



**Intronics
Power®**

Low Cost, STD Bus Compatible Analog I/O Subsystems

RTI-1225/1226

FEATURES

RTI-1225 ANALOG INPUT/OUTPUT CARD

16 Single-Ended/8 Differential Input Channels

2 Output Channels

10-Bit A/D and 8-Bit D/A Resolution

RTI-1226 ANALOG INPUT CARD

16 Single-Ended/8 Differential Input Channels

10-Bit A/D Resolution

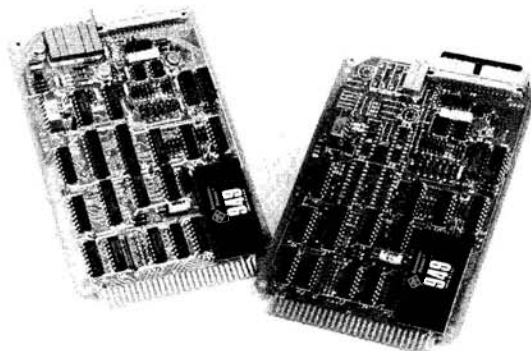
GENERAL

Low Cost

Single +5V Power Requirement

Memory Mapped or I/O Selectable

Compatible with All STD CPU Cards



SERIES DESCRIPTION

Analog Devices' RTI-1225 series products handle analog inputs and outputs for STD Bus microcomputer systems. These subsystems provide a cost effective solution to interfacing with the analog world by minimizing the hardware development time and providing low function cost.

The RTI-1225 combines both analog input and output functions on a single card, thus reducing components count. This design provides data acquisition of analog signals from 8 differential or 16 single-ended, jumper-selectable voltage inputs and 2 independent voltage outputs. Also included is a differential amplifier, a sample and hold circuit and a 10-bit A/D converter (AD571). Throughputs of 25,000 channels per second are achievable. The analog output section consists of two 8-bit D/A converters. Each channel has a user selectable output range of 0 to +10V, $\pm 5V$ and $\pm 10V$.

The RTI-1226 Analog Input Card provides the same analog functions as the RTI-1225, but does not include the two channels of 8-bit analog output. An ideal choice when only analog inputs are required, this card can be configured for 0 to +10V, $\pm 5V$ and $\pm 10V$ input ranges.

Reliable analog connections are made using 3M's "Scotchflex" socket and header connectors which enable a flat ribbon cable to be combined with gas tight and corrosion resistant connectors. An optional screw termination panel is also offered for simple and convenient field wire connections.

The RTI-1225 series cards come complete with their own dc/dc converters, allowing the cards to operate directly from the microcomputers +5V supply. Configured as a block of contiguous memory locations (memory mapped interface), these products simplify the task of interfacing STD Bus microcomputers to the real world.

Card Type	Model No.	INPUT		OUTPUT	
		Channel Capacity	A/D Resolution	Channel Capacity	D/A Resolution
Analog Input/ Output	RTI-1225	16SE/8D	10 Bits	2	8 Bits
Analog Input	RTI-1226	16SE/8D	10 Bits	N/A	

RTI-1225/1226 Function Chart

Represented/Distributed By

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SPECIFICATIONS (typical @ 25°C with nominal supply voltage unless otherwise noted)

INPUT

Number of Output Channels	16 Single-Ended or 8 Differential (Jumper Selectable)
Input Overvoltage Protection ¹	± 35V (Dielectrically Isolated)
Input Impedance	> 10 ⁸ Ω
Input Current	± 50nA
Input Voltage Ranges ²	0V to +10V, ± 5V, ± 10V
Input/Output Connector	3M #3493, 34 pin
A/D Resolution	10 Bits (1024 Counts)
A/D Output Codes ²	Binary, Offset Binary, Two's Complement
Instrumentation Amplifier Gain Range	1V/V
A/D Conversion Time	25μs
System Throughput	25,000 channels/sec
Common Mode Voltage (CMV)	± 10V min
Common Mode Rejection (CMR)	60dB
Linearity	± 1/2LSB
Differential Nonlinearity	± 1/2LSB
Total System Error (Adjustable to Zero)	± 0.1% of FSR
Temperature Coefficient	
Gain	± 50ppm/°C of FSR (Full Scale Range)
Offset	± 25ppm/°C of FSR

