
# 3000-SS33
# SoftScreen®/Allen-Bradley
# Data Highway Logical ASCII Serial Driver

P/N99980-033B



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Address comments concerning this manual to:

**xycom**

Technical Publications Department
750 North Maple Road
Saline, Michigan 48176-1292

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# SoftScreen/Allen-Bradley Data Highway Logical ASCII Serial Driver

This *SoftScreen* driver allows 3000 engines to communicate with the Allen-Bradley PLC-5 family. The interface is through the DF1 protocol, using the logical ASCII addressing capabilities of the PLC-5 family.

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-5/15
- PLC-5/20
- PLC-5/25
- PLC-5/30
- PLC-5/40
- PLC-5/60
- PLC-5/80
- 1770-KF2 Data Highway Communication Interface
- 1785-KE DH+/RS-232 Interface Card

## Installing the Driver

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

Because *SoftScreen* is a Microsoft Windows® Operating System program, you must install the Allen-Bradley 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 Allen-Bradley Data Highway PLC 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 when you install this driver.

2. Insert the Allen-Bradley Driver Install disk in your floppy 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 floppy 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

You are able to uninstall the driver.

**To uninstall the 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 A-B PLC5 Driver entry in the list of removable programs on the Install/Uninstall page.
4. Select Yes in the Confirm File Deletion dialog box, and Windows will uninstall the driver.

Windows will notify you once the driver has been successfully uninstalled.

# Connecting to the PLC

You can connect the 3000 engine to an Allen-Bradley Data Highway serial network in a stand-alone configuration or as a node on a Data Highway network.

## Stand-alone Configuration

A stand-alone configuration–shown in Figure 1–provides a one-to-one RS-232C link between a PLC-5 and a 3000 engine. If the PLC comes equipped with an RS-232C serial port, it connects directly to the 3000 engine. If it does not have an RS-232C serial port, you must use a 1770-KF2 or 1785-KE Communication Controller module.

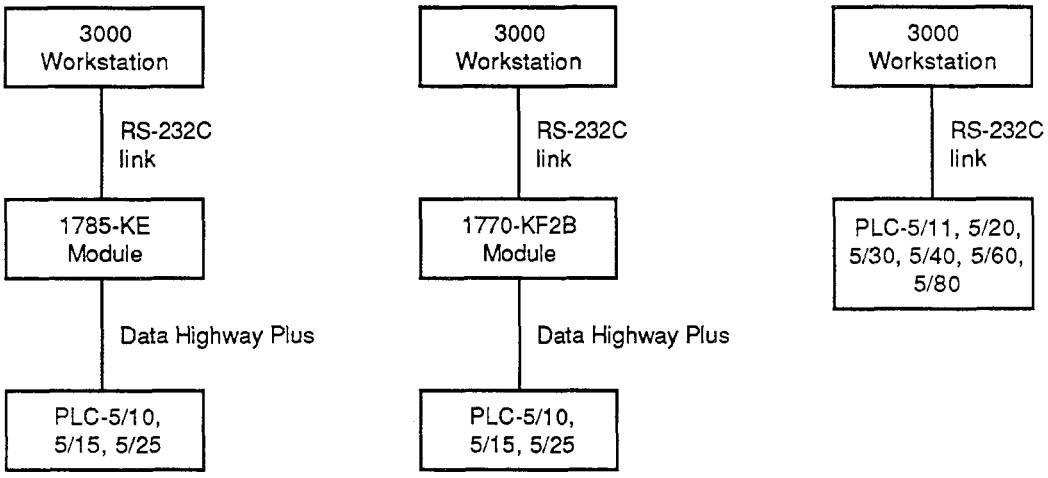


*Figure 1. Allen-Bradley Data Highway Standalone Configuration*

## Network Configuration

In a network configuration, the 3000 engine exists as a node on a PLC-5 network. Connecting to the PLC network requires a 1770-KF2 or 1785-KE module. The network configuration is shown in Figure 2.

