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A

# CCD Color Camera

## KP-HD20A/KP-HD1001/5 Series

### Remote control protocol Specifications

(preliminary version)

B

B

C

C

Hitachi Kokusai Electric Inc.

D

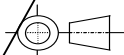
D

E

E

F

F

-	Sep.11.9	(first edition)						Hirayama	Hirayama
SYMBOL	DATE	DESCRIPTION						(DRAWN)	DESIGNED
MODEL	<b>KP-HD20A Series</b>			TOLERANCE	Prod. Code - Order No.				
DESIGNED	DATE	APPROVED	DATE	UNIT	TITLE			REV.	
CHECKED	DATE	STORED	DATE					SCALE	KP-HD20A Remote specification(RS-232C)
<b>Hitachi Kokusai Electric</b>					DWG. No.			SHEET 1/20	

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1) Comms\* specifications

Sync system	Start-stop sync
Bit rate	9600 bps
Data length	8 bits
Start bit	1
Stop bits	1
Parity	None
Bit transfer	LSB first

**\*Comms : Communications**

2) Comms control

The remote control software controls all communications. Data send/receive (BSC handshake) is by transferring TEXT data to the camera controller chip.

3) Comms connection Scheme

Here is Comms connection Scheme. 3 lines System(Tx,Rx,GND) is applied (RTS and CTS are not used)

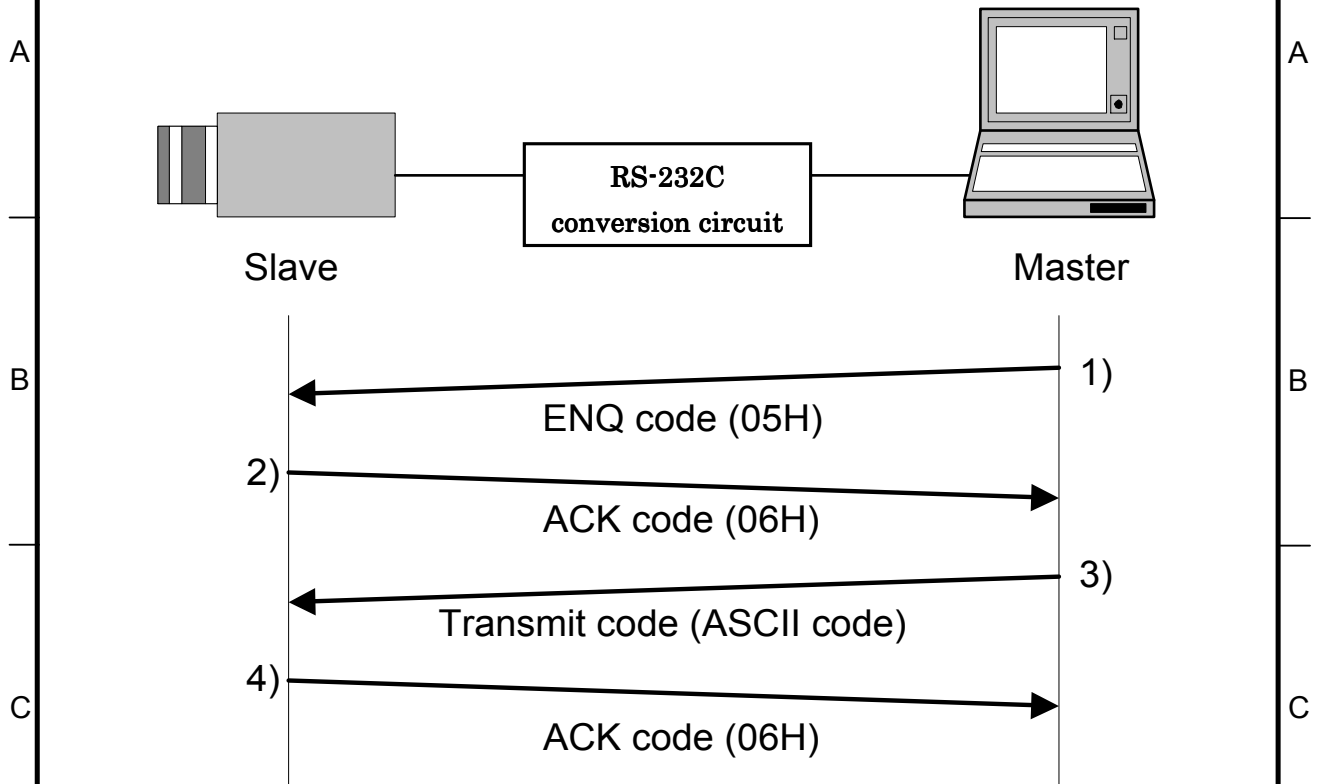
Serial Control	recitals
Tx	Sending
Rx	Reception
GND	Ground

4) Comms procedure

- The following pages indicate the camera controller chip and remote control software data protocol. In the description, the camera is designated as slave and the software as master.
- Receive protect timer (time out error)  
The receive protect timer for master and slave processes is 1 second. For example, if 1 block of TEXT data is being received, if the data interval exceeds 1 second, error is produced and the data are lost. An acknowledgment of data receipt is not produced.

