Training AV amplifiers

SC-LX90

- Practical repair guide -

Created by Roel Donckers

Contents:

RELATED DOCUMENTS	*v. 1.01*
Service manuals	**User Manuals**
SC-09TX	SC-LX90
RRV3708	*ARB7386*
SC-09TX	
RRV3711	

1. INTRODUCTION
1.1 Product lineup

	Regular	Mid end	High end	Top end
2008	VSX-418 VSX-818V VSX-918V	VSX-1018AH VSX-LX51	SC-LX71 SC-LX81	SC-LX90
2007	VSX-417 VSX-817 VSX-917V	VSX-1017AV VSX-LX50	VSX-LX60 VSX-LX70	
2006	VSX-416 VSX-516 VSX-916	VSX-1016V VSX-2016AV	VSX-AX2AS VSX-AX4ASi	
2005	VSX-415 VSX-515 VSX-915	VSX-1015	VSX-AX2AV VSX-AX4AVi	
2004	VSX-D514 VSX-D714 VSX-D814	VSX-1014 VSX-2014i	VSX-AX5Ai	VSA-AX10Ai

This product overview shows all Pioneer AV amplifiers of the last 5 years. Notice that 3 years long, there was no top end amplifier in the lineup. This year, after 4 years development, the SC-LX90 is the new flagship.

By the product names you can recognize basic features as there is a certain naming convention:

…A   Advanced 9ch MCACC available
…i   i-link input available
…V   HDMI input (optional conversion from analalogue input to analogue output).
…H   Conversion from analogue input to digital output available.
…S   Conversion from analogue input to analogue/digital output with resolution up
         scaling available.
Model suffixes are not applicable to LX models (i.e. VSX-LX50, SC-LX71, …).

1.2 Product specifications
1.2.1 Digital Video Converter (DVC)

Some AV amplifiers have the possibility to convert input signals to another type of output signal. This way, it can be possible, for example, to connect a DVD player to component, a game console to composite and only use the composite output to view either DVD or game console. This makes a large setup easier to connect. This conversion is done internally by the DVC (Digital Video Converter) and the capabilities are depending on the AV amplifier model. These are the different types of Digital Video conversion available:

No Video converter

Inputs   Monitor outputs

Composite

Applicable models:
VSX-415   VSX-416   VSX417   VSX-418
VSX-515   VSX-516

No Video converter

Inputs   Monitor outputs

Component

Composite

Applicable models:
VSX-817

No Video converter

Inputs   Monitor outputs

HDMI

Component

Composite

Applicable models:
VSX-818V
VSX-918V

No Video converter

Inputs   Monitor outputs

Component

S Video

Composite

Applicable models:
VSX-916
VSX-1015
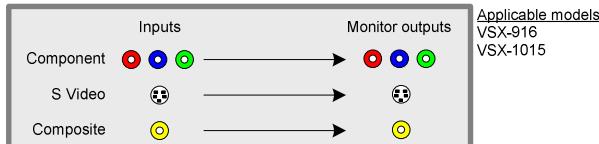
Analogue to Analogue video converter

Inputs   Monitor outputs

HDMI

Component

S Video

Composite

Applicable models:
VSX-917V
VSX-1016V   VSX-1017AV
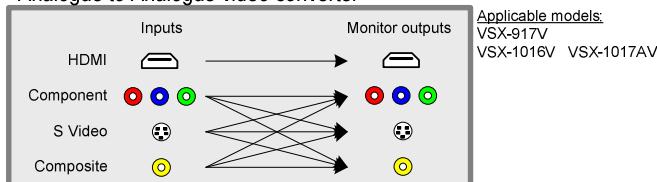
Analogue to Digital video converter

Inputs   Monitor outputs

HDMI

Component

S Video

Composite

Applicable model:
VSX-1018AH

Analogue and Digital video converter

Inputs   Monitor outputs

HDMI

Component

S Video

Composite

Applicable models:
VSX-2016AV
VSX-LX50
VSX-AX2AV
VSX-AX4AVi
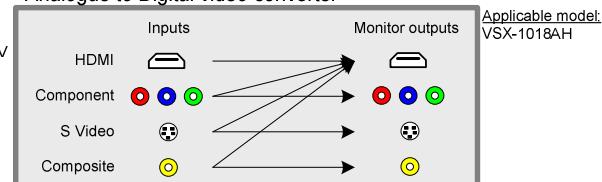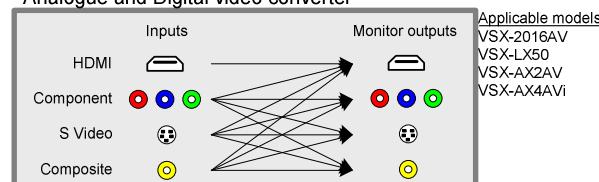
Analogue and Digital video converter + scaler

Inputs   Monitor outputs

HDMI

Component

S Video

Composite

Applicable models:
VSX-AX2AS
VSX-LX51
VSX-AX4ASi
VSX-LX60
VSX-LX70
VSX-LX71
SC-LX90
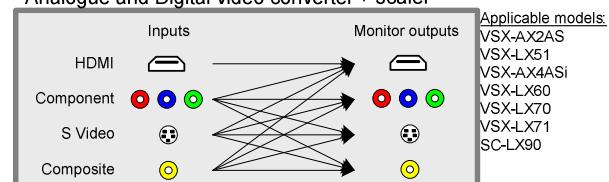
⚠ Pioneer amplifiers can't convert HDMI input to an analogue output: Main reason is that analogue outputs can't carry HDCP copy protection. So converting HDMI to analogue would mean removing HDCP. This is not allowed and therefore Pioneer amplifiers can't do this conversion.

1.2.2 Return to factory settings

When audio and video settings all need to be reset (typically when the AV amplifier is sold to another owner, or when a customer has fiddled with the settings to the point that there is no sound anymore), you can reset all setting to factory default. This is done using the front controls:

SC-LX90 / VSX-LX70 / VSX-LX60:
1. Switch the amplifier into standby
2. While holding down "SETUP" button on the front panel, press "STANDBY/ON"
3. Press the "ENTER" button on the front panel.
4. Select "RESET" using ← / →, then press "ENTER". The display shows "RESET? OK"
5. Press "ENTER" to confirm. "OK" appears in the display to indicate that the amplifiers has been reset.

VSX-LX50 / VSX-LX1017AV / VSX-917V / VSX-817 / VSX-417:
1. Switch the amplifier into standby
2. While holding down "TONE" button on the front panel, press "STANDBY/ON" for about 3 seconds.
3. Press the "ENTER" button on the front panel.
4. The display shows "RESET OK?"
5. Press "SYSTEM SETUP" to confirm. "OK" appears in the display.

VSX-AX4ASi / VSX-AX2AS / VSX-AX4AVi / VSX-AX2AV
1. Switch the amplifier into standby
2. While holding down "AV PARAMETER" button on the front panel, press "STANDBY/ON" for about 3 seconds.
3. Press the "ENTER" button on the front panel.
4. The display shows "RESET OK?"
5. Press "SETUP" to confirm. "OK" appears in the display.

1.2.3 Speaker impedance setting

With all class AB amplifiers (VSX-xxx) you're recommended to use 8Ω speakers. If you want to use 6Ω speakers, you need to change a system setting.
With all ICEpower amplifiers (SC-xxx), you can use speaker impedance from 6Ω to 16Ω without changing a system setting.

SC-LX90 / SC-LX81 / SC-LX71
Not applicable

VSX-LX70 / VSX-LX60
1. Switch the amplifier into standby
2. While holding down "SETUP" button on the front panel, press "STANDBY/ON"
3. Select "SPEAKER" using up / down, then select "6Ω" or "8Ω".

VSX-LX50 / VSX-1018AH / VSX-LX1017AV / VSX-917V / VSX-817
1. Switch the amplifier into standby
2. While holding down "SPEAKERS" button on the front panel, press "STANDBY/ON"
3. The setting will have changed between "SP 6 OHM" and "SP 8 OHM".

VSX-417
1. Switch the amplifier into standby
2. While holding down "QUICK SETUP" button on the front panel, press "STANDBY/ON"
3. The setting will have changed between "SP 6 OHM" and "SP 8 OHM".

1.2.4 Specifications overview

Year	Model	Available in black	Available in silver	Available in gold	MCACC (5EQ)	Advanced MCACC (9EQ)	OSD output CVBS	OSD output S-video / Compo	OSD output HDMI	multi room (Speaker B)	multi source (Zone 2)	HDMI switching	HDMI audio decoding	Analogue to HDMI conversion	HDMI resolution upscaling	Analogue video conversion	Dolby Digital	Dolby Digital EX	Dolby Pro Logic II	Dolby Prologic IIx	Dolby Digital+	Dolby TrueHD	DSD (SACD)	PCM 192/24 (DVD-A)	DTS	DTS NEO:6	DTS-ES	DTS 96/24	DTS Express	DTS-HD H.R.	DTS-HD M.A.
2005	VSX-415	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	-	-	•	-	-	-	-	-	-
	VSX-515	•	•	-	•	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-
	VSX-915	•	•	-	•	-	-	-	-	•	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-
	VSX-1015	•	•	-	•	-	•	•	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-
	VSX-AX2AV	-	•	-	-	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	•	•	•	•	•	-	-	-
	VSX-AX4AVi	-	•	-	-	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	•	•	•	•	•	-	-	-
2006	VSX-416	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	-	-	•	-	-	-	-	-	-
	VSX-516	•	•	-	•	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	-	-	-	-	-
	VSX-916	•	•	-	•	-	•	•	-	•	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	-	-	-	-	-
	VSX-1016V	•	•	-	•	-	•	•	-	-	-	•	-	-	-	•	•	•	•	•	-	-	-	-	•	•	-	-	-	-	-
	VSX-2016AV	-	•	-	-	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	•	•	•	•	•	-	-	-
	VSX-AX2AS	-	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	-	-	•	•	•	•	•	•	-	-	-
	VSX-AX4ASi	-	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	-	-	•	•	•	•	•	•	-	-	-
2007	VSX-417	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	-	-	•	-	-	-	-	-	-
	VSX-817	•	•	-	•	-	-	-	-	•	-	-	-	-	-	-	•	•	•	•	-	-	-	-	•	•	•	-	-	-	-
	VSX-917V	•	•	-	•	-	•	•	-	•	-	•	-	-	-	•	•	•	•	•	-	-	-	-	•	•	•	-	-	-	-
	VSX-1017AV	•	•	-	•	-	•	•	-	•	-	•	•	-	-	•	•	•	•	•	-	-	-	-	•	•	•	-	-	-	-
	VSX-LX50	•	-	-	-	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	VSX-LX60	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	VSX-LX70	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2008	VSX-418	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	-	-	•	-	-	•	-	-	-
	VSX-818V	•	•	-	-	-	•	•	-	•	-	•	-	-	-	-	•	•	•	•	-	-	-	-	•	•	•	-	-	-	-
	VSX-918V	•	•	-	•	-	•	•	-	•	-	•	•	-	-	-	•	•	•	•	-	-	-	-	•	•	•	-	-	-	-
	VSX-1018AH	•	•	-	•	-	•	•	-	•	•	•	•	•	•	-	•	•	•	•	•	•	-	-	•	•	•	-	-	•	•
	VSX-LX51	•	-	-	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	-	-	•	•	•	-	-	•	•
	SC-LX71	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	SC-LX81	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	SC-LX90	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Rev 1.00 27/05/2008 Donckers Roel

MCACC	Multi-Channel Acoustic Calibration system.
OSD output	With some AV amplifiers, the system menu is outputted as OSD on the monitor outputs.
Multi room	Gives you the ability to listen to 1 source in 2 separate rooms by using a speaker B output.
Multi source	Gives you the ability to listen to different sources in 2 different rooms.
HDMI switching	The ability to switch a HDMI input to a HDMI output without processing the signal *(*1)*
Analogue to HDMI conversion	These devices are able to convert an analogue video input signal and convert it to HDMI out.
Analogue video Conversion.	These devices are able to convert an analogue video signal and output it at all analogue Video outputs (for example: s-vhs in -> cvbs, s-vhs and component out)

(*1) Devices that are only capable of switching, have an hardware switch (see HDMI version) instead of a HDMI receiver/transceiver. Other AV amplifiers can simulate HDMI switching by setting it to "HDMI through". But in this case the HDMI signal will be decoded and encoded again.

Terminals

Year	Model	iPod	USB	optical in	Multi zone IR input	Component in	S-Video in	HDMI in	coaxial in	control in	i.link	RF in (Laserdisc)	LAN	USB (front)	Optical (front)	MCACC microphone	S video	Composite + 2ch audio	optical out	Multi zone IR output	HDMI out	coaxial out	control out	CVBS	S-video	component	Zone 2 CVBS	Zone 2 Component	Zone 3 CVBS	12V trigger	Audio Preouts	AC outlet (100W max.)
2005	VSX-415	-	-	•	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-515	-	-	•	-	-	-	-	2	-	-	-	-	-	-	•	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-915	-	-	2	-	3	3	-	2	•	-	-	-	-	•	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	•	-
	VSX-1015	-	-	3	-	3	4	-	2	•	-	-	-	-	•	•	•	•	•	-	-	•	-	•	•	•	•	-	-	-	•	•
	VSX-AX2AV	•	-	4	•	3	4	2	2	•	-	-	-	-	•	•	•	•	•	•	•	-	-	•	•	•	•	•	-	-	2	•
	VSX-AX4AVi	•	•	4	•	3	4	2	2	•	-	2	-	-	•	•	•	•	2	•	•	-	-	•	•	•	•	•	•	-	2	•
2006	VSX-416	-	-	•	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-516	-	-	•	-	-	-	-	2	-	-	-	-	•	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-916	-	-	2	-	3	3	-	2	•	-	-	-	•	•	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	•	-
	VSX-1016V	-	-	3	-	3	4	2	2	•	-	-	-	•	•	•	•	•	•	-	•	-	-	•	-	•	•	-	-	-	•	-
	VSX-2016AV	•	-	3	-	3	4	2	2	•	-	-	-	•	•	•	•	•	•	-	•	-	-	•	•	•	•	-	-	-	•	-
	VSX-AX2AS	•	-	4	•	3	4	3	2	•	-	-	-	•	•	•	•	•	•	•	•	-	-	•	•	•	•	•	-	-	2	•
	VSX-AX4ASi	•	•	4	2	3	4	4	2	•	-	2	-	•	•	•	•	•	2	•	•	-	-	•	•	•	•	•	•	-	2	•
2007	VSX-417	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-817	-	-	2	-	3	-	-	2	-	-	-	-	•	-	•	-	•	-	-	-	-	-	•	-	•	-	-	-	-	-	-
	VSX-917V	-	-	2	-	3	3	2	2	•	-	-	-	•	•	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	-	-
	VSX-1017AV	•	-	3	-	3	4	2	2	•	-	-	-	•	•	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	•	-
	VSX-LX50	•	-	3	-	3	4	2	2	•	-	-	-	•	•	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	•	-
	VSX-LX60	•	-	4	2	3	4	3	2	•	-	-	-	•	•	•	•	•	•	1	•	-	-	•	•	•	•	•	-	-	2	•
	VSX-LX70	•	-	4	2	3	4	4	2	•	-	-	•	•	•	•	•	•	2	1	•	-	-	•	•	•	•	•	-	-	2	•
2008	VSX-418	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-
	VSX-818V	*a	-	2	-	3	-	2	1	-	-	-	-	•	-	•	-	-	•	-	-	-	-	-	•	•	-	-	-	-	-	-
	VSX-918V	*a	-	2	-	3	-	2	1	•	-	-	-	•	-	•	-	-	•	-	-	-	-	-	•	•	-	-	-	-	-	-
	VSX-1018AH	*a	-	3	•	3	4	2	2	•	-	-	-	•	•	•	•	•	•	•	•	-	-	•	•	•	•	•	-	-	2	•
	VSX-LX51	*a	-	3	•	3	4	3	2	•	-	-	-	•	•	•	•	•	•	•	•	-	-	•	•	•	•	•	-	-	2	•
	SC-LX71																															
	SC-LX81																															
	SC-LX90	•	-	6	4	5	3	6	4	•	2	•	•	•	•	•	•	•	2	4	2	1	•	•	•	•	•	•	•	•	4	-

*a = iPod can be connected through front USB. Only compatible with iPod 5th gen, nano 2th gen and higher.

iPod	A dedicated connector for connection an iPod is available. *a means that there is no dedicated iPod connector, but iPod can be connected by front USB connector.
Multi zone IR input	Can be used to connect a separate IR receiver in another room.
LAN	For DLNA purposes.
12V trigger	To power on/off external devices or trigger an event (lowering projector screen, closing curtains, turn off lights, …)
AC outlet	Can be used to connect devices that switch on/off together with amplifier (other audio components, dvd player, subwoofer, …)

