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Find the *Measurement Computing / Data Translation DT1492-F-16SE* at our website: *Click HERE*

DATA TRANSLATION®

VMEbus
DATA ACQUISITION BOARD
DT1492 Series

FEATURES

- **Data acquisition board for high speed analog and digital I/O on the Sun-3, Sun-4, and other VMEbus computers**
- **Single board for easy installation**
- **512 Kbyte onboard memory supports high-speed simultaneous analog input and analog output operations**
- **Gap-free Continuous Performance operation assures absolute data integrity—no lost samples**
- **RAM channel-gain list provides sampling flexibility**
- **Optional Simultaneous Sample and Hold simultaneously samples four inputs at once**
- **Plugs directly into screw terminal panels for easy user connections and signal conditioning**

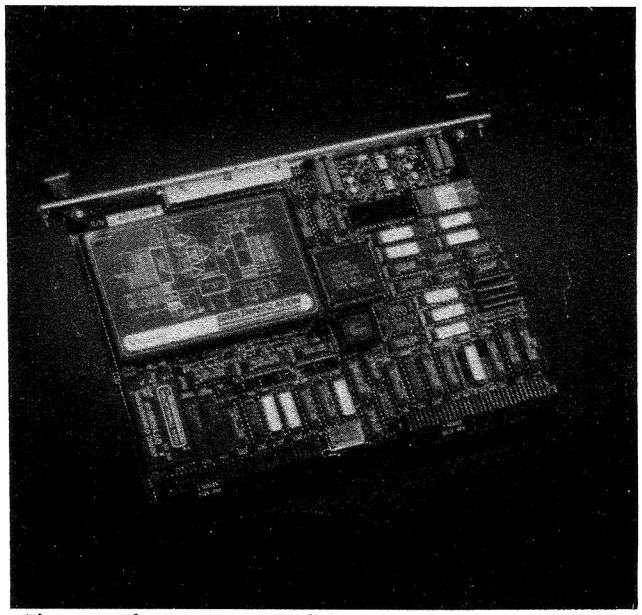


Figure 1. The DT1492 Series brings complete data acquisition capabilities to the VMEbus. M-4829

VME

TABLE 1. DT1492 SERIES FEATURES

Analog Inputs	Resolution	Gain	Thruput	Memory	Analog Outputs	Thruput	DIO	Pacer Clock
4 to 16; SS & H available	12 or 16 bits	1; 1,2,4,8; or 1,10,100,500	2.5kHz to 750kHz	256 x 16-bit RAM	2 chan, 12 bits	130kHz, degltiched	16 lines	1 for A/D, 1 for D/A

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GENERAL DESCRIPTION

The DT1492 Series consists of nine high speed analog and digital I/O boards for data acquisition on the Sun-3, Sun-4 and other VMEbus computers. A comprehensive set of features that includes 12-bit or 16-bit input resolution and throughput rates to 750kHz means that the DT1492 Series satisfies the most important demands of data acquisition: high throughput speed and accuracy.

A 512 Kbyte onboard memory eases host processing dependency and enhances throughput capability. By providing a direct link to the VMEbus system memory, the onboard memory in the DT1492 Series expands data memory and accelerates processing operations. To extract even more functionality, the DT1492 Series employs the onboard memory to deliver Continuous Performance.

Onboard memory allows the DT1492 Series to function as an analog input and analog output product simultaneously. The DT1492 Series delivers the power of two data acquisition products from a single slot in the VMEbus backplane.

The DT1492 Series includes a RAM channel-gain list to specify a sequence of channels and the gain at which each channel is sampled. You'll have ultimate flexibility to define the order and number of channels sampled. Sampling sequences can be predefined and provide the means to sample events at very high speeds—up to 750kHz.

Software-selectable gains of 1, 2, 4, and 8 or 1, 10, 100, and 500 on most models allow you to accommodate a wide range of input signal levels. Gain on every channel can be different, based on your requirements.

The DT1492 Series has two independent 12-bit deglitched digital-to-analog (DAC) converters that operate singly, sequentially, or simultaneously to control different output devices. Each DAC is capable of operating at a throughput rate of 130kHz.

