

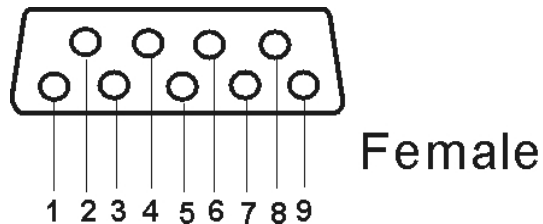
1. Communication Protocol

Transmit method : Asynchronous Interface Half Duplex Serial Communication.

- Transmit Speed: 9600bps
- Flow control: NA
- Data Bit: 8Bit
- Parity Bit: NA
- Stop Bit: 1Bit

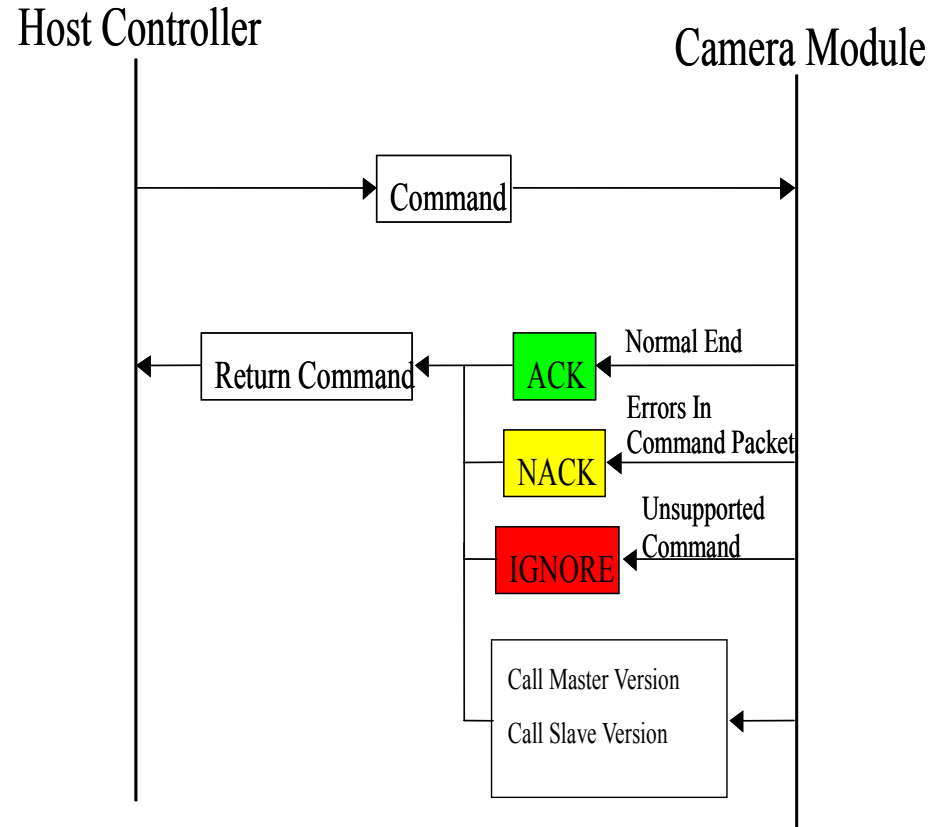
2. The wire diagram

The RS232 wire diagram between presenter and remote controller as below



CONNECTIONS		
DB 9F	COLOUR	DB 9F
2	-	3
3	-	2
5	-	5
SHELL	DRAIN	SHELL

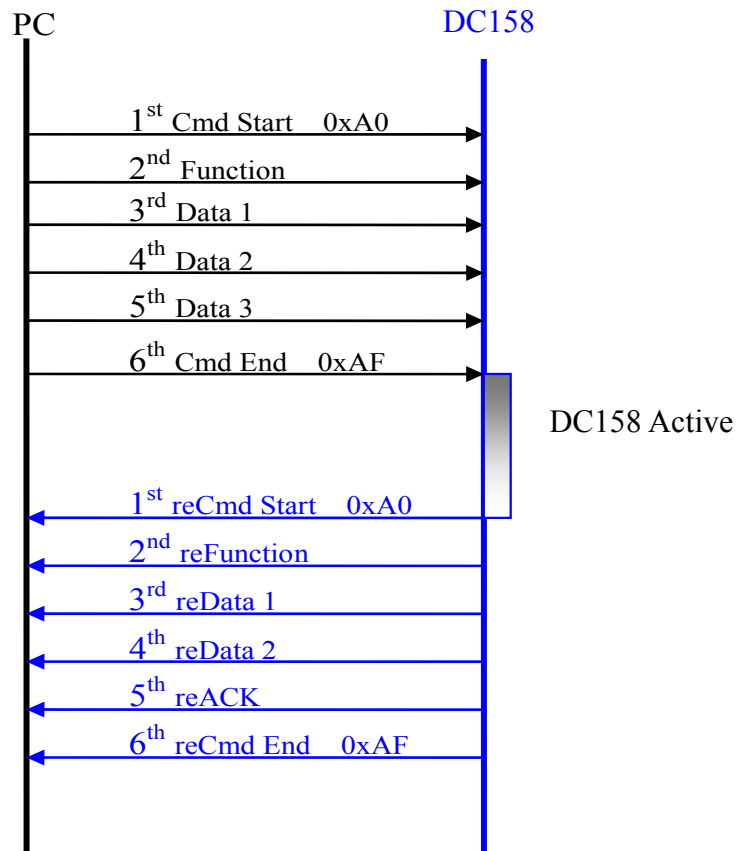
3. Command Process



4. The Command Transfer

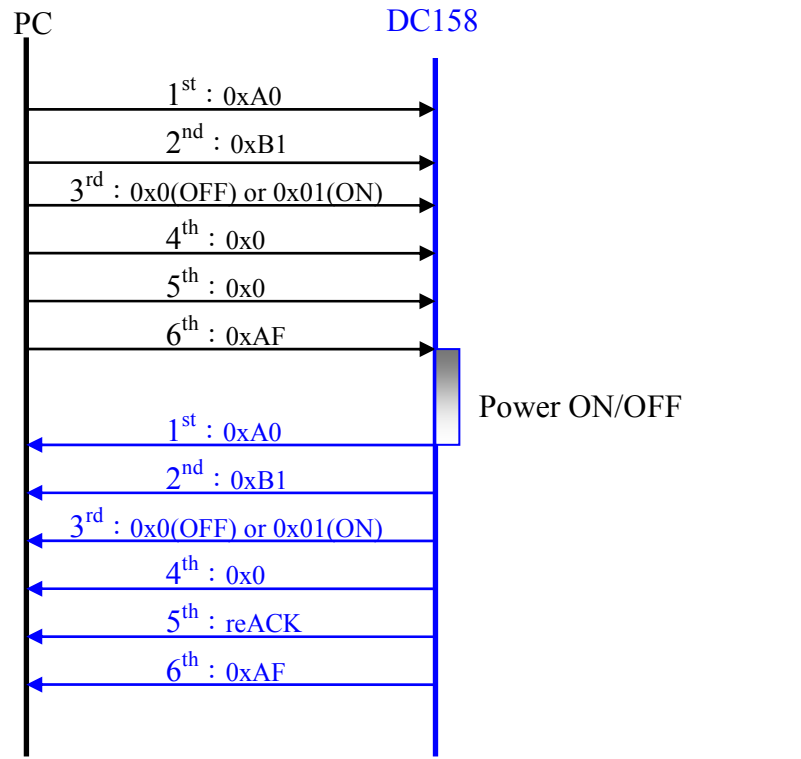
Control method

Control scheme as below



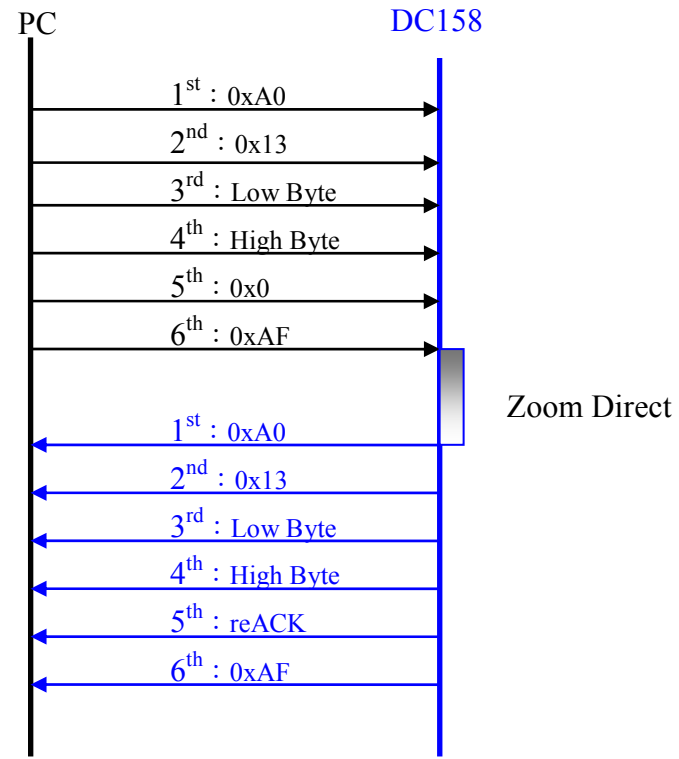
