RSS by Roland

S-1608 / S-0816

Digital Snake

S-1608 STAGE UNIT

S-0816 FOH UNIT

S-4000R REMOTE CONTROLLER

Owner's Manual

Before using this unit, carefully read the sections entitled: "IMPORTANT SAFETY INSTRUCTIONS" (Owner's Manual Pg. 2), "USING THE UNIT SAFELY" (Owner's Manual Pg. 3–4), and "IMPORTANT NOTES" (Owner's Manual Pg. 5). These sections provide important information concerning the proper operation of the unit. Additionally, in order to feel assured that you have gained a good grasp of every feature provided by your new unit, Owner's Manual should be read in its entirety. The manual should be saved and kept on hand as a convenient reference.

http://www.rolandsystemsgroup.net

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS.

IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

WARNING - When using electric products, basic precautions should always be followed, including the following:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturers instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

For the U.K.

WARNING: THIS APPARATUS MUST BE EARTHED
IMPORTANT: THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE.
GREEN-AND-YELLOW: EARTH, BLUE: NEUTRAL, BROWN: LIVE
    As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
    The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW.
    The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.
    The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

THE UNIT SAFELY

INSTRUCTIONS FOR THE PREVENTION OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS

About ⚠ WARNING and ⚠ CAUTION Notices

⚠ WARNING	Used for instructions intended to alert the user to the risk of death or severe injury should the unit be used improperly.
⚠ CAUTION	Used for instructions intended to alert the user to the risk of injury or material damage should the unit be used improperly. * Material damage refers to damage or other adverse effects caused with respect to the home and all its furnishings, as well to domestic animals or pets.

About the Symbols

⚠	The △ symbol alerts the user to important instructions or warnings. The specific meaning of the symbol is determined by the design contained within the triangle. In the case of the symbol at left, it is used for general cautions, warnings, or alerts to danger.
⃠	The ◯ symbol alerts the user to items that must never be carried out (are forbidden). The specific thing that must not be done is indicated by the design contained within the circle. In the case of the symbol at left, it means that the unit must never be disassembled.
⬤	The ● symbol alerts the user to things that must be carried out. The specific thing that must be done is indicated by the design contained within the circle. In the case of the symbol at left, it means that the power-cord plug must be unplugged from the outlet.

-------------------------------- **ALWAYS OBSERVE THE FOLLOWING** --------------------------------

⚠WARNING

● Before using this unit, make sure to read the instructions below, and the Owner's Manual.

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● Connect mains plug of this model to a mains socket outlet with a protective earthing connection.

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● Do not open or perform any internal modifications on the unit.

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● Do not attempt to repair the unit, or replace parts within it (except when this manual provides specific instructions directing you to do so). Refer all servicing to your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" page.

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● Never use or store the unit in places that are:
  • Subject to temperature extremes (e.g., direct sunlight in an enclosed vehicle, near a heating duct, on top of heat-generating equipment); or are
  • Damp (e.g., baths, washrooms, on wet floors); or are
  • Humid; or are
  • Exposed to rain; or are
  • Dusty; or are
  • Subject to high levels of vibration.

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⚠WARNING

● This unit should be used only with a rack or stand that is recommended by Roland.

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● When using the unit with a rack or stand recommended by Roland, the rack or stand must be carefully placed so it is level and sure to remain stable. If not using a rack or stand, you still need to make sure that any location you choose for placing the unit provides a level surface that will properly support the unit, and keep it from wobbling.

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● The unit should be connected to a power supply only of the type described in the operating instructions, or as marked on the rear side of unit.

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● Use only the attached power-supply cord. Also, the supplied power cord must not be used with any other device.

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● Do not excessively twist or bend the power cord, nor place heavy objects on it. Doing so can damage the cord, producing severed elements and short circuits. Damaged cords are fire and shock hazards!

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● Do not allow any objects (e.g., flammable material, coins, pins); or liquids of any kind (water, soft drinks, etc.) to penetrate the unit.

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The Name Plate is attached to the rear panel. Please see "Specifications" (Page 72 and Page 73) for information regarding electronic specifications.

⚠WARNING

● This unit, either alone or in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level, or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should immediately stop using the unit, and consult an audiologist.

● Immediately turn the power off, remove the power plug from the outlet, and request servicing by your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" page when:
  • The power-supply cord or the plug has been damaged; or
  • If smoke or unusual odor occurs
  • Objects have fallen into, or liquid has been spilled onto the unit; or
  • The unit has been exposed to rain (or otherwise has become wet); or
  • The unit does not appear to operate normally or exhibits a marked change in performance.

● In households with small children, an adult should provide supervision until the child is capable of following all the rules essential for the safe operation of the unit.

● Protect the unit from strong impact. (Do not drop it!)

● Do not force the unit's power-supply cord to share an outlet with an unreasonable number of other devices. Be especially careful when using extension cords—the total power used by all devices you have connected to the extension cord's outlet must never exceed the power rating (watts/amperes) for the extension cord. Excessive loads can cause the insulation on the cord to heat up and eventually melt through.

● Before using the unit in a foreign country, consult with your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" page.

● Do not put anything that contains water (e.g., flower vases) on this unit. Also, avoid the use of insecticides, perfumes, alcohol, nail polish, spray cans, etc., near the unit. Swiftly wipe away any liquid that spills on the unit using a dry, soft cloth.

⚠CAUTION

● The unit should be located so that its location or position does not interfere with its proper ventilation.

● Always grasp only the plug on the power-supply cord when plugging into, or unplugging from, an outlet or this unit.

● At regular intervals, you should unplug the power plug and clean it by using a dry cloth to wipe all dust and other accumulations away from its prongs. Also, disconnect the power plug from the power outlet whenever the unit is to remain unused for an extended period of time. Any accumulation of dust between the power plug and the power outlet can result in poor insulation and lead to fire.

● Try to prevent cords and cables from becoming entangled. Also, all cords and cables should be placed so they are out of the reach of children.

● Never climb on top of, nor place heavy objects on the unit.

● Never handle the power cord or its plugs with wet hands when plugging into, or unplugging from, an outlet or this unit.

● Before moving the unit, disconnect the power plug from the outlet, and pull out all cords from external devices.

● Before cleaning the unit, unplug the power cord from the outlet.

● Whenever you suspect the possibility of lightning in your area, pull the plug on the power cord out of the outlet.

● Keep AC Cord Clamp and any screws for the rack-mount bracket and AC Cord Clamp you may remove, and the included the ferrite core, REAC cover, and rubber feet in a safe place out of children's reach, so there is no chance of them being swallowed accidentally.

● Always turn the phantom power off when connecting any device other than condenser microphones that require phantom power. You risk causing damage if you mistakenly supply phantom power to dynamic microphones, audio playback devices, or other devices that don't require such power. Be sure to check the specifications of any microphone you intend to use by referring to the manual that came with it.
(The S-1608/S-0816 phantom power: +48 V DC, 14 mA Max)

IMPORTANT NOTES

In addition to the items listed under "IMPORTANT SAFETY INSTRUCTIONS" and "USING THE UNIT SAFELY" on pages 2 and 3–4, please read and observe the following:

Power Supply

● Do not connect this unit to same electrical outlet that is being used by an electrical appliance that is controlled by an inverter (such as a refrigerator, washing machine, microwave oven, or air conditioner), or that contains a motor. Depending on the way in which the electrical appliance is used, power supply noise may cause this unit to malfunction or may produce audible noise. If it is not practical to use a separate electrical outlet, connect a power supply noise filter between this unit and the electrical outlet.

● Before connecting this unit to other devices, turn off the power to all units. This will help prevent malfunctions and/or damage to speakers or other devices.

● This device has no power switch. Disconnect the plug from the power outlet whenever shutdown of power is required. The power cord's plug should be connected to the closest available power outlet to the device; this should be within immediate reach during use.

Placement

● Using the unit near power amplifiers (or other equipment containing large power transformers) may induce hum. To alleviate the problem, change the orientation of this unit; or move it farther away from the source of interference.

● This device may interfere with radio and television reception. Do not use this device in the vicinity of such receivers.

● Noise may be produced if wireless communications devices, such as cell phones, are operated in the vicinity of this unit. Such noise could occur when receiving or initiating a call, or while conversing. Should you experience such problems, you should relocate such wireless devices so they are at a greater distance from this unit, or switch them off.

● When moved from one location to another where the temperature and/or humidity is very different, water droplets (condensation) may form inside the unit. Damage or malfunction may result if you attempt to use the unit in this condition. Therefore, before using the unit, you must allow it to stand for several hours, until the condensation has completely evaporated.

● Depending on the material and temperature of the surface on which you place the unit, its rubber feet may discolor or mar the surface.
You can place a piece of felt or cloth under the rubber feet to prevent this from happening. If you do so, please make sure that the unit will not slip or move accidentally.

Maintenance

● For everyday cleaning wipe the unit with a soft, dry cloth or one that has been slightly dampened with water. To remove stubborn dirt, use a cloth impregnated with a mild, non-abrasive detergent. Afterwards, be sure to wipe the unit thoroughly with a soft, dry cloth.

● Never use benzine, thinners, alcohol or solvents of any kind, to avoid the possibility of discoloration and/or deformation.

Additional Precautions

● Unfortunately, it may be impossible to restore the contents of data that was stored in the unit's memory once it has been lost. Roland Corporation assumes no liability concerning such loss of data.

● Use a reasonable amount of care when using the unit's buttons, sliders, or other controls; and when using its jacks and connectors. Rough handling can lead to malfunctions.

● When connecting / disconnecting all cables, grasp the connector itself—never pull on the cable. This way you will avoid causing shorts, or damage to the cable's internal elements.

● A small amount of heat will radiate from the unit during normal operation.

● To avoid disturbing your neighbors, try to keep the unit's volume at reasonable levels (especially when it is late at night).

● When you need to transport the unit, package it in the box (including padding) that it came in, if possible. Otherwise, you will need to use equivalent packaging materials.

Table of Contents

Introduction

Welcome

Congratulations on your purchase of the RSS S-1608/S-0816 Digital Snake System. Featuring the new REAC (Roland Ethernet Audio Communication) interface, the S-1608/S-0816 System brings the audio snake into the digital age.

The S-1608/S-0816 System is designed to be extremely easy to configure and set up, and is at home in any application where multichannel audio transfer is required.

About This Manual

How the Manual is Organized

The *S-1608/S-0816 Digital Snake Owner's Manual* explains the S-1608/S-0816 System's primary components and functions. It also details the connection and operation of the system, and provides many tips and diagrams to help you configure the Digital Snake for your particular application.

To get the most out of your S-1608/S-0816 Digital Snake, we recommend reading the entire manual. The material is presented in the following chapters:

- *Main Features*—briefly describes the features and benefits of the system and its components.

- *Components and Accessories*—lists what's included with the S-1608/S-0816 System and some of the available system options.

- *Panel Descriptions*—show you where everything is and what it's for.

- *S-1608/S-0816 System Overview*—discusses the concept of the Digital Snake, and explains some of the technologies that make up the system.

- *Using the S-1608/S-0816 System*—shows you how to hook everything together and use the system's components.

- *Advanced Use*—discusses advanced topics such as controlling the system with a computer and splitting the audio to multiple destinations.

- *Applications*—provides diagrams for various S-1608/S-0816 System setups.

- *Appendices*—details system status and error indicators, troubleshooting, cable pin outs, and technical specifications.

Conventions Used in the Manual

Names

The S-1608/S-0816 Digital Snake System is comprised of three primary components:

- S-1608 Stage Unit

- S-0816 FOH Unit

- S-4000R Remote Controller

Throughout the text, the individual components' names are often shortened, and referred to simply as "S-1608," "S-0816," and "S-4000R." When a procedure or description refers to the entire system, the name "S-1608/S-0816 System" is used.

Additionally, the names of buttons, knobs, and connectors are shown exactly as they appear on the system components. As a result, these names are shown completely in capital letters. For example, the button labeled "LOCK" will appear in the manual as the [LOCK] button, or simply [LOCK], as in "Press [LOCK]."

One button on the S-4000R serves a dual purpose. The button's name indicates both of its functions: [CLIP CLEAR/ENTER].

Usage Conventions

The purpose of the S-1608/S-0816 System is to function as an audio "snake"—a device used to transfer multiple audio signals from one place to another, usually over a long distance. Since the S-1608/S-0816 System transfers signals as digital data—the system's primary benefit—it's called a "digital snake."

In most cases, audio snakes are used in sound reinforcement applications that involve a musical performance, a theatre presentation, or an orator (or orators). In such applications, the primary source of the audio is at a "stage" area, and that audio is sent via the snake to a "mixing" position (also referred to as the "front of house" or FOH position).

Of course, there are many other usage applications for an audio snake, such as transferring audio to a recording setup, a broadcast feed, or any other application where multiple audio signals are transferred and managed.

Occasionally, the manual refers to a physical location for the system's components as the "stage," "mixing," or "front of house" location. These terms are used only for the sake of brevity or to illustrate the signal flow of the system in terms understood by a typical audio engineer. However, they are not meant to imply that the system is unsuited for a particular alternate application. The S-1608/S-0816 System will function just as well in any installation where an audio snake is required.

Note, Tip, and Warning Icons

Throughout the *S-1608/S-0816 Digital Snake Owner's Manual*, you'll occasionally come across areas highlighted in gray that provide extra information related to the feature or operation described in the main text. The symbols in the left-hand margin define the nature of this extra information.

A warning contains important information that will help you avoid damage to the S-1608/S-0816 System, other equipment, or yourself.

A note is something that adds information about the topic at hand.

A tip offers suggestions for using the feature being discussed.

Other S-1608/S-0816 Digital Snake Documents

In addition to the *S-1608/S-0816 Digital Snake Owner's Manual*, carefully read the following manuals included with the S-4000 System:

• *S-4000R Installation Manual*

These manuals provide important information concerning the proper operation of each unit, and detail precautions for using the units safely.

Main Features

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S-1608/S-0816 System

- REAC transmission protocol provides up to 40 channels of 24-bit, 96 kHz audio transfer over a single Cat5e Ethernet cable. The S-1608/S-0816 system can transfer up to 24 channels which are 16 channels from the S-1608 and 8 channels from the S-0816.

- Transmission distance of 100 meters (330 feet) with REAC (cable length can be extended using REAC Splitter S-4000-SP or Ethernet switching hubs)

- Extremely low device-to-device transmission latency (The network latency between REAC devices is under 375 microseconds, and the analog signal latency from INPUT of one side to OUTPUT of the other side of S-1608/S-0816 system is about 1.2 millisecond)

- It can be rack mountable by fitting Rack-mounting hardware kit

- Free software for system control from a PC or Mac

System Components

S-1608 Stage Unit

- "Stage" unit with 16 inputs and 8 outputs on XLR connectors

- All new, precision-designed preamps with massive headroom and clean, warm sound (gain range from -65 to +10 dBu typical, +28 dBu maximum input level)

- Audio signal and system status indicators

- REAC port for connecting with S-0816 or other REAC device

- RS-232C interface for S-4000R Remote Controller or computer control

- MUTE ALL OUTPUTS button for noise-free connection of audio sources

S-0816 FOH Unit

- "Front of house" unit with 8 inputs and 16 outputs on XLR connectors

- All new, precision-designed preamps with massive headroom and clean, warm sound (gain range from -65 to +10 dBu typical, +28 dBu maximum input level)

- Audio signal and system status indicators

- REAC port for connecting with S-1608 or other REAC device

- RS-232C interface for S-4000R Remote Controller or computer control

- MUTE ALL OUTPUTS button for noise-free connection of audio sources

S-4000R Remote Controller

- Simple, easy-to-use remote control unit

- Provides control of preamp gain, phantom power, and pad for each S-1608/S-0816 input channel

- Clean input gain adjustment (1 dB steps)

- Ten memory presets for storing frequently used input setups

- Eight-segment LED meter for precise input signal level monitoring

- Signal status indicators for all 24 channels

- System status indicators

- System lock for protection of channel settings

Components and Accessories

3

What's Included

The following components and accessories are included with the S-1608/S-0816 Digital Snake.

Main Components

1—S-1608 Stage Unit

1—S-0816 FOH Unit

1—S-4000R Remote Controller

Accessories for S-1608

1—AC power supply cord (2.5 meters)

1—REAC connector cover

1—Rack-mounting hardware kit (1—left-side rack mount bracket, 1—Right-side rack mount bracket)

1—AC cord clamp * Attached to the side panel of the S-1608.

1—Ferrite core

4—Rubber Foot

1—S-1608/S-0816 Digital Snake Owner's Manual

> When using the S-1608/S-0816 system, you must have a REAC cable. We recommend using the separately available SC-W100S REAC cable for REAC-to-REAC connections.
> * Commercially available Cat5e ethernet cable may also be used.
> Please see "Things to Know" (Page 26) for information regarding the REAC cable.

Accessories for S-0816

1—AC power supply cord (2.5 meters)

1—REAC connector cover

1—Rack-mounting hardware kit (1—left-side rack mount bracket, 1—Right-side rack mount bracket)

1—AC cord clamp * Attached to the side panel of the S-1608.

