



**Rockwell  
Automation**

# **Backup Scanner Module**

Catalog Number 1747-BSN

Installation Instructions

**AB Parts**

## Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or in part, without written permission of Allen-Bradley Company, Inc., is prohibited.

Throughout this manual we use notes to make you aware of safety considerations:



**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

---

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

**Important:** Identifies information that is critical for successful application and understanding of the product.

## For More Information

As part of our effort to preserve, protect, and improve our environment, Allen-Bradley is reducing the amount of paper we use. Less paper means more options for you. In addition to traditional printed publications and CD-ROM versions, we now offer on-line materials with the most up-to-date information you can get. We recommend that you read the related publications listed below before starting up your control system.

### Related Publications

For	Refer to this Document	Pub. No.
A more detailed description on how to install, configure, and operate your Backup Scanner.	Backup Scanner User Manual	1747-6.22
A more detailed description on how to install and use your modular SLC 500™ system	SLC 500 Modular Hardware Style Installation and Operation Manual	1747-6.2
A reference manual that contains status file data and instruction set information for SLC 500 processors.	SLC 500™ and MicroLogix™ 1000 Instruction Set Reference Manual	1747-6.15

### How to Get More Information

If you would like a manual, you can:

- download a free electronic version from the internet at [www.theautomationbookstore.com](http://www.theautomationbookstore.com)
- purchase a printed manual by:
  - contacting your local distributor or Rockwell Automation representative
  - visiting [www.theautomationbookstore.com](http://www.theautomationbookstore.com) and placing your order
  - calling 1.800.963.9548 (USA/Canada) or 001.330.725.1574 (Outside USA/Canada)

# AB Parts

## Safety Considerations

This equipment is UL certified for ordinary locations only. The module is C-UL certified for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only. The following attention statement applies to use in hazardous locations.

---

**ATTENTION:** Explosion Hazard

- Substitution of components may impair suitability for Class I, Division 2.
  - Do not replace components or disconnect equipment unless power has been switched off, and the area is known to be non-hazardous.
  - Do not connect or disconnect connectors or operate switches while circuit is live unless the area is known to be non-hazardous.
- 

**Note:** The temperature code rating is marked on the product label.

## Environnements dangereux

Cet équipement est certifié UL pour une utilisation en environnements ordinaires seulement. Le module est certifié UL Canada pour une utilisation en environnements de Classe 1, Division 2, Groupes A, B, C, D, ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

---

**ATTENTION :** DANGER D'EXPLOSION

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
  - Couper le courant ou s'assurer que l'emplacement est désigné non dangereux avant de remplacer les composants.
  - Couper l'alimentation ou s'assurer que l'environnement est classé non dangereux avant de brancher ou débrancher des connecteurs ou de faire fonctionner des commutateurs.
- 

**Remarque :** Le taux du code de température est indiqué sur l'étiquette du produit.

## Overview

The 1747-BSN Backup Scanner Module provides a high-speed communication channel between two modular SLC 500™ (5/02 or higher) processors. The 1747-BSN backup system uses a set of modules, with one or more 1747-BSN modules residing in the primary system and one or more complementary modules in the secondary or backup system. The primary system controls the operation of remote I/O, while the secondary system monitors communications via the high-speed serial link (HSSL) and is available to take over control in the event of a fault in the primary system.

The backup scanner has the capability to switch between two communication channels. The first channel is configurable as Remote I/O (RIO) or Data Highway Plus™ (DH+). The second channel is used to switch one RS232/485 channel in order to provide connection for electronic operator interfaces.

A backup system using the 1747-BSN modules supports up to eight BSN modules in each processor chassis, connected by a local status link (LSL). Only I/O residing in remote chassis is backed up. Local I/O is not backed up. Examples of RIO and DH+ system configurations are shown in Figures 1 and 2 on page 6.

**Note:** During the transfer of control from one processor to another (switchover), the output modules in the remote chassis maintain their last state until the secondary processor program takes control. The secondary processor program is not synchronized with the primary program.