5. Example

Example 1 : (Power ON/OFF)



A0h△B1h△01h (Power ON)△00h△00h△AFh ← (PC send Command to DC158) → A0h△B1h△01h△00h△00h△AFh ← (DC158 Return Command to PC)

Example 2 : (Zoom Direct (Straight, No AF))



A0h△13h△06h△01h△00h△AFh ← (PC send Command to DC158) → A0h△13h△06h△01h△00h△AFh ← (DC158 Return Command to PC)

6. Packet Format

<Command Packet Format>

1Byte	STX	Start Of Command	:A0h
2Byte	Command	Command	:00~FFh
3Byte	Parameter1	Data	:00~FFh
4Byte	Parameter2	Data	:00~FFh
5Byte	Parameter3	Data	:00~FFh
6Byte	ETX	End Of Command	:AFh

<Return Packet Format>

1Byte	STX	Start Of Command	:A0h
2Byte	Command	Command	:00~ FFh
3Byte	Parameter1	Data	:00~FFh
4Byte	Parameter2	Data	:00~FFh
5Byte	Status	<Bit> <Contents>	
		7 (0)	
		6 Iris Moving Status (1)/(0)Stop Status	
		5 Zoom Moving Status (1)/(0)Stop Status	
		4 Focus Moving Status (1)/(0)Stop Status	
		3 (0)	
		2 (0)	
		1 Communication Response 0=ACK/1=NAK/2=IGNORE/3=Not Used	
		0 Communication Response	
6Byte	ETX	End Of Command	:AFh

Communication Response	5 th Byte	Status
ACK	0x00	Capable Of Normal End Or Normal Operation
NAK	0x01	Detecting Errors In Command Packet(STX, ETX Byte) Parity Error ,Framing Error, Overrun Error Data in out of specified range
IGNORE	0x10	Cannot execute the transmitted command for other operations Unsupported command
Not Used	0x11	

