3000-SS31

SoftScreen®/Allen-Bradley Data Highway+

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SoftScreen/Allen-Bradley Data Highway+ Driver

This *SoftScreen* driver allows 3000 engines to connect to the Allen-Bradley PLC5 family. The driver communicates to the PLC through a 5136-SD2 Direct-Link Interface Card made by S-S Technology.

The driver is installed separately from *SoftScreen*. However, once it is installed, it becomes a part of *SoftScreen* and is downloaded, along with an application, to the run-time engine.

Supported Devices

This driver supports the following Allen-Bradley devices:

- PLC-5/10
- PLC-5/11
- PLC-5/12
- PLC-5/15
- PLC-5/20
- PLC-5/25
- PLC-5/30
- PLC-5/40
- PLC-5/60
- PLC-5/80

Note

SLC PLCs are not supported.

Installing the Driver

> **Technical Note**
>
> You must install *SoftScreen* before you install the driver.

Because *SoftScreen* is a Microsoft Windows® 95 Operating System program, you must install the AB Data Highway+ driver in Windows 95. If you have already installed this driver on your system, this installation will overwrite the current files.

To install the AB Data Highway+ driver...

1. Start Windows 95.

> **Technical Note**
>
> *SoftScreen* must be closed when you install this driver. We also recommend you close all other Windows applications before you install this driver.

2. Insert the AB Data Highway+ Install disk in your local drive (usually drive A).
3. Click the Start button, and then select the Run command.
4. Type A:setup (or B:setup, depending on which local drive you use) in the Open text box, and then click OK or press ENTER to begin the installation.
5. Press the Next button to proceed to the next setup screen.
6. Follow the on-screen prompts to complete the installation.

   As files are being copied to your hard drive, three icons display on the left side of your workstation screen to indicate your progress.

   The far left icon indicates how much of an individual file has been transferred. The middle icon indicates how much of a floppy has been transferred. The far right icon represents the amount of space occupied on the system's hard drive before you install the driver.

Technical Note

To end the installation process at any time, select the Cancel button in the setup dialog boxes. A prompt will inform you that setup is not complete. Select the Exit Setup button if you still want to exit the installation program. If you wish to continue the installation, select the Resume button.

Uninstalling the Driver

To uninstall the AB Data Highway+ driver...

1. From Windows 95, click the Start button. Select the Settings command, then Control Panel.
2. From the Control Panel, double-click on Add/Remove Programs.
3. Double-click on the AB Data Highway+ driver entry in the list of removable programs on the Install/Uninstall page.
4. Select Yes in the Confirm File Deletion dialog box.

You will be notified once the driver has been successfully uninstalled.

Configuring the AB Data Highway+ Interface Module

To connect to Allen-Bradley's Data Highway+ network, you must have the 5136-SD2 interface card installed in your system. Refer to the PC/XT expansion section in the appropriate Focal Point manual for information on installing this card.

Table 1 describes the features of this card.

Table 1: 3000-5136-SD2 Interface Card Features

Feature	Description
Port Connector	This six-pin connector is the interface to your PLC.
Red LED	When on, the red LED indicates that the card has not been initialized. If the red LED is off after power-up, the card has been successfully initialized.
Green LED	The green LED is on whenever the card is transmitting data over the AB Data Highway+ network.

Setting Jumpers

Technical Note

Set jumpers before connecting to the PLC.

Jumper JB2 on the adapter card is used to enable/disable the transmitter on the card. The transmission jumper (JB2) must be positioned to Enable. The default position is shown in Figure 1.

