sound.vision.soul

Service Manual

ORDER NO.
CRT2955

UNIVERSAL MULTI-CD SYSTEM

CDX-FM1287 XN/UC,ES

CDX-FM1289 XN/UC

- **This service manual should be used together with the manual(s) listed below. For the parts numbers, adjustments, etc. which are not shown in this manual, refer to the following manual(s).**

Model No.	Order No.	Mech. Module	Remarks
CDX-FM1277/X1N/UC	CRT2590		
CX-938	CRT2357	C8	CD Mech. Module:Circuit Description, Mech.Description, Disassembly

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS (USA) INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZB. NOV. 2002 Printed in Japan

EXPLODED VIEWS AND PARTS LIST

PACKING (Page 3)

● PACKING SECTION PARTS LIST

Mark	No.	Description	Part No.	
			CDX-FM1277/X1N/UC	CDX-FM1287/XN/UC
	26	Carton	CHG4288	CHG4886
	28	Contain Box	CHL4288	CHL4886
	32-1	Installation Manual	CRD3356	CRD3732
	32-2	Owner's Manual	CRD3354	CRD3731
	35	Remote Control Unit	CXB6798	CXC1104

Mark	No.	Description	Part No.	
			CDX-FM1277/X1N/ES	CDX-FM1287/XN/ES
	26	Carton	CHG4287	CHG4887
	28	Contain Box	CHL4287	CHL4887
	32-1	Installation Manual	CRD3353	CRD3734
	32-2	Owner's Manual	CRD3352	CRD3733
	35	Remote Control Unit	CXB6798	CXC1104

Mark	No.	Description	Part No.	
			CDX-FM1279/X1N/UC	CDX-FM1289/XN/UC
	26	Carton	CHG4289	CHG4888
	28	Contain Box	CHL4289	CHL4888
	32-1	Installation Manual	CRD3356	CRD3732
	32-2	Owner's Manual	CRD3355	CRD3735
	35	Remote Control Unit	CXB6798	CXC1104

EXTERIOR (Page 6)

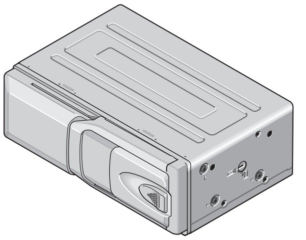
● EXTERIOR SECTION PARTS LIST

Mark	No.	Description	Part No.	
			CDX-FM1277/X1N/UC CDX-FM1277/X1N/ES	CDX-FM1287/XN/UC CDX-FM1287/XN/ES
	34	Remote Control Unit	CXB6798	CXC1104
	35	Cover	CNS6439	CNS7068
	36	Display Assy	CXB6806	CXC1167
	45	Grille Unit	CXB6812	CXC1153
	46	Grille Assy	CXB6832	CXC1158
	47	Door	CAT2205	CAT2470
	48	Door	CAT2206	CAT2466

Mark	No.	Description	Part No.	
			CDX-FM1279/X1N/UC	CDX-FM1289/XN/UC
	34	Remote Control Unit	CXB6798	CXC1104
	35	Cover	CNS6439	CNS7068
	36	Display Assy	CXB6807	CXC1168
	45	Grille Unit	CXB6813	CXC1154
	46	Grille Assy	CXB6833	CXC1157
	48	Door	CAT2208	CAT2465

Service Manual

CDX-FM1277/X1N/UC



ORDER NO.
CRT2590

UNIVERSAL MULTI-CD SYSTEM

CDX-FM1277 X1N/UC
CDX-FM1277 X1N/ES
CDX-FM1279 X1N/UC

● **This service manual should be used together with the following manual(s):**

Model No.	Order No.	Mech. Module	Remarks
CX-938	CRT2357	C8	CD Mech. Module:Circuit Description, Mech. Description, Disassembly

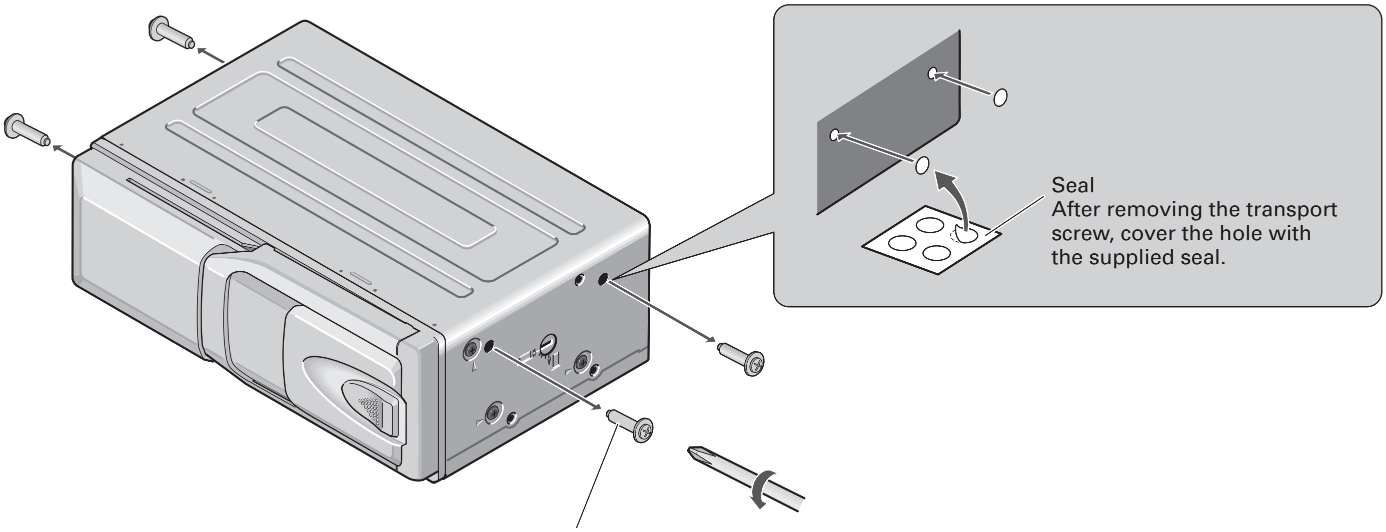
CONTENTS

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZY. DEC. 2000 Printed in Japan

● CD Player Service Precautions

1. For pickup unit(CXX1285) handling, please refer to"Disassembly"(see page 52).
   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 service pickup unit(see page 41).
4. Since these screws protects the mechanism during transport, be sure to affix it when it is transported for repair, etc.



Seal
After removing the transport screw, cover the hole with the supplied seal.

Transport screw
Attach to the original position before transporting the set.

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

● CDX-FM1277/X1N/UC and CDX-FM1279/X1N/UC

CAUTION

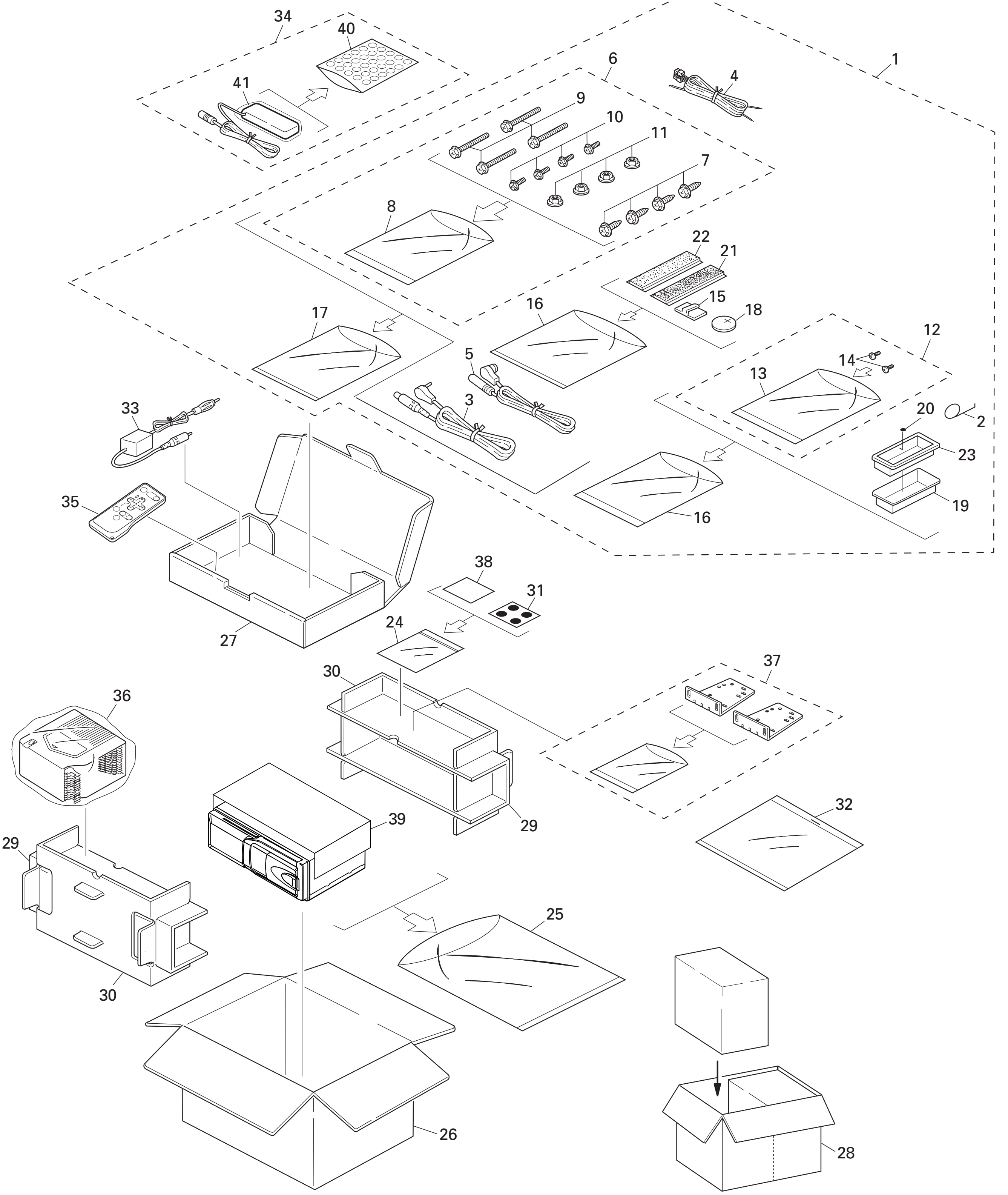
This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly 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

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

			Part No.		
Mark	No.	Description	CDX-FM1277/X1N/UC	CDX-FM1279/X1N/UC	CDX-FM1277/X1N/ES
	1	Accessory Assy	CEA2767	CEA2767	CEA2768
	2	Spring	CBH-865	CBH-865	CBH-865
	3	Cord	CDE4289	CDE4289	CDE4289
	4	Cord	CDE5812	CDE5812	CDE5812
	5	Cord	CDE5814	CDE5814	CDE5814
	6	Screw Assy	CEA1962	CEA1962	CEA1962
	7	Screw	CBA1295	CBA1295	CBA1295
*	8	Polyethylene Sheet	CNM5158	CNM5158	CNM5158
	9	Screw	HMB60P500FMC	HMB60P500FMC	HMB60P500FMC
	10	Screw	HMF40P080FZK	HMF40P080FZK	HMF40P080FZK
	11	Nut	NF60FMC	NF60FMC	NF60FMC
	12	Screw Assy	CEA1965	CEA1965	CEA1965
*	13	Polyethylene Bag	CEG-127	CEG-127	CEG-127
	14	Screw	IMS30P050FZK	IMS30P050FZK	IMS30P050FZK
	15	Clamper	CEF1010	CEF1010	CEF1010
*	16	Polyethylene Bag	CEG-158	CEG-158	CEG-158
	17	Polyethylene Bag	CEG1185	CEG1185	*CEG1263
	18	Battery	CEX1065	CEX1065	CEX1065
	19	Bracket	CNC8061	CNC8061	CNC8061
	20	Cushion	CNM3182	CNM3182	CNM3182
	21	Fastener(Soft)	CNM3872	CNM3872	CNM3872
	22	Fastener(Rough)	CNM4041	CNM4041	CNM4041
	23	Panel	CNS5428	CNS5428	CNS5428
*	24	Polyethylene Bag	CEG1099	CEG1099	CEG1099
	25	Polyethylene Bag	CEG1174	CEG1174	CEG1026
	26	Carton	CHG4288	CHG4289	CHG4287
	27	Sub Carton	CHG4296	CHG4296	CHG4296
	28	Contain Box	CHL4288	CHL4289	CHL4287
	29	Protector	CHP2136	CHP2136	CHP2136
	30	Protector	CHP2137	CHP2137	CHP2137
	31	Seal	CNM5599	CNM5741	CNM5599
	32-1	Installation Manual	CRD3356	CRD3356	CRD3353
	32-2	Owner’s Manual	CRD3354	CRD3355	CRD3352
*	32-3	Warranty Card	Not used	CRY1070	Not used
*	32-4	Card	ARY1048	Not used	Not used
	33	Antenna Select Assy	CWM7445	CWM7445	CWM7445
	34	Display Assy	CXB6806	CXB6807	CXB6806
	35	Remote Control Assy	CXB6798	CXB6798	CXB6798
	36	Magazine Assy	CXB4028	CXB4028	CXB4028
	37	Angle Assy	CXB3589	CXB6817	CXB3589
*	38	Caution Card	CRP1090	CRP1090	CRP1090
*	39	Caution Card	CRP1233	CRP1233	CRP1233
	40	Air Cushioned Bag	CEG1055	CEG1055	CEG1055
	41	Cover	CEG1062	CEG1062	CEG1062

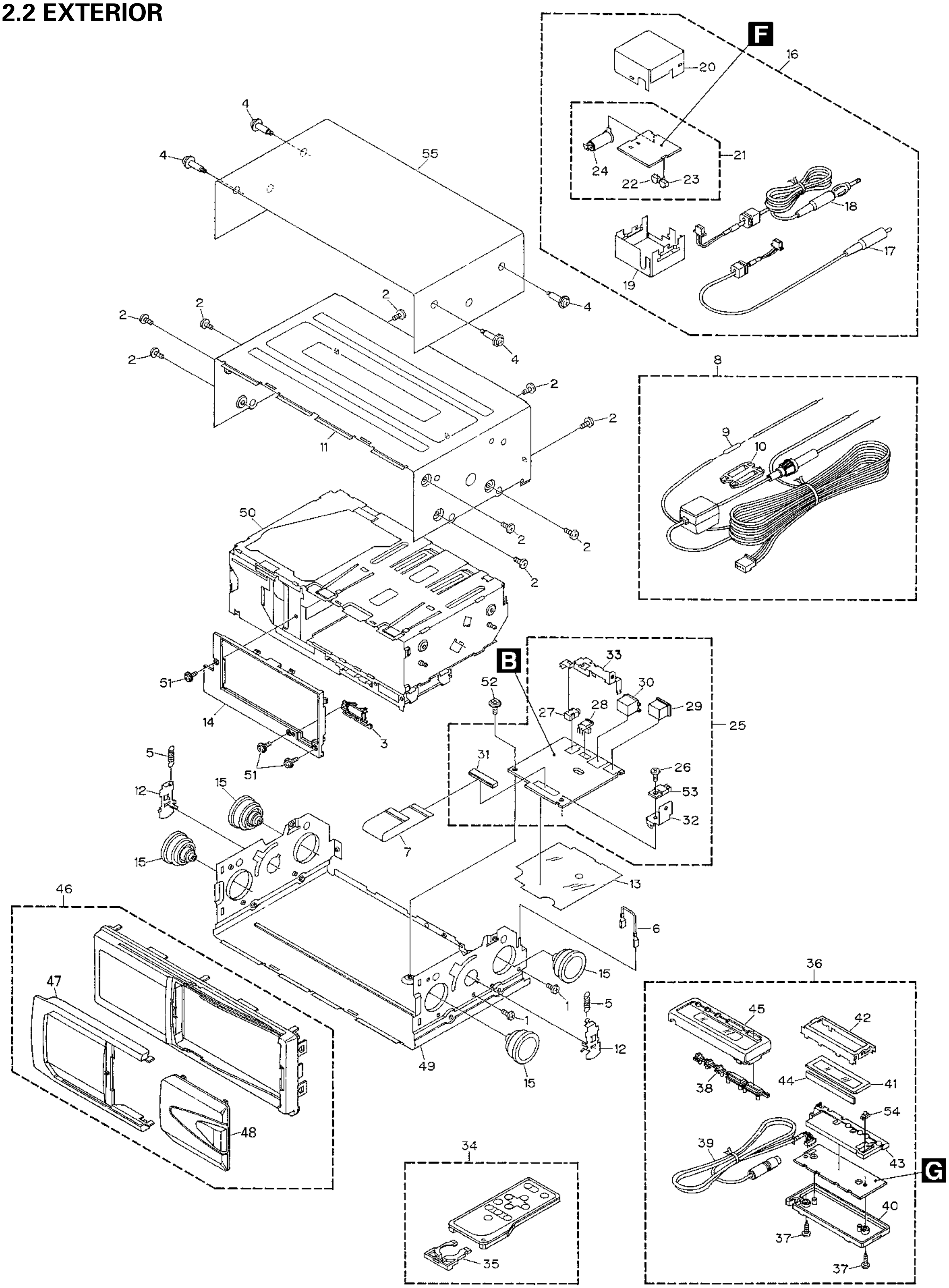
● Owner's Manual

Model	Part No.	Language
CDX-FM1277/X1N/UC	CRD3354	English, French
CDX-FM1279/X1N/UC	CRD3355	English, French
CDX-FM1277/X1N/ES	CRD3352	English, Spanish, Portuguese(B), Arabic

● Installation Manual

Model	Part No.	Language
CDX-FM1277/X1N/UC	CRD3356	English, French
CDX-FM1279/X1N/UC	CRD3356	English, French
CDX-FM1277/X1N/ES	CRD3353	English, Spanish, Portuguese(B), Arabic

2.2 EXTERIOR


F
16
20
21
24
22
23
18
19
17
4
55
2
11
50
8
9
10
B
33
52
30
27
28
29
25
31
26
53
32
7
13
51
14
3
5
12
15
6
46
47
48
49
1
36
45
42
38
44
41
54
39
43
G
40
37
34
35

(1) EXTERIOR SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Screw	BMZ26P040FMC
	2	Screw	BMZ30P040FZK
	3	Button	CAC6363
	4	Screw	CBA1353
	5	Spring	CBH1862
	6	Connector	CDE5525
	7	Connector	CDE6480
	8	Cord	CDE5812
	9	Resistor	RS1/2PMF102J
	10	Cap	CNS1472
	11	Upper Case	See Contrast table(2)
	12	Arm	CNC8058
	13	Insulator	CNM6074
	14	Panel	CNS5218
	15	Damper	CNV6778
	16	Antenna Select Assy	CWM7445
	17	Cord	CDE4087
	18	Antenna Cable	CDH1207
	19	Chassis	CNA1555
	20	Case	CNB1764
	21	Antenna Select Unit	CWX2580
	22	Plug(CN502)	CKS1222
	23	Plug(CN501)	CKS2812
	24	Antenna Jack(CN503)	CKX1006
	25	Extension Unit	CWX2560
	26	Screw	BMZ26P060FMC
	27	Jack(CN401)	CKN1022
	28	Plug(CN801)	CKS-460
	29	Connector(CN802)	CKS3195
	30	Connector(CN803)	CKS3407

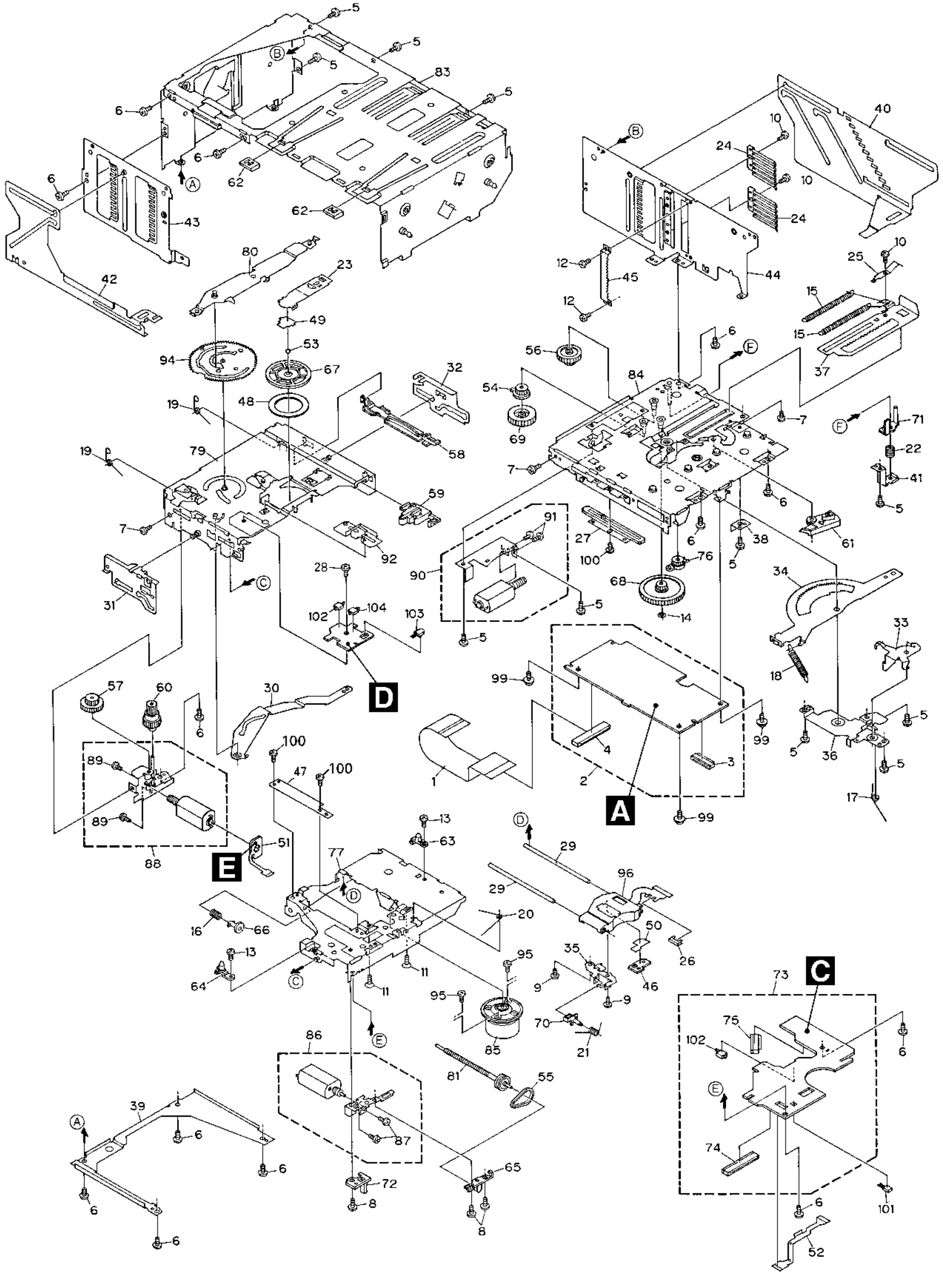
Mark	No.	Description	Part No.
	31	Connector(CN201)	CKS3920
	32	Holder	CNC8060
	33	Holder	CNC8069
	34	Remote Control Unit	CXB6798
	35	Cover	CNS6439
	36	Display Assy	See Contrast table(2)
	37	Screw	BPZ20P100FZK
	38	Button	CAC5887
	39	Cord	CDE5834
	40	Cover	CNS5223
	41	LCD(LCD901)	CAW1514
	42	Holder	CNC8062
	43	Lighting Conductor	CNV5594
	44	Rubber	CNV5599
	45	Grille Unit	See Contrast table(2)
	46	Grille Assy	See Contrast table(2)
	47	Door	See Contrast table(2)
	48	Door	See Contrast table(2)
	49	Lower Case Unit	See Contrast table(2)
	50	CD Mechanism Module(C8R2)	CXK4965
	51	Screw	IMS20P030FZK
	52	Screw	IMS26P040FMC
	53	Transistor(Q801)	2SD2396
	54	IC(IC902)	TSOP1840SB1
*	55	Caution Card	CRP1233

(2) CONTRAST TABLE

CDX-FM1277/X1N/UC,CDX-FM1279/X1N/UC and CDX-FM1277/X1N/ES are constructed the same except for the following:

			Part No.		
Mark	No.	Symbol and Description	CDX-FM1277/X1N/UC	CDX-FM1279/X1N/UC	CDX-FM1277/X1N/ES
	11	Upper Case	CNB2393	CNB2615	CNB2393
	36	Display Assy	CXB6806	CXB6807	CXB6806
	45	Grille Unit	CXB6812	CXB6813	CXB6812
	46	Grille Assy	CXB6832	CXB6833	CXB6832
	47	Door	CAT2205	CAT2203	CAT2205
	48	Door	CAT2206	CAT2208	CAT2206
	49	Lower Case Unit	CXB7008	CXB7007	CXB7008

2.3 CD MECHANISM MODULE

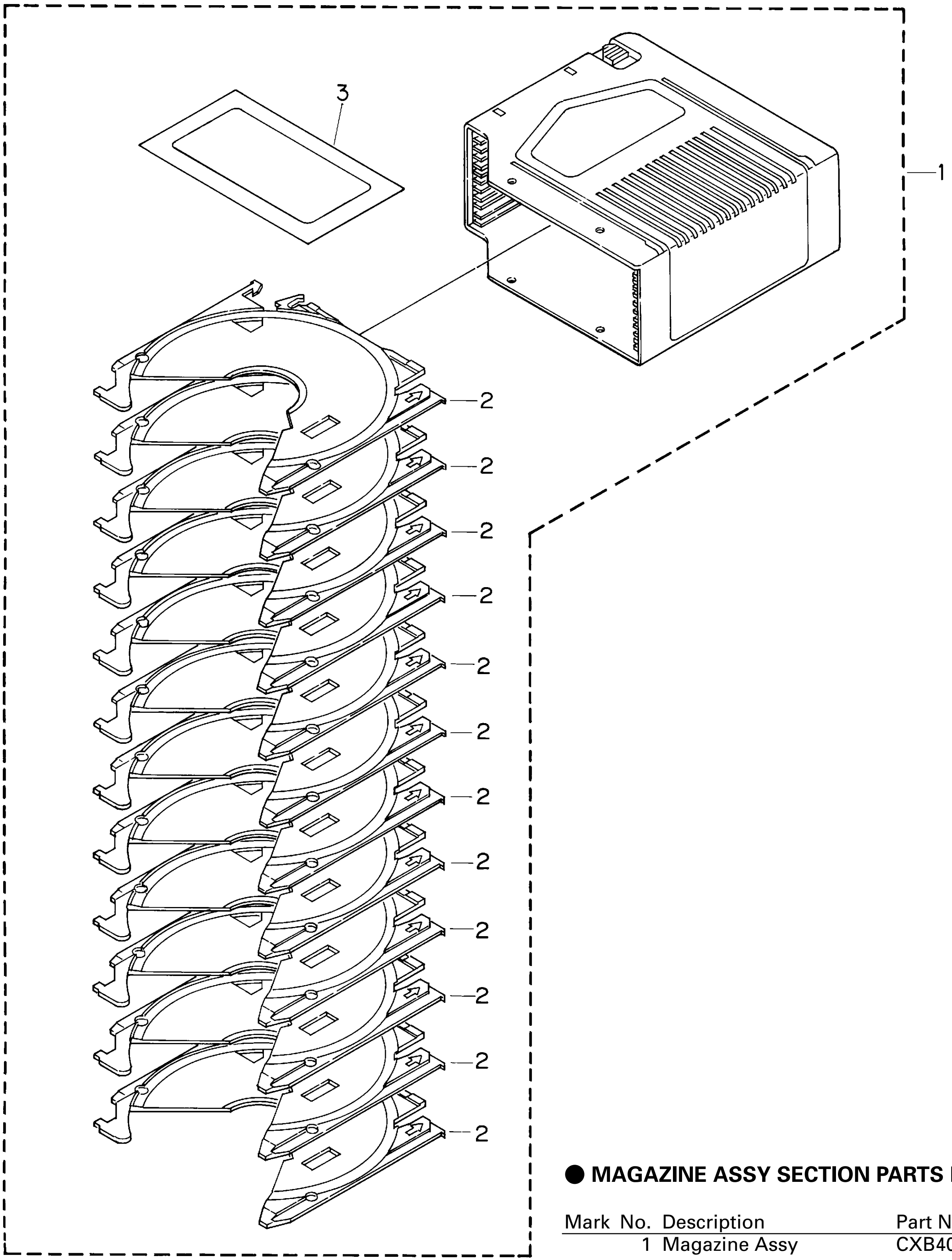


● CD MECHANISM MODULE SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Connector	CDE6069
	2	CD Core Unit	CWX2495
	3	Connector(CN701)	CKS1963
	4	Connector(CN101)	CKS2272
	5	Screw	BMZ20P025FMC
	6	Screw(M2x2.5)	CBA1037
	7	Screw(M2x2.5)	CBA1041
	8	Screw(M2x2)	CBA1176
	9	Screw(M2x4)	CBA1362
	10	Screw(M2x1.4)	CBA1387
	11	Screw(M2x2.5)	CBA1493
	12	Screw(M2x1.6)	CBA1476
	13	Screw(M2x3)	CBA1486
	14	Washer	CBF1038
	15	Spring	CBH2374
	16	Spring	CBH2172
	17	Spring	CBH2173
	18	Spring	CBH2174
	19	Spring	CBH2175
	20	Spring	CBH2177
	21	Spring	CBH2178
	22	Spring	CBH2179
	23	Spring	CBL1390
	24	Spring	CBL1393
	25	Spring	CBL1404
	26	Short Pin	CBL1239
	27	Volume(VR801)	CCW1024
	28	Screw(M2x1.5)	CBA1491
	29	Shaft	CLA3894
	30	Arm	CNC8482
	31	Lever	CNC7905
	32	Lever	CNC7906
	33	Arm	CNC7908
	34	Arm	CNC7909
	35	Holder	CNC7911
	36	Holder	CNC7912
	37	Lever	CNC7919
	38	Stopper	CNC7920
	39	Frame	CNC7921
	40	Lever	CNC7922
	41	Bracket	CNC7923
	42	Lever	CNC7924
	43	Frame	CNC7927
	44	Frame	CNC7928
	45	Bracket	CNC8355
	46	Plate	CNC8375
	47	Cover	CNC8434
	48	Sheet	CNM6009
	49	Spacer	CNM6428
	50	Sheet	CNM6296
	51	PCB	CNP5227
	52	PCB	CNP5228
	53	Ball	CNR1189
	54	Gear	CNR1531
	55	Belt	CNT1086
	56	Gear	CNV5472
	57	Gear	CNV5473
	58	Rail	CNV5920
	59	Lever	CNV6091
	60	Gear	CNV5477
	61	Arm	CNV5478
	62	Holder	CNV5480
	63	Guide	CNV5921
	64	Guide	CNV5922
	65	Holder	CNV5483
	66	Holder	CNV5484
	67	Clamper	CNV5485
	68	Gear	CNV5486
	69	Gear	CNV5562
	70	Holder	CNV5563
	71	Stopper	CNV5564
	72	Lighting Conductor	CNV5785
	73	Mechanism PCB	CWX2303
	74	Connector(CN801)	CKS1965
	75	Connector(CN802)	CKS3486
	76	Damper Unit	CXA7159
	77	Chassis Unit	CXB4463
	78	•••••	
	79	Chassis Unit	CXB4461
	80	Arm Unit	CXB2855
	81	Screw Unit	CXB4464
	82	•••••	
	83	Frame Unit	CXB4427
	84	Magazine Holder Unit	CXB4460
	85	Motor Unit(M851)(SPINDLE)	CXB3003
	86	Motor Unit(M854)(CARRIAGE)	CXB3004
	87	Screw	JFZ20P025FMC
	88	Motor Unit(M853)(TRAY)	CXB4421
	89	Screw	JFZ20P025FMC
	90	Motor Unit(M852)(ELV)	CXB3006

Mark	No.	Description	Part No.
	91	Screw	JFZ20P025FMC
	92	Lever Unit	CXB3938
	93	•••••	
	94	Gear Unit	CXB5061
	95	Screw	JGZ17P025FZK
	96	Pickup Unit(Service)	CXX1285
	97	•••••	
	98	•••••	
	99	Screw	IMS26P040FMC
	100	Screw	JFZ20P025FNI
	101	Photo-transistor(Q851)	PT4800
	102	Spring Switch(S851,S853)	CSN1051
	103	LED(D851)	CN504-2
	104	Spring Switch(S852)	CSN1052

