FOR.A®
INNOVATIONS IN VIDEO
and AUDIO TECHNOLOGY

OPERATION MANUAL

MFR-5000
Multi Format Routing Switcher

MFR-18/39RUA
MFR-16/18/39/40RU
MFR-16RUD
MFR-16/32/64RUW
MFR-16RUTA
MFR-GPI
MFR-TALM

13th Edition - Rev. 1

FOR-A COMPANY LIMITED

Edition Revision History

Edit.	Rev.	Date	Description	Section/Page
1	-	2011/11/07		
2 | 5	-	(Not released)	Added MFR-16ADI/16ADAO option cards. Added MFR-18RU. Added MFR-16RU. Added MFR-GUI.	
6	-	2013/05/22	Added MFR-16AAI/AESI/AESO option cards. Added MFR-16RUD Added MFR-TALM.	
7	-	2013/08/13	Added MFR-16RUW/32RUW remote units Changed DC cable retaining clamps Added Setup menu for RU Factual errors corrected	p 6 Sec. 5-6 Sec. 5-7
7	1	2013/08/21	Changed power consumption for MFR-GPI, MFR-16RUD/16RUW/32RUW	Sec. 9-1
7	2	2013/09/10	Manuals supplied on CD-ROM Changed Setup menu description Changed MFR-16RUW/32RUW front panels	p 5 Sec. 5-7 Sec. 5-8 Sec. 9-2-7 Sec. 9-2-8
8	-	2013/12/25	Added Main Unit Link function Added MFR-64RUW. RU current level is applied to RU Salvos. Added Group LOCK OTHER function.	3-2 2-2, 9-1-8, 9-2-7, etc. 6-2-2 6-3-2
8	1	2014/03/20	Added CPU2 condition display Added the max. number of LAN/Serial connections. Corrected factual errors.	p 22, 49, 52 p 98
9			(Not Rereaced)	
9	1	2014/10/24	Supported MFR-16DTIO cards Enabled group button assignments Added 2-way Lock buttons (by short and long press) Added serial control commands.	Sec. 2, 9-1-1 Sec. 5-2-2 Sec. 5-3 to 5-5 Sec. 7-3
10	-	2015/04/06	MFR-16RUTA supported Changed control command description Added text color tuning for remote control unit buttons. Notes on button labels deletec (uploaded to the HP) Corrected factual errors.	Sec. 7-3 Sec. 8 Appendix
11	-	2015/06/26	Added Switcher's AUX Crosspoints Switching. Added Destination Lock Status Request Command.	Sec. 3-4 Sec. 7-3-5
12	-	2015/11/11	MFR-18/39RUA supported.	
12	1	2016/04/01	LAN control command added (signal name import)	Sec. 7-3
12	2	2016/09/06	Changed control command description	Sec. 7-3
13	-	2017/02/22	Switcher AUX switching supported (HVS-100/110, HVS-2000). Gearbox (MFR-16SDIGB/SDOGB) supported.	Secs. 3-3, 3-4 Secs. 2-1, 2-2, 2-3, 8
13	1	2017/03/01	MFR-16AAIEX/AAOEX suppoerted.	Secs. 2-1, 2-2, 2-4

Firmware / Software Versions and Supported Hardware / Features

Main Unit Firmware Version (*1) MFR-5000	GUI Version (*2)	Supported Hardware	Supported Feature
1.62 or higher	1.63 or higher	MFR-64RUW	Main Unit Link
1.72 or higher	1.77 or higher	MFR-16RUTA	-
1.76 or higher	1.85 or higher	-	-MU link of MFR-8000 and 5000 -Switcher's AUX Crosspoints Switching
1.79 or higher	1.91 or higher	-	-Import names
1.85 or higher	1.98.1 or higher	MFR-16AAIEX MFR-16AAIOEX	-Analog audio input/output
1.86 or higher	2.01 or higher	MFR-16SDIGB MFR-16SDOGB	-Gearbox feature

(*1) Click [Primary CPU] in the [Web-based Control: System Settings- MU Info page] to see your version number under Firmware Version.

(*2) The GUI (Web-based control software) version is displayed on the browser's title bar.

Precautions

Important Safety Warnings

[Power]

⚠ **Caution**	Operate unit **only** at the specified supply voltage.
🔌	Disconnect the power cord via the power plug only. **Do not** pull on the cable portion.
🚫 **Stop**	**Do not** 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**	**Ensure** the unit is properly grounded at all times to prevent electrical shock.
⚠ **Hazard**	**Do not** ground the unit to gas lines, units, or fixtures of an explosive or dangerous nature.

[Operation]

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

[Transportation]

❗ **Caution**	**Handle** 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.

[Circuitry Access]

	Do not 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.
Stop	**Do not** 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.
Hazard	Unit **should not** 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 **before** attempting to operate the unit again.

[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.

[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.

Upon Receipt

Unpacking

MFR-5000 units and their accessories are fully inspected and adjusted prior to shipment. Operation can be performed immediately upon completing all required connections and operational settings.

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-5000	1	
AC Cord	1 set	AC cable and retaining clip
Rack Mount Brackets	1 set	EIA standard type (Attached to unit.)
Power Switch Faceplate	1	Switch guard for MFR-PS.
CD-ROM	1	Operation manual (PDF)
Quick Setup Guide	1	

◆ **Input / Output Cards**

ITEM	QTY	REMARKS
MFR-16SDI/16SDIA	1 – 8 *	16 SDI input card
MFR-16SDO	1 – 8 *	16 SDI output card
MFR-16ADI	1 – 4 *	Digital audio input card with SRC (AES/EBU 16 stereo pairs)
MFR-16AAI	1 – 4 *	Analog audio input card with A/D converter (Analog 16 stereo pairs)
MFR-16ADAO	1 – 8 *	Audio output card with D/A converter (AES/EBU 8 stereo pairs) (SDI x 2 8 stereo pairs) (ANALOG 4 stereo pairs)
MFR-16AESI	1 – 8 *	Digital audio input card (AES/EBU 16 stereo pairs)
MFR-16AESO	1 – 8 *	Digital audio output card (AES/EBU 16 stereo pairs)
MFR-16DTIO	1 – 8 *	Data Router card (9-pin D-sub x 16, RS-422)
MFR-16SDIGB	1 –	16 SDI input card (Gearbox 4ch built-in)
MFR-16SDOGB	1 –	16 SDI output card (Gearbox 4ch built-in)
MFR-16AAIEX	1 – 4 *	Analog audio input card with A/D converter (Analog 16 stereo pairs)
MFR-16AAOEX	1 – 4 *	Analog audio output card with D/A converter (Analog 16 stereo pairs)

* The number of installed cards varies depending on the system configuration. See the Matrix Size Chart on page 16.

◆ **Remote Control Panel**

ITEM	QTY	REMARKS
MFR-18RUA/39RUA MFR-39RU/40RU/18RU MFR-16RU/16RUD/16RUTA MFR-16/32/64RUW	1	
AC Adaptor (*1)	1	With DC lock plug (MFR-40RU/39RUA/18RUA)
AC cable	1	
DC cable retaining clip	1 set	For AC adapters w/o DC lock plug
Rack Mount Brackets	1 set	EIA standard type (MFR-16/32/64RUW/16RUTA is supplied w/o Rack Mount Brackets.)
Tool used to change button labels	1	

LAN Cable (straight) (*2)	1	MFR-39/40/18RU/16RUTA/18RUA/39RUA: UTP cable, 5m MFR-16RU/16RUD: STP cable, 5m (MFR-16/32/64RUW is supplied w/o LAN Cable.)

(*1) Depending on the production date, AC adapter is supplied without DC lock plug, but with a DC cable retaining clip.

(*2) User-prepared LAN cables are also available and Shielded Twist Pair cables are recommended for MFR-16RU/16RUD/16RUW/32RUW/64RUW.

◆ Option (for MFR-5000)

ITEM	QTY	REMARKS
MFR-CPU	1	Redundant CPU card *
MFR-PS	1 set	Redundant power supply unit (with AC cord and AC cord retaining clip.)

◆ Interface Expansion Unit

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

* Depending on the production date, AC adapter 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 cable	1	
Rack Mount Brackets (optional)	1 set	Single- or Dual-unit type EIA standard type

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

Installing the AC Cord Retaining Clip (Main Unit)

Secure the AC cord with the supplied AC cord retaining clip to prevent accidental removal from the unit.
Procedure
1) Securely plug the AC cord into the AC connector.
2) Attach the Retaining clip on to the side of the AC cord.
3) Thread both ends of the retaining clip into the holes of the retaining clip base attached on the unit.

Installing the DC Cable Retaining Bracket

Install the supplied retaining bracket onto the rear panel of devices, such as a Control Unit as shown below.

1) Bundle the cable with the supplied clip.

2) Secure the clip with the supplied screw.
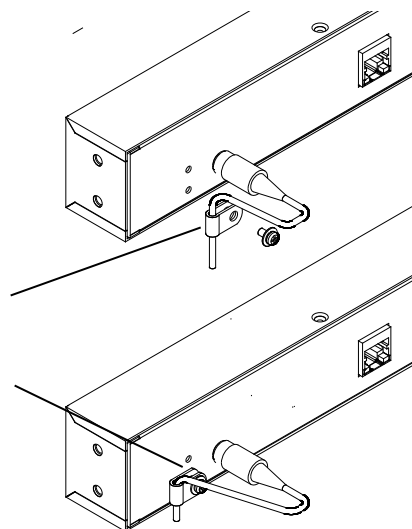
Font Conventions

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-5000 or Remote Control Units.
- References to the MFR Series Web-based Control Software are indicated by [Web-based Control: XXX page].

Table of Contents

1. Prior to Starting

1-1. Welcome

Congratulations! By purchasing an MFR-5000 Multi Format Routing Switcher (hereafter called MFR main unit) you have entered the world of FOR-A and its many innovative products. We thank you for your patronage and hope you will turn to FOR-A products again and again to satisfy your video and audio needs.

FOR-A provides a wide range of products, from basic support units to complex system controllers, which have been increasingly joined by products for computer video-based systems. Whatever your needs, talk to your FOR-A representative. We will do our best to be of continuing service to you.

1-2. Features

The MFR-5000 is a multi-format routing switcher that supports 12G-SDI, 3G-SDI, HD-SDI, SD-SDI, ASI, and AES video / audio signals as well as RS-422 data signals. Inside the 8U case a matrix of up to 128 inputs/128 outputs can be configured. And by linking multiple cases, they can be used as a large-scale routing switcher. It supports various functions such as the capability of linking multiple cases, tally connections with peripheral devices, and automatic source name tracking, to allow the units to be the core product in small to medium size systems.

➢ Support for **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 **12G-SDI**, **AES** audio and **RS-422 data** signals.
➢ By linking multiple units, they can be used as a large-scale routing switcher.
➢ Up to **4 units** can be linked together for expansions of up to **256x128 – 384x42**.
➢ 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 displays on video switchers and multi viewers can be switched in conjunction with switchings controlled in the main unit. MFR routers support TSL and Harris protocol, enabling 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. Immediate and smooth switch over to the secondary board without down time in case of irregularities, as well as stable remote control operation supported by the **network redundancy**
➢ **Power unit redundancy** for stable power supply against power unit failure or power supply troubles
➢ LED display on the main unit front that can display settings and alarms enabling the main unit to take over operation in the event the remote environment goes down.
➢ Designed for maintainability, all boards and power units can be accessed from the front without removing any cables connected in back.
➢ Matrix partition and level setting capabilities support a flexible control environment (maximum of 128 units in total including the 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 the exchange of this data with external devices such as a video switcher, multiviewer etc.. The unit performs the task of tally data computation, which is ordinarily undertaken by the MFR main unit, to accelerate the task.
➢ Conversions between 12G-SDI and Quad Link 3G-SDI and between 2SI and SQD available by installing optional **MFR-16SDIGB** and **MFR-16SDOGB** (Gearbox feature built-in) cards.

2. Panel Descriptions

2-1. MFR-5000 Front Panel

← Slot No

No.	Name	Description
A	POWER1	Power switch 1 (standard equipment) (1) Switch to turn unit power On/Off. (2) DC power supply voltage indication LED 　　(Normal: lit green / Error: unlit)
B	POWER2 *1	Power switch 2 (optional equipment) (1) and (2) the same as POWER1.
C	CPU1	CPU card (standard equipment/Primary CPU) (1) Displays settings and alarms (2) Alarm button to enter the ALARM menu. Effective during an alarm. (ALARM button) (The LED lights red in an alarm.) (3) Cancel button for menu settings. 　　(ACTIVE/BUS button) (The LED lights green when active) (4) Used for menu operation (CONTROL knob) * See section 4 "Settings via MFR-5000 Menus" for details on the menu operation.
D	CPU2	CPU card (optional/Secondary CPU) (1) to (4) are the same as CPU1.

*1 When installing the second power supply unit, be sure to set PS2 INSTALL to INSTALLED under SETTING > MU SETTING > PS2 INSTALL in the CPU card front menu. (See section 4. "Settings via MFR-5000 Menus")

◆ Input / Output Card Slots

No.	Slot	Video Card	Audio Card	16DTIO Card
E	INPUT 1 - 4 (No. 01 - 04)	16SDI/16SDIA Max. 4 cards	16AESI: Max. 4 cards	No. 01, 03 Max. 2 cards
E	INPUT 5 - 8 (No. 05 - 08)	16SDI/16SDIA Max. 4 cards	16ADI: Max. 4 cards 16AAI: Max. 4 cards 16AAIEX: Max. 4 cards 16AESI: Max. 4 cards	No. 05, 07 Max. 2 cards
F	OUTPUT 1 - 8 (No. 09 - 16)	16SDO Max. 8 cards.	16ADAO: Max. 8 cards 16AAOEX: Max. 4 cards 16AESO: Max. 8 cards	No. 09, 11, 13, 15 Max. 4 cards

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2-1-1. Matrix Size Chart

◆ Standard SDI Signal Routing

Matrix size varies depending on the number of installed MFR-16SDI/16SDIA and MFR-16SDO cards as shown below. (128 x 128 to 16 x 16)

		Number of cards: MFR-16SDO							
		8	7	6	5	4	3	2	1
Number of cards: MFR-16SDI/ 16SDIA	8	128 x 128	128 x 112	128 x 96	128 x 80	128 x 64	128 x 48	128 x 32	128 x 16
	7	112 x 128	112 x 112	112 x 96	112 x 80	112 x 64	112 x 48	112 x 32	112 x 16
	6	96 x 128	96 x 112	96 x 96	96 x 80	96 x 64	96 x 48	96 x 32	96 x 16
	5	80 x 128	80 x 112	80 x 96	80 x 80	80 x 64	80 x 48	80 x 32	80 x 16
	4	64 x 128	64 x 112	64 x 96	64 x 80	64 x 64	64 x 48	64 x 32	64 x 16
	3	48 x 128	48 x 112	48 x 96	48 x 80	48 x 64	48 x 48	48 x 32	48 x 16
	2	32 x 128	32 x 112	32 x 96	32 x 80	32 x 64	32 x 48	32 x 32	32 x 16
	1	16 x 128	16 x 112	16 x 96	16 x 80	16 x 64	16 x 48	16 x 32	16 x 16

◆ AUDIO Signal Routing

Matrix size varies depending on the number of installed MFR-16ADI, MFR-16AAI and MFR-16ADAO cards as shown below. (1 stereo pair = 2 channels)

		Number of cards: MFR-16ADAO							
		8	7	6	5	4	3	2	1
Number of cards: MFR-16ADI or 16AAI	4	64 x 64	64 x 56	64 x 48	64 x 40	64 x 32	64 x 24	64 x 16	64 x 8
	3	48 x 64	48 x 56	48 x 48	48 x 40	48 x 32	48 x 24	48 x 16	48 x 8
	2	32 x 64	32 x 56	32 x 48	32 x 40	32 x 32	32 x 24	32 x 16	32 x 8
	1	16 x 64	16 x 56	16 x 48	16 x 40	16 x 32	16 x 24	16 x 16	16 x 8

Matrix size varies depending on the number of installed MFR-16AESI, MFR-16AESO, MFR-16AAIEX and MFR-16AAOEX cards as shown below. (1 stereo pair = 2 channels)
* Up to 4 cards for MFR-16AAIEX and MFR-16AAOEX cards

		Number of cards: MFR-16AESO or 16AAOEX							
		8	7	6	5	4	3	2	1
Number of cards: MFR-16AESI or 16AAIEX	8	128 x 128	128 x 112	128 x 96	128 x 80	128 x 64	128 x 48	128 x 32	128 x 16
	7	112 x 128	112 x 112	112 x 96	112 x 80	112 x 64	112 x 48	112 x 32	112 x 16
	6	96 x 128	96 x 112	96 x 96	96 x 80	96 x 64	96 x 48	96 x 32	96 x 16
	5	80 x 128	80 x 112	80 x 96	80 x 80	80 x 64	80 x 48	80 x 32	80 x 16
	4	64 x 128	64 x 112	64 x 96	64 x 80	64 x 64	64 x 48	64 x 32	64 x 16
	3	48 x 128	48 x 112	48 x 96	48 x 80	48 x 64	48 x 48	48 x 32	48 x 16
	2	32 x 128	32 x 112	32 x 96	32 x 80	32 x 64	32 x 48	32 x 32	32 x 16
	1	16 x 128	16 x 112	16 x 96	16 x 80	16 x 64	16 x 48	16 x 32	16 x 16

► See section 2-4. "Audio Input / Output Cards" for details on audio input and output cards.

◆ RS-422 Data Routing

Matrix size can be freely selected depending on the number of installed MFR-16DTIO cards, regardless of their slot location, as shown below.

Number of MFR-16DTIO cards	8	7	6	5	4	3	2	1
Number of RS-422 ports	128	112	96	80	64	48	32	16
Routing	Matrix size can be freely selected depending on the number of installed MFR-16DTIO cards, regardless of their slot location. RS-422 data can be routed between ports in the same card or different cards. See section 2-5. "RS-422 Data Input / Output Cards" for details on input and output port settings.							

2-1-2. Input / Output Card Installation and Removal

MFR input/output cards should be installed by opening the MFR-5000 front panel. Remove the four screws on the front panel as shown below to open the front panel.
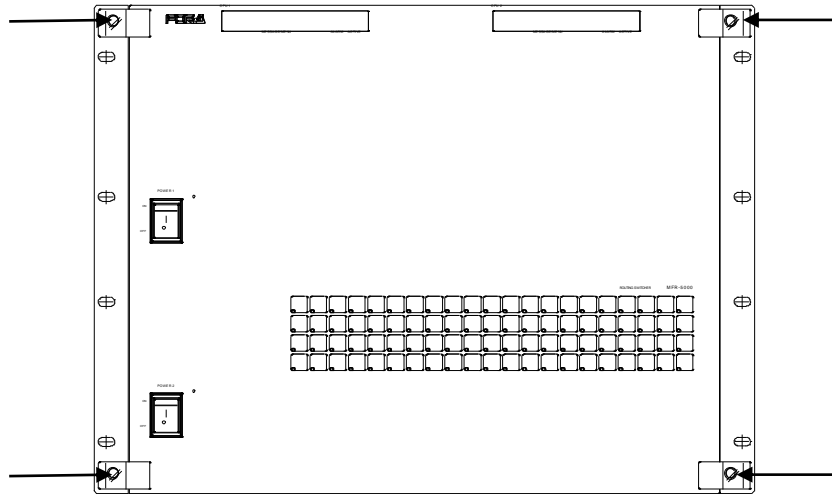
◆ **Removing an MFR Input/Output card**

To remove an input or output card with the MFR-5000 powered on, turn the power of the slot from which to remove the card OFF. Be sure to turn the power of the slot off before removing its card.

►See [SHUTDOWN] in section 4-5. "SETTINGS."

◆ **Installing an MFR Input/Output card**

To install an MFR option card with the MFR-5000 powered on, turn the power of the slot on, using the front menu, after installing the card.

► See [SHUTDOWN] in section 4-5. "SETTINGS."

MFR cards must be installed into their respective designated slots from the correct side.

►See section 2-1. "MFR-5000 Front Panel."

2-1-3. CPU Card Installation and Removal

CPU cards can be installed or removed with the MFR-5000 power turned on as shown below.

IMPORTANT
Do not touch any other parts on the card. Static electricity may damage sensitive electrical components on the card.

◆ **Removing a CPU card**
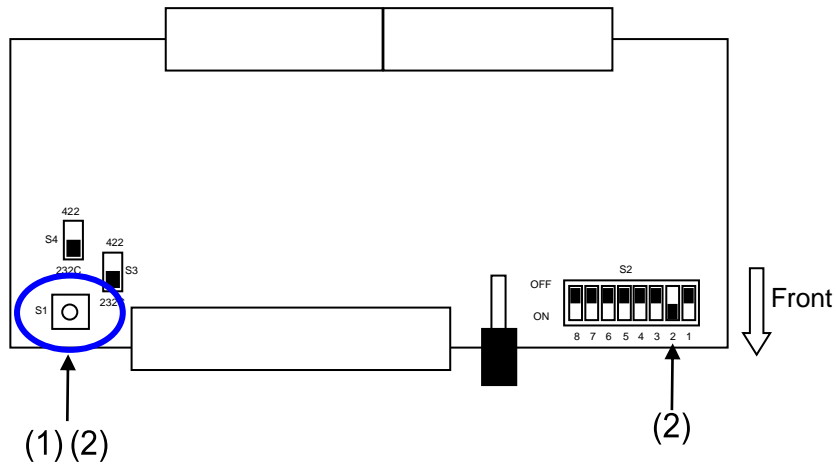
(1) Press the reset button (S1) on the CPU card.
(2) Repress and hold the button, then turn ON the switch 2 of Dipswitch S2.
(3) Release the button. The menu display will turn off automatically.
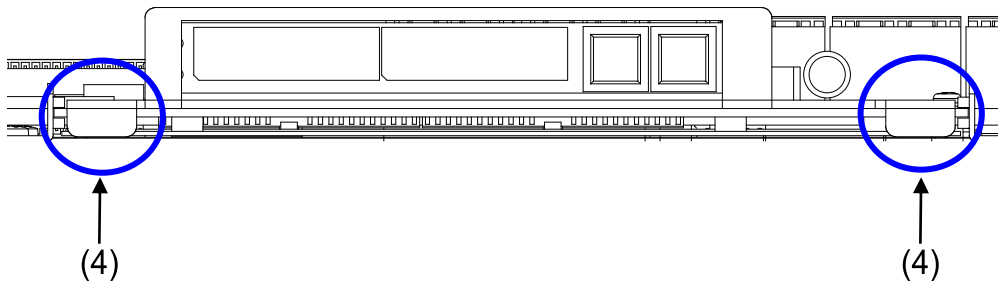
(4) Hold the two black handles at both sides on the CPU card and gradually remove the card
     from the chassis.

◆ Inserting a CPU card

S4 422 / 232C
S3 422 / 232C
S1
S2
OFF
ON
8 7 6 5 4 3 2 1
Front

(1)
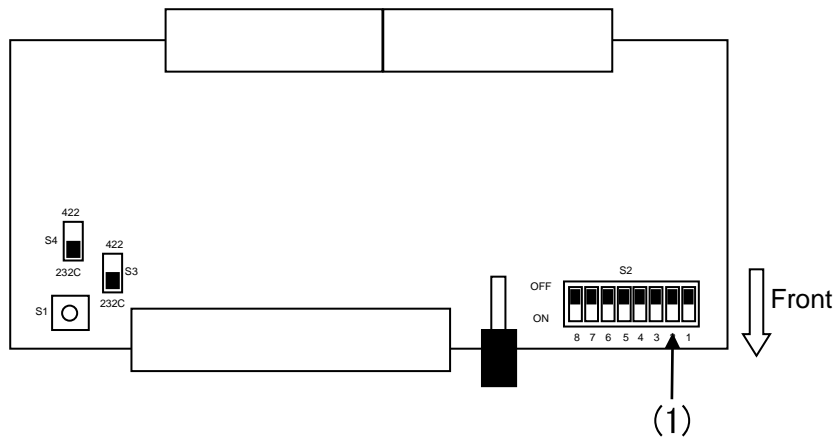
(1) Verify that the switch 2 of Dipswitch S2 on the card is turned OFF.
   If not, turn the switch to OFF.

ACTIVE/BUSY button
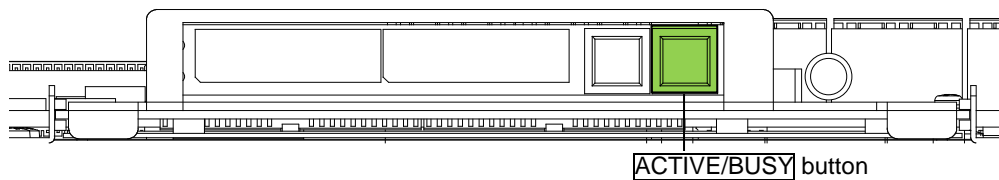
(2) If the installed CPU card is not active (ACTIVE/BUSY lights green.), wait for 20 seconds.
(3) Align a new CPU card with the slot guide rails and insert the card into the slot.
(4) Verify that the card is firmly installed.

2-1-4. CPU Card Switch Settings

IMPORTANT
Note that internal switch settings should only be performed by qualified technical personnel.

(1) Remove the 4 screws on the MFR-5000 front panel to remove the panel.
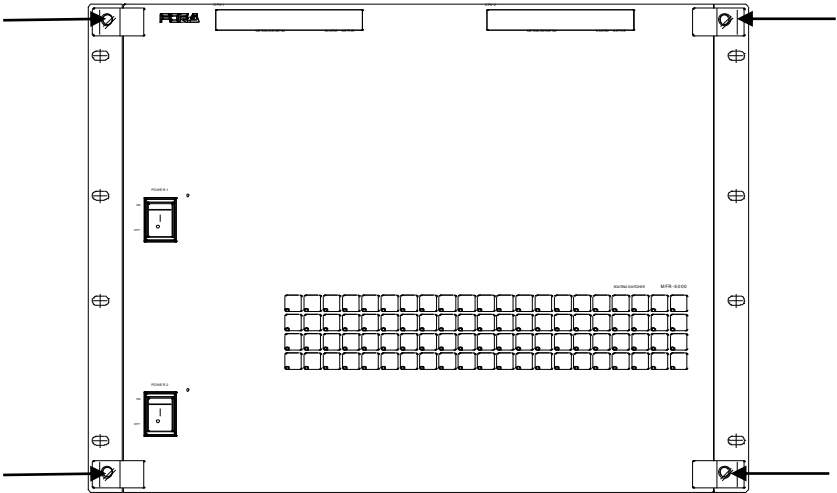
(2) The CPU card factory default settings are as shown below.
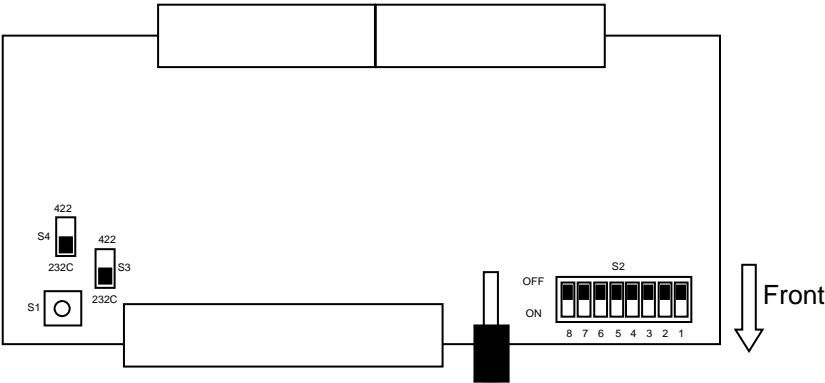
◆ **Switch settings**

Switch	Settings			
S1	Reset switch for the CPU card.			
S2	For maintenance use. Do not change these settings except when removing the CPU card. (Factory default settings are as shown in the right figure. The black squares (■) depict the switch positions.)	OFF ON ▣▣▣▣▣▣▣▣		
S3, S4	Used to select RS-232C or RS-422. Make your selection referring to the right figures. Both switches must be set the same. CPU1 and CPU2 must use the same settings.	Switch settings	RS-232C (Factory default)	▣
			RS-422	▣

► See section 2-1-3. "CPU Card Installation and Removal" to remove a CPU card.

2-2. MFR-5000 Rear Panel
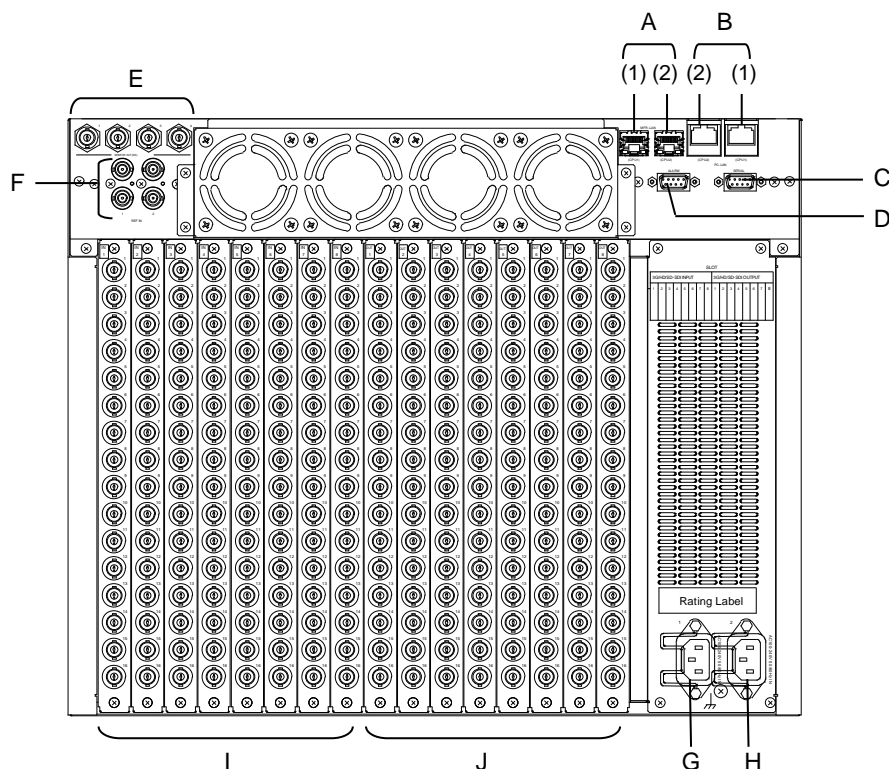
* The above figure shows an MFR-5000 with MFR-16SDI/16SDIA and MFR-16SDO cards installed.

No.	Name	Description
A	MFR-LAN *1	Ethernet ports for connection to MFR Remote Control Units and MFR-GPI (10/100/1000BASE-T, RJ-45) (1) For CPU 1 (2) For CPU 2
B	PC-LAN *1	Ethernet ports for connection to PC or other external unit (10/100BASE-TX RJ-45) (1) For CPU 1 (2) For CPU 2
C	SERIAL *2	Used for control via a serial interface. RS-232C or RS-422 selectable. ► See section 2-2-1. "Interfaces." The SERIAL connector is set to RS-232C as factory default. Consult your FOR-A reseller if you wish to change the setting.
D	ALARM	Used for alarm output ► See section 2-2-1. "Interfaces."
E	MONITOR OUTPUT 1 - 4	Used for monitor outputs (No automatic reclocking)
F	REF IN1, 2	Used to input reference signals (BB or Tri-level sync signal) (with loop-through. Terminate with 75Ω terminator, if unused.)
G	AC IN1	Used to connect Power Supply Unit 1 (standard equipment) to an AC power source
H	AC IN2	Used to connect Power Supply Unit 2 (optional) to an AC power source
I	INPUT	MFR-16SDI/16SDIA/16SDIGB: Used to input digital component video signals MFR-16ADI: Used to input digital audio signals MFR-16AAI: Used to input analog audio signals MFR-16AAIEX: Used to input analog audio signals MFR-16AESI: Used to input digital audio signals ► See section 2-4. "Audio Input/Output Cards."

		MFR-16DTIO: Used to input/output RS-422 data signals ► See section 2-5. "RS-422 Data Input/Output Cards."
J	OUTPUT	MFR-16SDO/16SDOGB: Used to output digital component video signals MFR-16ADAO: Used to output digital/analog audio signals MFR-16AAOEX: Used to output analog audio signals MFR-16AESO Used to output digital audio signals ► See section 2-4. "Audio Input/Output Cards." MFR-16DTIO: Used to input/output RS-422 data signals ► See section 2-5. " RS-422 Data Input/Output Cards."

*1 The MFR-LAN/MFR-LAN(CPU1, 2) connector may be labeled as TO RU, and the PC-LAN connector as TO PC on units shipped before Sep. 16, 2011.

*2 The SERIAL connector is set to RS-232C as factory default. Consult your FOR-A reseller if you wish to change the setting.

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)
RS-232C or 422 interface can be selected
via the CPU card DIP switches.
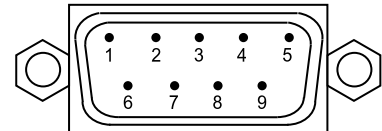
RS-232C Connector Pin Assignments (Factory default settings)

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 assignment (9-pin, D-sub male)

Pin No.	Signal Name	Description
1	FG	Frame Ground
2	T-	Transmit data (-)
3	R+	Receive data (+)
4	SG	Signal Ground
5	NC	Unused
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:

Under normal operation:	Pins 1 and 6 are open.
In a malfunction or power-off state:	Pins 1 and 6 are closed.

Alarm 2 Out:

Under normal operation:	Pins 2 and 7 are open.
In a malfunction or power-off state:	Pins 2 and 7 are closed.

Reset:
To reset the unit externally, short Pin 5 and a signal ground pin (8 or 9).
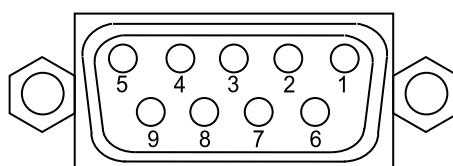
9-pin D-sub, female

ALARM Connector Pin Assignments

Pin No.	Signal Name	Description
1	ALARM 1 OUT	Alarm 1 output (Default setting: Fan)
2	ALARM 2 OUT	Alarm 2 output (Default setting: Power)
3	NC	Unused
4	NC	Unused
5	RESET IN	Reset in, active low
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 ALARM1 OUT and ALARM2 OUT. The alarms can be assigned in the Web-Based Control.

Available alarm signals

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

2-3. SDI Input/Output Cards

2-3-1. MFR-16SDI/16SDIA

MFR-16SDI/16SDIA is an SDI input card and can accept 16 of 3G/HD/SD-SDI and ASI signals.
Up to **8** cards can be installed into **Slot No. 01 to 08**.
► See section 2-1-1. "Matrix Size Chart."

BNC x 16 inputs (3G/HD/SD-SDI or ASI signal auto-detection)

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

◆ Source Name
In the left side of the Web-based Control screen, click to select [**Router System Settings**] - [**Source Name**] in the menu tree to display the setting 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-16SDO

MFR-16SDO is an SDI output card and can output 16 of 3G/HD/SD-SDI and ASI signals.
Up to **8** cards can be installed into **Slot No. 09 to 16**.
► See section 2-1-1. "Matrix Size Chart."
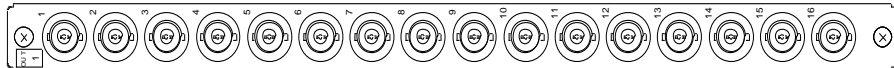
BNC x 16 outputs (3G/HD/SD-SDI or ASI signal depending on crosspoint selections)

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

◆ 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.

◆ 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.

2-3-3. MFR-16SDIGB

The MFR-16SDIGB is an SDI input card that accepts 12G- and 3G-SDI signals and supports Gearbox feature in which video signal conversions between 12G-SDI and Quad Link 3G-SDI, and between 2SI and SQD are available.
► See Sec. 8. "Gearbox Feature (MFR-16SDIGB/16SDOGB)."

The following numbers of inputs is available:
● 12G-SDI signal: Max 4 inputs (BNC: 1A, 2A, 3A and 4A)
● 3G-SDI signal: Max 16 inputs

Cards can be installed into **Slot No. 01 to 08**.
► See Sec. 2-1-1. "Matrix Size Chart."
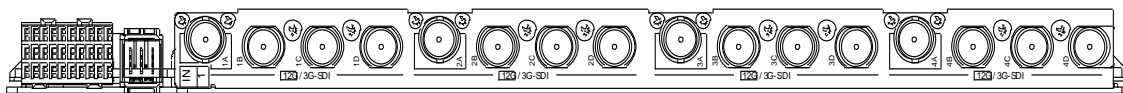
BNC x 16 inputs (12G/3G-SDI)

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

◆ **Gearbox settings**
In the left side of the Web-based Control screen, click to select [**(Main Unit Settings)** - **Gearbox Settings**] in the menu tree to display the settings page.
This page allows you to specify input signals and conversion modes.

◆ **Source Assignment**
In the left side of the Web-based Control screen, click to select [**Router System Settings - Source Assignment**] in the menu tree to display the settings page.
This page allows you to assign physical inputs to logical input channels.

◆ **Source Name**
In the left side of the Web-based Control screen, click to select [**Router System Settings** - **Source Name**] in the menu tree to display the settings page.
This page allows you to change source names displayed on Remote Controllers or other devices.

2-3-4. MFR-16SDOGB

The MFR-16SDOGB is an SDI output card that accepts 12G- and 3G-SDI signals and supports Gearbox features in which video signal conversions between 12G-SDI and Quad Link 3G-SDI, and between 2SI and SQD are available.
► See Sec. 8. "Gearbox Feature (MFR-16SDIGB/16SDOGB)."

The following numbers of outputs are available:
● 12G-SDI signal: Max 4 outputs (BNC: 1A, 2A, 3A and 4A)
● 3G-SDI signal: Max 16 outputs

Cards can be installed into **Slot No. 09 to 16**.
► See Sec. 2-1-1. "Matrix Size Chart."
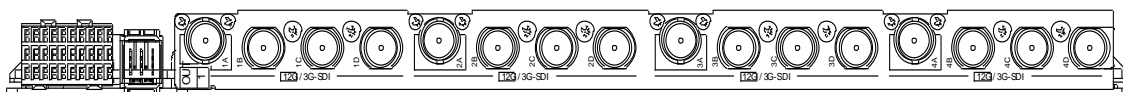
BNC x 16 outputs (12G/3G-SDI)

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

◆ **Gearbox settings**
In the left side of the Web-based Control screen, click to select [**(Main Unit Settings)** - **Gearbox Settings**] in the menu tree to display the settings page.
This page allows you to specify output signals and conversion modes.

◆ **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.

◆ **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.

2-4. Audio Input / Output Cards

Source and destination assignment procedures for audio signals are the same as those for SDI signals. Refer to the previous chapter This chapter describes audio specific setup. Audio signals should be setup in the Web-based Control pages
► See [Web-based Control: **Audio Settings** page].

2-4-1. MFR-16AAI / 16AAIEX (Analog Input)

MFR-16AAI/16AAIEX is an analog audio input card with A/D converter.
Up to **4** cards can be installed into **Slot No. 05 to 08**.
► See section 2-1-1. "Matrix Size Chart."

25-pin D-sub (female) x 4 (16 stereo pairs, 32 channels), 600 Ohm or high impedance

IMPORTANT
When using an MFR-16AAI, a Black Burst signal should be input to REF IN2.

To output analog audio signals input to MFR-16AAI and MFR-16AAIEX, a compatible analog audio output card should be installed into the MFR main unit.

	MFR-16AAOEX	MFR-16ADAO	MFR-16AESO
MFR-16AAI	-	✓	-
MFR-16AAIEX	✓	-	✓

✓ : Compatible, -: Incompatible

◆ **Analog Audio Input**
Select the input impedance and adjust the input level per each stereo pair (2 channels) in the [Web-based Control: **Audio Settings** page].

Analog Input Terminal	Select 600 ohm or High impedance for analog input.
Analog Input Level	Adjust analog input level.

◆ Analog Audio Connection

For balanced audio signals, connect the **hot**, **cold** and **shield** conductor to "**+**" ," **-** " and "**COM**" pins respectively.

For unbalanced audio signals, connect the conductor that carries **audio** to a "**+**" pin and **ground** to "**COM.**"

Analog Audio Connector (25-pin D-sub, female, inch screws) x 4

Connector Pin Assignments

Channels 1 to 8

Pin No.	Setting	Pin No.	Setting
13	CH1+	25	CH1 COM
12	CH1-	24	CH2+
11	CH2 COM	23	CH2-
10	CH3+	22	CH3 COM
9	CH3-	21	CH4+
8	CH4 COM	20	CH4-
7	CH5+	19	CH5 COM
6	CH5-	18	CH6+
5	CH6 COM	17	CH6-
4	CH7+	16	CH7 COM
3	CH7-	15	CH8+
2	CH8 COM	14	CH8-
1	SG	-	-

Channels 9 to 16

Pin No.	Setting	Pin No.	Setting
13	CH9+	25	CH9 COM
12	CH9-	24	CH10+
11	CH10 COM	23	CH10-
10	CH11+	22	CH11 COM
9	CH11-	21	CH12+
8	CH12 COM	20	CH12-
7	CH13+	19	CH13 COM
6	CH13-	18	CH14+
5	CH14 COM	17	CH14-
4	CH15+	16	CH15 COM
3	CH15-	15	CH16+
2	CH16 COM	14	CH16-
1	SG	-	-

Channels 17 to 24

Pin No.	Setting	Pin No.	Setting
13	CH17+	25	CH17 COM
12	CH17-	24	CH18+
11	CH18 COM	23	CH18-
10	CH19+	22	CH19 COM
9	CH19-	21	CH20+
8	CH20 COM	20	CH20-

7	CH21+	19	CH21 COM
6	CH21-	18	CH22+
5	CH22 COM	17	CH22-
4	CH23+	16	CH23 COM
3	CH23-	15	CH24+
2	CH24 COM	14	CH24-
1	SG	-	-

Channels 25 to 32

Pin No.	Setting	Pin No.	Setting
13	CH25+	25	CH25 COM
12	CH25-	24	CH26+
11	CH26 COM	23	CH26-
10	CH27+	22	CH27 COM
9	CH27-	21	CH28+
8	CH28 COM	20	CH28-
7	CH29+	19	CH29 COM
6	CH29-	18	CH30+
5	CH30 COM	17	CH30-
4	CH31+	16	CH31 COM
3	CH31-	15	CH32+
2	CH32 COM	14	CH32-
1	SG	-	-

2-4-2. MFR-16AAOEX (Analog Output)

MFR-16AAOEX is an analog audio output card with D/A converter.
Up to **4** cards can be installed into **Slot No. 09 to 16**.

