

KP-D20A/B remote control protocol and command data

1) Comms* specifications

Sync system	Start-stop sync
Bit rate	9600 bps
Data length	8 bits
Start bit	1
Stop bits	2
Parity	None
Bit transfer	LSB first

***Comms : Communications**

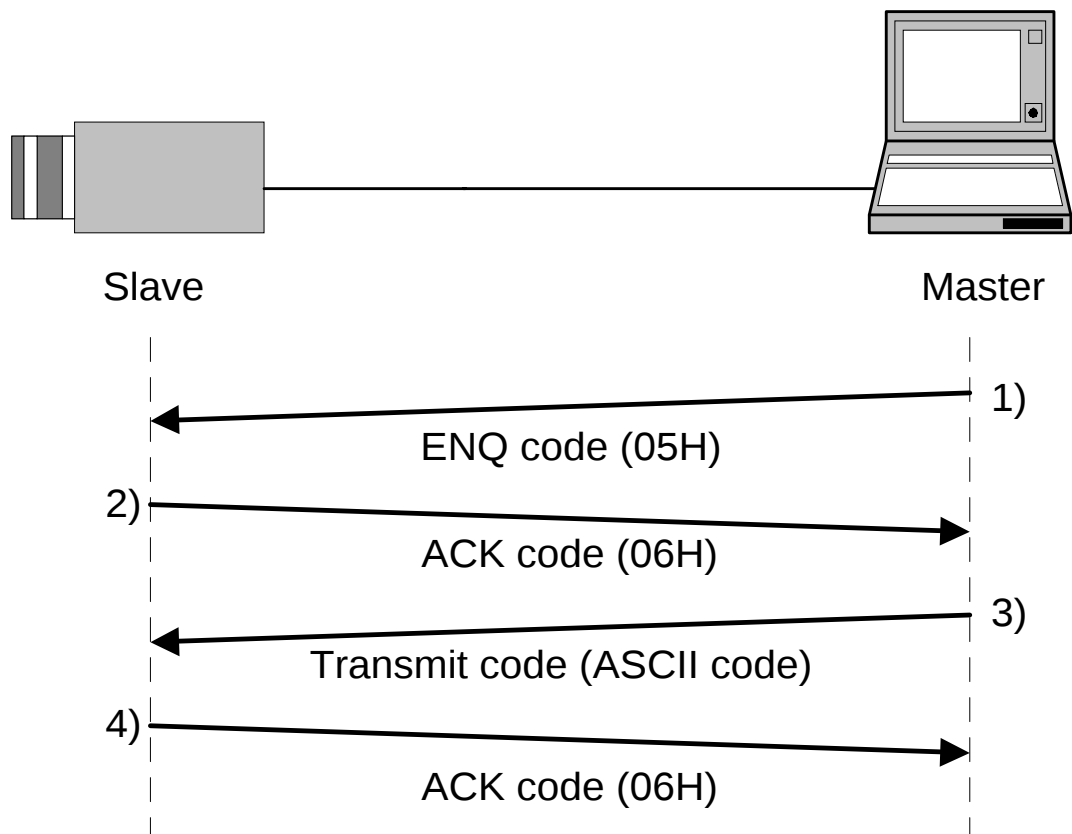
2) Comms control

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

3) Comms procedure

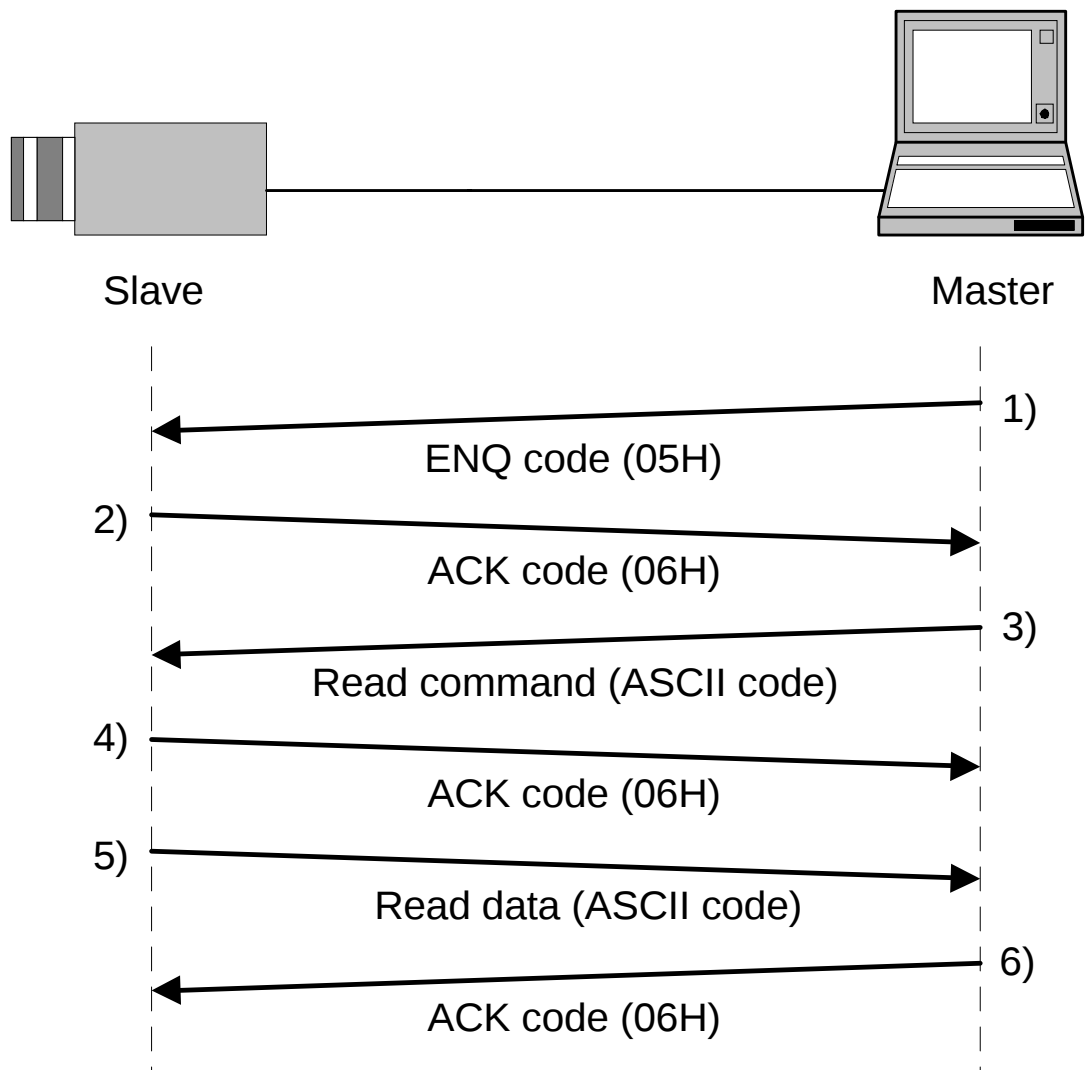
- The following pages indicate the camera controller chip and remote control software data protocol. In the description, the camera is designated as slave and the software as master.