OUTPUT (RTI-1225 Only)

Number of Output Channels	2
D/A Resolution	8 Bits (256 Counts)
D/A Input Codes ²	Binary, Offset Binary, Two's Complement
Output Voltage Ranges	0V to +10V, ± 5V, ± 10V @ 5mA
Output Settling Time	25μs (to ± 1/2LSB)
Nonlinearity	± 1/2LSB
Differential Nonlinearity	± 1/2LSB
Total Error (Adjustable to Zero)	± 0.4%
Temperature Coefficient	
Gain	± 50ppm/°C of FSR
Offset	± 30μV/°C

INTERFACE PARAMETERS

Compatibility	Meets all Electrical and Mechanical STD Bus Specifications
Implementation	Memory Mapped I/O Compatible with All CPU Types
	Port Mapped I/O Compatible with 8080, 8085, 8086 and Z-80
	Family of CPUs.
Address Selection	5 Contiguous Bytes in a 16 Byte Block. (Jumper Selectable in Any One of 256 Locations in 64K of Memory Space.)
Port Selection	5 Contiguous Ports in a 16 Port Block. (Jumper Selectable on Any 16 Port Boundary in Either an 8-Bit or 16-Bit Port Image.)
Expansion Options	MEMEX and IOEXP Fully Supported with Jumper Selectable Enable High, Enable Low and Ignore Expansion Options.

POWER REQUIREMENT

+5V ± 5% @ 750mA
(On-Board dc/dc Converter Generates An Isolated ± 15V to Power the Data Acquisition Components)

TEMPERATURE

Operating	0 to +70°C
Storage	-55°C to +85°C

RELATIVE HUMIDITY

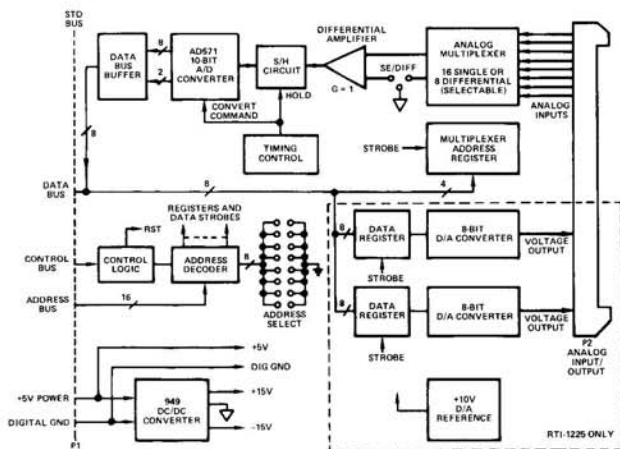
Meets or Exceeds MIL-STD 202 Method 103

NOTES

¹Specification with power applied, ± 20V with power off.

²User selectable with wire-wrap jumpers.

Specifications subject to change without notice.



RTI-1225/1226 Block Diagram

GENERAL DESCRIPTION

MULTIPLEXER

There are three ways to configure the input multiplexer: single-ended, differential and pseudo-differential. In the *single-ended mode*, sixteen separate analog signals may be randomly selected with reference to a common ground. For noisier environments, the *differential mode* can be used to reduce the effects of noise and bias current. This mode reduces the channel capacity to 8 inputs. The *pseudo-differential mode* takes advantage of differential inputs and provides a full 16 channel input capacity. It is necessary that all input signals have a common reference point.

This dielectrically isolated multiplexer can handle up to $\pm 35V$ signals without damage.

DIFFERENTIAL AMPLIFIER

This amplifier provides common mode rejection (CMR) at 60dB in the differential and pseudo-differential modes. High CMR is recommended for signal processing in noisy environments.

