

**1. Application Range**

This specification applies to the control of LCD Projector (Hereafter, referred to as LCD) with DTE terminal (Personal computer, etc., and hereafter, referred to as PC). Refer to User's Manual for the details of the function.

**2. Communication Specification**

The control of LCD with PC uses the RS-232C interface. PC sends each control command to LCD, and LCD can execute the function described in the function list. Basically, procedure structure is 'Handshake in which it starts with @G and terminates with @Q'. As a rule, the time-sharing by which the answering from LCD is monitored is used.

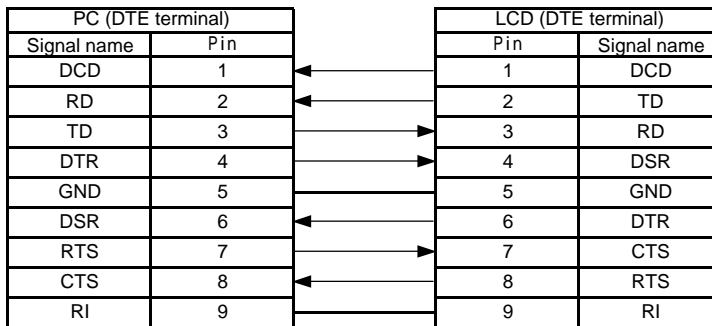
>Communication parameter

Baud rate 4800bps  
 Data length 8 bits  
 Parity None  
 Stop bit 1 bit  
 Flow control RTS/ CTS  
 Communication code ASCII code  
 Reception time out **8 seconds**

**When status is not returned after sending the command, wait for the time out 8 seconds and send the command again.**

**3. Connection with PC**

When using the DOS/V compatible machine, connect with it by the straight D-SUB 9 pins cable.



**4. Communication Procedure**

The handshake system is used for the communication between PC and LCD, and the status is returned against the command sending. Moreover, PC sends the communication start command and the communication termination command at the start and termination of the communication. The key of the remote control and the main unit becomes a disabling condition (does not function) because the communication has the priority when the communication starts after the @Q communication mode termination.

**4-1. Control format**

The command and the reception status consist of ASCII code, and this specification describes it by the character string.

**4-1-1. Communication start command**

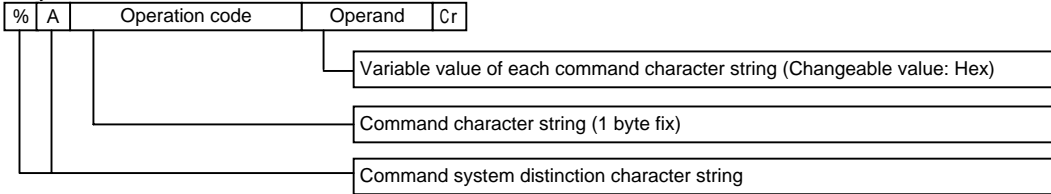
The communication starts.

@ G Cr

When this command is sent a ,text communication mode starts, and the communication command described in " 5.Function list " in clause 5 can be accepted  
 Wait for the normal reception status after sending this command.  
 However, resend it even if reception status is not received for 8 seconds.  
 Resend it until returning the normal reception status because irregular data or 'irregular data + reception status' might return after sending the start command. Cr means Carriage Return

**4-1-2. Communication command**

Command system



**4-1-3. Status**

Normal termination

@ S Cr

LCD returns the status to PC after LCD normally executes the command sent by PC.

Normal termination with condition data

@ S DT Cr

LCD sends the operating condition to PC after PC sends the condition reading command (Refer to 'Function list' in clause 5 for details of a reading command and above-mentioned DT value character string ;

Abnormal termination

@ E ST Cr

LCD sends it to PC if LCD does not normally execute the command sent by PC.

Above-mentioned ST value character string:

- 01: Communication error (For example, the cable is not correctly connected.)
- 02: Setting error (For example, the command is not correctly sent.[A non-corresponded command , out of setting range control ,etc.] )
- 03: Function execute error (For example, LCD fails in the execution of the command.)

