Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

BULLETIN 1203-SM1

SCANport MESSAGING

APPLICATION NOTE #3314 December 14, 1998

INTRODUCTION

Purpose

The purpose of this document is to provide guidelines for wiring and control schemes for SCANport devices including Bulletin 1305 and 1336 PLUS AC Drives. This document is a suggestion only. Users must ensure that installations meet applicable codes and are suitable for the existing conditions.

What This Note Contains

This document contains information and an example ladder program that demonstrates SCANport messaging using an SLC-5/03, a 1305 drive and a 1203-SM1 module. This note uses the 1203-SM1 configured as an enhanced mode module (refer to the application note “Bulletin 1203-SM1 Enhanced Mode”.

Intended Audience

This application note should be used by personnel familiar with the hardware components and programming procedures necessary to operate SCANport devices. It is also assumed that the user has some familiarity with the SLC-500 and ladder programming.

Where It Is Used

The diagrams, parameter settings and auxiliary hardware used in this application note are designed to address specific issues in many different applications. Some changes by the user may be necessary to apply the concepts of this document to a specific application.

Application Considerations

These example ladder programs were written to be simple and clear examples. Consult the SLC and 1203-SM1 manuals for more information.

When used as an enhanced mode module, the 1203-SM1 extends the model used by the basic mode configuration. The enhanced mode configuration adds:

Datalinks

Safe State Data

Messaging (the subject of this note)

For more information on the enhanced mode configuration refer to the application note “Bulletin 1203-SM1 Enhanced Mode”.

If these functions are not required OR to aid in understanding the differences between the two configurations refer to the application note “Bulletin 1203-SM1 Basic Mode”.

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CHANNEL STATUS & CONTROL IMAGE

Input Image

The first two words of the input image file for the module are used for SCANport channel and messaging status information.

Channel & Message Status Input Image Definitions

Channel 2 Status **Channel 1 Status**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	D2	C2	B2	A2	V2		ID2		D1	C1	B1	A1	V1		ID1		Word 0
	X	M0 STA	MSTAT CH 3		MSTAT CH 2		MSTAT CH 1		D3	C3	B3	A3	V3		ID3		Word 1

Message Status Ch 1-3 **Channel 3 Status**

NOTE: x = Designated SCANport Channel Number on the module.

IDx SCANport Channel x Connected Adapter Port ID Number. This three (3) bit field contains the adapter port number that channel x is connected to on the SCANport product. It should contain a value between 1-7. If this field contains a seven (7), then the channel is not connected to the SCANport product, or the SCANport product may not be powered.

Vx SCANport Channel x Valid Data bit. When high (1), the Logic Status and Analog Feedback values are valid and can be used. When low (0), the values should not be considered valid.

A-Dx SCANport Channel x Datalink A-D Valid Data bit. When high (1) the data associated Datalink A-D of the corresponding channel is valid and can be used. When low (0) the values should not be considered valid.

M0 STAT M0-File Status bit. When high (1), any previously written M0-file message to the module can be enabled by the SLC program. When low (0), the SLC to SCANport module is either actively reading the last sent M0_file data changes, or no M0_file data has been loaded into the module by the SLC program. Under SLC program control, any changes to the M0-file message buffers should cause the checking of this status bit before enabling that message to be sent out any SCANport channel. Unchanged buffers can still be enabled or sent while this status bit is low (0).

MSTAT CHx Message Status bits for the message buffer of the corresponding channel. These two (2) bit fields correspond to the status of each of the message buffers. There is one message response buffer for each channel. The first bit (MSB) contains the READY bit. The READY bit is active (high=1) when a new message request can be initiated to the SCANport product. The second bit (LSB) contains the DONE bit. The DONE bit is active (high=1) when an M1-file message buffer contains response data to a message request. When both the READY and the DONE bits are inactive (0), the buffer is in a BUSY state. This is the state during which the module is actually requesting the data from the SCANport product. These status bits should never be high at the same time.

