4100-6069 BACPac® Ethernet Installation Instructions

Cautions and Warnings

READ AND SAVE THESE INSTRUCTIONS- Follow the instructions in this installation manual. These instructions must be followed to avoid damage to this product and associated equipment. Product operation and reliability depend upon proper installation.

DO NOT INSTALL ANY SIMPLEX® PRODUCT THAT APPEARS DAMAGED- Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify an authorized Simplex product supplier.

ELECTRICAL HAZARD - Disconnect electrical field power when making any internal adjustments or repairs. All repairs should be performed by a representative or authorized agent of your local Simplex product supplier.

STATIC HAZARD - Static electricity can damage components. Handle as follows:

- Ground yourself before opening or installing.
- Prior to installation, keep components wrapped in anti-static material at all times.

FCC RULES AND REGULATIONS – PART 15 - This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In this Publication

This publication discusses the following topics:

General Information About the BACPac Ethernet Module

Introduction

The Simplex Model 4100-6069 BACPac Ethernet Module is a microprocessor-based communication device that provides seamless, one-way communications between a 4100/4120/4100U /4100ES Fire Alarm Control Panel (FACP) and the industry-standard Building Automation and Control Network (BACnet). The portal acts as a protocol translator between the Simplex 4100 Computer Port Protocol and the industry-standard BACnet® Protocol. When the BACPac Ethernet Module receives system status messages from the FACP, it translates the messages into BACnet Protocol and communicates the information to other BACnet devices.

The BACPac can be used with either a stand-alone FACP or a 4120 Network of up to 1000 points, (See Figure 1.)

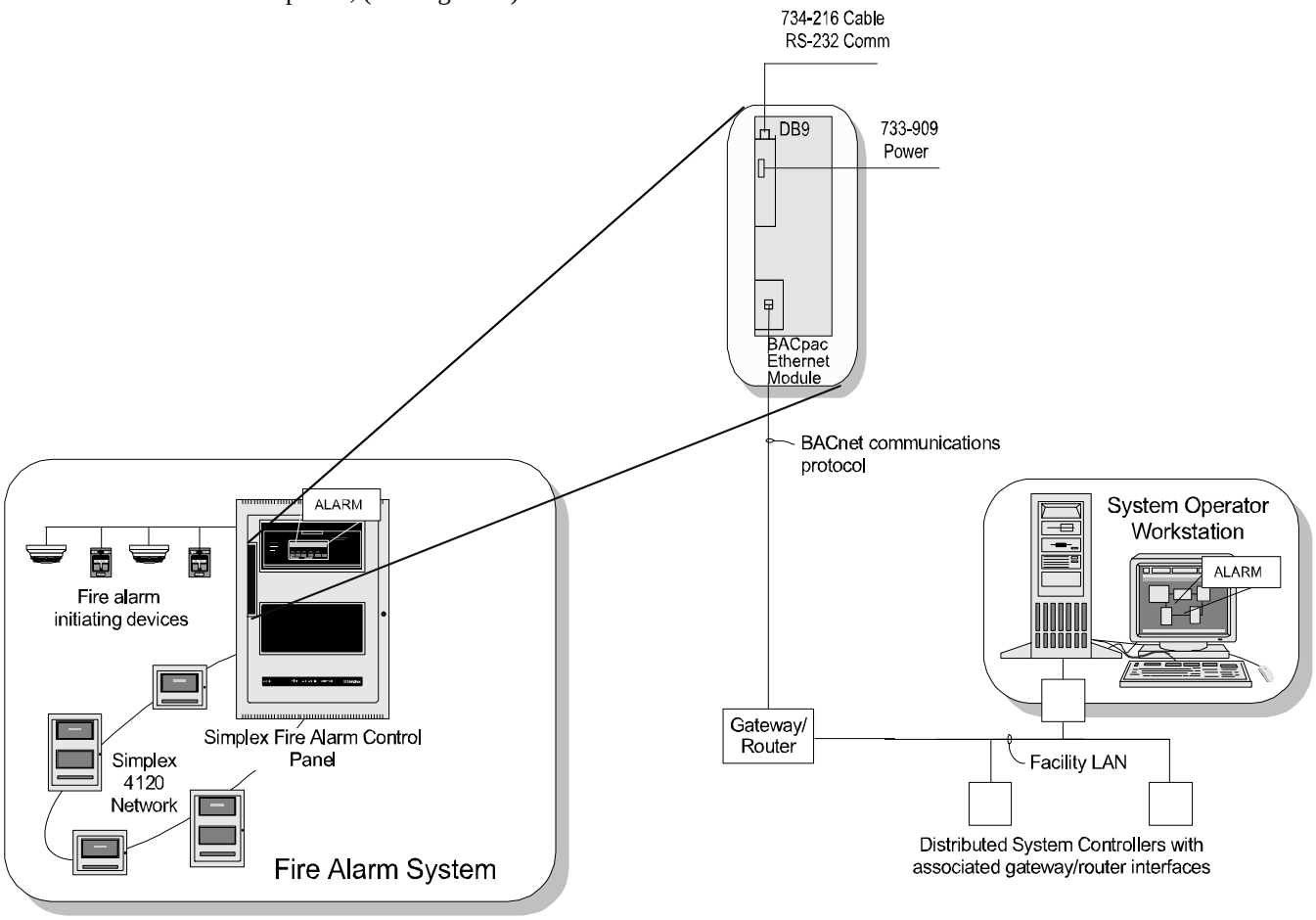

Figure 1: BACPac Ethernet Module Location Within the Control Panel

The basic BACPac Ethernet Module assembly consists of two modules that consist of:

- the electronics of the BACPac Ethernet Module
- a suppressor through which the LAN interface must be connected.

Continued on next page

General Information About the BACPac Ethernet Module, *Continued*

Introduction

The BACPac Ethernet module installs in a 2-inch legacy-style card slot. Each BACPac Ethernet module contains a ProtoCessor module mounted onto a Protocarrier module which is plugged into a LAN suppressor. See Figure 2 for details.

