

PAN-TILT HEAD

XU-80

XU-81

PROGRAMMER'S MANUAL

Ver. 02.02

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1. Getting Started

This manual describes commands which control the pan-tilt head system XU-80 (hereinafter XU-80) and XU-81 (hereinafter XU-81) from the host computer.

Before reading this manual, it is recommended to read Operation Manual of each product.

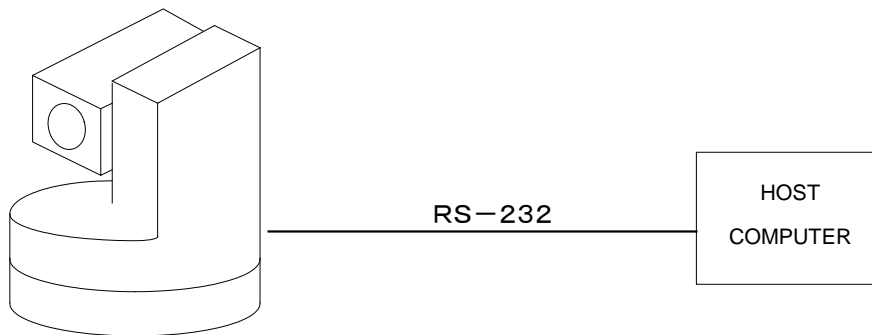
CAUTION:

XU-80 and XU-81 Pan/Tilt operational durability is guaranteed for 300K cycles. In case of the continuous operation by the program such as Auto Pan Tilt System, & etc., it is important not to overdrive the said value(300K)

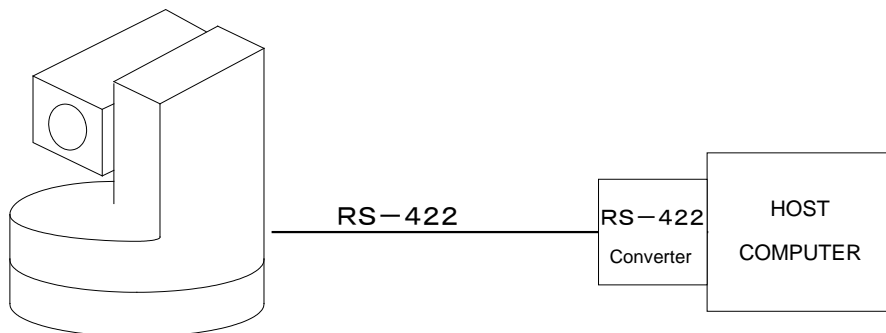
2. Connecting and Setup

2.1 Connection

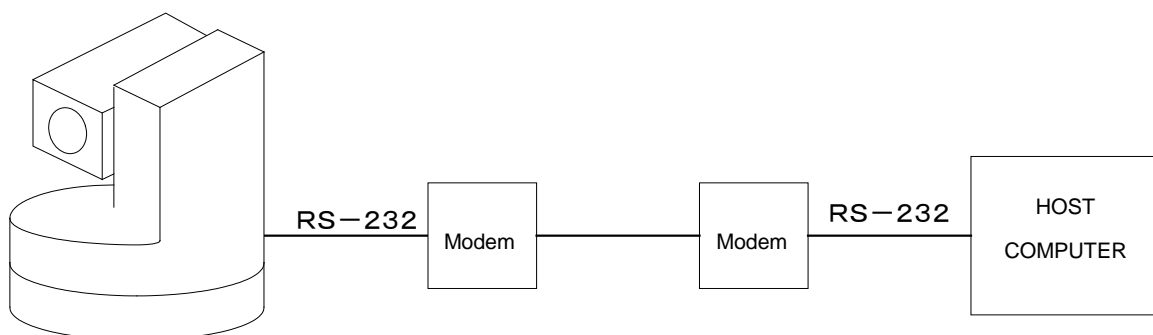
<RS-232 Direct Connection>



<RS-232 Direct Connection>



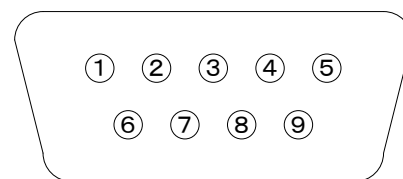
<Modem Usage >



2.2 Connector & Pin Assignment

<RS-232C connection (SW1 OFF)>

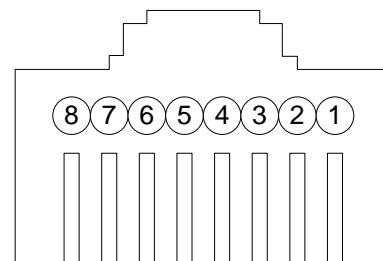
Pin number	Input/Output	Signal
2	Input	RX
3	Output	TX
5		GND



RS-232C pin assignment

<RS-422 connection (SW1 OFF)>

Pin number	Input/Output	Signal
2		GND
3	Input	RX+
4	Output	TX-
5	Output	TX+
6	Input	RX-
7		GND



RS-422 pin assignment

2.3 Switch Settings

The following settings are changed according to the status of the switches. Always turn off the power to the system to change the switches.

When the frame rate or video format is changed, be sure to turn the power on, confirm that the changes have been done correctly, and then turn the power off and on again before use.

SW	Description	OFF	ON
1	Communication type	RS-232C	RS-422
2	Direction of setup	Normal	Suspended
3	Frame rate	59.94	50
4	Video format	1080i	720p
5	Digital zoom operation (XU-81 only)	Optical interlocking	Independent
6	Reserve		
7	Reserve		
8	Operation mode	Standard	High speed

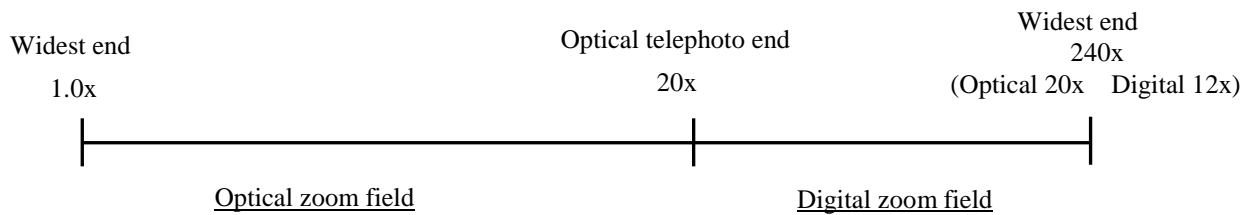
Note: XU-81 has two Digital zoom modes, which are Optical interlocking mode and Independent mode.

The setting of these modes are switchable by SW5. (XU-80 has only Optical interlocking mode regardless of the setting of the switch.)

[Optical interlocking mode]

In the field wider side than the optical telephoto end, the optical zoom works, and in the more telephoto side than the optical telephoto end, the digital zoom works. While the zooming is operated, the operation of both the optical zoom and the digital zoom interlocks in this mode.

When the zooming is operated in the optical zoom field, only the optical zoom works. When the zooming is operated toward more telephoto side than the optical telephoto end, the zooming stops once at the optical telephoto end and moves to the digital zoom field. When the zooming is operated in the digital zoom field, only the digital zoom works. When the zooming is operated the wider side than 1.0x in digital zoom magnification, the zooming moves to the optical zoom field without stop.



[Independent mode]

The optical zoom and the digital zoom works independently. When the zooming is operated, only the optical zoom works. When the digital zooming is operated, it is necessary to use the dedicated command.

3. Communication Format

3.1 Signal Format

RS-232C and RS-422 conformity

Transmission Mode	: Half Duplex
Transfer Speed	: 9600 bps.
Data Bit	: 8 bit
Parity	: None
Stop Bit	: 1 bit
Handshake	: None
Others	: One Acknowledge per Command

3.2 Understanding

Be aware the followings.

- After receiving the answer corresponding to the control command, the next control commands will be ready to transmit.
- The standard waiting time of the answer is 300 ms. If the pan-tilt head does not return the answer more than 300 ms, there must be some errors.

4. Control Command Format

This format is to transmit from the computer to Pan-tilt head.

Header	Device Num	Command	Parameter	End mark
--------	------------	---------	-----------	----------

Header : 1 byte FFh

Device Num : 2 byte 3030h

Command : 2 byte (refer to **8.Pan-tilt head Control Command ~ 11.System Control Command**)

Parameter : Variable length If not specified, Parameter manifests Hexadecimal, transmits its ASCII code.

End mark : 1 byte EFh

5. Answer Format

5.1 Answer Format

This answer format corresponds to the Control Command transmitted from the computer to Pan-tilt head.

Header	Device Num	Error Code	Status	End mark
--------	------------	------------	--------	----------

Header : 1 byte FEh

Device Num : 2 byte 3030h

Error Code : 2 byte manifested error flag In Hexadecimal and return it's ASCII code.

Status : Variable length If not specified, Status manifests Hexadecimal, transmits its ASCII code.

End mark : 1 byte EFh

5.2 Error Code

Error Code manifests error flag in Hexadecimal and returns it's ASCII code. If not exists error, all bits of error flags are cleared and becomes zero.

- The bit assignment of error flag.

b7(MSB)	b6	b5	b4	b3	b2	b1	b0(LSB)
Mode error	Parameter error	Command error	Busy	System reservation	System reservation	System reservation	System error

1st byte	b7: Mode Error	In case of wrong mode
	b6: Parameter Error	In case of receiving wrong parameter
	b5: Command Error	In case of receiving wrong command
	b4: Busy	In case of unable to execute by error
2nd byte	b3: System Reservation	Always Zero
	b2: System Reservation	Always zero
	b1: System Reservation	Always Zero
	b0: System Error	In case of the fatal error to the system

The details of Error Flags are described as below.

Busy	: Pan-tilt head is unable to execute the commands in process to execute the former command. : In case of generating Command Error, Parameter Error, Mode Error or System Error.
Command Error	: In case of receiving the wrong commands (not prepared commands)
Parameter Error	: In case of over value of parameter or wrong parameter length.
Mode Error	: In case of receiving the command unable to execute under Pan-tilt head during the receiving Status.
System Error	: In case that the fatal accidents occur for some reason.

CAUTION

- By **Operation Status Request**, the cause of error can be found.
- The error check will be executed by the following priority order.
 - (1) Command Error
 - (2) Mode Error, Busy
 - (3) Parameter Error

Pan-tilt head sets the error flag corresponding to any, after the detection of error, and returns the answer, then multiple error flags can't be set. Busy, however, is exceptional and set, whenever any of Command Error, Parameter Error, Mode Error or System Error occurs.

Example: Wrong command to be transmitted.

1st byte	2nd byte
b7 = 0, b6 = 0, b5 = 1, b4 = 1	b3 = 0, b2 = 0, b1 = 0, b0 = 0
3h → 33h	0h → 30h
(Hexadecimal Indication → ASCII code conversion)	

Note: When the Command errors occur and unable to execute, Busy flag and command error flag will be set at the 1.

5.3 Status

In case of having received Status Request Command, this status adds status value to the answer. The details of **Operation Status Request** command and status value are described later. (Refer to **11. Details of System Control Command**)

6. Classification of Command

6.1 Classification by Operation

“Pan-tilt head” consists of pan-tilt head and camera sections, and command consists of Pan-tilt head control, camera control, camera setting, and system control. This manual describes according to this classification.

(I) Pan-tilt head Control

This control is to inquire and to indicate operation for pan-tilt head.

Pan Speed Assignment, Pan Speed Request, Pan Angle Request, etc. are counted among **this classification**. See the **Table 7.1 Pan-tilt head Commands**, and **8. Details of Pan-tilt head Control Commands**.

(II) Camera Control

This control is to set each parameter, to inquire and to indicate operation for camera.

Zoom Speed Assignment, Zoom Position Request, Zoom Position Assignment, etc. are counted among this classification.

See the **Table 7.2 Camera Control Command** and **9. Details of Camera Control Commands**.

(III) Camera Settings

This sets various camera parameters. Commands for **AE area setting** and **GENLOCK phase relative value adjustments** belong to this class. Parameters set by this class of commands are saved in the camera’s memory, and are retained even when the camera is powered off. For that reason, there is no need to reset them after a system reset and the like, once they have been set during setup. Do not operate anything other than the camera settings for three seconds after making these settings. See section **7.3 System Control Command Table** for a list of commands, and Chapter **10 Details of System Control Command** for details on the commands.

(IV) System Control

This control is to Operation of Both Camera and Pan-tilt head, to inquire the Inside status and etc. **Status Request of Operation** is counted among this classification.

See the **Table 7.4 System Control Command** and **11. Details of System Control Commands**.

6.2 Classification by Executive Format

Each command classify as one of Synchronous Execution (type 1) and other of Non-Synchronous Execution (type 2)

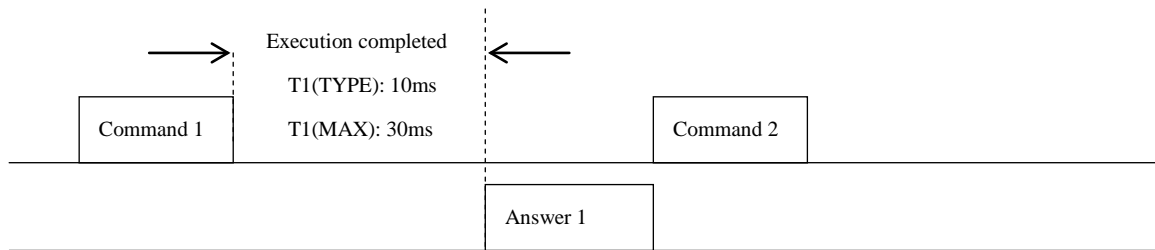
(I) Synchronous Execution (type 1)

This command executes immediately at the time of Command receipt, and complete the execution at the time of the answer completed.

The command among this classification enable to accept the next command at the moment of Answer transmission. This classified commands describe in **8. Detail of Pan-tilt head Control ~ 11. Camera Control Commands as type 1**.

Timing diagram describes below.

The answering time after receipt of the command code is 10 ms in Standard, and 30 ms Max.
And the execution completes at the beginning of transmission



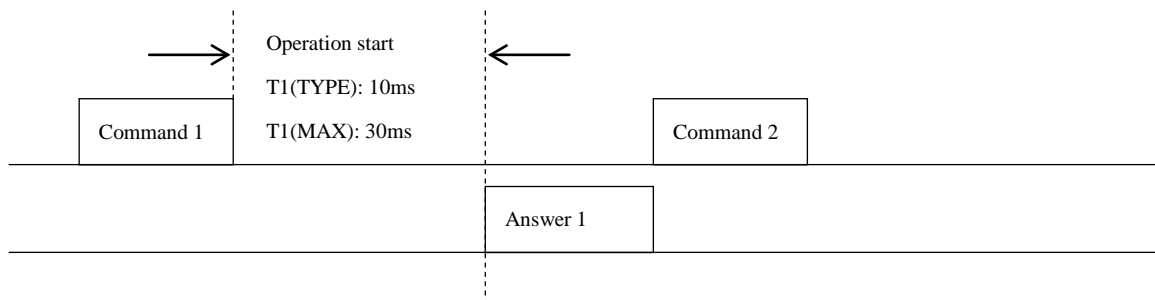
(II) Non-Synchronous Execution A (type 2)

On receipt of the command code, this command transmits the command without waiting of the completion to execute. The completion of operation can be found by the status of flag among the operation status.

The commands classified in this, describe in **8. Details for Pan-tilt head Control Command ~ 11. System Control Command as type 2.**

Timing diagram of the operation describes below.

The answering time after receipt of the command code, is 10 ms Standard, 30 ms Max
The time between start and stop, is depend on the class of commands and condition to be executed.



