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SST-ASI-SLC

User Guide

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This document applies to the SST-ASI-SLC AS-Interface (As-i) Scanner module for the SLC 500 interface card.

At Woodhead, we strive to ensure accuracy in our documentation. However, due to rapidly evolving products, software or hardware changes occasionally may not be reflected in our documents. If you notice any inaccuracies, please contact us (see Appendix E of this document).

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Hardcopies are not controlled.

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Preface

Preface Sections:

- Purpose of this Guide
- Who Should Use this Guide?
- Conventions

Warning

Only qualified electrical personnel familiar with the construction/ operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this guide in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or, in extreme cases, loss of life.

Purpose of this Guide

This manual explains how to install, configure and operate the SST-ASI-SLC Scanner.

Who Should Use this Guide?

Use this manual if you are designing, installing, programming or troubleshooting control systems that use Allen-Bradley SLC processors and the SST-ASI-SLC Scanner.

You should understand PLCs and have basic knowledge of SLC products. Familiarity with AS-Interface (AS-i) modules and the AS-I network would be an asset.

Refer to your RS Logix 500 documentation for help on that software.

Conventions

This guide uses stylistic conventions, special terms, and special notation to help enhance your understanding.

Style

The following stylistic conventions are used throughout this guide:

Bold	indicates field names, button names, tab names, executable files, and options or selections
Italics	indicates keywords (indexed) or instances of new terms and/or specialized words that need emphasis
CAPS	indicates a specific key selection, such as ENTER, TAB, CTRL, ALT, DELETE
`Code Font`	indicates command line entries or text that you'd type into a field
Underlining	indicates a hyperlink
">" delimiter	indicates how to navigate through a hierarchy of menu selections/options
"0x"	indicates a hexadecimal value

Terminology

The following special terms are used throughout this guide:

Card	The SLC 500 network interface card
Channel	An AS-i network interface on the card
Firmware Module	The embedded software module that gets loaded to the card's memory and runs on the card. This is the operating system of the card, enabling it to respond to commands from the host and manage network communications.
Scanner	The SST-ASI-SLC Scanner module, consisting of hardware and firmware.

Special Notation

The following special notations may be used throughout this guide:

Warning

Warning messages alert the reader to situations where personal injury may result. Warnings are accompanied by the symbol shown, and precede the topic to which they refer.

Caution

Caution messages alert the reader to situations where equipment damage may result. Cautions are accompanied by the symbol shown, and precede the topic to which they refer.

Note

A note provides additional information, emphasizes a point, or gives a tip for easier operation. Notes are accompanied by the symbol shown, and follow the text to which they refer.

1
Overview

Chapter Sections:

- System Overview
- Hardware Features

1.1 System Overview

The SST-ASI-SLC is the AS-Interface (AS-i) Scanner for the SLC 500. It allows an SLC processor (SLC 5/03 or later) and AS-i modules to communicate on the AS-i network. The Scanner supports 2 AS-i channels.

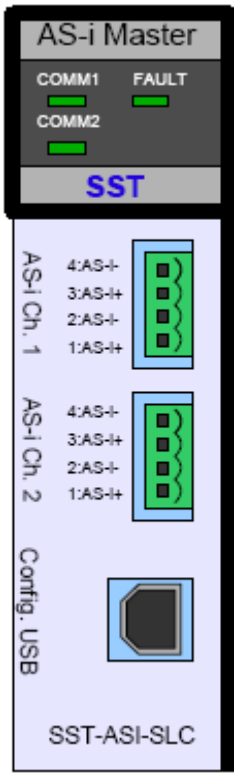
You can configure the AS-i network with the SLC G file or with the Scanner's Config USB port.

The Scanner can occupy any slot in the local SLC chassis except slot 0, which is reserved for the SLC processor. You can have multiple Scanners in the same rack.

The digital input and output data for the slaves is mapped into SLC I and O files. SLC M0 and M1 files store analog data and network status information.

1.2 Hardware Features

Figure 1: Front of AS-i Scanner



The following table describes the parts of the Scanner. The side label of the Scanner provides module information.

Table 1: Scanner Parts

Feature	Description
COMM 1 and COMM 2 LEDs	Display the communication status for each channel.
FAULT LED	Displays the fault status.
4-pin Phoenix connectors (AS-i Ch 1 and AS-i Ch 2)	Connections to AS-i networks.
USB port	Used for configuring I/O.

1.2.1 LEDs

The Scanner has three LEDs: the FAULT LED, and one COMM LED for each AS-i network. At power-up, they flash for 1 second.

Refer to Section 8.1, LED Status and SLC Fault Codes, for detailed information on what these LEDs indicate.

When the SLC is in Program mode, all LEDs are normally off.

FAULT LED

The FAULT LED indicates the overall status of Scanner operations.

COMM LEDs

The COMM LED displays the status of the respective channel. If there are no network errors and the SLC is in Run mode, the COMM LEDs are green.

1.2.2 4-pin Phoenix Combicon Connectors

Each connector allows you to connect the Scanner to an AS-i network, and consists of 2 sets of 2 pins. Pins 1 and 3 are internally connected, as are 2 and 4.

You can connect AS-I power to one set of pins and the AS-i network to the other.

1.2.3 Configuration Port

The configuration port is a USB type B female connector (USB port). It is used for field upgrades of module firmware and for configuration of AS-I slave addresses and information.

1.3 Software Installation

Before using the USB port to set the slave address, configure the list of slaves in the EEPROM, or update the firmware. You will need to install the Virtual COM Port driver and the Upgrading firmware utility tool, which are on the AS-I product CD.

2
Scanner Quick Start

Chapter Sections:

- Overview
- Equipment and Tools
- Procedures

2.1 Overview

This chapter provides all the necessary information to get you up and running quickly. It:

- Tells you which tools and equipment you need
- Describes how to configure and program the Scanner module
- Explains how to install the Scanner module
- Discusses system power-up procedures

This chapter does not include detailed explanations of these procedures, but refers to later sections and chapters. If you have any questions or are unfamiliar with the terms used or concepts presented, read the referenced chapters and other documentation before you proceed.

2.2 Equipment and Tools

Have the following tools and equipment ready:

- SLC programming equipment
- Virtual COM Port Drivers
- Firmware upgrade utility (flasher.exe)
- Terminal emulation software
- a USB A-B Cable, M/M
- AS-i cable to connect the Scanner to the AS-i network
- AS-i power supply

2.3 Procedures

To get the Scanner up and running, follow these procedures:

1. Unpack the module. Make sure you received the AS-i Scanner and a USB A-B M/M cable for configuring I/O.

2. Install the Virtual COM Port driver on your PC.

3. Review your system's power requirements to verify that your chassis supports the Scanner module. The Scanner consumes 120 mA at 5 VDC.

4. Calculate the total load on the system power supply using the procedure described in the SLC 500 Modular Style Installation & Operation Manual, Allen-Bradley Publication 1747-6.2, or the SLC 500 Family System Overview, Publication 1747-2.30.

5. Make sure system power is off.

6. Insert the Scanner module into your 1746 chassis.

7. Connect AS-i power to the Scanner. The slaves require AS-i power to be able to communicate with the Scanner. Refer to Chapter 4, Installing and Wiring the Scanner Module, for more details.

8. Set up your system I/O configuration for the relevant Scanner slot. Using RSLogix 500 software, configure the Scanner as **Other** and enter the Scanner module ID (13635). Refer to Chapter 5, Configuring the Master and Slaves, for details on configuring the Scanner with several popular programming packages. Refer to Section 5.1, Configuring the Scanner with RSLogix 500, for important information on dealing with a G file problem in RSLogix.

Note

Beginning in version 5.0 of RSLogix500, this ID is identified as a BLM Module. Overwrite the file sizes with the values below.

9. Set the M1 and M0 file sizes to 337 words.
10. Set scanned inputs and outputs to 32 words.
11. Set the G file size to 160 words.

Note

If using the Scanner in compatibility mode refer to Section 6.5 for the file sizes,

12. Modify the G file. For details on G file layout and configuration, refer to Section 6.1, G File. Set the following words to enable Channel 1:
    - Word 1 - 1
    - Word 80 - 0
    - Word 159 - 3543h (13635 decimal) (Scanner module ID)
    - All other words can be set to 0000h

    Once you verify your system is operating correctly, you can configure the rest of the network in the G file.
13. Use the provided USB A-B M/M cable to connect the Scanner to your configuration computer via the USB port.
14. Run your terminal emulation software.
15. Set the baud rate to 38400 and the parameters to No parity, 8 data bits and one Stop bit, no flow control.
16. With the SLC CPU in PROG/REM PROG mode, press the [*] key to get the Scanner's attention, and choose **Network 1** to configure.
17. Hook up AS-i power and add an AS-i slave.
18. In your terminal software, perform a **List** command and verify that the slave appears on the network. If the slave is listed at Address 0, use the **Address** command to change it to the desired address. Refer to Section 5.3, Example of Slave Configuration, for an example of configuring a slave. Continue adding slaves and setting their addresses.
19. Save the configuration and exit Config mode.

20. Put the SLC in Run mode. The Scanner module begins scanning I/O.

21. Verify that you can read inputs and write outputs.

3
Theory of Operation

Chapter Sections:

- The AS-Interface
- Scanner Overview
- Configuring the AS-i Scanner
- Configuring Slaves
- LAS/LDS/SDL/LPF
- AS-i Modes
- Power-up Sequence
- AS-i Faults
- Clearing Faults

3.1 The AS-Interface

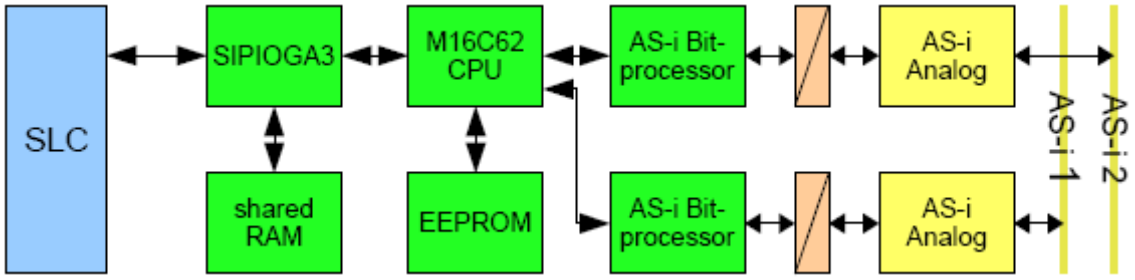
The AS-Interface (AS-i) is a master-slave network that offers reliable, inexpensive digital communications, to sensors and actuators, for low-level automation.

The network supports up to 31 slaves or up to 62 slaves with extended addressing, and a maximum cable length of 100 m.

With repeaters (2 maximum), the length can reach a maximum of 300m. The AS-i cabling contains data and power on a single cable, making setup extremely easy.

3.2 Scanner Overview

Figure 2: Scanner Block Diagram



The Scanner firmware is stored in flash memory on the module. The current version is 3.x.x, and it supports AS-i 3.0 functions.

Note

Although this version is compatible with SLC programs written for version 1.x., we recommend using the Scanner's new features. Refer to Section 6.5, Compatibility, for more details.

Each channel's EEPROM contains the network configuration. You can store a network configuration in the EEPROM in one of two ways:

- Connect to the USB port, select a channel and save
- Set the G bit in the G file, create a configuration in the G file and download the program to the SLC. When you put the SLC in Run mode, it writes the configuration from the G file to the EEPROM.

