ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Keithley / MetraByte DAS-16F* at our website: *Click HERE*

DAS-16 and UCDAS-16 External DAS Drivers

USER'S GUIDE

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DAS-16 and UCDAS-16
External DAS Drivers
User's Guide

Revision B - October 1995
Part Number: 59171

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

New Contact Information

Keithley Instruments, Inc.
28775 Aurora Road
Cleveland, OH 44139

Technical Support: 1-888-KEITHLEY
Monday – Friday 8:00 a.m. to 5:00 p.m (EST)
Fax: (440) 248-6168

Visit our website at http://www.keithley.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

If you need help, contact your local sales office or the Keithley MetraByte Applications Engineering Department between 8 am and 6 pm (Eastern Time), Monday through Friday:

Keithley MetraByte
Applications Engineering
440 Myles Standish Boulevard
Taunton, Massachusetts 02780

Telephone 508/880-3000
Telex 503989
FAX 508/880-0179

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The information contained in this manual is believed to be accurate and reliable. However, Keithley Instruments, Inc., assumes no responsibility for its use or for any infringements of patents or other rights of third parties that may result from its use. No license is granted by implication or otherwise under any patent rights of Keithley Instruments, Inc.

KEITHLEY INSTRUMENTS, INC., SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RELATED TO THE USE OF THIS PRODUCT. THIS PRODUCT IS NOT DESIGNED WITH COMPONENTS OF A LEVEL OF RELIABILITY SUITABLE FOR USE IN LIFE SUPPORT OR CRITICAL APPLICATIONS.

Refer to your Keithley Instruments license agreement for specific warranty and liability information.

MetraByte and EASYEST AG are trademarks of Keithley Instruments, Inc. VIEWDAC, EASYEST LX, and ASYST are registered trademarks of Keithley Instruments, Inc. All other brand and product names are trademarks or registered trademarks of their respective companies.

© Copyright Keithley Instruments, Inc., 1989, 1995.

All rights reserved. Reproduction or adaptation of any part of this documentation beyond that permitted by Section 117 of the 1976 United States Copyright Act without permission of the Copyright owner is unlawful.

Keithley MetraByte Division

Keithley Instruments, Inc.

440 Myles Standish Blvd. Taunton, MA 02780

Telephone: (508) 880-3000 • FAX: (508) 880-0179

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Preface

The DAS-16 and UCDAS-16 External DAS Drivers allow you to use Keithley MetraByte DAS-16 Series and µCDAS-16G boards with the following Keithley MetraByte data acquisition and analysis software packages:

- VIEWDAC®
- EASYEST LX®
- EASYEST AG™
- ASYST®

Unless referring specifically to the DAS-16, DAS-16F, DAS-16G1, or DAS-16G2 board, this manual refers to all boards collectively as the DAS-16 Series boards. The µCDAS-16G board is referred to specifically by name.

This manual provides the information needed to use the DAS-16 and UCDAS16 External DAS Drivers with data acquisition and analysis software. Use this manual in conjunction with your board user's guides and with the documentation for any expansion accessories and software package you are using.

Note: The DAS-16 and UCDAS16 External DAS Drivers may support options your software does not; likewise, your software may support options this external driver does not.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table of Contents

Preface

Using the DAS-16 and UCDAS-16 External DAS Drivers

Options Supported 2
Files on Disk 3
Quick Start 3
Setting up the Board 3
Running the Configuration Program 4
Configuring the DAS-16 External DAS Driver 4
Configuring the UCDAS-16 External DAS Driver 5
Loading the External DAS Driver 6
Accessing the External DAS Driver 7
Using the Configuration Program 7
Menu Items for the DAS-16 External DAS Driver 7
Menu Items for the UCDAS-16 External DAS Driver 9
Special Purpose Keys 10
Exiting the Configuration Program 11
Configuring the External DAS Drivers from DOS 12
Configuring the DAS-16 External DAS Driver from DOS . . . 12
Configuring the UCDAS16 External DAS Driver from DOS. 13
External DAS Driver Characteristics 14
EXP-16 Support 14
Synchronous-Mode Operations 16
DMA-Mode Operations 17
Interrupt-Mode Operations 17
Internal Clocking. 17
External Clocking 18
External Triggering 18
Event Counting 18
Pulse Output 18
Software Interrupt Vectors. 19
External DAS Driver Error Messages 19

