FOXBORO®

PSS 21H-3B1 B3

I/A Series® Hardware Application Processors

AP51D

AP51E

The Application Processors are microprocessor-based application processor/file server stations. They perform two basic functions:

- As application processor (computer) stations, they perform computation intensive functions.
- As file server stations, they process file requests from tasks within themselves or from other stations. Bulk storage devices used with the Application Processors include floppy disk drives, hard disk drives, streaming tape drives, and CD-ROMs.

The Application Processors operate in concert with other system stations (such as communication processors, workstation processors, and control processors), which provide the necessary means for data input/output and operator interfacing. A smaller I/A Series system can utilize a single Application Processor, while a larger system can incorporate several Application Processors, each configured to perform specific functions. Some functions can be performed by individual Application Processors, while others can be shared by two or more Application Processors in the same network.

The Model 51 Application Processors are available in three models: Style B, Style D, and Style E. Their operation is similar in terms of application functions performed, but the Application Processor 51 Style E offers the highest performance and greater bulk storage support capabilities.

For all models of the Application Processor, applications range from minimal functions, such as the storage of memory images, alarm events, and historical data, to larger-scale applications such as database management and program development.

A Small Computer System Interface (SCSI), designed into the Application Processors Style B, and Style E, provides an industry-standard bus (ANSI standard ANSC X3T9.2) to support peripherals that have SCSI-compatible controllers. An internal Enhanced Internal Device Electronics (EIDE) interface, designed into the Application Processor Style D, provides an industry-standard bus to support peripherals that have EIDE-compatible controllers. The Application Processor 51 Style D supports external SCSI devices when used with an optional SCSI-3 PCI card. The EIDE and SCSI interfaces thus allow flexibility in the utilization of peripheral devices, providing greater system performance and easy system upgrade.

Application Processor Functions

The following sections describe the major functions performed by the Application Processors.

System and Network Management Functions

The Application Processors perform system management functions, which include collecting system performance statistics, data reconciliation, performing station reloads, providing message broadcasting, handling all station alarms and messages, and maintaining consistent time and date in all system stations. The Application Processor also performs network management functions, which comprise that portion of system management functions which deal with the network.

Database Management

Database management involves the storage, manipulation, and retrieval of files containing data received and/or produced by the system. The Application Processors utilize the industry-standard INFORMIX-SQL Relational Data Base Management System.

File Requests

Each Application Processor contains a file manager, which manages all file requests associated with bulk memory attached to the Application Processor.

Each Application Processor also supports a remote file system which allows tasks in one station to share files in another.

Historical Data

The Application Processors can be configured to contain the Historian function, which maintains a history of application messages and continuous and discrete I/O values. These values may represent any parameters such as measurements, setpoints, outputs, and status switches from stations which have been configured to collect data and send it to a Historian. In addition, the Historian computes and stores a history of averages, maximums, minimums, and other derived values. This information is maintained for display, reporting, and access by application programs. An archiving facility saves the data on removable media, where applicable.

The Application Processors can be configured to maintain a history of errors, alarm conditions, and selected operator actions. The occurrence of errors, alarms, and events in other stations can be stored (for later review and analysis) by sending a message defining the event to the Historian in one or more Application Processors.

Graphic Display Support

The Application Processor supports graphic displays by storing and retrieving display formats, by providing access to objects stored on the Application Processor, and by storing tasks which execute in a workstation processor. Application Processors not only provide storage of information and file management for displays, but also execute programs that perform display and trend service.

Production Control Software

Production control software represents a large range of packages which require varied Application Processor resources. The following is a list of packages provided:

- INFORMIX DBMS
- Historian (6 sizes: 500, 1000, 1500, 2000, 4000, or 8000 points)
- Spreadsheet
- Physical Properties Library
- Mathematics Library
- BATCH

The operation and performance of the production control software are determined by the particular Application Processor configuration.

Configuration

Configuration, as used in this PSS, refers to the process of entering or selecting parameters to define what a software package does, or to define the environment for a software package. The Application Processors support configuration functions by providing bulk storage for configuration parameters and by executing some of the configuration processes.

Support Facilities

Support facilities include operator help and electronic documentation. Operator help provides on-line information about the Foxboro equipment and software packages; electronic documentation provides on-line access to documentation containing information similar to that contained in traditional instruction manuals.

Application Development Facilities

Application development tools are provided to build programs for all system stations. These include tools to document, enter, translate, link, test, and maintain programs written in several programming languages. The Application Processor supports program development for all I/A Series stations (workstation processors, control processors, and so forth).

Assembly language, FORTRAN, and C programs can be written on the Application Processor using standard operating system tools. An optional package is available including text editors, debuggers, linkers, revision control, and compilers, plus execution statistics functions.

User Application Program Execution

The Application Processors also execute user application programs. These may be application packages such as special optimizations, test data collections, special data reductions, or other packages that you may have already developed. The allocation of resources reserved for user application varies with each Application Processor.