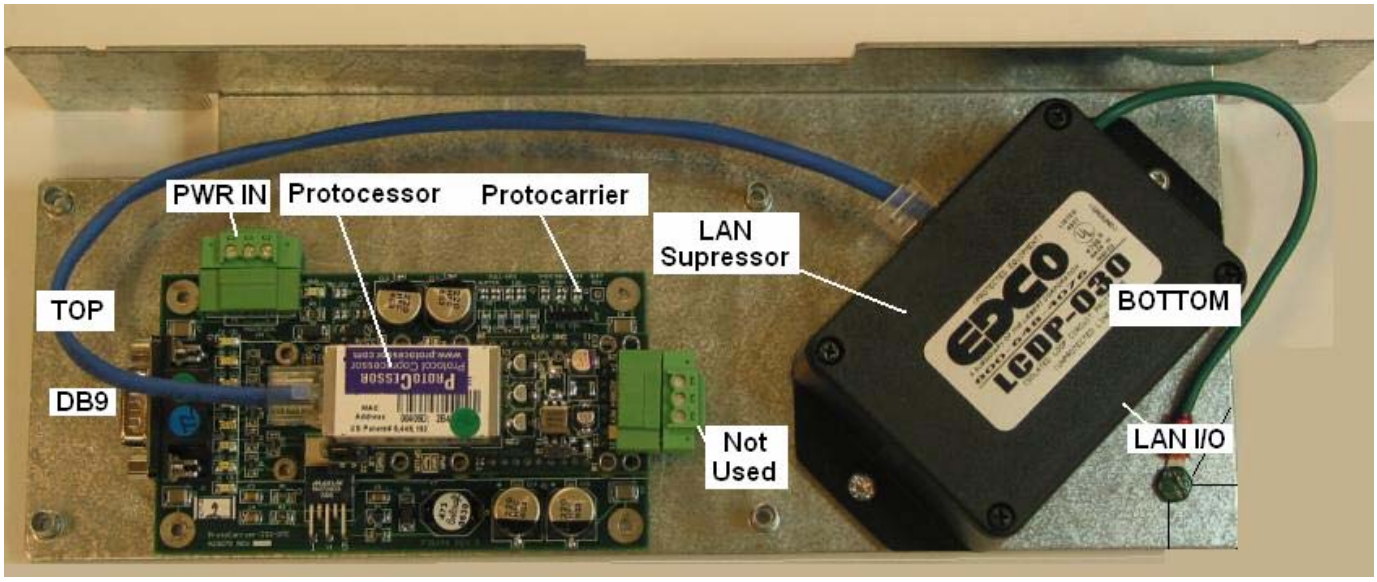

Figure 2: BACPac Ethernet Module

Related Documentation

Table 1: Related Documents

Document	Document Number
4100 Field Wiring Diagram	841-731
4100/4120 Interconnect Diagram	841-869

Specifications

Table 2: Power Requirements

Voltage	24 VDC or AC
Current	123 mA maximum

Table 3: Environmental Limitations

Operating Temperature Range	32° to 120° F (0° to 49° C)
Humidity	10% to 95% RH (relative humidity) from 32° to 113° F (0° to 45° C), non-condensing

Portal Interface
One 9-pin EIA-232 connector.

Continued on next page

Specifications

Status Indicators

The RS-232 Signal LEDs are each labeled and correspond to the respective data and control signals. Each label also shows the number of the connector pin on which the signal is transmitted or received. The available signal types are: TX, RX, RTX, CTS, DTR, DSR, DCD, and RI (See Figure 3).

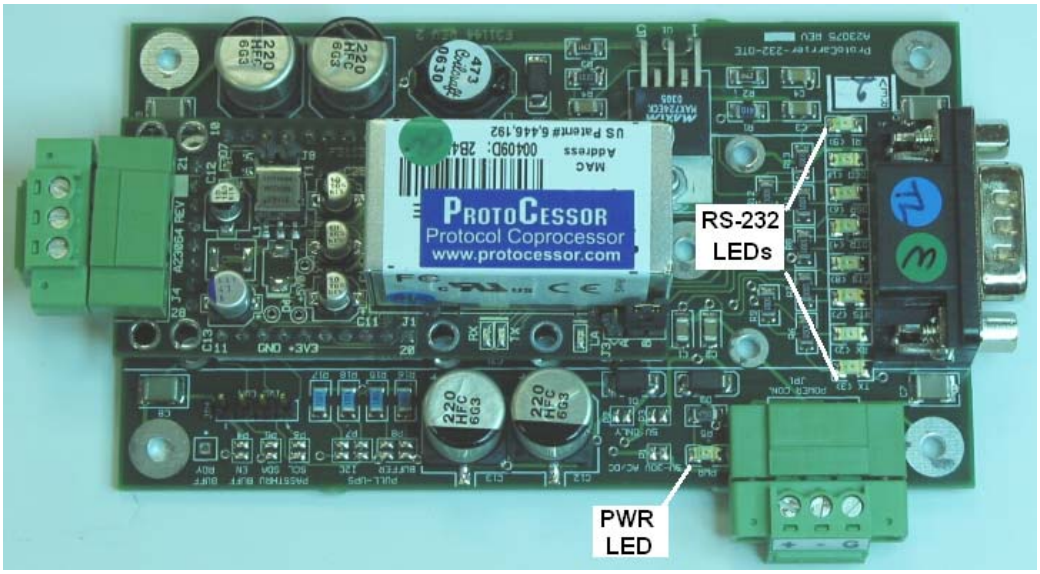

Figure 3: Protocarrier Status LEDs

BACPac Ethernet Module Programming and Installation

Overview

Installation of the BACPac Ethernet module into a 4100ES/4100U/4100 control panel requires three separate steps:

1. Program the host panel to communicate with the BACPac Ethernet module.
2. Configure the host panel to send point information to the BACPac Ethernet module.
3. Physically install the BACPac Ethernet module into the system host panel.