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

List of Figures

Figure 1. Analog Input Channels 16

List of Tables

Table 1. Configuration Program Menu Items 6
Table 2. Input Ranges and Gains Available. 7
Table 3. Time Interval Measurement Range 7
Table 4. Configuration Menu Special Keys. 8
Table 5. Command-Line Options 10
Table 6. Physical and Logical Channels (Maximum Configuration). 13
Table 7. Software Interrupt Vectors. 21
Table 8. Error Messages 21

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Using the DAS-16 and UCDAS-16 External DAS Drivers

This software package includes two drivers: the DAS-16 and UCDAS-16 External DAS Drivers.

The DAS-16 External DAS Driver allows your VIEWDAC, EASYEST LX, EASYEST AG, or ASYST application program to exchange data with the following DAS-16 Series boards:

- DAS-16
- DAS-16F
- DAS-16G1
- DAS-16G2 board

The UCDAS-16 External DAS Driver allows your VIEWDAC, EASYEST LX, EASYEST AG, or ASYST application program to exchange data with the µCDAS-16G board.

This document describes how to use the DAS-16 and UCDAS-16 External DAS Drivers.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Options Supported

The DAS-16 and UCDAS-16 External DAS Drivers support the following options:

- **Analog input**
  - Up to 16 single-ended or eight differential onboard channels
  - Up to 256 channels through EXP-16 support
  - Synchronous-mode, interrupt-mode, and DMA-mode
  - Channel-gain arrays of up to 128 entries in synchronous-mode and interrupt-mode
  - Internal and external clocking
  - Internal and external triggering
  - Single-cycle and continuous buffering for interrupt-mode and DMA-mode operations using single or double buffers
- **Analog output**
  - Two analog output channels
  - Synchronous mode
  - Internal and external clocking
  - Internal and external triggering
- **Digital I/O**
  - Four digital input lines
  - Four digital output lines
  - Synchronous mode
  - Internal and external clocking
  - Internal and external triggering
- **Counter/timer**
  - Event counting
  - Pulse output

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Files on Disk

The driver disk contains the following files:

- **DAS16.EXE** - Controls all DAS-16 Series boards except the µCDAS-16G board and allows communication between an application program and all DAS-16 Series boards except the µCDAS-16G board.
- **UCDAS16.EXE** - Controls µCDAS-16G boards and allows communication between an application program and µCDAS-16G boards.

DAS16.EXE and UCDAS16.EXE execute as terminate-and-stay-resident (TSR) programs that occupy a small amount of memory in your computer.

Quick Start

This section briefly describes how to configure, load, and access the DAS-16 and UCDAS-16 External DAS Drivers.

Setting up the Board

Refer to your board user's guide for information on setting the jumpers/switches for your particular board. Remember these settings when you use the external driver configuration program.

The following are a few important connections to keep in mind:

- Analog Output and Digital Internal Clock - Connect the Counter 2 Output signal to the digital input IP0 pin.
- Analog Output (DAC) Reference - For proper analog output operation, make sure that the D/A 0 REF IN and D/A 1 REF IN signals are connected to the proper reference voltage.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- External Clock Input - Connect the external clock signal to the digital input IP0 pin.
- External Trigger Input - Connect the external trigger signal to the digital input IP1 pin.

Running the Configuration Program

Each of the external DAS drivers are set up for a default configuration. You must run the configuration program if your requirements differ from the default settings. In addition, whenever you change the hardware or software settings, you must run the configuration program in order for the external DAS driver to function properly.

Note: Each memory-resident image of the external DAS driver can support two boards. If you are using more than one board, you must configure the parameters for each board, ensuring that the base address, interrupt level, and DMA channel do not conflict between the two boards.

The following subsections describe the default configuration for each driver and how to run the configuration program required for each driver.

