

# **OPERATION MANUAL**

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**MFR-6000**

Multi Format Routing Switcher

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**MFR-GPI**

**MFR-TALM**

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1<sup>st</sup> Edition - Rev.1

# Edition Revision History

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Edit.	Rev.	Date	Description	Section/Page
1	-	2018/10/22	First edition	
1	1	2019/04/19	Description errors corrected.	Throughout

# Precautions

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## Important Safety Warnings

### [Power]

 Caution	Operate unit <b>only</b> at the specified supply voltage.
 Stop	Disconnect the power cord via the power plug only. Do <b>not</b> pull on the cable portion.
 Stop	Do <b>not</b> place or drop heavy or sharp-edged objects on the power cord. A damaged cord can cause fire or electrical shock hazards. Regularly check the power cord for excessive wear or damage to avoid possible fire / electrical hazards.
 Caution	Ensure the power cord is firmly plugged into the AC outlet.

### [Grounding]

 Caution	<b>Ensure</b> the unit is properly grounded at all times to prevent electrical shock.
 Hazard	Do <b>not</b> ground the unit to gas lines, units, or fixtures of an explosive or dangerous nature.

### [Operation]

 Hazard	Do <b>not</b> operate the unit under hazardous or potentially explosive atmospheric conditions. Doing so could result in fire, explosion, or other hazardous results.
 Hazard	Do <b>not</b> allow liquids, metal pieces, or other foreign materials to enter the unit. Doing so could result in fire, other hazards, or a unit malfunction.
 Stop	If a foreign material does enter the unit, turn the power off and <b>immediately</b> disconnect the power cord. Remove the material and contact an authorized service representative if damage has occurred.

### [Transportation]

 Hazard	<b>Handle</b> with care to avoid impact shock during transit, which may cause malfunction. When you need to transport the unit, use the original or suitable alternative packing material.
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## [Circuitry Access]

 Do <b>not</b> remove covers, panels, casing, or access the circuitry with power applied to the unit. Turn the power off and disconnect the power cord prior to removal. Internal servicing / adjustment of unit should only be performed by qualified personnel.
 Do <b>not</b> touch any parts / circuitry with a high heat factor. Capacitors can retain enough electric charge to cause mild to serious shock, even after the power has been disconnected. Capacitors associated with the power supply are especially hazardous.
 Unit should <b>not</b> be operated or stored with cover, panels, and / or casing removed. Operating the unit with circuitry exposed could result in electric shock / fire hazards or a unit malfunction.

## [Potential Hazards]

 Caution	If abnormal odors or noises are noticed coming from the unit, immediately turn the power off and disconnect the power cord to avoid potentially hazardous conditions. If problems similar to the above occur, contact an authorized service representative <b>before</b> attempting to operate the unit again.
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## [Rack Mount Brackets, Ground Terminal, and Rubber Feet]

 Caution	To rack-mount or ground the unit, or to install rubber feet, do not use screws or materials other than those supplied. Doing so may cause damage to the internal circuits or components of the unit. If you remove the rubber feet that are attached to the unit, do not reinsert the screws that secure the rubber feet.
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## [Consumables]

 Caution	Consumable items that are used in the unit must be periodically replaced. For further details on which parts are consumables and when they should be replaced, refer to the specifications at the end of the Operation Manual. Since the service life of the consumables varies greatly depending on the environment in which they are used, such items should be replaced at an early date. For details on replacing consumable items, contact your dealer.
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# Upon Receipt

MFR-6000 units and their accessories are fully inspected and adjusted prior to shipment. Check your received items against the packing lists below. Check to ensure no damage has occurred during shipment. If damage has occurred, or items are missing, inform your supplier immediately.

## ◆ Main Unit

ITEM	QTY	REMARKS
MFR-6000	1	
AC Cord	1 set	AC cable and retaining clip
Rack Mount Brackets	1 set	EIA standard type (Attached to unit.)
CD-ROM	1	Operation manual (PDF)
Quick Setup Guide	1	

## ◆ Input / Output Cards

ITEM	QTY	REMARKS
MFR-9SDI12G	1-16*	9 SDI-input card
MFR-9SDO12G	1-16*	9 SDI-output card
MFR-8SDIEX	1-16*	8 SDI-input card
MFR-8SDOEX	1-16*	8 SDI-output card
MFR-2SDIGB	1-11*	8 SDI-input card (Gearbox 2ch built-in)
MFR-2SDOGB		8 SDI-input card (Gearbox 2ch built-in)

\* The number of installed cards varies depending on the system configuration. See Sec. 2-1-1. "Matrix Size Chart."

## ◆ Option (for MFR-6000)

ITEM	QTY	REMARKS
MFR-CPUA	1	Redundant CPU card
MFR-PSA	1 set	Redundant power supply unit (with AC cord and AC cord retaining clip.)
MFR-8/18/39RUA MFR-18/39/40RU MFR-16RU/16RUD/16RUTA MFR-16/32/64RUW	1	Remote Control Unit

## ◆ Interface Expansion Unit

ITEM	QTY	REMARKS
MFR-GPI	1	
AC Adaptor *	1	With DC lock plug
AC Cord	1	
Rack Mount Brackets	1 set	EIA standard type
LAN Cable (straight)	1	

\* Depending on date of production, AC adaptor is supplied without DC lock plug, but with a DC cable retaining clip.

◆ **Tally Manager Unit**

ITEM	QTY	REMARKS
MFR-TALM	1	
AC Adaptor *	1	With DC lock plug
AC Cord	1	
Rack Mount Brackets (optional)	1 set	Single- or Dual-unit type EIA standard type

\* Depending on date of production, AC adaptor is supplied without DC lock plug, but with a DC cable retaining clip.

## Font Conventions

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The following conventions are used throughout this manual:

- Shaded text (such as ON) indicates **parameter values** in the menu.
- Text enclosed by a square (such as **ALARM**, **MODE**) indicates **front panel buttons** on the MFR-6000 or Remote Control Units.
- References to the MFR Series Web-based Control Software are indicated by [Web-based Control: XXX page].

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# 1. Prior to Starting

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## 1-1. Overview

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The MFR-6000 is a multi-format routing switcher that supports 12G-SDI, 3G-SDI, HD-SDI, SD-SDI, and ASI signals. Inside the 13U case a matrix of up to 144 inputs/ 144 outputs can be configured. It supports various functions such as the capability of linking multiple units, tally connections with peripheral devices, and automatic source name tracking, to allow the units to be the core product in A/V systems.

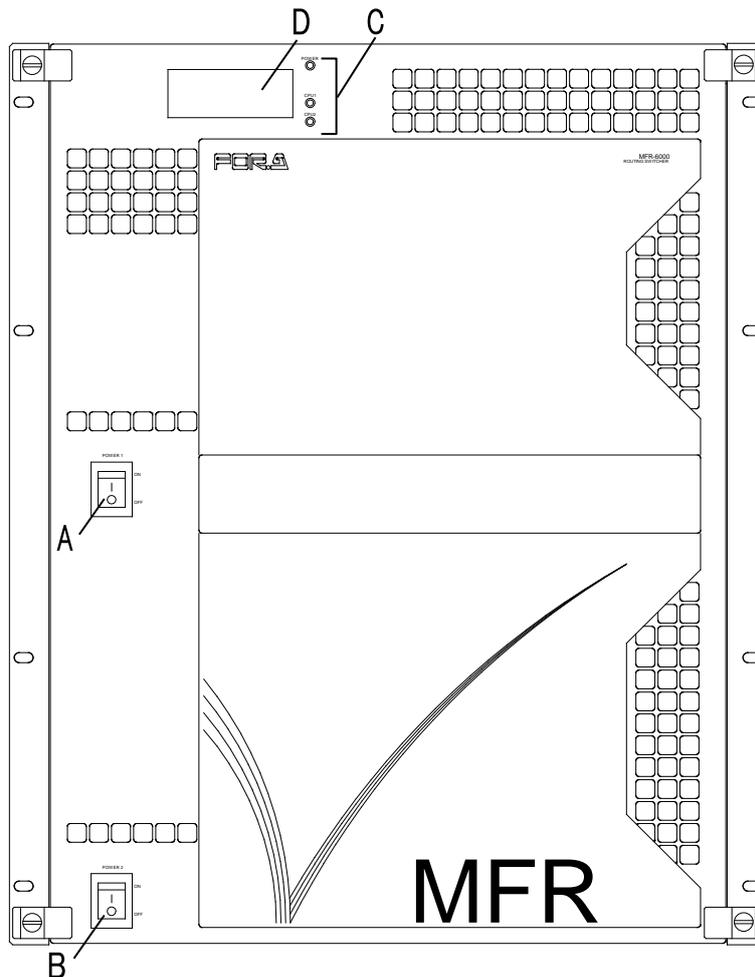
## 1-2. Features

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- Support for **12G-SDI, 3G-SDI, HD-SDI, SD-SDI, and ASI** signals with automatic signal recognition that enables operation without concern for the type of signal. Changing the input/output card enables support for **SD-SDI** signals.
- One routing switcher can be virtually partitioned to build any theoretical hierarchy, which creates possibilities for use in various operating forms.
- Various crosspoint control functions such as **Salvo, Take, Link, Level** operation, and **Chop**
- **Tally linking** with FOR-A's video switchers (HANABI Series) and multi viewers. Source name displayed on video switchers and multi viewers can be simultaneously changed according to crosspoint switches on MFR routers by TSL or Harris protocol, which also enables linkage to other companies' products.
- Built-in webserver for **remote control** through a web browser
- **SNMP support** enabling SNMP monitoring system configuration
- **Status monitoring** for power supply, fan, CPU, SDI input/output, etc.
- **CPU board redundancy** allowing monitoring of primary CPU board operation via the secondary board. Real time and smooth switching over to secondary board without down time in case of malfunctions, as well as stable remote control operation supported by **network redundancy**
- **Power unit redundancy** for stable power supply against power unit failure or power supply troubles
- Main unit front display of settings and alarms enabling the main unit to take over operation in the event a remote environment goes down.
- Matrix partition and level setting capabilities support a flexible control environment (maximum of 128 units total including main unit)
- Remote control panel connectivity for configuring a huge control panel
- Interface expansion unit (**MFR-GPI**) for additional 128 (32 x 4) GPI/O and 4 serial ports (9-pin D-sub, male)
- **MFR-TALM** Tally Manager Unit is designed specifically to manage tally and signal name data in the MFR system and exchange of this data with external devices such as video switchers, multiviewers, etc. The unit performs the task of tally data computation, ordinarily undertaken by the MFR main unit, to accelerate the task.
- Allows conversions between 12G-SDI and Quad Link 3G-SDI signals, and between 2SI and SQD, by installing optional **MFR-2SDIGB** and **MFR-2SDOGB** (Gearbox feature built-in) cards.

## 2. Panel Descriptions

### 2-1. MFR-6000 Front Panel



No.	Name	Description		
A	POWER1	Switch used to turn unit power ON / OFF.		
B	POWER2	Switch used to power ON / OFF the optional power supply.		
C	Status Indicators	POWER	Lit green	Power is supplied to the unit.
			Unlit	No power is supplied to the unit. Or power supply unit is not installed.
			Lit red	A failure has occurred. Turn off the power supply unit immediately and consult your reseller.
		CPU1	Lit green	CPU1 card (standard equipment/ Primary CPU) is active.
			Unlit	CPU1 card (standard equipment/ Primary CPU) is inactive.
			CPU2	Lit green
Unlit	CPU2 card (optional equipment/ Secondary CPU) is inactive.			
D	Menu Display	Displays menu. See Sec. 4. "Menu Display Operation" for details.		

## 2-1-1. Matrix Size Chart

### ◆ Standard SDI Signal Routing

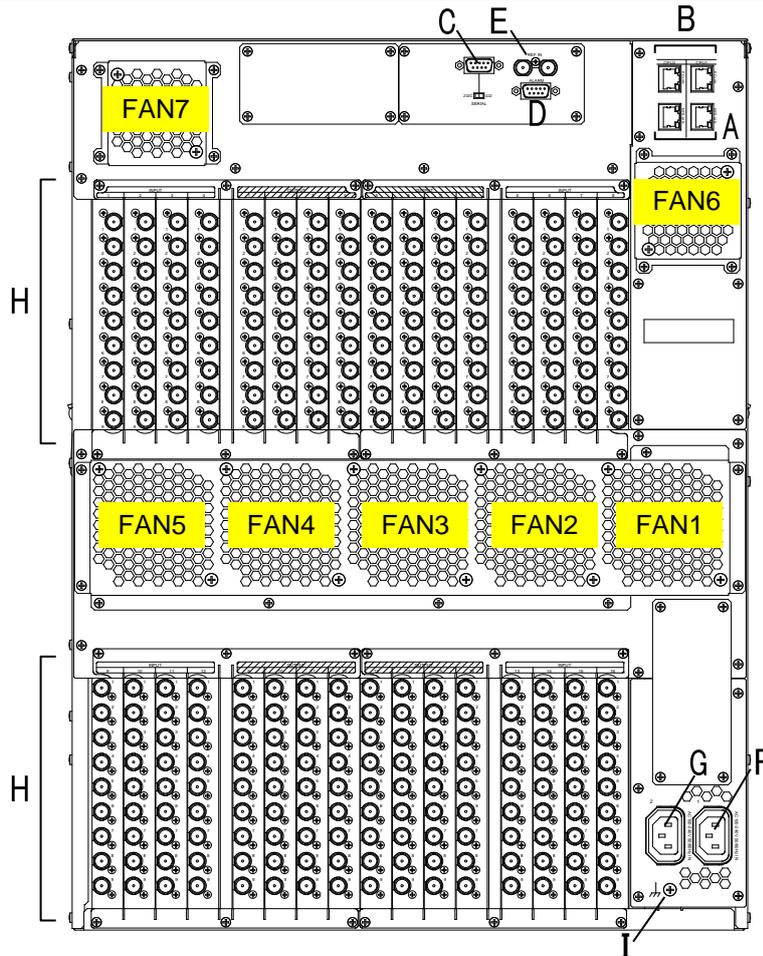
Matrix size varies depending on the number of installed MFR-9SDI12G and MFR-9SDO12G cards as shown below. (144 x 144 to 9 x 9)

		Number of cards: MFR-9SDO12G															
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Number of cards: MFR-9SDI12G	16	144 x 144	144 x 135	144 x 126	144 x 117	144 x 108	144 x 99	144 x 90	144 x 81	144 x 72	144 x 63	144 x 54	144 x 45	144 x 36	144 x 27	144 x 18	144 x 9
	15	135 x 144	135 x 135	135 x 126	135 x 117	135 x 108	135 x 99	135 x 90	135 x 81	135 x 72	135 x 63	135 x 54	135 x 45	135 x 36	135 x 27	135 x 18	135 x 9
	14	126 x 144	126 x 135	126 x 126	126 x 117	126 x 108	126 x 99	126 x 90	126 x 81	126 x 72	126 x 63	126 x 54	126 x 45	126 x 36	126 x 27	126 x 18	126 x 9
	13	117 x 144	117 x 135	117 x 126	117 x 117	117 x 108	117 x 99	117 x 90	117 x 81	117 x 72	117 x 63	117 x 54	117 x 45	117 x 36	117 x 27	117 x 18	117 x 9
	12	108 x 144	108 x 135	108 x 126	108 x 117	108 x 108	108 x 99	108 x 90	108 x 81	108 x 72	108 x 63	108 x 54	108 x 45	108 x 36	108 x 27	108 x 18	108 x 9
	11	99 x 144	99 x 135	99 x 126	99 x 117	99 x 108	99 x 99	99 x 90	99 x 81	99 x 72	99 x 63	99 x 54	99 x 45	99 x 36	99 x 27	99 x 18	99 x 9
	10	90 x 144	90 x 135	90 x 126	90 x 117	90 x 108	90 x 99	90 x 90	90 x 81	90 x 72	90 x 63	90 x 54	90 x 45	90 x 36	90 x 27	90 x 18	90 x 9
	9	81 x 144	81 x 135	81 x 126	81 x 117	81 x 108	81 x 99	81 x 90	81 x 81	81 x 72	81 x 63	81 x 54	81 x 45	81 x 36	81 x 27	81 x 18	81 x 9
	8	72 x 144	72 x 135	72 x 126	72 x 117	72 x 108	72 x 99	72 x 90	72 x 81	72 x 72	72 x 63	72 x 54	72 x 45	72 x 36	72 x 27	72 x 18	72 x 9
	7	63 x 144	63 x 135	63 x 126	63 x 117	63 x 108	63 x 99	63 x 90	63 x 81	63 x 72	63 x 63	63 x 54	63 x 45	63 x 36	63 x 27	63 x 18	63 x 9
	6	54 x 144	54 x 135	54 x 126	54 x 117	54 x 108	54 x 99	54 x 90	54 x 81	54 x 72	54 x 63	54 x 54	54 x 45	54 x 36	54 x 27	54 x 18	54 x 9
	5	45 x 144	45 x 135	45 x 126	45 x 117	45 x 108	45 x 99	45 x 90	45 x 81	45 x 72	45 x 63	45 x 54	45 x 45	45 x 36	45 x 27	45 x 18	45 x 9
	4	36 x 144	36 x 135	36 x 126	36 x 117	36 x 108	36 x 99	36 x 90	36 x 81	36 x 72	36 x 63	36 x 54	36 x 45	36 x 36	36 x 27	36 x 18	36 x 9
	3	27 x 144	27 x 135	27 x 126	27 x 117	27 x 108	27 x 99	27 x 90	27 x 81	27 x 72	27 x 63	27 x 54	27 x 45	27 x 36	27 x 27	27 x 18	27 x 9
	2	18 x 144	18 x 135	18 x 126	18 x 117	18 x 108	18 x 99	18 x 90	18 x 81	18 x 72	18 x 63	18 x 54	18 x 45	18 x 36	18 x 27	18 x 18	18 x 9
	1	9 x 144	9 x 135	9 x 126	9 x 117	9 x 108	9 x 99	9 x 90	9 x 81	9 x 72	9 x 63	9 x 54	9 x 45	9 x 36	9 x 27	9 x 18	9 x 9

Matrix size varies depending on the number of installed MFR-8SDIEX, MFR-8SDOEX, MFR-2SDIGB and MFR-2SDOGB cards as shown below. (128 x 128 to 8 x 8)

		Number of cards: MFR-8SDOEX / MFR-2SDOGB															
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Number of cards: MFR-8SDIEX / MFR-2SDIGB	16	128 x 128	128 x 120	128 x 112	128 x 104	128 x 96	128 x 88	128 x 80	128 x 72	128 x 64	128 x 56	128 x 48	128 x 40	128 x 32	128 x 24	128 x 16	128 x 8
	15	120 x 128	120 x 120	120 x 112	120 x 104	120 x 96	120 x 88	120 x 80	120 x 72	120 x 64	120 x 56	120 x 48	120 x 40	120 x 32	120 x 24	120 x 16	120 x 8
	14	112 x 128	112 x 120	112 x 112	112 x 104	112 x 96	112 x 88	112 x 80	112 x 72	112 x 64	112 x 56	112 x 48	112 x 40	112 x 32	112 x 24	112 x 16	112 x 8
	13	104 x 128	104 x 120	104 x 112	104 x 104	104 x 96	104 x 88	104 x 80	104 x 72	104 x 64	104 x 56	104 x 48	104 x 40	104 x 32	104 x 24	104 x 16	104 x 8
	12	96 x 128	96 x 120	96 x 112	96 x 104	96 x 96	96 x 88	96 x 80	96 x 72	96 x 64	96 x 56	96 x 48	96 x 40	96 x 32	96 x 24	96 x 16	96 x 8
	11	88 x 128	88 x 120	88 x 112	88 x 104	88 x 96	88 x 88	88 x 80	88 x 72	88 x 64	88 x 56	88 x 48	88 x 40	88 x 32	88 x 24	88 x 16	88 x 8
	10	80 x 128	80 x 120	80 x 112	80 x 104	80 x 96	80 x 88	80 x 80	80 x 72	80 x 64	80 x 56	80 x 48	80 x 40	80 x 32	80 x 24	80 x 16	80 x 8
	9	72 x 128	72 x 120	72 x 112	72 x 104	72 x 96	72 x 88	72 x 80	72 x 72	72 x 64	72 x 56	72 x 48	72 x 40	72 x 32	72 x 24	72 x 16	72 x 8
	8	64 x 128	64 x 120	64 x 112	64 x 104	64 x 96	64 x 88	64 x 80	64 x 72	64 x 64	64 x 56	64 x 48	64 x 40	64 x 32	64 x 24	64 x 16	64 x 8
	7	56 x 128	56 x 120	56 x 112	56 x 104	56 x 96	56 x 88	56 x 80	56 x 72	56 x 64	56 x 56	56 x 48	56 x 40	56 x 32	56 x 24	56 x 16	56 x 8
	6	48 x 128	48 x 120	48 x 112	48 x 104	48 x 96	48 x 88	48 x 80	48 x 72	48 x 64	48 x 56	48 x 48	48 x 40	48 x 32	48 x 24	48 x 16	48 x 8
	5	40 x 128	40 x 120	40 x 112	40 x 104	40 x 96	40 x 88	40 x 80	40 x 72	40 x 64	40 x 56	40 x 48	40 x 40	40 x 32	40 x 24	40 x 16	40 x 8
	4	32 x 128	32 x 120	32 x 112	32 x 104	32 x 96	32 x 88	32 x 80	32 x 72	32 x 64	32 x 56	32 x 48	32 x 40	32 x 32	32 x 24	32 x 16	32 x 8
	3	24 x 128	24 x 120	24 x 112	24 x 104	24 x 96	24 x 88	24 x 80	24 x 72	24 x 64	24 x 56	24 x 48	24 x 40	24 x 32	24 x 24	24 x 16	24 x 8
	2	16 x 128	16 x 120	16 x 112	16 x 104	16 x 96	16 x 88	16 x 80	16 x 72	16 x 64	16 x 56	16 x 48	16 x 40	16 x 32	16 x 24	16 x 16	16 x 8
	1	8 x 128	8 x 120	8 x 112	8 x 104	8 x 96	8 x 88	8 x 80	8 x 72	8 x 64	8 x 56	8 x 48	8 x 40	8 x 32	8 x 24	8 x 16	8 x 8

## 2-2. MFR-6000 Rear Panel



\*The above figure shows an MFR-6000 with MFR-9SDI12G and MFR-9SDO12G cards installed.