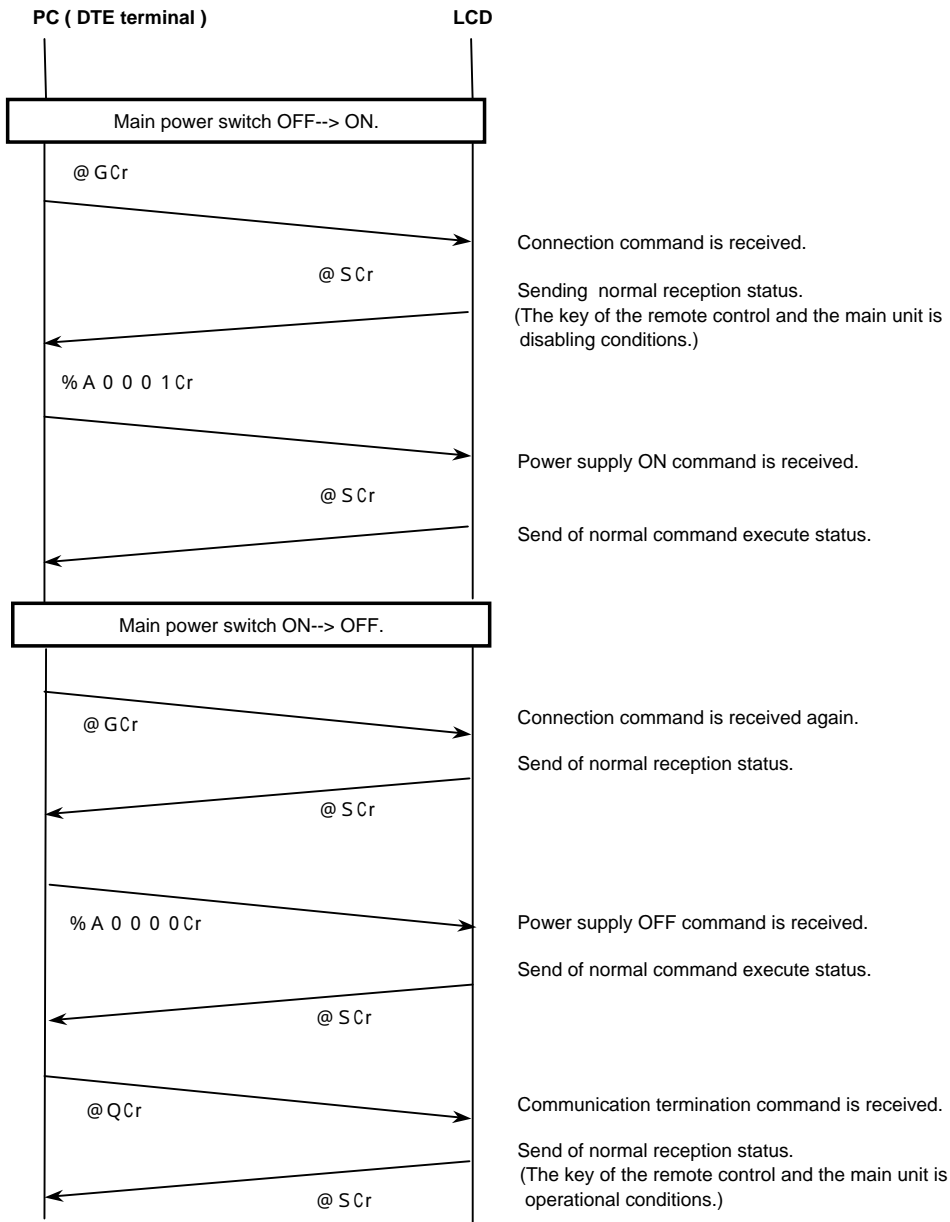
**4-1-4. Communication termination command**

The communication mode terminates.

@ Q Cr

4-2. Protocol procedure example

The protocol procedure example is as follows.



Communication code(hexadecimal) of protocol procedure example.

@GCr	= 40 47 0D	@SCr	= 40 53 0D
%A0000Cr	= 25 41 30 30 30 30 0D	%A0001Cr	= 25 41 30 30 30 31 0D
@QCr	= 40 51 0D		

n

**5. Function List**

'Cr' is added at the end of all communication commands. Moreover, variable value means the hex.

And only the command of "Power supply On/Off setting" and "Power supply condition reading" is controllable by the power supply standby state.

