DSP-3000

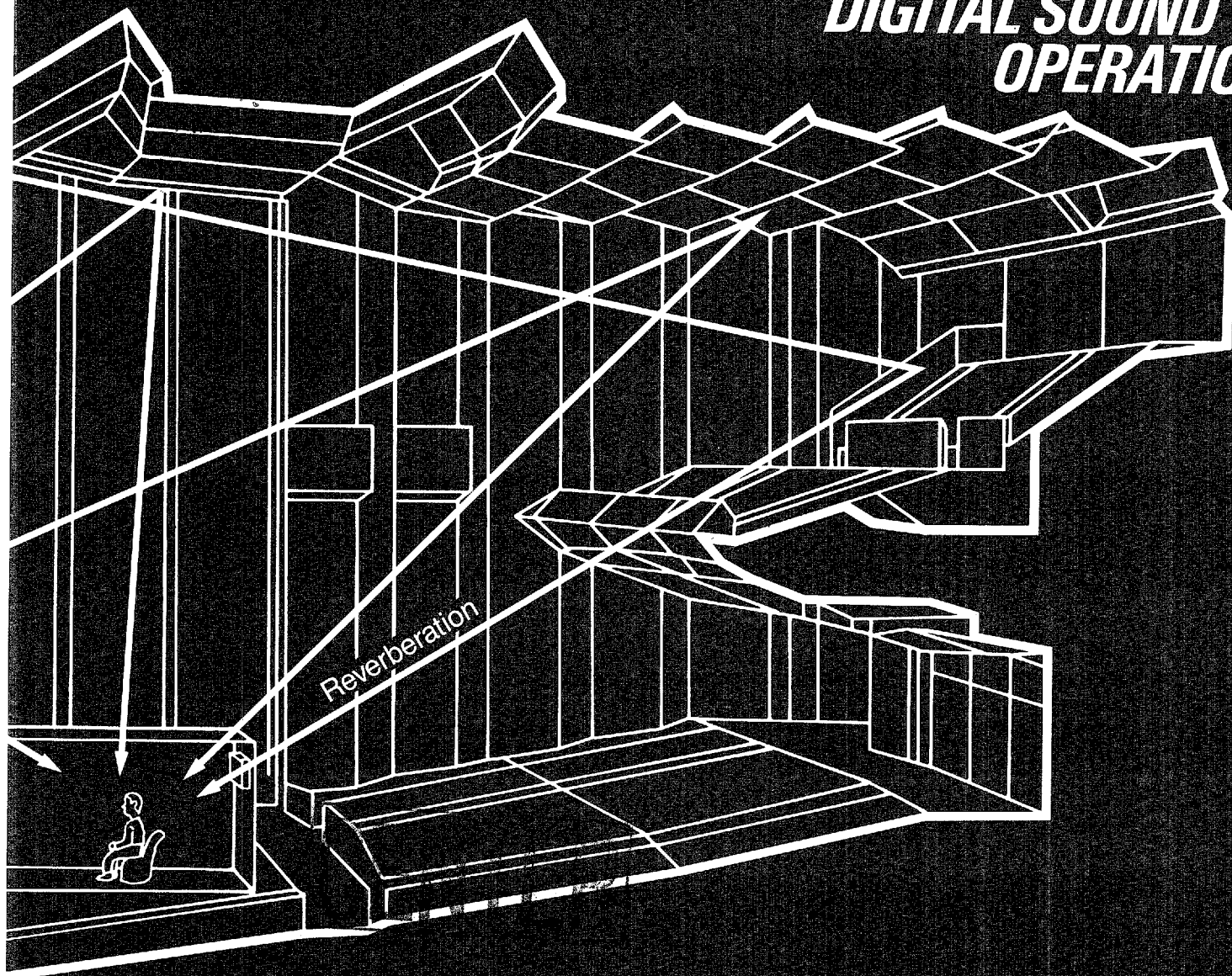## DIGITAL SOUND FIELD PROCESSOR
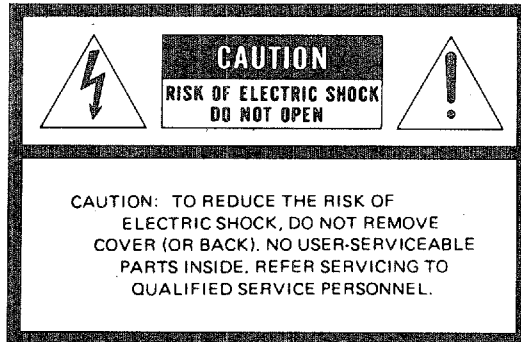## OPERATION MANUAL

Reverberation

YAMAHA

Congratulations!

You are the proud owner of a Yamaha DSP-3000 Digital Sound Field Processor—the most advanced audio component of its type.

The DSP-3000 takes full advantage of Yamaha's undisputed leadership in the field of digital audio processing to bring you a whole new world of aural experience. Follow the instructions given in this manual carefully when setting up your system, and the DSP-3000 will let you "sonically" transform your room into a vast range of high-quality listening environments—large and small. Hear Pavarrotti the way he actually sounds at a renowned opera house, enjoy your favorite trio in the cozy acoustic environment of a jazz club, experience the power of rock in a huge stadium... in short, you can simply select the acoustic environment that most ideally suits you and your music. And, of course, since all signal processing is digital, the sound is simply superb.
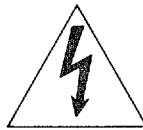
Rather than tell you about the wonders of the DSP-3000, however, let's get right down to the business of setting up the system and trying out the basic programs. Please read this operation manual carefully, and store it in a safe place for later reference.
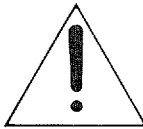
SAFETY INSTRUCTIONS

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF
ELECTRIC SHOCK, DO NOT REMOVE
COVER (OR BACK). NO USER-SERVICEABLE
PARTS INSIDE. REFER SERVICING TO
QUALIFIED SERVICE PERSONNEL.

●**Explanation of Graphical Symbols**

The lightning flash with arrowhead symbol,
within an equilateral triangle, is intended to
alert you to the presence of uninsulated
"dangerous voltage" within the product's
enclosure that may be of sufficient magni-
tude to constitute a risk of electric shock
to persons.

The exclamation point within an equilateral
triangle is intended to alert you to the pres-
ence of important operating and maintenance
(servicing) instructions in the literature
accompanying the appliance.

WARNING
To prevent fire or shock hazard, do not expose this
appliance to rain or moisture.

1 Read Instructions—All the safety and
operating instructions should be read
before the appliance is operated.

2 Retain Instructions—The safety and
operating instructions should be retained
for future reference.

3 Heed Warnings—All warnings on the
appliance and in the operating instructions
should be adhered to.

4 Follow Instructions—All operating and
other instructions should be followed.

5 Water and Moisture—The appliance
should not be used near water—for exam-
ple, near a bathtub, washbowl, kitchen
sink, laundry tub, in a wet basement, or
near a swimming pool, etc.

6 Cart and Stands—The appliance
should be used only with a cart or stand
that is recommended by the manufacturer.

7 Wall or Ceiling Mounting—The appli-
ance should be mounted to a wall or ceiling
only as recommended by the manufacturer.

8 Ventilation—The appliance should
be situated so that its location or position
does not interfere with its proper ventila-
tion. For example, the appliance should
not be situated on a bed, sofa, rug, or
similar surface, that may block the ventila-
tion openings; or cabinet that may impede
the flow of air through the ventilation
openings.

9 Heat—The appliance should be
situated away from heat sources such as
radiators, stoves, or other appliances that
produce heat.

10 Power Sources—The appliance
should be connected to a power supply
only of the type described in the operating
instructions or as marked on the appliance.

11 Power-Cord Protection—Power-
supply cords should be routed so that they
are not likely to be walked on or pinched
by items placed upon or against them,
paying particular attention to cords at
plugs, convenience receptacles, and the
point where they exit from the appliance.

12 Cleaning—The appliance should be
cleaned only as recommended by the
manufacturer.

13 Nonuse Periods—The power cord of
the appliance should be unplugged from
the outlet when left unused for a long
period of time.

14 Object and Liquid Entry—Care
should be taken so that objects do not fall
into and liquids are not spilled into the in-
side of the appliance.

15 Damage Requiring Service—The
appliance should be serviced by qualified
service personnel when:

A. The power-supply cord or the plug
has been damaged; or
B. Objects have fallen, or liquid has been
spilled into the appliance; or
C. The appliance has been exposed to
rain; or
D. The appliance does not appear to
operate normally or exhibits a marked
change in performance; or
E. The appliance has been dropped, or
the cabinet damaged.

16 Servicing—The user should not
attempt to service the appliance beyond
those means described in the operating
instructions. All other servicing should be
referred to qualified service personnel.

17 Power Lines—An outdoor antenna
should be located away from power lines.

18 Grounding or Polarization—
Precautions should be taken so that
the grounding or polarization of an
appliance is not defeated.

IMPORTANT!
Please record the serial number of your
unit in the space below.

Model: **DSP-3000**
Serial No.:

The serial number is located on the rear
of the unit.
Retain this Owner's Manual in a safe
place for future reference.

1. AVOID EXCESSIVE HEAT, HUMIDITY, DUST AND VIBRATION

Keep the unit away from locations where it is likely to be exposed to high temperatures or humidity—such as near radiators, stoves, etc. Also avoid locations which are subject to excessive dust accumulation or vibration which could cause mechanical damage.

2. AVOID PHYSICAL SHOCKS

Strong physical shocks to the unit can cause damage. Handle it with care.

3. DO NOT OPEN THE UNIT OR ATTEMPT REPAIRS OR MODIFICATIONS YOURSELF

This product contains no user-serviceable parts. Refer all maintenance to qualified Yamaha service personnel. Opening the unit and/or tampering with the internal circuitry will make servicing difficult and will endanger you and your DSP-3000.

4. MAKE SURE POWER IS OFF BEFORE MAKING OR REMOVING CONNECTIONS

Always turn the power OFF prior to connecting or disconnecting cables. This is important to prevent damage to the unit itself as well as other connected equipment.

5. HANDLE CABLES CAREFULLY

Always plug and unplug cables—including the AC cord—by gripping the connector, not the cord.

6. CLEAN WITH A SOFT DRY CLOTH

Never use solvents such as benzine or thinner to clean the unit. Wipe clean with a soft, dry cloth.

7. ALWAYS USE THE CORRECT POWER SOURCE

Make sure that the power source voltage specified on the rear panel matches your local AC mains supply.

8. DO NOT ATTEMPT TO REPLACE THE BACKUP BATTERY YOURSELF

If the backup battery in the main unit should need replacement ("**WARNING** USER MEM. ERROR" appears), have the job done by qualified Yamaha service personnel.

9. CONCERNING THE INSTALLATION LOCATION

Installing this unit above a heat-generating amplifier, etc. or in a rack with poor ventilation will reduce the visibility of the LCD display. Be sure to mount the unit in a well-ventilated location.
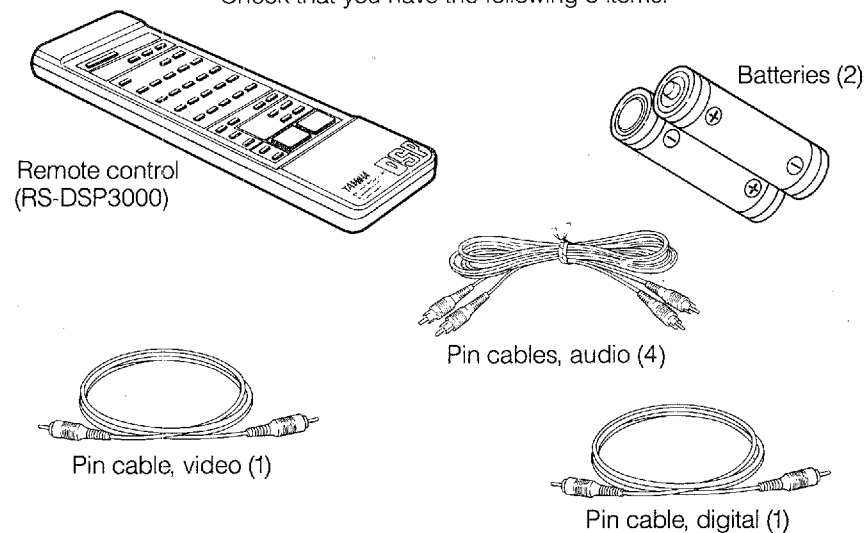
CONTENTS

1-1. GETTING STARTED

Unpacking

If you haven't already done so, carefully remove the DSP-3000 and its accessories from the box and wrapping material. You should find the DSP-3000 itself, a remote control unit, a pair of batteries for the remote control unit, four pairs of stereo audio cables, a video cable, and a digital signal cable.

Check that you have the following 5 items:

Remote control
(RS-DSP3000)

Batteries (2)

Pin cables, audio (4)

Pin cable, video (1)

Pin cable, digital (1)

Installing the Remote Control Unit Batteries

Since the remote control unit will be used for almost all DSP-3000 control operations, you should begin by installing the supplied batteries.

1. Turn the remote control unit over and pull down on the battery compartment cover clip while pulling the compartment cover outward, as shown in the accompanying illustration.
2. Insert the two batteries (SUM-3 or AA types), being careful to align them with the polarity markings on the inside of the battery compartment.
3. Close the battery compartment cover.

● When you notice that remote control operation has become erratic, or the distance from which the remote control will function has decreased markedly, it's time to replace the batteries. Always replace both batteries with new ones at the same time.
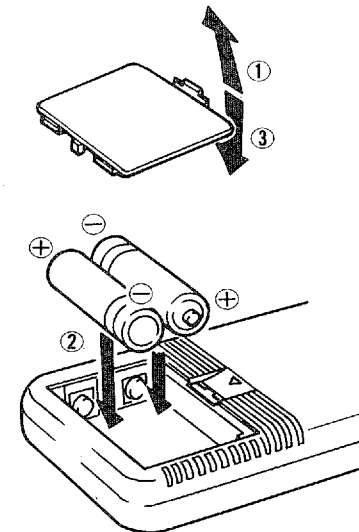
This remote control uses an advanced, highly directional infrared beam.

Be sure to aim the remote control directly at the infrared receiver on the main unit when operating. The remote control will not operate properly if aimed away from the receiver or if strong light falls on the receiver.

4-channel or 6-channel Operation?

The DSP-3000 was designed to provide the best sound-field quality with a full six-channel amplifier and speaker configuration, using two stereo power amplifiers in addition to the main stereo amplifier, and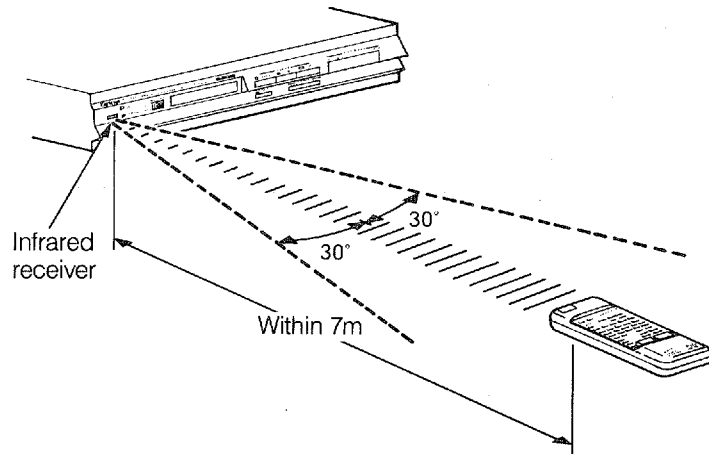 two extra pairs of speakers (two main speakers and four effect speakers). We therefore recommend that you use a six-channel setup, and we'll base our system setup instructions on the six-channel configuration. A four-channel system using only one extra stereo power amplifier and one pair of speakers for the effect sound will still provide impressive ambience and effects, however, and may be a good way to begin with your DSP-3000. You can always upgrade to the full six channels later. In the 4-channel mode, the full 6-channel processing is still performed, but with the front speakers used both for the main channels and the front effect channels.

Notes on four-channel setup will be given alongside the "4CH" symbol shown here.

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1-2. SETUP

Before You Start Making Connections Make Sure All Related Electronic Components are Turned OFF.

REAR PANEL
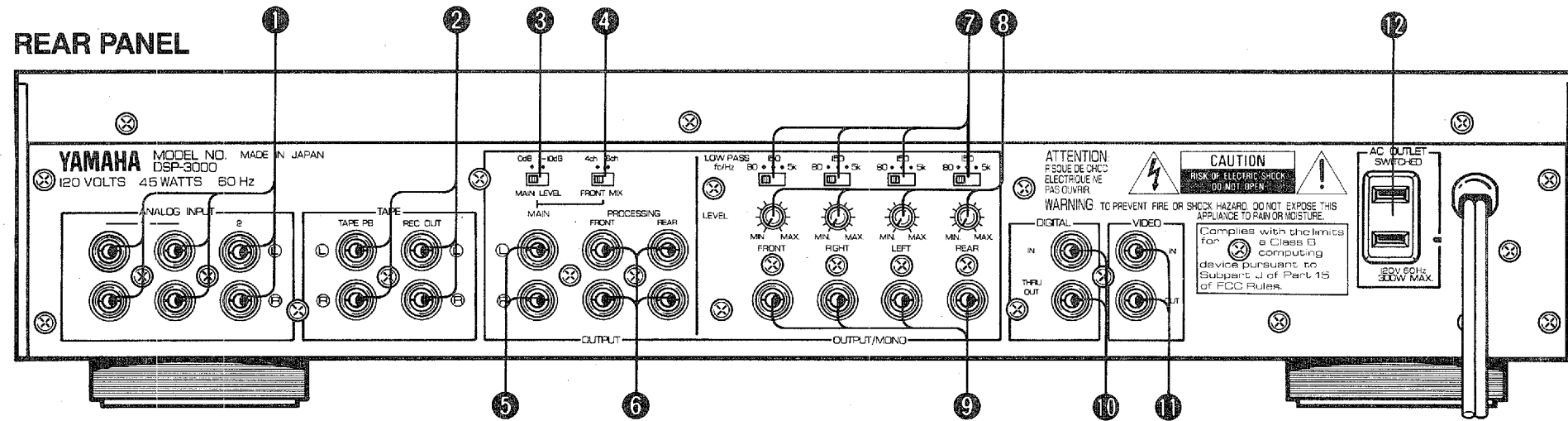
❶ Analog Inputs

Accept input from a preamplifier, the "PRE OUT" or "TAPE REC" outputs from an integrated amplifier, or direct input from a line-level source. Please note that there are two pairs of analog inputs under the "ANALOG INPUT 1" label. These are connected in parallel and either pair can be used for input. It is NOT possible to connect two different sources to these inputs. When a source is connected, the spare pair can be used to send the received input signal to an auxiliary amplifier or other equipment. The second pair of ANALOG INPUT 1 terminals should only be used in this way, however, when the DSP-3000 power is ON.

