12. jul 2004

The HV-FxxCL series cameras can be remotely controlled from a PC, etc. The control method is described below.

1. Control specifications

(1) Bit rate 19200bps
 (2) Communication system Full duplex
 (3) Sync system Start-stop system
 (4) Transmission system Bit serial
 (5) Used code 8-bit binary

(6) Bit composition start bit : 1-bit
Data bit : 8-bit
Parity bit: None
Stop bit : 1-bit

(7) Error detection 1. SUM check (16-bit)

2. Time check (Time between, the respond command and ACK, NAK receiving should be less than 0.5 second.)

(8) Error correction Request repeat system

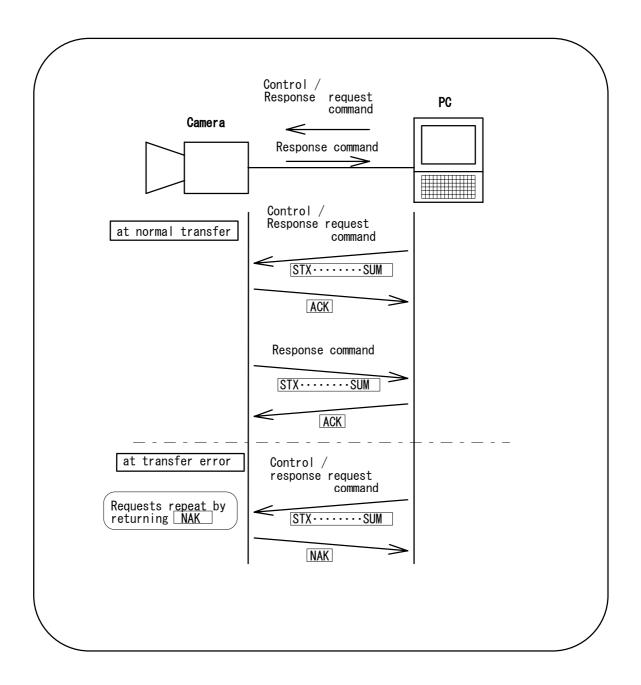
Note: When the HV- FxxCL series is controlled from a PC, the capacity of the buffer for the transmitted serial data is 128 bytes. When the camera ends the processing of a received command, it releases the buffer area for the command. Though the processing time for a command is normally approx. 20ms, the processing time for a response request command, the auto white balance (AWB) command, the auto shading control (ASC) command, the auto black balance (A. BLACK) command, etc. is in units of second. When setting commands are being transmitted to the camera during the processing time, the receive buffer overflows, resulting in causing malfunction.

Therefore, be sure to transmit a response request command or a command related to the auto control functions after a response command has been returned from the camera.

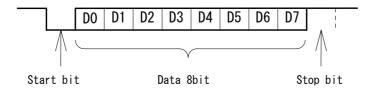
2. Control sequence

2.1 Basic system

The control command and the response command can be transmitted independently. The cameras cannot transmit the control command during receiving response command or response request command.

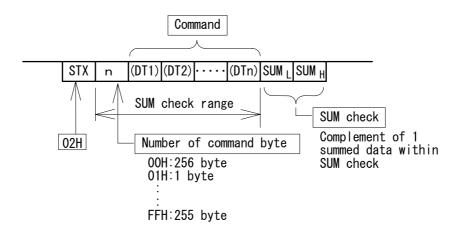


3. Character (1 byte) bit composition



4. Message composition

4.1 Standard type Transmits one command per a message.



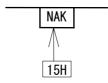
4. 2 Normal response

Returns ACK when the received message has no transfer errors.



4.3 Abnormal response

Returns NAK when the received message has transfer errors. Repeat the message when received NAK.



4.4 Example of standard type message (Case of the HV-C20 color camera "BAR/CAM:BAR" command)

STX : 02H

n : 04H (4 byte commands) $DT1 \sim DT4$: 20H 08H 01H FEH

SUM : 04H+20H+08H+01H+FEH=01H 2BH Complement of 1 summed data : FEH D4H(SUMH:FEH, SUML:D4H)

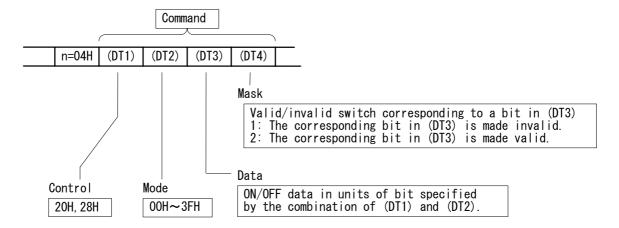
Therefore, the message composition of "BAR/CAM:BAR" is shown below.

02H 04H 20H 08H 01H FEH D4H FEH

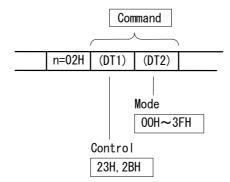
5. Configuration of command

Note: For details, see the command list for each camera.

