038

RESISTORS

R 1695 1910	RD1/4PS103JL
R 1696 1697	RD1/4PS332JL
R 1698 1699	RD1/4PS112JL
R 1791	RD1/4PS102JL
R 1792 1793 1794	RD1/4PS513JL
R 1795 1796 1908	RD1/4PS101JL
R 1798	RD1/4PS273JL
R 1799	RD1/4PS433JL
R 1906	RD1/4PS104JL
R 1907	RD1/4PS204JL
R 1909 1911	RD1/4PS201JL
R 1912	RD1/4PS241JL
R 1913	RD1/4PS681JL
R 1914	RD1/4PS511JL
R 1915	RD1/4PS104JL

CAPACITORS

C 1698 1699		CEA330M10LL
C 1798 1799		CKPYB471K50L
C 1901 1905 1906	470 μF/16V	CCH1183
C 1904		CEA220M10LL
C 1907		CKPYB102K50L
C 1908		CEA100M16LL
C 1909		CFTNA223J50

Unit Number :
Unit Name : P.C.Board

C 801 802	CKSQYB561K50

UnitNumber :
UnitName :Mechanism P.C.Board

D 802	LED	BR4361F
S 805	Switch(Home)	CSN1012

Miscellaneous Parts List

D 801	LED	BR4361F
S 801	Switch(RSTP)	CSN1025
S 802	Switch(MAG)	CSN1012
SW1800	Switch(Door)	CSN1027
SW1801	Switch(Reset)	CSG1039
	PU Unit	CGY1036
M 801	Motor Unit(Spindle)	CXA4540
M 802	Motor Unit(ELV)	CXA7272
M 803	Motor Unit(Tray)	CXA6977
M 804	Motor Unit(Carriage)	CXA4649
P 801 802	Photo-Transistor	PT4800
S 803 804	Switch(TRP,DSP)	CSN1012