7. Control Command Table

7.1 Pan-tilt head Control Command Table

Function	Meaning	Command	Parameter	Status
Pan Speed Assignment	Set the running speed for panning	0150h	005h to 7D0h	None
Tilt Speed Assignment	Set the running speed for tilting	0151h	005h to 7D0h	None
Pan Speed Request	Return the present running speed for panning	0152h	0h	005h to 7D0h
Tilt Speed Request	Return the present running speed for tilting	0152h	1h	005h to 7D0h
Pan Tilt Stop	Stop the panning/tilting operations	0153h	0h	None
Pan Right Start	Start panning to right	0153h	1h	None
Pan Left Start	Start panning to left	0153h	2h	None
Tilt Up Start	Start tilting upward	0153h	3h	None
Tilt Down Start	Start tilting downward	0153h	4h	None
Pan-Tilt Head Initialize 1	Move home position after initialization	0158h	0h	None
Pan-Tilt Head Initialize 2	Move to the original position after initialization	0158h	1h	None
Pan Slowest Speed Request	Return the slowest speed for panning	0159h	0h	005h
Pan Fastest Speed Request	Return the fastest speed for panning	0159h	1h	7D0h
Tilt Slowest Speed request	Return the slowest speed for tilting	0159h	2h	005h
Tilt Fastest Speed request	Return the fastest speed for tilting	0159h	3h	7D0h
Pan Angle Pulse Ratio Request	Return the coefficient of pan- angle conversion	015Bh	0h	07D0h
Tilt Angle Pulse Ratio Request	Return the coefficient of tilt-angle conversion	015Bh	1h	07D0h
Pan Minimum Angle Request	Return the minimum angle of panning	015Ch	0h	5CD8h
Pan Maximum Angle Request	Return the maximum angle of panning	015Ch	1h	A328h
Tilt Minimum Angle Request	Return the minimum angle of tilting	015Ch	2h	669Ch
Tilt Maximum Angle Request	Return the maximum angle of tilting	015Ch	3h	9964h
Pan/Tilt Angle Assignment	Move to assigned position of panning/tilting	0162h	XXXX, YYYYh	None
Pan/Tilt Angle Request	Return the present position of panning/tilting	0163h	None	XXXX, YYYYh
Wiper Control	Operate the wiper	017Ah	0h	None
Washer Control	Control the washer	017Ah	1h	None
Tally OFF	Turn off tally	017Bh	0h	None
Tally ON	Turns on tally	017Bh	1h	None
AUX OFF	Turn AUX output terminal off	0171h	0h, 0h	None
AUX ON	Turn on the AUX output terminal	0171h	0h, 1h	None
AUX Status Request	Request the AUX status	01EAh	Ah	aa
Housing Fan Status Request	Request the housing fan status	01EAh	Ah	bb
Washer output OFF	Turn off the washer output	0171h	Bh, 0h	None
Washer output ON	Turn on the washer output	0171h	Bh, 1h	None

Note: The values in the parameter and status columns are examples of operation modes (standard settings). XXXX, YYYY means Pan angle, Tilt angle In Hexadecimal. "aa" is hexadecimal indicating the AUX status. "bb" is hexadecimal indicating the status of the housing fan.

7.2 Camera Control Command Table

Function	Meaning	Command	Parameter	Status
Camera Version Request	Request the camera version	01BEh	0h	01h
Camera OFF	Turn off the power for camera section	01A0h	0h	None
Camera ON	Turn on the power for camera section	01A0h	1h	None
Focus Auto	Change the mode of focus to AF	01A1h	0h	None
Focus Manual	Stop and change of focus to Manual	01A1h	1h	None
Focus Fixed at Infinity	Fix the focus to infinity.	01A1h	Bh	None
Focus Near	Move to near focus	01A1h	2h	None
Focus Far	Move to far focus	01A1h	3h	None
Focus One-shot AF	Perform the one-shot AF	01A1h	Ah	None
Zoom Stop	Stop zoom operation	01A2h	0h	None
Zoom Wide	Zoom to wide side	01A2h	1h	None
Zoom Tele	Zoom to telephoto side	01A2h	2h	None
Zoom Hi Wide	Zoom to wide side in high speed	01A2h	3h	None
Zoom Hi Tele	Zoom to telephoto side in high speed	01A2h	4h	None
Zoom Position Assignment	Move to the assigned zoom position	01A3h	00h to EEh	None
Zoom Position Request	Return the present zoom position	01A4h	None	00h to EEh
Zoom Speed Assignment	Assign the running speed of zooming	01B4h	1h, 0h to 7h	None
Zoom Speed Request	Return the present running speed	01B4h	2h	0h to 7h
Digital Zoom Magnification Assignment	Specify the digital zoom magnification	01DAh	00h to 6Eh	None
Digital Zoom Magnification Status Request	Request the digital zoom magnification information	01C6h	Ah	00h to 6Eh
Color BAR OFF	Turn off the color bar output and switch the output video to camera video	01B8h	0h	None
Color BAR ON	Switch the output video to color bars	01B8h	1h	None
Color BAR Status Request	Request the color bar status information	01C5h	2h	0h, 1h
Shooting Mode Switching	Switch the camera shooting mode	0184h	0h to 4h	None
Shooting Mode Status Request	Request the shooting mode status information	01C5h	3h	0h to 4h
Shutter Speed 1/60 (PAL:1/50)	Change the shutter speed to 1/60 (PAL:1/50)	01A8h	1h	None
Shutter Speed 1/100	Change the shutter speed to 1/100	01A8h	2h	None
Shutter Speed Assignment	Set the shutter speed	01ADh	0h to 4h	None
Shutter Speed Status Request	Request the shutter speed status information	01C5h	5h	0h to 4h
Shutter Speed Detailed Settings	Set the shutter speed	019Dh	79h to 8Fh	None
Shutter Speed Status Request	Request the shutter speed status information	01C6h	1h	79h to 8Fh
Gain Assignment	Assign the camera gain	01AEh	0h to 5h	None
Gain Status Request	Request the gain status information	01C5h	4h	0h to 5h
Gain Details Specification	Set the camera gain	019Eh	XU-80: 00h to 10h XU-81: 00h to 15h	None
Gain Details Status Request	Request the camera gain status information	01C6h	0h	XU-80: 00h to 10h XU-81: 00h to 15h
Iris Assignment	Assign the iris position	01A6h	00h to FFh	None
Number of Iris Divisions Request	Return the number of iris divisions	01C3h	1h	XU-80: 15h XU-81: 11h

Iris Position Request	Return the current iris positions	01C3h	2h	XU-80: 00h to 14h XU-81: 00h to 10h
Exposure Compensation Specification	Compensate the exposure	01E3h	00h to FFh	None
White Balance Auto	Set the white balance to auto	01A7h	0h	None
White Balance Preset	Preset the white balance	01A7h	1h	None
White Balance Fixed 1	Set the white balance to indoor setting level	01A7h	2h	None
White Balance Fixed 2	Set the white balance to outdoor setting level	01A7h	3h	None
White Balance ATW	Set the white balance to ATW	01A7h	4h	None
White Balance Status Request	Request the white balance status information	01C5h	8h	0h to 4h
Black Level Assignment	Set the black level	01E1h	0h, 00h to FFh	None
R Gain Assignment	Set R gain	01E1h	1h, 00h to FFh	None
B Gain Assignment	Set B gain	01E1h	3h, 00h to FFh	None
Cr Gain Assignment	Set the Cr gain	01E1h	4h, 00h to FFh	None
Cb Gain Assignment	Set the Cb gain	01E1h	6h, 00h to FFh	None
Edge Assignment	Set the edge	01E1h	Ah, 00h to FFh	None
WDR OFF	Turn off the wide dynamic range	01A5h	0h	None
WDR ON	Turn on the wide dynamic range	01A5h	1h	None
WDR Status Request	Request the wide dynamic range status information	01C5h	7h	0h, 1h
ND filter OFF	Turn off the ND filter	01B6h	0h	None
ND filter ON	Turn on the ND filter	01B6h	1h	None
ND filter Status Request	Request the ND filter status information	01C5h	0h	0h, 1h, Fh
IR filter OFF	Turn off the IR filter	01BBh	0h	None
IR filter ON	Turn on the IR filter	01BBh	1h	None
IR filter Status Request	Request the IR filter status information	01C5h	Bh	0h, 1h
Auto IR OFF	Turn off the auto IR	01BAh	0h	None
Auto IR ON (shutter)	Turn on the auto IR (shutter)	01BAh	1h	None
Auto IR OFF (gain)	Turn on the auto IR (gain)	01BAh	2h	None
Auto IR Status Request	Request the auto IR status information	01C5h	Ah	0h to 2h
GENLOCK Vertical Line Information Request	Request the GENLOCK vertical line information	01C7h	0h	0000h to 000Fh
GENLOCK Horizontal Phases Information Request	Request the GENLOCK horizontal phases information	01C7h	1h	0000h to 0897h

7.3 Camera Setting Command Table

Function	Meaning	Command	Parameter	Status
AE Area Setting	Set the AE area	01BDh	1h, 0h to Bh	None
AE Responsiveness Setting	Set the AE responsiveness	01BDh	2h, 0h to 2h	None
AE Maximum Gain Setting	Set the AE maximum gain	01BDh	3h, XU-80: 0h to 7h XU-81: 0h to 9h	None
Brightness Peak Compression Assignment	Assign the brightness peak compression rate	01F0h	1h, 00h to 10h	None
AF Area Setting	Set the AF area	01BDh	4h, 0h to Bh	None
AF Sensitivity Setting	Set the AF sensitivity	01BDh	5h, 0h to 1h	None
AWB Shift Setting	Set the AWB shift	01BDh	6h, 0h to 6h	None

Gamma Level Setting	To set the gamma level	01F2h	XU-80: 0h to 4h XU-81: 0h to 5h	None
TV Setup OFF	To turn the TV setup off	01E1h	Bh, 0h, 0h	None
TV Setup ON	Turns the TV Setup on	01E1h	Bh, 0h, 1h	None
GENLOCK Phases Relative Value Adjustment	Adjusts GENLOCK to the relative value.	01E4h	00h to FFh	None
GENLOCK Phases Absolute Value Adjustment	Adjusts GENLOCK to the absolute value.	01E7h	0000h to 000Fh 0000h to 0897h	None

7.4 System Control Command Table

Function	Meaning	Command	Parameter	Status
Operation Status Request	Return the operation status	0186h	None	3 byte
Extended Operation Status Request	Return the extended operation status	0186h	0h	5 byte
Product Name Request	Return the product name	0187h	None	“XU-80”
ROM Version Request	Return ROM version of pan-tilt head	0188h	None	“V01-01”
Zoom, Focus, Tilt, Pan Speed Control	Operate at the assigned zooming, focusing, tilting, and panning speeds.	0181h	00h to 7Fh	None
Shot Memory Recording	Record the present position to the shot memory.	0182h	00h to 1Fh	None
Shot Memory Movement	Move to the specified shot memory number position.	0183h	00h to 7h 00h, 02h to 30h	None
Serial Number Status Request	Request the serial number information	01E9h	0h	15 byte

Note: The values in the parameter and status columns of GENLOCK are examples for videos (at the frame rate of 59.94 and the video format of 1080i).

8. Detail of Pan-Tilt Head Control Command

8.1 Pan Speed Assignment

Pan-Tilt Head Control Command Type 1

Function	Set the running speed for panning	
Command	0150h	
Parameter	Length	3 byte
	Range	Standard mode: 5 to 2000 (005h to 7D0h) High speed mode: 5 to 3000 (005h to BB8h)
	Default Value	Standard mode: 2000 (7D0h) High speed mode: 3000 (BB8h)
Status	None	
Reference	<ul style="list-style-type: none"> 1LSB of parameter value is equal to 0.02 degree/s. Commands which speed setting is enabled by this command are Pan Right Start and Pan Left Start, total 2 commands. After this command is issued, issuing a command of Pan Right Start or Pan Left Start enables to pan at assigned speed. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	50h	p0	p1	p2	EFh



The running speed indicates in Hexadecimal 3 digits, and its ASCII code treats as parameter.								
example:								
150			⇒	096h		⇒	p0 p1 p2 30h 39h 36h	

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example					
■ In case of No Error :		00000000B	⇒	00h	⇒ e0 e1 30h 30h
■ In case of Parameter Error :		01010000B	⇒	50h	⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.5 Pan Tilt Stop

Pan-Tilt Head Control Command Type 2

Function	Stop the panning/tilting operations	
Command	0153h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	53h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
EFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example					
■ In case of No Error:			00000000B	⇒	00h ⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒	50h ⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.6 Pan Right Start

Tilt Head Control Command Type 2

Function	Start panning to right	
Command	0153h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •Until Pan Tilt Stop command issues, or right limit position, continue to run. •The running speed is able to set by Pan Speed Assignment command. •By issuing this command, 1 is set in Panning flag among the Operating Status. The setting flag will be done, just before running Pan-tilt head. When Pan-tilt head reaches to the right limit, Pan running will stop and clear Panning flag to 0. •While panning in the right direction by this command, it is able to compulsory stop operation by Pan Left Start command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	53h	31h	EFh

● Answer Format

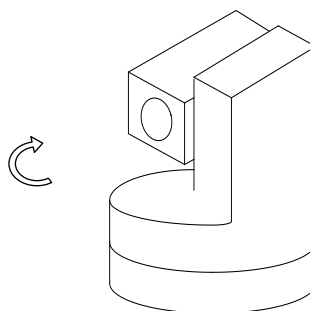
d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
EFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy:	00010000B	⇒	10h	⇒	31h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Busy	<ul style="list-style-type: none"> •While executing Shot Memory Movement and Pan Tilt Angle Assignment commands. •While executing Wiper Control and Washer Control commands. •While executing ND Filter Control commands.
Parameter Error	•Assigned parameter is an invalid value.



Normal Mounting: Right direction

8.7 Pan Left Start

Pan-Tilt Head Control Command Type 2

Function	Start panning to left	
Command	0153h	
Parameter	Length	1 byte
	Value	2h
Status	None	
Reference	<ul style="list-style-type: none"> •Until Pan/Tilt Stop Command issues, or reaches to the left limit, continue to run. •The running speed can be set by Pan Speed Assignment command. •By issuing this command, 1 is set in Panning flag among the Operating status. The setting flag will be done, just before running Pan-tilt head. When Pan-tilt head reaches to the left limit, Pan running will stop and clear Panning flag. •While panning in the left direction by this command, it is able to compulsory stop operation by Pan Right Start command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	53h	32h	EFh

● Answer Format

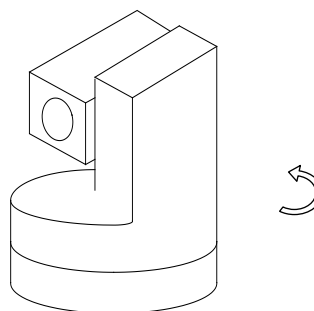
d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
EFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value		
Example		e0 e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Busy:	00010000B ⇒ 10h	⇒ 31h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h

● Condition of Error flag to be set

Busy	<ul style="list-style-type: none"> •While executing Shot Memory Movement and Pan Tilt Angle Assignment commands. •While executing Wiper Control and Washer Control commands. •While executing ND Filter Control commands.
Parameter Error	•Assigned parameter is an invalid value.



Normal Mounting: Left direction

8.8 Tilt Up Start

Pan-Tilt Head Control Command Type 2

Function	Start tilting upward	
Command	0153h	
Parameter	Length	1 byte
	Value	3h
Status	None	
Reference	<ul style="list-style-type: none"> •Until Pan/Tilt Stop command issues, or reaches to the upper limit, continue to run. •The running speed is able to set by Tilt Speed Assignment command. •By issuing this command, 1 is set in Tilting flag among the Operating status. •The setting flag will be done, just before running pan-tilt head. When pan-tilt head reaches to the upper limit, Tilt running will stop and clear Tilting flag to 0. •While tilting to the UP by this command, it is able to compulsory stop operation by Tilt Down Start command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	53h	33h	EFh

● Answer Format

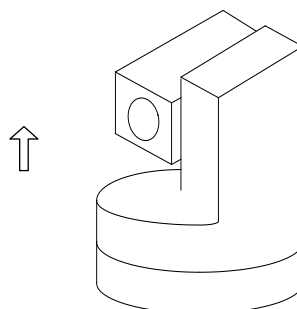
d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
EFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy:	00010000B	⇒	10h	⇒	31h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Busy	<ul style="list-style-type: none"> •While executing Shot Memory Movement and Pan Tilt Angle Assignment commands. •While executing Wiper Control and Washer Control commands. •While executing ND Filter Control commands.
Parameter Error	•Assigned parameter is an invalid value.