Figure 1 RIO System Configuration

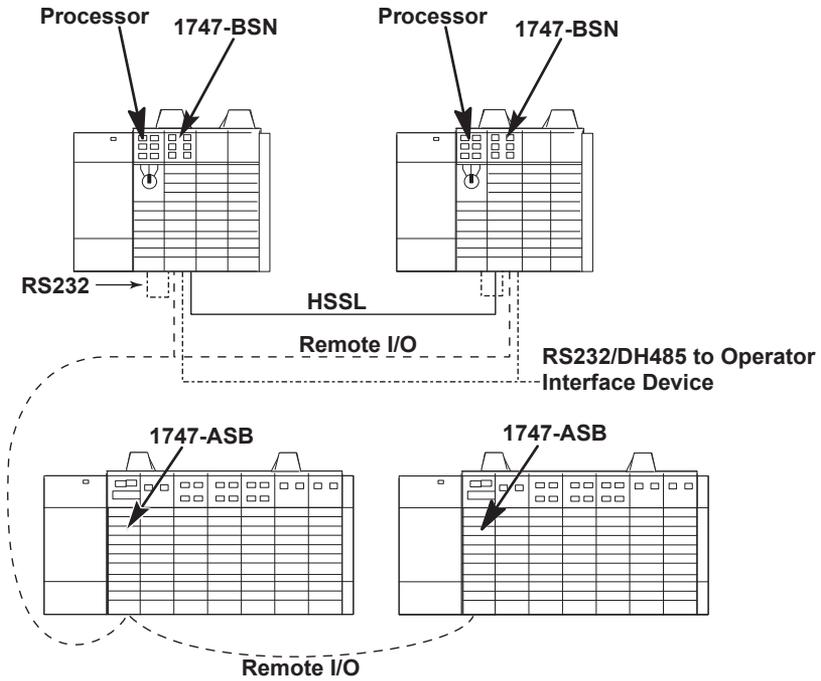
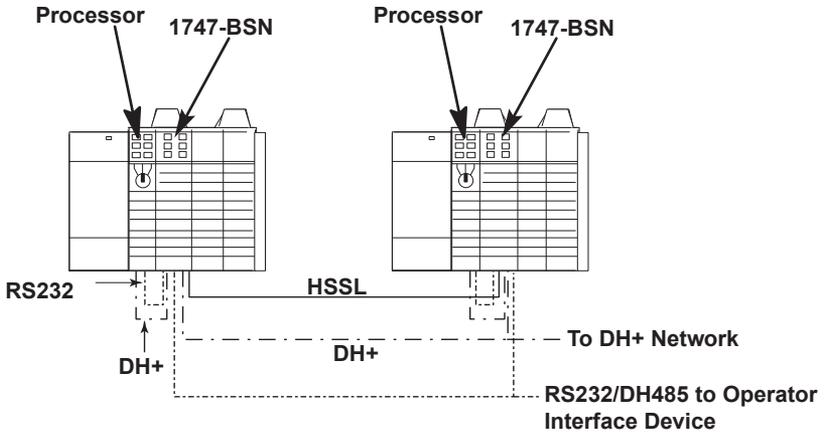


Figure 2 DH+ System Configuration

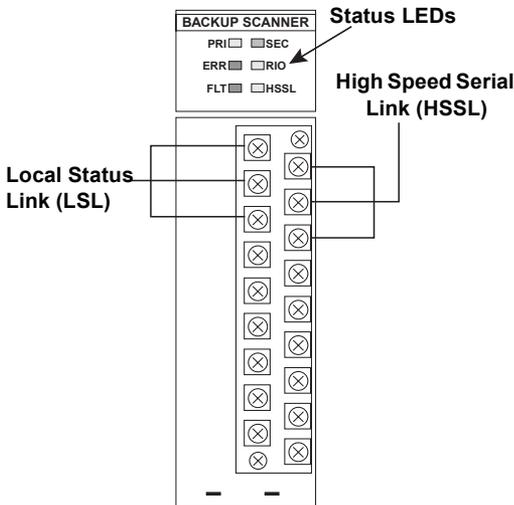


The 1747-BSN module provides backup functionality for the following:

- DH+ or RIO on a single pair of modules - Both may be backed up when two or more pairs of modules are used.
- RS232 - Any RS232 device communicating with channel 0 of the SLC controller may be backed up provided hardware-handshake lines are not required. These ports only allow switchover of the transmit, receive and ground wires for RS232.

## Features

Figure 3 Hardware Features



## Status LEDs

The table below describes the six LEDs located on the module's front panel. To ensure that they are operating correctly, all LEDs are illuminated during power-up.