Year	Model	Speaker outputs	Power/channel [W - 8ohm - front]	Front Bi-amp	Display	USB version	Input source rename (remote)	Input source rename (reciever)	Programmable remote	HDMI Version	HDMI Control / Kuro Link	HDMI DeepColor	SR+	Standby power [W]	Weight [kg]	THX certification
2005	VSX-415	5	80 / 8 ohm	-	8c segment - MCACC	-	-	-	-	-	-	-	-	0,5	8,7	-
	VSX-515	7	100 / 8 oh	-	8c segment	-	-	-	-	-	-	-	-	0,5	9,5	-
	VSX-915	7	100 / 8 oh	•	8c segment	-	-	-	•	-	-	-	•	0,5	9,7	-
	VSX-1015	7	120 / 8 oh	•	14c 5*7array	-	-	-	•	-	-	-	•	0,52	15,4	Select 2
	VSX-AX2AV	7	140 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.1	-	-	•	0,52	16	Select 2
	VSX-AX4AVi	7	150 / 8 oh	•	14c 5*7array + src	1.1	•	•	•	1.1	-	-	•	0,52	16,1	Select 2
2006	VSX-416	5	100 / 8 oh	-	8c segment	-	-	-	-	-	-	-	-	0,5	8,5	-
	VSX-516	6	100 / 8 oh	-	8c segment	-	-	-	-	-	-	-	-	0,5	8,9	-
	VSX-916	7	100 / 8 oh	•	8c segment	-	-	-	•	-	-	-	•	0,5	9	-
	VSX-1016V	7	120 / 8 oh	•	14c 5*7array	-	•	-	•	switch	-	-	•	0,5	15	Select 2
	VSX-2016AV	7	120 / 8 oh	•	14c 5*7array	-	•	•	•	1.2	-	-	•	0,7	15,3	Select 2
	VSX-AX2AS	7	140 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.2	-	-	•	0,65	16,3	Select 2
	VSX-AX4ASi	7	150 / 8 oh	•	14c 5*7array + src	1.1	•	•	•	1.2	-	-	•	0,65	16,4	Select 2
2007	VSX-417	5	100 / 8 oh	-	8c segment	-	-	-	-	-	-	-	-	0,5	8,3	-
	VSX-817	7	100 / 8 oh	•	8c segment	-	-	-	-	-	-	-	-	0,5	8,5	-
	VSX-917V	7	100 / 8 oh	•	8c segment	-	-	-	•	switch	-	•	•	0,5	8,8	-
	VSX-1017AV	7	120 / 8 oh	•	14c 5*7array	-	-	-	•	switch	-	•	•	0,5	15	-
	VSX-LX50	7	120 / 8 oh	•	14c 5*7array	-	•	•	•	1.3	-	-	•	0,6	15,3	Select 2
	VSX-LX60	7	140 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.3	•	•	•	0,6	17	Select 2
	VSX-LX70	7	150 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.3	•	•	•	0,6	17	Select 2
2008	VSX-418	5	100 / 8 oh	-	8c segment	-	-	-	-	-	-	-	-	0,5	7,9	-
	VSX-818V	7	100 / 8 oh	-	8c segment	-	-	-	•	switch	-	•	-	0,5	8,1	-
	VSX-918V	7	100 / 8 oh	-	8c segment	-	-	-	•	1.3a	-	-	•	0,5	8,1	-
	VSX-1018AH	7	120 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.3a	•	•	•	0,6	13,3	Select 2 plus
	VSX-LX51	7	120 / 8 oh	•	14c 5*7array + src	-	•	•	•	1.3a	•	•	•	0,6	13,5	Select 2 plus
	SC-LX71	7								1.3a	•					Select 2 plus
	SC-LX81	7									•					Ultra 2 plus
	SC-LX90	10	140 / 8ohm	•	Color LCD screen	2.0	•	•	•	1.3a	•	•	•	0,55	35,5	Ultra 2 plus

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Bi-amp   2 outputs can be used to connect 1 front speaker if the speakers has two separate Connections for high and low audio signals. This gives you more power and more accurate sound.

1.3 Audio information
1.3.1 Audio coding formats

When audio is digitally recorded on a medium, there are several digital coding formats that can be used.

Overview of some audio coding formats:

Audio carriers (CD, DAT, SACD, DVD-A, …) are typically 2ch audio, with exception of SACD & DVD-A, and have the complete memory available for audio data. Compressing audio is not necessary and for these mediums **PCM or DSD** coding is mostly used.

Video carriers (LD, DVD, BD) generally have multi channel audio and have to share the complete memory of the medium for video data as well. In these cases it's necessary to compress audio data to be able to get all the video data on there as well. These mediums usually have **Dolby, DTS** coding.
Since the launch of blu-ray disc and HD-DVD, much more memory is available and compression is less necessary. These mediums can carry high definition audio in the form of **Dolby trueHD, DTS-HD and PCM**.

Portable media have gained popularity ever since internet was accessible to most people. Because internet bandwith is relatively small and the first portable media players didn't have massive storage room, new audio coding formats were designed to compress audio as much as possible. For example: **MP3, WMA9, ATRAC**, … These audio coding formats are not explained in this guide since they're not commonly used for home cinema systems.

PCM (Pulse Code Modulation)
This is the most commonly used coding format for digital audio. It's used on formats as CD, DAT, DVD-A and optional format on DVD and BD. The principle of analogue to digital conversion with PCM is to take samples of the analogue audio signal at a certain frequency (sample rate). At each sample, the amplitude of the analogue signal at that moment is converted to a digital value.

CD: sampling rate = 44,1kHz   quantization = 16 bit/channel – stereo   bit rate = 1411 kbit/s
DAT: sampling rate = 48 kHz   quantization = 16 bit/channel – stereo   bit rate = 1536 kbit/s
DVD-A: sampling rate = 192kHz   quantization = 24 bit/channel – stereo   bit rate = 9216 kbit/s
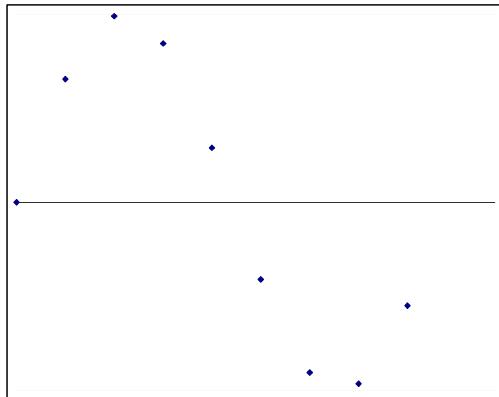
44,1kHz sampling of a 5kHz sine wave (as with CD)   192kHz sampling of a 5kHz sine wave (as with DVD-A)
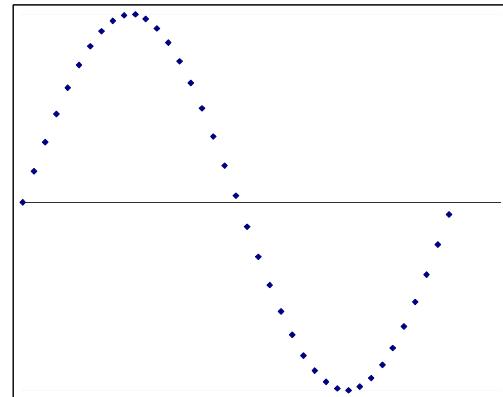
	Max. number of channels	Sampling rate [kHz]	Max. quantization [bit]	Max. bit rate [kbit/s]	CD	DVD-A	HDMI				SPDIF	i-link (IEEE1394)
							1.0	1.1	1.2	1.3		
CD (COMPACT disc)	2	44,1	16	1411	•	•	•	•	•	•	•	•
DVD-A (DVD AUDIO)	5.1 / 2.0	96 / 192	24 / 24	9216		•		•	•	•		•

<u>DSD (Direct Stream Digital)</u>

This is designed by Philips and Sony to provide a master quality coding format of analogue audio. Frequency response is theoretically much higher than DVD-A, and signal steepness is also very high. In general lines, it converts analogue audio by comparing the analogue signal at a very high sample rate (2,8224 MHz) and detects whether the differential value (delta) during each sample is rising or dropping. With each sample, there is only 1 bit information. This conversion is also called delta sigma conversion (ΔΣ)

SACD: sampling rate = 2,8224 MHz DSD. quantization = 1 bit/channel bit rate = 5644 kbit/s
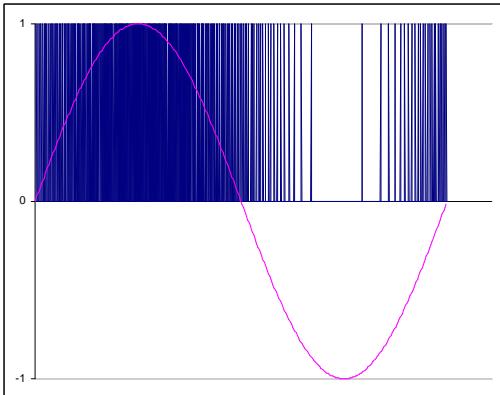
2,8224MHz DSD coding of 5kHz sine wave (as with SACD)

|		Max. number of channels	Sampling rate [kHz]	Max. quantization [bit]	Max. bit rate [kbit/s]	SACD	BD	HDMI 1.0	1.1	1.2	1.3	SPDIF	i-link (IEEE1394)
DSD	**DSD** Direct Stream Digital	6	2822	1	5644	•				•	•		•

Dolby Digital (AC3)
This lossy audio compression is developed by Dolby Laboratories and is mainly used on video carriers. Dolby Digital is capable of carrying multi channel audio and has a lower bit rate than PCM or DSD. A lower bitrate is recommended when combined with video information, to save up memory space for the video information.

Laserdisc:	5.1ch			bit rate: 384 kbit/s
DVD:	5.1ch	sampling rate = 48 kHz		bit rate: 448 kbit/s
Blu-ray:	5.1ch			bit rate: 640 kbit/s
Blu-ray:	8ch	sampling rate = 96kHz	(Dolby TrueHD)	bit rate: 18000 kbit/s

| | | Max. number of channels | Sampling rate [kHz] | Max. quantization [bit] | Max. bit rate [kbit/s] | DVD / DVD-A | BD | HDMI | | | | SPDIF | i-link (IEEE1394) |
								1.0	1.1	1.2	1.3		
Dolby digital		5.1	48	16	448	•	•	•	•	•	•	•	•
Dolby digital EX		7.1			1536	•	•	•	•	•	•	•	•
Dolby digital plus		7.1 (*1)	48		1664		•				•	•	•
Dolby trueHD		8 5.1 (*1)	96 192		18000		•				•		•

(*) Blu-ray specifications specification of DD+ is max. 13,1 and Dolby TrueHD is 14ch

There are also audio decoding processes that convert 2ch sources to 5.1 or more channels. Dolby Pro Logic will decode a 2ch audio track that was encoded with Dolby digital to 4.0, 5.1 or 6.1 ch (depending on the Pro Logic version). It will also convert regular 2ch audio sources from CD, VHS, LP to Multi channel audio.

|		Max. number of channels
Dolby Pro Logic		4.0
Dolby Pro Logic II		5.1
Dolby Pro Logic IIx		7.1

DTS (Digital Theatre System)
DTS has been designed to be a more qualitative audio compression technique in the film industry. Dts supports better channel separation, can carry up to 6 channels plus 1 LFE channel (DTS-ES) and uses higher bitrates.

DVD: 5.1ch   sampling rate = 96kHz   bit rate: 1536 kbit/s
Blu-ray: 5.1ch   sampling rate = 192kHz   (DTS-HD M.A.)   bit rate: 24000 kbit/s

		Max. number of channels	Sampling rate [kHz]	Max. quantization [bit]	Max. bit rate [kbit/s]	DVD / DVD-A	BD	HDMI				SPDIF	i-link (IEEE1394)
								1.0	1.1	1.2	1.3		
DTS (legacy)	dts Digital Surround	5.1 2	48 96	24 24	1536	•	•	•	•	•	•	•	•
DTS ES matrix	dts Digital Surround | ES	5.1 2	48 96	24 24	1536	•	•	•	•	•	•	•	•
DTS ES discrete 6.1	dts Digital Surround | ES	6.1 2	48 96	24 24	1536	•	•	•	•	•	•	•	•
DTS 96/24	dts Digital Surround | 96/24	5.1	96	24	1536	•	•	•	•	•	•	•	•
DTS Express	dts Express	5.1	48	24	256	*	•	*	*	*	•	*	*
DTS HD H.R.	dts-HD High Resolution Audio	7.1	48/96	24	5760		•			•			*
DTS HD M.A.	dts-HD Master Audio	7.1 5.1	48/96 192	24 24	24000		•			•			*

* is technically possible, but this combination is (currently) not used.

As with Dolby Pro Logic, DTS also has an audio decoding process that can up mix stereo channels to 6.1 ch or decode matrix coded stereo audio. This is called DTS NEO:6

|		Max. number of channels
DTS Neo:6	dts neo:6	6.1

1.3.2 Speaker setup

Since the SC-LX90 has 10 speaker outputs, there are various ways to create a speaker setup, depending on your needs/environment/taste.

There are 5 possible setups, which can be selected in the system menu. In the system menu, select "output setup"

```
DVD/LD                 - 55.0dB        DVD/LD                    - - - dB
System Setup MENU                      2. Output Setup
  1. Auto MCACC                        ◄          Normal              ►
  2. Output Setup
  3. Manual MCACC                      Front   :Normal
  4. FULL BAND PHASE CTRL              Center  :Normal
  5. Data Management                   Surr    :Array
  6. Manual SP Setup                   SB      :Normal
  7. Input Setup
  8. OSD Language
  9. Other Setup                       [  Confirm   ]
                         ↰:Exit                          ↰:Cancel
```
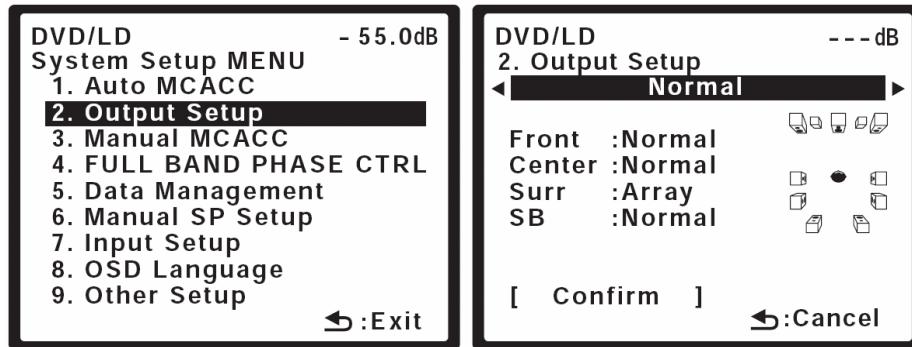
Normal: 9.2 setup (default)
   This setup provides a 7.2 setup with extra surround speakers, making this an ideal setup for larger rooms.
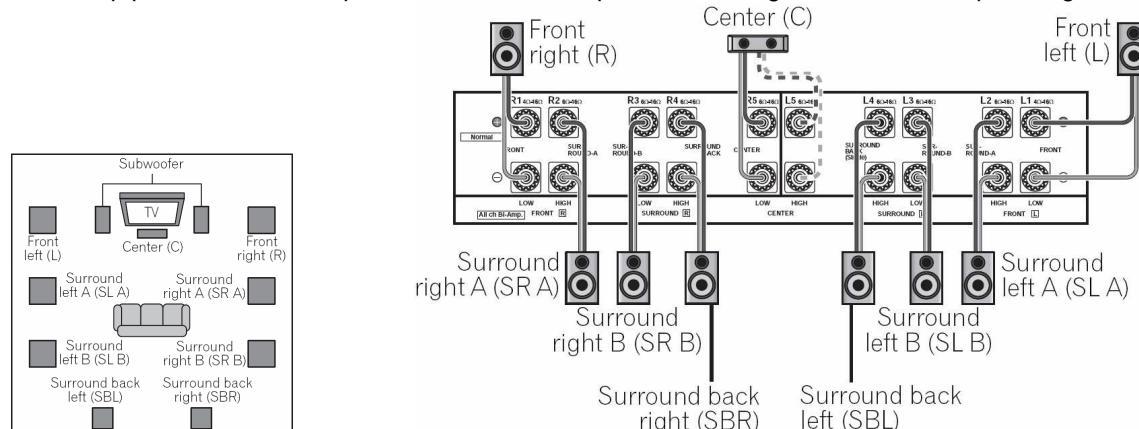
Notice that a bi-amp center speaker can be connected if available. It's not recommended to connect 2 separate center speakers since this is acousticaly not correct and MCACC will not be able to work correctly.

All CH Bi-amp: 5.2 setup
   Five channels + subwoofer channel give you the basic requirements for a home theater. Bi-amping your speakers will provide better seperation between high and lower frequencies and will provide a more consistent power to your speakers.
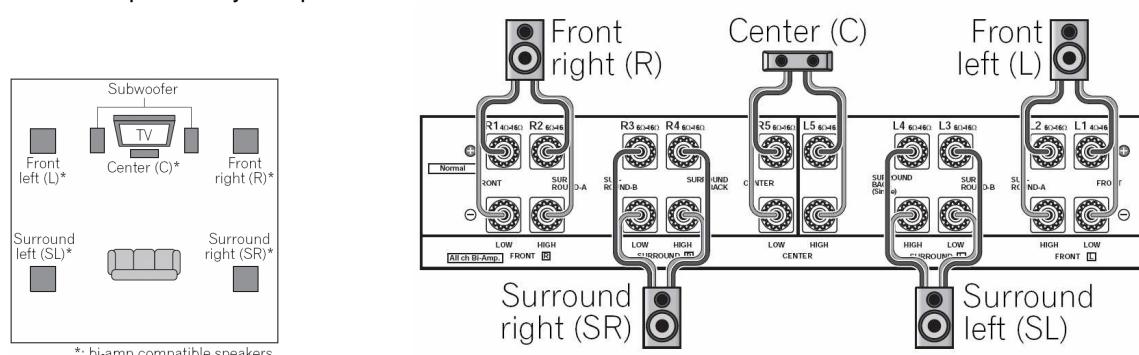
Front Bi-amp: 7.2 setup

This creates a 7.2 setup (used on some HD movies) with a possibility to use bi-amp front and center speakers.

