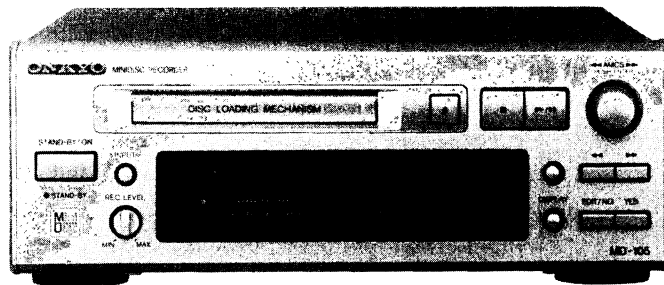




For more Hi-Fi manuals and set-up information  
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# ONKYO® SERVICE MANUAL

## MINIDISC RECORDER MODEL MD-105



Black model

BUP	230V AC, 50Hz
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### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\Delta$  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

### SPECIFICATIONS

<b>System</b>	Minidisc digital audio system
<b>Recording system</b>	Magnetic field modulation overwrite
<b>Signal read out system</b>	Optical non-contact
<b>Recording time</b>	Max.74min.
<b>Number of revolutions</b>	About 400-900 rpm (constant linear velocity)
<b>Error correction system</b>	Advanced Cross Interleave Reed-solomon code
<b>Sampling frequency</b>	44.1 kHz
<b>Number of channels</b>	2 (stereo)
<b>Frequency response</b>	10Hz - 20kHz ( $\pm 1$ dB)
<b>Signal to noise ratio</b>	98dB or more when playing
<b>Output level</b>	2.0 volts r.m.s.
<b>Power supply raiting</b>	AC230V, 50Hz AC120V, 60Hz
<b>Power consumption</b>	14 watts
<b>Dimensions (W x H x D)</b>	205 x 76 x 287 mm
<b>Weight</b>	2.2 kg

Specifications and features are subject to change without notice.

**ONKYO®**  
**AUDIO COMPONENTS**

## CAUTION ON REPLACEMENT OF OPTIONAL PICKUP

The laser diode in the optical pickup block is sensitive to static electricity, surge current and etc. The components are liable to be damaged or its reliability remarkably deteriorated.

During repair, carefully take the following precautions. (The following precautions are included in the service parts.)

### PRECAUTIONS

#### 1. Ground for the work-desk.

Place a conductive sheet such as a sheet of copper (with impedance lower than 10Mohm) on the work-desk and place the set on the conductive sheet so that the chassis can be grounded.

#### 2. Grounding for the test equipments and tools.

Test equipments and toolings should be grounded in order that their ground level is the same the ground of the power source.

#### 3. Grounding for the human body.

Be sure to put on a wrist-strap that is properly grounded.

Be particularly careful when wearing synthetic fiber clothes, or air is dry.

#### 4. Select a soldering iron that permits no leakage and have the tip of the iron well-grounded.

#### 5. Do not check the laser diode terminals with the probe of a circuit tester or oscilloscope.

## PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to carefully follow the instructions below when servicing.

### WARNING !!

**SERVICE WARNING: DO NOT APPROACH THE LASER EXIT WITH THE EYES TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.**

### Laser Diode Properties

Material:	GaAlAs
Wavelength:	780nm
Emission Duration:	continuous
Laser output:	max. 5mW*

\* This output is the value measure at a distance about 1.8mm from the objective lens surface on the Optical pick-up Block.

# LASER WARNING LABEL

These labels are located on the mechanism.

The label shown below are affixed.

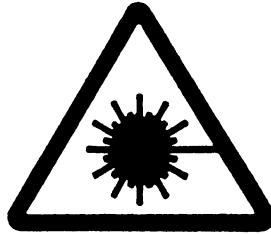
## 1. Warning label

This label is location on the chassis.

**DANGER** —INVISIBLE LASER RADIATION  
WHEN OPEN AND INTERLOCK FAILED OR  
DEFEATED. AVOID DIRECT EXPOSURE TO BEAM.

**CAUTION** —HAZARDOUS LASER AND  
ELECTROMAGNETIC RADIATION WHEN OPEN  
AND INTERLOCK DEFEATED

**ATTENTION** —RAYONNEMENT LASER  
ET ELECTROMAGNETIQUE DANGEREUX SI  
OUVERT AVEC L'ECLANCHEMENT DE SECURITE  
ANNULE.



### VARNING

OSYMLIG LASERSTRÅLNING NÄR DENNA DEL  
ÄR ÖPPNAD OCH SPÄNNEN ÄR URKOPPLAD.  
BETRÄKTA EJ STRÅLEN.

### VARO!

AVATTAESSA JA SUOJALUKITUS OHITETTAESSA  
OLET ALTTINA NAKYMATTONALLE  
LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

ADVARSEL: USYMLIG LASERSTRÅLING  
VED ÅBNING, NÄR SIKKERHEDSAF-  
BRYDER ER UDE AF FUNKTION.  
UNDGÅ UDSÆTTELSE FOR STRÅLING.

ADVARSEL  
USYMLIG LASERSTRÅLING NÄR DEKSEL  
ÅPNES OG SIKKERHEDSLÅS BRYTES.  
UNNGÅ EKSPONERING FOR STRÅLEN.

### ADVARSEL

Denna mækning er anbragt på apparatets højre side og indikerer, at apparatet arbejder med laserstråler af klasse 1, hvilket betyder, at der anvendes laserstråler af svageste klasse, og at man ikke på apparatets yderside kan blive udsat for utilladelig kraftig stråling.

APPARATET BØ/R KUN ÅBNES AF FAGFOLK MED SE RLIGT  
KENDSKAB TIL APPARATER MED LASERSTRÅLERI

Indvendigt i apparatet er anbragt den her gengivne  
advarselmærkning, som advarer imod at foretage sådanne indgreb  
i apparatet, at man kan komme til at udsætte sig for laserstråling.

VAROITUS! LAITTEEN KAYTTAMINEN MUULLA KUIN  
TASSA KAYTOOHJEESSA MAINTULLA TAVALLA  
SAATTAA ALTISTAA KAYTTAJAN TURVALLISUUSLUOKAN  
1 YLITTAVALLE NAKYMATTONALLE LASERSÄTEILYLLE.

## 2. Class 1 label

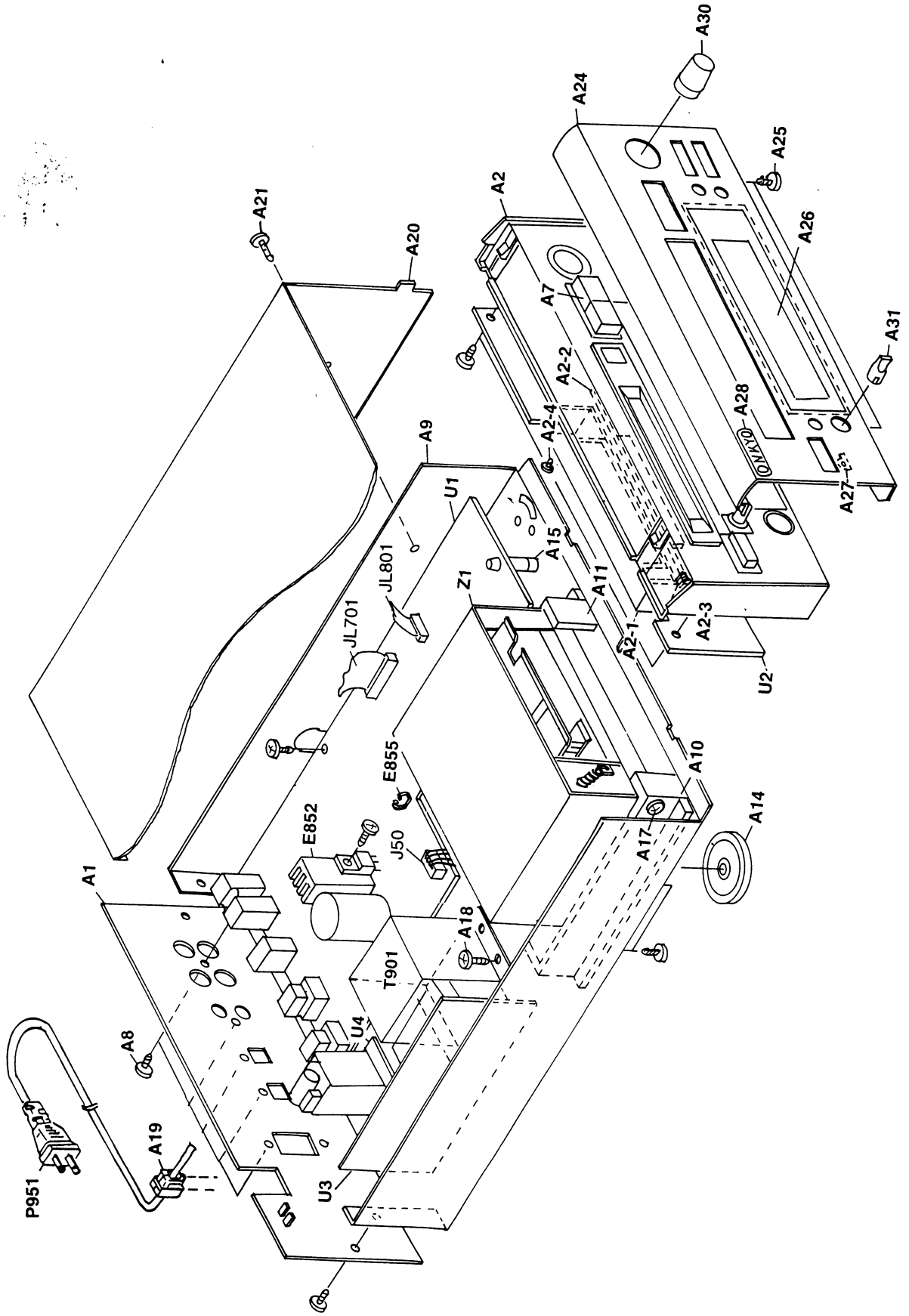
This label is located on the left side of rear cover.

"CLASS 1 LASER  
PRODUCT"

LUOKAN 1  
LASERLAITE

KLASS 1  
LASER APPARAT

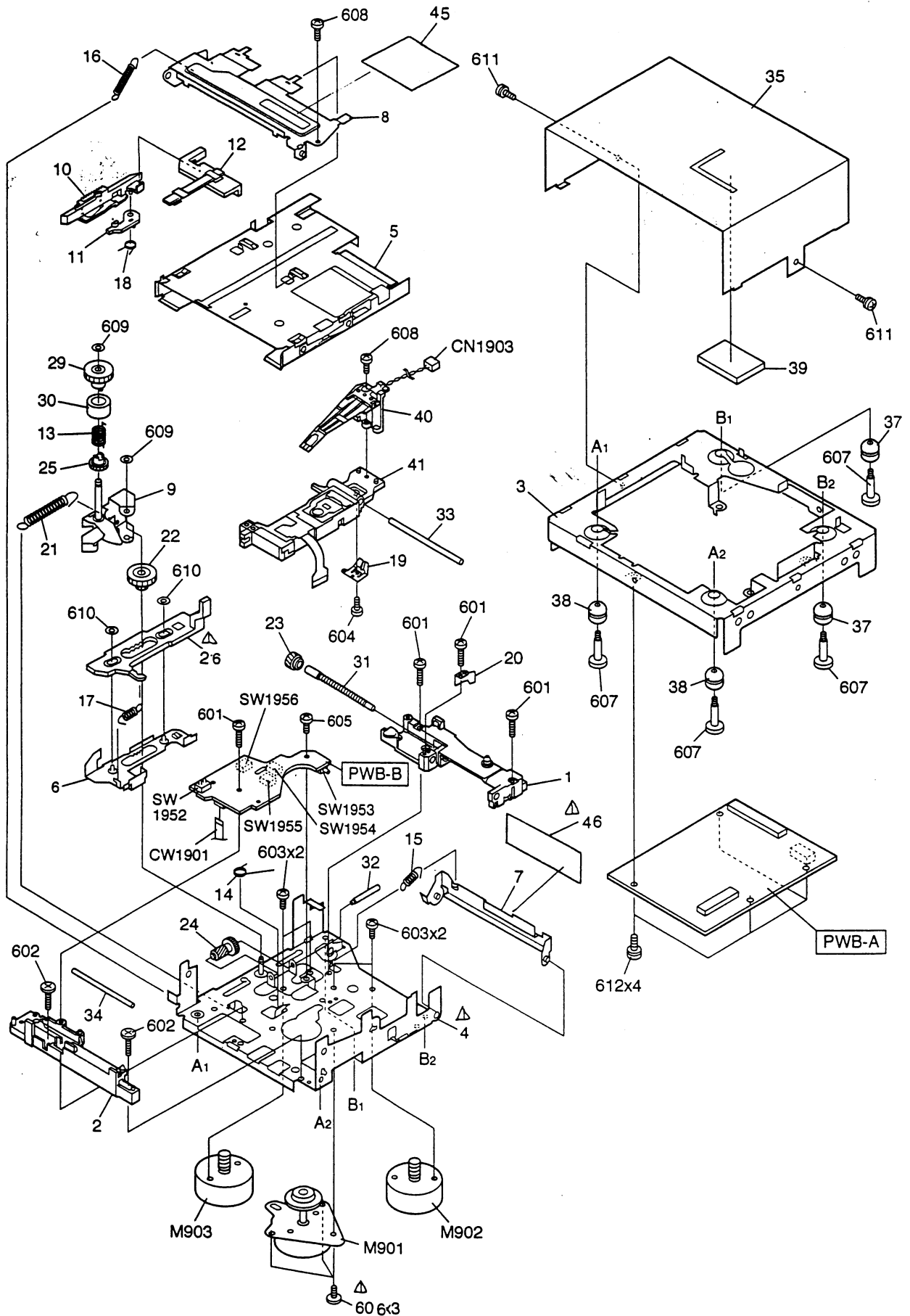
EXPLODED VIEW (CHASSIS)



## PARTS LIST (CHASSIS)

REF.NO.	PART NO.	DESCRIPTION
A1	27122457	Rear panel <D>
	27122387A	Rear panel <P>
A2	27111037A	Front bracket ass'y
A2-1	27267890B	Guide, door
A2-2	28148331A	Door
A2-3	27180549	Spring
A2-4	835126108	2.6TTF+10B,Self-tapping screw
A7	28325557A	Knob,play
A8	838130088	3TTB+8B,Self-tapping screw
A9	27100336	Chassis
A10	27130792B	Bracket ML
A11	27130793B	Bracket MR
A14	27175323	Leg
A15	27190524	KGLS-14RF,Holder
A17	838430107	3TTB+10S(BC),Self-tapping screw
A18	830440089	4TTC+8C(BC),Self-tapping screw
A19	△ 27300750	Bushing, Cord
A20	28184704Z	Top cover
A21	838230088	3TTB+8B(NI),Nickel screw
A24	27211959	Front panel
A25	838130068	3TTB+6B,Self-tapping screw
A26	28191801	Clear plate
A27	28198864	Facet
A28	28135247	Badge
A30	28325555	Knob, AMCS
A31	28325556	Knob, REC.
E801	2045171522	NCFC5-171522,Flat cable
E802	2044240022	NCFC4-240022,Flat cable
E803	2009990427	NSAS-8P0571,Socket
F901	252075	2.5A-SE-EAK, Fuse <P>
P951	△ 253192HIT	AS-UC-6#18(SPT-2),Power supply cord <D>
	△ 253193HIT	AS-CEE,Power supply cord <P>
Q910	3010287	ML2430-VS1,Battery
T901	△ 2301326	NPT-1311D,Power transformer <D>
	△ 2301290	NPT-1311P,Power transformer <P>
U1	1H376541-1B	NAAR-6141-1B,Main circuit pc board ass'y <P>
	1H376541-1C	NAAR-6141-1C,Main circuit pc board ass'y <D>
U2	1H376542-1B	NADIS-6142-1B,Display circuit pc board ass'y <P>
	1H376542-1C	NADIS-6142-1C,Display circuit pc board ass'y <D>
U3	1H376543-1B	NAPS-6143-1B,Power supply pc board ass'y <P>
	1H376543-1C	NAPS-6143-1C,Power supply pc board ass'y <D>
U4	1H376544-1B	NAETC-6144-1B,AC outlet pc board ass'y <P>
	1H376544-1C	NAETC-6144-1C,AC outlet pc board ass'y <D>
Z1	24650006	MDM-97XT,MD mechanism ass'y

EXPLODED VIEW (MD MECHANISM)