No.	Name	Description
A	MFR-LAN (CPU1 / CPU2)	Ethernet ports for connection to MFR Remote Control Units and MFR-GPI (10/100BASE-TX, RJ-45)
B	PC-LAN (CPU1 / CPU2)	Ethernet ports for connection to PC or other external unit (10/100/1000BASE-T, RJ-45)
C	SERIAL	Used for control via a serial interface. RS-232C or RS-422 selectable. ▶ See Sec. 2-2-1. "Interfaces."
D	ALARM	Used for alarm output ▶ See Sec. 2-2-1. "Interfaces."
E	REF IN1, 2	Used to input reference signals (BB or Tri-level sync signal) (with loop-through. Terminate with 75Ω terminator, if unused.)
F	AC IN1	Used to connect Power Supply Unit 1 (standard equipment) to an AC power source
G	AC IN2	Used to connect Power Supply Unit 2 (optional) to an AC power source
H	SLOTS for Input/Output Cards	Used to install SDI input/output cards. ▶ See Sec. 2-3. "SDI Input/Output Cards."
I	Ground Terminal	Used to ground the unit to protect operators against static electricity and/or electrical shock.

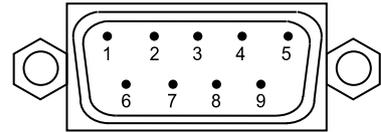
### IMPORTANT

All 4 MFR-LAN and PC-LAN connectors (2 each) must be connected to their respective devices to enable CPU redundancy. The LAN connections for MFR Series devices must be separated from the network segment of other devices.

## 2-2-1. Interfaces

### ◆ SERIAL Connector (9-pin D-sub, male)

Select RS-232C or RS-422 using the slide switch at the bottom of the connector.



#### RS-232C Connector Pin Assignments

Pin No.	Signal Name	Description
1	NC	Not used
2	RxD	Received Data
3	TxD	Transmitted Data
4	DTR	Data Terminal Ready
5	SG	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	NC	Not used

The maximum cable length is 10 m.

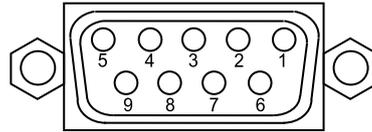
DTR/DSR and RTS/CTS are internally connected respectively.

#### RS-422 Connector Pin Assignments (Factory default settings)

Pin No.	Signal Name	Description
1	FG	Frame ground
2	T-	Transmit data (-)
3	R+	Receive data (+)
4	SG	Signal Ground
5	NC	Not used
6	SG	Signal Ground
7	T+	Transmit data (+)
8	R-	Receive data (-)
9	FG	Frame Ground

The maximum cable length is 100 m.

◆ **ALARM Connector (9-pin D-sub, female)**



**Alarm 1 Out:**

Normal operation:	Pins 1 and 6 are open.
Malfunction or power-off:	Pins 1 and 6 are closed.

**Alarm 2 Out:**

Normal operation:	Pins 2 and 7 are open.
Malfunction or power-off:	Pins 2 and 7 are closed.

**ALARM Connector Pin Assignments**

Pin No.	Signal Name	Description
1	ALARM1 OUT	Alarm 1 output (Default setting: Fan)
2	ALARM2 OUT	Alarm 2 output (Default setting: Power)
3	NC	Not used
4	NC	Not used
5	NC	Not used
6	ALARM 1 COMMON	Alarm 1 output, common
7	ALARM 2 COMMON	Alarm 2 output, common
8	GND	Signal Ground
9	GND	Signal Ground

The following items can be set for ALARM1OUT and ALARM2 OUT. Alarms can be assigned in Web-based Control.

Available alarm signals

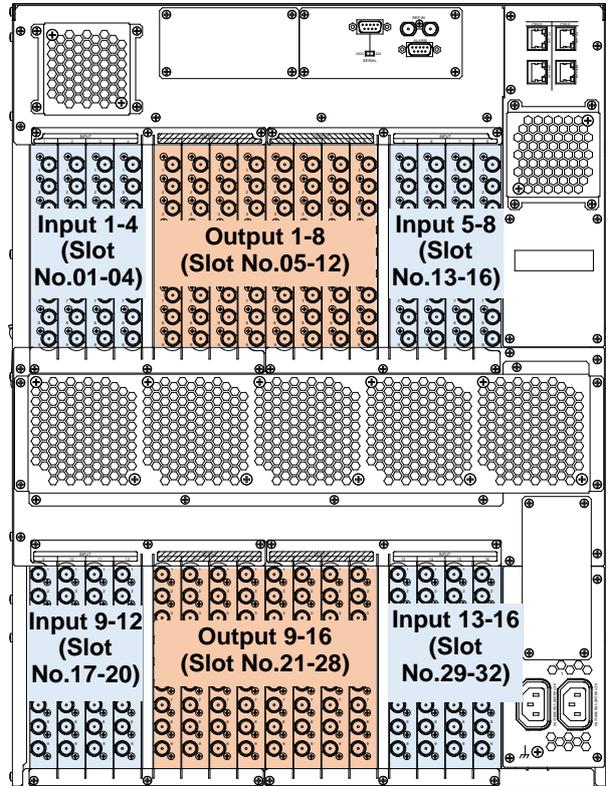
Fan (including power unit cooling fans)
Power
Secondary CPU error
CPU Changeover (issued when activated to change over to secondary CPU operation)
Crosspoint Error

## 2-3. SDI Input/Output Cards

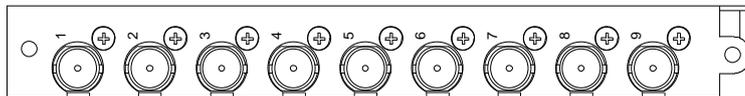
SDI input/output cards are available to install slots shown on the table and figure below.

► See Sec. 2-1-1. “Matrix Size Chart” for details.

Slot No	Input/ Output Cards
01-04 (Input 1-4)	MFR-9SDI12G MFR-8SDIEX MFR-2SDIGB
05-12 (Output 1-8)	MFR-9SDO12G MFR-8SDOEX MFR-2SDOGB
13-16 (Input 5-8)	MFR-9SDI12G MFR-8SDIEX MFR-2SDIGB
17-20 (Input 9-12)	MFR-9SDI12G MFR-8SDIEX MFR-2SDIGB
21-28 (Output 9-16)	MFR-9SDO12G MFR-8SDOEX MFR-2SDOGB
29-32 (Input 13-16)	MFR-9SDI12G MFR-8SDIEX MFR-2SDIGB



### 2-3-1. MFR-9SDI12G



BNC x 9 inputs (12G/3G/HD/SD-SDI and ASI)

Set up input signals in the Web-based Control Software as shown below.

#### ◆ Source Name

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Source Name** page].

This page allows you to change source names displayed on Remote Controllers or other devices.

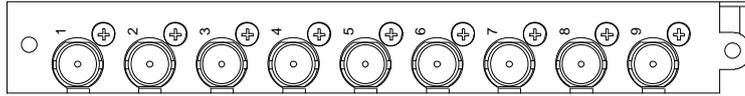
#### ◆ Source Assignment

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Source Assignment** page].

This page allows you to assign physical inputs to logical input channels.

## 2-3-2. MFR-9SDO12G

---



BNC x 9 outputs (12G/3G/HD/SD-SDI and ASI)

Set up output signals in the Web-based Control Software as shown below.

### ◆ Destination Name

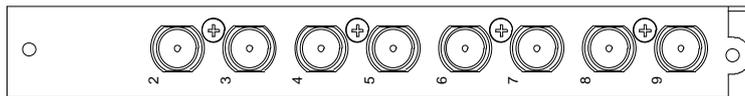
Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Destination Name** page]. This page allows you to change destination names displayed on Remote Controllers or other devices.

### ◆ Destination Assignment

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Destination Assignment** page]. This page allows you to assign physical outputs to logical output channels.

## 2-3-3. MFR-8SDIEX

---



BNC x 8 inputs (3G/HD/SD-SDI and ASI)

Set up input signals in the Web-based Control Software as shown below.

### ◆ Source Name

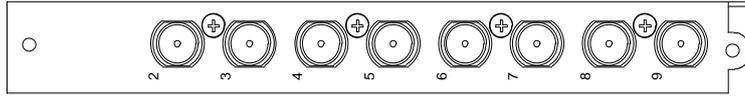
Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Source Name** page]. This page allows you to change source names displayed on Remote Controllers or other devices.

### ◆ Source Assignment

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Source Assignment** page]. This page allows you to assign physical inputs to logical input channels.

## 2-3-4. MFR-8SDOEX

---



BNC x 8 outputs (3G/HD/SD-SDI and ASI)

### ◆ Destination Name

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Destination Name** page]. This page allows you to change destination names displayed on Remote Controllers or other devices.

### ◆ Destination Assignment

Open the [Web-based Control: **ROUTER SYSTEM SETTINGS - Destination Assignment** page]. This page allows you to assign physical outputs to logical output channels.

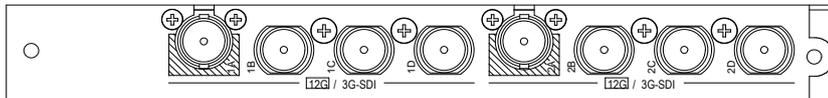
## 2-3-5. MFR-2SDIGB

---

The MFR-2SDIGB is a 12G/3G-SDI input card. Its Gearbox function enables conversion between 12G-SDI and Quad Link 3G-SDI signals and conversion between 2SI and SQD signals.

The following listed SDI signals can be input.

- 12G-SDI: Max. 2 inputs (If installed into Input 1-8: BNC **1D**, **2D**  
If installed into Input 9-16: BNC **1A**, **2A**)
- 3G-SDI: Max. 8 inputs



BNC x 8 inputs (12G/3G-SDI)

Set up input signals in the Web-based Control Software as shown below.

### ◆ Gearbox settings

Open the [Web-based Control: **(Main Unit Settings) – Gearbox Settings** page]. This page allows you to specify input/ output signals to Gearbox, reference signal and delay.

### ◆ Source Name

Open the [Web-based Control: **(Router System Settings) – Source Name** page.]. This page allows you to change displayed source names on Remote Controllers or other devices.

### ◆ Source Assignment

Open the [Web-based Control: **(Router System Settings) – Source Assignment** page]. This page allows you to assign physical inputs to logical input channels.

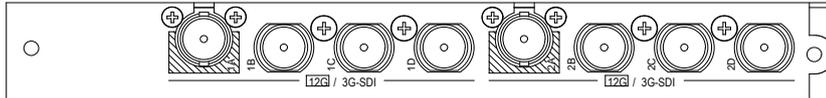
## 2-3-6. MFR-2SDOGB

---

The MFR-2SDOGB is a 12G/3G-SDI output card. Its Gearbox function enables conversion between 12G-SDI and Quad Link 3G-SDI signals, and between 2SI and SQD signals.

The following listed SDI signals can be output.

- 12G-SDI: Max. 2 outputs (If installed into Input 1-8: BNC **1D**, **2D**  
If installed into Input 9-16: BNC **1A**, **2A**)
- 3G-SDI: Max. 8 outputs



BNC x 8 Outputs (12G/3G-SDI)

Set up output signals in the Web-based Control Software as shown below.

### ◆ Gearbox settings

Open the [Web-based Control: **(Main Unit Settings) – Gearbox Settings** page].

This page allows you to specify input/ output signals to Gearbox, reference signal and delay.

### ◆ Destination Name

Open the [Web-based Control: **(Router System Settings) – Destination Name** page.].

This page allows you to change destination names displayed on Remote Controllers or other devices.

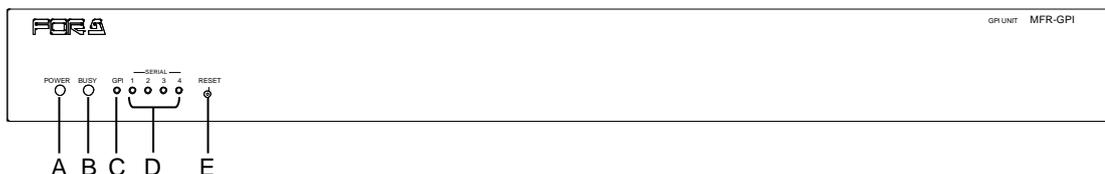
### ◆ Source Assignment

Open the [Web-based Control: **(Router System Settings) – Destination Assignment** page].

This page allows you to assign physical outputs to logical output channels.

## 2-4. MFR-GPI

### 2-4-1. Front Panel



No.	Item	Description
A	POWER	Displays the power status. ▶ See the table below for details on indications.
B	BUSY	Displays the flash memory writing status of backup settings. ▶ See the table below for details on indications.
C	GPI	When the GPI function is assigned using Web-based Control, the LED lights green. The LED remains unlit when there is no assignment.
D	SERIAL1 - 4	When a serial port is assigned using Web-based Control, the LED lights green. The LED remains unlit when there is no assignment.
E	RESET	Used to re-initialize the GPI unit.

#### ◆ Color indications on the MFR-GPI front panel

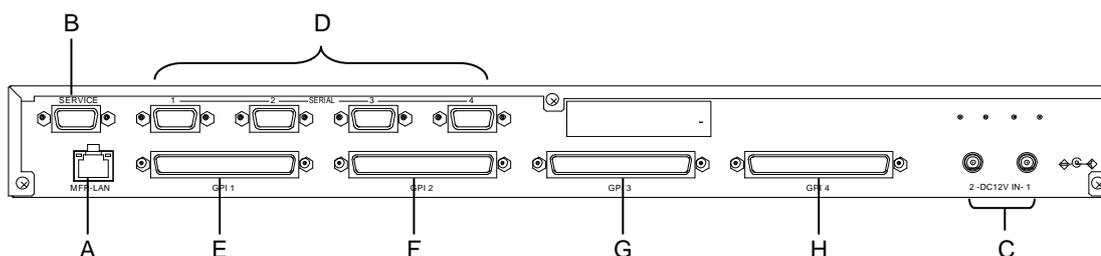
LED	LED Color	Green	Red	Orange
POWER		Normal	Power alarm	
BUSY		Normal processing		Writing to flash memory

\* POWER LED lights red if the unit is turned on but is unconnected to a network.

#### IMPORTANT

After finishing settings, do **not power OFF** the unit while BUSY LED is **lit orange**, since the system is writing to Flash memory. (approx. 2 minutes max.)

## 2-4-2. Rear Panel

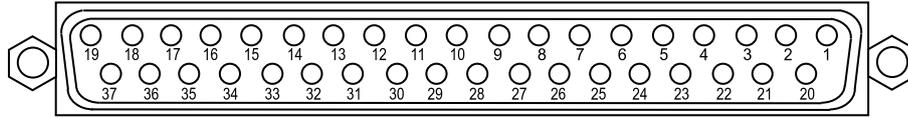


No.	Item	Description
A	MFR-LAN *1	Used to connect the MFR main unit Ethernet port (10/100 BASE-TX)
B	SERVICE	Used for maintenance only. Do not use.
C	DC12V IN 1, 2	Used to supply 12V DC power.
D	SERIAL1 - 4	Used for serial interface control. The default setting is RS-232C. RS-422 is also selectable using switches on the internal card. ▶ See Sec. 2-4-4. "Card Switches" Pin assignments are the same as those on the MFR main unit. ▶ See Sec. 2-2-1. "Interfaces."
E	GPI 1 (Port no: 1)	Used for GPI input / output connections. (32 total assignable inputs and outputs)
F	GPI 2 (Port no: 2)	Used for GPI input / output connections. (32 total assignable inputs and outputs)
G	GPI 3 (Port no: 3)	Used for GPI input / output connections. (32 total assignable inputs and outputs)
H	GPI 4 (Port no: 4)	Used for GPI input / output connections. (32 total assignable inputs and outputs)

\*1 The MFR-LAN connector may be labeled 10/100BASE-T on the previous model.

## 2-4-3. Interfaces (MFR-GPI)

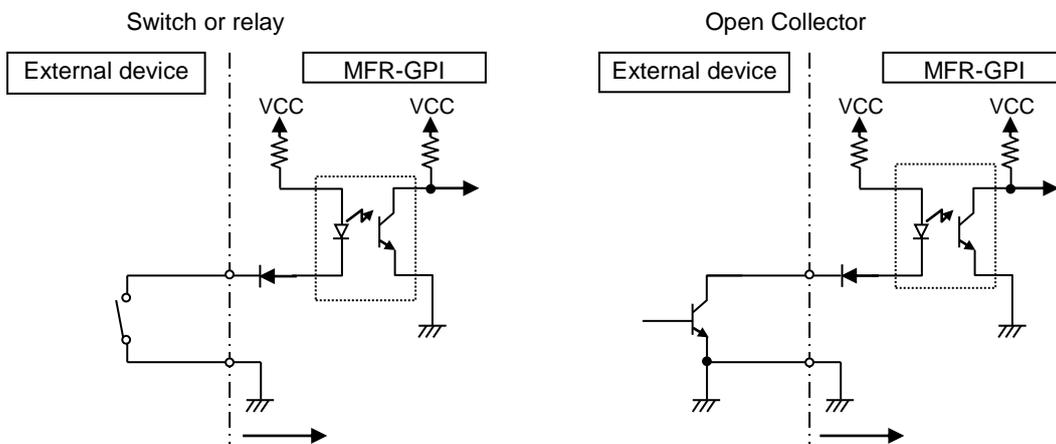
### ◆ GPI IN / TALLY OUT Connector (37-pin D-sub, female)



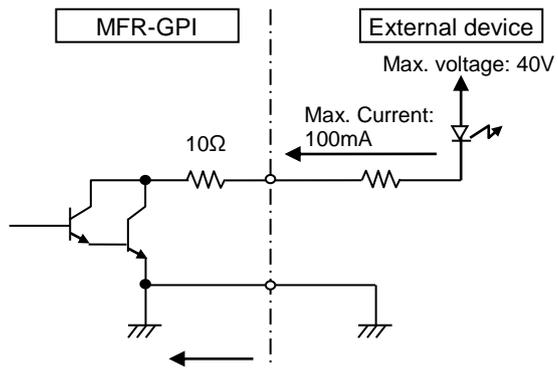
Pin No.	Signal	Pin No.	Signal
1	GPI_IN / TALLY_OUT 01 #	20	GPI_IN / TALLY_OUT 20 #
2	GPI_IN / TALLY_OUT 02 #	21	GPI_IN / TALLY_OUT 21 #
3	GPI_IN / TALLY_OUT 03 #	22	GPI_IN / TALLY_OUT 22 #
4	GPI_IN / TALLY_OUT 04 #	23	GPI_IN / TALLY_OUT 23 #
5	GPI_IN / TALLY_OUT 05 #	24	GPI_IN / TALLY_OUT 24 #
6	GPI_IN / TALLY_OUT 06 #	25	GPI_IN / TALLY_OUT 25 #
7	GPI_IN / TALLY_OUT 07 #	26	GPI_IN / TALLY_OUT 26 #
8	GPI_IN / TALLY_OUT 08 #	27	GPI_IN / TALLY_OUT 27 #
9	GPI_IN / TALLY_OUT 09 #	28	GPI_IN / TALLY_OUT 28 #
10	GPI_IN / TALLY_OUT 10 #	29	GPI_IN / TALLY_OUT 29 #
11	GPI_IN / TALLY_OUT 11 #	30	GPI_IN / TALLY_OUT 30 #
12	GPI_IN / TALLY_OUT 12 #	31	GPI_IN / TALLY_OUT 31 #
13	GPI_IN / TALLY_OUT 13 #	32	GPI_IN / TALLY_OUT 32 #
14	GPI_IN / TALLY_OUT 14 #	33	Frame ground
15	GPI_IN / TALLY_OUT 15 #	34	Frame ground
16	GPI_IN / TALLY_OUT 16 #	35	Frame ground
17	GPI_IN / TALLY_OUT 17 #	36	+4.8V output
18	GPI_IN / TALLY_OUT 18 #	37	+4.8V output
19	GPI_IN / TALLY_OUT 19 #		

- \* The symbol "#" at the end of signals represents the port number (1, 2, 3 or 4).
- \* The maximum total output current for all +4.8 V outputs is 1.5 A.
- \* The GPI input pulse width should be 54 ms or more.