*: bi-amp compatible speakers
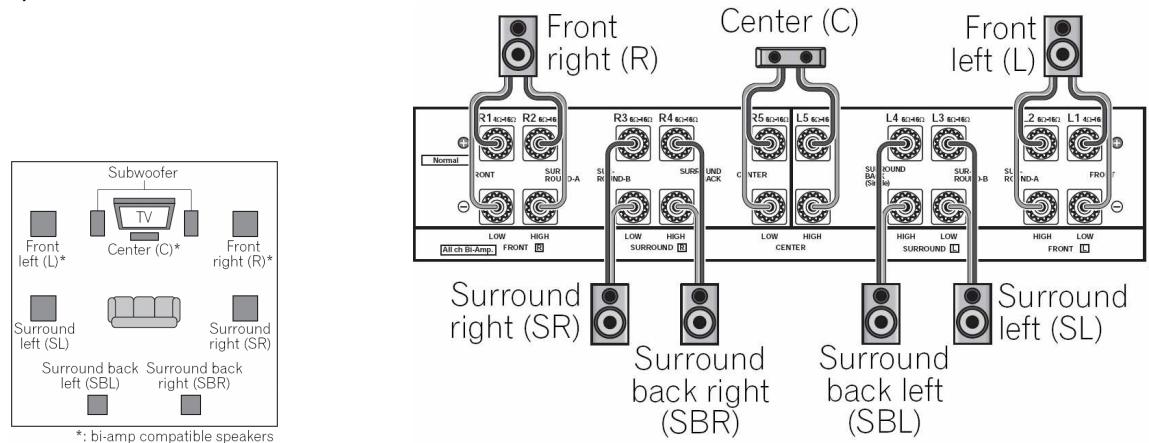
7.2ch+ZONE 2: 7.2 + second zone setup

This gives you the possibility to have a 7.2 home cinema setup in one room and listen to another stereo source in a second room.
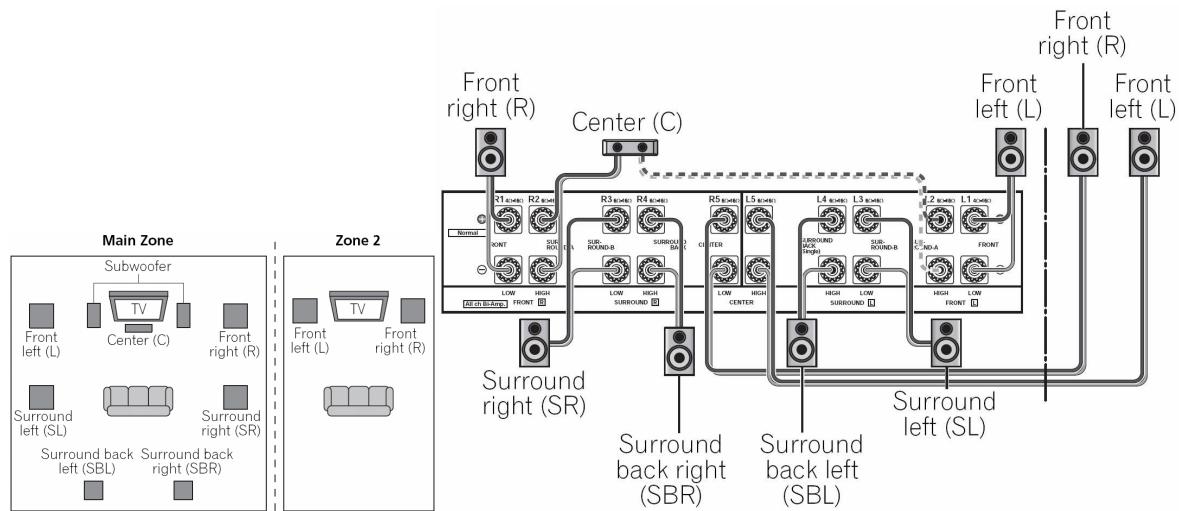
7.2ch+speaker B: 7.2 + zone B setup

This gives you a 7.2 home cinema setup and use 2 speaker outputs with the same front signals as the source that is listened in the main room.

AE HDMI ASSY   AWQ7067

**F** AUDIO BRIDGE 4 ASSY   AWX8766
C AUDIO BRIDGE 1 ASSY (Bottom)   AWX8764
D AUDIO BRIDGE 2 ASSY (Bottom)   AWX8765
BB DA DIODE ASSY   AWX8965
AW DD DISP ASSY   AWX8784
AS DD DSP ASSY   AWX8748
AX DD HDMI ASSY   AWX8750
Q DSP ASSY   AWX8868
R DIGI BRIDGE ASSY   AWX8752
W ICE INTERFACE ASSY   AWX8779
AP ICE REG ASSY   AWX8751
AQ ICE 5 ASSY
AR ICE 12 ASSY

AWX8959   FAN-12V ASSY **AV**
AWX8956   DSP DIODE ASSY (Top) **AT**
AWX8958   HN DIODE ASSY (Bottom) **AU**

AZ 2CH DD ASSY   AWX8961
AY HDMI DIODE ASSY   AWX8957

AWX8754
AN VOL ENCODER ASSY

AWV7006
5.1 TFT MODULE

AWX8777
AF DISPLAY ASSY

AWX8753
AO FUNC ENCODER ASSY

AWX8780 ICEBLUE ASSY

AWX8781 FRONT USB ASSY

AWX8783 PERCH DISP ASSY

AI PERCH DISP ASSY

AG ICEBLUE ASSY

J FRONT USB ASSY

AWX8755 POWER SW ASSY

AM POWER SW ASSY

AWX9329
K FRONT INPUT ASSY

L FRONT BUFF ASSY

AL TACT ASSY

AWX8946
BD ICE INPUT 4CH ASSY

AWX8945
BE ICE INPUT 6CH ASSY

AWX8731 INLET ASSY

BG INLET ASSY

ICEPOWER AMP ASSY   **AWH7010**

AWX8736 PFC ASSY

BF PFC ASSY

ICEPOWER SMPS ASSY   **AWR7049**

AWX8785   PERCH PS ASSY   **AJ**

**AWX8782**   PERCH FFC ASSY   **AH**

2.2 Jig list

For diagnosis of HDMI Assy:
GGD1545 (2pin extension cable)
GGD1546 (5pin extension cable)
GGD1547 (18pin extension cable)
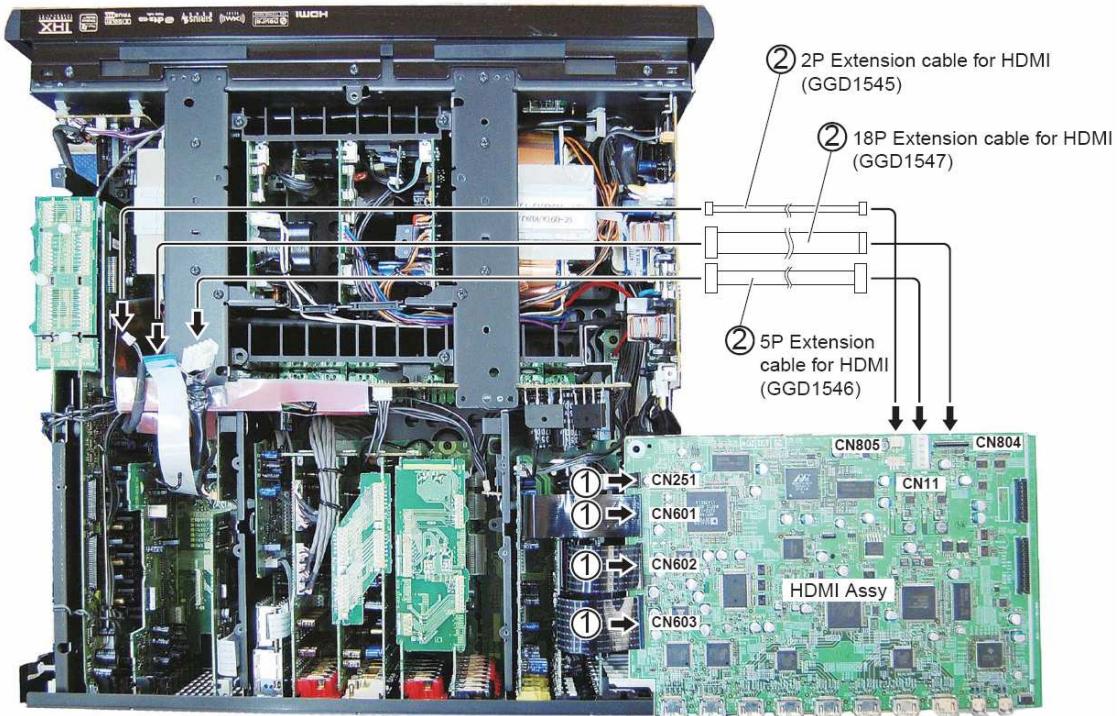
For diagnosis of Power amplifier section:
        GGD1548 (15p extension cable)
        GGD1549 (9p extension cable)
        GGD1550 (2p extension cable)
        GGD1551 (24p FFC)
        GGD1552 (7p extension cable)
        GGD1553 (4p + 3p extension cable)
        GGD1554 (12p + 3p extension cable)
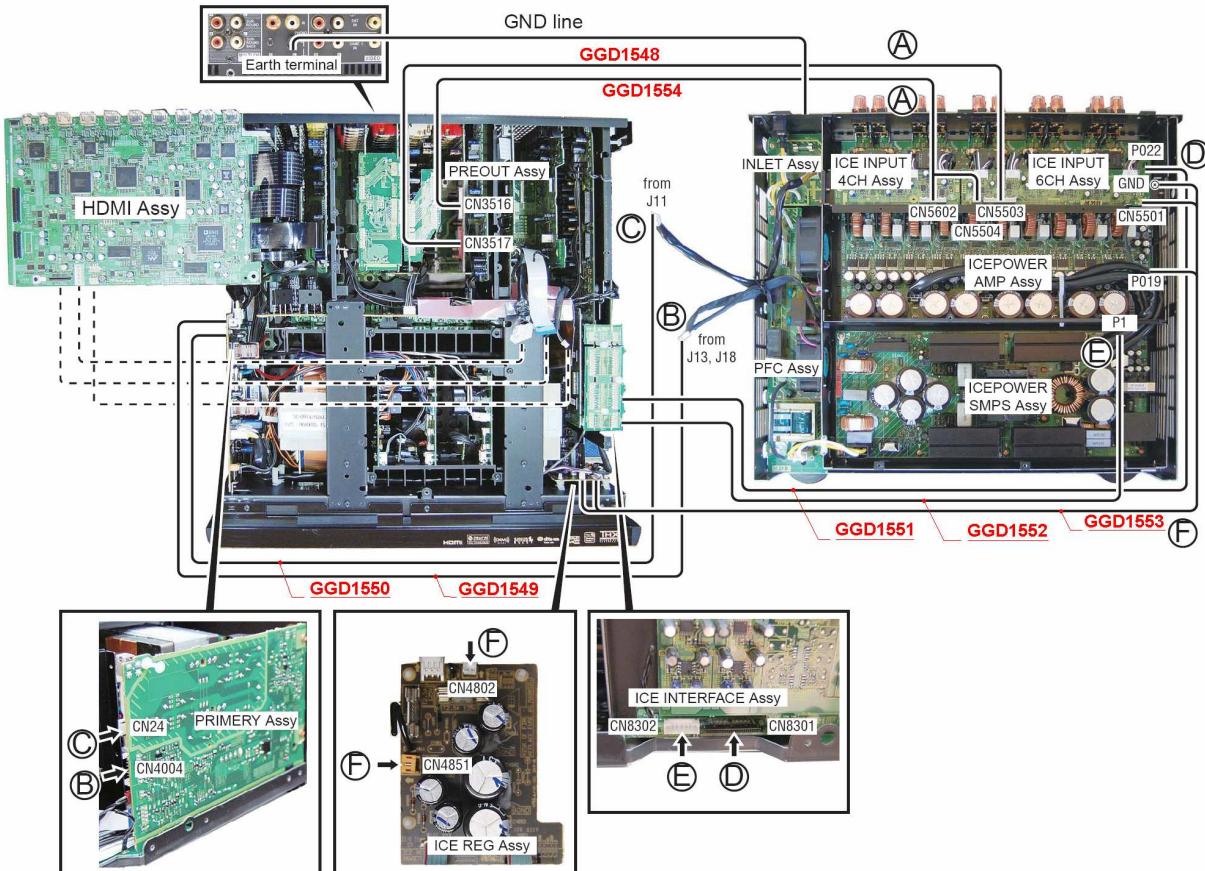
⚠ When Power amplifier section and main chassis section are seperated for diagnose purposes, make sure that GND line between both chassis are connected when the unit is powered on!

2.3 Disassembly

This chapter shows you how to dismantle the SC-LX90 but will also help you to re-assemble it and avoid misplacing screws or ending up with some screws left. Unfortunatly there is a wide variety of screws used. The illustrations are based on the screws how they were present in the first test productions, so there might be slight differences with the actual mass production units.

2.3.1 Exterior section

Step 1: remove the top plate

➔ **1** Remove 3 screws

➔ **2** Remove 7 hexagonal screws + washer

➔ **3** Remove top plate B

Top plate B
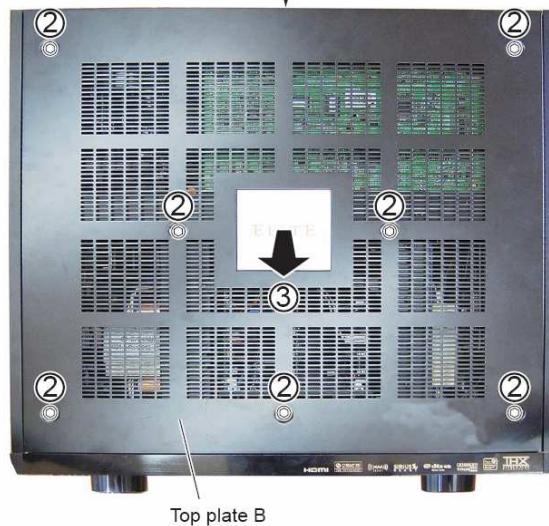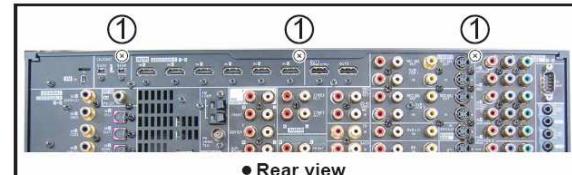
Step 2: Remove the side panel BU and BL

➔ **1** Remove four screws
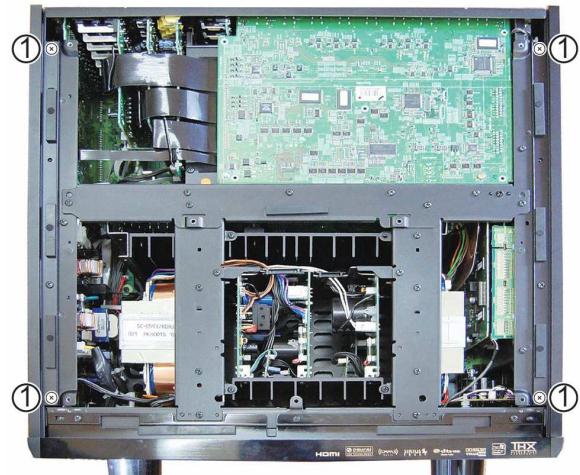
➔ **2** Remove the four hex. Screws

➔ **3** Remove the two side panels BU.
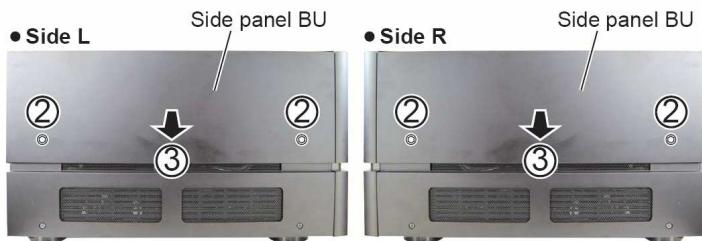
➔ **4** Remove the four hex. screws.

➔ **5** Remove the four screws.

➔ **6** Remove the two side panels BI
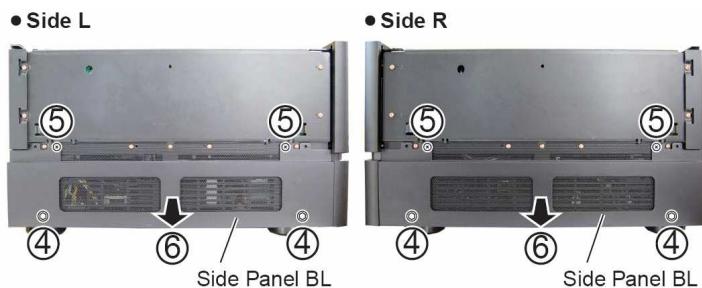
Step 3: Remove the metal brackets.

➔ **1** Remove the 12 screws

➔ **2** Remove the 2 screws + washers.

➔ **3** Remove the two metal gaskets.
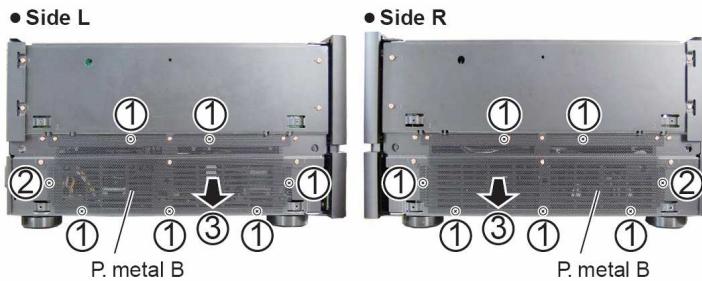
2.3.2 HDMI assy

Step 1: Remove the metal brackets.

➔ **1** Remove the 2 small headed screws.

➔ **2** Remove the 8 screws.

➔ **3** Remove 1 screw with long taping.

➔ **4** Release the locking card spacer.
➔ **5** Disconnect the 2 board connectors.
➔ **6** Disconnect the 4 flexible cables.
➔ **7** Titl the HDMI assy.
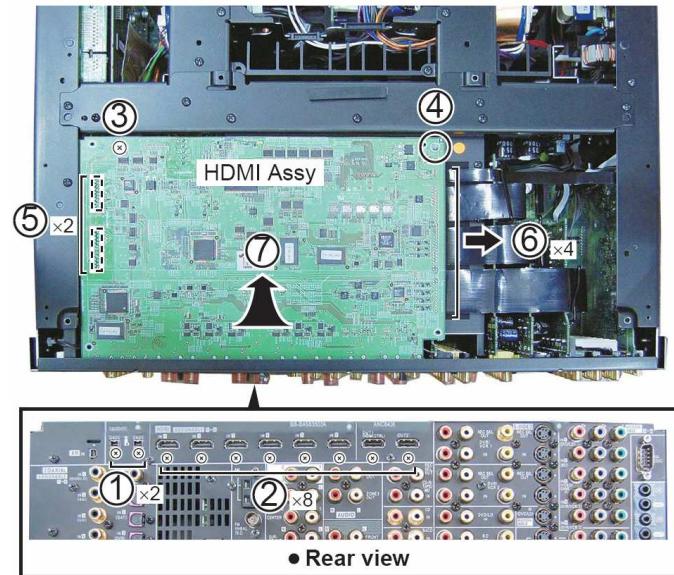
➔ **8** Disconnect 1 flex. Cable and 3 connectors.
➔ **9** Remove the HDMI assy.