A power supply standby state shows the state of "Power supply condition Off: @S00"

Function	Communication command	Note	
System operation			
01 Power supply ON / OFF setting	Power supply OFF: %A0000		
	Power supply ON: %A0001		
Power supply condition reading	%A0080  【 Return Code 】 @S00 : Power supply condition OFF @S01 : Power supply condition ON @S8* : Cooling Off		
02 On screen character clear	%A02		
03 Setting of remote control/main unit keylock function	Remote control key is validated and main unit key is valid. : %A0400	Note) When the communication is started again after the termination of the communication, the remote control key and the main unit key become a disabling condition (does not function) for the priority of the communication.	
	Remote control key is valid and main unit key is invalid. : %A0401		
	Remote control key is invalid and main unit key is valid.: %A0402		
	Remote control key is invalid and main unit key is invalid.: %A0403		
Confirmation of remote control/main unit keylock setting	%A0480  【 Return Code 】 @S00 : Remote control keylock valid / Main unit keylock valid. @S01 : Remote control keylock valid / Main unit keylock invalid. @S02 : Remote control keylock invalid / Main unit keylock valid. @S03 : Remote control keylock invalid / Main unit keylock invalid.		
Video adjustment			
04 Video input selection	RGB_1 input: %A1000		
	RGB_2 input: %A1001		
	RGB_3 input: %A1002		
	VIDEO1(C-VIDEO) input: %A1010		
	VIDEO2 (C-VIDEO) input: %A1011		
	VIDEO4 (C-VIDEO) input: %A1012		
	VIDEO5 (C-VIDEO) input: %A1013		
	VIDEO6 (C-VIDEO) input: %A1014		
	VIDEO1 (VIDEO) input: %A1020		
	VIDEO2 (VIDEO) input: %A1021		
	VIDEO3 (VIDEO) input: %A1022		
	VIDEO4 (VIDEO) input: %A1023		
	VIDEO1 (S-VIDEO) input: %A1040		
	VIDEO2 (S-VIDEO) input: %A1041		
	VIDEO3 (S-VIDEO) input: %A1042		
	VIDEO4 (S-VIDEO) input: %A1043		
	VIDEO7 (HDMI) input: %A1050		
	Video input selection condition reading	%A1080  【 Return Code 】 @S00-02 : RGB1-3 input @S10-11 : VIDEO1-2(C-VIDEO) input @S12-14 : VIDEO4-6(C-VIDEO) input @S20-23 : VIDEO1-4(VIDEO) input @S40-43 : VIDEO1-4 (S-VIDEO) input @S50 : VIDEO7 (HDMI)_ input	

Function		Communication command	Note
05	Display aspect selection	NORMAL: %A1100 WIDE1: %A1101 WIDE2: %A1102 ZOOM1: %A1103 ZOOM2: %A1104	Refer to Appendix 1 for the selectable display aspect condition.
	Display aspect selection condition reading	%A1180  【 Return Code 】 @S00 : NORMAL @S01 : WIDE1 @S02 : WIDE2 @S03 : ZOOM1 @S04 : ZOOM2	
06	Contrast	%A130062 ~ %A13009E (Reference value: %A130080)	LCD adjustable range:-30 ~ +30
	Contrast condition reading	%A1380  【 Return Code 】 @S62 ~ @S9E	
07	Brightness	%A130144 ~ %A1301BC (Reference value: %A130180)	LCD adjustable range:-60 ~ +60
	Brightness condition reading	%A1381  【 Return Code 】 @S44 ~ @SBC	
08	Color	%A130244 ~ %A1302BC (Reference value: %A130280)	LCD adjustable range:-60 ~ +60
	Color condition reading	%A1382  【 Return Code 】 @S44 ~ @SBC	
09	Tint	【 When HDMI,RGB,C-vide is selected 】 %A130344 ~ %A1303BC (Reference value: %A130380) 【 other than RGB,C-VIDEO,HDMI 】 %A130362 ~ %A13039E (Reference value: %A130380)	LCD adjustable range:-60 ~ +60 LCD adjustable range:-30 ~ +30
	Tint condition reading	%A1383  【 Return Code 】 @S62 ~ @S9E : When Video or S-video is selected @S44 ~ @SBC : When HDMI, RGB, C-Video is selected	
10	Sharpness	【 When RGB is selected 】 %A13047C ~ %A130484 (Reference value: %A130480) 【 other than RGB 】 %A130470 ~ %A130490 (Reference value: %A130480)	LCD adjustable range:-4 ~ +4 LCD adjustable range:-16 ~ +16
	Sharpness condition reading	%A1384  【 Return Code 】 @S70 ~ @S90 : When except RGB is selected @S7C ~ @S84 :When RGB is selected	
11	3D Noise reduction	OFF: %A130500 Min: %A130501 Std: %A130502 Max: %A130503	
	Noise reduction condition reading	%A1385  【 Return Code 】 @S00 : OFF @S01 : Min @S02 : Std @S03 : Max	
12	Color temperature	-3500K: %A130600 Standard: %A130607 +3500K: %A13060E User: %A13060F	In each 500K
	Color temperature condition reading	%A1386  【 Return Code 】 @S00 : -3500K @S07 : Standard @S0E : +3500K @S0F : User	

