Accuphase

DIGITAL FREQUENCY DIVIDING NETWORK

DF-35

INSTRUCTION MANUAL

Please read this manual and the separate Important Safety Instructions thoroughly before use, and retain these documents for future reference.

Thank you for purchasing this Accuphase product, which is another manifestation of our efforts to create the highest quality audio components. The strictest control was exercised throughout our entire manufacturing process in producing this component — from basic research, the selection of each part, assembly, testing, data recording, up to packing and shipping — so that we supply a product with every confidence that it will provide full satisfaction and pride in ownership.

We are pleased to heartily welcome you to the fast-growing Accuphase circle of distinguished audio enthusiasts and devotees of true sound.

About the ⚠ mark

This mark indicates an important instruction that must be observed to prevent the possibility of death or injury to persons or severe damage to the unit. To ensure safe use of the product, make sure that such instructions are fully understood and observed.

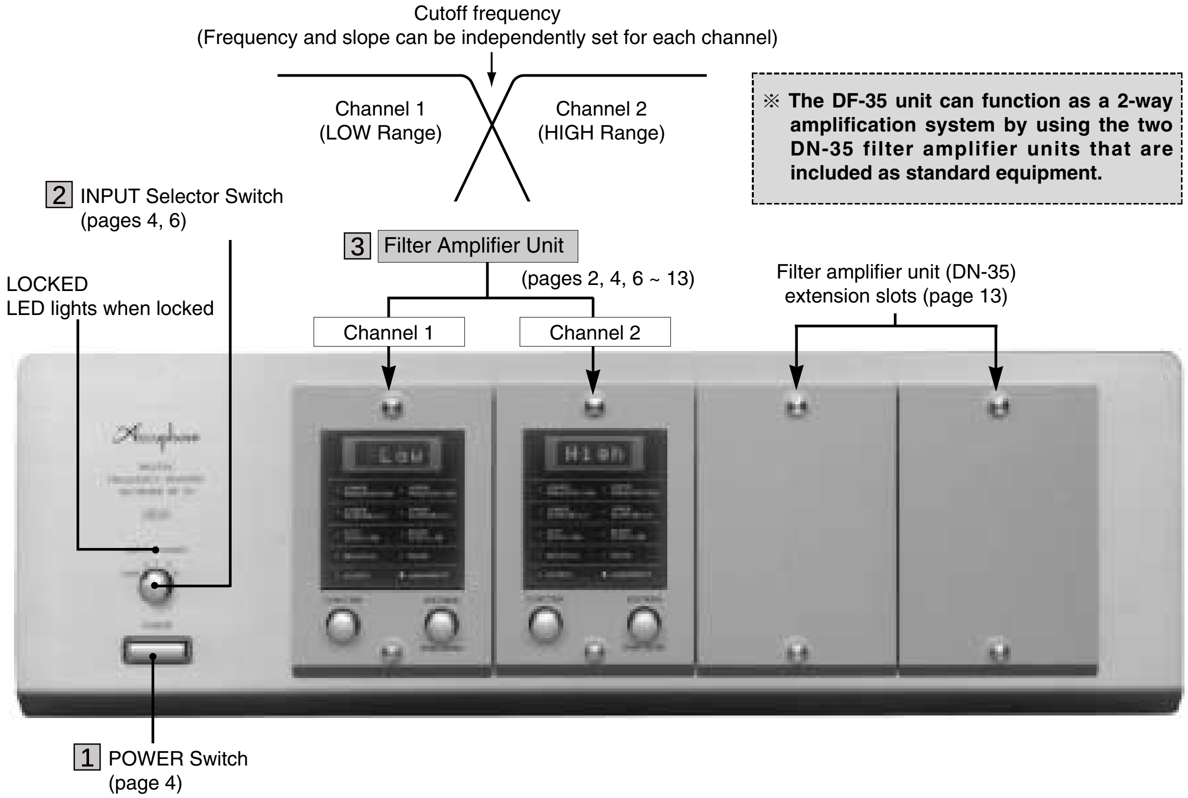
⚠ Warning:
Disregarding instructions bearing this mark incurs the risk of death or severe injury.

⚠ Caution:
Disregarding instructions bearing this mark incurs the risk of light injury to persons or damage to the product.

Contents

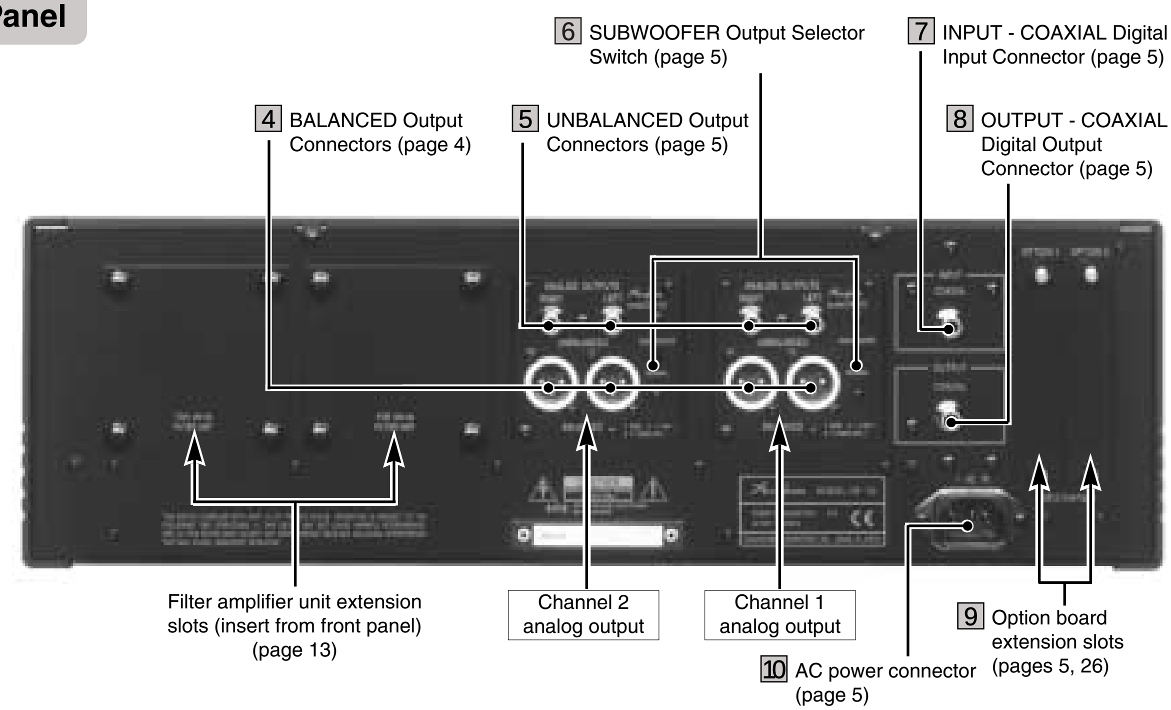
1. Naming of Parts

Front Panel



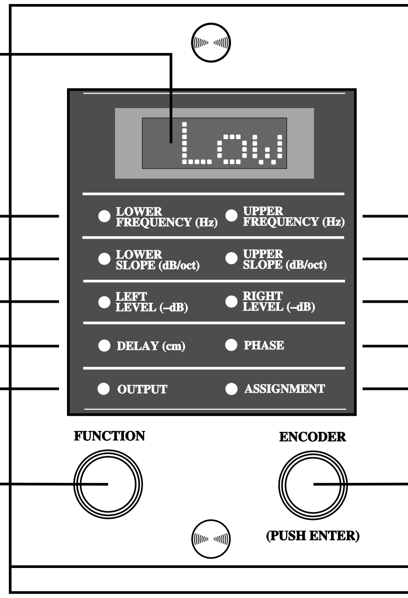
※ **The DF-35 unit can function as a 2-way amplification system by using the two DN-35 filter amplifier units that are included as standard equipment.**

Rear Panel



3 Filter Amplifier Unit

(see pages 7 ~ 12 for details of operations)



C Display Window

① LOWER FREQUENCY
Lower cutoff frequency (Hz)

③ LOWER SLOPE
Lower slope characteristic (dB/oct)

⑤ LEFT LEVEL
Left channel level (dB)

⑦ DELAY
Delay transmission distance (cm)
Set separately for left and right channels

⑨ OUTPUT
Output ON/OFF

A FUNCTION
Function selector knob
(Turn to light LEDs ① ~ ⑩)

② UPPER FREQUENCY
Upper cutoff frequency (Hz)

④ UPPER SLOPE
Upper slope characteristic (dB/oct)

⑥ RIGHT LEVEL
Right channel level (dB)

⑧ PHASE
Phase switch

⑩ ASSIGNMENT
Character display

B ENCODER
Parameter selector knob
(As you turn the knob, each function setting appears in the display window **C**. Push the knob to enter Function Memory, Function Safety Lock and other settings.)

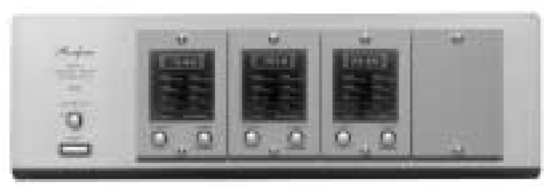
3-Way Amplification System or Greater Configurations

- Increase the number of filter amplifier units (DN-35).
- One DF-35 unit can be used for up to a 4-way configuration.
- 5-way or greater configurations require extra DF-35 units (see page 24).

DN-35 filter amplifier unit

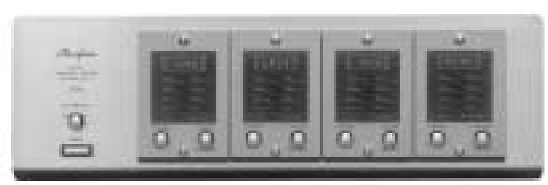
3-Way Amplification System (see page 20)

Add one DN-35 unit — LOW Range / MID Range / HIGH Range



4-Way Amplification System (see page 22)

Add two DN-35 units — LOW Range / LOW-MID Range / MID Range / HIGH Range



Verify that Supplied Accessories are Complete

- Instruction manual ·················· 1
- Important Safty Instructions ······ 1
- AC power cord (2 m) ··············· 1

2. ⚠ Warnings

Please read this manual and the separate Important Safety Instructions thoroughly before use, and retain these documents for future reference.

■ **Be sure to connect the power cord of the DF-35 only to an AC outlet rated for the voltage shown on the rear panel.**

- This unit can be used in areas with an AC line frequency of 50 or 60 Hz.

■ **Handle the power cord with care, to avoid the danger of electric shock.**

- Do not nick or excessively bend the cord, and do not place heavy objects on it.
- When removing, always grasp the plug. Do not pull at the cord.
- Never touch the plug with wet hands.
- Do not use the supplied power cord for other equipment. Do not use the DF-35 with any other than the supplied power cord.
  (Using a cord with a different rating or plug configuration poses a fire hazard and other risks.)

■ **When not using the unit for a long time, disconnect the power cord from the AC outlet.**

■ **Never remove the top or bottom cover of the unit. Touching any part inside the unit involves the risk of electric shock and may damage the unit.**

■ **Replacing the feet of the unit is dangerous. If the mount screws touch internal parts, this could lead to electric shock or damage.**

■ **After turning the power off, do not set the power switch immediately to ON again (within 10 seconds).**

■ **Contact your Accuphase dealer or an authorized service station in any of the following cases:**

- If liquids or chemicals were spilled into the unit.
- If a foreign object (such as a small pin, nail, coin, etc.) has entered the unit.
- If you notice any unusual circumstances, including smell or smoke.

⚠ Warnings

Digital Input

Use only signals from the OUTPUT connector of an additional digital output board installed in a DC-330 OUTPUTS slot as digital input to the DF-35. Do NOT input digital signals from any other source.

The following connections can cause speaker damage owing to full level signal input to the DF-35 without the DC-330's volume data.

▼ DC-330 OUTPUTS slot ⇨ DG-28 ⇨ DF-35 Digital Connection
▼ Digital output from a source other than the DC-330 OUTPUTS slot.
▼ Digital output from a CD player or other digital audio equipment.

Analog Input

Use only analog audio equipment such an analog pre-amplifier through which volume is routed for analog input signals to the DF-35.

The following connections will cause speaker damage, since the full level signal is input directly to the DF-35 without volume control.

▼ The analog output connector of a CD player or other audio equipment.
▼ The recording (REC) output connector of a pre-amplifier, etc.
▼ The analog output signal of an added optional circuit board such as the DC-300/DC-330.

⚠ Precautions

Filter Amplifier Unit Operation

- Do not change the cutoff frequency, slope characteristic or other functions while the speakers are active, as severe signal fluctuations can cause unwanted noise or shock noise.
- Particularly in the case of active tweeters and midrange drivers, if you change to a cutoff frequency below the LOWER cutoff frequency setting, the inordinately large output to the speakers could exceed the speakers' permissible input level and result in speaker damage. Take care, therefore, when setting below the rated cutoff frequency.
- Do not switch off the power within 1 seconds of making function changes, since the changes you made will not be stored in memory.
- Turning the FUNCTION and ENCODER knobs is an easy way of making a variety of setting changes. Use the SAFETY LOCK to avoid making mistakes or setting alterations that cause unwanted noise.

■ Be sure to turn off the power before connecting/disconnecting any input/output cable.

■ Be sure to turn off the power when inserting or removing a DN-35 filter amplifier unit or optional circuit board.

3. Parts and Function

1 POWER Switch

Push this push-button switch to turn the power On. Push the switch again to turn the power Off. For about 2.5 seconds after Power On until the internal circuitry stabilizes, the muting circuit operates and thus there is no output from the DF-35 during this period.

※The operations and functions that you set before turning the power off will be memorized even when the power is off.

2 INPUT Selector Switch

Use this selector switch to select the rear panel's COAXIAL input and input from the optional slots. An LED lights when you lock on a digital signal. (See page 6).

COAX: Selects COAXIAL input provided as standard equipment on the rear panel.
1, 2, 3, 4: Selects in order inputs from the optional slots.

3 DN-35 Filter Amplifier Unit

See pages 7 ~ 13 for a detailed description of operations.

A FUNCTION Selector Knob

Use this selector knob to select each type of setting within the divided audio frequency range. Turn the knob clockwise and counterclockwise to select functions 1 ~ 10 and parameters. The LED of a selected item lights and the content of the selection is indicated in the display window C

B ENCODER - Parameter Selector Knob

Use this selector knob to select the number and setting of items selected with FUNCTION selector knob A. Press the knob to use each function memory and safety lock, etc. (See page 12).

C Display Window

This displays each function in the frequency band selected with FUNCTION selector knob A. (See page 11 for factory display settings.)

① LOWER FREQUENCY
This sets the lower cutoff frequency of the audio band.

② UPPER FREQUENCY
This sets the upper cutoff frequency of the audio band.

③ LOWER SLOPE
This sets the attenuation slope characteristic of the lower cutoff frequency.

④ UPPER SLOPE
This sets the attenuation slope characteristic of the upper cutoff frequency.

⑤ LEFT LEVEL
This sets the left channel level.

⑥ RIGHT LEVEL
This sets the right channel level.

⑦ DELAY
Converts the delay transmission time of sound to distance (cm) and displays it. Set the value separately for left and right channels.

