Intronics Power ®

IBM-AT Compatible High-Performance Multifunction I/O Boards

RTI-834/RTI-835

FEATURES

- High-Performance Analog Input and Digital I/O Boards
- 16SE/8DI Analog Inputs (Expandable to 32SE/16DI)
- 12-Bit Sampling Analog-to-Digital Converter
- Analog Input Acquisition Rates Up to 200 kHz
- On-Board Scan Memory Stores Up to 64 Channel/Gain Combinations
- (±5 V, 0 V–5 V) or (±10 V, 0 V–10 V) Analog Input Range
- External Triggering Supported with Optional Gate
  - Pre/Post-Trigger Mode
  - TTL Trigger Input (Rising/Falling Edge)
- Software-Programmable Gain
  - Gains 1, 2, 4, 8 (RTI-834-H, RTI-835-H)
  - Gains 1, 10, 100, 500 (RTI-834-L, RTI-835-L)
- Software Programmable Pacer Clock
- Analog Configuration Options Software-Selectable Such as SE/DI, Input Voltage Range, ADC Coding
- 16 Digital I/O Channels
  - Bit-Configurable as Input or Output
  - Supports Pattern Recognition or Change of State as Interrupt Source
- Counter/Timers for Event Counting, Pulse Outputs, and Frequency Measurement
- Two Analog Output Channels (RTI-835)
- 12-Bit Digital-to-Analog Resolution (RTI-835)
- ±10 V or ±5 V Output Range (RTI-835)

GENERAL

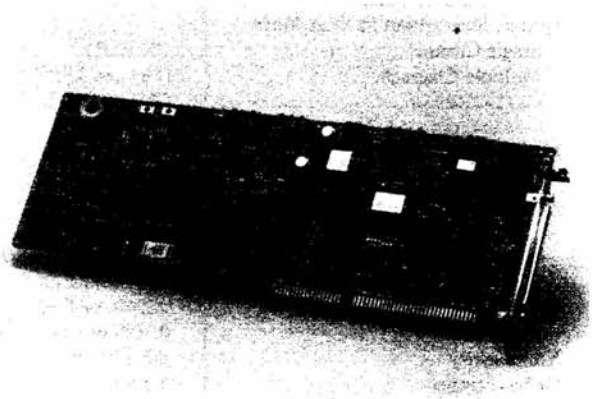
- Compatible with IBM AT* and 100% Compatibles
- Includes Extensive User's Manual
- Includes Software Utility Package: Contains Calibration and Exerciser Programs
- Compatible with 3B, 5B, and 7B Series Signal Conditioning Modules

SOFTWARE

- Callable I/O Drivers for Use with High-Level Languages Available
- Menu-Driven Application Software Packages Available

TYPICAL APPLICATIONS

- In-Vehicle Acquisition and Control
- Test Stands
- Data Acquisition



GENERAL DESCRIPTION

The RTI-834/RTI-835 (RTI®) are high-performance multifunction analog and digital I/O boards that plug into expansion slots in the IBM AT or compatible microcomputers. Their functions include analog input, analog output (RTI-835 only), digital I/O, and time related I/O functions.

The boards provide data acquisition capability for 16 single-ended or 8 differential analog inputs with optional expansion to 32 single-ended or 16 differential analog inputs. The analog-to-digital converter has 12-bit resolution and is a sampling ADC (built-in SHA). The RTI-834-H and RTI-835-H are high-level input boards and have software programmable gains of 1, 2, 4, 8. The RTI-834-L and RTI-835-L are low-level input boards and have software programmable gains of 1, 10, 100, 500. The RTI-835-H and RTI-835-L provide two analog output channels each using a 12-bit D/A converter. The boards also provide sixteen bits of digital I/O, which are bit configurable as input or output and four external counter/timer channels. These counter/timer channels can be used for event counting, frequency measurements, or pulse outputs.

There are no jumpers on the RTI-834/RTI-835. The following configuration options are software-selectable: analog input voltage range, analog-to-digital converter coding, single-ended/differential inputs, analog output voltage ranges, interrupt level and DMA channel. The base address of the board is selected using a on hand DIP switch, which helps avoid address conflicts at power up.

