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CNB E(D)N(P)300 Series PC Communication Protocol

This protocol spec. defines RS-232C logical communication regulations.

RS-232C/RS-232C TTL /RS-422/RS-485 means hard-ware conditions.

Any of above hardware conditions can use this protocol spec. for logical communication and programming!

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1. Communication Format

Communication between the microcomputer of the camera and the PC is available by using the RS - 232C. The microcomputer receives each control command given by the PC through RxD INPUT TERMINAL and it echoes back to the PC through TxD OUTPUT TERMINAL

1) Connection Conditions ;	Data Length	1 Byte = 1code (8 Bit)
	Stop Bit	1 Bit
	Parity Bit	None
	Baud rate	9,600 bps

2) The communication command format from PC to Camera

Each command consists of 11 bytes and transmitted from PC to camera.

Actually, HEXADECIMAL value is transferred.

(a) Format ;

	First									last
*	IDH	IDL	CH	CL	D4	D3	D2	D1	C.SH	C.SL

- (b) Description ;
- 1'st BYTE : START CODE(2Ah)
 - 2'nd BYTE : THE HIGH CHARACTER OF CAMERA ID
 - 3'rd BYTE : THE LOW CHARACTER OF CAMERA ID
 - 4'th BYTE : COMMAND High
 - 5'th BYTE : COMMAND Low
 - 6'th BYTE : DATA 4
 - 7'th BYTE : DATA 3
 - 8'th BYTE : DATA 2
 - 9'th BYTE : DATA 1
 - 10'th BYTE : Check Sum High
 - 11'th BYTE : Check Sum Low

3) The communication echo data format from Camera to PC

Each data consists of 11 bytes and transmitted from camera to PC.

Actually, HEXADECIMAL value is transferred.

(a) Format ;

	First									last
*	D8	D7	D6	D5	D4	D3	D2	D1	C.SH	C.SL

- (b) Description ;
- 1'st BYTE : START CODE (2Ah)
 - 2'nd BYTE : DATA 8
 - 3'rd BYTE : DATA 7
 - 4'th BYTE : DATA 6
 - 5'th BYTE : DATA 5
 - 6'th BYTE : DATA 4
 - 7'th BYTE : DATA 3
 - 8'th BYTE : DATA 2
 - 9'th BYTE : DATA 1
 - 10'th BYTE : Check Sum High
 - 11'th BYTE : Check Sum Low

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4) Check Sum Method

- The value of Check Sum is calculated as follows

Check Sum = Add 1'st BYTE to 9'th BYTE without carry.

- If we have to transmit

2Ah(*),30h('0'),30h('0'),37h('7'),35h('5'),30h('0'),39h('9'),30h('0'),30h('0'),**CSH,CHL**

