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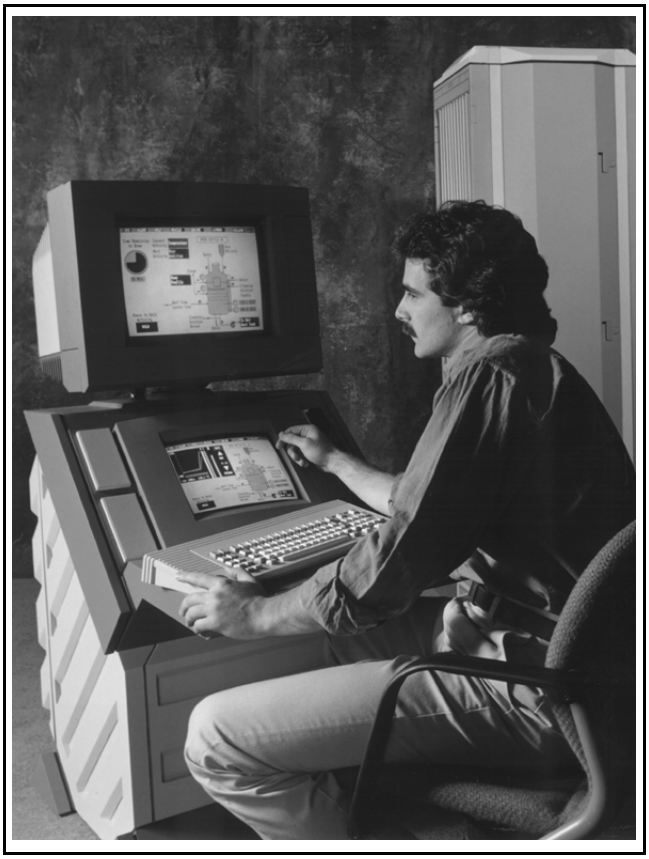
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FOXBORO®

PSS 21A-1B1 B2

I/A Series® Overview Hardware



- RUGGED, COST-EFFECTIVE HARDWARE
- MULTI-PROCESSOR power and flexibility
- OPEN ARCHITECTURE through standards
- HIGH RELIABILITY from sealed modules interconnected by serial communications
- OPTIONAL FAULT TOLERANCE where needed for processors, power, and communications
- LOW POWER CONSUMPTION using CMOS components
- SMALL SIZE from surface mount technology
- SOFTWARE CONFIGURATION of hardware functions
- EASY MAINTENANCE using intelligent modules

I/A Series Industrial Hardware: Advanced Technology for Industrial Environments

The I/A Series represents the next generation of industrial control systems. Its highly innovative hardware design utilizes advanced technology to bring a new level of capability, reliability, quality, and cost-effectiveness to the industrial environment. The modularity of I/A Series hardware allows the building of configurations to suit the geographical, functional, environmental, and performance requirements of present and future applications—economically and flexibly.

Rugged and Reliable Modules: A Layered Approach

Industrial environments vary over a wide range, and can be very harsh and destructive—especially for electronic equipment. Heat, humidity, shock, vibration, RFI, EMI, and contaminants can all take their toll. The equipment, however, must be cost-effective in any particular environment.

The I/A Series answers these needs by providing layers of environmental protection. There are no exposed electronics, no backplanes, no card cages, no large central power supplies. All electronics are enclosed in modules which have a very high basic level of environmental protection. Modules mount in enclosures that can optionally provide additional layers of protection for particular environments.

The Inner Layers: The Modules

The inner layers of environmental protection are contained within the modules themselves. To reduce power consumption, heat generation and to improve reliability, CMOS electronics are used throughout. Surface mount technology reduces the size of the circuits dramatically and further improves reliability by eliminating holes.

The electronic circuits are mounted inside the enclosed modules. Heat is conducted from the circuits through the metal plates to the outside of the modules, where it dissipates into the enclosure's ambient air.

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The modules are enclosed within rugged covers.The result is modules that are highly resistant to all forms of environmental attack and, for most industrial environments, need no further protection.

The Outer Layer: The Enclosures

Enclosures provide a housing for I/A Series functional and power modules, as well as for terminals and connectors for external wiring.

There are several types of enclosures, ranging from small enclosures designed to house only Fieldbus Modules installed in field environments, to larger ones that will support many modules of different types.