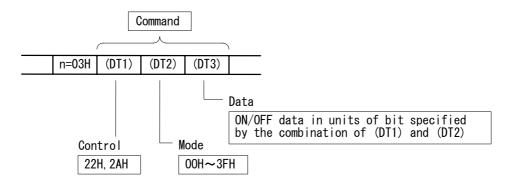
- 5.1 ON/OFF control commands (Setting command of each function, response request commands, response commands)
 - (1) Setting commands



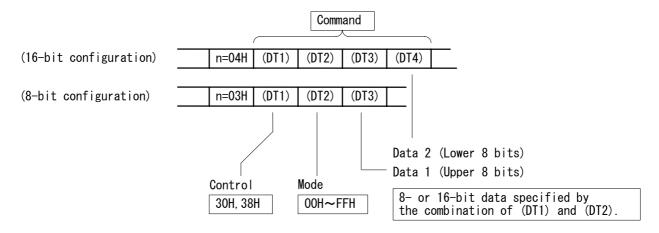
(2) Response request commands
Request the data specified by the mode of setting commands.



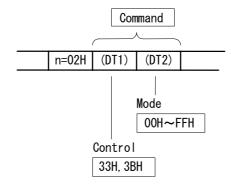
(3) Response commands
Response the data specified by the mode of setting commands.



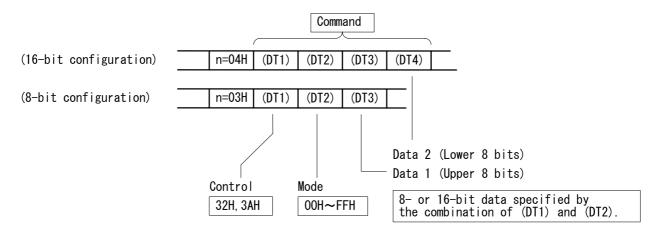
- 5.2 Analog control commands (Setting commands of each analog data, response request command, response commands)
 - (1) Setting commands



(2) Response request commands
Request the data specified in the mode of setting commands.

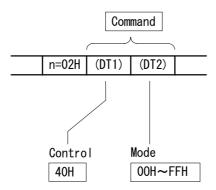


(3) Response commands
Response the data specified in the mode of setting commands.



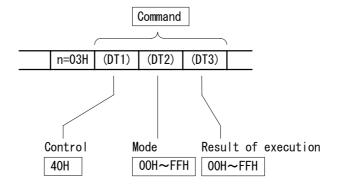
- 5.3 Auto function control commands (Setting (execution) commands of each auto function, response (result of execution) commands)
 - (1) Setting commands

 Execute the auto functions including auto white balance and auto black balance.

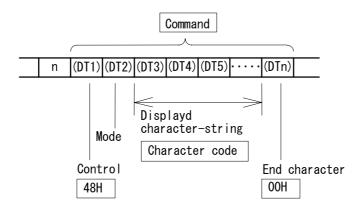


(2) Response commands

Return the result after executing the auto functions including auto white balance and auto black balance.



- 5.4 Character-string display control commands
 - (1) Setting commands



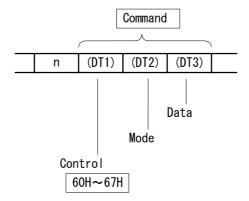
Note: Response request commands and response commands are not included in the characterstring display control commands.

5.5 File control commands

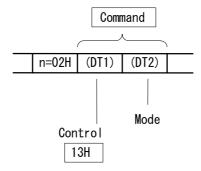
(1) Setting commands

Load, save and clear the specified files in a batch.

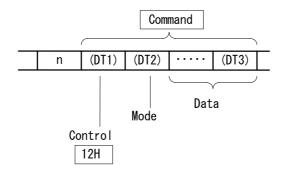
The number of bytes and function of a command differ from camera to camera. For details, see the command list for each camera.



- 5.6 Status read commands (Read the model designation, version, etc. of a camera.)
 - (1) Response request commands
 Request the data specified by mode.



(2) Response commands
Response the data corresponding to mode.



Technical information: Command List for HV-F22CL/F31CL Remote Control (Rev0. 90)

12. jul. 2004

The Hitachi HV-F22/F31CL series color cameras are provided with the functions which can be controlled from PC. This information is prepared to explain the commands corresponding respective control items. For remote control procedure, see Technical Information entitled Protocol for remote control.

- 1. ON/OFF control commands (Setting commands, response request commands, response commands)
 - Note 1. Set character S listed in the (DT4) column to 0 to control a camera, and 1 not to control it.
 - 2. Setting data can be backed up to the EEPROM by the command MEMORY BACK UP. In the case of the last of the name of the column of (DT3) is described as ON or OFF, (DT3) becomes ON or OFF as the name in case of 1 and (DT3) becomes the opposite condition in case of 0.

(Exsample)

KNEE OFF: Bit 2 of (DT3)

OFF: (20,02,04,FB) / ON: (20,02,00,FB)

(DT1)	(DT2)		(DT3)	
CTL	MODE	Bit	Item	MASK
		0		1
20H	02H	1	GAMMA OFF	S
23H		2	KNEE OFF	S
22H		3		1
		4	SHARPNESS OFF	S
		5	SHADING OFF	S
		6	MASKING ON	S
		7		1

(DT4)	(DT2)		(DT3)		(DT4)
(DT1) CTL	MODE	Bit	Item		MASK
CIL	MODE		Цен		
		0			1
20H	04H	1			1
23H		2	WHITE BAL MODE	0	S
22H		3		1	S
		4	GAIN MODE	0	S
		5		1	S
		6			1
		7	AUTO KNEE OFF		S
		0	SHUTTER MODE	0	S
	05H	1		1	S
		2		2	S
		3			S
		4			S
		5			S
		6			S
		7			S
		0			1
	06H	1			1
		2			1
		3			1
		4			1
		5			1
		6			1
		7	FLARE OFF		S

WHITE BAL MODE

	-	MEMORY	AUTO	1	(DT4)
0	0	1	0	1	F3H
1	0	0	1	1	

GAIN MODE

	-	MANUAL	AUTO	-	(DT4)
0	0	1	0	1	CFH
1	0	0	1	1	

MANUAL : The setting of variable GAIN by "GAIN(2001H)" command is enable.

