SMARTEYE SEA-8 or Twin Serial Communication Poll Mode Change of State Interface to 1746-BAS Module

for the Allen Bradley PLC-5 & SLC-500
using the Allen Bradley 1746-BAS or 1746-BAS-T BASIC Module

Application Note – SA0044

Revision 2

SMARTEYE CORPORATION

www.smarteyecorporation.com

Related documents:

SMARTEYE Electronic Assembly User Manual
SMARTEYE Twin User Manual

The material in this manual is for informational purposes and is subject to change without notice. Smarteye Corporation assumes no responsibility for any errors, which may appear in this manual.
©2004 Smarteye Corporation
SMARTEYE is a registered trademark of Smarteye Corporation
BELDEN is a registered trademark of Belden CDT Inc.
PLC-5 is a registered trademark of Rockwell Automation
SLC-500 is a registered trademark of Rockwell Automation
Printed in U.S.A.

SMARTEYE contact information:

SMARTEYE Corporation
2637 Bond Street
Rochester Hills, MI 48309
Phone: (248) 853-4495 Fax: (248) 853-8539
www.smarteyecorporation.com
Email: support@smarteyecorporation.com

1.0 Introduction 1
2.0 Configure the SEA-8 or Twin 1
2.1 SEA-8 RS232 CPU Board Configuration 2
2.2 SEA-8 RS422 CPU Board Configuration 3
2.3 Twin RS423 CPU Board Configuration 4
2.4 Twin RS422 CPU Board Configuration 5
3.0 Configure The BAS Module 6
3.1 BAS Module RS232/423 Configuration 7
3.2 BAS Module RS422 Configuration 8
3.3 BAS Module EEPROM Installation 9
3.4 BAS Module Placement in Rack 9
3.5 Loading the Program into the BAS Module 10
4.0 Wiring 10
4.1 BAS Module RS232/423 Wiring Diagram 10
4.2 BAS Module RS422 Wiring Diagram 11
4.3 BAS Module Monitor Port Cable 11
5.0 Sequence of Operation 12
6.0 PLC Data Table Layout 14
6.1 Label Data 14
6.1.1 Reader Last Carrier Past Data 14
6.1.2 Reader Read Event Flag 14
6.2 Error Data 15
6.2.1 Reader Last Error Data 15
6.2.2 Reader Error Event Flag 15
6.3 Reader Diagnostic Data 16
6.4 Application Configuration Values 16
6.5 Communication Status Indicators 17
7.0 Loading The Ladder Logic 17
7.1 PLC-5 Proc. with the BAS Module in a Remote SLC-500 Rack 17
7.2 SLC-500 Proc. with the BAS Module in the Local Rack 17
7.3 SLC-500 Proc. with the BAS Module in a Remote Rack 18
7.4 Setting the Box Poll Delay and Message Timeout Delay in the BAS module 19
Message Timeout Delay 20
8.0 PRT1 Monitor Port 20
8.1 Monitor Mode 20
8.2 BAS Module Startup 21
Appendix A PLC-5 Proc. with the BAS Module in a Remote SLC-500 Rack A-1
Appendix B SLC-500 Proc. with the BAS Module in the Local Rack B-1
Appendix C SLC-500 Proc. with the BAS Module in a Remote Rack C-1
Appendix D BASIC Program D-1
Appendix E Message Layout E-1

1.0 Introduction

The Allen-Bradley 1746-BAS or 1746-BAS-T BASIC module (hereinafter referred to as the BAS module) is used to provide a serial communication interface from a PLC-5 or SLC-500 Programmable Controller to a single SEA-8 or Twin. The interface program, written in BASIC, is permanently stored on an EPROM, if used, contained within the module or can be manually loaded through the programming port. The BAS module resides in a single I/O slot. The BAS module is equipped with two serial ports and a DH-485 interface. In this application, PRT2 is used to connect the BAS module to the SEA-8 or Twin and PRT1 is used to monitor the SEA-8 or Twin and verify program operation.

2.0 Configure the SEA-8 or Twin

There are two communication protocols for the SEA-8 or Twin, RS232/423 or RS422. See the figures below for the specific configuration being used.

See Figure 2-1 for the SEA-8 RS232 CPU Board Configuration.
See Figure 2-2 for the SEA-8 RS422 CPU Board Configuration.
See Figure 2-3 for the Twin RS423 CPU Board Configuration.
See Figure 2-4 for the Twin RS422 CPU Board Configuration.

