

# ADC-16

16-Bit Resolution  
Analog Input Board

## Functional Description

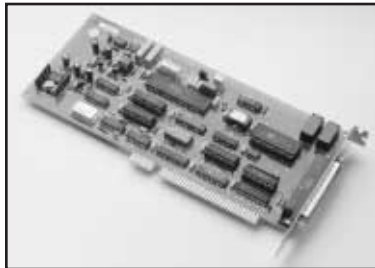
Keithley's ADC-16 is a low cost, 16-bit analog input board for ISA and EISA bus computers (IBM PC/XT/AT or compatibles). The heart of the ADC-16 is an integrating A/D converter which provides high accuracy (at up to 16 conversions/s) at low cost. Integrating A/D converters provide excellent precision and repeatability even in noisy environments.

ORDER	DESCRIPTION
ADC-16*	8-Channel 16-bit Analog Input board with Standard Software Package and ASO-ADC-16 (Advanced Software Option)
<b>OPTIONS</b>	See page 479 for descriptions of all accessories.
STA-EX8	8-Channel Expansion Accessory
STA-U	Screw Terminal Accessory Board
C1800	ADC-16 to STA-EX8 or STA-U Cable
MS-ADC-16*	Additional Hardware and Software Manual and Standard Software
TESTPOINT	TestPoint Software Package
* Software supplied on 3.5 inch disks.	

The board provides 8 differential channels at 16-bit resolution. The analog input range is jumper-selectable for +3.276V or +5V. An instrumentation amplifier with software programmable gain selects gains of 1, 10, or 100. Input autozeroing automatically eliminates input offset errors.

The ADC-16 also provides 5 TTL-compatible general-purpose digital outputs and two general-purpose TTL/CMOS compatible digital inputs. Two digital outputs drive two internal

form C relays on the ADC-16, and the contacts are brought out on the rear connector. These relays are used for a variety of switching and expansion applications. Three digital outputs can be used to control the optional STA-EX8 expansion multiplexers.



The ADC-16's high-precision current source has a compliance of -10V to +4V. This source can be used to directly excite resistance-based transducers such as RTDs.

### Software

Included with the ADC-16 is the following software:

- ADC-16 Standard Software Package
- Advanced Software Option (ASO-ADC-16)

These two software packages have the following basic modules:

### FEATURES

- 16-bit resolution
- 8 differential input channels
- Low noise, integrating A/D converter
- Expandable to 64 channels
- Onboard precision 1mA current source for sensor excitation
- ±5 or ±3.276V input ranges
- Programmable gains of 1, 10, or 100

### APPLICATIONS

- Chromatography
- Temperature measurement
- Flow measurement
- Spectroscopy
- High accuracy data acquisition

### Function Call Driver

The Function Call Driver provides high-level functions for use in your particular programming environment (e.g., QuickBASIC, C, Pascal). These functions provide access to all features and operations of the ADC-16 board. The driver handles all data acquisition functions and memory and buffer allocation. The function calls have intuitive names that describe the functions they perform.

### Example Programs

Commented example programs illustrate how to program the ADC-16 in a variety of different modes using the Function Call Driver. These programs are provided in all languages supported by that software package.

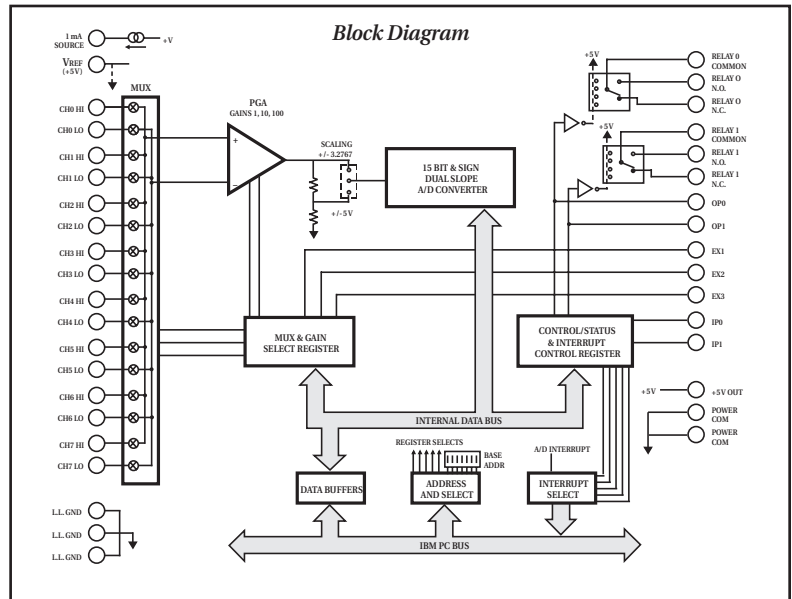
### Standard Software Package

The Standard Software Package provided with the ADC-16 includes the following:

- Function Call Driver compatible with BASICA, QBASIC, and QuickBASIC
- DOS-based panels for controlling the board without programming
- ADC-16 Installation and configuration program
- Example programs in BASIC
- Complete calibration routine

### Pop-Up Control Panel

The Pop-Up Control Panel is a DOS-based terminate and stay resident (TSR) program which allows you to directly control the operation of the data acquisition board without writing a single line of code.



### QUESTIONS?

1-800-552-1115 (U.S. only)

Call toll free for technical assistance, product support or ordering information, or visit our website at [www.keithley.com](http://www.keithley.com).

# ADC-16

## Installation and Configuration Program

A single executable program shipped with every ADC-16 provides a complete guide to installation.

