

Datavideo Switcher Internal Keyboard Control Protocol Rev.09-EX2

With SE-500MU Switcher Protocol Extension

Aug-23-201

Serial Interface Format

RS232

Baud rate: 115200

Data bit: 8bit

Stop Bit: 1bit

Parity: no parity

1. Command Format



Count: Length of the command excluding the Count byte. For example, if Count is 0x04, it means the command is 4 byte long after the Count byte.

Effects Address: The same command may be issued with different effects addresses. Unless specified, the effects address takes the value of 0x00.

Example: The command that selects the key source may be used to configure multiple keys (Key1, Key2, Key3, ..., Keyn) with each key corresponding to a different effects address (0x01, 0x02, ..., 0x0n).

Command Code: The command code type is either Read or Write command code. The Write command code is basically the Read command code + 0x80.

For example, if the WIPE command code has a Read value of 0x48, then the Write value should be 0xC8.

Message: Command parameters; some read commands do not include the message.

Checksum: Sum of the entire command, i.e. Count + Effects Address + Command Code + Message. Since checksum is one byte only, so when the sum exceeds the 8-bit representation, only the least significant 8 bits are retained.

Example:

For a command of 0x04 0x00 0xC1 0x01 0xC6, the checksum is $0x04 + 0x00 + 0xC1 + 0x01 = 0xC6$.

Note: The maximum command length (including count and checksum) is 127 bytes.

2. Response Format

Read Command

A read command, if received correctly, is responded to by returning the corresponding write command with the data represented as message bytes. *If command errors are detected, see the write command's error report.*

Example:

If the current wipe setting is 0x01, a wipe read command of 0x03 0x00 0x48 0x4B will be responded to by a returned command of 0x04 0x00 0xC8 0x01 0xCD.

Write Command

The write command always returns 3 byte of data.

Count	Status byte	Checksum
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Count: Always set to 0x02

Status byte:

Bit7: If the command is correct and can be executed, this bit should be set to 1. Hence if the write command can be correctly executed, it will return **0x02 0x80 0x82**.

Bit 6: If the command received is not in the command list, this bit will be set to 1.

Bit 5: If the command is correct but cannot be executed, this bit will be set to 1.

Bit 4: When the checksum is incorrect, this bit will be set to 1.

Bit 0-Bit 3: Always 0

Checksum: Sum of the command byte values; Checksum = Count + Status byte

3. Power up response

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Main Board Software Version	0x05	0x00	0xEC	Major, Minor	Checksum

While booting, the main board must return its firmware version, which serves the start of the command protocol. When the keyboard receives the command code 0xEC, it will start executing a sequence of functions listed as follows:

1. Transmit the keyboard firmware version
2. Set the current T-Bar address
3. Query status

Hence, the main board should wait till the boot is complete before issuing this command to start the protocol initialization. This prevents the keyboard from querying repetitively.

4. CROSSPOINT (41, 42, 43, 44 / C1, C2, C3, C4)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read Program	0x03	0x00	0x41	--	0x44
Read Preset	0x03	0x00	0x42	--	0x45
Read Key Fill Src	0x03	EX	0x43	--	Checksum
Read Key Key Src	0x03	EX	0x44	--	Checksum
Write Program	0x04	0x00	0xC1	Crosspoint	Checksum
Write Preset	0x04	0x00	0xC2	Crosspoint	Checksum
Write Key Fill Src	0x04	EX	0xC3	Crosspoint	Checksum
Write Key Key Src	0x04	EX	0xC4	Crosspoint	Checksum

The **Effects Address** is used to select Keyer:

Effects Addr (EX)	Keyer
0x00	Key1
0x01	Key2(PIP)
0x02	SPLIT

Valid crosspoint numbers:

Crosspoint	Select
0x00	Black
0x01	Input1
0x02	Input2
0x03	Input3
0x04	Input4
0x05	Background
0x06	Color Bar

5. ANALOGUE CONTROLS (45/C5) [MU-Wipe Borde Size]

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read Control	0x04	EX	0x45	Control	Checksum
Write Control	0x06	EX	0xC5	Control Data1 Data2	Checksum

Control	Effects Address	Name	Range
0x00	0x01	T-bar	0x000-0x3FF

Value = (Data2<<8) + Data1;

Example:

For Value = 0x012D, the write command should be 0x06 0x01 0xC5 0X00 **0x2D 0x01** 0xFA

