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BC 1054
USER 7500
SPECIFICATION

Met One Instruments, Inc
1600 Washington Blvd.
Grants Pass, Oregon 97526
Telephone 541-471-7111
Facsimile   541-471-7116

Table of Contents

1.   Overview

This document describes the implementation of the 7500 protocol used in BC 1054 Carbon Monitor.

2.   Communication Modes

2.1.   Overview

There are three modes of communication:

1. _User communication_ – This is a user interactive mode using simple letter commands for ease of use.
2. _Computer communication_ – This mode is used for computer-to-device communication. It requires a level of data integrity.

2.2.   User Communication

In the user communication mode (terminal mode), the user simply presses the Enter key, `<cr>`, three times to enter the mode. In this mode simple character commands can be issued with no `<Esc>` character required.

An asterisk character appears during wake-up, and also after a command has completed. The asterisk indicates that the instrument is ready for a new command. Commands are echoed back from the instrument in this mode. The characters must be echoed as received in the instrument.

A help menu can be viewed by sending H or h; giving all the commands available to the user.

Pressing `<Esc>` or `Q<cr>` will exit terminal mode.

2.3.   Computer Communication

In the computer communication mode the command format requires a level of data integrity – checksum.

This mode is entered whenever an `<Esc>` character is sent to the instrument.

Character echo is suppressed in this mode.

2.3.1. Computer Command Format

The computer command has the following format:

```
<Esc>Cmd p1 p2*cs<cr>
```

Computer commands are prefaced with an `<Esc>` (0x1B) character followed directly by a command, `Cmd`, which is variable in length depending on the command. After the command characters there can be zero or more parameter fields, `p1 p2`. Each parameter field is delimited by one or more Space characters (0x20). The end of the message is signaled by the Checksum Delimiter character `*` (0x2A) followed by the checksum, `cs`, and finally terminated with a carriage return `<cr>` (0x0D) character.

A computer command example follows:

```
<Esc>RV*1234<cr>
```

All command responses are terminated with a checksum

```
RV 092, 99999-1, R9.9.9*1234<cr><lf>
```

2.3.2. Checksum Computation

Checksum is calculated as the 16 bit unsigned integer sum of all of the characters after the `<Esc>` character up to but not Including the Checksum Delimiter Character `*` (0x2A). It is printed out as an ASCII decimal number.

The result is always 5 characters in length with leading zeros.

The checksum may be bypassed in the following manner: `*//<cr>`.

3. Command Summary

3.1. Command List

$ – User level password protected commands

Command	Description
#	Get MetRecord revision.
1	Report settings.
2	Report All data.
3	Report New data.
4	Report Last data.
7	Report Alarm data.
C	Clear data file – $.
D	Get/Set date part of the real time clock – $.
H	Help menu.
K	Get/Set User K-Factor– $
T	Get/Set time part of the real time clock – $.
Q	Exit User mode
CA	Clear alarm log file – $
DA	BH Data Query Command
DS	Request Channel Descriptor Information – $.
DT	Get/Set the date and time of the real time clock – $.
HS	Get/Set Ethernet flow control – $.
ID	Get/Set location ID or address – $.
OI	Get/Set output interval.
OP	Get Operational status – $.
PR	Print report – 0-Settings, 1-Data, 2-Alarm
PW	Unlock user commands
QH	Report data record header.
RQ	Report last data record without header
RV	Get product information.
SB	Get/Set serial baud rate – $

SS	Get Met One serial number.
SPW	Get/Set user password – $
XRD	Get XMODEM record descriptor report – Refer to *File Record Descriptor Specification*
XRF	XMODEM read file – Refer to *File Record Descriptor Specification*
FLSP	Get/Set flow set point – $
FTSP	Get/Set flow heat set point – $
SPOT	Get/Set number of tape advance spots – $
TENA	Get/Set tape advance loading enable – $
TPER	Get/Set tape advance period – $
DSCRC	Get Channel Descriptor Table CRC – $
TLOAD	Get/Set tape advance loading – $
XRDCRC	Get XMODEM file descriptors CRC – Refer to *File Record Descriptor Specification*
TCARBON	Get/Set tape advance load carbon type – $

4. User Commands

The command and responses shown below are for computer mode unless otherwise noted. User mode responses are more verbose and similar in nature.

4.1. # – Request MetRecord Revision

Command	Description
#	Request the MetRecord Revision.

Response	Description
# 7500 r	7500 – This document number
	r – The revision of this document implemented in firmware

Example
#<cr> # 7500 C<cr><lf>

4.2. 1 – Report Settings

Command	Description
1	Report the settings. The Factory Settings are encrypted.
	This report does not support the check sum if requested.