Normal Mounting: Up direction

8.9 Tilt Down Start

Pan-Tilt Head Control Command Type 2

Function	Start tilting downward	
Command	0153h	
Parameter	Length	1 byte
	Value	4h
Status	None	
Reference	<ul style="list-style-type: none"> •Until Pan/Tilt Stop Command issues, or reaches to the lower limit, continue to run. •The running speed is able to set by Tilt Speed Assignment command. •By issuing this command, 1 is set in Tilting flag among the Operating status. The setting flag will be done, just before running Pan-tilt head. When Pan-tilt head reaches to the low limit, Tilt running will stop and clear Tilting flag. •While tilting to the Down by this command, it is able to compulsory stop operation by Tilt Up Start command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	53h	34h	EFh

● Answer Format

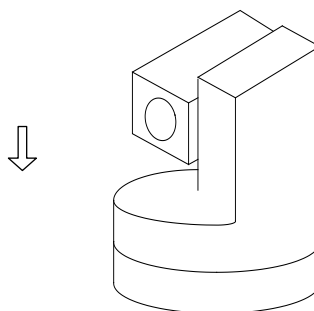
d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
EFh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy:	00010000B	⇒	10h	⇒	31h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Busy	<ul style="list-style-type: none"> •While executing Shot Memory Movement and Pan Tilt Angle Assignment commands. •While executing Wiper Control and Washer Control commands. •While executing ND Filter Control commands.
Parameter Error	•Assigned parameter is an invalid value.



Normal Mounting: Down direction

8.10 Pan-Tilt Head Initialize 1

Pan-Tilt Head Control Command Type 2

Function	Move home position after initialization of pan-tilt head	
Command	0158h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •After initialization, run to Home Position. (Pan: Front side; Tilt: Horizontal) •Home Position(Front) is originally set at the following position. <ul style="list-style-type: none"> Angle of Pan direction(position) 0 degree (8000h) Angle of Tilt direction(position) normal -90 degrees (6E6Ch) suspended 90 degrees (9194h) •The camera section is reset by executing this command. •Communication not possible while this command is executing. No control commands are received in this state. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	58h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value		
Example	e0 e1	
■ In case of No Error:	00000000B	⇒ 00h ⇒ 30h 30h
■ In case of Parameter Error :	01010000B	⇒ 50h ⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.11 Pan-Tilt Head Initialize 2

Pan-Tilt Head Control Command Type 2

Function	Move to the original position after initialization of pan-tilt head	
Command	0158h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •After initialization, runs to former position. •The camera section is reset by executing this command. •Communication not possible while this command is executing. No control commands are received in this state. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	58h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example					
■ In case of No Error:		00000000B	⇒	00h	⇒ 30h 30h
■ In case of Parameter Error :		01010000B	⇒	50h	⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.12 Pan Slowest Speed Request

Pan-Tilt Head Control Command Type 1

Function	Return the slowest running speed for panning	
Command	0159h	
Parameter	Length	1 byte
	Value	0h
Status	Length	3 byte
	Value	5 (005h)
Reference	<ul style="list-style-type: none"> •To return the slowest speed enable to set the running speed of Pan direction by Pan Speed Assignment command. •The status value 5 is equal to approx. 0.1 degrees/s. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	59h	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8
header	Device Num		Error Code		Status		End mark	
FEh	30h	30h	30h	30h	30h	30h	35h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.13 Pan Fastest Speed Request

Pan-Tilt Head Control Command Type 1

Function	Return the fastest running speed for panning	
Command	0159h	
Parameter	Length	1 byte
	Value	1h
Status	Length	3 byte
	Value	Standard mode: 2000 (7D0h) High speed mode: 3000 (BB8h)
Reference	<ul style="list-style-type: none"> •To return the fastest speed enable to set the running speed of Pan direction by Pan Speed Assignment command. •The status value 2000 is equal to approx. 40 degree/s. •The status value 3000 is equal to approx. 60 degree/s. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	59h	31h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8
header	Device Num		Error Code		Status		End mark	
FEh	30h	30h	30h	30h	42h	42h	38h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.14 Tilt Slowest Speed Request

Pan-Tilt Head Control Command Type 1

Function	Return the slowest running speed for tilting	
Command	0159h	
Parameter	Length	1 byte
	Value	2h
Status	Length	3 byte
	Value	5 (005h)
Reference	<ul style="list-style-type: none"> •To return the slowest speed enable to set the running speed of Tilt direction by Tilt Speed Assignment command. •The status value 5 is equal to approx. 0.1 degrees/s. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	59h	32h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8
header	Device Num		Error Code		Status		End mark	
FEh	30h	30h	30h	30h	30h	30h	35h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.15 Tilt Fastest Speed Request

Pan-Tilt Head Control Command Type 1

Function	Return the fastest running speed for tilting	
Command	0159h	
Parameter	Length	1 byte
	Value	3h
Status	Length	3 byte
	Value	Standard mode: 2000 (7D0h) High speed mode: 3000 (BB8h)
Reference	<ul style="list-style-type: none"> •To return the fastest speed enable to set the running speed of Tilt direction by Tilt Speed Assignment command. •The status value 2000 is equal to approx. 40 degrees/s. •The status value 3000 is equal to approx. 60 degrees/s. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	59h	33h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Error Code		Status		End mark	
FEh	30h	30h	30h	30h	42h	42h	38h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.16 Pan Angle Pulse Ratio Request

Pan-Tilt Head Control Command Type 1

Function	Return the coefficient to convert the parameter value or the status value used for Pan angle (position) and Pan speed commands to angle unit	
Command	015Bh	
Parameter	Length	1 byte
	Value	0h
Status	Length	4 byte
	Value	2000 (07D0h)
Reference	<p>•To return integral value multiplied 100,000 to the conversion coefficient of true Pan angle. In case of angle conversion, divide it by 100,000 Example below, Status value /100,000 = 2000 /100,000 = 0.02</p> <p>Example: The parameter of Pan Speed Assignment command can be converted as under. Pan speed (3000) $\Rightarrow 3000 \times 0.02 = 60$ degrees/s</p>	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Bh	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
header	Device Num		Error Code		Status			End mark	
FEh	30h	30h	30h	30h	30h	37h	44h	30h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
<p>■ In case of Parameter Error : 01010000B \Rightarrow 50h \Rightarrow 35h 30h</p>	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.17 Tilt Angle Pulse Ratio Request

Pan-Tilt Head Control Command Type 1

Function	Return the coefficient to convert the parameter value or the status value used for Tilt angle (position) and Tilt speed commands to angle unit	
Command	015Bh	
Parameter	Length	1 byte
	Value	1h
Status	Length	4 byte
	Value	2000 (07D0h)
Reference	<p>•To return integral value multiplied 100,000 to the conversion coefficient of true Tilt angle. In case of angle conversion, divide it by 100,000. Example below,</p> <p style="text-align: center;">$\text{Status value} / 100,000 = 2000 / 100,000 = 0.02$</p> <p>Example: The parameter of Tilt Speed Assignment command can be converted as under.</p> <p style="text-align: center;">$\text{Tilt speed (3000)} \Rightarrow 3000 \times 0.02 = 60 \text{ degrees/s}$</p>	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Bh	31h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
header	Device Num		Error Code		Status			End mark	
FEh	30h	30h	30h	30h	30h	37h	44h	30h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
<p>■ In case of Parameter Error : 01010000B \Rightarrow 50h \Rightarrow 35h 30h</p>	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.18 Pan Minimum Angle Request

Pan-Tilt Head Control Command Type 1

Function	Return the minimum value (left end) for panning angle (position)	
Command	015Ch	
Parameter	Length	1 byte
	Value	0h
Status	Length	4 byte
	Value	-9000 (5CD8h)
Reference	<ul style="list-style-type: none"> Status Value (-9000) is the position rotated approx. 180 degrees to left as zero degree for front. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Ch	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
Header	Device Num		Error Code		Status				End mark
FEh	30h	30h	30h	30h	35h	43h	44h	38h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	<ul style="list-style-type: none"> Assigned parameter is an invalid value.
-----------------	---

8.19 Pan Maximum Angle Request

Pan-Tilt Head Control Command Type 1

Function	Return the maximum value (right end) for panning angle (position)	
Command	015Ch	
Parameter	Length	1 byte
	Value	1h
Status	Length	4 byte
	Value	9000 (A328h)
Reference	<ul style="list-style-type: none"> •Status Value (+9000) is the position rotated approx. 180 degrees to right as zero degree for front. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Ch	31h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
Header	Device Num		Error Code		Status				End mark
FEh	30h	30h	30h	30h	41h	33h	32h	38h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

● Condition of Error flag to be set

Parameter Error	<ul style="list-style-type: none"> •Assigned parameter is an invalid value.
-----------------	--

8.20 Tilt Minimum Angle Request

Pan-Tilt Head Control Command Type 1

Function	Return the minimum value (down end) for tilting angle (position)	
Command	015Ch	
Parameter	Length	1 byte
	Value	2h
Status	Length	4 byte
	Value	-6500 (669Ch)
Reference	•Status Value(-6500) is the position rotated approx. 130 degrees to down as zero degree for horizontal.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Ch	32h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
Header	Device Num		Error Code		Status				End mark
FEh	30h	30h	30h	30h	36h	36h	39h	43h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value		
Example	e0	e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h		

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.21 Tilt Maximum Angle Request

Pan-Tilt Head Control Command Type 1

Function	Return the maximum value (up end) for tilting angle (position)	
Command	015Ch	
Parameter	Length	1 byte
	Value	3h
Status	Length	4 byte
	Value	6500 (9964h)
Reference	•Status Value(+6500) is the position rotated approx. 130 degrees to upper as zero degree for horizontal.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	5Ch	33h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
Header	Device Num		Error Code		Status				End mark
FEh	30h	30h	30h	30h	39h	39h	36h	34h	EFh

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value	
Example	e0 e1
■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h	

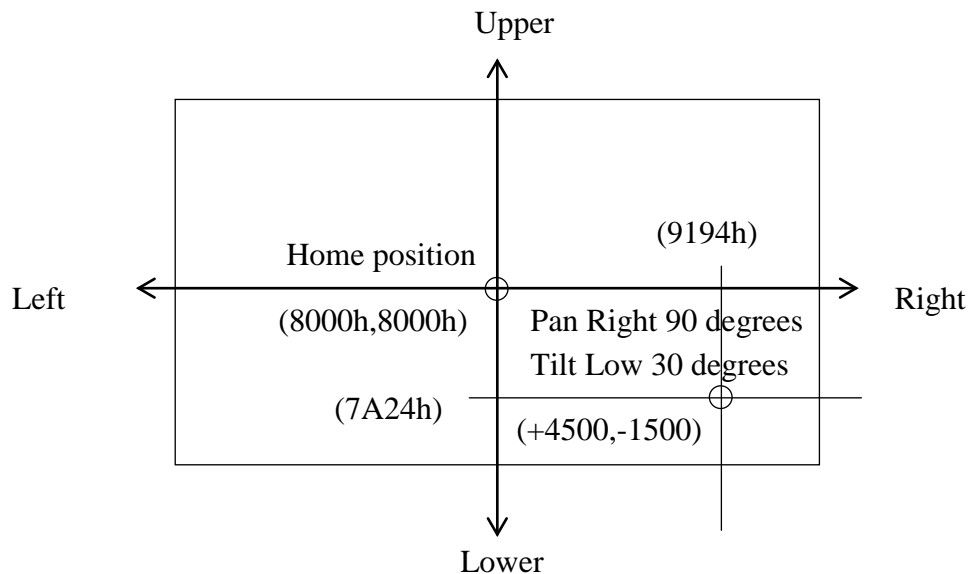
● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.22 Pan/Tilt Angle Assignment

Pan-Tilt Head Control Command type 2

Function	Assign the angle (position) for panning/tilting	
Command	0162h	
Parameter	Length	8 byte
	Range	Within range of Pan and Tilt Movable Range
	Default Range	Pan : -90000 to +90000 (5CD8h to A328h) Tilt : -6500 to +6500 (669Ch to 9964h)
status	None	
Reference	<ul style="list-style-type: none"> Parameter Value (1LSB) of both Pan/Tilt is equal to approx.0.02 degrees by converting to angle. (See 8.16 and 8.17) Parameter section (8 byte) splits p0~p3 as Pan angle (position) section, and p4~p7 as Tilt (position) section. The right direction of Pan Angle (position) is positive and the left one is negative. The upper direction of Tilt Angle (position) is positive and the lower one is negative. Assigned sample of Pan/tilt Angle(position) as below <ul style="list-style-type: none"> Pan right 90 degrees $\Rightarrow +90/0.02 \Rightarrow +4500 \Rightarrow +1194h$ $\Rightarrow 8000h+1194h = 9194h$ Tilt lower 30 degrees $\Rightarrow -30/0.02 \Rightarrow -1500 \Rightarrow -5DCh$ $\Rightarrow 8000h-5DCh = 7A24h$ By issuing this command, Pan/tilt will be in action simultaneously and Pan and Tilt flag in action among the running status, set 1 and when Pan/Tilt motion stop, Pan/Tilt flags in action clear to zero. 	



● Format of Control Command

d0	d1	d2	d3	d4										
Header	Device Num		Command											
FFh	30h	30h	01h	62h										
	d5	d6	d7	d8	d9	d10	d11	d12	d13					
	Pan Angle Parameter				Tilt Angle Parameter				End mark					
	p0	p1	p2	p3	p4	p5	p6	p7	EFh					



Angle indicates Hexadecimal 8 digits and returns ASCII as parameter value													
Example	Pan right 90 degrees				Tilt lower 30 degrees								
	Pan				p0	p1	p2	p3					
	+4500	⇒	9194h	⇒	39h	31h	39h	34h					
	Tilt				p4	p5	p6	p7					
	-1500	⇒	7A24h	⇒	37h	41h	32h	34h					

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in Hexadecimal 2 digits and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy :	00010000B	⇒	10h	⇒	31h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Busy	<ul style="list-style-type: none"> •In case of executing Shot Memory Movement command •In case of Panning by Pan-Tilt Head Control command •In case of Tilting by Pan-Tilt Head Control command •In case of executing Wiper Control and Washer Control commands. •In case of executing ND Filter Control command
Parameter Error	•Assigned parameter is an invalid value.

8.23 Pan/Tilt Angle Request

Pan-Tilt Head Control Command type 1

Function	Request the angle (position) for panning/tilting	
Command	0163h	
Parameter	None	
Status	Length	8 byte
	Range	within range of Pan and Tilt Movable Range
Reference	<ul style="list-style-type: none"> •Parameter Value (1LSB) of both Pan/Tilt is equal to approx.0.02 degrees by converting to angle (see 8.16 and 8.17) •Parameter section (8 byte) splits s0~s3 as angle (position) section, and s4~s7 as Tilt (position) section. •This command returns the angle(position), at the moment of receipt of Command even through Pan/Tilt is in action except executing Pan-tilt head Initialize 1 & 2 	

● Format of Control Command

d0	d1	d2	d3	d4	d5
Header	Device Num		Command		End mark
FFh	30h	30h	01h	63h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4								
Header	Device Num		Error Code									
EFh	30h	30h	30h	30h								
d5	d6	d7	d8	d9	d10	d11	d12	d13				
Pan Angel Status				Tilt Angle Status				End mark				
s0	s1	s2	s3	s4	s5	s6	s7	EFh				



The present position indicates in Hexadecimal 8 digits and its ASCII is as parameter value							
Example	Pan right 90 degrees			Tilt lower 30 degrees			
Pan				p0	p1	p2	p3
+4500	⇒	9194h	⇒	39h	31h	39h	34h
Tilt				p4	p5	p6	p7
-1500	⇒	7A24h	⇒	37h	41h	32h	34h

8.24 Wiper Control

Pan-Tilt Head Control Command Type 2

Function	Operate the wiper	
Command	017Ah	
Parameter	Length	1byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •The wiper performs one reciprocating operation each time this command is issued. •A command error is returned if the outdoor option is not installed. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	
FFh	30h	30h	01h	7Ah	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy:	00010000B	⇒	10h	⇒	31h 30h
■ In case of Command Error:	00110000B	⇒	30h	⇒	33h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Command Error	•The outdoor option is not installed.
Busy	<ul style="list-style-type: none"> •In case of executing Shot Memory command. •In case of Panning by Pan-tilt head Control command •In case of Tilting by Pan-tilt head Control command •In case of executing Wiper Control and Washer Control commands. •In case of executing ND Filter Control command.
Parameter Error	•Assigned parameter is an invalid value.