Programming the 4100 Host

Note: The BACPac Ethernet Module may be installed in a 4100 Legacy Control Panel, a 4100U Control Panel, or a 4100ES Control Panels. The programmer will be covered in this section. The Legacy programmer will use the same settings as the 4100U and 4100ES.

Both the RS-232 card and the BACPac Ethernet Module ProtoCessor need to be configured for the same communications settings. Table 4 shows the options available for the RS-232 card. The Default RS-232 card settings are the preferred/recommended settings. These must be set in the 4100U/4100ES Programmer, the job built and downloaded into the panel (there are other settings which need to be made so hold off on building the job).

Table 4: RS-232 Options

Settings	Default	Options
Baud rate	9600	75, 110, 134.5, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200
Parity	*EVEN	ODD, EVEN, MARK, SPACE, NONE
Data Bits	8	7 or 8
Stop Bits	1	1 or 2

* Odd or Even parity is recommended to provide additional error detection at the character level.

Continued on next page

Programming the 4100 Host

RS-232 Card Settings

We covered the communications settings above so the image here is a reference only. One thing to stress is USE PORT B, not port A. Port A was designed to support a service modem and as a result it broadcasts a modem startup string when the panel is powered up. We have had instances where the startup string has caused external programs to lockup. Port B does not have the startup string and is immune to this potential problem. With the communication settings confirmed, click on the Port Data button, as seen in Figure 4.

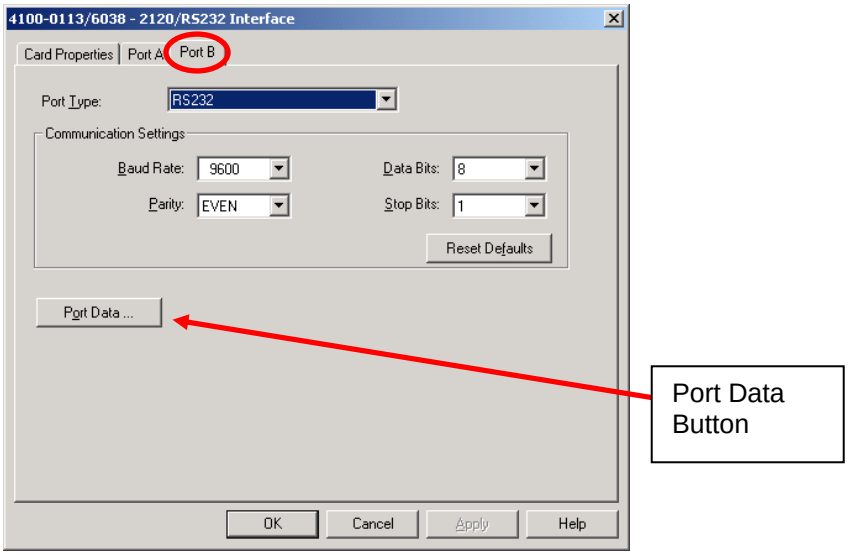

Figure 4: Port Data button

The RS-232 card has a number of configuration options for the device type. Follow this procedure.

1. Configure the RS-232 card for COMPUTER.

2. Leave the Port default SET priority at the default of 9 (as seen in Figure 5). This will restrict access to panel features (like Silence, Acknowledge and Reset). These features will only be available from the front panel or on another approved network device like a workstation, NDU or LCD Annunciator.

3. Change the Header and Port ID labels so they indicate BACnet or BACPac Ethernet interface.

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Programming the 4100 Host

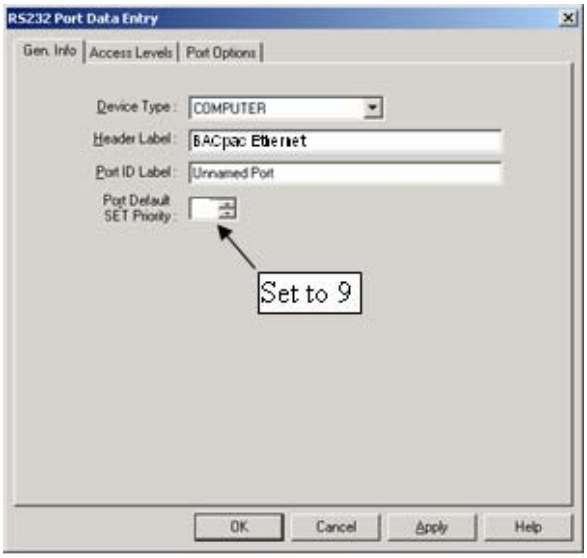

Figure 5: Port Default SET Priority

Leave access levels at the default settings. No changes are required. See Figure 6.

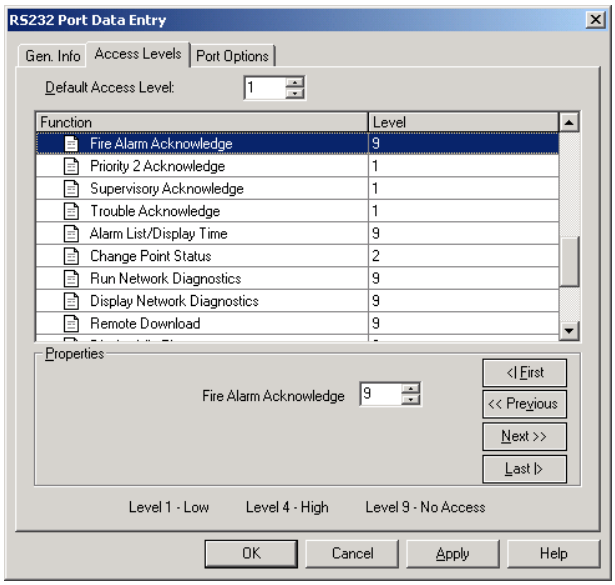

Figure 6: Access levels

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Programming the 4100 Host

The Port Options remain in the default state, as seen in Figure 7.

