

# Service Manual

**Pioneer**

CDX-P650/X1N/UC



ORDER NO.  
**CRT2315**

MULTI-COMPACT DISC PLAYER

# CDX-P650

X1N/UC

# CDX-P650

X1N/EW

# CDX-P650

X1N/ES

COMPACT  
**disc**  
DIGITAL AUDIO

- See the separate manual CX-892(CRT2356) for the CD mechanism description, disassembly and circuit description.
- The CD mechanism employed in this model is one of C7 series.

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**PIONEER ELECTRONICS ASIACENTRE PTE.LTD.** 253 Alexandra Road, #04-01, Singapore 159936

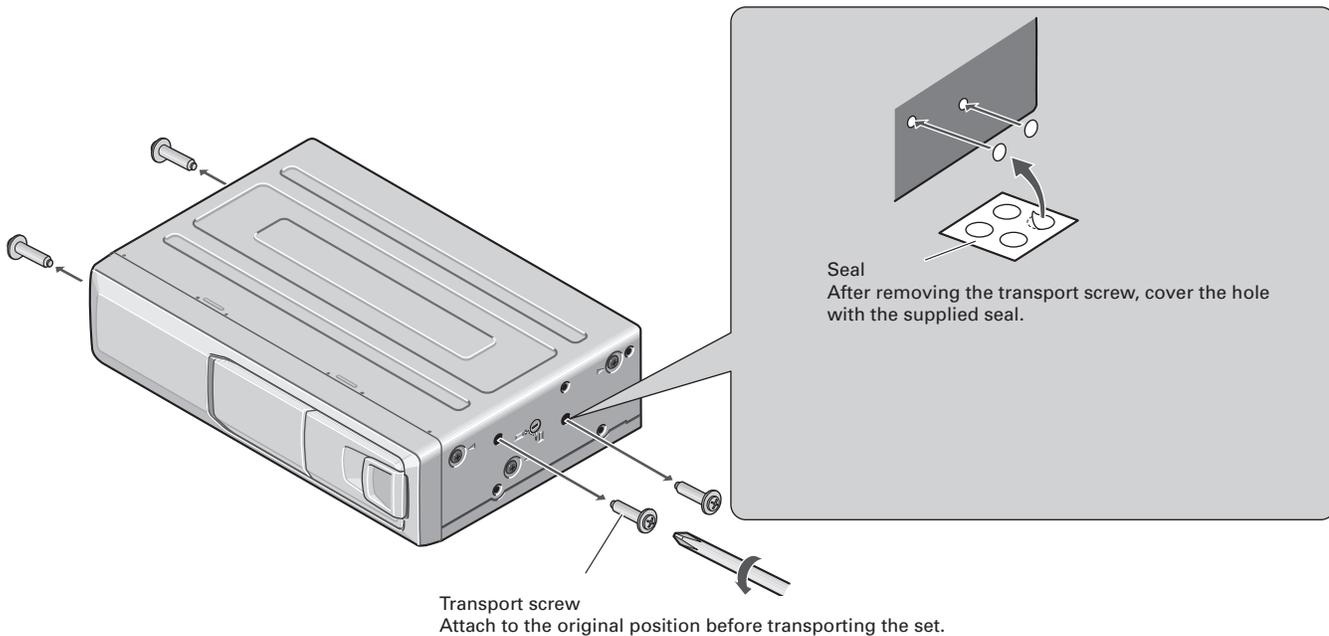
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K-ZZY. FEB. 1999 Printed in Japan

● **CD Player Service Precautions**

1. For pickup unit(CXX1285) handling, please refer to "Disassembly"(See page 40). During replacement, handling precautions shall be taken to prevent an electrostatic discharge(Protection by a short pin).
2. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.
3. Please checking the grating after changing the pickup unit(see page 29) since these screws protects the mechanism during transport, be sure to affix it when it is transported for repair, etc.

## Transportation of multi-CD Player



A transport screw has been attached to the set in order to protect it during transportation. After removing the transport screw, cover the hole with the supplied seal. Be sure to remove the transport screw before mounting the set. The removed transport screw should be retained in the accessory bag for use the next time the set is transported.

# 1. SAFETY INFORMATION

## 1.1 CDX-P650/X1N/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

This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.  
Health & Safety Code Section 25249.6 - Proposition 65

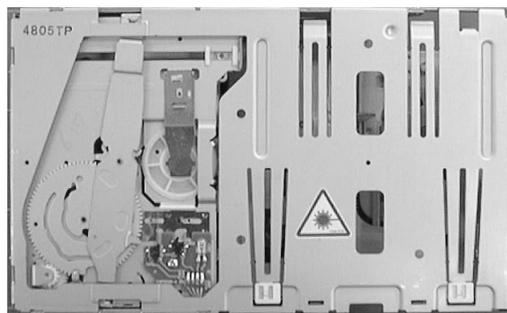
## 1.2 CDX-P650/X1N/EW

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

- Follow the adjustment steps (see pages 29 through 34) 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.

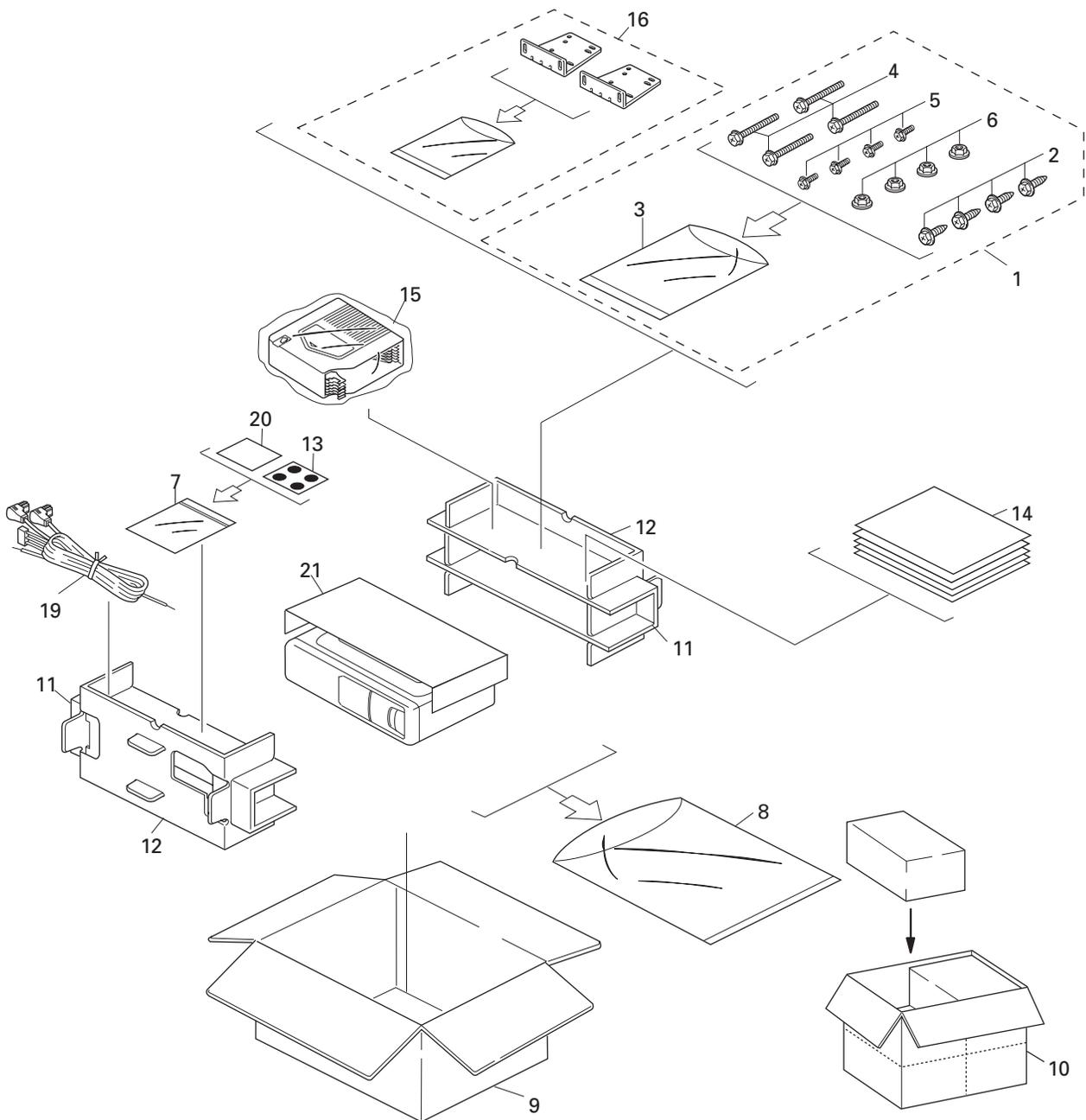


### 4. Specifications of Laser Diode

Specifications of laser radiation fields to which human access is possible during service.  
Wavelength = 800 nanometers

## 2. EXPLODED VIEWS AND PARTS LIST

### 2.1 PACKING



**NOTE:**

- Parts marked by "\*" are generally unavailable because they are not in our Master Spare Parts List.
- Screws adjacent to ∇ mark on the product are used for disassembly.

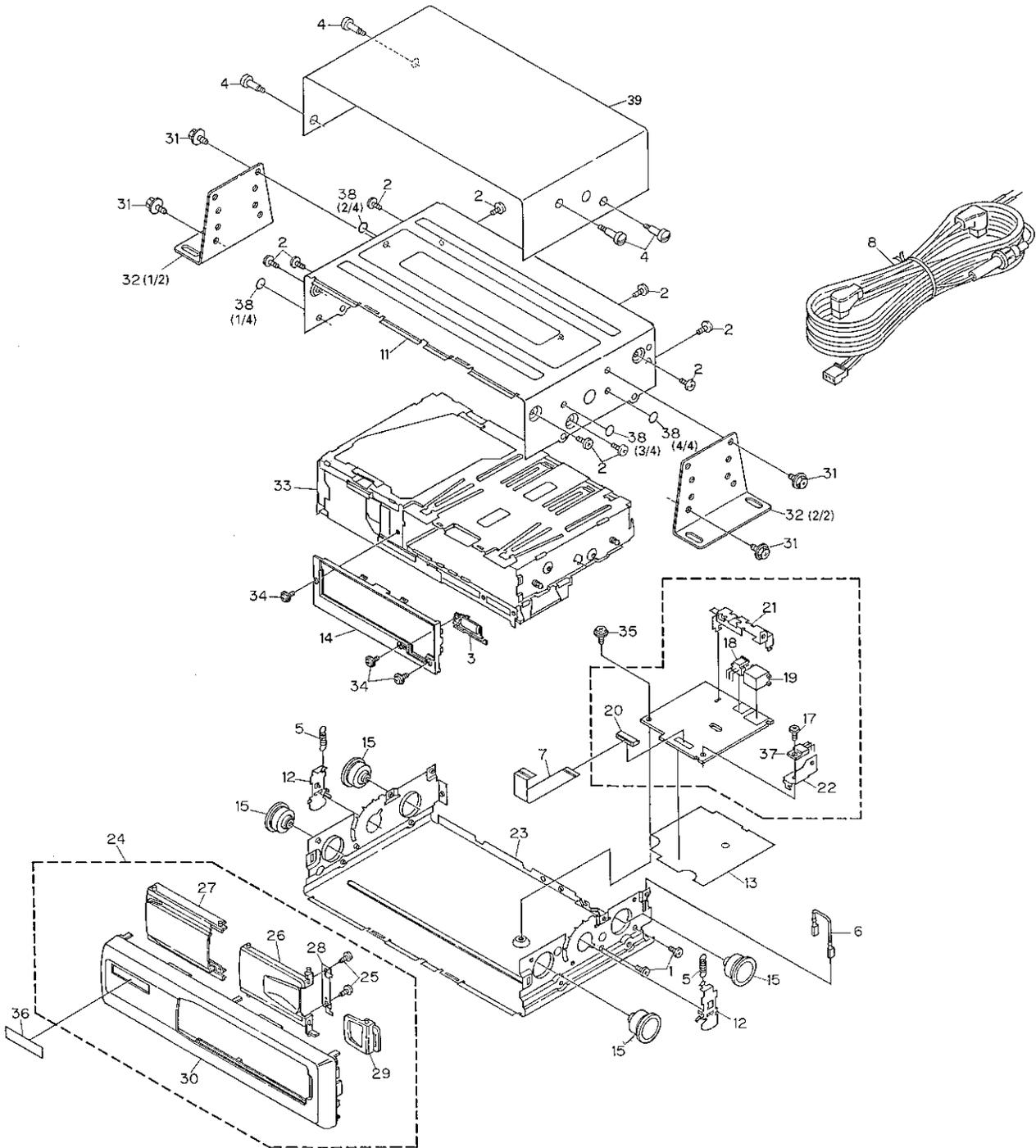
**● PACKING SECTION PARTS LIST**

| Mark No. | Description          | Part No.        |                 |                 |
|----------|----------------------|-----------------|-----------------|-----------------|
|          |                      | CDX-P650/X1N/UC | CDX-P650/X1N/EW | CDX-P650/X1N/ES |
|          | 1 Screw Assy         | CEA1962         | CEA1962         | CEA1962         |
|          | 2 Screw              | CBA1295         | CBA1295         | CBA1295         |
| *        | 3 Polyethylene Sheet | CNM5158         | CNM5158         | CNM5158         |
|          | 4 Screw              | HMB60P500FMC    | HMB60P500FMC    | HMB60P500FMC    |
|          | 5 Screw              | HMF40P080FZK    | HMF40P080FZK    | HMF40P080FZK    |
|          | 6 Nut                | NF60FMC         | NF60FMC         | NF60FMC         |
| *        | 7 Polyethylene Bag   | CEG1099         | CEG1099         | CEG1099         |
|          | 8 Polyethylene Bag   | CEG1185         | CEG1042         | CEG1042         |
|          | 9 Carton             | CHG3712         | CHG3714         | CHG3716         |
|          | 10 Contain Box       | CHL3712         | CHL3714         | CHL3716         |
|          | 11 Protector         | CHP2133         | CHP2133         | CHP2133         |
|          | 12 Protector         | CHP2134         | CHP2134         | CHP2134         |
|          | 13 Seal              | CNM5599         | CNM5741         | CNM5741         |
|          | 14-1 Owner's Manual  | CRD2888         | CRD2889         | CRD2891         |
|          | 14-2 Owner's Manual  | Not used        | CRD2890         | CRB1532         |
| *        | 14-3 Warranty Card   | Not used        | CRY1087         | Not used        |
| *        | 14-4 Caution Card    | CRP1201         | CRP1203         | CRP1202         |
| *        | 14-5 Caution Card    | CRP1205         | CRP1205         | CRP1205         |
|          | 15 Magazine Assy     | CXB4027         | CXB4027         | CXB4027         |
|          | 16 Angle Assy        | CXB3591         | CXB3588         | CXB3588         |
|          | 17 .....             |                 |                 |                 |
|          | 18 .....             |                 |                 |                 |
|          | 19 Cord              | CDE5831         | CDE5830         | CDE5831         |
| *        | 20 Caution Card      | CRP1090         | CRP1090         | CRP1090         |
| *        | 21 Caution Card      | CRP1195         | CRP1195         | CRP1195         |

**● Owner's Manual**

| Model           | Part No. | Language                                |
|-----------------|----------|---|
| CDX-P650/X1N/UC | CRD2888  | English, French                         |
| CDX-P650/X1N/EW | CRD2889  | English, Italian, French                |
|                 | CRD2890  | German, Dutch, Spanish                  |
| CDX-P650/X1N/ES | CRD2891  | English, Spanish, Portuguese(B), Arabic |
|                 | CRB1532  | Chinese                                 |

2.2 EXTERIOR



**(1) EXTERIOR SECTION PARTS LIST**

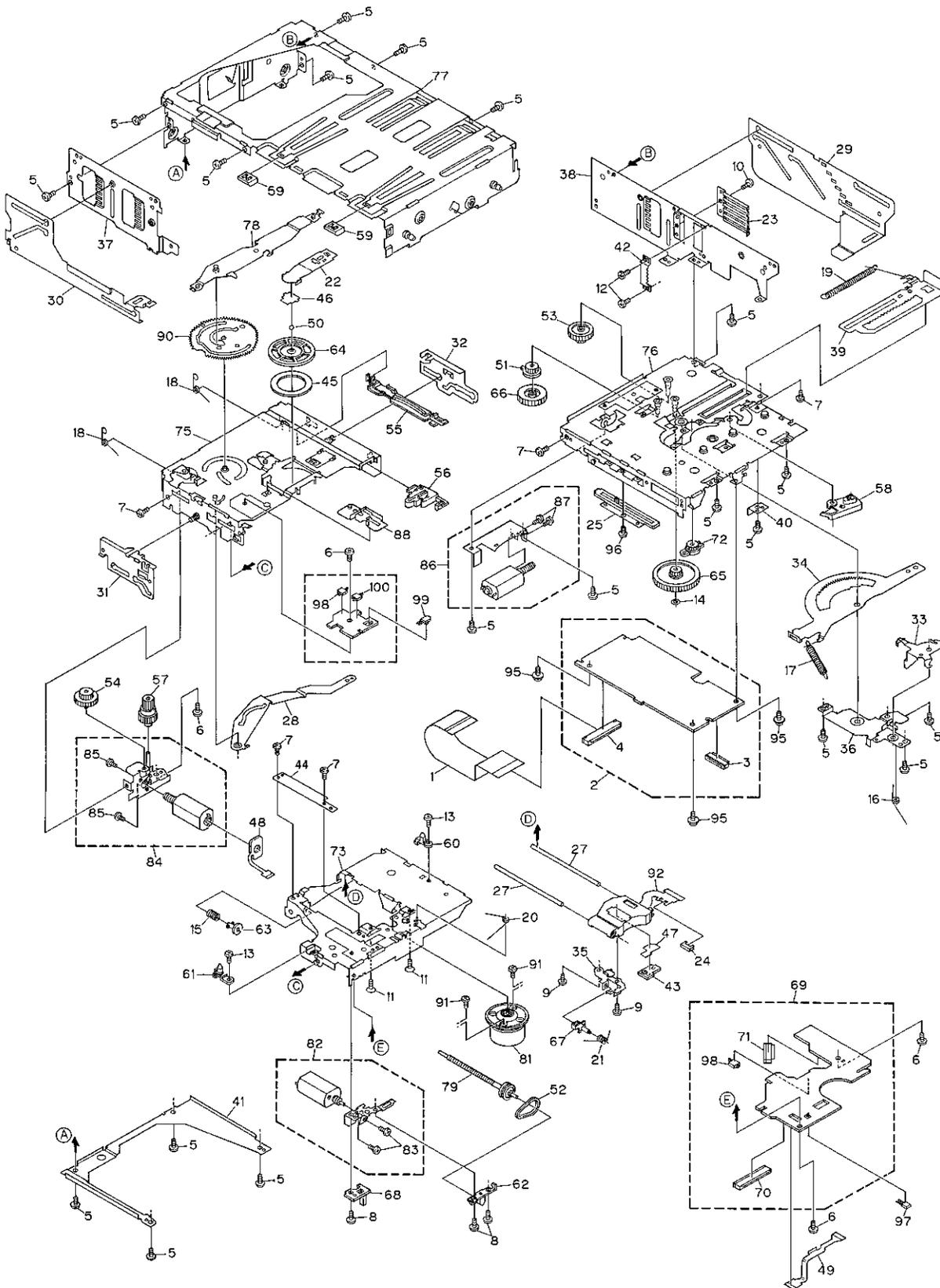
| Mark No. | Description      | Part No.              | Mark No. | Description         | Part No.              |
|----------|------------------|-----------------------|----------|---------------------|-----------------------|
| 1        | Screw            | BMZ26P040FMC          | 26       | Door                | See Contrast table(2) |
| 2        | Screw            | BMZ30P040FZK          | 27       | Door                | See Contrast table(2) |
| 3        | Button           | CAC4632               | 28       | Holder              | CNC8139               |
| 4        | Screw            | CBA1460               | 29       | Lever               | See Contrast table(2) |
| 5        | Spring           | CBH1859               | 30       | Grille              | See Contrast table(2) |
| 6        | Connector        | CDE5525               | 31       | Screw               | HMF40P080FZK          |
| 7        | Connector        | CDE5783               | 32       | Angle Assy          | See Contrast table(2) |
| 8        | Cord             | See Contrast table(2) | 33       | CD Mechanism Module | See Contrast table(2) |
| 9        | .....            |                       | 34       | Screw               | IMS20P035FZK          |
| 10       | .....            |                       | 35       | Screw               | IMS26P040FMC          |
| 11       | Upper Case       | See Contrast table(2) | 36       | Sheet               | See Contrast table(2) |
| 12       | Arm              | CNC8058               | 37       | Transistor(Q910)    | 2SD2396               |
| 13       | Insulator        | CNM6074               | 38       | Seal                | See Contrast table(2) |
| 14       | Panel            | CNS5216               | * 39     | Caution Card        | CRP1195               |
| 15       | Damper           | CNV5591               |          |                     |                       |
| 16       | Power Unit       | CWX2299               |          |                     |                       |
| 17       | Screw            | BMZ26P060FMC          |          |                     |                       |
| 18       | Plug(CN901)      | CKS-460               |          |                     |                       |
| 19       | Connector(CN921) | CKS3407               |          |                     |                       |
| 20       | Connector(CN911) | CKS4072               |          |                     |                       |
| 21       | Holder           | CNC8055               |          |                     |                       |
| 22       | Holder           | CNC8056               |          |                     |                       |
| 23       | Lower Case Unit  | See Contrast table(2) |          |                     |                       |
| 24       | Grille Unit      | See Contrast table(2) |          |                     |                       |
| 25       | Screw            | BPZ20P080FMC          |          |                     |                       |

**(2) CONTRAST TABLE**

**CDX-P650/X1N/UC, CDX-P650/X1N/EW and CDX-P650/X1N/ES are constructed the same except for the following:**

| Mark No. | Symbol and Description | Part No.        |                 |                 |
|----------|------------------------|-----------------|-----------------|-----------------|
|          |                        | CDX-P650/X1N/UC | CDX-P650/X1N/EW | CDX-P650/X1N/ES |
| 8        | Cord                   | CDE5831         | CDE5830         | CDE5831         |
| 11       | Upper Case             | CNB2431         | CNB2383         | CNB2383         |
| 23       | Lower Case Unit        | CXB3395         | CXB3394         | CXB3394         |
| 24       | Grille Unit            | CXB4373         | CXB4375         | CXB4376         |
| 26       | Door                   | CAT2045         | CAT2006         | CAT2006         |
| 27       | Door                   | CXT2046         | CAT2007         | CAT2007         |
| 29       | Lever                  | CNS5392         | CNS5356         | CNS5356         |
| 30       | Grille                 | CNS5288         | CNS5287         | CNS5298         |
| 32       | Angle Assy             | CXB3591         | CXB3588         | CXB3588         |
| 33       | CD Mechanism Module    | CXK4800         | CXK4805         | CXK4800         |
| 36       | Sheet                  | CAH1683         | CAH1681         | CAH1681         |
| 38       | Seal                   | CNM5599         | CNM5741         | CNM5741         |

## 2.3 CD MECHANISM MODULE



## (1)CD MECHANISM MODULE SECTION PARTS LIST

| Mark No. | Description       | Part No.              | Mark No. | Description                | Part No.     |
|----------|-------------------|-----------------------|----------|----------------------------|--------------|
| 1        | Connector         | CDE6069               | 46       | Spacer                     | CNM6146      |
| 2        | CD Core Unit (C7) | See Contrast table(2) | 47       | Sheet                      | CNM6296      |
| 3        | Connector(CN701)  | CKS1953               | 48       | PCB                        | CNP5227      |
| 4        | Connector(CN101)  | CKS2272               | 49       | PCB                        | CNP5228      |
| 5        | Screw             | BMZ20P025FMC          | 50       | Ball                       | CNR1189      |
| 6        | Screw             | CBA1037               | 51       | Gear                       | CNR1531      |
| 7        | Screw             | CBA1041               | 52       | Belt                       | CNT1086      |
| 8        | Screw             | CBA1176               | 53       | Gear                       | CNV5472      |
| 9        | Screw             | CBA1362               | 54       | Gear                       | CNV5473      |
| 10       | Screw             | CBA1387               | 55       | Rail                       | CNV5474      |
| 11       | Screw             | CBA1470               | 56       | Lever                      | CNV5475      |
| 12       | Screw             | CBA1476               | 57       | Gear                       | CNV5477      |
| 13       | Screw             | CBA1486               | 58       | Arm                        | CNV5478      |
| 14       | Washer            | CBF1038               | 59       | Holder                     | CNV5480      |
| 15       | Spring            | CBH2172               | 60       | Guide                      | CNV5481      |
| 16       | Spring            | CBH2173               | 61       | Guide                      | CNV5482      |
| 17       | Spring            | CBH2174               | 62       | Holder                     | CNV5483      |
| 18       | Spring            | CBH2175               | 63       | Holder                     | CNV5484      |
| 19       | Spring            | CBH2285               | 64       | Clamper                    | CNV5485      |
| 20       | Spring            | CBH2177               | 65       | Gear                       | CNV5486      |
| 21       | Spring            | CBH2178               | 66       | Gear                       | CNV5562      |
| 22       | Spring            | CBL1390               | 67       | Holder                     | CNV5563      |
| 23       | Spring            | CBL1392               | 68       | Lighting Conductor         | CNV5785      |
| 24       | Short Pin         | CBL1239               | 69       | Mechanism PCB              | CWX2303      |
| 25       | Volume(VR801)     | CCW1023               | 70       | Connector(CN801)           | CKS1965      |
| 26       | .....             |                       | 71       | Connector(CN802)           | CKS3486      |
| 27       | Shaft             | CLA3304               | 72       | Damper Unit                | CXA7714      |
| 28       | Arm               | CNC7901               | 73       | Chassis Unit               | CXB2850      |
| 29       | Lever             | CNC7902               | 74       | .....                      |              |
| 30       | Lever             | CNC7904               | 75       | Chassis Unit               | CXB2851      |
| 31       | Lever             | CNC7905               | 76       | Magazine Holder Unit       | CXB2853      |
| 32       | Lever             | CNC7906               | 77       | Frame Unit                 | CXB4426      |
| 33       | Arm               | CNC7908               | 78       | Arm Unit                   | CXB2855      |
| 34       | Arm               | CNC7909               | 79       | Screw Unit                 | CXB2857      |
| 35       | Holder            | CNC7911               | 80       | .....                      |              |
| 36       | Holder            | CNC7912               | 81       | Motor Unit(M851)(SPINDLE)  | CXB3003      |
| 37       | Frame             | CNC7917               | 82       | Motor Unit(M854)(CARRIAGE) | CXB3004      |
| 38       | Frame             | CNC7918               | 83       | Screw                      | JFZ20P025FMC |
| 39       | Lever             | CNC7919               | 84       | Motor Unit(M853)(TRAY)     | CXB4421      |
| 40       | Stopper           | CNC7920               | 85       | Screw                      | JFZ20P025FMC |
| 41       | Frame             | CNC7921               | 86       | Motor Unit(M852)(ELV)      | CXB3006      |
| 42       | Bracket           | CNC8354               | 87       | Screw                      | JFZ20P025FMC |
| 43       | Plate             | CNC8375               | 88       | Lever Unit                 | CXB3938      |
| 44       | Cover             | CNC8434               | 89       | .....                      |              |
| 45       | Sheet             | CNM6009               | 90       | Gear Unit                  | CXB4338      |

# CDX-P650

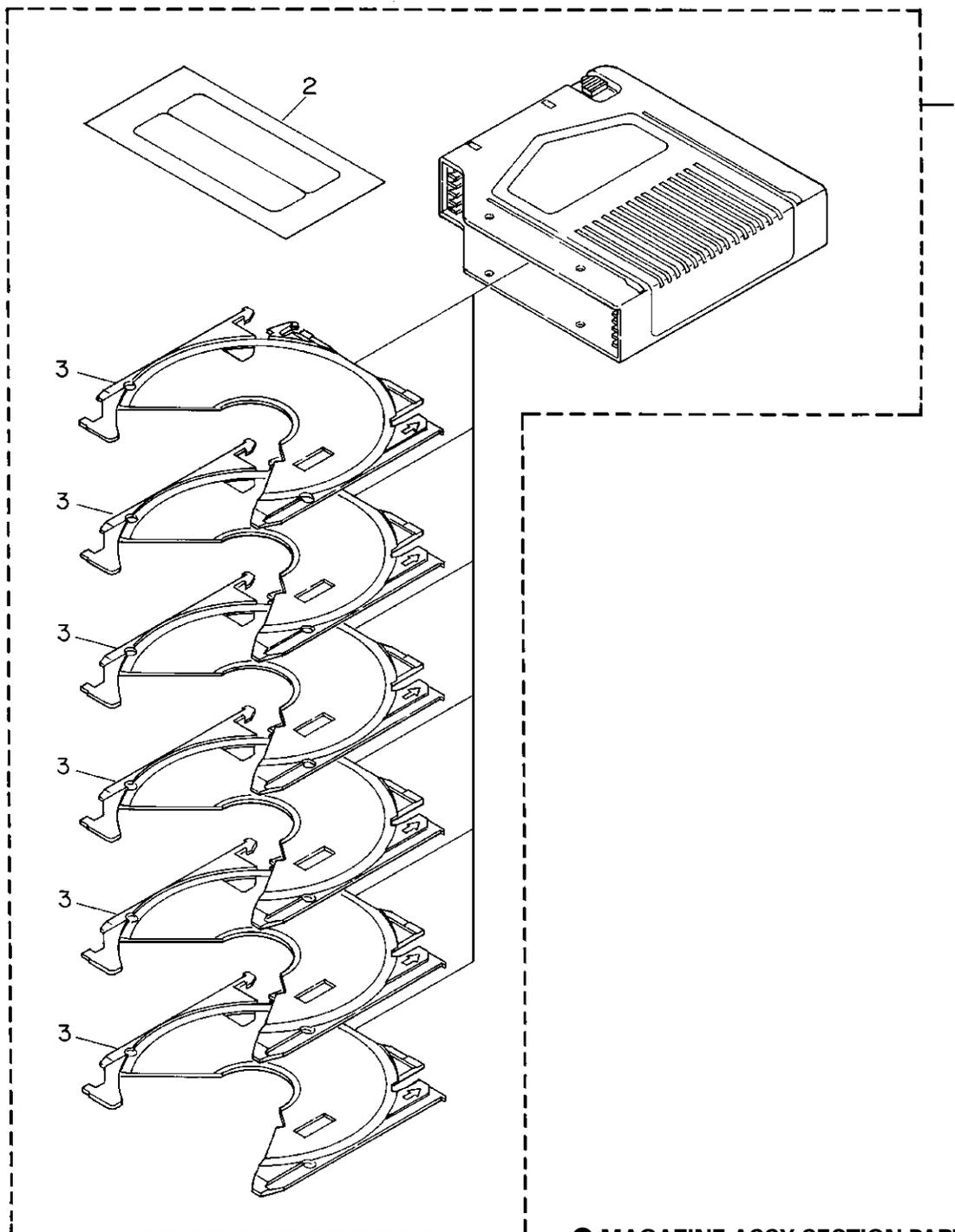
| Mark No. | Description              | Part No.     |
|----------|--------------------------|--------------|
| 91       | Screw                    | JGZ17P025FZK |
| 92       | Pickup Unit(Service)     | CXX1285      |
| 93       | .....                    |              |
| 94       | .....                    |              |
| 95       | Screw                    | IMS26P040FMC |
| 96       | Screw                    | JFZ20P025FNI |
| 97       | Photo-transistor(Q851)   | PT4800       |
| 98       | Spring Switch(S851,S853) | CSN1051      |
| 99       | LED(D851)                | CN504-2      |
| 100      | Spring Switch(S852)      | CSN1052      |