AUTO : AGC ON

SHUTTER MODE

	OFF	VAR.	AES	EXT	(DT4)
0	0	1	1	1	F8H
1	0	1	0	1	
2	0	0	1	1	

OFF :HV-F22 1/15sec, HV-F31 1/30sec

VARIABLE: The setting of variable shutter by "SHUTTER VARIABLE(3038H)" command is enabled.

AES : AES ON

EXT : External trigger mod

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit	Item		MASK
		0			1
20H	07H	1			1
23H		2			1
22H		3			1
		4	ALC PEAK/AVE	0	S
		5		1	S
		6			1
		7			1
		0	COLOR BAR ON		1
	08H	1			S
		2			S
		3			S
		4	NEGA ON		1
		5			1
		6			S
		7			S
		0			1
	0BH	1			1
		2			1
		3			1
		4			1
		5			1
		6			1
		7	PAINT ENABLE ON		S

ALC PEAK/AVE

		50/50	25/75	15/85	0/100	(DT4)
Ī	0	0	1	0	1	CFH
Ī	1	0	0	1	1	

PAINT ENABLE ON

if PAINT ENABLE ON(20,0B,80,7F),R/B Paint GAIN (3018H,301AH), R/B Paint BLACK(3021H,3023H) adjustment become effective.

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit	Item		MASK
		0	0		1
20H	11H	1	1		S
23H		2			S
22H		3			1
		4			S
		5			S
		6			S
		7	GL IN 75Ω/HIGH		S
		0	D.N.R. MODE	0	S
	15H	1		1	S
		2			1
		3			1
		4			1
		5			1
		6			1
		7			1
		0			1
	17H	1			1
		2	INDICATOR DISPLAY	0	S
		3		1	S
		4			1
		5			1
		6			11
		7			1

GL IN 75 Ω /HIGH

75 Ω	HIGH	(DT4)
0	1	7FH

D.N.R. MODE

	OFF	MODE1	MODE2	1	(DT4)
0	0	1	1	0	FCH
1	0	0	1	1	

INDICATOR DISPLAY

The indication mode of each detection area is chosen.

			WHT		FOCUS	(DT4)
		OFF	/ BLK		GATE	
ĺ	0	0	1	0	1	F3H
ĺ	1	0	0	1	1	

WHT/BLK : The detection indicator of WHT is displayed normally.

Detection indicator of ABB is displayed if ABB ON .

FOCUS GATE : The indicator of FOCUS GATE is displayed.

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit			MASK
		0	(SHARPNESS)	0	S
20H	20H	1	COLOR DTL	1	S
23H		2	PHASE ch1	2	S
22H		3			1
		4			11
		5			1
		6			1
		7			1
		0	(SHARPNESS)	0	S
	21H	1	COLOR DTL	1	S
		2	PHASE ch2	2	S
		3			11
		4			11
		5			11
		6			11
		7			1
		0	(SHARPNESS)	0	S
	29H	1	DTL BOOST FREQ	1	S
		2			11
		3			11
		4			11
		5			11
		6			11
		7			1
		0	PIXEL CORRECT ON		<u>s</u>
	33H	1			1
		2			1
		3			11_
		4			11_
		5			1
		6			1
		7			1

(SHARPNESS) COLOR DTL PHASE ch1

	R-Mg	Mg-B	В-Су	Cy-G	G-Ye	Ye-R	-(R-Mg)	-(R-Mg)	(DT4)
0	0	1	0	1	0	1	0	1	F8H
1	0	0	1	1	0	0	1	1	
2	0	0	0	0	1	1	1	1	

This command is used with COLOR DTL PHASE (3059H).

(SHARPNESS) COLOR DTL PHASE ch2

_		R-Mg	Mg-B	В-Су	Cy-G	G-Ye	Ye-R	-(R-Mg)	-(R-Mg)	(DT4)
	0	0	1	0	1	0	1	0	1	F8H
	1	0	0	1	1	0	0	1	1	
	2	0	0	0	0	1	1	1	1	

This command is used with COLOR DTL PHASE (306BH).