LED	Definition	Status and Color	Indication
PRI	Primary	Steady Green	The module is in the primary mode.
SEC	Secondary	Steady Amber	The module is in the secondary mode.
RIO	RIO Communication	Steady Green	The RIO link is working properly.
		Flashing Green	A remote device is not configured or connected correctly, or is faulted.
		Flashing Red	The RIO link has a fault. The scanner is connected incorrectly, or all devices are configured improperly, have no power, or are faulted.
		Steady Red	There is a configuration error.
		Off	The communication channel is not configured as RIO.
ERR	Backup Module Error	Flashing Red	The module is not ready for switchover.
		Off	The module is ready for switchover.
HSSL	High Speed Serial Link Communication	Flashing Green	The link is operating with no errors.
		Off	A communications error has been detected on the HSSL.
FLT	Fault	Steady Red	A hardware fault has occurred.
		Flashing Red	The module is not configured properly.

## High-Speed Serial Link (HSSL)

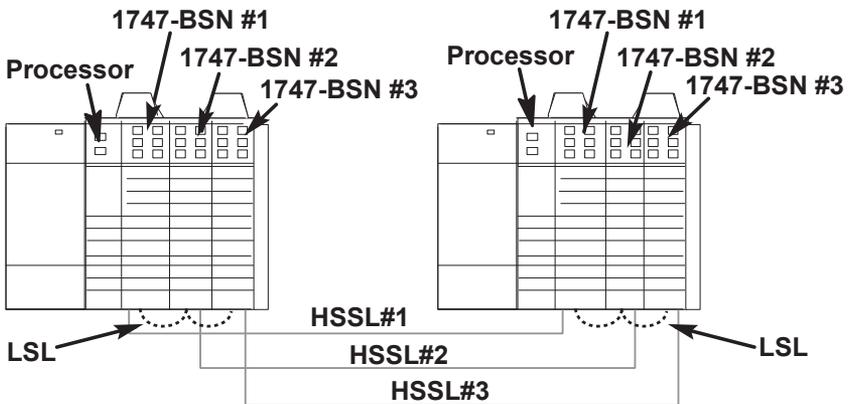
The high-speed serial link supports communication between the primary and secondary backup scanner modules. The baud rate is 2M baud, and the link supports a distance of up to 4.5 m (15 feet).

The HSSL also transfers a limited number of SLC 500 data table files from the primary to the secondary processor. The data table transfer is controlled by an application program in the processor.

## Local Status Link (LSL)

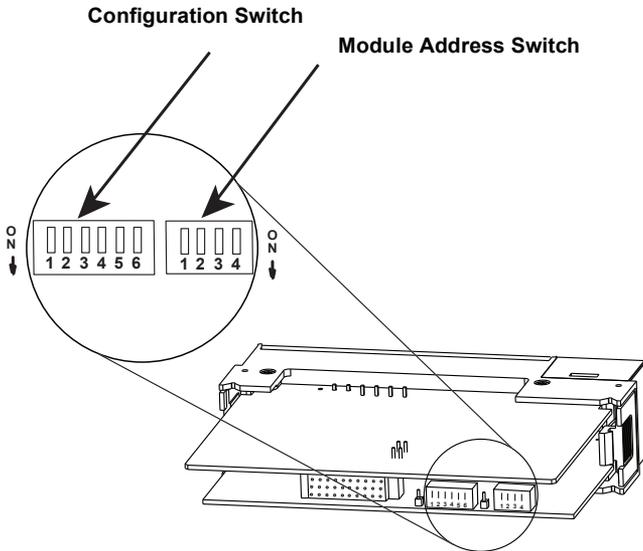
The local status link is a 57.6K baud serial link used to exchange status between up to eight 1747-BSN modules residing in the same chassis. The illustration below shows the LSL and HSSL connections between primary and secondary chassis with more than one 1747-BSN module.

**Figure 4 LSL and HSSL Connections**



## DIP Switches

The locations of the six-position configuration DIP switch and the four-position module address DIP switch are shown on page 10.

**Figure 5** DIP Switch Locations

### Configuration Switch

The six-position Configuration DIP Switch is used to select the baud rate, configure the communication channel, and identify each individual BSN module and the last BSN module. The tables below define the DIP switch configuration settings.

