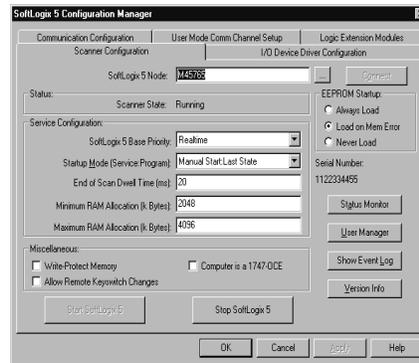
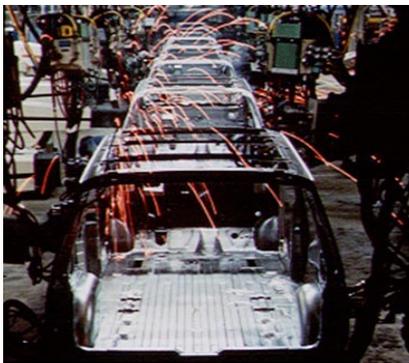




The SoftLogix 5 Controller

(Catalog Number 1789-SL5, -SL5x)

Product Data



With the Allen-Bradley SoftLogix™ 5 system, you can enter the world of soft control while limiting the risk of embarking on a completely new technology. The SoftLogix 5 controller provides the openness of soft control with the stability and familiarity of the PLC® technology that you already know. With the SoftLogix 5 controller, you can apply the advantages of soft control to your application while using the PLC-5® program library and knowledge base that you have built over time.

SoftLogix software gives you the cutting-edge technology of soft control, with the support and stability of 90 years of experience in the control industry. Rockwell Automation offers both traditional and soft control solutions, so we can provide the most effective control type for your application. We can help you evaluate your application needs and recommend a soft, traditional or hybrid control system to meet your needs.

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Defining Soft Control

Soft controllers, sometimes called ‘soft PLCs,’ describe the latest generation of control options for manufacturing and processing applications. A soft controller takes the control functions normally found on a dedicated programmable controller, encapsulates them in software, and runs them on a commercial operating system. It can provide features similar to a traditional PLC processor while running in a familiar PC environment.

Choosing a Soft Control Supplier: As Simple as A-B-C

With the advantages of the PC environment comes the responsibility of choosing the most appropriate control solution for the application. In choosing a soft control solution, you need to consider the flexibility of the provider as well as the product. Reliable soft control providers know the A-B-Cs of open automation. Soft control suppliers that possess these traits often offer the most time and cost-efficient open system solutions.

Automation expertise Your soft control provider should have extensive experience in the control field, and preferably offer PC-based and PLC-based control solutions. A provider that is new to the control industry will most likely offer a solution that looks great in a demo, but may not offer system safety and internal integrity checks as well as features such as on-line editing and existing PLC-5 compatibility.

Broad range of products For an open system, you need to choose more than just the controller. In supporting an application with an open solution, you need to consider products for communication, I/O, HMI, drives and motion systems. Many of the soft control providers offer only a control product and use third-party alliances to claim a complete system solution. At the first sign of trouble with the system, you may find your problem bounced between the soft control provider and its multiple third-party vendors. A reliable provider can offer solutions beyond the controller that have been through extensive integration and testing. Your soft control supplier should know how all of their open products work together, saving you time and money during integration.

Customer Support and Service Your soft control supplier should see the sale of the product as the beginning and not the end of the customer relationship. In selecting a soft control product, you need to consider the level of support that comes with the product. Important questions to ask of a soft control provider include:

- “Is support included in the price of the product?”
- “If I call your company after 5 p.m., will someone be there to answer my question?”
- “How many people are on your support staff?”
- “Do you have a local sales or support office in my area?”

These simple inquiries screen out vendors who aren’t capable of handling the support needed for open systems.

In making the choice to use soft control, an established soft control vendor is key. Your vendor should be able to address all of your concerns about soft control technology and provide an integrated product solution to support the application.

Selecting a Soft Controller for Your Application

Once you decide that you want to use a PC-based solution for the application, you then need to select a soft controller. This selection is as important as choosing a reputable vendor. With the variety of products available, the choice may seem overwhelming. To adequately support an industrial application, a soft control product should meet these minimum requirements:

- **Leverage the standard Windows NT operating system** Soft controllers that work within the standard Windows NT operating system take advantage of the diagnostic and recovery features inherent to the operating system. Many PC-based control products bypass these features and boast about being able to continue working after the “blue screen of death” appears. In considering this type of soft-control product, ask yourself if you want the application to continue to run even when the operating system has diagnosed itself with an unrecoverable error.
- **Integrate seamlessly into existing PLC applications** Complete PLC compatibility should be a requirement for any soft control product that you consider. Many applications require a combination of PLC-based and PC-based control, so it is important for a soft controller to be completely compatible with PLC programming, communications and diagnostics. Also, with any new technology training is a key issue. In choosing a system with seamless PLC compatibility, you minimize re-training costs.
- **Provide an integrated, control-based system solution** Most soft-control companies can provide an adequate control solution, but lack product offerings for platforms, I/O and human-machine interface. As a result, extensive configuration is required to integrate the application. The ideal soft control product doesn't stand alone, but can prove its performance with a range of supporting hardware and software products. By using a system solution from a single vendor, you can expect that future versions of the components you select will be developed and tested for compatibility with previous releases.