## (2) CONTRAST TABLE

CDX-P650/X1N/UC, CDX-P650/X1N/EW and CDX-P650/X1N/ES are constructed the same except for the following:

| Mark No. | Symbol and Description | Part No.        |                 |                 |
|----------|------------------------|-----------------|-----------------|-----------------|
|          |                        | CDX-P650/X1N/UC | CDX-P650/X1N/EW | CDX-P650/X1N/ES |
| 2        | CD Core Unit(C7)       | CWX2260         | CWX2261         | CWX2260         |

## 2.4 MAGAZINE ASSY



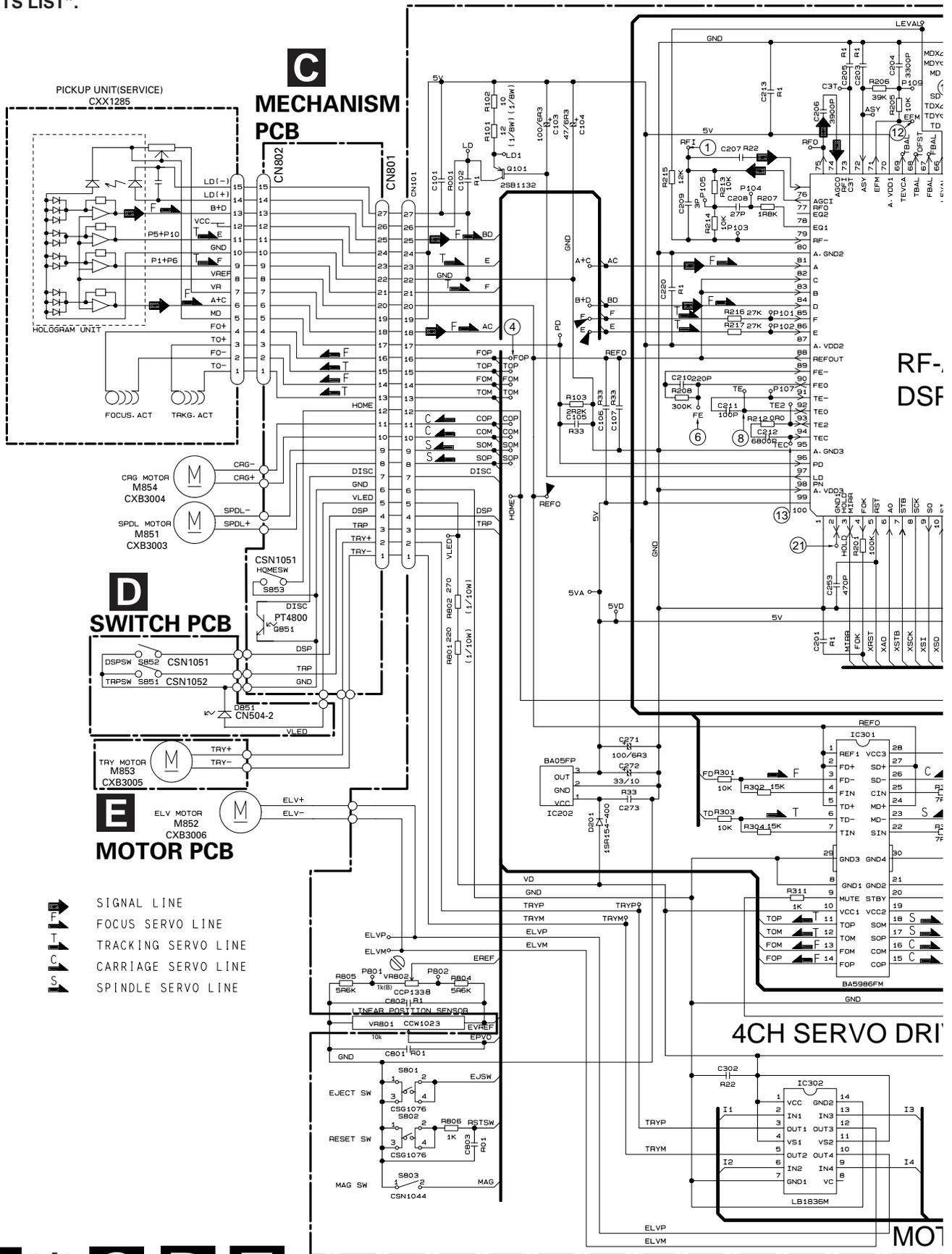
● MAGAZINE ASSY SECTION PARTS LIST

| Mark No. | Description   | Part No. |
|----------|---------------|----------|
| 1        | Magazine Assy | CXB4027  |
| 2        | Label         | CRW1395  |
| 3        | Tray          | CNV5341  |

### 3. SCHEMATIC DIAGRAM

#### 3.1 OVERALL CONNECTION DIAGRAM

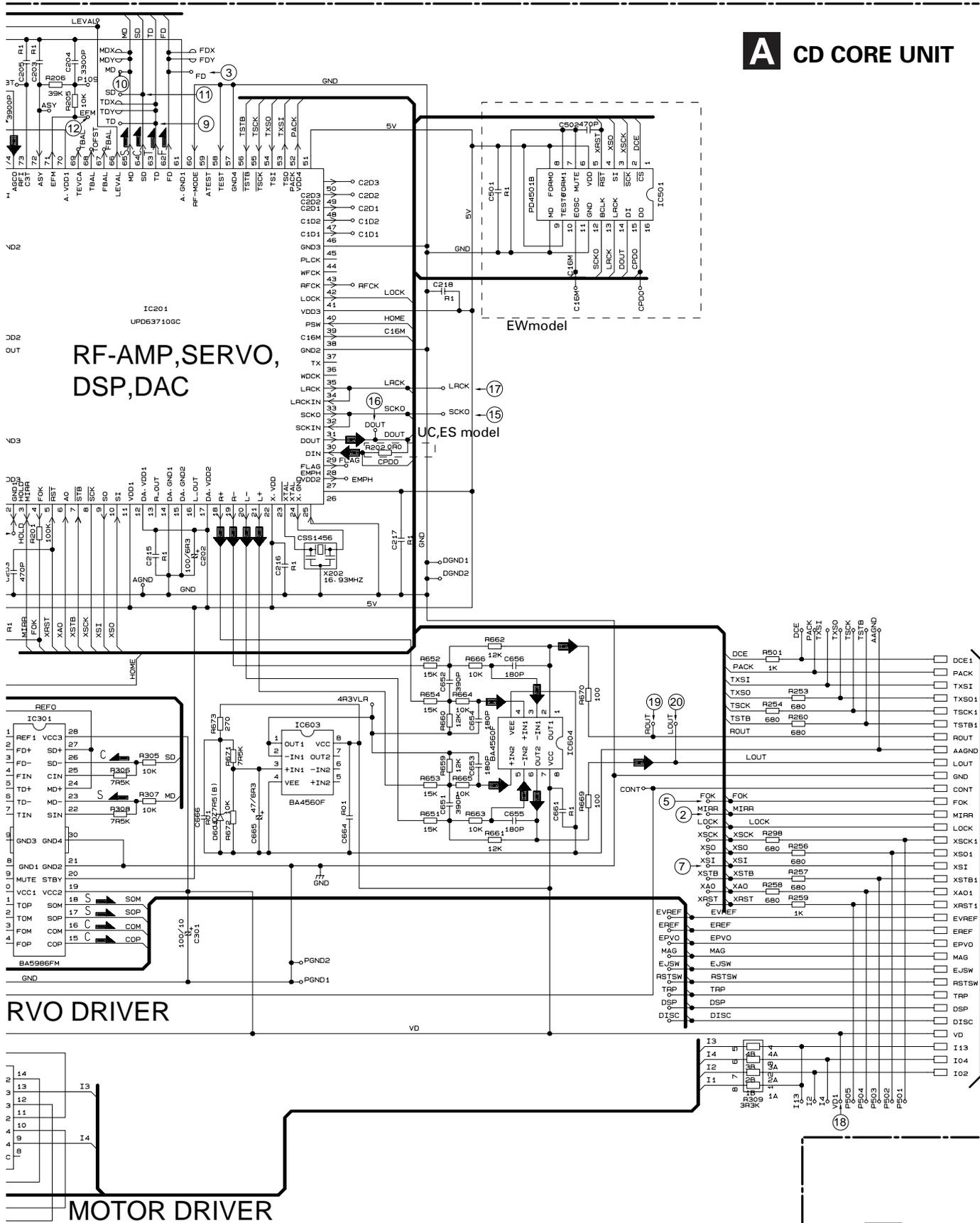
Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".



**A** **1/2** **C** **D** **E**

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



**A** CD CORE UNIT

A/2/2

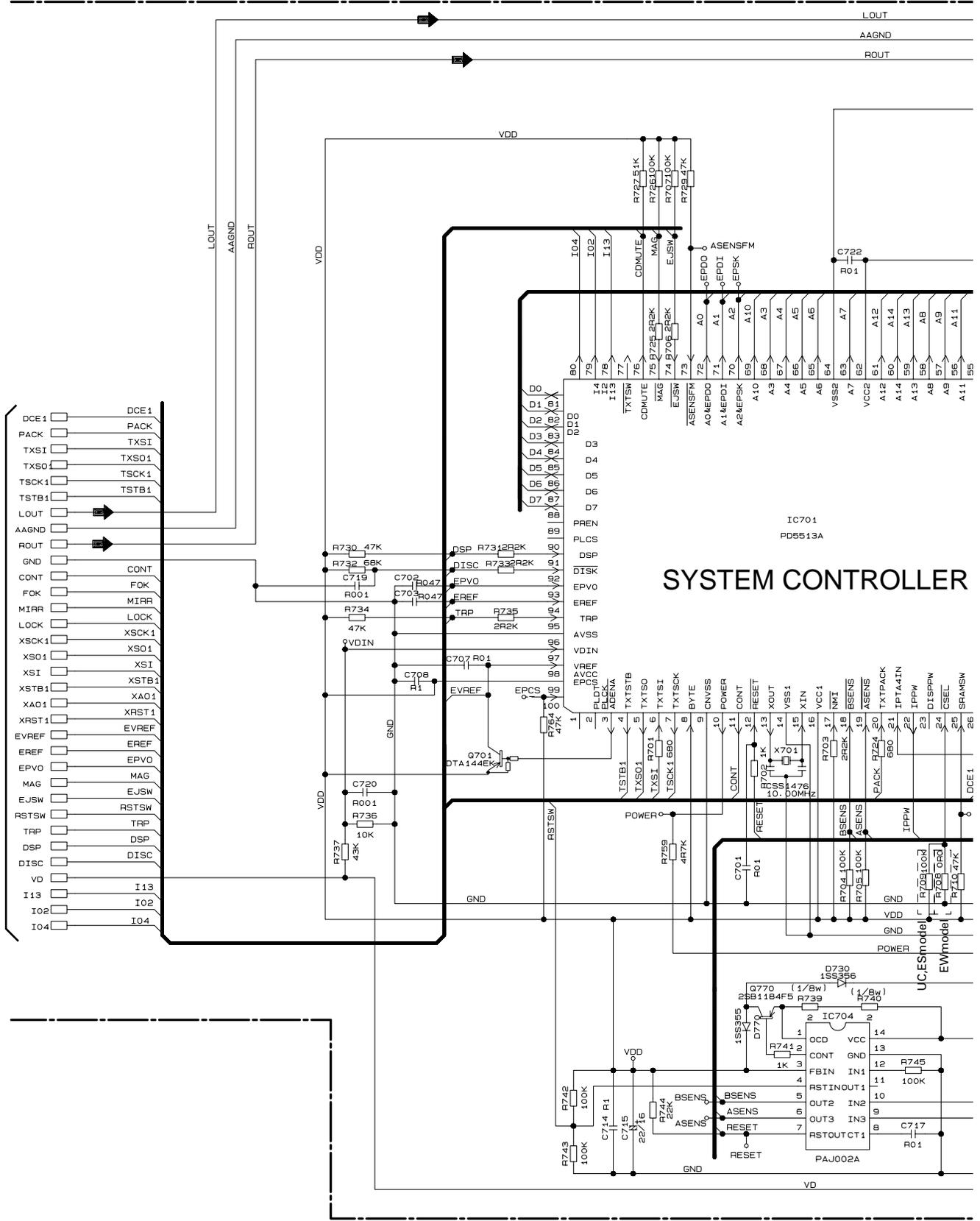
**A1/2**

A

B

C

D



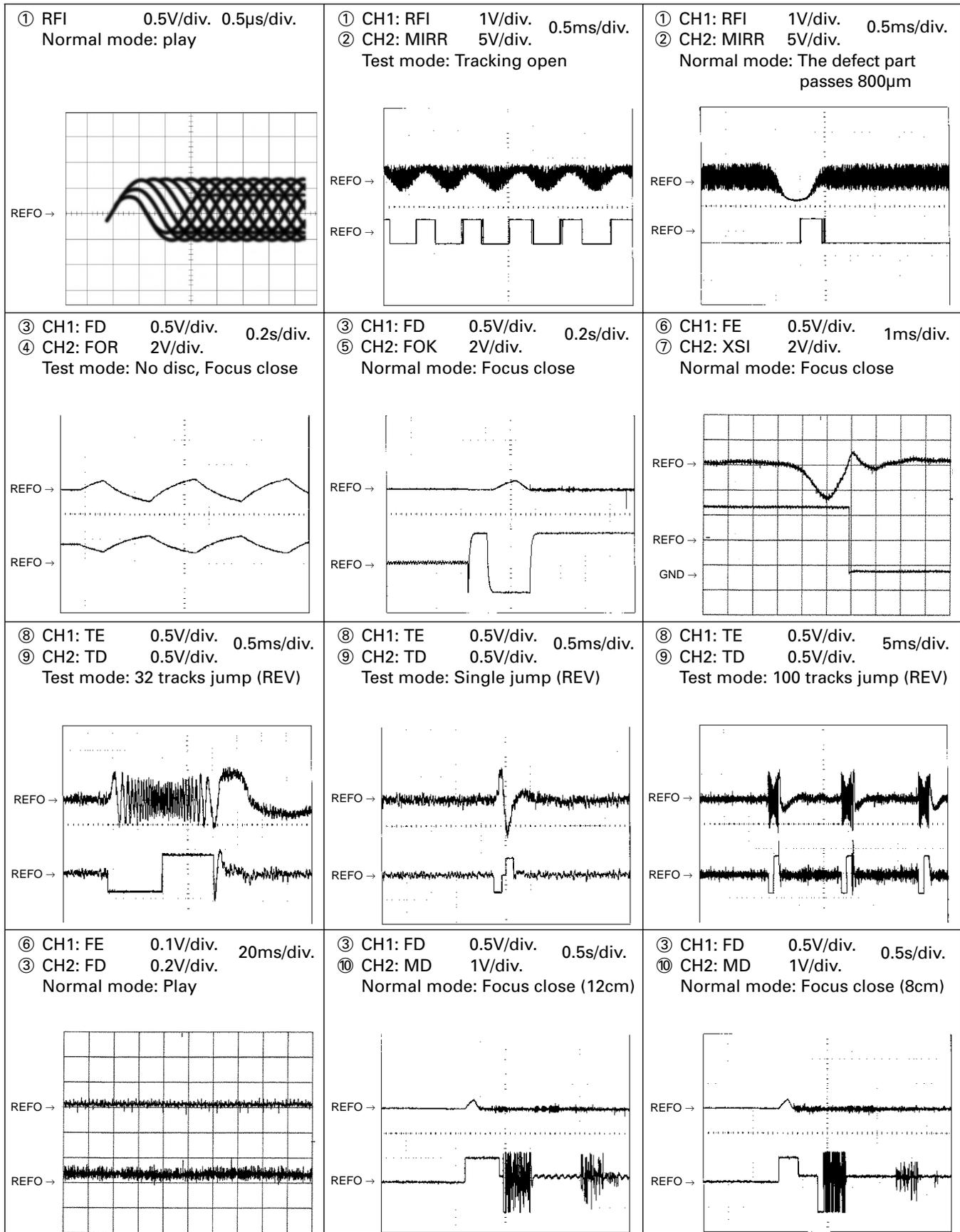
A1/2

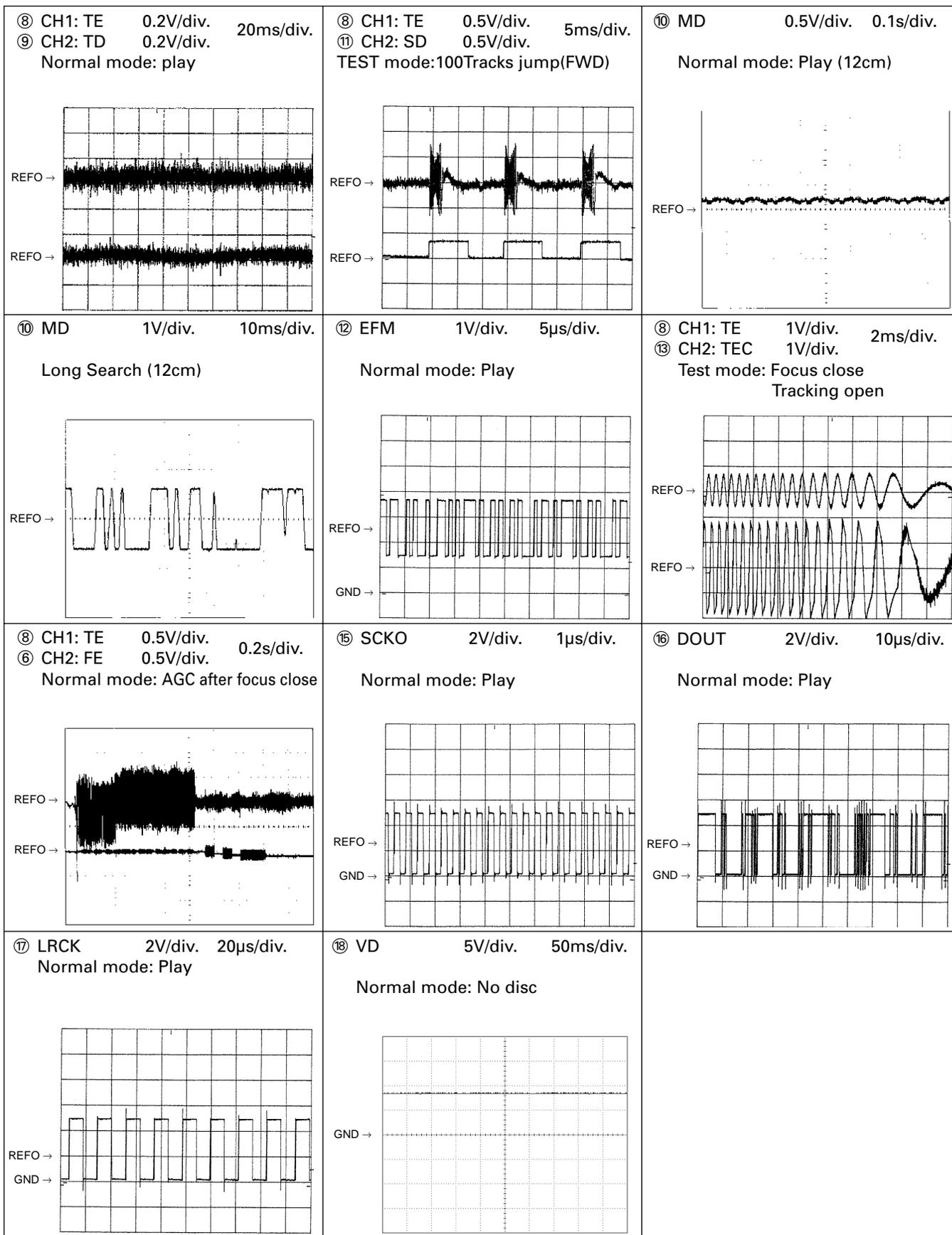
SYSTEM CONTROLLER



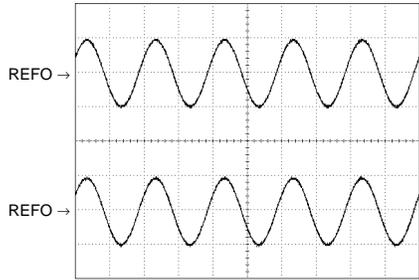
Note:1. The encircled numbers denote measuring pointes in the circuit diagram.  
 2. Reference voltage  
 REFO:2.5V

● Waveforms

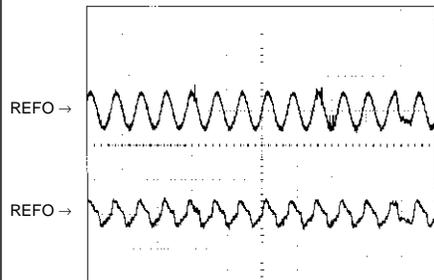




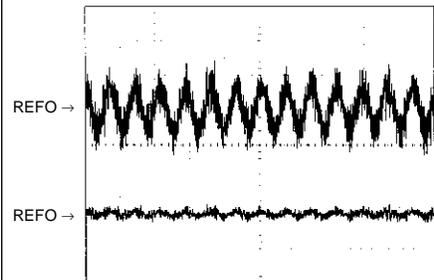
⑱ CH1: R OUT 2V/div. 500μs/div.  
 ⑳ CH2: L OUT 2V/div.  
 Normal mode: Play (1kHz 0dB)



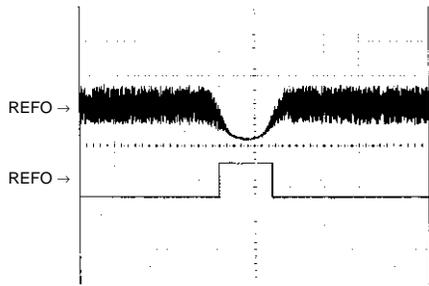
⑥ CH1: FE 0.2V/div. 1ms/div.  
 ③ CH2: FD 0.5V/div.  
 Normal mode: During AGC



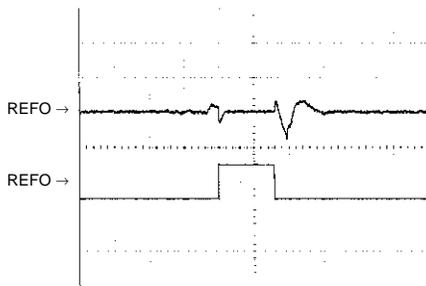
⑧ CH1: TE 0.2V/div. 1ms/div.  
 ⑨ CH2: TD 0.5V/div.  
 Normal mode: During AGC



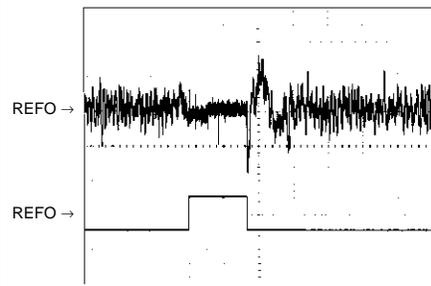
① CH1: RFI 1V/div. 0.5ms/div.  
 ② CH2: HOLD 5V/div.  
 Normal mode: The defect part passes 800μm(B.D)



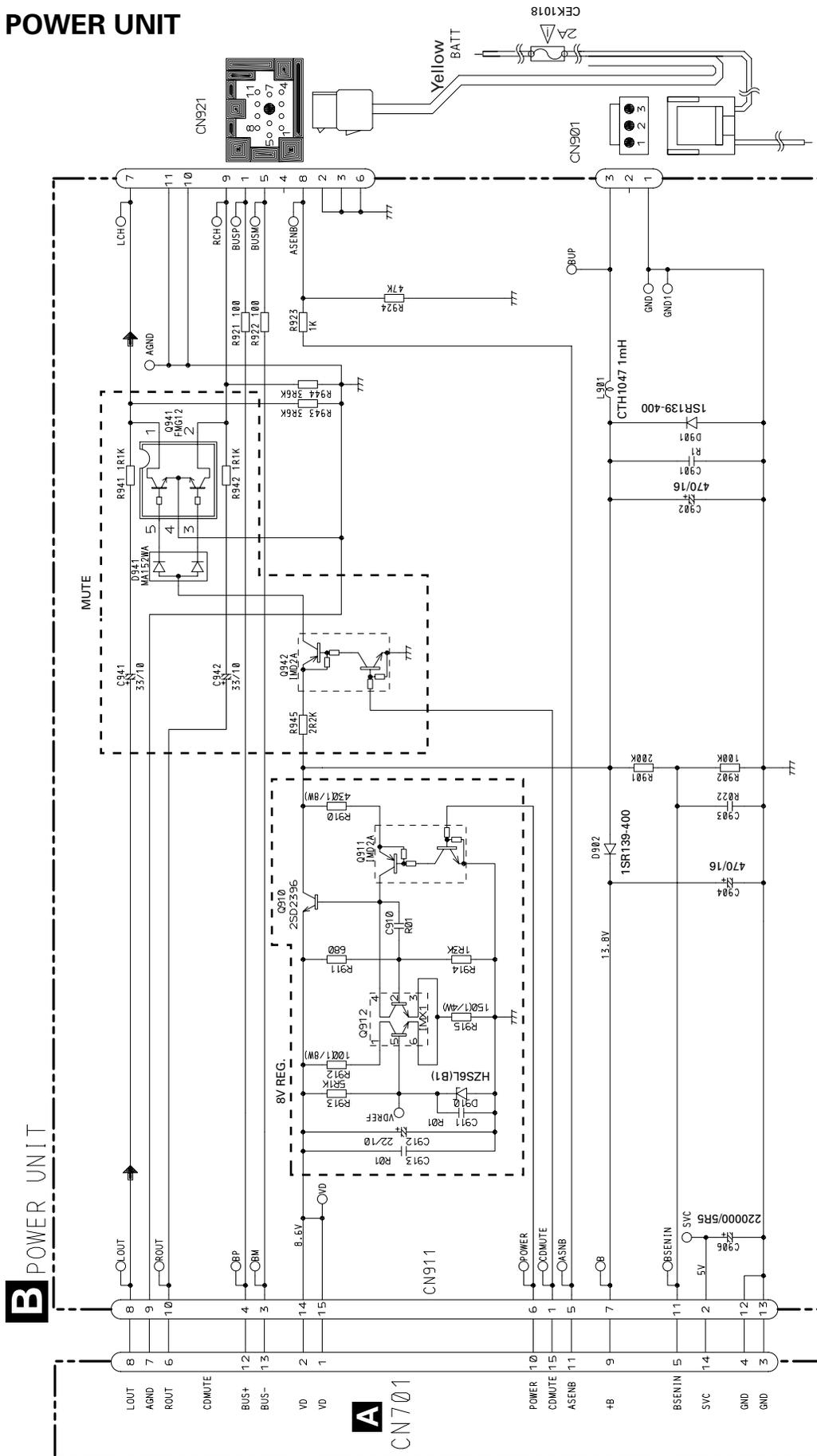
③ CH1: FD 1V/div. 0.5ms/div.  
 ② CH2: HOLD 5V/div.  
 Normal mode: The defect part passes 800μm(B.D)



⑨ CH1: TD 0.1V/div. 0.5ms/div.  
 ② CH2: HOLD 5V/div.  
 Normal mode: The defect part passes 800μm(B.D)



### 3.2 POWER UNIT



The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

**B** POWER UNIT

**A** CN701

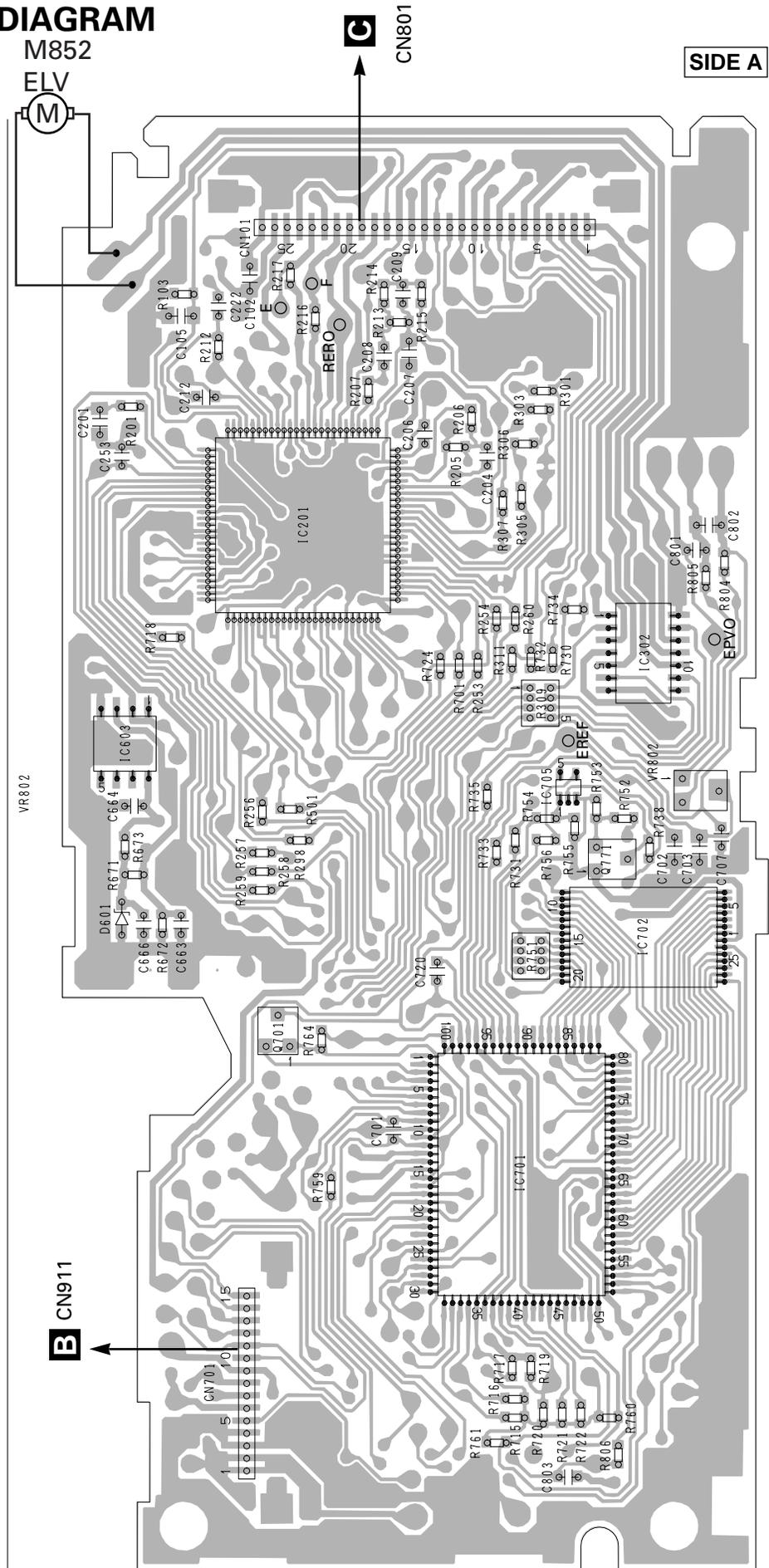
**B**

# 4. PCB CONNECTION DIAGRAM

## 4.1 CD CORE UNIT

### NOTE FOR PCB DIAGRAMS

- The parts mounted on this PCB include all necessary parts for several destination.
- For further information for respective destinations, be sure to check with the schematic diagram.