Some environments have pronounced temperature extremes or high corrosive levels which call for further protection. For such environments, enclosures can optionally be fitted with sealed doors, and air circulation fans. These enclosure options are rated according to environmental variables, making it easy to select the correct protection for the various types of environments.

In addition, metal enclosures are available in both EMI shielded and non-shielded configurations and with a wide range of options. The EMI shielded enclosures are primarily intended for use in countries that require compliance with the European Community EMC Directive.

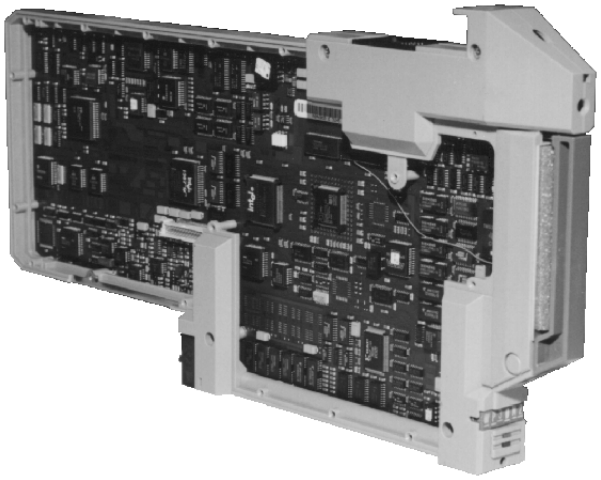


Figure 1. Processor Interior View of an I/A Series Module

A “Non-Stop" Power System for Reliable Operation

A new approach to power distribution significantly contributes to the total reliability of the system. Power from two primary power feeds can be distributed to the modules so that no failure from a power source or any modules will affect the operation of a node. Also, either power feed could be supplied from batteries. For installations with only one source of power, configurations are available to provide continued operation in the event of power module failure.

UPS systems and other special power conditioning equipment are unnecessary also. The built-in power conversion and distribution system accepts plant quality power.

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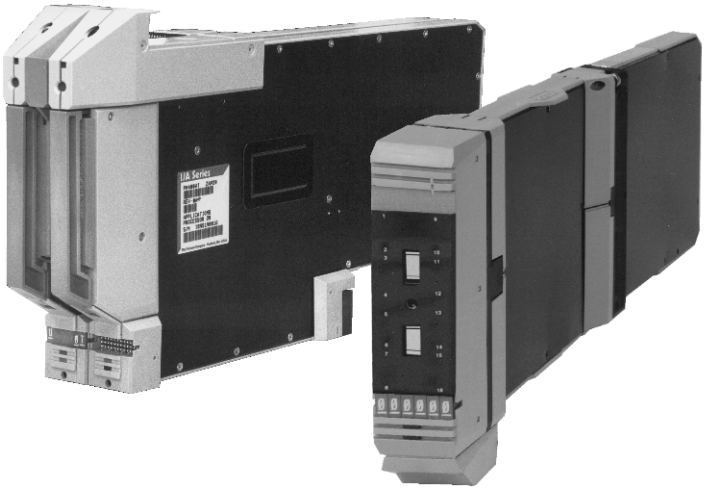


Figure 2. Processor and Fieldbus Modules

Fault Tolerance for Increased Reliability

A high degree of security is built-in. The I/A Series Industrial Software takes advantage of the distributed intelligence of the system to also distribute the error checking and diagnostic functions. All modules are self-diagnosing. Optional redundancy for critical modules further extends system availability. All messages between modules take place over communication links with error detection and retry mechanisms, and all communication paths within an enclosure are redundant. Redundancy is also available for the Local Area Network (LAN) between I/A Series nodes in geographically distributed systems.

A Custom Solution for Each Node... Off-the-Shelf

I/A Series Industrial Hardware modules put the performance where the work is by dividing functionality into modules. Modules work together, transparently, to provide a total solution.

The hardware scheme offers great flexibility in defining node capabilities. Processor modules, for example, perform functions such as control, computation, and operator interface. They also provide interfaces to other Foxboro—and non-Foxboro—equipment.

Fieldbus Modules and/or the Cluster I/O subsystem provide the interface between processor modules and a wide variety of field devices. Included are not only conventional field devices such as thermocouples, flowmeters, value positioners, limit switches, etc., but also the growing family of I/A Series Intelligent Transmitters.

