

**CAMERA UNIT (KX-DP7XX)**  
**SERIAL INTERFACE SPECIFICATION**

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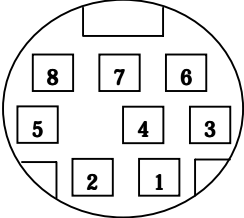
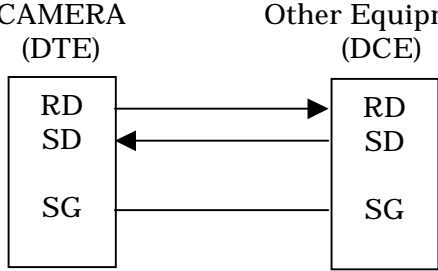
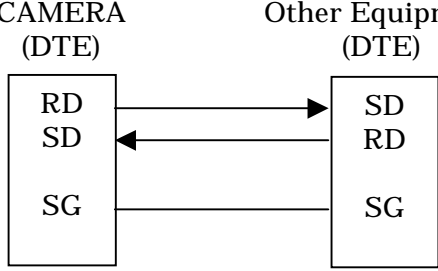
**Ver.1.03s**

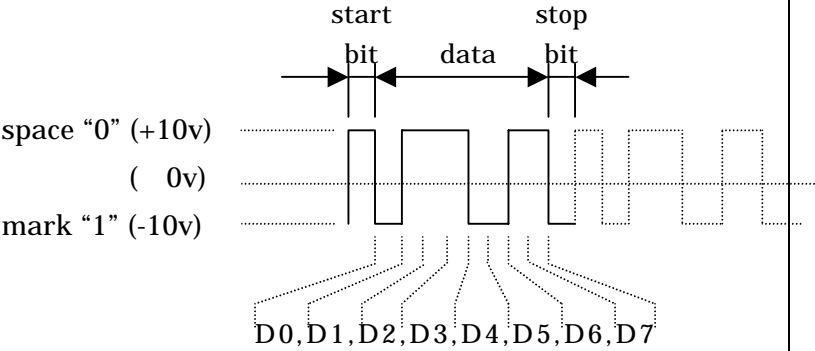
**Kyushu Matsushita Electric Co., Ltd.**  
**Telecom Division**

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Confirm that you have received the latest product standards or specifications  
before final design ,purchase or use.**

**August 28,2000**

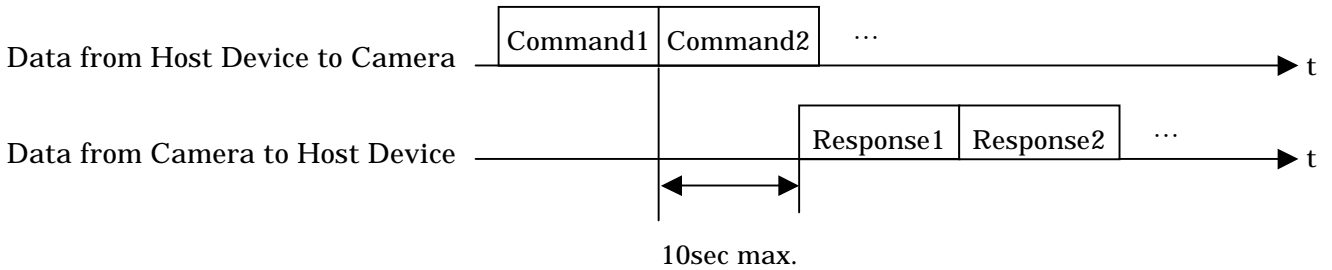
# 1. Serial Interface Specification

No	ITEM	CONTENTS	NOTES																																				
1	Communication Type	RS-232C (asynchronous) full duplex																																					
2	Terminal	Camera = DTE (Data Terminal Equipment)																																					
3	Connection Signal																																						
3-1	Connector Type	Circle type miniature Connector (8pin) 																																					
3-2	Pin Circle	<table border="1"> <thead> <tr> <th>Pin No.</th> <th>Signal</th> <th>JIS sign</th> <th>Signal direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Reserved</td> <td></td> <td>Output</td> </tr> <tr> <td>2</td> <td>Camera Mode</td> <td></td> <td>Input</td> </tr> <tr> <td>3</td> <td>Send Data(TXD)</td> <td>SD</td> <td>Output</td> </tr> <tr> <td>4</td> <td>Signal GND for RS-232C</td> <td>SG</td> <td>-</td> </tr> <tr> <td>5</td> <td>Receive Data (RXD)</td> <td>RD</td> <td>Input</td> </tr> <tr> <td>6</td> <td>Signal GND for RS-232C</td> <td>SG</td> <td>-</td> </tr> <tr> <td>7</td> <td>Power GND</td> <td></td> <td>-</td> </tr> <tr> <td>8</td> <td>Power Input (+12V)</td> <td></td> <td>Input</td> </tr> </tbody> </table>	Pin No.	Signal	JIS sign	Signal direction	1	Reserved		Output	2	Camera Mode		Input	3	Send Data(TXD)	SD	Output	4	Signal GND for RS-232C	SG	-	5	Receive Data (RXD)	RD	Input	6	Signal GND for RS-232C	SG	-	7	Power GND		-	8	Power Input (+12V)		Input	
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1	Reserved		Output																																				
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4	Signal GND for RS-232C	SG	-																																				
5	Receive Data (RXD)	RD	Input																																				
6	Signal GND for RS-232C	SG	-																																				
7	Power GND		-																																				
8	Power Input (+12V)		Input																																				
3-3	Connection Example	<p>1. Connect to DCE</p>  <p>2. Connect to DTE</p> 																																					

No	ITEM	CONTENTS	NOTES
4	Flow Control	Camera is not apply to flow control	
5	Communication Speed	9600 bps, 19200bps, 38400bps	After Initialization, 9600bps is selected
6	Data Construction	<p data-bbox="475 510 687 636">           -Data = 8 bit            -Parity = None            -Stop bit = 1 bit         </p> 	

## 2. Command Outline

### (1) Response Condition



### (2) Response Contents

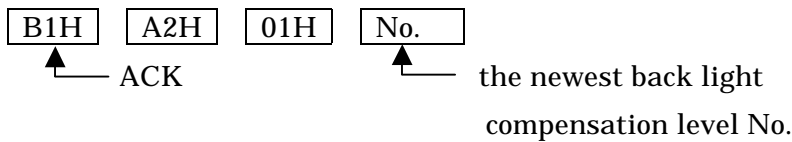
There are 4 types of response data format as following.

Type A) acknowledge format

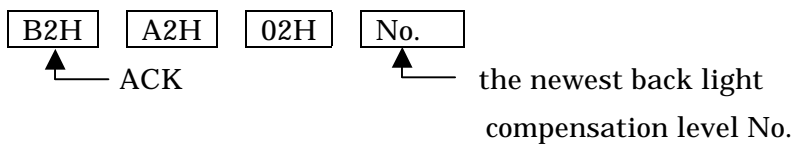
(1) Formal : B1H as ACK

(2) Error : B4H as NAK

Type B) acknowledge format with back light compensation level No.

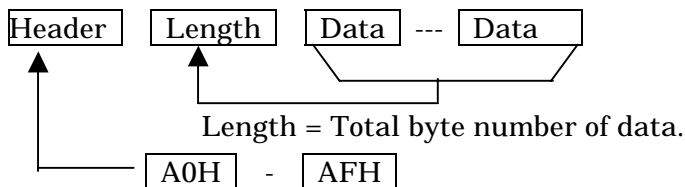


Type C) acknowledge format with back light compensation level No. in daisy chain mode.



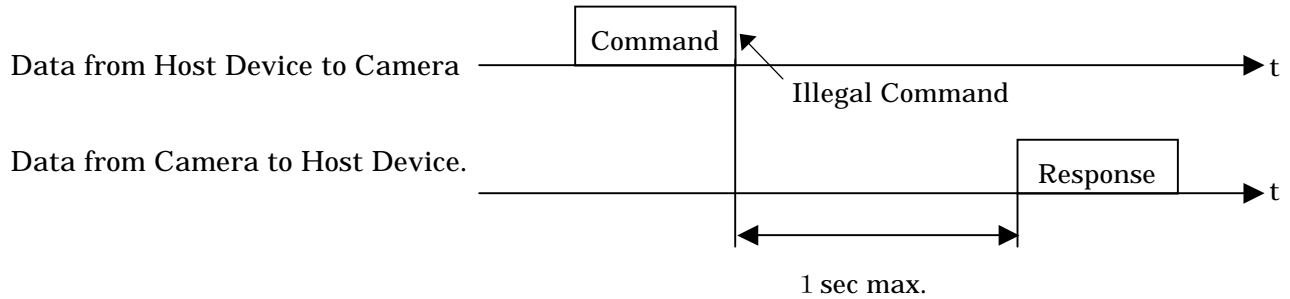
Type D) header, length, data

response for read command (90H - 9FH)

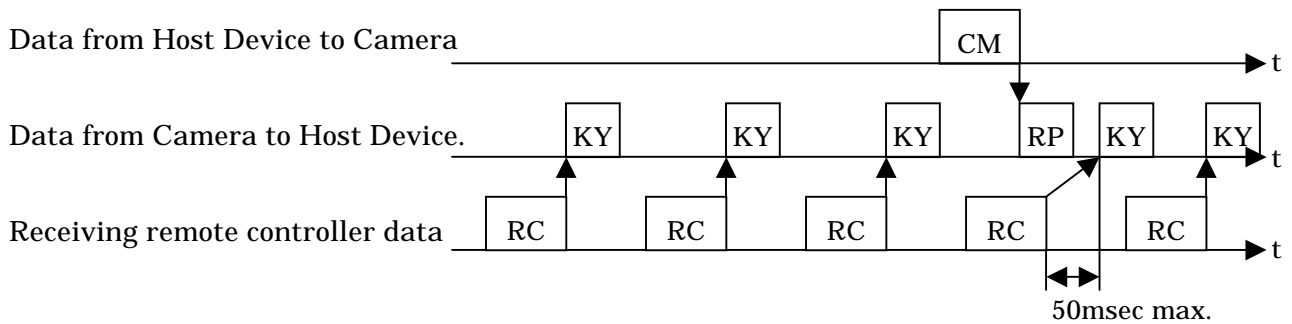


Notes)

1. If Command from Host Device to Camera are illegal, Camera send NAK to Host Device.(Time Out)



2. It is possible that output of Key Code data is delayed for 50msec max. because of output in response to the command "Read status of motion" (90H).