Configuring the DAS-16 External DAS Driver

The DAS-16 External DAS Driver is set up for the following default configuration:

- Board type = DAS-16/16F
- Base address = 300h
- Clock input frequency = 1 MHz
- Interrupt level = IRQ 2
- DMA channel = 1
- A/D input channel configuration = 16 single-ended
- DAC0 reference voltage = –5 V (corresponds to 0 to 5 V)
- DAC1 reference voltage = –5 V (corresponds to 0 to 5 V)
- Number of EXP-16s = 0

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- EXP gain setting = 1.0
- A/D input configuration = bipolar
- A/D gain setting = 1.0 (corresponds to ±5 V range)
- Number of boards = 1

If your board's settings differ from these default settings or if you changed the hardware or software settings, perform the following steps to run the configuration program for the DAS-16 External DAS Driver:

1. Create a DAS16 subdirectory on your hard disk. For example, at the DOS prompt, enter the following:

   ```
   MKDIR DAS16
   ```

2. Copy DAS16.EXE from the driver disk into the DAS16 directory.
3. Enter the following at the DOS prompt:

   ```
   CD \DAS16
   DAS16  –MENU
   ```

4. Configure the board parameters using the configuration program for the DAS-16 External DAS Driver, as described on page 7.

Configuring the UCDAS-16 External DAS Driver

The UCDAS-16 External DAS Driver is set up for the following default configuration:

- DAC0 reference voltage = –5 V (corresponds to 0 to 5 V)
- DAC1 reference voltage = –5 V (corresponds to 0 to 5 V)
- Number of EXP-16s = 0
- EXP gain setting = 1.0
- STA-U/16 Used? = Yes

If your board's settings differ from these default settings or if you changed the hardware or software settings, perform the following steps to run the configuration program for the UCDAS-16 External DAS Driver:

1. Create a DAS16 subdirectory on your hard disk. For example, at the DOS prompt, enter the following:

   ```
   MKDIR DAS16
   ```


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Copy UCDAS16.EXE from the driver disk into the DAS16 directory.
3. Enter the following at the DOS prompt:

```
CD \DAS16
UCDAS16  –MENU
```

4. Configure the board parameters using the configuration program for the UCDAS-16 External DAS Driver, as described on page 9.

Loading the External DAS Driver

You must load the external DAS driver each time you start up your computer in order for an application program to recognize it. The external DAS driver remains in memory until the computer is turned off or rebooted.

To load the external DAS driver, access the directory containing DAS16.EXE or UCDAS16.EXE and enter one of the following lines at the DOS prompt:

`DAS16` *for DAS-16, DAS-16F, DAS-16G1, or DAS-16G2 boards*

`UCDAS16` *for µCDAS-16G boards*

You can also load the external DAS driver automatically whenever you start the computer by adding the appropriate preceding line to your AUTOEXEC.BAT file.

If you want to access more than two boards, load the driver multiple times and use configuration files to recall the configurations. For example, to access three DAS-16 Series boards you could create two configuration files: DAS16-1.CFG and DAS16-2.CFG. DAS16-1.CFG contains the configuration data for two boards at addresses 300h and 310h, and DAS16-2.CFG contains the configuration data for a single DAS-16 Series board at address 340h. To load these drivers, use the @ command line option, as follows:

```
DAS16 @DAS16-1.CFG
DAS16 @DAS16-2.CFG
```


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessing the External DAS Driver

Some application programs access the external DAS driver automatically. For information on accessing external DAS drivers, see the documentation for your application program.

If you are using the ASYST program, perform the following steps to access the external DAS driver:

1. After loading the external DAS driver, boot ASYST version 2.10 or greater and permanently load the *Ext DAS Driver Support* system overlay from the Data Acquisition menu. ASYST automatically searches for and creates a DAS device called DAS16 or UCDAS16.

   Note: It is not necessary to load the DAS16 overlay file ACQMET16.SOV.

2. Enter one of the following lines at the OK prompt to select the current device:

   `DAS16` *for DAS-16, DAS-16F, DAS-16G1, or DAS-16G2 boards*

   `UCDAS16` *for µCDAS-16G boards*

Using the Configuration Program

This section describes the DAS16.EXE and UCDAS16.EXE configuration programs' menu items and special purpose keys, and how to exit from the configuration program.

