LEADER

LT 4440 / LT 444

CHANGEOVER

INSTRUCTION MANUAL

LEADER
ELECTRONIC MEASURING INSTRUMENTS

TABLE OF CONTENTS

GENERAL SAFETY SUMMARY

■ To Avoid Personal Injury

It is recommended that only qualified personnel with technical knowledge use this instrument only after reading and fully understanding all functions of the instrument described in this instruction manual.

This instrument is not designed and manufactured for consumers.
If you do not have enough knowledge on electricity, to avoid personal injury and prevent damage to this product, please be sure to use this product only under the supervision of an engineer who has sufficient knowledge about electronics.

■ Precautions on Contents

Should you find the contents in this manual and any of its technical terms confusing, please feel free to contact your local Leader agent.

■ Symbols and Terms

Following terms and symbols that indicate necessary warnings and cautions used in this manual and on the product are there for safe operation.

<Symbol> 	The sections where this symbol is marked in this manual or instrument, if not correctly performed or practiced, could result in personal injury or cause danger to the instrument. Misuse could also produce unintentional movement to create an operational impediment on the instrument or other products that might be connected to it. Be sure to refer to the safety precautions in this manual to safely use the part of the instrument where this symbol is marked.
<Term> 	Warning statements identify warning conditions that if disregarded or not correctly performed or adhere to, could result in serious personal injury or even loss of life.
<Term> 	Caution statements identify warning conditions if disregarded or not correctly performed or adhere to, could result in personal injury or damage to the instrument.

GENERAL SAFETY SUMMARY

Review the following safety precautions to avoid operator's injury and loss of life and prevent damage and deterioration to this product. To avoid potential hazards, use this product as specified.

■ Warning on the Cases and Panels of the Instrument

Operator should not remove any cases or panel for any reasons. If you touch the inside of the instrument it could result in electric shock or fire.
Refrain from spilling any liquid on or inserting flammable or metal objects inside the instrument. Such actions could cause fire, electric shock, malfunction, and accidents when the power is turned on.

■ Warnings on Power Line

Make sure to connect only to the rated power line voltage. Excessive voltage may cause fire.
Confirm the voltage of the commercial power line before connecting the power cord.
The power frequency of the power line should be 50/60 Hz.

Use only the power cord that came with the instrument. The use of other cords could cause a fire hazard. If the provided cord is damaged, stop using it and contact your local Leader agent.
The use of a damaged cord can cause electric shock or fire. When unplugging the power cord, pull by the plug, not the cord.

The instrument does not have a power switch. Provide means for immediately shutting down the power supply in an emergency.

GENERAL SAFETY SUMMARY

WARNING

■ Warnings on Installation Environments

- About the Operating Temperature Range
  Operate the instrument in the temperature range of 0 to 45 °C. Operating the instrument at higher temperatures could cause a fire hazard.
  Rapid changes in the temperature from a cold environment to a warm environment can cause condensation inside the instrument and could damage the instrument. If there is a possibility of condensation, allow the instrument to sit for 30 minutes without the power on.

- About the Operating Humidity Range
  Operate the instrument in the humidity range ≤ 90 %RH (without condensation).
  Do not operate the instrument with wet hands. Doing so could cause a shock or fire hazard.

- About the Operation in the Presence of Gasses
  Operating the instrument in or near the presence or storage locations of flammable or explosive gasses or fumes could cause an explosion or fire hazard. Do not operate the instrument anywhere near such environments.

- Do Not Insert Objects
  Do not insert metal or flammable objects into the instrument or drop liquid on or into the instrument. Doing so could cause fire, electric shock, malfunction, and accidents.

■ Warning While Operating

If abnormal symptoms such as smoke, flame, or odor arise from the instrument while in use, stop using the instrument immediately to avoid a fire hazard. Turn off the power and remove the power cord plug from the outlet. Check that the fire has not spread, and contact your local Leader agent.

■ Warnings on Grounding

The instrument has a ground terminal to prevent electric shock and to protect the instrument. Ensure that the instrument is properly grounded for safe operation.

GENERAL SAFETY SUMMARY

■ Caution on Input/Output Connectors

Input connectors are rated with a maximum input.
Do not supply input exceeding the specifications given in this manual.
Also, do not supply external power to output connectors as it could cause the instrument to malfunction.

■ Caution on Extended Non-Use

Be sure to disconnect the power cord plug from the socket if you do not plan to use the instrument for a long time.

Adhere to the warnings and precautions described above and use the instrument correctly and safely. In addition, individual precautions are given in the sections of the instruction manual.

If you have any questions or comments regarding the contents of this instruction manual, please contact your local Leader agent.

1. INTRODUCTION

Thank you for purchasing Leader's measuring instruments.
Read this instruction manual thoroughly before using the product to ensure safe and correct operation.

If you have any difficulties or questions on how to use the instrument after you have read this manual, please feel free to contact your local Leader agent.
After you have read the manual, keep the manual in a safe place for quick reference.

1.1 Scope of Warranty

This Leader instrument has been manufactured under the strictest quality control guidelines. Leader will repair free of charge any malfunctions that may occur under normal use for 1 year after the date of purchase.

Keep the receipt or invoice as it will serve as a warranty card.

Even during the warranty period, Leader will charge a fee for repairs in the following cases.

1. Repair of malfunction or damages resulting from fire, natural calamity, or improper voltage applied by the user.
2. Repair of an instrument that has been improperly repaired, adjusted, or modified.
3. Repair of malfunctions or damages resulting from improper use.
4. Repair of malfunctions caused by devices other than this instrument.
5. Repair of malfunctions or damages without the presentation of a proof of purchase or receipt bill for the instrument.

1.2 Operating Precautions

1.2.1 Line Voltage and Fuse

Confirm that the power line voltage is correct before connecting the power cord.
The voltage range is indicated on the rear panel.
The instrument must be connected to the rated line voltage and line frequency of 50/60 Hz.
If the fuse blows, contact your local LEADER agent.
(The fuse is located in the power supply circuit inside the case.)

1.2.2 Maximum Allowable Input Voltage

CAUTION

The maximum allowable input voltage to the input connectors is shown in the table below. Do not apply excessive voltage to prevent damage to the instrument.

Table 1-1 Maximum allowable input voltage

Connector	Maximum Allowable Input Voltage
Input connector	±5V (DC + peak AC)

1.2.3 Shorting of and Applying External Signals to Output Connectors

- Shorting of output connectors
  Do not short the output connectors. Doing so can damage the instrument.

- Applying external signal to output connectors
  Do not apply external signals to the output connectors. Doing so can damage the instrument or device connected to it.

1.2.4 Installation

Do not use the instrument in the following environments.

- High temperature environments
  Do not place the instrument under direct sunlight or near a heater (e.g., stove). Avoid using the instrument in a way that leads to drastic changes in temperature such as moving the instrument from a cold environment to a hot environment; this may cause condensation.
  Operating temperature range: 0 to 45°C

- High humidity environments
  Do not place the instrument in a high humidity environment (e.g., bathroom, near a humidifier).
  Operating humidity range: ≤ 90% RH

- Dusty environments

1.2.5 Mechanical Shock

The instrument uses precision parts. If a strong shock is applied to the instrument such as dropping the instrument, damage may result.

1.2.6 Calibration

WARNING

This instrument is produced under the strictest quality controls at the factory, but accuracy may gradually deteriorate due to worn components.
Therefore, periodic calibration should be performed.
When service or calibration is required, contact your local Leader agent.

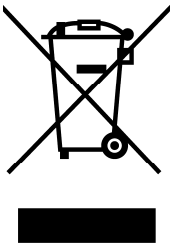
1.2.7 Routine Maintenance

Remove the power cord plug from the socket when cleaning the instrument.
Avoid the use of thinner or benzene solvents for cleaning cases, panels and knobs since this might remove the paint or damage plastic surfaces.
Wipe cases, panels, and knobs lightly with a soft cloth damped with neutral detergent.
Do not allow water, detergent, or other foreign objects to enter the instrument while cleaning.
If a liquid or metal object enters the instrument, it can cause electric shock or fire.

1.2.8 Warm-Up

To secure the most accurate operation, turn on the power to the instrument 30 minutes before actual use to stabilize the internal temperature.

1.2.9 EU WEEE Directive



The EU WEEE Directive applies to this product and its accessories. When disposing of this product or its accessories, follow the regulations in your country or region.
(WEEE Directive: Waste Electrical and Electronic Equipment)

1.3 Preventing Power Cord Disconnection

WARNING

The instrument does not have a power switch. Provide means for immediately shutting down the power supply in an emergency.

1.4 Rack Mounting Precautions

The size of the instrument is 1U. When rack mounting the instrument, use the rack support that came with the instrument as well as L angles, shelf boards, and slide rails that are sold commercially. Be sure to follow the installation conditions and prevent adverse effects on the instrument. (The table below lists the recommended slide rails.) Leader will not be held responsible for accidents that occur when these rails are not used.