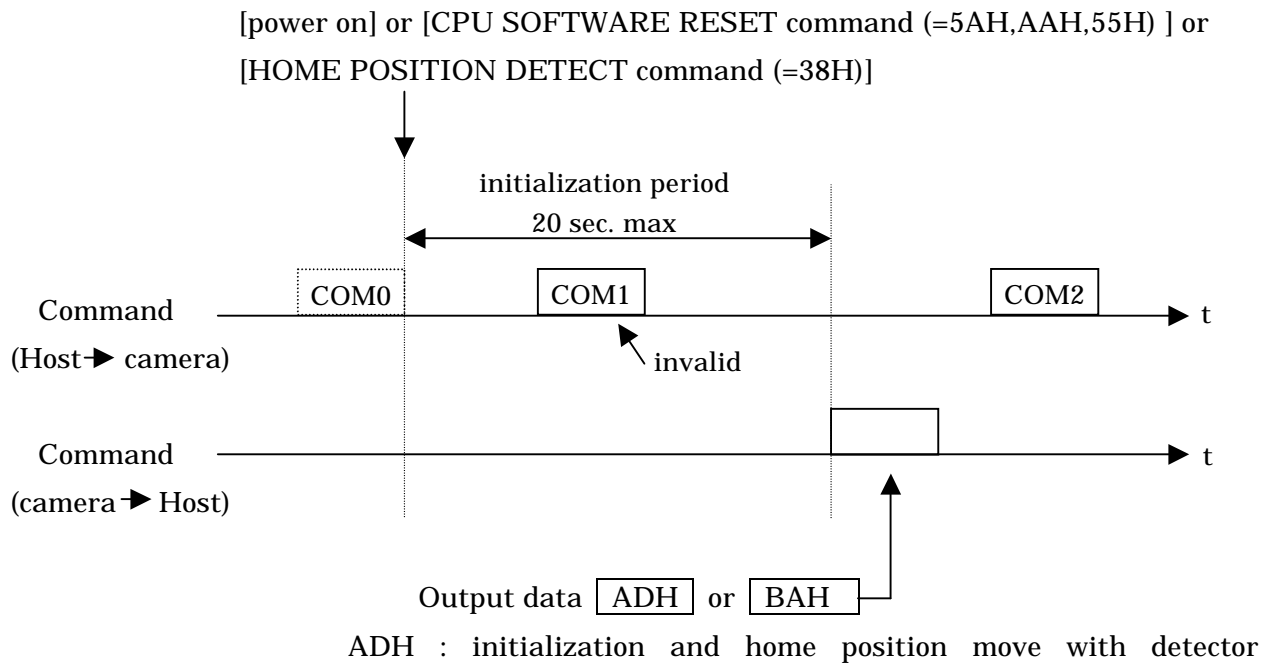


CM : Command "Read status of motion" (90H)    RC : data from I.R. remote controller  
 RP : response data to above command        KY : key code data from I.R. remote controller

### (3) Command Priority Condition

(i) During initialization and home position move with detector

- Normality



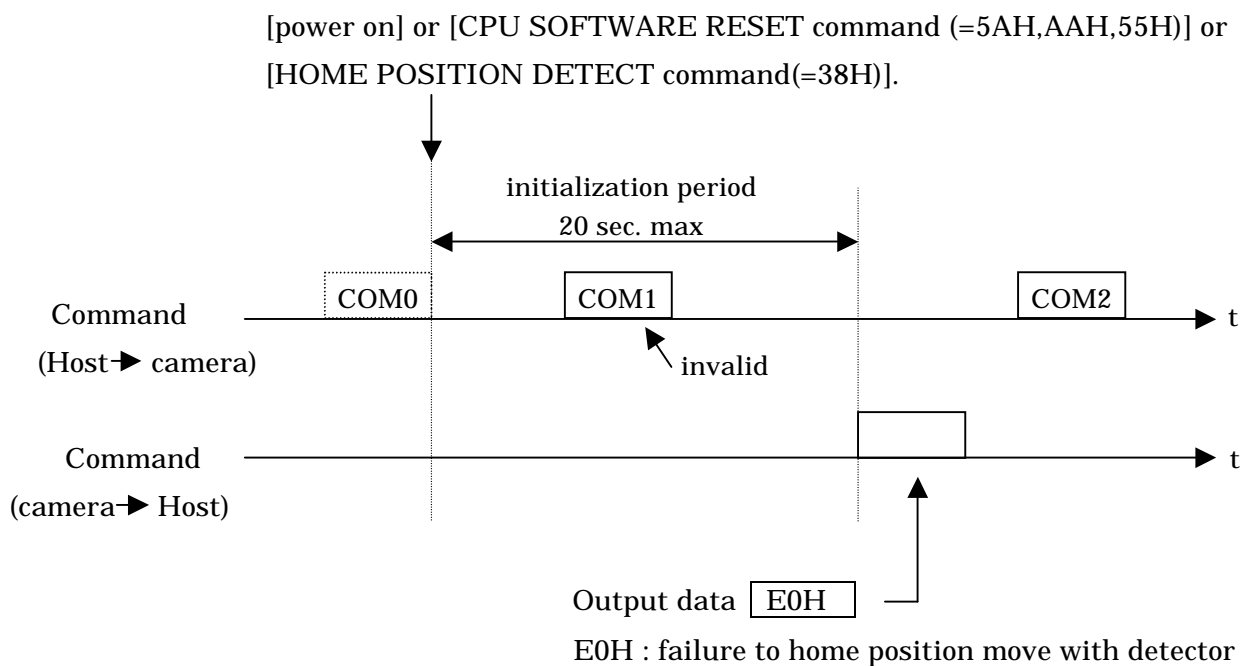
completed

by Power ON or CPU SOFTWARE RESET command

BAH : home position move with detector completed

by command 38H.

- Home position Error happened



### 3.Camera Control Command Summery Sheet

Notes) \*1 : Reserved.

UPPER(Hex.) LOWER(Hex.)	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	*1	PRESET STORE	PAN(left)	RESET MOVEP	PAN(left) START	PAN(right) START	BACK LIGHT SETTING	*1	ZOOM SPEED SETTING	READ STATUS OF MOTION	*1	*1	*1	*1	*1	*1
1	*1	SET PRESET POSITION	PAN(right)	*1	Direct Pan Speed Setting	Read Direct Pan Speed	*1	*1	*1	READ CAMERA STATUS	*1	*1	*1	*1	*1	*1
2	*1	READ PRESET POSITION	TILT(up)	*1	Direct Tilt Speed Setting	Read Direct Tilt Speed	*1	*1	*1	READ CUSTOM CODE#0	*1	*1	*1	*1	*1	*1
3	*1	*1	TILT(down)	*1	Direct Zoom Speed Setting	Read Direct Zoom Speed	*1	*1	*1	READ CUSTOM CODE#1	*1	*1	*1	*1	*1	*1
4	VIDEO ON	*1	ZOOM WIDE	*1	Direct Focus Speed Setting	Read Direct Focus Speed	*1	*1	*1	READ ABSOLUTE COORD	*1	*1	*1	*1	*1	*1
5	VIDEO OFF	*1	ZOOM TELE	*1	TILT(up) START	TILT(down) START	*1	*1	REMOTE CONTROL ON/OFF	READ PREVIOUS COMMAND	*1	*1	*1	*1	*1	*1
6	*1	*1	FOCUS FAR	*1	*1	*1	*1	*1	PAN DIR. REVERSE	READ BACK LIGHT	*1	*1	*1	*1	*1	*1
7	AUTO FOCUS	*1	FOCUS NEAR	*1	*1	*1	WHITE BALANCE HOLD	*1	PAN DIR. NORMAL	READ WHITE BALANCE	*1	*1	*1	*1	*1	*1
8	MANUAL FOCUS	*1	*1	HOME POSITION DETECT	*1	*1	*1	*1	CAMERA MODE CHANGE	*1	*1	*1	*1	*1	*1	*1
9	*1	*1	*1	HOME POSITION MOVE	*1	*1	*1	*1	*1	READ PAN/TILT SPEED	*1	*1	*1	*1	*1	*1
A	SHUTTER SPEED	DOC. POSITION STORE	*1	DOC. POSITION MOVE	PAN/TILT STOP	CPU SOFTWARE RESET	Power Save On	*1	CUSTOM CODE #0	READ ZOOM SPEED	*1	*1	*1	*1	*1	*1
B	*1	SET DOC POSITION	*1	*1	ZOOM WIDE START	FOCUS FAR START	Power Save Off	*1	CUSTOM CODE #1	*1	*1	*1	*1	*1	*1	*1
C	MANUAL WHITE BALANCE	READ DOC POSITION	*1	*1	ZOOM TELE START	FOCUS NEAR START	Led Control	*1	PAN SPEED SETTING	READ MODEL NAME	*1	*1	*1	*1	DAISY CHAIN	
D	AUTO WHITE BALANCE	*1	*1	*1	ZOOM STOP	FOCUS STOP	Motion Detect On/Off	*1	TILT SPEED SETTING	*1	*1	*1	*1	*1	CAMAERA SELECT	
E	*1	*1	*1	ABSOLUTE COORD. MOVE(	*1	SERIAL SPEED	*1	*1	*1	READ MOTION DETECT	*1	*1	*1	*1	DAISY CHAIN	
F	INITIAL. PARAM.	*1	*1	RELATIVE COORD. MOVE(	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	CAMAERA SELECT	

## Camera Control Command

Command	Application Contents		Command Format (Received Command)	Response Data Format
04H	Video On	Video on (Fade in condition)	04H	B1H --- ACK B4H --- NAK
05H	Video Off	Video off (Fade out condition)	05H	B1H --- ACK B4H --- NAK
07H	Auto Focus		07H	B1H --- ACK B4H --- NAK
08H	Manual Focus		08H	B1H --- ACK B4H --- NAK
0AH	Shutter Speed	Switch Shutter Speed  Setting by this command is held after turning off power. Factory setting : data=00H	0AH data ├── 00H NTSC:1/60 sec │   PAL :1/50 sec └── 01H NTSC:1/100 sec PAL :1/60 sec	B1H --- ACK B4H --- NAK
0CH	Manual White Balance		0CH No. └── 80H - 9CH (29points)	B1H --- ACK B4H --- NAK
0DH	Auto White Balance		0DH	B1H --- ACK B4H --- NAK

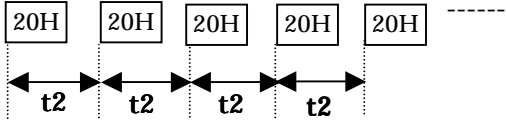
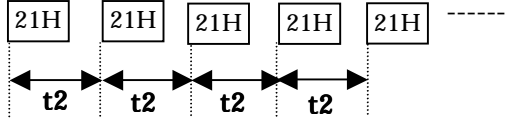
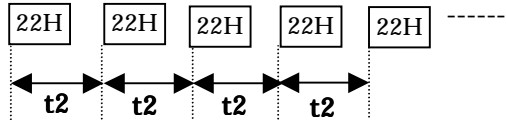
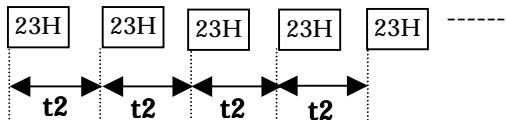


