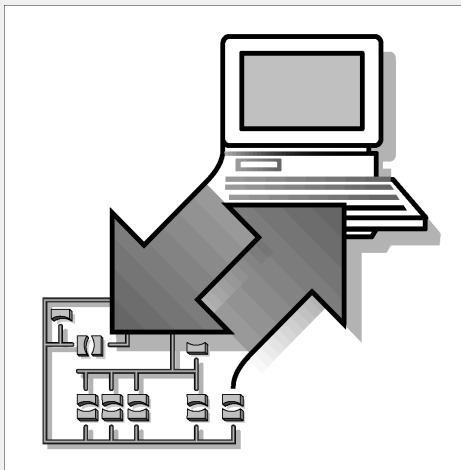




Allen-Bradley

*PLC-3[®] Family
Programmable
Controllers*



Addressing Reference Manual

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication *SGI-1.1, Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we make notes to alert you to possible injury to people or damage to equipment under specific circumstances.



WARNING: Tells readers where people may be hurt if procedures are not followed properly.



CAUTION: Tells readers where machinery may be damaged or economic loss can occur if procedures are not followed properly.

Warnings and Cautions:

- identify a possible trouble spot
- tell what causes the trouble
- give the result of improper action
- tell the reader how to avoid trouble

Important: We recommend that you frequently back up your application programs on an appropriate storage medium to avoid possible data loss

Addressing for PLC-3 Family of Processors

Using this Addressing Reference Guide

This addressing reference helps you specify the address in the PLC-3 data table. This reference contains:

For This Subject:	Refer to:
organization of the PLC-3 data table	page 2
general format for direct logical ASCII addressing	page 4
direct logical addressing for input and output sections	page 5
direct logical addressing for timers and counters	page 7
logical addressing for ASCII, binary, decimal, floating-point, high-order integer, and status sections	page 9
direct logical addressing of pointer structures	page 13
extended addressing format	page 14

For more information about the specific contents of the various sections of memory, consult the:

- PLC-3 programmer, who assigns specific data items to specific memory locations
- PLC-3 Family Programmable Controller Programming Reference Manual, publication 1775-6.4.1

Organization of the PLC-3 Data Table

Figure 1 shows how the data table of the PLC-3 processor is organized into sections.

Figure 1
Data Table Organization

Section	Title	Maximum Size	Address Range
O	Output Section	4,096 words/file; 1,000 files	O000:0000 to O999:7777 ₈ (O0000 to O3767 ₈ for output image)
I	Input Section	4,096 words/file; 1,000 files	I000:0000 to I999:7777 ₈ (I0000 to I3767 ₈ for input image)
T	Timer Section (3-word timer structures)	10,000 timers	T0 to T9999
C	Counter Section (3-word counter structures)	10,000 counters	C0 to C9999
N	Integer Section (16-bit integer words)	10,000 words/file; 1,000 files	N000:0000 to N999:9999
F	Floating-Point Section (32-bit floating-point words)	10,000 words/file; 1,000 files	F000:0000 to F999:9999
D	Decimal Section (16-bit BCD words)	10,000 words/file; 1,000 files	D000:0000 to D999:9999
B	Binary Section (16-bit binary words)	10,000 words/file; 1,000 files	B000:0000 to B999:9999
A	ASCII Section (16-bit 2-character words)	10,000 words/file; 1,000 files	A000:0000 to A999:9999
H	High-Order Integer Section (32-bit integer words)	10,000 words/file; 1,000 files	H000:0000 to H999:9999
P	Pointer Section (3-member pointer structures)	10,000 pointers	Pmember:0000 to Pmember:9999
S	Status Section (16-bit words)	10,000 words/file; 1,000 files	S000:0000 to S999:9999

Locating Addressing Information

The remainder of this addressing reference provides addressing formats, mnemonics, and data structures for addressing various PLC-3 data-table sections. Use the index at the back of this reference to locate information about specific data types

