

# MICRO COMPONENT SYSTEM MCR-E410 CD PLAYER CDX-E410

## SERVICE MANUAL

The MCR-E410 is composed of the CDX-E410, RX-E410 and NX-E800.

This service manual is for the CDX-E410.

For service manual of the RX-E410 and NX-E800, please refer to the following publication number:

RX-E810/RX-E410/NX-E800 101019

### IMPORTANT NOTICE

This manual has been provided for the use of authorized YAMAHA Retailers and their service personnel.

It has been assumed that basic service procedures inherent to the industry, and more specifically YAMAHA Products, are already known and understood by the users, and have therefore not been restated.

**WARNING:** Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components, and failure of the product to perform as specified. For these reasons, we advise all YAMAHA product owners that any service required should be performed by an authorized YAMAHA Retailer or the appointed service representative.

**IMPORTANT:** The presentation or sale of this manual to any individual or firm does not constitute authorization, certification or recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of YAMAHA are continually striving to improve YAMAHA products. Modifications are, therefore, inevitable and specifications are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

**WARNING:** Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

**IMPORTANT:** Turn the unit OFF during disassembly and part replacement. Recheck all work before you apply power to the unit.

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# YAMAHA

YAMAHA CORPORATION  
P.O.Box 1, Hamamatsu, Japan

06.08

CDX-E410

## ■ TO SERVICE PERSONNEL

### WARNING: CHEMICAL CONTENT NOTICE!

The solder used in the production of this product contains LEAD. In addition, other electrical/electronic and/or plastic (where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT PLACE SOLDER, ELECTRICAL/ELECTRONIC OR PLASTIC COMPONENTS IN YOUR MOUTH FOR ANY REASON WHATSOEVER!

Avoid prolonged, unprotected contact between solder and your skin! When soldering, do not inhale solder fumes or expose eyes to solder/flux vapor!

If you come in contact with solder or components located inside the enclosure of this product, wash your hands before handling food.

### About Lead Free Solder

All of the P.C.B.s installed in this unit are soldered using the lead free solder.

Among some types of lead free solder currently available, it is recommended to use one of the following types for the repair work.

- Sn + Ag + Cu (tin + silver + copper)
- Sn + Cu (tin + copper)
- Sn + Zn + Bi (tin + zinc + bismuth)

#### Caution:

As the melting point temperature of the lead free solder is about 30°C to 40°C (50°F to 70°F) higher than that of the lead solder, be sure to use a soldering iron suitable to each solder.

### WARNING: Laser Safety

This product contains a laser beam component. This component may emit invisible, as well as visible radiation, which may cause eye damage. To protect your eyes and skin from laser radiation, the following precautions must be used during servicing of the unit.

- 1) When testing and/or repairing any component within the product, keep your eyes and skin more than 30 cm away from the laser pick-up unit at all times. Do not stare at the laser beam at any time.
- 2) Do not attempt to readjust, disassemble or repair the laser pick-up, unless noted elsewhere in this manual.
- 3) CAUTION: Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

### Laser Emitting conditions:

- 1) When the top cover is removed, and the "STANDBY/ON" SW is turned to the "ON" position, the laser component will emit a beam for several seconds to detect if a disc is present. During this time (5-10 sec.) the laser may radiate through the lens of the laser pick-up unit. Do not attempt any servicing during this period!  
If no disc is detected, the laser will stop emitting the beam. When a disc is set, you will not be exposed to any laser emissions.
- 2) The laser power level can be adjusted with the VR on the pick-up PWB. However, this level has been set by the factory prior to shipping from the factory. Do not adjust this laser level control unless instruction is provided elsewhere in this manual. Adjustment of this control can increase the laser emission level from the device.

## Laser Diode Properties

Type: GaAlAs  
 Wave length: 780 nm  
 Emission duration: continuous  
 Laser output: max. 44.6  $\mu$ W \*

\* This output is the value measured at a distance of about 200 mm from the objective lens surface on the optical pick-up block.

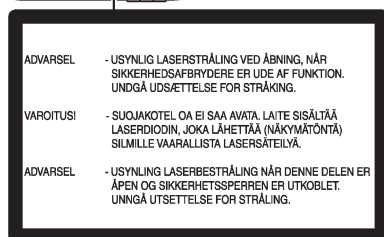
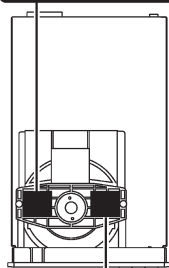
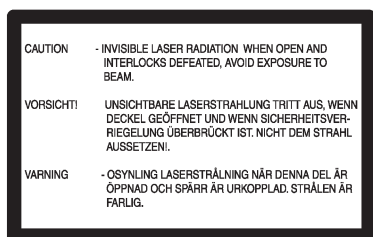
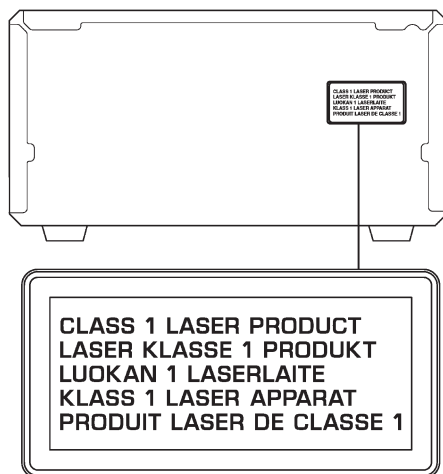
### VARO!

AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

### WARNING!

OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.

## WARNING



**CAUTION** INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.

**VORSICHT!** UNSICHTBARE LASERSTRAHLUNG TRITTT AUS, WENN DECKEL GEÖFFNET UND WENN SICHERHEITSSVERRIEGELUNG ÜBERBRÜCKT IST. NICHT DEM STRAHL AUSSETZEN!

**VARNING** OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRR ÄR URKOPPLAD. STRÅLEN ÄR FARLIG.

**ADVARSEL** USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.

**VAROITUS!** SUOJAKOTEL OI EI SAA AVATA. LAITE SISÄLTÄÄ LASERDIODIN, JOKA LÄHETTÄÄ (NÄKYMÄTÖNTÄ) SILMILLE VAARALLISTA LASER SÄTEILYÄ.

**ADVARSEL** USYNLIG LASERBESTRÅLING NÄR DENNE DELEN ER ÅPEN OG SIKKERHETSSPERRER ER UTKOBLET. UNNGÅ UTSETTELSE FOR STRÅLING.

## ■ PREVENTION OF ELECTROSTATIC DISCHARGE

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by electro static discharge (ESD).

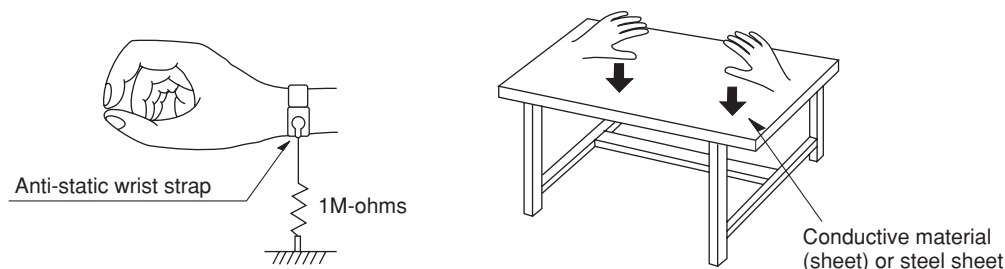
1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as “anti-static (ESD protected)” can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.  
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).

### Grounding for electrostatic breakdown prevention

1. Human body grounding.  
Use the antistatic wrist strap to discharge the static electricity from your body.
2. Work table grounding.  
Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed and ground the sheet.

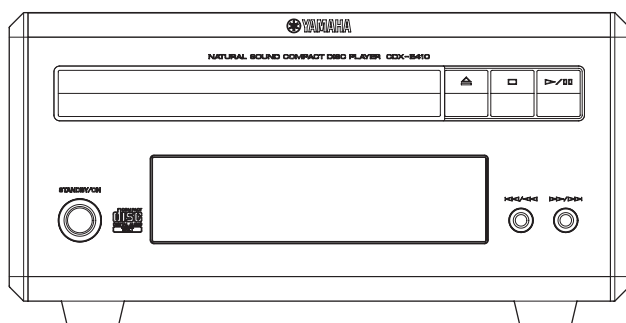
### Caution:

The static electricity of your clothes will not be grounded through the wrist strap. So take care not to let your clothes touch the optical pickup.



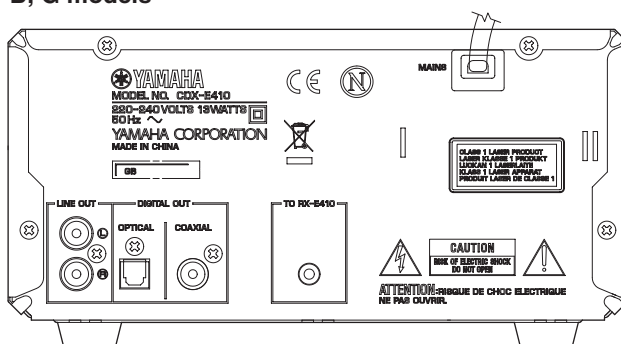
## FRONT PANEL

B, G models



## REAR PANEL

B, G models



## SPECIFICATIONS

### PLAYBACK SYSTEM

CD, CD-R/RW

### AUDIO PERFORMANCE

Signal to Noise (1 kHz) ..... 105 dB or more

Dynamic Range (1 kHz) ..... 95 dB or more

Distortion and Noise (1 kHz) ..... 0.003 % or less

### GENERAL

Dimensions (W x H x D) ..... 215 x 108 x 334 mm (8-7/16" x 4-1/4" x 13-1/8")

Weight ..... Approx. 2.8 kg (6 lbs. 3 oz)

Finish  
Black color ..... G model  
Silver color ..... B, G models

Power Supply  
B, G models ..... AC 220-240 V, 50 Hz

Power Consumption ..... Approx. 13 W

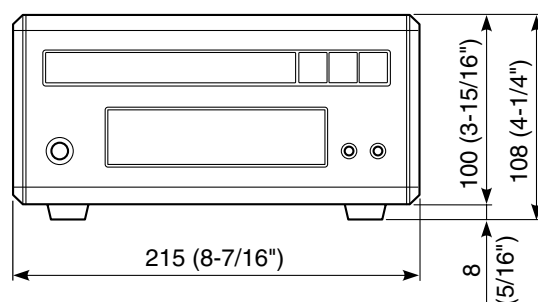
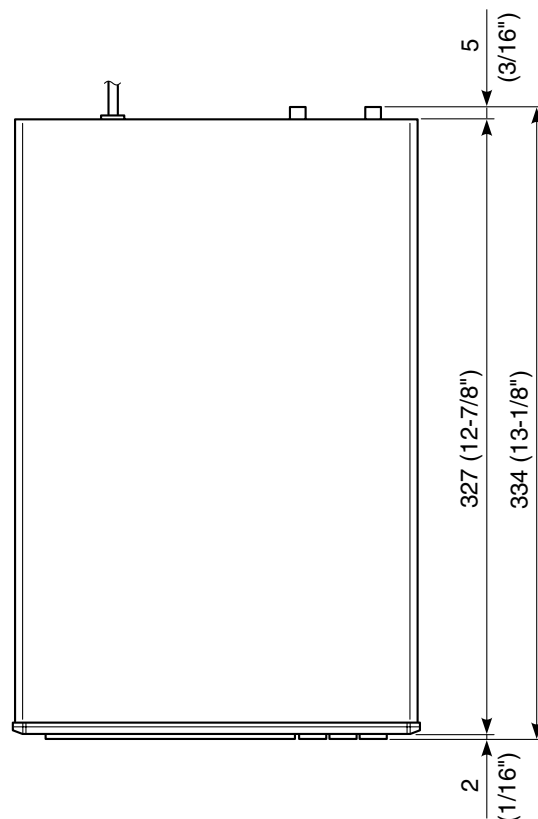
Accessories ..... Audio pin cable (1.5 m) x 1

\* Specifications are subject to change without notice.

**B** ..... *British model*

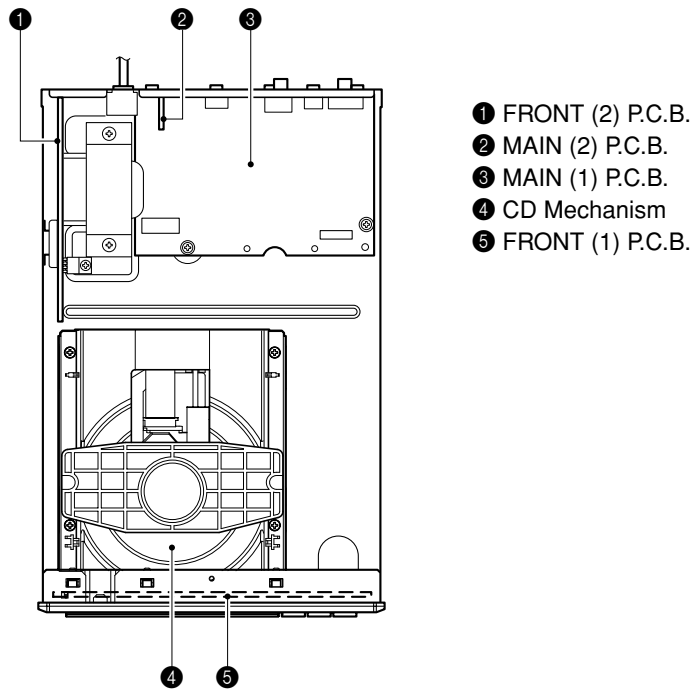
**G** ..... *European model*

### DIMENSIONS



Unit: mm (inch)

## ■ INTERNAL VIEW



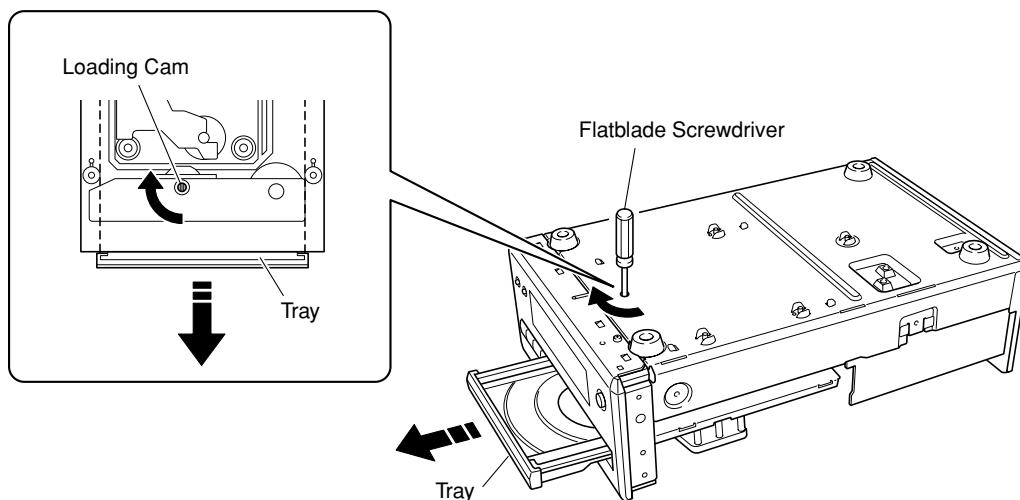
## ■ REPAIR NOTES

None of the components of the following units can be supplied separately.  
Each unit must be replaced as a whole in case of a failure.

