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FOXBORO®

PSS 21A-1A1 A1

I/A Series® Overview
System Overview



Superior architecture, long-lived and sophisticated yet easy-to-use interface. A vehicle for solving today's problems today – and providing for tomorrow's challenges.

Companies around the world are moving more rapidly to integrate and automate their manufacturing operations, due to increased global competition. I/A Series systems continue to meet day-to-day needs of these installations and provide the proven ability to expand along with more demanding applications. Foxboro continues to develop formidable additions to its array of I/A Series capabilities. They represent the ongoing evolution of the world's first Open Industrial System.

THE SYSTEM FOR TODAY

Solutions for industrial automation must begin with a foundation that will solve today's problems today, but will reach out to the future as well. For I/A Series systems, that foundation begins with system architecture.

I/A Series systems not only provide flexible, economical solutions to today's automation problems, but also provide the architecture for tomorrow's integrated plant-wide and inter-plant information and automation systems:

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Product Specifications

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- A WIDE RANGE OF SYSTEM SIZES, from small systems handling local devices to very extensive systems distributed over local and wide area networks
- MIX AND MATCH HARDWARE AND SOFTWARE MODULES to fit the application and the location
- TRULY DISTRIBUTED, both functionally and physically
- CONSISTENT, SECURE, FRIENDLY OPERATOR INTERACTION using high quality, high resolution graphics and multiple windows
- LOWER TOTAL COST to install, train on, operate, and maintain
- LONG-LIVED OPEN INDUSTRIAL SYSTEM ARCHITECTURE AND NETWORKING through adherence to a number of national and international hardware, software, and communication standards
- INTEGRATION WITH OTHER EQUIPMENT through standard communication networks and object based communications software
- BACKWARDS COMPATIBILITY to preserve investments in systems integration and applications
- THIRD PARTY APPLICATIONS CAPABILITY for virtually unlimited flexibility in providing additional functionality

FLEXIBLE AND POWERFUL

Flexibility begins with capabilities that solve problems today. The I/A Series is designed to address an exceptionally broad range of application requirements. Present generation systems are limited in functionality because of constricting architecture, and usually consist of a family of devices, each dedicated to a single automation function such as logic control or operator interface. In contrast, I/A Series systemsprovide nodes, made up of interchangeable hardware and software modules, with powerful capabilities that can be mixed and matched to fit numerous manufacturing processes. Innovative packaging of industrial and field enclosures allow these nodes to be physically located where they are needed.

For example, certain nodes on the plant floor might be configured initially for first-level control functions, with a separate node in a control room for operator interface. Later, some of the operator interface functions could also be installed at one or more of the control nodes, while supervisory control functions and password-protected engineering functions could be added to the operator interface node.

THE SYSTEM FOR TOMORROW

To maintain the continuity of a long-lived architecture, I/A Series systems are soundly based on international hardware, software, and communication standards. Also, Foxboro adheres to industrial and quality standards such as Factory Mutual, EEC, ISA and ISO9001. Adherence to standards allows I/A Series Industrial Software to be transported between today's compatible hardware, such as personal computers and workstations. Over 100 intelligent plant devices have been integrated into I/A Series systems and there are yet more to come as these devices become available in the future.

Adherence to software standards for operating systems, languages, and data bases enables software portability amongst compatible environments today. It also has proven to allow software to be preserved as new hardware technology is incorporated in generations of I/A Series systems. Newest of these systems additions are the 50 Series stations which allow direct integration of a wide variety of information networked systems (i.e., TCP/IP, DECnet, NFS, etc.) and devices.

For communications, the I/A Series is built on a solid foundation: the Open Systems Interconnect (OSI) standard model, using the communication standards specified by ISO and IEEE. Rather than using a proprietary communications network, I/A Series nodes communicate with each other over single or hierarchical IEEE 802.4 networks.

As manufacturers and vendors worldwide design and manufacture products adhering to international standards, their products can be integrated into I/A Series nodes by connecting to the same compatible networks. I/A Series systems provide a living, working embodiment of the OSI model, and continue to provide a clear migration path for users of earlier I/A Series systems and Foxboro SPECTRUM users.

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Any system must be flexible enough to grow, change, or be upgraded tomorrow. Because I/A Series systems adhere to rigorous international standards, future flexibility is assured. The right architecture solves today's problems today but also provides for the future.