DIP Switch Position	Definition	Setting
1 and 2	Set the communication channel baud rate.	see the table on page 11
3	Channel configuration.	DH+ = ON RIO = OFF
4	This user identification switch differentiates between BSN modules in the primary system and BSN modules in the secondary system, helping determine if switchover has occurred.	User selectable
5	Reserved.	
6	Identifies the last module in the local status link.	Last module = ON All others = OFF

## Baud Rate Settings

Position 1	Position 2	Baud Rate
ON	ON	57.6K
ON	OFF	115.2K
OFF	ON	230.4K
OFF	OFF	Disabled

## Module Address Switch

The four-position Module Address DIP switch configures the BSN address in the LSL. The table below shows the address that corresponds to each setting.

Switch Position			1747-BSN Address
1	2	3	
OFF	OFF	OFF	1
ON	OFF	OFF	2
OFF	ON	OFF	3
ON	ON	OFF	4
OFF	OFF	ON	5
ON	OFF	ON	6
OFF	ON	ON	7
ON	ON	ON	8

**Note:** Switch position 4 is not used.

## Configuration Errors

The module reports the following configuration errors by flashing the fault LED:

- two 1747-BSN modules are configured with the same address
- LSL addresses are not consecutive (addresses must be numbered 0, 1, 2, etc.)
- last LSL switch is not set in the last module in the link
- last LSL switch is set in a module that is not the last in the link, or
- primary and secondary modules do not have the same configuration settings (secondary module shows the configuration error)

## Switchover Conditions

The 1747-BSN module transfers control from the primary to the secondary processor (switchover) if one of the following fault conditions occurs in the primary system:

- power failure
- major fault in the processor
- 1747-BSN module fault
- primary processor mode change from Run to Program

**Note:** In order for switchover to occur, both primary and secondary modules must be working without faults prior to the event that triggers the switchover.

## Installation

---



**ATTENTION:** Disconnect system power before attempting to install, remove, or wire the module.

---

## Determining Power Requirements

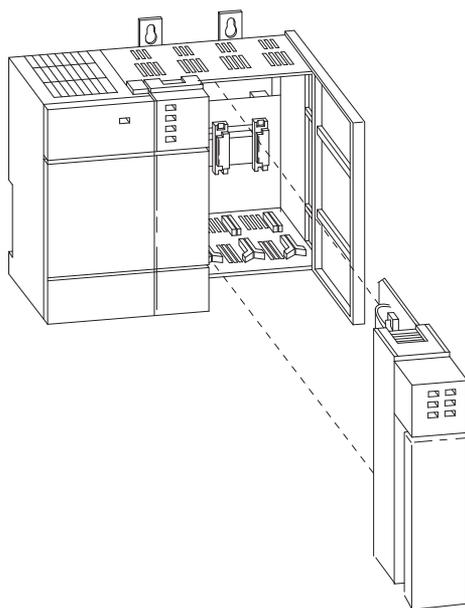
The BSN module is powered through the backplane of the I/O chassis. Before installation, make sure that your modular SLC power supply has adequate reserve capacity. The BSN module requires 800 mA at 5V.

**Important:** Use separate power sources for the primary and secondary processors to protect against interruptions and incoming power failures.

## Inserting the Module into the Chassis

1. Disconnect power.
2. Align the full-sized circuit board with the chassis card guides of the left-most slot of the first I/O module group in the I/O chassis. The first slot of the chassis is reserved for the processor.
3. Slide the module into the chassis until the top and bottom latches catch.

**Figure 6** Inserting the Module



## Wiring

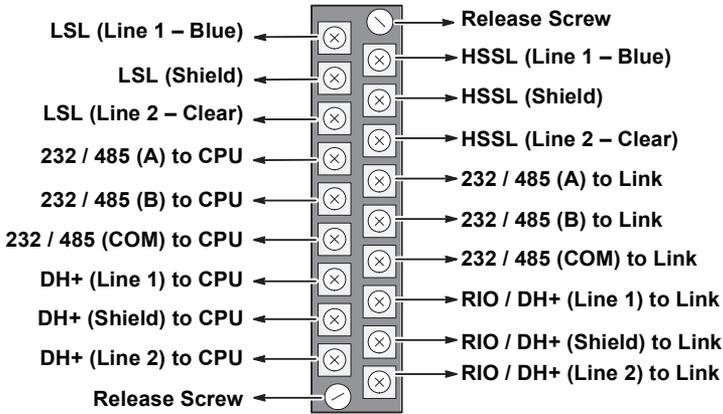
### Terminal Wiring



**ATTENTION:** Disconnect power to the SLC before attempting to install, remove or wire the removable terminal wiring block.