(SHARPNESS) BOOST FREQ

_	LOW	MID	HIGH		(DT4)
0	0	1	0	1	3FH
1	0	0	1	1	

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit	Item		MASK
		0			1
20H	35H	1			1
23H		2			1
22H		3			1
		4	COLOR DTL CH1 ON		S
		5	COLOR DTL CH2 ON		S
		6			1
		7			1
		0	EXT TRIGGER MODE	0	S
	36H	1		1	S
		2			1
		3			1
		4			1
		5	TRIGGER POLARITY		S
		6			1
		7			1
		0	FLASH WIDTH	0	S
	48H	1		1	S
		2			1
		3			1
		4			1
		5			1
		6			1
		7			1

EXT TRIGGER MODE

	MODE0	MODE1			(DT4)
0	0	1	0	1	FCH
1	0	0	1	1	

TRIGGER POLARITY

	NEGATIVE	POSITIVE	(DT4)
0	0	1	DFH

FLASH PULSE WIDTH

	-	NARROW	MID	WIDE	(DT4)
0	0	1	0	1	FCH
1	0	0	1	1	

NARRROW:10us MIDDLE :50us WIDE :250us

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit	Item		MASK
		0			11
28H	00H	1			1
2BH		2			1
2AH		3			1
		4			1
		5			1
		6			1
		7	ALC GATE ON		S
		0			
	01H	1			
		2	SHADING MODE	0	S
		3		1	S
		4			
		5			
		6			
		7			
		0	AGC LIMIT		0
	08H	1	06H(+6dB) \sim		0
		2	0CH(+12dB)		0
		3	. ,		0
		4			1
		5			1
		6			1
		7			1

SHADING MODE

		LUMINANCE	COLOR	FLAT	ī	(DT4)
()	0	1	0	1	F3H
•	1	0	0	1	1	

(DT1)	(DT2)		(DT3)		(DT4)
CTL	MODE	Bit	Item		MASK
		0	WHITE GATE ON		S
28H	10H	1			1
2BH		2			1
2AH		3	3		1
		4			1
		5			1
		6			1
		7	ATW SPEED		S
		0	ALC SPEED	0	S
	11H	1		1	S
		2			1
		3			1
		4			1
		5			1
		6			1
		7			1

ATW SPEED

Sets real-time auto white balance response speed.

SLOW	STANDARD	(DT4)
0	1	BFH

ALC SPEED

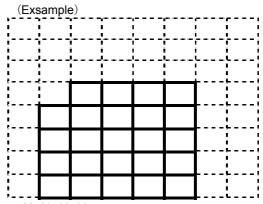
It sets up it with the action speed of AGC and AES.

	SLOW	STANDARD	FAST	-	(DT4)
0	0	1	0	1	FCH
1	0	0	1	1	

(DT1)	(DT2)		(DT3)	(DT4)
CTL	MODE	Bit	Item	MASK
		0		S
28H	20H	1	ALC GATE DATA1	S
2BH		2		S
2AH		3		S
		4		S
		5		S
		6		S
		7		S
		0		S
	21H	1	ALC GATE DATA2	S
	2111	2	ALO OME BATAL	
		3		S S
		4		S
		5		S
		6		
		7		S S
	2211	0	ALC GATE DATA3	S
	22H	1	ALC GATE DATAS	S
		2		S
		3		S
		4		S
		5		S
		6		S
		7		S
		0		S
	23H	1	ALC GATE DATA4	S
		2		S
		3		S
		4		<i>σ σ σ</i>
		5		S
		6		S
		7		
		0		S
	24H	1	ALC GATE DATA5	S
		2		S
		3		S
		4		S
		5		S
		6		0 0 0 0 0 0 0 0
		7		S

ALC GATE DATA1 \sim 8

DATA1(28,20)The top data
DATA8(28,27) The bottom data
(MSB: The left end, LSB: The right end),



28, 20, 00, 00 28, 21, 00, 00 28, 22, 00, 00 28, 23, 3C, 00 28, 24, 7C, 00 28, 25, 7C, 00 28, 26, 7C, 00 28, 27, 7C, 00

(DT1)	(DT2)		(DT3)	(DT4)
CTL	MODE	Bit	Item	MASK
		0		S
28H	25H	1	ALC GATE DATA6	S
2BH		2		S
2AH		3		S
		4		S
		5		S
		6		S
		7		S
		0		S
	26H	1	ALC GATE DATA7	S
		2		S
		3		S
		4		S
		5		S
		6		S
		7		S
		0		S
	27H	1	ALC GATE DATA8	S
		2		S
		3		S
		4		S
		5		S
		6		S
		7		S

2. Analog control commands (Setting commands, response request commands, response commands)

Note 1. ${\sf X}$ in the DATA column is undefined.

2. Setting data can be backed up to the EEPROM by the command MEMORY BACK UP.

	(DT1)	(DT2)	(DT3)u , (DT4)p
Item	CTL	MODE	DATA
R GAIN		00H	min preset max max
B GAIN	30H	02H	80XXH~00XXH~7FXXH (SINGED)
R GAMMA	33H	03H	min preset max
B GAMMA	32H	05H	80XXH~00XXH~7FXXH (SINGED)
FLARE		07H	-max FLARE off +max 80XXH~00XXH~7FXXH (SINGED)
R paint GAIN		18H	min preset max max
B paint GAIN		1AH	80XXH~00XXH~7FXXH (SINGED)
R paint BLACK		21H	min preset max
B paint BLACK		23H	80XXH~00XXH~7FXXH (SINGED)
TOTAL GAMMA		27H	min preset max 80XXH~00XXH~7FXXH (SINGED)
KNEE POINT		28H	min preset max 80XXH~00XXH~7FXXH (SINGED)
GAIN		2AH	0dB(min) 12dB(max) max 80XXH~00XXH~40XXH (SINGED)
BRIGHTNESS		2BH	min preset max
(MASTER BLACK)			80XXH~00XXH~7FXXH (SINGED)
SHARPNESS		2CH	min preset max 80XXH~00XXH~7FXXH (SINGED)