Leverage the Standard Windows NT Operating System

There have been debates over which commercial operating system is the most appropriate for a broad range of control solutions. For the development of the SoftLogix 5 controller, the choice was simple. We chose the Windows NT operating system for its proven control capabilities and robust performance that in many applications meets or exceeds today's standard PLC controls.

With the growing Windows NT knowledge base, expanding familiarity with the Windows NT environment helps minimize the learning and training curve of users. The Windows NT environment also allows users to leverage the rapid hardware and software development pace in the PC industry. This simplifies program integration into future systems without the need for software re-writes.

Windows NT Security and Stability By using a standard Windows NT operating system, the SoftLogix 5 controller gives you the maximum level of openness and flexibility while maintaining a high level of system stability and integrity. When you install the SoftLogix 5 controller, the software creates security groups which provide three levels of access to the SoftLogix 5 users within the domain. You can also apply the standard Windows NT privilege assignments for all of the remaining applications running on the station.

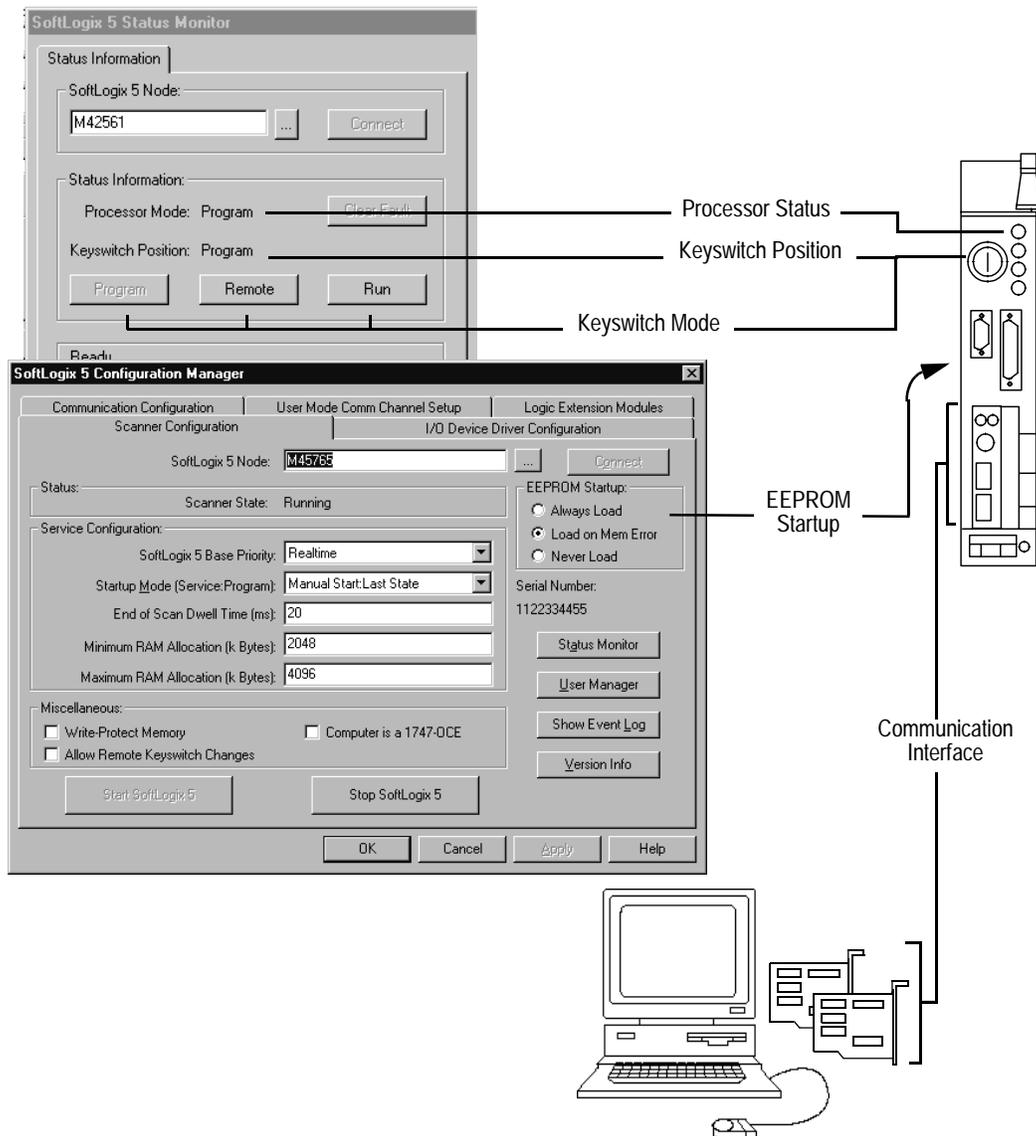
Compatibility with New Technologies By integrating the Windows NT operating system into the SoftLogix 5 platform, our customers can leverage the newer technologies being tested by Microsoft Corporation, such as Redundant Array of Independent Disks (RAID), and Symmetrical Multi-Processing (SMP). RAID technology enables the system to survive a hard disk crash by replacing the errant drive without interrupting data management activities. SMP systems use multiple processors to enhance overall system performance.