2.1 SEA-8 RS232 CPU Board Configuration

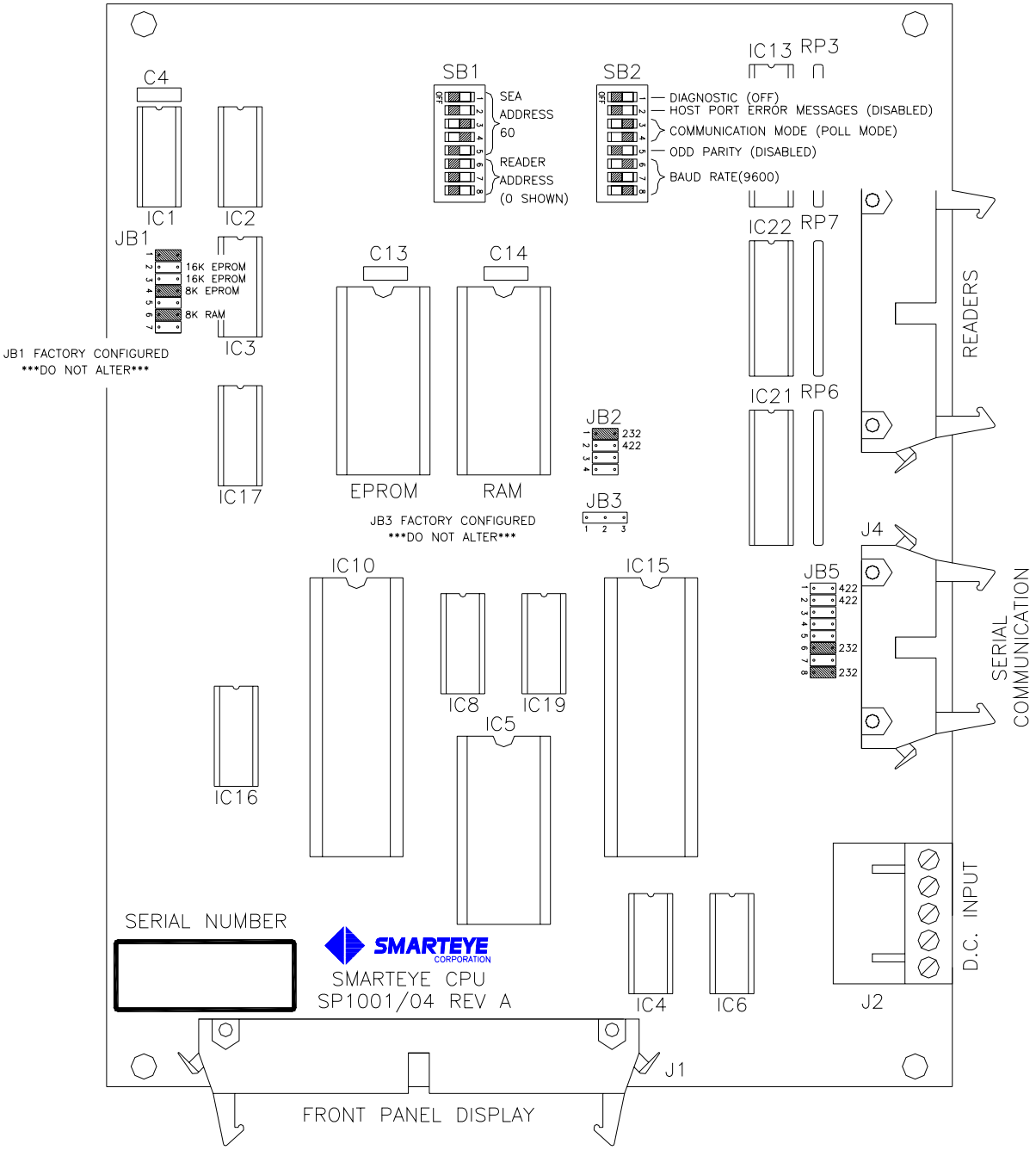


Figure 2-1

2.2 SEA-8 RS422 CPU Board Configuration

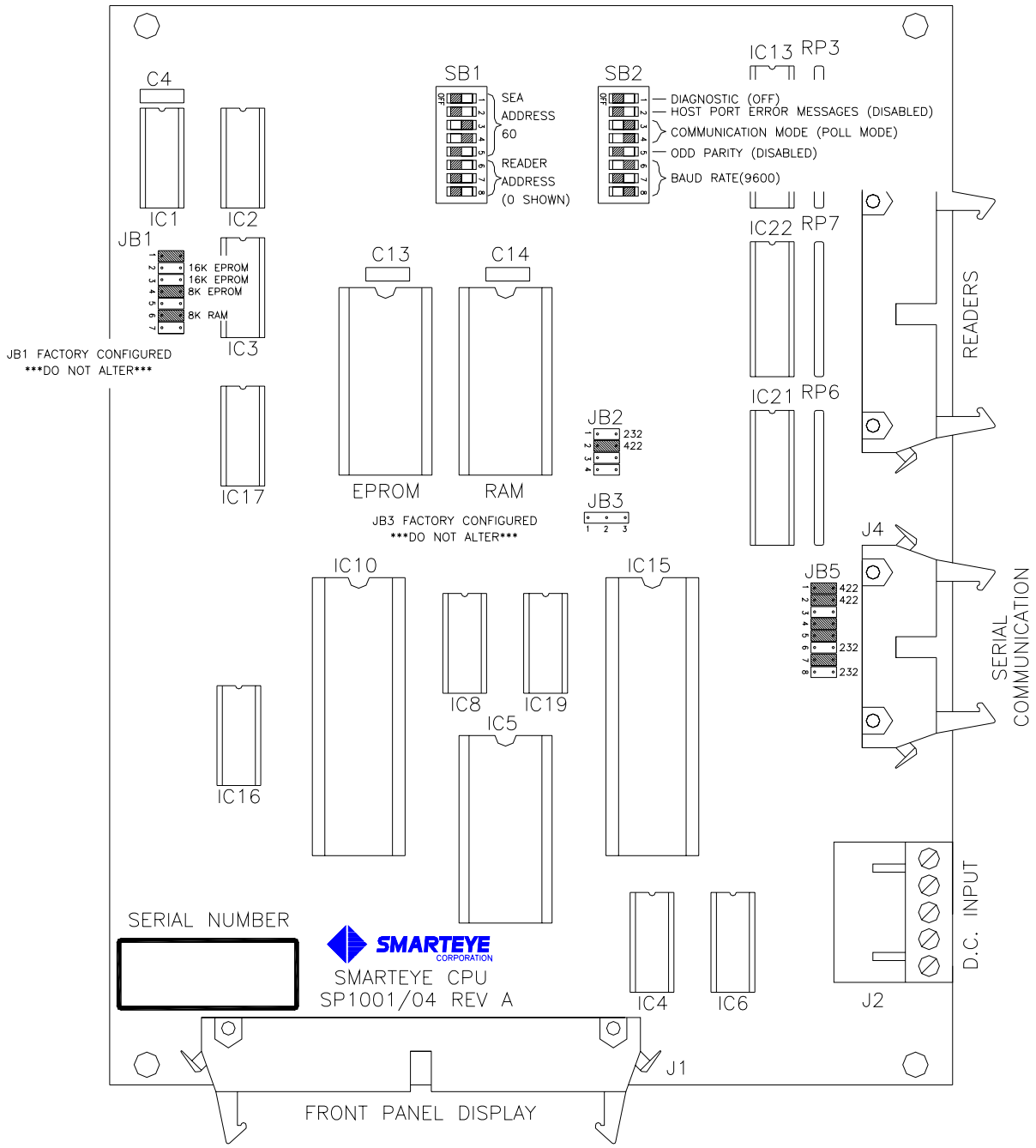


Figure 2-2

2.3 Twin RS423 CPU Board Configuration

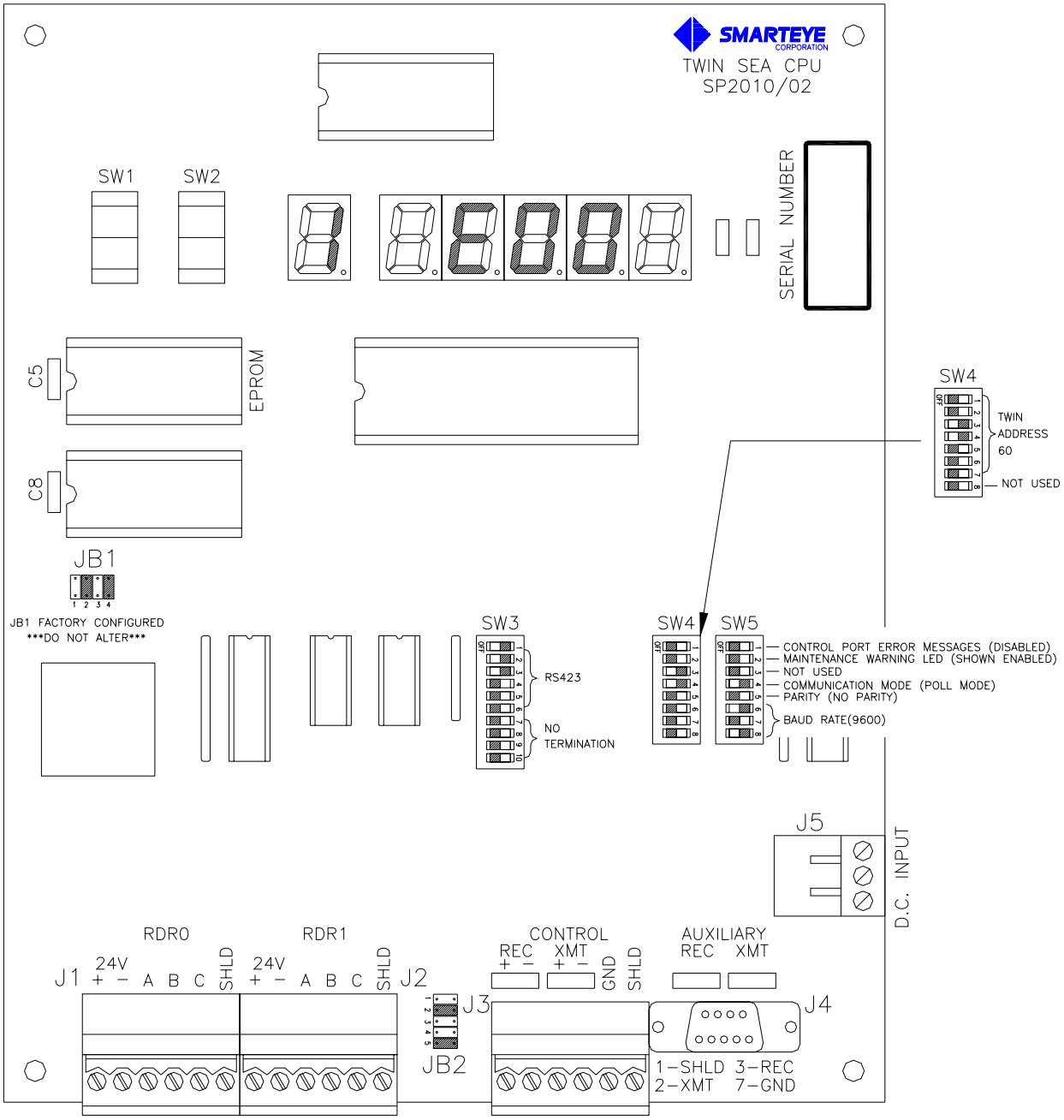


Figure 2-3

2.4 Twin RS422 CPU Board Configuration

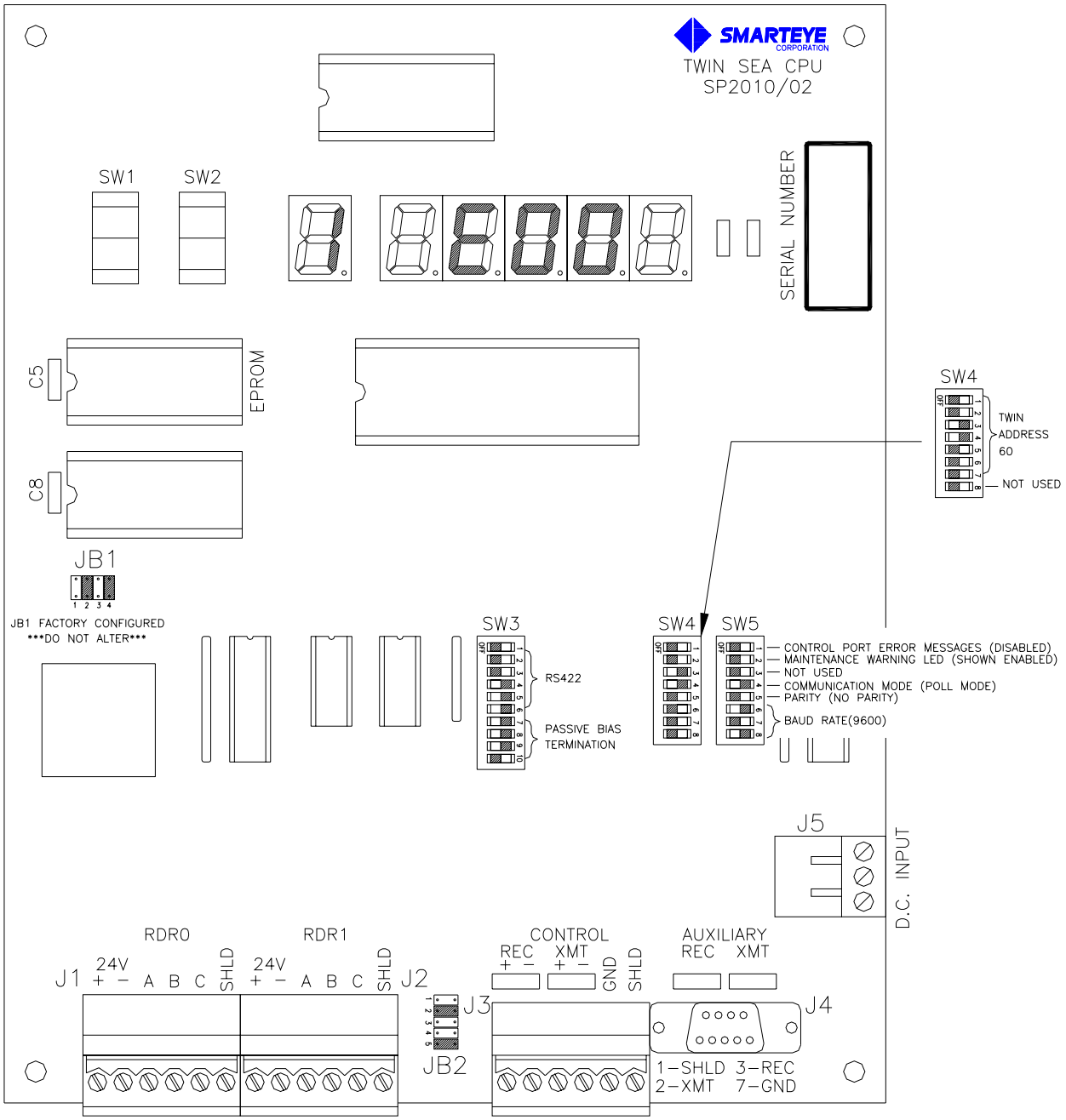


Figure 2-4

3.0 Configure The BAS Module

The BAS module must be configured for the same communication mode as the SEA-8 or Twin. See the figures below for the specific configuration being used.

See Figure 3-1 for the BAS module RS232/423 Configuration.
See Figure 3-2 for the BAS module RS422 Configuration.

3.1 BAS Module RS232/423 Configuration

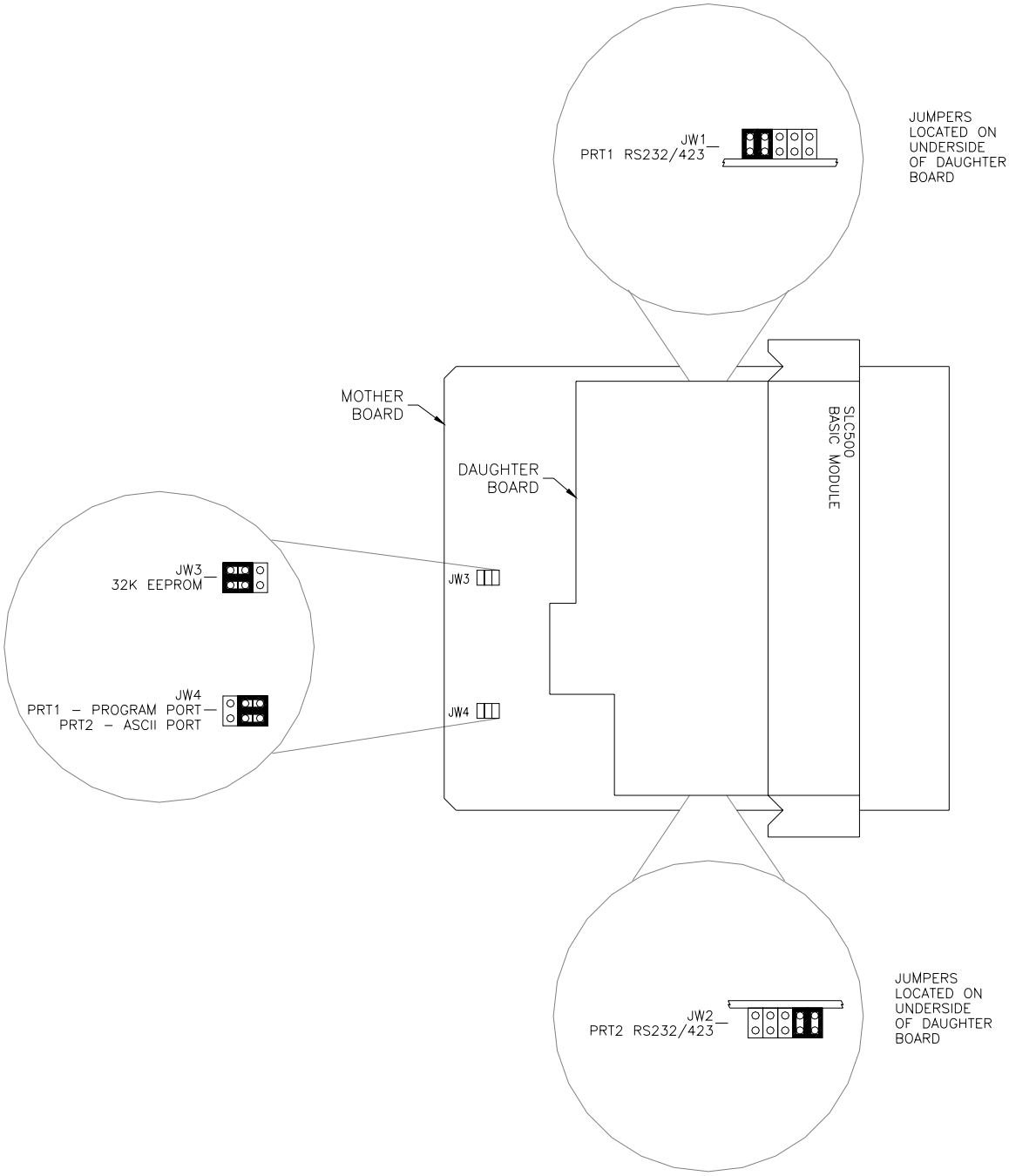


Figure 3-1

3.2 BAS Module RS422 Configuration

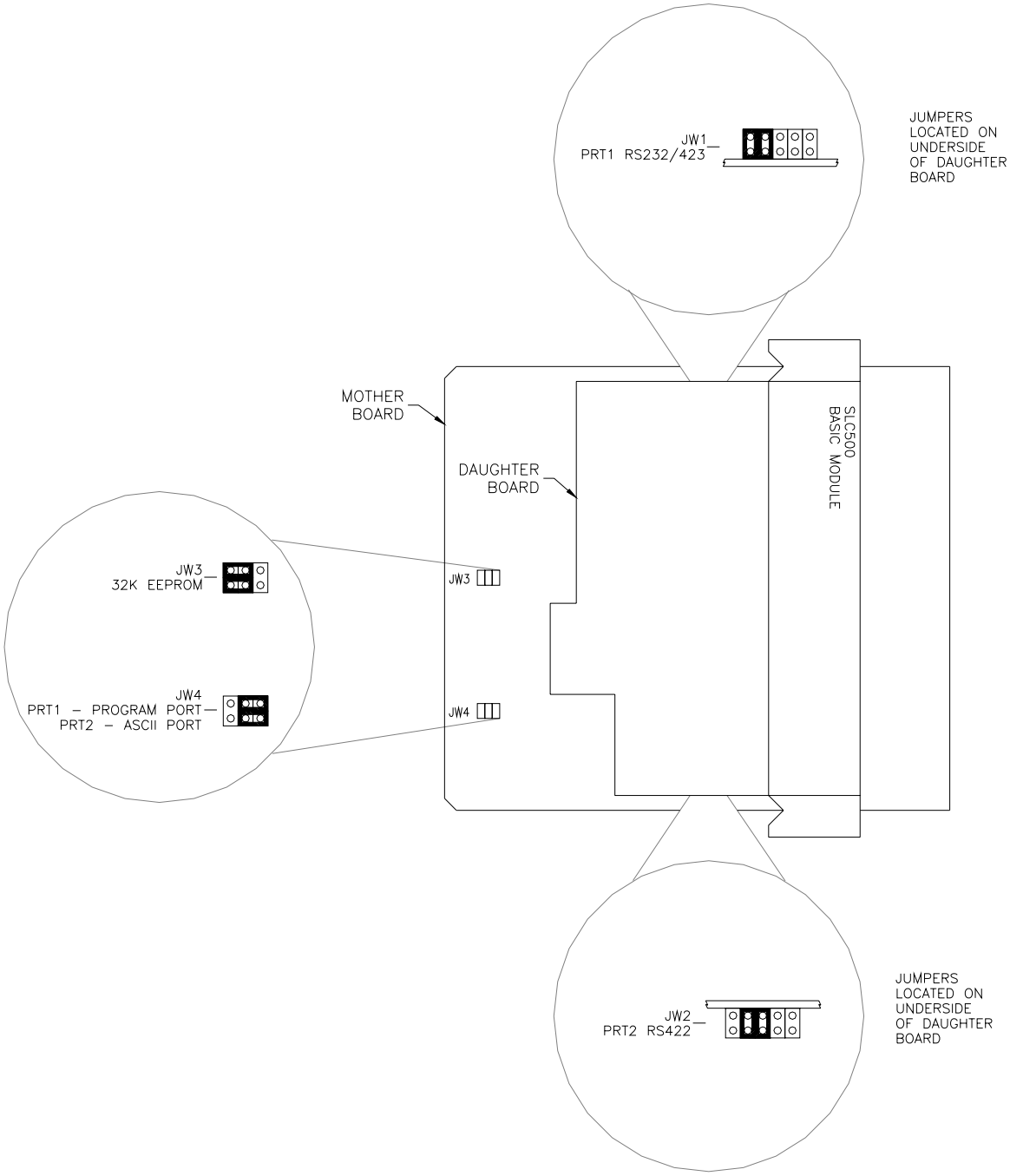


Figure 3-2

3.3 BAS Module EEPROM Installation

With the BAS module removed from the rack you will observe a memory module socket for the EEPROM. Insert the EEPROM carrier into the memory module socket ensuring the proper orientation. The proper orientation is determined by the keying on the backside of the EEPROM carrier. See Figure 3-3 for the memory module socket location.

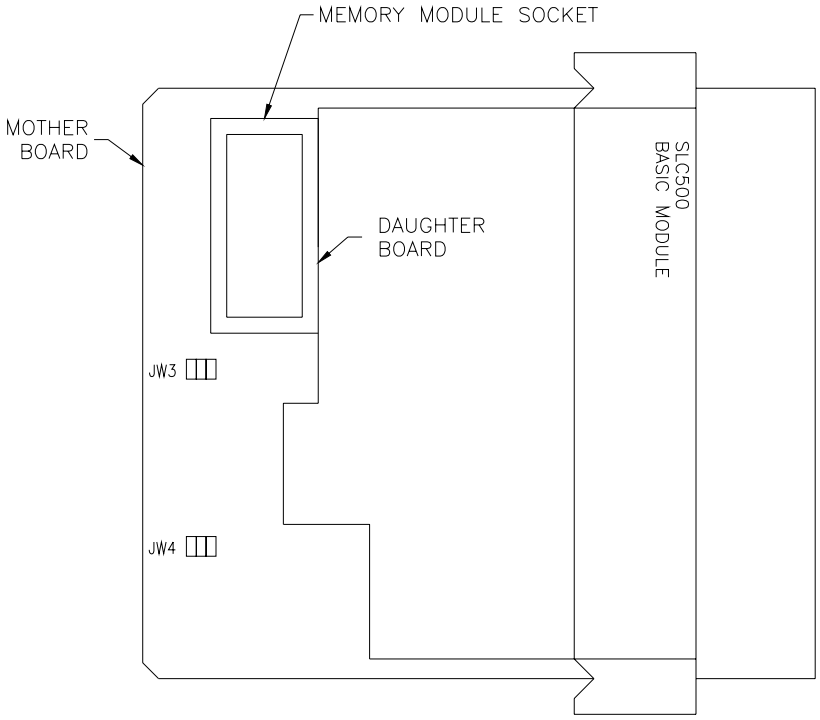


Figure 3-3

3.4 BAS Module Placement in Rack

The BAS module may be installed in any open slot of the SLC-500 I/O chassis except the first slot of the first chassis, which is reserved for the processor or adapter module. However, the rack and slot address of the module must match the ladder logic block transfers, M file location, or I/O configuration.

3.5 Loading the Program into the BAS Module

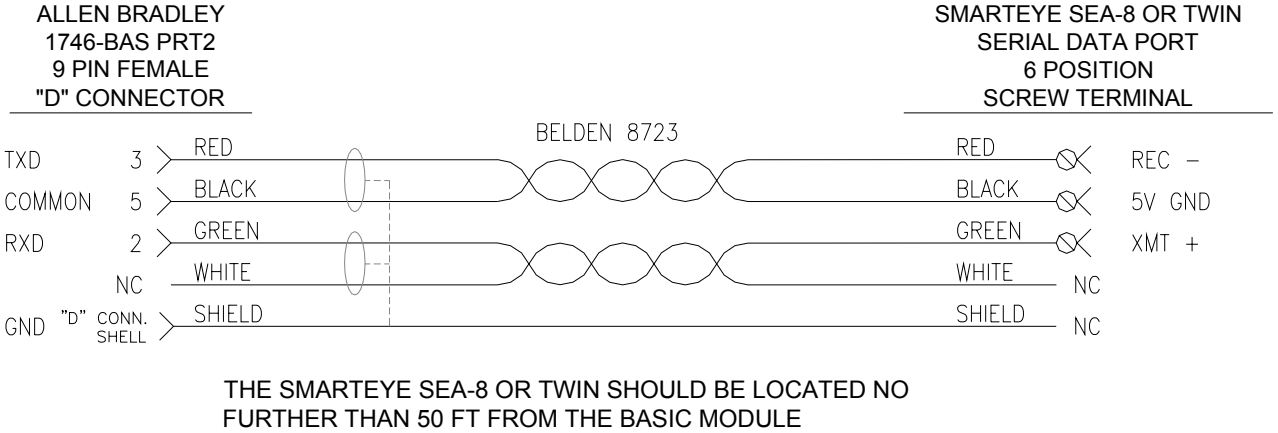
After the BAS module has been installed and power has been applied to the rack, the BASIC program can be downloaded through PRT1 on the BAS module. (Note: This step is not required if an EPROM with the BASIC program on it has been installed.) Connect the programming terminal to PRT1 of the BAS module using a null modem cable and set the baud rate, parity, data bits, and stop bits according to the defaults for the BAS module. Open the connection to the module; type NEW and hit enter to prepare the module for the new program. Transfer the text file to the module. When the program has completely loaded, type RUN and hit enter to activate the program. (Note: The battery must be installed in order for the module to retain the program upon loss of power.)

