



# **Ethernet PLC-5 Programmable Controllers**

**Series E, Revision F.2**

**Series D, Revision G.2**

**Series C, Revision Q.2**

(Cat. No. 1785-L20E, -L40E, -L80E)

## **For Information About...**

<b>For information about:</b>	<b>See page:</b>
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## **Purpose of this Document**

Use these release notes to understand current and previous enhancements to Ethernet PLC-5<sup>®</sup> programmable controllers.

## **Purpose of this Release and the Previous Release**

*Series E, Revision F.2*

*Series E, Revision F.1*

In this release and also in the Series E, Revision F.1 release, PLC-5 firmware was changed to incorporate the latest firmware enhancements into Ethernet PLC-5 programmable controllers.

# Allen-Bradley HMIs

## Previous Enhancements

*Series E, Revision F*

*Series D, Revision G*

*Series C, Revision Q*

This previous release included the following enhancements:

### Domain Name Service (DNS)

DNS is an enhancement that translates a user-defined name into an Internet Protocol (IP) address. This enhancement requires RSLogix5™, rev. 5.2 or later.

### Web Diagnostics and Module Information

This enhancement is a user-friendly tabular view of web diagnostics and module information.

### Web User Provided Pages (WUPP)

UPP allows you to create your own custom web pages to provide executive summaries of process information. These pages are accessible to any Internet user who has network access to the PLC-5 processor. Two types of web user provided pages are **HTML** pages and **Web Custom Data Monitor** pages:

- **HTML** pages can contain data table elements, text and images
- **Web Custom Data Monitor** pages contains data table elements in table form.

This enhancement requires RSLogix5, rev. 5.2 or later.

## Using Domain Name Service

DNS allows an Internet Protocol (IP) address in symbolic form to be converted into the equivalent numeric IP address. For the PLC-5, this conversion is a service provided by a remote host on the network.

With this release of Ethernet PLC-5 processors and release 5.20 or greater of RSLogix™ programming software, you may enter the symbolic form of the IP address as the IP address in the Message Block.

The Channel Configuration feature in RSLogix5 programming software allows you to configure a primary and secondary DNS server, as well as a Default Domain Name (for example cle.ab.com).

DNS names consist of a label name and a domain name. When programming the message instruction, you can enter the full label and domain name (for example, Motor1.cle.ab.com) or just the label name (Motor1). The default domain name (cle.ab.com) is appended to the label name.

Label names must start with a letter and can only consist of letters, digits and hyphens.

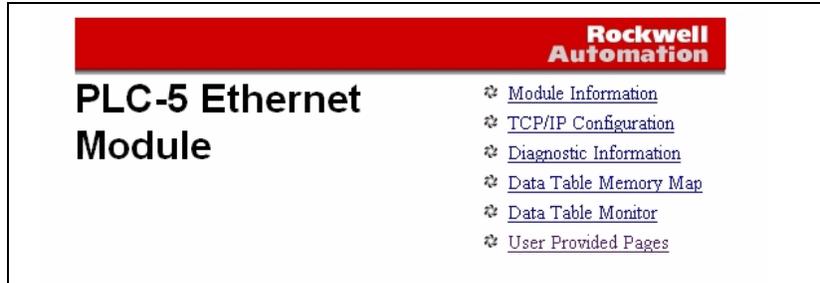
When a message instruction with a label name is first used, the PLC-5 processor verifies that label name with the name servers. When the IP address is returned, the connection is made. After the connection is made, subsequent message instruction will not require label name verification.

## Using the Embedded Web Server

To use the embedded web server:

1. Go online at your processor IP address (for example, www.cle.ab.com).

The 1785-ENET Ethernet Programmable Controllers main page appears:



