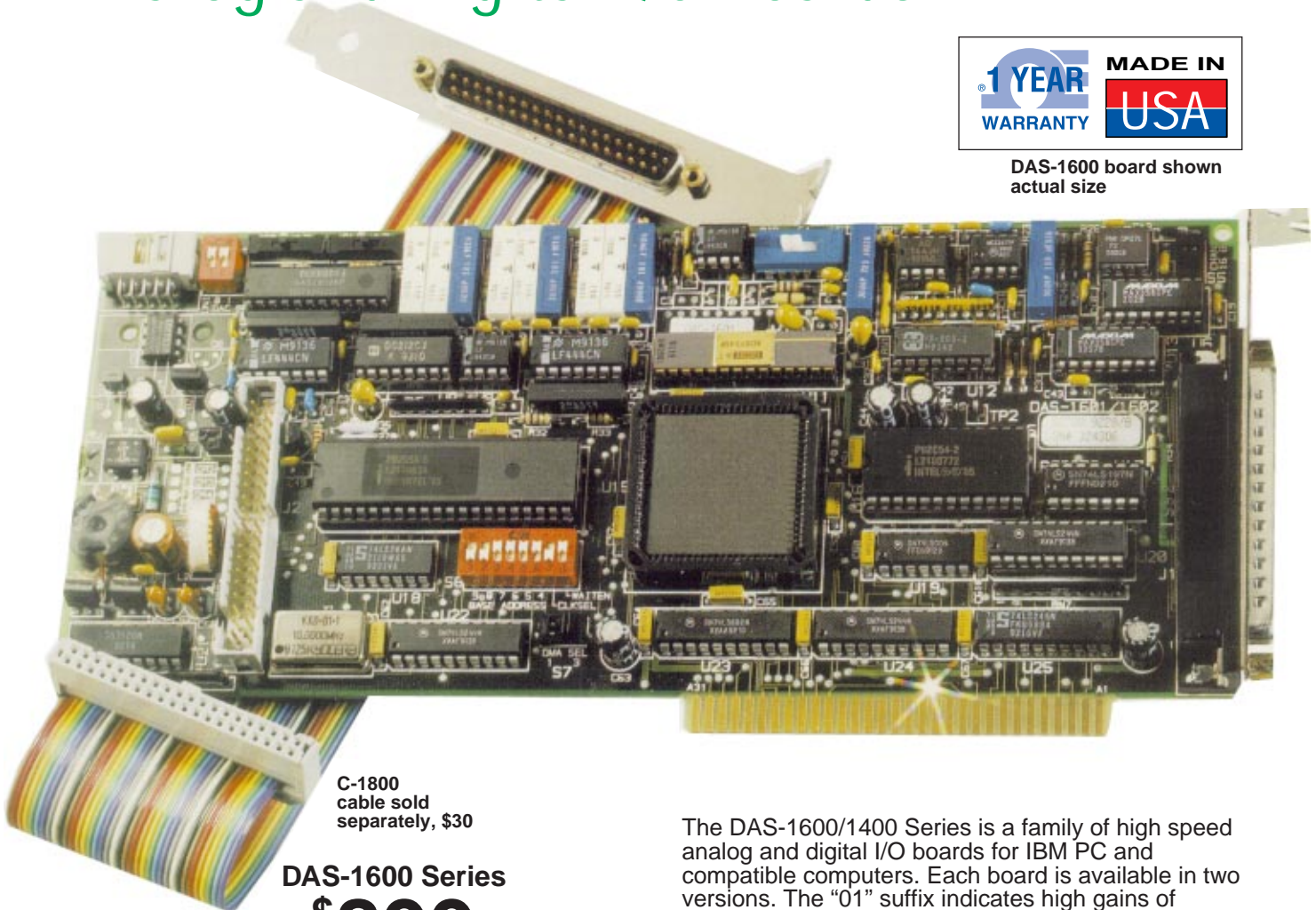# DAS-1400/1600 High Speed Analog and Digital I/O Boards