In either case, when you switch the SLC to Run mode, the SLC compares the contents of the EEPROM with the network and, if they match, it starts updating I/O. If they don't match, it generates a fault.

3.3 Configuring the AS-i Scanner

When you first configure your AS-i system, you must initially set some basic options in the G file. Then you may enter and manipulate the rest of your network configuration, using either the G file or the USB port. This section discusses both methods of configuration.

3.3.1 G File vs. USB Port Configuration

When you are connecting the Scanner to an existing (and present) network, the USB port method is much quicker than the G file method. However, it does not save the network configuration as part of the SLC program.

The G file method saves the configuration and allows you to archive and load it onto another system. If the Scanner fails, you can easily replace the failed device and reconfigure the system with the archived G file. To configure the G file more easily, you can connect to an existing network, and using the USB port, have the Scanner display a compatible G file configuration for entry into your program.

3.3.2 G File Configuration

Option bits in the G file affect the way the Scanner operates with respect to parameters and I and O file usage.

You must do at least some configuration via the G file. At a minimum, you must set the Scanner ID and indicate the AS-i channel(s) you are using. If you try to run without setting these bits in the G file, the Scanner will fault with a G file error (70H).

There are 3 parts within the G file. The first two are the configuration for each of the two channels. The third is a single word containing the module ID, which indicates the end of the G file. This word is usually contained in word 159.

The first word in each channel's configuration contains options bits. These are:

- Bit 0 – enables the channel
- Bit 1 – enables extended addressing (expands the number of slaves from 31 to 62 – requires special slaves to work).
- Bit 2 – enables auto address programming
- Bit 3 – enables the SLC to write parameters to the slaves; WParam from the M file is used, and slave Param echoes are put into different locations in M file (refer to M file layout).
  If you do not set the bit(s), the M file parameters are ignored.
- Bit 4 – mLAS – if set, the top portion of the channel's input table is replaced with the channel's list of active slaves. Refer to Section 6.2, Input and Output Files, for more details.
- Bit 5 –mSDL – if set, the top portion of the channel's input table is replaced with the list of missing slaves. Refer to Section 6.2, Input and Output Files, for more details.
- Bit 6 – mLPF – if set, the top portion of the channel's input table is replaced with list of slaves' peripheral fault status. Refer to Section 6.2, Input and Output Files, for more details.
- Bit 8 – Fault Bit – if set, the SLC will continue to operate when any AS-i fault on this channel occurs.
- Bit 12 – G file – if set, the G file contains slave configuration data.
- Bit 13 – Parameter – if set, the slave parameters from the G file are used.
- Bit 14 – Compress G file – if set, the G file length is reduced by skipping unused portions for this channel.
- Other bits are reserved and should be left as 0.

3.3.3 Configuring the USB Port

You can use the USB port to set slave addresses, to configure the list of slaves in the EEPROM or to update the firmware.

When configuring from or exiting the USB port, slave address changes are recorded in the slave but not in the EEPROM. Slave parameter changes are sent to the slave when they are made, but they are not stored in EEPROM until you use the **Save** command, or exit and choose the **Save** command.

When the AS-Interface enters Protected mode, only those slaves in the EEPROM are activated.

3.3.4 Saving to the EEPROM

Information is only saved to the EEPROM in four instances:

- When the configuration in the G file is different than the network's, the G bit is set and the SLC is set to run
- When you issue the command request in the M0 and M1 file, which changes permanent data (PCD, LPS, PP, operation mode and auto address enable)
- When you issue the **Save** command from the USB port
- When you exit and choose the **Save** command

3.4 Configuring Slaves

3.4.1 Programming Slaves

“Out of the box” slaves are programmed for Address 0. Use one of two methods to set the module address:

- Program the address using a handheld programmer before attaching the slave to the network.
- Attach the slave to the network and use the AS-i Scanner USB port to change the slave address. Slaves must be attached and addressed one at a time in this method.

3.4.2 Replacing Slaves

If Auto Addressing is enabled, slaves can be replaced while the network is running. For example, if a slave has failed and must be changed, you can remove it and add a new one with an address of 0 and matching I/O and IDs. The new slave will be automatically reprogrammed to the old slave's address; you don't have to configure it.

To enable Auto Address Programming, the Auto Address Programming bit (bit 2 of the option's word) must be set in the G file. You must be in AS-i Protected mode (see Section 3.6, AS-i Modes) and have network and SLC power ON when you replace the slave.

3.4.3 Slave Parameters

Slave parameters allow you to change the way a device operates. They are determined by the manufacturer's specifications and are not permanently stored in the slave.

You can set slave parameters in 3 ways: via the USB port, via the G file and via the M file.

The Scanner initially uses the slave parameters stored in EEPROM. If bit 13 of the Option word is set, the G file parameter entries override and update the EEPROM entries. If Bit 3 of the Option word is set, the M file parameters override any other entries. If neither bit is set, the Scanner continues to use the EEPROM entries.

When Bit 3 is set, and you change parameters in the M file, the parameters are written to the slave during a subsequent AS-i bus scan. Before any change-dependent logic is executed, the user program should check the M file to ensure that the slave has successfully echoed the parameter change.

When you configure via the USB port, the parameters are sent to the slave as soon as a change is made. You must use the **Save** command to update the EEPROM.

3.5 LAS/LDS/SDL/LPF

The LAS, LDS, SDL and LPF lists represent network slave status, and are maintained in Run mode. These lists are stored in the Scanner M files: M0 for Channel 1, and M1 for Channel 2.

The List of Detected Slaves (LDS) indicates the slaves that were found on the network, whether they appear in the EEPROM or not. When AS-i enters Configuration mode, all slaves, regardless of their presence in the EEPROM, are activated and listed in the LDS.

The List of Activated Slaves (LAS) contains the slaves listed in both the EEPROM of the AS-I Scanner and the LDS. Slaves on the network are activated on AS-i power-up. Only those slaves present in the EEPROM and found on the network are activated and only activated slaves exchange IO data.

Slaves must match ID and I/O codes stored in the EEPROM to be activated. The Slave Delta List (SDL) contains the slaves listed in either the EEPROM or the LDS, but not in both. When a slave is detected but doesn't match any slave listed in the EEPROM, it is listed in the SDL.

The List of Peripheral Faults (LPF) contains the slaves that have declared a peripheral fault.

For each bit of the LAS, LDS and LPF, 1 represents a present slave and 0 represents an absent slave. For SDL, 1 indicates a discrepancy between EEPROM and LDS and 0 indicates a match between EEPROM and LDS. Refer to Section 6.3, M0 and M1 Files, for more information.

For details on mapping the above bits to the input table, refer to Section 6.1, G File.

3.6 AS-i Modes

AS-i has 2 operating modes: *Configuration* and *Protected*. Normally, the system is in Protected mode. You can enter Configuration mode only if you are configuring via the USB port. The following sections describe each mode.

3.6.1 Configuration Mode

In Configuration mode, you can:

- Change slave addresses
- Save to EEPROM

In Configuration Mode, you cannot:

- Perform data exchanges
- Use Auto Address Programming

All slaves are active, regardless of the EEPROM. In other words, the LDS and the LAS are identical. Refer to Section 3.5, LAS/LDS/SDL/LPF, for more information on LDS and LAS.

3.6.2 Protected Mode

In Protected mode, you can:

- Exchange data
- Use Auto Address Programming (if enabled)

In Protected mode, you cannot:

- Write to EEPROM
- Enter protected mode with Slave 0 (zero) present
- Change slave addresses

Only those slaves present in the EEPROM and matching the ID and I/O codes in the EEPROM are activated for data exchange.

3.7 Power-up Sequence

The power-up sequence is as follows:

1. When the SLC goes into Run mode, the module parses the G file and configures the network controller appropriately. If the G file specifies a change from the current projected network, the module updates the EEPROM on the network controller to change the list of projected slaves.

2. The module sends the parameters to the slaves and begins bus scanning.

3.8 AS-i Faults

If an error occurs in Run mode, the Scanner interrogates bit 8 of the channel's options word in the G File to determine whether to fault the SLC processor. This fault may be a recoverable major fault. If an error handler routine is installed (S:29), it can determine the type of fault (S:6) and act appropriately. If the error routine clears the major error flag (S2:1/13), the SLC will try to continue in Run mode.

AS-i faults cannot be corrected by the Scanner, as user intervention is required. However, if you want to continue scanning, you can set the Fault Acknowledge bits and the Scanner will ignore the error until it reoccurs. The Fault Acknowledge bits are the 4 least significant bits of word 0 in the Output file. Set Bit 0 to acknowledge error 61h, bit 1 for 62h, bit 2 for 63h and bit 3 for 64h.

Note

63h and 64h are reserved for future use.

The fault bits may be set ahead of time (at start-up) or during the error handling routine. If they are set during the error handling routine, you will have to do an IOM instruction, which performs an immediate write. Refer to Figure 3, IOM Ladder Logic Instruction, for more details.

Note

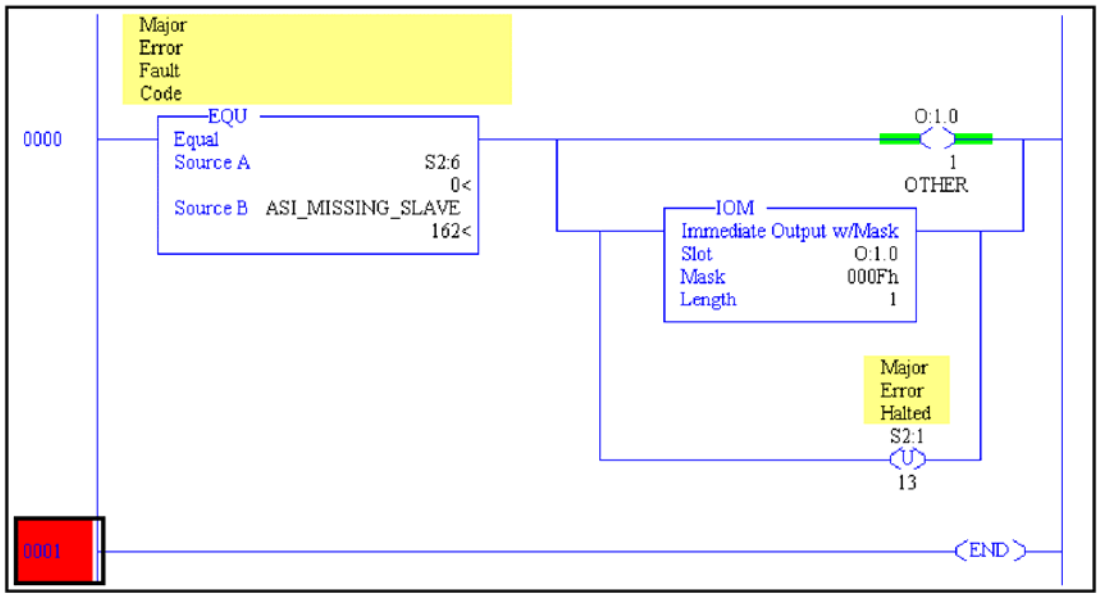
With some versions of the SLC, if your program clears the main error flag (S2:1/13), subsequent faults on other modules or the SLC processor might not be reported to the Scanner and the Scanner will continue scanning, even if the SLC is faulted.

If an error occurs during the error recovery process or is found in the G file, the fault will be indicated as non-recoverable. The error handler will still execute, but the SLC will be unable to clear the major error flag and the Scanner will stop.