Table 1-2 Recommended Slide Rails for the LT 4440/LT 444 (one rail on each side)

Parts Number	Maker Name
C-203-16	IDEAL
KC-251-16	TAKIGEN
MODEL203-16	Accuride Japan

* Please also have eight M4 screws ready for attaching the slide rails.

If you have any questions about the slide rails indicated above or any questions about rack mounting, contact your local Leader agent.

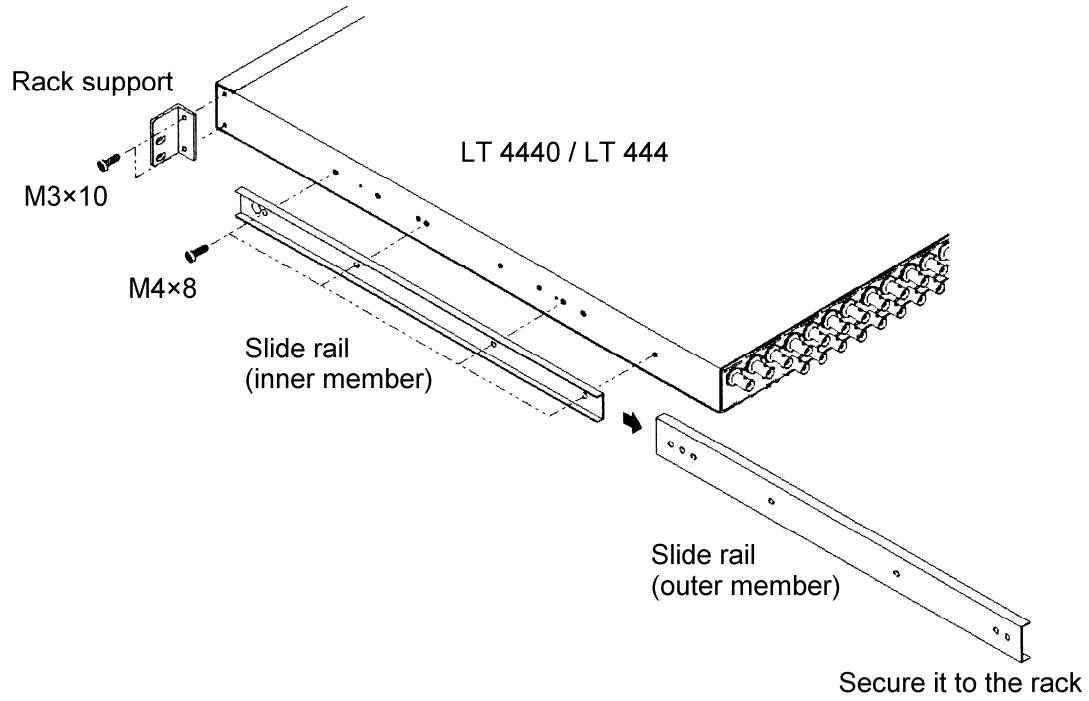


Figure 1-1 Attachment of the slide rail

* The method for fixing the slide rail (outer member) to the rack varies depending on the rack that you are using. Please refer to the manual or specifications of the rack.

2. SPECIFICATIONS

2.1 Description

The LT 4440/LT 444 is a changeover unit that automatically switches the signal from the primary signal to the backup signal when problems are detected in the primary signal. Two systems of input signals (primary and backup) are connected to the LT 4440/LT 444, and the LT 4440/LT 444 detects errors on the amplitude of the primary input signal. A single LT 4440/LT 444 provides 11 channels. HD-SDI (channels 1 to 6 only), SD-SDI, AES/EBU digital audio, analog black burst signal, and tri-level sync signals are supported through the configuration of the internal switch. If a switch occurs from the primary signal to the backup signal, the LT 4440/LT 444 indicates the channel that caused the problem on the panel LED.

The LT 4440 is a short version of the LT 444 with a depth of 400 mm. You can set up a backup system by combining the LT 4440 with the LT 443D or the LT 4400 Multiformat Video Generator.

2.2 Features

- Input/Output
  Provides 11 channels (a single channel consists of PRIMARY input, BACKUP input, and OUTPUT output) on a single LT 4440/LT 444.

- Delay for Starting the Monitor
  The delay for starting the error monitor at power up can be set to FAST or SLOW depending on the rise time of the system signal source being connected.

- Determination Criteria of the Signal Level
  The internal preset switch allows level detection switching among SD-SDI, AES/EBU digital audio, NTSC or PAL analog black burst, HD analog tri-level sync, HD-SDI (only supported on channels 1 to 6), and other signals.

- Error Display
  When a signal level error is detected, the LT 4440/LT 444 illuminates the error LED on the panel as well as the panel LED that indicates the channel causing the problem. This feature allows quick investigation of the problem.

- System Configuration
  Because the LT 4440 has the same depth as the LT 4400, you can configure a 2U backup system by combining the LT4440 with the LT4400.

2.3 Specifications

2.3.1 Inputs

PRIMARY inputs	1 input each for 11 channels (75Ω BNC connector)
BACKUP inputs	1 input each for 11 channels (75Ω BNC connector)

2.3.2 Outputs

OUTPUT outputs	1 output each for 11 channels (75Ω BNC connector)

2.3.3 Input/Output Characteristics (CH1 to CH11)

Return Loss	30 dB (0 to 10 MHz) 15 dB (10 to 750 MHz) 10 dB (750 MHz to 1.5 GHz)
Insertion Loss	0.2 dB (0 to 10 MHz) 0.5 dB (10 to 200 MHz) 2.0 dB (200 MHz to 1.5 GHz)
Cross Talk	–60 dB (0 to 10 MHz) –30 dB (10 MHz to 1.0 GHz) –20 dB (1.0 to 1.5 GHz)

2.3.4 Delay for Starting the Monitor

Select from two delay settings for starting the error monitor at power up according to the rise time of the system signal source connected to the LT 4440/LT 444.

FAST	1 minute or more (60 to 80 s)
SLOW	4 minutes or more (240 to 320 s)

2.3.5 Input Signal Type

Set the type of input signal applied to the LT 4440/LT 444 using the internal dipswitch.

Signal Type	HD-SDI (CH1 to CH6 only) SD-SDI (270 Mb/s) SD-SDI (143 Mb/s) AES/EBU digital audio Tri-level sync signal NTSC black burst PAL black burst

2.3.6 Determination Criteria of the Signal Level

Detection Level	Detects an error when the amplitude of the input signal drops by 2 to 5 dB from the defined level and makes the switch. The detection level varies slightly depending on the type of signal specified using the internal dipswitch. The detection level can be set to LOW or HIGH for each signal type.

2.3.7 Detection Reference Level

When the Determination Criteria Is Set to Low (*1)

HD-SDI (CH1 to CH6 only)	450 to 635 mV (800 mV)
SD-SDI (270 Mb/s)	450 to 635 mV (800 mV)
SD-SDI (143 Mb/s)	450 to 635 mV (800 mV)
AES/EBU digital audio	631 to 794 mV (1000 mV)
NTSC black burst	-180 to -227 mV (-286 mV)
PAL black burst	-190 to -238 mV (-300 mV)
Tri-level sync	337 to 476 mV (600 mV)

When the Determination Criteria Is Set to HIGH (*1)

HD-SDI (CH1 to CH6 only)	505 to 713 mV (800 mV)
SD-SDI (270 Mb/s)	505 to 713 mV (800 mV)
SD-SDI (143 Mb/s)	505 to 713 mV (800 mV)
AES/EBU digital audio	734 to 924 mV (1000 mV)
NTSC black burst	-210 to -264 mV (-286 mV)
PAL black burst	-220 to -277 mV (-300 mV)
Tri-level sync	379 to 535 mV (600 mV)

User-Defined Detection Level Setting (CH7 to CH11 only)

USER setting 1	Set between -100 to -700 mV (*2)
USER setting 2	Set between -100 to -700 mV (*2)

Expansion of the Detection Level Using the Attenuator (CH7 to CH11 only)

Set the internal attenuator to expand the detection level further by 5 times

USER setting 1	Set between -700 to -3500 mV (*2)
USER setting 2	Set between -700 to -3500 mV (*2)

*1 The signals levels inside the parentheses are those during normal conditions.
User-Defined Detection Level Setting (CH7 to CH11 only)

*2 When a signal equivalent to the H.SYNC waveform is applied. The specifications of the detection level may not be achieved depending on the waveform shape.

2.3.8 Error Display

Total Error LED	Notifies errors by illuminating the error LED on the panel.
Error Channel LED	Detects the channel causing the error and notifies the channel by illuminating the corresponding LED.

2.3.9 Panel Key Lock

Time to Key Lock	The key lock is automatically enabled when key operation is not detected for 60 s.

