

SERVICE MANUAL

VIDEO CD MECHANISM

BASIC CD MECHANISM :3ZG-2 E2

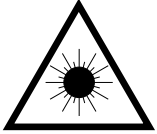
TYPE
VZRNDM
VZRDM
YVZRNDM

PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

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

WARNING!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE 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.



- Caution: Invisible laser radiation when open and interlocks defeated avoid exposure to beam.
- Advarsel: Usynlig laserstråling ved åbning, når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

VAROITUS!

Laiteen Käyttäminen muulla kuin tässä käyttöohjeessa mainituilla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

WARNING!

Om apparaten används på annat sätt än vad som specificeras i denna bruksanvisning, kan användaren utsättas för osynlig laserstråling, som överskrider gränsen för laserklass 1.

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

ATTENTION

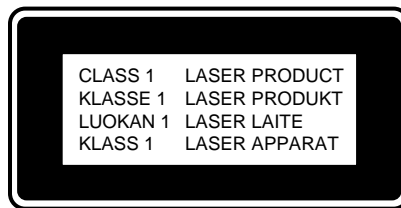
L'utilisation de commandes, réglages ou procédures autres que ceux spécifiés peut entraîner une dangereuse exposition aux radiations.

ADVARSEL!

Usynlig laserstråling ved åbning, når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

This Compact Disc player is classified as a CLASS 1 LASER product.

The CLASS 1 LASER PRODUCT label is located on the rear exterior.

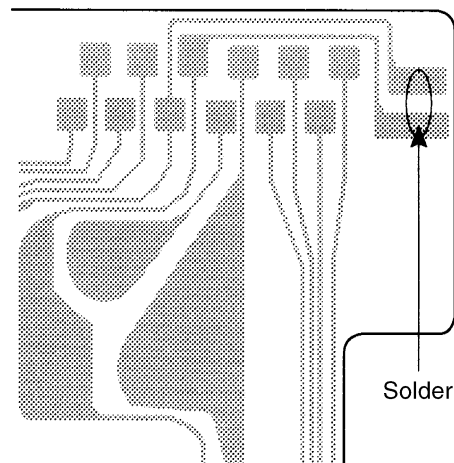


Precaution to replace Optical block (KSS-213F)

Body or clothes electrostatic potential could ruin laser diode in the optical block. Be sure ground body and workbench, and use care the clothes do not touch the diode.

- 1) After the connection, remove solder shown in the right figure.

PICK-UP Assy P.C.B



DISASSEMBLY INSTRUCTIONS

1. How to replace PICK UP.

- 1) Open the TRAY.
Push the stopper to arrow direction and release half of the SHAFT SLED.
- 2) Turn GEAR MAIN CAM to the counterclockwise (arrow "a") direction, and lift up CD mechanism. (Fig-1)
- 3) Remove SHAFT SLED.
- 4) CD mechanism in down position, replace PICK UP.
- 5) Lift up CD mechanism (Fig-1), and Reassemble the SHAFT SLED.

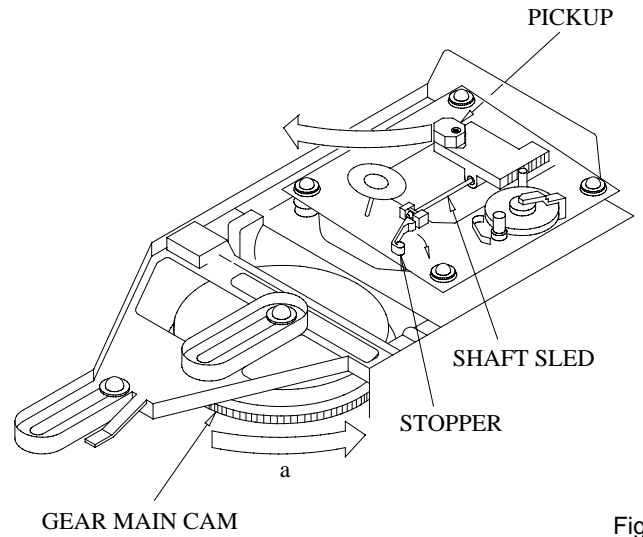


Fig-1

2. How to remove the 5CD CHANGER BLOCK (Fig-2)

- 1) Remove the two FFC of the CD circuit board, and remove the five SCREWS.
- 2) Lift 5 CD CHANGER BLOCK from behind, and remove it. (5CD CHANGER BLOCK can be removed even if PANEL TRAY is not removed.)

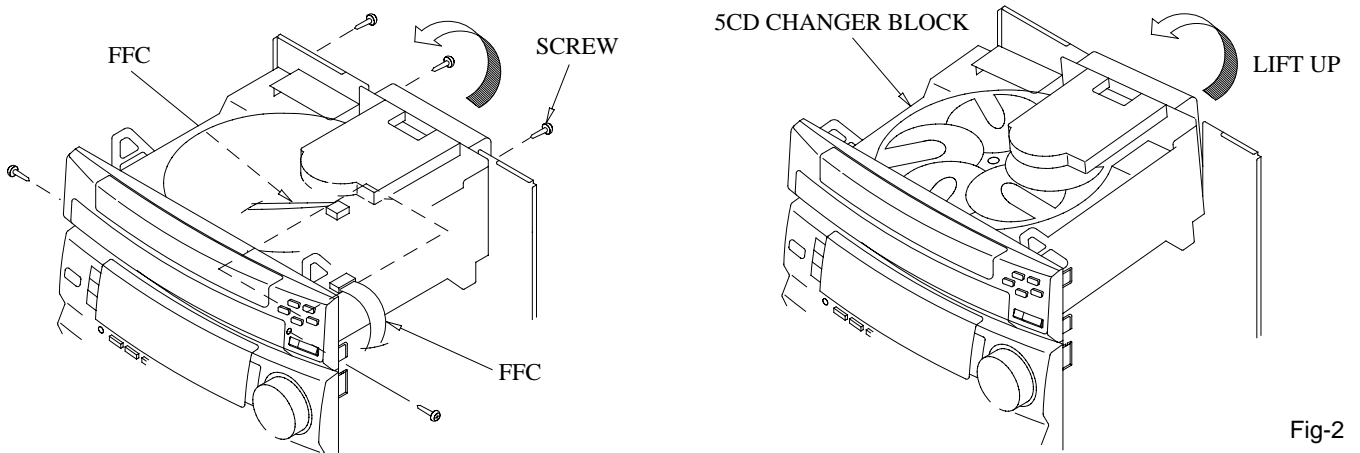


Fig-2

3. The disassemble and reassemble the TRAY

3-1. Disassembling procedure.

- 1) Push the PLATE GEAR'S Boss at the bottom part of CHAS MECHA strongly to the outside (arrow "b" direction). (Fig-3)
(Confirm that TRAY appears a little in the front.)
- 2) Draw TRAY to the open position.
- 3) Remove FFC, and push the two LEVERS at both side of the CHAS MECH to remove TRAY. (Fig-4)

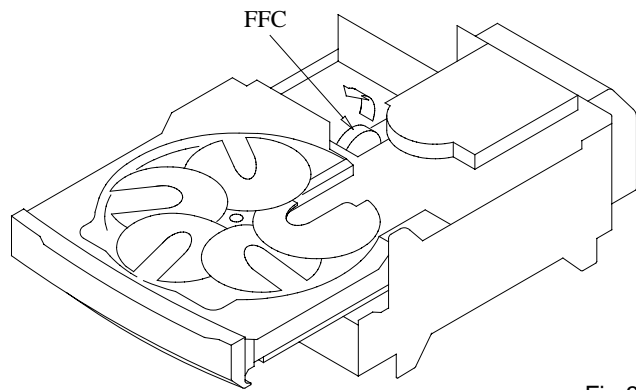
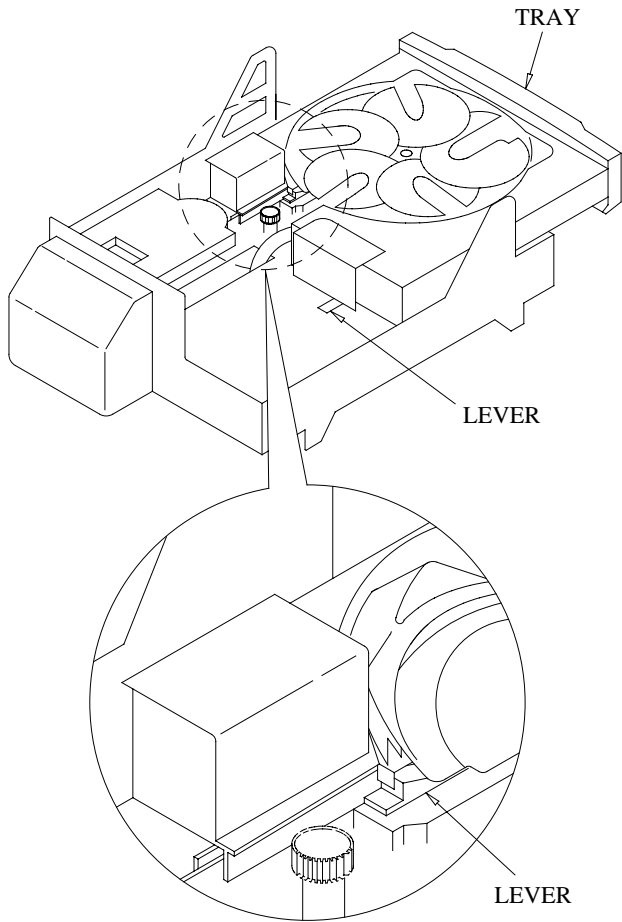
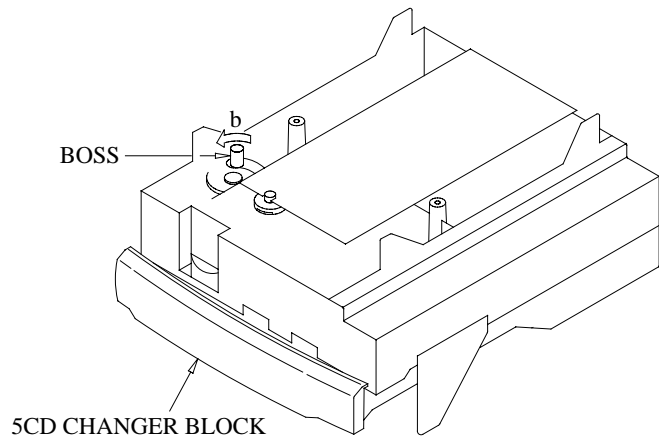


Fig-3

Fig-4

3-2. Reassembling procedure.

- 1) Confirm that LEVER TRAY is at the most right position and check for the CD Mechanism to be in the down position. (Fig-5)
- 2) Push in the TRAY along the rail of the CHAS MECHA.
- 3) After TRAY is half closed and FFC is put in, it can enter by force until the end of TRAY closed. (Fig-6)

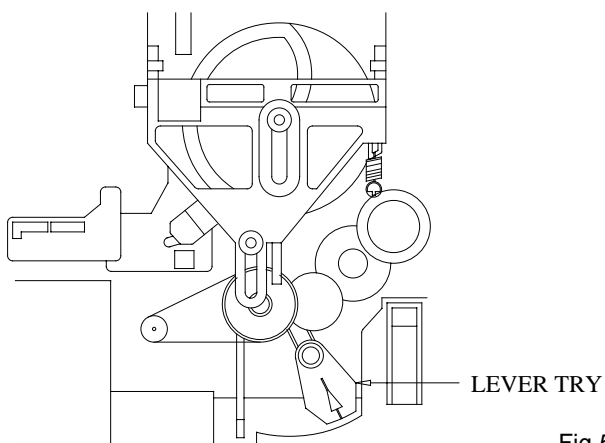


Fig-5

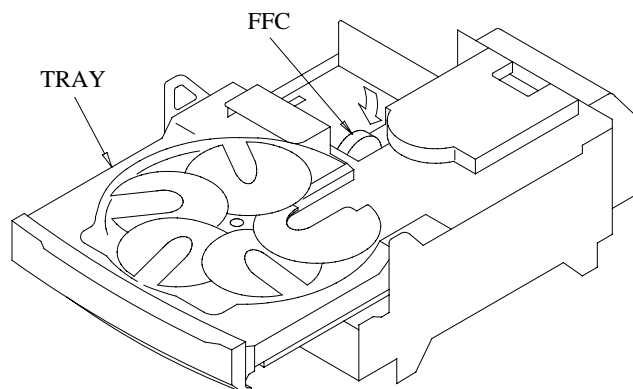


Fig-6

4. How to reassemble the TURN TABLE. (Fig-7)

- 1) Push LEVER TT in the direction of "C", and put in the TURN TABLE 5CD. (Fig-7)
After reassembly, one of the TURN TABLE DISC TRAY (can be either one of the five disc trays) must be aligned with TURN TABLE 5CD. (Fig-8)
That is, having no gap difference between the TURN TABLE 5CD and the TRAY 5CD.