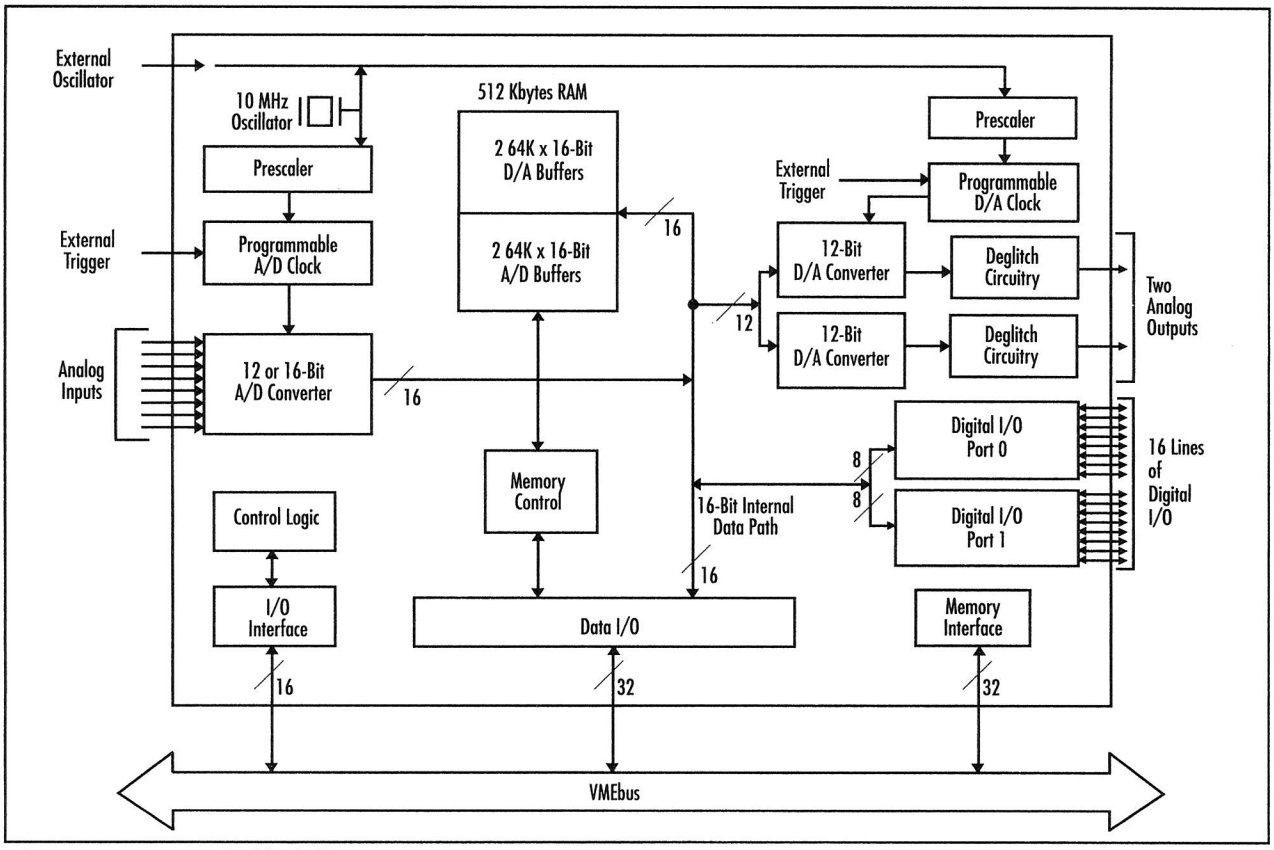


Figure 2. DT1492 Series block diagram

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DESIGNED FOR HIGH SPEED

Continuous Performance Operation

The DT1492 Series provides selectable Continuous Performance operation for analog input, analog output, or simultaneous analog input and analog output operations. Continuous Performance is a data sampling method that provides gap-free transfers of large volumes of data to (analog input operation) or from (analog output operation) system memory.

Analog in and analog out operations can be continuous or non-continuous. In non-continuous operation, a finite number of conversions is performed (65,536 or fewer). Conversions are terminated by the DT1492 Series board.

During Continuous Performance operation, the onboard memory in the DT1492 Series is filled and emptied to and from system memory. Data acquisition proceeds uninterrupted. Once programmed for Continuous Operation, the DT1492 Series converts all data non-stop until you intervene and halt the process.