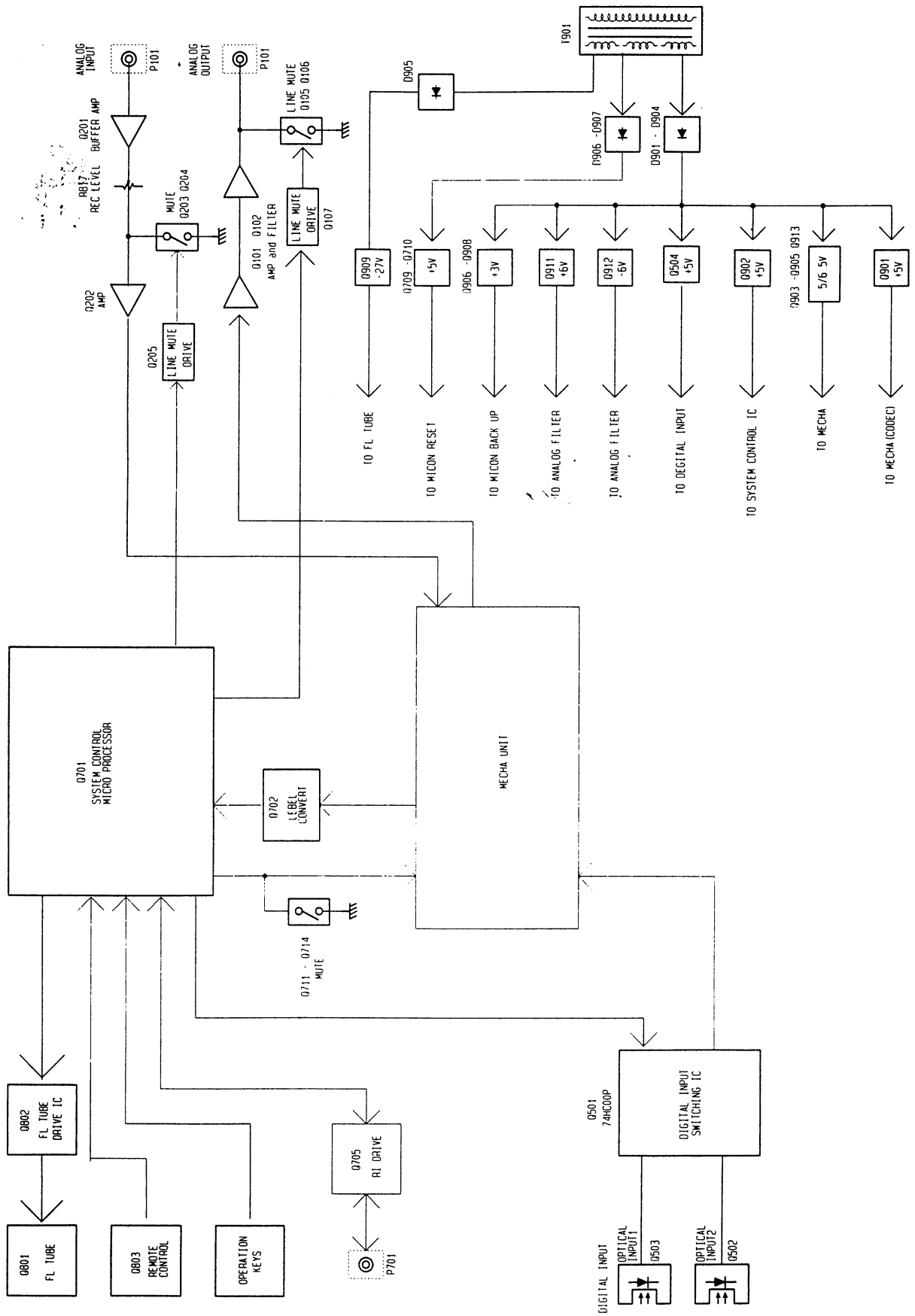


## MD MECHANISM PARTS LIST

REF. NO.	PART NAME	DESCRIPTION	PART NO.	REF. NO.	PART NAME	DESCRIPTION	PART NO.
IC1101	IC	1R3R55	1245730345	SW1954, SW1955	Push switch		1245300026
IC1201	IC	LR37648	1245730366	SW1956	Push switch		1245300025
IC1202	IC	IX2474AF	1245730207	1	Guide A		1242000208
IC1251	IC	74ACT02F	1245730043	2	Guide B		1242000209
IC1401	IC	IX0227AW	1245730353	3	Base frame		1242000210
IC1402	IC	S29294A	1245730301	4	Drive chassis		1242070047
IC1601	IC	M56758FP	1245730354	5	Cartridge holder		1242140138
IC1701	IC	UDA1340	1245730357	6	Cam plate lever		1242480122
IC1801	IC	XC62EP32	1245730367	7	Shift arm		1242480123
IC1802	IC	NJM431U	1245730356	8	Holder arm		1242480124
IC1906	IC	TC7ST08F	1245730152	9	Roller arm lever		1242480125
IC1907	IC	TC9246F	1245730153	10	Clamper lever		1242480126
IC1916	IC	74VHC08FT	1245730368	11	Catcher		1242480127
IC1990	IC	74AC04FS	1245730044	12	Slider lever		1242480128
Q1251, Q1252	Transistor	2SK2909	1245760042	13	Roller holder spring		1242580157
Q1253, Q1254	Transistor	2SK1473	1245760016	14	Spindle spring		1242580159
Q1401	Transistor	RN2404	1245760032	15	Shift arm spring		1242580053
Q1402	Transistor	RNC1404	1305760402	16	Holder arm spring		1242580054
Q1403	Transistor	RN2404	1245760032	17	Rack spring		1242580055
Q1404	Transistor	RNC1404	1305760402	18	Catcher spring		1242580094
Q1451	Transistor	RNC1407	1245760031	19	Plate spring		1242580160
Q1601	Transistor	2SA1314C	1245760001	20	Drive shaft spring		1242580161
Q1701	Transistor	2SC2412KR	1115760132	21	Roller spring		1242580093
Q1801	Transistor	2SA1314C	1245760001	22	Loading gear B		1242810063
Q1802, Q1803	Transistor	RN1406	1245760047	23	Drive gear		1242810064
Q1804	Transistor	2SA1162G	1305760552	24	Loading gear A		1242810065
Q1806	Transistor	RNC1404	1305760402	25	Roller gear		1242810066
Q1807	Transistor	2SA1314C	1245760001	26	Rack gear		1242810067
Q1820	Transistor	2SA1162G	1305760552	29	Roller holder		1242860001
Q1821, Q1822	Transistor	RNC1407	1245760031	30	Transfer roller		1242870014
D1251, D1252	Diode	SB0209CP	1245700005	31	Drive shaft		1242900105
D1990	Diode	1SS372	1245700008	32	Loading gear shaft		1242900108
L1101	Coil	10 $\mu$ H	1245850024	33	Slide shaft, opto. pickup		1242900039
L1102, L1201	Coil	0.47 $\mu$ H	1245850026	34	Pick-up guide shaft		1242900040
L1203	Coil	4.7 $\mu$ H	1245850025	35	Cover		1242000225
L1251	Coil	47 $\mu$ H	1245850002	37	Rubber vibration isolator A		1243260020
L1601, L1950	Coil	1 $\mu$ H	1246140023	38	Rubber vibration isolator A		1243260021
L1701, L1702	Coil	10 $\mu$ H	1245850024	39	Cushion for head		1243260097
LR190	Coil	4.7 $\mu$ H	1245850025	40	Head		1246100008
XL1201	Crystal oscillator	33.8688MHz	1246160018	41	Optical pickup		1246170019
CN1101	Plug	23P	1245100161	45	Protection sheet		
CN1252	Plug	2P	1425100204	46	Protection sheet		
CN1601	Plug	5P	1245100162	601	Screw	$\phi$ 1.7x9.5mm	1249700161
CN1602	Plug	2P	1245100163	602	Screw	$\phi$ 1.7x7.5mm	1249700162
CN1603	Plug	2P	1425100236	603	Screw	$\phi$ 1.7x2mm	1249700163
CN1604	Plug	2P	1245100164	604	Screw	$\phi$ 1.4x2.2mm	1249700011
CN1901	Plug	5P	1245100153	605	Screw	$\phi$ 1.7x3mm	1249700061
CN1902	Plug	24P	1245100165	606	Screw	$\phi$ 1.7x2.5mm	1249700065
CN1904	Plug	4P	1425100223	607	Screw	$\phi$ 1.7x8.9mm	1249700076
CW1901	Flat cable	5P	1245120287	608	Screw	$\phi$ 1.7x5mm	1249700108
CW1903	Connector	2P	1245120288	609	Washer	$\phi$ 1.5x $\phi$ 3.2x0.5mm	1249900005
M901	Spindle motor assembly		1246300048	610	Washer	$\phi$ 1.2x $\phi$ 3x0.25mm	1249900006
M902	Sled motor assembly		1246300049	611	Speical screw	$\phi$ 2x4mm	1189700020
M903	Loading motor assembly		1246300050	612	Screw	$\phi$ 1.7x3mm	1249700077
SW1952	Push switch		1245300027	PWB-A	Main circuit pc board ass'y		1246840192
SW1953	Push switch		1305301315				



**BLOCK DIAGRAM**



## PARTS LIST

MAIN CIRCUIT PC BOARD (NAAR-6141-1B/1C)

CIRCUIT NO.	PART NO.	DESCRIPTION			
	Ics				
Q101,Q102	22240191	NJM4565D-D	C506	374721044	0.1 $\mu$ F $\pm$ 5%, 50V, Plastic
Q201,Q202	22240191	NJM4565D-D	C702	354780159	1.5 $\mu$ F, 50V, Elect.
Q701	22241137	TMP87CM40AN-4824	C706,C911	354780479	4.7 $\mu$ F, 50V, Elect.
Q913	22241170T	NJM431L	C707	354780109	1 $\mu$ F, 50V, Elect.
Q501	222740005	74HC00P	C901	3500181	2200 $\mu$ F, 16V, Elect.
Q702	222740047TOS	74HCT04 (TC74HCT04AP)	C902	354742229	2200 $\mu$ F, 16V, Elect.
Q504,Q902	222780055JRC	78M05 (NJM78M05FA)	C904,C905	374721044	0.1 $\mu$ F $\pm$ 5%, 50V, Plastic
Q901,Q911	222780063	78L06			
Q912	222790063	79L06			
	Photo couplers				
Q502,Q503	24120073	GP1F32R			
Q502,Q503	24120075	GP1F37R			
	Transistors				
Q105,Q106	2211705 or 2211706	2SD655-E or 2SD655-F			
Q107,Q205	2213090 or 2213590	DTA114YS or RN2207			
Q203,Q204	221299 or 2213600	DTC114TS or RN1211			
Q703,Q710	221281 or	DTC114YS or			
Q711,Q713	2213570	RN1207			
Q704,Q706	2213354 or	2SA933S-R or			
Q907,Q909	2213355	2SA933S-S			
Q705,Q709	2213090 or	DTA114YS or			
Q712	2213590	RN2207			
Q707,Q708	2211705 or	2SD655-E or			
Q906	2211706	2SD655-F			
Q714,Q905	221281 or	DTC114YS or			
Q908	2213570	RN1207			
Q903	2202724 or 2202725	2SB1569A-D or 2SB1569A-E			
Q904	2213284 or 2213285	2SC1740S-R or 2SC1740S-S			
	Diodes				
D701,D703	223163,	1SS133,			
D906,D907	223205 or	1SS270A or			
D911	223222	WG713A			
D702,D908	224470562	MTZJ5.6B			
D901-D905	22380035 or 22380260	GP104003E or RL1N4003			
D909	224472404	MTZJ24D			
D910	224470562	MTZJ5.6B			
D917	224470472	MTZJ4.7B			
	Core				
L701	230906T	BL02RN2-R62			
	Oscillator				
X701	3010190	CST8.00MTW			
	Capacitors				
C101,C102	374723315	330pF $\pm$ 10%, 50V, Plastic			
C105,C106	374722224	2200pF $\pm$ 5%, 50V, Plastic			
C107,C108	374724714	470pF $\pm$ 5%, 50V, Plastic			
C109,C110	354784709	47 $\mu$ F, 50V, Elect.			
C201,C202	374721015	100pF $\pm$ 10%, 50V, Plastic			
C203-C206	354741019	100 $\mu$ F, 16V, Elect.			
C505	354722219	220 $\mu$ F, 6.3V, Elect.			

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C907	354762209	22 $\mu$ F, 35V, Elect.
C909	354781019	100 $\mu$ F, 50V, Elect.
C913, C919	354722219	220 $\mu$ F, 6.3V, Elect.
C914	374721034	0.01 $\mu$ F $\pm$ 5%, 50V, Plastic
C915	354742219	220 $\mu$ F, 16V, Elect.
C916	354721019	100 $\mu$ F, 6.3V, Elect.
C917	354741029	1000 $\mu$ F, 16V, Elect.
C920, C921	354744719	470 $\mu$ F, 16V, Elect.
C922	374723344	0.33 $\mu$ F $\pm$ 5%, 50V, Plastic
	Resistors	
R902	453530474	4.7 $\Omega$ $\pm$ 5%, 1/2W, Metal
R917	453532294	0.22 $\Omega$ $\pm$ 5%, 1/2W, Metal
R918	443528204	82 $\Omega$ $\pm$ 5%, 1/2W, Metal oxide
	Terminals	
P101	25045397	NPJ-4PDWR222
P701	25045330 or 25045481	NPJ-2PDBL184 or NPJ-2PDBL299
	Plugs	
P501	25055442	NPLG-4P424
P703	25055038	NPLG-2P29
	Sockets	
P702	25051776 or 25051982	NSCT-24P1563 or NSCT-24P1769
P801B	25051769 or 25051975	NSCT-17P1556 or NSCT-17P1762
P802A	2009990467	NSAS-12P0621
P901B	25050270	NSCT-6P98
	Holder	
E854	27191017A	(FL)

## DISPLAY CIRCUIT PC BOARD (NADIS-6142-1B/1C)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q801	212164	BJ561GK, FL tube
Q802	22240685R9	M66004FP, IC
D801	224470623T	MTZJ6.2C, Diode
D802	225338	SLR-332VR, LED
Q803	241306	RPM6938-V4, Remote sensor
S801-S811	25035652T	NPS-111-S604, Switch
P801A	25051797	NSCT-17P1584, Socket
S812	25065507	EC11B15244, Rotary encoder
C806	353721019T	100 $\mu$ F, 6.3V, Elect. capacitor
R817	5104362	N14RGLS10KA15Z, Variable resistor

## POWER SUPPLY CIRCUIT PC BOARD (NAPS-6143-1B/1C)

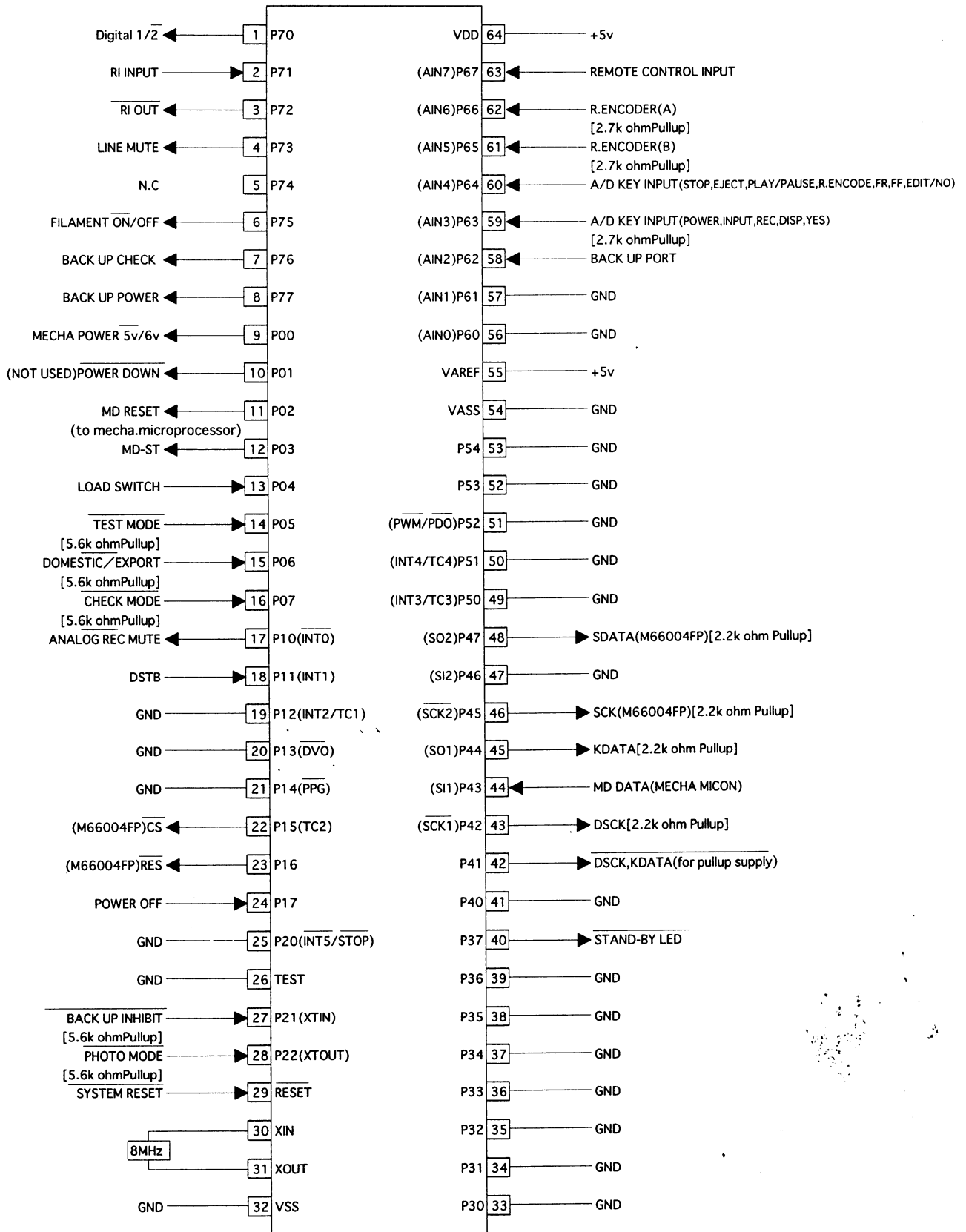
CIRCUIT NO.	PART NO.	DESCRIPTION
L951	231252	NCH-3489, Choke coil
E881	25050065	YSH403T, Fuseholder <P>
P901A	25051110	NSCT-6P897, Socket
P951	25055675	NPLG-2P631, Plug

## AC OUTLET TERMINAL PC BOARD (NAETC-6144-1B/1C)

CIRCUIT NO.	PART NO.	DESCRIPTION
P952	25051637	NSCT-2P1424, AC outlet <P>
P952	25051990	NSCT-2P1777, AC outlet <D>