THE I/A SERIES NODE: A BUILDING BLOCK FOR SUCCESSFUL PROCESS CONTROL

I/A Series system architecture is constructed around the concept of a node. A node operates independently, performing automation-related functions. It may connect to other Foxboro or non-Foxboro nodes via compatible networks.

A node typically comprises a set of book-sized modules in an Industrial Enclosure together with a workstation and field devices as shown in Figure 1 and Figure 2. Each module is self-contained and is designed to perform a general role in the total system, although its particular function is software-defined. The modules are loosely coupled and can be combined in just about any manner to fit an application requirement.

Modules: Building Blocks for I/A Series Nodes

There are several types of I/A Series modules. The most basic type is the processor module. Processor modules are interconnected by a common rugged serial bus called a Nodebus. Each module also connects to peripheral devices or other types of modules through one or more communication links.

There are four families of processor modules:

- Application Processors, which connect to bulk storage devices – and optimally to information networks (Ethernet) to allow bidirectional information flow
- Workstation Processors, which connect to CRTs, keyboards, annunciator keyboards, and other workstation devices – and optimally to information networks (Ethernet) to allow X Window displays sourced from other connected computers
- Communications Processors, interfaces, and gateways, which connect to RS232C/485 devices, Local Area Networks (LANs), Wide Area Networks (WANs), SPECTRUM and other networks
- Control Processors, which connect to I/A Series Fieldbus Modules and devices

The Fieldbus Module is another major module type. Fieldbus Modules connect to conventional sensors and actuators as well as to I/A Series Intelligent Field Devices.

Modules can perform a variety of functions, depending on their software. In one case, a control processor might perform only ladder logic or regulatory control functions; in another, it might perform sequence control. One Application Processor might perform historical data collection and archiving, and data base management functions; another might be coordinating other processor modules as part of a distributed batch control system. Configuration flexibility provides a broad range of solutions to match a broad range of needs.

Low Cost

The I/A Series system has been designed for inexpensive installation, training, operation, and maintenance. Hardware modules are rugged – individually encapsulated to withstand the environmental, electrical, and physical conditions of industrial environments.

For fast installation and maintenance, each module – processor module, Fieldbus Module, Intelligent Transmitter – is intelligent; the modules check each other continuously as soon as they are plugged in. If a module should fail, it is specifically identified by color-coded lights and messages to operating personnel. When a replacement module is installed, it is automatically downloaded with appropriate software.

As plant automation continues at an increased rate with ever more sophisticated equipment, the cost of control system downtime becomes more and more significant. The fault tolerance of I/A Series systems can be increased by simply adding redundant hardware modules for critical functions, including LAN and WAN communications. Network Fault Detection further enhances reliability and diagnosis. Hardware redundancy is 100% transparent to software, and switchover is instantaneous.

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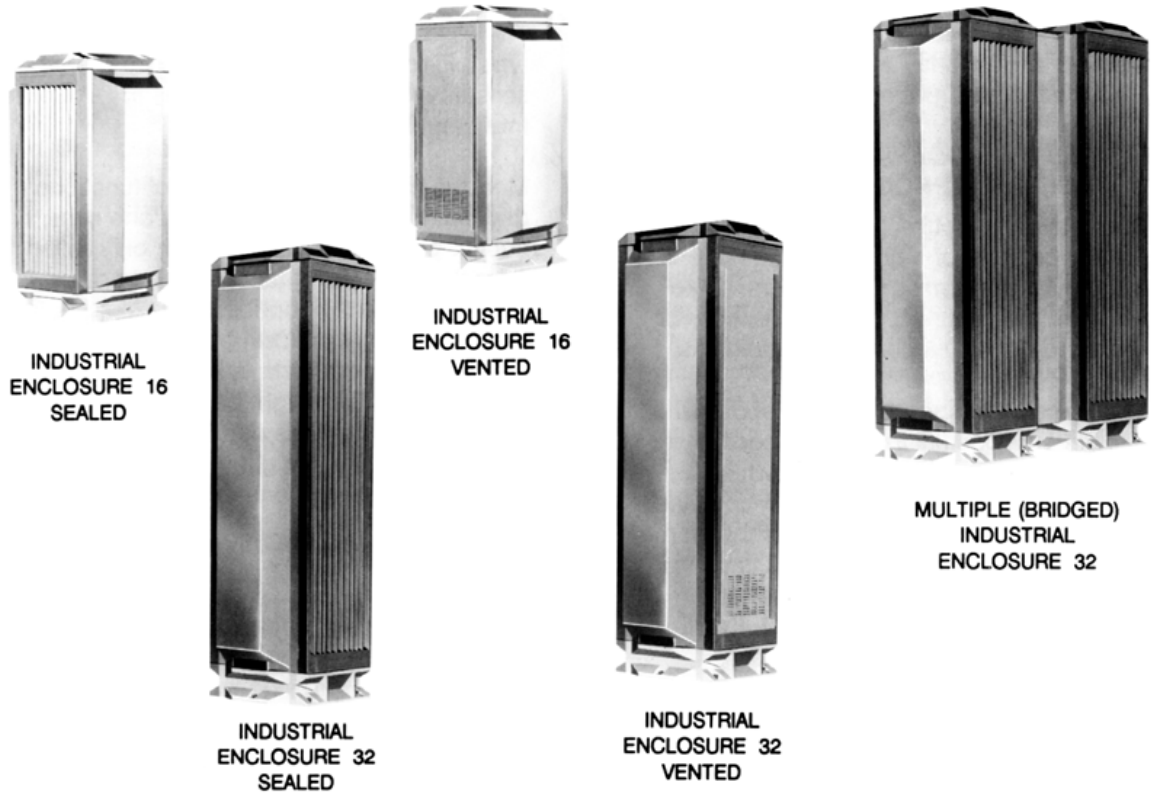