2.3.10 External Control (REMOTE) Connector

Application	For external remote control.
Inputs	RESET, AUTO SWITCHING, and TOGGLE SYNC
Outputs	FAULT and SYNC SOURCE
Connector Type	9-pin Dsub connector (female) (Inch screws for fixing the shell)

2.3.11 General Specifications

Environmental Conditions	
Operating Temperature	0 to 45°C
Operating Humidity	≤ 90% RH (without condensation)
Spec-Guaranteed Temperature	5 to 40°C
Spec-Guaranteed Humidity	≤ 85% RH (without condensation)
Operating Environment	Indoor use
Operating Altitude	Up to 2,000 m
Overvoltage Category	II
Pollution Degree	2
Power Requirements	
Voltage	90 to 250 VAC (no switching necessary)
Frequency	50/60 Hz
Power Consumption	25 Wmax.
Dimensions	426(W) × 44(H) × 400(D) mm (LT 4440) 426(W) × 44(H) × 560(D) mm (LT 444) (excluding protrusions)
Weight	3.5 kg (LT 4440) 4.0 kg (LT 444)
Accessories	Rack supports ..... 2 Rack support attachment screws .... 4 Power cord ..... 1 Instruction manual ..... 1 Cover/Inlet stopper 1

3. PANEL AND DIPSWITCH DESCRIPTION

The front panel, rear panel, side panel, and dipswitch section of the LT 4440/LT 444 are indicated below.

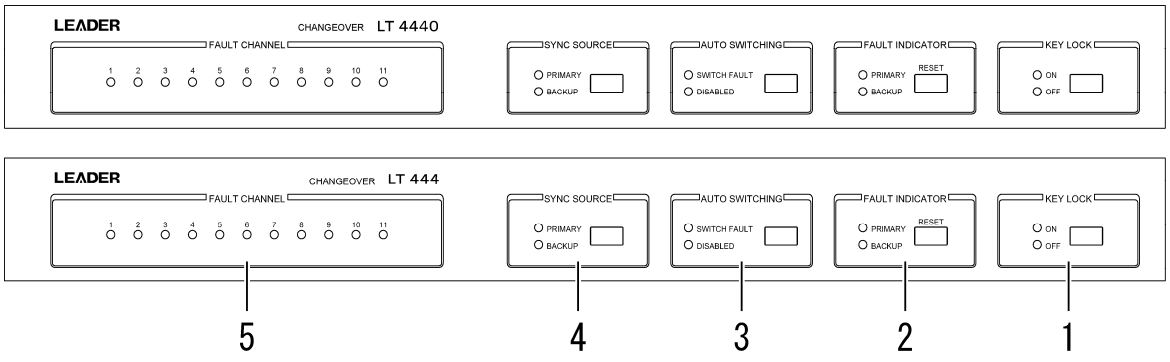


Figure 3-1 Front Panel

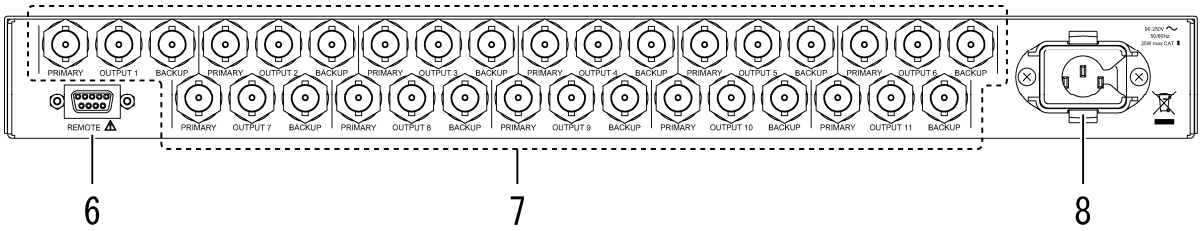


Figure 3-2 Rear Panel

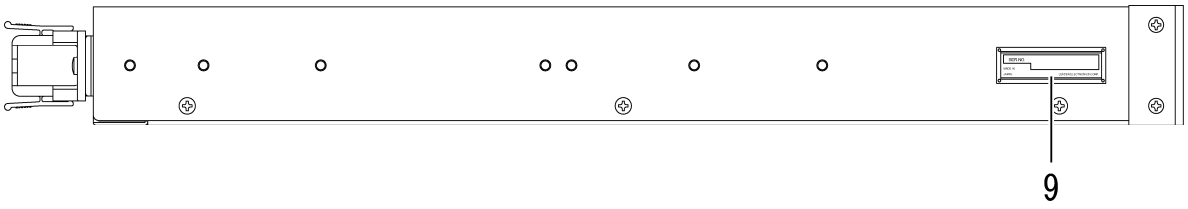


Figure 3-3 Side Panel

Removing the four screws from this cover enables you to set the internal dipswitch. This figure shows the factory default settings.

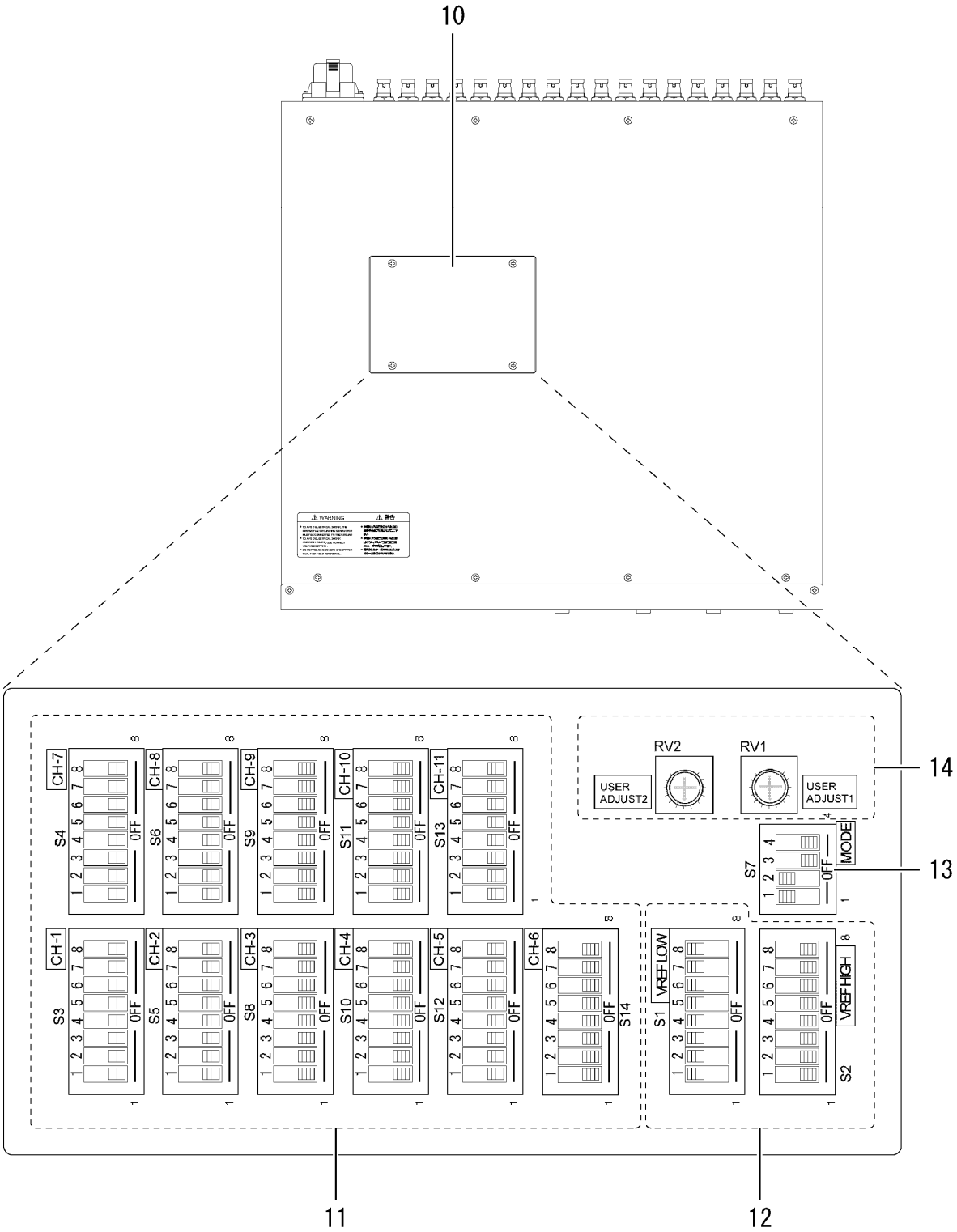


Figure 3-4 Dipswitch Section

3.1 Front Panel

Figure 3-1 shows the front panel of the LT 4440/LT 444.

1 KEY LOCK

Switch used to turn ON/OFF the key lock.
This key is also disabled while the instrument is starting up at power up.

2 FAULT INDICATOR

This LED blinks when a level error is detected.
This LED keeps blinking even if the error is cleared.
The LED is cleared by clearing the error and pressing the RESET key.

3 AUTO SWITCHING

Switch used to set the operation mode to SWITCH FAULT or DISABLED when an error is detected.