3.9 Clearing Faults

When you cycle the SLC from Program to Run, the fault is cleared if the cause of the fault has been removed.

Figure 3: IOM Ladder Logic Instruction



4

Installing and Wiring the Scanner Module

Chapter Sections:

- Installing the Scanner Module
- Wiring

4.1 Installing the Scanner Module

Installation procedures for the Scanner module are the same as for any other module. Refer to Figure 4 to identify the chassis and module components listed in the installation procedures.

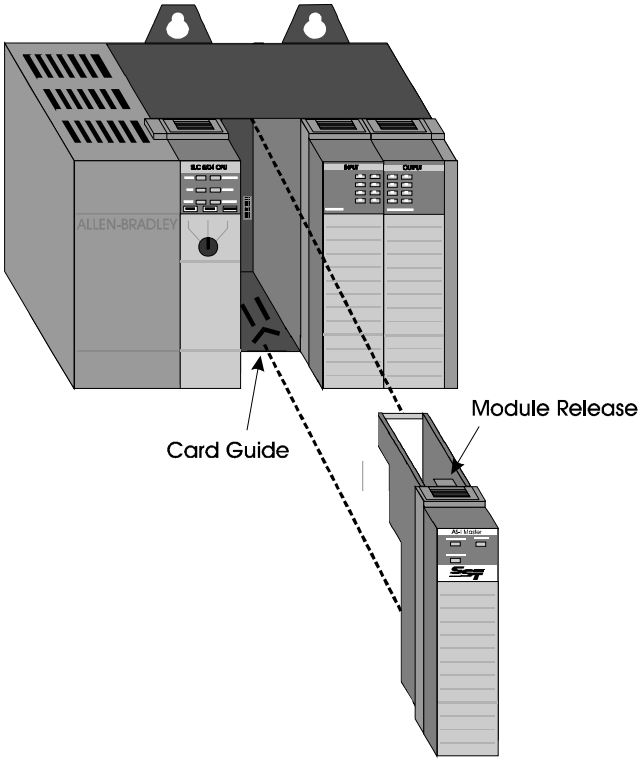
Caution

Disconnect system power before attempting to install, remove or wire the Scanner. Adding or removing the module with the power on may cause electrical damage.

Note

Before installation, make sure that your modular SLC power supply has adequate reserve current capacity. The Scanner requires 120 mA at 5 VDC.

Figure 4: Chassis and Module Components



To install the Scanner module:

1. Disconnect power.
2. Align the full-sized circuit board with the chassis card guides.

Note

The first slot (slot 0) of the first rack is reserved for the SLC 500 processor.

3. Slide the Scanner module into the chassis until the top and bottom latches catch.
4. Attach the AS-i cable. Refer to Section 4.2.1, AS-i Wiring, for cabling information.
5. Route the cable down and away from the Scanner.
6. Cover all unused slots with the card slot filler, Allen-Bradley catalog number 1746-N2.
7. Attach the USB cable between your PC and the Scanner module. For more information, refer to Section 4.2.2, USB port Wiring.
8. Power up the system.

Note

If there is a lot of electrical noise in your installation, you need to install an isolating transformer. For instructions, refer to Allen-Bradley's Installation and Operation Manual for Modular Hardware Style Programmable Controller, AB 1747-6.2.

4.1.1 Removing the Scanner Module

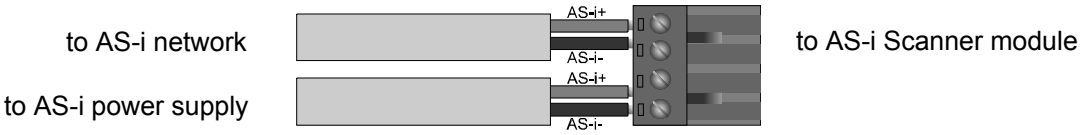
1. Disconnect power.
2. Remove all cabling from the Scanner.
3. Press the releases at the top and bottom of the module and slide the module out of the slot.
4. Cover all unused slots with the card slot filler, Allen-Bradley catalog number 1746-N2.
5. Place the Scanner into the static protective bag supplied with shipment packaging and store in the original box. Store the Scanner in a dry and cool environment.

4.2 Wiring

4.2.1 AS-i Wiring

The Scanner module uses two 4-pin Phoenix connectors, one for each AS-I channel. Pins 1 and 3 and pins 2 and 4 are internally connected for your convenience.

Figure 5: Daisy-Chained Phoenix Connector



The cable type is Siemens P/N 3RX9010-0AA00. To scan I/O, you must have a certified AS-i power supply connected to the Scanner.

If the network is daisy-chained through the Scanner, as in the above diagram, the maximum pass-through current is 6 Amps. If the Scanner is connected in a mode other than daisy chain, this limit is eliminated.

If you accidentally reverse the polarity on the AS-i line, it will not work but it should not be damaged.

The SST-ASI-SLC has been tested with power sources from Woodhead (TAS-PWR-4A), Siemens (types 3RX9303-0AA00 and 3RX9301-0AA00) and Pepperl + Fuchs (Type VAN-115/230AC-K8).

4.2.2 USB port Wiring

A USB-to-serial converter is integrated in the USB port. This converter is detected as COM-Port by the PC, and any terminal programs can communicate via this port with the SST-ASI-SLC.

Note

Before you can scan I/O, you must configure your slaves using either an addressing unit or the Scanner's USB port.

Figure 6: USB Port

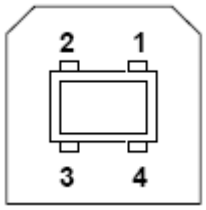


Table 1: Pin Names and Descriptions

Pin #	Pin Name	Description
1	+5	USB Power. Not Used
2	-Data	Data pin.
3	+Data	Data pin.
4	GND	USB ground.

Note

The recommended USB cable is USB A-B Cable M/M, USB A Male and USB B Male.

For an example of configuring slaves using a communications software package over the USB port, refer to Section 5.3, Example of Slave Configuration.

5
Configuring the Master and Slaves

Chapter Sections:

- Configuring the Scanner with RSLogix 500
- Using Hyperterminal to Access the Scanner via the USB Port
- Example of Slave Configuration
- Running the Scanner

5.1 Configuring the Scanner with RSLogix 500

Follow these steps to set up the Scanner when you program your SLC system in RSLogix 500:

1. Create a new file or load an existing file.
2. Open the I/O Configuration editor.
3. Select the proper rack for your setup.
4. Highlight the slot where the AS-i Scanner is installed.
5. From the list of available cards, select **Other**.
6. Enter an ID number of `13635`.

Note

Beginning in version 5.0 of RSLogix500 this ID is identified as a BLM Module. Simply overwrite the file sizes with the values below.

7. Right-click on the newly configured slot and select **Adv. Config**.
8. Set Scanned Input Words and Scanned Output Words to 32.
9. Set M0 and M1 lengths to 337 words. Refer to Section 6.3, M0 and M1 Files, for additional information on the M files.
10. Set G file size to 160 words.

Note

If using the Scanner in compatibility mode refer to Section 6.5 for the file sizes.

11. Select **Edit G file Data** and edit the G file to match your network configuration. Refer to Section 6.1, G File, for details on G file setup.

12. Click **OK** for G file editor and **OK** for Adv. Config.

13. Close the I/O Configuration window.

14. Write the rest of the ladder logic. Refer to Section 6.2, Input and Output Files, and Section 6.3, M0 and M1 Files, for information on the I, O and M files.

15. Transfer the program to the SLC.

5.2 Using Hyperterminal to Access the Scanner via the USB Port

To access the Scanner via the USB port:

1. Connect the AS-i Scanner to the PC, using the provided USB A-B cable.
2. Start HyperTerminal and create a new connection.
3. For Connect using:, select **Direct to Com n**, where n is the COM port (detected converter by the PC) you are using.
4. Select **38400 Bits per second** and **8 Data bits.**
5. Set Parity to **None**, select **1 Stop Bit**, and set Flow Control to **None**.
6. Type "*" several times.

You should now be able to communicate with the Scanner USB port. Once you have configured the Scanner, you can configure the AS-i slaves.

5.3 Example of Slave Configuration

1. Make sure the SLC is in Program mode and run your communication software.
2. Set your communications software to use **38400 Bits per second** and **8 Data bits**. Set Parity to **None**, select **1 Stop Bit** and set Flow control to **None**. The Scanner automatically detects the baud rate you are using by adjusting it until an "*" has been received correctly.

   You may have to type the asterisk several times so that the Scanner can detect the baud rate. When the Scanner properly receives your "*", the following prompt appears:

```
***** Slave Configuration Activated *****
AS-I 3.0 ASI-SLC Module
Firmware version 3.0
Which Channel do you want to configure? (1 or 2) _
```

   The FAULT and COMM 1 LEDs will now be alternately blinking red to indicate Configuration mode is active.

3. Enter 1 or 2 to select the channel to configure. This example configures Channel 1:

```
Configuring Channel 1

Commands: Address, Parameter, ID, List, GFile, Save, Exit, Help

Config :>
```

   The Config:> prompt lets you know that you are currently in Configuration mode. The available commands are listed above the prompt. Use the **Help** command for more information.

4. Attach a slave with an address of 0 to the network and type `List` to verify its presence:

```
Config :> list

   Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out

   00    8   0   F   F   F   0
```

   PID, PIO and the following ID2 and ID1 fields are Projected ID and I/O values. The fields are empty at this time because the values are not yet stored in EEPROM.

5. Once you have verified that your slave is present, you can change its network address using the **Address** command. In this example, Slave 0 is changed to Slave 3:

```
Config :> address

Enter slave # to change: 0

Enter new # for slave 00: 3
```

   For slaves that don't accept extended addressing, you can assign addresses 1 to 31. For slaves that accept extended addressing, you can assign addresses 1 to 31 and 1B to 31B.

6. Verify the operation using the **List** command:

```
Config :> list

   Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out

   03    8   0   F   F   F   0
```

7. If everything is OK, add a new slave at Address 0. Verify using the **List** command:

```
Config :> list

   Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out

   00    8   0   F   F   F   0

   03    0   0   F   F   F   0
```

8. Continue to add slaves, assign addresses and verify operations until all slaves have been added:

```
Config :> address

Enter slave # to change: 0

Enter new # for slave 00: 1

Config :> list

   Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out

   01    8   0   F   F   F   0

   03    0   0   F   F   F   0
```

9. Save the configuration and perform a **List** command:

```
Config :> save

Saving....

EEPROM write was successful.

Config :> list

   Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out

   01    8   0   F   F   F   0       8   0   F   F   F

   03    0   0   F   F   F   0       0   0   F   F   F
```

   The PID, PIO and projected ID1 and ID2 values are now saved in EEPROM so they appear in the display. If a slave has PID and PIO values displayed without corresponding ID and I/O values, that slave has failed or is missing.