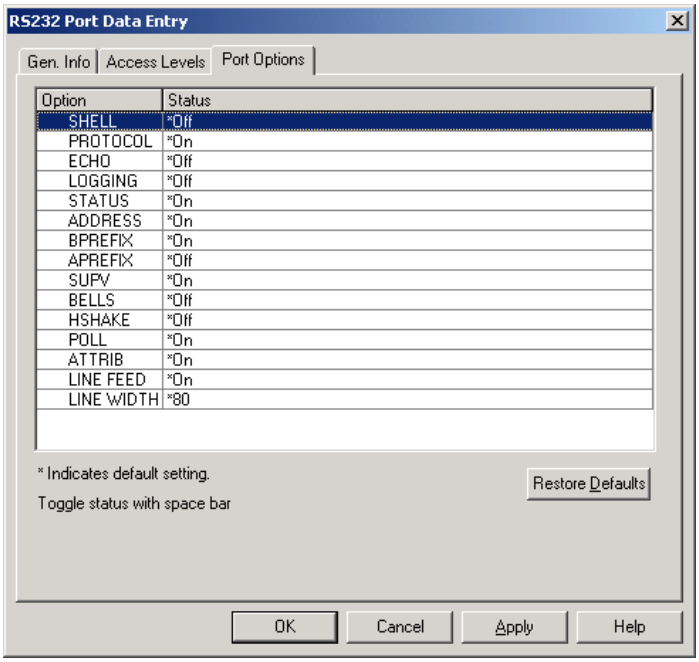

Figure 7: Port Options

A few of the more important items in this tab include:

- PROTOCOL
- SUPV
- POLL

These three options provide some important features:

PROTOCOL: Indicates that you will be using the Computer Port Protocol structure to send and receive messages. This protocol defines how to structure a message, which characters to use for the start and finish, how to maintain sequence numbers for message and how to calculate and where to locate the checksum in the message. All of these features help to ensure that no messages are lost/missed and that the message is correct when it is received.

SUPV: Stand for supervision, refers to the monitoring of the physical line connecting the two devices. This must be used in conjunction with POLL.

POLL: Stands for polling, refers to the method of supervision used to monitor the line. The process control world sometimes refers to this as a heartbeat. Every 30 seconds the fire panel will send a message to the external device, the external device is expected to ACK the message and then send a message back to the panel which the panel will ACK. If any part of the sequence does not happen, the panel will start the poll over. If any part fails again, the panel will report a Trouble (indicating Port B Abnormal), and begin trying to re-establish communications with the external device. Once the connection has been re-established, the trouble will clear.

Continued on next page

Programming the 4100 Host

Supervision and Polling adds work to the code required for the interface, but it ensures that the communication link is in place and that the messages sent to and from the panel are received intact/not corrupted.

Point Information Transfer Programming

The above procedure will allow the BACPac Ethernet Module and 4100U/4100ES to communicate. The next step is to add programming to allow the 4100U/4100ES to send point information to the BACPac Ethernet Module. The Simplex Technical Representative (TR) is not required to program the BACPac Ethernet Module in the field. Instead, the TR simply reprograms the 4100/4120 via the Custom Control option. The Portal has been preprogrammed with 4100/4120 digital pseudo-points, already linked to BACnet objects. If the TR wants to send a point out to the BACnet world, all he or she must do is tell a pseudo point to turn on. The BACPac Ethernet Module then sends out a related BACnet object.

Example

If the customer wishes to add a point that is sent to the BACnet world, a 4100/4120 digital pseudo point is linked to a BACnet object in the BACPac module configuration file. Assume the desired pseudo point is P512. The following is an example program:

```
M1-1 ALM            ; Alarm Status of Simplex Point
Out:
TRACK P512 on       ; SIMPLEX 130-0-0 TO BACNET OBJECT 1
End:
;
In:
M1-1 TBL            ; Trouble Status of Simplex Point
Out:
Track P513 on       ; SIMPLEX 130-1-0 TO BACNET OBJECT 2
End:
```

When Pseudo Point P513 turns on, the BACPac Ethernet Module will send out the related BACnet object. (See Default Configuration Worksheets).

System Options

In order for the 4100U/4100ES to properly send the pseudo point information to the BACPac module, pseudo point reporting must be activated for RS-232 Port B. To do so, select “Port Vectoring” in the 4100U/4100ES Programmer, RS-232port B and make sure Pseudo points are checked in the selection page.

Installation

The BACPac Ethernet Module may be installed in any 2” slot that is within reach of the power and data interface connections. The power cable is 48” long and the RS-232 cable is 48” long. As shown in Figure 8, the power cable is terminated at any legacy style power plug for power (“A”), or the 4100U/4100ES CPU Motherboard P7(“B”).

Note: If a power plug is not available, cut the plug off the end of the 733-909 harness and connect the white wire to + and the black wire to – of the AUX POWER terminals of the System Power Supply (SPS) or Expansion Power Supply (XPS).

The Data terminates at a terminal strip at the bottom of an RS-232 legacy Motherboard or the CPU motherboard.