1—Ferrite core

4—Rubber Foot

1—S-1608/S-0816 Digital Snake Owner's Manual

Accessories for S-4000R

1—RS-232C cable (3 meters)

1—Rack-mounting hardware kit (2—Rack-mount brackets, 4—Screws)

1—S-4000R Installation Manual

System Options

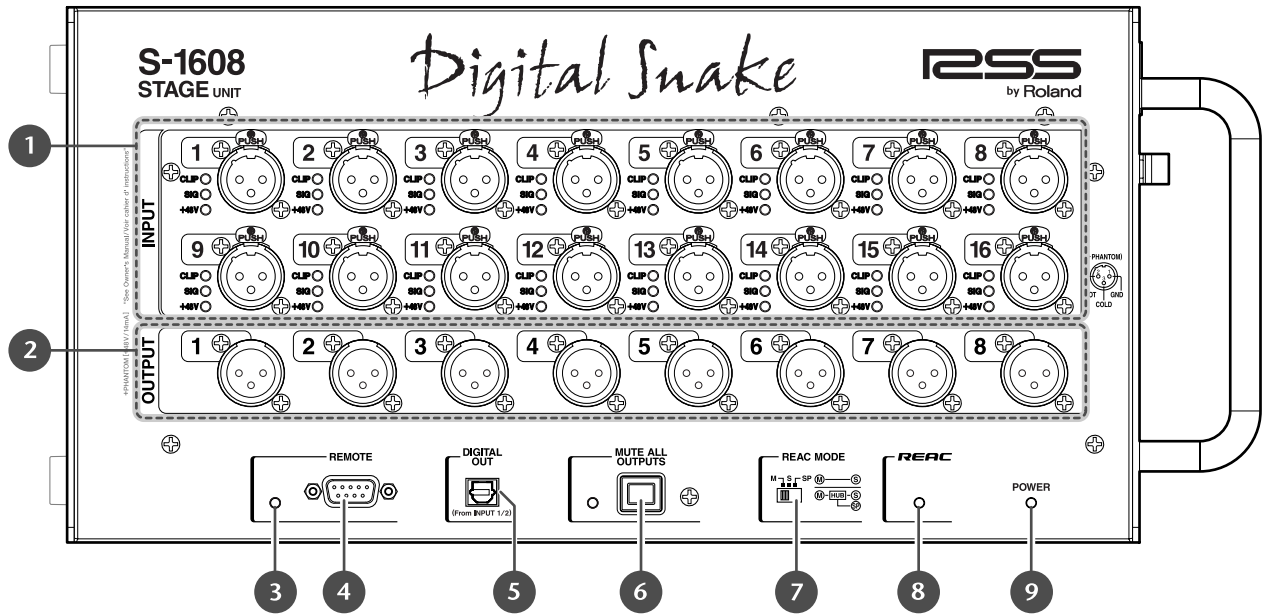These items are available system options:

- *S-4000 Remote Control Software (S-4000 RCS)*—Computer control software for PC/Mac (free download from www.rolandsystemsgroup.net)

- *SC-W100S*—Heavy duty 100 meter Cat5e Ethernet crossover cable with Neutrik® EtherCon® connectors
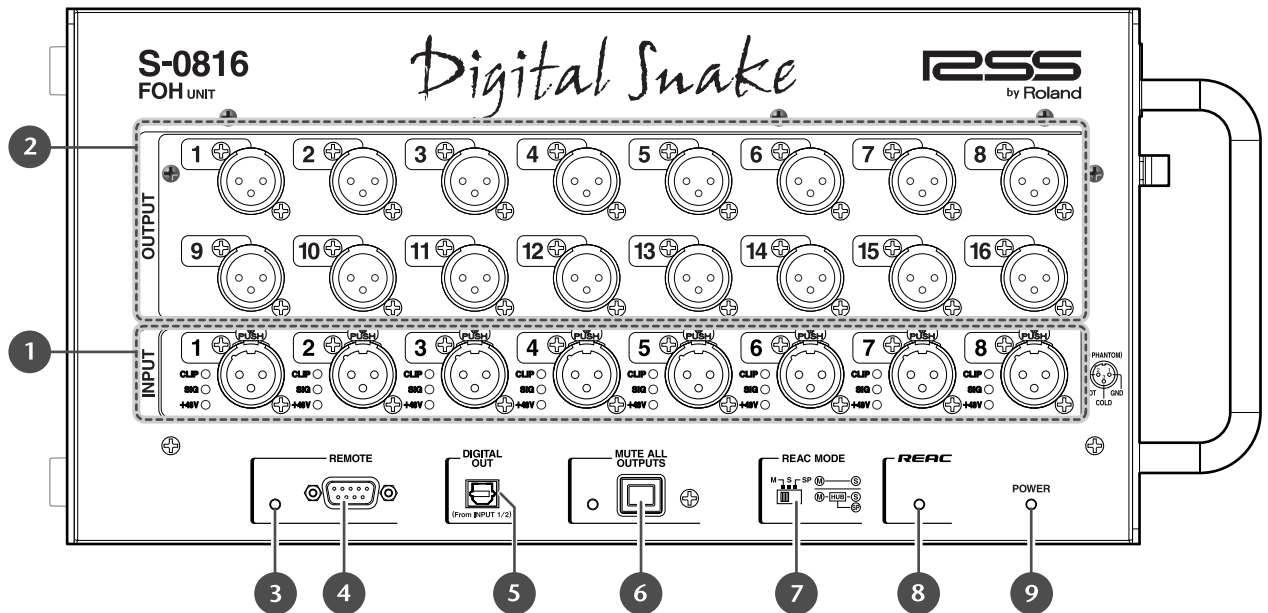
- *S-4000-SP*—REAC Splitter

Panel Descriptions

S-1608 Stage Unit / S-0816 FOH Unit

S-1608 Front Panel

S-0816 Front Panel

1—INPUT Connectors

Each Input Channel provides balanced input jacks with female XLR connectors. Each input has a variable gain preamp that accepts signals from -65 to +10 dBu (+28 dBu maximum). Additionally, there are three status indicators for each input:

- *CLIP*—lights red when the input signal exceeds 0 dB (after A/D conversion).

- *SIG*—lights green when the input signal is greater than -40 dB (after A/D conversion).

- *+48V*—lights orange when +48V phantom power is supplied from the channel.

Although changes may not seem smooth when adjusting preamp gain using an S-4000R remote controller or an S-4000RCS (remote control software) on a computer, this is not a malfunction.
Some noise is also generated when switching between the following gain levels. This is not a malfunction.
Three locations when Pad=ON: +3 ↔ +2, -13 ↔ -14, -19 ↔ -30 (dBu)
Three locations when Pad=OFF: -17 ↔ -18, -33 ↔ -34, -49 ↔ -50 (dBu)

The S-4000R upgrade allows the gain level to be verified with numerical values.
See the Roland website for the version that supports this feature and how to upgrade.
http://www.rolandsystemsgroup.net

Preamp gain adjustment and phantom power status can be controlled from the S-4000R Remote Controller or from a computer using the S-4000 RCS.

2—OUTPUT Connectors

Each Output Channel provides balanced output jacks with male XLR connectors. Signal output is +4 dBu typical, +22 dBu maximum.

3—REMOTE Indicator

The REMOTE indicator lights in orange when an S-1608/S-0816 system is communicating with another device via the RS-232C connection. If no RS-232C device is connected, or if a problem occurs in transmitting via the RS-232C connection, the indicator flashes or goes off. See Page 47 for more information.

4—REMOTE Connector

This D-Sub 9-pin female connector is provided for remote control and signal monitoring of the S-1608/S-0816 System from an external device supporting the RS-232C serial interface protocol. Normally, you'd connect the S-4000R Remote Controller to this connector using the supplied DB-9 cable. If you're using the S-4000 RCS on a computer, connect the computer's RS-232C port to this connector.

See Chapters 6 and 7 for information about remote control of the S-1608/S-0816 System. See *Appendix B: Connector Information* for a diagram of the REMOTE (RS-232C) connector.

5—Digital Out Connector (Optical Type)

This optical type digital out connector outputs the audio signal input to INPUT 1/2 of the S-1608/S-0816.

6—[MUTE ALL OUTPUTS] Button

The [MUTE ALL OUTPUTS] button is a momentary switch used to temporarily mute the S-1608/S-0816 System's audio outputs. This allows for noise-free connection of audio input sources.

Press and hold the [MUTE ALL OUTPUTS] button. After approximately 1.5 seconds, its indicator lights. While the indicator is lit, the audio outputs of all connected REAC devices are muted.

MUTE ALL
OUTPUTS

Indicator
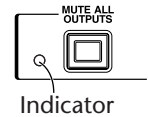
The system outputs will become un-muted after [MUTE ALL OUTPUTS] is released. If audio is passing through the system when [MUTE ALL OUTPUTS] is released, the sound may be distorted until the system outputs are completely un-muted.

If the exhaust fan has stopped working for any reason, the [MUTE ALL OUTPUTS] indicator will flash. See: *Appendix A: Troubleshooting.*

7—[REAC MODE] Switch

This switch sets the S-1608's or S-0816's REAC device behavior.

- *M*—configures the S-1608/S-0816 as a Master REAC device.
- *S*—configures the S-1608/S-0816 as a Slave REAC device.
- *SP*—configures the S-1608/S-0816 as a Split REAC device.

The [REAC MODE] switches must be set properly for the system to work. See Chapters 6 and 7 for information on configuring the system and setting the [REAC MODE] switches.

8—REAC Indicator

This indicator lights when REAC communication is established within the S-1608/S-0816 System. If REAC communication fails, this indicator will flash and then go out.

9—Power Indicator

This indicator lights when the S-1608/S-0816 is receiving power from its internal power supply.

S-1608/S-0816 Side Panel
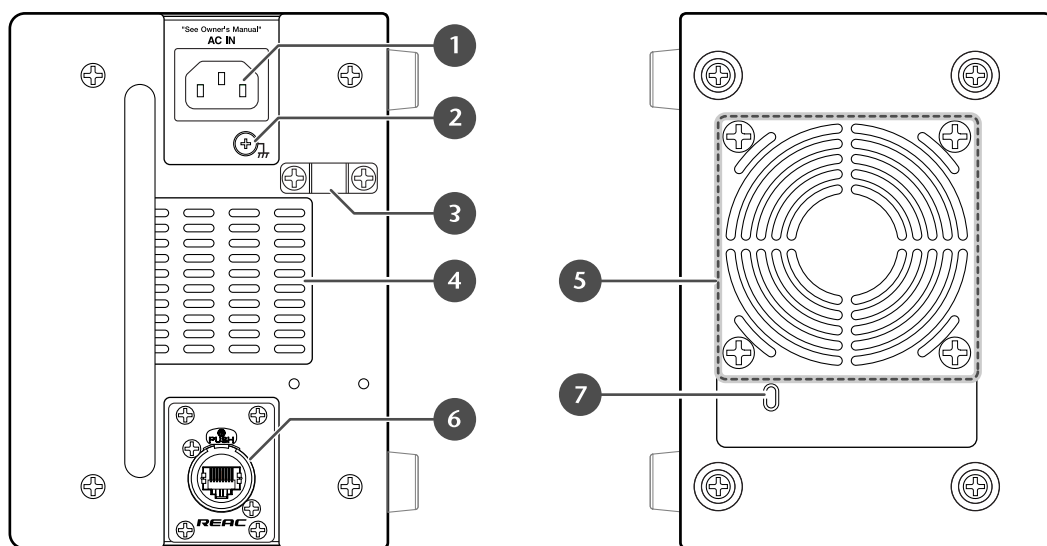
1—POWER AC INPUT Jack

Connect one end of the supplied AC power cord to a grounded AC outlet, and the other end to the POWER AC INPUT jack to provide power for the S-1608's or S-0816's internal power supply. Use the cord clamp on the side panel to prevent the power cord from being accidentally pulled out.

Use only the supplied power cord to prevent damage to the S-1608/S-0816.

2—Grounding Terminal

If necessary, use this terminal to connect the S-1608/S-0816 chassis to an external grounding source.

Never attempt to use the following sources for an external ground connection:

- Water pipes (may result in shock or electrocution).
- Gas pipes (may result in fire or explosion).
- Telephone line ground or lightning rod (may be dangerous in the event of lightning).

3—AC Cord Clamp

This clamp holds the AC power cord in place (See Page 34 for more information).

4—Air Intake Vents

5—Cooling Fan Exhaust Vents

The S-1608/S-0816 contains cooling fans that prevent the unit from overheating. The air intake vents provide fresh air for the cooling fans and the fans expel hot air through these vents.

Be sure never to block the cooling fan exhaust vents and air intake vents. Doing so may cause the S-1608/S-0816 to overheat and be damaged.

6—REAC Port

The REAC Port is for connecting the S-1608/S-0816 to another REAC device, REAC Splitter S-4000-SP or Ethernet switching hub. This port uses Neutrik® EtherCon® RJ45 connectors for a robust connection. Standard RJ45 plugs can be connected here as well.
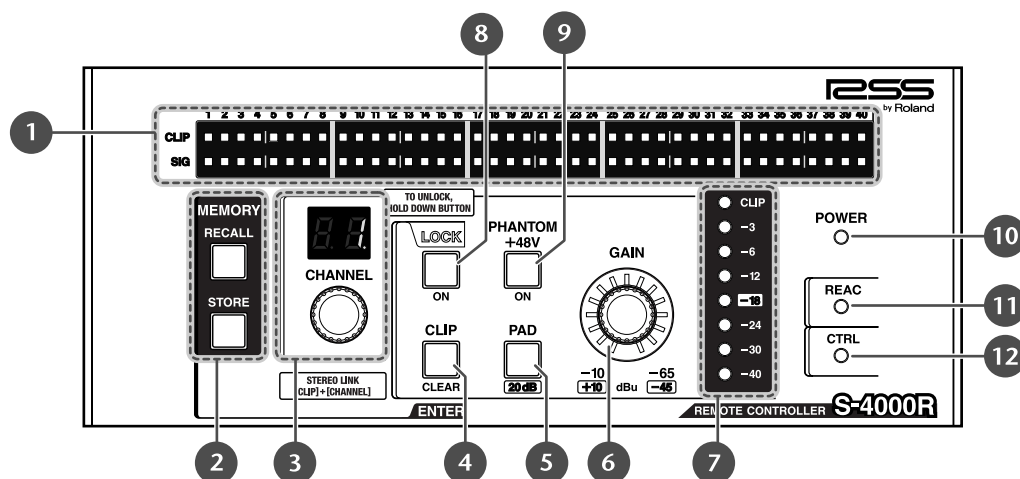
See Chapter 5 for information about the types of Ethernet cables that should be used for making REAC connections. See the Appendices for Ethernet cable wiring diagrams and Ethernet switching hub requirements.

7—Security Slot

http://www.kensington.com/

S-4000R Remote Controller

S-4000R Front Panel

1—Signal Status Indicators

These indicator lights show signal status for each of the S-1608/S-0816 System's 24 input channels.

- CLIP—lights red when the input signal exceeds 0 dB (after A/D conversion). Once a CLIP indicator lights, it stays lit until cleared with the [CLIP CLEAR / ENTER] button.

- SIG—lights green when the input signal level is greater than -40 dB (after A/D conversion).

The S-4000R was designed to also be used as a remote controller for the S-4000 systems (S-4000S or S-4000H). Accordingly, there are 40 CLIP and SIG indicators. When using an S-1608/S-0816 system, only channels 1 to 24 are enabled.
Please see the S-4000S Owner's Manual when using an S-4000 system.

2—Memory Buttons ([RECALL] Button/ [STORE] Button)

The S-4000R provides ten memory presets for storing S-1608/S-0816 System's input channel settings. Use the [RECALL] and [STORE] buttons to recall and store settings.

3—[CHANNEL] Knob and CHANNEL Display

Use the [CHANNEL] knob to select an input channel for editing or signal level monitoring. The currently selected channel is shown in the CHANNEL display.

The [CHANNEL] knob and CHANNEL display are also used to select memory presets and link odd/even channel pairs (Stereo Link function).

4—[CLIP CLEAR / ENTER] Button

The [CLIP CLEAR / ENTER] button is a dual-function button. It's used to:

- *clear the clip indicators*—When an input signal connected to one of the system's audio inputs exceeds 0 dB (in the digital domain), the corresponding clip indicators on the S-4000R light, and the [CLIP CLEAR / ENTER] button flashes. To turn off all clip lights, press [CLIP CLEAR / ENTER] so that it stops flashing.

- *finalize a selection*—When a selection is made (such as a memory preset), press [CLIP CLEAR / ENTER] to finalize the selection.

5—[PAD] Button

Press the [PAD] button so its indicator lights to engage a 20 dB pad on the currently selected input channel.

To disengage the pad, select the desired channel and press the [PAD] button so its indicator goes out.

6—[GAIN] Knob

Use this knob to set the preamp gain for the currently selected S-1608/S-0816 System's input channel. Indicator lights surrounding the [GAIN] knob show the current gain setting.

Each S-1608/S-0816 System's input channel's gain range is -45 to +10 dBu with the pad on, and -65 to -10 dBu with the pad off.

Although changes may not seem smooth when adjusting preamp gain using an S-4000R or an S-4000RCS (remote control software) on a computer, this is not a malfunction.
Some noise is also generated when switching between the following gain levels. This is not a malfunction.
Three locations when Pad=ON: +3 ↔ +2, -13 ↔ -14, -19 ↔ -30 (dBu)
Three locations when Pad=OFF: -17 ↔ -18, -33 ↔ -34, -49 ↔ -50 (dBu)

The S-4000R upgrade allows the gain level to be verified with numerical values.
See the Roland website for the version that supports this feature and how to upgrade.
http://www.rolandsystemsgroup.net

7—Input Signal Level Meter

This eight-segment LED meter indicates signal level for the currently selected input channel.

8—[LOCK] Button

The [LOCK] button allows you to lock the S-4000R so that input channel settings cannot be altered.

The S-4000R is locked when the [LOCK] button is lit. To unlock the S-4000R, hold the [LOCK] button until its light goes out.

To retain the current S-1608/S-0816 System's input channel settings, lock the S-4000R before powering down the S-1608/S-0816 System. When the system is powered up, the settings will return to the state they were in when the S-4000R was last locked.

9—[PHANTOM +48 V] Button

Each S-1608/S-0816 System's input channel can provide +48 V phantom power to connected devices that require it (such as condenser microphones and active direct boxes).

Press the [PHANTOM +48 V] button so its indicator lights to turn on phantom power on the currently selected input channel.

To turn off phantom power, select the desired channel and press [PHANTOM +48 V] so its indicator goes out.

Always turn the phantom power off when connecting any device other than condenser microphones that require phantom power. You risk causing damage if you mistakenly supply phantom power to dynamic microphones, audio playback devices, or other devices that don't require such power. Be sure to check the specifications of any microphone you intend to use by referring to the manual that came with it. (This instrument's phantom power: 48 V DC, 14 mA Max.)

10—POWER Indicator

This indicator lights when power is supplied to the S-4000R. (Power is supplied via the RS-232C cable when the S-4000R is connected to a powered-on S-1608 or S-0816.)
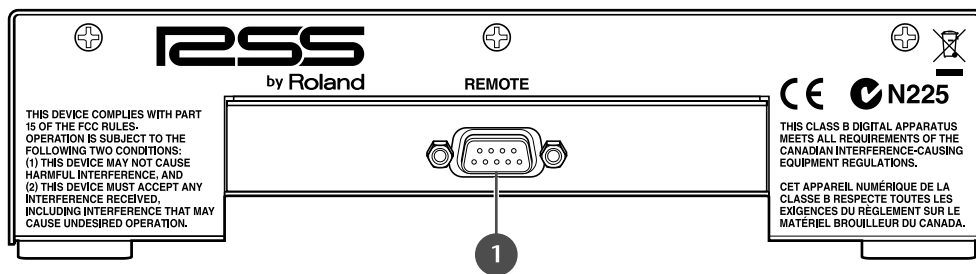
11—REAC Indicator

This indicator lights when REAC communication is established within the S-1608/S-0816 System. If REAC communication fails, this indicator will flash.