SAMPLE-HOLD CIRCUIT (S/H)

The Sample and Hold Circuit "freezes" the analog input signal so that it can be converted by the A/D without error.

A timing circuit delays the A/D convert command until the multiplexer and differential amplifier has settled and the S/H has acquired the signal.

ANALOG/DIGITAL CONVERTER (A/D)

The RTI-1225/1226 contains a fast, 10-bit, successive approximation, analog-to-digital converter. The A/D resolution of 1 part in 1024 provides a least significant bit weighing of 20mV at the ± 10 range. The user can select one of three A/D input ranges and one of three digital output codes via wire-wrap jumpers.

DIGITAL/ANALOG CONVERTER (D/A) (RTI-1225 ONLY)

The RTI-1225 contains two 8-bit D/A converters. Each D/A output can be independently selected. The user has three output voltage ranges from which to select. The 8 bits of resolution provide a least significant bit value of 39mV at the 10V range.

POWER SUPPLY (dc/dc)

The microcomputers +5V supply is all that is required to power the RTI-1225 series cards. An on-board dc/dc converter is supplied with each card to convert the +5V bus supply to a low noise, isolated $\pm 15V$ required by the analog circuitry.

BYTE ADDR.	DATA FORMAT								FUNCTION	OPER.
XFYB	D7	D6	D5	D4	D3	D2	D1	D0	MUX ADDR/ CONV	WRITE
XFYC	B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀	A/D DATA LO	READ
XFYD	BUSY						MSB	B ₈	A/D DATA HI	READ
XFYE	MSB	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	LSB	D/A 0 DATA	WRITE (RTI-1225 ONLY)
XFYF	MSB	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	LSB	D/A 1 DATA	WRITE (RTI-1225 ONLY)

NOTES: 1. X AND Y ARE USER SELECTABLE.

2. BITS SHOWN AS $\square$ HAVE THE UPPER VALUE FOR UNIPOLAR CODES AND LOWER VALUE FOR 2's COMPLEMENT.

3. THE SYMBOL ϕ MEANS THE BIT IS IGNORED.

4. BUSY BIT EQUALS "1" DURING CONVERSIONS AND "0" WHEN DONE.

RTI-1225/1226 Memory/Port Map

RTI-1225/1226

MODES OF OPERATION

Memory Map

In the memory map mode of operation, the RTI-1225/1226 card occupies consecutive bytes of memory. The address is determined by on-board jumpers which can be configured to any one of 256 locations in the 64K of address space. Since the RTI card is treated as a block of memory, simple memory read or write instructions (STA, LDA) can be used. Memory mapping also allows programmers to utilize any of the memory reference instructions in the repertoire (SHLD; LHLD; MOV M,r; MOV r,M).

Port Map

In the port mapped mode of operation, the RTI-1225/26 card occupies five consecutive ports in either an 8-bit or 16-bit port image. The port address is determined by on-board jumpers which can be configured to start at any 16 port boundary. Since the RTI card is treated as a group of I/O ports, simple input or output instructions (INP, OUT) can be used. Port mapping allows the use of this interface without interfering with a complete complement of memory in either 8- or 16-bit processor applications.

MUX ADDRESS/CONV BYTE

Any random input channel can be selected by writing the channel address code into the MUX ADDR/CONV BYTE. This write command also triggers a timer which automatically sets the S/H into the hold mode and starts the A/D conversion once the input signal has settled.

A/D DATA LO BYTE

The 8 lowest order bits of the A/D are available at this address.

A/D DATA HI BYTE

The 2 highest order bits of the A/D are available at the address. In addition the BUSY bit provides the status of the A/D converter. A logic "0" indicates that the conversion is complete and the A/D data is now ready to be read.

D/A DATA BYTES

Each D/A receives update information from the data written into the corresponding D/A data register.

