ProSoft
TECHNOLOGY

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EGD

ProLinx Gateway
GE Ethernet Global Data

PROTOCOL MANUAL

Your Feedback Please

We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about our products, documentation, or support, please write or call us.

ProSoft Technology® Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided on the enclosed CD-ROM, and are available at no charge from our web site: www.prosoft-technology.com

Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

A   WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;

B   WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES

C   WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

D   THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

All ProLinx® Products

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT – RISQUE D'EXPLOSION – AVANT DE DÉCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Markings

cULus	ISA 12.12.01 Class I, Div 2 Groups A, B, C, D
cULus	C22.2 No. 213-M1987

⟨Ex⟩   C €   c(UL)us
183151

CL I Div 2 GPs A, B, C, D

II 3 G

Ex nA nL IIC X

0°C <= Ta <= 60°C

II – Equipment intended for above ground use (not for use in mines).

3 – Category 3 equipment, investigated for normal operation only.

G – Equipment protected against explosive gasses.

ProLinx Gateways with Ethernet Ports

Series C ProLinx™ Gateways with Ethernet ports do **NOT** include the HTML Web Server. The HTML Web Server must be ordered as an option. This option requires a factory-installed hardware addition. The HTML Web Server now supports:

- 8 MB file storage for HTML files and associated graphics files (previously limited to 384K)
- 32K maximum HTML page size (previously limited to 16K)

To upgrade a previously purchased Series C model:

Contact your ProSoft Technology distributor to order the upgrade and obtain a Returned Merchandise Authorization (RMA) to return the unit to ProSoft Technology.

To order a ProLinx Plus gateway with the -WEB option

Add **-WEB** to the standard ProLinx part number. For example, **5201-MNET-MCM-WEB**.

Contents

1   Ethernet Global Data

In This Chapter

GE Fanuc Automation and GE Drive Systems developed an Ethernet Global Data, or EGD, exchange for PLC and computer data in 1998. GE Ethernet Global Data (EGD) offers versatility where a mix of control devices requires cooperation with each other. This involves sharing of information across the applications regardless of device or network type, often at high speed, and with high reliability. Bandwidth utilization is optimized by using efficient communication methods. High reliability means fewer communication failures and having the ability to detect failures upon occurrence. Particular emphasis is delivered for applications requiring periodic or frequent updates and time synchronization of devices. The protocol supports Unicast, Broadcast and Multicast group messaging. Efficiency is based on the fact that each device on the network can produce these types of messages, and each device determines which of these messages to consume.

The gateway supports the following functions specified in the EGD protocol:

Code	Description
3	Retrieve Configuration Request (example provided)
4	Retrieve Configuration Response (example provided)
7	Summary Request
8	Summary Response
9	Capabilities Request
10	Capabilities Response
15	Statistics Request
16	Statistics Response
18	Command NAK
32	Read Request
33	Read Response
34	Write Request
35	Write Response
36	Masked Write Request
37	Masked Write Response

1.1 Ethernet Global Data Compatible Devices

Devices that support the Ethernet Global Data protocol:

- GE Series 90-70 PLC CPU (CMM742 with EGD support)
- GE Series 90-30 PLC CPU 364 (with EGD support)
- VersaMax CPU E05
- Several drives and turbines
- Ethernet Global Data Service for NT
- CIMPLICITY HMI software
- Several HMI products

Warning: When interfacing with a GE RX3i Controller, all reserved bits within the RX3i Controller must be set to 0 in order to communicate with the ProLinx module. Also, the use of a Configuration Server is not supported.

2 Functional Overview

The Ethernet Global Data (EGD) driver can be used to interface many different protocols with EGD devices. The EGD driver supports both the producer/consumer service port (18246) and the command service port (7937) using the UDP protocol over an IP network. The user defines the data to be produced and consumed in a configuration file downloaded to the gateway. The command service is limited to responding to requests from other units. The gateway will not initiate commands.

The driver interfaces with a common internal database in the gateway. This permits the sharing of data across many different networks. The following illustration shows the functionality of the EGD driver running on a ProLinx gateway:
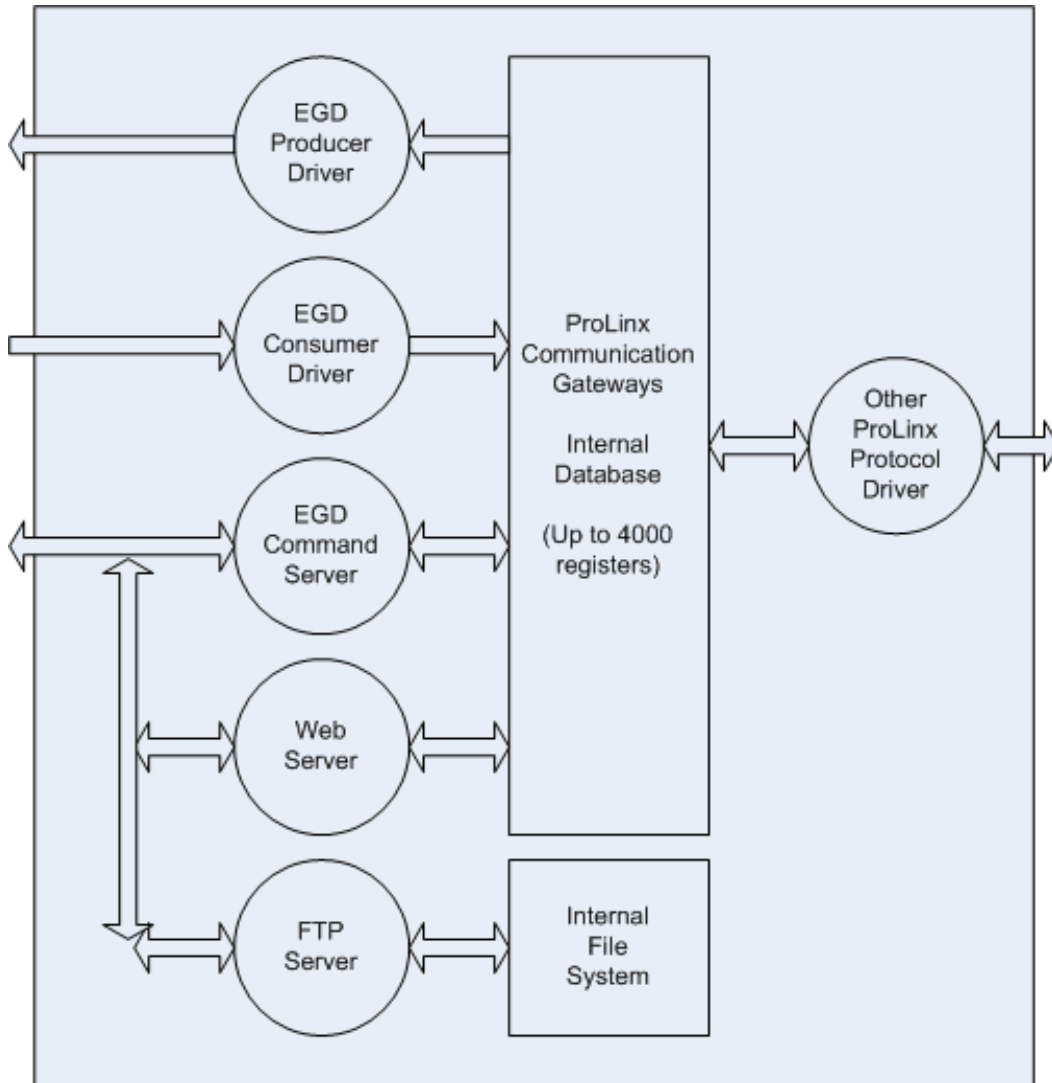
2.1 EGD Command Server

The gateway supports UDP service port 7937 (0x1F01) to handle all command requests. The gateway will only service requests and generate response messages. **It will not generate command requests.** The gateway supports the following functions specified in the EGD protocol:

Code	Description
3	Retrieve Configuration Request (page 12) (example provided)
4	Retrieve Configuration Response (page 12) (example provided)
7	Summary Request (page 18)
8	Summary Response (page 18)
9	Capabilities Request (page 16)
10	Capabilities Response (page 16)
15	Statistics Request (page 20)
16	Statistics Response (page 20)
18	Command NAK (page 22)
32	Read Request (page 23)
33	Read Response (page 23)
34	Write Request (page 25)
35	Write Response (page 25)
36	Masked Write Request (page 27)
37	Masked Write Response (page 27)

The gateway only supports address type 0 for the read and write commands. Therefore, the data requested is relative to the EGD exchange delimited in the request. In order to use these functions, an exchange must first exist in the gateway's exchange list defining the database and register count. If the production/consumption time is set to zero, the exchange will never be produced or consumed and will only be valid for command processing. These functions should be used for data that is not time critical and does not require periodic updating. The maximum length of the message is 1400 bytes.