7. Control Command

Item	Command	PC AP to DC158 Master Command Format						Parameters
		1B	2B	3B	4B	5B	6B	
1	Preset/Factory Reset	A0h	03h	P1	P2	00h	AFh	P1=0, P2=00/01:Preset Load/Save P1=1:Factory Reset
2	Slide show On/Off	A0h	04h	P1	00h	00h	AFh	P1=00/01:Off/On
3	Slide show Effect	A0h	05h	P1	00h	00h	AFh	P1=0~5:Off/Shutter/Right/Down/Side/Open
4	Slide show Delay	A0h	06h	P1	00h	00h	AFh	P1=0~4:1sec/3sec/5sec/10sec/Manual
5	Digital Zoom Direct	A0h	18h	P1	00h	00h	AFh	P1= SXGA、720P、XGA : 0~46(Dec) :Digital Zoom Position
6	Focus Stop	A0h	19h	00h	00h	00h	AFh	
7	Focus Start	A0h	1Ah	P1	P2	00h	AFh	P1=00/01:Near/Far P2=01~05:Speed
8	Focus Direct (No Limit)	A0h	1Bh	P1	P2	P3	AFh	P1(LowByte)P2(HighByte)=0~200(Dec):Focus Position P3=01~05:Speed
9	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	00h	AFh	P1=00/01:Auto Tune/AWB
10	White Balance Manual	A0h	23h	P1	P2	00h	AFh	P1=01/02 : +1/-1(Red Gain) P2=01/02 : +1/-1(Blue Gain)
11	Pan PBP	A0h	25h	P1	00h	00h	AFh	P2=00/01:Still/Preview P1= XGA:0~32(Dec)Step SXGA、WXGA:0~40(Dec)Step
12	Set Pan Mode	A0h	26h	P1	00h	00h	AFh	P1=00/01/:Normal/Pan mode
13	Set Pan Move	A0h	27h	P1	00h	00h	AFh	P1=01/02/03/04:Up/Down/Left/Right
14	Call DIP Switch Value	A0h	29h	00h	00h	00h	AFh	P1:DIP Switch Value
15	Freeze	A0h	2Ch	P1	00h	00h	AFh	P1=00/01:Off/On

Item	Command	PC AP to DC158 Master Command Format						Parameters
		1B	2B	3B	4B	5B	6B	
16	Iris	A0h	30h	P1	P2	00h	AFh	P1=00/01/02:Auto/Manual/Stop (AC 50Hz)P2=00~126(Dec):Brightness (AC 60Hz)P2=00~134(Dec):Brightness
17	Switch USB Transfer	A0h	32h	P1	00h	00h	AFh	P1=00/01:Mass Storage/USB Camera
18	Negative (film)	A0h	36h	P1	00h	00h	AFh	P1=00/01:Off/On
19	Color (gray)	A0h	37h	P1	00h	00h	AFh	P1=00/01:Photo/Gray
20	Language Select	A0h	38h	P1	00h	00h	AFh	P1=0~8:English/Chinese/Deutsch/Francais/Spanish/Russian /Nederlands/Finland/Polish
21	Brightness Control	A0h	39h	P1	00h	00h	AFh	P1=00/01:-1/+1
22	Source live/PC	A0h	3Ah	P1	00h	00h	AFh	P1=00/01:PC/DM350(no PC auto switch)
23	Call Master Version	A0h	45h	00h	00h	00h	AFh	DHAxxx = DHA P1 P2 P3(ASCII)
24	Call AE Status	A0h	46h	00h	00h	00h	AFh	P1=00/01:Off/On
25	Enable/Disable LOGO Image	A0h	47h	P1	00h	00h	AFh	P1=00/01:Off/On
26	Playback Image Index Change Page	A0h	4Ah	P1	00h	00h	AFh	P1=00/01:Page Up/Page Down
27	Call Slave Version	A0h	4Dh	00h	00h	00h	AFh	DHBxxx = DHB P1 P2 P3(ASCII)
28	Call lamp Status	A0h	50h	00h	00h	00h	AFh	P1=00/01:Off/On
29	Call Text/Photo Status	A0h	51h	00h	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray
30	reg1	A0h	52h	P1	P2	00h	AFh	P1=00/01:Read/Write P2=0x00~0xff
31	reg2	A0h	53h	P1	P2	00h	AFh	
32	reg3	A0h	54h	P1	P2	00h	AFh	