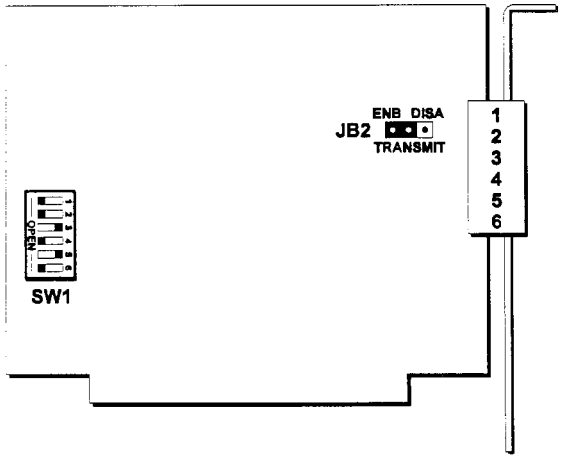

Figure 1. 5136-SD2 Card Jumper and Switch Locations

Setting Switches

Technical Note

Set the switches before connecting to the PLC.

Table 2 shows possible port address locations and the corresponding switch settings. The default address is 0x250. Use the default setting unless there is a known hardware conflict. The card requires eight bytes of I/O space. Therefore, a setting of 250 actually uses addresses 250 through 257.

Table 2. I/O Address Locations and Corresponding Switch Settings

Host I/O Address	Switch Bits 1	2	3	4	5	6
0x0200	On	On	On	On	On	On
0x0208	On	On	On	On	On	Off
0x0210	On	On	On	On	Off	On
0x0218	On	On	On	On	Off	Off
0x0220	On	On	On	Off	On	On
0x0228	On	On	On	Off	On	Off
0x0230	On	On	On	Off	Off	On
0x0238	On	On	On	Off	Off	Off
0x0240	On	On	Off	On	On	On
0x0248	On	On	Off	On	On	Off
0x0250	On	On	Off	On	Off	On
0x0258	On	On	Off	On	Off	Off
0x0260	On	On	Off	Off	On	On
0x0268	On	On	Off	Off	On	Off
0x0270	On	On	Off	Off	Off	On
0x0278	On	On	Off	Off	Off	Off
0x0280	On	Off	On	On	On	On
0x0288	On	Off	On	On	On	Off
0x0290	On	Off	On	On	Off	On
0x0298	On	Off	On	On	Off	Off
0x02A0	On	Off	On	Off	On	On
0x02A8	On	Off	On	Off	On	Off
0x02B0	On	Off	On	Off	Off	On
0x02B8	On	Off	On	Off	Off	Off
0x02C0	On	Off	Off	On	On	On
0x02C8	On	Off	Off	On	On	Off
0x02D0	On	Off	Off	On	Off	On
0x02D8	On	Off	Off	On	Off	Off
0x02E0	On	Off	Off	Off	On	On
0x02E8	On	Off	Off	Off	On	Off
0x02F0	On	Off	Off	Off	Off	On

Connecting to the PLC

The AB Data Highway+ driver is different than other SoftScreen drivers in that it does not communicate with the PLC through a serial port on the 3000 engine. Instead, communication is accomplished through a 5136-SD2 interface card.

The AB Data Highway+ connection is made through a daisy chain configuration using a Belden 9463 twin-axial cable (or blue hose). Figure 2 illustrates the pinouts for this connection.

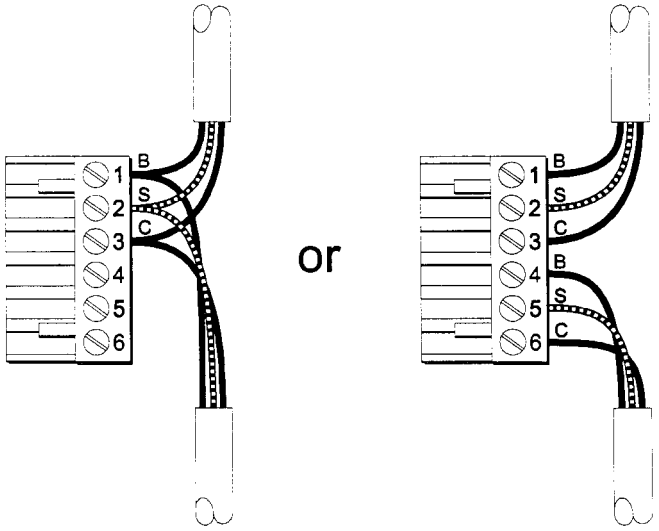

Figure 2. AB Data Highway+ I/O Pinouts

P1 is the top pin of the connector (the edge connector is on the bottom of the card). The alternate connectors on the board are used for wiring the AB Data Highway+ in a daisy chain configuration.