### ◆ GPI IN Circuits



### GPI OUT / TALLY OUT Circuit

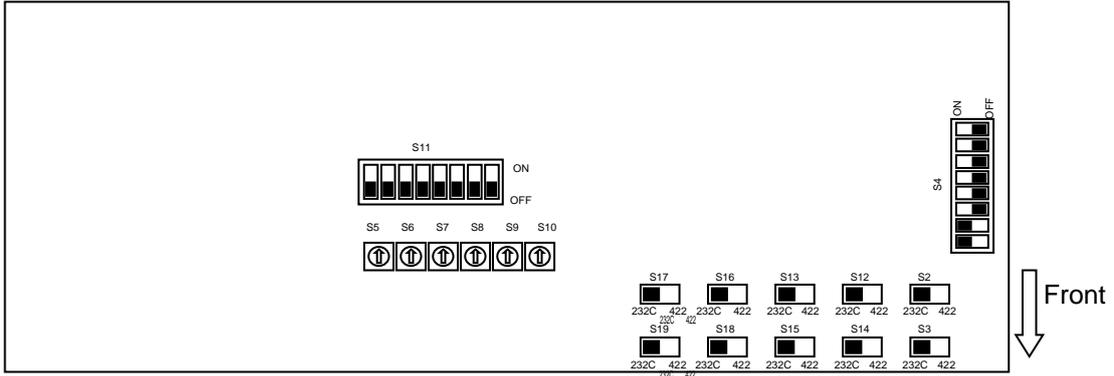


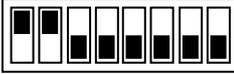
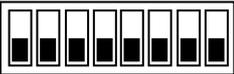
\* Approx. 0.9V when turned-on

## 2-4-4. Card Switches

 <b>CAUTION</b>	<p>Do not access internal cards or make connections with the unit powered ON. Always power OFF all connected units / disconnect power cords prior to accessing the interior.</p> <p>Further note that adjustments and maintenance should only be performed by qualified technical personnel familiar with FOR-A equipment.</p>
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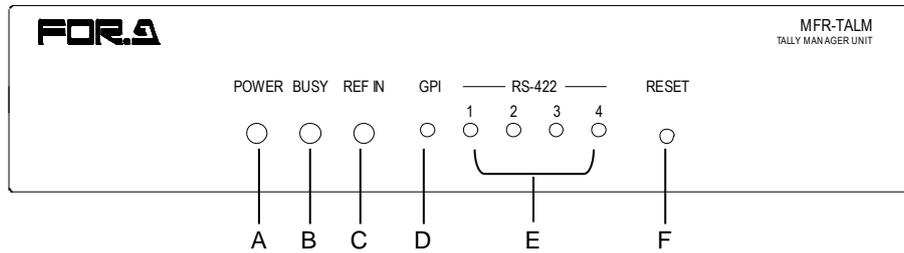
Remove the two screws on both sides of the MFR-GPI to access the internal card as shown below. The figure below shows the factory default switch settings.



Switch	Function / Settings		
S2,S3	Used for maintenance. Do not use.		
S4	Used for maintenance. Do not use. (Factory default settings are as shown at right. The black boxes (■) represent switches.)		
S5,S6,S7, S8,S9,S10	Used for maintenance. Do not use.		
S11	Used for maintenance. Do not use.		
S12,S14	Used to select RS-232C/RS-422 for SERIAL 1. The default setting is RS-232C (both switches to the left). To change to RS-422, set both switches to the right.	Switch Settings	RS-232C (Factory default setting) 
S13,S15	Used to select RS-232C/RS-422 for SERIAL 2. The default setting is RS-232C (both switches to the left). To change to RS-422, set both switches to the right.		RS-422 
S16,S18	Used to select RS-232C/RS-422 for SERIAL 3. The default setting is RS-232C (both switches to the left). To change to RS-422, set both switches to the right.		
S17,S19	Used to select RS-232C/RS-422 for SERIAL 4. The default setting is RS-232C (both switches to the left). To change to RS-422, set both switches to the right.		

## 2-5. MFR-TALM

### 2-5-1. Front Panel



No.	ITEM	Description
A	POWER	Displays power status. ▶ See the table below for details on indications.
B	BUSY	Displays the flash memory writing status of backup settings. ▶ See the table below for details on indications.
C	REF IN	Lights green when an external reference signal is present.
D	GPI	Lights green when a GPI function is assigned. Turns off when no GPI function is assigned.
E	RS-422 1-4	Lights green when a port function is assigned. Turns off when no port function is assigned.
F	RESET	Resets MFR-TALM.

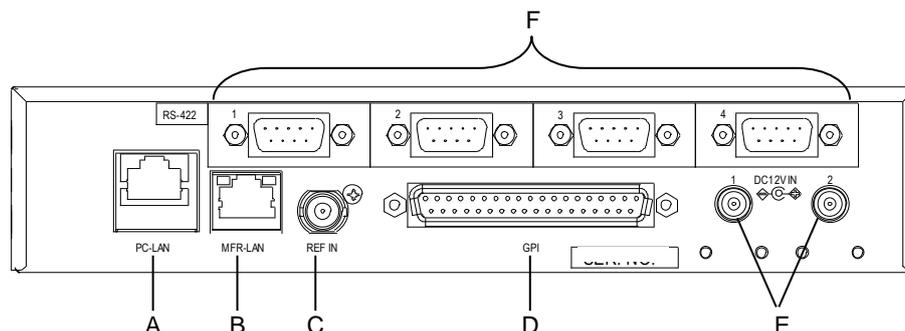
#### ◆ Color indications on the MFR-TALM front panel

LED \ LED Color	Green	Red	Orange
POWER	Normal	Power alarm	
BUSY	Normal processing		Writing to flash memory

#### IMPORTANT

Do not power off the unit while BUSY LED is lit orange (writing to the flash memory, about 2 minutes remain).

## 2-5-2. Rear Panel

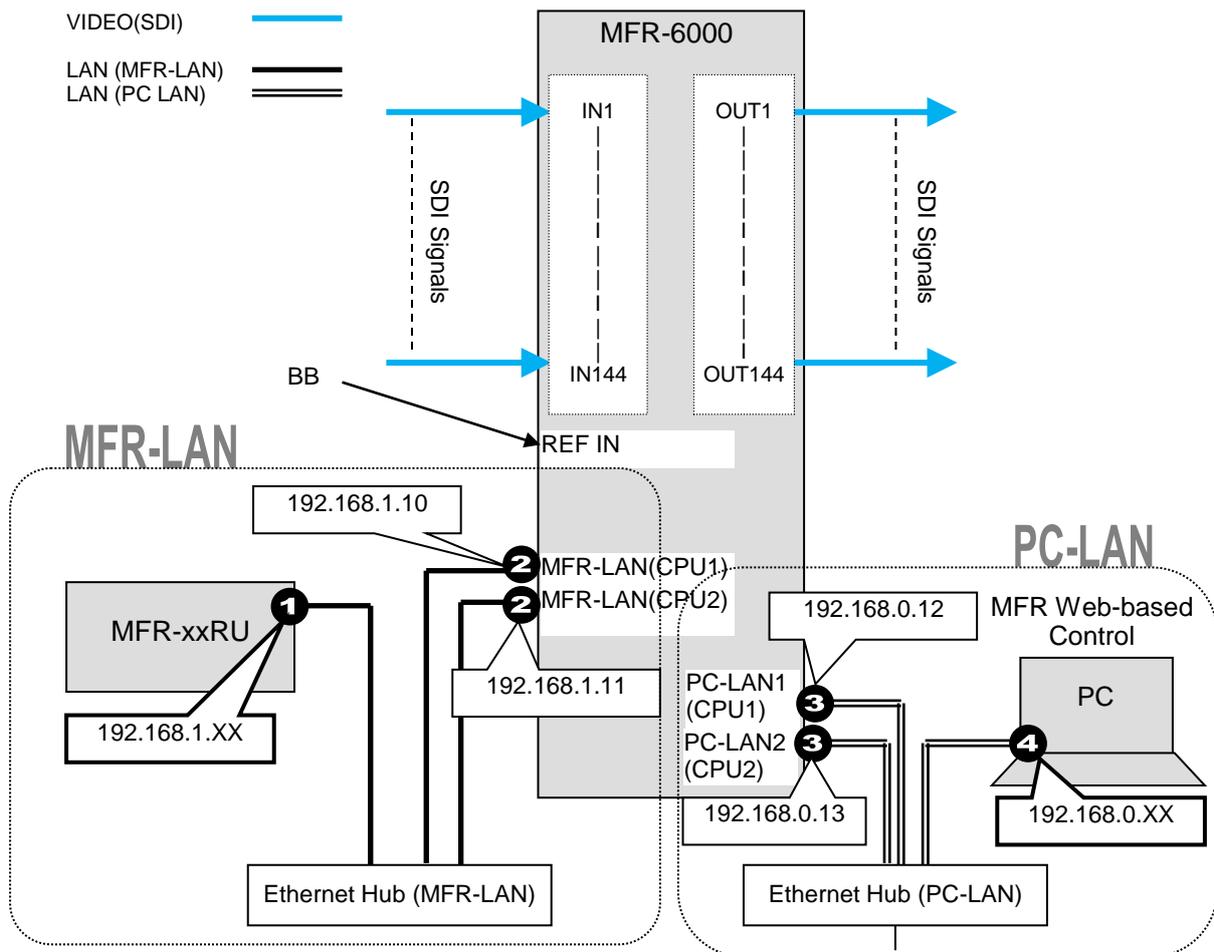


No.	ITEM	Description
A	PC-LAN	Ethernet port for connection to PC or other external unit (10/100BASE-TX, RJ-45)
B	MFR-LAN	Ethernet port for connection to MFR main unit (10/100/1000BASE-T, RJ-45)
C	REF IN	Used to input a reference signal (BB or Tri-level sync signal) (with loop-through. Terminate with 75Ω terminator, if unused.)
D	GPI	Used to input/output GPI signals for external control. (32 total assignable inputs and outputs) Pin assignments are the same as those of the MFR-GPI connectors. ▶ See Sec. 2-4-3. "Interfaces (MFR-GPI)."
E	DC12V IN 1,2	Used to supply 12 V DC power.
F	RS-422 1-4	Used for RS-422 interface control. Pin assignments are the same as those of the MFR main unit. ▶ See Sec. 2-2-1. "Interfaces."

### 3. System Configuration Example

#### 3-1. Basic Configuration

The block diagram below shows an example of the basic MFR routing system that consists of an MFR-6000, Remote Unit and the Web-based Control accessed from a computer. Make sure to connect both MFR-LANs (CPU1) and (CPU2) to a LAN respectively for CPU redundancy. Their LAN connections must be separated from the PC-LAN network segment and other devices. (Default IP addresses (Net mask: 255.255.255.0) are used in the configuration example below.)



#### LAN Port Settings

Port	RU Front Panel "Sec. in MFR-RU Series Operation Manual"	Web-based Control
①	MFR-39RUA: "Setting Mode Menu (MFR-39RUA)" MFR-39RU: "Setup Menu (MFR-39RU)" MFR-18RU/18RUA: "Setup Menu (MFR-18RU/18RUA)" MFR-16RUTA: "Setup Menu (MFR-16RUTA)" MFR-8RUA: "Setup Menu (MFR-8RUA)" Other RUs: "Setup Menu (MFR-16/40RU/16RUD/ MFR-16/32/64RUW)"	[RU Settings page]
②	---	[MU Settings page]
③	MFR-39RUA: "Setting Mode Menu (MFR-39RUA)" (Display only) MFR-39RU: "Setup Menu (MFR-39RU)" (Display only) MFR-18RU/18RUA: "Setup Menu (MFR-18RU/18RUA)" (Display only) MFR-16RUTA: "Setup Menu (MFR-16RUTA)" (Display only) MFR-8RUA: "Setup Menu (MFR-8RUA)" (Display only) Other RUs: "Setup Menu (MFR-16RU/40RU/16RUD/ MFR-16/32/64RUW)" (Display only)	[MU Settings page]

## 3-2. Main Unit Linking

The Main Unit Link feature allows you to control two MFR-6000 units at the same time.

**Parallel Link:** Controls two MFR-6000 units at the same time.

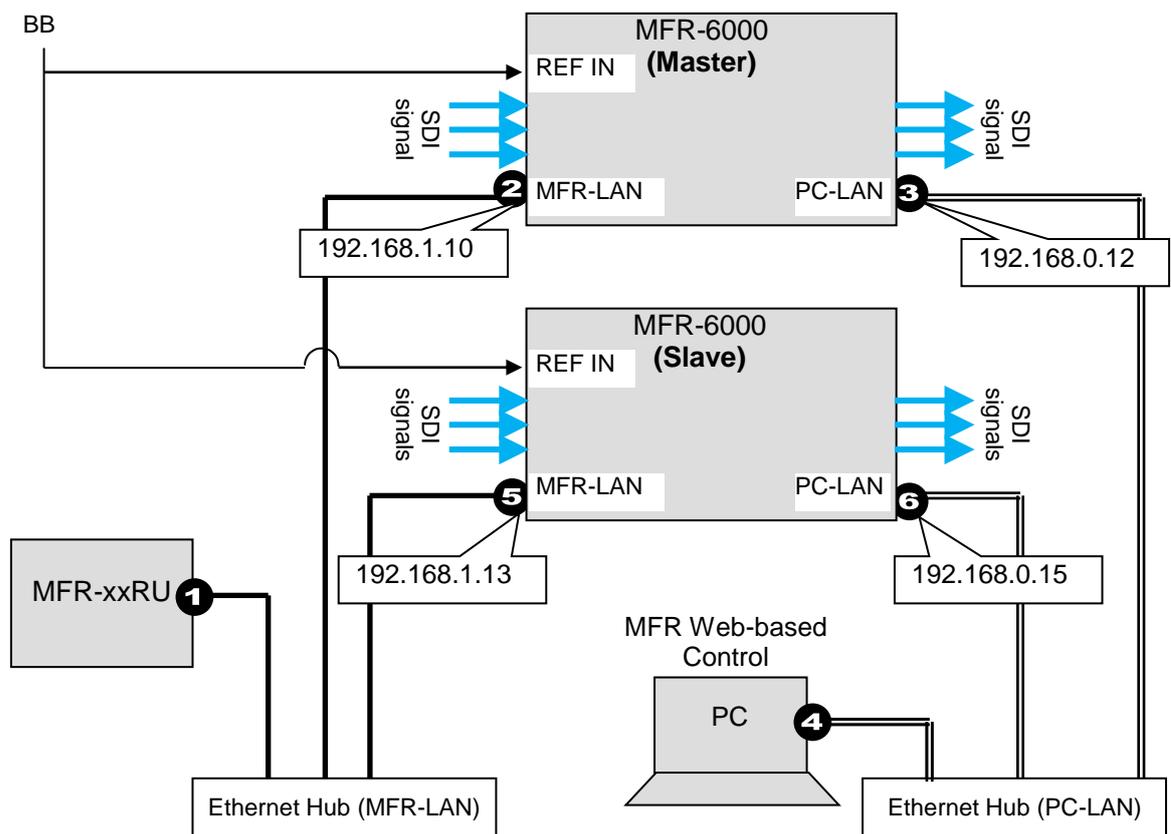
IP address and SNMP settings should be performed on each MFR-6000 unit. After these settings are completed, all linked MFR-6000 units are set and controlled together on the unit that is specified as Master.

### Main Unit Link Specifications

- Main Unit Link systems are set and controlled through a specified master unit.
- Two MFR-6000 units can be linked as a master and slave.
- All MFR main units in a system must be linked together and independent units cannot exist in the system.

### 3-2-1. Parallel Link System Example

The system example below is a redundant system using two MFR-6000 units.



Note that in all MFR-6000 units the IP address of MFR-LAN1 is set to 192.168.1.10 and that of PC-LAN1 to 192.168.0.12 as factory default. To prevent IP address conflict in a system, you need to change IP addresses of either unit. Also note that desired IP addresses can be set for system devices according to your network conditions.

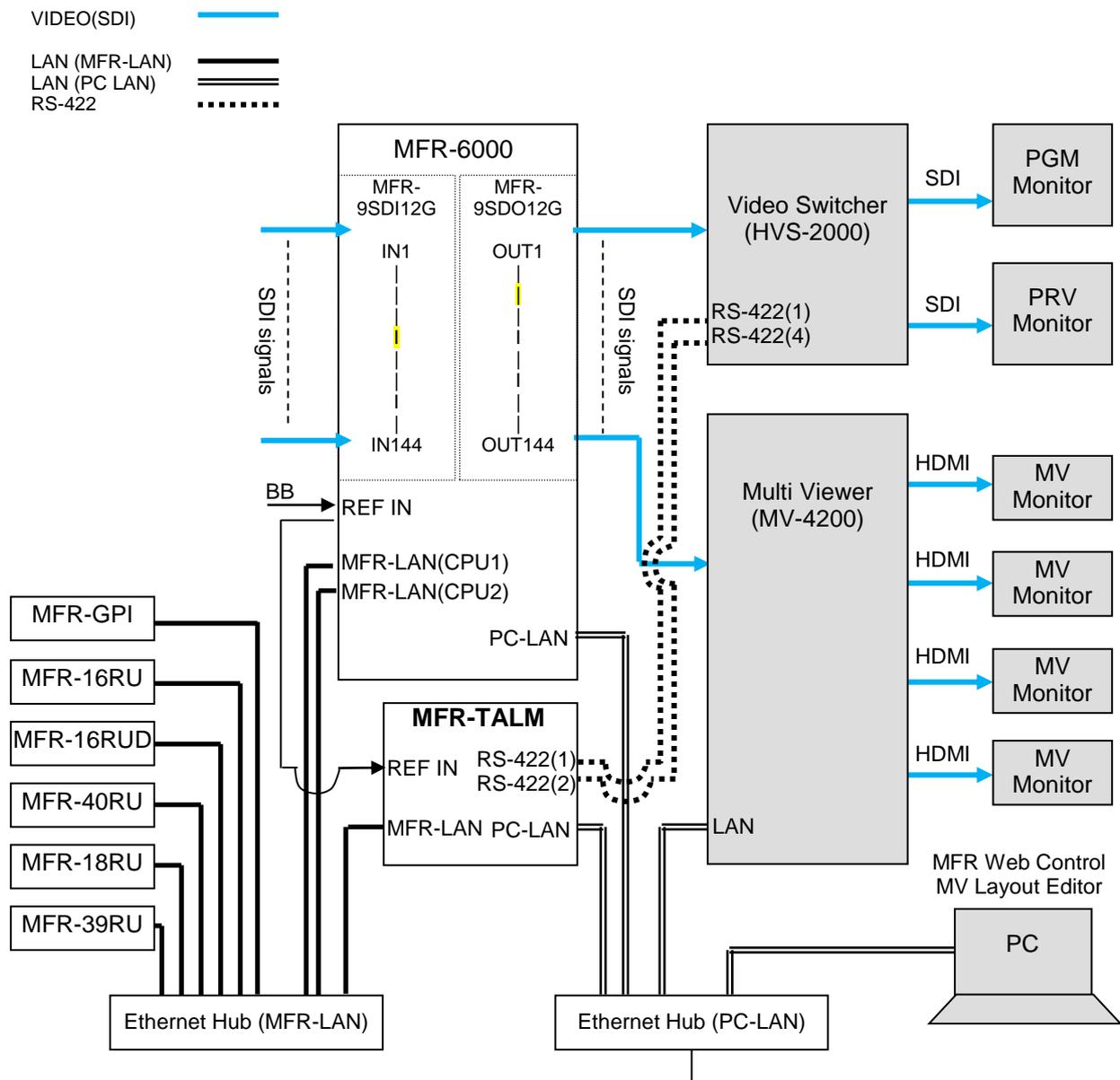
#### ◆ Setup Procedure

- 1) Connect all devices in the MFR system as shown in the figure above. Power on the MFR-6000 to be set as a Master, Remote Control unit and PC. Set the IP addresses for the Remote Control unit (1) and PC (4). Power off the Master MFR-6000.

