

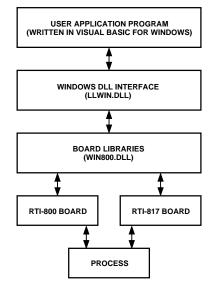
Software Drivers— Windows[®] and DOS[®]

SW800 Series

FEATURES

Supports Popular Languages Windows 3.1 Microsoft[®] Visual BASIC for Window **Microsoft Visual C⁺⁺ for Windows** Borland Turbo C⁺⁺ for Windows **Borland Turbo Pascal for Windows MS-DOS[®]** Microsoft Interpreted GWBASIC **IBM Interpreted BASIC** Microsoft OuickBASIC Microsoft C/C++ Borland Turbo C⁺⁺ Borland C⁺⁺ **Borland Turbo Pascal Callable Subroutine Libraries** Analog and Digital I/O **Frequency and Event Counting Pulse Output** Interrupt Servicing

INTERFACING AN APPLICATION PROGRAM



GENERAL DESCRIPTION

The SW800 Series of Windows and DOS Drivers are software packages that provide subroutine calls to access the I/O functions of the RTI-800 Series of Analog and Digital boards. There are four hardware-specific packages. Each package includes support for high level languages in both Windows and DOS. (See list of supported languages in the features chart.)

The driver software packages provide a high level interface to the RTI-800 Series analog and digital boards. Complex analog, digital, and counter/timer I/O operations are simplified with keywords such as SCAN, AOT, FINSTART. In order to use the driver software, experience with a programming language such as BASIC or VISUAL BASIC for Windows and familiarity with the application is required.

Each SW800 Series driver software package consists of all language libraries and a board library for the specific hardware supported. The language libraries include a language binding that handles the different parameter passing conventions used by the languages, as well as calls to the hardware libraries. Board libraries contain the low level subroutines that perform the I/O routines. Common language-specific packages within the SW800 Series can be merged to run in one system. For example, if a user wants to operate an RTI-815 and RTI-827 board in the same system and wants to develop an application in Microsoft C⁺⁺, the SW800 and SW827 packages can be combined using the LINK facility.

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An error-processing system checks for argument errors in every setup and I/O subroutine. Attempts to operate in illegal modes are trapped, and error codes are reported. Run-time errors such as "Overrun error detected" are also reported.

Table I lists the I/O routines in the SW800 Series of MS-DOS and Windows Driver Software packages. The target system for the SW800 Series of Driver Software is an IBM PC/AT or 100% compatible system with PC-DOS, MS-DOS (Version 3.3 or higher), or Windows 3.1, and one floppy disk drive and one hard disk drive.

Table II lists application software packages, available from third party vendors, which require little or no programming on the part of the user prior to configuring and running an application. Applications range from simple data collection and analysis to real-time control and high speed streaming of data to disk.

SW800 Series

UTILITIES DISK

A 3.5" utilities disk (SW-UTIL-D3) is shipped with each RTI-800 Series board. This disk contains the programs listed below.

EXER—Self-documenting, menu-driven program that allows access to all the RTI-800 Series board's functionality through software. EXER can be used as a diagnostic tool or as a means of becoming familiar with the capabilities of the board prior to developing an application program.

DMACONF, MLTDLOAD—Used to configure and allocate DMA buffers. If RTI-800 Series boards have unique DMA channels, then multiple boards can perform DMA-based operations at the same time.

CONF—Creates a table containing RTI-800 Series hardware configuration information that is used by the SW800 Series Driver Software and some application-specific software packages.

CAL800, CAL835, CAL860—Calibrates the analog I/O circuitry of RTI-800 Series boards.