Network Communications Flexibility

The 50 and 70 Series Application Workstation enhancements to the I/A Series family allow direct integration of a wide variety of information networked systems (i.e., TCP/IP, DECnet, NFS, etc.) and devices.

Processor Modules

Processor modules define the parameters of the I/A Series system and what happens within each node. They handle all levels of automation functions, provide interface to other types of automation equipment, perform data storage and computation, interface to other networks, and control the operator workstations.

A node may consist of any combination of processor modules coupled by a Nodebus. Almost any automation node can be configured as part of a complete automation system. I/A Series architecture distributes multi-purpose computing power where it is needed. This modular approach fits the way plants are designed—rather than the other way around.

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Processor modules differ according to the types of device interfaces that each supports, and also in their computing power. Processor modules have common microprocessor hardware and operating systems software. Usually a processor module will run those software modules most closely associated with the devices it interfaces to.

Processor modules are based on the Intel and Sun SPARC families of microprocessors used in most personal computers. This open architecture approach means that I/A Series Software can run on compatible personal workstations. Also, communication standards supported by processor modules provide an open architecture to external devices and systems.

The Control Processor

The control processor acquires input data from sensors and control field devices via Fieldbus Modules. The control processor performs any mix of integrated first-level automation functions such as continuous, sequential, or discrete logic functions. For control security, it can optionally be configured as a fault tolerant pair.

Workstation Processors

Each workstation processor interfaces to a CRT and the input devices associated with it. These may be alphanumeric keyboards, mice or trackballs, touchscreens, or up to two modular keyboards. Multiple workstation processors can be linked for multi-screen operations. Each processor manages the information on its CRT and exchanges data with other processor modules.

Application Processors

Application Processors interface to a wide variety of bulk storage devices and are a general-purpose computing and data resource. Application processors are configured by software to perform various combinations of system functions such as first-level control, process operations management, historical data collection, information management, configuration of system software functions, and management of system equipment. Some application processors and data storage devices can be made redundant to provide fault tolerance for critical functions.



Figure 3. 50 Series Processors

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The Communications Processor

The communications processor provides communication ports to general terminal devices like VT100s, black and white and color printers, and other serial asynchronous devices.

Gateways

The SPECTRUM Master Gateway allows a SPECTRUM system to be used with workstations and supervisory functions from the I/A Series. This gateway allows the I/A Series nodes to access control and I/O data as well as file data from SPECTRUM stations.

Additional gateways (e.g., Allen-Bradley Data Highway Plus, Modicon, Instrument, Device, MODBUS Plus, etc.) enable the I/A Series systems to be directly interfaced to other systems for enhanced flexibility.

Interfaces

The Carrierband Interface

The Carrierband Interface connects nodes on an IEEE 802.4 token bus compatible Carrierband LAN. IEEE 802.4 nodes from other vendors may communicate to I/A Series nodes over the LAN.

The Nodebus Interface

The Nodebus interface allows a personal computer to connect to an I/A Series node. It can then perform some or all of the functions normally performed by I/A Series processor modules.

Dual Nodebus Interface

The Dual Nodebus Interface (DNBI) provides direct interfacing of a 50 or 70 Series station (e.g., Application Processor 51, Workstation Processor 70) to the I/A Series Nodebus and allows the station to switch between two redundant Nodebus cables. Data transmission between the DNBI and the connected station is accomplished via an Attachment Unit Interface (AUI) module.

Dual Nodebus Interface Extender

The Dual Nodebus Interface (DNBX) is functionally similar to the DNBI; the only major difference is the cable type and maximum distance. The DNBX supports operation over distances of up to 450 meters (1500 feet) via a combination of coaxial and AUI cables.

Fiber Optic LAN Converter

The Fiber Optic LAN Converter provides bidirectional conversion between coaxial and fiber optic media. The converter is compatible with existing I/A Series hardware, utilizes industry standard fiber optic cabling and connectors, and supports both fiber optic only as well as coaxial/fiber optic combination topologies.

Fieldbus Modules

The Fieldbus Modules of the I/A Series system can be tied into either a control processor or a personal computer running I/A Series integrated control software. The Fieldbus Modules can be mounted local to the control processor, PW, AW70, etc. or at remote locations.

There are Fieldbus Modules to match the variety of field signals that are commonly encountered in industrial plants. Because these modules are software configured, however, fewer different types are needed than with earlier systems. For example, only one module is needed for the many types of thermocouple and millivolt signals.