2.4 MAGAZINE ASSY

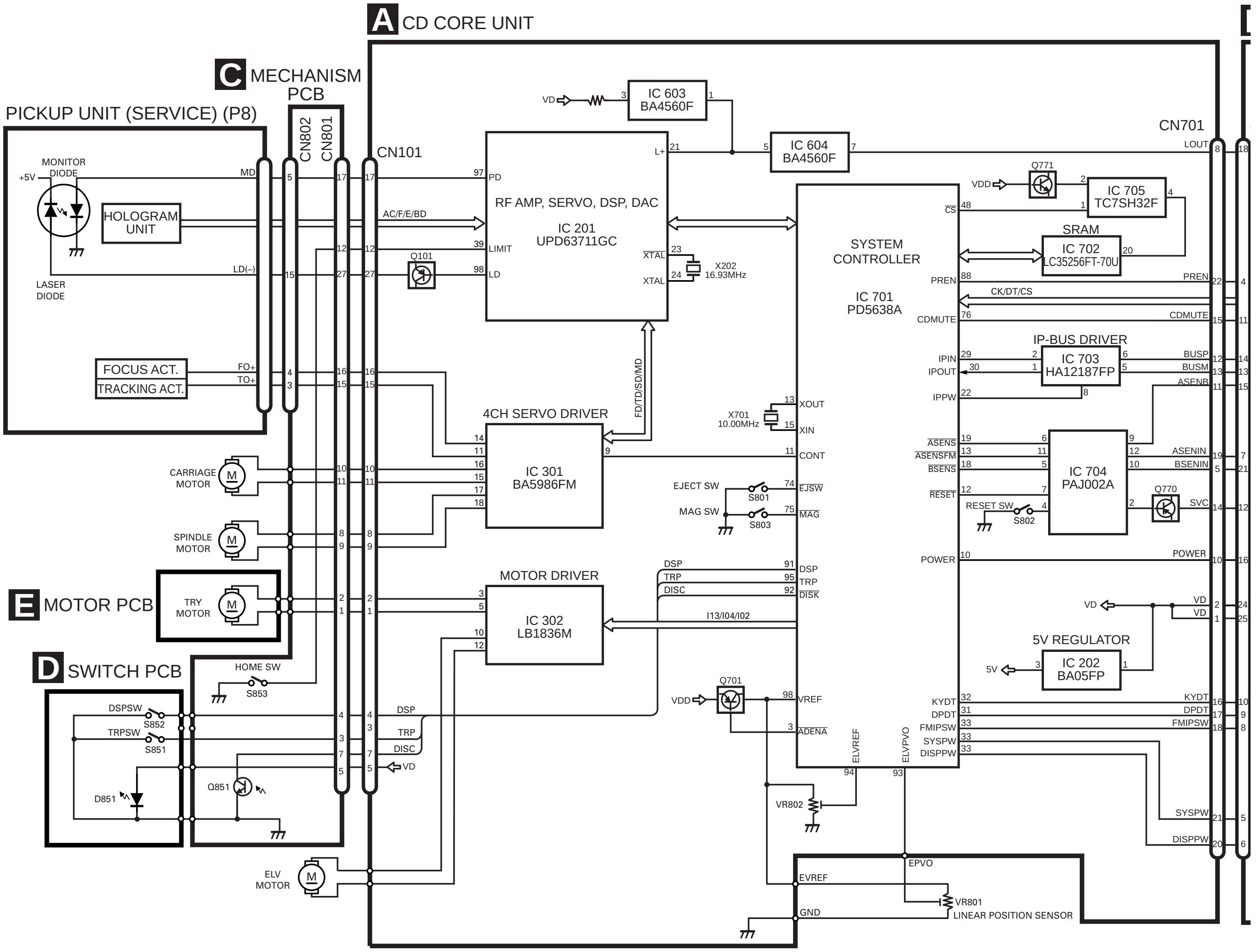


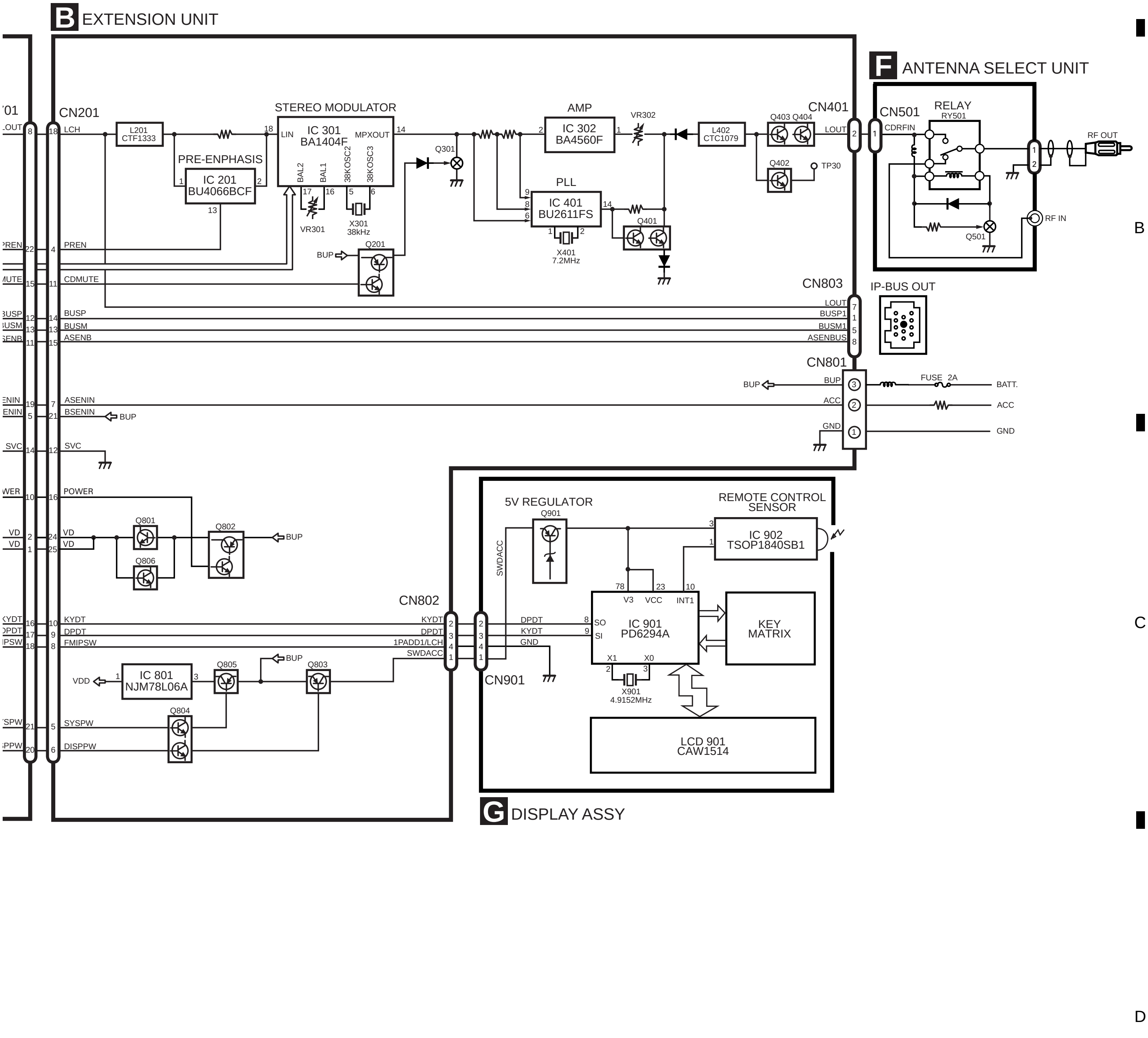
● MAGAZINE ASSY SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Magazine Assy	CXB4028
	2	Tray	CNV5341
	3	Label	CRW1419

3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

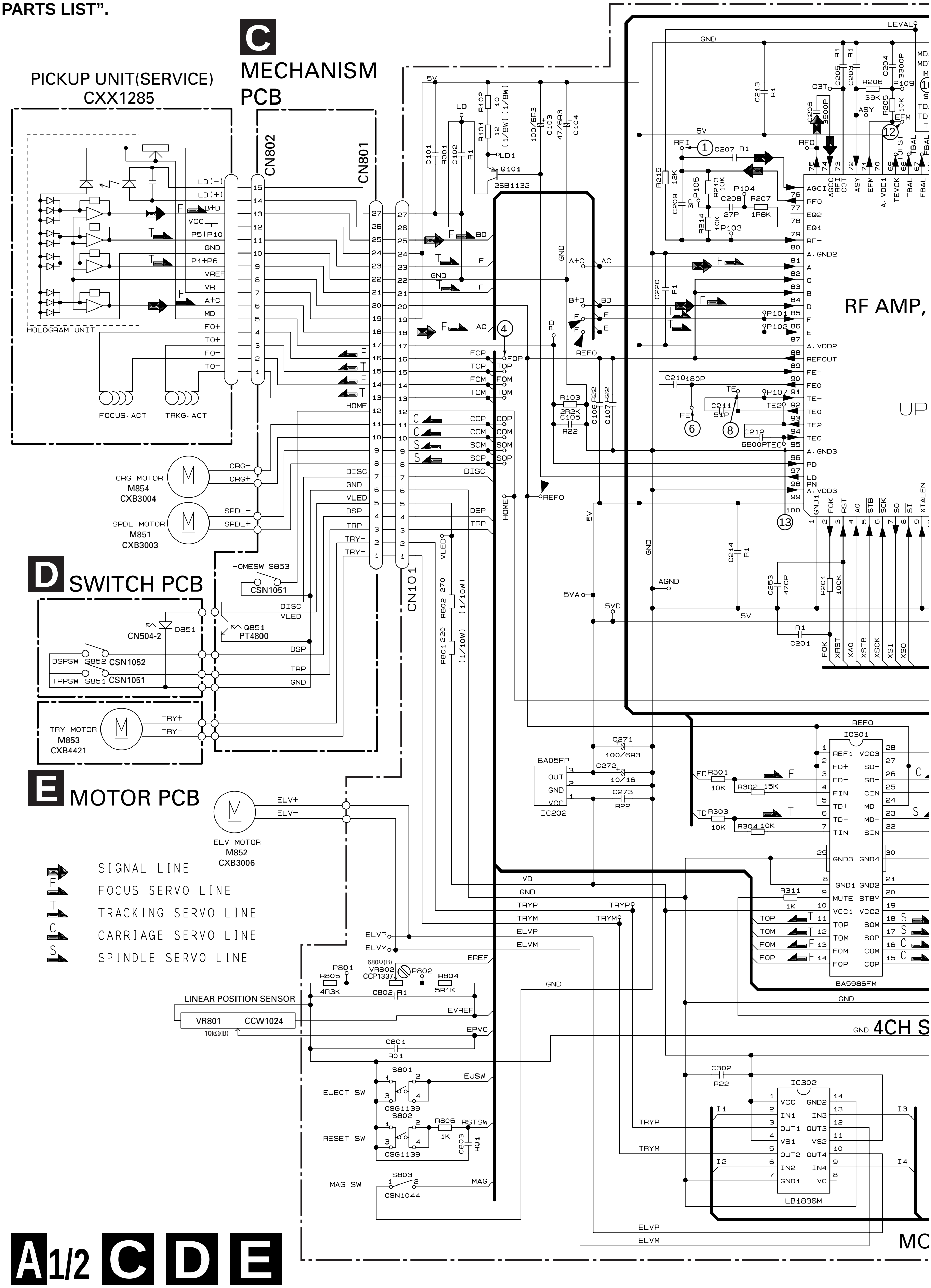
3.1 BLOCK DIAGRAM




B EXTENSION UNIT
F ANTENNA SELECT UNIT
G DISPLAY ASSY
CN201
L201 CTF1333
LCH
STEREO MODULATOR
IC 301 BA1404F
LIN
MPXOUT
BAL2
BAL1
38KOSC2
38KOSC3
PRE-ENPHASIS
IC 201 BU4066BCF
VR301
X301 38kHz
Q301
Q201
BUP
AMP
IC 302 BA4560F
VR302
PLL
IC 401 BU2611FS
X401 7.2MHz
Q401
L402 CTC1079
Q403 Q404
Q402
TP30
LOUT
CN401
CN501
CDRFIN
RELAY RY501
Q501
RF OUT
RF IN
CN803
IP-BUS OUT
BUSP1
BUSM1
ASENBUS
CN801
FUSE 2A
BATT.
ACC
GND
PREN
CDMUTE
BUSP
BUSM
ASENB
ASENIN
BSENIN
SVC
POWER
VD
Q801
Q802
Q806
KYDT
DPDT
FMIPSW
1PADD1/LCH
SWDACC
CN802
IC 801 NJM78L06A
VDD
Q805
Q803
Q804
SYSPW
DISPPW
CN901
5V REGULATOR
Q901
REMOTE CONTROL SENSOR
IC 902 TSOP1840SB1
IC 901 PD6294A
V3
VCC
INT1
SO
SI
X1
X0
X901 4.9152MHz
KEY MATRIX
LCD 901 CAW1514

3.2 CD MECHANISM MODULE

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

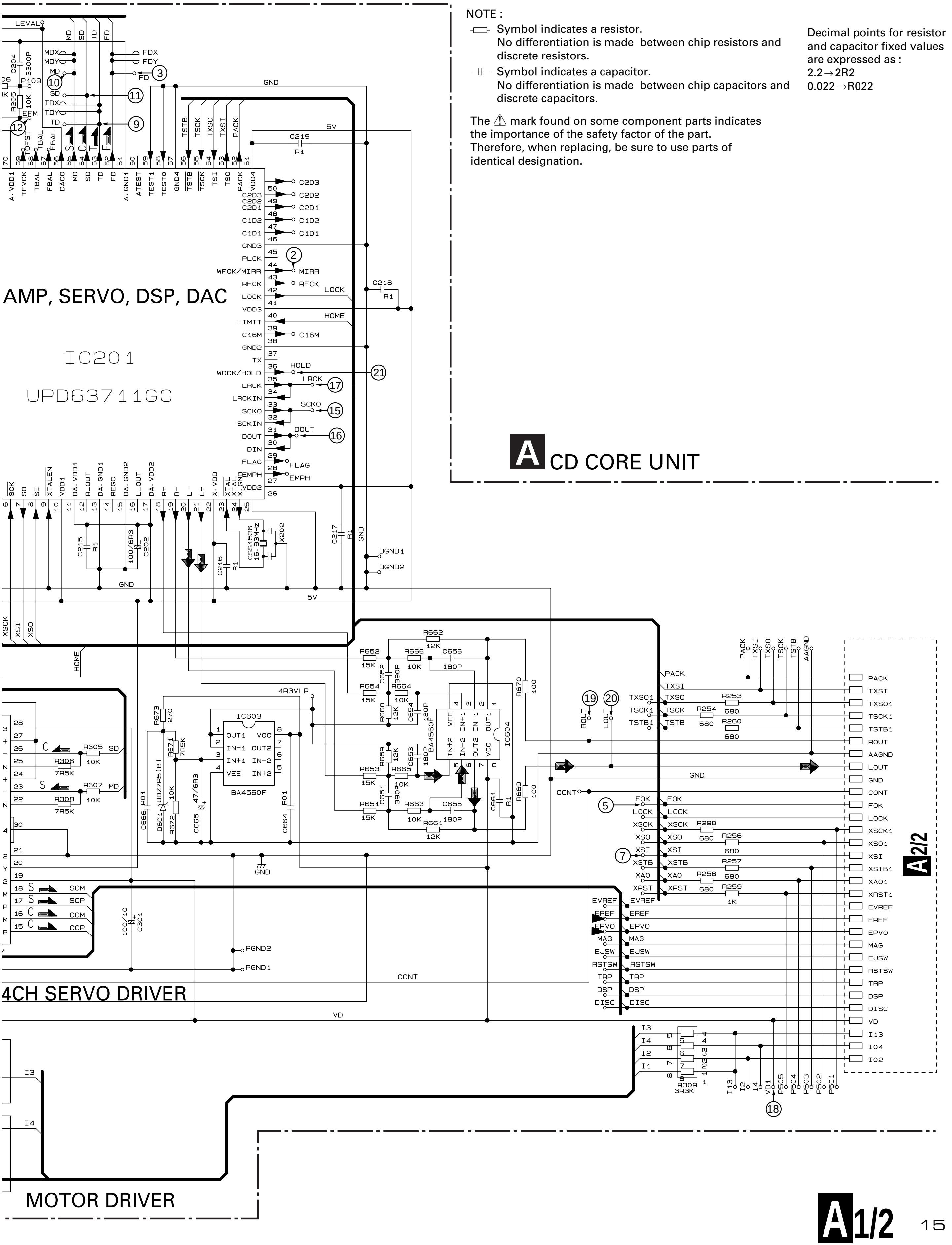


NOTE :

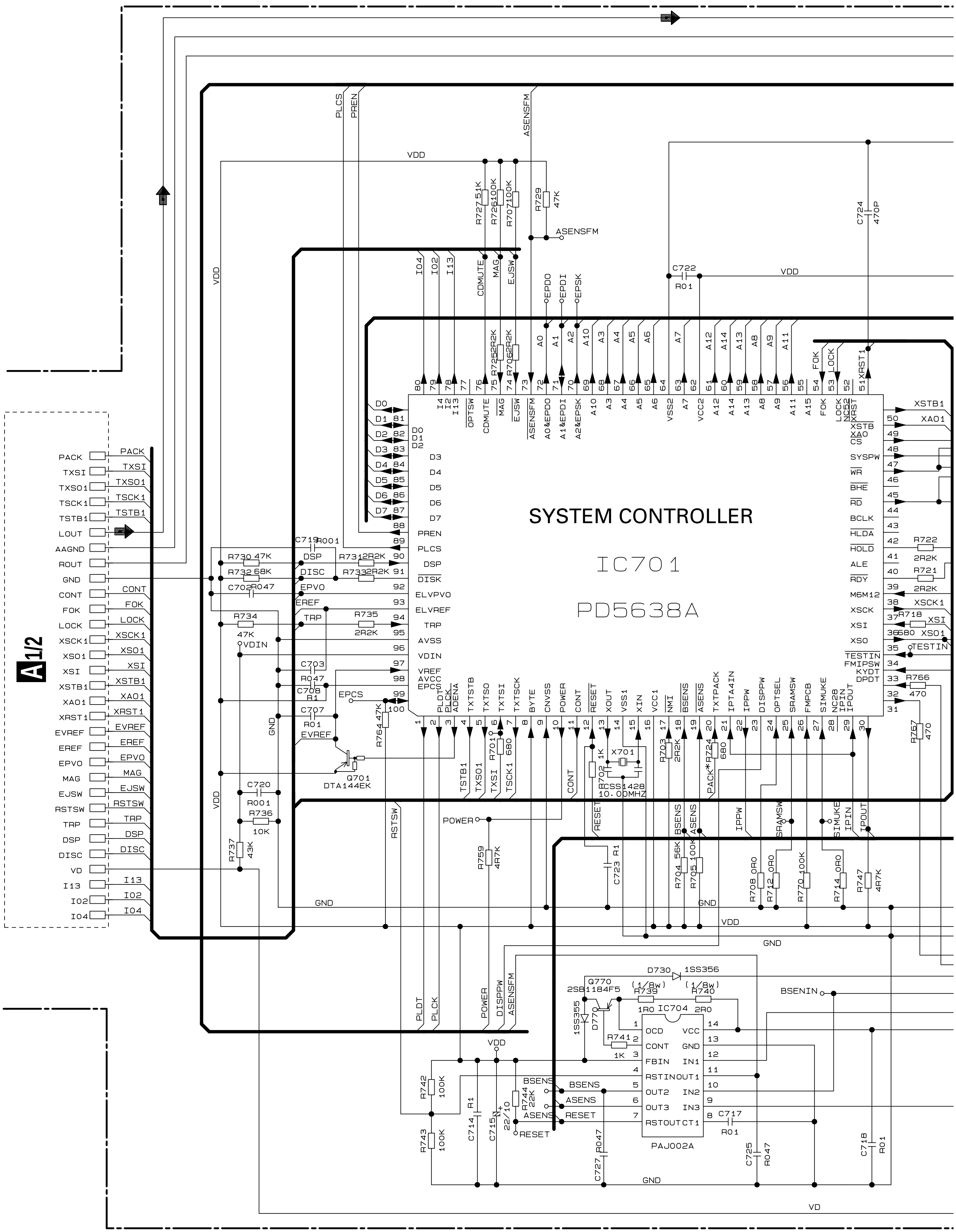
- ▭ Symbol indicates a resistor.
  No differentiation is made between chip resistors and discrete resistors.
- ⊣⊢ Symbol indicates a capacitor.
  No differentiation is made between chip capacitors and discrete capacitors.

The ⚠ 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.

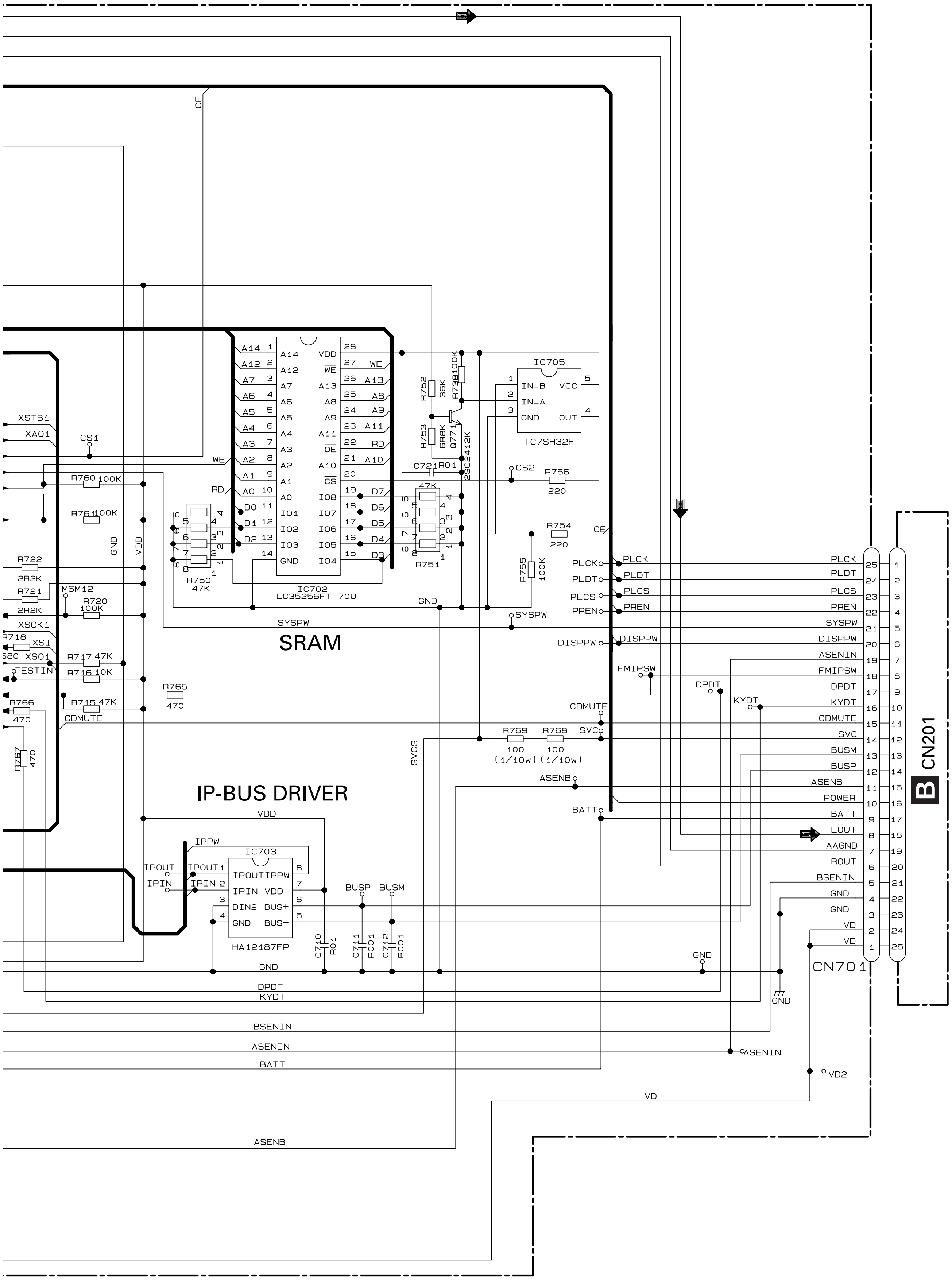
Decimal points for resistor and capacitor fixed values are expressed as :
2.2→2R2
0.022→R022



A 1/2


SYSTEM CONTROLLER
IC701
PD5638A
A1/2
PACK
TXSI
TXSO1
TSCK1
TSTB1
LOUT
AAGND
ROUT
GND
CONT
FOK
LOCK
XSCK1
XSO1
XSI
XSTB1
XAO1
XRST1
EVREF
EREF
EPVO
MAG
EJSW
RSTSW
TRP
DSP
DISC
VD
I13
I02
I04
VDD
PLCS
PREN
ASENSFM
R727 51K
R726 100K
R707 100K
R729 47K
C724 470P
C722 R01
R725 2R2K
R706 2R2K
CDMUTE
EPDO
EPDI
EPSK
XSTB1
XAO1
R722 2R2K
R721 2R2K
XSCK1
R718 680
XSI
XSO1
TESTIN
R766 470
R767 470
C719 R001
R730 47K
R731 2R2K
R732 68K
R733 2R2K
C702 R047
R734 47K
R735 2R2K
VDIN
C703 R047
C708 R1
C707 R01
EPCS
R764 47K
Q701 DTA144EK
C720 R001
R736 10K
R737 43K
R701 680
X701 10.00MHZ
D702 1SS142
R702 1K
R703 2R2K
R724 680
POWER
R759 4R7K
C723 R1
R704 56K
R705 100K
R708 0R0
R712 0R0
R770 100K
R714 0R0
R747 4R7K
BSENS
ASENS
RESET
IPPW
SRAMSW
SIMUKE
IPIN
IPOUT
D730 1SS356
Q770 2SB1184F5
R739 1R0 (1/8W)
R740 2R0 (1/8W)
IC704
PAJ002A
D771 1SS355
R741 1K
BSENIN
R742 100K
R743 100K
C714 R1
C715 22/10
R744 22K
C727 R047
C717 R01
C725 R047
C718 R01
PLDT
PLCK
DISPPW
OCD
CONT
FBIN
RSTIN
OUT2
OUT3
RSTOUT
VCC
GND
IN1
OUT1
IN2
IN3
CT1

A2/2

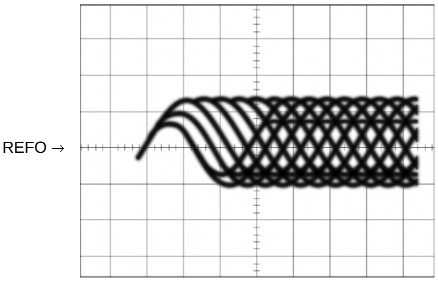


CN701 pin	Signal	CN201 pin
25	PLCK	1
24	PLDT	2
23	PLCS	3
22	PREN	4
21	SYSPW	5
20	DISPPW	6
19	ASENIN	7
18	FMIPSW	8
17	DPDT	9
16	KYDT	10
15	CDMUTE	11
14	SVC	12
13	BUSM	13
12	BUSP	14
11	ASENB	15
10	POWER	16
9	BATT	17
8	LOUT	18
7	AAGND	19
6	ROUT	20
5	BSENIN	21
4	GND	22
3	GND	23
2	VD	24
1	VD	25

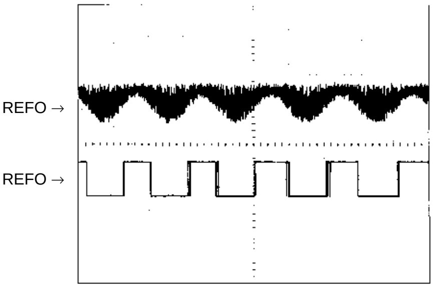
Note:1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
REFO:2.5V

● Waveforms

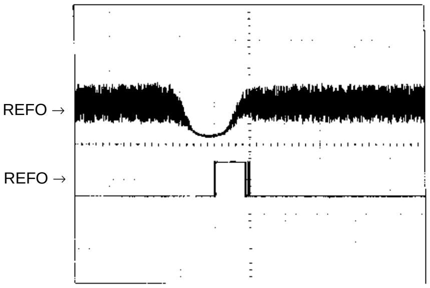
① RFI 0.5V/div. 0.5µs/div.
Normal mode: play



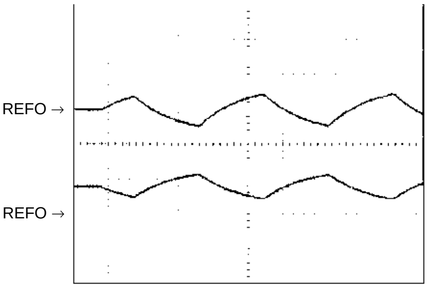
① CH1: RFI 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Test mode: Tracking open



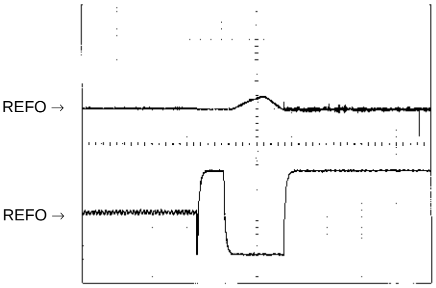
① CH1: RFI 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Normal mode: The defect part passes 800µm



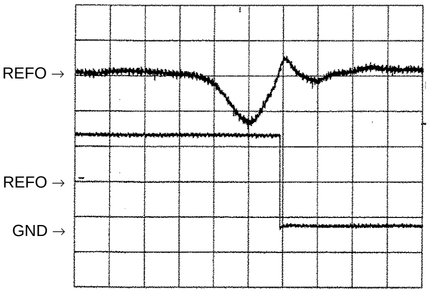
③ CH1: FD 0.5V/div. 0.2s/div.
④ CH2: FOR 2V/div.
Test mode: No disc, Focus close



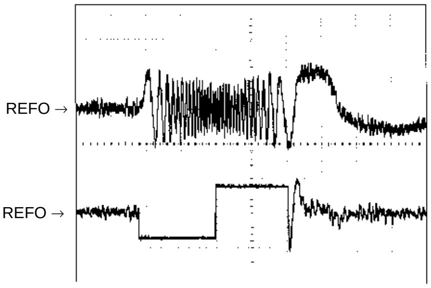
③ CH1: FD 0.5V/div. 0.2s/div.
⑤ CH2: FOK 2V/div.
Normal mode: Focus close



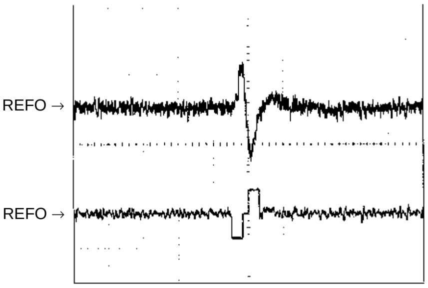
⑥ CH1: FE 0.5V/div. 1ms/div.
⑦ CH2: XSI 2V/div.
Normal mode: Focus close



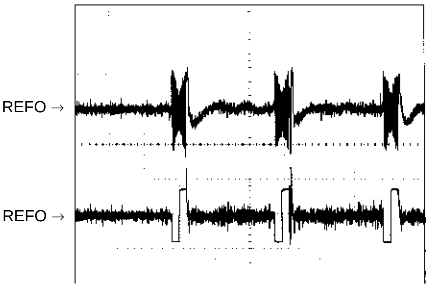
⑧ CH1: TE 0.5V/div. 0.5ms/div.
⑨ CH2: TD 0.5V/div.
Test mode: 32 tracks jump (REV)



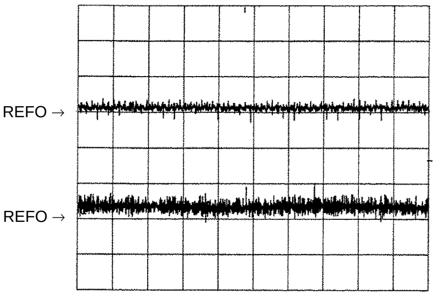
⑧ CH1: TE 0.5V/div. 0.5ms/div.
⑨ CH2: TD 0.5V/div.
Test mode: Single jump (REV)



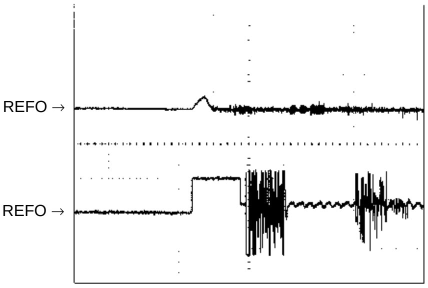
⑧ CH1: TE 0.5V/div. 5ms/div.
⑨ CH2: TD 0.5V/div.
Test mode: 100 tracks jump (REV)



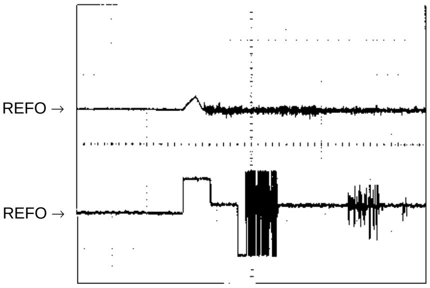
⑥ CH1: FE 0.1V/div. 20ms/div.
③ CH2: FD 0.2V/div.
Normal mode: Play



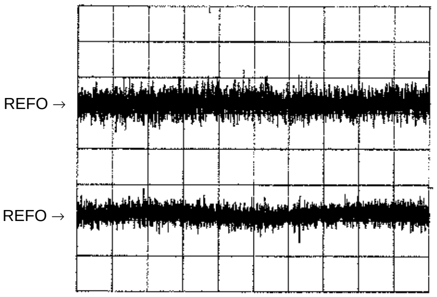
③ CH1: FD 0.5V/div. 0.5s/div.
⑩ CH2: MD 1V/div.
Normal mode: Focus close (12cm)



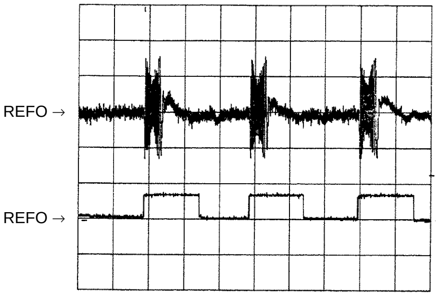
③ CH1: FD 0.5V/div. 0.5s/div.
⑩ CH2: MD 1V/div.
Normal mode: Focus close (8cm)



⑧ CH1: TE 0.2V/div.
⑨ CH2: TD 0.2V/div. 20ms/div.
Normal mode: play

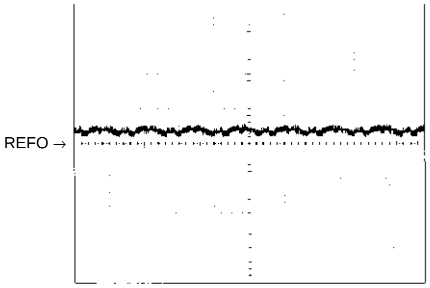


⑧ CH1: TE 0.5V/div.
⑪ CH2: SD 0.5V/div. 5ms/div.
TEST mode:100Tracks jump(FWD)



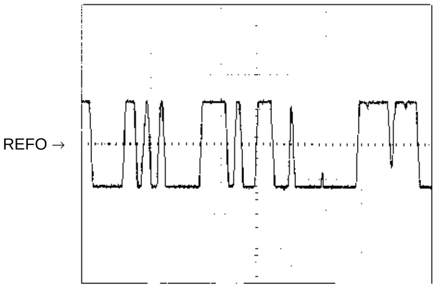
⑩ MD 0.5V/div. 0.1s/div.