► See section 2-1-1. "Matrix Size Chart."
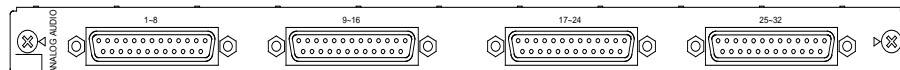
◆ **MUTE**
Mute can be enabled or disabled for each stereo pair (2 channels).
Mute should be set in the [Web-based Control: **Audio Settings** page].

◆ **Digital-to-Analog Conversion**
32 channels (16 stereo pairs) can be converted and output as analog audio. Audio level and gain can be set for each stereo pair.
Audio level and gain should be set in the [Web-based Control: **Audio Settings** page].

Level	Sets analog output level for each stereo pair. Audio output level is determined by the digital input level and this setting as shown in the table on next page. Maximum output level is +24 dBm.
Gain	Adjusts analog output level for each channel.

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Analog Output Level (determined by the input level and level setting)

Digital audio input level	Analog Output Level Setting			
	-10dBm	0dBm	4dBm	8dBm
-24dBFS	-14dBm	-4dBm	0dBm	+4dBm
-20dBFS	-10dBm	0dBm	+4dBm	+8dBm
-18dBFS	-8dBm	+2dBm	+6dBm	+10dBm
0dBFS	+10dBm	+20dBm	+24dBm	CLIP

◆ **Analog Audio Connection**
For balanced audio signals, connect the **hot**, **cold** and **shield** conductor to "**+**" ," **-** " and "**COM"** pins respectively.
For unbalanced audio signals, connect the conductor that carries **audio** to a "**+**" pin and **ground** to "**COM.**"

Analog Audio Connector (25-pin D-sub, female, inch screws) x 2

Connector Pin Assignments
Channels 1 to 8

Pin No.	Setting	Pin No.	Setting
13	CH1 +	25	CH1 COM
12	CH1 -	24	CH2 +
11	CH2 COM	23	CH2 -
10	CH3 +	22	CH3 COM
9	CH3 -	21	CH4 +
8	CH4 COM	20	CH4 -
7	CH5 +	19	CH5 COM
6	CH5 -	18	CH6 +
5	CH6 COM	17	CH6 -
4	CH7 +	16	CH7 COM
3	CH7 -	15	CH8 +
2	CH8 COM	14	CH8 -
1	SG	-	-

Channels 9 to 16

Pin No.	Setting	Pin No.	Setting
13	CH9 +	25	CH9 COM
12	CH9 -	24	CH10 +
11	CH10 COM	23	CH10 -
10	CH11 +	22	CH11 COM
9	CH11 -	21	CH12 +
8	CH12 COM	20	CH12 -
7	CH13 +	19	CH13 COM
6	CH13 -	18	CH14 +
5	CH14 COM	17	CH14 -
4	CH15 +	16	CH15 COM
3	CH15 -	15	CH16 +
2	CH16 COM	14	CH16 -
1	SG	-	-

Channels 17 to 24

Pin No.	Setting	Pin No.	Setting
13	CH17 +	25	CH17 COM
12	CH17 -	24	CH18 +
11	CH18 COM	23	CH18 -
10	CH19 +	22	CH19 COM
9	CH19 -	21	CH20 +
8	CH20 COM	20	CH20 -
7	CH21 +	19	CH21 COM
6	CH21 -	18	CH22 +
5	CH22 COM	17	CH22 -
4	CH23 +	16	CH23 COM
3	CH23 -	15	CH24 +
2	CH24 COM	14	CH24 -
1	SG	-	-

Channels 25 to 32

Pin No.	Setting	Pin No.	Setting
13	CH25 +	25	CH25 COM
12	CH25 -	24	CH26 +
11	CH26 COM	23	CH26 -
10	CH27 +	22	CH27 COM
9	CH27 -	21	CH28 +
8	CH28 COM	20	CH28 -
7	CH29 +	19	CH29 COM
6	CH29 -	18	CH30 +
5	CH30 COM	17	CH30 -
4	CH31 +	16	CH31 COM
3	CH31 -	15	CH32 +
2	CH32 COM	14	CH32 -
1	SG	-	-

2-4-3. MFR-16ADI (AES Input with SRC)

MFR-16ADI is an AES/EBU audio input card with SRC.
Up to **4** cards can be installed into **Slot No. 05 to 08**.
► See section 2-1-1. "Matrix Size Chart."
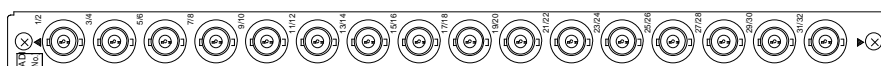
BNC x 16 inputs (16 stereo pairs, 32 channels), unbalanced, 75 Ohm

IMPORTANT
When using an MFR-16ADI, a Black Burst signal should be input to REF IN2.
To output the MFR-16ADI digital audio input, use **MFR-16ADAO**. The MFR-16AESO/16AAOEX can**not** output MFR-16ADI audio channels.

◆ **SRC (Sample Rate Converter)**
A Sample Rate Converter is implemented in MFR-16ADI cards.
It allows you to accept audio signals of the following frequencies:
    32 kHz, 44.1 kHz, 48 kHz and 96 kHz

If an audio input stereo pair meets the following conditions, set these channels to ON in the [Web-based Control: **Audio Settings** page]. If set to ON, the channels are synchronized to the external reference input and resampled to 48 kHz.

● Audio signals of other frequencies than 48kHz
● Audio signals asynchronous to the external reference input

IMPORTANT
If setting to OFF for asynchronous or other frequency audio channels, their output will be noisy or choppy.

2-4-4. MFR-16ADAO (Embedded / AES / Analog Output)

MFR-16ADAO is an audio output card with D/A converter. Each card can output the same audio (up to 8 stereo pairs, 16 channels) from 2 SDI, 8 AES/EBU and analog (4 stereo pairs) output connectors.
Up to **8** cards can be installed into **Slot No. 09 to 16**.
► See section 2-1-1. "Matrix Size Chart."
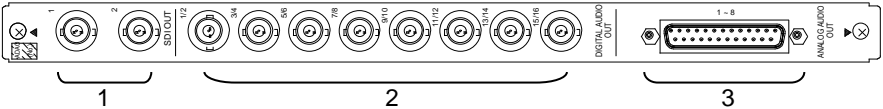
No.	Name	Description
1	SDI OUT1 SDI OUT2	Outputs SDI audio embedded SDI signals (8 stereo pairs, 16 channels), BNC x 2 * Supported video formats: 1080/59.94i and 1080/60i
2	DIGITAL AUDIO OUT 1/2 to 15/16	Outputs AES/EBU signals (8 stereo pairs, 16 channels), unbalanced, 75-ohm, BNC x 8 * Output audio is synchronized with the REF IN2 input.
3	ANALOG AUDIO OUT 1 to 8	Outputs analog audio signals (4 stereo pairs, 8 channels) balanced or unbalanced, 25-pin D-Sub x 1 (female),

IMPORTANT
When MFR-16ADAO cards are installed, Black Burst signal should be input to REF IN2.   MFR-16ADAO cards can output audio signals input to **MFR-16ADI** or **MFR-16AAI**.

◆ **V-Fade**
The V-Fade function can erase switching noise by setting fade-in and fade-out duration time.
V-Fade should be set in the [Web-based Control: **Audio Settings** page].

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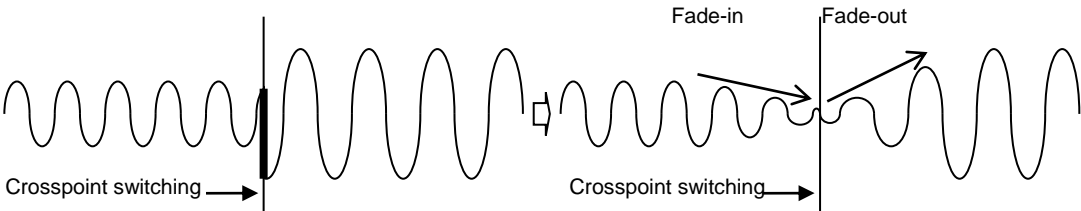
◆ **Audio De-embedding from SDI**

In addition to audio channels input to MFR-16ADI, embedded audio channels input to MFR-16SDI/16SDIA can output from MFR-16ADAO by de-embedding audio from SDI signals.

SDI-embedded audio should be set in the [Web-based Control: **Audio Settings** page].

Note that embedded audio should meet the following requirements. Otherwise, audio output should be choppy or noisy.
- Audio signals at 48kHz sample rates.
- HD-SDI embedded audio signals that are synchronized to the external reference signal (REF IN2 input). 3G and SD SDI embedded audio signals are not properly synchronized.

◆ **MUTE**

Mute can be enabled or disabled for stereo pair (2 channels).
Mute should be set in the [Web-based Control: **Audio Settings** page].

◆ **Digital-to-Analog Conversion**

8 channels (4 stereo pairs) can be converted and output as analog audio. Audio level and gain can be set for each stereo pair.
Audio level and gain should be set in the [Web-based Control: **Audio Settings** page].

Select AES	Selects 4 stereo pairs (8 channels) output as analog audio from the AES/EBU output channels.
Level	Sets analog signal output level for each channel. Audio output level is determined by the digital input level and this setting as shown in the table below. Maximum output level is +24dBm.
Gain	Adjusts signal gain for each channel.

Analog Output Level (determined by the input level and level setting)

Digital audio input level	Analog Output Level Setting			
	-10dBm	0dBm	4dBm	8dBm
-24dBFS	-14dBm	-4dBm	0dBm	+4dBm
-20dBFS	-10dBm	0dBm	+4dBm	+8dBm
-18dBFS	-8dBm	+2dBm	+6dBm	+10dBm
0dBFS	+10dBm	+20dBm	+24dBm	CLIP

◆ **Analog Audio Connection**

For balanced audio signals, connect the **hot**, **cold** and **shield** conductor to "**+**" ," **-** " and "**COM**" pins respectively.
For unbalanced audio signals, connect the conductor that carries **audio** to a "**+**" pin and **ground** to "**COM.**"

Analog Audio Connector (25-pin D-sub, female, inch screws)

Pin Assignments

Pin No.	Setting	Pin No.	Setting
13	CH1 OUT+	25	CH1 OUT COM
12	CH1 OUT-	24	CH2 OUT+
11	CH2 OUT COM	23	CH2 OUT-
10	CH3 OUT+	22	CH3 OUT COM
9	CH3 OUT-	21	CH4 OUT+
8	CH4 OUT COM	20	CH4 OUT-
7	CH5 OUT+	19	CH5 OUT COM
6	CH5 OUT-	18	CH6 OUT+
5	CH6 OUT COM	17	CH6 OUT-
4	CH7 OUT+	16	CH7 OUT COM
3	CH7 OUT-	15	CH8 OUT+
2	CH8 OUT COM	14	CH8 OUT-
1	SG	-	-

2-4-5. MFR-16AESI (AES Input)

MFR-16AESI is a digital audio input card.
Up to **8** cards can be installed into **Slot No. 01 to 08**.
► See section 2-1-1. "Matrix Size Chart."
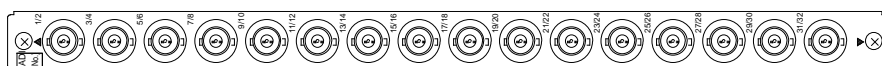
BNC x 16 inputs (16 stereo pairs, 32 channels), unbalanced, 75 Ohm

IMPORTANT
To output MFR-16AESI input audio, **MFR-16AESO/16AAOEX** is required.

2-4-6. MFR-16AESO (AES Output)

MFR-16AESO is a digital audio output card.
Up to **8** cards can be installed into **Slot No. 09 to 16**.
► See section 2-1-1. "Matrix Size Chart."
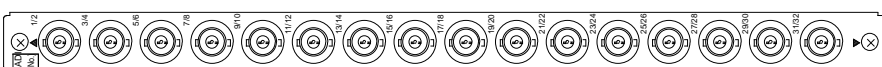
BNC x 16 outputs (16 stereo pairs, 32 channels), unbalanced, 75 Ohm

IMPORTANT
MFR-16AESO cards can output audio signals input to **MFR-16AESI/16AAIEX**.

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2-5. RS-422 Data Input / Output Cards

MFR-16DTIO is an RS-422 serial control input/output card compliant with the SMPTE 207M standard. .
Up to **8** cards can be installed into the following slots:
        No. 01, 03, 05, 07, 09, 11, 13, 15

        ► See section 2-1-1. "Matrix Size Chart."

◆ **MFR-16DTIO Card**
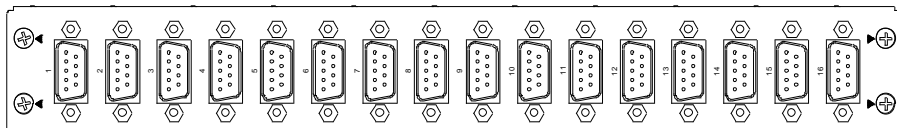
RS-422 Connector: 9-pin D-sub (female) x 16
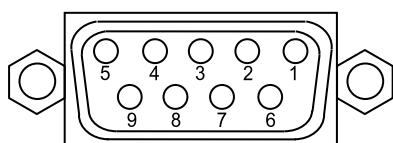
◆ **Connector Pin Assignments (9-pin D-sub, female)**

Pin no.	Device type *		Controller type *	
1	GND		GND	
2	TX--	Transmit data(-)	RX-	Receive data(-)
3	RX+	Receive data(+)	TX+	Transmit data(+)
4	GND		GND	
5	NC		NC	
6	GND		GND	
7	TX+	Transmit data(+)	RX+	Receive data(+)
8	RX-	Receive data(-)	TX-	Transmit data(-)
9	GND		GND	

*   Two pin assignment types are available: **Device** and **Controller**. The type can be selected under **Pin Assign** in the [Web-based Control: **RS-422 Settings** page].

► See the [Web-based Control: **RS-422 Settings** page] in the Web-based Control manual.

◆ **Port Assignments**

<Setting per Card>
● Specify a logical level under **Level**.

<Settings per Port>
● Assign a logical channel to a port under **Channel**.
● Assign Input (**SRC**) or Output (**DST**) for a port.
  Both Input and Output can be assigned to a single port. This can dynamically change Input / Output and pin assignments. (**2-Way** must be checked on.)
● Select a pin assignments type under **Pin Assign**. (See the table above.)

The port assignments can be performed in the **Port Assign** area in the [Web-based Control: **RS-422 Settings** page].

◆ **RS-422 Transmission Settings**
The **Route** and **Switching Mode** settings allow you to minimize I/O delay or to prevent data loss or corruption during switches.
They can be set in the [Web-based Control: **RS-422 Settings** page].

To transmit data with minimum delay:
>> Select **Direct** under **Route**.

To guarantee transmission reliability:
>> Set **Switching Mode** to **ON** and specify **Data Rate**, **Parity** and **Stop Bit**.

The table below shows details on how data switches are performed within the same card or between cards depending on the Route and Switching Mode settings.

		Route Setting			
		Direct		Via Main MTX	
		Within a card	Between cards	Within a card	Between cards
Switching Mode Setting	ON			I/O delay: Large Asynchronous Data loss: No	I/O delay: Large Asynchronous Data loss: No
	OFF	I/O delay: Small Asynchronous Data loss: Yes	I/O delay: Large Asynchronous Data loss: Yes	I/O delay: Large Synchronous Data loss: Yes	I/O delay: Large Synchronous Data loss: Yes

I/O delay: The minimum delay is approx. 190 nsec (Small) when an input and output ports are on the same card. In other cases, the delay becomes larger, from 0.8 msec (Large).
Synchronous / Asynchronous: This indicates whether data switches are always synchronizes with audio and video switches. "Asynchronous" means data switches may be delayed by one field (or one frame) relative to video or audio switches.
Data loss: This indicates whether data loss can occur during switches.

2-6. Remote Control Panel

2-6-1. Front Panel

◆ MFR-39RUA
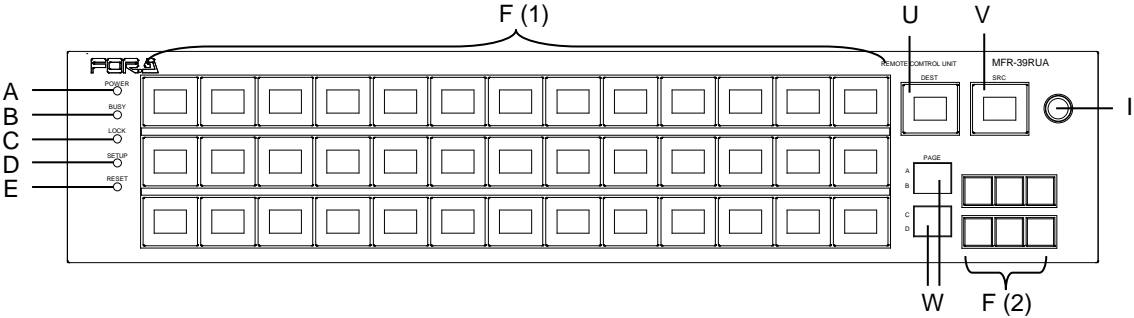
◆ MFR-39RU
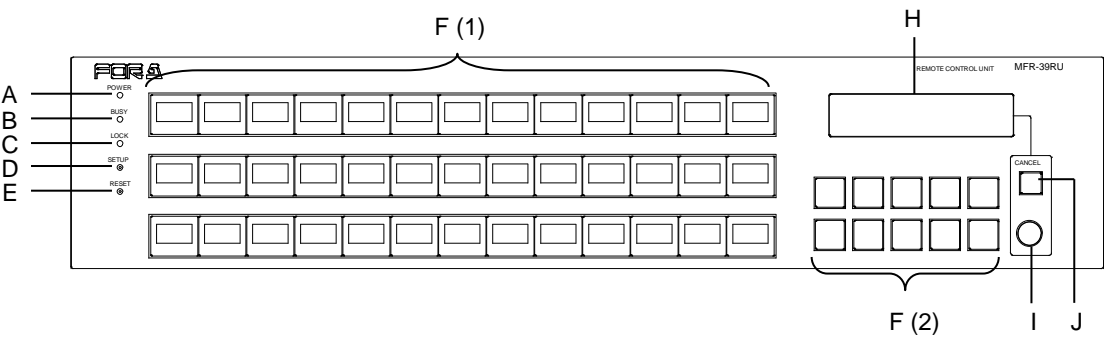
◆ MFR-40RU
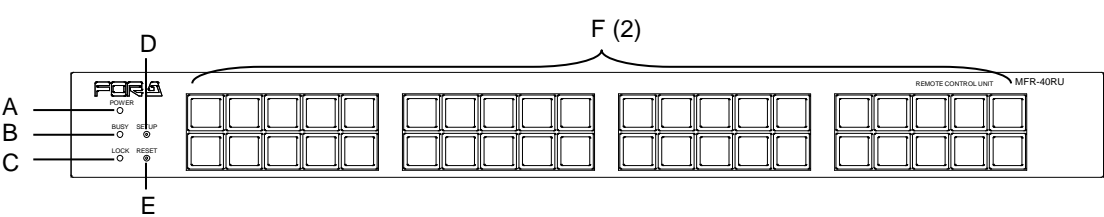
◆ MFR-18RU/18RUA
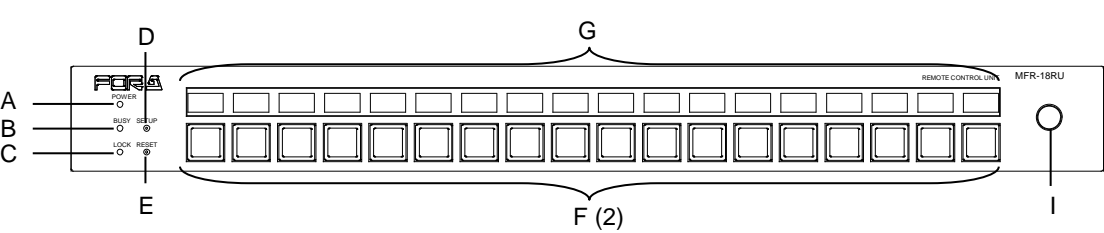
◆ MFR-16RU
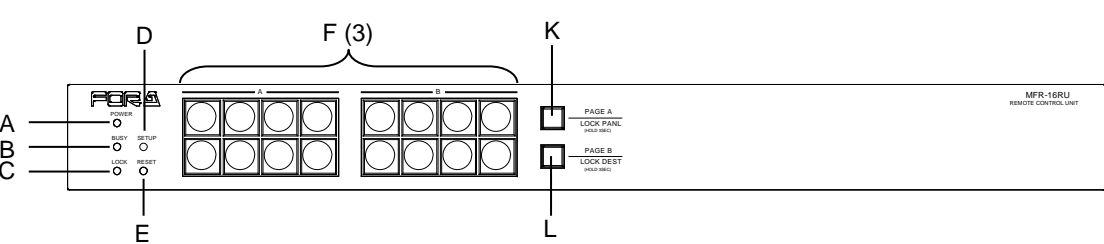
◆ MFR-16RUD
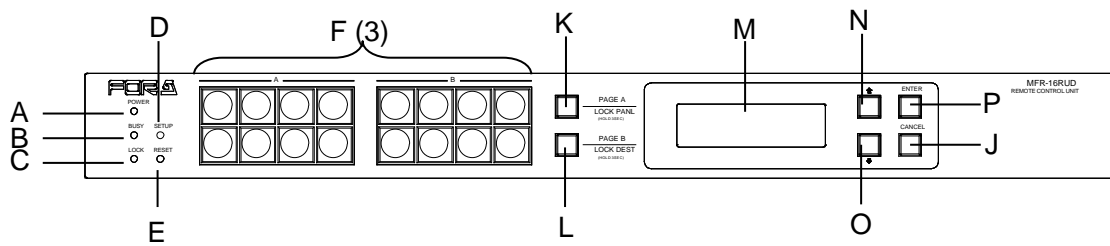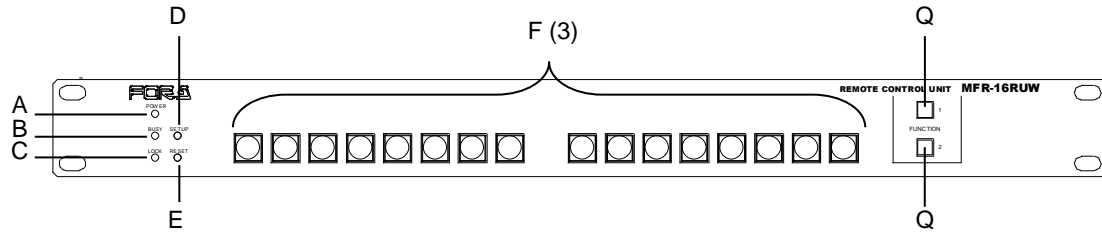
◆ MFR-16RUW

◆ MFR-32RUW
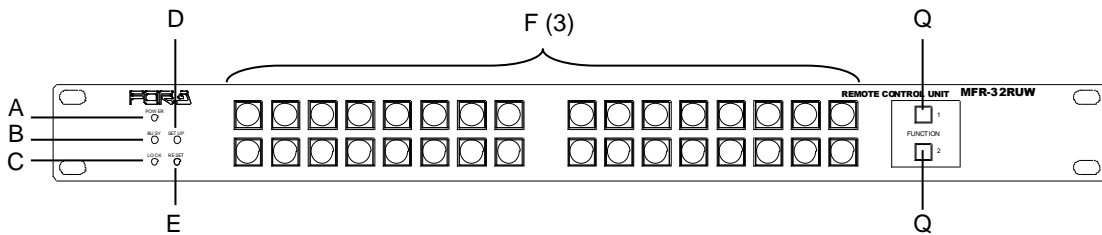
◆ MFR-64RUW
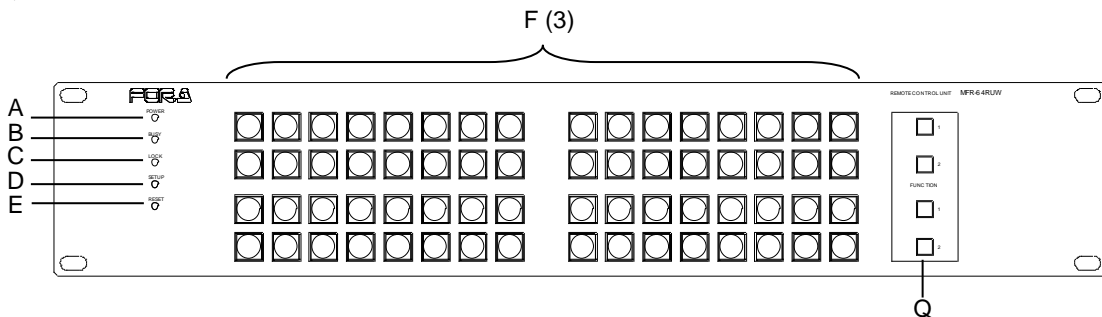
◆ MFR-16RUTA

No.	Item	Description
A	POWER	Displays the power status. ► See the table on the next page for details on indications.
B	BUSY	Displays the flash memory writing status of backup settings. ► See the table on the next page for details on indications.
C	LOCK	Displays the LOCK status. ► See the table on the next page for details on indications. ► See section 6-3. "Lock" for details on the lock function.
D	SETUP	Used for IP address or other settings. ► See section 5-6. "Setup Menu." for details on the SETUP menu.
E	RESET	Used to re-initialize the remote control panel.
F	Buttons	All buttons are user assignable. (1) 7-color selectable button name indication (red, green, yellow, blue, white, cyan or magenta) (hereafter called LCD) (2) 3-color selectable button illumination (red, green or orange) (3) Green illumination
G	NAME DISPLAY	7-color selectable button name/assignment indications (red, green, yellow, blue, white, cyan or magenta)
H	MENU	Displays setting menus and status.
I	CONTROL	Used to enter menu settings.
J	CANCEL	Used to cancel menu settings.
K	PAGE A / LOCK PANL	Page switch button. Pressing the button switches Page 1 and Page 2 of Group A. The button is unlit if Page 1 is applied. The button is lit orange if Page 2 is applied. To use the button as LOCK LOCAL, press and hold down (within 3 seconds). (*)
L	PAGE B / LOCK DEST	Page switch button. Pressing the button switches Page 1 and Page 2 of Group B. The button is unlit if Page 1 is applied. The button is lit orange if Page 2 is applied. To use the button as LOCK ALL, press and hold down (within 3 seconds). (*)
M	Display	Displays crosspoints and button assignments.
N	↑	UP / DOWN buttons, used to select items to be viewed on the Display.
O	↓	
P	ENTER	Used to confirm settings on the Display.
Q	FUNCTION	Function assignable buttons. (Green illumination)
R	PAGE A	If enabled, Group A pages can be controlled.
S	PAGE B	If enabled, Group B pages can be controlled.
T	LOCK	Lock function assignable button
U	Current DEST button	Displays the current destination channel.
V	Current SRC button	Displays the current source channel.
W	Current PAGE display	Displays the current page.

(*) PAGE Switch and LOCK features are initially enabled and can be disabled in the [Web-based Control: **Assign Function** page], respectively.

◆ Color indications on the MFR-RU front panel

LED color / LED	Green	Red	Orange
POWER LED	Normal	Power alarm	
BUSY LED	Normal processing		Writing to flash memory
LOCK LED	Operation locked by Lock Local	Operation locked by Lock All, or locked by Lock Other from another unit.	Lock Other is activated in own unit.

*   LOCK LED flashes if the locked operation is accessed. The operation will not perform.
*   POWER LED lights red if the unit is turned on while it is not connected to a network.
*   All indicators, POWER, BUSY and LOCK, light orange while the SETUP menu is displayed.

IMPORTANT

After finishing settings, do **not power OFF** the unit while BUSY LED is **lit orange**, since the system is writing to Flash. (It takes about two minutes at max.)

◆ Changing Button Labels

Button labels can be changed on user-assignable buttons. Utilize button label templates in the FOR-A web site. To remove button caps, use an optional tool.
To download button label templates, go to the **MFR-RU Series** page in the FOR-A site and open the **Documents** tab.
URL: http://www.for-a.com/products/mfr_ru_series/professional_router_p.html

2-6-2. Rear Panel

◆ **MFR-39RU / 39RUA**

B   A   C
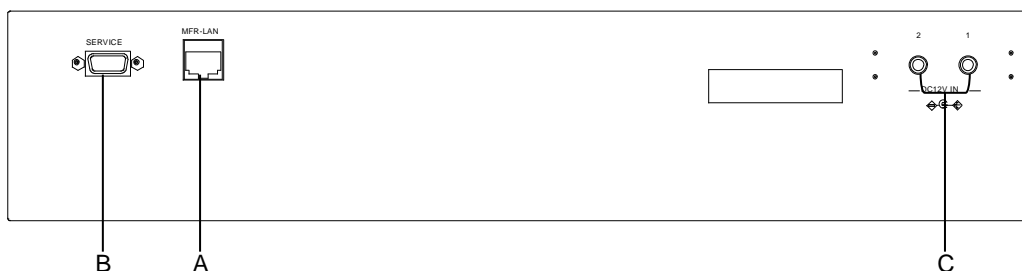
◆ **MFR-40RU / MFR-18RU/ MFR-18RUA**
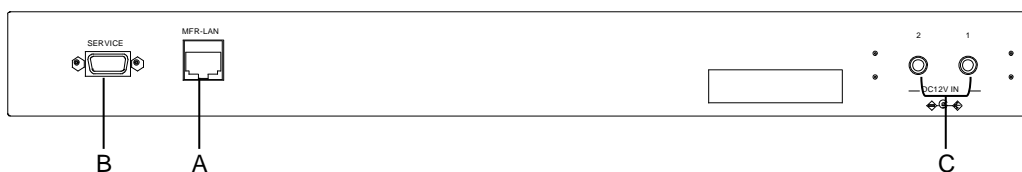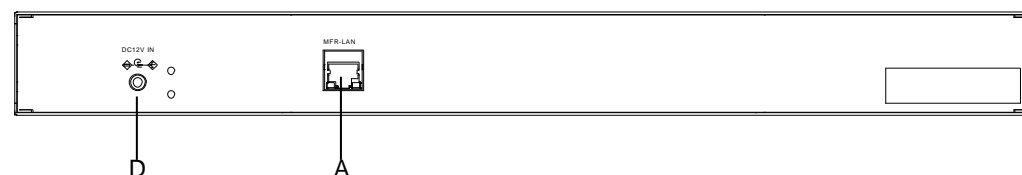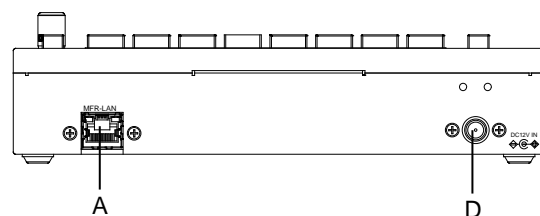
B   A   C

◆ **MFR-16RU / MFR-16RUD**

D   A

◆ **MFR-16/32/64RUW**

A   D

◆ **MFR-16RUTA**

A   D

No.	Item	Description
A	MFR-LAN *1	Used to connect the MFR main unit Ethernet port (10/100BASE-TX)
B	SERVICE	Used for maintenance only. Do not use.
C	DC 12 V IN 1,2	Used to supply 12 V DC power.
D	DC 12 V IN	Used to supply 12 V DC power.

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

2-7. MFR-GPI

2-7-1. Front Panel
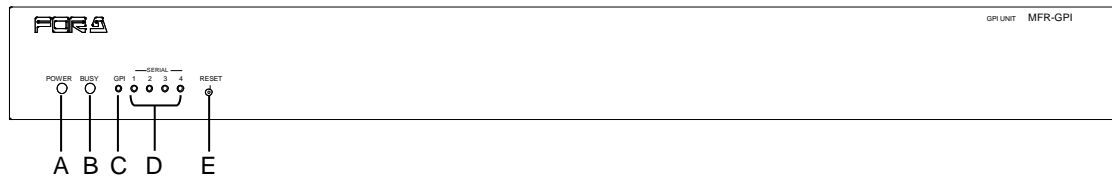
No.	Item	Description
A	POWER	Displays the power status. ► See the table below for details on indications.
B	BUSY	Displays the flash memory writing status of backup settings. ► See the table below for details on indications.
C	GPI	When the GPI function is assigned using the Web-based Control, the LED lights green. The LED remains unlit when there is no assignment.
D	SERIAL 1-4	When a serial port is assigned using the 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-GUI 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. (It takes about two minutes at max.)

2-7-2. Rear Panel

No.	Item	Description
A	MFR-LAN *1	Used to connect the MFR main unit Ethernet port (10/100BASE-TX)
B	SERVICE	Used for maintenance only. Do not use.
C	DC 12 V IN 1 and 2	Used to supply 12 V DC power.
D	SERIAL1 to 4	Used for serial interface control. The default setting is RS-422. RS-232C is also selectable using switches on the internal card. ► See section 2-7-4. "Switches on the Card." Pin assignments are the same as those on the MFR main unit. ► See section 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.

2-7-3. Interfaces (MFR-GPI)

◆ **GPI IN / TALLY OUT Connector (37-pin D-sub, female)**
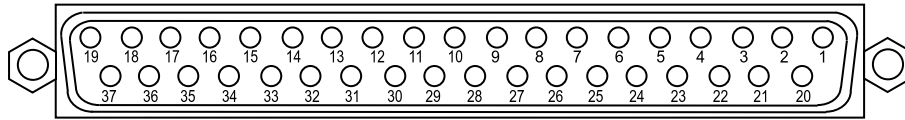
Pin No.	Signal	Pin No.	Signal
1	GPI_IN / TALLY_OUT 01 #	20	GPI_IN / TALLY_OUT 20 #
2	GPI_IN / TALLY_OUT 02 #	21	GPI_IN / TALLY_OUT 21 #
3	GPI_IN / TALLY_OUT 03 #	22	GPI_IN / TALLY_OUT 22 #
4	GPI_IN / TALLY_OUT 04 #	23	GPI_IN / TALLY_OUT 23 #
5	GPI_IN / TALLY_OUT 05 #	24	GPI_IN / TALLY_OUT 24 #
6	GPI_IN / 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**

43
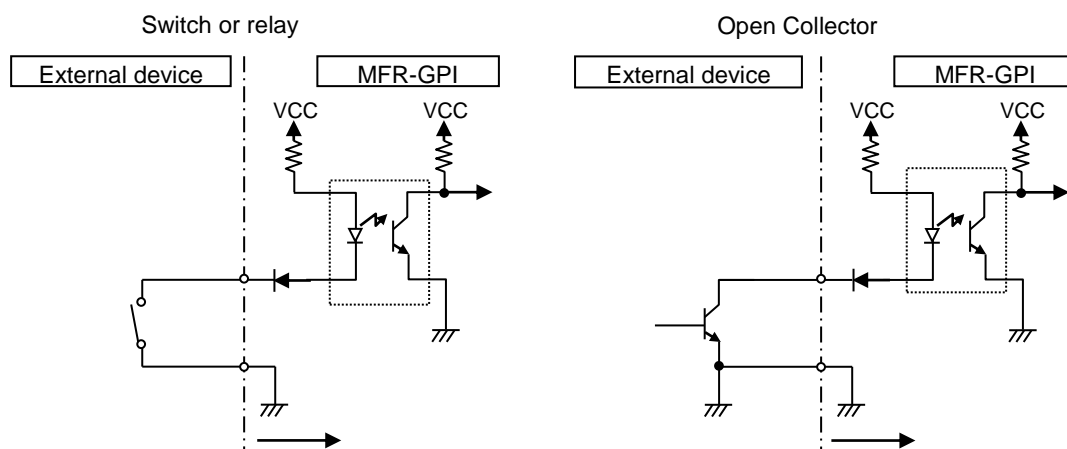
◆ **GPI OUT / TALLY OUT Circuit**
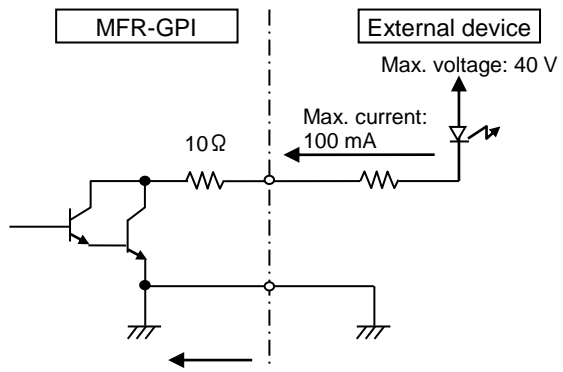
* The voltage is about 0.9 V when turned-on.

2-7-4. Switches on the Card

CAUTION
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.
Further note that adjustments and maintenance should only be performed by qualified technical personnel familiar with FOR-A equipment.

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.

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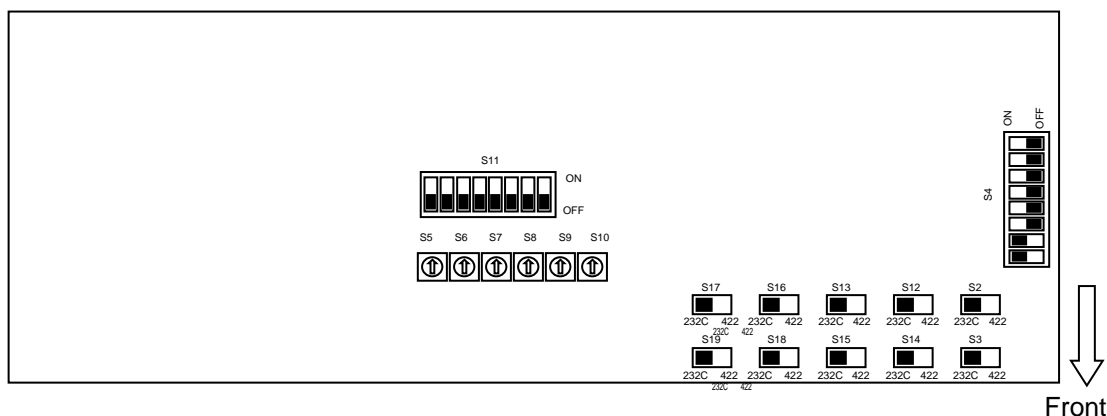
Switch	Function / Settings			
S2, S3	Used for maintenance. Do not use.			
S4	Used for maintenance. Do not use. (The factory default setting is as shown at right. The black boxes (■) represent switches.)			ON OFF
S5, S6, S7, S8, S9, S10	Used for IP address setting.			⇧
S11	Used for maintenance. Do not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

2-8. MFR-TALM

2-8-1. Front Panel
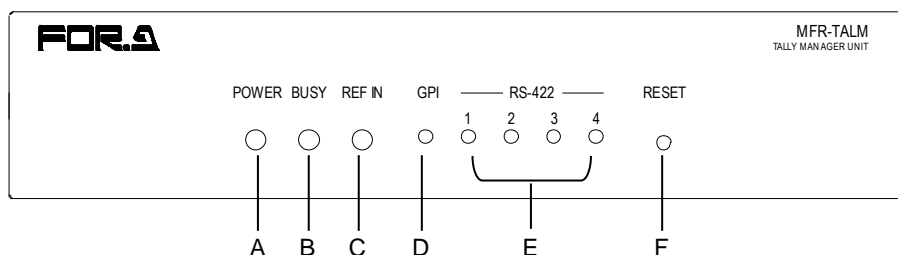
No.	Item	Description
A	POWER	Displays the power status. ► See the table below for details on indications.
B	BUSY	Displays the flash memory writing status of backup settings. ► See the table below for details on indications.
C	REF IN	Lights green when an external reference signal is present.
D	GPI	Lights green 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 seconds at most).