C.S = 2Ah+30h+30h+37h+35h+30h+39h+30h+30h = 1BFh therefore,

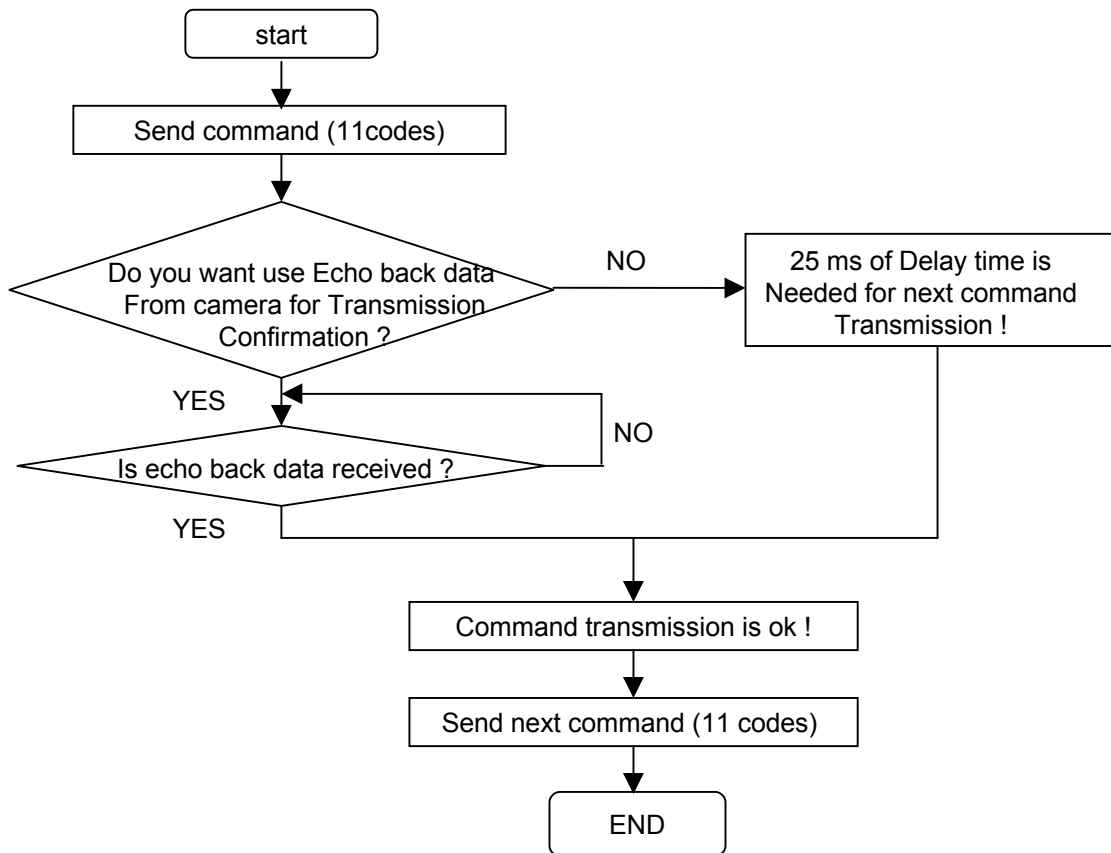
Check Sum becomes BFh, It needs to be changed to ASC II code [42h('B'),46h('F')]

CSH = 42h('B'), CSL = 46h('F')

- **CAMERA decodes this command "00h 75h 09h 00h BFh"**

See **2. RS - 232C Communication Commands** 5) Key Action (page 4)

5) Communication Flow



6) Miscellaneous for Communication

- * When transmitting 11 bytes of command, keep 2 milliseconds of waiting time between bytes.
- * If command transmission is stopped after transmitting only 3 bytes, camera waits for the remained 8 bytes permanently. At that moment, If new command starting from '*' (Start code) is transmitted to camera, the previous 3 bytes are ignored!
- * If echo back data isn't existent or has some errors, there can be some troubles in communication line or data receiving timing. On software, you can send command again!
- * About echo back: After 1 command transmission, you need to wait for echo back data from camera for confirmation and transmit next command.
- * If DIP SW is available, some functions which are assigned to DIP SW don't work properly.

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2. RS - 232C Communication Commands

- "DC" indicates "don't care" code and must be hexadecimal(0 ~9,A,B,C,D,E,F)
- "CS" indicates checksum

1) **Camera RESET** : Reset the micro controller (u-COM) of Camera.

(1) PC -> CAMERA

ASCII	*	DC	DC	7	1	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	37	31	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

2) **Camera ID Display ON/OFF control** : Switch the display of camera ID ON/OFF.

(1) PC -> CAMERA

ASCII	*	DC	DC	7	2	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	37	32	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

3) CAM ID READ

(1) PC -> CAMERA

ASCII	*	DC	DC	7	3	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	37	33	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	Z	Z	0	0	0	0	0	0	CS	CS
HEXA	2A	Z	Z	30	30	30	30	30	30	CS	CS

ZZ : Camera ID

4) **CAM ID CHANGE** : Change the data of CAM_ID to NEW_CAM_ID.