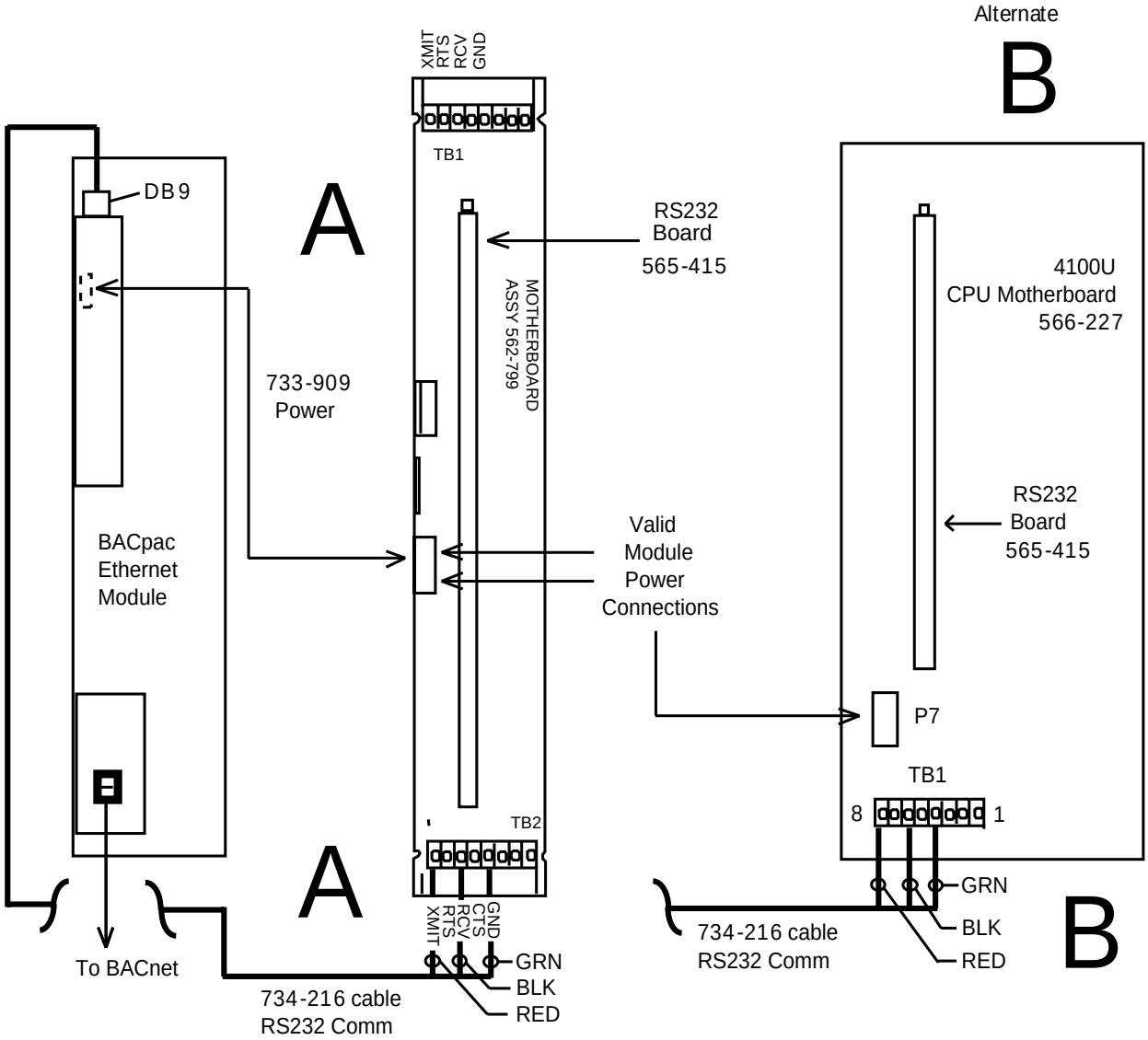

Figure 8: BACPac Ethernet Module Interconnections (4100U Shown)

Continued on next page

Installation

1. Remove and inventory all parts. You should have the following parts:
   - 1 BACPac Ethernet Module Assembly
   - 1 734-216 Data harness
   - 1 733-909 Power harness
   - 4 screws
   - 4 Wire ties
   - 4 Stand-offs
   - 8 lock washers
   - 4 washers
2. Make sure the power is off to the system which will host the BACPac Ethernet Module.
3. Select a location for the BACPac Ethernet Module.
4. Estimate route of Power Harness (733-909) and cut/strip if needed for best fit to ProtoCarrier JP1
5. Connect the power harness to the ProtoCarrier Power terminal block and per Table 5.

Note: If a power plug is not available, cut the plug off the end of the 733-909 harness and connect the white wire to + and the black wire to – of an appropriate internal 24VDC power source.

Table 5: Wiring Connections

Signal	FROM (ProtoCarrier)	TO (Legacy Mother Board)	To (4100U/4100ES CPU Mother Board)
Power+	733-909 Harness white wire to "+" Connection on Pluggable Terminal Block which plugs into JP1	733-909 Harness plug end to either of the 2 lower power connections in P3 of the Legacy Motherboard	733-909 Harness plug end to P7 in the lower left area of the CPU Motherboard
Power-	733-909 Harness Black wire to "-" Connection on Pluggable Terminal Block which plugs into JP1	733-909 Harness plug end to either of the 2 lower power connections in P3 of the Legacy Motherboard	733-909 Harness plug end to P7 in the lower left area of the CPU Motherboard
RS-232 Xmit	Pin #3 of DB9 connectors at the top of the ProtoCarrier to the black wire of the 734-216 harness	Black wire to TB2-3 on the bottom of the RS-232 legacy motherboard (Receive)	Black wire to TB1-6 on the bottom of the CPU motherboard (Receive)
RS-232 Rcv	Pin #2 of DB9 connectors at the top of the ProtoCarrier to the red wire of the 734-216 harness	Red wire to TB2-1 on the bottom of the RS-232 motherboard (Transmit)	Red wire to TB1-8 on the bottom of the CPU motherboard (Transmit)
RS-232 Gnd	Pin #5 of DB9 connectors at the top of the ProtoCarrier to the green wire of the 734-216 harness	Green wire to TB2-5 on the bottom of the RS-232 motherboard (Ground)	Green Wire to TB1-4 on the bottom of the CPU Motherboard

6. Install the BACPac Ethernet Module into an appropriate 2-inch slot, using the 4 screws, washers and as many of the stand-offs as needed.
7. Connect the DB9 connector of the 734-216 Data cable to the top of the ProtoCarrier.
8. Route the RS-232 cable to the desired connection point. Cut off excess data cable and strip jacket about 2". Strip ¼" of insulation of the Red, Black and Green wires. Bend back and tape the white and brown wires over the jacket. They will not be used.
9. Install the Red, Black and Green wires into TB2 on the Legacy motherboard, or TB1 on the 4100U/4100ES CPU Motherboard per Table 5 and Figure 8.
10. Carefully check all connections between the ProtoCessor and the termination points.
11. Apply power to the system.