4.0 Wiring

The two communication protocols require different wiring specifications. The RS232/423 protocol requires Belden 8723 cable and has a maximum cable length of 50 Feet. The RS422 protocol requires Belden 9730 cable and has a maximum cable length of 4000 feet. See the wiring diagrams below for specific wiring details.

See Figure 4-1 for the BAS module RS232/423 wiring diagram.
See Figure 4-2 for the BAS module RS422 wiring diagram.
See Figure 4-3 for the BAS module monitor port cable diagram.

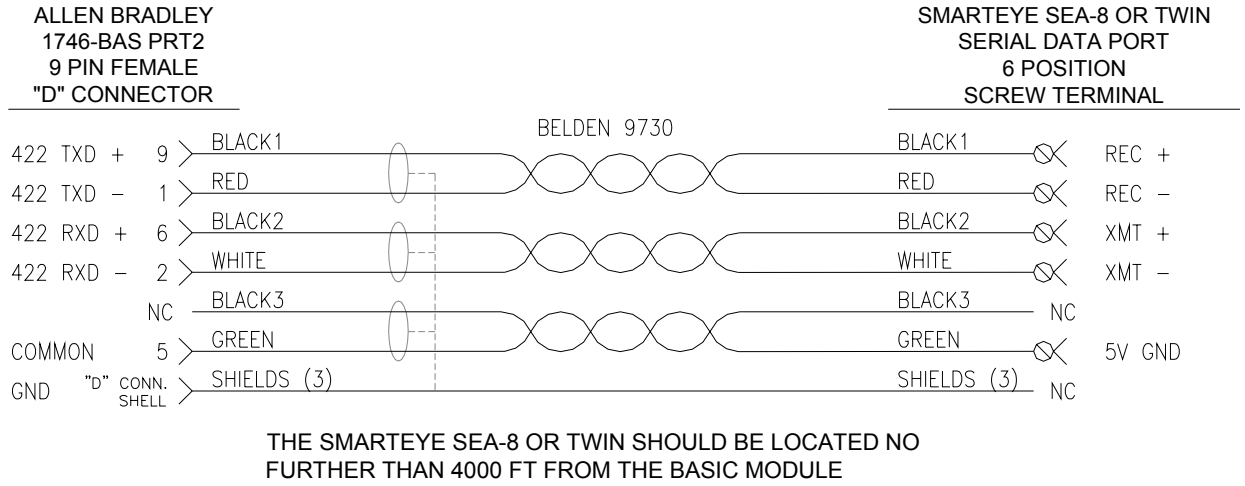
4.1 BAS Module RS232/423 Wiring Diagram



NOTE: THE "D" CONNECTOR SHELL ON THE BAS MODULE IS CONNECTED TO CHASSIS GROUND. IF THE "D" SHELL CONNECTOR DOES NOT PROVIDE AN ADEQUATE CONNECTION, THE SHIELD MAY HAVE TO BE PHYSICALLY CONNECTED TO THE CHASSIS GROUND.

Figure 4-1

4.2 BAS Module RS422 Wiring Diagram



NOTE: THE "D" CONNECTOR SHELL ON THE BAS MODULE IS CONNECTED TO CHASSIS GROUND. IF THE "D" SHELL CONNECTOR DOES NOT PROVIDE AN ADEQUATE CONNECTION, THE SHIELD MAY HAVE TO BE PHYSICALLY CONNECTED TO THE CHASSIS GROUND.

Figure 4-2

4.3 BAS Module Monitor Port Cable

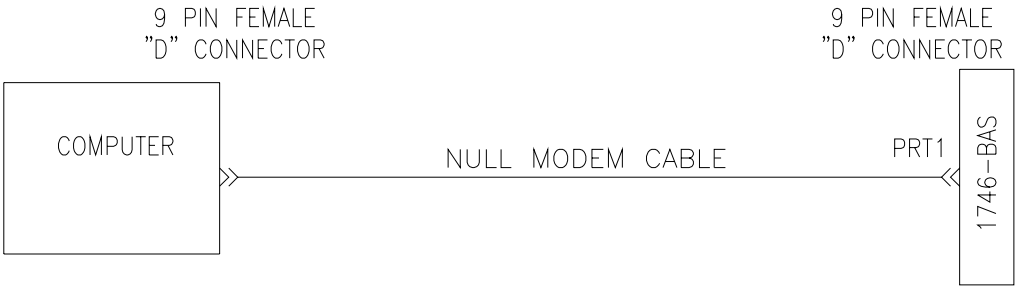


Figure 4-3

5.0 Sequence of Operation

The BAS module program begins communicating to the SEA-8 or Twin by initially issuing a 'restart' command upon power-up of the BAS module. The 'restart' command clears any label and diagnostic messages that may have been previously collected in the SEA-8 or Twin.

The BAS module will then poll the SEA-8 or Twin based on the poll delay timer set in the PLC. The SEA or Twin will transmit an Idle, Label, Error or Diagnostic message to the BAS module. The BAS module will receive the message; acknowledge it if the checksum test is passed, and then process the message. If the checksum test fails, the BAS module will issue a 'box-poll' command, which causes immediate retransmit of the message. See Figure 5-0 for a general overview of the sequence of operation.

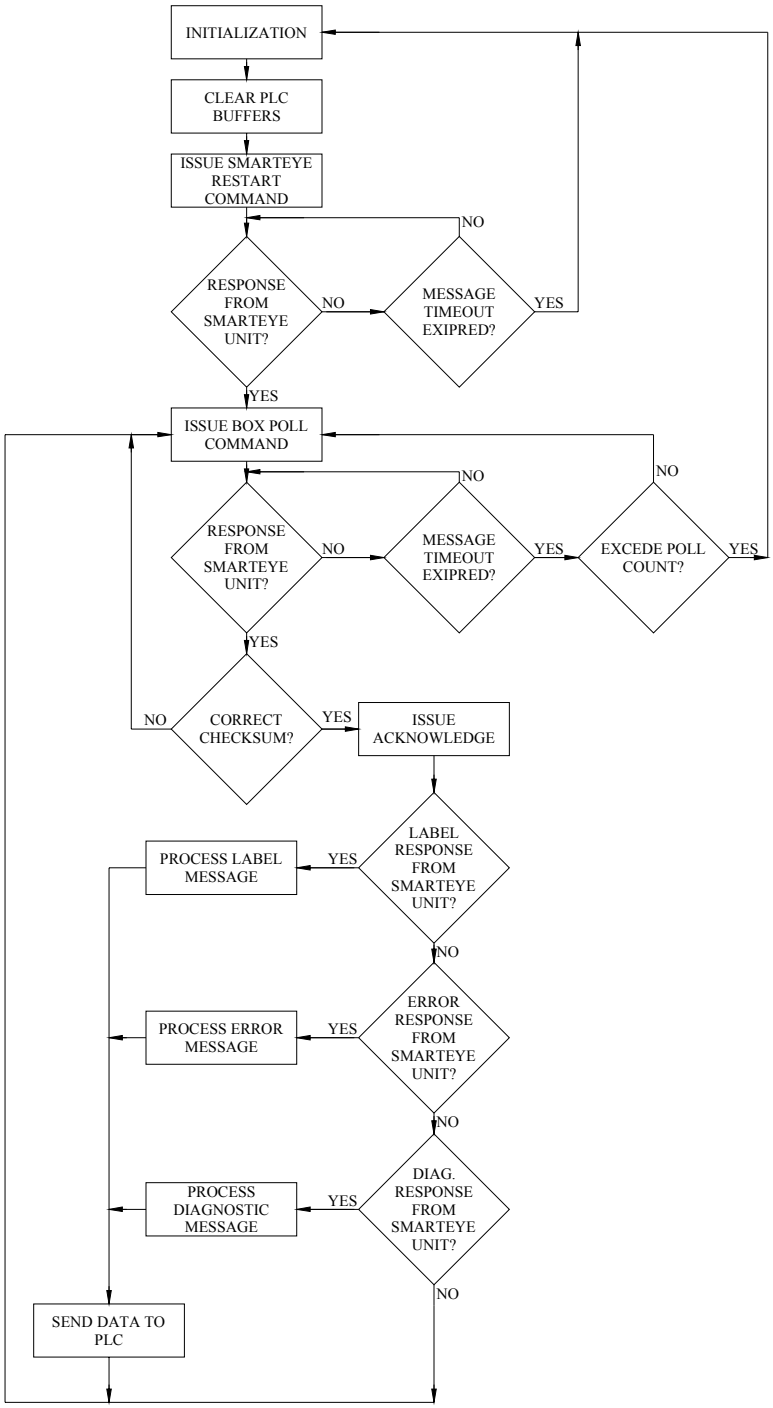

INITIALIZATION
CLEAR PLC BUFFERS
ISSUE SMARTEYE RESTART COMMAND
RESPONSE FROM SMARTEYE UNIT?
NO
MESSAGE TIMEOUT EXIPRED?
NO
YES
YES
ISSUE BOX POLL COMMAND
RESPONSE FROM SMARTEYE UNIT?
NO
MESSAGE TIMEOUT EXIPRED?
NO
YES
EXCEDE POLL COUNT?
NO
YES
YES
CORRECT CHECKSUM?
NO
YES
ISSUE ACKNOWLEDGE
LABEL RESPONSE FROM SMARTEYE UNIT?
YES
PROCESS LABEL MESSAGE
NO
ERROR RESPONSE FROM SMARTEYE UNIT?
YES
PROCESS ERROR MESSAGE
NO
DIAG. RESPONSE FROM SMARTEYE UNIT?
YES
PROCESS DIAGNOSTIC MESSAGE
NO
SEND DATA TO PLC

Figure 5-0

6.0 PLC Data Table Layout

This section contains the PLC data table layout specific to the example logic for this manual.

6.1 Label Data

6.1.1 Reader Last Carrier Past Data

The Reader Last Carrier Past data shows the last carrier number to be read by the Smarteye reader. This value is retained until the reader reads a new label. This data is only valid when the Reader Read Event Flag is set (see Reader Read Event Flag explanation below).

PLC Address	Description
N102:0	Reader 0 Last Carrier Past
N102:1	Reader 1 Last Carrier Past
N102:2	Reader 2 Last Carrier Past
N102:3	Reader 3 Last Carrier Past
N102:4	Reader 4 Last Carrier Past
N102:5	Reader 5 Last Carrier Past
N102:6	Reader 6 Last Carrier Past
N102:7	Reader 7 Last Carrier Past

Table 6-1

6.1.2 Reader Read Event Flag

The Reader Read Event Flag is set by the BAS application when a valid read is detected. When this bit is set, it indicates that the Reader Last Carrier Past data is valid. When the carrier or skid leaves the stop or table, this bit should be reset.

PLC Address	Description
N102:9/0	Reader 0 Read Event Flag
N102:9/1	Reader 1 Read Event Flag
N102:9/2	Reader 2 Read Event Flag
N102:9/3	Reader 3 Read Event Flag
N102:9/4	Reader 4 Read Event Flag
N102:9/5	Reader 5 Read Event Flag
N102:9/6	Reader 6 Read Event Flag
N102:9/7	Reader 7 Read Event Flag

Table 6-2

6.2 Error Data

6.2.1 Reader Last Error Data

The Reader Last Error data shows the last error number to be generated by the Smarteye unit. This value is retained until the Smarteye unit detects a new error. This data is only valid when the Reader Error Event Flag is set (see Reader Error Event Flag explanation below).

PLC Address	Description
N102:10	Reader 0 Last Error
N102:11	Reader 1 Last Error
N102:12	Reader 2 Last Error
N102:13	Reader 3 Last Error
N102:14	Reader 4 Last Error
N102:15	Reader 5 Last Error
N102:16	Reader 6 Last Error
N102:17	Reader 7 Last Error

Table 6-3

6.2.2 Reader Error Event Flag

The Reader Error Event Flag is set by the BAS application when an error is detected. When this bit is set, it indicates that the Reader Last Error data is valid. When the carrier or skid leaves the stop or table, this bit should be reset.

PLC Address	Description
N102:9/8	Reader 0 Error Event Flag
N102:9/9	Reader 1 Error Event Flag
N102:9/10	Reader 2 Error Event Flag
N102:9/11	Reader 3 Error Event Flag
N102:9/12	Reader 4 Error Event Flag
N102:9/13	Reader 5 Error Event Flag
N102:9/14	Reader 6 Error Event Flag
N102:9/15	Reader 7 Error Event Flag

Table 6-4

6.3 Reader Diagnostic Data

The Smarteye unit generates the Reader Diagnostic data. The following table shows the PLC address for each diagnostic value. For a detailed explanation of the Diagnostic values, refer to the Smarteye SEA-8 or Smarteye Twin User Manual.

	Reader Number							
Diagnostic	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Photoeye A	N102:20	N102:25	N102:30	N102:35	N102:40	N102:45	N102:50	N102:55
Photoeye B	N102:21	N102:26	N102:31	N102:36	N102:41	N102:46	N102:51	N102:56
Photoeye C	N102:22	N102:27	N102:32	N102:37	N102:42	N102:47	N102:52	N102:57
X	N102:23	N102:28	N102:33	N102:38	N102:43	N102:48	N102:53	N102:58
Y	N102:24	N102:29	N102:34	N102:39	N102:44	N102:49	N102:54	N102:59

Table 6-5

6.4 Application Configuration Values

The BASIC application in the BAS module requires certain configuration values to be set in the PLC data table.

PLC Address	Description
N101:12	Smarteye unit poll delay time. See section 7.4 Setting the Poll Delay and Message Timeout Delay in the BAS module
N101:14	Smarteye message timeout delay. See section 7.4 Setting the Poll Delay and Message Timeout Delay in the BAS module
N101:13/1	Suppress Error messages. Set to 1 to suppress error messages from the Smarteye unit to the PLC.

Table 6-6

6.5 Communication Status Indicators

The example logic provides two communication status indicators. The following table shows the PLC address for each communication status indicator.

PLC Address	Description
N102:8/0	Smarteye unit to BAS module communication active. 1 = Active. 0 = Inactive.
N102:8/1	BAS module status. 1 = Active. 0 = Inactive.

Table 6-7

7.0 Loading The Ladder Logic

There are 3 ladder logic examples included with this manual:

A. PLC-5 Processor with the BAS Module in a Remote SLC-500 Rack
B. SLC-500 Processor with the BAS Module in the Local Rack
C. SLC-500 Processor with the BAS Module in a Remote Rack

Determine which application to use and follow the instructions on pasting and configuring the logic.

7.1 PLC-5 Proc. with the BAS Module in a Remote SLC-500 Rack

Open the existing user program, copy the ladder logic from the sample application, and paste into the user program. Modify the addresses of the block transfers to match the physical rack, slot, and group of the BAS module. See Appendix A for example logic.

7.2 SLC-500 Proc. with the BAS Module in the Local Rack

If the BAS module is located in the local rack, it must be defined in the I/O configuration. Open the "IO Configuration" dialog in the user program and select the slot where the BAS module will reside. Select the appropriate BAS module from the list on the right and double click it to add it to the selected slot. See Figure 7-1 for an example I/O configuration dialog.