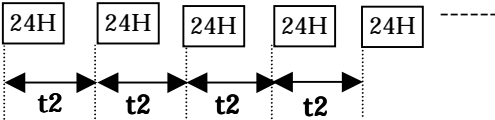
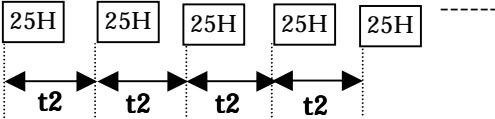
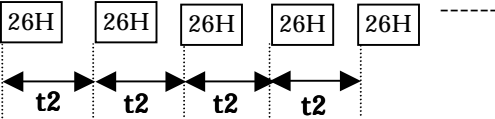
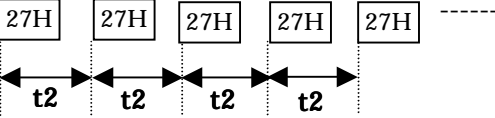
Command	Application Contents		Command Format (Received Command)	Response Data Format																
0FH	Parameters Initialization	Initialization of following Parameters  <table border="1" data-bbox="506 453 880 995"> <thead> <tr> <th>Parameter</th> <th>status</th> </tr> </thead> <tbody> <tr> <td>Pan direction</td> <td>Normal</td> </tr> <tr> <td>Focus</td> <td>Auto</td> </tr> <tr> <td>White Balance</td> <td>Auto</td> </tr> <tr> <td>Back Light Compensation Level</td> <td>Standard</td> </tr> <tr> <td>Video</td> <td>ON</td> </tr> <tr> <td>Pan Speed</td> <td>Auto</td> </tr> <tr> <td>Tilt Speed</td> <td>Auto</td> </tr> </tbody> </table>	Parameter	status	Pan direction	Normal	Focus	Auto	White Balance	Auto	Back Light Compensation Level	Standard	Video	ON	Pan Speed	Auto	Tilt Speed	Auto	0FH	B1H --- ACK  B4H --- NAK
Parameter	status																			
Pan direction	Normal																			
Focus	Auto																			
White Balance	Auto																			
Back Light Compensation Level	Standard																			
Video	ON																			
Pan Speed	Auto																			
Tilt Speed	Auto																			

Command	Application Contents		Command Format (Received Command)	Response Data Format
10H	Preset Store	<p>Store the current camera position as the Preset Position data.</p> <p>data to be stored :</p> <ul style="list-style-type: none"> <li>-pan coordination</li> <li>-tilt coordination</li> <li>-zoom coordination</li> <li>-focus coordination</li> <li>-white valance coordination</li> <li>-back light compensation condition</li> </ul>	<p><span style="border: 1px solid black; padding: 2px;">10H</span> <span style="border: 1px solid black; padding: 2px;">No.</span></p> <p>No. : 00 – 09H(10 Points)</p>	<p><span style="border: 1px solid black; padding: 2px;">B1H</span> --- ACK</p> <p><span style="border: 1px solid black; padding: 2px;">B4H</span> --- NAK</p>
11H	Setup Preset Position	<p>Setup the Preset Position data.</p> <p>data to be stored :</p> <ul style="list-style-type: none"> <li>-pan coordination</li> <li>-tilt coordination</li> <li>-zoom coordination</li> <li>-focus coordination</li> <li>-white valance coordination</li> <li>-back light compensation condition</li> </ul>	<p><span style="border: 1px solid black; padding: 2px;">11H</span> <span style="border: 1px solid black; padding: 2px;">No</span> <span style="border: 1px solid black; padding: 2px;">PP</span> <span style="border: 1px solid black; padding: 2px;">PP</span> <span style="border: 1px solid black; padding: 2px;">TT</span> <span style="border: 1px solid black; padding: 2px;">TT</span> <span style="border: 1px solid black; padding: 2px;">ZZ</span> <span style="border: 1px solid black; padding: 2px;">ZZ</span> <span style="border: 1px solid black; padding: 2px;">FM</span></p> <p><span style="border: 1px solid black; padding: 2px;">FF</span> <span style="border: 1px solid black; padding: 2px;">FF</span> <span style="border: 1px solid black; padding: 2px;">BK</span> <span style="border: 1px solid black; padding: 2px;">WBM</span> <span style="border: 1px solid black; padding: 2px;">RG</span> <span style="border: 1px solid black; padding: 2px;">RG</span> <span style="border: 1px solid black; padding: 2px;">BG</span> <span style="border: 1px solid black; padding: 2px;">BG</span></p> <p><span style="border: 1px solid black; padding: 2px;">No</span> 00-09H(10 Point)</p> <p><span style="border: 1px solid black; padding: 2px;">PP</span> <span style="border: 1px solid black; padding: 2px;">PP</span> Pan Position</p> <p><span style="border: 1px solid black; padding: 2px;">TT</span> <span style="border: 1px solid black; padding: 2px;">TT</span> Tilt Position</p> <p><span style="border: 1px solid black; padding: 2px;">ZZ</span> <span style="border: 1px solid black; padding: 2px;">ZZ</span> Zoom Position</p> <p><span style="border: 1px solid black; padding: 2px;">FM</span> Focus Mode 0:Manual / 1:Auto</p> <p><span style="border: 1px solid black; padding: 2px;">FF</span> <span style="border: 1px solid black; padding: 2px;">FF</span> Focus Position</p> <p><span style="border: 1px solid black; padding: 2px;">BK</span> Backlight Data</p> <p><span style="border: 1px solid black; padding: 2px;">WBM</span> White Balance Mode</p> <p>00h:Auto</p> <p>01h/ffh:Manual setting of direct gain</p> <p><span style="border: 1px solid black; padding: 2px;">00h</span> <span style="border: 1px solid black; padding: 2px;">80h</span> &lt;= <span style="border: 1px solid black; padding: 2px;">RG</span> <span style="border: 1px solid black; padding: 2px;">RG</span> &lt;= <span style="border: 1px solid black; padding: 2px;">07h</span> <span style="border: 1px solid black; padding: 2px;">ffh</span></p> <p><span style="border: 1px solid black; padding: 2px;">00h</span> <span style="border: 1px solid black; padding: 2px;">80h</span> &lt;= <span style="border: 1px solid black; padding: 2px;">BG</span> <span style="border: 1px solid black; padding: 2px;">BG</span> &lt;= <span style="border: 1px solid black; padding: 2px;">07h</span> <span style="border: 1px solid black; padding: 2px;">ffh</span></p> <p>02h:Manual setting by table (Refer to "0C" Command)</p> <p><span style="border: 1px solid black; padding: 2px;">00h</span> <span style="border: 1px solid black; padding: 2px;">80h</span> &lt;= <span style="border: 1px solid black; padding: 2px;">RG</span> <span style="border: 1px solid black; padding: 2px;">RG</span> &lt;= <span style="border: 1px solid black; padding: 2px;">00h</span> <span style="border: 1px solid black; padding: 2px;">9Ch</span></p> <p><span style="border: 1px solid black; padding: 2px;">RG</span> <span style="border: 1px solid black; padding: 2px;">RG</span> Red Gain for White Balance</p> <p><span style="border: 1px solid black; padding: 2px;">BG</span> <span style="border: 1px solid black; padding: 2px;">BG</span> Blue Gain for White Balance</p>	<p><span style="border: 1px solid black; padding: 2px;">B1H</span> --- ACK</p> <p><span style="border: 1px solid black; padding: 2px;">B4H</span> --- NAK</p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
12H	Read Preset Position Information	Read the Preset Position Data.	<b>12H</b> <b>No.</b> No. : 00 – 09H(10 Points)	<b>C5H</b> <b>0FH</b> <b>PP</b> <b>PP</b> <b>TT</b> <b>TT</b> <b>ZZ</b> <b>ZZ</b> <b>FM</b> <b>FF</b> <b>FF</b> <b>BK</b> <b>WBM</b> <b>RG</b> <b>RG</b> <b>BG</b> <b>BG</b>  <b>PP</b> <b>PP</b> Pan Position <b>TT</b> <b>TT</b> Tilt Position <b>ZZ</b> <b>ZZ</b> Zoom Position <b>FM</b> Focus Mode 0:Manual / 1:Auto <b>FF</b> <b>FF</b> Focus Position <b>BK</b> Backlight Data <b>WBM</b> White Balance Mode 00h:Auto 01h/ffh:Manual setting of direct gain <b>00h</b> <b>80h</b> <= <b>RC</b> <b>RC</b> <= <b>07h</b> <b>ffh</b> <b>00h</b> <b>80h</b> <= <b>BC</b> <b>BC</b> <= <b>07h</b> <b>ffh</b> 02h:Manual setting by table (Refer to “0C” Command) <b>00h</b> <b>80h</b> <= <b>RC</b> <b>RC</b> <= <b>00h</b> <b>9Ch</b> <b>RG</b> <b>RG</b> Red Gain for White Balance <b>BC</b> <b>BC</b> Blue Gain for White Balance
1AH	Document Position Store	Store the current Document Position as Document Position data  data to be stored : -pan coordination -tilt coordination -zoom coordination -focus coordination -white valance coordination -back light compensation condition	<b>1AH</b>	<b>B1H</b> --- ACK  <b>B4H</b> --- NAK

Command	Application Contents		Command Format (Received Command)	Response Data Format
1BH	Setup Document Position	Setup the Document Position data.  data to be stored : -pan coordination -tilt coordination -zoom coordination -focus coordination -white valance coordination -back light compensation condition	$\boxed{1BH} \boxed{PP} \boxed{PP} \boxed{TT} \boxed{TT} \boxed{ZZ} \boxed{ZZ} \boxed{FM}$ $\boxed{FF} \boxed{FF} \boxed{BK} \boxed{WBM} \boxed{RG} \boxed{RG} \boxed{BG} \boxed{BG}$  Refer to "11" Command.	$\boxed{B1H}$ --- ACK  $\boxed{B4H}$ --- NAK
1CH	Read Document Position Information	Read the Document Position Data.	$\boxed{1CH}$	$\boxed{C6H} \boxed{0FH} \boxed{PP} \boxed{PP} \boxed{TT} \boxed{TT} \boxed{ZZ} \boxed{ZZ} \boxed{FM}$ $\boxed{FF} \boxed{FF} \boxed{BK} \boxed{WBM} \boxed{RG} \boxed{RG} \boxed{BG} \boxed{BG}$  Refer to "12" Command