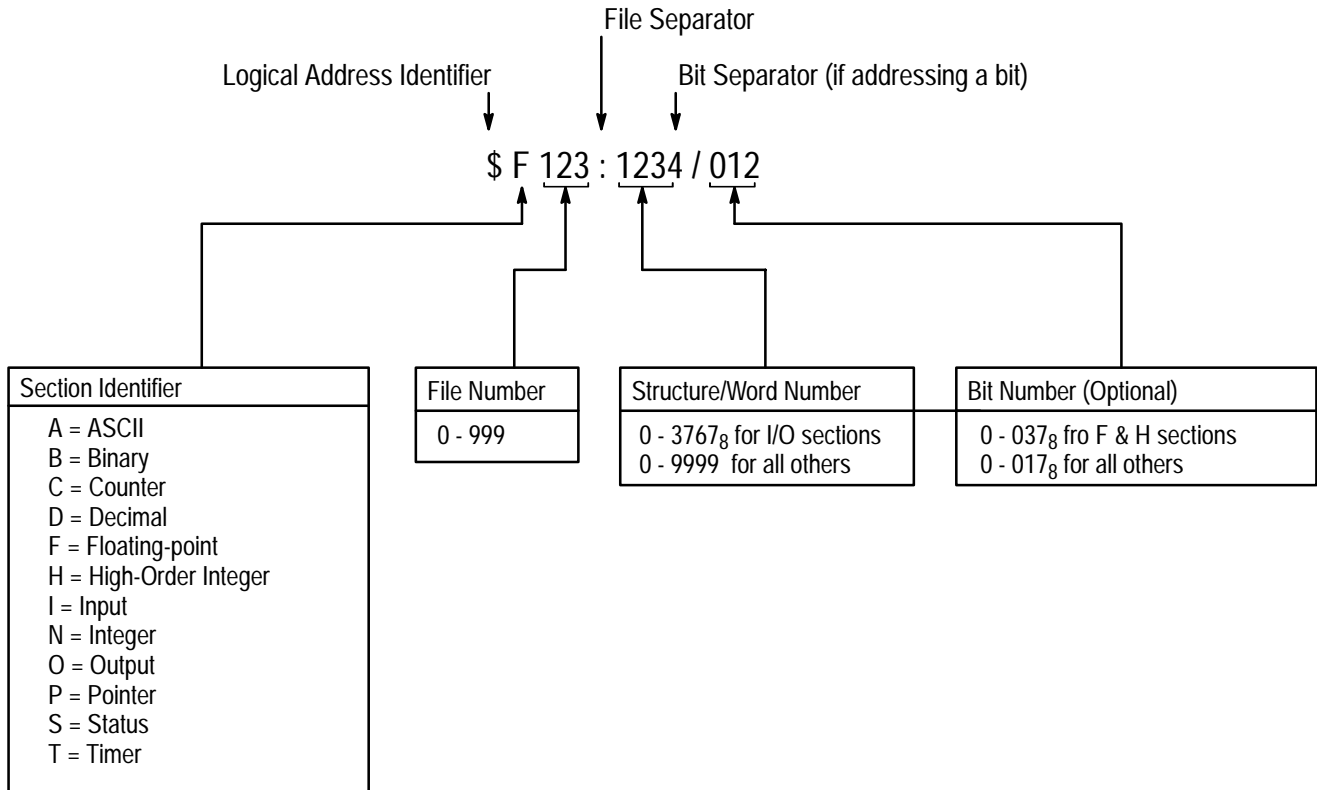
For Information About:	Refer to:
ASCII section	Figure 10, Figure 11
Binary section	Figure 10, Figure 12
Counters	Figure 7, Figure 9, Table A
Decimal section	Figure 10, Figure 13
Extended addressing	Figure 21
Floating-point section	Figure 10, Figure 14
High-order Integer section	Figure 10, Figure 15
Input image table	Figure 3, Figure 4
Integer section	Figure 10, Figure 16
Input/Output section	Figure 5, Figure 6
Output image table	Figure 3, Figure 4
Pointers	Figure 19, Figure 20
Status section	Figure 10, Figure 17, Figure 18
Timers	Figure 7, Figure 8, Table A

Use logical ASCII addressing to read and write data to and from the PLC-3 data table. You provide a string of letters, digits, and punctuation that specifies the file type, file, and structure or word of the address.