The gateway supports the masked write request command to alter one or more bits. Multiple cells can be provided in the request to alter more than one byte of data. The maximum length of the message is 1400 bytes.

Refer to EGD Protocol Specific Configuration (page 33) for information on the data structures required for each command. Command support is usually not available in most EGD devices or drivers. Most devices only support the producer/consumer services. Therefore, this service may not be utilized by those devices.

2.1.1 Retrieve Configuration PDUs Example

PDU Type = 3

Retrieve Configuration Request

The *Retrieve Configuration Request* PDU command permits an application program to request the configuration details associated with a matching Producer and Exchange ID. A *Retrieve Configuration Request* sent from a requesting node must be followed by a *Retrieve Configuration Response* message from the responding node.

Packet Info	Description		Data		
Ethernet II	Destination MAC:		`00:0D:8D:00:13:83`		
	Source MAC:		`00:12:3F:AE:5C:AE`		
	Type:		`0x0800 - Ipv4`		
IPv4	Version:		`0x4`		
	Header Size:		`20 bytes`		
	Type of service:	`000----0:`	Routine	`(0x 00)`	
		`---0---0:`	Normal Delay		
		`----0-—0:`	Normal throughput		
		`-----0-0:`	Normal reliability		
		`------00:`	Normal Monetary cost		
	Total Length:		`44 bytes (0x002C)`		
	Identification:		`2645 (0x0A55)`		
	Flags:	`00-:`	May Fragment	`(0x 00)`	
		`0-0:`	Last Fragment		
	Fragment Offset:		`0 bytes (0x0000)`		
	Time to Live:		`64 (0x40)`		
	Protocol:		`17 (0x11) [UDP]`		
	Header Checksum:		`39947 correct (0x9C0B)`		
	Source Address:		`105.102.0.200 (0x 69 66 00 C8)`		
	Destination Address:		`105.102.0.205 (0x 69 66 00 CD)`		
UDP	Source Port:		`7937 (0x 1F01)`		
	Destination Port:		`7937 (0x 1F01)`		
	Length:		`24 bytes (0x 00 18)`		
	Checksum:		`32236 - correct (0x 7DEC)`		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 03
		Message Flag:	1	1	0x 00
		Request ID:	2	2	0x 11 11
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x 00

Packet Info	Description		Data		
		Message Length:	6	2	0x 10 00
		Producer ID:	8	4	0x 69 66 00 C8
		Exchange ID:	12	4	0x E0 2E 00 00

This is an example of an EGD Configuration Request Command Production Data Unit.

This is the hexadecimal representation of the *Retrieve Configuration Request* from the above table. It includes the Ethernet II, IPv4, UDP, and within UDP, the EGD Command PDU Type 3 depicted in bold font.

```
00 0D 8D 00 13 83 00 12 3f AE 5C AE 08 00 45 00
00 2C 0A 55 00 00 40 11 9C 0b 69 66 00 C8 69 66
00 CD 1F 01 1F 01 00 18 7D EC 03 00 11 11 01 00
10 00 69 66 00 C8 E1 2E 00 00
```

PDU Type = 4

Retrieve Configuration Response

The *Retrieve Configuration Response* PDU supports the retrieval of exchange configurations for Ethernet Global Data. This message packet will be sent in response to a *Retrieve Configuration Request* message.

Packet Info	Description		Data (Hex)	
Ethernet II	Source MAC:		00:12:3F:AE:5C:AE (0x 00 12 3F AE 5C AE)	
	Destination MAC:		00:0D:8D:00:13:83 (0x 00 0D 8D 00 13 83)	
	Type:		0x0800 – IPv4 (0x 08 00)	
IPv4	Version:		0x45 (0x 45)	
	Header Size:			
	Type of service:	000----0:	Routine	(0x 00)
		---0---0:	Normal Delay	
		----0--0:	Normal throughput	
		-----0-0:	Normal reliability	
		------00:	Normal Monetary cost	
	Total Length:		104 bytes (0x00 68)	
	Identification:		2645 (0x00 04)	
	Flags:	00-:	May Fragment	(0x 00)
		0-0:	Last Fragment	
	Fragment Offset:		0 bytes (0x00 00)	
	Time to Live:		254 (0x FE)	
	Protocol:		17 [UDP] (0x 11)	
	Header Checksum:		8168 correct (0x E8 1F)	
	Source Address:		105.102.0.200 (0x 69 66 00 C8)	
	Destination Address:		105.102.0.205 (0x 69 66 00 CD)	

UDP	Source Port:		1025 (0x 04 01)		
	Destination Port:		7937 (0x 1F 01)		
	Length:		84 bytes (0x 00 54)		
	Checksum:		62188- correct (0x EC F2)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 04
		Message Flag:	1	1	0x 00
		Request ID:	2	2	0x 11 11
		PVN1:	4	1	0x 01
		Status:	5	1	0x 00
		Message Length:	6	2	0x 4C 00
		Producer ID:	8	4	0x 69 66 00 C8
		Exchange ID:	12	4	0x E1 2E 00 00
		Production Period:	16	4	0x 40 06 00 00
		Reserved:	20	2	0x 00 00
		Destination Type:	22	2	0x 01 00
		Destination address	24	32	0x 69 66 00 C8 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
		Configuration State:	56	2	0x 02 00
		Exchange Length:	58	2	0x 78 05
		Reserved:	60	4	0x 00 00 00 00
		UDP/IP Port	64	2	0x 46 47
		Configuration Type:	66	2	0x 00 00
		Configuration Sig.:	68	2	0x 00 00
		Mode:	70	2	0x 02 00
		Reserved:	72	2	0x 00 00
		Configuration Data:	74	2	0x 00 00

This is an example of the gateway's EGD Configuration Response to the Command Production Data Unit.

This is the hexadecimal representation of the *Retrieve Configuration Response* from the above table. It includes the Ethernet II, IPv4, UDP, and within UDP, the EGD Server's Reply PDU Type 4 depicted in bold font.

```
00 12 3F AE 5C AE 00 0D 8D 00 13 83 08 00 45 00
00 68 00 04 00 00 FE 11 E8 1F 69 66 00 CD 69 66
00 C8 04 01 1F 01 00 54 EC F2 04 00 11 11 01 00
4C 00 69 66 00 C8 E1 2E 00 00 40 06 00 00 00 00
01 00 69 66 00 C8 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 02 00 78 05 00 00 00 00 46 47 00 00 00 00
02 00 00 00 00 00
```

2.1.2 Capabilities PDUs

PDU Type = 9

Capabilities Request

The *Capabilities Request* PDU command permits an application program to request the supported capabilities of the EGD implementation on the destination node. A *Capabilities Request* sent from a requesting node must be followed by a *Capabilities Response* message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 09
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH

PDU Type = 10

Capabilities Response

The *Capabilities Response* command PDU is sent in response to a *Capabilities Request*. This message returns the functional capabilities and limits of the supported EGD implementation on the responding controller.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 0A
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH

Packet Info	Description		Data		
		Reserved:	12	4	0x HH HH HH HH
		Maximum Exchanges:	16	4	0x HH HH HH HH
		Capabilities Bit Mask:	20	4	0x HH HH HH HH
		Reserved:	24	2	0x HH HH
		Configuration Type:	26	2	0x HH HH
		Identification String (up to 80 characters):	28	XX	0x HH . . . HH

2.1.3 Summary PDUs

PDU Type = 7

Summary Request

The *Summary Request* PDU command permits an application program to request a summary of the exchanges configured on a given node. This allows a user to get a complete list of all exchanges defined. The Index field is normally 0 and is used to request a block of summaries in nodes which contain a large number of exchanges. A *Summary Request* sent from a requesting node must be followed by a *Summary Response* message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 07
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Index:	8	1	0x HH
		Reserved:	9	3	0x 00 00 00