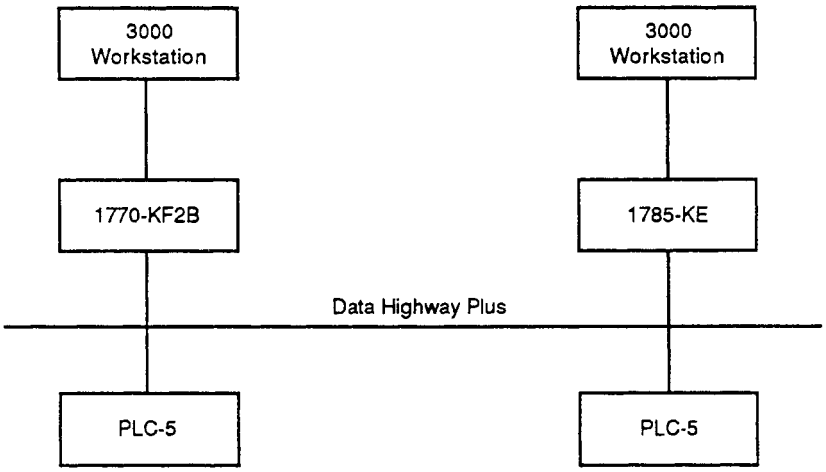


*Figure 2. Allen-Bradley Data Highway Network Configuration*

## Cabling

This section provides information on cabling between a 3000 engine and an Allen-Bradley PLC-5 device

### 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 the 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. Communication cable connectors must be metal, ideally zinc die-cast backsheet types, and provide 360° protection about the interface wires. The cable shield braid must be terminated directly to the metal connector shell; ground drain wires alone are not adequate.

## RS-232C Connection

When connecting via RS-232C, use a Belden 9925 or equivalent cable, maximum length of 50 feet. Refer to EIA RS-232C specifications for more details.

> **Caution**
>
> Make sure the cable is kept away from high voltage and current-carrying cables.

## Pinouts

Pinouts to connect the 3000 engine to a PLC-5 and to the communication controller modules are shown in figures 3 and 4.