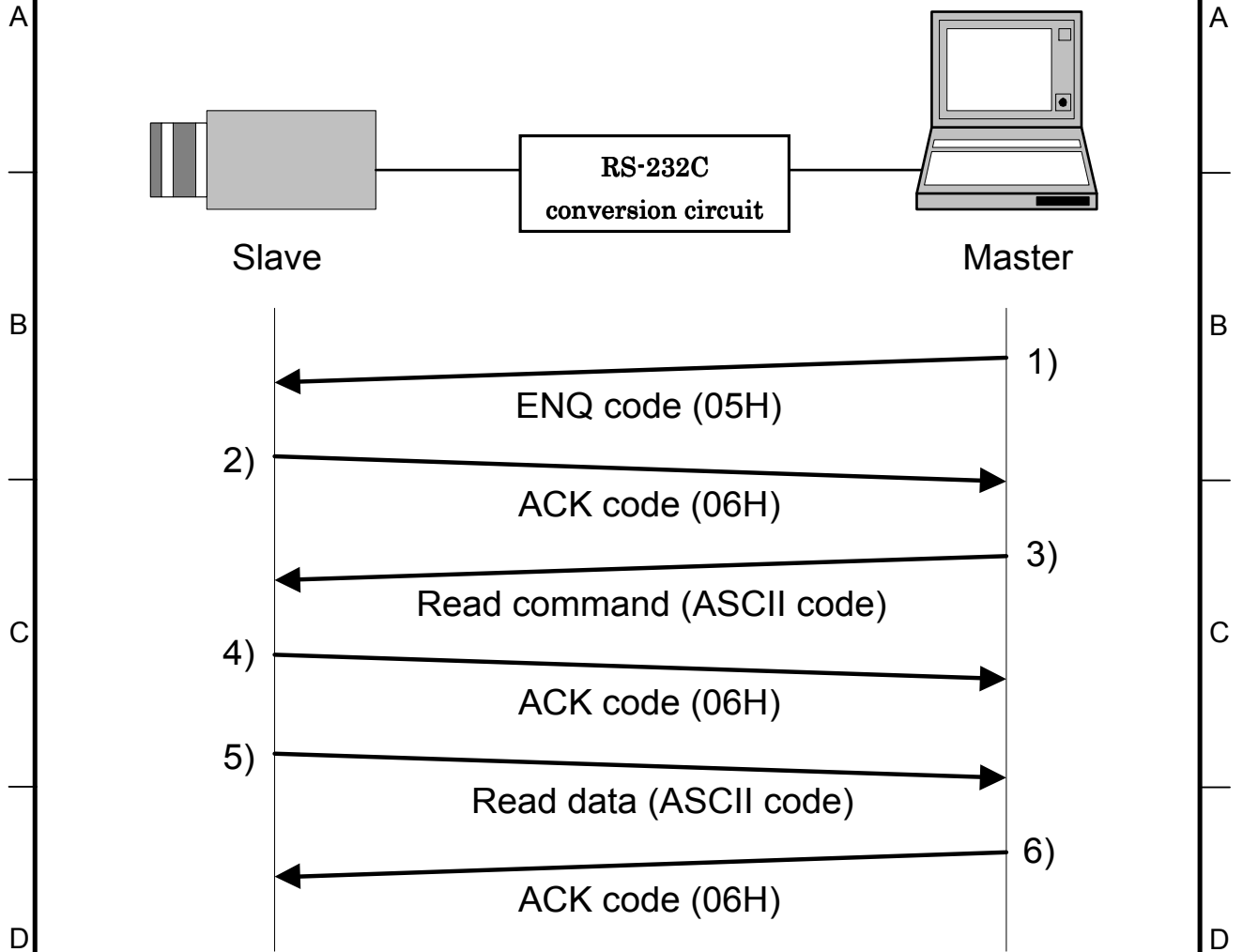
**( Caution )**  
The RS-232C conversion circuit is needed to connect a camera and a remote-controlled machine (PC etc.) among. Please refer to the product specification for the output pin on the camera side.

a) Transmission from master (normal process)