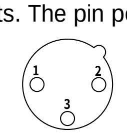
⑧ PHASE
Use this selector switch to change the phase of the output.

⑨ OUTPUT
Use this selector to turn ON/OFF analog output within the frequency range.

⑩ ASSIGNMENT
Use this selector to make selections from among those registered for display. You can also use this selector to enter optional character strings.
The ASSIGNMENT display lights up automatically when the power is turned On.

4 BALANCED Output Connectors

These connectors provide balanced transfer outputs that are strong against exterior inductance noise. The connectors enable excellent audio signal transmission when the power amplifier's input connectors are balanced inputs. The pin polarities are as follows:



❶ : Ground
❷ : Inverted (–)
❸ : Non-inverted (+)

- Accuphase sells audio cable designed for use with these connectors.

5 UNBALANCED Output Connectors

Use these output connectors when you are using regular pin plug type audio cable for output.

6 Subwoofer Output Selector Switch

Use this switch to select the Subwoofer mode when you configure a multi-amplification system using a subwoofer. (See pages 26, 27.)

NORMAL:

Normally leave the switch in this position when you do not intend to use the subwoofer system (Normal mode).

SUB WOOFER:

Set the switch in this position to produce monophonic signals by mixing left and right signals output from the filter amplifier unit. Because the same signal will be output from both the LEFT and RIGHT channels, connect either of the two outputs to a power amplifier (which may be a monophonic power amplifier).

Subwoofer System

The subwoofer system is also referred to as the three-dimensional (3D) system. By making use of the physiological nature of the human auditory system and its inability to sense the directivity of acoustic frequencies lower than 100 Hz, this system reproduces sounds by placing a speaker dedicated to ultra-low frequencies between the left and right stereo (not necessarily at the center) speakers to mix left and right sounds of low pitch.

7 INPUT — COAXIAL Digital Input Connector

This connector allows coaxial cable input of digital output signals from the output connector of a DC-330 board added to the OUTPUTS slot.

8 OUTPUT — COAXIAL Digital Output Connector

Use these connectors to transmit input signals when you configure a 5-way amplification or further expanded system using an extra DF-35 unit. The connectors output digital signals via coaxial cable. The volume signal is output at the same time.

9 OPTION 1, 2 Option Board Extension Slots

Use these slots to add option boards for analog or digital input. Connect to preamplifier output when installing an additional board.

- See page 28 for available board types.

10 AC INLET

Insert the supplied power cord into this connector and plug the other end into a wall AC outlet.

⚠ WARNING

- Do not use the unit with any other than the supplied power cord.
- The shape of the AC inlet and the plug of the supplied power cord depend on the voltage rating and destination country. Using any other type of cable except the supplied power cord poses the risk of fire and damage.
- This product is available in versions for 120/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.

⚠ WARNING

- Opening the unit involves a severe risk of electric shock.
- If the unit does not operate, the internal fuse may have blown. Never attempt to replace the fuse yourself. Be sure to contact your Accuphase dealer or an authorized service station.

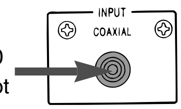
Input Selection

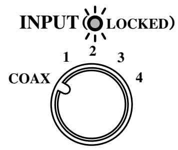
The LED (INPUT LOCKED) above the INPUT selector switch lights when you lock on an input signal.

<COAX> Position

Set the selector switch to this position for digital (COAXIAL) input.

From DC-330 OUTPUTS slot





LED lights with selector at the COAX position

<1 ~ 4> Positions (Added Optional Circuit Boards)

Set the INPUT selector switch in sequence from positions 1 ~ 4 as shown in the following table when taking input from added optional boards.

Input No.	Input connector examples Circled ○ number is the input selector switch position			INPUT selector switch position (LED lights for locked position)
1	OPTION 1 2 1	OPTION 1 2 1	OPTION 1 2 1	Lit Locked on 1
2	OPTION 1 2 1 2	OPTION 1 2 1 2	OPTION 1 2 1 2	Lit: Locked on 1 Lit: Locked on 2
3	OPTION 1 2 1 2 3	OPTION 1 2 1 2 3		Lit: Locked on 1 Lit: Locked on 2 Lit: Locked on 3
4	OPTION 1 2 1 2 3 4			Lit: Locked on 1 Lit: Locked on 2 Lit: Locked on 3 Lit: Locked on 4
Type of option	One-input option AI-U1 AI2-U1 DIO-ST1 D1-BNC1	Two-input option DIO-OC1	Option using two slots AI-B1 AI2-B1 DIO-PRO1 DI2-HS1	

PRECAUTIONS

※Because analog input boards lock in with the board's A/D converter, the LED lights irrespective of board connection.

※With digital input boards, the LED will not light if the digital signal is not input to its connector.

Filter Amplifier Unit Overview

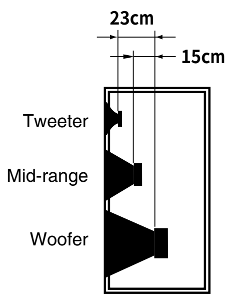
The DF-35 uses one DN-35 filter amplifier unit for one part of the audio frequency range, allowing setting of low-pass filter, high-pass filter and band-pass filter. The DF-35 is provided with two filter amplifier units as standard equipment, which enables the configuration of a 2-way amplification system. For 3-way amplification or greater systems, you must add DN-35 units accordingly.

Basic Display Settings

※ When configuring your system, please refer to pages 29 ~ 32 with regard to speaker unit delay (DELAY), PHASE, SLOPE characteristic and other settings.

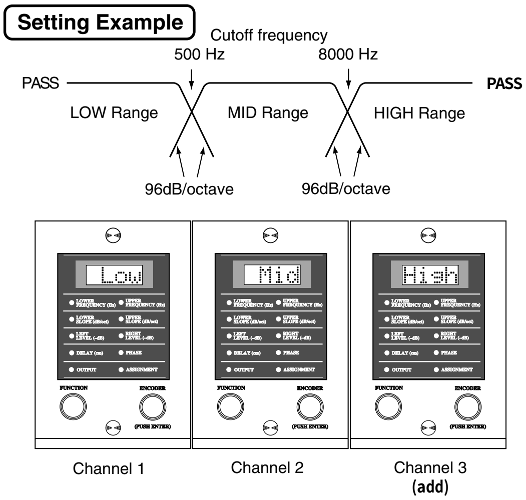
The following shows a setting display example for each function in a 3-way amplification system using one extra DN-35 filter amplifier unit for channel 3.

Speaker Example



Diaphragm position of each driver with reference to the woofer position (Same for left and right speakers)

Setting Example



Display Example

FUNCTION Turn to select functions ①~⑩ (LED lights)		ENCODER (PUSH ENTER) Turn to select the desired number						Details of displayed function
		Channel 1 LOW Range Low-pass		Channel 2 MID Range Band-pass		Channel 3 HIGH Range High-pass		
① LOWER FREQUENCY (Hz)	② UPPER FREQUENCY (Hz)	Pass	500	500	8000	8000	Pass	Selects from 59 frequencies
③ LOWER SLOPE (dB/oct)	④ UPPER SLOPE (dB/oct)	----	96	96	96	96	----	Selects from 6 dB/oct, 12 dB/oct, 18 dB/oct, 24 dB/oct, 48 dB/oct, 96 dB/oct.
⑤ LEFT LEVEL (dB)	⑥ RIGHT LEVEL (dB)	0.0	0.0	12.5	12.5	25.0	25.0	Variable from 0 ~ – 40 dB (in 0.1-dB steps)
⑦ **DELAY (cm)**		L 0 R 0		L 15 R 15		L 23 R 23		0 ~ 999 cm (in 1-cm steps) (Up to 700 cm for signals of sampling frequency 176.4 kHz or greater)
⑧ **PHASE**		Norm		Norm		Norm		Norm (Normal) / Inv (Inverted)
⑨ **OUTPUT**		On		On		On		On/Off setting
⑩ **ASSIGNMENT**		Low		Mid		High		

①② LOWER/UPPER CUTOFF FREQUENCY

This sets the unit's cutoff frequency from LOWER through UPPER portions of the audio frequency range. Settings are as follows:

LOW Range: PASS/500 Hz (low-pass filter)
MID Range: 500 Hz/8000 Hz (band-pass filter)
HIGH Range: 8000 Hz/PASS (high-pass filter)

The term Pass in the above means that filtering is not applied and the signal is allowed to pass as is.

Precaution: When LOWER range and UPPER range cutoff frequencies conflict (i.e., when LOWER range ≧ UPPER range), the frequency display window flashes to warn you of the discrepancy.

Cutoff Frequencies (Hz)

10	20	31.5	35.5	40	45	50	56	63	71
80	90	100	112	125	140	160	180	200	224
250	280	290	315	355	400	500	560	630	710
800	900	1000	1120	1250	1400	1600	1800	2000	2240
2500	2800	3150	3550	4000	5000	5600	6300	7100	8000
9000	10k	11.2k	12.5k	14k	16k	18k	20k	22.4k	

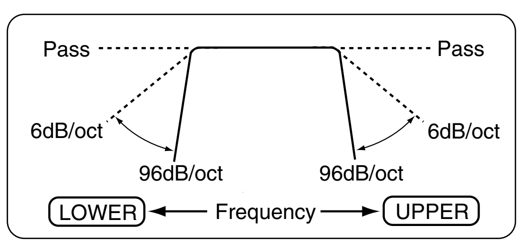
Displays the following frequencies
11.2k→11k2
12.5k→12k5
22.4k→22k4

Cutoff Frequencies

The DF-35 uses the range 31.5 Hz ~ 22.4 kHz with a series of 1/6 octave intervals (ISO standard). Cutoffs at 10 Hz, 20 Hz and 290 Hz are provided as exceptions. The 10 Hz and 20 Hz cutoff frequencies act as subsonic noise filters.
If the speaker system you use is a finished product, its cutoff frequency (e.g., crossover frequency at LOW range and HIGH range) is specified by the manufacturer. Therefore, the speaker system should, as a rule, be used at the specified cutoff frequency. However, this frequency need not be observed so strictly: a deviation of ±10% from the specified frequency has negligible effect on the sound quality.
However, when using a horn speaker at higher than LOW-MID range, be sure that the cutoff frequency does not become lower than the specified cutoff frequency. This precaution is necessary because with a horn speaker the sound reproduction limit (i.e., the flare cutoff frequency) of the speaker horn has been predetermined, and thus the horn speaker is intended for use at the cutoff frequency at least one octave higher than the flare cutoff frequency. Should the cutoff frequency be lowered to the vicinity of the flare cutoff frequency, sounds with a tone unique to the horn will be output, and the produced sounds may lack energetic continuity in tone with the range below.

③④ LOWER/UPPER SLOPE Characteristic

This control sets the attenuation slope characteristic for LOWER and UPPER range cutoff frequencies. As with cutoff frequencies, the attenuation slope characteristic can be set separately for each unit.
Which of the attenuation slope characteristics you should choose depends on the speaker system you use or your preference for sound. You should make a decision based on listening tests.
If FREQUENCY (cutoff frequency) is Pass, the slope characteristic cannot be set and the display window ------ flashes.



Selectable Attenuation Slope Characteristics
6dB/oct, 12dB/oct, 18dB/oct, 24dB/oct, 48dB/oct, 96dB/oct

PRECAUTIONS

With cutoff frequencies of 10 Hz and 20 Hz, the only available attenuation slope characteristics are 6 dB/oct, 12 dB/oct and 18 dB/oct.

- 24 48 96 are not displayed.
- If you set an attenuation slope characteristic of 24 dB/oct or greater with a cutoff frequency of 31.5 Hz or greater, when you turn the FUNCTION selector knob A to 10 Hz or 20 Hz, the slope characteristic will be automatically set at 18 dB/oct. (Please reset the slope characteristic when you return to a frequency of 31.5 Hz or greater.

⑤⑥ LEFT/RIGHT LEVEL Controls

These controls set the output level separately for left and right channels of each unit. See page 32 for an account of level adjustment.

⑦ DELAY (Delay Transmission Time)

If your speakers contain more than two drivers, the speaker diaphragm positions will be out of alignment with each other. Consequently, if each speaker driver is driven simultaneously, there will be a time difference between drivers for sound arriving at the ears. Adjustment of this time difference is known as time alignment (see page 27). The DF-35 incorporates a DELAY function that allows time adjustment for sound reaching the ears.
Delay is the electrically delayed time from the time taken for sound to reach a certain distance. For simplicity, the DF-35 converts the delay time to distance (cm) and displays the distance. In the case of the speaker example shown on page 27, the diaphragms of the three drivers are out of alignment with each other. Since the woofer is deepest within the speaker cabinet, it is subject to the most delay, so the woofer diaphragm position is taken as the reference position of 0 cm. Although measurement is not strictly accurate, the distance to another diaphragm is measured in cm units. In this setting example, the channel 1 woofer position is the reference position of 0 cm, the channel 2 mid-range is at 15 cm and the channel 3 tweeter is at 23 cm.
With horn speakers, the location of the sound source is not a diaphragm, and the resonant part of the horn changes depending on frequency. The DF-35 allows you to make settings in 1 cm units, so adjust the delay time of each filter amplifier unit with the DELAY control while conducting listening tests for each adjustment until you attain satisfactory delay.
Set DELAY separately for right and left speakers (see pages 11 and 29).

⑧ PHASE Selector Switch

See pages 30 ~ 32 for setting details.

⑨ OUTPUT Switch

The output of each filter amplifier unit can be switched ON and OFF. Use this switch when checking your speakers; otherwise you should normally leave the switch in the ON position.

⑩ ASSIGNMENT (Character Display)

Allows you to select and display characters you previously registered. ASSIGNMENT allows you to independently set a display of 4 characters of your own choosing.

●Selection of Previously Registered Characters

Turn the ENCODER knob B to select the characters you want.

Registered Characters

(Counterclockwise) ⇦ Turn ENCODER knob B ⇨ (Clockwise)

Displays characters previously entered (initial setting is blank)

SL	Low	LMid	Mid	MidH	High	SH	
(Super Low)		(Low Mid)		(Mid High)		(Super High)	〔Character entry mode〕

●Independent Character Setting

❶ Turn ENCODER knob B and select character entry mode (the characters entered on the previous occasion are displayed).

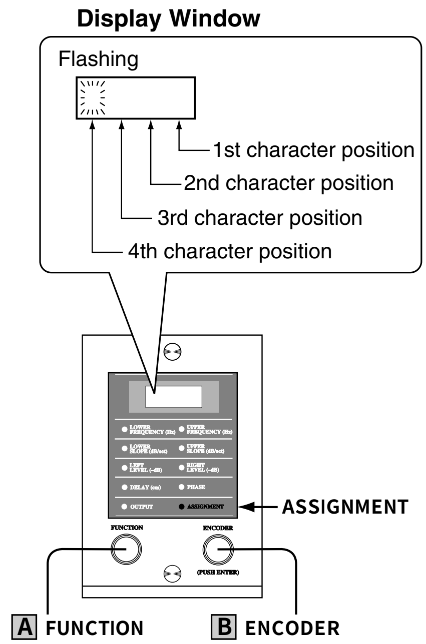
❷ Press ENCODER knob B and the fourth character position on the display flashes.

❸ Turn ENCODER knob B to select a character you want.

❹ Turn FUNCTION selector knob A clockwise and the third character position on the display flashes.