10. When you are finished, type `Exit`. You will be prompted to save any outstanding changes. These will be saved to the EEPROM on the module:

```
Config :> exit

SAVE changes before exiting? (Y or N) y

Saving...

EEPROM write was successful.
```

   With ASI 2.1-compatible slaves, there are 2 additional fields (ID1 and ID2).
   When the Scanner performs slave comparisons (auto addressing to replace a slave or going online) it compares ID, IO, ID1 and ID2 for a match. ID2 allows manufacturers to further discriminate between different types of slaves

   To allow you to discriminate as well, ID1 has been provided and can be set in the field. You can modify the ID1 by using the ID command in Configuration mode. If you are using slaves that have the same profile, yet are different in some physical manner, you can use ID1 to allow the Scanner to tell them apart. That way, if someone tries to auto address a physically incompatible slave, the Scanner will not allow it.

```
Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out
 31B  0   A   E   A   2  0       0   A   E   A   2
```

If you have set up a network, you can use the **G file** command to list the contents of a G file which reproduces the network configuration. This G file can then be copied into your program.

```
Config :> gfile
```

Offset 001: 7003

Offset 002: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 010: 00EF 70FF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 018: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 026: FFFF FFFF FFFF FFFF FFFF 736F FFFF FFFF

Offset 034: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 042: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 050: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 058: FFFF FFFF FFFF FFFF FFFF 0AEA

Offset 064: 0000 E000 0ABC 0007 0000 0000 0000 0500

Offset 072: 0700 0000 0000 0000 0000 0000 0000 2AAA

Offset 080: 7001

Offset 081: 70FF 70FF 70FF 70FF 70FF 70FF FFFF FFFF

Offset 089: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 097: FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 105: FFFF FFFF FFFF FFFF FFFF FFFF FFFF

Offset 112: 1230 0456 0000 0000 0000 0000 0000 0000

Offset 120: 3543

GFile Size: 121 M0 Size: 345 M1 Size: 337

Slaves with profile 0.a.x can be used in Extended Addressing mode. These slaves can be added in pairs (i.e. addresses 1 and 1B), allowing a maximum of 62 slaves. When you're working with these slaves in the Configuration menus, the address for the pair's second slave is postfixed with a B. The address of the primary slave can be entered with an optional A, for example, 1A and 1B. To access B slaves during Run mode, Extended Addressing mode must be enabled in the G file options for that channel (bit 1 in the Configuration word).

Once you have set up a network and successfully gone into Run mode with the SLC, you can return to Configuration mode (by putting the SLC in Program mode) to get more information.

The **List** command now shows 2 additional fields: “In” and “Out”. These fields indicate where in the SLC to find that slave's data. The format 015/012 indicates word 15, with bit 12 as the starting bit for that slave.

In certain configurations, a slave's input data may not be available (refer to your G file options). This will be indicated by a blank “in” field.

```
Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In      Out
31B   0   A   E   A   2   0       0   A   E   A   2  015/012 015/012
```

5.4 Running the Scanner

When you put the SLC in Run mode, the Scanner starts scanning the AS-Interface. You can then begin accessing data in the I/O files.

5.4.1 SLC Modes

The Scanner's operating mode follows that of the SLC (Program, Test or Run):

- When the SLC is in Program mode, the Scanner outputs are off and inputs hold their last state.
- When the SLC is in Test mode, inputs are read and updated but outputs are off.
- When the SLC is in Run mode, the Scanner updates inputs and outputs.

5.4.2 SLC Fault Codes

SLC fault codes are listed in the LED Status and SLC Fault Codes table in Section 8.1, LED Status and SLC Fault Codes.

6
SLC File Reference

Chapter Sections

- G File
- Input and Output Files
- M0 and M1 Files
- Command Interface Structure
- Compatibility

6.1 G File

For the G file layout, refer to Table 2: G File Layout Table.

6.1.1 Option Bit Description

1. Set word 159 of the G file to `13635` decimal. This is the Scanner ID.

2. Set the C bits. These are the Channel Enable bits. The C bits are bit 0 of words 1 (Channel 1) and 80 (Channel 2). If the C bit is 1, the channel is active. If the C bit is 0, the channel is inactive. If the C bit is not set for either channel, the SLC faults with error code 70h (G file error) and the FAULT LED flashes red when you go to Run mode.

3. Set the A bits if required. These are the Auto Address Programming bits. The A bits are bit 2 of words 1 (Channel 1) and 80 (Channel 2). If the A bit is 1, Auto Address Programming is enabled. If the A bit is 0, Auto Address Programming is disabled.

   Auto Address Programming allows you to replace one failed slave with a matching slave at Address 0. The Scanner will automatically reprogram the new slave to the missing address.

   If more than one slave is at fault, Auto Address Programming is unavailable.

4. Set the W bits if required. The W bits are the Write Parameter Enable bits.

   The W bits are bit 3 of words 1 (Channel 1) and 80 (Channel 2). If the W bit is 1, you can change the parameters while running, via the M file. These “runtime parameters” are valid only as long as the PLC is in Run mode. If the bit is 0, you cannot change parameters while running.

5. Set the G bits if required. These are the G file enable bits. The G bits are bit 12 of words 1 (Channel 1) and 80 (Channel 2). If you want to use the network configuration from the G file, set the G bit to 1. Otherwise, you must configure your network using the Config port on the AS-i Scanner module.

Note

When the G bit is 0, the C, A and W bits of the G file are still used.

6. Set the F bits if required. These are the “don’t fault” bits. The F bits are bit 8 of words 1 (Channel 1) and 80 (Channel 2). Set these bits if you want the SLC to keep operating when an AS-I fault occurs.

7. Set the Ext bit if you are using extended addressing (1B to 31B). The Ext bits are bit 1 of words 1 (Channel 1) and 80 (Channel 2). For extended addressing, you can use only slaves of type 0.A.x.

8. Set the PG bit if you want to set the slaves' parameters through G file. The PG bits are bit 13 of words 1 (Channel 1) and 80 (Channel 2). If you don’t set this bit, the parameters from the Scanner’s EEPROM will be loaded into the slaves at power-up and when the SLC is switched to Run.

9. Set the mLPF OR mSDL OR mLAS bits if required. These bits are bits 6, 5 and 4 of words 1 (Channel 1) and 80 (Channel 2). If you set one of these bits, the top portion of the channel's input table is replaced with the LPF or SDL or LAS list (only one at a time).

Note

This feature overwrites the input data if there are I/O slaves in that addressing area (15B to 28B).

10. Set the cG bits (bit 14) of words 1 (Channel 1) and 80 (Channel 2) to 1 if you want to enable G file compressing.

11. If you are configuring the network in the G file, edit the rest of the G file to match your network setup. Words 2 to 63 are used to configure the slaves on Channel 1; 81 to 142 on Channel 2. Each slave has 1 word. If the slave is not present in your configuration, enter FFFF in the appropriate G file word. If the slave is present, enter the slave ID/IO information in hex. For example, if you have a slave of profile 0.E.3 with the ID1 left at F, you would enter 0E3F into the Configuration word for that slave.

    If you want to initialize the parameters from the G file, set bit 13 in the options and enter the parameters into words 64 to 79 (143-158 for Channel 2). Each word holds the parameters for 4 slaves

Note

Slave 0's parameter is not set, but a space is reserved for it in the G file layout (the least significant nibble (4 bits) of word 64 for Channel 1) to simplify calculations.

Table 2: G File Layout Table

Slave#	Word	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	Reserved by SLC processor															
Channel 1 Slaves																	
	1		cG	PG	G				F		mLPF	mSDL	mLAS	W	Auto	Ext	C
1	2	IO_1				ID_1				ID2_1				ID1_1			
2	3	IO_2				ID_2				ID2_2				ID1_2			
62	63	IO_31B				ID_31B				ID2_31B				ID1_31B			
	64	Param_3				Param_2				Param_1							
	65	Param_7				Param_6				Param_5				Param_4			
	66	Param_11				Param_10				Param_9				Param_8			
	67	Param_15				Param_14				Param_13				Param_12			
	68	Param_19				Param_18				Param_17				Param_16			
	69	Param_23				Param_22				Param_21				Param_20			
	70	Param_27				Param_26				Param_25				Param_24			
	71	Param_31				Param_30				Param_29				Param_28			
	72	Param_3B				Param_2B				Param_1B							
	73	Param_7B				Param_6B				Param_5B				Param_4B			
	74	Param_11B				Param_10B				Param_9B				Param_8B			
	75	Param_15B				Param_14B				Param_13B				Param_12B			
	76	Param_19B				Param_18B				Param_17B				Param_16B			
	77	Param_23B				Param_22B				Param_21B				Param_20B			
	78	Param_27B				Param_26B				Param_25B				Param_24B			
	79	Param_31B				Param_30B				Param_29B				Param_28B			
Channel 2 Slaves																	
	80		cG	PG	G				F		mLPF	mSDL	mLAS	W	Auto	Ext	C
1	81	IO_1				ID_1				ID2_1				ID1_1			
2	82	IO_2				ID_2				ID2_2				ID1_2			
62	142	IO_31B				ID_31B				ID2_31B				ID1_31B			
	143	Param_3				Param_2				Param_1							
	144	Param_7				Param_6				Param_5				Param_4			
	145	Param_11				Param_10				Param_9				Param_8			
	146	Param_15				Param_14				Param_13				Param_12			
	147	Param_19				Param_18				Param_17				Param_16			
	148	Param_23				Param_22				Param_21				Param_20			
	149	Param_27				Param_26				Param_25				Param_24			
	150	Param_31				Param_30				Param_29				Param_28			
	151	Param_3B				Param_2B				Param_1B							
	152	Param_7B				Param_6B				Param_5B				Param_4B			
	153	Param_11B				Param_10B				Param_9B				Param_8B			

Slave#	Word	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	154	Param_15B				Param_14B				Param_13B				Param_12B			
	155	Param_19B				Param_18B				Param_17B				Param_16B			
	156	Param_23B				Param_22B				Param_21B				Param_20B			
	157	Param_27B				Param_26B				Param_25B				Param_24B			
	158	Param_31B				Param_30B				Param_29B				Param_28B			
	159	Scanner ID= 13635 dec (3543h)															

Note

The G file size can be variable. Setting the cG bit to 0 will force the G file into the uncompressed state, as shown in Table 2, G File Layout Table.

6.1.2 Fixed G File Size Examples

Example 1

In this example, we want:

- Channel 1 enabled
- Auto Address Programming enabled
- Run-time parameter changes enabled
- Configuration done via the G file
- Extended addressing enabled

The following slaves will be configured:

Table 3: Example 1 Slave Configurations

Slave	IO	ID	ID2	ID1	P
1	7	F	F	F	C
2	7	3	E	4	0
3	0	0	E	F	B
5	7	0	F	F	F
31	7	3	6	F	8
30B	0	A	E	A	2

To do this:

1. Write 13635 (=3543h) to word 159 in the G file.
2. Write 100Fh (=0001 0000 0000 1111) to word 1 to configure Channel 1.
3. Write 7FFF to word 2 to configure Slave 1.
4. Write 73E4 to word 3 to configure Slave 2.
5. Write 00EF to word 4 to configure Slave 3.
6. Write 70FF to word 6 to configure Slave 5.
7. Write 736F to word 32 to configure Slave 31.
8. Write 0AEA to word 62 to configure Slave 30B.
9. Write FFFF to all unused 2-63 words.

Example 2

In this example we want:

- Channel 1 enabled
- Auto Address Programming enabled
- Parameters set via the G file
- Extended Addressing enabled
- Configuration performed via the USB port

To do this:

1. Write 13635 (=3543h) to word 159 in the G file.
2. Write 2007h (=0010 0000 0000 0111) to word 1 to configure Channel 1.
3. Write B0C0 to word 64 to set parameters for Slaves 1, 2 and 3.
4. Write F0 to word 65 to set parameters for Slave 5.
5. Write 8000 to word 71 to set parameters for Slave 31.
6. Write 200 to word 79 to set parameters for Slave 30B.