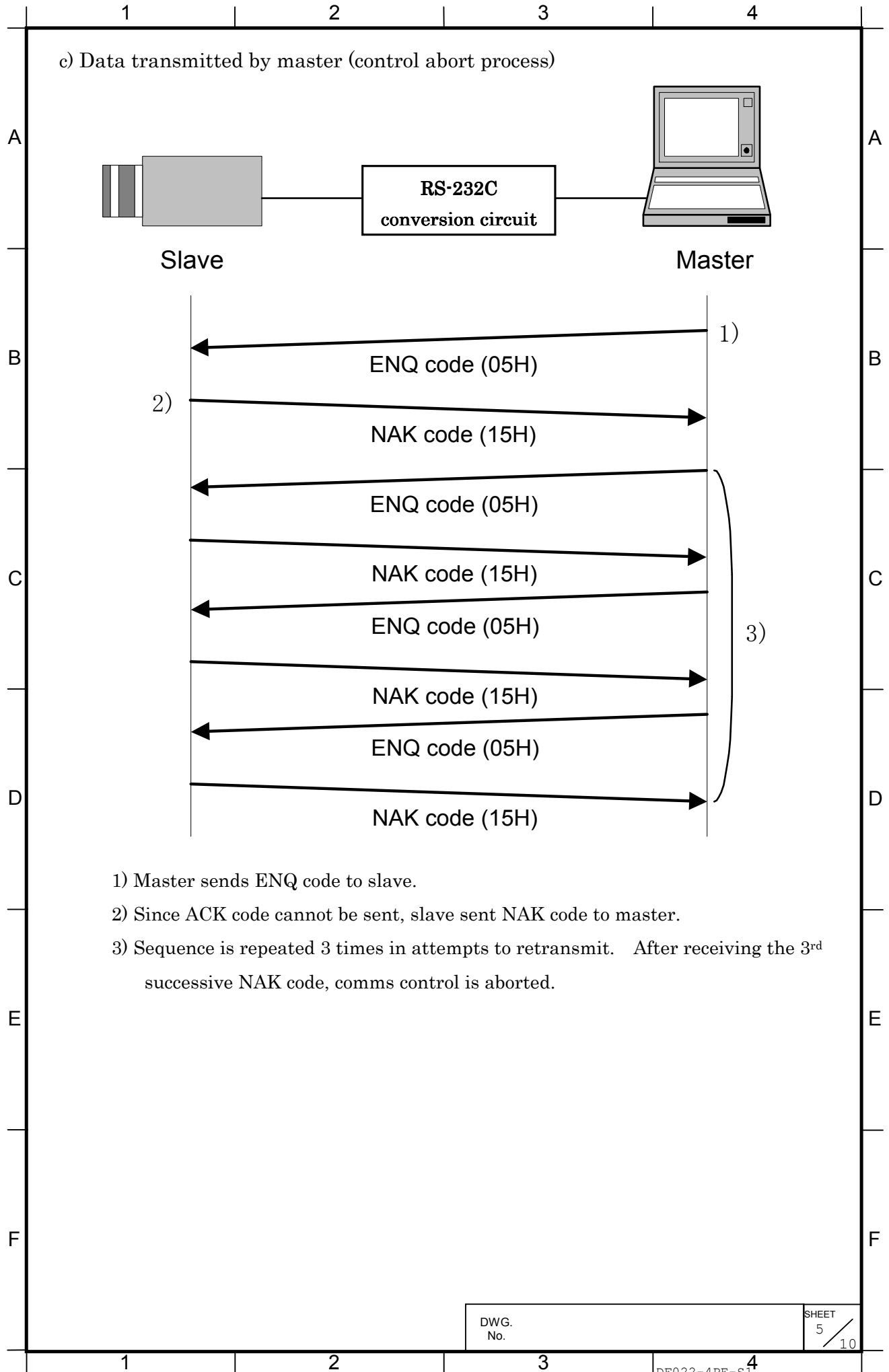
- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends data to slave.
- 4) Slave acknowledges receipt of data by again returning ACK to master and end the handshake.

b) Master reads data (normal process)



- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends read data command to slave.
- 4) Slave receives read data command, then acknowledges by returning ACK code to master.
- 5) Slave sends read data to master.
- 6) Master receives read data, then acknowledges by returning ACK code to slave.

c) Data transmitted by master (control abort process)