The following sample is a fragment of a Microsoft C program using the SW860 Driver package that simultaneously samples two channel groups on the RTI-860 board and stores the data in on-board memory. Channel Group 3 is read first (Group 3 consists of Channels 12, 13, 14 and 15); Channel Group 0 (consisting of Channels 0, 1, 2 and 3) is read next. This sequence repeats until the sample count is satisfied. CHECK verifies that the operation is complete. When the data is required. RRUF transfers it from on-board memory to the userdefined array in system memory. INITIALIZE (&erstat); if (erstat) printf ("\n\tINITIALIZE error: %2d\n",erstat); else lchan=5; board=7; chanarr[0]=2: /*two groups in channel sequence*/ chanarr[1]=3; /*group 3 is first group in sequence*/ chanarr[2]=0: /*group 0 is second group in sequence*/ range=1000; mult =10; /*pacing interval = range times mult microseconds*/ count=400;simul=1; /*enables simultaneous sampling*/ brdbuf=1000; /*starting location in on-board memory*/ BSCAN860 (lchan,board,chanarr,range,mult,count,simul,&erstat); if (erstat) printf ("\n\tBSCAN setup error: %2d\n",erstat); else BSCAN(lchan,brdbuf,&erstat); CHECK(lchan,&erstat); while (!erstat) CHECK (lchan,&erstat}; if (erstat!=117) printf ("mn\tRBUF error: %2d\n",erstat); else { RBUF (lchan,dest,&erstat); if (erstat) printf ("\n\tRBUF error: %2d\n",erstat); else printf ("\n\n\tBSCAN values: \n\n"); for (lp=0; lp<< count; lp++) printf ("%8d",dest[lp]; } }