- Receive protect timer (time out error)
The receive protect timer for master and slave processes is 1 second. For example, 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.

a) Transmission from master (normal process)



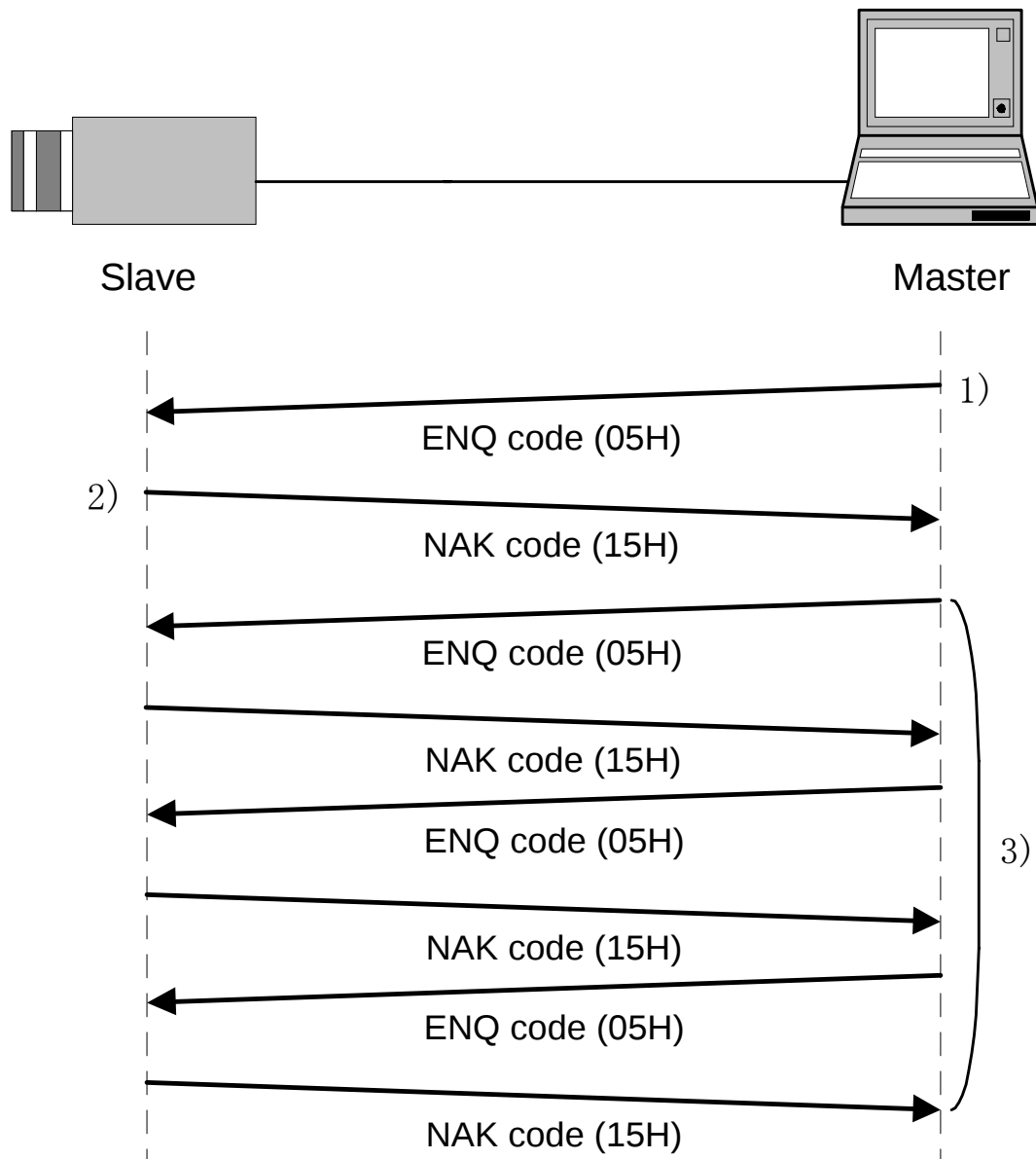
- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends data to slave.
- 4) Slave acknowledges receipt of data by again returning ACK to master and end the handshake.