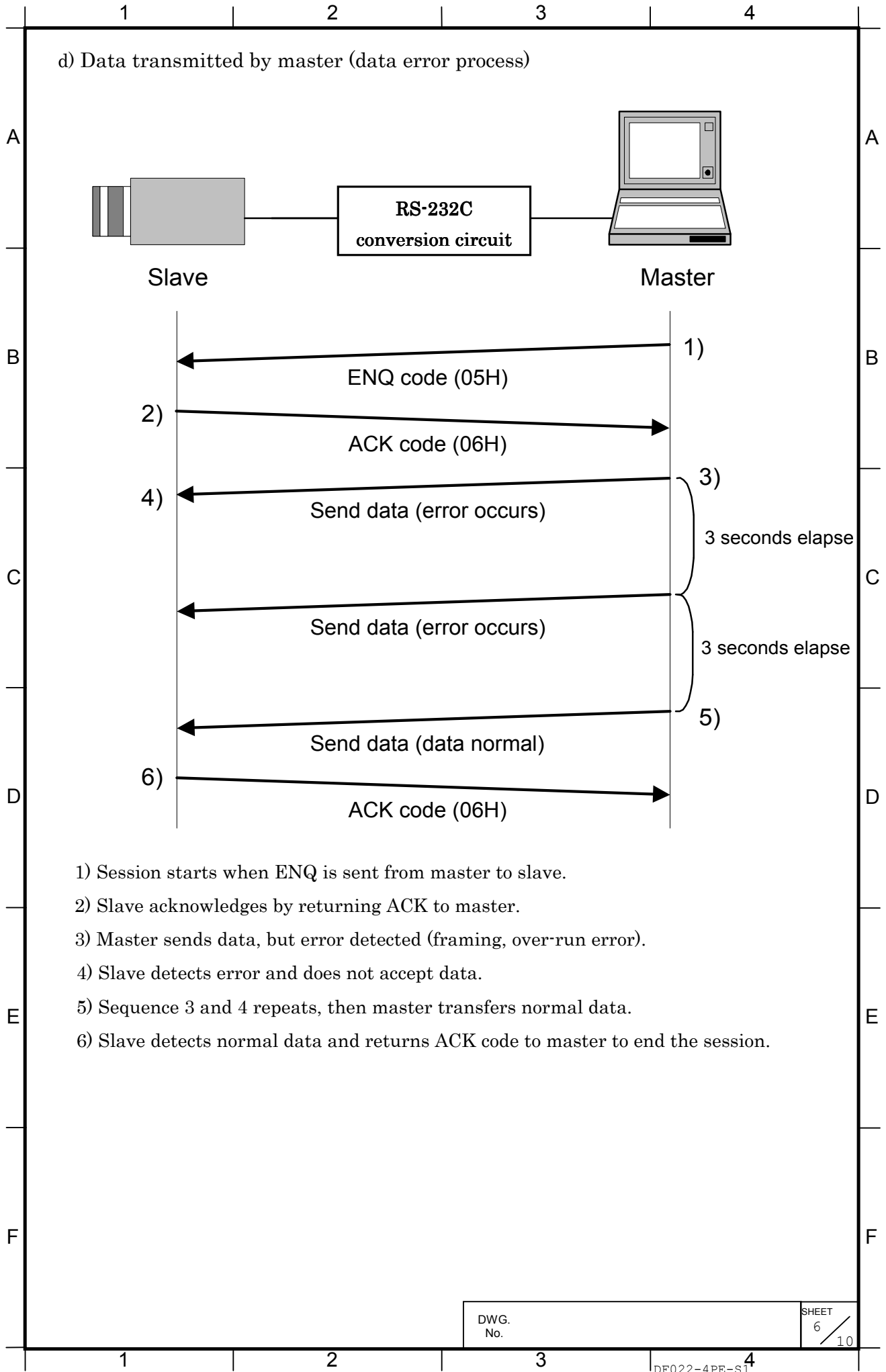


1) Master sends ENQ code to slave.

2) Since ACK code cannot be sent, slave sent NAK code to master.