SIDE A

A CD CORE UNIT

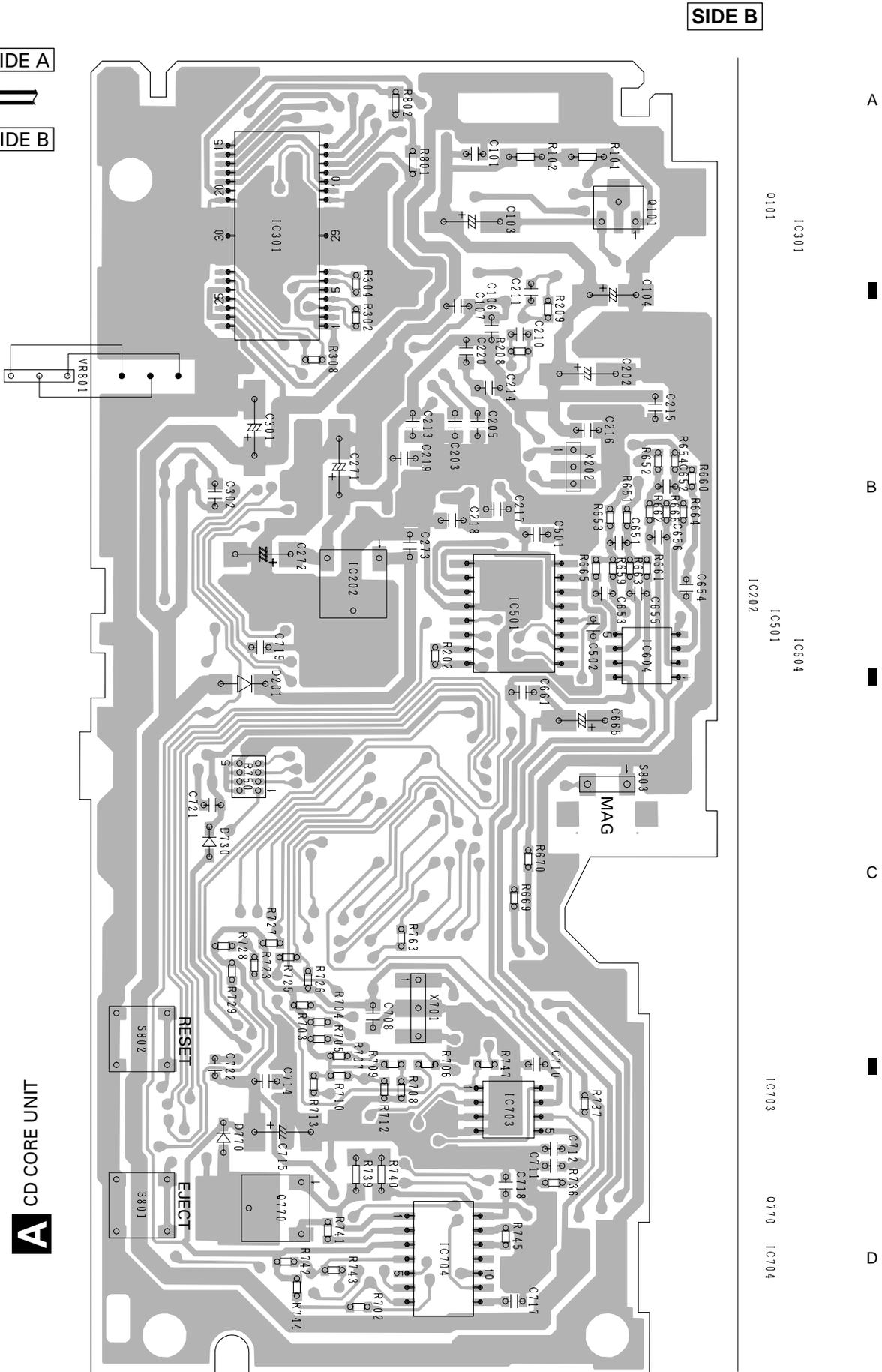
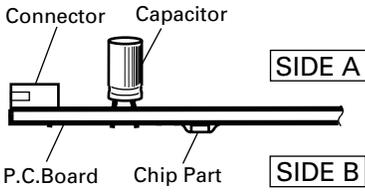
A

B

C

D

2. Viewpoint of PCB diagrams



# 4.2 POWER UNIT

SIDE A

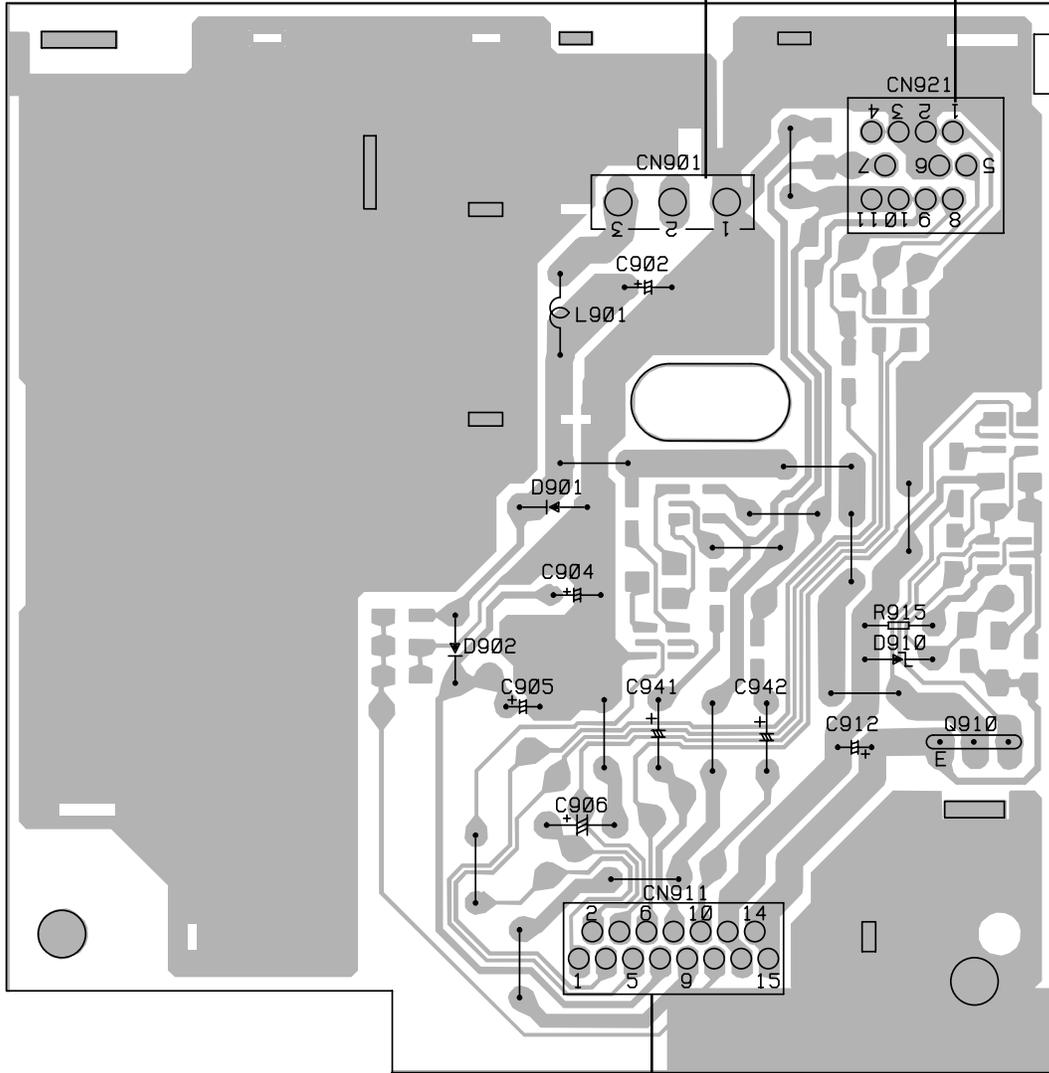
**B** POWER UNIT

CORD

IP-BUS

IC, Q

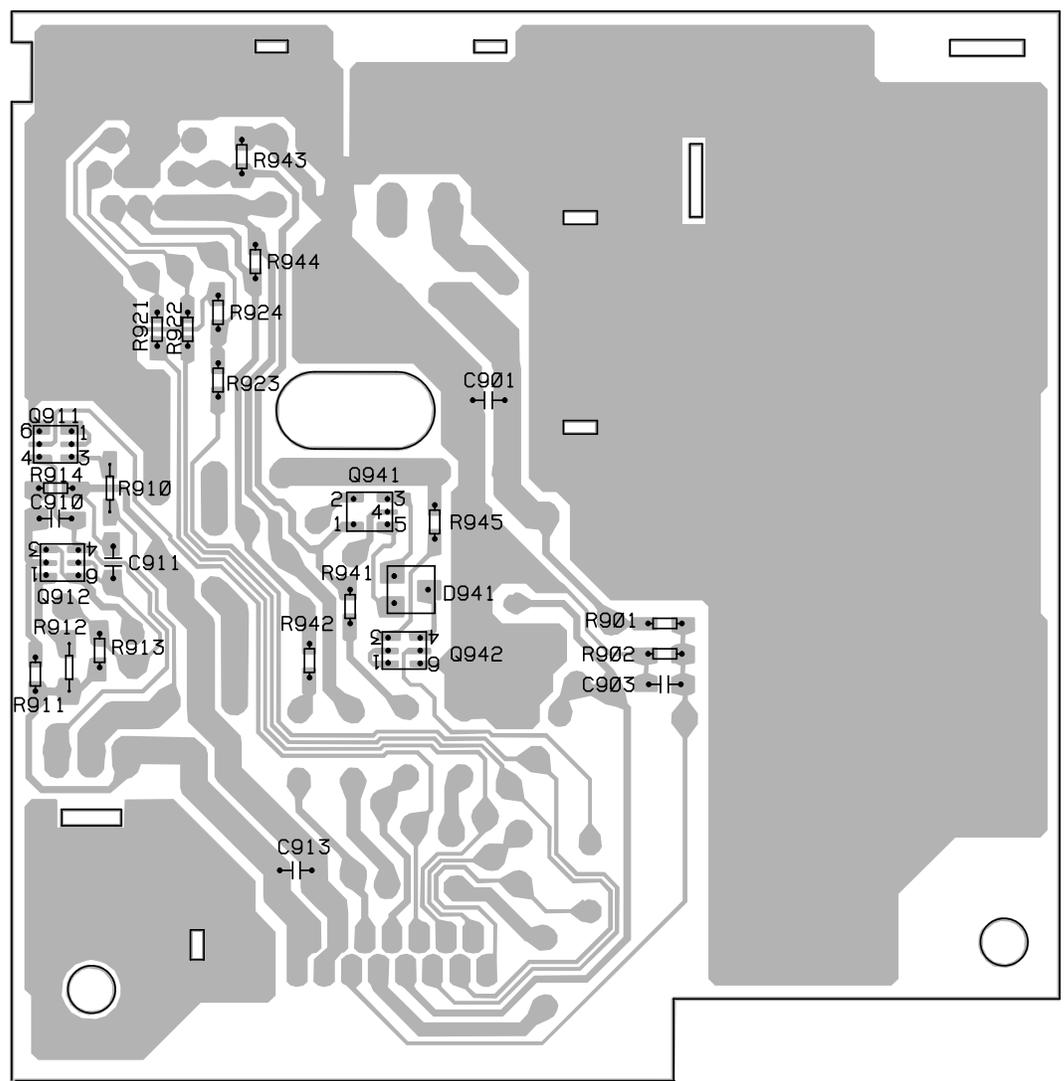
Q910



**A** CN701

**B** POWER UNIT

**SIDE B**



IC, Q

- Q911
- Q941
- Q912
- Q942

A

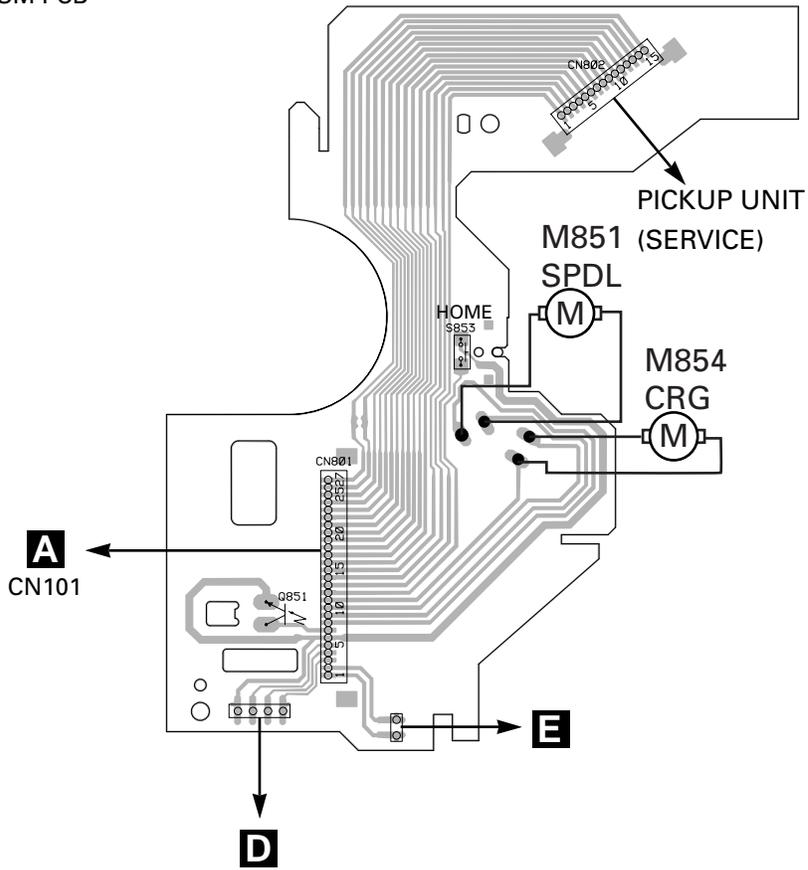
B

C

D

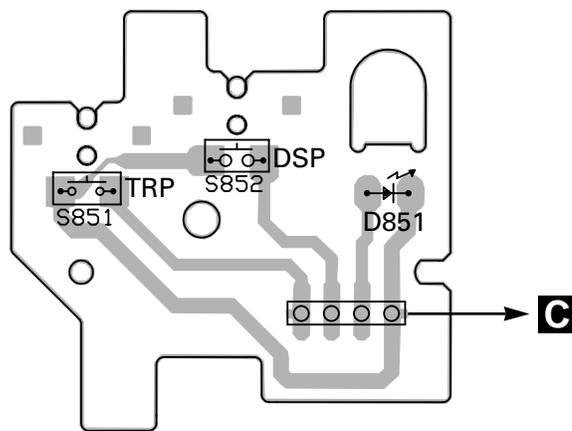
### 4.3 MECHANISM PCB

**C** MECHANISM PCB



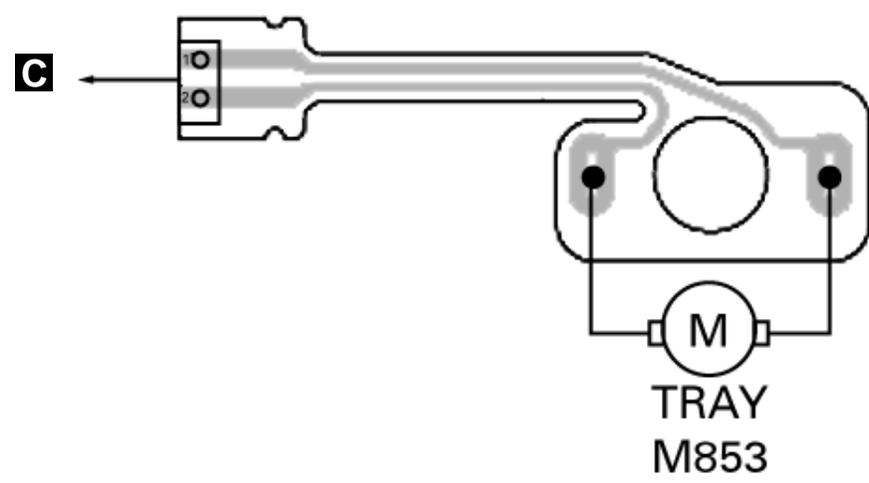
### 4.4 SWITCH PCB

**D** SWITCH PCB



### 4.5 MOTOR PCB

**E** MOTOR PCB



## 5. 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/OSOOOJ,RS1/OOSOOOJ

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

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

| ====Circuit Symbol and No.====Part Name            | Part No.    | ====Circuit Symbol and No.====Part Name | Part No.     |
|--|-------------|---|--------------|
| <b>A</b> Unit Number : CWX2260(CDX-P650/X1N/UC,ES) |             | R 259                                   | RS1/16S102J  |
| Unit Name : CD Core Unit                           |             | R 260                                   | RS1/16S681J  |
|  |             | R 298                                   | RS1/16S681J  |
|  |             | R 301                                   | RS1/16S103J  |
|  |             | R 302                                   | RS1/16S153J  |
| <b>MISCELLANEOUS</b>                               |             |   |              |
| IC 201 IC  | UPD63710GC  | R 303                                   | RS1/16S103J  |
| IC 202 IC  | BA05FP      | R 304                                   | RS1/16S153J  |
| IC 301 IC  | BA5986FM    | R 305                                   | RS1/16S103J  |
| IC 302 IC  | LB1836M     | R 306                                   | RS1/16S752J  |
| IC 501 IC(EW model)                                | PD4501B     | R 307                                   | RS1/16S103J  |
| IC 603 IC  | BA4560F     | R 308                                   | RS1/16S752J  |
| IC 604 IC  | BA4560F     | R 309                                   | RA4C332J     |
| IC 701 IC  | PD5513A     | R 311                                   | RS1/16S102J  |
| IC 702 IC (SRM2B256SLTMX70)                        | GGC1257     | R 501                                   | RS1/16S102J  |
| IC 703 IC  | HA12187FP   | R 651                                   | RSK1/16S153J |
| IC 704 IC  | PAJ002A     | R 652                                   | RSK1/16S153J |
| IC 705 IC  | TC7SH32FU   | R 653                                   | RSK1/16S153J |
| Q 101 Transistor                                   | 2SB1132     | R 654                                   | RSK1/16S153J |
| Q 701 Transistor                                   | DTA144EK    | R 659                                   | RSK1/16S123J |
| Q 770 Transistor                                   | 2SB1184F5   | R 660                                   | RSK1/16S123J |
| Q 771 Transistor                                   | 2SC2412K    | R 661                                   | RSK1/16S123J |
| D 201 Diode  | 1SR154-400  | R 662                                   | RSK1/16S123J |
| D 601 Diode  | UDZ7R5(B)   | R 663                                   | RSK1/16S103J |
| D 730 Diode  | 1SS356      | R 664                                   | RSK1/16S103J |
| D 770 Diode  | 1SS355      | R 665                                   | RSK1/16S103J |
| X 202 Ceramic Resonator 16.93MHz                   | CSS1456     | R 666                                   | RSK1/16S103J |
| X 701 Ceramic Resonator 10.00MHz                   | CSS1476     | R 669                                   | RS1/16S101J  |
| S 801 Push Switch(EJECT)                           | CSG1076     | R 670                                   | RS1/16S101J  |
| S 802 Push Switch(RESET)                           | CSG1076     | R 671                                   | RS1/16S752J  |
| S 803 Spring Switch(MAG)                           | CSN1044     | R 672                                   | RS1/16S103J  |
| VR 802 Semi-fixed 1kΩ(B)                           | CCP1338     | R 673                                   | RS1/16S271J  |
|  |             | R 701                                   | RS1/16S681J  |
|  |             | R 702                                   | RS1/16S102J  |
|  |             | R 703                                   | RS1/16S222J  |
|  |             | R 704                                   | RS1/16S104J  |
| <b>RESISTORS</b>                                   |             |   |              |
| R 101  | RS1/8S120J  |   |              |
| R 102  | RS1/8S100J  |   |              |
| R 103  | RS1/16S222J | R 705                                   | RS1/16S104J  |
| R 201  | RS1/16S104J | R 706                                   | RS1/16S222J  |
| R 202 (UC,ES model)                                | RS1/16S0R0J | R 707                                   | RS1/16S104J  |
|  |             | R 708                                   | RS1/16S0R0J  |
| R 205  | RS1/16S103J | R 709                                   | RS1/16S104J  |
| R 206  | RS1/16S393J |   |              |
| R 207  | RS1/16S182J | R 710                                   | RS1/16S473J  |
| R 208  | RS1/16S304J | R 713                                   | RS1/16S473J  |
| R 212  | RS1/16S0R0J | R 715                                   | RS1/16S473J  |
|  |             | R 716                                   | RS1/16S103J  |
|  |             | R 717                                   | RS1/16S473J  |
| R 213  | RS1/16S103J |   |              |
| R 214  | RS1/16S103J |   |              |
| R 215  | RS1/16S123J | R 718                                   | RS1/16S681J  |
| R 216  | RS1/16S273J | R 719                                   | RS1/16S0R0J  |
| R 217  | RS1/16S273J | R 721                                   | RS1/16S222J  |
|  |             | R 722                                   | RS1/16S222J  |
| R 253  | RS1/16S681J | R 724                                   | RS1/16S681J  |
| R 254  | RS1/16S681J |   |              |
| R 256  | RS1/16S681J | R 725                                   | RS1/16S222J  |
| R 257  | RS1/16S681J | R 726                                   | RS1/16S104J  |
| R 258  | RS1/16S681J | R 727                                   | RS1/16S513J  |
|  |             | R 729                                   | RS1/16S473J  |
|  |             | R 730                                   | RS1/16S473J  |

| ====Circuit Symbol and No.====Part Name | Part No.      | ====Circuit Symbol and No.====Part Name                  | Part No.               |
|---|---------------|--|------------------------|
| R 731                                   | RS1/16S222J   | C 302  | CKSQYB224K16           |
| R 732                                   | RS1/16S683J   | C 501 (EW model)   | CKSQYB104K25           |
| R 733                                   | RS1/16S222J   | C 502 (EW model)   | CKSRYB471K50           |
| R 734                                   | RS1/16S473J   | C 651  | CCSRCH391J50           |
| R 735                                   | RS1/16S222J   | C 652  | CCSRCH391J50           |
| R 736                                   | RS1/16S103J   | C 653  | CCSRCH181J50           |
| R 737                                   | RS1/16S433J   | C 654  | CCSRCH181J50           |
| R 738                                   | RS1/16S104J   | C 655  | CCSRCH181J50           |
| R 739                                   | RS1/8S2R0J    | C 656  | CCSRCH181J50           |
| R 740                                   | RS1/8S2R0J    | C 661  | CKSQYB104K25           |
| R 741                                   | RS1/16S102J   | C 664  | CKSRYB103K25           |
| R 742                                   | RS1/16S104J   | C 665  | CEV470M6R3             |
| R 743                                   | RS1/16S104J   | C 666  | CKSRYB103K25           |
| R 744                                   | RS1/16S223J   | C 701  | CKSRYB103K25           |
| R 745                                   | RS1/16S104J   | C 702  | CKSQYB473K16           |
| R 747                                   | RS1/16S472J   | C 703  | CKSQYB473K16           |
| R 750                                   | RA4C473J      | C 707  | CKSRYB103K25           |
| R 751                                   | RA4C473J      | C 708  | CKSQYB104K25           |
| R 752                                   | RN1/16SE3602D | C 710  | CKSRYB103K25           |
| R 753                                   | RN1/16SE6801D | C 711  | CKSRYB102K50           |
| R 754                                   | RS1/16S221J   | C 712  | CKSRYB102K50           |
| R 755                                   | RS1/16S104J   | C 714  | CKSQYB104K25           |
| R 756                                   | RS1/16S221J   | C 715  | CSZST220M16            |
| R 759                                   | RS1/16S472J   | C 717  | CKSRYB103K25           |
| R 760                                   | RS1/16S104J   | C 718  | CKSRYB103K25           |
| R 761                                   | RS1/16S104J   | C 719  | CKSRYB102K50           |
| R 764                                   | RS1/16S473J   | C 720  | CKSRYB102K50           |
| R 801                                   | RS1/10S221J   | C 721  | CKSRYB103K25           |
| R 802                                   | RS1/10S271J   | C 722  | CKSRYB103K25           |
| R 804                                   | RS1/16S562J   | C 801  | CKSRYB103K25           |
| R 805                                   | RS1/16S562J   | C 802  | CKSQYB104K25           |
| R 806                                   | RS1/16S102J   | C 803  | CKSRYB103K25           |
| CAPACITORS                              |               | <b>B</b> Unit Number : CWX2299<br>Unit Name : Power Unit |                        |
| C 101                                   | CKSRYB102K50  | MISCELLANEOUS  |                        |
| C 102                                   | CKSQYB104K25  | Q 910  | Transistor 2SD2396     |
| C 103                                   | CEV101M6R3    | Q 911  | Transistor IMD2A       |
| C 104                                   | CEV470M6R3    | Q 912  | Transistor IMX1        |
| C 105                                   | CKSQYB334K16  | Q 941  | Transistor FMG12       |
| C 106                                   | CKSQYB334K16  | Q 942  | Transistor IMD2A       |
| C 107                                   | CKSQYB334K16  | D 901  | Diode 1SR139-400       |
| C 201                                   | CKSQYB104K25  | D 902  | Diode 1SR139-400       |
| C 202                                   | CEV101M6R3    | D 910  | Diode HZS6L(B1)        |
| C 203                                   | CKSQYB104K25  | D 941  | Diode MA152WA          |
| C 204                                   | CKSRYB332K50  | L 901  | Choke Coil 1mH CTH1047 |
| C 205                                   | CKSQYB104K25  | RESISTORS  |                        |
| C 206                                   | CKSRYB392K50  | R 901  | RS1/10S204J            |
| C 207                                   | CKSQYB224K16  | R 902  | RS1/10S104J            |
| C 208                                   | CCSRCH270J50  | R 910  | RS1/8S431J             |
| C 209                                   | CCSRCJ3R0C50  | R 911  | RS1/10S681J            |
| C 210                                   | CCSRCH221J50  | R 912  | RS1/8S101J             |
| C 211                                   | CCSRCH101J50  | R 913  | RS1/10S512J            |
| C 212                                   | CKSRYB682K50  | R 914  | RS1/10S132J            |
| C 213                                   | CKSQYB104K25  | R 915  | RD1/4PU151J            |
| C 215                                   | CKSQYB104K25  | R 921  | RS1/10S101J            |
| C 216                                   | CKSQYB104K25  | R 922  | RS1/10S101J            |
| C 217                                   | CKSQYB104K25  | R 923  | RS1/10S102J            |
| C 218                                   | CKSQYB104K25  | R 924  | RS1/10S473J            |
| C 220                                   | CKSQYB104K25  | R 941  | RS1/10S112J            |
| C 253                                   | CKSRYB471K50  | R 942  | RS1/10S112J            |
| C 271                                   | CEV101M6R3    | R 943  | RS1/10S362J            |
| C 272                                   | CCH1300       | R 944  | RS1/10S362J            |
| C 273                                   | CKSQYB334K16  | R 945  | RS1/10S222J            |
| C 301                                   | CEV101M10     |  |                        |

33μF/10V

====Circuit Symbol and No.====Part Name      Part No.  
 -----

CAPACITORS

|   |     |            |              |
|---|-----|------------|--------------|
| C | 901 |            | CKSQYB104K50 |
| C | 902 | 470μF/16V  | CCH1183      |
| C | 903 |            | CKSQYB223K25 |
| C | 904 | 470μF/16V  | CCH1183      |
| C | 906 | 0.22F/5.5V | CCL1037      |
|   |     |            |              |
| C | 910 |            | CKSQYB103K50 |
| C | 911 |            | CKSQYB103K50 |
| C | 912 |            | CEJA220M10   |
| C | 913 |            | CKSQYB103K50 |
| C | 941 |            | CEJA330M10   |
|   |     |            |              |
| C | 942 |            | CEJA330M10   |

**C** Unit Number :  
 Unit Name : Mechanism PCB

|   |     |                     |         |
|---|-----|---------------------|---------|
| Q | 851 | Photo-transistor    | PT4800  |
| S | 853 | Spring Switch(HOME) | CSN1051 |

**D** Unit Number :  
 Unit Name : Switch PCB

|   |     |                    |         |
|---|-----|--------------------|---------|
| D | 851 | LED                | CN504-2 |
| S | 851 | Spring Switch(DSP) | CSN1051 |
| S | 852 | Spring Switch(TAP) | CSN1052 |

**E** Unit Number :  
 Unit Name : Motor PCB

|   |     |             |         |
|---|-----|-------------|---------|
| M | 853 | Motor(TRAY) | CXB3005 |
|---|-----|-------------|---------|

Miscellaneous Parts List

|    |     |                          |         |
|----|-----|--------------------------|---------|
|    |     | Pickup Unit(P8)(Service) | CXX1285 |
| M  | 851 | Motor(SPINDLE)           | CXB3003 |
| M  | 852 | Motor(ELV)               | CXB3006 |
| M  | 854 | Motor(CARRIAGE)          | CXB3004 |
| VR | 801 | Volume 10kΩ              | CCW1023 |

## 6. ADJUSTMENT

### 6.1 CHECKING THE GRATING

#### ● Checking the Grating After Changing the Pickup Unit

• **Note :**

CD mechanism modules the grating angle of the pickup unit cannot be adjusted after the pickup unit is changed. The pickup unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted pickup unit for the CD mechanism module. Changing the pickup unit is thus best considered as a last resort. However, if the pickup unit must be changed, the grating should be checked using the procedure below.

• **Purpose :**

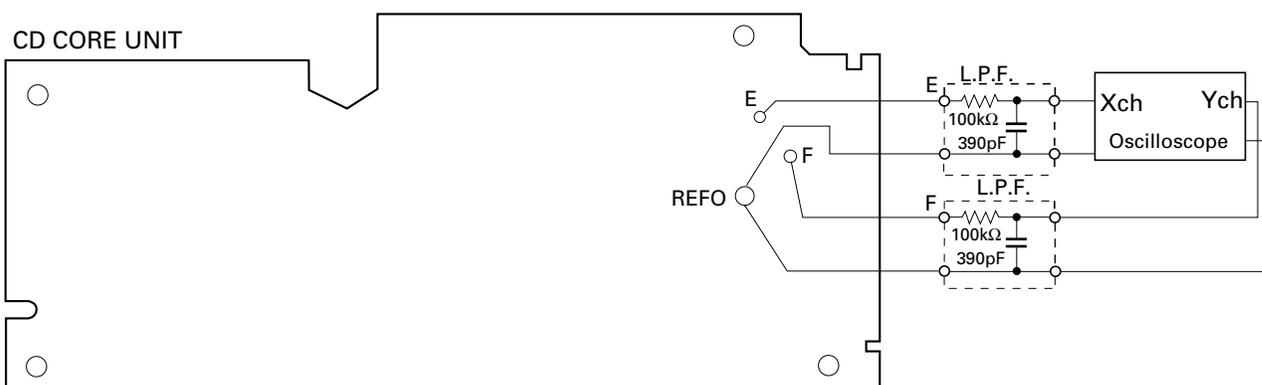
To check that the grating is within an acceptable range.

• **Symptoms of Mal-adjustment :**

If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or track searching taking a long time, may appear.

• **Method :**

- |                       |                            |
|-----------------------|----------------------------|
| • Measuring Equipment | • Oscilloscope, Two L.P.F. |
| • Measuring Points    | • E, F, REFO               |
| • Disc                | • ABEX TCD-784             |
| • Mode                | • TEST MODE                |



• **Checking Procedure**

1. Enter Test mode, then select Multi-CD player and switch the 5V regulator on.
2. Using the **TRK+** and **TRK-** buttons, move the pickup unit to the innermost track.
3. Press key **9** to close focus, the display should read "91". Press key **9 2** times. Enter Rough Servo mode. Press key **8** to implement the tracking balance adjustment the display should now read "81".
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within  $75^\circ$ . Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than  $75^\circ$  try changing the pickup unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than  $75^\circ$  then the mechanism should be judged to be at fault.