8.25 Washer Control

Pan-Tilt Head Control Command Type 2

Function	Operate the washer	
Command	017Ah	
Parameter	Length	1byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •Executing this command once performs four wiper cycles, and the washer terminal is set to ON during the first two cycles. •A command error is returned if the outdoor option is not installed. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	
FFh	30h	30h	01h	7Ah	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B ⇒	00h	⇒	30h	30h
■ In case of Busy :	00010000B ⇒	10h	⇒	31h	30h
■ In case of Command Error:	00110000B ⇒	30h	⇒	33h	30h
■ In case of Parameter Error:	01010000B ⇒	50h	⇒	35h	30h

● Condition of Error flag to be set

Command Error	•The outdoor option is not installed.
Busy	<ul style="list-style-type: none"> •In case of executing Shot Memory command. •In case of Panning by Pan-tilt head Control command •In case of Tilting by Pan-tilt head Control command •In case of executing Wiper Control and Washer Control commands. •In case of executing ND Filter Control command.
Parameter Error	•Assigned parameter is an invalid value.

8.26 Tally OFF

Pan-Tilt Head Control Command Type 2

Function	Turn off the tally	
Command	017Bh	
Parameter	Length	1byte
	Value	0h
Status	None	
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	7Bh	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	e0 e1 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.27 Tally ON

Pan-Tilt Head Control Command Type 2

Function	Turn on the tally	
Command	017Bh	
Parameter	Length	1byte
	Value	1h
Status	None	
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	7Bh	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:			00000000B ⇒	00h ⇒	e0 e1 30h 30h
■ In case of Parameter Error:			01010000B ⇒	50h ⇒	e0 e1 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.28 AUX OUT OFF

Pan-Tilt Head Control Command Type 2

Function	Set the AUX output terminal (non-contact output) to off	
Command	0171h	
Parameter	Length	2byte
	Value	1 st byte : 0h 2 nd byte: 0h
Status	None	
Reference	•The AUX status is saved even after the pan-tilt head is reset.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	71h	30h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.29 AUX OUT ON

Pan-Tilt Head Control Command Type 2

Function	Set the AUX output terminal (non-contact output) to on	
Command	0171h	
Parameter	Length	2byte
	Value	1 st byte : 0h 2 nd byte: 1h
Status	None	
Reference	•The AUX status is saved even after the pan-tilt head is reset.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	71h	30h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:			00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:			01010000B ⇒	50h ⇒	35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.30 AUX Status Request

Pan-Tilt Head Control Command Type 1

Function	Return the present AUX status information	
Command	01EAh	
Parameter	Length	1byte
	Value	0h
Status	Length	2byte
	Value	See below
Reference	•See the status details below.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	EAh	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		AUX Status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



AUX Status indicates in Hexadecimal 1 digit and parameter value is its ASCII code							
Example:					s0	s1	
				11	⇒	31h	31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of Parameter Error: 01010000B		⇒	50h	⇒	e0 e1
					35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

● Status Bit Assignment

By assigning the AUX status to bits as shown below, it can be expressed in two digits of hexadecimal. The ASCII code is returned.

Bit	Description
b7	Reserve
b6	Reserve
b5	Reserve
b4	AUX IN status ON: 1/OFF: 0
b3	Reserve
b2	Reserve
b1	Reserve
b0	AUX OUT status ON: 1/OFF: 0

Example: For AUX OUT ON, AUX IN ON: 11h ⇒ 31h 31h

8.31 Housing Fan Status Request

Pan-Tilt Head Control Command Type 1

Function	Return the present housing fan status information	
Command	01EAh	
Parameter	Length	1byte
	Value	Ah
Status	Length	2byte
	Value	See below
Reference	•See the status details below.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	EAh	41h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Fan Status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Fan Status indicates in Hexadecimal 1 digit and parameter value is its ASCII code							
Example:							
11				⇒	s0	s1	
					31h	31h	

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of Parameter Error: 01010000B		⇒	50h	⇒	e0 e1
					35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

● Status Bit Assignment

By assigning the Fan status to bits as shown below, it can be expressed in two digits of hexadecimal. The ASCII code is returned.

Bit	Description
b7	Reserve
b6	Reserve
b5	Reserve
b4	Fan status ON: 1/OFF: 0
b3	Reserve
b2	Reserve
b1	Reserve
b0	Fan alarm ON: 1/OFF: 0

Example: For Fan ON, Alarm ON: 11h⇒ 31h 31h

8.32 Washer Output OFF

Pan-Tilt Head Control Command Type 1

Function	Turn off the washer terminal output	
Command	0171h	
Parameter	Length	2byte
	Value	1 st byte : Bh 2 nd byte: 0h
Status	None	
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	71h	42h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:			00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:			01010000B ⇒	50h ⇒	35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

8.33 Washer Output ON

Pan-Tilt Head Control Command Type 1

Function	Turn on the washer terminal output	
Command	0171h	
Parameter	Length	2byte
	Value	1 st byte : Bh 2 nd byte: 1h
Status	None	
Reference	<ul style="list-style-type: none"> •The wiper will not work with this command. It is used for removing air from tubes during washer unit installation. •The Washer Output command automatically changes to Off status approximately one minute after turning On the command. •As well as the Washer Output OFF command, the Washer Output command can turns the Washer Output off after the wiper works for two cycles. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	71h	42h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:		00000000B	⇒	00h	⇒ 30h 30h
■ In case of Parameter Error:		01010000B	⇒	50h	⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

9. Details of Camera Control Command

9.1 Camera Version Request

Pan-Tilt Head Control Command Type 1

Function	Return the camera version value	
Command	01BEh	
Parameter	Length	1byte
	Value	0h
Status	Length	2byte
	Value	01h
Reference	<ul style="list-style-type: none"> •Returns the camera version value in 2 digits Hexadecimal. •In the future, the status (version number) could change. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BEh	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Version Value		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Camera version value indicates in 2 digits Hexadecimal and parameter value is its ASCII code							
Example:							
		1		⇒	01h		⇒
					s0		s1
					30h		31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value							
Example							
					e0		e1
					35h		30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

9.2 Camera OFF

Camera Control Command Type 2

Function	Turn off the power to the camera section	
Command	01A0h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •To power Camera section OFF(Picture signal of camera comes out OFF) •By issuing this command, flag of Camera Power OFF command is set as 1. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A0h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		
■ In case of No Error:	00000000B	⇒ 00h ⇒ 30h 30h
■ In case of Parameter Error :	01010000B	⇒ 50h ⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value
-----------------	---

9.3 Camera ON

Camera Control Command Type 2

Function	Turn on the power to the camera section	
Command	01A0h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •To power Camera section Power ON (Picture signal of camera turns out) •Camera section set values come out default value. •By issuing this command, the camera power off flag is cleared to 0, while in the operating status. •The camera busy flag of extended operation status is set to "1" while executing this command. The camera busy flag will be cleared after the camera ON process completes (the process takes approximately 15 seconds to complete). •Check the camera busy flag, to check that the camera power is on using this command, and that the camera control and camera settings are possible. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A0h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		
■ In case of No Error:	00000000B	⇒ 00h ⇒ 30h 30h
■ In case of Parameter Error :	01010000B	⇒ 50h ⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

9.4 Focus Auto

Camera Control Command Type 2

Function	Set the auto focus (AF) mode	
Command	01A1h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> Flags in Focusing of Operation Status and Manual Focus cleared to zero at AF Mode. AF Mode sets default value at the time of executing Camera Reset and Camera ON commands during power ON. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
			e0	e1	
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •In case of executing One-shot AF

9.5 Focus Manual

Camera Control Command Type 2

Function	Stop the focusing operation and set the manual focus (MF) mode	
Command	01A1h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •In case of AF and INF (infinity) Mode, cancels AF Mode and set MF Mode. •To stop focus operation under focusing by MF mode. Flags in Focusing of Operation Status comes out zero and Manual Focus come out 1.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •In case of executing One-shot AF

9.6 Focus Fixed at Infinity

Camera Control Command Type 2

Function	Fix the focus to infinity (INF) mode	
Command	01A1h	
Parameter	Length	1 byte
	Value	Bh
Status	None	
Reference	<ul style="list-style-type: none"> •In INF mode, the focusing flag in operating status, and the manual focus flag are set to 0. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	42h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •In case of executing One-shot AF

9.7 Focus Near

Camera Control Command Type 2

Function	Move the focus point near	
Command	01A1h	
Parameter	Length	1 byte
	Value	2h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the NEAR direction with this command, the focusing flag in operating status is set to 1. •If operating in the NEAR direction with this command, it is possible to stop movement using the focus MANUAL command. •If operating in the NEAR direction with this command, it is possible to forcibly stop movement using the focus FAR command. •The focusing movement stops at Focus Operation Limit (Near end), and the focusing flag in operating status is set to 0. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	32h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •Not in status of Manual Focus •In case of executing One-shot AF

9.8 Focus Far

Camera Control Command Type 2

Function	Move the focus point far	
Command	01A1h	
Parameter	Length	1 byte
	Value	3h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the FAR direction with this command, the focusing flag in operating status is set to 1. •If operating in the FAR direction with this command, it is possible to stop movement using the focus MANUAL command. •If operating in the FAR direction with this command, it is possible to forcibly stop movement using the focus NEAR command. •The focusing movement stops at Focus Operation Limit (Far end), and the focusing flag in operating status is set to 0. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	33h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •Not in status of Manual Focus •In case of executing One-shot AF

9.9 One-shot AF

Camera Control Command Type 2

Function	Perform the one-shot AF	
Command	01A1h	
Parameter	Length	1 byte
	Value	Ah
Status	None	
Reference	•One-shot AF operation takes approximately seven seconds.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A1h	41h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		e0 e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •When Focus is fixed at infinity •In case of executing One-shot AF •In case of executing Shot Memory command.

9.10 Zoom Stop

Camera Control Command Type 2

Function	Stop the zooming operation	
Command	01A2h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> Flags in Zooming of Operation Status are cleared to zero. To set Zoom Stop by default at the moment of setting Camera Reset and Camera ON commands during power ON. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A2h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> Not in status of Camera ON In status Color bar output is ON

9.11 Zoom Wide

Camera Control Command Type 2

Function	Zoom to wide side	
Command	01A2h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the Wide direction with this command, the Zooming flag in operating status is set to 1. •Movement speed can be set using Zoom Speed Assignment command. •Movement can be stopped using the Zoom Stop command. •If operating in the Wide direction with this command, it is possible to forcibly stop movement using the Zoom Tele or Zoom Hi Tele command. •The zooming movement stops at Zooming Wide Operation Limit (optical widest end), and the zooming flag is cleared to zero. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A2h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.12 Zoom Tele

Camera Control Command Type 2

Function	Zoom to telephoto side	
Command	01A2h	
Parameter	Length	1 byte
	Value	2h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the Tele direction with this command, the Zooming flag in operating status is set to 1. •Movement speed can be set using Zoom Speed Assignment command. •Movement can be stopped using the Zoom Stop command. •If operating in the Tele direction with this command, it is possible to forcibly stop movement using the Zoom Wide or Zoom Hi Wide command. •The zooming movement stops at Zooming Telephoto Operation Limit (Optical interlocking mode: Maximum digital magnification, Independent mode: optical telephoto end), and the zooming flag is cleared to zero. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A2h	32h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		e0 e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.13 Zoom Hi Wide

Camera Control Command Type 2

Function	Zoom to wide side in high speed	
Command	01A2h	
Parameter	Length	1 byte
	Value	3h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the Wide direction with this command, the Zooming flag in operating status is set to 1. •Movement speed can be set using Zoom Speed Assignment command. •Movement can be stopped using the Zoom Stop command. •If operating in the Wide direction with this command, it is possible to forcibly stop movement using the Zoom Tele or Zoom Hi Tele command. •The zooming movement stops at Zooming Wide Operation Limit (optical widest end), and the zooming flag is cleared to zero. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A2h	33h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value..
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.14 Zoom Hi Tele

Camera Control Command Type 2

Function	Zoom to telephoto side in high speed	
Command	01A2h	
Parameter	Length	1 byte
	Value	4h
Status	None	
Reference	<ul style="list-style-type: none"> •If operating in the Tele direction with this command, the Zooming flag in operating status is set to 1. •Movement speed can be set using Zoom Speed Assignment command. •Movement can be stopped using the Zoom Stop command. •If operating in the Tele direction with this command, it is possible to forcibly stop movement using the Zoom Wide or Zoom Hi Wide command. •The zooming movement stops at Zooming Telephoto Operation Limit (Optical interlocking mode: Maximum digital magnification, Independent mode: optical telephoto end), and the zooming flag is cleared to zero. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A2h	34h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		e0 e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.15 Zoom Position Assignment

Camera Control Command Type 2

Function	Move to the assigned zooming position	
Command	01A3h	
Parameter	Length	2 byte
	Range	Optical interlocking mode: 00h (Wide) to EEh (Telephoto) Independent mode: 00h (Wide) to 80h (Telephoto)
Status	None	
Reference	<ul style="list-style-type: none"> •When the setting of the digital zoom operation is the optical interlocking mode, 00 (00h) to 128 (80h) is the optical region; 129 (81h) to 238 (EEh) is the digital zoom region. •When the setting is the Independent mode, the optical zoom position between 00 (00h) and 128 (80h) can be assigned. The digital zoom position does not change. •Flags in Zooming of Operation Status are set to 1. Zooming will stop after moving assigned position and flag in zooming is cleared to 0. •To stop zooming by Zoom Stop Command and flag in zooming is cleared to zero. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	A3h	p0	p1	EFh



Zoom position indicates in Hexadecimal 2 digits and parameter value is its ASCII code							
Example					p0	p1	
64				⇒	40h	⇒	p0 p1 34h 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
•Example					
				e0	e1
■ In case of No Error:		00000000B ⇒ 00h		⇒	30h 30h
■ In case of Parameter Error :		01010000B ⇒ 50h		⇒	35h 30h
■ In case of Mode Error :		10010000B ⇒ 90h		⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.16 Zoom Position Request

Camera Control Command Type 1

Function	Return the present zooming position	
Command	01A4h	
Parameter	None	
Status	Length	2 byte
	Range	Optical interlocking mode: 00h (Wide) to EEh (Telephoto) Independent mode: 00h (Wide) to 80h (Telephoto)
Reference	<ul style="list-style-type: none"> •To assign zoom position by Pre-Assigned Step Value, within movable range. • When the setting of the digital zoom operation is the optical interlocking mode, 00 (00h) to 128 (80h) is the optical region; 129 (81h) to 238 (EEh) is the digital zoom region. • When the setting is the Independent mode, the optical zoom position between 00 (00h) and 128 (80h) is returned. It does not depend on the digital zoom magnification. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5
Header	Device Num		Command		End mark
FFh	30h	30h	01h	A4h	EFh

● Answer format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Zoom Position		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Present position indicates in Hexadecimal 2 digits and its ASCII code is Status value.	
Example:	<div style="display: flex; justify-content: space-around; align-items: center;"> 64 ⇒ 40h ⇒ s0 s1 </div> <div style="display: flex; justify-content: space-around; align-items: center;"> 34h 30h </div>

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates Hexadecimal 2 digits and returns ASCII value	
Example	<div style="display: flex; justify-content: space-around; align-items: center;"> e0 e1 </div> <div style="display: flex; justify-content: space-around; align-items: center;"> ■ In case of Mode Error : 10010000B ⇒ 90h ⇒ 39h 30h </div>