Menu Items for the DAS-16 External DAS Driver

When you run the configuration program for the DAS-16 External DAS Driver, the configuration menu is displayed. The menu options, choices, and default values are listed in Table 1. Using the special keys described on page 10, select the choices appropriate for your application, then exit the configuration program as described on page 11.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 1. DAS16.EXE Configuration Program Menu Items

Menu Item	Choices	Default Value
Board Type	DAS-16/16F, DAS-16G1, or DAS-16G2	DAS-16/16F
Base I/O Address	200h to 3F0h (in multiples of 10h)[1,2]	300h
Clock Input Frequency Jumper Position	X1 (1 MHz) or X10 (10 MHz)[2]	X1 (1 MHz)
Interrupt Level	IRQ 2, 3, 4, 5, 6, 7[1,2]	IRQ 2
DMA Channel	1, 3[1,2]	1
A/D Channel Configuration	16 (single-ended), 8 (differential), or 0 (no STA-16/U panel; with EXP-16 only)[1,2,3]	16
DAC0 Reference Voltage	–10.0 V to +10.0 V[4]	–5.0 V (corresponds to a range of 0 to 5 V)
DAC1 Reference Voltage	–10.0 V to +10.0 V[4]	–5.0 V (corresponds to a range of 0 to 5 V)
Number of EXP-16s	0 to 16	0
EXP-16 Gain Setting	0.5 to 2000.0[5]	1.0
A/D Input Mode	Unipolar, Bipolar[2]	Bipolar
A/D Gain Setting	See Table 2[6]	1.0 (corresponds to an input voltage range of ±5 V)
Number of Boards	1, 2[1]	1

Notes

[1] If you are using more than one DAS-16 Series board in your system, ensure that the base address, interrupt level, and DMA channel are unique for each board.

[2] Ensure that this value matches your board's setting.

[3] If you are using an EXP-16 expansion accessory, you must configure the channels of the DAS-16 Series board as 16, single-ended.

[4] A DAC reference voltage of 0 V is invalid and will not be accepted.

[5] For user-selectable gains, the status window shows the size of the USER R resistor that is required in achieving the desired gain (if not a common EXP-16 gain). You cannot use a STA-U/16 with an EXP-16 gain other than 1.0.

[6] This parameter is switch selectable on the DAS-16/DAS-16F only. For user-selectable gains, the status window shows the size of the USER R resistor that is required in achieving the desired gain (if not a common switch-selectable gain).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 2. Gain Codes for DAS-16 Series Boards

Gain Code	DAS16-G1 and μCDAS-16G Gains	DAS-16G2 Gains
0	1	1
1	10	2
2	100	4
3	500	8

Menu Items for the UCDAS-16 External DAS Driver

When you run the configuration program for the UCDAS-16 External DAS Driver, the configuration menu is displayed. The menu options, choices, and default values are listed in Table 1. Using the special keys described on page 10, select the choices appropriate for your application, then exit the configuration program as described on page 11.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 3. UCDAS16.EXE Configuration Program Menu Items

Menu Item	Choices	Default Value
DAC0 Reference Voltage	–10.0 V to +10.0 V[1]	–5.0 V (corresponds to a range of 0 to 5 V)
DAC1 Reference Voltage	–10.0 V to +10.0 V[1]	–5.0 V (corresponds to a range of 0 to 5 V)
Number of EXP-16s	0 to 16	0
EXP-16 Gain Setting	0.5 to 2000.0[2]	1.0
STA-U/16 Used?	Yes, No[3]	Yes
Status Window[4]	–	–

Notes

[1] A DAC reference voltage of 0 V is invalid and will not be accepted.

[2] For user-selectable gains, the status window shows the size of the USER R resistor that is required to achieve the desired gain (if not a common EXP-16 gain). You cannot use a STA-U/16 with an EXP-16 gain other than 1.0.

[3] The option of not using an STA panel is allowed only when EXP-16 expansion accessories are used.

[4] A status window in the µCDAS16 configuration program shows the board's current configuration as set through the PS/2 configuration program (contained on the PS/2 reference diskette). This window shows the base address, IRQ channel, A/D channel configuration, DMA channel, A/D input mode, and number of boards as read from the microchannel POS register. These items are not alterable through the µCDAS16 configuration program.