General Format for Direct Logical ASCII Addressing

Figure 2 illustrates the general format for logical addressing in the PLC-3 data table.

Figure 2
General Format for Logical Addressing



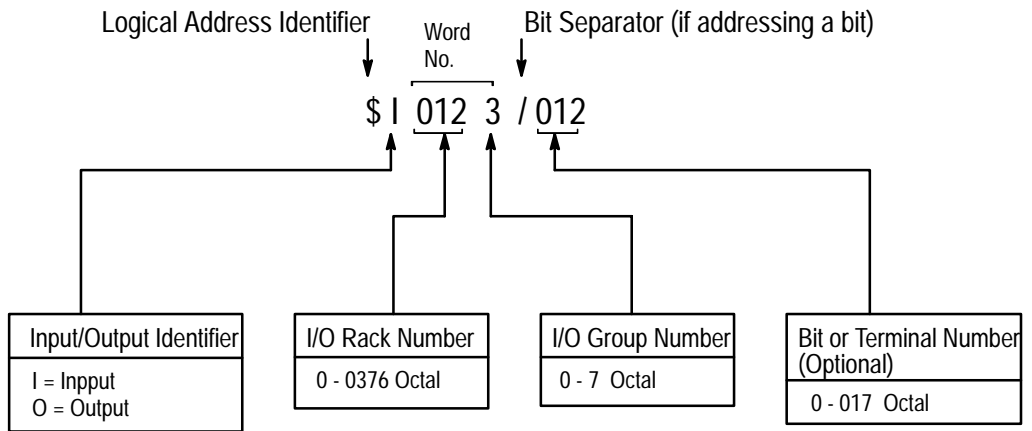
17409-1

Note that throughout this publication we use \$ as the logical address identifier. This is an entry for DTL software. It is also an entry for 6200 software in sending a message from some stations to a PLC-3 station. It is not used in 6200 software for internal addressing.

Figures 3 through 20 show specific formats for direct logical addressing of various areas of the PLC-3 data table.

Direct Logical Addressing for Input and Output Sections

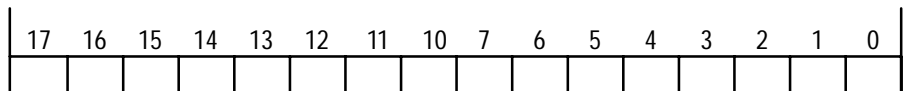
Figure 3
Format for Logical Addressing of Input and Output Image Tables



The first 2040 words of file 0 are reserved for the I/O image. The remaining words of file 0 and all of files 1 thru 999 can be used for data storage.

17404-1

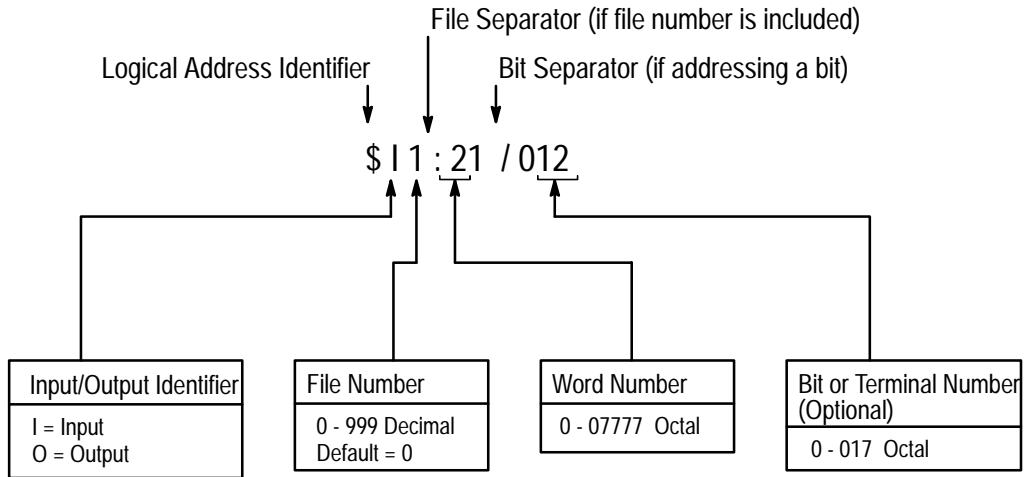
Figure 4
Word of Input or Output Image Section