Sample Program Using SW860

SW800 Series

BCOL (X)SCAN (X)CSCAN •	Operation/ Routine	800	802	815	817	820	827	834	835	850	860	Description
CXCOLLECT (X)CCOL • • Use DMA (paced) to a single analog channel and continuously transfers the data to system memory. Acquires data (paced) from a single analog channel and continuously transfers the data to system memory of input spaced). BCOL (X)CSCAN •	(X)AIN									•	•	
BCOL (X)SCAN • • Acquires data (paced) from an uput and stores it in on-board mem. (X)SCAN BSCAN • <td>(X)COLLECT</td> <td></td> <td>Use DMA (paced) to acquire data from a single input channel. Collects data (paced) from a single analog channel and continuously</td>	(X)COLLECT											Use DMA (paced) to acquire data from a single input channel. Collects data (paced) from a single analog channel and continuously
BSCAN and continuously transfers the data to system memory using interrup. (X)AVG · · · · · · · · · · · · · · · · · · ·		•		•								Acquires data (paced) from an input and stores it in on-board memory. Uses DMA to acquire data from a group of inputs (paced).
(X)AVG into on-board memory. (X)CAVG Uses DMA to acquire data from an analog input channel, continuously transferriche data to system memory (accel) and returns the average value. RBUF • ANALOG OUTPUT • (X)AVG • ANALOG OUTPUT • (X)AOTG • DIGITAL INPUT • DINB • DIOTAL OUTPUT • DINB • DIOTAL OUTPUT • DIOTAL OUTPUT • DIOTAL OUTPUT • DIOTA • DIOTA • DIOTA • DIOTA • DIOTA • DOTB • • DOTR • • DOTR • • Reads one bit from a digital I/O port. DOTR • • VERSTART • • REVENT • • FINSTART • • REVENT • • EVENT • • <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td>•</td> <td></td> <td></td> <td>and continuously transfers the data to system memory using interrupts.</td>								•	•			and continuously transfers the data to system memory using interrupts.
(X)CAVG . Acquires data from an analog input channel, continuously transferri the data to system memory (paced) and returns the average value. RBUF . . Transfers data from on-board memory into system memory. ANALOG OUTPUT . . . Transfers data from on-board memory into system memory. X)AOTG Transfers data from on-board memory into system memory. X)AOTG Transfers data from on-board memory into system memory. X)AOTG Transfers data from on-board memory into system memory. DidITAL INPUT DIGITAL OUTPUT .	(X)AVG									•	•	into on-board memory. Uses DMA to acquire data from an analog input channel and averages
ANALOG OUTPUT (X)AOT • • • Writes a value to a single analog output channel. Writes multiple values to a single analog output channel or a group analog output channels. DIGITAL INPUT DINB • • • • Reads one bit from a digital I/O port. Reads eight bits from a digital I/O port. DIGITAL OUTPUT DOTB • • • • • DOTB • • • • Writes one bit from a digital I/O port. Reads eight bits from a digital I/O port. DOTB • • • • • Writes eight bits from a digital I/O port. Reads back last value written to output port. FREQUENCY INPUT FINSTART • • • • • • FINSTOP • • • • • • • EVENT COUNTING EVENT COUNTING • • • • • • • PULSE OUTPUT PULSE •										•		Acquires data from an analog input channel, continuously transferring the data to system memory (paced) and returns the average value.
(X)AOT • • • Writes a value to a single analog output channel. DIGITAL INPUT . . Writes multiple values to a single analog output channel or a group analog output channels. DIGITAL INPUT . . . Reads one bit from a digital I/O port. DIN • • • . Reads one bit from a digital I/O port. DIGITAL OUTPUT DOTB • • • . . . DOTB DOTR DOTR DOTR .	RBUF									•	•	Transfers data from on-board memory into system memory.
DINB DIN•••••••Reads one bit from a digital I/O port. Reads eight bits from a digital I/O port.DIGITAL OUTPUT DOTB DOT DOT DOT DOT DOT DOT T POTR OTR OTR DOT DOT POTR FINSTART (X)FINREAD FINSTOP EVENT COUNTING EVENTART EVSTOP EVERAD VULSE PULSE PULSE PULSE PULSE PULSE PULSE PULSTART CONV 	(X)AOT	•	•		•							Writes multiple values to a single analog output channel or a group of
DIGITAL OUTPUT U	DINB				1				1			
DOTB DOTR••••••••••Writes one bit from a digital I/O port. Writes eight bits from a digital I/O port. Reads back last value written to output port.FREQUENCY INPUT FINSTART (X)FINREAD•••••Reads back last value written to output port.FINSTART FINSTOP••••••Reads back last value written to output port.EVENT COUNTING EVENT COUNTING EVENT COUNTING EVENART••••••EVENT COUNTING EVERAD••••••••EVENT COUNTING EVERAD••••••••EVENT COUNTING EVERAD•••••••••PULSE OUTPUT PULSE PULSTOP•••••••••PULSE OUTPUT PULSE PULSTOP•••••••••••CONVERSION AND LINEARIZATION CONV SETSCALE•• </td <td></td>												
DOT • • • • • • Writes eight bits from a digital I/O port. DOTR • • • • • • Writes eight bits from a digital I/O port. Reads back last value written to output port. • • • • • FREQUENCY INPUT • • • • • • FINSTART • • • • • • • FINSTART • • • • • • • • FINSTOP •<												Writes one hit from a digital I/O port
DOTR•••Reads back last value written to output port.FREQUENCY INPUT FINSTART (X)FINREAD••••Starts a frequency input operation. Returns the frequency measured. Stors a frequency input operation.FINSTOP•••••EVENT COUNTING EVINT EVSTART EVSTART EVSTART EVREAD••••EVERAD PULSE PULSE PULSTART EUSTOP••••OUTPUT PULSE PULSTART EUSTOP••••CONVERSION AND LINEARIZATION CONV SETSCALE••••CONVERSION AND LINEARIZATION DEB TRIG GATE••••MISCELLANEOUS DEB TRIG GATE•••••DEB TRIG GATE••••••OUR DEB TRIG GATE••••••DEB TRIG GATE••••••DEB TRIG GATE••••••DEF TRIG GATE••••••DEF TRIG GATE••••••DEF TRIG GATE••••••DEF TRIG GATE••••••DEF TRIG GATE••••••DEF TRIG GATE•••• <t< td=""><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>					1							
FREQUENCY INPUT FREQUENCY INPUT FINSTART • (X)FINREAD • FINSTOP • • • EVENT COUNTING EVINIT • EVSTART • EVENT COUNTING EVENT COUTPUT PULSE OUTPUT PULSTART PULSTOP • • EVENTOP • • PULSE OUTPUT PULSTOP • • • • PULSTOP • • • PULSTOP • • • PULSTOP •		•		•	•	•						