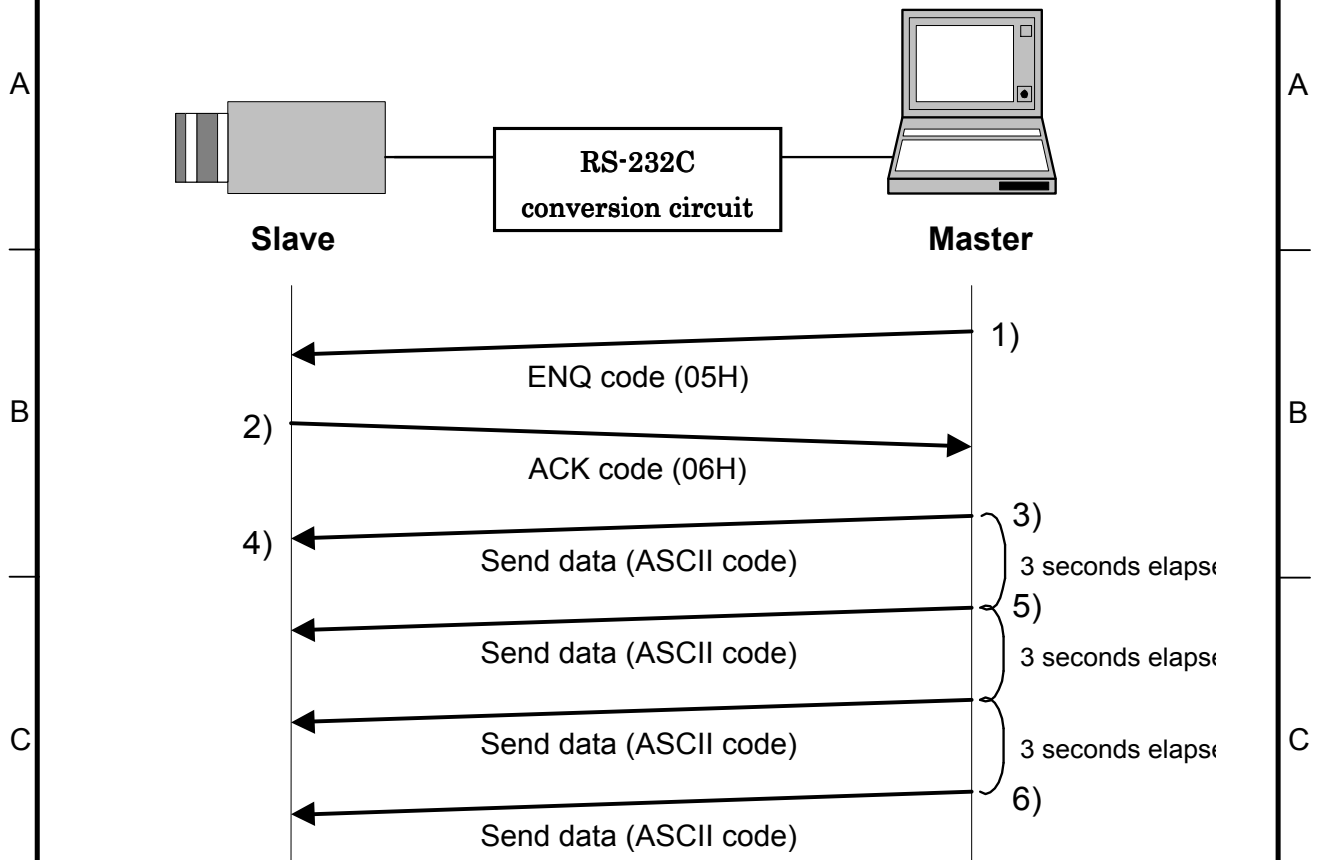
3) Sequence is repeated 3 times in attempts to retransmit. After receiving the 3<sup>rd</sup> successive NAK code, comms control is aborted.

d) Data transmitted by master (data error process)



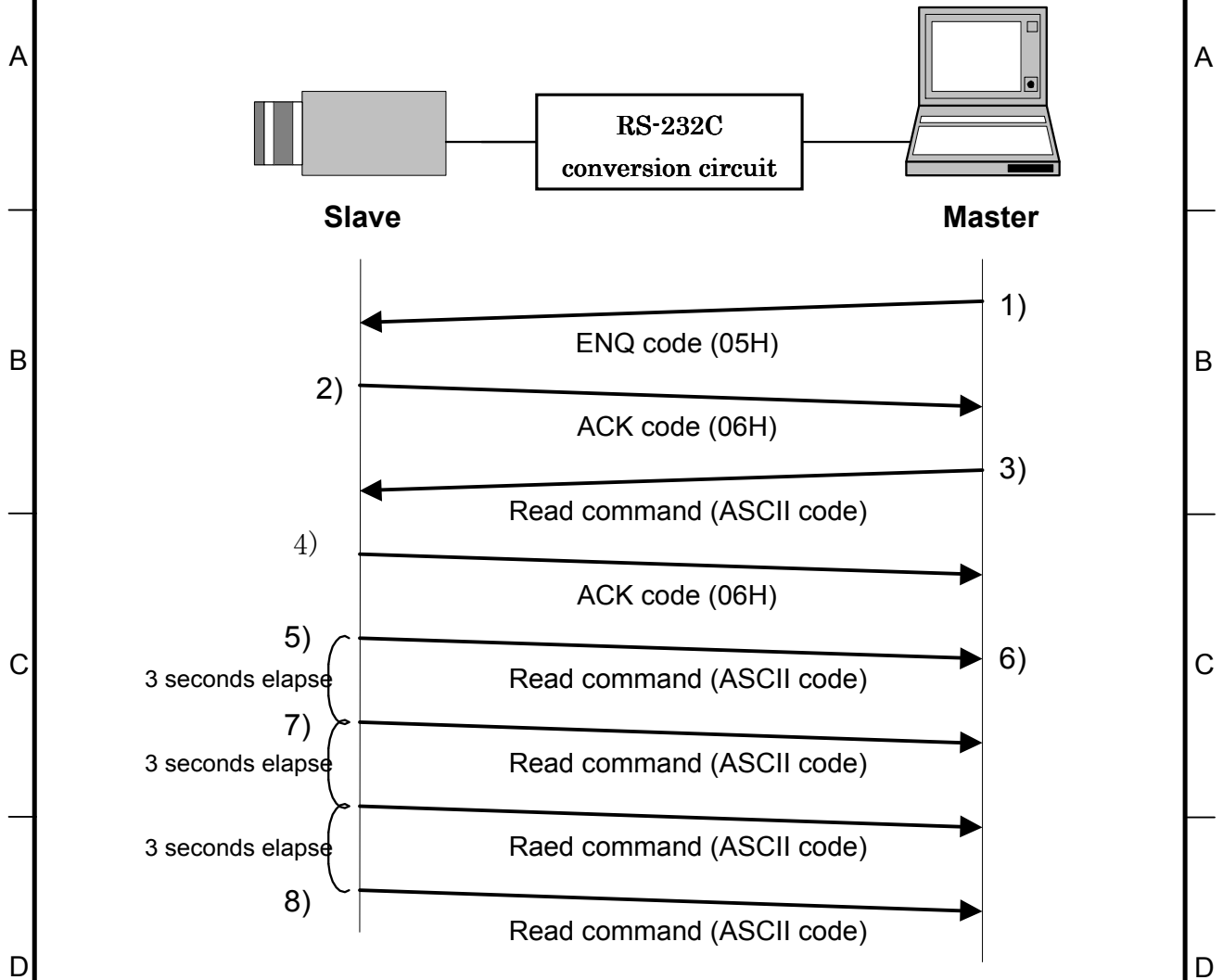
- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends data, but error detected (framing, over-run error).
- 4) Slave detects error and does not accept data.
- 5) Sequence 3 and 4 repeats, then master transfers normal data.
- 6) Slave detects normal data and returns ACK code to master to end the session.