- CD Mechanism
- MAIN P.C.B.
- FRONT P.C.B.

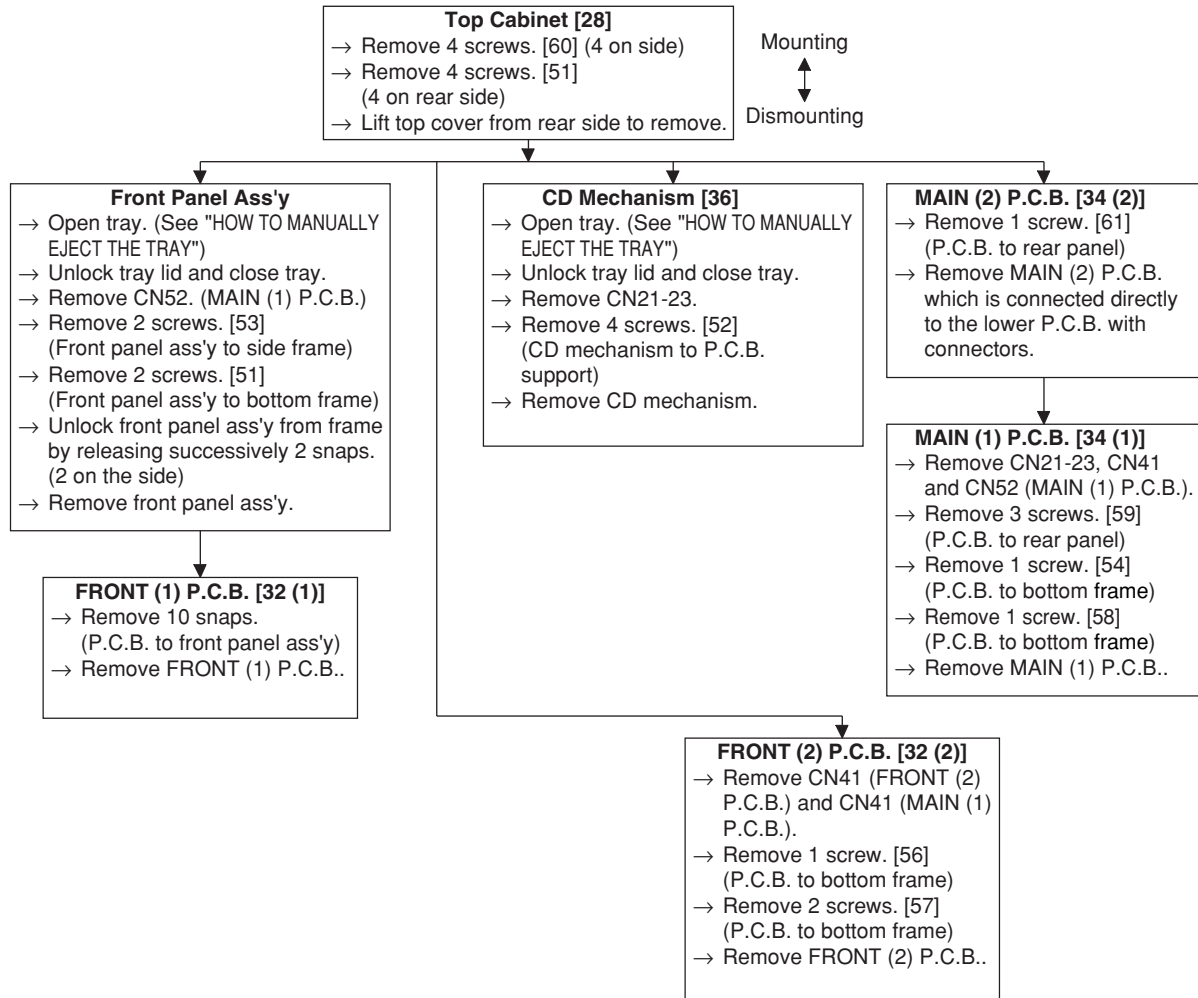
## ■ HOW TO MANUALLY EJECT THE TRAY

- a. Turn the unit bottom up.
- b. Using a flatblade screwdriver, turn the loading cam 90 degrees in the direction indicated by an arrow in the figure.
- c. Gently pull the tray out.

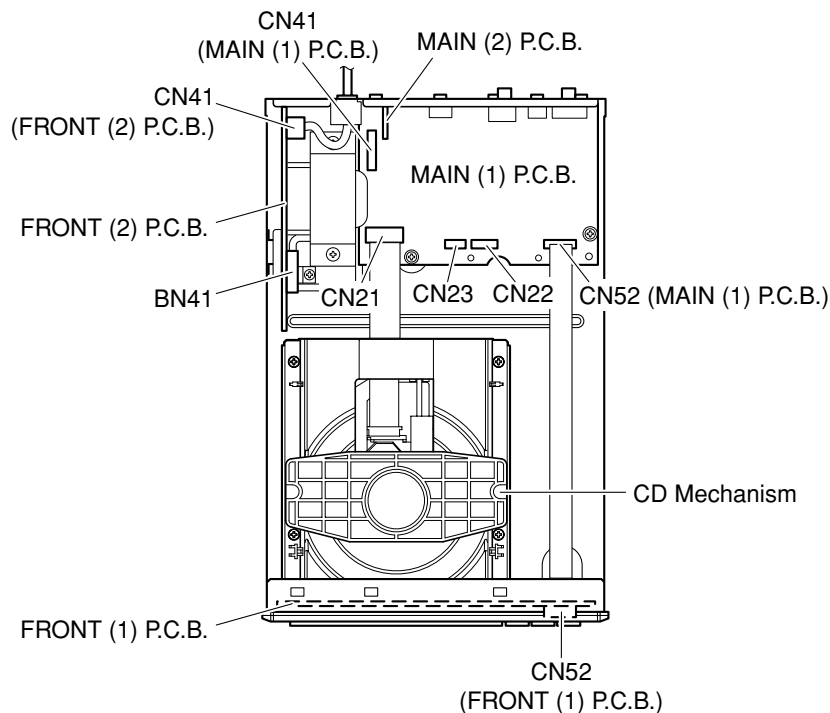


## ■ DISASSEMBLY PROCEDURES

See REPLACEMENT PARTS LIST for item numbers.



### • Cable Connections



■ TEST MODE

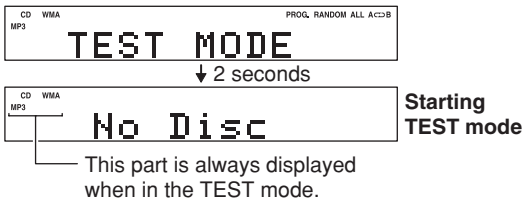
With CDX-E410 alone, it is not possible to start the TEST mode.  
Be sure to prepare, receiver (RX-E410), system control cable and remote control.

Preparation and precautions before starting the operation

Connect the “TO RX-E410” terminal of the CDX-E410 to the “TO CDX-E410” terminal of the RX-E410 with the system control cable.

• Starting Test Mode

- a. Connect the power cable of CDX-E410 and RX-E410 to the AC outlet.
- b. Press the “STANDBY/ON” key of the CDX-E410.  
RX-E410 and CDX-E410 will start up.
- c. Press the “FILE/A-E” key of the remote control while simultaneously pressing “STOP” key of the CDX-E410.  
When in the TEST mode, the “TEST MODE” is displayed for 2 seconds.



1. Function list of panel keys.

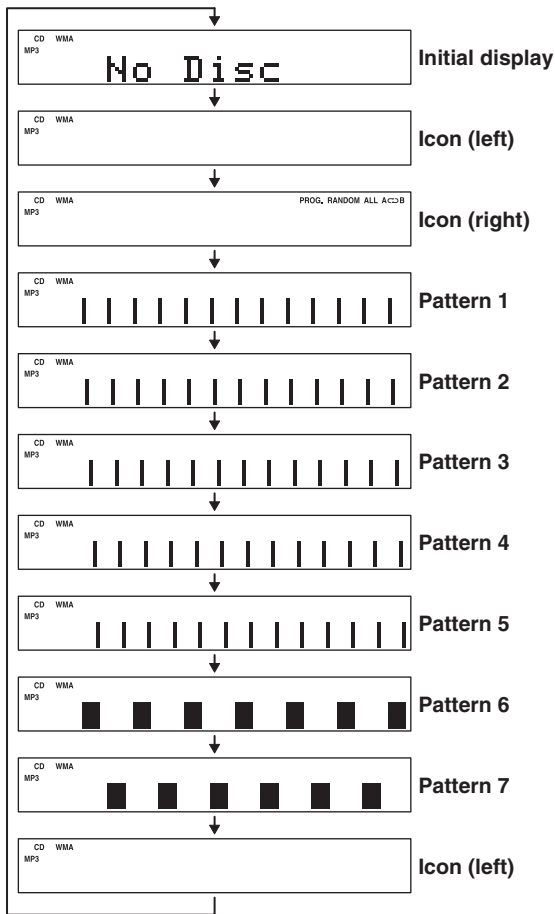
Panel key	Function
▲ (OPEN/CLOSE)	Tray open/close.
▶ / ■■ (PLAY/PAUSE)	Playback/Pause.
■ (STOP)	Stop.
◀◀ / ◀ (SKIP-/SEARCH-)	Move traverse reverse.
▶▶ / ▶ (SKIP+/SEARCH+)	Move traverse forward.

2. Function list of remote control keys.

Panel key	Function
▶ (PLAY)	Playback.
■ (PAUSE)	Pause.
■ (STOP)	Stop.
◀◀ (SKIP-)	Move traverse reverse.
▶▶ (SKIP+)	Move traverse forward.
TIME/INFO	Check FL display. (*1)
RANDOM	Spindle servo on/off.

\*1 Check FL display

The display condition varies as shown below according to the “TIME/INFO” key of the remote control.



• Canceling Test Mode

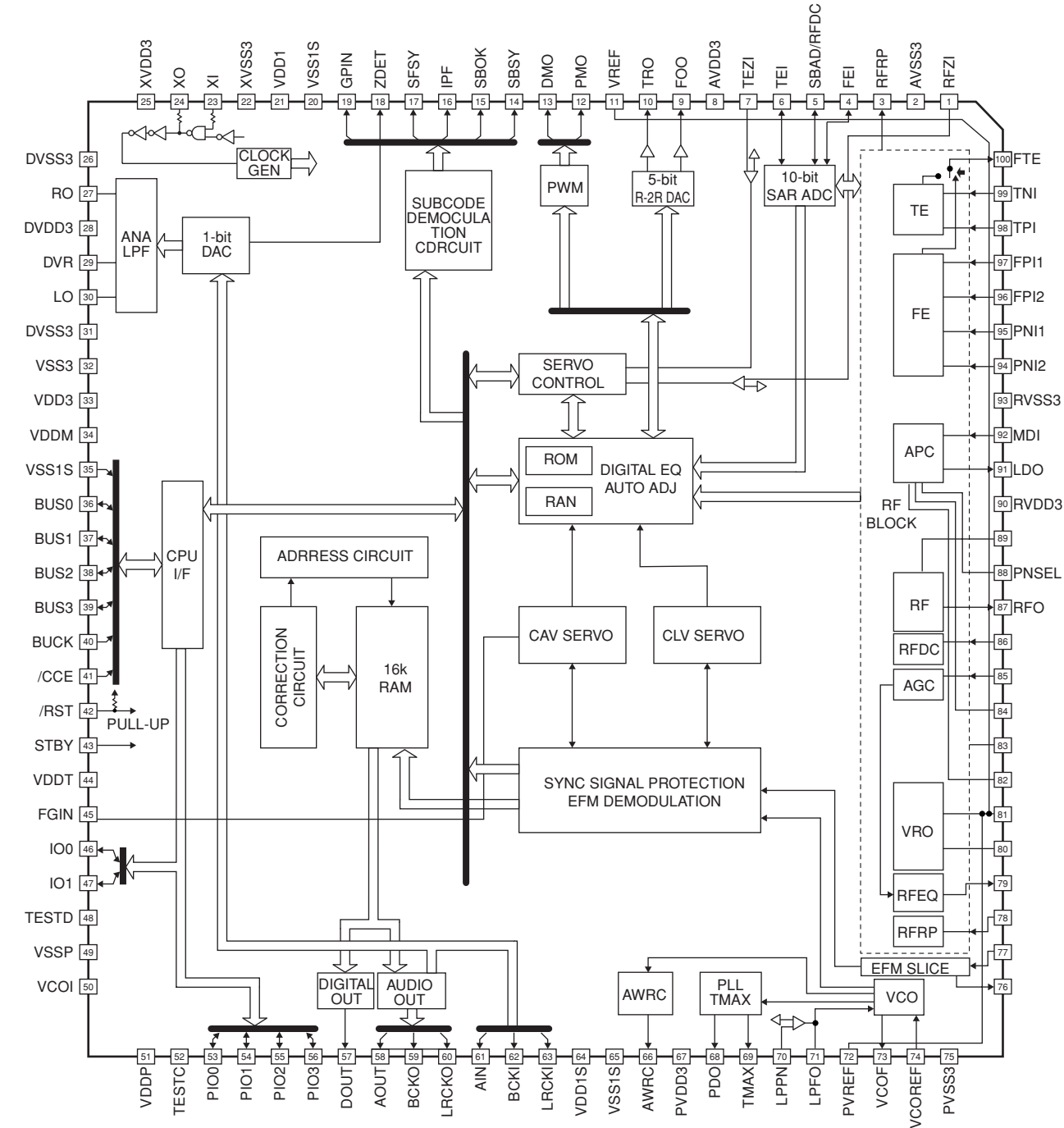
Press the “STANDBY/ON” key of the CDX-E410.