For further information on using the Windows NT operating system for soft control, refer to the Rockwell Automation white paper *Using the Windows NT Operating System for Soft Real-time Control - Separating Fact from Fiction*, publication 1789-1.2 or browse our web site at www.openautomation.com.

Integrate Seamlessly into Existing PLC-5 Applications

With minimal configuration, the SoftLogix 5 controller integrates simply and smoothly into your existing application. Once installed, the programmer and operator will immediately recognize the similarities between the PLC-5 processor and the SoftLogix 5 human interface. Since the SoftLogix 5 controller is PLC-5 compatible, most of the programs that you used with your PLC architecture can be re-used with the SoftLogix 5 controller with very few modifications.

Figure 1 : Comparison of SoftLogix 5 Controller Interface and the PLC-5 Processor



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Feature Comparison of a PLC Processor and a Soft Controller

In addition to being PLC compatible, the soft controller that you select should meet or exceed your current PLC requirements. For instance, if your current application uses more than a thousand program files, then the soft controller that you select should be able to handle as many, if not more. The following table compares the functionality of the SoftLogix 5 controller and the Allen-Bradley family of PLC-5 processors.

Functionality	Processors			SoftLogix 5 Controller
	PLC 5/80	PLC 5/80C	PLC 5/80E	
Instruction Set	More than 100 instructions			Uses same set as 5/80E and includes two new instructions: RHC and TDF
Program Files	2000			4096
Sequential Function Chart (SFC) sub-charts	2000			4096
Data Table Files	1000			4096
Elements per Data File	2000			4096
Data File Types	15	16	15	Uses same set as 5/80E and includes the following new data file types: <ul style="list-style-type: none"> • Long Integer (32-bit integer) • Double Precision Floating Point • User Defined Structures • Mutex (Win32 API) • Automatic Event (Win32 API) • Manual Event (Win32 API)
Memory (words)	100K			8192K
I/O Racks	24 (1 local, 23 remote)			128 (all remote) - 32 devices or 32 full racks (whichever comes first) per I/O channel (4 available)
I/O Capacity	3072 I/O			16384 I/O

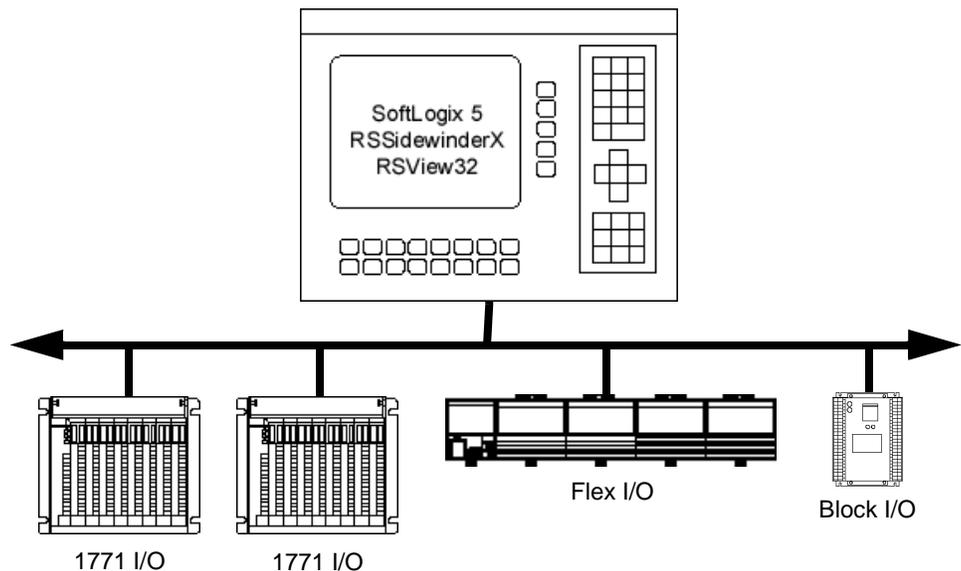
Provide an Integrated, Control-based System Solution

In choosing an open system, you can design a control system tailored to your application needs. With the SoftLogix 5 controller, you can design a centralized or distributed control architecture. No matter what type of architecture you choose, you can be sure that the SoftLogix 5 controller has been tested and verified to perform well with the Rockwell Automation products that it supports.