DAS-1600 board shown actual size

C-1800 cable sold separately, $30

DAS-1600 Series
$**899**
Basic Unit

- ✔ **Up to 100 Ksamples/Sec**
- ✔ **12-Bit Resolution**
- ✔ **8 Fully Differential or 16 Single-Ended Analog Input Channels**
- ✔ **High Speed DMA Transfer Capability**
- ✔ **Selectable Analog Input Ranges**
- ✔ **Burst Mode Timing Emulates Simultaneous Sample-and-Hold**
- ✔ **32 Digital I/O Lines (DAS-1600) 8 Digital Lines (DAS-1400)**
- ✔ **Two 12-Bit D/A Channels (DAS-1600)**
- ✔ **Backwards-Compatible with DAS-16F/G Series**
- ✔ **DriverLINX Windows 3.x and Windows 95 Drivers Included**

The DAS-1600/1400 Series is a family of high speed analog and digital I/O boards for IBM PC and compatible computers. Each board is available in two versions. The "01" suffix indicates high gains of 1, 10, 100, and 500. The "02" suffix indicates low gains of 1, 2, 4 and 8. The following table outlines the major data acquisition features of these products.

	DAS-1600	DAS-1400
Analog Inputs	16 single-ended or 8 differential	16 single-ended or 8 differential
Maximum Throughput		
Model 01	100 kS/s	100 kS/s
Model 02	100 kS/s	100 kS/s
Resolution	12 bits	12 bits
Input Ranges		
Unipolar	0 to +10 V	0 to +10 V
Bipolar	±10 V	±10 V
Range Selection	Programmable	Programmable
Gains		
Model 01	1, 10, 100, 500	1, 10, 100, 500
Model 02	1, 2, 4, 8	1, 2, 4, 8
D/A Channels	2	0
Digital I/O Lines	32	8
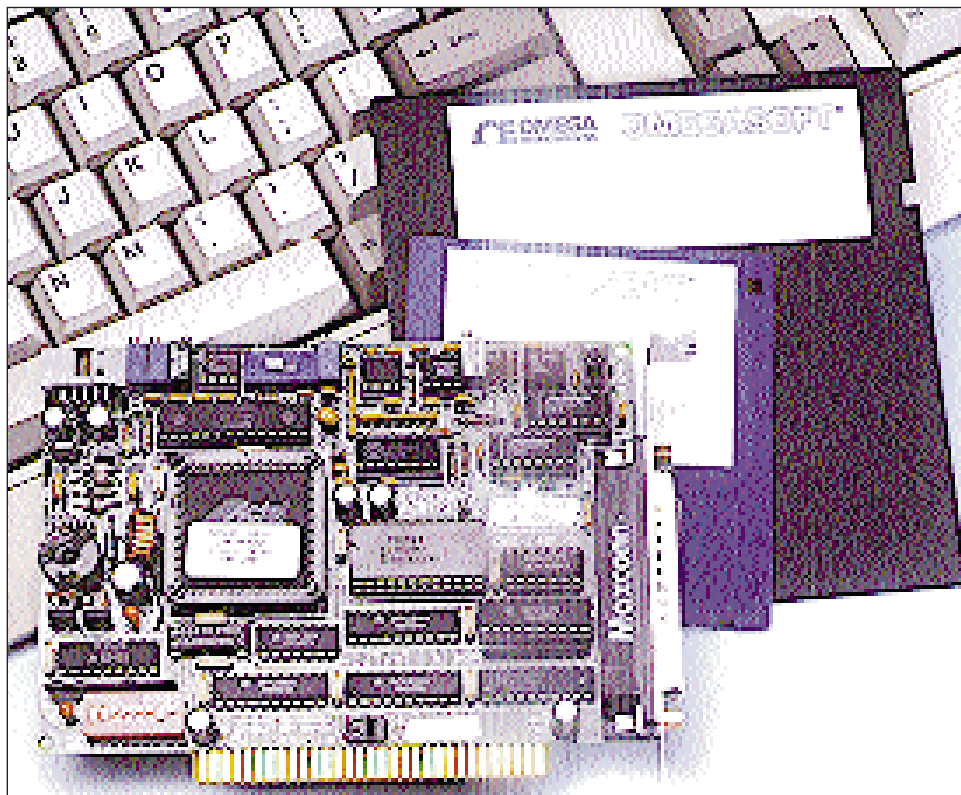
DI/O

IBM PC

A/OUT

A/IN

DAS-1400 Series
$**699**
Basic Unit

The DAS-1600/1400 boards occupy a single expansion slot in the computer. All boards in the family are of multilayer construction with an integral ground plane to minimize noise and crosstalk even at high sample rates. All boards are register and pin-compatible. As a result, applications running on one board in the series can be ported to another board in the series in the future without throwing away your investment in software and accessories.