The backup scanner module contains a green removable terminal block. The terminal pinout is shown on page 14.

Figure 7 Terminal Pinout



Use Belden™ 9463 cable when wiring the module.

Terminal screws accept a maximum of two #14 AWG (2mm<sup>2</sup>) wires. Tighten terminal screws only tight enough to immobilize wires. Maximum torque on terminal screws is 0.9 Nm (8 in-lbs.).



**ATTENTION:** To avoid cracking the terminal block, alternate the removal and tightening of the slotted release screws. Maximum torque on the release screws is 0.6 Nm (5.3 in-lbs.).

### For Remote I/O Installations

1. To ensure a proper earth ground of the cable shield, follow these steps:
2. Strip back enough of the RIO cable to expose enough shield drain wire to reach a chassis mounting bracket.
3. Attach the ring terminal lug to the end of the shield drain wire.
4. Attach the ring terminal lug to the SLC chassis mounting bracket.

**Important:** The RIO cable shield must be grounded at the backup scanner end only.

## HSSL Wiring

Connect the HSSL to establish communication between the primary and secondary systems. Maximum cable length for the HSSL is 4.5 m (15 ft.).

## Local Status Link Wiring

If you have more than one 1747-BSN module in the chassis, connect the LSL in series between modules in the same chassis. This enables BSN modules in the same chassis to exchange status information in order to perform switchovers in unison.

## RIO Link Wiring

The backup scanner module is connected to other devices on the RIO link in a daisy-chain (serial) configuration. There are no restrictions governing the space between devices, provided the maximum cable distance is not exceeded.

A ½ watt terminating resistor must be attached across lines one and two at each end of the RIO link. The value of the resistor depends on the baud rate and extended node capability, as shown in the table that follows.

**Note:** To use extended node, all devices on the RIO link must support it. Refer to each device's user manual.

	Baud Rate	Max. Cable Distance (Belden™ 9463)	Resistor Size
<b>Using Extended Node Capability</b>	57.6K baud	3048 m (10,000 ft.)	82Ω 1/2 Watt Gray-Red-Black-Gold
	115.2K baud	1524 m (5,000 ft.)	
	230.4K baud	762 m (2,500 ft.)	
<b>Not Using Extended Node Capability</b>	57.6K baud	3048 m (10,000 ft.)	150Ω 1/2 Watt Brown-Green-Brown-Gold
	115.2K baud	1524 m (5,000 ft.)	
	230.4K baud	762 m (2,500 ft.)	82Ω 1/2 Watt Gray-Red-Black-Gold

# Specifications

## Operating Specifications

<b>Backplane Current Consumption</b>	800 mA at 5V
<b>Operating Temperature</b>	+32°F to +140°F (0°C to +60°C)
<b>Storage Temperature</b>	-40°F to +185°F (-40C to +85°C)
<b>Humidity</b>	5 to 95% without condensation
<b>Noise Immunity</b>	NEMA Standard ICS 2-230
<b>Agency Certification</b> (when product or packaging is marked)	UL listed C-UL listed – Class I, Division 2, Groups A, B, C, D Temp. Code T3C  CE compliant for all applicable directives

## Network Specifications

### Baud Rate Determination of Maximum Cable Length and Terminating Resistor Size

Baud Rate	Maximum Cable Distance	Terminating Resistor Size
57.6K baud	3048 meters (10,000 feet)	150Ω 1/2 Watt Brown-Green-Brown-Gold
115.2K baud	1525 meters (5,000 feet)	150Ω 1/2 Watt Brown-Green-Brown-Gold
230.4K baud	750 meters (2,500 feet)	82Ω 1/2 Watt Gray-Red-Black-Gold

DIP switch configuration settings are shown on page 10.

[www.rockwellautomation.com](http://www.rockwellautomation.com)

#### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444  
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640  
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 1747-5.38 – September 1999

40071-040-01 (A)

© 1999 Rockwell International. All Rights Reserved. Printed in USA