PHD-02X Series

Communication Protocol
VISCA™
PELCO-D

Rev. 01

Approval	Examination	Drawing

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Revision History

Rev.	Date	Description
01	2011/12/5	Issued.

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VISCA™ Control Protocol

1. VISCA™ Communication Format

- Communication speed: 9600 / 19200 / 38400 bps
- Data length: 8bit
- Start bit: 1bit
- Stop bit: 1bit
- Parity: None
- No flow control such as No Flow Control such as XON / XOFF RTS / CTS

2. Command structure

Command structure should be referred to VISCA Specifications. The general overview explains as follows.

2.1 Transmission (Controller->Camera) packet structure

Header Byte Byte2 Byte3……Terminator

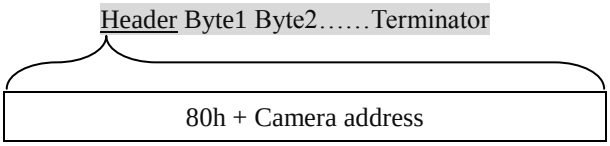
b7	b6	b5	b4	b3	b2	b1	b0
1	Sender's address 000			0	Camera address 001		

b7	b6	b5	b4	b3	b2	b1	b0
1	1	1	1	1	1	1	1

*1) Header byte: Sender is always 000. Camera address is 001 because it is not corresponded to daisy chain.

*2) Terminal byte ⊦: FFh at 16hex.

2.2 Response (Camera->Controller) Packet structure



*1) Response packet header:

This is the one that 80h (16 hex) is added on camera address. In case that command from host is 81h, the response packet header is 90h

2.3 Setting and Inquiry Command

- Setting command: Used for this camera operation
- Inquiry command: Used for inquiring about the setting data and current status of this camera

Packet Overview

8x pq rs…FF

pq = Command No., Inquiry No.. - 01(Command)、09(Inquiry)

rs = Category code -00(Interfacce)、04(Camera 1)、07(Camera 2)

3. Setting Command

3.1 System command

Command	Packet	Comments
IF_Clear broadcast	88 01 00 01 FF	Send Address set command through broadcast. The camera address is 01.
AddressSet	88 30 01 FF	Be sure to send IF_Clear command before controlling
CommandCansel	8x 2p FF	[x] represents "camera address. [p] represents the number of socket (0 to 3)

3.2 Various Setting Commands

3.2.1 CAM_ZOOM - Zoom

Command	Packet	Comments
Stop	8x 01 04 07 00 FF	
Tele(Standard)	8x 01 04 07 02 FF	
Wide(Standard)	8x 01 04 07 03 FF	
Tele(Variable)	8x 01 04 07 2p FF	p: Zoom speed=0 to 7 (Low to High)
Wide(Variable)	8x 01 04 07 3p FF	p: Zoom speed=0 to 7 (Low to High)
Direct	8x 01 04 47 0p 0q 0r 0s FF	pqrs: Zoom step

Direct: pqrs

Optical zoom			
pqrs	Step	pqrs	Step
0x0000	x1	0x23f0	x11
0x0dc0	x2	0x24b8	x12
0x14c8	x3	0x2558	x13
0x18d8	x4	0x25f8	x14
0x1ba8	x5	0x2670	x15
0x1dd8	x6	0x26e8	x16
0x1f90	x7	0x2738	x17
0x20f8	x8	0x2788	x18
0x2210	x9	0x27b0	x19
0x2328	x10	0x2808	x20

Digital zoom combine mode			
pqrs	Step	pqrs	Step
0x2808	x1	0x286c	x11
0x2812	x2	0x2876	x12
0x281c	x3		
0x2826	x4		
0x2830	x5		
0x283a	x6		
0x2844	x7		
0x284e	x8		
0x2858	x9		
0x2862	x10		

Digital zoom step at digital zoom combine mode is minimum x0.1. (pqrs can be specified at 1 step)

3.2.2 CAM_D-ZOOM - Digital zoom

Command	Packet	Comments
D-Zoom ON	8x 01 04 06 02 FF	Digital zoom ON
D-Zoom OFF	8x 01 04 06 03 FF	Digital zoom OFF
Combine mode	8x 01 04 36 00 FF	Combine mode.
Stop	8x 01 04 06 00 FF	
Tele(Variable)	8x 01 04 06 2p FF	p: Tele = 0 to 7 (Low to High)
Wide(Variable)	8x 01 04 06 3p FF	p: Wide = 0 to 7 (Low to High)
Separate mode	8x 01 04 36 01 FF	Separate mode.
x1/Max	8x 01 04 06 10 FF	Toggle
Direct	8x 01 04 46 00 00 0p 0q FF	pq: Digital zoom step

Direct: pq

Digital zoom combine mode			
pq	Step	pq	Step
0x00	x1	0x3c	x7
0x0a	x2	0x46	x8
0x14	x3	0x50	x9
0x1e	x4	0x5a	x10
0x28	x5	0x64	x11
0x32	x6	0x6e	x12

Digital zoom step is at x0.1(pq can be specified at minimum 1 step)

3.2.3 CAM_Focus - Manual Focus Mode

Command	Packet	Comments
Stop	8x 01 04 08 00 FF	Please set “Manual “ to use “ Direct“ or “Far/Near” when needing the adjustment
Far	8x 01 04 08 02 FF	
Near	8x 01 04 08 03 FF	
Far(Variable)	8x 01 04 08 2p FF	p: Focus speed = 0 to 7 (Low to High)
Near(Variable)	8x 01 04 08 3p FF	p: Focus speed = 0 to 7 (Low to High)
Auto focus	8x 01 04 38 02 FF	Auto focus
Manual focus	8x 01 04 38 03 FF	manual focus
Infinity	8x 01 04 38 04 FF	Specifying focal length to infinity distance.
Auto/Manual	8x 01 04 38 10 FF	Toggle. Changing auto and manual focus mode.
Direct	8x 01 04 48 0p 0q 0r 0s FF	pqrs: Focal position = 0x1000 to 0x26c0 It could be less than 1000 depending on AutoFocus

Direct: pqrs

Focal position	pqrs	
Far max.	0x0d46	Minimum value
Far end	0x1000	Far edge (when object is far up to infinity)
↕		↕
Near end	0x20c4	Near edge (When object is near)
Near max.	0x2ee0	Maximum value

Focus position varies depending on the optical zoom step. Both FAR END and NEAR END are the value as a reference. The value of FAR END may fall below or NEAR END may rise over depending on AUTO FOCUS.

Command	Packet	Comments
One push trigger	8x 01 04 18 01 FF	
Infinity	8x 01 04 18 02 FF	Same with AUTO mode
Near limit	8x 01 04 28 00 0p FF	p: Focus limit position = 0 to 8 (Infinity to 2.0m) Focal point been kept to closer than the specified focal length, during the auto focusing.

Near limit: p

p	Limit position	p	Limit position
0	No limit	5	3.7m
1	25.0m	6	2.9m
2	11.0m	7	2.3m
3	7.0m	8	2.0m
4	4.9m		

3.2.4 CAM_Zoom_Focus_Mode - Zoom/Focus Specification

Command	Packet	Comments
Normal AF	8x 01 04 89 0p 0q 0r 0s0t 0u 0v 0w FF	Digital zoom combine mode. pqrs=0x0000~0x4ec0 (Digital zoom combine mode OFF) pqrs=0x0000~0x4fc0 (Digital zoom combine mode ON) Zoom position setting (16bitHex) CAM_ZOOM Direct(8x 01 04 47 0p 0q 0r 0s FF) tuvw: Focal position setting (16bitHex) = 0x1000 to 0x26c0 CAM_FOCUS Direct(8x 01 04 48 0p 0q 0r 0s FF)

3.2.5 CAM_AF_Mode – AF Mode

Command	Packet	Comments
Normal AF	8x 01 04 57 00 FF	Operating AF when something moves.
Interval AF	8x 01 04 57 01 FF	AF will be done at specified time interval (with Interval Timeset command)
AF after Zoom	8x 01 04 57 02 FF	AF will be done after ZOOM operation
Interval time set	8x 01 04 27 00 00 0p 0q FF	pg: Interval time 0x01 (1sec) to 0xff (255sec) (1step=1sec)

Interval movement is performed when some movement is done during the interval time and AF movement is necessary.