The Fieldbus Modules include analog and digital types. The analog modules have 8 points per module, the digital modules have 16. The digital Fieldbus Modules can perform a variety of functions, such as sequence of events monitoring, ladder logic control, and pulse counting. Analog inputs have configurable resolution. All outputs support a selectable state in case of control processor, communication, or Fieldbus Module failure. All field signals are isolated from the control electronics, and in most cases, each point is isolated from all others. Other Fieldbus Modules communicate with I/A Series Intelligent Transmitters.

Fieldbus Cluster Input/Output Subsystem

The Cluster I/O Subsystem provides full support for analog measurement, digital sensing and analog or discrete control capabilities. The subsystem is available in redundant or non-redundant configurations, integrated with the Control Processor or Personal Workstation via the Fieldbus and includes a multi-slot chassis comprised of a Fieldbus Processor, Analog/ Digital Fieldbus Cards (FBCs), subsystem main power supply, and a power monitor. Various Cluster I/O enclosures employ Euro card mounting options.

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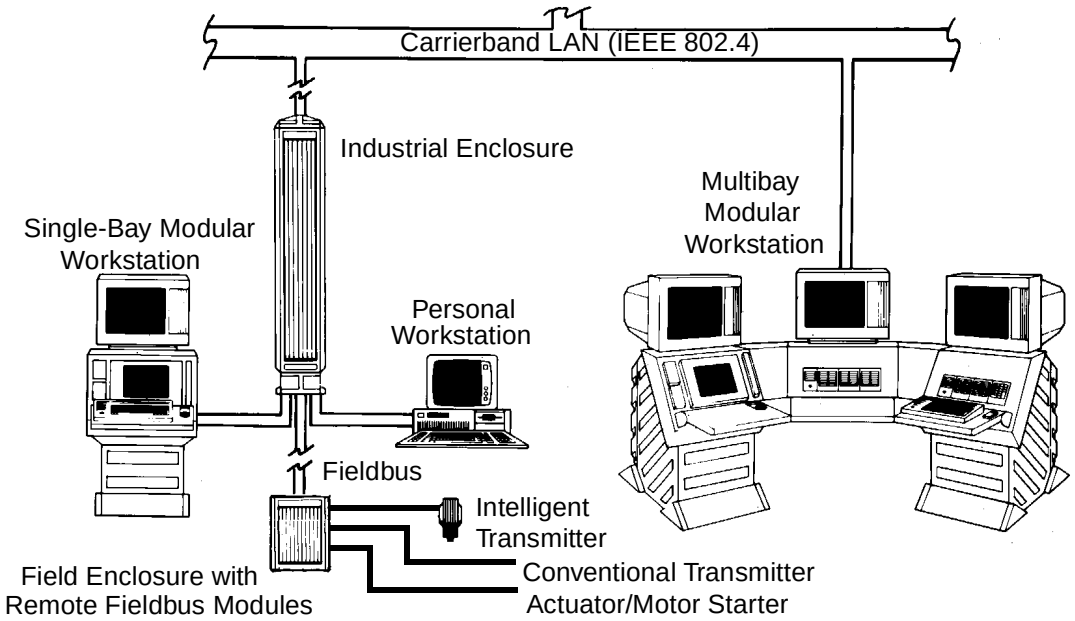


Figure 4. Example Network Diagram

Standard Maintenance Displays

Standard maintenance displays allow for the monitoring of system health and the performance of diagnostics. These displays are intended to be used by plant maintenance personnel to completely diagnose the system. The system health display monitors current system status and determines the location and type of failure. There are also displays that can be used to invoke off-line diagnostics to determine the existence of a faulty element of the system. These displays, coupled with the philosophy of operation of the system, create an environment in which efficient centralized or distributed system maintenance can occur.

Easy and Quick to Repair

If a module failure occurs, replacement is very simple. In fact, it requires only one tool. Each module carries a six-character identification code that is transferred to the new module upon replacement. Using this code, the system automatically downloads the corresponding software to the new module and has it up and running almost immediately.

Hardware Designed to Save You Money

The rugged hardware can be installed in the plant environment. There's no need for expensive air-conditioned rooms. Install it close to the process and save wiring costs. A variety of enclosures makes this even easier.

Modularity lets you purchase only what you need. You can configure the hardware to fit the application and expand the system incrementally as the need arises. In addition, the hardware and software are designed so that they can be enhanced as technology advances and yet still be compatible with the systems delivered today.

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