The DAS-1600/1400 Series boards use a 12-bit successive approximation converter. Each board in the series offers 8 differential or 16 single-ended analog inputs. The inputs of the DAS-1600 and DAS-1400 can be set to unipolar (e.g., ±10 V) modes. Input ranges are software-programmable. Actual system throughput will vary with the gain selected as shown here:

A/D conversions are initiated in one of three ways: software command, internal programmable interval timer, or external trigger. Data transfers also occur in one of three ways: polling a status register and reading data when ready, generation of a hardware interrupt and an interrupt service routine, or using the DMA (Direct Memory Access) mode. These operating modes are selected using a control register on the board and are supported by the utility software included with this board.

A three-channel programmable interval timer (Intel 8254) provides trigger pulses for A/D conversions. The DAS-1600/1400 Series uses two of the counter channels as frequency divider for an interval 10 MHz crystal-controlled oscillator. The output of this circuitry provides the trigger pulse for each conversion. The third channel is uncommitted and provides a gated 16-bit binary counter for event or pulse counting, frequency, or pulse generation.

The DAS-1600 provides two multiplying 12-bit D/A output channels. The D/A converters have switch-selectable output ranges of 0 to +5 V, 0 to +10 V, ±5 V, and ±10 V full scale.
The D/A converters may use an external DC or AC reference
to achieve different output ranges. The analog outputs are set to 0 V at powerup.

Eight bits of digital I/O (4 input and 4 output) are brought out on the DAS-1600/1400 Series main 37-pin connector. The
4 digital outputs on this connector can be used to control external accessories, such as the EXP-16. The additional 24 digital I/O bits
on the DAS-1600 are bi-directional and are available on the auxiliary connector. These 24 bits are divided into two 8-bit ports and two 4-bit ports. Each port is configurable independently as an input port or an output port. The 24-bit digital port is 100% compatible with PIO-12 board and can connect directly to the SSR-RACK24 and ERB-24.

The analog I/O connections are made via a 37-pin "D" connector at the rear of the host computer. An auxiliary 40-pin connector supports the connections to the DAS-1600 24-bit digital I/O port. A cable connecting the 40-pin connector on the board to a second backplate with a 37-pin "D" connector is included. This second connector allows digital I/O accessories to be used with the DAS-1600.

Driver Software
DriverLINX software is also included, at no additional charge, with every DAS-1200 series board. Supporting your programming requirements in Windows 3.x/95 environments, DriverLINX provides application developers a standardized interface to over 100 services for creating

High Speed Analog and Digital I/O Boards

foreground and background tasks to perform analog input and output, digital input and output, time and frequency measurement, event counting, pulse output and period measurement. In addition to basic I/O support, DriverLINX also provides sophisticated built-in capabilities to handle memory and data buffer management, a rich selection of starting and stopping trigger events including pre-, mid-point, and post triggering protocols, extensive error checking and reporting capabilities, and a context-sensitive on-line help system. There are two versions included: DriverLINX and DriverLINX/VB. DriverLINX provides the C/C++interfaces. DriverLINX/VB provides custom control interfaces (VBX and ActiveX) that can be accessed from the palette of built-in tools included in Microsoft's Visual Basic and Visual C environments. Software is supplied on CD-Rom.