Response – User

```
BC 1054 Settings Report
2017-01-04 14:21:00

       BC 1054, 82401, R1.1.1.1a
          CPLD, 81699, R1.0.0
         30030, 82402, R1.0.0
       Storage, 82403, R1.0.2
 Digital Sen 1, 597, 10503-01, R01.0.0

 Serial Number, U16130
      Location, 1
          Baud, 115200
  Flow Control, NONE
   Tape Period, AUTO
     Tape Spot, 1
   Load Enable, ON
    Load Level, 100
   Load Carbon, BC1
   Flow Set Pt, 2 LPM
      USB Days, 10
       User K1, 1.000
       User K2, 1.000
       User K3, 1.000
       User K4, 1.000
       User K5, 1.000
       User K6, 1.000
       User K7, 1.000
       User K8, 1.000
       User K9, 1.000
      User K10, 1.000
     FT Set Pt, 35.0
    Box Set Pt, 30.0

  Name, Offset,  Slope
  FLOW,  0.049,  0.978
    AT,  0.400
    BP, -2.000
```

```
Factory Settings
DQogICAgICBDLUZhY3RvciwgMi42MTANCiAgICAgICAgICBBQlMxLCAxOC4yMzQN
CiAgICAgICAgICBBQlMyLCAxNS45MDENCiAgICAgICAgICBBQlMzLCAxNC41NDgN
CiAgICAgICAgICBBQlM0LCAxMy4wMjQNCiAgICAgICAgICBBQlM1LCAxMi4xMDIN
CiAgICAgICAgICBBQlM2LCAxMS41ODkNCiAgICAgICAgICBBQlM3LCAxMC4zNjAN
CiAgICAgICAgICBBQlM4LCA5Ljc2OA0KICAgICAgICAgIEFCUzksIDcuNzcwDQog
ICAgICAgICBBQlMxMCwgNy4xOTcNCiAgICAgICBGYWN0IEsxLCAxLjAwNw0KICAg
ICAgIEZhY3QgSzIsIDEuMDAzDQogICAgICBRmFjdCBLMywgMS4wMDINCiAgICAg
ICBGYWN0IEs0LCAxLjAwMg0KICAgICAgIEZhY3QgSzUsIDEuMDAxDQogICAgICAg
RmFjdCBLNiwgMS4wMDINCiAgICAgICBGYWN0IEs3LCAxLjAwMg0KICAgICAgIEZh
Y3QgSzgsIDEuMDAxDQogICAgICAgRmFjdCBLOSwgMS4wMDMNCiAgICAgIEZhY3Qg
SzEwLCAwLjk5Nw0KICAgICAgTEVFIFNldFB0IDEsIDE3LjQNCiAgIExFRCBTZXRQdCAy
LCA1LjQNCiAgIExFRCBTZXRQdCAzLCAzLjINCiAgIExFRCBTZXRQdCA0LCA0LjQN
CiAgIExFRCBTZXRQdCA1LCAzLjQNCiAgIExFRCBTZXRQdCA2LCA3LjcNCiAgIExF
RCBTZXRQdCA3LCAzLjANCiAgIExFRCBTZXRQdCA4LCA4LjcNCiAgIExFRCBTZXRQ
dCA5LCA3LjENCiAgTEVEIFNldFB0IDEwLCAzLjMNCiAgICBCb3ggUC1SYWluLCAx
MC4wMDANCiAgICBCb3ggSS1SYWluLCAwLjUwMA0KICAgICBGVCBQLUdhaW4sIDEw
LjAwMA0KICAgICBGVCBJLUdhaW4sIDAuNTAwDQogICAgIFNhdCBMaW1pdCwgMjQw
MA0KICAgICBEZXQgTGltaXQsIDEwMA0KICAgICBaZXJvIExpbWl0LCAIwDQogICAg
ICAgUHVtcCBQUywgNTAuMA0K
```

4.3. 2 – Report All Data

Command	Description
2	Report all the data.

Header Response: A report header is present for the CSV format when execute from terminal mode. It is suppressed in computer mode. This report does not support the check sum if requested.

```
Data Report
2017-01-04 14:24:01
Location, 1, U16130

Time,
SZ(mV),RZ(mV),
SB1(mV),RB1(mV),ATN1,BC1(ng/m3),
SB2(mV),RB2(mV),ATN2,BC2(ng/m3),
SB3(mV),RB3(mV),ATN3,BC3(ng/m3),
SB4(mV),RB4(mV),ATN4,BC4(ng/m3),
SB5(mV),RB5(mV),ATN5,BC5(ng/m3),
SB6(mV),RB6(mV),ATN6,BC6(ng/m3),
SB7(mV),RB7(mV),ATN7,BC7(ng/m3),
SB8(mV),RB8(mV),ATN8,BC8(ng/m3),
SB9(mV),RB9(mV),ATN9,BC9(ng/m3),
SB10(mV),RB10(mV),ATN10,BC10(ng/m3),
Flow(lpm),WS(m/s),WD(Deg),AT(C),RH(%),
BP(mbar),LED T(C),DET T(C),FT(C),Status
```