IC DATA

IC21 : TC94A54 (MAIN P.C.B)  
DSP

\* No replacement part available.



Pin No.	Pin name	I/O	Description	Remark
1	RFZI	I 3A/I/F	Input pin for the RF ripple zero-cross signal.	To be connected to the RFRP via 0.033 uF.
2	AVSS3	–	Grounding pin for 3.3V analog circuits.	–
3	RFRP	O 3A/I/F	RF ripple signal output pin.	–
4	FEI	O 3A/I/F	Focus error signal input pin.	Monitor pin for various signals.
5	SBAD/RFDC	O 3A/I/F	Subbeam addition signal input pin.	
6	TEI	O 3A/I/F	Tracking error signal input pin.	To be connected to the TEI via 0.033 uF.
7	TEZI	I 3A/I/F	Input pin for tracking error signal zero-cross.	
8	AVDD3	–	Supply voltage pin for 3.3V analog circuit.	–
9	FOO	O 3A/I/F	Forcus equalizer output pin.	–
10	TRO	O 3A/I/F	Tracking equalizer output pin.	–
11	VREF	O 3A/I/F	Analog reference supply voltage pin.	Connected to the VRO and PVREF within the IC. To be connected 0.1 uF.
12	FMO	O 3A/I/F	Speed error/feed equalizer output pin.	PWM ternary output (AVDD3, GND, and VREF).
13	DMO	O 3A/I/F	Disc equalizer output pin.	
14	SBSY (SPCK)	O 3I/F	Pin for outputting the subcode block sync signal. It is “H” at position S1 when the subcode sync signal is detected. (CD Processor Status Read Clock (176.4 kHz) output)	“H” at S1 when Subcode Sync is detected.
15	SBOK (FOK) (CLK) (MBOV)	O 3I/F	Pin for outputting the CRCC check result of a subcode Q data check. It is “H” when the check result is OK. (Focus OK signal) (Input/output pin for the clock used in reading the subcode P to W data.) (CD Buffer memory overflow output)	–
16	IPF (SPDA)	O 3I/F	Correction flag output pin. “H” if the AOUT pin outputs an uncorrectable symbol in C2 correction. (CD Processor Status signal output)	–
17	SFSY (EMPH) (LOCK) (MONIT)	O 3I/F	Pin for outputting the playback frame sync signal. (Emphasis fiag output pin. ENPH on: “H”. EMPH off: “L”. The output polarity can be switched, using a command.) (LOCK signal) (Pin for monitoring signals in the DSP.)	7.35kHz (At this pin, flags in the DSP and PLL-circuit clock can be monitored, using microcontroller commands. The pin also outputs text data serially.)
18	ZDET (DATA) (COFS)	O 3I/F	Output pin for zero detection flag for the 1-bit DAC. (Pin for outputting subcode P to W data) (Error Correstion Frame Clock 7.35 kHz output)	Valid also for 1-bit DAC external inputs.
19	GPIN	I/O 3I/F	General-purpose I/O (DSP)	General-purpose I/O (input after a reset).
20	VSS1	–	1.5V grounding pin dedicated to the Digital circuit.	–
21	VDD1	–	1.5V supply voltage pin dedicated to the Digital circuit.	–
22	XVSS3	–	Grounding pin for the system clock oscillation circuit.	–
23	XI	I 3A/I/F	Input pin for the system clock oscillation circuit.	–
24	XO	O 3A/I/F	Output pin for the system clock oscillation circuit.	Input to the internal MCK.
25	XVDD3	–	3.3V supply voltage pin for the system clock oscillation circuit.	–
26	DVSS3	–	Grounding pin for the 1-bit DAC.	–
27	RO	O 3A/I/F	Output pin for normal R-channel data for the 1-bit DAC.	No capacitor is required at the DVR pin unless the built-in 1-bit DAC is used. 3.3V must be applied across the DVDD3 and DVSS3 pins, how-ever.
28	DVDD3	–	3.3V supply voltage pin for the 1-bit DAC.	
29	DVR	O	Reference voltage pin for the 1-bit DAC.	–
30	LO	O 3A/I/F	Output pin for normal L-channel data for the 1-bit DAC.	–
31	DVSS3	–	Grounding pin for the 1-bit DAC.	–
32	VSS3	–	3.3V grounding pin dedicated to the I/F circuit	–
33	VDD3	–	3.3V supply voltage pin dedicated to the I/F circuit.	–

Pin No.	Pin name	Pin name	Function	Remark
34	VDDM	–	1.5V supply voltage pin dedicated to the DSP/1Mbit SRAM circuit.	–
35	VSS1	–	1.5V groundind pin dedicated to the DSP/1Mbit SRAM circuit.	–
36	BUS0	I/O 3I/F	Data input/output pin for the microcontroller interface.	To be fixed at “H” or “L” when communication is not in progress, so that the pin will not become HiZ.
37	BUS1	I/O 3I/F		
38	BUS2	I/O 3I/F		
39	BUS3	I/O 3I/F		
40	BUCK	I 3I/F	Clock input pin for the microcontroller interface.	To be fixed at “H” when communication is not in progress, so that the pin will not become HiZ.
41	/CCE	I 3I/F	Chip enable signal input pin for the microcontroller interface. BUS3 to BUS0 are active if this pin is “L”.	To be connected to 0.1 uF.
42	/RST	I 3I/F	Reset signal input pin. The internal registers and servo section registers are reset, respectively, when the reset signal is “L” and on the positive-going edge of the reset signal.	
43	STBY	I 3I/F	STANDBY control pin dedicated to the DSP/1Mbit SRAM circuit.	
44	VDDT	–	3.3V supply voltage pin dedicated to the Digital I/O circuit.	–
45	FGIN	I 3AI/F	FG signal input pin for CAV. CLV: “L”. CAV: FG input.	–
46	IO0A (/HSO)	I/O 3I/F	Genelal-purpose input/output pins. (Pin for outputting the playback speed mode flag.)	Genelal-purpose I/O (input after a reset). The playback speed mode flag output can be switched, using command bits.
47	IO1A (/UHSO)	I/O 3I/F		
48	TESTD	I 3I/F	DSP/Test input pin. Usually fixed at “L”.	–
49	VSSP	–	1.5V grounding pin dedicated to the DSP/VCO circuit.	–
50	VCOI	O 1.5AI/F	PD output pin dedicated to the DSP/VCO circuit.	–
51	VDDP	–	1.5V supply voltage pin dedicated to the DSP/VCO circuit.	–
52	TESTC	I 3I/F	CD/Test input pin. Usually fixed at “L”.	–
53	PIO0	I/O 3I/F	General-purpose I/O (CD/DSP)	General-purpose I/O (input after a reset).
54	PIO1	I/O 3I/F	General-purpose I/O (CD/DSP)	
55	PIO2	I/O 3I/F	General-purpose I/O (DSP)	
56	PIO3	I/O 3I/F	General-purpose I/O (DSP)	
57	DOUT	O 3I/F	Digital-out output pin. Digital data for up to double speed can be output when a frequency of 16.9344 MHz is used.	As per CP-1201
58	AOUT	O 3I/F	Audio data output pin. Which bit is first (MSB first or LSB first) can be selected, using a command.	–
59	BCK	O 3I/F	Bit clock output pin. 32fs, 48fs, and 64fs can be selected, using a command.	Normal speed: 32fs = 1.4112 MHz
60	LRCK	O 3I/F	LR channel clock output pin. L for the L-channel and “H” for the R-channel. The output polarity can be inverted, using a command.	Normal speed: 44.1kHz
61	AIN	I 3I/F	1-bit DAC external input: AIN	1-bit DAC external input
62	BCKI	I 3I/F	1-bit DAC external input: BCKI	
63	LRCKI	I 3I/F	1-bit DAC external input: LRCKI	
64	VDD1	–	1.5V supply voltage pin dedicated to the DSP circuit.	
65	VSS1	–	1.5V grounding pin dedicated to the DSP circuit.	
66	AWRC	O 3AI/F	VCO control pin for active wide range.	Controllable in CLV/CAV.
67	PVDD3	–	3.3V supply voltage pin dedicated to the PLL circuit.	–
68	PDO	O 3AI/F	Pin for outputting a phase difference signal between the EFM signal and PLCK signal.	Quaternary output (PVDD3, HiZ, VSS, and PVREF).
69	TMAX	O 3AI/F	Pin for outputting the result of TMAX detection. The TMAX pin output the same signal.	Ternary output (PVDD3, VSS, and Hiz).

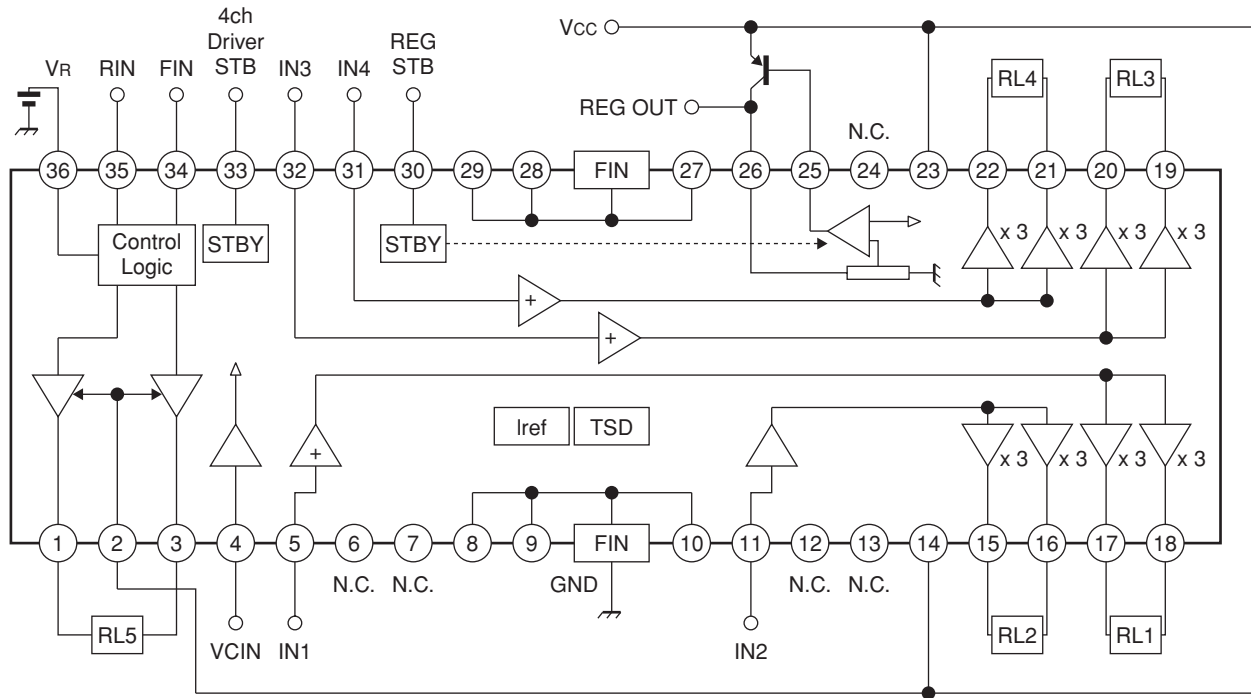
Pin No.	Pin name	I/O	Description	Remark
70	LPFN	I 3AI/F	Pin for receiving an inverted output of the PLL-circuit low-pass filter amp.	The resistance side is connected. See an applicable circuit diagram.
71	LPFO	O 3AI/F	Pin for the PLL-circuit low-pass filter amp output.	The capacitor side is connected. See an splicable circuit diagram.
72	PVREF	–	1.65V reference supply voltage pin dedicated to the PLL circuit.	Connected to the VREF and PVREF within the IC. A 0.1 uF capacitor is connected.
73	VCOF	O 3AI/F	VCO filter pin.	–
74	VCOREF	I 3AI/F	Input pin for the VCO center frequency reference level.	To be connected to the PVREF if the AWRC is not used.
75	PVSS3	–	3.3V grounding pin dedicated to the PLL circit.	–
76	SLCO	O 3AI/F	EFM slice level output pin. For both analog and digital slice modes, the output impedance = 2.5 k-ohms.	A capacitor to be connected is selected according to the servo operation band.
77	RFI	I 3AI/F	RF signal input pin. The input resistance can be selected, using a command.	Zin: 20 k-ohms, 10 k-ohms, 5 k-ohms
78	RFRPI	I 3AI/F	RF ripple signal input pin.	–
79	RFEQO	O 3AI/F	RF equalizer circuit output pin.	To be connected to the RFRPI via 0.1 uF and to the RFI via 4700 pF or higher.
80	RESIN	I 3AI/F	Pin for connecting a reference current generating resistance.	To be connected to 22 k-ohms and 680 pF in parallel.
81	VRO	O 3AI/F	1.65V reference voltage output pin.	Connected to the VREF and PVREF within the IC To be connected to 0.1uF anf 100 uF.
82	VMDIR	–	Reference voltage poutput pin for the APC circuit.	To be connected to 0.1uF.
83	TESTR	O 3AI/F	LPF pin for RFEQO offset correction.	To be connected to 0.015 uF or higher.
84	INVSEL	I 3AI/F	Test pin, usually fixed at “L”.	–
85	AGCI	I 3AI/F	Pin for RF signal amplitude adjustment amp input.	–
86	AGCI	I 3AI/F	RF signal peak detsection input pin.	–
87	RFO	O 3AI/F	RF signal generation amp output pin.	To be connected directly to the RFDCI. To ne connected to the AGCI via 0.1 uF.
88	PNSEL	I 3AI/F	Test pin, usually fixed at “H”.	
89	EQSET	O 3AI/F	External connection pin for the RF signal equalizer.	To be kept open when the RFEQ is used.
90	RVDD3	–	3.3V supply voltage pin for the Rfamp core section.	–
91	LDO	O 3AI/F	Laser diode amp output pin.	
92	MDI	I 3AI/F	Monitor photodiode amp input pin.	Reference to 178 mV (typ.)
93	RVSS3	–	3.3V grounding pin for the RF amp core section.	–
94	FNI2	I 3AI/F	Main beam input pin. Connected to PIN diode C.	–
95	FNI1	I 3AI/F	Main beam input pin. Connected to PIN diode A.	–
96	FPI2	I 3AI/F	Main beam input pin. Connected to PIN diode D.	–
97	FPI1	I 3AI/F	Main beam input pin. Connected to PIN diode B.	–
98	TPI	I 3AI/F	Subbeam input pin. Connected to PIN diode F.	–
99	TNI	I 3AI/F	Subbeam input pin. Connected to PIN diode E.	–
100	FTE	O 3AI/F	Focus /tracking signal output. (Test pin for servo characteristic measurement.)	Switchable using a command.