e) Data frame error (Master transmission)



- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends data.
- 4) For some reason, slave does not receive data.
- 5) Master does not receive acknowledgment to the send code and repeats the sequence every 3 seconds for 3 times.
- 6) If unsuccessful after 3 attempts, master aborts the sequence and ends communication.

f) Transmission frame error (Master receive)



- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends read command.
- 4) Slave returns ACK code to acknowledge read command.
- 5) Slave sends corresponding read data to master.
- 6) For some reason, master fails to receive read data.
- 7) Slave fails to receive acknowledgment of read data and attempts to resend every 3 seconds for 3 times.
- 8) After the third failure, slave aborts the sequence and ends communication.



5) Comms command Text data format

a) Send data and read command data (master to slave)

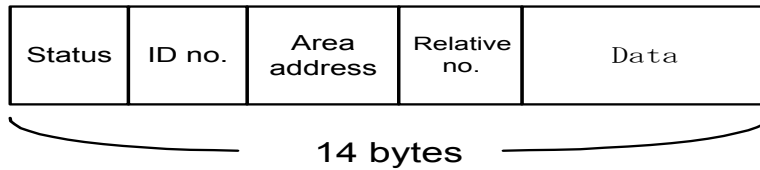
- A
- 1) Command data are converted into ASCII code and transmitted.
  - 2) Comms byte quantity is 18.
  - 3) Comms data format (transmission sequence).



■ Comms data description

- STX: Code indicating start of text. 1 byte (02H)
- Text data: Transmit / receive data. 14 byte (ASCII code)
- ETX: Code indicating end of text. 1 byte (03H)
- SUM: XOR result (FFH) of adding STX, Text data and ETX. 2 byte

C Text data format details (transmission sequence).

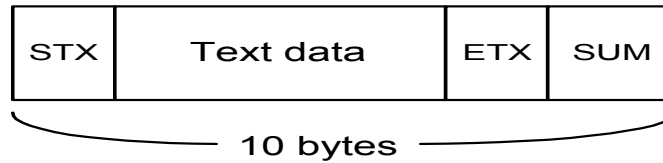


■ Text data details

- D
- Status: Transmission data status. 2 bytes (ASCII code)  
 This parameter is used for selecting EEPROM write setting.  
 (0: write absent, 1: write present)  
 In Case of KP-HD20A, this parameter is ineffective because KP-HD20A does not have an EEPROM.
  - ID no.: Identification (camera ID) number is set by user. (2bytes: ASCII code)  
 Please set ID no.to FFH because KP-HD20A does not have camera ID.  
 (FFH is global address and all data are changed)
  - Area address: Sets number (0 to 255) for each adjustment item.  
 2 bytes (ASCII code)
  - Relative no.: Sets number determined by each area address.  
 2 bytes (ASCII code)
  - Data (note): Sets data to be transmitted. 2 bytes x 3 (ASCII code)
- F

b) Read (receive) data (slave to master)