12—CTRL Indicator

The indicator lights when the S-4000R is connected to a powered-on S-1608 or S-0816 and communication is established

S-4000R Rear Panel

1—REMOTE Connector

Use the supplied RS-232C cable to connect the S-4000R's REMOTE connector to the REMOTE connector on either the S-1608 or S-0816.

See *Appendix B: Connector Information* for a diagram of the REMOTE (RS-232C) connector.
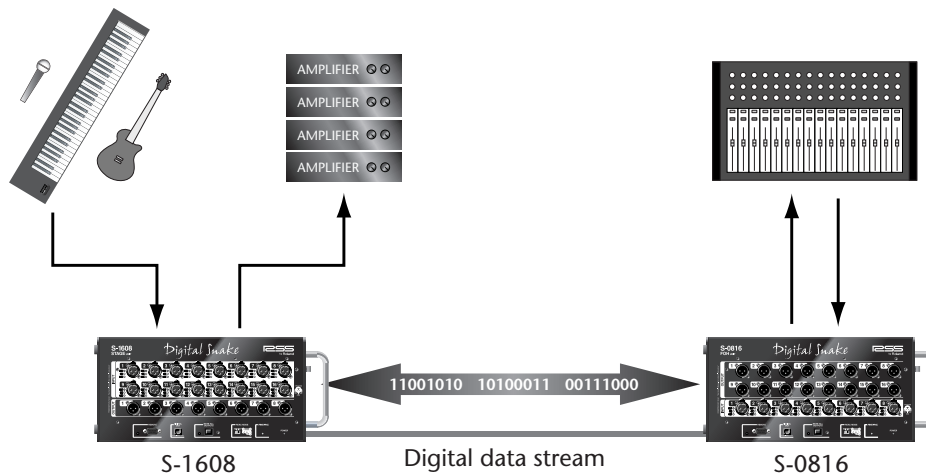
S-1608/S-0816 System Overview

Concept

The S-1608/S-0816 System brings the digital revolution to the world of audio snakes. Using computer networking technology, the system allows you to transfer 24 channels of high-quality audio over an extremely long distance on a single lightweight cable. The digital advantage also brings with it easy installation, low cost, portability, and pain-free expansion.

The Old School...

Traditional audio snakes transfer signals as analog audio. They consist of a large diameter cable containing multiple wires—one for each channel—that carry the audio signals from one location to the other. Though they get the job done, analog snakes are bulky, heavy, and often very expensive. On top of that, analog signals traveling through hundreds of feet of cable always have some degree of high-frequency loss and overall degradation due to cable capacitance, inductance, and resistance.

...Meets the New Generation

The fundamental benefit of the digital snake is that it eliminates long analog audio signal transfers and the signal degradation and noise interference that always comes along with them. This is accomplished by converting audio signals to digital data near the source, allowing them to be transferred hundreds of feet with absolutely no loss in sound quality. Additionally, since the multiple signals are transferred over a single lightweight cable, the enormous bulk of the analog snake's multichannel cable is also eliminated.

S-1608   Digital data stream   S-0816

Things to Know

About REAC

At the heart of the S-1608/S-0816 System is the REAC (Roland Ethernet Audio Communication) interface. This proprietary protocol is based on the Ethernet technology that's used in computer networks, and allows for the transfer of up to 40 channels of digital audio over a single Cat5e Ethernet cable.

> The S-1608/S-0816 system transfers a total of 24 channels of audio signal: 16 channels from the S-1608 and 8 channels from the S-0816.

REAC features and benefits:

- 40 channels of digital audio transfer at a 24-bit/96 kHz sampling rate

- Cable length up to 100 meters (330 feet)

- Cable length extension using REAC Splitter S-4000-SP or Ethernet switching hubs

- Easy device splits using REAC Splitter S-4000-SP or Ethernet switching hubs

- Extremely low device-to-device transmission latency (The REAC network latency is about 375 microseconds. The signal latency for analog input to another analog output is about 1.2 milliseconds.)

> If routed through the S-4000-SP REAC splitter or a switching hub, an approximate 200 microsecond delay is added for each device.

- Hot-swappable connection

Understanding Cables and Connections

Hooking REAC devices together is extremely easy, as connections are made using Cat5e (short for "Enhanced Category 5") Ethernet cable. This cable is a standard in the computer connection world—in fact, you may be using an Ethernet cable in your home or office right now to connect your computer to a high-speed modem, a printer, or a network. This lightweight cable uses RJ45 plugs, which are very similar to standard telephone connectors.

Cat5e Ethernet Cable Types

There are two different types of Cat5e Ethernet cables that you can use with the S-1608/S-0816 System. Though the cables look the same on the outside, the RJ45 plugs are wired in different ways. With a:

- *crossover cable*—some of the wires inside the cable are "crossed over" at each RJ45 plug. As a result, the two RJ45 plugs on each end of a single cable are wired differently.

- *straight-through cable*—the wires inside the cable are connected to each RJ45 plug in the same arrangement (each plug is wired the same).

In the following cases, either a crossover or a straight-through cable can be used.

- When directly connecting the S-1608 and S-0816 via REAC

- When using the S-4000-SP REAC splitter to extend the REAC cable or to split connect a separate S-1608 or S-0816

Ethernet connection standards recommend using straight-through cables to connect devices to the ports on a switching hub, and crossover cables when connecting hub-to-hub. However, some switching hubs provide ports that allow the use of either crossover or straight-through cables—the port will detect the type of cable that's connected and adjust the signal transfer accordingly. Consult the switching hub's documentation to determine which type of cables you should use with it.

See *Appendix B: Connector Information* for Cat5e crossover and straight-through cable wiring diagrams.

Ethernet Connectors

As mentioned previously, Cat5e Ethernet cables use RJ45 plugs. Each REAC device provides an RJ45 receptacle for its REAC ports.
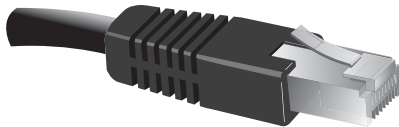
RJ45 plug

REAC RJ45 receptacle

Though the standard RJ45 connection is very reliable, in high-traffic installations you may want to protect the connection between the RJ45 plug and its receptacle. To this end, REAC RJ45 receptacles utilize rugged Neutrik® EtherCon® connectors. When used with RJ45 plugs housed in EtherCon connectors, this provides a robust latching connection similar to that provided by an XLR connector.

Neutrik offers EtherCon connectors for the fabrication of new cables (models NE8MC-1 and NE8MC-1-B), and EtherCon connectors that can be added to a pre-made Ethernet cable (models NE8MC and NE8MC-B).
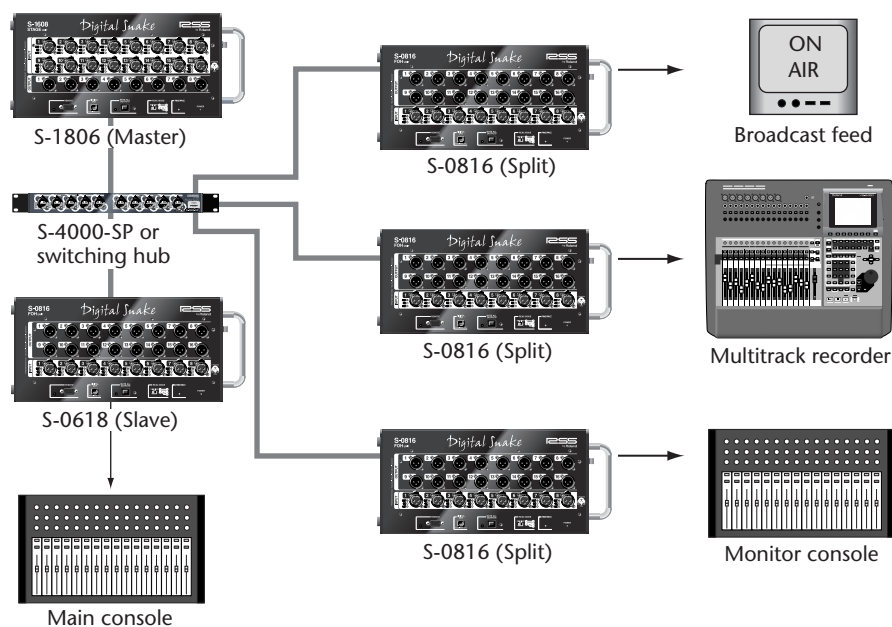
A REAC port's RJ45 receptacle can accept either a regular RJ45 plug or one housed in an EtherCon connector.

About Ethernet Switching Hubs

An Ethernet switching hub—sometimes referred to simply as a "switch"—is an interface that allows multiple devices (called "nodes" in Ethernet lingo) to communicate with each other in an Ethernet network. The switching hub has multiple ports with RJ45 receptacles, and each network device is connected to one of these ports. When one of the network devices transmits information, the switching hub's internal electronics makes sure this information is passed on to the intended receiving device.

Since REAC is based on Ethernet technology, switching hubs can be used to extend the functionality of the REAC system. Use a switching hub when:

*   *you need to extend the REAC cable length*—The maximum length for a single REAC cable is 100 meters. However, if you need to extend the cable length, you can use two cables (REAC cables or Cat5e cables) with a switching hub in-line to "refresh" the REAC signal and extend it another 100 meters. (Up to four switching hubs can be used for a maximum cable length extension of 500 meters.) See Chapter 6 for more information.

*   *you want to split input audio*—from a "Master" REAC device to one or more "Split" REAC devices. See Chapter 7 for information on splitting audio to multiple destinations.

S-1806 (Master)

S-4000-SP or switching hub

S-0618 (Slave)

Main console

S-0816 (Split)

ON AIR

Broadcast feed

S-0816 (Split)

Multitrack recorder

S-0816 (Split)

Monitor console

REAC device modes—including "Master," "Slave," and "Split"—are discussed starting on Page 38.

To be used in a REAC system, an Ethernet switching hub must meet the following requirements:

- 1000BASE-T transmission speed (IEEE802.3ab, Gigabit Ethernet)
- Support for 100BASE-TX devices (IEEE802.3u, Fast Ethernet)
- Bidirectional (full-duplex) communication

Connect REAC devices only to switching hub ports that support 100BASE-TX.

The transmission protocol for REAC is based on 100BASE-TX (Fast Ethernet). To transfer up to 40 channels of digital audio, REAC uses the full bandwidth of this protocol. However, some 100BASE-TX switching hubs cannot handle this amount of data traffic. Gigabit Ethernet switching hubs can handle a larger amount of data traffic, so we recommend them for use with REAC devices (just be sure that the Gigabit switching hub you use supports 100BASE-TX devices).

Consult the switching hub's documentation for information on its proper use.

A/D-D/A Conversion and Signal Optimization

Before an analog audio signal can be transmitted through REAC, it must first be converted to digital data. Once in digital form, the audio is sent down the Ethernet cable to the receiving REAC device. When it arrives there, the signal is converted back to analog for connection to an audio device such as an analog mixing console. This process of turning analog audio into digital data and back again is called *analog-to-digital* (A/D) and *digital-to-analog* (D/A) conversion.

The S-1608 and S-0816 units employ extremely high-quality 24-bit/96 kHz A/D and D/A converters on all audio inputs and outputs for the very best possible sound quality.

Additionally, the S-1608/S-0816 system provides variable gain preamps on each of its 24 audio inputs. This allows for signal optimization at the source, resulting in the highest A/D conversion quality.

RS-232C Serial Interface

The S-1608 and S-0816 feature REMOTE connectors that support the RS-232C serial interface protocol. RS-232C is a standard communications interface found in computers.

The S-1608/S-0816 System can be controlled from a remote device utilizing RS-232C, such as the included S-4000R Remote Controller or a personal computer running the S-4000 Remote Control Software (S-4000 RCS).

If RS-232C devices are connected to the REMOTE connectors on both the S-1608 and S-0816, the system can be controlled from either device (though only one remote device can control the system at any given time).

The System Components: A Closer Look

S-1608 Stage Unit

The S-1608 is the stage connection interface for the S-1608/S-0816 System. Its box design supports 24 channels of audio input and output (I/O). As standard, it comes in a 16x8 configuration—16 audio inputs and 8 audio outputs.

S-0816 FOH Unit

The S-0816 is the front-of-house (FOH) connection interface for the S-1608/S-0816 System. As such, its I/O configuration is the opposite of the S-1608—8 audio inputs and 16 audio outputs.

As it name suggests, the S-0816 FOH Unit's main application is near the FOH mixing console. However, the S-0816 can be used anywhere you need to receive stage audio from the S-1608—at a monitor console, a multi-channel recording device, a broadcast feed, etc. Additionally, multiple S-0816 units can be used for split destinations when connected to the system via an Ethernet switching hub. See Chapter 7 for details.

About the Remote Controlled Preamps

Each input on the S-1608 and S-0816 employs a newly-developed variable gain preamp. Designed for warm and accurate sound reproduction, the preamp accepts input signal levels from -65 to +10 dBu. Additionally, it provides an enormous amount of headroom before distortion—an incredible +28 dBu maximum input level. Each preamp's gain is controlled remotely from the S-4000R or S-4000 RCS, allowing you to optimize signal levels right at the connection interface.

If you're connecting the S-1608/S-0816 System to an analog mixing console, you may be wondering why you need adjustable gain at the S-1608/S-0816 System's inputs. After all, you have gain adjustment at the console inputs, right? Well, there are a few very good reasons to adjust the signal level at the S-1608/S-0816 System's inputs:

• *Better analog signal quality*—By adjusting the input gain so close to the source, the analog signal travels through less analog cabling before the signal level is optimized. Shorter analog cabling means less possibility of noise and signal deterioration.

• *Better digital signal quality*—A/D converters take "snapshots" of the analog audio during the digital conversion process. By optimizing the signal level before the A/D converter, a much higher resolution snapshot can be taken—and higher resolution means better signal quality.

• *Memory presets add digital mixer features to the analog mixer*—One of the big advantages of a digital mixer is the ability to store and recall frequently used setups. By taking advantage of the 10 memory presets in the S-4000R—or 100 presets using the S-4000 RCS—you can bring some digital functionality to your analog mixer. (More on the S-4000R in a little bit.)

The analog output for S-1608/S-0816 has line level fixed at +4 dBu (maximum output of +22 dBu).

S-4000R Remote Controller

The S-4000R functions as a remote controller for the S-1608/S-0816 System. It can be connected to either the S-1608 or S-0816 unit, whichever is most convenient for you.

- *Input channel control*—The S-4000R provides control over the S-1608/S-0816 System's input channels. This includes preamp gain adjustment, phantom power and pad on/off status, and channel linking.

- *Input level monitoring*—An eight-segment LED meter allows for precise preamp gain adjustment of the S-1608/S-0816 System's input channels.

- *Signal status*—The S-4000R provides signal status indicators for all of the S-1608/S-0816 System's 24 input channels.

- *Clip indicators*—The S-4000R provides channel clip indicators for all of the S-1608/S-0816 System's 24 input channels.

- *Memory presets*—10 memory presets allow you to store and recall frequently used S-1608/S-0816 System's input channel setups.

The S-4000R was designed to also be used as a remote controller for the S-4000 systems (S-4000S or S-4000H). Accordingly, there are 40 CLIP and SIG indicators. When using an S-1608/S-0816 system, only channels 1 to 24 are enabled.
Please see the S-4000S Owner's Manual when using an S-4000 system.

Computer Control

All functions that can be controlled from the S-4000R can also be controlled from a personal computer equipped with an RS-232C port(s), and running the S-4000 Remote Control Software (S-4000 RCS). Up to four S-1608/S-0816 Systems can be controlled at once.

The S-4000 RCS is a free download from www.rolandsystemsgroup.net.

Please see "Computer Control (S-4000 RCS)" (Page 56)for information regarding the S-4000 RCS.

There is no usage fee for the software, but the communication fees for downloading are your responsibility.

Using the S-1608/S-0816 System

<div style="text-align: right">6</div>

Installation

Installing the Rack-mount kit

S-1608 and S-0816

The S-1608 and S-0816 can be used in a free standing configuration, or rack-mounted using the installed rack-mount kit.

Precautions for Rack Mounting

- When mounting the S-1608 or S-0816 in a rack, observe the following precautions to ensure efficient and effective cooling.

  - Ensure that the location provides good air flow and ventilation.
  - Do not allow the vents to become obstructed.
  - Avoid using the S-1608 or S-0816 in sealed-type rack mounts. As this type of rack does not permit heated air within the rack to be expelled, the heated air is drawn into the S-1608 or S-0816 as a result, thus preventing adequately efficient cooling.
  - If the rack's rear panel is not removable, ensure that a ventilation port or exhaust fan is provided at the top of the rack's rear panel to expel any accumulated heat.
  - If the S-1608 or S-0816 is mounted in a portable rack, remove both the front and rear rack covers before use to ensure that the S-1608's or S-0816's front and rear panels remain unobstructed.

- Use due caution when mounting the S-1608 or S-0816 in a rack or other enclosure so you don't get your fingers wedged or pinched.