Item	Command	PC AP to DC158 Master Command Format						Parameters
		1B	2B	3B	4B	5B	6B	
33	Bad pixel fix	A0h	57h	P1	P2	P3	AFh	p1:00/01/02:bad pixel fix/bad pixel numbers/badpixel correction number p1=2,p2=00/01:Read/Set bad pixel correction number.p3:Set number.p2:Read number.
34	Call Digital Zoom Position	A0h	62h	00h	00h	00h	AFh	P1=SXGA、720P、XGA:0~46(Dec) :Digital Zoom Position
35	Call Focus Position	A0h	64h	00h	00h	00h	AFh	P1(LowByte)P2(HighByte)=0~200(Dec):Focus Position
36	Call Freeze Status	A0h	78h	00h	00h	00h	AFh	P1=00/01:Off/On
37	Call Iris Status	A0h	7Ah	00h	00h	00h	AFh	P1=00/01:Auto/Manual、Stop
38	Call Negative	A0h	87h	00h	00h	00h	AFh	(AC 50Hz)P2=00~126(Dec):Brightness (AC 60Hz)P2=00~134(Dec):Brightness P1=00/01:Off/On
39	Call Color	A0h	88h	00h	00h	00h	AFh	P1=00/01:Photo/Gray
40	Call Brightness Position	A0h	89h	00h	00h	00h	AFh	P1=00~134(Dec):Brightnes
41	Call Mix Zoom Position	A0h	8Ah	00h	00h	00h	AFh	P1(LowByte)P2(HighByte)=0~46(Dec):Mix Zoom Position
42	Call Menu Status	A0h	8Bh	00h	00h	00h	AFh	P1=00/01:Off/On
43	Key Function	A0h	A0h	P1	00h	00h	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/Menu
44	Set R/B Gain	A0h	A1h	P1	P2	P3	AFh	P1=01/02:Red Gain/Blue Gain P2(LowByte)P3(HighByte)=0~1023(Dec):Gain
45	Call R/B Gain	A0h	A2h	P1	00h	00h	AFh	Send : P1=01/02:Red Gain/Blue Gain Return : P1(LowByte)P2(HighByte)=0~1023(Dec):Gain
46	AF One Push Trigger	A0h	A3h	01h	00h	00h	AFh	

Item	Command	PC AP to DC158 Master Command Format						Parameters
		1B	2B	3B	4B	5B	6B	
47	Set Sharpness (Gamma)	A0h	A7h	P1	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray
48	Set Image Mode	A0h	A9h	P1	00h	00h	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope
49	Night Vision	A0h	ABh	P1	00h	00h	AFh	P1=00/01:Off/On
50	System ON/OFF	A0h	B0h	P1	00h	00h	AFh	P1=00/01:Off/On
51	Power	A0h	B1h	P1	00h	00h	AFh	P1=00/01:Off/On
52	Capture	A0h	B2h	P1	00h	00h	AFh	P1=00:Capture
53	Playback thumbnail	A0h	B3h	P1	00h	00h	AFh	P1=00/01:Thumbnail/PBP Thumbnail
54	Preview rotation	A0h	B4h	P1	00h	00h	AFh	P1=00/01/02/03:Rotate 0/90/180/270
55	Delete	A0h	B6h	P1	P2	00h	AFh	P1=00/01/02: Delete one/Delete all/Format Format: P2=00/01 Format Nan B\External
56	call system status	A0h	B7h	00h	00h	00h	AFh	P1(system situation)= 00/01:not ready/ Ready to accept commend P2(Power Status)=00/01:Off/On
57	AC Frequency Select	A0h	B8h	P1	00h	00h	AFh	P1=00/01:50 Hz/60 Hz
58	Lamp On/Off	A0h	C1h	P1	00h	00h	AFh	P1=00/01:Off/On
59	Firmware Upgrade	A0h	CBh	P1	00h	00h	AFh	P1=00/01:External/Internal; P1=1 and p2:00/01 Manual Run/Auto Run