Note: “3AI/F : 3V circuit analog input/output pin.”  
“3I/F : 3V circuit digital input/output pin.”  
“1.5AI/F : 1.5V circuit analog input/output pin.”

**IC22 : TA2125 (MAIN P.C.B)**

Motor driver

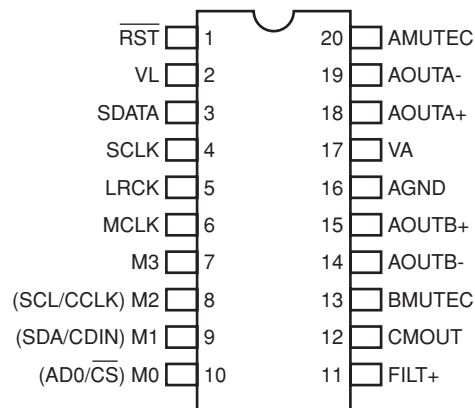
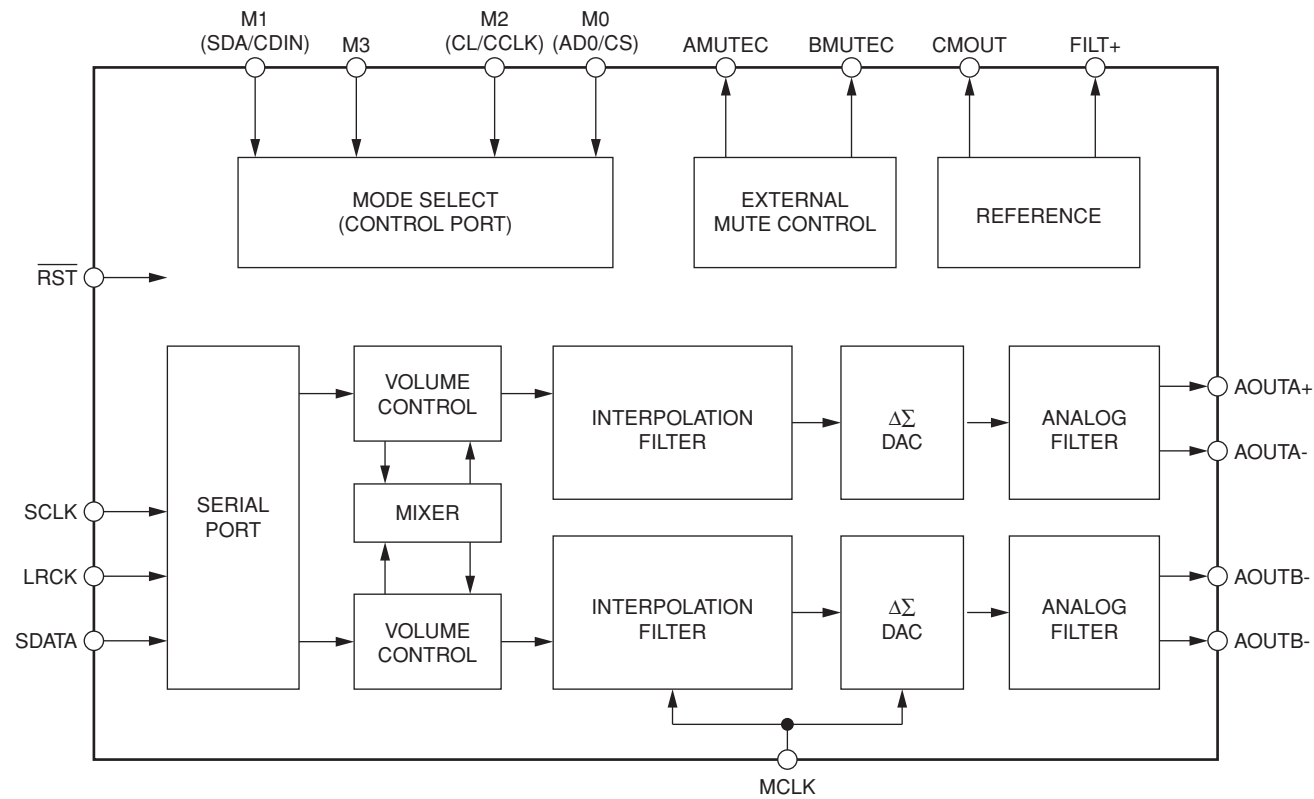
\* No replacement part available.



No.	Symbol	Function	
1	OUT5A	Output terminal	H-bridge
2	VM	Supply voltage terminal for Logic	H-bridge
3	OUT5B	Output terminal	H-bridge
4	VCIN	Input reference voltage	4ch BTL
5	IN1	Input for ch1	4ch BTL
6	N.C.	Open	—
7	N.C.	Open	—
8	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
9	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
10	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
11	IN2	Input for ch2	4ch BTL
12	N.C.	Open	—
13	N.C.	Open	—
14	VCC1	Supply voltage terminal for ch 1/ch2	4ch BTL
15	OUT2M	Inverted output for ch2	4ch BTL
16	OUT2P	Non-inverted output for ch2	4ch BTL
17	OUT1M	Inverted output for ch1	4ch BTL
18	OUT1P	Non-inverted output for ch1	4ch BTL
19	OUT3P	Non-inverted output for ch3	4ch BTL
20	OUT3M	Inverted output for ch3	4ch BTL
21	OUT4P	Non-inverted output for ch4	4ch BTL
22	OUT4M	Inverted output for ch4	4ch BTL
23	VCC2	Supply voltage terminal for ch3/ch4	4ch BTL
24	N.C.	Open	—
25	REG OUT	Connection with BASE of PNP Tr	Regulator
26	REG OUT	Output for regulator (5V)	Regulator
27	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
28	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
29	N.C.	8, 9, 10, 27, 28, 29 are connected to PW GND (FIN)	—
30	REG STBY	Standby control for regulator	Regulator
31	IN4	Input for ch4	4ch BTL
32	IN3	Input for ch3	4ch BTL
33	STBY	Standby control for 4ch BTL	4ch BTL
34	FIN	Logic control input	H-bridge
35	RIN	Logic control input	H-bridge
36	VR	Supply voltage terminal for motor driver	H-bridge

IC71 : CS4392 (MAIN P.C.B)  
DAC

\* No replacement part available.



No.	Symbol	Function
1	RST	Reset (Input) - Powers down device and resets all internal registers to their default settings.
2	VL	Logic Power (Input) - Positive power for the digital input/output.
3	SDATA	Serial Audio Data (Input) - Input for two's complement serial audio data.
4	SCLK	Serial Clock (input/output) - Serial clock for the serial audio interface.
5	LRCK	Left Right Clock (Input/output) - Determines which channel, Left or Right, is currently active on the serial audio data line.
6	MCLK	Master Clock (Input) -Clock source for the delta-sigma moudukafor and digital filters.
11	FILT+	Positive Voltage Reference (Output) - Positive reference voltage for the internal sampling circuits.
12	CMOUT	Common Mode Voltage (Output) - Filter connection for internal quiescent voltage.
20	AMUTEC	Mute Control (output) - The Mute Confrol pin goes high during power-up initialization, reset, muting, power-down or if the master clock to left/right clock frequency ratio is incorrect.
13	BMUTEC	
14	AOUTB-	Differential Analog Output (Outputs) - The full scale differential analog output level is specified in the Analog Characteristics specification table.
15	AOUTB+	
18	AOUTA+	
19	AOUTA	
16	AGND	Ground (Input)
17	VA	Analog Power (Input) - Positive power for the analog section.

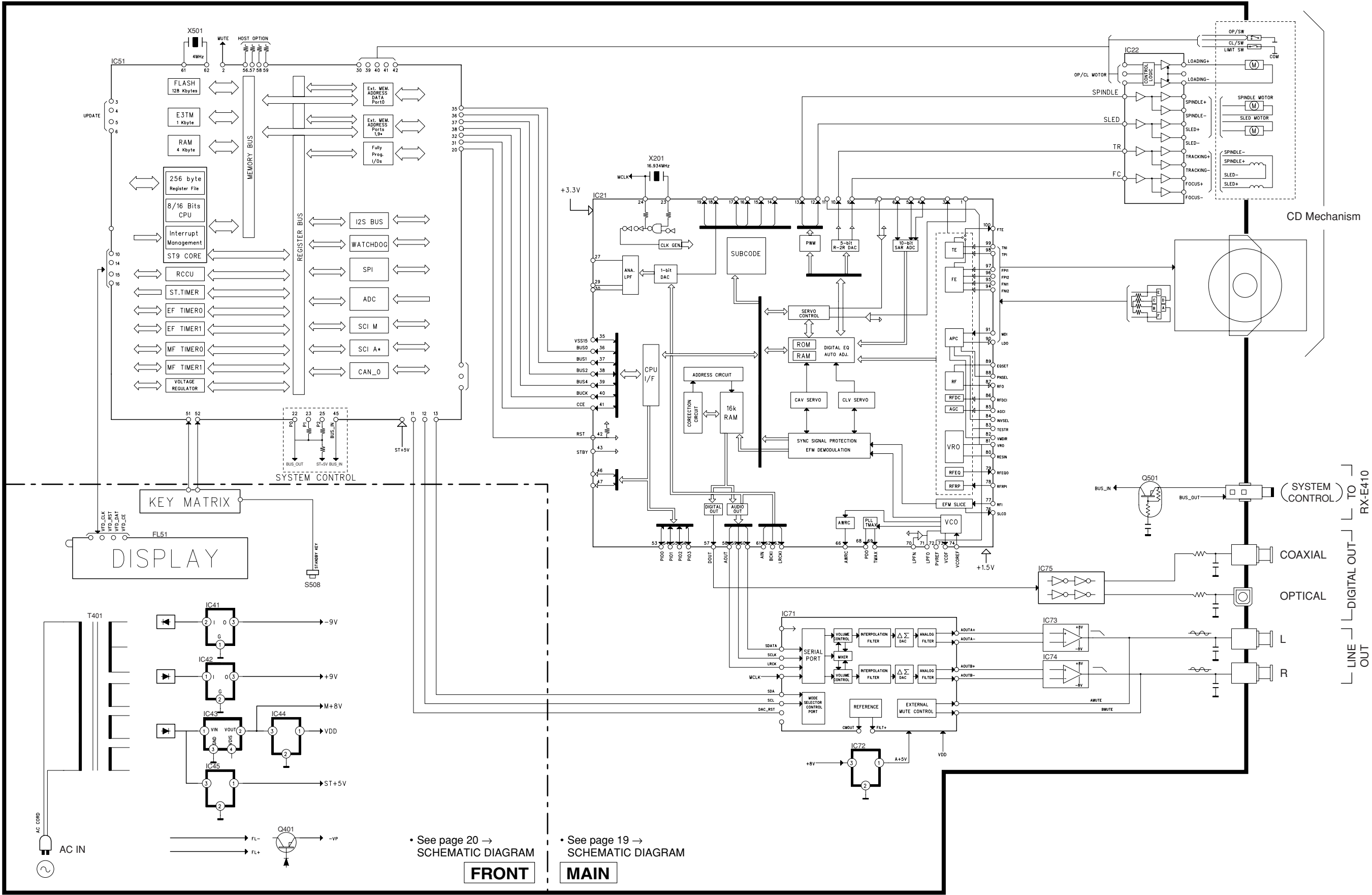
Control Port mode Definitions

No.	Symbol	Function
7	M3	Mode Selection (Input) -This pins should be tied to GND level during control port mode.
8	SCL/CCLK	Serial Control Port Clock (input) - Serial clock for the serial control port.
9	SDA/CDIN	Serial Control Data (input/output) - SDA is a data I/O line in I <sup>2</sup> C mode.CDIN is the input data line for the control port interface in SPI mode.
10	AD0/ $\overline{\text{CS}}$	Address Bit 0 (I <sup>2</sup> C) / Control Port Chip Select (SPI) (Input/Output) - AD0 is a chip address pin in I <sup>2</sup> C mode, $\overline{\text{CS}}$ is the chip select signal for SPI format.