(1) PC -> CAMERA

ASCII	*	DC	DC	7	4	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	37	34	Z	Z	DC	DC	CS	CS

ZZ : New Camera ID

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

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5) **Key Action** : Key action can be achieved by this command

(1) PC -> CAMERA

ASCII	*	DC	DC	7	5	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	37	35	Z	Z	DC	DC	CS	CS

ZZ : Key Code
(See Appendix 1: Key Code Table)

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

<Caution> When you use any Key Action command, key action code "KC_STOP " has to follow every Key Action code.

6) **CPU Version Read**

(1) PC -> CAMERA

ASCII	*	DC	DC	7	D	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	37	44	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	Z	Z	0	0	0	0	0	0	CS	CS
HEXA	2A	Z	Z	30	30	30	30	30	30	CS	CS

ZZ : CPU Version

7) **Digital Zoom Preset**

(1) PC -> CAMERA

ASCII	*	DC	DC	C	5	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	43	35	Z	Z	DC	DC	CS	CS

ZZ : PRESET No.

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

Memorize the current digital zoom position value into the internal nonvolatile memory of the CAMERA for controlling the PRESET Move.

The memory position to store is indicated by the "INDEX" value.

ZZ : (data range 0 ~ 5) : Index counter

ZZ : (data range 0 ~ 13h) : Index counter (**Ver 2.0**)

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8) Recall Digital Zoom Preset : Perform the PRESET Moving action.

(1) PC -> CAMERA

ASCII	*	DC	DC	C	6	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	43	36	Z	Z	DC	DC	CS	CS

ZZ : PRESET No.

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

ZZ : (data range 0 ~ 5) : Index counter

ZZ : (data range 0 ~ 13h) : Index counter **(Ver 2.0)**

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Appendix 1 : Key Code Table 1/2

KC_STOP	09	; After the other key commands below this command “KC_STOP” must be followed after. If continuous key service is needed send this command several seconds after the before command. In other words , when you want a certain function you can send any key codes when you want to stop the function send this command again.
KC_POWER	0A	; Toggles power on/off status
KC_TELE	01	; Slow zoom tele action
KC_WIDE	03	; Slow zoom wide action
KC_SET	0D	; In menu mode , toggles item selection mode/ item adjust mode
KC_Default	0E	; by this code all conditions in camera returns to manufacturer’s conditions
KC_OSD	0F	; Toggles function osd off/on modes
KC_MENU	10	; Toggles menu on/off modes
KC_BL	13	; Toggles backlight mode
KC_FLICKER	14	; Toggles flicker mode
KC_SSC Up	15	; Shutter speed counter up (Available in DC/VIDEO Iris)
KC_SSC Down	16	; Shutter speed counter down (Available in DC/VIDEO Iris)
KC_DEFT	17	; Switches digital effect modes WIDE→ART → MIRROR → NEGA80 → MONO → MOSAIC
KC_MIRROR	18	; Toggles Mirror mode on/off
KC_NEGA	19	; Toggles negative mode on/off
KC_MONO	1A	; Toggles mono mode on/off
KC_CINEMA	38	; Toggles cinema mode on/off
KC_MOSAIC	39	; Toggles mosaic mode on/off
KC_ART	3A	; Toggles art mode on/off
KC_SRPUP	1C	; sharpness data up
KC_SRPDN	1D	; sharpness data down
KC_BRTUP	1E	; Brightness data up
KC_BRTDN	1F	; Brightness data down

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Appendix 1 : Key Code Table 2/2

KC_WB_PUSH	24	; In white balance push auto mode (manual mode) ,initiates “push action”
KC_AWBup	25	; Switches awb modes auto → special → Indoor → outdoor → hue control → puah auto
KC_AWBdn	26	; Switches awb modes in reverse sequence to KC_AWBup
KC_RadjUP	27	; In Special WB mode ,R gain goes up
KC_RadjDN	28	; In Special WB mode ,R gain goes down
KC_BadjUP	29	; In Special WB mode ,B gain goes up
KC_BadjDN	2A	; In Special WB mode ,B gain goes down
KC_HUEUP	2B	; In HUE adjust WB Mode the picture become Reddish
KC_HUEDN	2C	; In HUE adjust WB Mode the picture become Bluish
KC_AUTO_ZOOM	33	; Toggles automatic zoom
KC_AGConOff	34	; Toggles AGC on/off
KC_AutoPAN	3B	; Toggles automatic PAN
KC_PANright	3C	; PAN right
KC_PANleft	3D	; PAN left
KC_TILTup	3E	; TILT up
KC_TILTdn	3F	; TILT down
KC_AutoTILT	40	; Toggles automatic TILT