Example 3

In this example, we want:

- Channel 1 enabled
- Map LPF into Input file
- SLC Faults disabled
- Configuration done via the G file

The following slaves will be configured:

Table 4: Example 3 Slave Configurations

Slave	IO	ID	ID2	ID1	P
1	7	F	F	F	C
2	7	3	E	4	0
3	0	0	E	F	B
5	7	0	F	F	F
31	7	3	6	F	8

To do this:

1. Write 13635 (=3543h) to word 159 in the G file.
2. Write 1141h (=0001 0001 0100 0001) to word 1 to configure Channel 1.
3. Write 7FFF to word 2 to configure Slave 1.
4. Write 73E4 to word 3 to configure Slave 2.
5. Write 00EF to word 4 to configure Slave 3.
6. Write 70FF to word 6 to configure Slave 5.
7. Write 736F to word 32 to configure Slave 31.
8. Write FFFF to all unused 2-63 words.

6.1.3 G File Variable Size (Compressed)

If you are using compressed G file and you don't use certain parts of the table (Extended Addressing, Parameter, etc) all remaining table data will shift upwards, so the total length of the file will decrease.

To enable G file compression, set the cG bits of words 1 (Channel 1) and 80 (Channel 2) to 1. All other configuration bits have the same functionality as in un-compressed mode.

6.1.4 G File Variable Size (Compressed) Examples

The configuration bits that affect the size of the G file are PG, G and Ext. If you don't set one or more of these bits, the unused data in the G file is removed and the file size is decreased.

The following table provides a few possible G file configurations. Only the configuration bits that influence the G file size are used. Example A occurs if all the PG, G and Ext bits are set, and as a result, the compressed G file size and structure match the un-compressed one (refer to Table 2: G File Layout Table).

Table 5: Compressed G File Examples

	Example A		Example B		Example C		Example D	
Config. Bits set, Ch 1	cG, PG, G, Ext		cG, PG, G		cG, G, Ext		cG, PG	
Config. Bits set, Ch 2	cG, PG, G, Ext		cG, G		cG, PG, Ext		cG, Ext	
	Start Word #	**Value (Hex)**	**Start Word #**	**Value (Hex)**	**Start Word #**	**Value (Hex)**	**Start Word #**	**Value (Hex)**
Ch 1 Options	1	7003	1	7001	1	5003	1	6001
Ch 1 Config	2		2		2		N/A	
Ch 1 Param	64		33		N/A		2	
Ch 2 Options	80	7003	41	5001	64	6003	10	4003
Ch 2 Config	81		42		N/A		N/A	
Ch 2 Param	143		N/A		65		N/A	
ID (Hex)	159	3543	73	3543	71	3543	11	3543

6.2 Input and Output Files

The Input and Output files are stored and updated by the SLC. These files contain network data. Since Slave 0 can't exist in protected (Run) mode, the first 4 bits of words 0 and 8 are undefined.

Note

The first 4 bits of word 0 in the Output file are used as fault bits. Refer to Section 3.8, AS-i Faults, for more information.

The first half of the Input and Output Layout table contains the I/O data for Channel 1, and the second half pertains to Channel 2.

If you've selected mLAS, mSDL or mLFP for the Channel configuration, the Input table's top words are replaced by the selected Status table. If you've selected Extended addressing, the top 4 words (12, 13, 14 and 15 for Channel 1; 28, 29, 30 and 31 for Channel 2) are replaced. If extended addressing is not enabled, only the top 2 words are replaced.

Table 6: Input and Output File Layout Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0
I/O Data for Channel 1 Slaves																
0	3				2				1				Undefined			
1	7				6				5				4			
2	11				10				9				8			
3	15				14				13				12			
4	19				18				17				16			
5	23				22				21				20			
6	27				26				25				24			
7	31				30				29				28			
8	3B				2B				1B				Undefined			
9	7B				6B				5B				4B			
10	11B				10B				9B				8B			
11	15B				14B				13B				12B			
12	19B				18B				17B				16B			
13	23B				22B				21B				20B			
14	27B				26B				25B				24B			
15	31B				30B				29B				28B			
I/O Data for Channel 2 Slaves																

Word	Bit															
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0	I/O3	I/O2	I/O1	I/O0
16	3				2				1				Undefined			
17	7				6				5				4			
18	11				10				9				8			
19	15				14				13				12			
20	19				18				17				16			
21	23				22				21				20			
22	27				26				25				24			
23	31				30				29				28			
24	3B				2B				1B				Undefined			
25	7B				6B				5B				4B			
26	11B				10B				9B				8B			
27	15B				14B				13B				12B			
28	19B				18B				17B				16B			
29	23B				22B				21B				20B			
30	27B				26B				25B				24B			
31	31B				30B				29B				28B			

6.3 M0 and M1 Files

The M0 file contains information about AS-i Channel 1, and the M1 file pertains to Channel 2. Both files must be set to a length of at least 337 words. M files cannot be edited. They are updated by the Scanner once per network scan or when requested by the SLC program. M files are not updated in Program mode or when the SLC is faulted. To read the updated M file, the SLC program must explicitly access it. Accessing M files is time consuming and may greatly increase SLC scan time. To speed up the scan, copy the M files to a local SLC file and use the local file. Refer to Table 7, M0 and M1 File Layout Table, for additional information.

The following short forms are used in the M0 and M1 File Contents table:

- LPF = List of Projected Faults (slaves with current faults)
- LDS = List of Detected Slaves (slaves actually found whether in EEPROM or not)
- LAS = List of Activated Slaves (slaves listed in both EEPROM and LDS)
- SDL = Slave Delta List (slaves listed in either EEPROM or LDS but not in both)

For each bit in the EEPROM, LDS and LAS lists, 1 means present and 0 means absent. For the SDL, 1 indicates a discrepancy between EEPROM and LDS, and 0 indicates a match between EEPROM and LDS.

If a slave is not present on the network, ID and I/O in the following table will be listed as FF (all bits set to 1).

For more information on the Status Flag Bytes (word 84), refer to Sections 6.3.1, Status Flag Bytes - Byte 1, and 6.3.2, Status Flag Bytes – Byte 2.

M files also contain data values for analog slaves. For each analog slave of type 7.3 and 7.4, the Scanner reserves up to 4 words in the M file for analog input or output data. The size of the M file will vary, based on the analog slave configured. To determine the current size, use the **G file** command in the Config menu (refer to Section 5.3, Example of Slave Configuration). To determine where the Scanner will access analog slave data, use the **List** command and review the **In** and **Out** fields.

Example:

```
Config :> list

Slave IO  ID  ID2 ID1 P  Sts  PF  PIO PID ID2 ID1 P  In       Out
01    7   3   E   F   8   0       7   3   E   F   8  M337(4)
30    7   3   6   F   F   0       7   3   6   F   F        M337(4)
```

With the Combined Transaction Type 2 slaves, the amount of analog IO data is not known at configuration time; it must be determined at run-time. The rules for Combined Transaction Type 2 slaves are as follows:

- For S-7.5.5 slaves, 4 words of analog input and 4 words of analog output are reserved
- For S-7.A.5 and S-B.A.5 slaves, 2 words of analog input and 2 words of analog output are reserved.

Table 7: M0 and M1 File Layout Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	LAS 15-12				LAS 11-8				LAS 7-4				LAS 3-0			
1	LAS 31-28				LAS 27-24				LAS 23-20				LAS 19-16			
2	LAS 15B-12B				LAS 11B-8B				LAS 7B-4B				LAS 3B-0B			
3	LAS 31B-28B				LAS 27B-24B				LAS 23B-20B				LAS 19B-16B			
4	IO_0				ID_0				ID2_0				ID1_0			
5	IO_1				ID_1				ID2_1				ID1_1			
6	IO_2				ID_2				ID2_2				ID1_2			
7	IO_3				ID_3				ID2_3				ID1_3			
8	IO_4				ID_4				ID2_4				ID1_4			
9	IO_5				ID_5				ID2_5				ID1_5			
10	IO_6				ID_6				ID2_6				ID1_6			
11	IO_7				ID_7				ID2_7				ID1_7			
12	IO_8				ID_8				ID2_8				ID1_8			
13	IO_9				ID_9				ID2_9				ID1_9			
14	IO_10				ID_10				ID2_10				ID1_10			
15	IO_11				ID_11				ID2_11				ID1_11			
16	IO_12				ID_12				ID2_12				ID1_12			
17	IO_13				ID_13				ID2_13				ID1_13			
18	IO_14				ID_14				ID2_14				ID1_14			
19	IO_15				ID_15				ID2_15				ID1_15			
20	IO_16				ID_16				ID2_16				ID1_16			
21	IO_17				ID_17				ID2_17				ID1_17			
22	IO_18				ID_18				ID2_18				ID1_18			
23	IO_19				ID_19				ID2_19				ID1_19			
24	IO_20				ID_20				ID2_20				ID1_20			
25	IO_21				ID_21				ID2_21				ID1_21			
26	IO_22				ID_22				ID2_22				ID1_22			
27	IO_23				ID_23				ID2_23				ID1_23			
28	IO_24				ID_24				ID2_24				ID1_24			
29	IO_25				ID_25				ID2_25				ID1_25			
30	IO_26				ID_26				ID2_26				ID1_26			

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
31	IO_27				ID_27				ID2_27				ID1_27			
32	IO_28				ID_28				ID2_28				ID1_28			
33	IO_29				ID_29				ID2_29				ID1_29			
34	IO_30				ID_30				ID2_30				ID1_30			
35	IO_31				ID_31				ID2_31				ID1_31			
36																
37	IO_1B				ID_1B				ID2_1B				ID1B_1B			
38	IO_2B				ID_2B				ID2_2B				ID1_2B			
39	IO_3B				ID_3B				ID2_3B				ID1_3B			
40	IO_4B				ID_4B				ID2_4B				ID1_4B			
41	IO_5B				ID_5B				ID2_5B				ID1_5B			
42	IO_6B				ID_6B				ID2_6B				ID1_6B			
43	IO_7B				ID_7B				ID2_7B				ID1_7B			
44	IO_8B				ID_8B				ID2_8B				ID1_8B			
45	IO_9B				ID_9B				ID2_9B				ID1_9B			
46	IO_10B				ID_10B				ID2_10B				ID1_10B			
47	IO_11B				ID_11B				ID2_11B				ID1_11B			
48	IO_12B				ID_12B				ID2_12B				ID1_12B			
49	IO_13B				ID_13B				ID2_13B				ID1_13			
50	IO_14B				ID_14B				ID2_14B				ID1_14B			
51	IO_15B				ID_15B				ID2_15B				ID1_15B			
52	IO_16B				ID_16B				ID2_16B				ID1_16B			
53	IO_17B				ID_17B				ID2_17B				ID1_17B			
54	IO_18B				ID_18B				ID2_18B				ID1_18B			
55	IO_19B				ID_19B				ID2_19B				ID1_19B			
56	IO_20B				ID_20B				ID2_20B				ID1_20B			
57	IO_21B				ID_21B				ID2_21B				ID1_21B			
58	IO_22B				ID_22B				ID2_22B				ID1_22B			
59	IO_23B				ID_23B				ID2_23B				ID1_23B			
60	IO_24B				ID_24B				ID2_24B				ID1_24B			
61	IO_25B				ID_25B				ID2_25B				ID1_25B			
62	IO_26B				ID_26B				ID2_26B				ID1_26B			
63	IO_27B				ID_27B				ID2_27B				ID1_27B			
64	IO_28B				ID_28B				ID2_28B				ID1_28B			
65	IO_29B				ID_29B				ID2_29B				ID1_29B			
66	IO_30B				ID_30B				ID2_30B				ID1_30B			
67	IO_31B				ID_31B				ID2_31B				ID1_31B			
68	Param_3				Param_2				Param_1							
69	Param_7				Param_6				Param_5				Param_4			
70	Param_11				Param_10				Param_9				Param_8			
71	Param_15				Param_14				Param_13				Param_12			
72	Param_19				Param_18				Param_17				Param_16			
73	Param_23				Param_22				Param_21				Param_20			