- 2) Power on the Slave MFR-6000. Set the IP addresses (5 and 6) as shown in the previous page.
- 3) Power on the Master MFR-6000.
- 4) Open the Master MFR-6000 Web-based control and go to the **Build Settings** page. Check on **Build Enable** to enable the Main Unit Link feature.
  - ▶ See Sec. 11 "Main Unit Link" in the "Web-based Control Operation Manual."

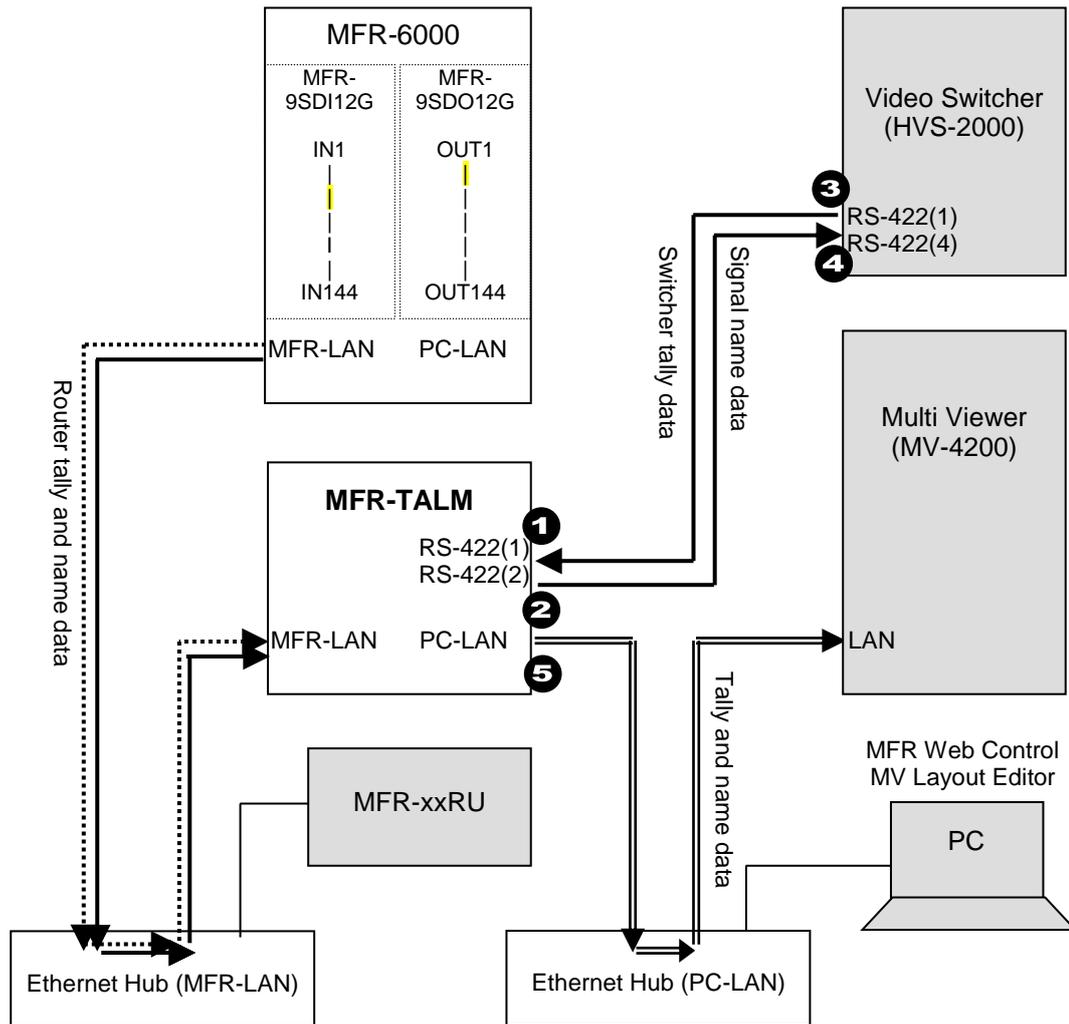
### 3-3. Configuring the System with MFR-TALM

The block diagram below shows an example signal name and tally link system comprised of a FOR-A video switcher and multiviewer using an MFR-TALM unit. The MFR-TALM is specifically designed to perform the task of tally data computation, which is ordinarily undertaken by the MFR main unit, to accelerate computation. RS-422 ports (1) to (4) are available for video switcher connection.



◆ **Transmitting Signal Name and Tally Data**

The figure below shows an example signal name and tally data routing system using the MFR-TALM.



Each serial port should be set as shown in the table below in the relevant page of the **MFR-TALM** Web-based Control accessed from "<http://192.168.1.62>" (default IP address) on your web browser.

**Serial Port Settings**

Open the [MFR-TALM Web-based Control: **Port Settings** page] and perform port settings under **Serial Port**.

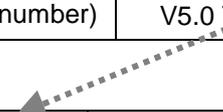
As for the HVS-2000 unit, perform port setting in the [SETUP - SYSTEM - RS-422] menu.

Port	Menu	[Port Settings] - [Serial Port]			
		Connector	Function	Baud rate	Parity
❶	Web-based Control [TALM Settings]	No. 1	HVS-TAL Protocol Reception	38400	EVEN
❷	Web-based Control [TALM Settings]	No. 2	Router/HVS connection Type 2	38400	NONE
❸	HVS-2000 [SETUP - SYSTEM - RS-422]	No. 1	TALLY	38400	EVEN
❹	HVS-2000 [SETUP - SYSTEM - RS-422]	No. 4	ROUTER	38400	NONE

### TCP/IP Setting

Open the [MFR-TALM Web-based Control: **Port Settings** page] and perform port settings under **TCP/IP** Port.

Port	Menu	[Port Settings] - [TCP/IP Port]			
		Access Method	IP Address	Port	Function
5	Web-based Control [TALM Settings]	Client	(MV IP address)	(MV TCP/IP port number)	TSL UMD protocol V5.0 Tally out



Encode	DLE	Screen No.
Unicode	ON	(Set the same as in MV)

### ◆ Data transmission settings between HVS-2000 and MFR-TALM

#### <HVS-2000-side>

- To receive name data from the router, set **LINK** in the ROUTER NAME menu to **MFR**.
- Perform the TALLY COLOR and TALLY UNIT settings so that the MFR-TALM unit can receive switcher tally data.

#### <MFR-TALM-side>

- Open the [MFR-TALM Web-based Control: **HVS-TAL Protocol Reception** page] and perform the same tally settings as those in HVS-2000.

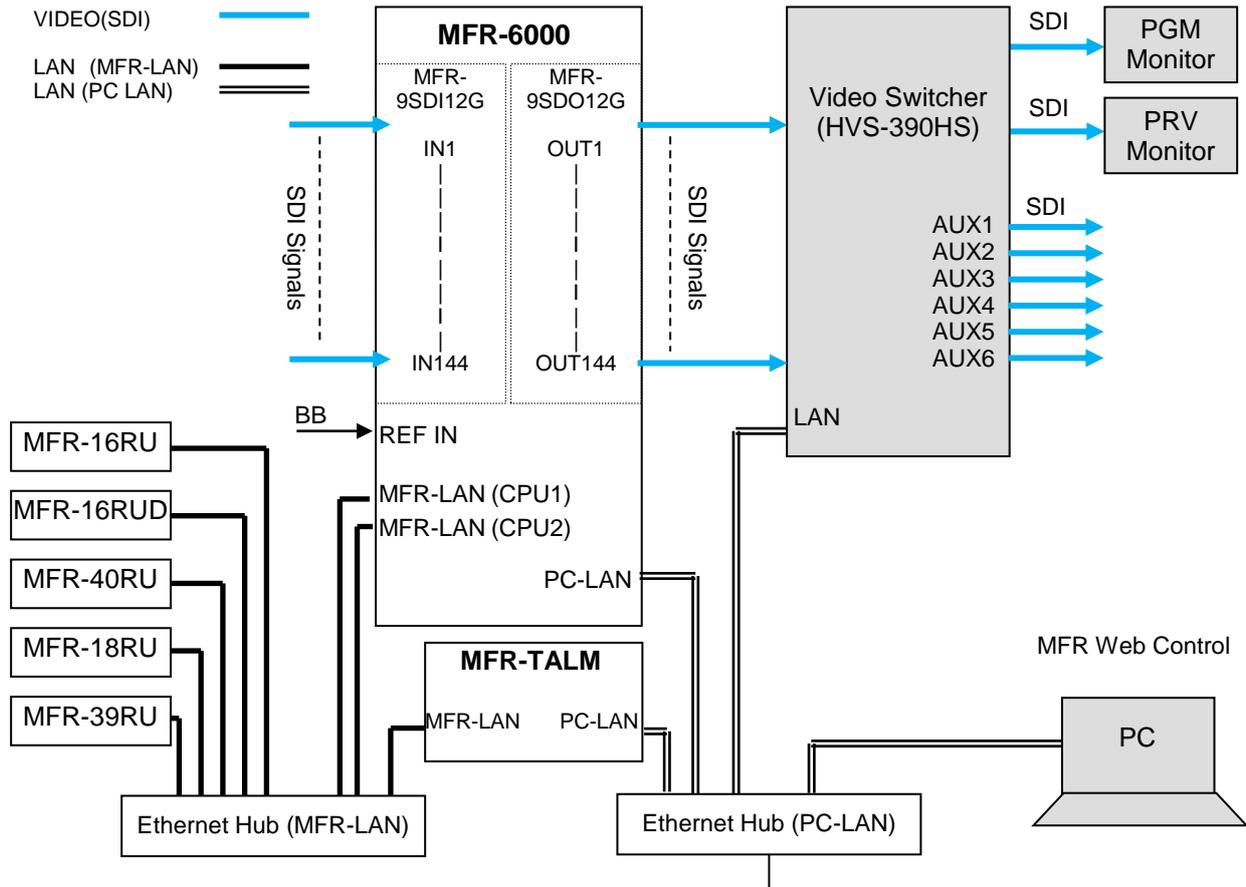
Set the MFR system tally settings in the [MFR-TALM Web-based Control: **Assign Tally** page]. Refer to your multiviewer operation manual for the details on how to handle tally data on the multiviewer.

## 3-4. Switcher's AUX Crosspoints Switching System

This system enables the following two features:

- Switches AUX crosspoints on a switcher using an MFR Series Remote Unit or serial commands.
  - Switches AUX crosspoints on a switcher as well as the corresponding crosspoints on the MFR-6000, if the MFR-6000 provides video sources to the switcher.
- Supported switcher: **HVS-390HS, HVS-100/110, HVS-2000, HVS-6000**

### ◆ System Example

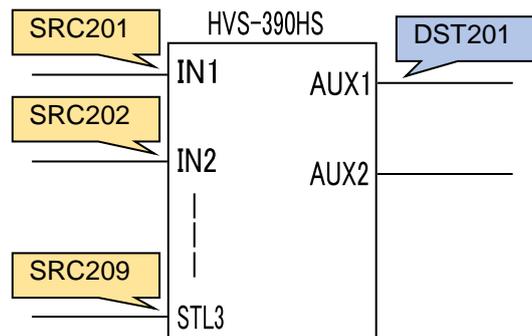


### 3-4-1. Switching an AUX Bus Signal

Assume that the system is configured as shown below:

**AUX1** on the switcher is assigned to **DST 201** (Level 1) on the MFR-6000.

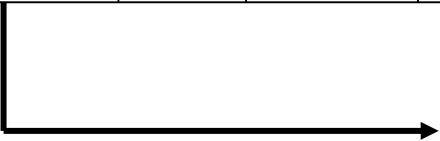
**IN1-8** on the switcher are assigned to **SRC201-208** on the MFR-6000 and **STL (Still) 3** is assigned to **SRC209**.



◆ **Setup Settings**

- 1) Connect and assign video signals as shown in the figure on previous page.
- 2) Device Setup on the MFR-6000:  
Connect to the MFR-6000 from the Web-based Control PC and open the [**Tally System Settings - Device Select**] page. Select **HVS-390HS** in the [**Switcher**] field and click [**Send**].
- 3) Network settings on the MFR-6000:  
Open the [**Router System Settings - PortSettings**] page and set the TCP/IP menu as shown below.

IP Address	Port	Protocol	Function	Local Port(MFR)
(Switcher's IP address)	See below	UDP	Editor(HVS)	Select a UDP port number. Do not use the UDP port number (Default: 23) already used in the Server (MFR).



Switcher	Port
HVS-390HS	8740
HVS-100/110	8740
HVS-2000	53381
HVS-6000	53381

- 4) Assign AUX buses and input channels on the switcher to logical destination and sources channels on the MFR-6000.  
<AUX bus assignments>
  - a) Open the **Destination Assignment** page.
  - b) Select HVS(AUX) under Select Table.
  - c) Set Level to 1.
  - d) Assign AUX1 to DST 201.

<Input channel assignments>

- a) Open the **Source Assignment** page.
- b) Select HVS(AUX) under Select Table.
- c) Set Level to 1.
- d) Assign input channels to MFR sources as shown below.

Logical No./Name	Switcher Channel
201   SRC 201	IN1
208   SRC 208	IN8
209   SRC 209	STL3

- 5) Settings on the switcher:  
Open the [**SETUP - EXT I/F - EDITOR**] menu on the HVS-390HS.  
Change [TYPE] to [**DVS**] and [ENABLE] to [**ON**].

After above setup settings are complete:

- If **SRC 201** is selected for **DST 201**, **AUX1** outputs **IN1** video on the switcher.
- If **SRC 209** is selected for **DST 201**, **AUX1** outputs **STL 3** on the switcher.
- If **IN4** is selected for **AUX1** on the switcher, **SRC 204** is selected for **DST 201** on the MFR-6000.

If input channels that are not assigned in the **Source Assignment** page are selected on the switcher, they are replaced with the Alternative Source set in the **Source Assignment** page in the MFR system.

## 3-4-2. Synchronous Crosspoints Switching

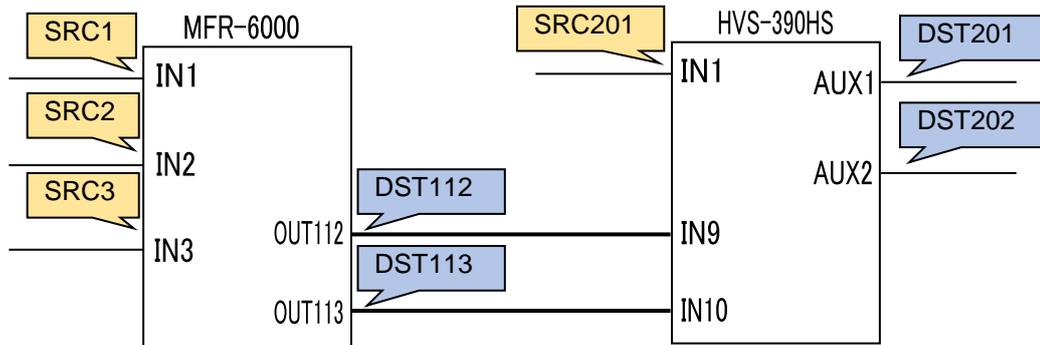
1) to 3) Configure the system as described in Sec. 3-4-1.

4) Configure channel link settings:

Open the **Re-Entry** page and set the menu page as shown below.

Output	Input
MFR Dst 112	HVS-390HS IN9 > AUX 1
MFR Dst 113	HVS-390HS IN10 > AUX 2

\* Physical destination channels must be assigned to these logical destination channels on the MFR-6000.



5) Assign logical source and destination channels on the MFR-6000 to input channels and AUX buses on the switcher.

<AUX bus assignments>

- Open the **Destination Assignment** page.
- Select HVS(AUX) under Select Table.
- Set Level to 1.
- Assign AUX1 to DST 201.
- Assign AUX2 to DST 202.

<Input channel assignments>

- Open the **Source Assignment** page.
- Select HVS(AUX) under Select Table.
- Set Level to 1.
- Assign IN1 to SRC 201.

After above setup settings are complete:

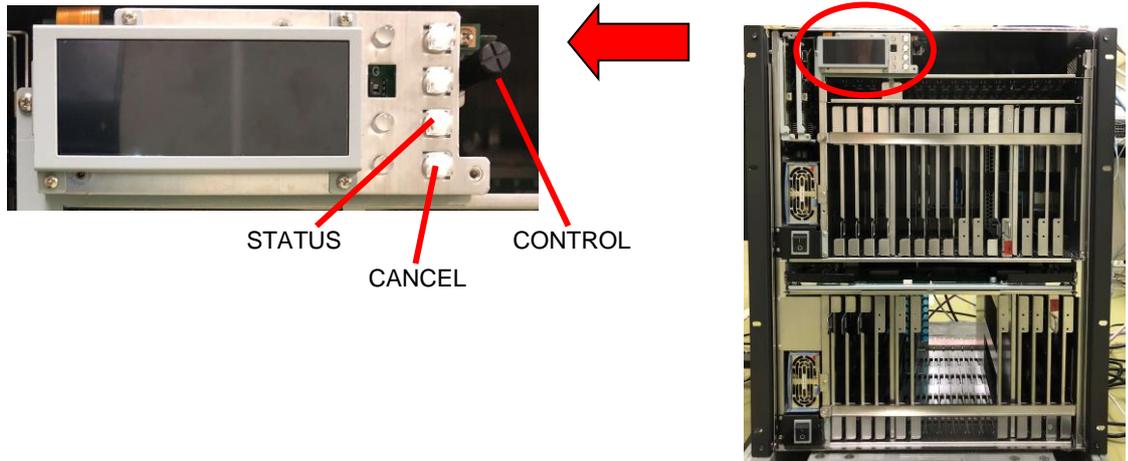
- If **SRC 201** is selected for **DST 201** on the MFR-6000, **IN1** is selected for **AUX1** on the switcher.
- If **SRC 3** is selected for **DST 201** on the MFR-6000, **IN9** is selected for **AUX1** on the switcher and **SRC 3** is also selected for **DST 112** on the MFR-6000.
- If **IN9** is selected for **AUX1** on the switcher, a source assigned to **DST 112** is selected for **DST 201** on the MFR-6000.
- If **IN10** is selected for **AUX2** on the switcher, a source assigned to **DST 113** is selected for **DST 202** on the MFR-6000.

### IMPORTANT

- \* Note that destination channels to which physical channels are assigned (DST 112 and DST 113 in the example above) on the MFR-6000 cannot select source channels to which the switcher input channels are assigned (SRC 201 in the example above).
- \* If an AUX crosspoint is switched on the switcher by the Synchronous Crosspoints switching and it is not listed in Re-Entry page, the AUX crosspoint returns to the previous state.

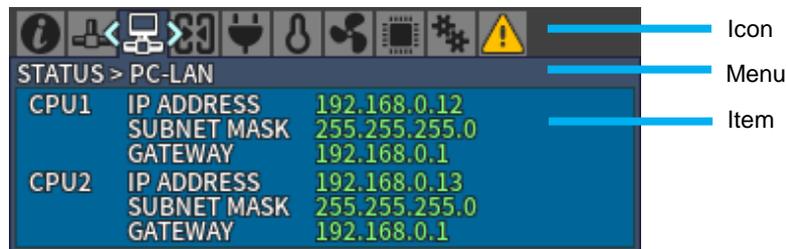
# 4. Menu Display Operation

Removing the front panel reveals menu display operation buttons.



Button	Description
STATUS	Opens <b>STATUS</b> menu. (STATUS menu is displayed when button is lit.)
CANCEL	Lit: Displays the menu display. Unlit: Returns to a menu selection using the icons on top.
CONTROL	Moves between menu icons.

Menu display is as shown below.



Icon	Menu	Description
	[STATUS > INFO]	System Information (See Sec. 4-1-1.)
	[STATUS > MFR-LAN]	MFR-LAN settings (See Sec. 4-1-2.)
	[STATUS > PC-LAN]	PC-LAN settings (See Sec. 4-1-3.)
	[STATUS > SLOT]	Slot status (See Sec. 4-1-4.)
	[STATUS > POWER]	Power status (See Sec. 4-1-5.)
	[STATUS > TEMPERATURE]	Temperature status (See Sec. 4-1-6.)
	[STATUS > FAN]	Fan status (See Sec. 4-1-7.)
	[STATUS > VERSION]	Version information (See Sec. 4-1-8.)
	[SETTING]	Manual switches CPU cards 1 and 2, slot shutdown and whether installed or not of the redundant power supply unit. (See Sec. 4-2.)
	[STATUS > ALARM]	Alarm information (See Sec. 4-1-9.)