4 SYNC SOURCE

Switch used to manually switch the signal passed to OUTPUT between PRIMARY and BACKUP input.

5 FAULT CHANNEL

The LED of the channel on which a level error was detected keeps illuminating.
This LED keeps illuminating even if the error is cleared.
The LED is cleared by clearing the error and pressing the RESET key.

3.2 Rear Panel

Figure 3-2 shows the rear panel of the LT 4440/LT 444.

6 REMOTE

Connector for remote control. It also has a level error status output.

7 PRIMARY/BACKUP/OUTPUT

OUTPUT connector that passes the signal from the PRIMARY or BACKUP signal connector.

8 AC inlet

Connect the power cord that came with the instrument. The operating supply voltage range is 90 VAC to 250 VAC.
A fuse socket is under the AC inlet.

3.3 Side Panel

Figure 3-3 shows the side panel of the LT 4440/LT 444.

9 Serial Number

Provide this number when contacting LEADER.

3.4 Dipswitch Section

Figure 3-4 shows the dipswitch section of the LT 4440/LT 444.

10 Dipswitch cover

Removing the four screws from this cover enables you to set the internal dipswitch.

11 Signal selection switches CH1 to CH11

Dipswitches used to select the signal type for CH1 to CH11.

12 Error detection level selection switch

Switch used to set the error detection sensitivity to high level or low level for each signal type selected.

13 Mode selection switch

Switch used to set the operation mode.

14 User defined volume

Adjust the USER ADJUST1 and USER ADJUST2 dials to adjust the error detection levels.

3.5 Detailed Description of the Front Panel

Table 3-1 Front panel functions

No.	Key Name	LED Name	Description
1	KEY LOCK		KEY LOCK ON/OFF switch.
		ON	Illuminates when KEY LOCK is ON.
		OFF	Illuminates when KEY LOCK is OFF.
2	FAULT INDICATOR (RESET)		Use this key to clear the PRIMARY or BACKUP LED under FAULT INDICATOR. (Valid only when KEY LOCK is OFF.)
		PRIMARY	This LED keeps blinking when a level error is detected when SYNC SOURCE is set to PRIMARY.
		BACKUP	This LED keeps blinking when a level error is detected when SYNC SOURCE is set to BACKUP.
3	AUTO SWITCHING		Switch used to set the operation mode to SWITCH FAULT or DISABLED. (Valid only when KEY LOCK is OFF.)
		SWITCH FAULT	When a level error is detected in the signal being passed to OUTPUT, a switch is made to the other signal (PRIMARY/BACKUP).
		DISABLED	Auto switching is not performed even when a level error is detected in the signal being passed OUTPUT
4	SYNC SOURCE		Switch used to manually switch the signal passed to OUTPUT between PRIMARY and BACKUP input. (Valid only when KEY LOCK is OFF.)
		PRIMARY	Indicates that the PRIMARY input signal is currently being passed to OUTPUT. Common to CH1 to CH11.
		BACKUP	Indicates that the BACKUP input signal is currently being passed to OUTPUT. Common to CH1 to CH11.
5	FAULT CHANNEL		When the FAULT INDICATOR illuminates due to a level error, the corresponding channel LED illuminates.
		1～11	The LED of the channel on which a level error was detected illuminates. You can clear the LED using the FAULT INDICATOR key. (Clearing is valid only when KEY LOCK is OFF.)

3.6 Detailed Description of the Dipswitch Section

Table 3-2 Signal selection switch (CH1 to CH11)

No.	SW No.	Selection Signal
11	All OFF	Disable (no error detection)
	SW1 : ON	NTSC Black Burst
	SW2 : ON	PAL Black Burst
	SW3 : ON	SD-SDI (143 Mb/s)
	SW4 : ON	SD-SDI (270 Mb/s) Tri-Level sync
	SW5 : ON	AES/EBU digital audio
	SW6 : ON	User Define 1 (adjust using USER ADJUST1)
	SW7 : ON	User Define 2 (adjust using USER ADJUST2)
	SW8 : ON	CH 1 to 6 : HD-SDI CH 7 to 11 : Attenuation

* Multiple selections on one dipswitch are prohibited except for Attenuation (SW8 on CH7 to CH11).

Table 3-3 Error detection low level selection switch (VREF LOW)

No.	SW No.	Error Detection Level Selection
12	All OFF	Disable (no error detection)
	SW1 : ON	Select low level for NTSC Black Burst
	SW2 : ON	Select low level for PAL Black Burst
	SW3 : ON	Select low level for SD-SDI (143 Mb/s)
	SW4 : ON	Select low level for SD-SDI (270 Mb/s) Select low level for tri-level sync
	SW5 : ON	Select low level for AES/EBU digital audio
	SW6 : ON	Select user-defined level 1 (common to high level and low level)
	SW7 : ON	Select user-defined level 2 (common to high level and low level)
	SW8 : ON	Channels 1-6: Select low level for HD-SDI

* Selecting both the error detection low level selection switch and error detection high level selection switch on each signal is prohibited. For details, see section 4.4, “Setting the Error Detection Level.”

Table 3-4 Error detection high level selection switch (VREF HIGH)

No.	SW No.	Error Detection Level Selection
12	All OFF	Disable (no error detection)
	SW1 : ON	Select high level for NTSC Black Burst
	SW2 : ON	Select high level for PAL Black Burst
	SW3 : ON	Select high level for SD-SDI (143 Mb/s)
	SW4 : ON	Select high level for SD-SDI (270 Mb/s) Select high level for tri-level sync
	SW5 : ON	Select high level for AES/EBU digital audio
	SW6 : ON	Select user-defined level 1 (common to high level and low level)
	SW7 : ON	Select user-defined level 2 (common to high level and low level)
	SW8 : ON	Channels 1-6: Select high level for HD-SDI

* Selecting both the error detection low level selection switch and error detection high level selection switch on each signal is prohibited. For details, see section 4.4, “Setting the Error Detection Level.”

Table 3-5 Mode selection switch (MODE)

No.	SW No.	Error Detection Level Selection
13	SW1	Switch operation mode OFF : Override Operation ON : Normal Operation
	SW2	Power Up Delay OFF : SLOW Mode ON : FAST Mode
	SW3	Not used
	SW4	Not used

4. OPERATING PROCEDURE

4.1 Signal Inputs and Outputs

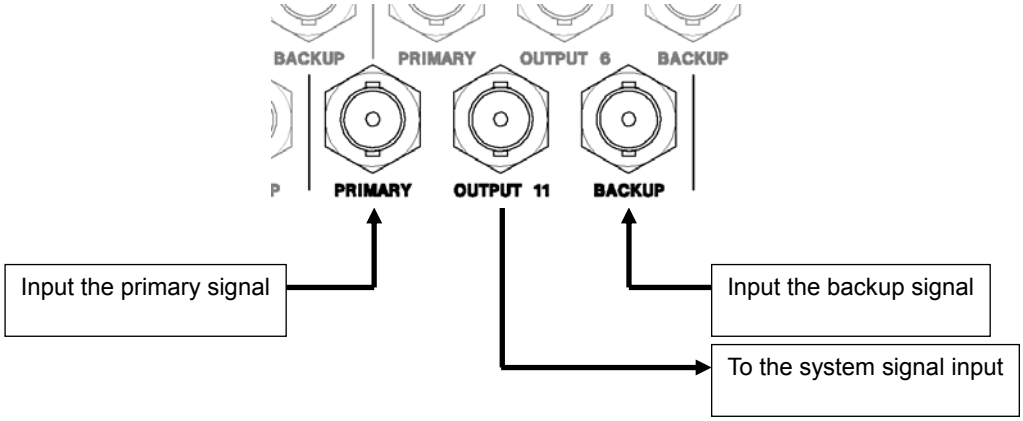


Figure 4-1 Signal Inputs and Outputs

At the BNC terminal on the rear panel, apply the primary signal to the PRIMARY connector and the backup signal to the BACKUP connector. The OUTPUT connector outputs either the PRIMARY or the BACKUP signal.

CAUTION

Both input and output connectors are designed for 75Ω systems. The signals applied to PRIMARY and BACKUP must be of 75Ω impedance. In addition, the output from OUTPUT must be terminated at 75Ω. Signals that are not selected by PRIMARY and BACKUP of SYNC SOURCE are terminated internally at 75Ω.

* When applying HD-SDI signals, use CH1 to CH6.
* When operating in attenuator mode, use CH7 to CH11.

4.2 Turning the Dipswitches ON/OFF

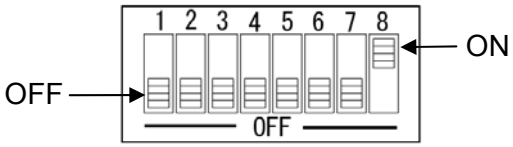


Figure 4-2 ON/OFF of a dipswitch

When the slide switch of the dipswitch is in the ON position in Figure 4-2, the switch is ON; when the slide switch is in the OFF position, the switch is OFF.