In a centralized control model, the control, HMI and data sharing applications are run on a single station. The advantages of the centralized model are:

- provides control, visual interface, and information in one piece of hardware
- supports data sharing between Rockwell Automation applications and compatible Windows NT-based applications
- accommodates memory-intensive programs and applications

Figure 2 : Centralized Control and HMI

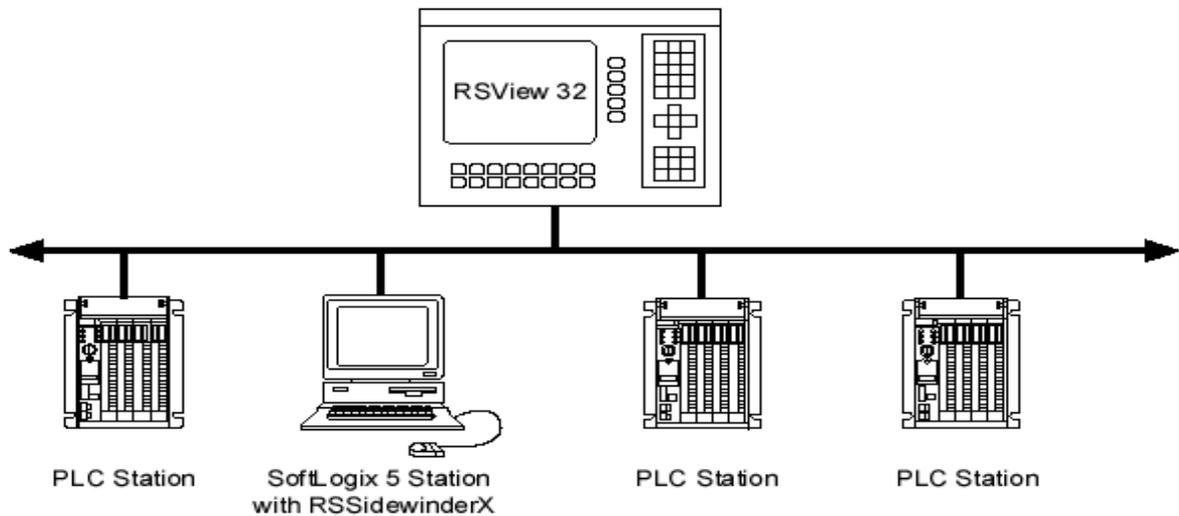


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The advantages of a distributed control model:

- integrates the data of various control types into a single interface
- simplifies maintenance and troubleshooting since each machine has a dedicated controller
- accommodates large machines performing a range of station-level activities
- supports open control and traditional control at the same level
- allows station-level visual interface for each machine

Figure 3 : Centralized HMI with Decentralized Control



Applying the SoftLogix 5 Controller

After reviewing the products available for soft control, you most likely have selected the SoftLogix 5 controller as your PC-based control engine. If you aren't at this point, you have probably narrowed your product options, but need more information to make your final choice. In the next sections, you will see how simple the SoftLogix 5 controller is to configure, program and troubleshoot. If you are looking for hard data, you can jump to the last page to review the product specifications. Once you compare this information to other soft control offerings, the choice will be clear.

Defining the SoftLogix 5 Environment

The *configuration manager* lets you define the I/O and communication drivers, specify priorities, and define memory allocations. You can access the configuration manager from any personal computer, stand-alone or networked, that is running the SoftLogix 5 controller. As long as the user has the appropriate privileges, the configuration manager will connect to the selected PC.

With the configuration manager's simple, user-friendly interface, you can optimize the SoftLogix 5 controller for your application.