Normal mode: Play (12cm)



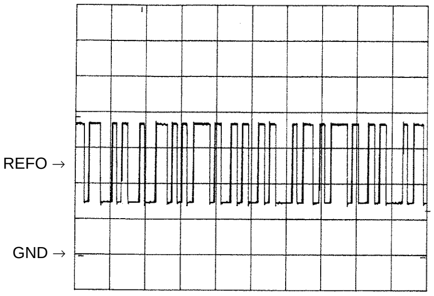
⑩ MD 1V/div. 10ms/div.

Long Search (12cm)

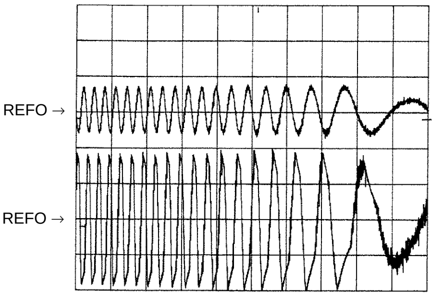


⑫ EFM 1V/div. 5μs/div.

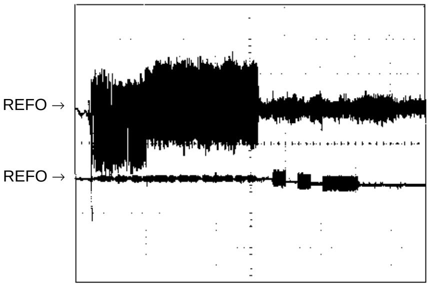
Normal mode: Play



⑧ CH1: TE 1V/div.
⑬ CH2: TEC 1V/div. 2ms/div.
Test mode: Focus close
Tracking open

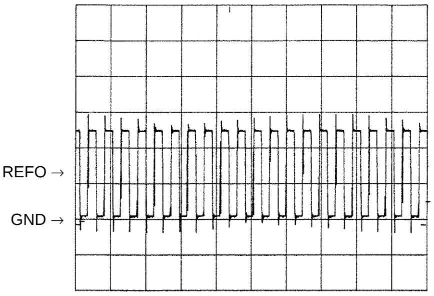


⑧ CH1: TE 0.5V/div.
⑥ CH2: FE 0.5V/div. 0.2s/div.
Normal mode: AGC after focus close



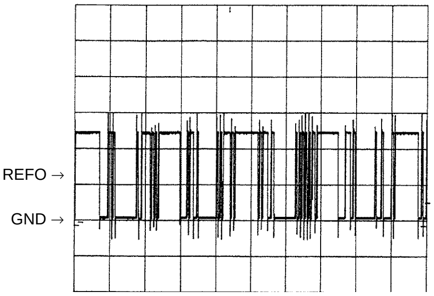
⑮ SCKO 2V/div. 1μs/div.

Normal mode: Play

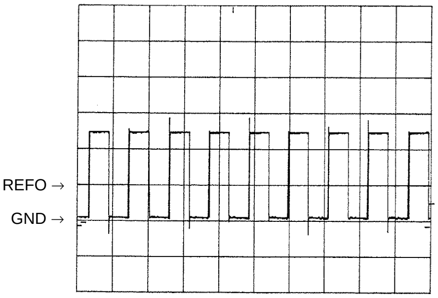


⑯ DOUT 2V/div. 10μs/div.

Normal mode: Play

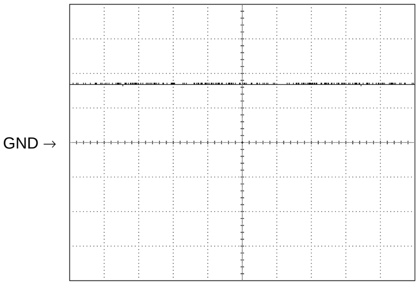


⑰ LRCK 2V/div. 20μs/div.
Normal mode: Play

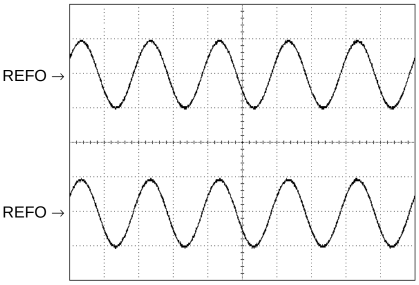


⑱ VD 5V/div. 50ms/div.

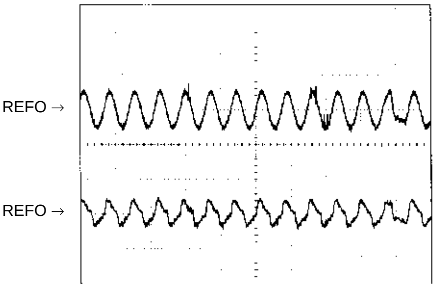
Normal mode: No disc



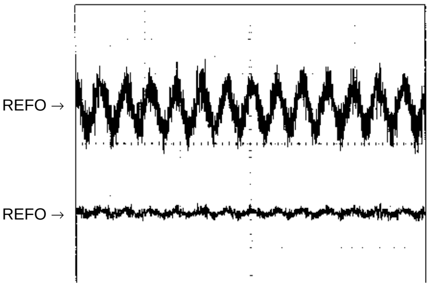
⑲ CH1: R OUT 2V/div.
⑳ CH2: L OUT 2V/div.
500µs/div.
Normal mode: Play (1kHz 0dB)



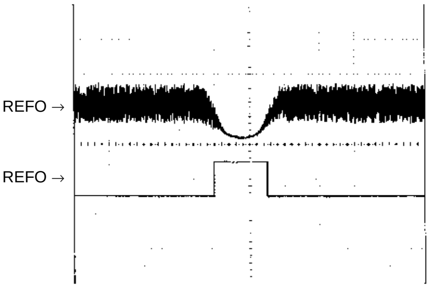
⑥ CH1: FE 0.2V/div.
③ CH2: FD 0.5V/div.
1ms/div.
Normal mode: During AGC



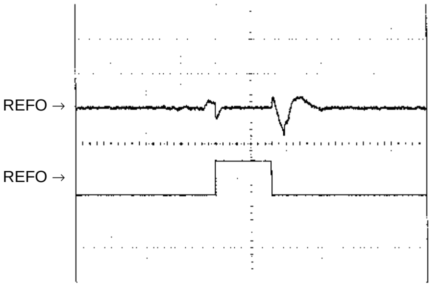
⑧ CH1: TE 0.2V/div.
⑨ CH2: TD 0.5V/div.
1ms/div.
Normal mode: During AGC



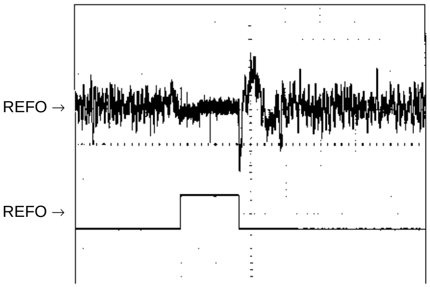
① CH1: RFI 1V/div.
㉑ CH2: HOLD 5V/div.
0.5ms/div.
Normal mode: The defect part passes 800µm(B.D)



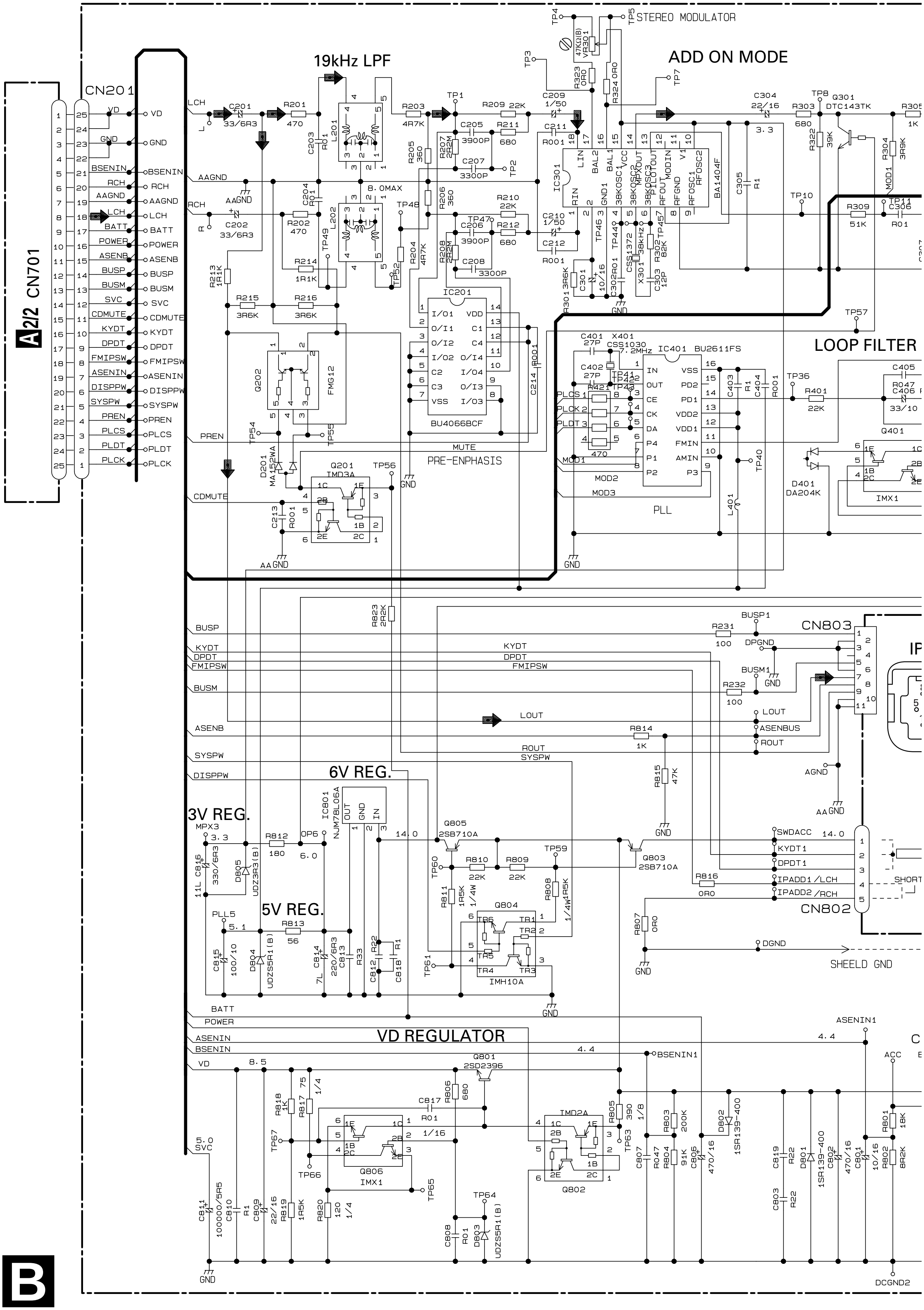
③ CH1: FD 1V/div.
㉑ CH2: HOLD 5V/div.
0.5ms/div.
Normal mode: The defect part passes 800µm(B.D)

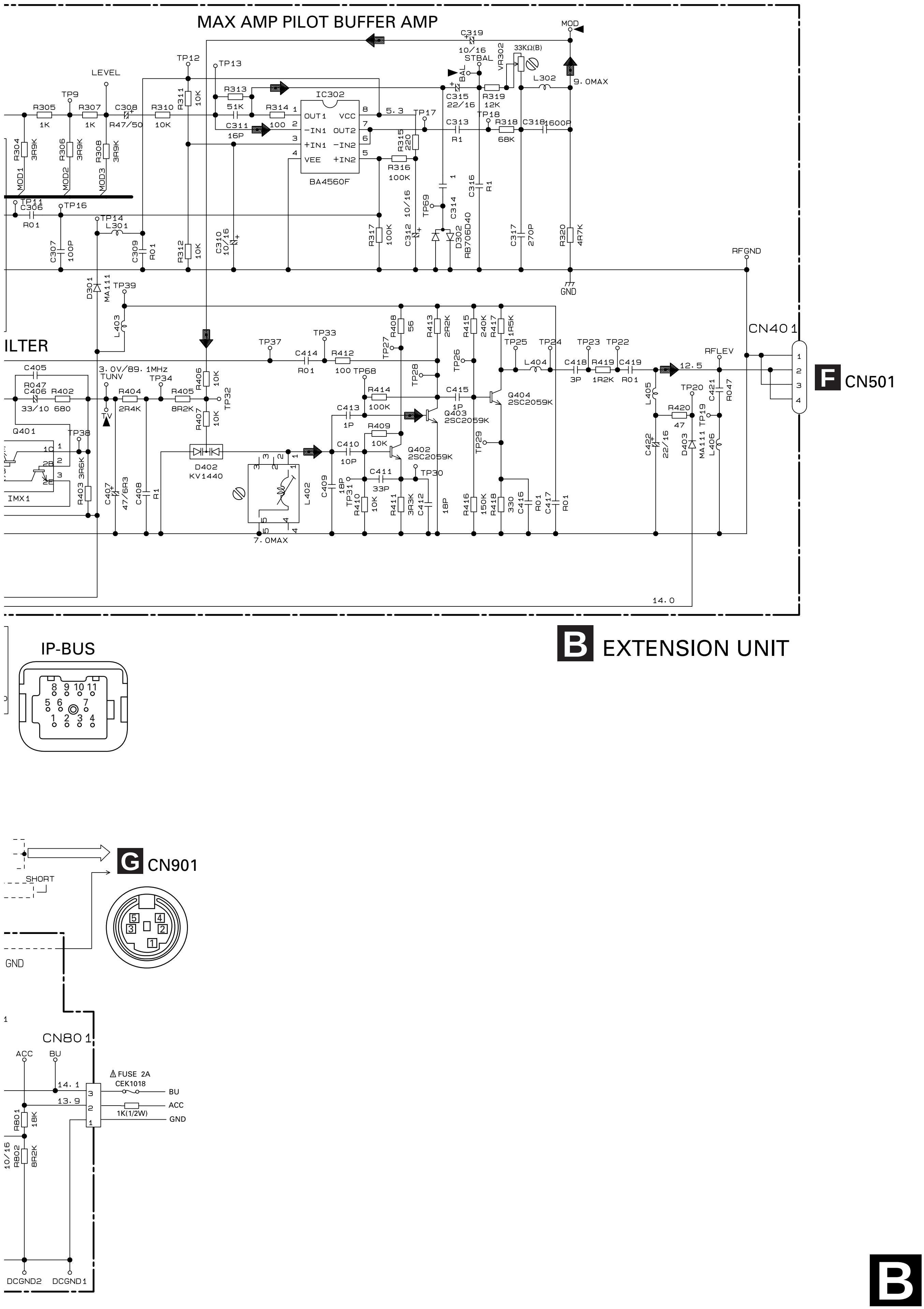


⑨ CH1: TD 0.1V/div.
㉑ CH2: HOLD 5V/div.
0.5ms/div.
Normal mode: The defect part passes 800µm(B.D)

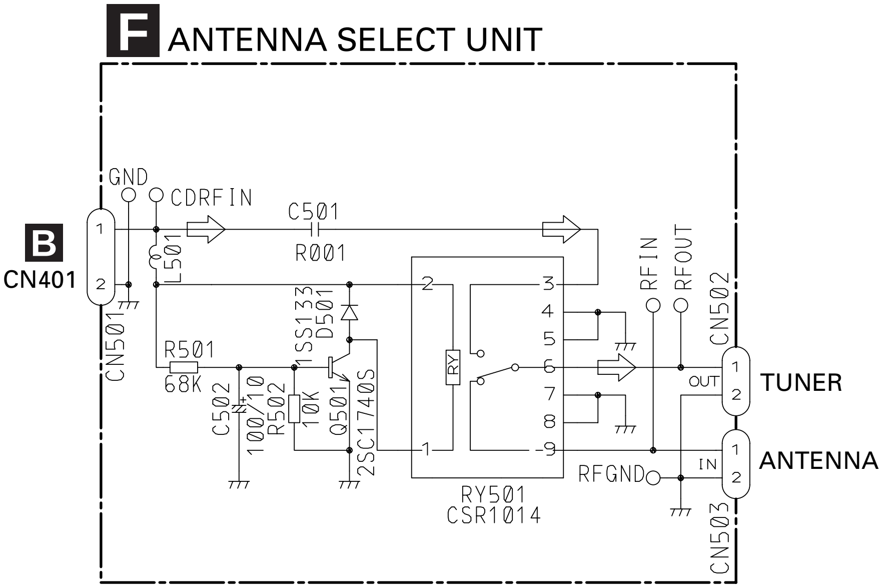


3.3 EXTENSION UNIT

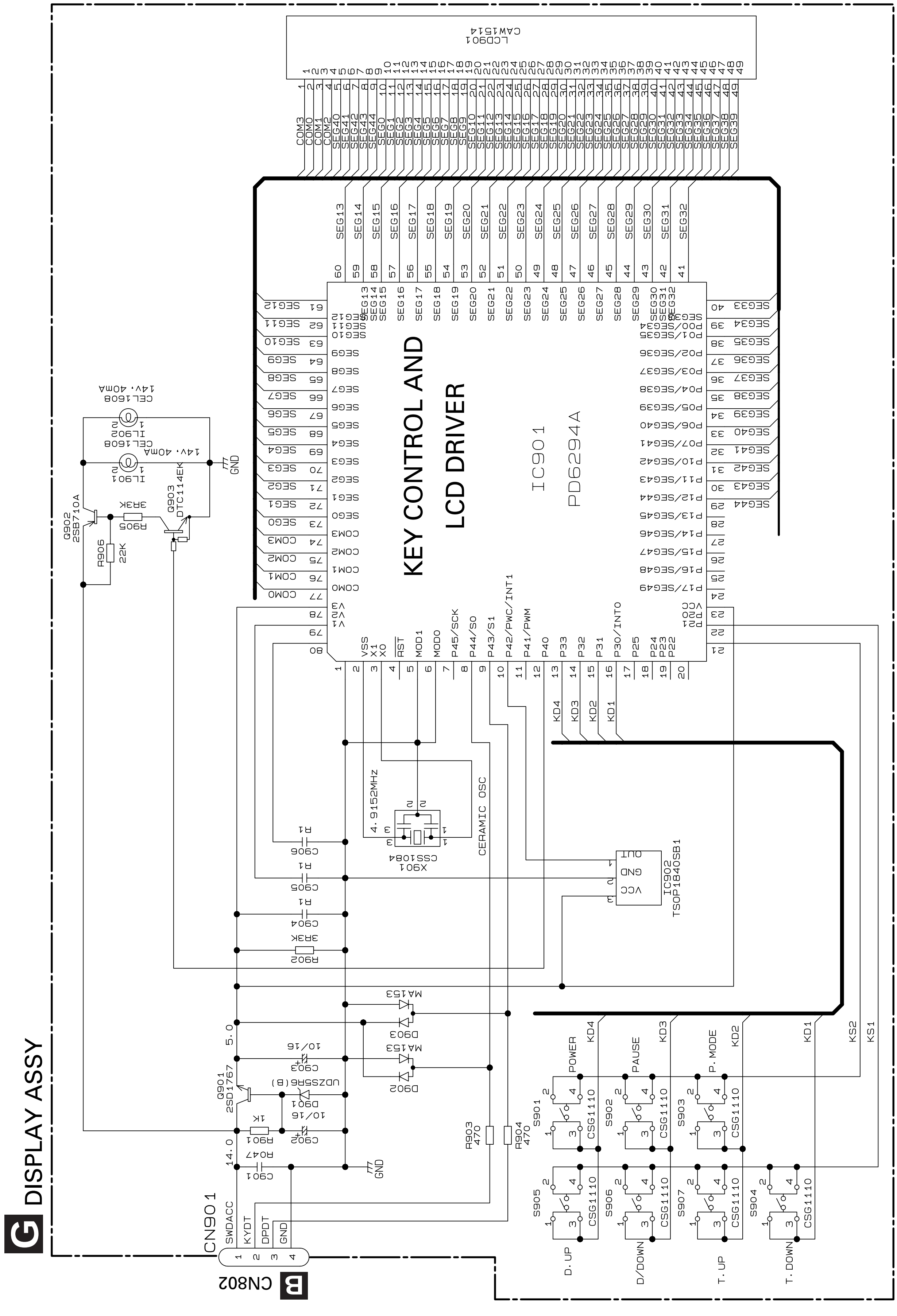



MAX AMP PILOT BUFFER AMP
MOD
C319
10/16
STBAL
VR302
33KΩ(B)
BAL
9.0MAX
L302
C315
22/16
R319
12K
TP12
TP13
LEVEL
TP9
R305
1K
R307
1K
C308
R47/50
R310
10K
R311
10K
R313
51K
R314
100
C311
16P
IC302
BA4560F
OUT1
-IN1
+IN1
VEE
VCC
OUT2
-IN2
+IN2
5.3
TP17
R315
220
R316
100K
C313
R1
TP18
R318
68K
C318
1600P
R304
3R9K
R306
3R9K
R308
3R9K
MOD1
MOD2
MOD3
TP11
C306
R01
TP16
TP14
L301
C307
100P
C309
R01
R312
10K
C310
10/16
R317
100K
C312
10/16
TP69
C314
1
D302
RB706D40
C316
R1
C317
270P
R320
4R7K
RFGND
GND
D301
MA111
TP39
L403
ILTER
TP37
TP33
C414
R01
R412
100
TP68
TP27
R408
56
R413
2R2K
R415
240K
R417
1R5K
TP25
TP24
TP23
TP22
CN401
C405
R047
C406
33/10
R402
680
3.0V/89.1MHz
TUNV
TP34
R404
2R4K
R405
8R2K
R406
10K
TP32
R407
10K
TP28
TP26
R414
100K
C415
1P
Q404
2SC2059K
L404
C418
3P
R419
1R2K
C419
R01
RFLEV
12.5
F CN501
C413
1P
Q403
2SC2059K
R409
10K
C410
10P
Q402
2SC2059K
C411
33P
TP30
Q401
TP38
IMX1
R403
3R6K
C407
47/6R3
C408
R1
D402
KV1440
L402
7.0MAX
C409
18P
TP31
R410
10K
R411
3R3K
C412
18P
TP29
R416
150K
R418
330
C416
R01
C417
R01
L405
TP20
R420
47
C421
R047
C422
22/16
D403
MA111
TP19
L406
14.0
B EXTENSION UNIT
IP-BUS
8 9 10 11
5 6 7
1 2 3 4
G CN901
SHORT
GND
1
CN801
ACC
BU
14.1
13.9
FUSE 2A
CEK1018
1K(1/2W)
BU
ACC
GND
R801
18K
R802
8R2K
10/16
DCGND2
DCGND1

3.4 ANTENNA SELECT UNIT



3.5 DISPLAY ASSY



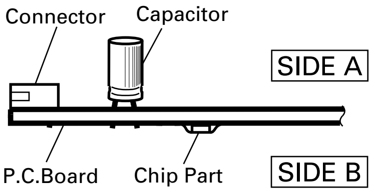
4. PCB CONNECTION DIAGRAM

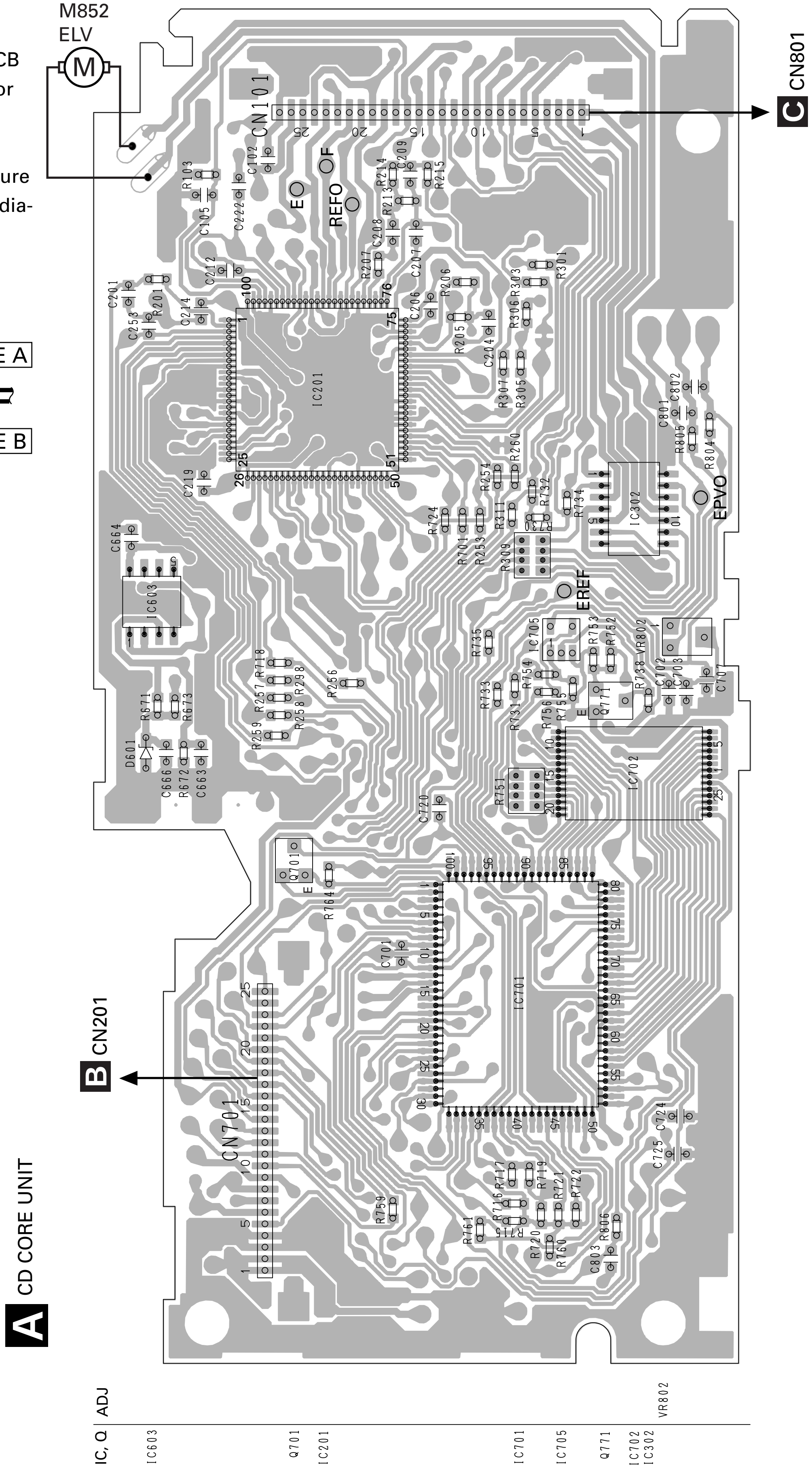
SIDE A

4.1 CD CORE UNIT

NOTE FOR PCB DIAGRAMS

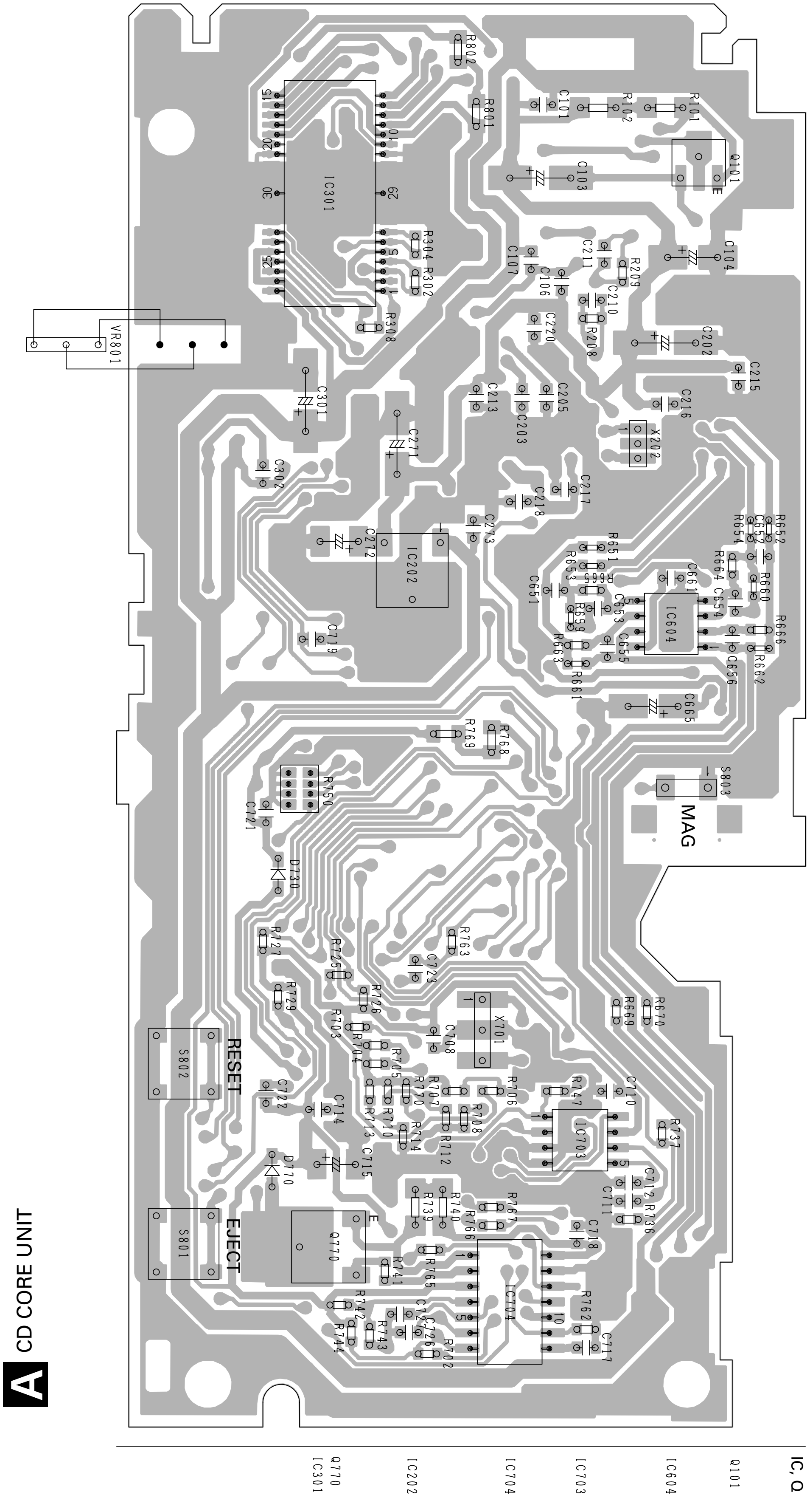
1. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.
2. Viewpoint of PCB diagrams