2-8-2. Rear Panel
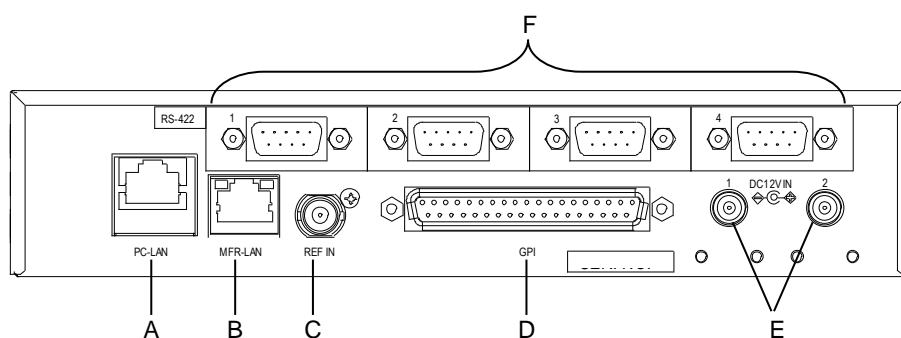
No.	Item	Description
A	PC-LAN	Ethernet port for connection to PC or other external unit (10/100BASE-TX, RJ-45)
B	MFR-LAN	Ethernet port for connection to MFR main unit (10/100/1000BASE-T, RJ-45)
C	REF IN	Used to input a reference signal (BB or Tri-level sync signal) (with loop-through. Terminate with 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 section 2-7-3. "Interfaces (MFR-GPI)."
E	DC 12 V 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 section 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-5000, 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 network segment of PC-LAN and other devices. (Default IP addresses (Net mask: 255.255.255.0) are used in the configuration example below.)
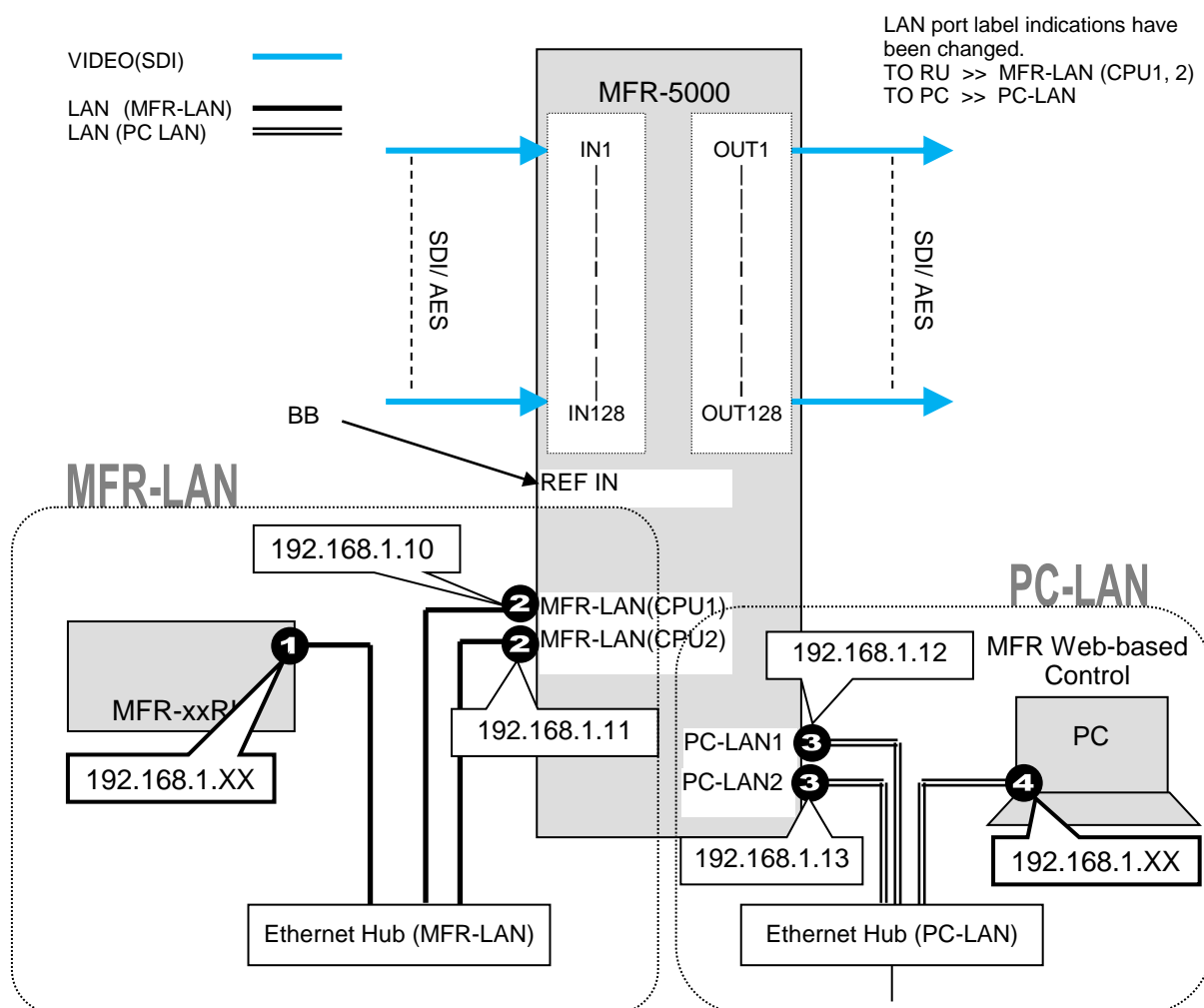
◆ **LAN Port Settings**

Port	RU Front Panel	Web-based Control	Sec. in Web Control Manual
❶	MFR-39RUA: See sec. 5-4-4. MFR-39RU: See sec. 5-6-1. MFR-18RU/18RUA: See sec. 5-8-1 and 5-8-2 Other RUs: See sec. 5-10-1 and 5-10-2.	RU Settings page	6-3
❷	---	MU Settings page	5-2
❸	MFR-39RUA: See sec. 5-4-4(display only). MFR-39RU: See sec. 5-6-3(display only). MFR-18RU/18RUA: See sec. 5-8-1 (display only). Other RUs: See sec. 5-10-1 (display only).	Network Settings page	4-1-7

3-2. Main Unit Linking

The Main Unit Link feature allows you to control multiple MFR-5000 units at the same time. Two types of system configurations are available:

Parallel Link: Controls several MFR-5000 units at the same time.
                       Controls an MFR-5000 and MFR-8000 units at the same time.
Expanded Matrix: Creates an expanded virtual matrix by linking MFR-5000 units.

Note that each Expanded Matrix system requires specific BNC connections. **IP port and SNMP settings** should be performed on **each** MFR-5000 unit. After these settings are completed, all linked MFR-5000 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. Up to **4** MFR-5000 units can be linked within a system.
- Parallel links using each one of MFR-5000 and one MFR-8000 are possible. **MFR-5000** and other MFR main units (**MFR-3000/ 3232/ 3216/ 1616/ 1616R/ 1616A/ 3216RPS/ 3232RPS**) can**not** be linked to each other.
- Only **SDI** signals can be routed in **Expanded Matrix** systems. However, MFR-5000 inputs and outputs not used in the Main Unit Link can be assigned independently and used as paralleled link matrix, managing both SDI and AES signals. (Note that, in such cases, ADAO cards output BLACK signals from SDI OUT.)
- All MFR main units in a link system must be linked together and independent units cannot exist in the system.
- Refer to Firmware / Software Versions and Supported Hardware / Features (p. 3) for details on the supported version.

3-2-1. Parallel Link System Example

The system example below is a redundant system using two MFR-5000 units.
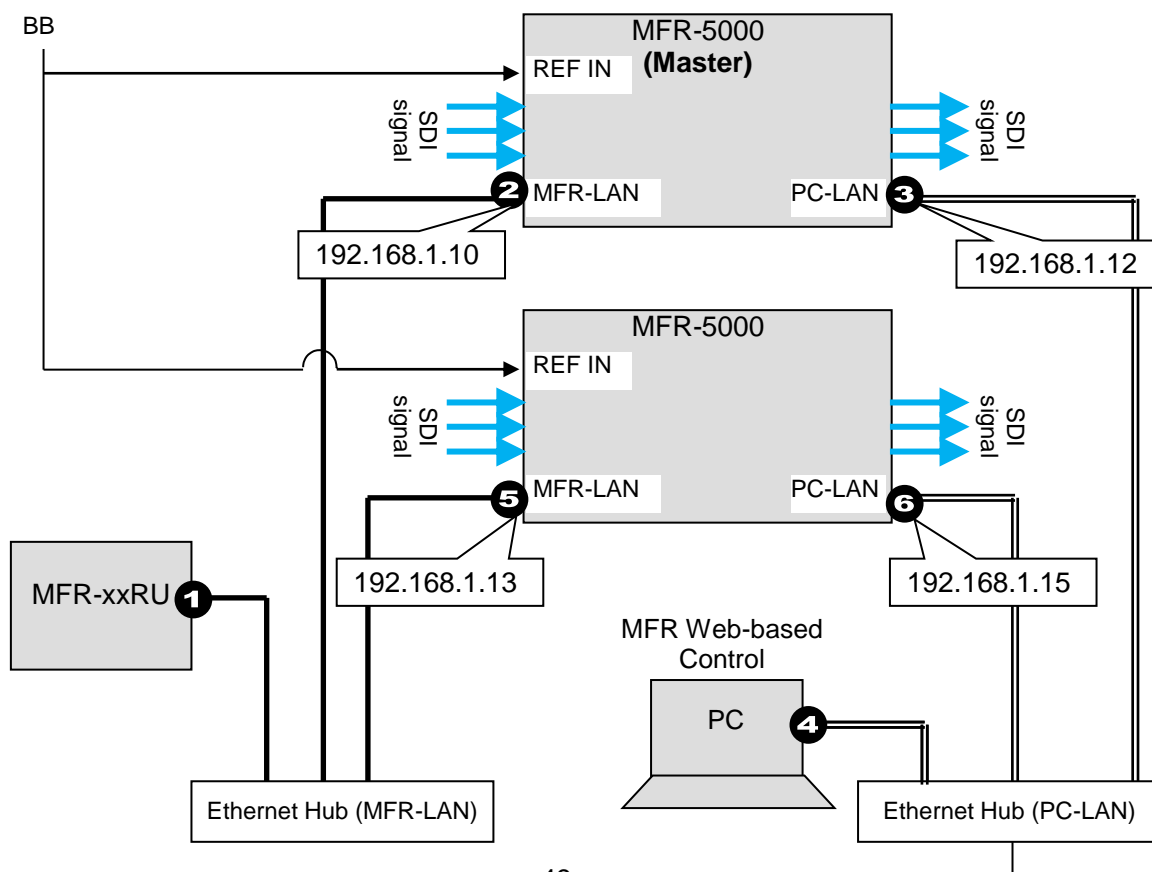
Note that in all MFR-5000 units the IP address of MFR-LAN1 is set to 192.168.1.10 and that of PC-LAN to 192.168.1.12 as factory default. To prevent IP address overlap in a system, you need to change IP addresses of either unit.

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 in the previous page. Power on the MFR-5000 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 MFR-5000.
2) Power on another MFR-5000. Set the IP addresses (⑤ and ⑥) as shown in the previous page.
3) Power on the Master MFR-5000.
4) Connect to the Master MFR-5000 Web-based control and open the **Build Settings** page. Check on **Build Enable** to enable the Main Unit Link feature.
▶ See section 11 "Main Unit Link" in the "Web-based Control Operation Manual."

3-2-2. Expanded Matrix System Example

The system example below connects three MFR-5000 units to form a 256 x 64 virtual matrix.
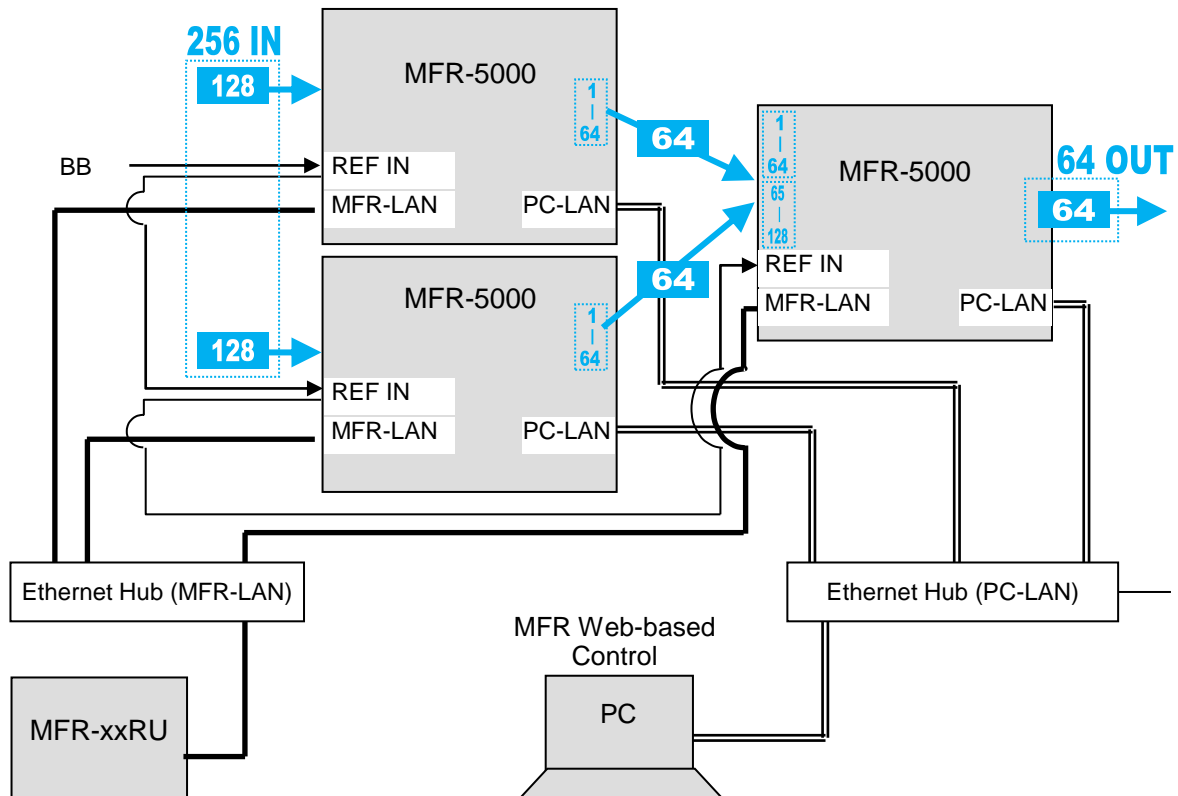
◆ **Setup Procedure**
1) Connect three MFR-5000 units, one by one, to the MFR system, referring to the previous chapter for details on to setting network settings. Do not use the same IP address twice in the system.
2) Connect all three MFR-5000 units to the MFR system. Connect BNC cables based on SDI signal routing paths.
3) Connect to the Web-based Control of an MFR-5000 and open the **Build Settings** page. Check on **Build Enable** to enable the Main Unit Link feature.
▶ See section 11 "Main Unit Link" in the "Web-based Control Operation Manual."

3-3. Signal Name and Tally Link System

3-3-1. Standard Configuration

The block diagram below shows a basic signal name and tally link system.

To connect a video switcher via serial connection, use the MFR-5000 SERIAL port or SERIAL1-4 on MFR-GPI. The signal name and tally link system requires an RS-422 interface. Before connecting devices, set the serial port for use to RS-422 using the switches on the Card.

► See section 2-1-4. CPU Card Switch Settings or 2-7-4. "Switches on the Card."

VIDEO(SDI)

LAN (MFR-LAN)
LAN (PC LAN)
RS-422
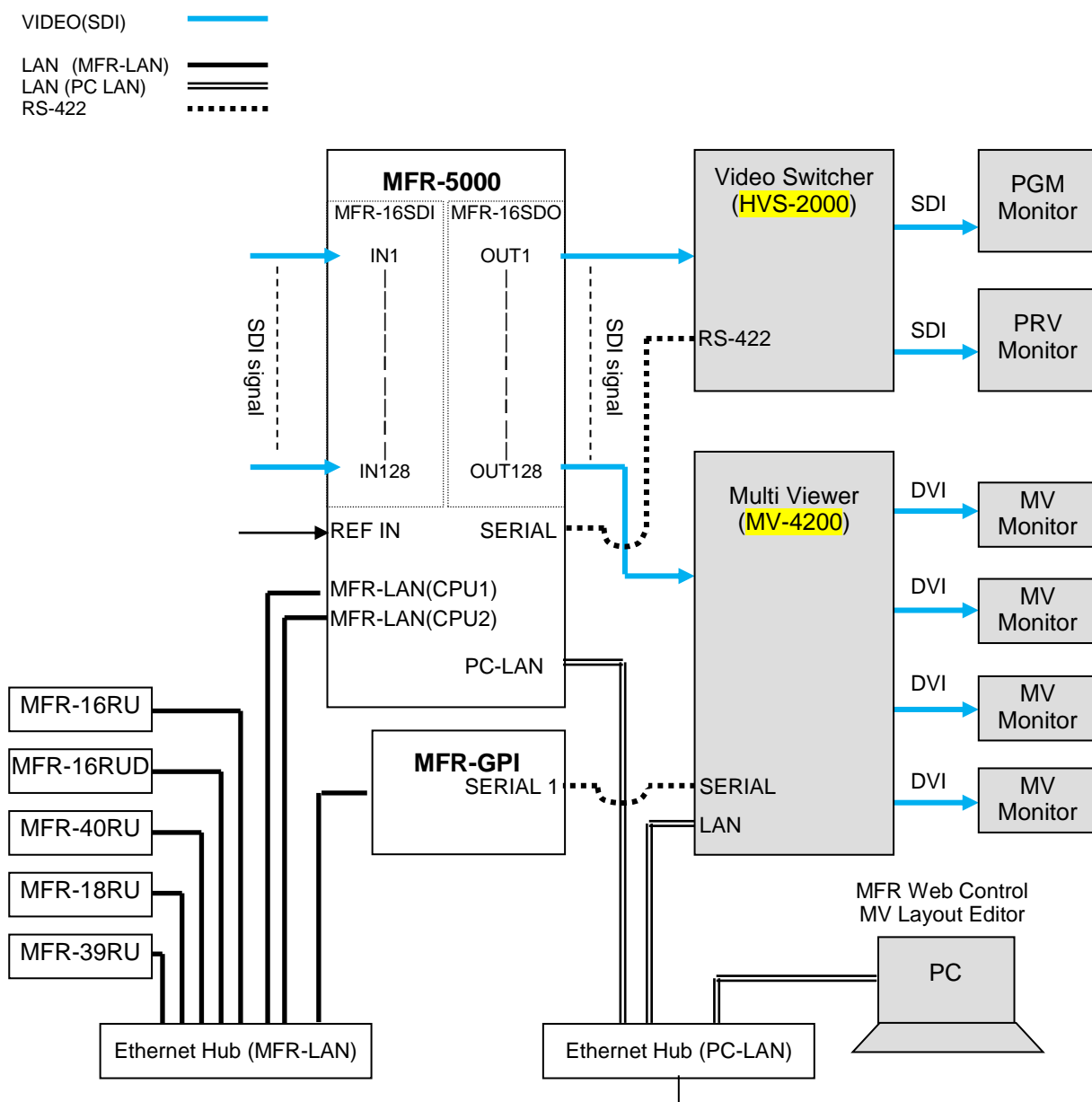
◆ Transmitting Signal Name and Tally Data
The figure below shows the routing of signal name and tally data.

> Set each serial port following the table on this page using the MFR Web Control and on the switcher.
>
> Each tally information setting should be performed in the [Web-based Control:**Tally System Settings** page].
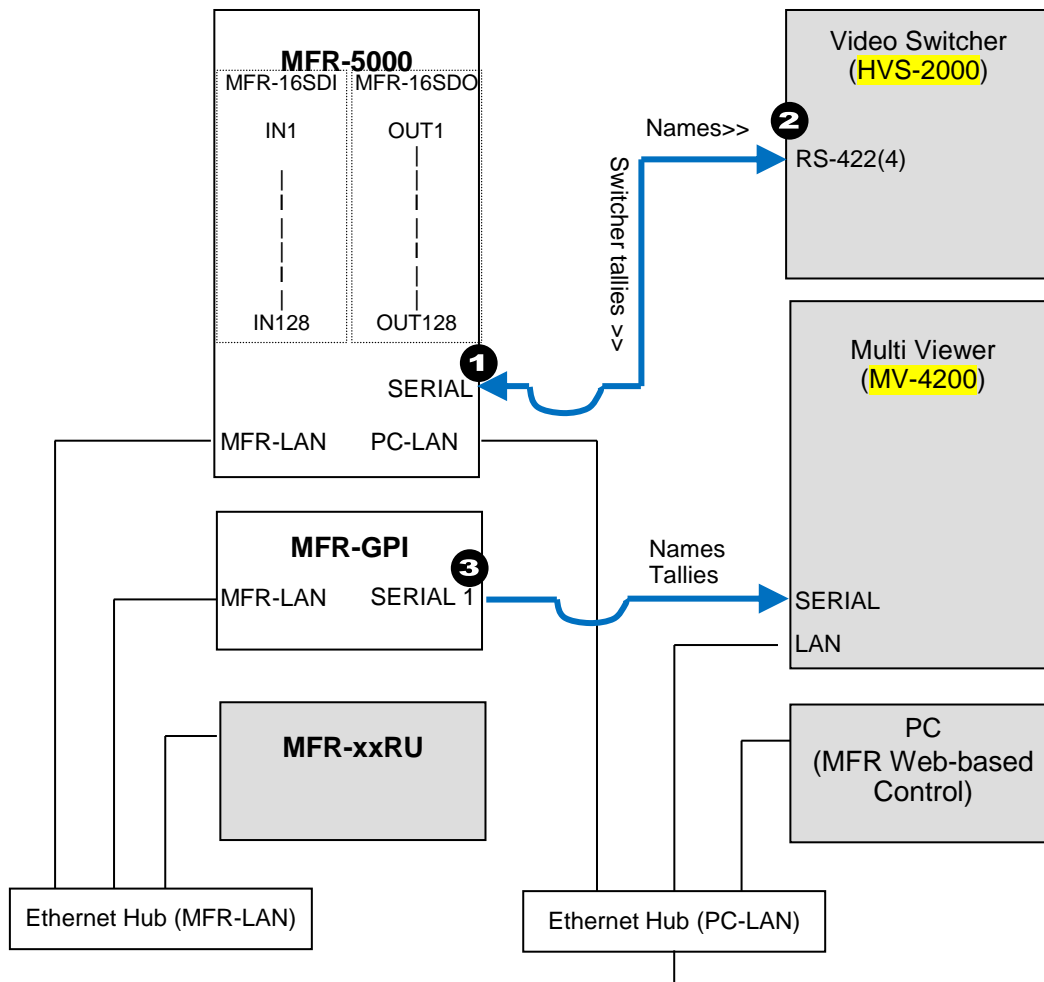
Serial Port Settings

Port	Menu	[Port Settings] - [Serial Port]			
		Connector	Function	Baud rate	Parity
❶	Web-based Control [Router System Settings]	(MU) -	Router/HVS connection type 2	38400	NONE
❷	HVS-2000 [SETUP - SYSTEM - RS-422]		ROUTER	38400	NONE
❸	Web-based Control [Router System Settings]	(GPI) No. 1	Tally out (TSL Ver. 3.1)	38400	EVEN

Other Parameter Settings (in HVS-2000)
To receive source names from the router, set [LINK] in the ROUTER NAME menu to [MFR].

3-3-2. If Configuring an 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 the computation. RS-422 ports (1) to (4) are available for video switcher connection.

Before using an MFR-TALM unit for the system, change **Tally Control Unit** to **MFR-TALM** in the [**Main unit** Web-based Control: **MU Settings** page].
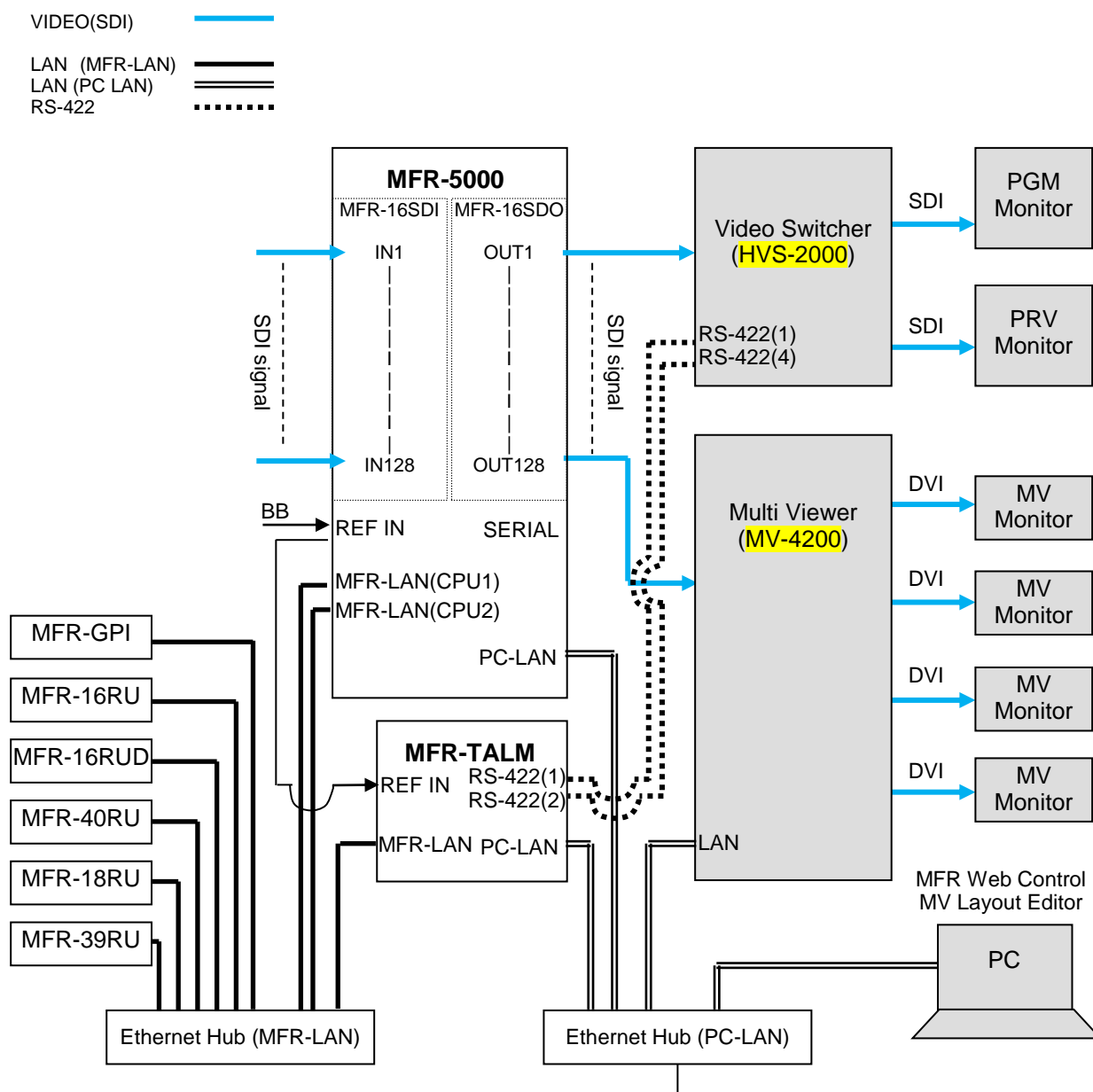
◆ Transmitting Signal Name and Tally Data

The figure below shows an example signal name and tally data routing system using the MFR-TALM.
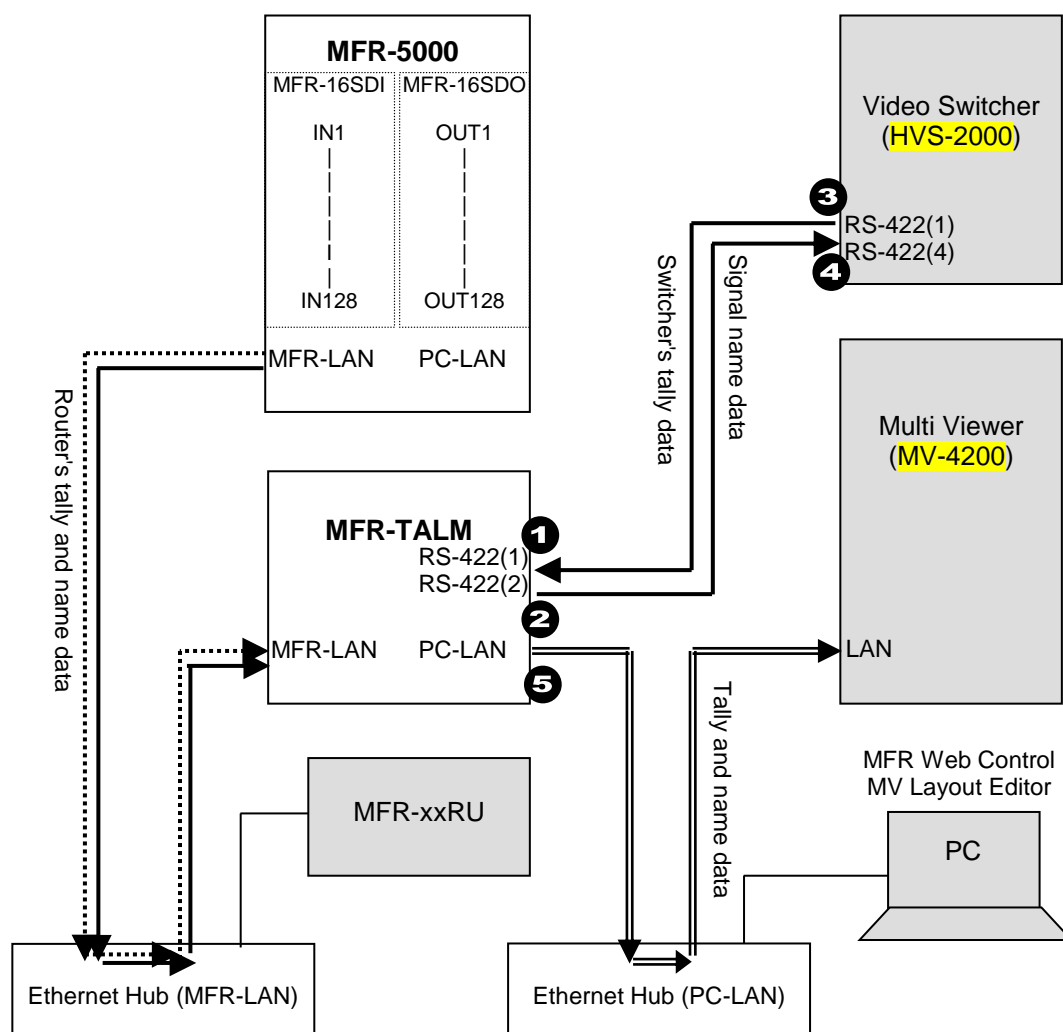
Each serial port should be set as shown in the table below in the relevant page of the **MFR-TALM** Web-based Control accessed from "**http://192.168.1.62**" (default IP address) on your web browser.

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
❺	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.

The tally settings in the MFR system must be entered in the [MFR-TALM Web-based Control: **Tally System Settings** page]. When using MFR-TALM for tally control, the [Main unit Web-based Control: **Tally System Settings** page] and its subpages are all disabled.

Refer to your mulitviewer's user guide 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-5000, if the MFR-5000 provides video souces to the switcher.

Supported switcher: **HVS-390HS, HVS-100/110, HVS-2000**

◆ **System Example**
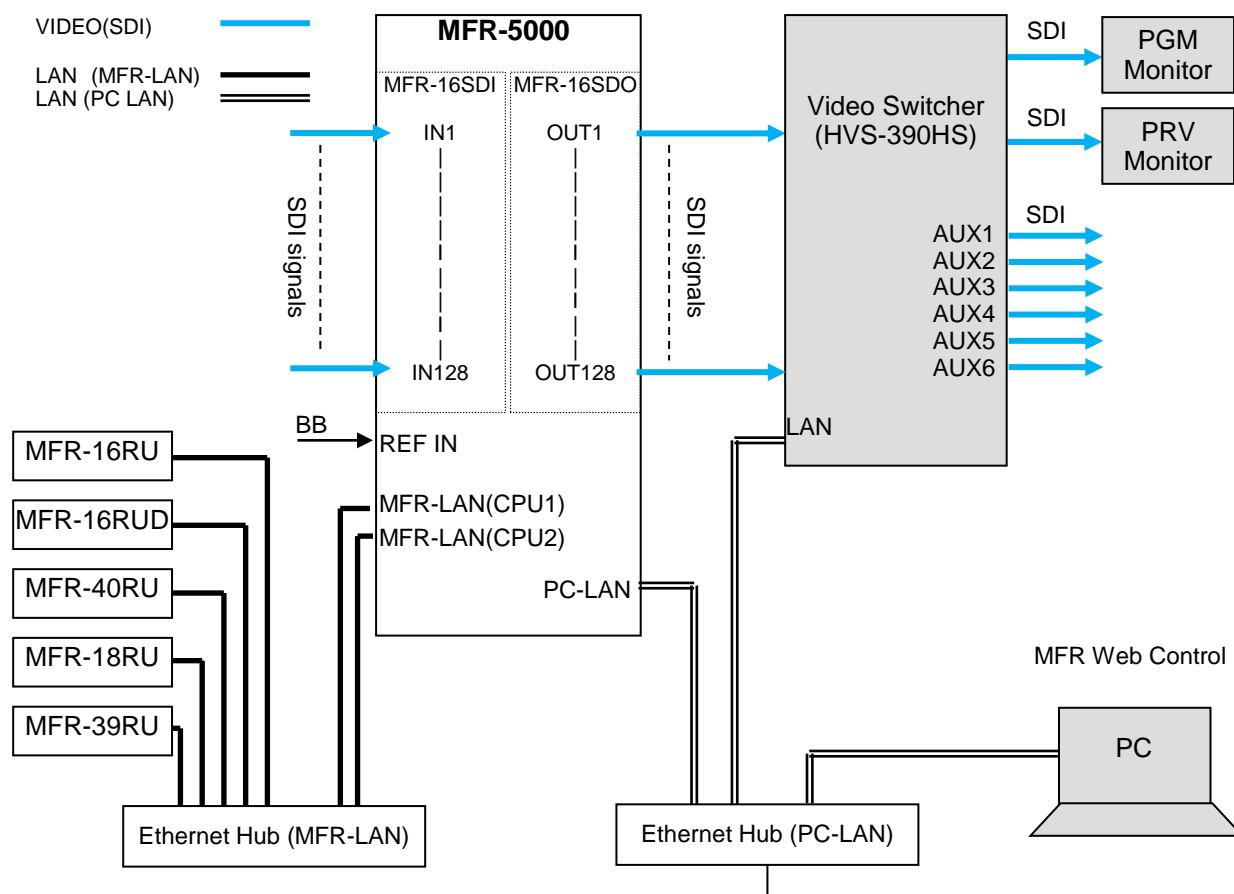
3-4-1. Switching an AUX Bus Signal

Assume that the system is configured as shown below:
AUX1 on the switcher is assigned to **DST 129** (Level 1) on the MFR-5000.
IN1-8 and **STL**(Still) **3** on the switcher are assigned to **SRC129-137** on the MFR-5000.

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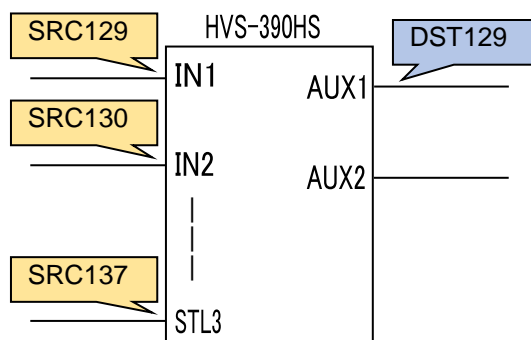
◆ **Setup Settings**
1) Connect and assign video signals as shown in the figure above.
2) Device Setup on the MFR-5000:
   Connect to the MFR-5000 from the Web-based Control PC and open the [**Tally System Settings - Device Select**] page. Select **HVS-390HS** in the [**Switcher**] field and click [**Send**].
3) Network settings on the MFR-5000:
   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)	※	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

4) Assign AUX buses and input channels on the switcher to logical destination and sources channels on the MFR-5000.

   <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 129**.

   <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.

LogicalNo./Name		Switcher Channel
129	SRC 129	IN1
136	SRC 136	IN8
137	SRC 137	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 129** is selected for **DST 129**,
   AUX1 outputs **IN1** video on the switcher.

● If **SRC 137** is selected for **DST 129**,
   AUX1 outputs **Still 3** video on the switcher.

● If **IN4** is selected for **AUX1** on the switcher,
   SRC 132 is selected for **DST 129** on the MFR-5000.

> 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

Configure the system as described 1) to 3) 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-5000.
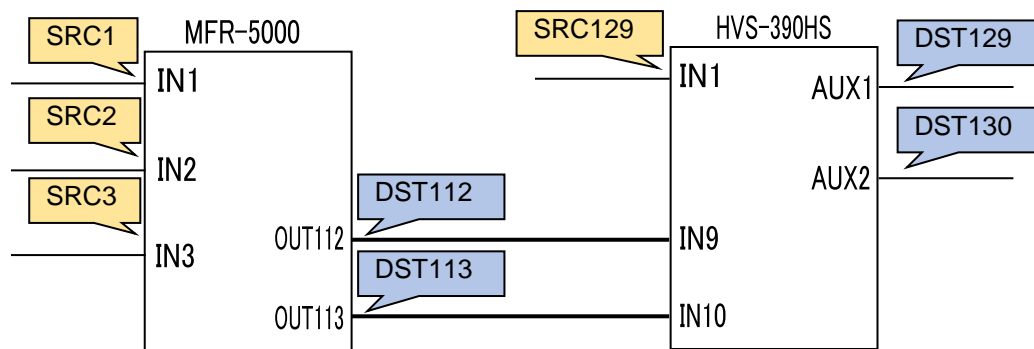
5) Assign logical source and destination channels on the MFR-5000 to input channels and AUX buses on the switcher.
   <AUX bus assignments>
   a) Open the **Destination Assignment** page.
   b) Select **HVS(AUX)** under **Select Table**.
   c) Set **Level** to **1**.
   d) Assign **AUX1** to **DST 129**.
   e) Assign **AUX2** to **DST 130**.

   <Input channel assignments>
   a) Open the **Source Assignment** page.
   b) Select **HVS(AUX)** under **Select Table**.
   c) Set **Level** to **1**.
   d) Assign **IN1** to **SRC 129**.

After above setup settings are complete:
● If **SRC 129** is selected for **DST 129** on the MFR-5000,
  IN1 is selected for **AUX1** on the switcher.

● If **SRC 3** is selected for **DST 129** on the MFR-5000,
  IN9 is selected for **AUX1** on the switcher and **SRC 3** is also selected for **DST 112** on the MFR-5000.

● If **IN9** is selected for **AUX1** on the switcher,
  a source assigned to DST 112 is selected for **DST 129** on the MFR-5000

● If **IN10** is selected for **AUX2** on the switcher,
  a source assigned to DST 113 is selected for **DST 130** on the MFR-5000

IMPORTANT
-Note that destination channels to which physical channels are assigned (DST 112 and DST 113 in the example above) on the MFR-5000 cannot select source channels to which the switcher input channels are assigned (SRC 129 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. Settings via MFR-5000 Menus

4-1. Function List

The MFR-5000 front menu display allows you to change or verify settings as shown below.
* The status and alarm display for uninstalled functions will be indicated as "- -".

Function	Indication	Description
MENU EXIT	MENU EXIT	Exits the menu.
ALARM	AC	Displays the AC alarm. (OK: Normal / NG: Alarm)
	DC	Displays the DC alarm. (OK: Normal / NG: Alarm)
	TEMP	Monitors the temperature (OK: Normal / NG: Alarm)
	FAN	ALARM PS: Displays the fan alarm for the power supply unit. (OK: Normal / NG: Alarm) ALARM FAN: Displays the fan alarm for the main unit. (NORMAL / WARNING / ERROR)
	FAIL	Displays the overheat alarm for the power supply unit. (OK: Running / NG: Stopped)
	V1, V2, …	Displays an alarm for the each card voltage (OK: Normal / NG: Alarm)
	CPU2▶COND	Displays the Secondary CPU condition (OK: Normal / NG: Alarm)
	CNFG	Displays the CPU and MTX card startup status. (OK: Startup successful / NG: Startup error)
STATUS	CPU1/2FIRM	Displays firmware versions
	CPU1/2FPGA MTX FPGA	Displays FPGA versions (CPU cards / MTX cards)
	PS	Displays whether the power supply unit is present. (INSTALLED: Present / NONE: Absent)
	CPU	Displays whether the CPU card is present. (INSTALLED: Present / NONE: Absent)
	SLOT	Displays whether an input or output card is present in each slot. (INSTALLED: Present / NONE: Absent)
	TEMP	Monitors the temperature (°C)
	AC	Displays the input voltage of the power supply unit (OK: Normal / NG: Alarm)
	DC	Displays the output voltage of the power supply unit (OK: Normal / NG: Alarm)
	FAN	PS STATUS: Displays the fan alarm for the power supply unit. (OK: Normal / NG: Alarm) FAN STATUS: Displays the fan alarm for the main unit. (NORMAL / WARNING / ERROR)
	FAIL	Displays the overheating alarm for the power supply unit. (OK: Running / NG: Stopped)
	V1, V2, …	Displays an alarm for the each card voltage (OK: Normal / NG: Alarm)
	CPU2▶COND	Displays the Secondary CPU condition (OK: Normal / NG: Alarm)
SETTINGS	-	Allows you to change the Ethernet, menu display brightness, and reference signal settings, and shut down slots. See section 4-5. "SETTINGS"

4-2. Front Menu Basic Operation

Menu display   ALARM   ACTIVE/BUSY   CONTROL knob
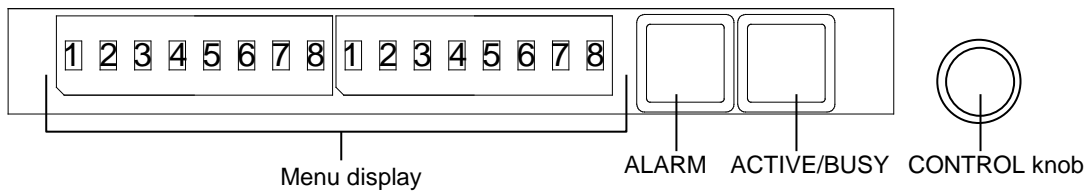
1. Activate the menu display
   Hold down the CONTROL knob for at least 3 seconds.

2. Select a menu item
   Turn the CONTROL knob to select a menu item. Press the CONTROL knob after selecting an
   item to go to the lower menu level.
   * When multiple setting items are shown at the same time
     Repeat the above for the items one by one from the left. (The subject item blinks.)
     To return to the previous item, press the ACTIVE/BUSY button.
     (To return to the above menu level, press the ACTIVE/BUSY button while the leftmost
     item is blinking.)

3. Confirmation display
   The confirmation display menu appears as shown below.

A	G	R	E	E	?	▶	C	A	N	C	E	L		O	K

   Turn the CONTROL knob to select either CANCEL or OK.
   → Select OK, and press the CONTROL knob to confirm the setting.
   → Select CANCEL, and press the CONTROL knob to cancel the setting and return to the
       settings display.

4. Setting completion
   The menu display appears as shown below.

D	A	T	A		S	E	T		D	O	N	E	!		

   Press either the CONTROL knob or ACTIVE/BUSY button while the menu is displayed as
   above to return to the above menu level.

5. Exit the menu
   Select MENU EXIT, and press the CONTROL knob to exit the menu.

4-3. Blinking ALARM Button

Alarm buttons blink to indicate alarms as shown below. Press the ALARM button while the buttons are blinking to see simplified alarm information.

Indication	Description
P S ▶ 1 A L M	Displays the number of power supply units that have an alarm triggered.
F A N ▶ 1 A L M	Displays the number of fans that have an alarm triggered.
C P U ▶ 1 A L M	Displays the number of CPU cards that have an alarm triggered.
M T X ▶ 1 A L M	Displays the number of MTX cards that have an alarm triggered.
R E A R ▶ 1 A L M	Displays the number of REAR cards that have an alarm triggered.
S L O T ▶ 1 A L M	Displays the number of alarms in each slot.
C N F G ▶ 1 A L M	Displays the number of CPU or MTX cards that have a configuration alarm triggered.

*   To see alarm information details, press the CONTROL knob while the above indications are being displayed. (The Alarm menu will be displayed.)

*   Pressing the ALARM button when no alarm is triggered, the menu display will appear as shown below and return to the previous display.