8. Return Packet

Item	Command	PC AP to DC158 Master command format						Parameters
		1B	2B	3B	4B	5B	6B	
1	Preset/Factory Reset	A0h	03h	P1	P2	St.	AFh	P1=0, P2=00/01:Preset Load/Save P1=1:Factory Reset
2	Slide show On/Off	A0h	04h	P1	00h	St.	AFh	P1=00/01:Off/On
3	Slide show Effect	A0h	05h	P1	00h	St.	AFh	P1=0~5:Off/Shutter/Right/Down/Side/Open
4	Slide show Delay	A0h	06h	P1	00h	St.	AFh	P1=0~4:1sec/3sec/5sec/10sec/Manual
5	Digital Zoom Direct	A0h	18h	P1	00h	St.	AFh	P1=SXGA、720P、XGA:0~46(Dec) :Digital Zoom Position
6	Focus Stop	A0h	19h	00h	00h	St.	AFh	
7	Focus Start	A0h	1Ah	P1	P2	St.	AFh	P1=00/01:Near/Far P2=01~05:Speed
8	Focus Direct (No Limit)	A0h	1Bh	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~200(Dec):Focus Position P3=01~05:Speed
9	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	St.	AFh	P1=00/01:Auto Tune/AWB
10	White Balance Manual	A0h	23h	P1	P2	St.	AFh	P1=01/02: +1/-1(Red Gain) P2=01/02: +1/-1(Blue Gain)
11	Pan PBP	A0h	25h	P1	00h	St.	AFh	P2=00/01:Still/Preview P1= XGA:0~32(Dec)Step SXGA、WXGA:0~40(Dec)Step
12	Set Pan Mode	A0h	26h	P1	00h	St.	AFh	P1=00/01:Normal/Pan mode
13	Set Pan Move	A0h	27h	P1	00h	St.	AFh	P1=01/02/03/04:Up/Down/Left/Right
14	Call DIP Switch Value	A0h	29h	P1	00h	St.	AFh	P1:DIP Switch Value
15	Freeze	A0h	2Ch	P1	00h	St.	AFh	P1=00/01:Off/On

Item	Command	PC AP to DC158 Master command format						Parameters
		1B	2B	3B	4B	5B	6B	
16	Iris	A0h	30h	P1	P2	St.	AFh	P1=00/01/02:Auto/Manual/Stop (AC 50Hz)P2=00~126(Dec):Brightness (AC 60Hz)P2=00~134(Dec):Brightness
17	Switch USB Transfer	A0h	32h	P1	00h	St.	AFh	P1=00/01:Mass Storage/USB Camera
18	Negative (film)	A0h	36h	P1	00h	St.	AFh	P1=00/01:Off/On
19	Color (gray)	A0h	37h	P1	00h	St.	AFh	P1=00/01:Photo/Gray
20	Language Select	A0h	38h	P1	00h	St.	AFh	P1=0~8:English/Chinese/Deutsch/Francais/Spanish/Russian /Nederlands/Finland/Polish
21	Brightness Control	A0h	39h	P1	00h	St.	AFh	P1=00/01:-1/+1
22	Source live/PC	A0h	3Ah	P1	00h	St.	AFh	P1=00/01:PC/DM350(no PC auto switch)
23	Call Master Version	A0h	45h	P1	P2	P3	AFh	DHAxxx = DHA P1 P2 P3(ASCII)
24	Call AE Status	A0h	46h	P1	00h	St.	AFh	P1=00/01:Off/On
25	Enable/Disable LOGO Image	A0h	47h	P1	00h	St.	AFh	P1=00/01:Off/On
26	Playback Image Index Change Page	A0h	4Ah	P1	00h	St.	AFh	P1=00/01:Page Up/Page Down
27	Call Slave Version	A0h	4Dh	P1	P2	P3	AFh	DHBxxx = DHB P1 P2 P3(ASCII)
28	Call lamp Status	A0h	50h	P1	00h	St.	AFh	P1=00/01:Off/On
29	Call Text/Photo Status	A0h	51h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray
30	reg1	A0h	52h	P1	P2	St.	AFh	P1=00/01:Read/Write P2=0x00~0xff
31	reg2	A0h	53h	P1	P2	St.	AFh	
32	reg3	A0h	54h	P1	P2	St.	AFh	
33	Bad pixel fix	A0h	57h	P1	P2	St.	AFh	p1:00/01/02:bad pixel fix/bad pixel numbers/badpixel correction