4.3 Setting the Error Detection Signal

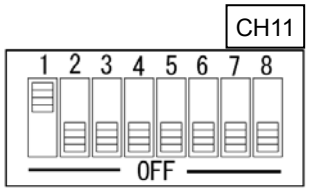


Figure 4-3 Error Detection Setting

<Example>
Refer to Table 3-4, “Signal selection switch (CH1 to CH11)” and set the dipswitch according to the type of input signal. When applying NTSC BLACK BURST to the CH11 input connector, set dipswitch SW1 for CH11 to ON. If the setting and input signal are not matched, erroneous operation will result.

This enables the error check of the NTSC BB input signal. If the switch is set to OFF, error check is not performed even when the input signal is in error, and the signal is assumed to be normal.

If you do not apply a signal that corresponds to the switch setting, an error occurs. In this case, the front panel FAULT CHANNEL 11 LED illuminates, and the PRIMARY and BACKUP LEDs under FAULT INDICATOR blink.

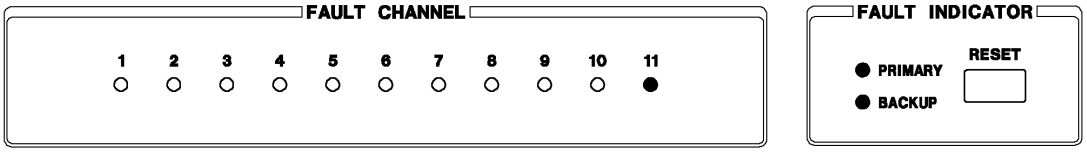


Figure 4-4 Error indication example

4.4 Setting the Error Detection Level

4.4.1 Low Level Setting

For normal error detection level, set dipswitch as shown in Figure 4-5, “Low level setting”, All VREF LOW switches are turned ON and all VREF HIGH switches are turned OFF.

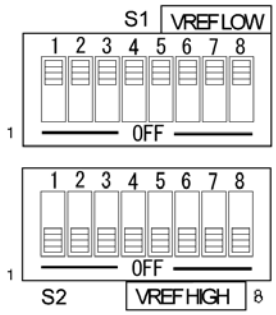


Figure 4-5 Low level setting

4.4.2 High Level Setting

If you wish to set the error detection to high level, set the VREF LOW switch (SW1 to SW8) of dipswitch corresponding to the signal to OFF and VREF HIGH switch to ON.
However, if the signal level fluctuation is large or large amount of noise is present in the signal, erroneous operation may occur due the error detection being activated.
Figure 4-6, “High level setting” shows an example in which the detection level of the AES/EBU digital audio is set to high level.

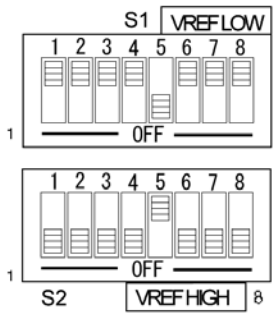


Figure 4-6 High level setting

4.4.3 Example of Incorrect Level Setting

Figure 4-7, “Example of incorrect level setting” shows an example in which the error detection level is set incorrectly. The setting is incorrect, because VREF LOW and VREF HIGH of SW1 of dipswitch are both set to ON. Only either of the two can be turned ON.
Note that incorrect setting will result in erroneous operation of the level detection.

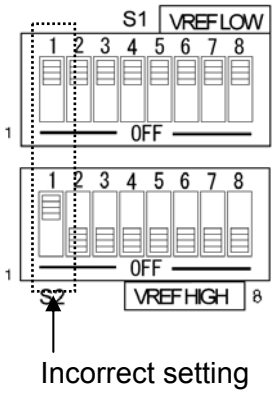


Figure 4-7 Example of incorrect level setting

4.5 USER Settings

The LT 4440/LT 444 automatically selects the detection level of the signal according to the signal selection switch. However, if you are using a signal other than those that are available, you can set the detection level using the USER volume. Two USER volumes are available. You can adjust the USER ADJUST1 and USER ADJUST2 dials to adjust the two error detection levels.

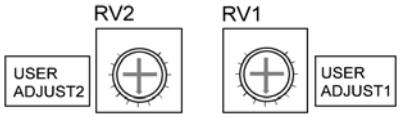


Figure 4-8 User-defined volume

Table 4-1 Error Detection Level

Name	Error Detection Level [mV]
Attenuator OFF	-100 to -700
Attenuator ON *	-700 to -3500

* For a description of attenuator ON, see section 4.6, “Attenuator Function.”

4.5.1 USER Setting Example

The example below assumes that a C.SYNC signal between 0 to -4V is applied to PRIMARY and BACKUP of CH7.

1. Turn KEY LOCK OFF in advance.
2. Prepare the signal source to be connected. (Signal level detection is possible in the range of -100 to -3500 mV including the operation with the attenuator turned ON.)
3. Turn ON SW7 and SW8 of CH7 signal selection switch.
4. Connect the input signal to the PRIMARY input connector through the 3- to 6-dB attenuator.
5. While turning the USER ADJUST2 volume, press the FAULT INDICATOR RESET key repeatedly, and stop when PRIMARY of FAULT INDICATOR turns OFF.
6. Turn USER ADJUST2 volume back slowly and stop when the PRIMARY LED of FAULT INDICATOR starts blinking.
7. Remove the 3 to 6dB attenuator and connect the input signal to the PRIMARY and BACKUP input connectors.
8. Check that the PRIMARY and BACKUP LEDs of FAULT INDICATOR are OFF, and the setting is complete.

4.6 Attenuator Function

SW8 of dipswitch CH7 to CH11 is the attenuator function. If the input signal is five times the specifications, you can turn SW8 ON to perform error check by passing the input signal through the attenuator. However, the output signal is output as-is with the input signal bypassing the attenuator.
Use the attenuator function in conjunction with the USER setting mode.

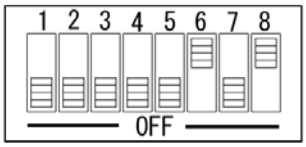


Figure 4-9 Attenuator Function

4.7 Powering Up

Check that the plug of the power cord that came with the instrument is not connected to the outlet and insert the power cord connector into the AC inlet. Then, connect the power plug to the outlet. Since there is no power switch on the instrument, the power is ON when you connect the power plug.
When the power is applied, the instrument starts up. The front panel keys are disabled while the instrument is starting up.
The startup time varies depending on the MODE switch setting.

Table 4-2 Startup time at power up

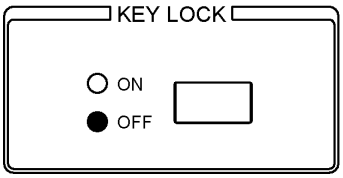
MODE Switch Setting	Startup Time	MODE
SW2:ON	Approx. 1 minute	FAST MODE
SW2:OFF	Approx. 4 minutes	SLOW MODE

While starting up, the ON and OFF LEDs of PRIMARY, SWITCH FAULT, and KEY LOCK illuminate, and the DISABLED LED blinks. When the startup time is over, the ON LEDs of PRIMARY, SWITCH FAULT, and KEY LOCK illuminate.

4.8 Powering Down

To power down the instrument, disconnect the power cord plug at the power supply end (since there is no power switch). You will hear a click inside the instrument. This is not a malfunction. It is the sound of the relay switching to the PRIMARY side due to the power turning OFF.

4.9 Key Lock Function

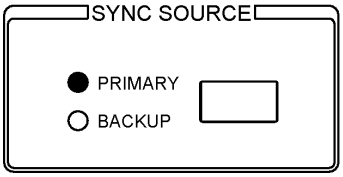


When key operation is enabled

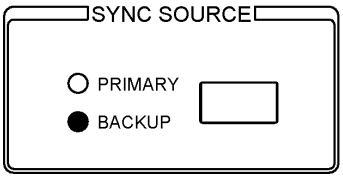
Figure 4-10 KEY LOCK Release

You can operate the front panel keys by turning OFF KEY LOCK on the front panel. However, if no key operation is detected for approximately 1 minute, KEY LOCK automatically turns ON and disables key operation.

4.10 Output Signal Switching



When the PRIMARY signal is selected



When the BACKUP signal is selected

Figure 4-11 Output signal indication

You can switch the output signal by pressing the SYNC SOURCE key.
(However, switching may not be possible depending on the setup conditions.)
The output signal switches to PRIMARY when the power is turned off.

4.11 Error Signal Release Operation

<Example 1>
When a level error is detected on CH1 PRIMARY, the PRIMARY LED of FAULT INDICATOR blinks and the FAULT CHANNEL 1 LED illuminates.