* When reassembling the TURN TABLE 5CD, it is acceptable facing any CD number (1-5).

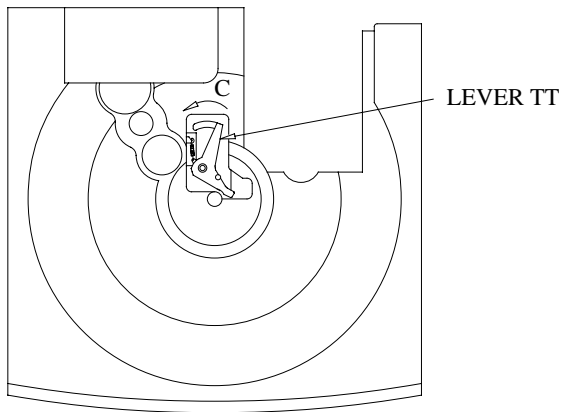


Fig-7

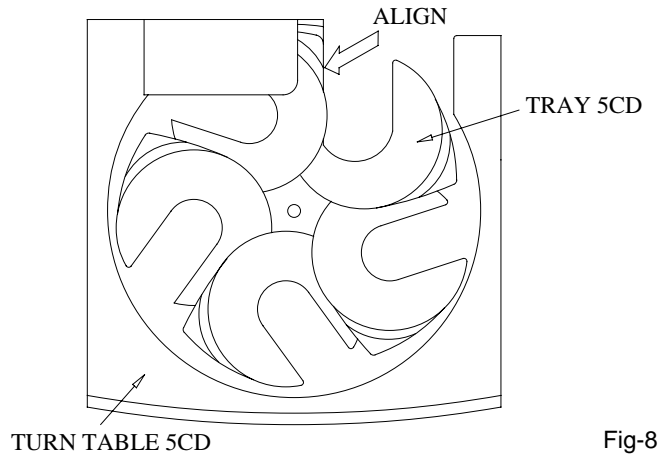


Fig-8

ELECTRICAL MAIN PARTS LIST

DESCRIPTIONで判断できない物は "REFERENCE NAME LIST" を参照してください。
 If can't understand for Description please kindly refer to "REFERENCE NAME LIST".

REF. NO	PART NO.	KANRI NO.	DESCRIPTION	REF. NO	PART NO.	KANRI NO.	DESCRIPTION
IC				C114	87-010-260-040		CAP,E 47-25 SME
				C115	87-010-197-080		CAP, CHIP 0.01 DM
	87-A21-381-040	C-IC, LA9235M		C116	87-010-260-040		CAP,E 47-25 SME
	87-A21-557-010	C-IC, LC78635E		C117	87-010-197-080		CAP, CHIP 0.01 DM
	8Z-ZJP-602-010	C-IC, UPD78016FGC-574		C118	87-010-263-040		CAP,E 100-10
	87-017-760-080	IC, M51943BML					
	87-A20-602-040	C-IC, M5291FP		C119	87-A11-567-080		C-CAP,S 0.01-50 K B
				C123	87-010-197-080		CAP, CHIP 0.01 DM
	87-A20-925-040	C-IC, BA05FP		C124	87-010-401-040		CAP,E 1-50 SME
	87-A20-905-040	C-IC, BA033FP		C126	87-010-196-080		CHIP CAPACITOR,0.1-25
	87-A21-513-040	C-IC, BA6998FP		C130	87-010-196-080		CHIP CAPACITOR,0.1-25
	87-A20-920-010	C-IC, CL680-D1					
	87-A20-975-040	C-IC, SN74LV74APW		C132	87-010-405-040		CAP,E 10-50
				C133	87-010-314-080		C-CAP,S 22P-50V
	87-A20-921-040	C-IC, SN74LVU04APW		C135	87-010-197-080		CAP, CHIP 0.01 DM
	87-A20-962-040	C-IC, MSM54V16258B/BSL		C140	87-010-322-080		C-CAP,S 100P-50 CH
	84-ZG1-695-040	C-IC, LH5V2RN1		C194	87-010-197-080		CAP, CHIP 0.01 DM
	87-A20-918-040	C-IC, SM5878AM					
	87-001-982-010	IC, TA7291S		C195	87-010-260-040		CAP,E 47-25 SME
				C201	87-016-669-080		C-CAP,S 0.1-25 K B
	87-A20-974-040	C-IC, LC74781M-9017		C213	87-010-190-080		S CHIP F 0.01
				C214	87-010-196-080		CHIP CAPACITOR,0.1-25
				C216	87-010-322-080		C-CAP,S 100P-50 CH
TRANSISTOR				C217	87-010-322-080		C-CAP,S 100P-50 CH
	87-026-609-080	TR, KTA1266GR		C218	87-010-322-080		C-CAP,S 100P-50 CH
	87-A30-076-080	C-TR, 2SC3052F		C219	87-010-322-080		C-CAP,S 100P-50 CH
	89-327-125-080	CHIP TR, 2SC2712GR		C220	87-010-263-040		CAP,E 100-10
	87-026-237-080	CHIP-TR, DTC124XK		C221	87-010-190-080		S CHIP F 0.01
	87-026-231-080	CHIP-TRANSISTOR, DTA124XK					
				C242	87-010-318-080		C-CAP,S 47P-50 CH
	87-A30-117-010	TR, 2SA1357		C301	87-016-251-040		CAP,E 220-16 SMG
	89-421-722-380	TR, 2SD2172V/W		C302	87-012-140-080		CAP 470P
	89-320-011-080	TR, 2SC2001 (15W)		C303	87-010-178-080		CHIP CAP 1000P
	87-026-223-080	TR, DTC143TK		C304	87-010-384-040		CAP,E 100-25 SME
	87-A30-031-010	P-TR, PT380F					
				C305	87-010-982-040		CAP,E 33-25 GAS
	87-026-580-080	C-TR, DTA123JK		C306	87-010-112-040		CAP,E 100-16
	87-026-470-080	TR, HNI03F (0.3W)		C307	87-010-196-080		CHIP CAPACITOR,0.1-25
	89-111-625-080	TR, 2SA1162 (0.15W)		C308	87-010-263-040		CAP,E 100-10
	87-026-608-080	C-TR, DTC 123 JK<VZRDM>		C309	87-010-196-080		CHIP CAPACITOR,0.1-25
DIODE				C310	87-010-263-040		CAP,E 100-10
				C311	87-010-196-080		CHIP CAPACITOR,0.1-25
	87-A40-003-080	ZENER, MTZJ4.3A		C312	87-010-178-080		CHIP CAP 1000P
	87-017-024-040	C-DIODE, DA204K		C340	87-010-112-040		CAP,E 100-16
	87-A40-180-040	C-DIODE, SB07-015C		C341	87-010-196-080		CHIP CAPACITOR,0.1-25
	87-020-465-080	DIODE, LSS133 (110MA)					
	87-020-027-080	CHIP-DIODE 1SS184		C351	87-010-197-080		CAP, CHIP 0.01 DM
				C352	87-016-251-040		CAP,E 220-16 SMG
				C353	87-010-196-080		CHIP CAPACITOR,0.1-25
VCD C.B				C361	87-010-403-040		CAP,E 3.3-50 SME
				C362	87-010-403-040		CAP,E 3.3-50 SME
C1	87-A10-222-040	CAP,AS 22-10 OS		C404	87-010-196-080		CHIP CAPACITOR,0.1-25
C2	87-010-196-080	CHIP CAPACITOR,0.1-25		C406	87-010-196-080		CHIP CAPACITOR,0.1-25
C3	87-010-260-040	CAP,E 47-25 SME		C407	87-010-196-080		CHIP CAPACITOR,0.1-25
C4	87-010-374-040	CAP,AS 22-10 OS		C410	87-010-196-080		CHIP CAPACITOR,0.1-25
C5	87-010-197-080	CAP, CHIP 0.01 DM		C420	87-010-196-080		CHIP CAPACITOR,0.1-25
C6	87-010-405-040	CAP,E 10-50		C447	87-010-263-040		CAP,E 100-10
C7	87-010-263-040	CAP,E 100-10		C462	87-010-196-080		CHIP CAPACITOR,0.1-25
C8	87-010-178-080	CHIP CAP 1000P		C464	87-010-221-080		CAP, ELECT 470-10V
C10	87-010-546-040	CAP,E 0.33-50		C501	87-010-197-080		CAP, CHIP 0.01 DM
C11	87-010-401-040	CAP,E 1-50 SME		C502	87-010-197-080		CAP, CHIP 0.01 DM
C13	87-010-321-080	C-CAP,S 82P (J)		C503	87-010-197-080		CAP, CHIP 0.01 DM
C15	87-010-197-080	CAP, CHIP 0.01 DM		C509	87-016-669-080		C-CAP,S 0.1-25 K B
C16	87-010-260-040	CAP,E 47-25 SME		C511	87-010-196-080		CHIP CAPACITOR,0.1-25
C65	87-010-196-080	CHIP CAPACITOR,0.1-25		C512	87-010-197-080		CAP, CHIP 0.01 DM
C101	87-010-992-080	C-CAP,S 0.047-25 B		C513	87-010-197-080		CAP, CHIP 0.01 DM
C102	87-010-401-040	CAP,E 1-50 SME		C514	87-010-197-080		CAP, CHIP 0.01 DM
C103	87-010-196-080	CHIP CAPACITOR,0.1-25		C518	87-010-322-080		C-CAP,S 100P-50 CH
C104	87-010-196-080	CHIP CAPACITOR,0.1-25		C519	87-012-145-080		CAP, CHIP S 270P CH
C105	87-010-260-040	CAP,E 47-25 SME		C520	87-012-157-080		C-CAP,S 330P-50 CH
C106	87-010-322-080	C-CAP,S 100P-50 CH		C521	87-012-154-080		C-CAP,S 150P-50 CH
C107	87-010-196-080	CHIP CAPACITOR,0.1-25		C523	87-010-197-080		CAP, CHIP 0.01 DM
C109	87-010-992-080	C-CAP,S 0.047-25 B		C524	87-010-197-080		CAP, CHIP 0.01 DM
C110	87-010-322-080	C-CAP,S 100P-50 CH		C525	87-010-197-080		CAP, CHIP 0.01 DM
C111	87-010-260-040	CAP,E 47-25 SME		C526	87-010-197-080		CAP, CHIP 0.01 DM
C112	87-010-197-080	CAP, CHIP 0.01 DM		C527	87-010-197-080		CAP, CHIP 0.01 DM