Output Image File

The first two words of the output image file for the module are used for SCANport channel and messaging control information.

Channel Command Output Image Definitions

Channel 2 Command **Channel 1 Command**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	Not Used			MSG ID			ME 2	DE 2	Not Used			MSG ID			ME 1	DE 1	Word 0
	Reserved								Not Used			MSG ID			ME 3	DE 3	Word 1

Channel 3 Command

NOTE: x = Designated SCANport Channel Number on the module.

DEx SCANport Channel x Data Enable bit. While low (0), the Channel will not be actively transferring I/O data (including datalink data) between the connected SCANport product. When high (1), the Channel will become active to the SCANport product and transfer the appropriate I/O data. When reset to low (0), the Channel will disconnect from the SCANport product. NOTE: This will usually cause the connected SCANport product to fault.

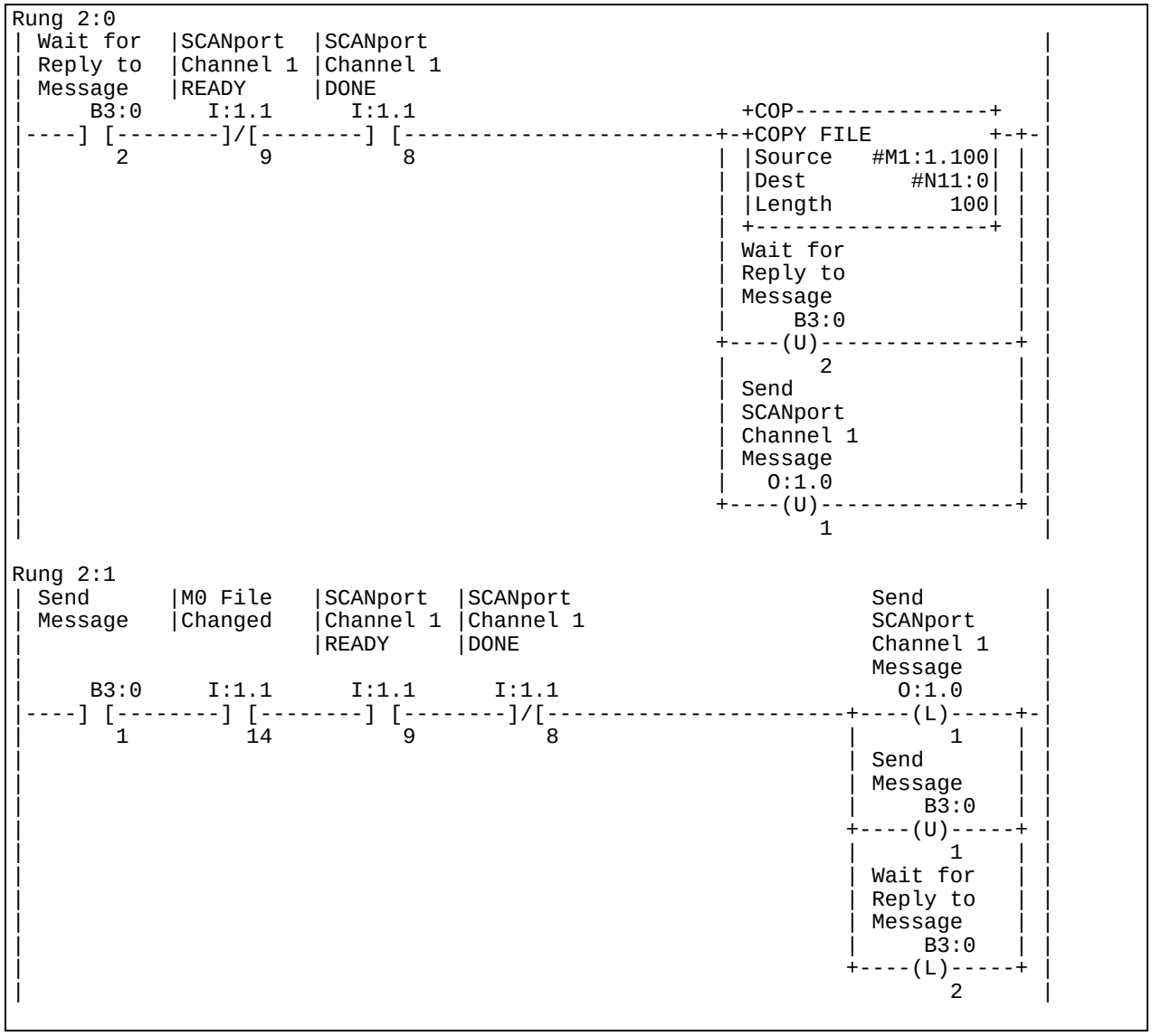
MEx SCANport Channel x Message Enable bit. When set high (1), the message selected by the Message ID field will be transmitted through the appropriate channel to the SCANport product. This bit should be held high during the duration of the request until the status DONE bit is asserted (1). The resetting (0) of this bit clears the DONE status, and returns the message status to the READY state.