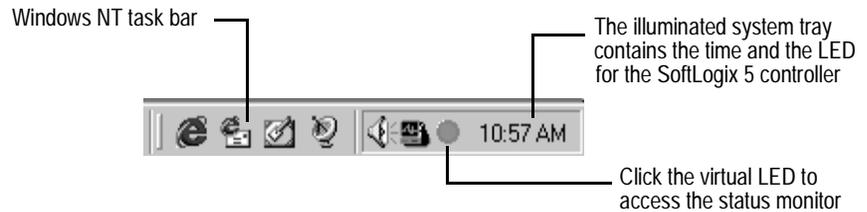
The screenshot shows the 'SoftLogix 5 Configuration Manager' window with the following settings and callouts:

- Communication Configuration:** Scanner Configuration tab selected. SoftLogix 5 Node: M4578E. Callout: 'Specifies drivers for Ethernet and DH+ networks'.
- User Mode Comm Channel Setup:** Callout: 'Specifies the user mode communication device drivers'.
- Logic Extension Modules:** Callout: 'Loads logic extension modules (LEMs) created with RSLibrary Builder'.
- I/O Device Driver Configuration:** Callout: 'Specifies drivers for I/O'.
- Status:** Scanner State: Running. Callout: 'Functions as a virtual memory module with load options'.
- Service Configuration:**
 - SoftLogix 5 Base Priority: Realtime. Callout: 'Defines the priority level of the controller within the Windows NT environment'.
 - Startup Mode (Service:Program): Manual Start: Last State. Callout: 'Defines the mode of the controller and the program when the computer starts. For the controller, you can select manual or auto. For the program, you can select last state, remote program or remote run.'
 - End of Scan Dwell Time (ms): 20. Callout: 'Defines the amount of time that the operating system is free to process other applications'.
 - Minimum RAM Allocation (k Bytes): 2048. Callout: 'Indicates the minimum amount of RAM locked by the operating system for controller use'.
 - Maximum RAM Allocation (k Bytes): 4096. Callout: 'Indicates the maximum amount of memory reserved for controller use'.
- Miscellaneous:**
 - Write-Protect Memory
 - Allow Remote Keyswitch Changes
 - Computer is a 1747-OCE
- Buttons:** Start SoftLogix 5, Stop SoftLogix 5, OK, Cancel, Apply, Help.
- Other Callouts:** 'Connect', 'Status Monitor', 'User Manager', 'Show Event Log', 'Version Info'.

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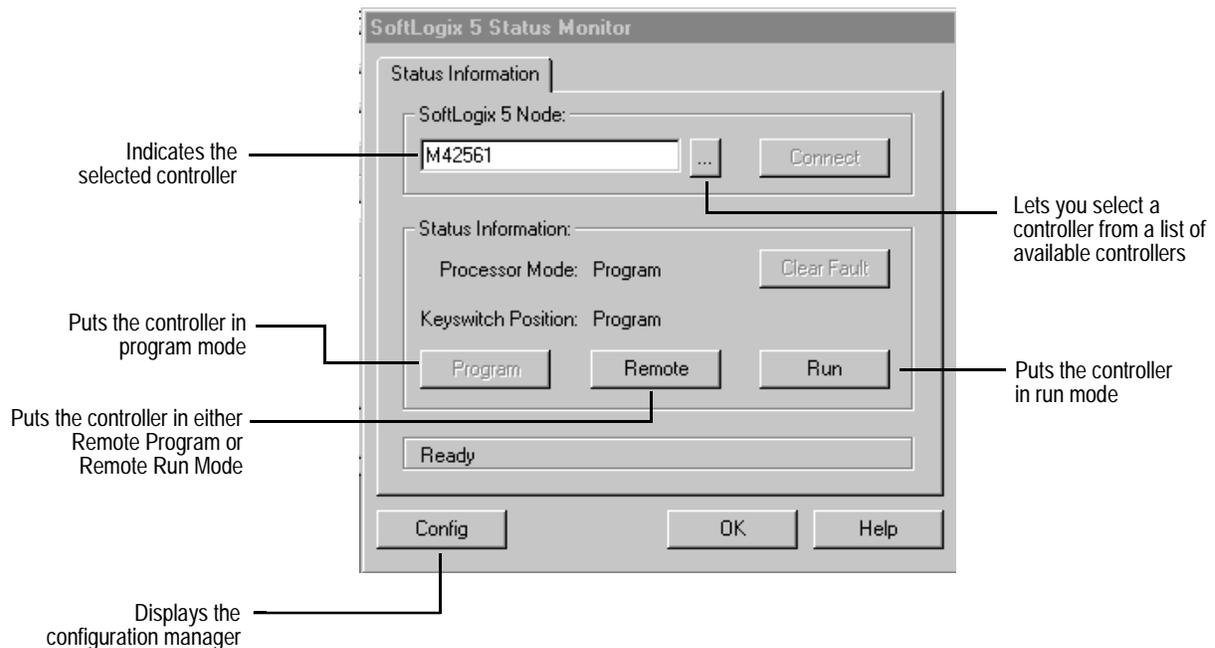
Monitoring a SoftLogix 5 Application

The status monitor features virtual versions of familiar hardware features of the PLC-5 controller such as the keyswitch, LEDs, and dipswitches. You access the status monitor by clicking the SoftLogix 5 virtual LED in the Windows NT task bar.