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RTI-834/RTI-835—SPECIFICATIONS (typical unless otherwise stated at +23°C)

ANALOG INPUT	
Number of Channels[1]	16 Single-Ended (SE) or 8 Differential (DI) Inputs, Expandable to 32SE or 16DI
Resolution	12 Bits (4096 Counts)
Analog Input Ranges[2]	±5 V, 0 V to 5 V, ±10 V, 0 V to 10 V
Analog Input Codes[1]	Twos Complement, Binary
A/D Conversion Time	5 μs max
System Throughput in Scan Mode	
Single Channel	200 kSPS
Multiple Channels	(SE) 166 kSPS, G = 1; 66 kSPS, G > 1 (DI) 66 kSPS, G < 100; 45.5 kSPS, G = 100 20 kSPS, G = 500
Measurement Accuracy	
-H board	GAIN = 1, 2, 4, 8
G = 1	±.03% of Full-Scale Range max
G = 2, 4, 8	±.04% of Full-Scale Range max
-L board	GAIN = 1, 10, 100, 500
G = 1	±.03% of Full-Scale Range max
G = 10, 100	±.04% of Full-Scale Range max
G = 500	0.10% of Full-Scale Range max
Nonlinearity	±1 LSB max (Best Straight Line)
Offset Tempco	5 ppm/°C
Gain Tempco	15 ppm/°C
Input Overvoltage Protection	Powered ±35 V max Unpowered ±20 V max
Input Impedance	>100 MΩ
Input Bias Current	±20 nA
Input Noise	1.5 LSB G < 500, 5 LSB G = 500
Common-Mode Voltage (CMV)	12 V min (V_{IN} = 0 V)
Common-Mode Rejection (CMR)	90 dB (@ 100 Hz, 1 kΩ Imbalance)
Data Acquisition Modes	Paced Operation-DMA or High-Speed (Both Support Continuous Transfer), Polled Status
ANALOG OUTPUT (RTI-835 Only)	
Number of Channels	2
Output Voltage Range[1]	±10 V, ±5 V
Output Current	2 mA max
Resolution	12 Bits (4096 Counts)
Total Output Accuracy	±0.025% max
Offset Tempco	5 ppm/°C
Gain Tempco	15 ppm/°C
Analog Output Coding	Twos Complement
Output Settling Time	10 μs (10 V Step Change R_L = 2.5 kΩ, 1000 pF) 22 μs (20 V Step Change R_L = 5 kΩ, 1000 pF)
Output Protection	Short to Ground
Power-On Voltage[3]	0 V, −5 V, or −10 V
DIGITAL I/O	
Number of Channels	16, Accessed as Two 8-Bit Ports
Configurability	Input/Output and Polarity Bit Configurable
Input Signal Levels	V_{IH} = 2.0 V min @ I_{IH} = 500 μA V_{IL} = 0.8 V max @ I_{IL} = 500 μA
Output Signal Levels	V_{OH} = 2.4 V min @ I_{OH} = −500 μA V_{OL} = 0.4 V max @ I_{OL} = 1.5 mA V_{OL} = 0.7 V max @ I_{OL} = 12 mA
TIME-RELATED DIGITAL I/O	
Number of Counter/Timers	4
Modes of Operation	Event Counting, Frequency Measurement, Pulse Output
Event Counting	
Maximum Count Rate	2 MHz max
Range	65,535 max
Frequency Measurement	
Frequency Range	15 Hz min to 2 MHz max
Gate Time	500 ns min to 4294 s max

Pulse Output	
Pulse Range	500 ns min to 4294 s max
Input Signal Levels	I_{IL} = −0.5 mA max @ V_I = 0.4 V
	I_{IH} = 0.25 mA max @ V_I = 2.7 V
	V_{IL} = 0.8 V max
	V_{IH} = 2.0 V min
	Hysteresis (V_{T+}–V_{T-}) = 0.4 V
Output Signal Levels	V_{OH} = 2.4 V min @ I_{OH} = 500 µA
	V_{OL} = 0.4 V max @ I_{OL} = 1.5 mA
	V_{OL} = 0.7 V max @ I_{OL} = 12 mA
Pacer	
Sampling Interval	5 µs min to 163 s max
Internal Pacer Time Base	4 MHz
Input Overvoltage Protection	+10 V max, −5 V min, Hysteresis = 0.4 V
Input Signal Levels	Same As Above
External Trigger	
Input Signal Levels	Same As Above
SYSTEM CONFIGURATION	
Bus Resource Utilization	Occupies One ISA/EISA Long Slot
Board Address[3]	100H to 3E0H 32 Bytes
Bus Compatibility	ISA/EISA Bus, PS/2* Model 30-286,
	COMPAQ* 80286/386/486-33 MHz
PHYSICAL/ENVIRONMENTAL	
I/O Connector	100-Pin Female (Amp 749076-9)
Operating Temperature Range	0°C to +60°C
Storage Temperature Range	−25°C to +85°C
Relative Humidity	5% to 90% Noncondensing
POWER	
Supply Voltage	+5 V ±5%
Power Consumption	+5 V @ 1.65 A typ
	+5 V @ 2.2 A max
Power Available to I/O Connector	+5 V @ 400 mA max