	(DT1)	(DT2)	(DT3)u , (DT4) _D			
Item	CTL	MODE	DATA			
H.PHASE	30H	34H	-128 0 +127			
	33H		80XXH~00XXH~7FXXH (SINGED)			
SHUTTER VARIABLE		38H	(F22)			
			4s \sim 1/15s \sim 1/100,000s			
			FC5H \sim 0000H \sim 036CH (SINGED)			
			(F31)			
			4s \sim 1/30s \sim 1/100,000s			
			FF89H \sim 0000H \sim 0327H (SINGED)			
	ł					
OVER RIDE		39H	-128 0 +127			
	ł		80XXH~00XXH~7FXXH (SINGED)			
AUTO KNEE TRIM		3FH	LOW HIGH			
			80XXH~00XXH~7FXXH (SINGED)			
			(KNEE LEVEL of the "AUTO KNEE" condition is adjusted.)			

```
—— [SHUTTER VARIABLE ] THE CALCULATION METHOD ——
           (Note) OFF_VALUE: HV-F22 is "15", HV-F31 is "30".
     (shutter speed \leq (1 / OFF_VALUE)
     ①Exposure time \rightarrow Value
            nnnnh = log_{0.99}(OFF_VALUE \times "Shutter Speed")
     ②Value→Exposure time
            Shutter Speed[sec] = OFF_VALUE \times 0.99<sup>(nnnn)</sup>
    Example 1. Exposure time = 1/100sec (for HV-F31CL)
           Value:nnnn = log_{0.99}(30 \times (1/100))
                      = \log(30 \times (1/100)) / \log 0.99 = 0.078h
    Example 2. Value:nnnn = 0078h (for HV-F31CL)
           Exposure time = (1/30) \times 0.99^{(78h)} \Rightarrow 1/100(sec)
     (shutter speed > (1 / OFF_VALUE)
       \textcircled{1} \textbf{Exposure time} \, \rightarrow \, \textbf{Value}
             nnnnh = 10001h - ( OFF_VALUE × "Shutter Speed" )
       ②Value→Exposure time
            Shutter Speed[sec] = ( 10001h - nnnnh ) / OFF_VALUE
    Example Exposure time = 1/7.5 sec (for HV-F31CL)
           10001h - (30 \times (1/7.5)) = FFFDh
```