● Condition of Error flag to be set

Mode Error	•Not in status of Camera ON
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9.17 Zoom Speed Assignment

Camera Control Command Type 1

Function	Assign the zooming speed	
Command	01B4h	
Parameter	Length	2 byte
	Range	1 st byte : 1 2 nd byte : 0~7 (0h~7h)
Status	None	
Reference	<ul style="list-style-type: none"> Speed set by this command is reflected in Zoom Wide and Zoom Tele commands. Default value is 7. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	B4h	31h	p1	EFh



Zoom speed indicates in Hexadecimal 1 digit and parameter value is its ASCII code	
Example:	p1 4 ⇒ 4h ⇒ 34h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
<ul style="list-style-type: none"> Example ■ In case of No Error: 00000000B ⇒ 00h ⇒ e0 e1 30h 30h ■ In case of Parameter Error : 01010000B ⇒ 50h ⇒ 35h 30h ■ In case of Mode Error : 10010000B ⇒ 90h ⇒ 39h 30h 	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.18 Zoom Speed Request

Camera Control Command Type 1

Function	Return the present zooming speed	
Command	01B4h	
Parameter	Length	1 byte
	Value	2h
Status	Length	1 byte
	Range	0~7 (0h~7h)
Reference	•Default value is 7	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	B4h	32h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Speed	End mark
FEh	30h	30h	30h	30h	s0	EFh



Zoom speed indicates in Hexadecimal 1 digit and status value is its ASCII code		
Example:	4	⇒ 4h ⇒ p0 34h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
•Example		e0 e1
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.19 Digital Zoom Magnification Assignment (XU-81)

Camera Control Command Type 2

Function	Set the digital zoom magnification	
Command	01DAh	
Parameter	Length	2 byte
	Range	0 to 110 (00h to 6Eh)
Status	None	
Reference	<ul style="list-style-type: none"> •The setting can be made between 1.0x to 12.0x at 0.1x intervals. •It is valid when the setting of digital zoom operation is the Independent mode. When the setting is the Optical interlocking mode, the command error is returned. •When the power is on, the initial value for camera reset and camera ON command is 0 (0h). •It is valid for XU-81 only. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	DAh	p0	p1	EFh



Digital zoom magnification indicates in Hexadecimal 2 digits and parameter value is its ASCII code			
Example:	110	⇒	6Eh ⇒ p0 36h p1 45h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example		e0	e1
■ In case of No Error:	00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h 30h
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h 30h

● Condition of Error flag to be set

Command Error	•The digital zoom mode setting is the Optical interlocking mode.
Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● **Digital Zoom Magnification Table (Prototypical value)**

Parameter	Digital Zoom Magnification
00h	1.0x
0Ah	2.0x
14h	3.0x
1Eh	4.0x
28h	5.0x
32h	6.0x
3Ch	7.0x
46h	8.0x
50h	9.0x
5Ah	10.0x
64h	11.0x
6Eh	12.0x

Note: The setting can be made within the above parameter range at 0.1x intervals.

9.20 Digital Zoom Magnification Status Request (XU-81)

Camera Control Command Type 1

Function	Return the digital zoom magnification status information	
Command	01C6h	
Parameter	Length	1 byte
	Value	10 (Ah)
Status	Length	2 byte
	Value	0 to 110 (00h to 6Eh)
Reference	<ul style="list-style-type: none"> For the detailed relation between the parameter values and the digital zoom magnification, refer to <i>Digital Zoom Magnification Table</i> in “Digital Zoom Magnification Assignment.” It is valid for XU-81 only. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C6h	41h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Shutter Status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Digital zoom magnification status indicates in Hexadecimal 2 digits and status value is its ASCII code	
Example:	
6.0x (50)	⇒ 32h ⇒ s0 s1 33h 32h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
•Example	e0 e1
■ In case of Parameter Error :	01010000B ⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.21 Color Bar OFF

Camera Control Command Type 2

Function	Turn off the color bar output and switch the output video to camera video	
Command	01B8h	
Parameter	Length	1 byte
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> When the power is on, the default settings are made when the Camera Reset and Camera ON commands are executed. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	B8h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.22 Color Bar ON

Camera Control Command Type 2

Function	Switch the output video to color bars	
Command	01B8h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	B8h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.23 Color Bar Status Request

Camera Control Command Type 1

Function	Return the present color bar status	
Command	01C5h	
Parameter	Length	1 byte
	Value	2h
Status	Length	1 byte
	Range	0, 1 (0h, 1h)
Reference	•For the detailed relation between the status and the color bar status, refer to <i>Color Bar Status Value Table</i> below.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	32h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Color bar status value indicates in Hexadecimal 1 digit and status value is its ASCII code	
Example:	s0
1 ⇒ 1h ⇒ 31h	

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
•Example	e0 e1
■ In case of Parameter Error :	01010000B ⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Color Bar Status Value Table

S0	Color Bar Status
30h	OFF (video output)
31h	ON

• Shooting Mode Table

Parameter Value	0h	1h	2h	3h	4h
Shooting Mode	Auto	Manual	Night	Shutter Priority	Iris Priority
Gain	Auto	○	Auto	Auto	Auto
Shutter	Auto (No accumulation)	○	Auto (Accumulation)	○	Auto (No accumulation)
Iris	Auto	○	Auto	Auto	○
AutoICR ON/OFF	× (Fixed at OFF)	× (Fixed at OFF)	○	× (Fixed at OFF)	× (Fixed at OFF)
IR Filter	○	○	○	○	○
AE compensation	○	×	○	○	○
Color Bar	○	○	○	○	○
WDR	○	○	○	○	○
ND Filter	○	○	○	○	○
White Balance	○	○	○	○	○
Edge compensation	○	○	○	○	○
Black Level	○	○	○	○	○

○: Operation is enabled

×: Operation is disabled

Auto: Automatically adjusted

9.25 Shooting Mode Status Request

Camera Control Command Type 1

Function	Return the camera shooting mode status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	3h
Status	Length	1 byte
	Range	0 to 4 (0 to 4h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the shooting mode status, refer to <i>Shooting Mode Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	33h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Shooting mode status value indicates in Hexadecimal 1 digit and status value is its ASCII code	
Example:	s0
1 ⇒ 1h ⇒ 31h	

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
•Example	e0 e1
■ In case of Parameter Error :	01010000B ⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Shooting Mode Status Value Table

S0	Shooting Mode Status
30h	Auto
31h	Manual
32h	Night
33h	Priority to Shutter
34h	Priority to Iris

9.26 Shutter Speed 1/60

Camera Control Command Type 2

Function	Set the shutter speed to 1/60 sec. (when the video rate setting is 59.94)	
Command	01A8h	
Parameter	Length	1 byte
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •To be able to change when the shooting mode is Manual and Shutter Priority. •The Shutter Speed is set to 1/50 sec. when the frame rate is set to 50. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A8h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
•Example		
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is Auto, Night, or Iris Priority mode. •In status Color bar output is ON

9.27 Shutter Speed 1/100

Camera Control Command Type 2

Function	Set the shutter speed to 1/100 sec.	
Command	01A8h	
Parameter	Length	1 byte
	Value	2h
Status	None	
Reference	<ul style="list-style-type: none"> To be able to change when the shooting mode is Manual and Shutter Priority. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A8h	32h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
•Example	e0 e1	
■ In case of No Error:	00000000B	⇒ 00h ⇒ 30h 30h
■ In case of Parameter Error :	01010000B	⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B	⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON. •The shooting mode is Auto, Night, or Iris Priority mode. •In status Color bar output is ON

9.28 Shutter Speed Assignment

Camera Control Command Type 2

Function	Assign the shutter speed.	
Command	01ADh	
Parameter	Length	1 byte
	Range	0~4 (0h~4h)
Status	None	
Reference	<ul style="list-style-type: none"> •See the following table for relation between Parameter value and the shutter speed. However, they vary depending on the frame rate setting. •To be able to change when the shooting mode is Manual and Shutter Priority. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	ADh	p0	EFh



Shutter Speed Parameter indicates in Hexadecimal 1 digit and parameter value is its ASCII code.		
Example:	3	⇒ 3h ⇒ p0 33h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example		e0	e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h	30h
■ In case of Parameter Error:	01010000B ⇒ 50h	⇒ 35h	30h
■ In case of Mode Error:	10010000B ⇒ 90h	⇒ 39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is Auto, Night, or Iris Priority mode. •In status Color bar output is ON

● Shutter Speed Corresponding Table

Parameter	Shutter Speed	
	59.94	50
00	2/1	2/1
01	1/15	1/12
02	1/60	1/50
03	1/100	1/100
04	1/1000	1/1000

9.29 Shutter Speed Status Request

Camera Control Command Type 1

Function	Return the present shutter speed status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	5h
Status	Length	1 byte
	Range	0 to 4 (0 to 4h)
Reference	For the detailed relation between the status and the shutter speed status, refer to <i>Shutter Speed Status Value Table</i> below.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	35h	EFh

● Answer Format

In case of No error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Shutter speed status value indicates in Hexadecimal 1 digit and status value is its ASCII code	
Example:	s0
1	⇒ 1h ⇒ 31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
•Example	e0 e1
■ In case of Parameter Error :	01010000B ⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Shooting Mode Status Value Table

S0	Shutter Speed Status
30h	2s (2 to 1/8s)
31h	1/15s (1/15 to 1/30s)
32h	1/60s
33h	1/100s (1/90 to 1/100s)
34h	1/1000s (1/125 to 1/10000s)

9.30 Shutter Speed Detailed Setting

Camera Control Command Type 2

Function	Set the shutter speed	
Command	019Dh	
Parameter	Length	2 byte
	Range	121 to 143 (79h to 8Fh)
Status	None	
Reference	<ul style="list-style-type: none"> •See the following table for relation between Parameter value and the shutter speed. However, they vary depending on the frame rate setting. •To be able to change when the shooting mode is Manual and Shutter Priority. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	9Dh	p0	p1	EFh



Shutter Speed Parameter indicates in Hexadecimal 2 digits and parameter value is its ASCII code.			
Example:	128	⇒	80h ⇒ p0 38h p1 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example		e0	e1
■ In case of No Error:	00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h 30h
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is Auto, Night, or Iris Priority mode. •In status Color bar output is ON

● **Shutter Speed Corresponding Table**

Parameter	Shutter Speed	
	59.94	50
79h	2	2
7Ah	1	1
7Bh	1/2	1/1.5
7Ch	1/4	1/3
7Dh	1/8	1/6
7Eh	1/15	1/12
7Fh	1/30	1/25
80h	1/60	1/50
81h	1/90	1/90
82h	1/100	1/100
83h	1/125	1/125
84h	1/180	1/180
85h	1/250	1/250
86h	1/350	1/350
87h	1/500	1/500
88h	1/725	1/725
89h	1/1000	1/1000
8Ah	1/1500	1/1500
8Bh	1/2000	1/2000
8Ch	1/3000	1/3000
8Dh	1/4000	1/4000
8Eh	1/6000	1/6000
8Fh	1/10000	1/10000

9.31 Shutter Speed Detailed Status Request

Camera Control Command Type 1

Function	Return the shutter speed detailed status information	
Command	01C6h	
Parameter	Length	1 byte
	Value	1h
Status	Length	2 byte
	Range	121 to 143 (79h to 8Fh)
Reference	•See the following table for relation between Parameter value and the shutter speed.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C6h	31h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Shutter status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Shutter Speed Status indicates in Hexadecimal 2 digits and parameter value is its ASCII code.

Example:
 $1/60 (128) \Rightarrow 80h \Rightarrow \begin{matrix} s0 & s1 \\ 38h & 30h \end{matrix}$

■ In case of error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example:
 ■ In case of Parameter Error: 01010000B \Rightarrow 50h $\Rightarrow \begin{matrix} e0 & e1 \\ 35h & 30h \end{matrix}$
 ■ In case of Mode Error: 10010000B \Rightarrow 90h $\Rightarrow \begin{matrix} e0 & e1 \\ 39h & 30h \end{matrix}$

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.32 Gain Assignment

Camera Control Command Type 2

Function	Assign the camera gain	
Command	01AEh	
Parameter	Length	1 byte
	Range	0~5 (0h~5h)
Status	None	
Reference	<ul style="list-style-type: none"> •See the following table for relation between Parameter value and Gain value. •Switching enabled when the shooting mode is set to Manual mode. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	AEh	p0	EFh



The camera gain parameter value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter.	
Example:	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">3</div> <div style="margin: 0 10px;">⇒</div> <div style="text-align: center;">3h</div> <div style="margin-left: 20px;">p0 33h</div> </div>

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example		e0	e1
■ In case of No Error:	00000000B ⇒	00h	⇒ 30h 30h
■ In case of Parameter Error:	01010000B ⇒	50h	⇒ 35h 30h
■ In case of Mode Error:	10010000B ⇒	90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is other than Manual mode. •In status Color bar output is ON

● Gain Value Table

Parameter Value	Gain Value	
	XU-80	XU-81
00h	0dB	0dB
01h	6dB	6dB
02h	12dB	12dB
03h	18dB	18dB
04h	24dB	24dB
05h	32dB	42dB

9.33 Gain Status Request

Camera Control Command Type 1

Function	Return the camera gain status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	4h
Status	Length	1 byte
	Range	0 to 5 (0h to 5h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the camera gain status value, refer to <i>Camera Gain Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	34h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Camera gain status values indicates in Hexadecimal 1 digit and status value is its ASCII code.

Example:

1	⇒	1h	⇒	s0	31h
---	---	----	---	----	-----

■ In case of error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example:

	e0	e1
■ In case of Parameter Error: 01010000B ⇒ 50h ⇒	35h	30h
■ In case of Mode Error: 10010000B ⇒ 90h ⇒	39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Camera Gain Status Value Table

S0	Gain Status	
	XU-80	XU-81
30h	0dB	0dB
31h	6dB (2 to 6dB)	6dB (2 to 6dB)
32h	12dB (8 to 12dB)	12dB (8 to 12dB)
33h	18dB (14 to 18dB)	18dB (14 to 18dB)
34h	24dB (20 to 24dB)	24dB (20~24dB)
35h	32dB (26 to 32dB)	42dB (26 to 42dB)

9.34 Gain Details Specification

Camera Control Command Type 2

Function	Set the camera gain.	
Command	019Eh	
Parameter	Length	2 byte
	Range	XU-80: 0 to 16 (00h to 10h) XU-81: 0 to 21 (00h to 15h)
Status	None	
Reference	<ul style="list-style-type: none"> •See the following table for relation between Parameter value and Gain value. •Switching enabled when the shooting mode is set to Manual mode. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	9Eh	p0	p1	EFh



The camera gain parameter value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter.			
Example:			
10	⇒	0Ah	⇒
			p0 p1
			30h 41h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	30h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	35h 30h
					39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is other than Manual mode. •In status Color bar output is ON

● **Gain Value Table**

Parameter Value	Gain Value	
	XU-80	XU-81
00h	0dB	0dB
01h	2dB	2dB
02h	4dB	4dB
03h	6dB	6dB
04h	8dB	8dB
05h	10dB	10dB
06h	12dB	12dB
07h	14dB	14dB
08h	16dB	16dB
09h	18dB	18dB
0Ah	20dB	20dB
0Bh	22dB	22dB
0Ch	24dB	24dB
0Dh	26dB	26dB
0Eh	28dB	28dB
0Fh	30dB	30dB
10h	32dB	32dB
11h	Parameter Error	34dB
12h		36dB
13h		38dB
14h		40dB
15h		42dB

9.35 Gain Detailed Status Request

Camera Control Command Type 1

Function	Return the camera gain detailed status information	
Command	01C6h	
Parameter	Length	1 byte
	Value	0h
Status	Length	2 byte
	Range	XU-80: 0 to 16 (00h to 10h) XU-81: 0 to 21 (00h to 15h)
Reference	•See the following table for relation between Parameter value and the gain value.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C6h	30h	EFh

● Answer Format

■ In case of No error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Gain status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