Data Response

```
2017-01-04
14:13:00,3.895,4.974,1661.251,1171.692,0.00011,0.1,1681.364,114
4.154,0.00013,0.2,1689.905,1118.796,0.00013,0.2,1702.322,1161.9
44,0.00002,0.0,1675.373,1249.420,0.00004,0.1,1638.623,1380.480,
0.00007,0.1,1708.453,1441.349,0.00015,0.3,1681.521,1543.995,0.0
0009,0.2,1681.913,1636.188,0.00009,0.2,1714.257,1808.156,0.0000
7,0.2,0.00,0.0,0,20.59,31.5,970.67,28.56,29.23,0.00,2048
```

Note: an <Esc> or <cr> character will cancel a report.

4.4. 3 – Report New Data

Command	Description
3	Report the new data since the last request.

Response:
The response is the same as the 2-command.

4.5. 4 – Report Last Data

Command	Description
4	Report the last data record.
4 0	Report all the data.
4 -1	Report the new data since the last request.
4 n	Report the last n records where n is less than or equal to 2000.
4 ts	Request the last data since timestamp, where ts has the format yyyy-MM-dd HH:mm:ss.

Response:
The response is the same as the 2-command.

4.6. 7 – Report Alarm Data

Command	Description
`7`	Report all the data.
`7 -1`	Report the new data since the last request.
`7 n`	Report the last `n` hours where `n` is less than or equal to 2000.
`7 ts`	Request the last data since timestamp, where `ts` has the format `yyyy-MM-dd HH:mm:ss`.

Header Response: A report header is present for the `CSV` format when execute from terminal mode. It is suppressed in computer mode. If the check sum is requested the check sum value will be prefaced with a comma only on the data header line.

```
Alarm Report
2015-09-24 13:42:41
Location, 1, I12345

Time,Alarm
```

Response: If the check sum is requested the check sum value will be prefaced with a comma.
```
2016-04-08 10:39:29,POWER OUTAGE
2016-04-08 10:39:29,DIGITAL LINK DOWN
2016-04-08 10:39:29,TAPE BREAK,14
2016-04-08 10:39:29,MAINTENANCE
2016-04-08 10:39:29,FLOW FAILURE,5.0,0.0
2016-04-08 10:39:29,TAPE ADVANCE
2016-04-08 10:39:29,DETECTOR,LED,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,SIG DET,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,REF DET,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,SIG ZERO,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,REF ZERO,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,SIG HIGH,1,4,5,1000,1100
2016-04-08 10:39:29,DETECTOR,REF HIGH,1,4,5,1000,1100
2016-04-08 10:39:29,SENSOR RANGE,AT,99.9
2016-04-08 10:39:29,SPI LINK DOWN,0,12,1
```

4.7. C – Clear Data Log

Command	Description
C Y	Clear the data log.

Response
C Y

Example
C Y<cr> C Y<cr><lf>

4.8. D – Request or Set the Date Only

Command	Description
D	Request the date part of the real time clock.
D yyyy-MM-dd	Set the date part of the real time clock.

Response
D yyyy-MM-dd

Parameter	Description
yyyy	Years 2000 – 2037
MM	Months 1 – 12
dd	Days 1 – 31

Example
D<cr> D 2013-01-08<cr><lf> D 2013-01-08<cr> D 2013-01-08<cr><lf>

4.9.   H – Help Menu

Command	Description
H	Report the help menu. The Factory Menu is included if Factory password has been issued.

```
BC 1054 Help Menu

 1 - Report Settings
 2 - Report All Data
 3 - Report New Data
 4 - Report Last Data
 7 - Report Alarm Data
 C - Clear Data File
 D - Set Date
 T - Set Time
CA - Clear Alarm File
DS - Met Record Descriptor
DT - Set Date/Time
ID - Set Location ID
OP - Get Operational State
PR - Print Report
QH - Report Data Record Header
RV - Report Model/Part/Revision
RQ - Request Last Data Record
SB - Set Baud Rate
SS - Get Serial Number
SPW - Set User Password
FLSP - Set Flow Set Point
SPOT - Set Tape Spots
TENA - Set Load Enable
TPER - Set Tape Period
TLOAD - Set Load Level
TCARBON - Set Load Carbon
```

4.10. K – Request or Set the K-Factor

Command	Description
K n	Request K-factor setting for BC channel n (1 – 10).
K n x.xxx	Set K-factor setting for BC channel n (1 – 10) where x.xxx is the value and the range is 0.1 to 9.999.

Response	Description
K 1 1.000	Returns the BC channel 1 K-factor.