• **Note**

Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" ( the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

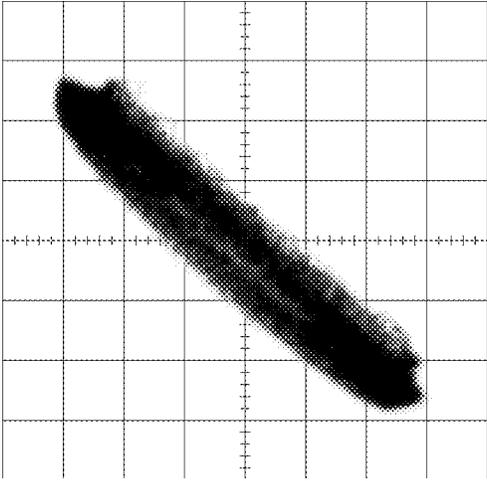
• **Hint**

Change the disc changes the clamp position and may decrease the "wobble".

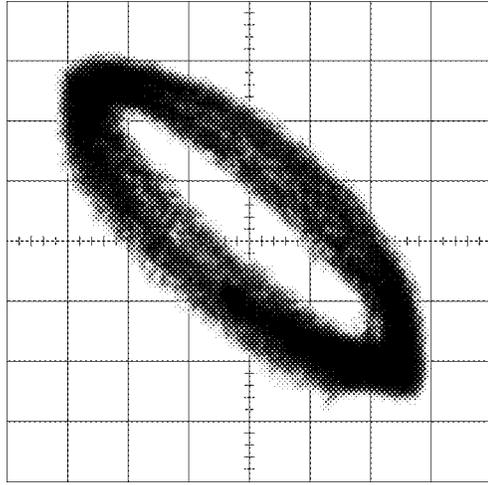
Grating waveform

Ech— Xch 20mV/div, AC  
Fch— Ych 20mV/div, AC

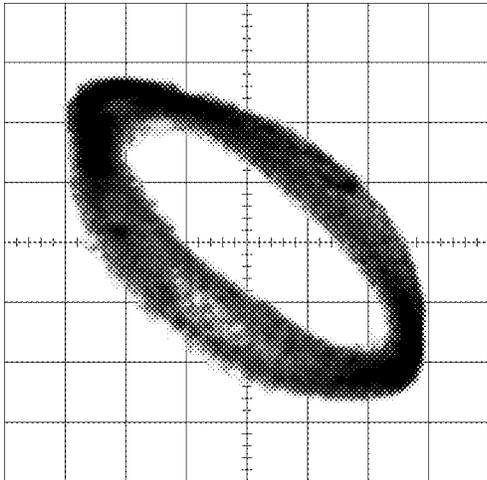
0°



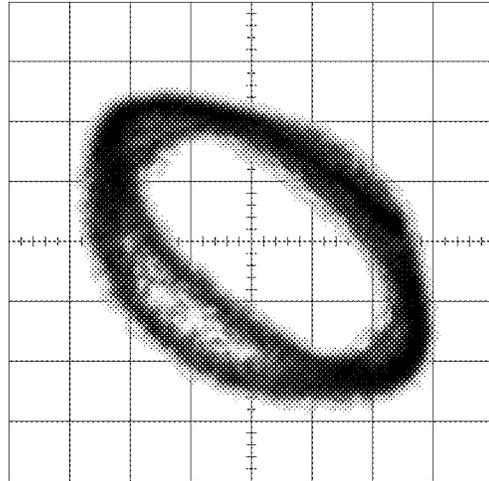
30°



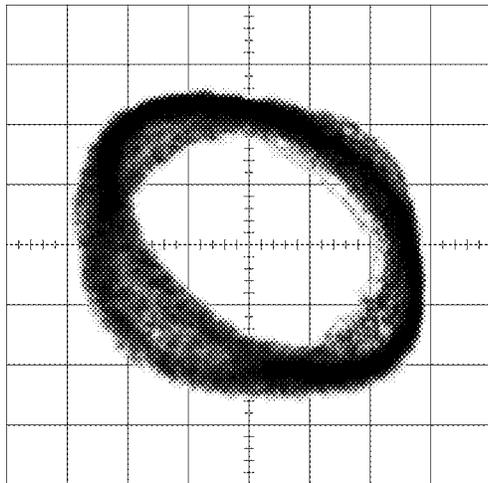
45°



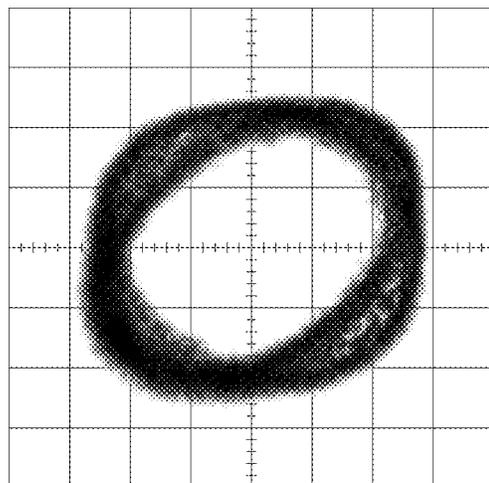
60°



75°



90°



## 6.2 ADJUSTMENT OF ELEVATION WHEN THE CD CORE UNIT HAS BEEN REMOVED FOR MAINTENANCE

### ● Adjustment When Error Code 60 is Displayed Because of Malfunctioning Elevation

**• Note :**

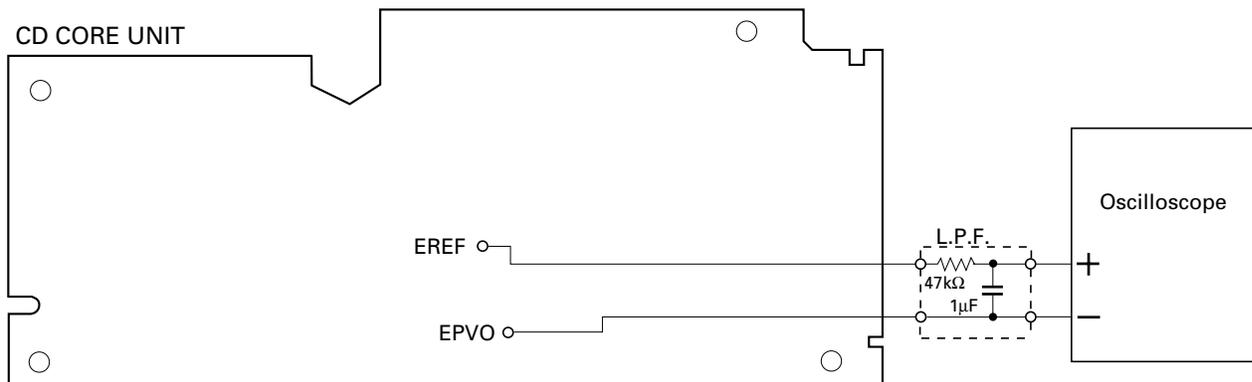
This mechanism is detects the height of the stage using slide-variable resistance. To absorb dislocation of the stage height caused by differences in the mechanism and the CD core unit, adjustment must be made for each CD-mechanism module using a variable resistor. Normally, readjustment is not needed, as this has been adjusted at the factory. However, adjustment of elevation is required according to the procedure explained below if an elevation error has occurred or if the CD core unit has been removed.

**• Purpose :**

To adjust and confirm whether or not elevation operates correctly.

**• Adjustment Method :**

- Measuring Equipment: Oscilloscope, One L.P.F.
- Measuring Points : EREF, EPVO
- Setting : Without a magazine in Test mode  
With the mechanism placed upside-down (Place the CD mechanism module so that the CD core unit is above.)



**• Confirmation Procedure**

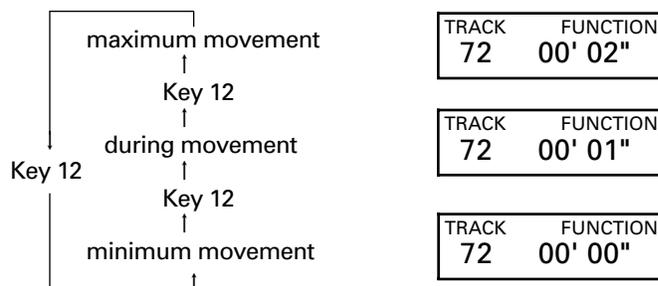
1. Enter Test mode, then select Multi-CD player.
2. Press key 7 to enter Mechanism Test mode.
3. Press key 12 twice to specify the amount of movement.

Examples of display

|       |          |
|-------|----------|
| TRACK | FUNCTION |
|       |          |

|       |          |
|-------|----------|
| TRACK | FUNCTION |
| 72    | 00' 00"  |

The amount of movement changes each time key 12 is pressed.



Examples of display

4. Press key **9** to set ELV/TRAY mode to TRAY.

|       |          |
|-------|----------|
| TRACK | FUNCTION |
| 72    | 01' 02"  |

5. Press key **FF** to release the clamp and return the tray to the magazine.

Release the clamp

6. Press key **9** to enter Elevation Move mode.

|       |          |
|-------|----------|
| TRACK | FUNCTION |
| 72    | 00' 02"  |

7. Use key **FF/REV** to operate elevation and set if to the graduation of the third step (Fig. 1).

8. Make the adjustment.

Use VR802 to adjust the difference in potential between EREF and EPVO to  $0 \pm 10$  mV.

9. When adjustment is completed, press key **BAND** to exit Mechanism Test mode.

|       |          |
|-------|----------|
| TRACK | FUNCTION |
| 72    | 00' 02"  |

10. Confirm operation of the mechanism.

Place the mechanism horizontally (CD core unit below). Take care not to short-circuit the PCB.

|       |          |
|-------|----------|
| TRACK | FUNCTION |
|       | ' "      |

11. Confirm the height of the stage. Use the DISC± key to select Disc No.3.

Check if the stopper bend of the clamp lever is engaged in the groove of the frame stopper (Fig. 2-4).

|       |          |
|-------|----------|
| TRACK | FUNCTION |
| 04    | 00' 00"  |

• **Note :**

The stopper bend will be pressed downward into the groove for final clamping. Confirm the engagement position of the stopper bend.

• If the stopper bend is engaged in the center and pressed downward, adjustment is completed. Go to step 15.

• If the stopper bend is dislocated, check the amount of dislocation by following steps 12 to 14.

12. To see the amount of dislocation, place the mechanism upside-down. If the stopper bend has been dislocated in the direction of the first CD, turn VR802 to the left(Fig. 2).

To lower the stage toward the sixth step by 0.1 mm, reduce the voltage of EREF (adjusted in step 8) by 20 mV.

If the stopper bend has been dislocated in the direction of the sixth CD, turn VR802 to the right(Fig. 4).

To raise the stage toward the first step by 0.1 mm, increase the voltage of EREF (adjusted in step 8) by 20 mV.

13. Place the mechanism horizontal. Go back to step 11 to reconfirm the stage height.

14. When adjustment of the stage height is completed, proceed as follows:

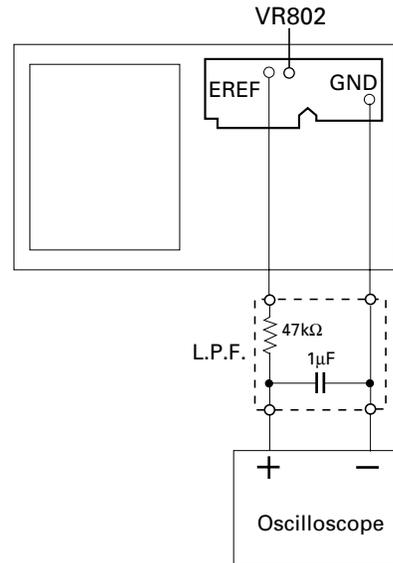
15. Press the **EJECT** switch.

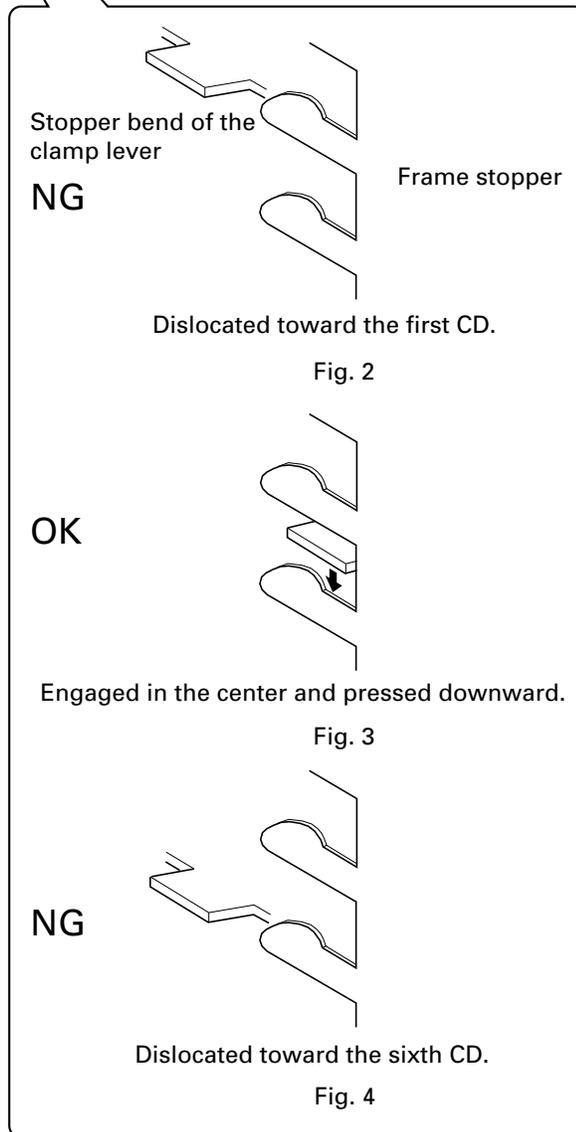
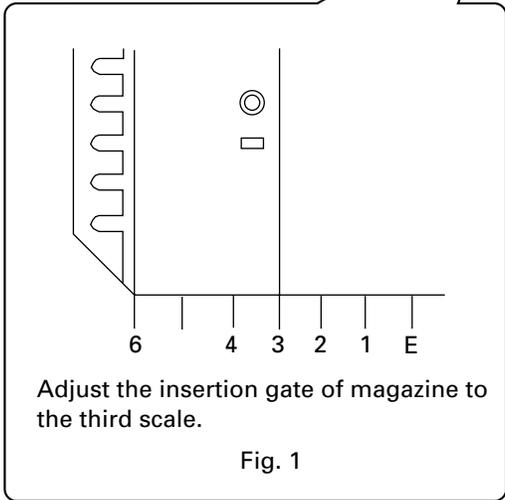
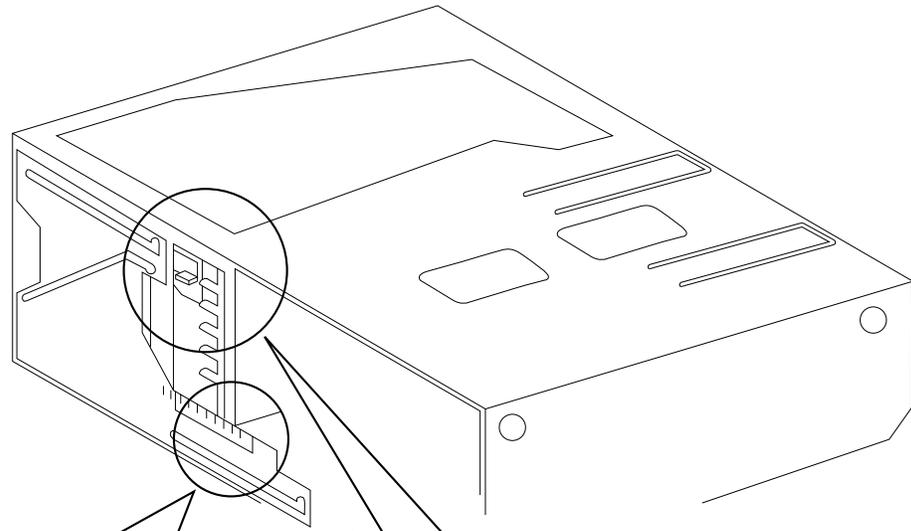
16. Once operation of the mechanism has stopped, turn the power OFF.

17. Wait more than one minute after the power is turned off, then turn the power ON and insert a magazine.

18. Check if the mechanism operates correctly with the first and fourth CDs.

19. If the mechanism operates properly, adjustment is completed. If the mechanism operates improperly, make the adjustment again.





## 7. GENERAL INFORMATION

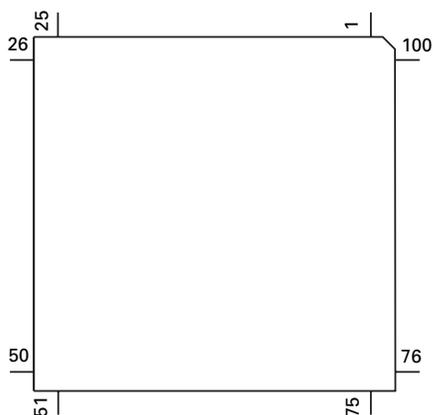
### 7.1 IC

#### ● Pin Functions (UPD63710GC)

| Pin No. | Pin Name | I/O | Function and Operation   |
|---------|----------|-----|--|
| 1       | GND      |     | Logic circuit GND  |
| 2       | HOLD     | I/O | Defect detection output  |
| 3       | MIRR     | I/O | MIRR output  |
| 4       | FOK      | O   | RFOK signal output   |
| 5       | RST      | I   | Reset signal input   |
| 6       | A0       | I   | Command/parameter identification signal input  |
| 7       | STB      | I   | Data strobe signal input   |
| 8       | SCK      | I   | Clock signal input for serial data input/output  |
| 9       | SO       | O   | Serial data and status signal output   |
| 10      | SI       | I   | Serial data input  |
| 11      | VDD      |     | Positive power supply terminal to logic circuit  |
| 12      | DA.VDD   |     | Positive power supply terminal to D/A converter  |
| 13      | NC       |     | Not used   |
| 14, 15  | DA.GND   |     | D/A converter GND  |
| 16      | NC       |     | Not used   |
| 17      | DA.VDD   |     | Positive power supply terminal to D/A converter  |
| 18      | R+       | O   | Right channel audio data output  |
| 19      | R-       | O   | Right channel audio data output  |
| 20      | L-       | O   | Left channel audio data output   |
| 21      | L+       | O   | Left channel audio data output   |
| 22      | X.VDD    |     | Positive power supply terminal to crystal oscillation circuit                                      |
| 23      | XTAL     | O   | Crystal oscillator connect pin   |
| 24      | XTAL     | I   | Crystal oscillator connect pin   |
| 25      | X.GND    |     | Crystal oscillation circuit GND  |
| 26      | VDD      |     | Positive power supply terminal to logic circuit  |
| 27      | EMPH     | O   | Output pin for the pre-emphasis data in the sub-Q code   |
| 28      | FLAG     | O   | Flag output pin to indicate that audio data currently being output consists of noncorrectable data |
| 29      | DIN      | I   | Serial data input to internal DAC  |
| 30      | DOUT     | O   | Serial audio data output   |
| 31      | SCKIN    | I   | Serial clock input to internal DAC   |
| 32      | SCKO     | O   | Audio data that is output from DOUT changes at rising edge of this clock                           |
| 33      | LRCKIN   | I   | LRCK signal input to internal DAC  |
| 34      | LRCK     | O   | Signals to distinguish the right and left channels of the audio data output from DOUT              |
| 35      | WDCK     | O   | Output double the frequency of LRCK  |
| 36      | TX       | O   | Digital audio interface data output  |
| 37      | GND      |     | Logic circuit GND  |
| 38      | C16M     | O   | Oscillator clock buffering output  |
| 39      | LIMIT    | I   | Status of the pin is output at Bit 5 of the status output  |
| 40      | VDD      |     | Positive power supply terminal to logic circuit  |
| 41      | LOCK     | O   | EFM synchronous detection signal   |
| 42      | RFCK     | O   | Frame synchronous signal of XTAL-system  |
| 43      | WFCK     | O   | Frame synchronous signal of PLL-system   |
| 44      | PLCK     | O   | Monitor pin of bit clock   |
| 45      | GND      |     | Logic circuit GND  |
| 46      | C1D1     | O   | Output pin for indicating the C1 error correction results  |
| 47      | C1D2     | O   | Output pin for indicating the C1 error correction results  |
| 48      | C2D1     | O   | Output pin for indicating the C2 error correction results  |
| 49      | C2D2     | O   | Output pin for indicating the C2 error correction results  |
| 50      | C2D3     | O   | Output pin for indicating the C2 error correction results  |
| 51      | VDD      |     | Positive power supply terminal to logic circuit  |

| Pin No. | Pin Name          | I/O | Function and Operation                           |
|---------|-------------------|-----|--|
| 52      | PACK              | O   | CD-TEXT PACK synchronous signal                  |
| 53      | TSO               | O   | CD-TEXT data serial output                       |
| 54      | TSI               | I   | CD-TEXT control parameter serial input           |
| 55      | T $\overline$ SCK | I   | CD-TEXT serial clock input                       |
| 56      | TSTB              | I   | CD-TEXT parameter strobe signal input            |
| 57      | GND               |     | Logic circuit GND                                |
| 58      | TEST              | I   | Test pin   |
| 59      | ATEST             | I/O | Test pin   |
| 60      | RFMODE            | I   | Use/not use select for internal RF amplifier     |
| 61      | A.GND             |     | Analog circuit GND                               |
| 62      | FD                | O   | Focus drive output                               |
| 63      | TD                | O   | Tracking drive output                            |
| 64      | SD                | O   | Sled drive output                                |
| 65      | MD                | O   | Spindle drive output                             |
| 66      | DACO              | O   | DAC output for adjustment                        |
| 67      | FBAL              | O   | DAC output for adjustment                        |
| 68      | TBAL              | O   | DAC output for adjustment                        |
| 69      | TEVCA             | O   | DAC output for adjustment                        |
| 70      | A.VDD             |     | Power supply terminal to analog circuit          |
| 71      | EFM               | O   | EFM signal output                                |
| 72      | ASY               | I   | EFM comparator reference voltage input           |
| 73      | C3T               |     | 3T detection capacitor additional pin            |
| 74      | RFI               | I   | RF signal input for EFM data regulation          |
| 75      | AGCO              | O   | RF signal output of after gain adjustment        |
| 76      | AGCI              | I   | RF-AGC amplifier input                           |
| 77      | RFO               | O   | RF summing amplifier output                      |
| 78      | EQ2               |     | RF amplifier equalizer parts additional pin      |
| 79      | EQ1               |     | RF amplifier equalizer parts additional pin      |
| 80      | RF-               | I   | RF summing amplifier inverted input              |
| 81      | A.GND             |     | Analog circuit GND                               |
| 82      | A                 | I   | Photo detector A input                           |
| 83      | C                 | I   | Photo detector C input                           |
| 84      | B                 | I   | Photo detector B input                           |
| 85      | D                 | I   | Photo detector D input                           |
| 86      | F                 | I   | Photo detector F input                           |
| 87      | E                 | I   | Photo detector E input                           |
| 88      | A.VDD             |     | Positive power supply terminal to analog circuit |
| 89      | REFOUT            | O   | Reference electric potential output              |
| 90      | FE-               | I   | Focus error amplifier inverted input             |
| 91      | FEO               | I/O | Focus error amplifier output                     |
| 92      | TE-               | I   | Tracking error amplifier inverted input          |
| 93      | TEO               | I/O | Tracking error amplifier output                  |
| 94      | TE2               | I/O | Tracking error output of after amplification     |
| 95      | TEC               | I   | Tracking comparator input                        |
| 96      | A.GND             |     | Analog circuit GND                               |
| 97      | PD                | I   | PD detection signal input for LD output monitor  |
| 98      | LD                | O   | LD control current output                        |
| 99      | PN                | I   | APC circuit control polarity set pin             |
| 100     | A.VDD             |     | Positive power supply terminal to analog circuit |

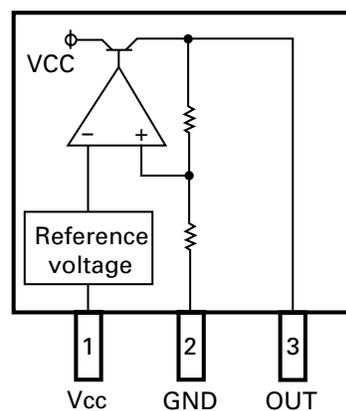
\*UPD63710GC



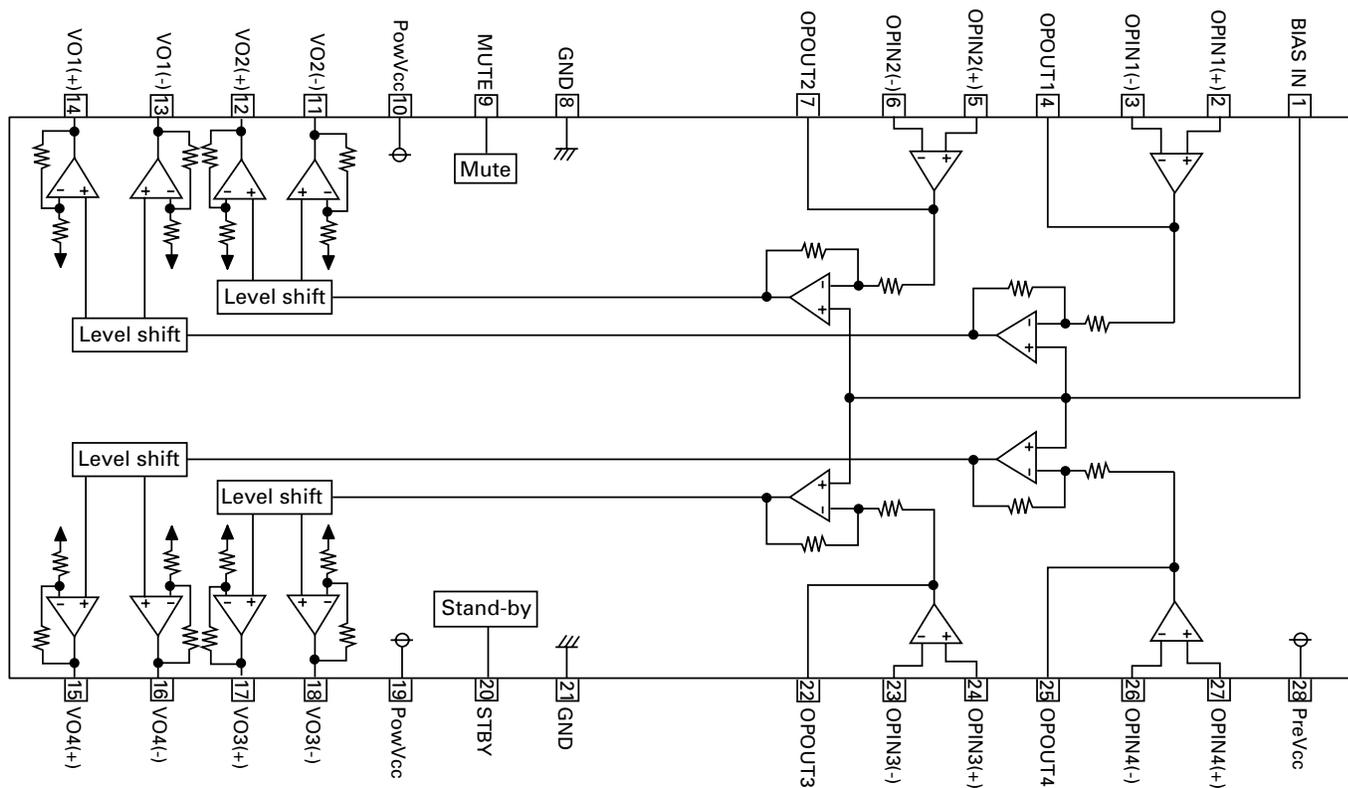
IC's marked by\* are MOS type.

Be careful in handling them because they are very liable to be damaged by electrostatic induction.

BA05FP



BA5986FM

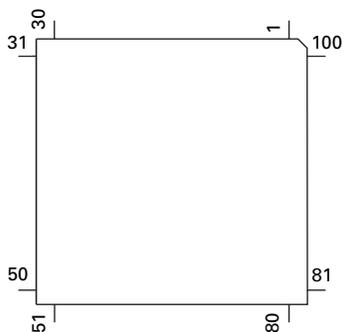


## ● Pin Functions (PD5513A)

| Pin No. | Pin Name | I/O | Format | Function and Operation                                |
|---------|----------|-----|--------|---|
| 1,2     | NC       |     |        | Not used  |
| 3       | ADENA    | O   | C      | A/D reference voltage output                          |
| 4       | TXTSTE   | O   | C      | TEXT parameter output                                 |
| 5       | TXTSO    | O   | C      | TEXT control parameter serial output                  |
| 6       | TXTSI    | I   |        | TEXT data serial input                                |
| 7       | TXTSCK   | O   | C      | TEXT clock output                                     |
| 8       | BYTE     | I   |        | VCC joint   |
| 9       | CNVSS    | I   |        | VSS joint   |
| 10      | POWER    | O   | C      | CD +5V control  |
| 11      | CONT     | O   | C      | Servo driver output control                           |
| 12      | RESET    | I   |        | Reset input   |
| 13      | XOUT     | O   |        | Crystal oscillating element connection pin            |
| 14      | VSS      |     |        | GND   |
| 15      | XIN      | I   |        | Crystal oscillating element connection pin            |
| 16      | VCC      |     |        | VDD   |
| 17      | NMI      | I   |        | Pull up   |
| 18      | BSENS    | I   |        | Back Up sense input                                   |
| 19      | ASENS    | I   |        | ACC power sense input                                 |
| 20      | TXTPACK  | I   |        | TEXT PACK interrupt input                             |
| 21      | IPTA4IN  | I   |        | IPIN joint  |
| 22      | IPPW     | O   | C      | Power supply control output for IP BUS interface IC   |
| 23      | NC       |     |        | Not used  |
| 24      | CSEL     | I   |        | Compression select                                    |
| 25      | SRAMSW   | I   |        | When there is SRAM, "H"                               |
| 26      | CCS      | O   | C      | IP-BUS chip select                                    |
| 27,28   | NC       |     |        | Not used  |
| 29      | IPIN     | I   |        | Data input from IP BUS interface IC                   |
| 30      | IPOUT    | O   | C      | Data output for IP BUS interface IC                   |
| 31,32   | NC       |     |        | Not used  |
| 33      | FMIPSW   | I   |        | FM/IP BUS select switch                               |
| 34      | TESTIN   | I   |        | Test program mode input                               |
| 35      | XSO      | O   | NM     | LSI data output                                       |
| 36      | XSI      | I   |        | LSI data input  |
| 37      | XSCK     | O   | NM     | LSI clock output                                      |
| 38      | M6M12    | I   |        | 6/12 disc select input                                |
| 39-43   | NC       |     |        | Not used  |
| 44      | RD       | O   | C      | SRAM enable output                                    |
| 45      | NC       |     |        | Not used  |
| 46      | WR       | O   | C      | SRAM write enable output                              |
| 47      | NC       |     |        | Not used  |
| 48      | CS       | O   | C      | SRAM chip select                                      |
| 49      | XA0      | O   |        | Control signal distinguishing data from microcomputer |
| 50      | XSTB     | O   | C      | CD LSI strobe output                                  |
| 51      | XRST     | O   | C      | CD LSI reset output                                   |
| 52      | MIRR     | I   |        | Mirror detector input                                 |
| 53      | LOCK     | I   |        | Spindle lock detector input                           |
| 54      | FOK      | I   |        | FOK signal input                                      |
| 55      | NC       |     |        | Not used  |
| 56      | A11      | I   |        | Address BUS input                                     |
| 57      | A9       | O   | C      | SRAM address bus output                               |
| 58      | A8       | O   | C      | SRAM address bus output                               |
| 59      | A13      | O   | C      | SRAM address bus output                               |
| 60      | A14      | O   | C      | SRAM address bus output                               |
| 61      | A12      | O   | C      | SRAM address bus output                               |
| 62      | VCC      |     |        | VDD   |
| 63      | A7       | O   | C      | SRAM address bus output                               |
| 64      | VSS      |     |        | GND   |

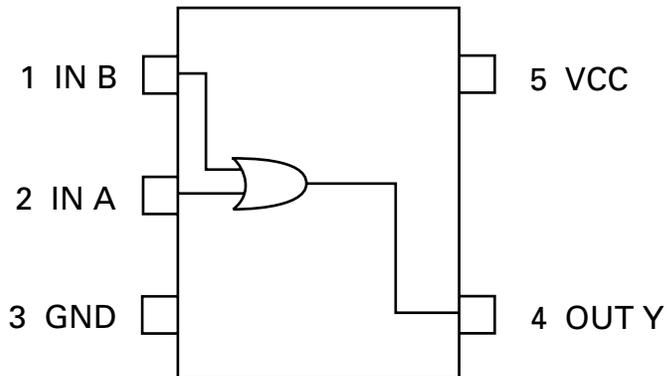
| Pin No. | Pin Name    | I/O | Format | Function and Operation                            |
|---------|-------------|-----|--------|---|
| 65-68   | A6-A3       | O   | C      | SRAM address bus output                           |
| 69      | A10         | O   | C      | SRAM address bus output                           |
| 70      | A2 & (EPSK) | O   | C      | SRAM address bus output and (E2PROM clock output) |
| 71      | A1 & (EPDI) | O/I | C      | SRAM address bus output and (E2PROM data input)   |
| 72      | A0 & (EPDO) | O   | C      | SRAM address bus output and (E2PROM data output)  |
| 73      | NC          |     |        | Not used  |
| 74      | EJSW        | I   |        | Eject key switch interrupt input                  |
| 75      | MAG         | I   |        | Magazine lock switch interrupt input              |
| 77      | NC          |     |        | Not used  |
| 78      | I13         | O   | C      | Motor driver control output                       |
| 79      | I2          | O   | C      | Motor driver control output                       |
| 80      | I4          | O   | C      | Motor driver control output                       |
| 81-88   | D0-D7       | I/O | C      | SRAM data bus                                     |
| 89,90   | NC          |     |        | Not used  |
| 91      | DSP         | I   |        | DISC detect timing input                          |
| 92      | DISK        | I   |        | Disc detector input                               |
| 93      | ELVPVO      | I   |        | Voltage input from ELV position sense             |
| 94      | ELVREF      | I   |        | ELV reference voltage input                       |
| 95      | TRP         | I   |        | Tray position input                               |
| 96      | AVSS        | I   |        | A/D GND   |
| 97      | VDIN        |     |        | Power supply short sensor input                   |
| 98      | VREF        | I   |        | A/D converter reference voltage input             |
| 99      | AVCC        |     |        | A/D VCC   |
| 100     | EPCS        | I/O | C      | E2PROM detect input , Chip select output          |

\*PD5513A



| Format | Meaning                                    |
|--------|--|
| C      | C MOS                                      |
| NM     | Middle resistivity<br>N channel open drain |

TC7SH32FU



## 7.2 DIAGNOSIS

### 7.2.1 DISASSEMBLY

#### ● Removing the Upper Case(not shown)

1. Remove the eight screws.
2. Remove the Upper Case.

#### ● Removing the CD Mechanism Module

-  1 Remove the four dampers(Fig.5).
-  2 Disconnect the connector(Fig.5).
-  3 Remove the two springs(Fig.5).
-  1 Disconnect the connector and then remove the CD Mechanism Module(Fig.6).

