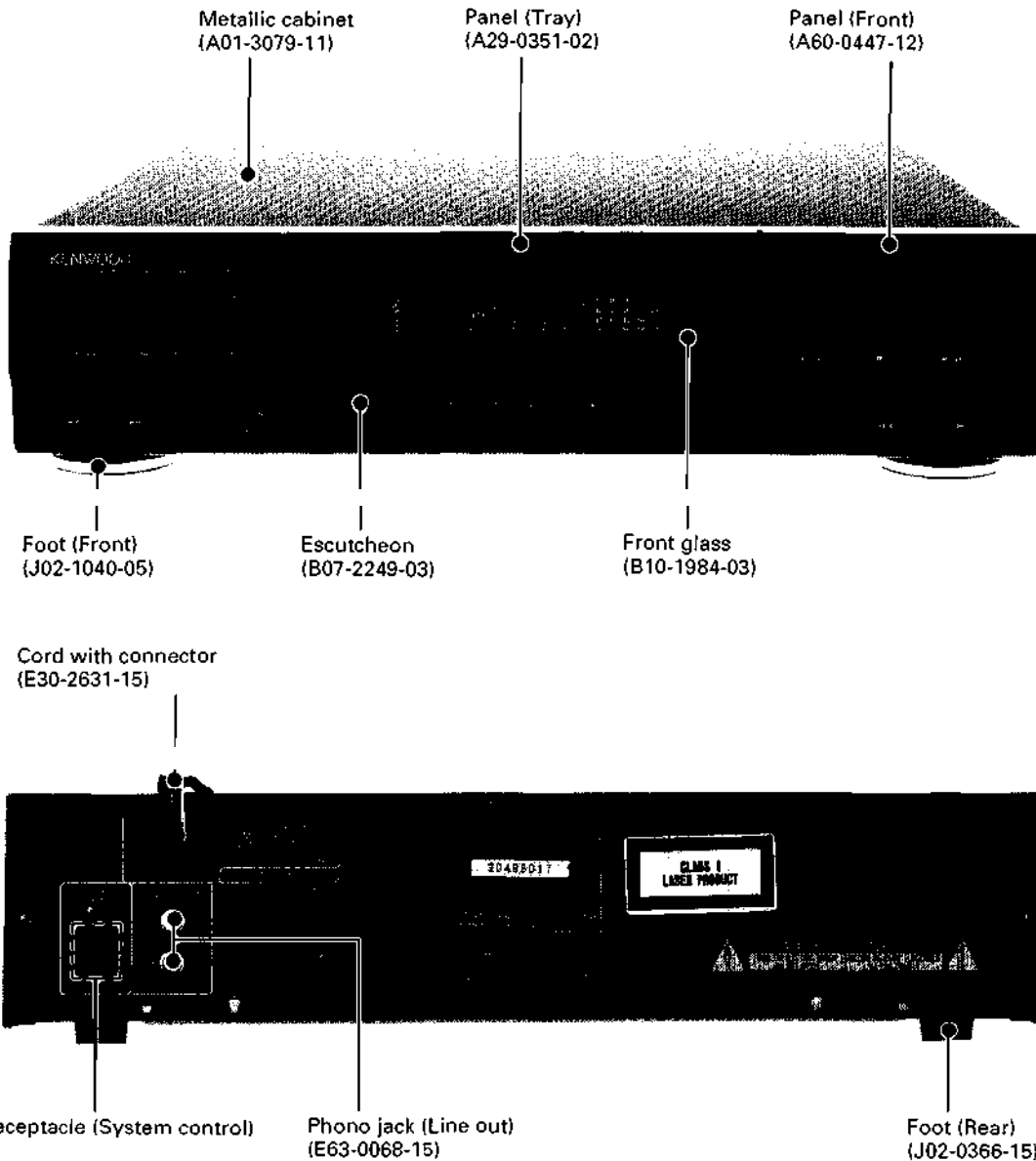


COMPACT DISC PLAYER

DP-M87

SERVICE MANUAL

KENWOOD

© 1993-6 PRINTED IN JAPAN
B51-4801-00(O)2180

Refer to DP-MA5/MA9 service manual (B51-4588-00), if need description in detail.

CAUTION : When doing repair of DP-M87 be sure to have the customer bring the A-57, A-77, A-87, A-97 or use power supply jig RM-90PS, or supply to 9V AC to terminal Nos 1 and 2 of WH4 on the X25-5350 (X25-5440) PC board ass'y. If not get 9V AC, please order the A-848's power transformer (parts No. L07-0038-05 / 120V / 220V / 240V). Refer to the DP-911 service manual. Don't use the "RHEOSTAT".

In compliance with Federal Regulations, following are reproductions of labels on, or inside the product relating to laser product safety.

KENWOOD-Corp. certifies this equipment conforms to DHHS Regulations No. 21 CFR 1040. 10, Chapter 1, Subchapter J.

DANGER : Laser radiation when open and interlock defeated. AVOID DIRECT EXPOSURE TO BEAM.

DP-M87

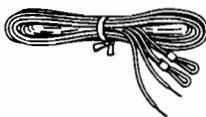
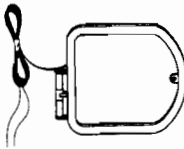
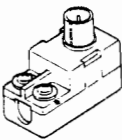



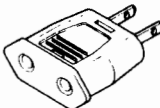


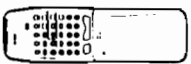
CONTENTS/ACCESSORIES

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NOTE : Refer to DP-MA5/MA9 service manual (B51-4588-00), if need description in detail.

ACCESSORIES Magazine is packed with the CD player.

<ul style="list-style-type: none"> • FM indoor antenna 1 (T90-0175-05) 	<ul style="list-style-type: none"> • AM loop antenna 1 (T90-0174-05) 	<ul style="list-style-type: none"> • Antenna adaptor 1 (T90-0185-05) : 75Ω / 300Ω T,E type only 	<ul style="list-style-type: none"> • Loop antenna stand 1 (J19-2815-04) 
<ul style="list-style-type: none"> • Audio cords (E30-0505-05) 3 (E30-0615-05) 1 	<ul style="list-style-type: none"> • System control cords (E30-2627-05) 1 (E30-2628-05) 1 	<ul style="list-style-type: none"> • AC plug adaptor 1 (E03-0115-05) : M type only  <p>For the unit with a European AC plug in areas other than Europe.</p>	<ul style="list-style-type: none"> • Magazine 1 (J19-3397-12) 
<ul style="list-style-type: none"> • Battery (AAA/R03) 2 (-) 	<ul style="list-style-type: none"> • Remote control unit 1 (X94-1011-41 : RC-77M) K-77M / 88M, MIDI M-57M / M-77M (X94-1050-11 : RC-97M) K-99M, MIDI M-97M 	<p>Battery cover (A09-0126-03) K-77M / 88M, MIDI M-57M / M-77M Battery cover (F07-0721-23) K-99M, MIDI M-97M</p>	

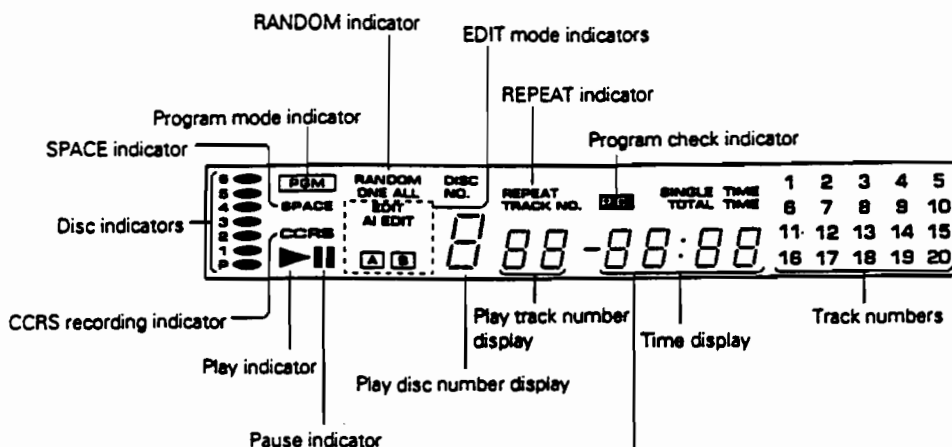
For M,X type

System name	Amp	Tuner	Cassette deck	CD player	Graphic equalizer (option)	Speaker
K-77M	A-57	T-76	X-57	DP-M87	GE-560	S-6M
K-88M	A-77	T-76	X-87	DP-M87	GE-760	S-8M
K-99M	A-87	T-76	X-87	DP-M87	GE-970	S-10M

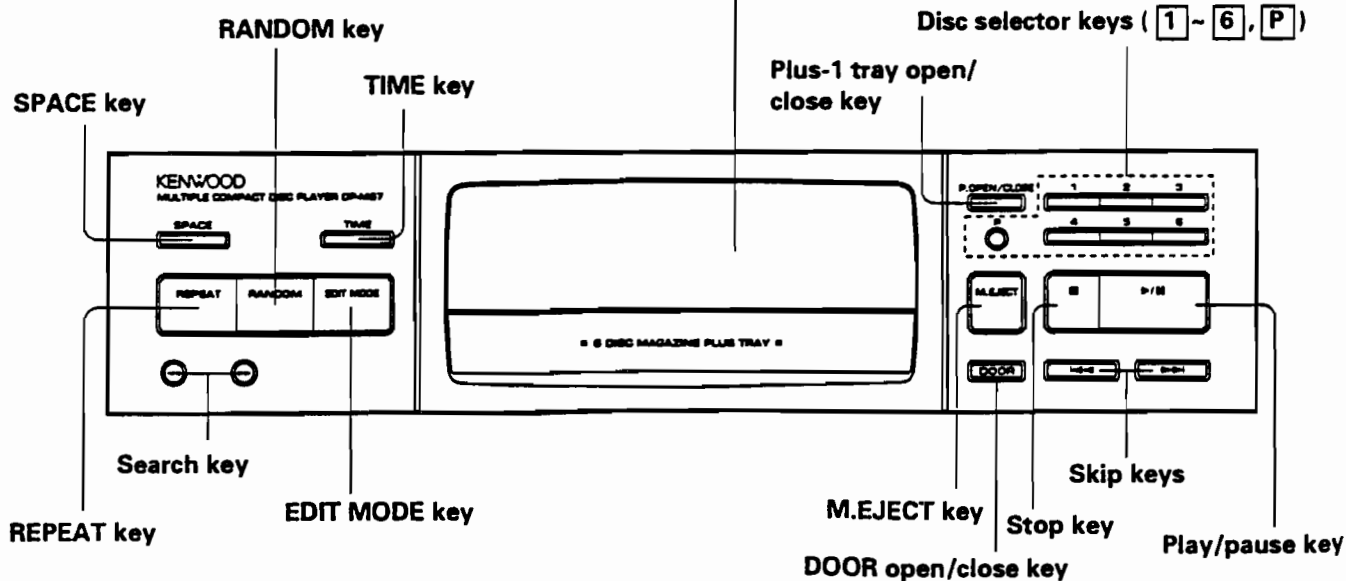
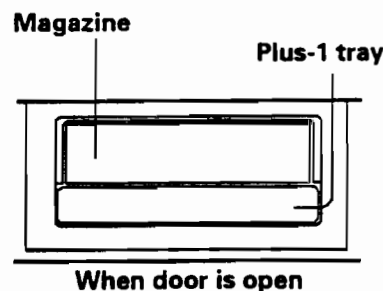
For E,T type

System name	Amp	Tuner	Cassette deck	CD player	Graphic equalizer (option)	Speaker
MIDI M-57M	A-57	T-76L	X-57	DP-M87	GE-560	LS-56
MIDI M-77M	A-77	T-76L	X-87	DP-M87	GE-760	LS-76
MIDI M-97M	A-97	T-76L	X-87	DP-M87	GE-970	LS-97

CONTROL



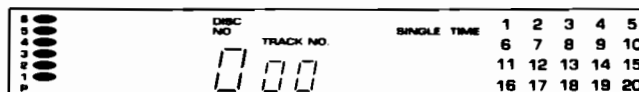
Display



Note related to transportation and movement

Before transporting or moving the CD PLAYER, carry out the following operations.