Connector Pin Assignments
The analog inputs and 8 digital I/O connections are made via a 37-pin D-type connector at the rear of the computer. In the DAS-1600 there is an auxiliary 40-pin connector that supports connections to the remaining 24-digital I/O lines. In the DAS-1600 the analog output connections are made at the main connector. In order to get access to all of the analog inputs and outputs, as well as the additional 24 bit digital I/O connector, two C-1800 cables and two STA-U terminal panels are required. The STA-16 may be used instead of the STA-U for the analog I/O, since it numbers each channel's high and low inputs and therefore makes wiring easier. The STA-U must be used for the 24 bit digital IO port. It is simply a screw terminal accessory board that numbers it's terminals from 1-37 in sequence.
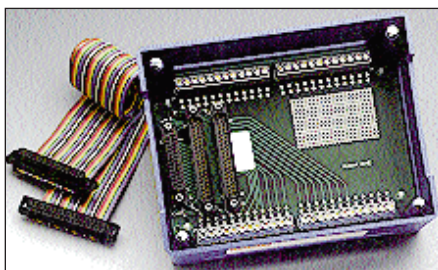
STA-U Screw Terminal Accesory, $120 and C-1800 Cable, $30, sold separately
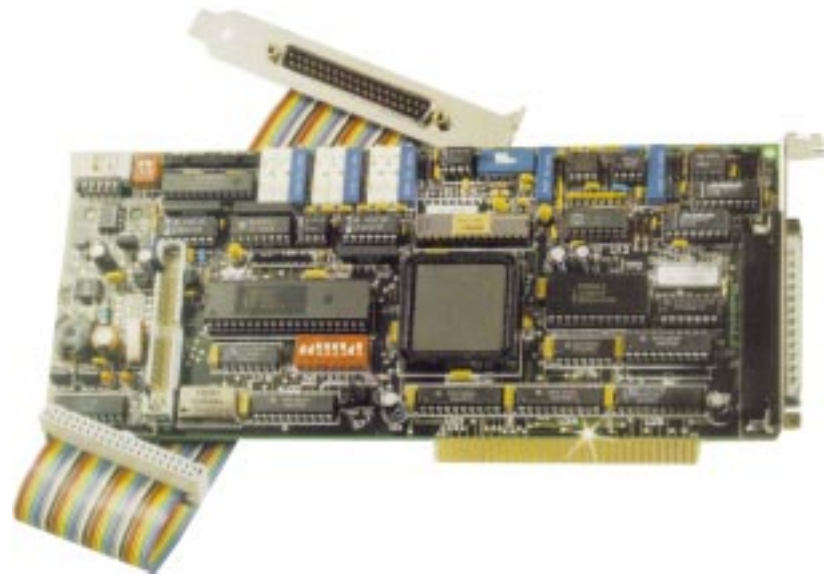
Specifications
ANALOG INPUTS
Channels:
8 differential (HI/LO/GND) or
16 single-ended (HI/GND); software-selectable
Accuracy: 0.01%
of reading ±1 bit
Converter Type: successive approximation
Resolution: 12-bit
Conversion Time: 8 μs max (7.5 μs typ)
Acquisition Time: 1.4 μs
Monotonicity: guaranteed over operating temperature range
Linearity: ±1 bit
Coding: Offset binary (bipolar), True binary (unipolar)
Overvoltage: ±35 V max
Input Current: 250 mA max (125 mA type) @ 25°C
Input Impedance: greater than 25 Megohms
TEMPERATURE COEFFICIENT
Gain Drift: ±50 ppm/°C max of full scale
Zero Drift: ±10 μV/°C ±200 μV/gain (bipolar)
±10 μV/°C ±50 μV/gain (unipolar)

DAS-1601 and DAS-1401

Gain	Unipolar Input Range	Bipolar Input Range	Throughput
1	0 to +10 V	±10 V	100 kS/s
10	0 to +1 V	±1 V	100 kS/s
100	0 to +100 mV	±100 mV	70 kS/s
500	0 to +20 mV	±20 mV	30 kS/s

DAS-1602 and DAS-1402

Gain	Unipolar Input Range	Bipolar Input Range	Throughput
1	0 to +10 V	±10 V	100 kS/s
2	0 to +5 V	±5 V	100 kS/s
4	0 to +2.5 V	±2.5 V	100 kS/s
8	0 to +1.25 V	±1.25 V	100 kS/s

D/A CONVERTERS (DAS-1600 ONLY)
Channels: 2 independent
Resolution: 12-bits
Voltage Range: 0 to 5 V, 0 to 10 V, +5 V, ±10 V; switch-selectable (other ranges possible with external reference)
Output Current: ±5 mA max
Settling Time: 20 µs to 0.01%
Linearity: ±½ bit
Monotonicity: guaranteed
Output Impedance: less than 0.1 ohm