Once accessed, the status monitor seeks out the PCs within your domain or workgroup that have the SoftLogix 5 controller installed. With the status monitor you can:

- select the controller you want to monitor
- clear faults on the controller
- change the mode of the virtual keyswitch (with SoftLogix 5 Admin or programmer privileges)
- access the configuration manager by clicking on a command button



Programming the SoftLogix 5 Controller

The SoftLogix 5 system can be programmed with programming software running on your local personal computer, or on any programming device connected to the network. Programming language options include structured text, sequential function charts, function block, and relay ladder logic. You can choose from a wide variety of Rockwell Automation programming software, such as RSLogix Frameworks™ Function Builder, or RSLogix™ 5 products, in addition to tools for diagnostics, HMI, and debugging.

While the programming tools are familiar to you, the SoftLogix 5 controller includes these new programming features:

New Data Types The SoftLogix 5 controller supports all of the familiar PLC-5 data types, plus two other data types that extend the accuracy and flexibility of your controller:

- (DF) Double Precision Floating Point - displays a 15-position numeral with floating decimal point, sign, and power, effectively doubling the precision of the floating point data type
- (UDS) User Defined Structure - lets you combine different data types in the same data table, for greater flexibility and the ability to customize your control program

The SoftLogix 5 controller also includes these new data types that are used to communicate with external programs created with Rockwell Software's **RSSidewinderX** or **RSLibrary Builder**:

- (EVT) Automatic Events and (EVTM) Manual Events - create user-defined events that signal external programs running under Windows, synchronizing processing between the external programs and those running in the SoftLogix 5 engine
- (MTX) Mutex - controls data table access between your ladder control program and **RSSidewinderX** and **RSLibrary Builder**

Enhanced Instruction Set The SoftLogix 5 controller includes six new instructions that work with the Event and Mutex data types. These instructions aid in the synchronization between the SoftLogix 5 controller and other user-defined applications executing on the same system:

- | | | |
|----------------|---------------|---------------|
| • (LCK) Lock | • (SET) Set | • (PLS) Pulse |
| • (UNL) Unlock | • (RST) Reset | • (TST) Test |

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The SoftLogix 5 controller also includes these instructions which are especially helpful in calculating the effect of other Windows NT applications on the performance of the SoftLogix 5 controller:

- (RHC) Read High-Performance Counter - reads a real-time counter for performance diagnostics and high-speed timing calculations
- (TDF) Compute Time Difference - calculates the time difference between two timestamps captured with the RHC instructions

New and Additional Interrupts The SoftLogix 5 controller includes four Selectable Timed Interrupts (STI), and a new type of interrupt, External User Event Interrupts (EUI). EUIs can be triggered by any Windows NT application using Rockwell Software's **RSSidewinderX** ActiveX components. The SoftLogix 5 controller supports 4 STIs and 4 EUIs per user program.

Communicating with the SoftLogix 5 Controller

The SoftLogix 5 controller can exchange data with other devices using your existing Allen-Bradley communication networks, as well as open networks such as DeviceNet™ and ControlNet™. You can also configure the SoftLogix 5 software to communicate with your Information Systems over an Ethernet network using the TCP/IP protocol.

One of the advantages of choosing the SoftLogix 5 controller is that you can design an open system tailored to your application. With our newest release of SoftLogix 5, you can opt for just the number of communication channels you need. Select one, two, or unlimited channels, based on your current and future requirements.

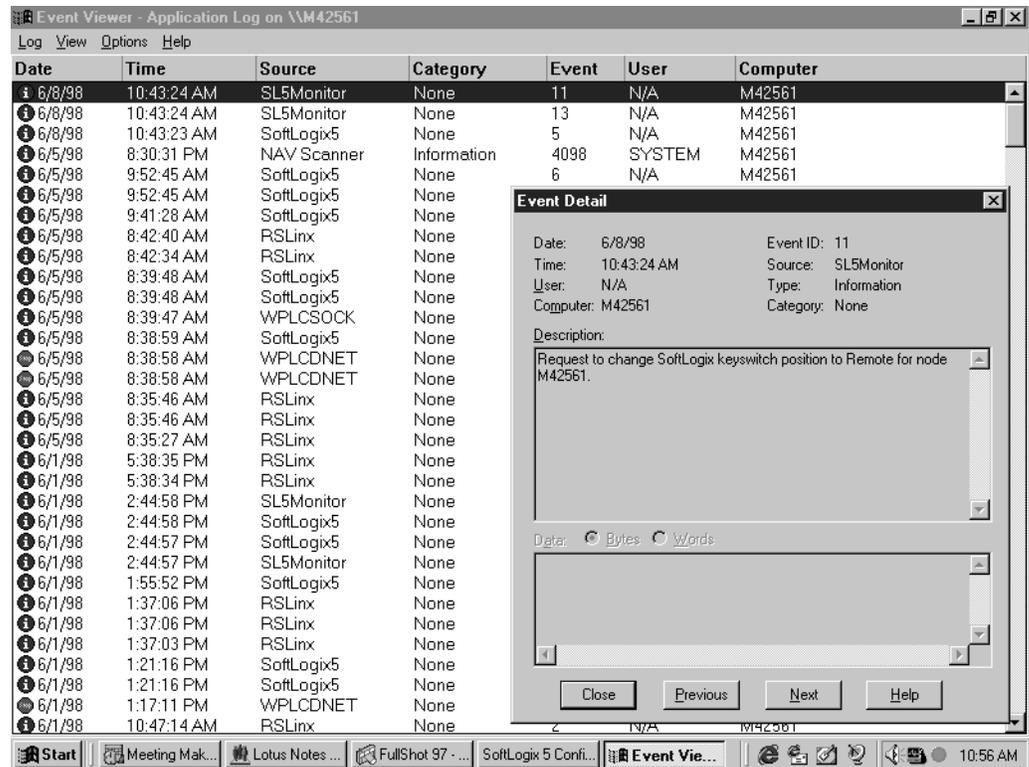
The following table details the communication and networking capabilities of the SoftLogix 5 controller.