O P E R A T I O N   N O R M A L

4-4. Menu Structure

◆ **If CPU Card is Active:**

MENU EXIT		

ALARM → ALARM PS →
- ALM ► PS* ► AC
- ALM ► PS* ► DC
- ALM ► PS* ► TEMP
- ALM ► PS* ► FAN
- ALM ► PS* ► FAIL
- ALARM : PS EXIT   (Exiting menu)

ALARM FAN →
- ALM ► FAN*
- ALARM : FAN EXIT   (Exiting menu)

ALARM CPU →
- ALM ► CPU* ► V*
- ALM ► CPU2 ► COND
- ALARM : CPU EXIT   (Exiting menu)

ALARM MTX →
- ALM ► MTX ► V*
- ALARM : MTX EXIT   (Exiting menu)

ALARM REAR →
- ALM ► REAR ► V*
- ALARM : REAR EXIT   (Exiting menu)

ALARM SLOT →
- ALM ► SLT* ► V*
- ALARM : SLOT EXIT   (Exiting menu)

ALARM CNFG →
- ALM ► CNFG ► F/W*
- ALM ► CNFG ► CPU*
- ALM ► CNFG ► MTX
- ALARM : CNFG EXIT   (Exiting menu)

STATUS → VERSION →
- CPU* FIRM ►
- CPU* FPGA ►
- MTX FPGA ►
- STATUS : VER EXIT   (Exiting menu)

PS STATUS →
- PS* ►
- PS* ► AC
- PS* ► DC
- PS* ► TEMP
- PS* ► FAN
- PS* ► FAIL
- STATUS : PS EXIT   (Exiting menu)

FAN STATUS →
- FAN* ►
- ALARM : FAN EXIT   (Exiting menu)

CPU STATUS →
- CPU* ►
- CPU2 ► COND
- CPU* ► V*
- CPU* ► TEMP
- STATUS : CPU EXIT   (Exiting menu)

(Continues to next page)

```
                    ┌──────────────┐    ┌──────────────────┐
                    │  MTX STATUS  │────│  MTX ►  V*        │
                    └──────────────┘    └──────────────────┘
                                        ┌──────────────────┐
                                      ──│  MTX ► TEMP       │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ STATUS : MTX EXIT │  (Exiting menu)
                                        └──────────────────┘
                    ┌──────────────┐    ┌──────────────────┐
                    │ REAR STATUS  │────│ REAR ►  V*        │
                    └──────────────┘    └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ REAR ► TEMP*      │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ STATUS:REAR EXIT  │  (Exiting menu)
                                        └──────────────────┘
                    ┌──────────────┐    ┌──────────────────┐
                    │ SLOT STATUS  │────│ SLOT* ►          │
                    └──────────────┘    └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ SLOT* ►  V*       │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ SLOT* ► TEMP      │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ STATUS : SLOT     │  (Exiting menu)
                                        └──────────────────┘
 ┌──────────┐       ┌──────────────┐    ┌──────────────────┐    ┌────────────────┐
 │ SETTINGS │───────│  MFR-LAN     │────│  IP ADDRESS      │────│  IP    ►       │
 └──────────┘       └──────────────┘    └──────────────────┘    └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│  NET MASK        │────│  MASK  ►       │
                                        └──────────────────┘    └────────────────┘
                    ┌──────────────┐    ┌──────────────────┐
                    │   PC-LAN     │────│ IP ADDRESS INFO  │
                    └──────────────┘    └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ NET MASK INFO    │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ GATEWAY INFO     │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                      ──│ PC-LAN REBOOT    │
                                        └──────────────────┘
                    ┌──────────────┐    ┌──────────────────┐    ┌────────────────┐
                    │  MU SETTING  │────│ MENU BRIGHTNESS  │────│ BRIGHT►        │
                    └──────────────┘    └──────────────────┘    └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│  REFERENCE       │────│ REF  ►         │
                                        └──────────────────┘    └────────────────┘
                                                                ┌────────────────┐
                                                              ──│ REF  ►         │
                                                                └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│  FORMAT          │────│ FMT  ►         │
                                        └──────────────────┘    └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│  PS2 INSTALL     │────│ PS2 ►          │
                                        └──────────────────┘    └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│  SHUT DOWN       │────│ SLOT ► *       │
                                        └──────────────────┘    └────────────────┘
                                        ┌──────────────────┐    ┌────────────────┐
                                      ──│ CPU REDUNDANT    │    │ SLOT  ► * ►    │
                                        └──────────────────┘    └────────────────┘
```

◆ **If CPU Card is not Active:**

```
        ┌──────────────────────┐
        │      MENU EXIT       │
        └──────────────────────┘
        ┌──────────────────────┐
      ──│   CPU REDUNDANT      │
        └──────────────────────┘
        ┌──────────────────────┐    ┌──────────────────┐
      ──│  MENU BRIGHTNESS     │────│ BRIGHT ►         │
        └──────────────────────┘    └──────────────────┘
        ┌──────────────────────┐    ┌──────────────────┐
      ──│    IP ADDRESS        │────│ IP    ►          │
        └──────────────────────┘    └──────────────────┘
        ┌──────────────────────┐    ┌──────────────────┐
      ──│     NET MASK         │────│ MASK   ►         │
        └──────────────────────┘    └──────────────────┘
        ┌──────────────────────┐
      ──│  IP ADDR[PC-LAN]     │
        └──────────────────────┘
        ┌──────────────────────┐
      ──│  NETMASK[PC-LAN]     │
        └──────────────────────┘
        ┌──────────────────────┐
      ──│  GATEWAY[PC-LAN]     │
        └──────────────────────┘
```

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4-5. SETTINGS

1. MFR-LAN

[IP ADDRESS]

Step	Display	Description
1	I P ▶ 1 9 2 . 1 6 8 . 0 0 1 . 0	Allows you to set the IP address. (For MFR-LAN/LAN (TO RU) connection)

[NET MASK]

Step	Display	Description
1	M A S K ▶ 2 5 5 . 2 5 5 . 0 0 0	Allows you to set the subnet mask. (255.0.0.0 to 255.255.255.254) (For MFR-LAN/LAN (TO RU) connection)

2. MU SETTING

[MENU BRIGHTNESS]

Step	Display	Description
1	B R I G H T ▶ 0 7	Allows you to set the menu display brightness. brightness: 1 (dark) to 15 (bright)

[REFERENCE]

Step	Display	Description
1	R E F ▶ A U T O	Allows you to select how to select a reference signal format. AUTO: Automatic detection MANUAL: Manual selection If set to MANUAL, select a signal below.
2	R E F ▶ B B	Allows you to select a reference signal from BB or TRI-SYNC.

[FORMAT]

Step	Display	Description
1	F M T ▶ 1 0 8 0 5 9 . 9 4 i	Allows you to select a video format

[PS2 INSTALL]

Step	Display	Description
1	P S 2 ▶ I N S T A L L E D	Displays whether the redundant power supply unit is present.

[SHUT DOWN]

Step	Display	Description
1	S L O T ▶ 0 1	Allows you to select a slot to shut down.
2	S L O T ▶ 0 1 ▶ O F F	Select OFF to shut down. Select ON to supply power.

* When selecting the following functions, the confirmation display appears. (Select OK to execute the function.)

■CPU REDUNDANT: Manually switches CPU cards 1 and 2.
Requires time for sharing files between CPUs after startup or CPU changeover, during which crosspoint switchings cannot be performed.

■PC-LAN(IP ADDRESS INFO / NET MASK INFO / GATEWAY INFO):
Displays the PC-LAN port settings.

■PC-LAN REBOOT: Restarts the PC-LAN port.

5. Remote control panel Operation

5-1. Functions and Operations

The below table shows the functions that can be controlled using the remote control panel (RU) and/or Web-based Control (GUI).

* For details on Web-based Control operation, see the separate MFR SERIES Web-based Control Operation Manual.

Description on Control

○: Changing settings and execution are both supported

●: Execution is supported

▲: Changing settings is supported

39: Supported by the MFR-39RU, MFR-39RUA

18: Supported by the MFR-18RU, MFR-18RUA

16D: Supported by the MFR-16RUD

16T: Supported by the MFR-16RUTA

Function	Controller	Remote Control Units	Web-based Control	Ref.
Crosspoint change (1 channel)	By changing source and/or destination	○	○	6-1-1
	Using bus buttons	○	---	6-1-2
	Using buttons and the CONTROL knob	18, 16T	---	5-4-2
	Using the display	16D	---	5-5-1
	CHOP function	●	---	6-1-3
	TAKE function	●	○	6-1-4
Crosspoint change (Simultaneous)	Main unit stored SALVO	●	▲	6-2-1
	Control panel button assigned SALVO	39, ●	▲	6-2-2
	TAKE function	●	○	6-2-3
	LINK function	●	▲	6-2-4
Erroneous operation protection	LOCK LOCAL	○	---	6-3-1
	LOCK OTHER/ALL	○	○	6-3-2
	Crosspoint inhibit	---	○	Web
	Monitor output function (*1)	●	---	6-4
	Operation Preview function	●	---	6-5
Main unit and system setting change	Source/destination name settings	---	○	Web
	System tally settings	---	○	Web
Remote control setting change	Mode menu	39, 18, 16T	---	5-4-2
	Button assignment	39, 18, 16T(*2) 16D	○	5-4-3-12 (5-4-2)
	PAGE function	○	---	5-2-2
	Group setting	---	○	5-2-2-1
	Multi-remote control panel operation	39 (*3)	▲	5-11-2
	IP address setting	▲	▲	5-6-1
	Other settings	39	○	5-4-3 5-6
Status display		●	●	---
Alarm indication		●	●	---

*1 This function is supported only for the MFR-5000.

*2 Source and destination button/channel assignments can be performed using CONTROL on MFR-18RU/ 16RUTA/18RUA/39RUA units.

*3 MFR-39RU/39RUA can change multi-remote control panel operation settings while other remote control panels can only be used for operation.

5-2. Basic Operation on Control Panels

This section describes basic operation of the remote control panel and how to set and execute various functions.

5-2-1. Buttons

1) Assign functions to buttons (change assignments)
To use buttons on the remote control panel, assign functions to the buttons in the Web-based Control: **Assign Function** page]. Any function can be assigned to any button except the CANCEL, PAGE A, PAGE B, UP, DOWN and ENTER buttons.

Button Assign Procedure
(1) In the Web-based Control, click to open the menu tree at the left side. Click to select **Assign Function** to display the menu page.
(2) Set the page, button and function respectively to assign functions to buttons. Buttons can be selected by specifying Button IDs or clicking on button icons.
(3) After selecting a function, set the function specific settings.
(4) After all settings are completed, click **Send** to apply the settings.

The MFR-39RU menu display can also assign functions.
► See section 5-4-3-12 "BTN ASSIGN"

The MFR-39RUA menu display can also assign functions.
► See section 5-4-4-4 "BUTTON ASSIGN"

Source and destination button/channel assignments can be performed using the control knob on MFR-18RU/ 16RUTA/18RUA / 39RUA units.
► See section 5-2-3. "Control Knob"

MFR-16RUD can perform assignments using the display on the front panel.
► See section 5-5-2 "Changing Button Assignments" for details

2) Press buttons to execute functions
Press a button to execute the assigned function. The button LED indication, NAME DISPLAY, and MENU display change according to the assigned function.

5-2-2. Page Function

By managing a set of remote control panel front panel buttons as a page, page-assigned functions can be performed by a single button press. Pages can be changed either by using the PAGE button (see section 5-3 "Function Buttons") or the control knob by changing the Mode. (See section 5-4 "MODE Button and Mode Menu.")

There also are settings for the Page function in the Mode and Setting menus. Please also refer to the following sections.

● For PAGE button assignment: 5-4-3-5 "PAGE ASSIGN"
  This section describes the setting for whether to assign the PAGE button in all pages. Having PAGE buttons assigned to all pages helps you not to have to look for the PAGE button.
● For Mode menu settings: 5-4-3-4 "PAGE MODE"
  This section describes how to select pages using the control knob.

5-2-2-1. Group Page Changes

Pages can be changed per a button group. The number of available button groups differ depending on a remote control unit as shown in the table below. These groupings can be freely changed using the Web-based Control menu.

Remote Control Unit	Button group
MFR-16RU/16RUD	A to B
MFR-16RUW/32RUW	A to C
MFR-39RU/40RU/18RU/16RUTA/39RUA/18RUA	A to D
MFR-64RUW	A to E

Default button groups of control panels are determined as shown in the figures below.

MFR-39RU
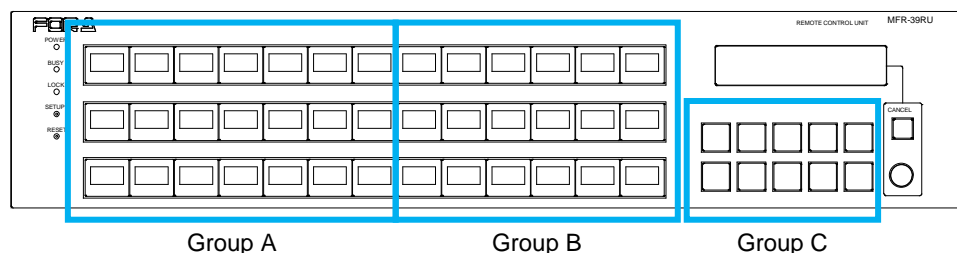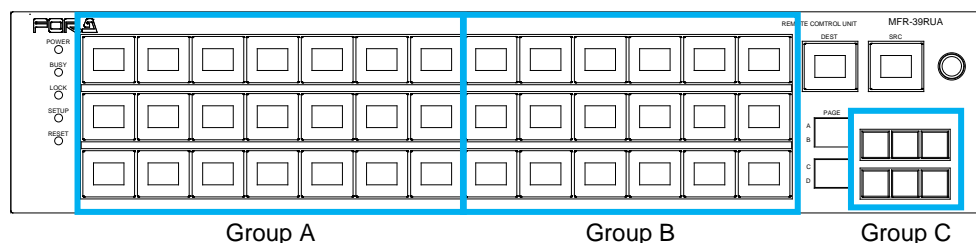
Group A   Group B   Group C

MFR-39RUA

Group A   Group B   Group C

MFR-40RU

Group A   Group B   Group C   Group D

MFR-18RU/18RUA

Group A   Group B

MFR-16RU

Group A   Group B

MFR-16RUD

Group A   Group B

MFR-16RUW

Group A   Group B   Group C

MFR-32RUW

Group A   Group B   Group C

MFR-64RUW

Group A   Group B

Group C   Group D   Group E

MFR-16RUTA

Group A

Group B
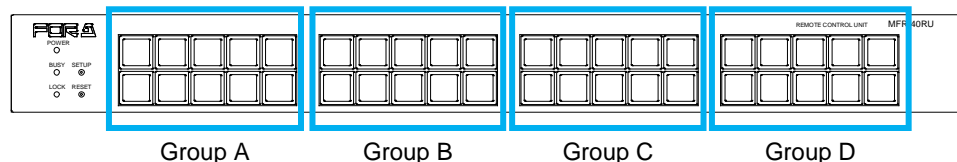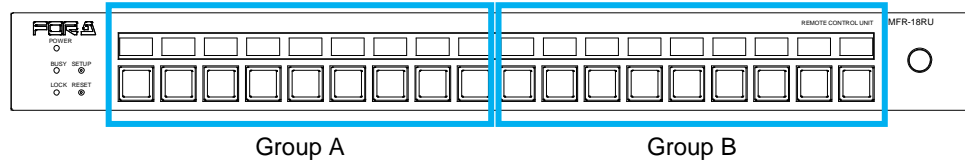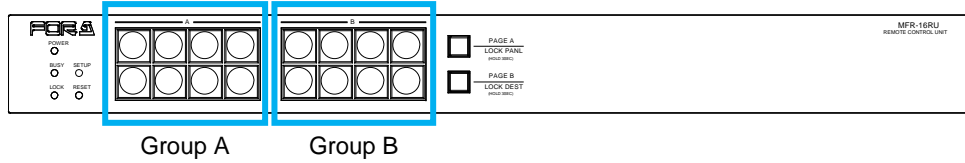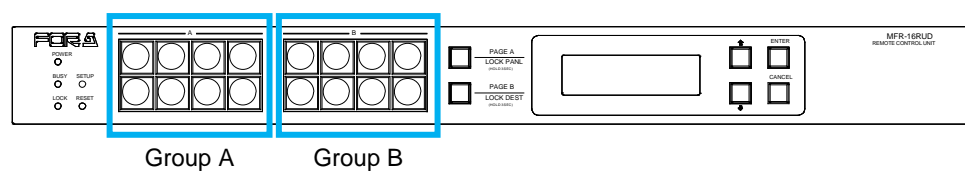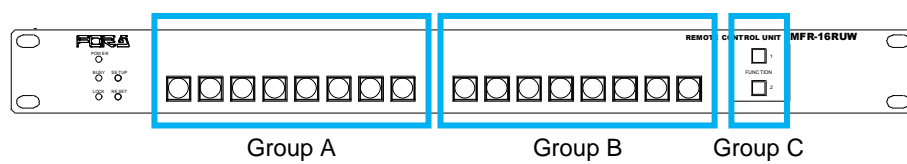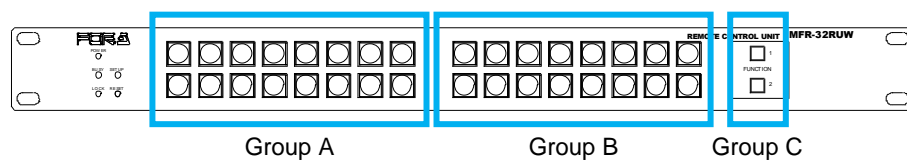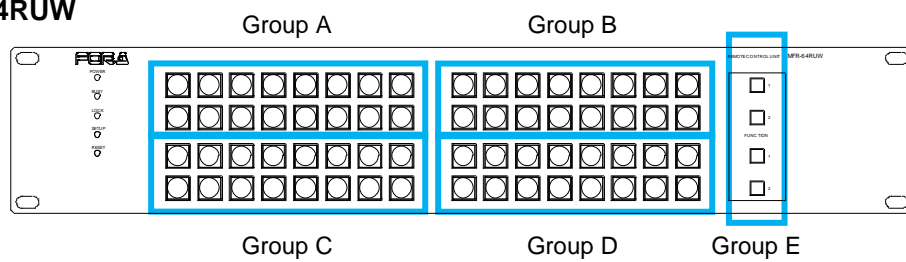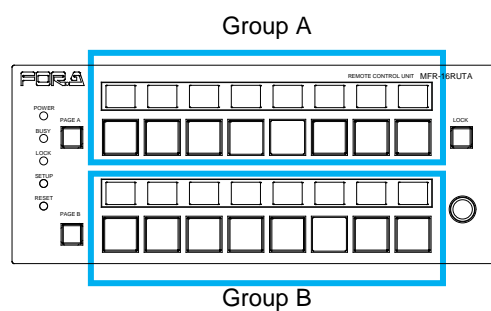
Page Limit and Maximum Page Number Setting

- The maximum number of assignable pages (page limit) is:
   32 for MFR-39RUA/18RUA/39RU /40RU /18RU / 16RUW / 32RUW / 64RUW / 16RUTA
   2 for MFR-16RU/16RUD

- The maximum number of pages, within which the page can be changed by the Mode menu or Page buttons, can be set within the page limit (excluding MFR-16RU/16RUD).

- The maximum page number setting is shared by all groups.

- Any page assignments or jumps are possible, but have no effect if they exceed the page limit. ("x" will appear instead of buttons on the MFR-39RUA/18RUA/39RU/18RU/16RUTA units.)

- The maximum page number can be set under **Page-Max number** in the [Web-based Control: **RU Settings** page]. A warning dialog box will appear when the number is reduced and sent.

- If the page limit is set to a number less than the displayed page, the displayed page will automatically change to the page number limit.

5-2-3. Control Knob

If your MFR Remote control panel has a control knob, you can select destination channels or other items using the knob.
You can also select menu items by turning and pressing the knob to confirm the selection.
Using the control knob, it is easy to select items to be displayed or to change settings by changing modes in the Mode menu. See section 5-4 "MODE Button and Mode Menu."
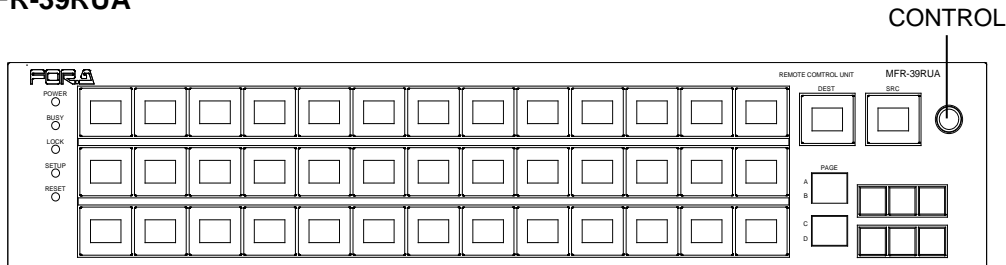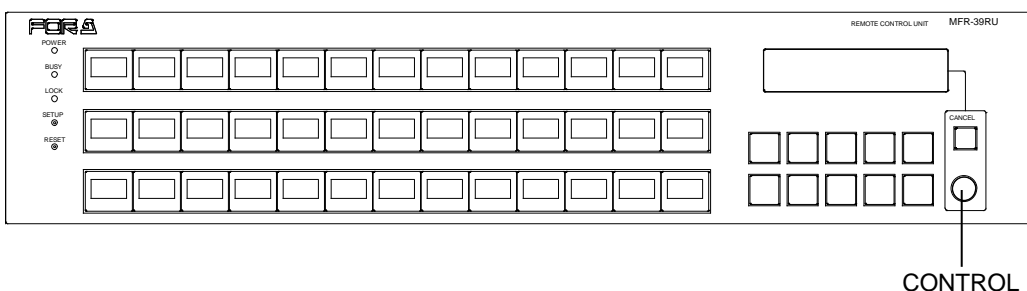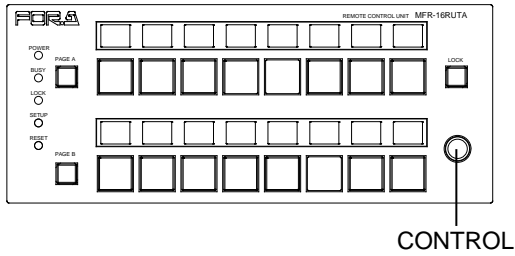
MFR-39RUA

MFR-18RU/18RUA
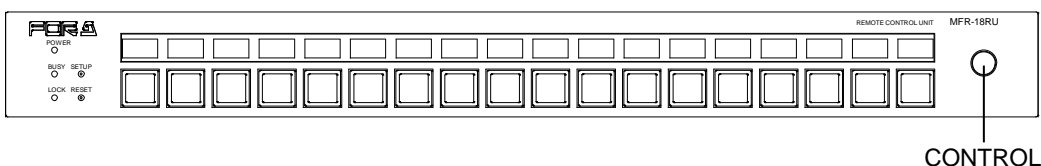
MFR-39RU

MFR-16RUTA

CONTROL

*   The Control knob can be disabled or enabled in the [Web-based Control: **RU Settings** page]

Selecting a source or non-function button on MFR-18RU/16RUTA/39RUA/18RUA units allows you to change the source channel assignment.
Selecting a destination button allows you to perform one of the following three operations set in the **RU Settings** page. (MFR-39RUA units perform **Assign** operations.)
● **Assign** (default): Allows you to change the channel assignment of the selected destination button.
● **Crosspoint**: Allows you to change the crosspoint assignment of the selected destination button.
● **Disable**: The operation is disabled.

The operation procedure is as follows:

(1) Press the desired source, destination or non-function button while holding down the control knob. The button light sequentially changes its color from red to orange, then green.

(1)
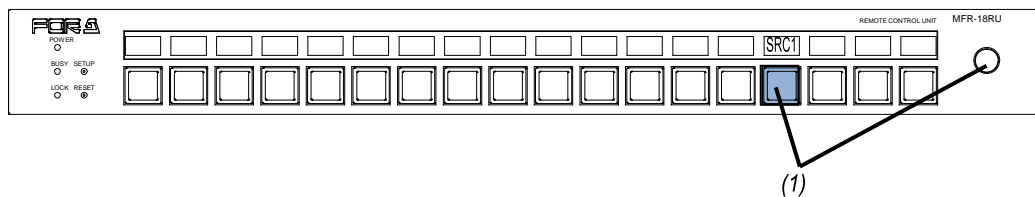
(2) Turn the control knob to select a source channel to assign to the button.

(2)
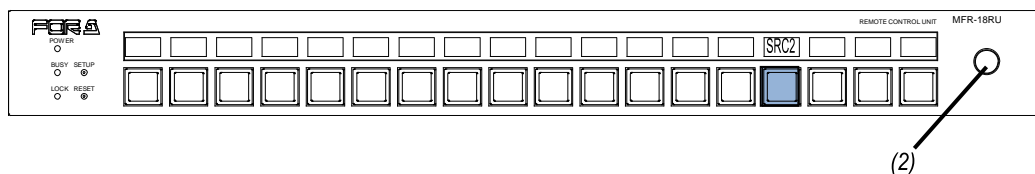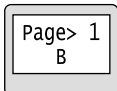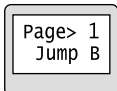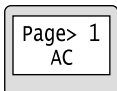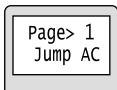
(3) Press the control knob to confirm the change. To cancel the change, press the selected source button. After confirming or canceling the change, the button light returns to the previous state.

(3)
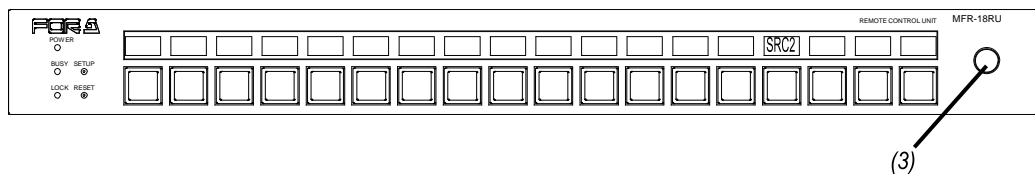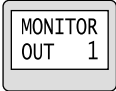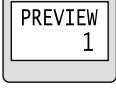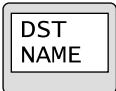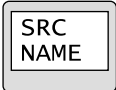
5-3. Function Buttons

Functions that are assignable to Remote control panel buttons are as shown in the below table. Normally, functions are assigned via Web-based Control ([Web-based Control: **Assign Function** page]).
MFR-39RU (see section 5-4-3-12. "BTN ASSIGN") and MFR-16RUD (see section 5-5-2. "Button Assignment Change") are enabled to assign functions.

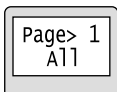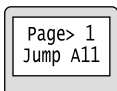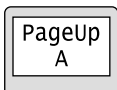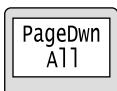| Function	Button indication	Description	Reference
None		No function is assigned.	
Destination	DST1	Allows you to change a destination to the destination specifically assigned to the button. If locked, the button lights up with a color indicating LOCK OTHER or LOCK ALL, which can be set in the [Web-based Control: **RU Settings** page]. Re-pressing the button allows you to display the Unit ID that locks the destination button.	6-1-1
Source	SRC1	Allows you to change a source to the source specifically assigned to the button.	6-1-1
Bus	SRC1 DST1	Allows you to change a source to the source specifically assigned to the button for a destination of the source-destination assignment of the button.	6-1-2
PAGE	Page> 1 B / Page> 1 Jump B / Page> 1 AC / Page> 1 Jump AC / Page> 1 All / Page> 1 Jump All / PageUp A / PageDwn All	Allows you to change pages to be displayed to a specific, next or previous page. There is a menu that allows you to select whether to return to the previously displayed page or to display the next specified page. Target group(s) is/are displayed on the bottom of the button indication. See Sec. 5-2-2. "Page Function" and Appendix: "How to use Page buttons" for details on Page button setting and operation. ∗ Button indications (from the top to the bottom) *A corresponding page name is displayed when assigning PAGE JUMP on MFR-18RUA/39RUA/ 16RUTA units. (*1) MFR-18RUA/39RUA/16RUTA only	5-2-2

∗ Button indications (from the top to the bottom)

PAGE JUMP (single)	Switches the page to 1 for Group B.
PAGE JUMP (single) (*1)	
PAGE JUMP (multi)	Switches the page to 1 for Group A and C.
PAGE JUMP (multi) (*1)	
PAGE JUMP (all)	Switches the page to 1 for all groups.
PAGE JUMP (all) (*1)	
PAGE UP (single)	Moves the page forward by 1 for Group A.
PAGE DOWN (all)	Moves the page backward by 1 for all groups.

Function	Button indication	Description	Reference
MODE	DST1 SRC1 LVL 1 Level-1 Page Grp-All MODE SETTING	* Supported for MFR-39RU/ 18RU/ 16RUTA/ 39RUA/ 18RUA. Allows you to change mode menus. Mode function can be assigned to either one or multiple buttons. One button assignment allows you to change modes one by one by every press. To assign modes to respective buttons, select modes in the BTN ASIGN menu. ∗ Button indications (from the top to the bottom) _table below_ (*1) The name set under Page Name Settings is displayed for PAGE_Grp-A/B/C/D. (MFR-39RUA/18RUA/16RUTA only)	5-4

Within MODE Description — embedded table:

Destination mode	
Source mode	
Level mode	
Page mode (*1) (PAGE_Grp-All / A / B / C / D)	* The example at left shows the PAGE_Grp-All mode
Setting mode	

Function	Button indication	Description	Reference
LOCK	LOCK (A) LOCK LOCAL (B) LOCK OTHER (C) LOCK OTH 1 (C)' LOCK ALL (D) LOCK ALL 1 (D)'	The following 4 Lock modes can be set by pressing a button for either a short or a long time (more than 3 seconds). -LOCK OTHER: Disables control from external devices. -LOCK ALL: Disables all controls. -LOCK LOCAL: Disables local control. -NONE Assignable 2-way button functions (short and long press combinations) are as shown in the table below. Assign the functions to buttons in the Web-based Control menu. _table below_ (*1) Button indications differ depending on the current or fixed destination. (*2) The button indication changes if enabling either function, for example, If a combination of LOCK OTHER (short press) and LOCK LOCAL (long press) functions are assigned to a button, long pressing the button changes the indication to LOCK LOCAL.	6-3-1 6-3-2

Within LOCK Description — embedded table:

Short press function	Long press function	Button indication
LOCK OTHER	NONE	(C) or (C)' (*1)
	LOCAL	(A) (*2)
LOCK ALL	NONE	(D) or (D)' (*1)
	LOCAL	(A) (*2)
LOCK LOCAL	NONE	(B)
	OTHER	(A) (*2)
	ALL	(A) (*2)
NONE	OTHER	(C) or (C)' (*1)
	ALL	(D) or (D)' (*1)
	LOCAL	(B)

Function	Button indication	Description	Reference
TAKE	TAKE	Allows you to enable the TAKE function for simultaneous crosspoint changes.	6-1-4
LEVEL	Level-1	Allows you to change a level to the level specifically assigned to the button.	6-6

LINK	LINK	Allows you to enable or disable the LINK function.	6-2-4
TENKEY	TENKEY	Allows you to enable numeric keypad mode on the remote control panel for assigning destinations and source by their channel numbers. * Supported only for MFR-39RU and MFR-39RUA.	6-1-1-2
SKIP	SKIP FWD SKIP BWD	Allows you to skip the set number of destination or source channels forward or backward to select one. * The control knob needs to be pressed for Source selections. ∗ Button indications Top: Channel number increases in the set step Bottom: Channel number decreases in the set step * Supported for MFR-39RU/18RU/16RUTA/ 39RUA/18RUA.	6-1-1-1
Monitor Out	MONITOR OUT 1	Allows you to enable or disable the Monitor Out function. * Supported only for MFR-5000.	6-4
Operation Preview	PREVIEW 1	Allows you to enable or disable the Operation Preview function.	6-5
SALVO	SALVO SALVO MU 1 SALVO RU 1	Allows you to assign salvos to buttons and execute a salvo assigned to the button or stored to a main or remote control panel. ∗ Button indications Top: Salvo Store – Allows you to assign salvos to buttons. Middle: Salvo Recall (MU) – Executes a main unit-stored salvo Bottom: Salvo Recall (RU) – Executes a remote control panel button-assigned salvo	6-2-1 6-2-2
Display Mode	DST NAME SRC NAME	* MFR-18RU/16RUTA/18RUA only Allows you to change button indication between Destination and Source channel names. <Button indication> Top: DST NAME Bottom: SRC NAME	

◆ **Destination Button LCD Indication**
Usually destination channel names are displayed on the LCD above the destination buttons. The MFR-18RU can also display source channel names that are selected for destinations. To display source channel names, set the menu under **Display Setting** in the [Web-based Control: **RU Settings** page]. Note that Display Mode buttons on MFR-18RU/16RUTA units can switch the button indication between destination and source names.
In the case of breakaway switching with multiple levels, the name of the level with the smallest number will be displayed.

● MFR-18RU/18RUA

LCD

● MFR-16RUTA

LCD
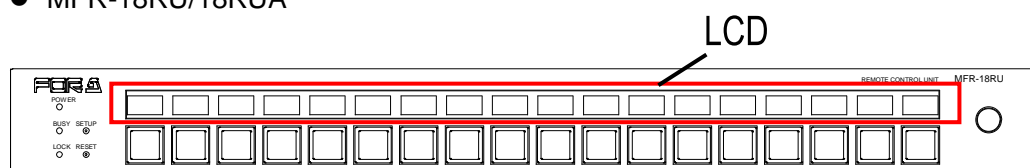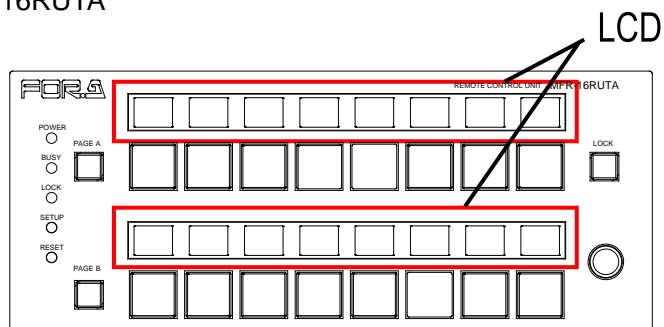
5-4. MODE Button and Mode Menu (MFR-39RU/18RU/16RUTA/39RUA/18RUA)

5-4-1. Outline

The MODE button allows you to select different setting modes. As the setting mode changes available items on the MENU and LCD displays and for the control knob change.
(Supported only for MFR-39RU/18RU/16RUTA/39RUA/18RUA.)

Modes are selectable for assignment. Assign only necessary modes to allow for easier searches.

Multiple buttons can be assigned to MODE buttons. If multiple MODE buttons are assigned, the MODE button will be highlighted (the text background illuminates) when it is pressed.

5-4-2. Mode Menu

The Mode menu has 5 mode options. In Setting mode, setting options are different in the MFR-18RU/16RUTA/39RU/39RUA and MFR-18RUA.
(The menu display and control knob setting mode are supported only for MFR-39RU.)

◆ **Destination Mode**
MENU: Displays the current destination channel [name] and its level [name].
LCD: Displays the current destination channel.
Current DEST button: Displays the current destination channel. Pressing the button shift the status display between LEVEL and LOCK.
Turning the knob: Changes the current destination channel.

```
DST :    1  [DST1          ]
LVL : 0001  [Level-1       ]
```

Menu display

DST1

Button LCD / Current DEST button (39RUA only)

◆ Source Mode
MENU: Displays the source channel [name] for the current destination.
LCD: Displays the source channel for the current destination.
Current SRC button: Displays the source channel of the current destination channel.
Turning the knob: Changes the source channel.
Pressing the control knob applies the change.
* Press TAKE instead of the control knob when applying source changes in TAKE mode.

SRC: 1 [SRC1   ]
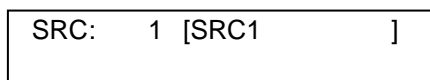
Menu display   Button LCD / Current SRC button (39RUA only)

```
SRC1
```

◆ Level Mode
MENU: Displays the current level [name] of the remote control panel.
LCD: Displays the current level and its display on the remote control panel.

LVL : 0001   [Level-1   ]

```
LVL    1
Level-1
```
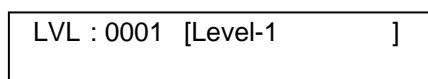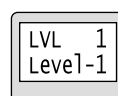
Menu display   Button LCD

◆ Page Mode
MENU: Displays the page number currently assigned to the remote control panel.
LCD: Displays the page number currently assigned to the remote control panel.
Turning the knob: Changes the page number.

PAGE (UP/DOWN) : 1

```
PAGE 1
```

Menu display   Button LCD

➤　MODE PAGE （PAGE_Grp-ALL）

PAGE JUMP	Moves the page to the specified number for all groups.
PAGE UP/DOWN	Moves the page forward or backward by the specified number for all groups.
MENU display	PAGE (UP/DOWN) Grp-A: 1 B: 1 C: 1 D: 1 PAGE (JUMP) Grp-A: 1 B: 1 C: 1 D: 1
LCD display	Page / Grp-All
Current PAGE display	PAGE A 01 B 01 C 01 D 01

➢ MODE PAGE （PAGE_Grp-A/B/C/D）

PAGE JUMP	Moves the page to the specified number for the specified group(s).
PAGE UP/DOWN	Moves the page forward or backward by the specified number for the specified group(s).

MENU display	PAGE (UP/DOWN)
	  Grp-C: 1
	
	PAGE (JUMP)
	  Grp-C: 1

LCD display	Page 1 Grp-C
Current PAGE display	PAGE A 01 B 01 C 01 D 01

◆ **Setting Mode**
➢ In MFR-39RU
Displays available menu settings that can be changed using the control knob.
Turn the control knob to select an item, then change the setting.
The items that can be changed are highlighted.
►See section 5-4-3. "Setting Mode Menu (MFR-39RU)"

SETTING>DEF MODE <ENT>

MENU display

MODE
SETTING

Button LCD

5-4-3. Setting Mode Menu (MFR-39RU)

Setting Mode menu items are as shown below.

◆ **Setting Mode menu items**

MENU indication	Description	Reference
SETTING>DEF MODE <ENT>	Allows you to change the remote control panel start-up default mode.	5-4-3-1
SETTING>DEF DEST <ENT>	Allows you to change the remote control panel start-up default destination.	5-4-3-2
SETTING>DEF LEVEL <ENT>	Allows you to change the remote control panel start-up default level.	5-4-3-3
SETTING>PAGE MODE <ENT>	Allows you to select the behavior of the control knob in Page mode.	5-4-3-4
SETTING>PAGEASSIGN <ENT>	Allows you to select a performance feature for the PAGE button assignment.	5-4-3-5
SETTING>DSTINHIBIT <ENT>	Allows you to set the inhibit function to a desired destination.	5-4-3-6
SETTING>SRCINHIBIT <ENT>	Allows you to set the inhibit function to a desired source.	5-4-3-7
SETTING>NAME TYPE <ENT>	Allows you to select a type for the destination, source and level name displays.	5-4-3-8
SETTING>TENKEY MOD <ENT>	Allows you to select how to confirm changes in numeric keypad mode.	5-4-3-9
SETTING>TENKEY NO <ENT>	Allows you to set thresholds of setting ranges in numeric keypad mode.	5-4-3-10
SETTING>SALVO CLR <ENT>	Allows you to clear the button-assigned Salvo.	5-4-3-11
SETTING>BTN ASSIGN <ENT>	Allows you to assign functions to buttons.	5-4-3-12
SETTING>EXIT <ENT>	Exits the Setting Mode menu.	

5-4-3-1. DEF MODE

This menu allows you to select a mode to be displayed on the menu display at start-up of the remote control panel.

```
SETTING>DEF MODE
  DESTINATION <ENT>
```

Turn the control knob to select a mode, then press the knob to confirm.

DESTINATION   : Destination mode
SOURCE   : Source mode
LEVEL   : Level mode
PAGE_Grp-All   : Page mode (all groups)
PAGE_Grp-A   : Page mode (Group A)
PAGE_Grp-B   : Page mode (Group B)
PAGE_Grp-C   : Page mode (Group C)
PAGE_Grp-D   : Page mode (Group D)
SETTING   : Control knob setting mode

IMPORTANT
Do not turn off the remote control panel until the BUSY indicator, which lights orange, goes off when changing modes. Doing so will disable the change.

5-4-3-2. DEF DEST

This menu allows you to select a destination to be displayed on the menu display at start-up of the remote control panel.

```
SETTING>DEF DEST
  DEF  DEST:   1<ENT>
```

Turn the control knob to select a destination, then press the knob to confirm the selection.

IMPORTANT
Do not turn off the remote control panel until the BUSY indicator, which lights orange, goes off when changing modes. Doing so will disable the change.

5-4-3-3. DEF LEVEL

This menu allows you to select a level to be displayed on the menu display at start-up of the remote control panel.

```
SETTING>DEF LEVEL
  DEF  LEVEL:0001<ENT>
```

Turn the control knob to select a level, then press the knob to confirm the selection.

IMPORTANT
Do not turn off the remote control panel until the BUSY indicator, which lights orange, goes off when changing modes. Doing so will disable the change.

5-4-3-4. PAGE MODE

This menu allows you to select the behavior for the control knob in Page mode.

```
SETTING>PAGE  MODE
  PAGE MODE :JUMP  <ENT>
```

Turn the control knob to select a behavior pattern from the below options, then press the knob to confirm the selection.
UP/DOWN: Every turn of the control knob changes the page one page forward or backward.
JUMP   : Turn the control knob to display the desired page and press the knob to confirm the display selection.

5-4-3-5. PAGE ASSIGN

This menu allows you to select whether to assign the PAGE button to the selected page or all pages by a page button assignment procedure.

```
SETTING>PAGEASSIGN
  ASIGN : ONE PAGE  <ENT>
```

Turn the control knob to select a performance feature from the below options, then press the knob to confirm the selection.
ONE PAGE: Assigns the PAGE button to the selected page.
ALL PAGE: Assigns the PAGE button to the button in all pages.

5-4-3-6. DST INHIBIT

Set INHIBIT to enabled or disabled for a destination channel.

```
SETTING>DSTINHIBIT
  DST  1 : OFF <ENT>
```

Turn the control knob to select a destination channel, then press the knob to confirm the selection.

```
SETTING> DSTINHIBIT
  DST  1 : ON <ENT>
```

Turn the control knob to select ON or OFF, then press the knob to confirm the selection.
ON disables the output selection of the selected destination channel.
OFF cancels the Inhibit setting.

The indication of buttons assigned to the inhibited destination will be crossed.