In Continuous Performance analog output operation, the DT1492 Series converts digital data in onboard memory into analog signals, without stopping. Again, once programmed, analog output proceeds uninterrupted until you halt the process.

In non-continuous operation, onboard memory is prefilled with the data to be converted. A trigger initiates the process and analog signals are output until all data has been used.

Onboard Memory

The DT1492 Series contains 512 Kbytes of onboard memory for data storage. The memory is subdivided into two analog input buffers and two analog output buffers, each capable of storing data for 65,536 samples. In high-speed data acquisition environments, where a variety of application programs can operate in tandem, the contention for system bus control is intense. In the DT1492 Series, large blocks of data are transferred to and from onboard memory at once, and do not have to rely on the system bus, where other applications vie for attention. The result is greater effective throughput.

Smart Data Flow

The DT1492 Series uses an enhanced data arbitration scheme, permitting simultaneous A/D, D/A, and digital I/O operations. Control of the data flow is performed by a custom designed interface chip, developed by Data Translation. This chip monitors and controls board operations to assure that data transfers to and from all three subsystems occur at the maximum possible throughput rates.

External Trigger

Triggers are used to start analog input and analog output events. A software trigger starts conversion events under program control. Alternatively, an external trigger can be employed also, to begin a data acquisition sequence exactly when conditions outside the computer are optimal. Thus the trigger can be a software command, or it can be an electrical pulse from an outside source.

In multiple conversion operations, an entire sampling sequence can be predefined by loading registers on the DT1492 Series board; a software command or external trigger then starts the sequence. Each conversion occurs on a clock "pulse." The DT1492 Series provides complete control to define internal and external clock and trigger sources.

Programmable Pacer Clocks

The DT1492 Series includes two onboard programmable pacer clocks. One clock is used to initiate analog-to-digital conversions and the second pacer clock initiates

VME

TABLE 2. DT1492 SERIES BOARD APPLICATIONS

Measurement & Control	Scientific	Industrial
Measurement	Chromatography	Process automation
-Temperature	Speech processing	Analog control loops
-Pressure	Electrophysiology	PID loops
-Moisture	-Neuron stimulation	Test measurement
-Flow, displacement	-Muscular stress test	-PC boards test
-Multichannel audio	Psychology	-Components test
Control	-Infant stimulation	-Particle counting
-XY Plotters	-Stimulus control,	Energy management
-Recorders	response measurement	Environmental monitoring
-Stepper motors	Vibration analysis	Waveform generation
-Process actuators		

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digital-to-analog conversions. By using two pacer clocks, analog input and analog output operations can be controlled separately, and can occur simultaneously. Each clock is made up of three elements: a 10MHz onboard oscillator, a clock prescaler, which serves as a programmable divider, and a counter divisor. Each clock can also be configured to accept an external oscillator.

ANALOG INPUT

The DT1492 Series monitors an individual channel at up to 750kHz, permitting you to sample events that change very rapidly. The analog-to-digital converter allows you to monitor up to 16 analog input channels from one slot in your Sun-3, Sun-4 or other VMEbus computer.

The DT1492 Series models differ in their analog (A/D) characteristics only (see the analog input specifications). The entry level DT1492 model has a throughput rate of 40kHz, 12-bit resolution, and can be user-configured for 16 single-ended or 8 differential inputs.

To reduce noise picked up through cables and connectors, many DT1492 Series models offer differential inputs. Differential inputs reject common mode noise, sampling signals more accurately in industrial and other electrically noisy environments.