7. BLOCK DIAGRAM

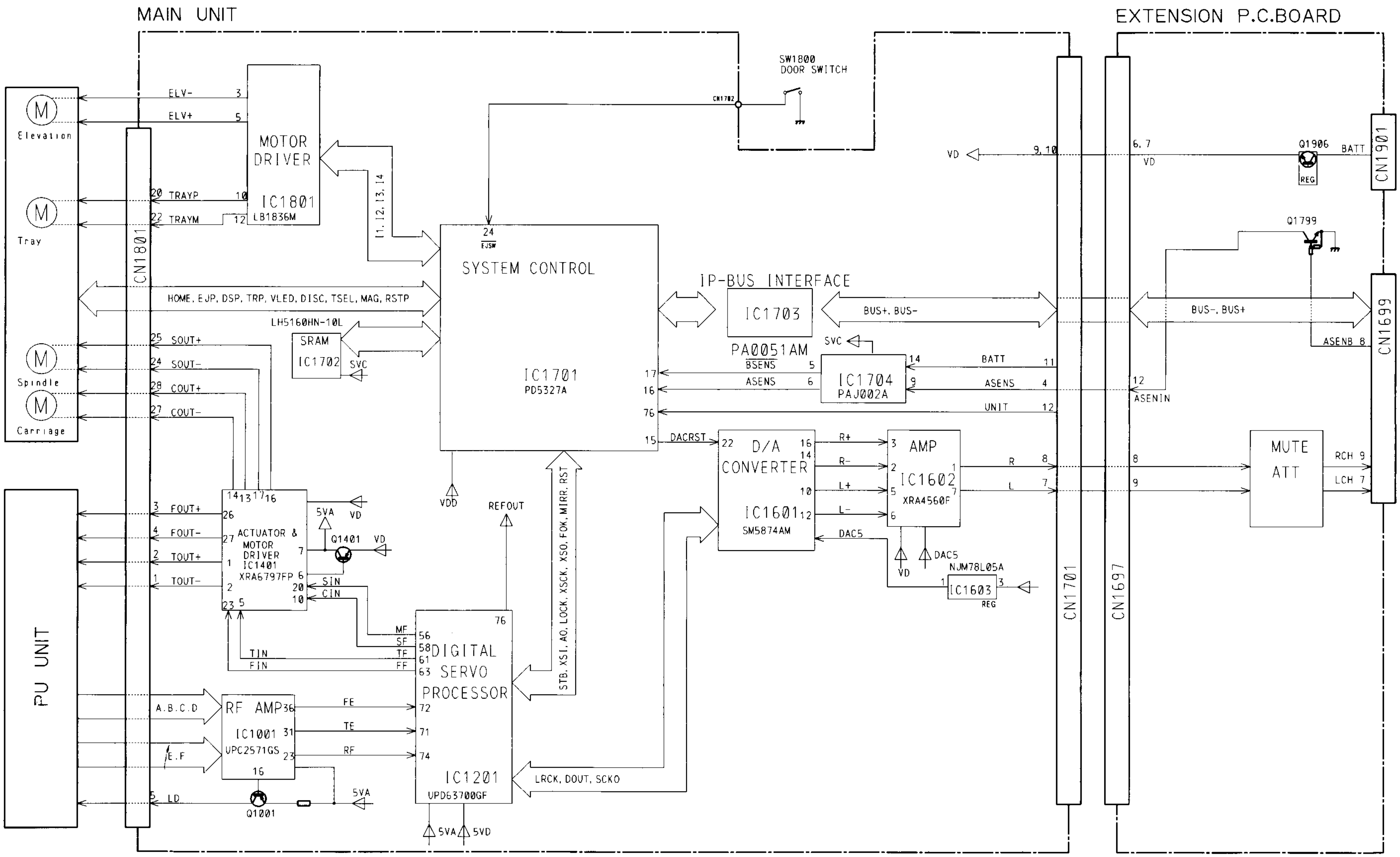


Fig.36

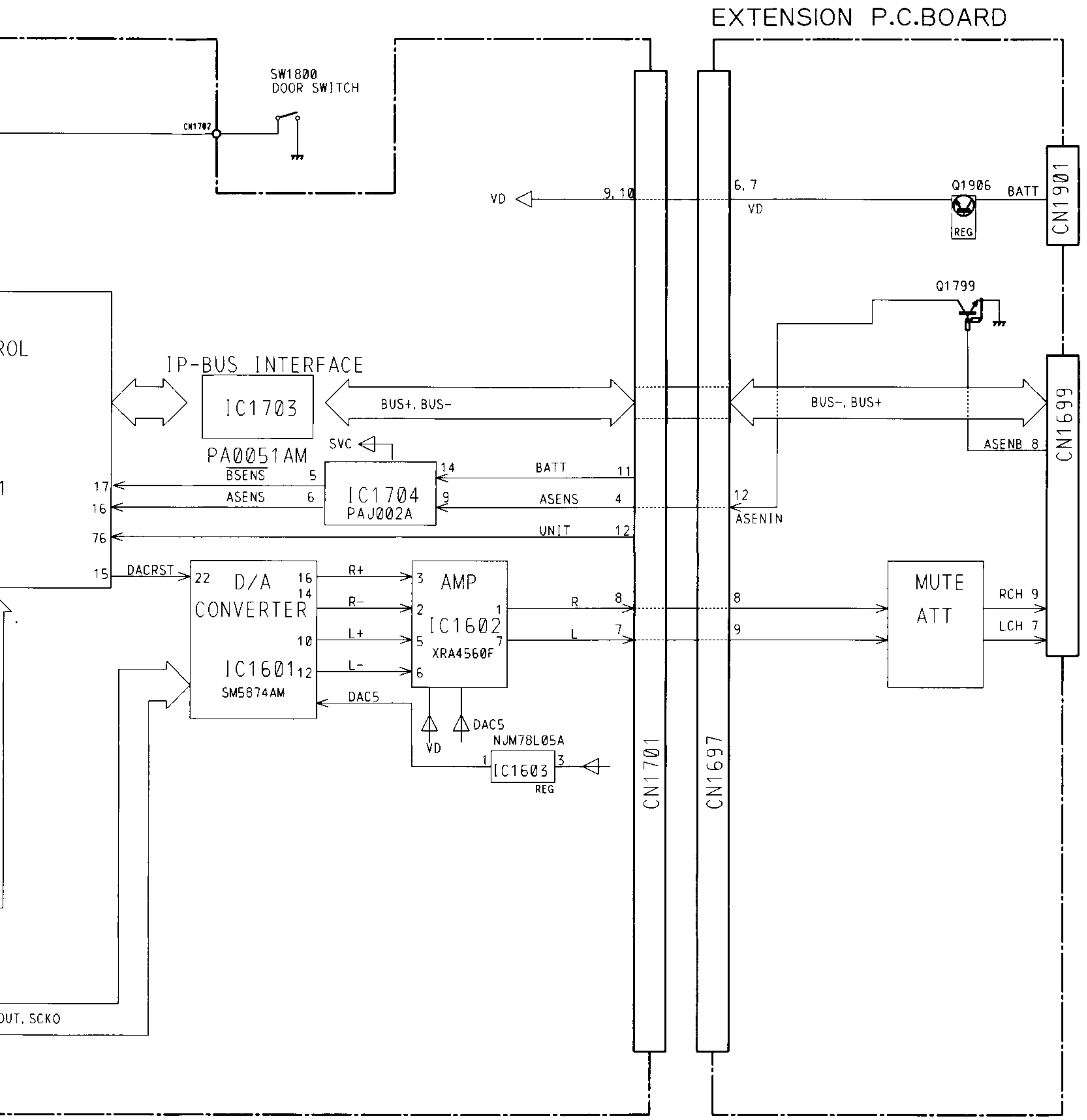
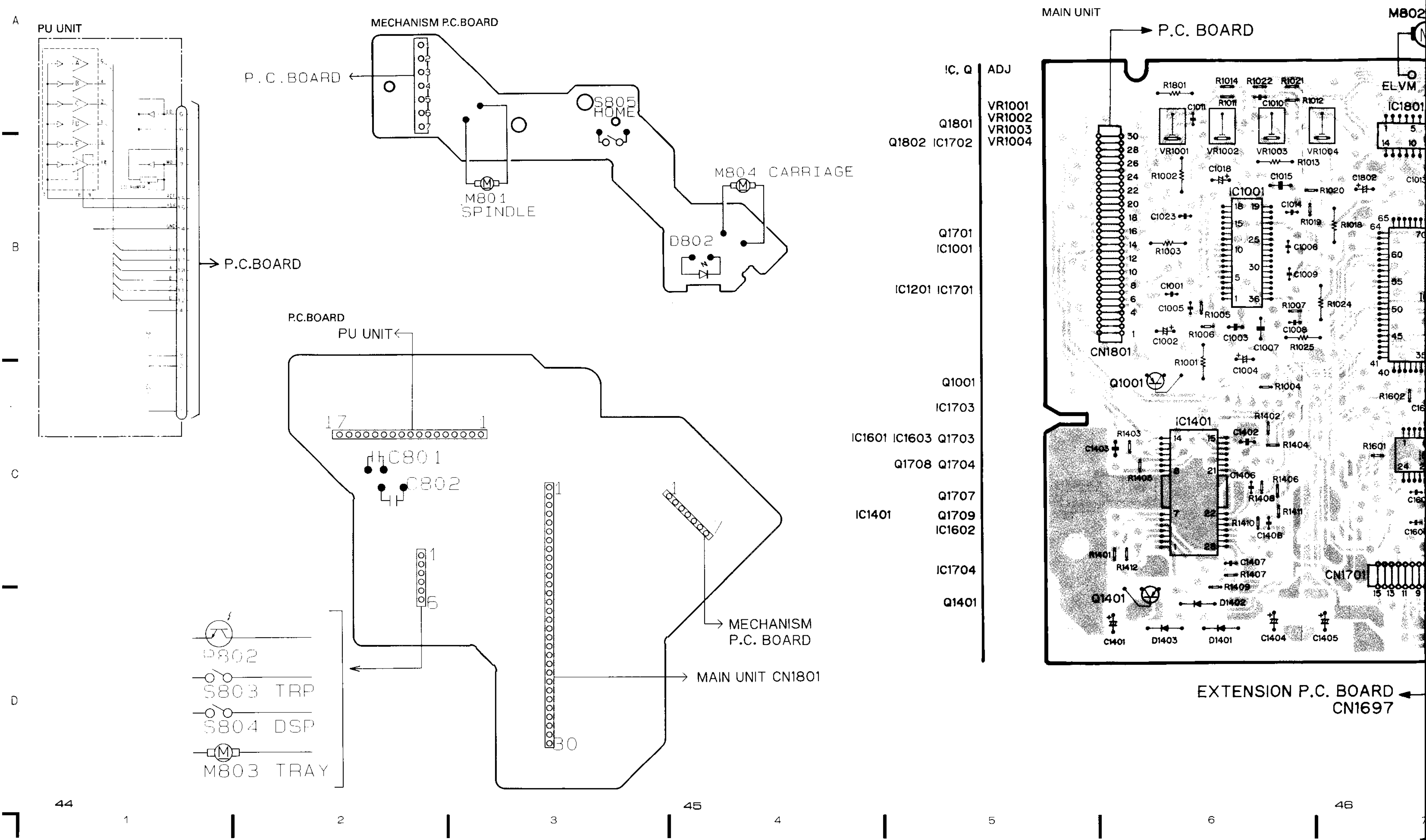

EXTENSION P.C.BOARD
SW1800
DOOR SWITCH
CN1702
VD
9, 10
6, 7
VD
Q1906
REG
BATT
CN1901
Q1799
ROL
IP-BUS INTERFACE
IC1703
PA0051AM
BUS+, BUS-
BUS-, BUS+
CN1699
ASENB 8
SVC