❺ Turn ENCODER knob B to select a character you want. Repeat these steps in the same way for setting of characters 2 and 1.

❻ After entering the characters, press ENCODER knob B. The next time you select character entry mode, the characters you entered on this occasion will be displayed. The characters will be retained in memory after the power is turned OFF.



Selectable Characters (Total: 70characters)

Upper-case characters	A B C ……… X Y Z
Lower-case characters	a b c ……… x y z
Digits	0 1 2 3 4 5 6 7 8 9
Symbols	(Blank) * - . / < > (Fully lit)

Filter Amplifier Unit Initial Settings Display

The filter amplifier unit has the following two initial settings (factory settings) displays. These settings are provided to protect your speakers from excess input should you turn on the power before setting each function.

Function		Display	
① LOWER FREQUENCY (Hz)	② UPPER FREQUENCY (Hz)	7100	Pass
③ LOWER SLOPE (dB/oct)	④ UPPER SLOPE (dB/oct)	12	----
⑤ LEFT LEVEL (dB)	⑥ RIGHT LEVEL (dB)	40.0	40.0
⑦ DELAY (cm)	⑧ PHASE	L 0 R 0	Norm
⑨ OUTPUT	⑩ ASSIGNMENT	On	SH

※ Additional DN-35 filter amplifier units also have the same initial settings.

Caution

⑦ DELAY displays as follows:

L 0 ···Left speaker 0 cm

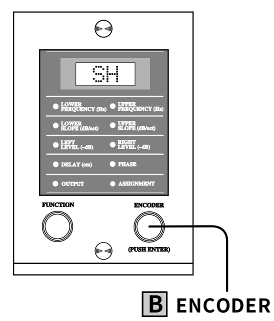
R 0 ···Right speaker 0 cm

To Return to the Initial Settings Display after Making Function Changes...

❶ Turn OFF the DF-35's POWER switch.

❷ Keep the ENCODER knob B depressed while turning ON the POWER switch. Keep the ENCODER knob B depressed until SH is displayed (approximately 3 seconds).

❸ All function settings ① ~ ⑩ for that unit will be returned to the initial settings.



(Keep the knob depressed for at least 3 seconds when turning the POWER switch ON.)

Set DELAY Separately for Left and Right Speakers

Setting Example: With the current DELAY setting of 0 cm for left and right speakers, change to a DELAY of 14 cm for the left speaker and 16 cm for the right.

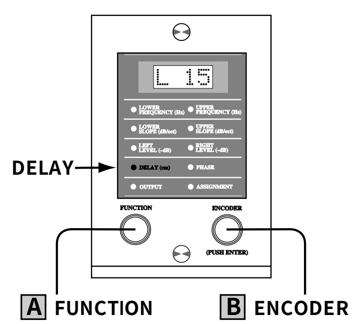
❶ Select DELAY using the FUNCTION selector knob A.
The display window will read L 0 (L: Left speaker).

❷ Turn the ENCODER knob B to change the display reading to L 14.

❸ Turn the FUNCTION selector knob A to display R 0 (R: Right speaker).

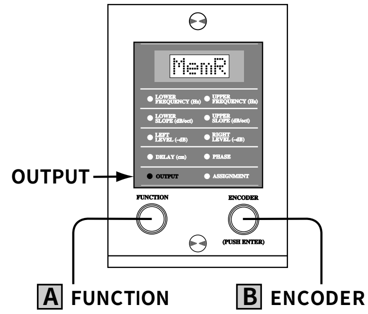
❹ Turn the ENCODER knob B to change the display to R 16.

※ When selecting DELAY, if you are turning FUNCTION selector knob A clockwise, the display changes in the order L 0 ⇨ R 0.
When turning the knob counterclockwise, the display changes in the order R 0 ⇨ L 0.



Accessing the Function Settings Memory

Memories 1 and 2 in each unit have the functions MemR and MemW, which refer to memory-read and memory-write respectively.



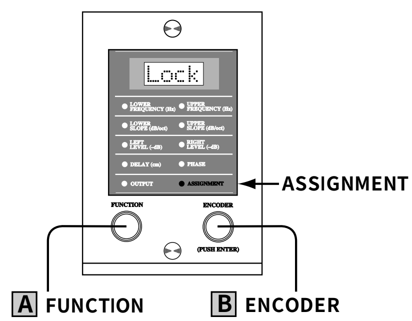
❶ Select OUTPUT using the FUNCTION selector knob A.
❷ Keep the ENCODER knob B depressed for two seconds.
❸ For five seconds, either the MemR or MemW display will flash. Turn the ENCODER knob B during this period to select one or the other and determine the selection by pressing ENCODER knob B.
❹ If you want to select MemR:
Rd 1 or Rd 2 will be displayed (flashing for 5 seconds).
Turn ENCODER knob B during this period to select one or the other, and determine the selection by pressing ENCODER knob B.
If you want to select MemW:
Wr 1 or Wr 2 will be displayed (flashing for 5 seconds).
Turn ENCODER knob B during this period to select one or the other, and determine the selection by pressing ENCODER knob B.

※ If you want to cancel during steps ❷~ ❹ above, turn the FUNCTION selector knob A.
※ Make the MemW (Memory Write) function setting. If you select MemR (Memory Read) first, the currently set function will be erased.

MemR ··· Memory Read
MemW ··· Memory Write
Rd 1 / Rd 2 ···Read Memory 1 or Memory 2
Wr 1 / Wr 2 ···Write Memory 1 or Memory 2

Function Safety Lock (Setting and Canceling)

Functions can be easily set using FUNCTION selector knob A and ENCODER knob B. For this reason, a safety lock is included to prevent another person from changing your function settings by turning the knobs by mistake or through carelessness.



❶ Select ASSIGNMENT with FUNCTION selector knob A.
❷ Keep the ENCODER knob B depressed for two seconds.
Either the UnL or Lock display will flash.
With ENCODER knob B depressed
Turn clockwise for Lock (Locked setting)
Turn counterclockwise for UnL (Unlocked setting)
❸ Three seconds after setting to locked mode, the display will change from Lock back to ASSIGNMENT.
❹ After setting to locked mode, if anyone turns the FUNCTION selector knob A or ENCODER knob B, the Lock display will flash for 3 seconds, and the set functions will be retained.

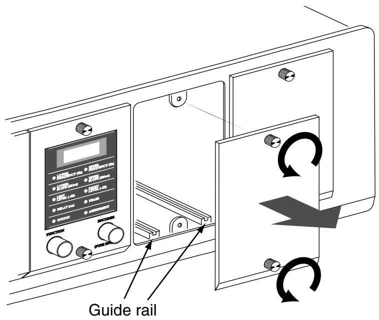
UnL ···Unlock

※ Since the setting is for this unit alone, you must repeat the same setting for all units that you use.

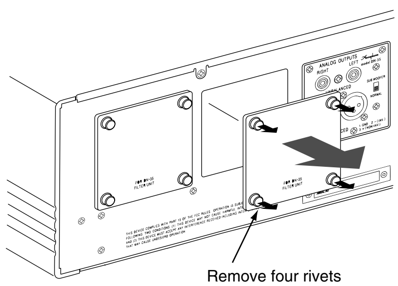
How to Install the DN-35 Filter Amplifier Units

⚠ **Before you do anything, be sure to turn Off the POWER switch of the DF-35. Also, take care not to mar the panel surface.**

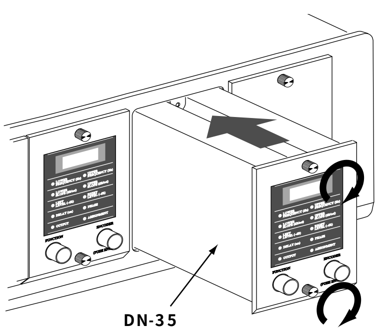
❶ Remove the slot cover on the front panel from the slot where you want to install a DN-35 filter amplifier unit. (The cover is held in place by two screws, one at the top and one at the bottom).



❷ Remove the slot cover for the relevant slot from the rear panel. (The cover is held in place by four rivets, two at the top and two at the bottom).



❸ Slide the new DN-35 filter amplifier unit into its slot along the guide rail and secure the two mounting screws, one at the top and one at the bottom.



5. How to Interconnect Units

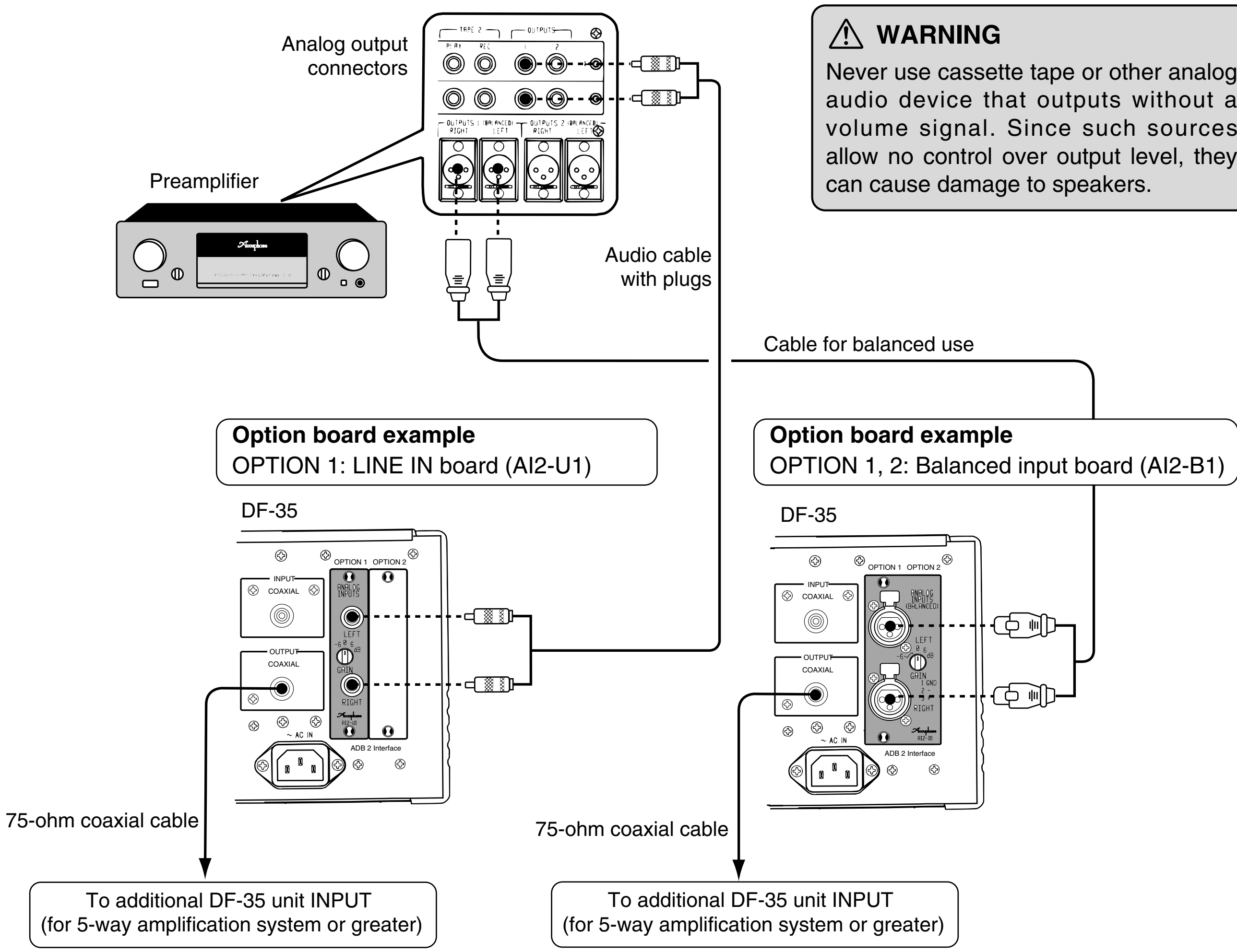
⚠ **WARNING**
- Use audio cable with plugs attached for analog inputs and outputs, and make sure you do no make mistakes with left and right channels.
- Do not connect analog output cable for balanced and unbalanced use at the same time. This results in a ground loop that causes noise to be generated.
- Be sure to turn off the power of each piece of equipment before making any interconnections,
- For digital input, use 75-ohm coaxial cable, TOSLINK optical fiber cable, HPC optical fiber cable or other digital cable.
- Digital input should be taken from the OUTPUT terminal of a Digital Output Board installed in a DC-330 OUTPUTS slot and connected to the DF-35.

Input Connections

Analog Input — The figure below shows a connection example with an added optional analog output device —

※With the following example, when you set the INPUT selector switch to "1" the LOCKED LED lights.

※ In case of excess input, the LOCKED LED flashes to warn you. Reduce the gain using the GAIN switch on the option board (–6 dB side).

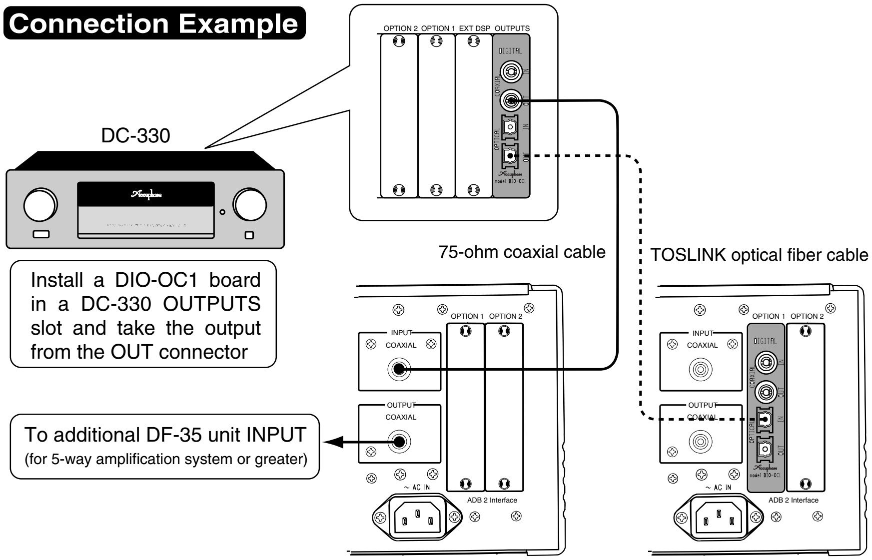


⚠ **WARNING**

Never use cassette tape or other analog audio device that outputs without a volume signal. Since such sources allow no control over output level, they can cause damage to speakers.

— Adding a Digital Output Board to the DC-330 OUTPUTS slot for program sources with sampling frequencies up to 96 kHz. —

Connection Example



DF-35: Connect to input
(lock in at INPUT selector switch COAX position)

DF-35: Install an additional DIO-OC1 and input to the IN connector
(lock in at INPUT selector switch position 2)

Digital Input/Output Options

- Digital I/O board (DIO-OC1)
- HPC coaxial I/O board (DIO-ST1)
- AES/EBU I/O board (DIO-PRO1)

PRECAUTION:
The DIO-PRO can accommodate up to 48 kHz

⚠ WARNING

Do not input digital signals without volume data, since such signals could cause speaker damage (see page 3).