# MICROPROCESSOR TERMINAL DESCRIPTION

## Q701:TMP87CM40AN-4824

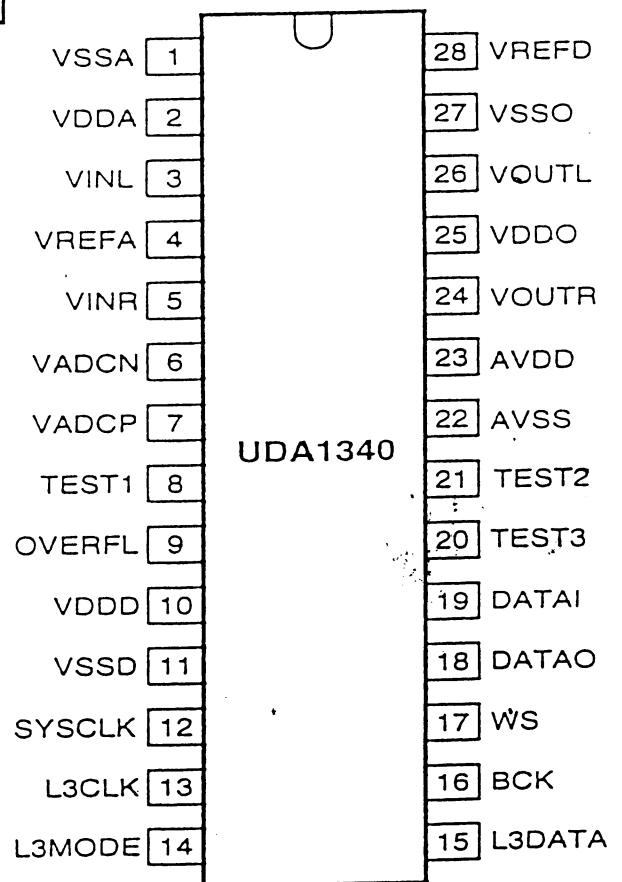


## Q701 TMP87CM040AN-4824

PIN No.	SYMBOL	DESCRIPTION
1	DIGITAL 1/2	Signal output port at digital input
2	RI IN	RI signal in
3	RI OUT	RI signal out (Active low)
4	LINE MUTE	LINE MUTE control output port(Active high)
5	NOT USED	N.C
6	FILAMENT	Filament control port (Active low)
7	BACKUP CHECK	Back up cheking cheking
8	BACKUP POWER	Back up voltage cheking
9	MECHA POWER	Voltage select for mecha.signal
10	POWER DOWN	Output signal at power failure(active low)
11	MD RESET	Reset port for mecha micon
12	MD-ST	communicate a mecha micon
13	LOAD SWITCH	Signal input port for lording switch
14	TEST MODE	Test mode detect port(active low)
15	JPN/EUROPE	Dome./Ex-port detect port
16	CHECK MODE	Check mode port
17	ANALOG REC MUTE	Analogue recording mute output
18	DSTB	Communication port for mech.micon
19	NOT USED	N.C (to GND)
20	NOT USED	N.C (to GND)
21	NOT USED	N.C (to GND)
22	CS	Chip select port to FL driver(M66004FP)
23	RES	Reset signal output port to FL driver(M66004FP) active low
24	POWER OFF	Signal port for power failure
25	NOT USED	N.C (to GND)
26	TEST	Test port (connect to GND)
27	BACKUP INHIBIT	Back up suppression input port
28	PHOTO MODE	Set-up mode at take a photo
29	SYSTEM RESET	System reset signal port
30	XIN	connect to clock(8MHz)
31	XOUT	connect to clock(8MHz)
32	Vss	Power supply (to GND)
33	NOT USED	N.C (to GND)
34	NOT USED	N.C (to GND)
35	NOT USED	N.C (to GND)
36	NOT USED	N.C (to GND)
37	NOT USED	N.C (to GND)
38	NOT USED	N.C (to GND)
39	NOT USED	N.C (to GND)
40	STAND-BY LED	Output control port for stand-by LED
41	NOT USED	N.C (to GND)
42	PULL UP VCC	Signal output (voltage control ) for DSCK,KDATA
43	DSCK	Serial communication port to mecha micon(output terminal)
44	MD DATA	Serial communication port to mecha micon(input terminal)
45	KDATA	Serial communication port to mecha micon(output terminal)
46	SCK	Transmit serial clock data to FL driver(M66004FP)
47	NOT USED	N.C (to GND)
48	DI	Serial data port to FL driver(M66004FP)
49	NOT USED	Serial
50	NOT USED	N.C (to GND)
51	NOT USED	N.C (to GND)
52	NOT USED	N.C (to GND)
53	NOT USED	N.C (to GND)
54	VASS	Reference voltage port for A/D transfer(to GND)
55	VAREF	Reference voltage port for A/D transfer(to +5V)
56	NOT USED	N.C (to GND)
57	NOT USED	N.C (to GND)
58	BACKUP	A/D input for backup voltage
59	A/D KEY(1)	A/D key input port
60	A/D KEY(2)	A/D key input port
61	R.ENCODER(B)	Pluse in port for rotaly-encoder
62	R.ENCODER(A)	Pluse in port for rotaly-encoder
63	REMOCON	Input signal for remote control
64	VDD	Power supply (to + 5 V)

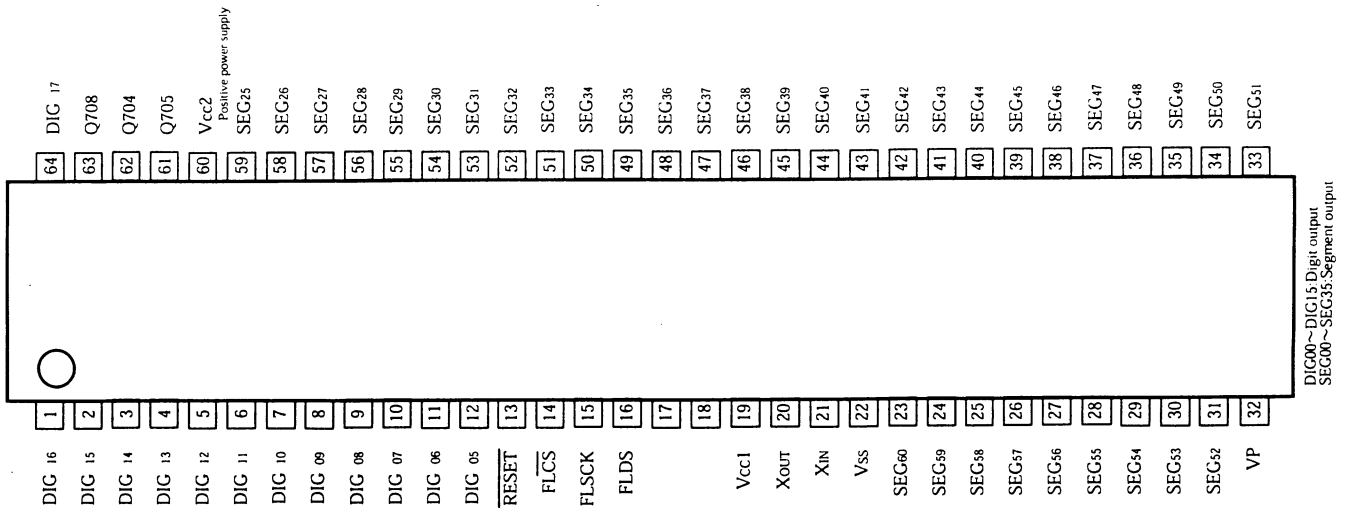
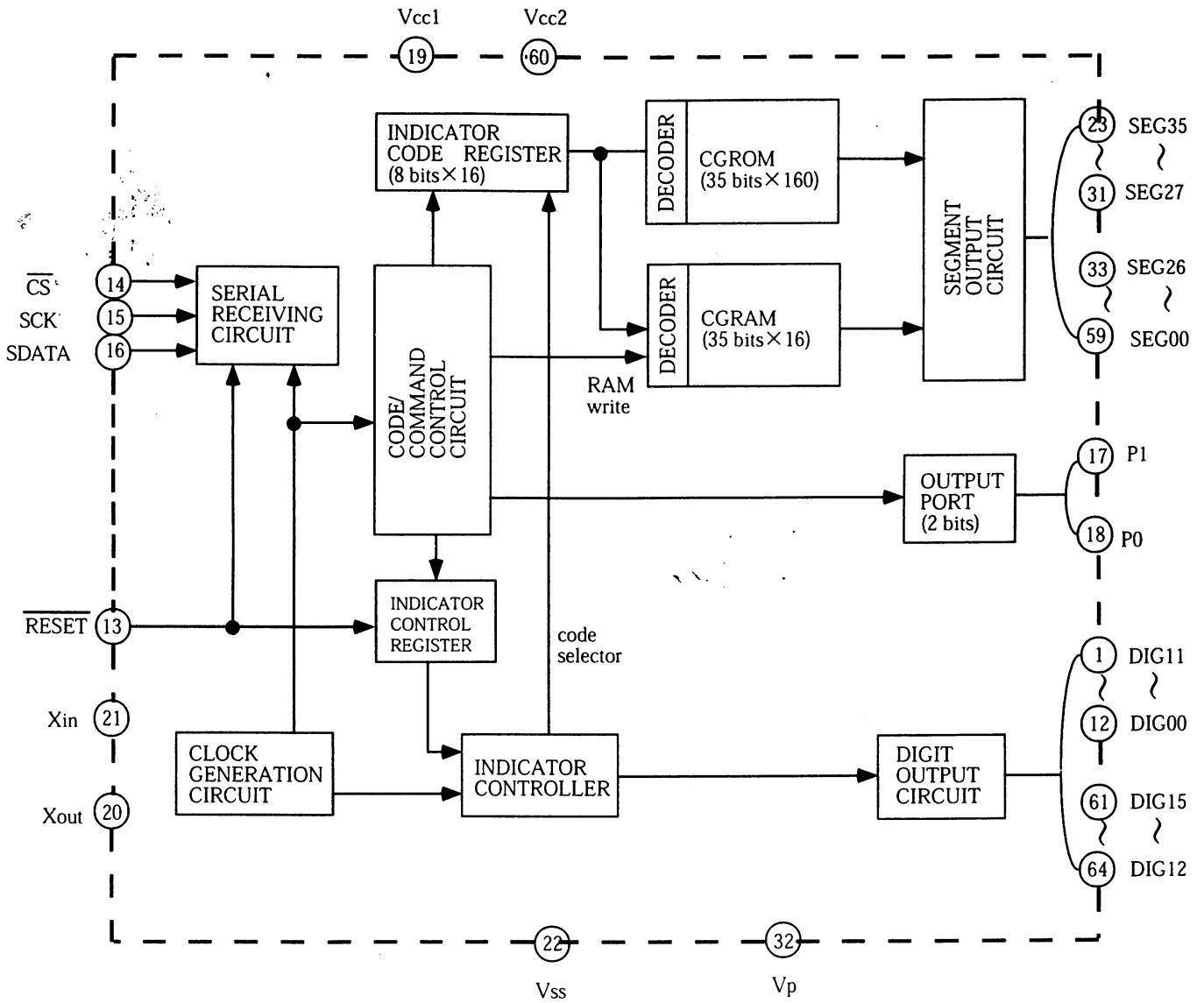
## UDA1340 A/D,D/A CONVERTER

PIN No.	SYMBOL	DESCRIPTION
1	VSSA	Analogue power supply port for ADC (Ground)
2	VDDA	Analogue power supply port for ADC
3	VINL	Input port for ADC (Lch)
4	VREFA	Reference voltage for ADC
5	VINR	Input port for ADC (Rch)
6	VADCN	Reference voltage for ADC(N-port)
7	VADCP	Reference voltage for ADC(P-port)
8	TEST 1	Test1 control port
9	OVERFL	Output port flag for over load
10	VDDD	Power supply for digital
11	VSSD	Power supply for digital(Ground)
12	SYSCLK	System clock(256,384 or 512fs)
13	L3CLOCK	L3 clock port(data in)
14	L3MODE	L3 mode port(data in)
15	L3DATA	L3 data port(data in)
16	BCK	Bit clock port
17	WS	Word select input
18	DATAO	Data output port
19	DATAI	Data input port
20	TEST3	Test port for data output
21	TEST2	Test control port 2
22	AVSS	Power supply for analogue DAC(Ground)
23	AVDD	Power supply for analogue DAC
24	VOUTr	Output port for DAC (Rch)
25	VDDO	Power supply for OP Amp
26	VOUtl	Output port for DAC (Lch)
27	VSSO	Power supply for OP Amp(Ground)
28	VREFD	Reference voltage port for DAC

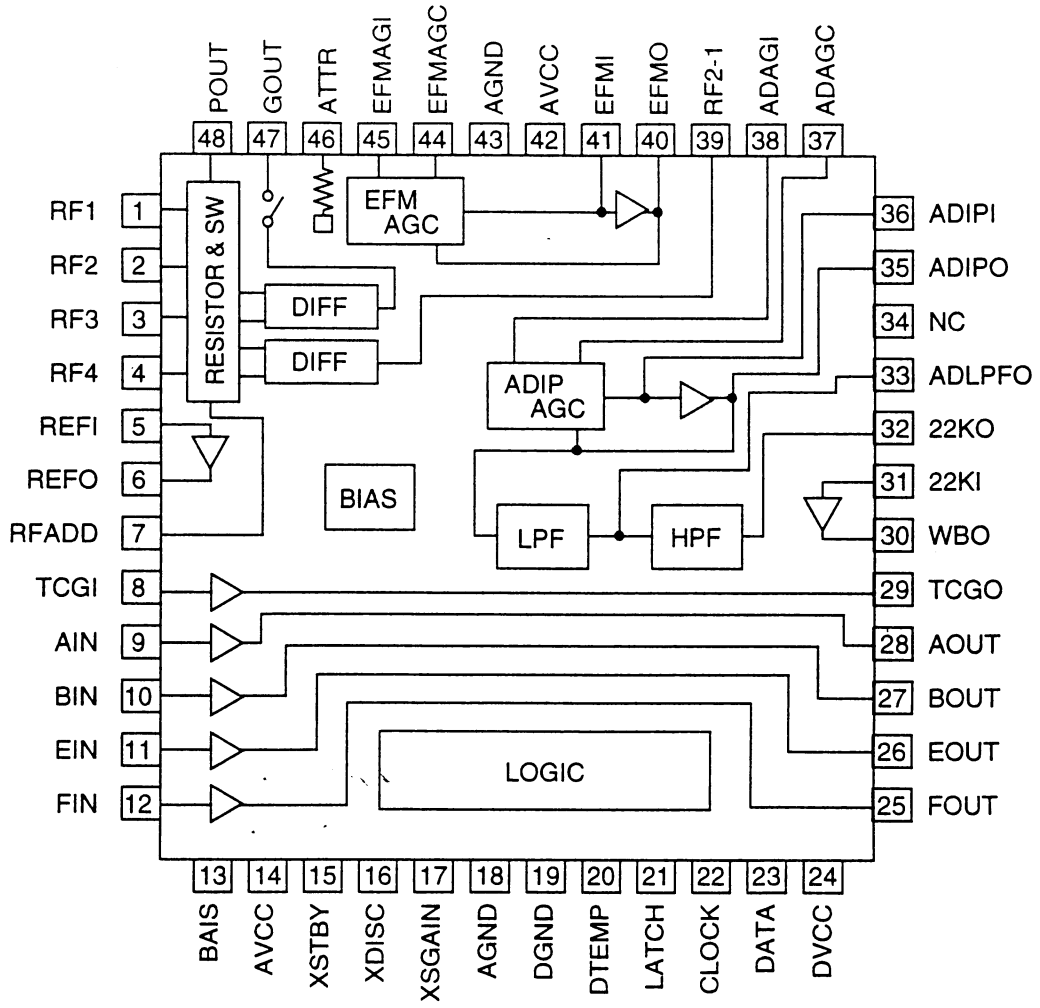


MGD014

Q802:M66004FP (FL TUBE,DRIVER)



IC1101:IR3R55 (RF AMP)



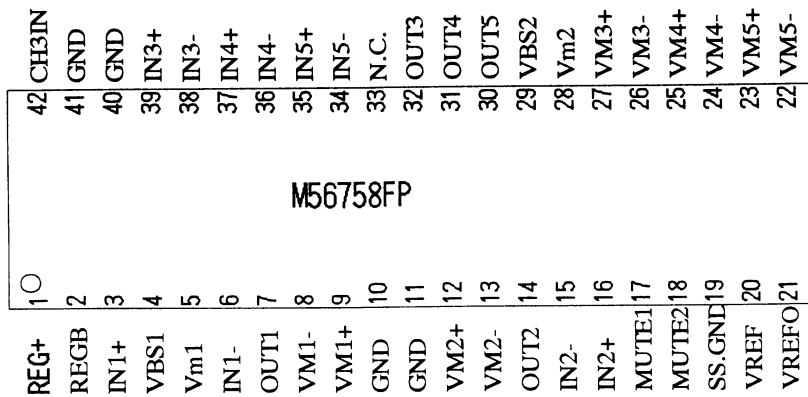


## IC1101:IR3R55 (RF SIGNAL PROCESSOR)

PIN No.	SYMBOL	DESCRIPTION
1	RF1	RF signal input port1(to pick up)
2	RF2	RF signal input port2(to pick up)
3	RF3	RF signal input port3(to pick up)
4	RF4	RF signal input port4(to pick up)
5	REF1	Reference voltage (input)
6	REF0	Reference voltage (output)
7	RFADD	Add output ports of RF1 to RF4
8	TCGI	Track cross detect input port
9	AIN	Focus-servo signal amplifire
10	BIN	Focus-servo signal amplifire
11	EIN	Tracking-servo signal amplifire
12	FIN	Tracking-servo signal amplifire
13	BIAS	Bias signal input port
14	AVCC	Power supply for analogue part
15*	VSTBY	Logic-signal output(STBY signal)
16*	XDISC	Logic-signal output(DISC signal)
17*	XSGAIN	Logic-signal output(SGAIN signal)
18	AGND	GND port (analogue part)
19	DGND	GND port (digital part)
20	DTEMP	Detect a chip-emperature
21	LATCH	Latch signal input
22	CLOCK	Clock signal input
23	DATA	Serial data input
24	DVCC	Power supply for digital ports
25	FOUT	Output signal port for tracking servo
26	EOUT	Output signal port for tracking servo
27	BOUT	Output signal port for focus servo
28	AOUT	Output signal port for focus servo
29	TCGO	Track cross detect output port
30	WBO	Comparetor output port (ADIP signal)
31	22KI	Comparetor input port (ADIP signal)
32	22KO	HPF signal output port (ADIP signal)
33	ADLPFO	LPF signal output port (ADIP signal)
34*	NC	NC
35	ADIPO	Pre-amp output port (ADIP signal)
36	ADIPI	AGC-amp output port (ADIP signal)
37	ADAGC	Conect a across-capacitor for AGC (ADIP signal)
38	ADAGI	AGC-amp input port (ADIP signal)
39	RF2-1	Difference signal of RF1 to RF2
40	EFMO	Pre-amp output port (RF signal)
41*	EFMI	AGC-amp output port (RF signal)
42	AVCC	Power supply of analogue part
43	AGND	GND port of analogue part
44	EFMAGC	AGC capacitor connect port (EFM signal)
45	EFMAGI	AGC-amp input port (EFM signal)
46*	ATTR	Output signal adjust port (47 and 48pin)
47	GOUT	RF1+RF2+RF3+RF4 signals output
48	POUT	RF1 to RF4 output

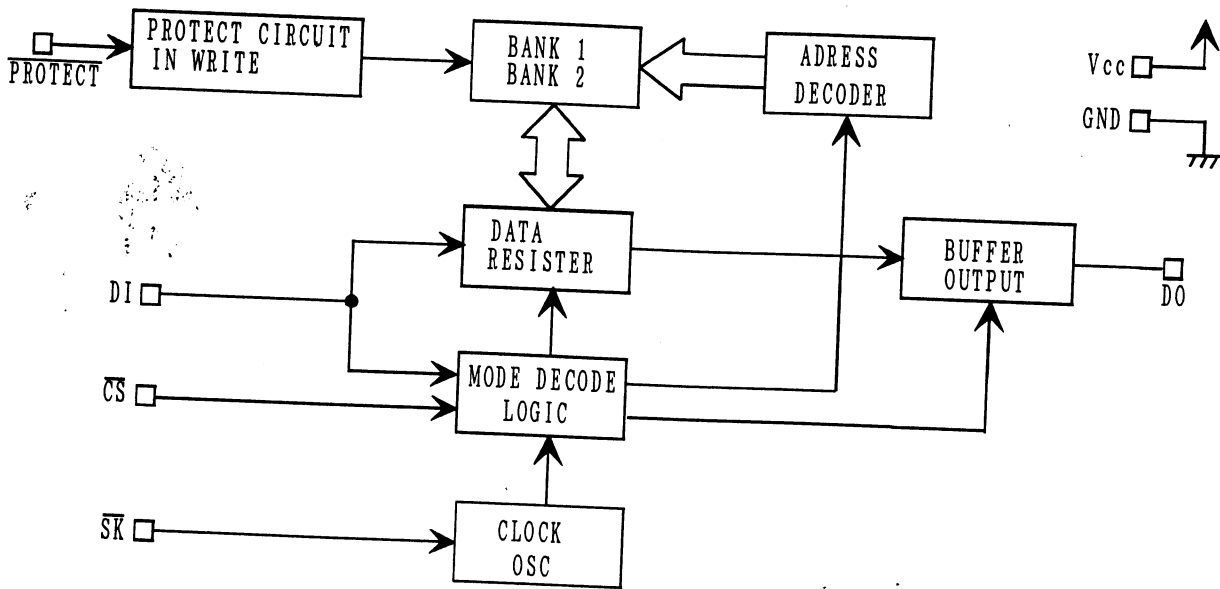
\*This mark terminals is open port.