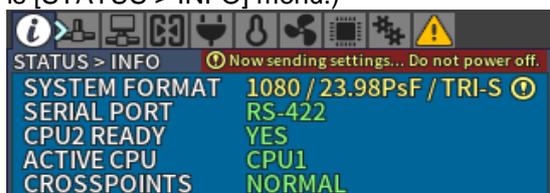
## 4-1. STATUS

Displays various status.

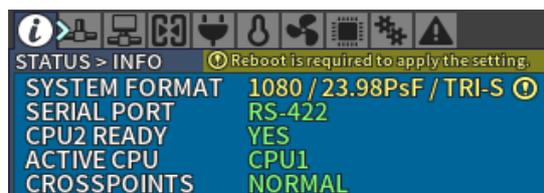
“Getting...” is displayed for items acquiring data.



When settings are changed in each menu, the following messages are displayed. (Example below is [STATUS > INFO] menu.)

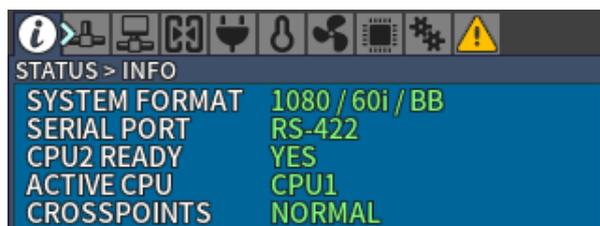


Now sending settings... Do not power off.



Reboot is required to apply setting.

### 4-1-1. STATUS > INFO



Item	Description
SYSTEM FORMAT	Resolution / Frame rate / Reference
SERIAL PORT	SERIAL port setting on rear panel - <b>RS-232C</b> or <b>RS-422</b> .
CPU2 READY	CPU2 condition <b>YES:</b> Normally operating <b>NO:</b> Abnormal operation <b>NOT INSTALLED:</b> CPU2 not installed
ACTIVE CPU	Displays an active CPU. <b>CPU1:</b> CPU1 is active. <b>CPU2:</b> CPU2 is active.
CROSSPOINTS	Displays any crosspoints errors. <b>NORMAL:</b> Normally operating <b>ERROR:</b> Crosspoint error(s) has occurred.

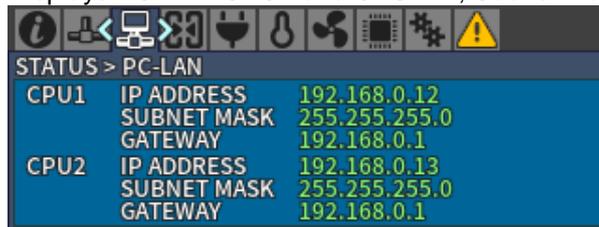
## 4-1-2. STATUS > MFR-LAN

Displays MFR-LAN CPU1 and CPU2 IP and Subnet mask addresses.



## 4-1-3. STATUS > PC-LAN

Displays PC-LAN CPU1 and CPU2 IP, Subnet mask and Gateway addresses.



## 4-1-4. STATUS > SLOT

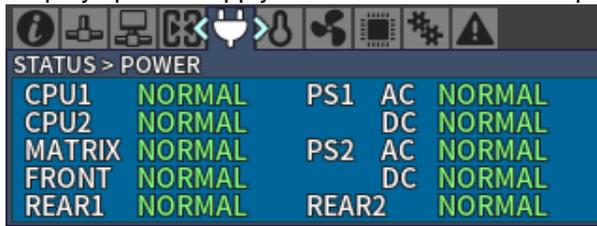
Move into [STATUS > SLOT] menu where a slot can be selected by pressing CONTROL. Select a slot by turning CONTROL and push CONTROL to decide a slot to display the installed card information.



Item	Description
TYPE	Installed card type
FPGA	FPGA version
FW	Firmware version (When MFR-2SDIGB or MFR-2SDOGB is installed)
POWER	Power supply status <b>NORMAL:</b> Normal. <b>ERROR:</b> Power supply error has occurred.
TEMP.	Temperature status <b>NORMAL:</b> Normal <b>WARNING:</b> Warning <b>ERROR:</b> Abnormal
INACTIVE(SHUTDOWN)	The slot is inactive (shutdown)
NOT INSTALLED	No card is installed into the slot

## 4-1-5. STATUS > POWER

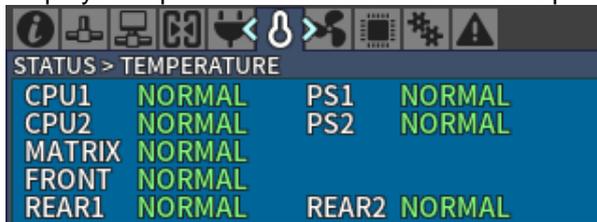
Displays power supply status for each card and power supply unit.



Item	Description
CPU1	<b>NORMAL:</b> Normal <b>ERROR:</b> Power supply error occurred.
CPU2	
MATRIX	
FRONT	
REAR1	
REAR2	
PS1 AC, DC	<b>NORMAL:</b> Normal <b>POWER OFF:</b> Power off
PS2 AC, DC	<b>NORMAL:</b> Normal <b>NOT INST.:</b> Not installed <b>POWER OFF:</b> Power off

## 4-1-6. STATUS > TEMPERATURE

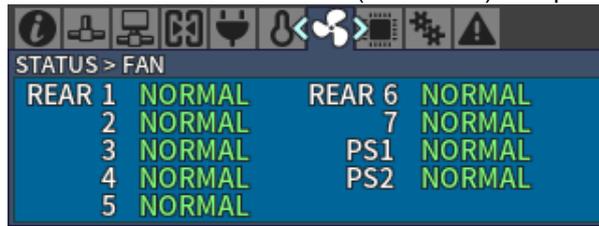
Displays temperature status of each card and power supply.



Item	Description
CPU1	<b>NORMAL:</b> Normal <b>WARNING:</b> Warning <b>ERROR:</b> Temperature error occurred.
CPU2	
MATRIX	
FRONT	
REAR1	
REAR2	
PS1	
PS2	

#### 4-1-7. STATUS > FAN

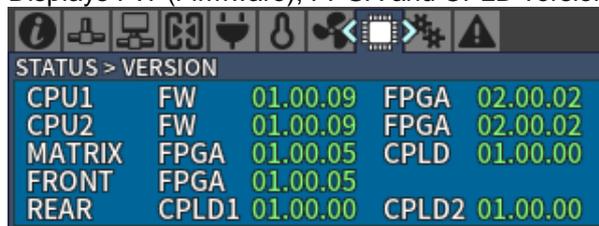
Status of MFR-6000 rear fan (REAR 1-7) and power supply fan (PS1-2) units.



Item	Description
REAR 1-7	<b>NORMAL:</b> Normal
PS1-2	<b>WARNING:</b> Warning <b>ERROR:</b> Fan error

#### 4-1-8. STATUS > VERSION

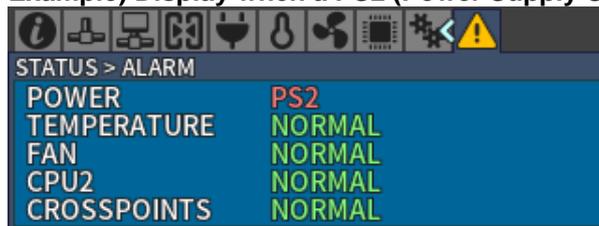
Displays FW (Firmware), FPGA and CPLD version for each card.



#### 4-1-9. STATUS > ALARM

When an alarm has occurred, ALARM icon is displayed in yellow and the part name indicating an alarm is displayed in red.

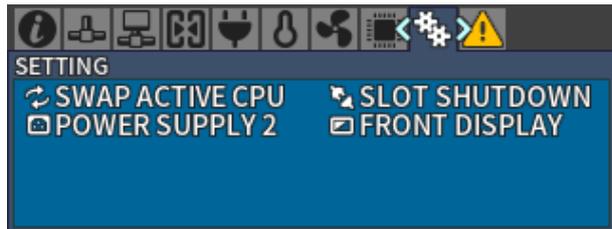
**Example) Display when a PS2 (Power Supply Unit 2) power supply alarm has occurred.**



Item	Description
POWER	Displays where a power alarm has occurred.
TEMPERATURE	Displays where a temperature alarm has occurred.
FAN	Displays where a fan alarm has occurred.
CPU2	Displays that a CPU2 alarm has occurred.
CROSSPOINTS	Displays crosspoints alarm(s) have occurred.

## 4-2. SETTING

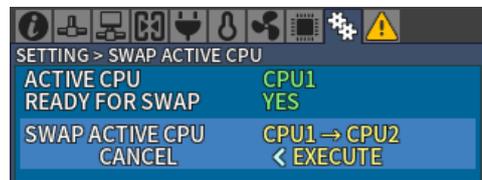
Turn CONTROL to select a menu to change settings and press CONTROL to enter the settings screen.



Menu	Description
SWAP ACTIVE CPU	Allows you to verify CPU condition and manually swap the active CPU.
SLOT SHUTDOWN	Allows you to turn on/off an in/out card.
POWER SUPPLY 2	Allows you to verify power supply 2 installation and change settings.
FRONT DISPLAY	Allows you to change front menu display settings.

### 4-2-1. Swapping Active CPU

1. Open [SETTING > SWAP ACTIVE CPU] menu. Confirm that **READY FOR SWAP** is set to **YES**.



When **READY FOR SWAP** is set to **NO**, a message appears as shown in the right figure.



Message	Description
THE OTHER CPU IS NOT INSTALLED	A redundant CPU is not installed.
THE OTHER CPU IS ERROR	The redundant CPU is not functioning.
DURING SYNC FOR SETTINGS	Synchronizing settings with the redundant CPU. Wait until status bar reaches 100%.

2. Turn and press CONTROL to select **EXECUTE** in SWAP ACTIVE CPU. A message **Now Executing...** is displayed while a swap is executed.

### 4-2-2. Turning ON/OFF an Input/ Output Card

**Example) Turning OFF the INPUT1 slot.**

1. Open the [SETTING > SLOT SHUTDOWN] menu.
2. Turn and press CONTROL to select **INPUT1** in TARGET SLOT.



- Turn and press CONTROL to select **EXECUTE** in CHANGE STATE. A **Now Executing...** message is displayed.
- When **SHUTDOWN** is displayed, slot shutdown is complete.



**Example) Turning ON the INPUT5 slot.**

- Open [SETTING > SLOT SHUTDOWN] menu.
- Turn and press CONTROL to select **INPUT5** in TARGET SLOT.  
Confirm that CURRENT STATUS is displayed as **SHUTDOWN**.



- Turn and press CONTROL to select **EXECUTE** in CHANGE STATE.  
A message **Now Executing...** is displayed.
- When **ON** is displayed for CURRENT STATUS, turning on slot power is complete.

**NOTE**

When **NOT INSTALLED** is displayed for CURRENT STATUS, the slot power is not able to power ON/OFF.

### 4-2-3. Changing Power Supply 2 Installation Status

Open the [SETTING > POWER SUPPLY 2] menu to check and change Power Supply 2 installation status.

Whether or not Power Supply 2 is installed can be checked by verifying whether the SETTING > POWER SUPPLY 2 Menu is INSTALLED / NOT INSTALLED



To change Power Supply 2 installation status, turn CONTROL, select EXECUTE in the CHANGE SETTING Menu and press CONTROL.

A message "**Now Executing...**" appears. When the message disappears, the setting is complete.

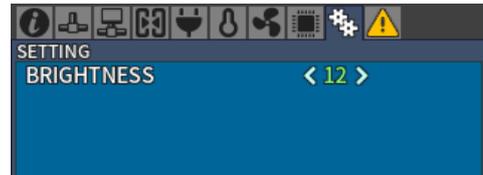
## 4-2-4. Changing Menu Display Settings

Open the [SETTING > FRONT DISPLAY] menu to change MFR-6000 menu display settings. When the menu is not displayed, press the **CANCEL** button to display the menu.



### Changing Menu Display Brightness

1. Open the [SETTING > FRONT DISPLAY] menu.
2. Turn and press CONTROL to select **BRIGHTNESS**.
3. Turn and press CONTROL to select the brightness level from 00 (dim) to 15 (bright). (Factory default: **12**)
4. Turn and press CONTROL to select **EXECUTE** under the CHANGE SETTING. If **CANCEL** is selected under the CHANGE SETTING and CONTROL is pressed, the display returns to the [SETTING > FRONT DISPLAY] menu without executing the change.



The Menu display contrast can also be adjusted following the above procedure but by selecting **CONTRAST**.

Setting range: 00 (weak) to 15 (strong) (Factory default: **13**)

### Hiding Menu Display

1. Open the [SETTING > FRONT DISPLAY] menu.
2. Turn and press CONTROL to select **DISPLAY OFF**.
3. Turn and press CONTROL to select **EXECUTE** under the CHANGE SETTING. Menu Display is hidden. If **CANCEL** is selected under CHANGE SETTING and CONTROL is pressed, the display returns to the [SETTING > FRONT DISPLAY] menu without executing the change.
4. If the **CANCEL** button is pressed, Menu Display reappears.



\* Menu Display Settings before turning off the power are retained when re-starting the unit.

## 5. Gearbox Feature (MFR-2SDIGB / 2SDOGB)

Optional **MFR-2SDIGB/2SDOGB** cards support Gearbox features, in which video signal conversion between 12G-SDI and Quad Link 3G-SDI, and between 2SI and SQD are available.

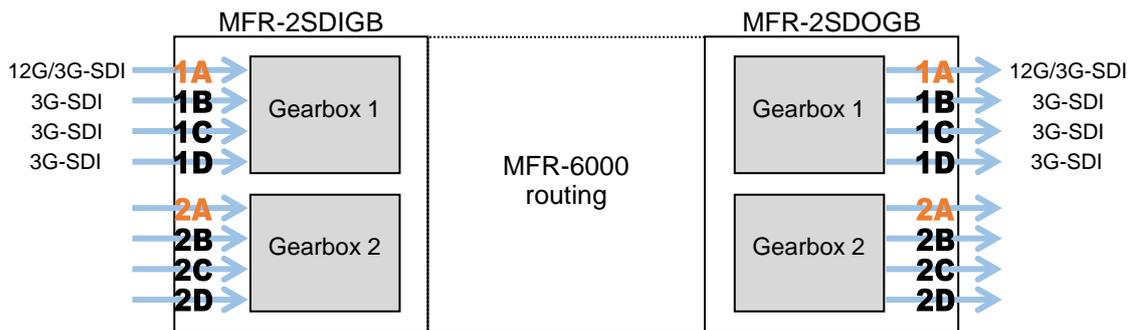
### ◆ Gearbox Features

- Conversion between 12G-SDI and Quad Link 3G-SDI. (Including asynchronous input)
- Conversion between 2SI and SQD.
- AVDL (Automatic Variable Delay Line) clean switching after conversion.  
Also allows Gearbox I/O delay selection. (Excluding 2SI / SQD conversion)
- Genlock or Line lock synchronization
- H/V ANC data pass-through

### 5-1. MFR-2SDIGB / 2SDOGB Cards

MFR-2SDIGB / 2SDOGB cards have two built-in Gearbox units that can respectively perform signal conversions and output test patterns.

If card(s) are installed into Input 1-8/ Output 1-8, 1D and 2D are the ports for 12G-SDI signals. Similarly, if card(s) are installed into Input 9-16/ Output 9-16, 1A and 2A are the ports for 12G-SDI signals. When a 12G-SDI signal is input to a Gearbox, other connectors are disabled.



### ◆ Supported formats

Signal format;		Video format		Standard
12G-SDI		3840 x 2160/59.94p 3840 x 2160/50p	4:2:2 10-bit	SMPTE ST2082-10
Quad Link 3G-SDI (Level-A)	SQD (Square Division) 2SI (2-Sample Interleave)	3840 x 2160/59.94p 3840 x 2160/50p	4:2:2 10-bit	SMPTE ST425-5

## 5-2. Available Conversions

MFR-2SDIGB / 2SDOGB cards allow following input/output conversions.

### ◆ Reference Signal: REF IN

Gearbox 1 \ Gearbox 2		12G→3G(2SI)				3G(2SI)→12G				12G→3G(SQD)				3G(SQD)→12G				3G(SQD)→3G(2SI)				3G(2SI)→3G(SQD)			
		0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H
12G→ 3G(2SI)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(2SI)→ 12G	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12G→ 3G(SQD)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(SQD)→ 12G	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(SQD)→ 3G(2SI)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(2SI)→ 3G(SQD)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Delay<sup>1)</sup>

Delay (H)

### ◆ Reference Signal: SDI Input (When installed into Input 1-8/ Output 1-8)

Gearbox 1 \ Gearbox 2		12G→3G(2SI)				3G(2SI)→12G				12G→3G(SQD)				3G(SQD)→12G				3G(SQD)→3G(2SI)				3G(2SI)→3G(SQD)			
		0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H	0 frame + * (H) 0.3~1H	1 frame + * (H) 0.3~1H	1 frame + 0H 0.3~0.4H	1 frame + 0H 0.5~1H
12G→ 3G(2SI)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(2SI)→ 12G	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12G→ 3G(SQD)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(SQD)→ 12G	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(SQD)→ 3G(2SI)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3G(2SI)→ 3G(SQD)	0 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + * (H)	0.3~1H	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	✓	✓	-	-
	1 frame + 0H	0.3~0.4H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- When **SDI Input** is selected in MFR-2SDOGB, input signals are synchronized only when all 4 channels are input to the Gearbox.

- In case of Input 9-16 / Output 9-16, read the table by swapping Gearbox 1 and Gearbox 2.

**Delay (H)** (**H** in **Total Delay**) indicates amount of horizontal delay and their settings correspond to the following adjustable ranges.

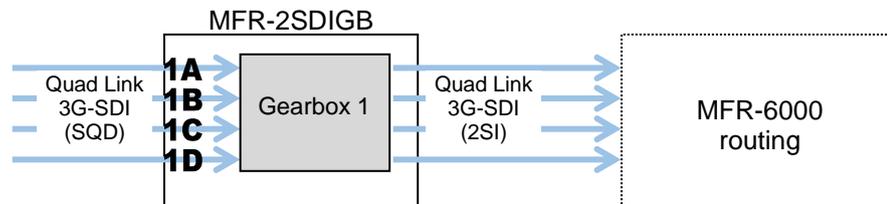
Delay (H) Setting	Adjustable range	Delay (H) Setting	Adjustable range
0.3H	-0.8H to +0.2H	0.8H	-0.3H to +0.7H
0.4H	-0.7H to +0.3H	0.9H	-0.2H to +0.8H
0.5H	-0.6H to +0.4H	1H (1)	-0.5H to +0.5H
0.6H	-0.5H to +0.5H	1H (2)	-0.1H to +0.9H
0.7H	-0.4H to +0.6H		

If **Total Delay** (frame) is set to **“0 frame”** for both Gearboxes, a **Total Delay (H)** setting is selectable for each Gearbox.

## 5-3. Conversion Settings

In the WebGUI, specify the Gearbox input and output formats, and then assign input/output physical channels to logical channels. Use Link Settings that allow simultaneous 4-channel operation and facilitate crosspoint switches.

### 5-3-1. Converting 3G SQD input to 2SI (MFR-2SDIGB)



1. Open the **Gearbox Settings** page in the WebGUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-2SDIGB card block. (This example sets Gearbox 1 on the Slot 4 card.)



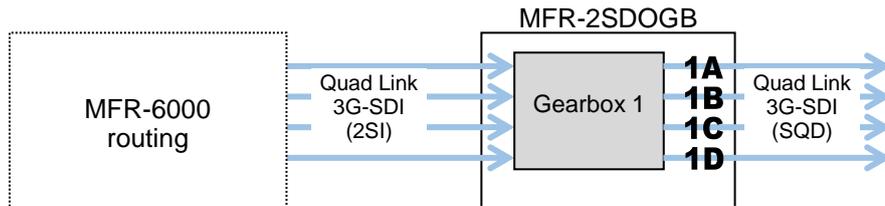
2. Open the **Source Assignment** page in the WebGUI and assign the physical channels (**SDI29-32**) to logical channels (**SRC 1-4**).

LogicalNo. / Name	Slot	Physical No.
1 SRC 1	4:MFR-2SDIGB	SDI 29
2 SRC 2	4:MFR-2SDIGB	SDI 30
3 SRC 3	4:MFR-2SDIGB	SDI 31
4 SRC 4	4:MFR-2SDIGB	SDI 32

3. Use a remote control unit or the Crosspoint page in the WebGUI to assign output channels to **SRC1-4**.

	1 SRC 1	2 SRC 2	3 SRC 3	4 SRC 4
5 SDI 5	1			
6 SDI 6		1		
7 SDI 7			1	
8 SDI 8				1
9 SDI 9				

### 5-3-2. Converting 2SI to SQD Output (MFR-2SDOGB)



1. Open the **Gearbox Settings** page in the WebGUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-2SDOGB card block. (This example sets Gearbox 1 on the Slot 15 card.)