Example
K 1<cr> K 1 1.000<cr><lf> K 2 1.5<cr> K 2 1.500<cr><lf>

4.11. T – Request or Set the Time Only

Command	Description
T	Request the time part of the real time clock.
T HH:mm:ss	Set the time part of the real time clock.

Response	Description
T HH:mm:ss	HH – Hours 0 – 23. mm – Minutes 0 – 59. ss – Seconds 0 – 59, this parameter is optional. When omitted the value will be 0.

Example
T<cr> T 13:18:38<cr><lf> T 14:13:12<cr> T 14:13:12<cr><lf>

4.12. Q – Exit User Mode

Command	Description
Q	Exit User mode and enter Computer mode. Esc will also exit User mode.

Response	Description
Exit User Mode	The command was successful.

Example
Q<cr> Exit User Mode<cr><lf>

4.13. CA – Clear Alarm Log

Command	Description
CA Y	Clear the alarm log.

Response
CA Y

Example
CA Y<cr> CA Y<cr><lf>

4.14. Gesytec (Bayern-Hessen) Protocol

The Gesytec (Bayern-Hessen) Protocol is provided to communicate with a BC 1054 from an established network. The protocol is used to retrieve measurement values at some periodic rate. This is a polled type protocol. Only the DA command is supported for data retrieval. Refer to the BC 1054-9955 BH Protocol Rev 2.docx document for detailed examples and descriptions. See the DA command in section 3 for uses.

4.15. DA - BH Data Query Command

The DA Command is the Data Query command. The unit responds with the current measurement data according to Section 2.

The command structure for the DA data query command is as follows:
`<STX>DA<address><ETX><BCC>`

The <address> is optional and can be left out completely. The <address> if present must match the Location ID. Additional Space can be present after the address. The valid range of Location ID numbers is from 1 to 999.

The <address> can be represented with either leading 0's or leading <SP>'s. The following are different acceptable formats of the DA command with the Location ID of 5:
`<STX>DA<CR>`
`<STX>DA005<CR>`
`<STX>DA<SP><SP>5<ETX><BCC>`
`<STX>DA<ETX><BCC>`

The data query string is valid and will be answered with a transmission only if the command starts with `<STX>` followed by the characters DA, and the <address> (if present) matches the Location ID, and the command is terminated by either a `<CR>` or `<ETX>` followed by the correct checksum `<BCC>`.

If the query command is terminated with a `<CR>` the response will also be terminated with a `<CR>` and no `<BCC>` will be used. If the command is terminated with `<ETX><BCC>` then the response will also be required to terminate with `<ETX><BCC>`.

The format of the Response String is as follows.
`<STX>MD[nn]<SP>`
[address]<SP>[measured value 1]<SP>[Status]<SP>[Serial #]<SP>[SFKT]<SP>
[address+1]<SP>[measured value 2]<SP>[Status]<SP>[Serial #]<SP>[SFKT]<SP>
…
<ETX><BCC> or <CR><LF>

[nn]:				Number of variables to follow. Two digits with leading 0 ie 02.

[address]:			Location ID, 3 characters, leading zeros are transmitted.

[Measured value]:	In exponential representation. 4 characters mantissa, 2 characters exponent each with a sign. The decimal point is implied to be after the first digit and is not transmitted. For example, 23.7 would be represented as +2370+01

[Status]:			Status consists of two parts, Operation Status and Error Status. These are two-character hexadecimal values separated by <SP> which represent status byte and error byte conditions indicated by bit positions. These values are shown in the accompanying tables.

[Serial #]:			Three-digit Serial Number with leading zeros.

[SFKT]:			Space provided for future use in special functions. It currently consists of a string of six 0's.

An Example follows:
Inquiry:		`<STX>DA<CR>`

Response:
`<STX>MD03 001 +2578+02 00 00 023 000000<SP>`
`002 +5681+00 00 00 023 000000<SP>`
`003 +1001+03 00 00 023 000000<CR><LF>`

4.16. Channel Descriptor Table Commands

Channel descriptor commands are used to query the instrument for measurement channel descriptor information. These commands can be accessed by any serial device such as a data logger or software.

Information can be retrieved in either in single line responses or in bulk. Single line responses are needed for devices with limited serial input buffer sizes.

4.17. DS 0 – Get Channel Descriptor Table Information

Command	Description
DS 0	This command returns the general table information.

Response	Description
DS n,id,r	The response will indicate the general descriptor information.
	n – Number of channel/field descriptor lines available.
	id – Location ID
	r – Reserved for future use. 0 is the default.

Example
DS 0<cr>
DS 53,312,0<cr><lf>

4.18. DS c – Channel Descriptor Information

Command	Description
DS c	This command returns the specific channel descriptor information. c – Channel number.