The interface card does not have on-board termination. If a terminator is required, it should consist of a 150 ohm resistor between the blue and clear wires (1 and 3 or 4 and 6). In environments with high noise, two 75 ohm resistors may be used; one between blue and shield (2 and 3 or 5 and 6), the other between clear and shield (1 and 2 or 4 and 5).

Electromagnetic Compatibility Warning

The connection of non-shielded equipment interface cables to the Focal Point workstations will invalidate FCC EMI and European Union EMC compliance and may result in interference and/or susceptibility levels which are in violation of relevant regulations. It is the responsibility of the system integrator and/or user to obtain and use shielded interface cables and equipment. If this equipment has more than one connector, do not leave cables connected to unused interfaces. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

All interface cables must include braid/foil type shields.

Development System Configuration

Once you have installed the driver (refer to the *Installing the Driver* section at the beginning of this manual), you must configure it in the *SoftScreen* Development System.

To configure the driver...

1. Open an application in *SoftScreen*. See the *SoftScreen Development System for Windows User's Guide* for information on creating an application.
2. Select the Drivers command on the Configure menu in the Application Navigator. The Configure Physical Drivers dialog box opens, as shown in Figure 3.

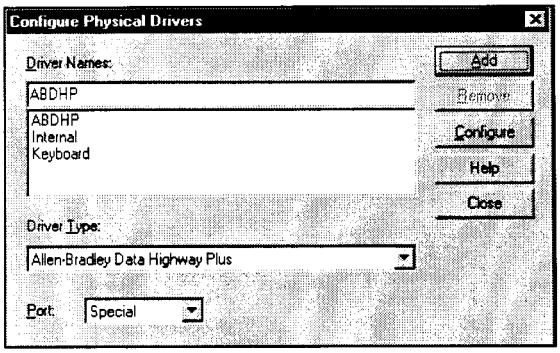

Figure 3. Configure Physical Drivers Dialog Box

3. Select Allen-Bradley Data Highway Plus from the Driver Type drop-down list box.
4. Type a unique name in the Driver Names text box, using up to 32 characters. Tag names can begin with a character or a colon and can contain alphanumeric characters, underscores, and colons. Tag names cannot begin with, or contain, a space.
5. Select the port to which you want to connect the PLC. For the AB Data Highway+ driver, the port is Special.
6. Click the Add button. The driver name is added to the Driver Names list box.
7. Highlight the name in the Driver Names list box. Then click on the Configure button.
8. The Allen-Bradley Data Highway+ Configuration dialog box opens, as shown in Figure 4.

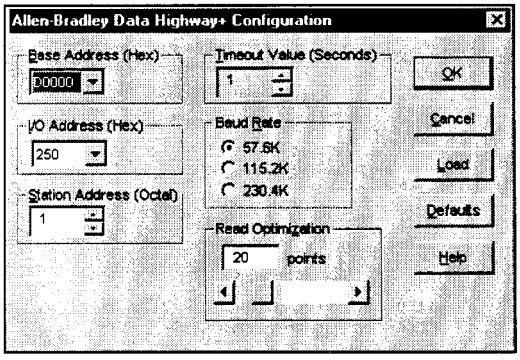

Figure 4. Allen-Bradley Data Highway+ Configuration dialog box

This dialog box reflects the default settings. Table 3 defines the fields in this dialog box.