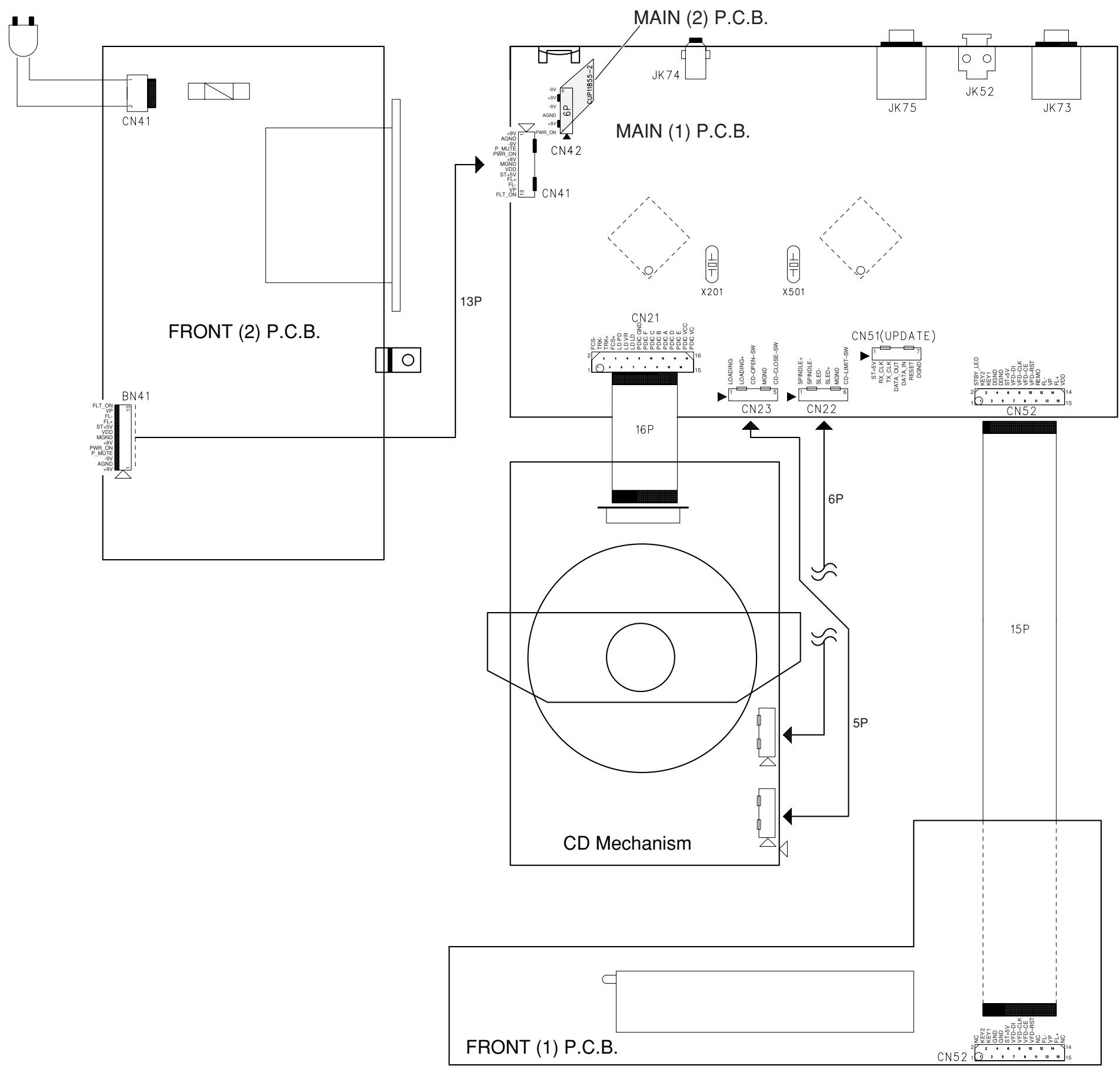
Stand-Alone Mode Definitions

No.	Symbol	Function
7	M3	Mode Selection (Input) - Determines the operational mode of the device.
8	M2	
9	M1	
10	M0	

■ BLOCK DIAGRAM



WIRING DIAGRAM



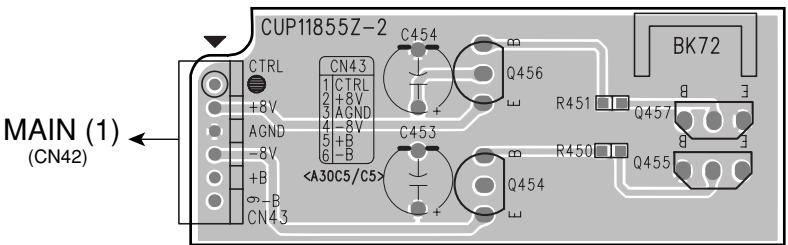
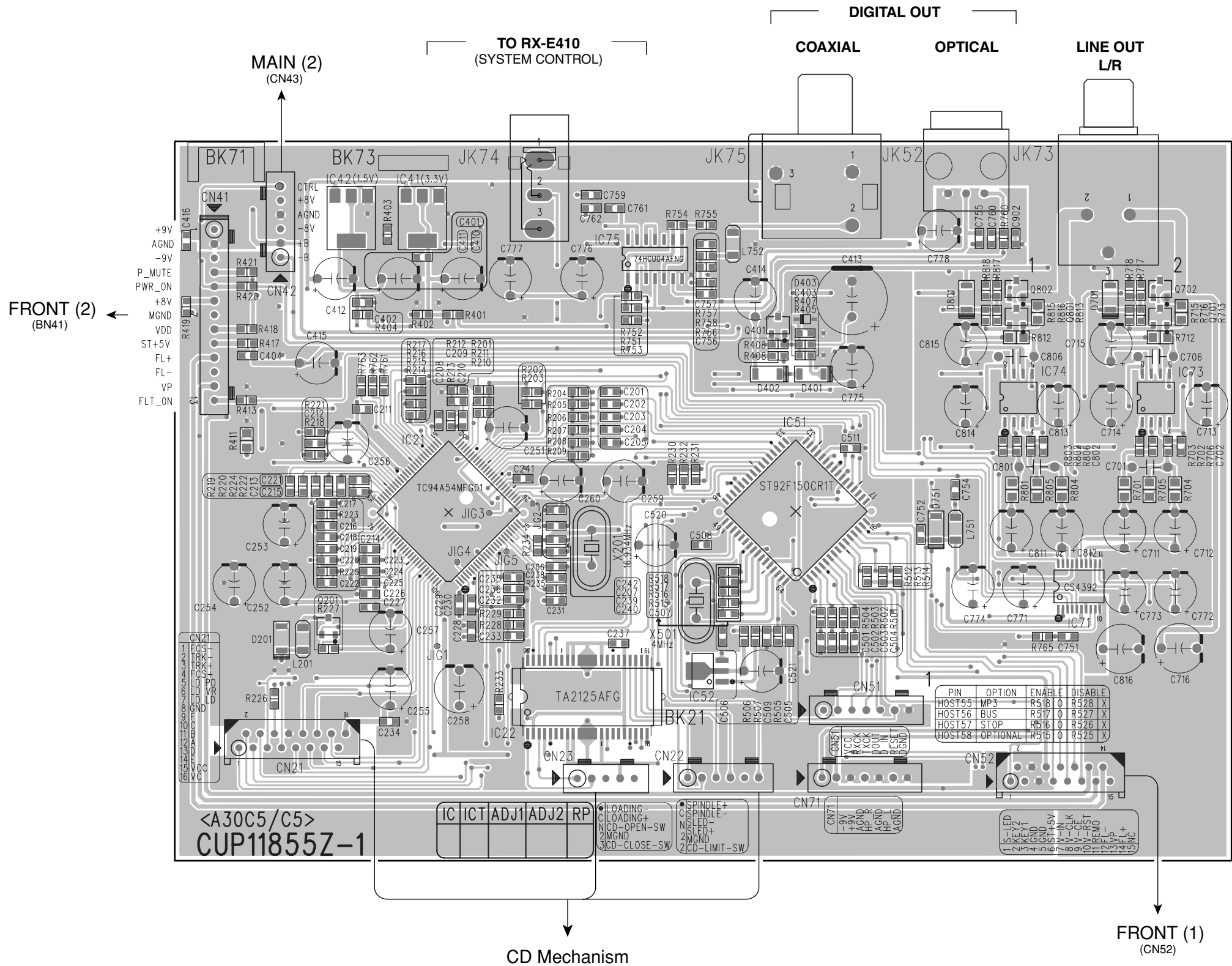


PRINTED CIRCUIT BOARDS

FOR INFORMATION ONLY (NO SERVICE PARTS WILL BE AVAILABLE)

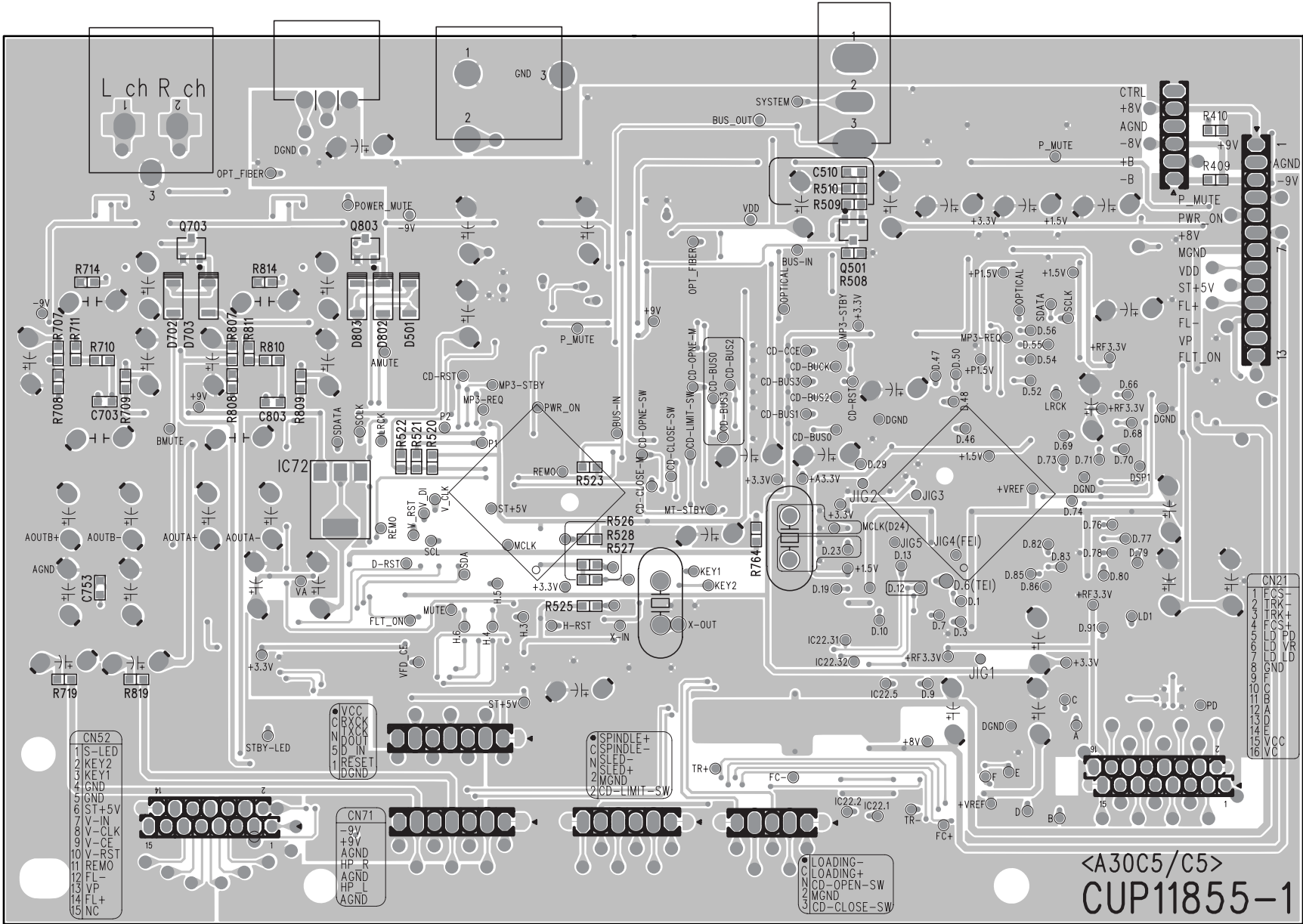
MAIN (1) P.C.B. (Top view)

MAIN (2) P.C.B. (Top view)