BACPac Ethernet Module Testing and Maintenance

Testing

After power is applied and the host 4100 system has stabilized, the following should be observed if the BACPac Ethernet Module is properly installed:

- The Green "PWR" LED next to the power plug on the BACPac Ethernet Module should be lit
- The 4100 port (Programmed as type "Computer port") to which the BACPac Ethernet Module is connected should be in a normal state.
- There should be a periodic blink (about every 30 seconds) of the TX and RX LED's on the ProtoCarrier, indicating the supervision handshake between the 4100 and BACPac Ethernet Module.

Testing the BACPac Before connecting it to the LAN:

The BACPac LAN hardware may be tested using utilities from FieldServer.com You will need the RUINET and RUIPING utilities. Go to www.fieldserver.com. Download the utilities by going to the Support Link and then the Downloads link.

Connections: After downloading and installing the above utilities into a PC, connect the PC LAN port to the BACPac Ethernet Module using a standard LAN cable and a hub or a crossover LAN cable with no hub. (If you have a PC that automatically adjusts the Ethernet port I/O pins, a standard LAN cable may be used, without a hub.)

Note: It may be necessary to disable the wireless LAN port on the PC for proper operation.

The IP address of the BACPac Ethernet Module may be verified by using the Ping utility. Simply start the utility, and observe the display. It should look something like this:

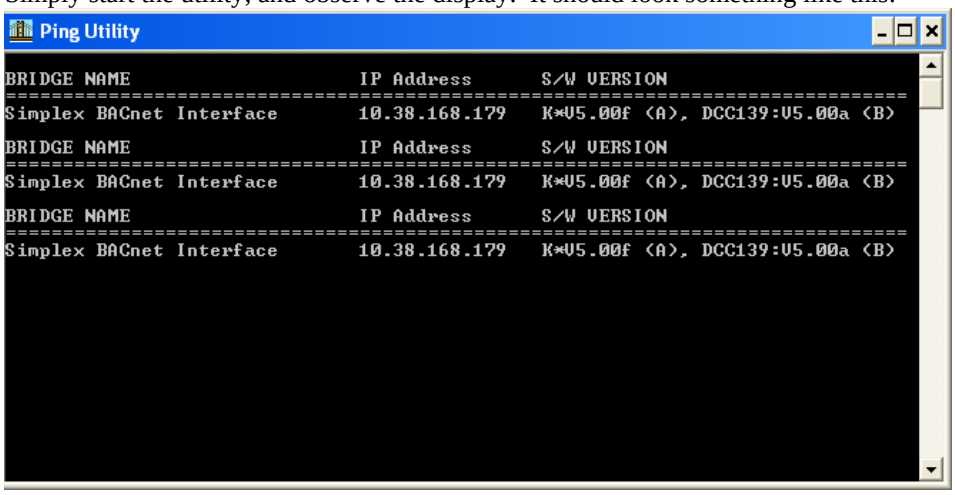

Figure 9: How the Ping Utility Appears on a PC screen

In this case, the utility has located a BACPac with the IP Address of 10.38.168.179
Note: The address is continuously scanned and displayed.

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Testing

The Ping Utility will verify that the BACPac module is able to communicate over the LAN. The default IP address and Subnet Mask for this unit is:

IP Address	192.168.1.24
Subnet Mask	255.255.255.0

If needed, the IP address of the BACPac Module may be set using the RUI Utility. See "I" in Figure 11.

The operation of the BACPac module may be tested using the RUINET Utility. Be sure to set up your PC Ethernet port with the appropriate IP address access. With the BACPac connected to the LAN of your computer, start the RUINET utility. Full instructions for using this software may can be found in the manual, which can be downloaded from www.fieldserver.com . We will touch on a few of the most useful menus.

If the BACPac Ethernet Module is communicating with your PC, you will see the following page:

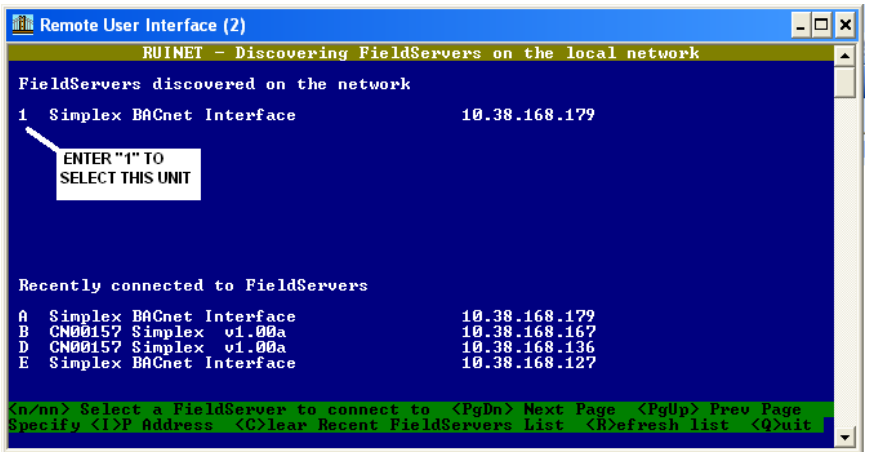

Figure 10: Top Screen of RUI Utility

Pressing "1" will result in this selection menu:

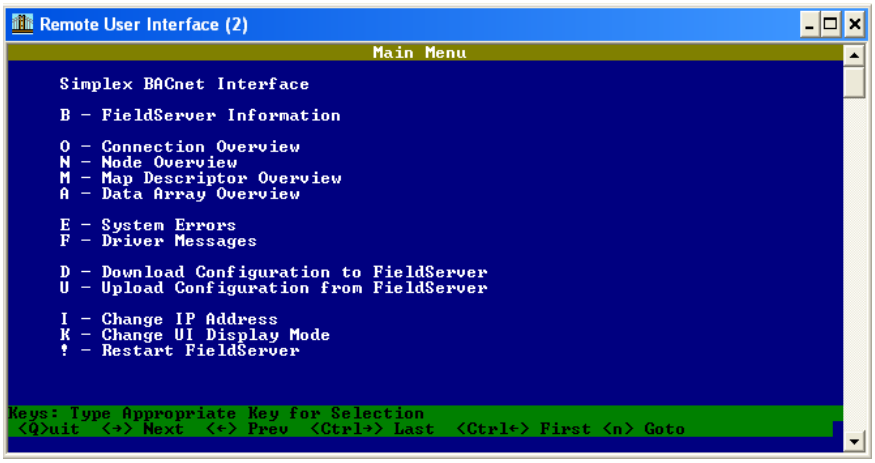

Figure 11: BACPac Interface Selection Menu

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Testing

We will discuss selections “O” and “A”