IC1704
PAJ002A
BSENS
ASENS
BATT
ASENS
UNIT
ASENIN
DACRST
D/A
CONVERTER
IC1601
SM5874AM
R+
R-
L+
L-
AMP
IC1602
XRA4560F
R
L
DAC5
VD
DAC5
NJM78L05A
IC1603
REG
MUTE
ATT
RCH 9
LCH 7
CN1701
CN1697
OUT, SCKO

Fig.36

8. CONNECTION DIAGRAM(1)



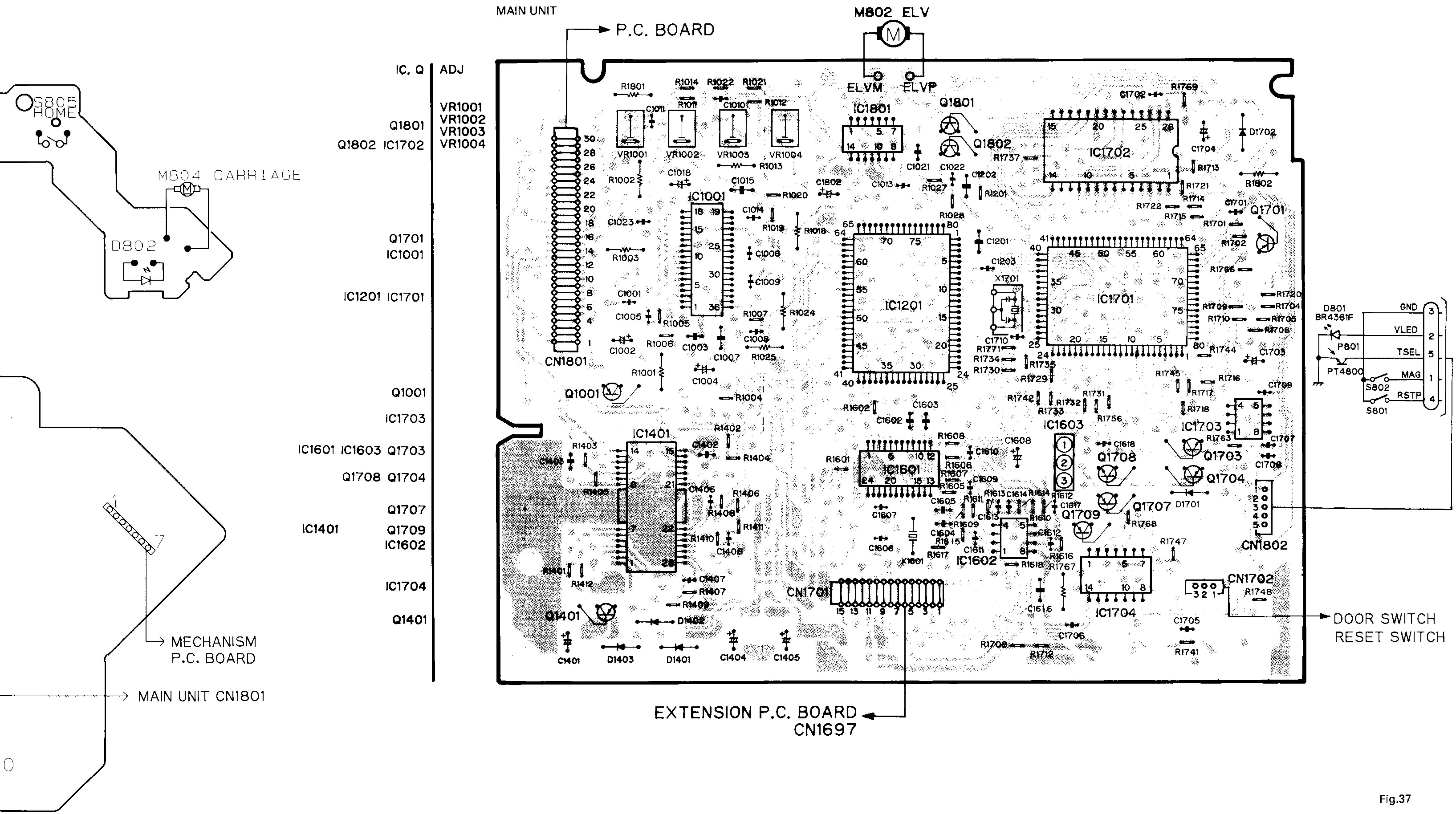
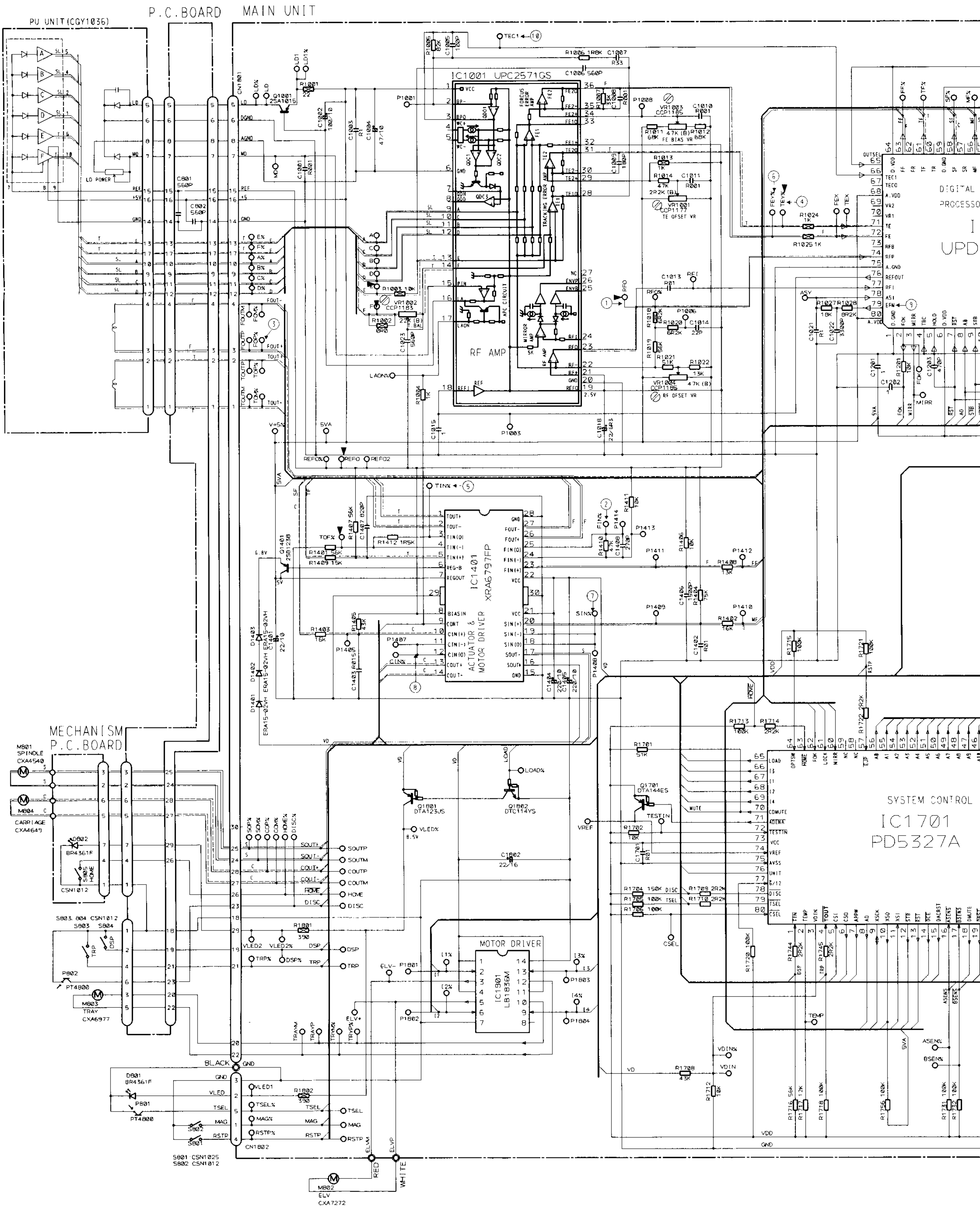