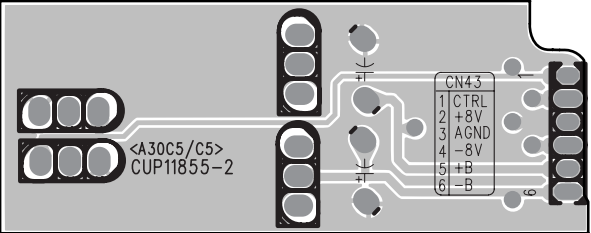




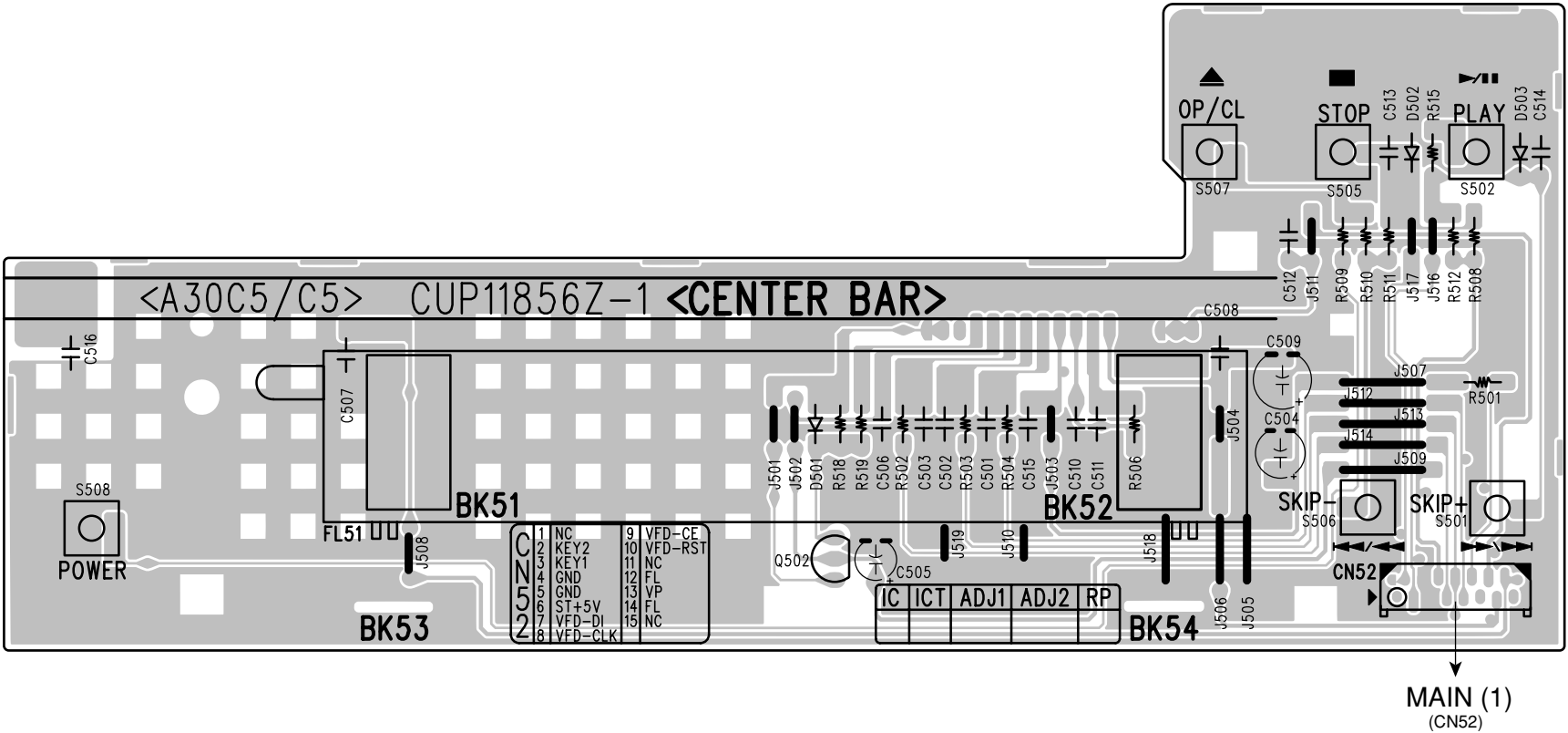
**MAIN (1) P.C.B.** (Bottom view)



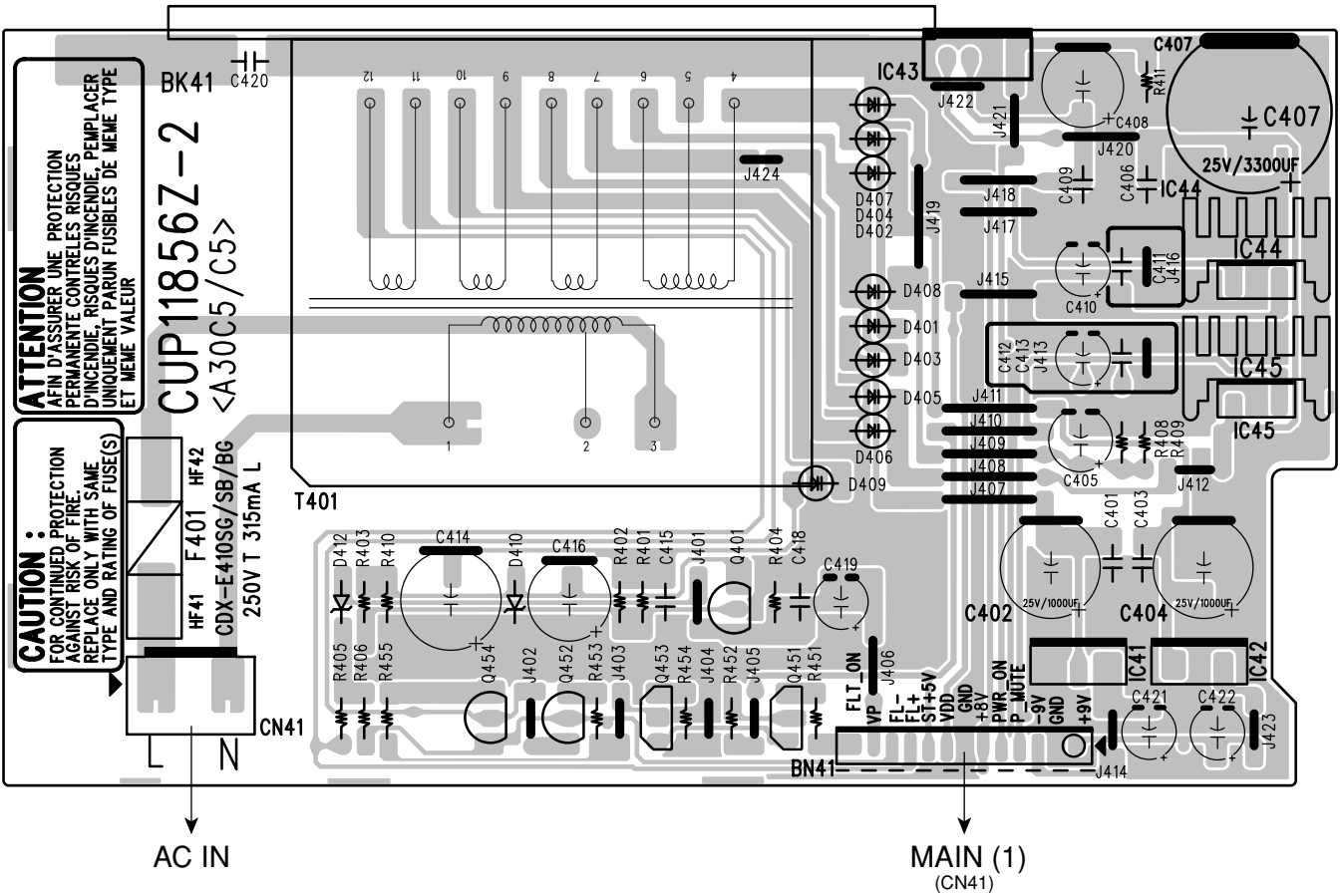
**MAIN (2) P.C.B.** (Bottom view)



FRONT (1) P.C.B. (Top view)



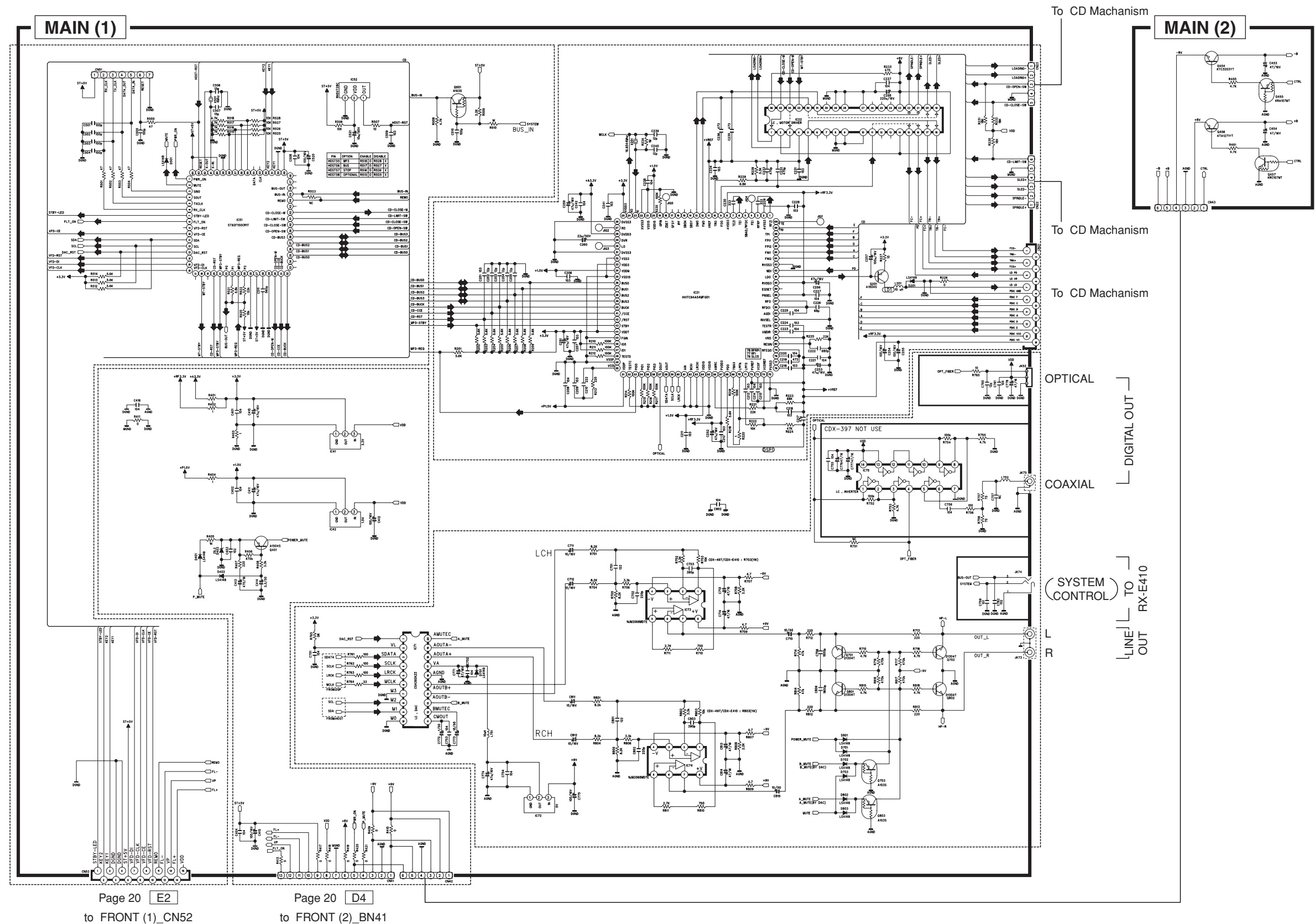
FRONT (2) P.C.B. (Top view)



## ■ SCHEMATIC DIAGRAMS

**FOR INFORMATION ONLY (NO SERVICE PARTS WILL BE AVAILABLE)**

## MAIN



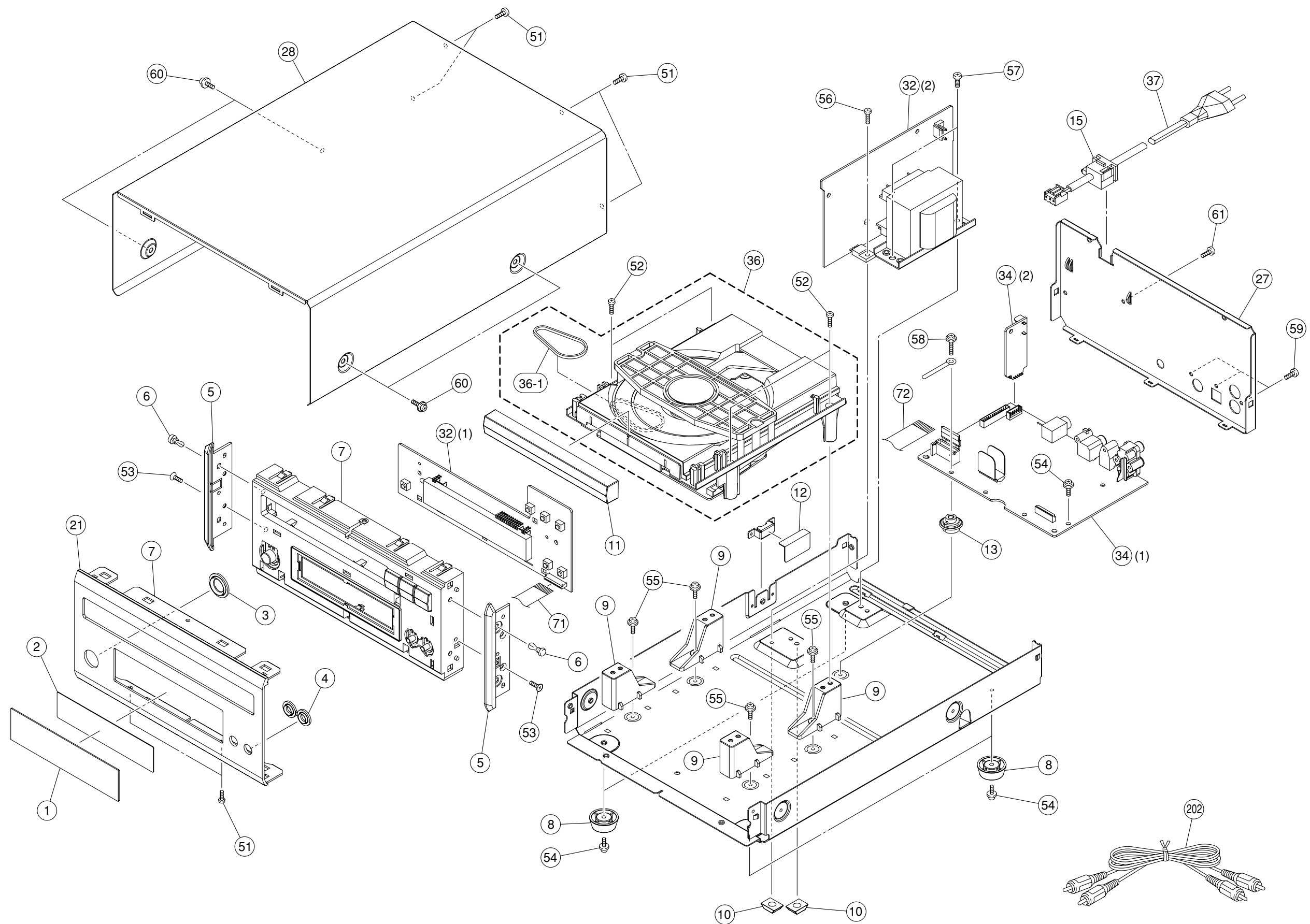
- ★ Components having special characteristics are marked  and must be replaced with parts having specifications equal to those originally installed.
- ★ Schematic diagram is subject to change without notice.