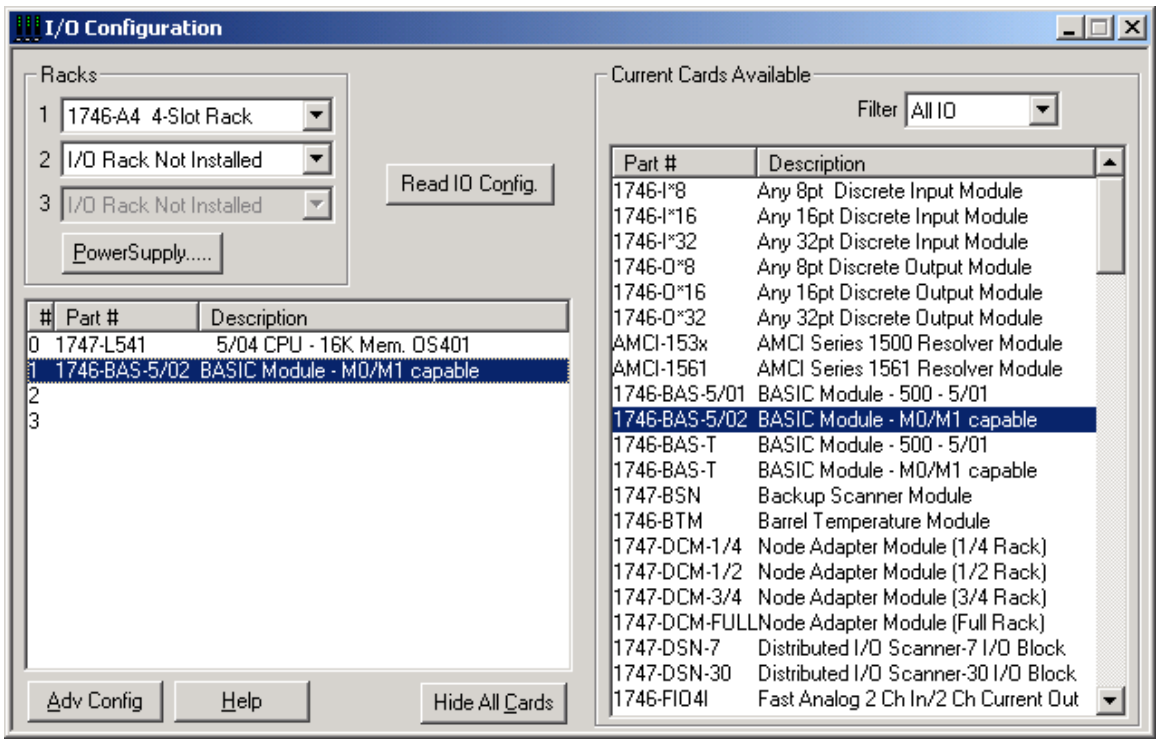


Figure 7-1

Open the existing user program, copy the ladder logic from the sample application, and paste into the user program. Modify the addresses in the input and output copy statements to match the physical rack, slot, and group of the BAS module. See Appendix B for example logic.

7.3 SLC-500 Proc. with the BAS Module in a Remote Rack

The SLC-500 uses virtual block transfers to communicate to and from the BAS module in the remote rack. The virtual block transfer configuration must be addressed with rack, group, and slot information. See Table 7-1 for virtual block transfer configuration addresses.

PLC Address	Description
N220:52	Rack, Group, Slot of the BAS module
N220:55	Rack, Group, Slot of the BAS module

Table 7-1

The rack, group, and slot data is entered as a decimal number. For example, rack 0, group 0, slot 0 would be entered as 0. Rack 1, group 0, slot 1 would be entered as 101. See Appendix C for example logic.

7.4 Setting the Box Poll Delay and Message Timeout Delay in the BAS module

The user can set the box poll delay, and message timeout delay in the PLC data table. These values are read by the BAS module at startup and restart. The 1746-BAS and 1746-BAS-T modules run at different speeds so the values in these words need to be set according to which module is being used. The box poll delay is located in N101:12 and the message timeout delay is located in N101:14 for the software example. See Table 7-2 for specific time values.

Box Poll Delay Value (Seconds)	Message Timeout Delay Value (Seconds)	BAS Module Data Table Value	BAS T Module Multiplier	BAS T Module Data Table Value
0		**0**	7.75	**0**
0.5		**50**	7.75	**388**
1		**100**	7.75	**775**
1.5		**150**	7.75	**1163**
2		**200**	7.75	**1550**
2.5		**250**	7.75	**1938**
3	3	**300**	7.75	**2325**
3.5	3.5	**350**	7.75	**2713**
4	4	**400**	7.75	**3100**
4.5	4.5	**450**	7.75	**3488**
5	5	**500**	7.75	**3875**

Note: The BAS T module runs approximately 7.75 times faster than the BAS module.

Table 7-2

Typical Settings
Box Poll Delay = 0.5.
Message Timeout Delay = 3 seconds.
Actual values depend on the application.

Box Poll Delay
Time delay between successive box polls.
A lower time value will cause the Smarteye unit to be polled more frequently.
A box poll delay value of 0 will cause the BAS module to poll the Smarteye unit as fast as the BASIC program will run.

Message Timeout Delay
Time delay to wait for a response from the Smarteye unit after a box poll.
When the Smarteye unit is polled, it will always send a response to the BAS module. The Message Timeout Delay specifies how long the BAS module should wait for a response from the Smarteye unit. A higher value will cause the BAS module to wait longer for the response.

If the Message Timeout Delay expires, the BAS module will poll the Smarteye unit again. After 5 message timeouts, the BAS module will try to restart the Smarteye unit.

8.0 PRT1 Monitor Port

PRT1 on the BAS module is used as a monitoring port. The user can connect to this port using a terminal and a null modem cable. The BASIC program sets the port for 19200 baud, no parity, 8 data bits, 1 stop bit, and no flow control. The user can also stop and start the BASIC program from here. To stop the program from executing the user must type "[ctrl] + c". To start the program the user must type "RUN" and hit enter. This is useful for initializing the box poll delay and message timeout delay values without powering down the rack.

8.1 Monitor Mode

While connected to the BAS module, the user can toggle the monitor mode on or off by typing an upper case "M". While the monitor mode is on the user will see the messages being sent to and from the SEA-8 or Twin to the BAS module.

Note: Monitor mode slows the processing of messages from the Smarteye unit. Use monitor mode for troubleshooting or short-term purposes only. Turn monitor mode off before disconnecting from the monitor port.

Box Poll and Idle Response
0B
0Zga

Box Poll, Label Message, and ACK
0B
0L00048 T01S4Zad
0A

Box Poll, Label Retransmit Message, and ACK
0B
0L00048RT01S4Zad
0A

Box Poll, Error Message, and ACK
0B
0E15 T01S4Zdd
0A

Box Poll, Error Retransmit Message, and ACK
0B
0E15RT01S4Zdd
0A

Box Poll, Diagnostic Message, and ACK
0B
0C A+01 B-01 C+01 X-02 Y-03 T01S6Zhn
0A

Box Poll, Diagnostic Retransmit Message, and ACK
0B
0C A+01 B-01 C+01 X-02 Y-03RT01S6Zhn
0A

8.2 BAS Module Startup

If the terminal is connected when the BAS module starts up, the user will see the initialization of the PLC communications, the timers, and the SEA-8 or Twin communications. The user will also see if any of these steps fail and can use this as a troubleshooting tool.

Successful Startup Message
PROGRAM START
ESTABLISH PLC COMMUNICATION
POLL RATE: .5
MESSAGE TIMEOUT: 3
RESTART
MAIN LOOP

Startup Message When PLC Communication Fails
PROGRAM START
ESTABLISH PLC COMMUNICATION
ESTABLISH PLC COMMUNICATION
ESTABLISH PLC COMMUNICATION
ESTABLISH PLC COMMUNICATION
ESTABLISH PLC COMMUNICATION

Note: The "ESTABLISH PLC COMMUNICATION" message will repeat until PLC communications are established.

Startup Message When Communication to the Smarteye Unit Fails
PROGRAM START
ESTABLISH PLC COMMUNICATION
POLL RATE: .5
MESSAGE TIMEOUT: 3
RESTART
MESSAGE TIMEOUT
COMM ERROR ON STARTUP

PROGRAM START
ESTABLISH PLC COMMUNICATION
POLL RATE: .5
MESSAGE TIMEOUT: 3
RESTART
MESSAGE TIMEOUT
COMM ERROR ON STARTUP

Note: The BAS module will repeat the "PROGRAM START" sequence until Smarteye communications are established.

Appendix A PLC-5 Proc. with the BAS Module in a Remote SLC-500 Rack

The following PLC logic is used for a BAS module in a remote SLC-500 rack, scanned by a PLC-5 processor.

Block transfer write instruction to write data to the DB module.

0000

BLOCK TRANSFER WRITE ENABLE BT9:1 EN

BLOCK TRANSFER READ ENABLE BT9:0 EN

DB MODULE BLOCK TRANSFER WRITE

BTW
Block Transfer Write
Module Type Generic Block Transfer
Rack 002
Group 0
Module 0
Control Block BT9:1
Data File N101:10
Length 8
Continuous No
Setup Screen

EN DN ER

Block transfer read instruction to read data from the DB module.

0001

BLOCK TRANSFER READ ENABLE BT9:0 EN

BLOCK TRANSFER WRITE ENABLE BT9:1 EN

DB MODULE BLOCK TRANSFER READ

BTR
Block Transfer Read
Module Type Generic Block Transfer
Rack 002
Group 0
Module 0
Control Block BT9:0
Data File N101:0
Length 8
Continuous No
Setup Screen

EN DN ER

Determine if new data is available. The DB module will increment the new data available word when new data is sent to the processor.

0002

BLOCK TRANSFER READ COMPLETE BT9:0 DN

BLOCK TRANSFER READ STATUS ERROR BT9:0 ER

DB MODULE BTR COS WORD

GRT
Greater Than (A>B)
Source A N101:1 16583<
Source B N101:11 16583<

DB MODULE BTW COS ECHO WORD

MOV
Move
Source N101:1 16583<
Dest N101:11 16583<

DB MODULE BTW COS ECHO WORD

GRT
Greater Than (A>B)
Source A N101:11 16583<
Source B 32766 32766<

DB MODULE BTW COS ECHO WORD

MOV
Move
Source 1 1<
Dest N101:11 16583<

BLOCK TRANSFER READ NEW DATA AVAILABLE N101:26 0

0003

If new data is available, parse reader number/message type word into reader number (used for indirect addressing) and message type bits.

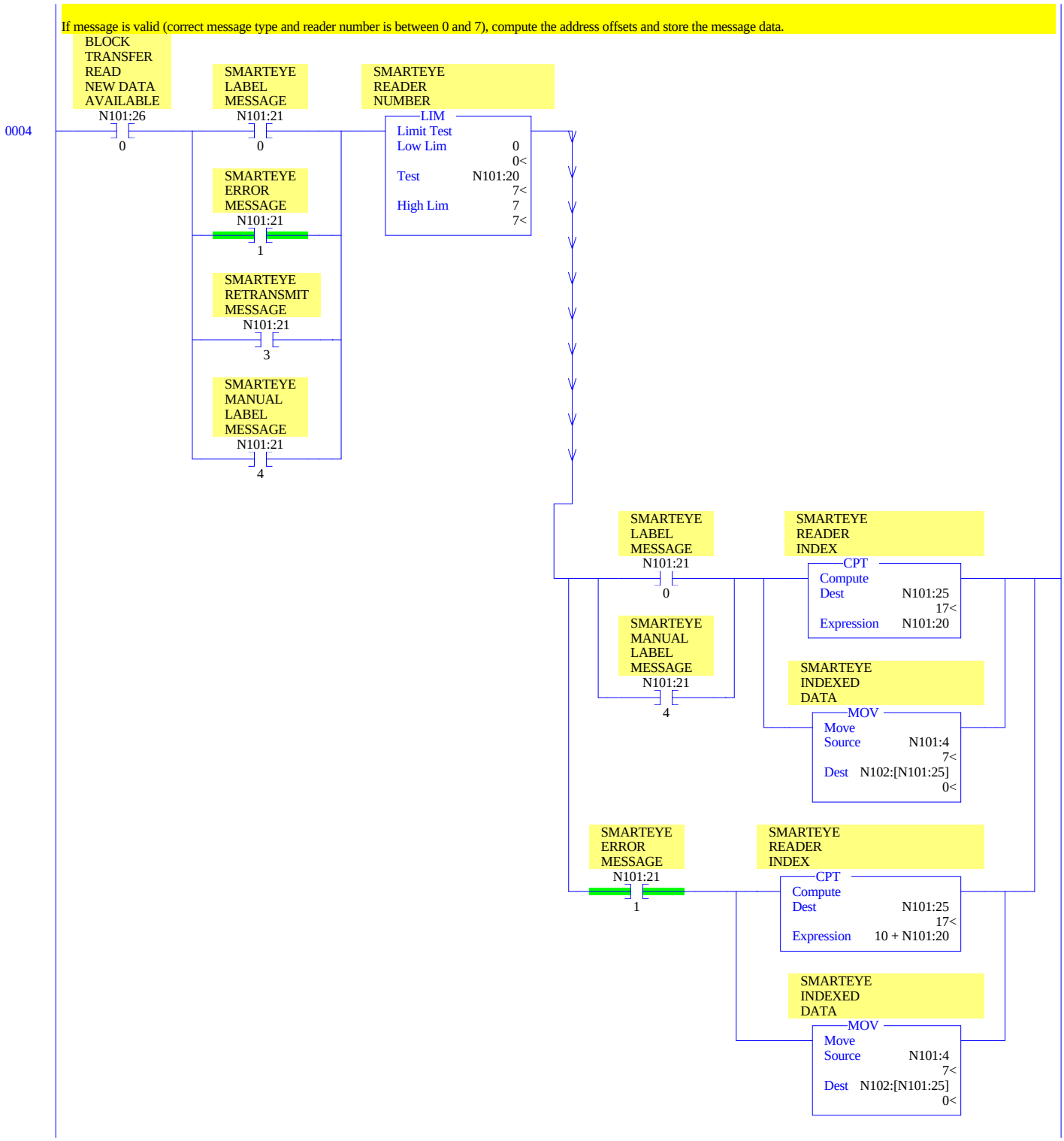
BLOCK TRANSFER READ NEW DATA AVAILABLE
N101:26
0

SMARTEYE READER NUMBER

BTD
Bit Field Distributor
Source N101:3 -16384<
Source Bit 0
Dest N101:20 7<
Dest Bit 0
Length 8

SMARTEYE MESSAGE TYPE WORD

BTD
Bit Field Distributor
Source N101:3 -16384<
Source Bit 8
Dest N101:21 2<
Dest Bit 0
Length 7


If message is valid (correct message type and reader number is between 0 and 7), compute the address offsets and store the message data.
0004
BLOCK TRANSFER READ NEW DATA AVAILABLE
N101:26
0
SMARTEYE LABEL MESSAGE
N101:21
0
SMARTEYE READER NUMBER
LIM
Limit Test
Low Lim 0
0<
Test N101:20
7<
High Lim 7
7<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE RETRANSMIT MESSAGE
N101:21
3
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
SMARTEYE LABEL MESSAGE
N101:21
0
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
17<
Expression N101:20
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
7<
Dest N102:[N101:25]
0<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
17<
Expression 10 + N101:20
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
7<
Dest N102:[N101:25]
0<

If the message is a diagnostic message, parse the message diagnostic words into temporary processor storage words.

