Appendix B: DIO Command Protocol

In this appendix the DIO command protocol is described here to let customer's remote management software to access Digital I/O state through Ethernet network by a specific TCP/UDP port(default is 50001).

Command Packet Format:

Length(Bytes)	2	2	32	32	2	1
Format	Start Flag	Command	Data1	Data2	End Flag	CRC

Send command to ATC-2000 by one of four ways (TCP Server/TCP Client/UDP Server/UDP Client)

Return Packet Format:

Length(Bytes)	2	2	32	32	2	1
Format	Start Flag	Command Status	Data1	Data2	End Flag	CRC

The ATC-2000 returns by Return packet. You can get command status to know the result after sending command packet and from Data1 and Data2 to know current I/O state.

Note:
Start Flag: 0xF0F0
End Flag: 0xF0F0
Command Status: the definition of command code is as following
0x0002 – ACK of Read Digital I/O state
0x0004 – ACK of Trigger Digital I/O
0x0006 – ACK of E-mail Alarm Trigger
0x0010 – Report current Digital I/O state (If I/O Operation Mode of BF-450 is set as TCP Client or UDP Client and Auto Report I/O Status is enabled, you will receive this report packet from BF-450)
0xFFFC – Flag error, incorrect Start Flag or End Flag received in command packet
0xFFFD – Length error, the length of command packet is invalid
0xFFFE – CRC error, incorrect CRC value
0xFFFF – Command error, no such command
CRC value = 0 – total sum from field of 'Start Flag" to "End Flag"

The format of each command code is as following:

1. Read Digital I/O state

Length(Bytes)	2	2	32	32	2	1
	0xF0F0	0x0001	Xxx (don't care)	Xxx (don't care)	0xF0F0	CRC

Return Successful Packet

Length(Bytes)	2	2	32	32	2	1
	0xF0F0	0x0002	Data1	Data2	0xF0F0	CRC

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
IN-1	IN-2	IN-3	reserved					reserved	reserved

IN-1: state of IN1, 0 for SHORT, 1 for OPEN
IN-2: state of IN2, 0 for SHORT, 1 for OPEN
IN-3: state of IN3, 0 for SHORT, 1 for OPEN

Data2

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: state of OUT1, 0 for SHORT, 1 for OPEN
OUT-2: state of OUT2, 0 for SHORT, 1 for OPEN
OUT-3: state of OUT3, 0 for SHORT, 1 for OPEN

2. Trigger Digital I/O

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0003**	**Data1**	**Xxx (don't care)**	**0xF0F0**	**CRC**

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: the value you want to write into OUT1, 0 for SHORT, 1 for OPEN
OUT-2: the value you want to write into OUT2, 0 for SHORT, 1 for OPEN
OUT-3: the value you want to write into OUT3, 0 for SHORT, 1 for OPEN

Return Successful Packet

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0004**	**Xxx (don't care)**	**Xxx (don't care)**	**0xF0F0**	**CRC**

3. E-mail Alarm Trigger

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0005**	**Alarm Message Description**		**0xF0F0**	**CRC**

Alarm Message Description: string of alarm message by customer attach and BF-450 send this content by e-mail

Return Successful Packet

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0006**	**Xxx (don't care)**	**Xxx (don't care)**	**0xF0F0**	**CRC**

4. Report Current I/O State Packet(sending from BF-450)

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0010**	**Data1**	**Data2**	**0xF0F0**	**CRC**

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
IN-1	IN-2	IN-3	reserved					reserved	reserved

IN-1: state of IN1, 0 for SHORT, 1 for OPEN
IN-2: state of IN2, 0 for SHORT, 1 for OPEN
IN-3: state of IN3, 0 for SHORT, 1 for OPEN

Data2

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: state of OUT1, 0 for SHORT, 1 for OPEN
OUT-2: state of OUT2, 0 for SHORT, 1 for OPEN
OUT-3: state of OUT3, 0 for SHORT, 1 for OPEN