MEMO

MEMO




## ■ REPLACEMENT PARTS LIST





**WARNING**

- Components having special characteristics are marked  and must be replaced with parts having specifications equal to those originally installed.

Ref. No.	Part No.	Description	Remarks	Markets
* 1	AAX79150	FL WINDOW	CGU1A390Z	
* 2	AAX79160	FL SHEET	CMZ1A114Z	
* 3	AAX79300	KNOB ORNAMENT	BL, STANDBY/ON CGR1A388K128	
* 3	AAX74080	KNOB ORNAMENT	SI, STANDBY/ON CGR1A388M7G5	
* 4	AAX79310	KNOB ORNAMENT	BL, SKIP/SEARCH CGR1A396K128	
* 4	AAX79320	KNOB ORNAMENT	SI, SKIP/SEARCH CGR1A396M7G5	
* 5	AAX79230	SIDE PLATE	CGR1A395	
* 6	AAX79360	PUSH RIVET	KRE1A005	
* 7	AAX79240	SUB PANEL ASS'Y	BL CGWCDXE410B	
* 7	AAX79250	SUB PANEL ASS'Y	SI CGWCDXE410S	
* 8	AAX74300	FOOT	CKL1A191	
* 9	AAX79140	CD MECHANISM SUPPORT	CMH1A254	
* 10	AAX73640	RUBBER	CHG1A113	
* 11	AAX79280	TRAY LID (DOOR ORNAMENT)	BL CGR1A394K128	
* 11	AAX79290	TRAY LID (DOOR ORNAMENT)	SI CGR1A394M7G5	
* 12	AAX79190	P.C.B. INSULATOR	CMX1A183	
* 13	AAX73910	P.C.B. SUPPORT	CHE170	
* 15	AAX73380	CORD STOPPER	KHR1A028	
* 21	AAX79350	FRONT PANEL	BL CKM1A175ZC59	
* 21	AAX79340	FRONT PANEL	SI CKM1A175ZC54	
* 27	AAX79370	REAR PANEL	CKF1A309Z	
* 28	AAX79260	TOP CABINET	BL CKC1A171B11	
* 28	AAX79270	TOP CABINET	SI CKC1A171G42	
*  32	AAX79170	P.C.B. ASS'Y	FRONT COP11856B	
* 34	AAX79180	P.C.B. ASS'Y	MAIN COP11855D	
* 36	AAX73190	CD MECHANISM	CJDKSL2130CCM	
* 36-1	AAX78500	BELT	9A07980900	
*  37	AAX78690	POWER CABLE	2m CJA2E086ZA	B
*  37	AAX74310	POWER CABLE	2m CJA2B043ZA	G
* 51	AAX73510	BIND HEAD B-TIGHT SCREW	BL 3x8 MFZN2B3 CTB3+8JFZ	
* 51	AAX73500	BIND HEAD B-TIGHT SCREW	SI 3x8 MFZN2W3 CTB3+8JFC	
* 52	AAX73540	BIND HEAD P-TIGHT SCREW	3x10 MFZN2Y CTB3+10G	
* 53	AAX79380	FLAT HEAD B-TIGHT SCREW	3x8 MFZN2Y CTS3+8J	
* 54	AAX79200	PW HEAD B-TIGHT SCREW	3x6 MFZN2Y CTW3+6J	
* 55	AAX73340	PW HEAD B-TIGHT SCREW	3x8 MFZN2Y CTW3+8J	
* 56	AAX74120	BIND HEAD B-TIGHT SCREW	3x8 MFZN2W3 CTB3+8J	
* 57	AAX73570	BIND HEAD SCREW	4x6 MFZN2Y CTB4+6F	
* 58	AAX74100	BIND HEAD B-TIGHT SCREW	3x12 MFZN2W3 CTB3+12J	
* 59	AAX73510	BIND HEAD B-TIGHT SCREW	3x8 MFZN2B3 CTB3+8JFZ	
* 60	AAX79220	PW HEAD B-TIGHT SCREW	BL 3x6 MFZN2B3 CTW3+6JFZ	
* 60	AAX79210	PW HEAD B-TIGHT SCREW	SI 3x6 MFZN2W3 CTW3+6JFC	
* 61	AAX79330	BIND HEAD B-TIGHT SCREW	3x6 MFZN2B3 CTB3+6JFZ	
* 71	AAX79920	FLEXIBLE FLAT CABLE	15P 220mm P=1mm CWC4F4A15A220A	
* 72	AAX79910	FLEXIBLE FLAT CABLE	16P 140mm P=1mm CWC4F2A16A140B	
202	AAX78310	ACCESSORY AUDIO PIN CABLE	2P 1.5m 1pc CJS4N001Y	

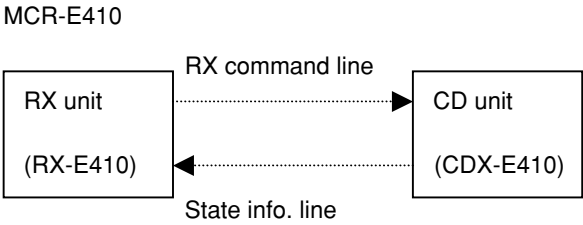
\* New Parts

SYSTEM CONTROL

1. External Bus

1.1. Physical format of external bus

It is composed of 2 bus lines.



1.2. Format of RX command

RX command is the request of RX to CD unit and the operation button code for CD. Both are expressed by the remote control code of the NEC format. And the signal wave form is the demodulated signal of remote control IR signal.

1.3. Format of state info.

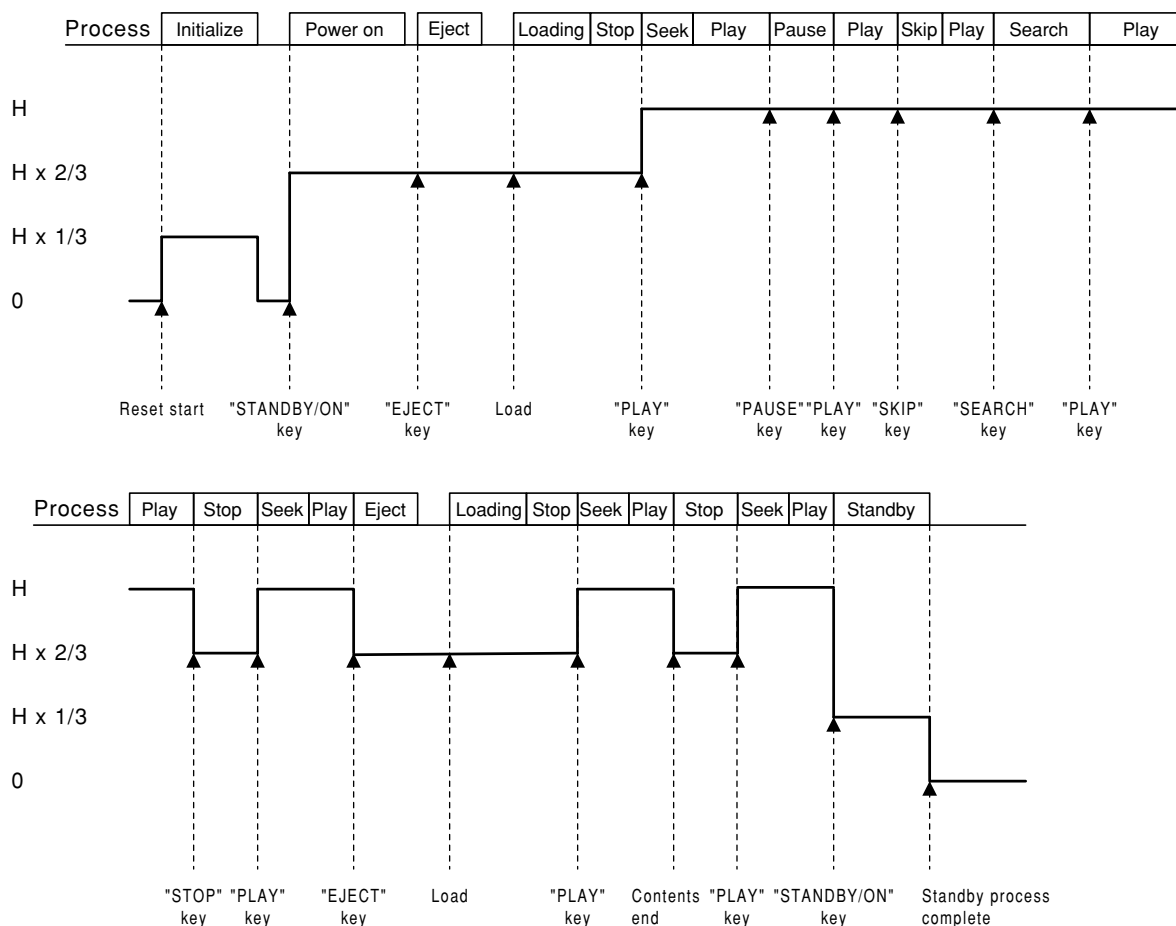
State info. is the state information of CD and expressed by the DC voltage level.

Name	DC voltage level	Content
PORT_PLAY	H	The period between from playback operation to stop factor generation. Playback operation: "PLAY" key operation, disc tray hand push close Stop factor: "STOP", "EJECT", "STANDBY/ON" key operation Playback contents end Failsafe stop by abnormal detection
PORT_STOP	H x 2/3	Power on state other than PORT_PLAY state
PORT_PRE_STANDBY	H x 1/3	The period between from standby operation to standby process completion and from CD reset start to initialize process completion
PORT_STANDBY	0	Standby state after standby process completion

H: Microprocessor Vcc level



Example:



Note: The details or some limitations regarding the change of player status need the extra discussion.

## 2. Command and Operation Key Code

The system command and the system remote control code described as follows are transmitted through RX command bus.

### 2.1 RX request command

Name	Code	Function
POWER_ON	78-7E	Power on request
POWER_OFF	78-7F	Standby request
PLAY	78-02	Playback request
STOP	78-01	playback stop request
DIMMER_ON	78-FE	Display dimmer(decrement of brightness) request
DIMMER_OFF	78-FF	Cancel display dimmer
VFD_OFF	78-FD	VFD turn off request

RX request command is not transmitted if CD is already in the state that RX requests.

### 2.2 Operation key code

The following operation key codes are transmitted from RX unit to CD unit when user operate the system remote control unit.

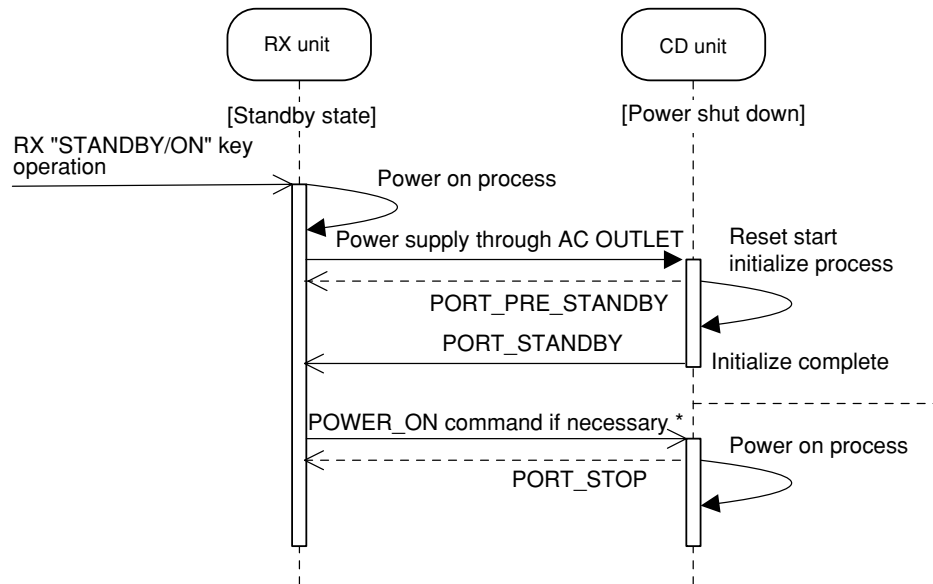
CODE		Function name
Custom	Data	
78	01	STOP
	02	PLAY
	B9	PAUSE
	03	SKIP/SCAN +
	04	SKIP/SCAN -
	07	RANDOM
	0A	TIME/INFO
	0B	PROGRAM
	0C	REPEAT
	10	Numeric "0"
	11	"1"
	12	"2"
	13	"3"
	14	"4"
	15	"5"
	16	"6"
	17	"7"
	18	"8"
	19	"9"
	8E	UP (FOLDER+)
	8F	DOWN (FOLDER-)
	9E	RIGHT (FILE+)
	9F	LEFT (FILE-)
	C1	ENTER
		TEST

### 3. Command Communication for System Function

#### 3.1 Power on

##### (1) Power on by RX "STANDBY/ON" key operation

RX turns on the power by RX "STANDBY/ON" key and at the same time CD also turns on the power if CD state is power on at the last RX power on.