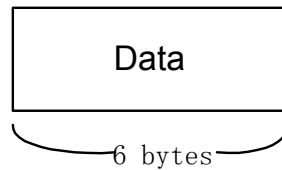
- 1) Command data are converted into ASCII code and transmitted.
- 2) Comms byte quantity is 10.
- 3) Comms data format (transmission sequence)



■ Comms data description

- STX: Code indicating start of text. 1 byte (02H)
- Text data: Transmit / receive data. 6 byte (ASCII code)
- ETX: Code indicating end of text. 1 byte (03H)
- SUM: XOR result (FFH) of adding STX, Text data and ETX. 2 byte

4) Text data details (transmission sequence)



■ Text data details (transmission sequence)

- Data (note): Sets data to be transmitted. 2 bytes x 3 (ASCII code)

	Feature	Menu display		KP-D20A		
		Command	Parameter	Area	ID	Data
1	White Balance	MODE	ATW	0x01	0x04	0x00
			MANUAL	0x01	0x04	0x02
2	Gain Mode	GAIN MODE	PRESET	0x01	0x06	0x01
			AGC	0x01	0x06	0x00
3	One Push Auto White	AWB		0x01	0x07	0x01
4	Shutter Speed	SHUTTER SPEED	1/30(1/25)	0x01	0x08	0x00
			1/50	0x01	0x08	0x01
			1/100	0x01	0x08	0x02
			1/250	0x01	0x08	0x03
			1/500	0x01	0x08	0x04
			1/1000	0x01	0x08	0x05
			1/2000	0x01	0x08	0x06
			1/5000	0x01	0x08	0x07
			1/10000	0x01	0x08	0x08
			1/20000	0x01	0x08	0x09
		1/50000	0x01	0x08	0x0A	
		AES	0x01	0x08	0x10	
		AES&LENS	1/1000	0x01	0x08	0x14
			1/2000	0x01	0x08	0x15
	1/5000	0x01	0x08	0x16		
6	Image level	LEVEL	-128~000 ~127	0x01	0x0C	0x00~0xFF
5	White Balance Manual R GAIN	R GAIN	-128 ~000 ~127	0x01	0x0D	0x00~0xFF
7	White Balance Manual B GAIN	B GAIN	-128 ~000 ~127	0x01	0x0E	0x00~0xFF
8	Pedestal	PEDESTAL	-28~000 ~100	0x01	0x10	0x64~0xE4
9	Gamma	GAMMA	OFF	0x01	0x14	0x00
			ON	0x01	0x14	0x01
			HIGH	0x01	0x14	0x02
10	Detail	DETAIL	-128~127	0x01	0x15	0~255
11	Chroma	CHROMA	-128~000 ~50	0x01	0x16	0x00~0xB2
12	Detection Area(ALC)	ALC GATE	OFF	0x01	0x1C	0x00
			No.1	0x01	0x1C	0x01
			No.2	0x01	0x1C	0x02
			No.3	0x01	0x1C	0x03
			No.4	0x01	0x1C	0x04
			No.5	0x01	0x1C	0x05
			No.6	0x01	0x1C	0x06
			No.7	0x01	0x1C	0x07
			No.8	0x01	0x1C	0x08
No.9	0x01	0x1C	0x09			
13	Title Mode	MODE	OFF	0x01	0x1D	0x00
			TOP	0x01	0x1D	0x01
			BOTTOM	0x01	0x1D	0x02
14	INPUT CHARACTER	1 or 2 characters		0x01	0x1E	
15		3 or 4 characters		0x01	0x1F	
16		5 or 6 characters		0x01	0x20	
17		7 or 8 characters		0x01	0x21	
18		9 or 10 characters		0x01	0x22	
19		11 or 12 characters		0x01	0x23	
20		13 or 14 characters		0x01	0x24	
21		15 or 16 characters		0x01	0x25	
22		17 or 4 characters		0x01	0x26	
23		3 or 4 characters		0x01	0x27	
24	3 or 4 characters		0x01	0x28		
25	Gate display	OFF	0x00	0x01	0x30	0x00
		WHITE GATE	0x01	0x01	0x30	0x01
		ALC GATE	0x02	0x01	0x30	0x02
26	Peak/Average	PEAK/AVE	0/100	0x01	0x39	0x00
			15/85	0x01	0x39	0x01
			30/70	0x01	0x39	0x02
			50/50	0x01	0x39	0x03
			75/25	0x01	0x39	0x04
			100/0	0x01	0x39	0x05