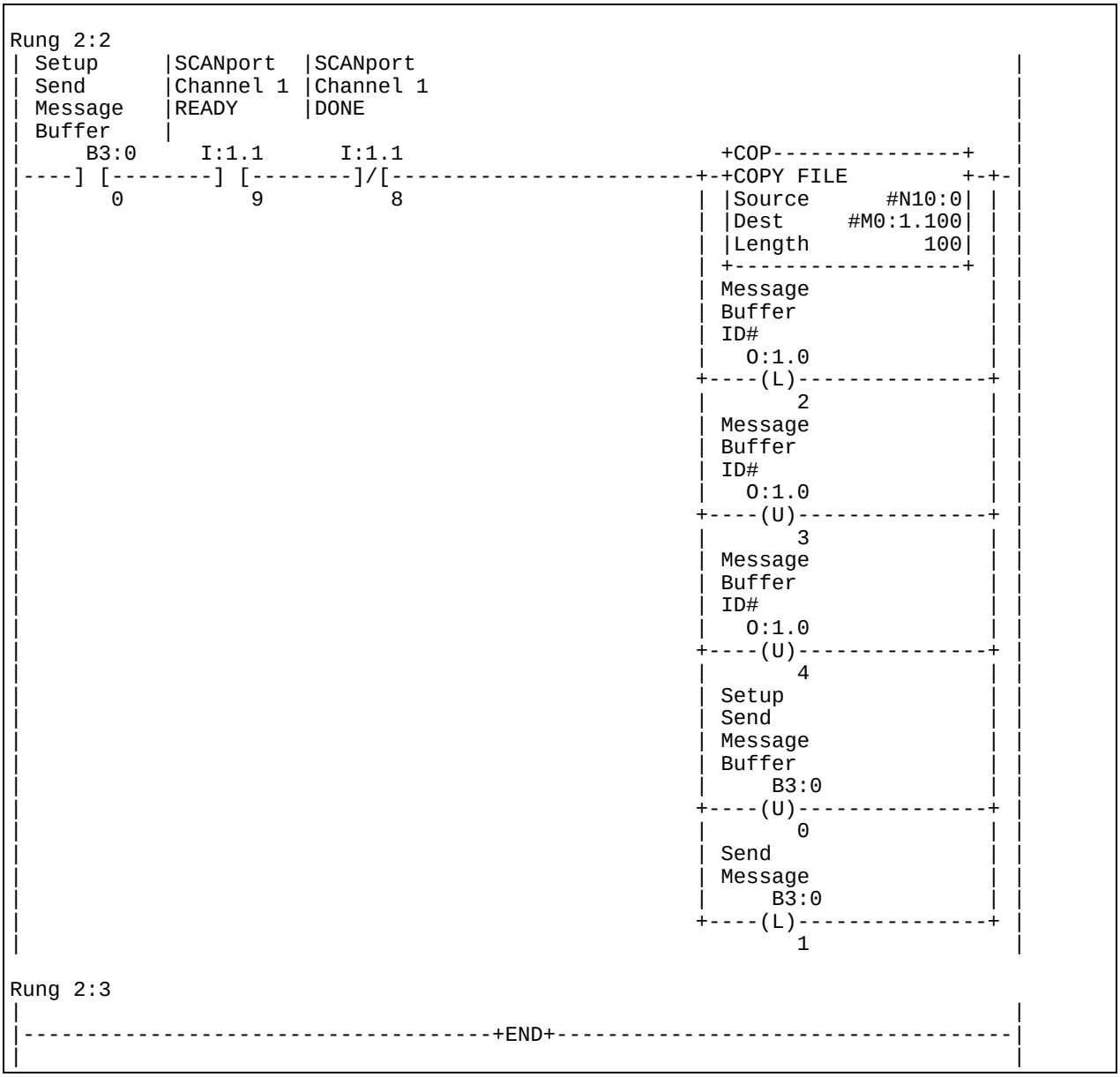
MSG ID Message Identifier field. This field allows for the selection of one of the eight (8) message buffers in the M0-file area for each channel. Multiple channels can utilize the same Message ID buffer simultaneously.