SIDE B

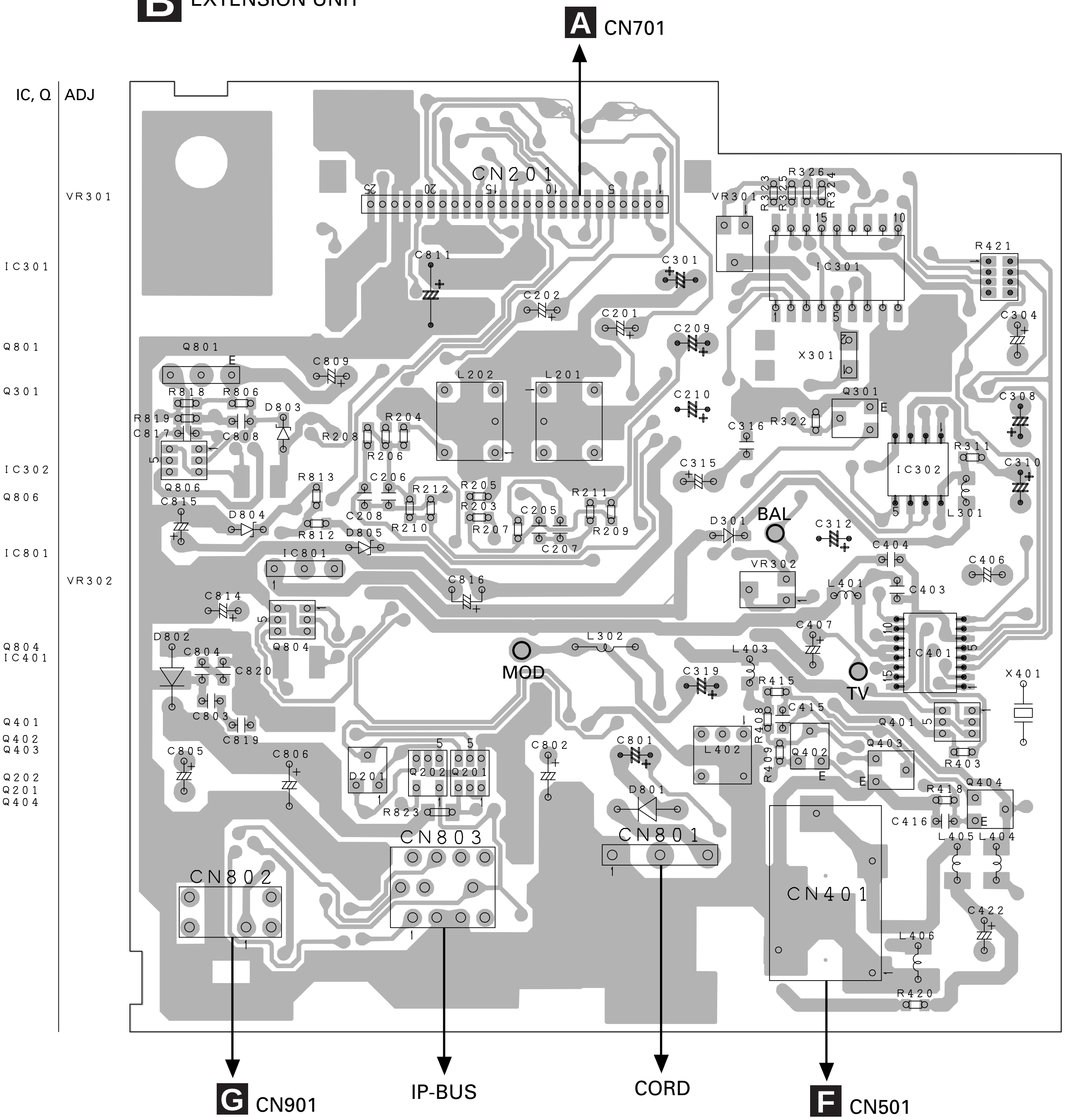
A CD CORE UNIT



4.2 EXTENSION UNIT

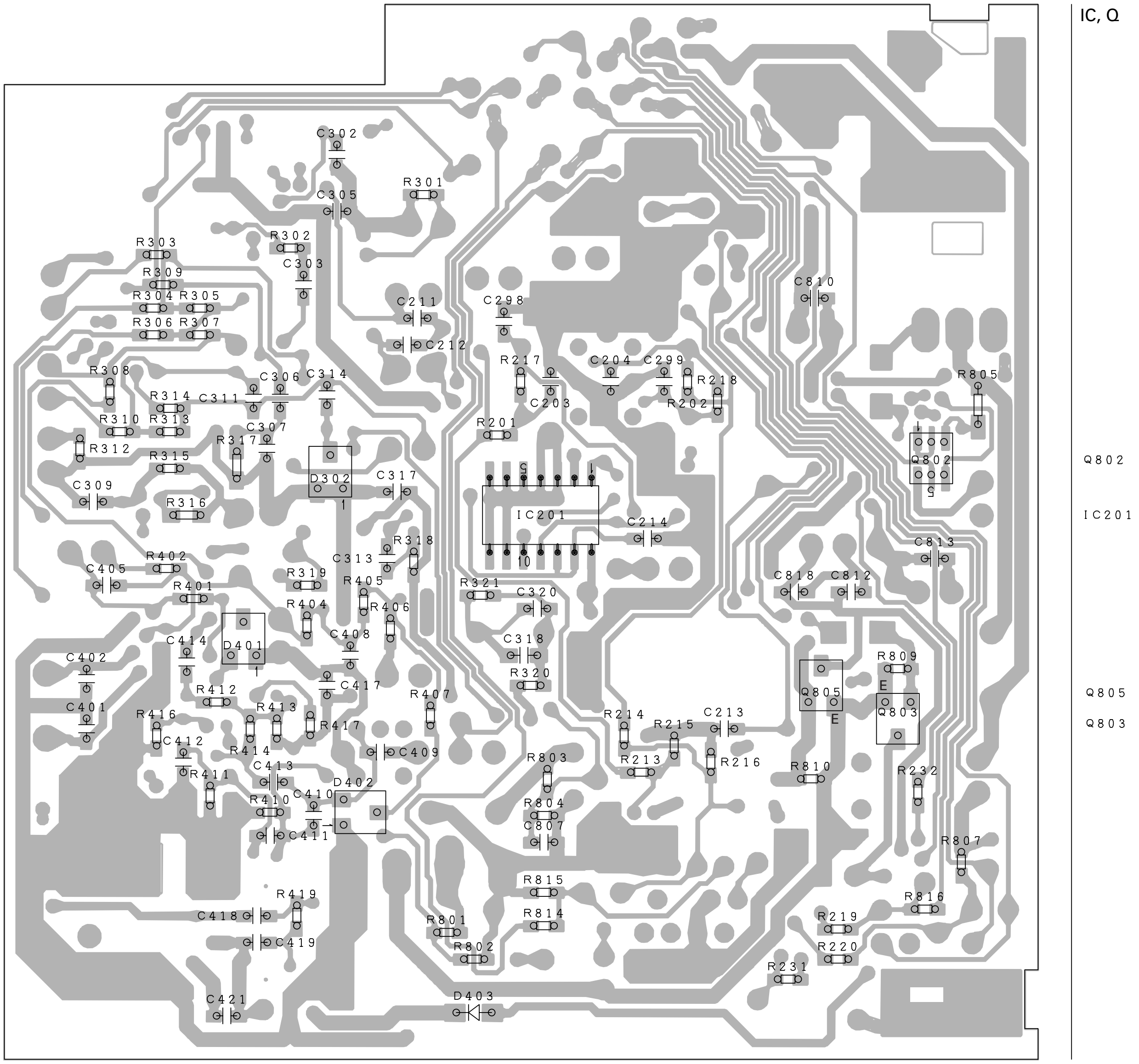
SIDE A

B EXTENSION UNIT



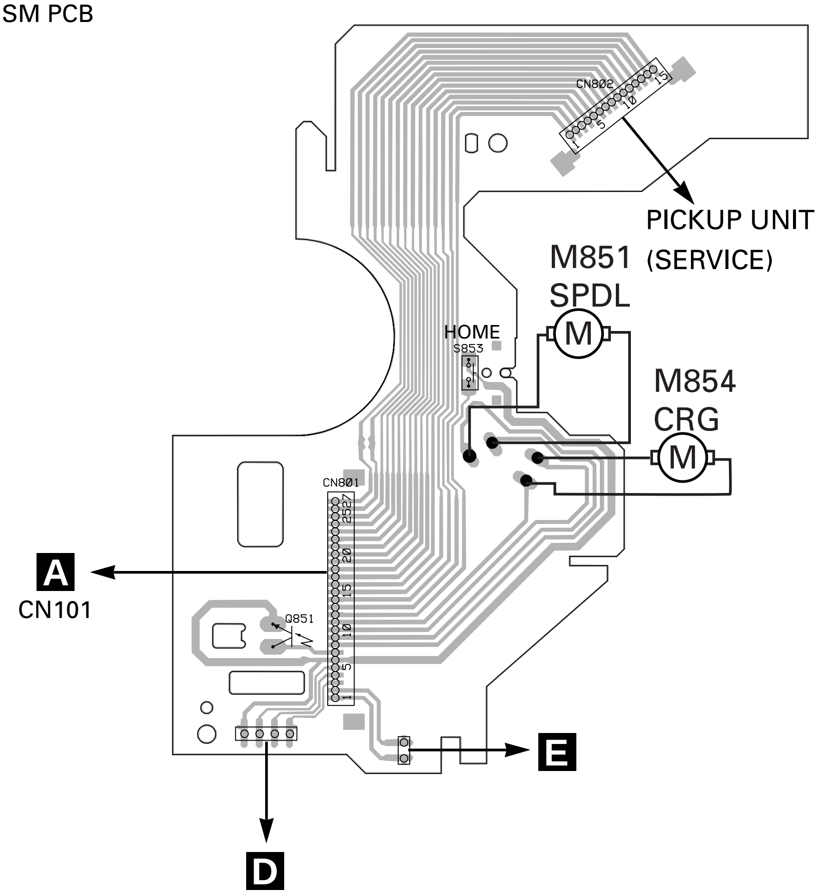
SIDE B

B EXTENSION UNIT



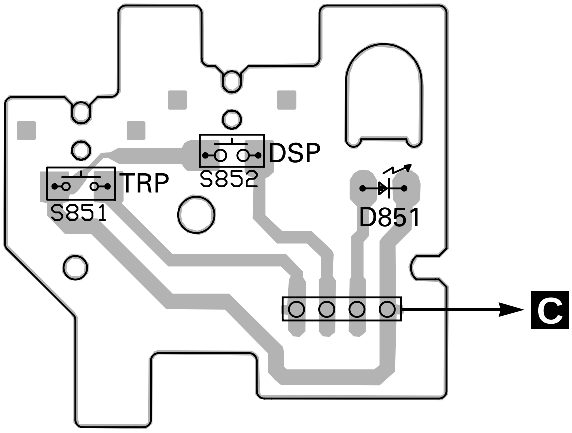
4.3 MECHANISM PCB

C MECHANISM PCB



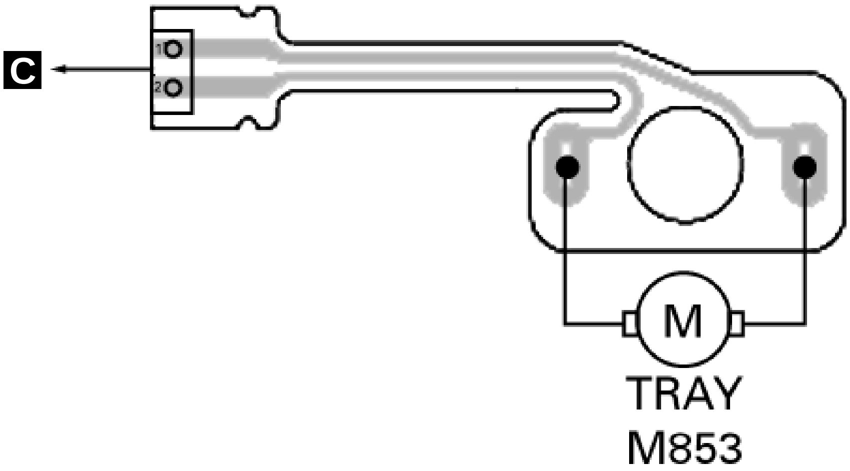
4.4 SWITCH PCB

D SWITCH PCB



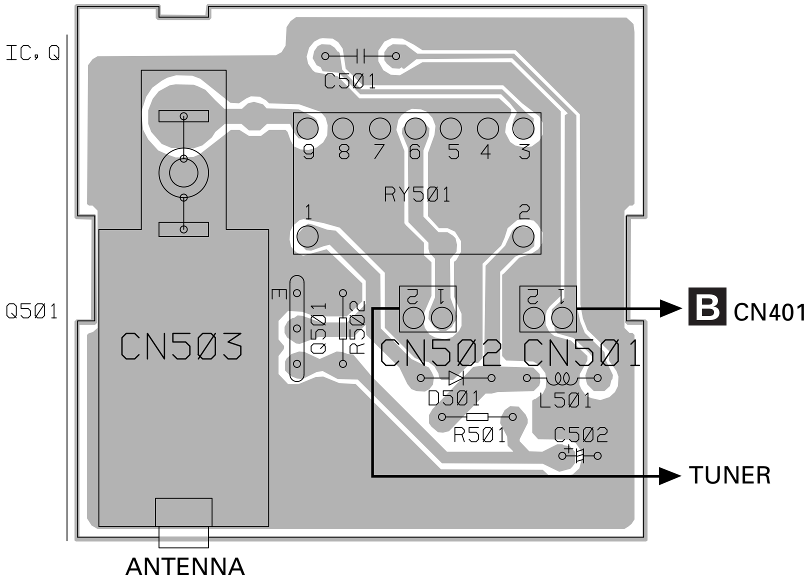
4.5 MOTOR PCB

E MOTOR PCB



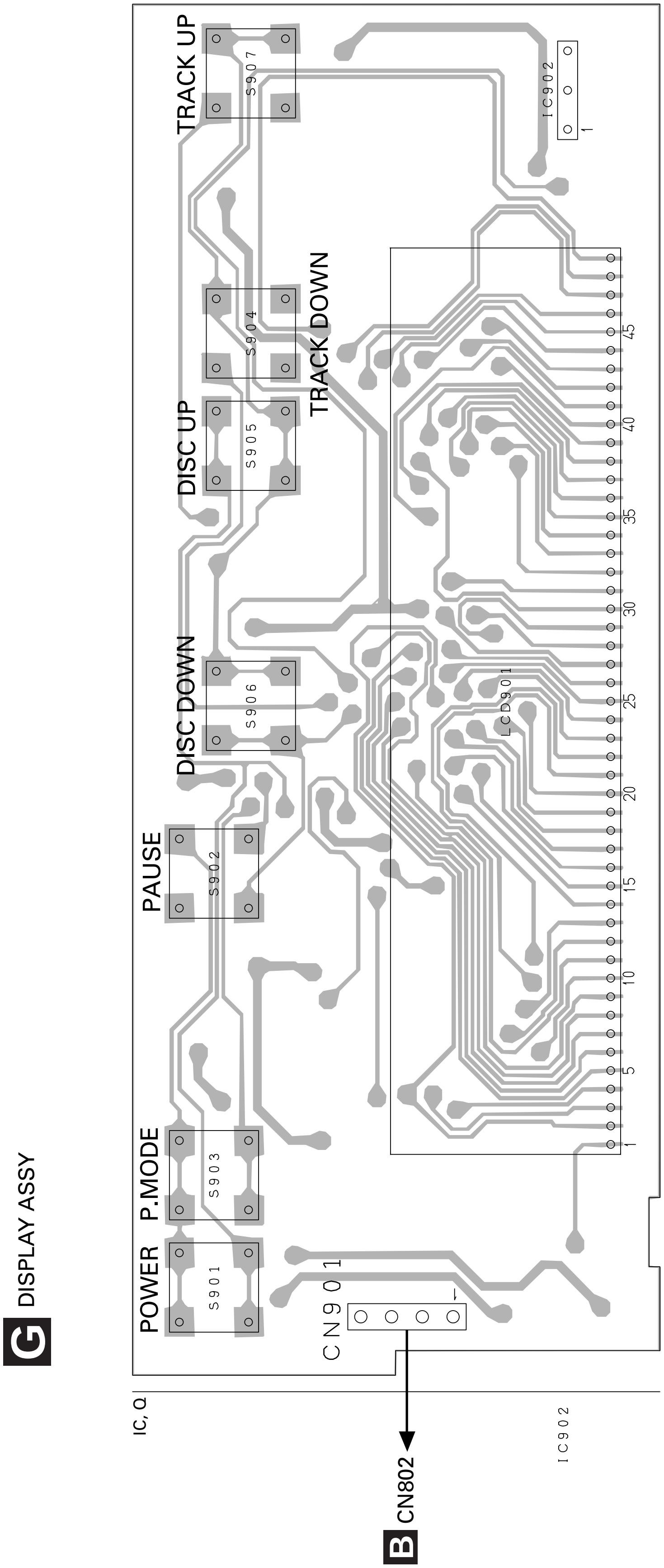
4.6 ANTENNA SELECT UNIT

F ANTENNA SELECT UNIT



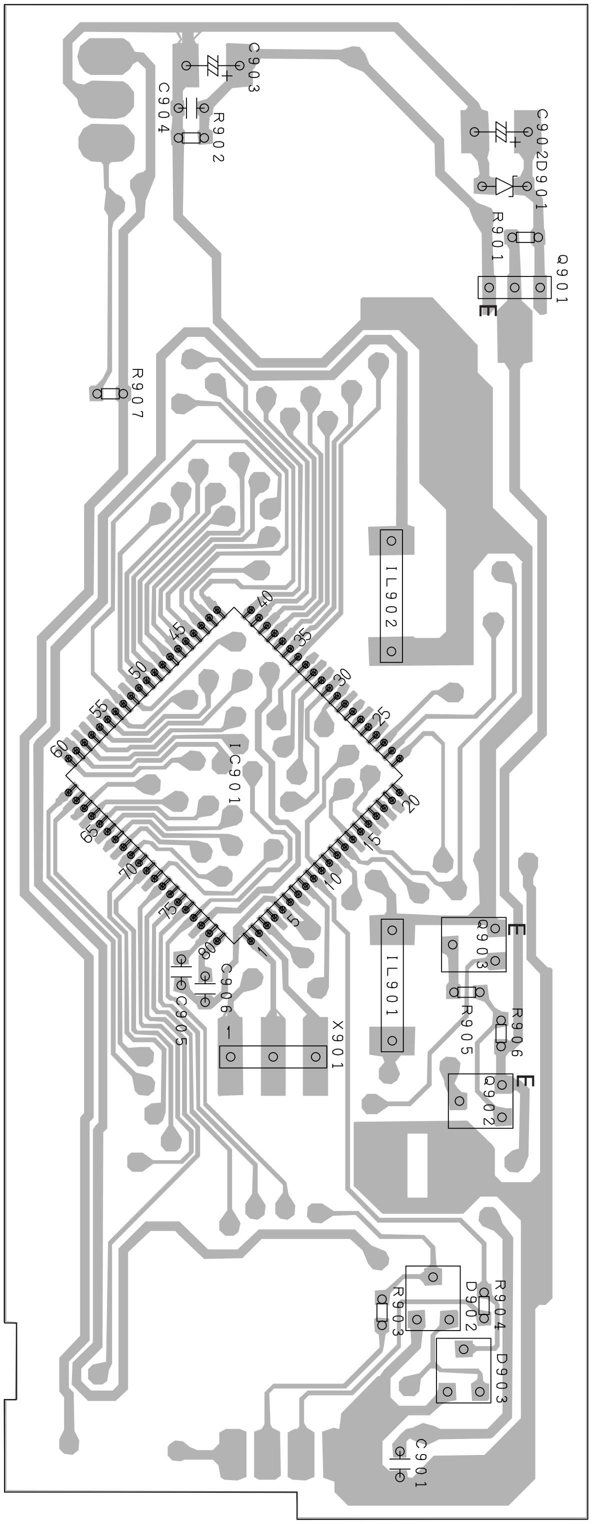
4.7 DISPLAY ASSY

SIDE A



SIDE B

G DISPLAY ASSY



IC, Q

Q901

Q902
Q903

IC901

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/○S○○○J,RS1/○○S○○○J

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

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

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

B Unit Number : CWX2560
Unit Name : Extension Unit

MISCELLANEOUS

IC	201	IC	BU4066BCF
IC	301	IC	BA1404F
IC	302	IC	BA4560F
IC	401	IC	BU2611FS
IC	801	IC	NJM78L06A
Q	201	Transistor	IMD3A
Q	202	Transistor	FMG12
Q	301	Transistor	DTC143TK
Q	401	Transistor	IMX1
Q	402	Transistor	2SC2059K
Q	403	Transistor	2SC2059K
Q	404	Transistor	2SC2059K
Q	801	Transistor	2SD2396
Q	802	Transistor	IMD2A
Q	803	Transistor	2SB710A
Q	804	Transistor	IMH10A
Q	805	Transistor	2SB710A
Q	806	Transistor	IMX1
D	201	Diode	MA152WA
D	301	Diode	MA111
D	302	Diode	RB706D40
D	401	Diode	DA204K
D	402	Diode	KV1440
D	403	Diode	MA111
D	801	Diode	1SR139-400
D	802	Diode	1SR139-400
D	803	Diode	UDZS5R1(B)
D	804	Diode	UDZS5R1(B)
D	805	Diode	UDZ3R3(B)
L	201	Filter	CTF1333
L	202	Filter	CTF1333
L	301	Inductor	LCTB2R2K2125
L	302	Inductor	CTF1302
L	401	Inductor	LCTB2R2K2125
L	402	Coil	CTC1079
L	403	Inductor	LCTB2R2K2125
L	404	Inductor	LCTA1R0J3225
L	405	Inductor	LCTA101J3225
L	406	Inductor	LCTAR68J3225
X	301	Radiator 38.000kHz	CSS1372
X	401	Crystal Resonator 7.2MHz	CSS1030
VR	301	Semi-fixed 47kΩ(B)	CCP1233
VR	302	Semi-fixed 33kΩ(B)	CCP1232

RESISTORS

R	201		RS1/16S471J
R	202		RS1/16S471J
R	203		RS1/16S472J
R	204		RS1/16S472J
R	205		RS1/16S361J
R	206		RS1/16S361J
R	207		RS1/16S225J
R	208		RS1/16S225J
R	209		RS1/16S223J
R	210		RS1/16S223J
R	211		RS1/16S681J
R	212		RS1/16S681J
R	213		RS1/16S112J
R	214		RS1/16S112J
R	215		RS1/16S362J
R	216		RS1/16S362J
R	231		RS1/16S101J
R	232		RS1/16S101J
R	301		RS1/16S362J
R	302		RS1/16S823J
R	303		RS1/16S681J
R	304		RS1/16S392J
R	305		RS1/16S102J
R	306		RS1/16S392J
R	307		RS1/16S102J
R	308		RS1/16S392J
R	309		RS1/16S513J
R	310		RS1/16S103J
R	311		RS1/16S103J
R	312		RS1/16S103J
R	313		RS1/16S513J
R	314		RS1/16S101J
R	315		RS1/16S221J
R	316		RS1/10S104J
R	317		RS1/10S104J
R	318		RS1/16S683J
R	319		RS1/16S123J
R	320		RS1/16S472J
R	322		RS1/16S393J
R	323		RS1/16S0R0J
R	324		RS1/16S0R0J
R	401		RS1/16S223J
R	402		RS1/16S681J
R	403		RS1/16S362J
R	404		RS1/16S242J
R	405		RS1/16S822J
R	406		RS1/16S103J
R	407		RS1/16S103J
R	408		RS1/16S560J
R	409		RS1/16S103J
R	410		RS1/16S103J
R	411		RS1/16S332J
R	412		RS1/16S101J
R	413		RS1/16S222J
R	414		RS1/16S104J
R	415		RS1/16S244J
R	416		RS1/16S154J
R	417		RS1/16S152J
R	418		RS1/16S331J
R	419		RS1/16S122J

=====Circuit Symbol and No.===Part Name			Part No.
R	420		RS1/16S470J
R	421		RAB4C471J
R	801		RS1/16S183J
R	802		RS1/16S822J
R	803		RS1/16S204J
R	804		RS1/16S913J
R	805		RS1/8S391J
R	806		RS1/16S681J
R	807		RS1/16S0R0J
R	808		RS1/4S152J
R	809		RS1/16S223J
R	810		RS1/16S223J
R	811		RS1/4S152J
R	812		RS1/16S181J
R	813		RS1/16S560J
R	814		RS1/16S102J
R	815		RS1/16S473J
R	816		RS1/16S0R0J
R	817		RS1/4S750J
R	818		RS1/16S102J
R	819		RS1/16S152J
R	820		RS1/4S121J
R	823		RS1/10S222J

CAPACITORS

=====Circuit Symbol and No.===Part Name			Part No.
C	201		CEAL330M6R3
C	202		CEAL330M6R3
C	203		CKSRYB103K50
C	204		CKSRYB103K50
C	205		CKSRYB392K50
C	206		CKSRYB392K50
C	207		CKSRYB332K50
C	208		CKSRYB332K50
C	209		CEAL1R0M50
C	210		CEAL1R0M50
C	211		CKSRYB102K50
C	212		CKSRYB102K50
C	213		CKSRYB102K50
C	214		CKSRYB102K50
C	301		CEAL100M16
C	302		CKSRYB103K50
C	303		CCSRCH120J50
C	304		CEAL220M16
C	305		CKSRYB104K16
C	306		CKSRYB103K50
C	307		CCSRCH101J50
C	308		CEALR47M50
C	309		CKSRYB103K50
C	310		CEAL100M16
C	311		CCSRCH160J50
C	312		CEAL100M16
C	313		CKSRYB104K16
C	314		CKSRYB105K10
C	315		CEAL220M16
C	316		CKSRYB104K16
C	317		CCSRCH271J50
C	318		CCSQCH162J50
C	319		CEAL100M16
C	401		CCSRCH270J50
C	402		CCSRCH270J50
C	403		CKSRYB104K16
C	404		CKSRYB102K50
C	405		CKSRYB473K16
C	406		CEALNP330M10
C	407		CEAL470M6R3
C	408		CKSRYB104K16
C	409		CCSRCH180J50
C	410		CCSRCH100D50
C	411		CCSRCH330J50
C	412		CCSRCH180J50
C	413		CCSRCK1R0C50
C	414		CKSRYB103K50
C	415		CCSRCK1R0C50
C	416		CKSRYB103K50
C	417		CKSRYB103K50
C	418		CCSRCJ3R0C50
C	419		CKSRYB103K50
C	421		CKSRYB473K16
C	422		CEAL220M16
C	801		CEAL100M16
C	802		CEAT471M16
C	803		CKSRYB224K16
C	806		CEAT471M16
C	807		CKSRYB473K16
C	808		CKSRYB103K50
C	809		CEAL220M16
C	810		CKSRYB104K16
C	811	0.1F/5.5V	CCL1055
C	812		CKSQYB224K16
C	813		CKSRYB334K10
C	814		CEJA221M6R3
C	815		CEJA101M10
C	816		CEAS331M6R3
C	817		CKSRYB103K50
C	818		CKSRYB104K16
C	819		CKSRYB224K16

A Unit Number : CWX2495
Unit Name : CD Core Unit

MISCELLANEOUS

IC	201	IC	UPD63711GC
IC	202	IC	BA05FP
IC	301	IC	BA5986FM
IC	302	IC	LB1836M
IC	603	IC	BA4560F
IC	604	IC	BA4560F
IC	701	IC	PD5638A
IC	702	IC	LC35256FT-70U
IC	703	IC	HA12187FP
IC	704	IC	PAJ002A
IC	705	IC	TC7SH32F
Q	101	Transistor	2SB1132
Q	701	Transistor	DTA144EK
Q	770	Transistor	2SB1184F5
Q	771	Transistor	2SC2412K
D	601	Diode	UDZ7R5(B)
D	730	Diode	1SS356
D	770	Diode	1SS355
X	202	Ceramic Resonator 16.93MHz	CSS1536
X	701	Radiator 10.00MHz	CSS1428
S	801	Push Switch(EJECT)	CSG1139
S	802	Push Switch(RESET)	CSG1139
S	803	Spring Switch(MAG)	CSN1044
VR	802	Semi-fixed 680Ω(B)	CCP1337

RESISTORS

R	101		RS1/8S120J
R	102		RS1/8S100J
R	103		RS1/16S222J
R	201		RS1/16S104J
R	205		RS1/16S103J

=====Circuit Symbol and No.===Part Name			Part No.
---	------	--	-------------------------
R	206		RS1/16S393J
R	207		RS1/16S182J
R	213		RS1/16S103J
R	214		RS1/16S103J
R	215		RS1/16S123J
R	253		RS1/16S681J
R	254		RS1/16S681J
R	256		RS1/16S681J
R	257		RS1/16S681J
R	258		RS1/16S681J
R	259		RS1/16S102J
R	260		RS1/16S681J
R	298		RS1/16S681J
R	301		RS1/16S103J
R	302		RS1/16S153J
R	303		RS1/16S103J
R	304		RS1/16S103J
R	305		RS1/16S103J
R	306		RS1/16S752J
R	307		RS1/16S103J
R	308		RS1/16S752J
R	309		RAB4C332J
R	311		RS1/16S102J
R	651		RN1/16SE1502D
R	652		RN1/16SE1502D
R	653		RN1/16SE1502D
R	654		RN1/16SE1502D
R	659		RN1/16SE1202D
R	660		RN1/16SE1202D
R	661		RN1/16SE1202D
R	662		RN1/16SE1202D
R	663		RS1/16S103J
R	664		RS1/16S103J
R	665		RS1/16S103J
R	666		RS1/16S103J
R	669		RS1/16S101J
R	670		RS1/16S101J
R	671		RS1/16S752J
R	672		RS1/16S103J
R	673		RS1/16S271J
R	701		RS1/16S681J
R	702		RS1/16S102J
R	703		RS1/16S222J
R	704		RS1/16S563J
R	705		RS1/16S104J
R	706		RS1/16S222J
R	707		RS1/16S104J
R	708		RS1/16S0R0J
R	712		RS1/16S0R0J
R	714		RS1/16S0R0J
R	715		RS1/16S473J
R	716		RS1/16S103J
R	717		RS1/16S473J
R	718		RS1/16S681J
R	720		RS1/16S104J
R	721		RS1/16S222J
R	722		RS1/16S222J
R	724		RS1/16S681J
R	725		RS1/16S222J
R	726		RS1/16S104J
R	727		RS1/16S513J
R	729		RS1/16S473J
R	730		RS1/16S473J
R	731		RS1/16S222J
R	732		RS1/16S683J

=====Circuit Symbol and No.===Part Name			Part No.
---	------	--	-------------------------
R	733		RS1/16S222J
R	734		RS1/16S473J
R	735		RS1/16S222J
R	736		RS1/16S103J
R	737		RS1/16S433J
R	738		RS1/16S104J
R	739		RS1/8S1R0J
R	740		RS1/8S2R0J
R	741		RS1/16S102J
R	742		RS1/16S104J
R	743		RS1/16S104J
R	744		RS1/16S223J
R	747		RS1/16S472J
R	750		RAB4C473J
R	751		RAB4C473J
R	752		RS1/16S3602D
R	753		RS1/16S6801D
R	754		RS1/16S221J
R	755		RS1/16S104J
R	756		RS1/16S221J
R	759		RS1/16S472J
R	760		RS1/16S104J
R	761		RS1/16S104J
R	764		RS1/16S473J
R	765		RS1/16S471J
R	766		RS1/16S471J
R	767		RS1/16S471J
R	768		RS1/10S101J
R	769		RS1/10S101J
R	770		RS1/16S104J
R	801		RS1/10S221J
R	802		RS1/10S271J
R	804		RS1/16S512J
R	805		RS1/16S432J
R	806		RS1/16S102J

CAPACITORS

C	101		CKSRYB102K50
C	102		CKSRYB104K16
C	103		CEV101M6R3
C	104		CEV470M6R3
C	105		CKSRYB224K16
C	106		CKSRYB224K16
C	107		CKSRYB224K16
C	201		CKSRYB104K16
C	202		CEV101M6R3
C	203		CKSRYB104K16
C	204		CKSRYB332K50
C	205		CKSRYB104K16
C	206		CKSRYB392K50
C	207		CKSRYB104K16
C	208		CCSRCH270J50
C	209		CCSRCJ3R0C50
C	210		CCSRCH181J50
C	211		CCSRCH510J50
C	212		CKSRYB682K50
C	213		CKSRYB104K16
C	214		CKSRYB104K16
C	215		CKSRYB104K16
C	216		CKSRYB104K16
C	217		CKSRYB104K16
C	218		CKSRYB104K16
C	219		CKSRYB104K16
C	220		CKSRYB104K16
C	253		CKSRYB471K50
C	271		CEV101M6R3
C	272	10μF/16V	CCH1399

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

C	273		CKSRYB224K16
C	301		CEV101M10
C	302		CKSRYB224K16
C	651		CCSRSL391J50
C	652		CCSRSL391J50
C	653		CCSRCH181J50
C	654		CCSRCH181J50
C	655		CCSRCH181J50
C	656		CCSRCH181J50
C	661		CKSRYB104K16
C	664		CKSRYB103K25
C	665		CEV470M6R3
C	666		CKSRYB103K25
C	702		CKSRYB473K16
C	703		CKSRYB473K16
C	707		CKSRYB103K25
C	708		CKSRYB104K16
C	710		CKSRYB103K25
C	711		CKSRYB102K50
C	712		CKSRYB102K50
C	714		CKSRYB104K16
C	715	22μF/10V	CCH1403
C	717		CKSRYB103K25
C	718		CKSRYB103K25
C	719		CKSRYB102K50
C	720		CKSRYB102K50
C	721		CKSRYB103K25
C	722		CKSRYB103K25
C	723		CKSRYB104K16
C	724		CKSRYB471K50
C	725		CKSRYB473K16
C	727		CKSRYB473K16
C	801		CKSRYB103K25
C	802		CKSRYB104K16
C	803		CKSRYB103K25

G Unit Number : CXB6806 (FM1277 model)
: CXB6807 (FM1279 model)
Unit Name : Display Assy

MISCELLANEOUS

IC	901	IC	PD6294A
IC	902	IC	TSOP1840SB1
Q	901	Transistor	2SD1767
Q	902	Transistor	2SB710A
Q	903	Transistor	DTC114EK
D	901	Diode	UDZS5R6(B)
D	902	Diode	MA153
D	903	Diode	MA153
X	901	Ceramic Resonator 4.9152MHz	CSS1449
S	901	Switch	CSG1110
S	902	Switch	CSG1110
S	903	Switch	CSG1110
S	904	Switch	CSG1110
S	905	Switch	CSG1110
S	906	Switch	CSG1110
S	907	Switch	CSG1110
IL	901	Lamp 14V 40mA	CEL1608
IL	902	Lamp 14V 40mA	CEL1608
LCD	901	LCD	CAW1514

RESISTORS

R	901		RS1/16S102J
R	902		RS1/16S332J
R	903		RS1/16S471J
R	904		RS1/16S471J
R	905		RS1/16S332J
R	906		RS1/16S223J

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

CAPACITORS

C	901		CKSRYB473K16
C	902		CSZSR100M16
C	903		CSZSR100M16
C	904		CKSRYB104K16
C	905		CKSRYB104K16
C	906		CKSRYB104K16

F Unit Number : CWX2580
Unit Name : Antenna Select Unit

MISCELLANEOUS

Q	501	Transistor	2SC1740S
D	501	Diode	1SS133
L	501	Ferri-Inductor	LAU4R7K
RY	501	Relay	CSR1014

RESISTORS

R	501		RD1/4PU683J
R	502		RD1/4PU103J

CAPACITORS

C	501		CKCYB102K50
C	502		CEAL101M10

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(TAP)	CSN1051
S	852	Spring Switch(DSP)	CSN1052

E Unit Number :
Unit Name : Motor PCB

M	853	Motor Unit(TRAY)	CXB4421

Miscellaneous Parts List

		Pickup Unit(P8)(Service)	CXX1285
M	851	Motor Unit(SPINDLE)	CXB3003
M	852	Motor Unit(ELV)	CXB3006
M	854	Motor Unit(CARRIAGE)	CXB3004
VR	801	Volume 10kΩ(B)	CCW1024

6. ADJUSTMENT

6.1 CD ADJUSTMENT

● 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.

