

*Professional Series*<sup>TM</sup>

REAL-TIME INTERFACE FOR  
THE PROFESSIONAL 300 SERIES



digital

## **BENEFITS**

The Real-Time Interface (RTI) for the Professional 300 Series offers these advantages:

- Allows you to automate instrument control and data collection from many laboratory devices.
- Provides you with the standard I/O interfaces used for digital I/O packaged on a single module.
- Makes application development simple and convenient.
- Installs easily in a few minutes.
- Complete Digital hardware and software servicing available.

## **PRODUCT DESCRIPTION**

The Real-Time Interface turns the Professional into a personal workstation for the laboratory. The RTI allows you to monitor and control research instruments and to collect and analyze data. You can use the Professional to generate reports and graphics, and communicate with a host computer to share resources such as program development tools, electronic mail and databases.

The RTI combines three of the most widely used I/O interfaces on a single module. They include:

- two EIA RS232/423-compatible serial asynchronous ports
- one IEEE-488 general purpose interface bus port
- one 24-bit wide TTL-compatible digital port

The module supports interrupt-driven I/O under program control (no direct memory access is available). The RTI is user-installable and includes on-board self-diagnostic routines that run automatically on power-up.

## **SERIAL ASYNCHRONOUS PORTS**

The RTI's two asynchronous serial line units supplement the communication and printer ports that are standard features on the system units of the Professional. They are compatible with the Electronic Industries Association's RS232C and RS423 recommended standards for data communication.

## **IEEE-488 BUS PORT**

The RTI's IEEE-488 bus port enables a Professional to interface with up to 14 compatible external devices. Other IEEE-488 devices are fully plug compatible. Software support for the port includes routines appropriate when the Professional is system controller, controller in charge or simply a talker or listener on the bus.

The IEEE bus logic includes two complete bus ports, one for interfacing to external devices and another dedicated to self-testing. This allows totally on-board wrap-around diagnostics and greatly simplifies the isolation of error conditions.

## **PARALLEL DIGITAL PORT**

The RTI's parallel digital port is a total of 24 bits wide and can be programmed for several different operating modes. These include:

- 24-bit transfers with no handshaking, configurable for all outputs, all inputs, or combination of outputs and inputs.
- 16-bit data transfers, one direction at a time, with hand-shaking on the remaining lines.
- 8-bit data transfers on two independent ports, one for inputs and one for outputs, with independent handshaking for the two ports on the remaining lines.

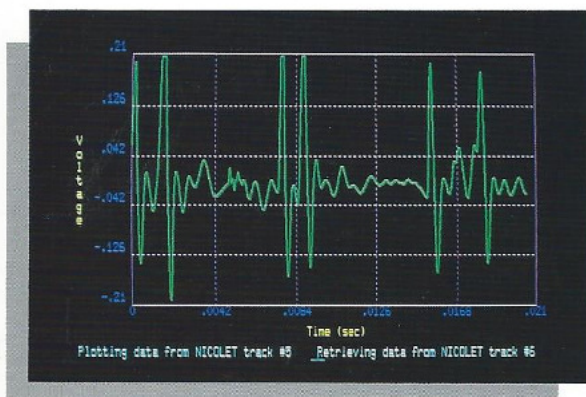
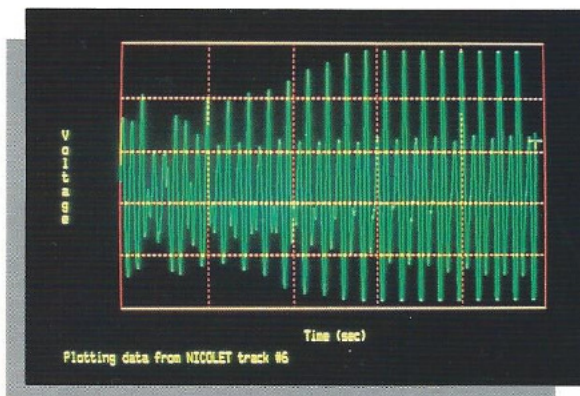
The port uses TTL logic connections. Since there are no widely accepted public standards for parallel digital I/O, you must make sure that your external device can perform the necessary handshaking. This may require special cabling or external logic.