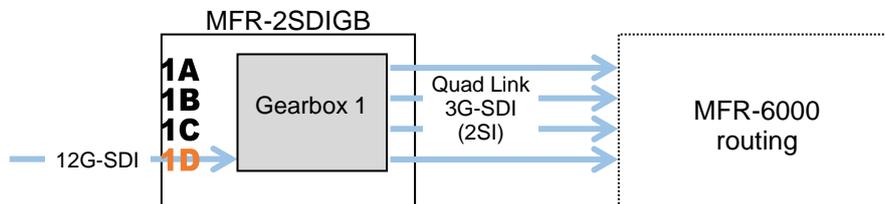


2. Open the **Destination Assignment** page in the Web GUI and assign the physical channels (**SDI 56-59**) to logical channels (**DST 1-4**).

LogicalNo. / Name	Slot	Physical No.
1 DST 1	7:MFR-2SDOGB	SDI 56
2 DST 2	7:MFR-2SDOGB	SDI 57
3 DST 3	7:MFR-2SDOGB	SDI 58
4 DST 4	7:MFR-2SDOGB	SDI 59

3. Use a remote control unit or the Crosspoint page in the WebGUI to assign input channels to **DST1-4**.

### 5-3-3. Converting 12G-SDI Input to 3G-SDI 2SI (MFR-2SDIGB)



1. Open the **Gearbox Settings** page in the WebGUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-2SDIGB card block. (This example sets Gearbox 1 on the Slot 4 card.)

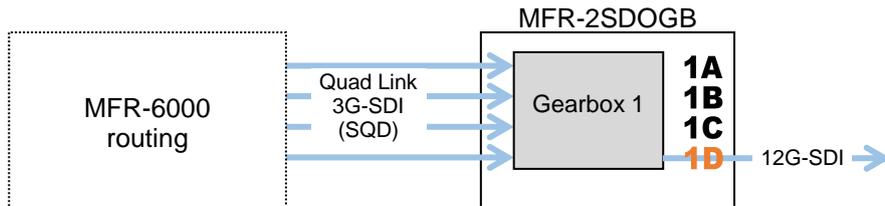


2. Open the **Source Assignment** page in the WebGUI and assign the physical channels (**SDI 29 Link A to D**) to logical channels (**SRC 1-4**).

LogicalNo. / Name	Slot	Physical No.
1 SRC 1	4:MFR-2SDIGB	SDI 29 Link A
2 SRC 2	4:MFR-2SDIGB	SDI 29 Link B
3 SRC 3	4:MFR-2SDIGB	SDI 29 Link C
4 SRC 4	4:MFR-2SDIGB	SDI 29 Link D

3. Use a remote control unit or the Crosspoint page in the WebGUI to perform the crosspoint switches.

### 5-3-4. Converting 3G-SDI SQD to 12G-SDI (MFR-2SDOGB)



1. Open the **Gearbox Settings** page in the WebGUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-2SDOGB card block. (This example sets Gearbox 1 on the Slot 15 card.)



2. Open the **Destination Assignment** page in the WebGUI and assign the physical channels (**SDI 56 Link A to D**) to logical channels (**DST1-4**).

LogicalNo. / Name	Slot	Physical No.
1 DST 1	7:MFR-2SDOGB	SDI 56 Link A
2 DST 2	7:MFR-2SDOGB	SDI 56 Link B
3 DST 3	7:MFR-2SDOGB	SDI 56 Link C
4 DST 4	7:MFR-2SDOGB	SDI 56 Link D

3. Use a remote control unit or the Crosspoint page in the WebGUI to perform the crosspoint switches.
- \* When converting 4K signals from 3G Quad-Link to 12G Single-Link, 3G-SDI Black or 12G-SDI Link 1 are selectable for remaining 3 SDI output signals.

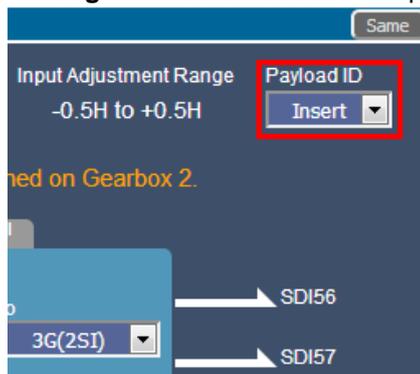
### 5-3-5. Payload ID

#### ◆ Adding Payload ID information to Output Signals.

Select Payload ID information source for output signals.

**Insert:** Data created for output signals.

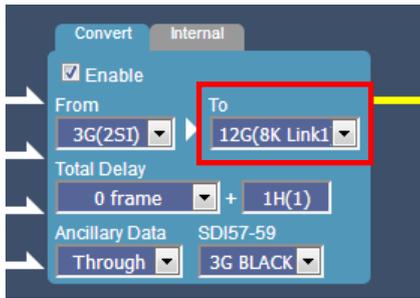
**Through:** Data embedded to input signals.



◆ **Adding 8K Quad-Link Payload ID Information.**

When converting 3G Quad-Link to 12G-SDI, Payload ID information for 8K Quad-Link (In compliance with SMPTE 2082-1) is able to be added to 12G-SDI output. Set as shown below.

From	To	Payload ID	Payload ID Information to Be Added
3G Quad-Link (2SI or SQD)	12G(8K Link1)	Insert	8K Quad-Link, Link1
	12G(8K Link2)	Insert	8K Quad-Link, Link2
	12G(8K Link3)	Insert	8K Quad-Link, Link3
	12G(8K Link4)	Insert	8K Quad-Link, Link4



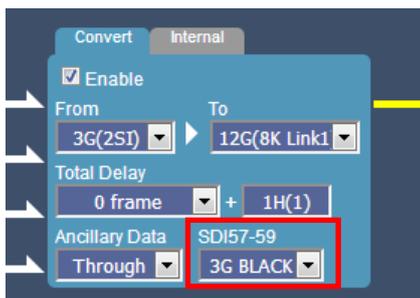
When adding 8K Quad-Link Payload ID information to Gearbox 1, make sure to also add the information to Gearbox 2 as shown below. Use different Link Numbers.

Ex.)

Gearbox	From	To (Yes)	To (No)
GB1	3G(SQD)	12G(8K Link1)	12G
GB2	3G(2SI)	12G(8K Link2)	12G(8K Link2)

### 5-3-6. 3G-SDI BNC Output Settings

When converting 3G Quad-Link to 12G-SDI, 3G-SDI Black or 12G-SDI Link 1 are selectable for remaining 3 SDI output signals.



## 6. Serial / LAN Command Control

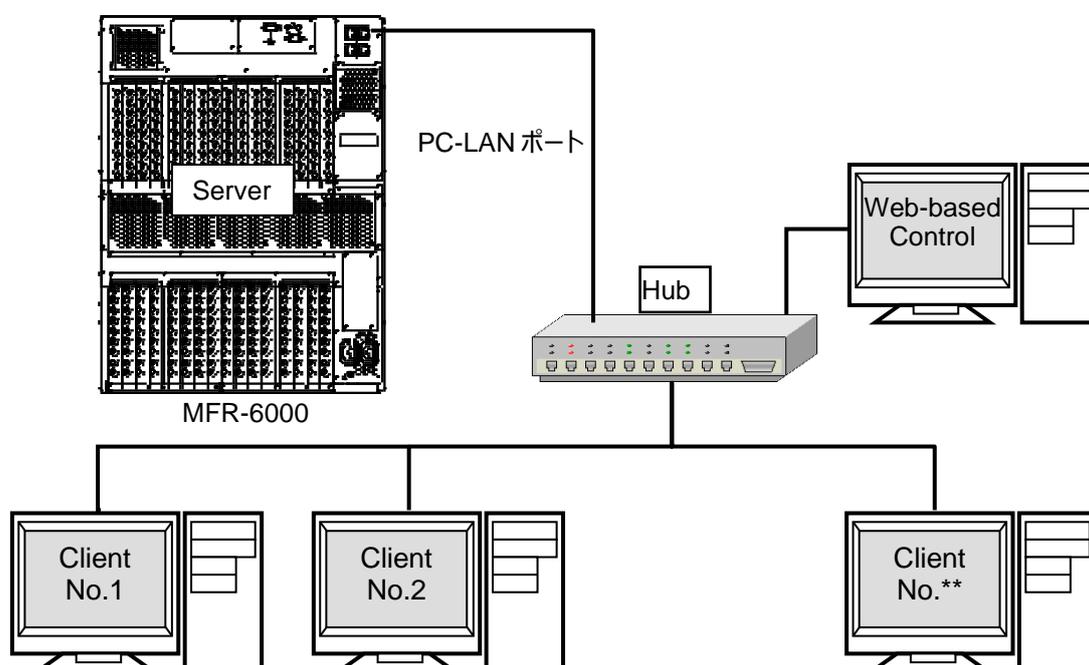
Up to 20 external devices can be connected to an MFR Main Unit (including MFR-GPI serial ports) through LAN or serial interface.

### 6-1. Serial Interface

Crosspoint switchover and tally output can be controlled via the SERIAL ports 1-4 on the MFR Series main unit or MFR GPI.

### 6-2. LAN Interface

The MFR Series main unit is able to connect to a third-party automatic control system via the RJ-45 port (PC-LAN port). The TCP/IP communication protocol is supported. The control PC will be the Client, and the MFR Series main unit will be the Server.



#### ◆ Basic specifications

Item	Description
IP address (PC-LAN port)	Primary LAN (PC-LAN CPU1) default IP address: 192.168.0.12 Secondary LAN (PC-LAN CPU2) default IP address: 192.168.0.13* (Subnet Mask: 255.255.255.0)
Port number	Setting range: 23, 49152 to 65534 (default: 23)
Number of PCs	Max. 16
Response / Resend	Wait before sending next command (Resend if the Echo is not returned.)
Login password	None
Communication protocol	TCP/IP, Control PC: Client, MFR-6000: Server Crosspoint Remote Control using ASCII code.
Command protocol	Crosspoint Remote Control protocol

\* When a redundant CPU is configured, a client should connect to both LAN ports (PC-LAN CPU1 and PC-LAN CPU2) and send commands to the ports respectively. When the system functions normally, the secondary port (PC-LAN CPU2) do not respond to commands. But if an error occurs in the CPU1 system, the secondary port will take over the primary port and respond to commands.

## 6-3. Control Commands

Although the protocols listed below support both serial and LAN connections, some commands can only be sent over a LAN.

### ◆ Control command list

	Function	Serial	LAN *1	Protocol *2
1	Commands (S?) for requesting the crosspoints list	Yes	Yes	Crosspoint remote control / Crosspoint remote control 2
2	Commands (X?) for requesting information on crosspoints (by specifying a destination and level.)	Yes	Yes	
3	Commands (X:) for switching over a crosspoint (single channel)	Yes	Yes	
4	Commands for switching over crosspoints (multi-channel simultaneous switchover)	Yes	Yes	
5	Commands (W:) for locking a destination	Yes	Yes	
6	Commands (z:) for reinitializing a unit	Yes	Yes	
7	Commands (K?) for requesting input/output channel names	–	Yes	Crosspoint remote control 2
8	Commands (A?) for requesting CPU status.	–	Yes	
9	Commands (W?) for requesting Destination Lock status.	–	Yes	
10	Commands (K:) for importing signal names	–	Yes	

\*1 When commands are sent via LAN, an Echo, Prompt, S response and other response messages may be included in a single packet or divided into two or more packets. Therefore, do not process commands in a per packet basis but a per stream basis.

\*2 A command protocol should be selected in the [Web-based Control: **Port Settings** page].

### ◆ Command formats

Func.	Control command	Command response	Ref.
1	@[sp]S?<Lvl>	S:<Lvl><Dest>,<Src>	–
2	@[sp]X?<Lvl><Dest>	S:<Lvl><Dest>,<Src>	–
3	@[sp]X:<Lvl>/<Dest>,<Src>	S:<Lvl><Dest>,<Src> C:<Lvl>/<Dest>,<Src>[.....[S<Salvo number>][L<Link number>]]:!<ID>	–
4	Clear a preset crosspoint. @[sp]B:C		–
	Preset a crosspoint. @[sp]P:<Lvl>/<Dest>,<Src>		
	<b>Read a preset crosspoint specifying a level and destination.</b> @[sp]P?<Lvl><Dest>	V:<Lvl><Dest>,<Src>	
	<b>Read preset crosspoints for all channels in the specified level.</b> @[sp]V?<Lvl>	V:<Lvl><Dest>,<Src>	
	Perform the preset crosspoints simultaneously. @[sp]B:E	S:<Lvl><Dest>,<Src> C:<Lvl>/<Dest>,<Src>[.....[S<Salvo number>][L<Link number>]]:!<ID>	–
5	LOCK ALL units. @[sp]W:<Lvl>/<Dest>,<ID>,1	W!<Lvl><Dest>,<ID>,1	–
	LOCK OTHER units. @[sp]W:<Lvl>/<Dest>,<ID>,2	W!<Lvl><Dest>,<ID>,2	–
	Disable LOCK. @[sp]W:<Lvl>/<Dest>,<ID>,0	W!<Lvl><Dest>,<ID>,0	–
6	@[sp]z:<Lvl>	S:<Lvl><Dest>,<Src> C:<Lvl>/<Dest>,<Src>[.....[S<Number of crosspoints in Salvo>][L<Number of Links>]]:!<ID>	
7	@[sp]K?<SorD><AorK>,<Offset>	K:<SorD><AorK><No.>,<Dat>	6-3-3
8	@[sp]A?		
	If CPU is active: If CPU is passive:	@[sp]A:<ID> (No response)	6-3-4

9	@[sp]W?<Lvl>,<Dest>	W!<Lvl><Dest>,<ID>,0-2* *0: Nothing locked 1: LOCK ALL 2: LOCK OTHER	6-3-5
10	K:<S or D><S or L or A><No.>,<Dat>  No : Start channel number Dat: Channel names using hex characters (max. 128 bytes).		6-3-6

\* [sp] indicates a space.

\* Commands must end with a carriage return (ASCII code 0x0D) only or carriage return and line feed (ASCII code 0x0A). MFR units add a **carriage return** and **line feed** in front of and at the end of reply messages.

#### ◆ Command parameters and setting range

<Lvl>	0-7	Allows you to specify the level to switch crosspoints. * When in single-level operation.
<Lvls>	0-7	Allows you to specify the levels to switch crosspoints. * When in multiple-level operation
<Dest>	0-1FF	Allows you to specify the crosspoint switchover destination.
<Src>	0-3FF	Allows you to specify the source of crosspoint switchover.
<ID>	0-FE	Unit ID. The ID must be different from that of other devices in the same network. Use <b>1</b> to <b>FE</b> for ID numbers. The host returns <b>0</b> when the lock is released.

\* All command values are in hexadecimal, starting from 0 (zero).

(For example, Source “**16**” is represented as <Src>”**F**.”)

\* If levels are not in use, set <Lvl> or <Lvls> to “0”(zero).

## 6-3-1. Command Responses (Commands 1-6)

### • Echo and Prompt

Responses will be sent as shown below when receiving commands:

Receipt of command ↓ Echo ↓ Prompt	@[sp]X:<Lvls>/<Dest>,<Src>[CR]  [CR][LF]>
--	---

\* MFR units respond with an Echo Reply with the same data received. Therefore, echo reply messages end with [CR] [LF] or [CR] only. If echo messages with [CR] [LF] are received, only [LF] composes the second line.

\* MFR units read a command, ended with a newline, and return a prompt to notify that they are ready to receive a new command.

\* A carriage return and line feed are not added at the end of “Echo Reply” or “Prompt”

### • “C” responses

A “C” response is sent as shown below when a control command is received:

[CR][LF]C:<Lvls>/<Dest>,<Src>[...[S<Salvo number>]][L<Link number>]]:!<ID>[CR][LF]
--

\* C responses are sent to all terminals in the system.

Parameter	Setting range	Description
<Salvo number >	1-FFF	The number of crosspoints to be changed simultaneously by Salvo settings. A response if 3 crosspoints are to be changed simultaneously: <b>C:0/0,0...S2:1A</b>
<Link number>	1-FFF	The number of crosspoints to be changed simultaneously by Link settings. A response if 2 crosspoints are to be changed simultaneously: <b>C:0/0,2...L1:1A</b>

- **“S” responses**

An “S” response is sent as shown below when crosspoints are switched by a command.

```
[CR][LF]S:<Lvl><Dest>,<Src>[CR][LF]
```

- \* If a crosspoint is switched by an X or B command, its “S” response is sent to all terminals in the system. However, if any crosspoints are not switched (specifying the same crosspoint as the current one), its “S” response is sent only to the terminal that sent the command.
- \* C responses are sent before S responses in some cases.
- \* When a command is received from another terminal while a B or X command is processed, MFR units send “S” response messages to the terminals, notifying only the latest crosspoint states.
- \* A crosspoint switch command is not performed if the relevant crosspoint is locked or inhibited from changing.

**Ex. 1)** When Source 5 is selected for Destination 3 in Level 1:  
(Function 3 in the previous page)

(A)	@ X:0/2,4[CR] [CR][LF]>	Terminal display:	@ X:0/2,4
(B)	[CR][LF] C:0/2,4:1A[CR][LF]		>
(C)	[CR][LF] S:02,4[CR][LF]		C:0/2,4:1A
			S:02,4

**Ex. 2)** When Source 113 is selected for Destination 49 in Levels 2 to 7:  
(Function 3 in the previous page)

(A)	@ X:123456/30,70[CR] [CR][LF]>	Terminal display:	@ X:123456/30,70
(B)	[CR][LF] C:123456/30,70...S5:1A[CR][LF]		>
(C)	[CR][LF] S:130,70[CR][LF]		C:123456/30,70...S5:1A
(C)	[CR][LF] S:230,70[CR][LF]		S:130,70
(C)	[CR][LF] S:330,70[CR][LF]		S:230,70
(C)	[CR][LF] S:430,70[CR][LF]		S:330,70
(C)	[CR][LF] S:530,70[CR][LF]		S:430,70
(C)	[CR][LF] S:630,70[CR][LF]		S:530,70
(C)	[CR][LF] S:630,70[CR][LF]		S:630,70

\* [CR] and [LF] represent Carriage Return (0x0D) and Line Feed (0x0A) respectively.

## 6-3-2. Receiving Responses (Commands 1-6)

- **Timeout Period for Response Commands from MFR**

Set the **timeout** period (maximum permitted time until its response returns from the MFR unit) to **1 second** for short message commands and to **5 seconds** for long message commands.

- **If Sending Commands Successively:**

-For “X:”, “B:C”, “P:” and “W:” commands, send the next command **after** a **prompt** returns.

-For “S?”, “X?”, “P?”, “V?”, “B:E” and “Z:” commands, send the next command **after** a **prompt and reply messages** return.

-For “S?” and “Z:” commands as well as “V?” and “B:E” commands after executing many preset commands, send the next command **after** having finished receiving **all strings** of reply messages.

Ex. 1)

Allows the next command to be sent when receiving a prompt.

Resends the previous command when the timeout period (5 seconds) has elapsed without reply after sending a command.

Ex. 2)

Allows the next command to be sent when receiving a prompt.

Resends the previous command when the timeout period (5 seconds) has elapsed without reply after sending a command.

Recognizes and uses "S" responses as tallies (crosspoint states).

Ex. 3)

Allows the next command to be sent when receiving a prompt.

Recognizes and uses "S" responses as tallies (crosspoint states).

Resends the previous command when the timeout period (5 seconds) has elapsed without reply after sending a command.

Sets the maximum number of continuous resends, because crosspoints cannot be changed if they are locked or inhibited from changing.