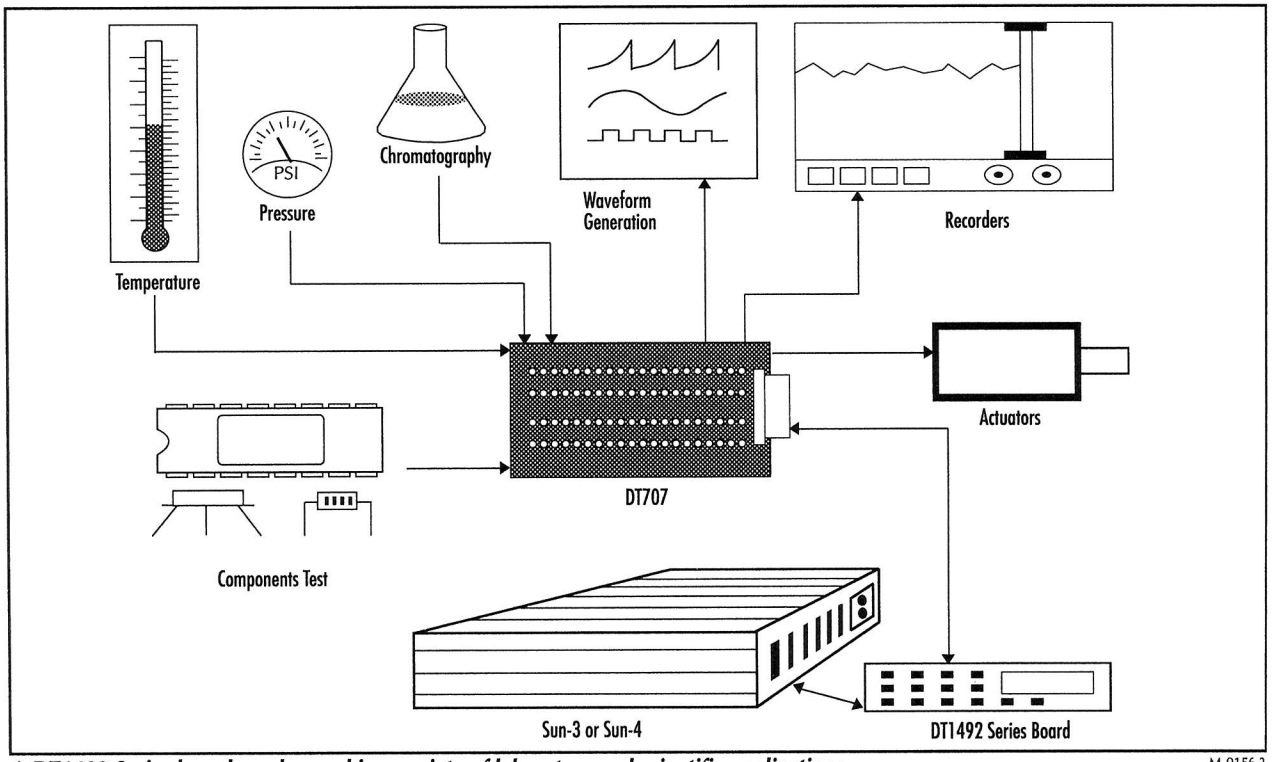
Mid-range DT1492 Series models deliver throughputs of 150kHz (DT1492-F) and 250kHz (DT1492-G). The DT1492-L model has a remarkable throughput rate of 750kHz with 4 differential inputs.

The DT1492 Series delivers more than speed. The DT1498 model provides Simultaneous Sample and Hold, to take a "snapshot" of 4 single-ended inputs at the same time. The high-resolution, 16-bit DT1497 model provides extremely high accuracy (±.003% FSR).

RAM Channel-Gain List

The RAM channel-gain list enhances the flexibility of the DT1492 Series by allowing any sequence of channels to be sampled at any available gain, while maintaining the full A/D throughput rate.

The channel-gain list can be predefined to perform any sampling sequence (0 to n, or n to m channels, for example). The DT1492 Series can also sample channels randomly (channels 0, 3, 2, 5), or sample successively on the same channel at different gain settings. Conversions can be performed on a single channel, for the entire channel-gain list, or repetitive conversions of the entire channel-gain list can be performed.



A DT1492 Series board can be used in a variety of laboratory and scientific applications.

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Programmable Gain

A programmable gain amplifier lets you measure low-level analog input signals accurately. Very small inputs (for example, 20mV) can be measured directly by the board (using full resolution) without depending on an external amplifier. Most important, several different analog input levels can be measured, and each can use a different gain setting.

DT1492 Series models provide two gain ranges: low level (1, 10, 100, 500) that sample full-scale inputs as small as 20mV at 2.5kHz; and high level (1, 2, 4, 8) that sample full-scale inputs to .625V at up to 250kHz throughput. Very high speed (750 kHz), 16-bit resolution, and Simultaneous Sample and Hold models provide a fixed gain of one on +5V or +10V input ranges.

Gain levels can be selected in software, eliminating the need to pull the DT1492 Series board out of the VMEbus backplane and adjust hardware settings every time you want to initiate a different process or experiment.