Table 3. Fields in the Allen-Bradley Data Highway+ Configuration Dialog Box

Field	Definition
Base Address (Hex)	The shared memory starting address of the SD2 card. It may be one of three hexadecimal numbers: C8000, D0000 or D8000.
I/O Address (Hex)	The I/O port address of the SD2 card. The address may be a hexadecimal number from 200 to 2F0 in increments of 8. This must match the switch settings on the SD2 card.
Station Address (Octal)	The station address of this driver on the Data Highway+ network. The allowable addresses range from 1 to 377 Octal.
Timeout Value (Seconds)	Sets the time period to wait for a communications response from the PLC. The allowable times are from 1 to 99 seconds.
Baud Rate	The communications baud rate between the PLC and driver. The allowable baud rates are 57.6K, 115.2K and 230.4K.
Read Optimization	Sets the number of data points the driver should try to read in a single command, from 1 to 100. The driver uses this length when optimizing its data point list to determine the maximum size of the read message it sends out. The default is 20. This number can be changed to affect driver performance.

8. Make changes to the dialog box settings as necessary.

9. Click Load to load the SD2 configuration data.

10. Click OK to accept the changes you have made to these settings. Click Cancel to cancel any changes you have made during the current use of the dialog box. Click Re-Load to load the SD2 configuration data. If you want to revert to the default settings, click Defaults.

To change settings once you have configured the driver, double-click on the driver name in the Drivers configured list box on the Application Navigator form.

Technical Note

You cannot change the port setting from the Application Navigator form. You must use the Drivers command on the Configure menu in the Application Navigator to change this setting.

Once the driver is configured, you can create tags that address data points on supported devices.

Addressing Supported Devices

SoftScreen uses tags to address data points on supported devices. Tag names can be up to 32 alphanumeric characters. Do not start tag names with a number or a space.

This section describes how to assign these tag names to data points and defines expressions supported by the AB Data Highway+ protocol.

Assigning Tag Names

To assign a tag name to a data point on a supported device...

1. Select Drivers from the Data drop-down list box on the Application Navigator form.
2. Double-click on the driver name for which you want to configure tags. The data point configuration form opens, as shown in Figure 5.

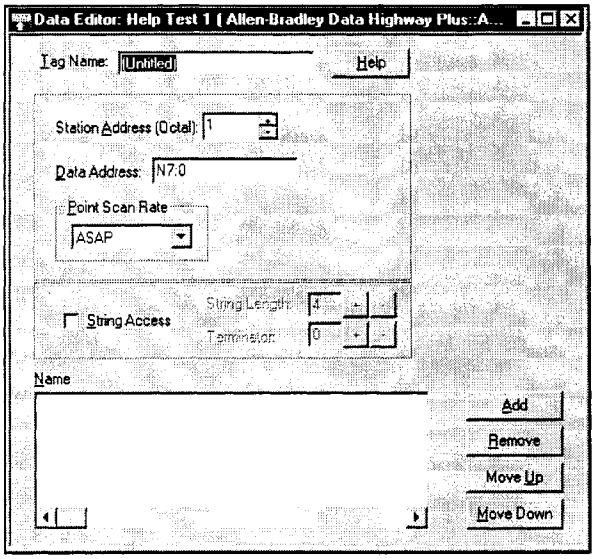

Figure 5. Allen-Bradley Data Highway+ Data Editor Dialog Box

Table 4 defines the fields in this form.

Table 4. Fields in the Allen-Bradley Data Highway+ Data Editor dialog box

Field	Definition
Tag Name	Defines a unique tag name.
Station Address (Octal)	The station address on the DH+ network that this tag name is addressing. The allowable addresses range from 1 to 377 Octal.
Data Address	Enter the address of the data point in which you are interested.
Point Scan Rate	Sets how often the run-time engine will read from the data point, from ASAP (as soon as possible) to once every eight hours. The default is ASAP.