b) Master reads data (normal process)



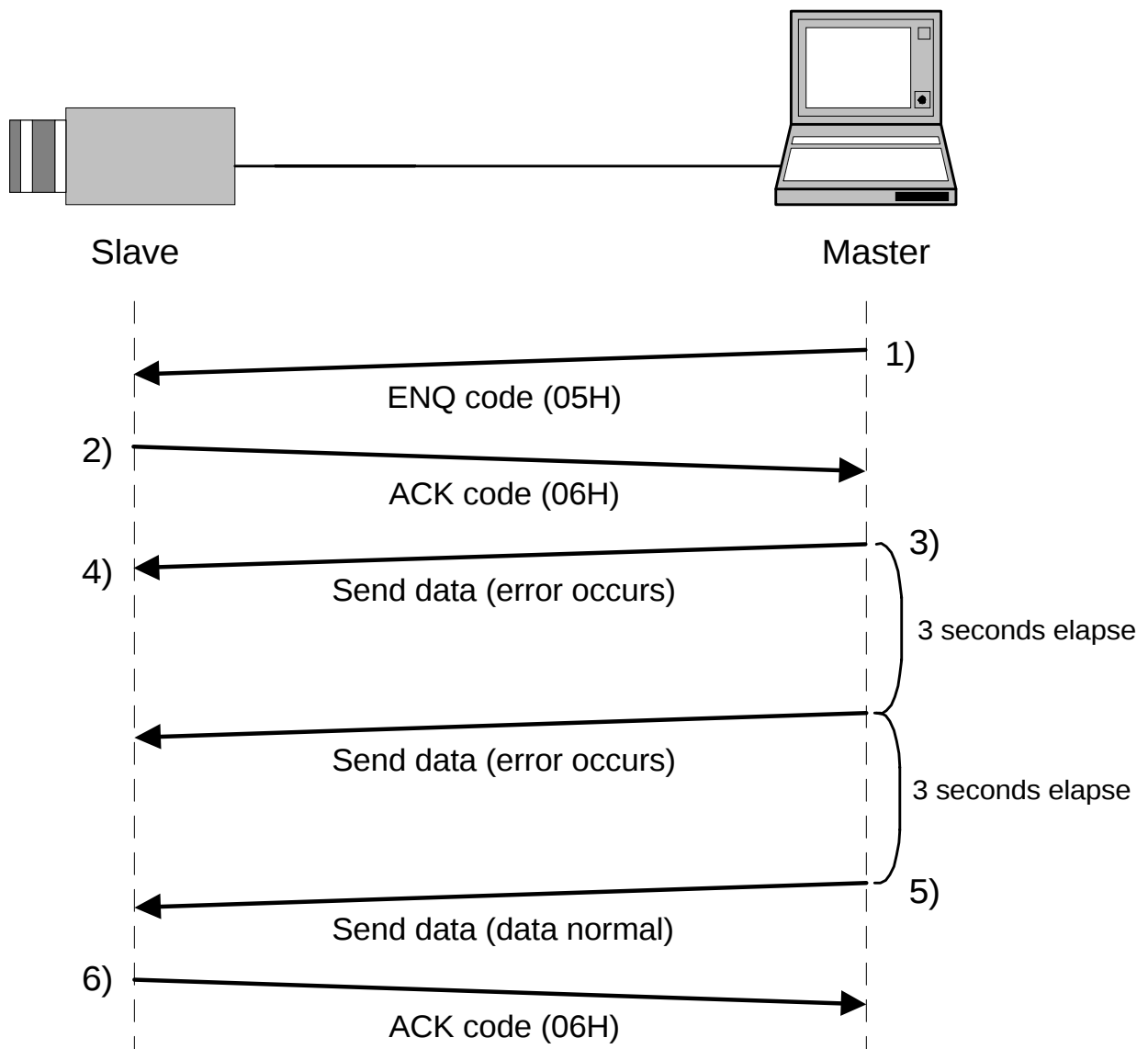
- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends read data command to slave.
- 4) Slave receives read data command, then acknowledges by returning ACK code to master.
- 5) Slave sends read data to master.
- 6) Master receives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

c) Data transmitted by master (control abort process)