## IC1601:5 CHANNEL ACTUATOR DRIVER IC

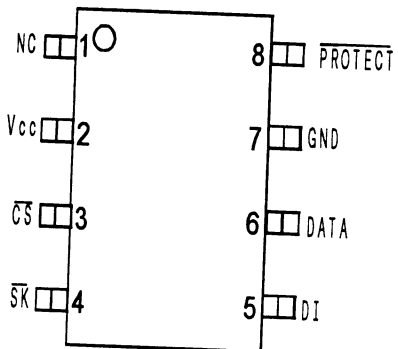


PIN No.	SYMBOL	DESCRIPTION	PIN No.	SYMBOL	DESCRIPTION
1	REG+	Voltage setting port for regulator	42	CH3IN	Non-inverted input port of CH3
2	REGB	Connect base position for regulator	41	OUT3	Output port of E3-amp.
3	IN1+	Non-inverted input port of E1-amp.	40	IN3-	Inverted input port of E3-amp.
4	VBS1	Power supply for boost-trap	39	VBS2	Power supply for boost-trap
5	Vm1	Power supply of moter	38	Vm2	Power supply of moter
6	IN1-	Inverted input port of E1-amp.	37	IN3+	Non-inverted input port of CH3
7	OUT1	Output port of E1-amp.	36	N.C.	N.C
8	VM1-	Inverted output port of CH1	35	VM3-	Inverted output port of CH3
9	VM1+	Non-inverted output port of CH1	34	VM3+	Non-inverted output port of CH3
10	GND	Ground(moter)	33	GND	Ground(moter)
11	GND	Ground(moter)	32	GND	Ground(moter)
12	VM2+	Non-inverted output port of CH2	31	VM4+	Non-inverted output port of CH4
13	VM2-	Inverted output port of CH2	30	VM4-	Inverted output port of CH4
14	OUT2	Output port of E2-amp.	29	VM5+	Non-inverted output port of CH5
15	IN2-	Inverted input port of E2-amp.	28	VM5-	Inverted output port of CH5
16	IN2+	Non-inverted input port of E2-amp.	27	OUT5	Output port of E5-amp.
17	MUTE1	Mute ports of CH1 to CH4	26	IN5-	Inverted input port of E5-amp.
18	MUTE2	Mute port of CH5	25	IN5+	Non-inverted input port of E5-amp.
19	SS.GND	Ground(signal)	24	IN4+	Non-inverted input port of E4-amp.
20	VREF	Input port of voltage reference	23	IN4-	Inverted input port of E4-amp.
21	VREFO	Output port of voltage reference	22	OUT4	Output port of E4-amp.

IC1402:S29294A (EEP-ROM) PROGRAMMABLE ROM

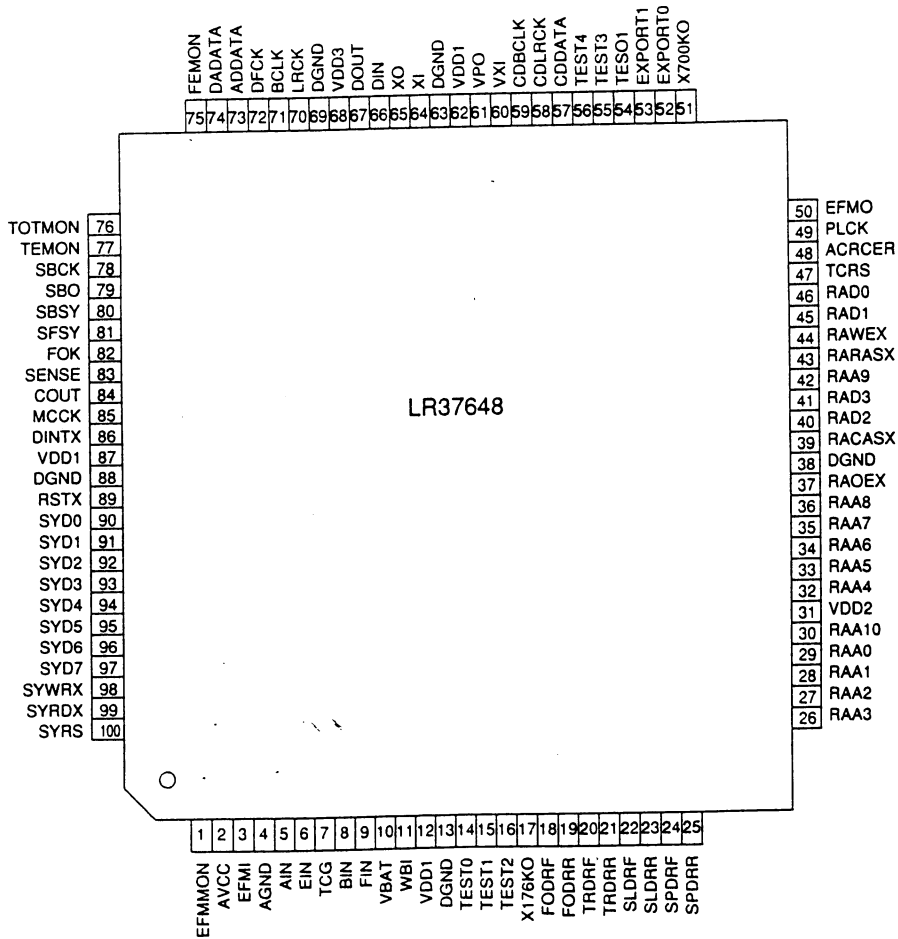


SOP1(8-PIN)



PIN	PIN No.	DESCRIPTION
CS	3	Chip select(Input)
SK	4	Serial clock(input)
DI	5	Serial data(input)
DATA	6	Serial data(output)
GND	7	Ground
PROTECT	8	Protect controlled of memory(input) Connect GND or open :Effective protect To Vcc :Ineffective protect
NC	1	Open
Vcc	2	Supply voltage

IC1201:LR37648 (ENCODER/DECODER)



## IC1201:LR37648 (ENCODER/DECODER)

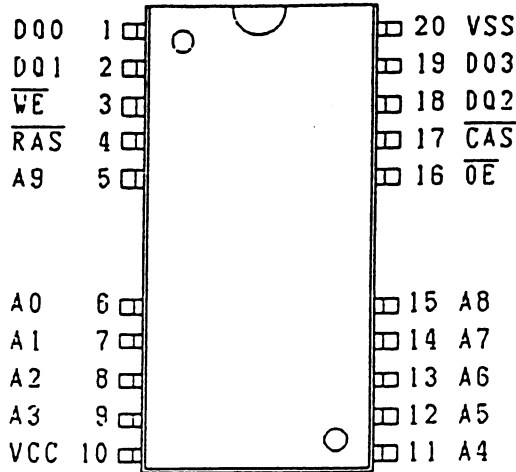
PIN No.	PIN NAME	I/O	DESCRIPTION
1	EFMMON	0	EFM monitor
2	AVCC	-	Power supply for analogue use
3	EFMI	I	EFM signal from RF amplifier
4	AGND	-	GND (analogue)
5	AIN	I	Focus error signal A
6	EIN	I	Tracking error signal E
7	TCG	I	Tracking loss signal
8	BIN	I	Focus error signal B
9	FIN	I	Tracking error signal F
10*	VBAT	I	Detect signal for power supply(servo regulator)
11	WBI	I	ADIP wobble signal
12	VDDI	-	Power supply for digital use
13	DGND	-	Ground for digital use
14/15	TEST0,TEST1	I	Test port(normally,connect to GND)
16	TEST2	I	Test port(normally,connect to GND)
17	X176KO	0	Clock output(f=176.4kHz)
18	FODRF	0	Focus servo forward output. PWM
19	FODRR	0	Focus servo reverse output. PWM
20	TRDRF	0	Tracking servo forward output.PWM
21	TRDRR	0	Tracking servo reverse output.PWM
22	SLDRF	0	Slide servo forward output.PWM
23	SLDRR	0	Slide servo reverse output.PWM
24	SPDRF	0	Spindle servo reverse output or switching motor's rotation
25	SPDRR	0	Spindle servo forward output or switching motor's rotation
26	RAA3	0	Address to D-RAM(ADR3)
27	RAA2	0	Address to D-RAM(ADR2)
28	RAA1	0	Address to D-RAM(ADR1)
29	RAA0	0	Address to D-RAM(ADR0) LSB
30*	RAA10	0	Address to D-RAM(ADR10) MSB
31	VDD2	-	Power supply for interface ( D-RAM)
32	RAA4	0	Address output to external D-RAM ADR4
33	RAA5	0	Address output to external D-RAM ADR5
34	RAA6	0	Address output to external D-RAM ADR6
35	RAA7	0	Address output to external D-RAM ADR7
36	RAA8	0	Address output to external D-RAM ADR8
37	RAOEX	0	Data output signal(enable) to external D-RAM
38	DGND	-	Digital section GND
39	RACASX	0	Column address signal output to external D-RAM
40	RAD2	I/O	Data I/O port of external D-RAM D2
41	RAD3	I/O	Data I/O port of external D-RAM D3(MSB)
42	RAD9	0	Data I/O port to D-RAM ADR9
43	RARASX	0	Low address strobe signal to external D-RAM
44	RAWEX	0	Data write enable signal to external D-RAM
45	RAD1	I/O	Data I/o port with external D-RAM D1
46	RAD0	I/O	Data I/O port with external D-RAM D1
47*	TCSR	0	Truck cross signal
48*	ACRCER	0	CRC error Flag monitor output for ADIP
49*	PLCK	0	EFM PLL clock signal output at playback
50	EFM0	0	EFM signal output at recording,CIF monitor output at playback

note : \* marks is open port.

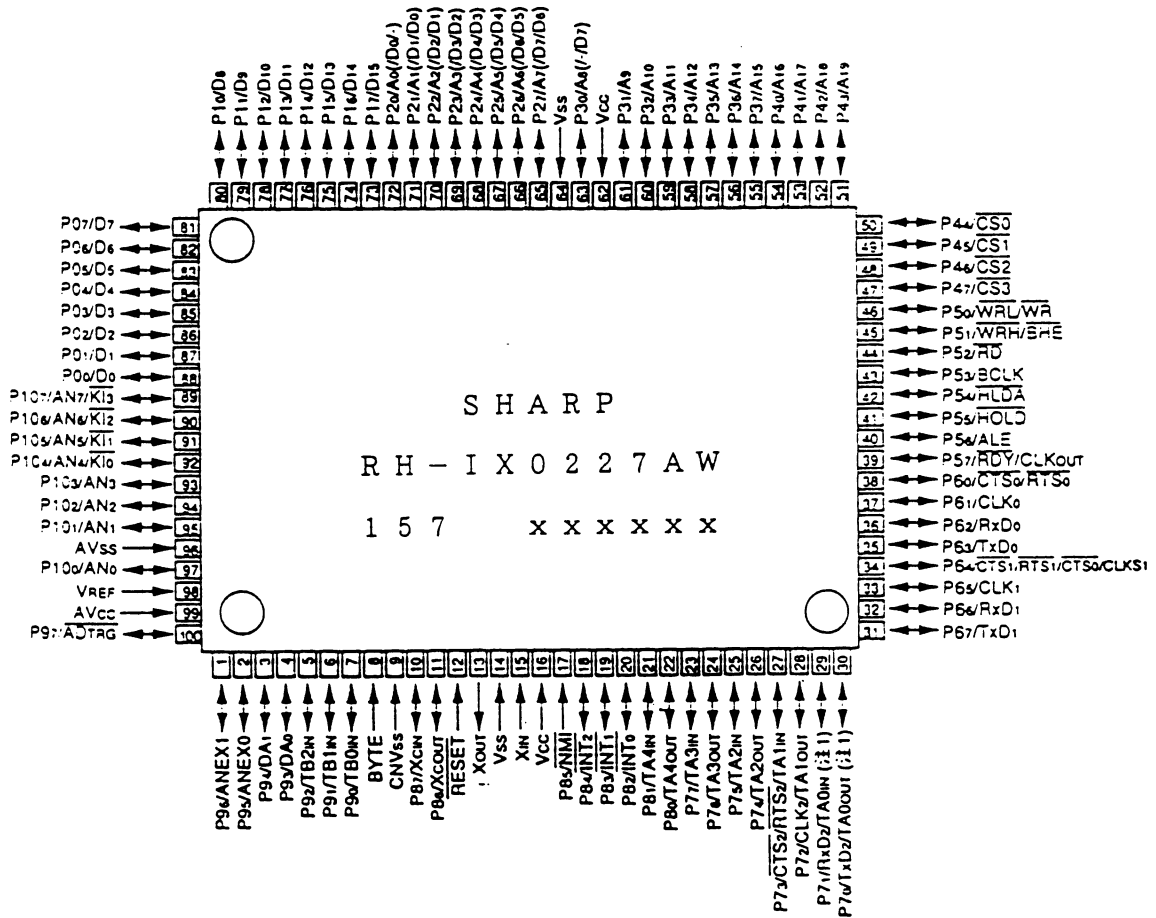
PIN No.	PIN NAME	I/O	DESCRIPTION
51*	X700KO	0	Clock output. f=705.6kHz
52*	EXPORT0	0	Micon.expander output "0"port
53*	EXPORT1	0	Micon.expander output "1"port
54	TESO1	0	When change the PLLLR, MICON.expander output port 2
55	TEST3	I/O	When change the PLLOSC, MICON.expander output port 3
56	TEST4	I/O	When change the EXTCLK, MICON.expander output port 4
57	CDDATA	I/O	CD data input port for fast dubbing.
58	CDLRCK	I/O	CDLR clock input for fast dubbing.
59	CDBCLK	I/O	CD bit clock input for fast dubbing.
60	VXI	I	PLL clock input for variable-pitch.
61*	VPO	0	PLL phase deference output for variable-pitch.
62	VDD1	-	Power supply for digital
63	DGND	-	Ground(digital)
64	XI	I	Oscillation circuit (input) 33.8688MHz
65	XO	0	Oscillation circuit (output) 33.8688MHz
66	DIN	I	Digital input signal
67	DOUT	0	Digital output signal
68	VDD3	-	Power supply for internal PLL
69	DGND	-	Ground(digital)
70	LRCK	0	Lch/Rch select output port for music data
71	BCLK	0	Shift clock for music data
72	DFCK	0	Clock for AD/DA converter(digital filter) 256Fs
73	ADDATA	I	Voice input data
74	DADATA	0	Voice output data
75*	FEMON	0	Monitor output for focus error signal
76*	TOTMON	0	Monitor output port for total signal
77*	TEMON	0	Monitor output port for tracking error signal
78*	SBCK	I	Reading clock sub-code
79*	SBO	0	Serial sub DIN code
80*	SBSY	0	Synchronized block sub-code signal
81*	SFSY	0	Synchronized frame sub-code signal
82	FOK	0	Focus detect signal. Focus good is "0" code
83	SENSE	0	Servo condition detect signal
84	COUT	0	Truck cross output signal
85	MCCK	0	Clock output signal for micon.
86	DINTX	0	Interruption output port to system interface
87	VDD1	-	Digital power supply
88	DGND	-	Ground(digital)
89	RSTX	I	Chip reset input(L = reset)
90	SYD0	I/O	Data buss port of interface (LSB)
91 to 96	SYD1 to SYD6	I/O	Data buss port of interface
97	SYD7	I/O	Data buss port of interface (MSB)
98	SYWRX	I	Pulse input port of writing resister
99	SYRDX	I	Pulse input port of reading resister
100	SYRS	I	Resister input select port of interface

note : \* marks is open port.