Field	Definition
String Access	When checked, indicates the data address you entered in the Data address field accesses strings. If this field is checked, you must select a string length, from 1 to 120 characters (the default is 4), and a string terminator character, from 0x00 to 0xFF (the default is 0x00). When a string is read from the PLC, the driver will search for the specified terminator, replace it with a null and then store it in the run-time engine. When a string is written to the PLC, the driver will append the specified terminator at the end of the string and then send it to the PLC. The String Access section will be "grayed out" unless a valid address (one that can be accessed as a string) has been entered.

3. Select an existing tag or enter data to create a new tag. Click Add to add the tag. Click Remove to delete the tag.

4. Click Move Up or Move Down to change the order in which the tags are arranged in the list box.

Creating Valid Addresses

Table 5 shows the addressing forms, allowable data types, and addressing ranges for the AB Data Highway+ driver. Note that *Address* is the I/O address RRG where *RR* is the rack number and *G* is the group number.

Table 5. Allowable data types and addressing ranges for the AB Data Highway+ driver

Data Type	File (f)	Address (a)	Element (e)	Bit (b)	Size	Access	String
(O) Output	-	00 - 377	-	0 - 17o	WORD	R/W	No
(I) Input	-	00 - 377	-	0 - 17o	WORD	R	No
(S) Status e/b	-	-	0 - 127d	0 - 15d	WORD	R	No
(B) Binary	3 - 999	-	0 - 999d	0 - 15d	WORD	R/W	No
(B) Binary (Bf/b form)	3 - 999	-	-	0 - 15999d	BIT	R/W	No
(T) Timer	3 - 999	-	0 - 999d	0 - 15d	WORD	R/W	No
(C) Counter	3 - 999	-	0 - 999d	0 - 15d	WORD	R/W	No
(N) Integer	3 - 999	-	0 - 999d	0 - 15d	WORD	R/W	Yes
(F) Floating Point	3 - 999	-	0 - 999d	-	DWORD	R/W	No
(ST) ASCII String f:e	3 - 999	-	0 - 779d	-	BYTE	R/W	Yes

Note: The Bit address (/b) is optional except for the Bf/b form.

d = decimal; o = octal

Sample Physical Addresses

On the following pages are several examples of AB data Highway+ physical addresses.

- Example 1. "N7:0", integer file (N)7, word 0, with an update rate of ASAP from station address 10 octal.

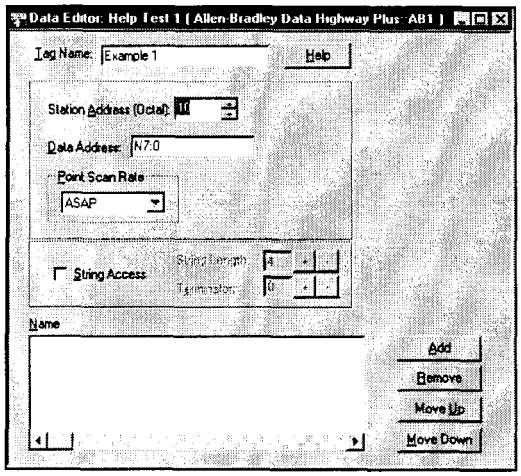

Figure 6. Physical Addressing Example 1

- Example 2. "T4:32.ACC", timer 4, element 32 accumulated value, once a second from station address 32 octal

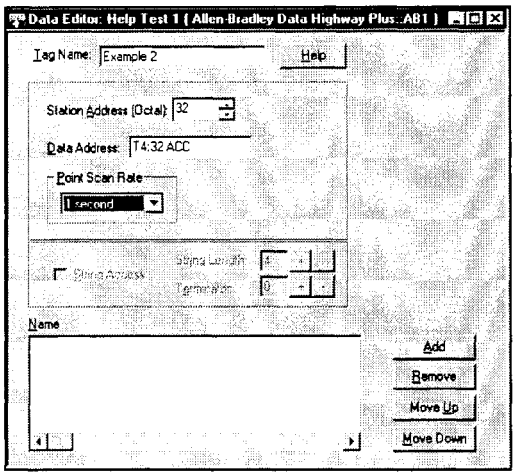

Figure 7. Physical Addressing Example 2

- Example 3. "B200/15999", this example addresses binary file #200, bit #15999, ASAP from station address 377 octal