Step 2: Remove HDMI shield and beam L

➔ **1** Remove the 5 screws

➔ **1a** Remove the 2 short screws

➔ **1b** Remove 1 flat headed screw

➔ **2** Remove the beam L
➔ **3** Remove the 2 screws

➔ **4** Remove 6 screws

➔ **5** remove the HDMI shield assy.

Beam L

HDMI shield Assy

● **Rear view**
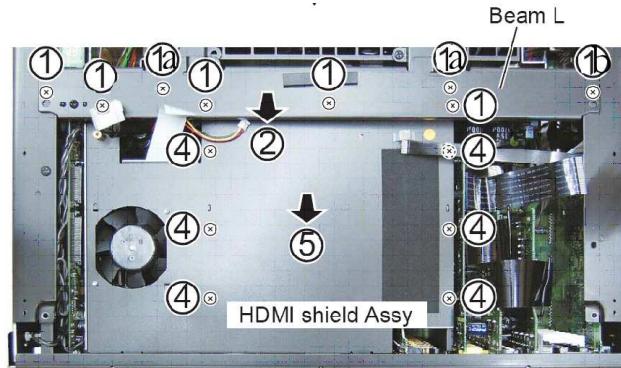
Step 3: Remove shield sheet A (analogue audio)

➔ **1** Disconnect one connector
➔ **2** Remove the shield sheet A.
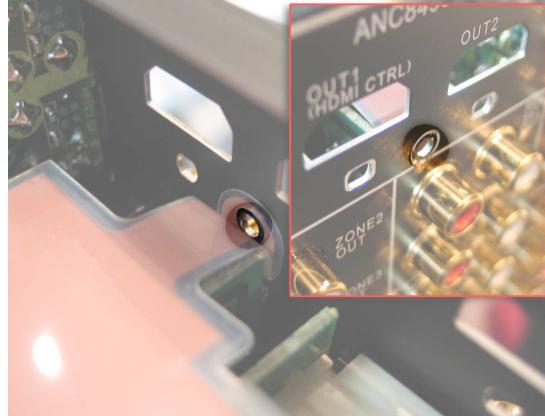
➔ **3** Reconnect the connector.
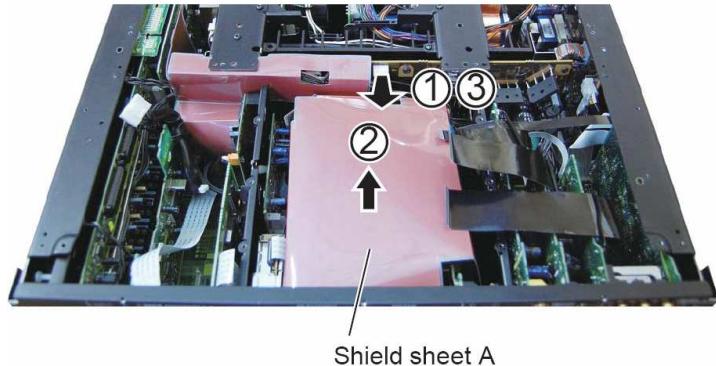
Shield sheet A

Step 4: Remove shield sheet A

➔ **1** Remove the 2 screws.

➔ **2** Remove one screw.

➔ **3** Remove 20 screws

➔ **4** Remove the 2 side angles.
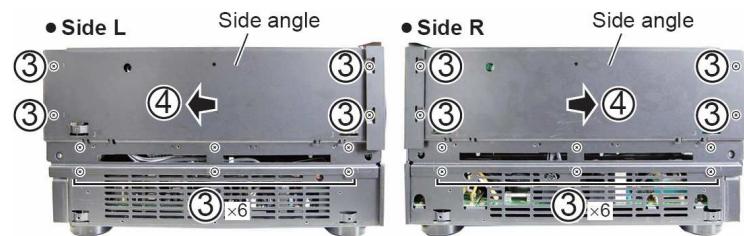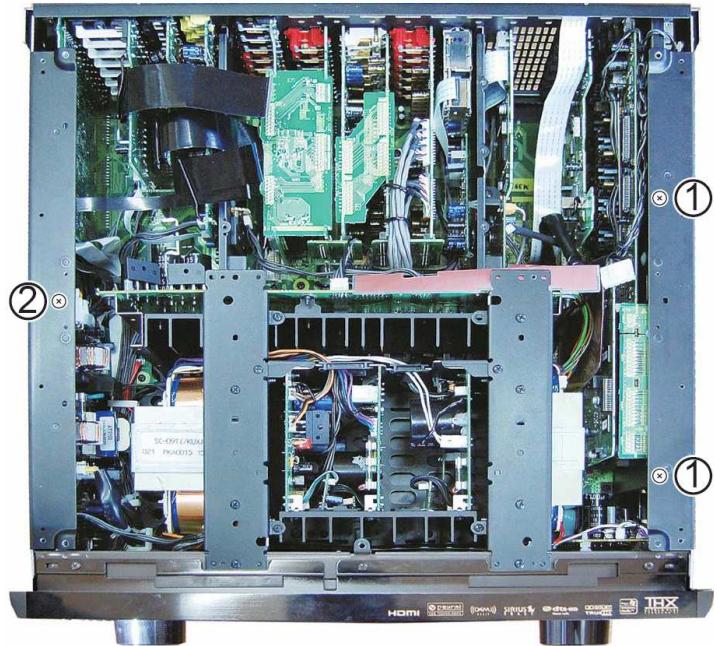
2.3.3 main chassis section

Step 1: Removal of beam S

→ **1** Remove 12 screws
→ **2** Remove the shield sheet A.
→ **3** Reconnect the connector.

Beam S   Shield sheet B   Beam S
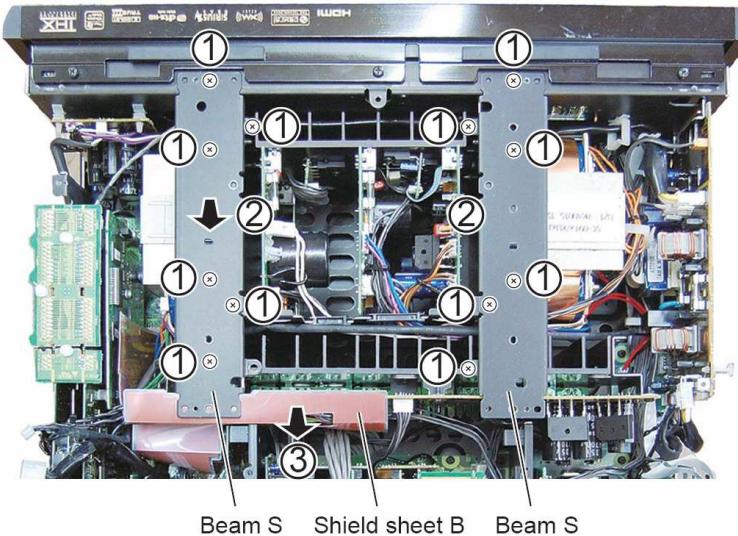
Step 2: Removal of A-REG assy

→ **1** Remove the two screws.
→ **2** Disconnect the 7 connectors.
→ **3** Remove the A-REG assy with heatsink REG.

Heatsink REG   A-REG Assy

COMPOSITE Assy
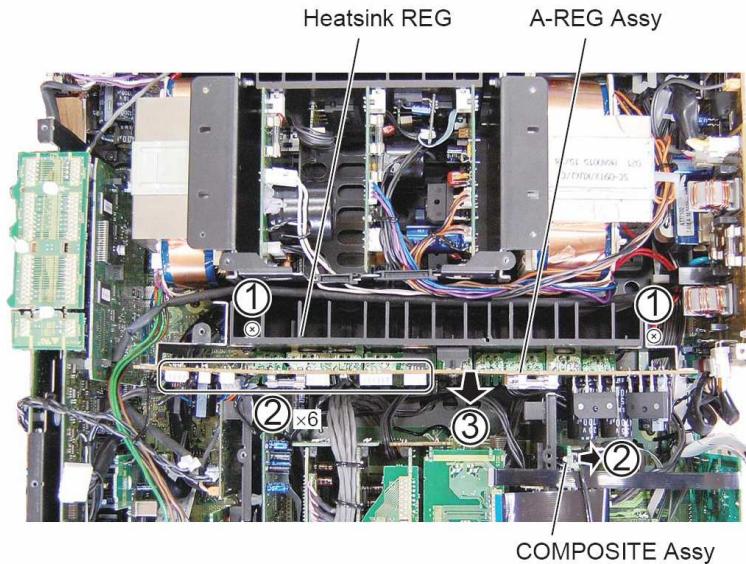
2.3.4 front section

➔ **1** remove the 12 screws.

● Bottom view
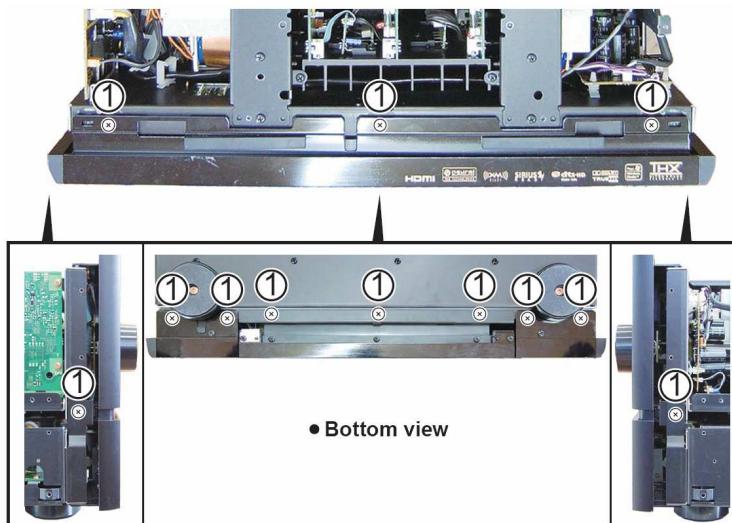
➔ **2** Disconnect one flexible cable.
➔ **3** Remove the PERCH DISP assy.

PERCH DISP Assy
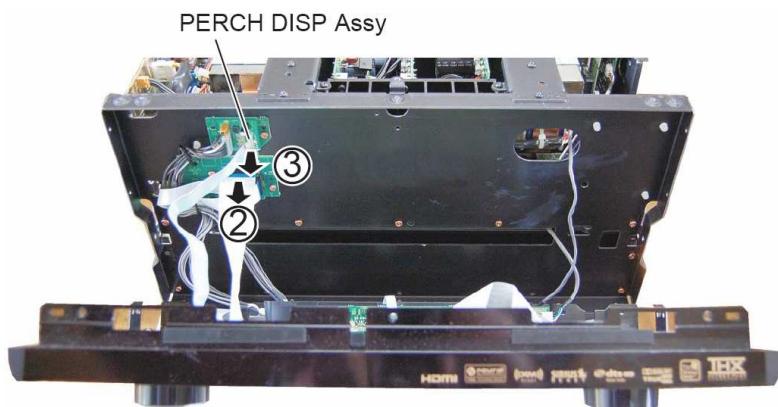
➔ **4** Disconnect the 4 connectors.
➔ **5** Remove the front section.

MAIN DIGITAL Assy

Front section   FRONT BUFF Assy   FRONT USB Assy
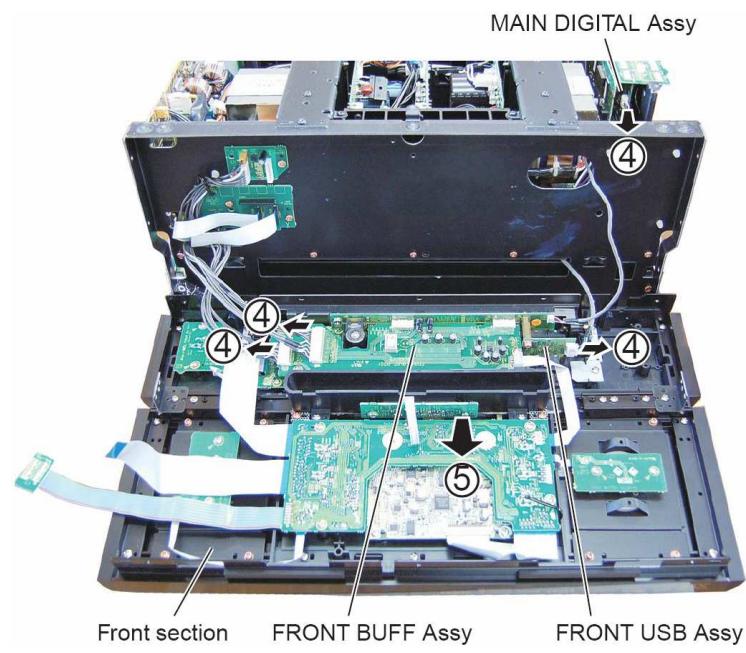
2.3.5 power amplifier section

➔ **1** Disconnect the 2 connectors
➔ **2** Release the jumper wire.
➔ **3** release chassis GND connector.

PREOUT Assy
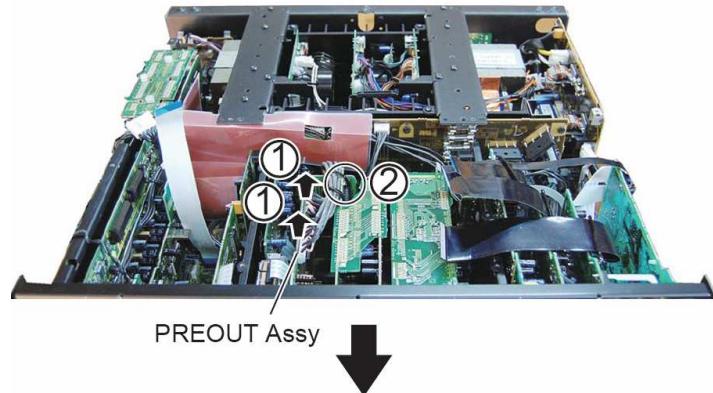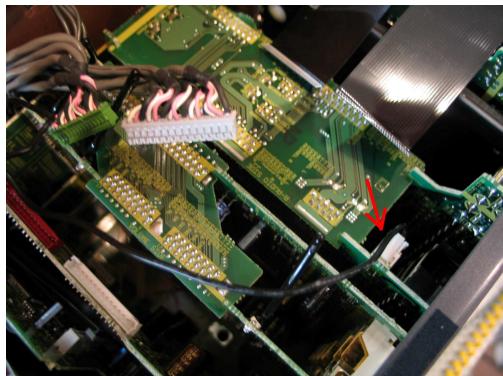
➔ **3** Disconnect one flexible cable and 5 connectors.
➔ **4** Release 3 jumper wires.

IR 232C Assy   PRIMARY Assy   ICE REG Assy   DAC Assy

ICE INTERFACE Assy

● Side L   ● Side R
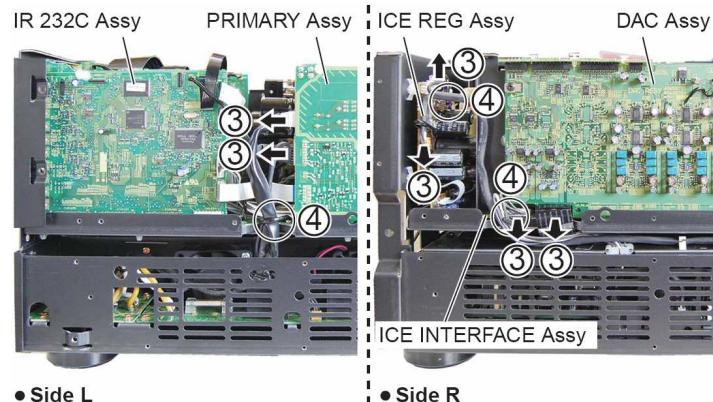
➔ **5** Remove the 5 screws.

Panel stay
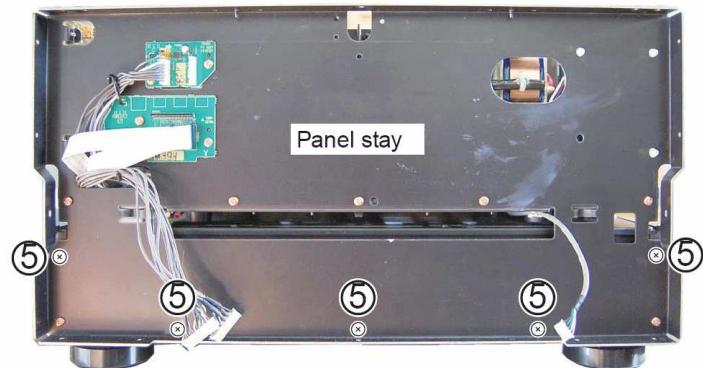
➔ **6** Remove 2 screws.