Command	Application Contents		Command Format (Received Command)	Response Data Format
20H	Pan (left)	<p>Move to Pan Direction</p> <p>-Direction is selectable by "Pan Direction" command.</p> <p>-Speed is selectable by "Pan Speed" command.</p>	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> <p><math>0 \leq t2 \leq 100\text{msec}</math></p>	<p>[B1H] --- ACK</p> <p>[B4H] --- NAK</p> <p>(NOTES) Even if the camera can not pan because panning limit exceeded, camera replies ACK(B1H)for this command.</p>
21H	Pan (right)	<p>Move to Pan Direction</p> <p>-Direction is selectable by "Pan Direction" command.</p> <p>-Speed is selectable by "Pan Speed" command.</p>	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> <p><math>0 \leq t2 \leq 100\text{msec}</math></p>	<p>[B1H] --- ACK</p> <p>[B4H] --- NAK</p> <p>(NOTES) Even if the camera can not pan because panning limit exceeded, camera replies ACK(B1H)for this command.</p>
22H	Tilt (up)	<p>Move to Tilt Direction(up)</p> <p>-Speed is selectable by "Tilt Speed" command.</p>	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> <p><math>0 \leq t2 \leq 100\text{msec}</math></p>	<p>[B1H] --- ACK</p> <p>[B4H] --- NAK</p> <p>(NOTES) Even if the camera can not tilt because tilting limit exceeded, camera replies ACK(B1H)for this command.</p>
23H	Tilt (down)	<p>Move to Tilt Direction(down)</p> <p>-Speed is selectable by "Tilt Speed" command.</p>	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> <p><math>0 \leq t2 \leq 100\text{msec}</math></p>	<p>[B1H] --- ACK</p> <p>[B4H] --- NAK</p> <p>(NOTES) Even if the camera can not tilt because tilting limit exceeded, camera replies ACK(B1H)for this command.</p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
24H	Zoom Wide	Move zooming lens to "Wide"  -Speed is selectable by "Zoom Speed" command.	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> $0 \leq t2 \leq 100\text{msec}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">B1H</div> --- ACK  <div style="border: 1px solid black; padding: 2px; display: inline-block;">B4H</div> --- NAK
25H	Zoom Tele	Move zooming lens to "Tele"  -Speed is selectable by "Zoom Speed" command.	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> $0 \leq t2 \leq 100\text{msec}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">B1H</div> --- ACK  <div style="border: 1px solid black; padding: 2px; display: inline-block;">B4H</div> --- NAK
26H	Focus Far	Move focusing lens to "Far" -Focus mode is switched to manual focus mode by execution of this command in auto focus mode.	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> $0 \leq t2 \leq 100\text{msec}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">B1H</div> --- ACK  <div style="border: 1px solid black; padding: 2px; display: inline-block;">B4H</div> --- NAK
27H	Focus Near	Move focusing lens to "Near" -Focus mode is switched to manual focus mode by execution of this command in auto focus mode.	 <p>If you would like to set the speed up continuously. You should keep t2 below timing.</p> $0 \leq t2 \leq 100\text{msec}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">B1H</div> --- ACK  <div style="border: 1px solid black; padding: 2px; display: inline-block;">B4H</div> --- NAK

Command	Application Contents		Command Format (Received Command)	Response Data Format
30H	Preset Move	<p>Move to Preset Position Position move Data: Pan, Tilt, Zoom, Focus, White Balance, Back Light</p> <p>Pan and Tilt motion is at same time .</p>	<p>30H    No.</p> <p>          └─── 00H - 09H</p> <p>(10 Points)</p>	<p>ACK : B1H   A2H   01H   No.</p> <p>No. : Back Light Compensation level. (00H – 7FH)</p> <p>NAK : B4H</p>

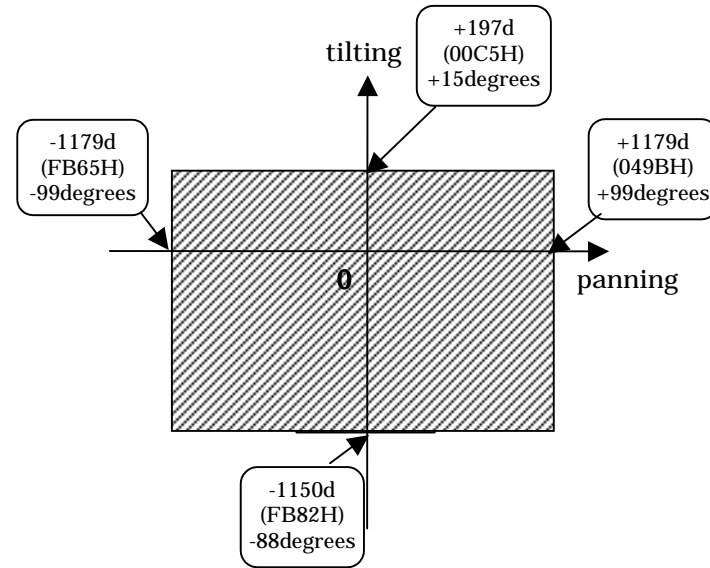
Command	Application Contents		Command Format (Received Command)	Response Data Format
38H	Home Position Detect	<p>Move to home position detecting home position sensor.</p> <p>Position move data:  - Pan (0 point)  - Tilt (0 point)  - Zoom(Wide-end),  - Focus(Auto)</p> <p>Refer to command "Home Position Move" (39H).  Pan and Tilt motion is concurrent.</p>	<div style="border: 1px solid black; display: inline-block; padding: 2px;">38H</div>	<div style="border: 1px solid black; display: inline-block; padding: 2px;">B1H</div> : ACK  <div style="border: 1px solid black; display: inline-block; padding: 2px;">B4H</div> : NAK



Command	Application Contents		Command Format (Received Command)	Response Data Format
39H	Home Position Move	<p>Move to home position</p> <p>Position move data :</p> <ul style="list-style-type: none"> <li>- Pan(0 Point),</li> <li>- Tilt(0 Point),</li> <li>- Zoom(Wide-end),</li> <li>- Back Light (standard)</li> </ul> <p>Camera does not calibrate home position in this motion . Refer to command (38H)</p> <p>“Home Position Detect”. Pan and Tilt motion is concurrent.</p>	<div style="border: 1px solid black; display: inline-block; padding: 2px;">39H</div>	<p>ACK :</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">B1H</div> <div style="border: 1px solid black; padding: 2px;">A2H</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">No.</div> </div> <p style="text-align: center;">No. : Back Light Compensation level. (00H – 7FH)</p> <p>NAK :</p> <div style="border: 1px solid black; display: inline-block; padding: 2px;">B4H</div>

Command	Application Contents		Command Format (Received Command)	Response Data Format
3AH	Document Position Move	Move to Document Position Position move Data: Pan, Tilt, Zoom, Focus, White Balance, Back Light  Pan and Tilt motion is concurrent.	3AH	ACK : B1H A2H 01H No. No. : Back Light Compensation level. (00H – 7FH)  NAK : B4H

Command	Application Contents		Command Format (Received Command)	Response Data Format
3EH	<p>Absolute Coordination Move</p>	<p>Move to the direction specified with this command</p> <p>Execute Tilt motion and Pan motion at the same time</p>	<p><math>\boxed{3EH} \boxed{P(U)} \boxed{P(L)} \boxed{T(U)} \boxed{T(L)} \boxed{Z(U)} \boxed{Z(L)}</math>    ← Pan →   ← Tilt →   ← Zoom →  </p> <p><math>\boxed{P(U)} \boxed{P(L)}</math> : Pan Coordination (2byte) : FB65H(Left) ↔ 049BH(Right)</p> <p><math>\boxed{T(U)} \boxed{T(L)}</math> : Tilt Coordination (2byte) : 00C5H(Up) ↔ FB82H(Down)</p> <p><math>\boxed{Z(U)} \boxed{Z(L)}</math> : Zoom Coordination (2byte) : 0000H(Wide) ↔ 0990H(Tele)</p>	<p><math>\boxed{B1H}</math> --- ACK</p> <p><math>\boxed{B1H}</math> --- NAK</p>



Command	Application Contents		Command Format (Received Command)	Response Data Format
3FH	Relative Coordination Move	Move to the direction specified with this command  Execute Tilt motion and Pan motion at the same time	<div style="text-align: center;"> </div> <p>           Pan Coordination (16bits)      Tilt Coordination (16bits)      Zoom Coordination (16bits)         </p> <p>           =P(Pan Coordination)            =T(Tilt Coordination)         </p> <p>(P,T= complement)</p> <p>           -Present Position : (P,T)=(0000H,0000H)            -when move Right Pan, Tilt Up              0000H,0001H,0002H,0003H,----            -when move Left Pan, Tilt Down              FFFFH,FFFEH,FFFDH,FFFCH,—         </p> <p> <u>-2358d(=F6CAH)&lt;=P&lt;=+2358d(=0936H)</u>            ↑ CW:198.025degrees      ↑ CCW:198.025degrees  <u>-1347d(=FABDH)&lt;=T&lt;=+1347d(=0543H)</u>            ↑ DOWN:103degrees      ↑ UP: 103degrees         </p> <p>           =Zoom Coordination            (Z= complement)         </p> <p>           -Present Zoom Position : Z=(0000H)            -when move to “Tele”              0000H,0001H,0002H,0003H, ----            -when move to “Wide”              FFFFH,FFFEH,FFFDH,FFFCH, —                      <u>F670H&lt;=Z&lt;=0990H</u>            End of Wide ↑      ↑ End of Tele         </p>	<div style="text-align: center;"> </div> <p>           ---ACK            ---NAK         </p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
40H	Pan (left) Start	Start panning  -Direction is selectable by "Pan Direction" command. -Speed is selectable by "Pan Speed" command.	<span style="border: 1px solid black; padding: 2px;">40H</span>	<span style="border: 1px solid black; padding: 2px;">B1H</span> ...ACK <span style="border: 1px solid black; padding: 2px;">B4H</span> ...NAK [NOTES] Even if the camera can not pan because panning limit exceeded, camera replies ACK(B1H) for this command.
41H	Direct Pan Speed Setting	Set Pan Speed directly	<span style="border: 1px solid black; padding: 2px;">41H</span> <span style="border: 1px solid black; padding: 2px;">Speed(U)</span> <span style="border: 1px solid black; padding: 2px;">Speed(L)</span> 000AH(pps) <= Speed <= 058FH(pps)	<span style="border: 1px solid black; padding: 2px;">B1H</span> ...ACK <span style="border: 1px solid black; padding: 2px;">B4H</span> ...NAK
42H	Direct Tilt Speed Setting	Set Tilt Speed directly	<span style="border: 1px solid black; padding: 2px;">42H</span> <span style="border: 1px solid black; padding: 2px;">Speed(U)</span> <span style="border: 1px solid black; padding: 2px;">Speed(L)</span> 000AH(pps) <= Speed <= 02F6H(pps)	<span style="border: 1px solid black; padding: 2px;">B1H</span> ...ACK <span style="border: 1px solid black; padding: 2px;">B4H</span> ...NAK
43H	Direct Zoom Speed Setting	Set Zoom Speed directly	<span style="border: 1px solid black; padding: 2px;">43H</span> <span style="border: 1px solid black; padding: 2px;">Speed(U)</span> <span style="border: 1px solid black; padding: 2px;">Speed(L)</span> 001FH(pps) <= Speed <= 00F0H(pps)	<span style="border: 1px solid black; padding: 2px;">B1H</span> ...ACK <span style="border: 1px solid black; padding: 2px;">B4H</span> ...NAK
44H	Direct Focus Speed Setting	Set Focus Speed directly	<span style="border: 1px solid black; padding: 2px;">44H</span> <span style="border: 1px solid black; padding: 2px;">Speed(U)</span> <span style="border: 1px solid black; padding: 2px;">Speed(L)</span> 000AH(pps) <= Speed <= 00F0H(pps)	<span style="border: 1px solid black; padding: 2px;">B1H</span> ...ACK <span style="border: 1px solid black; padding: 2px;">B4H</span> ...NAK