3.2.6 CAM_AFSensitivitySet – AF Sensitivity Setting

Command	Packet	Comments
AF sensitivity Normal	8x 01 04 58 02 FF	Normal
AF sensitivity Low	8x 01 04 58 03 FF	Low

3.2.7 CAM_WB - White Balance Setting

Command	Packet	Comments
Auto	8x 01 04 35 00 FF	Auto means the tracing of light source automatically. The range covers from 3000K to5000K.
Indoor	8x 01 04 35 01 FF	Indoor value is fixed as factory setting. (It can't be adjusted by RB gain)
Outdoor	8x 01 04 35 02 FF	Outdoor value is fixed as factory setting. (It can't be adjusted by RB gain)
ATW	8x 01 04 35 04 FF	ATW means the tracing of light source automatically. Tracing speed is faster than "Auto" and it covers more than 2600 to 8000K
One push	8x 01 04 35 03 FF	One push trigger captures the white forcibly and keeps the value up to the next trigger. The current value of RB gain is stored as "Manual gain" and R gain/B gain is set to x1.0.
One push trigger	8x 01 04 10 05 FF	Available only at One push mode

3.2.8 CAM_RGain – R Gain

Command	Packet	Comments
Reset	8x 01 04 03 00 FF	x1.0
Up	8x 01 04 03 02 FF	
Down	8x 01 04 03 03 FF	
Direct	8x 01 04 43 00 00 0p 0q FF	pq: R gain=0x00 to 0x14 (x0.70 to x1.30)

Direct: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.70	0x06	x0.88	0x0c	x1.06	0x12	x1.24
0x01	x0.73	0x07	x0.91	0x0d	x1.09	0x13	x1.27
0x02	x0.76	0x08	x0.94	0x0e	x1.12	0x14	x1.30
0x03	x0.79	0x09	x0.97	0x0f	x1.15		
0x04	x0.82	0x0a	x1.00	0x10	x1.18		
0x05	x0.85	0x0b	x1.03	0x11	x1.21		

When at manual operation, it is the setting of the gain stored in the memory against R gain. The R gain stored in the memory up to 0.7-x1.3 is changeable by OnePush AWB operation.

3.2.9 CAM_BGain – B Gain

Command	Packet	Comments
Reset	8x 01 04 04 00 FF	x1.0
Up	8x 01 04 04 02 FF	
Down	8x 01 04 04 03 FF	
Direct	8x 01 04 44 00 00 0p 0q FF	pq: B gain=0x00 to 0x14(x0.70 to x1.30)

Direct: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.70	0x06	x0.88	0x0c	x1.06	0x12	x1.24
0x01	x0.73	0x07	x0.91	0x0d	x1.09	0x13	x1.27
0x02	x0.76	0x08	x0.94	0x0e	x1.12	0x14	x1.30
0x03	x0.79	0x09	x0.97	0x0f	x1.15		
0x04	x0.82	0x0a	x1.00	0x10	x1.18		
0x05	x0.85	0x0b	x1.03	0x11	x1.21		

When at manual operation, it is the setting of the gain stored in the memory against B gain. The B gain stored in the memory up to 0.7-x1.3 is changeable by OnePush AWB operation.

3.2.10 CAM_CrGain – Cr Gain

Command	Packet	Comments
Reset	8x 01 07 96 00 FF	Initial value
Up	8x 01 07 96 02 FF	
Down	8x 01 07 96 03 FF	
Direct	8x 01 07 96 04 0p 0q FF	pq: Crgain =0x00 to 0x14(x0.50 to x2.00)

Direct: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.50	0x06	x0.80	0x0c	x1.20	0x12	x1.80
0x01	x0.55	0x07	x0.85	0x0d	x1.30	0x13	x1.90
0x02	x0.60	0x08	x0.90	0x0e	x1.40	0x14	x2.00
0x03	x0.65	0x09	x0.95	0x0f	x1.50		
0x04	x0.70	0x0a	x1.00	0x10	x1.60		
0x05	x0.75	0x0b	x1.10	0x11	x1.70		

Set the gain against the R chroma gain set as factory setting.

3.2.11 CAM_CbGain – Cb Gain

Command	Packet	Comments
Reset	8x 01 07 97 00 FF	Initial value
Up	8x 01 07 97 02 FF	
Down	8x 01 07 97 03 FF	
Direct	8x 01 07 97 04 0p 0q FF	pq: Cbgain =0x00 to 0x14(x0.50 to x2.00)

Direct: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.50	0x06	x0.80	0x0c	x1.20	0x12	x1.80
0x01	x0.55	0x07	x0.85	0x0d	x1.30	0x13	x1.90
0x02	x0.60	0x08	x0.90	0x0e	x1.40	0x14	x2.00
0x03	x0.65	0x09	x0.95	0x0f	x1.50		
0x04	x0.70	0x0a	x1.00	0x10	x1.60		
0x05	x0.75	0x0b	x1.10	0x11	x1.70		

Set the gain against the B chroma gain set as factory setting.

3.2.12 CAM_AE – AE Mode Setting

Command	Packet	Comments
Full auto	8x 01 04 39 00 FF	Auto exposure mode. Both Iris and Gain changes automatically
Manual	8x 01 04 39 03 FF	Iris, Gain and Shutter can be changed respectively
Shutter priority	8x 01 04 39 0A FF	Shutter priority exposure mode. Shutter is fixed * Due to Shutter control, Auto Slow shutter function is not available
Iris priority	8x 01 04 39 0B FF	Iris priority exposure mode. Shutter is adjusted automatically.

3.2.13 CAM_SlowShutter - Slow Shutter Setting

(Auto Slow is not available at Shutter priority mode. Enable to set the specified value of Slower shutter when AE is at manual)

Command	Packet	Comments
Auto slow	8x 01 04 5A 0p FF	Auto Slow shutter. p: Shutter speed = 3/4/6/2/5/7

Auto slow: p

In case of 60p/60i/30p		In case of 50p/50i/25p/24p	
p	Shutter speed	p	Shutter speed
3	OFF	3	OFF
4	1/30	4	1/25
6	1/4	6	1/3
2	1/8	2	1/6
5	1/15	5	1/12
7	1/2	7	1/1.5

3.2.14 CAM_AE_MAX_Gain – AE Max Gain Setting

Command	Packet	Comments
AE max gain	8x 01 07 56 0p FF	p: AE max gain =0 to 7 (0 to 32dB)

AE max gain: p

p	Max gain	p	Max gain
0	0dB	4	17dB
1	3dB	5	21dB
2	6dB	6	26dB
3	12dB	7	32dB

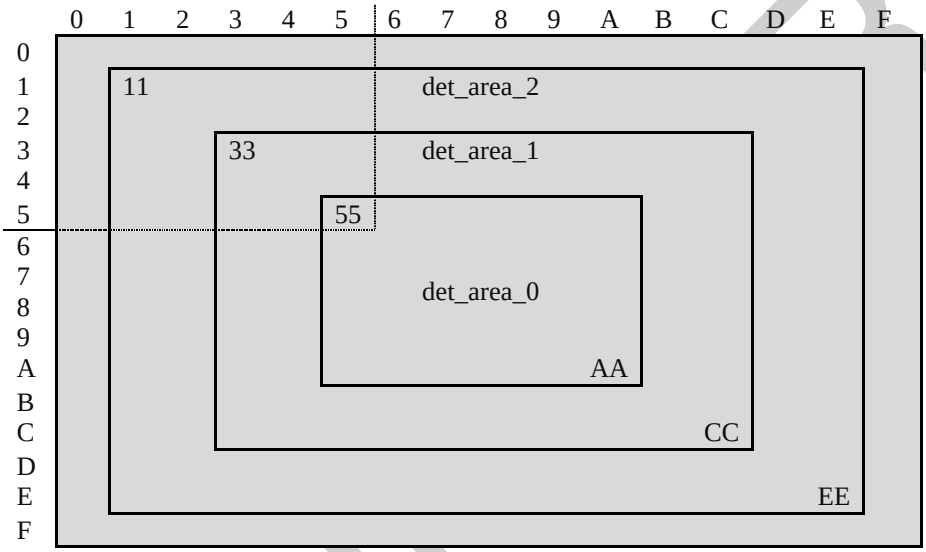
3.2.15 CAM_AEAreaSet – AE Area Setting

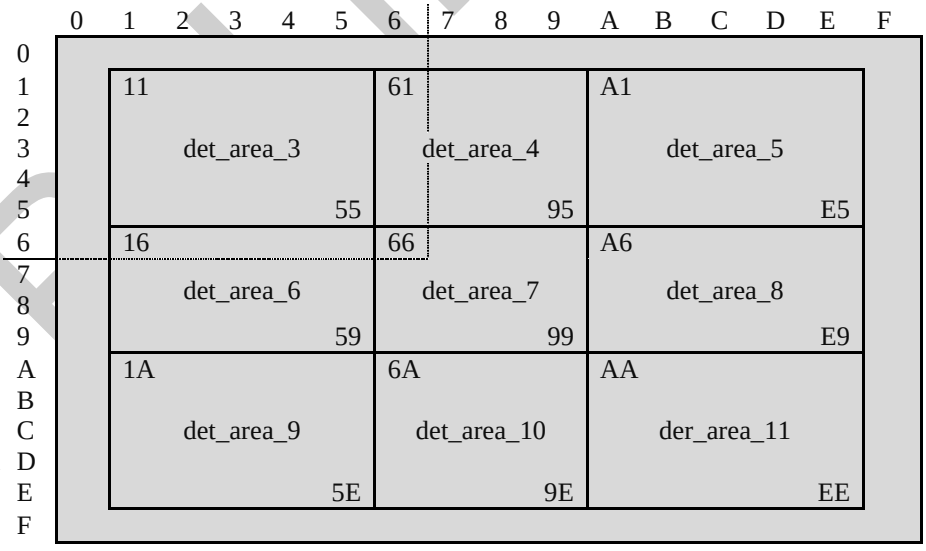
Command	Packet	Comments
det_area	8x 01 07 57 0p FF	p: AE area set = 0x0 to 0xb

det_area: p

p	area	p	area	p	area
0x0	det_area_0	0x4	det_area_4	0x8	det_area_8
0x1	det_area_1	0x5	det_area_5	0x9	det_area_9
0x2	det_area_2	0x6	det_area_6	0xa	det_area_10
0x3	det_area_3	0x7	det_area_7	0xb	det_area_11