Item	Command	PC AP to DC158 Master command format						Parameters
		1B	2B	3B	4B	5B	6B	
								number p1=2,p2=00/01:Read/Set bad pixel correction number.p3:Set number.p2:Read number.
34	Call Digital Zoom Position	A0h	62h	P1	00h	St.	AFh	P1=SXGA、720P、XGA:0~46(Dec) :Digital Zoom Position
35	Call Focus Position	A0h	64h	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~200(Dec):Focus Position
36	Call Freeze Status	A0h	78h	P1	00h	St.	AFh	P1=00/01:Off/On
37	Call Iris Status	A0h	7Ah	P1	P2	St.	AFh	P1=00/01:Auto/Manual、Stop
38	Call Negative	A0h	87h	P1	00h	St.	AFh	(AC 50Hz)P2=00~126(Dec):Brightness (AC 60Hz)P2=00~134(Dec):Brightness P1=00/01:Off/On
39	Call Color	A0h	88h	P1	00h	St.	AFh	P1=00/01:Photo/Gray
40	Call Brightness Position	A0h	89h	P1	00h	St.	AFh	P1=00~134(Dec):Brightnes
41	Call Mix Zoom Position	A0h	8Ah	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~46(Dec):Mix Zoom Position
42	Call Menu Status	A0h	8Bh	P1	00h	St.	AFh	P1=00/01:Off/On
43	Key Function	A0h	A0h	P1	00h	St.	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/Menu
44	Set R/B Gain	A0h	A1h	P1	P2	St.	AFh	P1=01/02:Red Gain/Blue Gain P2(LowByte)P3(HighByte)=0~1023(Dec):Gain
45	Call R/B Gain	A0h	A2h	P1	P2	St.	AFh	Send : P1=01/02:Red Gain/Blue Gain Return : P1(LowByte)P2(HighByte)=0~1023(Dec):Gain
46	AF One Push Trigger	A0h	A3h	01h	00h	St.	AFh	
47	Set Sharpness (Gamma)	A0h	A7h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray

Item	Command	PC AP to DC158 Master command format						Parameters
		1B	2B	3B	4B	5B	6B	
48	Set Image Mode	A0h	A9h	P1	00h	St.	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope
49	Night Vision	A0h	ABh	P1	00h	St.	AFh	P1=00/01:Off/On
50	System ON/OFF	A0h	B0h	P1	00h	St.	AFh	P1=00/01:Off/On
51	Power	A0h	B1h	P1	00h	St.	AFh	P1=00/01:Off/On
52	Capture	A0h	B2h	P1	00h	St.	AFh	P1=00:Capture
53	Playback thumbnail	A0h	B3h	P1	00h	St.	AFh	P1=00/01:Thumbnail/PBP Thumbnail
54	Preview rotation	A0h	B4h	P1	00h	St.	AFh	P1=00/01/02/03:Rotate 0/90/180/270
55	Delete	A0h	B6h	P1	P2	St.	AFh	P1=00/01/02: Delete one/Delete all/Format Format: P2=00/01 Format Nan B\External
56	call system status	A0h	B7h	P1	P2	St.	AFh	P1(system situation)= 00/01:not ready/ Ready to accept commend P2(Power Status)=00/01:Off/On
57	AC Frequency Select	A0h	B8h	P1	00h	St.	AFh	P1=00/01:50 Hz/60 Hz
58	Lamp On/Off	A0h	C1h	P1	00h	St.	AFh	P1=00/01:Off/On
59	Firmware Upgrade	A0h	CBh	P1	00h	St.	AFh	P1=00/01:External/Internal; P1=1 and p2:00/01 Manual Run/Auto Run

** St : 0 =Action Succeed, 1= NAK (No Action), 2 = Ignore (Command is not in the command list.)