Command	Application Contents		Command Format (Received Command)	Response Data Format
45H	Tilt (up) Start	Start tilting  -Speed is selectable by "Tilt Speed" command.	45H	B1H...ACK B4H...NAK [NOTES] Even if the camera can not tilt because tilting limit exceeded, camera replies ACK(B1H) for this command.
4AH	Pan/Tilt Stop	Stop panning or tilting.	4AH	B1H...ACK B4H...NAK
4BH	Zoom Wide Start	start to move zooming lens to "WIDE" -Speed is selectable by "Zoom Speed" command.	4BH	B1H...ACK B4H...NAK
4CH	Zoom Tele Start	start to move zooming lens to "TELE" -Speed is selectable by "Zoom Speed" command.	4CH	B1H...ACK B4H...NAK
4DH	Zoom Stop	Stop zooming lens motion	4DH	B1H...ACK B4H...NAK

Command	Application Contents		Command Format (Received Command)	Response Data Format
50H	Pan (right) Start	Start panning  -Direction is selectable by "Pan Direction" command. -Speed is selectable by "Pan Speed" command.	50H	B1H...ACK B4H...NAK [NOTES] Even if the camera can not pan because panning limit exceeded, camera replies ACK(B1H) for this command.
51H	Read Direct Pan Speed	Read Pan Speed directly	51H	C1H 02H Speed(U) Speed(L) 000AH(pps) <= Speed <= 058FH(pps)
52H	Read Direct Tilt Speed	Read Tilt Speed directly	52H	C2H 02H Speed(U) Speed(L) 000AH(pps) <= Speed <= 02F6H(pps)
53H	Read Direct Zoom Speed	Read Zoom Speed directly	53H	C3H 02H Speed(U) Speed(L) 001FH(pps) <= Speed <= 00F0H(pps)
54H	Read Direct Focus Speed	Read Focus Speed directly	54H	C4H 02H Speed(U) Speed(L) 000AH(pps) <= Speed <= 00F0H(pps)
55H	Tilt (down) Start	Start tilting  -Speed is selectable by "Tilt Speed" command.	55H	B1H...ACK B4H...NAK [NOTES] Even if the camera can not tilt because tilting limit exceeded, camera replies ACK(B1H) for this command.

Command	Application Contents		Command Format (Received Command)	Response Data Format
5AH	CPU Software RESET	Execute the software Reset to CPU	5AH AAH 55H	-No reply same as Power ON ADH ---initialization and Home position move completed E0H ---Home position error happened
5BH	Focus Far Start	Start to Far Focus of Lens	5BH	B1H ---ACK B4H ---NAK
5CH	Focus Near Start	Start to Near Focus of Lens	5CH	B1H ---ACK B4H ---NAK
5DH	Focus Stop	Stop focusing of Lens	5DH	B1H ---ACK B4H ---NAK
5EH	Communication Speed Setting	Communication Speed (Serial Interface) setting	5EH No.   00H :9600bps   01H :19200bps   02H :38400bps	- indefinite if speed is not changed (setting current speed) B1H ---ACK B4H ---NAK



Command	Application Contents		Command Format (Received Command)	Response Data Format
60H	Back Light Setting	Back Light compensation condition setting	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">60H</div> <div style="margin-right: 10px;">No.</div> <div style="margin-right: 10px;">└─┬─┘</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">00H</div> <div style="margin: 0 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">7FH</div> </div> <p>(back light compensation level No.) (128 Steps)</p>	<div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 10px;">B1H</div> ---ACK <div style="border: 1px solid black; padding: 2px 5px;">B4H</div> ---NAK
67H	White Balance Hold	Holding the white balance condition	<div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">67H</div>	<div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 10px;">B1H</div> ---ACK <div style="border: 1px solid black; padding: 2px 5px;">B4H</div> ---NAK
6AH	Power Save On	Power Save Mode Start	<div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">6AH</div>	<div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 10px;">B1H</div> ---ACK <div style="border: 1px solid black; padding: 2px 5px;">B4H</div> ---NAK
6BH	Power Save Off	Power Save Mode Stop	<div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">6BH</div>	-No reply same as Power ON <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">ADH</div> ---initialization and Home position move completed <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">E0H</div> ---Home position error happened

Command	Application Contents		Command Format (Received Command)	Response Data Format
6CH	LED Control	LED Control -Lighting / No lighting / Blinking -Green / Orange / Red -Blinking Interval	<div style="border: 1px solid black; display: inline-block; padding: 2px;">6CH</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">00H</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">Color</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">00H</div> Color : Control the lighting of LED 00H : No Lighting 01H : Lighting Green 02H : Lighting Orange 03H : Lighting Red  <div style="border: 1px solid black; display: inline-block; padding: 2px;">6CH</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">01H</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">Color</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">Time</div> Color : Control the blinking of LED 01H Blinking Green 02H Blinking Orange 03H Blinking Red 04H : Blinking with Changing Color Time : Blinking interval time(x100msec). <div style="border: 1px solid black; display: inline-block; padding: 2px;">LED ON</div>   <div style="border: 1px solid black; display: inline-block; padding: 2px;">LED OFF</div>   <div style="border: 1px solid black; display: inline-block; padding: 2px;">LED ON</div>   ...   ←Time→   ← Time →	<div style="border: 1px solid black; display: inline-block; padding: 2px;">B1H</div> ---ACK  <div style="border: 1px solid black; display: inline-block; padding: 2px;">B4H</div> ---NAK
6DH	Motion Detect	Set “Use” or “No use” of motion detect function.  Using this function , be enable to get the information of motion detect.	<div style="border: 1px solid black; display: inline-block; padding: 2px;">6DH</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">No.</div> No. : Select motion detect mode 00H : Not Alert motion detection (default) 01H : Alert motion detection code automatically	<div style="border: 1px solid black; display: inline-block; padding: 2px;">B1H</div> ---ACK  <div style="border: 1px solid black; display: inline-block; padding: 2px;">B4H</div> ---NAK  “Detection Code”: Camera output the next code.  <div style="border: 1px solid black; display: inline-block; padding: 2px;">AEH</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">01H</div>

Command	Application Contents		Command Format (Received Command)	Response Data Format
80H	Zoom speed setting	Set zooming speed	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">80H</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">00H</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">data</div> <div style="margin-left: 10px;"> <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">00H</div> <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">01H</div> </div> <div style="margin-left: 10px;"> <div style="margin-left: 10px;">- <div style="border: 1px solid black; padding: 2px;">0AH</div></div> </div> <div style="margin-left: 10px;"> <div style="margin-left: 10px;">:standard speed</div> <div style="margin-left: 10px;">:zoom speed choices (10 steps)</div> </div> </div>	<div style="margin-bottom: 10px;"><div style="border: 1px solid black; padding: 2px;">B1H</div> ---ACK</div> <div><div style="border: 1px solid black; padding: 2px;">B4H</div> ---NAK</div>

Command	Application Contents		Command Format (Received Command)	Response Data Format
85H	Remote Controller Receiving ON/OFF	Enable and disable of remote controller receiving	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">85H</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">data</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">00H</div> <div>enable receiving</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">01H</div> <div>disable receiving</div> </div> </div> </div>	<div style="display: flex; flex-direction: column; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B1H</div> <div>---ACK</div> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B4H</div> <div>---NAK</div> </div>
86H	Pan Direction Setting (Reverse)	Setting the Pan Move direction. Received 20H, 40H: Move direction : CCW Received 21H, 50H: Move direction : CW This command is valid in Sub Camera Mode only.	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">86H</div> </div> Setting by this command is held after turning off power.	<div style="display: flex; flex-direction: column; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B1H</div> <div>---ACK</div> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B4H</div> <div>---NAK</div> </div>
87H	Pan Direction Setting (Normal)	Setting the Pan Move direction. Received 20H, 40H: Move direction : CW Received 21H, 50H: Move direction : CCW This command is valid in Sub Camera Mode only.	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">87H</div> </div> Setting by this command is held after turning off power.	<div style="display: flex; flex-direction: column; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B1H</div> <div>---ACK</div> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B4H</div> <div>---NAK</div> </div>
88H	Camera Mode Change	Setting the Camera Mode  <Camera Mode> -Main Camera -Sub Camera -Auto Camera	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">88H</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">Mode</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">00H</div> <div>Sub Camera Mode</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">01H</div> <div>Main Camera Mode</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">02H</div> <div>Auto Camera Mode</div> </div> </div> </div>	<div style="display: flex; flex-direction: column; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B1H</div> <div>---ACK</div> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 10px;">B4H</div> <div>---NAK</div> </div>

Command	Application Contents		Command Format (Received Command)	Response Data Format
8AH	Setting of Custom Code #0	<p>Camera permits specified custom code #0 of infrared remote controller.</p> <p>Setting by this command is held after turning off power.</p>		
8BH	Setting of Custom Code #1	<p>Camera permits specified custom code #1 of infrared remote controller.</p> <p>Setting by this command is held after turning off power.</p>		
8CH	Pan Speed Setting	<p>Set Panning speed</p> <p>This command is invalid during manual pan motion. Camera increase and decrease speed gradually during manual pan motion.</p>		
8DH	Tilt Speed Setting	<p>Set Tilting speed</p> <p>This command is invalid during manual tilt motion. Camera increase and decrease speed gradually during manual tilt motion.</p>		

Command	Application Contents		Command Format (Received Command)	Response Data Format																																											
90H	Read status of motion	Camera responds status of following motion -pan -tilt -zoom -manual focusing motion -execution of a command belonging to group "MOVE" (Command group "MOVE" contains following commands) -Preset Move (30H) -Document Position Move -Home Position Move -Absolute Coordination Move -Relative Coordination Move	<div style="border: 1px solid black; padding: 5px; display: inline-block;">90H</div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">A4H</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">data</div> </div> <div style="text-align: center; margin-top: 5px;">↑</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>bit</th> <th>bit data</th> <th>s t a t u s</th> </tr> </thead> <tbody> <tr> <td rowspan="2">7</td> <td>0</td> <td>(reserved)</td> </tr> <tr> <td>1</td> <td>(reserved)</td> </tr> <tr> <td rowspan="2">6</td> <td>0</td> <td>(reserved)</td> </tr> <tr> <td>1</td> <td>(reserved)</td> </tr> <tr> <td rowspan="2">5</td> <td>0</td> <td>(reserved)</td> </tr> <tr> <td>1</td> <td>(reserved)</td> </tr> <tr> <td rowspan="2">4</td> <td>0</td> <td>stopped executing command group "MOVE"</td> </tr> <tr> <td>1</td> <td>executing command group "MOVE" at present</td> </tr> <tr> <td rowspan="2">3</td> <td>0</td> <td>stopped moving manual focus</td> </tr> <tr> <td>1</td> <td>moving manual focus at present</td> </tr> <tr> <td rowspan="2">2</td> <td>0</td> <td>stopped zooming</td> </tr> <tr> <td>1</td> <td>zooming in progress</td> </tr> <tr> <td rowspan="2">1</td> <td>0</td> <td>stopped tilting</td> </tr> <tr> <td>1</td> <td>tilting in progress</td> </tr> <tr> <td rowspan="2">0</td> <td>0</td> <td>stopped panning</td> </tr> <tr> <td>1</td> <td>panning in progress</td> </tr> </tbody> </table>	bit	bit data	s t a t u s	7	0	(reserved)	1	(reserved)	6	0	(reserved)	1	(reserved)	5	0	(reserved)	1	(reserved)	4	0	stopped executing command group "MOVE"	1	executing command group "MOVE" at present	3	0	stopped moving manual focus	1	moving manual focus at present	2	0	stopped zooming	1	zooming in progress	1	0	stopped tilting	1	tilting in progress	0	0	stopped panning	1	panning in progress
bit	bit data	s t a t u s																																													
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	1	(reserved)																																													
5	0	(reserved)																																													
	1	(reserved)																																													
4	0	stopped executing command group "MOVE"																																													
	1	executing command group "MOVE" at present																																													
3	0	stopped moving manual focus																																													
	1	moving manual focus at present																																													
2	0	stopped zooming																																													
	1	zooming in progress																																													
1	0	stopped tilting																																													
	1	tilting in progress																																													
0	0	stopped panning																																													
	1	panning in progress																																													