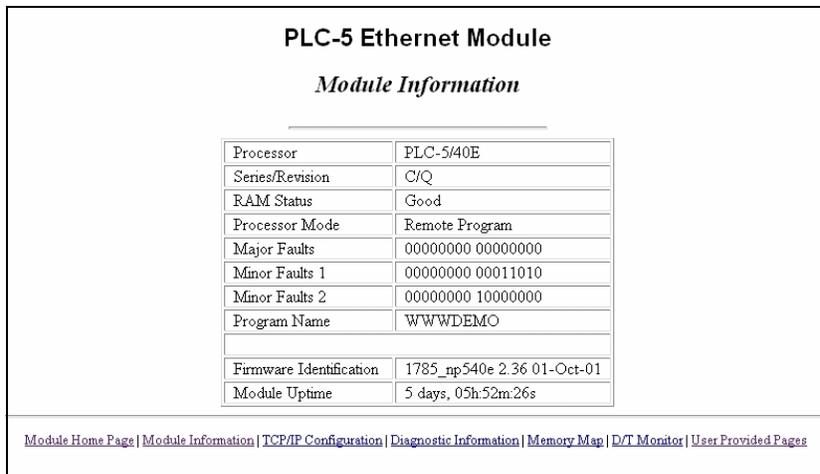
**Rockwell Automation**

### PLC-5 Ethernet Module

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- ✦ [Diagnostic Information](#)
- ✦ [Data Table Memory Map](#)
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2. Select the first item, Module Information.

The Module Information page appears and displays specific processor information:



### PLC-5 Ethernet Module

#### Module Information

Processor	PLC-5/40E
Series/Revision	C/Q
RAM Status	Good
Processor Mode	Remote Program
Major Faults	00000000 00000000
Minor Faults 1	00000000 00011010
Minor Faults 2	00000000 10000000
Program Name	WWWDEMO
Firmware Identification	1785_np540e 2.36 01-Oct-01
Module Uptime	5 days, 05h:52m:26s

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3. At the bottom of the Module Information page, select TCP/IP Configuration.

The TCP/IP Configuration page appears and displays TCP/IP parameters:

**PLC-5 Ethernet Module**  
*TCP/IP Configuration*

IP Address	130.151.135.83
Subnet Mask	255.255.254.0
Gateway Address	130.151.134.1
Name Server	130.151.135.207
Secondary Name Server	130.151.135.210
Default Domain Name	cle.ab.com
BOOTP Enable	No
Ethernet Address	00:00:BC:1C:14:92

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4. At the bottom of the TCP/IP configuration page, select **Diagnostic Information**.

The Diagnostic Information page appears and displays two lists of statistics pages:

**PLC-5 Ethernet Module**  
*Diagnostic Information*

*Network Stack Statistics*

- [General Ethernet Counters](#)
- [Ethernet Interface Statistics \(SONIC\)](#)
- [ICMP Statistics](#)
- [IP Statistics](#)
- [UDP Statistics](#)
- [TCP Statistics](#)
- [TCP Extended Statistics](#)
- [Network Memory Statistics](#)
- [Mbuf Statistics](#)

*Application Level Statistics*

- [Application Memory Statistics](#)
- [CSP Session Tables](#)
- [Encapsulation Protocol Session Table](#)
- [Encapsulation Protocol Statistics](#)
- [CIP Connection Statistics](#)
- [CIP Counters](#)

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The first list contains Network Stack Statistics. These pages present information about the TCP/IP stack.

5. For example, under Network Stack Statistics, select the first entry **General Ethernet Counters**.

This page displays general messaging statistics:

PLC-5 Ethernet Module			
<i>General Ethernet Counters</i>			
Commands Sent	0	Replies Sent	543383
Commands Received	543393	Replies Received	0
		Replies Sent With Error	10
		Replies Received With Error	0
		Replies Timed Out	0
In Octets	1885349104	Out Octets	9686629
In Packets	4175330	Out Packets	81251
Alignment Errors	0	FCS Errors	0
Carrier Sense Errors	0	Excessive Collisions	0
Excessive Deferrals	0	MAC Receive Errors	2
MAC Transmit Errors	0	Single Collisions	37
Multiple Collisions	33	Deferred Transmissions	46
Late Collisions	0	Packet Storms	60

Refresh counters every  seconds.

Use the information on this page when troubleshooting the network.