❷ Tape Record and Playback Terminals

Accept the inputs and outputs of a stereo tape deck for convenient recording and playback via the DSP-3000 (the effect sound cannot be recorded).

❸ Main Level Switch

Can be used to reduce MAIN output level by 10 dB to match the MAIN and EFFECT speaker levels.

❹ Front Mix Switch

Set to "6ch" when setting up a full 6-channel system, or to "4ch" when using only four speakers in a 4-channel system.

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⑤ Main Outputs
Output to the main power amplifier or to the "MAIN IN" terminals on an integrated amplifier.

⑥ Front and Rear Effect Outputs
Output to the FRONT and REAR effect power amplifiers (REAR only in the case of a 4-channel system).

⑦ Auxiliary Output Low-pass Filter Selectors
Limit the frequency output of the mono auxiliary outputs for use with subwoofers or woofers.

⑧ Auxiliary Output Level Controls
Adjust the level of the mono auxiliary outputs.

⑨ Mono Auxiliary Amp/Speaker Outputs
Output to optional center-channel or subwoofer auxiliary power amplifiers and speakers.

⑩ Digital Input and Through/Output Terminals
DIGITAL IN accepts direct digital input from a CD or DAT player equipped with a direct digital output. The THRU/OUT terminal re-transmits the digital signal to an external D/A converter unit if required.

⑪ Video Input and Output Terminals
These terminals connect the DSP-3000 between your VCR or video disc player and video monitor, allowing DSP-3000 programs and data to be displayed on the video monitor screen.

⑫ Auxiliary AC Outlet
This AC outlet may be used to power other components in your audio system as long as the total power consumption of the connected equipment does not exceed 300 watts. The auxiliary AC output is "switched," meaning that power is available only when the DSP-3000 is turned ON. This makes it possible to power up your system directly from the DSP-3000 remote control unit.

Rear-panel Switch Settings

There are two small switches on the DSP-3000 rear panel that you'll have to check before operating your system, and it's a good idea to do it before you connect cables. Locate the "MAIN LEVEL" (③) and "FRONT MIX" (④) slide switches—they're just above the OUTPUT terminal group. Make sure the "MAIN LEVEL" switch is set to its "0dB" position, and that the "FRONT MIX" switch is set to "6ch" for six-channel operation.

In a 4-channel system, set the FRONT MIX switch to "4ch."

Speakers & Speaker Placement

Your six-channel system will require three speaker pairs: the MAIN SPEAKERS (your normal stereo speakers), the FRONT EFFECT SPEAKERS, and the REAR EFFECT SPEAKERS. Use your best speakers for the MAIN SPEAKERS—that is, the ones with the best overall frequency response, sound quality, and highest power handling capacity. The other four speakers (the FRONT EFFECT pair and the REAR EFFECT pair) do not have to be of such high quality, but they should at least have a reasonably broad, flat frequency response, and be able to handle the maximum power output of the effect power amplifiers without distortion or damage.

The MAIN SPEAKERS should be placed where you would normally place your stereo speaker system. They should be far enough apart to produce good stereo imaging, and should be equal distances from your listening position. The only difference is that, if possible, the MAIN SPEAKERS should be placed 3 to 6 feet away from the front wall of the listening room.

The FRONT EFFECT SPEAKERS should be placed further apart than the MAIN SPEAKERS. They should be placed on either side of, a few feet above and behind the MAIN SPEAKER pair (that's why the main speakers should be a few feet from the wall).

The REAR EFFECT SPEAKERS should be placed behind and facing the listening position, at about the same distance apart and height as the FRONT EFFECT SPEAKER pair.

Since the DSP-3000 digitally synthesizes a variety of acoustic environments for you, a better effect is obtained if your

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listening room is as acoustically "dead" as possible. That is, it should have a minimum of hard, reflective surfaces. A carpeted floor is better than a hard wood or tile floor, large areas of window glass should be covered by curtains, etc. These precautions are not absolutely essential, but they will let you enjoy the maximum possible performance from the DSP-3000.

A four-channel system requires only two speaker pairs: the MAIN SPEAKERS and the REAR EFFECT SPEAKERS. Use your best speakers for the MAIN SPEAKERS.

The MAIN SPEAKERS should be placed where you would normally place your stereo speaker system. They should be far enough apart to produce good stereo imaging, and should be equal distances from the listening position.

The REAR EFFECT SPEAKERS should be placed behind and facing the listening position. They should be a little further apart and a few feet higher than the MAIN SPEAKER pair.

■ : Main Speaker   ☐ : Effect Speaker

Main Speaker
(For source sound reproduction)

Effect Speaker
(For effect sound reproduction)
(Place the sub speakers in a high place.)

Main Speaker
(For source sound + effect sound reproduction)

Effect Speaker
(For effect sound reproduction)
(Place the sub speakers in a high place.)

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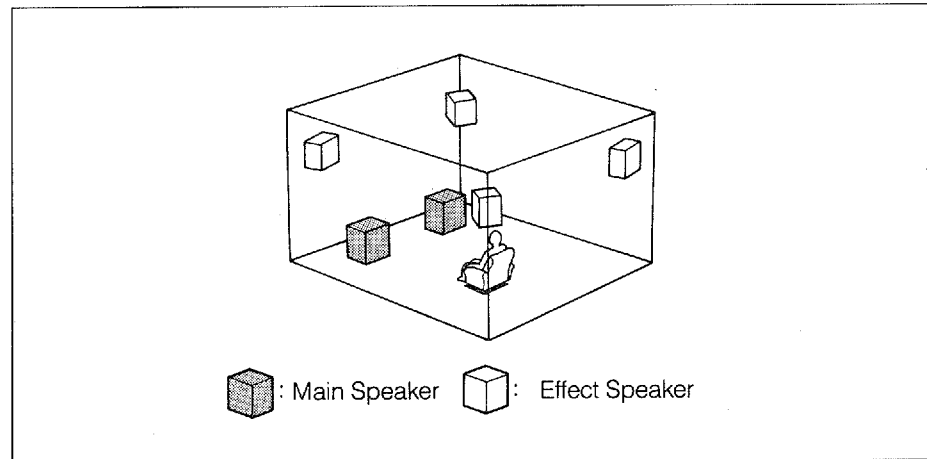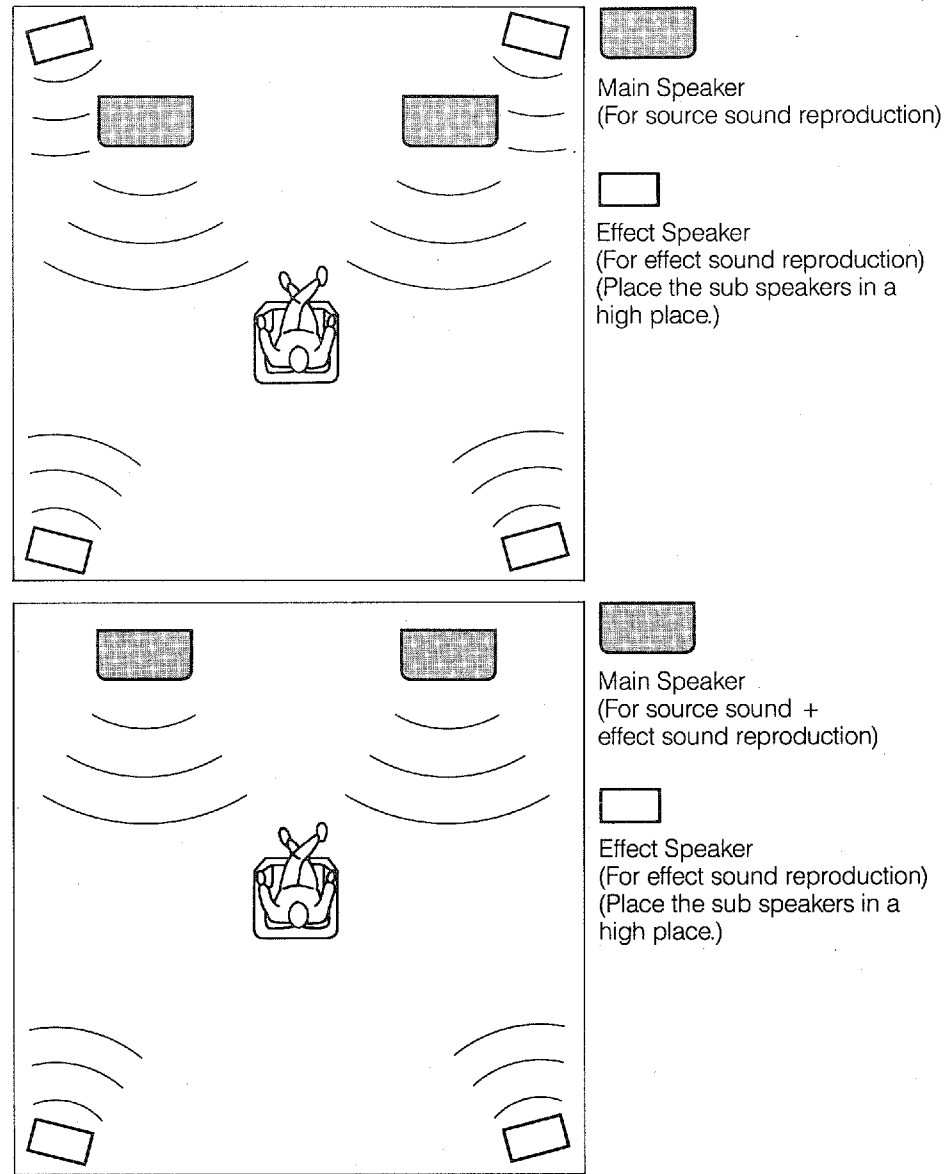
CONNECTING THE MAIN INTEGRATED STEREO AMPLI-FIER, STEREO RECEIVER OR COMPONENT PREAMPLI-FIER AND POWER AMPLIFIER TO THE DSP-3000

Using an Integrated Amplifier or Stereo Receiver with "PRE OUT" and "MAIN IN" Terminals

Some integrated amplifiers and stereo receivers have PRE OUT and MAIN IN terminals which permit the preamplifier and power amplifier sections to function independently. If your integrated amplifier or stereo receiver has these terminals, begin by removing the jumpers that connect the PRE OUT and MAIN IN terminals (or de-couple the preamplifier and power amplifier using the appropriate switch—refer to your amplifier or receiver operation manual).

- Connect the amplifier's PRE OUT terminals to the leftmost pair of DSP-3000 ANALOG INPUT 1 terminals with a stereo pin cable. Make sure the "L" output from the amplifier is connected to the "L" input on the DSP-3000, and that the "R" output from the amplifier is connected to the "R" input on the DSP-3000.
- Connect the MAIN OUTPUT terminals on the DSP-3000 to the MAIN IN terminals on your integrated amplifier or receiver with a second stereo pin cable—making sure to connect the left and right channels correctly.
- Connect the MAIN speakers to the speaker output terminals of your integrated amplifier or receiver.

Main Speaker

Main Speaker

Integrated Amp

Pre Out   Main In

Analog Input 1   Main Out
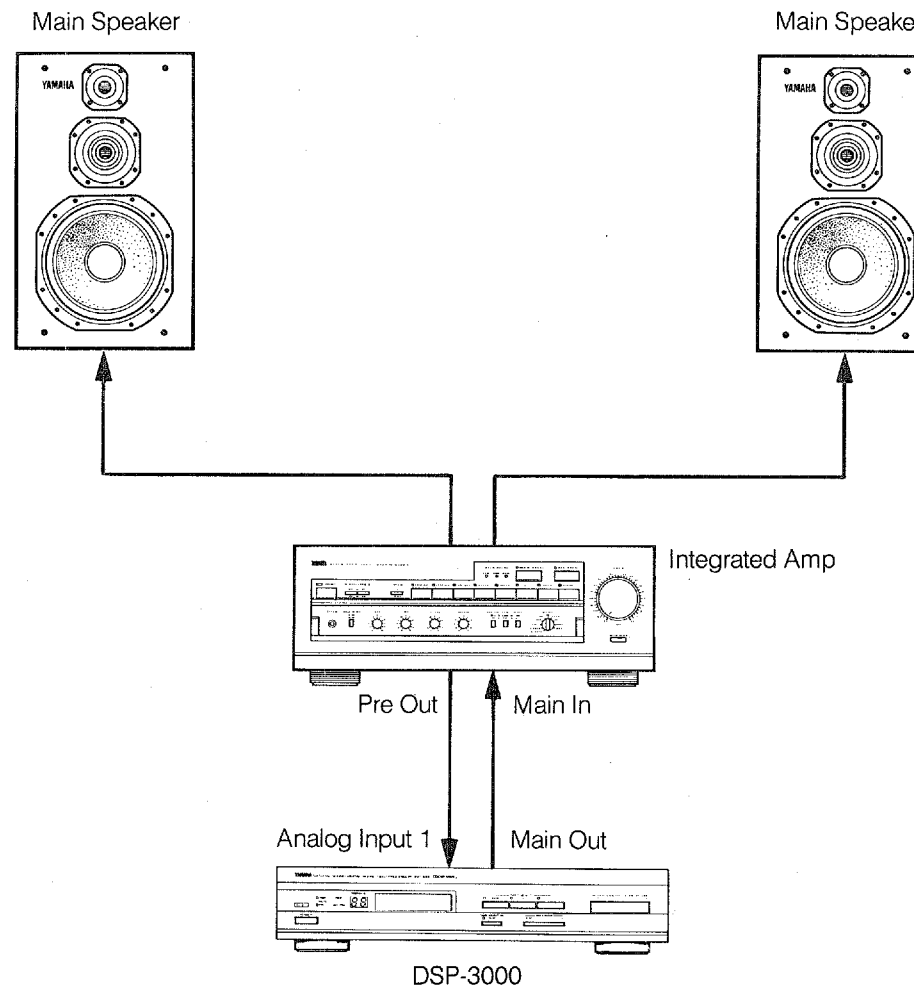
DSP-3000

Using an Integrated Amplifier or Stereo Receiver that Does NOT Have "PRE OUT" and "MAIN IN" Terminals

If your integrated amplifier or stereo receiver is NOT equipped with PRE OUT and MAIN IN terminals, the DSP-3000 must be connected to the amplifier or receiver tape record and playback terminals. The DSP-3000 provides a second tape monitor loop so you won't lose record and tape playback capability by connecting the DSP-3000 to your amplifier's tape terminals.
- Connect the amplifier or receiver TAPE REC (or TAPE OUT) terminals to the leftmost pair of DSP-3000 ANALOG INPUT 1 terminals with a stereo pin cable. Make sure the "L" output from the amplifier or receiver is connected to the "L" input on the DSP-3000, and that the "R" output from the amplifier or receiver is connected to the "R" input on the DSP-3000.
- Connect the MAIN OUTPUT terminals on the DSP-3000 to the TAPE PLAY (or TAPE IN) terminals on your amplifier or receiver with a second stereo pin cable—making sure to connect the left and right channels correctly.
- Connect the MAIN speakers to the speaker output terminals of the amplifier or receiver.

NOTE: If your system includes a tape deck which has been "displaced" by connecting the DSP-3000 to the TAPE terminals, reconnect your tape deck to the DSP-3000 TAPE PB and REC OUT terminals. REC OUT from the DSP-3000 goes to the INPUT terminals on your tape deck, and the DSP-3000 TAPE PB terminals should be connected to the tape deck's OUTPUT terminals. See "Selecting a Tape Deck Connected to the DSP-3000 TAPE Terminals" on page 24.

Main Speaker

Main Speaker

Integrated Amp

Tape Rec   Tape Play or Tape In

Analog Input 1   Main Output

DSP-3000

Tape PB   Rec Out

Output   Input

Tape Deck

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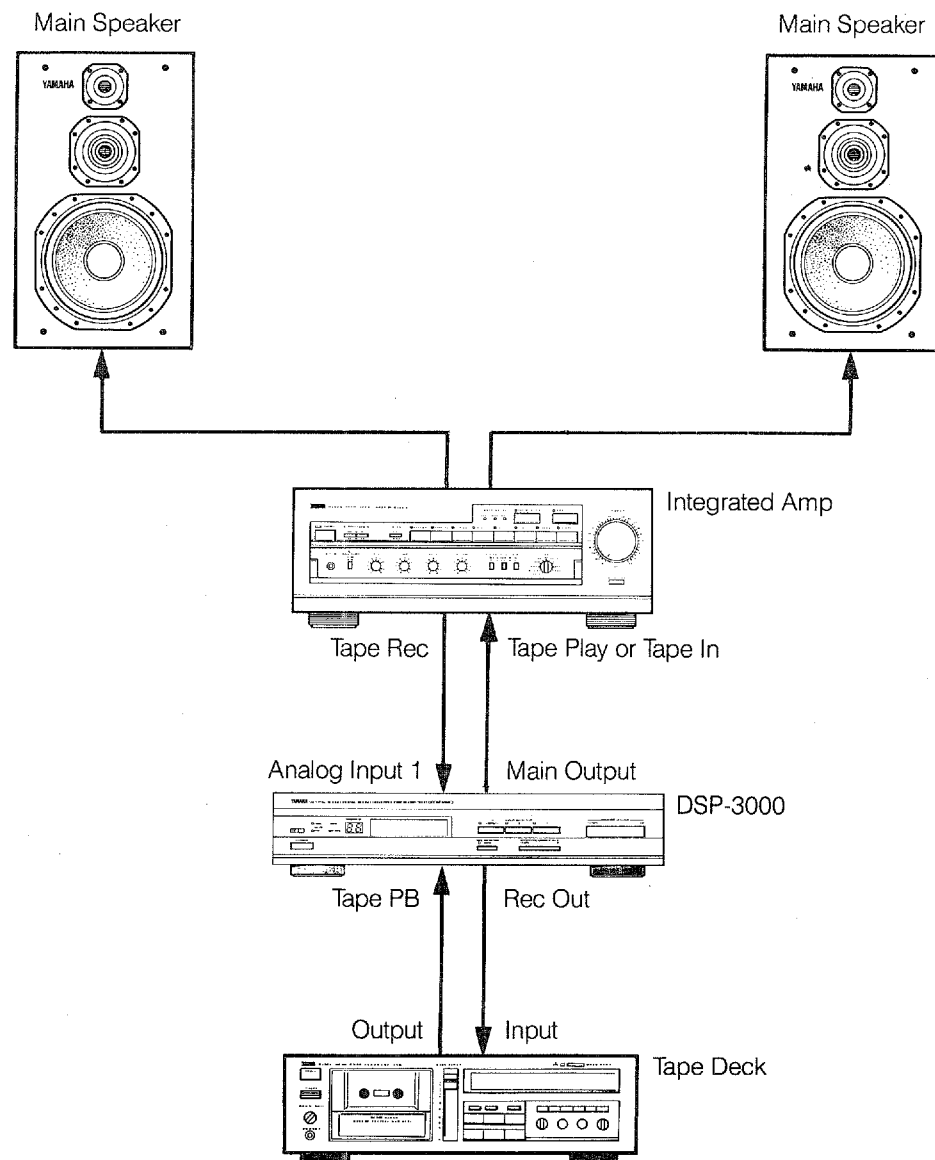
Using a Component Preamplifier and Power Amplifier

- Connect the preamplifier's PRE OUT terminals to the leftmost pair of DSP-3000 ANALOG INPUT 1 terminals with a stereo pin cable. Make sure the "L" output from the preamplifier is connected to the "L" input on the DSP-3000, and that the "R" output from the preamplifier is connected to the "R" input on the DSP-3000.
- Connect the MAIN OUTPUT terminals on the DSP-3000 to the INPUT terminals on your power amplifier with a second stereo pin cable—making sure to connect the left and right channels correctly.
- Connect the MAIN speakers to the speaker output terminals of the power amplifier.