0005

BLOCK TRANSFER READ NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE PHOTOEYE A DIAGNOSTIC MESSAGE TEMP STORAGE

FLL
Fill File
Source 0
Dest #N101:27
Length 5

SMARTEYE PHOTOEYE A DIAGNOSTIC MESSAGE TEMP STORAGE

BTD
Bit Field Distributor
Source N101:5
0<
Source Bit 0
Dest N101:27
-71<
Dest Bit 0
Length 7

SMARTEYE PHOTOEYE B DIAGNOSTIC MESSAGE TEMP STORAGE

BTD
Bit Field Distributor
Source N101:5
0<
Source Bit 8
Dest N101:28
-72<
Dest Bit 0
Length 7

SMARTEYE PHOTOEYE C DIAGNOSTIC MESSAGE TEMP STORAGE

BTD
Bit Field Distributor
Source N101:6
0<
Source Bit 0
Dest N101:29
-73<
Dest Bit 0
Length 7

SMARTEYE PHOTOEYE X DIAGNOSTIC MESSAGE TEMP STORAGE

BTD
Bit Field Distributor
Source N101:6
0<
Source Bit 8
Dest N101:30
-74<
Dest Bit 0
Length 7

SMARTEYE
PHOTOEYE Y
DIAGNOSTIC
MESSAGE
TEMP STORAGE

BTD
Bit Field Distributor

Source	N101:7
	0<
Source Bit	0
Dest	N101:31
	-75<
Dest Bit	0
Length	7

0006

If the message is a diagnostic message, determine if diagnostic values are negative using the sign bit. Calculate address offsets and store the diagnostic data.

BLOCK TRANSFER READ NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE READER NUMBER

LIM
Limit Test
Low Lim 0
0<
Test N101:20
7<
High Lim 7
7<

SMARTEYE PHOTOEYE A DIAGNOSTIC SIGN BIT
N101:5
7

SMARTEYE PHOTOEYE A DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:27
-71<
Dest N101:27
-71<

SMARTEYE PHOTOEYE B DIAGNOSTIC SIGN BIT
N101:5
15

SMARTEYE PHOTOEYE B DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:28
-72<
Dest N101:28
-72<

SMARTEYE PHOTOEYE C DIAGNOSTIC SIGN BIT
N101:6
7

SMARTEYE PHOTOEYE C DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:29
-73<
Dest N101:29
-73<

SMARTEYE PHOTOEYE X DIAGNOSTIC SIGN BIT
N101:6
15

SMARTEYE PHOTOEYE X DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:30
-74<
Dest N101:30
-74<

SMARTEYE PHOTOEYE Y DIAGNOSTIC SIGN BIT
N101:7
7

SMARTEYE PHOTOEYE Y DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:31
-75<
Dest N101:31
-75<

SMARTEYE READER INDEX

CPT
Compute
Dest N101:25
17<
Expression 20 + (N101:20 * 5)

SMARTEYE INDEXED DATA

COP
Copy File
Source #N101:27
Dest #N102:[N101:25]
Length 5

Compare new read event flags with last scan read event flags. Exclusive OR will detwemine which flags have changed state.

0007

BLOCK TRANSFER READ NEW DATA AVAILABLE N101:26 [0]

READ EVENT FLAGS
MOV
Move
Source N101:2 -32768<
Dest N101:22 -32768<

ERROR/READ EVENT CHANGE OF STATE DETECTION
XOR
Bitwise Exclusive OR
Source A N101:22 -32768<
Source B N101:23 -32768<
Dest N101:24 -32768<

Save new read event flags to last scan read event flags storage word.

0008

BLOCK TRANSFER READ NEW DATA AVAILABLE N101:26 [0]

LAST SCAN ERROR/READ EVENT FLAGS
MOV
Move
Source N101:22 -32768<
Dest N101:23 -32768<

If the Smarteye unit is active, update the Latched Error/Read Event Word.

0009

BLOCK TRANSFER READ NEW DATA AVAILABLE N101:26 [0]
SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE N101:7 [15]
PLC START UP COMPLETE T4:0 [DN]

LATCHED ERROR/READ EVENT WORD
OR
Bitwise Inclusive OR
Source A N101:24 -32768<
Source B N102:9 0<
Dest N102:9 0<

Smarteye Unit Communication Active indicator bit.

0010

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE N101:7 [15]
DB MODULE STATUS 1=ACTIVE 0=INACTIVE N102:8 [1]

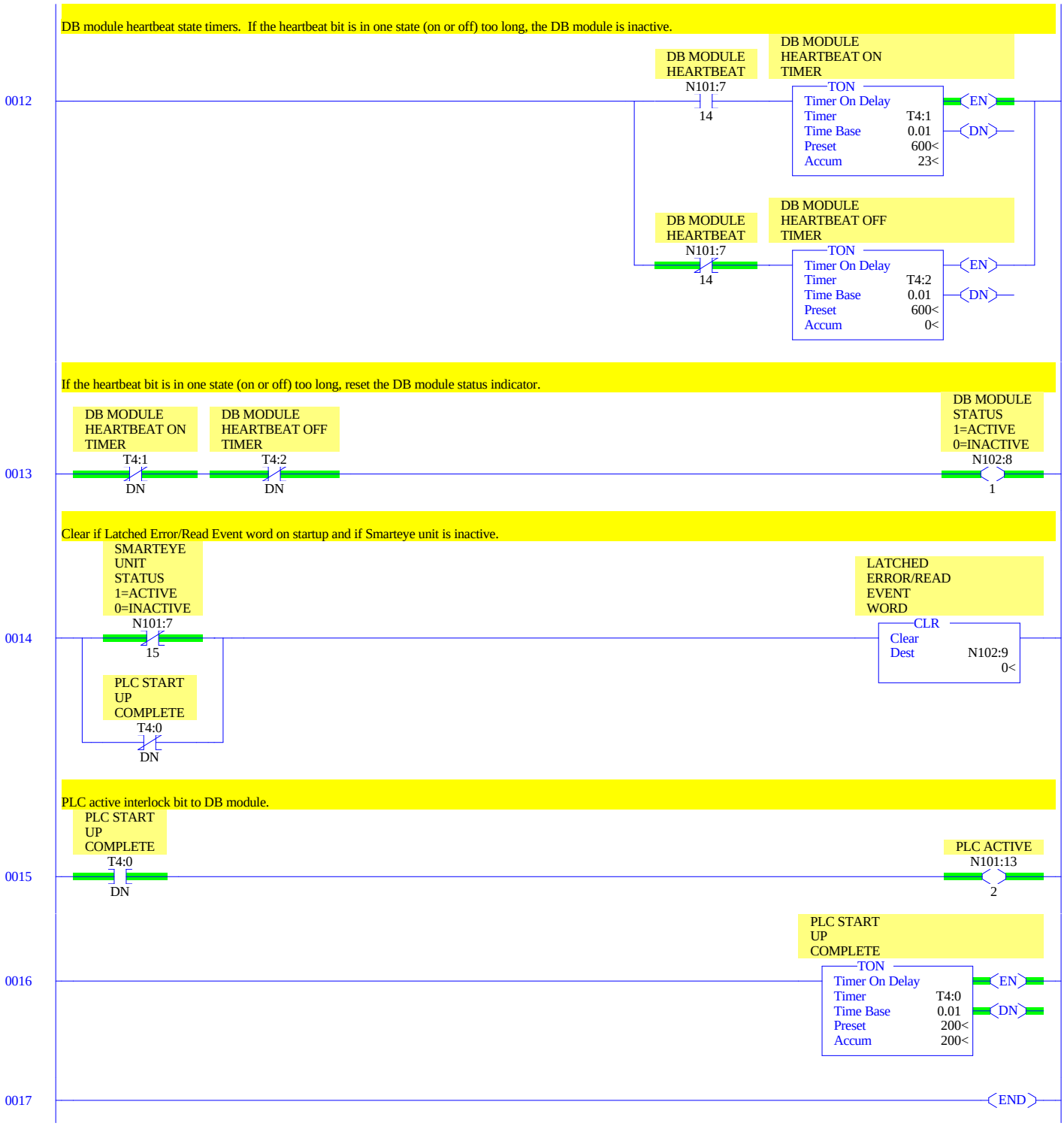
SMARTEYE UNIT COMMUNICATION ACTIVE N102:8 [0]

Heartbeat echo bit to DB module

0011

DB MODULE HEARTBEAT N101:7 [14]

DB MODULE HEARTBEAT ECHO N101:13 [0]


DB module heartbeat state timers. If the heartbeat bit is in one state (on or off) too long, the DB module is inactive.
0012
DB MODULE HEARTBEAT
N101:7
14
DB MODULE HEARTBEAT ON TIMER
TON
Timer On Delay
Timer T4:1
Time Base 0.01
Preset 600<
Accum 23<
EN
DN
DB MODULE HEARTBEAT
N101:7
14
DB MODULE HEARTBEAT OFF TIMER
TON
Timer On Delay
Timer T4:2
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
If the heartbeat bit is in one state (on or off) too long, reset the DB module status indicator.
0013
DB MODULE HEARTBEAT ON TIMER
T4:1
DN
DB MODULE HEARTBEAT OFF TIMER
T4:2
DN
DB MODULE STATUS 1=ACTIVE 0=INACTIVE
N102:8
1
Clear if Latched Error/Read Event word on startup and if Smarteye unit is inactive.
0014
SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
N101:7
15
PLC START UP COMPLETE
T4:0
DN
LATCHED ERROR/READ EVENT WORD
CLR
Clear
Dest N102:9
0<
PLC active interlock bit to DB module.
0015
PLC START UP COMPLETE
T4:0
DN
PLC ACTIVE
N101:13
2
0016
PLC START UP COMPLETE
TON
Timer On Delay
Timer T4:0
Time Base 0.01
Preset 200<
Accum 200<
EN
DN
0017
END

Appendix B SLC-500 Proc. with the BAS Module in the Local Rack

The following PLC logic is used for a BAS module in a local SLC-500 processor rack.

File copy instruction to read data from the BAS module.

0000

BAS MODULE BUFFERED INPUT WORDS

COP
Copy File
Source #I:1.0
Dest #N101:0
Length 8

Determine if new data is available. The BAS module will increment the new data available word when new data is sent to the processor.

0001

BAS MODULE COS WORD

GRT
Greater Than (A>B)
Source A N101:1
29150<
Source B N101:11
29150<

BAS MODULE COS WORD ECHO

MOV
Move
Source N101:1
29150<
Dest N101:11
29150<

BAS MODULE COS WORD ECHO

GRT
Greater Than (A>B)
Source A N101:11
29150<
Source B 32766
32766<

BAS MODULE COS WORD ECHO

MOV
Move
Source 1
1<
Dest N101:11
29150<

BAS MODULE NEW DATA AVAILABLE
N101:26
0

0002

If new data is available, parse reader number/message type word into reader number (used for indirect addressing) and message type bits.

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE READER NUMBER

FLL
Fill File
Source 0
Dest #N101:20
Length 2

SMARTEYE READER NUMBER

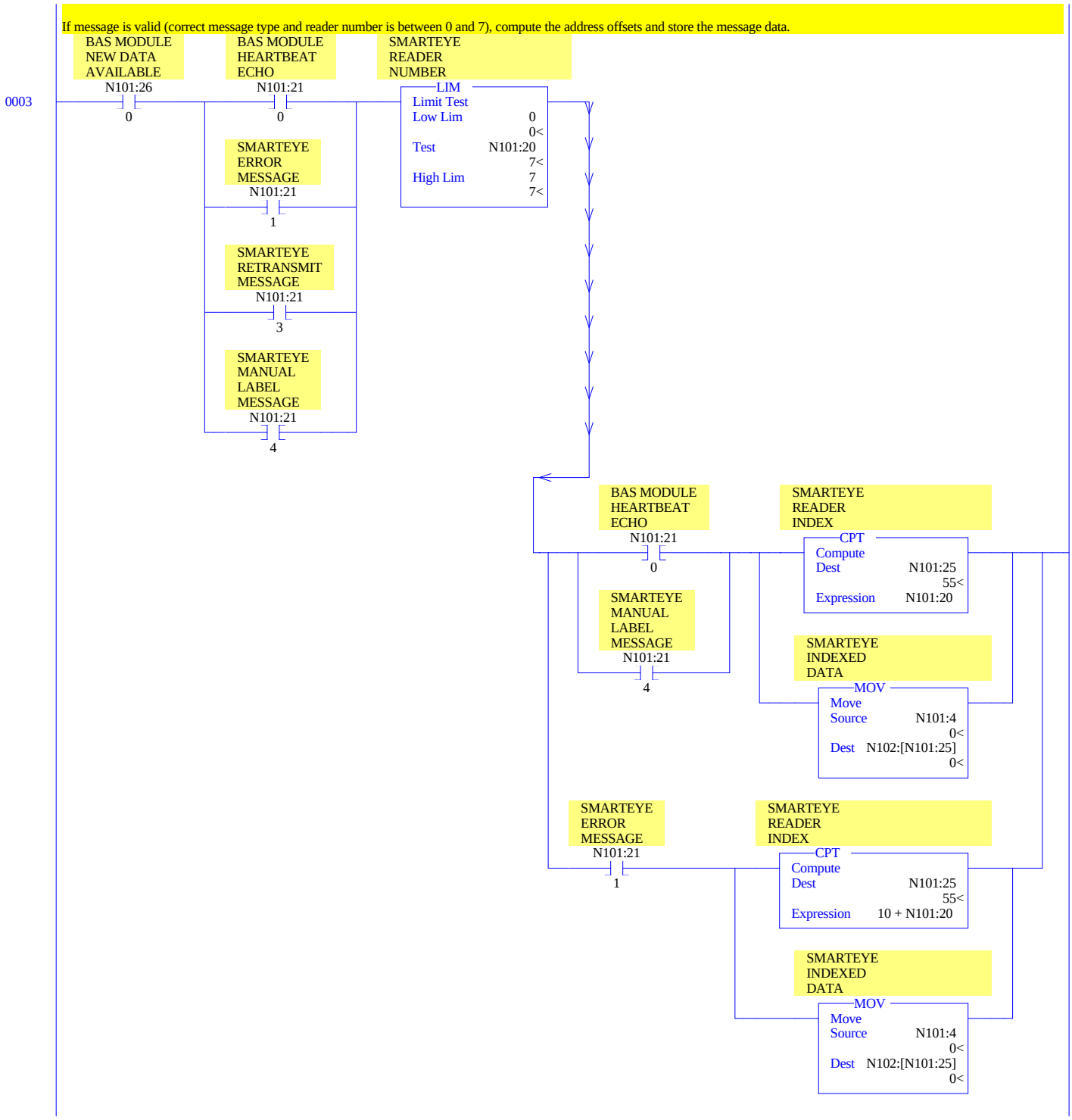
MVM
Masked Move
Source N101:3
-16384<
Mask 00FFh
255<
Dest N101:20
7<

SMARTEYE MESSAGE TYPE WORD

MVM
Masked Move
Source N101:3
-16384<
Mask 7F00h
32512<
Dest N101:21
4<

SMARTEYE MESSAGE TYPE WORD

DIV
Divide
Source A N101:21
4<
Source B 256
256<
Dest N101:21
4<


If message is valid (correct message type and reader number is between 0 and 7), compute the address offsets and store the message data.
0003
BAS MODULE NEW DATA AVAILABLE
N101:26
0
BAS MODULE HEARTBEAT ECHO
N101:21
0
SMARTEYE READER NUMBER
LIM
Limit Test
Low Lim 0
0<
Test N101:20
7<
High Lim 7
7<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE RETRANSMIT MESSAGE
N101:21
3
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
BAS MODULE HEARTBEAT ECHO
N101:21
0
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
55<
Expression N101:20
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
0<
Dest N102:[N101:25]
0<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
55<
Expression 10 + N101:20
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
0<
Dest N102:[N101:25]
0<

If the message is a diagnostic message, parse the message diagnostic words into temporary processor storage words.