Pressing the letter “O” will display a page of BACPac communication data for 3 ports on the Module:

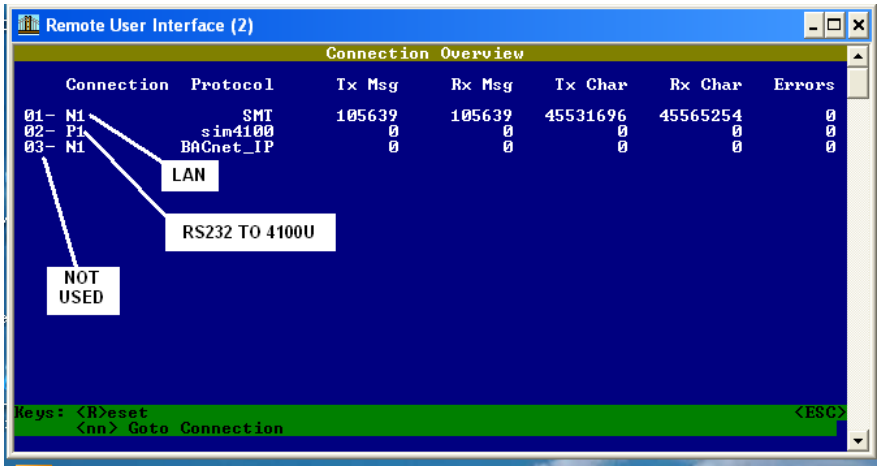

Figure 12: BACPac Interface Communications Data (Selection “O”)

Normal operation should show Zero errors on all ports, and a continuously updated reading of parameters for port N1 (the LAN) and occasionally updated listings for port P1 (the RS-232 port.) In short, this page indicates the quality of data communications between the BACPac module and the PC, and between the BACPac module and the 4100U/4100ES.

Depress the “ESC” key as many times as needed to step back to the Main Menu

The other menu selection we will discuss is selection “A”. This selection will give access to the data arrays programmed in the BACPac module. Figure 13 shows the Data Array Overview screen. In this example, there are 10 data arrays in the module. The arrays that contain the 4100 pseudo points are labeled with 4100 pseudo point card addresses #130-133.

To view the array for pseudo card:	Enter:
#130 (P513-P762)	04
#131 (P769-P1018)	05
#132 (P1025-P1274)	06
#133 (P1281-P1530)	07

Note: The data array numbers may change in the future, but the pseudo card numbers (130-133) will not change.

Continued on next page

Testing

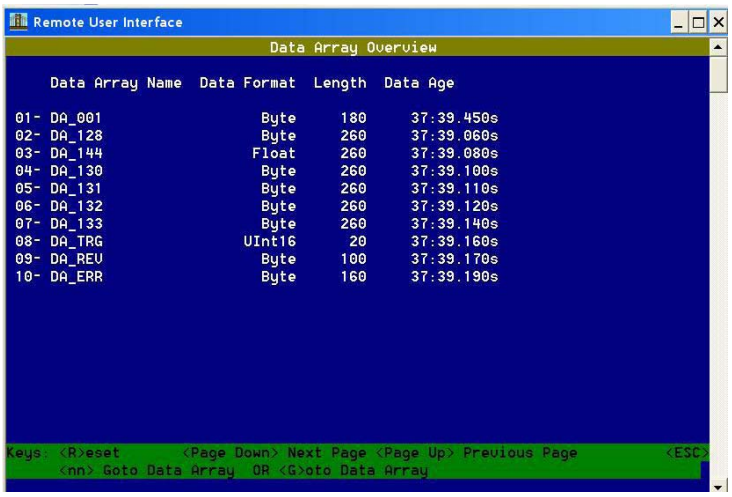

Figure 13: BACPac Data Array Overview (Selection "A")

Entering "04"will bring up the first 192 pseudo points in the array for card #130. If a point is "ON", the array contains a "10" for the array segment corresponding to the point. If the point is "OFF", the value is "00". In this example, pseudo point 513 (the first one) is the only point ON of the first 192. The pseudo points are listed left to right, top to bottom. For example, this display represents points P513 through P705. To see the rest of the array, press the "+" key. To return the display to the first 192 points, press the "-" key.

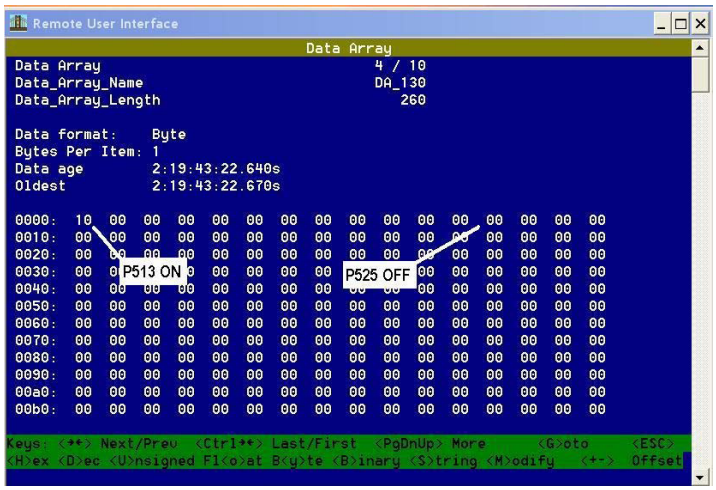

Figure 14: Data Array showing Pseudo Point Status

To test, turn on the desired pseudo point manually via the 4100 keyboard and observe the display.