Details of each counter on the General Ethernet Counters page are described in the following table:

<b>This Counter:</b>	<b>Totals:</b>
Commands Sent	number of PCCC (programmable controller communication commands) sent by the module
Replies Sent	number of PCCC replies sent by the module
Command Received	number of PCCC commands received by the module
Replies Received	number of PCCC replies received by the module
Replies Sent with Error	number of PCCC replies with error status sent by the module
Replies Received with Error	number of PCCC replies with error status received by the module
Replies Timed Out	number of PCCC replies that were not received within the time period specified on the Ethernet Configuration page
In Octets	number of octets received by the module
Out Octets	number of octets sent by the module
In Packets	number of packets received by the module, including broadcast packets
Out Packets	number of packets sent by the module, including broadcast packets
Alignment Errors	count of frames received that are not an integral number of octets in length
FCS Errors	count of frames that do not pass the FCS check
Carrier Sense Errors	number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame
Excessive Collisions	count of frames when transmission fails caused by excessive collisions
Excessive Deferrals	count of frames when transmission is deferred for an excessive period of time
MAC Receive Errors	count of frames when transmission fails because of an internal MAC sublayer receive error
MAC Transmit Errors	count of frames when transmission fails because of internal MAC sublayer transmit error
Single Collisions	count of successfully transmitted frames when transmission is inhibited by one collision
Multiple Collisions	count of successfully transmitted frames when transmission is inhibited by more than one collision
Deferred Transmissions	count of frames when the first transmission attempt is delayed because the medium is busy
Late Collisions	number of times that a collision is detected later than 512 bit-times into the transmission of a packet
Packet Storms	number of times the SONIC driver has entered storm or throttle back operation due to excessive traffic

- At the bottom of the General Ethernet Counters page, select `Diagnostic Information` to return to that page.

The second list contains Application Level Statistics. These pages present information about the Client Server Protocol (CSP) and the Control Information Protocol (CIP), such as:

- memory usage
- inbound/outbound connection information
- packet processing

Details of the first three of these pages are described in the following table:

This Page:	Indicates:
Application Memory Statistics	information on the number of connections available and the number currently in use for inbound/outbound connections
CSP Session Table	inbound/outbound information for the CSP connection
Encapsulation Protocol Session Table	inbound/outbound connection information for the CIP connections

The remainder of the Application Level Statistics pages present detailed information on CIP protocol counters. This information may be used in the event you must call Rockwell Automation Technical Support for troubleshooting.

7. On the bottom of your current page, click on Memory Map .

The Data Table Memory Map page appears and displays a table that lists the data table files and their type and size in elements of the connected PLC-5 as shown in the following example:

PLC-5 Ethernet Module		
<i>Data Table Memory Map</i>		
File	# Elements	File Type
<a href="#">O0</a>	128	Output
<a href="#">I1</a>	128	Input
<a href="#">S2</a>	128	Status
<a href="#">B3</a>	2	Binary
<a href="#">T4</a>	2	Timer
<a href="#">C5</a>	2	Counter
<a href="#">R6</a>	2	Control
<a href="#">N7</a>	340	Integer
<a href="#">F8</a>	4	Floating Point
<a href="#">ST9</a>	17	String
<a href="#">A10</a>	958	ASCII
<a href="#">MG20</a>	2	Message
<a href="#">BT21</a>	2	Block Transfer
<a href="#">A22</a>	20	ASCII
<a href="#">ST23</a>	4	String
<a href="#">N24</a>	33	Integer

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Each file contains a hyperlink that takes you to the specific Data Table Monitor page for that file.

8. On the bottom of the Data Table Memory Map page, click on DT Monitor .

The Data Table Monitor page appears and displays a table that shows the contents of the selected PLC-5 data table file:

**PLC-5 Ethernet Module**  
*Data Table Monitor*

Address	0	1	2	3	4	5	6	7	8	9
N7:100	0	0	0	0	0	0	0	0	0	0
N7:110	0	0	0	0	0	0	0	0	0	0
N7:120	0	0	0	0	0	0	0	0	0	0
N7:130	0	0	0	0	0	0	0	0	0	0
N7:140	0	0	0	0	0	0	0	0	0	0
N7:150	0	0	0	0	0	0	0	0	0	0
N7:160	0	0	0	0	0	0	0	0	0	0
N7:170	0	0	0	0	0	0	0	0	0	0
N7:180	0	0	0	0	0	0	0	0	0	0
N7:190	0	0	0	0	0	0	0	0	0	0

Data Table Address:     Display format:    
 Refresh data every  seconds.   