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
74	Param_27				Param_26				Param_25				Param_24			
75	Param_31				Param_30				Param_29				Param_28			
76	Param_3B				Param_2B				Param_1B							
77	Param_7B				Param_6B				Param_5B				Param_4B			
78	Param_11B				Param_10B				Param_9B				Param_8B			
79	Param_15B				Param_14B				Param_13B				Param_12B			
80	Param_19B				Param_18B				Param_17B				Param_16B			
81	Param_23B				Param_22B				Param_21B				Param_20B			
82	Param_27B				Param_26B				Param_25B				Param_24B			
83	Param_31B				Param_30B				Param_29B				Param_28B			
84	Status flag byte 2								Status flag byte 1							
85	LDS 15-12				LDS 11-8				LDS 7-4				LDS 3-0			
86	LDS 31-28				LDS 27-24				LDS 23-20				LDS 19-16			
87	LDS 15B-12B				LDS 11B-8B				LDS 7B-4B				LDS 3B-0B			
88	LDS 31B-28B				LDS 27B-24B				LDS 23B-20B				LDS 19B-16B			
89	SDL 15-12				SDL 11-8				SDL 7-4				SDL 3-0			
90	SDL 31-28				SDL 27-24				SDL 23-20				SDL 19-16			
91	SDL 15B-12B				SDL 11B-8B				SDL 7B-4B				SDL 3B-0B			
92	SDL 31B-28B				SDL 27B-24B				SDL 23B-20B				SDL 19B-16B			
93	LPF 15-12				LPF 11-8				LPF 7-4				LPF 3-0			
94	LPF 31-28				LPF 27-24				LPF 23-20				LPF 19-16			
95	LPF 15B-12B				LPF 11B-8B				LPF 7B-4B				LPF 3B-0B			
96	LPF 31B-28B				LPF 27B-24B				LPF 23B-20B				LPF 19B-16B			
97	WParam_3				WParam_2				WParam_1							
98	WParam_7				WParam_6				WParam_5				WParam_4			
99	WParam_11				WParam_10				WParam_9				WParam_8			
100	WParam_15				WParam_14				WParam_13				WParam_12			
101	WParam_19				WParam_18				WParam_17				WParam_16			
102	WParam_23				WParam_22				WParam_21				WParam_20			
103	WParam_27				WParam_26				WParam_25				WParam_24			
104	WParam_31				WParam_30				WParam_29				WParam_28			
105	WParam_3B				WParam_2B				WParam_1B							
106	WParam_7B				WParam_6B				WParam_5B				WParam_4B			
107	WParam_11B				WParam_10B				WParam_9B				WParam_8B			
108	WParam_15B				WParam_14B				WParam_13B				WParam_12B			
109	WParam_19B				WParam_18B				WParam_17B				WParam_16B			
110	WParam_23B				WParam_22B				WParam_21B				WParam_20B			
111	WParam_27B				WParam_26B				WParam_25B				WParam_24B			
112	WParam_31B				WParam_30B				WParam_29B				WParam_28B			
113	S-7.4 Analog Slaves Command															
…	or															
224	Command Interface Request (see Section 6.3.3, Configuring Type S-7.4 Analog and Combined Transaction Type 2 Profile Slaves, for															

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	details)															
225	S-7.4 Analog Slaves Response															
…	or															
336	Command Interface Response (see Section 6.3.3, Configuring Type S-7.4 Analog and Combined Transaction Type 2 Profile Slaves, for details)															
337	Analog values															
…	Analog values															

Note

If the BW_CMD_IFC function is selected, the subsequent bytes shall have the Command Interface Structure (for more details, refer to Section 6.4).

6.3.1 Status Flag Bytes - Byte 1 (Low Byte of Word 84)

Table 8: Description of Status Flag Bytes – Byte 1

Bit	Description
7	ASI CONFIG OK. If this bit is 1, the configuration stored in EEPROM matches the current configuration.
6	ASI LDS 0. If this bit is 1, the slave with Address 0 exists.
5	RESERVED
4	ASI AUTO PROG AVAILABLE. If this bit is 1, Auto Address Programming is possible. This means that a slave has failed and can be immediately replaced with a new one of the same ID and I/O at Address 0. The new slave will be automatically re-addressed.
3	ASI OPERATION MODE. If this bit is 1, the Scanner is in Configuration Mode; if it's 0, the Scanner is in Protected mode.
2	ASI NORMAL OPERATION. If this bit is 1, the network is operating normally
1	ASI POWER FAIL. If this bit is 1, voltage on AS-Interface line is too low
0	ASI OFFLINE. If this bit is 1, it causes a 75h error. Usually, this is due to having an extra slave at Address 0.

6.3.2 Status Flag Bytes - Byte 2 (High Byte of Word 84)

Table 9: Description of Status Flag Bytes – Byte 2

Bit	Description
7 - 5	RESERVED
4	PERIPHERY FAULT
3	ASI AUTO ADDRESS ENABLE. If this bit is 1, Auto Address Programming is enabled. This means that if a slave fails, it can be replaced with a new one via Auto Address Programming.
2	ASI EEPROM OK. If this bit is 1, the EEPROM configuration is OK (there is something stored in EEPROM).
1	RESERVED
0	RESERVED

6.3.3 Configuring Type S-7.4 Analog and Combined Transaction Type 2 Profile Slaves

Two areas of the M0 and M1 files are dedicated to provide support for type 7.4 analog slaves and combined into transaction type 2 slaves.
Access to this non-time-critical data is made via 2 data structures in the M files:

Table 10: Slave Command Layout

In the following tables, "x" means reserved and shall be set to 0.

Word\Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
113	Function								Toggle	x	x	x	x	x	x	x
114	address								Length							
115	byte1								byte2							
116	byte3								byte4							
…																
224	byte219								byte220							

Table 11: Slaves Result Layout

Word\Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
225	Result								Done	x	x	x	x	x	x	x
226	address								Length							
227	byte1								byte2							
228	byte3								byte4							
…																
336	byte219								byte220							

The Command structure starts in M file at word offset 113, and the response starts at offset 225.

The supported Command functions are:

Table 12: Command Functions

Function	Description
1	Read parameter string
2	Write parameter string
3	Read ID string
4	Read diagnostic string

The Result values are:

Table 13: Result Values

Result (Hex)	Description
0	Success
2	Wrong slave address
5	AS-i bus error
7	AS-I unknown error
8	AS-I not allowed
41	Command too long
42	Response too long
61	Command not supported

The data access procedure is:

1. Wait for the Done bit (in Response word 1) to be 0
2. Fill the Command data structure with the Function, slave Address, data length and desired data.
3. Set the Toggle bit to 1, leaving the remaining Word 1 bits unchanged (ex., 0x180 for a read parameter command).
4. Wait for the Done bit to be 1. This means that the command was processed by the Scanner and the results are available for processing.
5. Read the Result in the Response structure.
6. If the Result is Success (0) and the Function was a read, the Length in Response shows the length of the returned data, which will start in the next word (word 3).
7. After processing the Response, clear the Toggle bit, so the Scanner can clear the Done bit and prepare for a new command.

Note

For reliable operations, the Command Data Buffer shouldn't be modified while the command Toggle bit is set.

6.4 Command Interface Structure

The Command Interface is a host and field bus-independent interface. The Command interface call-instructions are described as follows:

Table 14: Command Request Construction

Command Request								
Byte/Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
1	command							
2	x	x	x	x	x	x	x	x
3	request parameter byte 1							
…	…							
36	request parameter byte 34							

Table 15: Command Response Construction

Command Response								
Byte/Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
1	command (mirrored)							
2	x	Result						
3	response byte 1							
…	…							
36	response byte 34							

The Command Interface is located in the M0 and M1 files. If the function BW_CMD_IFC is selected, the subsequent bytes shall have the command interface structure.

The following tables describe the Command Interface in M0 and M1 files:

Table 16: Command Request Layout in M0 and M1

Request																
Word/Bit	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
113	BW_CMD_IFC (A0h)								Toggle	x	x	x	x	x	x	x
114	command								x	x	x	x	x	x	x	x

115	request parameter byte 1	request parameter byte 2
…	…	…
132	request parameter byte 33	request parameter byte 34
133	spare	spare
…	…	…
224	spare	spare

Table 17: Command Response Layout in M0 and M1

Response															
Word\Bit	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
225	BW_CMD_IFC (A0h)								Done	x	x	x	x	x	x	x
226	command								x	result						
227	response parameter byte 1								response parameter byte 2							
…	…								…							
244	response parameter byte 33								response parameter byte 34							
245	spare								spare							
…	…								…							
336	spare								spare							

“x”x means reserved, and it shall be set to 0.

Notes

The execution of a command is declined if the command interface is too small.

6.5 Compatibility

This version of the Scanner accepts all layouts of the G-File, IO-Files and M-Files, except acyclic services to the Combined Transaction Type 2 slaves.

This means:

- Analog data of A-Slaves is mapped to analog channels 0 and 1 of the respective AS-i address
- Analog data of B-Slaves is mapped to analog channels 2 and 3 of the respective AS-i address
- For slaves with mixed binary and analog data, the binary data is mapped to the original

data bit (e.g., transmitted on bits 2 and 3, mapped to bits 2 and bit 3).

- Acyclic services to slaves of Combined Transaction Type 2 can be executed with the new Command Interface Structure (for details, refer to Section 6.4,)

SLC programs written for earlier versions of the Scanner module (1.xx) had a G file that was 64 words long, with word 64 containing the Scanner ID. If you install the Scanner into an SLC running a program designed for that Scanner version, the Scanner will revert to Compatibility mode. If the Scanner sees 13635 in word 63, it will run with the old G file, Input, Output and M file layouts. Refer to the SST-ASI-SLC User's Guide, Version 1.30 for more details.

7

Upgrading the Scanner Firmware

Chapter Sections:

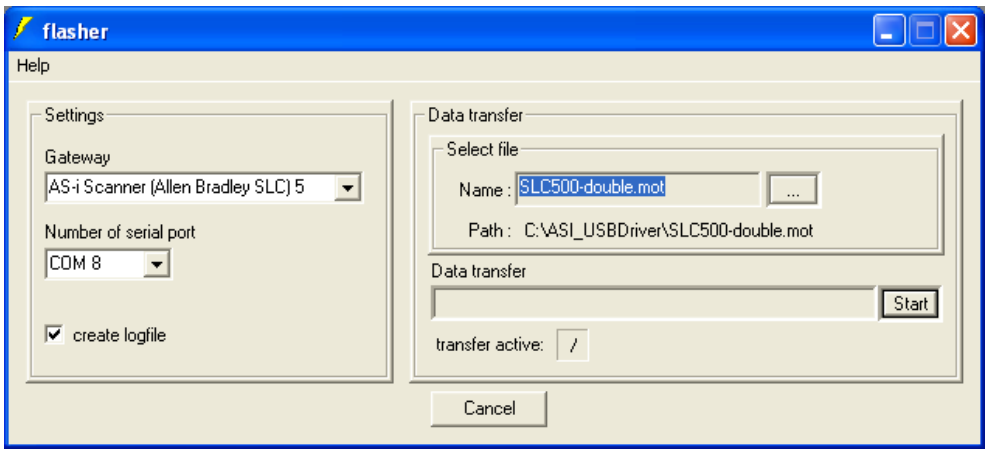
- Overview
- Upgrading the Firmware

7.1 Overview

The following procedure describes the steps for uploading a new version of the Scanner firmware into the Scanner's flash memory.