0004

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

FLL
Fill File
Source 0
Dest #N101:27
Length 5

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:5
-14137<
Mask 007Fh
127<
Dest N101:27
-71<

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:5
-14137<
Mask 7F00h
32512<
Dest N101:28
-72<

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

DIV
Divide
Source A N101:28
-72<
Source B 256
256<
Dest N101:28
-72<

SMARTEYE PHOTOCELL C DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:6
-13623<
Mask 007Fh
127<
Dest N101:29
-73<

SMARTEYE
PHOTOCELL X
DIAGNOSTIC
MESSAGE
TEMP STORAGE

MVM
Masked Move
Source N101:6
-13623<
Mask 7F00h
32512<
Dest N101:30
-74<

SMARTEYE
PHOTOCELL X
DIAGNOSTIC
MESSAGE
TEMP STORAGE

DIV
Divide
Source A N101:30
-74<
Source B 256
256<
Dest N101:30
-74<

SMARTEYE
PHOTOCELL Y
DIAGNOSTIC
MESSAGE
TEMP STORAGE

MVM
Masked Move
Source N101:7
203<
Mask 007Fh
127<
Dest N101:31
-75<

0005

If the message is a diagnostic message, determine if diagnostic values are negative using the sign bit. Calculate address offsets and store the diagnostic data.

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE READER NUMBER

LIM
Limit Test
Low Lim 0 0<
Test N101:20 7<
High Lim 7 7<

SMARTEYE PHOTOCELL A DIAGNOSTIC SIGN BIT
N101:5
7

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:27 -71<
Dest N101:27 -71<

SMARTEYE PHOTOCELL B DIAGNOSTIC SIGN BIT
N101:5
15

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:28 -72<
Dest N101:28 -72<

SMARTEYE PHOTOCELL C DIAGNOSTIC SIGN BIT
N101:6
7

SMARTEYE PHOTOCELL C DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:29 -73<
Dest N101:29 -73<

SMARTEYE PHOTOCELL X DIAGNOSTIC SIGN BIT
N101:6
15

SMARTEYE PHOTOCELL X DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:30 -74<
Dest N101:30 -74<

SMARTEYE PHOTOCELL Y DIAGNOSTIC SIGN BIT
N101:7
7

SMARTEYE PHOTOCELL Y DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:31 -75<
Dest N101:31 -75<

SMARTEYE READER INDEX

CPT
Compute
Dest N101:25 55<
Expression 20 + (N101:20 * 5)

SMARTEYE INDEXED DATA

COP
Copy File
Source #N101:27
Dest #N102:[N101:25]
Length 5

Compare new read event flags with last scan read event flags. Exclusive OR will detwemine which flags have changed state.

0006

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE READ EVENT FLAGS
MOV
Move
Source N101:2 -2<
Dest N101:22 -2<

SMARTEYE ERROR/READ EVENT CHANGE OF STATE DETECTION
XOR
Bitwise Exclusive OR
Source A N101:22 FFFEh<
Source B N101:23 FFFEh<
Dest N101:24 0000h<

Save new read event flags to last scan read event flags storage word.

0007

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE LAST SCAN ERROR/READ EVENT FLAGS
MOV
Move
Source N101:22 -2<
Dest N101:23 -2<

If the Smarteye unit is active, update the Latched Error/Read Event Word.

0008

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
I:1
63
1746-BAS-T

PLC STARTUP COMPLETE
T4:0
DN

SMARTEYE LATCHED ERROR/READ EVENT WORD
OR
Bitwise Inclusive OR
Source A N101:24 0000h<
Source B N102:9 0000h<
Dest N102:9 0000h<

Smarteye Unit Communication Active indicator bit.

0009

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
I:1
63
1746-BAS-T

BAS MODULE STATUS 1=ACTIVE 0=INACTIVE
N102:8
1

SMARTEYE UNIT COMMUNICATION ACTIVE
N102:8
0

Heartbeat echo bit to BAS module

0010

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT ECHO
N101:13
0

BAS module heartbeat state timers. If the heartbeat bit is in one state (on or off) too long, the BAS module is inactive.

0011

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT ON TIMER
TON
Timer On Delay
Timer T4:1
Time Base 0.01
Preset 600<
Accum 17<
EN
DN

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT OFF TIMER
TON
Timer On Delay
Timer T4:2
Time Base 0.01
Preset 600<
Accum 0<
EN
DN

If the heartbeat bit is in one state (on or off) too long, reset the BAS module status indicator.

0012

BAS MODULE HEARTBEAT ON TIMER
T4:1
DN

BAS MODULE HEARTBEAT OFF TIMER
T4:2
DN

BAS MODULE STATUS 1=ACTIVE 0=INACTIVE
N102:8
1

Clear if Latched Error/Read Event word on startup and if Smarteye unit is inactive.

0013

PLC STARTUP COMPLETE
T4:0
DN

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
I:1
63
1746-BAS-T

SMARTEYE LATCHED ERROR/READ EVENT WORD
CLR
Clear
Dest N102:9
0<

PLC active interlock bit to BAS module.

0014

PLC STARTUP COMPLETE
T4:0
DN

PLC ACTIVE
N101:13
2

0015

PLC STARTUP DELAY
TON
Timer On Delay
Timer T4:0
Time Base 0.01
Preset 200<
Accum 200<
EN
DN

File copy instruction to write data to the BAS module.

0016

BAS MODULE I/O WORDS
COP
Copy File
Source #N101:11
Dest #O:1.1
Length 7

0017

END

Appendix C SLC-500 Proc. with the BAS Module in a Remote Rack

The following PLC logic is used for a BAS module in a remote SLC-500 rack, scanned by a 1747-SN module.

Jump to virtual block transfer subroutine. Subroutine will read and write data from/to the BAS module.

0000

JSR
Jump To Subroutine
SBR File Number U:3

Determine if new data is available. The BAS module will increment the new data available word when new data is sent to the processor.

0001

BAS MODULE COS WORD

GRT
Greater Than (A>B)
Source A N101:1
24210<
Source B N101:11
24210<

BAS MODULE COS WORD ECHO

MOV
Move
Source N101:1
24210<
Dest N101:11
24210<

BAS MODULE COS WORD ECHO

GRT
Greater Than (A>B)
Source A N101:11
24210<
Source B 32766
32766<

BAS MODULE COS WORD ECHO

MOV
Move
Source 1
1<
Dest N101:11
24210<

BAS MODULE NEW DATA AVAILABLE
N101:26
0

If new data is available, parse reader number/message type word into reader number (used for indirect addressing) and message type bits.

0002

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE READER NUMBER

FLL
Fill File
Source 0
Dest #N101:20
Length 2

SMARTEYE READER NUMBER

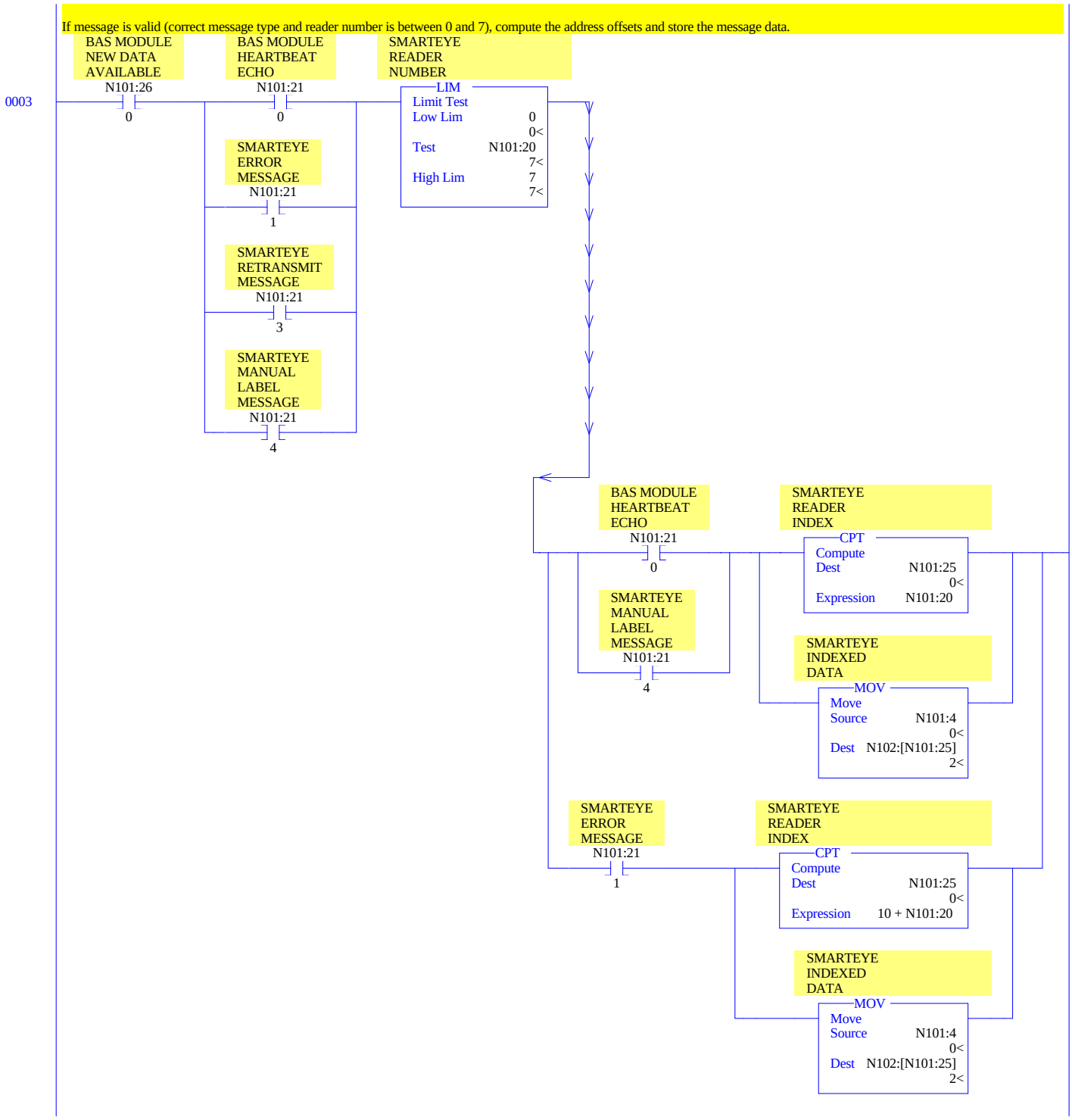
MVM
Masked Move
Source N101:3
-32768<
Mask 00FFh
255<
Dest N101:20
7<

SMARTEYE MESSAGE TYPE WORD

MVM
Masked Move
Source N101:3
-32768<
Mask 7F00h
32512<
Dest N101:21
0<

SMARTEYE MESSAGE TYPE WORD

DIV
Divide
Source A N101:21
0<
Source B 256
256<
Dest N101:21
0<


If message is valid (correct message type and reader number is between 0 and 7), compute the address offsets and store the message data.
0003
BAS MODULE NEW DATA AVAILABLE
N101:26
0
BAS MODULE HEARTBEAT ECHO
N101:21
0
SMARTEYE READER NUMBER
LIM
Limit Test
Low Lim 0
0<
Test N101:20
7<
High Lim 7
7<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE RETRANSMIT MESSAGE
N101:21
3
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
BAS MODULE HEARTBEAT ECHO
N101:21
0
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
0<
Expression N101:20
SMARTEYE MANUAL LABEL MESSAGE
N101:21
4
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
0<
Dest N102:[N101:25]
2<
SMARTEYE ERROR MESSAGE
N101:21
1
SMARTEYE READER INDEX
CPT
Compute
Dest N101:25
0<
Expression 10 + N101:20
SMARTEYE INDEXED DATA
MOV
Move
Source N101:4
0<
Dest N102:[N101:25]
2<

If the message is a diagnostic message, parse the message diagnostic words into temporary processor storage words.

0004

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

FLL
Fill File
Source 0
Dest #N101:27
Length 5

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:5
0<
Mask 007Fh
127<
Dest N101:27
0<

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:5
0<
Mask 7F00h
32512<
Dest N101:28
0<

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

DIV
Divide
Source A N101:28
0<
Source B 256
256<
Dest N101:28
0<

SMARTEYE PHOTOCELL C DIAGNOSTIC MESSAGE TEMP STORAGE

MVM
Masked Move
Source N101:6
0<
Mask 007Fh
127<
Dest N101:29
-73<

SMARTEYE
PHOTOCELL X
DIAGNOSTIC
MESSAGE
TEMP STORAGE

MVM
Masked Move
Source N101:6
0<
Mask 7F00h
32512<
Dest N101:30
-74<

SMARTEYE
PHOTOCELL X
DIAGNOSTIC
MESSAGE
TEMP STORAGE

DIV
Divide
Source A N101:30
-74<
Source B 256
256<
Dest N101:30
-74<

SMARTEYE
PHOTOCELL Y
DIAGNOSTIC
MESSAGE
TEMP STORAGE

MVM
Masked Move
Source N101:7
0<
Mask 007Fh
127<
Dest N101:31
-75<

If the message is a diagnostic message, determine if diagnostic values are negative using the sign bit. Calculate address offsets and store the diagnostic data.

0005

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE DIAGNOSTIC MESSAGE
N101:21
2

SMARTEYE READER NUMBER

LIM
Limit Test
Low Lim 0
0<
Test N101:20
7<
High Lim 7
7<

SMARTEYE PHOTOCELL A DIAGNOSTIC SIGN BIT
N101:5
7

SMARTEYE PHOTOCELL A DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:27
0<
Dest N101:27
0<

SMARTEYE PHOTOCELL B DIAGNOSTIC SIGN BIT
N101:5
15

SMARTEYE PHOTOCELL B DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:28
0<
Dest N101:28
0<

SMARTEYE PHOTOCELL C DIAGNOSTIC SIGN BIT
N101:6
7

SMARTEYE PHOTOCELL C DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:29
-73<
Dest N101:29
-73<

SMARTEYE PHOTOCELL X DIAGNOSTIC SIGN BIT
N101:6
15

SMARTEYE PHOTOCELL X DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:30
-74<
Dest N101:30
-74<

SMARTEYE PHOTOCELL Y DIAGNOSTIC SIGN BIT
N101:7
7

SMARTEYE PHOTOCELL Y DIAGNOSTIC MESSAGE TEMP STORAGE

NEG
Negate
Source N101:31
-75<
Dest N101:31
-75<

SMARTEYE READER INDEX

CPT
Compute
Dest N101:25
0<
Expression 20 + (N101:20 * 5)

SMARTEYE INDEXED DATA

COP
Copy File
Source #N101:27
Dest #N102:[N101:25]
Length 5

Compare new read event flags with last scan read event flags. Exclusive OR will detwemine which flags have changed state.

0006

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE READ EVENT FLAGS
MOV
Move
Source N101:2 0<
Dest N101:22 0<

SMARTEYE ERROR/READ EVENT CHANGE OF STATE DETECTION
XOR
Bitwise Exclusive OR
Source A N101:22 0000h<
Source B N101:23 0000h<
Dest N101:24 0000h<

Save new read event flags to last scan read event flags storage word.

0007

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE LAST SCAN ERROR/READ EVENT FLAGS
MOV
Move
Source N101:22 0<
Dest N101:23 0<

If the Smarteye unit is active, update the Latched Error/Read Event Word.

0008

BAS MODULE NEW DATA AVAILABLE
N101:26
0

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
N101:7
15

PLC STARTUP COMPLETE
T4:0
DN

SMARTEYE LATCHED ERROR/READ EVENT WORD
OR
Bitwise Inclusive OR
Source A N101:24 0000h<
Source B N102:9 0000h<
Dest N102:9 0000h<

Smarteye Unit Communication Active indicator bit.

0009

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
N101:7
15

BAS MODULE STATUS 1=ACTIVE 0=INACTIVE
N102:8
1

SMARTEYE UNIT COMMUNICATION ACTIVE
N102:8
0

Heartbeat echo bit to BAS module

0010

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT ECHO
N101:13
0

BAS module heartbeat state timers. If the heartbeat bit is in one state (on or off) too long, the BAS module is inactive.

0011

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT ON TIMER
TON
Timer On Delay
Timer T4:1
Time Base 0.01
Preset 600<
Accum 60<
EN
DN

BAS MODULE HEARTBEAT
N101:7
14

BAS MODULE HEARTBEAT OFF TIMER
TON
Timer On Delay
Timer T4:2
Time Base 0.01
Preset 600<
Accum 0<
EN
DN

If the heartbeat bit is in one state (on or off) too long, reset the BAS module status indicator.