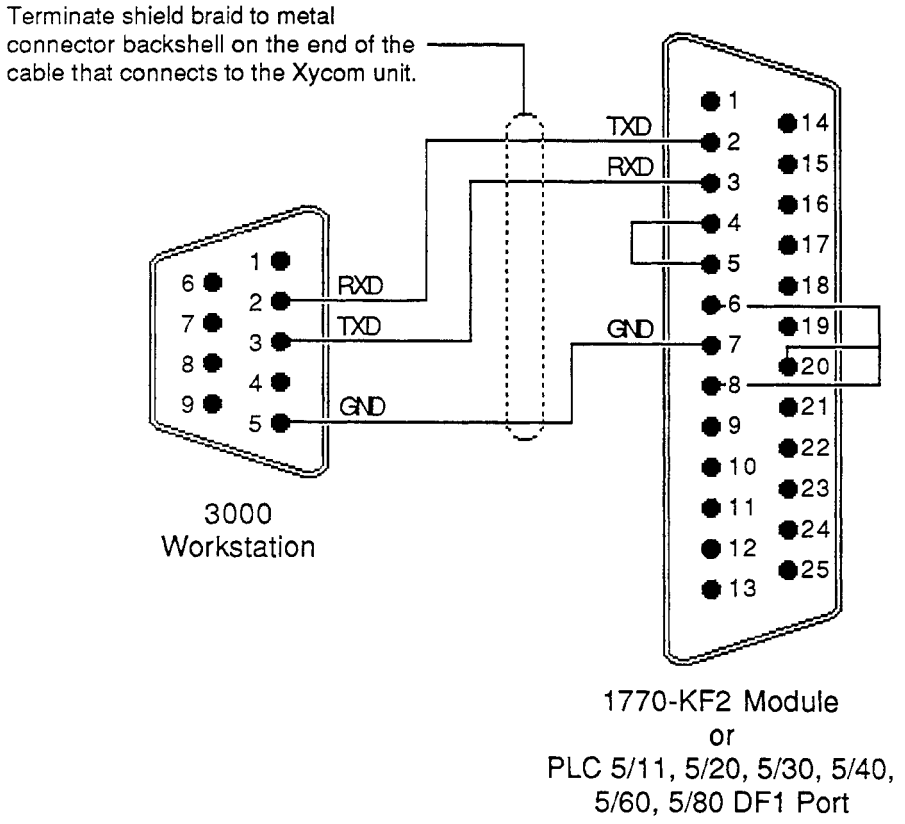


*Figure 3. RS-232C Pinouts: 3000 Workstation to PLC-5*

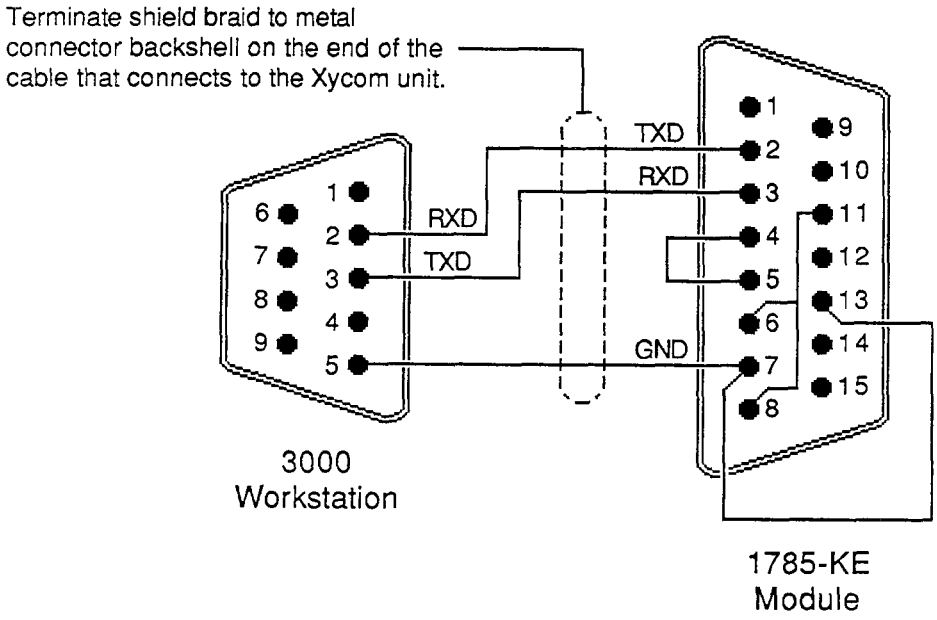


*Figure 4. RS-232C Pinouts: 3000 Workstation to Allen-Bradley Communication Modules*

# 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 development system. Once it is configured, you can create tag names that address Allen-Bradley Data Highway PLC data points.

## Configuring the Driver

**To configure the driver...**

1. Open a *SoftScreen* application. 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 or the Drivers button on the Application toolbar. The Configure Physical Drivers dialog box opens, as shown in Figure 5.

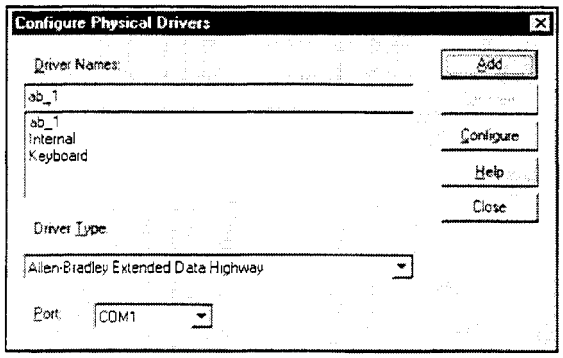


*Figure 5. Configure Physical Drivers dialog box*

3. Select Allen-Bradley Logical ASCII Data Highway 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, spaces.
5. Select the port to which you want to connect the PLC. Choices are None, COM1, and COM2. The default is None.
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, and then click on the Configure button.
8. The Allen-Bradley Data Highway Configuration dialog box opens, as shown in Figure 6.