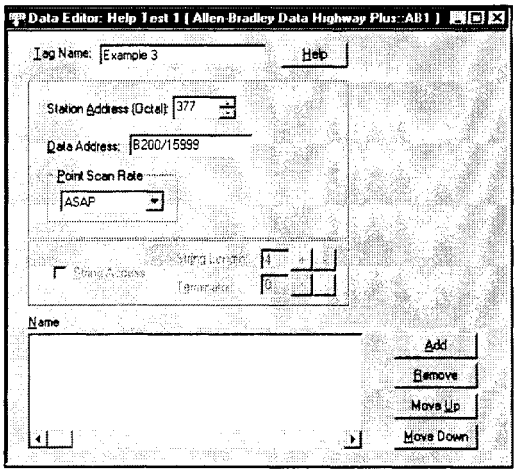

Figure 8. Physical Addressing Example 3

- Example 4. "F8:58", floating point file #8, element 58, ASAP from station address 100 octal

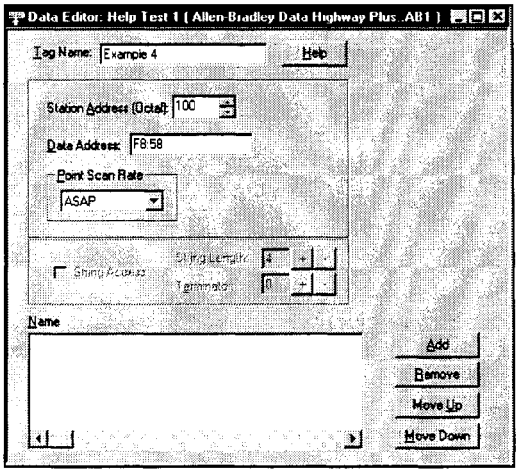

Figure 9. Physical Addressing Example 4

- Example 5. 40 characters (up to NULL terminator) from "ST16:0", string file #16, starting element #0, every 5 seconds from station address 10 octal

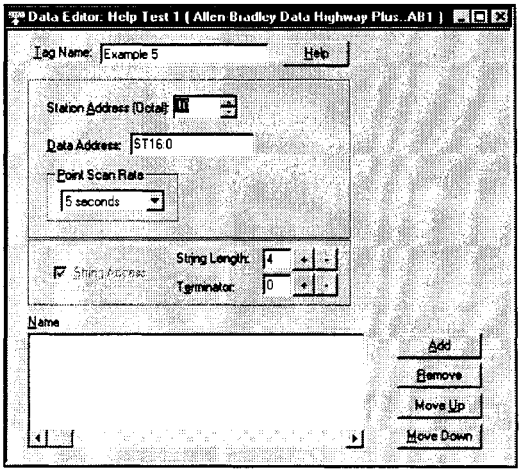

Figure 10. Physical Addressing Example 5

- Example 6. "I:017/01" input rack 1, I/O group 7, bit 1 ASAP from station address 10 octal

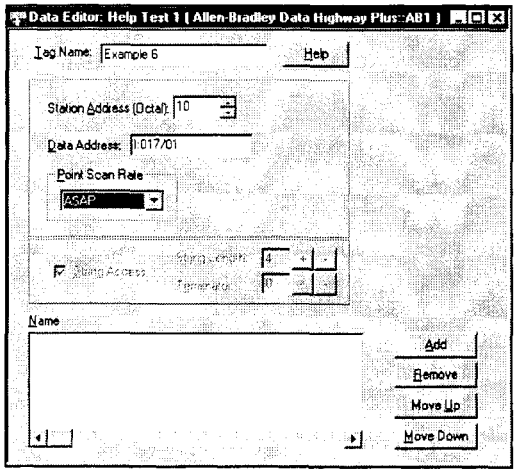

Figure 11. Physical Addressing Example 6

Retrieving Status Information

Use the strings described in this section to retrieve driver status information.