1. Turn off the power on all equipment and disconnect all cables from the S-1608 or S-0816 unit.

2. Remove only the screws shown in the following diagram (4 screws total).
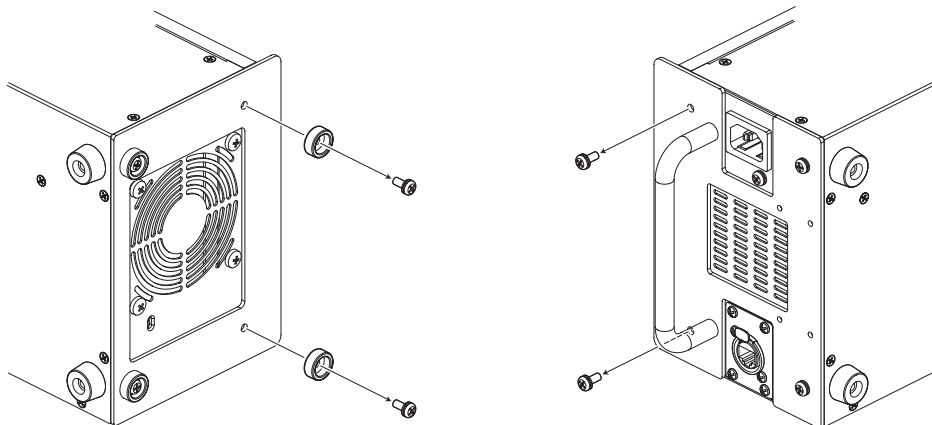
3. Using the 4 screws you removed in Step 2, install the rack-mount bracket as shown.
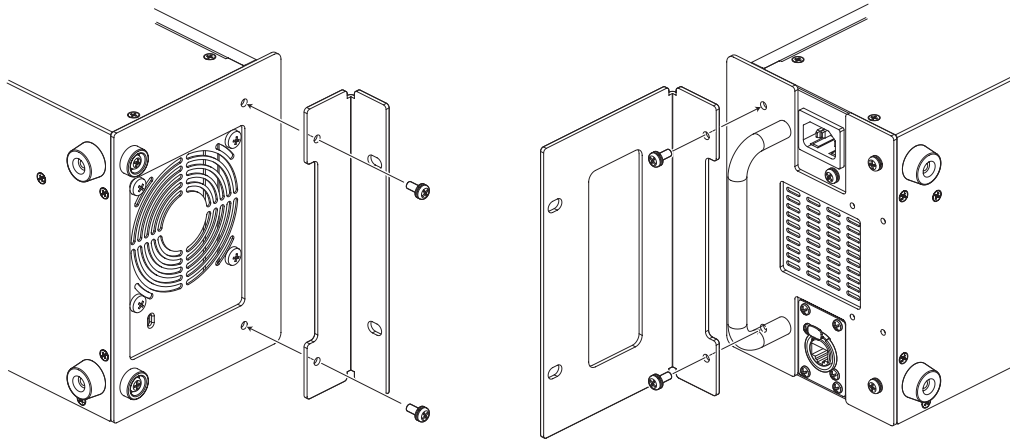
S-4000R

The S-4000R Remote Controller is designed for handheld or desktop use. If desired, it can be rack-mounted by installing the included rack-mount brackets.

Use the following procedure to install the rack-mount brackets on the S-4000R.

1. Disconnect the RS-232C cable from the S-4000R unit.

2. Install the S-4000R rack-mount brackets with the supplied screws as shown in the following diagram.
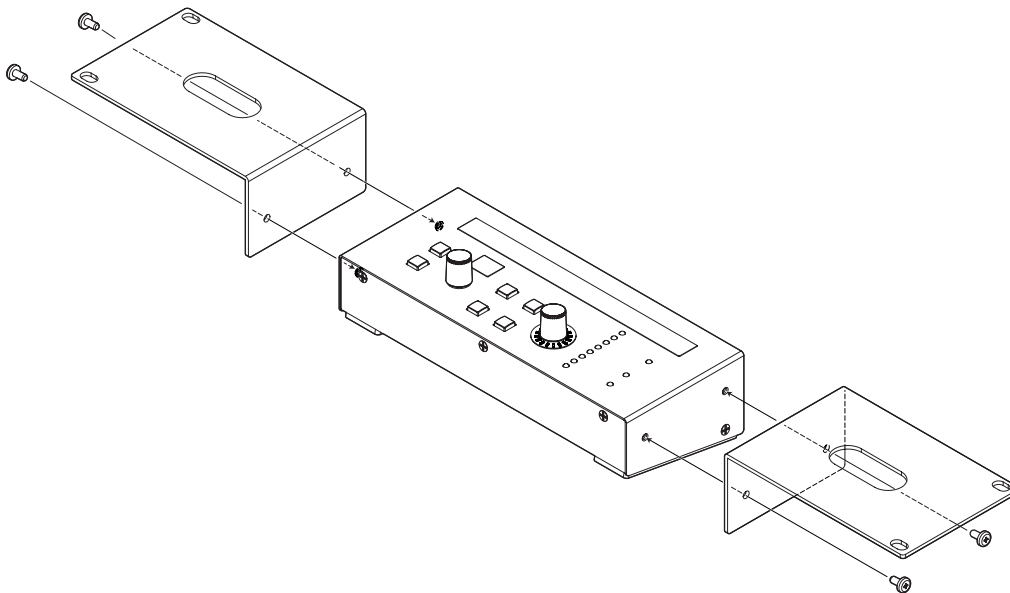
Using the AC Cord Clamp

The S-1608 and S-0816 units have AC cord clamps to prevent the cord from being pulled out accidentally.

1. Remove only the screws shown in the following diagram (2 screws total), and detach the AC cord clamp.
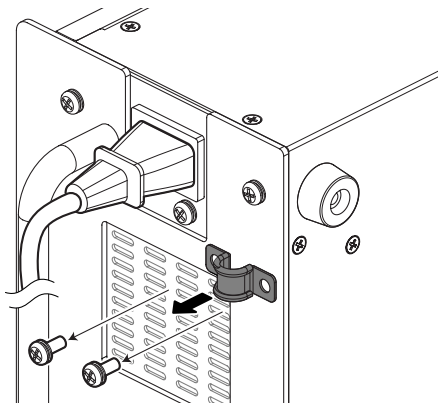
2. As shown in the figure, clamp the AC power cord with the AC Cord Clamp, and secure with the screws (2) removed in Step 1.
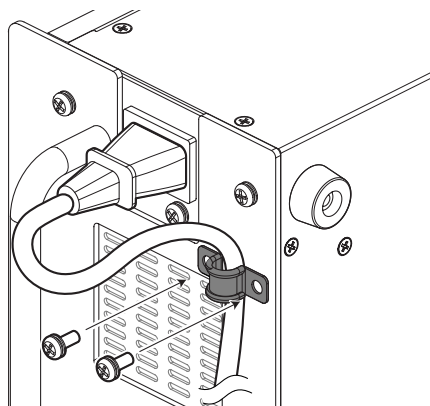
You can also prevent the AC power cord from being unplugged by wrapping it around the handle.
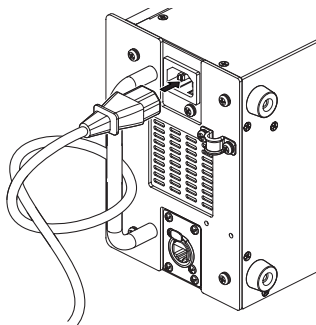
Installing the Included Ferrite Core on Ethernet Cables

One ferrite core is included with both the S-1608 and S-0816 for installation on Ethernet cables. Install a ferrite core on REAC cable SC-W100S (sold separately) or Ethernet cable near the RJ45 plug that will be connected to a REAC port.

For REAC connections, make sure to attach ferrite cores to your cables.

Use the following procedure to install a ferrite core on an Ethernet cable.

1.   Lift up the ferrite core's tabs and open the ferrite core.
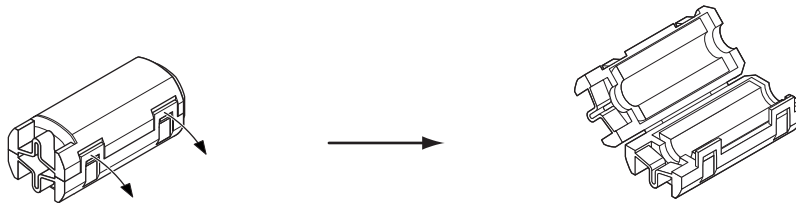
2.   Place the REAC cable SC-W100S or Ethernet cable in the ferrite core so that the core abuts the base of the cable's connector.
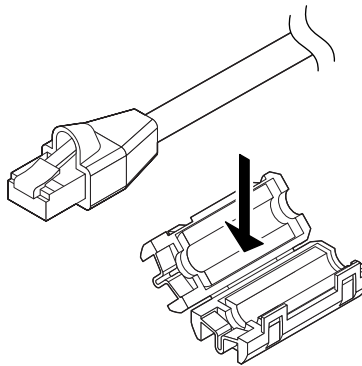
3.   Push the tabs until they close securely with a snapping sound.
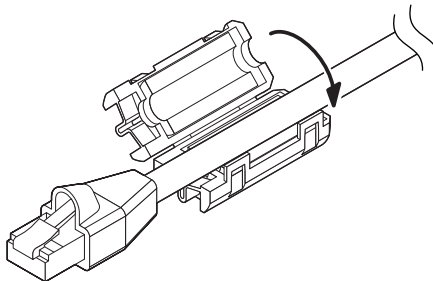
Using the REAC Connector Cover (S-1608 and S-0816)

The REAC port on the S-1608 and S-0816 units feature rugged Neutrik® EtherCon® connectors. As discussed in Chapter 5, they can accept either standard RJ45 plugs or RJ45 plugs housed in EtherCon-type connectors.

When using an Ethernet cable with standard RJ45 plugs, fit the included REAC connector cover on the REAC port as shown.

REAC connector cover
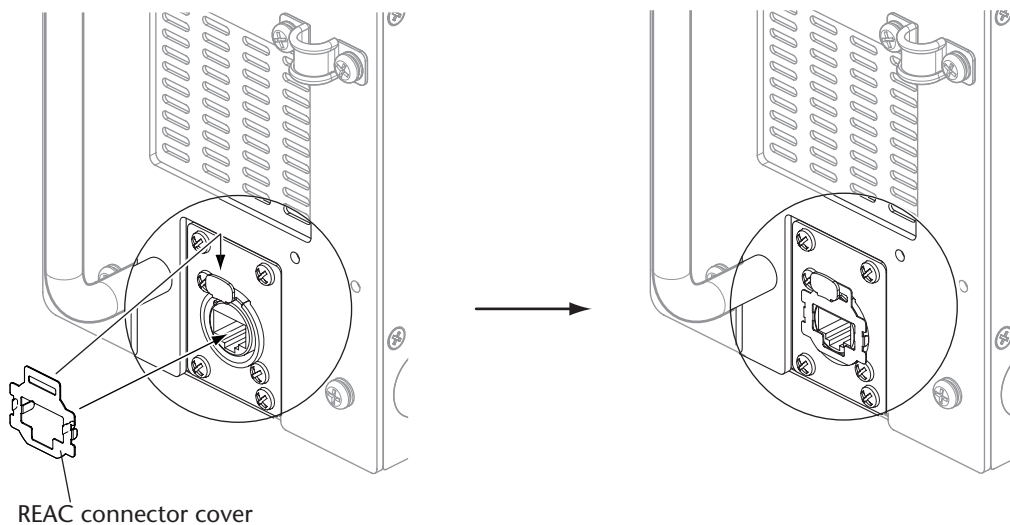
Remove the REAC connector cover when using Ethernet cables (SC-W100S) with EtherCon-type connectors.

Attaching the Rubber Feet

Attach these as required, such as when you're using the S-1608 or S-0816 without mounting it on a rack or the like. Peel off the double-sided tape from the rubber feet and affix the rubber feet at the locations shown in the following figure.
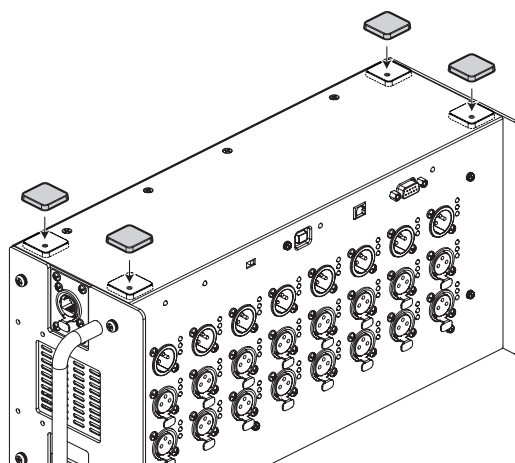
Connection Overview

> ⚠ To prevent malfunction and/or damage to speakers or other devices, always turn down the volume, and turn off the power on all devices before making any connections.

S-1608 16x8 (Master REAC device)

8 outputs from console

16 mic/line inputs

REMOTE connector on S-1608 or S-0816

REAC cable SC-W100S or Cat5e cable

S-0816 8x16 (Slave REAC device)

RS-232C cable

16 mic/line sources from stage   8 outputs from console

S-4000R Remote Controller
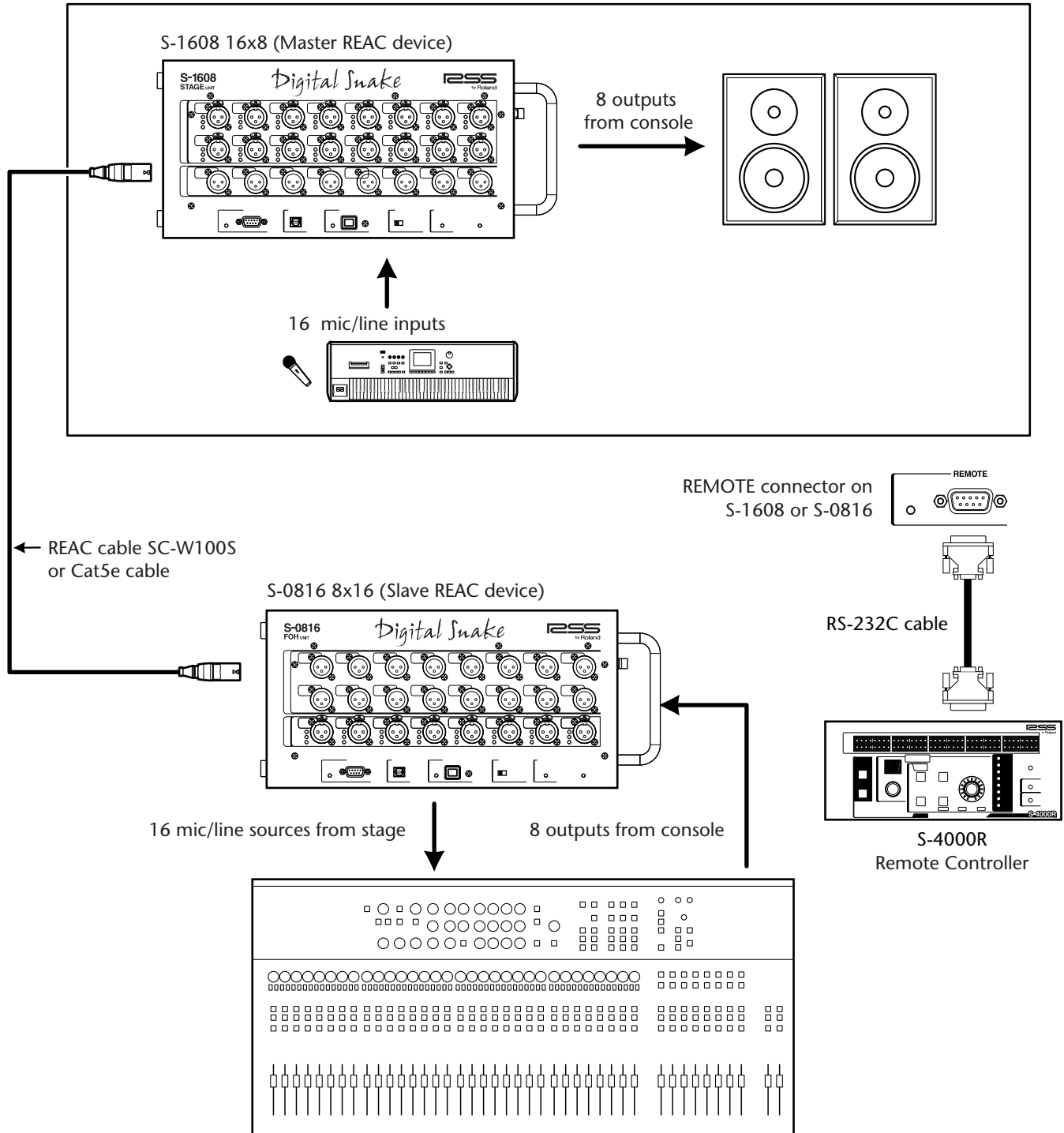
Setting the REAC Mode

The S-1608 and S-0816 each feature a [REAC MODE] switch. This switch sets the REAC behavior of each device, and determines how audio is transferred throughout the system. Each unit's [REAC MODE] switch must be set properly for correct system operation.
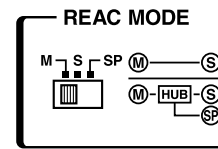
The [REAC MODE] switch has three different settings:

- *M*—configures the unit as a Master REAC device. A Master REAC device can:

  - send audio signals to Slave and Split REAC devices.

  - receive audio signals from a Slave REAC device.

- *S*—configures the unit as a Slave REAC device. A Slave REAC device can:

  - receive audio signals from a Master REAC device.

  - send audio signals to a Master REAC device.

- *SP*—configures the unit as a Split REAC device. A Split REAC device can:

  - receive audio signals from a Master REAC device (a Split device cannot send audio signals).

When setting the [REAC MODE] switches, here are the most important rules you need to know:

- There must be—and can only be—one Master REAC device in a system.

- There must be—and can only be—one Slave REAC device in a system.

- There can be many Split REAC devices in a system.

- In most circumstances, it's best to make the main stage connection unit the Master REAC device and the FOH unit the Slave REAC device. (This configuration allows you to split the stage audio to multiple destinations—see Chapter 7.)

- You can expand your system by using an additional S-0816 at a "split" location. This will deliver the 16 inputs from the Stage (Master) unit but will not allow any return channels. The additional S-0816 will require the use of the S-4000-SP or a standard gigabit Ethernet switching hub in order to switch the Ethernet data. Your split location S-0816 REAC mode must be set to Split (SP).

Setting the REAC Mode

If you set the REAC mode of a split location S-0816 as a REAC Slave device (S), the system will not work properly. It creates a communication problem in the REAC routing system. In order to maintain correct REAC routing, perform the following:

1. Turn off the power of all REAC devices according to "Powering Off" (Page 46).

2. Set the [REAC MODE] switches of all REAC devices properly.

3. Turn on the power of all REAC devices again according to "Powering Up" (Page 46).

See Chapter 7 for information on setting up Split REAC devices with a REAC Splitter S-4000-SP or Ethernet switching hub.

Setting the [REAC MODE] Switches

The [REAC MODE] switch on the S-1608/S-0816 is recessed from the front panel so that its setting can't be changed inadvertently. To change the switch setting, use a blunt-tipped instrument such as a ball-point pen, mechanical pencil, etc.
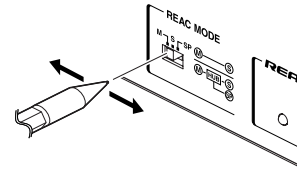
With their power off, set the units as follows:

1. On the S-1608, set the [REAC MODE] switch to M.

2. On the S-0816, set the [REAC MODE] switch to S.

If the [REAC MODE] switch setting is changed when the unit is powered on, the new setting won't take effect until the unit is powered off and then back on again.

Component Connections

AC Power Connections

On the S-1608:

• Connect one end of the supplied AC power cord to a grounded AC outlet, and the other end to the POWER AC INPUT jack to provide power for the S-1608's internal power supply.