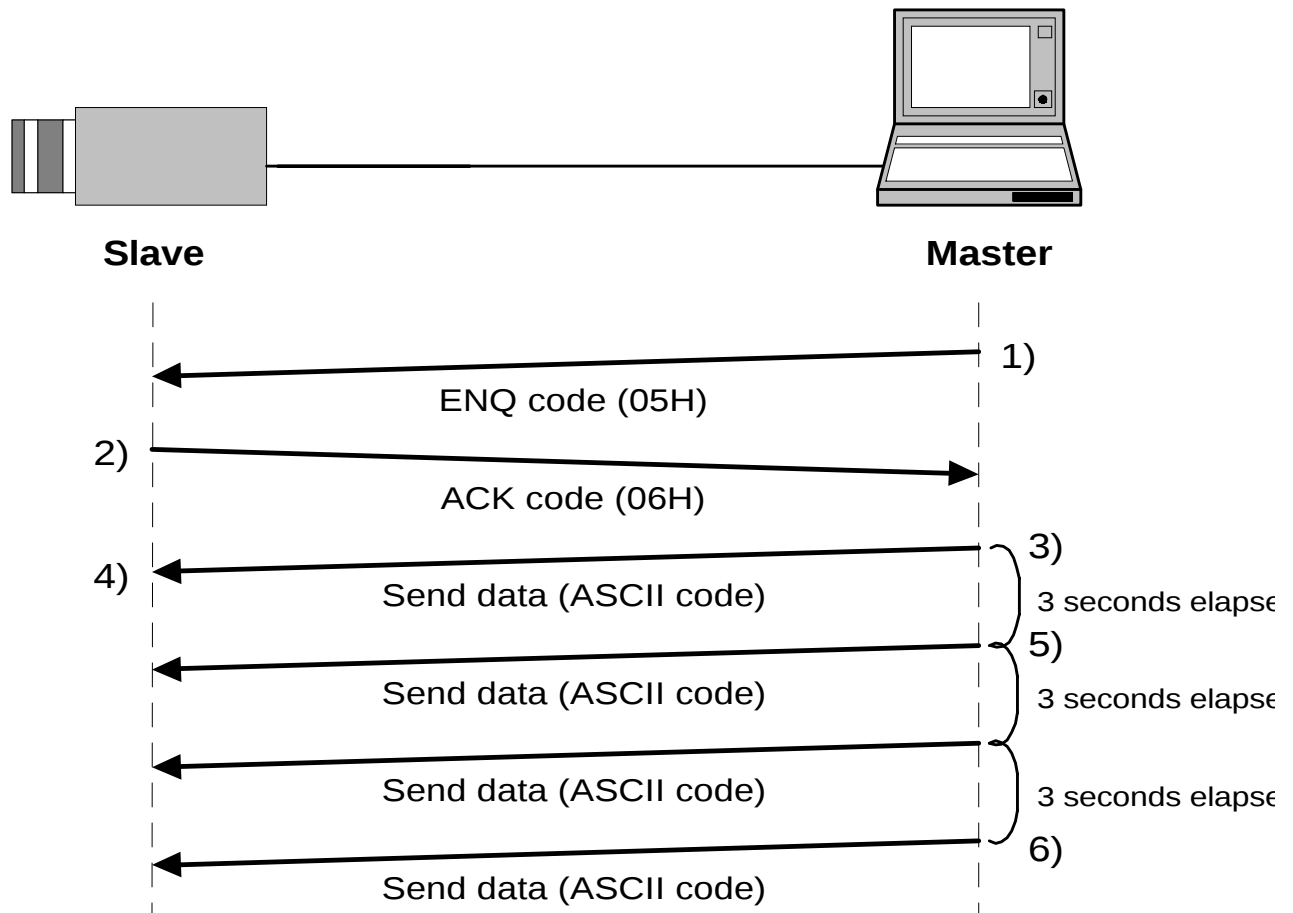
- 1) Master sends ENQ code to slave.
- 2) Since ACK code cannot be sent, slave sent NAK code to master.
- 3) Sequence is repeated 3 times in attempts to retransmit. After receiving the 3rd successive NAK code, comms control is aborted.

d) Data transmitted by master (data error process)