1. Turn the power ON but do not load a disc or magazine.
2. Wait a few seconds and verify that the display shown appears.
3. Turn the power OFF.



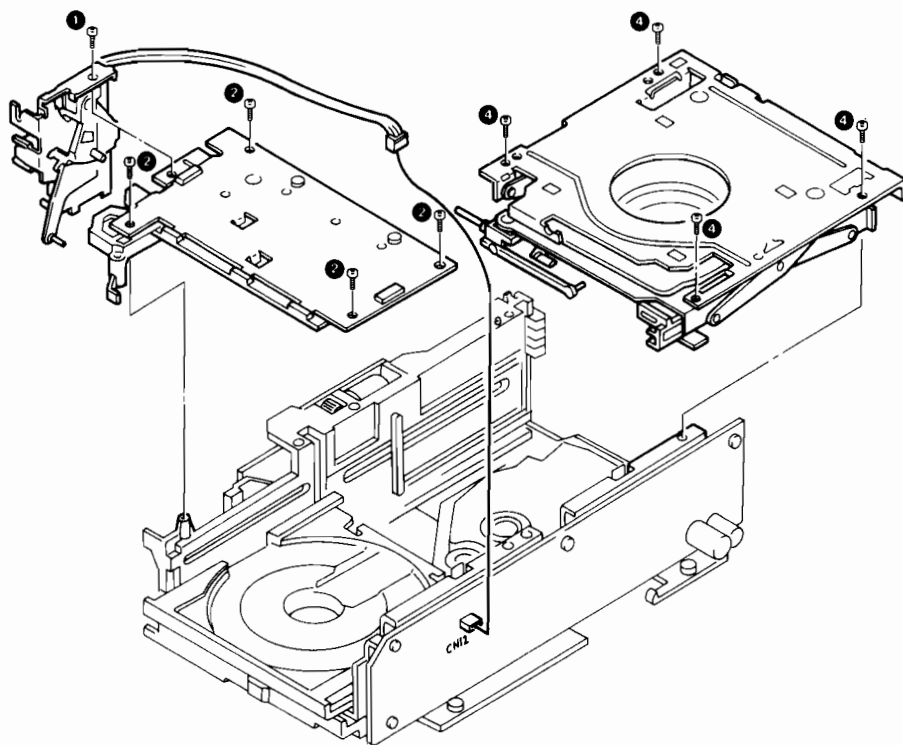
DISASSEMBLY FOR REPAIR

1. How to Disassemble MD (Mechanism Deck) ass'y

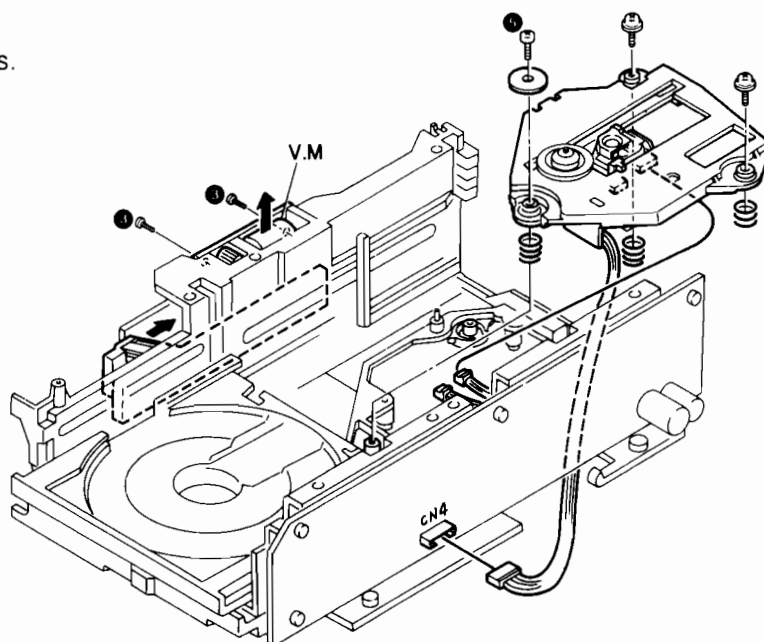
Deck) ass'y

* Take out Magazine pack.

1. Remove solenoid ass'y (①).
2. Remove magazine lock ass'y (②).



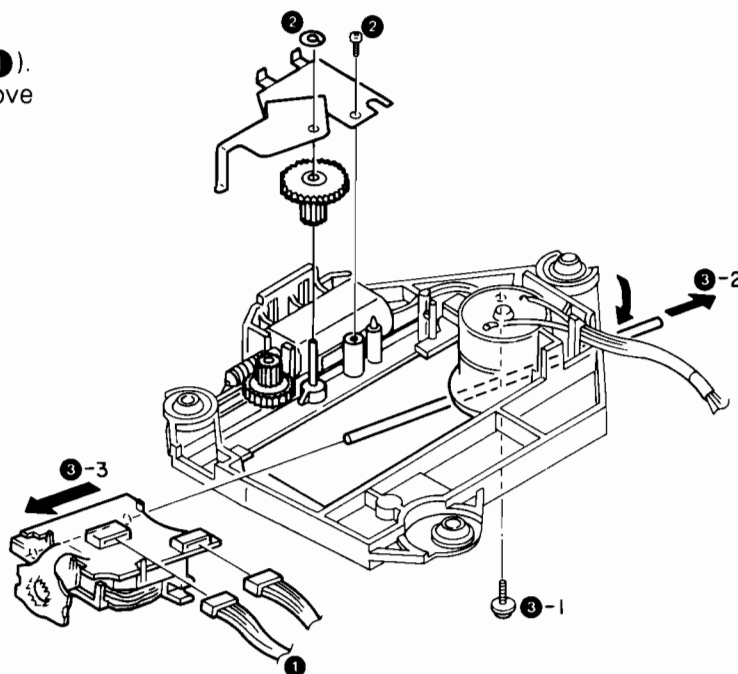
3. Remove screws of vertical motor (③).
4. Lift up motor and move slider fully backwards.
5. Remount vertical motor with screws.
6. Remove lifter ass'y (④).
7. Remove screws of MD ass'y (⑤).



DISASSEMBLY FOR REPAIR

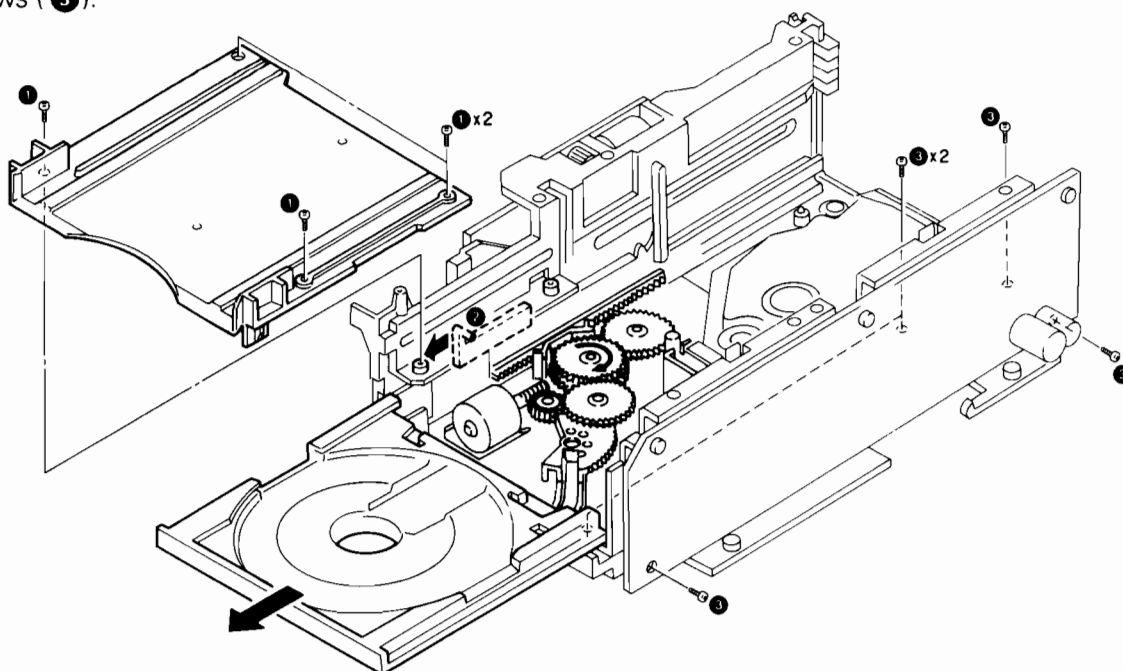
2. How to Replace the Pickup

1. Remove MD ass'y and connector for pickup (1).
2. Remove washer and screw (2). And remove feed gear.
3. Remove screw for pickup rod (3-1).
4. Pull out rod (3-2) and remove pickup (3-3).