On the S-0816:

• Connect one end of the supplied AC power cord to a grounded AC outlet, and the other end to the POWER AC INPUT jack to provide power for the S-0816's internal power supply.

Use only the supplied power cords to prevent damage to the units.

REAC Connections

Cable Requirements

A single cable REAC-to-REAC connection requires a standard Cat5e Ethernet cable with RJ45 plugs wired in a straight-through or crossover configuration. The maximum length for a single cable is 100 meters (330 feet).

SC-W100S or Cat5e cable

S-1608 — S-0816

Maximum length: 100 meters
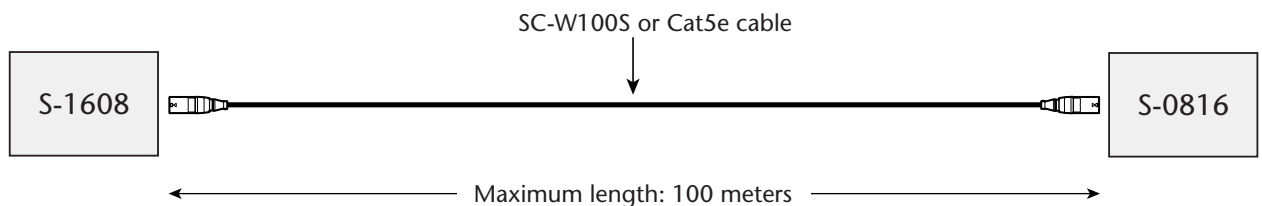
As a reminder, a "REAC-to-REAC" connection means connecting directly from REAC device to REAC device, with neither REAC Splitter S-4000-SP nor Ethernet switching hub in between.

REAC Cable Length Extension

If necessary, the REAC cable length can be extended by placing a REAC Splitter S-4000-SP or Ethernet switching hub in-line to refresh the REAC signal. Multiple splitters and switching hubs can be used (up to four total), with a maximum cable length of 100 meters between hubs. (Total cable length with four switching hubs: 500 meters.)

See Chapter 5 for a discussion about Ethernet cables. See the Appendices for a cable wiring diagram and Ethernet switching hub requirements.

Use Cat5e straight-through cables to connect REAC devices to the ports on the switching hub. If multiple hubs are used, use Cat5e crossover or straight-through cables to connect hub-to-hub.
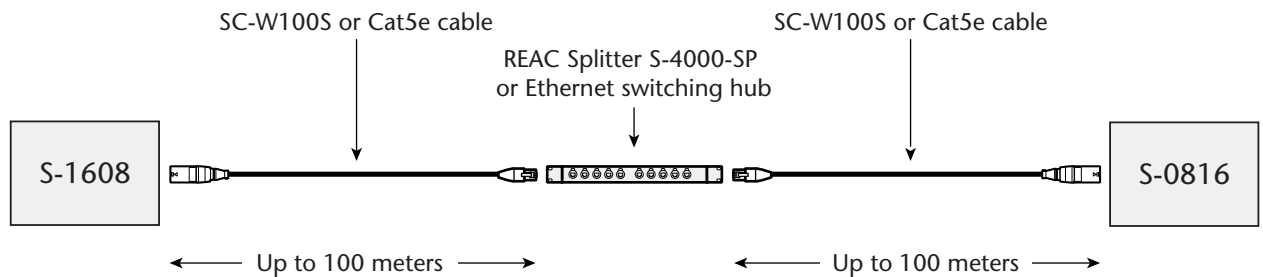
Some switching hubs have ports that allow the use of either crossover or straight-through cables—they will detect the type of cable that's connected and adjust the signal transfer accordingly. Consult the documentation for the switching hub to determine what type of cables can be used.

REAC Connection Notes

- The REAC connection can be "hot-swapped"—that is, connections can be made when the S-1608 and S-0816 units are powered on.

- In some circumstances, this connection may result in brief noise at the system's audio outputs. To avoid this, turn down the volume and/or power off any devices connected to the S-1608/S-0816. Or, connect/disconnect the REAC cable while [MUTE ALL OUTPUTS] is held.

- If the REAC cable is disconnected while [MUTE ALL OUTPUTS] is held, it's possible that one of the S-1608 or S-0816 will remain in a muted state when [MUTE ALL OUTPUTS] is released. If this occurs, use the following procedure:

  1. Reconnect the REAC cable.

  2. Press and release [MUTE ALL OUTPUTS].

Notes About Handling Cat5e Cables (REAC Cables)

• Do not subject the Cat5e cable to stress or physical shock.

• Do not bend the Cat5e cable within a range of 25 mm.

• Do not fasten Cat5e cables in a tight bundle.

• Avoid laying multiple Cat5e cables in a parallel orientation over long distances.

• Avoid laying Cat5e cables near noise sources (AC power cables, motors, fluorescent lighting, etc.).

Connecting the S-4000R Remote Controller

Using the supplied RS-232C cable, connect the S-4000R's REMOTE jack to the REMOTE jack on either the S-1608 or S-0816.

S-4000R Remote Controller
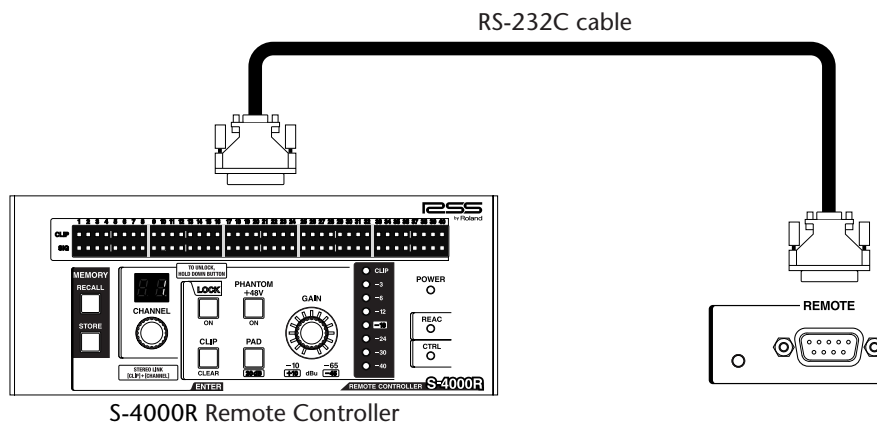
Power is supplied to the S-4000R through the REMOTE connection. The S-4000R's POWER indicator will light when receiving power.

If you require a longer cable than the one provided, you can use an off-the-shelf RS-232C cable or fabricate your own. See *Appendix B: Connector Information* for an RS-232C pin out diagram.

The S-4000R can be connected to either the S-1608 or S-0816. Connect it to whichever device location is most convenient for you.

The REMOTE connections can be hot-swapped—that is, connections can be made when the S-1608 and S-0816 units are powered on. This allows you to move the S-4000R from stage to FOH without shutting down the system's power first.

Multiple S-4000R units can be simultaneously connected to all S-1608 and S-0816 units in the S-1608/ S-0816 System. See Chapter 7 for more information.

Audio Connections

When making audio input connections with the S-1608 and/or S-0816 units powered on, always press and hold the [MUTE ALL OUTPUTS] button on the respective unit's front panel so its indicator lights. This will mute the sound coming from the S-1608/S-0816 System's audio outputs and prevent possible damage to connected speakers and other devices. See Page 48 for more information about [MUTE ALL OUTPUTS].

Note that [MUTE ALL OUTPUTS] only mutes the outputs of the S-1608/S-0816 System, and not the outputs of other devices. Before connecting the audio outputs on the S-1608 and S-0816 units to the audio inputs of other devices, always turn down the volume or turn off the power on the receiving devices to prevent possible damage.

S-1608/S-0816 Audio Connections

16 XLR inputs (connect mics, instruments, etc.)

8 XLR outputs (connect to amplifiers, mixing consoles, etc.)
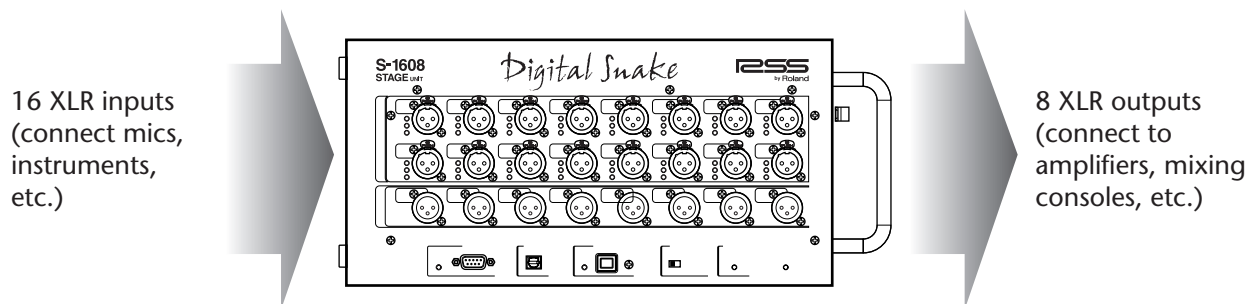
The S-1608's (S-0816's) balanced audio I/O is provided on XLR-type jacks. The wiring diagram for these jacks is shown in the following illustration. Make connections after first checking the wiring diagrams of other equipment you intend to connect.

GROUND

COLD

HOT
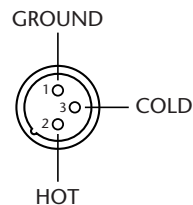
To prevent hazard or damage, ensure that only microphone cables and microphones conforming to IEC-268-15A are connected.

French language
for Canadian Safety Standard

Afin d'éviter tout risque ou dommage, ne brancher que des câbles de microphone et des microphones conformes à la norme IEC-268-15A.

S-1608/S-0816 Audio Inputs

The S-1608's (S-0816's) audio inputs are used to send source audio signals to the S-0816's (S-1608's) audio outputs.

Connect the output of balanced audio devices (microphones, instrument outputs, etc.) to the balanced audio inputs on the S-1608 (S-0816) front panel.

To connect unbalanced sources:

• use a direct box—such as the BOSS DI-1—or balancing adaptor in-line

—or—

• a cable adaptor with the following wiring:
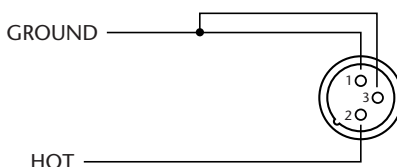
When connecting unbalanced sources that require long cable runs (over 6 meters), a direct box or balancing adaptor placed in-line near the source is recommended for the best audio quality and noise rejection.

To connect high-impedance sources—such as the output of an electric guitar or bass with passive pickups—use a direct box or impedance-matching transformer in-line.

Howling (feedback) could be produced depending on the location of microphones relative to speakers. This can be remedied by:

• changing the orientation of the microphone(s).

• relocating the microphone(s) to a greater distance from the speakers.

• lowering volume levels.

Input Status Indicators

Each S-1608/S-0816 input has three status indicators:

- *+48V*—lights orange when +48 V phantom power is supplied from the channel.

- *CLIP*—lights red when the input signal exceeds 0 dB.

- *SIG*—lights green when the input signal is greater than -40 dB.

CLIP ◯
SIG ◯
+48V ◯

> The CLIP and SIG signal status indicators represent the signal level in the digital domain (post-A/D conversion). Signals exceeding 0 dB will clip, resulting in distortion.

Preamp gain and phantom power on/off status are controlled from the S-4000R. See Pages 51 and 52 for more information.

S-1608/S-0816 Audio Outputs

The S-1608's (S-0816's) audio outputs are used to receive audio signals connected to the S-0816's (S-1608's) audio inputs.

Connect the S-1608's (S-0816's) balanced audio outputs to the balanced audio inputs of the desired devices.

If you need to connect the S-1608's (S-0816's) audio outputs to unbalanced devices, use a direct box or balancing adaptor in-line, or a cable adaptor with the wiring described in the previous section (*S-1608/S-0816 Audio Inputs*).

> When audio outputs from an S-1608 or an S-0816 are connected to inputs of external devices such as mixing consoles, please be sure to turn off the phantom power supply from these external devices. Noise may come out while [MUTE ALL OUTPUTS] is pressed and all outputs are muted if phantom power is supplied from the external device.

Powering Up

Powering Up

Connect and power up devices in the following order:

Turn on power to your various devices in the order specified. By turning on devices in the wrong order, you risk causing malfunction and/or damage to speakers and other devices.
Additionally, in each of the following steps, allow each piece of equipment to finish its power-up sequence before proceeding to the next step.

1. Connect the S-1608/S-0816 system components as described previously.

2. Connect audio devices to the S-1608 and S-0816 inputs and outputs as described previously.

3. Turn on any devices connected to the S-1608 and S-0816 units' audio inputs.

4. Turn on the power of the S-1608 and S-0816 units.
    Use the included AC power cord to connect between an AC outlet and the AC IN connector on the side panel. Power is supplied to the S-1608/S-0816, and the POWER indicator lights up.

The S-1608 and S-0816 units are equipped with protection circuits. A brief interval (a few seconds) after power up is required before the units will operate normally.

5. Turn on the power to the audio devices (mixing consoles, power amplifiers, monitor speakers, etc.) connected to the S-1608 and S-0816 units' audio outputs. (Note: It's always best to power on any speakers or amplification systems last.)

Powering Off

Perform the following steps to power off the S-1608/S-0816 System.

1. Turn down the volume and power off any devices connected to the S-1608 and S-0816 units' inputs and outputs. (Note: It's always best to turn down the volume and power off any speakers or amplification systems first.)

2. If an S-4000R is connected to the system, press and hold the S-4000R's [LOCK] button until its indicator lights. (Locking the S-4000R retains the current S-1608 and S-0816 input settings when the power is turned off.)

3. To power off the S-1608 and S-0816 units, unplug the power cords from the AC outlets.

System Status Indicators

The S-1608, S-0816, and S-4000R have system status indicators that allow you to monitor the integrity of the component connections when the system is powered up.

Power Indicators

S-1608/S-0816

This indicator lights when the unit is receiving power from its internal power supply.
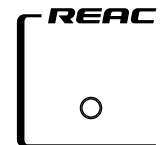
POWER

○

S-4000R

The POWER indicator on the S-4000R will light when it's receiving power from an S-1608 or S-0816.

POWER

○

REAC System Indicators (REAC Communication)

The S-1608, S-0816, and S-4000R have REAC indicators that light when REAC communication is established. If communication fails, these indicators flash and then go out.

⌐*REAC*

○

REMOTE (CTRL) Indicators (Remote Communication)

The S-1608 and S-0816 have REMOTE indicators, and the S-4000R has CTRL indicator, that show when RS-232C communication is established within the system.

- *On the S-1608 and S-0816 units—*

    - REMOTE lights when an RS-232C device (such as the S-4000R) is connected to the S-1608/S-0816 System and communication is established.

    - If no RS-232C device is connected to the S-1608/S-0816 System—or if a device is connected and communication is not established—REMOTE will not light.

    - If the RS-232C device is disconnected after communication has been established, REMOTE will flash for 10 seconds.

REMOTE

REMOTE indicator

- *On the S-4000R*—CTRL lights when communication is established with the S-1608/S-0816 System. If communication fails, CTRL will flash.
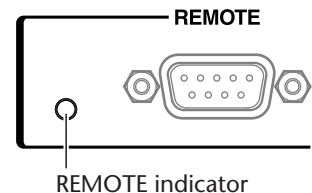
For more information about the system status indicators, see *Appendix A: Troubleshooting*.

Muting the System Outputs

Ordinarily, when plugging and unplugging devices to and from the audio inputs and outputs on the S-1608 and S-0816 units, the volume of all devices connected to the S-1608/S-0816 System's audio outputs should be lowered.

MUTE ALL OUTPUTS

Indicator

However, this may be impractical in some circumstances. In such cases, you can temporarily mute the sound coming from the S-1608/S-0816 System's audio outputs.
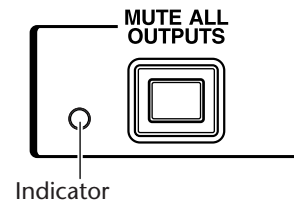
1. On the S-1608 or S-0816 front panel, press and hold the [MUTE ALL OUTPUTS] button. After approximately 1.5 seconds, its indicator will light. No sound is output while the indicator is lit.

2. When you have finished making input connections to the unit, release [MUTE ALL OUTPUTS].

The system outputs will become un-muted after releasing [MUTE ALL OUTPUTS]. If audio is passing through the system when [MUTE ALL OUTPUTS] is released, the sound may be distorted until the system outputs are completely un-muted.

Note that [MUTE ALL OUTPUTS] only mutes the outputs of the S-4000 System, and not the outputs of other devices. Before connecting the audio outputs on the S-1608 and S-0816 units to the audio inputs of other devices, always turn down the volume or turn off the power on the receiving devices.

When an S-4000R is connected to the system, its CHANNEL display flashes when the audio outputs are muted using [MUTE ALL OUTPUTS].

If the REAC cable is disconnected while [MUTE ALL OUTPUTS] is held, it's possible that one of the S-1608/S-0816 units will remain in a muted state when [MUTE ALL OUTPUTS] is released. If this occurs, use the following procedure:

1. Reconnect the REAC cable.

2. Press and release [MUTE ALL OUTPUTS].

Using the S-4000R Remote Controller

When the S-4000R is connected to the S-1608/S-0816 System, you can:

*   *control S-1608 and S-0816 input channel functions*—including preamp gain, pad, and phantom power.

*   *monitor signal level status of the system's input channels*—including the presence of signal and overload (clip).

*   *monitor the level of the system's input channels*—using the eight-segment LED input meter.

*   *monitor system status*—using the various indicators on the S-4000R panel.

*   *store and recall*—10 different sets of S-1608/S-0816 system's channel settings

> When the S-4000R is connected to a unit set as a Split REAC device, only system and signal level monitoring is possible. See Chapter 7 for more about split setups.

In the following sections, we'll show you how to use the S-4000R's functions. Before proceeding, make sure that the S-4000R is connected to the S-1608 or S-0816 as described on Page 42.

Lock Mode

The S-4000R has a Lock mode that blocks the editing of S-1608/S-0816 system's input channels. This protects the current channel settings from accidental changes during a live performance.

*   *To lock the S-4000R*—press [LOCK] so its indicator lights. When locked, S-1608 and S-0816 channel settings cannot be adjusted.