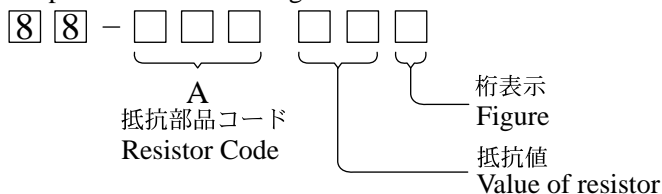
REF. NO	PART NO.	KANRI NO.	DESCRIPTION	REF. NO	PART NO.	KANRI NO.	DESCRIPTION
C528	87-010-197-080		CAP, CHIP 0.01 DM	△PR350	87-A90-246-080		PROTECTOR,0.25A 60 4
C529	87-010-197-080		CAP, CHIP 0.01 DM	R350	88-130-220-080		RES,22-1/4 W J
C530	87-010-197-080		CAP, CHIP 0.01 DM	R507	87-A00-408-080		C-RES,S 2K-1/10W D
C531	87-010-197-080		CAP, CHIP 0.01 DM	S353	87-036-109-010		PUSH SWITCH
C532	87-010-374-040		CAP,E 47-10	SW351	87-036-109-010		PUSH SWITCH
C533	87-010-197-080		CAP, CHIP 0.01 DM	SW352	87-036-109-010		PUSH SWITCH
C534	87-010-263-040		CAP,E 100-10	X501	87-A70-125-080		VIB,XTAL 27MHZ 50PPM
C535	87-010-197-080		CAP, CHIP 0.01 DM	X601	87-030-270-080		VIB,XTAL 16.9344MHZ
C536	87-010-078-040		CAP,E 47-6.3 5L				
C537	87-010-190-080		S CHIP F 0.01				
C538	87-010-196-080		CHIP CAPACITOR,0.1-25				
C539	87-010-196-080		CHIP CAPACITOR,0.1-25	LED901	87-017-733-080		LED,SEL1250SM<VZRDM>
C540	87-010-078-040		CAP,E 47-6.3 5L	LED902	87-017-350-080		LED,SEL1550CM<VZRDM>
C541	87-010-197-080		CAP, CHIP 0.01 DM	LED903	87-017-733-080		LED,SEL1250SM<VZRDM>
C544	87-010-197-080		CAP, CHIP 0.01 DM				
C546	87-010-197-080		CAP, CHIP 0.01 DM				
C548	87-010-154-080		CAP CHIP 10P				
C553	87-010-154-080		CAP CHIP 10P				
C555	87-010-197-080		CAP, CHIP 0.01 DM				
C560	87-010-196-080		CHIP CAPACITOR,0.1-25				
C561	87-010-263-040		CAP,E 100-10				
C563	87-010-263-040		CAP,E 100-10				
C604	87-016-669-080		C-CAP,S 0.1-25 K B				
C605	87-010-197-080		CAP, CHIP 0.01 DM				
C606	87-010-197-080		CAP, CHIP 0.01 DM				
C607	87-010-313-080		CAP, CHIP 18P				
C608	87-010-313-080		CAP, CHIP 18P				
C609	87-010-178-080		CHIP CAP 1000P				
C610	87-010-178-080		CHIP CAP 1000P				
C611	87-010-178-080		CHIP CAP 1000P				
C612	87-010-178-080		CHIP CAP 1000P				
C613	87-010-403-040		CAP,E 3.3-50 SME				
C614	87-010-403-040		CAP,E 3.3-50 SME				
C615	87-010-318-080		C-CAP,S 47P-50 CH				
C616	87-010-318-080		C-CAP,S 47P-50 CH				
C617	87-010-197-080		CAP, CHIP 0.01 DM				
C618	87-010-197-080		CAP, CHIP 0.01 DM				
C619	87-010-112-040		CAP,E 100-16				
C722	87-010-371-080		CAP, ELECT 470-6.3V				
C749	87-010-401-040		CAP,E 1-50 SME				
C751	87-012-153-080		C-CAP,S 120P-50 CH				
C752	87-016-526-080		C-CAP,S 0.47-16 BK				
C754	87-010-197-080		CAP, CHIP 0.01 DM				
C756	87-010-197-080		CAP, CHIP 0.01 DM				
C757	87-A11-167-080		C-CAP,S 27P-50 F CH				
C758	87-A11-167-080		C-CAP,S 27P-50 F CH				
CN3	87-A60-133-010		CONN,8P V FE				
CN201	86-ZG1-620-010		CONN ASSY,2P VIDEO-SW				
CN202	87-A60-154-010		CONN,6P H FE				
CN231	87-A60-162-010		CONN,14P H FE				
CON1	87-A60-424-010		CONN,16P V TOC-B				
CON2	87-A60-623-010		CONN,6P V 2MM JMT				
FB191	87-008-372-080		FILTER, EMI BL 01RN1				
FC1	86-ZG1-605-010		CABLE,FFC 16P				
FC2	86-ZG1-609-010		CONN ASSY,6P				
FC3	86-ZG1-667-010		F-CABLE,8P 1.25 175MM BLACK				
J701	87-009-502-010		JACK,PIN 1P Y EARTH				
L301	87-A50-095-010		COIL,68UH RCR875D				
L302	87-005-426-080		COIL,3.3UH K FLR50				
L303	87-005-426-080		COIL,3.3UH K FLR50				
L401	87-003-102-080		COIL, 10UH				
L502	87-005-204-080		COIL,47UH				
L503	87-005-189-080		COIL 2.7UH				
L504	87-005-187-080		COIL,1.8UH				
L505	87-005-204-080		COIL,47UH				
L506	87-005-204-080		COIL,47UH				
L507	87-005-204-080		COIL,47UH				
L708	87-005-817-080		C-COIL, 33UH J FLC32				
LED191	87-A40-558-010		LED,SLZ-8128A-01-A				
M351	87-045-305-010		MOTOR, RF-500TB DC-5V (2MA)				

- Regarding connectors, they are not stocked as they are not the initial order items.
The connectors are available after they are supplied from connector manufacturers upon the order is received.

○チップ抵抗部品コード/CHIP RESISTOR PART CODE

チップ抵抗部品コードの成り立ち

Chip Resistor Part Coding



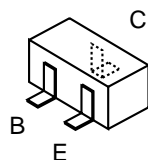
チップ抵抗
Chip resistor

容量 Wattage	種類 Type	許容誤差 Tolerance	記号 Symbol	寸法/Dimensions (mm)			抵抗コード : A Resistor Code : A	
				外形/Form	L	W		t
1/16W	1005	± 5%	CJ		1.0	0.5	0.35	104
1/16W	1608	± 5%	CJ		1.6	0.8	0.45	108
1/10W	2125	± 5%	CJ		2	1.25	0.45	118
1/8W	3216	± 5%	CJ		3.2	1.6	0.55	128