AEarea setting diagram





3.2.16 CAM_ExpComp – Exposure Correction

Command	Packet	Comments
Reset	8x 01 04 0E 00 FF	Back to 0EV.
Up	8x 01 04 0E 02 FF	0.5EV at 1step
Down	8x 01 04 0E 03 FF	
Direct	8x 01 04 4E 00 00 00 0p FF	p = 0x0 to 0xe (±7steps)

Direct: p

0x0	…	0x7	…	0xe
-7	…	0	…	+7
-3.5EV		0		+3.5EV

3.2.17 CAM_Shutter - Electronic Shutter

(at AE manual, AE Shutter priority)

Command	Packet	Comments
Reset	8x 01 04 0A 00 FF	1/60 sec
Up	8x 01 04 0A 02 FF	
Down	8x 01 04 0A 03 FF	
Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter speed = 0xff, 0x00 to 0x15

Direct: pq

In case of 60p/60i/30p				In case of 60p/60i/30p			
pq	(sec)	pq	(sec)	pq	(sec)	pq	(sec)
0xff	2	0x0b	1/250	0xff	2	0x0b	1/250
0x00	1	0x0c	1/350	0x00	1	0x0c	1/350
0x01	1/2	0x0d	1/500	0x01	1/1.5	0x0d	1/500
0x02	1/4	0x0e	1/725	0x02	1/3	0x0e	1/725
0x03	1/8	0x0f	1/1,000	0x03	1/6	0x0f	1/1,000
0x04	1/15	0x10	1/1,500	0x04	1/12	0x10	1/1,500
0x05	1/30	0x11	1/2,000	0x05	1/25	0x11	1/2,000
0x06	1/60	0x12	1/3,000	0x06	1/50	0x12	1/3,000
0x07	1/90	0x13	1/4,000	0x07	1/90	0x13	1/4,000
0x08	1/100	0x14	1/6,000	0x08	1/100	0x14	1/6,000
0x09	1/125	0x15	1/10,000	0x09	1/125	0x15	1/10,000
0x0a	1/180			0x0a	1/180		

3.2.18 CAM_Iris – Iris Adjustment

(at AE_Manual, AE_Iris_Priority)

Command	Packet	Comments
Reset	8x 01 04 0B 00 FF	1/60 sec
Up	8x 01 04 0B 02 FF	
Down	8x 01 04 0B 03 FF	
Direct	8x 01 04 4B 00 00 0p 0q FF	pq: F value = 0x00 (Close) to 0x14 (F1.6)

Direct: pq

pq	F	pq	F	pq	F
0x00	Close	0x07	F16	0x0e	F4.8
0x01	F64	0x09	F11	0x0f	F4.0
0x02	F38	0x0a	F9.6	0x10	F3.4
0x03	F32	0x0b	F8.0	0x11	F2.8
0x04	F26	0x0c	F6.8	0x12	F2.4
0x05	F22	0x0d	F5.6	0x13	F2.0
0x06	F19	0x0e	F4.8	0x14	F1.6

3.2.19 CAM_Gain – Gain Adjustment

(at AE manual)

Command	Packet	Comments
Reset	8x 01 04 0C 00 FF	6dB
Up	8x 01 04 0C 02 FF	
Down	8x 01 04 0C 03 FF	
Direct	8x 01 04 4C 00 00 0p 0q FF	pq: gain =0x01 to 0x11 (0dB to 32dB)

Direct: pq

pq	Gain	pq	Gain	pq	Gain
0x01	0dB	0x07	12dB	0x0d	24dB
0x02	2dB	0x08	14dB	0x0e	26dB
0x03	4dB	0x09	16dB	0x0f	28dB
0x04	6dB	0x0a	18dB	0x10	30dB
0x05	8dB	0x0b	20dB	0x11	32dB
0x06	10dB	0x0c	22dB		

3.2.20 CAM_Aperture – Edge Enhancement

Command	Packet	Comments
Reset	8x 01 04 02 00 FF	
Up	8x 01 04 02 02 FF	
Down	8x 01 04 02 03 FF	
Direct	8x 01 04 42 00 00 00 0p FF	p = 0x0 to 0xf (16 steps)

3.2.21 CAM_LR Reverse - Mirror Reverse

Command	Packet	Comments
ON	8x 01 04 61 02 FF	
OFF	8x 01 04 61 03 FF	

3.2.22 CAM_Freeze - Freeze

Command	Packet	Comments
ON	8x 01 04 62 02 FF	
OFF	8x 01 04 62 03 FF	

3.2.23 CAM_Picture Effect - Effect

Command	Packet	Comments
OFF	8x 01 04 63 00 FF	
Neg. Art	8x 01 04 63 02 FF	
B&W	8x 01 04 63 04 FF	

3.2.24 CAM_Picture Flip - Flip Reverse

Command	Packet	Comments
ON	8x 01 04 66 02 FF	
OFF	8x 01 04 66 03 FF	

3.2.25 CAM_ICR - ICR ON/OFF

Command	Packet	Comments
ON	8x 01 04 01 02 FF	ON: Remove ICR
OFF	8x 01 04 01 03 FF	OFF: Move ICR in

3.2.26 CAM Auto ICR - Auto IRC Mode

Command	Packet	Comments
AICR	8x 01 04 51 0p 0q 0r 0s 0t 0u 0v FF	p: Auto mode qr: Switching dwell time. ICR switching when reaching switching level. (Specify the dwell time at 0.1 sec step) st: Specify the gain to remove the IR cut filter uv: Specify the gain to move in the IR cut filter

AICR: pqrstuv

p: Auto mode = 0: OFF, 1: ON

qr: Dwell time for IR cut filter switching

Specify the dwell time at the unit of 0.1 sec when reaching the level to switch

st: Gain setting for IR cut filter [OUT]

The gain value is calculated as follows when camera is configured with slow shutter mode. However, if gain was over the result, the camera removes IR cut filter automatically.

Gain generated by Slow Shutter: **SGain**

Sum gain = (gain at 1/30 sec) + 6dB
(gain at 1/15sec) + 12dB
(gain at 1/8sec) + 18dB
(gain at 1/4sec) + 24dB

AEMax gain: **MGain**

Gain setting for IR cut filter OUT = SGain + MGain + intermediate gain (0 to 5)

uv: Gain setting for IR cut filter [IN]

IR cut filter will insert to a camera, in case of the gain lower than the AE max gain.

Gain setting for IR cut filter = Gain value is lower than AE max gain.