Function		Communication command	Note
13	User Color temperature (R)	%A130700 ~ %A1307FF	LCD adjustable range: 0 ~ 255
	User Color temperature (R) condition reading	%A1387 【 Return Code 】 @S00 ~ @SFF	
14	User Color temperature(G)	%A130800 ~ %A1308FF	LCD adjustable range: 0 ~ 255
	User Color temperature (G) condition reading	%A1388 【 Return Code 】 @S00 ~ @SFF	
15	User Color temperature(B)	%A130900 ~ %A1309FF	LCD adjustable range: 0 ~ 255
	User Color temperature (B) condition reading	%A1389 【 Return Code 】 @S00 ~ @SFF	
16	Dot clock (Only RGB<except DVI>)	%A130A** ~ %A130A** (Reference value: %A130A80)	LCD adjustable range: -5 ~ +5(7B ~ 85)
	Dot clock condition reading	%A138A 【 Return Code 】 @S7B ~ @S85	
17	Clock phase (Only RGB<except DVI>)	%A130B00 ~ %A130B1F Automatic adjustment: %A130B80	LCD adjustable range: 1 ~ 32
	Clock phase condition reading	%A138B 【 Return Code 】 @S00 ~ @S1F When automatic adjustment, it is @S80 ~ @S9F.	
18	Clamp pulse position (Only RGB and Comp.Video<except DVI>)	%A130D78 ~ %A130D88 (Reference value: %A130D80)	LCD adjustable range: -8 ~ +8
	Clamp pulse position condition reading	%A138D 【 Return Code 】 @S78 ~ @S88	
19	Picture mode setting	NATURAL %A130F00 FINE %A130F01 EFFECTIVE %A130F02 CONVENTIONAL %A130F03 STILL %A130F04	
	Picture mode setting Condition reading	%A138F 【 Return Code 】 @S00 ~ @S04 : (Code details are referred to the lower 2 digits of Picture mode setting command )	
20	24 Frame mode	OFF: %A131100 ON: %A131101	
	24 Frame mode Condition reading	%A1391 【 Return Code 】 @S00 : OFF @S01 : ON	
21	Drive Contrast	100 : %A131314 90 : %A131312 80 : %A131310 70 : %A13130E	LCD adjustable range: 70 ~ 100%
	Drive Contrast condition reading	%A1393 【 Return Code 】 @S0E ~ @S14	
23	Black Level	%A131471 ~ %A13148F (Reference value: %A131480)	LCD adjustable range: -15 ~ +15
	Black Level condition reading	%A1394 【 Return Code 】 @S71 ~ @S8F	
24	Detail Gradation	OFF: %A131600 ON: %A131601	
	Codec Noise reduction	OFF: %A131700 Min: %A131701 Mid: %A131702 Max: %A131703	