Response
DS c,FieldName,MeasureType,units,prec,math,max,min

Parameter	Description
c	Field number – 1 based.
FieldName	Field name string in printable ASCII. This is the user selected name for the measurement. Example: AT1 for air temp, FT1 for flow temp, etc.
MeasureType	Measurement type string in printable ASCII See the definitions in Appendix B
units	Engineering units string in printable ASCII. See the definitions in Appendix C.
prec	Display value precision.
math	Math type field. Vector (V), Scalar (S), Total (T), Minimum (MIN), Maximum (MAX), Standard Deviation (STD), No math type (NONE), Binary OR (OR).
max	Maximum measurement value.
min	Minimum measurement value.

Example
DS 7<cr> DS 7,BC1,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>

4.19. DS – Request All Channel Descriptor Information

Command	Description
DS	This command returns all of the Channel Descriptor information. The command can be used for devices that have a large serial input buffer size.

Example
DS<cr>

```
DS<cr>
DS 1,Time,TIME,,0,NO,0,0<cr><lf>
DS 2,SZ,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 3,RZ,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 4,SB1,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 5,RB1,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 6,ATN1,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 7,BC1,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 8,SB2,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 9,RB2,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 10,ATN2,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 11,BC2,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 12,SB3,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 13,RB3,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 14,ATN3,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 15,BC3,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 16,SB4,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 17,RB4,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 18,ATN4,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 19,BC4,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 20,SB5,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 21,RB5,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 22,ATN5,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 23,BC5,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 24,SB6,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 25,RB6,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 26,ATN6,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 27,BC6,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 28,SB7,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 29,RB7,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 30,ATN7,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 31,BC7,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 32,SB8,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 33,RB8,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 34,ATN8,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 35,BC8,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
```

```
DS 36,SB9,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 37,RB9,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 38,ATN9,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 39,BC9,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 40,SB10,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 41,RB10,BV,mV,3,S,2500.000,0.000<cr><lf>
DS 42,ATN10,ATN,,5,S,2.00000,0.00000<cr><lf>
DS 43,BC10,CONC,ng/m3,1,S,1000000.0,-10000.0<cr><lf>
DS 44,Flow,FLOW,lpm,2,S,10.00,0.00<cr><lf>
DS 45,WS,WS,m/s,1,S,60.0,0.0<cr><lf>
DS 46,WD,WD,Deg,0,V,360,0<cr><lf>
DS 47,AT,AT,C,2,S,70.00,-50.00<cr><lf>
DS 48,RH,RH,%,1,S,100.0,0.0<cr><lf>
DS 49,BP,BP,mbar,2,S,1100.00,500.00<cr><lf>
DS 50,LED T,AT,C,2,S,70.00,-50.00<cr><lf>
DS 51,DET T,AT,C,2,S,70.00,-50.00<cr><lf>
DS 52,FT,AT,C,2,S,70.00,-50.00
DS 53,Status,INFO,,0,OR,0,0<cr><lf>
```

4.20. DSCRC – Channel Descriptor table CRC

Command	Description
DSCRC	This command returns the channel descriptor table CRC. The intent is for the system or software to query and save this CRC. The value is then compared on subsequent reads to check for any instrument configuration changes.
	If the CRC does not match the previous CRC then check for a change in the field configuration parameters.

Response	Description
DSCRC hhhh	hhhh – The CRC value in hexadecimal.

Example
DSCRC<cr>
DSCRC 52B2<cr><lf>

4.21. DT – Request or Set the Date and Time

Command	Description
DT	Request the date and time part of the real time clock.
DT yyyyMMddHHmmss DT yyyy-MM-dd HH:mm:ss	Set the date and time part of the real time clock.

Response
DT yyyy-MM-dd HH:mm:ss

Parameter	Description
yyyy	Years 2000 – 2037
MM	Months 1 – 12
dd	Days 1 – 31
HH	Hours 0 – 23
mm	Minutes 0 – 59
ss	Seconds 0 – 59

Example
DT<cr> DT 2013-01-08 11:39:23<cr><lf> DT 2013<cr> DT 2013-01-01 00:00:00<cr><lf> DT 20130108<cr> DT 2013-08-08 00:00:00<cr><lf> DT 2013-01-081141<cr> DT 2013-01-08 11:41:00<cr><lf>

4.22. HS – Request or Set Ethernet Hardware Handshake

Ethernet hardware handshake should be set to RTS/CTS when using the Ethernet port for communications. Also, remember to use the NetBurner Web interface to set Port 0 flow control to RTS/CTS.