PLC Data Type: Unsigned word
Range: 0 thru 65,535

17405-1

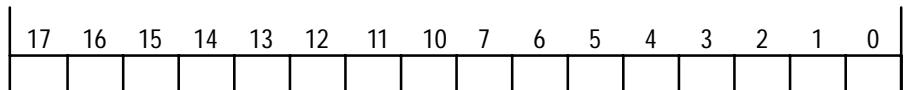
Figure 5
General Format for Logical Addressing of Input and Output Sections



The first 2040 words of file 0 are reserved for the I/O image. The remaining words of file 0 and all of files 1 thru 999 can be used for data storage.

17800-I

Figure 6
Word of Input of Output Section

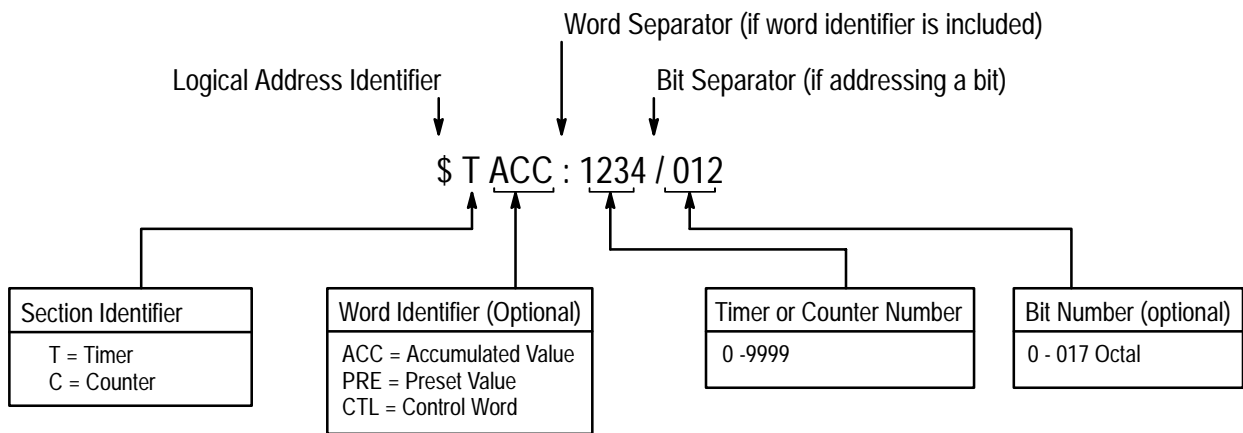


PLC Data Type: Unsigned word
Range: 0 thru 65,535

17405-I

Direct Logical Addressing of Timers and Counters

Figure 7
Format for Logical Addressing of Timer and Counter Structures



With no word identifier, by default, the whole structure is addressed.

17406-I

Figure 8
Timer Structure

17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
TE	TT	TD	Reserved			Used to maintain timer accuracy									
PRE — Preset Value (0 thru 65,535) — PLC Data Type: Unsigned Word															
ACC — Accumulated Value (0 thru 65,535) — PLC Data Type: Unsigned Word															

TE - Timer Enabled
 TT - Timer Timing
 TD - Timer Done

17407-I

Figure 9
Counter Structure

17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
CU	CD	DN	OV	UF	Reserved										
PRE - Preset Value (-32,768 thru +32,767) - PLC Data Type: Signed Word															
ACC - Accumulated Value (-32,768 thru +32,767) - PLC Data Type: Signed Word															

CU = Count-Up Enable
 CD = Count-Down Enable
 DN = Counter Done
 OV = Counter Overflow
 UF = Counter Underflow