3.2.27 CAM_Alarm – Alarm Setting

Command	Packet	Comments
ON	8x 01 04 6B 02 FF	Alarm setting ON
OFF	8x 01 04 6B 03 FF	Alarm setting OFF
Set mode	8x 01 04 6C 0p FF	p: Alarm mode = 0 to 5(Mode 0 to Mode 5)

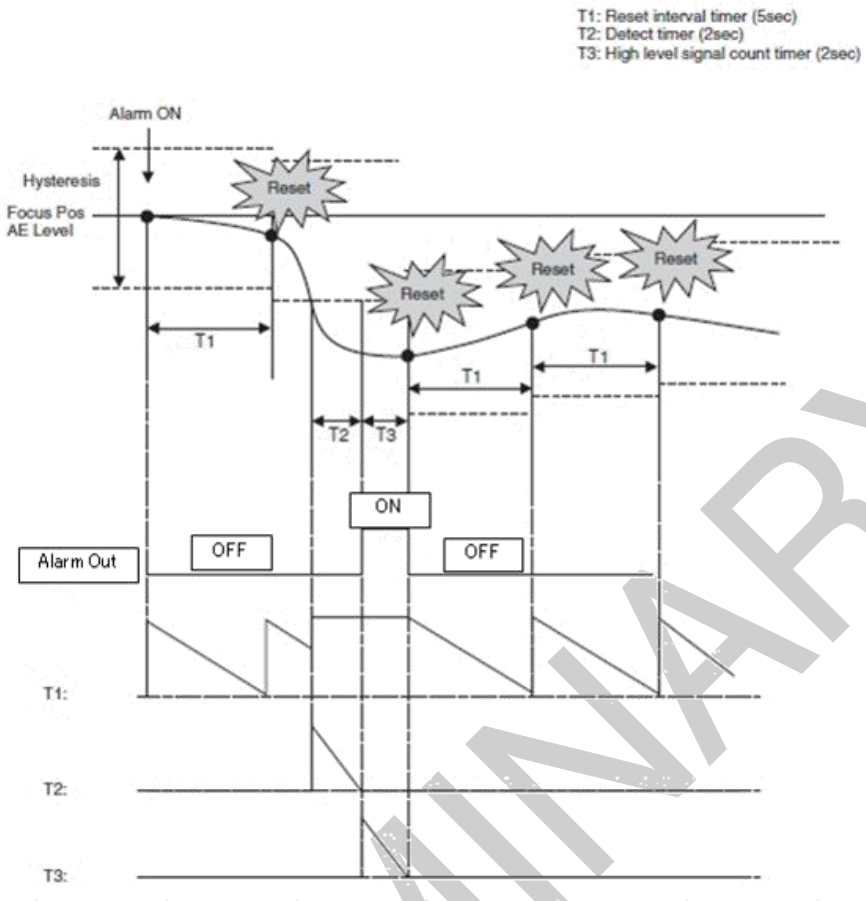
Set mode: p

p	Mode	Comments
0	Mode 0	Detection of Focus change / Hysteresis is fixed Detection center is detected and fixed when starting
1	Mode 1	Detection of Focus change / Hysteresis is fixed Detection center is changed following time from starting
2	Mode 2	Detection of luminance level change / Hysteresis is fixed Detection center is detected and fixed when starting
3	Mode 3	Detection of luminance level change / Hysteresis is fixed Detection center is changed following time from starting
4	Mode 4	Mode 0 AND Mode 2
5	Mode 5	Day-Night Mode / Detection of luminance level change Alarm when exceeding the level of DAY, NIGHT

Command	Packet	Comments
Set DayNight level	8x 01 04 6D 00 0p 0q 0r 0s 0t FF	pq: Day detective level setting = 0x00 to 0xff rst: Night detective level setting = 0x000 to 0x0ff
Alarm(reply)	y0 07 04 6B 01 FF	Detect level “LOW”->“HIGH” y = 8+Camera ID
	y0 07 04 6B 00 FF	Detect level “HIGH”->“LOW” y = 8+Camera ID
	8x 01 04 6C 0p FF	p: Alarm mode =0 to 5(Mode 0 to Mode 5)

*) Alarm response is transmitted to host when detecting the alarm

*) Hardware alarm output signal is the 3 pin of CN302 on FPGA board. Low level at Signal level 5VTTL level (Negative Logic)



*) Detection of MODE1, MODE3

In the drawing as shown above, the Alarm out is Positive Logic. However, in our PHD-01X, the logic is negative. Therefore, the actual signal output is low level

3.2.28 CAM_KeyLock - Prohibiting of Key-pad

Command	Packet	Comments
ON	8x 01 04 17 02 FF	Prohibiting of key-pad
OFF	8x 01 04 17 00 FF	Permitting of key-pad

3.2.29 CAM_Memory – Preset Memory

(Recall the preset camera status)

Command	Packet	Comments
Reset	8x 01 04 3F 00 0p FF	p: Recall No. = 1 to 4
Set	8x 01 04 3F 01 0q FF	q = 1 to 4(4 positions) , 0 In case of 0, it is stored in current status memory
Recall	8x 01 04 3F 02 0r FF	Recall the preset memory in current status memory

3.2.30 CAM_IDWrite - Camera ID Setting

Command	Packet	Comments
ON	8x 01 04 22 0p 0q 0r 0s FF	pqrs: camera ID=0x0000 to 0xffff

3.2.31 CAM_IDDisplay - ID Display

Command	Packet	Comments
OFF	8x 01 07 39 00 FF	
ON(Left up)	8x 01 07 39 01 FF	
ON(Right up)	8x 01 07 39 02 FF	
ON(Right down)	8x 01 07 39 04 FF	

*) Not supported ID display on lower left.

*) ID Display is decimal system and 5-digit (00000 to 65535)

3.2.32 Character Set – Character Display

Command	Packet	Comments
Character set	8x 01 07 62 pp qq rr ss tt uu vv ww xx yy FF	10-digit –number , Alphabet and symbol can be displayed and set on the monitor

Character set: VISCA™ Character code

00	**A**	10	**Q**	20	**3**	30	**Ó**	40	**Å**
01	**B**	11	**R**	21	**4**	31	**Ú**	41	**$**
02	**C**	12	**S**	22	**5**	32	**Â**	42	**₣**
03	**D**	13	**T**	23	**6**	33	**Ê**	43	**¥**
04	**E**	14	**U**	24	**7**	34	**Ô**	44	**DM**
05	**F**	15	**V**	25	**8**	35	**Æ**	45	**£**
06	**G**	16	**W**	26	**9**	36	**Œ**	46	**¿**
07	**H**	17	**X**	27	**0**	37	**Ã**	47	**¡**
08	**I**	18	**Y**	28	**À**	38	**Õ**	48	**φ**
09	**J**	19	**Z**	29	**È**	39	**Ñ**	49	**"**
0a	**K**	1a	**&**	2a	**Ì**	3a	**Ç**	4a	**;**
0b	**L**	1b		2b	**Ò**	3b	**β**	4b	**`**
0c	**M**	1c	**?**	2c	**Ù**	3c	**Ä**	4c	**.**
0d	**N**	1d	**!**	2d	**Á**	3d	**Ï**	4d	**,**
0e	**O**	1e	**1**	2e	**É**	3e	**Ö**	4e	**/**
0f	**P**	1f	**2**	2f	**Í**	3f	**Ü**	4f	**-**

3.2.33 Character_DisplayOnOff - Location of Character Display

Command	Packet	Comments
OFF	8x 01 07 63 00 00 FF	p: Blinking function = (0: No, 1: Yes) q: Color
ON(Left up)	8x 01 07 63 01 pq FF	p: Blinking function = (0: No, 1: Yes) q: Color
ON(Right up)	8x 01 07 63 02 pq FF	p: Blinking function = (0: No, 1: Yes) q: Color
ON(Right down)	8x 01 07 63 04 pq FF	p: Blinking function = (0: No, 1: Yes) q: Color

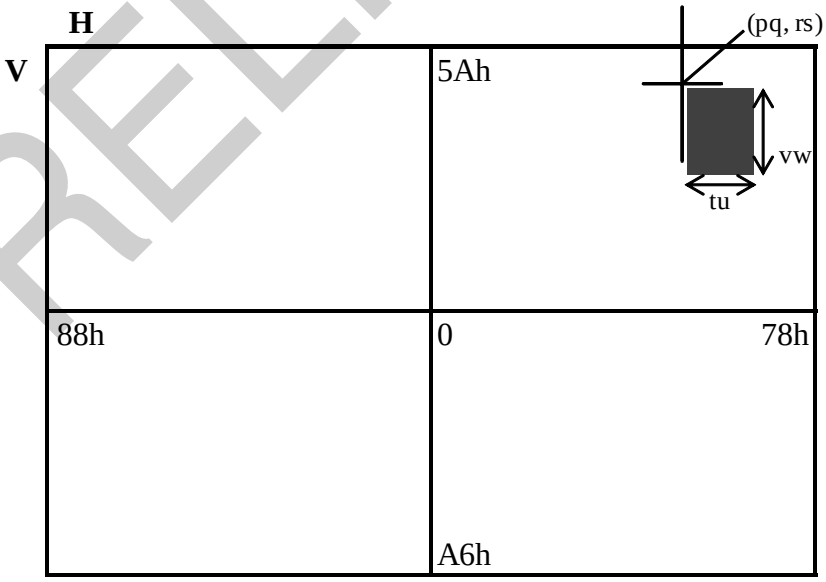
*) Not supported ID display on lower left.