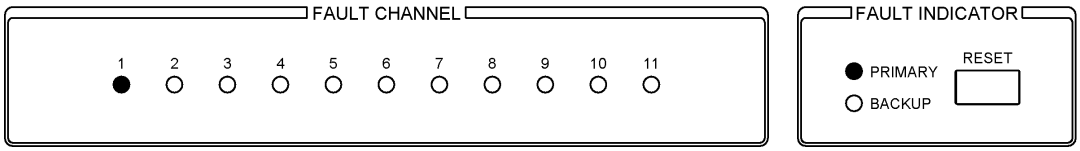


Figure 4-12 Error detection example 1

To release the error, apply a normal signal to CH1 PRIMARY and press the RESET key of the FAULT INDICATOR section.
(However, key operation is enabled only when KEY LOCK is OFF.)

The error is released when the PRIMARY and FAULT CHANNEL 1 LEDs turn OFF.
(The error release procedure for BACKUP error as well as both PRIMARY and BACKUP errors is also the same.)

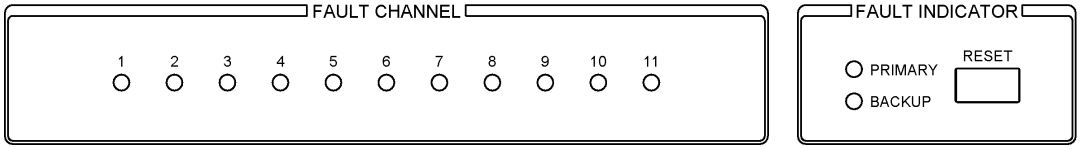


Figure 4-13 Releasing the error of example 1

<Example 2> When errors occur on multiple channels
When an error is detected on CH1 PRIMARY and CH3 BACKUP, the PRIMARY and BACKUP LEDs blink and the FAULT CHANNEL 1 and FAULT CHANNEL 3 LEDs illuminate.

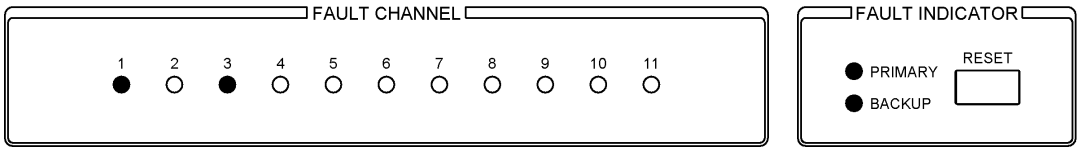


Figure 4-14 Error detection example 2

If a normal signal is applied to CH1 PRIMARY but CH3 BACKUP remains in error and you press the RESET key of the FAULT INDICATOR section, the PRIMARY and FAULT CHANNEL 1 LEDs turn OFF, but the BACKUP LED remains blinking, and the FAULT CHANNEL 3 LED remains illuminated.

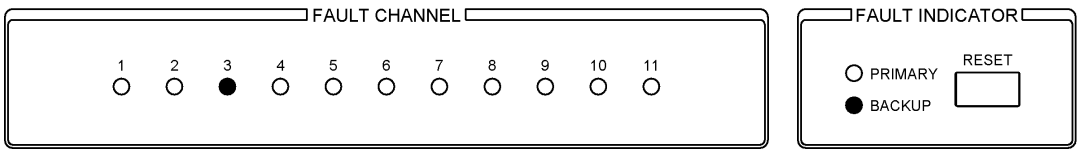
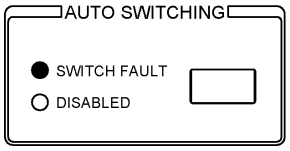


Figure 4-15 Releasing the error of example 2

4.12 Auto Switching Function

When set to SWITCH FAULT, a switch is made to the other signal (PRIMARY/BACKUP) when a level error is detected in the signal being passed to OUTPUT.
Use this setting in the normal case.



If an error is detected and a switch is made from the PRIMARY to BACKUP and then the error of PRIMARY is corrected and an error occurs in the BACKUP signal, the signal is not switched automatically back to PRIMARY (while the PRIMARY LED of FAULT INDICATOR remains blinking and you do not press the RESET key).

When set to DISABLED, auto switching is not performed even when a level error is detected in the signal being passed OUTPUT.
Use this setting if you only wish to detect errors and not perform auto switching.

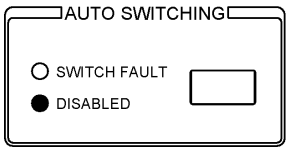


Figure 4-16 Auto Switching

4.12.1 When set to NORMAL and AUTO SWITCHING SWITCH FAULT

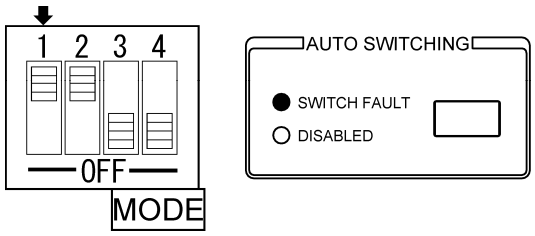


Figure 4-17 NORMAL and AUTO SWITCHING SWITCH FAULT

The output signal is automatically switched to the normal input signal.
The output signal maintains the current setting when both signals are normal or erroneous. You can change this so that output signal is toggled by switching the SYNC SOURCE switch.
Use this setting in the normal case.

4.12.2 When set to NORMAL and AUTO SWITCHING DISABLED

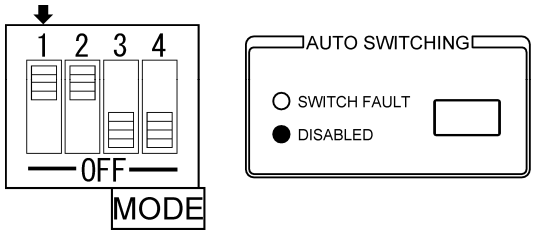


Figure 4-18 NORMAL and AUTO SWITCHING DISABLED

The output signal maintains the current setting regardless of the status of the input signal.
If you switch the SYNC SOURCE switch, the output signal can be toggled when both the input signals are normal or erroneous. If only one of input signals is normal, the output switches to the normal input signal. Switch to the error signal is not possible.
Normally, use the setting described in section 4.12.1, “When set to NORMAL and AUTO SWITCHING SWITCH FAULT.”

4.12.3 When set to OVERRIDE and AUTO SWITCHING SWITCH FAULT

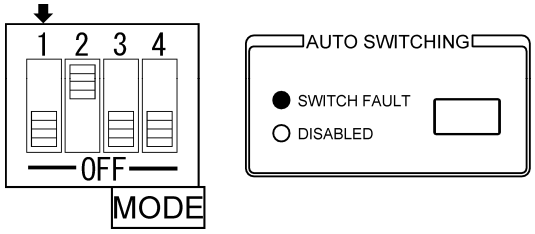


Figure 4-19 OVERRIDE and AUTO SWITCHING SWITCH FAULT

The operation of this combination is the same as the operation described in section 4.12.1, “When set to NORMAL and AUTO SWITCHING SWITCH FAULT.”
See 4.12.1.

4.12.4 When set to OVERRIDE and AUTO SWITCHING DISABLED

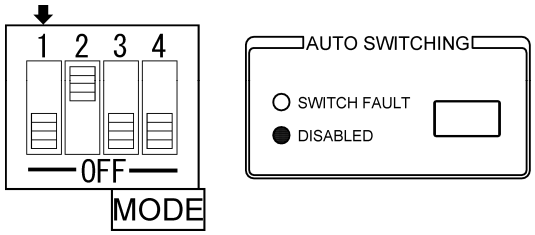


Figure 4-20 OVERRIDE and AUTO SWITCHING DISABLED

The output signal maintains the current setting regardless of the status of the input signal.
If you switch the SYNC SOURCE switch, the output signal can be toggled regardless of the status of the input signal.
Normally, use the setting described in section 4.12.1, “When set to NORMAL and AUTO SWITCHING SWITCH FAULT.”

4.13 LIST OF OPERATING STATUS

Normally, use the shaded settings.
Settings of other sections are available for manual operation and maintenance. They are not usually used.