Figure 1. Industrial Enclosures

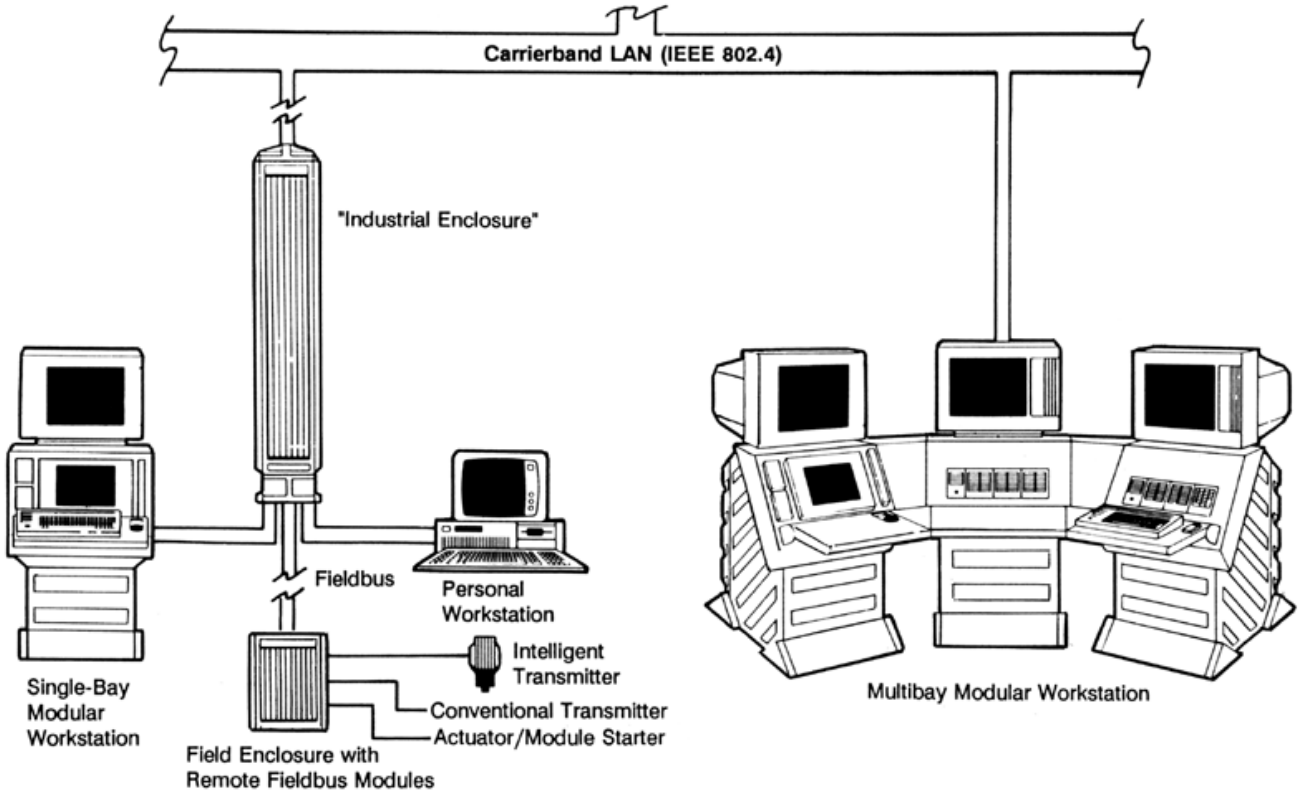


Figure 2. Typical Nodes on a Network

I/A Series Nodes Offer Modular Growth

A virtually unlimited range of system sizes is possible with I/A Series system components. A small system could consist of a personal workstation by itself, or one node with just a few modules.