Main Speaker

Main Speaker

Power Amplifier

Control Amplifier

Pre Out

Input

Analog Input

Main Output

DSP-3000

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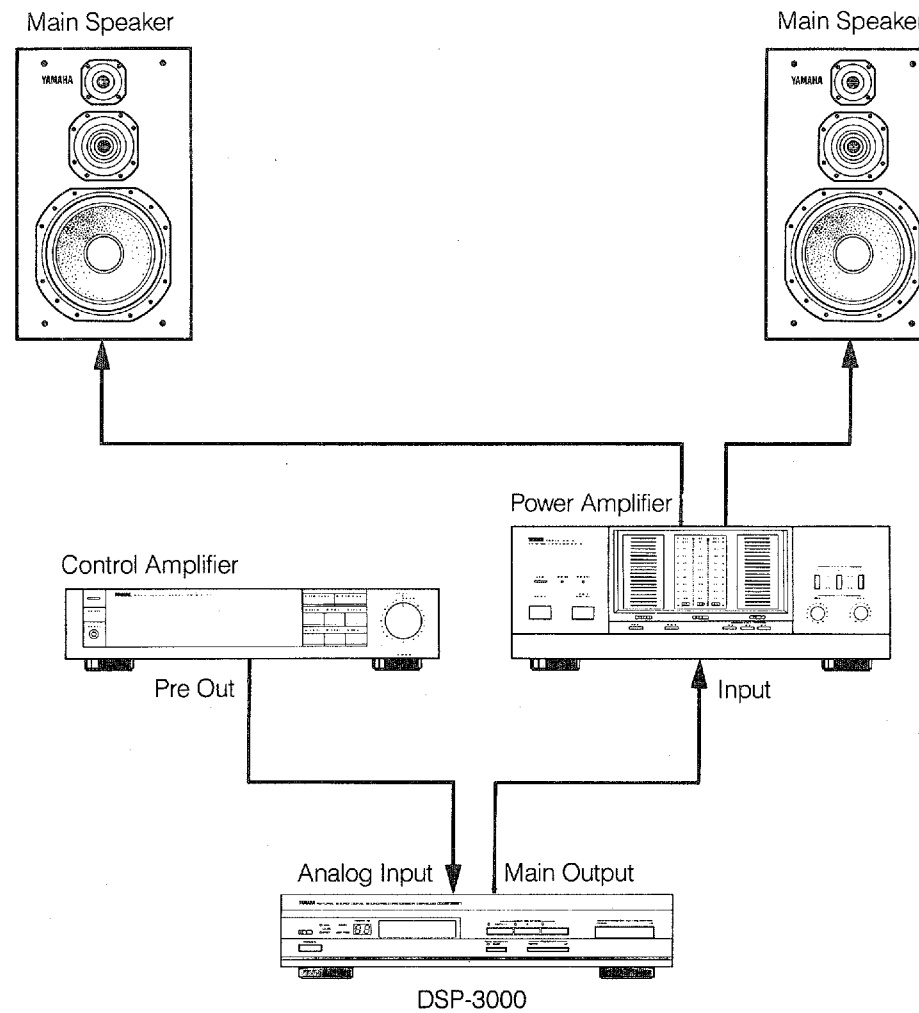
CONNECTING THE EFFECT POWER AMPLIFIER(S) AND SPEAKERS TO THE DSP-3000

If you will be using separate stereo power amplifiers for the FRONT and REAR effect speakers, simply connect the FRONT OUTPUT terminals on the DSP-3000 to the INPUT terminals of the FRONT power amplifier, and the REAR OUTPUT terminals on the DSP-3000 to the INPUT terminals of the REAR power amplifier. The FRONT and REAR effect speakers should be connected to the appropriate speaker terminals of the FRONT and REAR power amplifiers.

Front Effect Speaker

Front Effect Speaker

Power Amplifier

Input | Front Processing Out

DSP-3000

Rear Processing Out

Input

Power Amplifier

Rear Effect Speaker

Rear Effect Speaker

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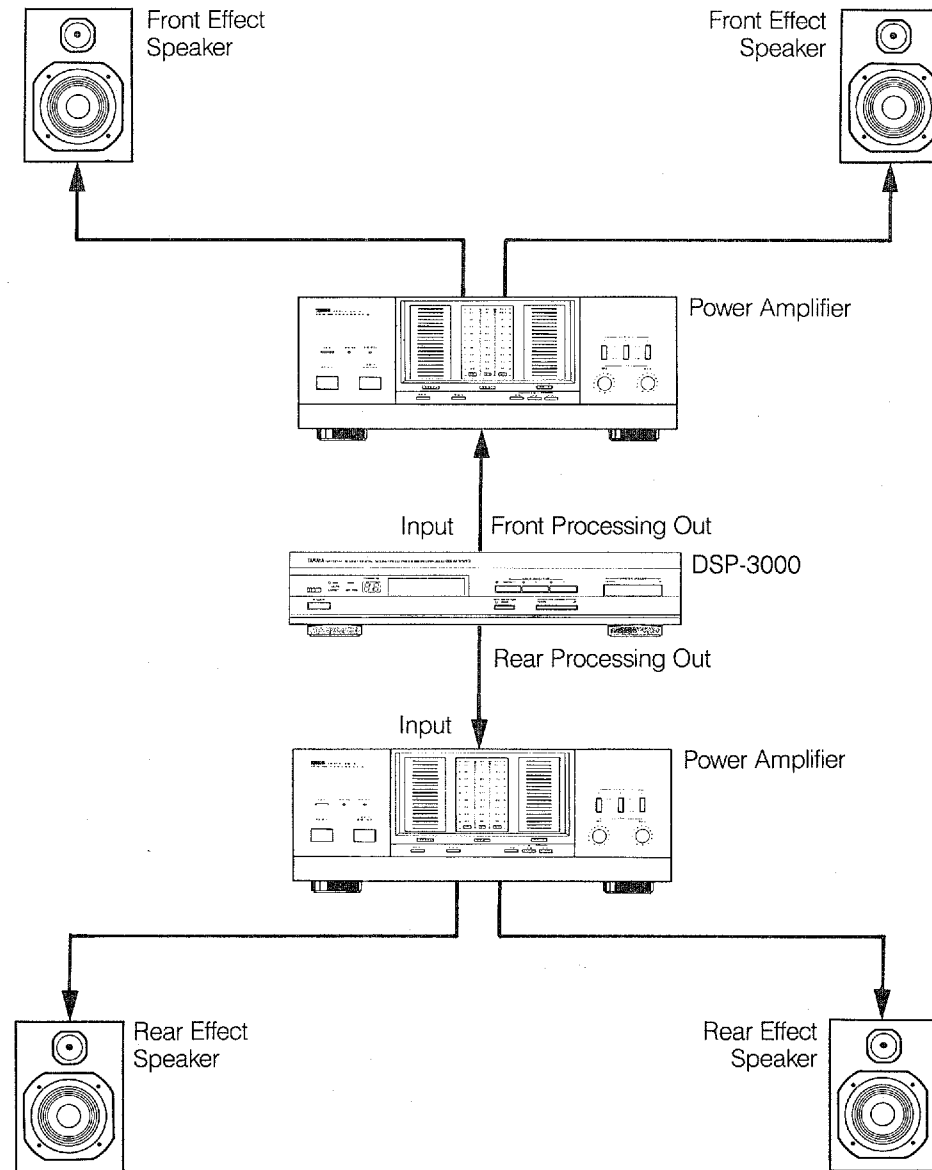
It is also possible to use a four-channel power amplifier to drive both the front and rear effect speakers. In this case you would normally use the first two channels of the power amplifier (channels "1" and "2" or "A" and "B") for the FRONT effect speakers, and the second two channels ("3" and "4" or "C" and "D") for the REAR effect speakers.

Front Effect Speaker

Front Effect Speaker

4-channel Power Amplifier

Input   Input

Rear Processing Out   Front Processing Out

DSP-3000

Rear Effect Speaker

Rear Effect Speaker
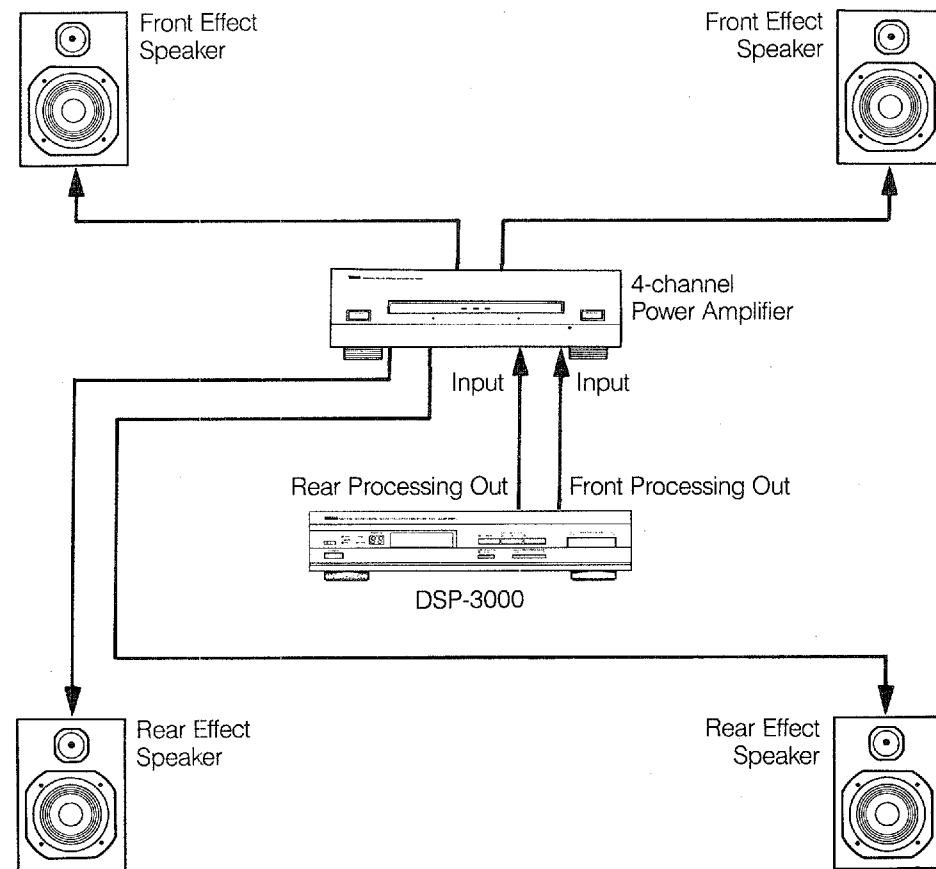
4CH
□ □
□ ° □   In a four-channel system connect the effect stereo power amplifier to the DSP-3000 REAR OUTPUT terminals. Connect the speaker output terminals of the REAR power amplifier to the REAR EFFECT speakers.

4ch 6ch

DSP-3000

Rear Processing Out

Input

Power Amplifier

Rear Effect Speaker

Rear Effect Speaker
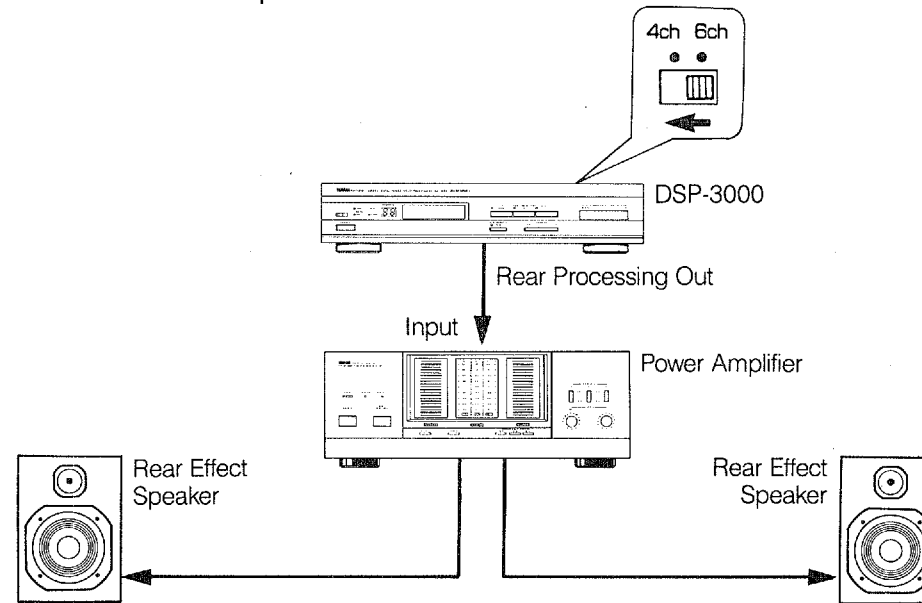
CAUTION: Make absolutely sure that all line-level connections are made between the correct channels (L→L, R→R), and that all speaker connections are phased properly (that is, the red or "+" terminal on the amplifier goes to the red or "+" terminal on the speaker, and the black or "−" terminal on the amplifier goes to the black or "−" terminal on the speaker). Use phase-coded speaker cable (one of the two wires in the cable is a different color or marked with a stripe) to facilitate proper speaker wiring.

1-3. OPTIONAL CONNECTIONS

This section deals with:

* Adding center auxiliary speakers to your system.
* Direct digital input from CD or DAT players.
* Using the DSP-3000 video superimpose capability.

If you do not plan to use any of these capabilities skip ahead to the "CONTROLS & ADJUSTMENTS" section which follows.

ADDING CENTER AUXILIARY SPEAKERS

In particularly large listening rooms you might want to add auxiliary speakers to "fill in" the overall sound field and reinforce the low-mid frequencies. The DSP-3000 actually makes it possible to add four auxiliary speakers: FRONT, LEFT, RIGHT and REAR. The FRONT auxiliary speaker should be located midway between the MAIN speakers, the LEFT auxiliary speaker should be located midway between the left-side FRONT and REAR effect speakers, the RIGHT auxiliary speaker should be located midway between the right-side FRONT and REAR effect speakers, and the REAR auxiliary speaker should be located midway between the REAR effect speakers. Normally, however, you'll only need one FRONT auxiliary speaker or FRONT and REAR auxiliary speakers.

To connect an auxiliary speaker, simply connect the appropriate OUTPUT/MONO terminal on the DSP-3000 (FRONT, RIGHT, LEFT or REAR) to the input of the power amplifier you will use to drive the auxiliary speaker. Each output also features a low-pass filter which can be switched on to restrict the fre-

quency range it delivers. Each LPF switch has the following settings:

80 Hz: Only frequencies below 80 Hz will be output. This is ideal for driving a subwoofer.

150 Hz: Only frequencies below 150 Hz will be output. This setting is useful for driving both subwoofers and conventional woofers.

5 kHz: Only frequencies below 5 kHz will be output. This setting can be used with woofers and midrange drivers.

Choose the appropriate LPF switch setting for the type of speaker you are using. Each OUTPUT/MONO terminal also has its own level control. Use these to adjust the volume of the corresponding auxiliary speakers.

Front Effect Speaker

Front Auxiliary Speaker

Front Effect Speaker

Main Speaker

Main Speaker

Power Amplifier

Input   Input

Rear Mono Output   Front Mono Output

DSP-3000

Rear Effect Speaker

Rear Auxiliary Speaker

Rear Effect Speaker

Front Effect Speaker

Front Effect Speaker

Main Speaker

DSP-3000

Main Speaker

Left Auxiliary Speaker

Left Mono Output   Right Mono Output

Right Auxiliary Speaker

Input   Input

Power Amplifier

Rear Effect Speaker

Rear Effect Speaker

DIRECT DIGITAL INPUT FROM CD OR DAT PLAYERS

Some CD (Compact Disc) and DAT (Digital Audio Tape) players have digital output terminals which deliver a digital signal via a standard RCA pin jack. Such outputs can be directly connected to the DSP-3000's DIGITAL IN terminal. This eliminates one complete cycle of digital-to-analog and analog-to-digital conversion, thus providing significantly improved overall sound quality. A DIGITAL THRU/OUT terminal is also provided so the digital signal from the CD or DAT player can be sent to a standard D/A converter unit as well as to the DSP-3000.

NOTE: The digital signal from the CD or DAT player will NOT be delivered to the DIGITAL THRU/OUT terminal when the DSP-3000 power is OFF. Also, when the DSP-3000 is turned OFF a noise pulse may be transmitted to the D/A converter. To prevent this, connect the D/A converter's power cord to the DSP-3000's switched AC outlet on the rear panel.