7.2 Upgrading the Firmware

The module's firmware can be updated via USB, using the "flasher.exe" tool.



To upgrade the firmware, follow these steps:

1. Connect the AS-I module and your PC USB port with the USB cable.
2. Cycle power on the SLC.
3. Start the flasher tool.
4. Select **AS-i Scanner** as the Gateway.
5. Select the USB serial Port. You can find out which port to select in the Device Manager, under the Control Panel.
6. Locate the firmware file.
7. Click on the Start.

   The FAULT LED flashes red during the firmware update. You will get a message indicating that the firmware updated successfully.

Note

Don’t click on the cancel button during the firmware update; otherwise the AS-i Scanner will be damaged.

8
Troubleshooting

Chapter Sections:

- LED Status and SLC Fault Codes
- AS-i Power Failure
- Slave Failure
- An Important Note on AS-i Faults
- Other Troubleshooting Tips

8.1 LED Status and SLC Fault Codes

SLC Fault Codes can be read from the SLC processor using Allen-Bradley's RSLogix 500 software.

Table 18: LED Status and SLC Fault Codes

FAULT LED	COMM LEDs	Description	Troubleshooting	SLC Fault Code
Flashing Red	Any	G File error. No network communication attempted.	Check for a missing Scanner ID code in the last word of the G file. Make sure the network configuration is in the G File. Make sure at least one channel is enabled.	70h
		The SLC slot the Scanner is in is disabled.	Enable the slot using your programming software.	N/A
Flashing Red	Flashing Green	G file configuration doesn't match current network setup. More than one configured slave on the network is inactive.	Make sure the network is properly configured in the G file and the slaves are properly attached to the network.	71h
		Saved configuration in EEPROM doesn't match network setup.	Using the Config port on the Scanner, verify and save the network configuration.	72h
Flashing Red	Flashing Red	If you try to put the SLC into Run mode while configuring the network devices, the LEDs will continue to blink alternately and the SLC will show this fault code.	Finish configuring the network devices and exit the configuration utility.	73h
Any	Flashing Red	AS-Interface power is too low (less than 23.5V).	Make sure the cable is properly connected to the Scanner and the power supply is properly connected to the network. See section 8.2, AS-i Power Failure.	61h
		AS-Interface is in Configuration mode rather than Protected mode	Slave 0 is present and Auto Address Programming is disabled. Configure the slave address in the G file.	74h
		AS-Interface is off-line.	Call Technical support with a description of the circumstances that caused this error.	75h
Any	Flashing Green	A slave on the network has failed or is missing.	Check that the G file is not in error. If the G file is OK, check the network setup for the missing slave. If Auto Address Programming is enabled, replace the missing slave with a matching slave at Address 0. Go to Config mode and perform a **List** command.	62h
Off	Green	Scanner is operating properly.	All OK.	N/A
Red	Both Red	Software error on Scanner.	Call Technical support with a description of the circumstances that caused this error.	N/A

8.2 AS-i Power Failure

If an AS-i power failure occurs, scanning of the AS-i network stops and the slave outputs turn off. The SLC faults with code 61h. Refer to Table 14, LED Status and SLC Fault Codes. To return the SLC to Run mode, correct the power fault and switch from Program to Run mode.

8.3 Slave Failure

8.3.1 One Slave Has Failed

In the event of a single slave failure, Auto Address Programming may be available if you have enabled it in the G file. If you have enabled Auto Address Programming, the COMM LED on the affected channel flashes green and the SLC faults with error code 62h (refer to Table 20, LED Status and SLC Fault Codes).

If you want to replace the slave via Auto Address Programming, you must replace it with a slave at Address 0 and with an I/O type and ID code that match the defective slave's. Once this has been done, the SLC can be toggled from Program to Run and the network should return to normal operation.

If the M files have been scanned recently (i.e. immediately before the fault occurred), the slave delta list (SDL) will reflect which slave failed.

Normally, when using Auto Address Programming, the SLC will not be allowed to fault. This can be done by setting the Fault bit in the channel options, or by installing a fault handler on the SLC.

8.3.2 Multiple Slaves Have Failed

If multiple slaves fail and the M files have been scanned recently (i.e. immediately before the fault occurred), the SDL in the M files will indicate which slaves failed.

8.4 An Important Note on AS-i Faults

Note

This information applies to hardware version 1.0 only.

With some versions of the SLC, if your program clears the main error flag (S2:1/13), subsequent faults on other Scanners or SLC processors might not be reported to the Scanner, and the Scanner will continue scanning even if the SLC is faulted. Refer to Section 3.8, AS-i Faults, for further details.

8.5 Other Troubleshooting Tips

8.5.1 Nothing Shows up in a List Command

A **List** command on the USB port should provide a list of addresses, IDs, I/Os and parameters of slaves on the network. If the command displays an empty list:

- Check that the AS-i power is connected
- Verify that you have an AS-i power supply. The supply must be a genuine AS-i power supply and not just a generic one.
- Verify that the power supply polarity is correct
- Check the AS-i cable to the master
- Try the **List** command with only one slave on the network. If there are duplicate slaves, you might not see any of the slaves.

8.5.2 Can't Find a Failed Slave

To find failed slaves, issue a **List** command on the USB port. A failed slave will have PID and PIO values displayed but no corresponding ID and I/O values.

8.5.3 Unable to go Online

Try running with a minimal G file. Set only the following items:

- Word 1 = 0001h
- Word 80 = 0000h
- Word 159 = 3543h = 13635 decimal

8.5.4 Slaves Don't Have AS-i power

If the slaves don't have AS-i power, check that the Phoenix connector is still plugged in to the Scanner.

8.5.5 Two Masters on Network

Only one master is allowed on the network at once. Make sure that a Scanner and hand-held programmer aren't plugged in simultaneously.

8.5.6 Error Message: “Error during transmission via AS-i bus”

You can’t change a slave address (except Slave 0) while Slave 0 is present on the network.

This error can also be caused by bad connections. Verify all connectors and cables.

8.5.7 Replaced Slave Didn't Auto Address

For Auto Address Programming to work, you must replace the slave while the network is powered and running. To do this, follow these steps:

1. Remove the slave.
2. Add a new slave of same ID, ID1, ID2 and I/O at Address 0.
3. Cycle from Program to Run to clear the fault.

The slave is readdressed to replace the failed slave.

A
M0 and M1 Files

Appendix Sections:

- Overview
- Addressing M0 and M1 Files

A.1 Overview

The following data is based on information in the SLC 500 Instruction Set Reference Manual, Allen-Bradley publication 1747.6.15, and is provided here for reference.

M0 and M1 files reside in specialty I/O modules only. There is no image for these files in the processor memory. This means that when an application running on the SLC accesses the data, the SLC must go out to the module and read the data. The contents of these files depend on the specialty I/O module's function. Both M0 and M1 files are considered read/write files by the SLC processor. M0 and M1 files can be addresses in your ladder program and they can also be acted upon by the specialty I/O module, independent of the processor scan. It is important to keep the following in mind when creating and applying your ladder logic.

During the processor scan, M0 and M1 data can be changed by the processor, according to ladder diagram instructions addressing the M0 and M1 files. During the same scan, the specialty I/O module can change the M0 and M1 data, independent of the rung logic applied during the scan.

A.2 Addressing M0 and M1 Files

The addressing format for M0 and M1 files is `Mf:e.s/b`, where:

- f = file type, 0 or 1
- e = slot (1 to 30)
- s = word (0 to maximum supplied by module)
- b = bit (0 to 15)

A.2.1 Restrictions on Using M0-M1 Data File Addresses

M0 and M1 data file addresses can be used in all instructions except the OSR instruction and the instruction parameters noted below:

Table 19: M0 and M1 File Access Restrictions

Instruction	Parameter (uses file indicator #)
BSL,BSR	File (bit array)
SQO, SQC, SQL	File (sequencer file)
LFL, LFU	LIFO (stack)
FFL, FFU	FIFO (stack)

A.2.2 Monitoring Bit Addresses

M0 and M1 Bit Monitoring Disabled

When you monitor a ladder program in Run or Test mode, the following bit instructions, addressed to an M0 or M1 file, are indicated as false (regardless of their actual true/false logical state):

--| |-- --|/|-- --( )-- --(L)-- --(U)--

M0 and M1 Bit Monitoring Enabled

The SLC 5/03, SLC 5/04 and SLC 5/05 processors allow you to monitor the actual state of each addressed M0/M1 address (or data table). The highlighting appears normal when compared with other processor data files. The SLC 5/03's performance will be reduced to the degree of M0/M1 referenced screen data.

If you need to show the state of the M0 or M1 addressed bit, you can transfer the state to an internal processor bit.

Transferring Data between Processor Files and M0/M1 Files

The SLC processor does not contain an image of the M0 or M1 file. As a result, you must edit and monitor M0 and M1 file data via instructions in your ladder program. For example, you can copy a block of data from a processor data file to an M0 or M1 data file or vice versa using the COP instruction in your ladder program.

Access Time

During the program scan, the SLC processor must access the Scanner card to read or write M0 or M1 data. This access time must be added to the execution time of each instruction referencing M0 or M1 data. The SLC 500 Instruction Set Reference Manual contains details about this access time.

Minimizing the SLC Scan Time

You can limit the SLC processor scan time by minimizing the use of instructions that address M0 or M1 files.

B
Technical Specifications

Appendix Sections:

- Technical Specifications

B.1 Specifications

Table 20: SST-ASI-SLC Specifications

Part number	SST-ASI-SLC
Function	SLC-500 Scanner for AS-Interface networks
Description	Renesas M16C processor 31 Kbytes of internal RAM 512 Kbytes of internal flash memory (for storage of firmware) 32 Kbytes of external RAM 16 Kbytes of external EEPROM (for storage of configuration data)
Environmental	Storage temperature –25 °C to 70°C Operating temperature 0 °C to 50°C Operating relative humidity (RH) level 5% to 95% Pollution degree 1 - no pollution or only non-conductive or non-corrosive pollution Isolation rating type tested at 560 VAC ESD severity level ESD-4 Vibration tested according to IEC 68-2-6 Test Fc Shock tested according to IEC 68-2-27
Backplane Current Consumption	120 mA at 5 VDC The 5VDC backplane voltage must be from a supply delivering Seperate Extra Low Voltage (SELV).
AS-i Power Consumption	50 mA
Phoenix Connector Part #	MSTB 2,5/4-ST-5,08
RoHS Compliance	"The stated products comply with the European Parliament and Council's RoHS Directive (2002/95/EC), either by virtue of design and manufacture, or by legal waiver, as specified within Annex Article 4(1)".