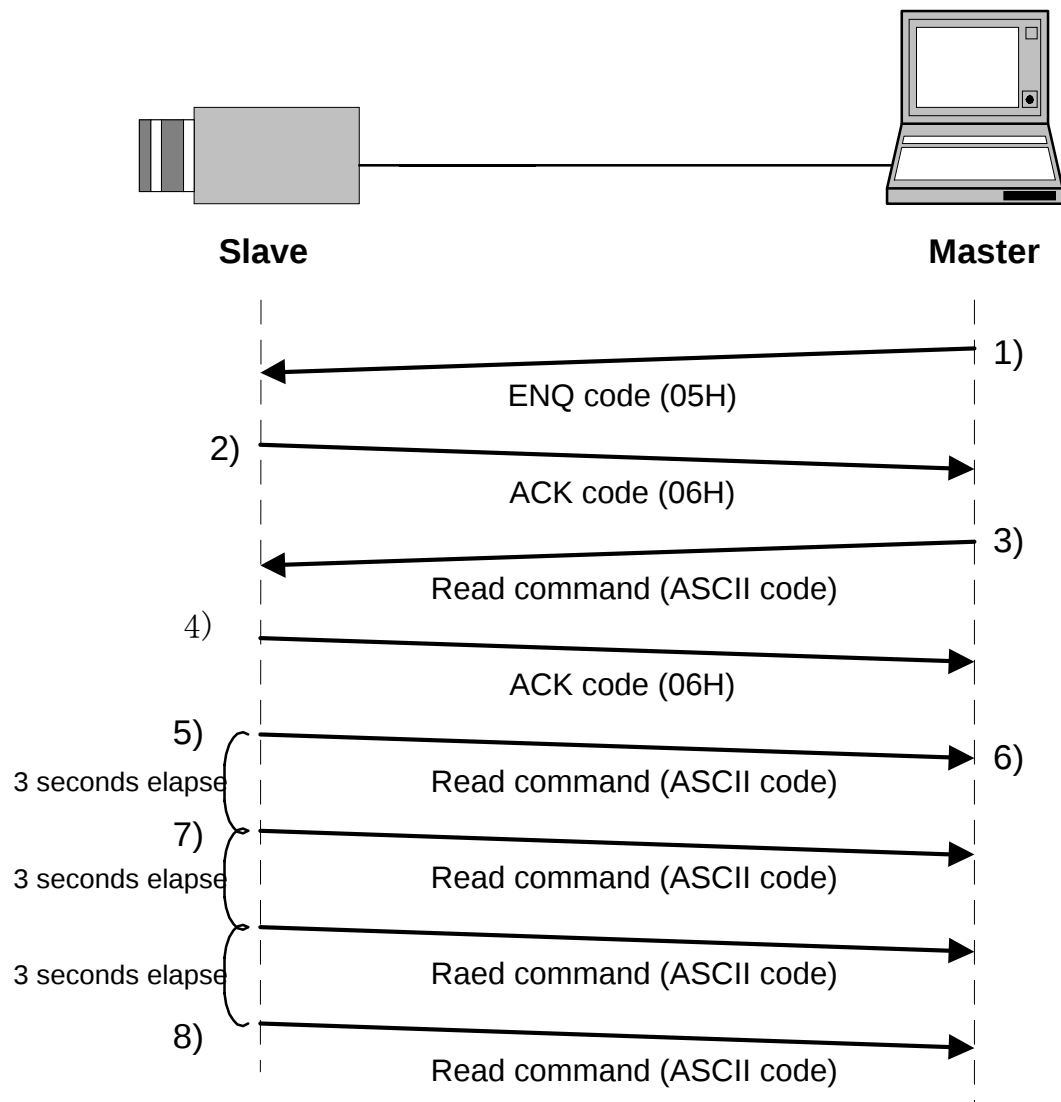
- 1) Session starts when ENQ is sent from master to slave.
- 2) Slave acknowledges by returning ACK to master.
- 3) Master sends data, but error detected (framing, over-run error).
- 4) Slave detects error and does not accept data.
- 5) Sequence 3 and 4 repeats, then master transfers normal data.
- 6)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

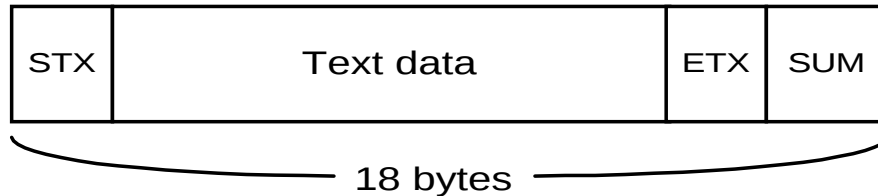
(4) Comms command Text data format

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

1) Command data are converted into ASCII code and transmitted.

2) Comms byte quantity is 18.

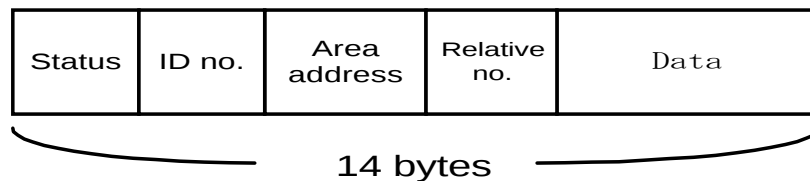
3) Comms data format (transmission sequence).



■ 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

4) Text data format details (transmission sequence).