IC1202:IX2474AF (D-RAM)



CONNECTION



## IC1401:IX0227AW (SYSTEM MICROCOMPUTER)

PIN No.	PIN NAME	I/O	DESCRIPTION
1*	P96/ANEX1	O	I/O port P96
2*	P95/ANEX0	O	I/O port P95
3	P94/DA1	O	Adjust output of lessor power LDJS
4*	P93/DA0	O	ADJS for auto adjusting step check
5*	P92/TB2IN	O	I/O port P92
6	P91/TB1IN	I	LD SW CK input
7	P90/TB0IN	I	ERR input
8	BYTE	I	GND
9	CNVss	I	GND
10*	P87/Xcin	O	ST-ID output
11*	P86/Xout	O	MD search output
12	RESET	I	Reset input
13*	XOUT	-	Clock output
14	Vss	-	GND
15	XIN	I	Crystal (8.4672MHz)
16	Vcc	-	+3.15V
17	P85/NMI	I	I/O port P85
18	P84/INT2	I	D INT
19	P83/INT1	I	D SENSE(Servo-sens. input from MD-LSI)
20	P82/INT0	I	ST-ID (MD on)
21	P81/TA4IN	I	CD serch input
22	P80/TA4OUT	O	MD RSW input
23*	P77/TA3IN	I	Frequency select for swiching power supply
24	P76/TA3OUT	O	Variable pitch output port
25	P75/TA2IN	I	Power failure detect port P-DOWN
26	P74/TA2OUT	O	On/off output for magunetic-head current HDON
27	P73/TA1IN	O	Loading motor output and control lsignal output LD+
28	P72/TA1OUT	O	Loading motor output and control lsignal output LD-
29	P71/TA0IN	I	Truck counts signal input CIN
30	P70/TA0OUT	I	Innér switch detect input INN SW
31	P67/TXD1	O	R-DATA
32	P66/RXD1	O	R-LATCH
33	P65/CLK1	O	R-CLK
34	P64/CTS1/RTS1/ CTS0/CLKS1	O	Communication's possible to system
35	P63/TXD0	O	MD data output MD DATA
36	P62/RXD0	I	System control data output K DATA
37	P61/CLK0	I	System communication clock input
38	P60/CTS0/CLKout	I	D RAM(4M/16M) input select
39	P57/RDY/CLKout	O	REC/PLAY select output port R/P
40	P56/ALE		Monitor input for focus servo condition FOK
41*	P55/HOLD	O	I/O port P55
42	P54/HLDA	O	S2 output
43	P53/BCLK	O	S1 output
44	P52/RD	O	Resister select signal (MD-LSI) output SYRS
45	P51/WRH/BHE	O	Lead signal output (MD-LSI) SYRD
46	P50/WRL/WR	O	Write signal output (MD-LSI) SYWR
47	P47/CS3	I/O	Data bus 7 SYS D7
48	P46/CS2	I/O	Data bus 6 SYS D6
49	P45/CS1	I/O	Data bus 5 SYS D5
50	P44/CS0	I/O	Data bus 4 SYS D4

note : \* mark is open port



PIN No.	PIN NAME	I/O	DESCRIPTION
51	P43/A19	I/O	Data bus 3 SYS D3
52	P42/A18	I/O	Data bus 2 SYS D2
53	P41/A17	I/O	Data bus 1 SYS D1
54	P40/A16	I/O	Data bus 0 SYS D0
55*	P37/A15	O	I/O port P37
56*	P36/A14	O	I/O port P36
57*	P35/A13	O	I/O port P35
58	P34/A12	O	EEPROM protect mode cancel EEPRO
59	P33/A11	O	EEPROM chip selector output EEPD
60	P32/A10	I/O	EEPROM serial data output
61	P31/A9	O	EEPROM serial clock output
62	Vcc	I	+3.15V
63*	P30/A8	O	I/O port P30
64	Vss	-	Ground
65	P27/A7	O	Soft serial communication ,LSB fast,and 2-mode output L3 DATA
66	P26/A6	O	Soft serial communication ,LSB fast,and 2-mode output L3 MODE
67	P25/A5	O	Soft serial communication ,LSB fast,and 2-mode output L3 CLK
68*	P24/A4	O	I/O port P24
69*	P23/A3	O	I/O port P23
70	P22/A2	O	PCNT0 output
71*	P21/A1	O	I/O port P21
72	P20/A0	O	LDON output
73	P17/D15	O	ANLPTR output
74*	P16/D14	O	ADPON output (for CK)
75*	P15/D13	O	DAPON output (for CK)
76*	P14/D12	O	
77*	P13/D11	O	DSS1 output
78*	P12/D10	O	DIG EX output (for CK)
79*	P11/D9	O	DIG CD output (for CK)
80	P10/D8	O	System reset output XRST
81*	P07/D7	O	ADMUTE output
82*	P06/D6	O	EMPHA output
83*	P05/D5	O	DAMUTE output
84*	P04/D4	O	Mute output
85*	P03/D3	O	DOUTM output
86	P02/D2	I	TEST2 (select special mode12)
87	P01/D1	I	TEST1 (select special mode11)
88	P00/D0	I	TEST0 (select special mode10)
89	P107/AN7/ $\overline{K13}$	I	AVCK3 (special monitor mode input)
90	P106/AN/ $\overline{K12}$	I	Monitor(3.1V) input for AD/DA sections) AVCK2
91	P105/AN5/ $\overline{K11}$	I	Monitor(5V) input for DOUT section AVCK1
92	P104/AN4/ $\overline{K10}$	I	Detect input port for temperature DTEMP
93	P103/AN3	I	Rec-input detect MINF
94	P102/AN2	I	Test key input1 TEST K1
95	P101/AN1	I	Test key input2 TEST K2
96	AVss	-	Ground
97	P100/ANO	I	Mecha. and head position detect port HINF
98	VREF	-	+3.15V
99	AVcc	-	+3.15V
100	P97/ $\overline{ADTRG}$	I	I/O port P97

note : \* mark is open port

## MD-105

## Check before &amp; after replacing the mechanism parts and how to replace it

## 1. Type Number of Mechanism: MDM-970K

## 2. Optical Pickup replacement

## 2-1. Conditions to replace optical pickup

Before replacing the optical pickup, be sure to confirm below listed points and perform the replacement only when abnormal symptom is found. Ask detail analysis with the Disc attached if the cause is uncertain for the problem such as skipping sound. In that case, carefully examine if the Disc is not wrong.

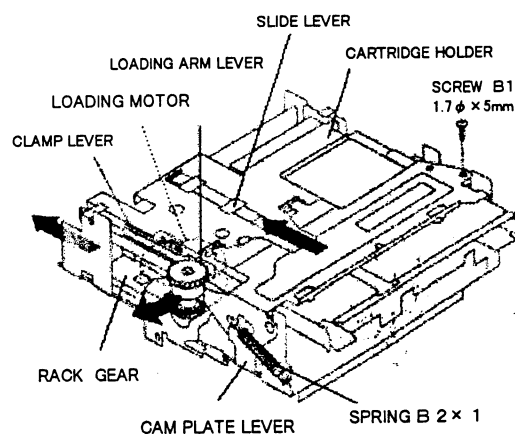
- 1). If error signal at focus or tracking is found abnormal.
- 2). If focus and tracking actuator does not work. (Tracking actuator can be observed by Circuit Tester at #8 and #9 pin of IC M56758FP.)
- 3). Motion of actuator is not smooth enough. (Focus actuator can be confirmed during Search operation by using transparent Disc. Tracking can not be checked with this method.)
- 4). Use Pre-mastered Disc and check if jitters is more than 9.5nsec with KIKUSUI 6135 or if jitters is more than 24nsec with LEADER LJM-1851.
- 5). Use Recordable Disc and check if jitters is more than 11.0nsec with KIKUSUI 6135 or if jitters is more than 28nsec with LEADER LJM-1851.  
\* If jitters can not be measured at MDM-970K test point, observe the RF wave form by using Oscilloscope with the 10:1 probe.
- 6). If C1 error rate is more than 40 by Pre-mastered Disc.
- 7). If C1 error rate is more than 60 by Recordable Disc.
- 8). If value of Lasor Power meter is too low at play mode and recording mode.
- 9). Grating is out of spec, even if the position of spindle motor is aligned.

## 2-2. How to check

- 1). Check by using separate document "MD-105 MD mechanism measurement methods" for above item 4). to 9). of 2-1.

## 2-3. Replacement process of optical pickup

- 1). Disconnect 4 sockets (white x2, red and blue colored) and CN1601 (FFC 5 leads ) on the PCB.
- 2). Unscrew the 4 screws which fix the PCB. Raise the PCB from the right side of front view, leaving the left side (pick up FFC side) in place. Unlock the CN1101 socket and pull out the FFC.
- 3). Open the roller-arm lever toward the arrow shown in illustration and push back the clumper lever.
- 4). Add 5 volts to the blue color socket of loading motor, push the rack gear toward the arrow and move the cam plate lever until it clatters. (Refer to Fig. 2-1)
- 5). Add 2 volts (Circuit Tester can be used) to the red color socket of pick motor, move the pick to the outermost position and remove the magnetic head. (M1.7 x5 screw)
- 6). Unscrew the screw (M1.7x5) that fix the spring on arm holder and remove the spring at the left side.
- 7). Move the holder arm to the left side and remove it together with cartridge holder.
- 8). Unscrew the 3 screws (M1.7x10) on the molded parts that fix the shaft of the pick up and remove the pick.  
If possible, do not remove the mechanism switch PCB by unscrewing the screws (front M1.7x10, back M1.7x3), since it will result difficult work to build the PCB with all of the 3 switches at ON position.
- 9). Install a new pick and confirm the motion. Then, remove the metal fitting from the back side of defective pick and attach it on the new pick by using M1.4x2 screw.
- 10). Attach the holder arm and cartridge holder which were removed at above item 7 and also attach the screws and spring which were removed at above item 6.
- 11). Insert and lock the pick up FFC to the socket CN1101, and fix the PCB by using screws.
- 12). Insert the 2 sockets of the motor (except the blue color) and insert the FFC at CN1601.
- 13). Attach the magnetic head and insert the socket to the PCB.
- 14). Add 5 volts at the blue color socket to move back the mechanism to the EJECT position.



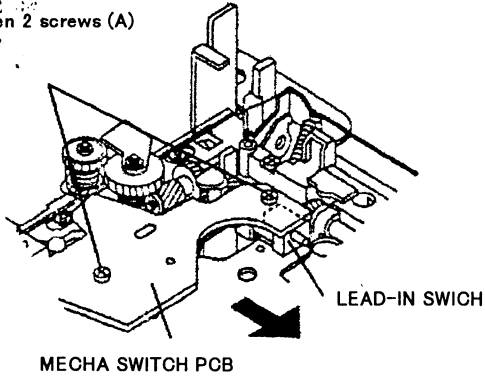
(Fig 2-1)

## 2-4. Check after the replacement

After the replacement, confirm the following points are within the specifications.

- 1). Error rate measured by Pre-mastered Disc must be within the specification.
- 2). Error rate measured by Recordable Disc must be within the specification.
- 3). Error rate at self recording/playback must be within the specification.
- 4). Measurements for the location of lead-in switch must be within the specification. If not, adjust it referring to Fig. 2-2.
- 5). Confirm the Grating is within the specification.

Loosen 2 screws (A)

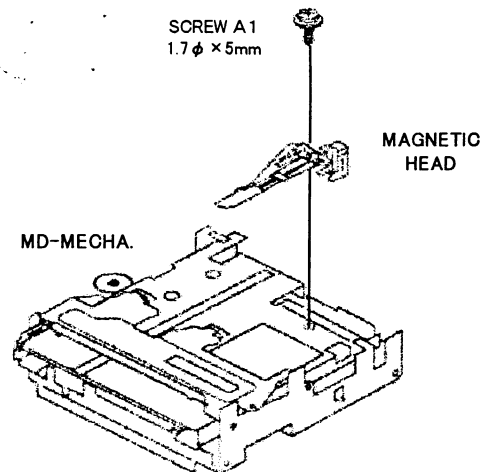


(Fig 2-2)

## 3. Magnetic head replacement

## 3-1. Replacement process

- 1). Pull out the red color socket( CN1604) of slide motor and head(CN1252), add 5 volts at the socket(CN1604) to move the pick up to the outermost position.
- 2). Pull out the socket of magnetic head, unscrew and replace the head. (refer to Fig. 2-3)
- 3). Insert the sockets of magnetic head and slide motor.



(Fig 2-3)

## 3-2. Check after the replacement

Make recording and measure the error rate by using the recorded disc.  
Error rate must be within the specification.

(Note). Refer to separate document (MD-105 MD mechanism measurements methods) for the measurement methods and the specifications.

4. Replace the spindle motor

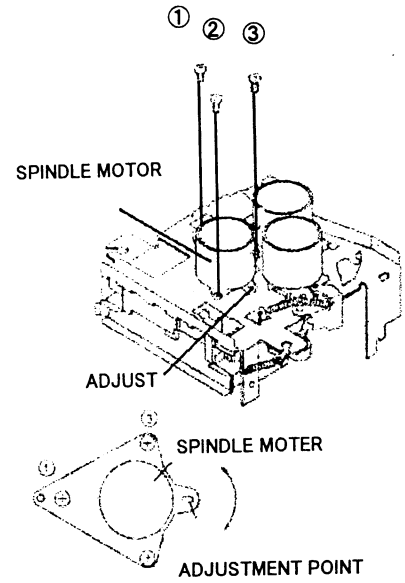
When a motor get old, metallic dust will adhere around the brush and it will decrease the impedance by causing a shor circuit on the coil. This will result an insufficient capability of the driving circuitry andunstable rotating. To detect this, connect a digital multi meter (Circuit Tester is not good) to the motor and rotate the moter may cause skipping etc. slowly by hand. If the resistance decreases at paticular point, the motor is defective. Defective motormay cause skipping sound, etc..

4-1. Procedure to replace the spindle motor

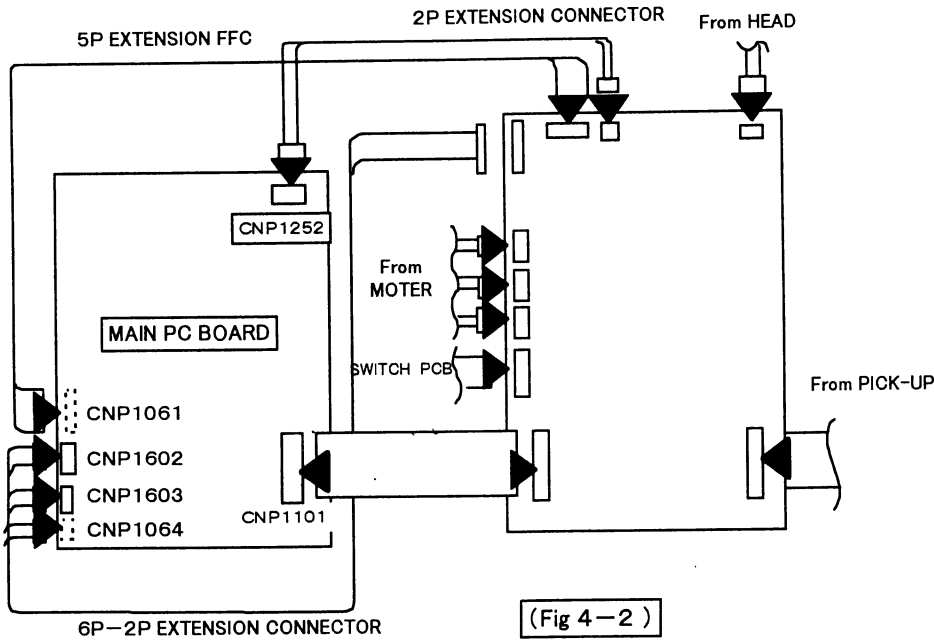
- 1). Disconnect four sockets (white x2, red and blue) and CN1601 (FFC 5 leads) on the PCB.
- 2). Unscrew the four screws which fix the PCB. Raise the PCB from the right side of front view, leaving the left side (pick up FFC side) in place. Unlock the CN1101 socket and pull out the FFC.
- 3). Unscrew the three screws that fix the spindle motor and replace the motor. Fasten the screw temporarily for alignment.

4-2. Alignment after the replacement

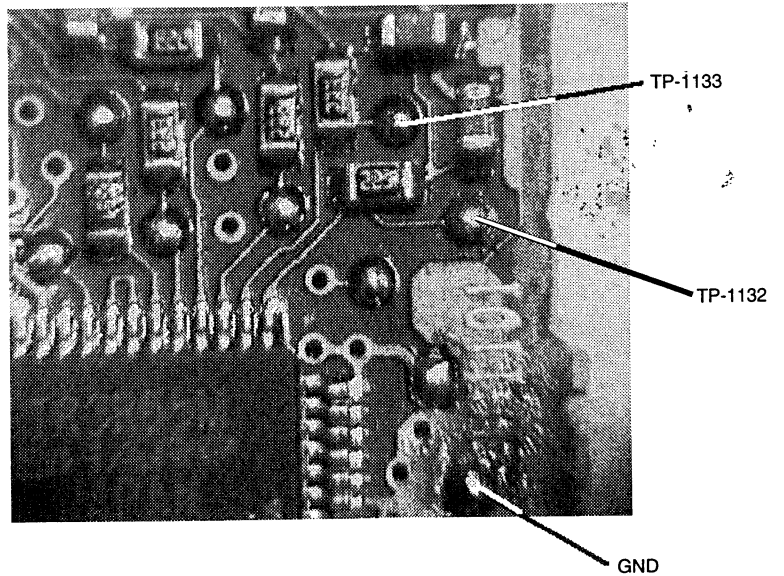
- 1). Use an extension JIG and connect it as shown in Fig. 4-2.
- 2). Connect an oscilloscope to the test points of the PCB as shown in Fig. 4-3. (Refer to Fig. 4-4 for the wirings.)
- 3). Adjust the position of spindle motor while observing the lissajous' figure,by using a screw driverput into the hole for adjustment. (Refer to Fig. 4-4)



(Fig 4-1)



(Fig 4-2)



## MD-105

## MD mechanism measurement items and measurement methods

## 1. Type number of Mechanism: MDM-970K

## 2. Error rate

## 2-1. Pre-mastered Disc

- 1). Connect the right side of R720 (5.6k ohms, at Q701 side) and the chassis. Plug in the AC plug to the wall outlet.
- 2). Push the ENTER key of remote control (RC-301MD or RC-339MD) to enter the TEST mode. Confirm the display shows "tsm\*\*\*e\*\*" and then it changes to "EJECT".
- 3). Insert the Pre-mastered Disc (TCD-381) and confirm the display shows "AUT YOBI".
- 4). Turn the AMCS knob counterclockwise by one click and confirm the display shows "TEST PLAY".
- 5). Push INPUT key and confirm the display shows "ADRES 0050".  
ADRES shows the location of the pick and lager number means outer location of the disc. Turning the AMCS knob counterclockwise will change the ADRES number to measure the error rate of desired point.  
0050 is the inner, 03C0 is the middle, 0700 is the outer and 08A0 is the outermost position.
- 6). Push PLAY/PAUSE key. The display shows "s\*\*\*c\*\*\*\*" and error rate measurement will start. Four digit numerals following the "s" show the subcode address and four digit numerals following the "c" show C1 error rate.  
Ascertain the quality of MD mechanism and Disc by the value of error rate. Error rate is defined to be less than 220 in RAINBOW BOOK, although there is no error rate specified for the Pre-mastered Disc. Onkyo has an internal specification for the Pre-mastered Disc error rate, as a criterion to ascertain the MD mechanism.  
Pre-mastered Disc error rate =< 40  
Just after starting playback, error rate is displayed as if it is big. However, this is no problem.

## 2-2. Recordable Disc

- 1). Push EJECT key and exchange the disc to Recordable Disc (issued by MD Proj., MD01).
- 2). Confirm the display indicates "AUT YOBI". Turn the AMCS knob counterclockwise and confirm the display shows "TEST PLAY".
- 3). Push INPUT key and confirm the display shows "ADRES 0050".
- 4). Push PLAY/PAUSE key and confirm the display shows "a\*\*\*c\*\*\*\*". Error rate measurement will start.  
Four digit numerals following the "a" show the address and four digit numerals following the "c" show C1 error rate.  
Similarly, Onkyo has an internal specification as shown below.  
Recordable Disc error rate =< 60

## 2-3. Self recording/playback disc

- 1). Push EJECT key and exchange the disc to the self recording/playback disc. (If it is not available, cancel the test mode, make self recording/playback disc and reenter the test mode.)
- 2). Confirm the display indicates "AUT YOBI". Turn the AMCS knob counterclockwise and confirm the display shows "TEST PLAY".
- 3). Push INPUT key and confirm the display shows "ADRES 0050".
- 4). Push PLAY/PAUSE key and confirm the display shows "a\*\*\*c\*\*\*\*". Error rate measurement will start.

Four digit numerals following the "s" show the address and four digit numerals following the "c" show C1 error rate.

Onkyo has an internal specification as shown below.