PDU Type = 8

Summary Response

The *Summary Response* PDU is used to respond to a *Summary Request*. This PDU returns a list of exchanges which are currently defined on the responding node. This message is of variable length; the number of summaries, or cells, included in the message is returned in the header of the message. If the number of cells returned is less than the total number of cells, remaining summaries can be retrieved by subsequent requests with a larger index variable.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 08

Packet Info	Description		Data		
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Index:	8	1	0x HH
		Producer ID:	9	4	0x HH HH HH HH
		Total Cells: (Qty of exchange cells defined for this node)	13	2	0x HH HH
		Cells contained in the message:	15	2	0x HH HH
		The following six items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD gateway's configuration file. Cell Qty is limited to [EGD Exchange] command lines present in the gateway's configuration file.			
		Producer ID:	17	4	0x HH HH HH HH
		Exchange ID:	21	4	0x HH HH HH HH
		Mode:	25	1	0x HH
		Reserved:	26	1	0x HH
		State:	27	2	0x HH HH
		Production Period:	29	4	0x HH HH HH HH

2.1.4 Statistics PDUs

PDU Type = 15

Statistics Request

The *Statistics Request* PDU command permits an application program to obtain the current operating statistics of the specified exchange. The exchange must be valid on the destination node. A *Statistics Request* sent from a requesting node must be followed by a *Statistics Response* message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 0F
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH

PDU Type = 16

Statistics Response

The *Statistics Response* PDU command returns the operating statistics for the Producer and Exchange ID specified in the request message.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 10
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH

Packet Info	Description		Data		
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH
		Configuration Time:	16	4	0x HH HH HH HH
		Due Time:	20	4	0x HH HH HH HH
		State:	24	4	0x HH HH HH HH
		Exchange Length:	28	4	0x HH HH HH HH
		Message Count:	32	4	0x HH HH HH HH
		Missed Count:	36	4	0x HH HH HH HH
		Refresh Error Count:	40	4	0x HH HH HH HH
		Reserved:	44	4	0x HH HH HH HH

2.1.5 Command NAK PDU

PDU Type = 18

Command NAK Response

The *Command NAK Response* may be sent by a responder to any command received on the command port that is in error. Use of the *Command NAK* allows the responder to give more precise and detailed information about the nature of the error to the requester. The *Command NAK* shall not be sent in response to a NAK message.

The NAK message is returned to indicate a syntactic error in a request message. It should only be used if the request is unintelligible. Thus, whenever possible, the corresponding response to a received request message shall be returned.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 12
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH
		Error Code:	16	2	0x HH HH
		Reserved:	18	2	0x HH HH
		Offending Message:	20	16	0x HH . . . HH
		Error String: (up to 80 characters)	36	XX	0x HH . . . HH

2.1.6 Read PDUs

PDU Type = 32

Read Request

The *Read Request* PDU is used to request the contents of one or more contiguous groups of memory from a specific peer controller. The header defines parameters which apply to all of the individual cell references in the message. Each cell reference specifies an offset into the specified exchange or target-specific address and the number of bytes to read. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A *Read Request* sent from a requesting node must be followed by a *Read Response* message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 20
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following two items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD gateway's configuration file. **Offset:** reads the DB Register specified in the Command. **Length:** is Bytes count, not Words. Multiple Cells may be requested dependent on the Cell Count field specified above.			
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH

PDU Type = 33

Read Response

The *Read Response* PDU (Read_Resp) is used to return the contents of one or more contiguous groups of memory from the local node to the requesting controller. The header defines parameters which apply to the all of the individual cell references in the message. Each cell reference specifies an offset into the specified exchange, the number of bytes of data, and the data itself. All data returned must be padded to the nearest 4-byte boundary.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 20
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following four items are referred to as the exchange Cell. Each Cell contains data from one [EGD Exchange] command line present in the EGD gateway's configuration file. **Offset:** reads the DB Register specified in the [EGD Exchange] command. **Length:** is Bytes Qty, not Words. Multiple Cells may be returned dependent on the Cell Count: field specified in the requesting PDU.			
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH
		Data (depends on length requested):	36	XX	0x HH . . . HH
		Padding (to 32-bit boundary):	XX	XX	0x HH HH

2.1.7 Write PDUs

PDU Type = 34

Write Request

The *Write Request* PDU is used to change the contents of one or more contiguous groups of memory on a specific peer controller. The header defines parameters which apply to all of the individual cell references in the message. Each cell reference specifies an offset into the specified exchange or target-specific address, the number of bytes to write, and the data. Each data field must be padded to the nearest 4-byte boundary. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A *Write Request* sent from a requesting node must be followed by a *Write Response* message from the responding node. See the discussion in the section entitled Exchange Data Handling for information about coherency in the write.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 22
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following two items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD gateway's configuration file. **Offset:** reads the DB Register specified in the Command. **Length:** is Bytes count, not Words. Multiple Cells may be requested dependent on the Cell Count field specified above.			
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH

Packet Info	Description	Data		
	Data (depends on length requested):	36	XX	0x HH . . . HH
	Padding (to 32-bit boundary):	XX	XX	0x HH HH

PDU Type = 35

Write Response

The *Write Response* is returned from a destination controller in response to a *Write Request* message. It serves as an acknowledgment for the original request. A positive response indicates that all of the data has been written to the responding device. An error response indicates that one or more of the transfers to the responding device failed. Responders shall use all available means to assure that a write is performed in its entirety or not performed at all. Requesting applications are advised that if partial failures of the write can cause problems with the control algorithm, they should include only one cell in each write to assure complete knowledge of the disposition of the *Write Request*.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 23
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH

2.1.8 Masked Write PDUs

PDU Type = 36

Masked Write Request

The *Masked Write Request* PDU is used to change individual bits in one or more bytes in the destination controller. The header defines parameters which apply to all of the individual cell references in the message. Each cell reference specifies which bits to change in the byte specified by the offset given. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A *Masked Write Request* sent from a requesting node must be followed by a *Masked Write Response* message from the responding node. Some devices may not support writing individual bits and others may support writing only one bit at a time. Such devices shall return a status of MEMORY_ACCESS_ERROR for masked write attempts that they do not support.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 24
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Type:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following three items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD gateway's configuration file. **Offset:** writes into the DB Register specified in the [EGD Exchange] command line. **Mask:** example 0x AA AA. Bin 1010101010101010 **Data:** is ANDed with the Mask Bytes on the target server.			
		Offset:	32	4	0x HH HH HH HH

Packet Info	Description		Data		
		Mask:	36	2	0x HH HH
		Data:	38	2	0x HH HH

PDU Type = 37

Masked Write Response

The *Masked Write Response* provides an acknowledgment to the *Masked Write Request* message. A positive response indicates that all of the data has been written to the responding device. An error response indicates that one or more of the transfers to the responding device failed. Responders shall use all available means to assure that a write is performed in its entirety or not performed at all. Requesting applications are advised that if partial failures of the write can cause problems with the control algorithm, they should include only one cell in each write to assure complete knowledge of the disposition of the write request. Requesters should be aware that some responding devices are not capable of setting more than one bit in a request. Before sending a mask with more than one bit set, the requester should assure that the responding device supports multiple bit writes.

| Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 25
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH

2.2   EGD Data Producer

The EGD driver will generate produced data as defined in the user configuration exchange list. This data is derived from the gateway's internal database and is produced at the set frequency defined in the exchange list. The data can be broadcast to all nodes or to a specific node on the network. Up to 700 database registers can be transferred in a single produced message. Therefore, to transfer the whole database would only require 6 messages (4000 word registers in the gateway's database).

The internal database is central to the functionality of the gateway. This database is shared between all the drivers in the gateway and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port to be viewed and controlled by devices on another port.