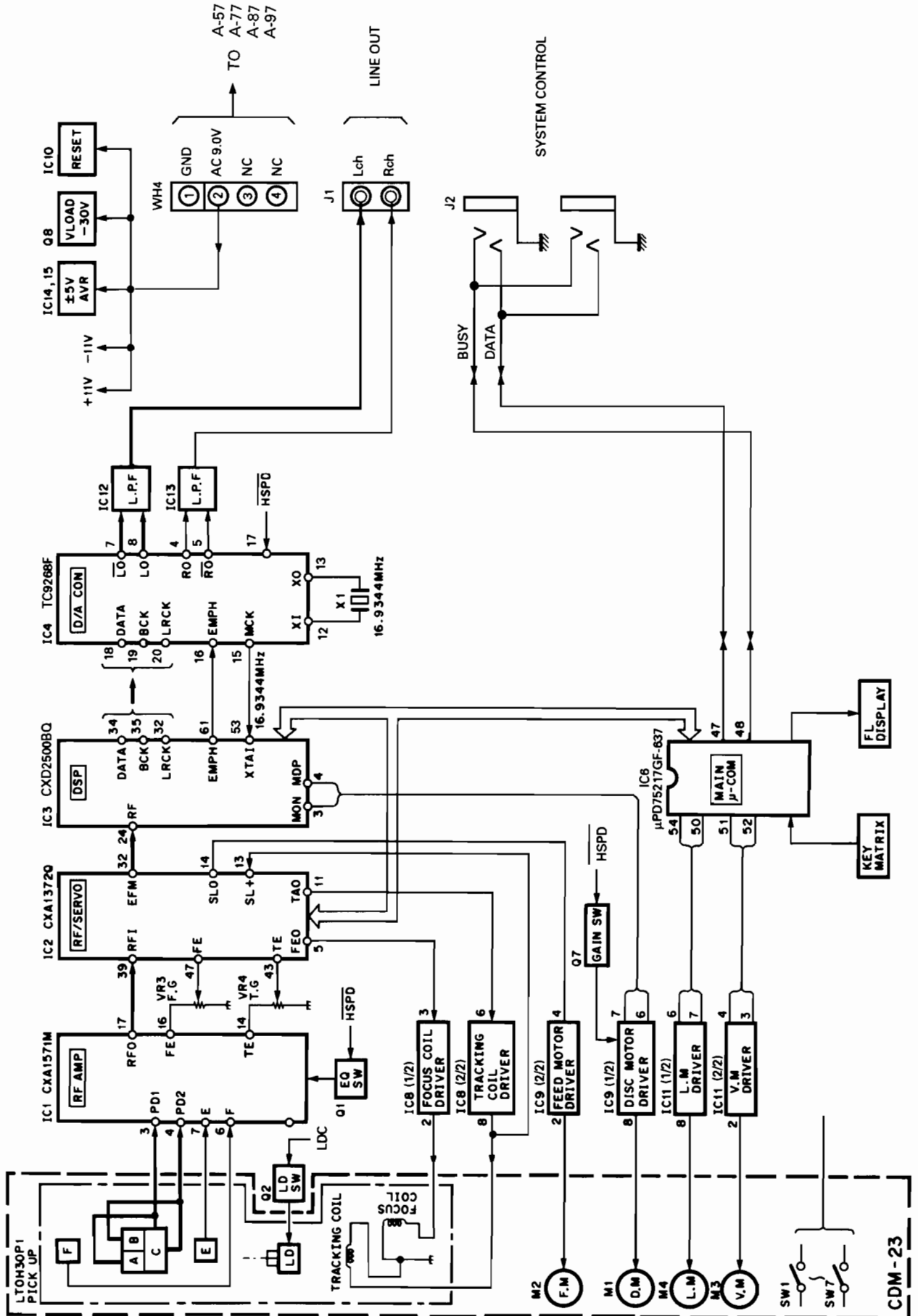
3. How to Remove Plus 1 Tray ass'y

1. Unscrew screws (1) and remove magazine pack holder.
2. Move lock lever (2) frontwards and pull out plus 1 tray frontwards. If not come out tray, turn gear clockwise.
3. Remove screws (3).



DP-M87

BLOCK DIAGRAM

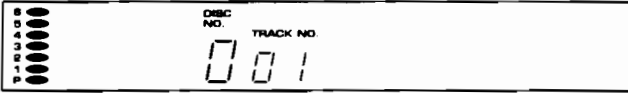
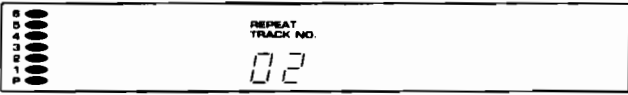
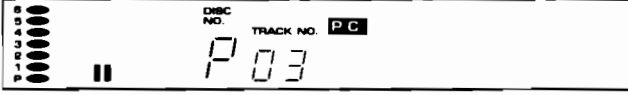
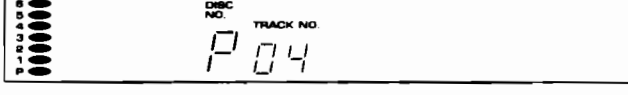
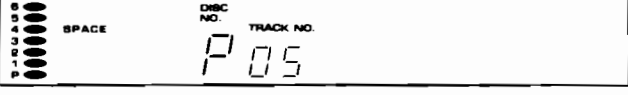
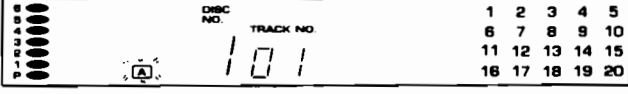
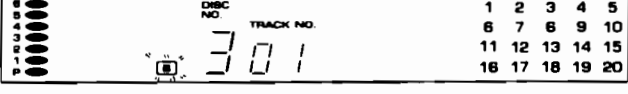


CIRCUIT DESCRIPTION

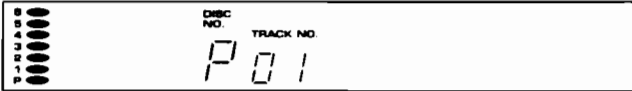

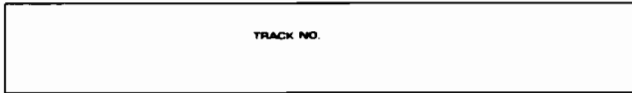
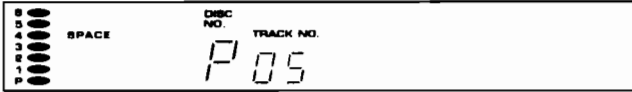
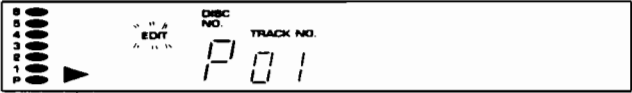
1. Test Mode

Setting the test mode

This microprocessor built in this unit (X32-) can be put to TEST MODE by just short-circuiting the test pins (#2 and #3).

No.	Input key	Function	Display
1	STOP	(1) Focusing servo OFF (2) Tracking servo OFF (3) Feed servo OFF	
2	REPEAT	(1) Laser (In STOP mode only) ON	
3	RANDOM	(1) Focusing servo ON (2) Tracking servo OFF (3) Feed servo OFF	
4	TIME	(1) Focusing servo ON (2) Tracking servo ON (3) Feed servo OFF	
5	PLAY	(1) Focusing servo ON (2) Tracking servo ON (3) Feed servo ON	
6	DISC 1	Load No.1 disc to No.6 in order.	
7	DISC 2	Read the TOC (table of contents) of disc No.3 to No.6 in order. TEST mode is cancelled after reading the TOC of No.6 disc, and then playback the 1st track.	

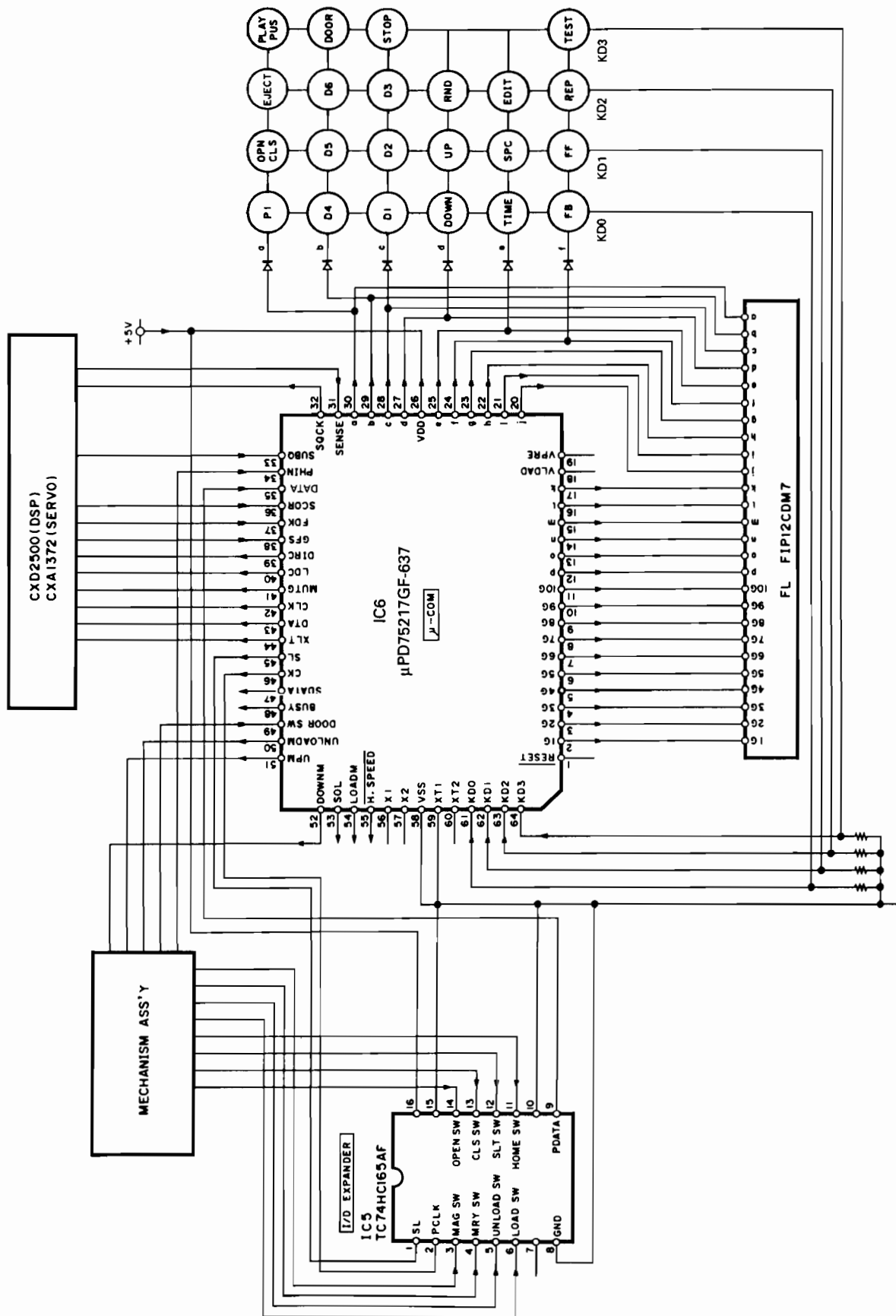
CIRCUIT DESCRIPTION

No.	Input key	Function	Display
8	DISC 3 ~ 6 DISC P	Load the decided No. disc which is pressed by the key and set to STOP mode. ex. Disc No.4 key is pressed (PLAY, CHECK and CLEAR keys are available to operate).	
9	UP	Turns all FL display lamps ON.	
10	DOWN	Turns all FL display lamps OFF. "DISC" and "1 ~ 6" are not off because circuit is static operation.	
11	EDIT	(1) Door opens. (2) P1 tray come out. Press "EDIT" key, "PLAY MODE".	
12	FF	In the STOP mode, moves the pickup slightly toward the outer position of disc.	
13	FB	In the STOP mode, moves the pickup slightly toward the inner position of disc.	
14	SPACE	High-speed playback CHECK mode (in stop mode only) playback P1 disc in high-speed mode. If press "SPACE" key, change to normal mode. In this mode, all keys are available.	