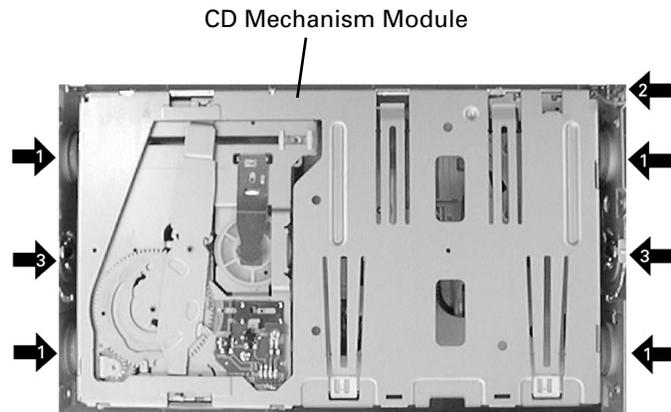


Fig.5

#### ● Removing the Grille Unit(not shown)

- 1.Press the two tabs indicated by arrows and then pull out the Grille Unit.



Fig.6

#### ● Removing the Power Unit(Fig.7)

-  1 Remove the two screws.
-  2 Remove the screw.
-  3 Remove the claw and remove the Power Unit.

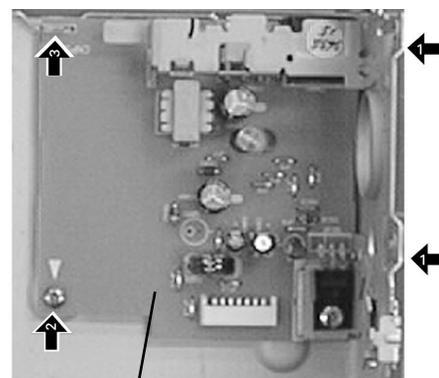


Fig.7

## ● Removing the Pickup Unit

1. Insert the short pin from the pickup unit in the flexible substrate.
2. Remove the flexible substrate from the connector.
3. Remove the flexible card from the connector.
4. Remove the lead wires to which the spindle motor and carriage motor assy were soldered.
5. Remove the two screws and lift the relay substrate up as shown in the figure on the upper right. At this time, make sure that the flexible tray motor printed circuit board and flexible relay card are not pulled excessively.

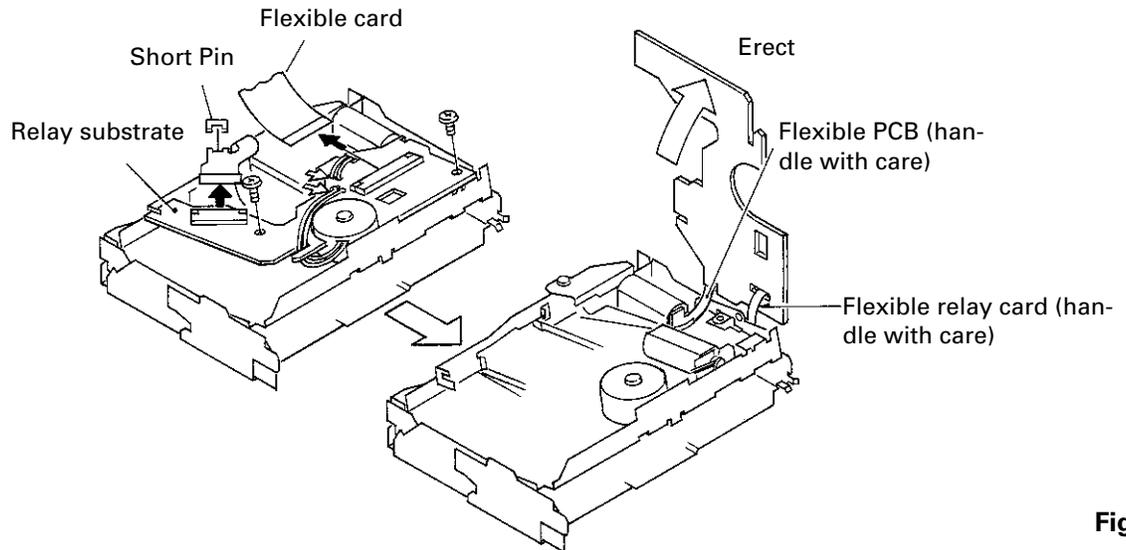


Fig.8

6. Remove screw A and then remove the carriage motor assy, lighting conductor, feed screw holder, feed screw and belt (see Fig. 9).
7. Remove screw B on the main side and the pickup unit together with the guide shaft (see Fig. 9).

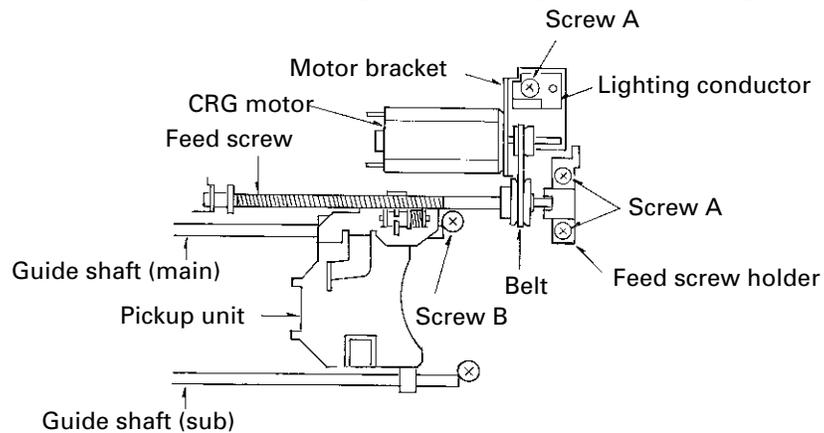


Fig.9

## 7.2.2 TEST MODE

### ● CD Test Mode

#### 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.
- Disc detection during tray extraction and return operations is performed by means of the photo transistor in this unit. Consequently, if the inside of the unit is exposed to a strong light source with the outer casing removed for repairs or adjustment, the following malfunctions may occur:
  - \*Even with a disc loaded, the unit detects "no disc" and cannot start play.
  - \*Although a 12-cm disc is loaded, the unit detects "8cm disc" mistakenly.

When the unit malfunctions this way, either re-position the light source, move the unit or cover the photo transistor.
- During exchanging discs, do not press the keys for the discs to be exchanged.

#### 2) Test Mode

This mode is used for adjusting the CD mechanism module of the device.

- Test mode starting procedure  
Reset while pressing the **4** and **6** keys together.
- Test mode cancellation  
Switch ACC, back-up OFF.
- If the 8 or 9 key is pressed while focus search is in progress, immediately turn the power off (otherwise the actuator may be damaged due to the lens stuck).
- Jump operation of TRs other than 100TR continues after releasing the key. CRG move and 100TR jump operations are brought into the "Tracking close" status when the key is released.
- Powering Off/On resets the jump mode to "Single TR (91)", the RF AMP gain setting to 0 dB, and the automatic adjustment value to the initial value.
- During exchanging discs, do not press the keys for the discs to be exchanged.

| Key to adjustment text<br>inside (12 keys type) | HEAD UNIT (6 keys type) |
|---|-------------------------|
| BAND  | BAND                    |
| TRK+/FF   | TRK+/FF                 |
| TRK-/REV  | TRK-/REV                |
| 7   | 1                       |
| 8   | 2                       |
| 9   | 3                       |
| 10  | 4                       |
| 11  | 5                       |
| 12  | 6                       |
| DISC-   | DISC-                   |
| SOURCE ON/OFF                                   | SOURCE ON/OFF           |



## ● Error Messages

If a CD is not operative or stopped during operation due to an error, the error mode is turned on and cause(s) of the error is indicated with a corresponding number. This arrangement is intended at reducing nonsense calls from the users and also for facilitating trouble analysis and repair work in servicing.

### (1) Basic Indication Method

1) When SERRORM is selected for the CSMOD (CD mode area for the system), error codes are written to DMIN (minutes display area) and DSEC (seconds display area). The same data is written to DMIN and DSEC. DTNO remains in blank as before.

### 2) Head unit display examples

Depending on display capability of LCD used, display will vary as shown below. xx contains the error number.

|                 |                 |                 |
|-----------------|-----------------|-----------------|
| 8-digit display | 6-digit display | 4-digit display |
| ERROR-xx        | ERR-xx          | E-xx            |
|                 | OR              |                 |
|                 | Err-xx          |                 |

\* When the system is manufactured for an OEM basis, the error display will be configured according to the customer specification.

### (2) Error Code List

| Code | Class       | Displayed error code                       | Description of the code and potential cause(s)   |
|------|-------------|--|--|
| 10   | Electricity | Carriage Home NG                           | CRG can't be moved to inner diameter.<br>CRG can't be moved from inner diameter.<br>→ Failure on home switch or CRG move mechanism.  |
| 11   | Electricity | Focus Servo NG                             | Focusing not available.<br>→ Stains on rear side of disc or excessive vibrations on REWRITABLE.  |
| 12   | Electricity | Spindle Lock NG<br>Subcode NG<br>RF AMP NG | Spindle not locked. Sub-code is strange (not readable).<br>→ Failure on spindle, stains or damages on disc, or excessive vibrations.<br>A disc not containing CD-R data is found. Turned over disc are found, though rarely.<br>→ Failure on home switch or CRG move mechanism.<br>An appropriate RF AMP gain can't be determined.<br>→ CD signal error. |
| 17   | Electricity | Setup NG                                   | APC protection doesn't work. Focus can be easily lost.<br>→ Damages or stains on disc, or excessive vibrations.  |
| 30   | Electricity | Search Time Out                            | Failed to reach target address.<br>→ CRG tracking error or damages on disc.  |
| A0   | System      | Power Supply NG                            | Power (VD) is ground faulted.<br>→ Failure on SW transistor or power supply (failure on connector).  |
| A1   | System      | Mechanism power failure                    | Mechanism elevation reference voltage is out of prescription.<br>→ EREF adjustment VR and/or power abnormal.   |
| 50   | Mechanism   | An error upon ejection                     | MAG switch release time has time out.<br>Elevation time out when eject.  |
| 60   | Mechanism   | An error while putting in and out the tray | Tray in / out time has time out.<br>Tray is caught when put in.  |

| Code | Class     | Displayed error code                     | Description of the code and potential cause(s) |
|------|-----------|--|--|
| 70   | Mechanism | An error upon elevation                  | Elevation time has time out.                   |
| 80   | Mechanism | An error with an empty magazine inserted | No disc is available.                          |

Remarks: Unreadable TOC does not constitute an error. An intended operation continues in this case.

A newly designed head unit must conform to the example given above.

Upper digits of an error code are subdivided as shown below:

1x: Setup relevant errors, 3x: Search relevant errors, 3x: Search relevant errors, Ax: Other errors.

## ● New Test Mode

M-CD plays the same way as before.

If an error such as off focus, spindle unlocking, unreadable sub-code, or sound skipping occurs after setup, its cause and time occurred (in absolute time) are displayed.

During setup, operational status of the control software (internal RAM: CPOINT) is displayed.

These displays and functions are prepared for enhancing aging in the servicing and efficiency of trouble analysis.

### (1) Shifting to the New Test Mode

- ① Turn on the current test mode by starting the reset from the 4 and 6 keys together.
- ② Select M-CD for the source through the specified procedure including use of the [SOURCE] key. Then, press the 12 key while maintaining the regulator turned off.
- ③ After the above operations, the new test mode remains on irrespective of whether the M-CD is turned on or off.  
You can reset the new test mode by turning on the reset start.

\* With some products, the new test mode can be reset through the same operations as that employed for shifting to the STBY mode (while maintaining the Acc turned off).

### (2) Key Correspondence

| Key<br>(Example) | Test mode  |   | New test mode |                        |
|------------------|--|---|---------------|------------------------|
|                  | Power Off  | Power On  | In-play       | Error Production       |
| BAND             | To power on<br>(offset adjustment performed)     | To power off  | –             | Time/Err.No. switching |
| UP               | –  | FWD-Kick  | FF/TR+        | –                      |
| DOWN             | –  | REV-Kick  | REV/TR-       | –                      |
| 7                | –  | T.Close (AGC performed)<br>/parameter display switching | Scan          | –                      |
| 8                | RF AMP gain switching                            | Parameter display switching<br>/T.BAL adjustment/T.Open | Mode          | –                      |
| 9                | To power on<br>(offset adjustment not performed) | F.Close/RF AGC/F.T.AGC                                  | –             | –                      |
| 10               | –  | F.Open  | –             | –                      |
| 11               | –  | Jump Off  | –             | –                      |
| 12               | –  | F.Mode switching<br>/T.Close (no AGC)/Jump switching    | Auto/Manu     | T.No./Time switching   |

| Key<br>(Example) | Mechanism Test Mode    |
|------------------|------------------------|
| BAND             | Back to the test mode  |
| UP               | Playing the mechanism  |
| DOWN             | Playing the mechanism  |
| 7                | Mechanism test mode in |
| 8                | –                      |
| 9                | TRAY/ELV select        |
| 10               | –                      |
| 11               | –                      |
| 12               | Operation step select  |

Note: Eject and CD on/off is performed in the same procedure as that for the normal mode.

### (3) Cause of Error and Error Code

| Code | Class       | Contents                 | Description and cause  |
|------|-------------|--------------------------|--|
| 40   | Electricity | Off focus detected.      | FOK goes low.<br>→ Damages/stains on disc, vibrations or failure on servo.                               |
| 41   | Electricity | Spindle unlocked.        | FOK = Low continued for 50 msec.<br>→ Damages/stains on disc, vibrations or failure on servo.            |
| 42   | Electricity | Sub-code unreadable.     | Sub-code was unreadable for 50 msec.<br>→ Damages/stains on disc, vibrations or failure on servo.        |
| 43   | Electricity | Sound skipping detected. | Last address memory function was activated.<br>→ Damages/stains on disc, vibrations or failure on servo. |

Note: Mechanical errors during aging are not displayed.

The error codes should be indicated in the same way as in the normal mode.

### (4) Display of Operational Status (CPOINT) during Setup

| Status No. | Contents   | Protective action   |
|------------|--|---|
| 00         | CD+5V ON process in progress.  | None  |
| 01         | Servo LSI initialization (1/3) in progress.                                    | None  |
| 02         | Servo LSI CRAM initialization in progress.                                     | None  |
| 03         | Servo LSI initialization (2/3) in progress.                                    | None  |
| 04         | Offset adjustment (1/3) in progress.   | None  |
| 05         | Offset adjustment (2/3) in progress.   | None  |
| 06         | Offset adjustment (3/3) in progress.   | None  |
| 07         | FZD adjustment in progress.  | None  |
| 08         | Servo LSI initialization (3/3) in progress.                                    | None  |
| 10         | Carriage move to home position started.  | None  |
| 11         | Carriage move to home position started.  | None  |
| 12         | Carriage is moving toward inner diameter.                                      | Specified 10 seconds has been passed or failure on home switch. |
| 13         | Carriage is moving toward outer diameter.                                      | Specified 10 seconds has been passed or failure on home switch. |
| 14         | Carriage outer kick in progress.   | None  |
| 15         | Carriage outer diameter feed (1 second) in progress.                           | None  |
| 20         | Servo close started.   | None  |
| 21         | Pre-processing for focus search started.                                       | None  |
| 22         | Spindle rotation and focus search started.                                     | None  |
| 23         | Waiting for focus close (XSI=Low).   | Specified focus search time has been passed.                    |
| 24         | Standing by after focus close is over.   | Specified focus search time has been passed.                    |
| 25         | Focus search preprocessing is in progress while setup protection is turned on. | None  |

| Status No. | Contents   | Protective action                |
|------------|--|----------------------------------|
| 26         | Focus search preprocessing is in progress while focus recovery is turned on. | None                             |
| 27         | Wait time after focus close is set up.                                       | Off focus.                       |
| 28         | Standing by after focus close is over.                                       | Off focus.                       |
| 29         | Setup (1/2) before T balance adjustment is started.                          | Off focus.                       |
| 30         | Setup (2/2) before T balance adjustment is started.                          | Off focus.                       |
| 31         | T balance adjustment started.  | Off focus.                       |
| 32         | T balance adjustment (1/2).  | Off focus.                       |
| 33         | T balance adjustment (2/2).  | Off focus.                       |
| 34         | Waiting for spindle rotation to end.<br>Spindle rough servo.                 | Off focus.                       |
| 35         | Standing by after spindle rough servo is over.                               | Off focus.                       |
| 36         | RF AGC started.  | Off focus.                       |
| 37         | RF AGC started.  | Off focus.                       |
| 38         | RF AGC ending process in progress.   | Off focus.                       |
| 39         | Tracking close in progress.  | Off focus.                       |
| 40         | Standing by after tracking is closed.<br>Carriage closing in progress.       | Off focus.                       |
| 41         | Focus/tracking AGC started.  | Off focus.                       |
| 42         | Focus AGC started.   | Off focus.                       |
| 43         | Focus AGC in progress.   | Off focus.                       |
| 44         | Tracking AGC in progress.  | Off focus.                       |
| 45         | Standing by after focus/tracking AGC are over.                               | Off focus.                       |
| 46         | Spindle processes applicable servo.  | Off focus.                       |
| 47         | Check for servo close is started.  | Off focus.                       |
| 48         | Check of LOCK pin started.   | Off focus or spindle not locked. |
| 49         | RF AGC started.  | Off focus.                       |
| 50         | RF AGC in progress.  | Off focus.                       |
| 51         | Standing by after RF AGC is over.  | Off focus.                       |

(5) Display Examples

1) During Setup (When status no. = 11)

| TRK No. | MIN. | SEC. |
|---------|------|------|
| 11      | 11'  | 11"  |

2) During Operation (TOC read, TRK search, Play, FF and REV)

The same as in the normal mode.

3) When a Protection Error Occurred

Switch to the following displays (A) and (B) using the [BAND] switch:

(A) Error occurrence timing display in absolute time.

An example: Error occurred in 12th tune at 34'56" in absolute time.

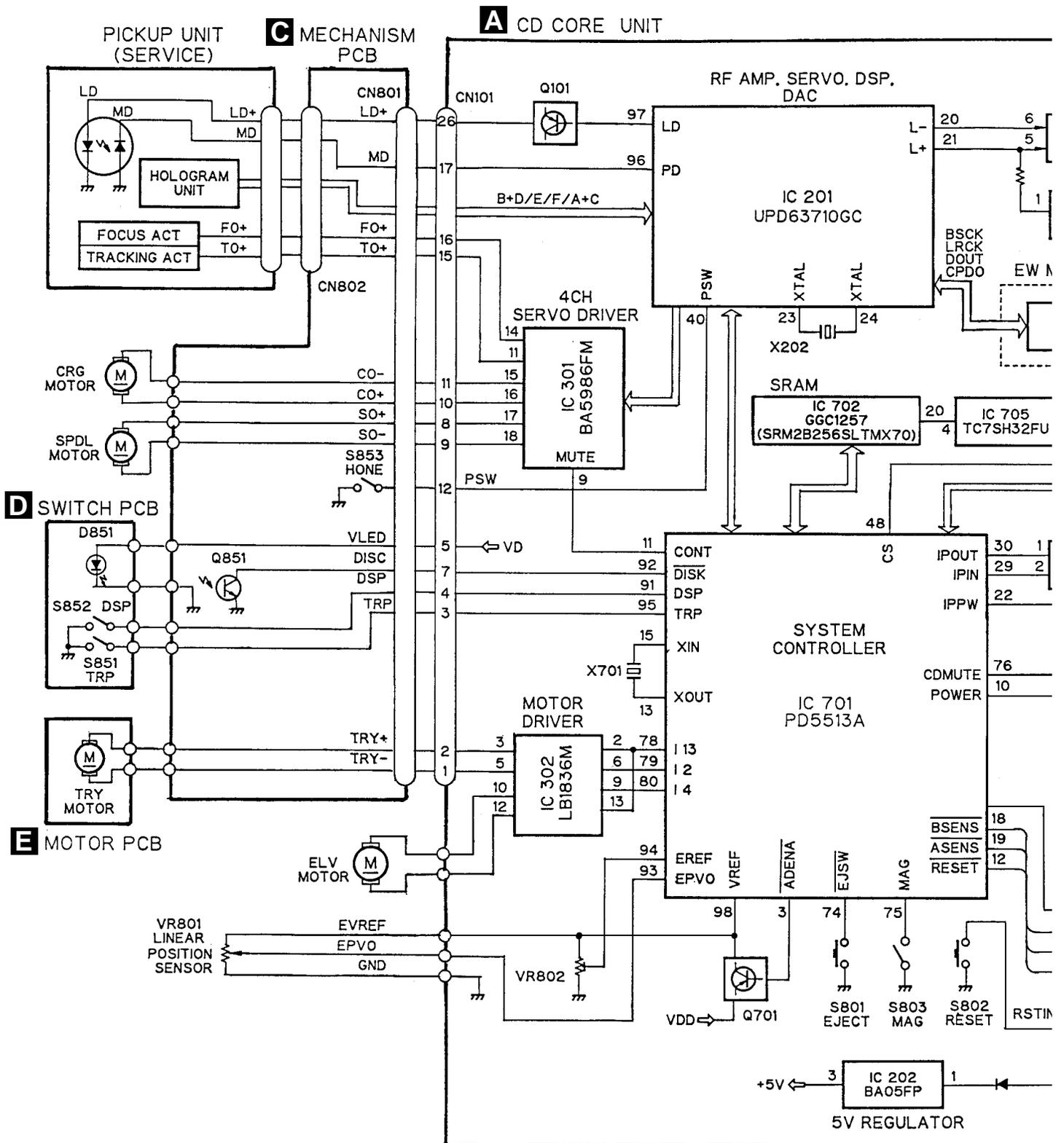
| TRK No. | MIN. | SEC. |
|---------|------|------|
| 12      | 34'  | 56"  |

(B) Error No. display

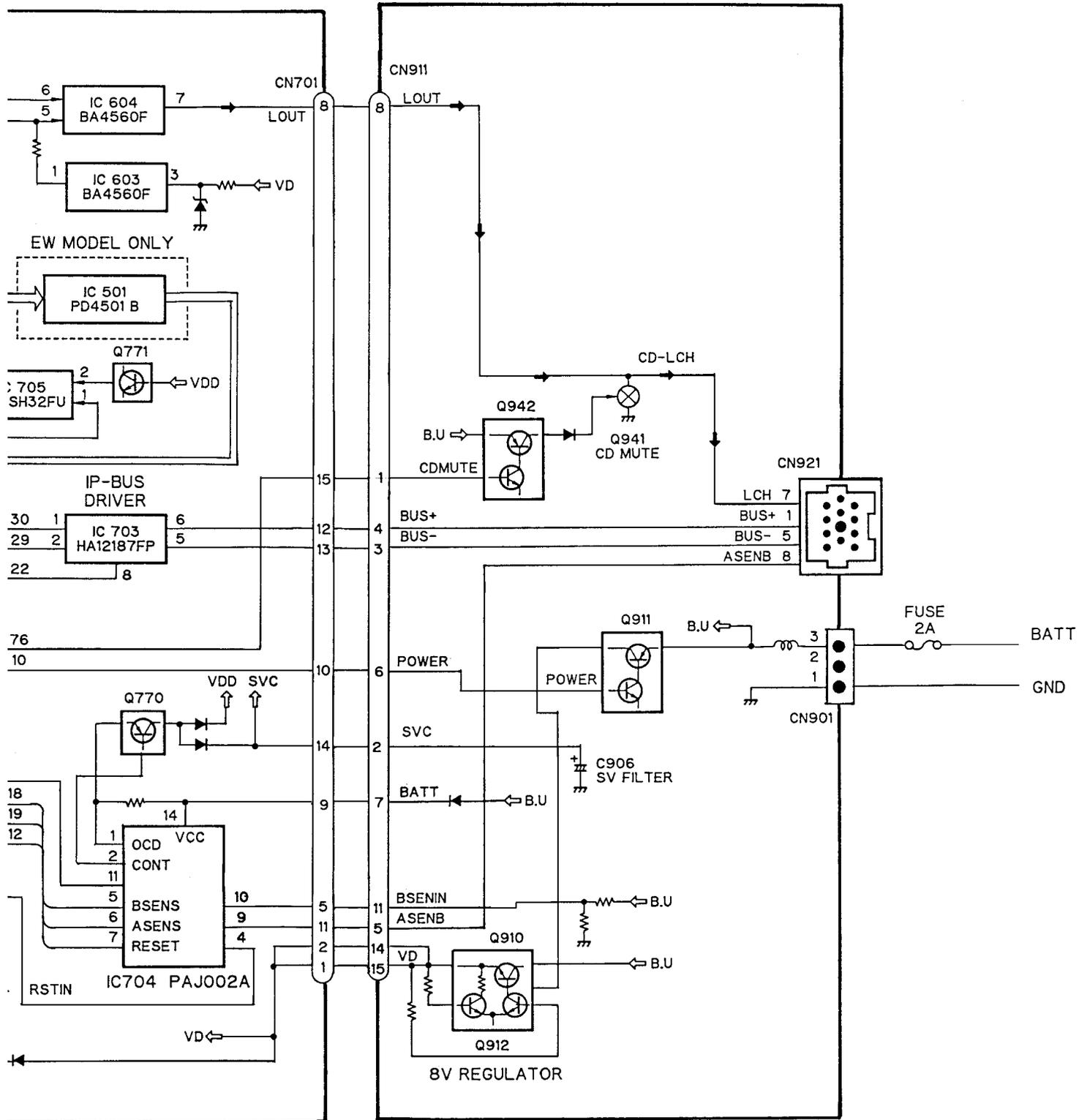
An example: Error #40 (Off focus is detected)

ERROR-40

### 7.3 BLOCK DIAGRAM

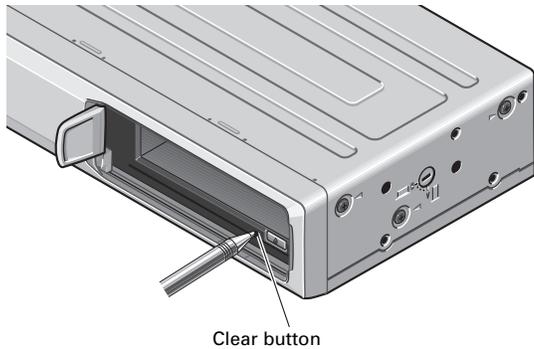


**B** POWER UNIT



## 8. OPERATIONS AND SPECIFICATIONS

### 8.1 OPERATION



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.**

- 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.

### 8.2 SPECIFICATIONS

#### General

|                                |  |
|--------------------------------|--|
| System .....                   | Compact disc audio system  |
| Usable discs .....             | Compact Disc   |
| Signal format .....            | Sampling frequency: 44.1 kHz<br>Number of quantization bits: 16; linear  |
| Power source .....             | 14.4 V DC<br>(10.8 — 15.1 V allowable)                                   |
| Max. current consumption ..... | 1.0 A  |
| Weight .....                   | 1.9 kg (4.2 lbs.)  |
| Dimensions .....               | 248 (W) × 66 (H) × 169 (D) mm<br>[9-3/4 (W) × 2-5/8 (H) × 6-5/8 (D) in.] |

#### Audio

|                                 |                               |
|---------------------------------|-------------------------------|
| Frequency characteristics ..... | 5 — 20,000 Hz (± 1 dB)        |
| Signal-to-noise ratio .....     | 92 dB (1 kHz) (IHF-A Network) |
| Distortion .....                | 0.005 %                       |
| Dynamic range .....             | 90 dB (1 kHz)                 |
| Output level .....              | 1,000 mV (1 kHz, 0 dB)        |
| Number of channels .....        | 2 (stereo)                    |

#### Note:

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

**Pioneer**

# Service Manual

ORDER NO.  
**CRT2356**

CD MECHANISM MODULE

# CX-892

- This service manual describes the 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 model under repair.

| Model                  | Service Manual | CD Mechanism Module | Mechanism Unit |
|------------------------|----------------|---------------------|----------------|
| CDX-P650/X1N/UC,EW,ES  | CRT2315        | CXK4800             | CXB3007        |
| CDX-P656/X1N/UC        | CRT2317        | CXK4805             | CXB3007        |
| CDX-P25/X1N/EW         |                | CXK4800             | CXB3007        |
| CDX-FM657/X1N/UC,EW,ES | CRT2316        | CXK4815             | CXB3007        |
| CDX-FM653/X1N/UC       | CRT2321        | CXK4811             | CXB3007        |

## CONTENTS

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| 2. DISASSEMBLY .....           | 18 |
| 3. MECHANISM DESCRIPTIONS..... | 23 |

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# 1. CIRCUIT DESCRIPTIONS

The LSI (UPD63710GC) used on this unit comprises five main blocks ; the pre-amp section, servo, signal processor, DAC and CD text decoder (not used on this model). It also equips with nine automatic adjustment functions.