C
Conformance Statement

Appendix Sections:

- ASI Protocol Implementation Conformance Statement (PICS)

C.1 ASI Protocol Implementation Conformance Statement (PICS)

Table 21: ASI Protocol Implementation Conformance Statement

Vendor:	Woodhead Industries Inc.
Product name:	SST-ASI-SLC
Order No.:	SST-ASI-SLC
Release:	3.0
Date:	July 1, 2008

C.1.1 List of Implemented Functions

Table 22: AS-i Functions

No.	Function or Call to AS-i Network Interface	Profiles	Remark/ Implemented By
1	Image, Status = Read_IDI ()	X	Input
2	Status = Write_OD (Image)	X	Output
3	Status = Set_Permanent_Parameter (Addr, Param)	X	G File/Config
4	Param, Status = Get_Permanent_Parameter (Addr)	X	M file
5	Status, RParam = Write_Parameter (Addr, Param)	X	Output
6	Status, Param = Read_Parameter (Addr)	X	Input
7	Status = Store_Actual_Parameters ()	X	Config
8	Status = Set_Permanent_Configuration (Addr, Config)	X	G File/Config
9	Status, Config = Get_Permanent_Configuration (Addr)	X	M file
10	Status = Store_Actual_Configuration ()	X	Config
11	Status, Config = Read_Actual_Configuration (Addr)	X	Config
12	Status = Set_LPS (List31)	X	G file
13	Status, List31 = Get_LPS ()	X	M file
14	Status, List31 = Get_LAS ()	X	M file/Config
15	Status, List32 = Get_LDS ()	X	M file/Config
16.0	Status, Flags = Get_Flags ()	X	M file
16.1	Status, Flag = Get_Flag_Config_OK ()	X	M file
16.2	Status, Flag = Get_Flag_LDS.0 ()	X	M file
16.3	Status, Flag = Get_Flag_Auto_Address_Assign ()	X	M file
16.4	Status, Flag = Get_Flag_Auto_Prog_Available ()	X	M file
16.5	Status, Flag = Get_Flag_Configuration_Active ()	X	M file
16.6	Status, Flag = Get_Flag_Normal_Operation_Active ()	X	M file
16.7	Status, Flag = Get_Flag_APF ()	X	M file
16.8	Status, Flag = Get_Flag_Offline_Ready ()	X	M file
16.9	Status, Flag = Get_Flag_Peripehry_OK ()	X	M file
17	Status = Set_Operation_Mode (Mode)	X	Automatic
18	Status = Set_Offline_Mode (Mode)	X	Automatic
19	Status = Activate_Data_Exchange (Mode)	X	Automatic
20	Status = Change_Slave_Address (Addr1, Addr2)	X	Config Port
21.1	Status = Set_Auto_Adress_Enable (Mode)	X	G file
21.2	Mode = Get_Auto_Adress_Enable ()	X	M file

No.	Function or Call to AS-i Network Interface	Profiles	Remark/ Implemented By
22.1	Status, Resp = Cmd_Reset_ASI_Slave (Addr, RESET)	X	Config
22.2	Status, Resp = Cmd_Read_IO_Configuration (Addr, CONF)	X	Config
22.3	Status, Resp = Cmd_Read_Identification_Code (Addr, IDCOD)	X	Config
22.4	Status, Resp = Cmd_Read_Status (Addr, STAT)	X	Config
22.5	Status, Resp = Cmd_Read_Reset_Status (Addr, STATRES)	-	-
22.6	Read Ext-Id code 1	X	Config
22.7	Resd Ext-Id code 2	X	Config
23	Status, Flag = Get_LPF ()	X	M file
24	Write IDCode 1	X	Config
25	Read Analog Input –	X	M file
26	Write Analog Outputs	X	M file
27	Read Param String	X	M file
28	Write Param String	X	M file
29	Read Diag String	X	M file
30	Read Ident String	X	M file

Table 23: Key for Symbols in Column 3

Label	Meaning
X	Implemented
-	Not implemented

Table 24: Key for Symbols in Column 4

Label	Meaning
G file	Mapped to G file
Input	Mapped to Input table
Output	Mapped to Output table
Config	Accessible from Config port
M file	Mapped to M files

C.1.2 List of All Commands

Table 25: AS-i Commands

Command	Value	Meaning	Req. Len.	Res. Len.
AS-i 16-bit data				
RD_7X_IN	50h	Read 1 16-bit slave profile in.data	3	10
WR_7X_OUT	51h	Rrite 1 16-bit slave profile out.data	11	2
RD_7X_OUT	52h	Read 1 16-bit slave profile out.data	3	10
RD_7X_IN_X	53h	Read 4 16-bit slave profile in.data	3	34
WR_7X_OUT_X	54h	Write 4 16-bit slave profile out.data	35	2
RD_7X_OUT_X	55h	Read 4 16-bit slave profile out.data	3	34
OP_RD_16BIT_IN_CX	4Ch	Read 16 channels 16-bit slave in.data	3	34
OP_WR_16BIT_IN_CX	4Dh	Write 16 channels 16-bit slave in.data	36	2
Commands acc. to Profile S-7.4/S-7.5				
WR_74_75_PARAM	5Ah	Write S-7.4/S-7.5-slave parameter	≥6	2
RD_74_75_PARAM	5Bh	Read S-7.4/S-7.5-slave parameter	4	≥3
RD_74_75_ID	5Ch	Read S-7.4/S-7.5-slave ID string	4	≥3
RD_74_DIAG	5Dh	Read S-7.4/S-7.5-slave diagnosis string	4	≥3
Acyclic Commands				
WRITE_ACYC_TRANS	4Eh	Write acyclic transfer	≥7	2
READ_ACYC_TRANS	4Fh	Read acyclic transfer	5	≥2
AS-i Diagnosis				
GET_LISTS	30h	Get LDS/LAS/LPS flags	2	29
GET_FLAGS	47h	Get flags	2	5
GET_DELTA	57h	Get list of config. diff.	2	10
GET_LCS	60h	Get LCS	2	10
GET_LAS	45h	Get LAS	2	10
GET_LDS	46h	Get LDS	2	10
GET_LPF	3Eh	Get LPF	2	10
GET_LOS	61h	Get LOS	2	10
SET_LOS	62h	Set LOS	10	2
GET_TECA	63h	Get transm.err.counters	2	34
GET_TECB	64h	Get transm.err.counters	2	34
GET_TEC_X	66h	Get transm.err.counters	4	≥3
READ_FAULT_DETECTOR1	10h	Read Fault_Detector	2	4
READ_DUPLICATE_ADDR2	11h	Read list of duplicate addresses	2	10
Configuration of AS-i Master				
SET_OP_MODE	0Ch	Set Operation_Mode	3	2
STORE_CDI	07h	Store Actual_Configuration	2	2

READ_CDI	28h	Read Actual_Configuration	3	4
SET_PCD	25h	Set Permanent_Config	5	2
GET_PCD	26h	Get Permanent_Config	3	4
SET_LPS	29h	Set LPS	11	2
GET_LPS	44h	Get LPS	2	10
STORE_PI	04h	Store Actual_Parameter	2	2
WRITE_P	02h	Write Parameter	4	3
READ_PI	03h	Read Parameter	3	3
SET_PP	43h	Set Permanent_Parameter	4	2
GET_PP	01h	Get Permanent_Parameter	3	3
SET_AAE	0Bh	Set Auto_Address_Enable	3	2
SLAVE_ADDR	0Dh	Change Slave_Address	4	2
WRITE_XID1	3Fh	Write Extended_ID-Code_1	3	2
Other commands				
IDLE	00h	R	2	2
READ_IDI	41h	Read IDI	2	36
WRITE_ODI	42h	Write ODI	34	2
READ_ODI	56h	Read ODI	2	34
SET_OFFLINE	0Ah	Set Off-Line_Mode	3	2
SET_DATA_EX	48h	Set Data_Exchange_Active	3	2
REWRITE_DPRAM3	78h	Rewrite DPRAM	3	3
BUTTONS	75h	Disable push buttons	3	2
FP_PARAM	7Dh	Functional Profile Parameter	≥3	≥2
language-select	0Eh	Set display language	4	3
replacement of safety slaves input data	0Fh	Set safety input slave "interpretation data"	4	2
FP_DATA	7Eh	Functional profile data	≥3	≥2
"Safety at Work" list	00h	Slaves with released safety function, response contains EcFlags	3	8
"Safety at Work" list	0Dh	Slaves with released safety function, response doesn‘t contain EcFlags	3	6
"Safety at Work" diagnosis	02h	Monitor diagnosis	5	n
integrated AS-i sensors: Warnings	03h	Sensors with deleted D1 bit	3	10
Integrated AS-i sensors: Availability	04h	Sensors with deleted D2 bit	3	6
language-select	0Eh	Read display language	3	3
replacement of safety slaves input data	0Fh	Read safety input slave "interpretation data"	3	4
list of safety slaves	10h	Read addresses of safety slaves	3	6
EXT_DIAG4	71h	ExtDiag generation	6	2
RD_EXT_DIAG5	7Bh	Read ExtDiag Settings	2	7
INVERTER	7Ch	Configure inverter slaves	12	4
MB_OP_CTRL_WR_FLAGS	85h	Write flags	≥5	2

MB_OP_CTRL_RD_FLAGS	86h	Read flags	4	≥3
RD_MFK_PARAM	59h	Read SEW MFK21 parameter	6	≥3

D
CE Compliance

Appendix Sections:

- CE Compliance

D.1 CE Compliance

This device meets or exceeds the requirements of the following standards:

- EN 50081-2:1994 - “Electromagnetic compatibility – Generic emission standard Part 2. Industrial Environment.”
- EN 50082-2:1995 - “Electromagnetic compatibility – Generic immunity standard Part 2. Industrial Environment.”

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case you may be required to take adequate measures.

Caution

This equipment is neither designed for, nor intended for operation in installations where it is subject to hazardous voltages and hazardous currents.

Marking of this equipment with the symbol CE indicates compliance with European Council Directive 89/336/EEC - The EMC Directive.

Note

To maintain compliance with the limits and requirements of the EMC Directive, it is required to use quality interfacing cables and connectors when connecting to this device. Refer to the cable specifications in the Hardware Guide for selection of cable types.

Note

The backplane voltage supply for this equipment must be delivered as Separated Extra Low Voltage (SELV).

E

Warranty and Support

Appendix Sections:

- Warranty
- Reference Documents
- Technical Support

E.1 Warranty

For warranty information pertaining to this product, refer to http://www.mysst.com/warranty.asp.

E.2 Reference Documents

Table 26: Reference Documents

For…	Read This Document	Document Number
An overview of SLC products	SLC 500 System Overview	A-B 1747-2.30
A description of how to install and use the SLC 500 PLC	Installation and Operation Manual for Modular Hardware Style Programmable Controllers	A-B 1747-6.2
An index of Allen-Bradley publications	Allen-Bradley Publication Index	A-B SD499
RSLogix information	Getting Results with RSLogix	500 9399-RL50GR
	Hardware Configuration Reference Guide	9399-HDWAREREF
	RSLinx Lite User's Guide	9399-WAB32LUG
AS-i information	ASI: The Actuator-Sensor Interface for Automation Eds. Kriesel and Madelung	ISBN # 3-446-18265-9

E.3 Technical Support

Please ensure that you have the following information readily available before calling for technical support:

- Card type and serial number
- Computer's make, model, CPU speed and hardware configuration (other cards installed)
- Operating system type and version
- Details of the problem you are experiencing: firmware type and version, target network and circumstances that may have caused the problem

E.3.1 Getting Help

Technical support is available during regular business hours by telephone, fax or email from any Woodhead Software & Electronics office, or from http://www.woodhead.com/. Documentation and software updates are also available on the website.

North America

Canada:
Tel: +1-519-725-5136
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For the most current contact details, please visit http://www.woodhead.com.

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