CIRCUIT DESCRIPTION

2. Microprocessor : μ PD75217GF-637 (IC6)

2-1. Pin connection diagram



CIRCUIT DESCRIPTION

2-2. Pin functions : μ PD75217GF-637 (IC6)

Pin No.	Pin name	I/O	Function
1	RESET	-	Reset input port
2 ~ 11	1G ~ 10G	O	FL grid control port
12 ~ 17	p ~ k	O	Not used
18	VLOAD	I	FL driver negative power supply
19	VPRE	I	FL pre-driver power supply
20 ~ 25	j ~ e	O	FL grid control port also used for key-scan
26	VDD	-	+5V power supply
27 ~ 30	d ~ a	O	FL grid control port also used for key-scan
31	SENSE	I	Signal detection port for SENSE signal from signal processor and servo IC
32	SQCK	O	Q-data read clock output port
33	SUBQ	O	Q-data input port
34	PHIN	I	Photo interrupter input port for mechanism (PH1)
35	DATA	I	Data input from TC74HC165AF
36	SCOR	I	Sub-code frame sync detection signal input port
37	FOK	I	Input port of FOK signal from RF amp
38	GFS	I	Input port of frame sync signal
39	DIRC	O	DIRC control port of servo IC
40	LDC	O	Laser ON/OFF signal output
41	MUTG	O	Mute port of signal processor
42	CLK	O	Signal processor and servo IC control out port (CLOCK)
43	DATA	O	Signal processor and servo IC control out port (DATA)
44	XLT	I	Signal processor and servo IC control out port (LATCH)
45	S/L	I	Latch output port of TC74HC165AF
46	CK	O	Clock output port of TC74HC165AF
47	SDATA	I/O	Serial DATA in/out port
48	BUSY	I/O	Serial BUSY in/out port
49	DOORSW	O	Door switch input port of mechanism
50	UNLOADM	O	Control port of unloading motor for mechanism
51	UPM	O	Control port of up motor for mechanism
52	DOWNM	O	Control port of down motor for mechanism
53	SOL	O	Control port of solenoid for mechanism
54	LOADM	O	Control port of loading motor for mechanism (L.M.)
55	H.SPEED	O	High-speed control port (Active L)
56	X1	I	Oscillation input port (4.19MHz)
57	X2	-	NC
58	Vss	-	GND
59	XT1	-	GND
60	XT2	-	NC (Open)
61 ~ 64	KD0 ~ 3	I	Key input port

2-3. Pin functions : TC74HC165AP (IC5)

Pin No.	Pin name	I/O	Function
1	SL	I	Shif load input
2	PCLK	I	Clock input
3	MAGSW	I	Magazine switch (SW4)
4	MRYSW	I	Memory switch (SW3)
5	UNLOADSW	I	Unload switch (SW5)
6	LOADSW	I	Load switch (SW5)
7	-	O	No use
8	GND	-	Ground
9	PDATA	O	Data output
10	-	I	No use
11	HOMESW	I	Home position switch (SW2)
12	SLTSW	I	Start limit switch (SW1)
13	CLSSW	I	Tray close switch (SW6)
14	OPNSW	I	Tray open switch (SW6)
15	-	I	No use
16	Vcc	-	Power supply (+5V)

2-4. TOC data output of serial codes for AI file

When the CD player reads the TOC data of a disc (in the play mode), the following serial codes (16 bits) are output.

- **CD MAX TRACK No. [61XX]**

Model code 61H

Function codeXXH (Max TNO)

- **CD TOTAL TIME (min.) [62XX]**

Model code 62H

Function codeXXH (Total time in min.)

- **CD TOTAL TIME (sec.) [62XX]**

Model code 63H

Function codeXXH (Total time in sec.)

Example

When a disc containing 20 tunes of 65 minutes and 2 seconds in total is played, the following three codes [6120], [6265] and [6302] are output continuously.

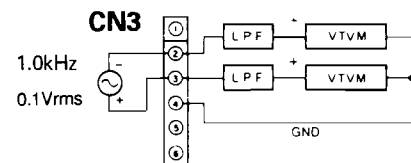
ADJUSTMENT

No.	ITEM	INPUT SETTING	OUTPUT SETTING	PLAYER SETTING	ALIGNMENT POINT	ALIGN FOR	FIG.
1	TRACKING ERROR BALANCE	Test disc Type 4	Connect an oscilloscope as follows. CH1: RF (CN3-1) CH2: TE (CN3-6)	Press the P. OPEN/CLOSE key to open the tray. Reset to TEST mode. Then, press the CHECK key. Confirm that the display is "03".	TE BALANCE VR2	Symmetry between upper and lower patterns, or DC=0±0.05V	(a)
2	FOCUS ERROR BALANCE	Test disc Type 4	Connect an oscilloscope as follows. CH1: RF (CN3-1) CH2: TE (CN3-6)	Press the PLAY key. Confirm that the display is "05".	FE BALANCE VR1	Optimum eyepattern Grating is correctly aligned with the RF level of 1.5Vp-p or more and the TE (servo open) level of 1.5Vp-p or more, the pickup is acceptable.	(b)
3	FOCUS GAIN	Test disc Type 4 Apply signal of 1kHz, 0.1Vrms to CN3 pin 2 and 3.	Connect a LPF to CN3 pin 2-3, to which connect an oscilloscope or two AC voltmeters.	Press the PLAY key. Confirm that the display is "05".	FOCUS GAIN VR3	Two VTVMs should read the same value.	(c)
4	TRACKING GAIN	Test disc Type 4 Apply signal of 1.3kHz, 0.1Vrms to CN3 pin 5 and 6.	Connect a LPF to CN3 pin 5-6, to which connect an oscilloscope or two AC voltmeters.	Press the PLAY key. Confirm that the display is "05".	TRACKING GAIN VR4	Two VTVMs should read the same value.	(c)

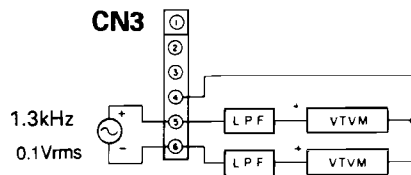
(NOTE) Type 4 disc : SONY VEDS-18 TEST DISC or equivalent. LPF: around 47kohms-390pF or so. Adjustment procedures are in TEST MODE.

(c) Focus Gain and Tracking Gain Adj.

Focus gain adj.

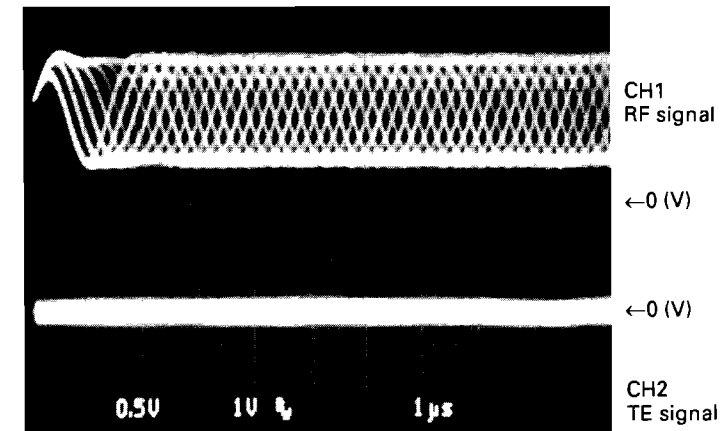


Tracking gain adj.



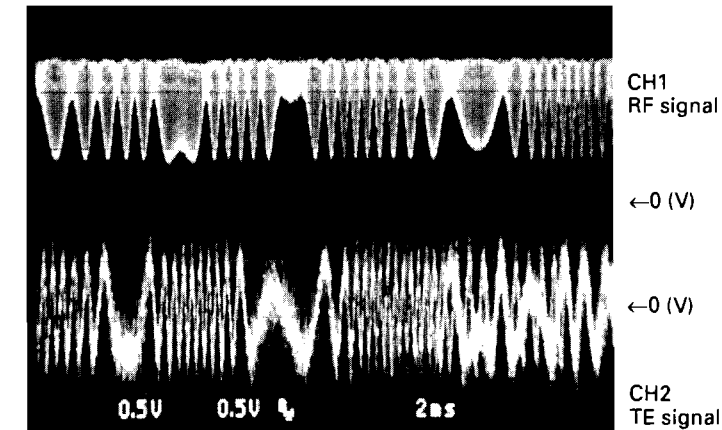
ADJUSTMENT

RF level Wave-form



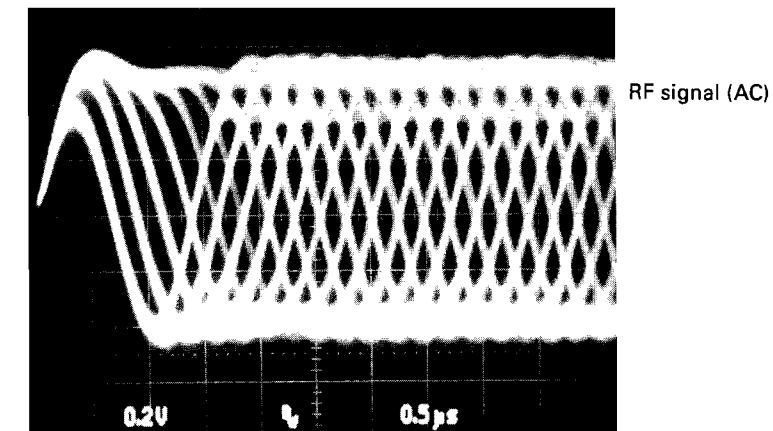
- RF signal and E.Spot signal in test mode (PLAY).

Tracking error balance



- RF signal and T.Error signal; in test mode (Focusing ON). (Disc type 4)
- Adjust T.Error so that the waveform is symmetrical above and below 0V (VR2).