*Cover Photo: Polaroid Corporation utilizes Digital Equipment Corporation's Real-Time Interface and Professional 350 in their spectrophotometric laboratory to automate instrument control.*

## SOFTWARE

Use of the RTI requires an application program. Developing an application for the RTI requires either the Professional Host Tool Kit or the PRO/Tool Kit. While it is possible to program the device using Tool Kit MACRO-11, most users will want to take advantage of the high-level support provided in the Professional Real-Time Interface Library (PRTIL), a set of subroutines callable from Tool Kit BASIC-PLUS-2 and FORTRAN-77 that provide access to a P/OS driver for the RTI. PRTIL is packaged separately from the RTI hardware and has the same prerequisites as the Tool Kit; once the application has been developed, however, it can be run on any Professional target system with Hard Disk P/OS and with the RTI.

*The Professional 300 Series graphics capabilities enhance the real-time display of acquired data.*



Using the Tool Kit, the required PRTIL subroutines are linked selectively to the calling application tasks. PRTIL supports I/O operations that are synchronous with the calling task (that is, the task waits to continue execution until the I/O is complete) as well as asynchronous with the calling task (that is, task execution may proceed independent of the completion of I/O operations).

PRTIL provides for four main types of operation:

- hardware initialization
- determination of handshaking or flow control protocols
- data transfers
- utility routines

## SYSTEM REQUIREMENTS

The Real-Time Interface hardware is compatible with any Professional 300 Series system. Programming the RTI requires a Professional Host Tool Kit or PRO/Tool Kit. The Professional Real-Time Interface Library software requires a Host Time Interface Library software requires a Host Tool Kit and all of its prerequisites or the PRO/Tool Kit and its prerequisites. PRTIL applications can be run on any Professional system equipped with P/OS Hard Disk V1.7 or later.

## PACKAGING AND CONNECTIONS

The Real-Time Interface is installed in the rear option slot of the Professional 300 Series card cage. It includes the option module, an internal cable that runs from the top of the module to the Professional's back panel, and a 62-pin connector that mounts through the back panel and carries all signals for the four RTI I/O ports.

Users can connect external devices by constructing cables that mate with the RTI back panel connector. However, external cabling and connection options are also available to simplify interfacing external devices.

## SUPPORT

Digital Equipment Corporation supports the RTI with a complete range of hardware, software and training services.



The Professional 350 with the RTI Connector Pod enables the researcher to use more than one I/O interface.

## SPECIFICATIONS

### SERIAL LINES

- 2 independent ports
- Asynchronous operation only
- RS232C/423 lines supported:
  - Transmit Data (Pin 2)
  - Receive Data (Pin 3)
  - Request to Send (Pin 4)
  - Clear to Send (Pin 5)
  - Data Set Ready (Pin 6)
  - Signal Ground (Pin 7)
  - Data Carrier Detect (Pin 8)
  - Data Terminal Ready (Pin 20)
- Baud Rates supported: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600
- Word lengths supported: 5, 6, 7 or 8 bits
- Stop bits supported: 1, 1½ or 2 bits
- Parity type supported: odd, even, disabled
- XON/XOFF flow control optional (under software control)
- Connector type: (using PC 3XX-AB or BCC10-03) 25-pin subminiature D male

### IEEE-488 PORT

- Conforms to IEEE-488 (1978) protocols for inter-device communication
- Controller status: can operate as controller or pass control to other devices
- Connector Type: (using PC3XX-AB or BCC11-03) IEEE-488 standard

### PARALLEL PORT

- Interface type: Intel 8255A
- I/O lines (total): 24
- Data word sizes supported: 8, 16 or 24 bits
- Types of transfers supported: Single data word transfer (no handshaking)  
Multiple data word transfer (with handshaking)
- Connector Types: On PC3XX-AB: Push pin terminal strip  
On BCC12-03: 37-pin subminiature D male.

### ENVIRONMENTAL

- Ambient temperature 10°C – 40°C (50°F – 104°F)
- Temperature gradient 11°C (20°F) per hour
- Relative humidity 20% – 80% noncondensing
- Maximum wet bulb 25°C (78°F)
- Minimum dew point 2°C (36°F)
- The Real-Time Interface Module meets all FCC requirements for Class B environments.

