

# ComputerBoards CIO-DAS08-AOL SoftPLC Driver

## I. INTRODUCTION

The "DAS08.TLM" is a TOPDOC Loadable Module (TLM) that enables the ComputerBoards Model CIO-DAS08-AOL ISA Bus multifunction analog and digital I/O board card to be integrated with SoftPLC. The card has eight (8) analog inputs, two (2) analog outputs, three (3) counter/timers, and thirty-one (31) digital I/O. This initial release of the driver is configured via command line arguments. The data will be automatically written to and read during SoftPLC's I/O Scan at a user defined start address. A TOPDOC Loadable Instruction (TLI) is provided to reset the counter. At this time, only one (1) board is supported.

## II. COMPUTERBOARDS HARDWARE INSTALLATION, CONFIGURATION & BOARD TESTING

Install the CIO-DAS08 in the computer following the instructions outlined in the CIO-DAS08-AO manual on page 3 after you have set the hardware option switches as desired.

There are several hardware settings that are set via dip switches on the board. The option switches and suggested setting are as follows:

Analog Output Range	Any available range
Clock Source Jumper	1 MHz or higher
Interrupt	None
Base Address	Any non-bios related port address such as 300H
Wait States	Usually OFF

The CIO-DAS08-AOL must be assigned a board number with the ComputerBoards "InstaCal" software. The board can also be tested using this software provided jumper wires are installed between the following pins on the main board connector:

PIN 11 to PIN 19

PIN 7 to PIN 37

See the "CIO-DAS08-AO User's Manual" and the "InstaCal" software for further information.

### III. SOFTWARE INSTALLATION

The "DAS08" TLM should be installed on SoftPLC's Flash EEPROM or Hard Disk in the "\SPLCZIODVR" directory.

The "DAS08" 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:\SPLCZIODVR\DAS08.TLM <options>**

For off-line programming, a "MODULE.LST" file must also be provided. In this case it must reside in the TDZ directory (\TDZ). Since no I/O scanning is performed in TOPDOC, the keyword "MODULE" can be used instead of DRIVER. If TDZ was being executed from the "C:" drive, the following entry would be required in TDZ's "MODULE.LST" file:

**MODULE=C:\SPLCZIODVR\DAS08.TLM**

### IV. 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.
- GAIN** - Analog Input Gain factor for all eight (8) channels; options 0-4.  
Default is 1.
- Gain options are:  
0 = Gain of .5  
1 = Gain of 1  
2 = Gain of 2  
4 = Gain of 4  
8 = Gain of 8
- MODE** - Analog Mode; (S)ingle or (D)ifferential  
Default is 'S'
- AIN** - Number of Analog Channels to read (1-8)
- PA** - I/O Port A designation as (I)nput or (O)utput.  
default is 'I'.
- PB** - I/O Port B designation as (I)nput or (O)utput.  
Default is 'I'.

- PC** - I/O Port C designation as (I)nput or (O)utput.  
Default is 'O'
- C0** - Counter 0 operation mode (0-5). Default = 0.
- C1** - Counter 1 operation mode (0-5). Default = 0.

Counter options are:

- 0 = Change on Terminal Count
- 1 = One Shot
- 2 = Rate Generator
- 3 = Square Wave Generator
- 4 = Software Trigger Strobe
- 5 = Hardware Trigger strobe

Note: Counter 2 is not configurable!

For example, an entry in the "Module.lst" may read as follows:

**DRIVER=C:\SPLCZ\IODVR\DAS08.TLM BASE=320 ADDR=010 PB=0 C1=3**

The above example statement would mean that **BOARD** number zero (0) is a CIO-DAS08 and has I/O **BASE** 320H set via dip switches on the card. The data from the DAS08 will be INPUT/OUTPUT to SoftPLC's datatable **ADDR**ess starting at I:010 and O:010 and a **GAIN** of one (1) will be used for the eight (8) analog input channel's Single-ended data. I/O **Port A's** eight (8) bits will be configured as Inputs, and **Port B's** and **C's** as Outputs. The output of **Counter's** zero (0) and two (2) will be configured to "Change on Terminal or Maximum Count". The output for **Counter** one (1) will be configured to create a square wave.

Normally only counters zero (0) and one (1) should be re-programmed. For pulse input counting, the default mode of zero (0) or "Change on Terminal Count" is sufficient.

## v. I/O MAPPING IN SOFTPLC

The entire card's Input and Output registers will mapped into SoftPLC's datatable starting at the given address on the command line in the "module.lst" file (ADDR=0NN). The seven (7) digital points on the main connector and the twenty-four (24) bits on the auxiliary connector will be mapped in the first two (2) words. Next the three (3) counters are mapped, followed by the eight (8) analog Inputs and two (2) Analog Outputs. Currently, all eight (8) analog words are allocated to the driver even if less than the maximum number of channels are actually read. For example when AIN=1...7.

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:

<u>Input Addr</u>	<u>Card Mapping</u>	<u>Output Addr</u>	<u>Card Mapping</u>
I:00	IP1 00 IP2 01 IP3 02	O:00	OP1 00 OP2 01 OP3 02 OP4 03
I:01	PORT A 10 - 17 PORT B 00 - 07 PORT C 10 - 17	O:01	PORT A 10 - 17 PORT B 00 - 07 PORT C 10 - 17
I:02	Counter 0 Value	O:02	Not Used
I:03	Counter 1 Value	O:03	Not Used
I:04	Counter 2 N/A	O:04	Not Used
I:05	Analog Input #1	O:05	Analog Output #1
I:06	Analog Input #2	O:06	Analog Output #2
I:07	Analog Input #3	O:07	Not Used
I:10	Analog Input #4	O:10	Not Used
I:11	Analog Input #5	O:11	Not Used
I:12	Analog Input #6	O:12	Not Used
I:13	Analog Input #7	O:13	Not Used
I:14	Analog Input #8	O:14	Not Used

## VI. RUNTIME TLI'S

The following TLI can be programmed using TOPDOC for SoftPLC (TDZ).

1. **C82c54Load** - Loads one of two (2) counters on the next input pulse to the given value.

Parm1: Port - Decimal Port Address of start of counter registers (base+4).  
 parm2: Chan - Counter Channel Number (0 or 1).  
 parm3: Value - Value to set counter to on next pulse.  
 parm4: ErrCode - Error Code.

## VII. COUNTER OPERATION

The counters are count down counters and can be reset to a specified value with the C82c54Load TLM provided. The new value will be loaded on the next signal pulse on the CLK input.

Please note that counter zero (0) requires a 0 volt enable signal and counter one (1) requires a +5 volt enable signal. This is contrary to the documentation on page 18 of the CIO-DAS08-AO User's Manual.

Further information on the operation of the 82c54 counter chip may be found at:  
[www.harris.com](http://www.harris.com).

## VIII. 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
- 1105 - Invalid Analog Input Mode
- 1106 - Invalid Analog Input Gain
- 1107 - Invalid Digital Port Type
- 1108 - Invalid Counter Port Type
- 1109 - Invalid Board Number
- 1110 - Invalid Command Line Argument
- 1111 - Invalid Number of Analog Channels Specified (AIN=)
- 1200 - Not Initialized
- 1203 - Invalid Internal Command
- 1203 - Incomplete Configuration File Entry
- 1207 - Invalid Channel Number
- 1208 - Invalid Counter Type
- 1209 - Invalid Analog Range
- 1210 - I/O Request Timeout