Table 4-3 List of operating status

Settings		Input Signal Status		SYNC SOURCE : PRIMARY		SYNC SOURCE : BACKUP	
MODE	AUTO SWITCHING	PRIMARY	BACKUP	OUTPUT	SYNC SOURCE SW	OUTPUT	SYNC SOURCE SW
NORMAL	SWITCH FAULT	Fault	Fault	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Fault	Normal	Switch to BACKUP	Switch to BACKUP	Remains at BACKUP	Remains at BACKUP
		Normal	Fault	Remains at PRIMARY	Remains at PRIMARY	Switch to PRIMARY	Switch to PRIMARY
		Normal	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
NORMAL	DISABLED	Fault	Fault	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Fault	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Remains at BACKUP
		Normal	Fault	Remains at PRIMARY	Remains at PRIMARY	Remains at BACKUP	Switch to PRIMARY
		Normal	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
OVERRIDE	SWITCH FAULT	Fault	Fault	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Fault	Normal	Switch to BACKUP	Switch to BACKUP	Remains at BACKUP	Remains at BACKUP
		Normal	Fault	Remains at PRIMARY	Remains at PRIMARY	Switch to PRIMARY	Switch to PRIMARY
		Normal	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
OVERRIDE	DISABLED	Fault	Fault	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Fault	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Normal	Fault	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY
		Normal	Normal	Remains at PRIMARY	Switch to BACKUP	Remains at BACKUP	Switch to PRIMARY

5. REMOTE CONTROL

Connector used : Dsub 9 pin female (Inch screws for fixing the shell)

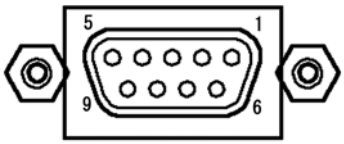
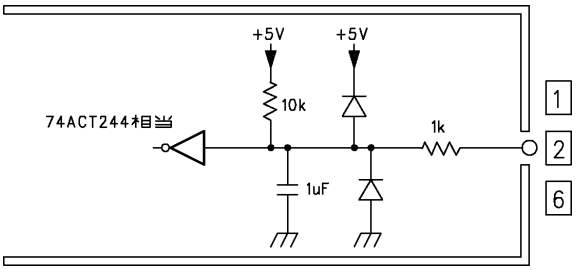
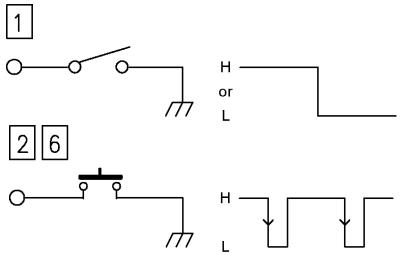
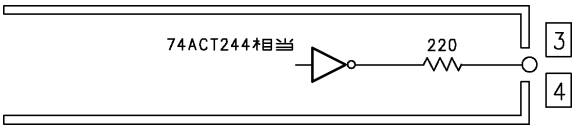
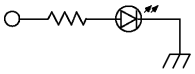
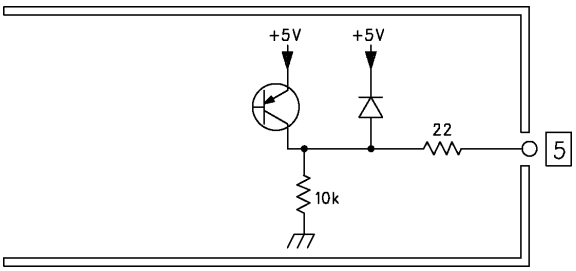
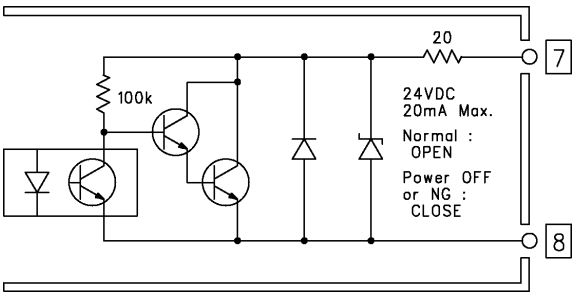


Figure 5-1 REMOTE connector

Table 5-1 Remote connector functions

Pin No.	Name	I/O	Description
1	AUTO SWITCHING	I	When the front-panel AUTO SWITCHING is set to SWITCH FAULT, applying a low signal sets AUTO SWITCHING to DISABLED, and applying a high signal (or opening the circuit) sets AUTO SWITCHING to SWITCH FAULT. When the front-panel AUTO SWITCHING is set to DISABLED, remote control is not possible. Set AUTO SWITCHING to SWITCH FAULT using keys to enable remote control.
2	SYNC SOURCE	I	Each time a low signal is applied, SYNC SOURCE switches between PRIMARY and BACKUP.
3	SYNC SOURCE (PRIMARY)	O	Transmits a high signal when SYNC SOURCE is set to PRIMARY.
4	SYNC SOURCE (BACKUP)	O	Transmits a high signal when SYNC SOURCE is set to BACKUP.
5	FAULT INDICATOR	O	Transmits a high signal when an error occurs in PRIMARY or BACKUP. Even when the error clears, the LT 4440/LT 444 retains the high signal until the error is reset.
6	RESET	I	Apply a low signal to reset errors.
7	FAULT INDICATOR+	O	Open during normal operation. Conducts current when the power is not on or when there is an error in the input signal. Use these pair of pins when you want to electrically isolate the connected device from the LT 4440/LT 444. (There is a photocoupler inside the LT 4440/LT 444 that is used for isolation.)
8	FAULT INDICATOR-		
9	GND	-	Ground

Table 5-2 Remote connector I/O specifications

Pin No.	I/O	I/O Specifications	Connection example
1 2 6	I		Connect a switch to apply a low signal. Connect one side of the switch to the remote connector and the other side to ground. 
3 4	O		Connect an LED so that it will light when a high signal is transmitted. Connect the anode to the remote connector and the cathode to ground. 
5	O		
7 8	O		-

6. APPLICATIONS

A setup example is given for the case when CH1 is set to NTSC BB, CH2 is set to HD-SDI, CH3 is set to DIGITAL AUDIO, and all other channels are set to no input signal.

6.1 Connection

In this example, the signals are connected as shown in Figure 6-1.
(However, do not connect the signals until the setup is complete in order to prevent erroneous operation on the receiving device.)

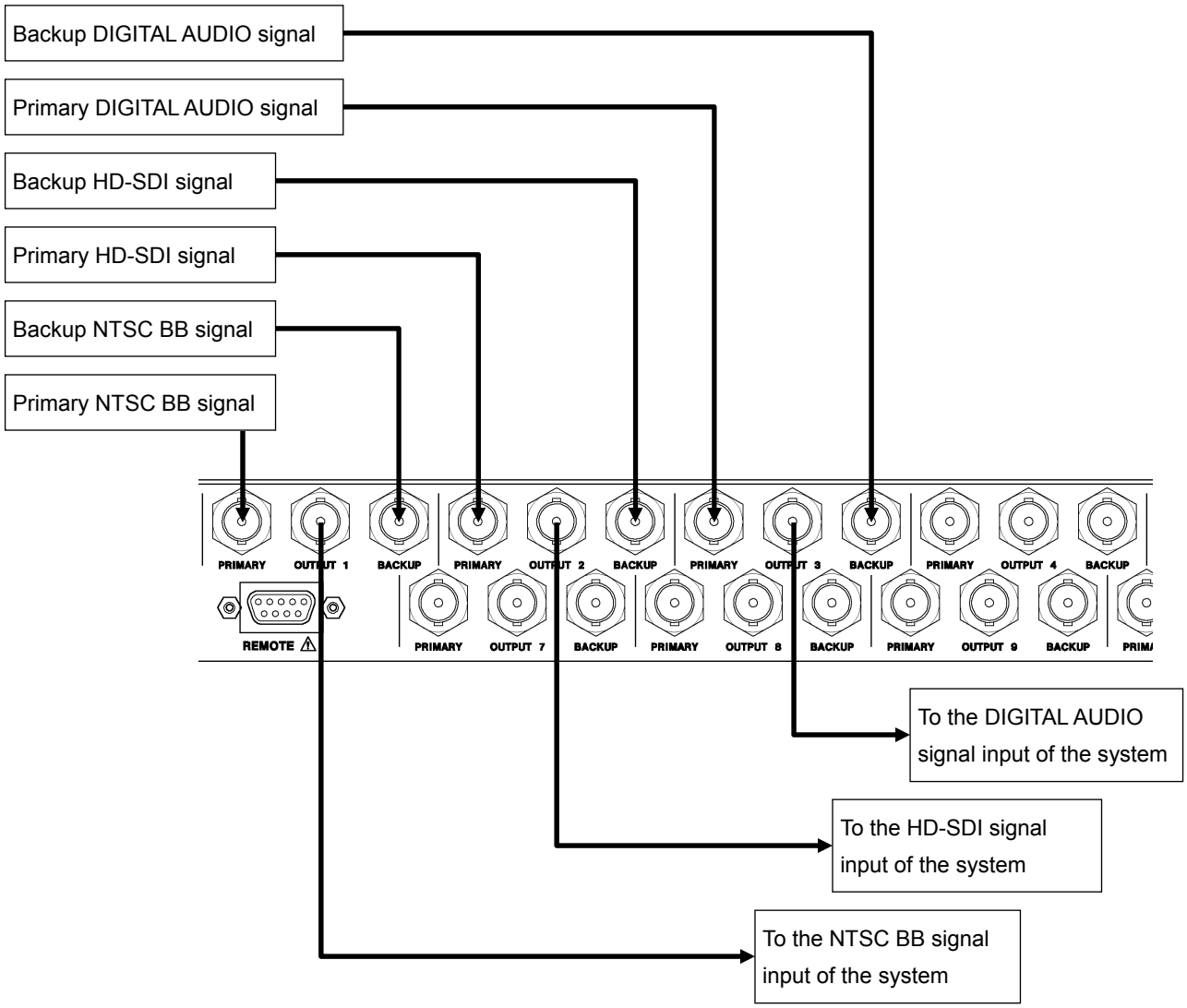


Figure 6-1 Connection example

6.2 Dipswitch Setup Procedure

1. Remove the four screws from the dipswitch cover on the top of the instrument.
2. Refer to Table 3-4, “Signal selection switch (CH1 to CH11)” and set the dipswitch so that CH1 is set to NTSC BB, CH2 is set to HD-SDI, CH3 is set to DIGITAL AUDIO, and all other channels are set to no input signal. Set all the dipswitches for CH4 to CH11 to OFF.
3. Set the error detection sensitivity. Normally, select VREF LOW.
4. Set the MODE switch. Normally set SW1 to Normal Operation and SW2 to FAST Mode.
5. For the dipswitch settings, see Figure 6-2, “Dipswitch Setup Example.”
6. Set KEY LOCK to OFF and check that a normal signal is output from OUTPUT regardless of whether SYNC SOURCE is set to PRIMARY or BACKUP.
7. Connect the OUTPUT signal to the system and attach the dipswitch cover on the top of the instrument.