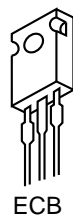
TRANSISTOR ILLUSTRATION



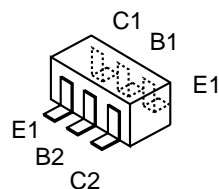
ECB
2SC2001
2SD2172
KTA1266



CEB
2SA1162
2SC2712
DTA123JK
DTA124XK
DTC124XK
DTC143TK
2SC3052F
DTC123JK

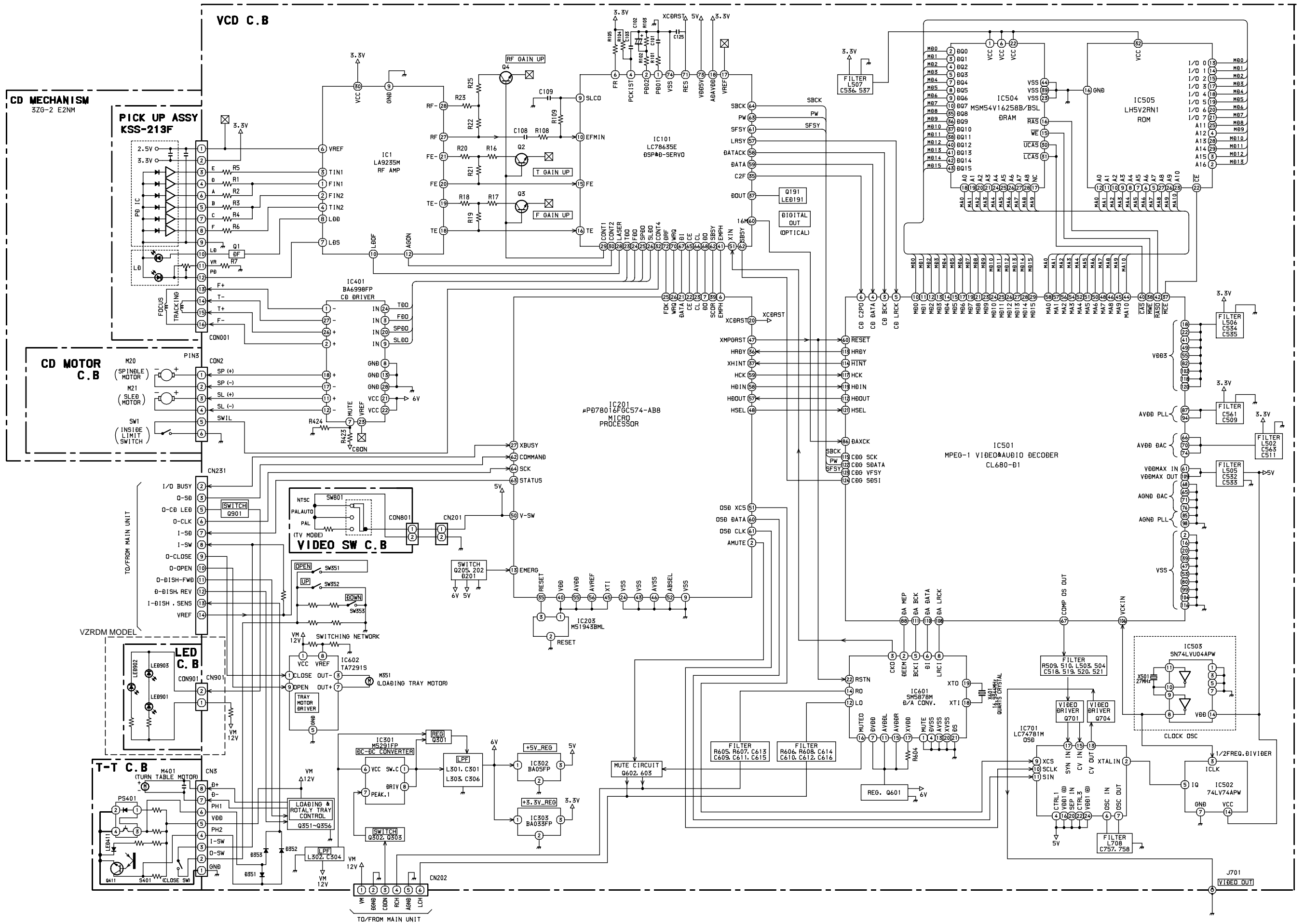


ECB
2SA1357

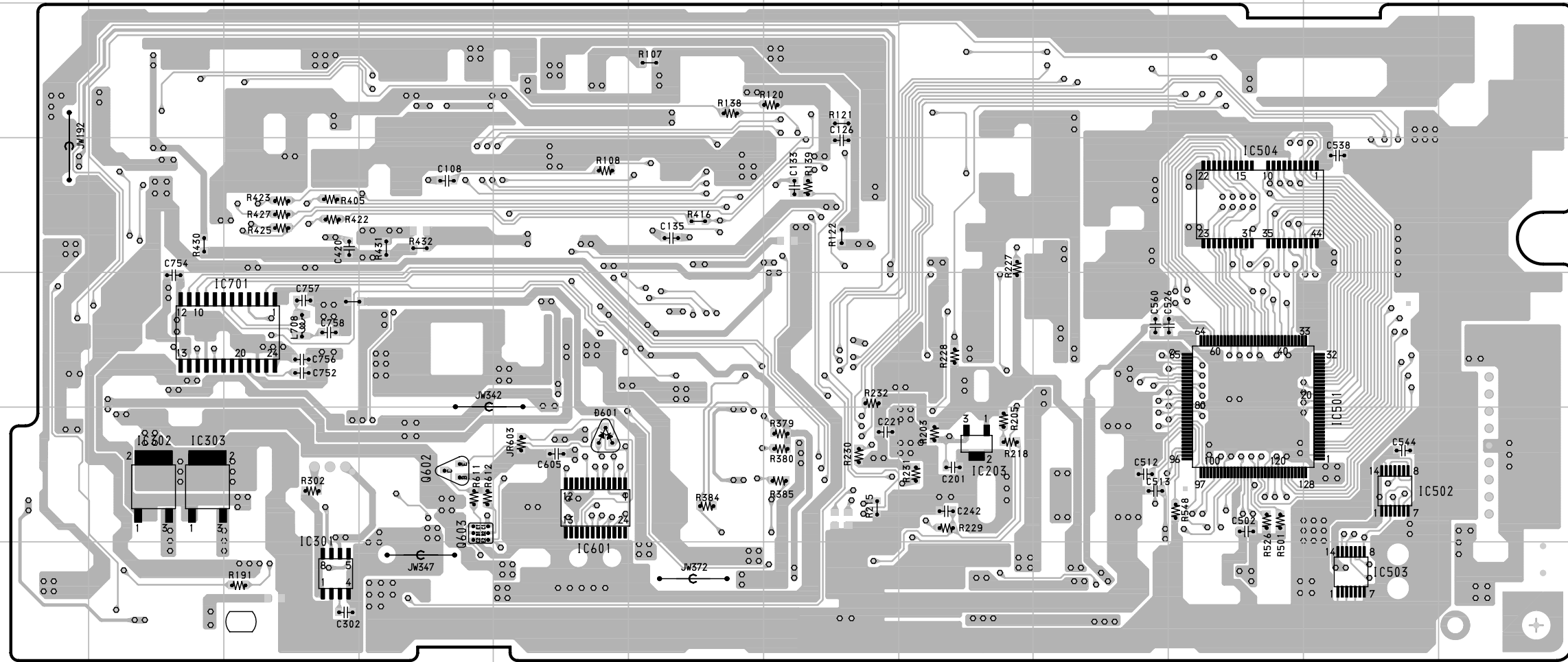


HN1C03F

BLOCK DIAGRAM

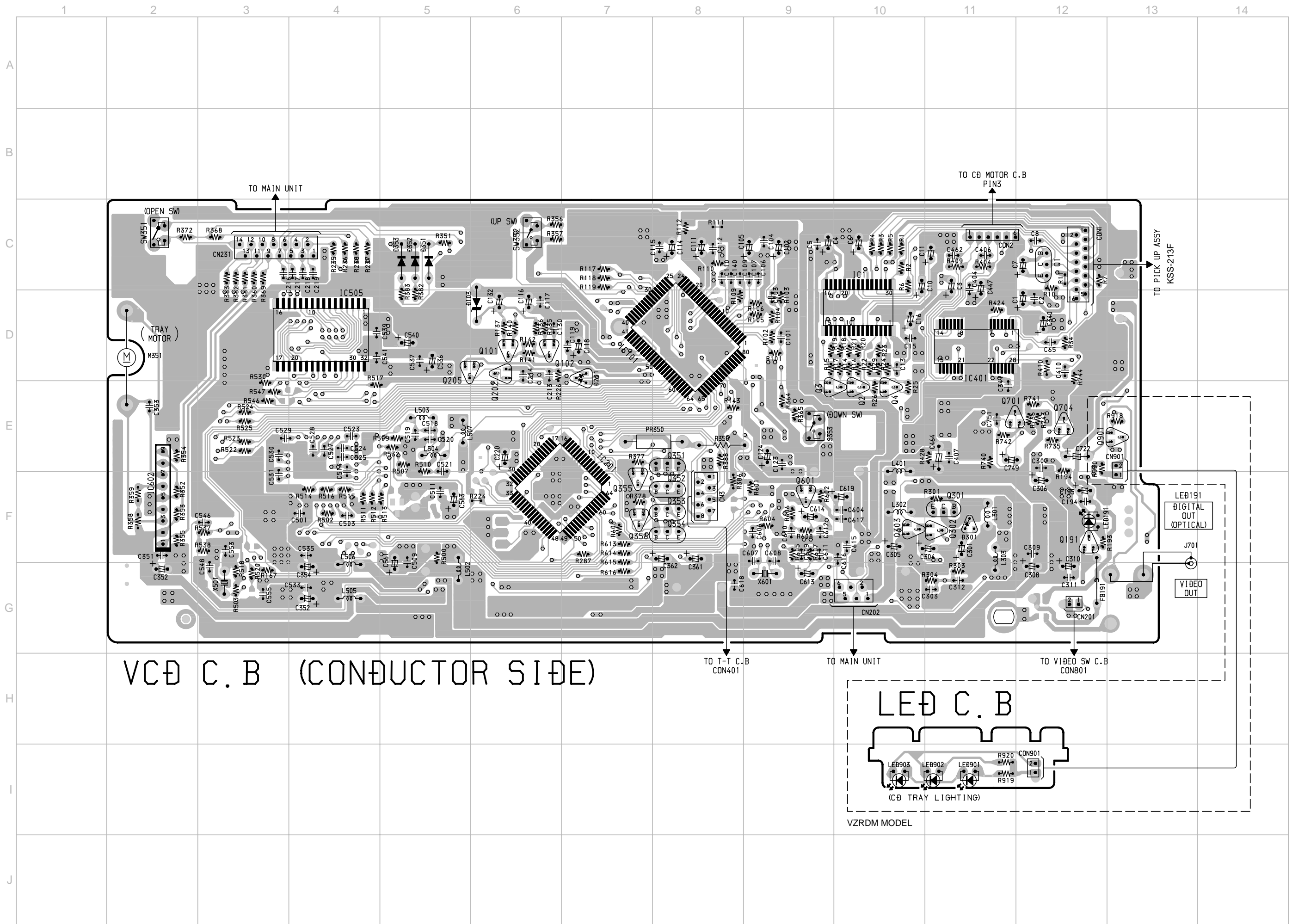


WIRING-1 (VCD: COMPONENT SIDE)

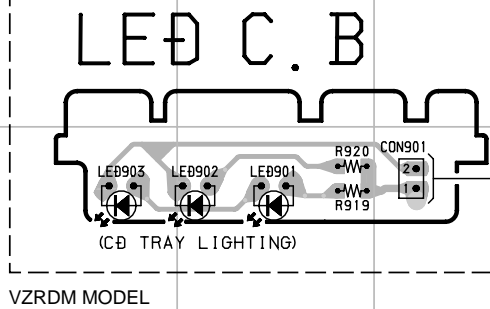


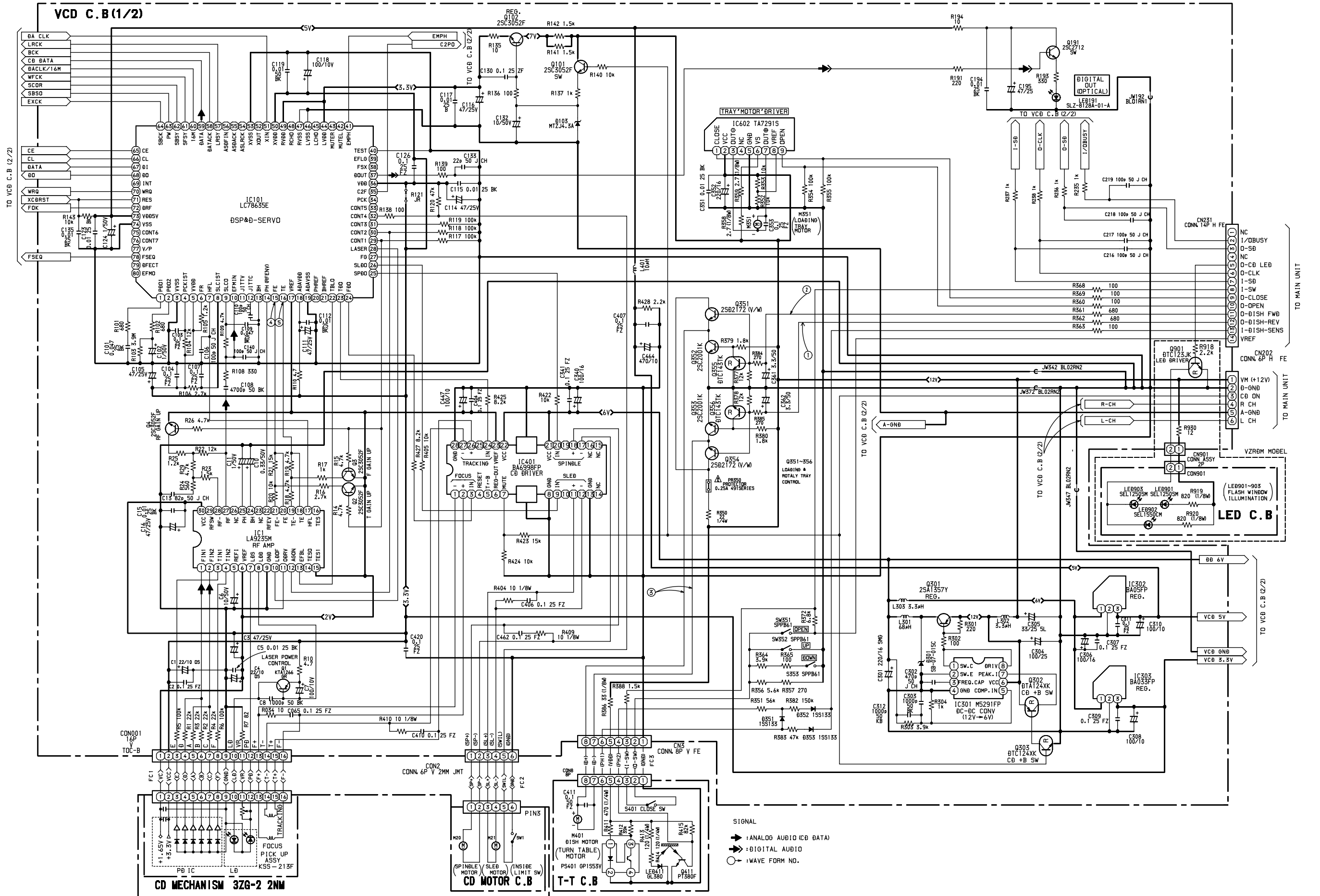
VCD C.B (COMPONENT SIDE)

WIRING-2 (VCD: CONDUCTOR SIDE)

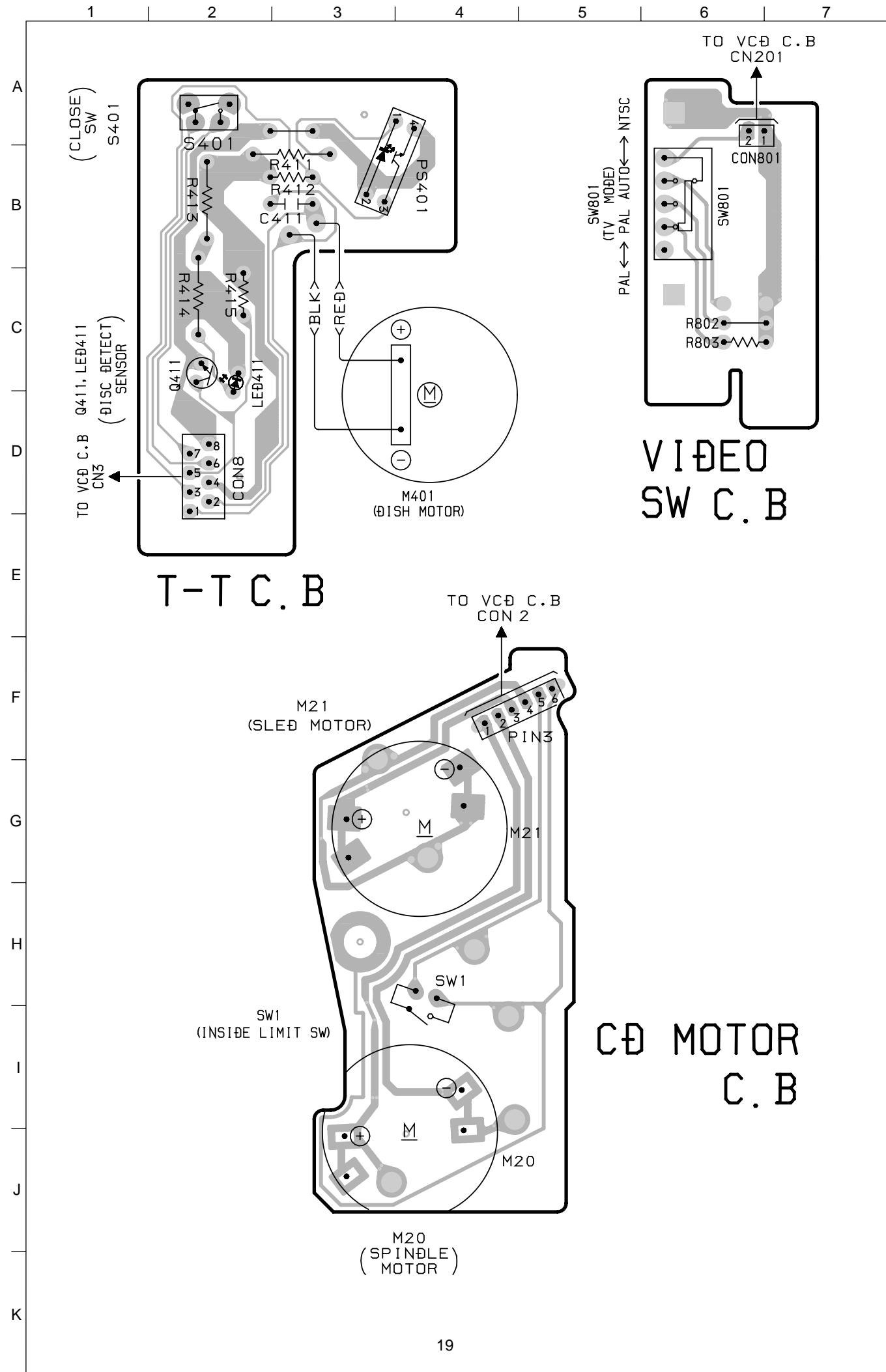


VCD C.B (CONDUCTOR SIDE)