NOTE: The 1203-SM1 can be used to send SCANport messages without the SCANport Channel Data Enable bit being set hi (1). This allows the SM1 to monitor parameters in a SCANport product without performing any control functions. If this is done, the SCANport product will not fault if the SCANport link is broken.

SLC SCANPORT MESSAGING LADDER PROGRAM

When B3:0/0 is set to a value of 1 this program will send the message structure contained in N10:0 to the SCANport device connected to Channel 1 of the 1203-SM1. When B3:0/0, B3:0/1 and B3:0/2 have all been reset to zero the message response has been received in N11:0.




Rung 2:2
Setup Send Message Buffer
SCANport Channel 1 READY
SCANport Channel 1 DONE
B3:0
I:1.1
I:1.1
COP
COPY FILE
Source #N10:0
Dest #M0:1.100
Length 100
Message Buffer ID#
O:1.0
2
3
4
Setup Send Message Buffer
B3:0
0
1
Rung 2:3
END

SCANPORT MESSAGE EXAMPLES

The following are examples of SCANport messages that can be sent by the 1203-SM1. All of these example messages can be used with the SLC ladder program shown in the last section. In each example the message is contained in file N10 and the response is in file N11. All data file values are shown in hexadecimal mode. Some example messages also show file N11 in ASCII mode -- note that in ASCII mode the string is shown in a byte-swapped fashion.

Read Number of Parameters

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         000e   000f   0000   0002   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         000e   000f   0000   0002   0006   00d8   0000   0000
```

The reply to the Read Number of Parameters message indicates that the SCANport device contains 216 (D8h) parameters.

Read Parameter Value

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         000e   000f   0005   0001   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         000e   000f   0005   0001   0002   0007
```

The value of parameter number 5 is 7.

Read Parameter Name Text

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         000e   000f   0005   0007   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         000e   000f   0005   0007   0011   4610   6572   2071   6553   656c
N11:10        7463   3120   2020   0020

  address      0      1      2      3      4      5      6      7      8      9
N11:0       \00\0E \00\0F \00\05 \00\07 \00\11  F \10  e  r      q   e  S   e  l
N11:10       t  c   1            \00
```

The parameter name text for parameter number 5 is "`Freq Select 1 `". Note that the low byte of word N11:5 indicates that the name text contains 16 (10h) bytes.

Write Parameter 5

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         0010   000f   0005   0001   0002   0006   0000   0000   0000   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         0010   000f   0005   0001   0000
```

This message writes a value of 6 into parameter number 5. The response indicates that the parameter write was accepted by the drive. Parameter number 5 now contains a value of 6.