VIDEO SUPERIMPOSE

If your DSP-3000 will be used in conjunction with a video system, this connection allows the DSP-3000 to display program titles and parameter data on your video monitor screen, superimposed over the video image. Refer to "2-6. SUPERIMPOSED VIDEO PROGRAM/PARAMETER DISPLAY" on page 37 for operational details.

Connect the NTSC composite video output from your video cassette recorder or video disc player to the DSP-3000 VIDEO IN terminal. The DSP-3000 VIDEO OUT terminal should then be connected to the composite video input of your video monitor or TV.

NOTE: The video signal from your video cassette deck or video disc player will be sent to the video monitor via the DSP-3000 VIDEO terminals even when the DSP-3000 power is OFF.

CD, DAT, etc.   D/A Converter

Digital Out   Digital In

Digital In   Digital Thru Out

Video Deck, etc   TV Monitor

Video Out   Video In
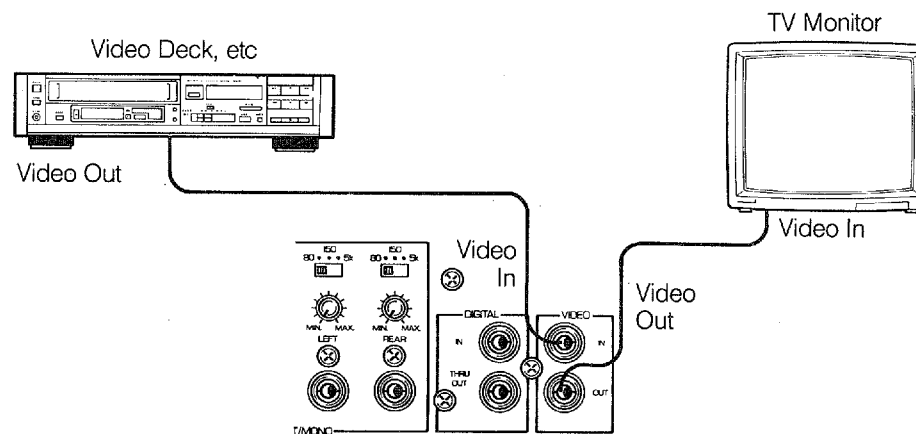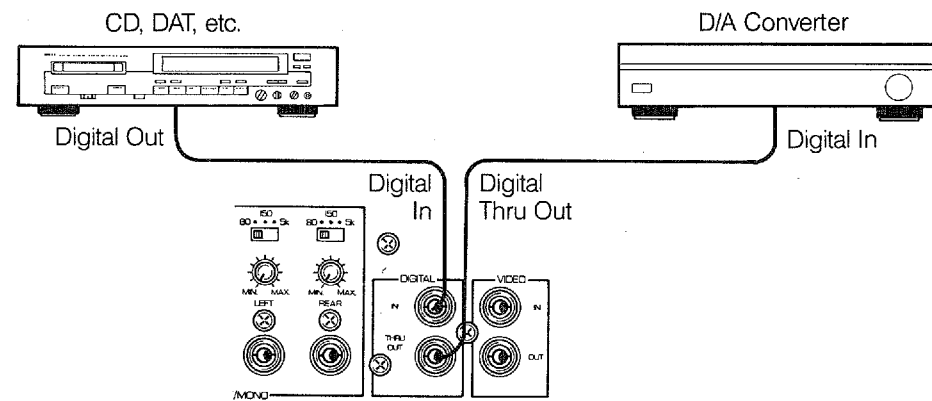
Video In   Video Out

1-4. CONTROLS & ADJUSTMENTS

FRONT PANEL
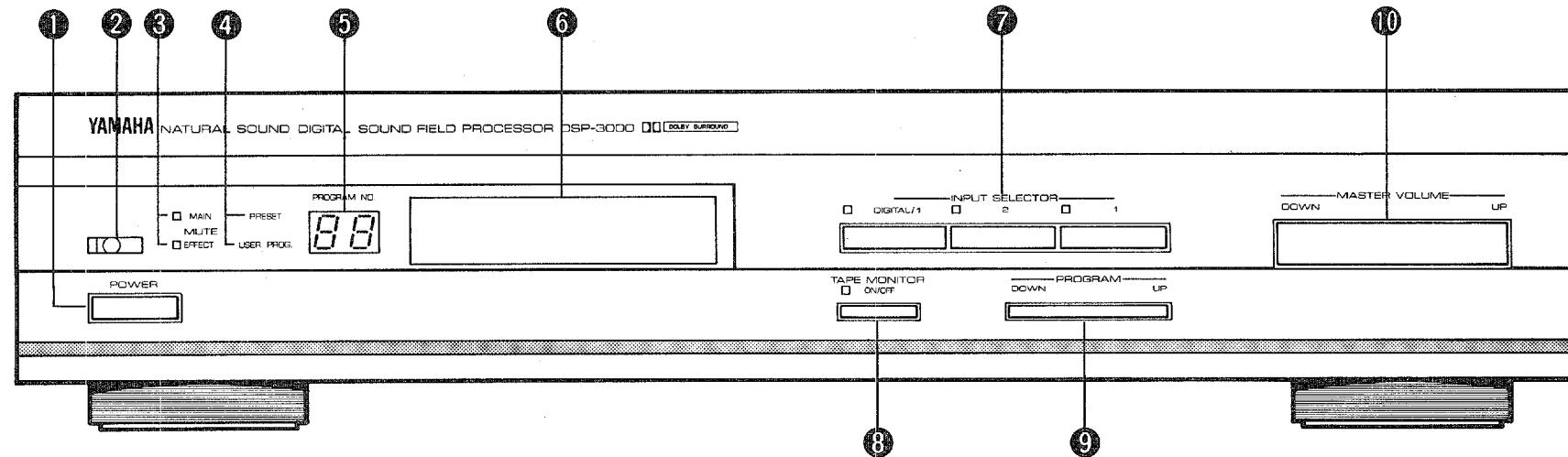
❶ Power Switch

❷ Remote Control Receiver Window
Receives the infra-red data beam from the remote control unit (do not obstruct).

❸ Main and Effect Mute Indicators
Show when the MAIN and/or EFFECT MUTE functions are ON.

❹ Preset and User Prog. Indicators
Show whether the PRESET or USER programs are currently selected.

❺ Program Number Display
Shows the number of the currently selected preset or user program.

❻ Liquid Crystal Display Panel
A 2-line × 16-character display which shows program names as well as parameters and utility data.

❼ Input Selectors
Select one of the DSP-3000's three main input sources: ANALOG 1, ANALOG 2 or DIGITAL.

❽ Tape Monitor Switch & Indicator
Allows selection of a tape deck source connected to the TAPE PB terminals.

❾ Program Selector
Sequentially selects the preset and user programs in the UP or DOWN direction.

❿ Master Volume Control
Increases (UP) or decreases (DOWN) the master volume level.

REMOTE CONTROL UNIT


```
                POWER

        DIGITAL/1   2      1
INPUT

MEMO          PRESET  USER

        CONCERT HALL
    1     2     3     4     5
OPERA CATHEDRAL CHURCH  1 JAZZ CLUB 2
    6     7     8     9    10
CHAMBER ROCK CNCT DISCO PAVILION STADIUM
   11    12    13    14    15
PRESENCE SURROUND  MOVIE THEATER  DD SUR
                    1      2
   16    17    18    19    20

        PARAMETER
  DOWN    UP         DEC   INC
TITLE EDIT          BALANCE
                    REAR  FRONT
UTILITY  EFFECT     LEVEL
                    DOWN   UP
MUTE      MASTER VOLUME
  MAIN
          DOWN        UP
 EFFECT
```

YAMAHA
REMOTE CONTROL
TRANSMITTER
RS-DSP-3000

DSP
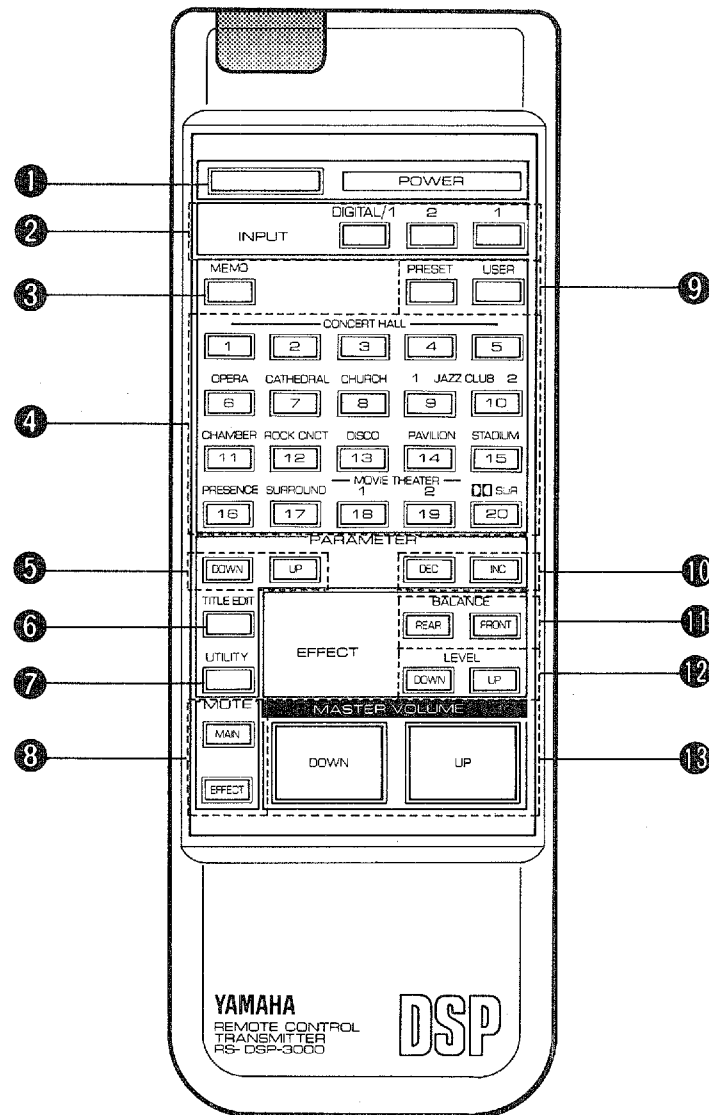
1 Remote Power Key

2 Input Selector Keys
Select the ANALOG 1, ANALOG 2 or DIGITAL input sources.

3 Memory Store (MEMO) Key
Stores an edited sound field program in the user memory.

4 Program Select Keys (1 through 20)
Select either PRESET or USER programs 1 through 20.

5 Parameter Down, Up Keys
Select program parameters.

6 Title Edit Key
Accesses the title edit function allowing new titles to be created for user programs.

7 Utility Key
Accesses the DSP-3000 utility functions (e.g. calibration functions, video superimpose display control).

8 Main and Effect Mute Keys
Mute the MAIN and/or EFFECT for comparison and sound-checks.

9 Preset and User Program Selector Keys
Select either the PRESET or USER program groups.

10 Parameter Increment and Decrement Keys
Edit program parameters.

11 Effect Rear and Front Balance Keys
Adjust the balance between the FRONT and REAR EFFECT speaker levels.

12 Effect Level Up and Down Keys
Increase (UP) or decrease (DOWN) the level of the EFFECT sound in relation to the MAIN speaker sound.

13 Master Volume Up and Down Keys
Increase (UP) or decrease (DOWN) the master volume level.

PREPARATION

1. Set all volume controls—on the main amp (preamp) and effect power amplifiers—to their MINIMUM positions.

2. Turn on the power to all system components. The DSP-3000 can be turned ON by pressing either the POWER switch on the front panel or the POWER key on the remote control unit.

Front Panel   Remote Control

POWER

or
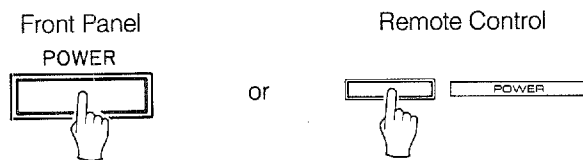
3. Use the MASTER VOLUME keys on either the DSP-3000 front panel or remote control unit to set the master volume to its lowest level—watch the VOLUME LEVEL bar graph on the DSP-3000 display.

Remote Control   Front Panel

or

```
VOLUME  LEVEL
UU_ _ _ _ _ _ _ _ _ _
```
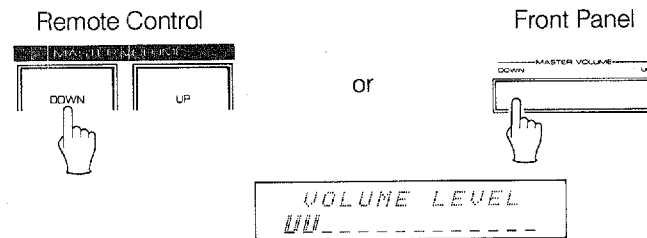
4. Select the desired input source on your preamplifier, integrated amplifier or receiver, and press the INPUT SELECTOR 1 (analog) key on the DSP-3000. If you have a source connected to the ANALOG INPUT 2 terminals, you can select it simply by pressing the INPUT SELECTOR 2 key.

* If you intend to use your tape deck as a source, and it's connected to the DSP-3000 TAPE terminals, press the TAPE MONITOR key on the DSP-3000 panel so that the TAPE MONITOR ON/OFF indicator lights.
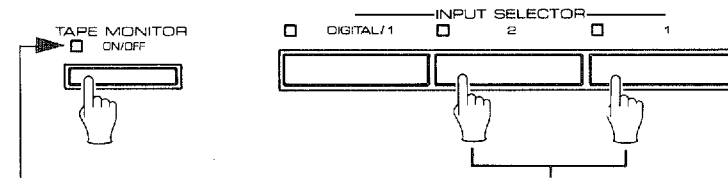
.1. ON if tape, OFF otherwise
2. Press button corresponding to ANALOG INPUT jacks to which desired source is connected.

5. Begin playback of the selected source.

6. Increase the setting of the volume control on your preamplifier, integrated amplifier or receiver to about the halfway point.

−20dB   −16dB

Minimum   Maximum
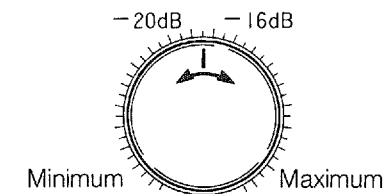
7. Use the MASTER VOLUME keys on either the DSP-3000 front panel or remote control unit to set the master volume to a comfortable listening level.

Remote Control   Front Panel

or

```
VOLUME  LEVEL
UUUUUUUU_ _ _ _ _ _
```
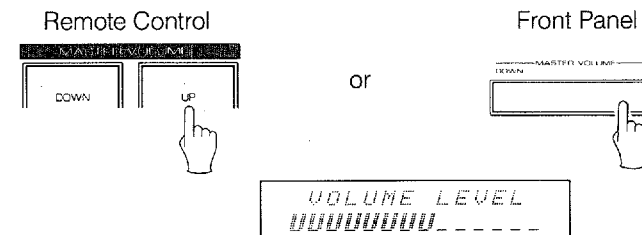
INPUT LEVEL ADJUSTMENT

This operation sets the input level for optimum performance—minimum noise and maximum dynamic range—from the DSP-3000 analog-to-digital converter.

NOTE: Input level adjustment is not possible or necessary if the DSP-3000 is connected to the TAPE terminals of an integrated amplifier.

1. Press the UTILITY key on the remote control unit a few times until the BIT MONITOR display appears.

UTILITY

```
BIT  MONITOR
```
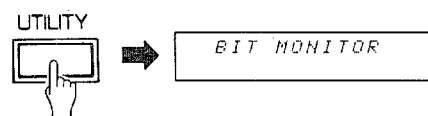
2. Adjust the preamplifier, integrated amplifier or receiver volume control so that "16bit" appears to the right of the bottom line of the DSP-3000 display on the HIGHEST LEVEL MUSIC PEAKS.

If "OVER" appears on the display the level is set too high and must be reduced.

If "<13bit" appears on the display the level is set too low and must be increased.

```
BIT  MONITOR
                16bit
```
Level of Largest Peaks is Just Right

```
BIT  MONITOR          BIT  MONITOR
        <13bit                       Full
```
Level Too Low   Level Too High

3. When proper adjustment has been achieved, stop the playback source.

NOTE: Once you have finished the above adjustment DO NOT CHANGE THE SETTING OF THE PREAMPLIFIER, AMPLIFIER OR RECEIVER VOLUME CONTROL. Overall volume should be adjusted using the DSP-3000 MASTER VOLUME function.

MAIN/EFFECT SPEAKER BALANCE ADJUSTMENT

This operation uses an internal pink-noise generator to balance the levels of the MAIN and front and rear EFFECT speakers. You should perform this adjustment process using the remote control unit from your normal listening position.

1. Press the UTILITY key on the remote control unit a few times until the TOTAL ADJUST—HIT PRESET KEY! display appears.

UTILITY

```
TOTAL  ADJUST
HIT  PRESET·KEY  !
```

2. Press the PRESET key on the remote control unit ONCE. You should hear a hiss-like calibration signal from the main speakers. Use the MASTER VOLUME keys on either the DSP-3000 front panel or remote control unit to set the calibration signal to approximately the level you will use for normal music listening.

PRESET

```
OSCILLATION
    MAIN
```

3. Press the remote control unit PRESET key a second time. The calibration signal will now be heard from the FRONT EFFECT SPEAKERS if you are using a 6-channel setup. If you are using a 4-channel system skip ahead to step 4. Adjust the volume of the FRONT effect power amplifier so that, from your listening position, the sound from the front speakers seems to be at the same level as the sound heard from the main speakers in the previous step.

PRESET

```
OSCILLATION
    FRONT
```
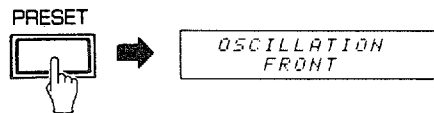
NOTE: If the front effect speaker level cannot be made loud enough to match the level from the main speakers, set the MAIN LEVEL switch on the DSP-3000 rear panel to the −10 dB position and repeat the calibration process from step 2.

If the DSP-3000 is connected to the TAPE terminals of an in-

tegrated amplifier or receiver use the main amplifier volume control to decrease the main speaker output level.

4. Press the remote control unit PRESET key a third time. The calibration signal will now be heard from the REAR EFFECT SPEAKERS. Adjust the volume of the REAR effect power amplifier so that, from your listening position, the sound from the rear speakers seems to be at the same level as the sound heard from the main and front speakers in the previous steps (or the main speakers only if your are using a 4-channel system).