NOTES
[1]Selectable thru software.
[2]The input range selection is made for all channels as either 5 V or 10 V and on an individual basis as unipolar or bipolar. Selectable in software.
[3]Selectable using a DIP switch.

Specifications subject to change without notice.

*Personal System/2 (PS/2) and PC DOS are trademarks of International Business Machines Corp.
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FUNCTIONAL DESCRIPTION

The RTI-834-H and RTI-834-L are high-performance analog input and digital input/output boards that plug into expansion slots in the IBM AT or 100% compatible computers. The RTI-835-H and RTI-835-L boards have two analog output channels in addition to the capabilities of the RTI-834-H and RTI-834-L. These features are discussed in detail below.

ANALOG INPUT FEATURES

The RTI-834/RTI-835 supports the measurement of sixteen single-ended or eight differential analog input signals. The analog input capacity can be expanded to 32SE/16DI by adding a -32 to the model number for each board (e.g., RTI-834-H-32). The RTI-834-L and RTI-835-L are low-level input boards, and they contain a software programmable instrumentation amplifier with gain settings of 1, 10, 100 or 500. The RTI-834-H and RTI-835-H are high-level input boards and they contain a software programmable instrumentation amplifier with gain settings of 1, 2, 4, or 8. The analog input voltage range is software selectable and can be switched between ±5 V and ±10 V on a board basis and unipolar and bipolar on a per channel basis. This implementation of the analog input stage allows maximized resolution for a wide variety of signal types. The analog-to-digital conversion resolution is 12 bits. Table I shows the effective input ranges and LSB weight for the RTI-834/RTI-835.

Table I. Effective Analog Input Ranges for RTI-834/RTI-835

Board Type	Range Selection	Effective Input Ranges, LSB Weight			
		G = 1	**G = 10**	**G = 100**	**G = 500**
-L	10 V FS, Bipolar	±10 V, 4.88 mV	±1 V, 488 μV	±100 mV, 48.8 μV	±20 mV, 9.8 μV
-L	10 V FS, Unipolar	0 to 10 V, 2.44 mV	0 to 1 V, 244 μV	0 to 100 mV, 24.4 μV	0 to 20 mV, 4.9 μV
-L	5 V FS, Bipolar	±5 V, 2.44 mV	±500 mV, 244 μV	±50 mV, 24.4 μV	±10 mV, 4.9 μV
-L	5 V FS, Unipolar	0 to 5 V, 1.22 mV	0 to 500 mV, 122 μV	0 to 50 mV, 12.2 μV	0 to 10 mV, 2.4 μV
		G = 1	**G = 2**	**G = 4**	**G = 8**
-H	10 V FS, Bipolar	±10 V, 4.88 mV	±5 V, 2.44 mV	±2.5 V, 1.22 mV	±1.25 V, 610 μV
-H	10 V FS, Unipolar	0 to 10 V, 2.44 mV	0 to 5 V, 1.22 mV	0 to 2.5 V, 610 μV	0 to 1.25 V, 305 μV
-H	5 V FS, Bipolar	±5 V, 2.44 mV	±2.5 V, 1.22 mV	±1.25 V, 610 μV	±625 mV, 305 μV
-H	5 V FS, Unipolar	0 to 5 V, 1.22 mV	0 to 2.5 V, 610 μV	0 to 1.25 V, 305 μV	0 to 625 mV, 153 μV

The digital coding of the analog-to-digital converter is software selectable as either binary or twos complement. The RTI-834/RTI-835 has a maximum analog-to-digital conversion speed of 5 μs. The RTI-834/RTI-835 maximum throughput for measurement of multiple readings of a single channel is 200,000 samples/second and for multiple readings of a group of channels is 166,000 samples per second (for G = 1).