## 1.1 PRE-AMP SECTION

This section processes the pickup output signals to create the signals for the servo, demodulator and control.

The pickup output signals are I-V converted by the pre-amp with the built-in photo-detector in the pickup, then added by the RF amp to obtain RF, FE, TE, TE zero cross and other signals.

This pre-amp section is built in the servo LSI UPD63710GC (IC201). The following describes function of each section.

Since this system has a single power supply (+5V), the reference voltage for this LSI and pickup are set to REFO (2.5V). The REFO is obtained by passing the REFOUT from the LSI through the buffer amplifier. The REFO is output from Pin 89 of this LSI. All measurements are done using this REFO as reference.

Note : During the measurement, do not try to short the REFO and GND.

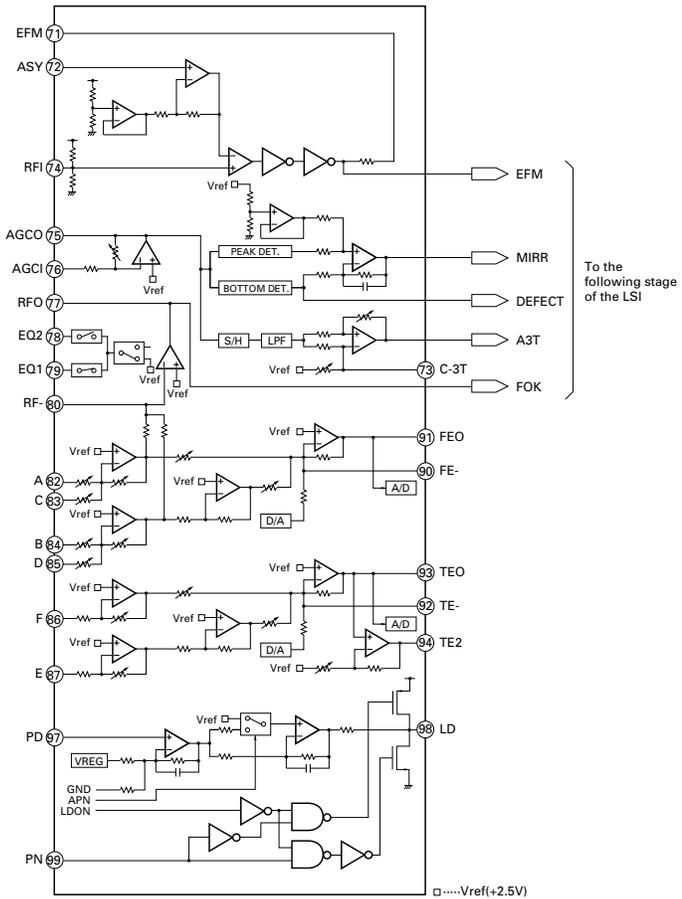


Fig.1 : BLOCK DIAGRAM OF BUILT-IN RF AMPLIFIER

### 1) APC Circuit (Automatic Power Control)

When the laser diode is driven with constant current, the optical output has large negative temperature characteristics. Thus, the current must be controlled from the monitor diode so that the output may be constant. APC circuit is for it. The LD current is obtained by measuring the voltage between LD1 and V+5. The value of this current is about 35mA.

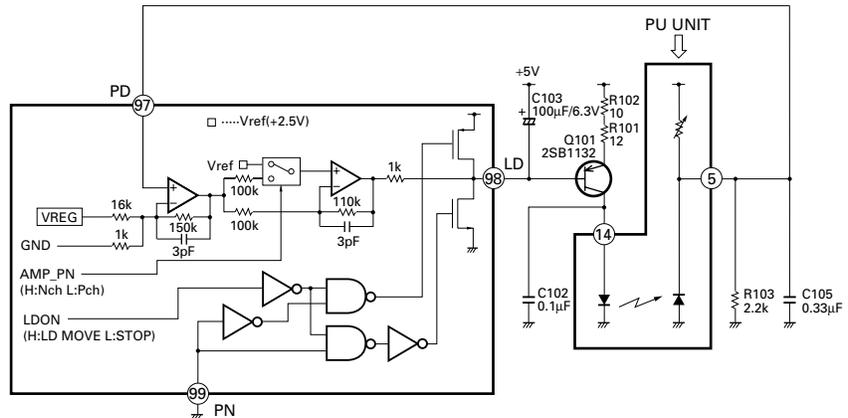


Fig.2 : APC CIRCUIT

**2) RF Amplifier and RFAGC Amplifier**

The photo-detector outputs (A + C) and (B + D) are added, amplified and equalized on this LSI and then output to the RFI terminal as the RF signal. (The eye pattern can be checked by this signal.)

The RFI voltage low frequency component is :

$$RFI = (A + B + C + D) \times 3.2$$

RFI is used on the FOK generator circuit and RF offset adjusting circuit.

R215 is an offset resistor for maintaining the bottom reference voltage of the RFI signal at 1.5 VDC. The D/A output used for the RF offset adjustment (to be described later) is entered via this resistor.

After the RFI signal from Pin 77 is externally AC coupled, entered to Pin 76 again, then amplified on the RFAGC amplifier to obtain the RFO signal.

The RFAGC adjustment function (to be described later) built-in the LSI is used for switching feedback gain of the RFAGC amplifier so that the RFO output may go to  $1.5 \pm 0.3V_{pp}$ .

The RFO signal is used for the EFM, DFCT, MIRR and RFAGC adjustment circuits.

**3) FOK Circuit**

This circuit generates the signal that is used for indicating the timing of closing the focus or state of the focus close currently being played. This signal is output from Pin 4 as the FOK signal. It goes high when the focus close and in-play.

The RFOK signal is generated by holding DC level of the RFI at its peak with the succeeding digital section, then comparing it at a specific threshold level. Thus, the RFOK signal goes high even if the pit is absent. It indicates that the focus close can take place on the disc mirror surface, too.

This signal is also supplied to the micro computer via the low pass filter as the FOK signal and used for the protection and the RF amplifier gain switching.

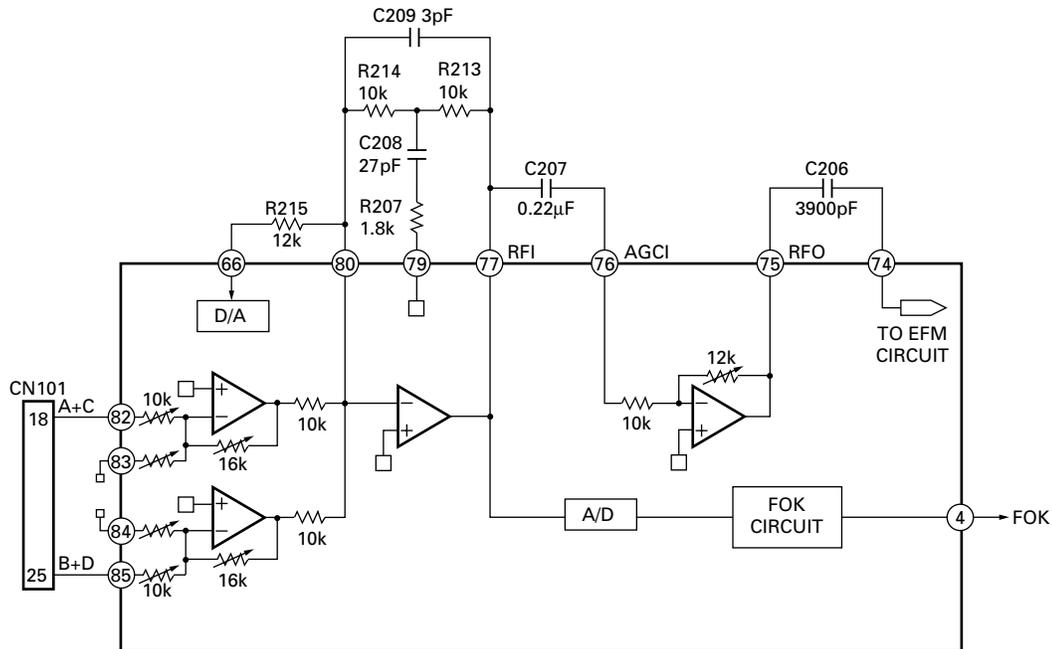


Fig.3 : RFAMP, RFAGC AND FOK CIRCUIT

**4) Focus Error Amplifier**

The photo-detector outputs (A + C) and (B + D) are passed through a differential amplifier and an error amplifier, and then (A + C - B - D) is output from Pin 91 as the FE signal.

The FE voltage low frequency component is :

$$FE = (A + C - B - D) \times \frac{16k}{10k} \times \frac{(80k/300k)}{20k}$$

$$= (A + C - B - D) \times 5$$

Using REFO as the reference, an S-curve of approximately 1.5 Vpp is obtained for the FE output. The final-stage amplifier cutoff frequency is 11.4 kHz.

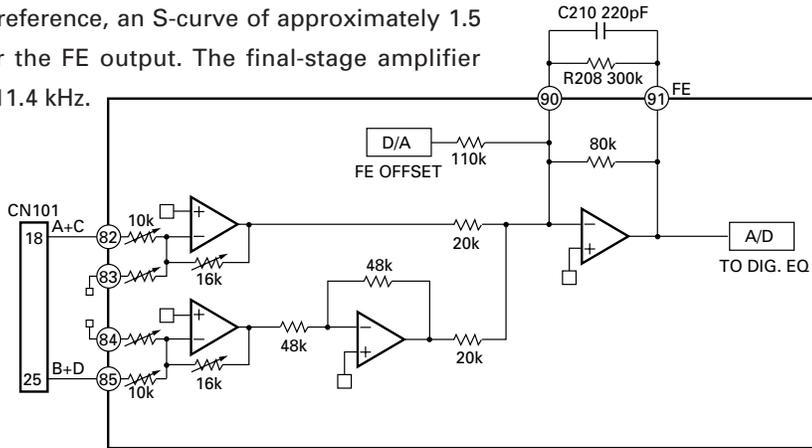


Fig.4 : FOCUS ERROR AMPLIFIER

**5) Tracking Error Amplifier**

The photo-detector outputs E and F are passed through a differential amplifier and an error amplifier, and then (E - F) is output from Pin 93 as the TE signal. The TE voltage low frequency component is :

$$TE = (E - F) \times \frac{224k}{(56k+27k)} \times \frac{80k}{38k}$$

$$= (E - F) \times 5.7 \text{ (Effective LSI output is 5.0).}$$

Using REFO as the reference, the TE waveform of approximately 1.3 Vpp is obtained for the TE output. The final-stage amplifier cutoff frequency is 20 kHz.

**6) Tracking Zero Crossing Amplifier**

TEC signal (the tracking zero crossing signal) is obtained by multiplying the TE signal four times. It is used for locating the zero crossing points of the tracking error. The zero cross point detection is done for the following two reasons :

- ① To count tracks for carriage moves and track jumps.
- ② To detect the direction in which the lens is moving when the tracking is closed (it is used on the tracking brake circuit to be described later).

The TEC signal frequency range is 300 Hz to 20 kHz.

$$TEC \text{ voltage} = TE \text{ level} \times 4$$

Theoretical TEC level is 5.2V. The signal exceeds D-range of the operational amplifier and thus is clipped. It, however, can be ignored since this signal is used by the servo LSI only at the zero crossing point.

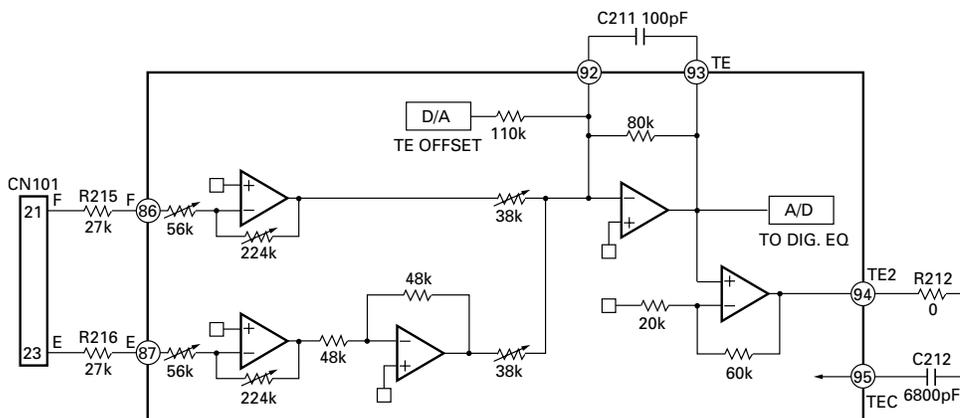


Fig.5 TRACKING ERROR AMPLIFIER AND TRACKING ZERO CROSSING AMPLIFIER

**7) DFCT (Defect) Circuit**

The DFCT signal is used for detecting defects on the mirrored disc surface. It allows monitoring from the HOLD pin (Pin 2). It goes high when defects are found on the mirrored surface.

The DFCT signal is generated by comparing the RF amplified signal (which is obtained by bottom holding the RFO signal) at a specific threshold level by the succeeding digital section.

Stains or scratches on the disc can constitute the defects on the mirrored disc surface. Thus, as long as the DFCT signal remains high in the LSI, the focus and tracking servo drives are held in the current state so that a better defect prevention may be ensured.

**8) 3TOUT Circuit**

The 3TOUT signal is generated by entering disturbance to the focus servo loop, comparing phase of fluctuations of the RF signal 3T component against that of the FE signal at that time, then converting the signal to DC level. This signal is used for adjusting bias of the FE signal (to be described later). This signal is not output from the LSI, thus its monitoring is not available.

**9) MIRR (Mirror) Circuit**

The MIRR signal shows the on track and off track data, and is output from Pin 3.

When the laser beam is

On track : MIRR = "L"

Off track : MIRR = "H"

This signal is used on the brake circuit (to be described later) and also as the trigger to turn on track counting when jumping take place.

The MIRR signal is supplied to the micro computer, too, for the protection purpose.

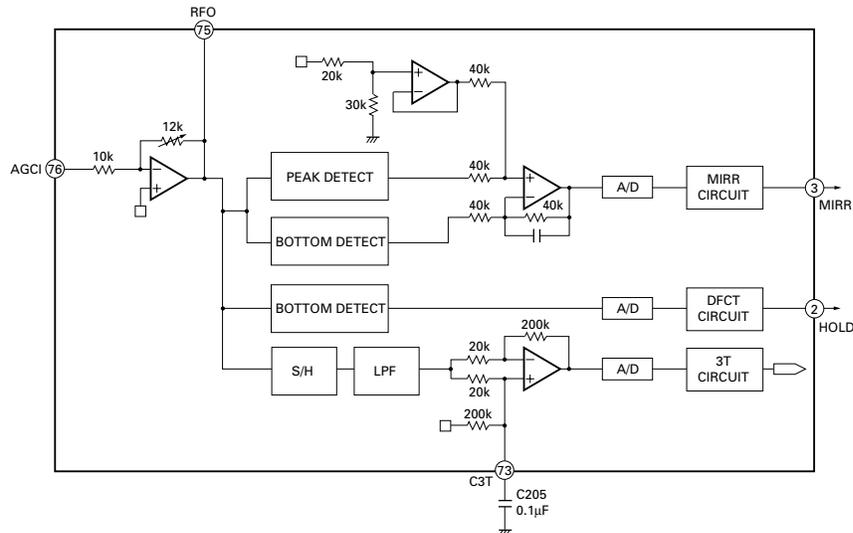


Fig.6 : DFCT, MIRR AND 3T DETECTION CIRCUIT

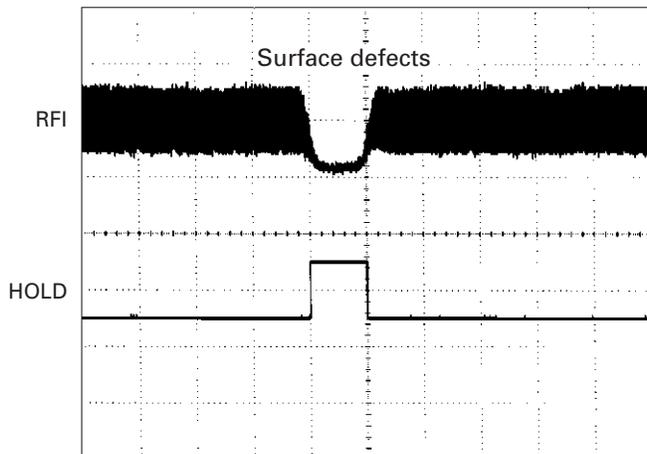


Fig.7 : HOLD OUTPUT WAVEFORM  
(When surface defects are present)

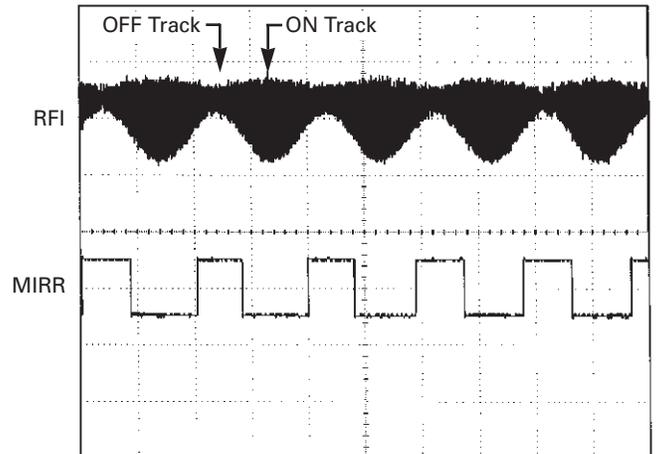


Fig.8 : MIRR OUTPUT WAVEFORM  
(When an access is made)



## 1.2 SERVO SECTION (UPD63710GC : IC201)

The servo section controls the operations such as error signal equalizing, in focus, track jump and carriage move. The DSP is the signal processing section used for data decoding, error correction and interpolation processing, among others.

This circuit implements analog to digital conversion of the FE and TE signals generated on the pre-amplifier, then outputs them through the servo block as the drive signal used on the focus, tracking and carriage system. The EFM signal is decoded on the signal processing section and finally output via the D/A converter as the audio signal. The decoding process also generates the spindle servo error signals which is fed to the spindle servo block to generate the spindle drive signal.

The focus, tracking, carriage and spindle drive signals are then amplified on the driver IC BA5986FM (IC301) and fed to respective actuators and motors.

### 1) Focus Servo System

The focus servo main equalizer is consisted of the digital equalizer. Fig.10 shows the focus servo block diagram.

When implementing the focus close on the focus servo system, the lens must be brought within the in-focus range. Therefore, the lens is moved up and down according to the triangular focus search voltage to find the focus point. During this time, the spindle motor is kicked and kept rotating as a set speed.

The servo LSI monitors the FE and RFOK signals and automatically carries out the focus close at an appropriate point.

The focus closing is carried out when the following three conditions are met :

- ① The lens approaches the disc from its current position.
- ② RFOK = "H"
- ③ The FZC signal is latched at high after it has once crossed the threshold set on the FZD register (Edge of the FZD).

As the result, the FE (= REFO) is forced to low.

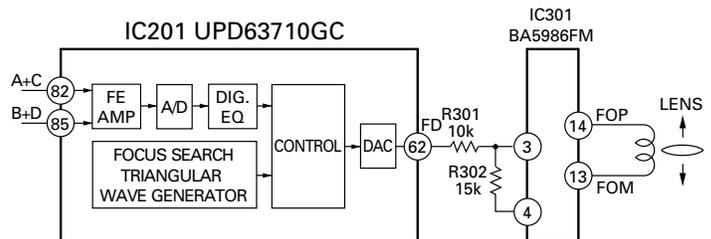


Fig.10 : FOCUS SERVO BLOCK DIAGRAM

When the above conditions are all met and the focus is closed, the XSI pin goes to low from the current high, then 40 ms later, the microcomputer begins to monitor the RFOK signal after it that has been passed through the low pass filter.

When the RFOK signal is recognized as low, the micro computer carries out various actions including protection.

Fig.11 a series of operations carried out relevant to the focus close (the figure shows the case where focus close is not available).

You can check the S-curve, search voltage and actual lens behavior by selecting the Display 01 for the focus mode select in the test mode, and then pressing the focus close button.

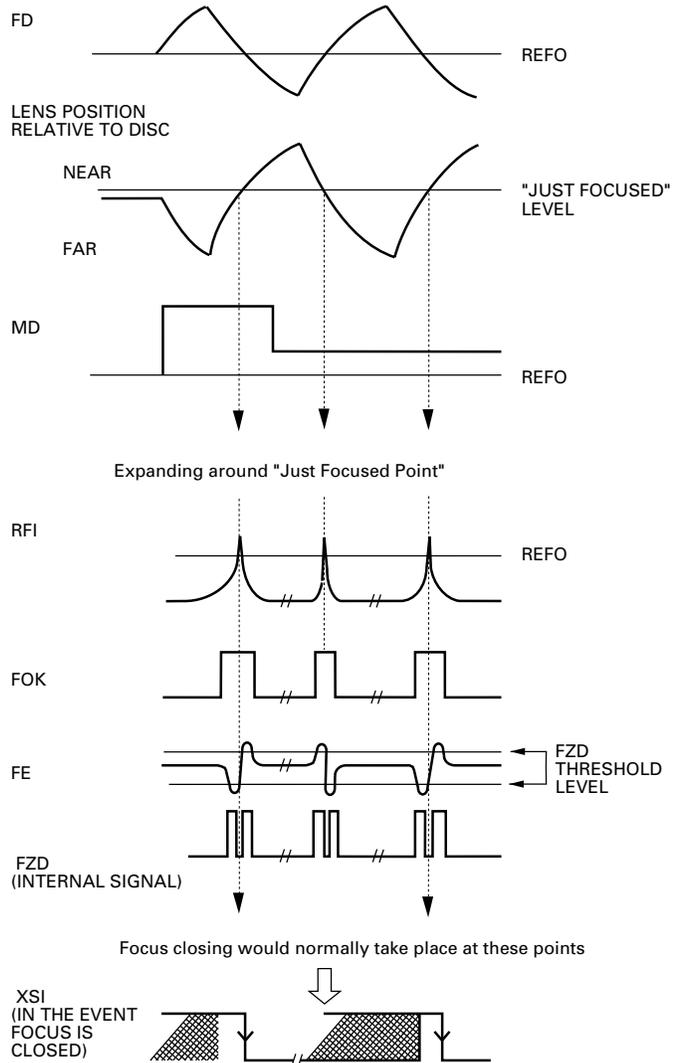


Fig.11 : FOCUS CLOSE SEQUENCE

**2) Tracking Servo System**

The digital equalizer is employed for the main equalizer on the tracking servo. Fig.12 shows the tracking servo block diagram.

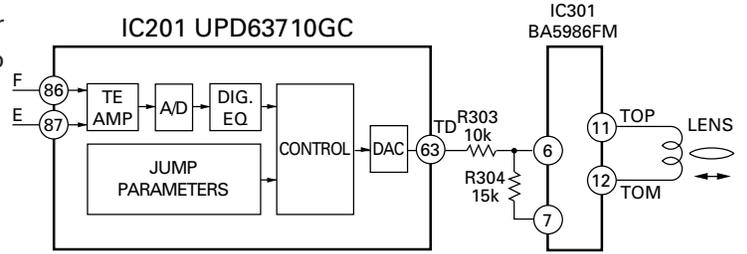


Fig.12 : TRACKING SERVO BLOCK DIAGRAM

**a) Track jump**

When the LSI receives the track jump command from the microcomputer, the operation is carried out automatically by the auto sequence function of the LSI. This system has five types of track jumps used for the search : 1, 4, 10, 32 and  $32 \times 3$ . In the test mode, in addition to three jumps (1, 32 and  $32 \times 3$ ), move of the carriage can be check by mode selection. For track jumps, the microcomputer sets almost half of tracks (5 tracks for 10 tracks, for instance) and counts the set number of tracks using the TEC signals. When the microcomputer has counted the set number of tracks, it outputs the brake pulse for a fixed period of time (duration can be specified with the command) to stop the lens. In this way, the tracking is closed and normal play is continued.

To improve the servo loop retracting performance just after the track jump, the brake circuit is turned on for 50 ms after the brake pulse has been terminated to increase gain of the tracking servo.

Fast forward and reverse operations are realized by through consecutive signal track jumps. The speed is about 10 times as fast as that in the normal mode.

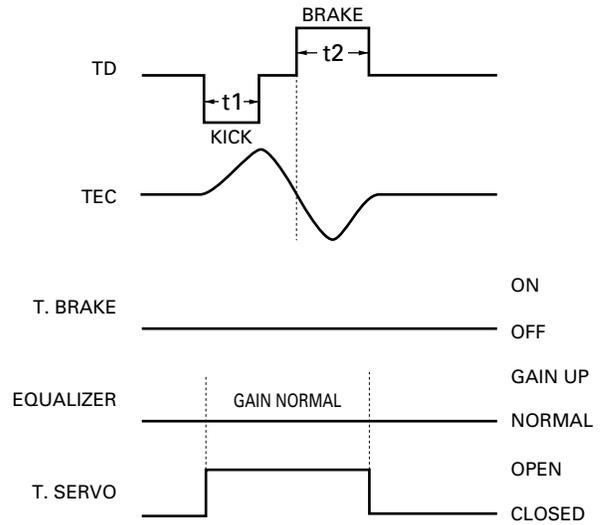


Fig.13 : SINGLE TRACK JUMP

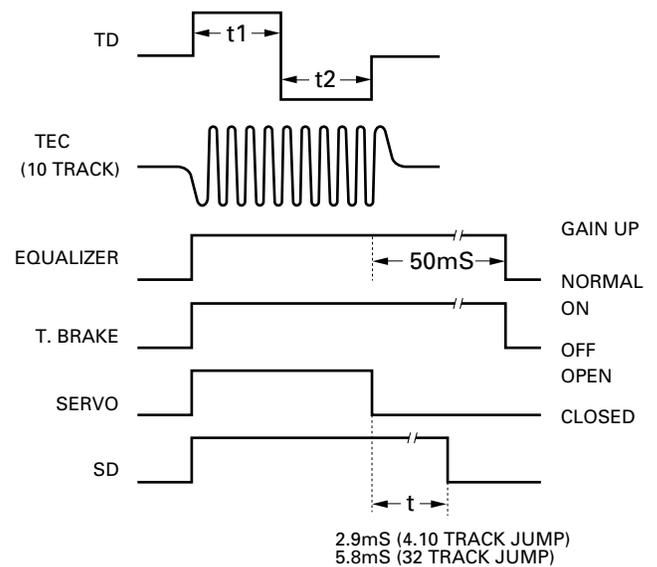
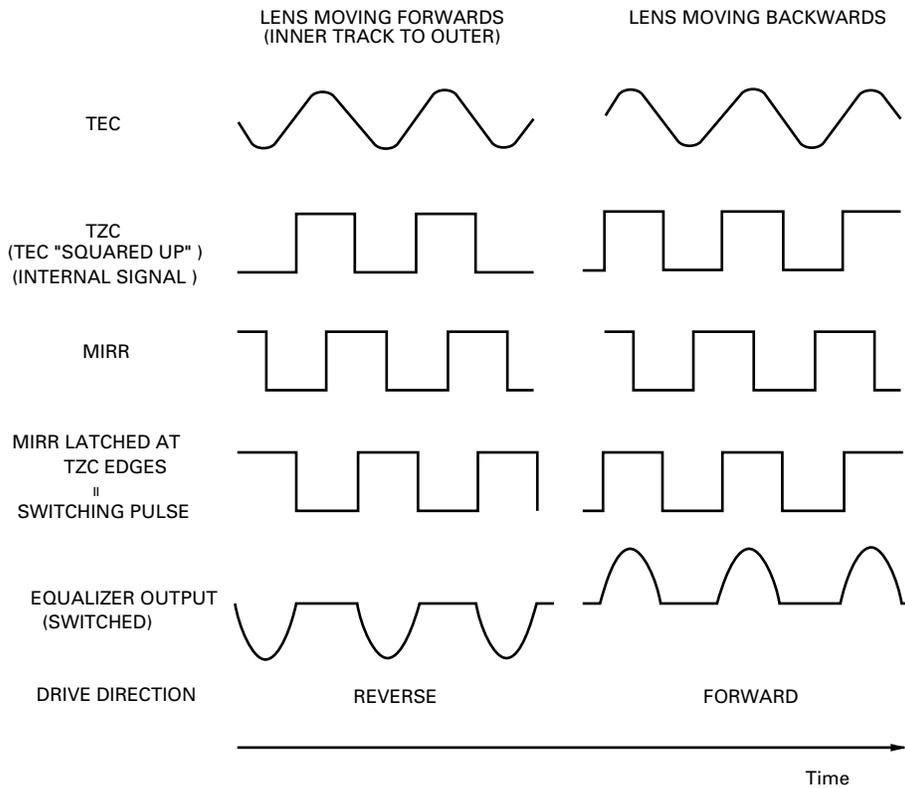


Fig.14 : MULTI-TRACK JUMP

**b) Brake Circuit**

The servo retracting performance can be deteriorate during the setup or track jump operation. In this connection, the brake circuit is used to ensure steady retract of the tracking servo. The brake circuit detects in which direction the lens is moving, then slows down its move by outputting the drive signal that moves the lens into the opposite direction alone. Track slippage direction is determined by referencing the TEC and MIRR signals and their phase.



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

Fig.15 : TRACKING BRAKE CIRCUIT

### 3) Carriage Servo System

The carriage servo supplies the tracking equalizer's low-frequency component (lens position data) output to the carriage equalizer, then, after providing a fixed amount of gain to it, outputs the drive signal from the LSI. This signal is then applied to the carriage motor via the driver IC.

When the lens offset reaches a certain level during play, the entire pickup must be moved into the forward direction. Therefore, the equalizer gain is set to the level that allows to generate a voltage higher than the carriage motor starting voltage. In actual operations, a certain threshold level is set for the equalizer output by the servo LSI so that the drive voltage may be output from the servo LSI only when the equalizer output exceeds the threshold level. This arrangement helps reducing power consumption. Also, due to disc eccentricity or other factors, the equalizer output may cross the threshold level a number of times. In this case, the drive voltage output from the LSI will have pulse-like waveform.

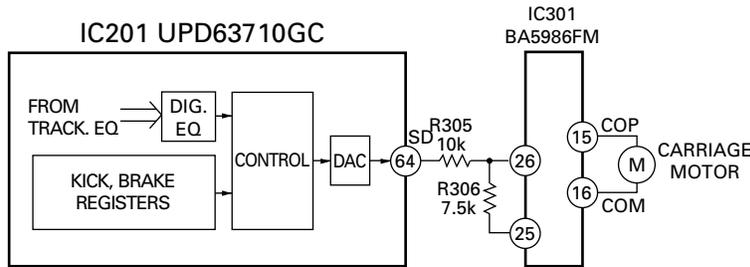


Fig.16 : CARRIAGE SERVO BLOCK DIAGRAM

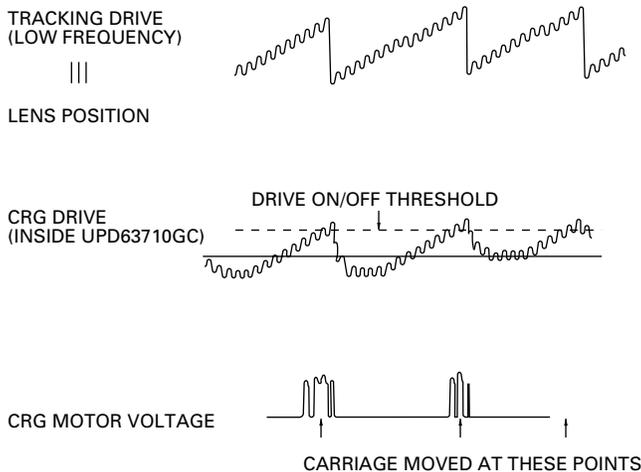


Fig.17 : CARRIAGE SIGNAL WAVEFORM

#### 4) Spindle Servo System

The spindle servo has the following modes.