17408-I

Addressing Examples for Timers and Counters

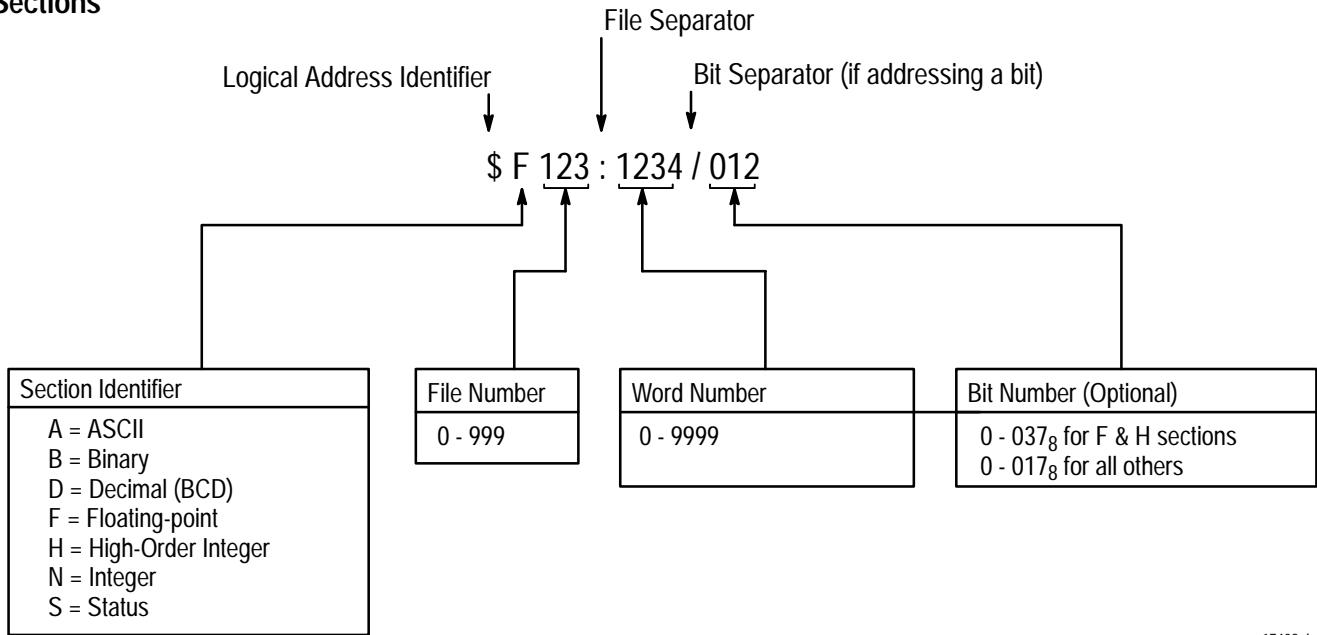
Table A shows you how to address a whole timer or counter structure or any individual member of a timer or counter structure.

Table A
Example PLC-3 Logical Addresses

To Address:	PLC Data Type:	Example Address:
Whole Timer Structure	structure	\$T0
Timer Accumulated Word	unsigned word	\$TACCO
Timer Preset Word	unsigned word	\$TPRE0
Timer Control Word	unsigned word	\$TCTL0
Timer Enabled Bit	bit	\$T0.TE or \$TCTL:0/17
Timer Timing Bit	bit	\$T0.TT or \$TCTL:0/16
Timer Done Bit	bit	\$T0.TD or \$TCTL:0/15
Whole Counter Structure	structure	\$C0
Counter Accumulated Word	signed word	\$CACCO
Counter Preset Word	signed word	\$CPRE0
Counter Control Word	unsigned word	\$CCTL0
Count-Up Enable Bit	bit	\$C0.CU or \$CCTL:0/17
Count-Down Enable Bit	bit	\$C0.CD or \$CCTL:0/16
Counter Done Bit	bit	\$C0.DN or \$CCTL:0/15
Counter Overflow Bit	bit	\$C0.OV or \$CCTL:0/14
Counter Underflow Bit	bit	\$C0.UF or \$CCTL:0/13

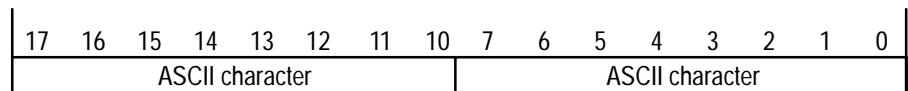
**Direct Logical Addressing for
ASCII, Binary, Decimal,
Floating-Point, High-Order
Integer, Integer, and Status
Sections**