Read Parameter Full

```
address     0      1      2      3      4      5      6      7      8      9
N10:0        0001   000f   0007   0000   0000

  address     0      1      2      3      4      5      6      7      8      9
N11:0        0001   000f   0007   0000   0035   0064   6400   0200   1002   6341
N11:10       6563   206c   6954   656d   3120   2020   2020   5304   6365   0073
N11:20       0000   ea60   03e8   0001   000a   0001   0000   0000   0000   0000
N11:30       0000   0001

  address     0      1      2      3      4      5      6      7      8      9
N11:0      \00\01 \00\0F \00\07 \00\00 \00 5  \00 d   d \00 \02\00 \10\02  c  A
N11:10      e  c      l   i  T   e  m   1                    S \04  c  e  \00 s
N11:20     \00\00 \EA `  \03\E8 \00\01 \00\0A \00\01 \00\00 \00\00 \00\00 \00\00
N11:30     \00\00 \00\01
```

This message reads all the information about parameter 7 from the SCANport product. It is encoded as shown in the following tables. (Note that the data is not word aligned.)

Attribute Order in Parameter Read Full

Attribute	Starting Address	Size (Bytes)	Description
1 (01h)	N11:5	2	Parameter Value
2 (02h)	N11:6 (Lo Byte)	1	Link Path Size (Always 0)
4 (04h)	N11:6 (Hi Byte)	2	Descriptor -- see Descriptor table
5 (05h)	N11:7 (Hi Byte)	1	Data Type -- see Data Types table
6 (06h)	N11:8 (Lo Byte)	1	Parameter Value Data Size in bytes
7 (07h)	N11:8 (Hi Byte)	17	Parameter Name String "Accel Time 1 " The hi byte of N11:8 is the number of characters in the string and is always 16 (10h).
8 (08h)	N11:17	5	Units String "Secs" The lo byte of N11:17 is the number of characters in the string and is always 4 (04h)
9 (09h)	N11:19 (Hi Byte)	1	Help String (always 0 indicating no help string)
10 (0Ah)	N11:20	2	Minimum Value
11 (0Bh)	N11:21	2	Maximum Value
12 (0Ch)	N11:22	2	Default Value
13 (0Dh)	N11:23	2	Scaling Multiplier -- see scaling formula
14 (0Eh)	N11:24	2	Scaling Divisor -- see scaling formula
15 (0Fh)	N11:25	2	Scaling Base -- see scaling formula
16 (10h)	N11:26	2	Scaling Offset -- see scaling formula
17 (11h)	N11:27	2	Multiplier Link -- parameter containing multiplier value
18 (12h)	N11:28	2	Divisor Link -- parameter containing divisor value
19 (13h)	N11:29	2	Base Link -- parameter containing base value
20 (14h)	N11:30	2	Offset Link -- parameter containing offset value
21 (15h)	N11:31 (Lo Byte)	1	Decimal Precision (see scaling formula)

Descriptor Encoding

Descriptor Bit	Meaning when set to 1
0	Not Used -- Always 0
1	Supports ENUM Strings
2	Supports Scaling
3	Supports Scaling Links
4	Read Only Parameter
5	Monitor Parameter (Parameter is continuously updated by SCANport device)
6	Supports Extended Precision Scaling

Scaling Formulae:

There are four scaling formulae -- two for use with extended precision scaling and two for normal scaling. The decimal precision variable is always used to locate the decimal point for a display by counting from the rightmost digit. In extended precision scaling the decimal precision variable is also used in the scaling formula.