5-4-3-7. SRCINHIBIT

Set INHIBIT to enabled or disabled for a source channel.

```
SETTING>SRCINHIBIT
  SRC  1 : OFF <ENT>
```

Turn the control knob to select a source channel, then press the knob to confirm the selection.

```
SETTING>SRCINHIBIT
  SRC  1 : ON <ENT>
```

Turn the control knob to select ON or OFF, then press the knob to confirm the selection.
ON disables the output selection of the selected source channel.
OFF cancels the Inhibit setting.

The indication of buttons assigned to the inhibited source channel will be crossed.

5-4-3-8. NAME TYPE

This menu allows you to select a name display type for the destination, source and level.

```
SETTING>NAME TYPE
 DST BTN :PHY NUM <ENT>
```

Turn the control knob to select a button group from the destination, source and level buttons. Press the control knob to confirm the selection.

```
SETTING>NAME TYPE
 DST BTN :PHY NUM <ENT>
```

Turn the control knob to select a display type, then press the knob to confirm the selection.

Display type	Description	Example indication		
		DST	SRC	LEVEL
PHY NUM	Physical number display	OUT1	IN1	LV0001
ASCII	Ascii character display (Alphanumeric characters and symbols)	MV_IN1	VTR1	Level-1
KANJI	2-byte character code including 1-byte character code (Not selectable for LEVEL)	出力1	素材1	

* When using 2-byte characters:
  Up to 8 characters (including one-byte characters) on MFR-39RUA/18RUA/16RUTA units
  Up to 4 characters (including one-byte characters) on MFR-39RU/18RU units.
* Up 14 characters when using only one-byte characters.

5-4-3-9. TENKEY MOD

This menu allows you to change the method to confirm changes in numeric keypad mode.

```
SETTING>TENKEY MOD
 INPUT MODE:ENTER <ENT>
```

Turn the control knob to select a method from the below options, then press the knob to confirm the selection.
ENTER : Enter a value and press the ENTER button on the displayed numeric keypad on the remote control panel.
DIRECT: Enter a value using the numeric keypad. The value is confirmed.

5-4-3-10. TENKEY NO

This menu allows you to select the start point of each setting between 0 and 1 in numeric keypad mode.

```
SETTING>TENKEY NO
 INPUT START NO:0<ENT>
```

Turn the control knob to select 0 or 1, then press the knob to confirm the selection.

5-4-3-11. SALVO CLR

This menu allows you to clear a specific salvo assigned to a button.

```
SALVO DELETE
 NO:      1<ENT>
```

Turn the control knob to select a salvo to clear, then press the knob to confirm the selection.
If any salvo is assigned, the menu display appears as shown below.

```
SALVO DELETE
  (NO SALVO DATA)
```

5-4-3-12. BTN ASSIGN

This menu allows you to assign button functions.
►See section 5-3 "Function Buttons" for the assignable functions.

```
SETTING>BTN ASSIGN
 BTN NO: 1<ENT>
```

Select a button to change the button assignment by turning and pressing the control knob, or by pressing the desired button.

```
SETTING>BTN ASSIGN
   PAGE: 1<ENT>
```

Select a page to change the button assignment by turning the control knob, then press the knob to confirm the selection.

```
SETTING>BTN ASSIGN
   FUNC:DEST    <ENT>
```

Turn the control knob to select a function, then press the knob to confirm the selection. Set details for the function if necessary.

```
SETTING>BTN ASSIGN
   EXEC:NO <ENT>
```

The menu display asks you to confirm the assignment change as shown above when necessary settings are complete. To apply the change to the system, turn and press the control knob to select Yes. Selecting No cancels the change and returns to the menu display to select buttons.

◆ Setting Function Parameters

Function	Parameter		Note
(NONE)			
DEST	DEST:XXX	(XXX: Destination channel number)	
	LEVEL:XXXX	(XXXX: Level)	
SRC	SRC:XXXX	(XXXX: Source channel number)	
	LEVEL:XXXX	(XXXX: Level)	
BUS	DEST:XXX	(XXX: Destination channel number)	
	SRC:XXXX	(XXXX: Source channel number)	
	LEVEL:XXXX	(XXXX: Level)	
PAGE	MODE:JUMP	(JUMP: Jump to a specified page /UP : Go forward a page /DOWN: Go back a page)	
	PAGE:XX	(XX: Page number)	* Effective for JUMP
	RETPAGE:XX	(PREV PAGE: Return to the previous page /XX: Jump to the next specified page)	* Effective for JUMP
	GROUP-A:ON	(ON / OFF)	
	GROUP-B:ON	(ON / OFF)	
	GROUP-C:ON	(ON / OFF)	
	GROUP-D:ON	(ON / OFF)	
MODE	DESTINATION:ON	(ON / OFF)	
	SOURCE :ON	(ON / OFF)	
	LEVEL :ON	(ON / OFF)	
	PAGE_Grp-All:ON	(ON / OFF)	
	PAGE_Grp-A :ON	(ON / OFF)	
	PAGE_Grp-B :ON	(ON / OFF)	
	PAGE_Grp-C :ON	(ON / OFF)	
	PAGE_Grp-D :ON	(ON / OFF)	
	SETTING :ON	(ON / OFF)	
LOCK	LOCK[S]:OTHER	(NONE / OTHER / ALL / LOCAL) LOCK function by short press	
	DEST:XX	(CURRENT: Locks the current destination. / XX: Destination Channel number to be locked)	* Effective for OTHER and ALL
	LOCK[L]:NONE	(NONE / OTHER / ALL / LOCAL) LOCK function by long press	
	DEST:XX	(CURRENT: Locks the current destination. / XX: Destination Channel number to be locked)	* Effective for OTHER and ALL
TAKE			
LEVEL	LEVEL:XXXX	(XXXX: Level)	
LINK			
TENKEY			
SKIP	MODE:FWD	(FWD: Forward / BWD: Backward)	
	COUNT:XXX	(XXX: number of channels to skip)	
MON-OUT	OUT :X	(X:MONITOR OUT)	* MFR-5000/ 8000 only
O-PREVIEW	DEST:XXX	(XXX: Destination channel number)	
SALVO	MODE:MU RECALL	(MU RECALL: Execute the main unit-assigned SALVO /RU RECALL: Execute the button-assigned SALVO /RU STORE: Assign a SALVO to a button)	
	NO:XXXX	(XXXX: Salvo number)	* Effective for MU RECALL, and RU RECALL

5-4-4. Setting Mode Menu (MFR-39RUA)

The current SRC button functions as an **EXIT/CANCEL** button used for exiting mode or processes during Setting mode.

Use the following procedures to change settings.
● Press a button to turn On/Off.
● Use the control knob to change values.
   (1) Press to select a desired menu item.
   (2) Turn the control knob to change its value.
   (3) Press the control knob to confirm the setting.

After menu setting, do not turn off the remote control unit until the BUSY indicator changes from lit orange to unlit. Otherwise, settings may not be applied.
* To enter Setting mode, press the SETUP button. The BUSY indicator lights orange during Setting mode. To exit Setting mode, press the **EXIT/CANCEL** button. Before powering off the remote control unit, verify that the BUSY indicator is turned off.

Setting Mode menu items are as shown below.

MENU indication	Description	Reference
NETWORK	Allows you to change the IP address of the remote control unit and display the PC-LAN network information.	5-4-4-1
VER/ALARM	Allows you to display the version and alarm information.	5-4-4-2
DEFAULT	Allows you to change the default settings that are loaded when the remote control unit is powered on.	5-4-4-3
BUTTON ASSIGN	Allows you to assign functions to user-assignable buttons.	5-4-4-4
INHIBIT	Allows you to enable/disable the INHIBIT function for a channel.	5-4-4-5
NAME TYPE	Allows you to select the display type for Destination, Source and Level.	5-4-4-6
BRIGHTNESS	Allows you to set the brightness of buttons.	5-4-4-7
RU-RU CONNECT	Allows you to configure a link system of multiple remote control units.	5-4-4-8
TENKEY	Allows you to set TENKEY (numeric keypad) operation.	5-4-4-9
PAGE	Allows you to change PAGE settings.	5-4-4-10
SALVO CLEAR	Allows you to clear salvo data stored in buttons.	5-4-4-11

5-4-4-1. NETWORK

The following submenus are available in NETWORK setting mode.

Submenu	Description
RU NETWORK	Allows you to change the IP address of the remote control unit and display the network information.
PC-LAN NETWORK	Displays the network settings of the PC-LAN port.
PC-LAN REBOOT	Restarts the PC-LAN port.

NETWORK > RU NETWORK

Menu item	Description
IP	Displays and changes the IP address of the remote control unit. The lower 8 bits (the fourth byte) represent the Unit ID.
MASK	Displays the subnet mask of the remote control unit.
UNIT NAME	Displays the unit name of the remote control unit.

To Change IP Address:
(1) Hold down the button where the number to be changed is displayed. The button will blink.
(2) Turn the control knob to change the number.
(3) Repeat (1) and (2) to change the IP address.
(4) Hold down the current DEST button to confirm the change. The remote control unit will automatically restart.

NETWORK > PC-LAN NETWORK

Menu item	Description
IP	Displays the PC-LAN IP address.
MASK	Displays the PC-LAN subnet mask.
GW	Displays the PC-LAN Default Gateway IP address.

NETWORK > PC-LAN REBOOT
To restart the PC-LAN port:
(1) Press REBOOT.
(2) Hold down **EXEC HOLD 1s** to restart the PC-LAN port while showing "STARTUP" or "NOW".

5-4-4-2. VER/ALARM

◆ **Menu List**

Menu item	Description
VERSION	Displays the firmware version.
PS1	Displays the AC adapter 1 status.
PS2	Displays the AC adapter 2 status.
TEMPERATURE	Displays the temperature.
VOLTAGE	Displays the voltage status.

5-4-4-3. DEFAULT

◆ **Menu List**

Menu item	Description	Set by
MODE	Allows you to select a mode when the remote control unit is powered on. DEST: Destination mode SRC: Source mode LEVEL: Level mode PAGE ALL: Page mode (all groups) PAGE GROUP A: Page mode (Group A) PAGE GROUP B: Page mode (Group B) PAGE GROUP C: Page mode (Group C) PAGE GROUP D: Page mode (Group D) SETTING: Setting mode	Pressing a button
DEST	Allows you to select a destination channel when the remote control unit is powered on.	CONTROL
LEVEL	Allows you to select a level when the remote control unit is powered on.	Pressing a button

5-4-4-4. BUTTON ASSIGN

This menu displays the assignment list for PAGE 1.

To Assign Functions to Buttons:
(1) Turn the control knob to select a page.
(2) Press a button for assignment. The button will blink and its information will be displayed.
(3) Turn the control knob to select a function to the button.
(4) Use the control knob to set the corresponding parameter(s). Once the settings are complete, the current DEST button blinks and "SAVE" is displayed on the button.
(5) Press the current DEST button to confirm the settings.
To perform another assignment, proceed from Step (1).

FUNC Menu List

FUNC	Parameter	Description	Remarks
NONE			
DEST	DESTINATION	Destination channel	
	LEVEL	Level (Available level number are displayed.)	
SRC	SOURCE	Source channel	
	LEVEL	Level (Available level number are displayed.)	
BUS	DESTINATION	channel	
	SOURCE	Source channel	
	LEVEL	Level (Available level number are displayed.)	
PAGE	TYPE	JUMP: Moves to the set page. UP: One page forward DOWN: One page back	
	FORWARD	Page to jump	When TYPE is set to JUMP:
	REVERSE	Page to return HOME: Back to the origin page	
	GROUP	Page group selection	
MODE	TARGET	Mode selection when using the Mode button	
LOCK	TYPE[S]	Lock mode selection for the short-press of the LOCK button.	
	DESTINATION[S]	Destination channel setting for the short-press of destination buttons. CURRENT: Locks the current destination	When ALL or OTHER is set for TYPE[S]:
	TYPE[L]	Lock mode selection for the long-press of the LOCK button.	
	DESTINATION[L]	Destination channel setting for the long-press of destination buttons. CURRENT: Locks the current destination	When ALL or OTHER is set for TYPE[S]:
TAKE			
LEVEL		Level (Available level number are displayed.)	
LINK			
TENKEY			
SKIP	BWD/FWD	Mode selection	
	COUNT	Number to be skipped	

MON-OUT	NO.	Number of monitor output	MFR-5000/8000 only
O-PREV	DESTINATION	Destination channel	
SALVO	TYPE	MU: Execution of an MU salvo. RU: Execution of an RU button salvo STORE: Registration of an MU salvo	
	NO.	Salvo number	When TYPE is set to MU or RU:

5-4-4-5. INHIBIT

The following submenus are available in INHIBIT Setting mode.

Submenu	Description
DEST	Allows you to set INHIBIT to enabled / disabled for a destination channel. Symbol "X" appears on channels when INHIBIT is enabled.
SRC	Allows you to set INHIBIT to enabled / disabled for a source channel. Symbol "X" appears on channels when INHIBIT is enabled.

INHIBIT > DEST
Displays the destination channel list. Press a channel to enable/disable the INHIBIT function.

INHIBIT > SRC
Displays the source channel list. Press a channel to enable/disable the INHIBIT function.

5-4-4-6. NAME TYPE

Menu List

Menu Item	Description	Set by
DEST	Allows you to select the display format for a destination button.	Pressing a button
SRC	Allows you to select a display format for a source button.	Pressing a button
LEVEL	Allows you to select the display format for a level button.	Pressing a button

Available formats are as shown in the table below.

Display format	Description	Display example		
		DST	SRC	LEVEL
PHY NUM	Physical number display	OUT1	IN1	LV0001
ASCII	Ascii character display (Alphanumeric characters and symbols)	MV_IN1	VTR1	Level-1
KANJI	2-byte character code including 1-byte character code (Not selectable for LEVEL)	出力1	素材1	

*   When using 2-byte characters:
   Up to 8 characters (including one-byte characters) on MFR-39RUA/18RUA/16RUTA units
   Up to 4 characters (including one-byte characters) on MFR-39RU/18RU units
*   Up 14 characters when using only one-byte characters

5-4-4-7. BRIGHTNESS

Menu List

Menu item	Description	Set by
BUTTON	Allows you to select a button.	Pressing a button
LOW LIGHT	Allows you to select between NORMAL and LOWLIGHT for dim lighting.	Pressing a button

5-4-4-8. RU-RU CONNECT

Menu List

Menu item	Description	Set by
CONNECT	Allows you to enable /disable the link of remote control units.	Pressing a button
MASTER ID	Allows you to select a link ID.	CONTROL

5-4-4-9. TENKEY

Menu List

Menu item	Description	Set by
INPUT MODE	Allows you to select the confirmation method when using the numeric keypad. DIRECT: Confirms setting by just pressing a numeric key. ENTER: Confirms setting by pressing a numeric key then pressing ENTER.	Pressing a button
START	This menu allows you to select the start point of each setting between 0 and 1 in numeric keypad mode.	Pressing a button

5-4-4-10. PAGE

Menu List

Menu item	Description	Set by
MODE	Allows you to select the control knob behavior in Page mode. UP/DOWN: Turns the control knob to move one page forward/back. JUMP: Turns the control knob to select a page then presses the control knob to move to the page.	Pressing a button
ASSIGN	Allows you to select ONE PAGE or ALL PAGE for PAGE button assignments.	Pressing a button
DISPLAY	Allows you to select whether to display unit names for Current PAGE display (C/D). PAGE C&D: Current PAGE display for Group C and D. UNIT NAME: Displays unit names.	Pressing a button

5-4-4-11. SALVO CLEAR

This menu displays the button-assigned salvo list and allows you to clear salvos.

To Clear a Button-assigned Salvo:
(1) Press a salvo button. The button will blink and "CLEAR" is displayed on the button.
(2) Press the current DEST button.

5-5. Operation Using the Menu Display (MFR-16RUD)

The MFR-16RUD, a remote control unit with a display, allows you to select destination channels and switch crosspoints using the menu display.
Function button assignments are also possible.

◆ **Default Display**
  The name of Current Destination Channel is displayed on the first line.
  The name of Source Channel selected for Current Destination is displayed on the second line.
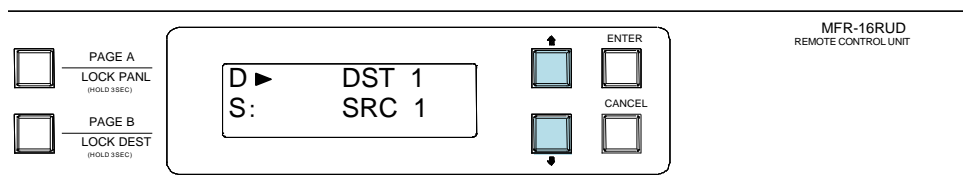
5-5-1. Crosspoint Switching

To switch crosspoints on the MFR-16RUD, proceed as follows:

(1) Press the UP or DOWN button to change Current Destination to the desired number. (DST 5 in this example)
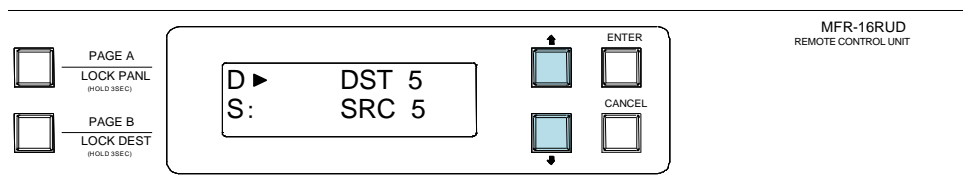
(2) Press ENTER.
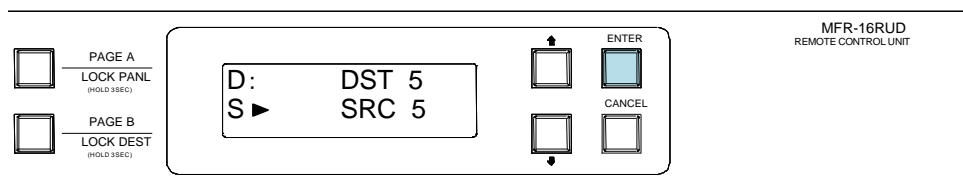
The cursor automatically moves to the second line (Source side). Press UP or DOWN to select a source channel.
Note that source names blink during the selection.
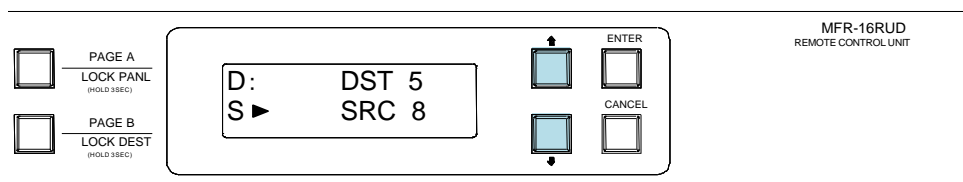
(3) Press ENTER to perform the crosspoint switch. The screen will return to the default display.
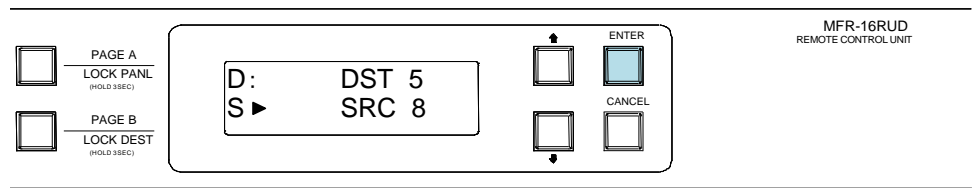
5-5-2. Button Assignment Change

To change button assignments, proceed as follows:

(1) Press a button while holding down ENTER. The button will blink.
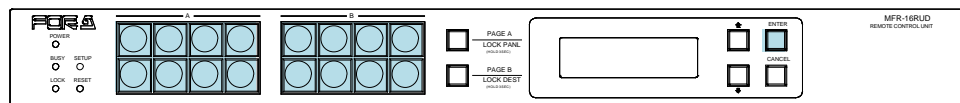
The first line will display the function and its parameter currently assigned to the button and the second line will display its detailed information.
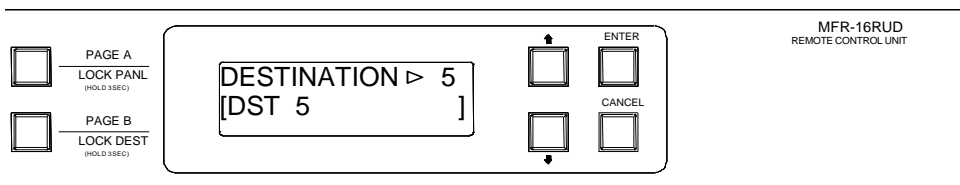
(2) Press UP or DOWN to select a function to be assigned. Press ENTER to apply the change.
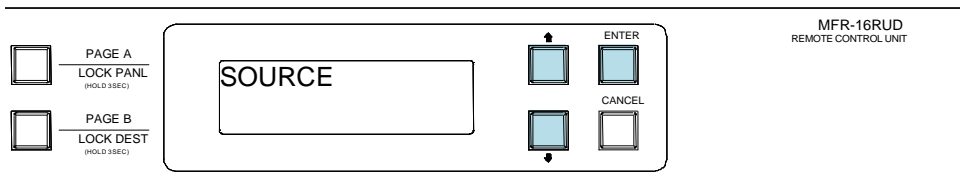
(3) The display changes to the parameter selection according to the selected function.
Press UP or DOWN to select the parameter value. Press ENTER to confirm the selection. The cursor will move to the next parameter if there are two or more parameters. Set the value and press ENTER in the same way.
Note that parameters blink during the selection.
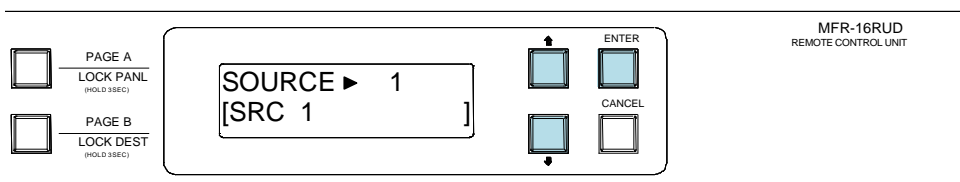
When all settings are finished, the screen automatically returns to its default display.

◆ Assignable Function/Parameter List

Function	Parameter	Description
(NONE)	None	
DESTINATION	DESTINATION ► XXX (XXX: Destination Channel number)	
SOURCE	SOURCE ► YYYY (YYYY: Source Channel number)	
BUS	BUS D ► XXX S ▷ YYYY (XXX: Destination Channel number YYYY: Source Channel number)	

LOCK	LOCKS ► XXX ▷ YYY (Lock function by short press)
	LOCKL ► XXX ▷ YYY (Lock function by long press)
	
	(XXX: OTH LOCK OTHER
	           /ALL LOCK ALL
	           /LOC LOCK LOCAL
	           /NON No lock
	YYY: CUR Current Destination
	           /Destination Channel number)
	YYY is effective only when XXX is set to OTHER or ALL.	

TAKE	None	
LINK	None	
MON-OUT	MON-OUT ► X (X: MONITOR OUT number)	* MFR-5000 only
PREVIEW	PREVIEW ► XXX (XXX: Destination Channel number)	
SALVO	SALVO ► XX ▷ YYYY (XX : MU Main Unit Stored Salvo /RU Remote Control Panel Button Assigned Salvo YYYY: Salvo number)	

5-6. Setup Menu (MFR-39RU)

The SETUP button enables you to use the setup menu. The Setup menu has the following sub menus. To select a submenu, turn the control knob to select and press to confirm.

◆ **Setup Menu Sub-menu List**

Menu display	Description	Reference
SETUP>IP ADDRESS[RU] <ENT>	Allows you to set the IP address for the remote control panel. The last 8bits will be the unit ID.	5-6-1
SETUP>SUBNET MASK[RU] <ENT>	Displays the subnet mask setting in the Remote Control Unit.	5-6-2
SETUP>PC-LAN[MU]<ENT>	Displays the PC-LAN[MU] menu.	5-6-3
SETUP>RU CONN ID <ENT>	Allows you to set the ID to recognize remote control panels connected to be used in conjunction.	5-6-4
SETUP>RU CONNECT <ENT>	Allows you to select whether to connect and use multiple remote control panels.	5-6-5
SETUP>BRIGHTNESS <ENT>	Allows you to set the brightness for buttons and the menu display.	5-6-6
SETUP>BTN ASSIGN <ENT>	Allows you to assign functions to buttons. Assignments the same as in the Setting mode menu can be performed.	5-6-7
SETUP>VER/ALARM <ENT>	Displays version and alarm information.	5-6-8
SETUP>REBOOT <ENT>	Allows you to reboot the unit.	5-6-9
SETUP>EXIT <ENT>	Allows you to exit the Setup menu. The menu returns to display the menu before entering the SETUP menu. (The CANCEL button works the same.)	

5-6-1. IP ADDRESS[RU]

This menu allows you to change the IP address of remote control panels. The last 8 bits (the 4th byte) will be the unit ID.

> SETUP>IP ADDRESS[RU]
> 192.168.001.100<ENT>

Turn the control knob to select a byte to be changed. The selected byte will be highlighted. After changing the value, press the knob. The next byte to be changed will be highlighted.

> SETUP>IP ADDRESS
> 192.168.001.100<ENT>

Pressing the control knob while the 4th byte is highlighted will highlight the whole IP address, and the changed IP address will be saved. Press the control knob again. The remote control panel will restart, or a message appears to ask to restart the remote control panel. Select YES and press the control knob to restart the remote control panel with the new IP address.

IMPORTANT
The saved IP address is applied when the remote control panel restarts. Selecting NO will necessitate a manual restart of the remote control panel to apply the new IP address. The IP address must not be identical to the IP address of the MFR main unit or other remote control panels.

5-6-2. SUBNET MASK[RU]

Displays the subnet mask setting in the Remote Control Unit.

> SETUP>SUBNET MASK[RU]
> 255.255.255.000

5-6-3. PC-LAN[MU]

The PC-LAN[MU] menu allows you to display the network settings for the PC-LAN port on the MU and restart the port.

```
SETUP>PC-LAN[MU]>
          NET          <ENT>
```

Selecting NET allows you to display the network port settings.
Turning the control knob allows you to scroll through all network settings.

```
PC-LAN[MU]>IP ADDRESS
192.168.001.012        <ENT>
```

```
PC-LAN[MU]>SUBNET MASK
255.255.255.000        <ENT>
```

```
PC-LAN[MU]>GATEWAY
000.000.000.000        <ENT>
```

Selecting GUI REBOOT allows you to restart the network port.

```
SETUP>PC-LAN[MU]
          GUI REBOOT<ENT>
```

```
PC-LAN[MU]>GUI REBOOT
 EXEC: NO <ENT>
```

To restart the port, turn the control knob to select **YES**, then press the control knob.
To cancel the process, turn the control knob to select **NO**. The display will return to the initial SETUP menu page.

The following message will appear while the port is being restarted.

```
PC-LAN[MU]>GUI REBOOT
Startup…
```

5-6-4. RU CONN ID

This menu allows you to set the ID for remote control panel IDs to be recognized in the integrated use of multiple remote control panels.

```
SETUP>RU CONN ID
 UNIT ID: 0<ENT>
```

Turn the control knob to select an ID, then press the knob to confirm the selection. See section 5-11-2 "Enabling Multi-Panel Operation"

IMPORTANT
Do not turn the power of the remote control panel off before the orange BUSY lamp goes off when changing ID. Doing so will obstruct the settings to be applied.

5-6-5. RU CONNECT

This menu allows you to enable or disable integrated operation of connected multiple remote control panels.

```
SETUP>RU CONNECT
 ENABLE:OFF<ENT>
```

Turn the control knob to select ON or OFF, then press the knob to confirm the selection.

IMPORTANT
Do not turn the power of the remote control panel off before the orange BUSY lamp goes off when changing ID. Doing so will obstruct the settings to be applied.

5-6-6. BRIGHTNESS

This menu allows you to set the brightness for the button LCDs and menu display.

```
SETUP>BRIGHTNESS
 BTN:8  MENU:8<ENT>
```

Turn the control knob to select the brightness. Press the control knob to change the BTN and MENU selection. Pressing the control when MENU is selected confirms the changes. After settings are complete, press the CANCEL button to exit the menu.

Brightness: (dark) 1 to 8 (bright)

5-6-7. BTN ASSIGN

This menu allows you to assign functions to buttons. The functions that are the same as those assignable in the Setting mode BTN ASSIGN menu can be assigned.
► See section 5-4-3-12 "BTN ASSIGN" for the setting procedure.

```
SETUP>BTN ASSIGN
 BTN NO: 1<ENT>
```

5-6-8. VER/ALARM

This menu displays the version and alarm information. Turn the control knob to scroll the page.

```
Ver.0.05.1
PS1: Normal
```

5-6-9. REBOOT

This menu allows you to execute a restart of the remote control panel.

```
SETUP>REBOOT
 EXEC:NO <ENT>
```

Turn the control knob to select YES or NO, then press the knob to confirm the selection. Selecting YES will restart the remote control panel. Pressing NO will return you to the menu display to select menus.

5-7. Setup Menu (MFR-39RUA)

The **SETUP** button allows you to enter **Setup Menu** mode, in which menu settings can be performed as shown in Sec 5-4-4. "Setting Mode Menu (MFR-39RUA)."

5-8. Setup Menu (MFR-18RU/18RUA)

The **SETUP** button allows you to enter **Setup Menu** mode, in which RU and MU PC-LAN network settings are displayed, the MU-PC LAN port can be rebooted, and RU network settings can be changed. The left three buttons are used to select information to be displayed or the PC-LAN reboot. To exit Setup Menu mode, press the **SETUP** button again.

Selection buttons (See the figures below)	LAN Port	Display / Execution
Button A	Remote Control Unit (RU)	IP address display and change
		Subnet mask display
Button B	PC-LAN on Main Unit (MU)	IP address display
		Subnet mask display
		Default gateway display
Button C	PC-LAN on Main Unit (MU)	Reboot

5-8-1. Displaying Network Settings

◆ To Display RU IP Address and Subnet Mask
Press **SETUP** to enter Setup Menu mode. The RU IP address and subnet mask are displayed as shown below. (If Button A is off (unlit), press Button **A**.)
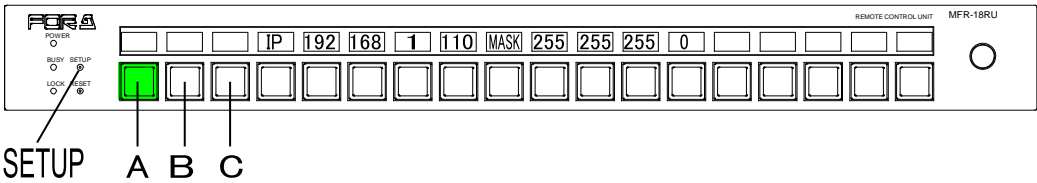
◆ To Display IP address, Subnet Mask and Default Gateway of MU PC-LAN
Press Button **B** in Setup Menu mode. The network settings are displayed as shown below, in order, as "IP address, Subnet Mask and Default Gateway."
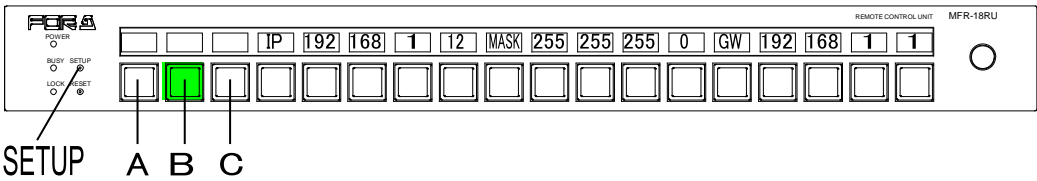
5-8-2. Changing the RU Network Settings

(1) Press **SETUP** to enter Setup Menu mode. The RU IP address and subnet mask are displayed as shown below. (If Button A is off (unlit), press Button **A**.)

(2) Press and hold down a button below the number for change. The number will blink.
(3) Turn the control knob to change the number value. To clear the number setting, press and hold down the button.
(4) Repeat steps (2) and (3) to change the IP address.
(5) When a number is changed, the **SAVE** button will blink. Press and hold down **SAVE** to confirm the change. The Remote Control Unit will automatically restart.
   To cancel the process, display another information without pressing **SAVE**.
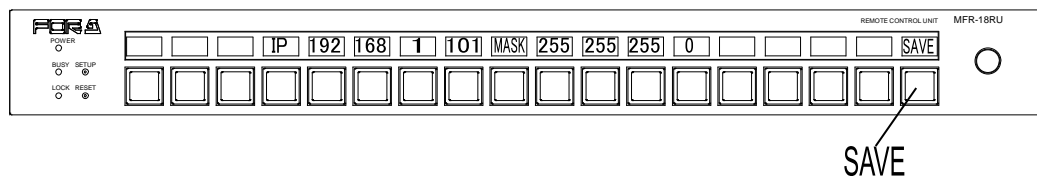
5-8-3. Rebooting MU PC-LAN

(1) Press Button **C** in Setup Menu mode.
(2) Press and hold down the **REBOOT** button shown below. The **EXEC** button will appear.
(3) Press and hold down **EXEC**. The "PC-LAN Startup" message is displayed during rebooting. The message will disappear when the reboot is complete.
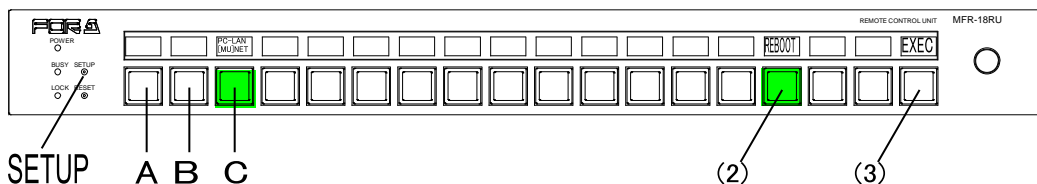
5-9. Setup Menu (MFR-16RUTA)

The **SETUP** button allows you to enter **Setup Menu** mode, in which RU and MU PC-LAN network settings are displayed, the MU PC-LAN port can be rebooted, and RU network settings can be changed. The left three buttons are used to select information to be displayed or the PC-LAN reboot. The fourth button from the left is used to switch network information display. To exit Setup Menu mode, press the **SETUP** button again.

Selection buttons (See the figures below)	LAN Port	Display / Execution
Button A	Remote Control Unit (RU)	IP address display and change
		Subnet mask display
Button B	PC-LAN on Main Unit (MU)	IP address display
		Subnet mask display
		Default gateway display
Button C	PC-LAN on Main Unit (MU)	Reboot
Button D	If Button A or B is selected	Display item change

5-9-1. Displaying Network Settings

◆ To Display RU IP Address and Subnet Mask
Press **SETUP** to enter Setup Menu mode. (If Button **A** is off (unlit), press Button **A**.)
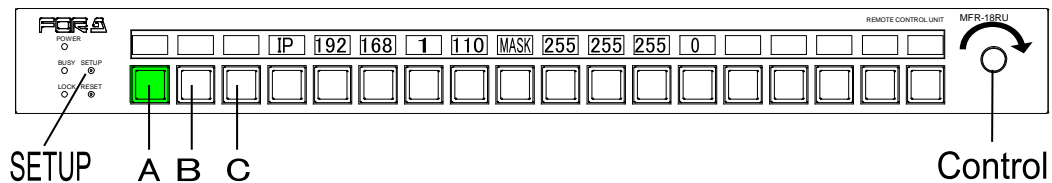Pressing Button **D** displays the RU IP address and repressing it displays the subnet mask.
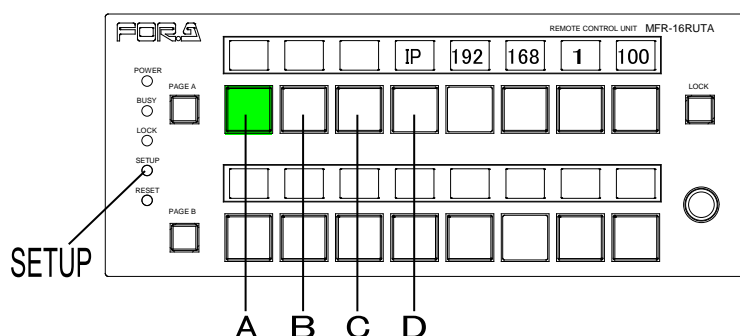
◆ To Display IP address, Subnet Mask and Default Gateway of MU PC-LAN
Press Button **B** in Setup Menu mode. The IP address, subnet mask and default gateway are successively displayed by pressing Button **D**.
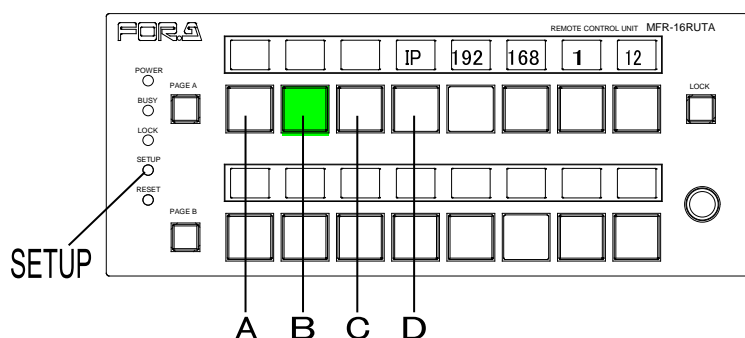
5-9-2. Changing the RU Network Settings

(1) Press **SETUP** to enter Setup Menu mode. (Press Button **A** if other information is displayed.)
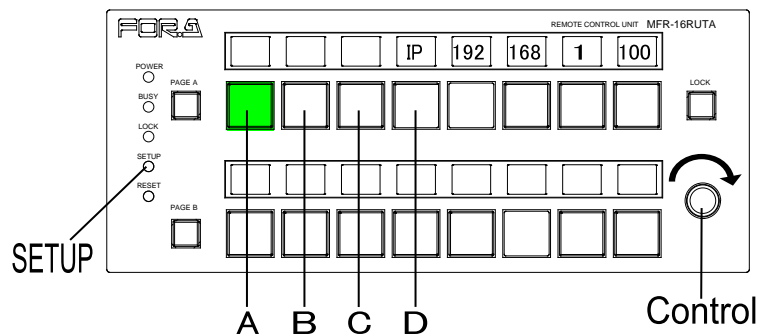
(2) Press and hold down a button below the number for change. The number will blink.
(3) Turn the control knob to change the number value. To clear the number setting, press and hold down the button.
(4) Repeat steps (2) and (3) to change the IP address.
(5) When a number is changed, the **SAVE** button will blink. Press and hold down **SAVE** to confirm the change. The Remote Control Unit will automatically restart.
   To cancel the process, display another information without pressing **SAVE**.
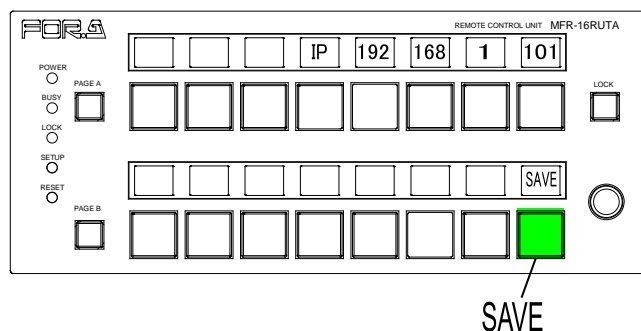
5-9-3. Rebooting MU PC-LAN

(1) Press Button **C** in Setup Menu mode.
(2) Press and hold down the **REBOOT** button shown below. The **EXEC** button will appear.
(3) Press and hold down **EXEC**. The "PC-LAN Startup" message is displayed during rebooting. The message will disappear when the reboot is complete.
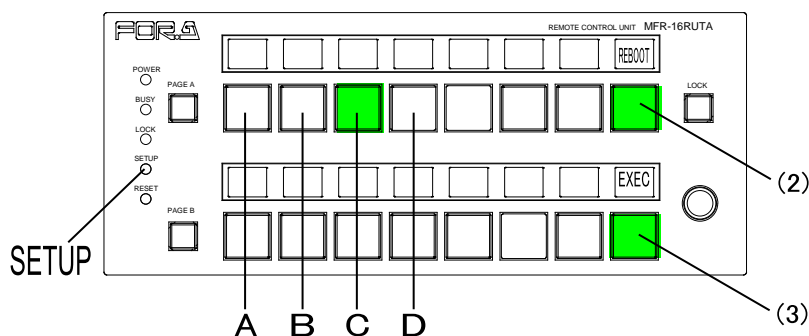
5-10. Setup Menu (Other Remote Control Units)

The **SETUP** button changes the RU to **Setup Menu** mode, which allows you to display RU and MU PC-LAN network settings, reboot the MU PC-LAN port, and change the RU network settings To exit Setup Menu mode, press the **SETUP** button again.

◆ IP Address Display
The following procedure shows how to display an IP address in Setup Menu mode using MFR-16RU as an example.

(1) Press **SETUP**. All idicators, POWER, BUSY and LOCK, turn on orange to indicate that the RU enters in Setup Menu mode.
(2) Press Button **D**. (If Button **B** or **C** is lit, press the lit button.)
(3) Press the left-most button (the first octet) of Buttons **H**.
The first octet number will be displayed on Buttons **I**. If the MFR-16RU IP address is set to "192.168.1.100," The eight buttons (8 bits) displays "192" (128+64) by turning the light **On** or **Off** for each bit (On, On, Off, Off, Off, Off, Off, Off).
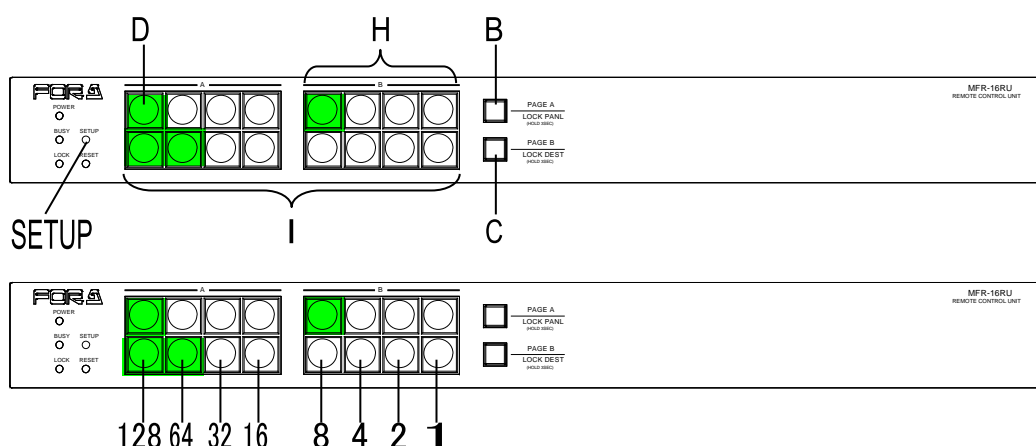
(4) Press the second button (the second octet) of Buttons **H**.
The number value will be displayed on Buttons **I**.
If the MFR-16RU IP assress is set to "192.168.1.100," "168" will be displayed.