- ① Kick :  
This mode is used for accelerating the disc rotation during setup.
- ② Offset :  
(a) After the kick is over in the setup, this mode is turned on until changing to rough servo mode.  
(b) When focus is lost during play, this mode is turned on until the focus is restored.  
Both of the above are used for maintaining the disc rotation rate near to the specified rate.

③ Applicable servo :  
The CLV servo mode is turned on for the normal operations.  
In the EFM demodulation block, the frame sync signal and internal counter output signal are sampled for every WFCK/16 and a signal is produced for indicating whether or not they are matching. They are determined to be asynchronous only when this signal fails to match 8 times in succession. In all other cases, above two signals are assumed to be synchronous. In the applicable servo mode, the retracting servo is automatically selected if the two signals are synchronous. If not, the regular servo is automatically selected.

④ Brake :  
This mode is turned on when stopping the spindle motor.  
The microcomputer outputs the brake voltage through the servo LSI. The LSI monitors the EFM waveform and, if its longest pattern exceeds a certain interval (if the rotation is sufficiently slow), the flag is set the LSI and the microcomputer turns off the brake voltage. When the flag is not up within a specified period time, the microcomputer switches the mode from the brake to the stop mode, and maintains this mode for a fixed period of time. If this stop mode is continued for a fixed period of time, the disc will be ejected.

⑤ Stop :  
This mode is used for powering on the system and the eject operation. When this mode is turned on, voltage across the spindle motor is 0V.

⑥ Rough servo :  
This mode is used for when the carriage feed (carriage mode for the long search, etc.) is turned on. The linear speed is calculated from the EFM waveform and high or low level is entered to the spindle equalizer. In the test mode, this mode is also used for the grating check.

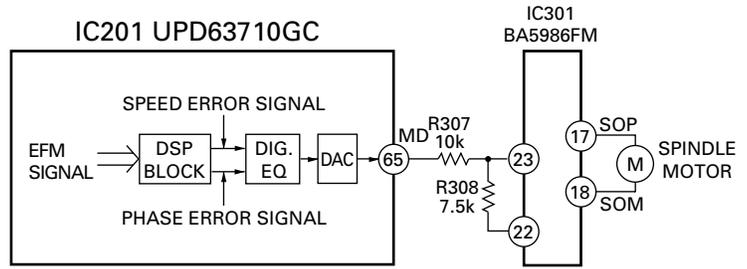


Fig.18 : SPINDLE SERVO MOTOR BLOCK DIAGRAM

## 1.3 AUTOMATIC ADJUSTMENT FUNCTIONS

Every circuit adjustment on the CD-LSI of this system is automated.

Every circuit adjustment is automatically implemented when the disc is inserted or the CD mode is selected from the source key. The following describes how the adjustments are executed.

### 1) FZD Cancel Setting

This setting is used for executing the focus close operation without fail.

When power is turned on, the FE offset level is read and a voltage opposite to this offset value is written to the CRAM on the IC to cancel the offset. In this manner, the FZD threshold level can be set to a constant value (+240mV), thereby ensuring to meet one of the requirements for the IC to execute the focus close that "the FZD signal is latched at high".

### 2) Automatic Adjustment of TE, FE and RF Offset

Using REFO as the reference, this function adjusts the pre-amp TE, FE and RF offsets to the respective target value when power is turned on (targets values of the TE, FE and RF are 0, 0 and -1V, respectively).

The following is the adjustment procedure :

- (1) Respective offset (LD off) is read by the microcomputer via the servo LSI.
- (2) The microcomputer calculates the voltages to be corrected from the read values, then sets them to the specified field.

### 3) Automatic Adjustment of Tracking Balance (T. BAL)

This adjustment is used for eliminating differences between the pickup E and F channels outputs by adjusting gain of the amplifier on the LSI. In the actual operation, the TE waveform is adjusted so that it may be vertically symmetric with REFO.

The following is the adjustment procedure :

- (1) Make sure the focus close is complete.
- (2) Kick the lens in the radial direction to generate the TE waveform.
- (3) At this time, the microcomputer reads the TE signal offset value (via the servo LSI) being calculated by the LSI.

- (4) The microcomputer determines if the read offset value is positive, negative or zero.

If the offset value = 0, the adjustment is terminated.

If the offset value = A positive or negative value, gain of the E and F channels amplifiers are modified according the predetermined rule.

Then above steps (2) through (4) are repeated until the "Offset value = 0" or "Specified limit count" is reached.

### 4) Automatic Adjustment of FE Bias

This adjustment is intended at maximizing the RFI level by optimizing the focus point in-play. This adjustment utilizes the phase difference between the RF waveform 3T level and the focus error signal when disturbance is applied.

Since disturbance is applied to the focus loop, this adjustment is designed to take place in the same timing as the auto gain control (to be described later).

The following is the adjustment procedure :

- (1) Disturbance is injected to the focus loop by the command from the microcomputer (within the servo LSI).
- (2) The LSI detects fluctuation of the RF signal 3T component level.
- (3) The LSI determines relationship between fluctuation of the 3T component and the injected disturbance to detect magnitude and direction of the off-focus introduced.
- (4) The microcomputer reads the detected results from the LSI.
- (5) The microcomputer calculates necessary correction, then hands the calculated value to the bias adjustment term set on the LSI.

This adjustment is repeated several times, as it is so with the auto gain control, to ensure higher accuracy.

**5) Focus and Tracking Automatic Gain Control**

This function is used for implementing automatic control of the focus and tracking loop gain.

The following is the adjustment procedure :

- (1) Inject disturbance to the servo loop.
- (2) Extract the error signal (FE and TE) generated at when the disturbance is applied to obtain the signals G1 and G2 via the B.P.F.
- (3) The microcomputer reads the G1 and G2 signals via the LSI.
- (4) Based on the necessary correction calculated by the microcomputer, the LSI performs the loop gain adjustment.

Above adjustments are repeated several times to ensure higher adjustment accuracy.

**6) Automatic RF Level Adjustment (RFAGC)**

This adjustment is used for implementing intended signal transmission successfully by adjusting unevenness of the RF signal (RFO) levels, that results from disc and machine relevant factors, to a target value. The adjustment is actually done by varying gain of the amplifier provided between the RFI and RFO.

The following is the adjustment procedure :

- (1) Using the command, the microcomputer reads the output from the RF level detection circuit on the servo LSI.
- (2) Based on the read value, the microcomputer calculates an amplifier gain that will produce the target RFO level.
- (3) The microcomputer sends the corresponding command to the servo LSI so that the above gain value may be set.

This adjustment takes place at the following timing :

- When the focus close alone is completed during the setup process.
- Just before the setup is completed (just before the play takes place).
- After the off-focus has been corrected during the play.

**7) Adjustment of Pre-Amp Stage Gain**

It is used for adjusting the entire RFAMP (FE, TE and RF amplifiers) to +6dB or +12dB depending on given gain level when reflected light from the disc is significantly below the required level due to stained lens. This phenomena can be noticed when playing back the CD-RW.

The following is the adjustment procedure :

When reflected light from disc is judged to be significantly below the required level during the setup, set the entire RFAMP to +6dB or +12dB. In this case, if the gain is modified, the setup have to be repeated from the first step.

Through the adjustment, if you judged the play becomes available by setting the entire RFAMP to +6dB, +6dB should be selected for the setup next time on.

See the figure below :

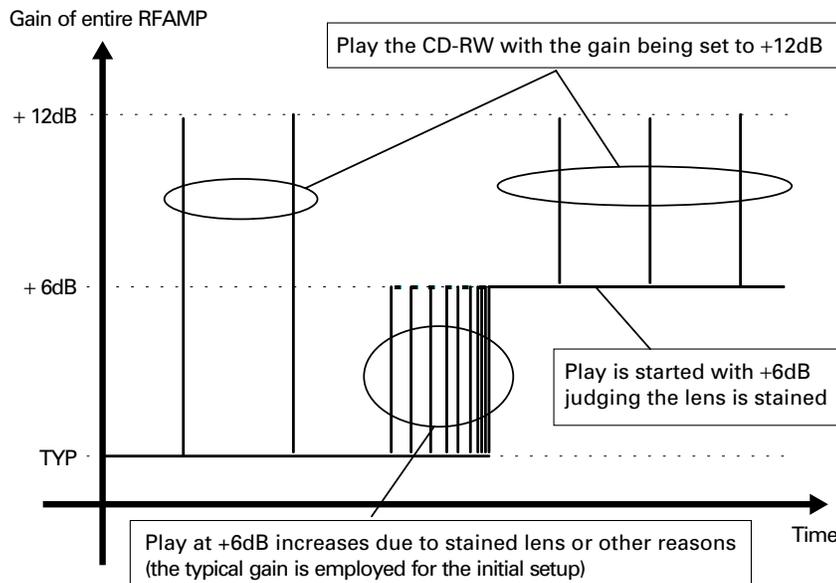


Fig.19 : CONCEPTUAL DIAGRAM OF PRE-AMP GAIN ADJUSTMENT

## 8) Initial Adjusting Values

All the automatic adjustments are implemented using the previous adjustment values as the initial values unless the microcomputer power (the backup power) is not turned off (though there are some exceptions).

When the backup is turned off, automatic adjustment is executed based on the initial values rather than the previous adjustment values.

## 9) Displaying Coefficients After Adjustment

You can display and check results of some automatic adjustments (FE and RF offset, FZD cancel and F / T / RFAGC) from the test mode. The following coefficients are displayed in each automatic adjustment :

### (1) FE and RF offset and FZD cancel

Reference value = 32 (The coefficient of 32 indicates that no adjustment was required).

The results are displayed in multiples of approximately 40 mV.

An example : When FZD cancel coefficient = 35

$$35 - 32 = 3$$

$$3 \times 40 \text{ mV} = 120 \text{ mV}$$

Since the corrected value is approximately +120 mV, the FE offset before adjustment was -120 mV.

### (2) F and T gain adjustment

Reference value = Focus/Tracking = 20

A coefficient displayed indicates an amount of adjustment conducted on the reference value.

An example : When AGC coefficient = 40

$40/20 =$  Overall gain has been doubled (+6dB). (The original loop gain of 1/2 has been doubled to have the targeted overall gain.)

### (3) RF level adjustment (RFAGC)

Reference value = 8

Coefficient = 9 to 15 ..... The direction in which the RF level is increased (the gain is increased).

Coefficient = 7 to 0 ..... The direction in which the RF level is decreased (the gain is decreased).

Incrementing or decreasing the coefficient by "1" varies the gain by 0.7 to 1dB.

Maximum gain = Typically +6.5dB. Coefficient at this time is 15.

Minimum gain = Typically -6.0dB. Coefficient at this time is 0.

## 1.4 POWER SUPPLY UNIT CONFIGURATION

The power supply unit of this system consists of 4 power sources, VD(8.6V), 5VA(5V), 4R3VLR(4.3V) and EVREF(5V).

- VD :Main power source. Generated in the expansion board.
- 5VA :Power source for IC201 and the Pick-up Unit. Generated by the regulator IC (IC101) from VD.
- 4R3VLR :Audio midpoint voltage. Generated by the regulator IC (IC603) from VD.
- EVREF :Power source for Linear Position Sensor. A/D reference voltage of the microcomputer. Usually taken from the microcomputer's VDD line via an enabling switch.

## 1.5 MECHANISM OPERATION

### 1) Elevation Operation

The microcomputer determines the present elevation position from the voltage value (EPVO) obtained from the potential divider VR801.

The voltage of the position of the requested disk is calculated from figure 20 and the ELV Motor is controlled so that the EPVO voltage is matched to the value obtained from the calculation.

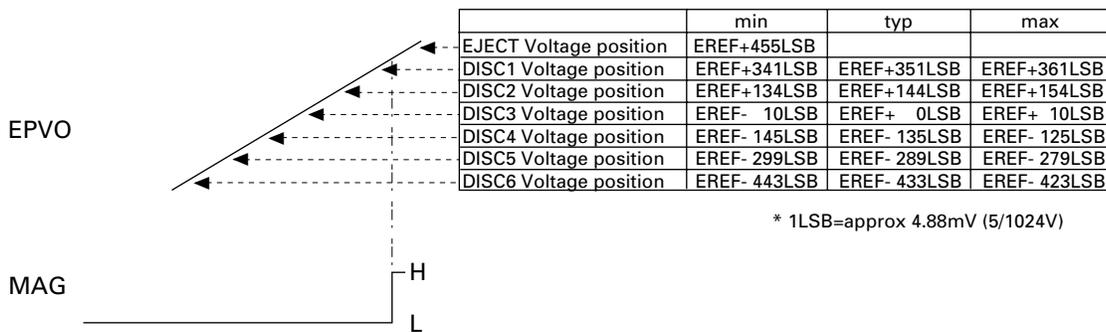
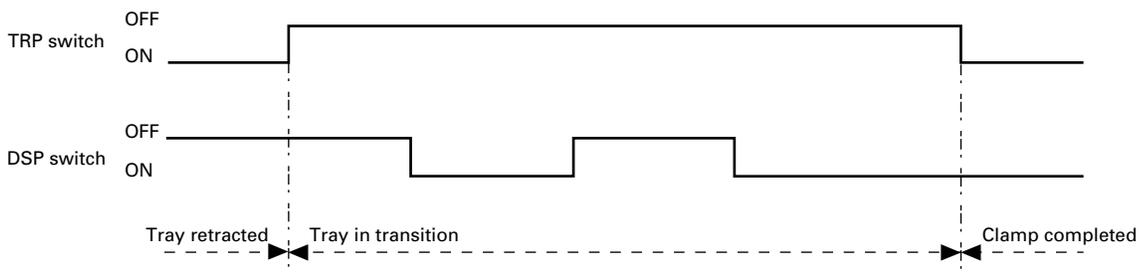


Fig. 20

### 2) Tray Extension and Retraction

The microcomputer detects the DSP signal waveform (voltage) and TRP signal waveform (voltage) obtained at the DSP switch (S852) and the TRP switch (S851) by tray retraction, tray extension and clamp completion and controls the Tray Motor.



**3) 0.6mm UP/DOWN Operation**

In order to secure clearance with the neighboring disk the Stage Mechanism is driven down by the ELV Motor (M852) when clamping is complete. The microcomputer detects the completion of clamping, and when the Tray Motor is brought to a full stop, the ELV Motor (M852) is forcibly driven for a 240 ms interval in the downward direction.

When the tray is being retracted, the ELV Motor (M852) is controlled to match the value of EPVO calculated during the elevation operation. The tray retraction operation is started when the Tray has been moved to the prescribed position.

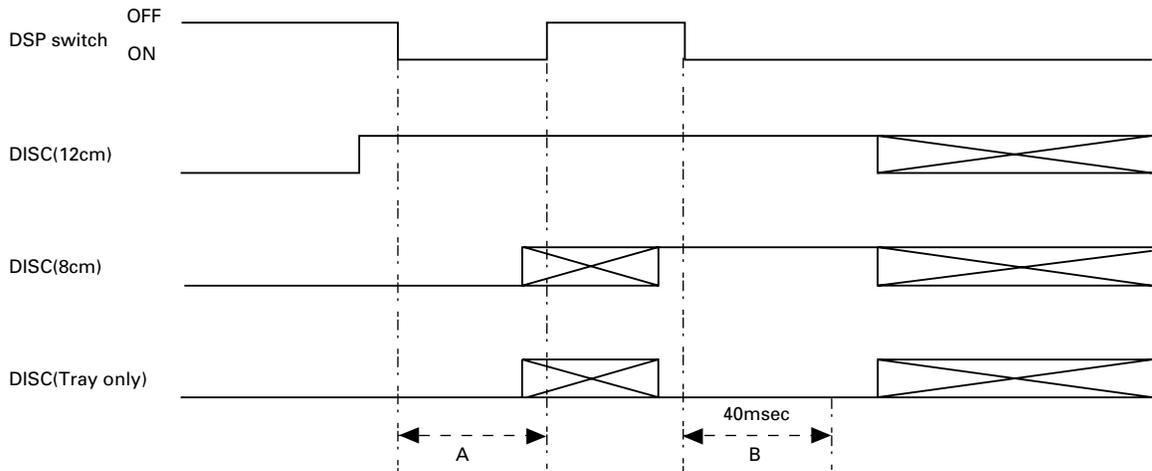
Each motor is driven by the driver IC302 (LB1836M). LB1836M is an IC which usually operated through the combination of H and L of the 4 lines I1, I2, I3 and I4. With this system, I1=I3 and control is realized through a combination of H and L of the 3 lines I1, I2 and I4.

| ELV Motor | Tray Motor | I1,I3 | I2 | I4 |
|-----------|------------|-------|----|----|
| Forward   | Brake      | H     | H  | L  |
| Reverse   | Stand-by   | L     | L  | H  |
| Brake     | Forward    | H     | L  | H  |
| Stand-by  | Reverse    | L     | H  | L  |
| Brake     | Brake      | H     | H  | H  |
| Stand-by  | Stand-by   | L     | L  | L  |

\* ELV Motor Forward : ELV-up (Disc No. Down)  
 Tray Motor Forward : Tray Ejection

**4) Disc Detection**

The DSP signal waveform (voltage) at the DSP switch (S852) is used for determining the existence and non-existence of a disk and the disk type (8cm or 12cm). The disk detection operations are carried out while the Tray is being pulled out of the magazine. Disk detection is determined when the light passes through (DISC waveform L:less than 2.5v) or is interrupted (DISC waveform H:2.5V or above) with an array of LEDs and photo transistors above and below the Tray.



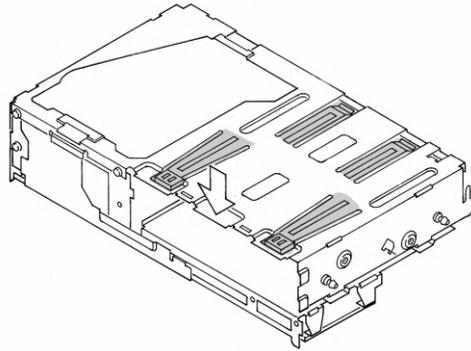
The DISC waveform is continuously monitored within the intervals A and B above and if a L is detected even once, that interval is determined as L. If a L is not detected at all then that interval is determined as H in the following.

|         | A | B |
|---------|---|---|
| 12cm    | H | H |
| 8cm     | L | H |
| No Disk | — | L |

## Cautions on Service

- 1) Do not hold the upper frame of the magazine insertion port in the CD mechanism module, marked by an arrow in Fig. 21, when servicing. It's because this section is easily deformed.

CD mechanism module



■ This section is easily deformed.

Fig. 21

- 2) The stage mechanism section projects below the chassis when positioned at the fifth stage or lower. So, do not leave the stage mechanism section at these positions to avoid damage or malfunction.
- 3) Before removing the flexible card and pickup flexible PCB from the connectors on the relay PCB, be sure to insert a short pin into the pickup unit first.
- 4) When replacing the tray motor assy, mount the 2-stage gear(Not resable) on the shaft of a new tray motor assy. (As the gear uses snap-on fittings, push it in until it is snapped completely.)
- 5) When replacing the magazine holder assy, mount the worm wheel(Not resable) on the shaft of a new elevation worm wheel.  
(As the gear uses snap-on fittings, push it in until it is snapped completely.)

## 2. DISASSEMBLY

### ● Removing the Pickup Unit

1. Insert a short pin into the pickup flexible PCB.
2. Remove the pickup flexible PCB from the connector.
3. Remove the flexible card from the connector.
4. Remove the lead wires of the spindle motor assy and carriage motor assy by removing solder.
5. Loosen the two screws. Lift up the relay PCB as shown in Fig. 22.

Be careful not to excessively pull the tray motor flexible PCB and the relay flexible PCB.

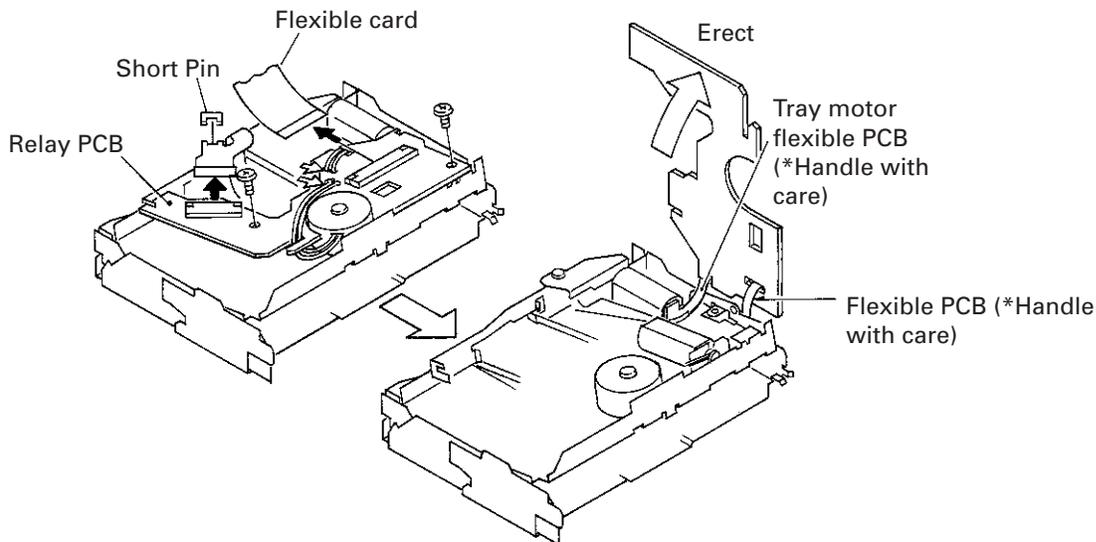


Fig. 22

6. Remove three screws A and then remove the carriage motor assy, remove the lighting conductor , screw holder, feed screw and belt (see Fig. 23).
7. Remove screw B on the main side and the pickup unit together with the guide shaft (see Fig. 23).

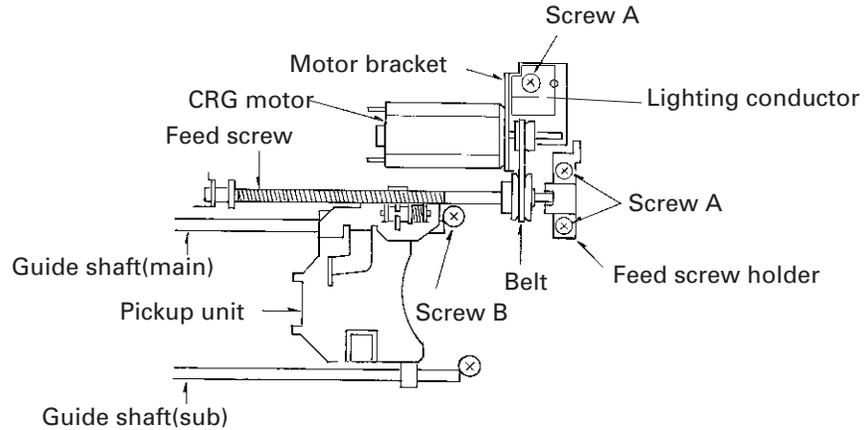


Fig. 23

● **Removing the CD Core Unit**

1. Insert a short pin into the pickup flexible PCB.
2. Remove the flexible card from the CD core unit connector.
3. Remove the lead wires of the elevation motor assy that were soldered to the CD core unit.
4. Remove screw C and three screws D and then the CD core unit (see Fig. 24).

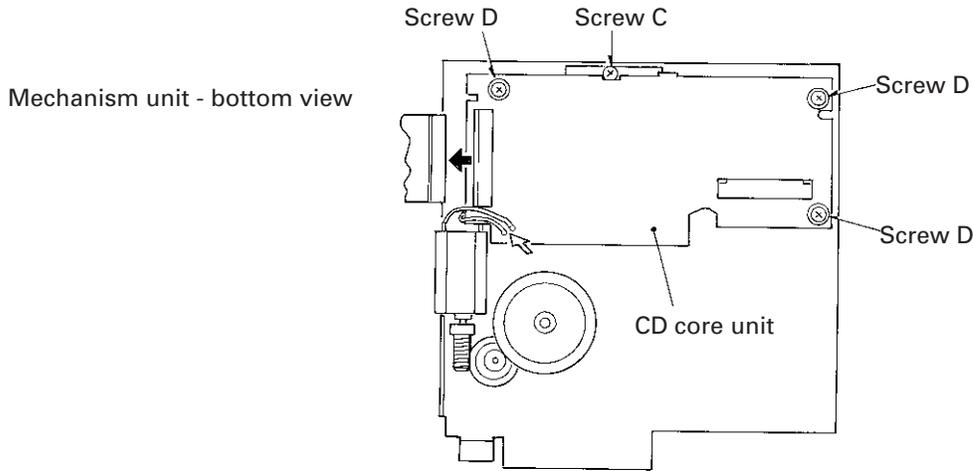


Fig. 24

● **Cautions on Mounting the CD Core Unit**

When mounting the CD core unit on the CD mechanism module, accurately insert the linear position sensor (Slide control: VR801) mounted on the CD core unit into the U-shaped groove of the elevation front lever (see Fig. 35).

If the linear position sensor is not inserted into the U-shaped groove, elevation operation will malfunction.

● **Removing the Carriage Motor Assy**

After removing the pickup unit (see "Removing the Pickup Unit" in pages 17 and 18), remove the feed screw, remove the lighting conductor, belt ,and feed screw holder.

● **Removing the Spindle Motor Assy**

1. Rotate the tray motor until the clamp joint arm moves.
2. Slide and remove the clamp spring as shown in Fig. 25.
3. Remove the clammer.
4. As shown below, match the positions of the holes of the support wheel and screws F. Then remove the two screws F and spindle motor assy.

\* When removing the clammer, be careful not to lose the ball mounted between the clammer and clamp spring.

Release the clamp spring from the hook(s), and then slide it in the direction indicated with an arrow.

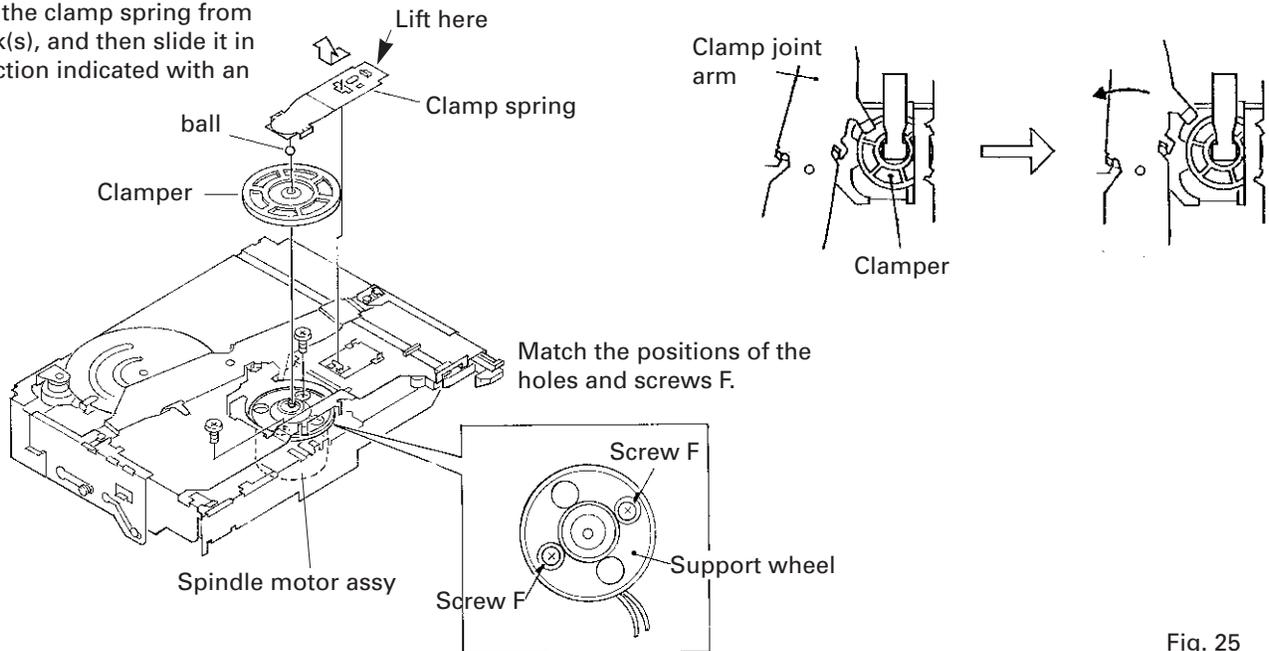


Fig. 25

● **Cautions on Mounting the Spindle Motor Assy**

1. Mount the spindle motor assy so that the lead wires face the rear of the mechanism unit (see Fig. 26).

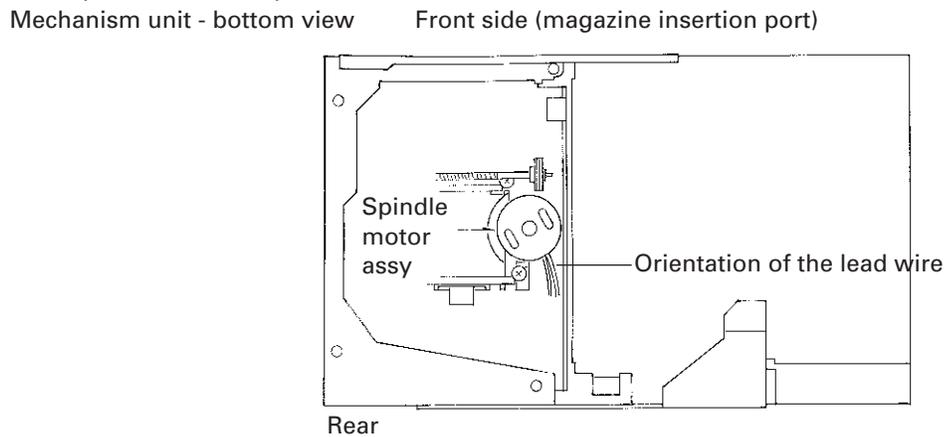


Fig. 26

2. Check that the torsion spring presses the side pressure plate (see Fig. 27).

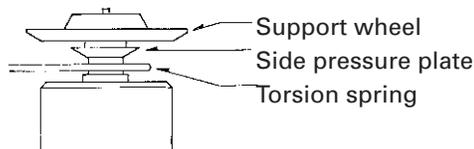


Fig. 27

3. When mounting the clammer, confirm that the ball has been installed.

### ● Removing the Tray Motor Assy (see Fig. 28)

1. Remove screw G.
2. Remove the elevation joint arm spring.
3. Remove the polyslider washer and the 2-stage gear.
4. Move the front lever to move the stage mechanism unit to the "2" position on the front lever.
5. Remove screw H.
6. Move the front lever again to move the stage mechanism unit to the uppermost stage.
7. Remove the tray motor assy.

### ● Cautions on Mounting the Tray Motor Assembly (see Fig. 28)

When mounting the 2-stage gear, verify that the positions of the holes of the 2-stage gear and the stage chassis match each other. For easy confirmation, check that the shapes of the 2-stage gear and the stage chassis form a concentric circle, as shown in the figure.