The RTI-834/RTI-835 allows you to acquire data in a variety of ways. The analog-to-digital conversion process can be initiated by one of three possible sources: a software convert command; an external pacer source connected to the pacer input line; or the on-board counter/timer programmed to act as a pacer clock supplying a timed series of output pulses. The paced method allows you to have the flexibility to have the analog-to-digital conversion process initiated at precise time intervals or synchronized with external events.

The third method listed above is called scan mode, and the RTI-834/RTI-835 has three scan modes: normal, group and simultaneous. Each scan mode can be operated with either an external or internal pacer source and can be initiated by an external TTL trigger. The RTI-834/RTI-835 driver software allows data to be collected and stored before (pre-trigger) and after (post-trigger) the trigger source has been activated. The RTI-834/RTI-835 gate/external trigger line can also be used to gate acquisitions.

Each scan mode allows you to choose how many analog input channels you wish to acquire data from, the gain for each channel and the input polarity (unipolar or bipolar). The RTI-834/RTI-835 stores this data in on-board scan memory which can store a scan list with up to 64 channels entries.

The normal mode allows you to specify the time "T" between each channel in the scan list. The on-board pacer source initiates each conversion when the time "T" is elapsed. The channels are read in the user-defined sequence until the user-specified number of conversions (count) is completed. Figure 1 shows how normal scan works on a scan list with five channels and a user-specified count of 15. The scan cycle time is derived from the number of channel entries in the scan list multiplied by the time "T" between conversions.

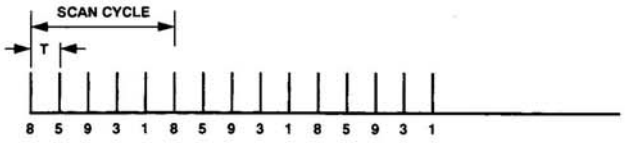

Figure 1. Normal Scan Mode

Group scan mode allows you to specify the time "T" between scan cycles. In this mode, the channels are sampled "as quickly as possible," and the next scan cycle is started when the time "T" is elapsed. The time between conversions in a cycle is dependent on the gain setting you select. Figure 2 shows how group scan works on a scan list with five channels and a user-specified count of 15. The scan cycle time is user-defined. This mode is very useful when you want to minimize the skew between channels or you need to read a group of channels at a defined timer interval.

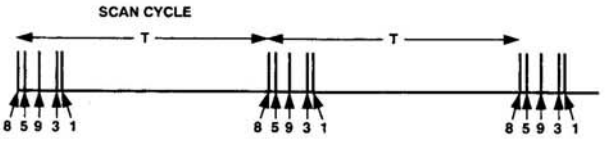

Figure 2. Group Scan Mode

Both normal and group scan mode accept timing commands as small as 5 μs and as great as 163 seconds providing a level of flexibility that allows the board to be adapted to a wide variety of applications.

Simultaneous scan mode requires that you use the STB-MF-SHA, simultaneous sampling panel. The STB-MF-SHA supports the simultaneous acquisition of data from up to eight single-ended analog inputs. In this mode, you specify the time "T" between scan cycles. The eight channels are held constant until the conversion process is complete. When the time "T" elapses, the next scan cycle starts.

ANALOG OUTPUT FEATURES (RTI-835 ONLY)

The RTI-835 contains two voltage output channels. Each output channel has its own 12-bit digital-to-analog converter. The analog output range is software configurable for either ±5 V or ±10 V. The digital-to-analog coding for both converters is twos complement. The digital-to-analog conversion resolution is 12-bits (4096 counts), providing an LSB value of 4.88 mV for the ±10 V output range and 2.44 mV for the ±5 V output range. At power up, the two analog output channels can be set to 0 V, −5 V, or to −10 V by using a DIP switch.

The RTI-835 analog output circuitry contains a one-shot which can be programmed to control the time between successive digital-to-analog conversions. The default for the RTI-834/RTI-835 software drivers is 10 μs.