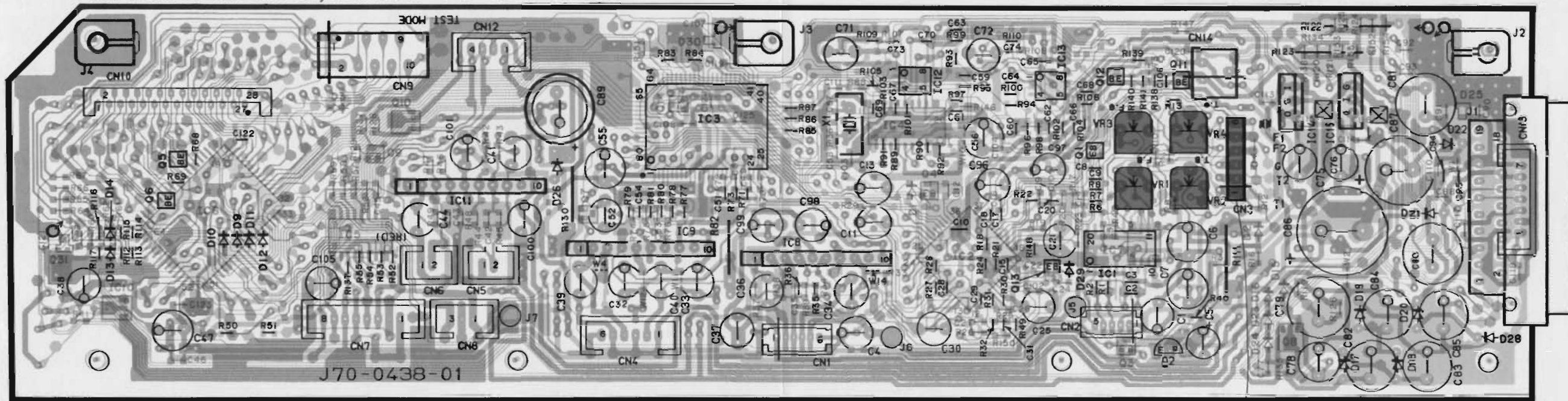
Focus error balance



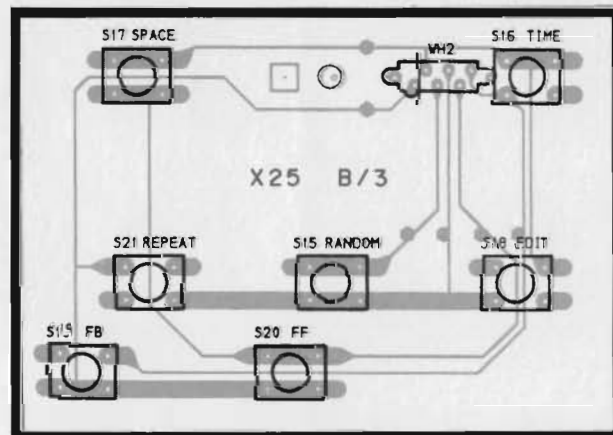
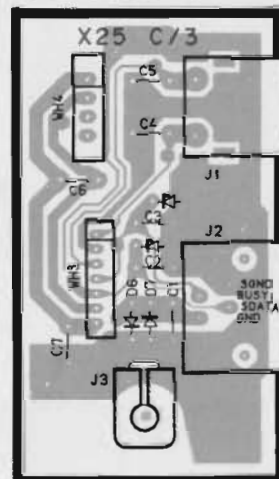
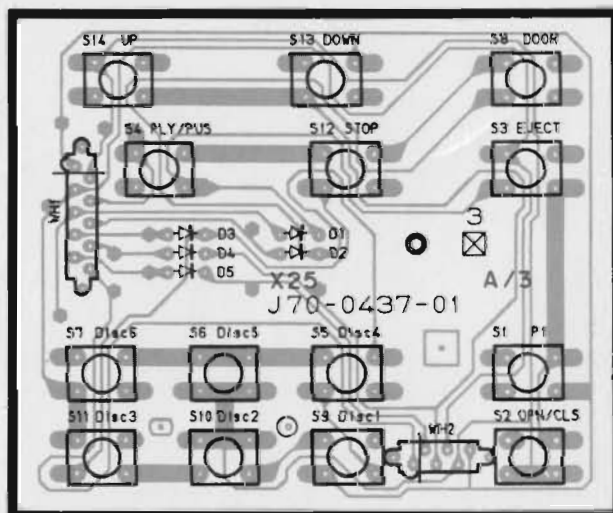
- RF signal in test mode (PLAY).
- Perform the tangential and focusing offset adjustments so that each of the center cross points are focused into one point on the display. The crossing points above and below the center shall also be displayed clearly.

PC BOARD (COMPONENT SIDE VIEW)

X32-2550-71: JAPAN MADE, X32-2590-71: SINGAPORE MADE



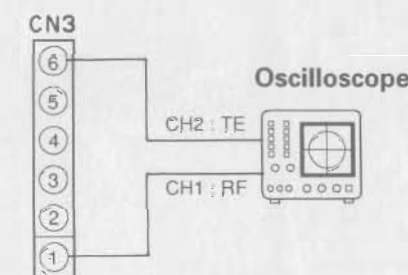
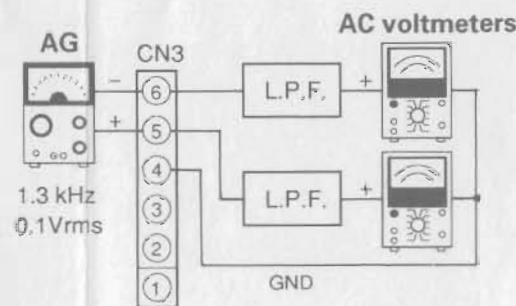
X25-5350-70: JAPAN MADE, X25-5440-70: SINGAPORE MADE



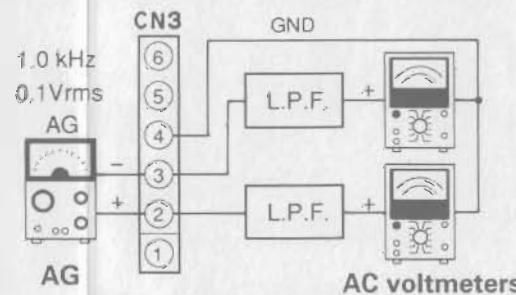
(c) Tracking gain : Two VTVMs should read the same value.

(a) Tracking error balance : Symmetry between upper and lower patterns or DC=0±0.05V,

(b) Focus error balance : Optimum eye pattern.



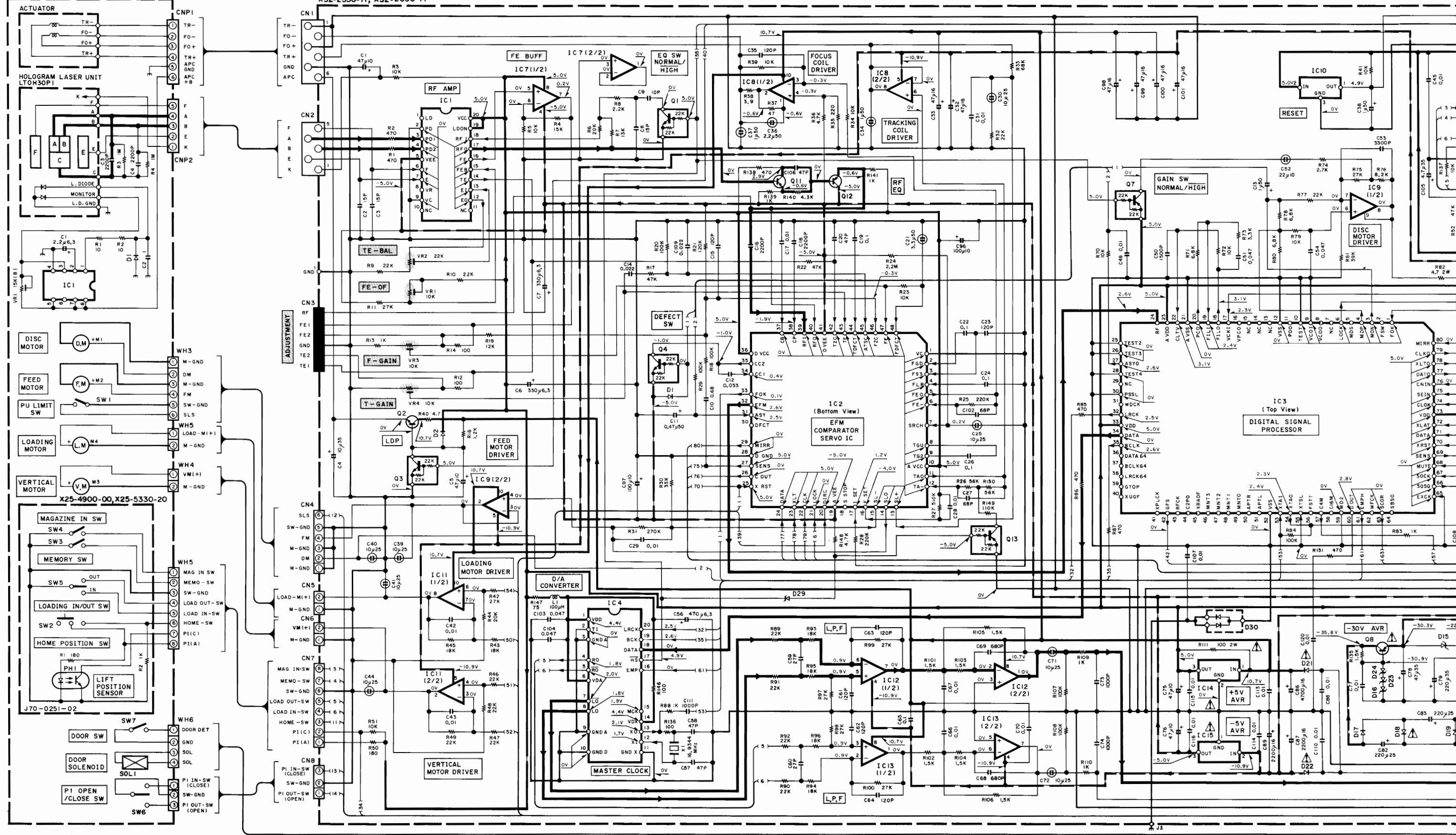
(c) Focus gain : Two VTVMs should read the same value.



Refer to the schematic diagram for the values of resistors and capacitors.

MECHANISM ASS'Y (CDM-23) X92-1749-51, X92-1839-51

X32-2550-71, X32-2590-71



2SC3246

DTA124EU
DTC124EU
2SA1576
2SC4081

2SB1308

2SD1963

LA6510
TA8410AK

NJM4565M

TC74HC165AF

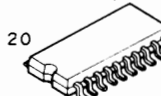
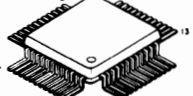
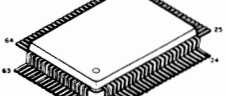
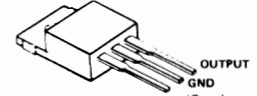
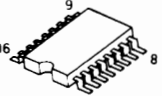
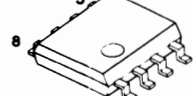
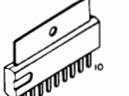
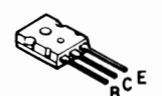
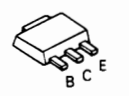
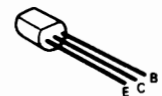
LM2940CT-5.0