Command	Description
HS	Request or set the Ethernet flow control.
HS e	Set the Ethernet flow control, where `e` is `0-NONE, 1-RTS/CTS,`

Response	Description
HS e-n	`x` – The enumerator setting.
	`n` – The Ethernet flow control setting name

Example
HS<cr> HS 0-NONE<cr><lf> HS 1<cr> HS 1-RTS/CTS<cr><lf>

4.23. ID – Request or Set the Location ID

Command	Description
ID	Request the Location ID.
ID id	Set the Location ID. The range is 1 to 999.

Response	Description
ID id	id – The location ID. The ID value is three characters with leading zero's.

Example
ID<cr> ID 001<cr><lf> ID 2<cr> ID 002<cr><lf>

4.24. OI – Request Output Interval

Command	Description
OI	Request the output interval.

Response	Description
OI 0	Always zero. Included for 466A compatibility

Example
OI<cr> OI 0<cr><lf> OI 1<cr> OI 0<cr><lf>

4.25. OP – Request or Set Operation Status

Command	Description
OP	Request the operational status.
OP n	Set the operation state where n is 0=stop operation, 1=start operation

Response	Description
OP e-state	Where e is the enumerator and state is the name of the operation state. 0-OFF 1-STARTING 2-STOPPING 3-WAIT UP 4-MOVING TAPE 5-WAIT DOWN 6-WAIT FLOW 7-WAIT TOP-OF-MIN 8-WAIT I0 9-WAIT IX

Example
OP<cr> OP 0-OFF<cr><lf> OP<cr> OP 1-STARTING<cr><lf> OP 1<cr> OP 0-OFF

4.26. PR – Print Report

Command	Description
PR f	Print report where f is the file number. 0 – Settings 1 – Data 2 – Alarm
PR f 0	Report all the data.
PR f -1	Report the new data since the last request.
PR f n	Report the last `n` hours where `n` is less than or equal to 2000.
PR f ts	Request the last data since timestamp, where `ts` has the format `yyyy-MM-dd HH:mm:ss`.

4.27. PW – Unlock Commands

Command	Description
PW x	This command unlocks the protected commands where `x` is the password setting.
PW	This command locks the protected commands. There is no response for this command.

Response	Description
PW Unlocked	The protected commands are unlocked.

Example
PW 1000<cr>
PW Unlocked<cr><lf>

4.28. QH – Report Data Record Header

Command	Description
QH	Report data record header.

Response:

```
Time,
SZ(mV),RZ(mV),
SB1(mV),RB1(mV),ATN1,BC1(ng/m3),SB2(mV),RB2(mV),ATN2,BC2(ng/m3),
SB3(mV),RB3(mV),ATN3,BC3(ng/m3),SB4(mV),RB4(mV),ATN4,BC4(ng/m3),
SB5(mV),RB5(mV),ATN5,BC5(ng/m3),SB6(mV),RB6(mV),ATN6,BC6(ng/m3),
SB7(mV),RB7(mV),ATN7,BC7(ng/m3),SB8(mV),RB8(mV),ATN8,BC8(ng/m3),
SB9(mV),RB9(mV),ATN9,BC9(ng/m3),SB10(mV),RB10(mV),ATN10,
BC10(ng/m3),Flow(lpm),WS(m/s),WD(Deg),AT(C),RH(%),BP(mbar),
LED T(C),DET T(C),FT(C),Status
```

If the check sum is requested the check sum value will be prefaced with comma.

```
AT(C),RH(%),BP(mbar),LED T(C),DET T(C),FT(C),Status,* 27648
```

Example

```
QH<cr>
Time,
SZ(mV),RZ(mV),
SB1(mV),RB1(mV),ATN1,BC1(ng/m3),SB2(mV),RB2(mV),ATN2,BC2(ng/m3),
SB3(mV),RB3(mV),ATN3,BC3(ng/m3),SB4(mV),RB4(mV),ATN4,BC4(ng/m3),
SB5(mV),RB5(mV),ATN5,BC5(ng/m3),SB6(mV),RB6(mV),ATN6,BC6(ng/m3),
SB7(mV),RB7(mV),ATN7,BC7(ng/m3),SB8(mV),RB8(mV),ATN8,BC8(ng/m3),
SB9(mV),RB9(mV),ATN9,BC9(ng/m3),SB10(mV),RB10(mV),ATN10,
BC10(ng/m3),Flow(lpm),WS(m/s),WD(Deg),AT(C),RH(%),BP(mbar),
LED T(C),DET T(C),FT(C),Status<cr><lf>
```

4.29. RQ – Report Last Data Record

Command	Description
RQ	Report last data record without header.

Response:

`2016-09-15 11:39:00,8.041,5.177,1675.259,1096.157,0.00449,`
`-1.0,1708.442,1069.187,0.00145,0.6,1763.015,1150.913,0.00129,`
`-0.1,1722.277,1225.313,0.00256,-1.7,1712.210,1230.033,0.00328,`
`-0.2,1745.743,1496.269,0.00363,1.1,1722.772,1483.365,0.00362,`
`0.4,1689.907,1534.218,0.00362,-1.4,1683.380,1783.365,0.00273,`
`-0.8,1707.764,1838.878,0.00301,2.2,5.00,0.0,0,24.63,31.6,`
`977.02,30.58,30.64,30.12,0`
 	
If the check sum is requested the check sum value will be prefaced with comma.
 	