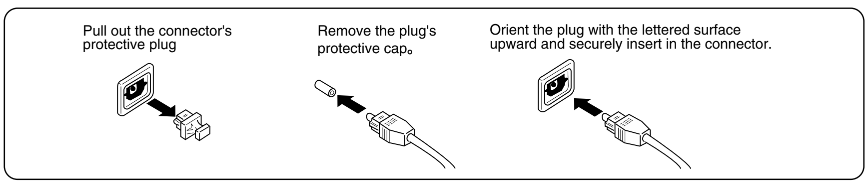
Connecting Cables

COAXIAL DIO-OC1

Connect with 75-ohm coaxial cable with pin plugs (e.g., DL-15).

OPTICAL DIO-OC1

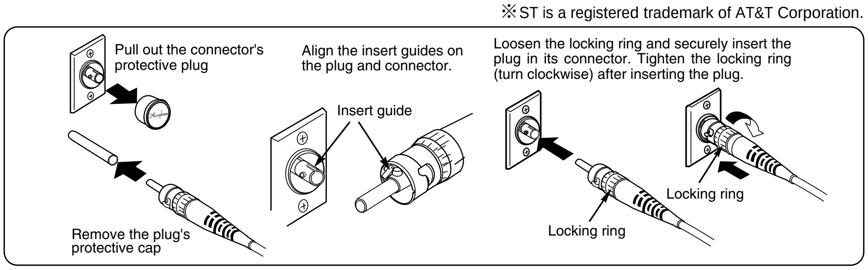
Connector for EIAJ standard TOSLINK optical fiber cable. Accuphase sells this type of optical fiber cable incorporating a Yuei Glass core (LG-10 and others, sold separately).



HPC OPTICAL : ST DIO-ST1

Connect with ST type HPC optical fiber cable (HLG-10 or similar cable, sold separately).

※ST is a registered trademark of AT&T Corporation.



AES/EBU DIO-PRO1

Connect with AES/EBU standard XLR connector.

Accuphase sells HPC balanced cable (HLC-10 and others).

※ Since the board uses slot 2, it cannot be used if the DC-330 "EXT DSP" slot is not available.

⚠ PRECAUTIONS

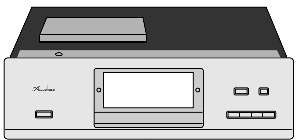
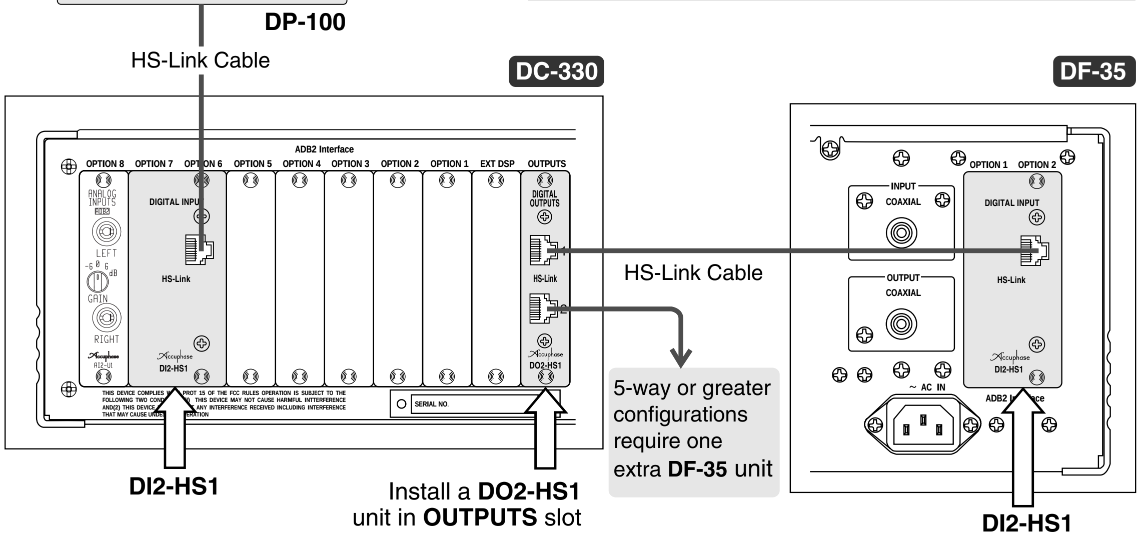
- Optical fiber cable is extremely susceptible to bending force and can easily cause a disconnection if handled inappropriately. If you obtained too much cable length, coil the remainder at the back end to a diameter of 10 cm or more. Do not tightly coil the cable. Remember that cutting and reprocessing is not possible with this type of cable.
- Optical signals are transmitted through the core of the optical fiber cable. Scratches or debris on cable plugs or foreign matter in the receptacle severely affect performance. Therefore, be sure to replace the protective caps when not using the cable.
- Grip the plug firmly when removing optical fiber cable. Do not pull on the cable.

Digital Input ② — Connect by HS-Link (High Speed Link) to match high sampling frequency sources such as the DP-100 —

Interconnecting the DC-330 and DF-35 by HS-Link allows use of high sampling frequency sources such as the DP-100.

Connection Examples

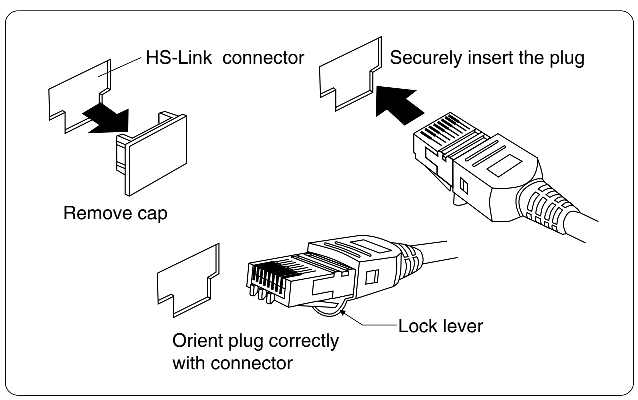
- DP-100 connected by installation of a DI2-HS1 in a DC-330 option slot.
- Installation of DO2-HS1 in a DC-330 option slot or installation of a DI2-HS1 in a DF-35 option slot and connection by HS-Link cable.

Connecting HS-Link Cable

Remove the HS-Link connector cap, make sure that the HS-Link cable's plug is correctly oriented with respect to the shape of the jack, and insert the plug until its lock lever clicks securely.
When removing the plug, press the plug's lock lever and pull lightly on the plug.

※ One HS-Link cable is provided as an accessory with each DP-100 unit.



PRECAUTIONS

- Digital transmission of SACD/CD signal input by DC-330 is only possible by HS-Link cable. There is no output if you install a non-HS-Link Digital Output Board (e.g., DIO-OC1) in one of the OUTPUTS slots.
- When installing a DIO-DG1 unit in the DC-330 EXT DSP slot, install a DO2-HS1 unit in an OUTPUTS slot and connect by HS-Link cable.

Examples for Connecting to Multi-Channel Amplifiers

∗ Please refer to the pages indicated below for details on each multi-amplification configuration.

2-Way Configuration ························18, 19
3-Way Configuration ························20, 21
4-Way Configuration ························22, 23
5-Way Configuration ························24, 25
Subwoofer Configuration ··················26, 27

∗ Be sure to switch off the power to each unit before making connections.

∗ Take care not to mistake left and right channels, making sure of correct polarity (+–) for power amps in each range and the speakers. (Devices must be in phase).

∗ Carefully read pages 6 ~ 13 for setting methods of each divider unit.

∗ When connecting to an analog preamp, install Line IN Board AI2-U1 in the OPTION 1 slot.

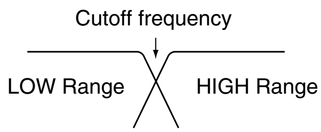
∗ The digital input example shows connection to the DC-330 OUTPUTS slot by HS-Link cable and coaxial cable.

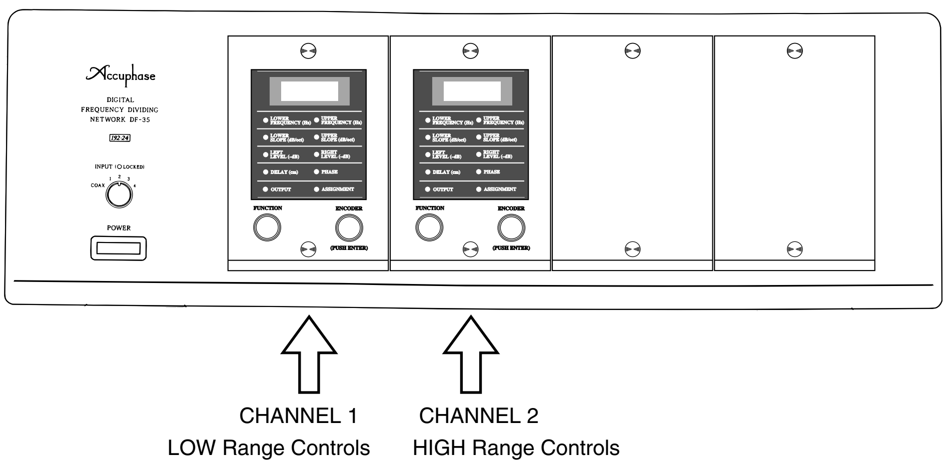
∗ Input Selector signal lock-in positions:

- Digital input by coaxial cable ·················· "COAX" position
- HS-Link Input Board ······························Position "1"
- Analog preamp input ······························Position "1"

2-Way Amplification System

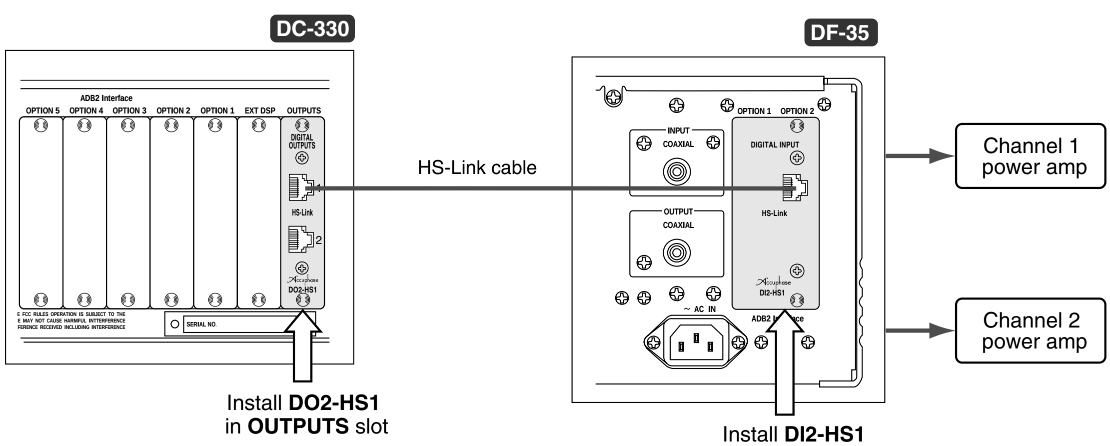
- Divide the entire input signal frequency range into two (LOW Range and HIGH Range) by setting the cutoff frequencies of each DN-35 filter amplifier unit for channel 1 and channel 2.
- The DF-35 is available with two DN-35 filter amplifier units as standard equipment, enabling the configuration of a 2-way amplification system.

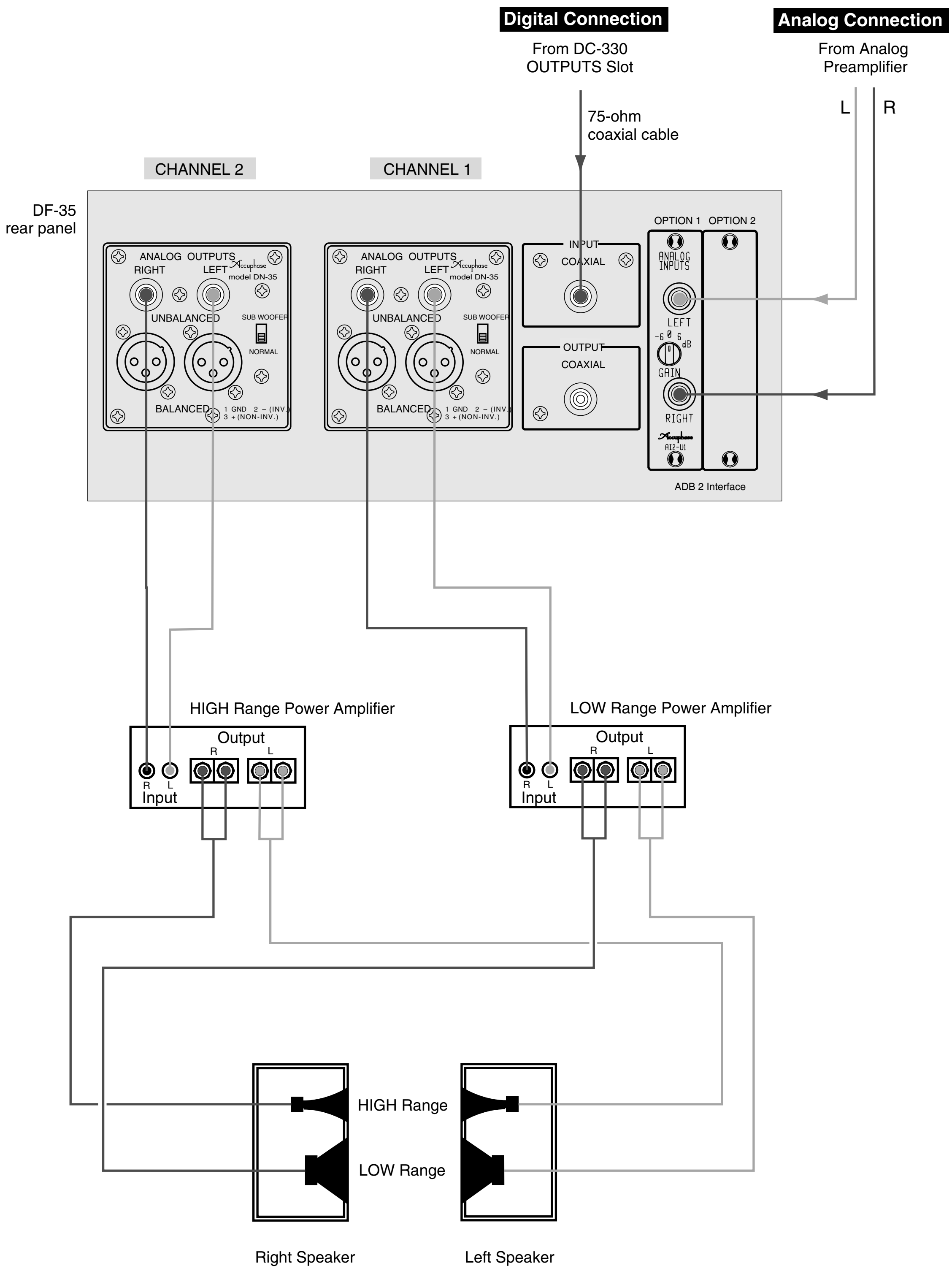




HS-Link Cable Connection with 2-Way Configuration

※ Install DO2-HS1 in DC-330
※ Install DI2-HS1 in DF-35
※ Connect with HS-Link cable

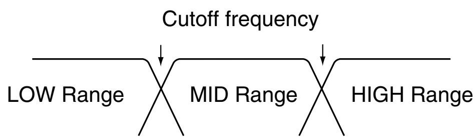


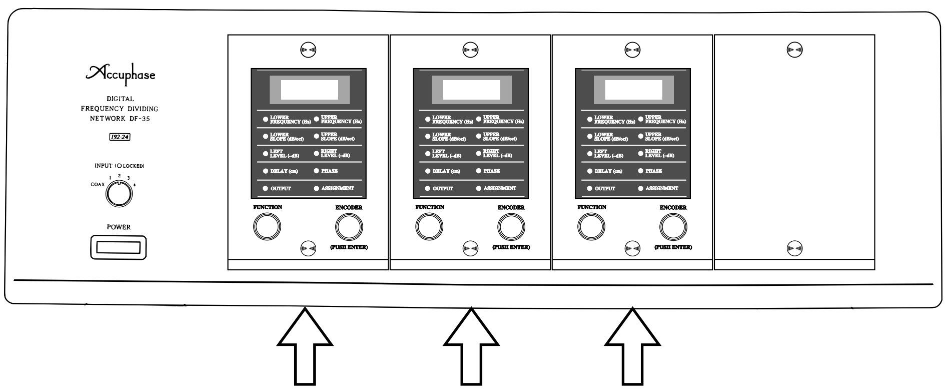


Interconnection of Units in a 2-Way Amplification System

3-Way Amplification System

- Divide the entire input signal frequency range into three (LOW Range, MID Range and HIGH Range) by setting the cutoff frequencies of each DN-35 filter amplifier unit for channel 1, channel 2 and channel 3.
- Add one DN-35 filter amplifier unit for channel 3 to enable the configuration of a 3-way amplification system.