0012

BAS MODULE HEARTBEAT ON TIMER
T4:1
DN

BAS MODULE HEARTBEAT OFF TIMER
T4:2
DN

BAS MODULE STATUS 1=ACTIVE 0=INACTIVE
N102:8
1

Clear if Latched Error/Read Event word on startup and if Smarteye unit is inactive.

0013

PLC STARTUP COMPLETE
T4:0
DN

SMARTEYE UNIT STATUS 1=ACTIVE 0=INACTIVE
N101:7
15

SMARTEYE LATCHED ERROR/READ EVENT WORD
CLR
Clear
Dest N102:9
0<

PLC active interlock bit to BAS module.

0014

PLC STARTUP COMPLETE
T4:0
DN

PLC ACTIVE
N101:13
2

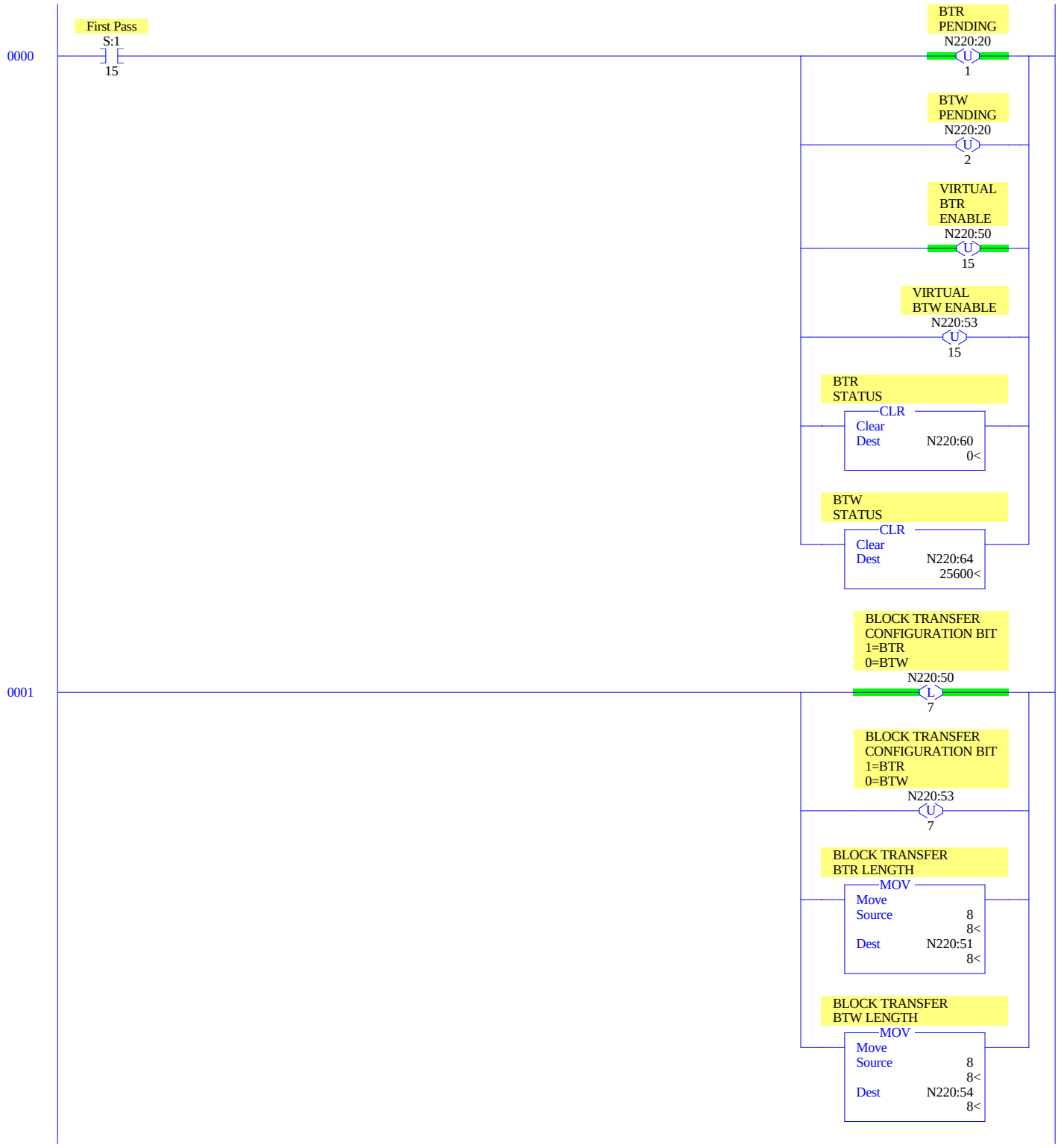
0015

PLC STARTUP DELAY
TON
Timer On Delay
Timer T4:0
Time Base 0.01
Preset 200<
Accum 200<
EN
DN

0016

END

LAD 3 - VIRT BXFER --- Total Rungs in File = 16



CONFIGURE THE BT OPERATION TYPE, LENGTH AND RIO ADDRESS (R, G, S IN DECIMAL) AT POWER UP. BIT N220:50/7 MUST BE SET TO A "1" TO INDICATE A BTR AND BIT N220:53/7 MUST BE A LOGICAL "0" TO INDICATE A BTW OPERATION

0002

First Pass
S:1
15

BTR CONTROL
COP
Copy File
Source #N220:50
Dest #M0:3.100
Length 3

BTW CONTROL
COP
Copy File
Source #N220:53
Dest #M0:3.200
Length 3

COPY THE BTR STATUS AREA TO AN INTEGER FILE ONLY WHEN A BTR IS IN PROGRESS. THIS STATUS INFORMATION WILL THEN BE USED THROUGHOUT THE PROGRAM AND WILL LIMIT THE NUMBER OF M-FILE ACCESSES.

0003

BTR PENDING
N220:20
1

CHECK BTR STATUS
N220:20
3

BTR STATUS
COP
Copy File
Source #M1:3.100
Dest #N220:60
Length 4

UNLATCH THE BIT THAT CONTINUES TO CHECK THE BTR STATUS. WHEN A BTR IS COMPLETE, THE DN OR ER BIT IS SET. THE LADDER PROGRAM MUST THEN UNLATCH THE ENABLE BIT, THEN WAIT FOR THE SN MODULE TO TURN OFF THE DN/ER BIT BEFORE ANOTHER BTR TO THE SAME M-FILE LOCATION CAN BE INITIATED. THIS IS ONE COMPLETE BTR CYCLE.

0004

VIRTUAL BTR DONE
N220:60
13

VIRTUAL BTR ERROR
N220:60
12

CHECK BTR STATUS
N220:20
U
3

COPY THE BTW STATUS AREA TO AN INTEGER FILE ONLY WHEN A BTW IS IN PROGRESS. THIS STATUS DATA WILL THEN BE USED THROUGHOUT THE PROGRAM AND WILL LIMIT THE NUMBER OF M-FILE ACCESSES.

0005

BTW PENDING
N220:20
2

CHECK BTW STATUS
N220:20
4

BTW STATUS
COP
Copy File
Source #M1:3.200
Dest #N220:64
Length 4

UNLATCH THE BIT THAT CONTINUES TO CHECK THE BTW STATUS. WHEN A BTW IS COMPLETE, THE DN OR ER BIT IS SET. THE LADDER PROGRAM MUST THEN UNLATCH THE EN BIT, THEN WAIT FOR THE SN MODULE TO TURN OFF THE DN/ER BIT BEFORE ANOTHER BTW TO THE SAME M-FILE LOCATION CAN BE INITIATED. THIS COMPLETES ONE BTW CYCLE.

0006

VIRTUAL BTW DONE
N220:64
13

VIRTUAL BTW ERROR
N220:64
12

CHECK BTW STATUS
N220:20
U
4

WHEN A BTR SUCCESSFULLY COMPLETES, BUFFER THE BTR DATA AND UNLATCH BOTH THE BTR VIRTUAL ENABLE BIT AND THE BTR PENDING BIT. ALSO, LATCH THE BIT THAT CONTINUES CHECKING THE BTR STATUS UNTIL THE SN MODULE TURNS OFF THE DONE BIT.

0007

VIRTUAL BTR DONE N220:60 13

BAS MODULE BUFFERED I/O WORDS

COP
Copy File
Source #M1:3.110
Dest #N101:0
Length 8

BTR PENDING N220:20 U 1

VIRTUAL BTR ENABLE N220:50 U 15

CHECK BTR STATUS N220:20 L 3

WHEN A BTR UNSUCCESSFULLY COMPLETES, BUFFER THE ERROR CODE AND UNLATCH THE BTR ENABLE BIT AND THE BTR PENDING BIT. ALSO, LATCH THE CHECK BTR STATUS BIT IN ORDER TO CONTINUE READING THE STATUS INFORMATION FROM THE SCANNER UNTIL IT TURNS OFF THE ERROR BIT, COMPLETING THE HAND-SHAKE PROCESS.

0008

VIRTUAL BTR ERROR N220:60 12

BTR ERROR CODE

MOV
Move
Source M1:3.103
?<
Dest N220:21
-9<

BTR PENDING N220:20 U 1

VIRTUAL BTR ENABLE N220:50 U 15

CHECK BTR STATUS N220:20 L 3

WHEN A BTW SUCCESSFULLY COMPLETES, UNLATCH THE BTW ENABLE BIT AND THE BTW PENDING BIT TO COMPLETE A BTW SEQUENCE. ALSO, LATCH THE BIT THAT CONTINUES CHECKING THE BTW STATUS UNTIL THE SN MODULE TURNS THE DONE BIT OFF.

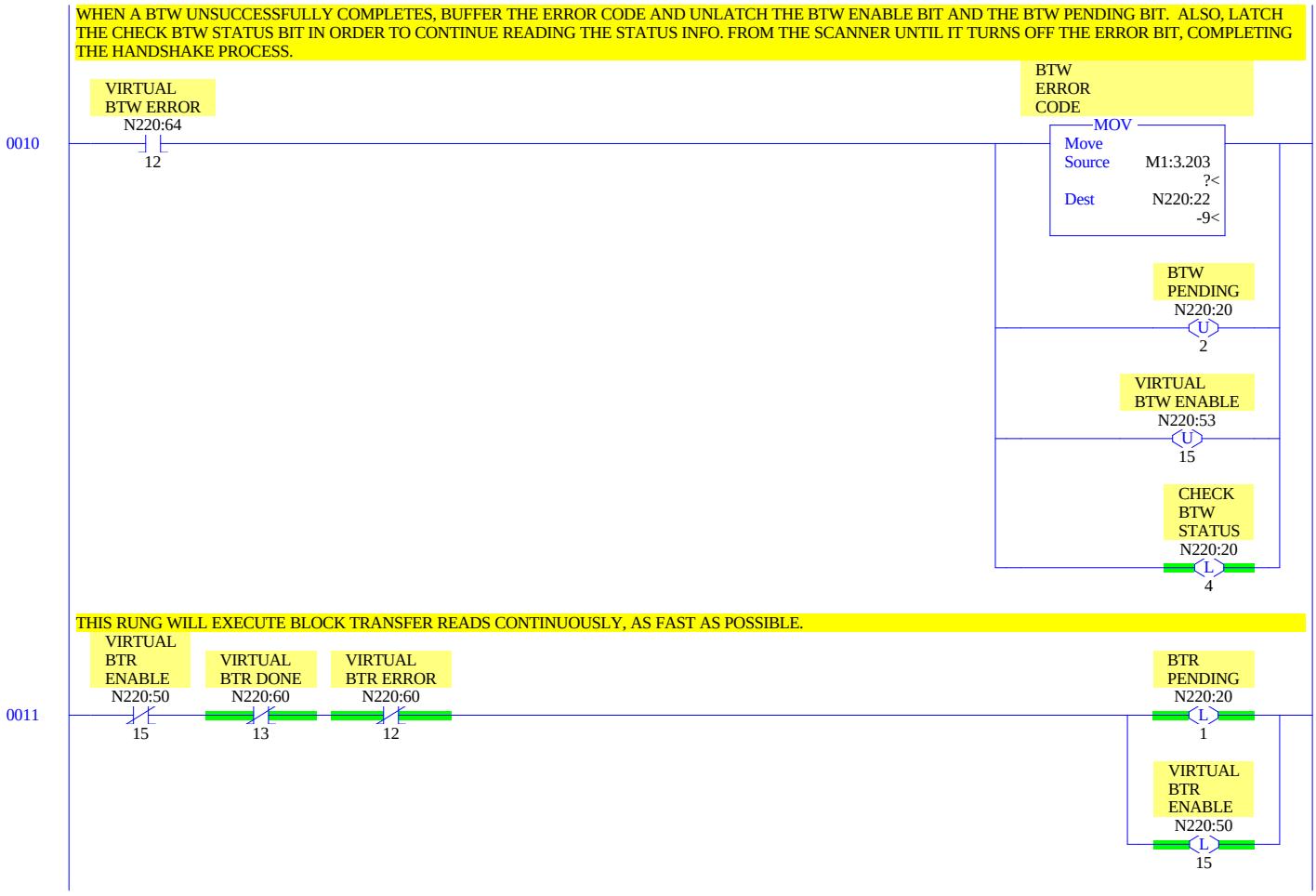
0009

VIRTUAL BTW DONE N220:64 13

BTW PENDING N220:20 U 2

VIRTUAL BTW ENABLE N220:53 U 15

CHECK BTW STATUS N220:20 L 4


WHEN A BTW UNSUCCESSFULLY COMPLETES, BUFFER THE ERROR CODE AND UNLATCH THE BTW ENABLE BIT AND THE BTW PENDING BIT. ALSO, LATCH THE CHECK BTW STATUS BIT IN ORDER TO CONTINUE READING THE STATUS INFO. FROM THE SCANNER UNTIL IT TURNS OFF THE ERROR BIT, COMPLETING THE HANDSHAKE PROCESS.
0010
VIRTUAL BTW ERROR
N220:64
12
BTW ERROR CODE
MOV
Move
Source M1:3.203
?<
Dest N220:22
-9<
BTW PENDING
N220:20
U
2
VIRTUAL BTW ENABLE
N220:53
U
15
CHECK BTW STATUS
N220:20
L
4
THIS RUNG WILL EXECUTE BLOCK TRANSFER READS CONTINUOUSLY, AS FAST AS POSSIBLE.
0011
VIRTUAL BTR ENABLE
N220:50
15
VIRTUAL BTR DONE
N220:60
13
VIRTUAL BTR ERROR
N220:60
12
BTR PENDING
N220:20
L
1
VIRTUAL BTR ENABLE
N220:50
L
15

BTW DATA

THIS RUNG WILL EXECUTE BLOCK TRANSFER WRITES CONTINUOUSLY, AS FAST AS POSSIBLE

0012

VIRTUAL BTW ENABLE N220:53 15 — VIRTUAL BTW DONE N220:64 13 — VIRTUAL BTW ERROR N220:64 12

COP
Copy File
Source #N101:11
Dest #M0:3.211
Length 7

VIRTUAL BTW ENABLE N220:53 — L 15

BTW PENDING N220:20 — L 2

MOVE THE VIRTUAL BTR CONTROL WORD TO THE MO FILE FOR THE SN MODULE WHILE A BTR IS IN PROGRESS, AND CONTINUE DOING SO UNITL THE EN, DN, ER BITS ARE ALL TURNED OFF, COMPLETING THE HAND-SHAKE PROCESS