`-0.8,1707.764,1838.878,0.00301,2.2,5.00,0.0,0,24.63,31.6,`
`977.02,30.58,30.64,30.12,0,*03789`

Example

`RQ<cr>`
`2016-09-15 11:39:00,8.041,5.177,1675.259,1096.157,0.00449,`
`-1.0,1708.442,1069.187,0.00145,0.6,1763.015,1150.913,0.00129,`
`-0.1,1722.277,1225.313,0.00256,-1.7,1712.210,1230.033,0.00328,`
`-0.2,1745.743,1496.269,0.00363,1.1,1722.772,1483.365,0.00362,`
`0.4,1689.907,1534.218,0.00362,-1.4,1683.380,1783.365,0.00273,`
`-0.8,1707.764,1838.878,0.00301,2.2,5.00,0.0,0,24.63,31.6,`
`977.02,30.58,30.64,30.12,0,*04065<cr><lf>`

4.30. RV – Report Model, Firmware, Revision

Command	Description
RV	Request the model number, firmware part number, and revision string.
	Instruments with more than one processor or programmable devices will include more than one part number and revision on the next subsequent lines.

Response	Description
m, p, r	m – Device model name.
	p – Firmware part number.
	r – Firmware revision.

Example
| ```
RV<cr>
BC 1054, 82401, R1.1.1<cr><lf>
CPLD, 81699, R1.0.0<cr><lf>
30030, 82402, R1.0.0<cr><lf>
Storage, 82403, R1.0.2<cr><lf>
``` |

4.30.1. RV 0 – Request the number of processor/devices supported

Command	Description
RV 0	Request the number of processor or programmable devices.

Response	Description
RV n	n – Number processor or programmable devices.

Example
| ```
RV 0<cr>
RV 4<cr><lf>
``` |

4.30.2.   RV n – Request individual processor/device information

Command	Description
RV n	Request the model number, firmware part number, and revision for a specified processor or programmable device n.

Response	Description
RV e m, p, r	e – Device enumerator. m – Device model name. p – Firmware part number. r – Firmware revision.

Example
| ```
RV 1<cr>
RV 1 BC 1054, 82401, R1.1.1<cr><lf>


RV 2<cr>
RV 2 CPLD, 81699, R1.0.0<cr><lf>
``` |

4.31. SB – Request or Set the Serial Baud Rate

Command	Description
SB	Request or set the serial baud rate setting. The new baud rate will be set immediately.
SB m	Set the serial baud rate where m is `2-1200, 3-2400, 4-4800, 5-9600, 6-19200, 7-38400, 8-38400, 9-115200`.

Response	Description
SB m-name	`m` – Serial baud rate enumerator. `name` – enumerator name.

Example

`SB<cr>`
`SB 5-9600<cr><lf>`
 	
`SB 9<cr>`
`SS 9-115200<cr><lf>`

4.32. SS – Request the Serial Number

Command	Description
SS	Request the serial number.
SS A99999	Set the serial number. Factory unlock required. `A99999` – Follows the MOI standard definition.

Response	Description
SS A99999	

Example
`SS<cr>` `SS T21312<cr><lf>`

4.33. SPW – Request or Set User Password

Command	Description
SPW	Request the user password setting.
SPW p	Set the user password setting. The p range is 0 to 9999. A 0 is no password required.

Response	Description
SPW 1000	

Example
SPW<cr> SPW 1000<cr><lf> SPW 0<cr> SPW 0000<cr><lf>

4.34. XRD – Request the XMODEM Record Descriptors

Command	Description
XRD f	Request the XMODEM record descriptors, where f is the file number.
	1 – Data

Response Example
XRD 1\<cr\>
XRD 1,2,52,312,LE\<cr\>\<lf\>
1,Time,,0,NO,DATETIME,1.0E+00,0.0E+00\<cr\>\<lf\>
2,Status,,0,OR,UINT32,1.0E+00,0.0E+00\<cr\>\<lf\>
3,WS,m/s,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
4,WD,Deg,0,V,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
5,AT,C,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
6,RH,%,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
7,BP,mbar,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
8,LED T,C,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
9,DET T,C,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
10,FT,C,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
11,Flow,lpm,2,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
12,SZ,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
13,RZ,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
14,SB1,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
15,RB1,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
16,ATN1,,5,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
17,BC1,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
18,SB2,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
19,RB2,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
20,ATN2,,5,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
21,BC2,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
22,SB3,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
23,RB3,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
24,ATN3,,5,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
25,BC3,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
26,SB4,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
27,RB4,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
28,ATN4,,5,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
29,BC4,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
30,SB5,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
31,RB5,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
32,ATN5,,5,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
33,BC5,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
34,SB6,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>
35,RB6,mV,3,S,FLOAT,1.0E+00,0.0E+00\<cr\>\<lf\>