... OTHER STD BUS PRODUCTS FROM Intronic Power

RTI-1260

High Performance, Analog Input Card
32-Input Channels, 12-Bit A/D
Programmable Gain Ranges (1-1000)

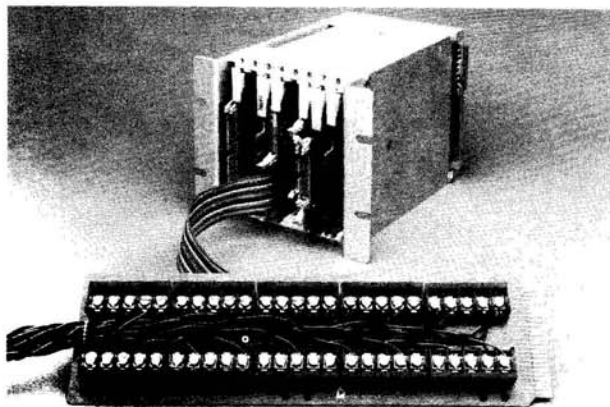
RTI-1262

High Performance, Analog Output Card
4 Output Channels, 12-Bit D/A
Optional 4-20mA Converter

RTI-1270

Sensor Based Data Acquisition Subsystem optimized for temperature and low level signal measurements. Includes sensor signal conditioning ($\pm 1000V$ isolation), 16-channel analog multiplexing, 13-bit A/D conversion, data manipulation (cold junction compensation, linearization, conversion to engineering units) and maps as a contiguous block of memory onto the STD bus.

SCREW TERMINATION PANEL



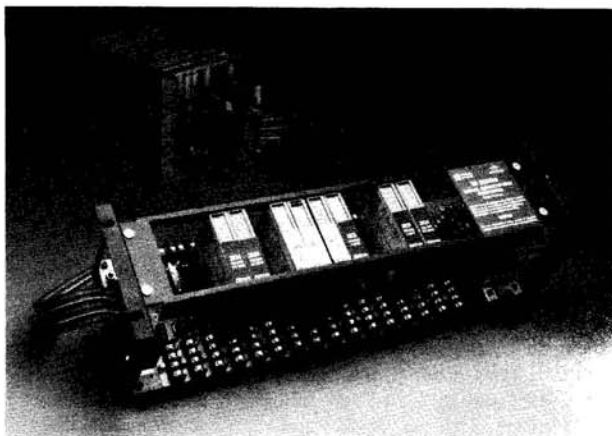
FEATURES

Easily Interconnects Analog I/O Cards to Field Wiring
Barrier Strip Screw Terminals
Ribbon Cable Compatible to RTI Cards

GENERAL DESCRIPTION

The AC1585 Termination Panel is a printed circuit board which contains screw terminal connectors, provides a one-for-one connection to the RTI cards and comes complete with a 3' ribbon cable which is compatible to analog connector on the RTI.

SIGNAL CONDITIONING I/O SUBSYSTEM



FEATURES

Complete Signal Conditioning Function
Wide Variety of Sensor Inputs
Thermocouples, RTDs, Strain Gage
High Level Output Compatible to RTI Cards
Provides High CMV Isolation and Input Protection

GENERAL DESCRIPTION

The 3B Series Signal Conditioning I/O Subsystem provides an easy and convenient solution to signal conditioning problems associated with connecting sensors to an analog card. It is designed to interface directly to sensor or analog signals such as thermocouples, RTDs, strain gages, millivolt or process currents and convert the inputs to high level analog outputs compatible to the RTI analog cards. Features include 220V rms input protection, isolation ($\pm 1500V$), filtering, low drift amplification and sensor excitation.

For more information call or write for 3B Series Data Sheet.

ORDERING GUIDE

ADI Model No.	Description	Used On
Cards		
RTI-1225	Analog Input/Output Card	—
RTI-1226	Analog Input Card	—
Mating Connectors		
AC1562	34-pin flat cable connector with 3' color coded cable Analog Input/Output Analog Input	RTI-1225 RTI-1226
Screw Termination Panel		
AC1585-3	Screw terminal for field wiring.	RTI-1225/1226
User's Manual*		
AC1564	User's Manual for RTI-1225/1226	—

*A user's manual is furnished with each shipment. Additional copies are available under this part number.