DIGITAL I/O AND TIME-RELATED I/O FEATURES

The RTI-834/RTI-835 provides 16-bit configurable digital I/O lines and four counter/timers, which are provided by two counter/timer devices that can be programmed in a variety of I/O modes. The time-related I/O is independent of the counter/timer device that is used to program the pacing of the analog input circuitry.

The digital I/O lines can be used for parallel data transfer, monitoring and control of ac or dc voltages, or for interfacing to optically isolated solid-state relay modules. The counter/timers can also be used for frequency measurement, event counting, or single or continuous pulse outputs.

DIGITAL INPUT/OUTPUT FEATURES

The RTI-834/RTI-835 provides 16 bits of digital I/O that are separated into two 8-bit TTL-compatible digital I/O ports. Each bit can be programmed for input or output. All digital inputs can sense TTL logic or contact closure states. All digital outputs can sink up to 12 mA and drive optically isolated solid-state relays. The RTI-834/RTI-835 software uses inverted logic (active-low) for the digital ports to maintain compatibility with solid-state relay modules.

The RTI-834/RTI-835 supports pattern-recognition on the two digital I/O ports. It can be programmed to generate an interrupt request when either a change-of-state is detected on a single bit or when a specific pattern is recognized on multiple bits (defined by the user). The pattern-recognition logic is independent of the port configuration, and an interrupt request is generated when there is a transition from no-match to match.

TIME-RELATED DIGITAL I/O FEATURES

The RTI-834/RTI-835 provides four counter/timers that can be programmed for frequency input measurement, period measurement, event counting, and pulse outputs. These counter/timers are in addition to the counter/timers that the RTI-834/RTI-835 uses to pace analog input applications. Each counter/timer has its own individual counter input, output, gate input, and trigger input. The RTI-834/RTI-835 DOS drivers support event counting, frequency measurement (requires two counter/timers), and pulse outputs. Pulse output operations include single pulse outputs, continuous pulses trains, or pulse trains with a specified number of pulses.

POWER SUPPLY

The RTI-834/RTI-835 is powered directly from the +5 V provided by IBM AT bus. On-board dc-to-dc circuitry translates the +5 V bus supply into the low noise, isolated ±15 V power required by the analog I/O circuitry. The RTI-834/RTI-835 provides fused +5 V power on the user connector.

ACCESSORIES

Several accessories are available for use with the RTI-834/RTI-835. The STB-835 is a screw-termination panel that provides remote signal termination for all RTI-834 and RTI-835 I/O signals.

The STB-MF01 is a general purpose interface panel for the RTI-834 and RTI-835. It provides termination for all I/O signals as well as four connectors for access to two optional 3B01/5B01/3B02/3B03/7B signal conditioning backplanes and two optional DB-16/DB-24 solid-state relay subsystems. Analog input and output signals in your application can go through 3B, 5B, or 7B Series signal conditioning modules or directly in through the screw terminals. Digital I/O and time-related I/O can be brought in through the screw terminals on the STB-MF01 or, if you need to switch or sense high-level voltages, you can interface your digital I/O through solid-state relays and backplanes. The STB-MF01 provides a user-configurable input network for filters, attenuators, shunts, etc. This open position network is supported for up to 16SE/8DI analog inputs.

The STB-MF-SHA simultaneous sampling panel provides all of the capabilities of the STB-MF01 as well as the circuitry necessary to sample up to eight analog inputs simultaneously. The analog inputs can come from the 3B/5B/7B backplanes or eight single-ended inputs from the screw terminal blocks. The user must provide external +5 V power for the sample-and-hold circuitry.

UTILITIES PACKAGE

A Utilities disk is shipped with each RTI-834/RTI-835. This disk contains programs that allow you to configure, calibrate and verify the functionality of the RTI-834/RTI-835. The utilities disk is shipped to you on 5.25″ media (SW-UTIL-D5) but can be ordered on 3.5″ media (SW-UTIL-D3) at no cost.

The EXER program is self-documenting and allows you to access all the functionality of your RTI board through software. EXER can be used as a diagnostic tool or as a means of becoming familiar with the capabilities of your board prior to developing an application program.