Key to adjustment text 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

● CD 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.

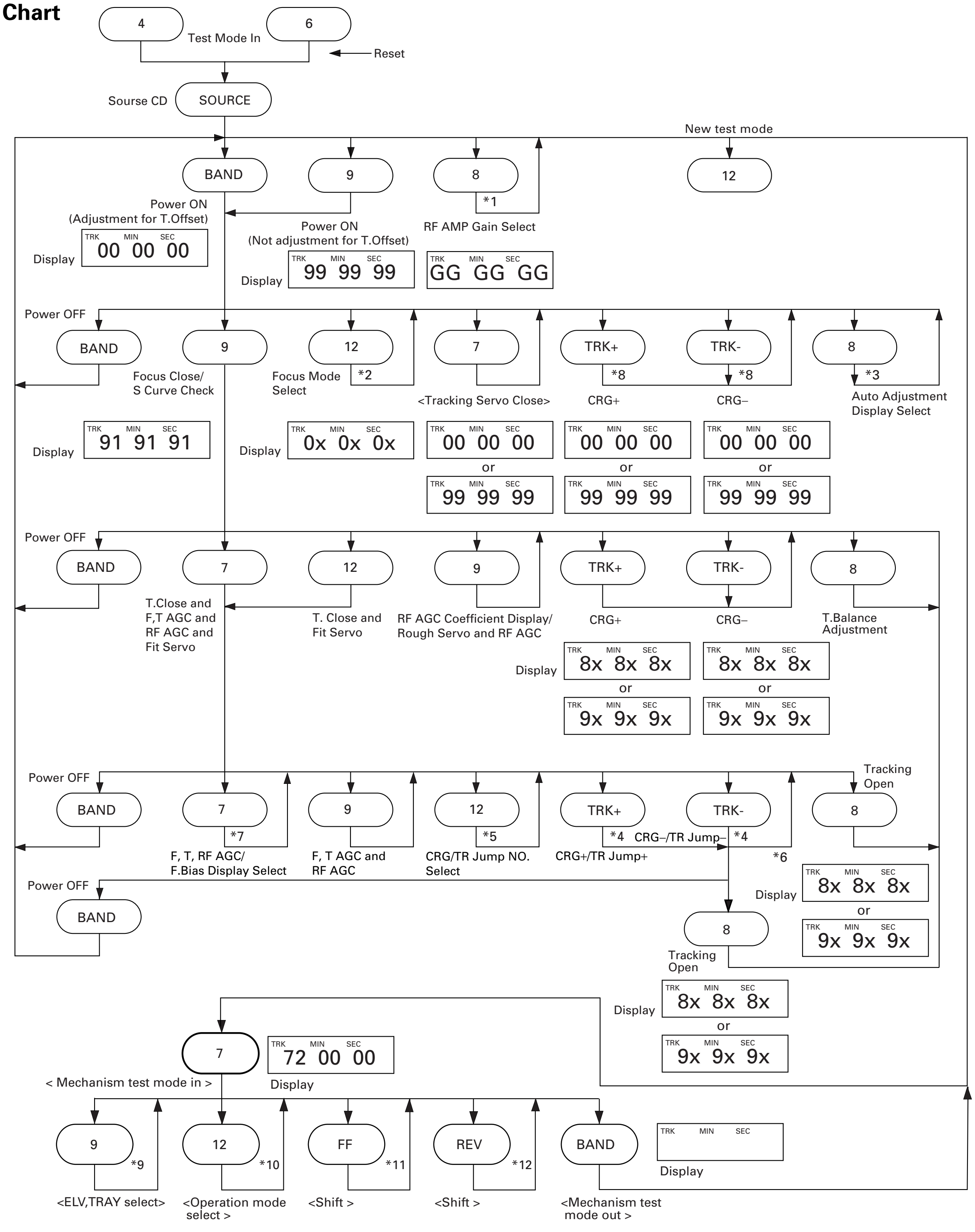
- Powering Off/On resets the jump mode to "Single TR (91)", the RF AMP gain setting to 0 dB, and the automatic adjustment value to the initial value.

- During exchanging discs, do not press the keys for the discs to be exchanged.

- The following head units are exceptional so that their entering ways to the test mode are different from others.
  Test mode starting procedure
  Reset while pressing the **3** and **5** keys together.

  KEH-P5010R/X1M/EW
  KEH-4011/X1M/EE
  KEH-P5011/X1M/EE
  KEH-4010R/X1M/EW
  KEH-P4010RB/X1M/EW
  KEH-P4013R/X1M/EW
  KEH-5015/X1M/ES
  KEH-P4010/X1M/UC
  KEH-P4015/X1M/ES

● Flow Chart



*1 → TYP → +6dB → +12dB
Display 06 06 06 12 12 12

*2 → Focus Close → S Curve Check
Display 00 00 00 01 01 01
(99 99 99)

*3 → F.Offset Display → RF.Offset Display → F.Cansel Display
F.Cancel Value = {Top Rank 8bit of Set Value (7F [H] to 80 [H]) + 128} / 4
= 63 [D] to (32 [D]) to 00 [D]

*4 Single TR/32TR/100TR

*5 → Single TR → 32TRK → 100TRK → CRG Move
Display 9x(8x):91(81) 92(82) 93(83) 94(84)

*6 CRG Move, 100TR Jump Only

*7 → TRK, MIN, SEC → F.AGC Gain → T.AGC Gain → RF AGC Gain
(F,T.AGC Gain = (Present Value/Initial Value) × 20)

*8 Voltage of CRG Motor = 2 [V]

*9 ELV motor select → TRAY motor select
72 00 0X Display 72 10 0X

*10 8ms pulse drive → 24ms pulse drive → DC drive
72 00 00 Display 72 00 01 72 00 02
48ms pulse drive → 100ms pulse drive → DC drive
72 10 00 Display 72 10 01 72 10 02

*11 ELV select : ELV dowm (Disc 12 → 1)
TRAY select : TRAY out

*12 ELV select : ELV up (Disc 1 → 12)
TRAY select : TRAY in

6.2 CHECKING THE GRATING

● Checking the Grating After Changing the Pickup Unit

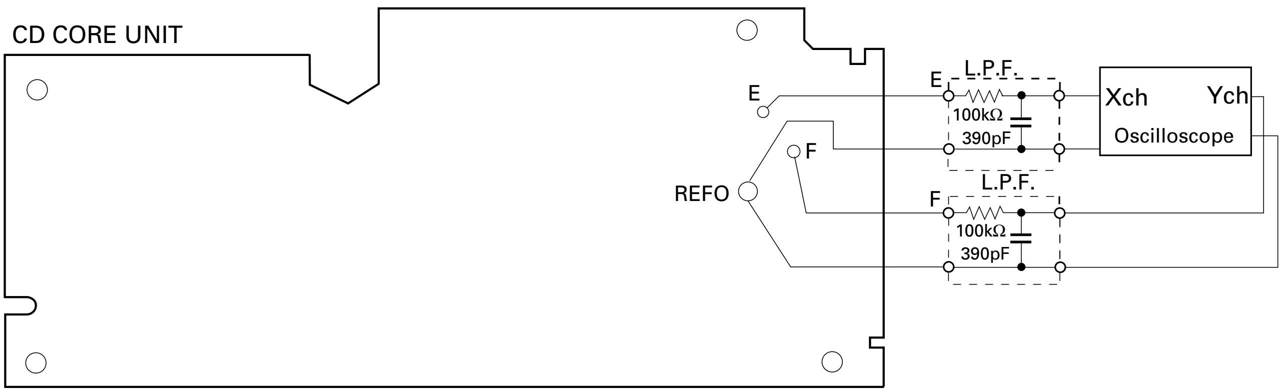
- **Note :**
  CD mechanism modules the grating angle of the pickup unit cannot be adjusted after the pickup unit is changed. The pickup unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted pickup unit for the CD mechanism module. 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° . Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75° 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° then the mechanism should be judged to be at fault.

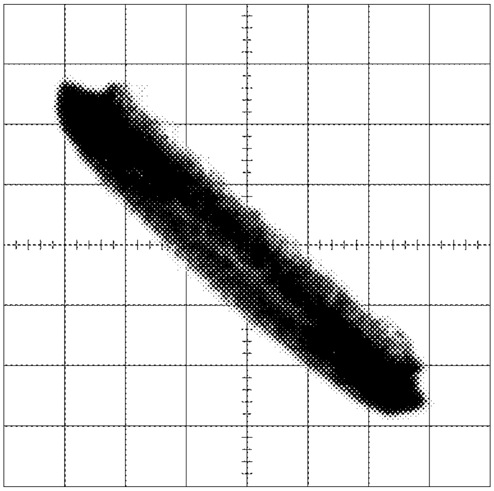
- **Note**
  Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

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

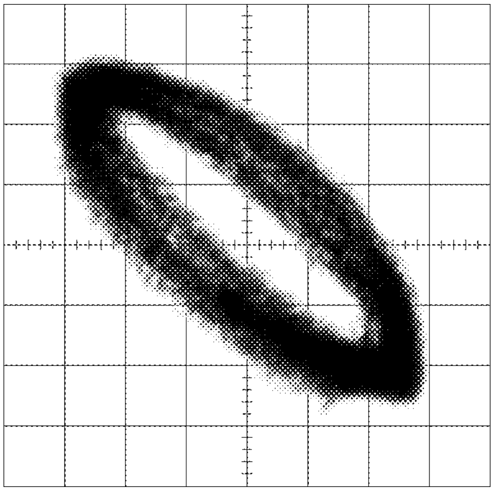
Grating waveform

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

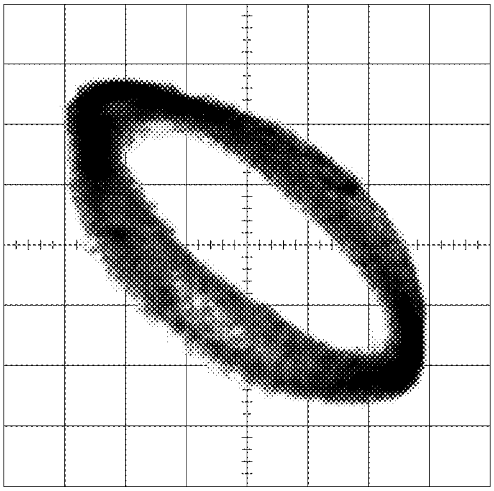
0˚



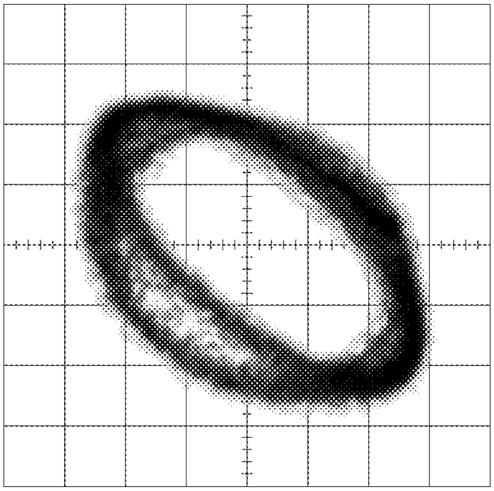
30˚



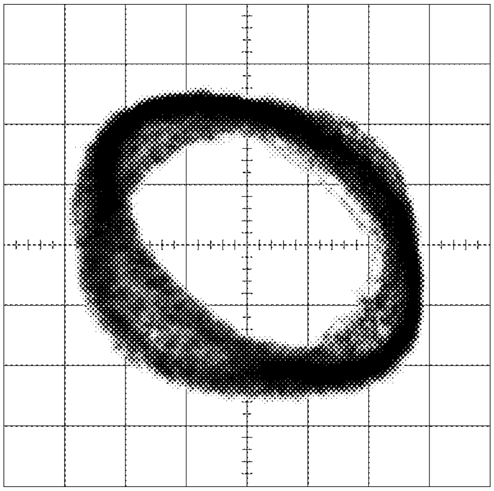
45˚



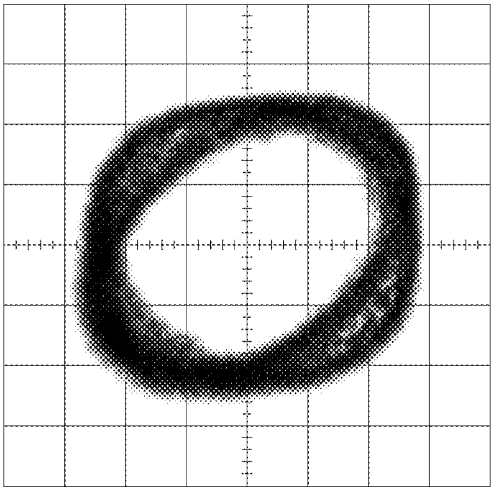
60˚



75˚



90˚



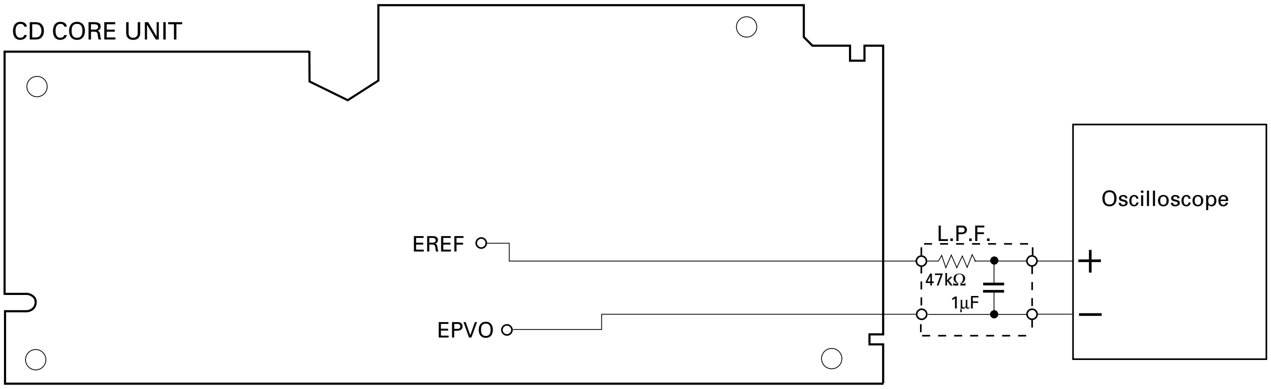
6.3 ADJUSTMENT OF ELEVATION WHEN THE CD CORE UNIT HAS BEEN REMOVED FOR MAINTENANCE

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

- **Note :**
  This mechanisms 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 Equlpment: 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**

Examples of display

1. Enter Test mode, then select Multi-CD player.

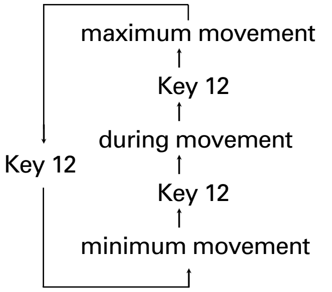
TRACK FUNCTION
' "

2. Press key **7** to enter Mechanism Test mode.

TRACK FUNCTION
72 00' 00"

3. Press key **12** twice to specify the amount of movement.

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



TRACK FUNCTION
72 00' 02"

TRACK FUNCTION
72 00' 01"

TRACK FUNCTION
72 00' 00"

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 sixth step (Fig. 1).

8. Make the adjustment.
   Use VR802 to adjust the difference in potential between EREF and EPVO to 0 ±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.6.

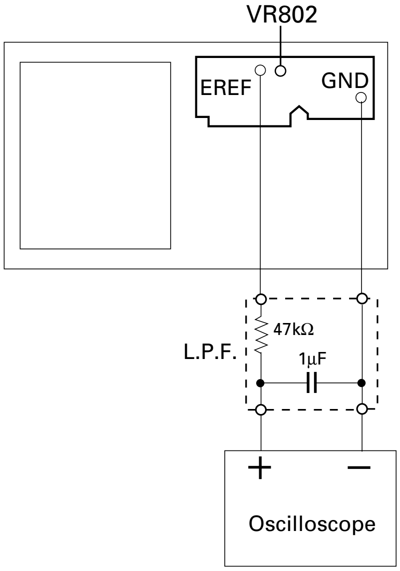
TRACK FUNCTION
04 00' 00"

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

• **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 twelfth step by 0.1 mm, reduce the voltage of EREF (adjusted in step 8) by 10 mV.

    If the stopper bend has been dislocated in the direction of the twelfth 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 10 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:

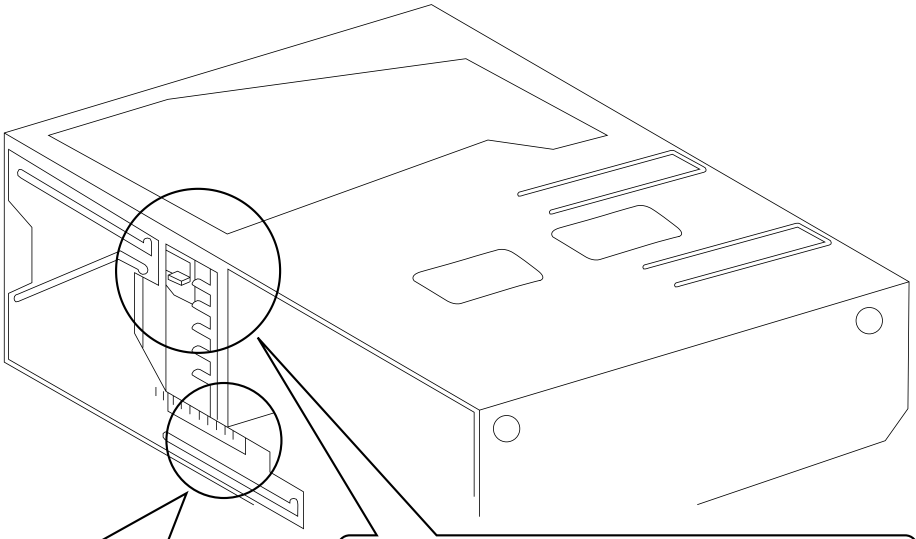
15. Press the **EJECT** switch.

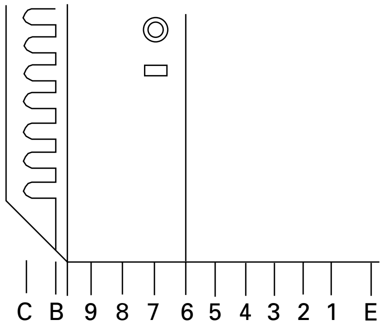
16. Once operation of the mechanism has stopped, turn the power OFF.

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, sixth, seventh and twelfth CDs.

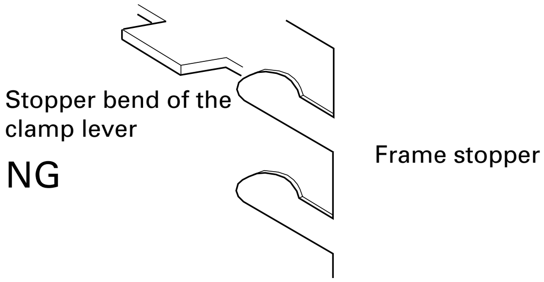
19. If the mechanism operates properly, adjustment is completed. If the mechanism operates improperly, make the adjustment again.





Adjust the insertion gate of magazine to the sixth scale.

Fig. 1

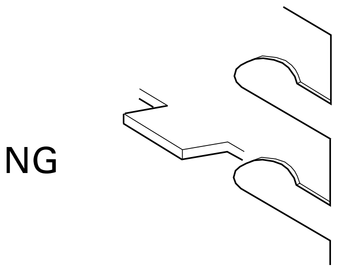


Dislocated toward the first CD.

Fig. 2

Engaged in the center and pressed downward.

Fig. 3

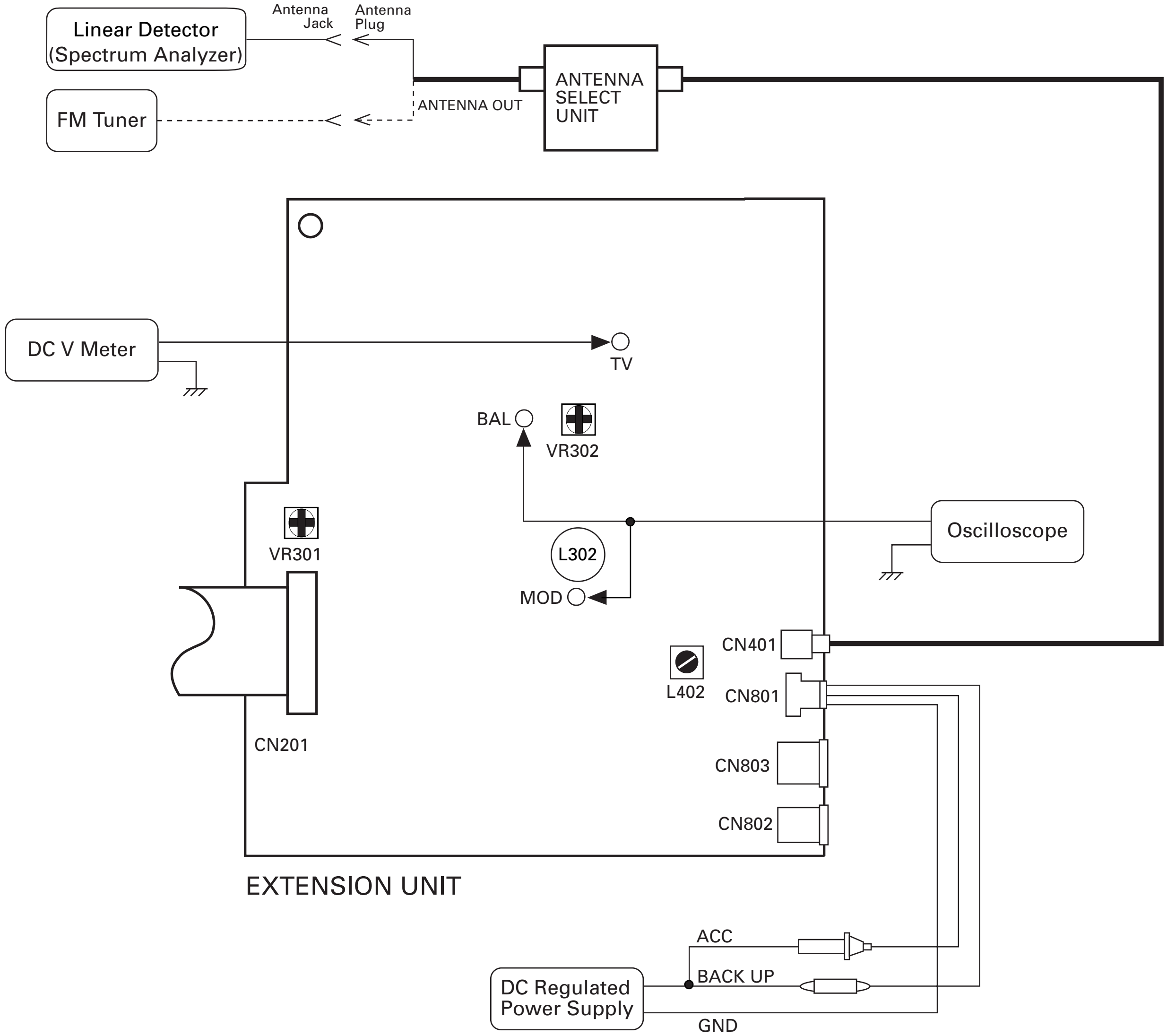


Dislocated toward the twelfth CD.

Fig. 4

6.4 MODULATOR ADJUSTMENT

● Connection Diagram



● Adjustment

Note: When ajusting, the frequency is made 89.1MHz.

	CD Signal	Adjusting Point	Adjustment Method	Notes
Tuning Voltage Adjustment	-∞	L402	DC V Meter:TV 3.0V±0.1V	
Balance Adjustment	-∞	VR301	Oscilloscope:BAL 38kHz signal becomes minimum	
Modulation Adjustment	400Hz 0dB (*1) or 499Hz 0dB	VR302	Linear Detector(Spectrum Analyzer) 135±5kHz or Oscilloscope:MOD 0.23Vpp	LEVEL = 7

*1 : L and R are input at the same time.

7. GENERAL INFORMATION

7.1 DIAGNOSIS

7.1.1 TEST MODE

● **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. CRG can't be moved from inner diameter. → Failure on home switch or CRG move mechanism.
11	Electricity	Focus Servo NG	Focusing not available. → Stains on rear side of disc or excessive vibrations on REWRITABLE.
12	Electricity	Spindle Lock NG	Spindle not locked. Sub-code is strange (not readable). → Failure on spindle, stains or damages on disc, or excessive vibrations.
		Subcode NG	A disc not containing CD-R data is found. Turned over disc are found, though rarely. → Failure on home switch or CRG move mechanism.
		RF AMP NG	An appropriate RF AMP gain can't be determined. → CD signal error.
17	Electricity	Setup NG	APC protection doesn't work. Focus can be easily lost. → Damages or stains on disc, or excessive vibrations.
30	Electricity	Search Time Out	Failed to reach target address. → CRG tracking error or damages on disc.
A0	System	Power Supply NG	Power (VD) is ground faulted. → Failure on SW transistor or power supply (failure on connector).
A1	System	Mechanism power failure	Mechanism elevation reference voltage is out of prescription. →EREF adjustment VR and/or power abnormal.

Code	Class	Displayed error code	Description of the code and potential cause(s)
50	Mechanism	An error upon ejection	MAG switch release time has time out. Elevation time out when eject.
60	Mechanism	An error while putting in and out the tray	Tray in / out time has time out. Tray is caught when put in.
70	Mechanism	An error upon elevation	Elevation time has time out.
80	Mechanism	An error with an empty magazine inserted	No disc is available.

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 (Example)	Test mode		New test mode	
	Power Off	Power On	In-play	Error Production
BAND	To power on (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) /parameter display switching	Scan	–
8	RF AMP gain switching	Parameter display switching /T.BAL adjustment/T.Open	Mode	–
9	To power on (offset adjustment not performed)	F.Close/RF AGC/F.T.AGC	–	–
10	–	F.Open	–	–
11	–	Jump Off	–	–
12	–	F.Mode switching /T.Close (no AGC)/Jump switching	Auto/Manu	T.No./Time switching

Key (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. → Damages/stains on disc, vibrations or failure on servo.
41	Electricity	Spindle unlocked.	FOK = Low continued for 50 msec. → Damages/stains on disc, vibrations or failure on servo.
42	Electricity	Sub-code unreadable.	Sub-code was unreadable for 50 msec. → Damages/stains on disc, vibrations or failure on servo.
43	Electricity	Sound skipping detected.	Last address memory function was activated. → 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. 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. 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

7.1.2 DISASSEMBLY

● Removing the Upper Case (not shown)

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

● Removing the CD Mechanism Module (Fig.5)

1 Remove the four dampers.

2 Remove the two springs.

Disconnect the connector and then remove the CD Mechanism Module.

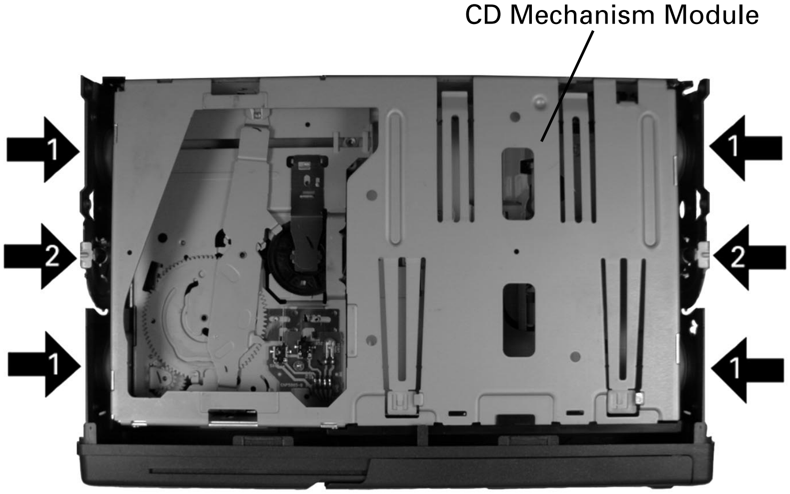


Fig.5

● Removing the Extension Unit (Fig.6)

1 Remove the two screws.

2 Remove the screw.

3 Straight the tabs at location indicated and then remove the Extension Unit.

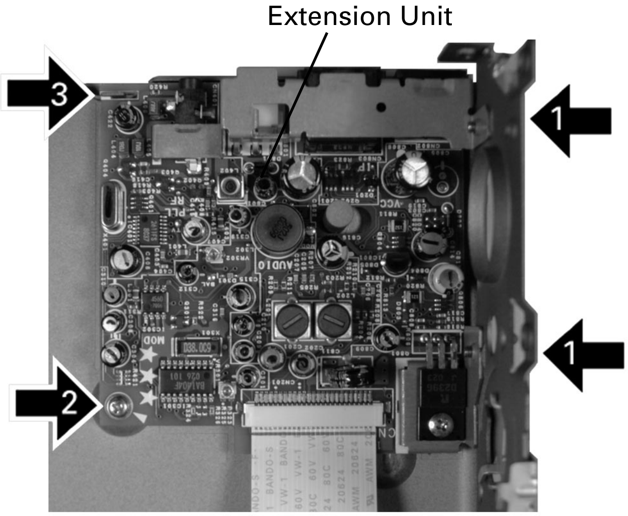


Fig.6

● Removing the Door

1. Remove the Door(A) in the direction of arrow② while pushing the Grille in the direction of arrow①, the slide is done as it is in the direction of arrow③ and remove the Door(A). (Fig.7)

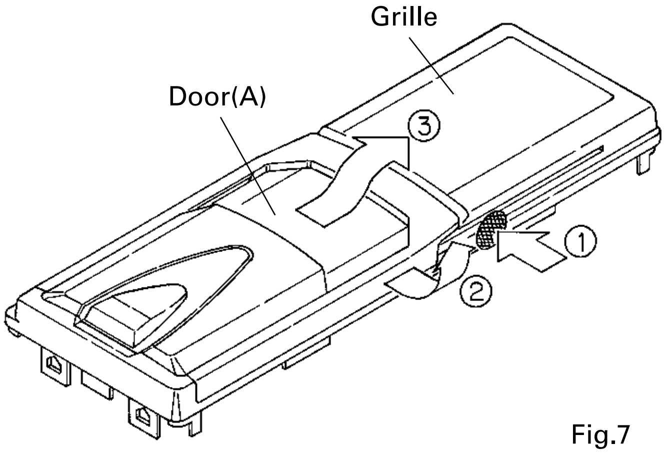


Fig.7

2. The slide is done in the direction of arrow⑤ and remove the Door(B) while spread out the Door(A) in the direction of arrow④. (Fig.8)

*) The illustration of the text for 12-Disc type but disassembling method is the same for 6-Disc type.