*   *To unlock the S-4000R*—press and hold [LOCK] until its indicator goes out (approximately 1.5 seconds). When unlocked, S-1608 and S-0816 channel settings can be adjusted.
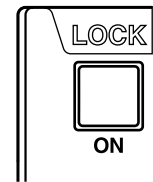
> To retain your changes to the S-1608 and S-0816 input channel settings, lock the S-4000R before powering down the S-1608/S-0816 System. When the system is powered up, the settings will return to the state they were in when the S-4000R was last locked. It's also a good idea to store your custom settings to a memory preset as well (refer to Memory Function).

> When the S-4000R is in a locked state, you can still use the [CHANNEL] knob to select channels whose signal level you want to monitor with the LED input meter.

Monitoring Input Signals

Signal Status Indicators

The S-4000R has two rows of signal status indicators that allow you to monitor the signal activity on the S-1608/S-0816 System's 24 audio inputs (1–16 for the S-1608 and 17–24 for the S-0816).
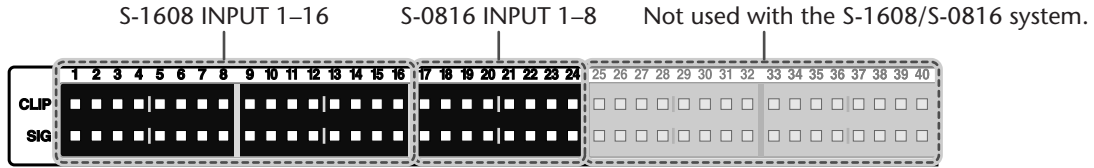
- SIG—lights green when the input signal level is higher than -40 dB on a particular channel.

- CLIP—lights red when the input signal exceeds 0 dB. Once a CLIP indicator lights, it stays lit until cleared with the [CLIP CLEAR / ENTER] button.

The signal status indicators represent the signal level in the digital domain (post-A/D conversion). Signals exceeding 0 dB will clip, resulting in distortion.

Clearing the CLIP Indicators

When an input signal on a particular channel exceeds 0 dB, the corresponding signal status CLIP indicator will light, and the [CLIP CLEAR / ENTER] button will flash.

To clear all lit CLIP indicators, press [CLIP CLEAR / ENTER] so its indicator goes out.

To keep a channel's CLIP indicator from lighting again, lower the preamp gain on that particular channel (see Page 51 for more information).
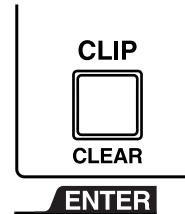
The signal status indicators also warn you when there's a problem with the system. See *Appendix A: Troubleshooting* for more information.

LED Input Meter

The S-4000R features an eight-segment LED input meter for precise input signal measurement.

To view an input channel's signal level with the LED input meter, turn the [CHANNEL] knob to select the desired channel (1–16 for the S-1608 and 17–24 for the S-0816).
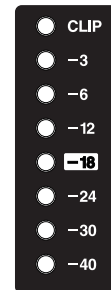
The LED input meter represents the signal level in the digital domain (post-A/D conversion). CLIP will light when the signal exceeds 0 dB.

S-1608/S-0816 Input Channel Settings

With the S-4000R unlocked, use the following procedures to adjust settings on the S-1608 and S-0816 input channels.

📌 To retain your changes to the S-1608/S-0816 system's input channel settings, lock the S-4000R before powering down the S-1608/S-0816 System. When the system is powered up, the settings will return to the state they were in when the S-4000R was last locked. It's also a good idea to store your custom settings to a memory preset as well (refer to Memory Function).

Selecting a Channel for Editing

Use the [CHANNEL] knob to select the desired S-1608/S-0816 channel for editing (1–24). The currently selected channel is shown in the CHANNEL display.
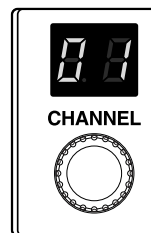
Setting the Preamp Gain

Use the following procedure to set the preamp gain on an S-1608/S-0816 system's input channel:

1. Select the desired channel (1–24) with the [CHANNEL] knob.

2. Send an input signal to the selected channel.

3. While viewing the input level on the LED input meter, use the [GAIN] knob to adjust the preamp gain to the desired level.
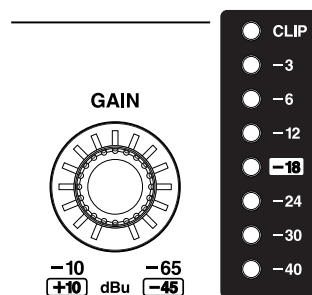
If the signal level exceeds 0 dB, the CLIP indicators on the LED input meter and signal status indicators will light and distortion will occur. For the best audio quality, set the preamp gain so the meter reads between -18 and -3 dB on the input signal's loudest peaks.

4. Repeat Steps 1-3 to adjust other channels' preamp gain.

📌 The indicator lights surrounding the [GAIN] knob show the currently selected channel's gain setting.

Input Pad

Each S-1608/S-0816 system's input channel features a switchable input pad. When the pad is engaged, the channel's input sensitivity is reduced by 20 dB.

PAD

20 dB

Use the pad when connecting a "hot" audio source to an S-1608/S-0816 system's input—one whose signal exceeds 0 dB (and causes the clip indicator to light) even when the channel's [GAIN] knob is at its lowest setting.
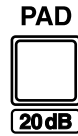
Use the following procedure to engage the input pad on a particular channel:

1. Select the desired channel (1–24) with the [CHANNEL] knob.

2. Press [PAD] so its indicator lights.

3. Repeat Steps 1-2 to engage the input pad on other channels.

To turn off a pad, select the channel with the [CHANNEL] knob, and then press [PAD] so its indicator goes out.

> While a channel's input pad setting (on/off) is changed, its output is temporarily muted to avoid noise.

Phantom Power

Each of the S-1608/S-0816 system's inputs can supply +48 V phantom power to devices that require it, such as condenser microphones or active direct boxes.

> Always turn the phantom power off when connecting any device other than condenser microphones that require phantom power. You risk causing damage if you mistakenly supply phantom power to dynamic microphones, audio playback devices, or other devices that don't require such power. Be sure to check the specifications of any microphone you intend to use by referring to the manual that came with it. (This instrument's phantom power: 48 V DC, 14 mA Max.)

Use the following procedure to turn on phantom power on a particular channel:

PHANTOM +48V

ON

1. Select the desired channel (1–24) with the [CHANNEL] knob.

2. Press [PHANTOM +48 V] so its indicator lights.

3. Repeat Steps 1-2 to turn on other channels' phantom power.

To turn off a channel's phantom power, select the channel with the [CHANNEL] knob, and then press [PHANTOM +48 V] so its indicator goes out.

> While a channel's phantom power setting (on/off) is changed, its output is temporarily muted to avoid noise.

Stereo Link

The Stereo Link function allows you to link odd/even adjacent S-1608/S-0816 system's input channel pairs (1/2, 3/4, etc.). When channels are linked, gain and pad settings made on one channel of the linked pair will be duplicated on the other. This can be convenient when audio devices with stereo outputs are connected to the S-1608 or S-0816.

With the S-4000R unlocked, use the following procedure to link a pair of channels:

1. Using the [CHANNEL] knob, select one channel of the pair that you wish to link together. For example, if you wish to link Channels 7 and 8, choose either "07" or "08".

2. While holding [CLIP CLEAR / ENTER], turn the [CHANNEL] knob clockwise.

3. Release [CLIP CLEAR / ENTER].

When channels are linked, their channel numbers are displayed with two periods (.), as shown in the following examples:

Channels 7 and 8 linked: Channels 23 and 24 linked:

With the S-4000R unlocked, use the following procedure to unlink a channel pair:

1. Using the [CHANNEL] knob, select one channel of the linked pair that you wish to unlink.

2. While holding [CLIP CLEAR / ENTER], turn the [CHANNEL] knob counterclockwise.

3. Release [CLIP CLEAR / ENTER].

Stereo Link Notes

*   Only odd/even adjacent pairs can be linked (1/2, 3/4, etc.).

*   When a channel pair is linked, the current gain and pad settings of the odd-numbered channel will be copied to the even-numbered channel.

*   When a channel pair is unlinked, each channel's gain and pad settings will remain in the same state as when they were linked.

*   While channels are linked, their phantom power status can still be set independently.

Memory Function

The S-1608/S-0816 system features 10 user-storable memory presets. A memory preset contains channel settings (preamp gain, pad, phantom power, and stereo link) for all of the S-1608/S-0816 system's 24 input channels. Using memory presets, you can quickly reconfigure the S-1608/S-0816 for frequently used audio input setups.

> ✎ If the S-4000R is in a locked state, it's not necessary to unlock the unit before selecting or storing presets. The unit is automatically unlocked when entering a Memory mode.

Storing a Memory Preset (Memory Store Mode)

To store the current settings to a memory preset:

1. Press and hold [STORE] until its indicator lights solid.

2. Turn the [CHANNEL] knob until the desired memory preset (0–9) is shown in the CHANNEL display.

   The currently loaded preset displays a period (.) next to the preset number. If the currently loaded preset is in a state different than the stored version, two periods are displayed.

Currently loaded preset   Currently loaded preset (edited)

3. Press [CLIP CLEAR / ENTER] to finalize your selection. (To exit Memory Store mode without storing the current settings, press [STORE] so that its indicator goes out instead.)

4. If you wish to store the current settings to another memory preset, repeat Steps 2-3. To exit Memory Store mode, press [STORE] so that its indicator goes out.

Recalling a Memory Preset (Memory Recall Mode)

To recall a memory preset:

1. Press and hold [RECALL] until its indicator lights solid.

2. Turn the [CHANNEL] knob until the desired memory preset (0-9) is shown in the CHANNEL display.

   The currently loaded preset displays a period (.) next to the preset number. If the currently loaded preset is in a state different than the stored version, two periods are displayed (see the illustration above). If you wish to retain the current settings, exit as indicated in Step 3.

3. Press [CLIP CLEAR / ENTER] to finalize your selection. (To exit Memory Recall mode without making a selection, press [RECALL] so that its indicator goes out instead.)

4. If you wish to select another memory preset, repeat Steps 2-3. To exit Memory Recall mode, press [RECALL] so that its indicator goes out.

> ✎ While a memory preset is recalled, all system outputs are temporarily muted.

Advanced Use

Using Two S-4000R Units in a Single S-1608/S-0816 System

As discussed in Chapter 6, the S-4000R can be connected to either the S-1608 or S-0816. However, if you have a second S-4000R (available separately), you can connect one to each unit. This allows for control and signal monitoring of the S-1608/S-0816 System at the location of either unit.
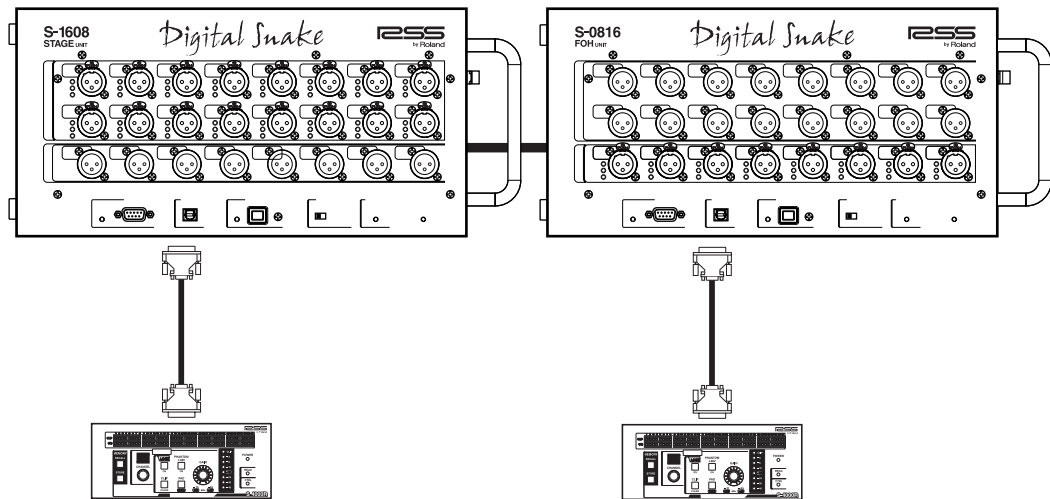
The following behaviors occur when two S-4000Rs are used in a single system:

- Only one S-4000R unit can be used to edit S-1608/S-0816 system's channels and recall/store memory presets at any one time.

- When one S-4000R unit is in use, the other S-4000R unit automatically enters a locked state and its [LOCK] button flashes.

See "Using the S-4000R Remote Controller" in Chapter 6 for information on operating the S-4000R.

Computer Control (S-4000 RCS)

The S-4000 Remote Control Software (S-4000 RCS) allows for the remote control and monitoring of the S-1608/S-0816 System from a personal computer equipped with an RS-232C port.

Functionally, using the S-4000 RCS is similar to using the S-4000R Remote Controller, but with the conveniences provided by a personal computer.

S-4000 RCS features:

- *S-1608/S-0816 input channel control screen*—View and adjust settings for all S-1608/S-0816 System's channels from one screen.

- *Comprehensive input level meter screen*—View input activity of all input channels from one screen.

- *100 memory presets*—Store and recall up to 100 different S-1608/S-0816 input setups.

- *Integrated monitoring and control of multiple systems*—You can connect up to four S-1608/S-0816 Systems to multiple RS-232C ports on a personal computer. This allows for control and signal monitoring of multiple systems from a single interface.

Where to Get the S-4000 RCS

The S-4000 RCS is available as a free download from www.rolandsystemsgroup.net. Refer to the documentation included with software for instructions on using it with the S-1608/S-0816 System.

System Requirements

The S-4000 RCS is available for both Windows and Macintosh operating systems. Please visit www.rolandsystemsgroup.net for the latest S-4000 RCS version and current computer and operating system requirements.

Splitting Stage Audio to Multiple Destinations

As we've discussed previously, REAC uses Ethernet networking technology to transfer audio signals. Besides providing great sound quality and inexpensive and convenient installation, this allows for one more huge benefit: pain-free audio splits using REAC splitter S-4000-SP or standard Ethernet hardware.

By integrating a REAC splitter S-4000-SP or an Ethernet switching hub into the REAC system, source signals from REAC Master unit can be split to multiple additional REAC Split units. This allows you to send stage audio to multiple destinations in addition to the FOH position, such as:

- a monitor console.
- a multitrack recorder.
- a remote truck.
- a broadcast feed.
- a secondary FOH console.
- anywhere else you need to send stage audio.

Traditionally, when using an analog snake system, audio splits are taken directly at the source. This requires the use of expensive and bulky transformer-based audio splitters, as well as an additional analog snake for each split destination. Besides this, analog signal splitting can reduce the source signals' quality and greatly increase the potential for introducing noise into the entire sound reinforcement system via ground loops and RF interference.

Using REAC, splitting the stage audio in an S-1608/S-0816 System is extremely easy. Simply add a REAC splitter or a switching hub and an S-0816 unit for each split destination, hook them together with Cat5e cables, and you're ready to go! Besides this setup convenience, REAC splits provide pristine audio quality—once the input signals are converted to digital data in the S-1608, they can be split as many times as you wish with absolutely no loss in quality.

What You'll Need

To split the S-1608's 16 channels of input audio, you'll need:

- a REAC splitter S-4000-SP or an Ethernet switching hub with enough ports to connect each REAC device.

- an additional S-0816 unit for each split destination.

- REAC cable SC-W100S or Cat5e cables.

Ethernet connection standards recommend using straight-through cables to connect devices to the ports on a switching hub, and crossover cables when connecting hub-to-hub. However, some switching hubs provide ports that allow the use of either crossover or straight-through cables—the port will detect the type of cable that's connected and adjust the signal transfer accordingly. Consult the switching hub's documentation to determine which type of cables you should use with it.

Ethernet Switching Hub Requirements

To work with REAC, an Ethernet switching hub must meet the following requirements:

- 1000BASE-T transmission speed (IEEE802.3ab, Gigabit Ethernet)

- Support for 100BASE-TX devices (IEEE802.3u, Fast Ethernet)

- Bi-directional (full-duplex) communication

Connect REAC devices only to switching hub ports that support 100BASE-TX.

Split Connection Overview

S-4000-SP or
Ethernet switching hub

S-1608 16x8 (Master REAC device)

S-1608
STAGE UNIT   Digital Snake   RSS by Roland

8 outputs
from console

REAC cable SC-W100S
or Cat5e cable

S-0816 8x16 (Split REAC device)

S-0816
FOH UNIT   Digital Snake   RSS by Roland

16 mic/line inputs

16 mic/line sources
from the stage

Monitor
Console

REAC cable SC-W100S
or Cat5e cable

REMOTE connector
on S-1608 or S-0816
* when connected to a
Split device, levels and
parameters can be
monitored but not adjusted.

REMOTE

RS-232C cable

S-0816 8x16 (Slave REAC device)

S-0816
FOH UNIT   Digital Snake   RSS by Roland

S-4000R Remote Controller

16 mic/line sources
from stage

8 outputs from console

Notes on Split Setups

- A Split REAC device can only receive audio from the Master REAC device—it can't receive audio from a Slave REAC device (or another Split device).

- When a unit is set as a Split REAC device, its audio inputs are disabled.

- An S-4000R can be connected to the REMOTE connector on a Split REAC device. However, it can only be used for system and signal level monitoring—adjustment of Master/Slave device's inputs is not possible. (If you need to adjust the signal level coming from a Split device's outputs, use the input trim controls on the receiving device.)

Setting the [REAC MODE] Switches

See Page 38 for a discussion about the [REAC MODE] switches and how they affect REAC signal flow.

With their power off, set the units as follows:

1. On the S-1608, set the [REAC MODE] switch to M.
2. On the primary S-0816 (usually at the FOH position), set the [REAC MODE] switch to S.
3. On each S-0816 used to receive audio splits from the stage, set the [REAC MODE] switch to SP.

If the [REAC MODE] switch setting is changed when the unit is powered on, the new setting won't take effect until the unit is powered off and then back on again.

REAC Connections

For the REAC connections:

•   Using Cat5e cables, connect the REAC port on the S-1608/S-0816 units to ports on the REAC splitter S-4000-SP or the switching hub.