The max August		(DT1)	(DT2)	(DT3)u , (DT4)p
G HUE CROMA COMPEN 33H 42H 39XXH~00XXH~7FXXH (SINGED) 43H 42H 44H 44H 44H 45H	Item	CTL	MODE	DATA
SHUE CROMA COMPEN Y HUE CROMA COMPEN CHUE CROMA COMPEN R SAT CROMA COMPEN R SAT CROMA COMPEN B SAT CROMA COMPEN C SAT CROMA COM	R HUE CROMA COMPEN		40H	' / + # / \ \
Y HUE CROMA COMPEN C HUE CROMA COMPEN M HUE CROMA COMPEN R SAT CROMA COMPEN R SAT CROMA COMPEN B SAT CROMA COMPEN SAT CROMA COMPEN Y SAT CROMA COMPEN M SAT CROMA COM	G HUE CROMA COMPEN	30H	41H	80XXH∼00XXH∼7FXXH(SINGED)
C HUE CROMA COMPEN 44H M HUE CROMA COMPEN 45H R SAT CROMA COMPEN 46H B SAT CROMA COMPEN 48H YSAT CROMA COMPEN 48H YSAT CROMA COMPEN 48H YSAT CROMA COMPEN 48H M SAT CROMA COMPEN 48H M SAT CROMA COMPEN 48H MASTER SAT CROMA 52H COMPEN 53H DTL LEVEL DEPEND 53H CSHARPNESS) 54H DTL LEVEL DEPEND 53H CSHARPNESS) 55H DTL LEVEL DEPEND 55H CSHARPNESS) 55H DTL LEVEL DEPEND 55H CSHARPNESS) 55H DTL LEVEL DEPEND 55H CSHARPNESS) 55H COLOR DTL CRISP 55H SBalance setting for horizontal and vertical detail amount H H SH Sets color detail level SCH CRIST SET SET SET SET SET	B HUE CROMA COMPEN	33H	42H	\ ^ / /
M HUE CROMA COMPEN R SAT CROMA COMPEN G SAT CROMA COMPEN B SAT CROMA COMPEN B SAT CROMA COMPEN C SAT CROMA COMPEN M SAT CROMA COMPEN M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND 53H Dependent level setting Low High 80XXH~00XXH~7FXXH (SINGED) 54H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED) 55H Balance setting for horizontal and vertical detail amount H <v h="">V 80XXH~00XXH~7FXXH (SINGED) 58H Sets color detail level 0 0 1 2 (magnification) 80XXH~00XXH~7FXXH Balance setting for horizontal and vertical detail amount H (SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 WIDTH (SHARPNESS) COLOR DTL ch2 LEVEL (SHARPNESS) COLOR DTL ch2 PHASE 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6AH Sets color detail level 0 1 2 (magnification) 80XXH~00XXH~7FXXH (SINGED) 6BH Sets color detail level 0 1 2 (magnification) 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~7FXXH (SINGED) 6CH Setects color phase range for setting -128 0 127 80XXH~00XXH~10XH~10XH~10XH~10XH~10XH~10XH</v>	Y HUE CROMA COMPEN	32H	43H	
R SAT CROMA COMPEN G SAT CROMA COMPEN B SAT CROMA COMPEN Y SAT CROMA COMPEN C SAT CROMA COMPEN M SAT CROMA COMPEN M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND SH CSHARPNESS) DTL HV BALANCE (SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 WIDTH (SHARPNESS) COLOR DTL ch2 LEVEL (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH 48H 49H 49H 49H 44H 48H 49H 49H 49H 49H 44H 49H 49H 44H 49H 49	C HUE CROMA COMPEN		44H	
G SAT CROMA COMPEN B SAT CROMA COMPEN Y SAT CROMA COMPEN C SAT CROMA COMPEN M SAT CROMA COMPEN M SAT CROMA COMPEN M SAT CROMA COMPEN M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND SH CRISP SH CRISP SH CRISP SH CRISP SH SH SH SH SH SH SH SH SH	M HUE CROMA COMPEN		45H	
B SAT CROMA COMPEN Y SAT CROMA COMPEN C SAT CROMA COMPEN M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND SHARPNESS) DTL CRISP CSAT CROMA COMPEN (SHARPNESS) DTL CRISP SHARPNESS) DTL HV BALANCE SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 PHASE (SHARPNESS) COLOR DTL ch2 LEVEL SHARPNESS) COLOR DTL ch2 LEVEL (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH SAT CROMA COMPEN 44H 49H 44H 44H 44H 44H 44H 44H 44H 44H	R SAT CROMA COMPEN		46H	min max max
B SAT CROMA COMPEN Y SAT CROMA COMPEN C SAT CROMA COMPEN M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND (SHARPNESS) DTL CRISP S4H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED) (SHARPNESS) DTL HV BALANCE (SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 PHASE (SHARPNESS) COLOR DTL ch2 LEVEL (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH (SHARPNESS) COLOR DTL ch2 WIDTH (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH	G SAT CROMA COMPEN		47H	80XXH \sim 00XXH \sim 7FXXH (SINGED) $\left(\begin{array}{c} 1 \\ \text{min} \end{array}\right)$
C SAT CROMA COMPEN MSAT CROMA COMPEN	B SAT CROMA COMPEN		48H	(""")
M SAT CROMA COMPEN MASTER SAT CROMA COMPEN (SHARPNESS) DTL LEVEL DEPEND 53H Dependent level setting Low High 80XXH~00XXH~7FXXH (SINGED) (SHARPNESS) DTL CRISP 54H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED) 55H Balance setting for horizontal and vertical detail amount 164 H-V	Y SAT CROMA COMPEN		49H	
Sets color detail level	C SAT CROMA COMPEN		4AH	
COMPEN (SHARPNESS) DTL LEVEL DEPEND (SHARPNESS) DTL CRISP 53H Dependent level setting Low High 80XXH~00XXH~7FXXH (SINGED) 54H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED) 55H Balance setting for horizontal and vertical detail amount H <v h="">V 80XXH~00XXH~7FXXH (SINGED) 58H Sets color detail level 0 1 2(magnification) 80XXH~00XXH~7EXXH Balance setting for horizontal and vertical detail amount (SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 WIDTH (SHARPNESS) COLOR DTL ch2 LEVEL 5AH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.)</v>	M SAT CROMA COMPEN		4BH	
(SHARPNESS) DTL LEVEL DEPEND 53H Dependent level setting Low High 80XXH~00XXH~7FXXH (SINGED) 54H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED) 55H Balance setting for horizontal and vertical detail amount H=V H=V H=V 80XXH~00XXH~7FXXH (SINGED) 58H Sets color detail level 0 1 2(magnification) 80XXH~00XXH~7EXXH Balance setting for horizontal and vertical detail amount (SHARPNESS) COLOR DTL ch1 LEVEL 59H Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch1 WIDTH (SHARPNESS) COLOR DTL ch2 LEVEL 5AH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 PHASE 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	MASTER SAT CROMA		52H	
Low High 80XXH~00XXH~7FXXH (SINGED) SHARPNESS) DTL CRISP Sets color detail level COLOR DTL ch1 WIDTH SHARPNESS) COLOR DTL ch2 LEVEL SHARPNESS) COLOR DTL ch2 PHASE CHARPNESS COLOR DTL ch2 PHASE COLOR DTL ch2 WIDTH C	COMPEN			
Low High 80XXH~00XXH~7FXXH (SINGED) SHARPNESS) SHARPNESS COLOR DTL ch1 WIDTH SHARPNESS) COLOR DTL ch2 LEVEL SHARPNESS) COLOR DTL ch2 LEVEL SHARPNESS) COLOR DTL ch2 PHASE COLOR DTL ch2 WIDTH CSHARPNESS) COLOR DTL ch2 PHASE COLOR DTL ch2 WIDTH CH2 PHASE CH2 PHASE COLOR DTL ch2 WIDTH CH2 PHASE COLOR DTL ch2 WIDTH CH2 PHASE CH2 PHASE COLOR DTL ch2 WIDTH CH2 PHASE	(SHARPNESS)		53H	Dependent level setting
SHARPNESS DTL CRISP S4H Crispness level setting 0 max 80XXH~00XXH~7FXXH (SINGED)	DTL LEVEL DEPEND			
DTL CRISP				
(SHARPNESS) DTL HV BALANCE (SHARPNESS) (SHARPNESS) COLOR DTL ch1 LEVEL (SHARPNESS) COLOR DTL ch1 PHASE (SHARPNESS) COLOR DTL ch1 WIDTH (SHARPNESS) COLOR DTL ch2 LEVEL (SHARPNESS) COLOR DTL ch2 PHASE (SHARPNESS) COLOR DTL ch2 WIDTH	(SHARPNESS)		54H	Crispness level setting
SHARPNESS DTL HV BALANCE	DTL CRISP			0 max 0 → 7
H <v h="">V</v>				80XXH~00XXH~7FXXH (SINGED)
SHARPNESS COLOR DTL ch1 LEVEL Sets color detail level 0 1 2(magnification)	(SHARPNESS)		55H	Balance setting for horizontal and vertical detail amount
Sets color detail level	DTL HV BALANCE			H <v h="">V</v>
COLOR DTL ch1 LEVEL 0 1 2(magnification) 80XXH~00XXH~7EXXH Balance setting for horizontal and vertical detail amount 59H Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch1 WIDTH 5AH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°) 80XXH~00XXH~7FXXH (SINGED) 5AH Selects color detail level 0 1 2(magnification) 80XXH~00XXH~7FXXH (SINGED) 6AH Sets color detail level 0 1 2(magnification) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 PHASE 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)				80XXH~00XXH~7FXXH (SINGED)
SOLOR DTL CHT LEVEL 80XXH~00XXH~7EXXH Balance setting for horizontal and vertical detail amount	(SHARPNESS)		58H	
Balance setting for horizontal and vertical detail amount (SHARPNESS) COLOR DTL ch1 PHASE Sets color detail phase -128	COLOR DTL ch1 LEVEL			, ,
COLOR DTL ch1 PHASE -128				
COLOR DTL ch1 PHASE -128	(SHARPNESS)		59H	Sets color detail phase
(SHARPNESS) COLOR DTL ch1 WIDTH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°) 80XXH ~ 00XXH ~ 7FXXH (SINGED) (SHARPNESS) COLOR DTL ch2 LEVEL O 1 2(magnification) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) (SHARPNESS) COLOR DTL ch2 PHASE 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	· ·			-128 0 127
COLOR DTL ch1 WIDTH				80XXH~00XXH~7CXXH
COLOR DTL ch1 WIDTH				
80XXH ~ 00XXH ~ 7FXXH (SINGED)			5AH	
(SHARPNESS) COLOR DTL ch2 LEVEL 6AH Sets color detail level 0 1 2(magnification) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) (SHARPNESS) COLOR DTL ch2 PHASE 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	COLOR DTL ch1 WIDTH			
COLOR DTL ch2 LEVEL 0 1 2(magnification) 80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) (SHARPNESS) COLOR DTL ch2 PHASE 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	(CHADDNESS)		6 V LI	
80XXH~00XXH~7EXXH (SINGED: Upper 7 bits are effective. 128 steps.) (SHARPNESS) COLOR DTL ch2 PHASE 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)			υΑП	
(SHARPNESS) COLOR DTL ch2 PHASE 6BH Sets color detail phase -128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	SOLON DIE GIZ LEVEL			, ,
-128 0 127 80XXH~00XXH~7CXXH (SHARPNESS) COLOR DTL ch2 WIDTH -128 0 127 80XXH~00XXH~7CXXH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)				(SINGED: Upper 7 bits are effective. 128 steps.)
(SHARPNESS) COLOR DTL ch2 WIDTH 80XXH~00XXH~7CXXH 80XXH~00XXH~7CXXH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	(SHARPNESS)		6BH	//
(SHARPNESS) COLOR DTL ch2 WIDTH 6CH Selects color phase range for setting -128(-120°) 0(0°) 127(+120°)	COLOR DTL ch2 PHASE			I (•)
COLOR DTL ch2 WIDTH -128(-120°) 0(0°) 127(+120°)				OUAATI~UUAATI~/CAATI
COLOR DTL ch2 WIDTH -128(-120°) 0(0°) 127(+120°)	(SHARPNESS)		6C⊔	Selects color phase range for setting
	, ,		0011	•
OOVVII - OOVVII - LEVVII (STIMEN)				80XXH ~ 00XXH ~ 7FXXH (SINGED)