The RTI-834/RTI-835 is calibrated and tested by Analog Devices. If other calibration settings are necessary, the CAL835 program is provided. The CAL835 program is menu-driven and allows you to calibrate the analog I/O circuitry on the RTI-834/RTI-835 and the simultaneous sampling circuitry on the STB-MF-SHA.

RTI-834/RTI-835 SOFTWARE

Three levels of software are provided for data acquisition and control applications using the RTI-834/RTI-835. The first level includes the utilities programs that ship with each RTI board. The second level includes the DOS drivers that are available for a variety of high-level languages. The third level includes the menu-driven application packages.

The RTI-834/RTI-835 DOS drivers provide a convenient and powerful software interface between your DOS-based host and your RTI hardware. The software drivers contain the system configuration, analog I/O, digital I/O, and time-related I/O routines that you can invoke from your PC DOS or MS-DOS* application program using one of the following languages: IBM Interpreted BASIC; Microsoft Interpreted GWBASIC; Microsoft Compiled BASIC; Microsoft QuickBASIC*; Microsoft C; Borland International TURBO C*; and Borland International TURBO Pascal. The driver software is available on 3.5″ and 5.25″ media. The routines are I/O specific and have names that relate directly to the operation they perform (AIN and SCAN for analog input, AOT for analog output, PULSE for pulse output, etc). Conversion and linearization routines are able to support all the 3B, 5B and 7B Series signal conditioning modules. Table II lists the routines provided by the RTI-834/RTI-835 DOS Drivers.

*MS-DOS, Microsoft and QuickBASIC are registered trademarks of Microsoft Corporation. Turbo C is a trademark of Borland International Corp.

Table II. RTI-834/RTI-835 DOS Driver Routines

Function	Operation	834	835	Description
Analog Input	(X)AIN	X	X	Acquires data from a single analog input.
	(X)AING	X	X	Acquires data (polled) from a user-specified sequence of channels with gain and input range selectable on per channel basis.
	(X)SCAN	X	X	Acquires data (H/W paced) from a user specified sequence of channels with gain and input range selectable on per channel basis.
Analog Output	(X)AOT	–	X	Writes a value to a single analog output channel.
	(X)AOTG	–	X	Writes multiple values to a single analog output channel or a group of analog output channels.
Digital In	DINB	X	X	Reads one channel (bit) from a digital I/O port.
	DIN	X	X	Reads eight channels (bits) from a digital I/O port.
Digital Out	DOTB	X	X	Writes one bit to a single channel of a digital I/O port.
	DOT	X	X	Writes an 8-bit pattern to a digital I/O port.
Frequency	FINSTART	X	X	Initializes counter/timer and starts a frequency input operation.
	FINREAD	X	X	Checks for the completion of operation and returns the number of pulses counted.
	XFINREAD	X	X	Checks for the completion of operation and returns the frequency as a real number in hertz
	FINSTOP	X	X	Stops a frequency input operation.
Event Counting	EVINIT	X	X	Initializes counter timer for event counting.
	EVSTART	X	X	Starts the event counting operation.
	EVSTOP	X	X	Stops the event counting operation.
	EVREAD	X	X	Returns the number of events counted.
Pulse Out	PULSTART	X	X	Generates either a single pulse, a specific number of pulses, or a continuous stream of pulses.
	PULSTOP	X	X	Stops a pulse output train.
Conversion and Linearization	CONV	X	X	Converts counts to engineering units and engineering units to counts.
	SETSCALE	X	X	Defines linear relationships for scaling analog inputs.
Miscellaneous	ACTIO	X	X	Activates a specified function upon receipt of an interrupt.
	CLCHAN	X	X	Clears the specified logical channel.
	CLRIO	X	X	Disables an interrupt enabled by ACTIO.
	DELAY	X	X	Postpones execution of the code for up to one hour.
	GATE	X	X	Defines gate parameters for SCAN, EVSTART, and PULSTART.
	INITIALIZE	X	X	System routine that resets all RTI-800 series boards in system.
	SETOUT	X	X	Defines a user-specified value that is written to a counter/timer, digital, or analog output channel upon program termination.
	TRIG	X	X	Defines triggering parameters for SCAN, EVSTART, and PULSTART.

An (X) indicates that the value can be expressed as an integer (raw counts from A/D or D/A) or as a real number in engineering units, i.e., volts, amps, psi, Hz.