Self recording/playback disc error rate =< 60

\* In case of self recording/playback disc, rewriting might have been done many times and the song with larger track number is not necessarily located at outer side. Be careful for this when measure the error rate by designating the address.

### 3. Jitter

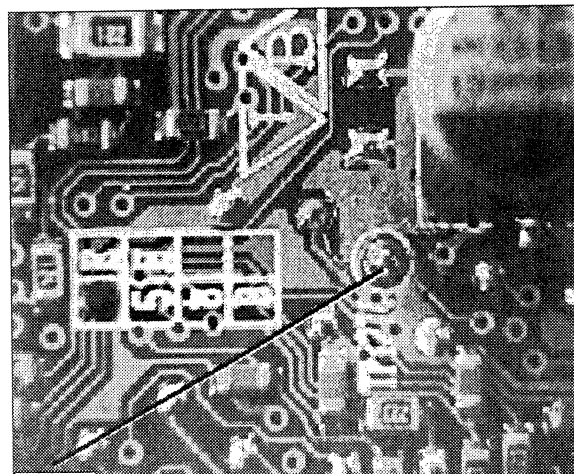
#### 3-1. Pre-mastered Disc

- 1). Solder a lead wire at the RF-TP point shown in the Fig. 3-1 PCB picture and connect it to Jittermeter.
- 2). Measure the jitter while playing at the same test modes as error rate measurements.
- 3). Onkyo internal specifications

KIKUSUI 6135: Less than 9.5nsec

LEADER LJM-1851: Less than 24.0nsec

\* Jitter might not be able to measure for MDM-970K mechanism when jitter meter is connected at the test point, due to the unstable RF signal. In that case, observe the wave form by oscilloscope to ascertain the quality.



RF-TP

#### 3-2. Recordable Disc and Self recording/playback disc

- 1). Use same procedure as Pre-mastered Disc for measurements.
- 2). Onkyo internal specifications

KIKUSUI 6135: Less than 11.0nsec

LEADER LJM-1851: Less than 28.0nsec

(Note): Refer Fig. 6-1 for GND connection.

### 4. Measurement for Read-in position

- 1). Connect the right side of R720 (5.6k ohms, at Q701 side) and the chassis. Plug in the AC plug to the wall outlet.
- 2). Push the ENTER key of remote control (RC-301MD or RC-339MD) to enter the TEST mode. Confirm the display shows "tsm\*\*\*\*e\*\*" and then it changes to "EJECT".
- 3). Inset the disc and confirm the display shows "AUT YOBI". Push the STOP key and the display will change to "tsm\*\*\*\*e\*\*".
- 4). Push DISPLAY key and confirm the display shows "INNER".
- 5). Push PLAY/PAUSE key and confirm the display shows "s\*\*\*\*c\*\*\*\*".

Four digit numerals following the "s" show the position of read-in switch.

The specification is in between FF85 and FFD2.

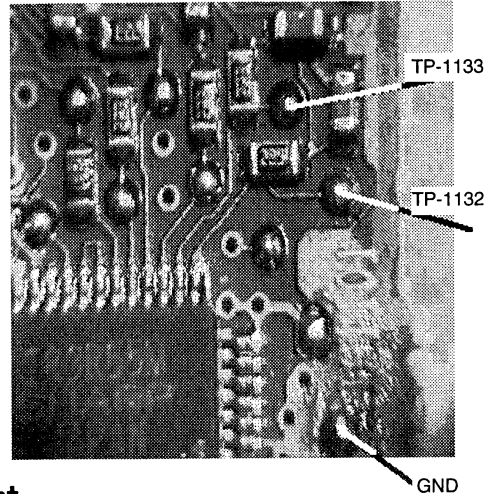
### 5. Lasor power measurement

- 1). Connect the right side of R720 (5.6k ohms, at Q701 side) and the chassis. Plug in the AC plug to the wall outlet.
- 2). Push the ENTER key of remote control (RC-301MD or RC-339MD) to enter the TEST mode. Confirm the display shows "tsm\*\*\*\*e\*\*" and then it changes to "EJECT".
- 3). Put the optical sensor of lasor power meter (LEADER 8001 or 8010) to the objective lens of pick up.
- 4). Each time to push INPUT key will change the display to "xpw", "rpw" and "ppw". Measure the power for each position. Do not keep the "rpw" and "xpw" conditions for long. Especially, measure the power for "xpw" within 15 seconds.

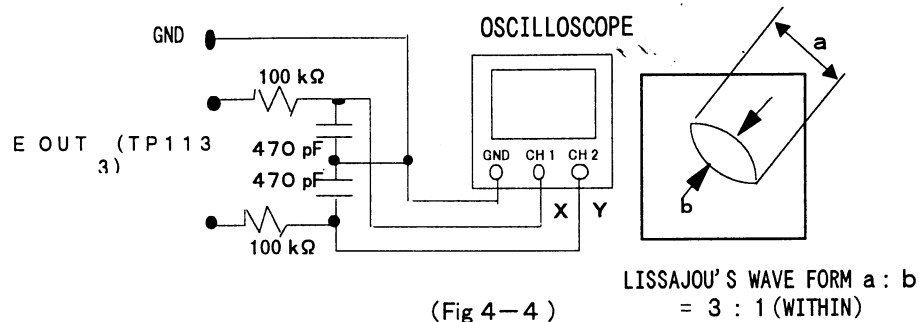
Reference value: "xpw" 6.8 mW +/- 5%  
 "rpw" 5.2 mW +/- 5%  
 "Ppw" 0.62mW +/- 5%

## 6. Grating check

- 1). Solder lead wires at the points shown in the Fig 6-1 PCB picture and connect them to oscilloscope as shown in Fig 6-2. Set the oscilloscope as shown in Fig 6-2. Set the oscilloscope at AC input, 20mV/DIV range.
- 2). Connect the right side of R720 (5.6k ohms, at Q701 side) and the chassis.  
Plug in the AC plug to the wall outlet.
- 3). Push the ENTER key of remote control (RC-301MD or RC-339MD) to enter the TEST mode. Confirm the display shows "tsm\*\*\*e\*\*" and then it changes to "EJECT".
- 4). Insert the Pre-mastered Disc and confirm the display shows "AUT YOBI". Push STOP key and the display will change to "tsm\*\*\*e\*\*".
- 5). Turn the AMCS knob clockwise by two clicks and confirm the display shows "AUTO AJST". Push PLAY/PAUSE key.
- 6). Confirm the display changes to "PEG:", "HAG:" and then "COMPLETE". Wave form of the Gratings shown in the oscilloscope.



## Pick-up grating measurement



## 7. Cancel the test mode

Unplug the AC plug from wall outlet to cancel the test mode.

## Message List

The following table explain the various messages that appear in the display.

Message	meaning
Blank Disc	A new recordable MD or a recordable MD without disc or track names is inserted.
Cannot Copy	An attempt was made to make a second copy from a digitally dubbed MD.
Cannot Edit	An attempt was made to edit the disc during MEMORY or RANDOM play, or in recording standby mode, or an attempt to edit a premastered disc was made.
Cannot Rec	An attempt was made to record onto a premastered (read-only) disc.
D. In Unlock	The digital equipment (CD player, DAT, etc) has not been connected properly. Otherwise, the connected digital equipment is not operating properly.
Disc Error	The disc is abnormal (scratched or missing a TOC).
Disc Full	The disc is full.
Impossible	The disc could not be edited.
Mecha Error	An error occurred in the unit's internal mechanism.
Memory Full	An attempt was made to record a 26th track.
Name Full	The titling capacity of the disc has reached its limit.
No Change	The naming attempt failed.
No Disc	There is no disc in the unit.
No Track	The inserted disc has a disc title but no tracks.
Not Audio	An attempt was made to play a non-audio disc.
Over	In pause mode (when playing is paused): the Fast Forward button (▶▶) was pressed to the end of the disc.
Protected	The inserted disc is record-protected.
Retry Error	The recording attempt failed due to a consecutive disturbance or scratches on the MD.
Temp Over	An abnormally high temperature is detected in the unit's internal mechanism.
TOC Error	The reading of the TOC failed.
TOC Writing	The unit is writing the recorded or edited contents to the MD.
U-TOC Error	The writing of the recorded or edited contents failed.

## MD MECHANISM SECTION

- Remove the optical head  
(refer to Fig.1)

1. Screw (A1) take off.

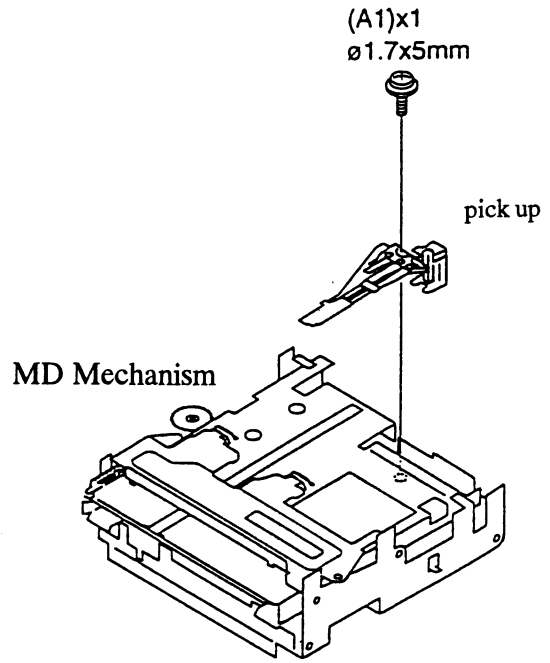


Fig.1

- Cartridge holder take off  
(refer to Fig.2)

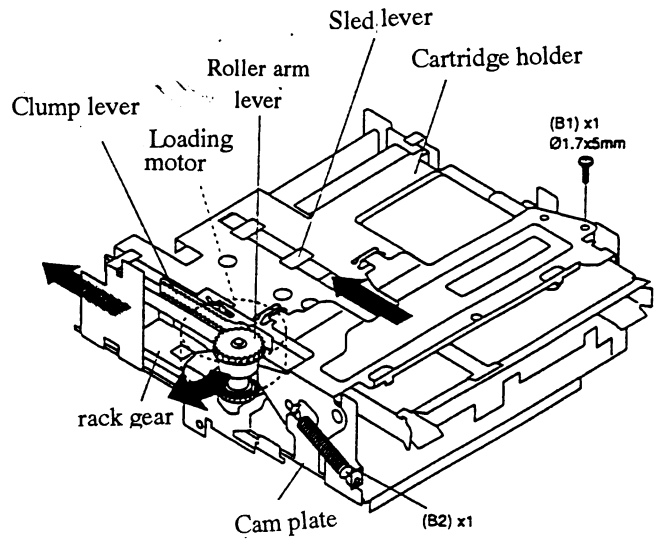


Fig.2

- Mecha switch PC Board  
take off. (refer to Fig.3)

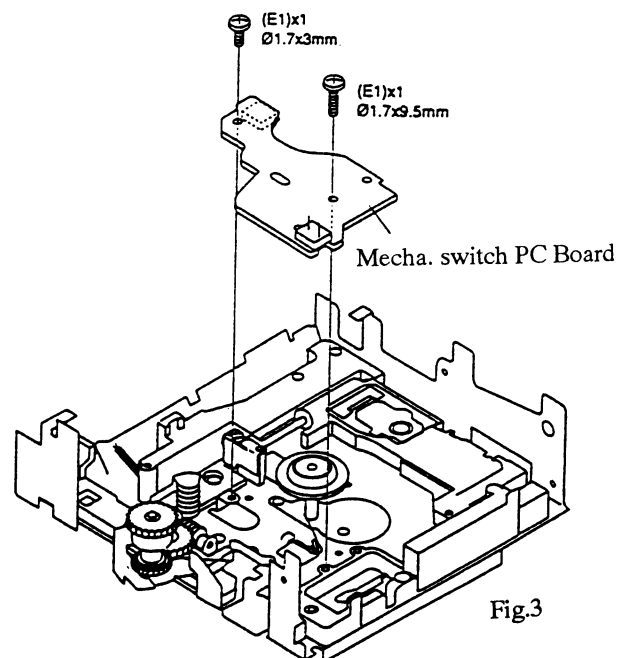
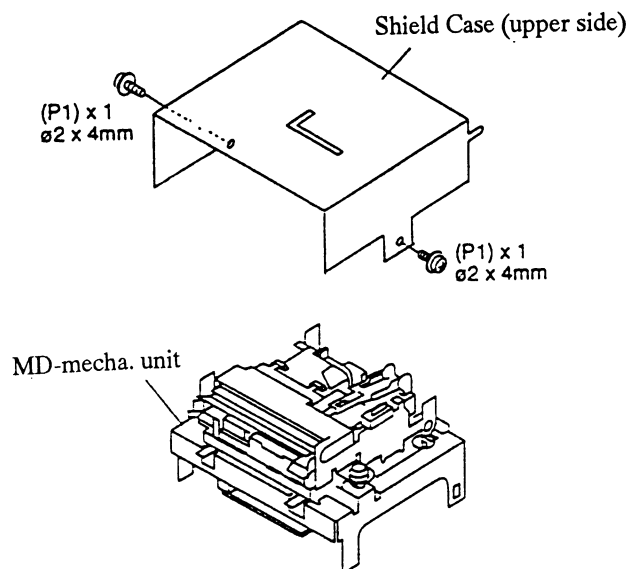


Fig.3

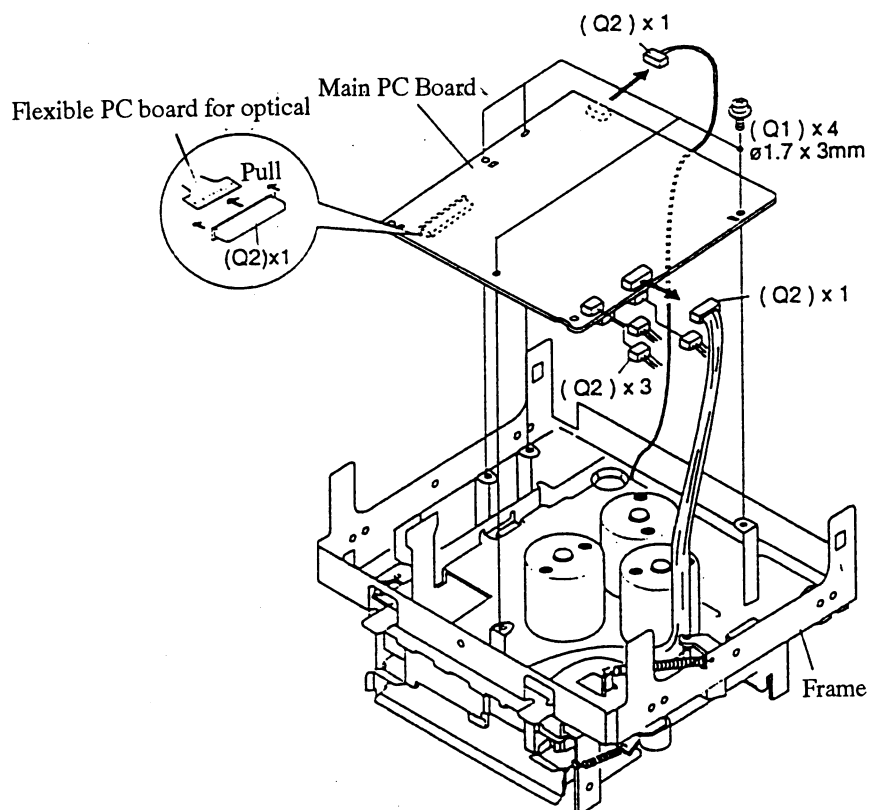


## MD MECHANISM DISASSEMBLY

**note: Procedure to reset the Mechanism**

Be sure to reset the mechanism, when you exchanged it.  
Follow next procedure for the reset.

- 1) Remove the top cover of the unit.  
Temporarily connect either of RESET MECHA terminals (2p terminal) on the main PCB (NAAR-6141) to the chassis (GND) by using a lead wire with clips at each side.
- 2) Plug in the AC plug to the wall outlet, keeping above lead wire connected.
- 3) Disconnect above lead wire.
- 4) Turn on the unit.



- Sled motor/Loading motor take off (refer to Fig.4)

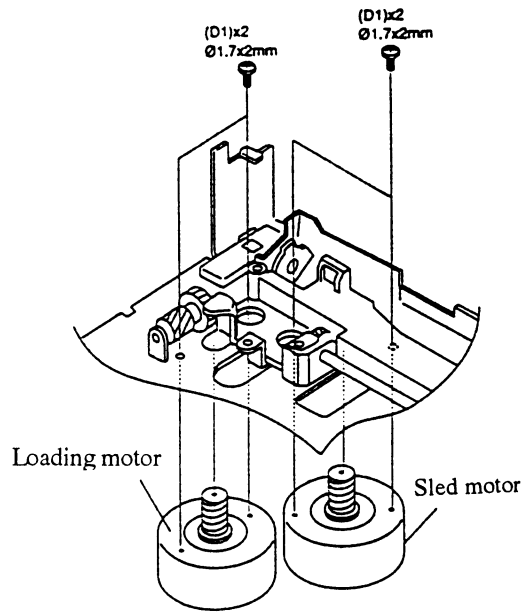


Fig.4

- Spindle motor take off (refer to Fig.5)

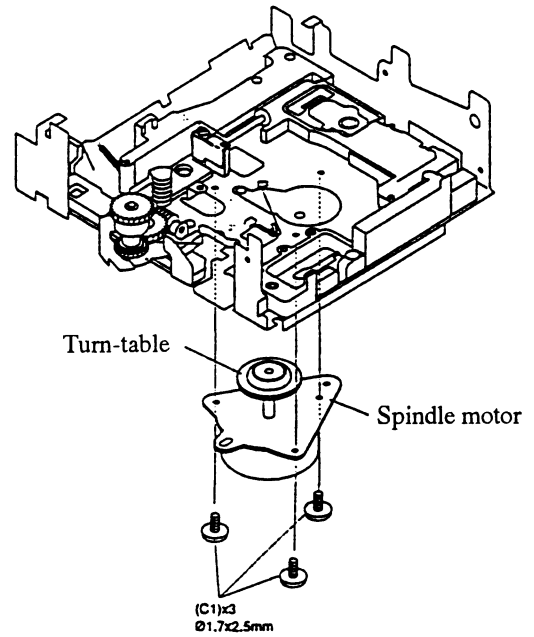


Fig.5

- Optical pick up take off (refer to Fig.6)

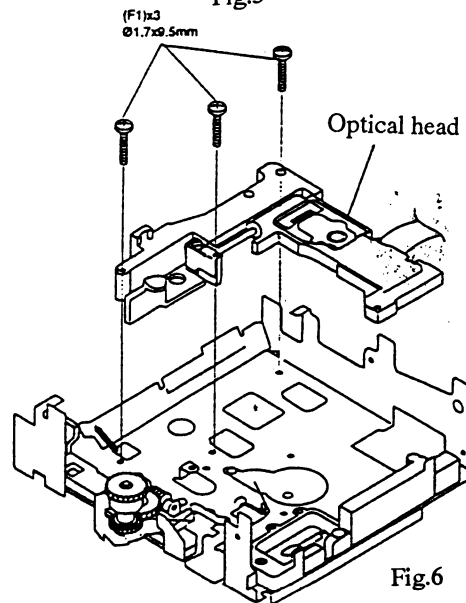


Fig.6

● Mechanism Adjustment

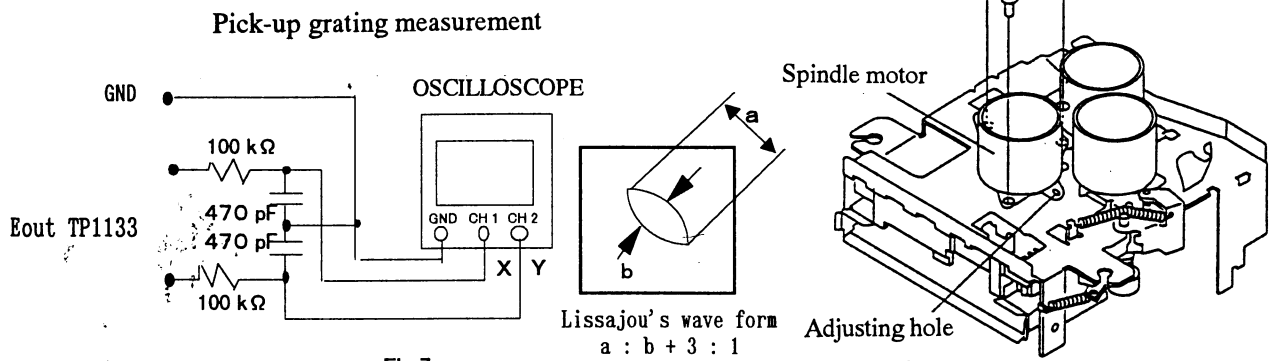


Fig.7

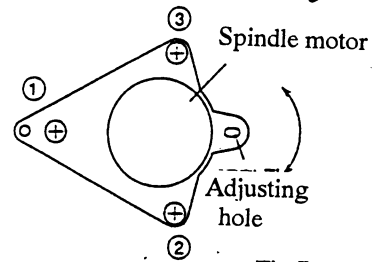


Fig.7

JITTER CHECKING

- 1) Insert the Pre-mastered disc,
- 2) Setting is AUTO Mode (TEST MODE) and then auto adjust. (Indicate on display "COMPLETE")
- 3) 3 screws of spindle motor few loosen, then re-adjusting screws while look at the oscilloscope.