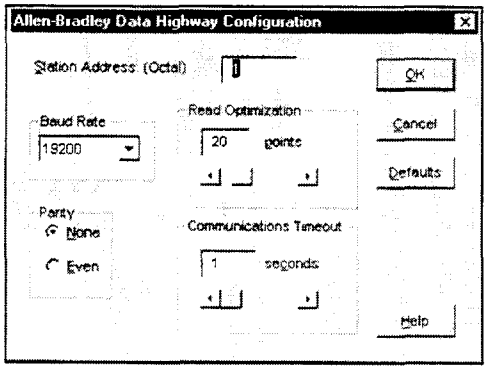


*Figure 6. Allen-Bradley Data Highway Configuration Dialog Box*

You can change the settings to conform to your PLC. Table 1 defines each of the fields.

| Field | Definition |
|---|---|
| Station Address | Sets the station address at which the 3000 engine resides on the Data Highway, from 0 to 377 octal. This address must be different from the addresses of the PLCs on the network. The default is 1. |
| Baud Rate | Sets the baud rate at which you will transfer data, from 300 to 19200. The default is 19200. |
| Read Optimization | Optimizes the number of data points read in a single command, from 1 to 100. The default is 20. This number can be changed to affect driver performance. |
| Parity | Sets error-checking to even parity or none. The default is None. |
| Communications Timeout | Sets the time period the engine will wait for a response from the PLC before timing out. The range is from 1 to 9999 seconds. The default is 1. |

*Table 1. Fields in Allen-Bradley Data Highway Configuration Dialog Box*

Click Defaults to revert to the original dialog box settings. Click Cancel to cancel any changes you have made during the current use of the dialog box. Click OK if you want to accept the changes you have specified.

To make changes to the 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 settings from the Application Navigator form. You must use the Drivers command on the Configure menu in the Application Navigator to change port settings.

# Addressing the PLC

*SoftScreen* uses tag names to address PLC data points. Tag names can include 32 alphanumeric characters, as well as underscores (_) and colons (:). (Do not start tag names with a number, a space, or an underscore.) This section defines how to assign tag names, and identifies the allowable expressions used to address PLC data points.

## Assigning Tag Names

This section describes how to assign tag names to PLC data points.

**To assign a tag name to a PLC data point...**

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 tag names. The driver-specific form opens.

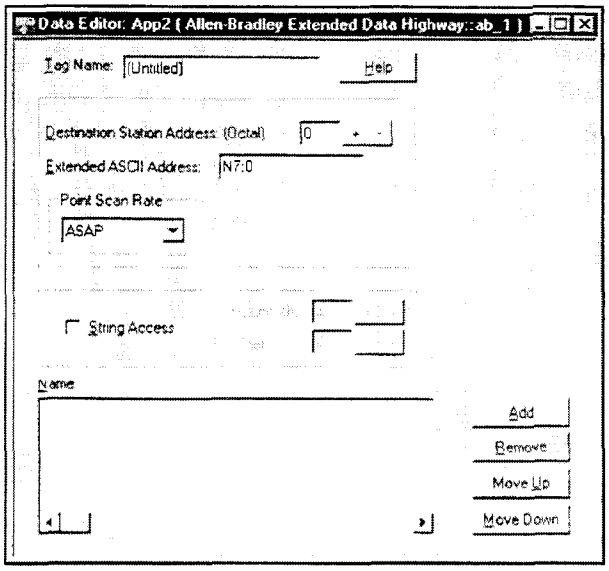


*Figure 7. Allen-Bradley Form*

Use the fields in this form to create tags that address Allen-Bradley Data Highway PLC data points. Table 2 defines the fields.

| Field | Definition |
|---|---|
| Tag Name | Defines a unique tag name. |
| Destination Station Address | Sets the station address of the PLC to which you will communicate, from 0-377 octal. The default is 0. |
| Extended ASCII Address | Links the tag name to a valid data point. See the following section, *Creating Valid Addresses*, for more information. The default is N7:0. |
| Point Scan Rate | Sets how often the run-time engine will read the data point, from ASAP (as soon as possible) to once every eight hours. The default is ASAP. |
| String Access | Allows string access when checked. If this option is selected, you must select a string length, from 1 to 128 characters (the default is 4), and a string terminator character, from 0 to 255 (the default is 0). 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. *Note: String access is available only if you enter a valid address that can be accessed by a string. Refer to Table 3 for more information.* |