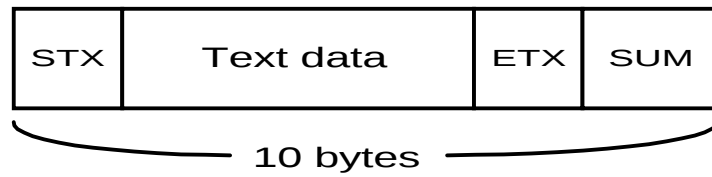


■ Text data details

- Status : Transmission data status. 2 bytes (ASCII code)
Used for EEPROM write (0: write absent, 1: write present)
- ID no. : Identification (camera ID) number set by user.
However, ID no. FFH is global address and all data are changed.
2 bytes (ASCII code)
- 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)

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

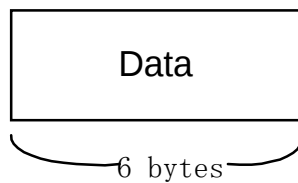
- 1) Command data are converted into ASCII code and transmitted.
- 2) Comms byte quantity is 10.
- 3) Comms data format (transmission sequence)



■ 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)

Remote controll protocol and command data of KP-D20A/B/D28/D591

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = 00(not write)

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **SEND ONLY**

4) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

No.	Item		STX	1 EEPROM	2 ID No.	3 REA ADDRESS	4 RELATIVE NO	5	6	7	DATA	ETX	SUM	NOTE
1	AGC mode	ON	02	00	FF	01	06	00	00	00	03	27		
2		OFF	02	00	FF	01	06	01	00	00	03	26		
3	AGC GAIN	6dB	02	00	FF	01	4D	00	00	00	03	15		
4		12dB	02	00	FF	01	4D	01	00	00	03	14		
5		21dB	02	00	FF	01	4D	02	00	00	03	13		
6		31dB	02	00	FF	01	4D	03	00	00	03	12		
7	MANUAL SHUTTER speed	1/60s	02	00	FF	01	08	00	00	00	03	25		
8		1/100s	02	00	FF	01	08	01	00	00	03	24		
9		1/250s	02	00	FF	01	08	02	00	00	03	23		
10		1/500s	02	00	FF	01	08	03	00	00	03	22		
11		1/1000s	02	00	FF	01	08	04	00	00	03	21		
12		1/2000s	02	00	FF	01	08	05	00	00	03	20		
13		1/4000s	02	00	FF	01	08	06	00	00	03	1F		
14		1/10000s	02	00	FF	01	08	07	00	00	03	1E		
15		1/20000s	02	00	FF	01	08	08	00	00	03	1D		
16		1/30000s	02	00	FF	01	08	09	00	00	03	1C		
17	AES	AUTO	02	00	FF	01	08	0A	00	00	03	14		
18	WHITE BALANCE mode	ATW	02	00	FF	01	04	00	00	00	03	29		
19		PRESET	02	00	FF	01	04	01	00	00	03	28		
20		MANUAL	02	00	FF	01	04	02	00	00	03	27		
21	R gain (WB: MANUAL MODE ONLY)	MIN	02	00	FF	01	0D	01	00	00	03	19		
22		CENTER	02	00	FF	01	0D	64	00	00	03	11		
23		MAX	02	00	FF	01	0D	FF	00	00	03	ED		
24	B gain (WB: MANUAL MODE ONLY)	MIN	02	00	FF	01	0E	01	00	00	03	18		
25		CENTER	02	00	FF	01	0E	64	00	00	03	10		
26		MAX	02	00	FF	01	0E	FF	00	00	03	EC		

Remote controll protocol and command data of KP-D20A/B/D28/D591

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = 00(not write)

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **SEND ONLY**

4) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

No.	Item		STX	1 EEPROM	2 ID No.	3 REA ADDRESS	4 RELATIVE NO	5	6	7	DATA	ETX	SUM	NOTE
27	TITLE	OFF	02	00	FF	01	1D	00	00	00	03	18		
28		TOP	02	00	FF	01	1D	00	00	00	03	17		
29		BOTTOM	02	00	FF	01	1D	01	00	00	03	16		
30		MENU	02	00	FF	01	2A	02	00	00	03	18		
31	MENU	OFF	02	00	FF	01	2A	00	00	00	03	1A		
32		MAIN	02	00	FF	01	2B	00	00	00	03	19		
33		TITLE	02	00	FF	01	2B	01	00	00	03	18		
34		LIGHT CONT	02	00	FF	01	2B	03	00	00	03	16		
35		AREA SELEC	02	00	FF	01	2B	04	00	00	03	15		
36		WHITE BAL.	02	00	FF	01	2B	05	00	00	03	14		
37		D.ZOOM	02	00	FF	01	2B	07	00	00	03	12		
38		SUB	02	00	FF	01	2B	08	00	00	03	11		
39	BLC MODE	OFF	02	00	FF	01	1B	00	00	00	03	1A		
40		ON	02	00	FF	01	1B	01	00	00	03	19		
41	BLC AREA	NO.1	02	00	FF	01	1C	00	00	00	03	19		
42		NO.2	02	00	FF	01	1C	01	00	00	03	18		
43		NO.3	02	00	FF	01	1C	02	00	00	03	17		
44		NO.4	02	00	FF	01	1C	03	00	00	03	16		
45		NO.5	02	00	FF	01	1C	04	00	00	03	15		
46		NO.6	02	00	FF	01	1C	05	00	00	03	14		
47		NO.7	02	00	FF	01	1C	06	00	00	03	13		
48		NO.8	02	00	FF	01	1C	07	00	00	03	12		
49		NO.9	02	00	FF	01	1C	08	00	00	03	11		

3 Remote controll protocol and command data of KP-D20A/B/D28/D591

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = 00(not write)