6. PUSHBUTTON/LAMP CONTROLS (46 47/ C6 C7)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read PB/L	0x04	0x00	0x46/0x47	PB/Lamp	Checksum
Write PB/L On	0x04	0x00	0xC6	PB/Lamp	Checksum
Write PB/L OFF	0x04	0x00	0xC7	PB/Lamp	Checksum

PB/Lamp	Name	Comment
0x00	AUTO	The AUTO PB/Lamp requires the keyboard to set a timeout value of 4.2 seconds. The main board returns ACK (0x02 0x80 0x82) once it finishes executing the AUTO PB/Lamp. The keyboard either receives the ACK or queries the status after timeout.
0x01	CUT	
0x02	REV	
0x03	SPLIT	
0x04	MIX Transition	Mix mode If mix mode is ON then wipe mode is OFF. If mix mode is OFF then wipe mode is ON.
0x05	WIPE Transition	Mix mode If wipe mode is ON then mix mode is OFF. If wipe mode is OFF then mix mode is ON.
0x06	PRESET	Manual Factory Reset
0x11	PIP PGM	
0x12	PIP PVW	

0x13	SPLIT PGM	
0x14	SPLIT PVW	
0x15	KEY PGM	
0x16	KEY PVW	
0x20	MENU	<ol style="list-style-type: none"> 1. In the IDLE state, executing this function enters the menu mode. 2. While in the menu, executing this function exits the current menu page to return to the previous level. If on the first level of the menu hierarchy, executing this function returns to the IDLE state.
0x21	MENU UP	
0x22	Menu Down	
0x23	Menu Left	
0x24	Menu Right	
0x25	Menu Enter	
0x26	Menu Normal	Resets the selected menu

7. WIPE PATTERN (48/C8)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read PB/L	0x03	0x00	0x48	--	0x4B
Write PB/L	0x04	0x00	0xC8	Wipe No	Checksum

The Read command returns the current wipe mode.

The Write command switches the wipe mode.

Wipe No Table (Need to be defined)

Wipe No	Comment
0x00	Left Right
0x01	Top Bottom
0x02	Center

8. Save User Mem (--/DA)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Save User Memory	0x04	0x00	0xDA	User Memory (1-6, 0xFF)	Checksum

Saves the current switcher state to the user memory (1 – 6)

0xFF: Saves setup in the System Memory such as PGM out resolution

9. Load User Mem (--/DB)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Load User Memory	0x04	0x00	0xDB	User Memory(0-6)	Checksum

Reads the saved state from the user memory (1 – 6) and sets the switcher

0: Loads Factory Default

10. Firmware Update (6B/EB)

Count	Effects Address	Command Code	Message	Checksum	Comment
0x03	0x01	EB	--	EF	Start upgrade
0x03	0x02	EB	--	F0	End of FILE

11. Software Version (--/EC)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Software Version	0x05	0x00	0xEC	Major, Minor	Checksum

The Keyboard firmware info is displayed on the OSD menu.

12. OSD Information (6A/EA)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read OSD	04	EX	0x6A	Device index(1-n)	Checksum
Write OSD	Count	EX	0xEA	OSD Message	Checksum

Count	Effects Address	Message	Comment
Count	0x00	OSD Message	Settings of each device
0x03	0x01	Device Number	Total number of devices 0 – No device

OSD Message

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0		CAM ADDR	CAM ADDR	CAM ADDR	Index 3	Index 2	Index 1	Index 0
Byte 1		DHCP/Filtered	Joystic Tilt	JoysticPan	Tally LED 1	Tally LED 0	Manual WB	Power
Byte 2	Format7	Format6	Format5	Format4	Format3	Format2	Format1	Format0
Byte 3	R Gain 7	R Gain 6	R Gain 5	R Gain 4	R Gain 3	R Gain 2	R Gain 1	R Gain 0
Byte 4	B Gain 7	B Gain 6	B Gain 5	B Gain 4	B Gain 3	B Gain 2	B Gain 1	B Gain 0
Byte 5	Mirror Mode H	Mirror Mode V		<i>Memory Speed 4</i>	<i>Memory Speed 3</i>	<i>Memory Speed 2</i>	<i>Memory Speed 1</i>	<i>Memory Speed 0</i>
Byte 6	VENDER ID 1	VENDER ID 1	VENDER ID 1	VENDER ID 1	VENDER ID 1	VENDER ID 1	VENDER ID 1	VENDER ID 1
Byte 7	VENDER ID 2	VENDER ID 2	VENDER ID 2	VENDER ID 2	VENDER ID 2	VENDER ID 2	VENDER ID 2	VENDER ID 2
Byte 8	VENDER ID 3	VENDER ID 3	VENDER ID 3	VENDER ID 3	VENDER ID 3	VENDER ID 3	VENDER ID 3	VENDER ID 3
Byte 9	MB Ver 1	MB Ver 1	MB Ver 1	MB Ver 1	MB Ver 1	MB Ver 1	MB Ver 1	MB Ver 1
Byte 10	MB Ver 2	MB Ver 2	MB Ver 2	MB Ver 2	MB Ver 2	MB Ver 2	MB Ver 2	MB Ver 2
Byte 11	MB Ver 3	MB Ver 3	MB Ver 3	MB Ver 3	MB Ver 3	MB Ver 3	MB Ver 3	MB Ver 3
Byte 12	MB Ver 4	MB Ver 4	MB Ver 4	MB Ver 4	MB Ver 4	MB Ver 4	MB Ver 4	MB Ver 4
Byte 13	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1	FPGA Ver 1
Byte 14	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2	FPGA Ver 2