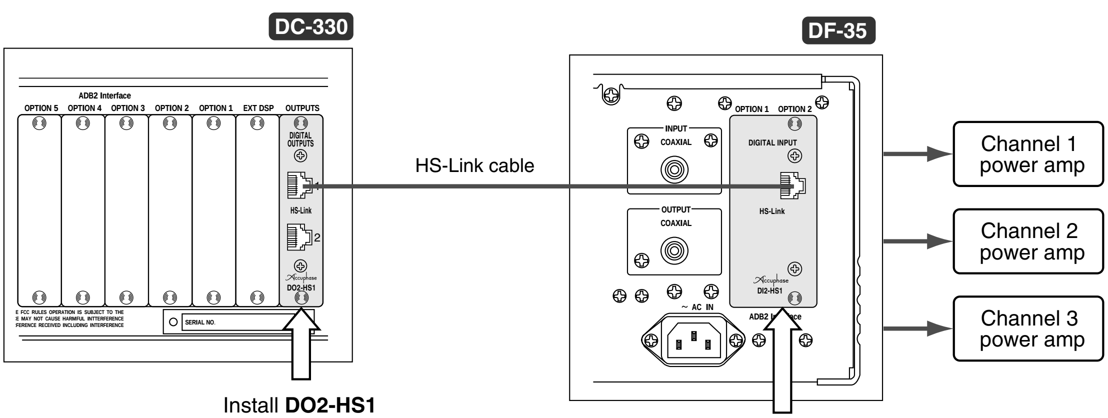
CHANNEL 1
LOW Range Controls

CHANNEL 2
MID Range Controls

CHANNEL 3
HIGH Range Controls
(Additional DN-35 Unit)

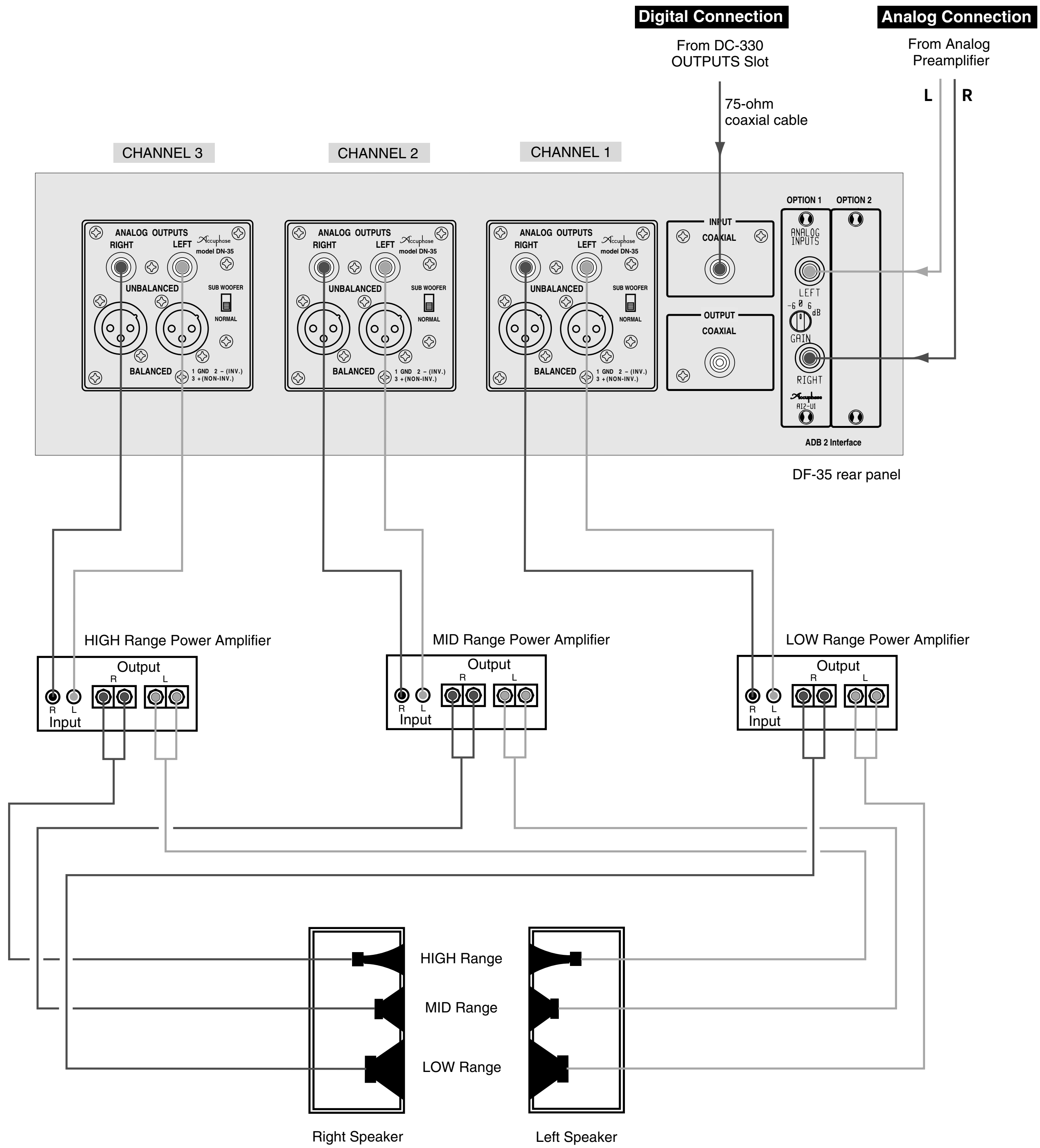
HS-Link Cable Connection with 3-Way Configuration

※ Install DO2-HS1 in DC-330
※ Install DI2-HS1 in DF-35
※ Connect with HS-Link cable



Install **DO2-HS1** in **OUTPUTS** slot

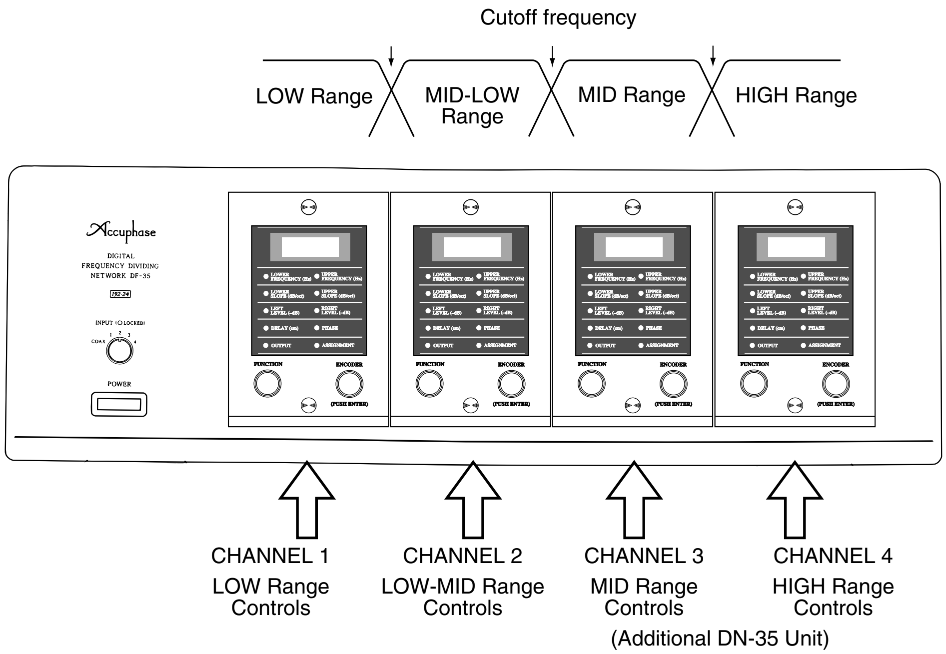
Install **DI2-HS1**



Interconnection of Units in a 3-Way Amplification System

4-Way Amplification System

- Divide the entire input signal frequency range into four (LOW Range, LOW-MID Range, MID Range and HIGH Range) by setting the cutoff frequencies of each DN-35 filter amplifier unit for channels 1, 2, 3 and 4.
- Add two DN-35 filter amplifier units for channel 3 and channel 4 to enable the configuration of a 4-way amplification system.

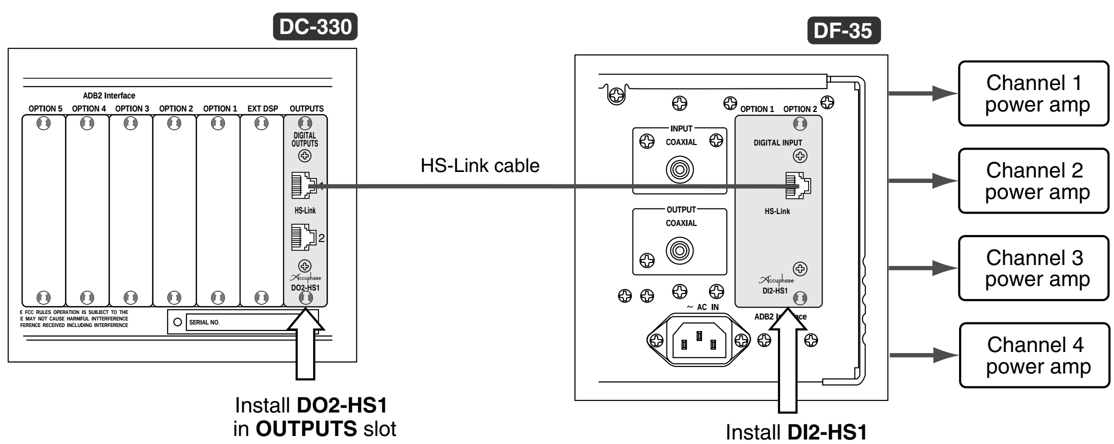


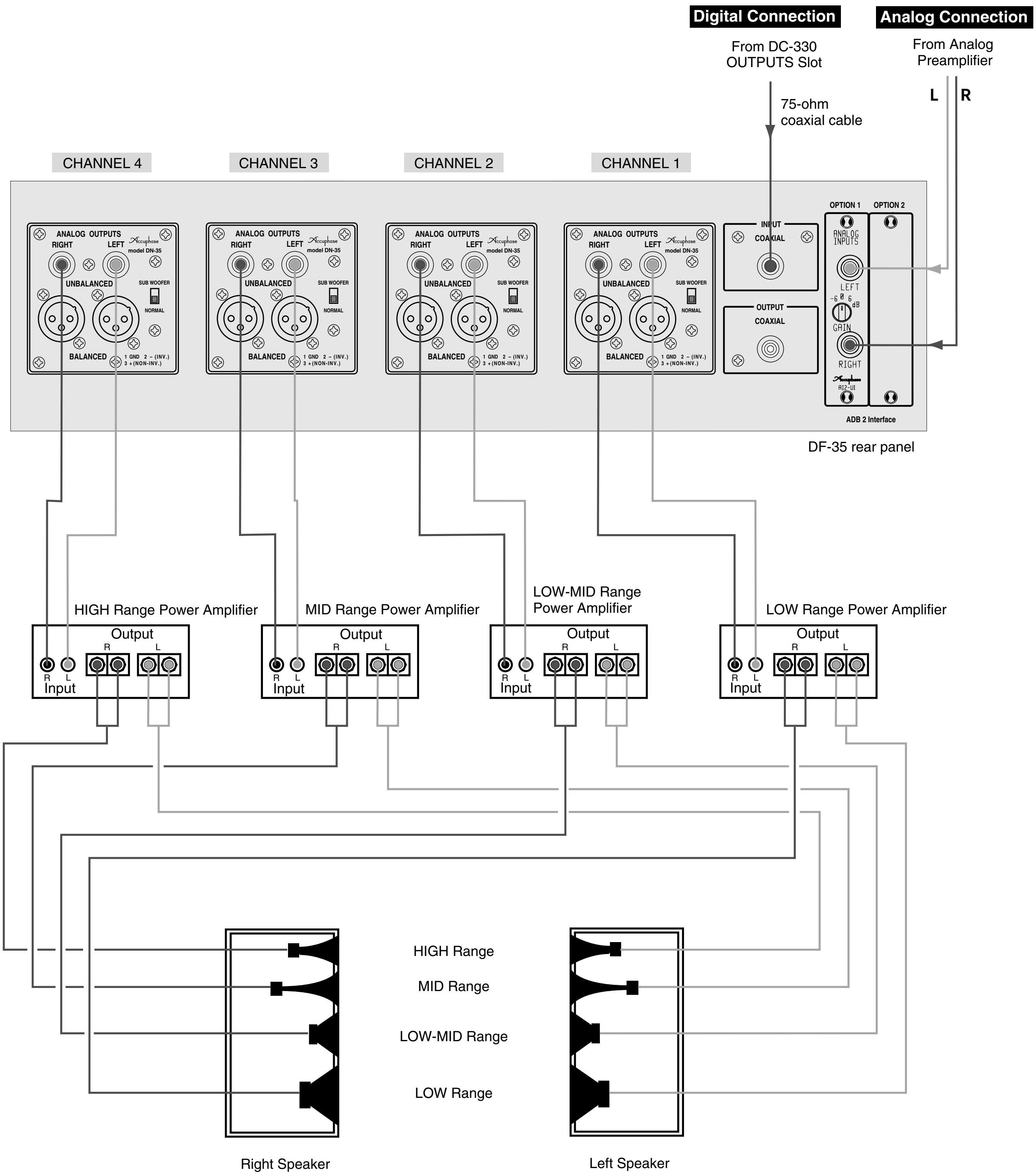
HS-Link Cable Connection with 4-Way Configuration