Networks	Network Cards	I/O	Messaging	Specifications*
Ethernet (TCP/IP)	Microsoft Windows NT 4.0 certified Ethernet card		X	unlimited channels per controller
ControlNet	1784-KTCS	X		one channel per controller
DeviceNet	1784-PCIDS, 1784-CPCIDS	X		four channels per controller
DH+	1784-KTx(D), 1747-OCKTx(D), 1784-PKTx(D)		X	four channels per controller
	1784-PCMCK		X	one channel per card; one card per controller
Remote I/O	1784-KTx(D), 1747-OCKTx(D), 1784-PKTx(D), 1784-KTS	X		four channels per controller
Local I/O	1747-PCIS card	X		one channel per controller; 30 1746 I/O slots
Serial	up to four COMM ports		X	data managed by ASCII instruction set; buffer size = 4096 bytes
Third Party Networks	Contact your Rockwell Automation representative for information			

*Total number of communication channels is limited by the number of interrupts available

Troubleshooting the Controller

The SoftLogix 5 controller uses the Windows NT event log to record information that can be helpful when troubleshooting an application. When you click on the Show Event Log command button in the configuration manager, the Event Viewer screen appears and displays warning information and error entries. When you double click on an entry, the system displays an Event Detail window that contains information that you can use to troubleshoot or optimize the controller.

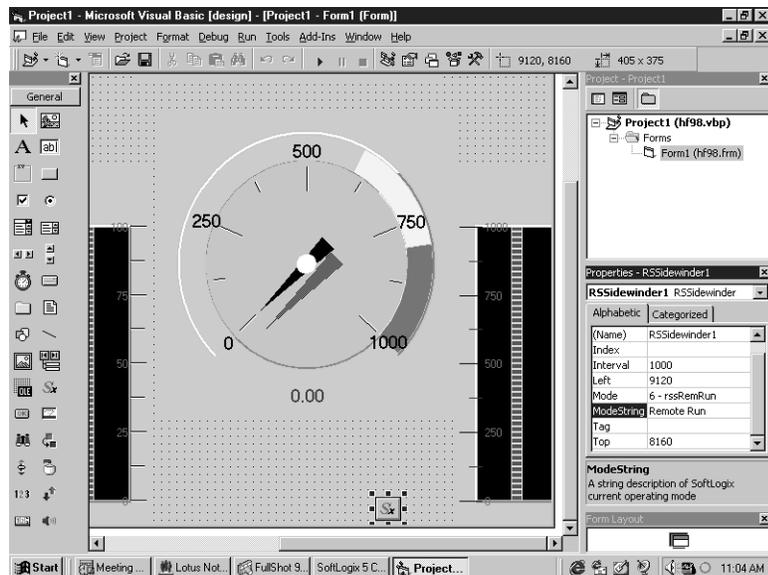


Getting Data from the SoftLogix 5 Controller

With Rockwell Software's **RSSidewinderX**, you can send data to and obtain data from the SoftLogix 5 controller. Through a shared memory interface, **RSSidewinderX** connects to the SoftLogix 5 controller to provide access to the mode of the controller and to data tables contained in the controller.