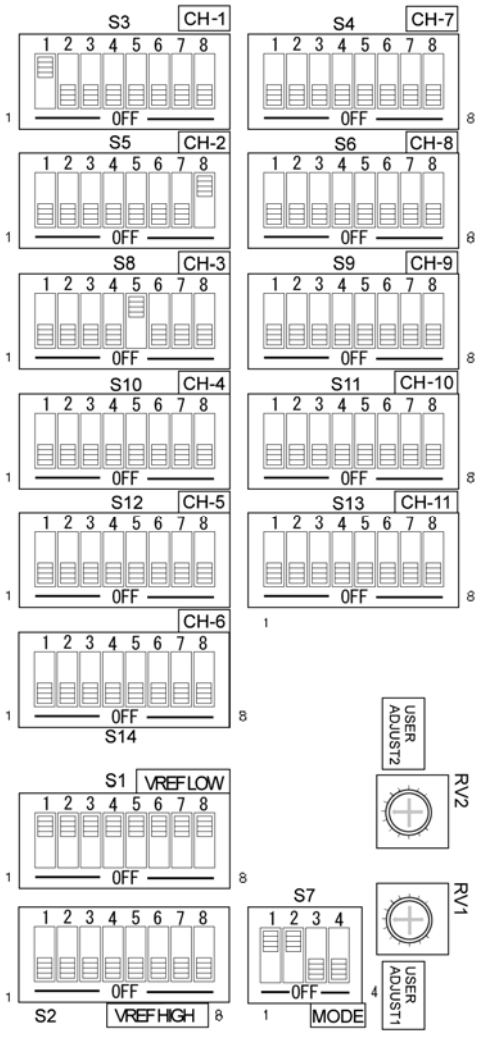


Figure 6-2 Dipswitch Setup Example

6.3 Panel Setup

The panel setup for the example is described below.

1. Press the KEY LOCK key to illuminate the OFF LED.
2. Press the SYNC SOURCE key to illuminate the PRIMARY LED.
3. Press the AUTO SWITCHING key to illuminate the SWITCH FAULT LED.
4. Check that the PRIMARY and BACKUP LEDs of FAULT INDICATOR are not illuminated.
5. Press the KEY LOCK key to illuminate the ON LED.

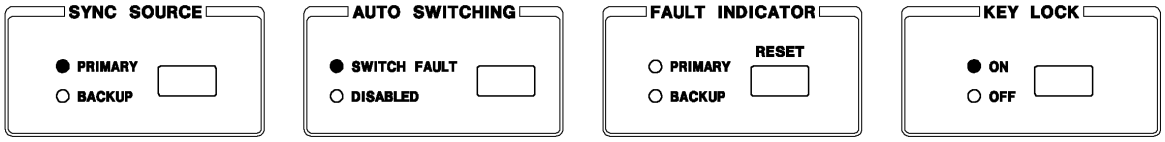


Figure 6-3 Panel Setup Example

7. FACTORY DEFAULT SETTINGS

Below are the factory default settings of the dipswitch on the LT 4440/LT 444.
Error detection on all channels is disabled. Set the dipswitch according to the type of signal used before starting operation.

Table 7-1 Factory default dipswitch settings

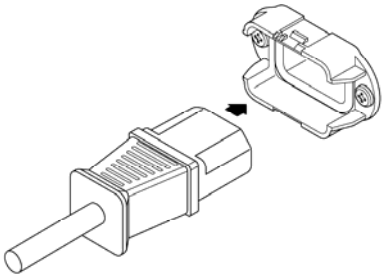
Dipswitch Setup Item	Description	Dipswitch Setting
MODE	NORMAL	MODE SW1: ON
Startup time	Approx. 1 minute	MODE SW2: ON
Error detection level selection switch	Low level	VREF LOW SW1 to SW8 : All ON VREF HIGH SW1 to SW8 : All OFF
Signal selection switch	Signal not selected	SW1 to SW8 of CH1 to CH11 : All OFF

8. PREVENTING POWER CORD DESCRIPTION

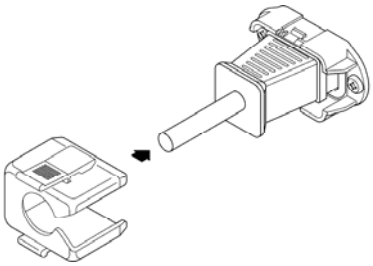
To prevent power cord disconnection from the AC inlet, the Cover/Inlet stopper is supplied with the instrument. Refer to the procedure below.

8.1 Connecting the Power Cord

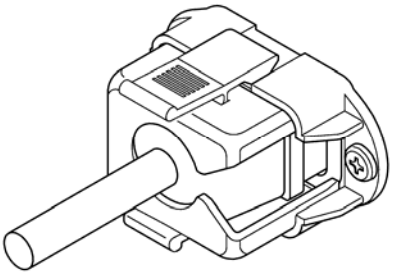
1 Insert the power cord connector into the AC inlet.



2 Place the Cover/Inlet stopper on top of the connector as shown below.



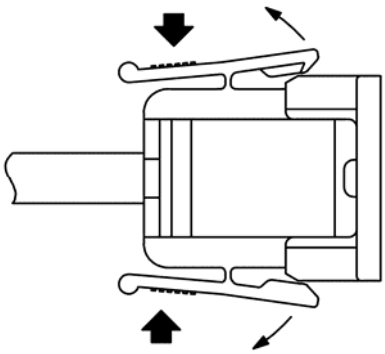
3 Press the cover until it clicks into place.



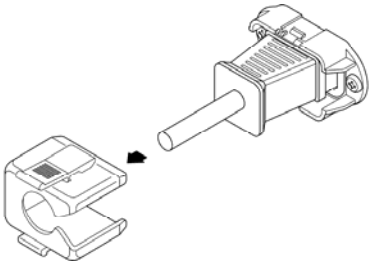
4 Confirm that the Cover/Inlet stopper is locked to the base.

8.2 Disconnecting the Power Cord

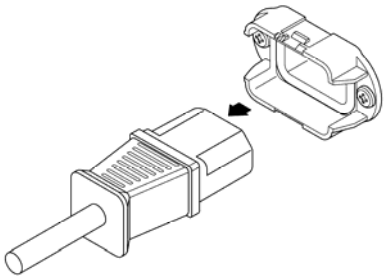
1 Press the levers on the Cover/Inlet stopper with your fingers to release the lock.



2 Remove the Cover/Inlet stopper from the base.



3 Disconnect the power cord connector from the AC inlet.



9. MAINTENANCE

The LT 4440/LT 444 is designed to operate stably under normal handling. If you have questions regarding output calibration and service, contact your local Leader agent.

Following information is for Chinese RoHS only

所含有毒有害物质信息

部件号码: LT 444/4440

此标志适用于在中国销售的电子信息产品,依据2006年2月28日公布的《电子信息产品污染控制管理办法》以及SJ/T11364-2006《电子信息产品污染控制标识要求》，表示该产品在使用完结后可再利用。数字表示的是环境保护使用期限，只要遵守与本产品有关的安全和使用上的注意事项，从制造日算起在数字所表示的年限内，产品不会产生环境污染和对人体、财产的影响。
产品适当使用后报废的方法请遵从电子信息产品的回收、再利用相关法令。
详细请咨询各级政府主管部门。

产品中有毒有害物质或元素的名称及含量

部件名称 Parts	有毒有害物质或元素 Hazardous Substances in each Part					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
实装基板	×	○	○	○	○	○
主体部	×	○	○	○	○	○
上盖	○	○	○	○	○	○
底座	○	○	○	○	○	○
前框	○	○	○	○	○	○
電源部	×	○	○	○	○	○
线材料一套	○	○	○	○	○	○
附件	○	○	○	○	○	○
包装材	○	○	○	○	○	○

备注）

○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 规定的限量要求以下。

×：表示该有毒有害物质或元素至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。

Ver.2

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