※ Install DO2-HS1 in DC-330

※ Install DI2-HS1 in DF-35

※ Connect with HS-Link cable

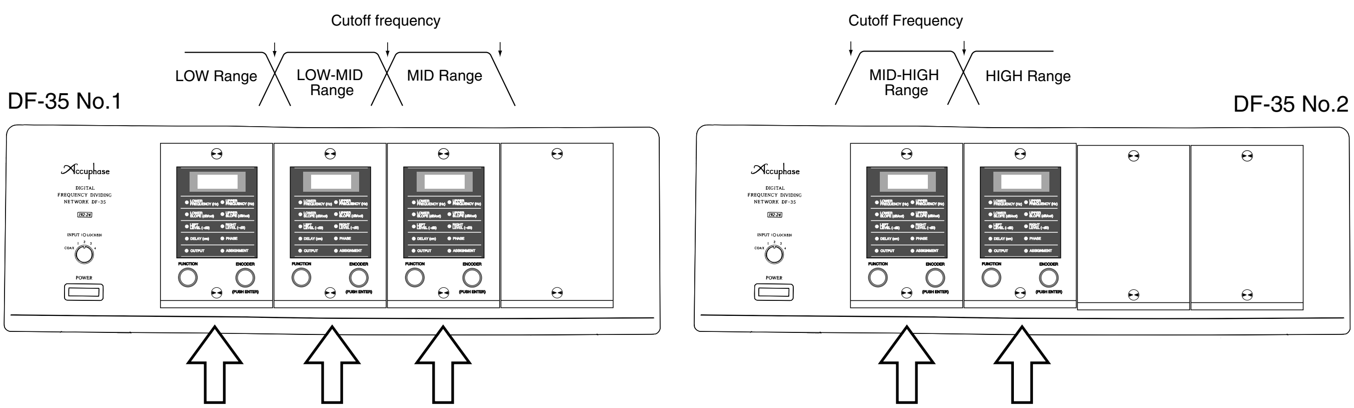




Interconnection of Units in a 4-Way Amplification System

5-Way Amplification System

- Divide the entire input signal frequency range into five (LOW Range, LOW-MID Range, MID Range, MID-HIGH Range and HIGH Range) by setting the cutoff frequencies of each DN-35 filter amplifier unit for channels 1, 2, 3, 4 and 5.
- Add one DF-35 unit to accommodate channels 4 and 5.
- Add one DN-35 filter amplifier unit to accommodate channel 3 in a 5-way (5-channel) amplification system configuration.
- In the connection example on page 25, the Digital Output of DF-35 (No.1) preamp input and Digital Input of one more DF-35 (No.2) are connected by 75-ohm coaxial cable. (See page 5, 8.)



CHANNEL 1
LOW Range Controls

CHANNEL 2
LOW-MID Range Controls

CHANNEL 3
MID Range Controls
(Additional DN-35 Unit)

CHANNEL 4
MID-HIGH Range Controls

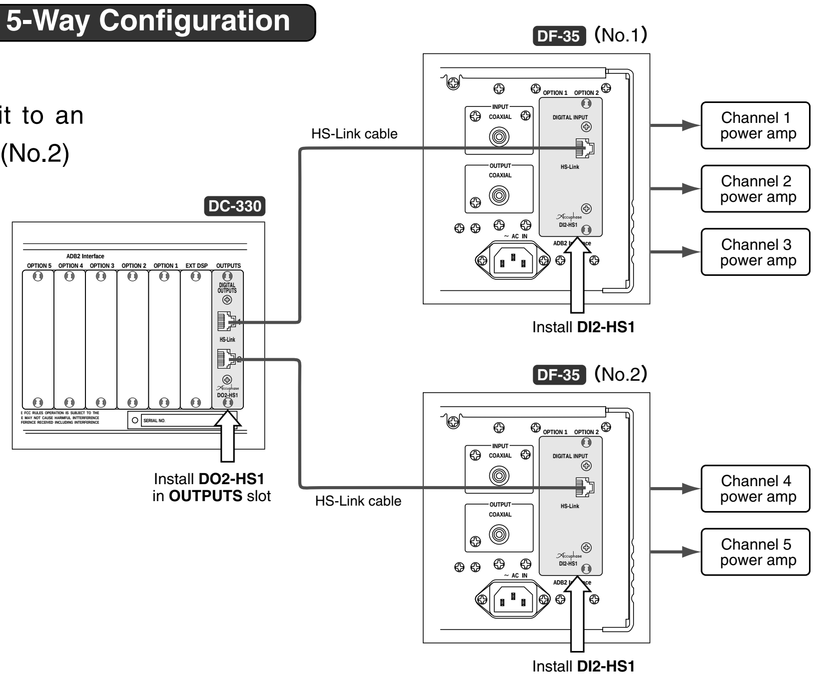
CHANNEL 5
HIGH Range Controls

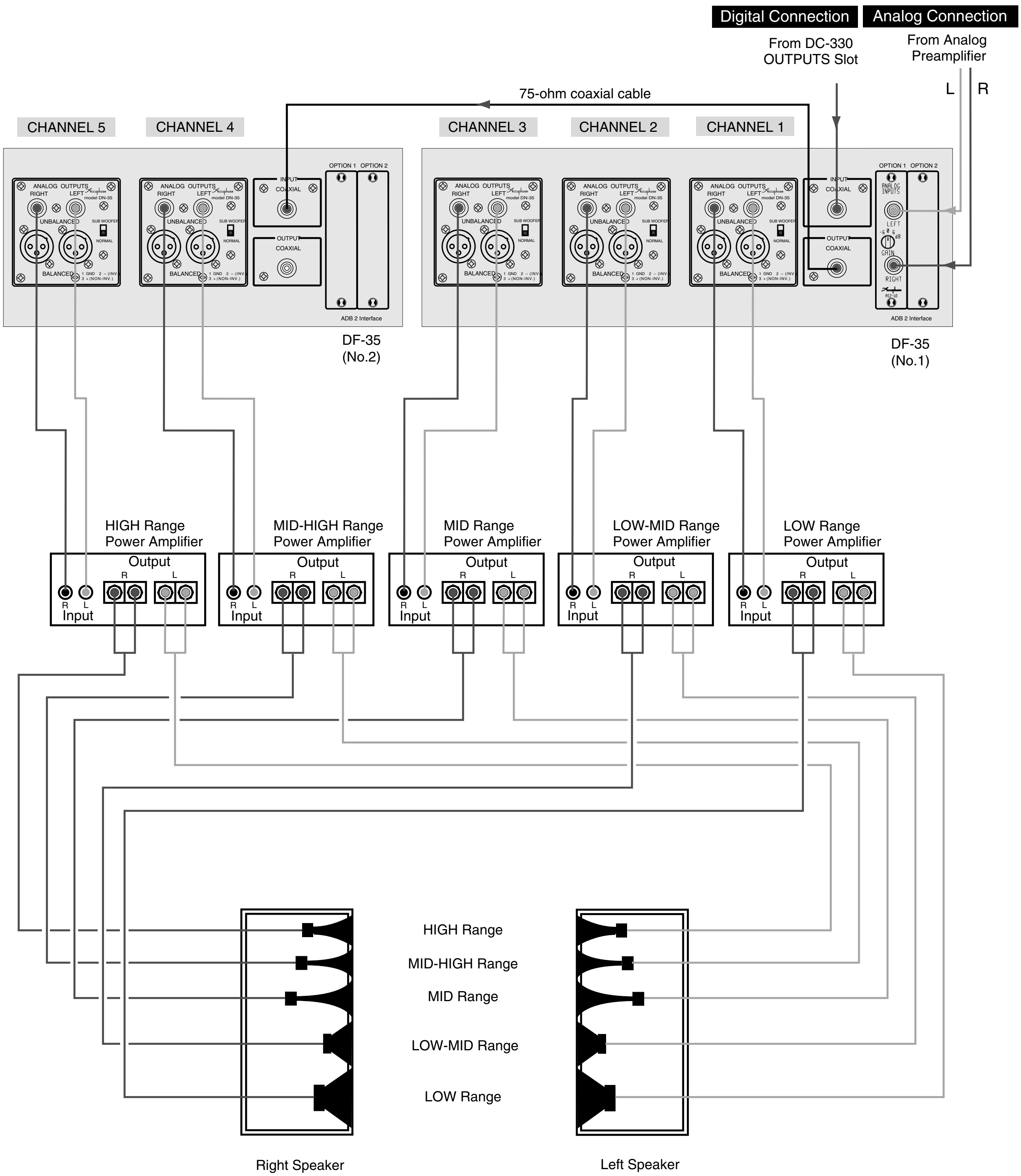
HS-Link Cable Connection with 5-Way Configuration

※ Install DO2-HS1 in DC-330

※ Connect an additional DI2-HS1 unit to an option slot for each DF-35 (No.1) and (No.2)

※ Connect with two HS-Link cables

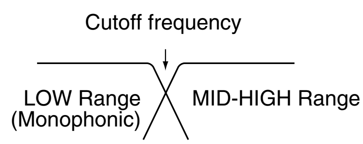




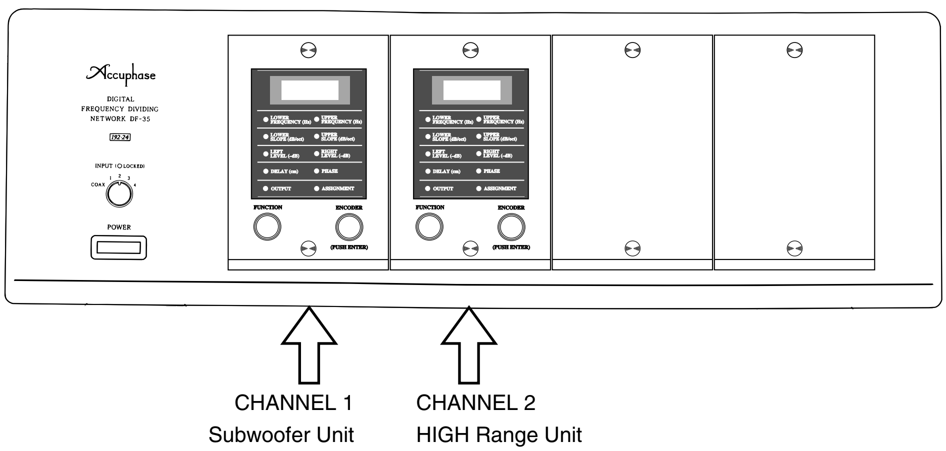
Interconnection of Units in a 5-Way Amplification System

Subwoofer System

- The basic interconnections are the same as any of the above multi-amplification systems.
- The only difference is that the Slide switch in the LOW OUTPUT section on the rear panel (CHANNEL 1) must be set in the "SUBWOOFER" position to turn low-range output signals left and right into monophonic signals. (See page 5, 6).
- And example of a 2-way amplification system configuration with a subwoofer system is shown below. Interconnections with a multi-amplification system expanded from the standard 2-way system to those for three, four and five channels are the same as those of the respective multi-amplification systems, except for turning low-pitch left and right signals into monophonic ones.

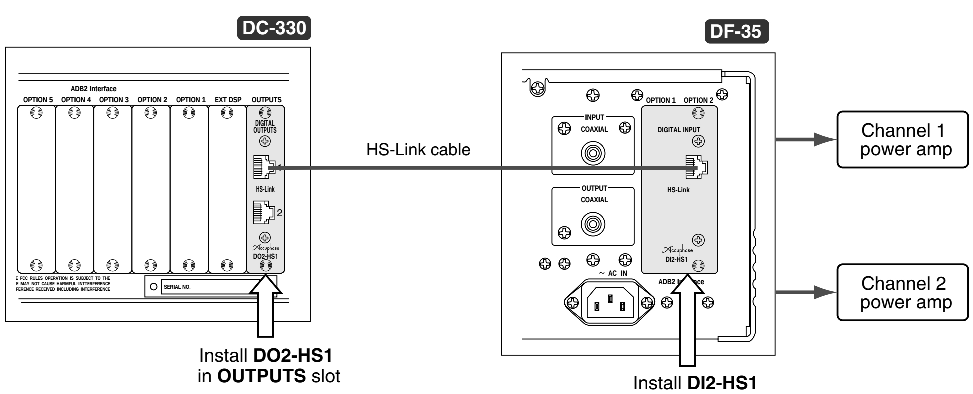


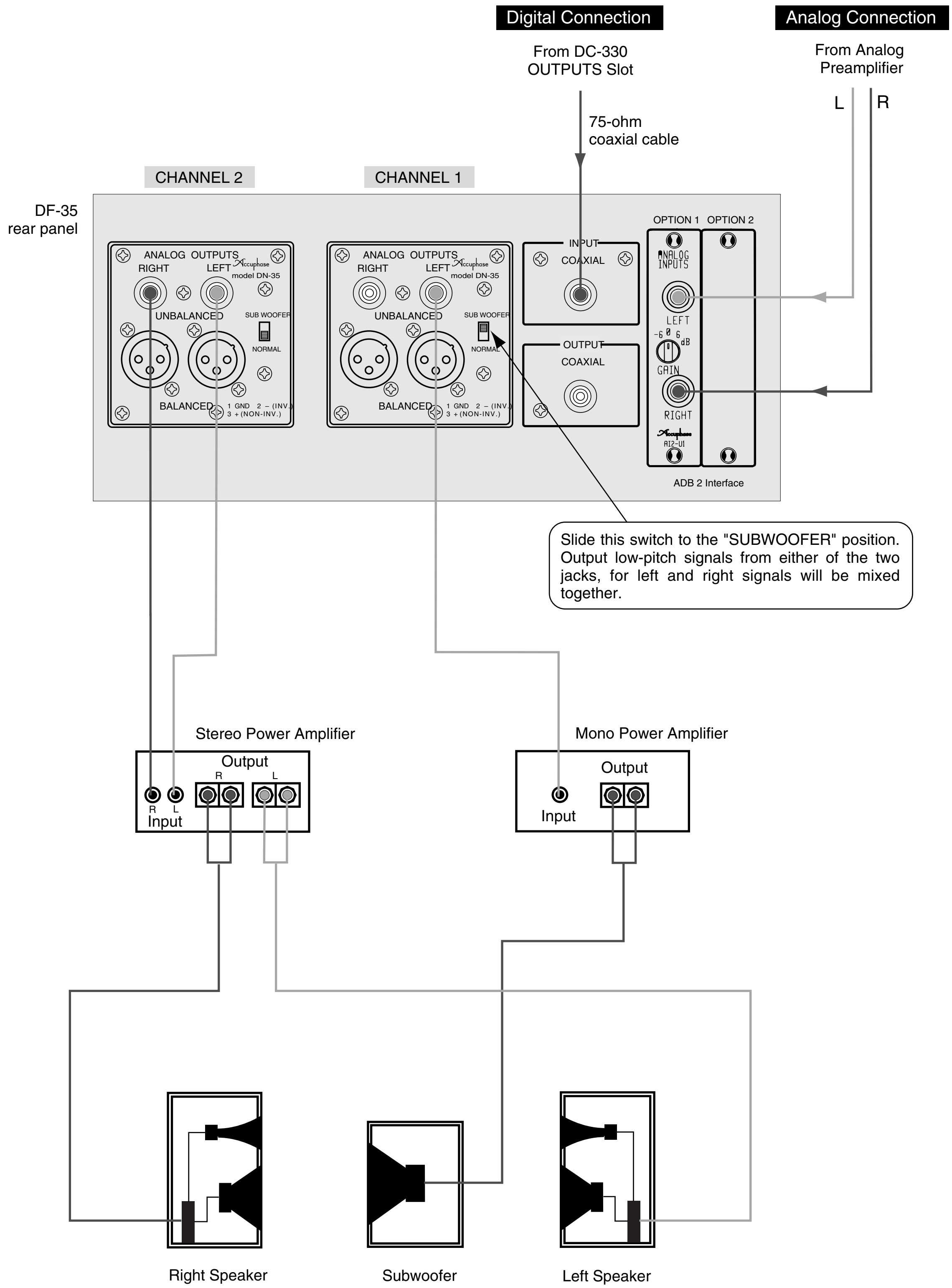
Conduct level Channel 1 LEVEL adjustment on the side (left or right) from which you are taking the output (LEFT in the above example).