Note 1: If the data does not change when the pseudo points are turned on and off, check the 4100U/4100ES program options to verify that the pseudo points are checked as being vectored out RS-232 Port B.

Note 2: If the pseudo was already on when the BACPac was connected to the 4100U/4100ES, it does not show as being on, because the status message was already sent out the port. The data arrays contain the last status received for a point.

Continued on next page

BACPac Ethernet Module Testing and Maintenance, *Continued*

Testing

To exit this program hit the escape key as many times as needed to step back to the original menu, and then hit the “Q” key, or simply hit the “Q” key as many times as needed to exit.

Next you will need to coordinate with the Customer supplied BACnet experienced technician to test the interface between the 4100U/4100ES and the BACnet. All mapped points should be tested. It is not the Simplex Technicians responsibility to program the external equipment to which the BACPac Ethernet Module interfaces.

Maintenance

For service, call your local Simplex Grinnell Branch Office.

Appendix

Testing

Table 6 : BACPac Ethernet Module Field Replaceable Units

Description	Part Number
BACPac Ethernet Module	4100-6069

BACPac Ethernet Module Default Configuration

The Simplex BACPac Ethernet Module is shipped with a default program configuration loaded in Portal Memory. Table 7 lists the default BACnet Network Settings.

Table 7: BACnet Default Settings

Description	Default Setting
Device Instance	32400
IP Address	192.168.1.24
Subnet Mask	255.255.255.0

Cross Reference of Data Arrays

As stated previously in this manual, the arrays that contain the 4100 pseudo points mapped to the BACPac module are labeled with pseudo point card addresses #130-133. The structure is as follows:

- DA-130 contains pseudo points P513-P762.
- DA-131 contains pseudo points P769-P1018.
- DA-132 contains pseudo points P1025-P1274.
- DA-133 contains pseudo points P1281-P1530.

More details can be obtained from the configurations file for the BACPac module. To obtain this file, download the RUINET utility software from www.fieldserver.com. Select "U" in the main menu for the RUINET utility to upload the configuration file. This file will be placed in the Fieldserver Utilities program area, which you can access by selecting **Start**, **All Programs**, and **Field Server Utilities** from the lower left corner of your screen.

As shown in Figure 14 in this manual, the points in the array start at the top left corner and are read left to right and top to bottom.

Continued on next page

Cross Reference of Data Arrays

Table 8 shows several segments from the configuration file of a typical BACPac module. The Data Array Offset is the point number in the array. For example, P524 is array cell #12 in Array DA_130; P843 is array cell #75 in Array DA_131, and so forth.

Table 8: Configuration File Segments

Map Descriptor Name	Data Array Name	Data Array Offset	Function	Node Name	Data Type
P519	DA_130	7	Server	SimplexPanel01	Bl
P520	DA_130	8	Server	SimplexPanel01	Bl
P521	DA_130	9	Server	SimplexPanel01	Bl
P522	DA_130	10	Server	SimplexPanel01	Bl
P523	DA_130	11	Server	SimplexPanel01	Bl
P524	DA_130	12	Server	SimplexPanel01	Bl
--	--	--	--	--	--
P840	DA_131	72	Server	SimplexPanel01	Bl
P841	DA_131	73	Server	SimplexPanel01	Bl
P842	DA_131	74	Server	SimplexPanel01	Bl
P843	DA_131	75	Server	SimplexPanel01	Bl
P844	DA_131	76	Server	SimplexPanel01	Bl
P845	DA_131	77	Server	SimplexPanel01	Bl
--	--	--	--	--	--
P1046	DA_132	22	Server	SimplexPanel01	Bl
P1047	DA_132	23	Server	SimplexPanel01	Bl
P1048	DA_132	24	Server	SimplexPanel01	Bl

BACNet Protocol Implementation Conformance Statement

BACNet Protocol

Date: July 13, 2006 Vendor Name: BACPac Ethernet Module Technologies
Product Name: BACPac Ethernet Module Product Model ASP-485 ProtoCessor Number:
Product Description: This software product will provide bi-directional communication between various RTU, DCS, SCADA and PLC using most common protocols and a BACnet system. The BACPac Ethernet Module can perform protocol conversion (as opposed to routing) between the different BACnet Data Link Layer options. This is arranged by way of static mappings.
Protocol Conversions:See BACPac Ethernet Module Technologies list of protocol drivers available to determine available protocol conversions.

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Appendix

BACNet Protocol Implementation Conformance Statement

BACNet Standardized Device Profile (Annexe L)

BACnet Smart Sensor (B-SS)
BACnet Smart Actuator (B-SA)
BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):
K.1.2 BIBB -Data Sharing -ReadProperty-B (DS-RP-B)
K.1.8 BIBB -Data Sharing -WriteProperty-B (DS-WP-B)
K.5.2 BIBB -Device Management -Dynamic Device Binding-B (DM-DDB-B)

Segmentation Capability: None
Standard Object Types Supported

- Device Object
- Analog Input
- Analog Output
- Analog Value
- Binary Input
- Binary Output
- Binary Value
- Multi State Input Output
- Multi State Output
- Multi State Value

For all these properties the following apply:

- Does not support BACnet CreateObject
- Does not support BACnet DeleteObject
- Does not support any optional properties
- No additional writeable properties exist
- No proprietary properties exist
- No range restrictions exist

Data Link Layer Options:

- MS/TP master (Clause 9), baud rate up to 76800 bps
- MS/TP slave (Clause 9), baud rate up to 76800 bps

Device Address Binding:

- Not supported

Character Sets Supported:
Where support for multiple character sets is indicated, this does not imply that they can all be supported simultaneously.

- ANSI X3.4.
- ISO 10646 (ICS-4)
- ISO 10646 (UCS-2).
- ISO 8859-1
- IBM/Microsoft DBCS

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