BZBGEAR®

Amplify Your World™

BG-QuadFusion-JR

Crestron Driver User Manual

4-Channel HD Production Switcher with PIP/POP, Keying, Recording, Streaming and USB UVC Output

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Statement

Please read these instructions carefully before connecting, operating, or configuring this product. Please save this manual for future reference.

Safety Precaution

- To prevent damaging this product, avoid heavy pressure, strong vibration, or immersion during transportation, storage, and installation.
- The housing of this product is made of organic materials. Do not expose to any liquid, gas, or solids which may corrode the shell.
- Do not expose the product to rain or moisture.
- To prevent the risk of electric shock, do not open the case. Installation and maintenance should only be carried out by qualified technicians.
- Do not use the product beyond the specified temperature, humidity, or power supply specifications.
- This product does not contain parts that can be maintained or repaired by users. Damage caused by dismantling the product without authorization from BZBGEAR is not covered under the warranty policy.
- Installation and use of this product must strictly comply with local electrical safety standards.

Introduction

This driver has been designed to provide control of the BZBGEAR BG-QuadFusion-JR production switcher from a Crestron control system over the network.

The BG-QuadFusion-JR takes four HD inputs and provides program output, a multiview output and a USB UVC output, together with on-board recording and network streaming. The module controls the program and preview buses, cuts and auto transitions, Mix / Fade / Wipe effects, fade to black, freeze, PIP and POP, luma and chroma keying, the two-channel audio mixer, the output resolution, recording and streaming.

Like the BG-QuadFusion-4K this product uses the manufacturer's "Communication Protocol for Video Switcher V2.1": binary frames carried over UDP. There is no TCP control port and no serial port, so the module must be wired to a UDP client.

It is NOT simply a smaller QuadFusion-4K. The switcher reports platform id 0x28 where the 4K reports 0x69, returns a 150-byte status block instead of 98, has no HDR, uses the 2K output resolution codes, draws its audio mixer sources from table 2, and adds recording and streaming. The module reflects all of those differences.

Installation

- Copy all of the files in the module folder into your SIMPL Windows project directory so that SIMPL Windows recognizes the driver module.
- Open "BG QuadFusion JR.usp" in SIMPL+ Windows and compile it (F12) to generate the .ush header and the user module.

- In SIMPL Windows, add an Ethernet UDP/TCP Client and set it to UDP, with the switcher's IP address and port 7000.
- Drop the "BG QuadFusion JR" user module into your program.
- Wire the module's Tx_Switcher output to the tx$ of the UDP client, and wire the rx$ of the UDP client back to the module's Rx_Switcher input.
- Connect your touch panel joins to the module signals listed under Inputs and Outputs. A suggested join map is included with the module.

To control the matrix over the network, use a TCP/IP Client with the following settings:

Setting	Value
Connection	UDP - use an Ethernet UDP/TCP client symbol set to UDP
IP Address	The address configured on the switcher (shown in its menu)
UDP Port	7000
RS-232	Not used - this product is controlled over the network only

This model has no serial control port. All control is over UDP port 7000.

Because UDP is connectionless there is no socket to monitor: the module drives Online_Fb from the replies themselves and drops it if the switcher stops answering for 15 seconds.

Inputs

The module has the following signals available as inputs:

Status

Signal	Type	Description
Poll_Status	Digital	Read the switcher's full status block. The module sends this automatically at start-up and again shortly after every command. Drive it from an oscillator to keep the state fresh.
Identify	Digital	Ask the switcher to identify itself. The reply populates Model_Fb.

Program and Preview

Signal	Type	Description
PGM_Source	Analog	Program bus source: 1-4 for the inputs, 9 for colour bars. This changes what goes to air.
PVW_Source	Analog	Preview bus source: 1-4 for the inputs, 9 for colour bars.
Take_Cut	Digital	CUT: swap the program and preview buses immediately.
Take_Auto	Digital	AUTO: transition from preview to program using the selected effect and rate.

Transition Settings

Signal	Type	Description
Transition_Mix	Digital	Select the Mix transition.
Transition_Fade	Digital	Select the Fade transition.