Camera Gain Status indicates in Hexadecimal 2 digits and status value is its ASCII code.	
Example:	
6 dB (3) ⇒ 03h ⇒	s0 s1 30h 33h

■ In case of error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
Example:	
■ In case of Parameter Error: 01010000B ⇒	e0 e1 50h 35h 30h
■ In case of Mode Error: 10010000B ⇒	90h 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.36 Iris Assignment

Camera Control Command Type 2

Function	Assign the iris	
Command	01A6h	
Parameter	Length	2 byte
	Range	0 to 255 (00h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> •To be able to set when the shooting mode is Manual and Iris Priority. •Screen darkens as numerical value decreases. •Screen brightens as numerical value increases. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FEh	30h	30h	01h	A6h	p0	p1	EFh



The Iris position indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter.			
Example:			
	64	⇒	40h
		⇒	p0 p1
			34h 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	30h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	35h 30h
					39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is Auto, Night, Shutter priority mode. •In status Color bar output is ON

9.37 Number of Iris Divisions Request

Camera Control Command Type 1

Function	Return the number of iris divisions.	
Command	01C3h	
Parameter	Length	1 byte
	Value	1h
Status	Length	2 byte
	Value	XU-80: 21 (15h) XU-81: 17 (11h)
Reference	<ul style="list-style-type: none"> Returns the number of divisions of the iris that can actually be set in the camera. Set in 256 levels with the Iris Specification command of 9.30, but actually the 256 levels are assigned in equivalent intervals in levels returned by this command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C3h	31h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Number of iris divisions		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



The number of iris divisions indicates in 2 digits Hexadecimal, and its ASCII code treats as the status value.	
Example:	
21	⇒ 15h ⇒ s0 s1 31h 35h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example		e0	e1
■ In case of Parameter Error: 01010000B ⇒ 50h ⇒	35h	30h	
■ In case of Mode Error: 10010000B ⇒ 90h ⇒	39h	30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.38 Iris Position Request

Camera Control Command Type 1

Function	Return the present iris position	
Command	01C3h	
Parameter	Length	1 byte
	Value	2h
Status	Length	2 byte
	Range	XU-80: 0 to 20 (00h to 14h) XU-81: 0 to 16 (00h to 10h)
Reference	<ul style="list-style-type: none"> To return the value within the number of iris divisions received by 9.31 Iris Divisions Request command as status. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C3h	32h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Error Code		Number of iris status		End mark
FEh	30h	30h	30h	30h	s0	s1	EFh



The iris status indicates in 2 digits Hexadecimal, and its ASCII code treats as the status value.

Example:

12 ⇒ 0Bh ⇒ s0 s1
30h 42h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

■ In case of Parameter Error: 01010000B ⇒ 50h ⇒ e0 e1
 35h 30h
 ■ In case of Mode Error: 10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.39 Exposure Compensation Specification

Camera Control Command Type 2

Function	Compensate the exposure	
Command	01E3h	
Parameter	Length	2 byte
	Range	0 to 255 (00h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be set when the capturing mode is other than Manual mode. •Screen darkens as numerical value decreases. •Screen brightens as numerical value increases. •The default value is 128 (80h) at the moment of Camera Reset and Camera ON Commands in status of Power ON. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		
FEh	30h	30h	01h	E3h	p0	p1	EFh



The exposure compensation value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter.

Example:

64 ⇒ 40h ⇒ p0 p1
34h 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

			e0	e1
■ In case of No Error:	00000000B ⇒	00h ⇒	30h	30h
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h	30h
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is Manual mode. •In status Color bar output is ON

9.40 White Balance Auto

Camera Control Command Type 2

Function	Set the white balance to auto	
Command	01A7h	
Parameter	Length	1 byte.
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •To set to Auto in default value at the moment of Camera Reset and Camera ON Commands in status of Power ON. •Cr gain and Cb gain setting values are 128 (80h). 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A7h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •In case of executing Shot Memory Movement Command.

9.41 White Balance Preset

Camera Control Command Type 2

Function	Adjust and fix the white balance	
Command	01A7h	
Parameter	Length	1 byte.
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> • R gain and B gain setting values are 128 (80h). • It takes approximately five minutes to preset the white balance. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A7h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON •In case of executing Shot Memory Movement Command.

9.42 White Balance Fixed 1

Camera Control Command Type 2

Function	Fix the white balance at an indoor setting level of 3200K	
Command	01A7h	
Parameter	Length	1 byte.
	Value	2h
Status	None	
Reference	• Cr gain and Cb gain setting values are 128 (80h).	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A7h	32h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON •In status Color bar output is ON •In case of executing Shot Memory Movement command.

9.43 White Balance Fixed 2

Camera Control Command Type 2

Function	Fix the white balance at an indoor setting level of 5800K	
Command	01A7h	
Parameter	Length	1 byte.
	Value	3h
Status	None	
Reference	• Cr gain and Cb gain setting values are 128 (80h).	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A7h	33h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON •In status Color bar output is ON •In case of executing Shot Memory Movement command.

9.44 White Balance ATW

Camera Control Command Type 2

Function	Set the white balance to ATW	
Command	01A7h	
Parameter	Length	1 byte.
	Value	4h
Status	None	
Reference	<ul style="list-style-type: none"> Automatically adjusts the white balance according to the video image. However, the following of color changes is faster than White Balance Auto. Cr gain and Cb gain setting values are 128 (80h). 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A7h	34h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> Not in status of Camera ON In status Color bar output is ON In case of executing Shot Memory Movement command.

9.45 White Balance Mode Status Request

Camera Control Command Type 1

Function	Return the present white balance mode status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	8h
Status	Length	1 byte
	Range	0 to 4 (0 to 4h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the white balance mode status, refer to <i>White Balance Mode Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	38h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



White balance mode status value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the status value.

Example:

1	⇒	1h	⇒	s0
				31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

			e0	e1
■ In case of Parameter Error: 01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error: 0010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● White Balance Mode Status Value Table

S0	White Balance Mode Status
30h	Auto
31h	Preset
32h	Fixed 1 (Indoor)
33h	Fixed 2 (Outdoor)
34h	ATW

9.46 Black Level Assignment (XU-81)

Camera Control Command Type 2

Function	Adjust the black level of HD-SDI signal	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 0 (0h) 2 nd , 3 rd byte : 0 to 255 (0h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> • The default value is 128 (80h) when Camera Reset and Camera ON commands are executed in status of Power ON. • HD-SDI output changes. VBS output does not change. • Valid in XU-81 only. In XU-80, the parameter error is returned. 	

- **Format of Control Command**

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	30h	p0	p1	EFh

↓ ↓

Black level specified value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the parameter value.					
Example:					
64	⇒	40h	⇒	p0 34h	p1 30h

- Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh

↓ ↓

Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h

- Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON •In status Color bar output is ON

9.47 R Gain Assignment

Camera Control Command Type 2

Function	Adjust the R Gain	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 1 (1h) 2 nd , 3 rd byte : 0 to 255 (0h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be switched when the white balance is Preset. •Default value when white balance is Preset is 128 (80h). 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	31h	p0	p1	EFh



The R Gain value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter value.			
Example:	64	⇒	40h
		⇒	p0 p1 34h 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The white balance is other than Preset. •In status IR Filter is OFF •In status Color bar output is ON

9.48 B Gain Assignment

Camera Control Command Type 2

Function	Adjust the B Gain	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 3 (3h) 2 nd , 3 rd byte : 0 to 255 (0h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be switched when white balance is Preset. •Default value when white balance is Preset is 128 (80h). 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	33h	p0	p1	EFh



The R Gain value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter value.			
Example:	64	⇒	40h ⇒ p0 34h p1 30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example			e0 e1
■ In case of No Error:	00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h 30h
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The white balance is other than Preset. •In status IR Filter is OFF •In status Color bar output is ON

9.50 Cb Gain Assignment

Camera Control Command Type 2

Function	To adjust Cb gain	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 6 (6h) 2 nd , 3 rd byte : 0 to 255 (0h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> The default value is 128 (80h) at the moment of Camera Reset and Camera ON commands in status of Power ON. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	36h	p0	p1	EFh



The Cb Gain value indicates in 1 digit Hexadecimal, and its ASCII code treats as the parameter value.

Example:

64	⇒	40h	⇒	p0	p1
				34h	30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

			e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒ 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒ 35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> Not in status of Camera ON In status IR Filter is OFF In status Color bar output is ON

9.51 Edge Assignment

Camera Control Command Type 2

Function	Adjust the video edges	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 10 (Ah) 2 nd , 3 rd byte : 0 to 255 (0h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> The default value is 128 (80h) at the moment of Camera Reset and Camera ON commands in status of Power ON. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	41h	p0	p1	EFh



The edge compensation value indicates in 1 digit Hexadecimal, and its ASCII code treats as the parameter value.

Example:

64	⇒	40h	⇒	p0	p1
				34h	30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

			e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒ 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒ 35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	<ul style="list-style-type: none"> Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> Not in status of Camera ON In status Color bar output is ON

9.52 WDR OFF

Camera Control Command Type 2

Function	Turn off the Wide Dynamic Range	
Command	01A5h	
Parameter	Length	1 byte.
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •This command is selected by default at the moment of Camera Reset and Camera ON commands in status of Power ON. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A5h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.53 WDR ON

Camera Control Command Type 2

Function	Turn on the Wide Dynamic Range	
Command	01A5h	
Parameter	Length	1 byte.
	Value	1h
Status	None	
Reference		

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	A5h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON •In status Color bar output is ON

9.54 WDR Status Request

Camera Control Command Type 1

Function	Return the present Wide Dynamic Range status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	7h
Status	Length	1 byte
	Range	0, 1 (0h to 1h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the Wide Dynamic Range status, refer to <i>Wide Dynamic Range Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	37h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Wide Dynamic Range status value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the status value.

Example:

1 ⇒ 1h ⇒ s0
31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

■ In case of Parameter Error: 01010000B ⇒ 50h ⇒ e0 e1
 ■ In case of Mode Error: 10010000B ⇒ 90h ⇒ 35h 30h
 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Wide Dynamic Range Status Value Table

S0	Wide Dynamic Range Status
30h	OFF
31h	ON

9.55 ND Filter OFF

Camera Control Command Type 2

Function	Turn off the ND filter	
Command	01B6h	
Parameter	Length	1 byte.
	Value	0h
Status	None	
Reference	<ul style="list-style-type: none"> •Returns command error when no outdoor options are installed. •This command is selected by default at the moment of Camera Reset and Camera ON commands in status of Power ON. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	B6h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example		e0 e1			
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy Error :	00010000B	⇒	10h	⇒	31h 30h
■ In case of Command Error:	00110000B	⇒	30h	⇒	33h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Busy Error	<ul style="list-style-type: none"> •In case of executing Shot Memory Movement Command. •When executing the pan movement operation with the pan-tilt control command. •When executing the tilt movement operation with the pan-tilt control command. •When executing Wiper Control and Washer Control command.
Command Error	•When no outdoor options are installed.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.56 ND Filter ON

Camera Control Command Type 2

Function	Turn on the ND filter	
Command	01B6h	
Parameter	Length	1 byte.
	Value	1h
Status	None	
Reference	•Returns command error when no outdoor options are installed.	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	B6h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy Error :	00010000B	⇒	10h	⇒	31h 30h
■ In case of Command Error:	00110000B	⇒	30h	⇒	33h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Busy Error	<ul style="list-style-type: none"> •In case of executing Shot Memory Movement Command. •When executing the pan movement operation with the pan-tilt control command. •When executing the tilt movement operation with the pan-tilt control command. •When executing Wiper Control and Washer Control command.
Command Error	•When no outdoor options are installed.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.57 ND Status Request

Camera Control Command Type 1

Function	Return the present ND filter status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	0h
Status	Length	1 byte
	Range	0, 1, 15 (0h, 1h, Fh)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the ND status, refer to <i>FD Filter Status Value Table</i> below. When outdoor options are not installed, the validity of function can be known since No Function is returned. Therefore the command can be received even in case Camera Power OFF. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



ND Filter status value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the status value.

Example:

1 ⇒ 1h ⇒ 31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

■ In case of Parameter Error: 01010000B ⇒ 50h ⇒ 35h e0 e1
30h

● Condition of Error flag to be set

Parameter Error	Assigned parameter is an invalid value.
-----------------	---

● ND Filter Status Value Table

S0	ND Filter Status
30h	OFF
31h	ON
46h	No Function

9.58 IR Filter OFF

Camera Control Command Type 2

Function	Turn off the IR filter (ICR ON)	
Command	01BBh	
Parameter	Length	1 byte.
	Value	0h
Status	None	
Reference	•Video automatically becomes black and white.	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BBh	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON •In status Color bar output is ON

9.59 IR Filter ON

Camera Control Command Type 2

Function	To turn on the IR filter (ICR OFF)	
Command	01BBh	
Parameter	Length	1 byte.
	Value	1h
Status	None	
Reference	<ul style="list-style-type: none"> •This command is selected by default at the moment of Camera Reset and Camera ON commands in status of Power ON. •Video automatically becomes color. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BBh	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0 e1		
■ In case of No Error:			00000000B	⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :			01010000B	⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :			10010000B	⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

9.60 IR Filter Status Request

Camera Control Command Type 1

Function	Return the present IR filter status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	Bh
Status	Length	1 byte
	Range	0 to 1 (0 to 1h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the IR Filter status, refer to <i>IR Filter Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	42h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



IR Filter status value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the status value.

Example:

1	⇒	1h	⇒	s0
				31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

	e0	e1
■ In case of Parameter Error: 01010000B ⇒	50h	⇒ 35h 30h
■ In case of Mode Error: 10010000B ⇒	90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● IR Filter Status Value Table

S0	IR Filter Status
30h	IR Filter OFF
31h	IR Filter ON

9.61 Auto IR OFF

Camera Control Command Type 2

Function	Turn off the auto IR filter	
Command	01BAh	
Parameter	Length	1 byte.
	Value	0 (0h)
Status	None	
Reference	<ul style="list-style-type: none"> •This command is selected by default at the moment of Camera Reset and Camera ON Commands in status of Power ON. •This command is selected by default at the moment of the shooting mode changes to mode other than Night mode. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BAh	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error :	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error :	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is other than Night mode. •In status Color bar output is ON

9.62 Auto IR ON (Slow Shutter)

Camera Control Command Type 2

Function	Turn on the auto IR filter (slow shutter)	
Command	01BAh	
Parameter	Length	1 byte.
	Value	1 (1h)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be switched when shooting mode is Night mode. •When camera gain is maxed, and the periphery becomes dark until the slow shutter reaches the lower limit value, IR filter automatically turns off. For that reason, even if the slow shutter is entered, there is an effect if you want to get color video. •When the periphery becomes brighter, the IR filter automatically turns on. •This command is selected by default at the moment of shooting mode changes to Night mode. •Cannot be operated if the AE maximum gain setting is lower than 21 dB. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BAh	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		e0 e1
■ In case of No Error:	00000000B ⇒ 00h	⇒ 30h 30h
■ In case of Parameter Error :	01010000B ⇒ 50h	⇒ 35h 30h
■ In case of Mode Error :	10010000B ⇒ 90h	⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is other than Night mode. •The AE maximum gain setting is lower than 21 dB. •In status Color bar output is ON

9.63 Auto IR ON (Gain)

Camera Control Command Type 2

Function	Turn on the auto IR filter (gain)	
Command	01BAh	
Parameter	Length	1 byte.
	Value	2 (2h)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be switched when shooting mode is Night mode. •When camera gain is maxed, slow shutter changes from 1/30 to 1/15, and the periphery becomes dark, IR filter automatically turns off. For that reason, even if the video is black and white, there is an effect if you want to get video with emphasis on movement. •When the periphery becomes brighter, the IR filter automatically turns on. •Cannot be operated if the AE maximum gain setting is lower than 21 dB. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	BAh	32h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value		
Example		
■ In case of No Error:	00000000B	⇒ 00h ⇒ 30h 30h
■ In case of Parameter Error :	01010000B	⇒ 50h ⇒ 35h 30h
■ In case of Mode Error :	10010000B	⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •The shooting mode is other than Night mode. •The AE maximum gain setting is lower than 21 dB. •In status Color bar output is ON

9.64 Auto IR Status Request

Camera Control Command Type 1

Function	Return the present auto IR status information	
Command	01C5h	
Parameter	Length	1 byte
	Value	Ah
Status	Length	1 byte
	Range	0 to 2 (0 to 2h)
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the Auto IR mode status, refer to <i>Auto IR Mode Status Value Table</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C5h	41h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Error Code		Status	End mark
FEh	30h	30h	30h	30h	s0	EFh



Auto IR mode status value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the status value.