Diagnostics

The Application Processors utilize three types of diagnostic tests to detect and/or isolate faults:

- Power-up self-checks
- Run-time and watchdog timer checks
- Off-line diagnostics

Power-up self-checks are initiated when power is applied to the Application Processor. These checks perform sequential tests on the various Application Processor functional elements. Any malfunction detected during the power-up self-checks is reported by means of messages printed or displayed on a directly connected printer or terminal.

The run-time and watchdog timer checks provide continuous monitoring of Application Processor functions during normal system operations. For any processor model, you are informed of a malfunction by means of printed or displayed system messages. Off-line diagnostics are temporarily loaded into the system for the purpose of performing comprehensive tests and checks on various system stations and devices. Using the off-line diagnostics, a suspected fault in the Application Processor can be isolated and/or confirmed.

Application Processor Associated Devices

Application Processors perform each of the functions mentioned above in conjunction with one or more file storage devices (for example, disk drives). Application Processors offer advanced bulk storage device handling capabilities, providing support for CD-ROMs, high-capacity hard disk drives, and high-capacity tape drives. As an option, for maximum system security and data availability, the hard disk drives connected to the Application Processors can be configured redundantly.

Large storage capacity of connected data storage devices, coupled with high-speed processing power of the Application Processor enhances the performance of the I/A Series system in terms of:

- Large historian data base storage capacity
- Instant availability of large volumes of applications software
- Support for third-party software
- High-speed access to database information
- High-speed execution of control and application programs.

Application Processors also offer an optional Token Ring interface and optional Ethernet interface for connecting to other networks such as DECnet or TCP/IP, thus providing communication with non Foxboro supplied host computers.

Table 1 lists the quantities and types of SCSI-based(1) devices served by the Application Processors.

Each Application Processor 51, Style B, can support

(1) The maximum number of SCSI devices may be determined by the maximum allowable equivalent SCSI cable length, which is 6 meters (20 feet) for SCSI-2 devices (such as the AP51, Style B), and 3 meters (10 feet) for high-speed, ultra-wide SCSI-3 devices (such as the AP51, Style E). This distance includes the SCSI cabling contained within the Application Processor, and can vary, depending on the machine. The Application Processors Style D and E are limited to two external SCSI devices due to their SCSI cabling length.

up to two internal and four external SCSI devices, along with its internal CD-ROM drive (for a total of seven). For example, if a CD-ROM, two digital tape drives, and four hard disk drives are selected, no more SCSI devices can be added for the processor.

The Application Processor 51, Style D internally contains one EIDE hard drive and one CD-ROM drive. An optional SCSI-3 PCI card allows the AP51D to support up to two external SCSI devices.

The Application Processor 51 Style E can supports up to two external SCSI devices on its high performance SCSI-3 port. The Application Processor 51, Style E can internally contain up to two SCSI hard drives and either a CD-ROM or digital tape (drive, along with these external SCSI devices.

Table 1. Quantities and Types of External SCSI Devices Served by Application Processors

AP51B, AP51D(a), AP51E	1	CD-ROM drive, with controller
AP51B, AP51D(a), AP51E	1	2.5 GB Quarter-Inch Cartridge (QIC) streaming tape drive with controller
AP51B, AP51D(a), AP51E	1	5.0 GB digital tape drive with controller
AP51B, AP51D(a), AP51E	1	12.0 GB digital tape drive with controller
AP51B	4	Hard disk drives, with embedded controllers(b)
AP51D(a), AP51E	2	

(a) The AP51D requires and optional SCSI-3 PCI card to support external SCSI devices.

(b)For the AP51, Style B and E, an optional redundant hard disk drive configuration is available, providing a second SCSI port which allows up to eight hard disk drives for the AP51, Style B, or up to two hard disk drives for the Application Processor 51, Style E.

In the optional redundant (mirrored) hard disk drive configuration, a second SCSI port is included for the Application Processor Styles B and E. Each SCSI port can connect up to four external hard disk drives for the Application Processor, Style B, for a total of eight (four redundant pairs), or up to two external hard drives to the Application Processor, Style E for a total of four (two redundant pairs). The streaming tape drives and CD-ROMs cannot be configured redundantly.

The Application Processor 51, Style B, consists of a single C-size module form factor for mounting in I/A Series enclosures or in a Modular Industrial Workstation Bay. Alternatively, this processor can be mounted in a 19-inch rack equipped with a Foxboro designed modular mounting structure, or in a tabletop configuration.

The Application Processor, Style D consists of an F-size module form factor. The Application Processor, Style E consists of an E-size module form factor. The AP51D and AP51E can be mounted in I/A Series plastic and metal enclosures in a Foxboro designed dual height modular mounting structure, hardened enclosures, Modular Industrial Workstations, and Modular Industrial Consoles or in a tabletop configuration.

Interfacing with the I/A Series Nodebus is effected via a Dual Nodebus Interface Module, Dual Nodebus 10Base-T Interface, or Dual Nodebus Interface Extender Module (refer to Product Specification Sheet PSS 21H-7B2 B4).

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