DIGITAL I/O (DAS-1600/1400 SERIES)
(8 bits on main 37-Pin D connector)
  Outputs (Standard LSTTL)
  Output Bits: 4
  Low Voltage: 0.5 V max at Isink = 8.0 mA
  High Voltage: 2.4 V min at Isource = 0.4 mA

INPUTS (AND INTERRUPTS)(LSTTL)
  Input Bits: 4
  Low Voltage: 0.8 V max
  Low Current: -0.2 mA max
  High Voltage: 2.0 V min
  High Current: 20 µA max

DIGITAL I/O (DAS-1600)
(24 bits on Auxiliary Connector)
Type: NMOS 8255A-5
I/O: 24 bits
Input Low Voltage: 0.8 V max
Input High Voltage: 2.0 V min
Input Current: ±10 µA max
Output Low Voltage: 0.45 V max at 1.7 mA
Output High Voltage: 2.4 V min at -200 µA

PROGRAMMABLE TIMER (DAS-1600/1400)
Type: 82C54-2
N**umber of Counters:** 3 down counters, 16-bit 2 permanently connected to 1/10 MHz as programmable timer, 1 counter uncommitted
Outputs (buffered):
  Low Voltage: 0.5 V max at Isink = 25 mA
  High Voltage: 2.0 V min at Isource = 15 mA
Input (buffered):
  Low Voltage: 0.8 V max
  Low Current: -0.2 mA max
  High Voltage: 2.0 V min
  High Current: 20µA max
Input & Gate: TTL/NMOS/CMOS-compatible
Clock Input: DC to 10 MHz
Active Count Edge: Negative
Minimum Clock Pulse Width: 30 nsec. high/50 nsec. low

POWER REQUIREMENTS (DAS-1600)
+5 Vdc: 800 mA type, 1A max
+12 Vdc: 30 mA typ, 40 mA max
POWER REQUIREMENTS (DAS-1400)
+5 Vdc: 500 mA typ, 750 mA max
+12 Vdc: 30 mA typ, 40 mA max.
GENERAL ENVIRONMENTAL
Operating Temperature: 0 to 70°C
Storage Temperature: -20 to 70°C
Humidity: 0 to 95%, non-condensing
DAS-1600 Dimensions: 9" L x 4.25" H x 0.90"D (22.9 cm x 10.8 cm x 2.3 cm)
DAS-1400 Dimensions: 5.5" L x 4.25" H x 0.75" D (14.0 cm x 10.8 cm x 1.9 cm)

To Order *(Specify Model Number)*

Model No.	Price	Description
DAS-1601*	**$899**	100 kS/s Analog and Digital I/O Board with gains of 1, 10, 100 and 500
DAS-1602*	899	100 kS/s Analog and Digital I/O Board with gains of 1, 2, 4 and 8
DAS-1601/E*	949	DAS-1601 for EISA bus computers
DAS-1602/E*	949	DAS-1602 for EISA bus computers
DAS-1401*	699	100 kS/s Analog and Digital I/O Board with gains of 1, 10, 100 and 500
DAS-1402*	699	100 kS/s Analog and Digital I/O Board with gains of 1, 2, 4 and 8
DAS-1401/E*	749	DAS-1401 for EISA bus computers
DAS-1402/E*	749	DAS-1402 for EISA bus computers

Software drivers provided on CD ROM

Options

Model No.	Price	Description
ERB-24*	**$449**	24 Relay Output Card (AC powered). (requires C-1800 cable)
STA-16	120	Screw Terminal Accessory for main I/O connector, requires C-1800 cable
STA-U	120	Universal Screw Terminal Accessory for auxiliary I/O connector, requires C-1800 cable
STP-37	70	Cost-effective Screw Terminal Panel, requires C-1800 cable (no enclosure)
STC-37	110	Direct Screw Terminal Connector
C-1800	30	DAS-1600/1400 to STA-16, STA-U, or STP-37 Cable

* Also available is SSR-RACK24 solid state relay panel ($160). Requires solid state switche for input or output. Contact engineering for more info.

***Ordering Example:** DAS-1601 100 kS/s Analog and Digital I/O Board with gains of 1, 10, 100 and 500, with ASO-1600 advanced software, STA-16 screw terminal accessory and C-1800 cable,*