Color: q

q	Color	q	Color
0	White	4	Cyan
1	Yellow	5	Green
2	Violet	6	Blue
3	Red		

3.2.34 CAM_PrivacyMask – Privacy Mask Setting

Command	Packet	Comments
Set mask	8x 01 04 76 0m 00 0p 0q 0r 0s 0t 0u 0v 0w FF	pq: x / rs: y / tu: w / vw: h m: Mask No. 0 to 7



Set mask: m/pqrstuvw

Parameter	Range	Actual Coordinates
pq: X-Coodinate	+120 to -120	1080 mode: (pq+120) * 8 720 mode: (pq+120) *5.3 (16hex setting)
rs: Y-Coodinate	+90 to -90	1080 mode: (rs+90) * 6 720 mode: (rs+90) *4 (16hex setting)
tu: Width	1 to 255	tu*4
vw: Height	1 to 255	vw*4
m: Mask No.	0 1 2 3 4 5 6 7	MASK_A MASK_B MASK_C MASK_D MASK_E MASK_F MASK_G MASK_H

Command	Packet	Comments
Mask display	8x 01 04 77 00 00 00 pq FF	pq: Mask ON/OFF bit set =0 to 7 (0: OFF, 1: ON)

Mask display: pq

pq bit	0	1	2	3	4	5	6	7
Mask name	A	B	C	D	E	F	G	H

Command	Packet	Comments
Set Pan Tilt angle	8x 01 04 79 0p 0q 0r 0s 0t 0u FF	

Set Pan Tilt angle: pqrstu

pqr: Pan angle stu: Tilt angle	Pan/Tilt angle 

Command	Packet	Comments
Move Pan Tilt	8x 01 04 7A 0p 0q 0r 0s 0t 0u vw FF	pqr: Pan speed(degree/sec) 0.1° step 0.1 to 90° stu: Tilt speed(degree/sec) 0.1° step 0.1 to 90° v: Pan direction=(0: Stop, 1: Right, 2: Left) w: Tilt direction=(0: Stop, 1: Up, 2: Down)

3.2.35 Initialize – Lens Initialization

Command	Packet	Comments
Zoom/Focus initialization	8x 01 04 19 01 FF	The command to initialize the lens to avoid the gap for internal counter

3.2.36 Color bar Set - Color Bar Setting

Command	Packet	Comments
Color bar ON/OFF	8x 01 07 9A 0p FF	p: Color bar display = (1: ON, 0: OFF)

3.2.37 Flip & Mirror Set – Flip & Mirror Reverse Setting

Command	Packet	Comments
Flip & Mirror	8x 01 07 90 0p 0q FF	p: Flip reverse ON/OFF = (2: ON, 3: OFF) q: Mirror reverse ON/OFF = (2: ON, 3: OFF)

3.2.38 Gamma Level Set - Gamma Level Setting

Command	Packet	Comments
Gamma level	8x 01 07 91 0p FF	p: Gamma level = 0 (0.30) to 4 (1.00)

Gamma level: p

p	Gamma level
0	0.30
1	0.45
2	0.60
3	0.80
4	1.00

3.2.39 TV Setup – TV Setup ON/OFF

Command	Packet	Comments
TV set up	8x 01 07 9E 0p FF	p: TV set upsetting = (0: OFF, 1: ON)

3.2.40 HD Format Set - HD Format Setting

Command	Packet	Comments
HD format	8x 01 07 9F 0p 0q FF	p: HD Format q: NTSC Enable/Disable = (0: Enable, 1: Disable)

HD format: p (**Output from LVDS is not available)

p	Format	p	Format	p	Format
0x0**	1080/60p	0x4	1080 / 50i	0x8	720/50p
0x1	1080/60i	0x5	1080/25p	0x9	720/25p
0x2	1080/30p	0x6	720/60p	0xa	1080/24p
0x3**	1080/50p	0x7	720/30p		

*) At NTSC ENABLE setting, 60p/60i and 30p/24p frame rate will be following. However, at 50p/50i/25p, they don't change.

60 -> 59.94 **30 -> 29.97** **24 -> 23.97**

3.2.41 RemoteControl - Remote Control

Command	Packet	Comments
Remote Control	8x 01 07 A0 00 0p 0q 0r FF	pqr: Operation key (bit) 1: Enter (Automatically entered after executing)

Remote Control: pqr

pqr	Operations
001	Menu Key
002	Cursor Up Key
010	Cursor Right Key
020	Enter Key
040	Cursor Left Key
200	Cursor Down Key

1) Above commands support only items that be able to by OSD.
2) Key pad operation's priority is higher than command operation. So command operation will be available if you input some command into camera during operating by key pad.
3) To acquire available current key status, you input to the command 8x 09 07 A0 FF into the camera.

3.2.42 WDR ON/OFF Control - WDR ON/OF Setting

Command	Packet	Comments
WDR ON	8x 01 07 93 02 FF	
WDR OFF	8x 01 07 93 03 FF	

3.2.43 AFAreaSet – AF Area setting

Command	Packet	Comments
det_area	8x 01 07 94 0p FF	p: Area set =0x0 to 0xb Refer to AE Detection area setting diagram *CAM_AEAreaSet*

det_area: p

p	area	p	area	p	area
0x0	det_area_0	0x4	det_area_4	0x8	det_area_8
0x1	det_area_1	0x5	det_area_5	0x9	det_area_9
0x2	det_area_2	0x6	det_area_6	0xa	det_area_10
0x3	det_area_3	0x7	det_area_7	0xb	det_area_11

3.2.44 AWBShift – AWB Shift Setting

Command	Packet	Comments
AWB shift	8x 01 07 98 0p FF	p: Shift setting =0 to 6

AWB shift: p

p	shift setting	p	shift setting
0	Normal(standard)	4	B-High
1	R-Low	5	B-Middle
2	R-Middle	6	B-Low
3	R-High		

Shift the color to Red or Blue from the standard color. The color shift of R、B covers from LOW/MID/HI respectively.

3.2.45 FocusManualType – Focus Manual Type Setting

Command	Packet	Comments
Focus manual type	8x 01 07 99 0p FF	Setting an AF after zoom operation or not. p: AF type set =(0: No, 1: Yes)

3.2.46 AE response - AE Response setting

Command	Packet	Comments
AE response	8x 01 07 9B 0p FF	p: AE response speed =(0: Fast, 1: Normal, 2: Slow)

3.2.47 ExtSyncLock - Ext. Sync. Setting

Command	Packet	Comments
External sync lock	8x 01 07 30 0p FF	p: Ext. Sync. ON/OFF = (0: OFF, 1: ON)

3.2.48 ExtSyncLockLine - Ext. Sync. Vertical Position Setting

Command	Packet	Comments
External sync lock Vertical	8x 01 07 3A 0p 0q 0r 0s FF	pqr: Vertical setting position = 0x0 to 0xf s: memory writing = 0x0 to 0xf s = 1: Vertical/Horizontal position coincident writing s ≠ 1:Without writing to a memory. The range value of Vertical sync. position: All modes (1080i60 / 1080i50 / 720p60 / 720p50): Select a point from value of 0 to 7.

3.2.49 ExtSyncLockHorizontal - Ext. Sync. Horizontal Position Setting

Command	Packet	Comments
External sync lock Horizontal	8x 01 07 3B 0p 0q 0r 0s FF	pqr: Horizontal setting position =0x000 to 0xa4f s: memory writing =0x0 to 0xf s=1: Vertical/Horizontal position coincident writing. s ≠ 1: Without writing to a memory. The range value of Horizontal Sync. position: 1080i60: 0x000 to 0x897 1080i50: 0x000 to 0xa4f 720p60: 0x000 to 0x671 720p50: 0x000 to 0x7bb

3.2.50 OthersSettingCommand – Other Setting

Command	Packet	Comments
Others setting command	8x 01 07 95 0p 0m FF	p: setting Parameter(bitset) bit0: (0) YC swap OFF/(1) YC swap ON bit1: (0) LED OFF/(1) LED ON m: Flag to writing current setting status into a memory.=(1: writing. 0: no writing)

3.3 Inquiry Command

3.3.1 <Inquiry Command>

Inquiry response

x0 5y…FF

x: 8+Camera address

y: Command socket number.