(5) Press the third button (the third octet) of Buttons **H**.
The number value will be displayed on Buttons **I**.
If the MFR-16RU IP assress is set to "192.168.1.100," "1" will be displayed.

(6) Press the right-most button (the fourth octet) of Buttons **H**.
The number value will be displayed on Buttons **I**.
If the MFR-16RU IP address is set to "192.168.1.100," "100" (64+32+4) will be displayed as shown below (Off, On, On, Off, Off, On, Off, Off).
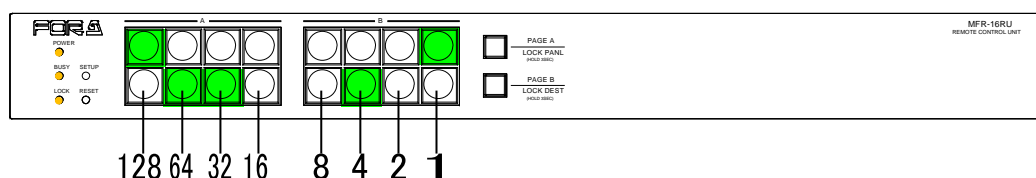
5-10-1. Displaying Network Settings

(1) In Setup Menu mode, press a button shown in the table below to display the desired network setting. Note that button locations vary depending on remote control units.

Button operation		LAN port	Display Info.
Press D.	If B is lit, press B. If C is lit, press C.	Remote Control Unit (LAN)	IP address
Press E.	If B is lit, press B. If C is lit, press C.		Subnet mask
Press B, then D.		PC-LAN on Main Unit (MU)	IP address
Press B, then E.			Subnet mask
Press B, then F.			Default Gateway

(2) Press an octet button of Buttons **H** to select an octet. The right-most button represents the fourth octet. (See the previous page.)
(3) The octet value will be displayed on Buttons **I** (eight buttons). (See the previous page.)

MFR-40RU
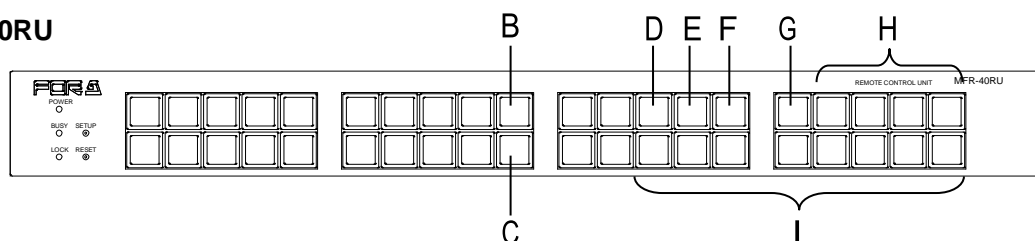
MFR-16RU (MFR-16RUD)
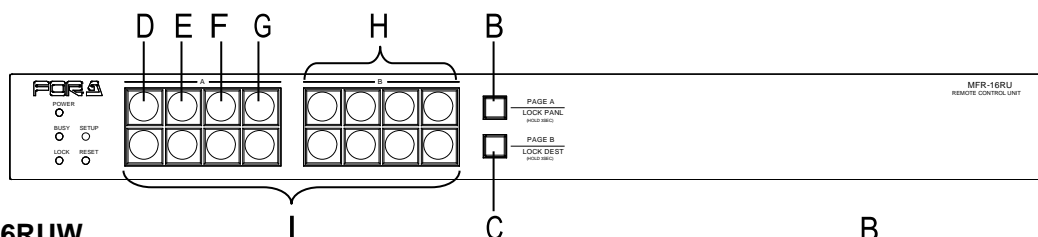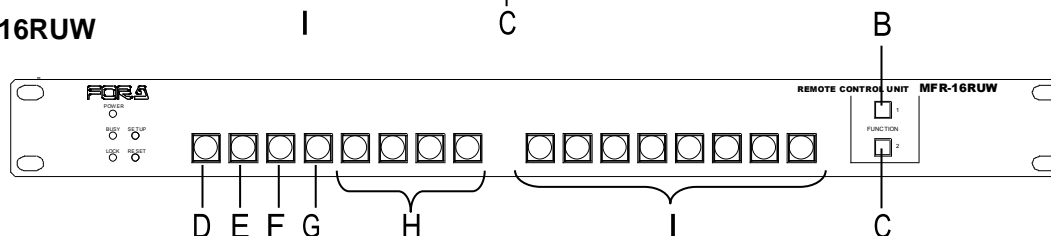
MFR-16RUW

MFR-32RUW
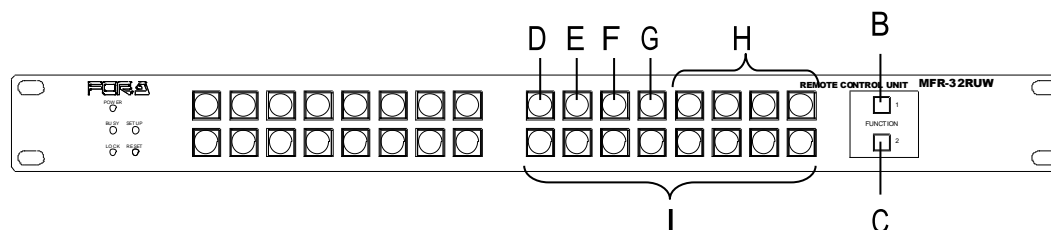
MFR-64RUW
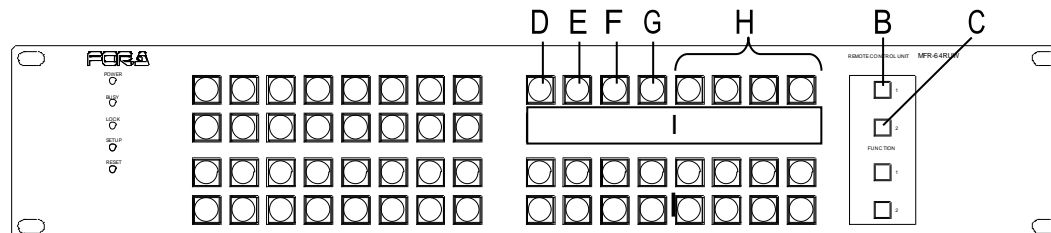
5-10-2. Changing the RU IP Address

The RU IP address can be changed as shown in the procedure below, which changes the MFR-16RU IP address from "192.168.1.100" to "192.168.1.101."
Button locations vary depending on remote control units. Refer to the previous page for other remote control unit button locations.

(1) Press Button **D** in **Setup Menu** mode. (If Button **B** or **C** is lit, press the lit button.)
(2) Press and **hold down** the **right-most** button (the fourth octet) of Buttons **H**. The button will blink and the bottom eight buttons (Buttons **I**) display the value (100) by turning the light **On** and **Off**.
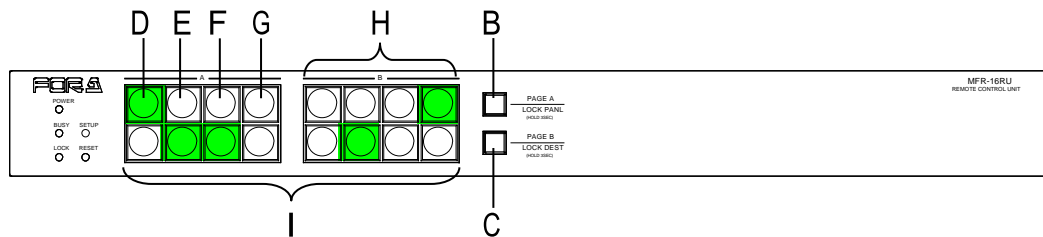
(3) On the bottom row, press the **right-most** button of Buttons **I** to turn on the button. The octet value will change to "101" (64+32+4+1).
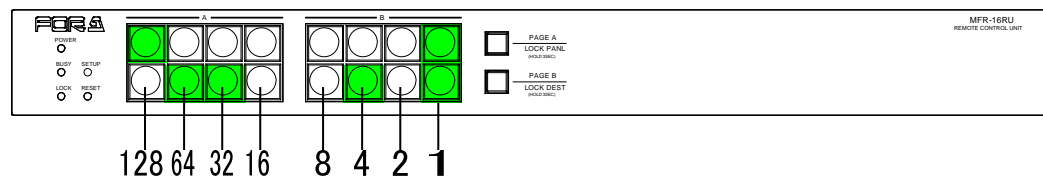
To change the first, second or third octet value, repeat steps (2) and (3), respectively.
To clear an octet value, press the flashing octet selection button on the upper row.

(4) When a value is changed, Button **G** will blink. Press and hold down G to confirm the change. The Remote Control Unit will automatically restart. To cancel the process, press Button **B** or **C** without pressing **G**.

101
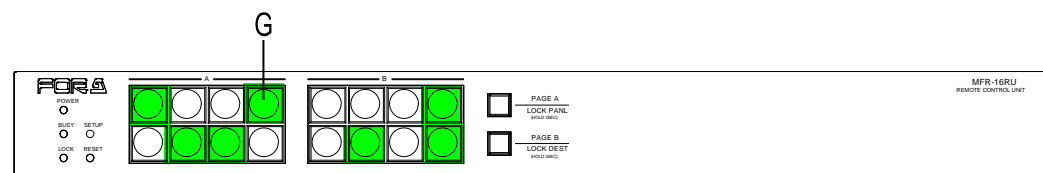
5-10-3. Rebooting MU PC-LAN

(1) Press Button **C** in Setup Menu mode.
(2) Press and hold down Button **K**. Button **L** (EXEC button) will blink.
(3) Press and hold down Button **L**. Buttons **I** will blink during rebooting. The buttons will turn off when the reboot is complete.

MFR-40RU
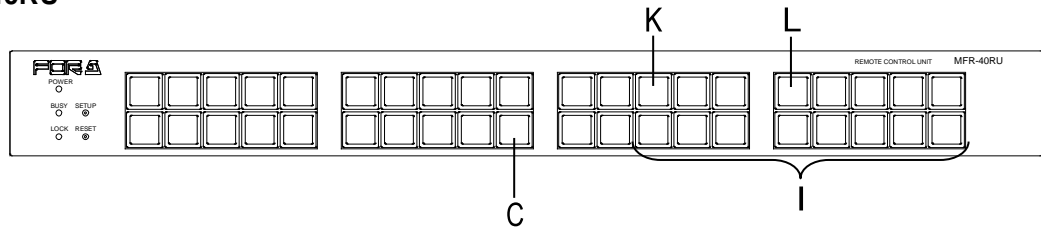
MFR-16RU (MFR-16RUD)
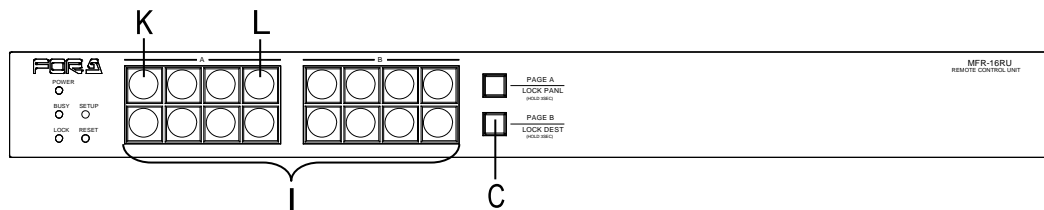
MFR-16RUW
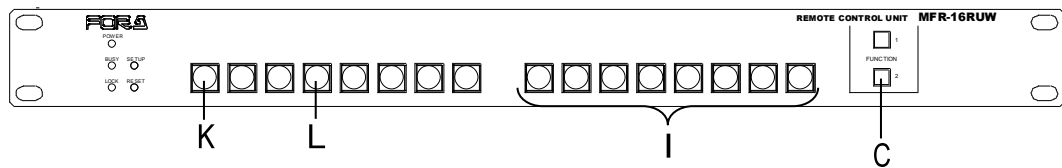
MFR-32RUW
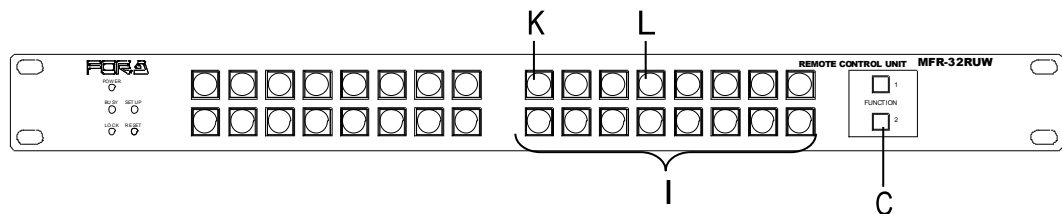
MFR-64RUW
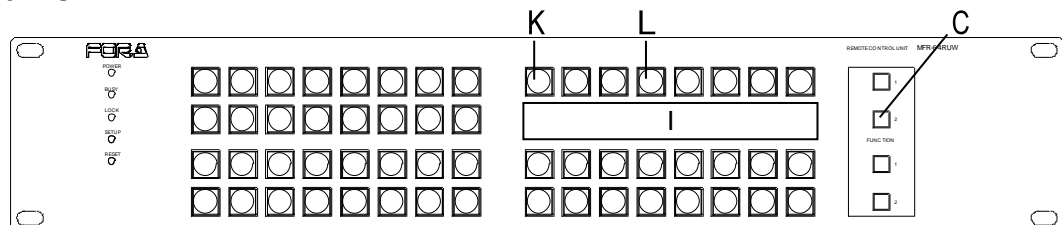
5-11. Multi-Panel Operation

5-11-1. Outline

Multiple remote control panels can be connected to build a large control panel.

(Ex.) To build a 96 x 96 maximum control system:
    Units to use: MFR-40RU x 4, and MFR-39RU x 1
    Configuration:
     Destination button assignments to: MFR-40RU x 2 and a part of MFR-39RU
     Source button assignments to: MFR-40RU x 2 and a part of MFR-39RU

    This system can control 96 x 96 inputs and outputs without using the PAGE function.

For System & I/O : MFR-39RU

OUTPUT: MFR-40RU x 2   INPUT: MFR-40RU x 2
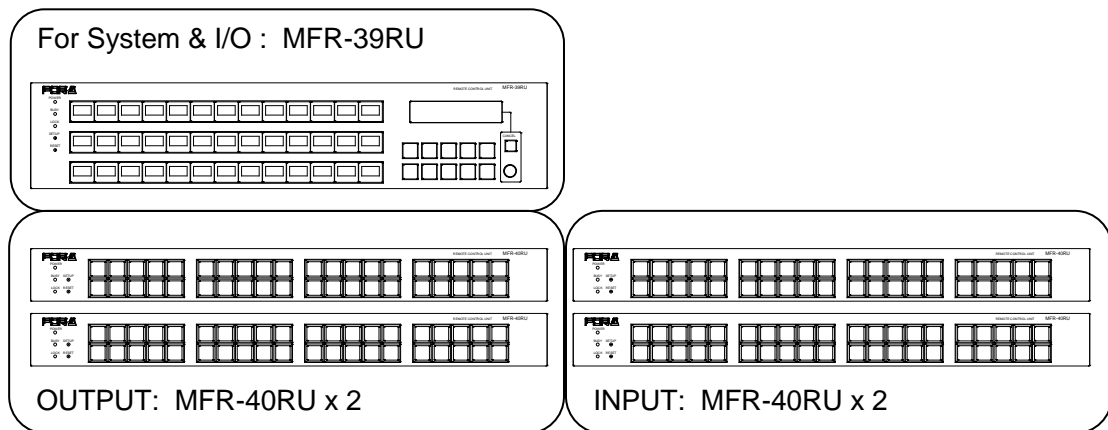
◆   **Functions that can be integrated**
The following operation can be integrated between the connected remote control panels by the interlock function.
-   To select destination channels
-   To select destination/source channels and levels by the control knob.
-   To enable or disable Lock functions (LOCK LOCAL, LOCK OTHER, and LOCK ALL)

● Lock functions in the multi-panel operation
All connected remote control panels work as one remote control panel, so:

    LOCK LOCAL: All integrated remote control panels are locked locally.
    LOCK OTHER: Restricts units other than the remote control panels in the multi-panel operation system from changing crosspoints.
                        All integrated remote control panels can unlock the Lock function.
    LOCK ALL: Restricts all units within the multi-panel operation system from changing crosspoints.
                        All integrated remote control panels can unlock the Lock function.

5-11-2. Enabling Multi-Panel Operation

Multi-panel operation can be enabled in the Setup menu or in the [Web-based Control: **RU Settings** page].

The procedure to enable multi-panel operation in the Setup menu is as shown below. (Supported only by MFR-39RU/39RUA)

◆ MFR-39RUA

Step	Description	Refer to
1	Press SETUP to enter Setup menu.	
2	Press **RU-RU CONNECT**.	
3	Change **CONNECT** to ENABLE.	5-4-4-8
4	Turn the control knob to select a link ID under **MASTER ID**. * The link ID is used to configure a link of multiple remote control units and equal to the unit ID of the master unit in the remote control unit link. To configure the remote control unit link using the master unit of Unit ID 100, set **MASTER ID** to 100 for another remote control unit in the link system.	5-4-4-8
5	To exit Setup Menu mode, press EXIT twice.	

◆ MFR-39RU

Step	Description
1	Press the SETUP button to enter Setup menu.
2	Turn the control knob to select RU CONN ID, and press the knob to confirm. SETUP>RU CONN ID UNIT ID: 0<ENT> Menu display
3	Turn the control knob to select the ID, and press the knob to confirm. **ID:** This ID is used to synchronize remote control panels for multi-panel operation. All panels must have the same ID as the unit ID of the master remote control panel of the system. (ex.) To enable multi-panel operation using a master remote control panel whose unit ID is 100, set the ID as 100 for all integrated remote control panels.
4	Press the CANCEL button to return the menu display to select menus. Turn the control knob to select RU CONNECT, and press the knob to confirm. SETUP>RU CONNECT ENABLE:OFF<ENT> Menu display
5	Turn the control knob to select ON, and press the knob to confirm.

Perform the above procedure for each remote control panel to be integrated.

To enable multi-panel operation in Web-based Control, proceed as follows:
(1) Click the remote control unit for setting to display the menu tree. Select **RU Settings** to display the menu.
(2) Set the master remote control unit using Unit ID under **Master ID** (for RU Linkage).
(3) Set **RU Linkage** to ON.

6. Crosspoint Control

6-1. One Crosspoint Switching
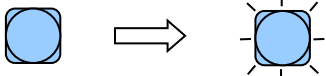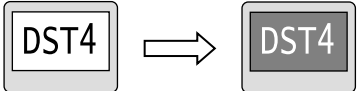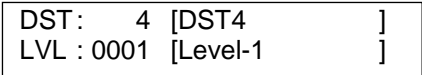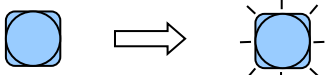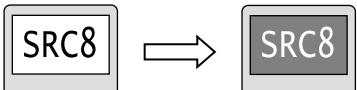
There are two ways of switching crosspoints: Switching a crosspoint one at a time, or switching multiple crosspoints simultaneously. This section describes the switching of one crosspoint.

6-1-1. One Crosspoint Switching by X-Y Setting

A crosspoint can be switched by using the destination and source buttons on the remote control panel.
Destination and source channels must be assigned to those buttons beforehand.

(Ex.) The procedure to output source channel 8 to destination channel 4.

Step	Description	Indications
1	Press a destination button to select destination channel 4.	- The selected destination button lights up. - The button with the destination channel indication will be highlighted. - Menu display appears as shown below. DST: 4 [DST4] LVL : 0001 [Level-1]
2	Press a source button to select source channel 8.	- The selected source button lights up. - The button with the source channel indication will be highlighted.

● Destination and source channels can also be selected by the control knob or using the display. To select channels by the control knob, the mode menu must be set to destination mode or source mode using the MODE button(s). (Supported for MFR-39RU/39RUA/18RUA/18RU/16RUTA)
Operation using the display is available only on MFR-16RUD.

● MFR-18RU/16RUTA/18RUA units have the Control DestMode function, which can be set in the [Web-based Control: **RU Settings** page]. If **Control DestMode** is set to **Crosspoint**, crosspoints can be switched by turning CONTROL after pressing a destination button with CONTROL pressed.
　► See section 5-2-3 "Control Knob" for details.

● Control Assist Buttons
The following functionalities can be assigned to remote control panel buttons to assist crosspoint switches.
　► See section 6-1-1-1 "SKIP-FWD/SKIP BWD" for SKIP-FWD and SKIP-BWD
　► See section 6-1-1-2 "TENKEY" for -TENKEY

6-1-1-1. SKIP-FWD/BWD

The SKIP-FWD button allows you to skip the set destination number or source channels forward to select the current one. The SKIP-BWD button allows you to skip channels backward.
In Destination or Source mode, the set number of channels is skipped. In Level, Page or Setting mode, these buttons are inoperable. (See section 5-4-2. "Mode Menu.")
* To confirm the source selection, press the control knob.

If the source and/or destination channels are categorized, the buttons allows you to go to the first or last channel in the category.

(Ex.) If Category 1: Dest 1 to 13, Category 2: Dest 14 to 20,
SKIP-FWD is set to 5, and
Current destination is 1.
Pressing the SKIP-FWD button selects destination channels 1 → 6 → 11 → 13 → 14 → 19 → 20 → 21 → 26 → 31 → and so on.

The categories are user programmable source or destination channel groups. They are set under **Category** accessed from each Web-based Control page.

[Web-based Control: **Router System Settings** > **Source Name** > **Category**]

[Web-based Control: **Router System Settings** > **Destination Name** > **Category**]

► See section 5-4-3-12. "BTN ASSIGN" for details on how to assign these buttons.

6-1-1-2. TENKEY (MFR-39RU/39RUA)

The TENKEY button is used to enable Tenkey mode. Tenkey mode allows you to select source and destination channels using the numeric keypad that appears on the remote control panel. (Supported only for MFR-39RU/39RUA.)

Category buttons   Numeric keypad
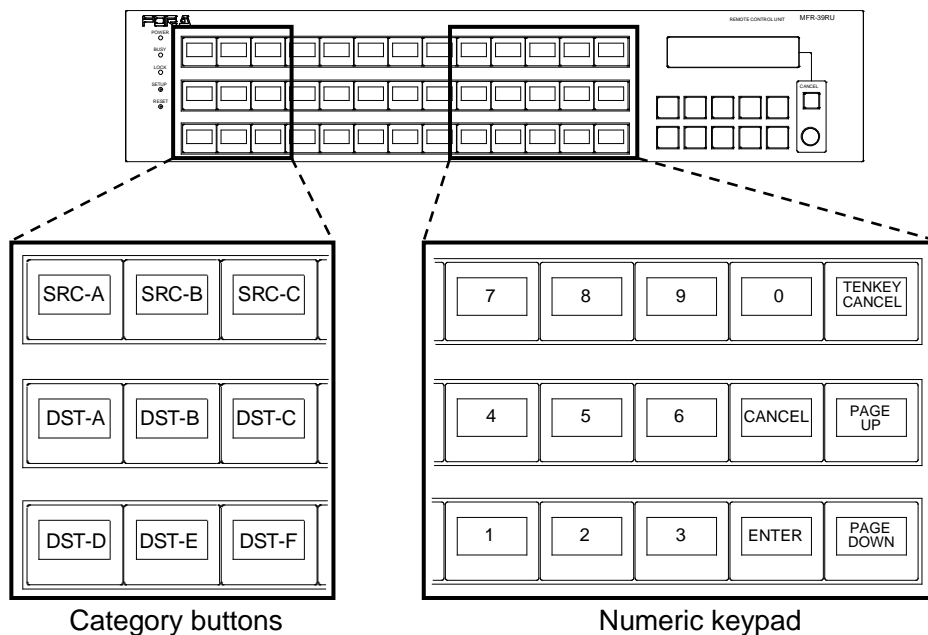
Category buttons: Allows you to select a category from which to select a channel using the numeric keypad.

- TENKEY CANCEL:	Allows you to exit TENKEY mode. The entered number is indicated on the button when "SETTING > TENKEY MOD (INPUT MODE)" is set to ENTER.
- PAGE UP / DOWN:	Allows you to change pages for the category buttons.
- ENTER / CANCEL:	Allows you to confirm or cancel the change when "SETTING > TENKEY MOD (INPUT MODE)" is set to ENTER. If it is set to DIRECT, entering a value will change and confirm the selection. ► See section 5-4-3-9. "TENKEY MOD."
- 0 to 9 (numeric keys):	Allows you to select a channel in the selected category. The TENKEY NO (INPUT START NO) menu allows you to select whether to count from 0 or 1. ► See section 5-4-3-10. "TENKEY NO."

◆ **Source channel selection using the numeric keypad function**
If categories are set as; SRC-A (SRC 1 to 13), and SRC-B (SRC 14 to 20)

(ex.1) TENKEY MOD (INPUT MODE) is ENTER and TENKEY NO (INPUT START NO) is 1.
- Select SRC-A, enter 3 on a numeric keypad and press ENTER to select SRC 3.
- Select SRC-B, enter 5 on a numeric keypad and press ENTER to select SRC 18.

(ex. 2) TENKEY MOD (INPUT MODE) is DIRECT and TENKEY NO (INPUT START NO) is 0.
- Select SRC-A, and enter 3 on a numeric keypad to select SRC 4.
- Select SRC-B, and enter 0 on a numeric keypad to select SRC 14.

► See section 5-4-3-12. "BTN ASSIGN" for details on how to assign the TENKEY button.

6-1-2. A Crosspoint Switching Using a Bus Button

A button to which a destination channel and source channel for the destination is assigned is called a bus button in the remote control panel. The bus buttons allow you to change source channels to be output from destination channels by the push of a button.

Bus button crosspoint switching can switch crosspoints regardless of the current destination selection.

► See section 5-3. "Function Buttons" for details on button assignments.
► See section 5-4-3-12. "BTN ASSIGN" and 5-5-2. "Button Assignment Change" for details on how to assign the bus buttons.

6-1-3. CHOP Function

The CHOP function allows you to alternate 2 images to compare the images.

◆ **Enabling the CHOP function**
(1) Press one of 2 source buttons (source A) to compare the images.
(2) While holding down the source button, press and release another source button (source B).

Source A and B images alternate.

Press source button A.
→ Source A is output.

Holding down source button A, press source button B.
→ Source B is output.

Release source button B.
→ Source A is output.
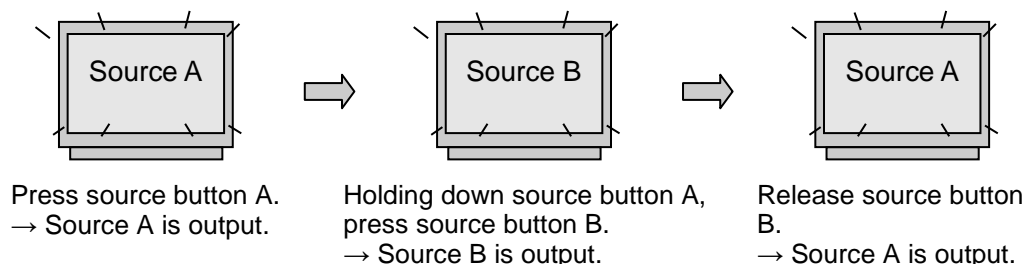
6-1-4. Crosspoint Switching Using TAKE Function

Crosspoint switching using the **Take** function is available by the remote control panel that is assigned **Take**.
The **Take** function enables crosspoint switching by the TAKE button.
The **Take** function has 2 modes that can be assigned to different remote control panel respectively. To select the Take mode, select Preset or Direct under **Take Mode** in in the [Web-based Control: **RU Settings** page].
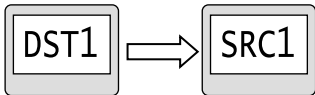
◆ **Preset mode**
Press the TAKE button to enable Take, and select crosspoints, then press the TAKE button to switch crosspoints.

◆ **Direct mode**
The Take function is always enabled. Select crosspoints, then press the TAKE button to switch crosspoints.

● Ex.1: To use the TAKE button assigned to Preset mode

Step	Description	
1	Press the TAKE button. The take function will be enabled, and the button will be highlighted.	TAKE
2	Select a crosspoint by selecting a destination button and source button. The selected buttons will blink. * To switch multiple crosspoints, repeat the procedure.	DST1 ⟹ SRC1
3	After completing the crosspoint selection, press the blinking TAKE button to switch the crosspoint/s. In multiple crosspoint switching, the last set of destination and source buttons will be highlighted.	

Once a crosspoint switch has been completed, the TAKE button preset mode will be disabled. The button will return to direct mode.

To switch crosspoints in the preset mode again, repeat the procedure from step 1.

● Ex. 2: To use the TAKE button assigned to Direct mode

Step	Description
1	In Direct mode, the Take function is always enabled. Select a crosspoint by selecting a destination button and source button. The selected buttons will blink. * To switch multiple crosspoints, repeat the procedure.
2	After completing the crosspoint selection, press the blinking TAKE button to switch the crosspoint/s. In multiple crosspoint switching, the last set of destination and source buttons will be highlighted.
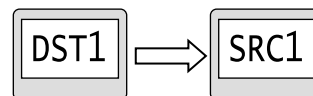
6-2. Simultaneous Crosspoint Switching

The simultaneous crosspoint switching function allows you to **simultaneously switch multiple crosspoints** by the press of one button. There are two ways to do so. One is the Salvo function which performs the switching by recalling the pre-assigned crosspoints. The other is the Take function which allows you to assign and switch multiple crosspoints simultaneously.

The SALVO crosspoints can be saved to either the **routing switcher main unit** or to **the remote control panel**.

6-2-1. Main Unit Stored Salvos

This type of salvo allows you to store crosspoint data to be simultaneously switched. The stored data can be recalled from any connected remote control panel.

◆ **Storing Salvo Data to Main Unit**
Salvo data for Main Unit can be stored using the Web-based Control.
► See [Web-based Control: **Salvo** page]

◆ **Executing Salvos**
Use a SALVO (MU RECALL) button on the remote control panel as shown in the procedure below.
(1) Assign a SALVO button on the remote control panel. Set the salvo for **MU RECALL**, and select a Salvo number.
    ► See section 5-4-3-12 "BTN ASSIGN" and 5-5-2. "Button Assignment Change"

(2) Pressing the SALVO button to executes the salvo. The crosspoints stored to the salvo number are simultaneously set.

6-2-2. Remote Control Stored Salvos

This type of salvo allows to you assign crosspoints to be simultaneously switched to a button. The salvo can be recalled only by the SALVO button on the remote control panel. Once a salvo is executed, crosspoints assigned to the salvo are switched according to the current remote control level setting.

Remote Control Stored Salvo data can also be stored using the Web-based Control.
► See [Web-based Control: **Salvo** page]
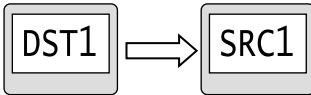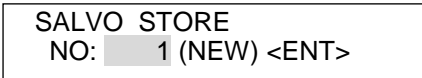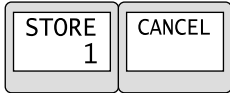
◆ **Storing Salvo Data to the Remote Control Unit (MFR-39RU/39RUA only)**
Use a SALVO (RU STORE) button on the remote control panel as shown in the procedure below.
(1) Assign a SALVO button on the remote control panel. Set the salvo for **RU STORE**.
    ► See section 5-4-3-12 "BTN ASSIGN."
(2) Store salvo data as shown in the table below.

Step	Description	
1	Press the SALVO button as shown below. The button is highlighted and ready for crosspoints to be assigned.	SALVO
2	To assign crosspoints to a salvo, press a destination button then a source button. The selected buttons flash. Repeat the procedure for all crosspoints.	DST1 ⟹ SRC1
3	**MFR-39RU:** After completing the crosspoints assignments, press the SALVO button again. The menu display appears as shown below. SALVO STORE NO: 1 (NEW) <ENT> **MFR-39RUA:** After completing the crosspoints assignments, press the SALVO button again. The Current DEST and SRC button displays change as shown below. STORE 1 CANCEL	
4	**MFR-39RU:** To add crosspoints to an existing salvo, select a salvo number by turning the control knob. Salvo numbers to which no crosspoints are assigned are indicated with (NEW). Turn the control knob to select a number, and press the knob to confirm the selection. **MFR-39RUA:** Turn the control knob to select a number then press the control knob to confirm the selection.	

◆ **Executing Salvos**
Use a SALVO (RU RECALL) button on the remote control panel as shown in the procedure below.
(1) Assign a SALVO button on the remote control panel. Set the salvo for **RU RECALL**, and select a Salvo number.
    ► See section 5-4-3-12 "BTN ASSIGN" and 5-5-2. "Button Assignment Change."
(2) Pressing the SALVO button to executes the salvo. The crosspoints stored to the salvo number are simultaneously set.

6-2-3. Simultaneous Switching Using the Take Function

The TAKE button on the remote control panel allows you to simultaneously switch preset crosspoints.
► See section 5-4-3-12 "BTN ASSIGN" for details on assigning the TAKE button.

◆ **Executing a TAKE**
See the Ex. 1) and Ex. 2) in section 6-1-4. "Crosspoint Switching Using TAKE Function" for the procedure.

6-2-4. Simultaneous Switching by the Link Function

The LINK button on the remote control panel allows you to simultaneously switch crosspoints associated with a specific crosspoint.
Pressing the LINK button enables or disables the Link function. The LINK button is highlighted with a bright background when the function is enabled.
► See section 5-4-3-12 "BTN ASSIGN" for details on assigning the LINK button.

If the Link function is turned on, selecting a trigger crosspoint switches the slave crosspoints with it. The trigger and slave crosspoints can be assigned using Web-based Control.
► See [Web-based Control: **Link Settings** page] for more details.

6-3. Lock

Function operation and crosspoint changes can be disabled by the Lock function.

◆ **LOCK Function**
The Lock function is a function that inhibits the use of function buttons or crosspoint changes.
There are three types of Lock functions.

Inhibits source channel and function button operation	→	Inhibits operation on own unit	→ LOCK LOCAL function
Inhibits the specific destination channel related operation	→	Inhibits operation from other units Inhibits operation form other groups.	→ LOCK OTHER function
		Inhibits operation for all units	→ LOCK ALL function
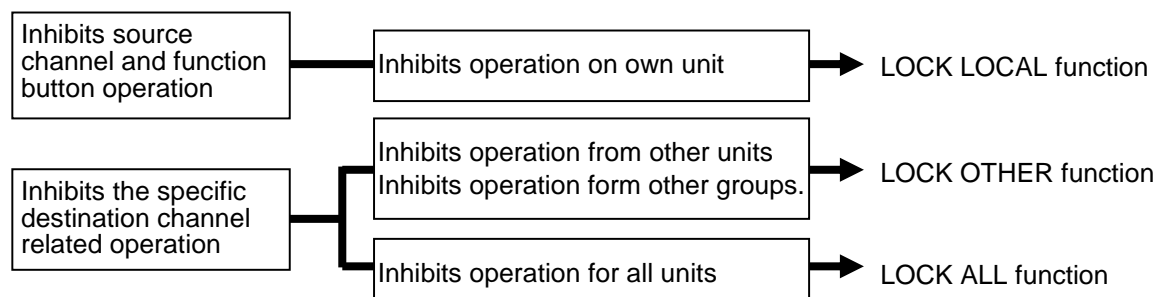
6-3-1. LOCK LOCAL

The Lock Local function inhibits operation of buttons and menus that change the source channel or sets or executes Take switching on the unit that enabled the Lock function. (Selecting destination channels is not inhibited.)
This function is used in protecting the system from unintended operation.

◆ **Enabling LOCK LOCAL**
(1) Assign **LOCK LOCAL** to a button on the control unit.
   ► See section 5-4-3-12 "BTN ASSIGN" and 5-5-2. "Button Assignment Change."
(2) Press the assigned LOCK LOCAL button to enable the Lock Local function.
*   Operations are locked for units in black boxes and unlocked for units in white boxes.

| RU (Local) | RU | RU | RU | MU |
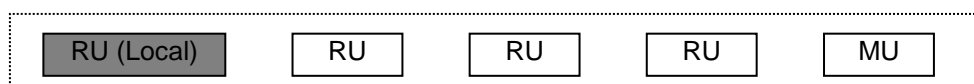
◆ **Disabling LOCK LOCAL**
   Press the LOCK LOCAL button again.

If LOCK LOCAL is ON:

On the remote control panel:
● LOCK LED is lit green
● LOCK LOCAL is highlighted (background of the text illuminates.)
● Source and bus button indications are crossed.

To check the **LOCK status**, press the current destination button.
The MENU display shows the LOCK status (ON or OFF) as shown below.

DST: 8 [DST8]		DST: 8 [DST8]
LK-LOCAL [PANEL LOCK]		LK-OFF [NOT LOCKED]

The LOCK LOCAL button and LOCK LED on the remote control panel flash if any inhibited operation such as changing the source channel is performed when Lock Local is enabled. (Only if the LOCK LOCAL button is assigned.)

LOCK LOCAL can be issued only on Remote Control Units.

6-3-2. LOCK OTHER / LOCK ALL

The Lock Other and Lock All functions disable crosspoint changes for current destination channels to all other units or all units including the unit that enabled the Lock function. Lock functions can be disabled only from the unit that enabled the function.
In multi-panel operation, lock functions can be disabled from any remote control panel in the operation system. Lock Other does not disable operation of remote control panels in the system.

◆ **Enabling LOCK OTHER/LOCK ALL**
<Setting on the Remote Control Panel>
(1) Assign **LOCK OTHER** or **LOCK ALL** to a button on the remote control unit.
    ► See section 5-4-3-12 "BTN ASSIGN" and 5-5-2. "Button Assignment Change."
(2) Press the assigned button to enable the Lock function.

RU (Local)	RU	RU	RU	MU
RU (Local)	RU	RU	RU	MU
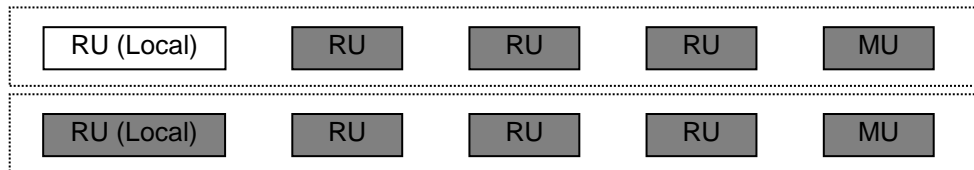
<Setting in the Web-based Control>
Open the [Web-based Control: **Lock Destination** page, and assign a lock button.

◆ **Disabling LOCK OTHER/LOCK ALL**
Press the lock button again.

> To unlock buttons from other units, press and hold the |LOCK| button for the time specified in the [Web-based Control: **RU Settings** page].

If LOCK OTHER or LOCK ALL is ON:

On the remote control panel:
● LOCK LED illuminates
  Orange, if a LOCK OTHER command is sent by itself.
  Red, if a LOCK OTHER command is sent by another unit.
  Red, if a LOCK ALL command is sent by any unit.
● The |LOCK| button is highlighted (background illuminates)
● LED and LCD colors of locked current destination buttons are changed to those set under **LockButtonColor** in the [Web-based Control: **RU Settings** page] (MFR-40/ 18/ 39RU, 16RUTA)

To check the **LOCK status**, press the current destination button.
The MENU display shows the LOCK status and the ID number of the unit that has issued the LOCK command.

```
DST:    8 [DST8          ]
LK-ID: 103[OTHER PANELS]
```
        LOCK OTHER ON

```
DST:    8 [DST8          ]
LK-ID: 103[ALL PANELS  ]
```
        LOCK ALL

```
DST:    8 [DST8          ]
LK-OFF   [NOT LOCKED  ]
```
        LOCK OFF

The |LOCK| button and LOCK LED on the remote control unit flash if any inhibited operation such as selecting a source channel is performed when Lock Other (or Lock All) is enabled and the |LOCK OTHER| (or |LOCK ALL|) button is assigned.

◆ **LOCK GROUP**
The LOCK OTHER function also enables Group LOCK OTHER, which allows crosspoint switching by RU units only in the same group and locks RU switching in other groups. Any RU in the same group can lock or release the LOCK OTHER command. LOCK ALL disables crosspoint switching from all remote control units and can be unlocked only by remote control units in the same group.

<LOCK GROUP Setting Example>
This example creates the following three groups from five RU units as shown below using the Unit ID and Group ID numbers.
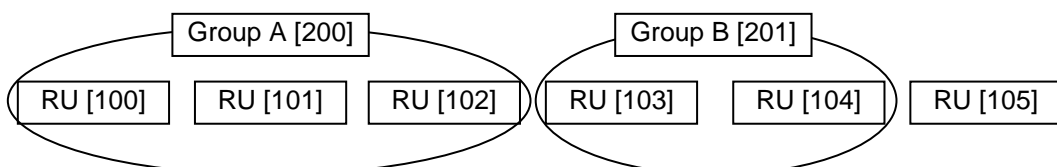
1. Open the [Web-based Control: **Lock Destination** page]. Add RU [100], RU[101] and RU[102] to Group A.
2. Add RU [103] and RU[104] to Group B.

> Once an RU is added to a group, the LOCK OTHER/LOCK ALL button on the RU changes to a Group LOCK OTHER/LOCK ALL button.

When sending a LOCK OTHER command from RU[100], RU [103], RU[104] and RU[105] are locked (greyed out in the figure below) for the set crosspoint.

| RU [100] | RU [101] | RU [102] | RU [103] | RU [104] | RU [105] |

When sending a LOCK OTHER command from RU[103]…

| RU [100] | RU [101] | RU [102] | RU [103] | RU [104] | RU [105] |

When sending a LOCK OTHER command from RU[105]…

| RU [100] | RU [101] | RU [102] | RU [103] | RU [104] | RU [105] |

When sending Group LOCK OTHER/LOCK ALL commands, use a Group ID number in the [Web-based Control :**Lock Destination** page].

If operating in Multi-panel mode, all linking RU devices must belong to the same group.

6-4. Monitor Output Function

The monitor output function allows you to monitor a destination channel through a MONITOR OUTPUT.

