



ALLEN-BRADLEY BULLETIN 1203-SM1 SCANport MESSAGING

APPLICATION NOTE # SM1 - 3

June 24, 1997

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".

Input Image File

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.

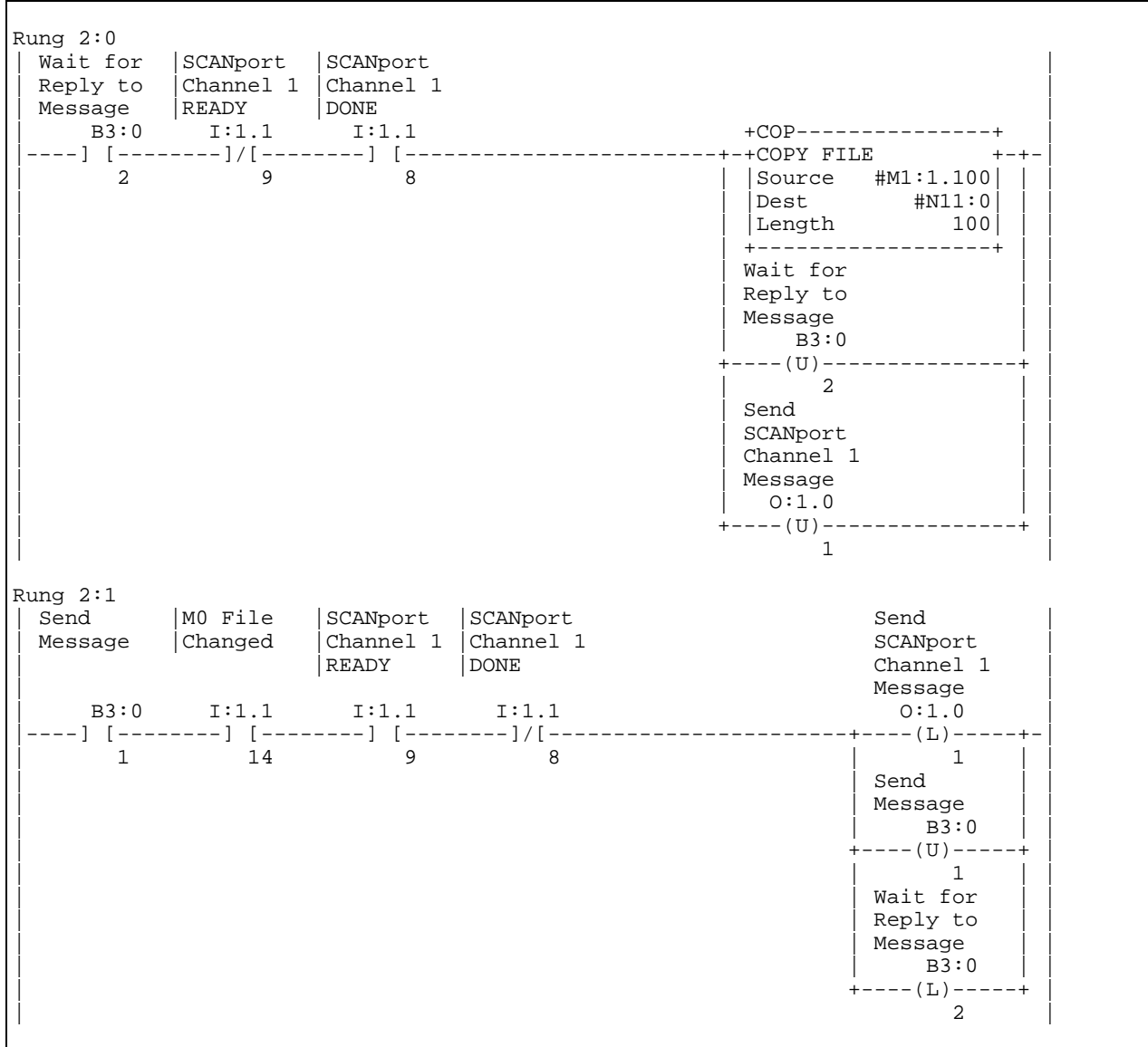
ME_x SCANport Channel x Message Enable bit. When set high (1), the message selected by the Message ID field will be transmitted through the appropriate channel to the SCANport product. This bit should be held high during the duration of the request until the status DONE bit is asserted (1). The resetting (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 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      | SCANport | SCANport |
| Send       | Channel 1| Channel 1|
| Message    | READY    | DONE     |
| Buffer      |          |          |
| B3:0      | I:1.1    | I:1.1    |
|-----] [-----] [-----]/[-----+-----+
|          0          9          8          | +COP-----+
|                                         | +COPY FILE  +
|                                         | |Source      |#N10:0|
|                                         | |Dest        |#M0:1.100|
|                                         | |Length      |100|
|                                         | +-----+
|                                         | Message
|                                         | Buffer
|                                         | ID#
|                                         |   O:1.0
|----- (L)-----+
|                                         | 2
|                                         | Message
|                                         | Buffer
|                                         | ID#
|                                         |   O:1.0
|----- (U)-----+
|                                         | 3
|                                         | Message
|                                         | Buffer
|                                         | ID#
|                                         |   O:1.0
|----- (U)-----+
|                                         | 4
|                                         | Setup
|                                         | Send
|                                         | Message
|                                         | Buffer
|                                         |   B3:0
|----- (U)-----+
|                                         | 0
|                                         | Send
|                                         | Message
|                                         |   B3:0
|----- (L)-----+
|                                         | 1

```

```

Rung 2:3
|-----+-----+
|                                         | +END+

```



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 l			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								

Read Full Parameter 7

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

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 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.

$$\text{Engineering Value} = \frac{(\text{Internal Value} + \text{Offset}) * \text{Multiplier} * \text{Base}}{\text{Divisor} * 10^{\text{Decimal Precision}}}$$

$$\text{Internal Value} = \frac{\text{Engineering Value} * \text{Divisor} * 10^{\text{Decimal Precision}}}{\text{Multiplier} * \text{Base}} - \text{Offset}$$

$$\text{Engineering Value} = \frac{(\text{Internal Value} + \text{Offset}) * \text{Multiplier} * \text{Base}}{\text{Divisor}}$$

$$\text{Internal Value} = \frac{\text{Engineering Value} * \text{Divisor}}{\text{Multiplier} * \text{Base}} - \text{Offset}$$

This table shows the coding of the Data Type field.

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)

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					

Set Default Parameter Values into EEPROM

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

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					

Restore Parameter Values from EEPROM

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

Save Parameter Values to EEPROM

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

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
N11:10						t	P	t	o	

Read ENUM String -- Parameter 5 Value of 1

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

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		

Read Product Number

The product number is 3.

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						

Read Product Text String

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				

Read Product Series Number

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

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				

Read Product Software Version

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.)

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				

Read Link

This example is a read of the link value of parameter #5 (the parameter number appears in N10:2). The link value is 6.

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					

Write Link

This example is a write to the link value of parameter #5 (the parameter number appears in N10:2). The link value being written is 6.

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									

Scattered Parameter Value Read

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.

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									

Scattered Parameter Value Write

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.