Fig.37

4 5 6 7 8 9

9. SCHEMATIC CIRCUIT DIAGRAM(1)

SL — SIGNAL LINE
F — FOCUS SERVO LINE
T — TRACKING SERVO LINE
S — CARRIAGE SERVO LINE
SP — SPINDLE SERVO LINE



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

SWITCHES:
MECHANISM P.C.BOARD
S805: HOME SWITCH: ON–OFF
MISCELLANEOUS
S801: RSTP SWITCH: ON–OFF
S802: MAG SWITCH: ON–OFF
S803: TRP SWITCH: ON–OFF
S804: DSP SWITCH: ON–OFF
SW1800: DOOR SWITCH: OPEN–CLOSE
The underlined indicates the switch position.

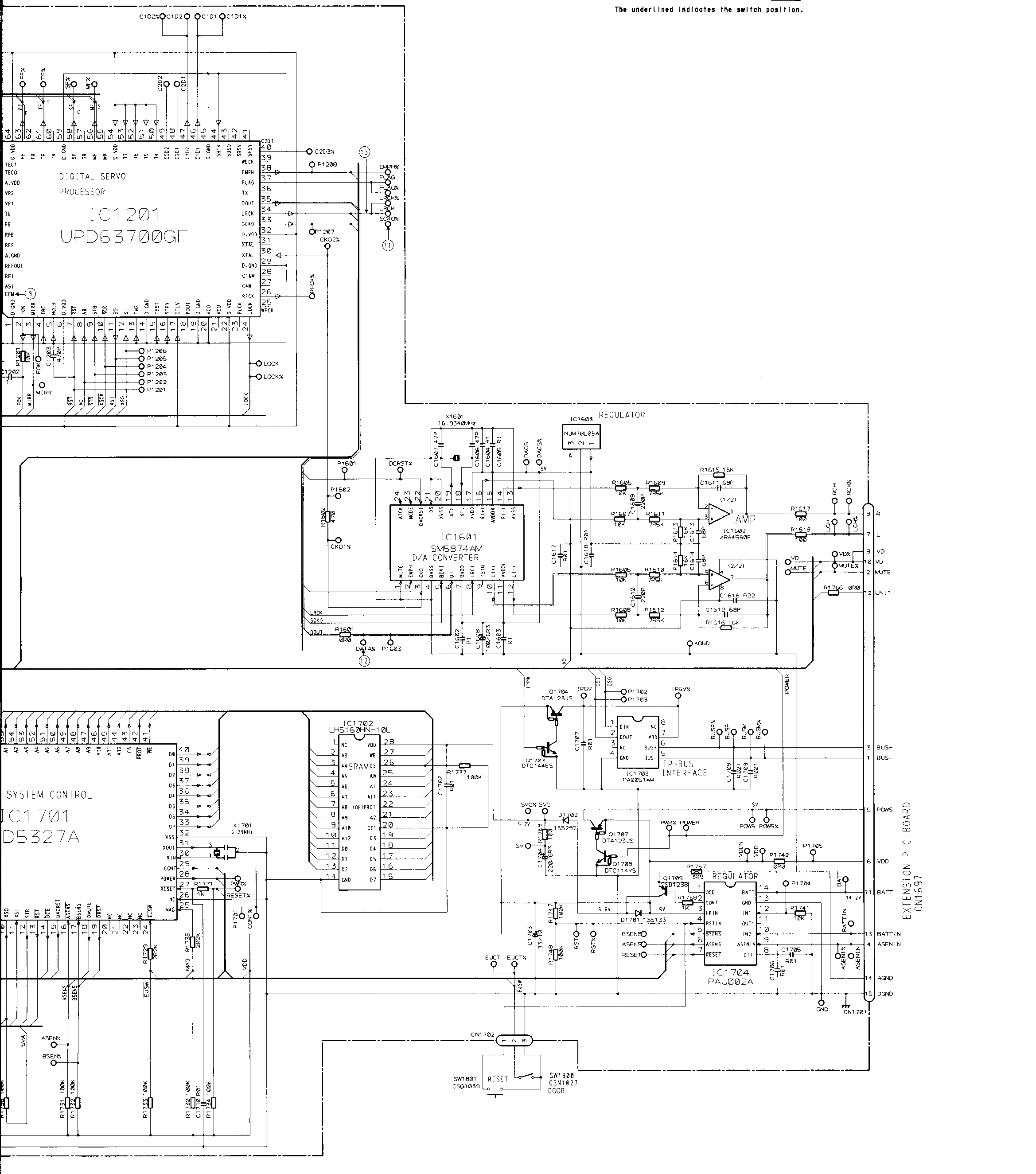


Fig.38

10. SCHEMATIC CIRCUIT DIAGRAM(2)

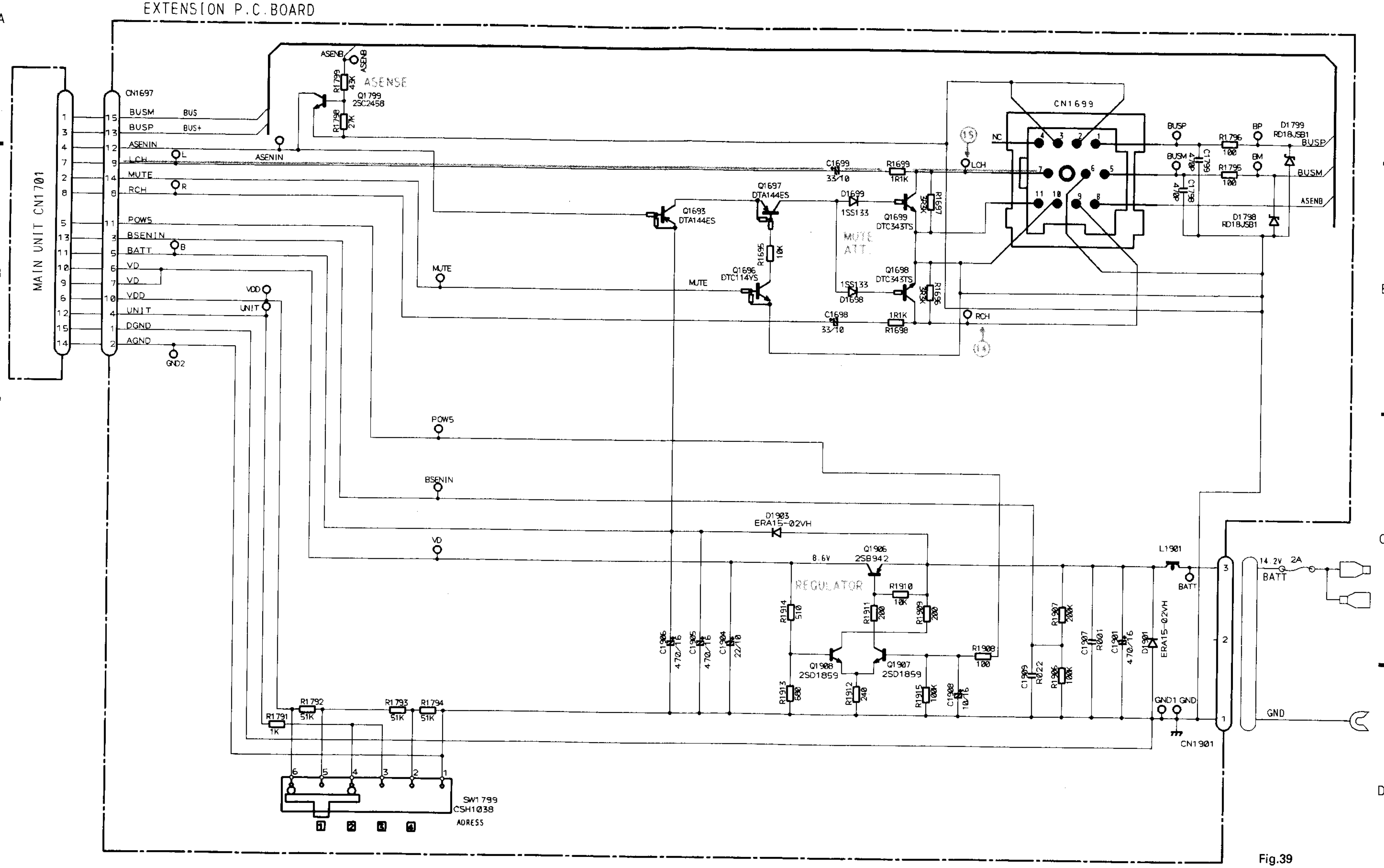


Fig.39

11. CONNECTION DIAGRAM(2)

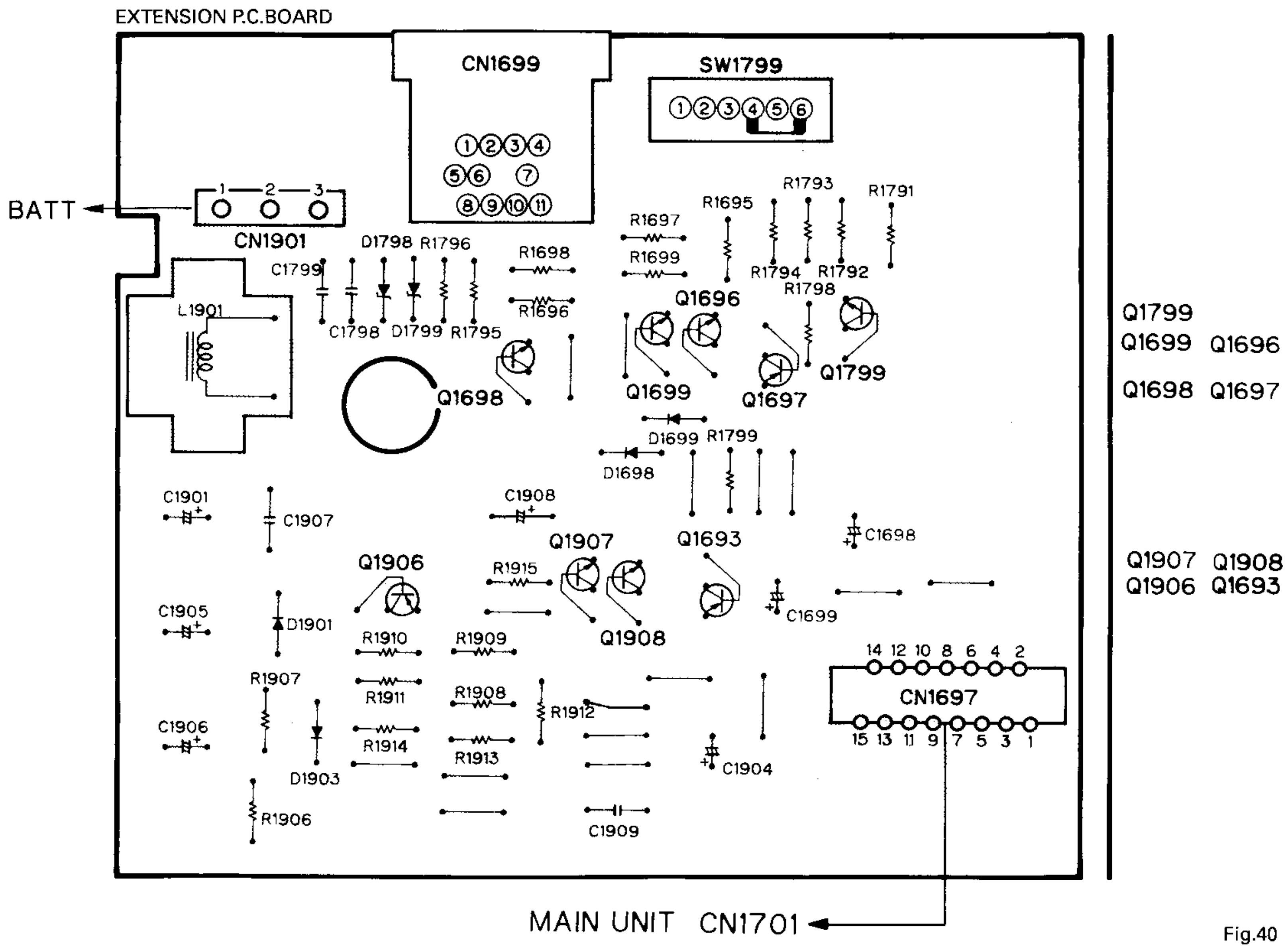
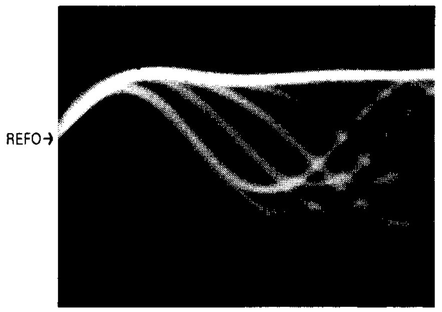


Fig.40

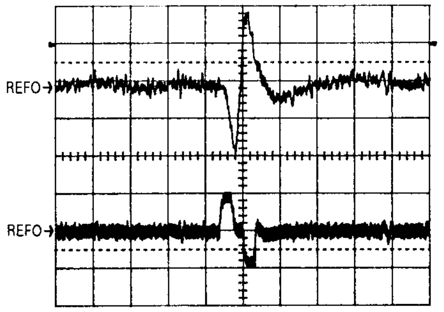
● Waveforms

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

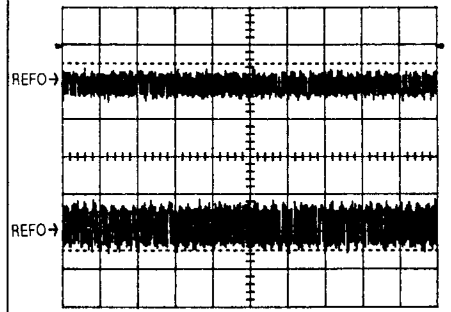
① RFO 0.5V/div. 0.2μs/div.
Normal mode: play



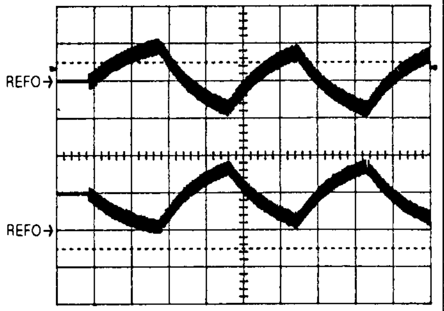
④ CH1: TEY 0.5V/div. 0.5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: Single jump (FWD)



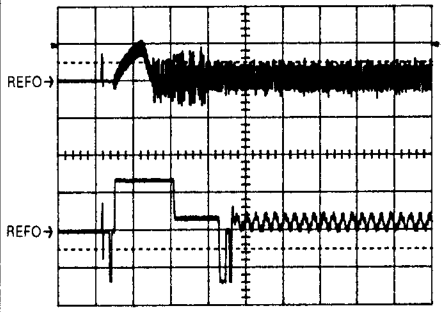
④ CH1: TEY 0.5V/div. 20ms/div.
⑤ CH2: TIN 0.5V/div.
Normal mode: Play



② CH1: FIN 1V/div. 0.2s/div.
③ CH2: FO+ 2V/div.
Test mode: No disc, Focus close

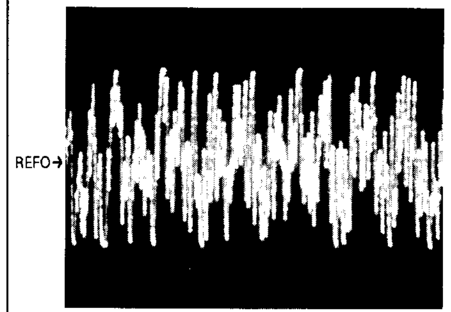


② CH1: FIN 1V/div. 0.5s/div.
⑦ CH2: SIN 1V/div.
Normal mode: Focus close (12cm)

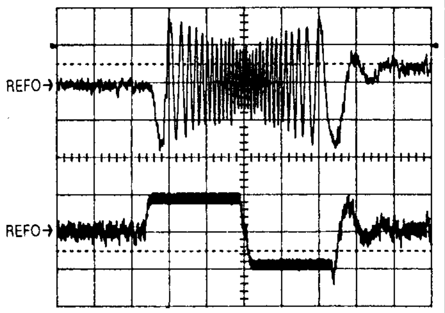


⑦ SIN 0.5V/div. 10ms/div.