(DT1)	(DT2)	(DT3)∪ , (DT4) _D					
CTL	MODE	DATA					
30H	A2	LEFT	CENTER		RIGHT		
33H		AF00H	\sim 0000H	\sim	5100H	(F22) (SINGED)	
		C400H	\sim 0000H	\sim	3C00H	(F31) (SINGED)	
32H	A3	UP	CENTER	?	DOWN		
		C400H	\sim 0000H	\sim	3C00H	(F22) (SINGED)	
		D400H	\sim 0000H	\sim	2C00H	(F31) (SINGED)	
	В0	HV-F220	CL:				
		約1/50	$00s \sim 1/1$	00,00	0s		
		015C	\sim 0:	36CH			
		HV-F310	CL:				
		約1/50	$00s \sim 1/1$	00,00	0s		
		.,,					
	CE						
	02	0ms		2	ms		
	CTL 30H 33H 32H	CTL MODE 30H A2 33H 32H A3 B0	TTL MODE 30H A2 LEFT AF00H C400H C400H D400H B0 HV-F22C	CTL MODE 30H A2 LEFT CENTER AF00H ~0000H C400H ~0000H 32H A3 UP CENTEF C400H ~0000H D400H ~0000H B0 HV−F22CL: 約1/500s ~ 1/1 015CH ~ 0 HV−F31CL: 約1/500s ~ 1/1 0117H ~ 03	CTL MODE 30H A2 LEFT CENTER AF00H ~0000H ~ C400H ~0000H ~ C400H ~0000H ~ 32H A3 UP CENTER C400H ~0000H ~ D400H ~0000H ~ D400H ~0000H ~ B0 HV-F22CL: 約1/500s ~ 1/100,00 015CH ~ 036CH HV-F31CL: 約1/500s ~ 1/100,00 0117H ~ 0327H CE Oms 2	CTL MODE DATA 30H A2 LEFT CENTER RIGHT AF00H ~0000H ~ 5100H C400H ~0000H ~ 3C00H 32H A3 UP CENTER DOWN C400H ~0000H ~ 3C00H D400H ~0000H ~ 2C00H B0 HV-F22CL: 約1/500s ~ 1/100,000s 015CH ~ 036CH HV-F31CL: 約1/500s ~ 1/100,000s 0117H ~ 0327H CE	