➔ **6b** Remove 1 screw

● Rear view
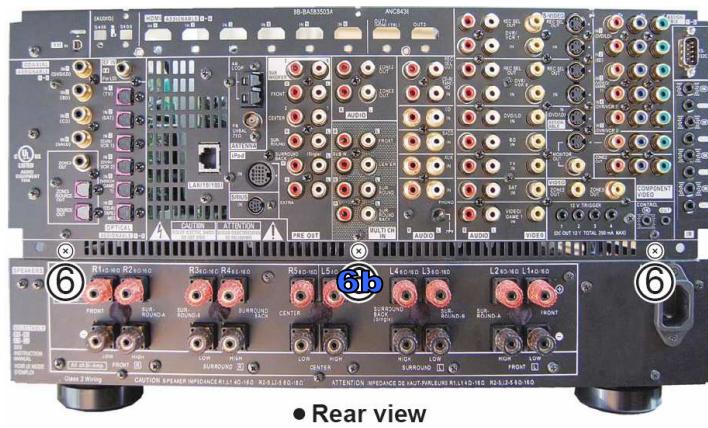
→ 7 Remove the main chassis section while being careful to jumper wire (*1)

Main chassis section

Power amplifier section
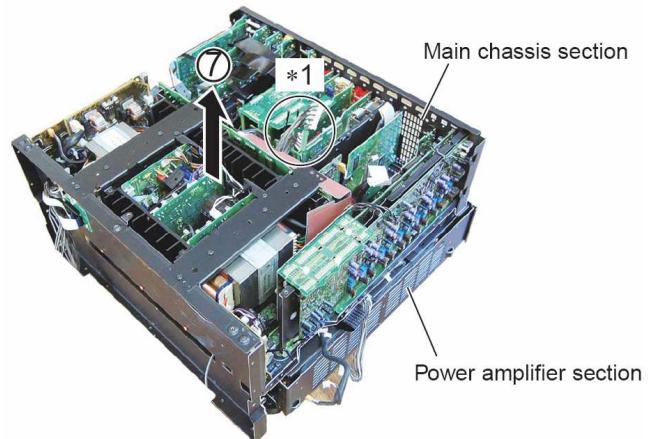
Step 2: Removal of top plate ICE

→ 1 Remove the 4 screws.

→ 2 Remove the 6 screws.

→ 3 Remove the 3 screws.

→ 4 Disconnect the 2 connectors.
→ 5 Release the 4 jumper wires.
→ 6 Remove the top plat ICE.

● Rear view

Top plate ICE

Power amplifier section
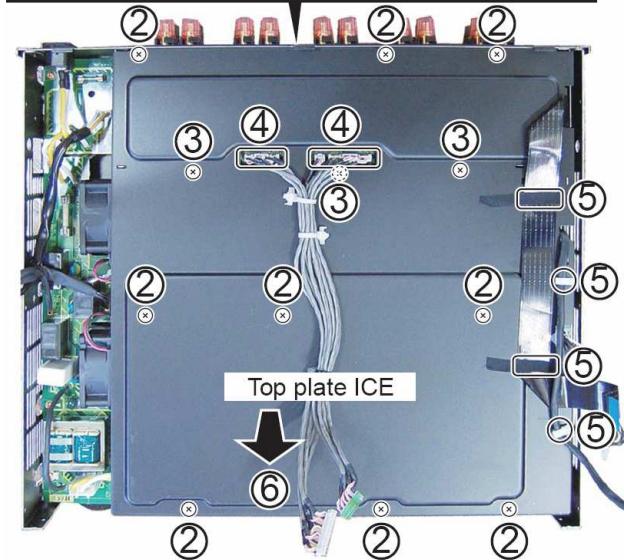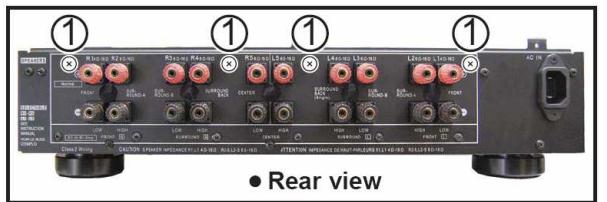
⚠ When removing the ICEPOWER SMPS assy, be sure to grip it by the transformer, since the pcb might be deformed by the weight of this transformer otherwise.

＊

ICEPOWER SMPS Assy
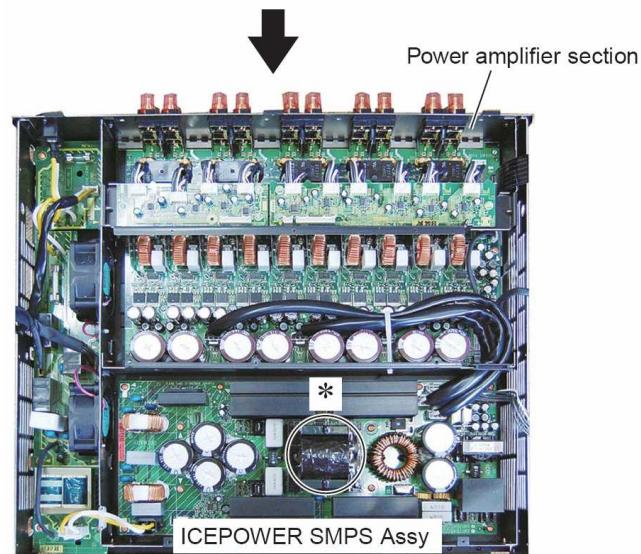
2.3.6 Removal of rear panel

Remove approximately 109 screws:
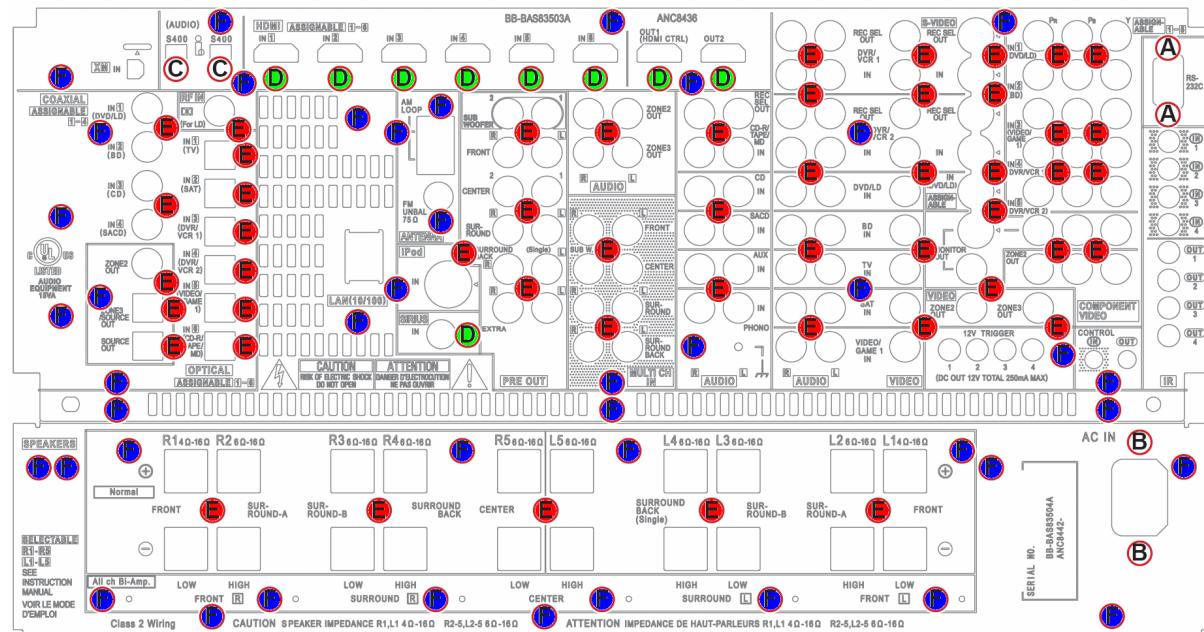
* This image is from SC-09TX (American equivalent from SC-LX90), there are small differences with SC-LX90.

A	B	C	D	E	F
X2	x2	x2	x9	x51	x43
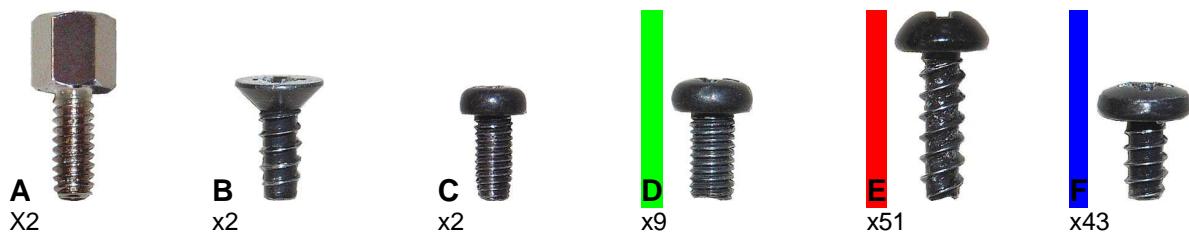
When you want to power on the unit with the rear panel removed, it's neccesairy to make ground connections between the separate PCB's in order to work. To do this, screw in the screws as indicated on following picture, and connect these screws with a wire.
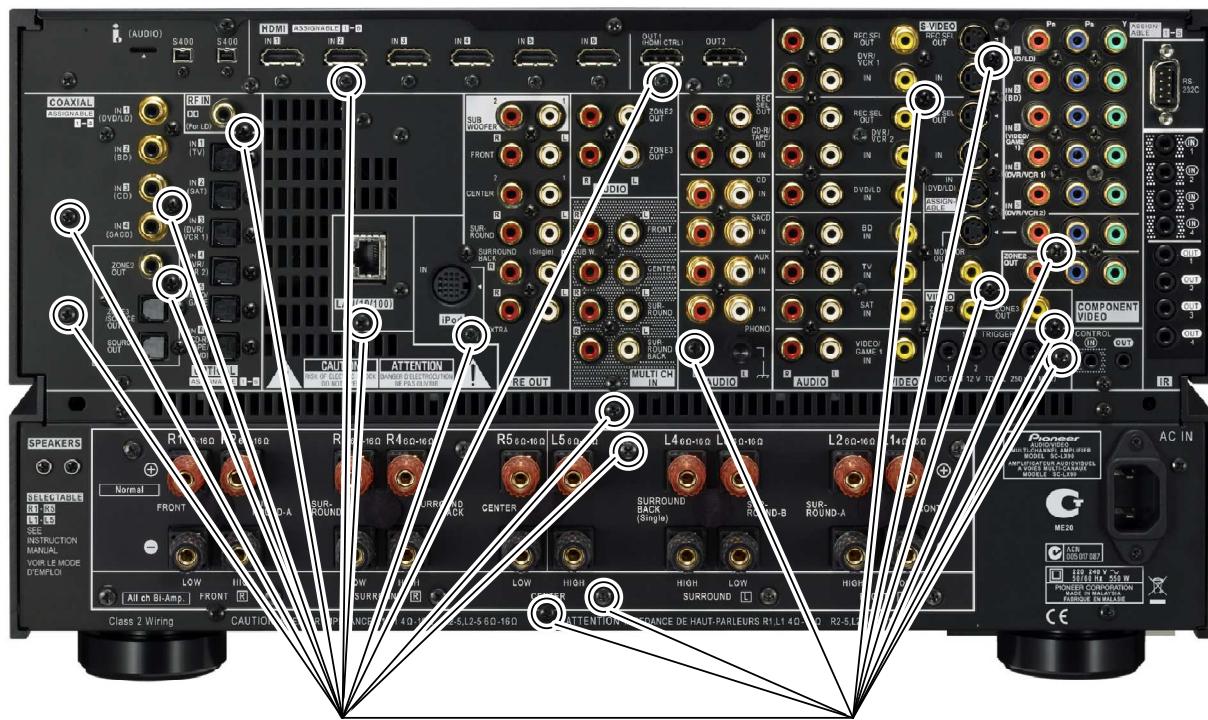
2.4 Service Mode

Enter service mode:
1) Turn off the ZONE 2 and ZONE 3 of the multi-zone control. Turn the master volume to minimum (---dB) and turn off the power.
2) After the power-off, press and hold down both "**ENTER**" key and "**ZONE 2**" key on the front for approximately 2 seconds.

Exit service mode:
- Turning of the power or pressing the "**RETURN**" key returns to normal mode.
- Pressing no key for 10 seconds, will automaticaly return to normal mode.

Mode transition method for each mode:
* If no key is pressed within 10 seconds, the Service mode returns to the normal mode.
* Use the up and down buttons to scroll through the different menu's.
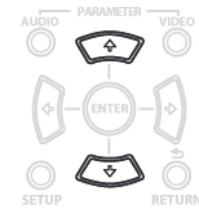
VERSION screen

```
CONFIDENTIAL  PANEL
              ▲            1 / 4
MAIN :1.000   EVNT :1.000
DISP :1.000   ITEM :1.000
DSPM :1.000   HDMI :1.000
DSP1 :1.000   DSP2 :1.000
DSP3 :1.000
HOST :1.000
FONT  ROM     Ver.:1.000

GUID    :  30  30  0000001
              ▼
```

PROTECT (1)

```
CONFIDENTIAL  PANEL
              ▲            2 / 4
PROTECT :DC      :  000
    AMP  OVER    :  000
         CON     :  000
         FAN     :  000
    AMP  TEMP    :  000
    SMPS ERR1    :  000
    SMPS ERR2    :  000
    SMPS CURR    :  000


              ▼
```

PROTECT (2) screen

```
CONFIDENTIAL  PANEL
              ▲            3 / 4
    HDMI  TEMP   :  000
    HDMI  FAN    :  000
    HDMI  OVER   :  000


         RESET  ◄  HOLD  ►

12345h20m        [  HOLD  ]
EX.SSP           [1500ms ]
              ▼
```

DOWNLOAD screen

```
CONFIDENTIAL  PANEL
              ▲            4 / 4
MAIN  DOWNLOAD  [START?]
EVNT  DOWNLOAD  [START?]
DISP  DOWNLOAD  [START?]
ITEM  DOWNLOAD  [START?]
DSPM  DOWNLOAD  [START?]
HDMI  DOWNLOAD  [START?]
DSP1  DOWNLOAD  [START?]
DSP3  DOWNLOAD  [START?]
              ▼
```

2.4.1 Version screen

The version screen displays firmware information of various microcomputers, DSP firmware, Font Rom and i.link GUID.

2.4.2 Protect screen
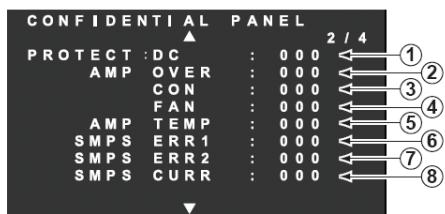
```
CONFIDENTIAL  PANEL
           ▲              2 / 4
PROTECT :DC       :  0 0 0  ◁──── ①
        AMP  OVER :  0 0 0  ◁──── ②
             CON  :  0 0 0  ◁──── ③
             FAN  :  0 0 0  ◁──── ④
        AMP  TEMP :  0 0 0  ◁──── ⑤
        SMPS ERR1 :  0 0 0  ◁──── ⑥
        SMPS ERR2 :  0 0 0  ◁──── ⑦
        SMPS CURR :  0 0 0  ◁──── ⑧
```

	Detected Abnormalities	Description	Indication During Detection	LED that Flashes After Detection
①	Number of AMP DC detections	DC detection in the amp output (after passing through the LPF)	AMP ERR	*
②	Number of AMP OVER (overcurrent) detections	Overcurrent detection in the amp output	–	PHASE CONTROL
③	Number of simultaneous detections of AMP DC&OVER (DC and overcurrent)	Simultaneous detection of DC and overcurrent	–	PHASE CONTROL
④	Number of AMP FAN (STOP) detections	FAN abnormality detection for the AMP, SMPS, or transformer	FAN STOP	i.Link
⑤	Number of AMP TEMP (abnormal temperature) detections	Abnormality in the temperature of the amp	AMP OVERHEAT	STANDBY ON
⑥	Number of SMPS ERR1 (abnormal) detections	Abnormality in the SMPS (temperature, short-circuit, overvoltage etc.)	–	STANDBY ON
⑦	Number of SMPS ERR2 (failure) detections	Abnormality in the SMPS (failure)	–	MCACC
⑧	Number of SMPS CURR (overcurrent) detections	Overcurrent detection in the SMPS	–	STANDBY ON

```
CONFIDENTIAL  PANEL
           ▲              3 / 4
    HDMI  TEMP :  0 0 0  ◁──── ①
    HDMI  FAN  :  0 0 0  ◁──── ②
    HDMI  OVER :  0 0 0  ◁──── ③

       RESET  ◀  HOLD  ▶◁──── ④

12345h20m        [ HOLD ]
EX. SSP          [1500ms]
           ▼
```

	Detected Abnormalities	Description	Indication During Detection	LED that Flashes After Detection
①	Number of HDMI TEMP (abnormal temperature) detections	Abnormal temperature of the HDMI	–	STANDBY ON
②	Number of HDMI FAN (STOP) detections	Detection of abnormality in the fans for HDMI	–	i.Link
③	Number of HDMI OVER (abnormal voltage) detections	Detection of over-voltage in the HDMI	–	MCACC
④	Clear the numbers of detections mentioned above. This is to be used before shipment or after repair.	–	–	–

Key Operation	OSD
Resetting the number of times error is detected [↓]　[↑]	CONFIDENTIAL PANEL ▲　　　　　3 / 4 HDMI TEMP : 000 HDMI FAN : 000 HDMI OVER : 000 RESET ◄ HOLD ► 12345h20m [HOLD] EX.SSP [1500ms] ▼
Display accumulated time and reset [↓]　[↑]	CONFIDENTIAL PANEL ▲　　　　　3 / 4 HDMI TEMP : 000 HDMI FAN : 000 HDMI OVER : 000 RESET [HOLD] 12345h20m ◄ HOLD ► EX.SSP [1500ms] ▼
The Timer of Exception "Set Stream Path" [↓]　[↑] To DOWNLOAD screen	CONFIDENTIAL PANEL ▲　　　　　3 / 4 HDMI TEMP : 000 HDMI FAN : 000 HDMI OVER : 000 RESET [HOLD] 12345h20m [HOLD] EX.SSP ◄1500ms► ▼

Resetting the number of times error is detected

Key Operation	OSD
[←] [→]	◄ Clear? ►
[ENTER]	◄ RESET ►
↓ Service mode continuation	

Resetting the accumulated time

Key Operation	OSD
[←] [→]	12345h20m ◄ Clear? ►
[ENTER]	0h 0m [RESET]
↓ Service mode continuation	

Setting of the Timer of Exception "Set Stream Path" command on CEC

Key Operation	OSD
[←] [→]	EX.SSP ◄ 1600ms ►
↓ Service mode continuation	

2.4.3 Download screen

This block is used to enter rewrite mode for various microcomputers and DSP firmware.