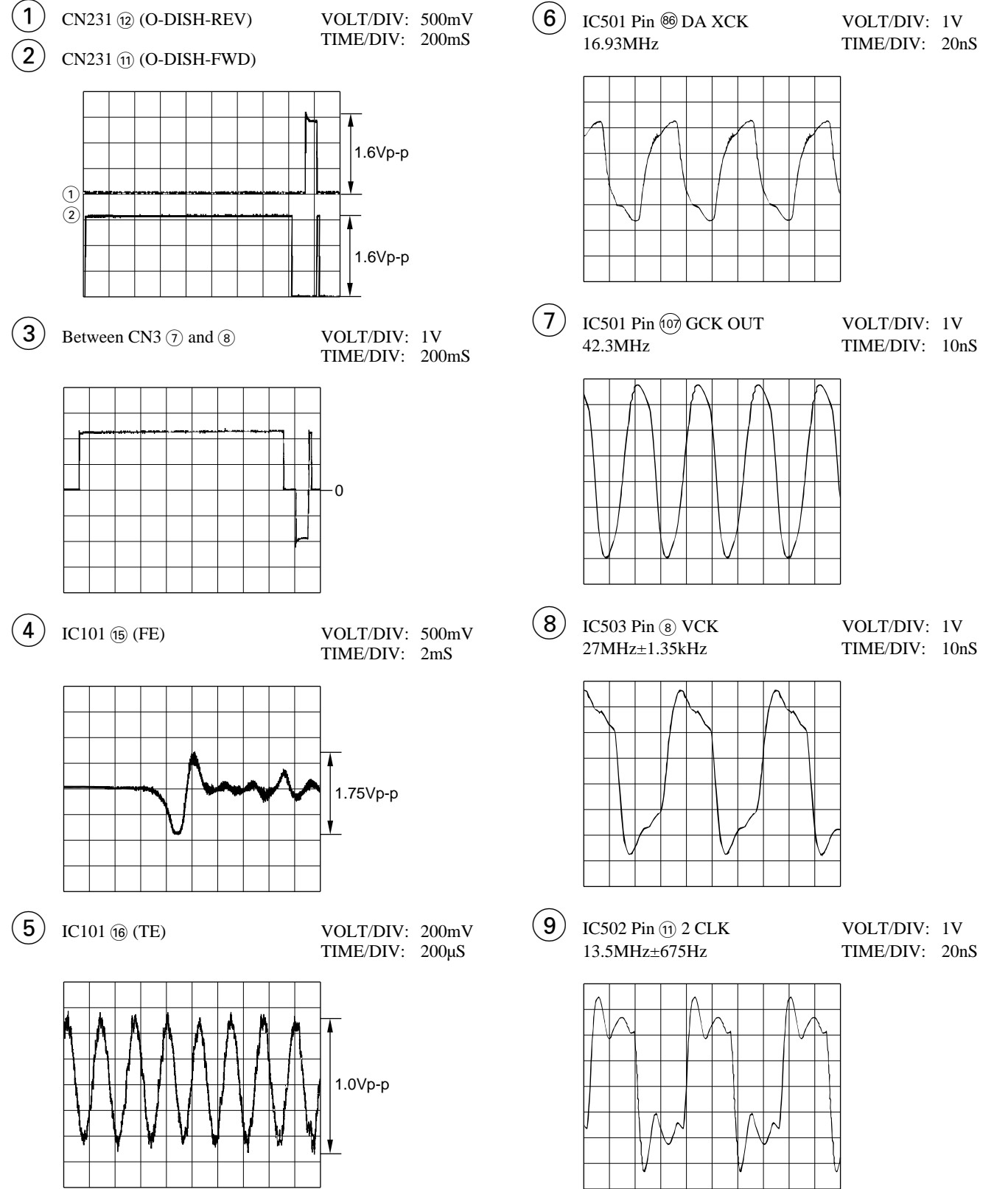




WIRING-3 (T-T/VIDEO SW/CD MOTOR)

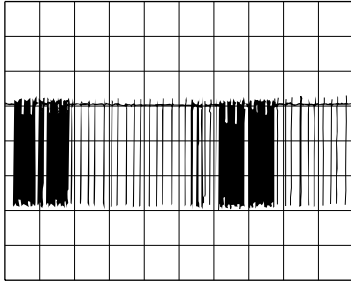


WAVE FORM



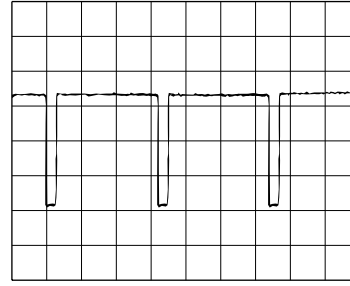
10 IC504 Pin 30 \overline{UCAS}
(Pin 31 \overline{LCAS})

VOLT/DIV: 1V
TIME/DIV: 2 μ S



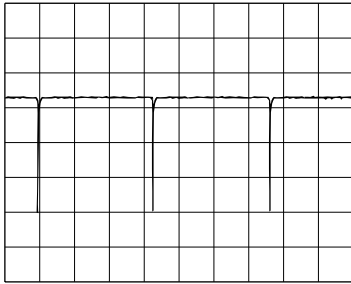
12 IC501 Pin 101 \overline{HSync}
PAL

VOLT/DIV: 1V
TIME/DIV: 20 μ S



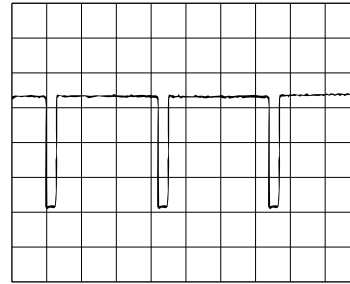
11 IC501 Pin 93 \overline{VSync}
NTSC

VOLT/DIV: 1V
TIME/DIV: 5mS



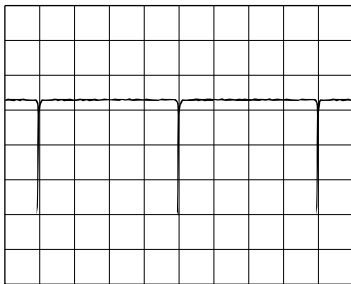
IC501 Pin 101 \overline{HSync}
NTSC

VOLT/DIV: 1V
TIME/DIV: 20 μ S



IC501 Pin 93 \overline{VSync}
PAL

VOLT/DIV: 1V
TIME/DIV: 5mS



IC DESCRIPTION

IC, CL680

Pin No.	Pin Name	I/O	Description
1	NC	—	No connection.
2	VSS	—	GND.
3	CD BCK	I	Bit clock input from CD DSP.
4	CD DATA	I	Data input from CD DSP.
5	CD LRCK	I	LRCK input from CD DSP.
6	CD C2PO	I	C2 pointer input from CD DSP.
7-9	NC	—	No connection.
10-15	MD0-MD5	I/O	DRAM/ROM interface. (DATA)
16	VSS	—	Ground.
17	MD6	I/O	DRAM/ROM interface. (DATA)
18	VDD3	—	Power supply 3.3V.
19	MD7	I/O	DRAM/ROM interface. (DATA)
20	VSS	—	Ground.
21	MD8	I/O	DRAM/ROM interface. (DATA)
22	VDD3	—	Power supply 3.3V.
23-29	MD9-MD15	I/O	DRAM/ROM interface. (DATA)
30-36	NC	—	No connection.
37	MCE	—	ROM chip enable.
38	MWE	O	DRAM write enable.
39	VSS	—	Ground.
40	CAS	O	DRAM/ROM interface.
41	VDD3	—	Power supply 3.3V.
42	RASO	O	DRAM/ROM interface.
43	RASI	O	
44-46	MA10-MA8	O	DRAM/ROM interface. (Address)
47	VSS	—	Ground.
48	MA7	O	DRAM/ROM interface. (Address)
49	VDD3	—	Power supply 3.3V.
50-52	MA6-MA4	O	DRAM/ROM interface. (Address)
53	VSS	—	Ground.
54	MA3	O	DRAM/ROM interface. (Address)
55	VDD3	—	Power supply 3.3V.
56-58	MA2-MA0	O	DRAM/ROM interface. (Address)
59	PGIO7	I/O	Programmable I/O.
60	RESET	I	Reset input.
61	VDD MAX IN	—	Power supply - VDDMAX. (5.0V)
62-64	NC	—	No connection.
65	AGND DAC	—	Analog ground.
66	A DAC	—	Analog power supply (DAC) : 3.3V.
67	COMP OUT	O	Composite out.
68	AGND DAC	—	Analog ground.

Pin No.	Pin Name	I/O	Description
69	Y OUT	O	Video signal “Y” OUT.
70	AVDD DAC	—	Analog power supply (DAC) 3.3V.
71	AGND DAC	—	Analog ground.
72	R REF	I	Reference resistor input.
73	V REF	I	Voltage reference input.
74	AVDD DAC	—	Analog power supply (DAC) : 3.3V.
75	C OUT	O	Video signal “C” out.
76	AGND DAC	—	Analog ground.
77-79	CLK SEL0-2	I	Clock selection input.
80	VSS	—	Ground.
81	CLK SEL3	I	Clock selection input.
82	VDD3	—	Power supply 3.3V.
83, 84	CLK SEL4, 5	I	Clock selection input.
85	AGND PLL	—	Analog ground.
86	DA XCK	I	DA XCK (16.933MHz) input.
87	AVDD PLL	—	Analog power supply 3.3V.
88	DA EMP	O	DAC-emphasis output.
89, 90	PGIO5, O6	I/O	Programmable I/O.
91	PGIO0	I/O	
92	PGIO8	I/O	
93	$\overline{\text{VSYNC/CSYNC}}$	O	$\overline{\text{VSYNC/CSYNC}}$ output.
94	AVDD PLL	—	Analog power supply (PLL) 3.3V.
95	VID_DAC_CK	O	Video DAC clock.
96	PROC_CK	O	Processor clock.
97	AUD_XCK	O	Audio XCK.
98	AGND PLL	—	Analog ground.
99	VSS	—	Ground.
100	NC	—	No connection.
101	$\overline{\text{HSYNC}}$	O	$\overline{\text{HSYNC}}$ output.
102	VDD3	—	Power supply 3.3V.
103	VCK OUT	O	VCK out.
104	VSS	—	Ground.
105	GCK	I	Global clock signal input. (42.3MHz)
106	VCK	I	Video clock signal input. (27.0MHz)
107	GCK OUT	O	Global clock signal output. (27.0MHz)
108	DA LRCK	O	DAC-LRCK output.
109	VDD MAX OUT	—	Power supply (VDD MAX) : 5.0V.
110	DA DATA	O	DAC-PCM data output.
111	DA BCK	O	DAC-BIT clock output.
112	HD OUT	O	Micon interface. (Data out)
113	HRDY	O	Micon interface. (Host ready)

Pin No.	Pin Name	I/O	Description
114	$\overline{\text{HINT}}$	O	Micon interface. (Host interrupt)
115	CDG SCK	I	CD-G serial clock input.
116	VSS	—	Ground.
117	HCK	I	Micon interface. (Host clock)
118	VDD3	—	Power supply 3.3V.
119	HD IN	I	Micon interface. (Host data in)
120	VDD3	—	Power supply 3.3V.
121	HSEL	I	Micon interface. (Host select in)
122	CDG DATA	I	CD-G data input.
123	CDG VFSY	I	CD-G VFSY input.
124	CDG SOSI	I	CD-G SOSI input.
125	DSP-XCK	O	DSP-XCK output.
126-128	NC	—	No connection.