	(DT1)	(DT2)	(DT3), (DT4), (DT5), (DT6)
Item	CTL	MODE	DATA
FOCUS	33H	В8Н	MIN \sim MAX
DETECT DATA	32H		00000000H \sim FFFFFFFH
(READ ONLY)			

3. Auto function control commands (Setting commands, response commands)

(Note) As for the executive result, a memory is done.

	Setting o	commands			Response commands
	(DT1)	(DT2)	(DT1)	(DT2)	(DT3)
Item	CTL	MODE	CTL	MODE	RESULT
AUTO WHITE	40H	10H	40H	00H	00H:"OK" 11H: "NG CHANGE TO CAM" 12H: "NG CHANGE TO MEMORY MODE" 13H: "NG LOW LIGHT" 14H: "NG HIGH LIGHT" 15H: "NG C.TEMP.HIGH" 16H: "NG C.TEMP.LOW" 18H: "NG ???" 24H: "NG LONG SHUTTER MODE CHANGE SHUTTER MODE" 25H: "NG EXT TRIGGER CHANGE SHUTTER MODE"
AUTO BLACK	40H	20H	40H	00H	00H:"OK" 11H:"NG CHANGE TO CAM" 18H:"NG ???"
AUTO SHADING	40H	30H	40H	00H	00H:"OK" 11H:"NG CHANGE TO CAM" 13H:"NG LOW LIGHT" 14H:"NG HIGH LIGHT" 18H: "NG ???" 24H:"NG LONG SHUTTER MODE CHANGE SHUTTER MODE" 25H:"NG EXT TRIGGER CHANGE SHUTTER MODE"

4. SCENE file select

(Note) Every time "SCENE FILE NO." is changed, "SCENE FILE NO." does a memory.

	(DT1)	(DT2)	(DT3)
Item	CTL	CTL	CTL
FILE-1	60H	01H	01H
FILE-2			02H
FILE-3			03H
FILE-4			04H
PRESET			FFH

5. Memory backup

The change setting data can be backed up to the EEPROM.

(1) In a bundle memory backup

	(DT1)	(DT2)
Item	CTL	CTL
MEMORY BACK UP(ALL)	61H	02H

(2) One item memory backup

	(DT1)	(DT2)	(DT3)	
Item	CTL	CTL	CTL	Remark
MEMORY BACK UP2	65H	20H	XXH	ON/OFF Command
		28H	XXH	ON/OFF Command
		30H	XXH	Analog Command

The same value as DT1 and DT2 of when that command to, DT2, DT3 setting are set up.

(3) Only an optional scene file, memory backup.

(Note) The item of the menu screen that "FILE SEL" is indicated is the item of the scene file.

	(DT1)	(DT2)	(DT3)
Item	CTL	CTL	CTL
FILE-1	61H	01H	01H
FILE-2			02H
FILE-3			03H
FILE-4			04H

Note

The memory backup writes data to the address of memory IC which was assigned in the unit of a command. The rewriting guarantee number to the same address of memory IC that is using with the camera is becoming 100,000 times. Therefore, please pay attention in the case that a memory backup command is used.

6. States read (Response request commands, response commands)

	(DT1)	(DT2)	(DT3),(DT4),(DT5)		
Item	Item CTL MODE RESULT		RESULT		
CAMERA TYPE	13H	00H	(DT3) 6AH: HV-F22, 6BH:HV-F31		
CAMERA VERSION	12H	01H	Ver.(DT3).(DT4) (DT5)ASCII code		
FILE No.		04H	(DT3) 01H:FILE-1,02H:FILE-2,03H:FILE-3,04H:FILE-4,FFH:PRESET		

8. INITIALIZE COMMANDS

	(DT1)	(DT2)	(DT3)
Item	CTL	CTL	CTL
FACTORY INITIALIZE	90H	00H	FFH