Command	Application Contents		Command Format (Received Command)	Response Data Format																																																											
91H	Read Camera Status	Camera responds camera status condition: -Pan Direction -Camera Mode -Focus Mode -Video Output Mode (ON/OFF) -Receiving of I.R. remote controller (enabled/disabled) -Shutter Speed remote controller obedience mode	<div style="border: 1px solid black; display: inline-block; padding: 2px;">91H</div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">A5H</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">data</div> </div> <div style="text-align: center; margin-top: 5px;">↑</div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>bit</th> <th>bit data</th> <th colspan="2">s t a t u s</th> </tr> </thead> <tbody> <tr> <td rowspan="2">7</td> <td>0</td> <td colspan="2">Receiving of I.R. remote controller is enabled.</td> </tr> <tr> <td>1</td> <td colspan="2">Receiving of I.R. remote controller is disabled.</td> </tr> <tr> <td rowspan="2">6</td> <td>0</td> <td>obedient to "AUX." remote controller</td> <td rowspan="2">remote controller obedience mode</td> </tr> <tr> <td>1</td> <td>obedient to "MAIN" remote controller</td> </tr> <tr> <td rowspan="2">5</td> <td>0</td> <td colspan="2">Shutter Speed (NTSC: 1/60 sec, PAL:1/50 sec.)</td> </tr> <tr> <td>1</td> <td colspan="2">Shutter Speed (NTSC:1/100 sec, PAL:1/60 sec.)</td> </tr> <tr> <td rowspan="2">4</td> <td>0</td> <td colspan="2">(reserved)</td> </tr> <tr> <td>1</td> <td colspan="2">(reserved)</td> </tr> <tr> <td rowspan="2">3</td> <td>0</td> <td colspan="2">Video output condition is Normal. (Fade in)</td> </tr> <tr> <td>1</td> <td colspan="2">Video output condition is Fade out.</td> </tr> <tr> <td rowspan="2">2</td> <td>0</td> <td colspan="2">Focus control condition is Auto.</td> </tr> <tr> <td>1</td> <td colspan="2">Focus control condition is Manual.</td> </tr> <tr> <td rowspan="2">1</td> <td>0</td> <td colspan="2">Camera mode is Sub Camera mode.</td> </tr> <tr> <td>1</td> <td colspan="2">Camera mode is Main Camera mode.</td> </tr> <tr> <td rowspan="2">0</td> <td>0</td> <td colspan="2">Pan direction condition is Normal. Received Move direction : CW</td> </tr> <tr> <td>1</td> <td colspan="2">Pan direction condition is Reverse. Received Move direction : CCW</td> </tr> </tbody> </table>	bit	bit data	s t a t u s		7	0	Receiving of I.R. remote controller is enabled.		1	Receiving of I.R. remote controller is disabled.		6	0	obedient to "AUX." remote controller	remote controller obedience mode	1	obedient to "MAIN" remote controller	5	0	Shutter Speed (NTSC: 1/60 sec, PAL:1/50 sec.)		1	Shutter Speed (NTSC:1/100 sec, PAL:1/60 sec.)		4	0	(reserved)		1	(reserved)		3	0	Video output condition is Normal. (Fade in)		1	Video output condition is Fade out.		2	0	Focus control condition is Auto.		1	Focus control condition is Manual.		1	0	Camera mode is Sub Camera mode.		1	Camera mode is Main Camera mode.		0	0	Pan direction condition is Normal. Received Move direction : CW		1	Pan direction condition is Reverse. Received Move direction : CCW	
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Command	Application Contents		Command Format (Received Command)	Response Data Format
92H	Read Custom Code #0	Camera responds set Custom Code #0 for Infrared remote controller	92H	<div style="display: flex; justify-content: space-around; align-items: center;"> <span style="border: 1px solid black; padding: 2px;">A6H</span> <span style="border: 1px solid black; padding: 2px;">02H</span> <span style="border: 1px solid black; padding: 2px;">CUS(U)</span> <span style="border: 1px solid black; padding: 2px;">CUS(L)</span> </div> <div style="text-align: center; margin-top: 5px;"> <span style="margin: 0 10px;">(upper)</span> <span style="margin: 0 10px;">(lower)</span> </div> <p style="text-align: center; margin-top: 10px;">Custom Code #0 for Infrared Remote Controller (16 bits)</p>
93H	Read Custom Code #1	Camera responds set Custom Code #1 for Infrared remote controller	93H	<div style="display: flex; justify-content: space-around; align-items: center;"> <span style="border: 1px solid black; padding: 2px;">A6H</span> <span style="border: 1px solid black; padding: 2px;">02H</span> <span style="border: 1px solid black; padding: 2px;">CUS(U)</span> <span style="border: 1px solid black; padding: 2px;">CUS(L)</span> </div> <div style="text-align: center; margin-top: 5px;"> <span style="margin: 0 10px;">(upper)</span> <span style="margin: 0 10px;">(lower)</span> </div> <p style="text-align: center; margin-top: 10px;">Custom Code #1 for Infrared Remote Controller (16 bits)</p>



Command	Application Contents		Command Format (Received Command)	Response Data Format
94H	Read Absolute Coordination	When this command is received Camera responds current absolute coordination of Pan/Tilt/Zoom.	94H	<p> <math>A0H</math> <math>06H</math> <math>P(U)</math> <math>P(L)</math> <math>T(U)</math> <math>T(L)</math> <math>Z(U)</math> <math>Z(L)</math>  Pan Coordination (16bit)      Tilt Coordination (16bit) </p> <p> <math>P(U)</math> <math>P(L)</math> =P(Pan Coordination)  <math>T(U)</math> <math>T(L)</math> =T(Tilt Coordination) </p> <p> (P,T= complement) </p> <p> -Home Position : (P,T)=(0000H,0000H)  -when move Pan (Right Area), Tilt Up 0000H,0001H,0002H,0003H,----  -when move Pan(Left Area), Tilt Down FFFFH,FFFEH,FFFDH,FFFCH,--- </p> <p> -1179d(=FB65H)&lt;=P&lt;=+1179d(=049BH)  ↑ -99.0125degrees      ↑ +99.0125degrees  -1150d(=FB82H)&lt;=T&lt;=+197d(=00C5H)  ↑ -88degrees      ↑ +15degrees </p> <p> <math>Z</math> <math>Z</math> = Zoom Coordination  (2 byte : 0000H&lt;=Z&lt;=0990H) </p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
95H	Read previous command	Camera responds previous received command	95H	<p data-bbox="1518 293 2051 389">A1H Length data data ----- data previous command</p> <p data-bbox="1496 399 1850 469">previous command length (the number of bytes)</p> <p data-bbox="1317 430 1460 469">[Example]</p> <p data-bbox="1317 475 1877 596">A1 H 01H 0DH previous command length previous command</p> <p data-bbox="1317 609 2056 730">A1 H 02H 8CH SPD Data length previous command(with data)</p> <p data-bbox="1317 756 2065 922">A1 H 03H 8BH CUS(U) CUS(L) previous command length previous command(with data)</p> <p data-bbox="1317 963 2065 1145">A1H 07H 3FH P(U) P(L) T(U) T(L) Z(U) Z(L) previous command length previous command(with data)</p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
96H	Read Back Light Condition	Respond the Back Light Compensation Condition	<div style="border: 1px solid black; display: inline-block; padding: 2px;">96H</div>	<div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px;">A2H</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">No.</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">00H</div> - <div style="border: 1px solid black; padding: 2px;">7FH</div> </div> </div>
97H	Read White Balance Condition	Respond the White balance Condition	<div style="border: 1px solid black; display: inline-block; padding: 2px;">97H</div>	<div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px;">A3H</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">No.</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">00H</div> <div style="margin-left: 10px;">(Auto W/B Mode)</div> <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">01H</div> <div style="margin-left: 10px;">(W/B Hold Mode)</div> <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">80H</div> - <div style="border: 1px solid black; padding: 2px;">9CH</div> <div style="margin-left: 10px;">(Manual W/B Mode) (29 points)</div> </div> </div>

Command	Application Contents		Command Format (Received Command)	Response Data Format
99H	Read Pan/Tilt Speed	Camera responds setting of pan and tilt speed.  Refer to specification of command "8CH" ,"8DH"	<div style="border: 1px solid black; display: inline-block; padding: 2px;">99H</div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">A8H</div> <div style="border: 1px solid black; padding: 2px;">02H</div> <div style="border: 1px solid black; padding: 2px;">SPD(P)</div> <div style="border: 1px solid black; padding: 2px;">SPD(T)</div> </div> <div style="margin-left: 150px;">       ↑ Tilt speed No.        ↑ Pan speed No.     </div> <p>       SPD(P),SPD(T) = "00H" :Auto speed change        SPD(P),SPD(T) = "01H"-"08H": Fixed speed        SPD(P),SPD(T) = "FFH" :Setting by Direct Speed Command (41H, 42H)     </p>
9AH	Read zoom Speed	Camera responds zoom speed.  Refer to specification of command "80H"	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">9AH</div> <div style="border: 1px solid black; padding: 2px;">00H</div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">AAH</div> <div style="border: 1px solid black; padding: 2px;">01H</div> <div style="border: 1px solid black; padding: 2px;">SPD(Z)</div> </div> <p>       SPD(Z) = "00H" :Auto speed change        SPD(Z) = "01H" - "0AH" : Fixed speed        SPD(Z) = "FFH" :Setting by Direct Speed Command (43H)     </p>

Command	Application Contents		Command Format (Received Command)	Response Data Format
9CH	Model name inquiring	Camera responses the fundamental model name  The model name indicates the video signal type. DP702 : NTSC DP702P : PAL	9CH	ABH 0AH STR --- STR   ←Character Strings→   (10Byte)  [Example] ABH 0AH 44H 50H 37H 30H 32H 20H --- 20H   ← “DP702” →   ←Space→   (KX-DP702 Series) (meaningless)
9EH	Status of Motion detection inquiring	Read the status of motion detection.	9EH	B1H 00H :Not motion detect B1H 01H :Motion detect

Command	Application Contents		Command Format (Received Command)	Response Data Format
EEH (ECH)	Daisy Chain	setting of daisy chain mode and assignment of ID No. of camera in daisy chain (Refer to “5.Daisy Chain Function”.)	<div style="border: 1px solid black; padding: 2px; display: inline-block;">EEH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">00H</div>  For compatibility with KX-DP600 series, next command has same function.  <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">00H</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">EEH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div>  n: Total Camera Number. If you connect 4 camera then n = 4.  <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">ECH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div>
EFH (EDH)	Select the target camera of operation in daisy chain mode	Designation of the target camera to be operated (Refer to “5.Daisy Chain Function”.)  This command is valid in daisy chain mode only.	<div style="border: 1px solid black; padding: 2px; display: inline-block;">EFH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div> <div style="text-align: center;">↑ Target camera ID</div> For compatibility with KX-DP600 series, next command has same function.  <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div> <div style="text-align: right;">↑ Target camera ID</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">EFH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div> <div style="text-align: center;">↑ Target camera ID</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">EDH</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">n</div> <div style="text-align: right;">↑ Target camera ID</div>

## 4. Camera Completion Code

(1) Camera sends completion code via serial interface when camera completes following motion.