The available and default display formats depend on the data type of the file.

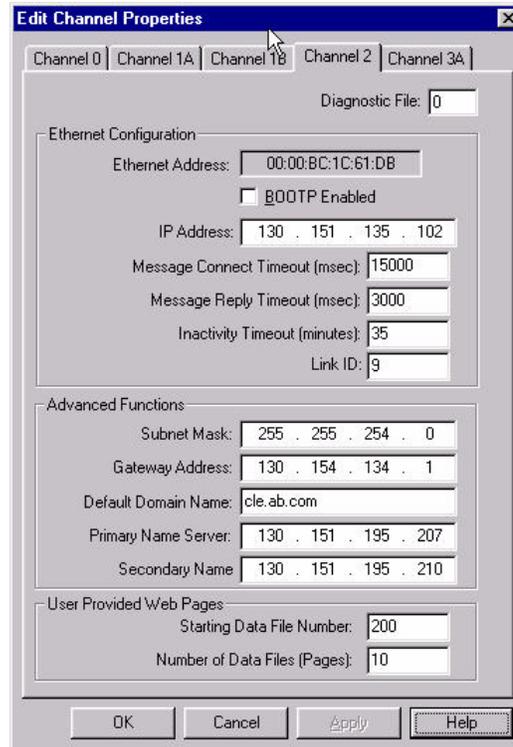
Press the **Prev** or **Next** buttons to display the previous or next page of the data table file.

You can change the **Data Table Address**, **Display Format** and **Refresh data every** fields by entering the data in the text boxes and clicking the **Change Parameters** button.

To change the refresh data function back to the default of 15 seconds, click the **Default** field. To disable the refresh data function, click the **Disable** button.

## Generating Web User Provided Pages

You can use a text editor to generate up to 16 web user provided pages. The pages are stored in consecutive ASCII files of the PLC-5 processor. The channel configuration feature of RSLogix5 (release 5.20 or later) allows you to select the starting file and number of files used, as shown in the following example:



The software also allows you to import your user file from your PC to a specified ASCII file in the PLC-5 processor.

### HTML Pages

**Referencing Other Pages/Servers** - following are some basic considerations when referencing other pages or servers:

- reference User Specified Pages in the PLC-5 by using the names **user1.html** through **user 16.html**
- to reference a page on the same processor, specify a URL such as **/user2.html**
- to reference a page on another processor, specify a URL such as **http://iota4/user2/html**
- you can reference other WWW servers and display images from other sources without affecting your usage of data table memory (except for the size of the HTTP reference)

**Referencing Data Table Memory** - reference data table memory locations by placing custom tags into your HTML source which specify the data table location and optional formatting information. Use the following format for the custom tag:

```
<!ABDTR-file_type{file_number};{file_element}[,#elements]
[%format]>
```

The items surrounded by {} are sometimes optional. The items surrounded by [] are always optional.

You must always specify the basic file reference. Depending on which file is being referenced, **file\_number** or **file\_element** may be defaulted. If the **file\_type** is I, O or S, the **file\_number** does not need to be specified, but the **file\_element** must be specified. If the **file\_type** is not one of the three special files, the **file\_number** must be specified and the **file\_element** may default to zero (the input, output and status files have fixed numbers).

Other considerations:

**#elements** - if not specified, this defaults to one. If less than one, also defaults to one. Each element gets output using the same format (whether specified with %format or defaulted).

**%format** - legal values are %d for decimal and %x for hexadecimal. The following file types allow the format to be specified:

- Input
- Output
- Status
- Integer
- Timer
- Counter
- MSG
- BT
- Control
- BCD
- PID
- SFC

**Display format defaults** - Input and Output file elements are output in octal format. Status and BCD file elements are output in hexadecimal format with a leading 0x. Integer file elements are output in decimal format. Complex data types (Timer, Counter, MSG, BT, Control, PID, SCF) are output as a table with bits and important words specified.