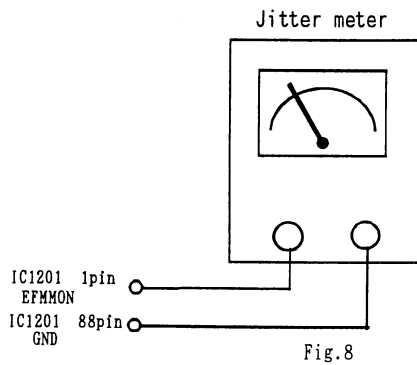


Fig.8

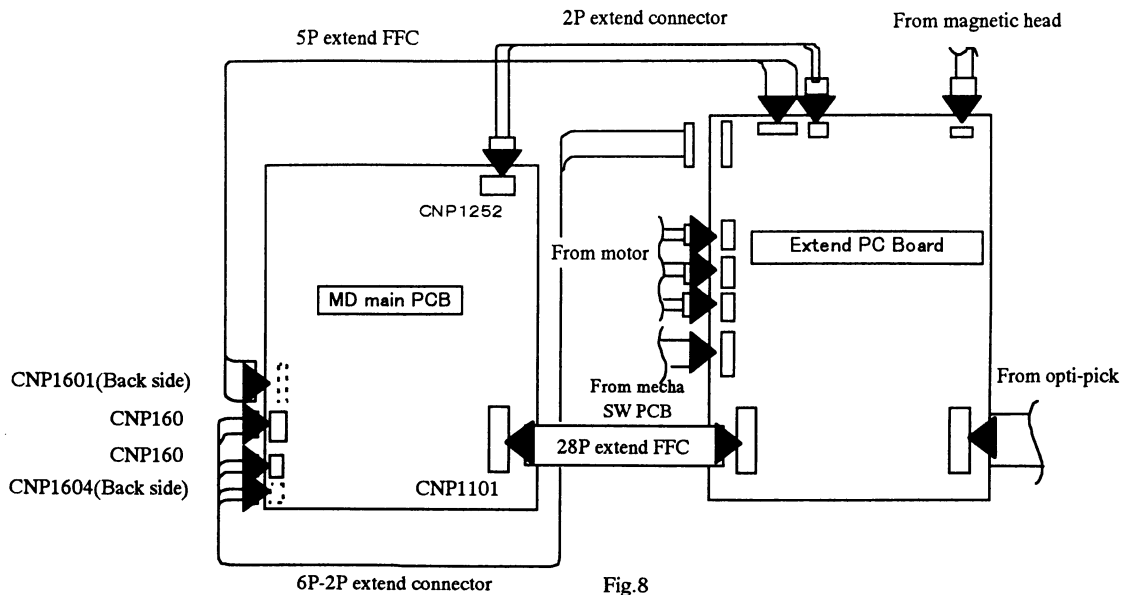
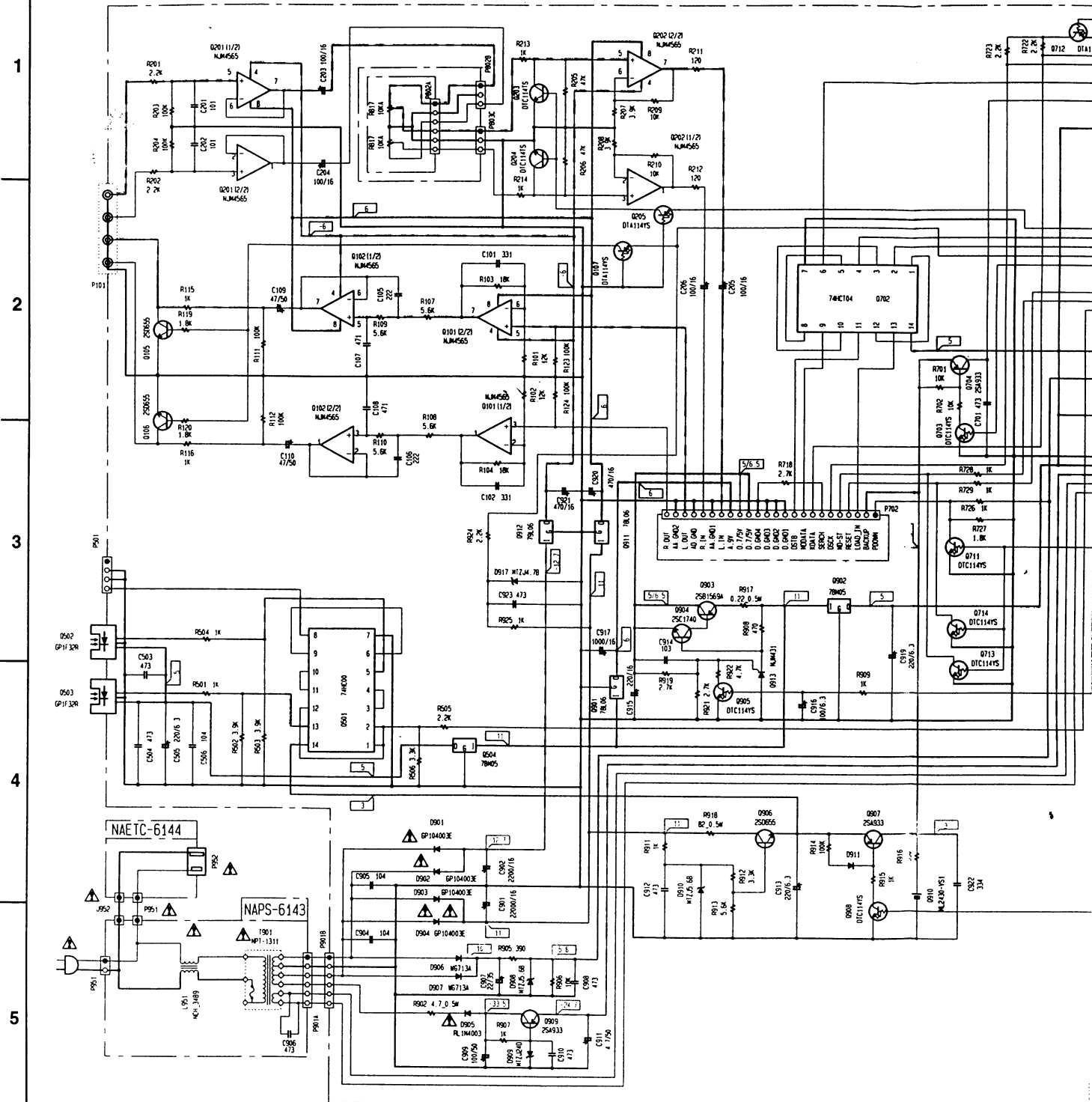


Fig.8

**A**                      **B**                      **C**                      **D**

**SCHEMATIC DIAGRAM**

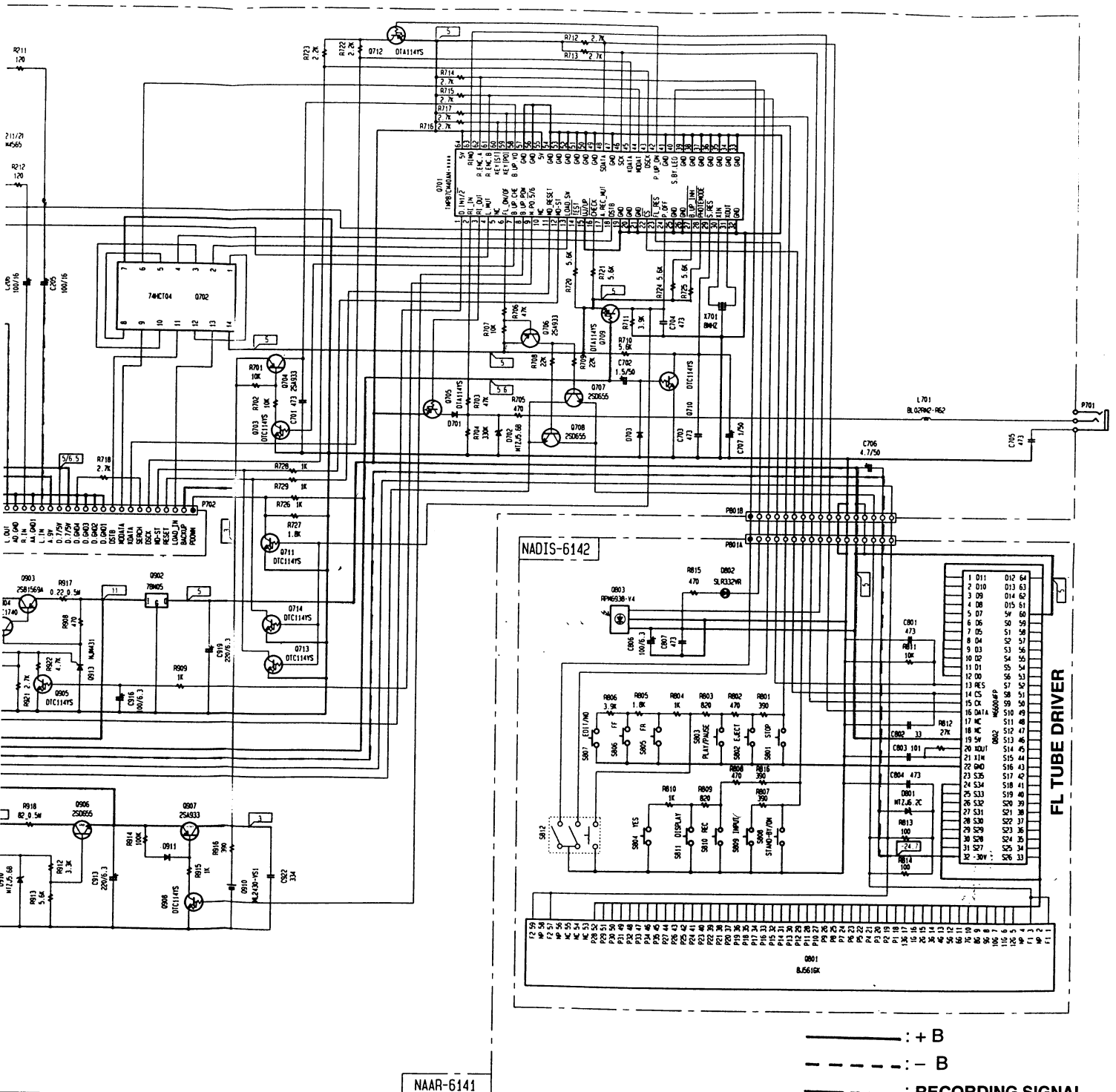


D

E

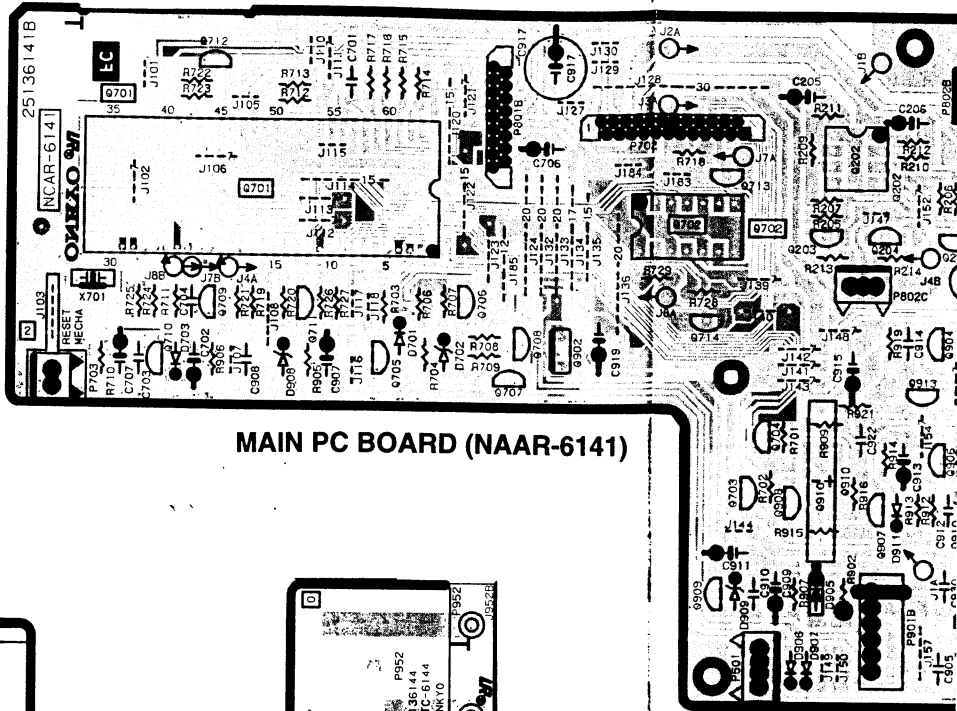
F

G

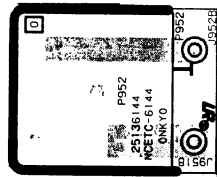


- : + B
- - - : - B
- - - - : RECORDING SIGNAL
- · - · : PLAY BACK SIGNAL

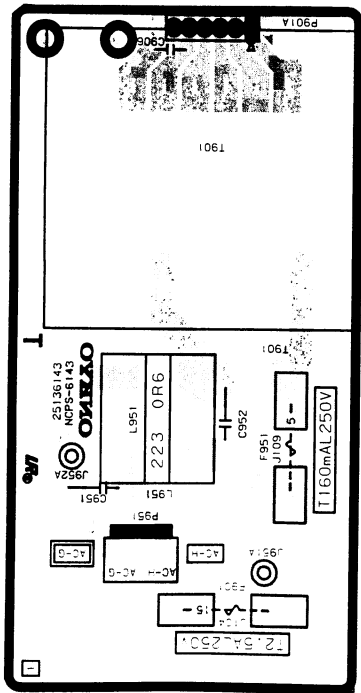
PC BOARD (BOTTOM VIEW)



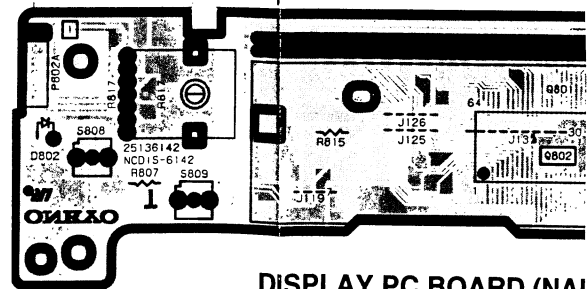
MAIN PC BOARD (NAAR-6141)



OUTLET PC BOARD (NAETC-6144)



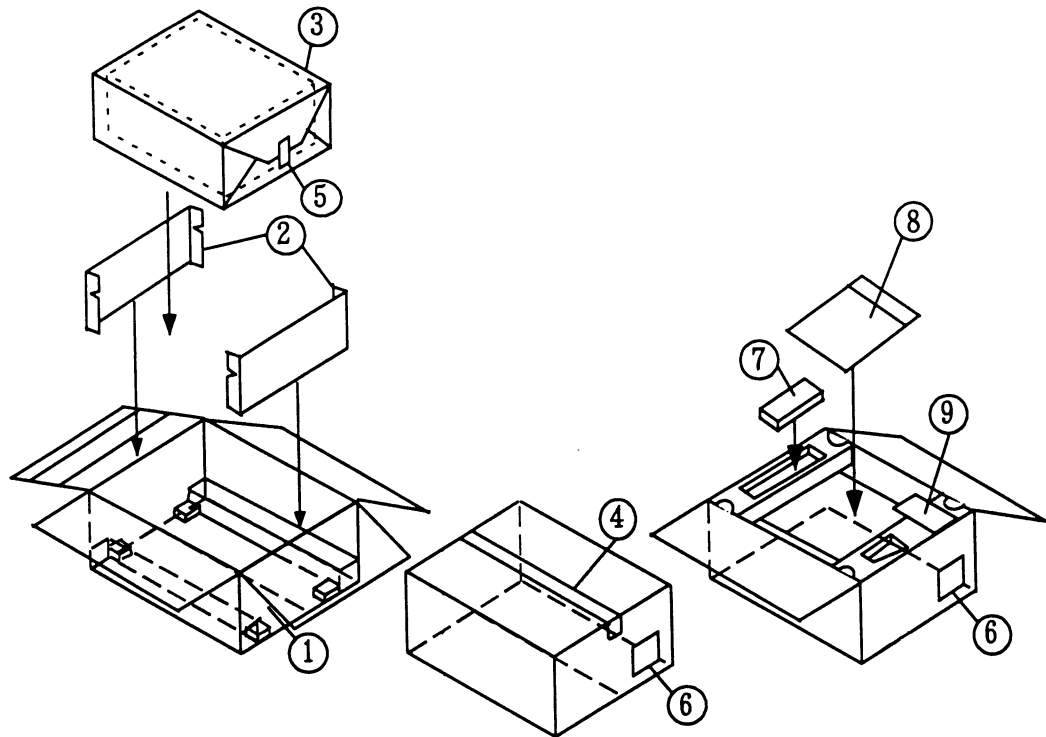
POWER SUPPLY PC BOARD (NAPS-6143)