Motion	Completion code
Panning	BBH
Tilting	BCH
Zooming	BDH
Manual focusing far / near	BEH
Execution of command group "MOVE" *	BFH

\*Execution of command group "MOVE" contains following command.

- preset move
- document position move
- home position move
- absolute coordination move
- relative coordination move

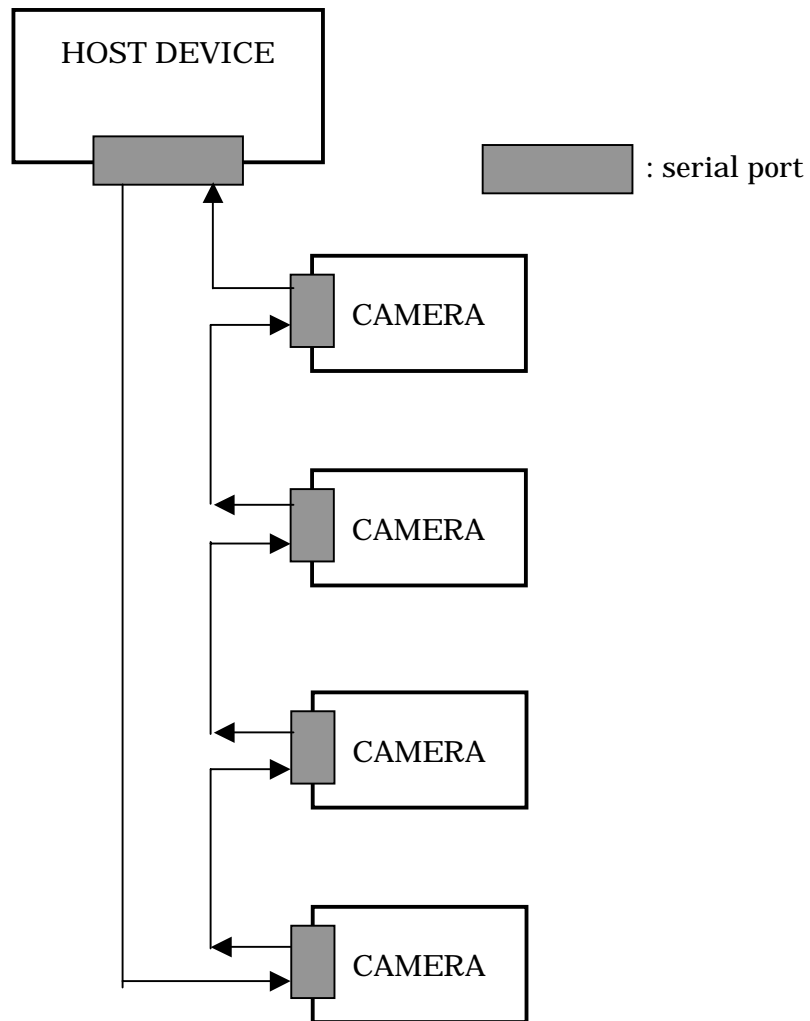
(2) However, camera postpone to send completion code in following case.

- (i) Camera receive new pan command during executing pan command.
- (ii) Camera receive new tilt command during executing tilt command.
- (iii) Camera receive new zoom command during executing zoom command.
- (iv) Camera receive new focus command during executing focus command.
- (v) Camera receive new move command during executing other motion command.

## 5. Daisy Chain Function

### 1. Structure of daisy chain

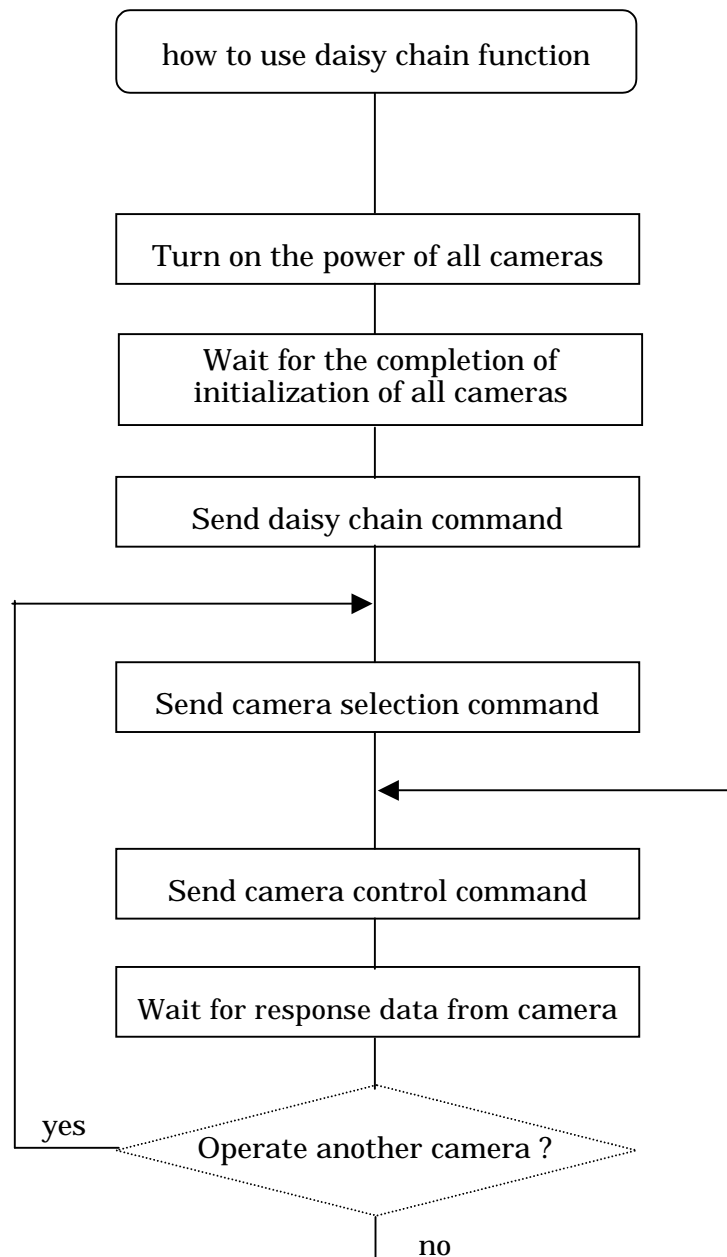
- (1) One host device and some cameras are connected with serial interface.  
(Refer to the figure shown below.)
- (2) Host device can operate plural cameras with its one serial port.  
(However, host device can not operate plural cameras at same time.)





## 2. Procedure to use daisy chain function of camera

- (1) Turn on the power of all cameras.
- (2) Wait for the completion of initialization of all cameras.
- (3) Host device sends daisy chain command to cameras.  
With this all cameras go into daisy chain mode and get ID No.
- (4) Host device sends camera selection command to cameras.  
With this the host device designates one camera as the object of operation.
- (5) Host device sends camera control commands.  
With this host device operates the designated camera.
- (6) To operate another camera, the host device must send camera selection command.  
With this host device can operate the camera designated newly.



### 3. Daisy chain command

(1) command format : EEH n (8bytes, 00H <= n <= 04H)

[Attention]

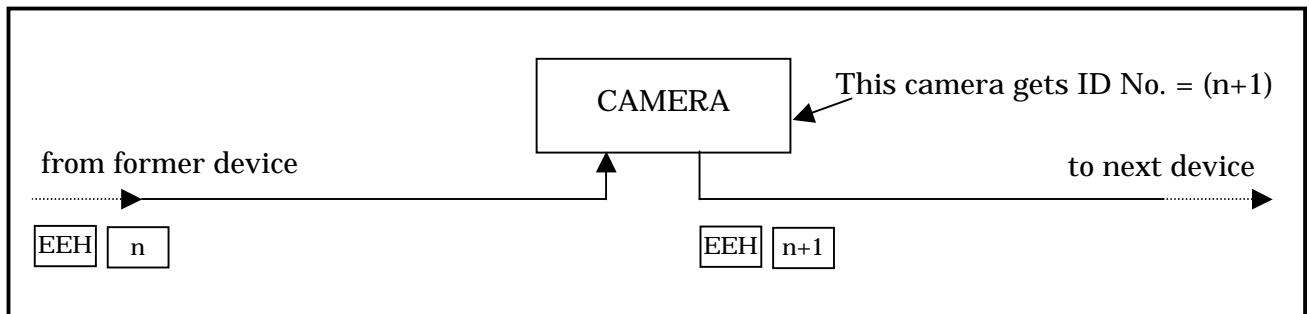
The 2nd data 'n' of this command must be 00H when host device sends this command.

Daisy chain command that host device send : EEH 00H

(2) function : All cameras go into "daisy chain mode", and every camera gets its own ID No.

(3) Camera that received the daisy chain command executes following process.

- Camera goes into "daisy chain mode".
- Camera goes into "inactive state".
- Camera get its own ID No. (Refer to figures shown below.)  
[camera's ID No.] = [the 2nd data 'n' of received command] + 1
- Camera change the 2nd data 'n' of received command into its own ID No., and transmit renewed daisy chain command to next device. (Refer to figures shown below.)