FINSTART (X)FINREAD FINSTOP••••••Starts a frequency input operation. Returns the frequency measured. Stops a frequency input operation.EVENT COUNTING EVINIT EVSTART EVSTART EVSTART EVREAD•••••PULSTOP PULSE PULSE PULSTOP EVINTOP•••••PULSE PULSTOP EVSTOP EVSTOP EVREAD•••••PULSE PULSTART EVSTOP EVREAD•••••PULSE PULSTART EVSTOP EVINTOP EVINT EVREAD••••PULSE PULSE PULSTART EVINTOP EVINTOP EVINTOP EVINT EVIN	EDEOLIENCY INDUT											
(X) FINREAD • • • • • Returns the frequency measured. FINSTOP • • • • • Stops a frequency measured. EVENT COUNTING • • • • • Initializes counter/timer for event counting. EVENT COUNTING • • • • • Initializes counter/timer for event counting. EVENT COUNTING • • • • • Initializes counter/timer for event counting. EVENT COUNTING • • • • • Initializes counter/timer for event counting. EVENT COUNTING • • • • • Starts the event counting operation. EVENEAD • • • • • Stops the event counting operation. EVERAD • • • • • • Outputs a pulse. PULSE OUTPUT • • • • • • Outputs a pulse. PULSTOP • • • • • • Stops the pulse output train operation. <td>-</td> <td></td> <td>Stanta - farman innat an anti-</td>	-											Stanta - farman innat an anti-
FINSTOP•••••Stops a frequency input operation.EVENT COUNTING EVINIT EVSTART••••Initializes counter/timer for event counting. Starts the event counting operation.EVSTART EVSTOP•••••EVSTOP EVREAD••••Starts the event counting operation. Starts the event counting operation. Stops the event counting operation.PULSE OUTPUT PULSE OUTPUT PULSE OUTPUT PULSTART PULSTOP••••Outputs a pulse. PULSTOP•••••OUTPUT PULSTOP••••••OUNVERSION AND LINEARIZATION CONV SETSCALE•••••MISCELLANEOUS DEB GATE••••••DEB GATE•••••••DEB GATE•••••••Defines gate parameters. Defines gate parameters.••••												
EVENT COUNTING EVINIT EVINIT EVSTART EVSTART EVSTART EVSTOP EVREAD PULSE OUTPUT PULSE OUTPUT PULSE OUTPUT PULSE OUTPUT PULSE OUTPUT PULSTART • PULSTART • PULSTART • PULSTART • • PULSTART •<				•			•	•				
EVINIT EVSTART EVSTOP EVREAD•••••Initializes counter/timer for event counting. Starts the event counting operation. Stops the event counting operation. Reads the number of events counted.PULSE OUTPUT PULSE PULSTART PULSTOP••••••PULSE OUTPUT PULSE PULSTART PULSTOP•••••••Outputs a pulse. PULSTOP•••••••Outputs a pulse. Starts a pulse train with a user-specified period and duty cycle. Stops the pulse output train operation.•••CONVERSION AND LINEARIZATION CONV SETSCALE••••••MISCELLANEOUS DEB TRIG GATE•••••••DEB TRIG GATE••••••••Defines gate parameters. Defines gate parameters.•••••		_										
EVSTART • • • • • • Starts the event counting operation. Stops the event counting operation. EVREAD • • • • • • • Starts the event counting operation. Stops the event counting operation. Reads the number of events counted. PULSE OUTPUT PULSE PULSTART PULSTOP • • • • • • • Outputs a pulse. Starts a pulse train with a user-specified period and duty cycle. Stops the pulse output train operation. CONVERSION AND LINEARIZATION CONV •												Initialized counter/timer for quart counting
EVSTOP EVREAD•••••Stops the event counting operation. Reads the number of events counted.PULSE OUTPUT PULSE PULSTART PULSTOP•••••Outputs a pulse. Starts a pulse train with a user-specified period and duty cycle. Stops the pulse output train operation.CONVERSION AND LINEARIZATION CONV SETSCALE••••••MISCELLANEOUS DEB TRIG GATE•••••••PUES PULSTOP••••••••Converts Sets debounce time. Defines triggering parameters. Defines gate parameters.••••												8
EVREAD • • • • Reads the number of events counted. PULSE OUTPUT PULSE PULSTART PULSTOP • • • • • • • Outputs a pulse. Starts a pulse train with a user-specified period and duty cycle. Stops the pulse output train operation. CONVERSION AND LINEARIZATION CONV SETSCALE •												
PULSE OUTPUT PULSE PULSTART PULSTOP •									1			
PULSE • • • • • • • Outputs a pulse. PULSTART • • • • • • • Starts a pulse train with a user-specified period and duty cycle. PULSTOP • • • • • • • Starts a pulse train with a user-specified period and duty cycle. CONVERSION AND LINEARIZATION • • • • • • • CONV • <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>												
PULSTART • • • • • • • • Starts a pulse train with a user-specified period and duty cycle. Stops the pulse output train operation. CONVERSION AND LINEARIZATION • <td></td> <td>Output a sulta</td>												Output a sulta
PULSTOP • • • • Stops the pulse output train operation. CONVERSION AND LINEARIZATION CONV • <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>												
CONVERSION AND LINEARIZATION • <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td></td<>									1			
CONV SETSCALE • <												
SETSCALE • • • • • • Defines linear relationships used for scaling analog inputs. MISCELLANEOUS DEB TRIG GATE • • • • • • • • Sets debounce time. Defines triggering parameters. Defines gate parameters.		1	ZATI	ION								
MISCELLANEOUS • • • • • • • Sets debounce time. DEB TRIG • • • • • Defines triggering parameters. GATE • • • • • Defines gate parameters.			•									
DEB • • • • Sets debounce time. TRIG • • • • • • GATE • • • • • •		-		•		•	•	•	•	•	•	Dennes miear relationships used for scaling analog inputs.
TRIG GATE•••••Defines triggering parameters. Defines gate parameters.												
GATE • • Defines gate parameters.												
		•		•						•	•	
AVAINE A CONTRACT OF A CONTRAC												
CLRIO												
=		•	•	•	•	•		•				Disables an interrupt enabled by ACTIO. Defines a user-specified value that is written to a counter/timer, digital
or analog output channel upon program termination.	021001											
CLCHAN • • • • • • • • • • Clears the specified logical channel.	CLCHAN	•	•	•	•	•	•	•	•	•	•	
DELAY* • • • • • • • • • Postpones execution of the code for up to one hour.			•	•	•	•	•	•	•	•		
INITIALIZE • • • • • • • • • System routine that resets all RTI-800 series boards in system.		•	•	•	•	•	•	•	•	•	•	