REAC Splitter S-4000-SP
or Switching hub

S-1608
(Master)

S-0816
(Slave)

Cable length up to 100 meters

Cable length up to 100 meters

S-0816
(Split)

S-1608
(Split)
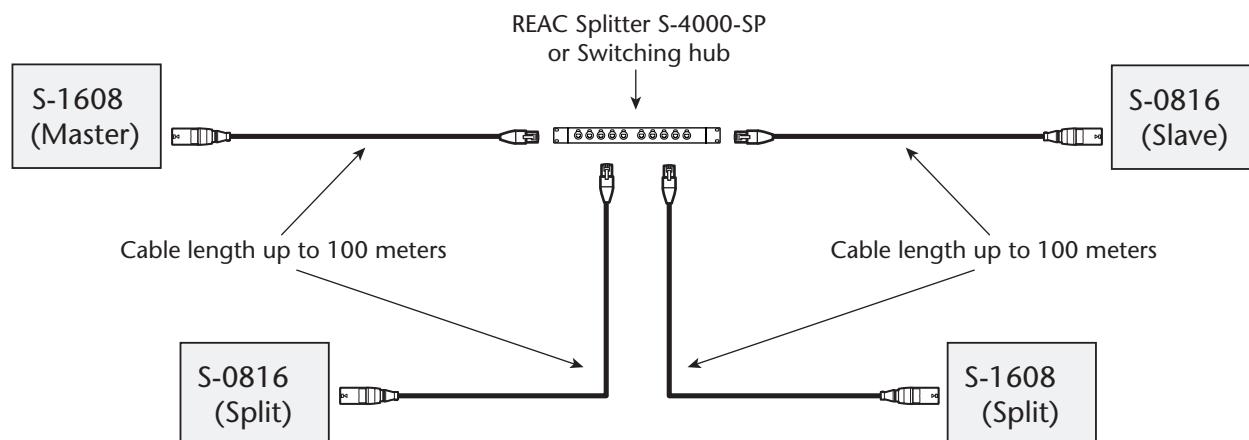
The cable length from each REAC device to the REAC Splitter S-4000-SP or the switching hub must not exceed 100 meters. If you need to extend the cable length of a particular REAC device connection beyond 100 meters, a separate REAC splitter or switching hub must be used in-line. See "REAC Cable Length Extension" in Chapter 6 for more information.

As mentioned earlier in the manual, some switching hubs have ports that allow the use of either crossover or straight-through cables—they will detect the type of cable that's connected and adjust the signal transfer accordingly. Consult the documentation for the switching hub to determine what type of cables can be used.

Audio Connections and Power Up

Connect and power up devices in the following order:

In each of the following steps, allow each piece of equipment to finish its power-up sequence before proceeding to the next step.

1. Connect the system components as described here and in Chapter 6.

2. Connect audio devices to the Master and Slave REAC devices' inputs and outputs.

3. Connect audio devices to the Split REAC devices' outputs.

S-1608 and S-0816 audio connections are explained in Chapter 6.

4. Turn on any devices connected to the Master and Slave REAC devices' audio inputs.

5. Turn on the power on the REAC splitter(s) or the switching hub(s).

6. Power up the Master, Slave, and Split devices so that their POWER indicators light.

7. Turn on the power to the audio devices (mixing consoles, power amplifiers, monitor speakers, etc.) connected to the Master, Slave, and Split devices' audio outputs.

Applications

16x8 System

S-1608 16x8 (Master REAC device)

8 outputs
from console

16 mic/line inputs

REAC cable SC-W100S
or Cat5e cable

S-0816 8x16 (Slave REAC device)

16 mic/line sources from stage

8 outputs from console
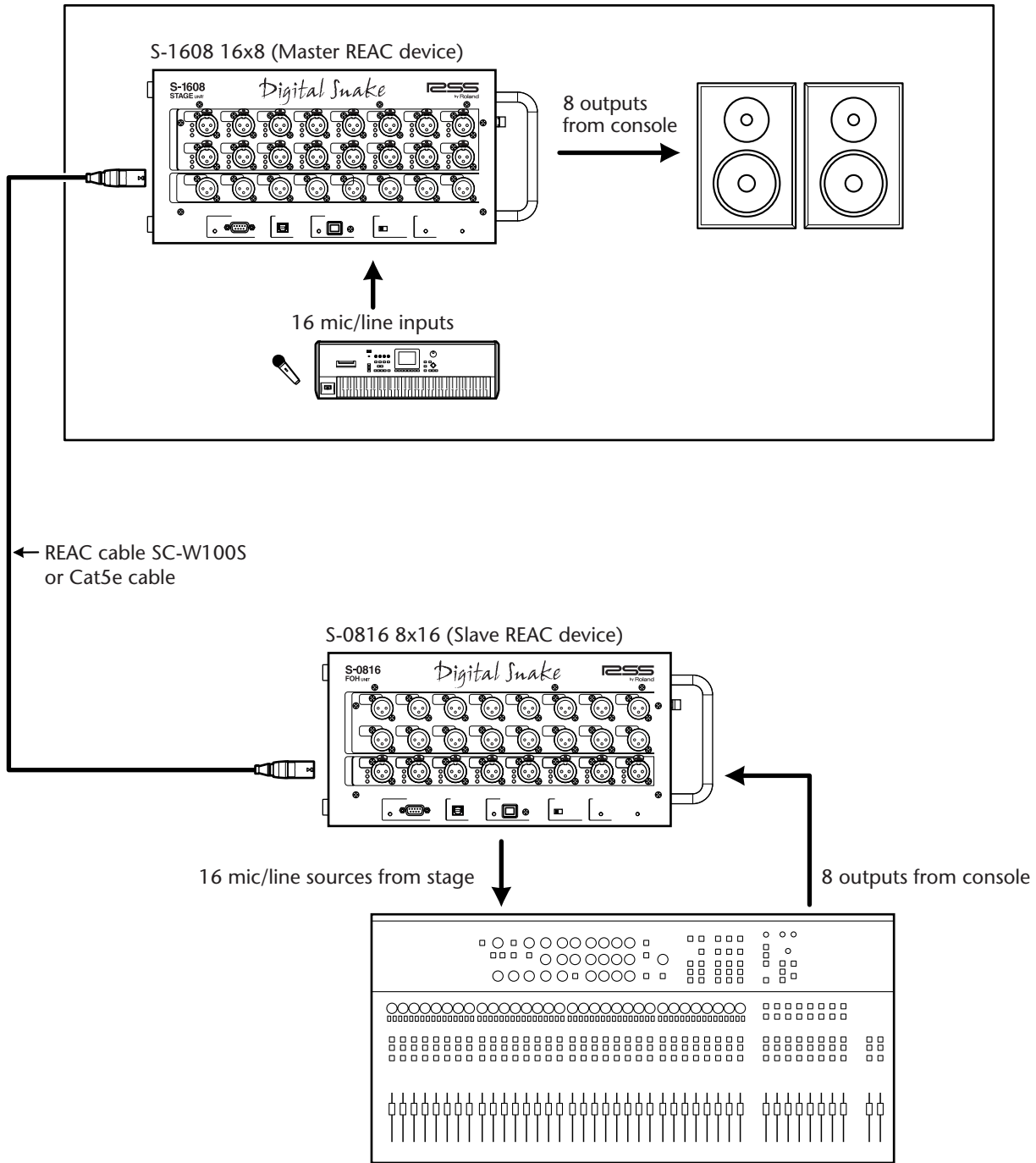
16x8 System with 16 Channel Split

S-4000-SP or
Ethernet switching hub

S-1608 16x8 (Master REAC device)

S-0816
FOH UNIT

Digital Snake

RSS
by Roland

8 outputs
from console

Cat5e
cables

S-0816 8x16 (Split REAC device)

S-0816
FOH UNIT

Digital Snake

RSS
by Roland

16 mic/line inputs

16 mic/line sources
from the stage

Monitor
Console

REAC cable SC-W100S
or Cat5e cable

S-0816 8x16 (Slave REAC device)

S-0816
FOH UNIT

Digital Snake

RSS
by Roland

16 mic/line sources
from stage

8 outputs from console

32x16 System

(2) S-1608 16x8 (Master REAC device)

16 outputs from console

32 mic/line inputs

(2) S-0816 8x16 (Slave REAC device)

REAC cable SC-W100S
or Cat5e cable

32 mic/line sources
from stage

16 outputs from console

32x16 System with 32 Channel Split

S-4000-SP or
Ethernet switching hub

(2) S-1608 16x8 (Master REAC device)

16 outputs
from console

REAC cable SC-W100S
or Cat5e cable

(2) S-0816 8x16 (Split REAC device)

32 mic/line inputs

Monitor Console

32 mic/line sources from the stage

(2) S-0816 8x16 (Slave REAC device)

REAC cable SC-W100S
or Cat5e cable

32 mic/line sources
from stage

16 outputs from console
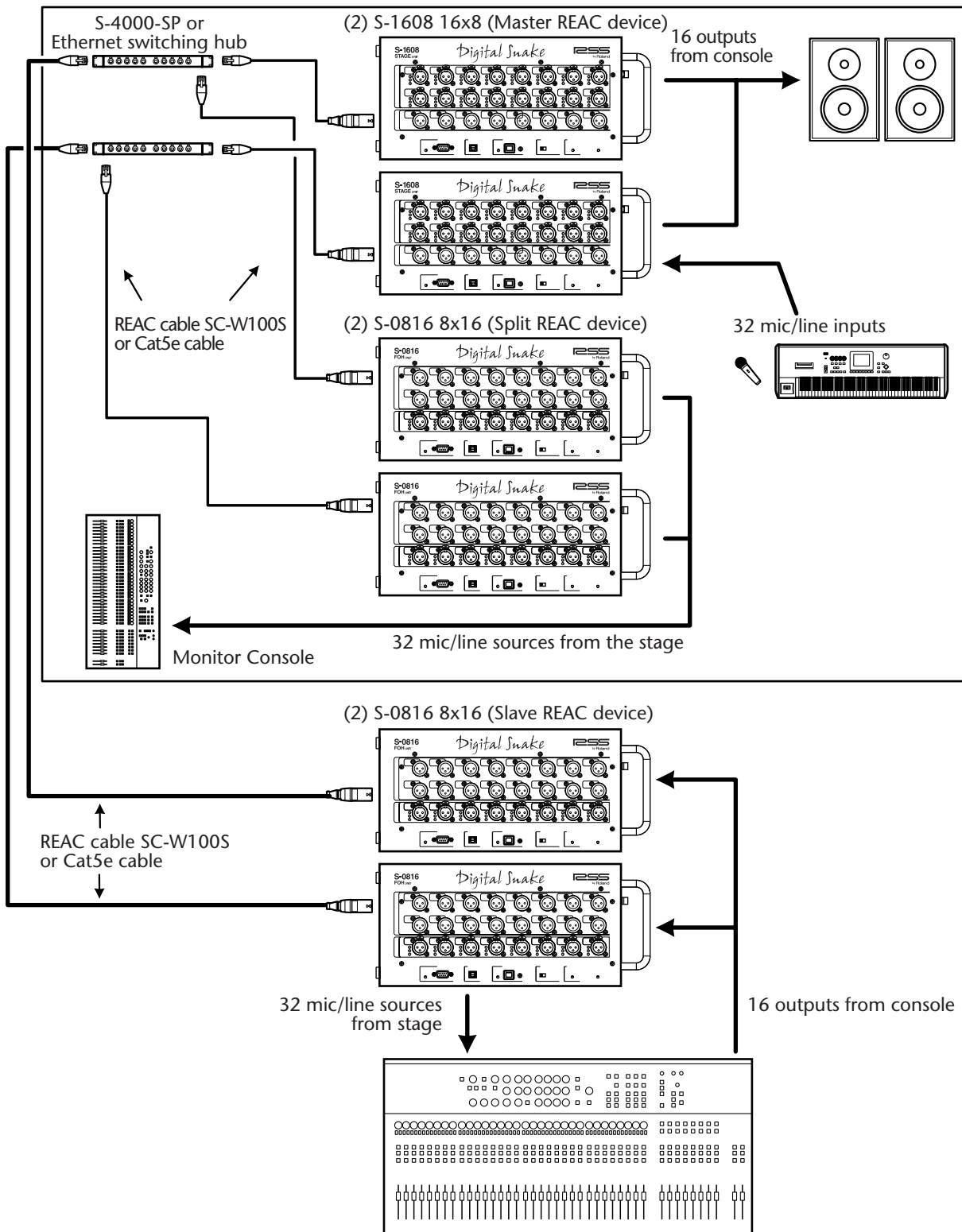
Connection to S-4000S/S-4000H

It's possible to use the S-1608/S-0816 with S-4000S or S-4000H in the following configuration.

The S-4000S input/output module (SI-AD4, SI-AES4/SO-DA4, SO-AES4) is set up as shown below. You should not attach nor remove the module. Be sure to consult with the nearest Roland Service Center.

Please visit www.rolandsystemsgroup.net for the latest information about the S-1608/S-0816 System.

SO = SO-DA4/SO-AES4
SI = SI-AD4/SI-AES4

S-4000S — SO SO SO SO SI SI Empty Empty Empty Empty Empty

S-1608 16x8

REAC cable SC-W100S or Cat5e cable

S-4000S — SI SI SI SI SO SO Empty Empty Empty Empty Empty

S-0816 8x16

REAC cable SC-W100S or Cat5e cable

S-1608 16x8

S-4000H

REAC cable SC-W100S or Cat5e cable

* Be sure to set the REAC mode of the S-1608 to M (MASTER).

* OUTPUT 1–8 on the S-1608 do not output anything.

* Be sure to set the REAC mode of the S-4000H to S (SLAVE).

* OUTPUT 17–24 and 25–32 on the S-4000H do not output anything.

Appendices

Appendix A: Troubleshooting

The components in the S-1608/S-0816 System provide many different indicators that show the current system status. Additionally, the units provide error indicators that let you know whenever a potentially serious problem is detected in the system.

The following tables show the meaning of the various status and error indicators, and suggest actions for troubleshooting and safe system operation.

S-1608 and S-0816 Units: System Status Indicators			
Indicator	Status	Definition	Troubleshooting Action
REAC	Lit	Communication is established	• None (normal operation)
	Flashing ↓ Dark	No REAC communication	• Make sure all REAC devices are turned on • Check Cat5e cable connections • Check the Cat5e cable(s) for damage • Is the proper cable type being used? (See Page 40) • If a switching hub is used, is it working? • If a switching hub is used, is it properly connected? (See Page 41, 60) • If a switching hub is used, does it have the proper specification? (See Appendix C)
	Dark	System power-up	• None (normal operation)
REMOTE	Lit	REMOTE communication established	• None (normal operation)
	Dark	No device is connected to REMOTE jack	• None (normal operation)
	Flashing ↓ Dark	No REMOTE communication	• Check the RS-232C cable for damage • Are you using an RS-232C cable with the proper wiring? (See Appendix B) • If connected to a computer, is the computer on? • Is the computer's RS-232C port functioning properly?
MUTE ALL OUTPUTS	Lit	All outputs are muted	• None (normal operation)
	Dark	All outputs are un-muted	• None (normal operation)
	Flashing	All outputs are in the process of un-muting	• None (normal operation)
		The exhaust fan has stopped working properly	• Check the exhaust fan is working • Turn off the power to prevent overheating and damage • Consult with the nearest Roland Service Center

S-4000R Unit: System Status Indicators

Indicator	Status	Definition	Troubleshooting Action
POWER	Lit	Power is received	• None (normal operation)
	Dark	No power is received	• Make sure all REAC devices are turned on • Check the RS-232C cable for damage • Are you using an RS-232C cable with the proper wiring? (See Appendix B)
REAC	Lit	Communication is established	• None (normal operation)
	Flashing	System power-up	• None (normal operation)
		No REAC communication	• Make sure all REAC devices are turned on • Check Cat5e cable connections • Check the Cat5e cable(s) for damage • Is the proper cable type being used? (See Page 40) • If a switching hub is used, is it working? • If a switching hub is used, is it properly connected? (See Page 41, 60) • If a switching hub is used, does it have the proper specification? (See Appendix C)
CTRL	Lit	REMOTE communication established	• None (normal operation)
	Flashing	System power-up	• None (normal operation)
		No REMOTE communication	• Check the RS-232C cable for damage • Are you using an RS-232C cable with the proper wiring? (See Appendix B)

S-4000R Unit: Error Indicators

Indicator	Status	Definition	Troubleshooting Action
CLIP 1/ SIG 1	Lit	The REAC connection has failed	• Check REAC cabling • Check REAC connections • Check in-line REAC Splitter S-4000-SP or switching hub (if used) on REAC connection
	Flashing	Recovery from the above error	• None
CLIP 2	Lit	An exhaust fan on the Master REAC unit has stopped working	• Check the exhaust fan is working • Turn off the power to prevent overheating and damage • Consult with the nearest Roland Service Center
	Flashing	Recovery from the above error	• None
CLIP 4/ SIG 4	Lit	REAC packets error detected on the unit connected to the S-4000R	• Check REAC cabling • Check REAC connections • Check in-line switching hub (if used) on REAC connections
SIG 2	Lit	An exhaust fan on a Slave/ Split REAC unit has stopped working	• Check the exhaust fan is working • Turn off the power to prevent overheating and damage • Consult with the nearest Roland Service Center
	Flashing	Recovery from the above error	• None
CHANNEL Display	Flashes "Er"	This happens whenever one of the previously described S-4000R error indicators lights or flashes	• Look for the source of the error • Press [CLIP CLEAR / ENTER] to return to normal S-4000R operation

Appendix B: Connector Information

Cat5e Ethernet Cable Wiring (RJ45-type Connectors)

Cat5e Crossover Wiring (REAC cable: SC-W100S)

TX+ ① ① TX+
TX- ② ② TX-
RX+ ③ ③ RX+
④ ④
⑤ ⑤
RX- ⑥ ⑥ RX-
⑦ ⑦
⑧ ⑧
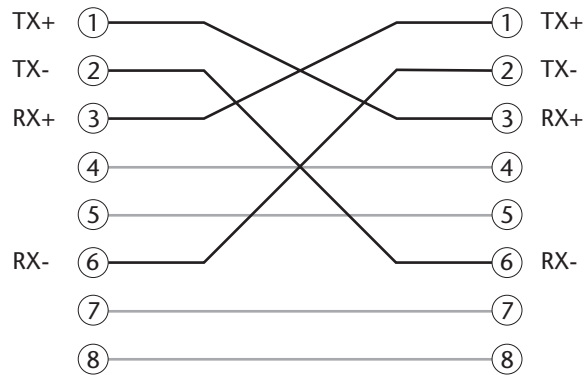
Note: Pins 4, 5, 7, and 8 are not used in this application, but may be wired in the cable as shown.