*) Camera address is continuously 1 (Because Daisy chain can't be supported)

Command socket is normally zero (0) in case that command is continuously transmitted. Thus, basic form of inquiry response will be **90 50…FF**(16 hex)

3.3.2 CAM_ZoomPosInq - Zoom Step Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ZoomPosInq	8x 09 04 47 FF	x0 5y 0p 0q 0r 0s FF	pqrs: Zoom step

CAM_ZoomPosInq: pqrs

Optical zoom			
pqrs	Step	pqrs	Step
0x0000	x1	0x23f0	x11
0x0dc0	x2	0x24b8	x12
0x14c8	x3	0x2558	x13
0x18d8	x4	0x25f8	x14
0x1ba8	x5	0x2670	x15
0x1dd8	x6	0x26e8	x16
0x1f90	x7	0x2738	x17
0x20f8	x8	0x2788	x18
0x2210	x9	0x27b0	x19
0x2328	x10	0x2808	x20

Digital zoom combine mode			
pqrs	Step	pqrs	Step
0x2808	x1	0x286c	x11
0x2812	x2	0x2876	x12
0x281c	x3		
0x2826	x4		
0x2830	x5		
0x283a	x6		
0x2844	x7		
0x284e	x8		
0x2858	x9		
0x2862	x10		

Digital zoom step at digital zoom combine mode is minimum x0.1 (pqrs can be specified at 1 step)

3.3.3 CAM_D-ZoomModeInq - Digital Zoom Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_D-ZoomModeInq	8x 09 04 06 FF	x0 5y 02 FF	Digital zoom ON
		x0 5y 03 FF	Digital zoom OFF

3.3.4 CAM_D-Zoom_C/S_ModeInq - Digital Zoom C/S Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_Dzoom_C/S_ ModeInq	8x 09 04 36 FF	x0 5y 00 FF	Optical/Digital zoom combine mode.
		x0 5y 01 FF	Optical/Digital zoom separate mode.

3.3.5 CAM_DZoomPosInq – Digital Zoom Step Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_D-ZoomPos Inq	8x 09 04 46 FF	x0 5y 00 00 0p 0q FF	pq: Digital zoom step

CAM_D-ZoomPosInq: pq

Digital zoomCombine mode			
pq	Step	pq	Step
0x00	x1	0x3c	x7
0x0a	x2	0x46	x8
0x14	x3	0x50	x9
0x1e	x4	0x5a	x10
0x28	x5	0x64	x11
0x32	x6	0x6e	x12

Digital zoom step set at x01 step, and “pq” value be specified at minimum 1 step.

3.3.6 CAM_FocusModeInq – Focus Mode Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FocusModeInq	8x 09 04 38 FF	x0 5y 02 FF	Auto
		x0 5y 03 FF	Manual

3.3.7 CAM_FocusPosInq – Manual Focus Position Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FocusPosInq	8x 09 04 48 FF	x0 5y 0p 0q 0r 0s FF	pqrs: Focal position

CAM_FocusPosInq: pqrs

Focal position	pqrs	
Far max.	0x0d46	Minimum value
Far end	0x1000	Far edge (When object is far up to infinity)
↕		↕
Near end	0x20c4	Near edge (When object is near)
Near max.	0x2ee0	Maximum value

Focus position varies depending on the optical zoom step. Both FAR END and NEAR END are the value as a reference. The value of FAR END may fall below or NEAR END may rise over depending on AUTO FOCUS.

3.3.8 CAM_FocusNearLimitInq - Focus Near Limit Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FocusNearLimitInq	8x 09 04 28 FF	x0 5y 00 0p FF	p: Focus limit position

CAM_FocusNearLimitInq: p

p	Limit position	p	Limit position
0	No limit	5	3.7m
1	25.0m	6	2.9m
2	11.0m	7	2.3m
3	7.0m	8	2.0m
4	4.9m		

3.3.9 CAM_FocusModeInq - Focus Mode Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FocusModeInq	8x 09 04 38 FF	x0 5y 02 FF	Auto focus
		x0 5y 03 FF	Manual focus
		x0 5y 04 FF	Infinity

3.3.10 CAM_AFModeInq – AF Mode Type Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AFModeInq	8x 09 04 57 FF	x0 5y 00 FF	Normal AF
		x0 5y 01 FF	Interval AF
		x0 5y 02 FF	Zoom trigger AF
		x0 5y 03 FF	Infinity

3.3.11 CAM_IntervalTimeInq - Focus Interval Time Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_IntervalTimeInq	8x 09 04 27 FF	x0 5y 00 00 0p 0q FF	pq = Interval time (01 to FF) 0x01(1sec) to 0xff (255sec) (1step = 1sec)

3.3.12 CAM_AFSensitivityInq – AF Sensitivity Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AFSensitivityInq	8x 09 04 58 FF	x0 5y 02 FF	Normal
		x0 5y 03 FF	Low

3.3.13 CAM_WBModeInq - White Balance Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_WBModeInq	8x 09 04 35 FF	x0 5y 00 FF	Auto
		x0 5y 01 FF	Indoor mode
		x0 5y 02 FF	Outdoor mode
		x0 5y 03 FF	One push mode

3.3.14 CAM_RGainInq – R Gain Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_RGainInq	8x 09 04 43 FF	x0 5y 00 00 0p 0q FF	pq: R gain =0x00 to 0x14 (x0.7 to x1.30)

CAM_RGainInq: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.70	0x06	x0.88	0x0c	x1.06	0x12	x1.24
0x01	x0.73	0x07	x0.91	0x0d	x1.09	0x13	x1.27
0x02	x0.76	0x08	x0.94	0x0e	x1.12	0x14	x1.30
0x03	x0.79	0x09	x0.97	0x0f	x1.15		
0x04	x0.82	0x0a	x1.00	0x10	x1.18		
0x05	x0.85	0x0b	x1.03	0x11	x1.21		

3.3.15 CAM_BGainInq – B Gain Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_BGainInq	8x 09 04 44 FF	x0 5y 00 00 0p 0q FF	pq: B gain =0x00 to 0x14 (x0.7 to x1.30)

CAM_BGainInq: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.70	0x06	x0.88	0x0c	x1.06	0x12	x1.24
0x01	x0.73	0x07	x0.91	0x0d	x1.09	0x13	x1.27
0x02	x0.76	0x08	x0.94	0x0e	x1.12	0x14	x1.30
0x03	x0.79	0x09	x0.97	0x0f	x1.15		
0x04	x0.82	0x0a	x1.00	0x10	x1.18		
0x05	x0.85	0x0b	x1.03	0x11	x1.21		

3.3.16 CAM_CrGainInq – Cr Gain Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_CrGainInq	8x 09 07 96 FF	x0 5y 00 00 0p 0q FF	pq: Cr gain =0x00 to 0x14 (x0.50 to x2.00)

CAM_CrGainInq: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.50	0x06	x0.80	0x0c	x1.20	0x12	x1.80
0x01	x0.55	0x07	x0.85	0x0d	x1.30	0x13	x1.90
0x02	x0.60	0x08	x0.90	0x0e	x1.40	0x14	x2.00
0x03	x0.65	0x09	x0.95	0x0f	x1.50		
0x04	x0.70	0x0a	x1.00	0x10	x1.60		
0x05	x0.75	0x0b	x1.10	0x11	x1.70		

3.3.17 CAM_CbGainInq – Cb Gain Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_CbGainInq	8x 09 07 97 FF	x0 5y 00 00 0p 0q FF	pq: Cb gain =0x00 to 0x14 (x0.50 to x2.00)

CAM_CbGainInq: pq

pq	Gain	pq	Gain	pq	Gain	pq	Gain
0x00	x0.50	0x06	x0.80	0x0c	x1.20	0x12	x1.80
0x01	x0.55	0x07	x0.85	0x0d	x1.30	0x13	x1.90
0x02	x0.60	0x08	x0.90	0x0e	x1.40	0x14	x2.00
0x03	x0.65	0x09	x0.95	0x0f	x1.50		
0x04	x0.70	0x0a	x1.00	0x10	x1.60		
0x05	x0.75	0x0b	x1.10	0x11	x1.70		

3.3.18 CAM_AEModeInq – AE Mode Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AEModeInq	8x 09 04 39 FF	x0 5y 00 FF	Full Auto
		x0 5y 03 FF	Manual
		x0 5y 0A FF	Shutter priority
		x0 5y 0B FF	Iris priority

3.3.19 CAM_AEMax_GainInq – AE Max Gain Setting Value Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AEMaxGainInq	8x 09 07 56 FF	x0 5y 0p FF	p: AE Max gain =0 to 7(0 to 32dB)

AE_MaxGainInq: p

p	Max gain	p	Max gain
0	0dB	4	17dB
1	3dB	5	21dB
2	6dB	6	26dB
3	12dB	7	32dB

3.3.20 CAM_AEAreaInq – AE Area Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AEAreaInq	8x 09 07 57 FF	x0 5y 0p FF	p: AE det area = 0x0 to 0xb Refer to AE detection area setting diagram *CAM_AEArea Set*

3.3.21 CAM_ExpCompInq – AE Level Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ExpCompInq	8x 09 04 4E FF	x0 5y 00 00 00 0p FF	p = AE level p=0x0 to 0xe (±7steps)

CAM_ExpCompInq: p

0x0	…	0x7	…	0xe
-7	…	0	…	+7
-3.5EV		0		+3.5EV

3.3.22 CAM_ShutterPosInq - Electronic Shutter Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ShutterPosInq	8x 09 04 4A FF	x0 5y 00 00 0p 0q FF	pq: Shutter speed = 0xff, 0x00 to 0x15