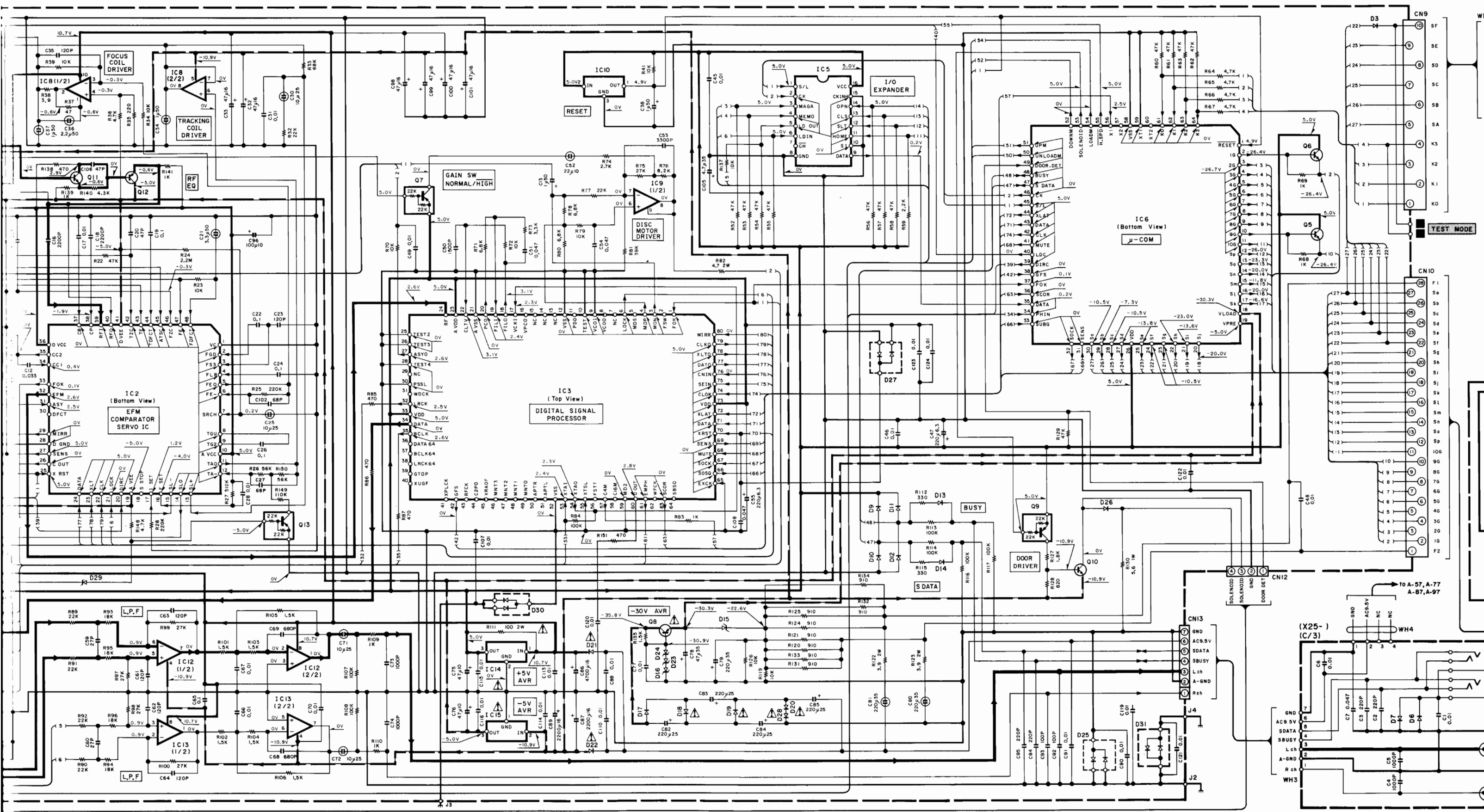
CXA1571M

CXD2500BQ

CXA1372Q

TC9268F





TC74HC165AF

LM2940CT-5.0

CXA1571M

CXD2500BQ

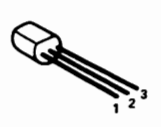
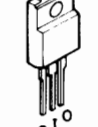
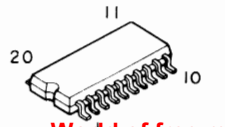
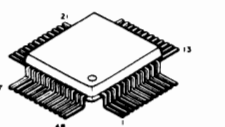
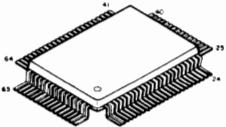
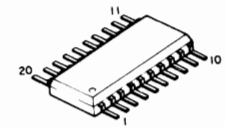
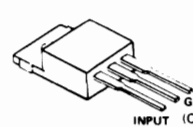
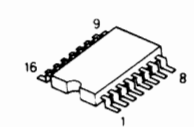
CXA1372Q

TC9268F

UPC7905HF

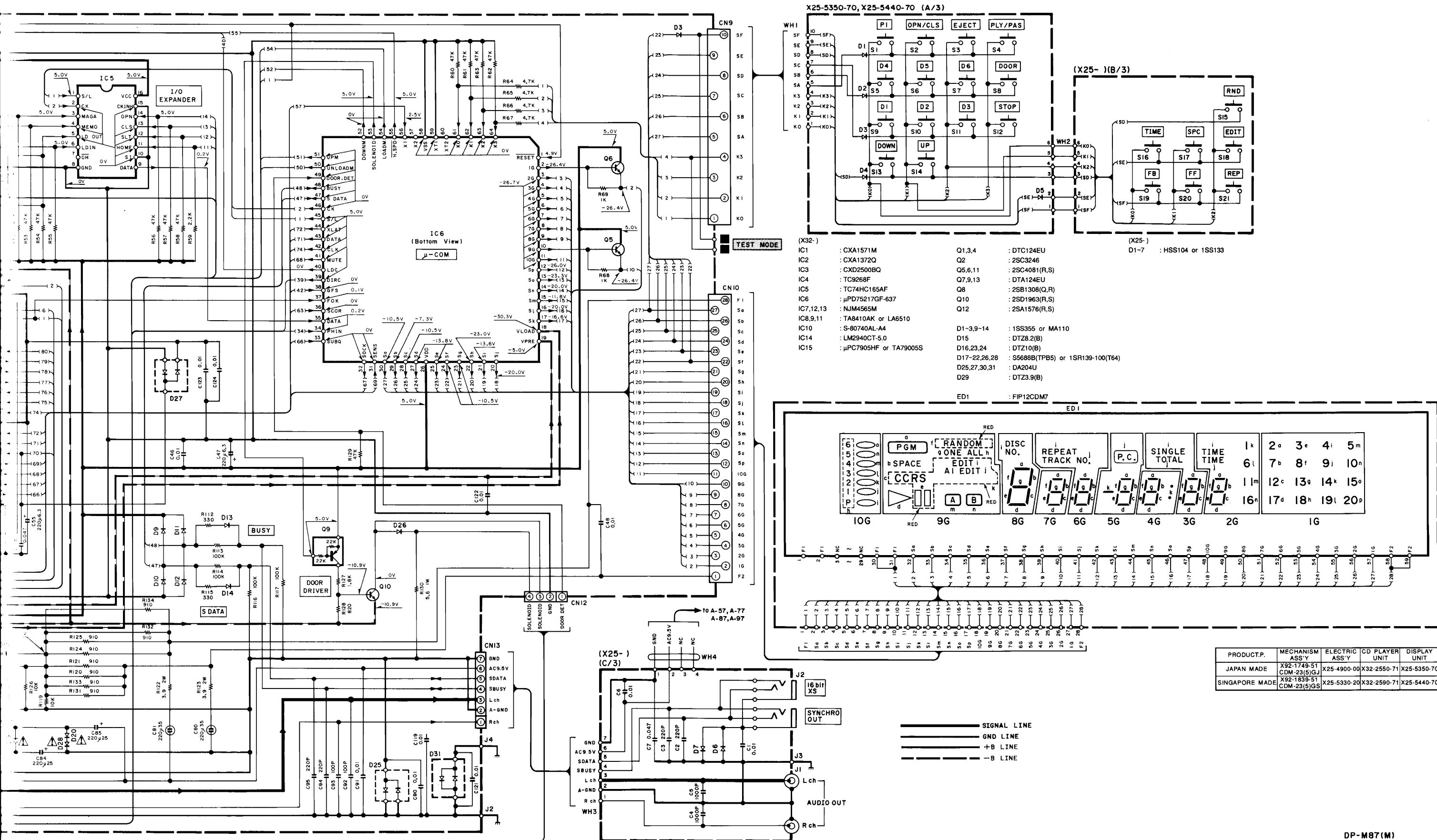
TA79005S

S-80740AL-A4



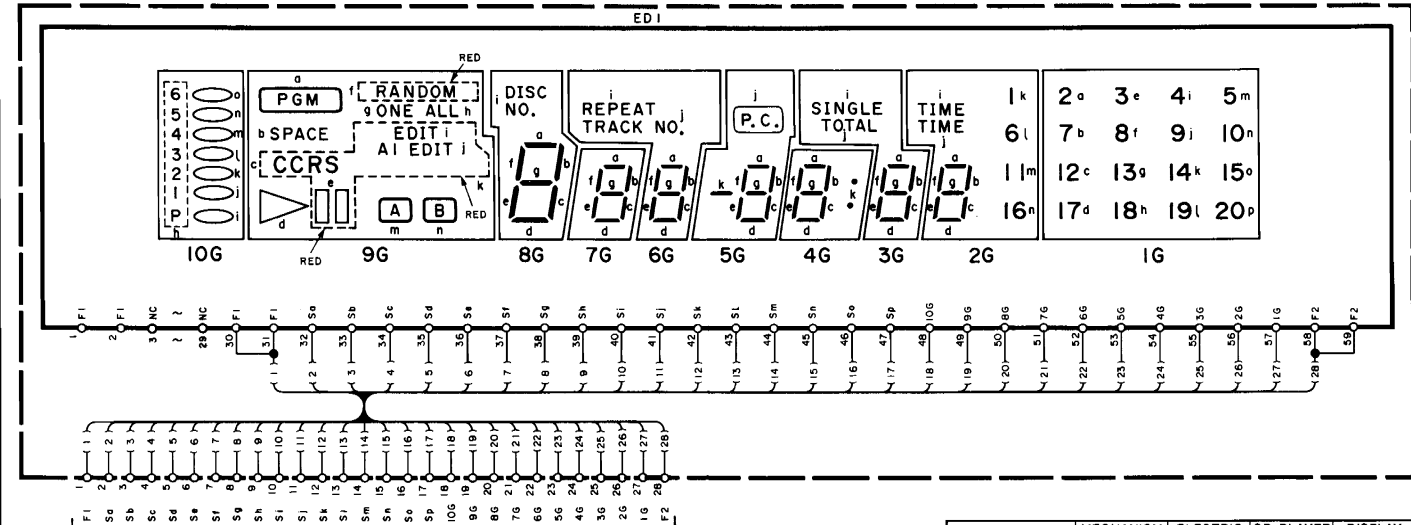
• DC voltages are as measured with a high impedance voltmeter. Values are in volts and/or units.

CAUTION : For continued safety, replace safety critical components (see list). Δ Indicates safety critical components. To reduce the risk of electric shock, the user must be instructed that the equipment must be properly grounded out (exposed parts are acceptably insulated from the supply circuit) before

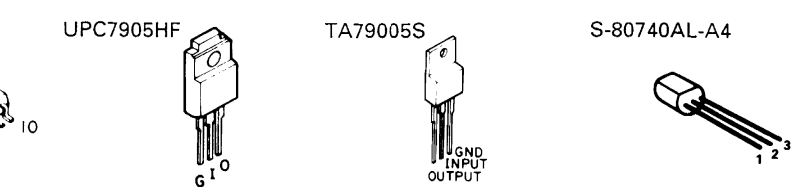
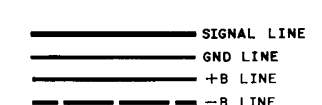


- (X32-)
- IC1 : CXA1571M
 - IC2 : CXA1372Q
 - IC3 : CXD2500BQ
 - IC4 : TC9268F
 - IC5 : TC74HC165AF
 - IC6 : μ PD75217GF-637
 - IC7,12,13 : NJM4565M
 - IC8,9,11 : TA8410AK or LA6510
 - IC10 : S-80740AL-A4
 - IC14 : LM2940CT-5.0
 - IC15 : μ PC7905HF or TA79005S
- Q1,3,4 : DTC124EU
- Q2 : 2SC3246
- Q5,6,11 : 2SC4081(R,S)
- Q7,9,13 : DTA124EU
- Q8 : 2SB1308(Q,R)
- Q10 : 2SD1963(R,S)
- Q12 : 2SA1576(R,S)
- D1-3,9-14 : 1SS355 or MA110
- D15 : DTZ8.2(B)
- D16,23,24 : DTZ10(B)
- D17-22,26,28 : S5688B(TPB5) or 1SR139-100(T64)
- D25,27,30,31 : DA204U
- D29 : DTZ3.9(B)
- ED1 : FIP12CDM7

- (X25-)
- D1-7 : HSS104 or 1SS133



PRODUCT.P.	MECHANISM ASS'Y	ELECTRIC ASS'Y	CD PLAYER UNIT	DISPLAY UNIT
JAPAN MADE	X92-1748-51 CDM-23(5)GU	X25-4900-00	X32-2550-71	X25-5350-70
SINGAPORE MADE	X92-1839-51 CDM-23(5)GS	X25-5330-20	X32-2590-71	X25-5440-70