Wipe_Effect	Analog	Select wipe effect 1-10. The module converts this to the value the switcher expects. Note that the switcher does not report which wipe is selected, only that one is.
Transition_Rate	Analog	AUTO transition speed: 0 slow, 1 medium, 2 fast.

Output

Signal	Type	Description
Output_Resolution	Analog	Program output resolution, using the 2K codes in the table below. This model is HD only.

Fade to Black, Freeze, Mute and Rotation

Signal	Type	Description
FTB_ON / FTB_OFF	Digital	Fade the program output to black, or restore it.
Still_ON / Still_OFF	Digital	Freeze the program output, or release it.
Mute_ON / Mute_OFF	Digital	Mute the program audio, or unmute it.
UVC_Rotate	Digital	Rotate the USB UVC output. This is a toggle on the switcher, so each pulse advances it.

PIP and POP

Signal	Type	Description
PIP_Enable	Analog	Picture-in-picture: 0 off, 1 on.
PIP_Size	Analog	PIP window size: 0 small, 1 medium, 2 large. Changing the size also repositions the PIP window.
POP_Enable	Analog	Picture-outside-picture: 0 off, 1 on.
POP_Window	Analog	Which source fills the POP window: 1 preview, 2 program. The switcher does not accept 0.

Keying

Signal	Type	Description
Luma_Key	Analog	Luma key: 0 off, 1 on.
Chroma_Key	Analog	Chroma key: 0 off, 1 on.
Chroma_Color	Analog	Chroma key background: 0 green, 1 blue.

Audio

Signal	Type	Description
Audio_Mode	Analog	0 AFV (audio follows video), 1 Mix. The two mixer sources below only take effect in Mix mode.
Volume_CH1 / Volume_CH2	Analog	Mixer channel volume, 0-100.
Volume_Master	Analog	Master output volume, 0-100.
Audio_Source_CH1 / Audio_Source_CH2	Analog	Mixer channel source, using table 2 below. This platform has no third audio channel.

Recording and Streaming

Signal	Type	Description
Record_Enable	Analog	Start (1) or stop (0) recording. Recording writes files to the switcher's storage.
Record_Pause	Digital	Pause or resume a running recording. This is a toggle on the switcher.
Stream_Enable	Analog	Start (1) or stop (0) streaming. Streaming pushes video to the endpoint configured on the switcher.

System

Signal	Type	Description
Restart_Device	Digital	Restart the switcher. It goes off air while it reboots and comes back with its last saved settings.

Device Receive

Signal	Type	Description
Rx_Switcher	Buffer	Binary frames received from the switcher. Wire the rx$ of the UDP client to this signal.

Outputs

The module has the following signals available as feedback outputs:

Status Feedback

Signal	Type	Description
Online_Fb	Digital	High while the switcher is answering. UDP is connectionless, so this is driven by the replies themselves and drops after 15 seconds of silence.
FTB_Fb	Digital	High while the program output is faded to black.
Still_Fb	Digital	High while the program output is frozen.
Mute_Fb	Digital	High while the program audio is muted.
PIP_Fb / POP_Fb	Digital	High while PIP or POP is active.
Luma_Fb / Chroma_Fb	Digital	High while the luma or chroma key is active.
UVC_Rotate_Fb	Digital	High while the USB UVC output is rotated.
Recording_Fb	Digital	High while a recording is running.
Rec_Paused_Fb	Digital	High while a recording is paused.
Streaming_Fb	Digital	High while streaming is on.
Storage_Present_Fb	Digital	High when recording media is present in the switcher.
Input_Signal_Fb	Digital	High when the switcher detects an input signal.
Model_Fb	Serial	The model name the switcher reports ("BG-QuadFusion-JR-").
Rx_Last_Frame	Serial	A summary of the last frame received - command, status and length. Useful when commissioning.
PGM_Source_Fb / PVW_Source_Fb	Analog	The source on each bus: 1-4 for the inputs, 9 for colour bars.
Transition_Fb	Analog	1 Mix, 2 Fade, 3 Wipe. Which wipe is not reported by this platform.
Rate_Fb	Analog	AUTO transition speed: 0 slow, 1 medium, 2 fast.
Resolution_Fb	Analog	Program output resolution code - see the table below.
PIP_Size_Fb	Analog	0 small, 1 medium, 2 large.
POP_Window_Fb	Analog	1 preview, 2 program.