◆ **Enabling the Monitor Output Function**
The monitor output function is disabled as default. To enable the function, use the monitor output button on the remote control panel.
▶See 5-4-3-12. "BTN ASSIGN" and 5-5-2. "Button Assignment Change" for details on assigning functions to buttons.

◆ **Selecting Destinations to output from MONITOR OUTPUT connectors**
The following procedure shows how to use the monitor output function.

Step	Description
1	Press the assigned Monitor Out button on the remote control panel. The button will be highlighted if the function is enabled.
2	Press a destination button to output the destination channel signal from the Monitor Output.

6-5. Preview Function

The preview function allows you to set an output to be used for the preview.

(ex.) When pressing a source button on the remote control panel for a simultaneous crosspoint switch, the selected source will be output to the preview output. Then you can check images of the source channels to be assigned to a Take.
When pressing a destination button, the source channel assigned for the destination channel will be output to the preview output.

◆ **Assigning Operation Preview to a Button on the Remote Control Panel**
The Operation Preview function is disabled as default. To enable the function, assign the function to a button on the remote control panel in the Web-based Control.
Only MFR-39RU and MFR-16RUD units can assign Operation Preview on the front panel operation.
► See [Web-based Control: **Assign Function** page].
► See sections 5-4-3-12. "BTN ASSIGN" and 5-5-2." Button Assignment Change."

◆ **Outputing the Operation Preview**
Press the O-PREVIEW button on the remote control unit to output the preview signal from the set destination channel.

6-6. Level Control

Generally, routing switchers control crosspoints according to the signal types such as video, audio, time codes, and VCR control. To control switchers, level numbers are used to identify which type of signal to control.
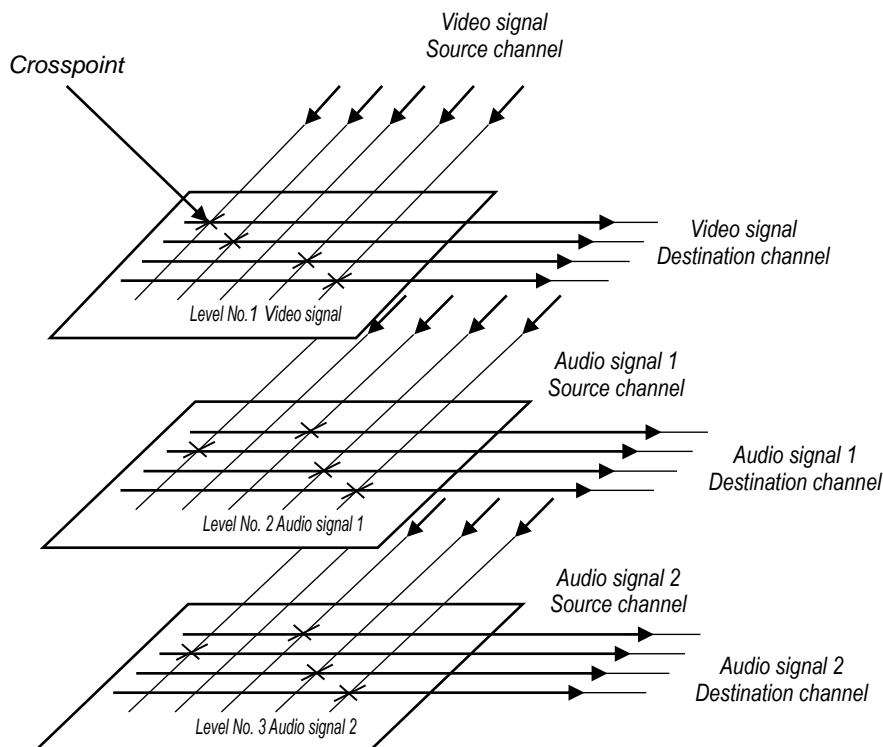
In the above example, if you select Level No. 1 for the current level, you can switch crosspoints that are set to Level 1. If you select Level No. 2, you can switch crosspoints on Level 2. If you select multiple levels, you can switch crosspoints on all of the selected levels at the same time.

◆ **Assigning levels**
Signals can be assigned to logical inputs and outputs using Web-based Control. When assigning the signals, select a level for respective signals to be assigned to the respective levels.
► See the separate MFR SERIES Web-based Control Operation Manual for details on assigning levels using Web-based Control.

◆ **Selecting levels on remote control panels**
The remote control panel can select channels on the current level. The level selections can be changed using the LEVEL button or control knob. Multiple levels can be set to the current levels by the LEVEL button or control knob.

Pressing the respective LEVEL button allows you to go to the respectively assigned levels.

To change levels on remote control panels using the Control knob, press the MODE button and select Level mode in the mode menu.
► See Sec. 5-4 "MODE Button and Mode Menu."

6-6-1. Level Indication on the Remote Control Panel

The MFR main unit and remote control panel can control signals on multiple levels at the same time. The remote control panel indicates the current level(s) by hexadecimal numbers in the menu display and on the LCD.

(ex.1) If all levels 1 through 8 are enabled, the indication is "00FF".
Level 8: ENBL 7: ENBL 6: ENBL 5: ENBL   4: ENBL 3: ENBL 2: ENBL 1: ENBL

    ⇒   F   F

(ex. 2) If levels 3, 4, 6, and 7 are enabled, the indication is "006C".
Level 8: DSBL 7: ENBL 6: ENBL 5: DSBL   4: ENBL 3: ENBL 2: DSBL 1: DSBL

    ⇒   6   C

   * ENBL: enabled
    DSBL: disabled

If multiple levels are selected to the current levels, the smallest enabled level number is indicated in the menu display and on the button.
In the above case (ex.1): indicated as Level1
In the above case (ex.2): indicated as Level3

7. 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.

7-1. Serial Interface

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

7-2. 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.
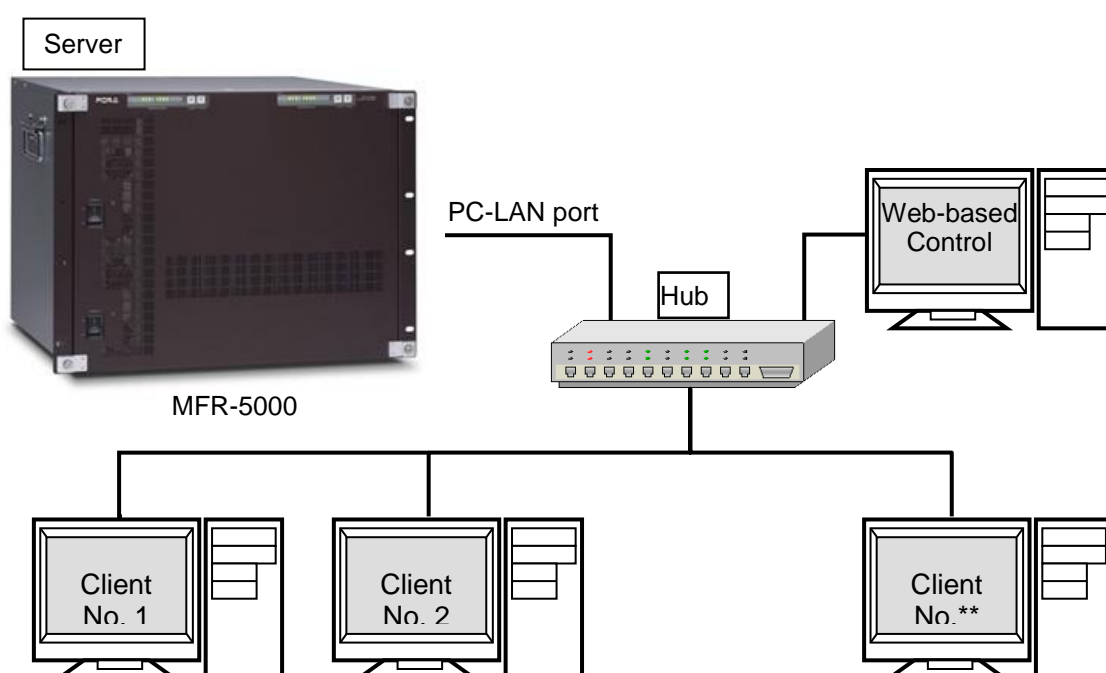
◆ **Basic specifications**

tem	Description
IP address (PC-LAN port)	Primary LAN (PC-LAN CPU1) default IP address: 192.168.1.12 Secondary LAN (PC-LAN CPU2) default IP address: 192.168.1.13 * (Subnet Mask: 255.255.255.0)
Port number	Setting range: 49152 to 65534 (Default: 23)
Number of PCs	Max. 16
Response / Resending	Wait before sending next command (Resend if the Echo is not returned.)
Login password	None
Communication protocol	TCP/IP, Control PC: Client, MFR-3232: 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 repond to commands.

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

9	@[sp]W?<Lvl>,<Dest>	W!<Lvl><Dest>,<ID>,0-2*
		*0: Nothing locked
		  1: LOCK ALL
		  2: LOCK OTHER
			7-3-5

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).		7-3-6

*   [sp] indicates a space.

*   Commands must end with a carriage return (ASCII code 0x**0D**) only or carriage return and line feed (ASCII code 0x**0A**). 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>	000-1FF	Allows you to specify the crosspoint switchover destination.
<Src>	000 - 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 **1** to **FE** for ID numbers. The host returns **0** 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).

7-3-1. Command Responses (Commands 1-6)

● **Echo and Prompt**
Responses will be sent as shown below when receiving commands:

A command is received.	
↓	
Echo	@[sp]X:<Lvls>/<Dest>,<Src>[CR]
↓	
Prompt	[CR][LF]>

*   MFR units respond with an Echo Reply with the same data that they 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" and "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**>]]:I<ID>[CR][LF]

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

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

● **"S" responses**
An "S" response is sent as shown below when crosspoints are switched by a command.

```
[CR][LF]C:<Lvls>/<Dest>,<Src>[···[S<Salvo number>][L<Link number>]]:I<ID>[CR][LF]
```

* If a crosspoint is switched by an X or B command, its "S" response is sent to all the 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.
* 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 to change.

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

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

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

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

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

7-3-2. Receiving Responses (Commands 1-6)

● **Timeout Waiting for Command Response 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 to send the next command when receiving a prompt.
Resends the previous command when the timeout period (5 seconds) have elapsed without reply after sending a command.

Ex. 2)
Allows to send the next command when receiving a prompt.
Resends the previous command when the timeout period (5 seconds) have elapsed without reply after sending a command.
Recognizes and uses "S" responses as tallies (crosspoint states).

Ex. 3)
Allows to send the next command when receiving a prompt.
Recognizes and uses "S" responses as tallies (crosspoint states).
Resends the previous command when the timeout period (5 seconds) have elapsed without reply after sending a command.
Sets the maximum number of continuous resendings, because crosspoints cannot be changed if they are locked or inhibited to change.

Ex. 4)
Allows to send the next command when receiving a prompt.
Resends the previous command when the timeout period (5 seconds) have elapsed without reply (echo) after sending a command.

Ex. 5)
Allows to send the next command when receiving a prompt.

● **Response Message Evaluation Example:**

```
Response message received
        │
        ▼
    New line? ──────────────────┐        [CR] or [LF]
      │  Yes    No              │
      │                         ▼
      │              Prompt?              Is the 1st character of a line Prompt?
      │            Yes │   No             - Prompts are not added to line buffers.
      │                │                  
      │                ▼
      │          Add to the line buffer
      │                │
      │◄───────────────┘
      ▼
Processing S Response                     Does the line buffer begin with **S:**?
      │                                   - Other characters are recognized and used as tally.
      │                                   - Characters are cleared, if unnecessary.
      ▼
Processing C Response                     Does the line buffer begin with **C:**?
      │                                   - Other characters are received as a processed command.
      │                                   - Characters are cleared, if unnecessary.
      ▼
Verifying Echo Reply                      Add the rest of characters to the echo buffer, excluding S and C responses Newline and Prompt. (The echo buffer is cleared when sending a new command.)
      │                                   - Checks that they are identical to the sent command.
      │                                   - Characters are cleared, if unnecessary.
      ▼
Clears the line buffer
      ▼◄────────────
Waiting the next message.
```

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- **If Commands are Overlapped:**

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 sent to all these terminals from the MFR.

The following command examples shows 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.

7-3-3. 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:<S or D><A or K><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: **Ascii** Character code for Kanji names: **UTF-8**
Command	CR	Carriage return
Response	LF	Line feed

Up to 32 channel names can be obtained per a single request.

Note that 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)

Source Name

Logical No.	Category	Name(ASCII)	ID Name(Kanji)
1	SRC-A	SRC 1	
2	SRC-A	SRC 2	
3	SRC-A	SRC 3	
4	SRC-A	SRC 4	
5	SRC-A	SRC 5	
6	SRC-A	SRC 6	
7	SRC-A	SRC 7	
8	SRC-A	SRC 8	
9	SRC-A	SRC 9	
10	SRC-A	SRC10	
11	SRC-A	SRC11	
12	SRC-A	SRC12	
13	SRC-A	SRC13	
14	SRC-A	SRC14	
15	SRC-A	SRC15	
16	SRC-A	SRC16	
17	SRC-A	SRC17	
18	SRC-A	SRC18	
19	SRC-A	SRC19	
20	SRC-A	SRC20	

Source Category

No.	Name
1	SRC-A
2	SRC-B
3	SRC-C
4	SRC-D
5	SRC-E
6	SRC-F
7	SRC-G
8	SRC-H
9	SRC-I
10	SRC-J
11	SRC-K
12	SRC-L
13	SRC-M
14	SRC-N
15	SRC-O
16	SRC-P
17	SRC-Q
18	SRC-R
19	SRC-S
20	SRC-T

➢ Terminal display

Command	@ K?SA,000

Response	@ K?SA,000	Echo
	K:SA**000**,5352432031	Ascii Name for Source **Channel 1** is SRC 1.
	K:SA**001**,5352432032	Ascii Name for Source **Channel 2** is SRC 2.
	K:SA**002**,5352432033	Ascii Name for Source **Channel 3** is SRC 3.
	I	
	K:SA**01F**,5352433332	Ascii Name for Source **Channel 32** 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:DK**064**,E587BAE58A9BEFBC91EFBC90EFBC91	Kanji Name for Destination **Channel 101** is 出力101.
	K:DK**065**,E587BAE58A9BEFBC91EFBC90EFBC92	Kanji Name for Destination **Channel 102** is 出力102.
	K:DK**066**,E587BAE58A9BEFBC91EFBC90EFBC93	Kanji Name for Destination **Channel 103** is 出力103.
	I	
	K:DK**083**,E587BAE58A9BEFBC91EFBC93EFBC92	Kanji Name for Destination **Channel 132** is 出力132.
	>	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:SK**040**,E382ABE383A1E383A9EFBC91	Kanji Name for Source **Channel 65** is カメラ1.
	K:SK**041**,E382ABE383A1E383A9EFBC92	Kanji Name for Source **Channel 66** is カメラ2.
	K:SK**042**,E382ABE383A1E383A9EFBC93	Kanji Name for Source **Channel 67** is カメラ3.
	K:SK**043**,E382ABE383A1E383A9EFBC94	Kanji Name for Source **Channel 68** is カメラ4.
	K:SK**044**,	Kanji Name for Source **Channel 69** is empty.
	K:SK**045**,	Kanji Name for Source **Channel 70** is empty.
	K:SK**046**,	Kanji Name for Source **Channel 71** is empty.
	K:SK**047**,E382B5E383BCE38390E383BCEFBCA1	Kanji Name for Source **Channel 72** is サーバーA.
	l	
	K:SK**05F**,	Kanji Name for Source **Channel 96** is empty.
	>	Prompt

K:	S	K	040,	E382AB	E383A1	E383A9	EFBC91
	Source	Kanji	Channel 68	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

7-3-4. CPU Status Request Command (8)

This command allows you to indicate which CPU is active in the MFR-5000.

◆ 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
There are two response types whether the CPU is active or passive state.
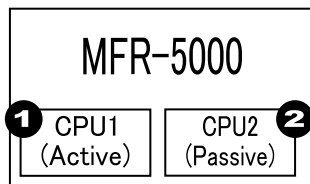
If the CPU is active:

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

7-3-5. Destination Lock Status Request Command (9)

This command (W?) allows you to indicate the 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	8
Command	@	[sp]	W	?	<Lvl>	,	<Dest>	CR

<Dest>: Destination channel number

Command response

BYTE No.	1	2	3	4	5	6	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

7-3-6. 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
K:<S or D><S or L or A><No.>,<Dat>	Echo Prompt

Commands

BYTE No.	1	2	3	4	5-7	8	9	
Command	K	:	S	S	000-3FF	,		CR
			D	L	000-1FF			
				A				

BYTE 3	<S or D> Select between S (Source) or D (Destination)
BYTE 4	<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 Web GUI. L: Source Name or Destination Name, Import Name fields on the Web GUI. A: Source Name or Destination Name, Name (ASCII) fields on the Web GUI.
BYTE5-7	<No.> Indicates the channel number. Source: 000-3FF, Destination: 000-1FF
BYTE9-	<Dat> Channel names Strings in Hex characters (max. 128 bytes). Character code: UTF-8
CR	Carriage return

8. Gearbox Feature (MFR-16SDIGB/16SDOGB)

Optional **MFR-16SDIGB**/**16SDOGB** cards support Gearbox features, in which video signal conversions 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
- Clean switch after conversion by AVDL (Automatic Variable Delay Line)
  Also allows Gearbox I/O delay selection (excluding 2SI / SQD conversions)
- Genlock or Line lock synchronization
- H/V ANC data pass-through

8-1. MFR-16SDIGB / 16SDOGB Cards

MFR-16SDIGB / 16SDOGB cards have four built-in Gearboxes that can respectively perform signal conversions and output test patterns.
Four A connectors (1A, 2A, 3A and 4A) can support 12G-SDI signals. If a 12G-SDI signal is input to a Gearbox, other connectors are disabled.
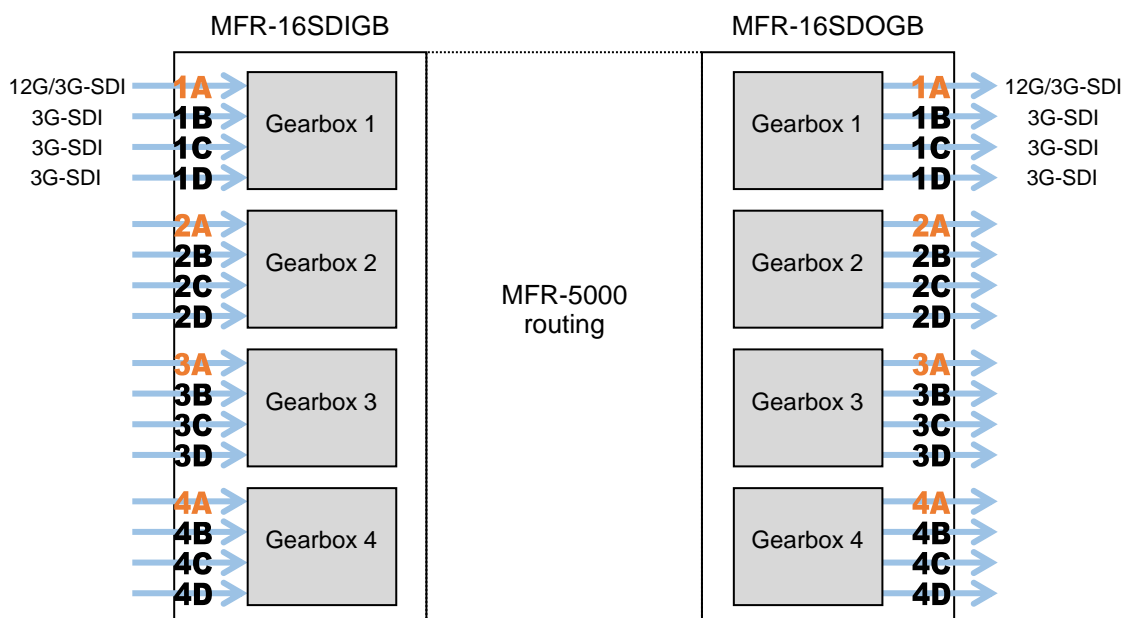
◆ **Supported formats**

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

8-2. Available Conversions

◆ **The following input conversions are available on MFR-16SDIGB cards**

From	To	Lock	Delay(H)(*3)	Total Delay (*4)	Ancillary Data
12G-SDI	3G Quad (2SI)	Line lock (*1)	0.3H to 1H	0 frame + ** (H)	Through Mask
		Genlock	0.3H to 1H	0 frame + ** (H) 1 frame + Delay (H)	
			0.5H to 1H	1 frame + 0H	
12G-SDI	3G Quad (SQD)	Line lock (*1)(*2) Genlock	0.3H to 1H	1 frame + Delay (H)	
3G Quad (2SI)	3G Quad (SQD)				
3G Quad (SQD)	3G Quad (2SI)		0.5H to 1H	1 frame + 0H	

◆ **The following output conversions are available on MFR-16SDOGB cards**

From	To	Lock	Delay(H)(*3)	Total Delay (*4)	Ancillary Data
3G Quad (2SI)	12G-SDI	Line lock (*1)	0.3H to 1H	0 frame + ** (H)	Through Mask
		Genlock	0.3H to 1H	0 frame + ** (H) 1 frame + 0H 1 frame + Delay (H)	
3G Quad (SQD)	12G-SDI	Line lock (*1)(*2) Genlock	0.3H to 1H	1 frame + 0H 1 frame + Delay (H)	
3G Quad (2SI)	3G Quad (SQD)				
3G Quad (SQD)	3G Quad (2SI)				

(*1) SDI signal input to the A connector is used as reference. When Line Lock is selected on MFR-16SDOGB cards, video signals are synchronized by inputting signals to all four channels in gearboxes.
(*2) Available only on Gearboxes 1 and 3.
(*3) **Delay (H)** and **Total Delay (H)** indicate amount of 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)	-0.1H to +0.9H
0.6H	-0.5H to +0.5H	1H (2)	-0.5H to +0.5H
0.7H	-0.4H to +0.6H		

(*4) If **Total Delay (frame)** is set to "**0 frame**" for both gearboxes, the **different Total Delay (H)** setting is available for the gearboxes.
If **Total Delay (frame)** is set to "**1 frame**" for either one or both gearboxes, the **same Total Delay (H)** setting is required for the gearboxes: **1 frame + 0H** or **1frame + Delay (H).**

8-3. Conversion Settings

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

8-3-1. Converting 3G SQD Input to 2SI (MFR-16SDIGB)
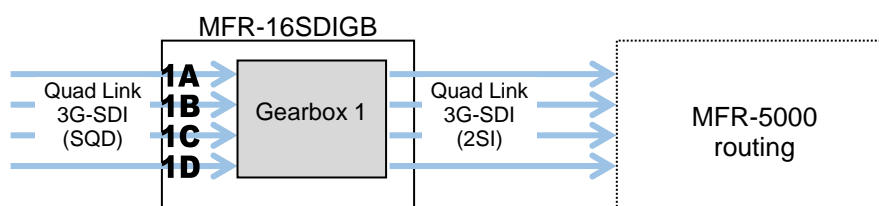
1) Open the **Gearbox Settings** page in the Web GUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-16SDIGB card block. (This example sets Gearbox 1 on the Slot 1 card.)
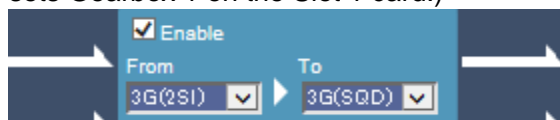
2) Open the **Source Assignment** page in the Web GUI and assign the physical channels (**SDI1-4**) to logical channels (**SRC 1-4**).

	LogicalNo. / Name	Slot	Physical No.
1	SRC 1	1 MFR-16SDIGB	SDI 1
2	SRC 2	1 MFR-16SDIGB	SDI 2
3	SRC 3	1 MFR-16SDIGB	SDI 3
4	SRC 4	1 MFR-16SDIGB	SDI 4

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

8-3-2. Converting 2SI to SQD Output (MFR-16SDOGB)

1) Open the **Gearbox Settings** page in the Web GUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-16SDOGB card block. (This example sets Gearbox 1 on the Slot 9 card.)
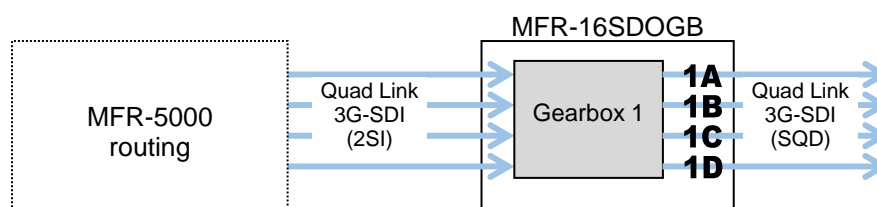

2) Open the **Destination Assignment** page in the Web GUI and assign the physical channels (**SDI1-4**) to logical channels (**DST 1-4**).

	LogicalNo. / Name	Slot	Physical No.
1	DST 1	1:MFR-8SDOGB	SDI 1
2	DST 2	1:MFR-8SDOGB	SDI 2
3	DST 3	1:MFR-8SDOGB	SDI 3
4	DST 4	1:MFR-8SDOGB	SDI 4

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

8-3-3. Converting 12G-SDI Input to 3G-SDI 2SI (MFR-16SDIGB)

1) Open the **Gearbox Settings** page in the Web GUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-16SDIGB card block. (This example sets Gearbox 1 on the Slot 1 card.)
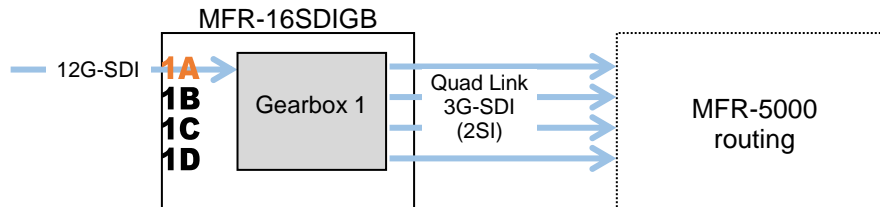

2) Open the **Source Assignment** page in the Web GUI and assign the physical channels (**SDI 1 Link A to D**) to logical channels (**SRC 1-4**).

	LogicalNo. / Name	Slot	Physical No.
1	SRC 1	1:MFR-16SDIGB	SDI 1 Link A
2	SRC 2	1:MFR-16SDIGB	SDI 1 Link B
3	SRC 3	1:MFR-16SDIGB	SDI 1 Link C
4	SRC 4	1:MFR-16SDIGB	SDI 1 Link D

* Four channel assignments are required for 12G-SDI signals in the same manner as for Quad-Link 3G-SDI signals.

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

8-3-4. Converting 3G-SDI SQD to 12G-SDI Output (MFR-16SDOGB)

1) Open the **Gearbox Settings** page in the Web GUI and select signal formats under **From** and **To** as shown below for a Gearbox in the MFR-16SDOGB card block. (This example sets Gearbox 1 on the Slot 9 card.)
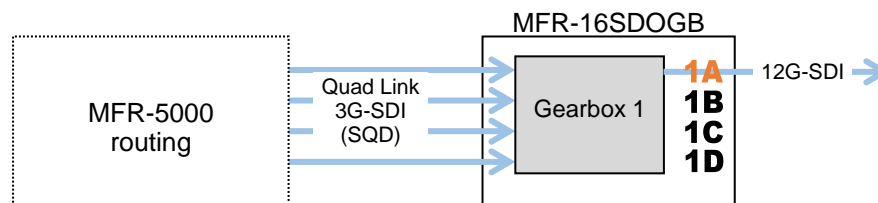

2) Open the **Destination Assignment** page in the Web GUI and assign the physical channels (**SDI 1 Link A to D**) to logical channels (**DST 1-4**).

	LogicalNo. / Name	Slot	Physical No.
1	DST 1	1:MFR-16SDOGB	SDI 1 Link A
2	DST 2	1:MFR-16SDOGB	SDI 1 Link B
3	DST 3	1:MFR-16SDOGB	SDI 1 Link C
4	DST 4	1:MFR-16SDOGB	SDI 1 Link D

* Four channel assignments are required for 12G-SDI signals in the same manner as for Quad-Link 3G-SDI signals.

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

9. Troubleshooting

If any of the following problems occur during operation of your MFR-5000, proceed as indicated below to see if the problem can be corrected before assuming a unit malfunction has occurred.

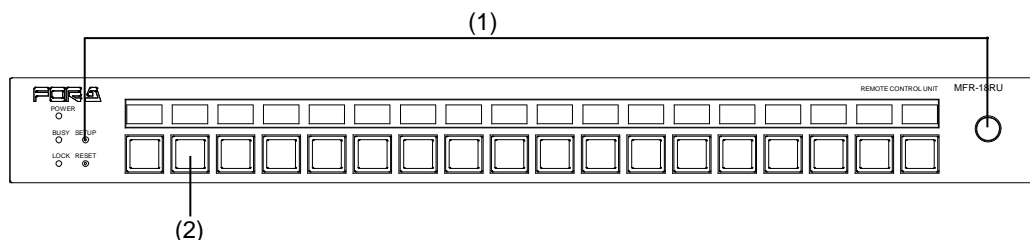| IMPORTANT |
| --- |
| If the problem cannot be corrected by performing the procedures below, turn the unit off and then on again. If this still does not correct the problem, contact your dealer. |

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?	Connect cables properly.
	Is the crosspoint set properly?	Set crosspoints properly.
Unable to control using the remote control panel.	Is the LAN cable properly connected?	Properly connect the LAN cable.
	Is the RU Info page in the Web-based Control indicating NG?	Check the item 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.)	Connect both MFR-LAN (CPU1) and MFR-LAN (CPU2) to the network correctly.
	If network connections are properly made, turn unit power OFF then ON again.	Consult your FOR-A reseller if the secondary CPU is still active after restarting
The text color has changed from the original color.	Button displays may be deteriorated over time.	Refer to Sec. 9-1 to fine-tune colors.

# 9-1. Tuning the Text Color on Remote Unit Buttons

MFR-18RU/39RU/16RUTA/39RUA/18RUA units allow you to adjust the color of NAME DISPLAY and LCD.

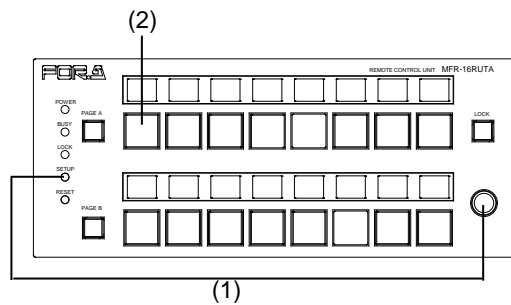## 9-1-1. MFR-18RU/39RU Color Tuning Procedure

Ex) MFR-18RU

(1) Press and hold CONTROL, then press the SETUP button for more than 5 seconds. All NAME DISPLAY text will turn to white.
(2) Press a button to be adjusted.

TARGET	RED	GREEN	BLUE	ADJUST	EXEC
	OFF	OFF	OFF	0	NO
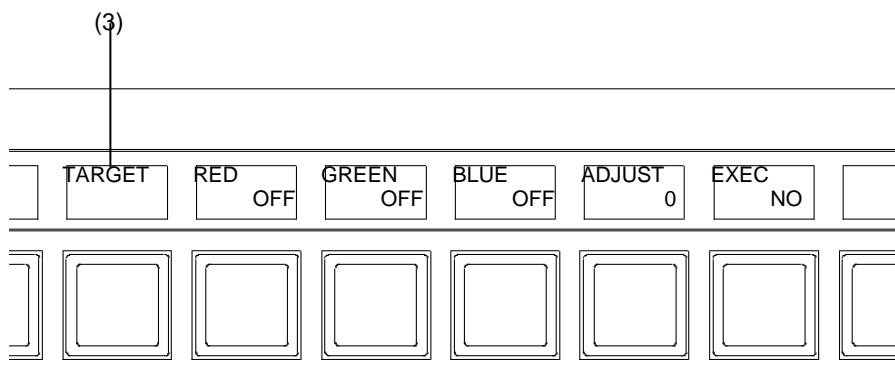
(3) The **TARGET** will appear and blink above the button and **RED**, **GREEN**, **BLUE**, **ADJUST** and **EXEC** are also displayed.
(4) To set **RED**, **GREEN** or **BLUE** to **ON**, turn the control knob to select **RED**, **GREEN** or **BLUE**, then press the control knob to turn it to **ON**.
(5) Press the control knob to select **ADJUST**, then turn the control knob to adjust the selected color component(s) (RED, GREEN and/or BLUE).
(6) After the button color adjustment is complete, press the control knob to move to **EXEC**. Turn the control knob to select **YES**, then press the control knob to execute the setting.
(7) The **TARGET** will blink above the button.
Pressing another button allows you to apply the set color to the button. The **COPY** will appear above the button.
(8) After applying the color to all buttons, press **SETUP** to complete the color adjustment.

9-1-2. MFR-16RUTA/39RUA/18RUA Color Tuning Procedure

Ex) MFR-16RUTA

(1) Press and hold CONTROL, then press the SETUP button for more than 5 seconds. All NAME DISPLAY text will turn to white.
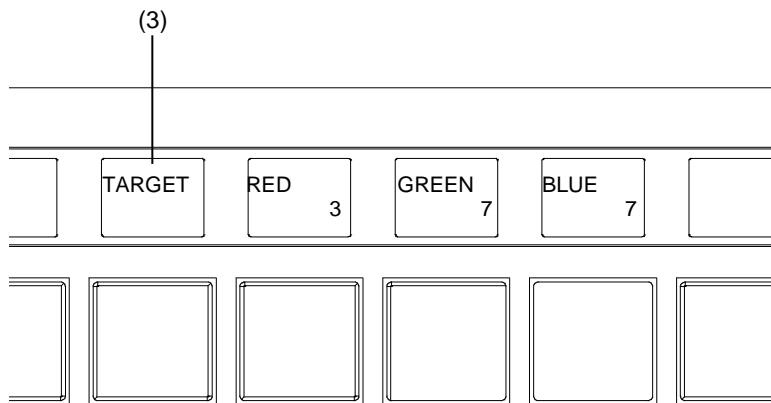(2) Press a button to be adjusted.

(3) The **TARGET** will appear and blink above the button. **RED**, **GREEN** and **BLUE** are also displayed.
(4) To adjust the target button color using **RED**, **GREEN** and **BLUE**, press the control knob to select **RED**, **GREEN** or **BLUE**, then turn the control knob to change its value.

    Setting range: RED: 0-3, GREEN and BLUE: 0-7

(5) To adjust another button color, repeat steps from (2) to (4)
(6) All button color settings are finished, press **SETUP**.

10. Specifications and Dimensions

10-1. Unit Specifications

10-1-1. MFR-5000

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. 16 x 16 to Max. 128 x 128 + Monitor OUT x 4 Number of input slots: 8 Number of output slots: 8 (Expandable on a 16-channel basis)
Video Input	
MFR-16SDI/ 16SDIA	SDI Input Card: 75 ohm, BNC x 16 (8 cards Max.) Compliant with the following (75Ω BNC) - SMPTE 424M (3G-SDI) - SMPTE 292M (HD-SDI) - SMPTE 259M (SD-SDI) - DVB-ASI Cable Equalization 3G/HD-SDI: 100 m (5C-FB cable) SD-SDI: 200 m (5C-2V cable)
MFR-16SDIGB	SDI Input Card - BNC x 4 (12G-SDI or 3G-SDI) - BNC x 12 (3G-SDI) Compliant with the following (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-16SDO	SDI Output Card: 75 ohm, BNC x 16 (Max. 8 cards) Compliant with the following (75Ω BNC) (Auto reclocking) - SMPTE 424M (3G-SDI) - SMPTE 292M (HD-SDI) - SMPTE 259M (SD-SDI) - DVB-ASI
MFR-16SDOGB	SDI Output Card - BNC x 4 (12G-SDI or 3G-SDI) - BNC x 12 (3G-SDI) Compliant with the following (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)
Monitoring Output	3G/HD/SD-SDI, DVB-ASI: 75Ω BNC x 4 (Auto reclocking not supported)
Audio Input	
MFR-16ADI	AES/EBU Audio Input Card with SRC (Max. 4 cards) - BNC x 16 (16 stereo pairs, 32 channels) - 75 ohm, BNC - Sampling frequency: 32kHz, 44.1kHz, 48kHz, 96kHz

MFR-16AAI	Analog Audio Input Card with A/D converter (Max. 4 cards)
	- 25-pin D-sub (female) x 4 (16 stereo pairs, 32 channels)
	- Balanced or unbalanced, 600 ohm or highimpedance
	- Sampling frequency: 48kHz
MFR-16AAIEX	Analog Audio Input Card with A/D converter (Max. 4 cards)
	- 25-pin D-sub (female) x 4 (16 stereo pairs, 32 channels)
	- Balanced or unbalanced, 600 ohm or high impedance
	- Sampling frequency: 48kHz
MFR-16AESI	AES/EBU Audio Input Card (Max. 8 cards)
	- BNC x 16 (16 stereo pairs, 32 channels)
	- 75 ohm, BNC
Audio Output	
MFR-16AAOEX	Analog Audio Output Card with D/A converter (Max. 4 cards)
	- 25-pin D-sub (female) x 4 (16 stereo pairs, 32 channels)
	- Balanced or unbalanced, less than 100Ω, 48kHz
	- Sampling frequency: 48kHz
MFR-16ADAO	Embedded/AES/Analog Audio Output Card (Max. 8 cards)
	AES/EBU (Synchronous only)
	- BNC x 8 (8 stereo pairs. 16 channels)
	- 48 kHz
	Embedded audio (1080/59.94i or 1080/60i)
	- BNC x 2 (8 stereo pairs. 16 channels),
	- Unbalanced, 48 kHz
	Analog audio
	- 25-pin D-sub (female) x 1 (4 stereo pairs. 8 channels),
	- Balanced or unbalanced, less than 100Ω, 48 kHz
MFR-16AESO	AES/EBU Audio Output Card (Max. 8 cards)
	- BNC x 16 (16 stereo pairs. 32 channels)
	- 75 ohm BNC
RS-422 data input/output	
MFR-16DTIO	RS-422 data Input / Output Card (Max. 8 cards)
	Data rate: Max. 115.2 kbps
	9-pin D-sub (female) x 16
Reference Input	BB: 0.429 Vp-p (NTSC)/0.45 Vp-p (PAL) or Tri-level Sync: ±0.3 Vp-p
	75Ω BNC x 2, loop-through (Terminate with 75Ω terminator, it unused.)
Interfaces	
MFR-LAN	10/100/1000 Base-T, RJ-45 x 2
	(For connecting up to 128 RU/GPI units.)
	(Second LAN port used in redundant CPU configuration)
PC-LAN	10/100 Base-TX, RJ-45 x 2 (for PC operation)
	(Second LAN port used in redundant CPU configuration)
SERIAL	RS-232C/RS-422 (Internal switch), 9-pin D-sub (male) x 1
ALARM	9-pin D-sub (female) x 1 (Input: Reset, Output: Power, Fan Alarm)
Temperature	0ºC to 40ºC
Humidity	30% to 85% (no condensation)
Power	100 VAC to 240 VAC ±10%, 50/60Hz IN x 2
Consumption	128 x 128 input/output, Dual CPU/Redundant Power Unit (Maximum Configuration):
	100 V AC to 120 V AC: 1000 VA (982 W)
	200 V AC to 240 V AC: 946 VA (938 W)
Dimensions	480 (W) x 354 (H) x 402 (D) mm, EIA 8 RU
Weight	50 kg (with full options)
Consumables	Power supply unit: Replace every 5 years
	Fans: P-1426, P-1429, P-1430, P-1431 Replace every 4 years

10-1-2. MFR-39RUA

Buttons/Colors	39 buttons (OLED buttons, 7-color) Displayed in each button (Max. 7 characters x 2 lines) 6 buttons (3 colors: red/green/orange), user assignable Current DEST button, current SRC button, current PAGE display x 2, Rotary selector
Number of Connections	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1 (For connection to MU. A network hub required for multiple unit configuration.)
SERVICE	RS-232C 9-pin D-sub (male) x 1 (for maintenance)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 V DC Pin-connector x 2 (redundant power supply as standard)
Consumption	100 V AC to 120 V AC: 19 VA (9 W), 200 V AC to 240 V AC: 24 VA (9 W)
Dimensions	430(W) x 88(H) x 42(D) mm EIA 2 RU
Weight	3 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-3. MFR-39RU

Buttons/Colors	39 buttons (LED buttons, 7-color) Displayed in each button (Max. 7 characters x 2 lines) 10 buttons (3 colors: red/green/orange), user assignable Menu display x 1 (Max. 23 characters x 2 lines) with Rotary selector
Number of Connections	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1 (For connection to MU. A network hub required for multiple unit configuration.)
SERVICE	RS-232C 9-pin D-sub (male) x 1 (for maintenance)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 V DC Pin-connector x 2 (redundant power supply as standard)
Consumption	100 V AC to 120 V AC: 17 VA (9 W), 200 V AC to 240 V AC: 22 VA (11 W)
Dimensions	430(W) x 88(H) x 44(D) mm EIA 2 RU
Weight	3 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-4. MFR-40RU

Buttons/Colors	40 buttons (3 colors: red/green/orange), user assignable
Number of Connections	Max. 128 units (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
SERVICE	RS-232C 9-pin D-sub (male) x 1 (for maintenance)
Temperature	0°C to 40°C
Humidity	30% to 85% (no condensation)
Power	+12 VDC Pin-connector x 2 (redundant power supply as standard)
Consumption	100 V AC to 120 V AC: 10 VA (5 W), 200 V AC to 240 V AC: 15 VA (7 W)
Dimensions	430(W) x 44(H) x 42(D) mm EIA 1 RU
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-5. MFR-18RUA

Buttons/Colors	18 buttons (3 colors: red/green/orange), user assignable OLED display x 18 (Max. 7 characters x 2 lines, Displayed above each button) with Rotary selector
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
SERVICE	RS-232C 9-pin D-sub (male) x 1 (for maintenance)
Temperature	0°C to 40°C
Humidity	30% to 85% (no condensation)
Power	+12 V DC Pin-connector x 2 (redundant power supply as standard)
Consumption	100 V AC to 120 V AC: 14 VA (6 W), 200 V AC to 240 V AC: 18 VA (6 W)
Dimensions	430(W) x 44(H) x 42(D) mm EIA 1 RU
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-6. MFR-18RU

Buttons/Colors	18 buttons (3 colors: red/green/orange), user assignable
	LCD display x 18 (Max. 7 characters x 2 lines, Displayed above each button) with Rotary selector
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
SERVICE	RS-232C 9-pin D-sub (male) x 1 (for maintenance)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 V DC Pin-connector x 2 (redundant power supply as standard)
Consumption	100 V AC to 120 V AC: 12 VA (6 W),
	200 V AC to 240 V AC: 18 VA (8 W)
Dimensions	430(W) x 44(H) x 42(D) mm EIA 1 RU
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-7. MFR-16RU/16RUD

Buttons/Color	16 buttons (1 color: green), user assignable
	Menu Display (Max. 16 characters x 2 lines) (MFR-16RUD only)
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 V DC Pin-connector x 1
Consumption	MFR-16RU: 100 V AC to 120 V AC: 7 VA (3 W),
	200 V AC to 240 V AC: 11 VA (4 W)
	MFR-16RUD: 100 V AC to 120 V AC: 8 VA (3 W),
	200 V AC to 240 V AC: 11 VA (4 W)
Dimensions	430(W) x 44(H) x 34 (D) mm EIA 1 RU
Weight	1 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-8. MFR-16RUTA

Buttons/Color	16 buttons (3 colors: red/green/orange), user assignable
	OLED display x 16 (Max. 7 characters x 2 lines, Displayed above each button)
	2 buttons for PAGE control (lit orange)
	1 button for LOCK control (lit orange)
	Rotary selector
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 V DC Pin-connector x 1
Consumption	100 V AC to 120 V AC: 12VA (5W)
	200 V AC to 240 V AC: 15VA (6W)
Dimensions	215(W) x 88(H) x 43(D) mm EIA 2 RU, half-rack size
Weight	1 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-9. MFR-16RUW

Buttons/Color	18 buttons (1 color: green), user assignable
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 VDC Pin-connector x 1
Consumption	100 V AC to 120 V AC: 8 VA (3 W),
	200 V AC to 240 V AC: 11 VA (3 W)
Dimensions	480(W) x 44(H) x 27 (D) mm EIA 1 RU
Weight	1 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-10. MFR-32RUW

Buttons/Color	34 buttons (1 color: green), user assignable
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 VDC Pin-connector x 1
Consumption	100 V AC to 120 V AC: 10 VA (4 W), 200 V AC to 240 V AC: 13 VA (4 W)
Dimensions	480(W) x 44(H) x 27 (D) mm EIA 1 RU
Weight	1 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-11. MFR-64RUW

|	
Buttons/Color	64 buttons (1 color: green), user assignable
Number of Connection	Max. 128 (including Main, Remote and GPI units)
Interfaces	
MFR-LAN	10/100BASE-TX RJ-45 x 1
	(For connection to MU. A network hub required for multiple unit configuration.)
Temperature	0°C to 40°C
Humidity	30**%** to 85% (no condensation)
Power	+12 VDC Pin-connector x 1
Consumption	100 V AC to 120 V AC: 15 VA (7 W) 200 V AC to 240 V AC: 20 VA (8 W)
Dimensions	480(W) x 88(H) x 27(D) mm EIA2RU
Weight	1.5 kg
Consumables	AC adaptor: Replace every 5 years.