**Fixed display formats** - float files are always output in floating point format (“C”%g format). ASCII and string files are always output as a null terminated text string. Binary files are always output as two binary bytes.

**HTML Examples** - the following examples shows an HTML code segment in **bold** with a short description of what you would see on a web browser:

The input image word is I:0 is **<b><!ABDTR-I:0></b>**  
*(this segment displays the value of the first word of the input image table in the default format of octal with bold type)*

The time values in T4:0 are**<!ABDTR-T4:0>**  
*(this segment will display the values of the timer in T4:0 in the default format of a table)*

I:0 is **<,b><!ABDTR-I:0%d></b>**  
*(this segment displays the value of the first word of the input image table in decimal with bold type)*

T4:0 is **<b><!ABDTR-T4:0%d></B>**  
*(this segment displays the values of the three words comprising timer T4:0 in decimal with bold type)*

N24:0 to n24:3 are **<b><!ABDTR-N24:0,4></b>**  
*(this segment displays the values of the four words in N24:0 through N24:3 in decimal with bold type)*

S:21-S:23 are **<b><!ABDTR-S:21, 3%d></b>**  
*(this segment displays the values of the three words in S:21 through S:23 in decimal with bold type)*

### Generating Custom Data Table Monitor Pages

You can generate Custom Data Table Monitor pages with your text editor then download them to the PLC-5 processor. The first element of the file must contain a special tag as follows:

**<!ABCDM-xx>**

where **xx** is the automatic refresh rate in seconds (01-99).

A value outside the range defaults to a “snapshot” display.

You can modify the refresh rate three different ways:

- enter the desired refresh rate and press the Change button
- select the default button for a 15 second refresh
- disable the refresh by selecting the disable button

**Referencing Data Table Memory** - the Data Table locations in the Custom Data Table Monitor are referenced by placing custom tags into the ASCII file of the processor. The format of the custom tag is:

```
<!ABDTR-file_type{file_number}:{file_element}[,#elements][%format][#expand]!comment>
```

The items surrounded with {} are sometimes optional, whereas the items surrounded by [] are always optional.

You must always specify the basic file reference. Depending on which file is being referenced, **file\_number** or **file\_element** may be defaulted. If the **file\_type** is I, O or S, the **file\_number** does not need to be specified, but the **file\_element** must be specified. If the **file\_type** is not one of the three special files, the **file\_number** must be specified and the **file\_element** may default to zero (because the input, output and status files have fixed numbers).

Other considerations:

**#elements** - if not specified, this defaults to one. If less than one, also defaults to one. Each element gets output using the same format (whether specified with %format or defaulted). Any associated comment is displayed only for the first element.

**%format** - legal values are %b for binary, %d for decimal, %0 for octal and %x for hexadecimal. The following file types allow the format to be specified:

- Input
- Output
- Status
- Integer
- BCD

All other file types are displayed in an appropriate format. If a % format modifier is present, the format may be changed by clicking on the file type/number via a web browser.

**#expand** - legal values are #c and #e. This modifier determines whether the structure file types are displayed in their expanded or compacted formats. If a # modifier is present, the format may be changed by clicking on the [+]/[-] via a web browser. If a #modifier is not present, the default display of expanded will be used.

**!comment** - data after the exclamation point and up to the closing > will be displayed in the Comment column of the monitor.

**Fixed display formats** - float files are always output in floating point format (“C”%g format). String files are always output as a null terminated text string. Binary files are always output as four binary nibbles. ASCII files are displayed in a memory dump format.