Key Operation	OSD
MAIN microcomputer DOWNLOAD [↓] [↑]	CONFIDENTIAL PANEL ▲ 4/4 MAIN DOWNLOAD [START?] EVNT DOWNLOAD [START?] DISP DOWNLOAD [START?] ITEM DOWNLOAD [START?] DSPM DOWNLOAD [START?] HDMI DOWNLOAD [START?] DSP1 DOWNLOAD [START?] DSP3 DOWNLOAD [START?] ▼

Key Operation	OSD
[ENTER] ↓ To MAIN microcomputer DOWNLOAD mode	MAIN DOWNLOAD [GO ON]

Key Operation	OSD
EVENT microcomputer DOWNLOAD [↓] [↑]	CONFIDENTIAL PANEL ▲ 4/4 MAIN DOWNLOAD [START?] EVNT DOWNLOAD [START?] DISP DOWNLOAD [START?] ITEM DOWNLOAD [START?] DSPM DOWNLOAD [START?] HDMI DOWNLOAD [START?] DSP1 DOWNLOAD [START?] DSP3 DOWNLOAD [START?] ▼

Key Operation	OSD
[ENTER] ↓ To EVENT microcomputer DOWNLOAD mode	EVNT DOWNLOAD [GO ON]

| Key Operation	OSD
DISPLAY microcomputer DOWNLOAD [↓] [↑]	CONFIDENTIAL PANEL ▲ 4/4 MAIN DOWNLOAD [START?] EVNT DOWNLOAD [START?] DISP DOWNLOAD [START?] ITEM DOWNLOAD [START?] DSPM DOWNLOAD [START?] HDMI DOWNLOAD [START?] DSP1 DOWNLOAD [START?] DSP3 DOWNLOAD [START?] ▼

Key Operation	OSD
[ENTER] ↓ To DISPLAY microcomputer DOWNLOAD mode	DISP DOWNLOAD [GO ON]

Key Operation	OSD
ITEM microcomputer DOWNLOAD [↓] [↑]	CONFIDENTIAL PANEL ▲ 4/4 MAIN DOWNLOAD [START?] EVNT DOWNLOAD [START?] DISP DOWNLOAD [START?] ITEM DOWNLOAD [START?] DSPM DOWNLOAD [START?] HDMI DOWNLOAD [START?] DSP1 DOWNLOAD [START?] DSP3 DOWNLOAD [START?] ▼

Key Operation	OSD
[ENTER] ↓ To ITEM microcomputer DOWNLOAD mode	ITEM DOWNLOAD [GO ON]

Key Operation	OSD

DSP microcomputer DOWNLOAD

[↓] [↑]

```
C O N F I D E N T I A L   P A N E L
                        ▲    4/4
M A I N   D O W N L O A D   [ S T A R T ? ]
E V N T   D O W N L O A D   [ S T A R T ? ]
D I S P   D O W N L O A D   [ S T A R T ? ]
I T E M   D O W N L O A D   [ S T A R T ? ]
D S P M   D O W N L O A D   [ S T A R T ? ]
H D M I   D O W N L O A D   [ S T A R T ? ]
D S P 1   D O W N L O A D   [ S T A R T ? ]
D S P 3   D O W N L O A D   [ S T A R T ? ]
                        ▼
```

Key Operation	OSD
[ENTER] ↓ To DSP microcomputer DOWNLOAD mode	`D S P M   D O W N L O A D   [ G O   O N ]`

HDMI microcomputer DOWNLOAD

[↓] [↑]

```
C O N F I D E N T I A L   P A N E L
                        ▲    4/4
M A I N   D O W N L O A D   [ S T A R T ? ]
E V N T   D O W N L O A D   [ S T A R T ? ]
D I S P   D O W N L O A D   [ S T A R T ? ]
I T E M   D O W N L O A D   [ S T A R T ? ]
D S P M   D O W N L O A D   [ S T A R T ? ]
H D M I   D O W N L O A D   [ S T A R T ? ]
D S P 1   D O W N L O A D   [ S T A R T ? ]
D S P 3   D O W N L O A D   [ S T A R T ? ]
                        ▼
```

Key Operation	OSD
[ENTER] ↓ To HDMI microcomputer DOWNLOAD mode	`H D M I   D O W N L O A D   [ G O   O N ]`

1st DSP firmware DOWNLOAD

[↓] [↑]

```
C O N F I D E N T I A L   P A N E L
                        ▲    4/4
M A I N   D O W N L O A D   [ S T A R T ? ]
E V N T   D O W N L O A D   [ S T A R T ? ]
D I S P   D O W N L O A D   [ S T A R T ? ]
I T E M   D O W N L O A D   [ S T A R T ? ]
D S P M   D O W N L O A D   [ S T A R T ? ]
H D M I   D O W N L O A D   [ S T A R T ? ]
D S P 1   D O W N L O A D   [ S T A R T ? ]
D S P 3   D O W N L O A D   [ S T A R T ? ]
                        ▼
```

Key Operation	OSD
[ENTER] ↓ To 1st DSP firmware DOWNLOAD mode	`D S P 1   D O W N L O A D   [ G O   O N ]`

3rd DSP firmware DOWNLOAD

[↓] [↑]

To VERSION screen

```
C O N F I D E N T I A L   P A N E L
                        ▲    4/4
M A I N   D O W N L O A D   [ S T A R T ? ]
E V N T   D O W N L O A D   [ S T A R T ? ]
D I S P   D O W N L O A D   [ S T A R T ? ]
I T E M   D O W N L O A D   [ S T A R T ? ]
D S P M   D O W N L O A D   [ S T A R T ? ]
H D M I   D O W N L O A D   [ S T A R T ? ]
D S P 1   D O W N L O A D   [ S T A R T ? ]
D S P 3   D O W N L O A D   [ S T A R T ? ]
                        ▼
```

Key Operation	OSD
[ENTER] ↓ To 3rd DSP firmware DOWNLOAD mode	`D S P 3   D O W N L O A D   [ G O   O N ]`

2.5 Test mode

Preparation:
1) While holding the MULTI OPERATION key pressed, press the SETUP key. "SETUP" is displayed in the display of the remote control unit.

2) Select "PRESET" by using the up-down directional buttons and press ENTER key.
3) Select one of the multi-control (function) keys for which the test code is to be registered. If the customer's remote control unit is used, there is a possibility that registered settings will be overwritten and lost. (Be sure to select a function key for which no setting has been registered.) If the customer's remote control unit is used, restore the preset values after servicing is finished. (be sure to make note of the customer's preset ID beforehand.)

4) Select "I" press ENTER key.
5) Select "INSTSERV" press ENTER key.
6) Select "LD 150" press ENTER key.
7) Press and hold the MULTI OPERATION key for 2 seconds to finish test code preset.

For details on preset code setting, refer to page 112 of the operating instructions.

Enter test mode:

⚠ On entering test mode, all user settings (MCACC, tuner presets, function names, zone2/3 settings, …) will be lost. Before using test mode, be sure to consult with the customer.

Press the MENU key of the function for which the test code has been registered.

Exit test mode:
Press the 9 key of the function for which the test code has been registered. The unit exits test mode and enters standby mode.

Press **"0" key** of the function of which the test code has been registered.	HDMI test mode	A 1 kHz suare wave is output from the HDMI CEC output of the unit.	CEC TEST ON CEC TEST OFF
Press **"7" key** of the function of which the test code has been registered.	FAN ON/OFF	All fans are activated or disactivated at high speed. The HDMI fan is always active.	TEST FAN ON TEST FAN OFF
Press **"9" key** of the function of which the test code has been registered.	Exit test mode	The unit exits test mode and enters standby mode.	

2.6 Control panel mode

The control panel is also expained in the user manual, and is accesible for customers as well.

Enter control panel :
1) Turn off the ZONE 2 and ZONE 3 of the multi-zone control and turn off the power.
2) After the power-off, press and hold down both "**SETUP**" key and "POWER" key.

Exit service mode:
Turning off the power or pressing the "**RETURN**" key returns to normal mode.

```
CONTROL  PANEL

ALL  RESET        ◄   NO   ►
DIGITAL  SAFETY[     OFF  ]
i.LINK DB       [     NO   ]

iPod  mode      [  Type1]
```

ALL RESET   To return the unit to factory settings. Select "Reset" and press "ENTER". "Reset OK?"
                   appears, press enter to confirm.

DIGITAL SAFETY   Activate a peak level limitter to allow higher volume output with less chance to damage
                   the speakers or amplifier by peaks in the audio. D. Safety1 is medium effect,
                   D.Safety2 is high effect. This peak limiting is done by the DSP.

i.LINK DB   When a i.link component is connected, the ID (GUID) of the component is stored in the
                   flash rom for Host µcom. This option will clear this memory. This can be neccesairy
                   after upgrading a i.link component.

PAL/NTSC   Change the video system of the OSD generators (main, zone 2 and zone 3)

iPod mode   The SC-LX90 is the first AV amplifier from pioneer that can use digital audio coming
                   from the iPod through the iPod connector. The SC-LX90 can't use an iPod when it is
                   connected directly with the front USB input!
                   Since this is possible, it's neccesairy to have a setting that enables the user to use
                   analogue or digital audio from it's iPod.

                   Type1: For digital audio transferring and the video browse function. This works from
                   iPod 5th generation or iPod nano, second generation. Video playback of iPod touch is
                   not supported.
                   Type2: For analogue audio transfering. Used for older iPod models, uncapable of
                   output digital audio.

iPod cable VSX-LX70 (analogue only)   iPod cable SC-LX90 (full connect)

2.7 Firmware
2.7.1 Upgrading DSP flash by CD

[Purpose]

By referring to this section, rewrite the DSP Flash ROM when required. Rewriting is instructed through service information, etc.
By playing back a CD-R on which a DSP program is recorded, using a normal CD player, rewriting is possible.

[Tools to be used]

Please use DVD player based on MTK system (DV-270, 370, 373, 575K, 280, 380, 383, etc.) ,Mitsubishi system (DV-59AVi, 868AVi, S969AVi, 668AVi, etc.) or Fujitsu system (DV-343, 444, 545, etc.) DO NOT use DVD player based on ST system (DV-353, 454, 250, 400, 555K, 260, 363, 464, 466, 563, etc.) The factory confirmed that DVD players based on ST system cannot send the correct data to the VSX unit using the update disc.
You can check the base system of our DVD players on the firmware version list at PSN web (Niis)

• Coaxial cable or Optical cable
• Update disc (CD-R disc)

[Connections]

Connect this unit and a player, as shown in the figure below.

CD or DVD player ——— This unit
Digital connection
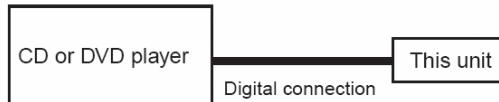
[Preparations]

Burn the DSP flash ROM firmware (.wav file) to a CD-R disc using commercially available burning software.
It is necessary to select the writing format to "For music player", not "For PC data".
Note:
Depending on a burning software, data on a CD-R may not be worked for updating the DSP flash ROM.
If the HDMI indicator does not flash when playing back a update disc by following procedure 5, the disc is not able to use for updating.
Burn the DSP flash ROM firmware to a CD-R disc, using other burning software. (The burning software that operation check is finished: Record Now !)

[Note]

• **Do NOT disconnect the AC cords of this unit nor the CD/DVD player while rewriting is in progress.**

• **The "OK" indication displayed after updating means the checksum on the flash ROM is OK.**
  If the "OK" indication is not displayed, updating has not been completed.

Note that confirmation with audio check or version check is insufficient for checking if updating has been completed.
If you set the unit to STANDBY OFF without confirming of "OK" indication on the FL display, be sure to perform the updating procedures again.

[Procedures]

1. Check the versions of the DSP and microcomputer.
   Check the versions by referring to "Version screen" in "6.1 SERVICE MODE."

2. Connect a CD or DVD player.
   (1) Connect the CD or DVD player to be used for updating to any digital input connector of this unit.
   (2) With the INPUT SELECTOR, select the input being used.

3. Check if the digital signal is locked (received).
   (1) Play back a stream for updating with the player.
   (2) Set the receiver to normal setting, "Signal Select" to Auto, then check the SIGSEL item of AUDIO INPUT screen on the STATUS display whether the input is set to Auto and Digital. (SIGSEL: AUTO [DIGITAL])

4. Start up this unit in writing mode.
   (1) Relocate the CD playback starting point to the beginning (time: 0:00) of the track No and pause playback.
   (2) Set the volume of the receiver to - ∞ dB and set the receiver to STANDBY OFF.
   (3) Press the ENTER key and the ZONE 2 (MULTI-ZONE CONTROL) key simultaneously for several seconds.
   (4) Press "⬇" key until it enters the predetermined mode.
       When DSP1 is downloaded:
         Display: DSP1 DOWNLOAD [START?] → Press the Enter key. → Display: DSP1 DOWNLOAD [GO ON]
       When DSP3 is downloaded:
         Display: DSP3 DOWNLOAD [START?] → Press the Enter key. → Display: DSP3 DOWNLOAD [GO ON]

5. Play back the track on CD disc.
   (1) Release Pause mode of the player and play back the track where the DSP program stream signal to be burned is stored.
   (2) After 5 to 10 seconds, the HDMI indicator starts flashing. Be sure to check that it is flashing.
   (3) Flashing indicates that a correct stream is being received and that updating is in progress.

   Note: Do NOT turn off the unit while the HDMI indicator is flashing. If the unit is turned off, be sure to go back to Step 4. (As the Flash ROM goes into unusual status if the power is off during rewriting, the unit may not start properly.) Even in such a case, you can restore the unit by performing Steps 4 to 7.

6. Wait until rewriting is completed.
   (1) Basically, wait until "OK" is displayed on the LCD screen. It takes about several minutes for updating DSP1 or DSP3.
   (2) After confirming that "OK" is displayed, stop or pause the player then turn off the power of the Player and the Receiver after 5 seconds.

7. Check the version of the program after updating.
   (1) Check the version by pressing and holding the ENTER key and ZONE 2 (MULTI-ZONE CONTROL) key simultaneously for several seconds.
   (2) Check the downloaded version with the LCD screen.
       DSP1 : *.***
       DSP3 : *.***
   (3) For confirmation, check basic operations.

■ Troubleshooting of DSP FLASH ROM UPDATE

Symptoms	Items to be checked
The HDMI indicator does not start flashing, and 10 seconds or more has elapsed after a updating stream is input.	Is DSP writing mode entered? (Simultaneously press and hold the ENTER and ZONE 2 keys.)
	Is DIR locked? → You can check this on the Signal Select indicator if the input is set to Auto and Digital. If DIR is not locked, check the input function and digital connections between the player and this unit.
	Is the stream (Track No., etc.) being played back correct?
	Are compressed audio signals, such as WMA, being input when or after writing mode is entered ? → As soon as the compressed audio signals are input, writing mode is exited. It is recommended that playback be paused at the beginning of the track of a updating stream then writing mode is entered by simultaneous pressing of the keys. Release Pause mode after entering of writing mode is confirmed.
Writing mode is not entered upon simultaneous pressing of the ENTER and ZONE 2 keys.	Is the volume control of the receiver set to -∞ dB? If not, set it to -∞ dB (- - -).
	Reset the receiver then enter writing mode. **Note:** All the user data stored in the receiver are cleared when the receiver is reset.
"OK" is not displayed.	Is the track played back from the beginning to the end? → With the receiver in writing mode, be sure to play back the stream track twice.
	If an error is generated because any scratches on the disc, "OK" is not displayed. → In such a case, play back the same stream stored on another track as backup.

2.7.2 Updating flash roms for various microcomputers

[Purpose]
    Refer to this section when updating of a Flash ROM is required by the service information, etc.

[Tools to be used]
    • PC with a serial port
    • RS-232C cable (9-pin to 9-pin, cross)
    • Firmware ("mot" extension)
    • Program for updating (ufu.exe: ver. 1.08)

[Connections] (MAIN microcomputer)   (DSP microcomputer)
                    (EVENT microcomputer)   (HDMI microcomputer)
                    (DISPLAY microcomputer)
                    (NEW ITEM microcomputer)

Connect as indicated in the figure right:

PC ──── RS-232C cross cable (9-pin to 9-pin) ──── This unit

Pin-out diagram of RS-232C cross cable

```
2 ──── 2
3 ──╳── 3
4 ──── 4
5 ──╳── 5
6 ──── 6
7 ──── 7
8 ──── 8
Dsub 9-pin female    Dsub 9-pin female
```
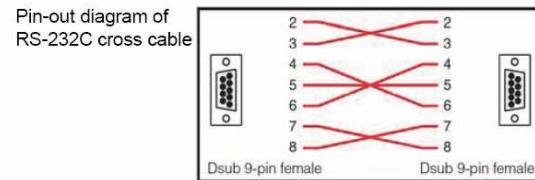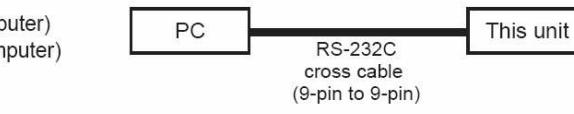
[Note]
 Do NOT disconnect the AC power cords of this unit nor the PC.

[Procedures]

1. Turn off the power to this unit by setting the main volume level to "---dB" and Multi-Zone to "OFF".
2. Connect the 232C interlink cable and the PC, as indicated in "Connections".
3. Simultaneously press and hold the ENTER and ZONE 2 keys for about 5 seconds.
4. Turn the power ON at SERVICE mode.
5. (MAIN microcomputer)
   Press ↓ key and select "MAIN DOWNLOAD [START?]" display.
   Press ENTER key and set to "MAIN DOWNLOAD [GO ON]".