10-1-12. MFR-GPI

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 in standard configuration)
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

10-1-13. MFR-TALM

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 in standard configuration)
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 size
Weight	2 kg
Consumables	AC adaptor: Replace every 5 years

10-2. External Dimensions

10-2-1. MFR-5000

(All dimensions in mm.)
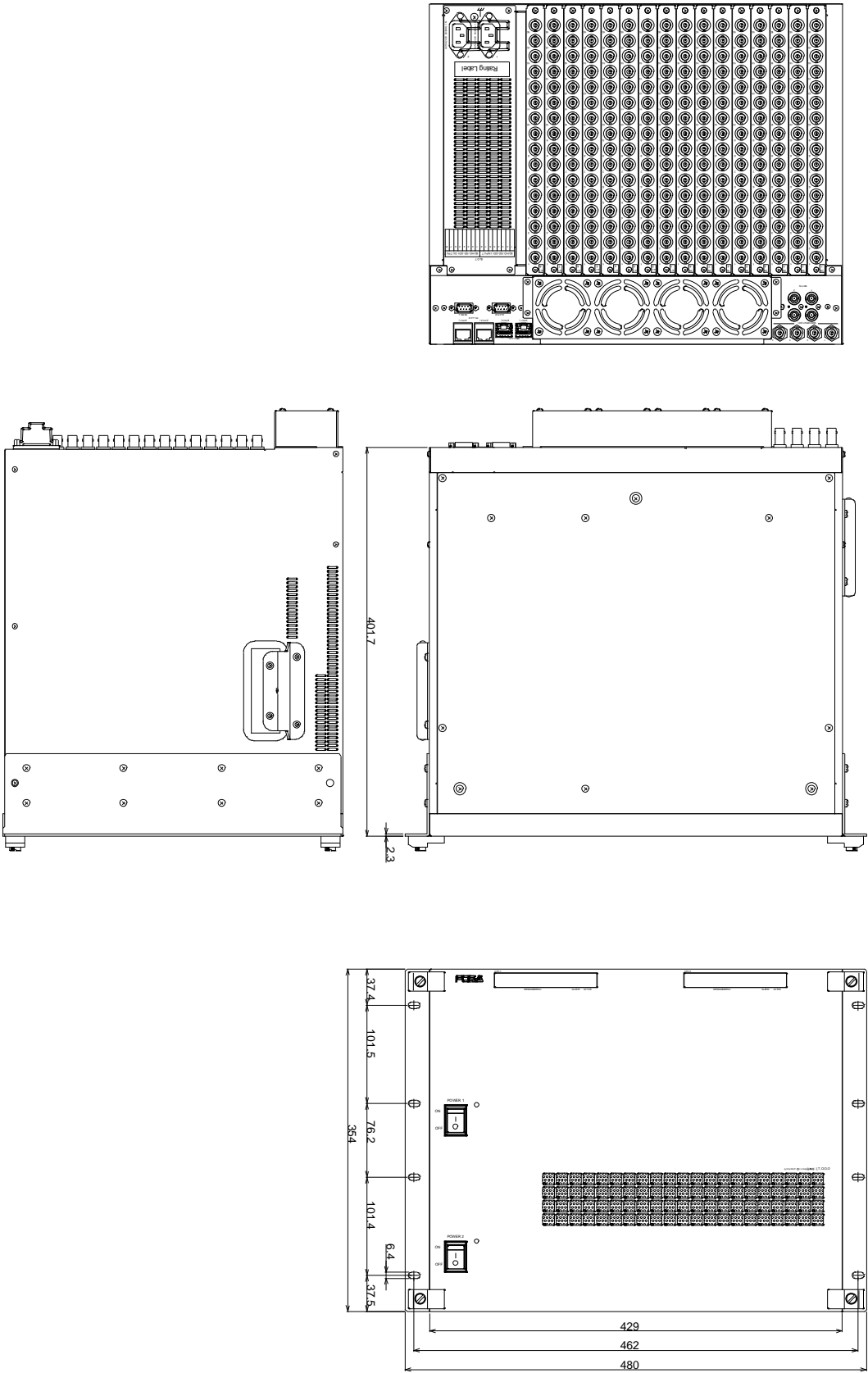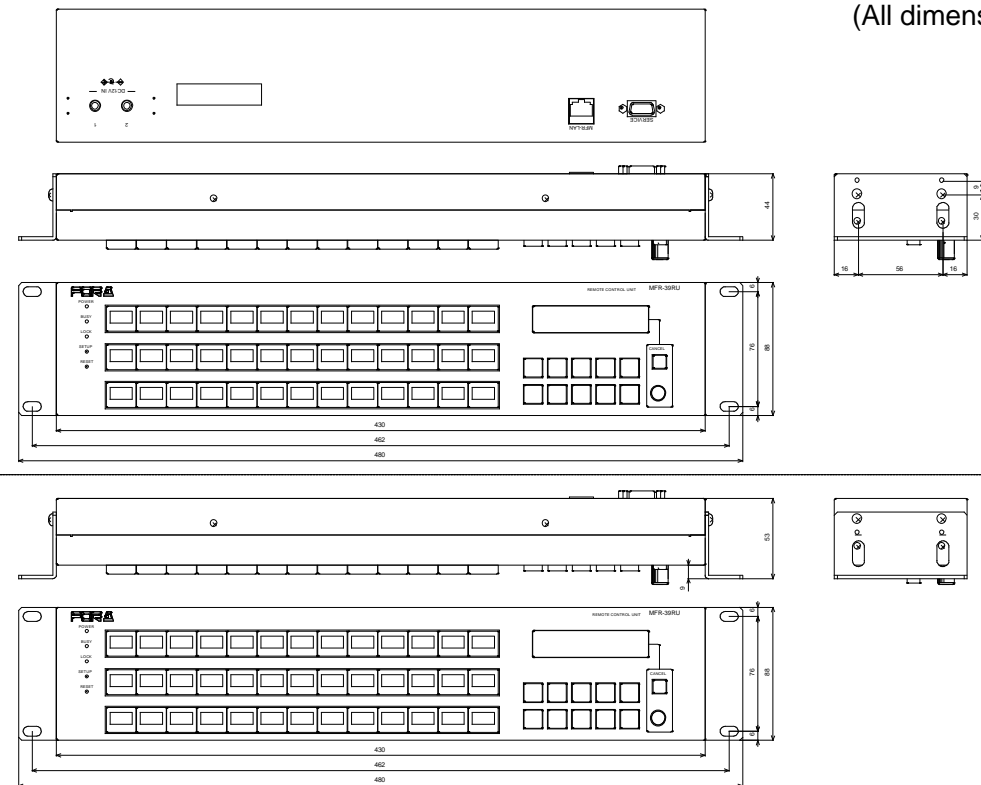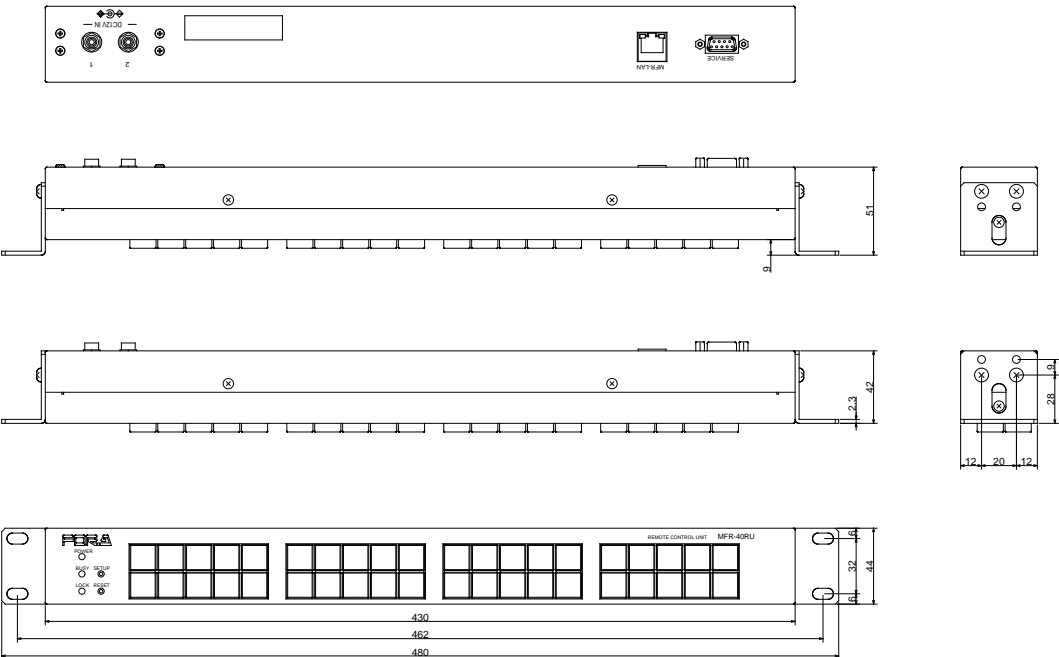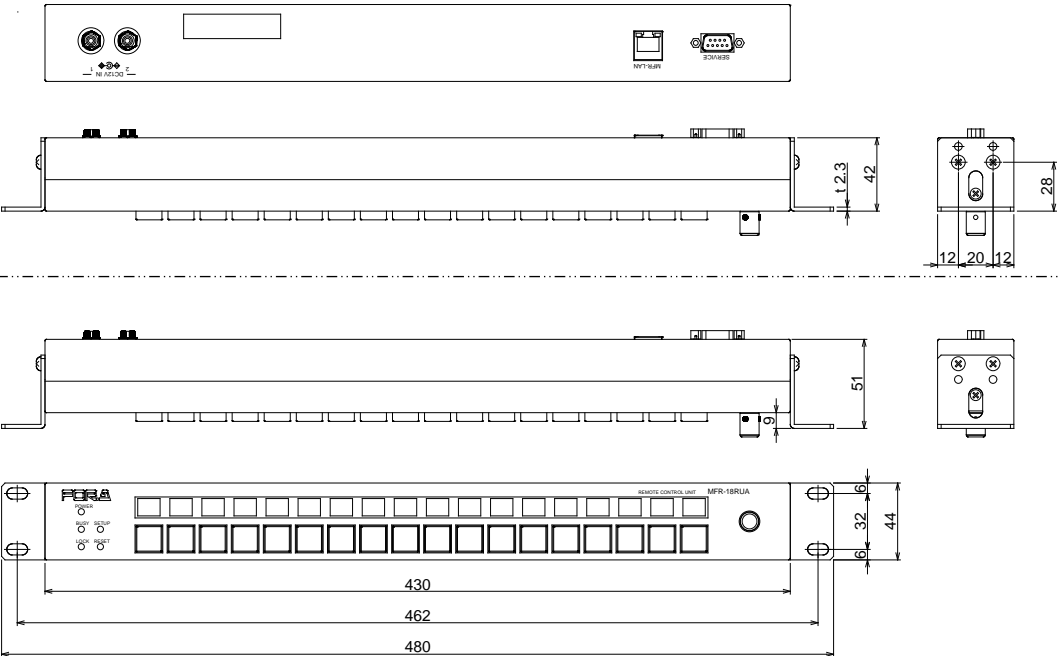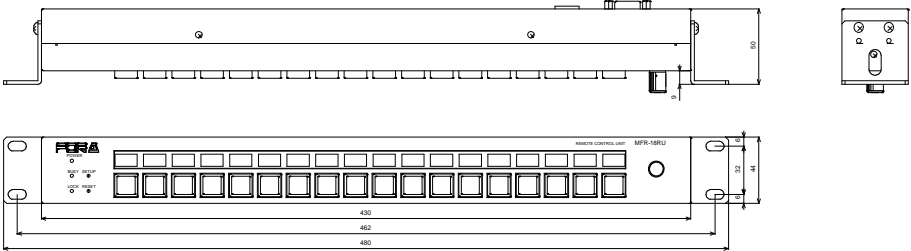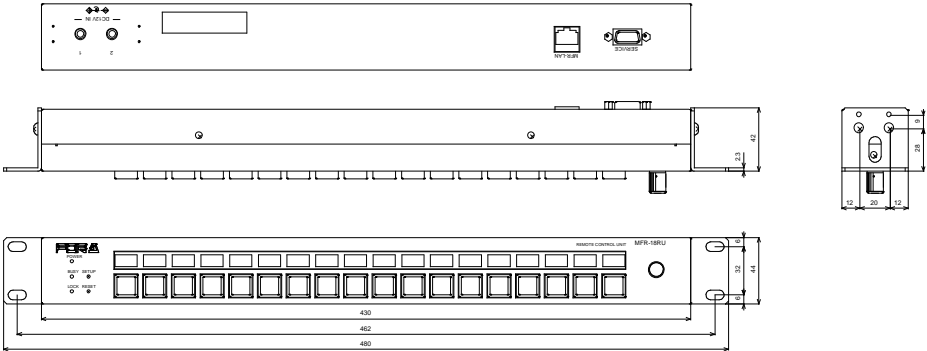
10-2-2. MFR-39RUA

(All dimensions in mm.)
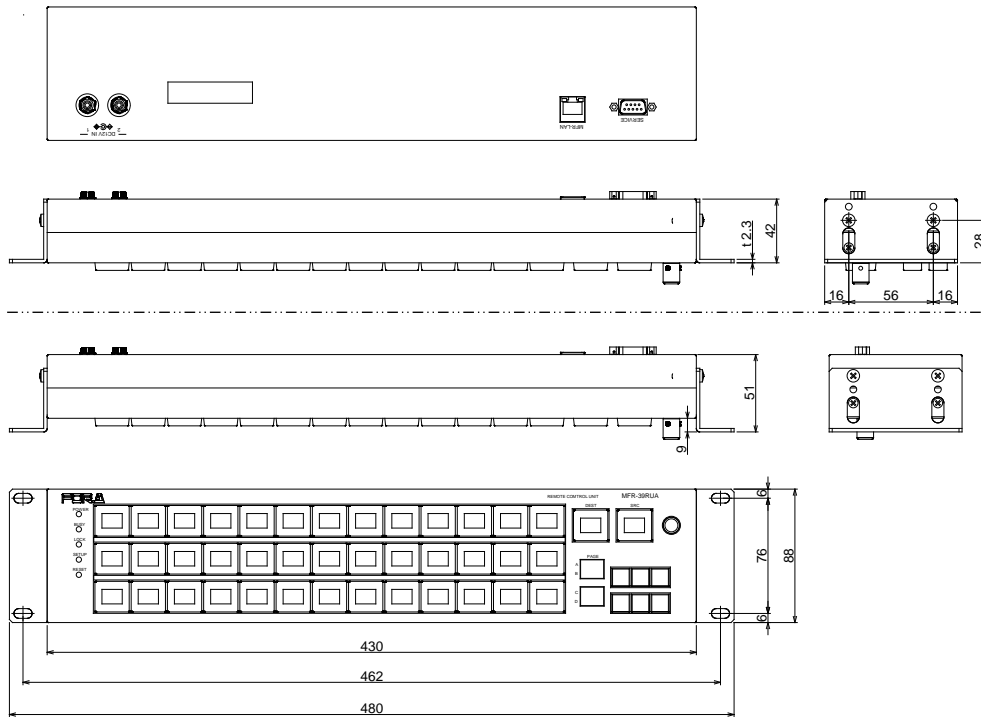
*   The panel buttons can be fitted within the rack by sliding the rack ears forward to attach as shown in the bottom figure above.

10-2-3. MFR-39RU

(All dimensions in mm.)

*   The panel buttons can be fitted within the rack by sliding the rack ears forward to attach as shown in the bottom figure above.

10-2-4. MFR-40RU
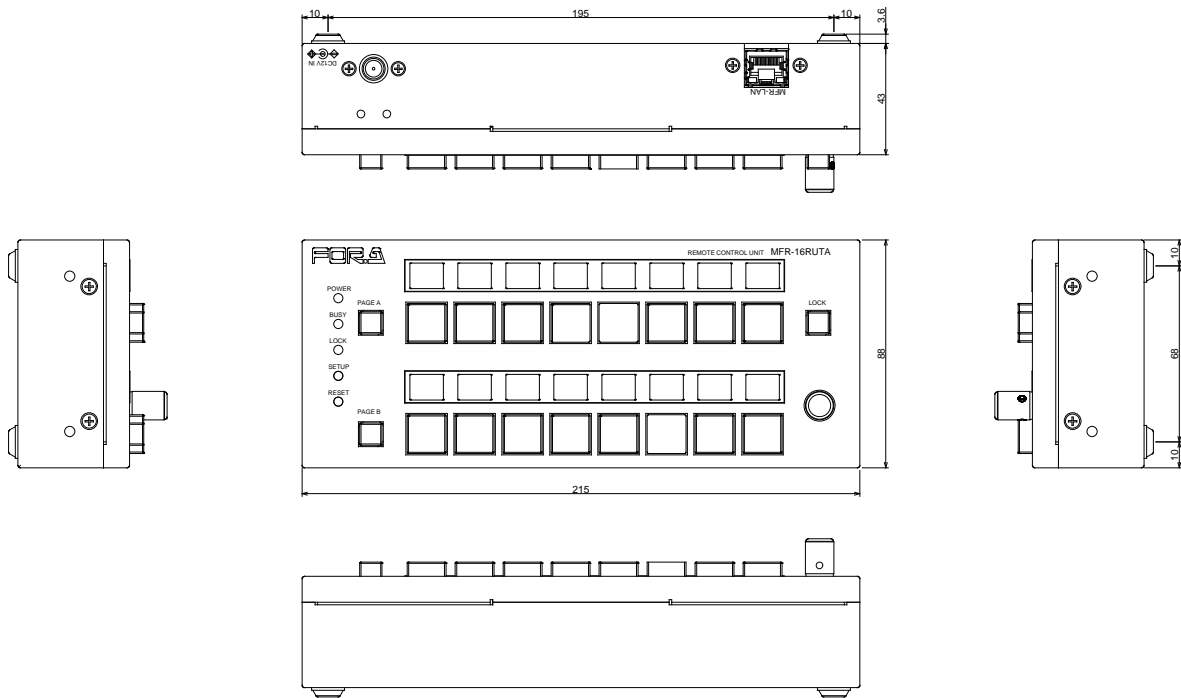
(All dimensions in mm.)

*   The panel buttons can be fitted within the rack by sliding the rack ears forward to attach as shown in the bottom figure above.

10-2-5. MFR-18RUA

(All dimensions in mm.)

*   The panel buttons can be fitted within the rack by sliding the rack ears forward to attach as shown in the bottom figure above.

10-2-6. MFR-18RU

(All dimensions in mm.)

* The panel buttons can be fitted within the rack by sliding the rack ears forward to attach as shown in the bottom figure above.

10-2-7. MFR-16RU

(All dimensions in mm.)

10-2-8. MFR-16RUD

10-2-9. MFR-16RUTA
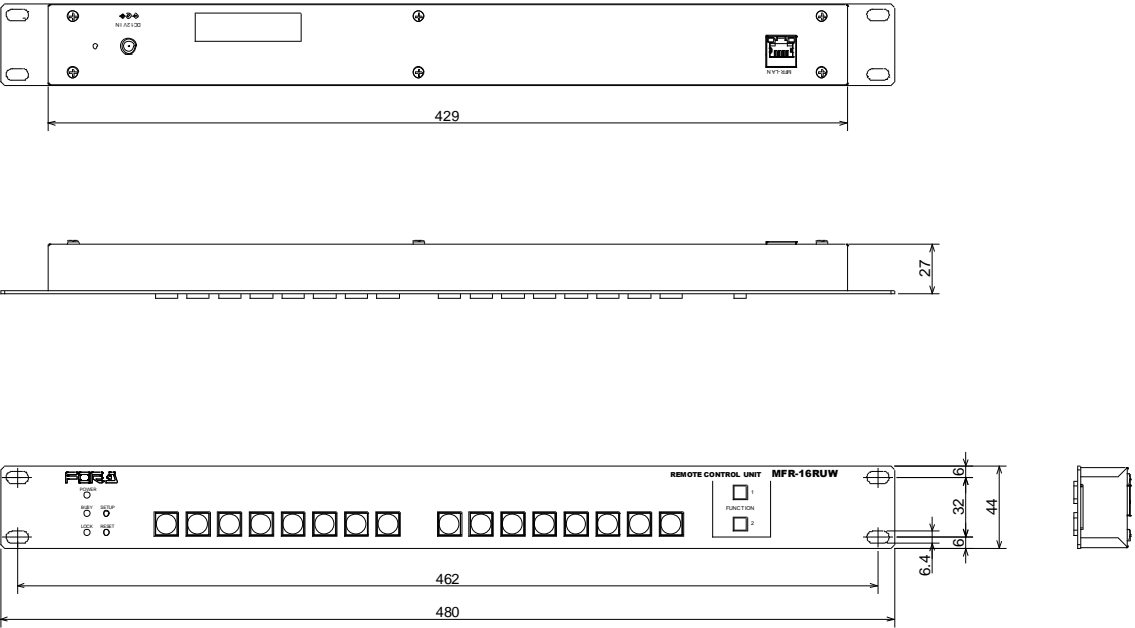
151
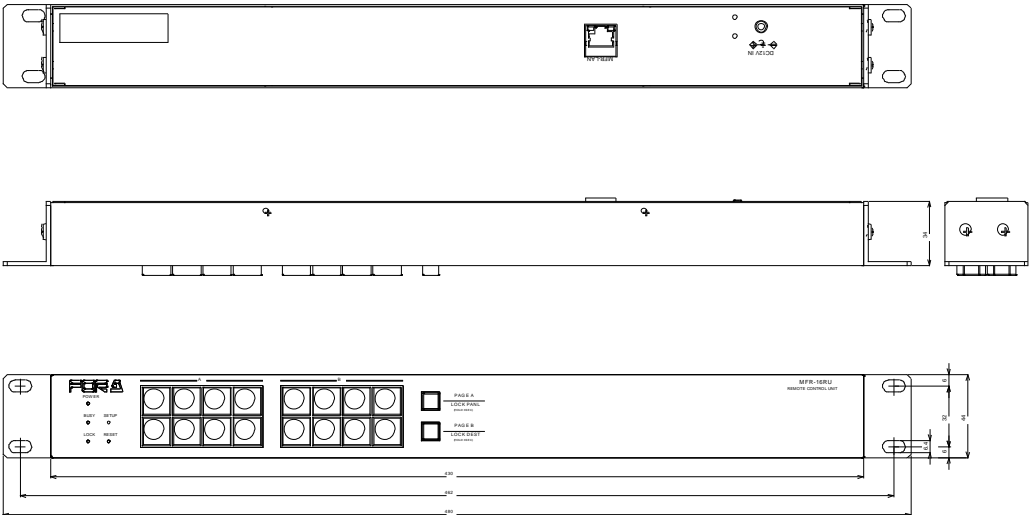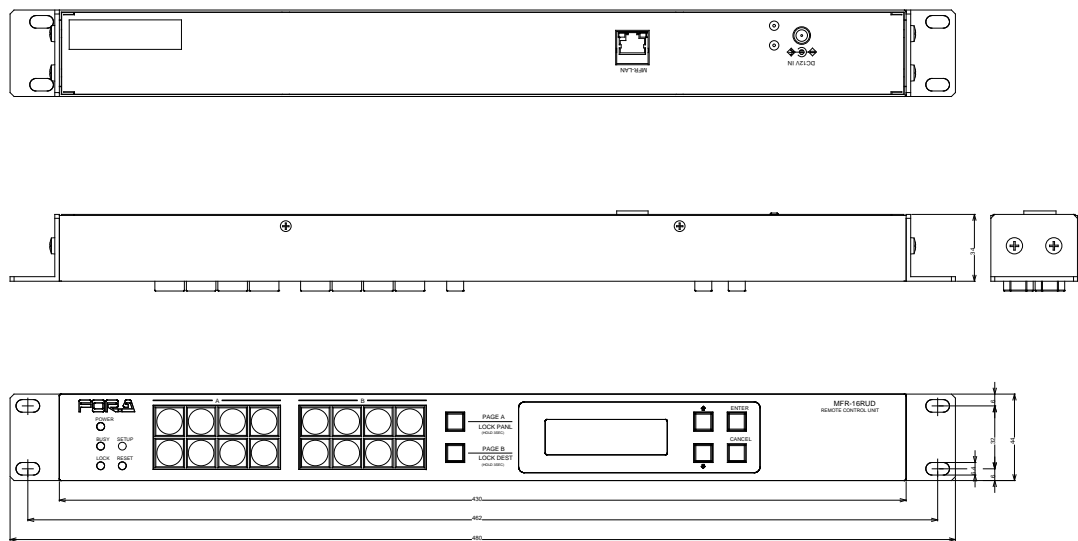
10-2-10. MFR-16RUW

(All dimensions in mm.)

429

27

462

480

6

32

44

6

6.4

10-2-11. MFR-32RUW

(All dimensions in mm.)

429

27

462

480

6

32

44

6

6.4
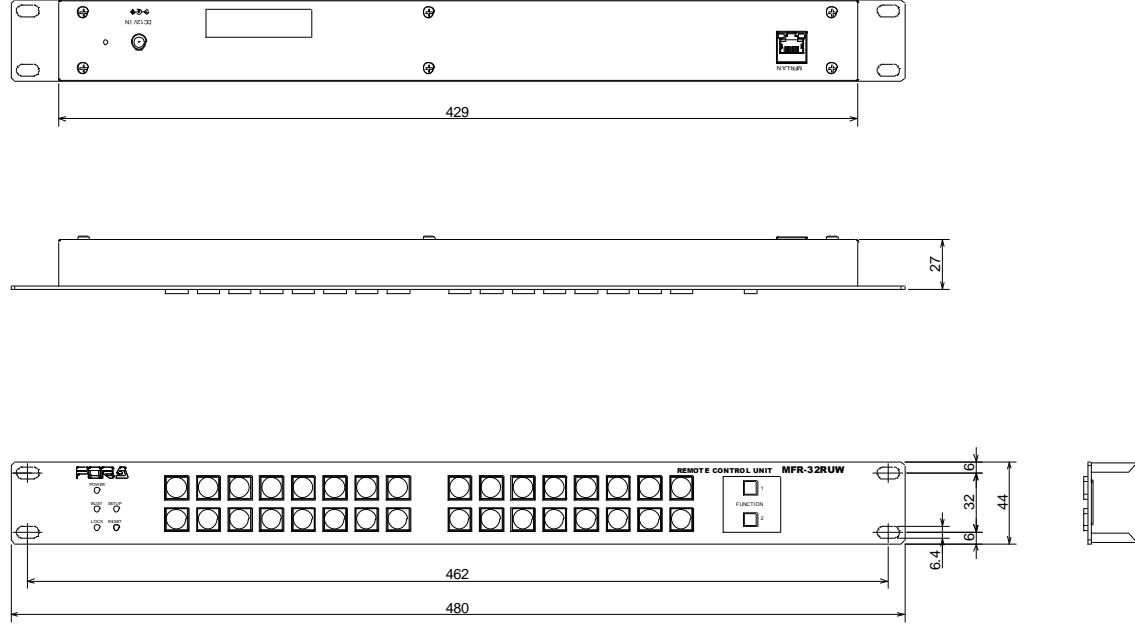
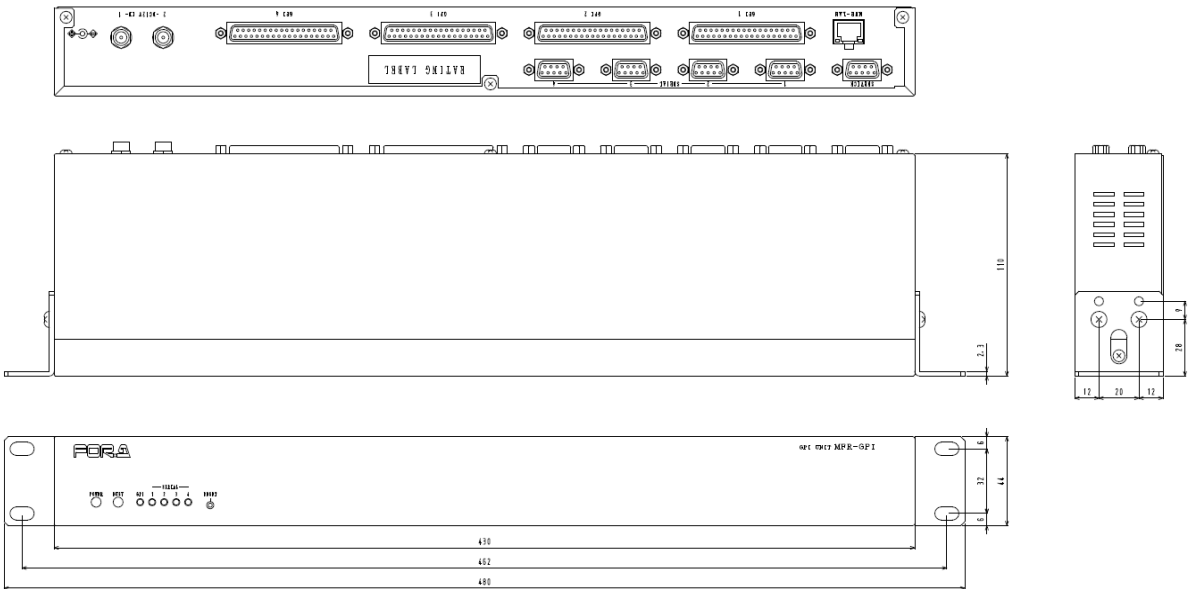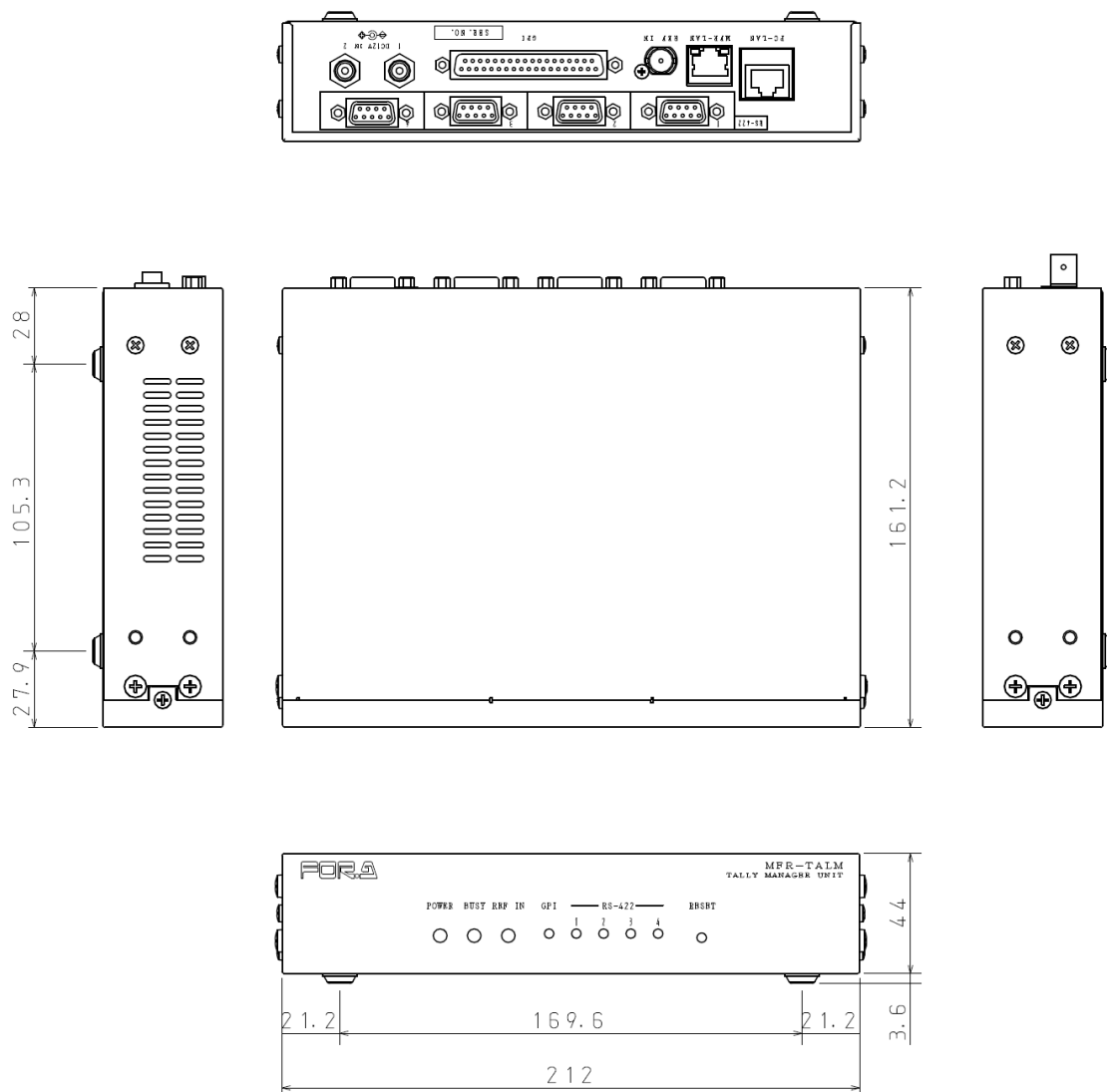## 10-2-12. MFR-64RUW

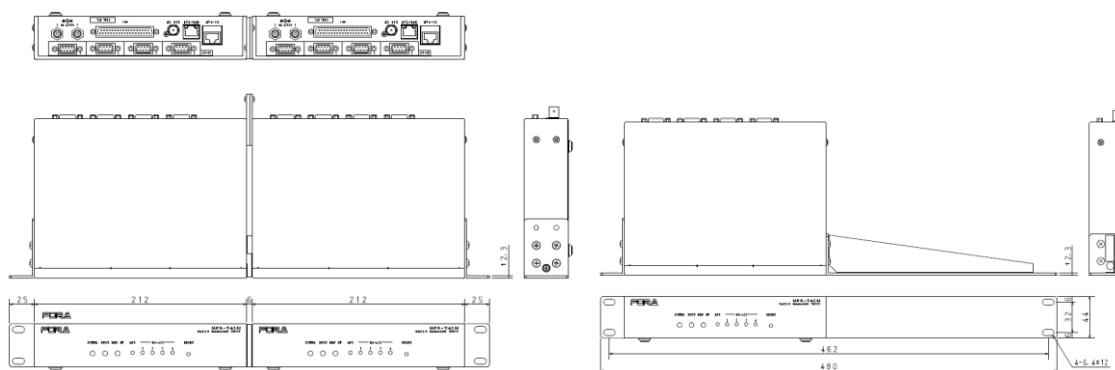(All dimensions in mm.)
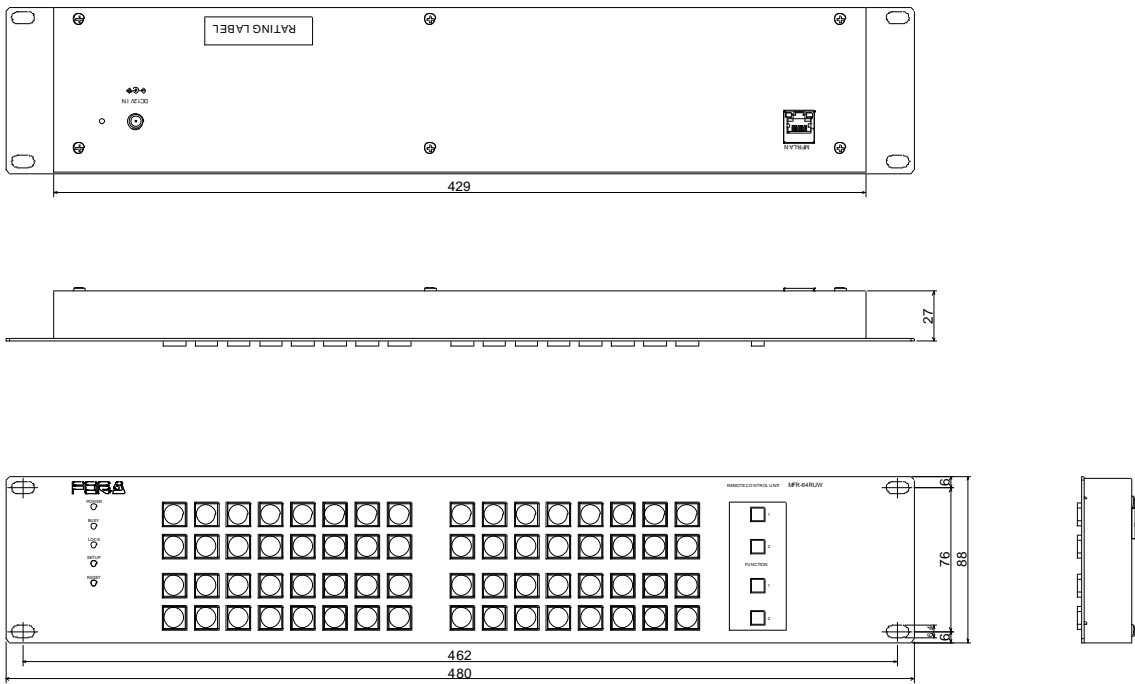
10-2-13. MFR-GPI

(All dimensions in mm.)

(All dimensions in mm.)

◆ If attaching the rack mount brackets (Dual / Single)

Appendix: Operation Tips

How to use Page buttons

Page navigation functions can be assigned to the front panel buttons on Remote Control Units.
► See Sec. 5-2-2 "Page Function" and Sec. 5-3. "Function Buttons."
► See [Web-based Control: RU Settings > **Assign Function**]

◆ Page Up/Page Down buttons
These buttons allow you to move one page forward/back. If the page reaches to the end, it loops back to the first page.

Ex) Assign Page Up for Group B to Button 9 in the Web GUI
(1) Click **System Settings** in the left pane.
(2) Click to select [(RU name)-[**Assign Function**] in the left pane to display the setting page.
(3) Select **9** under [Button ID].
(4) Select **Page** under [Function].
(5) Select **UP** under [Up/Down] and **B** under [Group].
(6) Click **Send** to apply settings.

```
PageUp
  B
```
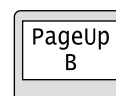
◆ Page Jump buttons
These buttons allow you to go back and forth between specified pages.

Ex) Assign Page Jump between 3 and 7 for Group B, C and D to Button 1 in the Web GUI
(1) Click to select [(RU name)-[**Assign Function**] in the left pane to display the setting page.
(2) Select **1** under [Button ID].
(3) Select **Page** under [Function].
(4) Select **Jump** under [Up/Down] and enable B, C and D under [Group], then select **3** under [Fwd] and **7** under [Rev].
(5) Click **Send** to apply settings.

```
Page>3
  All
```
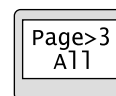
If **HOME** is set for [Rev], pressing the button lets you move between the current page and Page. If you are in Page 3 (Fwd setting), the button label is displayed highlighted.

The MFR-16RUD/39RU/39RUAunits allow you to assign functions to buttons by front panel operation.
► For default page buttons on the RU front panel, see Sec. 2-6-1 "Front Panel."
► For MFR-16RUD units, see Sec. 5-2-2. "Page Function."
► For MFR-39RU units, see Sec. 5-4-3-4. "PAGE MODE", 5-4-3-5. "PAGE ASSIGN" and 5-4-3-12. "BUTTON ASSIGN."
► For MFR-39RUA units, see Sec. 5-4-4-4. "BUTTON ASSIGN" and 5-4-4-10. "PAGE."

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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