IC, LC78635E

Pin No.	Pin Name	I/O	Description
1	PDO1	O	Internal VCO control phase comparator output pin. (Pull down)
2	PDO2	O	Internal VCO control phase comparator output pin. OFF for rough servo, ON for phase servo. (Pull down)
3	VVSS	—	Internal VCO ground pin.
4	PCKIST	I	PDO output current adjustment resistor connection pin.
5	VVDD	—	Internal VCO power supply pin.
6	FR	I	VCO frequency range adjustment resistor connection pin. (Pull up)
7	HFL	I	Mirror detection signal input pin.
8	SLCIST	I	SLCO output current adjustment resistor connection pin.
9	SLCO	O	Control output.
10	EFMIN	I	EFM signal input pin.
11	JITTV	O	Jitter detection monitor pin.
12	JITTC	O	Jitter detection adjustment pin. (Pull down)
13	BH	I	BH signal input pin. (Connected to GND)
14	PH (RFENV)	I	PH signal or RFENV signal input pin.
15	FE	I	FE signal input pin.
16	TE	I	TE signal input pin.
17	VREF	I	VREF input pin.
18	ADAVDD	—	Servo A/D, D/A power supply pin.
19	ADAVSS	—	Servo A/D, D/A ground pin.
20	PHREF	O	PH reference output pin.
21	BHREF	O	BH reference output pin.
22	TBLO	O	Tracking balance output pin.
23	TDO	O	Tracking control output pin.
24	FDO	O	Focus control output pin.
25	SPDO	O	Spindle control output pin.
26	SLDO	O	Thread control output pin.
27	FG	I/O	FG signal input pin. (Connected to GND)
28	LASER	O	Laser ON/OFF control pin.
29	CONT1	I/O	General-purpose input/output pin 1. (Connected to GND)
30	CONT2	I/O	General-purpose input/output pin 2. (Connected to GND)
31	CONT3	I/O	General-purpose input/output pin 3.
32	CONT4	I/O	General-purpose input/output pin 4.
33	CONT5	I/O	General-purpose input/output pin 5. (Not connected)
34	PCK	O	EFM data playback clock monitor pin. Average 4.3218MHz when the phase is locked. (Not connected)
35	C2F	O	C2 flag output pin.
36	VDD	—	Digital power supply pin.
37	DOUT	O	Digital out output pin. (EIAJ format)
38	FSX	O	Output pin for the 7.35kHz synchronization signal divided from the crystal oscillator. (Not connected)

Pin No.	Pin Name	I/O	Description
39	EFLG	O	C1, C2 error correction monitor pin. (Not connected)
40	TEST	I	Test input pin. (Connected to GND)
41	EMPH	I/O	Emphasis pin. Which becomes an input pin after reset and can be controlled externally. This becomes an emphasis monitor pin under control by command.
42	MUTEL	O	L channel mute output pin. (Not connected)
43	MUTER	O	R channel mute output pin. (Not connected)
44	LVDD	—	L channel power supply pin.
45	LCHO	O	L channel output pin. (Not connected)
46	LVSS	—	L channel ground pin.
47	RVSS	—	R channel ground pin.
48	RCHO	O	R channel output pin. (Not connected)
49	RVDD	—	R channel power supply pin.
50	XVDD	—	Crystal oscillator power supply pin.
51	XIN	I	Connections for a 16.9344MHz crystal oscillator pin.
52	XOUT	O	
53	XVSS	—	Crystal oscillator ground pin.
54	ASLRCK	I	L/R clock input pin. (Connected to GND)
55	ASDACK	I	Bit clock input pin. (Connected to GND)
56	ASDFIN	I	L/R channel data input pin. (Connected to GND)
57	LRSY	O	L/R clock output pin.
58	DATAACK	O	Bit clock output pin.
59	DATA	O	L/R channel data output pin.
60	16M	O	16.9344MHz output pin.
61	SFSY	O	Subcode frame synchronization signal output pin. This signal falls when the subcode is in the standby state.
62	SBSY	O	Subcode clock synchronization signal output pin.
63	PW	O	Subcode P, Q, R, S, T, U and W output pin.
64	SBCK	I	Subcode readout clock input pin.
65	CE	I	Chip enable signal input pin.
66	CL	I	Data transfer clock input pin.
67	DI	I	Data input pin.
68	DO	O	Data output pin.
69	INT	O	Interruption signal output pin. (Not connected)
70	WRQ	O	Interruption signal output pin.
71	RES	I	Reset input pin. This pin must be set low briefly after power is first applied.
72	DRF	O	Focus ON detect pin.
73	VDD5V	—	Microprocessor interface power supply.
74	VSS	—	Digital ground pin.
75	CONT6	I/O	General-purpose input/output pin 6.
76	CONT7	I/O	General-purpose input/output pin 7.
77	V/P	O	Rough servo/phase control automatic switching monitor output pin. "H" for rough servo and "L" for phase servo. (Not connected)

Pin No.	Pin Name	I/O	Description
78	FSEQ	O	Synchronization signal detection output pin. Outputs a high level when the synchronization signal detected from the EFM signal and the internally generated synchronization signal agree.
79	DEFECT	I/O	Defect pin. Which becomes an input pin after reset and can be controlled externally. This becomes the defect monitor pin under control by command. (Not connected)
80	EFMO	O	EFM signal output pin. (Not connected)

IC, LC74781M

Pin No.	Pin Name	I/O	Description
1	VSS1	—	GND connection terminal. (Digital ground terminal).
2	Xtal IN	I	External X'tal and capacitor for internal sync generator, or the external clock are connected to this terminal. (2fsc or 4fsc).
3	Xtal OUT	O	
4	CTRL1	I	Either the external clock input mode or the X'tal generator mode is selected by this selector terminal. L: X'tal generator mode, H: External clock input.
5	BLANK	O	Blank signal (character and the green ORed signal) is output from this terminal. (MODE 0: composite sync signal is output at H.) When reset (\overline{RST} terminal = L), the X'tal clock signal is output. (It is not output when reset by the reset command).
6	OSC IN	I	External coil and capacitor for the character output dot clock generator are connected to this terminal.
7	OSC OUT	O	
8	CHARA	O	The character signal is output from this terminal. (MOD 0: when H, the external sync signal identification signal is output from this terminal. This output signal tells whether the external sync signal is present or not. When external sync signal is present, H is output.) When reset (\overline{RST} terminal = L), the dot clock signal (LC oscillator) is output. (It is not output when reset by the reset command).
9	\overline{CS}	I	Enable signal for the serial data input is input to this terminal. The serial data input is enabled at L. Pull-up resistor is built-in. (Hysteresis input).
10	SCLK	I	Clock of the serial data input is input to this terminal. Pull-up resistor is built-in. (Hysteresis input).
11	SIN	I	Serial data input terminal. Pull-up resistor is built-in. (Hysteresis input).
12	VDD2	—	Power supply for the composite video signal level adjustment. (Analog power supply).
13	CV OUT	O	Composite video signal output terminal.
14	NC	—	Connected to GND or not connected.
15	CV IN	I	Composite video signal input terminal.
16	VDD1	—	Power supply (+5V digital power supply).
17	SYN IN	I	Video signal for the internal sync separator circuit is input to this terminal. (When the internal sync separator circuit is not used, the horizontal sync signal or composite sync signal is input to this terminal).
18	SEP C	—	Internal sync separator circuit bias voltage monitoring terminal.
19	SEP OUT	O	The composite sync output signal of the internal sync separator circuit is output from this terminal. (H: MOD 1. H: during internal sync mode. L: during external sync mode.) (When internal sync separator circuit is not used, the SYN IN input signal is output from this terminal).
20	SEP IN	I	The output signal of the SEP OUT terminal is integrated so that the vertical sync signal is input to this terminal. An integrator circuit must be connected between the SEP OUT terminal and this terminal. When this terminal is not used, it must be connected to VDD1.
21	CTRL2	I	When selecting any of the NTSC or PAL or PAL-M or PAL-N system, the pin setting has priority. When L, the NTSC system is selected after resetting. Selection of either NTSC or PAL or PAL-M or PAL-N system by the command becomes effective. H: PAL-M system.

Pin No.	Pin Name	I/O	Description
22	CTRL3	I	Controls whether or not to input the $\overline{\text{VSYNC}}$ signal to the SEPIN input. L: to input the $\overline{\text{VSYNC}}$ signal. H: not to input the $\overline{\text{VSYNC}}$ signal.
23	$\overline{\text{RST}}$	I	System reset input terminal. Pull-up resistor is built-in. (Hysteresis input).
24	VDD1	—	Power supply. (+5V digital power supply).

IC, μ PD78016FGC

Pin No.	Pin Name	I/O	Description
1	RBPLS	O	RADIAL BALANCE PLUS.
2	AMUTE	O	AUDIO ANALOG MUTE (H=MUTE ON).
3	GFS	I	GFS.
4	XVCDMD	I	AUDIO/VIDEO CD MODE (L=VCD=SPINDLE GAIN UP).
5	MD2	O	DOUT MUTE CONT.
6	EMPH	I	EMPHASIS.
7	SQSO	I	SQDATA FROM CD.
8	SQCK	O	SQCLK TO CD.
9	VSS	—	GND.
10	SWNT	I	SW TV OUT MODE (L=NTSC).
11	SWAUTO	I	SW TV OUT MODE (L=NTSC/PAL AUTO).
12	SWPAL	I	SW TV OUT MODE (L=PAL).
13	EMERG	I	POWER EMERGENCY STOP (L*3sec=STOP).
14	NC	—	Nou used.
15	LPCSEL	I	“LPC ON/OFF (H=ON, NORMAL)”.
16	NC	—	Nou used.
17	LOCK	O	GFS (FRAME SYNC) LOCK (NO USE=H).
18	DMUTE	O	DIGITAL DATA OUT MUTE.
19	SENS	I	DSP SENS1 FROM CD.
20	XCDRST	O	CD RESET.
21	DATA	O	DATA TO CD.
22	XLAT	O	XLT TO CD.
23	CLOK	O	CLK TO CD.
24	VSS	—	GND.
25	FOK	I	FOCUS OK.
26	SENS2	I	SSP SENS2 FROM CD.
27	XBUSY	I/O	READY/BUSY I/O TO HOST OD.
28	NC	—	Nou used.
29	NC	—	
30	NC	—	
31	TST0	I/O	CHECK LAND.
32	TST1	I/O	
33	TST2	I/O	
34	TST3	I/O	
35	RESET	I	RESET.
36	HRDY	I	HRDY FROM CL680.
37	XHINT	I	HINT FROM CL680.
38	NC	—	Nou used.
39	SCOR	I	SCOR FROM CD.
40	VDD	—	5.0VDD.
41	XO	O	8.0MHz CERALOCK.

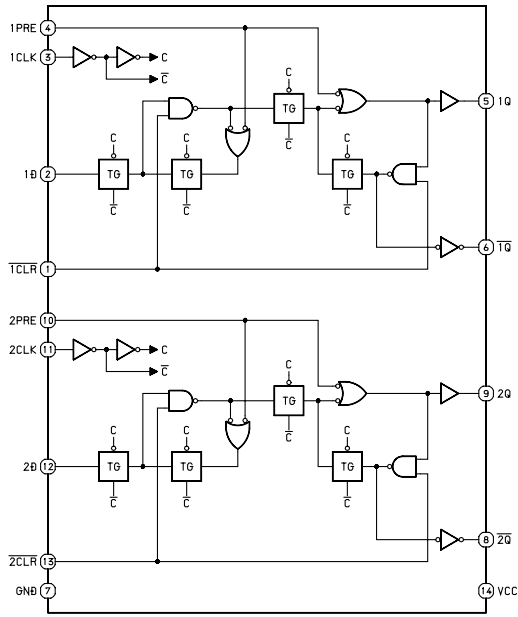
Pin No.	Pin Name	I/O	Description
42	XI	I	8.0MHz CERALOCK.
43	VSS	—	GND.
44	XT2	—	Nou used.
45	XT1	I	5.0VDD.
46	AVSS	—	GND.
47	XMPGRST	O	MPEG BLOCK IC RESET.
48	HSEL	O	ADDRESS/DATA SEL TO CL680.
49	INLSW	I	INSIDE LIMIT SW .
50	NC	—	Nou used.
51	OSDXCS	O	OSD CHIP SELECT.
52	ABSEL	I	CXA1992A/B SELECT (L=CXA1992A).
53	CLVSEL	I	CLV MODE SELECT (H=CLV-N).
54	AADSEL	I	AUTO ADJUST SELECT (H=AUTO ON).
55	AVDD	—	5.0VDD.
56	AVREF	—	
57	HDOUT	I	HD-OUT FROM CL680.
58	HDIN	O	HD-IN TO CL680.
59	HCK	O	HCK TO CL680.
60	OSDDATA	O	OSD DATA.
61	OSDCLK	O	OSD CLOCK.
62	COMMAND	I	COMMAND FROM HOST .
63	STATUS	O	STATUS TO HOST.
64	SCK	I	SCK FROM HOST.