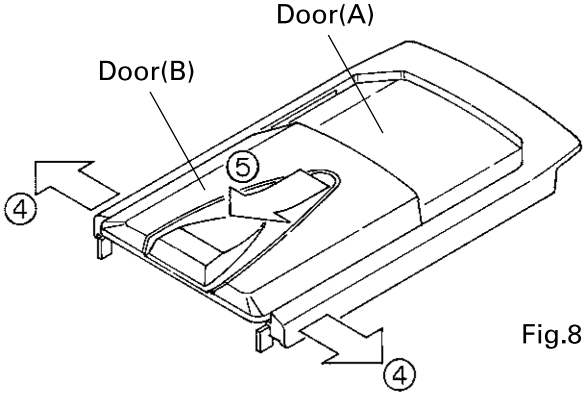


Fig.8

● Removing the Pickup Unit

1. Insert the short pin from the pickup unit in the flexible PCB.
2. Remove the flexible PCB 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 mechanism PCB up as shown in the figure on the upper right. At this time, make sure that the motor PCB and flexible relay card are not pulled excessively.

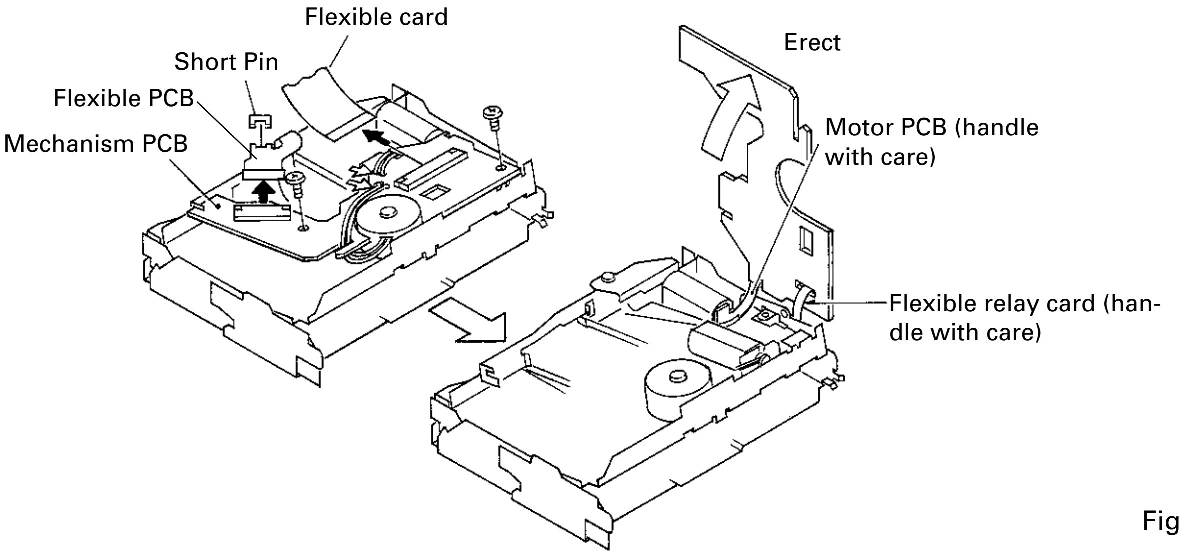


Fig.9

6. Remove screw A and then remove the carriage motor assy, lighting conductor, feed screw holder, feed screw and belt (see Fig.10).
7. Remove screw B on the main side and the pickup unit together with the guide shaft (see Fig.10).

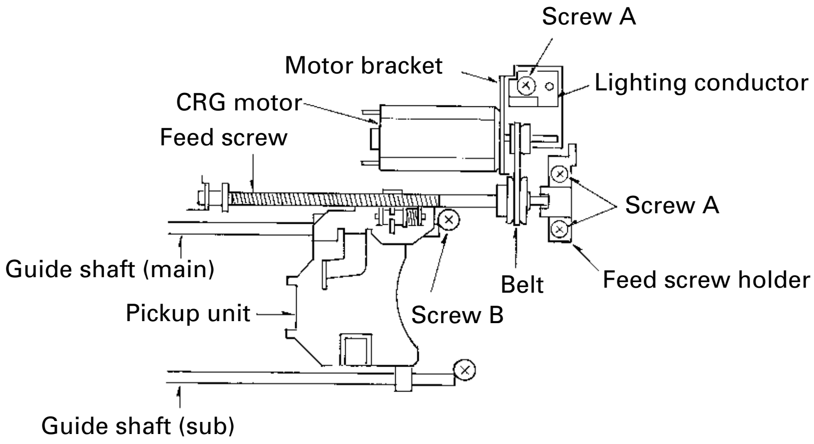
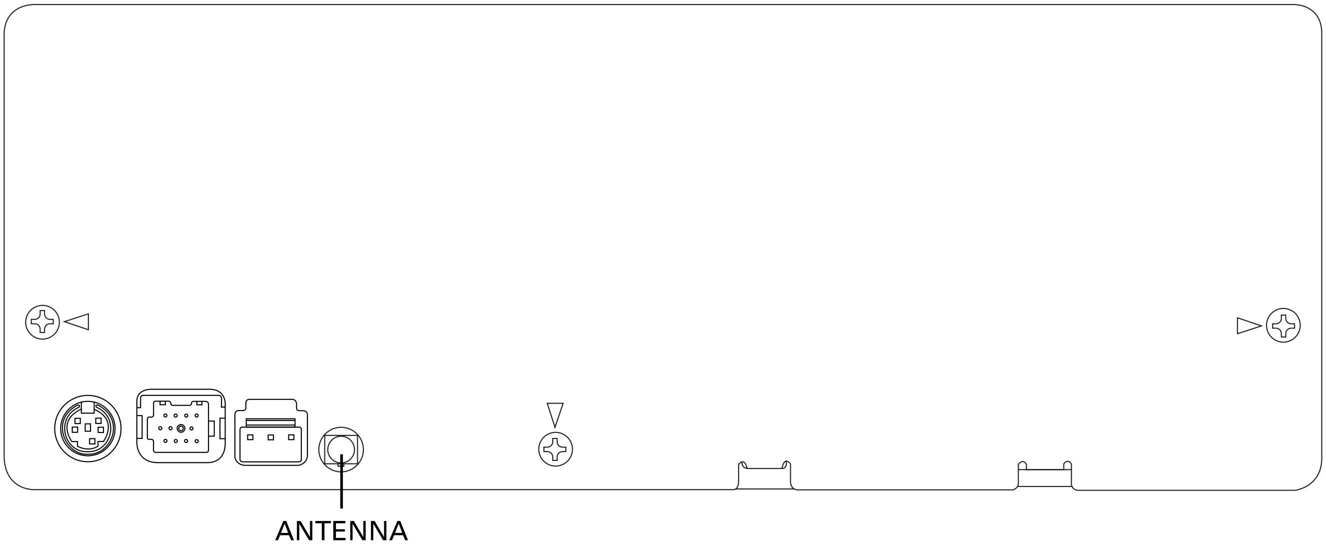
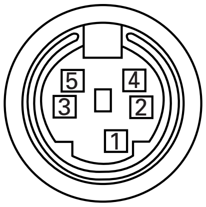


Fig.10

7.1.3 CONNECTOR FUNCTION DESCRIPTION

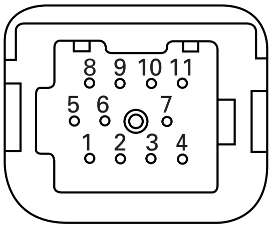


DISPLAY



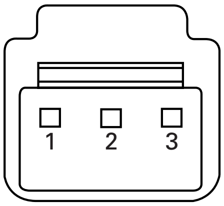
1.SWDACC
2.KYDT
3.DPDT
4.FMIPSW
5.GND

IP-BUS



1.BUS+
2.GND
3.GND
4.NC
5.BUS-
6.GND
7.LCH
8.ASENB
9.RCH
10.SGNDR
11.SGNDL

POWER SUPPLY



1.GND
2.ACC
3.BATT.

7.2 PARTS

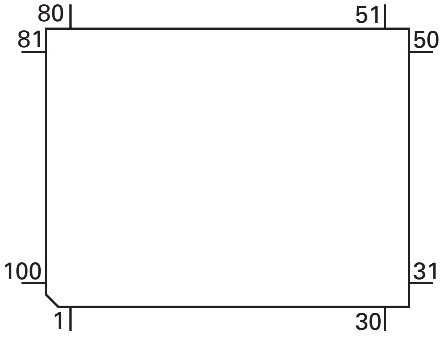
7.2.1 IC

● Pin Functions (PD5638A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	PLDT	O	C	PLL data output
2	PLCK	O	C	PLL clock output
3	$\overline{\mathrm{ADENA}}$	O	C	A/D reference voltage output
4	TXTSTB	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 output
11	CONT	O	C	Servo driver output control
12	$\overline{\mathrm{RESET}}$	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	$\overline{\mathrm{NMI}}$	I		Pull up
18	$\overline{\mathrm{BSENS}}$	I		Back up power sense input
19	$\overline{\mathrm{ASENS}}$	I		Acc 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	DISPPW	O	C	Key/Display microcomputer supply control
24	OPTSEL	I		Pull down
25	SRAMSW	I		”H”
26	FMPCB	I		Pull up
27	SIMUKE	I		”L”
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	DPDT	O	C	Display data output
32	KYDT	I		Key data input
33	FMIPSW	I		FM/IP-BUS select switch
34	$\overline{\mathrm{TESTIN}}$	I		Test program mode input
35	XSO	O	C	CD LSI data output
36	XSI	I		CD LSI data input
37	XSCK	O	C	CD LSI clock output
38	M6M12	I		6/12 disc select input
39–43	NC			Not used
44	$\overline{\mathrm{RD}}$	O	C	SRAM enable output
45	NC			Not used
46	$\overline{\mathrm{WR}}$	O	C	SRAM write enable output
47	SYSPW	O	C	System power supply control output
48	$\overline{\mathrm{CS}}$	O	C	SRAM chip select output
49	XAO	O	C	CD LSI data discernment control signal output
50	$\overline{\mathrm{XSTB}}$	O	C	CD LSI strobe output
51	$\overline{\mathrm{XRST}}$	O	C	CD LSI reset output
52	NC			Not used
53	LOCK	I		Spindle lock detector input
54	FOK	I		FOK signal input
55	NC			Not used
56	A11	O	C	SRAM address bus output
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

Pin No.	Pin Name	I/O	Format	Function and Operation
63	A7	O	C	SRAM address bus output
64	VSS			GND
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	$\overline{\text{ASENSFM}}$	I		Select FM=”ASENS”
74	$\overline{\text{EJSW}}$	I		Eject key switch interrupt input
75	$\overline{\text{MAG}}$	I		Magazine lock switch interrupt input
76	CDMUTE	O	C	CD mute output
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 input/output
89	PREN	O	C	Preemphasis select output
90	PLCS	O	C	PLL chip select output
91	DSP	I		DISC detect timing input
92	$\overline{\text{DISK}}$			Disc detector input
93	ELVPVO			Voltage input from ELV position sense
94	ELVREF			ELV reference voltage input
95	TRP	I		Tray position input
96	AVSS			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

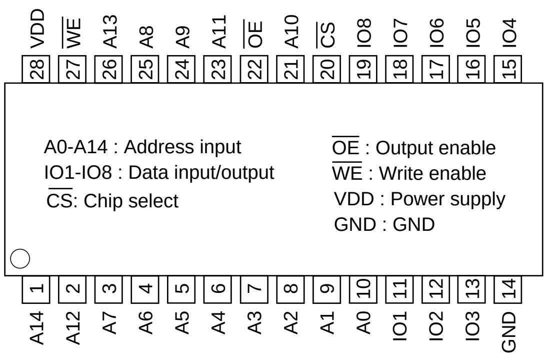
*PD5638A



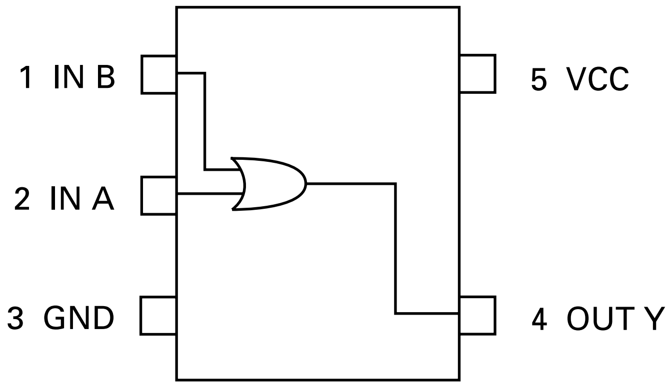
Format	Meaning
C	C MOS

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

LC35256FT-70U

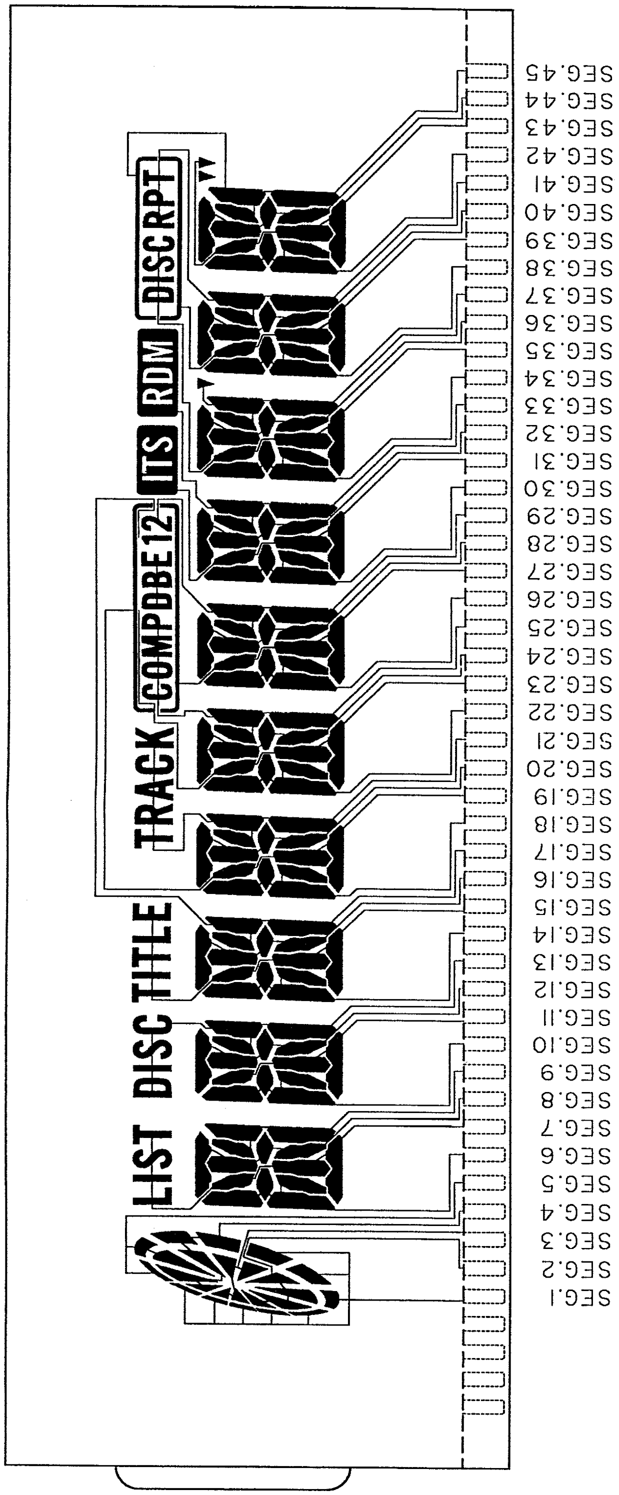


TC7SH32F

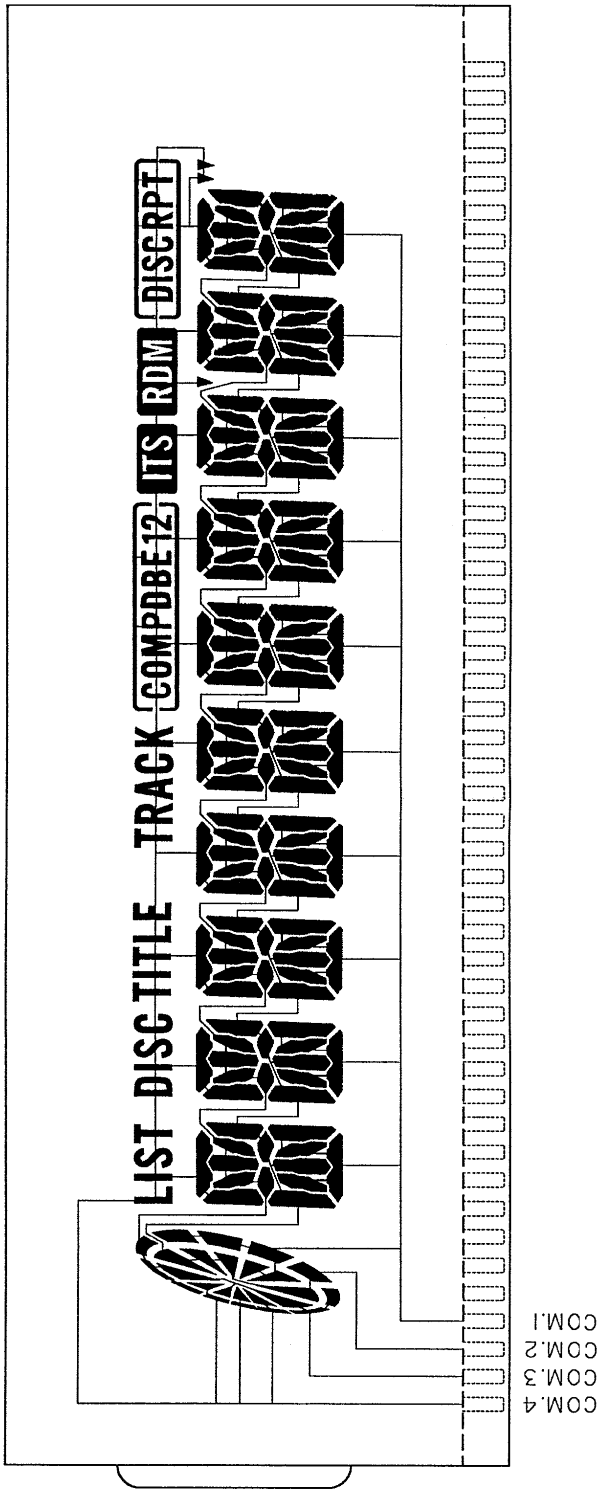


7.2.2 DISPLAY

● CAW1514

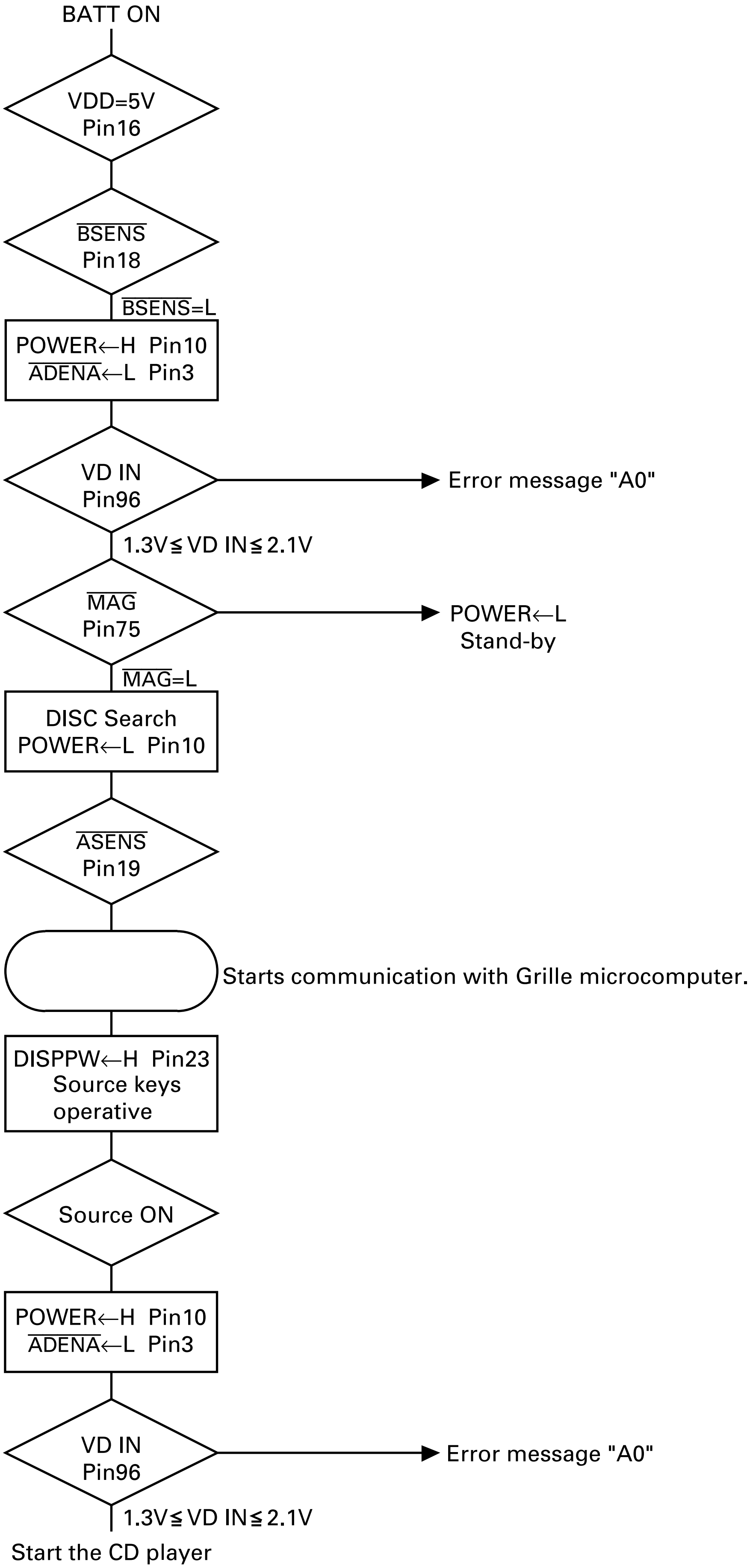


SEGMENT



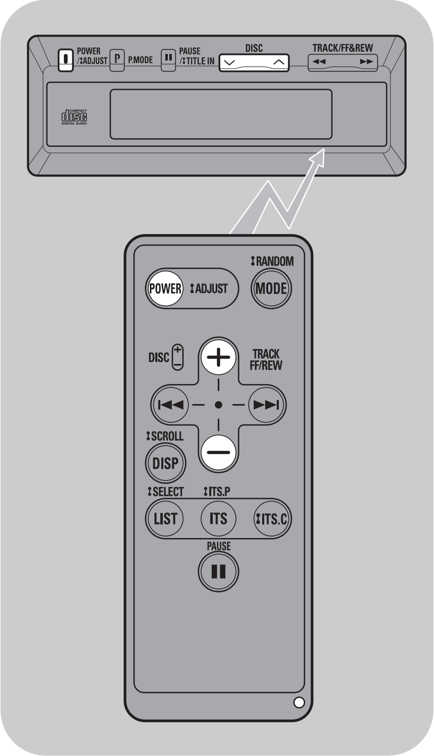
COMMON

7.3 OPERATIONAL FLOW CHART



8. OPERATIONS AND SPECIFICATIONS

8.1 OPERATIONS

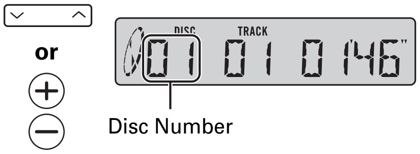


Start the CD player

1. **Switch the radio on and tune to Modulating Frequencies.**
   - The initial value is 89.1 MHz.
   - If your radio does not have muting, there may be some noise before power switch of control unit is ON. If this happens, turn down the volume of the radio.

2. **Press button to switch on and start the player.**

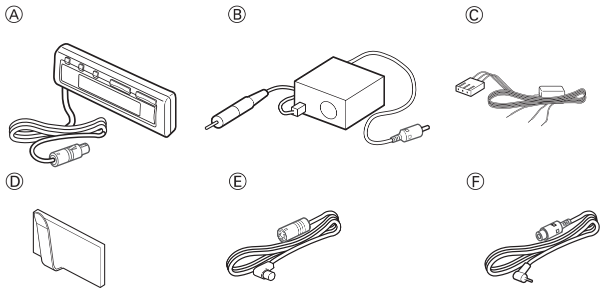
Disc Number Search



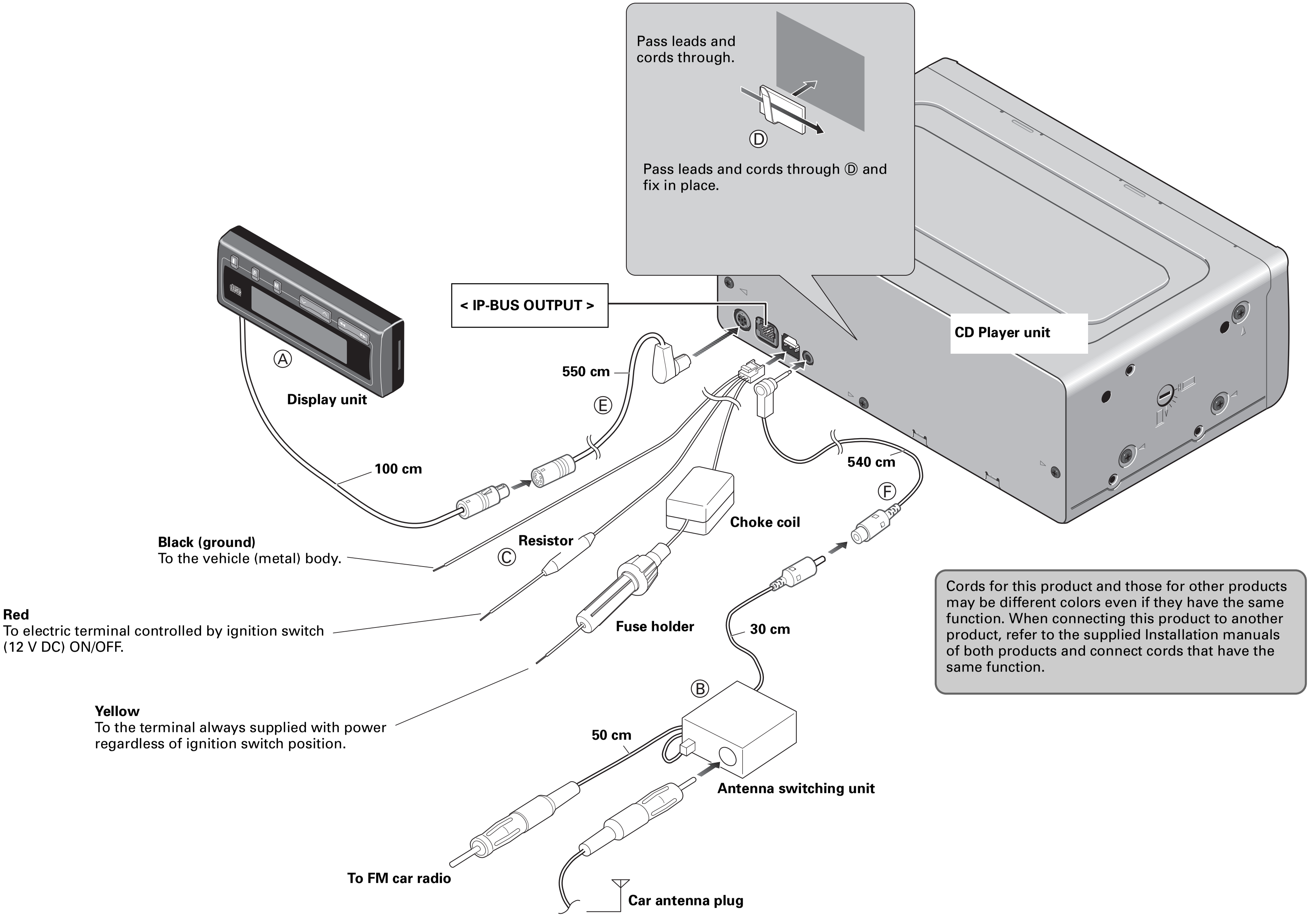
⊕ : increase the number.

⊖ : decrease the number.

Parts for connection



Connecting the Units



Cords for this product and those for other products may be different colors even if they have the same function. When connecting this product to another product, refer to the supplied Installation manuals of both products and connect cords that have the same function.

8.2 SPECIFICATIONS

CD Player unit
System .... Compact disc audio system
Usable discs .... Compact Disc
Signal format
.... Sampling frequency: 44.1 kHz
Number of quantization bits: 16; linear
Power source
.... 14.4 V DC (10.8 — 15.1 V allowable)
Max. current consumption .... 1.0 A
Weight .... 2.2 kg (4.9 lbs)
Dimensions
.... 257 (W) × 94 (H) × 170 (D) mm
[10-1/8 (W) × 3-3/4 (H) × 6-3/4 (D) in]
FM modulator usable frequency
.... 87.9/88.1/88.3/88.5/88.7/88.9/89.1
/89.3/89.5/89.7/89.9/90.1 MHz
Backup current .... 1mA or less

Antenna Switching unit
Weight .... 140 g (0.3 lbs)
Dimensions
.... 45 (W) × 25 (H) × 43 (D) mm
[1-3/4 (W) × 1 (H) × 1-5/8 (D) in]

Display unit
Weight .... 78 g (0.2 lbs)
Dimensions
.....................100 (W) × 37 (H) × 18 (D) mm
[3-15/16 (W) × 1-7/16 (H) × 5/8 (D) in]

Remote Controller unit
Power source
.... Battery (CR2025)
Weight (including battery)
.... 15 g (0.03 lbs)
Dimensions
.... 36 (W) × 92 (H) × 9 (D) mm
[1-2/5 (W) × 3-5/8 (H) × 1/3 (D) in]

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

Pioneer

Service Manual

ORDER NO.
CRT2357

CD MECHANISM MODULE

CX-938

- **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-P1250/X1N/UC,ES	CRT2318	CXK4900	CXB3008
CDX-P1250/X1N/EW		CXK4905	CXB3008
CDX-FM1259/X1N/UC	CRT2320	CXK4916	CXB3008
CDX-FM1257/X1N/UC,ES		CXK4915	CXB3008

CONTENTS

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZU. FEB. 1999 Printed in Japan

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.

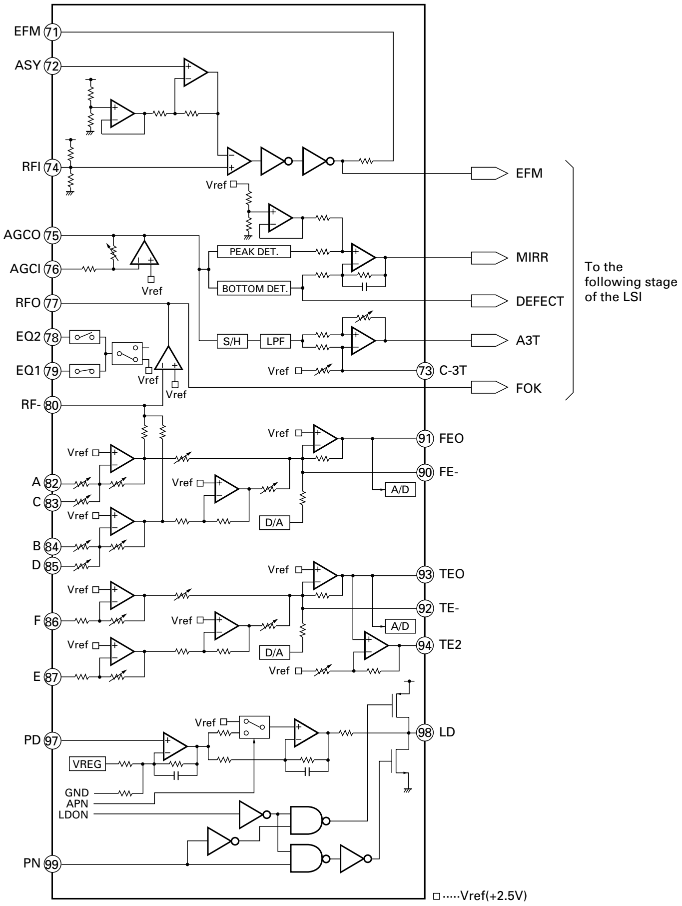


Fig.1 : BLOCK DIAGRAM OF BUILT-IN RF AMPLIFIER

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.

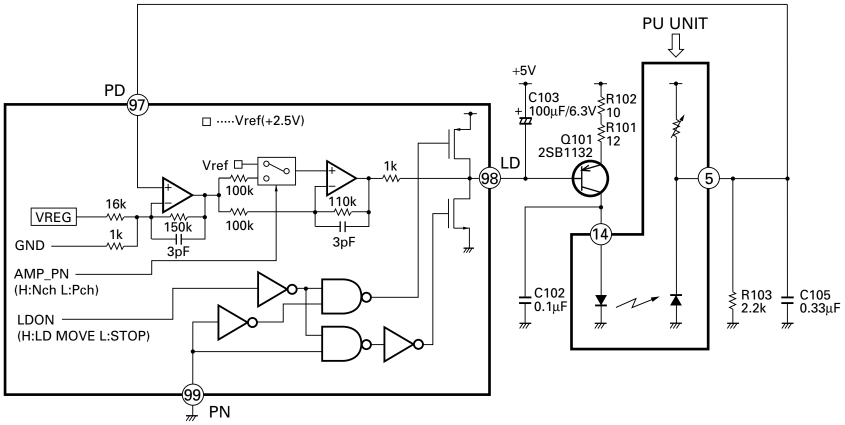


Fig.2 : APC CIRCUIT

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 ± 0.3Vpp.