ANALOG OUTPUT

The DT1492 includes two 12-bit deglitched digital-to-analog converters that provide independent channels capable of operating at throughput rates to 130kHz per channel, with a settling time of 5µs. Each channel's digital-to-analog circuitry is independent, so that you can configure each for a different output range. The DT1492 Series thus provides a complete analog input-output control loop, delivering the power to detect and alter events from a single slot in the VMEbus backplane.

Conventional D/A converters produce glitches: pulses of short duration but high energy. Glitches significantly reduce the effective accuracy of the converter, and are especially bothersome in audio and waveform regeneration applications. The deglitching circuitry in the DT1492 Series virtually eliminates this noise.

DIGITAL I/O

The DT1492 Series's digital I/O lines provide access to as many as 16 peripheral digital signals. The digital I/O lines can be used to detect digital input data or drive digital output data directly.

The DT1492 Series allows you to configure the 16 lines in two 8-bit groups. Each group can be set individually for digital input or digital output transfers. You can monitor peripheral devices on 8 input lines, and control others on 8 output lines.

ACCESSORIES

SCREW TERMINAL PANELS

The DT1492 Series is compatible with several Data Translation screw terminal panels, which make connections to the board easy to manipulate. Screw terminal panels are available with signal conditioning circuits that provide high levels of isolation, amplification, linearization, and filtering that allow data to be discernible from surrounding noise.

TABLE 3. COMPATIBLE SCREW TERMINAL PANELS

DT1492 Series Board	Adapter Boards and Cable Assemblies	Screw Terminal Panel	Panel Function
DT1492 **DT1492-F-16SE** **DT1492-G-16SE** **DT1495**	—	DT707	General purpose
	—	DT707-T[1]	Thermocouple inputs; cold-junction compensation
	EP035	DT760	Isolated signal conditioning; thermocouple, RTD linearization
	DT752	DT709-Y	16DI inputs
	DT752	DT756-Y	Thermocouple inputs; 16DI inputs, gain, cold-junction compensation
DT1492-F-8DI **DT1492-G-8DI** **DT1492-L** **DT1497, DT1498**	—	DT707	General purpose

Notes:
1. The DT707-T is recommended only for use with the DT1495.
2. Cable assemblies are included with all screw terminal panels except the DT760. An EP035 cable assembly is required to connect the DT1492 Series board to the DT760.
3. For complete information on screw terminal panels, see the individual Data Translation data sheets.

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SPECIFICATIONS

Specifications are typical at +25°C and rated power unless otherwise specified

TABLE 4. ANALOG INPUTS

	DT1492	DT1492-F-16SE DT1492-F-8DI	DT1492-G-16SE DT1492-G-8DI	DT1492-L	DT1495	DT1497	DT1498
Number of Inputs	16SE/8DI	16SE or 8DI	16SE or 8DI	4DI	16SE/8DI	4DI	4SE, SS & H
Resolution	12 bits (to .024%)	12 bits (to .024%)	12 bits (to .024%)	12 bits (to .024%)	12 bits (to .024%)	16 bits (to .0015%)	12 bits (to .024%)
Input Range	0–1.25,2.5, 5,10V ±1.25,2.5, 5,10V	0–1.25,2.5, 5,10V ±1.25,2.5, 5,10V	0–1.25,2.5, 5,10V ±.625,1.25, 2.5,5,10V	— ±5V	0–.02,.1, 1,10V ±.02,.1, 1,10V	— ±10V	0–10V ±10V
A/D Throughput Gain = 1,2,4,8, or 10 Gain = 100 or 500	40kHz —	150kHz —	250kHz —	750kHz —	40kHz 2.5kHz	100kHz —	100kHz —
System Accuracy (% FSR) Gain = 1 Gain = 2 Gain = 4 Gain = 8	±.03% — — —	±.03% ±.04% ±.05% ±.07%	±.03% ±.04% ±.05% ±.07%	±.04% — — —	±.03% — — —	±.003% — — —	±.04% — — —
Gain	1,2,4,8	1,2,4,8	1,2,4,8	—	1,10,100,500	—	—
Acquisition Time Gain = 1,2,4,8, or 10 Gain = 100 or 500	15µs —	4µs —	2.5µs —	1µs —	15µs 385µs	6µs —	6µs —
Input Impedance On Channel Off Channel	100MΩ,100pF 100MΩ,10pF	100MΩ,50pF 100MΩ,10pF	100MΩ,50pF 100MΩ,10pF	10kΩ,10pF 10kΩ,10pF	100MΩ,100pF 100MΩ,10pF	100MΩ,20pF 100MΩ,10pF	100MΩ,100pF 10MΩ,10pF
Maximum Input Voltage Without Damage Power On Power Off	 ±35V ±20V	 ±27V ±12V	 ±16V ±1V	 ±20V ±20V	 ±35V ±20V	 ±27V ±12V	 ±31V ±16V
Channel-to-Channel Phase Match @ 50kHz	—	—	—	—	—	—	<.1°
Common Mode Rejection (1kΩ, Unbalance)	80dB @60Hz	80dB @1kHz	80dB @1kHz	80dB @1kHz	80dB @60Hz	80dB @1kHz	—
Temperature Drift (per °C) Full Scale Zero (µV)	±.003% FSR ±120	±.003% FSR ±50	±.003% FSR ±50	±.003% FSR ±100	±.003% FSR ±120 ±3/°CxG	±.003% FSR ±50	±.003% FSR ±200