Cat5e Straight-Through Wiring

TX+ ① ① TX+
TX- ② ② TX-
RX+ ③ ③ RX+
④ ④
⑤ ⑤
RX- ⑥ ⑥ RX-
⑦ ⑦
⑧ ⑧
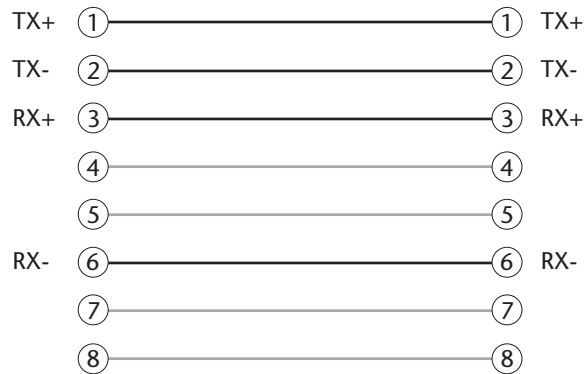
Note: Pins 4, 5, 7, and 8 are not used in this application, but may be wired in the cable as shown.

RS-232C (REMOTE) Connector (D-Sub, DB-9-type)

Maximum recommended cable length: 15 meters.

Pin Number	Signal Name	Pin Connection
1	NC	
2	TxD (Data Out)	
3	RxD (Data In)	
4	NC	
5	GND	
6	+5 V	
7	Short to Pin 8	
8	Short to Pin 7	
9	NC	

Note: Pins 1, 4 and 9 are not used in this application, but may be wired in the cable as shown.

S-1608/S-0816 Audio Connectors (XLR-type)

S-1608/S-0816 XLR Audio Pin Outs (INPUT and OUTPUT)

Balanced connections (recommended):
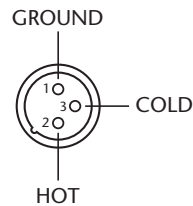
Unbalanced connections:
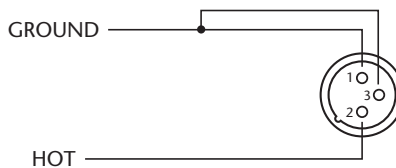
Appendix C: Ethernet Switching Hub Requirements

To be used in a REAC system, an Ethernet switching hub must meet the following requirements:

- 1000BASE-T transmission speed (IEEE802.3ab, Gigabit Ethernet)
- Support for 100BASE-TX devices (IEEE802.3u, Fast Ethernet)
- Bi-directional (full-duplex) communication

Connect REAC devices only to switching hub ports that support 100BASE-TX.

The transmission protocol for REAC is based on 100BASE-TX (Fast Ethernet). To transfer up to 40 channels of digital audio, REAC uses the full bandwidth of this protocol. However, some 100BASETX switching hubs cannot handle this amount of data traffic. Gigabit Ethernet switching hubs can handle a larger amount of data traffic, so we recommend them for use with REAC devices (just be sure that the Gigabit switching hub you use supports 100BASE-TX devices).

When using switching hubs in-line for REAC cable length extension, a maximum of four hubs can be used. (Total cable length with four switching hubs: 500 meters. See Chapter 6 for more information.)

Consult the switching hub's documentation for information on its proper use.

When a switching hub is used in-line with REAC cables, the network latency will increase by the amount of processing delay introduced by the hub itself. The actual delay is dependant upon the specifications of the hub, though the maximum delay amount for a single hub should be about 200 microseconds.

Appendix D: Specifications

Specifications: S-1608 STAGE UNIT

Number of Channels	16 in 8 out
AD Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bits
DA Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bits
Frequency Response	-2 dB / +0 dB (@ +4 dBu, 20 Hz to 20 kHz)
Total Harmonic Distortion + Noise	0.05 % or less (Pad: On, Input Gain: +4 dBu, 22 Hz to 20 kHz)
Dynamic Range	110 dB
Cross Talk	-80 dB or less (Input Gain: +4 dBu, typ.)
Nominal Input Level	-65 to -10 dBu (PAD: Off) -45 to +10 dBu (PAD: On) (1 dB step, Max. +28 dBu)
PAD	20 dB On/Off
Input Impedance	14 k ohms
Nominal Output Level	+4 dBu, Max. +22 dBu
Output Impedance	600 ohms
Recommended Load Impedance	10 k ohms or greater
Residual Noise Level (IHF-A, typ.)	-80 dBu or less
Equivalent Input Noise Level (E.I.N.)	-128 dB
Network Latency	375 microseconds when using REAC cable only *1 (AD → REAC → DA Latency: about 1.2 ms)
Connectors	Input x 16 (XLR type, balanced, phantom power) Output x 8 (XLR type, balanced) DIGITAL OUT connector x 1 (Optical type) REAC Connector x 1 (RJ-45 EtherCon type) Remote Connector x 1 (RS-232C, DB-9 type)
Indicators	POWER Indicator x 1, REAC Indicator x 1, REMOTE Indicator x 1, MUTE ALL OUTPUTS Indicator x 1
Power Supply	AC 115 V, AC 117 V, AC 220 V, AC 230 V, AC 240V (50/60 Hz)
Power Consumption	45 W
Phantom Power	+48 V / 14 mA (each input, remote controlled)
Dimensions	401 (W) x 135.0 (D) x 177.0 (H) mm 15-13/16 (W) x 5-3/8 (D) x 7 (H) inches
Weight	5.5 kg 12 lbs 3 oz
Operation Temperature	0 to +40 degrees Celsius +32 to +104 degrees Fahrenheit
Accessories	Power Cord x 1, REAC Connector Covers x 1, Ferrite Core x 1, Rubber Foot x 4, Rack Mount Kit x 1, Owner's Manual
Options	REAC Splitter: S-4000-SP Cat5e Ethernet Crossover Cable with Neutrik(R) EtherCon(R) Plug: SC-W100S (100 m)

*1: When a REAC Splitter S-4000-SP or a switching hub is used in-line with REAC cables, the network latency will increase by the amount of processing delay introduced by the splitting device itself. The actual delay is dependant upon the specifications of the splitting device, though the maximum delay amount for a single splitting device should be about 200 microseconds.

* 0 dBu = 0.775 V rms

* In the interest of product improvement, the specifications and/or appearance of this unit accessories are subject to change without prior notice.

Specifications: S-0816 FOH UNIT

Number of Channels	8 in 16 out
AD Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bits
DA Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bits
Frequency Response	-2 dB / +0 dB (@ +4 dBu, 20 Hz to 20 kHz)
Total Harmonic Distortion + Noise	0.05 % or less (Pad: On, Input Gain: +4 dBu, 22 Hz to 20 kHz)
Dynamic Range	110 dB
Cross Talk	-80 dB or less (Input Gain: +4 dBu, typ.)
Nominal Input Level	-65 to -10 dBu (PAD: Off) -45 to +10 dBu (PAD: On) (1 dB step, Max. +28 dBu)
PAD	20 dB On/Off
Input Impedance	14 k ohms
Nominal Output Level	+4 dBu, Max. +22 dBu
Output Impedance	600 ohms
Recommended Load Impedance	10 k ohms or greater
Residual Noise Level (IHF-A, typ.)	-80 dBu or less
Equivalent Input Noise Level (E.I.N.)	-124 dB
Network Latency	375 microseconds when using REAC cable only *1 (AD → REAC → DA Latency: about 1.2 ms)
Connectors	Input x 16 (XLR type, balanced, phantom power) Output x 8 (XLR type, balanced) DIGITAL OUT connector x 1 (Optical type) REAC Connector x 1 (RJ-45 EtherCon type) Remote Connector x 1 (RS-232C, DB-9 type)
Indicators	POWER Indicator x 1, REAC Indicator x 1, REMOTE Indicator x 1, MUTE ALL OUTPUTS Indicator x 1
Power Supply	AC 115 V, AC 117 V, AC 220 V, AC 230 V, AC 240V (50/60 Hz)
Power Consumption	45 W
Phantom Power	+48 V / 14 mA (each input, remote controlled)
Dimensions	401 (W) x 135.0 (D) x 177.0 (H) mm 15-13/16 (W) x 5-3/8 (D) x 7 (H) inches
Weight	5.5 kg 12 lbs 3 oz
Operation Temperature	0 to +40 degrees Celsius +32 to +104 degrees Fahrenheit
Accessories	Power Cord x 1, REAC Connector Covers x 1, Ferrite Core x 1, Rubber Foot x 4, Rack Mount Kit x 1, Owner's Manual
Options	REAC Splitter: S-4000-SP Cat5e Ethernet Crossover Cable with Neutrik(R) EtherCon(R) Plug: SC-W100S (100 m)

*1: When a REAC Splitter S-4000-SP or a switching hub is used in-line with REAC cables, the network latency will increase by the amount of processing delay introduced by the splitting device itself. The actual delay is dependant upon the specifications of the splitting device, though the maximum delay amount for a single splitting device should be about 200 microseconds.

* 0 dBu = 0.775 V rms

* In the interest of product improvement, the specifications and/or appearance of this unit accessories are subject to change without prior notice.

[Specifications: S-4000R REMOTE CONTROLLER

Connectors	Remote Connector: 1 (RS-232C, DB-9-type)
Indicators	CLIP Indicators (1–40) SIG Indicators (1–40) POWER Indicator REAC Indicator CTRL Indicator Level Meter CHANNEL Display (8 segments 2 digits.) GAIN Indicators (15 steps)
Memory	10 memory presets
Power Supply	Supplied from connected device (S-1608 or S-0816, through the remote cable)
Dimensions	215 (W) x 87 (D) x 54.6 (H) mm 8-1/2 (W) x 3-7/16 (D) x 2-3/16 (H) inches
Weight	0.8 kg 1 lb. 13 oz.
Operation Temperature	0 to +40 degrees Celsius +32 to +104 degrees Fahrenheit
Accessories	Remote Cable (3 meter) Rack-mount brackets Installation Manual

* In the interest of product improvement, the specifications and/or appearance of this unit accessories are subject to change without prior notice.

Appendix E: Dimensions

Dimensions: S-1608

Note: Dimensions are shown in millimeters.
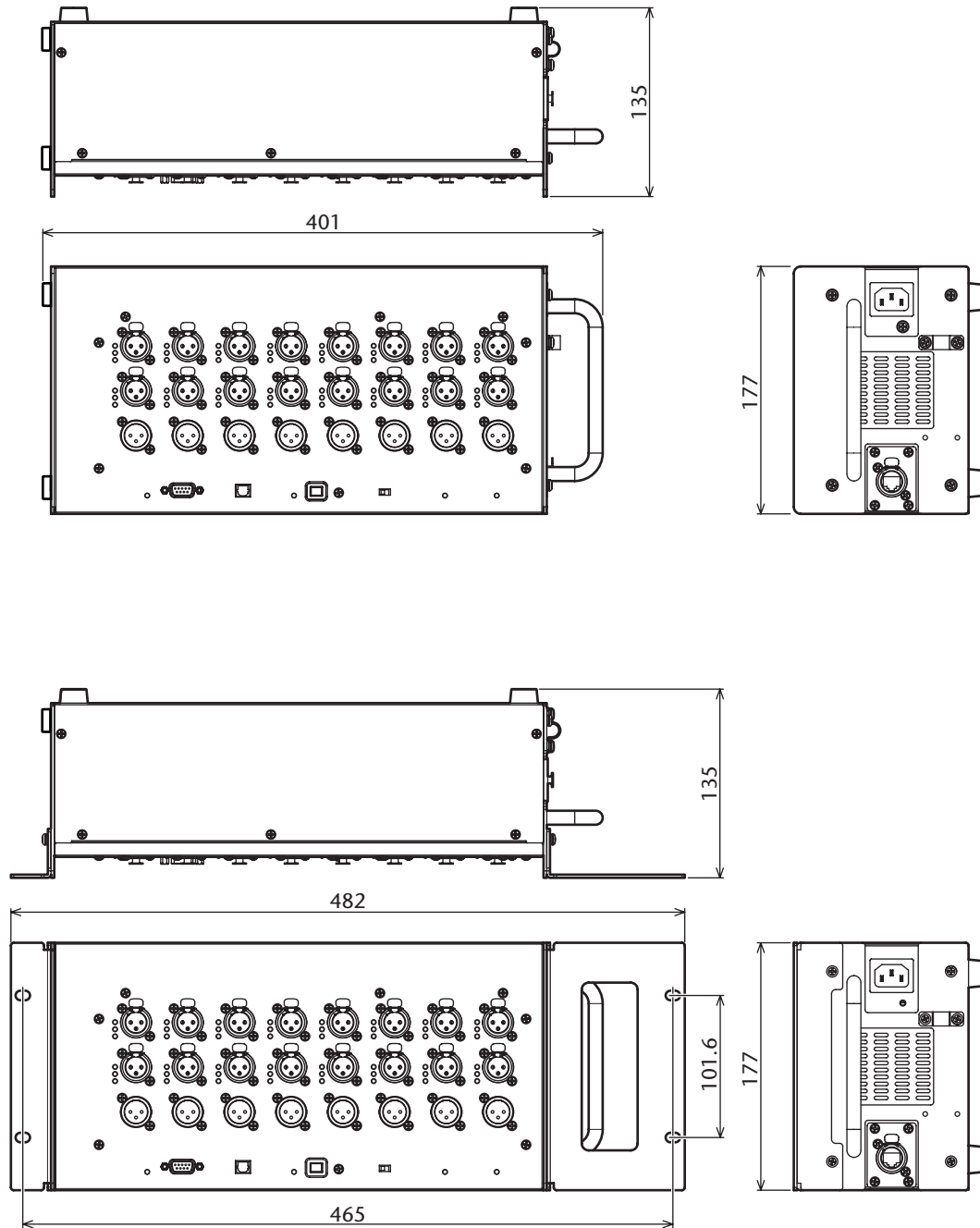
Dimensions: S-0816

Note: Dimensions are shown in millimeters.
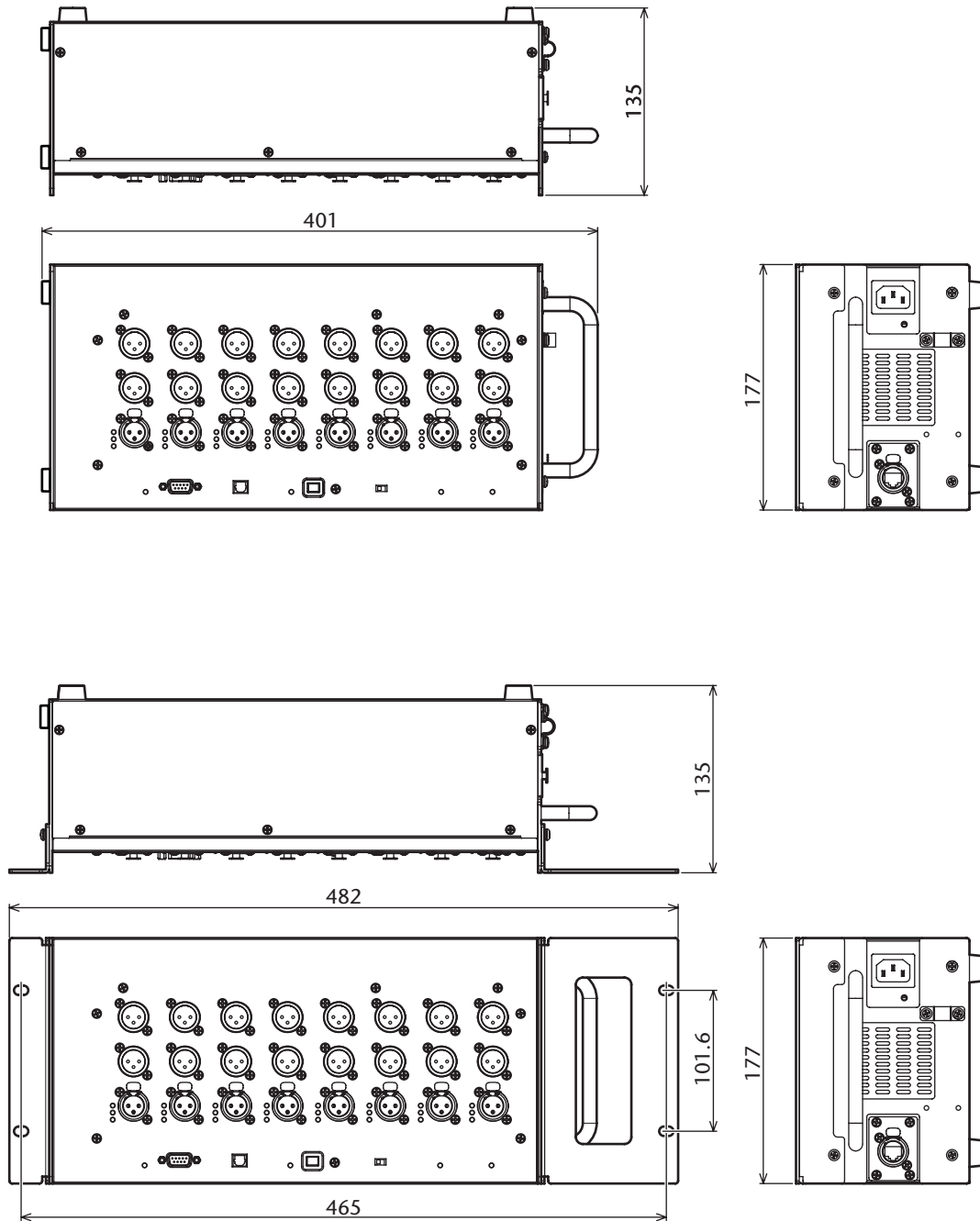
Dimensions: S-4000R

Note: Dimensions are shown in millimeters.

215

87.8

60.9

54.3

89.2

54.6

Index

Information

When you need repair service, call your nearest Roland Service Center or authorized Roland distributor in your country as shown below.

ASIA

INDONESIA
PT. Citra IntiRama
JL. Cideng Timur No. 15J-15O
Jakarta Pusat
INDONESIA
TEL: (021) 632-4170

TAIWAN
ROLAND TAIWAN
ENTERPRISE CO., LTD.
Room 5, 9fl. No. 112 Chung Shan
N.Road Sec.2, Taipei, TAIWAN,
R.O.C.
TEL: (02) 2561 3339

SINGAPORE/ MALAYSIA
Roland Asia Pacific Sdn. Bhd.
45-1, Block C2, Jalan PJU 1/39,
Dataran Prima, 47301 Petaling
Jaya, Selangor, MALAYSIA
TEL: 3-7805-3263

CENTRAL/LATIN AMERICA

BRAZIL
Roland Brasil Ltda.
Rua San Jose, 780 Sala B
Parque Industrial San Jose
Cotia - Sao Paulo - SP, BRAZIL
TEL: (011) 4615 5666

Other CENTRAL/ LATIN AMERICA
Roland Systems Group U.S.
425 Sequoia Drive Suite 114,
Bellingham, Washington,
98226 USA
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