HS-Link Cable Connection with 2-Way Configuration

※ Install DO2-HS1 in DC-330
※ Install DI2-HS1 in DF-35
※ Connect with HS-Link cable





Interconnection of Units in 2-Way Amplification System with Subwoofer System

6. Optional Boards

In addition to the standard Digital Input (COAXIAL) connection, there is a wide range of option boards for analog and digital input available for DF-35 and preamplifier interconnection. While the DF-35 is a channel divider for full digital signal processing, it is also possible to install an option board that acts as an analog preamplifier, thereby enabling the same style operation as the previous frequency dividing network.
The DF-35 supports SACD, DVD-Audio and other next-generation formats, and is equipped with an optional slot with an ADB 2 interface standard port.

- Optional slots for system expansion using a variety of available optional boards.
- Compatible with boards employing the DC-300, DC-330, DG-28, DP-75V and more.
- On installing an option board, select its connector using the INPUT selector switch. Once locked in, the LOCKED LED will light.
- Before you install an option board, be sure to read through its instruction manual.

When Interconnecting with an Analog Preamplifier

- Install an optional analog board with input jacks.
- To assure top-quality performance and sound, install the AI2-U1 or AI2-B1.

Analog Board Type		Sampling Frequency	
		48kHz	96kHz
Line input board	AI-U1	○	×
Line input board	AI2-U1 ※	○	○
Balanced input board	AI-B1	○	×
Balanced input board	AI2-B1 ※	○	○

※ AI2-U1 and AI-B1 are equipped with an internal 48/96 kHz selector switch.

Digital Connection from DC-330

- When connecting with anything other than with the COAXIAL jack, install an optional board that has digital input. You must choose a digital output board with a connector that also matches the DC-330 OUTPUTS slot. Please read through the instruction manual for the DC-330.
- Whatever the digital output connector of the additional board, it transmits the same signal as the input, which can be sent as output to the DF-35.
- To reproduce sound when an SACD transport input board is connected to the DC-330, you must connect an HS Link option board to the DF-35. See the instruction manual for the DP-100 for details.

Digital Board Type			Sampling Frequency	
			48kHz MAX.	96kHz MAX.
HPC coaxial input board	DI-BNC1		○	○
HPC optical I/O board	DIO-ST1		○	○
Digital I/O board	DIO-OC1		○	○
AES/EBU I/O board	DIO-PRO1	IN	○	○
		OUT	○	×
HS-Link Input Board	DI2-HS1*		Max. 192 kHz	
HS-Link Output Board	DO2-HS1*		Max. 192 kHz	

* HS-Link is also compatible with 2.6224 MHz/bit DSD signals

⚠ **PRECAUTION** If you install a DI-BNC1 board with a BNC cable connection, install a DIO-OC1 board in a DC-330 OUTPUTS slot and use one of the commercially available COAXIAL-BNC conversion connectors.

Configuring a multi-channel system requires you to make adjustments and decisions such as cutoff frequency, attenuation slope characteristic, delay, phase between speaker units and signal level. These adjustments and characteristic determinations are not necessarily predetermined by theory. The following therefore serves only as a basic guideline and should be used as a reference when configuring your own particular system. DELAY (time alignment) and PHASE in particular are greatly influenced by their mutual relations and the acoustic properties of the equipment. In the final analysis, you should conduct repeated listening tests while you work towards making the adjustments and characteristic selections that are optimal for your system and your preference for sound.

Time Alignment and the DELAY Function

Since sound waves are vibrations propagated in the medium of air, sound has a certain velocity. In general this velocity is 340 m/sec (with an air temperature of 14℃). This is extremely slow compared with electrical signals or light. So when using several speaker drivers, there is a difference between drivers as regards the time required for sound to reach the listening position. This difference is noticeable enough to adversely affect sound quality.

In a multi-channel system, the speaker units (drivers) are out of horizontal alignment with each other. Because of this, sound radiated from different units arrives at the listening position at different times. The method of time adjustment for sound arriving at the listening position is known as time alignment.

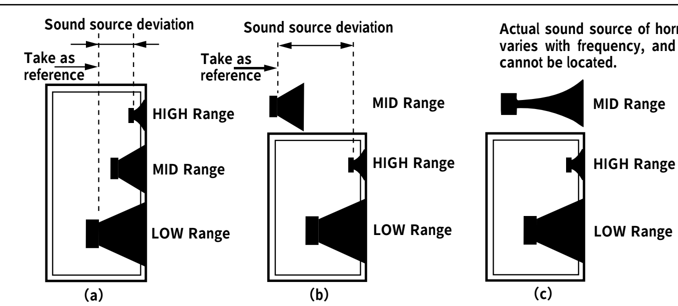
The DF-35 employs digital signal processing to introduce an electrical delay. This DELAY function allows adjustment of the time differences between speaker units for sound to reach the listening position. DELAY converts delay time to distance (cm) from the velocity, and displays the result.

■ Adjusting the Relative Positions of Speaker Unit Sound Sources

With the speaker system in the next figure, when setting the speaker unit phases, it is assumed that the surfaces (sound sources) of the respective speaker units are flush with one another. Because of this, it is first necessary to align the relative sound source positions.

In an actual speaker system, the positions of speaker units deviate as shown in figure (a) and figure (b). Since figure (c) is a horn speaker, the sound source varies with frequency and is therefore difficult to locate.

The DF-35's DELAY function allows you to change the sound source position of each unit electrically. Taking the diaphragm position of the speaker unit that is furthest away from the listening position as a reference, the DF-35 introduces a delay to the sound emitted by the nearer units in order to match the times of sound reaching the ears. The DF-35 estimates the distance of the diaphragms between speaker units, and allows setting of DELAY for each filter amplifier unit. (See pages 9 and 11 for details.)



Various Positions of Speaker Units

Reference: Velocity of Sound

Velocity of Sound = $331.5 + 0.607t$ [m/sec] t : temperature (℃)

From the above equation, the velocity of sound at 14℃ is 340 m/sec.

Based on the above equation, the DF-35 converts delay time to distance (cm) and displays the result.

The maximum DELAY display values with the DF-35 are as follows:

Sampling frequency of 96 kHz or less : 999 cm

Sampling frequency of 176.4 kHz or greater : 700 cm

Phase Relations

■ Phase Relations between Units

In an audio system, the speaker is the sound source, and the sound is transmitted through air to reach the ears of the listener. If sound of the same frequency is radiated from two or more speaker units at the same time, and there are phase differences between speaker units, these will be heard as changes in sound quality and tone.

Let us examine phase relations assuming that the sound sources (start positions) of two speaker units are in alignment. If the signals at two speaker units are in phase with each other, the condition in which the moving direction of energy from each speaker unit is the same with respect to the other as shown in Fig. 1 and is referred to as "positive phase," and their composite waveform represents the sum of the energies of the two speaker units.

In the condition illustrated in Fig. 2, the phase waveforms completely cancel each other out. This phase relation is referred to as "reverse phase" or "negative phase." In an electronic circuit, if two reverse-phase signals of equal magnitude are combined, the two energies conflict but do not cancel completely to zero with signals which have once turned into the vibrational energy of air such as the ones from speakers. Their composite energy will thus be weakened.

The phase condition shown in Fig. 3 is intermediate between positive phase and reverse phase. The composite waveform will not become zero, and while the starting point of the combined waveform is shifted slightly with respect to the two original waveforms, the energy level is maintained somewhat.

The phase of an output is quantitatively expressed in angular degrees. Like the circular motion of a rigid body, if the phase of an output is shifted by 180 degrees from its starting point, the direction of the output waveform becomes opposite with respect to its phase: that is, reverse phase. If the output waveform further advances by 180 degrees (amounting to a total of 360 degrees), it will return to its original point. The mid point between the positive and reverse phases is referred to as the "intermediate state". These phase relations are summarized in the table on the right.

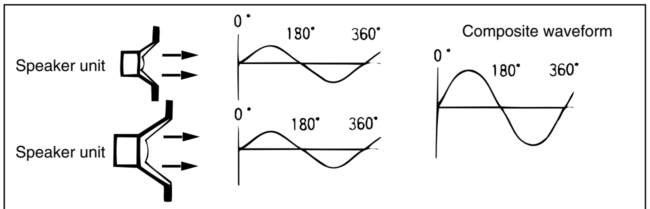


Fig. 1 Two Signals in Same Phase (Positive Phase)

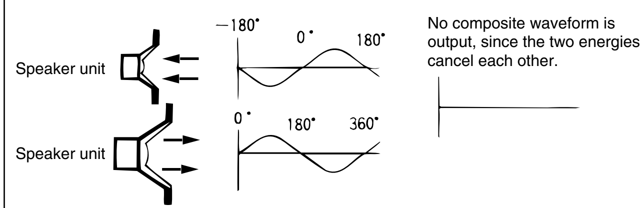


Fig. 2 Two Signals in Out-of-Phase Condition

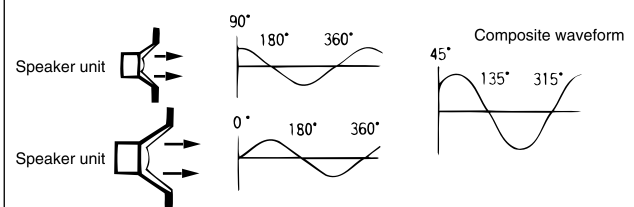


Fig. 3 Two Signals in Intermediate State (Between positive phase and reverse phase)

Phase difference (degrees)	Phase	Composite waveform	Sound quality
0	Positive phase	Double the original two energies	No change at all
↕	Intermediate state	Phase lead or lag occurs	Only slightly changed
180	Reverse phase	The two energies cancel each other	Changed to a great extent
↕	Intermediate state	Phase lead or lag occurs	Only slightly changed
360 = 0	Positive phase	Double the original two energies	No change at all

■ Phase in a Multi-Speaker System

In a multi-speaker system, the necessary division of the audio frequency range always results in the generation of phase differences. At a cutoff frequency, the sound radiated from two speakers forms composite waveforms in the intervening space between the speakers and the listening position, necessitating phase-matching, Phase differences vary with the attenuation slope. The DF-35 exhibits Butterworth response, the phase and slope characteristics of which are shown in the table on the right.

To sum up, in a multi-speaker system, each filter amplifier unit generates phase differences in the vicinity of its cutoff frequency.

SLOPE	PHASE (degrees)	PHASE setting (determine through listening tests)
6dB/octave	90 (Intermediate state)	Norm or Inv
12dB/octave	180 (Reverse phase)	Inv
18dB/octave	270 (Intermediate state)	Norm or Inv
24dB/octave	360 (= 0, Positive phase)	Norm
48dB/octave	720 (= 0, Positive phase)	Norm
96dB/octave	1440 (= 0, Positive phase)	Norm

With an attenuation slope of 12 dB/octave, when speakers are driven by a power amplifier, movement is reversed at the cutoff point as shown in Fig. 4 (a). Accordingly, with the composite waveform the two energies cancel out at the cutoff point indicated by the dotted line in Fig. 4 (b).
To solve this problem, if we reverse the polarities (+ –) between mid-range amplifier and mid-range speaker, the diaphragm movements of the speakers at the respective cutoff points are in relative agreement, and the characteristic of the composite waveform becomes flat as indicated by the solid line in Fig. 4 (b).
With attenuation slopes of 6 dB/octave and 18 dB/octave, the phase difference is an intermediate state between positive and reverse phases. In this case, the composite output will not vary in magnitude, regardless of whether the connections between the mid-range amplifier and mid-range speaker unit are the same phase or not.

With the DF-35, to reverse the polarity of the mid-range amplifier, set the PHASE Selector switch to the "Inv" position (reversed). It is not necessary to change the connections between amplifier and speaker.

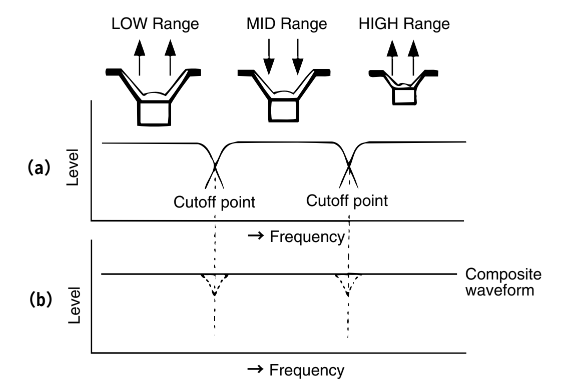


Fig. 4 Phase and Composite Waveform at Cutoff Points

■ Checking Phase Relations (3-Way Speaker System)

Let's first check the phase relations between frequency ranges. A method of checking phase by ear is to use the interstation noise of an FM tuner. You need to check the phase relations between two contiguous acoustic frequency ranges. So, with a 3-way speaker system, be sure to turn OFF the speaker for the HIGH Range.

❶ Turn OFF the muting circuit and set the tuner at a frequency where it is not receiving signals from any station in order to generate interstation noise.

❷ Restrict outputs to those from either the left or right channel only, to produce sound from the left or right speaker.

❸ Adjust the volume of the left or right outputs to an appropriate level and listen to the reproduced sounds at the center position between the speakers.

❹ Reverse the phase of the mid-range with the PHASE Selector switch, and again listen to the result as in step ❸.

❺ Repeat steps ❸ and ❹. You can determine that the polarity is correct if you can hear stable sound around the speaker. If the polarity is not correct, the sound will be unstable (sporadic).

❻ After you have determined the polarity of the MID Range speaker unit, determine the polarity of the HIGH Range speaker unit.

Change the DELAY values of the MID Range speaker unit, and conduct more listening tests. It is important to observe the following points during these tests.

(1) Select the attenuation slope characteristic (-12 db/octave, -18 dB/octave or -24 dB/octave) before conducting the listening test, and keep to the same one throughout because phase relations between speaker units are governed by the slope characteristic.

(2) Do not listen to sounds near a wall in your room because you will be picking up sound reflected from the wall and other interference sounds, which may lead you to misjudgment. As far as possible, try to conduct this listening test at the center of the room, close to the optimal listening position.

(3) In a 3-way system, first test the LOW range and MID-range, and determine the polarity of the MID-range based upon that of the LOW range.

(4) If the cutoff frequency exceeds 2000 Hz, the wavelength will be shortened, making it difficult to decide which is the connection for the correct phase. In this case, listen to various program sources and check which polarity provides better balance and localization.