Ex. 4)

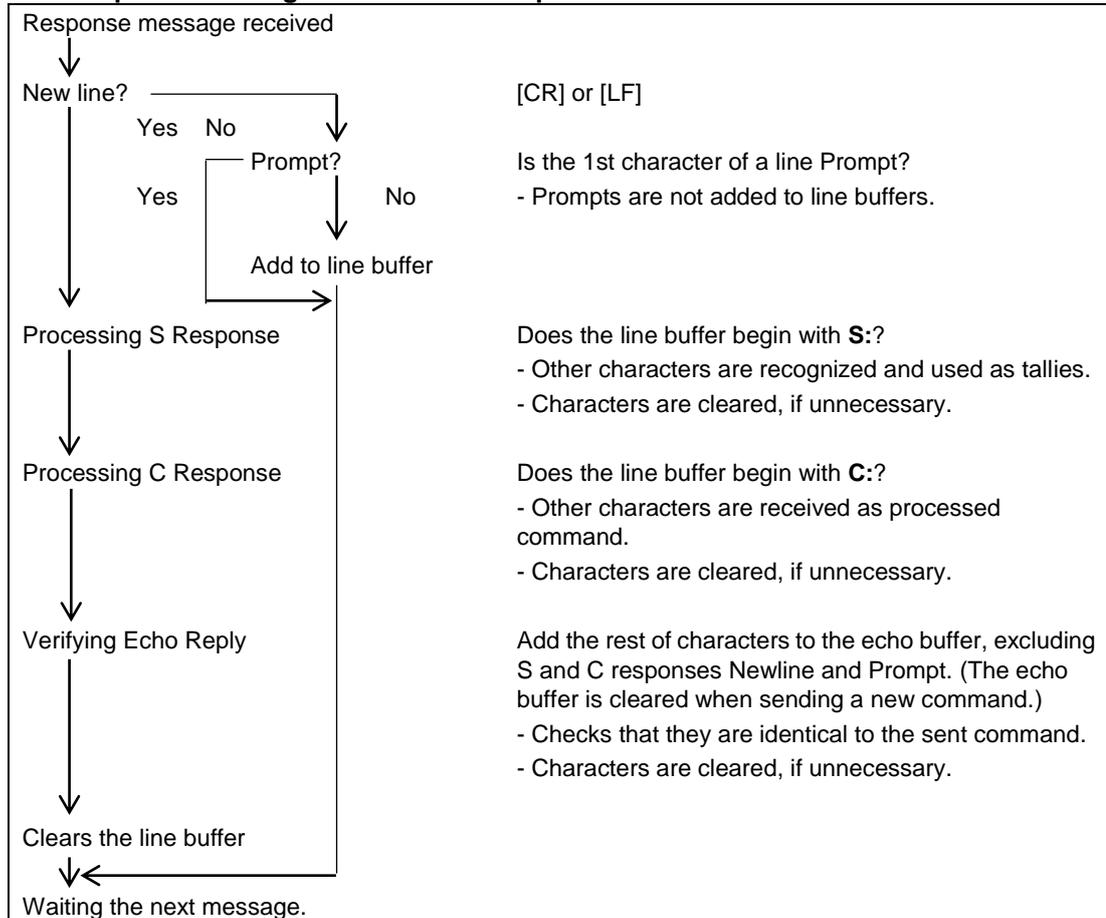
Allows the next command to be sent when receiving a prompt.

Resends the previous command when the timeout period (5 seconds) has elapsed without reply (echo) after sending a command.

Ex. 5)

Allows the next command to be sent when receiving a prompt if tally or echo recognition is not performed.

• **Response Message Evaluation Example:**



- **If Commands Overlap:**

Two or more commands are sent from different terminals (via serial or LAN interface, or Remote Control units), all command results (C and S responses) are returned to all these terminals from the MFR.

The following command examples show how overlapped commands are processed.

Ex.) Assume that the following commands are overlapped:

**Terminal 1** sent "@ X:0/2,4."

**Terminal 2** sent "@ X:123456/30,70."

**Message examples returned to Terminal 1**

1-(A)	@ X:0/2,4[CR] [CR][LF]>
1-(B)	[CR][LF] C:0/2,4:IA[CR][LF]
2-(B)	[CR][LF] C:123456/30,70...S5:IA[CR][LF]
1-(C)	[CR][LF] S:02,4[CR][LF]
2-(C)	[CR][LF] S:130,70[CR][LF]
2-(C)	[CR][LF] S:230,70[CR][LF]
2-(C)	[CR][LF] S:330,70[CR][LF]
2-(C)	[CR][LF] S:430,70[CR][LF]
2-(C)	[CR][LF] S:530,70[CR][LF]
2-(C)	[CR][LF] S:630,70[CR][LF]

Terminal display:

```
@ X:0/2,4
>
C:0/2,4:IA
C:123456/30,70...S5:IA
S:02,4
S:130,70
S:230,70
S:330,70
S:430,70
S:530,70
S:630,70
```

**Message examples returned to Terminal 2**

2-(A)	@ X:123456/30,70[CR] [CR][LF]>
1-(B)	[CR][LF] C:0/2,4:IA[CR][LF]
2-(B)	[CR][LF] C:123456/30,70...S5:IA[CR][LF]
1-(C)	[CR][LF] S:02,4[CR][LF]
2-(C)	[CR][LF] S:130,70[CR][LF]
2-(C)	[CR][LF] S:230,70[CR][LF]
2-(C)	[CR][LF] S:330,70[CR][LF]
2-(C)	[CR][LF] S:430,70[CR][LF]
2-(C)	[CR][LF] S:530,70[CR][LF]
2-(C)	[CR][LF] S:630,70[CR][LF]

Terminal display:

```
@ X:123456/30,70
>
C:0/2,4:IA
C:123456/30,70...S5:IA
S:02,4
S:130,70
S:230,70
S:330,70
S:430,70
S:530,70
S:630,70
```

\* C responses are sent before S responses in some cases.

## 6-3-3. Channel Name Request Commands (7)

K? commands allow you to obtain Source and Destination names in ASCII and/or in Kanji set in the MFR Web-based Control menu.

### ◆ Command Format

Command	Command response
@[sp]K?<S or D><A or K>,<Offset>	K:<SorD><AorK><No.>,<Dat>

### Commands

BYTE No.	1	2	3	4	5	6	7	8-10	11
Command	@	[sp]	K	?	S	A	,	000-3FF	CR
					D	K		000-1FF	

### Command response

BYTE No.	1	2	3	4	5	6	7-9	10	11-		
Response	CR	LF	K	:	S	A	000-3FF	,		CR	LF
					D	K	000-1FF				

Command Response	BYTE 5	<S or D> Select between S (Source) or D (Destination) S: Source, D: Destination
	BYTE 6	<A or K> Select A (Ascii) or K (Kanji) for names.
Command	BYTE8-10	<Offset> Specify the start number of channels. Source: 000-3FF, Destination: 000-1FF
Response	BYTE7-9	<No.> Indicates the channel number. Source: 000-3FF, Destination: 000-1FF
Response	BYTE11-	<Dat> Indicates the short or long channel name using hex characters (max. 128 bytes). Character code for Ascii names: <b>Ascii</b> Character code for Kanji names: <b>UTF-8</b>
Command Response	CR	Carriage return
	LF	Line feed

Up to 32 channel names can be obtained per request.

Note that if the number of request channels exceeds the system maximum size, no data will return for the exceeded channels.

► See the [Web-based Control: **SystemSize/LevelName** page].

◆ **Command Example 1: Requesting the Source Channel 1 Ascii Name**

➤ **Web-based Control (Source Name menu)**



➤ **Terminal display**

Command	@ K?SA,000
---------	------------

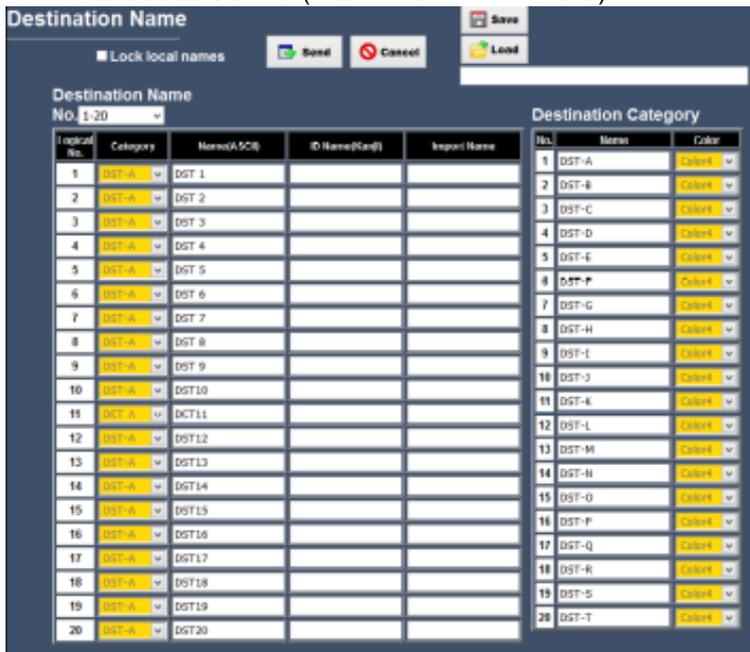
Response	@ K?SA,000	Echo
	K:SA000,5352432031	Ascii Name for Source <b>Channel 1</b> is SRC 1.
	K:SA001,5352432032	Ascii Name for Source <b>Channel 2</b> is SRC 2.
	K:SA002,5352432033	Ascii Name for Source <b>Channel 3</b> is SRC 3.
	K:SA01F,5352433332	Ascii Name for Source <b>Channel 32</b> is SRC32.
	>	Prompt

➤ **Response details**

K:	S	A	000,	53	52	43	20	31
	Source	ASCII	Channel 1	S	R	C	[sp]	1

◆ **Command Example 2: Requesting the Destination Channel 101 Kanji Name**

➤ **Web-based Control (Destination Name menu)**



➤ **Terminal display**

Command	@ K?DK,064
---------	------------

Response	@ K?DK,064	Echo
	K:DK064,E587BAE58A9BEFBC91EFBC90EFBC91	Kanji Name for Destination Channel 101 is 出力 1 0 1.
	K:DK065,E587BAE58A9BEFBC91EFBC90EFBC92	Kanji Name for Destination Channel 102 is 出力 1 0 2.
	K:DK066,E587BAE58A9BEFBC91EFBC90EFBC93	Kanji Name for Destination Channel 103 is 出力 1 0 3.
	K:DK083,E587BAE58A9BEFBC91EFBC93EFBC92	Kanji Name for Destination Channel 132 is 出力 1 3 2.
	>	Prompt

➤ **Response details**

K:	D	K	064,	E587BA	E58A9B	EFBC91	EFBC90	EFBC91
	Destination	Kanji	Channel 101	出	力	1	0	1

K:	D	K	065,	E587BA	E58A9B	EFBC91	EFBC90	EFBC92
	Destination	Kanji	Channel 102	出	力	1	0	2

◆ **Command Example 3: Requesting the Source Channel 65 Kanji Name**

➤ **Web-based Control (Source Name menu)**



➤ **Terminal display**

Command @ K?SK,040

Response	@ K?SK,040	Echo
	K:SK040,E382ABE383A1E383A9EFBC91	Kanji Name for Source Channel 65 is カメラ 1 .
	K:SK041,E382ABE383A1E383A9EFBC92	Kanji Name for Source Channel 66 is カメラ 2 .
	K:SK042,E382ABE383A1E383A9EFBC93	Kanji Name for Source Channel 67 is カメラ 3 .
	K:SK043,E382ABE383A1E383A9EFBC94	Kanji Name for Source Channel 68 is カメラ 4 .
	K:SK044,	Kanji Name for Source Channel 69 is empty.
	K:SK045,	Kanji Name for Source Channel 70 is empty.
	K:SK046,	Kanji Name for Source Channel 71 is empty.
	K:SK047,E382B5E383BCE38390E383BCEFBCA1	Kanji Name for Source Channel 72 is サーバー A .
	K:SK05F,	Kanji Name for Source Channel 96 is empty.
	>	Prompt

➤ Response details

K:	S	K	040,	E382AB	E383A1	E383A9	EFBC91
	Source	Kanji	Channel 65	カ	メ	ラ	1

K:	S	K	044,	
	Source	Kanji	Channel 69	(Empty)

K:	S	K	047,	E382B5	E383BC	E38390	E383BC	EFBCA1
	Source	Kanji	Channel 72	サ	—	バ	—	A

### 6-3-4. CPU Status Request Command (8)

This command allows you to indicate which CPU is active in the MFR-6000.

◆ **Command format**

Control command	Command response
@[sp]A?	@[sp]A:<ID>

Control command

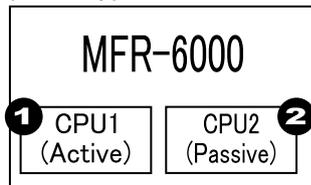
BYTE No.	1	2	3	4
Command	@	[sp]	A	?

Command response

BYTE No.	1	2	3	4	5	
Response	@	[sp]	A	:	<ID>	<ID>: Unit ID number (01-FE)

◆ **Command Response**

Two response types indicate whether the CPU is active or passive state.



**If the CPU is active:**

Response	@ A?	Echo
	A:A	Unit ID number is 10 (0x0A)
		New line
	>	Prompt

**If the CPU is passive:**

Response		No echo, response or prompt
----------	--	-----------------------------

## 6-3-5. Destination Lock Status Request Command (9)

This command (W?) allows you to indicate destination lock status in the MFR system.

### ◆ Command format

Control command	Command response
@[sp]W?<Lvl>,<Dest>	@[sp]W!<Dest>,<ID> ,

Control command

BYTE No.	1	2	3	4	5	6	7-9	8
Command	@	[sp]	W	?	<Lvl>	,	<Dest>	CR

<Dest>: Destination channel number

Command response

BYTE No.	1	2	3	4	5	6-8	7	8	9	10	11	12
Response	CR	LF	W	!	<Lvl>	<Dest>	,	<ID>	,	0	CR	LF
										1		
										2		

### ◆ Command Response Examples

**If Destination 1 is locked by ID10 Unit using LOCK, Destination 1 status returns as shown below:**

Response	@ W?0,0	Echo
	W!00,A,1	Dest 1 is locked by ID10 (0x0A) unit using LOCK ALL.
		CR LF
	>	Prompt

**If Destination 2 is locked by ID11 Unit using LOCK OTHER, Destination 2 status returns as shown below:**

Response	@ W?0,1	Echo
	W!01,B,2	Dest 2 is locked by ID11 (0x0B) unit using LOCK OTHER.
		CR LF
	>	Prompt

**If Destination 3 is not locked, Destination 3 status returns as shown below:**

Response	@ W?0,2	Echo
	W!02,0,0	Dest 3 is not locked.
		CR LF
	>	Prompt

## 6-3-6. Channel Name Import Commands (10)

K: commands allow you to import Source and Destination names from the device that sends K: commands to the MFR system.

### ◆ Command Format

Command	Command response
@[sp]K:<S or D><S or L or A><No>,<Dat>	Echo Prompt

### Commands

BYTE No.	1	2	3	4	5	6	7-9	10	11-	
Command	@	[sp]	K	:	S	S	000-3FF	,		CR
					D	L	000-1FF			
						A				

BYTE 5	<S or D> Select between S (Source) or D (Destination)
BYTE 6	<S or L or A > Select the destination to which names are imported. S: Source Name or Destination Name, ID Name (Kanji) fields on the WebGUI. L: Source Name or Destination Name, Import Name fields on the WebGUI. A: Source Name or Destination Name, Name (ASCII) fields on the WebGUI.
BYTE 7-9	<No.> Indicates the channel number. Source: 000-3FF, Destination: 000-1FF
BYTE 11-	<Dat> Indicates the channel names Strings in Hex characters (max. 128 bytes). Character code: UTF-8
CR	Carriage return

## 7. Troubleshooting

If any of the following problems occur while operating your MFR-6000, proceed as indicated below to see if the problem can be corrected before assuming a unit malfunction has occurred.

### IMPORTANT

If the problem cannot be corrected by performing the procedures below, turn the unit off and then on again. If doing so still does not correct the problem, contact your dealer.

Problem	Check	Remedy
No image output.	Are there signal inputs to the video input connectors?	Input video signals to the video input connectors.
	Are cables properly connected for the signal inputs?	Properly connect cables.
	Are I/O cards installed into correct slots?	Re-install the I/O cards into their correct slots.
	Are the crosspoints set properly?	Set crosspoints properly.
Unable to control using the remote control panel.	Is the LAN cable properly connected?	Properly connect the LAN cable.
	Does the RU Info page in the Web-based Control indicate NG?	Check the item/s that is indicated as NG. However, if the Voltage is indicated as NG, contact your FOR-A agent. See the Web-based Control Operation Manual for details.
The secondary CPU is active.	Are both MFR-LAN (CPU1) and MFR-LAN (CPU2) properly connected to the network? (Check the cable and Ethernet hub connections.)	Ensure both MFR-LAN (CPU1) and MFR-LAN (CPU2) are connected properly to the network.
	If network connections are properly made, turn the MFR-6000 power OFF then ON again.	Consult your FOR-A agent if the secondary CPU is still active after restarting

## 8. Specifications and Dimensions

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### 8-1. Unit Specifications

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#### 8-1-1. MFR-6000

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##### Video Formats

12G-SDI	2160/59.94p, 2160/50p
3G-SDI	1080/60p, 1080/59.94p, 1080/50p
HD-SDI	1080/60i, 1080/59.94i, 1080/50i, 1080/30p, 1080/30PsF, 1080/29.97p, 1080/29.97PsF, 1080/23.98p, 1080/23.98PsF, 1080/25p, 1080/25PsF, 1080/24PsF, 1080/24p, 720/60p, 720/59.94p, 720/50p
SD-SDI	525/60, 625/50

Matrix Size	Min. 9 x 9 to Max. 144 x 144 (Expandable on a 9-channel basis) Number of input slots: 16 Number of output slots: 16
-------------	---

##### Video Input

MFR-9SDI12G	SDI Input Card: 75 ohm, BNC x 9 (16 cards Max.) Complies with the following standards (75Ω BNC) - SMPTE ST 2082-10 (12G-SDI) - SMPTE424M (3G-SDI) - SMPTE292M (HD-SDI) - SMPTE259M (SD-SDI) - DVB-ASI Cable Equalization 12G-SDI: 100 m (L-5.5CUHD cable) 3G/HD-SDI: 100 m (5C-FB cable)
-------------	---

MFR-8SDIEX	SDI Input Card: 75 ohm, BNC x 8 (16 cards Max.) Complies with the following standards (75Ω BNC) - SMPTE424M (3G-SDI) - SMPTE292M (HD-SDI) - SMPTE259M (SD-SDI) - DVB-ASI Cable Equalization 3G/HD-SDI: 100 m (5C-FB cable) SD-SDI: 200 m (5C-2V cable)
------------	--

MFR-2SDIGB	SDI Input Card ·BNC x 2 (12G-SDI or 3G-SDI) ·BNC x 6 (3G-SDI) Complies with the following standards (75Ω BNC) ·SMPTE ST 2082-10 (12G-SDI) ·SMPTE ST 425-5 (Quad Link 3G-SDI) I/O delay selection Delay (H) (0.3H-1H), 1 frame, 1 frame+ Delay (H)
------------	--

##### Video Output

MFR-9SDO12G	SDI Output Card: 75 ohm, BNC x 9 (16 cards Max.) Complies with the following standards (75Ω BNC) (Auto reclocking) - SMPTE ST 2082-10 (12G-SDI) - SMPTE424M (3G-SDI) - SMPTE292M (HD-SDI) - SMPTE259M (SD-SDI) - DVB-ASI Cable Equalization 12G-SDI: 100m (L-5.5CUHD cable) 3G/HD-SDI: 100m (5C-FB cable)
-------------	--

MFR-8SDOEX	<p>SDI Output Card: 75 ohm, BNC x 8 (16 cards Max.)  Complies with the following standards (75Ω BNC) (Auto reclocking)</p> <ul style="list-style-type: none"> <li>- SMPTE424M (3G-SDI)</li> <li>- SMPTE292M (HD-SDI)</li> <li>- SMPTE259M (SD-SDI)</li> <li>- DVB-ASI</li> </ul> <p>Cable Equalization  3G/HD-SDI: 100m (5C-FB cable)  SD-SDI: 200m (5C-2V cable)</p>
MFR-2SDOGB	<p>SDI Output Card</p> <ul style="list-style-type: none"> <li>·BNC x 2 (12G-SDI or 3G-SDI )</li> <li>·BNC x 6 (3G-SDI)</li> </ul> <p>Complies with the following standards (75Ω BNC)</p> <ul style="list-style-type: none"> <li>·SMPTE ST 2082-10 (12G-SDI)</li> <li>·SMPTE ST 425-5 (Quad Link 3G-SDI)</li> </ul> <p>I/O delay selection  Delay (H) (0.3H-1H), 1 frame, 1 frame+ Delay (H)</p>
Reference Input	<p>BB: 0.429 Vp-p (NTSC)/0.45 Vp-p (PAL) or Tri-level Sync: 0.6 Vp-p  75Ω BNC x 2, loop-through (Terminate with 75Ω terminator, it unused.)</p>
Interfaces	
MFR-LAN	<p>10/100 BASE-TX, RJ-45 x 2  (For connecting up to 128 RU/GPI units.)  (Second LAN port used in redundant CPU configuration)</p>
PC-LAN	<p>10/100/1000 BASE-T, RJ-45 x 2 (for PC operation)  (Second LAN port used in redundant CPU configuration)</p>
SERIAL	<p>RS-232C/RS-422 (Internal switch), 9-pin D-sub (male) x 1</p>
ALARM	<p>9-pin D-sub 9 (female) x1  (Input: Reset, Output: Power, Fan Alarm)</p>
Temperature	<p>0°C to 40°C</p>
Humidity	<p>30% to 85% (no condensation)</p>
Power	<p>100 VAC to 240 VAC ±10%, 50/60Hz IN x 2</p>
Consumption	<p>SDI 144 x 144, Dual CPU/Redundant Power Unit (Maximum Configuration)  100 V AC to 120 V AC: 1100 VA (1067 W)  220 V AC to 240 V AC: 1078 VA (689 W)</p>
Dimensions	<p>480 (W) x 576 (H) x 400 (D) mm, EIA 13 RU</p>
Weight	<p>73.2 kg (Including all options)</p>
Consumables	<p>Power supply unit: Replace every 5 years  FAN1-3(P-1619): Replace every 4 years.  FAN4-5(P-1620): Replace every 4 years.  FAN6-7(P-1621): Replace every 4 years.</p>