A larger system could be made up of a combination of nodes connected by an IEEE 802.4 compatible Carrierband LAN. Figure 3, Figure 4, and Figure 5 show examples of typical system arrangements.

Also, there is a Fieldbus that allows Control Processors to communicate with remote Fieldbus Modules and devices for further geographical distribution of instrumentation devices and functions into field environments.

A system can have any variety of operator workstations as necessary. Modular workstation components such as keyboards, annunciator keyboards, CRTs, touchscreens, mice, and trackballs can be mixed and matched as required for each workstation in the plant.

Friendly and consistent interaction is provided through windows, menus, and graphics, which can be configured to provide the most appropriate environment for the operator. 50 Series workstations have enhanced graphics and windows capabilities that allow concurrent access to several applications at a time. I/A Series workstations are easy to use and have a flexible hardware and software design so that they can readily be reconfigured as plant integration and automation progresses. Figure 6 shows a typical desktop workstation, while a typical modular workstation bay is shown on the cover.

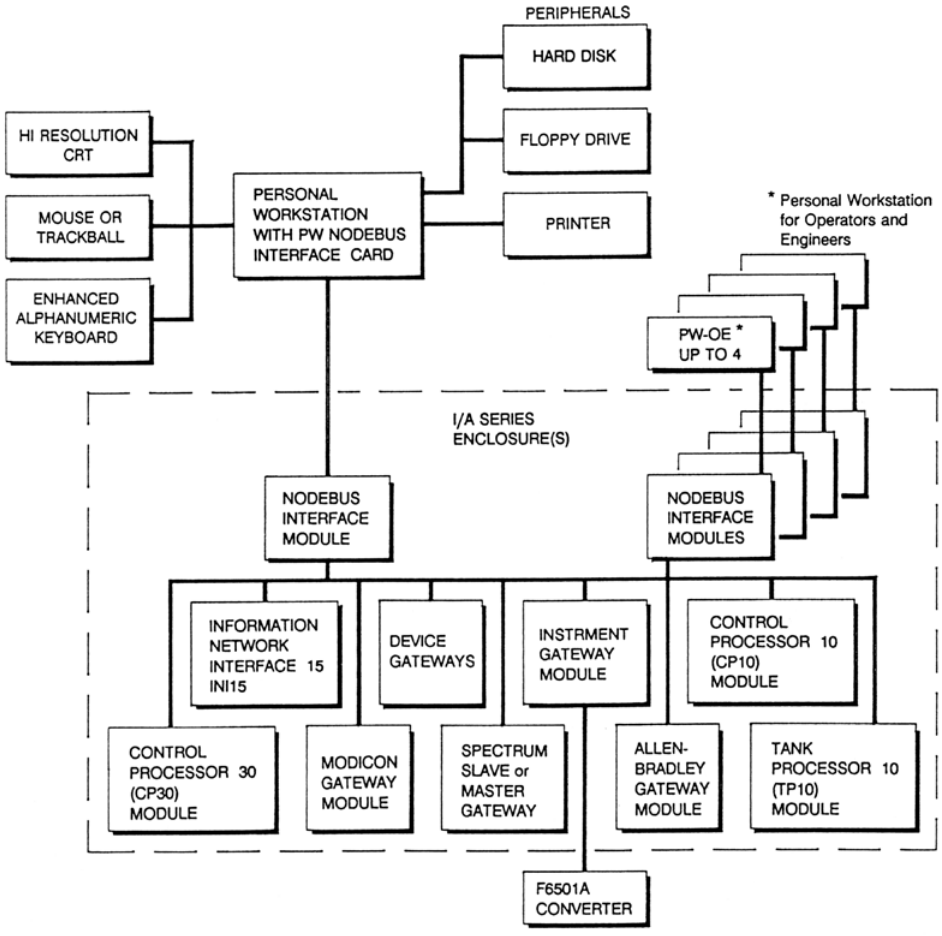


Figure 3. Typical I/A Series Personal Workstation for Small Nodebus Control System (PW-NB)