Function		Communication command	Note
26	30 Frame Mode	OFF: %A131A00	
		Auto: %A131A01	
27	Jaggies Filter	OFF: %A131B00	
		Auto: %A131B01	
28	Lamp	Normal: %A131D00	
		Low: %A131D01	
29	Light Control	Of: %A131E00	
		Mid: %A131E01	
		Mid: %A131E02	
		Max: %A131E03	
30	Picture memory setting	【Picture setting SAVE】 %A150000 ~ %A150007 ( Memory1 ~ 8 )	
		【Picture setting LOAD】 %A150100 ~ %A150107 ( Memory1 ~ 8 )	
Audio			
31	Audio input selection	%A20MMRR	
		MM VIDEO INPUT	
		00:RGB1	
		01:RGB2	
		02:RGG3	
		03:VIDEO1	
		04:VIDEO2	
		05:VIDEO3	
		06:VIDEO4	
		07:VIDEO5	
		08:VIDEO6	
		09:VIDEO7	
		RR AUDIO INPUT	
		00:ANALOG AUDIO INPUT HDMI (VIDEO7)	
01:DIGITAL AUDIO INPUT1 02:DIGITAL AUDIO INPUT2			
36	Selection of indications (Name select) (RGB input)	%A31RRMM	On screen menu
		MM 【Indication】	
		00: RGB1 - RGB2 (Default value)	
		01: PC1	
		02: PC2	
		03: DVD1	
		04: DVD2	
		05: STB	
		06: Satellite	
		07: CableTV	
		RR 【RGB input】	
		10:RGB1	
		11:RGB2	
12:RGB3			
36	Selection of indicationscondition reading (RGB input)	%A3190 (RGB1) %A3191 (RGB2) %A3192 (RGB3)	
		【Return Code】 @S00 : RGB1 or RGB2 (Default value) @S01 : PC1 @S02 : PC2 @S03 : DVD1 @S04 : DVD2 @S05 : STB @S06 : Satellite	

Function	Communication command	Note
Selection of indications (Name select) (Video input)	%A31VVMM	On screen menu
	MM 【Indication】	
	00: Video1 - Video5 (Default value)	
	01: DVD1	
	02: DVD2	
	03: VCR1	
	04: VCR2	
	05: GAME	
	06: Camcorder	
	07: STB	
	08: Satellite	
	09: CableTV	
	VV 【VIDEO input】	
	13:Video1	
	14:Video2	
	15:Video3	
	16:Video4	
	17:Video5	
	18:Video6	
19:Video7		
Selection of indications condition reading (Video input)	%A3193 (Video1)	
	%A3194 (Video2)	
	%A3195 (Video3)	
	%A3196 (Video4)	
	%A3197 (Video5)	
	%A3198 (Video6)	
	%A3199 (Video7)	
	【Return Code】	
	@S00 : Video1 - Video7 (Default value)	
	@S01 : DVD1	
	@S02 : DVD2	
	@S03 : VCR1	
	@S04 : VCR2	
@S05 : GAME		
@S06 : Camcorder		
@S07 : STB		
REMOTE		
41	Power turns On/Off %A328A00	
42	DISPLAY %A328A08	
43	PICTURE-MOE %A328A44	
44	PICTURE-MEMORY %A328A48	
45	WIDE %A328A10	
46	OFF-TIMER %A328A41	
47	RGB1 %A328B68	
48	RGB2 %A328B69	
49	RGB3 %A328B70	
50	VIDEO1 %A328B40	
51	VIDEO2 %A328B41	
52	VIDEO3 %A328B42	
53	VIDEO4 %A328B43	
54	VIDEO5 %A328B44	
55	VIDEO6 %A328B45	
56	VIDEO7 %A328B46	
57	MENU %A328A22	
58	%A328A23	
59	%A328A20	
60	%A328A21	
61	%A328A24	
62	ENTER %A328A26	
63	SET UP %A328752	
64	ZOOM/FOCUS %A328753	



Appendix 1

SIGNAL	MODE
VIDEO	NORMAL
S-VIDEO	WIDE1
480P	WIDE2
576P	ZOOM1
480i	ZOOM2
576i	
1080P	WIDE2
1080i (50Hz)	
720P	
WXGA (RGB)	
WVGA (RGB)	
1080i (60Hz , HDMI,DVI)	
1080i (60Hz C-VIDEO)	WIDE2 , ZOOM1
PC-SXGA	WIDE2
PC-UXGA	ZOOM1
PC-XGA	NORMAL
PC-SVGA	
PC-VGA	