

## ICO-DIO-Series SoftPLC Ver. 2.00 Driver Documentation

April 23, 2001

### A. Introduction

The "*DIO.TLM*" is a *TOPDOC* Loadable Module (TLM) that enables SoftPLC's ISA and PC/104 Digital I/O boards **ICO-DIO24**, **ICO-DIO48**, **PC104-DIO48**, **ICOO-DIO96**, and **ICO-DIO192** to be integrated with *SoftPLC*. The boards have from 24 to 192 programmable digital I/O points. The data will be automatically read from and to the board during *SoftPLC's* I/O Scan at a user defined start address. Two (2) *TOPDOC* Loadable Instruction (TLI) are also provided to both write and read data to and from the card immediately during the ladder scan. Currently, a maximum of one-hundred and ninety two bits (192) is supported on one or more sequentially addressed boards. The driver is configured via command line arguments.

### B. Hardware Installation, Configuration & Board Testing

Install the ICO-DIO series board in the computer following the instructions outlined in the associated User's Manual. There are only two hardware settings that are set via dip switches on the board. The option switches and suggested setting are as follows:

Base Address	Any non-bios related port address such as 300H.
Wait States	Usually OFF

### C. Software Installation

The "DIO" TLM should be installed on *SoftPLC's* flash EEPROM or hard disk in the "\SPLCZ\IODVR" directory.

The "DIO" driver is loaded by *SoftPLC* via its "**MODULE.LST**" file. The Module.lst file must be located in the default directory when the *SoftPLC* kernel is executed. For most systems the "Module.lst" should include the following statement.

```
DRIVER=C:\SPLCZ\IODVR\DIO.TLM <options>
```

## D. Driver Option Parameters

The driver is configured via the following command line options:

- BASE** - Base I/O port address in HEX; set via card dip switches.  
Any non-BIOS I/O port is allowed. Default is 300H.
- ADDR** - Desired *SoftPLC* datatable start address in OCTAL.  
Default is 00.
- BITS** - Number of I/O bits on the card. (24, 48, 96, 144, 192). Default is 96.
- IV** - Invert Digital I/O states. Options are (T)rue and (F)alse. Default = FALSE,
- Pn** - Parallel Chips 0-7 I/O Port designation as Input or Output.  
Where n=0-7. Each 82C55 has 3 ports (A, B & C) for a total of 24 bits.  
All 3 ports are set via a single HEX value where zero (0) equals OUTPUT and one (1) equals INPUT. For example:

<u>HEX</u>	<u>C</u>	<u>B</u>	<u>A</u>	<u>Description</u>
0	0	0	0	All Ports are Outputs
1	0	0	1	Port A is Input
2	0	1	0	Port B is Input
3	0	1	1	Port A & B are Inputs
4	1	0	0	Port C is Input
5	1	0	1	Port C & A are Inputs
6	1	1	0	Port C & B are Inputs
7	1	1	1	All Ports are Inputs

**Note:** The default is all ports are set as INPUT's.

For example, an entry in the "**MODULE.LST**" may read as follows:

```
DRIVER=C:\SPLCZ\IODVR\DIO.TLM BASE=330 ADDR=010 BITS=48 P0=7 P1=0
```

The above example statement would mean that the board is a **CIO-DIO48** or **PC104-DIO48** card and has a **BASE** I/O Port address of 330H set via dip switches on the card. The data from the DIO48 will be INPUT/OUTPUT to *SoftPLC*'s datatable **ADDR**ess starting at I:010 and O:010. The first 24 bits are

mapped as INPUT's and the second 24 bits are mapped as OUTPUT's.

### E. I/O Mapping in SoftPLC

The entire card's Input and Output registers will be mapped into *SoftPLC's* datatable starting at the given address on the command line in the "Module.lst" file (ADDR=0NN). Each CIO-DIO Series board will use the same number of words in the INPUT and OUTPUT datatables. The 24 bit board uses two (2) words, the 48 bit card uses three (3) words, the 96 bit board uses six (6) words and the 192 bit board uses twelve (12) words.

In most cases the address will be set to the default of zero (ADDR=00). In this case, both the Input and Output will be mapped starting at the octal address 00. For example:

				DIO Series Boards MAP				
<u>Addr</u>	<u>Card Mapping</u>		<u>Addr</u>	<u>Card Map</u>	<u>192</u>	<u>96</u>	<u>48</u>	<u>24</u>
I:00	P0 A	00 - 07	O:00	P0 A	00 - 07	X	X	X X
	P0 B	10 - 17		P0 B	10 - 17	X	X	X X
I:01	P0 C	00 - 07	O:01	P0 C	00 - 07	X	X	X X
	P1 A	10 - 17		P1 A	10 - 17	X	X	X
I:02	P1 B	00 - 07	O:02	P1 B	00 - 07	X	X	X
	P1 C	10 - 17		P1 C	10 - 17	X	X	X
I:03	P2 A	00 - 07	O:03	P2 A	00 - 07	X	X	
	P2 B	10 - 17		P2 B	10 - 17	X	X	
I:04	P2 C	00 - 07	O:04	P2 C	00 - 07	X	X	
	P3 A	10 - 17		P3 A	10 - 17	X	X	
I:05	P3 B	00 - 07	O:05	P3 B	00 - 07	X	X	
	P3 C	10 - 17		P3 C	10 - 17	X	X	
I:06	P4 A	00 - 07	O:06	P4 A	00 - 07	X		
	P4 B	10 - 17		P4 B	10 - 17	X		
I:07	P4 C	00 - 07	O:07	P4 C	00 - 07	X		
	P5 A	10 - 17		P5 A	10 - 17	X		
I:10	P5 B	00 - 07	O:10	P5 B	00 - 07	X		
	P5 C	10 - 17		P5 C	10 - 17	X		
I:11	P6 A	00 - 07	O:11	P6 A	00 - 07	X		
	P6 B	10 - 17		P6 B	10 - 17	X		
I:12	P6 C	00 - 07	O:12	P6 C	00 - 07	X		
	P7 A	10 - 17		P7 A	10 - 17	X		
I:13	P7 B	00 - 07	O:13	P7 B	00 - 07	X		

**E. TLI Instructions:**

Two (2) *TOPDOC* loadable Instructions (TLI's) are available to read and/or write to the I/O within the I/O scan. This feature will allow the bit level I/O to be used to process very high speed events if necessary. The two (2) instruction names are: **DIOREAD** and **DIOWRITE**. Neither instruction requires any parameters.

**F. Possible Error Codes:**

- 1100 - Incompatible *SoftPLC* version
- 1101 - Illegal number of Racks
- 1102 - No Command Line Arguments
- 1103 - Invalid Base Port Address
- 1104 - Invalid *SoftPLC* Octal start Address
- 1107 - Invalid Port Type
- 1108 - Invalid Counter Type Specified
- 1110 - Invalid Command Line Argument
- 1112 - Invalid Number of Bits Specified.
- 1115 - Invalid Invert Parameter
  
- 1200 - Not Initialized
- 1203 - Invalid Internal Command