(5) After determining the polarity between the speakers for two adjoining frequency ranges in the left and right channels, conduct the same listening test for the other channel as well. Confirm that sounds from speakers focus well at the center between the two.

Level Adjustments

Speakers units differ depending on efficiency, amplifier gain and room characteristics in different parts of the audio frequency range. Level adjustments are therefore necessary to compensate for these differences and assure that speaker units of all frequency ranges produce a sound of constant intensity.

❶ Level adjustment between speaker units
Take the woofer as a reference, since this speaker unit has the least efficiency of all. With the level of the LOW range set at maximum, and taking into account the efficiency of each speaker unit and the gain of each amplifier, lower the levels of the MID and HIGH ranges for adjustment. Use the LEVEL control of the DF-35's filter amplifiers to adjust the level in each frequency range, and set the level of each power amplifier to maximum.

❷ Level difference adjustment between Left and Right channels
To check for non-uniformity of sound level between left and right channels, reproduce monophonic signals and find a level difference between the channels that achieves sound localization at the center position between speakers for each frequency range.

❸ Final adjustment using an actual program source
Use the level adjustments completed in steps ❶ and ❷ above as reference, and conduct the final adjustment including room characteristic by varying the output level at the same increment for both the left and right channels. Use a familiar vocal arrangement for the program source and make fine adjustments until you attain a sound that is well balanced across the whole frequency range.

Speaker Measurement with the DG-28

The DG-28 digital voicing equalizer allows you to make sound field measurements with a high level of reliability. Take measurements one speaker at a time. (Refer to the instruction manual for the DG-28 for details of the measuring method.)

❶ Place a microphone for measurement purposes one meter in front of a speaker and direct it towards the MID range and HIGH range speaker units.

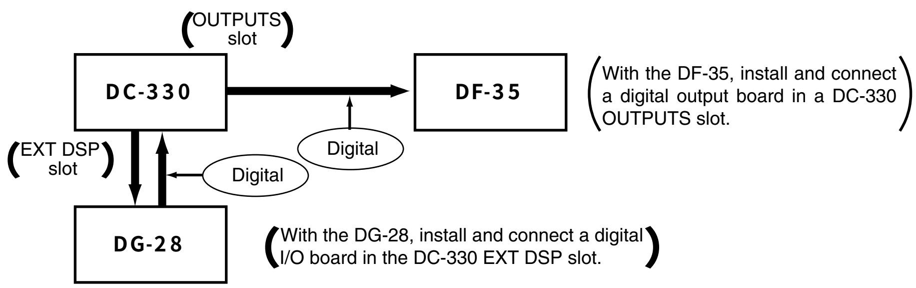
❷ With the DG-28, measure the speaker system as a unit in sound field measurement mode alone (no compensations made).

❸ Observe level differences at cutoff frequencies, level differences between frequency ranges and other characteristics while checking frequency response on the monitor.

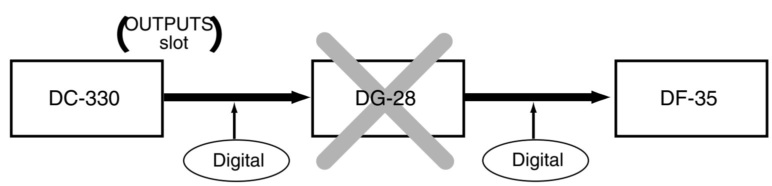
❹ Alter the functions on each filter amplifier unit (FREQUENCY, SLOPE, DELAY, PHASE, LEVEL, etc.) and repeat measurements in order to achieve flat frequency response with no dips and bumps.

■ When connecting a DG-28 unit between a preamplifier and the DF-35, make sure that the connection allows volume operation.

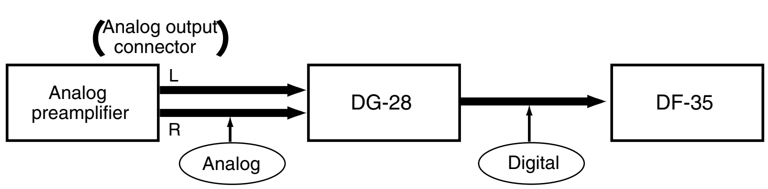
① Connecting from the DC-330



⚠ **PRECAUTIONS** With the setup shown here, the DF-35 does not receive volume data. Never interconnect units in this way.



② Connecting from Analog Preamplifier



[Install an analog input board for the DG-28]

8. Guaranteed Specifications

The following characteristics were measured in compliance with EIAJ standard method CP-2402

Input Format
EIAJ standard format
Quantization: 16 ~ 24 bits linear
Sampling Frequency: (auto-detected)
32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz,
176.4 kHz, 192 kHz, 2.8224 MHz:
Provided by option boards

Digital Input Format Level (EIAJ CP-1201)
Format : DIGITAL AUDIO INTERFACE
OPTICAL : Optical input –27 ~ –15 dBm
(Provide by option board)
COAXIAL : 0.5 V_{P-P} 75 ohms

Digital Output Format Level (EIAJ CP-1201)
Format : DIGITAL AUDIO INTERFACE
COAXIAL : 0.5 V_{P-P} 75 ohms

Frequency Response
0.5～50,000 Hz +0, –3 dB

D/A Converter
24-bit MDS system

Total Harmonic Distortion
0.0008% (20 ~ 20,000 Hz)

Signal-to-Noise Ratio
116 dB

Dynamic Range
112 dB

Channel Separation
108 dB (20～20,000Hz)

Cutoff Frequencies

10	20	31.5	35.5	40	45	50	56
63	71	80	90	100	112	125	140
160	180	200	224	250	280	290	315
355	400	500	560	630	710	800	900
1000	1120	1250	1400	1600	1800	2000	2240
2500	2800	3150	3550	4000	5000	5600	6300
7100	8000	9000	10k	11.2 k	12.5 k	14 k	16 k
18k	20 k	22.4 k					

Cutoff Characteristic
–3.0 dB

Attenuation Slope Characteristic
6 dB/octave, 12 dB/octave, 18 dB/octave
24 dB/octave, 48 dB/octave, 96 dB/octave
※Only slope characteristics 6 dB/octave, 12 dB/octave and 18 dB/octave are possible with cutoff frequencies at 10 Hz and 20 Hz.

Delay (Converted to Distance)
0 ~ 999 cm (in 1-cm steps)
※Maximum delay is 700 cm with a sampling frequency of 176.4 kHz or greater.
※Can be set independently for left and right channels.

Level Adjustment
0 ~ -40 dB in 0.1-dB steps
※Independent left and right channel adjustment for each frequency range

Output Voltage/Output Impedance
BALANCED : 2.5 V 50 ohms balanced XLR type
UNBALANCED : 2.5 V 50 ohms RCA phono jack

Minimum Load Impedance
BALANCED : 600 ohms
UNBALANCED : 600 ohms

Power requirements
120V/230V (Voltage as indicated on rear panel)
AC, 50/60Hz

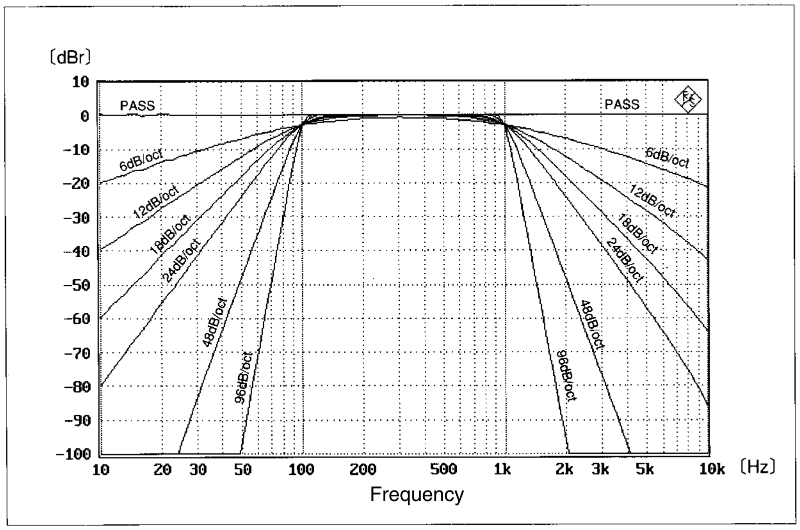
Power consumption
25 W

Maximum Dimensions
Width 475 mm (18-11/16")
Height 171 mm (6-3/4")
Depth 405 mm (15-15/16")

Weight
18 kg (39.7 lbs) net
23.0 kg (50.7 lbs) in shipping carton

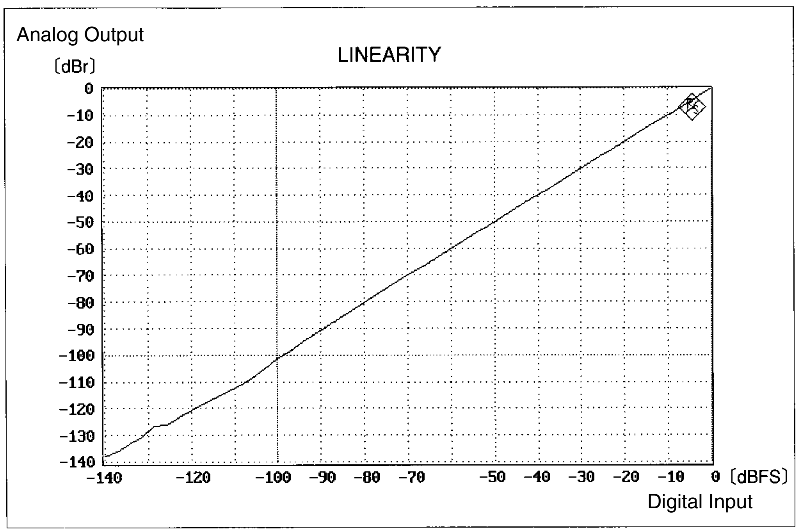
※ Specifications and design subject to change without notice for improvements.

9. Performance Curves

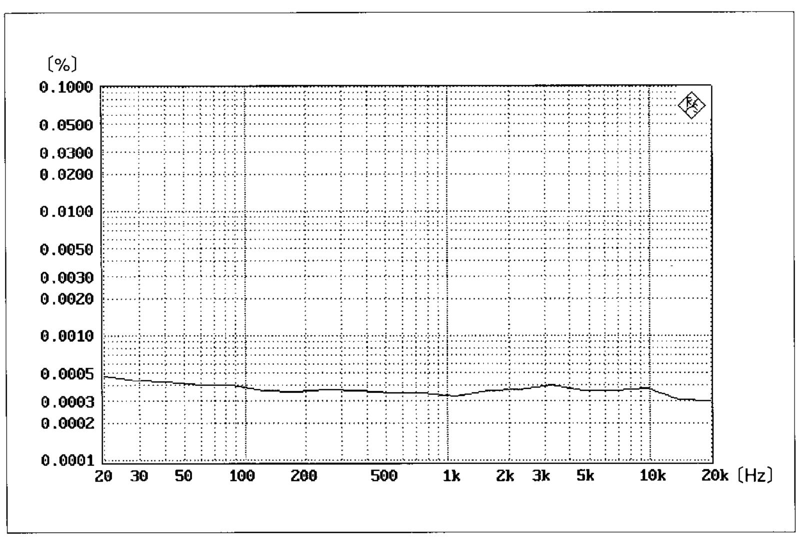


Filter amplifier unit slot characteristics
(band-pass filter)

[LOWER cutoff frequency : 100 Hz
UPPER cutoff frequency : 1 kHz]

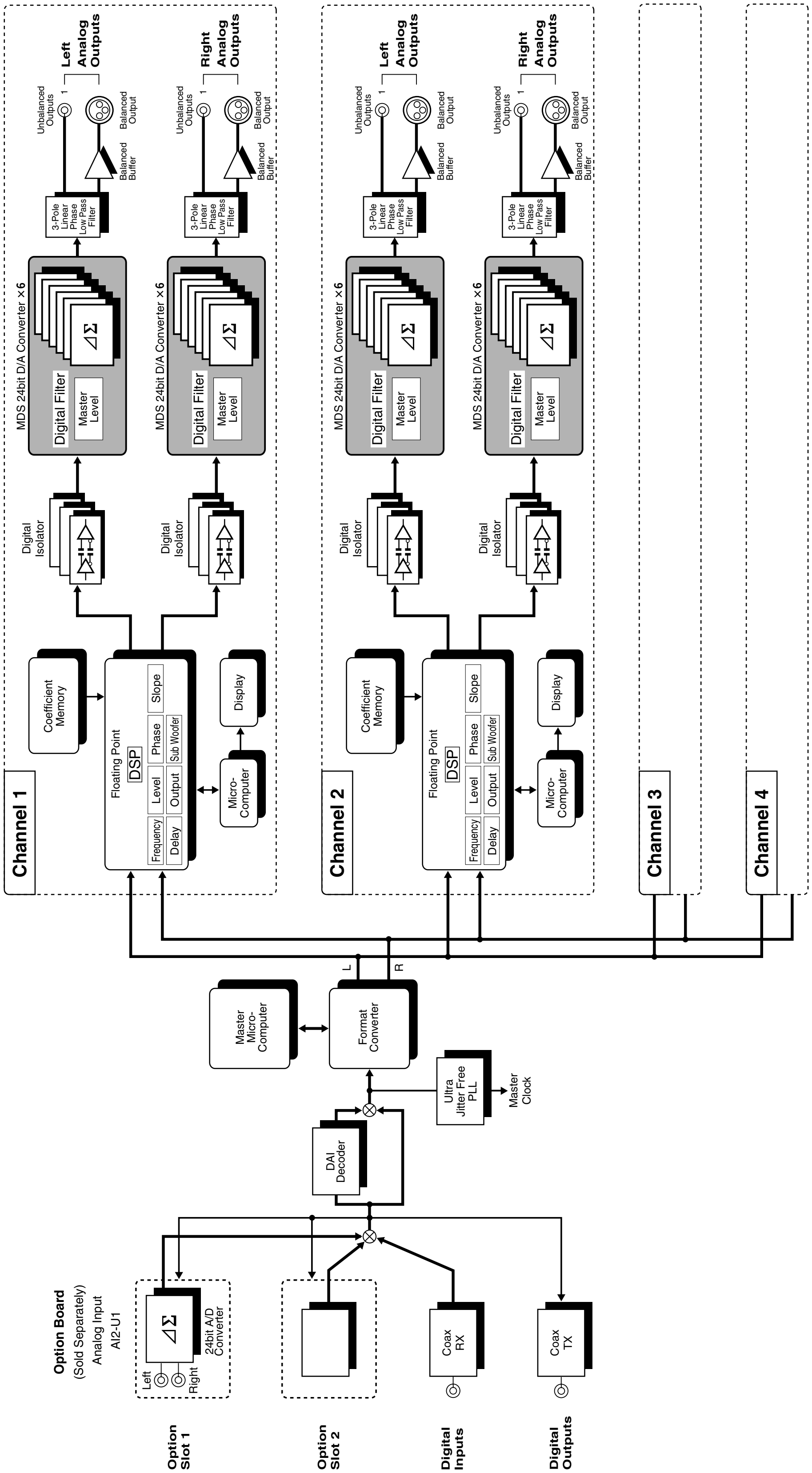


Linearity (analog output against digital input)



Total harmonic distortion (including noise) against frequency response

10. Block Diagram



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