Table I. RTI Series Driver Software Routines

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. *Not available in windows.

SW800 Series

ORDERING INFORMATION

Each SW800 Series driver software package is shipped with all language libraries (Windows and MS-DOS) on 3.5", 720K double sided, double density diskettes; a software manual; and Analog Devices End-User Software License. OEM and redistribution licenses are available; please consult factory.

SW800

Supports the RTI-800/RTI-802/RTI-815/RTI-817/RTI-820

SW827

Supports the RTI-827

SW835

Supports the RTI-834/RTI-835

SW860

Supports the RTI-850/RTI-860

MANUALS

A software manual is supplied with each Driver Software package. Additional Manuals are available.

AC1938

RTI-827 Software Manual

AC1940

RTI-834/RTI-835 Software Manual

AC1941

RTI-800, RTI-802, RTI-815, RTI-817, RTI-820 Software Manual AC1942 RTI-850, RTI-860 Software Manual

			Analog Devices Hardware												
Vendor	Package	Operating Environment	6B Series	800	802	815	817	820	827	834	835	850	860		
DSP Development Corp. One Kendall Square Cambridge, MA 02139 617-577-1133	DADiSP	Windows & DOS	•	•	•	•	•	•	•			•	•		
HEM Data Corporation 17336 12 Mile Road Southfield, MI 48076 810-559-5607	Snap-Master Snap-Series	Windows DOS		•		•				•	•	٠	•		
Iconics Inc. 100 Foxborough Blvd. Foxborough, MA 02035 508-543-8600	Genesis	DOS	•	•	•	•	•	•							
Intellution 315 Norwood Park South Norwood, MA 02062 617-769-8878	The Fix	DOS		•	•	•	•	•							
Keithley Metrabyte 28775 Aurora Road Cleveland, OH 44139 216-248-1344	Asyst Viewdac Easyest	DOS DOS DOS		• •	•	• •	• •	•							
LABTECH 400 Research Drive Wilmington, MA 01887 508-657-5400	Notebook Notebook/XE Notebook/LE LT/Control Acquire	Windows & DOS Windows & DOS Windows & DOS Windows & DOS DOS	•	• • • •	•	• • • •	• • •	•	• • •	•	•	• • •	•		
NemaSoft Inc. 55 West Street Walpole, MA 02081 508-660-1221	Paragon 500/550	DOS	•	•	•	•	•	•							
Quinn-Curtis 35 Highland Circle Needham, MA 02194 617-449-6155	Control EG	DOS	•	•	•	•	•	•							
TA Engineering Co., Inc. 1150 Moraga Way Moraga, CA 94556 510-376-8500	AIMAX-PLUS AIMX-WIN	DOS Windows	•												

Table II. Guide to Third Party Software

All brand or product names mentioned are trademarks or registered trademarks of their respective holders.