Normal Precision Scaling

$$EngineeringValue = \frac{(InternalValue + Offset) * Multiplier * Base}{Divisor}$$

$$InternalValue = \frac{EngineeringValue * Divisor}{Multiplier * Base} - Offset$$

$$EngineeringValue = \frac{(InternalValue + Offset) * Multiplier * Base}{Divisor * 10^{Decimal\ Precision}}$$

$$InternalValue = \frac{EngineeringValue * Divisor * 10^{Decimal\ Precision}}{Multiplier * Base} - Offset$$

Extended Precision Scaling

Data Type Field Encoding

Data Type Value	Description of Data Type of Parameter Value field
1	16-bit word
2	16-bit unsigned integer
3	16-bit signed integer
4	Boolean
5	Short integer
6	Double integer
7	Long integer
8	Unsigned short integer
9	Unsigned double integer
10	Unsigned long integer
11	Single floating point (IEEE 754)
12	Double floating point (IEEE 754)
13	Duration (short)
14	Duration
15	Duration (high-resolution)
16	Duration (long)
17	Date
18	Time of day
19	Date and Time
20	String (8-bit characters)
21	String (16-bit characters)
22	String
23	Short String
24	Byte (8-bits)
25	Double word (32-bits)
26	Long word (64-bits)

Set Default Parameter Values into EEPROM

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         0005   000f   0000   0000   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         0005   000f   0000   0000   0000
```

This message has set all parameter values in the SCANport device EEPROM and RAM to factory default values.

Restore Parameter Values from EEPROM

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         0015   000f   0000   0000   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         0015   000f   0000   0000   0000
```

This message has successfully restored all SCANport device parameters in RAM from the EEPROM.

Save Parameter Values to EEPROM

```
address      0      1      2      3      4      5      6      7      8      9
N10:0         0016   000f   0000   0000   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         0016   000f   0000   0000   0000
```

This message has successfully saved all SCANport device parameters from RAM to EEPROM.

Read Parameter ENUM String

```
  address      0      1      2      3      4      5      6      7      8      9
N10:0         004b   000f   0005   0001   0000

  address      0      1      2      3      4      5      6      7      8      9
N11:0         004b   000f   0005   0001   000c   6552   6f6d   6574   5020   746f
N11:10        2020

  address      0      1      2      3      4      5      6      7      8      9
N11:0       \00 K  \00\0F \00\05 \00\01 \00\0C  e  R   o  m   e  t   P      t  o
N11:10
```

Parameter 5 has an ENUM string of "`Remote Pot  `" associated with a value of 1. Note that ENUM strings are all 12 characters long.

Read Product Number

```
  Address      0      1      2      3      4      5      6      7      8      9
N10:0         000e   0092   0000   0000   0000

N11:0         000e   0092   0000   0000   0006   0003   0000   0000
```

The product number is 3.

Read Product Text String

```
  Address      0      1      2      3      4      5      6      7      8      9
N10:0        000e   0092   0000   0001   0000
N11:0        000e   0092   0000   0001   0012   7542   206c   3331   3633   5020
N11:10       554c   2053   2020   0000

N11:0       \00 K  \00\0F \00\05 \00\01 \00\0C  e  R   o  m   e  t   P      t  o
N11:0       \00\0e \00 ’  \00\00 \00\01 \00\12  u  B      l   3  1   6  3   P
N11:10       U  L      S          \00\00
```

The Product Text String is "1336 PLUS ".

Read Product Series Number

```
  Address      0      1      2      3      4      5      6      7      8      9
N10:0        000e   0092   0000   0003   0000
N11:0        000e   0092   0000   0003   0002   0001
```

The product series is ‘A’ (1=A, 2=B, ...)

Read Product Software Version

```
  Address      0      1      2      3      4      5      6      7      8      9
N10:0        000e   0092   0001   0001   0000
N11:0        000e   0092   0001   0001   0002   00ca
```

The software version for microprocessor #1 is $00CA_{hex}$ or 202_{dec} which is FRN2.02. (The instance number, set into N10:2, determines the microprocessor being accessed by this message. Some products have multiple microprocessors -- All products have at least one.)

Scattered Parameter Value Read

```
  Address      0      1      2      3      4      5      6      7      8      9
N10:0        0032   0093   0000   0000   000c   0001   0000   0002   0000   0003
N10:10       0000
N11:0        0032   0093   0000   0000   000c   0001   0078   0002   0000   0003
N11:10       0000
```

This example will read the values of three parameters.