RSSidewinderX is a Microsoft® Active X™ control. It functions as an OLE automation server that you can use with Visual Basic (or OLE-compatible containers) to create a graphical user interface to the data files and logic programs. By using **RSSidewinderX** between Visual Basic and the SoftLogix 5 controller, you can create a graphic interface that can:

- read values from the data files of the controller
- write values to the data files of the controller
- provide properties to monitor the mode of the controller



The **RSSidewinderX** control can also start a process within a Visual Basic application when the SoftLogix 5 engine changes mode. This includes providing a means to trigger external user interrupts (EUIs) in the SoftLogix 5 controller. With this function, you can create an interface to reflect and react to a change in the mode of the controller.

Building a PC-based Control System

Rockwell Software's ControlPak™ is an integrated development and run-time environment that offers customizable tools for building advanced PC-based control systems using the SoftLogix 5 controller. ControlPak brings the power of the Microsoft Windows NT 4.0 operating system, secure networking and ActiveX and Visual Basic Application (VBA) technology to traditional PLC-based applications. ControlPak provides you with state-of-the-art tools to build the most advanced PC-based control systems possible.

RSLibrary Builder™ Included in ControlPak is Rockwell Software's RSLibrary Builder software, which allows you to create your own instructions in the familiar PLC-5 environment. With the SoftLogix 5 controller, RSLogix SL5 programming software, and the new RSLibrary Builder, you can create your own C-based instructions to encapsulate proprietary algorithms, to simplify your control code, or for other custom applications. RSLibrary Builder allows you to create instructions compatible with both ladder logic and structured text. The SoftLogix 5 controller and RSLibrary Builder add a completely new dimension to how you conceptualize and develop control applications.

Maximizing Rockwell Automation Support

At Rockwell Automation, we know that while you need the flexibility of open systems, you don't want to sacrifice reliability and uptime. Our SoftLogix 5 system is backed with more than 90 years of experience in factory floor control. We've taken that experience and used it to design and configure a soft control solution that you can count on—a solution backed by support services, value-add distributors and system integrators worldwide.

Ordering Information

Description	Catalog Number
SoftLogix 5 Controller v 1.2, with:	
Unlimited communication channels	1789-SL5
One communication channel	1789-SL51
Two communication channels	1789-SL52
<i>For information on SoftLogix 5 extensions, including RSSidewinderX and ControlPak, contact your local Rockwell Software representative.</i>	

For more information, contact your local Rockwell Automation distributor or sales office, or visit us at <http://www.OpenAutomation.com>.

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System Specifications

Operating System	<ul style="list-style-type: none"> Windows NT 4.0 Workstation or Server
Minimum System Requirements	<ul style="list-style-type: none"> 100 MHz Pentium-class processor 32 Mbytes RAM; 20 Mbytes hard disk space VGA graphics adapter: 640x480 minimum; 800x600 recommended
PLC Compatibility	<ul style="list-style-type: none"> compatible in function and interface for seamless integration and minimal re-training
performance (with a 200 MHz Pentium® processor)	<ul style="list-style-type: none"> 2,000-16,000 instructions - 2 to 4 milliseconds¹ I/O throughput - 4 to 20 milliseconds (depending on I/O system used)
Data Sharing	<ul style="list-style-type: none"> DDE or Active X with RSSidewinderX Ethernet DH+
Programming Tools	<ul style="list-style-type: none"> RSLogix 5 RSLogix Frameworks with Function Builder ControlPak
Programming Modes	<ul style="list-style-type: none"> on-line off-line run-time
Programming Languages	<ul style="list-style-type: none"> relay ladder logic (RLL) sequential function chart (SFC) editor structured text editor function block editor (with RSFrameworks)
Programming Features	<ul style="list-style-type: none"> fault routines scheduled time interrupts (STIs) and external user interrupts (EUIs) automatic events (EVT) and manual events (EVTM) mutex (MTX)
Supported HMI Tools	<ul style="list-style-type: none"> RSView 32 RSTools
Supported I/O Types ²	<ul style="list-style-type: none"> Remote I/O (up to four channels per controller) DeviceNet (up to four channels per controller) ControlNet (one channel per controller) local 1746 I/O (one channel per controller; 30 I/O slots)
Supported Communication Networks	<ul style="list-style-type: none"> DH+ (up to four channels per controller) TCP/IP over Ethernet (unlimited channels per controller) Serial (four ports per controller - user mode only)
Supported Platforms	<ul style="list-style-type: none"> Allen-Bradley industrial PCs, such as the RAC6800 Series 1747 open controller any Pentium-class (or higher) Windows NT 4.0 OEM-approved PC

¹ Performance could increase or decrease depending on the type of instructions and network used.

² For information on third-party I/O support, contact your local sales office.

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Wherever you need us, Rockwell Automation brings together leading brands in industrial automation including Allen-Bradley controls, Reliance Electric power transmission products, Dodge mechanical power transmission components, and Rockwell Software. Rockwell Automation's unique, flexible approach to helping customers achieve a competitive advantage is supported by thousands of authorized partners, distributors and system integrators around the world.



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