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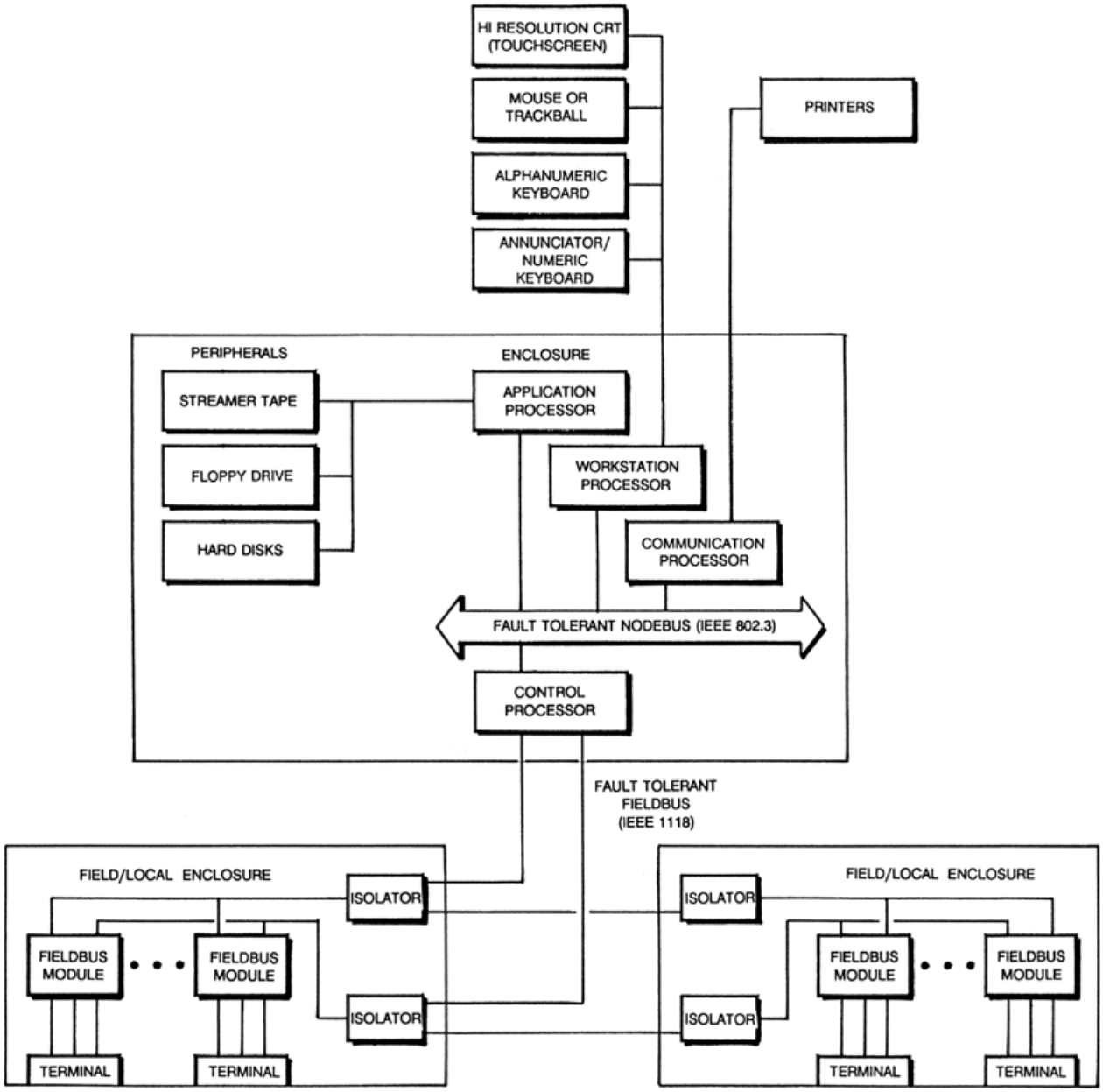