ANALOG OUTPUTS

Number of Outputs	2 independent, deglitched
Resolution	12 bits (.024% FSR increments)
Output Ranges	
Unipolar	0–5, 10V
Bipolar	±2.5, 5, 10V
Throughput	130kHz, each channel
Settling Time to .01% FSR	5µs
Accuracy	±.012% FSR
Output Protection	Short circuit protected
Glitch Energy	15mVµs
Temperature Drift	
Full Scale	±.004% FSR/°C
Zero	50µV/°C
Capacitive Loads	To .004µF, no oscillations

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DIGITAL I/O
Number of DIC
Inputs and Outp
PACER CLOCK
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Usable Frequen
Divider Range
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External Oscilla
External Oscilla
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I/O Base Addre
Memory Data T
I/O Data Transf
Address Modifi
Interrupts
Interrupt Vector
Interrupt Source
Connectors
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J2 (Contains
POWER REQU
+5V
DT1492
DT1492-F
DT1492-F
DT1492-L
DT1495
DT1497
DT1498
±15V
All Models
PHYSICAL/EN
Dimensions
Weight

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DT1498
4SE, SS & H
12 bits (to .024%)
0–10V ±10V
1u0kHz —
±.04% — — —
—
6µs —
100MΩ,100pF 10MΩ,10pF
±31V ±16V
<.1°
—
±.003% FSR ±200

DIGITAL I/O

Number of DIO Lines	16 lines, configurable in groups of 8 for input or output
Inputs and Outputs	TTL levels

PACER CLOCKS

Number of Clocks	Two; one each for A/D and D/A
Function	Sets rates of A/D, D/A conversions
Usable Frequencies	1.19Hz (839ms) to 750kHz
Divider Range	1 to 8,388,608
Onboard Oscillator	10MHz ± .01%
External Oscillator	DC to 10MHz (applied to clock divider)
External Oscillator Input	TTL levels, 40ns minimum pulse width

EXTERNAL TRIGGER

Trigger Function	Initiates A/D or D/A conversions
Trigger Input	TTL levels, 40ns minimum pulse width

ONBOARD MEMORY

Memory Function	Stores data for 128K A/D and 128K D/A samples
Memory Size	256K x 16 bits (512 Kbytes) RAM; Direct access from VMEbus

INTERFACE CHARACTERISTICS

Compatible Bus	VMEbus
Number of Locations Occupied	128 bytes in 16-bit I/O addressing; 512 bytes of 24-bit memory addressing or 32-bit memory addressing
Board Identification	Configuration PROM contains board type, I/O addressing, memory addressing, revision, and model; readable from I/O space
Memory Base Address	Jumper-selectable 00000000 (hex) to FFF80000 (hex) in increments of 80000 (hex)
I/O Base Address	Jumper-selectable, 0000 (hex) to FF80 (hex) in increments of 80 (hex)
Memory Data Transfer	D32 (32-bit), D16 (16-bit), or D08 (8-bit)
I/O Data Transfer	D16 (16-bit)
Address Modifier Codes	0D, 0E, 09, 0A, 3D, 3E, 39, 3A, (memory); 2D, 29, 10-1F (I/O)
Interrupts	Jumper-selectable, 1, 2, 3, 4, 5, 6, 7
Interrupt Vector	Jumper-selectable, 00(hex) to FF (hex) in increments of 1
Interrupt Source	Board can issue interrupt when an error occurs, data transfer is done, or data conversion is done
Connectors	
J1 (Contains All User Connections)	50-pin 3M connector (mating connector 3M-3425; user-supplied)
J2 (Contains Separate External Oscillator In)	3-pin tab connector