### Importing User Page Files to the PLC-5 Processor

Use RSLogix5 to import user page files to the PLC-5 ASCII files:

1. In the Project folder (under Data Files folder), right-click on the ASCII file where you will import the user page file.
2. Click on *Properties*.
3. Click on *Import HTML*.
4. Use the browser to locate the user page file you want to import.
5. Double-click on the file to select it.
6. Click *OK*.
7. Repeat this process for each user page file.
8. When all user page files have been imported, go online with your PLC-5 processor.
9. Select the *User Provided Pages* link to view the User Provided Pages menu, as shown in the following example:

**PLC-5 Ethernet Module**

*User Provided Pages*

Page	File
<a href="#">User Provided Page #1</a>	<a href="#">A10</a>
<a href="#">User Provided Page #2</a>	<a href="#">A11</a>
<a href="#">User Provided Page #3</a>	<a href="#">A12</a>
<a href="#">User Provided Page #4</a>	<a href="#">A13</a>
<a href="#">User Provided Page #5</a>	<a href="#">A14</a>
<a href="#">User Provided Page #6</a>	<a href="#">A15</a>

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Click on the *User Provided Page #* to display that specific page.

Click on the link under the file heading to display an ASCII dump of the ASCII file. For example, click on the A15 to display the following screen:

**PLC-5 Ethernet Module**  
*File A15 Dump*

Address	0	1	2	3	4	5	6	7	8	9	ASCII
A15:0	3C21	4142	4344	4D2D	3030	3E0A	3C21	4142	4454	522D	<IABCDM-00>.<IABDTR-
A15:10	5434	3A30	2363	2154	343A	3020	496E	6469	7669	6475	T4:0#c!T4:0 Individu
A15:20	616C	3E0A	3C21	4142	4454	522D	533A	3231	2C33	2564	al>.<IABDTR-s:21,3&d
A15:30	2152	6561	6C20	5469	6D65	2043	6C6F	636B	2048	6F75	!Real Time Clock Hou
A15:40	7273	2F4D	696E	7574	6573	2F53	6563	6F6E	6473	3E0A	rs/Minutes/Seconds>.
A15:50	3C21	4142	4454	522D	4E32	343A	3225	6821	496E	7465	<IABDTR-N24:2#hlInte
A15:60	6765	7220	5661	6C75	653E	0D0A	3C21	4142	4454	522D	ger Value>..<IABDTR-
A15:70	4638	3A31	2C32	2146	6C6F	6174	2056	616C	7565	733E	F8:1,2!Float Values>
A15:80	0D0A	3C21	4142	4454	522D	4D47	3230	3A30	2363	214D	..<IABDTR-MG20:0#c!M
A15:90	6573	7361	6765	2042	6C6F	636B	3E0A	3C21	4142	4454	essage Block>.<IABDT
A15:100	522D	5354	3233	3A30	2C32	2153	7472	696E	6773	206C	R-ST23:0,2!strings l
A15:110	6F61	6361	7465	6420	696E	2053	5432	333B	0A3C	2141	oated in ST23>.<IA
A15:120	4244	5452	2D41	3232	2144	6973	706C	6179	2044	756D	BDTR-A22!Display Dum
A15:130	7020	6F66	2074	6869	7320	4153	4349	4920	6669	6C65	p of this ASCII file
A15:140	3E0A	3C21	4142	4454	522D	4233	2142	696E	6172	7920	>.<IABDTR-B3!Binary
A15:150	5661	6C75	653E	0A0A	0000						Value>....

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Select the User Provided Page #4 to display the following screen:

**PLC-5 Ethernet Module**  
*Custom Data Table Monitor (A15)*

Address	Data	Comment
[+]T4:0	(...)	T4:0 Individual
S2:21	6	Real Time Clock Hours/Minutes/Seconds
...2:22		35
...2:23		40
N24:2		13
F8:1	-1024.204956	Float Values
F8:2	8.578958e+12	
[+]MG20:0	(...)	Message Block
ST23:0	String one	Strings located in ST23
ST23:1	String two	
[+]A22	(...)	Display Dump of this ASCII file
B3:0	0000 0000 0011 0011	Binary Value

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Refresh data every  seconds.

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Click on +A22 to display the following screen:

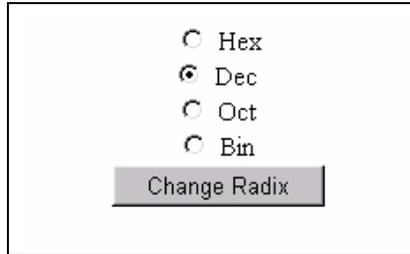
**PLC-5 Ethernet Module**  
*File A22 Dump*

Address	0	1	2	3	4	5	6	7	8	9	ASCII
A22:0	5468	6973	2069	7320	616E	2041	5343	4949	2073	7472	This is an ASCII str
A22:10	696E	672E	0000	0000	0000	0000	0000	0000	0000	0000	ing.....