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **SEND ONLY**

4) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

				1	2	3	4	5	6	7			
No.	Item		STX	EEPROM	ID No.	REA ADDRESS	RELATIVE NO	DATA			ETX	SUM	NOTE
50	SENS UP	OFF	02	00	FF	01	1A	00	00	00	03	1B	
51		AUTO X2	02	00	FF	01	1A	01	00	00	03	1A	
52		AUTO X4	02	00	FF	01	1A	02	00	00	03	19	
53		AUTO X6	02	00	FF	01	1A	03	00	00	03	18	
54		AUTO X8	02	00	FF	01	1A	04	00	00	03	17	
55		AUTO X10	02	00	FF	01	1A	05	00	00	03	16	
56		AUTO X12	02	00	FF	01	1A	06	00	00	03	15	
57		AUTO X16	02	00	FF	01	1A	07	00	00	03	14	
58		AUTO X32	02	00	FF	01	1A	08	00	00	03	13	
59		AUTO X64	02	00	FF	01	1A	09	00	00	03	12	
60		MANUAL X2	02	00	FF	01	1A	0B	00	00	03	09	
61		MANUAL X4	02	00	FF	01	1A	0C	00	00	03	08	
62		MANUAL X6	02	00	FF	01	1A	0D	00	00	03	07	
63		MANUAL X8	02	00	FF	01	1A	0E	00	00	03	06	
64		MANUAL X10	02	00	FF	01	1A	0F	00	00	03	05	
65		MANUAL X12	02	00	FF	01	1A	10	00	00	03	1A	
66		MANUAL X16	02	00	FF	01	1A	11	00	00	03	19	
67		MANUAL X32	02	00	FF	01	1A	12	00	00	03	18	
68		MANUAL X64	02	00	FF	01	1A	13	00	00	03	17	
69		MANUAL X88	02	00	FF	01	1A	14	00	00	03	16	
70		MANUAL X128	02	00	FF	01	1A	15	00	00	03	15	
71		MANUAL X160	02	00	FF	01	1A	16	00	00	03	14	
72		MANUAL X256	02	00	FF	01	1A	17	00	00	03	13	
73		MANUAL X320	02	00	FF	01	1A	18	00	00	03	12	
74		MANUAL X420	02	00	FF	01	1A	19	00	00	03	11	
75		MANUAL X512	02	00	FF	01	1A	1A	00	00	03	09	

4 Remote controll protocol and command data of KP-D20A/B/D28/D591

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = 00(not write)

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **SEND ONLY**

4) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

No.	Item		STX	1	2	3	4	5	6	7	ETX	SUM	NOTE
			EEPROM	ID No.	REA ADDRESS	RELATIVE NO	DATA						
78	DIGITAL ZOOM	OFF	02	00	FF	01	37	01	00	00	03	22	
79		ON	02	00	FF	01	37	00	00	00	03	23	
80		WIDE	02	00	FF	01	38	01	00	00	03	21	
81		TELE	02	00	FF	01	38	00	40	00	03	1E	
82	IRIS level	MIN	02	00	FF	01	0C	01	00	00	03	1A	
83		CENTER	02	00	FF	01	0C	64	00	00	03	12	
83		MAX	02	00	FF	01	0C	FF	00	00	03	EE	
84	GAMMA mode	OFF(ã=0.45)	02	00	FF	01	14	01	00	00	03	27	
85		ON(ã=1.0)	02	00	FF	01	14	00	00	00	03	28	
86	CHROMA GAIN	MIN	02	00	FF	01	16	00	00	00	03	26	
87		CENTER	02	00	FF	01	16	80	00	00	03	1E	
88		MAX	02	00	FF	01	16	FF	00	00	03	FA	
89	PEDESTAL level	MIN	02	00	FF	01	10	00	00	00	03	2C	
90		CENTER	02	00	FF	01	10	80	00	00	03	24	
91		MAX	02	00	FF	01	10	FF	00	00	03	00	
92	DETAIL level	MIN	02	00	FF	01	15	00	00	00	03	27	
93		CENTER	02	00	FF	01	15	80	00	00	03	1F	
94		MAX	02	00	FF	01	15	FF	00	00	03	FB	
95	PICTURE mode	NORMAL	02	00	FF	01	13	00	00	00	03	2C	
96		RESERVE	02	00	FF	01	13	01	00	00	03	2B	
97	DNR	OFF	02	00	FF	01	3E	00	00	00	03	15	
98		ON	02	00	FF	01	3E	01	00	00	03	14	
99	CAMERA ID	GLOBAL	02	00	FF	01	0F	FF	00	00	03	EB	
100		OTHER'S	02	00	FF	01	0F	00	00	00	03	17	