## 8-1-2. MFR-GPI

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Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interface	
MFR-LAN	10/100BASE-TX RJ-45 x 1 (Ethernet hub is needed for Main and multiple unit connections.)
SERVICE	RS-232C: 9-pin D-sub (male) x 1 (for maintenance)
GPI IN	37-pin D-sub (female) x 4
/TALLY OUT	128-input/output (user assignable)
SERIAL 1-4	RS-232C/422 (selectable): 9-pin D-sub (male) x 4
Temperature	0°C to 40°C
Humidity	30% to 85% (no condensation)
Power	+12VDC pin connector x 2 (redundant power supply as standard)
Power Consumption	100 V AC to 120 V AC: 8 VA (4 W) 200 V AC to 240 V AC: 13 VA (6 W)
Dimensions	430(W) x 44(H) x 110(D) mm EIA 1 RU
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years

## 8-1-3. MFR-TALM

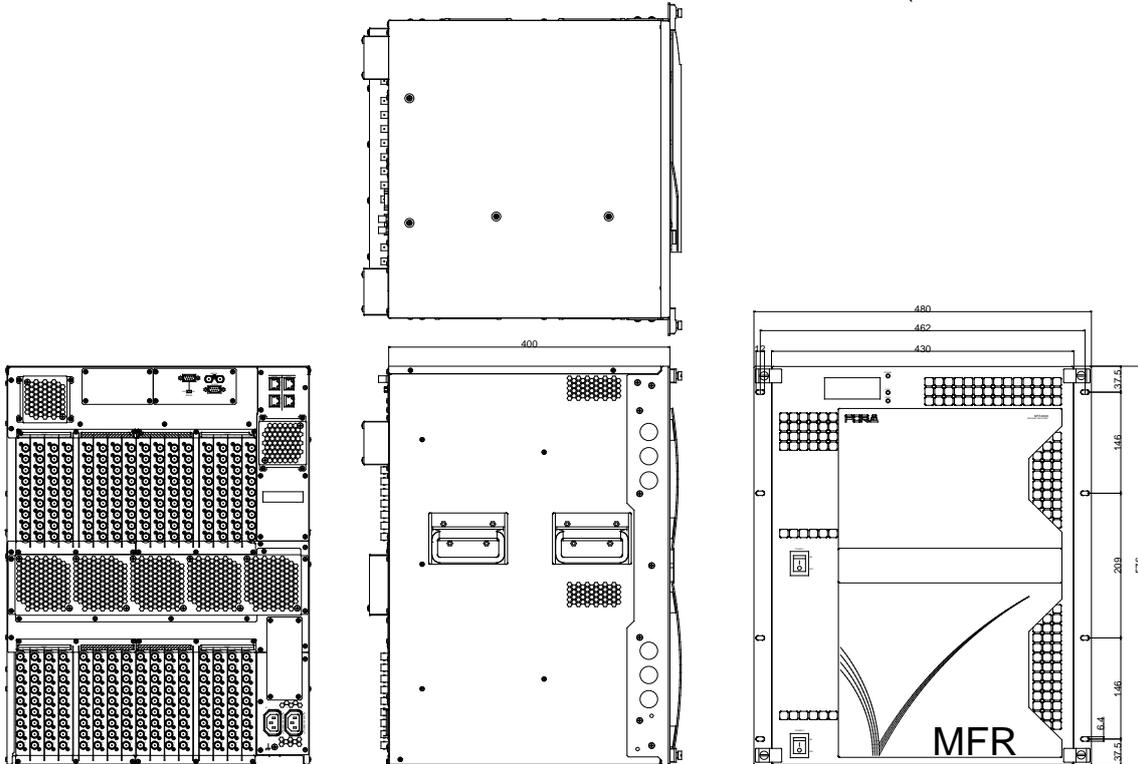
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Number of Connections	Max. 128 (including Main, Remote and GPI units)
Interface	
MFR-LAN	10/100/1000BASE-T RJ-45 x 1 (Ethernet hub is required for Main and multiple unit connections.)
PC-LAN	10/100BASE-TX RJ-45 x 1 (for PC or other external devices)
GPI IN	37-pin D-sub (female) x 1
/TALLY OUT	32-input/output (user assignable)
RS-422	9-pin D-sub (male) x 4
Temperature	0°C to 40°C
Humidity	30% to 85% (no condensation)
Power	+12 V DC pin connector x 2 (redundant power supplies as standard)
Power Consumption	100 V AC to 120 V AC: 17 VA (9 W) 200 V AC to 240 V AC: 20 VA (9 W)
Dimensions	212(W) x 44(H) x 161(D) mm EIA 1 RU Half Rack
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years

## 8-2. External Dimensions

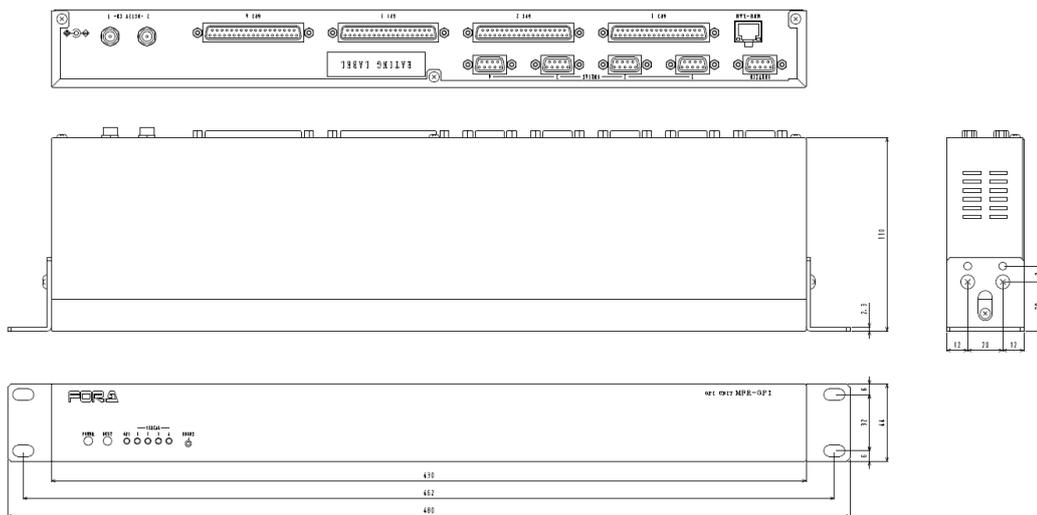
### 8-2-1. MFR-6000

(All dimensions in mm.)



### 8-2-2. MFR-GPI

(All dimensions in mm.)





# Appendix 1. MFR-CPUA Installation/ Replacement

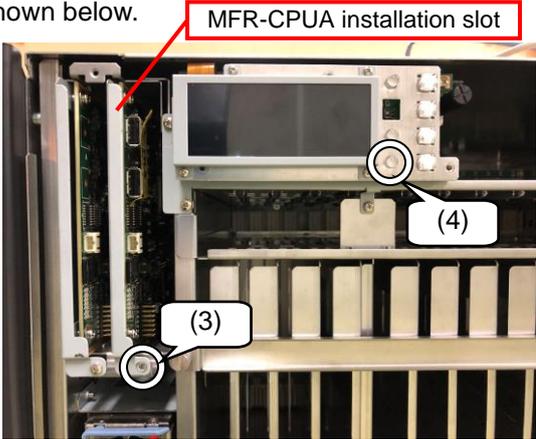
## 1-1. How to Install a New MFR-CPUA

**IMPORTANT**

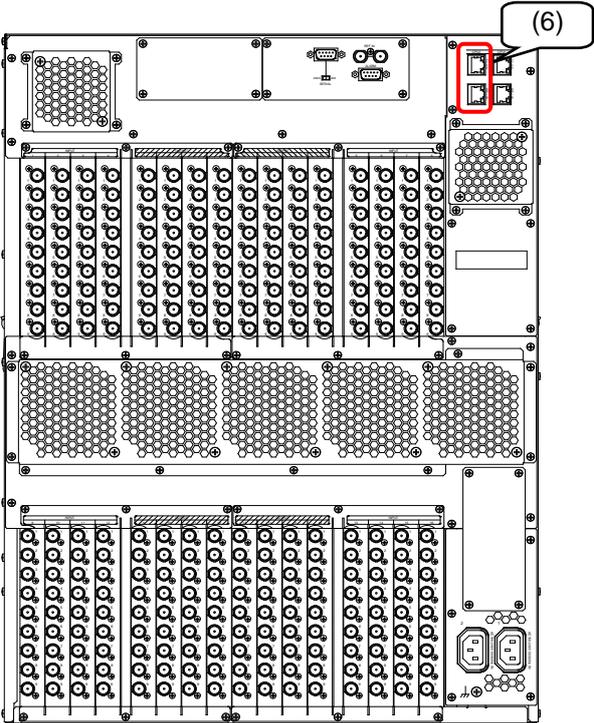
Do not touch any components on the MFR-CPUA to protect it from electrostatic damage.

The following procedure shows how to install a new MFR-CPUA card.

1. Unfasten to remove four fixing screws along the front panel and detach the front panel.
2. Insert a new MFR-CPUA firmly into its slot as shown below.
3. Fasten the fixing screw (circled) of the MFR-CPUA.
4. Verify that the LED on the CPU2 is unlit.
5. Re-install the front panel.



6. Insert LAN cables into CPU2 MFR-LAN and PC-LAN ports and connect the cables with respective hubs.



MFR-CPUA installation is now complete.

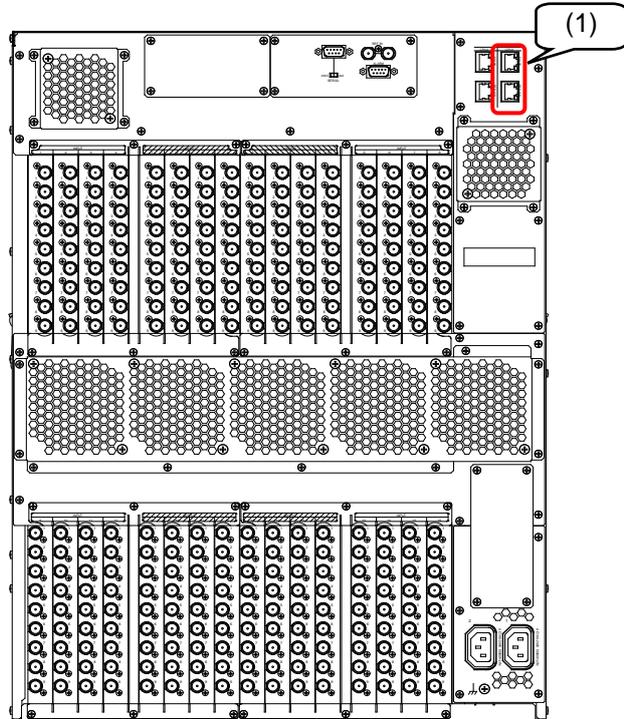
## 1-2. How to Replace a CPU1 Card

### IMPORTANT

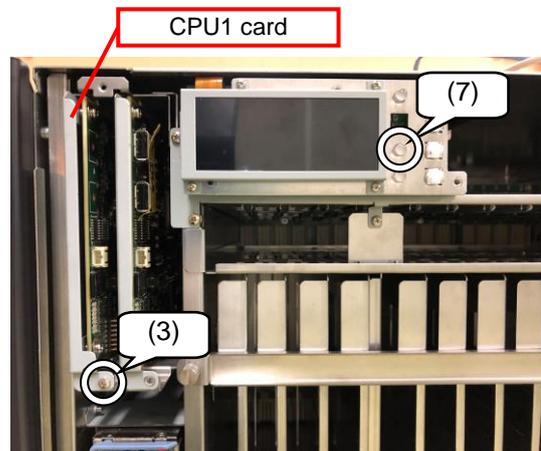
Do not touch the components on the MFR-CPU to protect it from electrostatic damage.

The following procedure shows how to replace an MFR-CPU card.

1. Detach the cables from CPU1 MFR-LAN and PC-LAN.



2. Unfasten to remove four fixing screws along the front panel and detach the front panel.
3. Unfasten the fixing screw of CPU1.
4. Grab the CPU1 card handle and slowly remove (pull out) the card.
5. Insert a new MFR-CPUA card firmly into the slot.
6. Fasten the fixing screw on the right side of the card.
7. Verify that the LED on the CPU1 is unlit.
8. Re-install the front panel.
9. Re-connect LAN cables detached in Step 1. into the CPU1 MFR-LAN and PC-LAN connection ports.



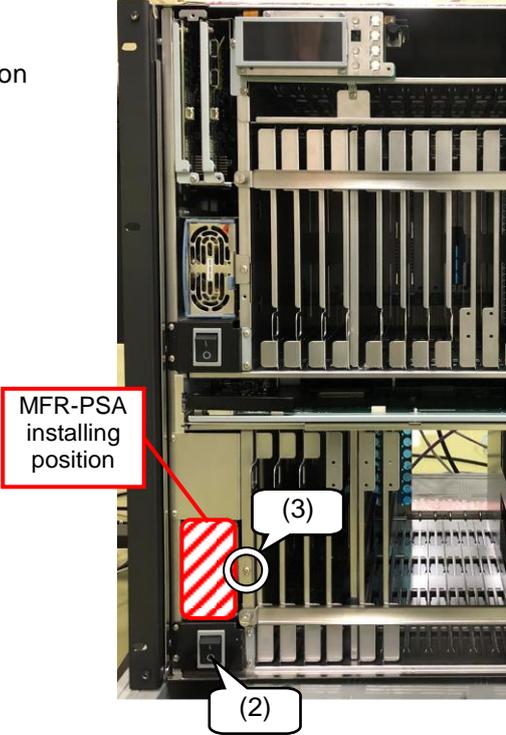
CPU1 replacement is now complete.

# Appendix 2. MFR-PSA Installation/ Replacement

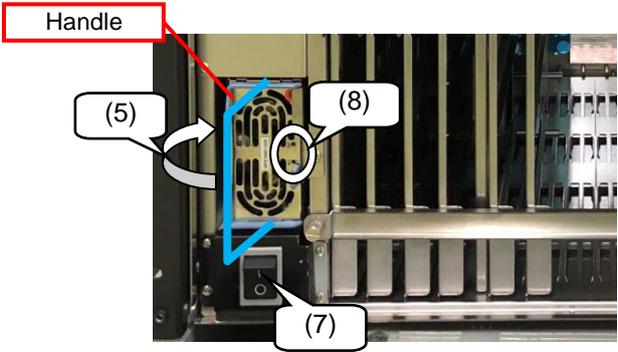
## 2-1. How to Install a New MFR-PSA

The following procedure shows how to install a new MFR-PSA.

1. Unfasten to remove four fixing screws along the front panel and detach the front panel.
2. Turn off the POWER2 power supply switch.
3. Remove the screw.
4. Confirm that the MFR-PSA is facing correct direction and firmly insert the unit.



5. Lay down the MFR-PSA handle.
6. Re-install the screw detached in Step 3.
7. Turn on the POWER2 power supply switch.
8. Verify that the AC and DC LEDs on the MFR-PSA lights green.
9. Re-install the front panel.

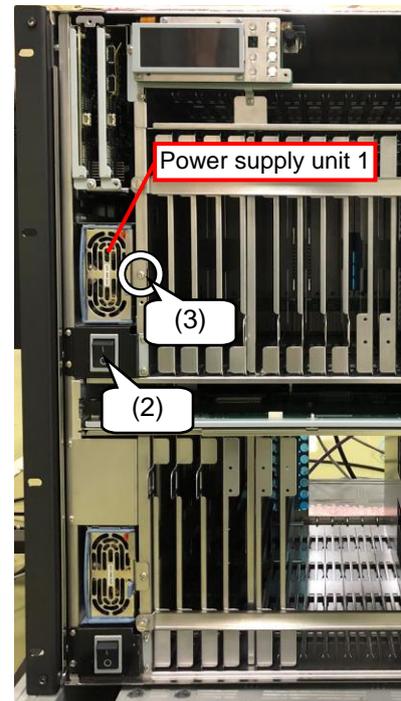


MFR-PSA installation is now complete.

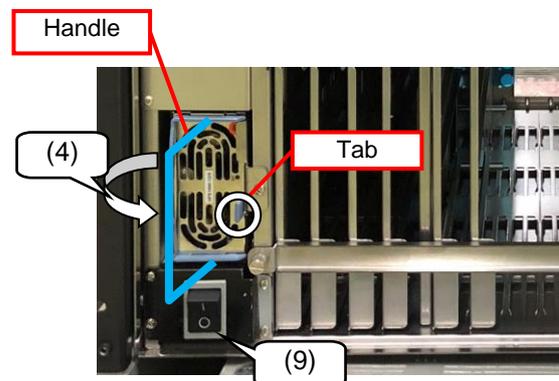
## 2-2. How to Replace an MFR-PSA

The following procedure shows how to replace an MFR-PSA.

1. Unfasten to remove four fixing screws along the front panel and detach the front panel.
2. Turn off the POWER1 power supply switch.
3. Remove the screw.



4. Stand the MFR-PSA handle upright.
5. Grab the handle to pull out the POWER1 unit while pushing the light-blue tab (circled) to the left.
6. Confirm that the MFR-PSA is facing correct direction and firmly insert the unit.
7. Lay down the MFR-PSA handle.
8. Re-install the plate and screw detached in Step 3.
9. Turn on the POWER1 power supply switch.
10. Verify that the AC and DC LEDs on the MFR-PSA light green.
11. Re-install the front panel.



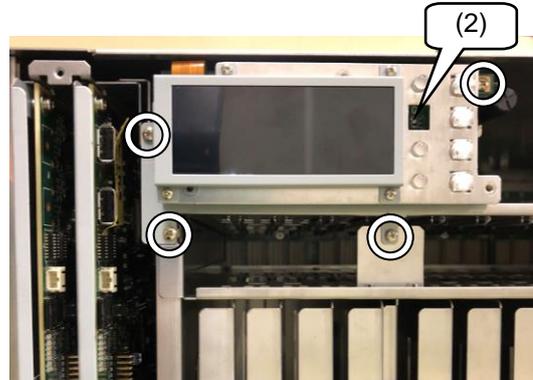
POWER1 replacement is now complete.

## Appendix 3. Replacing the Menu Display

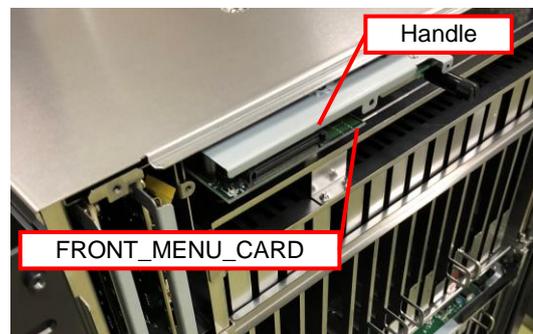
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The following procedure shows how to replace the menu display. Replacement is able to be performed while the main unit power is on.

1. Unfasten to remove the four fixing screws on the front panel sides and detach the front panel.
2. Turn off the menu display power supply by turning the dip switch to the OFF position.
3. Remove the four screws (circled).
4. Pull out the menu display.



5. Grab the handle and slowly pull out the FRONT\_MENU\_CARD.
6. Insert a new FRONT\_MENU\_CARD to all the way in.
7. Confirm that the dip switch on the new menu display is set to the OFF position.
8. Install the new menu display into the FRONT\_MENU\_CARD connector.
9. Re-install the screws removed in Step 3.
10. Turn on the menu display power supply by turning the dip switch to the ON position.



Menu display replacement is now complete.



## **Warning**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.



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