CAM_ShutterPosInq: pq

In case of 60p/60i/30p				In case of 50p/50i/25p/24p			
pq	(sec)	pq	(sec)	pq	(sec)	pq	(sec)
0xff	2	0x0b	1/250	0xff	2	0x0b	1/250
0x00	1	0x0c	1/350	0x00	1	0x0c	1/350
0x01	1/2	0x0d	1/500	0x01	1/1.5	0x0d	1/500
0x02	1/4	0x0e	1/725	0x02	1/3	0x0e	1/725
0x03	1/8	0x0f	1/1,000	0x03	1/6	0x0f	1/1,000
0x04	1/15	0x10	1/1,500	0x04	1/12	0x10	1/1,500
0x05	1/30	0x11	1/2,000	0x05	1/25	0x11	1/2,000
0x06	1/60	0x12	1/3,000	0x06	1/50	0x12	1/3,000
0x07	1/90	0x13	1/4,000	0x07	1/90	0x13	1/4,000
0x08	1/100	0x14	1/6,000	0x08	1/100	0x14	1/6,000
0x09	1/125	0x15	1/10,000	0x09	1/125	0x15	1/10,000
0x0a	1/180			0x0a	1/180		

3.3.23 CAM_IrisPosInq – Iris Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_IrisPosInq	8x 09 04 4B FF	x0 5y 00 00 0p 0q FF	pq: F value = 0x00(Close) to 0x14 (F1.6)

CAM_IrisPosInq: pq

pq	F value	pq	F value	pq	F value
0x00	Close	0x07	F16	0x0e	F4.8
0x01	F64	0x09	F11	0x0f	F4.0
0x02	F38	0x0a	F9.6	0x10	F3.4
0x03	F32	0x0b	F8.0	0x11	F2.8
0x04	F26	0x0c	F6.8	0x12	F2.4
0x05	F22	0x0d	F5.6	0x13	F2.0
0x06	F19	0x0e	F4.8	0x14	F1.6

3.3.24 CAM_GainPosInq – Gain Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_GainPosInq	8x 09 04 4C FF	x0 5y 00 00 0p 0q FF	pq: gain =0x01(0dB) to 0x11 (32dB)

CAM_GainPosInq: pq

pq	Gain	pq	Gain	pq	Gain
0x01	0dB	0x07	12dB	0x0d	24dB
0x02	2dB	0x08	14dB	0x0e	26dB
0x03	4dB	0x09	16dB	0x0f	28dB
0x04	6dB	0x0a	18dB	0x10	30dB
0x05	8dB	0x0b	20dB	0x11	32dB
0x06	10dB	0x0c	22dB		

3.3.25 CAM_ApertureInq -Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
ApertureInq	8x 09 04 42 FF	x0 5y 00 00 00 0p FF	p: ApertureLevel=0x0 to 0xf (16steps)

3.3.26 CAM_LR_ReverseModeInq —Mirror Reverse Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_LR_Reverse ModeInq	8x 09 04 61 FF	x0 5y 02 FF	ON
		x0 5y 03 FF	OFF

3.3.27 CAM_FreezeModeInq – Freeze Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FreezeModeInq	8x 09 04 62 FF	x0 5y 02 FF	ON
		x0 5y 03 FF	OFF

3.3.28 CAM_PictureEffectInq - Effect Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_PictureEffect Inq	8x 09 04 63 FF	x0 5y 00 FF	OFF
		x0 5y 02 FF	Neg. Art
		x0 5y 02 FF	B&W

3.3.29 CAM_PictureFlipInq -Flip Reverse Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_PictureFlipInq	8x 09 04 66 FF	x0 5y 02 FF	ON
		x0 5y 03 FF	OFF

3.3.30 CAM_ICRModeInq - ICR ON/OFF Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ICRModeInq	8x 09 04 01 FF	x0 5y 02 FF	ON: Remove ICR
		x0 5y 03 FF	OFF: Move ICR in

3.3.31 CAM_AutoICRInq - Auto ICR Setting Level Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AutoICRInq	8x 09 04 51 FF	x0 5y 0p 0q 0r 0s 0t 0u 0v FF	p: Auto mode(0: OFF, 1: ON) qr: Switching dwell time st: IR cut filter OUT gain uv: IR cut filter INgain Refer to AE detection area setting diagram *CAM_AEArea Set*

3.3.32 CAM_VersionInq – Firm Version Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_VersionInq	8x 09 00 02 FF	0 5y 00 20 pq rs tu vw FF	pqrstuvw: Firm version (8 digits / Decimal)

3.3.33 CAM_AlarmInq - Alarm ON/OFF Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AlarmInq	8x 09 04 6B FF	x0 5y 02 FF	Alarm ON
		x0 5y 03 FF	Alarm OFF

3.3.34 CAM_AlramModeInq to Alarm Mode Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AlramModeInq	8x 09 04 6C FF	x0 5y 0p FF	p: Alarm mode =0 to 5(Mode 0 to Mode 5)

CAM_AlarmModeInq: p

p	Mode	Comments
0	Mode 0	Detection of Focus change / Hysteresis is fixed Detection center is detected and fixed when starting
1	Mode 1	Detection of Focus change / Hysteresis is fixed Detection center is changed following time from starting
2	Mode 2	Detection of luminance level change / Hysteresis is fixed Detection center is detected and fixed when starting
3	Mode 3	Detection of luminance level change / Hysteresis is fixed Detection center is detected and fixed when starting
4	Mode 4	Mode 0 AND Mode 2
5	Mode 5	Day-Night Mode / Detection of luminance level change Alarm when exceeding the level of DAY, NIGHT

3.3.35 CAM_AlarmDayNightInq - Alarm setting level Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AlarmDayNight Inq	8x 09 04 6D FF	x0 5y 00 0p 0q 0r 0s 0t 0u 0v 0w FF	pq: Day detective level setting = 0x00 to 0xff rst: Night detective level setting = 0x000 to 0x0ff uvw: Current AE level = 0x 000 to 0x0ff

3.3.36 CAM_AlramDetectLevel - Alarm Status Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AlramDetect Level	8x 09 04 6E FF	x0 5y 02 FF	Detect ON
		x0 5y 03 FF	Detect OFF

3.3.37 CAM_KeyLockInq - Prohibiting of key-padSetting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_KeyLockInq	8x 09 04 17 FF	x0 5y 02 FF	Prohibiting of key-pad
		x0 5y 00 FF	Permitting of key-pad

3.3.38 CAM_MemoryInq - User Setting Memory Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_MemoryInq	8x 09 04 3F FF	x0 5y 0p FF	p: Recall No. 0: Valid data is only camera status hold memory. Storage date of user setting memory is invalid. 1 to 4: The number of valid user setting memory.

3.3.39 CAM_IDInq - camera IDSetting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_IDInq	8x 09 04 22 FF	x0 5y 0p 0q 0r 0s FF	pqrs: camera ID=0x0000 to 0xffff

3.3.40 CAM_IDDisplayInq - camera ID Display Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_IDDisplayInq	8x 09 07 39 FF	x0 5y 00 FF	OFF
		x0 5y 01 FF	ON (Left Up)
		x0 5y 02 FF	ON (Right Up)
		x0 5y 04 FF	ON (Right Down)

3.3.41 CAM_PrivacyInq – Making Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_Privacy DisplaInq	8x 09 04 77 FF	y0 50 00 00 00 pq FF	Return ON/OFF status of current Privacy Mask pq: Specify mask / bit0 to bit7->MASK_A to MASK_H = (1: ON, 0: OFF)
CAM_Privacy PanTiltInq	8x 09 04 79 FF	y0 50 0p 0q 0r 0s 0t 0u FF	Return the current angle of PanTilt inside the camera

3.3.42 CAM_SlowShutter Inq - Slow shutter Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
AutoSlowInq	8x 09 04 5A FF	y0 50 00 00 00 0p FF	p: Auto Slow Shutter MAX Limit

AutoSlow: p

In case of 60p/60i/30p		In case of 50p/50i/25p/24p	
p	Shutter speed	p	Shutter speed
3	OFF	3	OFF
4	1/30	4	1/25
6	1/4	6	1/3
2	1/8	2	1/6
5	1/15	5	1/12
7	1/2	7	1/1.5

3.3.43 CAM_ZoomFocusMode Inq - Focus /zoomSetting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
Direct by Counter	8x 09 04 89 FF	x0 5y 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position (The same pqrs return value of CAM_ZOOM Direct 8x 01 04 47 0p 0q 0r 0s FF) tuvw: Focus Position (The same pqrs return value of CAM_FOCUS Direct 8x 01 04 48 0p 0q 0r 0s FF)