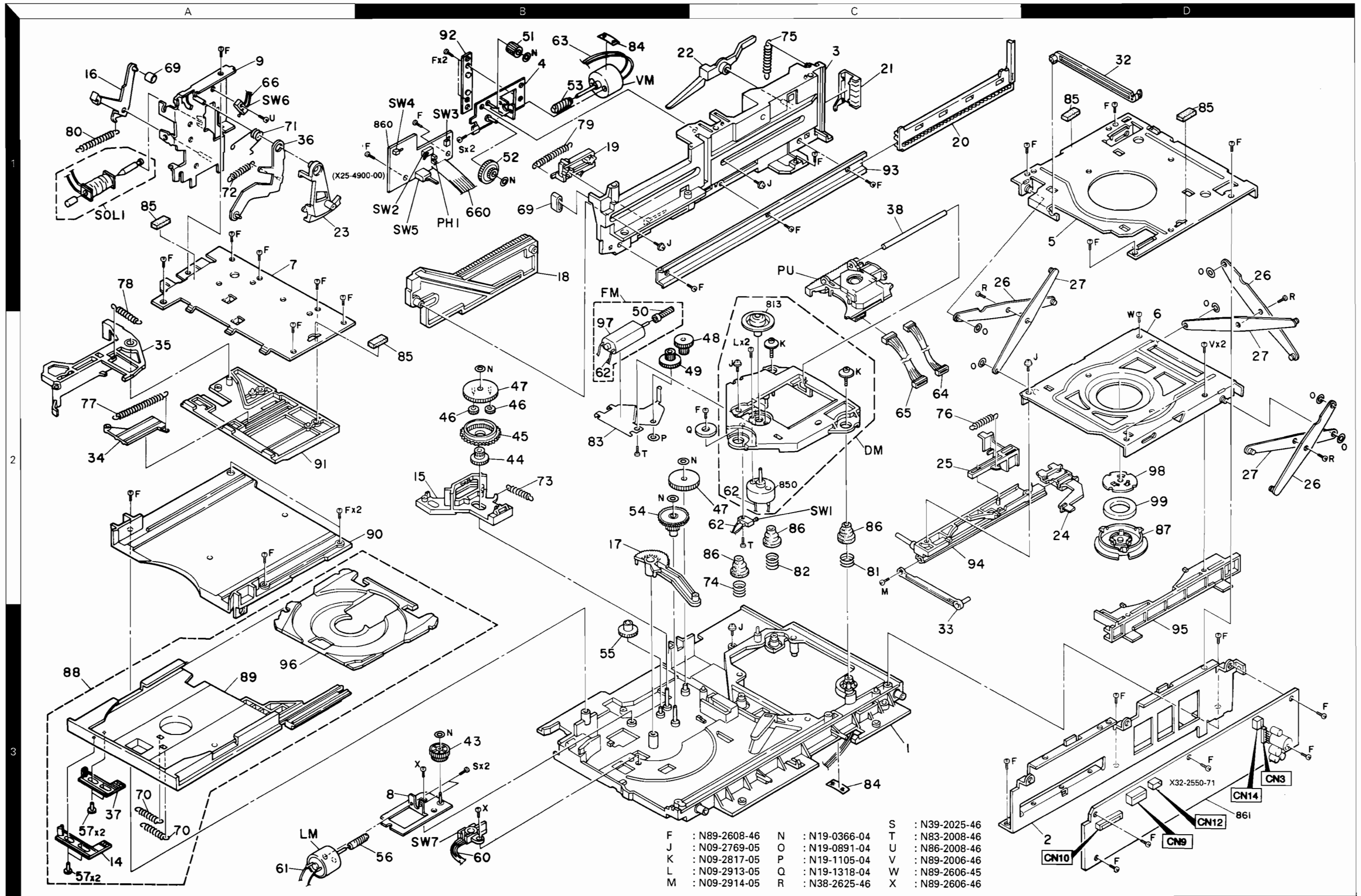


• DC voltages are as measured with a high impedance voltmeter. Values may vary slightly due to variations between individual instruments or/and units.

CAUTION : For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list). Δ Indicates safety critical components. To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.



EXPLODED VIEW (MECHANISM) : JAPAN MADE

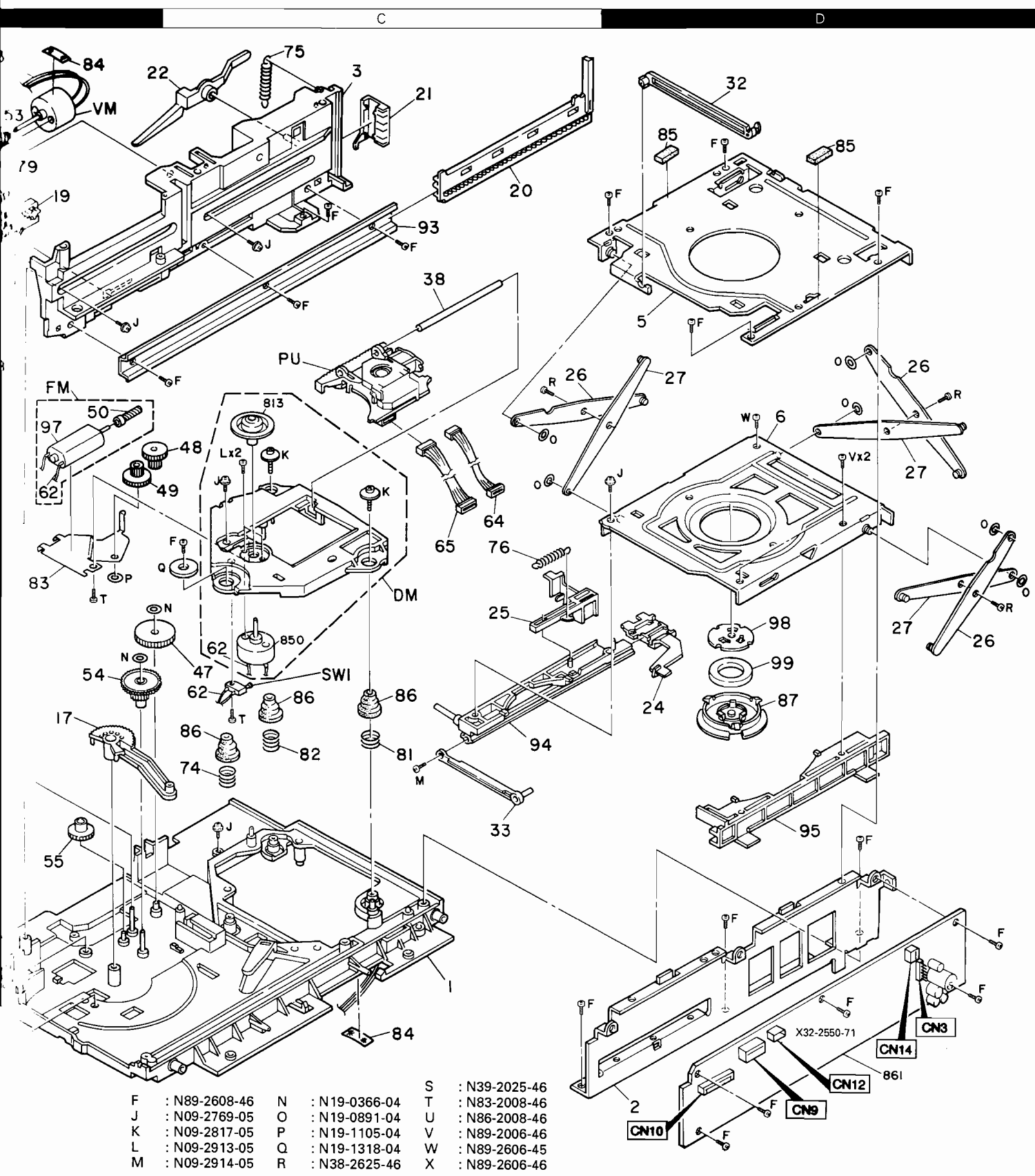


F	: N89-2608-46	N	: N19-0366-04	S	: N39-2025-46
J	: N09-2769-05	O	: N19-0891-04	T	: N83-2008-46
K	: N09-2817-05	P	: N19-1105-04	U	: N86-2008-46
L	: N09-2913-05	Q	: N19-1318-04	V	: N89-2006-46
M	: N09-2914-05	R	: N38-2625-46	W	: N89-2606-45
				X	: N89-2606-46

Parts with the exploded numbers larger than 700 are not supplied.