*Table 2. Fields in Allen-Bradley Data Highway Form*

## Creating Valid Addresses

Table 3 defines the valid data types and address ranges used to address Allen-Bradley Data Highway Extended PLC data points.

| Data Type | Preset File # | Valid File Range | String Support | Element | Bit | R/W |
|---|---|---|---|---|---|---|
| Output (O) | 0 | 0 | No | 0-377 octal | 0-17octal | R/W* |
| Input (I) | 1 | 1 | No | 0-377 octal | 0-17 octal | R |
| Status (S) | 2 | 2 | No | 0-127 | 0-15 | R |
| Binary (B) | 3 | 3-999 | No | 0-999 | 0-15 | R/W |
| Binary (B) | 3 | 3-999 | No | N/A | 0-15999 | R/W |
| Timer (T)* | 4 | 3-999 | No | 0-999 and .PRE (preset values) or .ACC (accumulated values) | N/A | R/W |
| Counter (C)** | 5 | 3-999 | No | 0-999 and .PRE (preset values) or .ACC (accumulated values) | N/A | R/W |
| Integer (N) | 7 | 3-999 | Yes | 0-999 | 0-15 | R/W |
| Floating Point (F) | 8 | 3-999 | No | 0-999 | N/A | R/W |
| ASCII String (ST) | N/A | 3-999 | Yes | 0-799 | N/A | R/W |

**You may only write to bit outputs.*

***You can only access accumulated and preset values in timer and counter files.*

*Table 3. Valid Allen-Bradley Data Types and Address Ranges*

Following are some *SoftScreen*/Allen-Bradley Data Highway Extended PLC addressing examples.

Example_1 addresses binary file 3, element 999, bit 10 at station address 25 (octal) every eight hours, as shown in Figure 8.

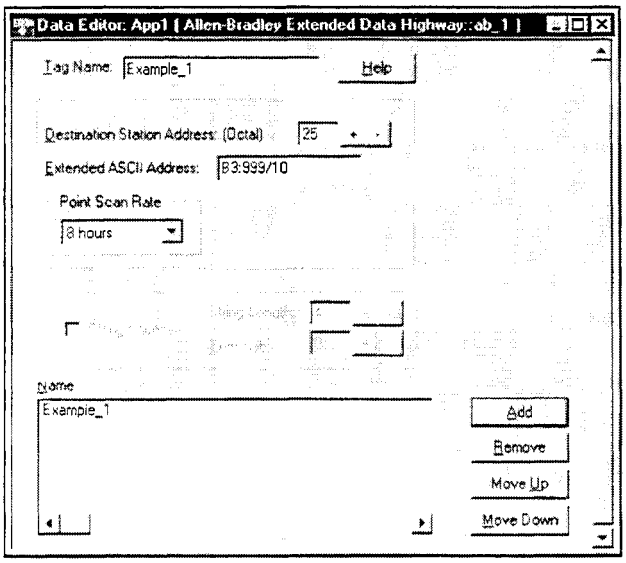


*Figure 8. Allen-Bradley Addressing, Example 1*

Example_2 addresses timer file 4, element 32 (accumulated value) at station address 56 (octal) every second, as shown in Figure 9.

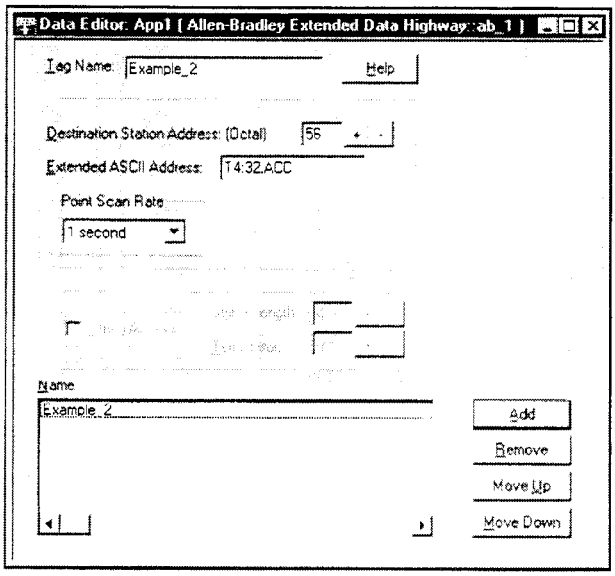


*Figure 9. Allen-Bradley Addressing, Example 2*

Example_3 reads up to 40 characters (up to the NULL terminator) of ASCII string file 16, element 0 at station address 31 (octal) every five seconds, as shown in Figure 10.