> **Technical Note**
>
> These strings are not case sensitive.

Driver ID

DHPDriverID returns the following null-terminated string identifying the driver running on the 3000 engine:

```
"Allen-Bradley Data Highway Plus Driver"
```

Driver Revision

DHPDriverRev returns a string identifying the driver revision level, such as "2.1" or "2.2".

Communication Status

DHPCommStatus returns a float value describing the current communication status of the driver. See *AB Data Highway+ Communication Status Values* in Table on page 19.

Communication String

DHPCommString returns a null terminated string value describing the current communication status of the driver. Several examples are:

- "Transmit Error: Station 10, N7:0"
- "Receive Error: Station 100, T5:0"
- "AB DH+: No Errors"

Scan Time

DHPScanTime returns a float value in milliseconds (with 10 ms granularity) describing the amount of time it takes the driver to read all of its current data points. For example, if all data points are set to ASAP, the system would track the time between the starting point of the scan and the ending point and then would display the scan time based on these two numbers. However, if one data point is set to an ASAP scan rate and another is set to an eight-hour scan rate, the system would continue to read the ASAP point until eight hours had passed. Then it would read the ASAP point and the eight-hour point and provide you with the time period it took for this scan to read both the points.

Error Codes

Table summarizes the errors that the AB Data Highway+ driver can detect and report. Some of the errors will be detected by the AB Data Highway+ drive itself. The others will come from the PLC(s) and will be mapped into the *DHPCommStatus* and *ABCommString* data types.

Bits 0 through 7 are errors that are Xycom detected protocol errors and are common to all driver. Bits 8 through 22 are driver specific protocol errors.

If the entire 32-bit value is 0, then there are no communication errors.

Table 6: AB Data Highway+ Communication Status Values

Bit Number	Error	Description
0	Timeout	PLC did not respond in the configured amount of time.
1	Transmit error	The initial part of the message (before the response data) had an error.
2	Receive error	The response block contained invalid information (station number, header, or data).
3 - 7	NA	Not used by this driver. They will always be zero.
8		Bit 8 = 1 if there is an extended status code in bits 15 - 22.
9	Invalid TNS	The message number that was received did not match the message number that was sent out.
10	Initialization Error	The Sutherland-Schultz SD2 card did not initialize correctly.
11	Internal Error	If this error occurs, there is a defect in the DH+ driver. Contact Xycom for assistance.
12	Write Error	An attempt has been made to write to an address that cannot be written to (for example, the status file).
13 - 14	N/A	Unused.
15 - 22		If Bit 8 = 0, then these bits will contain the Local STS codes defined by Allen-Bradley. If Bit 8 = 1, then these bits will contain the Ext STS codes defined by Allen-Bradley.
23 - 31	N/A	Unused.

AB Data Highway+ Error Handling

Each of the data points assigned to the driver can have a different update rate so, on any given scan, some points will be scanned and some will not. When the driver detects an error (either read or write), it will post an alarm if it has not previously posted an alarm. The alarm will be posted at the bottom of the screen for three seconds. During any given scan, only the first error condition in the scan will be posted.

The alarm message that is posted will indicate the data point that caused the error. The number that indicates the type of error that occurred does not appear on screen. However, the number will be logged in the alarm

summary along with the date and time of the alarm (refer to the SoftScreen Development System for Windows User's Guide for information on the alarm summary).

If the driver is optimizing points, it will read data points in optimized blocks instead of one at a time. If an error occurs while the driver is reading the block, the alarm message will describe the data point that was at the beginning of the block.

For example, if the driver reads an optimized block of data points (a, b, and c), and an error occurs because data point "c" does not exist in the target device, an alarm message is posted. This message will indicate that there was an error reading data point "a," not data point "c."

Once the driver completes a scan without any errors (after an error has occurred in a previous scan), then the driver will post the following message:

```
"AB DH+: Communication Restored"
```

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