Special Purpose Keys

Table 4 describes the keys used for special purposes in the menus of the configuration programs.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 4. Configuration Menu Special Keys

Keys	Description
[w]	Write a response file. This option allows you to save the current configuration to a response file for future use.
[q]	Quit the configuration program without loading the driver.
[d]	Reset the driver settings to their default values.
[Esc]	Exit the configuration menu with the option of saving the current settings and loading the driver into memory. This key is also used to exit the Channel Assignments menu.
[Tab]	Toggle between boards 1 and 2 when two boards are being configured.
[?]	Invoke help on the current menu item.

Exiting the Configuration Program

To exit the configuration program without saving any changes, press [**q**]. Otherwise, to exit the configuration program press [**Esc**]. The following prompt is displayed:

```
Do you want to permanently save this configuration?
[Y/N]
```

Type [**Y**] to save the configuration; type [**N**] if you do not want to save the configuration settings. If the configuration is saved, the program displays the message:

```
Remembering...
```

Then, you are prompted with the following message:

```
Exit Configuration Program? [Y/N]
```

Type [**Y**] to exit from the configuration program; type [**N**] to remain in the configuration program.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Configuring the External DAS Drivers from DOS

If you wish, you can also change the configuration of the external DAS driver using DOS command-line options instead of using the configuration program, as described in the following subsections.

Configuring the DAS-16 External DAS Driver from DOS

To configure the DAS-16 External DAS Driver from DOS, use the following command-line syntax:

```
DAS16 [bd #1 options],[bd #2 options] [-menu ]
```

The DAS16.EXE command-line options are described in Table 5.

Table 5. DAS16.EXE Command-Line Options

Command	Purpose
-a###	base address = ### (in hex)
-b#	Board type: 0 - DAS-16/DAS-16F 1 - DAS-16G1 2 - DAS-16G2
-irq#	Interrupt channel (# = 2 to 7)
-dma#	DMA channel (# = 1 or 3)
-c#	Number of analog input channels on STA-U/16 panel (0, 8, or 16)
-j#	Clock Jumper Position: 0 (X1), 1 (X10)
-da0#	D/A 0 reference voltage = # (–10.0 V to +10.0 V)
-da1#	D/A 1 reference voltage = #(–10.0 V to +10.0 V)
-x#	Number of EXP-16 boards (# = 0 to 16)
-gx#	EXP-16 gain setting (# = .5 to 2000.0)
-inp-	Unipolar input mode
-inp+	Bipolar input mode
-g#	A/D gain (DAS-16/DAS-16F only)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 5. DAS16.EXE Command-Line Options (cont.)

Command	Purpose
-def	Recall defaults
-h or ?	help
-menu	invoke menu driven setup
@xxxx	Indicates use of response file xxxx. A response file is an ASCII file containing the command-line options for the driver.

Configuring the UCDAS16 External DAS Driver from DOS

To configure the UCDAS-16 External DAS Driver from DOS, use the following command-line syntax:

```
UCDAS16 [bd #1 options],[bd #2 options] [-menu ]
```

The UCDAS16.EXE command-line options are described in Table 5.

Table 6. UCDAS16.EXE Command-Line Options

Command	Purpose
-da0#	D/A 0 reference voltage = # (–10.0 V to +10.0 V)
-da1#	D/A 1 reference voltage = # (–10.0 V to +10.0 V)
-x#	Number of EXP-16 boards (# = 0 to 16)
-gx#	EXP-16 gain setting (# = .5 to 2000.0)
-sta+	STA used
-sta-	STA not used
-def	Recall defaults
-h or ?	help

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 6. UCDAS16.EXE Command-Line Options (cont.)

Command	Purpose
-menu	invoke menu driven setup
@xxxx	Indicates use of response file xxxx. A response file is an ASCII file containing the command-line options for the driver.

External DAS Driver Characteristics

The following sections describe the attributes and operating characteristics of the DAS-16 and UCDAS16 External DAS Drivers.

EXP-16 Support

DAS-16 Series boards and the µCDAS-16G board provide 16 analog input channels. To increase the number of analog input channels to 256, you can connect up to 16 EXP-16 expansion accessories. Each EXP-16 expansion accessory multiplexes 16 differential inputs into one output signal.