The producer functionality provided in the EGD driver is used to transfer portions of the gateway's database to other EGD nodes on the network. The following diagram describes the flow of data between the producer, the internal database and the remote EGD devices:
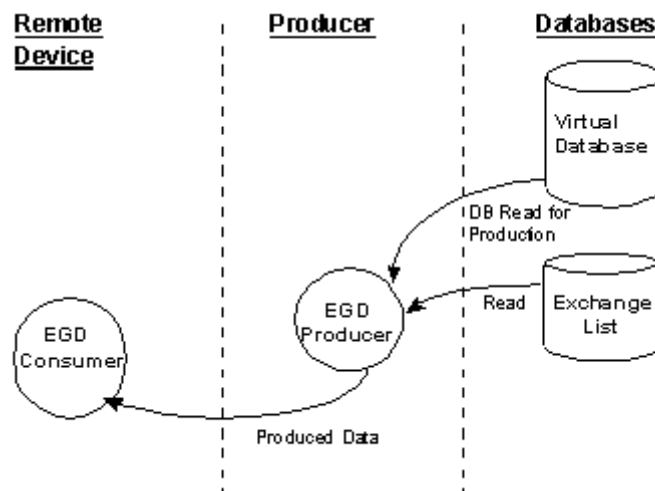
2.3   EGD Data Consumer

The EGD driver will consume data as defined in the user configuration exchange list. This data is derived from other nodes on the network and is placed in the gateway's internal database. If a consumer exchange is not received at the specified timeout, the driver will update the status of the exchange. When the driver again receives the exchange, the status will be updated. Exchanges received by the consumer driver that are not defined in the exchange list will be discarded. Up to 700 words of data can be consumed in a single message. Therefore, to fill the whole database with values would only require 6 exchanges (4000 word registers in the gateway's database).

The internal database is central to the functionality of the gateway. This database is shared between all the drivers in the gateway and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port to be viewed and controlled by devices on another port.

The consumer functionality provided in the EGD driver is used to transfer data from other nodes on the network into the gateway's database. The following diagram describes the flow of data between the consumer, the internal database and the remote EGD devices:
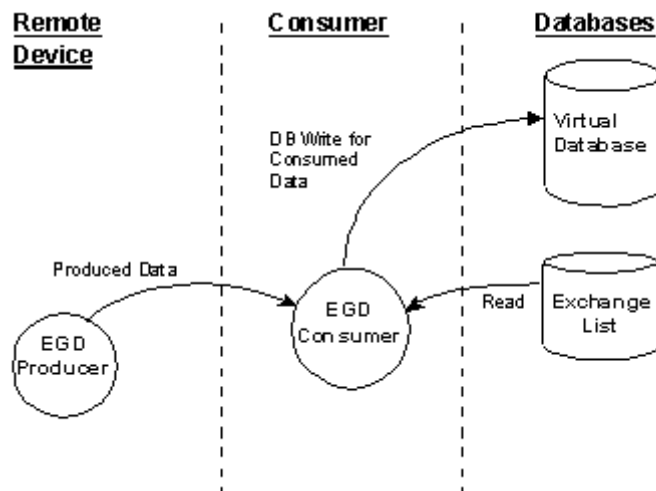
2.4   Other Ethernet Services (HTTP/FTP)

Other network services are provided on the gateway, if the WEB option is installed.

> **Important:** The WEB option is an additional hardware component that is installed on the gateway during manufacturing. If the WEB option is not installed, the following features are not enabled.

The gateway contains an HTTP server to serve Web pages containing database data and error/status values present in the gateway's internal database to a Web browser. The pages presented can be those built into the gateway or custom designed by the user. Additionally, Web pages can be constructed to alter (write) the values contained in the gateway's database.

An FTP server is present to handle file operations controlled from a remote computer on the network.

The following table describes the capabilities of the WEB option.

Type	Specifications
HTML Server (See note below)	Key features of the HTML server include: ▪ Max HTML page size: 1MB ▪ Max File Storage: 32MB ▪ Supported context types: jpeg, bmp, css ▪ Supported data types: bit, ASCII, integer, float ▪ Sockets: Up to ten connections. Note that this limits the number of simultaneous graphic file and frame references per HTML page
FTP Server	Permits remote HTML file transfer between the gateway and remote host. Capabilities of the FTP Server include: ▪ Single socket connection ▪ Non-passive transfers only ▪ WS_FTP or Command Line FTP recommended CuteFTP, Internet Explorer, Netscape, or NCFTP all support multiple socket connections and therefore will not support the ProLinx gateway

For detailed information on these services, refer to the WEB Driver Manual.

3 Installing and Using ProSoft Configuration Builder

In This Chapter

You must install the *ProSoft Configuration Builder (PCB)* software to configure the gateway. You can always get the newest version of *ProSoft Configuration Builder* from the ProSoft Technology website.

Installing ProSoft Configuration Builder from the ProSoft website

1 Open your web browser and navigate to *http://www.prosoft-technology.com/pcb*

2 Click the **DOWNLOAD HERE** link to download the latest version of *ProSoft Configuration Builder*.

3 Choose **SAVE** or **SAVE FILE** when prompted.

4 Save the file to your *Windows Desktop*, so that you can find it easily when you have finished downloading.

5 When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install *ProSoft Configuration Builder* from the *ProSoft Solutions Product CD-ROM*, included in the package with your gateway.

Installing ProSoft Configuration Builder from the Product CD-ROM

1 Insert the *ProSoft Solutions Product CD-ROM* into the CD-ROM drive of your PC. Wait for the startup screen to appear.

2 On the startup screen, click **PRODUCT DOCUMENTATION**. This action opens a *Windows Explorer* file tree window.

3 Click to open the **UTILITIES** folder. This folder contains all of the applications and files you will need to set up and configure your gateway.

4 Double-click the **SETUP CONFIGURATION TOOL** folder, double-click the **PCB_*.EXE** file and follow the instructions on your screen to install the software on your PC. The information represented by the "*" character in the file name is the *PCB* version number and, therefore, subject to change as new versions of *PCB* are released.

Note: Many of the configuration and maintenance procedures use files and other utilities on the CD-ROM. You may wish to copy the files from the Utilities folder on the CD-ROM to a convenient location on your hard drive.

3.1 Adding a Location

To add a location to an existing project file

1 Right-click the **PROJECT** icon and select **ADD LOCATION**. A new **LOCATION** icon appears.

or
Select the **PROJECT** icon.

2 Choose **PROJECT** from the **PROJECT** menu, and then choose **ADD LOCATION**. A new **LOCATION** icon appears.

or
If the *Default Location* has not been named (is not already an existing project), right-click the folder and choose **RENAME**.

3 Type in the *Location* name.

3.2 Adding a Project

To add a project to an existing project file

1 Select the **DEFAULT PROJECT** icon.
2 Open the **PROJECT** menu, choose **PROJECT,** and then choose **ADD PROJECT**.
   This action opens a new **PROJECT** folder.

3.3 Adding a Module

Begin the process of creating your custom application configuration by selecting the module type of your ProLinx gateway.

1 Double-click the **DEFAULT MODULE** icon to open the *Choose Module Type* dialog box.
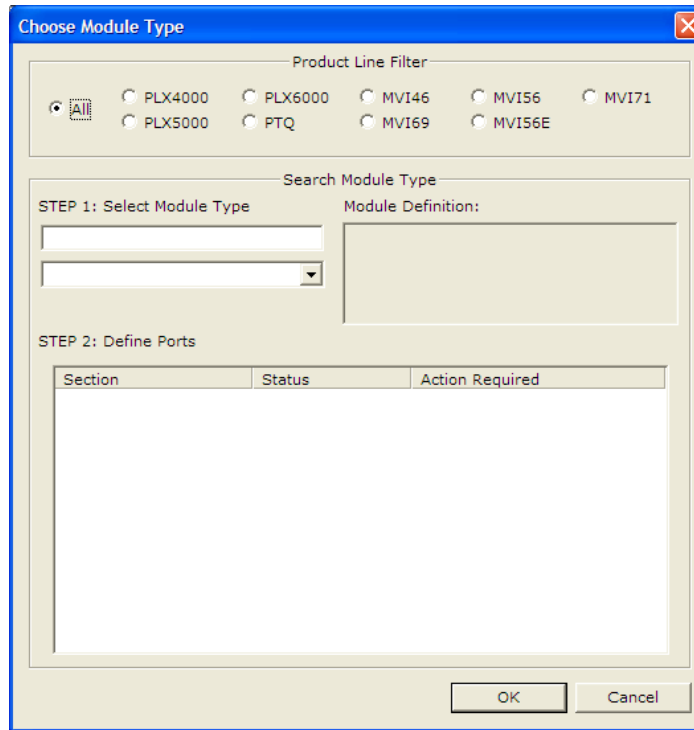
2 On the *Choose Module Type* dialog box, select the **MODULE** type.