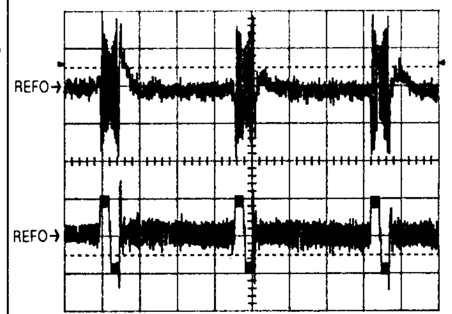
Search (12cm disc)



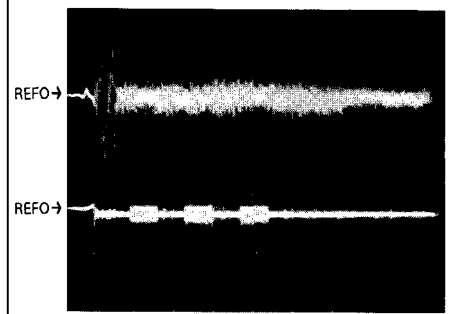
④ CH1: TEY 0.5V/div. 0.5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: 32 track jump (FWD)



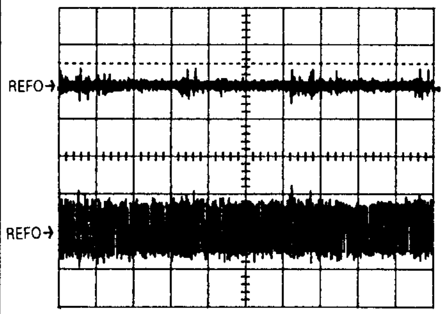
④ CH1: TEY 0.5V/div. 5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: 100 track jump (FWD)



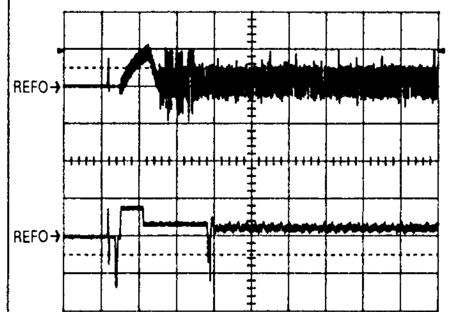
④ CH1: TEY 0.5V/div. 0.1s/div.
⑥ CH2: FEY 0.5V/div.
Normal mode: AGC after focus close



⑥ CH1: FEY 0.2V/div. 20ms/div.
② CH2: FIN 0.5V/div.
Normal mode: Play



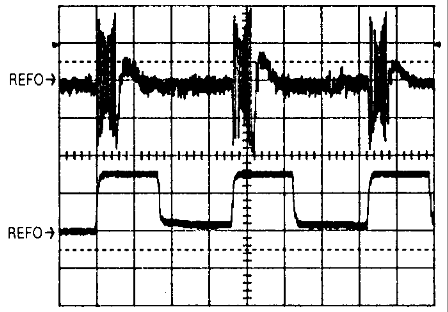
② CH1: FIN 1V/div. 0.5s/div.
⑦ CH2: SIN 1V/div.
Normal mode: Focus close (8cm)



⑫ DATA 2V/div. 10μs/div.

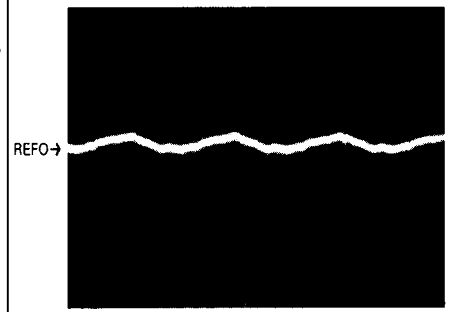
Play

④ CH1: TEY 0.5V/div. 5ms/div.
⑧ CH2: CIN 0.5V/div.
Test mode: 100 track jump (FWO)

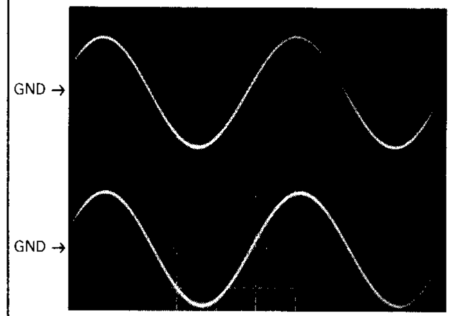


⑦ SIN 0.5V/div. 50ms/div.

Normal mode: 1Play (12cm disc)

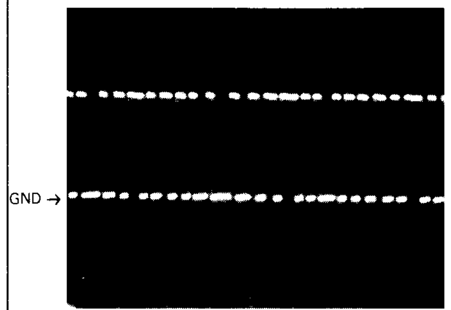


⑭ CH1: R OUT 1V/div. 0.2ms/div.
⑮ CH2: L OUT 1V/div.
Normal mode: Play (1kHz 0dB)

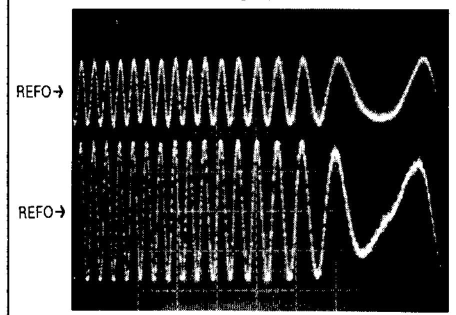


⑨ EFM 2V/div. 5μs/div.

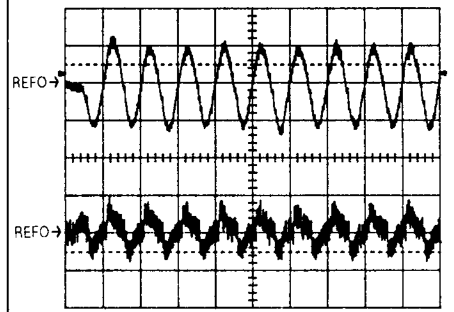
Play



④ CH1: TEY 1V/div. 2ms/div.
⑩ CH2: TEC 1V/div.
Test mode: Focus closed
Tracking open

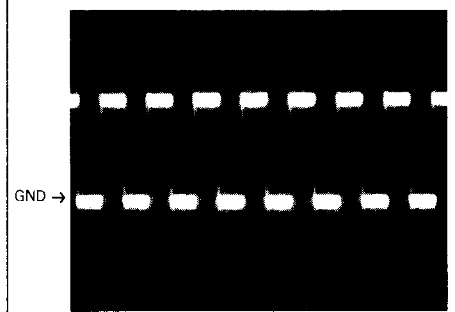


⑥ CH1: FEY 0.2V/div. 1ms/div.
② CH2: FIN 1V/div.
Normal mode: During AGC



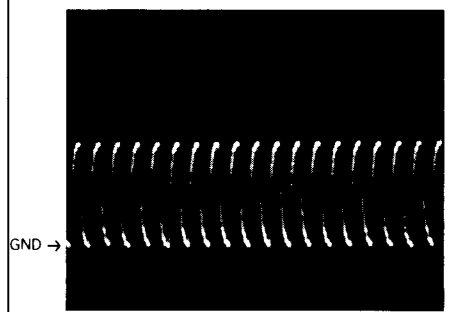
⑬ LRCK 2V/div. 20μs/div.

Play

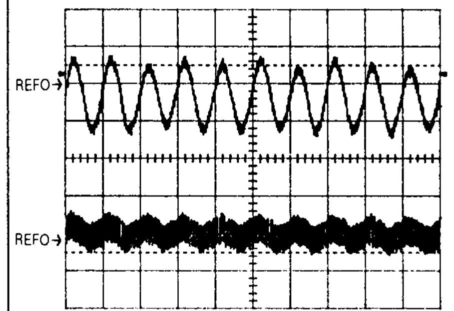


⑪ SCKO 2V/div. 1μs/div.