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.

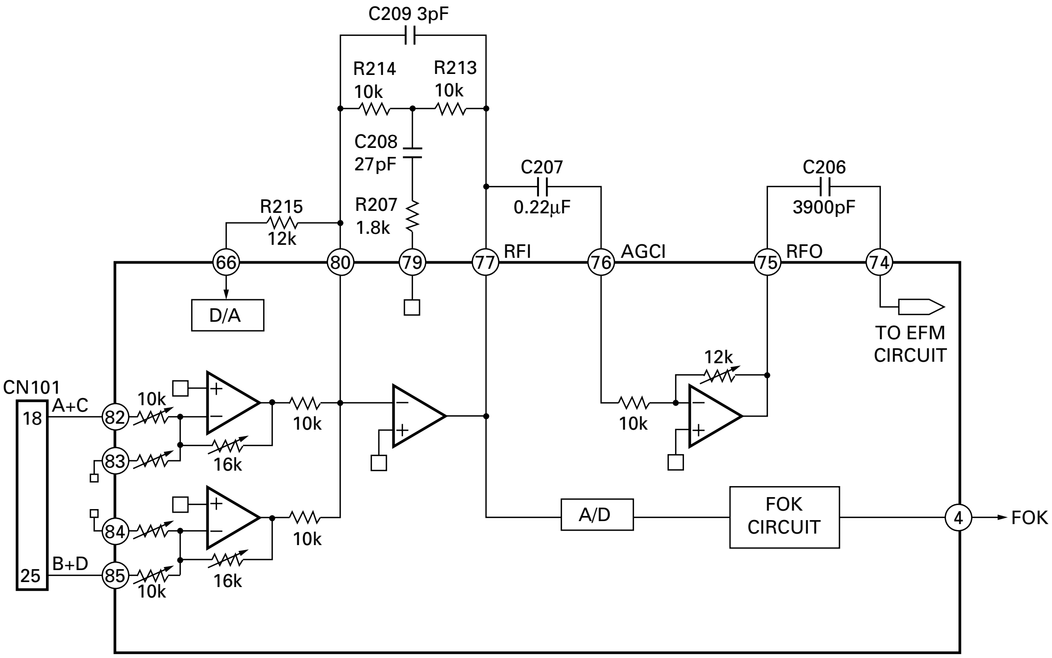


Fig.3 : RFAMP, RFAGC AND FOK CIRCUIT

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.

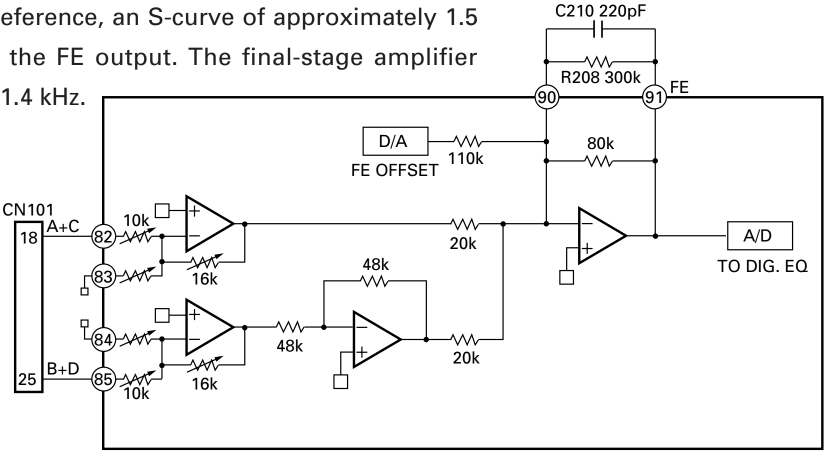


Fig.4 : FOCUS ERROR AMPLIFIER

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 voltage = TE level × 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.

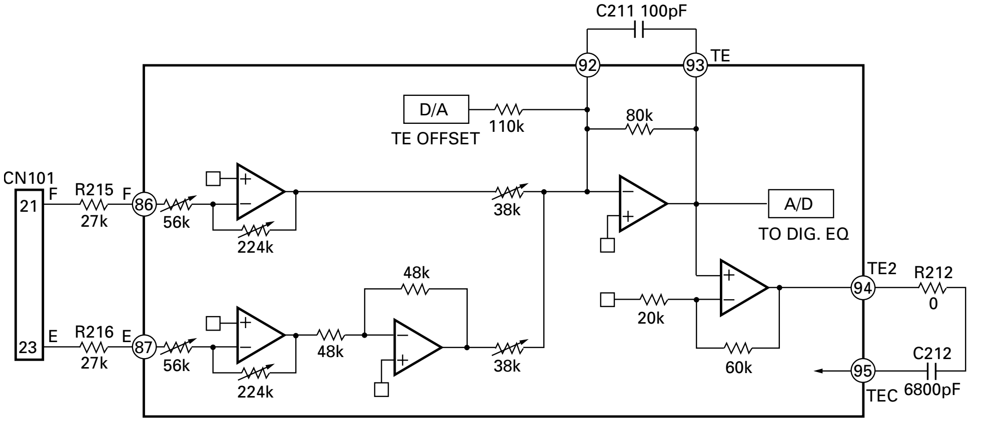


Fig.5 TRACKING ERROR AMPLIFIER AND TRACKING ZERO CROSSING AMPLIFIER

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.

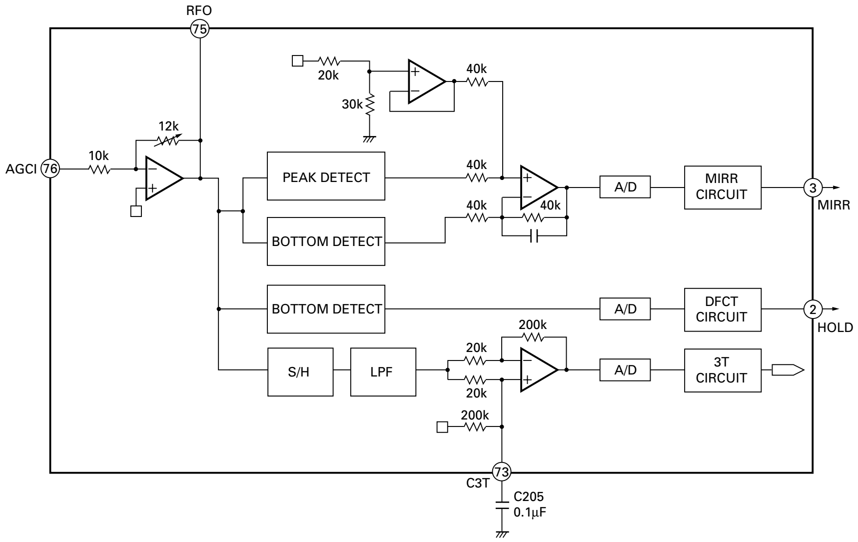


Fig.6 : DFCT, MIRR AND 3T DETECTION CIRCUIT

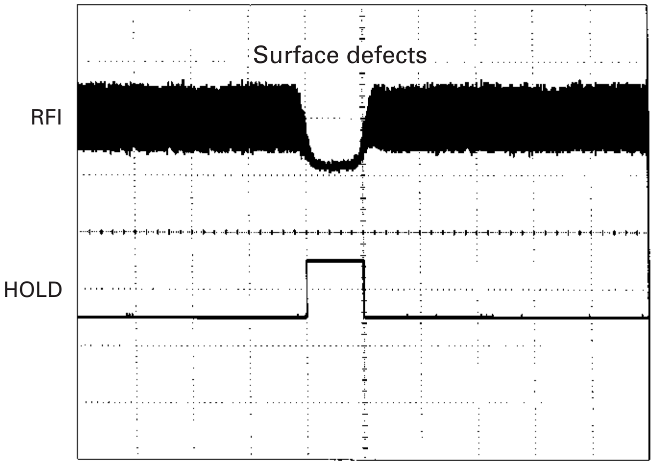


Fig.7 : HOLD OUTPUT WAVEFORM
(When surface defects are present)

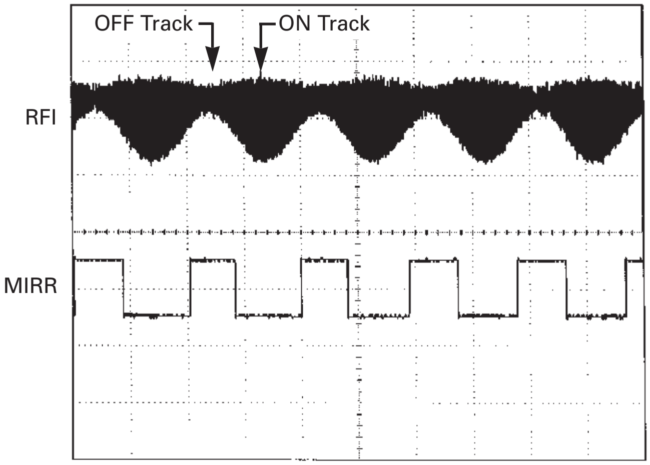


Fig.8 : MIRR OUTPUT WAVEFORM
(When an access is made)

10) EFM Circuit

This circuit is used for converting the RF signal to digital signal consisting of “0” and “1”. The RFO signal from Pin 75 is externally AC coupled, entered to Pin 74, then applied to the EFM circuit.

Loss of the RF signal due to scratches or stains on the disc, or vertical asymmetry of the RF due to variations in the discs manufactured can’t be eliminated by AC coupling alone. This circuit, therefore, controls the reference voltage ASY on the EFM comparator by use of the fact that “0” and “1” appear fifty fifty in the EFM signal. By this arrangement, the comparate level is constantly maintained at almost center of the RFO signal level. The reference voltage ASY is generated when the EFM comparator output is passed through the low pass filter. The EFM signal is output from Pin 71. It is a 2.5 Vp-p amplitude signal centering on REFO.

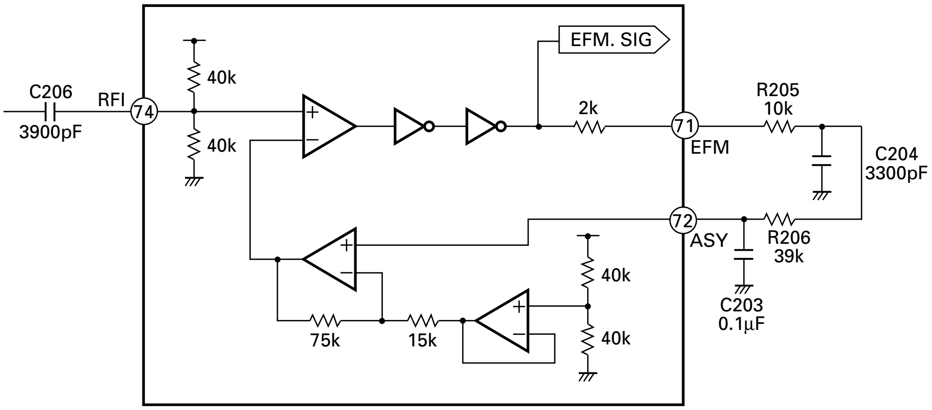


Fig.9 : EFM CIRCUIT

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.

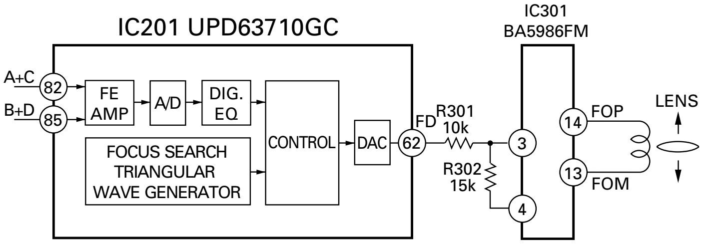


Fig.10 : FOCUS SERVO BLOCK DIAGRAM

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.

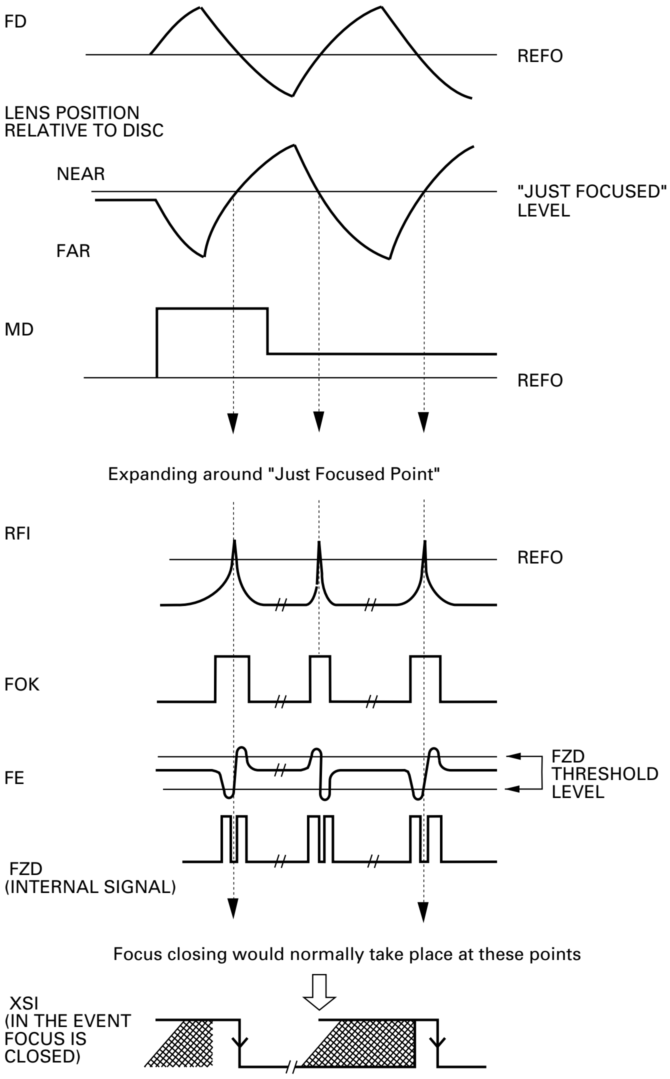


Fig.11 : FOCUS CLOSE SEQUENCE

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.

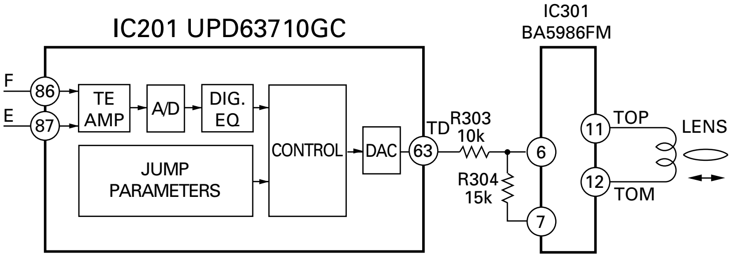


Fig.12 : TRACKING SERVO BLOCK DIAGRAM

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 × 3. In the test mode, in addition to three jumps (1, 32 and 32 × 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.

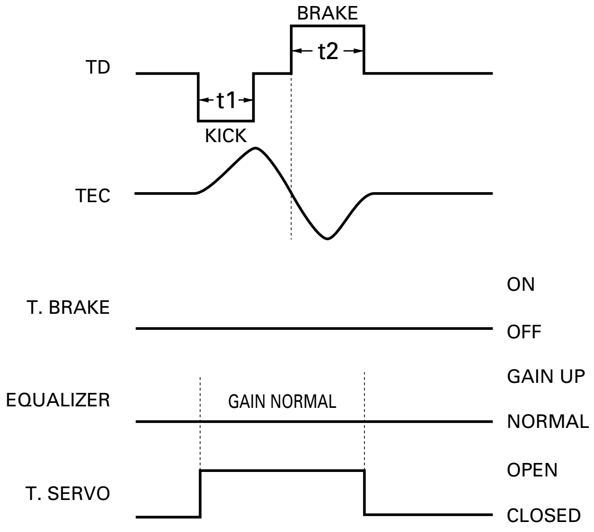


Fig.13 : SINGLE TRACK JUMP

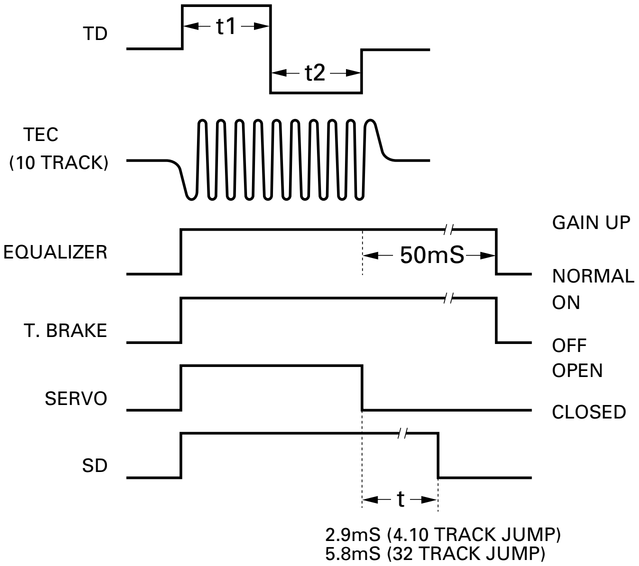
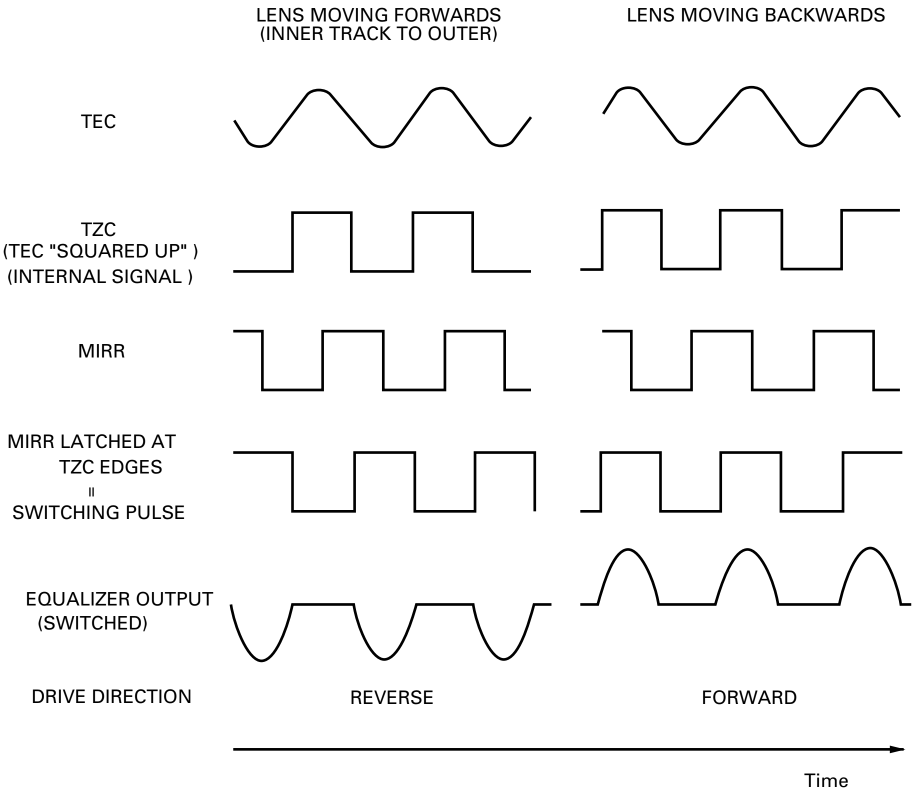


Fig.14 : MULTI-TRACK JUMP

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 hava 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.

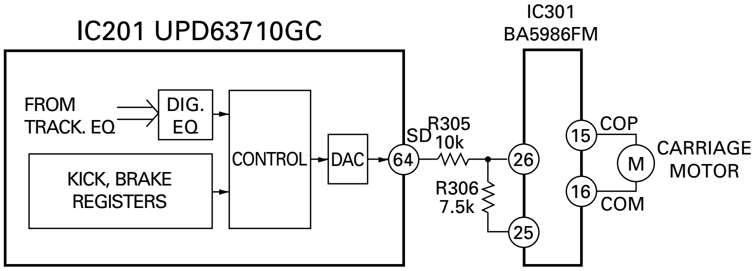


Fig.16 : CARRIAGE SERVO BLOCK DIAGRAM

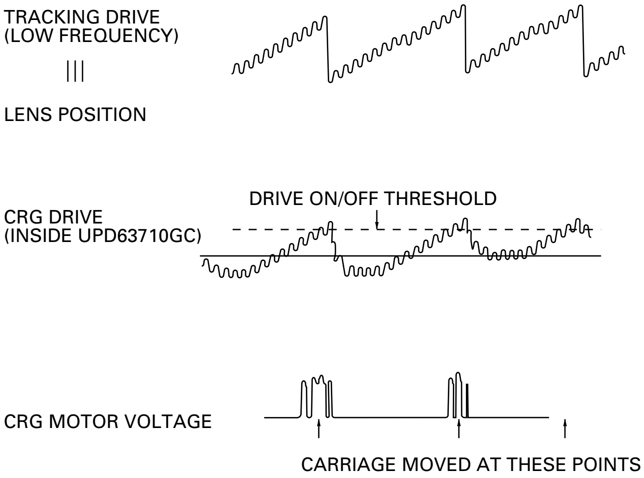


Fig.17 : CARRIAGE SIGNAL WAVEFORM

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.

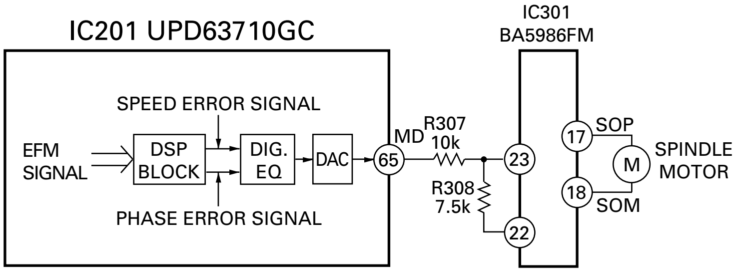


Fig.18 : SPINDLE SERVO MOTOR BLOCK DIAGRAM

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 :

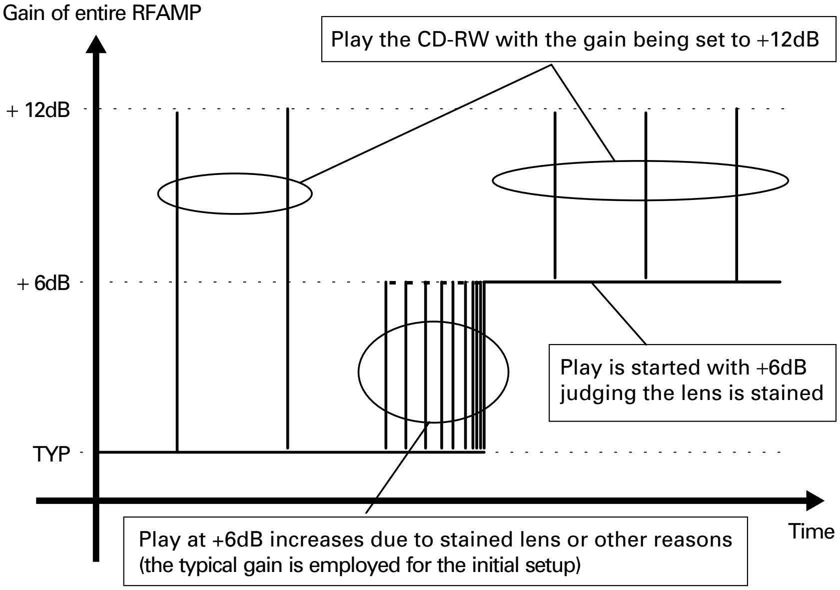


Fig.19 : CONCEPTUAL DIAGRAM OF PRE-AMP GAIN ADJUSTMENT

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 × 40 mV = 120 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 bee 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).

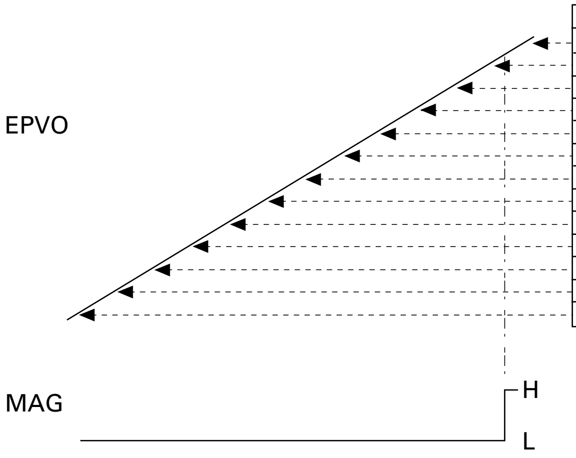
VD	:Main power source. Generated in the expansion board.
5VA	:Power source for IC201 and the Pick-up Unit. Generated by the regulator IC (IC101) from VD.
4R3VLR	:Audio midpoint voltage. Generated by the regulator IC (IC603) from VD.
EVREF	:Power source for Linear Position Sensor. A/D reference voltage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



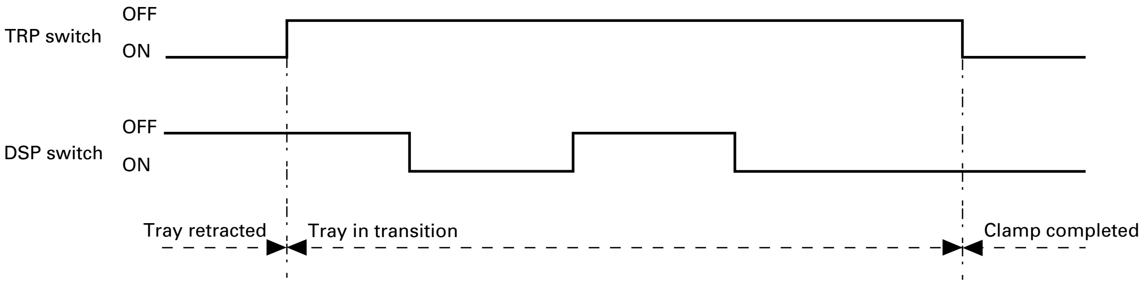
	min	typ	max
EJECT Voltage position	EREF+446LSB		
DISC1 Voltage position	EREF+367LSB	EREF+377LSB	EREF+387LSB
DISC2 Voltage position	EREF+260LSB	EREF+270LSB	EREF+280LSB
DISC3 Voltage position	EREF+193LSB	EREF+203LSB	EREF+213LSB
DISC4 Voltage position	EREF+125LSB	EREF+135LSB	EREF+145LSB
DISC5 Voltage position	EREF+ 58LSB	EREF+ 68LSB	EREF+ 78LSB
DISC6 Voltage position	EREF+ 0LSB	EREF+ 0LSB	EREF+ 0LSB
DISC7 Voltage position	EREF- 78LSB	EREF- 68LSB	EREF- 58LSB
DISC8 Voltage position	EREF-145LSB	EREF-135LSB	EREF-125LSB
DISC9 Voltage position	EREF-213LSB	EREF-203LSB	EREF-193LSB
DISC10 Voltage position	EREF-280LSB	EREF-270LSB	EREF-260LSB
DISC11 Voltage position	EREF-348LSB	EREF-338LSB	EREF-328LSB
DISC12 Voltage position	EREF-416LSB	EREF-406LSB	EREF-396LSB

* 1LSB=approx 4.88mV (5/1024V)

Fig. 20

2) Tray Extension and Retractino

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.

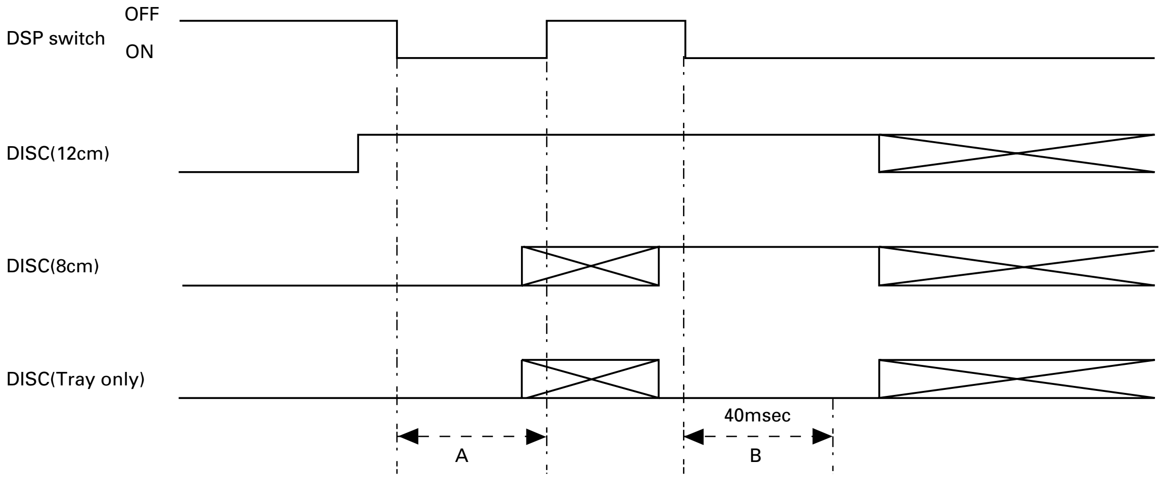
Each motor is driven by the driver IC302 (LB1836M). LB1836M is an IC which usually operated through the combination of H and L of the 4 lines I1, I2, I3 and I4. With this system, I1=I3 and control is realized through a combination of H and L of the 3 lines I1, I2 and I4.

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 determinating 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.

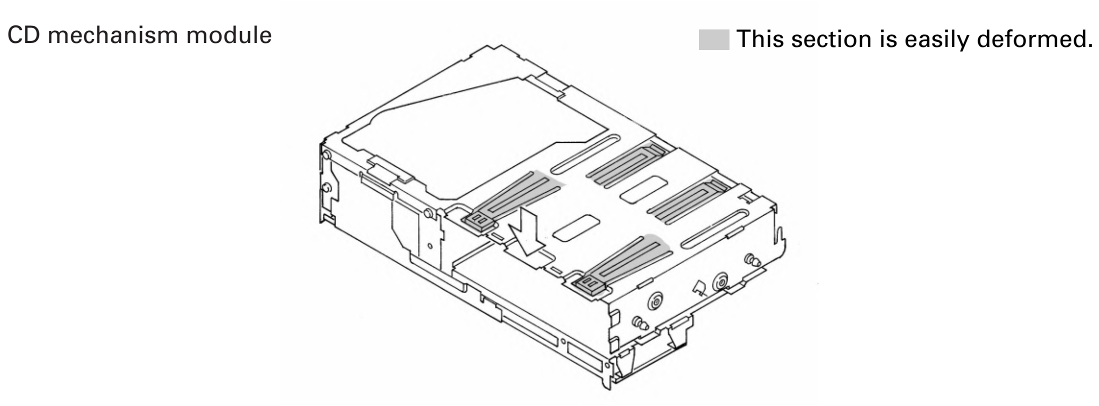


Fig. 21

2) The stage mechanism section projects below the chassis when positioned at the tenth 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.

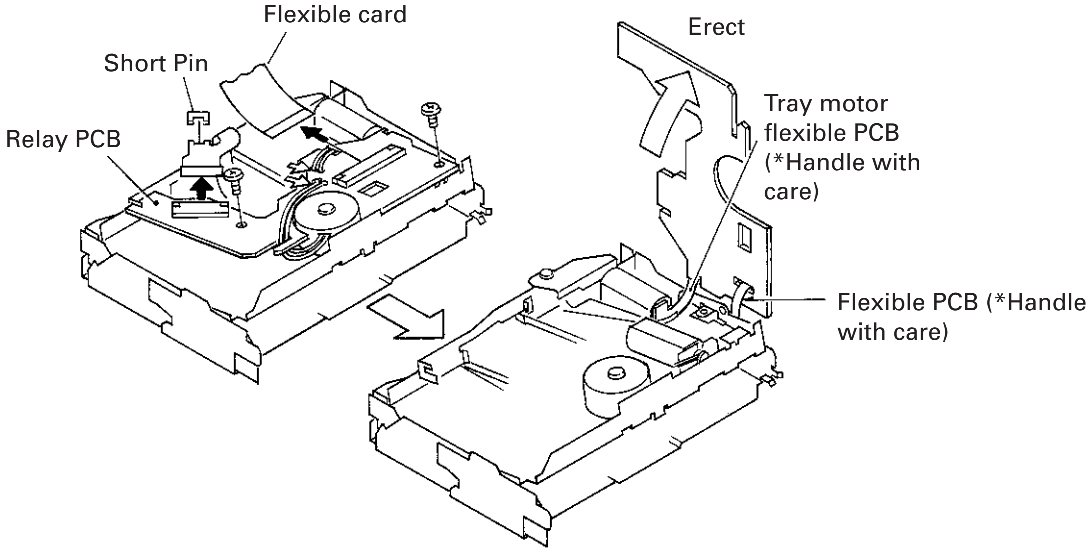


Fig. 22

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

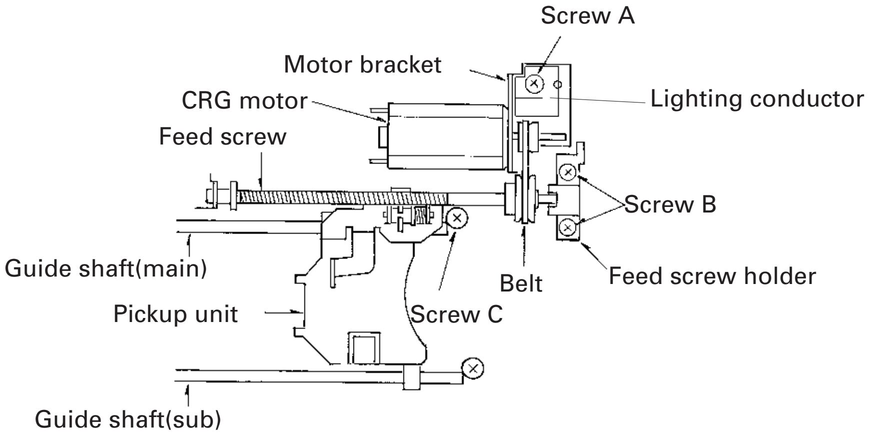


Fig. 23

● 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 D and three screws E and then the CD core unit (see Fig. 24).