PRESET

```
OSCILLATION
    REAR
```
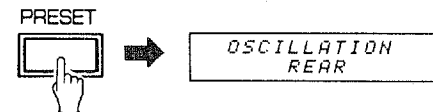
5. Repeat the procedure from step 2, if necessary, to achieve the proper level matching.

6. Press the remote control unit UTILITY key to exit the adjustment mode.

UTILITY

IF YOUR EFFECT POWER AMPLIFIERS DO NOT HAVE LEVEL CONTROLS

Although it's best to adjust the effect power amplifier level using controls on the amplifiers themselves, some amplifiers are not equipped with level controls. In this case, use the following alternative level adjustment method.

1. In the adjustment mode (with the hiss-like calibration signal being output by the front or rear effect speakers) use the EFFECT LEVEL DOWN and UP keys on the remote control unit to adjust the overall level of the effect signal (front and rear). If the effect signal level cannot be increased enough to match the main speaker output level, set the rear-panel MAIN LEVEL switch to the −10dB position and try again.

LEVEL

```
DOWN   UP   ➡   LEVEL ADJUST
                HHHHHHHHHHH 100%
```
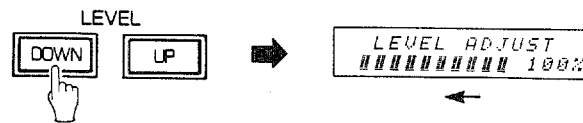
2. The balance between the front and rear effect speakers can be adjusted using the EFFECT BALANCE REAR and FRONT keys on the remote control unit. Pressing the REAR key decreases the level of the front speakers in relation to the rear speakers, while pressing the FRONT key decreases the level of the rear speakers in relation to the front speakers.

BALANCE

```
REAR   FRONT   ➡   BALANCE ADJUST
                   R____II____F 50%
```
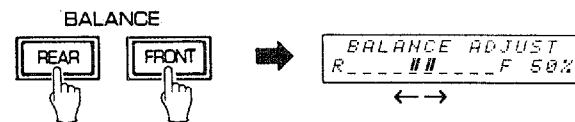
2-1. INPUT SOURCE SELECTION

1. Selecting a Source Connected to Your Preamplifier, Integrated Amplifier or Receiver

If the source you wish to hear is connected to your preamplifier, integrated amplifier or receiver then all you need to do is select the desired source using the preamplifier, integrated amplifier or receiver controls. If your preamplifier, integrated amplifier or receiver is connected to the DSP-3000 ANALOG INPUT 1 terminals according to the setup instructions given in this manual, make sure the DSP-3000 INPUT SELECTOR 1 indicator is lit. If it is not, use the remote control or panel controls to select INPUT 1.
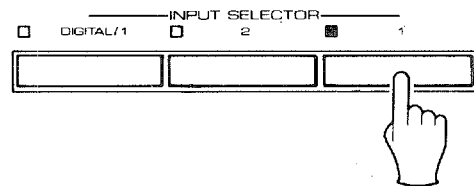
2. Selecting a Source Connected to the ANALOG INPUT 2 Terminals

While your preamplifier, integrated amplifier or receiver will normally be connected to the ANALOG INPUT 1 terminals, it is possible to have a second source connected to the ANALOG INPUT 2 terminals. If you wish to play this source rather than one connected to your amplifier, use the remote control or panel INPUT keys to select INPUT 2.
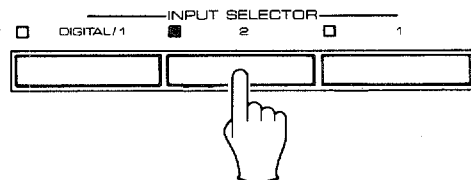
3. Selecting a Source Connected to the Direct Digital Input

If you wish to play a source connected to the direct digital input, as described in the "OPTIONAL CONNECTIONS" section on page 17, use the remote control or panel INPUT keys to select the DIGITAL/1 input. If no digital source is connected, the ANALOG INPUT 1 terminals will automatically be selected.
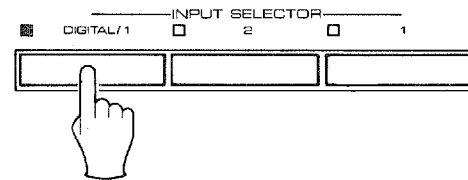
NOTE: When selecting one of the sources described in 1, 2 or 3, above, make sure that the DSP-3000 TAPE MONITOR ON/OFF indicator is OFF. If it is ON, press the front-panel TAPE MONITOR key to turn it OFF.
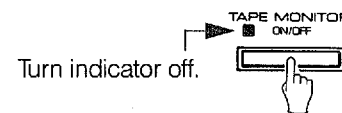
Turn indicator off.

4. Selecting a Tape Deck Connected to the DSP-3000 TAPE Terminals

To select a tape deck connected to the DSP-3000's TAPE terminals, press the front-panel TAPE MONITOR key to turn the TAPE MONITOR ON/OFF indicator ON.
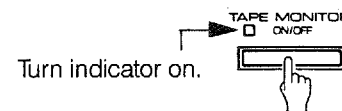
Turn indicator on.

2-2. PROGRAM & MEMORY CONFIGURATION

The DSP-3000 has two groups of 20 memory locations: 20 preset sound field programs, and 20 user memory locations. You can edit the preset programs to create original sound fields, then store the results in any of the 20 user memory-locations for instant recall when needed. The DSP-3000 even provides a TITLE EDIT function (described on page 44) so you can give your original sound field programs appropriate titles. The PRESET memory locations cannot be written to or altered in any way.

When the DSP-3000 is originally shipped from the Yamaha factory, USER memory locations 1 through 20 contain the same data as in the PRESET memory locations 1 through 20.
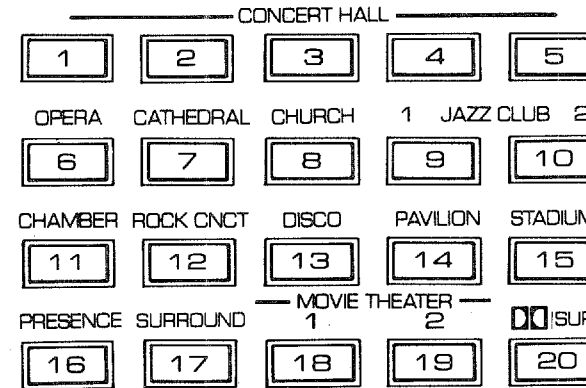
2-3. SELECTING THE PRESET SOUND FIELD PROGRAMS

1. Press the remote control unit PRESET key to ensure that you will select a preset program rather than a user memory location.
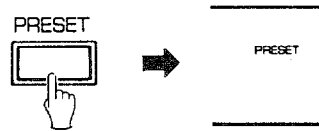
2. Select the desired sound field program by pressing the appropriate key on the remote control unit. The selection keys numbered 1 through 20 on the remote control unit allow direct access to the desired program.

—— CONCERT HALL ——

1	2	3	4	5
OPERA	CATHEDRAL	CHURCH	1 JAZZ CLUB 2	

6	7	8	9	10
CHAMBER	ROCK CNCT	DISCO	PAVILION	STADIUM

11	12	13	14	15
PRESENCE	SURROUND	—— MOVIE THEATER —— 1 2		DD SUR

16	17	18	19	20

* The front-panel PROGRAM UP/DOWN key provides sequential access to both the PRESET and USER programs. Pressing the UP or DOWN end of the PROGRAM key increments (increases) or decrements (decreases) the selected program number, respectively. Hold down the UP or DOWN end of the key for continuous incrementing or decrementing.

—— PROGRAM ——
DOWN   UP

P01 ↔ P02 ↔ P03 ← ··· → P18 ↔ P19 ↔ P20

U20 ↔ U19 ↔ U18 ← ··· → U03 ↔ U02 ↔ U01

—— PROGRAM ——
DOWN   UP

P: Preset program   U: User program

3. All preset sound field programs except CATHEDRAL, CHURCH, CHAMBER, PAVILION and DOLBY SURROUND have two "sub-programs" (see "2-5. DESCRIPTIONS OF THE PRESET SOUND FIELD PROGRAMS," below). The sub-programs are selected using the PARAMETER DEC and INC keys on the remote control unit. The CONCERT HALL 1 program, for example, contains the sub-programs "Hall A in Europe" and "Hall B in Europe." When the CONCERT HALL 1 program is first selected, the "Hall A in Europe" sub-program will be selected and its title will be displayed on the bottom line of the LCD. To select "Hall B in Europe," press the PARAMETER INC key. To return to Hall A in Europe, press the PARAMETER DEC key. The same selection procedure applies to all other programs which have sub-programs.
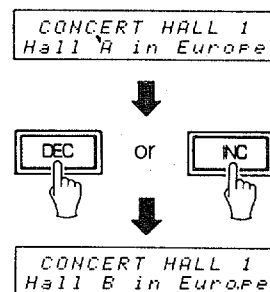
2-4. MUTING THE MAIN AND/OR EFFECT SOUND

The MAIN and EFFECT MUTE keys on the remote control unit make it simple to compare the normal stereo sound (MAIN) with the fully processed effect sound, or you can hear the effect sound alone (a feature which is useful for comparing the various effects).

To mute the EFFECT sound and monitor only the MAIN sound, press the MUTE EFFECT key on the remote control unit. The red EFFECT MUTE indicator on the DSP-3000 display will light to remind you that the effect sound is muted. Press the EFFECT mute key a second time to restore normal operation.

To mute the MAIN sound and monitor only the EFFECT sound, press the MUTE MAIN key on the remote control unit. The red MAIN MUTE indicator on the DSP-3000 display will light to remind you that the MAIN sound is muted. Press the MAIN mute key a second time to restore normal operation.

Both the MAIN and EFFECT mute functions may be turned ON to temporarily silence the system while you answer a phone call, etc.

2-5. DESCRIPTIONS OF THE PRESET SOUND FIELD PROGRAMS

What is it that makes live music so good? Today's advanced sound reproduction technology lets you get extremely close to the sound of a live performance, but chances are you'll still notice something missing, the acoustic environment of the live concert hall. Extensive research into the exact nature of the sonic reflections that create the ambience of a large hall has made it possible for Yamaha engineers to bring you this same sound in your own listening room, so you'll feel all the excitement of a live concert. What's more, our technicians, armed with sophisticated measuring equipment, have even made it possible to capture the acoustics of a variety of actual concert halls, jazz clubs, theaters, etc. from around the world, to allow you to accurately recreate one of a large variety of actual live performance environments, all in your own home.

The following list gives brief descriptions of the sound field produced by each of the DSP-3000 preset programs. Keep in mind that most of these are precise digital recreations of actual acoustic environments, and the data for them was recorded at the locations described using sophisticated Yamaha digital sound field data acquisition equipment.

1. CONCERT HALL 1

Hall A in Europe: This is a fairly common type of concert hall in Europe. It has approximately 2500 seats and features a very beautiful (and acoustically active) wood-panel interior. The overall sound is rich but reserved.

Hall B in Europe: Another wood-interior concert hall that seats a little less than 2400. Polished reflective panelling above the stage produces strong frontal reflections which tend to reinforce the direct sound from the stage. This hall has a very solid, powerful sound.

Preset Parameter
ROOM SIZE	1.0
LIVENESS	5
INIT DLY	30ms
HPF	THRU
LPF	7.0kHz

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2. CONCERT HALL 2

Hall C in Europe: A unique 2000-seat hall design featuring a non-symmetrical layout. The right wall is constructed of heavy teak wood, while the left wall is of concrete and has a curved surface. The ceiling is designed for maximum sound dispersion, and a large reflective panel is installed above the stage.

Hall D in Europe: A smaller 1300-seat hall which uses marble for most interior surfaces. The crisp, clean acoustics of this hall make it a popular location for recording live orchestra performances.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	5
INIT DLY	25ms
HPF	THRU
LPF	7.0kHz

3. CONCERT HALL 3

Hall E in Europe: A classic 1700-seat concert hall with pillars and ornate carvings that, by creating an extremely complex field of reflections arriving from all directions, produces a very full, rich sound.

Hall F in Europe: Hall F is very similar to Hall E in interior surfaces and design. It is, however, much larger (2200 seats) and a little wider than Hall E.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	5
INIT DLY	30ms
HPF	THRU
LPF	7.0kHz

4. CONCERT HALL 4

Hall G in U.S.A.: This is a large 2600-seat concert hall in the United States which features a fairly traditional European design. The interior is relatively simple, allowing the middle and high frequencies to come through with authority.

Hall H in U.S.A.: Another large 2600-seat American hall. This one features a dome over the stage, and seating relatively close to the stage. The sound in this hall is remarkably crisp and precise.

Preset Parameter
ROOM SIZE	1.0
LIVENESS	5
INIT DLY	35ms
HPF	THRU
LPF	7.0kHz

5. CONCERT HALL 5

Live Concert A: This is the sound field you would experience at approximately the center of the stage in a circular hall. This program produces a noticeable "surround" effect.

Live Concert B: This program places you fairly close to the stage at a live concert. Widely separated processing of the left and right channels makes this program ideal for sources which originally have good stereo separation.

Preset Parameter
ROOM SIZE	1.0
LIVENESS	5
INIT DLY	45ms
HPF	THRU
LPF	5.0kHz

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6. OPERA HOUSE

Balcony: The OPERA HOUSE Balcony sound field pro-
gram seats you in the balcony of a 2000-seat
opera house.

Mezzanine: This is the same opera house as above, but your
listening position is in the front row of the
mezzanine.

Preset Parameter
ROOM SIZE	1.0
LIVENESS	5
INIT DLY	20ms
HPF	THRU
LPF	10kHz

7. CATHEDRAL

Although you might have a chance to experience organ or
choral music live in a real cathedral, this program lets you
listen to any type of music in a cavernous stone cathedral. Of
course, the effect is stunning with appropriate sources. The
cathedral at which this program was measured is in the
south of West Germany, and has an unusually long natural
reverb time.

Preset Parameter
REV TIME	4.0s
HIGH	0.8
INIT DLY	95ms
HPF	THRU
LPF	7.0kHz
REV LEVEL	100%

8. CHURCH

This program recreates the acoustic environment of a modern church with a high pointed dome and columns along the sides. This interior produces very few primary reflections, and a reverb time only half as long as the cathedral.

Preset Parameter

REV TIME	2.5s
HIGH	0.9
INIT DLY	40ms
HPF	THRU
LPF	8.0kHz
REV LEVEL	100%

9. JAZZ CLUB 1

Village Vanguard: A traditional New York jazz club located on 7th Avenue. This room has a low ceiling, and the "stage" is located in a corner. This program does not produce nearly as many reflections as the concert hall or church programs, but creates an intimate "close-to-the-music" feel.

Village Gate: Another jazz club in New York. This one, however, is in a basement and has a relatively spacious floor area. The reflection pattern is similar to that of a small hall.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	5
INIT DLY	20ms
HPF	THRU
LPF	THRU

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10. JAZZ CLUB 2

Cellar Club: This is a small, cozy jazz club with a low ceiling. The sound is very close and intimate.

Cabaret: The large size of this environment in relation to the other jazz clubs gives it a fuller, richer sound.

Preset Parameter
ROOM SIZE	1.0
LIVENESS	5
INIT DLY	20ms
HPF	THRU
LPF	THRU

11. CHAMBER

This is the "chamber" that goes with "chamber music." It is a large regularly-shaped room with a high ceiling. A perfect environment for small renaissance and classical ensembles.

Preset Parameter
REV TIME	1.1s
HIGH	0.7
INIT DLY	15ms
HPF	THRU
LPF	10kHz
REV LEVEL	50%

12. ROCK CONCERT

The Roxy Theatre: The ideal program for lively, dynamic rock music. The data for this program was recorded at LA's "hottest" rock live spot.

Arena: A big, powerful sound suited to rock music.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	9
INIT DLY	15ms
HPF	THRU
LPF	7.0kHz

13. DISCO

New York: Discos tend to have a high-energy, "immediate" sound. This one is no exception. The room itself is circular, approximately 20 meters (65 feet) in diameter.

Tokyo: A lively disco in the heart of a very lively city. The sound is dense and highly concentrated.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	6
INIT DLY	10ms
HPF	THRU
LPF	THRU

14. PAVILION

The sound field of a large, all-concrete enclosed multi-purpose pavilion which is used for exhibitions, sports, etc.

Preset Parameter

REV TIME	1.9s
HIGH	0.9
INIT DLY	5ms
HPF	56Hz
LPF	2.5kHz
REV LEVEL	100%

15. STADIUM

Anaheim Stadium: This program gives you the long delays and extraordinarily spacious feel of a stadium that is no less than 300 meters (990 feet) in diameter.

Bowl: An outdoor stadium with the typical bowl-shaped seating arrangement.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	5
INIT DLY	55ms
HPF	THRU
LPF	7.0kHz

16. PRESENCE

Pattern A, Pattern B: Used as they are, these programs bring the sound forward producing a remarkable "close-up" effect. They are much more sophisticated—and more effective—than conventional "presence" programs because they utilize up to 16 reflections per channel, each with different direction, time and level. The PRESENCE programs are also an ideal place to start when creating your own original sound fields. Pattern A and Pattern B give you broad control over a sound field consisting of 32 individual reflections (see "SECTION 3—CREATING YOUR OWN SOUND FIELDS"). With the original factory settings, Pattern A has 2 different reflections coming from different directions in each channel. Pattern B has 16 reflections per channel—measured in an actual hall.

Preset Parameter

ROOM SIZE	1.0	HPF	THRU
LIVENESS	5	LPF	8.0kHz
INIT DLY	10ms	2nd LPF	7.0kHz

17. SURROUND

Type A: The Type A SURROUND program places you right at the front of the stage, almost surrounded by the performers. This is an excellent surround effect for standard stereo audio sources—but is not particularly effective with mono signals.

Type B: This program moves you even further into the midst of the action, virtually enveloping you in sound. Type B is an ideal choice for A/V sources—but is not particularly effective with mono signals.

Preset Parameter

ROOM SIZE	1.0
LIVENESS	5
INIT DLY	20ms
HPF	THRU
LPF	7.0kHz

35

18. MOVIE THEATER 1

Adventure: A sound field ideally suited to viewing action-packed adventure movies.

Standard: This is the sound field most commonly encountered in standard movie theaters.