Chroma_Color_Fb	Analog	0 green, 1 blue.
Audio_Mode_Fb	Analog	0 AFV, 1 Mix.
Volume_CH1_Fb / Volume_CH2_Fb / Volume_Master_Fb	Analog	Current volumes, 0-100.
Audio_Source_CH1_Fb / Audio_Source_CH2_Fb	Analog	Current mixer sources - see table 2 below.
Record_Status_Fb	Analog	0 none, 1 recording, 2 paused, 3 waiting.
Storage_Type_Fb	Analog	0 TF card, 1 USB, 2 internal drive.

Device Transmit

Signal	Type	Description
Tx_Switcher	Serial	Binary frames for the switcher. Wire this signal to the tx$ of the UDP client.

Note: This module has no I/O arrays. If any are ever added they must be declared last within their direction group: SIMPL+ shares one index space for analog and serial outputs, and a discrete output declared after an output array causes the feedback pins to be mis-formed.

There is deliberately no wipe-index feedback signal. This platform reports only that a wipe is selected, never which one, so such a signal could never populate.

Device Feedback

The switcher does not send text. It returns binary frames, and almost all feedback comes from a single 150-byte status block returned by the read-all command. The module decodes the byte offsets below. Each one was confirmed on a live BG-QuadFusion-JR by changing one value at a time and comparing the status block before and after; the protocol document covers a whole family of switchers and does not match this model everywhere.

Line received from the device	Signal updated
Offset 0 / 1	PGM_Source_Fb / PVW_Source_Fb (1-4, 9 = colour bars)
Offset 2	Audio_Mode_Fb (0 AFV, 1 Mix)
Offset 4 / 5	Audio_Source_CH1_Fb / Volume_CH1_Fb
Offset 7 / 8	Audio_Source_CH2_Fb / Volume_CH2_Fb
Offset 10	Volume_Master_Fb
Offset 11	Transition_Fb - 1 Mix, 2 Fade, any other value means a wipe
Offset 23	FTB_Fb
Offset 24 / 28	PIP_Fb / PIP_Size_Fb
Offset 33	Still_Fb
Offset 34 / 35	Rate_Fb / Resolution_Fb
Offset 38	Mute_Fb - reported as 1 on this platform, not 0xFF as on the 4K
Offset 39	UVC_Rotate_Fb
Offset 40 / 41	POP_Fb / POP_Window_Fb
Offset 50 / 51 / 53	Luma_Fb / Chroma_Fb / Chroma_Color_Fb
Offset 145	bit 7 Input_Signal_Fb, bits 3-4 Record_Status_Fb
Offset 146	bit 2 Streaming_Fb, bits 3-4 Storage_Type_Fb, bits 5-6 Storage_Present_Fb

Note: Fade to black, freeze, mute and UVC rotation are TOGGLES on this switcher - there is no command to set them to a particular state. For FTB, freeze and mute the module reads the current state and only sends the toggle when it needs to change, so the On and Off inputs behave like ordinary level controls.

The switcher also emits unsolicited fader frames while the T-bar moves or an AUTO transition runs; the module consumes and ignores them. The recording and streaming bits are packed least-significant bit first within their bytes.

UDP Command Reference

The switcher is controlled with binary frames over UDP port 7000. Every frame has the layout below; multi-byte values are sent LOW BYTE FIRST. The module builds and checks these frames for you - this reference is here so the frames can be recognised in a packet capture, and so additional commands can be sent with a raw string if needed.

A5 6C | length (2) | device type A5 | device id FF | interface 01 | 00 x9 | command | data | checksum (2) | AE

The length counts the whole frame, including the leading A5 6C and the trailing AE. The checksum is the sum of every byte before it. Replies use the same layout with the platform id 0x69 in reserved byte 14, followed by the command, a status byte (00 = ok) and the data.

Status Commands

Command	Description
0xFF	Identify. Replies with the model name followed by binary id bytes
0x0A	Read all data. Replies with the 150-byte status block
0x06	Heartbeat. Replies with an acknowledgement only
0x49	Version. Replies with hardware and serial information plus a copy of the status block
0x0B	Restart the switcher. It returns with its last SAVED settings

Program, Preview and Takes

Command	Description
0x80 n	Program source: n = 1-4 for the inputs, 9 for colour bars
0x81 n	Preview source, same values
0x83	CUT - swap the buses immediately
0x84	AUTO - transition at the selected rate. Emits unsolicited fader frames

Transitions and Output

Command	Description
0x8D	Select the Mix transition
0x8E	Select the Fade transition
0x92 n	Select a wipe: n = 116-125 for wipes 1-10. The switcher does not report which

	wipe is active
0xB1 n	AUTO rate: 0 slow, 1 medium, 2 fast
0xA3 n	Program output resolution - see the 2K table below. Answers with a full status dump rather than an acknowledgement

Toggles

Command	Description
0x85	Fade to black - TOGGLE, there is no set-to-state form
0xCF	Freeze frame - TOGGLE
0xD6	One-touch mute - TOGGLE
0xD7	Rotate the USB UVC output - TOGGLE

PIP, POP and Keying

Command	Description
0x86 n	PIP: 0 off, 1 on
0xA2 n	PIP size: 0 small, 1 medium, 2 large. Also moves the PIP position
0xA0 / 0xA1	PIP horizontal / vertical position, two bytes, low byte first
0xA7 n	POP: 0 off, 1 on
0xA8 n	POP window: 1 preview, 2 program. 0 is ignored. Answers with a full status dump
0x8B n / 0x8C n	Luma key / chroma key: 0 off, 1 on
0x98 n	Chroma key background: 0 green, 1 blue

Audio

Command	Description
0xB6 n	Audio mode: 0 AFV, 1 Mix
0xB8 c v	Volume: c = 0 channel 1, 1 channel 2, 3 master; v = 0-100. Channel index 2 is accepted and ignored - this platform has no third channel
0xB9 n / 0xBA n	Mixer source for channel 1 / channel 2, from table 2. Mix mode only

Recording and Streaming

Command	Description
0xB2 n	Recording: 0 off, 1 on. Writes files to the switcher's storage
0xC7	Pause or resume a running recording - TOGGLE
0x87 n	Streaming: 0 off, 1 on. Pushes video to the configured endpoint

Note: Most commands are acknowledged with a status byte of 00 even when the value is out of range and the switcher ignores it, so the only reliable way to confirm a setting is to read the status block back - which this module does automatically after every command. Two commands behave differently: 0xA3 and 0xA8 answer with a complete status block instead of an acknowledgement.

Commands the document lists that this model does NOT implement, verified on the hardware: the third audio

channel (0xB8 with channel index 2) and the AUX output (0xC8). Both are accepted and do nothing, so neither is exposed. Camera control, GPI, patterns and network configuration belong to other switchers in the family.

Source Values (0x80 and 0x81)

The same values are used for the program bus, the preview bus and the PGM_Source / PVW_Source feedback signals.

Value	Source
1	Input 1
2	Input 2
3	Input 3
4	Input 4
9	Colour bars

Output Resolution Values (0xA3)

This model is HD only and uses the 2K code table. The codes are not sequential.

Value	Resolution
7	1080p60
11	1080p50
9	1080i60
1	1080i50
3	1080p30
13	1080p25
5	1080p24

Audio Mixer Source Values (0xB9 and 0xBA) - Table 2

This platform draws its mixer sources from table 2, which is NOT the same table the BG-QuadFusion-4K uses. The values are not contiguous. They apply to Audio_Source_CH1 and Audio_Source_CH2 and only take effect in Mix mode; in AFV mode the audio follows the program source.

Value	Source
0	MIC In 2
3	Input 1
4	Input 2
5	Input 3
6	Input 4
7	AUX In
8	MIC In 1

Tech Support

For technical support, please contact BZBGEAR:

- Email: support@bzbgear.com
- Phone: +1(888)499-9906
- Address: 830 National Drive #140, Sacramento, CA 95834, USA

Warranty

BZBGEAR products are backed by a limited product warranty. For full warranty details, please visit www.bzbgear.com or contact BZBGEAR support.

Mission Statement

BZBGEAR is dedicated to providing high-quality, professional-grade AV equipment that delivers exceptional performance and reliability for both commercial and residential applications.

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