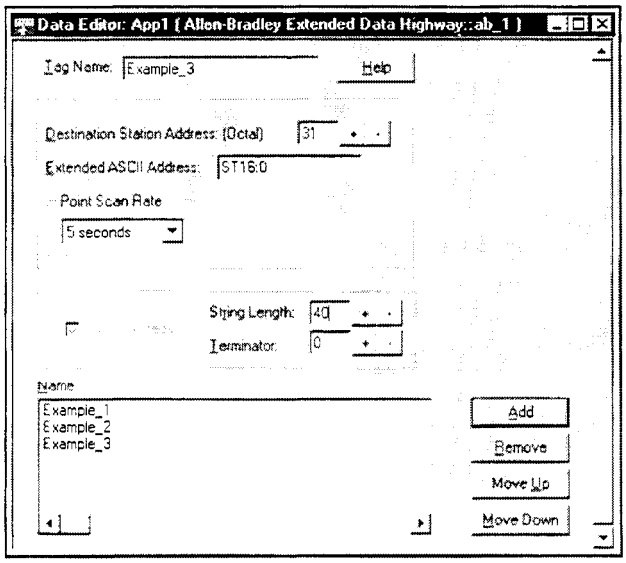


*Figure 10. Allen-Bradley Addressing, Example 3*

## Retrieving Status Information

Use the strings described in this section to retrieve status information during run-time.

**Technical Note**

Status strings are *not* case sensitive.

### Driver ID

*ABdriverID* returns the following null-terminated string identifying the driver running on the 3000 engine: "Allen-Bradley PLC-5 Logical ASCII driver."

## Driver Revision

*ABdriverRev* returns a string identifying the driver revision level.

## Error Codes

*ABcommStatus* returns a number describing the current communication status of the driver. Table 4 defines the error codes.

### Technical Note

If the entire number is 0, there are no communication errors.

| Bit | Description |
|---|---|
| 0 | Timeout–The 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 part of the message after the first ACK from the PLC had an error. |
| 3 | Checksum error–The message received an invalid checksum. |
| 4-7 | Reserved. |
| 8 | If this bit is 1, bits 16 through 23 will contain the local STS codes as defined by Allen-Bradley. If this bit is 0, bits 16 through 23 will contain the Ext STS codes as defined by Allen-Bradley. |
| 9 | Invalid TNS–The received message number did not match the message number the 3000 engine sent. |
| 10 | NAK error–Received multiple NAKs from the PLC while doing retries. |
| 11-14 | Unused. |
| 15-22 | If bit 8 is 1, these bits will contain the Allen-Bradley local STS codes. If bit 8 is 0, these bits will contain the Allen-Bradley Ext STS codes. Refer to the Allen-Bradley documentation for more information on these codes. |

*Table 4. SoftScreen/Allen-Bradley Data Highway Driver Error Codes*

### Communication Status

*ABcommString* returns a null-terminated string describing the current communication status of the driver.

### Scan Time

*ABscanTime* returns a number (in msecs) describing the amount of time it takes the driver to read the 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 then provide you with the time period it took for this scan to read both the points.

## Detecting Errors and Generating Alarms

Each of the data points defined for a 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 a read or write error, 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 error number will not appear on screen. However, it 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 more information on the alarm summary).

Following is an example of a communication error:

```
ABPLC5 Port:1 DEST:12 Addr:(R) T4:0.ACC
```

This error occurred while reading (R) T4:0.ACC from PLC5, destination PLC address 12, on port 1.

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:

```
"ABPLC5: Communication Restored"
```

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