```
36,ATN6,,5,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
37,BC6,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
38,SB7,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
39,RB7,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
40,ATN7,,5,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
41,BC7,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
42,SB8,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
43,RB8,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
44,ATN8,,5,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
45,BC8,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
46,SB9,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
47,RB9,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
48,ATN9,,5,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
49,BC9,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
50,SB10,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
51,RB10,mV,3,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
52,ATN10,,5,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
53,BC10,ng/m3,1,S,FLOAT,1.0E+00,0.0E+00<cr><lf>
```

4.35. XRF – XMODEM Read File

Command	Description
XRF f	Start a XMODEM file download where f is the file number. 1 – Data

Response	Description
	The response is the start of the XMODEM protocol. Refer to https://en.wikipedia.org/wiki/XMODEM for more information on the XMODEM protocol.

Example
XRF 1<cr>

4.36. FLSP – Request or Set the Flow Rate Set Point

Command	Description
FLSP	Request flow rate set point setting.
FLSP e	Set the flow rate set point setting. The e enumerator is 0-2 LPM or 1-5 LPM.

Response	Description
FLSP 1-5 LPM	Return the current flow rate set point enumerator.

Example
FLSP<cr> FLSP 1-5 LPM<cr><lf> FLSP 0<cr> FLSP 0-2 LPM<cr><lf>

4.37. FTSP – Request or Set the Flow Temperature Set Point

Command	Description
FTSP	Request flow temperature set point setting.
FTSP sp	Set the flow temperature set point setting. The sp parameter range is 25.0 − 40.0 C.

Response	Description
FTSP 30.0	Return the current flow temperature set point.

Example
FTSP<cr> FTSP 25.0<cr><lf> FTSP 30.0<cr> FTSP 30.0<cr><lf>

4.38. SPOT – Request or Set the Tape Advance Spots

Command	Description
SPOT	Request tape advance spot setting.
SPOT n	Set the tape advance spot setting. The n range is 1 to 2.

Response	Description
SPOT 1	

4.39. TENA – Request or Set the Tape Loading Enable

Command	Description
TENA	Request tape loading enable setting.
TENA e	Set the tape loading enable setting. The e range is 0-OFF to 1-ON.

Response	Description
TENA 1-ON	

Example
| ```
TENA<cr>
TENA 1-ON<cr><lf>

TENA 0<cr>
TENA 0-OFF<cr><lf>
``` |

4.40. TPER – Request or Set the Tape Advance Period

Command	Description
`TPER`	Request tape advance period setting.
`TPER e`	Set the tape advance period setting.
	The `e` range is `0-AUTO, 1-1 HR, 2-2 HR, 3-3 HR, 4-4 HR, 5-6 HR, 6-8 HR, 7-12 HR, 8-24 HR.`

Response	Description
`TPER 0-AUTO`	

Example

`TPER<cr>`
`TPER 8-24 HR<cr><lf>`
 	
`TPER 0<cr>`
`TPER 0-AUTO<cr><lf>`

4.41. TLOAD – Request or Set the Tape Advance Loading

Command	Description
`TLOAD`	Request tape compression time setting.
`TLOAD x`	Set the tape compression time setting.
	The `x` range is 75 to 125.

Response	Description
`TLOAD x`	The `x` range is 75 to 125.

Example

`TLOAD<cr>`
`TLOAD 125<cr><lf>`
 	
`TLOAD 100<cr>`
`TLOAD 100<cr><lf>`

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4.42. XRDCRC – Request the XMODEM File Descriptor CRC

Command	Description
XRDCRC f	Request the file descriptor CRC, where f is the file number. 1 – Data

Response	Description
XRDCRC f hhhh	f – the file number (1 – Data)
	hhhh – the file record descriptor CRC value in hexadecimal.

Example
XRDCRC 1<cr> XRDCRC 1 7923<cr><lf>

4.43. TCARBON – Request or Set the Load Carbon Type

Command	Description
TCARBON	Request tape loading carbon type.
TCARBON e	Set the tape loading carbon type setting. The e range is 0-BC1, 1-BC2,2-BC3,3-BC4,4-BC5, 5-BC6,6-BC7,7-BC8,8-BC9,9-BC10.

Response	Description
TCARBON 1-OC	

Example
TCARBON <cr> TCARBON 1-BC2<cr><lf> TCARBON 0<cr> TCARBON 0-BC1<cr><lf>