END

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Appendix 2 : Added Command

1) Target Brightness Data Read (Ver 2.0)

(1) PC -> CAMERA

ASCII	*	DC	DC	8	8	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	38	38	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	Z	Z	0	0	0	0	0	0	CS	CS
HEXA	2A	Z	Z	30	30	30	30	30	30	CS	CS

ZZ : (data range 00h ~ 90h) : Brightness Data

2) Target Brightness Data Set (Ver 2.0)

(1) PC -> CAMERA

ASCII	*	DC	DC	9	1	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	39	31	Z	Z	DC	DC	CS	CS

ZZ : (data range 00h ~ 90h) : Brightness Data

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

3) Sharpness Data Read (Ver 2.0)

(1) PC -> CAMERA

ASCII	*	DC	DC	B	5	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	42	35	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	0	Z	0	0	0	0	0	0	CS	CS
HEXA	2A	30	Z	30	30	30	30	30	30	CS	CS

Z : (data range 0h ~ Fh) : Brightness Data

4) Sharpness Data Set (Ver 2.0)

(1) PC -> CAMERA

ASCII	*	DC	DC	B	6	0	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	42	36	30	Z	DC	DC	CS	CS

Z : (data range 0h ~ Fh) : Brightness Data

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

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5) Motion Detection Set (Ver 2.0)

(1) PC -> CAMERA

ASCII	*	DC	DC	A	1	0	Z	X	Y	CS	CS
HEXA	2A	DC	DC	41	31	30	Z	X	Y	CS	CS

Z : Motion Detect Action ON/OFF

0 : OFF 1 : ON

X : Motion Detect Action Area

0 : Upper side

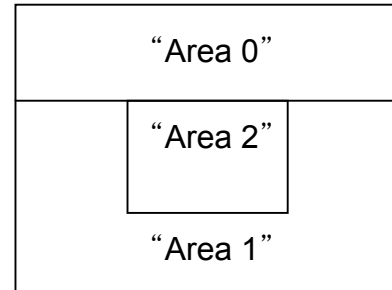
1 : Lower, Left, Right side

2 : Center

3 : All area

Y : Motion Detect Sensitivity

2 ~ F (The smaller value the higher sensitivity.)



* If motion is detected camera will send message to host as follows.

ASCII	*	X	X	0	1	5	5	0	0	CS	CS
HEXA	2A	X	X	30	31	35	35	30	30	CS	CS

XX : Camera ID

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS

6) Digital Zoom Position Read (Ver 2.2)

(1) PC -> CAMERA

ASCII	*	DC	DC	A	C	DC	DC	DC	DC	CS	CS
HEXA	2A	DC	DC	41	43	DC	DC	DC	DC	CS	CS

(2) CAMERA -> PC

ASCII	*	Z	Z	0	0	0	0	0	0	CS	CS
HEXA	2A	Z	Z	30	30	30	30	30	30	CS	CS

ZZ : (Data range 00h ~ E6h) : Zoom Data

* Zoom Ratio = 256/(256-ZZ)

EX) if ZZ = 80h(Decimal 128)

then, Zoom Ratio = 256/(256-128) = 2

As a result, Digital Zoom Ratio is X2.

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7) Move to Digital Zoom Position (Ver 2.2)

(1) PC -> CAMERA

ASCII	*	DC	DC	A	D	Z	Z	DC	DC	CS	CS
HEXA	2A	DC	DC	41	44	Z	Z	DC	DC	CS	CS

ZZ : (Data range 00h ~ E6h) : Zoom Data

(2) CAMERA -> PC

ASCII	*	0	0	0	0	0	0	0	0	CS	CS
HEXA	2A	30	30	30	30	30	30	30	30	CS	CS