ORDERING INFORMATION

RTI-834-H, RTI-834-H-32	High-Performance Analog Input and Digital I/O Board for high-level analog input signals.
RTI-834-L, RTI-834-L-32	High-Performance Analog Input and Digital I/O Board for low-level analog input signals.
RTI-835-H, RTI-835-H-32	High-Performance Multifunction Analog and Digital I/O Board for high-level analog input signals.
RTI-835-L, RTI-835-L-32	High-Performance Multifunction Analog and Digital I/O Board for low-level analog input signals.

Software

Each of the RTI-834/RTI-835 driver software packages is available on 3.5″ or 5.25″ media. Order the -D3 version of the software if your system accepts 3.5″ media; order the -D5 version if your system accepts 5.25″ media.

SW-C-835-D3 SW-C-835-D5	DOS Driver Software for Microsoft C and Borland International TURBO C. This software can be linked with SW-C-800-D, SW-C-827-D, and/or SW-C-860-D for applications that use the RTI-800, RTI-802, RTI-815, RTI-817, RTI-820, RTI-827, RTI-850 or RTI-860.
SW-B-835-D3 SW-B-835-D5	DOS Driver Software for IBM Interpreted BASIC, Microsoft Interpreted, Compiled BASIC, and QuickBASIC. This software can be linked with SW-B-800-D, SW-B-827-D, and/or SW-B-860-D for applications that use the RTI-800, RTI-802, RTI-815, RTI-817, RTI-820, RTI-827, RTI-850 or RTI-860.
SW-TP-835-D3 SW-TP-835-D5	DOS Driver Software for Borland International TURBO Pascal. This software can be linked with SW-TP-800-D, SW-TP-827-D, and/or SW-TP-860-D for applications that use the RTI-800, RTI-802, RTI-815, RTI-817, RTI-820 RTI-827, RTI-850 or RTI-860.

I/O Panels

STB-835	Screw-Termination Panel.
STB-MF01	Multifunction Screw-Termination Panel with screw-terminals for all RTI-834/RTI-835 I/O functionality, connectors for hookup to two 3B01/5B01 and two DB-16 and an open position matrix for user-installed current shunts, resistor attenuators, low-pass filter, etc.
STB-MF-SHA	Simultaneous Sampling Panel. Includes all features of STB-MF01 and allows for 8SE Analog Input Channels to be sampled simultaneously. Inputs can be from 3B/5B backplane or from Screw-Terminals on panel.
DB-16	Isolated Digital I/O Subsystem (16-Channel). Provides sockets for up to 16 Single Solid-State Relay modules. Order modules and cable separately.
5B01	Interface panel to 16 analog I/O channels using the 5B Series Signal Conditioning Modules. Order modules, power supply, and AC1315 cable separately.
3B01	Interface panel to 16 analog I/O channels using the 3B Series Signal Conditioning Modules. Order modules, power supply, and AC1315 cable separately.
3B02	Interface panel to 8 analog I/O channels using the 3B Series Signal Conditioning Modules. Order modules, power supply, and AC1315 cable separately.
3B03	Interface panel to 4 analog I/O channels using the 3B Series Signal Conditioning Modules. Order modules, power supply, and AC1315 cable separately.

Cables

AC1585-9	3′ (0.9 m) Cable Connects STB-MF01 or STB-MF-SHA to DB-24 or DB-16 Isolated Digital I/O Subsystems.
AC1315	2′ (0.61 m) Cable Connects STB-MF01 or STB-MF-SHA to 3B01/3B02, 3B03 or 5B01 Backplanes.
CAB15	5′ (1.52 m) Ribbon Cable Connects RTI-834/RTI-835 to STB-MF01
CAB16	5′ (1.52 m) Shielded Cable Connecting RTI-834/RTI-835 to STB-MF01

Manuals

AC1939	RTI-834/RTI-835 User's Manual. Shipped with each RTI-834/RTI-835.
AC1940	RTI-834/RTI-835 Software Driver User's Manual. Shipped with each RTI-834/RTI-835 DOS Driver Software package.
AC1943	STB-MF Multifunction Panel User's Guide. Shipped with each STB-MF01 and STB-MF-SHA.
AC1944	Technical Manual. Contains information for user's who want to operate the RTI-834/RTI-835 without using our DOS driver software or an application specific software package.