Preset Parameter

C.SPTL EXPS	1.0
C.LIVENESS	5
C.INI. DLY	20ms
C.LPF	7.0kHz
C.LEVEL	70%
S.SPTL EXPS	1.0
S.LIVENESS	5
S.INI. DLY	20ms
S.LPF	7.0kHz
S.LEVEL	100%

19. MOVIE THEATER 2

Musical: By providing clean projection of music and dialogue, this program produces an excellent acoustic environment for viewing musicals.

Classic: This is the classic movie theater sound. Ideal for old monaural movies.

Preset Parameter

C.SPTL EXPS	1.0
C.LIVENESS	5
C.INI. DLY	20ms
C.LPF	7.0kHz
C.LEVEL	70%
S.SPTL EXPS	1.0
S.LIVENESS	5
S.INI. DLY	35ms
S.LPF	7.0kHz
S.LEVEL	100%

20. ▢▢ DOLBY SURROUND*

A stunning, surrounded-by-sound effect for reproducing video discs, video tapes and similar sources which are Dolby Surround encoded and bear the " ▢▢ DOLBY SURROUND" logo.

* ▢▢ DOLBY SURROUND

Manufactured under license from Dolby Laboratories Licensing Corporation. Additionally licensed under one or more of the following patents: U.S. numbers 3632886, 3746792 and 3959590; Canadian numbers 1004603 and 1037877. "Dolby" and the Double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

    Preset Parameter
        DELAY   20.0ms
        INPUT BALANCE   50%

NOTE: Dolby Surround is ineffective with mono sources. With a 6-channel system, there is no sound from the front effect speakers.

2-6. SUPERIMPOSED VIDEO PROGRAM/PARAMETER DISPLAY

If you have connected your video cassette player or video disc player and video monitor to the DSP-3000 as described in the "OPTIONAL CONNECTIONS" section on page 17, you can take advantage of the DSP-3000's capability to provide a more comprehensive display of program and parameter data.

1. With the video monitor properly connected to the DSP-3000 VIDEO OUT terminal and turned ON, press the UTILITY key ONCE.

UTILITY

The current program name and its parameters will be displayed on the monitor screen. The screen display also appears whenever you select a program or edit a parameter, and will disappear again after a few seconds (see "SETTING THE DISPLAY PARAMETERS," below). The arrow-shaped cursor points to the currently selected parameter. Parameters are selected and edited using the PARAMETER UP/DOWN and INC/DEC keys as described previously. Place the cursor on the "END" parameter to exit the video display.

P01 CONCERT HALL1

→ Hall A in Europe
ROOM SIZE
LIVENESS
INIT DLY
HPF
LPF
END

SETTING THE DISPLAY PARAMETERS

1. Press the UTILITY key twice. The "DISPLAY CONTROL FOR SUPERIMPOSE" display will appear on the LCD, and the following display will appear on the video monitor screen:

UTILITY

DISPLAY CONTROL

FORM * SHORT FULL
MODE * AUTO CONT OFF
COLOR 123456789
END

Use the PARAMETER UP/DOWN keys to select one of the three available parameters (FORM, MODE or COLOR), and the PARAMETER INC/DEC keys to set the desired value for the selected parameter. The parameters and their possible settings are:

FORM: This parameter can be set to SHORT or FULL. When set to SHORT the video monitor will display only the same amount of information that is shown on the DSP-3000 LCD. When set to FULL the video monitor will show a full list of the parameters for each program.

MODE: This parameter can be set to AUTO, CONT or OFF. When set to AUTO, the video program and parameter display will appear for a few seconds each time a control key is pressed. When set to CONT the video display will be ON at all times. When set to OFF the video display will be OFF at all times.

COLOR: This parameter can be set to a number between 1 and 9. Settings between 1 and 8 produce different background colors on the video display when no video signal is present at the DSP-3000 VIDEO IN terminal. A setting of 9 produces a black background.

Place the cursor on the "END" parameter to exit the video display.

3-1. SELECTING & EDITING PROGRAM PARAMETERS

WHAT IS A SOUND FIELD?

In order to explain the impressive functions of the DSP-3000, let's go where it all begins, and find out what a sound field really is.

What really creates the rich, full tones of a live instrument are the multiple reflections from the walls of the room. In addition to making the sound "live", these reflections enable us to tell where the player is situated, and the size and shape of the room in which we are sitting. We can even tell whether it is highly reflective, with steel and glass surfaces, or more absorbent—wood panels, carpeting and curtains.
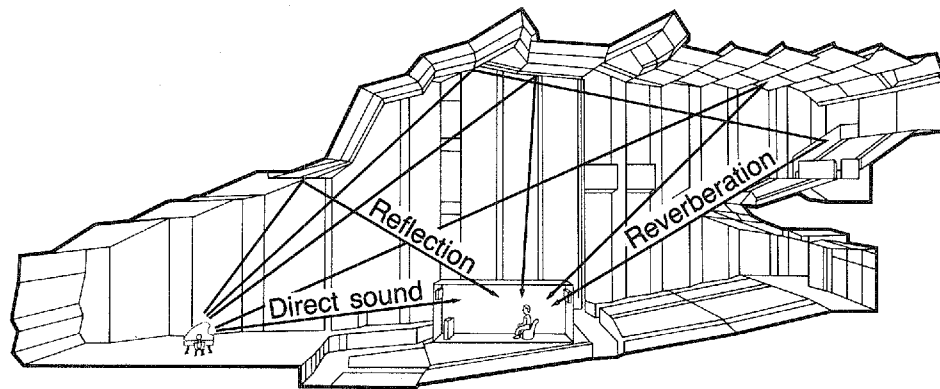
THE ELEMENTS OF A SOUND FIELD

In any environment, in addition to the direct sound coming straight to our ears from the player's instrument, there are two distinct types of sound reflections that combine to make up the sound field:

(1) Early Reflections. Reflected sounds that reach our ears extremely rapidly (50 ms—80 ms after the direct sound), after reflecting from one surface only—for example, from the ceiling or one wall. These reflections fall into specific patterns as shown in the following diagram for any particular environment, and provide vital information to our ears. Early reflections actually add clarity to the sound.

(2) Subsequent Reverberations. These are caused by reflections from more than one surface—walls, ceiling, the back of the room—so numerous that the merge together to form a continuous sonic "afterglow". They are non-directional, and lessen the clarity of any sound.

Direct sound, early reflections and subsequent reverberation taken together indicate to us very clearly the subjective size and shape of the room, and it is this information that the DSP-3000 reproduces in order to create sound fields.

If you could only create the appropriate early reflections and subsequent reverberations in your listening room, you would be able to create your own listening environment. The acoustics in your room could be changed to be those of a concert hall, a dance floor, or virtually any size room at all. This ability to create sound fields at will is exactly what Yamaha has done with the DSP-3000.

In addition to allowing you to recreate the sound fields of famous listening environments from around the world, the DSP-3000 also allows you to create your own sound fields. Starting with one of the built-in "preset" programs, you can adjust such parameters as apparent room size, liveness of the room, and distance from you to the performer. If you start from the "Presence" program, you can build your own detailed sound field entirely from scratch, explicitly specifying up to 16 independent reflections per channel. Up to 20 of your own sound fields can be stored in the DSP-3000's memory for later use. The following pages detail how to make your own sound fields.
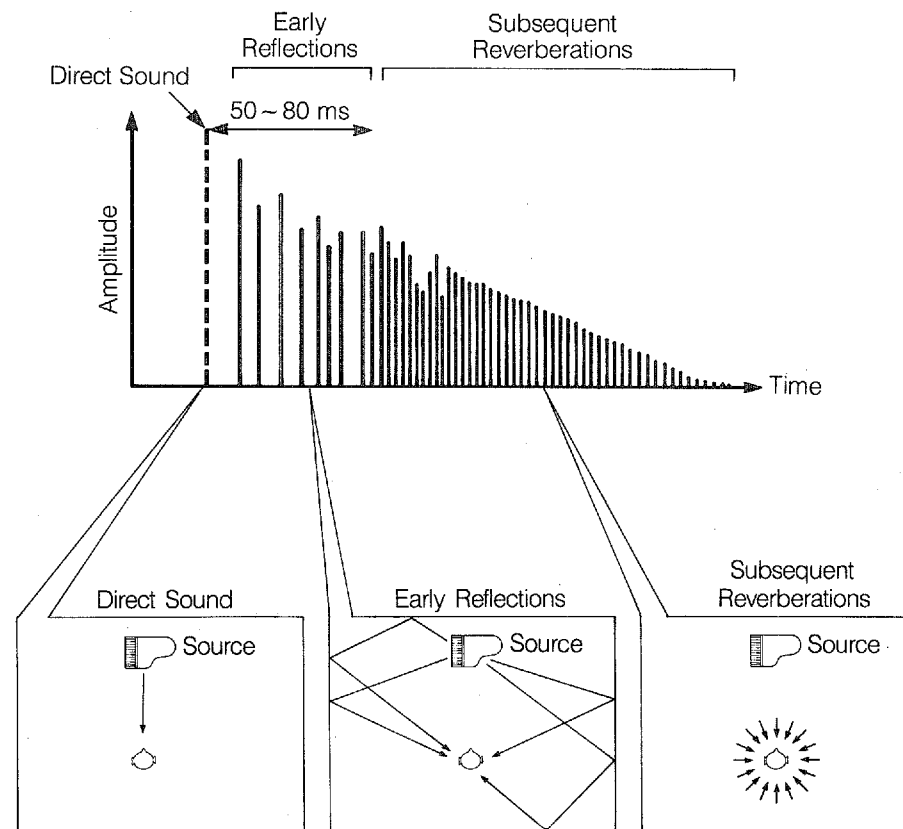
In addition to the "TYPE" parameter which selects the sub-programs within each sound field program (e.g. "Hall A in Europe" and "Hall B in Europe" for program 1, CONCERT HALL 1), each program also has a set of parameters which allow you to change the characteristics of the acoustic environment to create precisely the effect you want. These parameters correspond to the many natural acoustic factors that create the sound field you experience in an actual concert hall or other listening environment. The size of the room, for example, affects the length of time between the "early reflections"—that is, the first few widely-spaced reflections you hear after the direct sound. The "ROOM SIZE" parameter provided in many of the DSP-3000 programs alters the timing between these reflections, thus changing the size of the "room" you hear. In addition to room size, the shape of the room and the characteristics of its surfaces have a significant effect on the final sound. Surfaces that absorb sound, for example, cause the reflections and reverberation to die out quicker, while highly reflective surfaces allow the reflections to carry on for a longer period of time. The DSP-3000's parameters allow you to control these and many other factors that contribute to your personal sound field, allowing you to essentially "redesign" the concert halls and rooms provided to create custom-tailored listening environments that ideally match your mood and music.

Refer to "3-5. DESCRIPTIONS OF THE SOUND FIELD PARAMETERS" on page 45 for a description of what each parameter does, how it affects the sound, and its control range.

1. With the desired program selected, press the PARAMETER DOWN key on the remote control unit once. This will recall the next parameter after the program type. In the case of the CONCERT HALL 1 program, for example, this would be the ROOM SIZE parameter. You can continue pressing the PARAMETER DOWN key until you reach the "bottom" of the parameter list and no more parameters appear. Press the PARAMETER UP key to scroll upward through the parameter list.

DOWN ➡ ROOM SIZE=OOO

⬇

DOWN ➡ LIVENESS=OOO

⬇

DOWN ➡ INIT DLY = OOO

⬇

DOWN ➡ HPF = OOO

⬇

DOWN ➡ LPF = OOO
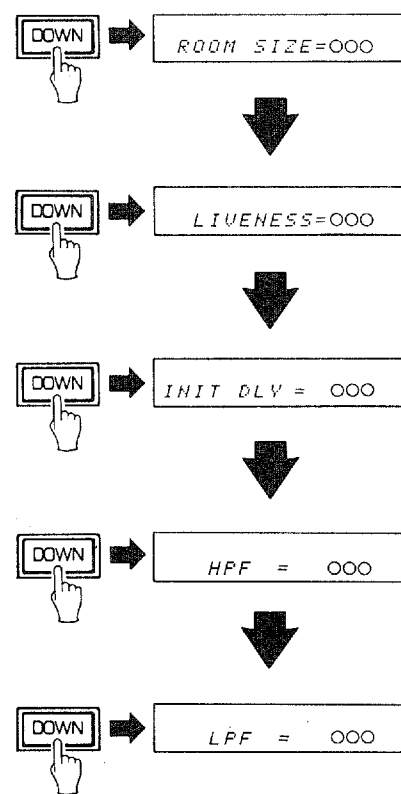
2. When the desired parameter has been recalled, use the PARAMETER INC (increment) and DEC (decrement) keys to change its value to create the effect you want. INC increases the value of the selected parameter, and DEC decreases the value of the selected parameter. In both cases you can hold the key down for continuous incrementing or decrementing.
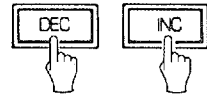
NOTE: Parameter edits made in this way will remain in effect only for as long as the current program is selected. If you select a different program and then re-select the edited program, all parameters will have been reset to their preset values. In order to save your edited program for instant recall later on, store it into a user memory location as described in "3-3. STORING AN EDITED PROGRAM IN THE USER MEMORY."

3-2. EFFECT LEVEL & BALANCE

These parameters can be used to individually adjust the effect level and front/rear effect balance for each program.

LEVEL
Use the EFFECT LEVEL DOWN and UP keys on the remote control unit to adjust the overall level of the effect signal (front and rear).
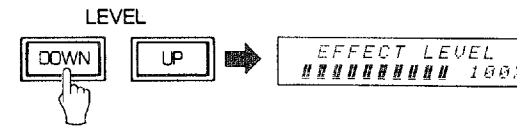
BALANCE
The balance between the front and rear effect speakers can be adjusted using the EFFECT BALANCE REAR and FRONT keys on the remote control unit. Pressing the REAR key decreases the level of the front speakers in relation to the rear speakers, while pressing the FRONT key decreases the level of the rear speakers in relation to the front speakers.
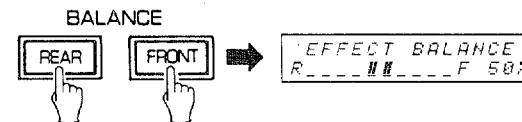
NOTE: Used as described above, the EFFECT LEVEL and BALANCE parameters affect only the selected program and NOT the overall system level and balance as they do when used during the calibration procedure (refer to page 21, MAIN/EFFECT SPEAKER BALANCE ADJUSTMENT). If, however, EFFECT LEVEL and BALANCE are again used for overall system calibration, the individual program level and balance parameters will be reset to their initial values (EFFECT LEVEL 100%, EFFECT BALANCE 50%).

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3-3. STORING AN EDITED PROGRAM IN THE USER MEMORY

Once you've edited the parameters of one of the preset programs and created the sound you want, you can store your original program into one of the DSP-3000's 20 USER memory locations so you can recall it again later without having to re-edit all the parameters individually.

1. After you've finished editing the preset program (do NOT switch to a different program), press the MEMO key on the remote control unit. The USER PROG indicator and program number display will begin to flash.

2. The USER PROG indicator and program number display will continue to flash for a few seconds. **WHILE THE INDICATOR AND DISPLAY ARE FLASHING,** press the number key corresponding to the memory location you wish to store the program to. If you press a program number key AFTER the indicator and display have stopped flashing, all your original parameter data will be erased and you'll have to re-edit the entire program. If the indicator and display stop flashing before you get a chance to press a memory number key, simply press the MEMO key again.

3. To recall your original program, press the USER key followed by the number key corresponding to the number of the memory location to which you stored the edited program.

* The front-panel PROGRAM UP/DOWN key provides sequential access to both the PRESET and USER programs. Pressing the UP or DOWN end of the PROGRAM key increments (increases) or decrements (decreases) the selected program number, respectively. Hold down the UP or DOWN end of the key for continuous incrementing or decrementing.

NOTE: When you switch between the USER and PRESET programs, the DSP-3000 automatically returns to the previously selected program number and any parameter changes you programmed.

CAUTION: If you store a new program to a user memory location which contains a previous program, the program originally contained in the user memory location will be erased and replaced with the new data.

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BATTERY BACKUP: The DSP-3000 user memory is maintained by a special long-life backup battery even while the power is OFF. The battery should last for approximately five years. When the battery reaches a point where it can no longer safely maintain the user memory, the "**WARNING** USER MEM. ERROR" display will appear on the LCD when the DSP-3000 is initially turned ON. When this happens, have the battery replaced by a qualified YAMAHA service center. It's a good idea to record the parameter values of your most important original programs in the "USER PARAMETER TABLE" given in the last section of this manual, so you can quickly re-program the DSP-3000 should you lose your original programs due to a battery failure.

The preset programs cannot be erased or lost.

```
** WARNING **
USER MEM. ERROR
```

WARNING: DO NOT ATTEMPT TO REPLACE THE BACK-UP BATTERY YOURSELF
If the backup battery in the main unit should need replacement, have the job done by qualified Yamaha service personnel.

3-4. USING THE TITLE EDIT FUNCTION

Once you've created an original sound field and stored it in the DSP-3000's user memory, you might want to give your program an original title (up to 16 characters long) so that you can easily identify it later.

1. Select the USER memory location containing the program you wish to title by first pressing the USER key and then the number of the program.

2. Press the TITLE EDIT key once and the "TITLE EDIT" display will appear. A cursor will appear at the first character position on the DSP-3000 LCD, or on your monitor screen if you are using the video superimpose function.

TITLE EDIT

```
OOOOOOOOOOOOOOOO
    TITLE EDIT
```
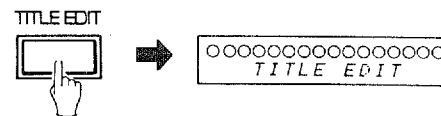
3. Use the PARAMETER INC and DEC keys to scroll through the DSP-3000 character set (see character chart below). Stop when the desired first character appears at the cursor position.
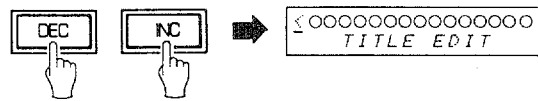
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
R	S	T	U	V	W	X	Y	Z		a	ä	b	c	d	e	f	g
h	i	j	k	l	m	n	o	ö	p	q	r	s	t	u	ü	v	w
x	y	z		[	]	<	>	:	•	*	+	—	=	&	/	,	.
'	%	!	?	→	←		#	0	1	2	3	4	5	6	7	8	9

4. Press the TITLE EDIT key once more to move the cursor to the next character position, and repeat step 3, above, to enter the second character of your title. The cursor will return to the first character position again if you press the TITLE EDIT key while it is at the last character position. This allows you to go back and correct errors.
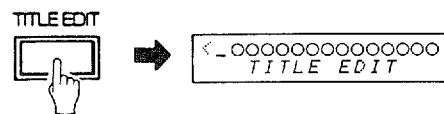
5. Repeat steps 3 and 4, above, until your title is completed. The title is automatically memorized in the currently selected user memory location. You can now select a different program.