### ELECTRICAL

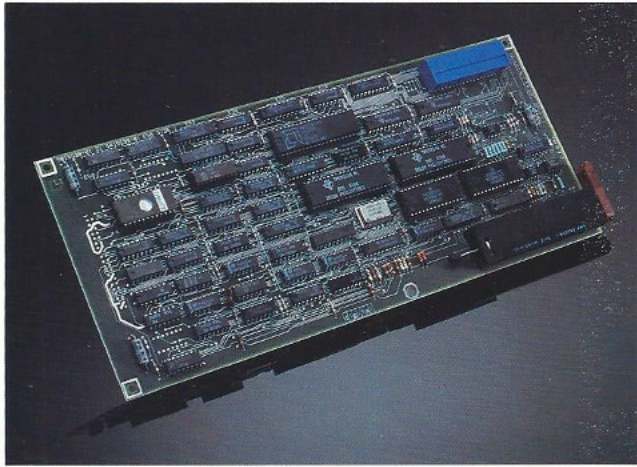
- The power requirements of the Real-Time Interface Module are:
  - + 5 Vdc at 1.80 A maximum
  - + 12 Vdc at 0.14 A maximum
  - 12 Vdc at 0.10 A maximum
- The tolerance levels, or ripple specifications, for the module, are:
  - + 5 Vdc ± 5%
  - + 12 Vdc ± 5%
  - 12 Vdc ± 5%

### I/O DRIVE CAPABILITY

- The programmable I/O port consists of three 8-bit ports. Ports A and B transceivers source 16 milliamperes (mA) and sink 24 mA. Port C transceivers source 5 mA and sink 16 mA.
- The IEEE-488 bus transceivers sink 48 mA.
- The serial line unit drivers source and sink 75 mA and the receivers sink 50 mA.

### GENERAL

- Single Professional 300 Series module, installed in slot 5 (rearmost) of card cage.
- RTI Back Panel Connector Type: AMP 211070-01 receptacle and AMP 66556-04 pins (male).



The RTI provides four I/O ports on a single Professional 300 option module.

## **ORDERING INFORMATION**

### **BASE MODULE**

One (1) Real-Time Interface hardware module is **REQUIRED** for each Professional 300 system in which the RTI will be used. Only one RTI is supported per system:

#### **OPTION**

RTI Module with internal cable, back panel connector and hardware documentation –  
ORDER: PC3XX-AA

### **EXTERNAL CABLING/CONNECTIONS**

The RTI Connector Pod is **REQUIRED** if you wish to use multiple interface types concurrently. It provides connections for simultaneous use of all the RTI ports. With the Connector Pod, none of the single function cables described below are needed.

#### **OPTION**

RTI Connector Pod – ORDER: PC3XX-AB

Single-function cables are **SUGGESTED** if you will use a single RTI interface type. Changing the interface type used requires changing the cable. Order one or more of the following:

#### **OPTION**

Serial I/O Cable (supports both serial lines)

ORDER: BCC10-03

IEEE-488 Cable – ORDER: BCC11-03

Parallel I/O Cable – ORDER: BCC12-03

## **SOFTWARE**

The Professional Real-Time Interface Library (PRTIL) software provides high level software support for developing applications that use the RTI. Separate packages are available for use on a PDP-11 or VAX/VMS host system with the Professional Host Tool Kit and on a Professional 300 system with the PRO/Tool Kit. Order **ONE** of the following:

For PDP-11 or VAX host systems:

#### **OPTION**

PRTIL for PDP-11 running RSX-11M/M + :

ORDER: QJO76-AM or AH

PRTIL for VAX-11/780 running VMS:

ORDER: QE355-AY

PRTIL for VAX-11/750 running VMS:

ORDER: QD355-AG

PRTIL for VAX-11/730 running VMS:

ORDER: QC355-AG

For a PRO 300 system running P/OS

#### **OPTION**

PRO/Tool Kit Real-Time Interfacing Library –

ORDER: QBA58-A3

To order the Real-Time Interface and any options, contact your local Digital Sales Office or contact your nearest Digital Business Center.



Professional 300 Series, PDP-11, VAX, VAX/VMS, VAX-11/780, VMS, P/OS, RSX-11M/M+, Professional Host Tool Kit, PRO/Tool Kit, Tool Kit MACRO-11, Professional Real-Time Interface Library (PRTIL), are all trademarks of Digital Equipment Corporation. The information in this document is subject to change without notice. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

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