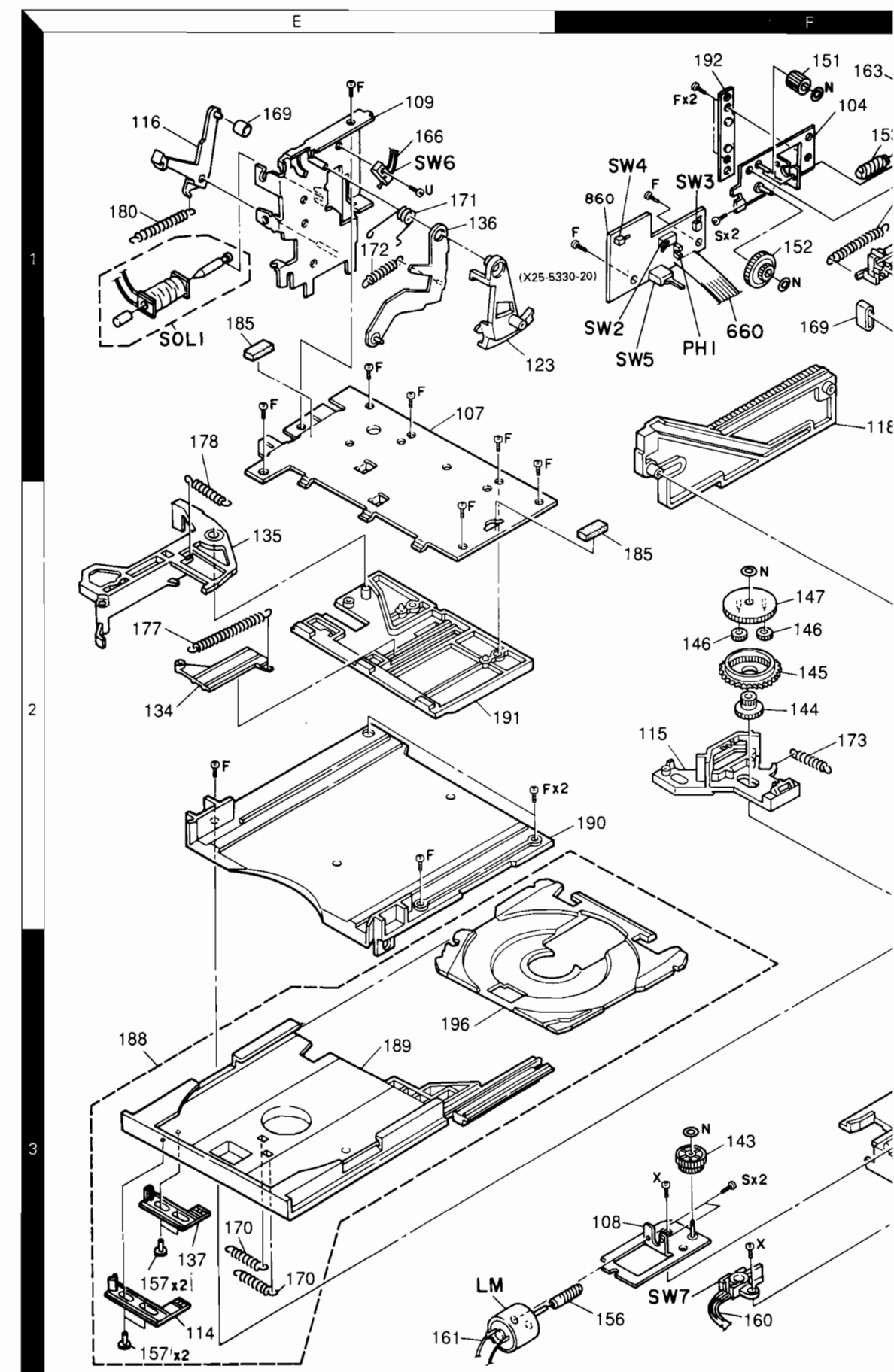
VIEW (MECHANISM) : JAPAN MADE

EXPLODED VIEW

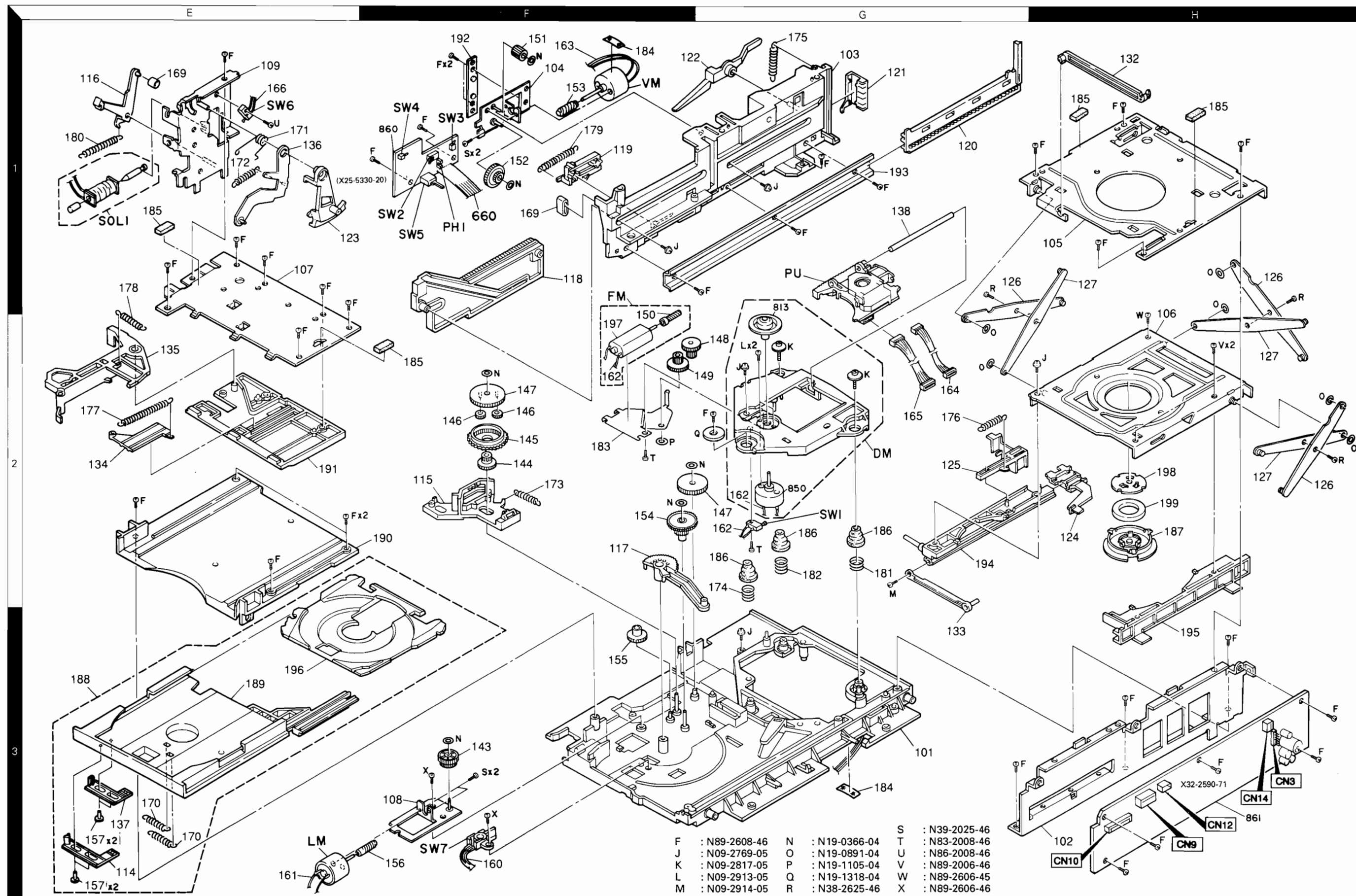


F	: N89-2608-46	N	: N19-0366-04	S	: N39-2025-46
J	: N09-2769-05	O	: N19-0891-04	T	: N83-2008-46
K	: N09-2817-05	P	: N19-1105-04	U	: N86-2008-46
L	: N09-2913-05	Q	: N19-1318-04	V	: N89-2006-46
M	: N09-2914-05	R	: N38-2625-46	W	: N89-2606-45
				X	: N89-2606-46

Parts with the exploded numbers larger than 700 are not supplied.



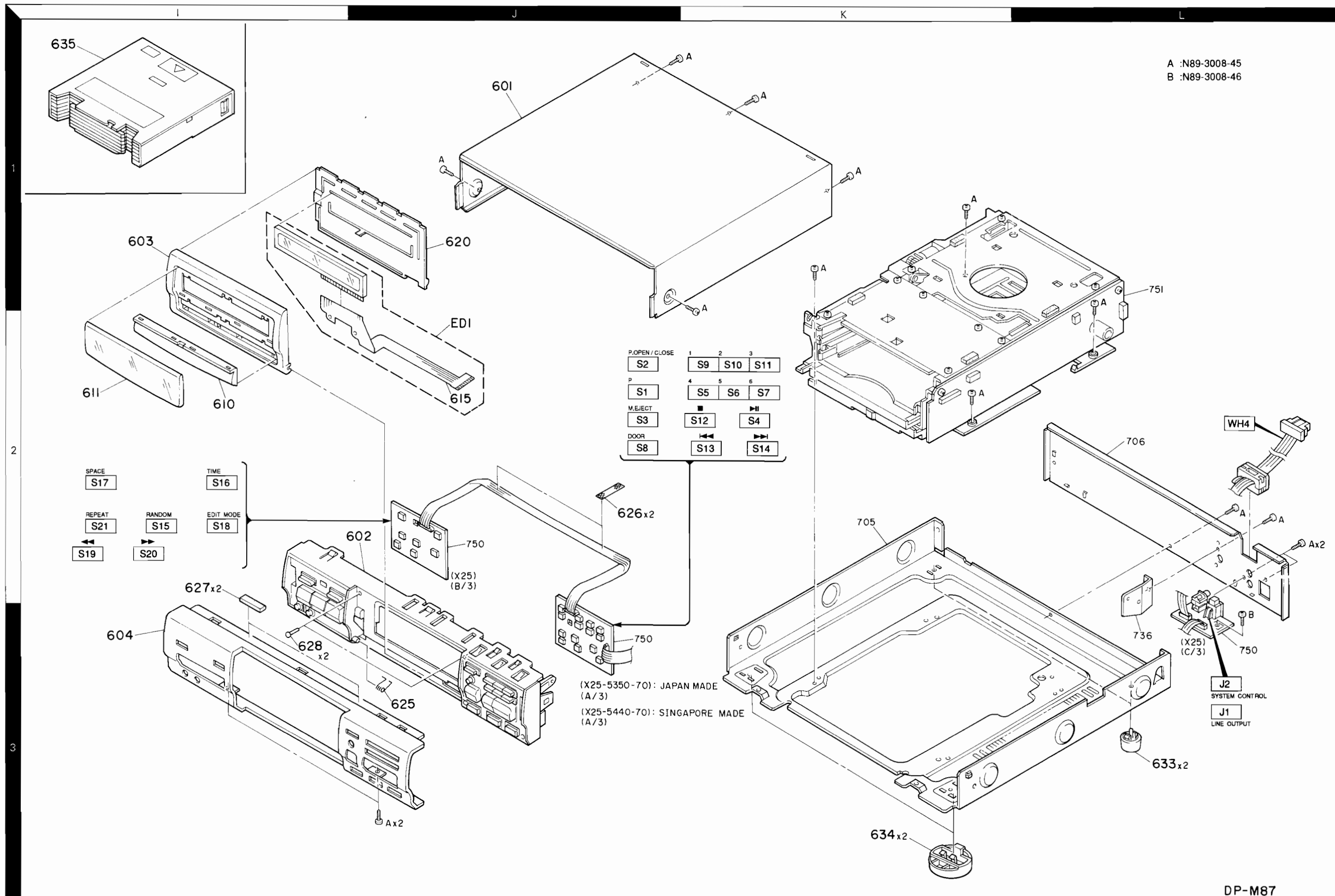
DP-M87 DP-M87 EXPLODED VIEW (MECHANISM) : SINGAPORE MADE



F	: N89-2608-46	N	: N19-0366-04	S	: N39-2025-46
J	: N09-2769-05	O	: N19-0891-04	T	: N83-2008-46
K	: N09-2817-05	P	: N19-1105-04	U	: N86-2008-46
L	: N09-2913-05	Q	: N19-1318-04	V	: N89-2006-46
M	: N09-2914-05	R	: N38-2625-46	W	: N89-2606-45
		X	: N89-2606-46		

DP-M87 DP-M87

EXPLODED VIEW (UNIT)



DP-M87 DP-M87

PARTS LIST

Table with 6 columns: Ref. No., Address, Parts No., Description, Destination marks. Includes parts like GEAR, SHAFT, WIRING HARNESS, etc.

Table with 6 columns: Ref. No., Address, Parts No., Description, Destination marks. Includes parts like IC(VOLTAGE REGULATOR), TRANSISTOR, MECHANISM ASSY, etc.

PARTS LIST

Table with 6 columns: Ref. No., Address, Parts No., Description, Destination marks. Includes parts like GEAR, SHAFT, WIRING HARNESS, etc.

Table with 6 columns: Ref. No., Address, Parts No., Description, Destination marks. Includes parts like PAN HEAD TAPTITE SCREW, MOTOR, MECHANISM ASSY, etc.

PARTS LIST

* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 规格	Desti- nation 任	Re- marks 備考
P			N19-1105-04	FLAT WASHER		
Q			N19-1318-04	FLAT WASHER		
R			N38-2625-46	PAN HEAD WACHIN SCREW		
S			N39-2025-46	PAN HEAD WACHIN SCREW		
T			N83-2008-46	PAN HEAD TAPITTE SCREW		
U			N86-2008-46	BINDING HEAD TAPITTE SCREW		
V			N89-2006-46	BINDING HEAD TAPITTE SCREW		
W			N89-2606-45	BINDING HEAD TAPITTE SCREW		
X			N89-2606-46	BINDING HEAD TAPITTE SCREW		
SW1	2G		S33-1022-05	LEVER SWITCH(PICKUP LIMIT)		
SW6	1E		S33-1022-05	LEVER SWITCH(OPEN/CLOSE)		
SW7	3F		S33-2061-05	LEVER SWITCH(DOOR)		
197	2F		T42-0597-05	DC MOTOR(FEED MOTOR)		
198	2H		T50-1055-04	YØKE		
199	2H		T99-0503-15	MAGNET		
DM	2G		A11-0791-03	SUB CHASSIS ASSY(DISC MOTOR)		
FM	1F		T42-0612-04	MOTOR ASSY(FEED MOTOR)		
LM	3E		T42-0620-05	DC MOTOR(LOADING MOTOR)		
PU	1C		T25-0023-05	OPTICAL PICKUP HEAD(HPC-2S)		
VM	1E		T42-0567-05	DC MOTOR(VERTICAL MOTOR)		
SOL1	1E		T94-0227-18	MAGNETIC PLUNGER(DOOR)		