DISPLAY PC BOARD (NAI)



**PACKING VIEW**



REF.NO.	PART NO.	DESCRIPTION
1	29053219	Carton box
2	29095799	Sheet
3	29100156	Poly bag
4	29110071	PP tape
5	261504	Paper tape
6	29362226	Label EAN
7	2010098A or	Audio cord
7	2010326	Audio cord
7	2010200	Cord RI
7	24140339	RC-339MD,Remote control
7	3010054	UM-3,Battery
8	29100180	240*250,Poly bag
8	29355267	Instruction sheet
8	29342496	Instruction manual
8	29342533	Instruction manual T <A>
8	29342519	Instruction manual FG <E>
8	2050039	NCS-1P104,Opto. cord



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D

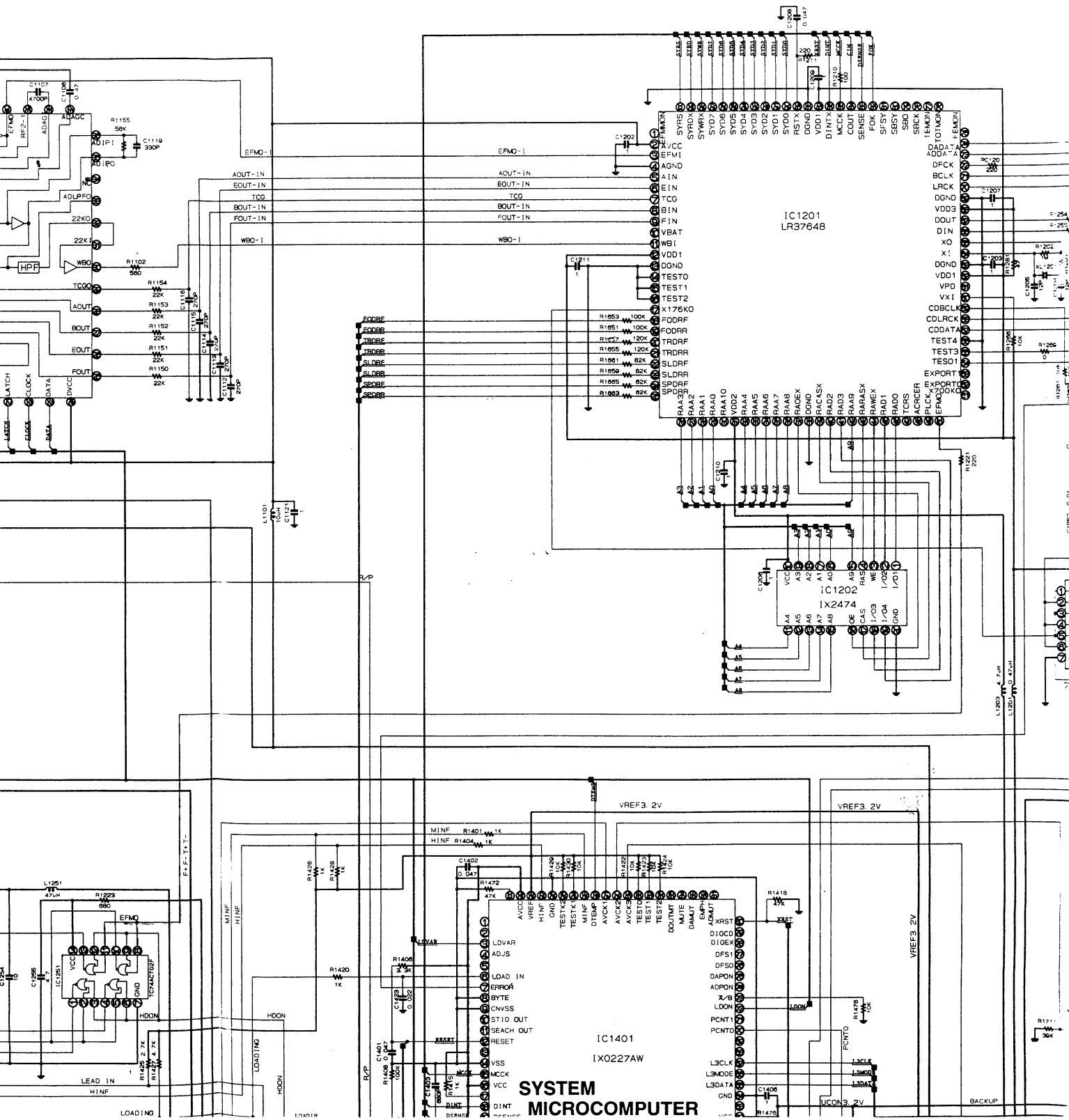
E

F

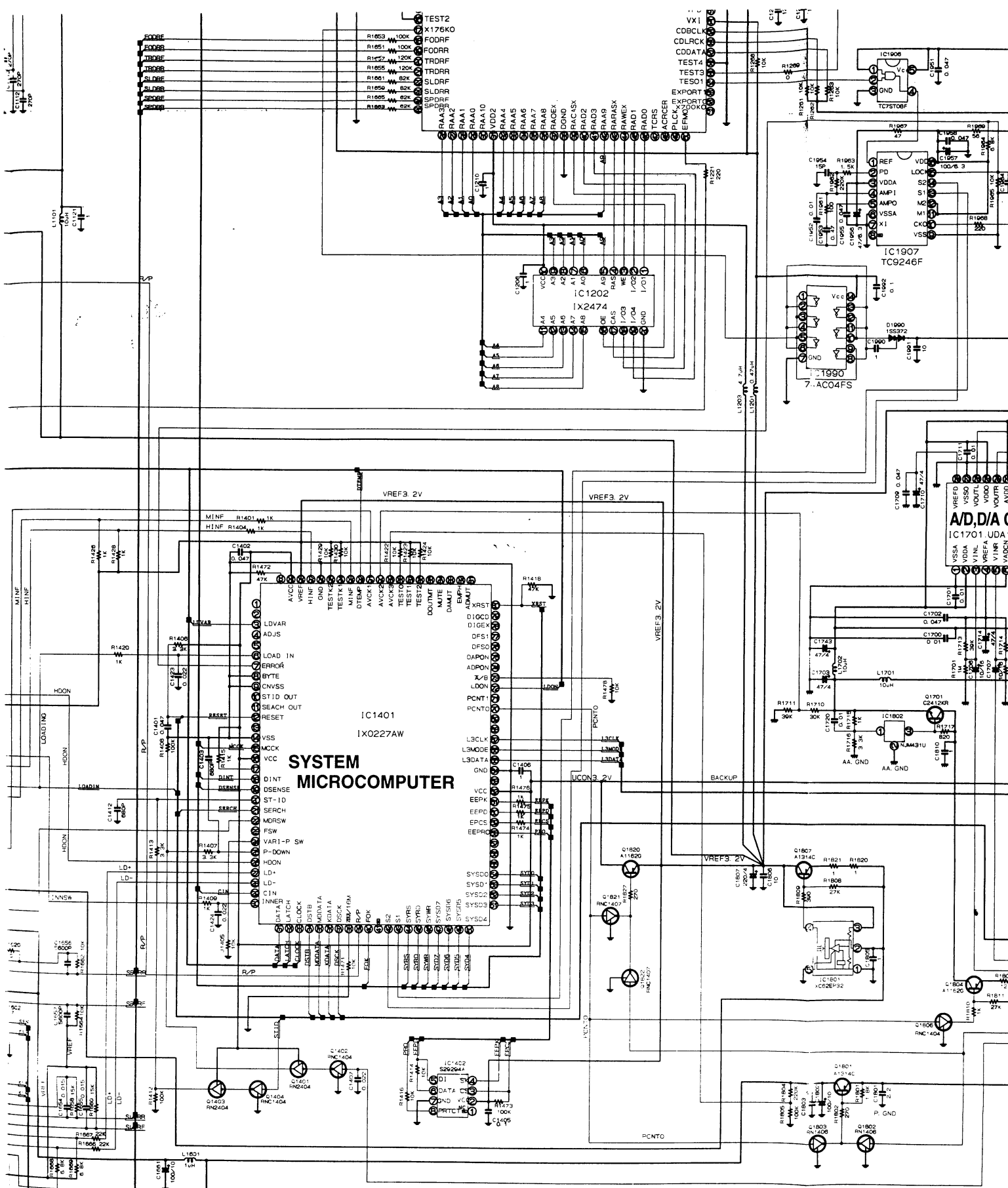
G

F

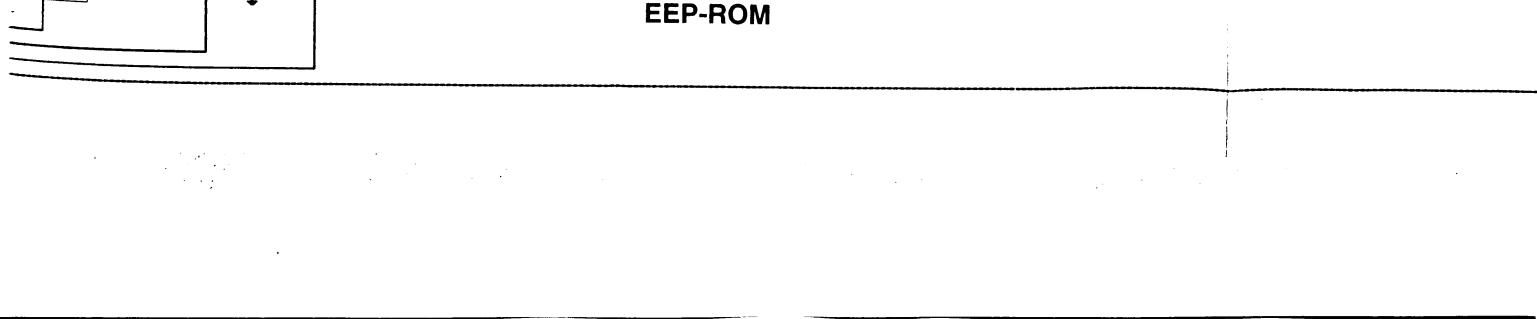
### ENCODER/DECODER



### SYSTEM MICROCOMPUTER



**EEP-ROM**



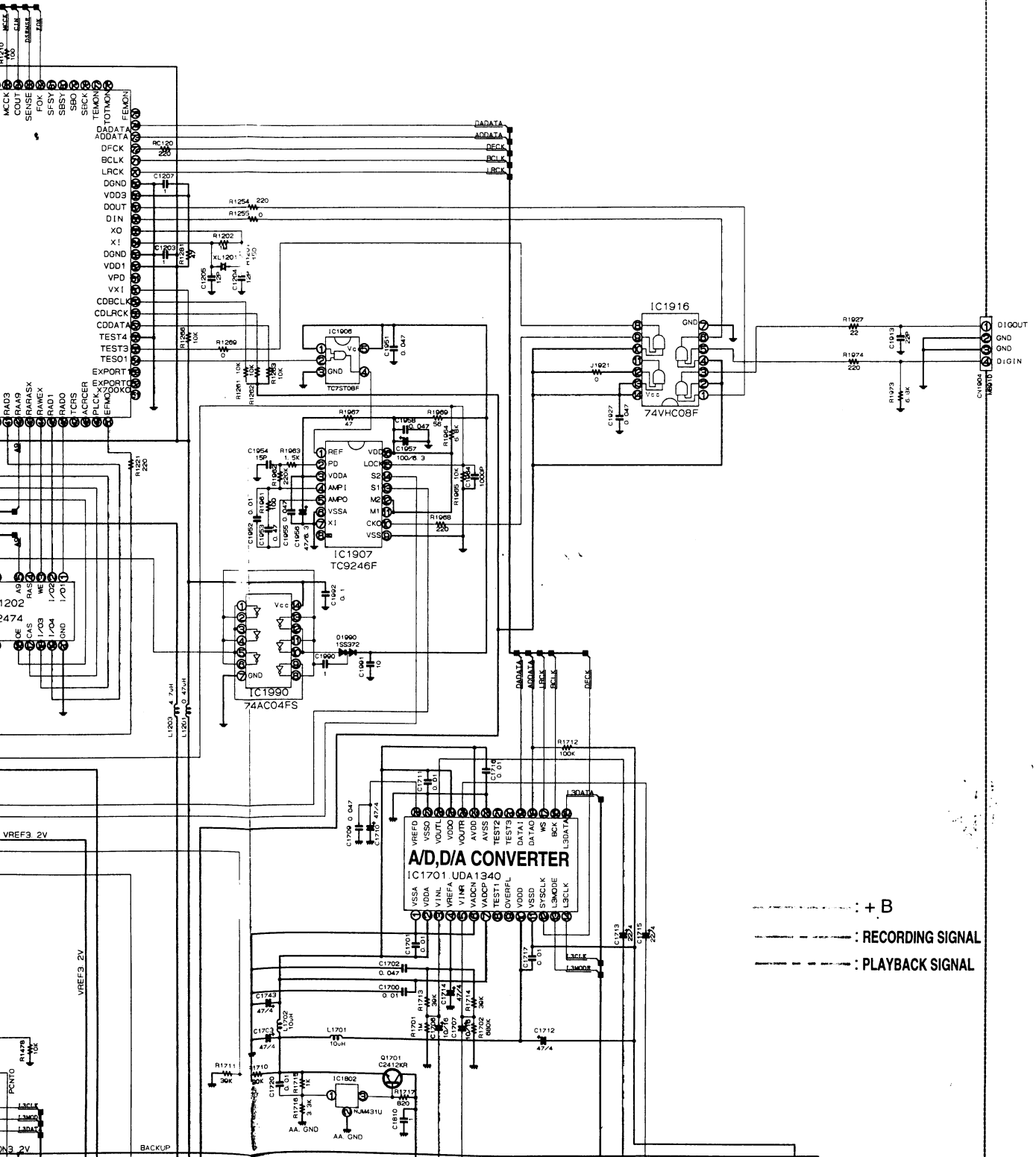
H

I

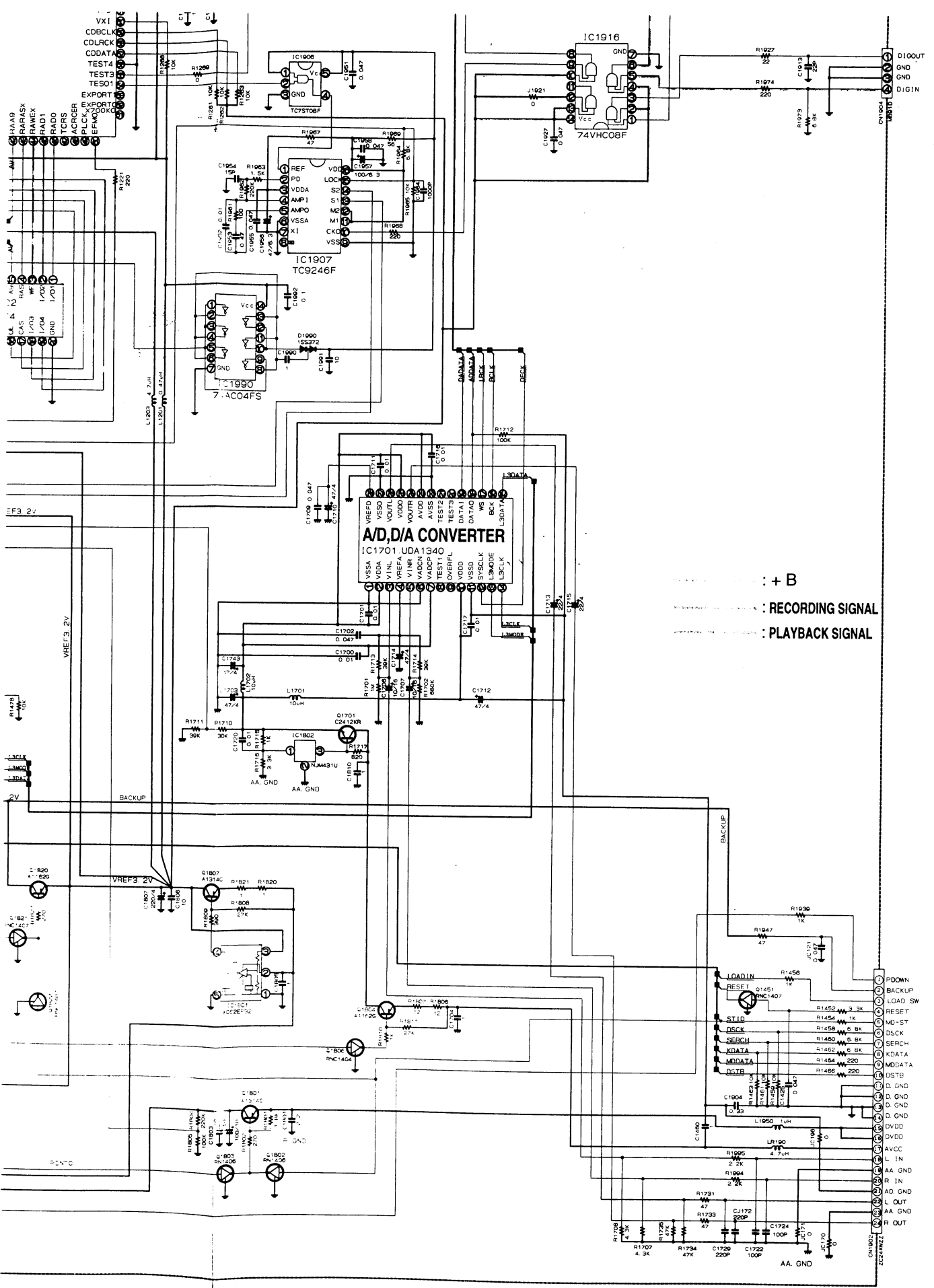
J

K

ENCODER



- - - - - : + B
- - - - - : RECORDING SIGNAL
- - - - - : PLAYBACK SIGNAL



..... : + B  
 - - - - - : RECORDING SIGNAL  
 - - - - - : PLAYBACK SIGNAL

FIG. 24

AA. GND

CN1802