IC, SM5878M

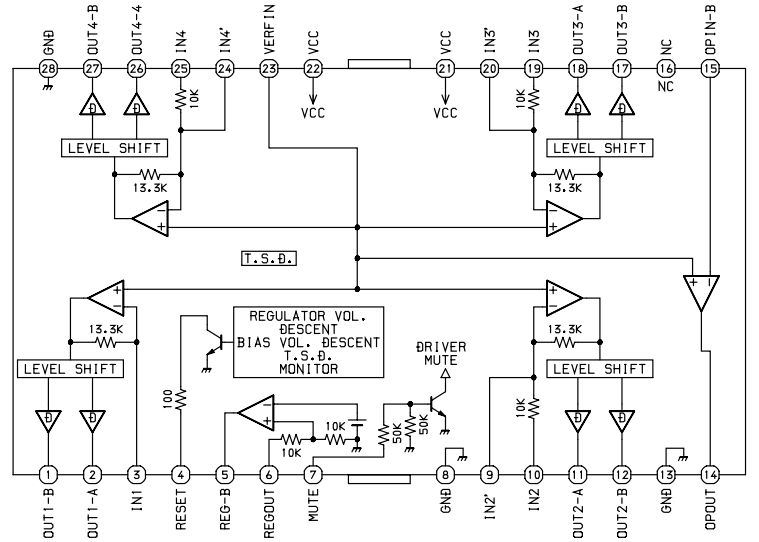
Pin No.	Pin Name	I/O	Description
1	MUTE	I	MODE = H: Soft mute ON/OFF terminal. (Mute at H). MODE = L: Attenuator level DOWN/UP terminal. (DOWN at H).
2	DEEM	I	De-emphasis ON/OFF terminal. (De-emphasis ON at H).
3	CKO	O	Oscillator clock output. (16.9344 MHz).
4	DVSS	—	Digital VSS terminal.
5	BCKI	I	Bit clock input terminal.
6	DI	I	Serial data input terminal.
7	DVDD	—	Digital VDD terminal.
8	LRCI	I	Sample rate clock (fs) input terminal. (H = L ch/L = R ch).
9	TSTN	I	Test input. ("H" or open during normal operation)
10	TO1	O	Test output 1. (Normally low level output).
11	AVDDL	—	Analog VDD terminal. (For L ch).
12	LO	O	Left channel analog output terminal.
13	AVSS	—	Analog VSS terminal.
14	RO	O	Right channel analog output terminal.
15	AVDDR	—	Analog VDD terminal. (For R ch).
16	MUTEO	O	Infinity zero detection output.
17	XVDD	—	X'tal system VDD terminal.
18	XTI	I	X'tal oscillator terminal. (Or external clock input terminal of 16.9344 MHz).
19	XTO	O	X'tal oscillator terminal.
20	XVSS	—	X'tal system VSS terminal.
21	DS	I	Double-speed/normal playback selection. (Double-speed at H).
22	RSTN	I	Reset terminal. (Reset at L).
23	MODE	I	Soft mute/Attenuator mode selection. (Soft mute at H).
24	ATCK	I	Attenuator level setup clock (Ignored when MODE = H).

IC BLOCK DIAGRAM

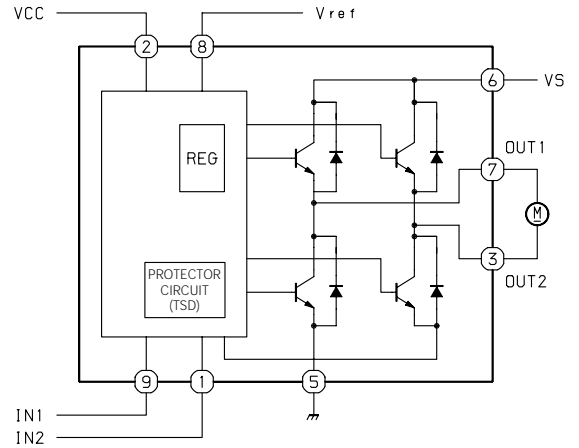
IC, SN74LV74APW



IC, BA6998FP



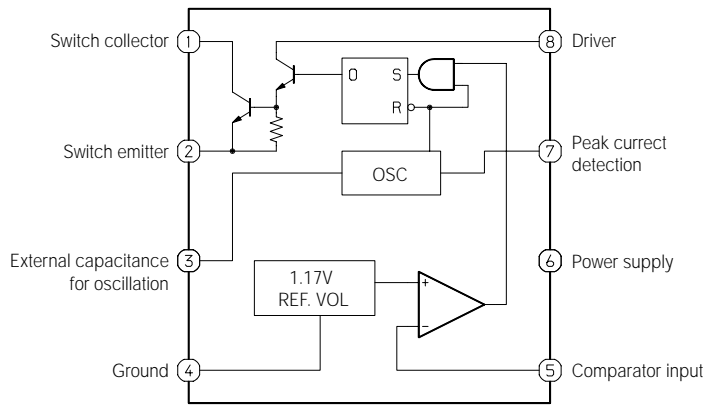
IC, TA7291S



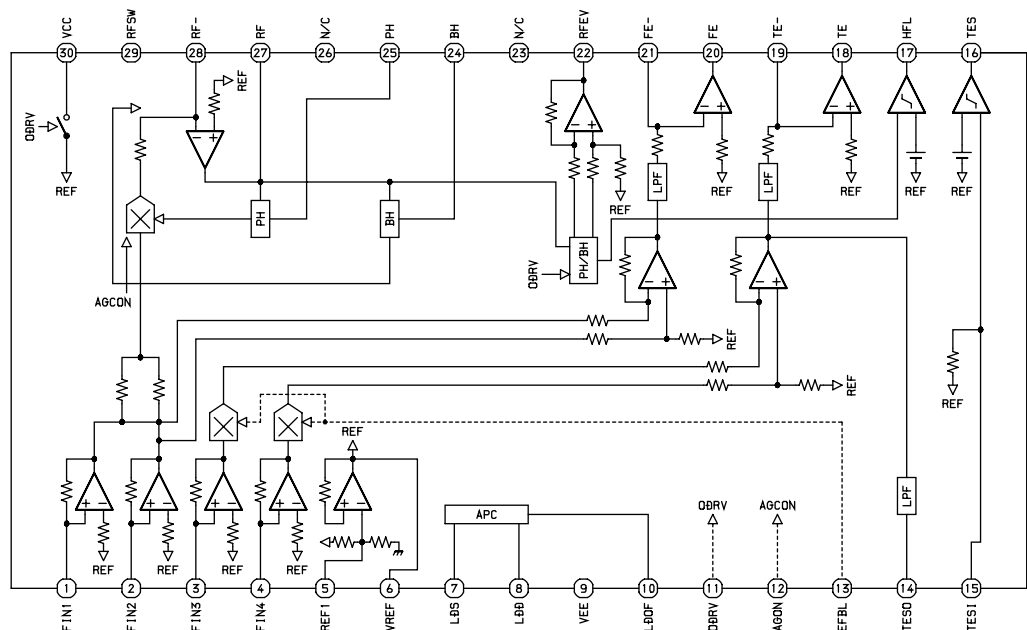
INPUT		OUTPUT		MODE
IN1	IN2	OUT1	OUT2	
0	0	H	H	STOP
1	0	H	L	CW/CCW
0	1	L	H	CCW/CW
1	1	L	L	BRAKE