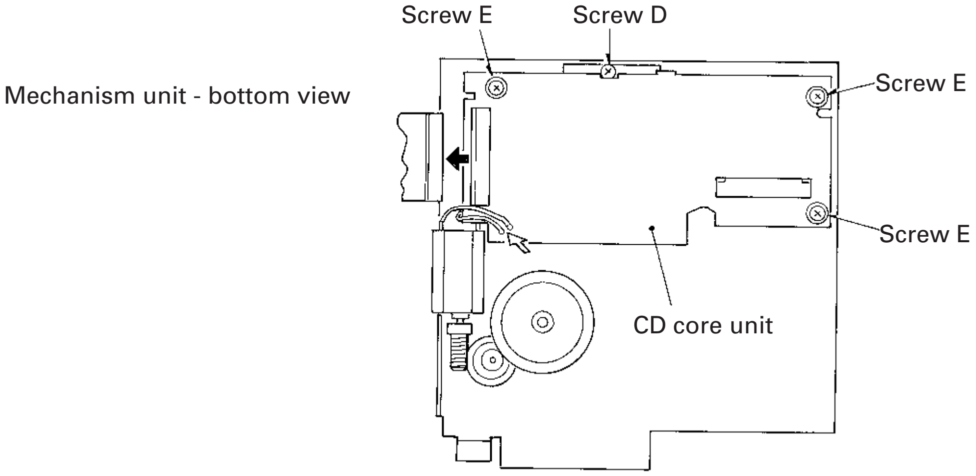


Fig. 24

● 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.

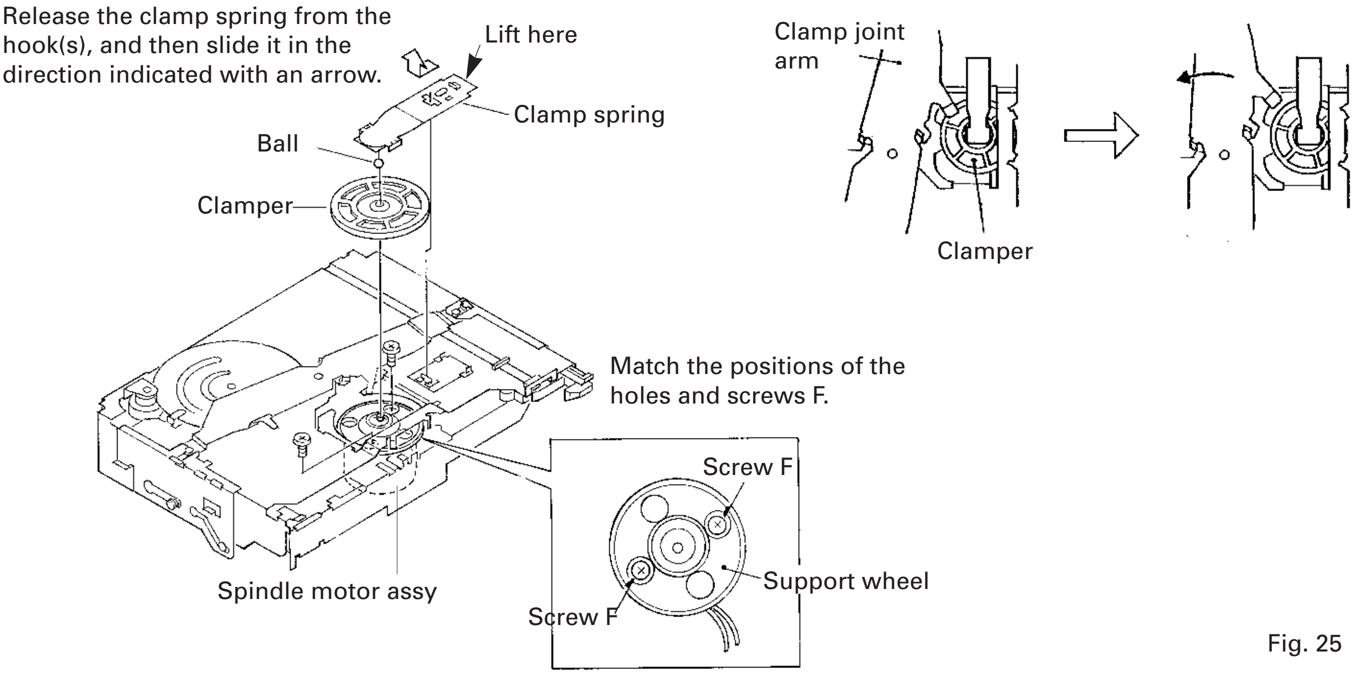
● Removing the Carriage Motor Assy

After removing the pickup unit (see "Removing the Pickup Unit" in pages 17 and 18), remove the feed screw, 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 clamper.
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 clamper, be careful not to lose the ball mounted between the clamper and clamp spring.


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

Match the positions of the holes and screws F.

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).

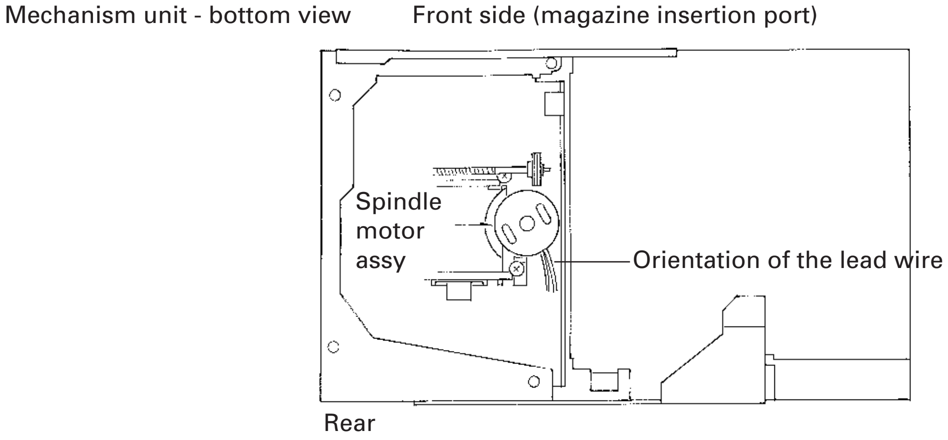


Fig. 26

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

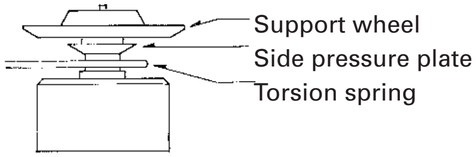


Fig. 27

3. When mounting the clamper, 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 "4" 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.

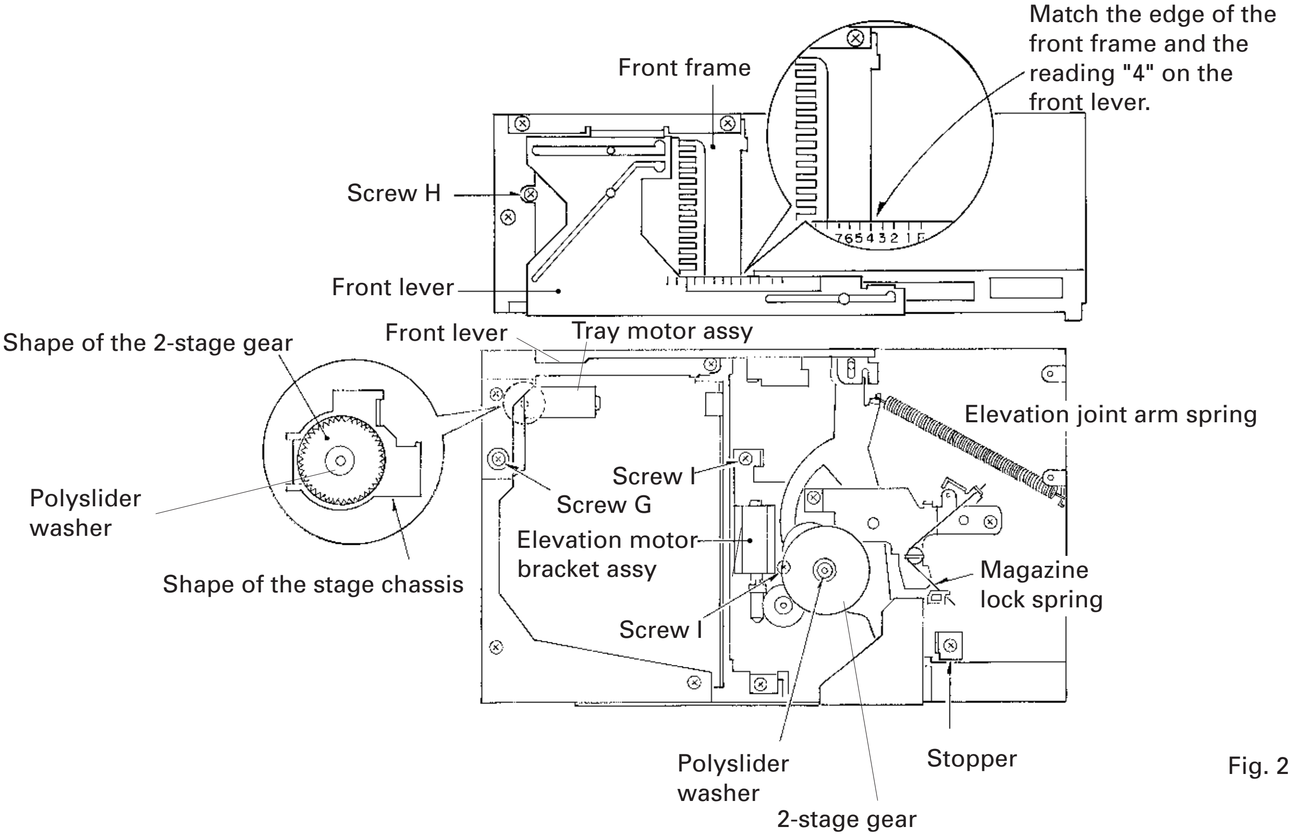
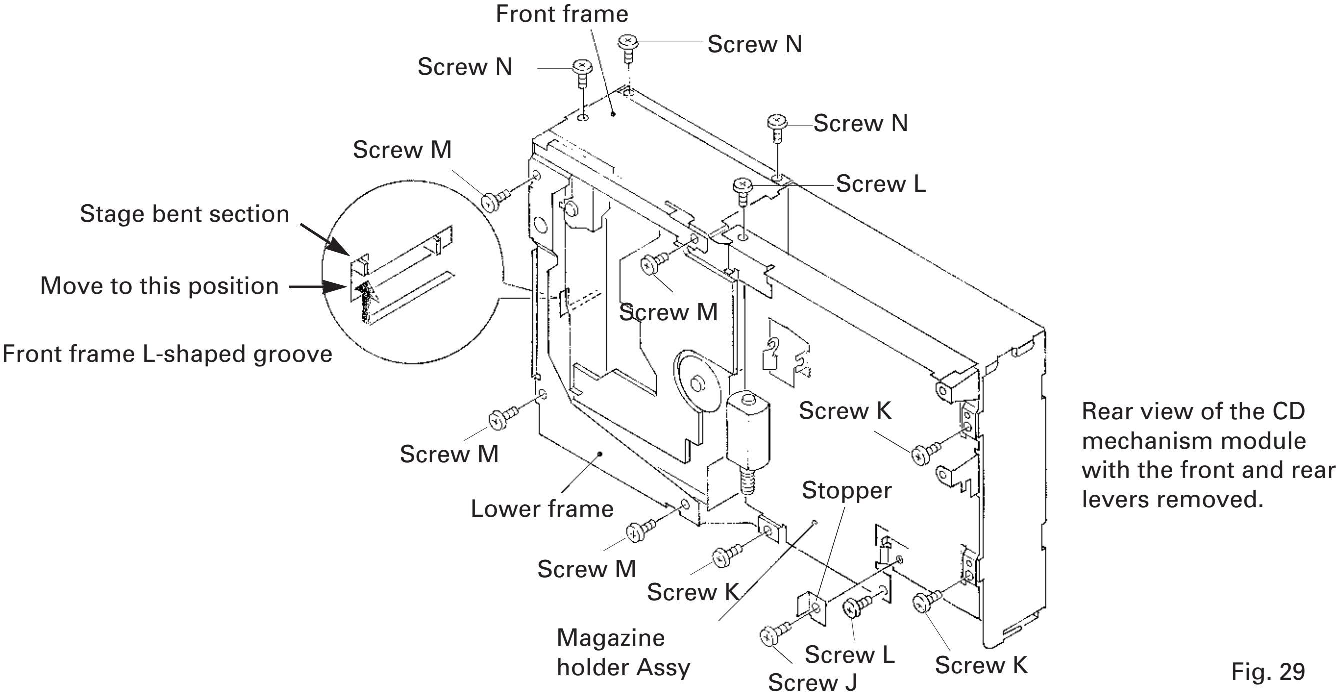


Fig. 28

● 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.



Rear view of the CD mechanism module with the front and rear levers removed.

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).

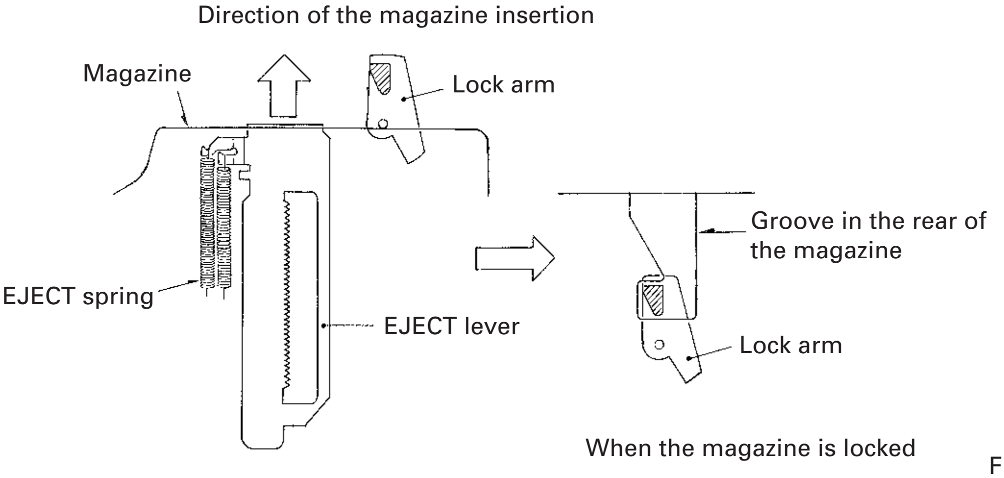


Fig. 30

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)

When the magazine is not inserted

After the magazine has been inserted

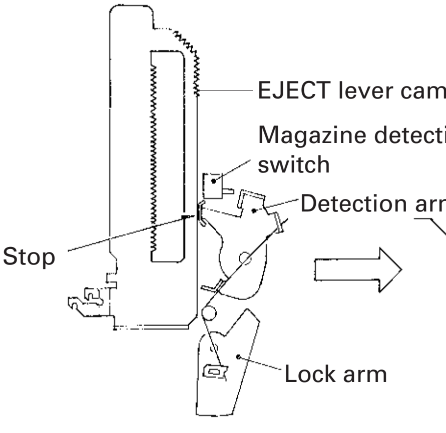


Fig. 31

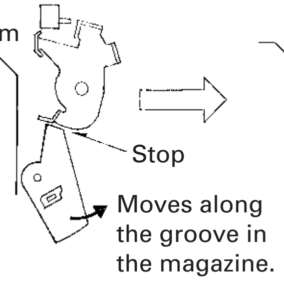


Fig. 32

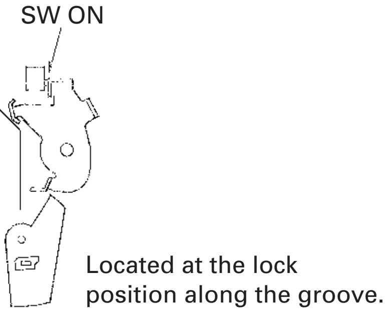


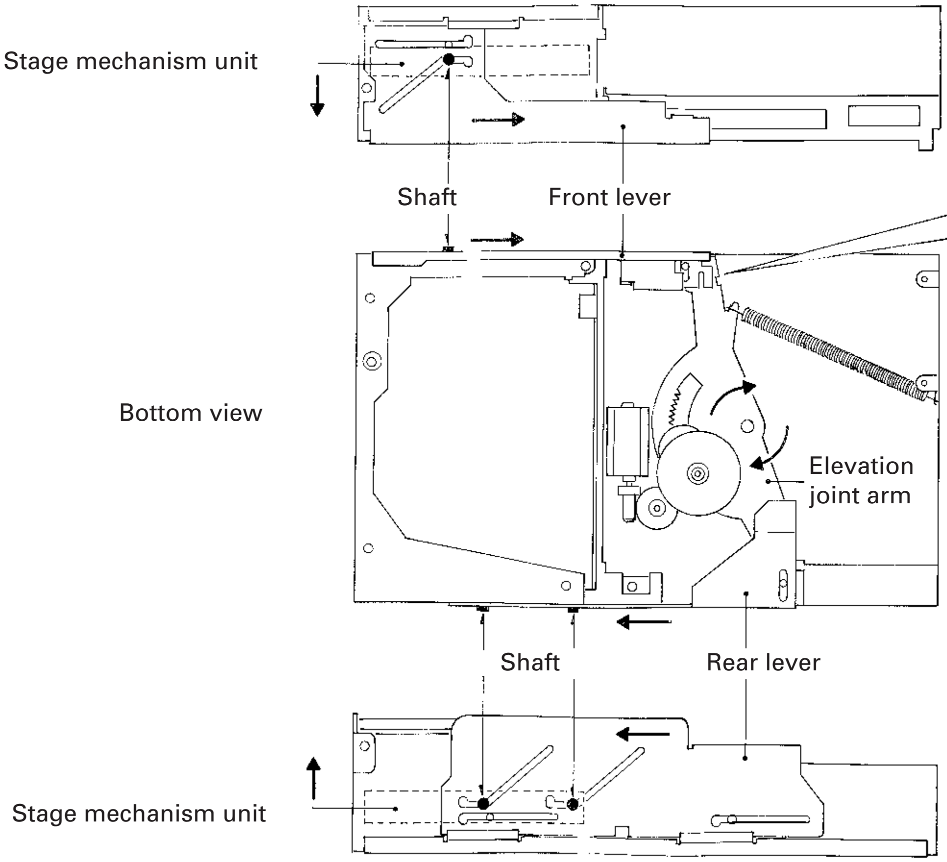
Fig. 33

● 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.



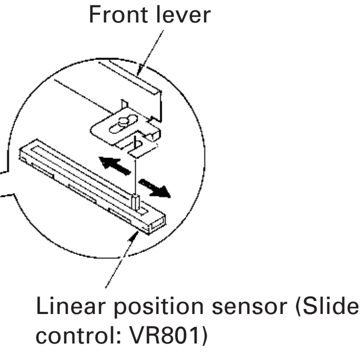


Fig. 35

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.

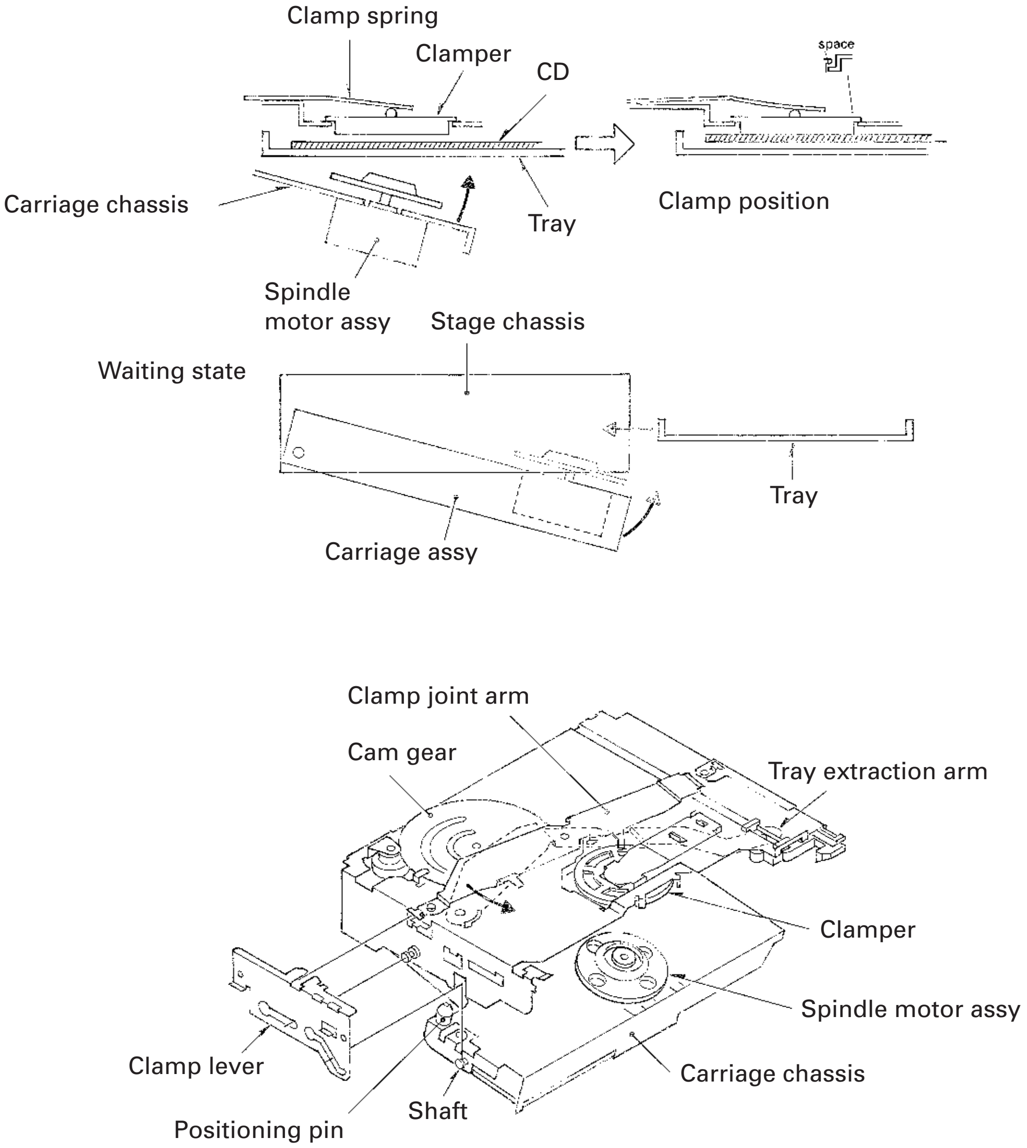


Fig. 36

● 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.

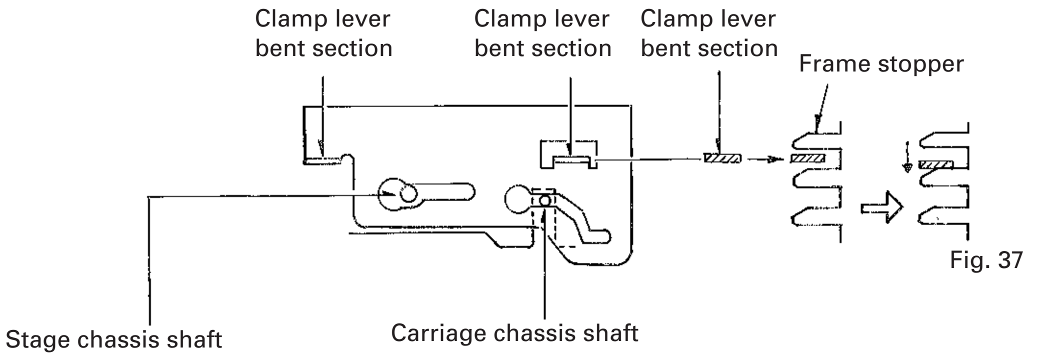


Fig. 37

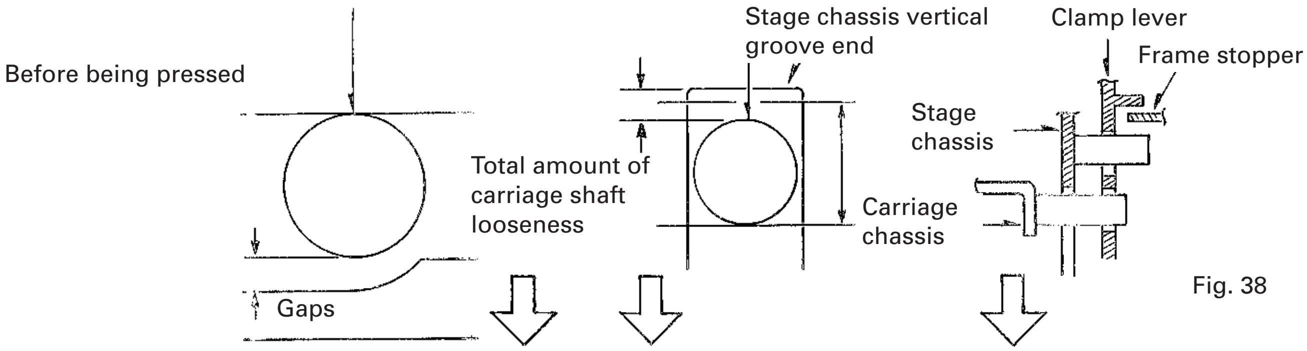
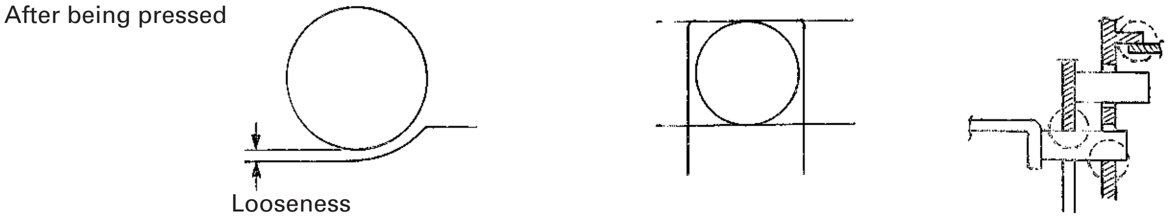


Fig. 38



The play of each section is eliminated by pressing the sections marked by circles.

Fig. 39

● Disc detection

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.

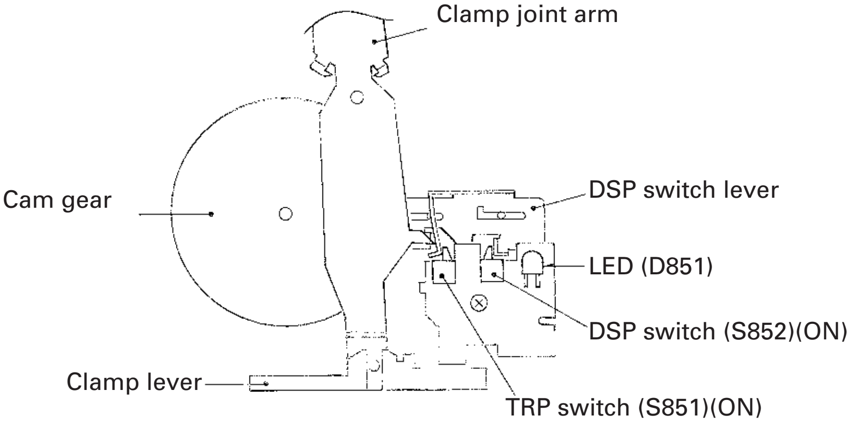


Fig. 40

B) Tray return (see Fig. 41)
The TRP switch (S851) is turned on by the DSP switch lever moved by the cam gear.

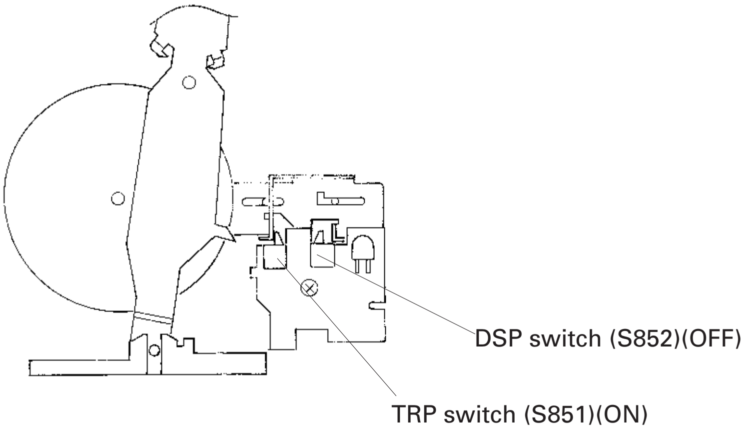


Fig. 41

● 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

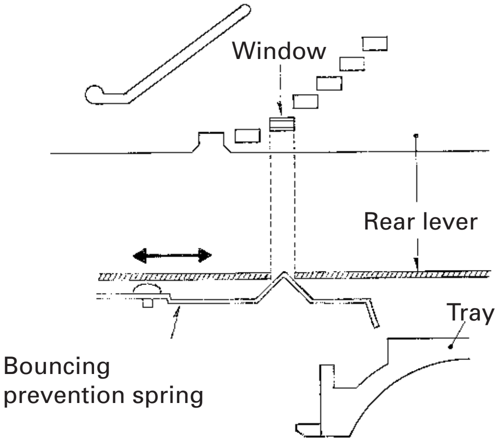


Fig. 42

When set to a position other than PLAY

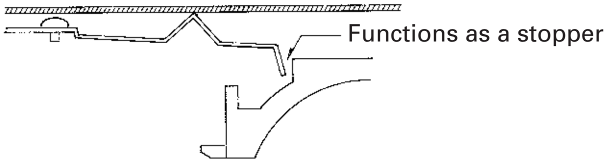


Fig. 43

● 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.

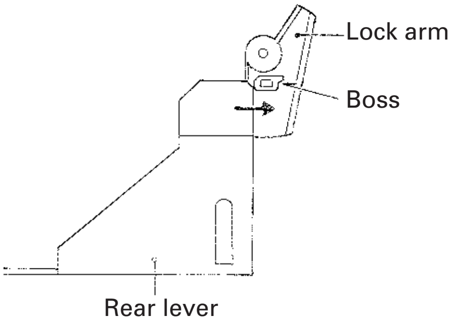
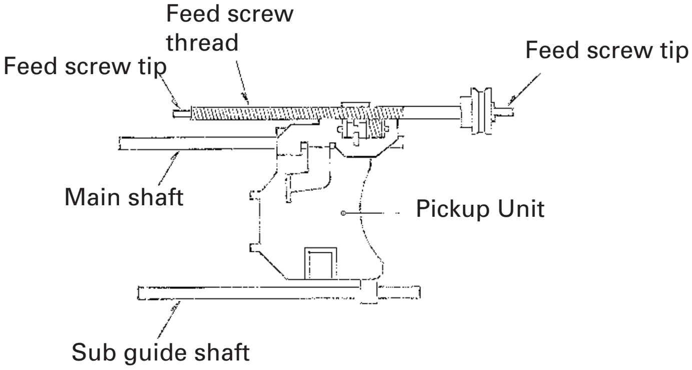


Fig. 44

● Lubrication points (Fig. 45)

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



(2) Slide section with clamp ball

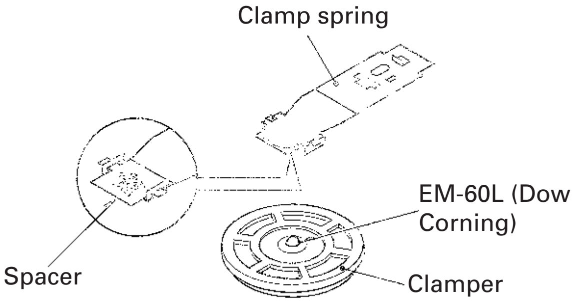


Fig. 45

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