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You can change the radix display of N7:0 through N7:2:

1. Go back to the Custom Data Table Monitor page.
2. In the Address column, click on N : 70 to display the radix selection page:



A dialog box for selecting the radix type. It contains four radio buttons: Hex, Dec (selected), Oct, and Bin. Below the buttons is a button labeled "Change Radix".

3. Click on a radio button to select the desired radix type.

To see the Sample Extended Format page:

1. Go back to the Custom Data Table Monitor page.
2. In the Address column, click on the + before the T4:0 to display the Sample Extended Format:

**PLC-5 Ethernet Module**

*Custom Data Table Monitor (A15)*

Address	Data	Comment
[+]T4:0	(...)	T4:0 Individual
--- DN	0	
--- TF	1	
--- EN	1	
--- PRE	100	
--- ACC	54	
--- BASE	10 ms	
S2:21	6	Real Time Clock Hours/Minutes/Seconds
...2:22	39	
...2:23	12	
N24:2	13	
F8:1	-1024.204956	Float Values
F8:2	8.578958e+12	
[+]MG20:0	(...)	Message Block
ST23:0	String one	Strings located in ST23
ST23:1	String two	
[+]A22	(...)	Display Dump of this ASCII file
B3:0	0000 0000 0011 0011	Binary Value

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Refresh data every  seconds.

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This completes the Embedded Web Server enhancements and descriptions. Corrected anomalies and previous processor enhancements are described on the following pages.

## Previous Ethernet PLC-5 Processor Enhancements

*Series E, Revision E.2*

This release included these enhancements for Ethernet Channel diagnostics - channel 2 in Ethernet processors and/or channel 3A when using a **Series B, Revision B or later** Ethernet sidecar module:

- additional diagnostics are available for use within a user program as words 44 through 49 of the Ethernet diagnostic file:

This word:	Displays:
44	Network storm counter
45-47	Ethernet hardware address
48-49	Assigned Internet Protocol Address

Words 48 and 49 contain 4 bytes of data, with each byte holding one of the numbers of the address in hex in the dot address format. For example, an IP address of 142.169.124.1 will be displayed as 8EA9 7C01.

- Series C, revision H and later processors limit the amount of messages they will accept under extremely high levels of Ethernet traffic (storms). This is designed to prevent a fault with memory loss.

To complement this enhancement, Series E, revision E.1 processors include diagnostics with a network storm counter (word 44 of Ethernet diagnostic file). At the beginning of each storm, the network storm counter is incremented once independent of the length of the storm.

For example, when the processor receives more than 16 Ethernet frames within 10ms, it goes into storm mode and increments the network storm counter. In this mode, the processor disables receive interrupts for 6ms. After 6ms, the processor enables the input interrupts, and sets the input limit to 8 frames in 10ms. After 10ms (and without the input limit being exceeded), the processor returns the input limit to 16 frames.

During certain times (such as when the processor encounters mode changes), the input limit is further reduced to 5 frames for 10ms and interrupts are disabled for 10ms.

To access these additional words, you must create the diagnostic file in the channel configuration and manually expand the data table file from 44 to 50 words.

# Allen-Bradley HMIs

### **Additional Processor Enhancements**

This release also includes the following enhancements to Ethernet PLC-5 processors:

- TCP/IP communications have been updated for enhanced UDP message support and super-netting
- includes an embedded web server that makes specific network diagnostic counter information available through a web browser

You can access this information via any Ethernet network connection by using your web browser and the IP address of this processor.

- supports use of the 1785-RC Relay Cartridge

The relay cartridge serves as an interface from the PLC-5 to a user-supplied external device such as the Allen-Bradley™ 700P relay. When the PLC-5 is in run mode, it monitors online ladder program edits and I/O forcing activity. When either of these is detected, the processor opens the relay on the relay cartridge for one second.

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# Allen-Bradley HMIs

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