0013

VIRTUAL BTR ENABLE N220:50 15 — VIRTUAL BTR DONE N220:60 13 — VIRTUAL BTR ERROR N220:60 12

BTR CONTROL
MOV
Move
Source N220:50 -32640<
Dest M0:3.100 ?<

0014

VIRTUAL BTW ENABLE N220:53 15 — VIRTUAL BTW DONE N220:64 13 — VIRTUAL BTW ERROR N220:64 12

BTW CONTROL
MOV
Move
Source N220:53 0<
Dest M0:3.200 ?<

0015

END

Appendix D BASIC Program

The following is a printout of the BASIC program. Text in ***bold italics*** is not in the actual BASIC program, it is only shown in this manual for user clarity.

```
10    REM **** APPL #SA0044
20    REM **** BAS MODULE - POLL COS MODE
30    REM **** REVISION 1  04/27/2005
40    REM **** SMARTEYE CORPORATION

50    REM **** VARIABLES
60    REM $(1) = RESTART
70    REM $(2) = BOX POLL
80    REM $(3) = ACK
90    REM TIMO = MESSAGE TIMEOUT VALUE
100   REM ML = MESSAGE LENGTH
110   REM POLL = POLL DELAY TIME (SEC)
120   REM TER = MESSAGE TIMEOUT/LENGTH ERROR
130   REM CER = MESSAGE CHECKSUM ERROR
140   REM RN = READER NUMBER
150   REM MT = MESSAGE TYPE
160   REM ST = SMARTEYE COMMUNICATION STATUS
170   REM EV = READER/ERROR EVENT FLAG
180   REM NUM = LABEL/ERROR NUMBER OUTPUT WORD
190   REM PCNT = POLL TIMEOUT COUNT
200   REM PMAX = MAXIMUM POLL COUNT FOR RESTART
210   REM IO(x) = BLOCK TRANSFER BUFFER POSITION NUMBER
220   REM T(x) = SMARTEYE MESSAGE ARRAY
230   REM L(x) = LABEL NUMBER ARRAY
240   REM ER(x) = ERROR NUMBER ARRAY
250   REM SCS = CALCULATED MESSAGE CHECKSUM
260   REM CS = SMARTEYE TRANSMITTED CHECKSUM
270   REM MTMO = SMARTEYE MESSAGE TIMEOUT VALUE
280   REM SER = SUPPRESS ERROR MESSAGES
290   REM HB =  BASIC MODULE HEARTBEAT

300   REM **** INITIALIZATION
310   STRING 0,0 :  STRING 2000,50
320   MODE (PRT1,19200,N,8,1,N,) :  CLOCK 0
330   MODE (PRT2,9600,N,8,1,N,) :  CLOCK 1
340   DIM IO(8) :  DIM T(72) :  DIM L(8) :  DIM ER(8)
350   EV=0 : ML=0 : DA=0 : ER=0 : LN=0 : POLL=0
360   RN=0 : G=0 : TIME=0 : CS=0 : SCS=0 : SER=0
370   CER=0 : MT=0 : PCNT=0 : PMAX=5 : TER=0
380   IO(1)=200 : IO(2)=201 : IO(3)=202 : IO(4)=203
390   IO(5)=204 : IO(6)=205 : IO(7)=206 : IO(8)=207
400   $(1)="xxR" : ASC($(1),1)=10 : ASC($(1),2)=48
410   $(2)="xxB" : ASC($(2),1)=10 : ASC($(2),2)=48
420   $(3)="xxA" : ASC($(3),1)=10 : ASC($(3),2)=48
```

Establish communications from the BAS module to the PLC. This communication link must be established before the program will continue. If communication is not established, the program will loop until it is established.

```
430   PRINT "PROGRAM START"
440   REM **** ESTABLISH PLC COMMUNICATION
450   PRINT "ESTABLISH PLC COMMUNICATION"
460   CALL 53 :  POP Y :  IF Y<>0 THEN 450
470   PUSH IO(4) :  CALL 15 :  POP ACT : ACT=(ACT.AND.4)
480   IF ACT=O THEN 460
490   FOR I=2 TO 8 :  PUSH 0 :  PUSH IO(I) :  CALL 25 :  NEXT I
500   CALL 51 :  POP Y :  IF Y=0 THEN 500
510   CALL 53 :  POP Y :  IF Y<>0 THEN 450
520   PUSH IO(2) :  CALL 15 :  POP DA
530   DA=DA+1
540   PUSH DA :  PUSH IO(2) :  CALL 25
550   CALL 54 :  POP Y :  IF Y<>0 THEN 450
560   CALL 55 :  POP Y :  IF Y=0 THEN 560
570   PUSH IO(3) :  CALL 15 :  POP POLL : POLL=POLL/100
580   PRINT "POLL RATE (BAS/BAS-T):",POLL,"/",POLL/7.75
590   PUSH IO(5) :  CALL 15 :  POP MTMO : MTMO=MTMO/100
600   PRINT "MESSAGE TIMEOUT (BAS/BAS-T):",MTMO,"/",MTMO/7.75
```

Establish communications from the BAS module to the Smarteye unit. This communication link must be established before the program will continue. If communication is not established, either from a timeout error or checksum error, the program will restart.

```
610   REM **** ISSUE RESTART
620   PRINT "RESTART"
630   TER=0 : CER=0 : PCNT=0 : CSTAT=0
640   GOSUB 1780 :  REM HEARTBEAT SERVICE
650   GOSUB 1180 :  REM RESTART COMMAND
660   GOSUB 1340 :  REM RETRIEVE MESSAGE
670   IF TER<>0 THEN 740
680   GOSUB 1440 :  REM CALCULATE CHECKSUM
690   IF CER<>0 THEN 740
700   PUSH CSTAT :  PUSH IO(4) :  CALL 25
710   CALL 54 :  POP Y :  IF Y<>0 THEN 740
720   CALL 55 :  POP Y :  IF Y=0 THEN 720
730   GOTO 760
740   PRINT "COMM ERROR ON STARTUP" :  PRINT
750   GOTO 350
```

The main loop of the program handles the polling of the Smarteye unit. It will send the poll command and determine if the response is valid. If the response is not valid, the Smarteye unit will be polled again. After exceeding the maximum number of retries, the Smarteye unit will be restarted.

If the response is valid, the Smarteye unit will be acknowledged and the response will be parsed into the appropriate message.

```
760   REM **** MAIN LOOP
770   PRINT "MAIN LOOP"
780   MT=0 : NUM=0 : TIME=0 : HB=0
790   CER=0 : TER=0 : P_DLY=TIME+POLL
800   IF PCNT<PMAX THEN 820
810   PRINT "POLL COUNT RESTART" :  GOTO 620
```

Start of polling loop.

```
820   A=GET :  IF A=77 THEN  GOSUB 1310
830   IF TIME<P_DLY.AND.T(3)=90 THEN 820
840   GOSUB 1260 :  REM BOX POLL COMMAND
850   GOSUB 1340 :  REM RETRIEVE MESSAGE
860   GOSUB 1780 :  REM HEARTBEAT SERVICE
```

Message has been received from the Smarteye unit or timeout error has occurred.

```
870   IF T(3)=69.AND.SER=1 THEN  GOSUB 1220 :  GOTO 780
880   IF TER=0 THEN 900
890   PCNT=PCNT+1 :  GOTO 780
900   IF T(3)=90 THEN 780
910   GOSUB 1440 :  REM CALCULATE CHECKSUM
920   IF CER=0 THEN 940
930   PCNT=PCNT+1 :  GOTO 780
```

Message has passed the checksum test and no timeout error has occurred. The message will be parsed into the appropriate message

```
940   RN=T(2)-48
950   IF T(3)<>90 THEN  GOSUB 1220 :  REM ACK COMMAND
960   IF T(3)=76 THEN  GOSUB 1520 :  REM LABEL MESSAGE
970   IF T(3)=77 THEN  GOSUB 1520 :  REM MAN LABEL MESSAGE
980   IF T(3)=69 THEN  GOSUB 1590 :  REM ERROR MESSAGE
990   IF T(3)=67 THEN  GOSUB 1650 :  REM CAL MESSAGE
```

Load message data into the PLC communication buffer. In order to ensure the data is valid in the PLC, the message data (label, error or calibration data) is sent first, then the new data available flag is sent second.

```
1000   CALL 51 :  POP Y :  IF Y=0 THEN 1000
1010   CALL 53 :  POP Y :  IF Y<>0 THEN 1160
1020   PUSH IO(2) :  CALL 15 :  POP DA
1030   PUSH IO(4) :  CALL 15 :  POP HB : HB=16384*(HB.AND.1)
1040   PUSH EV :  PUSH IO(3) :  CALL 25
1050   PUSH MT.OR.RN :  PUSH IO(4) :  CALL 25
1060   PUSH NUM :  PUSH IO(5) :  CALL 25
1070   PUSH (BCAL*256).OR.ACAL :  PUSH IO(6) :  CALL 25
1080   PUSH (XCAL*256).OR.CCAL :  PUSH IO(7) :  CALL 25
1090   PUSH YCAL.OR.CSTAT.OR.HB :  PUSH IO(8) :  CALL 25
```

Send message data to the PLC. Check communication status.

```
1100   CALL 54 :  POP Y :  IF Y<>0 THEN 1160
1110   CALL 55 :  POP Y :  IF Y=0 THEN 1110
```

Increment the new data available flag and send it to the PLC

```
1120   DA=DA+1 :  PUSH DA :  PUSH IO(2) :  CALL 25
1130   CALL 54 :  POP Y :  IF Y<>0 THEN 1160
1140   CALL 55 :  POP Y :  IF Y=0 THEN 1140
1150   GOTO 780
1160   PRINT "PLC COMM TIMEOUT" :  GOTO 350
1170   END
```

Program subroutines

Send restart command subroutine.

```
1180   REM ****  RESTART COMMAND  SUBROUTINE
1190   PCNT=0 :  PUSH 2 :  CALL 37 :  PRINT #$(1), CR ,
1200   IF G=77 THEN  PRINT $(1)
1210   RETURN
```

Send acknowledge subroutine.

```
1220   REM ****  ACK COMMAND  SUBROUTINE
1230   PUSH 2 :  CALL 37 : ASC($(3),2)=T(2) :  PRINT #$(3), CR ,
1240   IF G=77 THEN  PRINT $(3)
1250   RETURN
```

Send box poll command subroutine.

```
1260   REM ****  BOX POLL COMMAND  SUBROUTINE
1270   PUSH 2 :  CALL 37 :  PRINT #$(2), CR ,
1280   IF G=77 THEN  PRINT $(2)
1290   RETURN
```

Monitor mode toggle subroutine.

```
1300   REM **** MONITOR TOGGLE SUBROUTINE
1310   G=G.XOR.A
1320   IF G=A THEN  PRINT "MONITOR ON" ELSE  PRINT "MONITOR OFF"
1330   RETURN
```

Smarteye message retrieval subroutine. This routine will wait for the Smarteye unit to respond to a previously sent command. If no response is received within the timeout value, the timeout error will be set. This routine will also set the Smarteye communication status indicator.

```
1340   REM **** RETRIEVE MESSAGE FROM SEA SUBROUTINE
1350   TIMO=TIME+MTMO : ML=0
1360   IF TIME<TIMO THEN 1380
1370   TER=1 :  PRINT "MESSAGE TIMEOUT" :  RETURN
1380   X=GET# :  IF X=0 THEN 1360 ELSE ML=ML+1 : T(ML)=X
1390   IF X<>13.AND.ML<72 THEN 1360
1400   IF ML<72 THEN 1410 ELSE TER=1 : PRINT "MESSAGE LENGTH ERROR" : RETURN
1410   IF G=77 THEN  FOR J=2 TO ML :  PRINT CHR(T(J)), :  NEXT J :  PRINT
1420   CSTAT=32768 : PCNT=0
1430   RETURN
```

Message checksum calculation subroutine.

```
1440   REM **** CHECKSUM CALCULATION SUBROUTINE
1450   CER=0 : CS=0 : SCS=0
1460   FOR I=1 TO ML-3 : CS=CS.XOR.T(I) :  NEXT I
1470   SCS=(T(ML-2)-97)*16
1480   SCS=(T(ML-1)-97)+SCS
1490   IF CS=SCS THEN 1510
1500   CER=1 :  PRINT "CHECKSUM ERROR"
1510   RETURN
```

Label message parsing subroutine.

```
1520   REM ****  PROCESS LABEL MESSAGE SUBROUTINE
1530   LN=10000*(T(4)-48)+1000*(T(5)-48)+100*(T(6)-48)+10*(T(7)-48)+(T(8)-48)
1540   IF LN=L(RN).AND.T(9)=82 THEN 1580
1550   L(RN)=LN : NUM=LN : EV=EV.XOR.(2**(RN))
1560   IF T(9)=82 THEN MT=2304 ELSE MT=256
1570   IF T(3)=77 THEN MT=MT.OR.4096
1580   RETURN
```

Error message parsing subroutine.

```
1590   REM ****  PROCESS ERROR MESSAGE SUBROUTINE
1600   ER=10*(T(4)-48)+(T(5)-48)
1610   IF (ER=ER(RN).AND.T(9)=82).OR.ER=0 THEN 1640
1620   ER(RN)=ER : NUM=ER : EV=EV.XOR.((2**(RN))*256)
1630   IF T(6)=82 THEN MT=2560 ELSE MT=512
1640   RETURN
```

Calibration message parsing subroutine.

```
1650  REM ****  PROCESS CALIBRATION MESSAGE SUBROUTINE
1660  ACAL=10*(T(7)-48)+(T(8)-48)
1670  IF T(6)=45 THEN ACAL=ACAL.OR.128
1680  BCAL=10*(T(12)-48)+(T(13)-48)
1690  IF T(11)=45 THEN BCAL=BCAL.OR.128
1700  CCAL=10*(T(17)-48)+(T(18)-48)
1710  IF T(16)=45 THEN CCAL=CCAL.OR.128
1720  XCAL=10*(T(22)-48)+(T(23)-48)
1730  IF T(21)=45 THEN XCAL=XCAL.OR.128
1740  YCAL=10*(T(27)-48)+(T(28)-48)
1750  IF T(26)=45 THEN YCAL=YCAL.OR.128
1760  IF T(29)=82 THEN MT=3072 ELSE MT=1024
1770  RETURN
```

Heartbeat service subroutine. This routine will toggle the PLC Heartbeat bit.

```
1780  REM ****  HEARTBEAT SERVICE SUBROUTINE
1790  CALL 53 :  POP Y
1800  PUSH IO(4) :  CALL 15 :  POP TEM
1810  HB=16384*(TEM.AND.1) : SER=(TEM.AND.2)/2
1820  PUSH CSTAT.OR.HB.OR.YCAL :  PUSH IO(8) :  CALL 25
1830  CALL 54 :  POP Y
1840  RETURN
```

Appendix E Message Layout

BAS module to Processor

BTR Word N101	Description															
0	Reserved															
1	COS Word															
2	E7	E6	E5	E4	E3	E2	E1	E0	R7	R6	R5	R4	R3	R2	R1	R0
3				M	R	D	E	L	Reader Number							
4	Label/Error Number															
5	Sign	B Diagnostic Value 0-99							Sign	A Diagnostic Value 0-99						
6	Sign	X Diagnostic Value 0-99							Sign	C Diagnostic Value 0-99						
7	Status	HB							Sign	Y Diagnostic Value 0-99						

Error/Read Event Word N101:2
E0-E7=Error Event
R0-R7=Read Event

Message Type Word N101:3
L=Label R=Re-transmit
E=Error M=Manual Input
D=Diagnostic

Diagnostic Words N101:5, N101:6, and N101:7
Sign=Sign of Diagnostic value 1=negative/0=positive
Status = Status of connected Smarteye device 1=Active/0=Inactive
HB = Basic module heartbeat

Table E-1

Processor to BAS module

BTW Word N101	Description			
10	Reserved			
11	COS Echo Word			
12	Poll Time Delay (Delay time between Smarteye polls)			
13	Not Used	Active	SE	HB
14	Smarteye Message Timeout Delay (Delay time for Smarteye communication timeout)			
15	Not Used			
16	Not Used			
17	Not Used			

SE = Suppress Error messages from the Smarteye unit. Set to 1 to suppress error messages to PLC.
HB = PLC heartbeat
Active = PLC is active

Table E-2

This page left intentionally blank

SMARTEYE
CORPORATION

www.smarteyecorporation.com