Example:

1 ⇒ 1h ⇒ s0
31h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

	e0	e1
■ In case of Parameter Error: 01010000B ⇒ 50h ⇒ 35h 30h		
■ In case of Mode Error: 10010000B ⇒ 90h ⇒ 39h 30h		

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

● Auto IR Mode Status Value Table

S0	Auto IR Mode Status
30h	OFF
31h	ON (Slow Shutter)
32h	ON (Gain)

9.65 GENLOCK Vertical Line Information Request

Camera Control Command Type 1

Function	Return the GENLOCK vertical line information	
Command	01C7h	
Parameter	Length	1 byte
	Value	0h
Status	Length	4 byte
	Range	0 to 15 (0000h to 000Fh)
Reference		

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C7h	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d6	d7	d8
Header	Device Num		Error Code		Phases Information				End mark
FEh	30h	30h	30h	30h	s0	s1	s2	s3	EFh



GENLOCK vertical phase value indicates in 2 digits Hexadecimal, and fixes its ASCII code as the status value.

Example:
 4 ⇒ 0004h ⇒ s0 s1 s2 s3
 30h 30h 30h 34h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example
 ■ In case of Parameter Error: 01010000B ⇒ 50h ⇒ e0 e1
 35h 30h
 ■ In case of Mode Error: 10010000B ⇒ 90h ⇒ 39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

9.66 GENLOCK Horizontal Phases Information Request

Camera Control Command Type 1

Function	Return the GENLOCK horizontal phases information	
Command	01C7h	
Parameter	Length	1 byte
	Value	1h
Status	Length	4 byte
	Range	1080 60i: 0 to 2199 (0000h to 0897h) 1080 50i: 0 to 2639 (0000h to 0A4Fh) 720 60p: 0 to 1649 (0000h to 0671h) 720 50p: 0 to 1979 (0000h to 07BBh)
Reference	•The status range is changed by the video rate and video format settings as shown above.	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	C7h	31h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	d6	d6	d7	d8
Header	Device Num		Error Code		Phases Information				End mark
FEh	30h	30h	30h	30h	s0	s1	s2	s3	EFh



GENLOCK Horizontal Phases indicates in 2 digits Hexadecimal, and fixes its ASCII code as the status value.			
Example:			
324	⇒	0144h	⇒
		s0	s1
		30h	31h
		s2	s3
		34h	34h

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example			
■ In case of Parameter Error: 01010000B	⇒	50h	⇒
		e0	e1
		35h	30h
■ In case of Mode Error: 10010000B	⇒	90h	⇒
		39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

10. Details of Camera Setting Command

10.1 AE Area Setting

Camera Control Command Type 2

Function	Set the AE judgment area	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 1 (1h) 2 nd byte : 0 to 11 (0h to Bh)
Status	None	
Reference	<ul style="list-style-type: none"> • Saves the status even after pan-tilt is reset. • Do not operate anything other than the camera settings for three seconds after making these settings. • Factory default setting is "normal". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FEh	30h	30h	01h	BDh	31h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



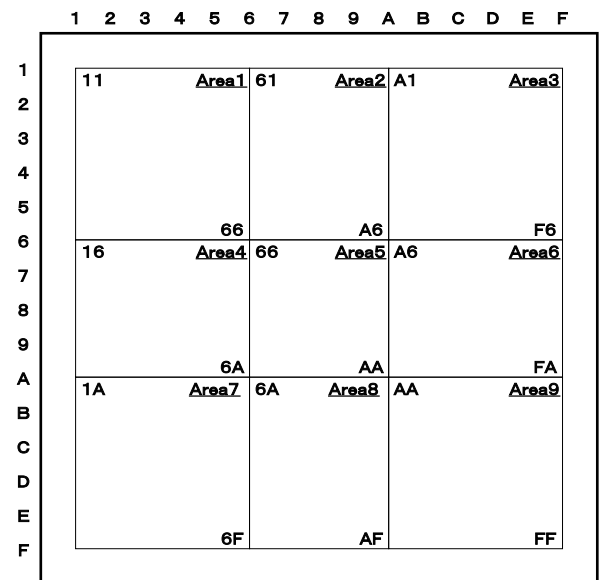
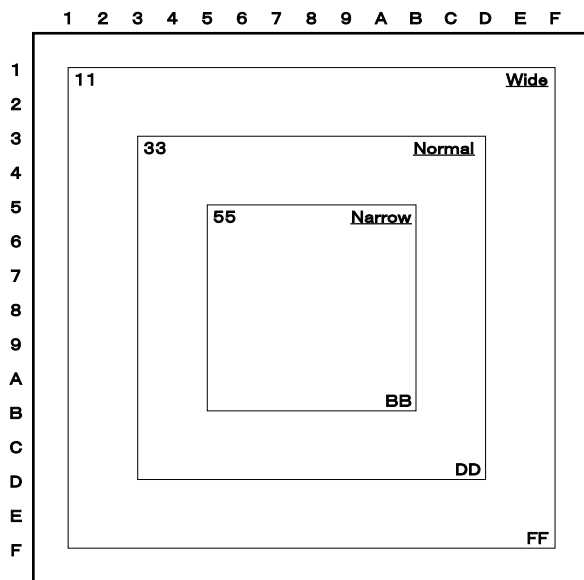
Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:			00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:			01010000B ⇒	50h ⇒	35h 30h
■ In case of Mode Error:			10010000B ⇒	90h ⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	• Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> • Not in status of Camera ON • In status Color bar output is ON

● AE Area Table

Parameter Value	AE Area
00h	Narrow
01h	Normal
02h	Wide
03h	Aria 1
04h	Aria 2
05h	Aria 3
06h	Aria 4
07h	Aria 5
08h	Aria 6
09h	Aria 7
0Ah	Aria 8
0Bh	Aria 9



10.2 AE Responsiveness Setting

Camera Control Command Type 2

Function	Set the AE responsiveness	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 2 (2h) 2 nd byte : 0 to 2 (0h to 2h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "normal". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	BDh	32h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● AE Area Table

Parameter Value	AE Area
00h	Slow
01h	Normal
02h	Fast

10.3 AE Maximum Gain Setting

Camera Control Command Type 2

Function	Set the AE maximum gain	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 3 (3h) 2 nd byte : XU-80 :0 to 7 (0h to 7h) XU-81: 0 to 9 (0h to 9h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "32dB" (XU-80) or "42dB" (XU-81). 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	BDh	33h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B ⇒	00h	⇒	30h	30h
■ In case of Parameter Error:	01010000B ⇒	50h	⇒	35h	30h
■ In case of Mode Error:	10010000B ⇒	90h	⇒	39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● AE Area Table

Parameter Value	AE Maximum Gain	
	XU-80	XU-81
00h	0 db	0 db
01h	3 db	3 db
02h	6 db	6 db
03h	12 db	12 db
04h	17 db	17 db
05h	21 db	21 db
06h	26 db	26 db
07h	32 db	30 db
08h	Parameter Error	36 db
09h		42 db

10.4 Brightness Peak Compression (XU-81)

Camera Control Command Type 2

Function	Adjust the brightness peak compression level at AE	
Command	01F0h	
Parameter	Length	3 byte
	Range	1 st byte : 1 (1h) 2 nd , 3 rd byte : 0 to 16 (0h to 10h)
Status	None	
Reference	<ul style="list-style-type: none"> •Can be used as the support of exposure compensation since the total brightness is also adjusted. •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "6". •Valid only in XU-81. In XU-80, command error is returned. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	F0h	31h	p0	P1	EFh



Brightness Peak Compression value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the parameter value.			
Example:	2	⇒	02h ⇒ s0 s1 30h 32h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value			
Example			e0 e1
■ In case of No Error:	00000000B ⇒	00h ⇒	30h 30h
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h 30h
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

10.5 AF Area Setting

Camera Control Command Type 2

Function	Set the AF judgment area	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 4 (4h) 2 nd byte : 0 to 11 (0h to Bh)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "narrow". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	BDh	34h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



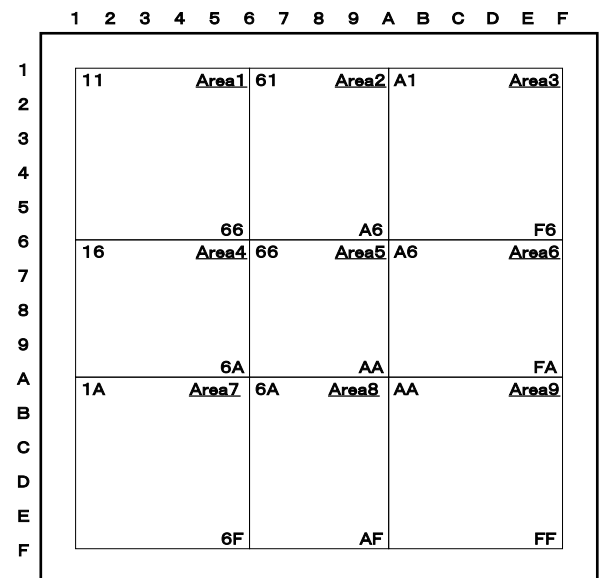
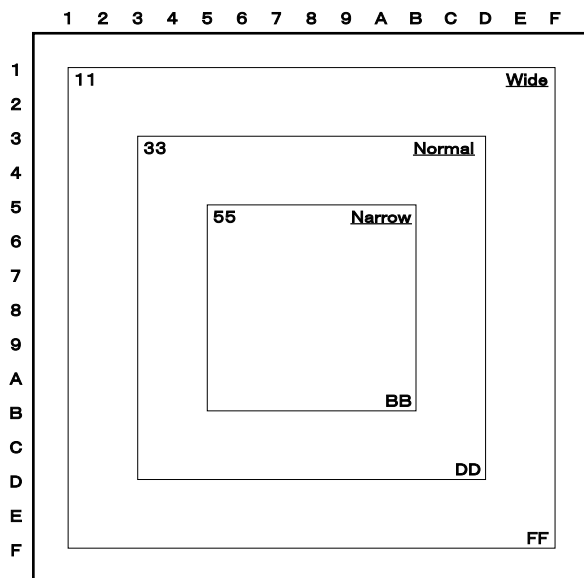
Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● AF Area Table

Parameter Value	AF Area
00h	Narrow
01h	Normal
02h	Wide
03h	Area 1
04h	Area 2
05h	Area 3
06h	Area 4
07h	Area 5
08h	Area 6
09h	Area 7
0Ah	Area 8
0Bh	Area 9



10.6 AF Sensitivity Setting

Camera Control Command Type 2

Function	Set the AF sensitivity	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 5 (5h) 2 nd byte : 0 to 1 (0h to 1h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "normal". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FEh	30h	30h	01h	BDh	35h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● AF Sensitivity Table

Parameter Value	AF Sensitivity
00h	Low
01h	Normal

10.7 AWB Shift Setting

Camera Control Command Type 2

Function	Adjust the shift amount when using AWB	
Command	01BDh	
Parameter	Length	2 byte
	Range	1 st byte : 6 (6h) 2 nd byte : 0 to 6 (0h to 6h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "normal". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FEh	30h	30h	01h	BDh	36h	p0	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	e0 e1 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● AWB Shift Table

Parameter Value	AE Shift
00h	Normal
01h	R-Low
02h	R-Middle
03h	R-High
04h	B-Low
05h	B-Middle
06h	B-High

10.8 Gamma Level Setting

Camera Control Command Type 2

Function	Set the gamma level	
Command	01F2h	
Parameter	Length	1 byte
	Range	XU-80: 0 to 4 (0h to 4h) XU-81: 0 to 5 (0h to 5h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "0.6"(XU-80) or "0.45"(XU-81). 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	F2h	p0	EFh



The Gamma parameter value indicates in 1 digit Hexadecimal, and its ASCII code treats as the parameter.		
Example:		p0
3	⇒	3h ⇒ 33h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

● Gamma Level Table

Parameter	Gamma Level	
	XU-80	XU-81
00h	0.3	0.3
01h	0.45	0.45
02h	0.6	0.6
03h	0.8	0.8
04h	1.0	1.0
05h	Parameter Error	0.525
06h to 08h		Reserve

10.9 Contrast Adjustment (XU-81)

Camera Control Command Type 2

Function	Adjust the video contrast	
Command	01F0h	
Parameter	Length	3 byte
	Range	1 st byte : 2 (2h) 2 nd , 3 rd byte : 0 to 16 (0h to 10h)
Status	None	
Reference	<ul style="list-style-type: none"> •When the setting value is big, the low brightness part may be blackened. •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "3". •Valid only in XU-81. In XU-80, command error is returned. 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	F0h	32h	p0	P1	EFh



Contrast Adjustment value indicates in 1 digit Hexadecimal, and fixes its ASCII code as the parameter value.

Example:

2	⇒	02h	⇒	s0 30h	s1 32h
---	---	-----	---	-----------	-----------

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

	e0	e1
■ In case of No Error: 00000000B ⇒ 00h ⇒	30h	30h
■ In case of Parameter Error: 01010000B ⇒ 50h ⇒	35h	30h
■ In case of Mode Error: 10010000B ⇒ 90h ⇒	39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	<ul style="list-style-type: none"> •Not in status of Camera ON •In status Color bar output is ON

10.10 TV Setup OFF

Camera Control Command Type 2

Function	Turn off the composite signal TV setup	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 11 (Bh) 2 nd byte : 0 (0h) 3 rd byte : 0 (0h)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "ON". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	42h	30h	30h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B ⇒	00h ⇒	30h	30h	
■ In case of Parameter Error:	01010000B ⇒	50h ⇒	35h	30h	
■ In case of Mode Error:	10010000B ⇒	90h ⇒	39h	30h	

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

10.11 TV Setup ON

Camera Control Command Type 2

Function	Turn on the composite signal TV setup	
Command	01E1h	
Parameter	Length	3 byte
	Range	1 st byte : 11 (Bh) 2 nd byte : 0 (0h) 3 rd byte : 1 (1h)
Status	None	
Reference	<ul style="list-style-type: none"> •If the video signal setting is 59.94i, the video black level output from the VBS pin rises 7.5%. •Saves the status even after pan-tilt is reset. •Do not operate anything other than the camera settings for three seconds after making these settings. •Factory default setting is "ON". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Command		Parameter			End mark
FFh	30h	30h	01h	E1h	42h	30h	31h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example			e0	e1	
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

10.12 GENLOCK Phases Relative Value Adjustment

Camera Control Command Type 2

Function	Adjust the GENLOCK phase	
Command	01E4h	
Parameter	Length	2 byte
	Range	0 to 255 (00h to FFh)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. However, this changes when you change the video rate and video format setting. •Do not operate anything other than the camera settings for three seconds after making these settings. •Parameter indicates the relative value considering 80h as a median for adjusting GEN-LOCK phase. Effective in fine-adjustments of the GENLOCK phase. <p>Example: To add 30 to GEN-LOCK phase.</p> $30 \Rightarrow 1\text{Eh} \Rightarrow 80\text{h} + 1\text{Eh} = 9\text{Eh}$ <ul style="list-style-type: none"> •Factory default setting is " Vertical : 7 Horizontal : 0". 	

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	E4h	p0	p1	EFh



The GEN-LOCK Phase Adjustment value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter value.