Figure 10
Format for Logical Addressing of ASCII, Binary, Decimal, Floating-Point,
High-Order Integer, Integer, and Status Sections



17409-I

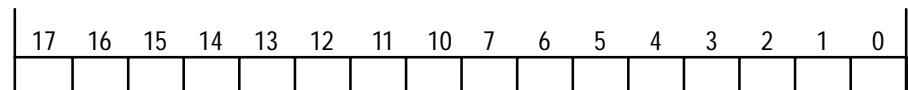
Figure 11
Word of ASCII (ANSI X3.4) Section



PLC Data Type: Unsigned word

17410-I

Figure 12
Word of Binary Section

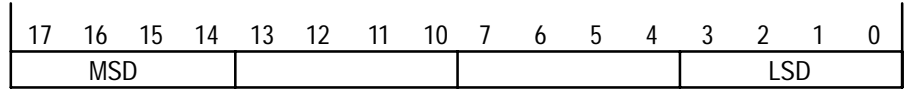


PLC Data Type: Unsigned Word

Range: 0 thru 65,535

17411-I

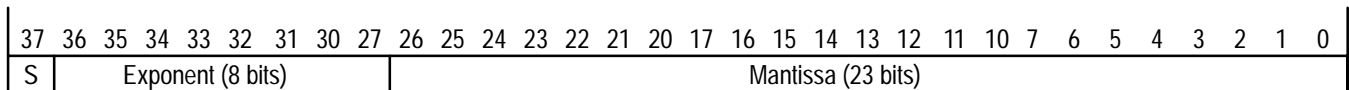
Figure 13
Word of Decimal (BCD) Section



MSD = Most Significant Digit
 LSD = Least Significant Digit
 PLC Data Type: BCD (4 digits per word)
 Range: 0 thru 9,999

17412-I

Figure 14
Word of Floating-Point Section

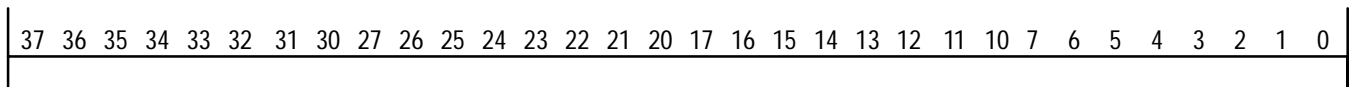


PLC Data Type:

- IEEE float — when accessed with PLC-5 read-block (CMD = 0F, FNC = 68) or write-block (CMD = 0F, FNC = 67) command messages that require matching data types on each end. DTL software does not use these types of messages
- PLC-3 Float (VAX type F) — when accessed with other read and write commands. For DTL software, this is the data type because DTL software uses PLC-3 read-block (CMD = 0F, FNC = 01) or write-block (CMD = 0F, FNC = 00) command messages that do not require matching data types on each end.

Range: +/- 2.939 E-39 thru +/- 1.701 E+38

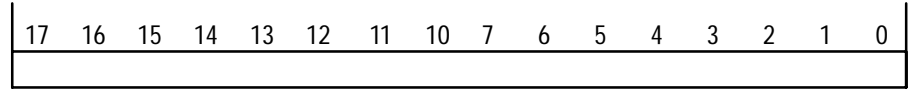
Figure 15
Word of High-Order Integer Section



PLC Data Type: Signed PLC-3 Long (negative values in 2's complement form)

Range: -2,147,483,648 thru +2,147,483,647

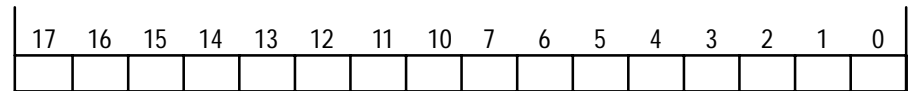
Figure 16
Word of Integer Section



PLC Data Type: Signed Word (negative values in 2's complement form)
Range: -32,768 thru +32,767