Play



④ CH1: TEY 0.5V/div. 1ms/div.
⑤ CH2: TIN 0.5V/div.
Normal mode: During AGC



12. CHASSIS EXPLODED VIEW

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.
	1	Screw	BMZ26P080FMC
	2	Screw	BSZ30P055FZK
	3	Cord(UC,ES)	CDE4211
		Cord(EW)	CDE4210
	4	Connector(CN1701)	CKS2764
	5	Connector(CN1801)	CKS2779
	6	Connector	CDE4716
	7	Connector	CDE4372
	8	Upper Case	CNB1901
	9	Lower Case	CNB1884
	10	Earth Plate	CNC5769
	11	Insulator	CNM4427
	12	Main Unit	CWX1722
	13	CD Mechanism Unit	CXK4100
	14	Spare Assy(UC, ES)	CXX1157
		Spare Assy(EW)	CXX1170
	15	Screw	PMS26P040FMC
	16,17	·····	
	18	Screw	HMF40P080FZK
	19	·····	
	20	Angle	CNB1873

Mark	No.	Description	Part No.
	21	·····	
	22	Connector(CN1702)	CKS3125
	23	Connector(CN1802)	CKS3127
	24	Plug(CN1901)	CKS-460
	25	Plug(CN1800)	CKS1036
	26	Connector(CN1697)	CKS2218
	27	Extension Unit	CWX1823
	28	Screw	BPZ26P080FMC
	29	Door	CAT1655
	30	Connector	CDE4501
	31	Connector(CN1699)	CKS2479
	32	Grille(UC, ES)	CNS3314
		Grille(EW)	CNS3665
	33	Guide	CNV4055
	34	Heat Sink	CNC4447
	35	Connector Bracket	CNC5570
	36	Transistor(Q1906)	2SB942

● Chassis

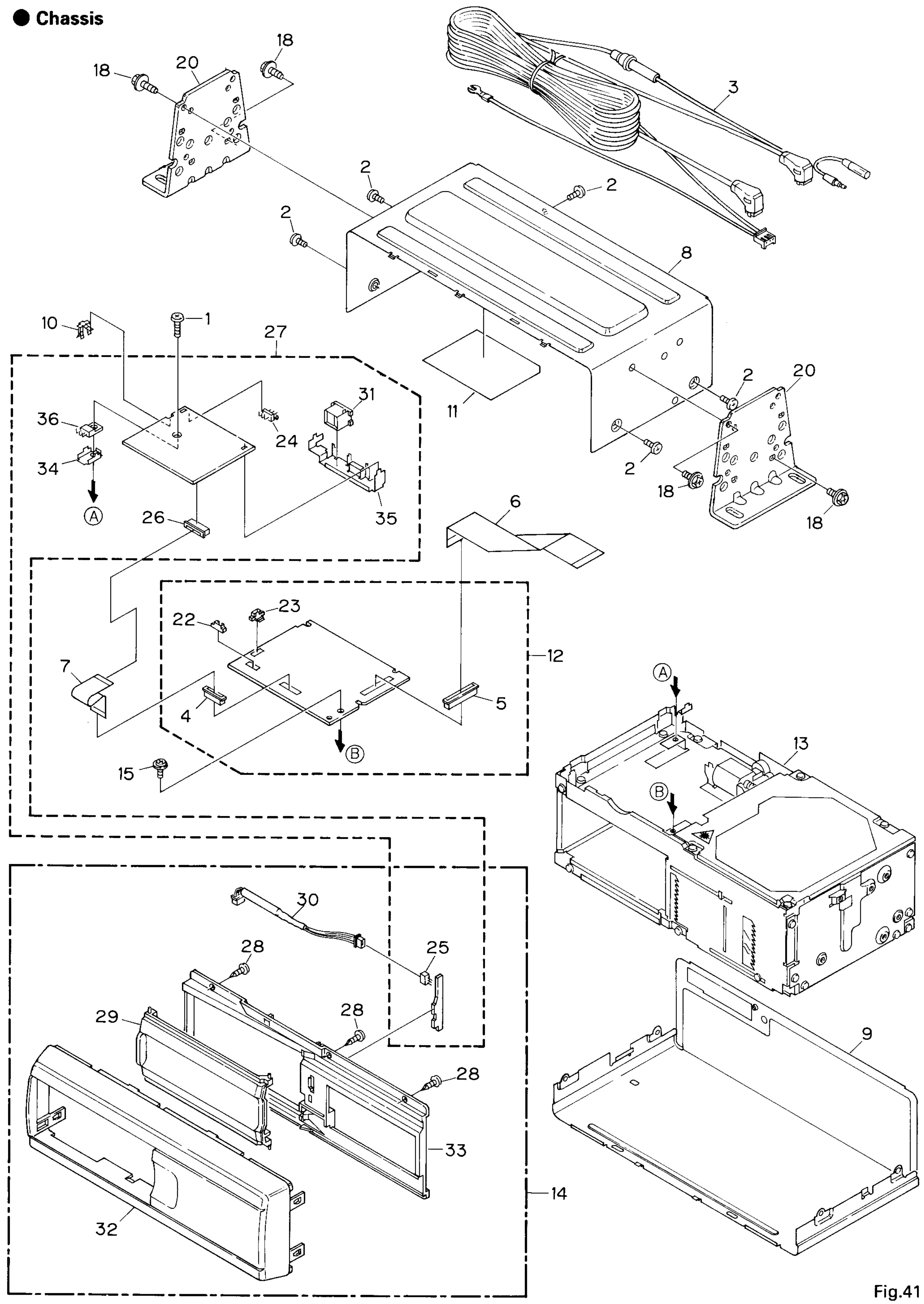


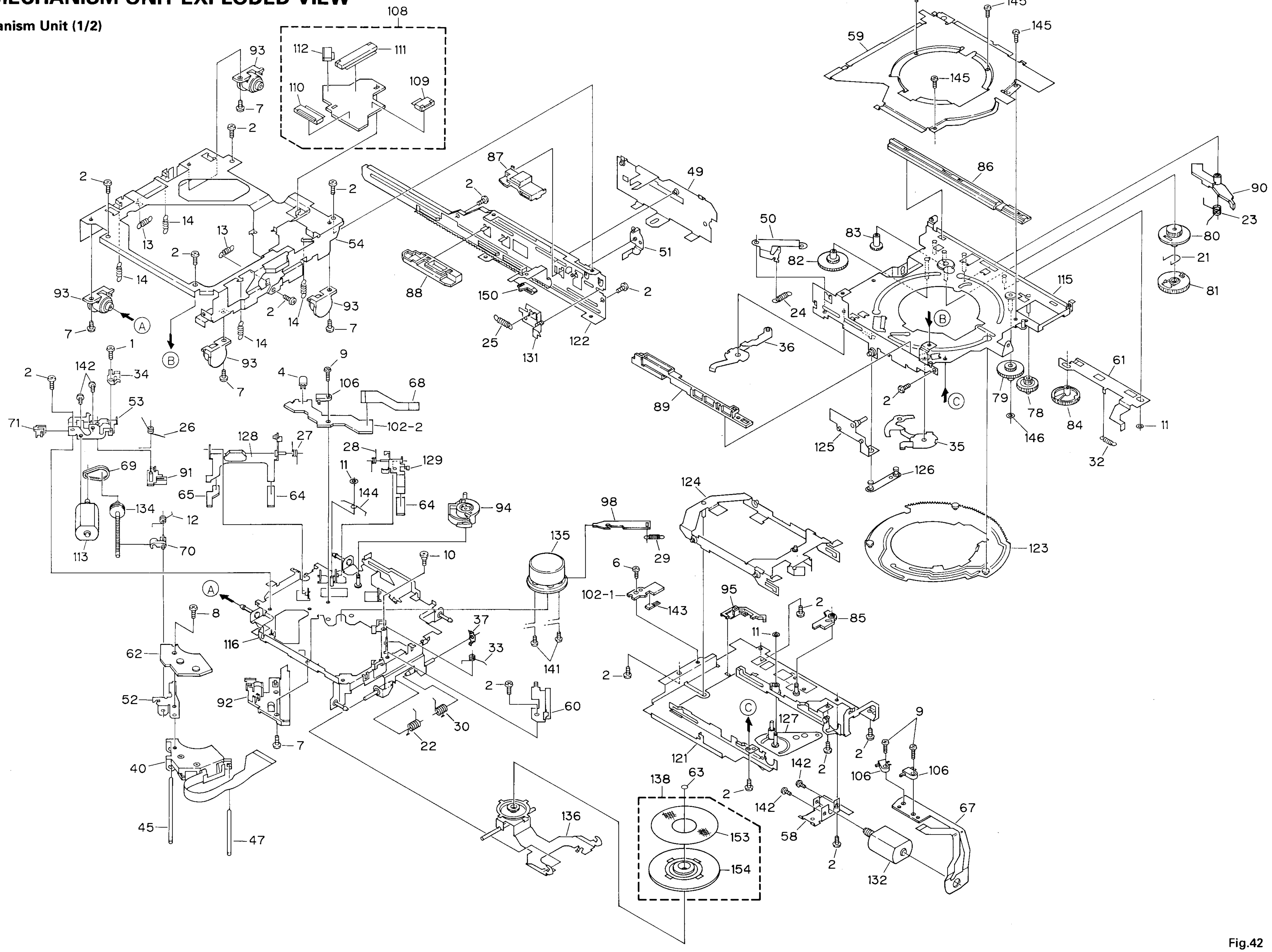
Fig.41

2 3 4 5 6

13. CD MECHANISM UNIT EXPLODED VIEW

● **CD Mechanism Unit (1/2)**

A



B

C

D

Fig.42

● **Parts List**

Mark	No.	Description	Part No.
	1	Screw	BMZ20P030FMC
	2	Screw	BMZ20P025FMC
	3	Screw	CBA1065
	4	LED	BR4361F
	5	Screw	CBA1037
	6	Screw	CBA1041
	7	Screw	CBA1077
	8	Screw	CBA1086
	9	Screw	CBA1229
	10	Screw	CBA1243
	11	Washer	CBF1038
	12	Spring	CBH1488
	13	Spring	CBH1497
	14	Spring	CBH1498
	15,16	·····	
	17	Spring	CBH1589
	18	Spring	CBH1675
	19	Spring	CBH1592
	20	Spring	CBH1593
	21	Spring	CBH1594
	22	Spring	CBH1596
	23	Spring	CBH1597
	24	Spring	CBH1599
	25	Spring	CBH1604
	26	Spring	CBH1605
	27	Spring	CBH1606
	28	Spring	CBH1607
	29	Spring	CBH1631
	30	Spring	CBH1633
	31	Spring	CBH1667
	32	Spring	CBH1706
	33	Spring	CBH1721
	34	Spring	CBL1157
	35	Arm	CBL1186
	36	Arm	CBL1187
	37	Spring	CBL1210
	38	Spring	CBH1787
	39	Spring	CBH1674
	40	PU Unit	CGY1036
	41	Spring	CBH1720
	42	Connector	CDE4468
	43	Link	CNC5584
	44	Rear Frame	CNC5586
	45	Shaft	CLA2027
	46	Shaft	CLA2322