Example:

$158 \Rightarrow 9\text{Eh} \Rightarrow \begin{matrix} \text{p0} & \text{p1} \\ 39\text{h} & 45\text{h} \end{matrix}$

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

	e0	e1
■ In case of No Error: 00000000B \Rightarrow 00h \Rightarrow	30h	30h
■ In case of Parameter Error: 01010000B \Rightarrow 50h \Rightarrow	35h	30h
■ In case of Mode Error: 10010000B \Rightarrow 90h \Rightarrow	39h	30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

10.13 GENLOCK Phases Absolute Value Adjustment

Camera Control Command Type 2

Function	Adjust the GENLOCK phase	
Command	01E7h	
Parameter	Length	8 byte
	Range	Vertical: 0 to 15 (0000h to 000Fh) Horizontal (1080 60i): 0 to 2199 (0000h to 0897h) (1080 50i): 0 to 2639 (0000h to 0A4Fh) (720 60p): 0 to 1649 (0000h to 0671h) (720 50p): 0 to 1979 (0000h to 07BBh)
Status	None	
Reference	<ul style="list-style-type: none"> •Saves the status even after pan-tilt is reset. However, this changes when you change the video rate and video format setting. •Do not operate anything other than the camera settings for three seconds after making these settings. •Parameter displays the absolute value to adjust GENLOCK phase. •The horizontal parameter range is changed by the video rate and video format settings as described above. •Factory default setting is " Vertical : 7 Horizontal : 0". 	

● Format of Control Command

d0	d1	d2	d3	d4
Header	Device Num		Command	
FFh	30h	30h	01h	E7h

d5	d6	d7	d8	d9	d10	d11	d12	d13
Vertical Parameter				Horizontal Parameter				End mark
p0	p1	p2	p3	p4	p5	p6	p7	EFh



The GEN-LOCK Phase Adjustment value indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter value.							
Example: Vertical 0010, Horizontal 2000							
Pan			p0	p1	p2	p3	
0010	⇒	000Ah	⇒	30h	30h	30h	41h
Tilt			p4	p5	p6	p7	
2000	⇒	07D0h	⇒	30h	37h	44h	30h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example					
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h
■ In case of Mode Error:	10010000B	⇒	90h	⇒	39h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
Mode Error	•Not in status of Camera ON

11. Details of System Control Command

11.1 Operation Status Request

System Control Command Type 1

Function	Return information of inside status of the pan-tilt head (operation status)	
Command	0186h	
Parameter	None	
Status	Length	3 byte
	Value	Value of operation status which indicates inside status (12 bits)
Reference	<p>•The followings show status, in case that each bit is 1 among of status.</p> <p>(MSB)</p> <p>b11 Tilting under operation</p> <p>b10 Tilt movable limit position</p> <p>b9 Panning under operation</p> <p>b8 Pan movable limit position</p> <p>b7 Zooming under operation</p> <p>b6 Not used</p> <p>b5 Camera Power OFF</p> <p>b4 Not used</p> <p>b3 Not used</p> <p>b2 Not used</p> <p>b1 Manual Focus mode</p> <p>b0 Focusing under operation</p> <p>(LSB)</p>	

● Format of Control Command

d0	d1	d2	d3	d4	d5
Header	Device Num		Command		End mark
FFh	30h	30h	01h	86h	EFh

● Answer Format

d0	d1	d2	d3	d4	d5	d6	d7	d8
Header	Device Num		Error Code		Status			End mark
FEh	30h	30h	30h	30h	s0	s1	s2	EFh



Inside operation status (12bits) indicated camera inside status indicates in 3 digits Hexadecimal returns ASCII code as status											
Example:											
s0				s1				s2			
b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	1	0	0	1	0	0	0	0	0	0	0
"4"				"8"				"0"			
⇓				⇓				⇓			
34h				38h				30h			

11.2 Extended Operation Status Request

System Control Command Type 1

Function	Return the extended information of inside status of the pan-tilt head (operation status)	
Command	0186h	
Parameter	0h	
Status	Length	5 byte
	Value	value of operation status which indicates inside status (20 bits)
Reference	The followings show status, in case that each bit is 1 among of status.	
	(MSB)	
	b19	Not used
	b18	Not used
	b17	Tilt motor error
	b16	Pan motor error
	b15	Not used
	b14	Camera busy
	b13	Camera mode MANUAL
	b12	Other than White balance mode AUTO
	b11	Tilting under operation
	b10	Tilt movable limit position
	b 9	Panning under operation
	b 8	Pan movable limit position
	b7	Zooming under operation
	b6	Not used
	b5	Camera Power OFF
	b4	Not used
	b3	Not used
	b2	Not used
	b1	Focus mode MANUAL
b0	Focusing under operation	
(LSB)		
•The information of b0 through b11 is equal to the information of 10.1 Operation Status Request .		

● Format of Control Command

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	86h	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4						
Header	Device Num		Error Code							
FEh	30h	30h	30h	30h						
					d5	d6	d7	d8	d9	d10
					Status					End mark
					s0	s1	s2	s3	s4	EFh



Inside operation status (12bits) indicated camera inside status indicates in 5 digits Hexadecimal returns ASCII code as status											
Example:											
s0				s1							
b19	b18	b17	b16	b15	b14	b13	b12				
0	0	0	0	0	0	0	0				
"0"				"0"							
↓				↓							
30h				30h							
s2				s3				s4			
b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	1	0	0	1	0	0	0	0	0	0	0
"4"				"8"				"0"			
↓				↓				↓			
34h				38h				30h			

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag comes out Hexadecimal 2 digits and returns ASCII value					
Example					
■ In case of Parameter error			01010000B	⇒	50h ⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

11.3 Product Name Request

System Control Command Type 1

Function	Return the product name	
Command	0187h	
Parameter	None	
Status	Length	7 byte
	Value	"XU-80" (58h 55h 2Dh 38h 30h 20h 20h)
Reference	To return fixed value.	

● Format of Control Command

d0	d1	d2	d3	d4	d5
Header	Device Num		Command		End mark
FFh	30h	30h	01h	87h	EFh

● Answer Format

d0	d1	d2	d3	d4				
Header	Device Num		Error Code					
FEh	30h	30h	30h	30h				
d5	d6	d7	d8	d9	d10	d11	d12	
Status							End mark	
58h	55h	2Dh	38h	30h	20h	20h	EFh	

11.4 ROM Version Request

System Control Command Type 1

Function	Return the ROM version of the pan-tilt head	
Command	0188h	
Parameter	None	
Status	Length	6 byte
	Value	"V01-01" (56h 30h 31h 2Dh 30h 31h)
Reference	Status value (Version number) may be changed in future.	

● Format of Control Command

d0	d1	d2	d3	d4	d5
Header	Device Num		Command		End mark
FFh	30h	30h	01h	88h	EFh

● Answer Format

d0	d1	d2	d3	d4							
Header	Device Num		Error Code								
FEh	30h	30h	30h	30h							
					d5	d6	d7	d8	d9	d10	d11
					Status						End mark
					56h	30h	31h	2Dh	30h	31h	EFh

11.5 Zoom, Focus, Tilt, and Pan Speed Control Assignment

System Control Command Type 2

Function	Operate at the assigned zooming, focusing, tilting, and panning speeds	
Command	0181h	
Parameter	Length	8 byte
	Range	0 to 127 (00h to 7Fh)
Status	None	
Reference	<ul style="list-style-type: none"> •Central values 63 (3Fh) or 64 (40h) become stop (speed 0). •As the difference increases with the central value, the speed increases; 0 (00h) or 127 (7Fh) are high speed. <ul style="list-style-type: none"> •Zoom Speed Parameter (p0, p1) <ul style="list-style-type: none"> 0 (00h): Maximum speed to Wide side 127 (7Fh): Maximum speed to Tele side •Focus Speed Parameter (p2, p3) <ul style="list-style-type: none"> 0 (00h): Maximum speed to Far side 127 (7Fh): Maximum speed to Near side •Tilt Speed Parameter (p4, p5) <ul style="list-style-type: none"> 0 (00h): Maximum speed to top side 127 (7Fh): Maximum speed to bottom side •Pan Speed Parameter (p6, p7) <ul style="list-style-type: none"> 0 (00h): Maximum speed to the right side 127 (7Fh): Maximum speed to the left side 	

● Format of Control Code

d0	d1	d2	d3	d4									
Header	Device Num		Command										
FFh	30h	30h	01h	81h									
					d5	d6	d7	d8	d9	d10	d11	d12	d13
					Zoom Speed Parameter		Focus Speed Parameter		Tilt Speed Parameter		Pan Speed Parameter		End mark
					p0	p1	p2	p3	p4	p5	p6	p7	EFh

↓

The zoom, focus, tilt, and pan speeds indicate in 2 digits Hexadecimal, and its ASCII code treats as the parameter.					
Example: Zoom Speed				p0	p1
100	⇒	64h	⇒	36h	34h

- Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh

↓

Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example				e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒	30h 30h
■ In case of Busy :	00010000B	⇒	10h	⇒	31h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒	35h 30h

● Condition of Error flag to be set

Busy Error	<ul style="list-style-type: none"> •In case of executing Shot Memory Movement Command. •While Wiper Control and Washer Control commands are being executed.(Pan-tilt movement) •While ND Filter Control commands are being executed. (Pan-tilt movement)
Parameter Error	<ul style="list-style-type: none"> •Assigned parameter is an invalid value.

11.6 Shot Memory Recording

System Control Command Type 1

Function	Record the zooming/focusing positions and tilting/panning angles (position) when the command is received to assigned shot memory number	
Command	0182h	
Parameter	Length	2 byte
	Range	0 to 127 (00h to 7Fh)
Status	None	
Reference	•Specify the shot memory number to be recorded by using the parameter value. (128 [0-127] locations can be registered.)	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7
Header	Device Num		Command		Parameter		End mark
FFh	30h	30h	01h	82h	p0	p1	EFh



The shot memory number indicates in 2 digits Hexadecimal, and its ASCII code treats as the parameter.

Example:

			p0	p1
4	⇒	04h	⇒	30h 34h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value

Example

			e0	e1
■ In case of No Error:	00000000B	⇒	00h	⇒ 30h 30h
■ In case of Parameter Error:	01010000B	⇒	50h	⇒ 35h 30h

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
-----------------	--

11.7 Shot Memory Movement

System Control Command Type 2

Function	Move to the zooming/focusing positions and tilting/panning angles (position) stored for the assigned shot memory number	
Command	0183h	
Parameter	Length	4 byte
	Range	Shot memory number: 0 to 127 (00h to 7Fh) Shot movement time (seconds): 0,2 to 48 (02h to 30h)
Status	None	
Reference	<ul style="list-style-type: none"> •This command is ineffective until to store preset position by Shot Memory Recording command, since shot memory is unused at the factory shipping moment. •By issuing this command, start Pan/Tilt/Zoom/Focus operations to the assigned Shot Memory position at the same time, and flags in operation of Pan/Tilt/Zoom/Focus come out 1. When each operation reaches to Shot Memory position, all of operation will stop and corresponding flags be cleared to zero. •The movement is canceled and stopped by sending the command of shot movement time 0 [0h] again during the shot memory movement by this command. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6	d7	d8	d9
Header	Device Num		Command		Shot memory parameter		Shot time parameter		End mark
FFh	30h	30h	01h	83h	p0	p1	p2	p3	EFh



The shot memory numbers and shot movement times indicate in 2 digits Hexadecimal, and its ASCII codes treat as the parameter.			
Example: Shot memory number of 5 seconds and shot movement time of 20 seconds			
Shot memory number		p0	p1
5	⇒ 05h	⇒ 30h	35h
Shot movement time		p2	p3
20	⇒ 14h	⇒ 31h	34h

● Answer Format

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value					
Example		e0	e1		
■ In case of No Error:		00000000B	⇒ 00h	⇒ 30h	30h
■ In case of Busy:		00010000B	⇒ 10h	⇒ 31h	30h
■ In case of Parameter Error:		01010000B	⇒ 50h	⇒ 35h	30h

● Condition of Error flag to be set

Busy Error	<ul style="list-style-type: none"> •While Camera is being initialized. •In case of executing Wiper Control and Washer Control Commands. •While ND Filter Control commands are being executed. •In case of executing White Balance Preset. •In case of executing One Shot AF.
Parameter Error	<ul style="list-style-type: none"> •Assigned parameter is an invalid value.

11.8 Serial Number Information Request

Camera Control Command Type 1

Function	Return the serial number information of pan-tilt system	
Command	01E9h	
Parameter	Length	1 byte
	Value	0h
Status	Length	15 byte
	Value	Return the serial number information by ASCII code
Reference	<ul style="list-style-type: none"> For the detailed relation between the status and the serial number, refer to <i>Details of Serial Numbers</i> below. 	

● Format of Control Code

d0	d1	d2	d3	d4	d5	d6
Header	Device Num		Command		Parameter	End mark
FFh	30h	30h	01h	E9h	30h	EFh

● Answer Format

■ In case of no Error

d0	d1	d2	d3	d4	d5	...	d19	d20
Header	Device Num		Error Code		Serial Number Information			End mark
FEh	30h	30h	30h	30h	s0	...	S14	EFh



ASCII code of serial number is fixed as the status value.	
Example:	<div> <div>s0</div> <div>s1</div> <div>s14</div> </div> <div> <div>“.....”</div> <div>⇒</div> <div>2D</div> <div>2D</div> <div>...</div> <div>2D</div> </div>

■ In case of Error

d0	d1	d2	d3	d4	d5
Header	Device Num		Error Code		End mark
FEh	30h	30h	e0	e1	EFh



Error Flag indicates in 2 digits Hexadecimal and returns ASCII code value	
Example	<div> <div>e0</div> <div>e1</div> </div> <div> <div>■ In case of Parameter Error: 01010000B ⇒</div> <div>50h</div> <div>⇒</div> <div>35h</div> <div>30h</div> </div>

● Condition of Error flag to be set

Parameter Error	•Assigned parameter is an invalid value.
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●Details of Serial Number (An example of XU-80W)

S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
Model Name						Product Code		Serial Number					Reserve	
X	U	-	8	0	W	2	5	0	0	0	0	0	-	-
58h	55h	2Dh	38h	30h	57h	32h	35h	30h	30h	30h	30h	30h	2Dh	2Dh

Note: The values above is an example and it is varies in each equipment.

12. Command Table

1st byte: 01h 2nd byte: See below.

Note: Do not use commands of “Reserve”. These are used for system and doing so may cause malfunction.

Higher Lower	0xh	1xh	2xh	3xh	4xh	5xh	6xh	7xh
x0h						Pan Speed Specification		
x1h						Tilt Speed Specification		AUX control
x2h						Pan/Tilt Speed Request	Pan/Tilt Angle Assignment	
x3h						Pan/Tilt Operation	Pan/Tilt Angle Request	
x4h								Reserve
x5h								
x6h								
x7h								
x8h						Initialization		
x9h						Pan/Tilt Speed Request		
xAh								Wiper Control
xBh						Pan/Tilt Factor Request		Tally Control
xCh						Pan-Tilt Angle Range		
xDh								
xEh								
xFh								

Higher Lower	8xh	9xh	Axh	Bxh	Cxh	Dxh	Exh	Fxh
x0h		Reserve	Camera Power Control			Reserve		Reserve
x1h	ZFTP Speed Control	Reserve	Focus Control			Reserve	Color Adjustment Control	Reserve
x2h	Shot Memory	Reserve	Zoom Control			Reserve	Reserve	Gamma Specification
x3h	Shot Operation		Zoom Position Assignment		Iris Request	Reserve	AE Level Correction	Reserve
x4h	Shooting Mode Switching		Zoom Position Request	Zoom Speed		Reserve	GENLOCK Phase Relative Value Control	Reserve
x5h			WDR Control	Reserve	Reserve		Reserve	Reserve
x6h	Status Request		Iris Assignment	ND Filter Control	Camera Status		Reserve	
x7h	Model Name Request		AWB Control		Reserve		GENLOCK Phase Absolute Value Control	
x8h	ROM Version Request		Shutter Control	Color Bar Control			Reserve	
x9h							Reserve	
xAh				Auto IR Control		Digital Zoom Magnification	AUX Fan Status	
xBh				IR Filter Control			Reserve	
xCh								
xDh		Shutter Detail Settings	Shutter Assignment	Camera Setting				
xEh		Gain Detail Settings	Gain Assignment	Camera Version Request				
xFh		Reserve						