## Advanced Software Option (ASO-ADC-16)

The ASO-ADC-16, which is included with each board, has the following capabilities:

- Function Call Drivers for Pascal, C/C++, Turbo Pascal (6.0), Visual Basic, and QuickC for Windows
- File I/O Command Driver for all languages
- Windows 3.X compatible Dynamic Link Library (DLL)
- Examples programs in all supported languages

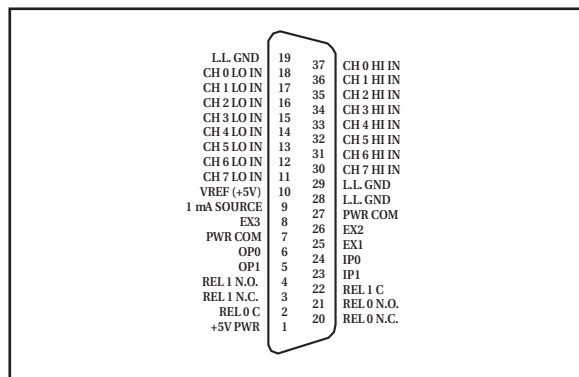
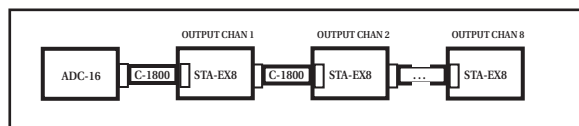
## File I/O Command Driver

The File I/O command driver is supplied as a loadable/unloadable DOS device driver and consists of a comprehensive set of English-based commands.

## Accessories

The STA-EX8 8-channel expansion multiplexer option provides screw connections to all of the ADC-16 interface signals. It also adds 8 input channels. One STA-EX8 will provide a total of 15 channels, two provide 22 channels etc. A full complement of eight STA-EX8s will multiplex a total of 64 full differential channels. Applications not requiring the additional channels use the standard STA-U screw terminal board.

## Configuration Guide



## SPECIFICATIONS: ADC-16

### A/D INPUTS

**CHANNELS:** 8 differential expandable to 64 with the use of 8 STA-EX8 boards.

**INPUT RESOLUTION:** 16 bits (15 + sign).

**CODING:** Sign + magnitude (binary).

**INPUT RANGES:** ±3.2768V, ±327.68mV, ±32.768mV, ±5V, ±500mV, ±50mV.

**INPUT GAINS:** 1, 10, or 100 (software selectable).

**SAMPLE RATE:** 16 samples/s.

**INPUT SETTLING TIME:** 50µs.

**INPUT IMPEDANCE:** Greater than 100MΩ.

**INPUT BIAS CURRENT:** 50nA max.

<b>INPUT OFFSET:</b>	Auto-zeroed	
	Gain = 1, 10	±1 LSB
	Gain = 100	±10µV
<b>ACCURACY (OF FULL SCALE):</b>	Gain = 1	±0.01% typ ±0.03% max
	Gain = 10	±0.05% typ ±0.10% max
	Gain = 100	±0.05% typ ±0.15% max
<b>NOISE (TYPICAL):</b>	Gain = 1	< ±1 bit rms
	Gain = 10	< ±1 bit rms
	Gain = 100	< ±3 bits rms
<b>COMMON MODE REJECTION:</b>	G=1	100dB typ, 80dB min
	G=10	110dB typ, 86dB min
	G=100	120dB typ, 92dB min

**COMMON MODE RANGE:** ±6V.

**MAX INPUT VOLTAGE W/O DAMAGE (POWER ON):** ±35VDC.

**MAX INPUT VOLTAGE W/O DAMAGE (POWER OFF):** ±20VDC.

## DIGITAL I/O

### DIGITAL INPUTS:

**NO. OF INPUTS:** 2, TTL/CMOS compatible.

**LOGIC LEVELS:**  $V_{IL} = 0.8V$ ,  $V_{IH} = 2.0V$ .

$I_{IL} = -0.2mA$ ,  $I_{IH} = 20µA @ 2.7V$ .

### DIGITAL OUTPUTS:

**No. of Outputs:** 5 TTL compatible.

**Logic Levels:**  $V_{OL} = 0.5V$  max at 8.5mA.

$V_{OH} = 2.7V$  min @ -0.4mA.

### RELAY OUTPUTS:

**No. of Channels:** 2 form C.

**Max. Current:** 2.0A, at 28V rms.

## POWER REQUIREMENTS

**+5V:** 800mA typ, 1A max.

**+12V:** 25mA max.

**-12V:** 15mA max.

## ENVIRONMENTAL

**OPERATING TEMP:** 0 to 70°C.

**STORAGE TEMP:** -25 to 85°C.

**HUMIDITY:** 0 to 95% non-condensing.

**DIMENSIONS:** 9.0in L × 4.25in H × 0.75in D  
(22.9cm × 10.8cm × 1.9cm).

## SPECIFICATIONS: STA-EX8

**NUMBER OF INPUTS:** 8 differential.

**INPUT OFFSET:** Auto-zeroed.

**ACCURACY:** 0.01 of full scale.

### NOISE:

**GAIN = 1:** < ±1 bit rms.

**GAIN = 10:** < ±2 bit rms.

**GAIN = 100:** < ±15 bits rms.

**INPUT IMPEDANCE:** Greater than 100MΩ.

**INPUT BIAS CURRENT:** 50nA max.

**COMMON MODE RANGE:** ±6V.

**MAX INPUT VOLTAGE W/O DAMAGE:** ±35VDC (power on), ±20VDC (power off).

## POWER REQUIREMENTS

**+5V:** 10mA typ, 100mA max.

## ENVIRONMENTAL

**OPERATING TEMP:** 0 to 70°C.

**STORAGE TEMP:** -25 to 85°C.

**HUMIDITY:** 0 to 95% non-condensing.

**DIMENSIONS:** 5.2in by 6.7in by 2.3in (not including plastic enclosure).