Mark	No.	Description	Part No.
	47	Shaft	CLA2345
	48	Lever	CNC5590
	49	Lever	CNC5166
	50	Arm	CNC5168
	51	Arm	CNC5169
	52	Bracket	CNC5170
	53	CM Bracket	CNC5171
	54	Cover	CNC5587
	55	Main Frame	CNC5591
	56	Upper Frame	CXA8113
	57	Side Frame(R)	CNC5594
	58	Bracket	CNC5462
	59	Cover	CNC5567
	60	Cover	CNC5576
	61	Lever	CNC5678
	62	Plate	CNC5782
	63	Spacer	CNM1787
	64	Sheet	CNM3897
	65	Sheet	CNM4337
	66	Insulator	CNM4266
	67	P.C.Board	CNP3642
	68	P.C.Board	CNP3730
	69	Belt	CNT1047
	70	Rack	CNV3355
	71	Holder	CNV3363
	72	Side Frame(L)	CNC5595
	73	Bracket	CNC5988
	74	Guide	CNV3756
	75	Arm	CNV3757
	76	Arm	CNV3758
	77	Gear	CNV4003
	78	Worm Wheel	CNV3761
	79	Gear	CNR1382
	80	Gear	CNV3763
	81	Gear	CNV3764
	82	Gear	CNV3765
	83	Gear	CNV3766
	84	Gear	CNV3767
	85	Arm	CNV3769
	86	Guide	CNV3770
	87	Guide	CNV3771
	88	Guide	CNV3772
	89	Guide	CNV3773
	90	Arm	CNV3775
	91	Bearing	CNV3778

Mark	No.	Description	Part No.
	92	Holder	CNV3779
	93	Damper	CNV3780
	94	Cam	CNV3781
	95	Guide	CNV3784
	96	Guide	CNV3785
	97	Arm	CNV3787
	98	Plate	CNV3912
	99	Gear	CNV4005
	100	Gear	CNV4006
	101	Gear	CNV4008
	102	Gathering P.C.Board	CNX2237
	103	Rack	CNV4009
	104	Arm	CNV4010
	105	Guide	CNV4104
	106	Switch	CSN1012
	107	Switch	CSN1025
	108	P.C.Board Unit	CWX1809
	109	Connector(6P)	CKS1944
	110	Connector(17P)	CKS1955
	111	Connector(30P)	CKS1968
	112	Connector(7P)	CKS2406
	113	Motor Unit(M804)	CXA4649
	114	·····	
	115	Stage Chassis Unit	CXA6608
	116	CRG Chassis Unit	CXA6609
	117	Gear	CNV4004
	118	Steer Unit	CXA7267
	119	Bracket Unit	CXA7268
	120	Magazine Holder Unit	CXA7269
	121	Lower Cover Unit	CXA6614
	122	Bracket Unit	CXA6615
	123	Cam Ring Unit	CXA6616
	124	Lever Unit	CXA6619
	125	Lever Unit	CXA6620
	126	Link Unit	CXA6621
	127	Arm Unit	CXA6622
	128	Arm Unit	CXA6623
	129	Arm Unit	CXA6624
	130	Frame Unit	CXA7271
	131	Lever Unit	CXA6626
	132	Motor Unit(M803)	CXA6977
	133	Motor Unit(M802)	CXA7272
	134	Screw Unit	CXA6990
	135	Motor Unit(M801)	CXA4540
	136	Arm Unit	CXA7153
	137	Arm Unit	CXA7273
	138	Clamper Unit	CXA7632
	139	Damper Unit	CXA7450
	140	Spring	CBL1216
	141	Screw	JFZ17P025FNI
	142	Screw	JFZ20P025FNI
	143	Photo-transistor (P801,802)	PT4800
	144	Spring	CBH1741
	145	Screw	JFZ20P014FMC
	146	Washer	CBF1002
	147	Spring	CBL1203
	148	Screw	CBA1340
	149	Arm	CNV4185
	150	Guide	CNV4221
	151	Composite P.C.Board	CNX2334
	152	Gathering P.C.Board	CNX2335
	153	Sheet	CNM4071
	154	Clamper	CNV3774
	155	Plug	CKS3266
	156	Screw	CBA1114