Or

1 Open the **PROJECT** menu and choose **LOCATION.**
2 On the **LOCATION** menu, choose **ADD MODULE.**

To add a module to a different location

1 Right-click the **LOCATION** folder and choose **ADD MODULE**. A new **MODULE** icon appears.

Or

1 Select the **LOCATION** icon.
2 From the **PROJECT** menu, select **LOCATION**, and then select **ADD MODULE**.

3.4   Configuring Gateway Parameters

1   Click on the **[+]** sign next to the gateway icon to expand gateway information.

2   Click on the **[+]** sign next to any icon to view gateway information and configuration options.

3   Double-click any icon to open an *Edit* dialog box.

4   To edit a parameter, select the parameter in the left pane and make your changes in the right pane.

5   Click **OK** to save your changes.

3.5 Creating Optional Comment Entries

1 Click the **[+]** to the left of the ⊞🔗 Comment icon to expand the module comments.

2 Double-click the 🔖 Module Comment icon. The *Edit - Module Comment* dialog box appears.
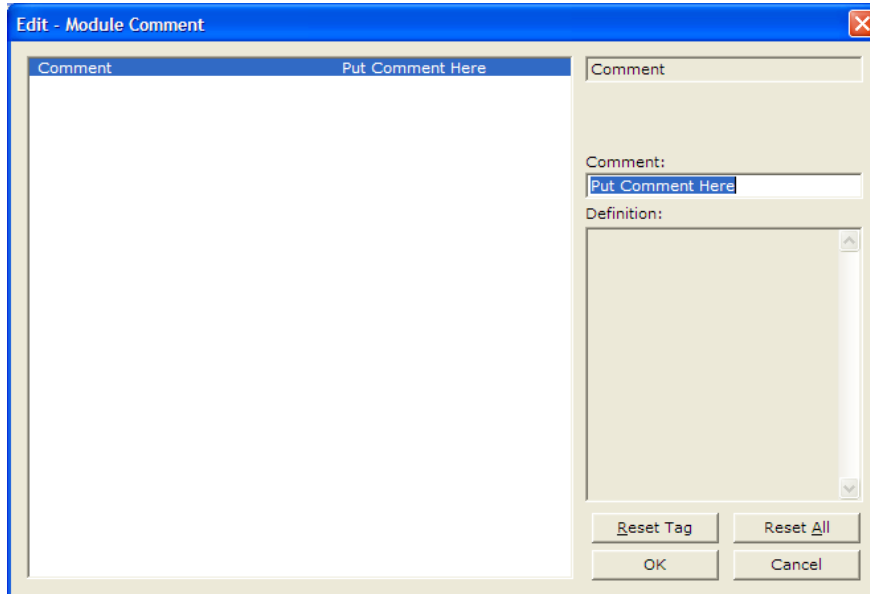
**3** Enter your comment and click **OK** to save your changes.

3.6   Printing a Configuration File

1   Select the gateway icon, and then click the right mouse button to open a shortcut menu.
2   On the shortcut menu, choose **VIEW CONFIGURATION.** This action opens the *View Configuration* window.
3   On the *View Configuration* window, open the **FILE** menu, and choose **PRINT.** This action opens the *Print* dialog box.
4   On the *Print* dialog box, choose the printer to use from the drop-down list, select printing options, and then click **OK.**

3.7   Downloading a File from PC to the Gateway

1 Verify that your PC is connected to the gateway with a null-modem serial cable connected to the serial port on your PC and the serial port on the gateway

2 Open the **PROJECT** menu, and then choose **MODULE.**

3 On the **MODULE** menu, choose **DOWNLOAD.** Wait while ProSoft Configuration scans for communication ports on your PC. When the scan is complete, the *Download* dialog box opens.
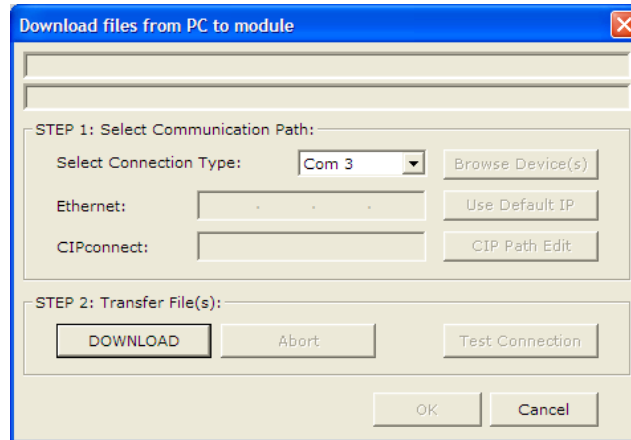
4 Select the **PORT** to use for the download.

5 Click the **DOWNLOAD** button.

3.8   Ethernet Port Configuration - wattcp.cfg

The wattcp.cfg file must be set up properly in order to use a TCP/IP network connection. The ProLinx Reference Guide provides detailed information on setting up this file, as well as how to transfer it to ProLinx gateways.

3.9   Alternative Configuration Method Using a Text File

The preferred method for configuring the EGD driver is using ProSoft
Configuration Builder. Alternatively, the driver can be configured by downloading
a text file containing configuration parameters.

The following is excerpted from a full configuration file showing typical examples
of the EGD driver configuration. This example should serve only to give the
programmer an idea of how a CFG file is structured. Complete configuration files
are shipped on each unit and are available from www.prosoft-technology.com for
each of the products. These files can serve as an excellent starting point for any
project. Note that the EGD protocol configuration only requires configuration of
exchanges ([EGD EXCHANGES]) and of the Simple Network Time Protocol
([SNTP CLIENT]).

```
# This section defines the parameters required for the Simple Network
# Time Protocol (SNTP) client.
[SNTP CLIENT]
NTP SERVER IP ADDRESS    : 132.163.4.102   #IP address for NIST, Boulder,
                                           #Colorado
TIME ZONE                : 7               #Number of hours from GMT
                                           #(-11 to +11)
USE DAYLIGHT SAVINGS TIME: No              #Yes or No
DATABASE REGISTER        : 1000            #database word location where to
                                           #store time (-1=ignore).
                                           #This register value should be an
                                           #even number.


# This section contains the list of multicast group addresses the EGD server
# should process (consumer messages for this server produced on other
units).
# This list may contain up to 32 IP addresses. The reserved group addresses
# for the EGD protocol are 224.0.7.1 to 224.0.7.32. The module will support
# other group addresses than this data set.
[EGD MULTICAST GROUP LIST]
START
  224.0.7.1
  224.0.7.2
END


# This section defines the exchanges that will be produced and
# consumed using the Ethernet Global Data Protocol (EGD). You may enter up
to
# 100 exchanges for the EGD driver.
[EGD EXCHANGES]
#
# Exch Type  = Exchange type P=Producer, C=Consumer
# Cast Type  = If producer, B=Broadcast (to all nodes), M=Multicast (group
of  #           nodes), U=Unicast (to a single node),
#             If consumer when failed, N=No database change, -=DB to -1,
Z=DB #            to 0, O=DB to 1
# DB Reg     = Starting database register in module where data
sourced/placed
# Reg Count  = Number of database registers to transfer/accept in message
# Swap Code  = 0=None, 1=Swap words, 2=Swap bytes & words, 3=Swap bytes
# P/C Time   = Milliseconds between production/consumption
```

```
# IP Address = IP address of destination (produced data) or source (consumed
data)
# Exch ID    = Exchange ID for this message (1 to 16383) must be unique
#               for node
# CS Major   = Configuration Signature Major version number (0 to 255)
# CS Minor   = Configuration Signature Minot version number (0 to 255)
#
# Exch  Cast  DB     Reg   Swap                                  Exch  Cfg
Signature
# Type  Type  Reg   Count  Code   P/C Time   IP Address           ID  Major
Minor
START
     P    B    0     200    0      10000   255.255.255.255    1      1
0
     P    U   200    100    0       3073   192.168.0.207      2      1
0
     P    M   200    100    0        273   224.0.7.1         11      0
0
     P    M   200    100    0        307   224.0.7.2         12      0
0
     C    Z  1000    500    0      40000   192.168.0.131  16381      1
0
     C    N  1500    100    0      12292   192.168.0.131  16382      1
0
     C    -  1600     50    0       8000   192.168.0.131  16383      1
0
END
```

4 EGD Configuration Parameters

In This Chapter

This section describes the parameters necessary to configure the EGD protocol driver on the ProLinx Gateway.

4.1   [EGD Network]

4.1.1   ARP Timeout

1 ms to **65535** ms

The *ARP Timeout* parameter defines the minimum time in milliseconds that the gateway will wait for an ARP response from a node. During that time, the gateway will not communicate with any nodes. If the gateway does not receive an ARP response within this period of time, it will proceed communicating with other nodes for 30 seconds until the next ARP request attempt.
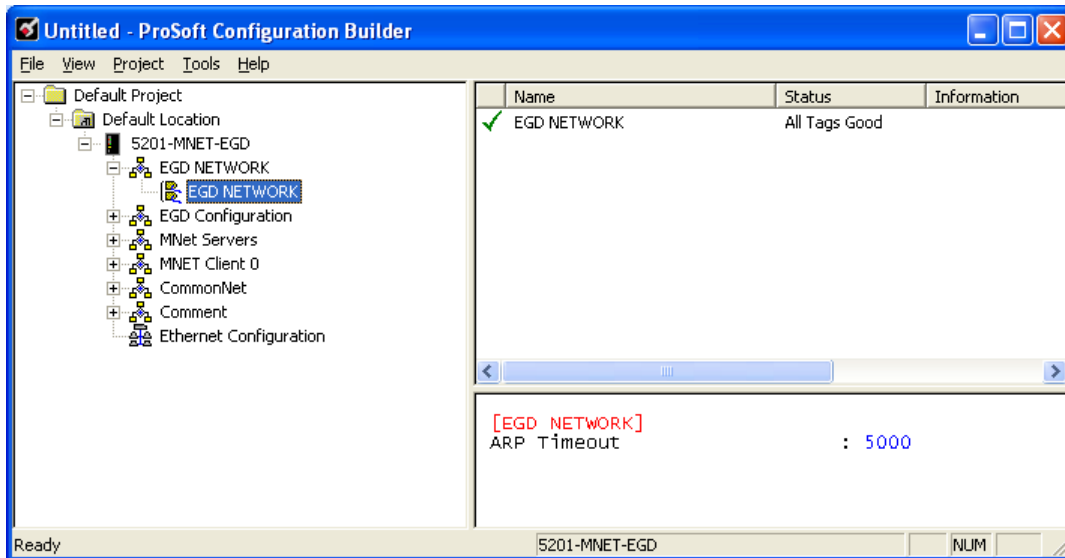
4.2   [SNTP Client]

The [SNTP CLIENT] section specifies the parameters for the Simple Network Time Protocol (SNTP) Client, which keeps the internal clock set correctly. This version of the driver supports the unicast implementation of the SNTP Revision 3 and stratum between 1 and 14.

The gateway can be configured to periodically synchronize its clock with a remote SNTP server. Approximately every 6 minutes, the gateway sends 10 consecutive requests to the remote SNTP Client (at approximately 6-second intervals). You can check these requests and responses from the SNTP Client Configuration Menu (press the **[N]** key from the Configuration/Debug Main Menu). If the gateway receives a valid response from the SNTP server, the computations value will be also be incremented. After 10 consecutive successful requests and responses, the gateway will synchronize its internal clock (an average is performed based on all 10 responses for better accuracy). The *Time Set Cnt* value is incremented every time the clock is synchronized.

After the synchronization is performed, the time valid register is set to Yes. If the gateway cannot connect to the remote SNTP server after 3 consecutive attempts, the time valid register is set to No. You can also configure the GMT settings to use, and the database address where the date and time information can be copied.

The following parameters in the configuration file set up the SNTP Client:
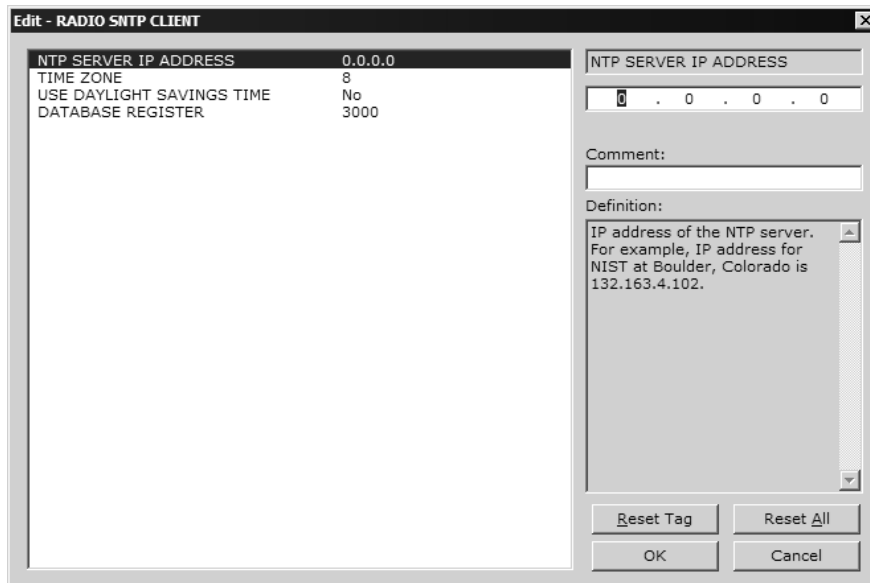
The database register parameter defines a database register where the SNTP time and date values are copied. It occupies four words as follows:

Word Offset	Description
0 and 1	Date and time in Unix format (long integer)
2 and 3	Microseconds (long integer)

4.2.1 NTP Server IP Address

Enter in dotted notation

This parameter sets the IP address of the NTP server to contact for time acquisition. Select an NTP server with the greatest accuracy that is available all the time from your network. Set this IP address to 0.0.0.0 to disable SNTP server requests.

4.2.2 Time Zone

-11 to 11

This parameter sets the time zone offset from UTC. Positive values are for time zones west of UTC, and negative values are for time zones east of UTC. Set this value to 0 to use UTC in the gateway.

4.2.3 Use Daylight Savings Time

YES or NO

This parameter specifies if daylight savings time will be used in the time computation.

4.2.4 Database Register

Valid database register or -1 to ignore

This parameter specifies the database location for the SNTP time. If set to -1, the data is not placed into the database. The time requires four registers. The first two registers contain the seconds and the second two registers contain the microseconds.

4.3   [EGD Exchanges]

The [EGD Exchanges] section defines the messages that will be produced and consumed by the driver. The UDP protocol on the IP network is used to transport these over Ethernet between all the EGD devices.

For the exchanges to operate correctly, the other EGD devices must be configured and correctly set up. Use the configuration tools provided by the device manufacturer to verify that each device is correctly configured and communicating, and that you understand each parameter. When you have verified that the other devices are correctly configured, you can then set up the ProLinx gateway to communicate on the network.

4.3.1 Exchange List Overview

In order to interface the ProLinx gateway with EGD devices, you must construct an exchange list. The exchanges specify messages that will be produced or consumed at a user-defined frequency using the gateway's internal database. Messages can be broadcast to multiple nodes on the network or associated with a single node on the network. Up to 100 exchanges can be defined for the driver. Up to 680 word registers can be produced or consumed in a single exchange.

4.3.2 Exchange List Entry

The following is an example section from a configuration file for the [EGD Exchanges] section:

```
# Exch  Cast  DB     Reg    Swap                              Exch   Cfg
Signature
# Type  Type  Reg   Count  Code   P/C Time   IP Address         ID   Major
Minor
START
      P     B    0    200     0     10000   255.255.255.255     1     1
0
      P     U  200    100     0      3073   192.168.0.207       2     1
0
      C     O 1000    500     0     40000   192.168.0.131   16381     1
0
      C     N 1500    100     0     12292   192.168.0.131   16382     1
0
      C     - 1600     50     0      8000   192.168.0.131   16383     1
0
END
```

Exchange Type

For each entry in the exchange list, the *Exchange Type* field (*Exch Type*) specifies either a producer data exchange or a consumer data exchange. In a producer exchange, a message is generated by the driver using data from the gateway's database. In a consumer exchange, data is received from other EGD devices and placed in the gateway's database.

Cast Type

Cast Type defines which stations should listen for exchanges:

- If *Exchange Type* is **P** (producer), **B**=Broadcast (to all nodes), **M**=Multicast (to a group of nodes), **U**=Unicast (to a single node).
- If *Exchange Type* is **C** (consumer) and communication fails, **N**=No database change, **M**=DB set to -1, **Z**=DB set to 0, **O**=DB set to 1.

In the case of the consumer, the database will be set to the specified value or left unchanged (**N** option) if the gateway does not receive the message before the *P/C Time* set for the exchange.

DB Reg

The *DB Reg* parameter is the starting gateway database register from which data is sourced (produced data) or into which data is placed (consumed data). This parameter can have a value of 0 to 3999. The validity of the entry depends on the number of registers to be produced or consumed. The sum of the two values cannot exceed 4000, as this would be outside the range of the gateway's database.

Reg Count

The *Reg Count* column defines the number of database registers to transfer/accept in a message. This parameter has a valid range of 1 to 700. The sum of this parameter and the *DB Reg* parameter cannot exceed 4000, as this would be outside the range of the gateway's database.

Swap Code

The *Swap Code* column is used to set byte and word swapping of data produced or consumed. Acceptable values are **0**=no swapping, **1**=swap words, **2**=swap bytes and words and **3**=swap bytes. Swapping of words and/or bytes in the message may be required for different protocol and operating systems, as their representation of multi-byte values may not be the same as that of the EGD

P/C Time

The *P/C Time* column defines the number of milliseconds between exchanges. For produced exchanges, it defines how often messages are produced. For consumed exchanges, it defines the number of milliseconds to wait for a remotely produced exchange before a timeout error occurs. For consumed messages, set the value to approximately four times the value of the produced exchange time of the producer device. This will prevent the exchange from constantly timing out on a busy network.

A zero *P/C Time* value for a produced message means the message will not be produced. A zero value for a consumed message means the exchange will never time out. The zero value can be used for exchanges that will interface with the command service port (7937) to handle command read and write requests from another device. In this mode, when the *P/C Time* = 0 (zero), the mode becomes a server responding to a Client on the network that is producing PDUs with command type messages. For more information, refer to EGD Command Server (page 11).

IP Address

The *IP Address* column should be set to the IP address of destination (produced data) or source (consumed data). If the *Cast Type* is set to **U** for a produced exchange, the address should be set to the IP address of the specific node to receive the data. If the *Cast Type* is set to **B** for produced data, set the IP to either a network (255.255.255.255) or subnet (192.168.0.255) broadcast address. If the *Cast Type* is set to **M** for produced data, enter a valid multicast IP address. For consumed messages, this column should be set to the IP address of the remote producer generating the specific exchange. The combination of the *IP Address* and the *Exchange ID* uniquely identifies the exchange to the system.

Exchange ID

The *Exch ID* column defines the *Exchange ID* for the message (1 to 16383), and must be unique for a produced message. For produced exchanges, the Exchange ID uniquely defines the exchange message on the network. For consumed exchanges, the producer's *IP Address* along with the *Exchange ID* is used to determine which messages to consume. The other parameters defined for the exchange then determine how much data is present in the message and where to place the data into the gateway's internal database.

Configuration Signature

The *Configuration Signature* version information is used to determine if the message can be parsed using the defined exchange message.

If the *Major* version numbers don't match, the consumer will not accept the data.

If the *Major* version numbers match, then:

- If the *Minor* version number in a produced message is greater than or equal to the consumed message's *Minor* version number, the message is accepted because it has more data than expected.

  OR

- If the *Minor* version number in a produced message is less than the consumed message's *Minor* version number, the message is rejected because it does not have all the data required for a complete message.

Definition Example

Producing Message		Consuming Message		Definition
Configuration Signature		Configuration Signature		
Major	Minor	Major	Minor	
0	0	0	0	The consumer command will consume the producer's message without version checking.
Y	0	Z	0	The consumer command will NOT consume the producer's message when *Major* numbers do not match.
X	0	X	0	The consumer command will consume the producer's message only if the consumer's *Major* number matches the producer's *Major* number.
X	5	X	4	The consumer command will consume the producer's message when the consumer and producer's *Major* numbers match, and the consumer's *Minor* number is less than or equal to the producer's *Minor* number. The consumer accepts the message received because it has more data than expected.
X	2	X	3	The consumer command will NOT consume the producer's message when the consumer and producer's *Major* numbers match, but the consumer's *Minor* number is greater than the producer's *Minor* number. The consumer rejects the message received because it has less data than expected.

4.4   [EGD Multicast Group List]

This section contains the list of multicast group addresses the EGD server should process (consumer messages for this server produced on other units). This list may contain up to 32 IP addresses. The reserved group addresses for the EGD protocol are 224.0.7.1 to 224.0.7.32. The gateway will support other group addresses than this data set.

```
[EGD MULTICAST GROUP LIST]
START
  224.0.7.1
  224.0.7.2
END
```

5 Error/Status Data

In This Chapter

The second and most thorough troubleshooting method for debugging the operation of the EGD driver (and the gateway in general) is the powerful Debug port on the gateway which provides much more complete access to the internal operation and status of the gateway. Accessing the Debug capabilities of the gateway is accomplished easily by connecting a PC to the Debug port and loading a terminal program.

5.1   SNTP Status Data

The status data for the SNTP driver is located at the virtual database addresses shown in the following table.

Status Register	Description
4030	Time is valid
4031	Request count
4032	Response count
4033	Computation count
4034	Clock set count
4035	Timeout error count

The gateway's data mapping feature can be utilized to move this data into the gateway's database area. This way the data can be made available to all drivers on the gateway for use on any of the connected networks. If it is not mapped into the gateway's database, the data will only be available through the Configuration/Debug Port.

The Time is valid status register will be set to 1 if the SNTP time is valid. If the time is not valid, the register will be set to 0. All the other registers are counters used to determine the functionality of the driver.

The data area is initialized with zeros whenever the gateway is initialized. This occurs during a cold-start (power-on), reset (reset push-button pressed) or a warm-boot operation (commanded or loading of new configuration).

5.2 EGD Error/Status Data

The Error/Status data associated with the EGD driver is displayed in the following table.

Status Register	Description
16000	Configuration tate
16001	Status
16002 to 16003	Message count
16004 to 16005	Number of times missed
16006 to 16007	Number of refresh errors
16008	Invalid bit set by producer count
16009	Time sync bit set by producer count
16010	Short message count
16011	Long message count
16012	Protocol version number error count
16013	Configuration signature error count
16014 to 16027	Exchange message 1 in same format as above for 14 registers
16028 to 16042	Exchange message 2 in same format as above for 14 registers
…	…
17386 to 17399	Exchange message 99 in same format as above for 14 registers

The gateway's data mapping feature can be utilized to move this data into the gateway's database area. This way the data can be made available to all drivers on the gateway for use on any of the connected networks. If it is not mapped into the gateway's database, the data will only be available through the Configuration/Debug Port.

There is a 14-word register data area for each exchange. The following table describes each value stored for an exchange.

Status value	Description
Configuration state	This word register defines the configuration state of the exchange as follows: 0=Invalid, 1=producing/healthy, 2=pending/unhealthy
Production status	This word is bit mapped with the following definition of the production status: bit0=err/invalid, bit1=not time sync
Message count	This double-word value counts the number of times the exchange has been produced or consumed.
Number of times missed	This double-word value counts the number of data production packets missed. This counter is incremented each time the Request ID in the received produced message is greater than 1 more than the last Request ID received (adjusted for roll-over).
Number of refresh errors	This double-word value counts the number of refresh errors that have been encountered by the driver. A refresh error occurs when the produced exchange does not arrive to the consumer within the set P/C time. This will only be valid for consumer exchanges.

Status value	Description
Invalid bit set by producer count	This word counter is incremented each time the producer indicates that the produced data exchange is invalid.
Time sync bit set by producer count	This word counter is incremented each time the producer indicates that the time sync bit is set in a produced message. The data in the message may be valid.
Short message count	This word counter is incremented each time the message being consumed is less than that configured in the exchange.
Long message count	This word counter is incremented each time the message being consumed is greater than that configured for the exchange. The data will be consumed for the length set in the exchange. The remaining data will be discarded.
Protocol version number error count	This word counter is incremented for each message in which the protocol version is not set correctly. Only a protocol version number of 1 is acceptable. If any other protocol version number is received, the message will not be consumed.
Configuration signature error count	This word counter is incremented for each message in which the major and minor configuration version values are not acceptable for the configured exchange. The data will not be consumed.

The data area is filled with zeros whenever the gateway is initialized. Initialization occurs as a result of:

- A cold start (power-on)
- Pressing the reset button
- Forcing a warm boot
- Configuration download

5.3   Exchange Configuration Form

This section contains a form that can be used to design the exchange list for an application.

1	2	3	4	5	6	7	8	9	10
Exchange Type (C/P)	Cast Type	Database Address	Register Count	Swap Code	Prod/Cons Time	IP Address	Exchange ID	Cfg Signature Version	
								Major	Minor

1	2	3	4	5	6	7	8	9	10
Exchange Type (C/P)	Cast Type	Database Address	Register Count	Swap Code	Prod/Cons Time	IP Address	Exchange ID	Cfg Signature Version	
								Major	Minor

6   Support, Service & Warranty

How to Contact Us: Technical Support

 ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1   Product Version Number
2   System architecture
3   Network details

If the issue is hardware related, we will also need information regarding:

1   Module configuration and associated ladder files, if any
2   Module operation and any unusual behavior
3   Configuration/Debug status information
4   LED patterns
5   Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: *For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers.*

Internet	Web Site: www.prosoft-technology.com/support E-mail address: support@prosoft-technology.com
Asia Pacific (location in Malaysia)	Tel: +603.7724.2080, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Asia Pacific (location in China)	Tel: +86.21.5187.7337 x888, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Europe (location in Toulouse, France)	Tel: +33 (0) 5.34.36.87.20, E-mail: support.EMEA@prosoft-technology.com Languages spoken include: French, English
Europe (location in Dubai, UAE)	Tel: +971-4-214-6911, E-mail: mea@prosoft-technology.com Languages spoken include: English, Hindi

North America (location in California)	Tel: +1.661.716.5100, E-mail: support@prosoft-technology.com Languages spoken include: English, Spanish
Latin America (Oficina Regional)	Tel: +1-281-2989109, E-Mail: latinam@prosoft-technology.com Languages spoken include: Spanish, English
Latin America (location in Puebla, Mexico)	Tel: +52-222-3-99-6565, E-mail: soporte@prosoft-technology.com Languages spoken include: Spanish
Brasil (location in Sao Paulo)	Tel: +55-11-5083-3776, E-mail: brasil@prosoft-technology.com Languages spoken include: Portuguese, English

6.1 Return Material Authorization (RMA) Policies and Conditions

The following RMA Policies and Conditions (collectively, "RMA Policies") apply to any returned Product. These RMA Policies are subject to change by ProSoft without notice. For warranty information, see Limited Warranty (page 65). In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

6.1.1 All Product Returns:

a) In order to return a Product for repair, exchange or otherwise, the Customer must obtain a Return Material Authorization (RMA) number from ProSoft and comply with ProSoft shipping instructions.

b) In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above (page 61). A Technical Support Engineer will request that you perform several tests in an attempt to isolate the problem. If after completing these tests, the Product is found to be the source of the problem, we will issue an RMA.

c) All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft, and be accompanied by proof of purchase and receipt date. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft using a shipment method other than that specified by ProSoft, or shipped without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.

d) A 10% restocking fee applies to all warranty credit returns, whereby a Customer has an application change, ordered too many, does not need, etc. Returns for credit require that all accessory parts included in the original box (i.e.; antennas, cables) be returned. Failure to return these items will result in a deduction from the total credit due for each missing item.

6.1.2 Procedures for Return of Units Under Warranty:

A Technical Support Engineer must approve the return of Product under ProSoft's Warranty:

a) A replacement module will be shipped and invoiced. A purchase order will be required.

b) Credit for a product under warranty will be issued upon receipt of authorized product by ProSoft at designated location referenced on the Return Material Authorization

   i. If a defect is found and is determined to be customer generated, or if the defect is otherwise not covered by ProSoft's warranty, there will be no credit given. Customer will be contacted and can request module be returned at their expense;

   ii. If defect is customer generated and is repairable, customer can authorize ProSoft repair the unit by providing a purchase order for 30% of the current list price plus freight charges, duties and taxes as applicable.

6.1.3 Procedures for Return of Units Out of Warranty:

a) Customer sends unit in for evaluation to location specified by ProSoft, freight prepaid.

b) If no defect is found, Customer will be charged the equivalent of $100 USD, plus freight charges, duties and taxes as applicable. A new purchase order will be required.

c) If unit is repaired, charge to Customer will be 30% of current list price (USD) plus freight charges, duties and taxes as applicable. A new purchase order will be required or authorization to use the purchase order submitted for evaluation fee.

The following is a list of non-repairable units:

o 3150 - All
o 3750
o 3600 - All
o 3700
o 3170 - All
o 3250
o 1560 - Can be repaired, only if defect is the power supply
o 1550 - Can be repaired, only if defect is the power supply
o 3350
o 3300
o 1500 - All

6.2   LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft, and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

6.2.1   What Is Covered By This Warranty

a) *Warranty On New Products*: ProSoft warrants, to the original purchaser, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires three (3) years from the date of shipment for Product purchased **on or after** January 1st, 2008, or one (1) year from the date of shipment for Product purchased **before** January 1st, 2008 (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 39 months from date of original shipment. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or remanufactured replacement parts. ProSoft reserves the right, and at its sole discretion, may replace unrepairable units with new or remanufactured equipment. All replacement units will be covered under warranty for the 3 year period commencing from the date of original equipment purchase, not the date of shipment of the replacement unit. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft.

b) *Warranty On Services*: Materials and labor performed by ProSoft to repair a verified malfunction or defect are warranteed in the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

6.2.2 What Is Not Covered By This Warranty

a) ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.

b) This Warranty does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3, "C" or any variant of "C" programming languages) not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges; or (viii) disasters such as fire, flood, earthquake, wind and lightning.

c) The information in this Agreement is subject to change without notice. ProSoft shall not be liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material. The user guide included with your original product purchase from ProSoft contains information protected by copyright. No part of the guide may be duplicated or reproduced in any form without prior written consent from ProSoft.

6.2.3 Disclaimer Regarding High Risk Activities

Product manufactured or supplied by ProSoft is not fault tolerant and is not designed, manufactured or intended for use in hazardous environments requiring fail-safe performance including and without limitation: the operation of nuclear facilities, aircraft navigation of communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly or indirectly to death, personal injury or severe physical or environmental damage (collectively, "high risk activities"). ProSoft specifically disclaims any express or implied warranty of fitness for high risk activities.

6.2.4 Intellectual Property Indemnity

Buyer shall indemnify and hold harmless ProSoft and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not ProSoft is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless ProSoft and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party. ProSoft makes no warranty that the product is or will be delivered free of any person's claiming of patent, trademark, or similar infringement. The Buyer assumes all risks (including the risk of suit) that the product or any use of the product will infringe existing or subsequently issued patents, trademarks, or copyrights.

a) Any documentation included with Product purchased from ProSoft is protected by copyright and may not be duplicated or reproduced in any form without prior written consent from ProSoft.

b) ProSoft's technical specifications and documentation that are included with the Product are subject to editing and modification without notice.

c) Transfer of title shall not operate to convey to Customer any right to make, or have made, any Product supplied by ProSoft.

d) Customer is granted no right or license to use any software or other intellectual property in any manner or for any purpose not expressly permitted by any license agreement accompanying such software or other intellectual property.

e) Customer agrees that it shall not, and shall not authorize others to, copy software provided by ProSoft (except as expressly permitted in any license agreement accompanying such software); transfer software to a third party separately from the Product; modify, alter, translate, decode, decompile, disassemble, reverse-engineer or otherwise attempt to derive the source code of the software or create derivative works based on the software; export the software or underlying technology in contravention of applicable US and international export laws and regulations; or use the software other than as authorized in connection with use of Product.

f) **Additional Restrictions Relating To Software And Other Intellectual Property**

In addition to compliance with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

6.2.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 65) are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

6.2.6 Limitation of Remedies **

In no event will ProSoft or its Dealer be liable for any special, incidental or consequential damages based on breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Damages that ProSoft or its Dealer will not be responsible for include, but are not limited to: Loss of profits; loss of savings or revenue; loss of use of the product or any associated equipment; loss of data; cost of capital; cost of any substitute equipment, facilities, or services; downtime; the claims of third parties including, customers of the Purchaser; and, injury to property.

** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas, the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

6.2.7 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 39 months following shipment of the Product.

6.2.8 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

6.2.9 Allocation of Risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

6.2.10 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

Index

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