3-5. DESCRIPTIONS OF THE SOUND FIELD PARAMETERS

Not all of the following parameters are found in every program. Refer to the "PROGRAM PARAMETER TABLE" on page 54 for a complete list of the parameters contained in each program.

• ROOM SIZE

How it Affects the Sound:
Changes the apparent size of the listening room. The larger the value, the larger the simulated room will sound.

What it Does:
Adjusts the timing between the early reflections. Early reflections are the first group of reflections you hear before the subsequent, dense reverberation begins.

Control Range:
0.1—4.0.
Standard setting is 1.0.
Changing this parameter from 1 to 2 increases the apparent volume of the room eight times (length, width, and height all doubled).

45
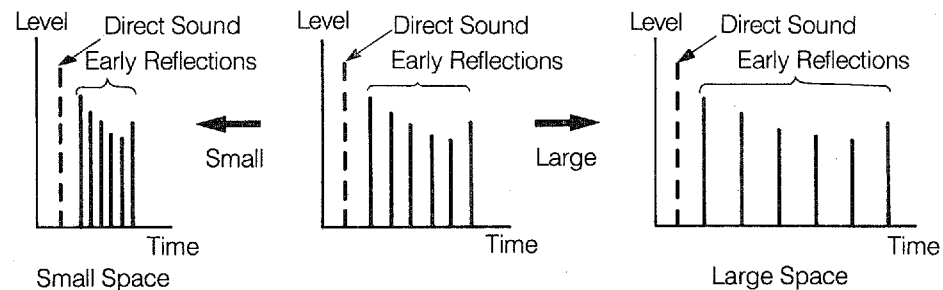
• LIVENESS

How it Affects the Sound:

This parameter changes the apparent reflectivity of the walls in the hall.

The early reflections from a sound source will lose intensity (decay) much faster in a room with acoustically absorbent wall surfaces than in one which has mostly reflective surfaces. A room with highly reflective surfaces in which the early reflections decay slowly is termed "live," while a room with absorbent characteristics in which the reflections decay rapidly is termed "dead." The LIVENESS parameter lets you adjust the early reflection decay rate, and thus the "liveness" of the room.

What it Does:

Changes the rate at which the early reflections decay.

Control Range:

0—10.
Standard setting is 5.
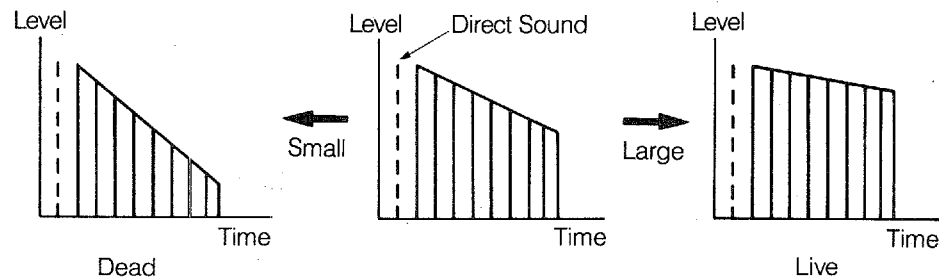
• INIT DELAY (Initial Delay)

How it Affects the Sound:

Changes the apparent distance from the source sound.

Since the distance of the sound source from a reflective surface determines the delay between the direct sound and the first reflection, this parameter changes the location of the sound source within the acoustic environment.

What it Does:

Adjusts the delay between the direct sound and the first reflection heard by the listener.

Control Range:

0.1—150 milliseconds.
For a small living room this parameter would be set between 4 and 5. Between 15 and 30 for a big hall. Larger values produce an echo effect.
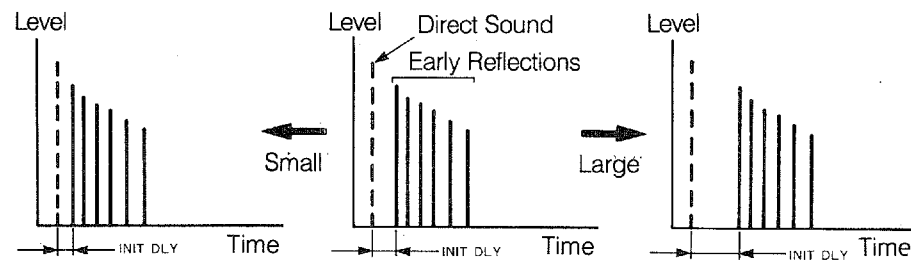
• HPF (High Pass Filter)

How it Affects the Sound:

This parameter can be used to reduce "boominess" in the effect sound (caused by listening room characteristics and speaker placement). Use your ears to tell you whether you need to use this parameter.

What it Does:

Rolls off the low frequencies, allowing the high frequencies to pass above a frequency you set.

Control Range:

32 Hz—1 kHz (in 32 steps), THRU

Level

THRU

32Hz, 35Hz, 40Hz·········1.0kHz 32 steps
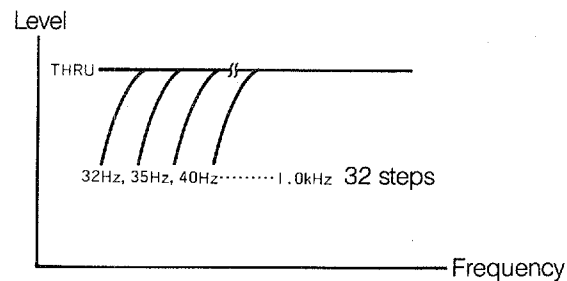
Frequency

• LPF (Low Pass Filter)

How it Affects the Sound:

This parameter can be used to simulate the dissipation of the high frequencies in large rooms, and to adjust the overall tonal quality of the effect sound. A setting of "THRU" turns the LPF OFF. Settings of 16 kHz or THRU add clarity to the sound, while settings at lower frequencies can reduce excess reflections from instruments such as cymbals, etc.

What it Does:

Rolls off the high frequencies, allowing the low frequencies to pass below a frequency you set.

predominate, a   You set the low pass frequency

Control Range:

1 kHz—16 kHz (in 26 steps), THRU.
A setting of 7 or 8 kHz is appropriate for a large hall.

Level

THRU

1.0kHz···12kHz, 14kHz, 16kHz 26 steps

Frequency

47
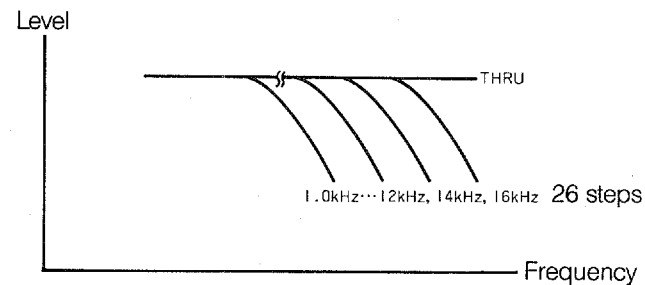
• REV TIME (Reverberation Time)

How it Affects the Sound:
The natural reverberation time of a room depends primarily on its size and the characteristics of its inner surfaces. This parameter, therefore, changes the apparent size of the acoustic environment over an extremely wide range.

What it Does:
Adjusts the amount of time it takes for the level of the dense, subsequent reverberation sound to decay by 60 dB (@1 kHz).

Control Range:
0.3—10 seconds.
The reverb time in a standard living room would be about 0.3—1, in a small-to-medium size hall it would be between 1 and 2, and in a large hall it is normally between 2 and 3.
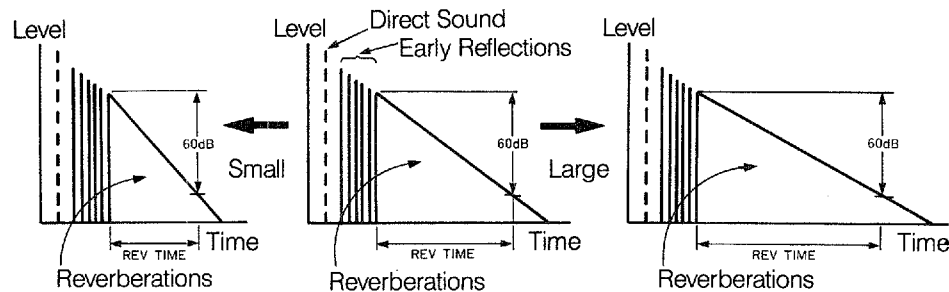
• HIGH (High Frequency Reverberation Time Ratio)

How it Affects the Sound:
Because of dissipation in the air, and depending on the characteristics of the room's inner surfaces, the high frequency reverberation in a real acoustic environment generally decays quicker than the low frequency reverb. The HIGH parameter accurately simulates this effect. A HIGH setting of 0.5, for example, results in high frequency reverberation time only one-half as long as the low-frequency reverberation.

What it Does:
Changes the reverberation time of the high frequencies in relation to the lower frequencies.

Control Range:
0.1—10.
Standard setting is 0.7.
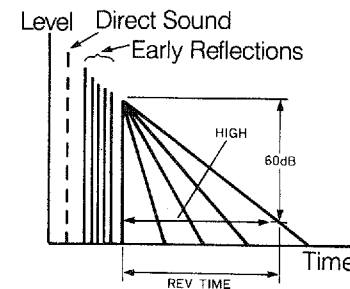
• REV LEVEL (Reverberation Level)

How it Affects the Sound:

A higher reverb level suggests a more acoustically reflective environment, while a lower reverb level simulates a relatively dead room.

What it Does:

Adjusts the overall level of the reverb sound.

Control Range:

0%—100%
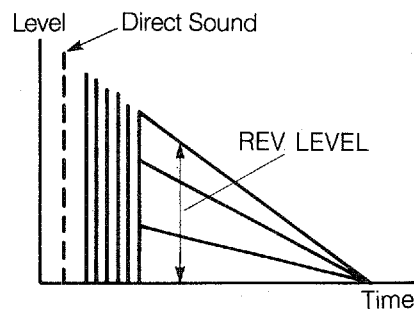
PARAMETERS PROVIDED ONLY IN THE PRESENCE PROGRAM

In addition to several of the parameters already described, the PRESENCE program has a special set of parameters which afford extremely fine control over 32 discrete reflections—16 per channel. This amount of control virtually makes it possible to create an acoustic environment "from scratch."

As you scroll DOWN through the parameters of the PRESENCE program, you'll come to a display that reads "*EDIT PATTERN*." This is NOT a parameter in itself. The *EDIT PATTERN* display simply signifies that the parameters below it are all dedicated to editing the actual reflection pattern produced by the acoustic environment.

• 2nd LPF (Second Low Pass Filter)

This is a second low-pass filter located after the LPF previously described. The output from the first LPF controls the 1st through the 11th reflections, while the output from the second LPF controls the 12th through the 16th reflections. Keep in mind the fact that the 2nd LPF is actually fed by the first LPF, so it must be set at a frequency below that of the first LPF to be effective. A setting of "THRU" turns the 2nd LPF OFF.

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Control Range:

1.0—16 kHz (in 26 steps), THRU
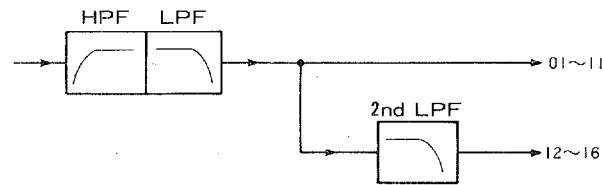
* **L01 DLY (Left Delay 1)—L16 DLY (Left Delay 16)**
* **R01 DLY (Right Delay 1)—R16 DLY (Right Delay 16)**

These parameters independently set the delay of 16 discrete reflections for the right and left channels—for a total of 32 reflections.

Control Range:

0.0—650 milliseconds
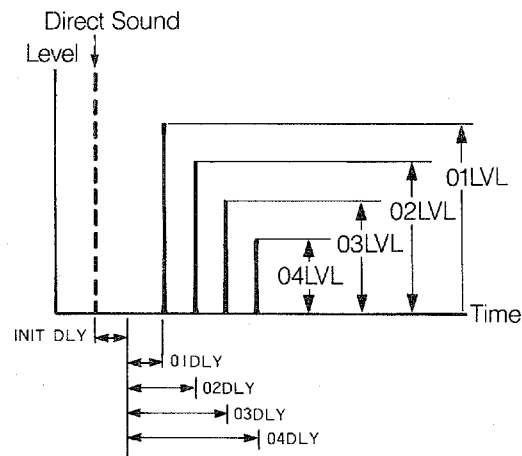
Note: The delay parameters all have the same control range, and can be programmed in any order.

* **L01 LVL (Left Level 1)—L16 LVL (Left Level 16)**
* **R01 LVL (Right Level 1)—R16 LVL (Right Level 16)**

These parameters independently set the levels of the 16 left channel and 16 right channel reflections. A positive (+) setting gives the reflection normal phase, while a negative setting (−) gives the reflection reverse phase. Set the level of all unused reflections to zero.

Control Range:

−100%— +100%

* **L01 DIR (Left Direction 1)—L16 DIR (Left Direction 16)**
* **R01 DIR (Right Direction 1)—R16 DIR (Right Direction 16)**

These parameters determine the direction from which each reflection is heard. A setting of FC (0 degrees) causes the reflection to be heard from front center, a setting of 90 degrees causes the reflection to be heard from right center, etc. Refer to the direction chart below.

PARAMETERS ONLY PROVIDED IN THE MOVIE THEATER PROGRAMS

The following parameters are found only in the MOVIE THEATER programs. Unlike the parameters found in the other programs, the MOVIE THEATER parameters individually adjust the "center" sound (left + right channel) and the surround sound. The functions of the parameters, however, are similar to those described previously.

● C. SPTL EXPS (Center, Spatial Expanse)

This parameter has basically the same effect as the ROOM SIZE parameter described previously. It allows adjustment of the timing between the center-channel (L+R) early reflections, changing the perceived size of the listening space or "movie theater."

Control Range:
0.1—4.0

● C. LIVENESS (Center, Liveness)

Similar to the previous LIVENESS parameter, this parameter adjusts the decay rate of the center-channel (L+R) early reflections, changing the perceived reflective characteristics of the listening environment.

Control Range:
0—10

Control Range:
FC (0 degrees)—350 degrees
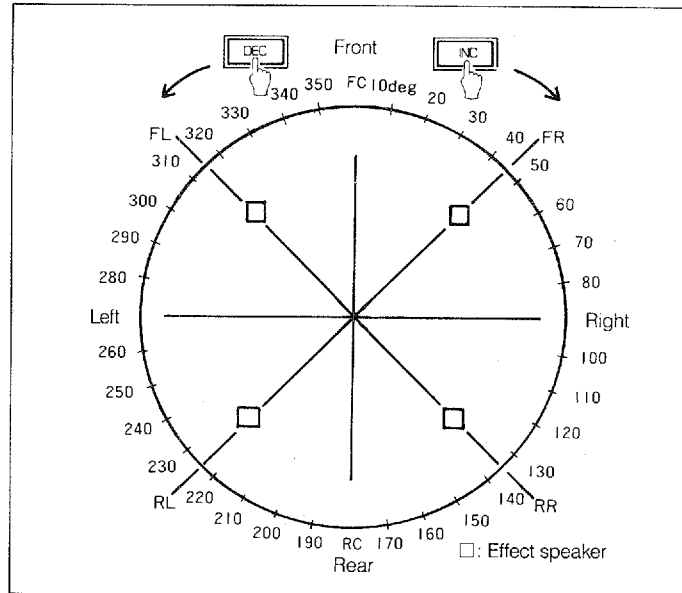
NOTE: The original factory presence pattern parameters will be lost if you alter them. If you wish to restore the original settings, refer to the parameter chart on page 59.

Only the standard presence parameters can be stored in the user memory. The pattern parameters remain stored in a separate memory area (separate memory areas are provided for the PRESENCE A and PRESENCE B programs) and apply to both the preset and user presence programs.

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• C. INI. DLY (Center, Initial Delay)

Adjusts the delay between the direct sound and the first center-channel (L+R) reflection, thus changing the perceived distance between the sound source and reflective surfaces.

Control Range:
 1—150 milliseconds

• C. LPF (Center, Low Pass Filter)

Rolls off the high frequencies of the center-channel (L+R) early reflections, allowing the low frequencies to pass below a frequency you set.

Control Range:
 1 kHz—16 kHz (in 26 steps), THRU

• C. LEVEL. (Center, Level)

Adjusts the level of the center-channel (L+R) early reflections.

Control Range:
 0%—100%

• S. SPTL. EXPS (Surround, Spatial Expanse)

This parameter has basically the same effect as the ROOM SIZE parameter described previously. It allows adjustment of the timing between the surround-channel (L-R) early reflections, changing the perceived size of the listening space.

Control Range:
 0.1—4.0

• S. LIVENESS (Surround, Liveness)

Similar to the previous LIVENESS parameter, this parameter adjusts the decay rate of the surround-channel early reflections, changing the perceived reflective characteristics of the listening environment.

Control Range:
 0—10

• S. INI. DLY (Surround, Initial Delay)

Adjusts the delay between the direct sound and the first surround-channel reflection, thus changing the perceived distance between the sound source and reflective surfaces.

Control Range:
 1—150 milliseconds

• S. LPF (Surround, Low Pass Filter)

Rolls off the high frequencies of the surround-channel early reflections, allowing the low frequencies to pass below a freqency you set.

Control Range:
1 kHz—16 kHz (in 26 steps), THRU

• S. LEVEL (Surround, Level)

Adjusts the level of the surround-channel early reflections.

Control Range:
0%—100%

NOTE: The surround parameters are not effective with mono sources.

ADJUSTMENT HINT: Turn the surround sound level down while adjusting the center parameters, then turn the center channel sound down while adjusting the surround parameters.

DOLBY SURROUND PARAMETERS

• DELAY

This parameter sets the time difference between the beginning of the source sound and the beginning of the effect sound. Simply adjust for the best effect.

Control Range:
15.0 ms—30.0 ms

• INPUT BALANCE

Normally the center (50%) position is best, but for sources that are out of balance (off center), the following adjustment procedure will improve the Dolby Surround effect.