Note: When using EXP-16 expansion accessories, ensure that the DAS board is set up for single-ended operation.

If you are using more than one EXP-16 accessory, you must assign each accessory to a different analog input channel. These assignments must start with analog input channel 0 for the first EXP-16, channel 1 for the second EXP-16, and so on. You can use the remaining onboard channels using an STA-U or STA-16 screw termination panel. Refer to your board and accessory documentation for more information.

You can daisy chain multiple EXP-16 accessories to a DAS-16 Series or µCDAS-16G board, provided that each expansion accessory is assigned to a distinct analog input channel on the DAS board. Use Output Channel

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

jumper J4 on the expansion accessory to assign one of the analog input channels on the DAS board to the output signal on the accessory board.

To refer to the channels, a scheme of physical and logical channels is used. A physical channel is the analog input channel on the DAS board to which the expansion accessory is assigned. The logical channel is the channel that the application software uses to access channels on the DAS board and any expansion accessories. The logical and physical channel assignments are displayed in the configuration program.

Table 7 lists the physical channels on the DAS board and the corresponding logical channels associated with each expansion accessory.

Table 7. Physical and Logical Channels (Maximum Configuration)

Physical Channels on DAS Board	Logical Channels on EXP-16
0	0 to 15
1	16 to 31
2	32 to 47
3	48 to 63
4	64 to 79
5	80 to 95
6	96 to 111
7	112 to 127
8	128 to 143
9	144 to 159
10	160 to 175
11	176 to 191
12	192 to 207
13	208 to 223
14	226 to 239
15	240 to 255

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 1 illustrates the use of two EXP-16 expansion accessories and the 14 remaining onboard channels. The channels on the EXP-16 attached to analog input channel 0 are referred to in software as logical channels 0 to 15; the channels on the EXP-16 attached to analog input channel 1 are referred to in software as logical channels 16 to 23; the remaining onboard analog input channels (2 to 15), which you can access using a screw termination panel, are referred to in software as logical channels 24 through 37.

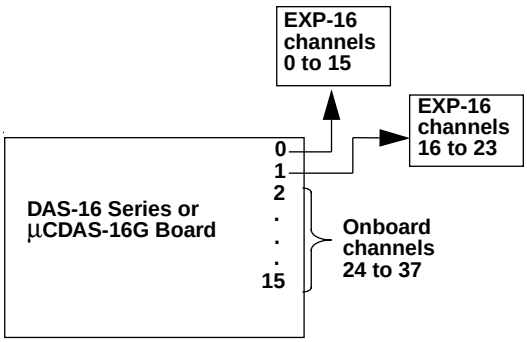


Figure 1. Analog Input Channels

Note: Digital outputs OP0 to OP3 are used to select the current channel on the expansion accessory. If you use these digital output channels, the analog input operation may change the digital output signals.

Synchronous-Mode Operations

You can perform analog input, analog output, digital input, and digital output operations in synchronous mode.

You can use the following with synchronous-mode operations:

- Internal or external clocking
- Internal or external triggering

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DMA-Mode Operations

DMA is allowed for analog input operations only. You cannot start an interrupt-mode or synchronous-mode analog input operation while a DMA-mode analog input operation is active. In addition, you cannot use a channel-gain array or EXP-16 channels with DMA-mode operations.

You can use the following with a DMA-mode analog input operation:

- Internal or external clocking
- Internal or external triggering
- Single or double buffering

Interrupt-Mode Operations

Interrupt-mode is allowed for analog input operations only. You cannot start a DMA-mode or synchronous-mode analog input operation while an interrupt-mode analog input operation is active.

You can use the following with an interrupt-mode analog input operation:

- Internal or external clocking
- Internal or external triggering
- Single or double buffering

Internal Clocking

Using the internal clock, DAS-16 Series and µCDAS-16G boards can perform analog input, analog output, and digital I/O operations at rates between 250 kHz and 1 pulse/hour. To perform multiple analog output or digital I/O operations, ensure that the Counter 2 Output signal is connected to the digital input IP0 signal because the counter/timer circuits do not connect internally to the analog output circuitry.