Byte 15	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3	FPGA Ver 3
Byte 16	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1	MOTOR Ver 1
Byte 17	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2	MOTOR Ver 2
Byte 18	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3	MOTOR Ver 3
Byte 19	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4	MOTOR Ver 4
Byte 20-34	Host name	Host name	Host name	Host name	Host name	Host name	Host name	Host name
Byte 35	DVIP Version	DVIP Version	DVIP Version	DVIP Version	DVIP Version	DVIP Version	DVIP Version	DVIP Version
Byte 36	Baud Rate	Baud Rate	Baud Rate	Baud Rate	Baud Rate	Baud Rate	Baud Rate	Baud Rate

13.STATUS UPDATE (6E/EE)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Request Status Packet	0x03	0x00	0x6E	--	0x71
Status Update Data	0x09	0x00	0xEE	Status Packet	Checksum

Status Packet

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	PVW 3	PVW 2	PVW 1	PVW 0	PGM 3	PGM 2	PGM 1	PGM 0
Byte 1	MENU	KEY PVW	KEY PGM	PIP / SPLIT PVW	PIP / SPLIT PGM	SPLIT	Mix/ Wipe	AUTO
Byte 2	SPLIT 3	SPLIT 2	SPLIT 1	SPLIT 0	PIP 3	PIP 2	PIP 1	PIP 0
Byte 3	KEY FILL 3	KEY FILL 2	KEY FILL 1	KEY FILL 0	KEY KEY 3	KEY KEY 2	KEY KEY 1	KEY KEY 0

Byte 4	REV	WIPE6	WIPE5	WIPE4	WIPE3	WIPE2	WIPE1	WIPE0
Byte 5	Page change	Search Device	Define device 1	Define device 0	Device index3	Device index2	Device index1	Device index0

Note:

1. AUTO is set 1 while it is being executed and cleared (0) after execution.
 2. MENU is set 1 while entering the menu mode and cleared (0) after exiting the menu mode.
 3. Mix/Wipe
 - 0: Mix
 - 1: Wipe
 4. Search Device will be set to 1 as the user selects "Search Device" and the keyboard will clear it using the write command of status update data.
 5. PIP sets the PIP window, allowing the user to select the PIP video source.
 6. KEY KEY/KEY FILL sets chroma key, allowing the user to select key and fill sources.
 7. PIP PGM/PIP PVW display PIP image on Program/Preview windows respectively.
 8. KEY PGM/KEY PVW displays Chroma or Luma key effect on Program/Preview windows respectively.
- See crosspoint numbers for configurable parameters of PGM0-3/PVW0-3/PIP0-3/Key Key0-3/Key Fill0-3.*
9. Since PIP and SPLIT cannot be activated at the same time so they share the same bits.

14. Device Type (6F/EF)

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read Device Type	0x03	0x00	0x6F	--	0x72
Write Device Type	0x04	0x00	0xEF	Device Type	Checksum

Device Type: 0x00 HS-1500T, 0x01 SE-500HD, 0x02 SE-500MU

15. Transition Control (4C / CC) [MU – Transition Speed]

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read Auto-Trans Rate	0x03	0x00	0x4C	--	0x4F
Write Auto-Trans Rate	0x04	0x00	0xCC	Rate	Checksum

Rate = 1~200 (frame/sec)

16. SE-500HD Switcher Control (49/C9) [MU]

Function	Byte Count	Effects Address	Command Code	Message	Checksum
Read Cmd	0x03	EX	0x49	--	Checksum
Write Cmd	0x0B	EX	0xC9	Param (8 bytes)	Checksum

16.1 Color & Border Controls (EX=0) [MU]

Param	Name	Value	Description
Byte 0	BKG Color	0~7	White/Yellow/Cyan/Green/Magenta/Red/Blue/Black
Byte 1	Wipe Border Size	0~3	Off/Small/Middle/Large
Byte 2	Wipe Border Color	0~7	White/Yellow/Cyan/Green/Magenta/Red/Blue/Black
Byte 3	PIP Border Size	0~3	Off/Small/Middle/Large
Byte 4	PIP Border Color	0~7	White/Yellow/Cyan/Green/Magenta/Red/Blue/Black
Byte 5		0	Reserved
Byte 6		0	Reserved
Byte 7		0	Reserved

16.2 PIP Controls (EX=1) [MU]

Param	Name	Value	Description
Byte 0	PIP Size	1~100	
Byte 1	PIP Position X	-50~50	Signed char
Byte 2	PIP Position Y	-50~50	Signed char
Byte 3	PIP Crop Size	0~100	
Byte 4	PIP Crop Left	0~100	

Byte 5	PIP Crop Right	0~100	
Byte 6	PIP Crop Top	0~100	
Byte 7	PIP Crop Bottom	0~100	

16.3 Lumakey & Audio Controls (EX=2) [MU]

Param	Name	Value	Description
Byte 0	Lumakey Mode	0~1	Black/White
Byte 1	Lumakey Cleanup Level	0~100	
Byte 2	Lumakey Transparency	0~64	
Byte 3	Audio Mute	0~1	Off/On
Byte 4	Audio HDMI Input	0~4	Input1/Input2/Input3/Input4/Follow
Byte 5	Audio HDMI Group	0~3	Channel 1&2/3&4/5&6/7&8
Byte 6	Audio Level	0~2	Auto/SMPTE/EBU
Byte 7	Audio Tally Mode	0~1	Normal/Audio Mixer Mode

16.4 Setup Controls (EX=3) [MU]

Param	Name	Value	Description
Byte 0	PGM Out Resolution	0~10	1080p/60, 1080p/59.94, 1080p/50, 1080i/60 1080i/59.94, 1080i/50, 720p/60, 720p/59.94 720p/50, 576i, 480i
Byte 1	MV Out Resolution	0~9	1080p/60, 1080p/59.94, 1080p/50, 1080i/60 1080i/59.94, 1080i/50, 720p/60, 720p/59.94 720p/50
Byte 2	Language	0~2	English/Simplified Chinese/Traditional Chinese
Byte 3	MB Version Major	0~99	
Byte 4	MB Version Minor	0~99	
Byte 5	OSD Version Major	0~99	
Byte 6	OSD Version Minor	0~99	
Byte 7		0	Reserved

Revision History

Revision	Description	Date
01	Initial release	MAY-13-2016
02	Add Read/Write Command List	MAY-16-2016
03	<ol style="list-style-type: none"> 1. Change OSD information from 0x6C to 0x6A 2. Add Software version 	MAY-17-2016
04	<ol style="list-style-type: none"> 1. Add Rev bit for status 2. Add Power up response 	June-13-2016
05	<ol style="list-style-type: none"> 1. Add Color bar for PGM/PVW 2. Add SPLIT Source 3. Add Upgrade start/end 4. Change SPLIT and key in status 	July-22-2016
06	<ol style="list-style-type: none"> 1. Recover Key in status 2. Change Split in status 3. Add key PGM/PVW 	Aug-12-2016
07	<ol style="list-style-type: none"> 1. Define status in OSD status. 2. Add speed/Mirror/cam info in OSD message 3. Remove host name, IP, GW in OSD message. 	Nov-25-2016
08	<ol style="list-style-type: none"> 1. Add host name to OSD message. 	Dec-12-2016
09	<ol style="list-style-type: none"> 1. Add DVIP version and buad rate to OSD message 	June-12-2017
09-ex1	<ol style="list-style-type: none"> 1. Modified for SE-500MU, add switcher related protocols to ch.7,8,9,15,16 	July-24-2017
09-ex2	<ol style="list-style-type: none"> 1. Add Checksum 'one byte only' 2. Read PB/L byte count = 0x04 3. Add Device Type : 0x01 SE-500HD, 0x02 SE-500MU 4. SE-500HD Switcher Control (49/C9) 	Aug-23-2017