### ● Removing the Elevation Motor bracket Assy (see Fig. 28)

1. Remove the elevation joint arm spring.
2. Remove the polyslider washer and the 2-stage gear.
3. Remove two screws I and the elevation motor bracket assy

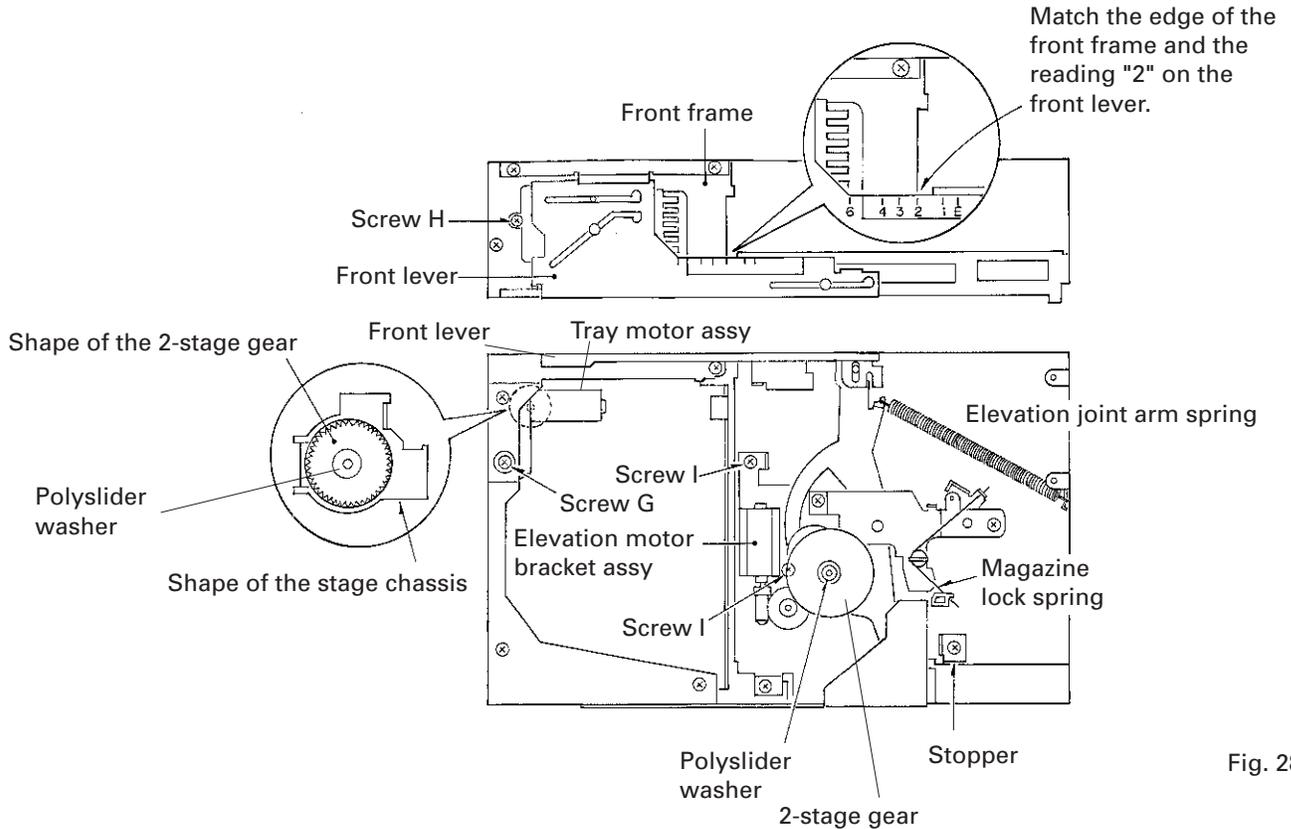


Fig. 28

● **Removing the Stage Mechanical Unit Section (see Fig. 29)**

1. Remove the elevation joint arm spring.(See Fig. 28)
2. Remove the magazine lock spring.(See Fig. 28)
3. Remove the 2-stage gear.(See Fig. 28)
4. Remove the screw J and then the stopper.
5. Fully slide the front lever in the direction that the stage mechanism assy moves upwards. Then, the front lever and the rear lever can be removed at the same time.
6. Remove three screws K and two screws L, and then the magazine holder Assy.
7. Remove four screws M and then the lower frame.
8. Remove three screws N and then the front frame.
9. Move the stage mechanism assy to the lowest position. Slide the bent section of the stage mechanism assy along the L-shaped groove in the front frame to remove the stage mechanism assy.

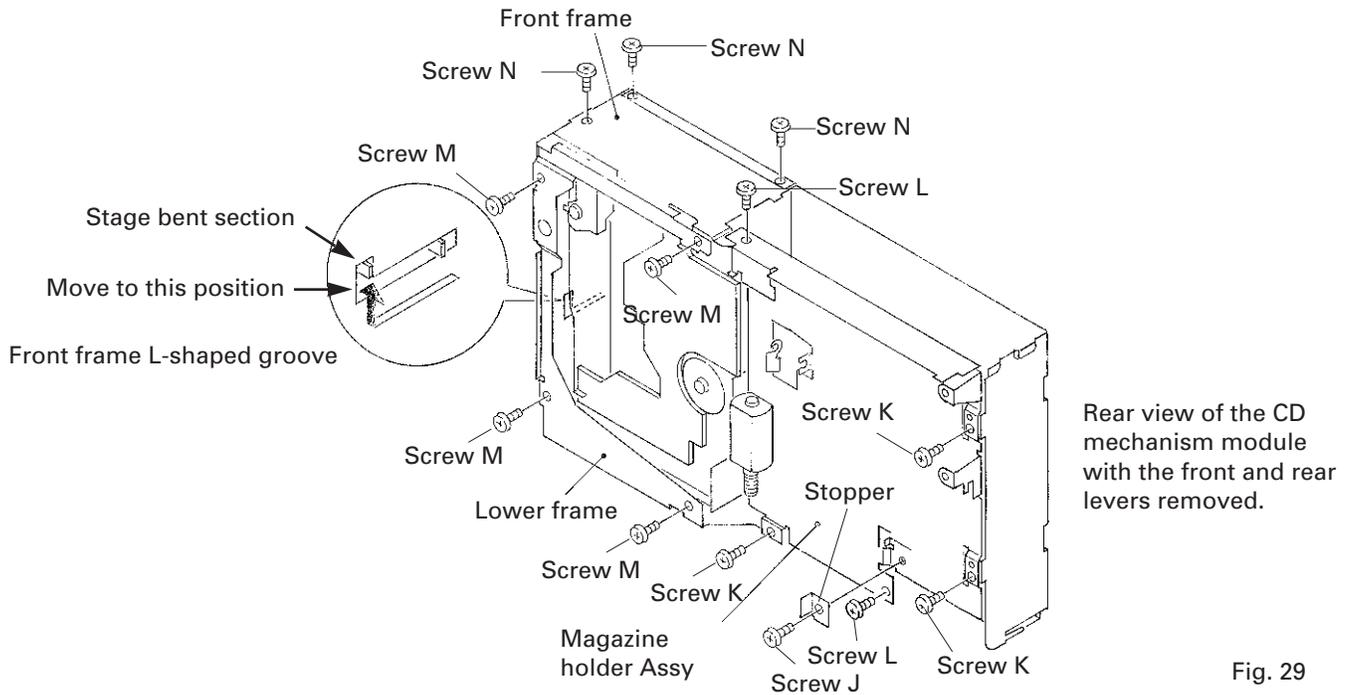


Fig. 29

### 3. MECHANISM DESCRIPTIONS

#### ● Inserting the Magazine

1. When the magazine is inserted against the force of the EJECT lever spring, the lock arm comes in along the groove in the rear side of the magazine to lock (see Fig. 30).

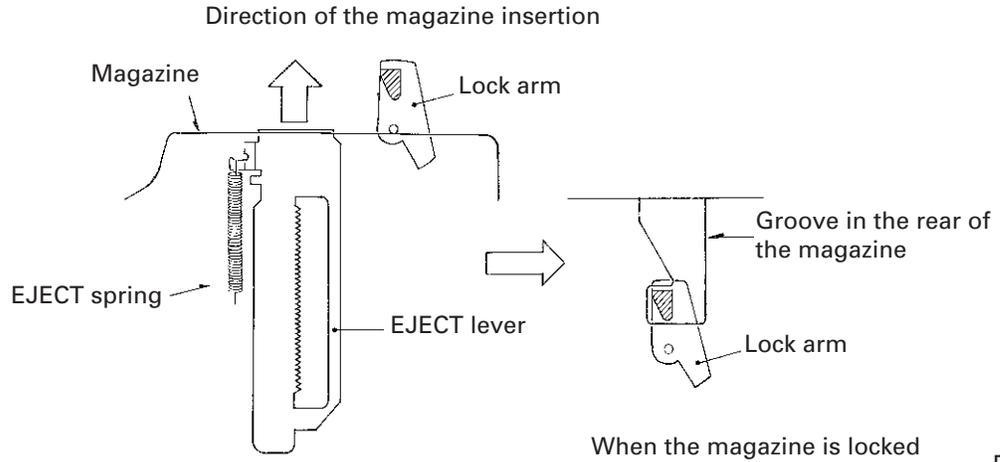


Fig. 30

2. The magazine lock is detected when the detection arm moves along the EJECT lever cam section and presses the magazine detection switch mounted on the CD core unit. When the magazine is not inserted, the detection arm is held at the SW OFF position by the EJECT lever cam (see Fig. 31).

When the magazine starts insertion, the lock arm starts moving along the groove in the rear of the magazine. Then the lock arm stops at the detection arm "stop" position. Although the detection arm tries to move in the SW ON direction, the lock arm stops it. (See Fig. 32.)

When the magazine is completely inserted, the magazine to lock. At the same time, the detection arm is released to press the magazine detection switch with spring force. (See Fig. 33)

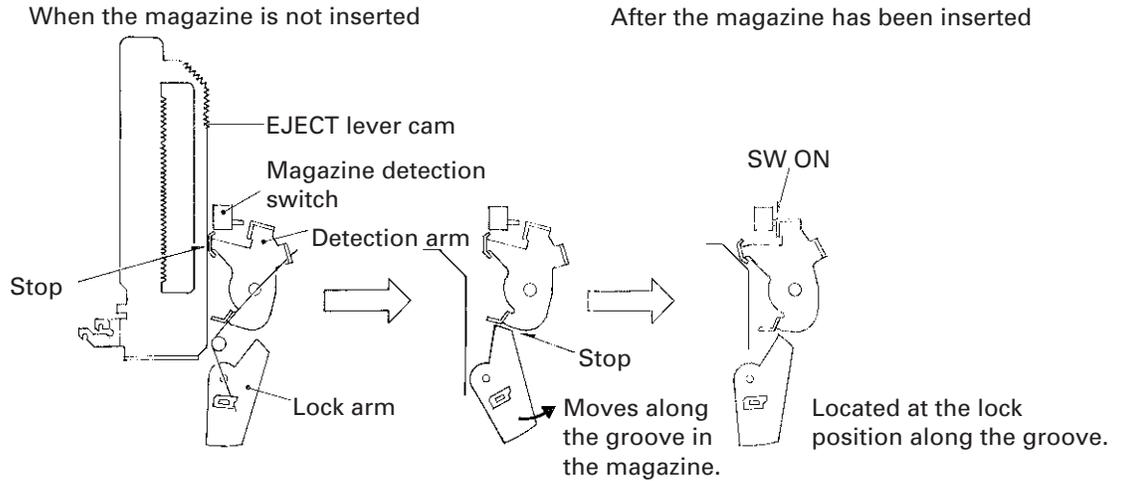


Fig. 31

Fig. 32

Fig. 33

● Elevation Operation (see Fig. 34)

When the elevation motor is driven, the elevation joint arm rotates. The front and rear levers, engaged with the ends of the elevation joint arm respectively, slide to move the stage mechanism unit up and down.

● Detecting Elevation (see Fig. 35).

When the elevation joint arm rotates, the front lever slides.

Because the knob of the linear position sensor (slide control: VR801) is inserted in the U-shaped groove of this front lever, the elevation joint arm moves in synchronization with the lever and detects the voltage at that time.

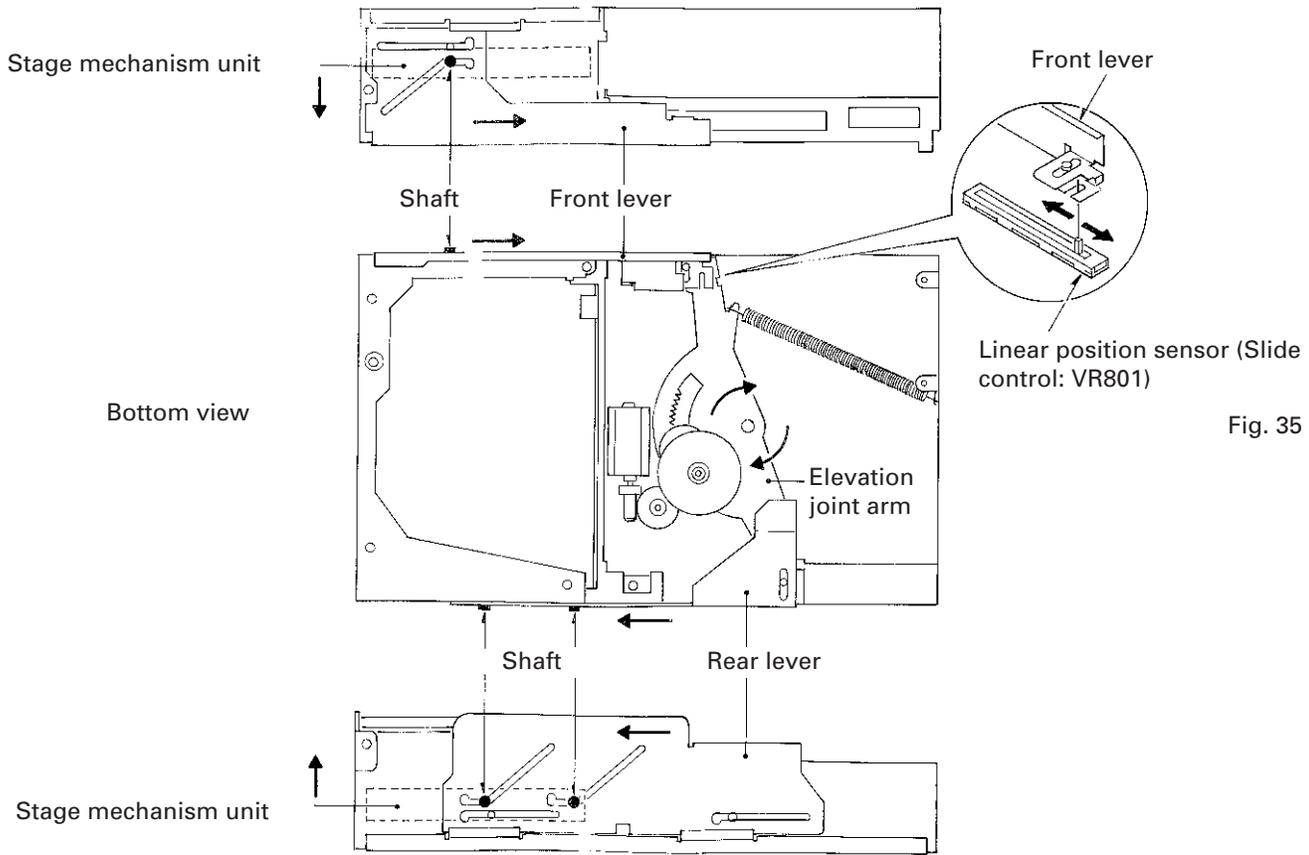


Fig. 35

Fig. 34

● **Tray Extraction to Clamp Operation (Loading Motor Drive Section) (See Fig. 36.)**

When the loading motor drives the cam gear, the cam gear moves the tray extraction arm along the cam groove to extract the tray. At that time, the carriage assy (including the spindle motor assy and tray positioning pin) waits until the tray passes it. When tray extraction has been completed, the cam gear swings the clamp joint arm and slides the clamp lever engaged with the clamp joint arm. The shaft of the carriage assy is lifted along the step-shaped groove as the clamp lever slides. The carriage assy swings toward the stage chassis. Subsequently, the spindle motor assy comes to a CD disc to load and lift it up from the tray.

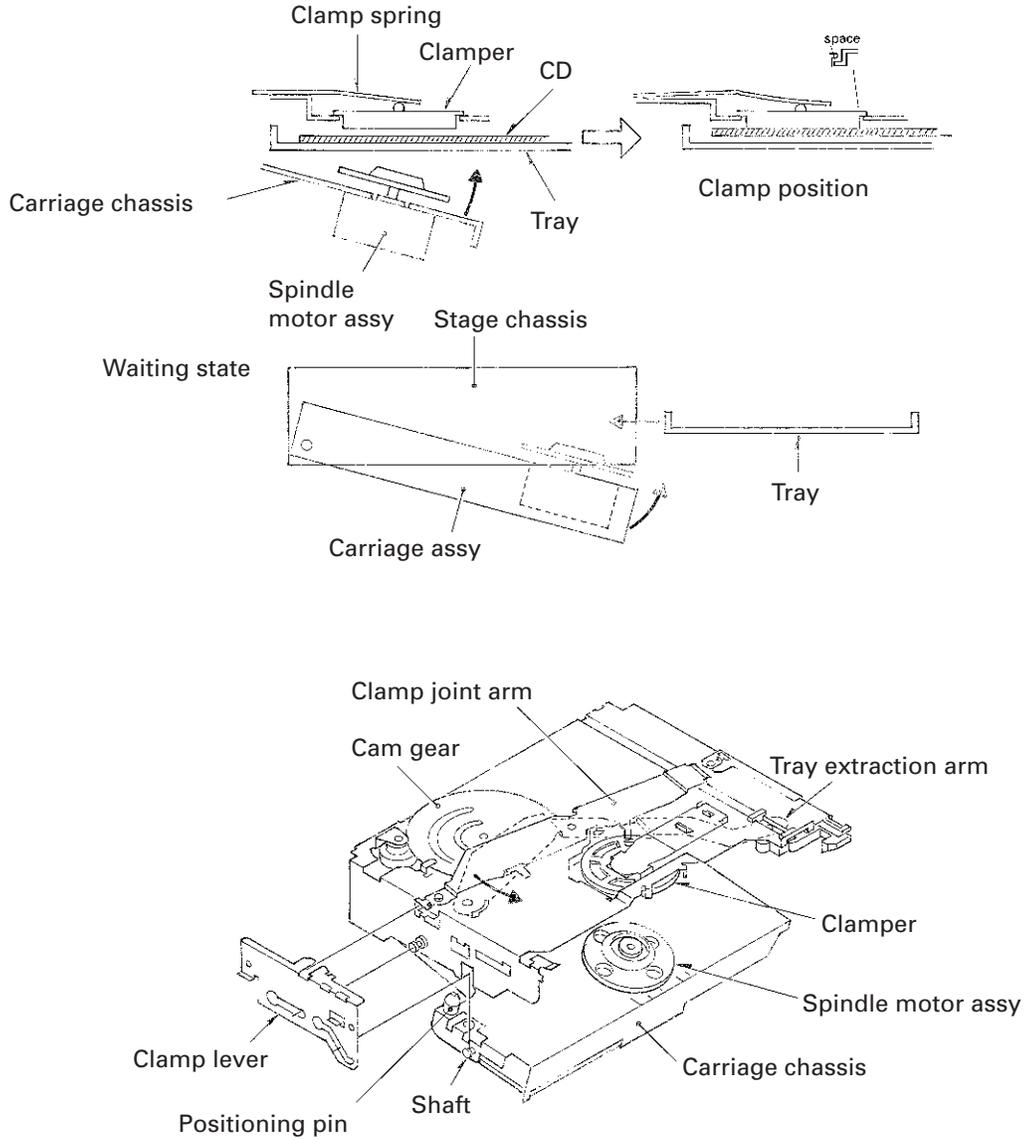


Fig. 36

● **Elevation Mechanism - Play Elimination**

Immediately before the clamp operation is completed, the bent sections of the clamp lever comes into the frame stopper section and press it downward to control the vertical position. This operation can press the stage downward by means of the elevation mechanism. At this time, the elevation motor stops, not by the detection of the pressed position, but in a certain period of time after the elevation mechanism moves up to the limit of the movement. (See Fig. 37)

The figure 37 shows the pressing mechanism. When the clamp lever bent sections press the framestopper section, the carriage chassis shaft inserted into the clamp lever groove is lifted up until it is pressed against the end of the vertical groove in the stage chassis. At this time, the stage chassis shaft, which is also inserted into the other groove in the clamp lever, is located at the wider portion of the groove so that the carriage chassis shaft can move to the end of the vertical groove in the stage chassis. This pressing operation eliminates the play at each of the stage chassis, carriage chassis, clamp lever, and the frame to improve the resistance against vibration. (See Fig. 39.)

\* The elevation joint arm spring has been installed to keep this pressing state.

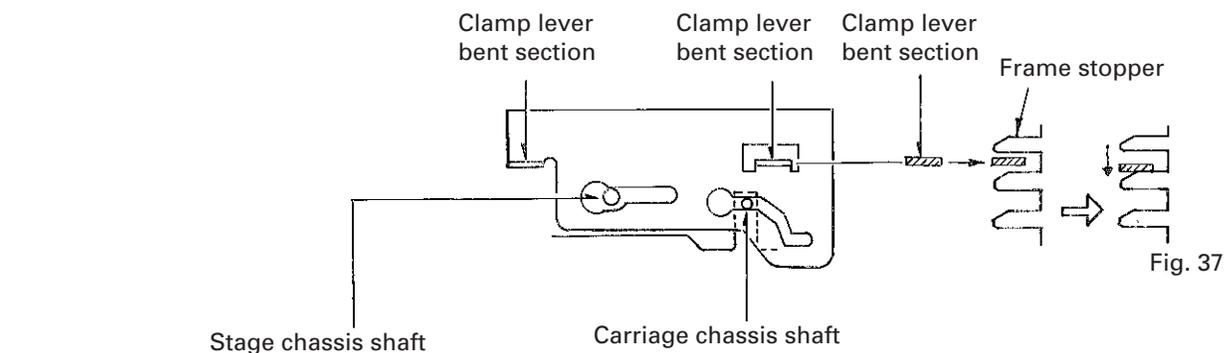


Fig. 37

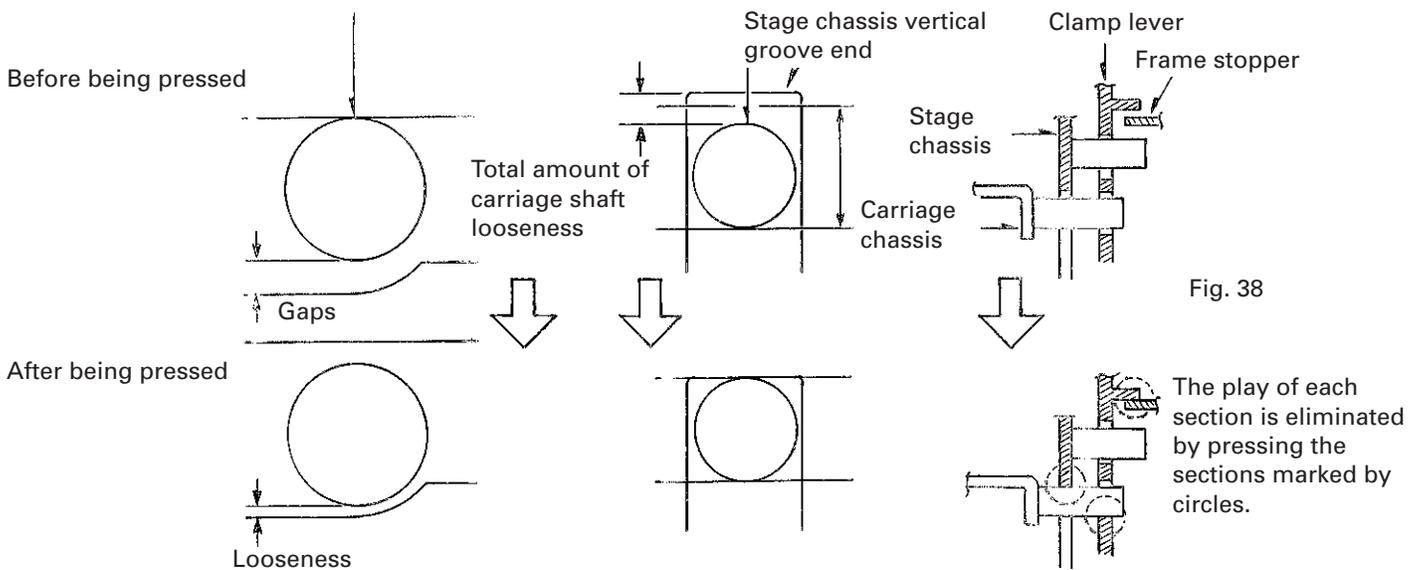


Fig. 38

● **Disc detection**

Fig. 39

The cam gear for tray extraction operation moves the DSP switch lever to turn the DSP switch (S852) ON and OFF. The photo sensors (Q851 and D852) detect the presence of discs and their types (8 or 12 cm) with a certain timing.

● **Detecting Tray Extraction and Return**

A) Tray extraction (Fig. 40)

The clamp joint arm moves the clamp lever and performs clamping. After clamping has been completed, the protrusion on the clamp joint arm presses the TRP switch (S851) via the TRP switch (S851) via the plate spring on the DSP switch lever and turns on the switch.

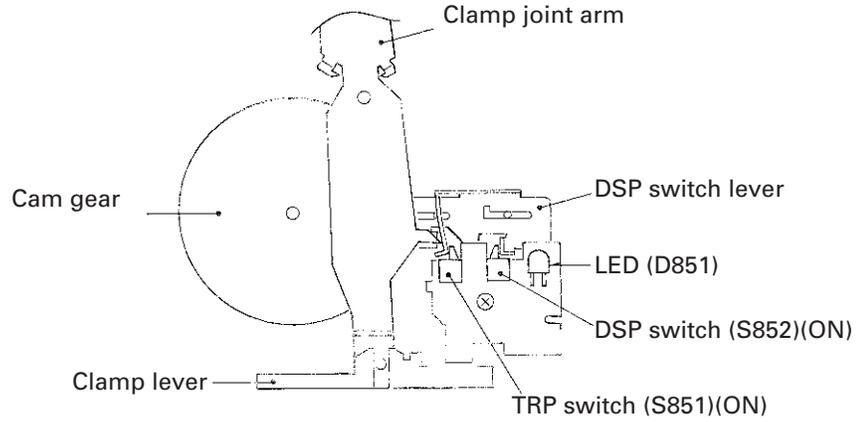


Fig. 40

B) Tray return (see Fig. 41)

The TRP switch (S851) is turned on by the DSP switch lever moved by the cam gear.

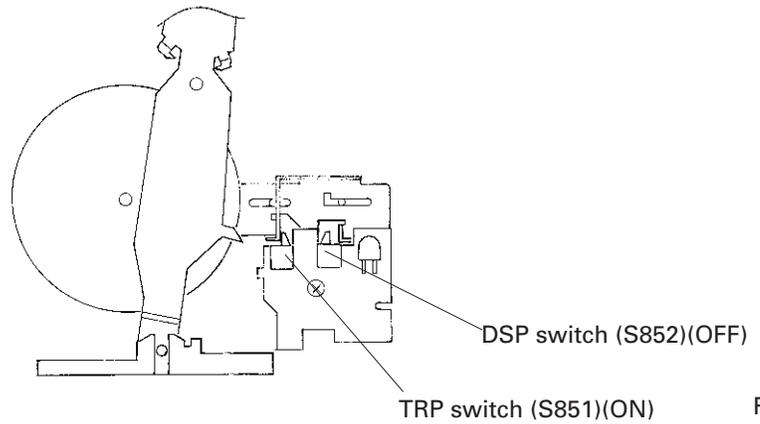


Fig. 41

● **Tray Lock Mechanism**

In other modes than the PLAY mode, the tray bouncing prevention spring is deflected by the rear lever and functions as a stopper to prevent the tray from coming out of the magazine. (Fig. 43)

In the PLAY mode, the window in the rear frame catches the projection of the tray bouncing prevention spring. Accordingly, the spring is not deflected to enable the tray's insertion and extraction. (Fig. 42)

Consequently, in other modes than the PLAY mode (during the waiting mode), the tray will not come out of the magazine even if external shock is applied to it. (Fig. 43)

When set in the  
PLAY position

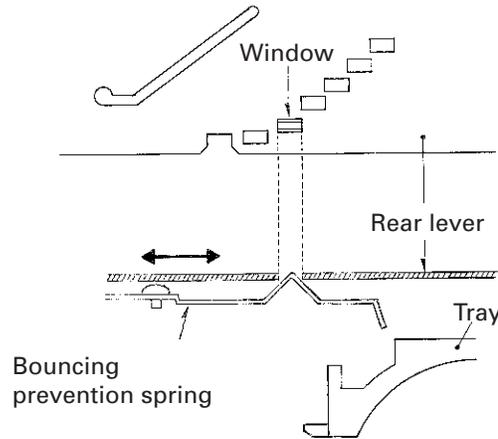


Fig. 42

When set to a position  
other than PLAY

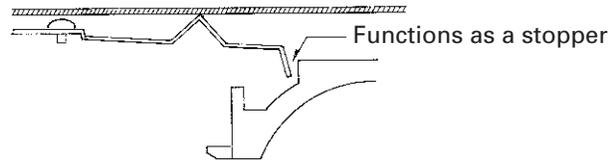


Fig. 43

● **Ejecting the Magazine (see Fig. 44)**

When the rear lever is further driven from the uppermost stage position of the elevation, the bent end face of the rear lever presses the boss on the lock arm to release the lock and the magazine is ejected by the EJECT lever.

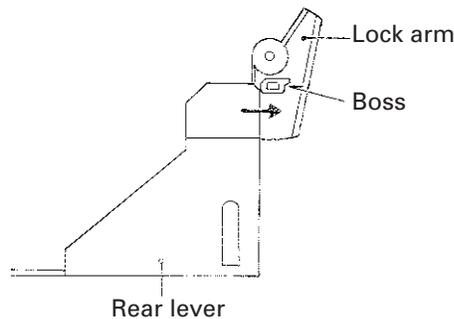
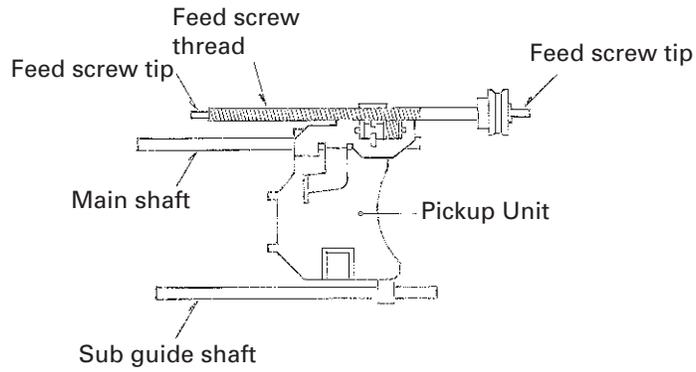


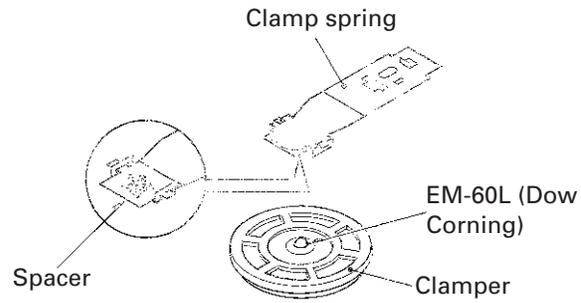
Fig. 44

● **Lubrication points (Fig. 45)**

(1) Around the pickup assy ->  
Use EM-60L for all points.



(2) Slide section with clamp ball



(3) For the other sections, use the E paste.

Fig. 45