   (EVENT microcomputer)
   Press ↓ key and select "EVNT DOWNLOAD [START?]" display.
   Press ENTER key and set to "EVNT DOWNLOAD [GO ON]".

   (DISPLAY microcomputer)
   Press ↓ key and select "DISP DOWNLOAD [START?]" display.
   Press ENTER key and set to "DISP DOWNLOAD [GO ON]".

   (NEW ITEM microcomputer)
   Press ↓ key and select "ITEM DOWNLOAD [START?]" display.
   Press ENTER key and set to "ITEM DOWNLOAD [GO ON]".

   (DSP microcomputer)
   Press ↓ key and select "DSPM DOWNLOAD [START?]" display.
   Press ENTER key and set to "DSPM DOWNLOAD [GO ON]".

   (HDMI microcomputer)
   Press ↓ key and select "HDMI DOWNLOAD [START?]" display.
   Press ENTER key and set to "HDMI DOWNLOAD [GO ON]".

6. Double-click on "ufu.exe".
7. Check that "Full" is selected in Mode Select.
8. Select the firmware file with "mot" extension.
9. Select the communication speed.
      • Base speed: 19200
      • Data Send Speed: 57600
10. Click on "START" button.
11. "Completed" is displayed in the"ufu.exe" window.

12. Check the version.
    Following the procedures described in "VERSION screen" in "6.1 SERVICE MODE," check that the version has been changed to a new one.
13. Initialize the memory in the ALL RESET of CONTROL PANEL mode after the updating is completed.
    (Refer to the section "6.3 CONTROL PANEL MODE.")

Check that "Full" is selected in Mode Select.
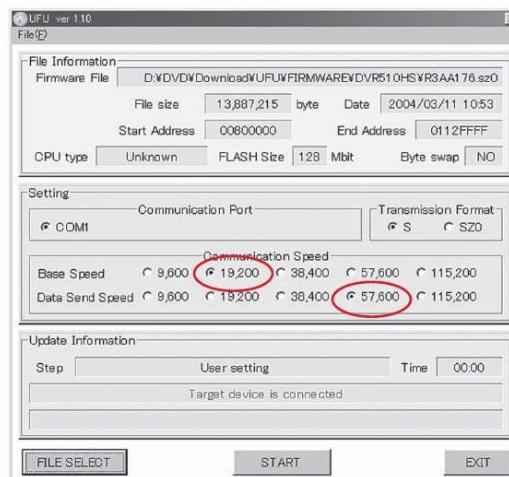
Select the communication speed.
    • Base Speed: 19200
    • Data Send Speed: 57600

2.7.3 Updating flash rom for USB module

[Purpose]

Referring to this section, rewrite the USB firmware when rewriting is instructed through service information.

[Tools to be used]

• iPod
• Firmware file ("Player.rom" file)

Note: Place the "Player.rom" file for updating in the root directory (top layer) of the iPod.

[Procedures]   **OSD**

1. Turn down the volume to minimum (- - - dB).
2. Press and hold the [⬆] and [POWER] keys for about 5 sec.

   Host preparing for rewriting

```
i P o d                    - - -
F / W  U P D A T E

W A I T I N G
```

3. After about 20 sec., the current firmware version is automatically displayed.
   Note: When this version indication is displayed, the host board is ready. Therefore, do not connect the iPod until this indication is displayed.

```
i P o d                    - - -
F / W  U P D A T E

C O R E 1 . 5 0
```

4. Connect the iPod.
   The name of the file for updating is always "Player.rom."

```
i P o d                    - - -
F / W  U P D A T E

U P D T   0 0 0
```

5. Counting continues until updating is completed.

```
i P o d                    - - -
F / W  U P D A T E

U P D T   0 2 4
```

6. Updating is completed.
   Turn the power OFF.

```
i P o d                    - - -
F / W  U P D A T E

C O M P L E T E
```

[Procedures]

<div style="text-align:center">OSD</div>

7. Check to make sure that the version has been updated.
   Press and hold the [⬆] and [POWER] keys for about 5 sec.

```
iPod                    - - -
F/W  UPDATE

WAITING
```

8. After about 20 sec., the updated firmware version is
   automatically displayed.

```
iPod                    - - -
F/W  UPDATE

CORE2.00
```

3. SCHEMATICAL EXPLANATIONS
3.1. Power on sequence

From the moment that you plug the SC-LX90 in the mains, it will power up the system µcom and event µcom to start up to standby status. The startup procedure is as following (refer to block diagram for more info):

Going to standby status after connecting the mains (230V).

#	Signal name	Location	Status	function
1.	V+5.6ST	**BC** Primary assy	5,6V	Standby voltage for system µcom
2.	V+3UM	**V** Mother1 assy System µcom (IC8001)	3V	3V is supplied to system µcom. (**V** IC8001 *pin 96&97*)
3.	V50U	**AC** IR 232C assy Event µcom (IC6201)	5V	5V is supplied to Event µcom. (**AC** IC6201 *pin 80*)
4.	X8001	**V** Mother1 assy System µcom (IC8001)	15,67 MHz	X8001 oscillation. (**V** IC 8001 *pin 11&13*)
5.	ACWP3	**V** Mother1 assy System µcom (IC8001)	50/60Hz pulse	50HZ or 60Hz pulse is inputted. (**V** IC 8001 *pin 16*)
6.	XRESET	**V** Mother1 assy System µcom (IC8001)	L -> H	System µcom is reset by reset IC. (**V** IC8003 *pin 1*) (**V** IC8001 *pin 10*)
7.	EVTRST3 EVERT	**AC** IR 232C assy Event µcom (IC6201)	L -> H	Event µcom is reset by system com. (**AC** IC6201 *pin 8*)

The unit is now in standby status, waiting to be powered on. The powering on of the unit can be triggered by the following actions:

- pressing of standby/on button on the **front**.
- pressing stanby/on button on the **remote control**.
- power on signal coming from **HDMI-CEC**.
- power on signal coming from **SR input or IR inputs**.
- power on command coming from **RS232 device**.

When a power on signal is given, the Event µcom will receive this and the following will happen:

Power on after standby status.

#	Signal name	Location	Status	function
8.	1WWP	**AC** IR 232C Assy Event µcom (IC6201)	L->H->L	After pressing Standby/on button, Event µcom changes 1WWP signal to wake up System µcom. (**AC** IC6201 *pin 86*) (**V** IC8001 *pin 18*)
9.	EVERD EVTRDY3	**AC** IR 232C Assy Event µcom (IC6201)	L->H->L	The event µcom changes EVERD (RDY) signal to inform system µcom that it's ready for communication. (**AC** IC6201 *pin 83*) (**V** IC8001 *pin 37*)
10.	EVECK EVTCK3	**V** Mother1 assy System µcom (IC8001)	L->H->L	System µcom changes EVECK signal. (**AC** IC6201 *pin 100*) (**V** IC8001 *pin 35*)
11.	EVEDO EVTDO3	**AC** IC 232C System µcom (IC8001)	L->H->L	Event µcom starts communication with system µcom. (**AC** IC6201 *pin 98*) (**V** IC8001 *pin 34*)
12.	EVEDI EVTDI3	**V** Mother1 assy System µcom (IC8001)	L->H->L	System µcom communicates with Event µcom (**AC** IC6201 *pin 99*) (**V** IC8001 *pin 33*)
13.	ACRY	**V** Mother1 assy System µcom (IC8001)	L->H	System µcom activates main voltage to digital transfo and analog transfo by closing relays on the primary assy. (**V** IC8001 *pin 39*)(**BC** CN4001 *pin 2*)
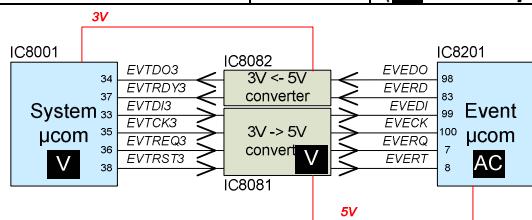
3.2 Power supply system

In the SC-LX90 there are 4 separate power supplies:

- Circuit for analogue signals
- Circuit for digital signals
- Stanby power circuit
- Icepower circuit

The standby power circuit is always activated from the moment that the SC-LX90 is connected to the mains. It switches off, from the moment the SC-LX90 is powered on!

3.2.1 PCB locations

---SUPPLY SYSTEM---
Trans for Analog circuit
Trans for Digital circuit

DD DSP ASSY	DSP±5V, HN MODULE+5V
DD DISP ASSY	FAN/u-COM±12V, DISPLAY +8V
DD HDMI ASSY	HDMI UNREG -> 2chDD -> +5V+6V
2ch DD ASSY	+V5, +V6
ICE REG ASSY	ICE POWER ±5V, ±12V
PRIMARY	UNREG -> TRANSFORMER, STBY +5.6
A-REG ASSY	AD+5V, DA+5V, Analog±15V, VIDEO±5V
Mother2 ASSY	iPOD Charge 8-13V & USB+5V ,u-COM

---Local Regulator---
Mother1 ASSY(Main COM)
HDMI ASSY(HDMI)
IR&232C ASSY(DISPLAY u-COM)
Main Digital ASSY(u-COM etc.)
DAC ASSY(DAC SLC)
DSP ASSY(DSP)
LCD MODULE
HN MODULE

Labels on image: FRONT SIDE, ICE REG ASSY, Trans for Analog, DD HDMI ASSY, 2ch DD ASSY, DD DSP ASSY, DD DISP ASSY, Trans for Digital, PRIMARY & STBY, A- REG ASSY, iPod & USB (REG5V), u-COM

BLUE /BLUE 120V (KU)

GREEN/GREEN 100V (Japan)

BLACK/RED 230V (Other)

3.2.2 Primary power supply

PFC ASSY

AC INLET ASSY

INLET ASSY

CN14 — V — REACTOR — V — R — RY — RY — FU2

RY

FAN

FAN

FU1

Varistor: For surge absorbing

Relay will be ON in the second timing

Resistance for inrush current suppression

Coil for PFC (Power Factor Correction)

Relays will be ON in the first timing

To PRIMARY ASSY

Primary Power supply (Upper side of the unit)

PRIMARY ASSY

Primary

AC

STBY 5V

13-16V

Power On : H (Reg sw off)

3.3V AC PULS (50/60Hz):Wakeup

1. To Trans for Digital circuit
2. To Trans for Analog circuit
3. STBY 5V (power on : 0V :regulator sw off.)
4. AC relay
5. HDMI FAN dirver (10V-11V)
6. AC relay driver (+12V) for ICE -> To PFC ASSY
7. FAN driver (±12V) for ICE -> To PFC ASSY
8. FAN error detection -> To EVENT u-com (IR&232C ASSY)
9. Wake up (3.3V 50 or 60 Hz AC puls) -> To MAIN u-com (Mother1 ASSY)

3.2.3 Power supply for analogue circuit

PRIMARY | SECONDARY

BA A-REG ASSY

IC4133
NJM78M12
+12V

47µ
25V
TUNER +12V
KU MODEL ONLY

IC4131
NJM78M15

Rough lock
+18V
Q4133

+15V

FU7
D4131
D3SBA20
D

4700µ
35V

47µ
25V

47µ
25V
A-Audio +15V

A-Audio -15V

4700µ
35V

47µ
25V

47µ
25V

Q4134
-18V
Rough lock

-15V
IC4132
NJM79M15

FU8

IC4151
NJM7805
+5.0V

Rough lock
+8.0V
Q4152

FU9
D4151
D3SBA20
D

6800µ
16V

100µ
16V

100µ
16V
A-Video +5.0V

A-Video -5.0V

4700µ
16V

-5.0V
IC4152
NJM7905

100µ
16V

FU10

IC410
D4111
D3SBA20
D

IC4111
NJM7805
+5.0V

4700µ
16V

100µ
16V
ADC +5.0V

FU6
D4121
D15XB20
D

IC4121
LM2940CT-5.0
+5.0V

4700µ
16V

100µ
16V
DAC +5.0V

BA A-REG ASSY

AP ICE REG ASSY
FU11

IC4803
NJM7805
+5.0V

D4801
D3SBA20
D

3300µ
16V

100µ
16V
Audio(ice) +5.0V

3300µ
16V

100µ
16V

-5.0V
IC4804
NJM7905
Audio(ice) -5.0V

FU12

IC4851
NJM78M12
+12.0V

3300µ/16V

4700µ
35V

100µ
16V
Audio(ice) +12.0V

4700µ
35V

100µ
16V

-12.0V
IC4861
NJM79M12
Audio(ice) -12.0V

3300µ/16V

A-REG ASSY

CN4101 CN4102 CN4104 CN4121 CN4105 CN4103

AD

DA

DA

Analo

VIDE

Analo

VIDE

Analog+/-15V & TUNER

VIDEO+/-5V

DA DIODE

DA

To CN4121

AD

DA

A-15V

A+15V

TUNER+12V(K

V+5V

V-5V

JP4102

A-REG ASSY

Main Digital ASSY ← CN4102 ← AD+5V REG (IC4111) ← AD+5V Rectifier Diode (D4111) ← CN4101 ← Trans for Analog

DAC ASSY ← CN4104 ← DA+5V REG (IC4121) ← Ripple filter ← CN4121 ← DA+5V Rectifier Diode (D4121)

A-18V Rough Lock (Q4134)
A-15V (IC4132)
A＋15V (IC4131)
A+18V Rough Lock (Q4133)
TUNER+12V (IC4133)

CN4105

CN4103 ← A-Bridge1ASSY

S-VIDEO & COMPONENT ASSY ← COMPOSITE ASSY ← CN2005 ← JP4102 ← Analog Rectifier Diode (D4131)

V+5V (IC4151)
A+8V Rough Lock (Q4152)
V-5V (C4152)
Video Rectifier Diode (D4152)

ICE REG ASSY

ICE ← CN4802 ← ICE+-5V (IC4803, IC4804) ← CN4801
CN4851 ← ICE+-12V (IC4851, IC4861) Rectifier Diode (D4801)

ICE REG ASSY

Rough Lock Circuit
Making midpoint potential.
The purpose is to reduce heat of a regurator.

exsample

21V
18V
15V

Direct	(21-15)*0.3=	1,8 W
Rough Lock	(21-18)*0.3=	0,9 W
	(18-15)*0.3=	0,9 W

Check points : It is able to check following voltage when removing the top plate and the beam L which is located center of the unit.

A-REG ASSY

For analog signals (RCA inputs) and function IC, etc.

CN4103

NC
+15V
GND
GND
-15V

Composite Assy

For VIDEO
CN2005

-5V
GND
GND
+5V

A-REG ASSY

For AD convertor IC and DA convertor IC

CN4104   CN4102   CN4101

GND
DA+5V

AD+5V
GND

AC input connector from transformer

ICE REG ASSY

CN4851
+12V
GND
-12V

ICE AMP for pre amp(±12V),
ICE AMP for modurator (±5V)

CN4802

+5V
GND
-5V
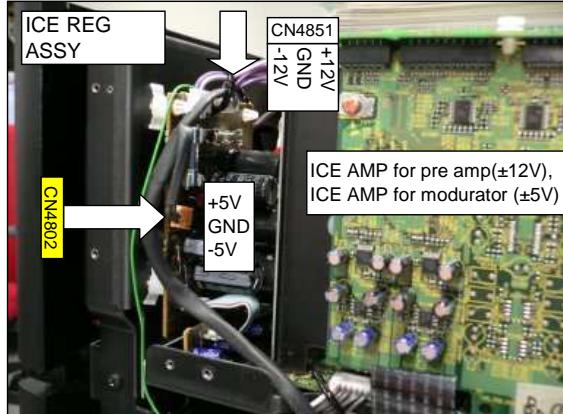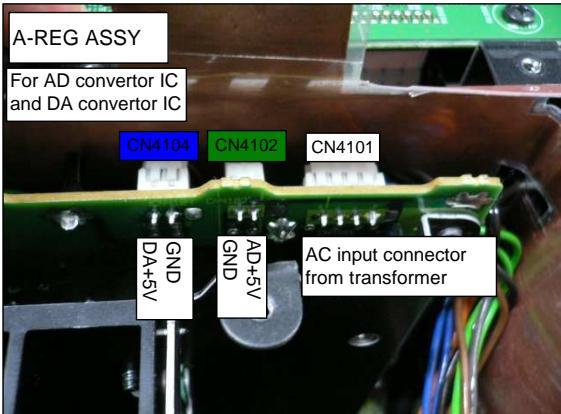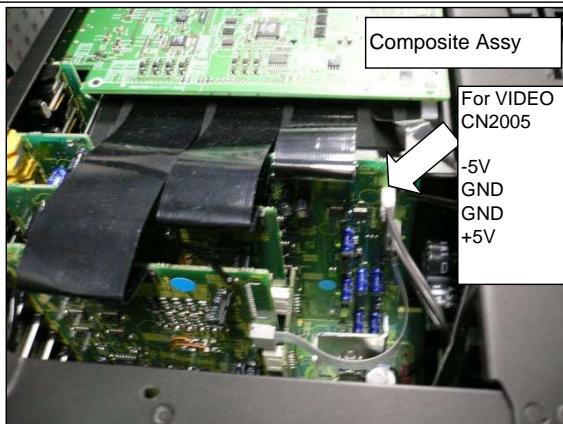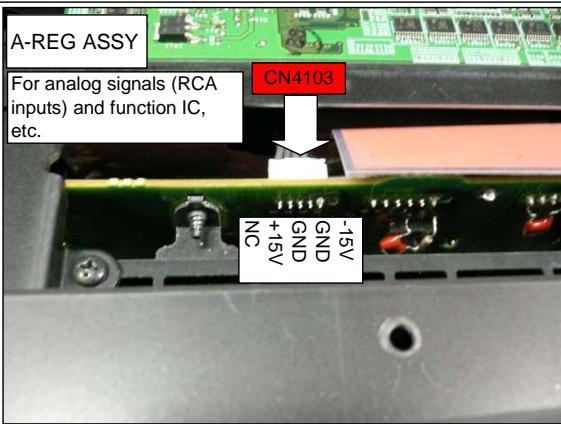
3.2.4 Power supply for digital circuit

DD DSP ASSY

DSP+5V
DSP-5V
NETWORK+5V
NETWORK+5V
DSP+5V
J4303
CN4302
DSP-5V

DD DSP ASSY
CN4302
DSP-5V
GND
DSP+5V

FOR HN MODULE
J4303
GND
GND
NTWK+5-5
NTWK-5-5V

DD DISP ASSY

FAN-12V ASSY
FAN -12V
FAN +12V
FAN-12V
DISPLAY+8V
HD Radio (KU ONLY)
FAN+12V
DISPLAY+8V

CN4002
PRIMARY ASSY
FAN (u-COM)
SIDE A
FAN+12V
GND
FAN-12V

PRIMARY ASSY
SIDE A
FAN+12V
J223

PRIMARY ASSY
SIDE B
CN4005

SIDE B   CN4002
FAN+12V
GND
FAN-12V

PERCH PS
CN6503
DISPLAY+8V
GND

DD HDMI ASSY+2chDD ASSY

Power Block
OUT(CN4605)
Control
IN(CN4604)
DC-DC CONVERTOR PART
(2ch DD ASSY)

IN/OUT PART(DD HDMI ASSY)

HDMI
SIDE B
CN11
V+5V
GND
GND
V+6V
P-GOOD(+5V)

P-GOOD : This signal informs that power supply of DD-convertor side is OK to HDMI ASSY.