● **CD Mechanism Unit (2/2)**

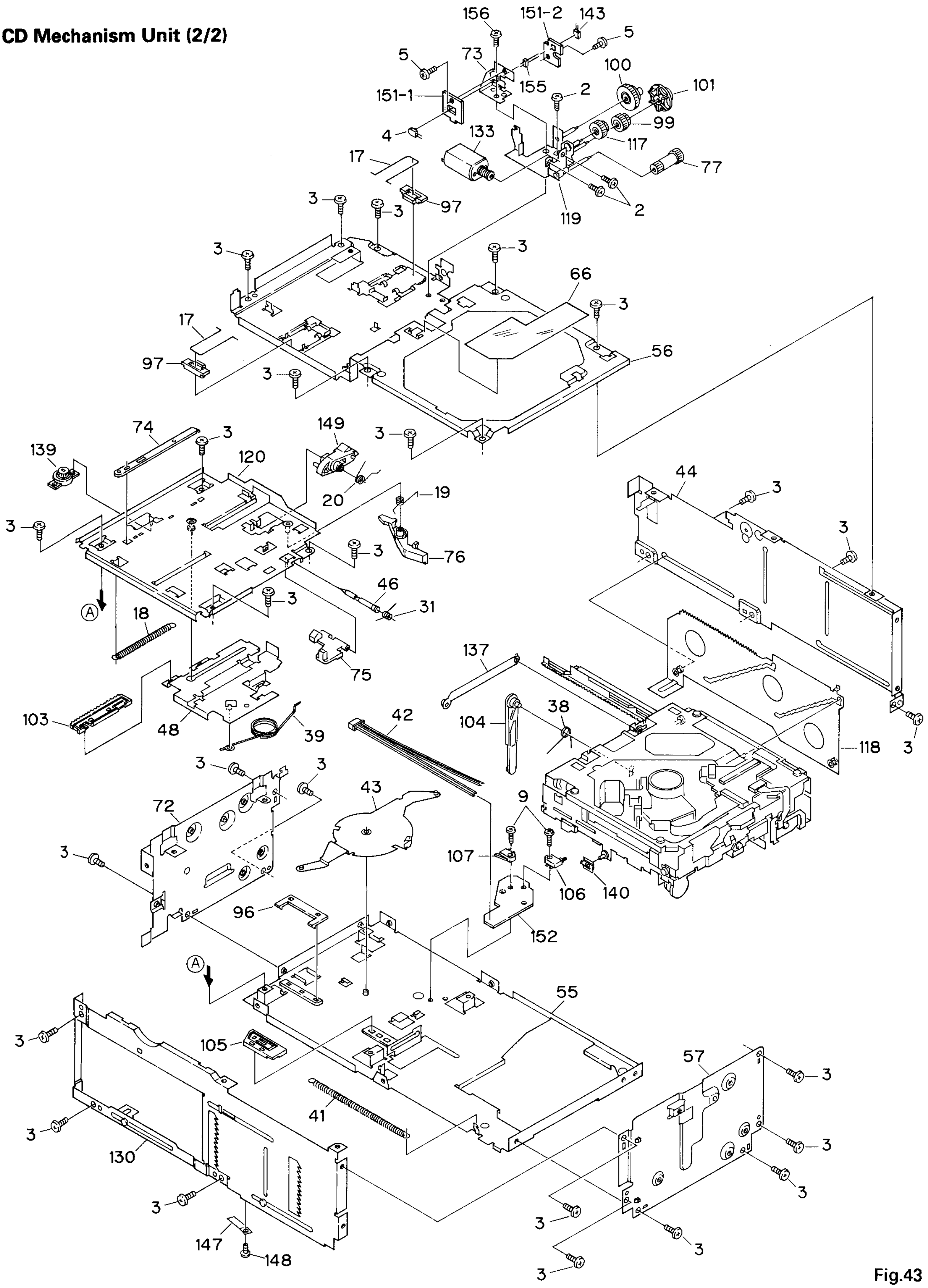


Fig.43

14. MAGAZINE ASSY(CXA5482) EXPLODED VIEW

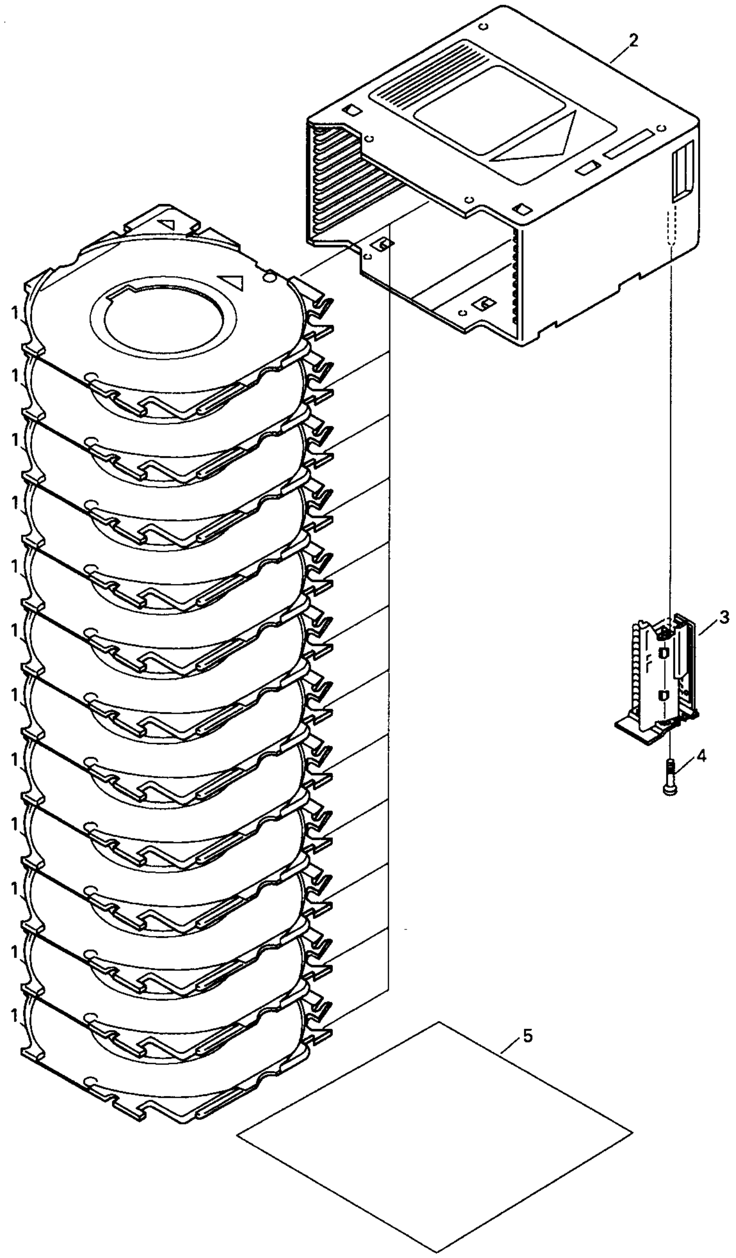


Fig.44

● Parts List

Mark	No.	Description	Part No.
	1	Tray Unit	CXA5484
	2	Case Unit	CXA5474
	3	Bracket Assy	CXA5475
	4	Screw(M2×13)	CBA1272
	5-1	Owner's Manual	CRD1638
	5-2	Label	CRW1247

15. PACKING METHOD

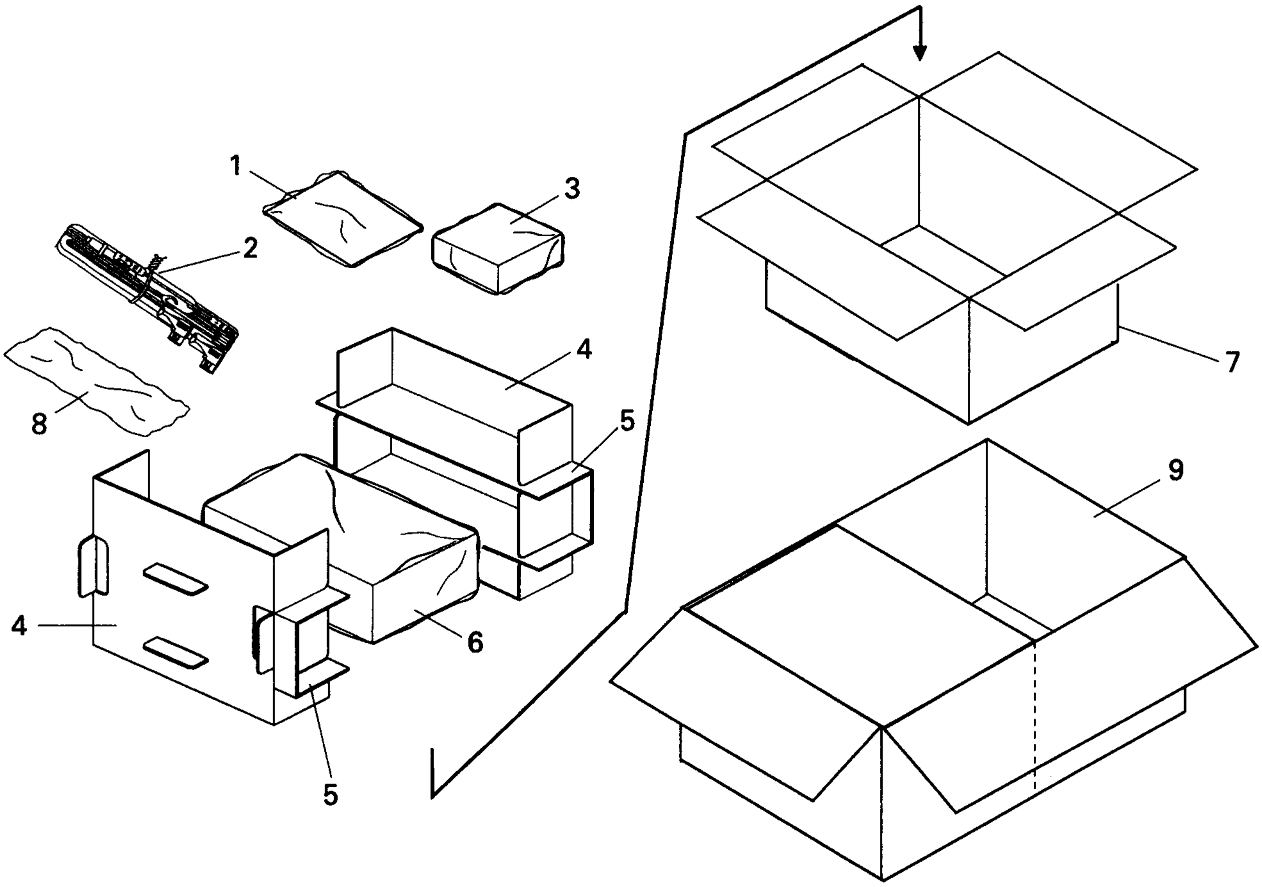


Fig.45

● Parts List(CDX-P1210/UC)

Mark	No.	Description	Part No.
	1-1	Polyethylene Bag	CEG1116
✱	1-2	Card	ARY1048
	1-3	Owner's Manual	CRD1864
	1-4	•••••	
	2	Cord	CDE4211
	3	Magazine Assy	CXA5482
	4	Protector	CHP1537
	5	Protector	CHP1536
	6	Polyethylene Bag	CEG1174
	7	Carton	CHG2604
	8	Accessory Assy	CEA2084
	8-1	Screw Assy	CEA1962
	8-1-1	Screw(×4)	CBA1295
✱	8-1-2	Polyethylene Bag	E36-615
	8-1-3	Screw(×4)	HMB60P500FMC
	8-1-4	Screw(×4)	HMF40P080FZK
	8-1-5	Nut(×4)	NF60FMC
	8-2	Angle(×2)	CNB1873
✱	8-3	Polyethylene Bag	E36-634
	9	Contain Box	CHL2604

• The CDX-P1210/EW and CDX-P1210/ES Parts Lists enumerate the parts which differ from those enumerated in the CDX-P1210/UC Parts List only. The parts other than those enumerated in the former are identical with those in the latter, to which you are requested to refer, accordingly.

Mark	No.	Description	CDX-P1210/UC Part No.	CDX-P1210/EW Part No.	CDX-P1210/ES Part No.
	1-1	Polyethylene Bag	CEG1116	CEG1116	•••••
✱	1-2	Card	ARY1048	•••••	•••••
	1-3	Owner's Manual	CRD1864	CRD1862 CRD1863	CRD1865
✱	1-4	Warranty Card	•••••	CRY1071	•••••
	2	Cord	CDE4211	CDE4210	CDE4211
	6	Polyethylene Bag	CEG1174	CEG1026	CEG1026
	7	Carton	CHG2604	CHG2603	CHG2605
	9	Contain Box	CHL2604	CHL2603	CHL2605

● Owner's Manual

Part No.	Model	Language
CRD1862	CDX-P1210/EW	English,Italian,French,German,Dutch
CRD1863	CDX-P1210/EW	Spanish,Portuguese,Swedish,Norwegian,Finnish
CRD1864	CDX-P1210/UC	English,French
CRD1865	CDX-P1210/ES	English,French,Spanish,Arabic