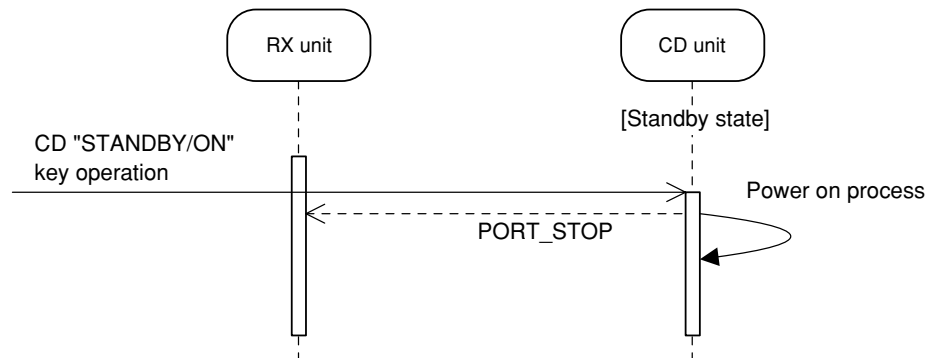


\* RX transmits POWER\_ON command if CD state at the last RX power on is power on.

##### (2) Power on of individual unit by each "STANDBY/ON" key operation

In the system power on, the each unit can be changed into standby and then into power on again by the "STANDBY/ON" key operation of the unit.

When the power supply of the unit is individually supplied, only the unit can turn on the power by operating "STANDBY/ON" key of an individual unit even in system standby.

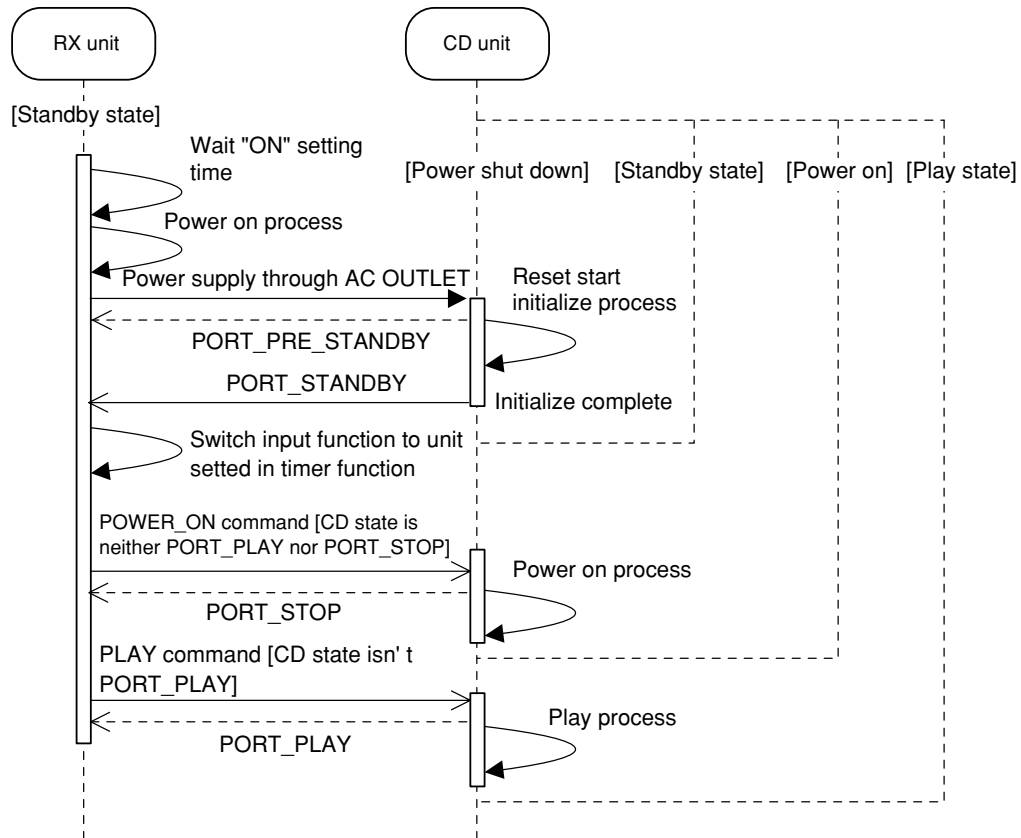


### 3.2 Timer function

The unit set in this RX timer function is played back at the setting time as the ON-TIME.  
It functions even when at set time the system is already in power on state or the unit is already played back.

#### (1) Timer play

The state is not changed if the set unit is already in the state of playback.



After sending POWER\_ON command, if CD unit has Auto-play function after power-on, RX will not send PLAY command.

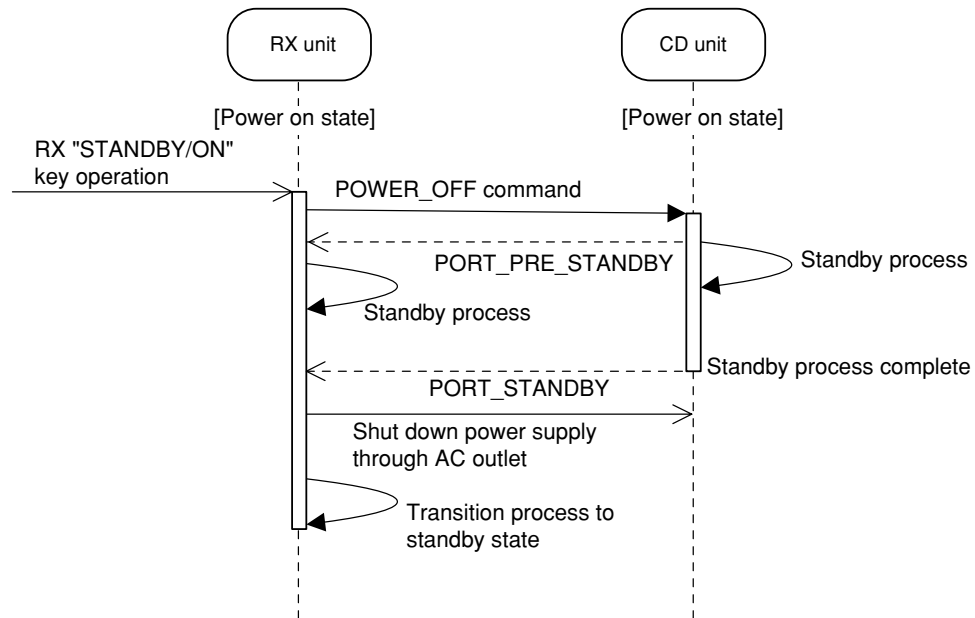
### 3.3 Standby (power off)

#### (1) System standby

The power supply through AC outlet of RX is shut down in system standby (power off).

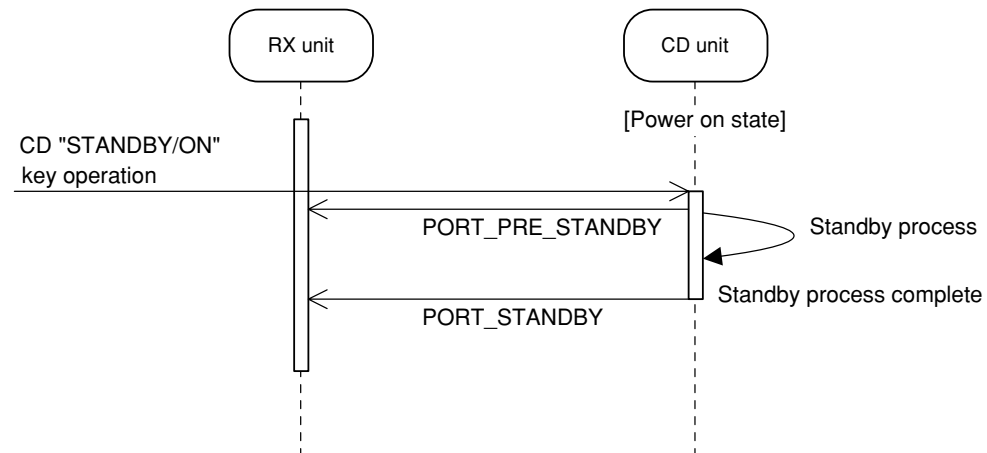
The microcomputer of the unit connected with AC outlet of RX cannot work after system power off.

When there is processing that should be finished before the system power off, the system is turned power off after such processing completion.



#### (2) Unit standby (power off)

Each unit can be individually standby (power off) with an individual "STANDBY/ON" key of each unit.

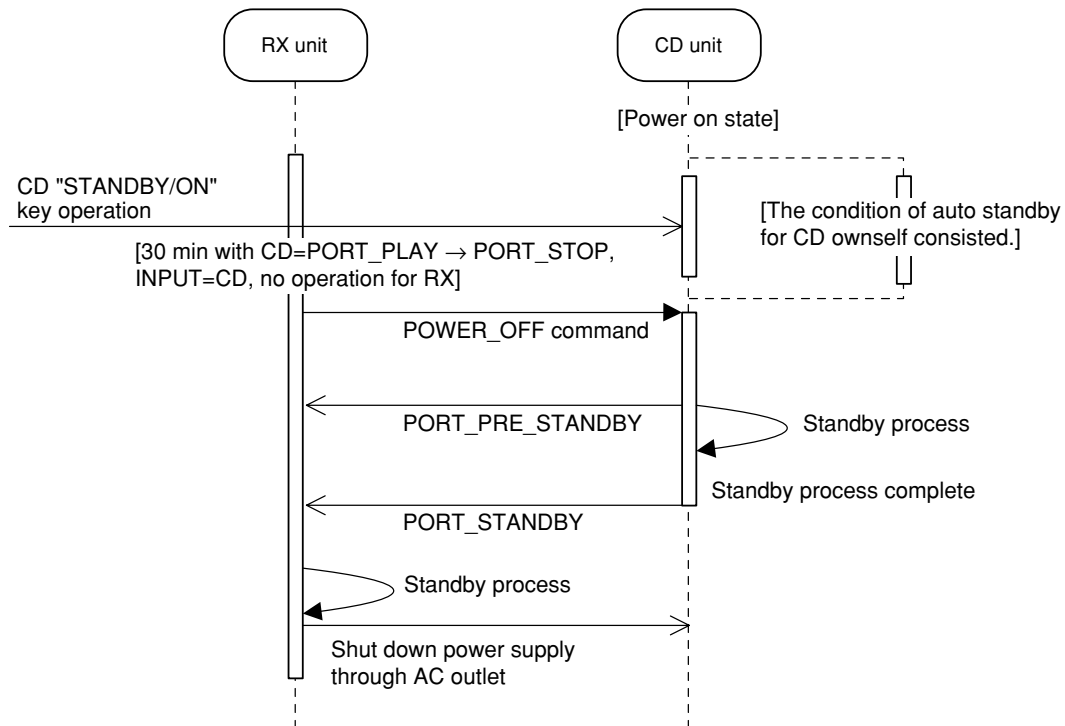


**(3) Auto standby (power off)**

When 30 minutes pass with the following conditions consisted, the system turns off the power (standby) automatically.

- a. The unit connected with an external bus is in the standby state.
- b. RX input function is CD.
- c. RX is not operated

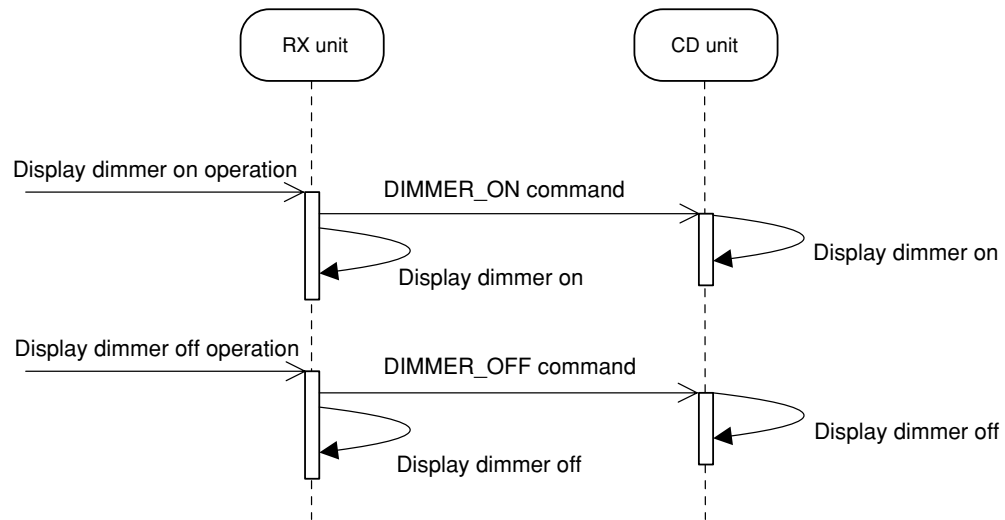
CD might turn off the power by own auto standby function.



### 3.4 Display control

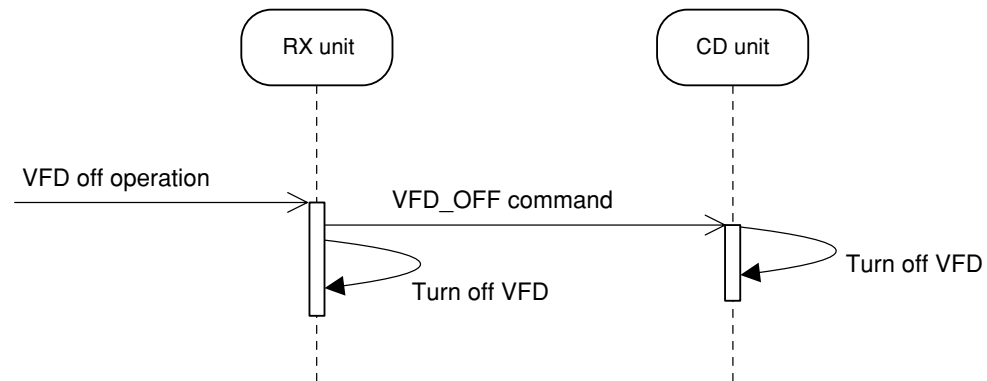
#### (1) Display dimmer function

This is the function to change the brightness of CD's display by operating RX.



#### (2) Turn off VFD

This is the function to turn off VFD.



Exit: RX sends DIMMER\_ON or DIMMER\_OFF command, and then CD unit turn on VFD with the appropriate dimmer value.

# CDX-E410

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**YAMAHA**

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