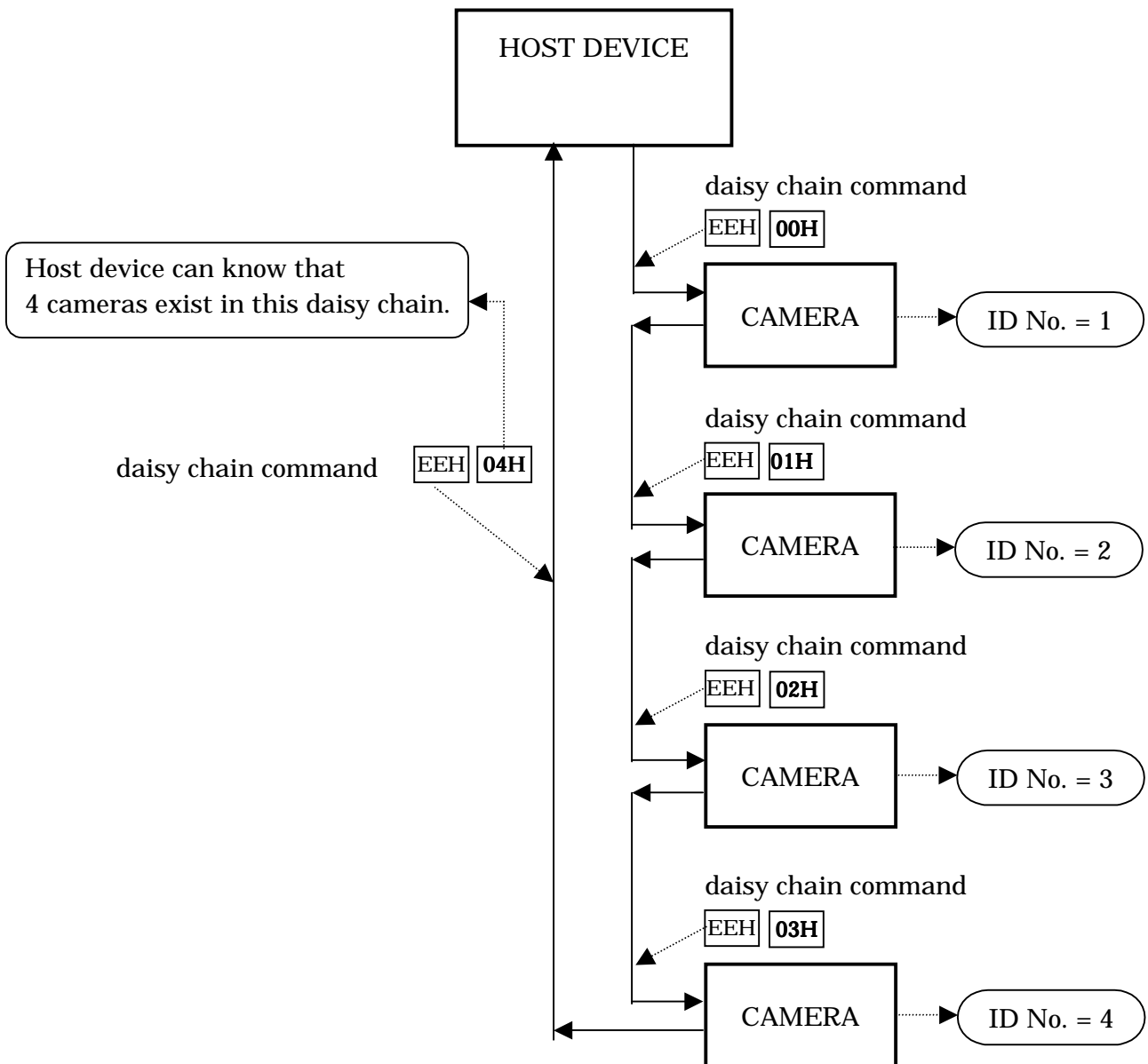
received command	EEH n
ID No. that camera gets	n+1
command to transmit	EEH n+1

(4) Daisy chain command is passed around for every camera.

Consequently, all cameras get their own ID No. and go into "daisy chain mode" and "inactive state".

ID No. 1,2,3,--- are assigned to every camera by turns. (Refer to figure shown on next page.)

Host device can know how many cameras are connected in daisy chain by the 2nd data 'n' of received command from last camera. (Refer to figure shown on next page.)

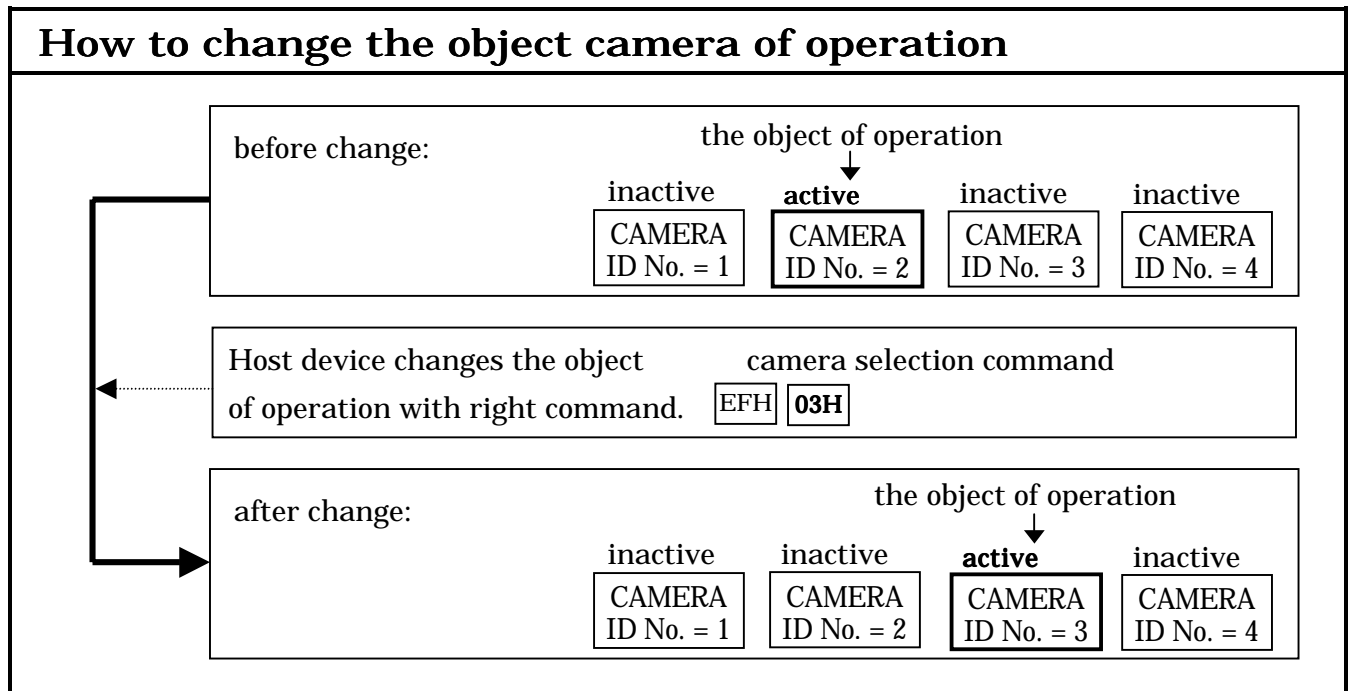


#### (5) Attention

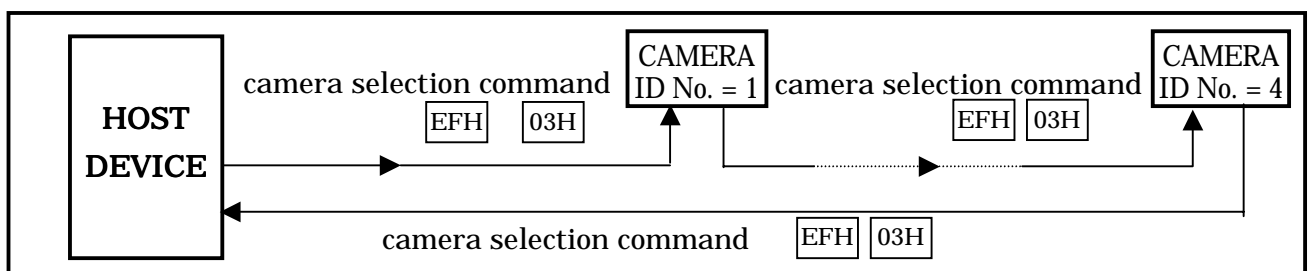
- Host device must send daisy chain command at first after all cameras finished initialization.
  - Each camera transmits initialization completion code "ADH" (1byte) after initialization. However, even if host device received the data "ADH" from camera, it is not mean that all cameras have finished their initialization.
  - Unless power of camera is turned off, camera can not escape from daisy chain mode.
  - Daisy chain command is valid even if camera is already in the daisy chain mode.
  - All cameras become inactive after they received daisy chain command. Then all cameras are not the object of operation.
- Therefore, it is need that host device sends camera selection command after daisy chain command to operate a camera. (Refer to next section.)

#### 4. Camera Selection Command

- (1) command format : EFH n (2bytes)  
(n : ID No. of the camera to be designated)
- (2) function : Host device designates one camera as the object of operation, and the designated camera goes into "active state".
- (3) Host device can use this command to change the object camera of operation after host device designated a camera as the object of operation. (Refer to figure shown below.)



(4) This command returns to the host device via all cameras.



(5) Attention

- Camera selection command is invalid when camera is not in the daisy chain mode.
- All cameras become inactive and they are not the object of operation after they received daisy chain command. Then host device must designate one camera as the object of operation with camera selection command before host device sends a camera control command.
- All cameras become inactive and no camera is operated by camera control command when the camera designate by the 2nd data of camera selection command that does not exist in the daisy chain.

<example> camera selection command  
EDH 05H → All cameras become inactive.

## 5.About Camera Control Command in daisy chain mode

- (1)Host device can operate the object camera (active camera) with all commands described in “3. Camera Control Command Summary Sheet”.
- (2)Only one active camera (the object camera of operation) can be operated by host device with camera control command.
- (3)The object camera of operation sends the response data described in “3. Camera Control Command Summary Sheet” as the reaction to camera control command.

## 6.Points to notice

- (1)In following case, we recommend that host device send the daisy chain command afresh.
  - Return data can not arrive at the host device within 10 sec. after the host device sent a command.  
(In this case, there is a possibility that some camera is not in the “daisy chain mode”.)
  - Some camera has been deleted from the daisy chain.
  - Some camera has been inserted into the daisy chain.
  - Some camera in the daisy chain has been replaced.
  - Some camera has been changed their position (order) in the daisy chain.
- (2)Host device can not operate plural cameras at same time with camera control command.
- (3)The camera in daisy chain mode sends the response data of format type c) as acknowledge data when they executed the commands shown below.  
(Refer to “2. Command Outline (2)Response Contents”)
  - preset move command (30H XXH)
  - home position move command (39H)
  - document position move command (3AH)
- (4)There is a possibility that camera sends meaningless data when camera’s power is turned on.  
We recommend that the host device ignores data received from camera before all cameras completes their initialization.

## 7.Points to be forbidden

(1)Host device must not send either “daisy chain command” or “camera selection command” during some camera is executing the motion shown below.

- pan
- tilt
- zoom
- manual focus (far / near)
- preset move
- home position move
- document position move
- absolute coordination move
- relative coordination move

We recommend that host device confirms the completion of these motion with completion code or the “Read status of motion command(90H)” before host device sends daisy chain command or camera selection command. (Refer to “4. Camera Completion Code” or the explanation of “Read status of motion command(90H)” in “Camera Control Command”.)