17415-I

Figure 17
Word of Status Section



PLC Data Type: Unsigned Word

17416-I

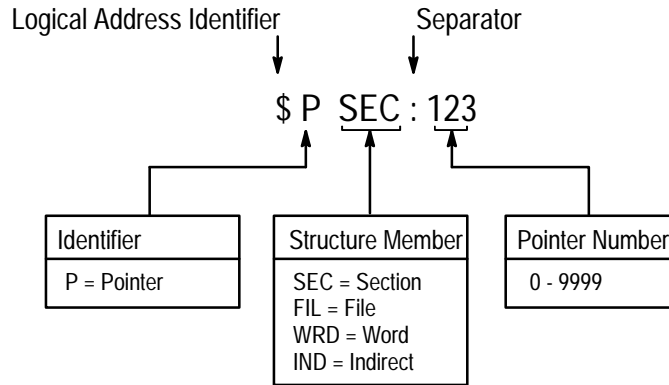
The status section of the data table is organized as shown in Figure 18. For more detailed information about the contents of the status section, refer to the PLC-3 Family Programming Reference Manual, publication 1775-6.4.1

Figure 18
Organization of the Status Section of the Data Table

File		Word
0	arithmetic operation status	0
	major faults	1
	minor faults	2
	controller operating mode	3
	ladder-logic program check-sum	4
1	time-of-day clock and calendar	5
		0
		1
		2
		3
		4
2	I/O adapter faults	5
		6
3	I/O communication retry counts	
4	memory communication module	
5	memory/PC communication module	
6	S5/SR5 DH+ active-node table	
10 – 25	peripheral communication module	0
		79

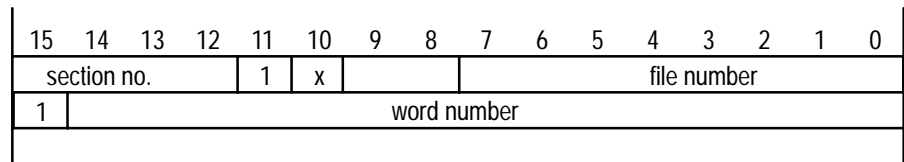
Direct Logical Addressing of Pointer Structures

Figure 19
Format for Logical Addressing of Pointer Structures



17417-1

Figure 20
Pointer Structure



x = reserved

17396-1

PLC Data Type: Unsigned Word (3 structure members)

If the section number is pointing to the timer (3) or counter (4) section, the value of the file member is one of the following:

If the Section1-Number Value is:	Word-Number Value Points to:	File-No. Value:	Points to this word of the timer or counter structure
3 (timer) or 4 (counter)	Timer or Counter Number	0	control
		256	preset value
		512	accumulated value

If the section number is pointing to the pointer (12) section, the value of the file member is one of the following:

If the Section1-Number Value is:	Word-Number Value Points to:	File-No. Value:	Points to this member of the pointer structure
12 (pointer)	Pointer Number	0	direct section number
		256	direct file number
		512	direct word number