MOTHER2 ASSY
iPOD CHARGE SUPPLY+5V for USB ASSY
u-COM 5.6V REG

MOTHER2 ASSY
iPOD+8 to 13V
GND
iPOD(USB)+5V
CN4752

IR&232C ASSY
It is able to check power supply voltage for u~com when removing side angle (left side).
3.3V
5.6V
5.6V
5.6V_STB

3.3. Protection indications

Once the analogue, digital and ICE power power supplies are activated, it's possible that a protection is detected and the unit will shut off again. The following protection can occur:

Description	Protection History in the Service Mode	OSD	LED Flashes	Detection Port
AMP Overload (Overcurrent)	AMP OVER	NA	PHASE CONTROL	System ucom (IC8001) pin 21 (AMP OL DET)
SMPS Abnormal	SMPS ERR1	NA	POWER indicator	System ucom (IC8001) pin 87 (LATCH MONITOR)
SMPS Failure	SMPS ERR2		*MCACC	
SMPS Overcurrent	SMPS CURR	SMPS OVER CURR	POWER indicator	System ucom (IC8001) pin 91 (POWER MONITOR)
AMP DC (Abnormal)	DC	AMP ERR	POWER indicator	System ucom (IC8001) pin 85 (DC DET)
AMP DC (Failure)			*MCACC	
AMP Overheat	AMP TEMP	AMP OVERHEAT	POWER indicator	System ucom (IC8001) pin 19 (TEMP OL)
FAN Stop	FAN	FAN STOP	iLink	Event ucom (IC6201) pin 27 (FAN STOP DET)
HDMI Overheat	HDMI TEMP	NA	POWER indicator	HDMI ucom (IC804) pin 84, 85, 86 (TDET1, 2 , 3)
HDMI FAN Stop	HDMI FAN	NA	iLink	HDMI ucom (IC804) pin 87 (FANLOCK)
HDMI Overvoltage	HDMI OVER	NA	*MCACC	HDMI ucom (IC804) pin 71 (XPDET)

*It is necessary to enter the Release Mode, when the MCACC LED is flashing.

AMP FAN control
80 degree C : Low rotation (12V)
90 degree C : High rotation (24V)
100 degree C to 110 degree C : AMP Overheat

Release mode :
  During standby mode, simultaneously press and hold "DOWN" and "ZONE2 ON/OFF" keys for 2 seconds.

3.4. Microcomputer overview
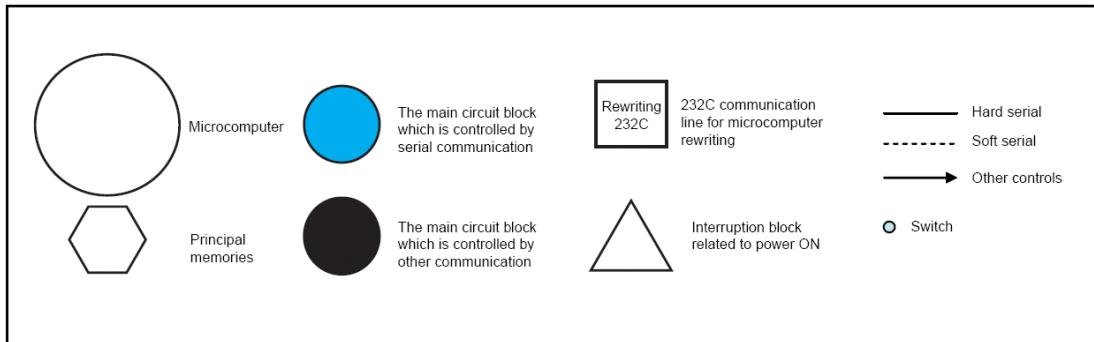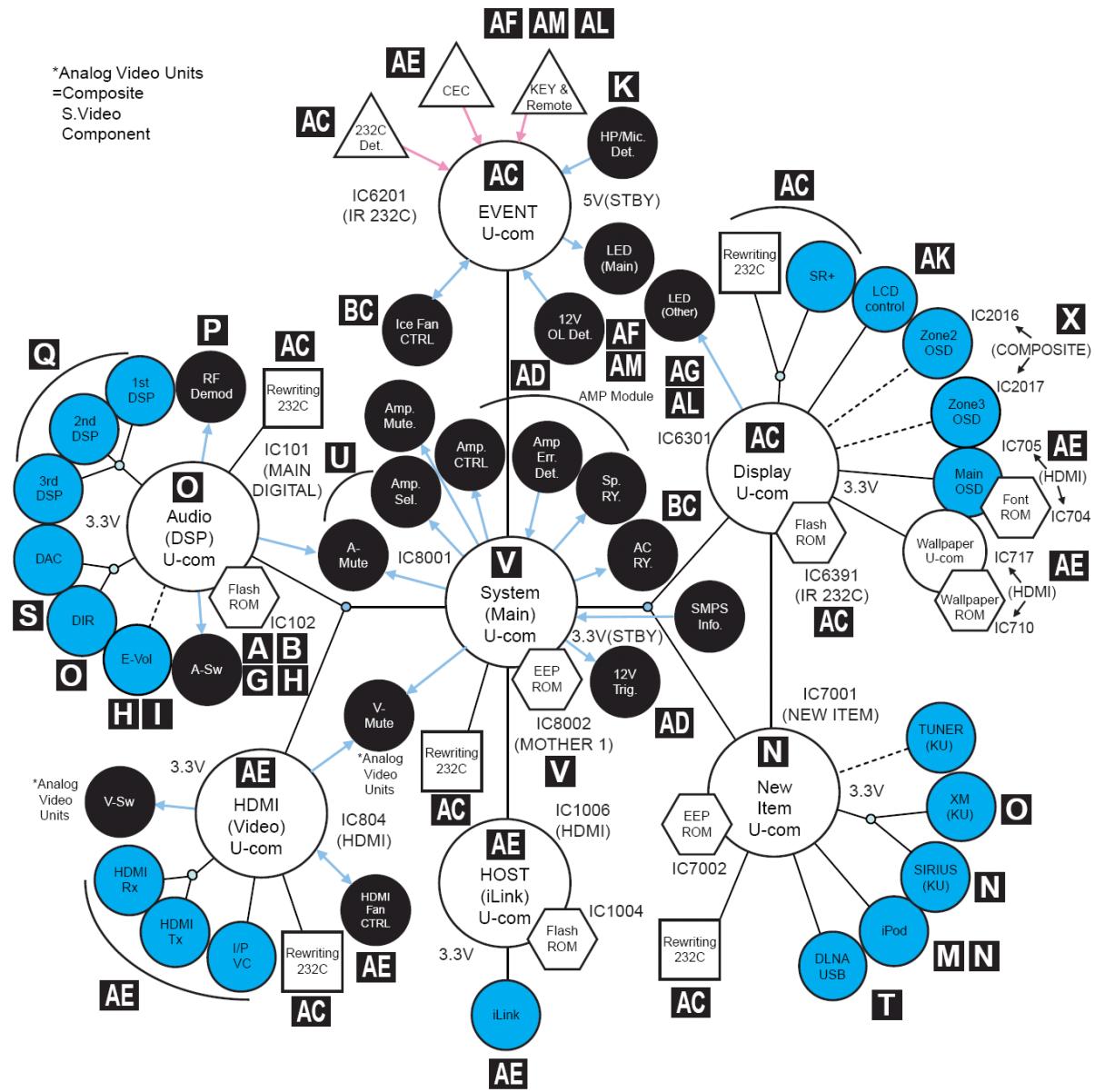
4.2. Screw list (rear part)

* This image is from SC-09TX (American equivalent from SC-LX90), there are small differences.

| **A** | **B** | **C** | **D** | **E** | **F** |
| X2 | x2 | x2 | x9 | x51 | x43 |
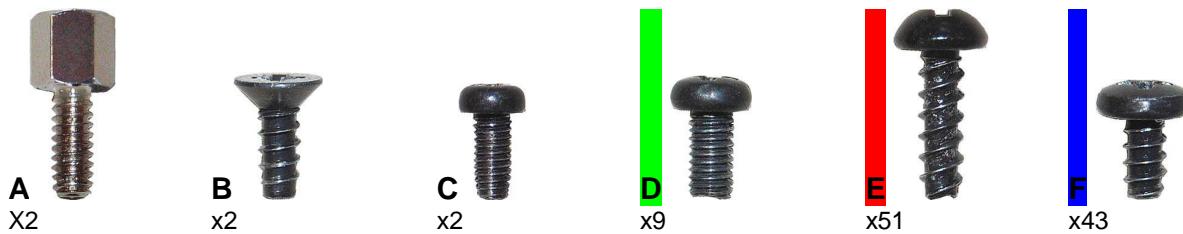
4.3 Tutorial

Bi-amp	This is an amplifier setting that will output 1 audio channel on 2 speaker outputs. This is for connecting speakers that have separate connections for high and low frequencies. As advantage you have better seperation between high and low frequencies and a more eficient power usage.

DSD	Direct Stream Digital. This is a digital audio format designed for mastering quality audio. The technology consist out of 1 bit delta sigma encoding and is currently used as digital audio format on SACD.
DVC	The **Digital Video converter** converts video signals from one connection to another. This is done digitally (analogue inputs are converted to digital and then converted to another analogue format). The capabilities of this Digital Video converter are related to the AV amplifier model.
I²S	Abbreviation for '**inter-IC sound**'. An internal serial link especially designed for digital audio. Designed by Philips.
MCACC	Multi-Channel Acoustic Calibration system. Is used to perform a acoustic calibration of your system.
SPDIF	**Sony/Philips Digital Interconnect Format**. This is a digital audio format capable of carrying stereo PCM sound (IEC60958) or compressed multichannel audio (IEC61937) through coaxial connection or optical connection.

Block diagrams

BG Inlet assy

BC Primary assy

BF PFC assy

AD Mother 2 assy

V MOTHER1 assy

AC IR 232C assy

AL TACT assy

AM Power SW assy

AH PERCH FFC assy

AJ PERCH PS assy

AI PERCH Disp assy

AF Display assy

To digital transfo

To analog transfo

To ICEPower assy

System μcom

Event μcom

Display μcom

Flash ROM

IC6411 Voltage regulator

IC6201

IC6201 Display μcom

IC6201 Flash ROM

IC8503 Voltage regulator — V+12V

IC8502 Port expander

IC8501

IC8502 Port expander

IC8001 System μcom

IC8082 3V<-5V

IC8081 3V->5V

IC8082 & &

X8001 15,67 MHz

IC8002 2kbyte EEPROM

IC8003 Reset IC

IC8022 Voltage regulator — V+5UM

IC8021 Voltage regulator — V+3US

IC4002 Voltage regulator

IC5001 Port expander

IC5002 Port expander

IC5003 Port expander

HDMI IN1/2
HDMI IN 3/4
HDMI IN 5/6
HDMI OUT 1

SR in
SR OUT

KEYP
POWER
CECIO
SRIN
IRIN

IR IN 1
IR IN 2
IR IN 3
IR IN 4

LACRY

EVTRDY3
EVTDO3
EVTRST3
EVTREQ3
EVTCK3
EVTDI3
XRST
SCL
SDA

1WWP3
ACWP3
ACRY
MEXxx

V+5R6ST
V56ST
V56U
V50U
V33U
V33D
V33D
V56U
V56ST
V+5,6U
V+5ST
V+5US
V+5U (4,1V)
V+5,6UO
V+5,6U
V+5,6ST
V+3UM
V+3UM
V-3UM

ST RC
AC RY
1WWP
WUP

D4001
D4006
D6401
D6402
D6201
D5012
D8021
D8042
D8043

Q4011

RY21
RY11
RY12
RY13
RY1,2
RY3

T21
H11
H16

FU3
FU4

L6301

CN24
CN4012
CN4004
CN4001
CN23
CN22
CN14
CN6408
CN6401
CN6402
CN6404
CN6405
CN6406
CN6407
CN6409
CN6501
CN6502
CN8508
CN8509
CN8511
CN8513
CN8501
CN8503
CN8502
CN8029
CN8031
CN8030
CN251
CN5102
CN5191
CN5101
CN5092
CN5091
CN5002
CN5003
CN5082

J11
J18
J13
J8512

BD1

Block diagram — SC-LX90 — ANALOGUE AUDIO

N New item assy
IC7201 AMP — IC7204
CN7002 1,4

C Audio Bridge 1 assy
IC3411
CN3411 — CN3006 9,12

D Audio Bridge 2 assy
CN3422 — CN3421 — CN3010
CN3204

H MULTI CH IN assy
- Center/sub
- Surround L/R
- Surround back L/R
- Front L/R
MULTI CH IN
IC3211 — IC3221 — IC3231
IC3251 Multi ch/stereo selector
8ch analogue audio Axxx
FL, FR, C
IC3261 Center & LFE (dac) downmix
IC3267 Analog Switch Array
10ch Analogue audio (center2 & Sub2 added)

IC3232 Zone 3 volume — Zone 3 out
IC3303 Zone 2 volume — Zone 2 out

8ch analogue audio to ADC
10 ch analogue audio + 2ch extra from DAC
SLB DA, SRB DA (extra 1)

CN3207 — CN3206 — CN3208

VOL IN X1L, VOL IN X1R, VOL IN SBL, VOL IN SBR, VOL IN C2, VOL IN L, VOL IN R, VOL IN SW1, VOL IN SW2
VOL IN SL, VOL IN SR, VOL IN SW1, VOL IN SW2

CN3211 — CN3210
CN3443 — CN3441
CN3444 — CN3442

E Audio Bridge 3 assy

CN3901 — CN3902

A A-AUDIO assy
- CDR in
- CD in
- SACD in
- AUX in
- Phono in
IC3001
Multi Fx
IC3051 CDR in / SACD in / Phono in / iPod in / Multi ch front input — Switch MAIN
IC3053 — Switch ZONE 3
IC3052 — Switch ZONE 2
IC3851
MAINOUT / Z3OUT
CN3007 — CN3851 1,5
MAINSELx — CN3009 — CN3852
Z3SELx, Z2SELx, Z3OUTx, REC
CDR out
Z2 D/A x — CN3005
CN3854 / CN3855

G REC SEL assy
IC3871 — IC3881 Switch ZONE 3 REC SEL — IC3861

I Volume assy
IC3521 VOLUME C (1/2) — IC3522 — IC3502 — IC3501 VOLUME F
IC3921 VOLUME SB — IC3921 — IC3902 — IC3901 VOLUME S
IC3961 VOLUME XTRA1 — IC3962 — IC3942 — IC3941 VOLUME SW(1/2)
CN3904 / CN3905

B V-AUDIO assy
- DVR1 in
- DVR2 in
- DVD/LD in
- BD in
- TV in
- Sat in
- Video 1 in
IC3151 — Switch MAIN
IC3152 — Switch ZONE 3
IC3153 — Switch ZONE 2
MAINSEL x, VREC2x, VREC1x
CN3109 — DVR1 out / DVR2 out
Z3SEL x, Z2SEL x — CN3110
Z2x — CN3105
NET L / NET R — CN8028
HP x — CN3106 / CN3027
FV x, MIC x, HP x — CN3108

V Mother 1 assy
CN8024 — CN8025
Z2VOLIN x, Z2VOLOUT x
Z2LDA, Z2RDA
CN8023
SWAD, CAD, FRAD, FLAD, SRAD, SLAD, SBRAD, SBLAD, SW1DA, SW2DA, SBLDA
CN8022
SBRDA, C1DA, C2DA, FLDA, FRDA, SLDA, SRDA, E1LDA, E1RDA

Continue in Block diagram "Digital audio"

F Audio Bridge 4 assy
CN3431 / CN3433 — CN3432 / CN3434

U Preout assy
CN8019 — CN8027 — CN3515
IC3541 / IC3542
AMP SELECTOR
- SW 1/2 out
- Surround out
- Front L/R out
- Center 1/2 out
- Surround back
- Extra L/R

L Front buff assy
IC5301 — CN5304 / CN5302 / CN5202
CN5301 / CN5201
IC5221 — headphone / Mic in / L/R in

K Front input assy

CN3517 / CN3516 — CN5503 / CN5504
R1, R2, R3, R4, R5
L1, L2, L3, L4, L5

BD ICE input 4ch assy
IC5611, IC5621, IC5631, IC5641
CN5602 / CN3516
To ICE POWER AMP assy

BE ICE input 6ch assy
IC5511, IC5521, IC5531, IC5541, IC5551, IC5561
To ICE POWER AMP assy

BD2

Block diagram   SC-LX90   VIDEO

BD4