5 Remote controll protocol and command data of KP-D20A/B/D28/D591(COMMON DATA mode)

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = **(00 or 01)DON'T CARE**

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **READ ONLY**

4) DATA = **00 ONLY**

5) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

No.	Item	STX	1	2	3	4	5	6	7	ETX	SUM	NOTE
			EEPROM	ID No.	REA ADDRESS	RELATIVE NO	DATA					
1	CONTROLL mode	02	00	FF	81	09	00	00	00	03	22	
2	AGC mode	02	00	FF	81	06	00	00	00	03	25	
3	MANUAL SHUTTER speed	02	00	FF	81	08	00	00	00	03	23	
4	WHITE BALANCE mode	02	00	FF	81	04	00	00	00	03	27	
5	ATW mode	02	00	FF	81	07	00	00	00	03	24	
6	R gain (WB: MANUAL MODE ONLY)	02	00	FF	81	0D	00	00	00	03	17	
7	B gain (WB: MANUAL MODE ONLY)	02	00	FF	81	0E	00	00	00	03	16	
8	IRIS level	02	00	FF	81	0C	00	00	00	03	18	
9	GAMMA mode	02	00	FF	81	14	00	00	00	03	26	
10	ENHANCER level	02	00	FF	81	15	00	00	00	03	25	
11	COLOR level	02	00	FF	81	16	00	00	00	03	24	
12	CAMERA ID	02	00	FF	81	0F	00	00	00	03	15	
13	PICTURE mode	02	00	FF	81	13	00	00	00	03	27	

6 Remote controll protocol and command data of KP-D20A/B/D28/D591

(Note: Each data(1 to 7 , SUM) must be converted to ASCII codes)

1) EEPROM = **(00 or 01)DON'T CARE**

2) CAMERA ID = GLOBAL

3) AREA ADDRESS = **READ ONLY**

4) DATA = **00 ONLY**

5) SUM = FF XOR (STX + (1 to 7) + ETX)low byte

No.	Item	STX	1 EEPROM	2 ID No.	3 REA ADDRESS	4 RELATIVE NO	5	6	7	ETX	SUM	NOTE
14	CONTROLL mode	02	00	FF	81	09	00	00	00	03	22	
15	AGC mode	02	00	FF	81	06	00	00	00	03	25	
16	AES mode	02	00	FF	81	03	00	00	00	03	28	
17	MANUAL SHUTTER speed	02	00	FF	81	08	00	00	00	03	23	
18	WHITE BALANCE mode	02	00	FF	81	04	00	00	00	03	27	
19	ATW mode	02	00	FF	81	07	00	00	00	03	24	
20	R gain (WB: MANUAL MODE ONLY)	02	00	FF	81	0D	00	00	00	03	17	
21	B gain (WB: MANUAL MODE ONLY)	02	00	FF	81	0E	00	00	00	03	16	
22	VIDEO OUTPUT mode	02	00	FF	81	02	00	00	00	03	29	
23	RG(CCD) voltage ROUGH	02	00	FF	81	0B	00	00	00	03	19	
24	RG(CCD) voltage DETAIL	02	00	FF	81	18	00	00	00	03	22	
25	SUB(CCD) voltage ROUGH	02	00	FF	81	0A	00	00	00	03	1A	
26	SUB(CCD) voltage DETAIL	02	00	FF	81	17	00	00	00	03	23	
27	R gain (WB: AUTO INITIAL)	02	00	FF	82	19	00	00	00	03	20	
28	B gain (WB: AUTO INITIAL)	02	00	FF	82	1A	00	00	00	03	18	
29	G gain (WB: AUTO INITIAL)	02	00	FF	82	1B	00	00	00	03	17	
30	C-Y matrix (Gr-y,Gr-g)	02	00	FF	82	3A	00	00	00	03	16	

KP-D20 Series Command List

Item		TEXT Data														
		Status	ID	Aria	Rela. No	Data										
CAMERA TITLE Model	OFF	01	FF	01	1D	00	00	00								
CAMERA TITLE Display Position	TOP	01	FF	01	1D	01	00	00								
	BOTTOM	01	FF	01	1D	02	00	00								
CAMERA TITLE Input	(Char 1,2)	01	FF	01	1E	**	**	00								
	(Char 3,4)	01	FF	01	1F	**	**	00								
	(Char 5,6)	01	FF	01	20	**	**	00								
	(Char 7,8)	01	FF	01	21	**	**	00								
	(Char 9,10)	01	FF	01	22	**	**	00								
	(Char 11,12)	01	FF	01	23	**	**	00								
	(Char 13,14)	01	FF	01	24	**	**	00								
	(Char 15,16)	01	FF	01	25	**	**	00								
	(Char 17,18)	01	FF	01	26	**	**	00								
	(Char 19,20)	01	FF	01	27	**	**	00								
	(Char 21,22)	01	FF	01	28	**	**	00								
	(Char 23,24)	01	FF	01	29	**	**	00								
Caution . See Conversion Table Below																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	G	W	m											!	(
1	1	H	X	n											?	)
2	2	I	Y	o											/	<
3	3	J	Z	p											+	>
4	4	K	A	q											±	:
5	5	L	B	r											►	;
6	6	M	c	s											◄	.
7	7	N	d	t											=	°
8	8	O	e	u											-	°
9	9	P	f	v											*	,
A	A	Q	g	w											●	~
B	B	R	h	x											%	Blank
C	C	S	l	y										←	#	“
D	D	T	J	z										→	X	‘
E	E	U	K											↑		
F	F	V	I											↓	&	

Example . P(19), !(E0)