Figure 4. Typical I/A Series Single Node System

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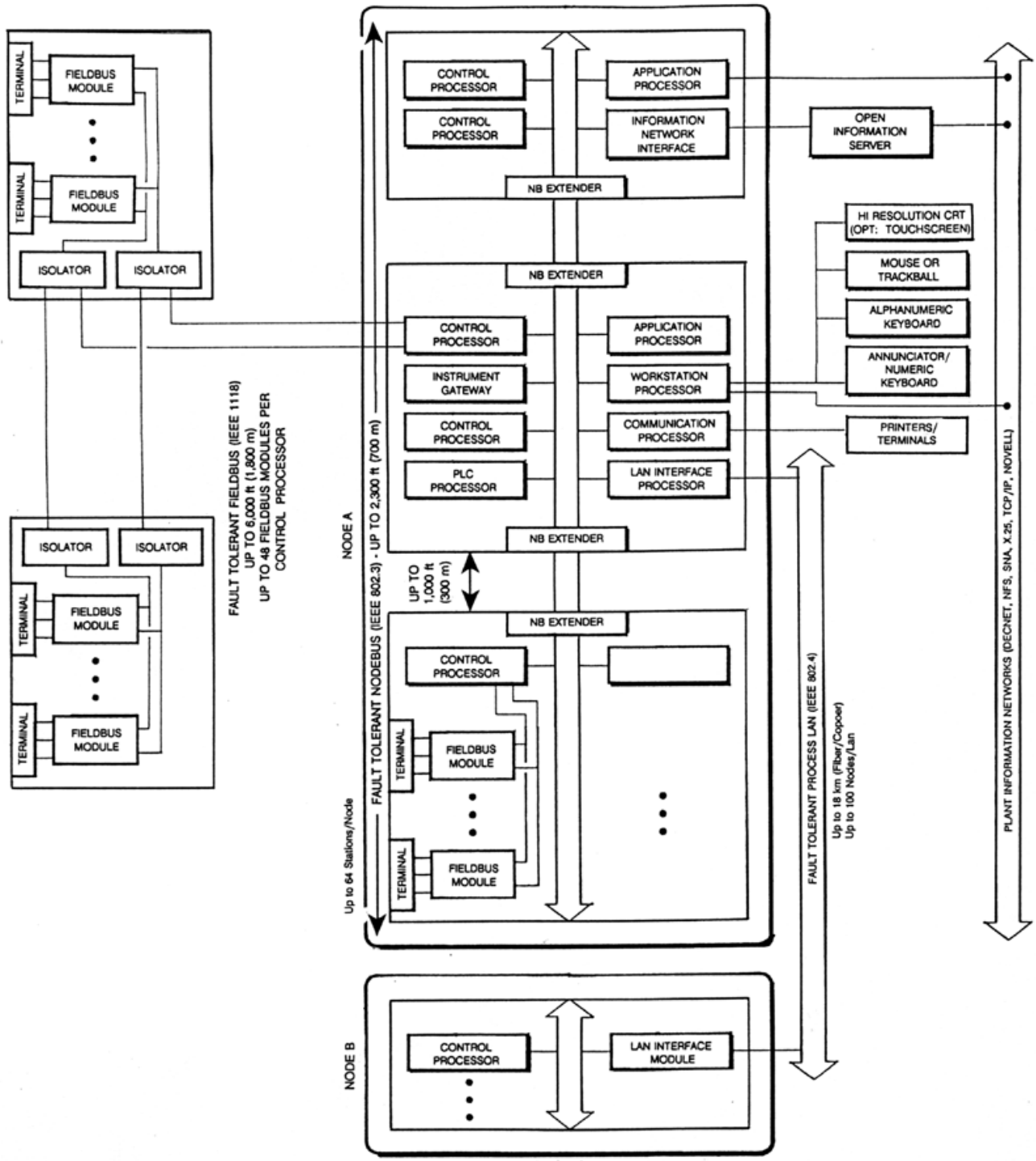


Figure 5. Typical I/A Series Two Node System With Options

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Figure 6. Typical I/A Series Desktop Workstation (50 Series)

The modular design of the I/A Series system offers an additional key benefit – it is relatively easy to add on to an existing system. A very small system, perhaps a personal workstation with some processor and Fieldbus Modules, can grow step by step to a plant-wide integrated automation and information system. This offers the flexibility to plan a total installation, starting small and growing as plant operations require and budgetary constraints allow.

The I/A Series system is a new generation in Open Industrial Control System design that provides an unprecedented ability to meet growing plant automation requirements. I/A Series systems continue to be forerunners of the future, always at the leading edge of capabilities.

The Foxboro Company
33 Commercial Street
Foxboro, Massachusetts 02035-2099
United States of America
Telephone 1-888-FOXBORO
(1-888-369-2676)

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