N10:4 contains the length of the data in bytes (three parameters require 12 bytes). A pair of words are required for each parameter being read (starting at N10:5). The first word of each pair is the parameter number. The second word is a placeholder.

The response message (N11 file) has the same structure as the request message with a few changes. If an error occurred while reading one of the parameters, the hi bit of that parameter number is set and the second word of the pair contains an error code. If the hi bit of the parameter number is not set the second word of the pair contains the parameter value.

Scattered Parameter Value Write

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0034	0093	0000	0000	000c	0005	0001	0006	0002	0007
N10:10	0258									
N11:0	0034	0093	0000	0000	000c	0005	0000	0006	0000	0007
N11:10	0000									

This example writes three parameters.

N10:4 contains the length of the data in bytes (three parameters require 12 bytes). A pair of words are required for each parameter being read (starting at N10:5). The first word of each pair is the parameter number. The second word is the value to be written.

The response message (N11 file) has the same structure as the request message with a few changes. If an error occurred while writing one of the parameters, the hi bit of that parameter number is set and the second word of the pair contains an error code. If the hi bit of the parameter number is not set the second word of the pair contains a zero.

Write Fault Command – Clear Faults

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0097	0000	0000	0002	0001				
N11:0	0010	0097	0000	0000	0000					

Write Fault Command – Clear Fault Queue

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0097	0000	0000	0002	0002				
N11:0	0010	0097	0000	0000	0000					

Write Fault Command – Reset Drive

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0097	0000	0000	0002	0003				
N11:0	0010	0097	0000	0000	0000					

Read Number of Fault Queue Entries

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0097	0000	0001	0000					
N11:0	000e	0097	0000	0000	0002	0004				

This drive has 4 fault queue entries.

Read Number of Trip Fault Queue Index

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0097	0000	0001	0000					
N11:0	000e	0097	0000	0000	0002	0001				

The fault that tripped the drive is recorded in Fault Queue Entry Number 1.

Read Fault Queue Entry

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0097	0001	0000	0000					
N11:0	000e	0097	0001	0000	001a	#1	#1	#1	#1	#1
N11:10	#1	#1	#1	#2	#3	#3	#3	#3		

This message reads Fault Queue Entry Number 1.

#1 Fault Text appears in this location
#2 Fault Code appears in this location
#3 Fault Timestamp appears in this location (on some drives)

Write Warning Command – Clear Warnings

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0098	0000	0000	0002	0001				
N11:0	0010	0098	0000	0000	0000					

Write Warning Command – Clear Warning Queue

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0098	0000	0000	0002	0002				
N11:0	0010	0098	0000	0000	0000					

Write Warning Command – Reset Drive

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0098	0000	0000	0002	0003				
N11:0	0010	0098	0000	0000	0000					

Read Number of Warning Queue Entries

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0098	0000	0001	0000					
N11:0	000e	0098	0000	0000	0002	0004				

This drive has 4 Warning Queue Entries.

Read Warning Queue Entry

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0098	0001	0000	0000					
N11:0	000e	0098	0001	0000	001a	#1	#1	#1	#1	#1
N11:10	#1	#1	#1	#2	#3	#3	#3	#3		

This message reads Warning Queue Entry Number 1.

#1 Warning Text appears in this location
#2 Warning Code appears in this location
#3 Warning Timestamp appears in this location (on some drives)

Read Link

Address	0	1	2	3	4	5	6	7	8	9
N10:0	000e	0099	0005	0000	0000					
N11:0	000e	0099	0005	0000	0002	0006				

This example is a read of the link value of parameter #5. The link value is 6.

Write Link

Address	0	1	2	3	4	5	6	7	8	9
N10:0	0010	0099	0005	0000	0002	0006				
N11:0	0010	0099	0005	0000	0000					

This example is a write to the link value of parameter #5. The link value being written is 6.