POWER REQUIREMENTS

+5V	
DT1492	±10%,@3.0A typical
DT1492-F	±10%,@3.3A typical
DT1492-F	±10%,@3.5A typical
DT1492-L	±10%,@3.5A typical
DT1495	±10%,@3.0A typical
DT1497	±10%,@3.5A typical
DT1498	±10%,@3.2A typical
±15V	
All Models	Generated by onboard DC/DC power converter; low noise, regulated

PHYSICAL/ENVIRONMENTAL

Dimensions	6.3"H x 9.2"W x .8"D (16 x 23.37 x 2.03 cm)
Weight	20 ounces (568g)

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ORDERING GUIDE

DATA ACQUISITION BOARDS

The DT1492 Series consists of nine models which differ only in analog input specifications. Each model is shipped with:

- DT1492 Series data acquisition board
- User manual
- 90-day warranty

Order one of the following models.

DT1492
Sun-3, Sun-4, and VMEbus compatible board with 12-bit A/D resolution; 40kHz A/D throughput; 16SE or 8DI input channels; programmable gains of 1, 2, 4, and 8; two 12-bit D/A converters; 16 lines of digital I/O; 512 Kbytes of onboard memory; and two programmable pacer clocks.

DT1492-F-16SE
Same as the DT1492 but has 150kHz A/D throughput and 16SE input channels.

DT1492-F-8DI
Same as the DT1492 but has 150kHz A/D throughput and 8DI input channels.

DT1492-G-16SE
Same as the DT1492 but has 250kHz A/D throughput and 16SE input channels.

DT1492-G-8DI
Same as the DT1492 but has 250kHz A/D throughput and 8DI input channels.

DT1492-L
Same as the DT1492 but has 750kHz A/D throughput, 4DI input channels, and a fixed gain of 1.

DT1495
Same as the DT1492 but has programmable gains of 1, 10, 100, and 500; and throughput is reduced to 2.5kHz at gains of 100 and 500.

Note that an adapter is required to install a DT1492 Series board into a Sun-3 or Sun-4 Workstation. Contact the Data Translation Sales Department for recommended adapters.

DT1497
Same as the DT1492 but has 16-bit A/D resolution, 100kHz A/D throughput, 4DI input channels, and a fixed gain of one.

DT1498
Same as the DT1492 but has 4SE Simultaneous Sample & Hold input channels, 100kHz A/D throughput, and a fixed gain of one.

SCREW TERMINAL PANELS

DT707 and DT707-T
The DT707 screw terminal panel accommodates all DT1492 Series user connections on convenient screw terminal connectors. This panel is supplied complete with a 3.3 foot (1 meter) cable that plugs directly into the DT1492 Series boards. A version of the DT707, the DT707-T has the added feature of thermocouple cold-junction compensation circuitry.

DT709-Y
The DT709-Y signal conditioning screw terminal panel provides 16DI inputs and 16SE outputs, effectively giving boards with 16SE inputs differential input capabilities.

DT756-Y
The DT756-Y signal conditioning screw terminal panel provides 16DI inputs, low level thermocouple signals, jumper selectable gain, offset, and thermocouple cold-junction compensation. A DT752 is required.

DT752
Routes analog input connections to 20-pin connector, allowing the DT709-Y and DT756-Y to be used with the DT1492 Series boards. This panel is supplied complete with a 3.3 foot (1 meter) cable that plugs directly into the DT1492 Series boards.

DT760 and DT500 Series
DT760 accommodates DT500 Series isolated signal conditioning modules that provide input and output isolation, differential inputs, and 4-20mA current input and output ranges. The DT760-T should be used with RTD or thermocouple modules. Requires EP035 cable.

EP035
Eight foot 50-conductor flat ribbon cable assembly for connection of DT760 and DT760-T to selected DT1492 Series boards.

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