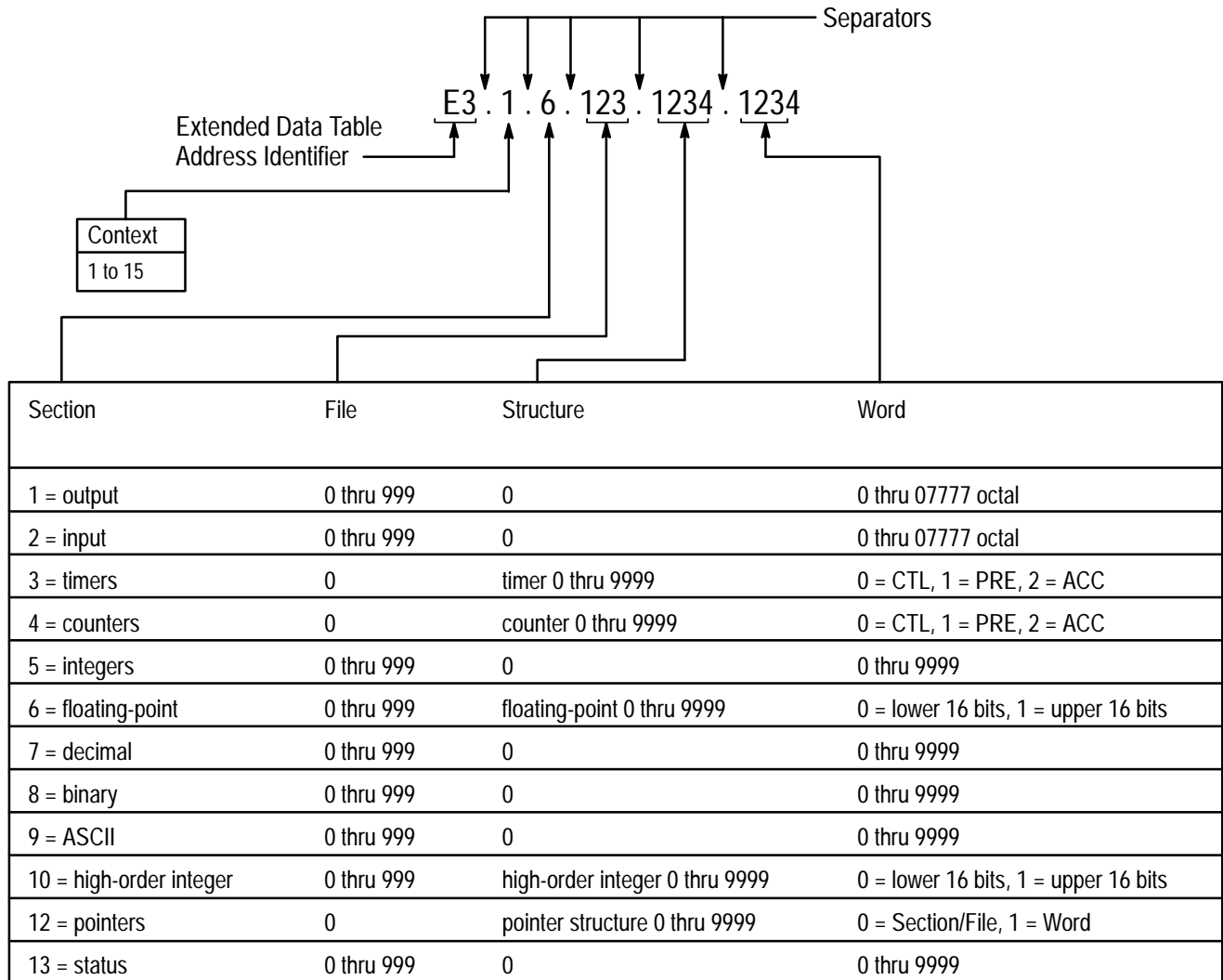
Extended Addressing format

The PLC-3 system supports the extended addressing format shown in Figure 21. You can use this format in your application programs as an alternative to the direct logical addressing formats, described previously.

In this format, context refers to a means of using PLC-3 memory to store multiple programs and sets of supporting data, including the data table. For each context, the PLC-3 memory allocates a separate data table with each section as shown in Figure 21.

For more information about extended addressing, refer to the PLC-3 Family of Programmable Controllers Programming Reference Manual, publication 1775-6.4.1.

Figure 21
Format for Extended addressing of the PLC-3 Data Table



Customer Support

If you need additional assistance on using your software, Allen-Bradley offers telephone and on-site product support at Customer Support Centers worldwide.

For technical assistance on the telephone, first contact your local sales office, distributor, or system integrator. If additional assistance is needed, then contact your local Customer Support Center or contact system Support Services.

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If you have a SupportPlus agreement or your software is under warranty, you can contact System Support Services at: 1-800-289-2279. Have your support contract or software registration number available.

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United Kingdom (Milton Keynes)	44-908 838800
Europe (Amsterdam)	31-2975 43500
France (Paris)	(33-1) 4778 1402
Germany (Gruiten)	(49) 2104 6900
Italy (Milan)	(39-2) 4830 0381
Asia Pacific (Hong Kong)	(852) 873-1342

For assistance that requires on-site support, contact your local office, distributor, or system integrator. During non-office hours, contact your local Customer Support Center.



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