	Feature	Menu display		KP-D20A				
		Command	Parameter	Area	ID	Data		
27	White balance Area Select	WHITE GATE	OFF	0x01	0x3C	0x00		
			No.1	0x01	0x3C	0x01		
			No.2	0x01	0x3C	0x02		
			No.3	0x01	0x3C	0x03		
			No.4	0x01	0x3C	0x04		
			No.5	0x01	0x3C	0x05		
			No.6	0x01	0x3C	0x06		
			No.7	0x01	0x3C	0x07		
			No.8	0x01	0x3C	0x08		
28	Lens control	IRIS OPEN	No.9	0x01	0x3C	0x09		
			OFF	0x01	0x3E	0x00		
29	CAMERA MENU OPERATION	CAMERA MENU OPERATION	ON	0x01	0x3E	0x01		
			OFF	0x01	0x40	0x00		
			MENU ON	0x01	0x40	0x02		
			UP	0x01	0x40	0x10		
			DOWN	0x01	0x40	0x20		
			LEFT	0x01	0x40	0x80		
30	CAMERA RESET	CAMERA RESET	RIGHT	0x01	0x40	0x40		
31	WDR MODE	WDR MODE	OFF	0x01	0x4F	0x00		
			ON	0x01	0x51	0x01		
			AUTO	0x01	0x51	0x02		
32	WDR BLEND	WDR BLEND	128~255	0x01	0x52	0x80~0xFF		
33	SHORT SHUTTER	SHORT SHUTTER	1/30(1/25)	0x01	0x53	0x00		
			1/50	0x01	0x53	0x01		
			1/100	0x01	0x53	0x02		
			1/250	0x01	0x53	0x03		
			1/500	0x01	0x53	0x04		
			1/1000	0x01	0x53	0x05		
			1/2000	0x01	0x53	0x06		
			1/5000	0x01	0x53	0x07		
			1/10000	0x01	0x53	0x08		
			1/20000	0x01	0x53	0x09		
34	SDI OUTPUT	SDI OUTPUT	1/50000	0x01	0x53	0x0A		
			HD-SDI	0x01	0x57	0x00		
35	ATW RANGE	ATW RANGE	HD-VLC	0x01	0x57	0x01		
			NORMAL	0x01	0x61	0x00		
36	MANUAL GAIN	PRESET GAIN	SPECIAL	0x01	0x61	0x01		
			0~48	0x01	0x68	0x00~0x30		
37	AGC LIMIT	AGC LIMIT	0~48	0x01	0x6A	0x06~0x30		
38	KNEE	KNEE	OFF	0x01	0x98	0x00		
			ON	0x01	0x98	0x01		
			SLOPE1	0~255	0x01	0x99	0x00~0xFF	
			SLOPE2	0~255	0x01	0x9A	0x00~0xFF	
			POINT1	0~255	0x01	0x9B	0x00~0xFF	
40			POINT2	0~255	0x01	0x9C	0x00~0xFF	
41			42	43	VIDEO RENS Control	IRIS GAIN	0~255	0x01
44	SCENE FILE SAVE	SCENE FILE SAVE	FILE1	0x01	0xA7	0x00		
			FILE2	0x01	0xA7	0x01		
			FILE3	0x01	0xA7	0x02		
			FILE4	0x01	0xA7	0x03		
			FILE5	0x01	0xA7	0x04		
49	SCENE FILE SELECT	SCENE FILE SELECT	FILE1	0x01	0xA8	0x00		
			FILE2	0x01	0xA8	0x01		
			FILE3	0x01	0xA8	0x02		
			FILE4	0x01	0xA8	0x03		
			FILE5	0x01	0xA8	0x04		
50	LENS TYPE	LENS TYPE	DC	0x01	0xA9	0x00		
			VIDEO	0x01	0xA9	0x01		
51	TV FORMAT	TV FORMAT	1080i 59.94	0x01	0xAE	0x00		
			1080i 50	0x01	0xAE	0x01		
			1080p 29.97	0x01	0xAE	0x02		
			1080p 25	0x01	0xAE	0x03		

	Feature	Menu display		KP-D20A		
		Command	Parameter	Area	ID	Data
52	Aspect Ratio	VBS ASPECT	4:3	0x01	0xAF	0x00
			16:9	0x01	0xAF	0x01
53	MASKING	MASKING	PRESET	0x01	0xC0	0x00
			VARIABLE	0x01	0xC0	0x01
54		HUE R	0~255	0x01	0xC1	0x00~0xFF
55		HUE Y	0~255	0x01	0xC2	0x00~0xFF
56		HUE G	0~255	0x01	0xC3	0x00~0xFF
57		HUE C	0~255	0x01	0xC4	0x00~0xFF
58		HUE B	0~255	0x01	0xC5	0x00~0xFF
59		HUE M	0~255	0x01	0xC6	0x00~0xFF
60		SAT R	-	-	-	-
61		SAT Y	-	-	-	-
62		SAT G	1~255	0x01	0xC9	0x01~0xFF
63		SAT C	1~255	0x01	0xCA	0x01~0xFF
64		SAT B	1~255	0x01	0xCB	0x01~0xFF
65		SAT M	1~255	0x01	0xCC	0x01~0xFF