3.3.44 CAM_FlipMirror Inq – Flip & Mirror ReverseSetting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FlipMirrorInq	8x 09 07 90 FF	x0 5y 0p 0q FF	p: Flip Reverse ON/OFF=(2: ON, 3: OFF) q: Mirror Reverse ON/OFF= (2: ON, 3: OFF)

3.3.45 CAM_GammaLevelInq - Gamma levelSetting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_GammaLevel Inq	8x 09 07 91 FF	x0 5y 0p FF	p: Gamma level = 0 (0.30) to 4 (1.00)

Gamma Level: p

p	Gamma level
0	0.30
1	0.45
2	0.60
3	0.80
4	1.00

3.3.46 CAM_TVSetupInq – TV Setup ON/OFF Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_TVSetupInq	8x 09 07 9E FF	x0 5y 0p FF	p: TV Setup status = (0: OFF, 1: ON)

3.3.47 CAM_HDFormatInq - HD FORMAT Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_HDFormatInq	8x 09 07 9F FF	x0 5y 0p 0q FF	p: HD FORMAT setting q: NTSC Enable/Disable=(0: Enable, 1: Disable)

HDFormatInq: p **: Output from LVDS is not available

p	Format	p	Format	p	Format
0x0**	1080/60p	0x4	1080 / 50i	0x8	720/50p
0x1	1080/60i	0x5	1080/25p	0x9	720/25p
0x2	1080/30p	0x6	720/60p	0xa	1080/24p
0x3**	1080/50p	0x7	720/30p		

*) At NTSC ENABLE setting, 60p/60i and 30p/24p frame rate will be following. However, at 50p/50i/25p, they don't change.

60 -> 59.94 **30 -> 29.97** **24 -> 23.97**

3.3.48 CAM_RemoteControl Inq - Remote Control Status Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_RemoteControlInq	8x 09 07 A0 FF	x0 5y 00 0p 0q 0r 0s FF	p: Menu Status=0(Menu OFF) / Except 0(Menu ON) • First Layer Menu(Main Menu) …1 • Second Layer Menu …2 • Third Layer Menu…3 due to Menu layer structure pqrs: Key-pad Status (16bit) bit0～bit15 at each operation condition 1: Enter Status

3.3.49 CAM_WDR_ON/OFF_Inq - WDR ON/OFF Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_WDROnOffInq	8x 09 07 93 FF	x0 5y 02 FF	WDR ON
		x0 5y 03 FF	WDR OFF

3.3.50 CAM_AFAreaInq - AFarea Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AFAreaInq	8x 09 07 94 FF	x0 5y 0p FF	p: area setting 枠=0x0 to 0xb Refer to AE Detection area setting diagram *CAM_AEAreaSet*

3.3.51 CAM_AWBShiftInq - AWBshift Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AWBShiftInq	8x 09 07 98 0p FF	x0 5y 0p FF	p: shift setting =0 to 6

AWBShiftinq: p

p	shift setting	p	shift setting
0	Normal(standard)	4	B-High
1	R-Low	5	B-Middle
2	R-Middle	6	B-Low
3	R-High		

3.3.52 CAM_FocusManualTypeInq - Focus Manual Type Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_FocusManualTypeInq	8x 09 07 99 0p FF	x0 5y 0p FF	Setting an AF after zoom operation or not. p: AF type set =(0: No, 1: Yes)

3.3.53 CAM_AE responseInq - AE response Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_AE responseInq	8x 09 07 9B 00 FF	x0 5y 0p FF	p: AE response speed setting =(0: Fast, 1: Normal, 2: Low)

3.3.54 CAM_ExtSyncLockInq - Ext. Sync. Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ExtSyncLock Inq	8x 09 07 30 FF	x0 5y 0p FF	p: ON/OFF setting = (0: OFF, 1: ON)

3.3.55 CAM_ExtSyncLockLineInq - Ext. Sync. Vertical Position Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ExtSyncLock LineInq	8x 09 07 3A FF	x0 5y 0p 0q 0r FF	pqr: Vertical setting position = 0x0 to 0xf The range value of Vertical sync. position: All modes (1080i60 / 1080i50 / 720p60 / 720p50): Select a point from value of 0x0 to 0xf

3.3.56 CAM_ExtSyncLockHorizontalInq - Ext. Sync. Horizontal Position Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_ExtSyncLock HorizontalInq	8x 09 07 3B FF	x0 5y 0p 0q 0r FF	pqr: Horizontal setting position =0x000 to 0xa4f The range value of Horizontal Sync. position: 1080i60: 0x000～0x897 1080i50: 0x000～0xa4f 720p60: 0x000～0x671 720p50: 0x000～0x7bb

3.3.57 CAM_OthersSettingCommandInq – Other Setting Inquiry

Inquiry	Command packet	Inquiry packet	Comments
CAM_OthersSettingComInq	8x 09 07 95 FF	x0 5y 0p FF	p: setting Parameter(bit set) bit0: (0) YC Swap OFF (1) YC Swap ON bit1: (0) LED OFF (1) LED ON

PELCO-D Control Protocol

4. PELCO-D Communication Format

- Communication speed: 9600bps
- Data Length: 8bit
- Start bit: 1bit
- Stop bit: 1bit
- Parity: None
- No Flow Control such as XON / XOFF RTS / CTS

5. Command structure

Forwarding command – Command to camera

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Sync Byte	Address	Command1	Command2	Data1	Data2	Checksum
FFH (Always FFH)	00H-FFh					Add Byte2-Byte6

There are 2 types of command to the camera

1) Basic command

2) Expanded command

The difference between the two commands is distinguished in Bit 0(zero) of Byte4 (Command2)

0- Basic command

1- Expanded command

Thus, expanded command is an odd in command2 value.

*) Currently, the command is processed with ignoring the address

6. Basic Command (Byte4: Comand2 の bit0 is 0(Even))

Byte3 Command 1	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	Sense	0	0	Auto / Manual scan	Camera ON/OFF	Iris Close	Iris Open	Focus Near
Byte4 Command 2	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	Focus Far	Zoom Wide	Zoom Tele					0 Basic command

*1) Bit4 and Bit3 of command1 will work when Bit7 of command1 is 1

*2) Byte5:Data1 and Byte6:Data2 is not available with only camera itself because they are PTZ information

*3) Once IRIS is fully open in manual operation (UP/DOWN), it switches over to Gain-up (Continuous operation)

7. Expand Command (Byte4: Command2 of bit0 is 1(Odd))

The un-defined number is 16 hex (in decimal number, “d” character is followed after the number)

Function	Command 1 (Byte3)	Command 2 (Byte4)	Data1 (Byte5)	Data2 (Byte6)
Remote Reset	00	0F	00	00(ZOOM / FOCUS reset of the camera)
Write Char. To screen	00	15	display Pos. X	ASCII Value
			720p mode: 00-25	Displayed line is upper on the screen
			1080p mode: 00-3B	
Clear screen	00	17	00	00
Set Zoom Speed	00	25	00	00-02
Set focus speed	00	27	00	00-02
RES. Camera to default	00	29	00	00
Auto Focus Auto /ON/OFF	00	2B	00	00: Auto / 01: ON / 02 OFF ON: One push AF / OFF: Manual One-Push is available in both AUTO and OFF
Auto Iris Auto/ ON/OFF	00	2D	00	MODE setting command 00: Auto, 01: Auto, 02: Manual, 03: Shut-P, 04: Iris-P
AWB ON/OFF	00	33	00	00: (One shot WB at Manual. No action at Auto) , 01: Auto, 02: Manual
Set shutter speed	00	37	Any	255d: 2s 0d: 1s 2d: 1/2s 3d: 1/4s 4d: 1/8s 5d: 1/30s 6d: 1/60s 7d: 1/90s 8d: 1/100s 9d: 1/125s 10d: 1/180s 11d: 1/25s 13d: 1/500s 14d: 1/725s 15d: 1/1000s 16d: 1/1500s 17d: 1/2000s 18d: 1/3000s 19d: 1/4000s 20d: 1/6000s 21d: 1/10000s Available when AE mode is SHUT-P or MANUAL. In case of AUTO and IRIS-P, it is changed to SHUT-P.
Adj. Gain	01	3f	Any	Max gain set 0: 0dB 1: 3dB 2: 6dB 3: 12dB 4: 21dB 5: 32dB
Adj. Auto Iris Level	00	41	Any	0d: -7.0dB 1d: -6.0dB 2d: -5.0dB 3d: -4.0dB 4d: -3.0dB 5d: -2.0dB 6d: -1.0dB 7d: 0dB 8d: +0.5dB 9d: +1.0dB 10d: +1.5dB 11d: +2.0dB 12d: +2.5dB 13d: +3.0dB 14d: +3.5dB