8 : HI IMPEDANCE
NOTE : INPUT 'H' ACTIVE

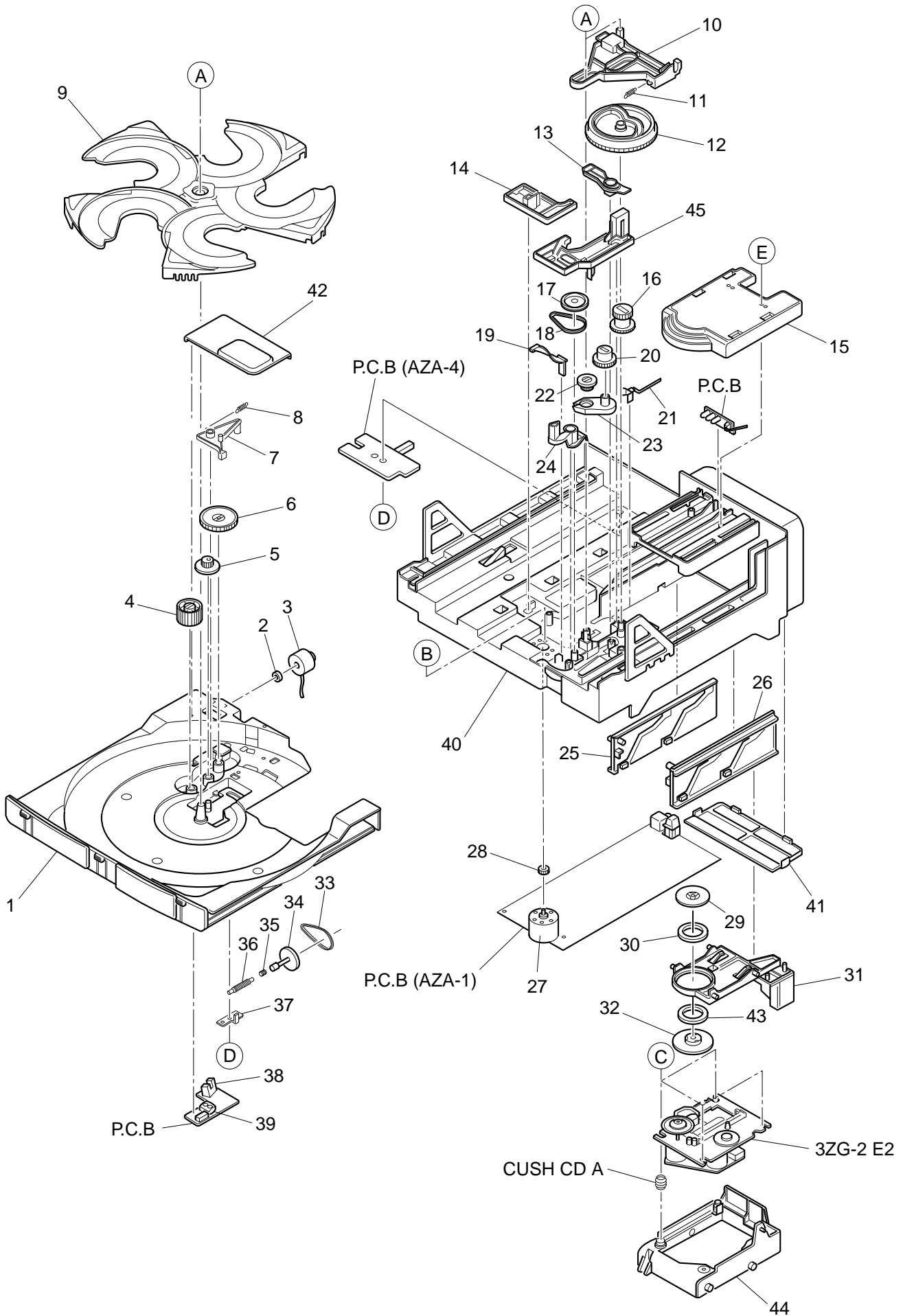
IC, M5291FP



IC, LA9235M



MECHANICAL EXPLODED VIEW 1/1



MECHANICAL PARTS LIST 1/1

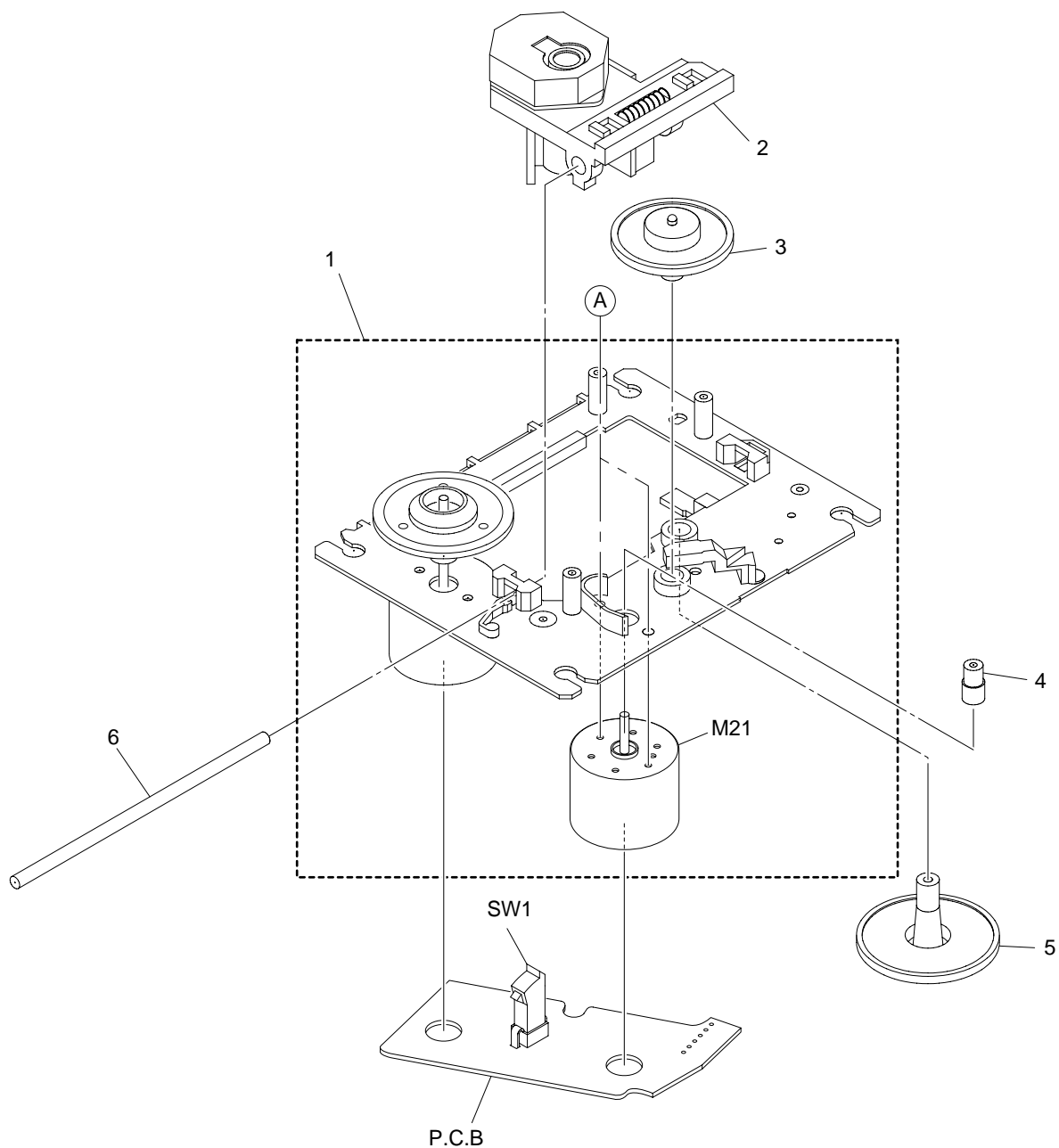
DESCRIPTIONで判断できない物は "REFERENCE NAME LIST" を参照してください。
 If can't understand for Description please kindly refer to "REFERENCE NAME LIST".

REF. NO	PART NO.	KANRI NO.	DESCRIPTION	REF. NO	PART NO.	KANRI NO.	DESCRIPTION
1	86-ZG1-001-410		TRAY,5CD	26	86-ZG1-210-110		SLIDER,CAM R(*)
2	84-ZG1-267-010		PULLEY,LOAD MO 8	27	87-045-305-010		MOTOR, RF-500TB DC-5V (2MA)
3	87-A90-036-010		MOT ASSY,RF-300CA-11	28	84-ZG2-228-010		PULLEY,MOT
4	86-ZG1-228-110		GEAR,TT-B	29	83-ZG3-211-010		PLATE,DISC
5	86-ZG1-227-110		GEAR,TT-A	30	83-ZG3-604-010		RING,MAG 2
6	86-ZG1-223-110		GEAR,WORM-WHEEL TT	31	86-ZG1-215-010		HLDR,CHUCK
7	86-ZG1-224-110		LEVER,TT(*)	32	86-ZG1-238-010		HLDR,MAGNET 6ZG N
8	86-ZG1-226-010		SPR-E,LEVER TT	33	86-ZG1-225-010		BELT,SQ1.2-32.9
9	86-ZG1-002-210		TURN TABLE,5CD	34	86-ZG1-221-010		PULLEY,TT
10	86-ZG1-211-210		JOINT,CAM	35	86-ZG1-231-010		SPR-C,WORM
11	86-ZG1-216-010		SPR-E,JT	36	84-ZG1-256-010		GEAR,WORM N2
12	86-ZG1-203-210		GEAR,MAIN CAM	37	86-ZG1-232-010		SPR-P,WORM
13	86-ZG1-213-110		LEVER,LOAD	38	86-ZG1-229-010		HLDR,SENSOR
14	86-ZG1-214-110		LEVER,PROTECT	39	86-ZG1-230-010		HLDR,DISC SENSOR
15	86-ZG1-004-010		REFLECTOR,CD<VZRDM>	40	86-ZG1-201-310		CHAS,MECHA
16	86-ZG1-205-110		GEAR,TRAY	41	86-ZG1-005-110		COVER,CHAS
17	84-ZG1-207-010		PULLEY,RELAY	42	86-ZG1-003-110		COVER,TRAY<VZRDM>
18	84-ZG1-209-010		BELT,SQ1.8-117.7	43	86-ZG1-239-110		PLATE,DISC
19	86-ZG1-217-010		LEVER,SW	44	86-ZG1-202-210		HLDR,MECHA
20	86-ZG1-206-110		GEAR,RELAY B	45	86-ZG1-212-410		SLIDER,LOAD
21	86-ZG1-220-110		SPR-P,LOCK	A	87-078-148-010		VFT2+3-12(F10) BLK
22	86-ZG1-204-110		GEAR,RELAY A	B	87-251-072-410		U+2.6-5
23	86-ZG1-218-110		PLATE,GEAR	C	81-ZG1-254-010		S-SCREW,MECH HLDR
24	86-ZG1-208-010		LEVER,TRAY	D	87-067-579-010		TAPPING SCREW, BVT2+3-8
25	86-ZG1-209-110		SLIDER,CAM L(*)	E	87-067-703-010		TAPPING SCREW, BVT2+3-10<VZRDM>

COLOR NAME TABLE

Basic color symbol	Color	Basic color symbol	Color	Basic color symbol	Color
B	Black	C	Cream	D	Orange
G	Green	H	Gray	L	Blue
LT	Transparent Blue	N	Gold	P	Pink
R	Red	S	Silver	ST	Titan Silver
T	Brown	V	Violet	W	White
WT	Transparent White	Y	Yellow	YT	Transparent Yellow
LM	Metallic Blue	LL	Light Blue	GT	Transparent Green
LD	Dark Blue	DT	Transparent Orange	GM	Metallic Green
YM	Metallic Yellow	DM	Metallic Orange	PT	Transparent Pink

CD MECHANISM EXPLODED VIEW 1/1 (3ZG-2E2)



CD MECHANISM PARTS LIST 1/1 (3ZG-2E2)

DESCRIPTIONで判断できない物は "REFERENCE NAME LIST" を参照してください。
 If can't understand for Description please kindly refer to "REFERENCE NAME LIST".

REF. NO	PART NO.	KANRI NO.	DESCRIPTION
1	83-ZG2-261-010		CHAS ASSY, E2
2	87-A90-836-010		PICKUP, KSS-213F
3	83-ZG2-235-010		GEAR, A3
4	83-ZG2-236-010		GEAR, MOTOR 3
5	83-ZG2-205-310		GEAR, B
6	83-ZG2-253-010		SHAFT, SLIDE 5
A	87-261-032-210		V+2-3

REFERENCE NAME LIST

ELECTRICAL SECTION

DESCRIPTION	REFERENCE NAME
ANT	ANTENNAS
C-	CHIP
C-CAP	CAP, CHIP
C-CAP TN	CAP, CHIP TANTALUM
C-COIL	COIL, CHIP
C-DI	DIODE, CHIP
C-DIODE	DIODE, CHIP
C-FET	FET, CHIP
C-FOTR	FILTER, CHIP
C-JACK	JACK, CHIP
C-LED	LED, CHIP
C-RES	RES, CHIP
C-SFR	SFR, CHIP
C-SLIDE SW	SLIDE SWITCH, CHIP
C-SW	SWITCH, CHIP
C-TR	TRANSISTOR, CHIP
C-VR	VOLUME, CHIP
C-ZENER	ZENER, CHIP
CAP, CER	CAP, CERA-SOL
CAP, E	CAP, ELECT
CAP, M/F	CAP, FILM
CAP, TC	CAP, CERA-SOL
CAP, TC-U	CAP, CERA-SOL SS
CAP, TN	CAP, TANTALUM
CERA FIL	FILTER, CERAMIC
CF	FILTER, CERAMIC
DL	DELAY LINE
E/CAP	CAP, ELECT
FILT	FILTER
FLTR	FILTER
FUSE RES	RES, FUSE
MOT	MOTOR
P-DIODE	PHOTO DIODE
P-SNSR	PHOTO SENSER
P-TR	PHOTO TRANSISTOR
POLY VARI	VARIABLE CAPACITOR
PPCAP	CAP, PP
PT	POWER TRANSFORMER
PTR, RES	PTR, MELF
RC	REMOTE CONTROLLER
RES NF	RES, NON-FLAMMABLE
RESO	RESONATOR
SHLD	SHIELD
SOL	SOLENOID
SPKR	SPEAKER
SW, LVR	SWITCH, LEVER
SW, RTRY	SWITCH, ROTARY
SW, SL	SWITCH, SLIDE
TC CAP	CAP, CERA-SOL
THMS	THERMISTOR
TR	TRANSISTOR
TRIMMER	CAP, TRIMMER
TUN-CAP	VARIABLE CAPACITOR
VIB, CER	RESONATOR, CERAMIC
VIB, XTAL	RESONATOR, CRYSTAL
VR	VOLUME
ZENER	DIODE, ZENER

MECHANICAL SECTION

DESCRIPTION	REFERENCE NAME
ADHESHIVE	SHEET ADHESHIVE
AZ	AZIMUTH
BAR-ANT	BAR-ANTENNA
BAT	BATTERY
BATT	BATTERY
BRG	BEARING
BTN	BUTTON
CAB	CABINET
CASS	CASSETTE
CHAS	CHASSIS
CLR	COLLAR
CONT	CONTROL
CRSR	CURSOR
CU	CUSHION
CUSH	CUSHION
DIR	DIRECTION
DUBB	DUBBING
FL	FRONT LOADING
FLY-WHL	FLYWHEEL
FR	FRONT
FUN	FUNCTION
G-CU	G-CUSHION
HDL	HANDOL
HIMERON	CLOTH
HINGE, BAT	HINGE, BATTERY
HLDR	HOLDER
HT-SINK	HEAT SINK
IB	INSTRUCTION BOOKLET
IDLE	IDLER
IND, L-R	INDICATOR, L-R
KEY, CONT	KEY, CONTROL
KEY, PRGM	KEY, PROGRAM
KNOB, SL	KNOB, SLIDE
LBL	LABEL
LID, BATT	LID, BATTERY
LID, CASS	LID, CASSETTE
LVR	LEVER
P-SP	P-SPRING
PANEL, CONT	PANEL, CONTROL
PANEL, FR	PANEL, FRONT
PRGM	PROGRAM
PULLY, LOAD MO	PULLY, LOAD MOTOR
RBN	RIBBON
S-	SPECIAL
SEG	SEGMENT
SH	SHEET
SHLD-SH	SHIELD-SHEET
SL	SLIDE
SP	SPRING
SP-SCREW	SPECIAL-SCREW
SPACER, BAT	SPACER, BATTERY
SPR	SPRING
SPR-P	P-SPRING
SPR-PC-PUSH	P-SPRING, C-PUSH
T-SP	T-SPRING
TERM	TERMINAL
TRIG	TRIGGER
TUN	TUNING
VOL	VOLUME
W	WASHER
WHL	WHEEL
WORM-WHL	WORM-WHEEL