Control Range:
0%—100%

First, turn the volume of the main speakers and the front effect speakers (if you have a 6-channel setup) all the way down so that only the surround channel can be heard coming from the rear speakers (volume control on preamplifier, integrated amplifier or receiver for main speakers, volume control on additional amplifier for front effect speakers). Next select a MONO input such as AM radio or a MONO FM broadcast for the rear effects speakers. Now, adjust the INPUT BAL parameter for minimum surround channel output. Finally, restore the volume controls to their original settings.

4-1. PROGRAM PARAMETER TABLE

No.	Program Name	Parameter Name	Minimum		Preset Value		Maximum	Effect	Type
1	CONCERT HALL 1	TYPE			Hall A in Europe/Hall B in Europe			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	30ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess in effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
2	CONCERT HALL 2	TYPE			Hall C in Europe/Hall D in Europe			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	25ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
3	CONCERT HALL 3	TYPE			Hall E in Europe/Hall F in Europe			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	30ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
4	CONCERT HALL 4	TYPE			Hall G in U.S.A/Hall H in U.S.A			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	35ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
5	CONCERT HALL 5	TYPE			Live Concert A/Live Concert B			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	45ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	5.0kHz	→	16kHz, THRU	Simulate dissipation of highs	

*Program types: ER = Early Reflection
REV = Reverberation
P = Presence
S = Surround
M = Movie Theater

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No.	Program Name	Parameter Name	Minimum		Preset Value		Maximum	Effect	Type
6	OPERA HOUSE	TYPE			Balcony/Mezzanine			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	10kHz	→	16kHz, THRU	Simulate dissipation of highs	
7	CATHEDRAL	REV TIME	0.3s	←	4.0s	→	10.0s	Reverberation time	REV
		HIGH	0.1	←	0.8	→	1.0	High-frequency reverberation time	
		INIT DLY	1ms	←	95ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
		REV LEVEL	0%	←	100%			Strength of reverberations	
8	CHURCH	REV TIME	0.3s	←	2.5s	→	10.0s	Reverberation time	REV
		HIGH	0.1	←	0.9	→	1.0	High-frequency reverberation time	
		INIT DLY	1ms	←	40ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess in effect sound	
		LPF	1.0kHz	←	8.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
		REV LEVEL	0%	←	100%			Strength of reverberations	
9	JAZZ CLUB 1	TYPE			Village Vanguard/Village Gate			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz↔16kHz	/	THRU			Reduce highs in effect sound	
10	JAZZ CLUB 2	TYPE			Cellar Club/Cabaret			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent size of hall	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz↔16kHz	/	THRU			Reduce highs in effect sound	

*Program types: ER = Early Reflection
REV = Reverberation
P = Presence
S = Surround
M = Movie Theater

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No.	Program Name	Parameter Name	Minimum		Preset Value		Maximum	Effect	Type
11	CHAMBER	REV TIME	0.3s	←	1.1s	→	10.0s	Reverberation time	REV
		HIGH	0.1	←	0.7	→	1.0	High-frequency reverberation time	
		INIT DLY	1ms	←	15ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	10kHz	→	16kHz, THRU	Simulate dissipation of highs	
		REV LEVEL	0%	←	50%	→	100%	Strength of reverberations	
12	ROCK CONCERT	TYPE			The Roxy Theatre/Arena			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent room size	
		LIVENESS	0	←	9	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	15ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
13	DISCO	TYPE			New York/Tokyo			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent room size	
		LIVENESS	0	←	6	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	10ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz↔16kHz	/	THRU			Reduce highs in effect sound	
14	PAVILION	REV TIME	0.3s	←	1.9s	→	10.0s	Reverberation time	REV
		HIGH	0.1	←	0.9	→	1.0	High-frequency reverberation time	
		INIT DLY	1ms	←	5ms	→	150ms	Apparent distance from sound source	
		HPF	THRU, 32Hz	←	56Hz	→	1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	2.5kHz	→	16kHz, THRU	Simulate dissipation of highs	
		REV LEVEL	0%	←	100%			Strength of reverberations	
15	STADIUM	TYPE			Anaheim Stadium/Bowl			Sub-program select	ER
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent room size	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	55ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess in effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	

*Program types: ER = Early Reflection
　　　　　　　REV = Reverberation
　　　　　　　P   = Presence
　　　　　　　S   = Surround
　　　　　　　M   = Movie Theater

No.	Program Name	Parameter Name	Minimum		Preset Value		Maximum	Effect	Type
16	PRESENCE	TYPE			Pattern A/Pattern B			Sub-program select	P
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent room size	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	10ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	8.0kHz	→	16kHz, THRU	Simulate dissipation of highs	
		2nd LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	2nd low-pass filter	
					EDIT PATTERN See chart on page 59.			Pressing PARAMETER DOWN enters pattern parameter edit mode. The following parameters are pattern parameters.	
		Ln DLY			0.1ms~650ms			nth reflection delay time for left channel	
		Ln LVL			−100%~+100%			nth reflection phase and level for left channel	
		Ln DIR			10dg~350deg, 10deg step/FC/FR/Right/ RR/RC/RL/Left/FL			nth reflection direction for left channel	
		Rn DLY			0.1ms~650ms			nth reflection delay time for right channel	
		Rn LVL			−100%~+100%			nth reflection phase and level for right channel	
		Rn DIR			10deg~350deg, 10deg step/FC/FR/Right/ RR/RC/RL/Left/FL			nth reflection direction for right channel	
17	SURROUND	TYPE			Type A/Type B			Sub-program select	S
		ROOM SIZE	0.1	←	1.0	→	4.0	Apparent room size	
		LIVENESS	0	←	5	→	10	Apparent reflectivity of walls	
		INIT DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source	
		HPF			THRU	/	32Hz↔1.0kHz	Reduce boominess of effect sound	
		LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs	

*Program types: ER = Early Reflection
REV = Reverberation
P = Presence
S = Surround
M = Movie Theater

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No.	Program Name	Parameter Name	Minimum		Preset Value		Maximum	Effect	Type
18	MOVIE THEATER 1	TYPE			Adventure/Standard			Sub-program select	M
		C.SPTL EXPS	0.1	←	1.0	→	4.0	Apparent room size, center channel	
		C.LIVENESS	0	←	5	→	10	Apparent wall reflectivity, center channel	
		C.INI. DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source, center channel	
		C.LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs, center channel	
		C.LEVEL	0%	←	70%	→	100%	Volume level, center channel	
		S.SPTL EXPS	0.1	←	1.0	→	4.0	Apparent room size, surround channel	
		S. LIVENESS	0	←	5	→	10	Apparent wall reflectivity, surround channel	
		S.INI.DLY	1ms	←	20ms	→	150ms	Apparent distance from source, surround channel	
		S.LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs, surround channel	
		S.LEVEL	0%	←	100%			Volume level, surround channel	
19	MOVIE THEATER 2	TYPE			Musical/Classic			Sub-program select	M
		C.SPTL EXPS	0.1	←	1.0	→	4.0	Apparent room size, center channel	
		C.LIVENESS	0	←	5	→	10	Apparent wall reflectivity, center channel	
		C.INI. DLY	1ms	←	20ms	→	150ms	Apparent distance from sound source, center channel	
		C.LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs, center channel	
		C.LEVEL	0%	←	70%	→	100%	Volume level, center channel	
		S.SPTL EXPS	0.1	←	1.0	→	4.0	Apparent room size, surround channel	
		S. LIVENESS	0	←	5	→	10	Apparent wall reflectivity, surround channel	
		S.INI.DLY	1ms	←	35ms	→	150ms	Apparent distance from source, surround channel	
		S.LPF	1.0kHz	←	7.0kHz	→	16kHz, THRU	Simulate dissipation of highs, surround channel	
		S.LEVEL	0%	←	100%			Volume level, surround channel	
20	DOLBY SURROUND	DELAY	15.0ms	←	20.0ms	→	30.0ms	Time until the rear delay sound is produced	S
		INPUT BALANCE	0%	←	50%	→	100%	Correct out-of-balance source	

*Program types: ER = Early Reflection
REV = Reverberation
P = Presence
S = Surround
M = Movie Theater

Presence Program (Edit Pattern Preset Data)

Unlike other parameters, once the pattern parameters have been edited they will not be restored to their factory preset values even if the Presence program is called out again from preset memory. The chart below gives the factory preset values to allow manual resetting of parameters if desired.

Pattern A

No.	DLY (ms)	LVL (%)	DIR. (deg)	No.	DLY (ms)	LVL (%)	DIR. (deg)
L01	10.0	+100	FL	R01	18.0	+100	FR
L02	14.0	+100	RL	R02	16.0	+100	RR
L03	0.0	0	FC	R03	0.0	0	FC
L04	0.0	0	FC	R04	0.0	0	FC
L05	0.0	0	FC	R05	0.0	0	FC
L06	0.0	0	FC	R06	0.0	0	FC
L07	0.0	0	FC	R07	0.0	0	FC
L08	0.0	0	FC	R08	0.0	0	FC
L09	0.0	0	FC	R09	0.0	0	FC
L10	0.0	0	FC	R10	0.0	0	FC
L11	0.0	0	FC	R11	0.0	0	FC
L12	0.0	0	FC	R12	0.0	0	FC
L13	0.0	0	FC	R13	0.0	0	FC
L14	0.0	0	FC	R14	0.0	0	FC
L15	0.0	0	FC	R15	0.0	0	FC
L16	0.0	0	FC	R16	0.0	0	FC

Pattern B

No.	DLY (ms)	LVL (%)	DIR. (deg)	No.	DLY (ms)	LVL (%)	DIR. (deg)
L01	14.1	+24	FR	R01	11.2	+39	FC
L02	34.3	+50	320	R02	35.3	+50	10
L03	39.6	+59	340	R03	43.9	+15	30
L04	46.5	+30	330	R04	46.1	+22	FC
L05	62.3	+19	30	R05	51.9	+25	10
L06	63.9	+10	10	R06	62.9	+21	320
L07	67.0	+15	80	R07	73.8	+14	260
L08	82.2	+11	110	R08	76.5	+13	40
L09	87.0	+15	RC	R09	88.4	+9	300
L10	104.8	+11	310	R10	113.0	+8	Left
L11	109.5	+10	FR	R11	123.3	+9	300
L12	113.5	+10	210	R12	131.8	+12	350
L13	119.3	+13	350	R13	153.4	+9	Left
L14	122.0	+15	FC	R14	169.7	+10	340
L15	134.7	+15	30	R15	193.2	+8	330
L16	182.9	+9	350	R16	202.7	+7	70

The direction parameter functions as shown in the diagram below.

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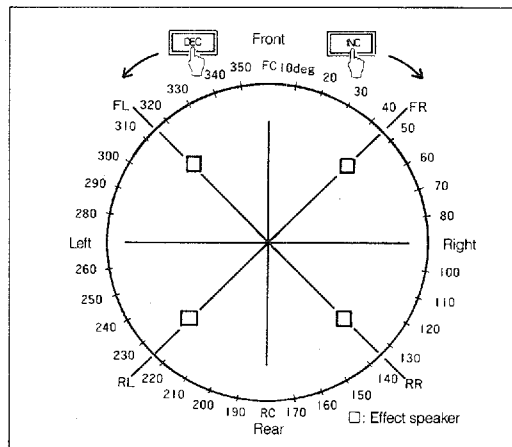
4-2. USER PROGRAM TABLE

Use the chart below for writing user programs.

Program No/	Program Name	Parameter (Name and value)				

Program No/	Program Name	Parameter (Name and value)				

Presence Program Pattern Chart

Use this chart to record data
before editing.

* Delay is 0.1—650.0 msec.
* Level is 0—100%.
* Direction is as shown in diagram below.
* Set unused level parameters to 0%.
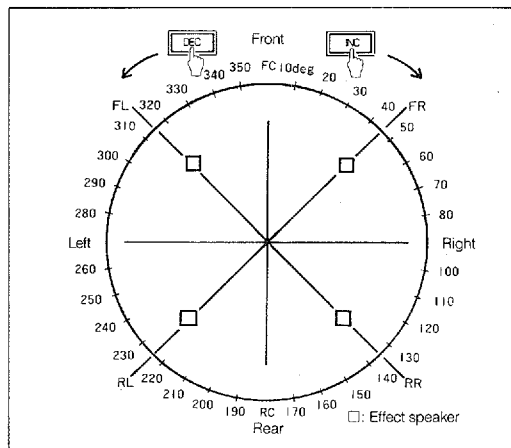
	Pattern A/Pattern B			INIT DLY			
ROOM SIZE				HPF			
LIVENESS				LPF		2nd LPF	
No.	DLY (ms)	LVL (%)	DIR (deg)	No.	DLY (ms)	LVL (%)	DIR (deg)
L01				R01			
L02				R02			
L03				R03			
L04				R04			
L05				R05			
L06				R06			
L07				R07			
L08				R08			
L09				R09			
L10				R10			
L11				R11			
L12				R12			
L13				R13			
L14				R14			
L15				R15			
L16				R16			

4-3. TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	CURE
Power does not come on.	AC cord not properly plugged in.	Carefully plug AC plug into outlet.
Hum.	Bad cable connection.	Firmly plug in all connection cables.
No sound.	Bad or incorrect input connection. Incorrect input source selection. MUTE indicators (MAIN, EFFECT) are ON.	Check connections. Check DSP-3000 and amp switch settings. Press the MUTE keys to turn MUTE OFF.
No sound from MAIN speakers.	MAIN MUTE indicator is ON. Wrong amplifier settings.	Press MAIN MUTE key to turn MUTE OFF. Check amplifier operation.
No sound from EFFECT speakers.	EFFECT MUTE indicator is ON. Wrong amplifier settings. A SURROUND program is being used with a mono source.	Press MAIN MUTE key to turn MUTE OFF. Check amplifier operation. Use a different sound field program.
No front reflection sound.	In a 4-channel system, the FRONT MIX switch is set incorrectly.	Set the FRONT MIX switch to "4ch."
Reflection sound from the MAIN speakers in a 6-channel system even when the effect sound is turned OFF.	The FRONT MIX switch is set incorrectly.	Set the FRONT MIX switch to "6ch."
No sound from auxiliary speaker.	The MONO/OUTPUT LEVEL control is set to "MIN."	Rotate the LEVEL control clockwise to set the proper level.
The sound field cannot be recorded.	It is not possible to record the sound field on a tape deck connected to the DSP-3000 TAPE terminals.	
The super-imposed program & parameter display does not appear on a video monitor screen.	Incorrect display control settings.	Set the display control mode to "AUTO" or "CONT."
The remote control unit does not function properly.	Dead Batteries. Wrong distance or angle.	Replace batteries. The remote control unit will function from a maximum range of 7 meters, no more than 30 degrees off-axis from the DSP-3000 front panel.
Noise from nearby TV or tuner.	The DSP-3000 is too close to the affected equipment.	Move the DSP-3000 further away from the affected equipment.

4-4. SPECIFICATIONS

INPUT/OUTPUT CHARACTERISTICS

- **ANALOG INPUT**

Input Terminals	ANALOG INPUT 1
	ANALOG INPUT 2
	TAPE PB
Max. Input/Input Impedance	2.5 V r.m.s/47 kΩ

- **DIGITAL INPUT**

Input Terminal	DIGITAL IN
Input sens./Impedance	0.5 V p-p/75 Ω
Sampling Freq.	32, 44.1, 48 kHz (automatic selection)

- **VIDEO INPUT**

Input Terminal	VIDEO IN
Input sens./Impedance	1 V p-p/75 Ω

- **ANALOG OUTPUTS**

Output Terminals	TAPE REC
	MAIN OUTPUT
	EFFECT OUTPUT (FRONT/REAR)
	MONO OUTPUT (FRONT/RIGHT/LEFT/ REAR)
Max. Output (Analog input)	2.5 V r.m.s
Output Voltage (0dB digital input)	2.5 V r.m.s
Output Impedance	1 kΩ

- **DIGITAL OUTPUT**

Output Terminal	DIGITAL THRU OUT
Output Voltage/ Impedance	0.5 V p-p (75 Ω load)/75 Ω

- **VIDEO OUTPUT**

Output Terminal	VIDEO OUT
Output Voltage/ Impedance	1 V p-p (75 Ω load)/75 Ω

- **OTHERS**

Analog Output Gain	0 + 0.5 dB

A/D CONVERTER

● QUANTIZATION	16 bit linear
● SAMPLING FREQUENCY	48 kHz
● FEATURES	Independent L and R channels. Internal dither circuitry.

D/A CONVERTER

● QUANTIZATION	18 bit (MAIN)
	16 bit linear (EFFECT)
● SAMPLING FREQUENCY	32, 44.1, 48 kHz

DSP PROGRAM

● PRESET	20 programs
● USER	20 programs

THD

● MAIN OUT (ANALOG IN)	0.002% (1 kHz, 2.5 V)
● EFFECT OUT (ANALOG IN)	0.005% (1 kHz, 2.5 V)
● MAIN OUT (DIGITAL IN)	0.003% (1 kHz, 0 dB)
● EFFECT OUT (DIGITAL IN)	0.005% (1 kHz, 0 dB)

FREQUENCY CHARACTERISTICS

● ANALOG IN to MAIN	10 Hz—100 kHz +0, −3 dB
● ANALOG IN to EFFECT	20 Hz—20 kHz +0.5, −3 dB
● DIGITAL IN to MAIN/EFFECT	20 Hz—20 kHz ±0.5 dB

S/N (IHF-A NETWORK)

● ANALOG INPUT (Input shorted, s=2.5 V)	110 dB (MAIN 94 dB (EFFECT)
● DIGITAL INPUT	110 dB (MAIN) 105 dB (EFFECT)

RESIDUAL NOISE

● IHF-A NETWORK	2 μV (MAIN, EFFECT)

CHANNEL SEPARATION

- **ANALOG INPUT**

(Input terminated with 5.1 kΩ)	1 kHz, 80 dB (MAIN)

● DIGITAL INPUT	1 kHz, 90 dB (MAIN)

OTHERS

● POWER SUPPLY	AC 120 V, 60 Hz
● POWER CONSUMPTION	45 watts
● AC OUTLET	Switched × 300 W Max.
● DIMENSIONS (W × H × D)	435 × 95.5 × 352.3 mm
● WEIGHT	9.6 kg

4-5 BLOCK DIAGRAM

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YAMAHA

Reflection

Direct sound