For DAS-16/16F and DAS-16G boards with the jumper in the X1 position, the resolution of the counter is in increments of 1 µs. With the jumper in the X10 position, the resolution of the counter is in increments of 0.1 µs.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

External Clocking

You can use an external clock for analog input, analog output, or digital I/O operations. Ensure that the external clock is connected to the digital input IP0 pin. Clocking occurs on the rising edge of the input signal. When an external clock is used, no limitation is placed on digital I/O operations. (IP0 is also used as a digital input bit.)

External Triggering

You can use an external trigger for analog input, analog output, and digital I/O operations. Ensure that the external trigger is connected to the digital input IP1 pin. When an external trigger is used, no limitation is placed on digital I/O operations. (IP1 is also used as a digital input bit.)

When a conversion is started with an external trigger, the DAS board waits for a TTL, high-level signal before performing the requested conversions.

Event Counting

To perform event counting, ensure that the output of the event that you want to count is connected to the external clock input of counter 0. The minimum count available is two (if only one count is detected, a count of zero is returned). The maximum count obtainable is 65,535; any count greater than 65,535 causes an error.

Pulse Output

Pulse output is derived from the counter two output signal. The duty cycle of the pulse train is fixed at 50% due to the nature of the 8254 counter/timer circuitry.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Software Interrupt Vectors

The external DAS drivers use three software interrupt vectors to communicate with the application program. The interrupt vectors used are three of the MS-DOS “user interrupts” (interrupts 60h to 67h). To ensure that conflicts with other devices, hardware, or programs do not exist, you can set each of the interrupt vectors to use an interrupt number that is different than from the default.

You can change the interrupt vector numbers by using the SET command from DOS. This command saves a string in the DOS environment that the driver searches for on loading. These strings are specified in Table 8.

Table 8. Interrupts and Environment Strings

Interrupt	Default Interrupt Number	Environment String[1]
Device linking vector	66h	DAS DS=*xx*
Critical error vector	65h	DAS CE=*xx*
Timer interrupt vector	64h	DAS TI=xx

Notes
[1] *xx* is between 60h and 67h.

External DAS Driver Error Messages

Table 9 lists the error messages that may occur during operation of the DAS-16 or UCDAS-16 External DAS Driver.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 9. Error Messages from the DAS-16 or UCDAS-16 External DAS Driver

Error Number	Error Message	Description
0	No error	No error message.
1	Function not supported	An operation was requested that is not supported by the external DAS driver.
2	Function out of bounds	An operation not defined by the external DAS driver was requested.
3	Non-valid board number	A board number that is out of the range of configured boards was requested. This driver supports a maximum of two boards.
4	Non-valid error number	A non-valid error number was detected by the external DAS driver function “REPORT ERROR MESSAGE.”
5	Interrupt overrun	An interrupt was generated before the program was ready to handle it. This usually occurs when the interrupt generator is running too fast.
6	A/D not initialized	An analog input operation was started before the analog input circuitry was initialized.
7	D/A not initialized	An analog output operation was started before the analog output circuitry was initialized.
8	Digital input not initialized	A digital input operation was started before the digital ports were initialized.
9	Digital output not initialized	A digital output operation was started before the digital ports were initialized.
10	Timer not initialized	The counter/timer circuits were not initialized.
11	Timer in use	The internal clock is active and is not available for another operation.
12	Non-valid A/D channel number	An invalid channel number was used.
13	DMA currently active	Another board operation was attempted before the board's DMA-mode operation was completed.
14	Use of gain/channel array not allowed	A DMA-mode operation was attempted with a channel-gain array or a channel-gain array was attempted with a DAS-16 Series board that does not support channel-gain arrays.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 9. Error Messages from the DAS-16 or UCDAS-16 External DAS Driver

Error Number	Error Message	Description
15	DMA not allowed on EXP-16 modules	A DMA-mode operation was attempted on an EXP-16 expansion accessory.
16	A/D interrupt channel currently in use	An interrupt analog input operation is running; no other analog input operations can be performed until the interrupt analog input operation is complete.
17	Event counter overflow	The count exceeded 65,535 in an event counting operation.
18	DAS-16 not present or incorrectly configured	The external DAS driver was unable to find the DAS-16 Series board at the configured address.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP