I/A Series® Hardware
Field Automation Subsystem
Micro-I/A™ Station Overview

DESCRIPTION

The Micro-I/A family of products provides a universal processing platform of configurable and expandable processors suitable for a wide variety of distributed and field-based automation functions. Depending on hardware and software choices, the family performs control, device integration, field communication network integration, user display and supervisory functions.

The Micro-I/A stations are the first members of the Micro-I/A family. They are designed to run various real-time control-related software packages for continuous, batch and discrete control as well as for integration of a wide range of field devices and fieldbus technologies. The first software package is Integrated Control software, which integrates continuous, batch and discrete control function blocks with a selection of I/O subsystems including Foxboro, GE™ Field Control, Allen-Bradley™ Flex™ I/O and A-B™ PLCs™ via Ethernet, PROFIBUS-DP™ and Modbus™ subsystems.

Key processor attributes include:

- Stackable and expandable design utilizing an open architecture that is based on Personal Computer Memory Card Industry Association (PCMCIA) technology (sometimes referred to as PC card technology)

- Wide selection of card options for both system and field communications

- Small, compact packaging, available in a Type 1 physical package for DIN rail mounting. The packaging geometry enables the Micro-I/A stations to be mounted in field locations adjacent to the plant equipment being controlled

- Micro-I/A stations are part of the I/A Series family of control products and thus can be used in a variety of small and large I/A Series system configurations running with either UNIX® or Windows NT® platforms.

ARCHITECTURE

The architecture of the Micro-I/A stations is based on the PCMCIA standards and incorporated into a unique stackable design. This open architecture permits the user to select the main processor as well as each PCMCIA card desired for system (network) communication and field communications. The multiple card slots enable expansion from the smallest configuration (that is, a single processor with one system and one field communication card) to a large configuration consisting of a processor, a system communication card and multiple field communication cards. This design permits easy field removal and replacement of failed PCMCIA cards as well as introduction of additional cards into available slots.

PROCESSOR

The design employs a unique credit card size processor that plugs into a dedicated connector in the head section of the Micro-I/A station. A variety of processor cards permits selection of the capacity, performance and peripheral interfaces appropriate to the application. The modular design facilitates easy upgrades to different processor cards as desired.

SYSTEM COMMUNICATIONS

System communications are implemented through the selected PCMCIA host communication option cards. One or two single cable Ethernet cards with either a 10Base2 or 10BaseT interface are supported. A card connects to a single cable I/A Series Ethernet control bus. This provides the capability to construct a small to medium size system consisting of up to 64 stations and comprised of multiple Micro-I/A stations, workstation processors, application workstations, operator workstations and engineering/operator workstations, on one Ethernet control bus.

As system size increases, the Ethernet control bus can be connected to an I/A Series Nodebus via a Nodebus interface module; for large systems, the I/A Series Nodebus segments can be interconnected via the I/A Series Carrierband LAN interface module.

In a multi-node system, Micro-I/A stations require a host station to be in the local node, where they reside.

Two examples of system communication schemes are illustrated; one is a small sized system based on a Windows NT platform and the other is a medium sized system based on a UNIX platform.

FIELD COMMUNICATIONS

Field communications are implemented through the selected PCMCIA field communication option cards. The Type 1 station can house up to three field communication card options. Currently, the available option cards include the I/A Series Fieldbus Interface, General Electric Fanuc™ Direct Connect I/O Interface, Allen-Bradley Remote I/O Interface to the A-B FLEX I/O system, PROFIBUS-DP Interface, Modbus Interface and Ethernet Interface to A-B programmable logic controllers (PLCs).

I/A Series Fieldbus Interface – This interface provides field communication between a Micro-I/A station and an I/A Series Fieldbus. A single I/A Series Fieldbus Interface card is supported within each processor.

OPERATOR STATIONS

HOST AND ENGINEERING STATION

AW70/
AW51

WP70/
WP51

ETHERNET HUB

TWISTED-PAIR
CABLE

TWISTED-PAIR
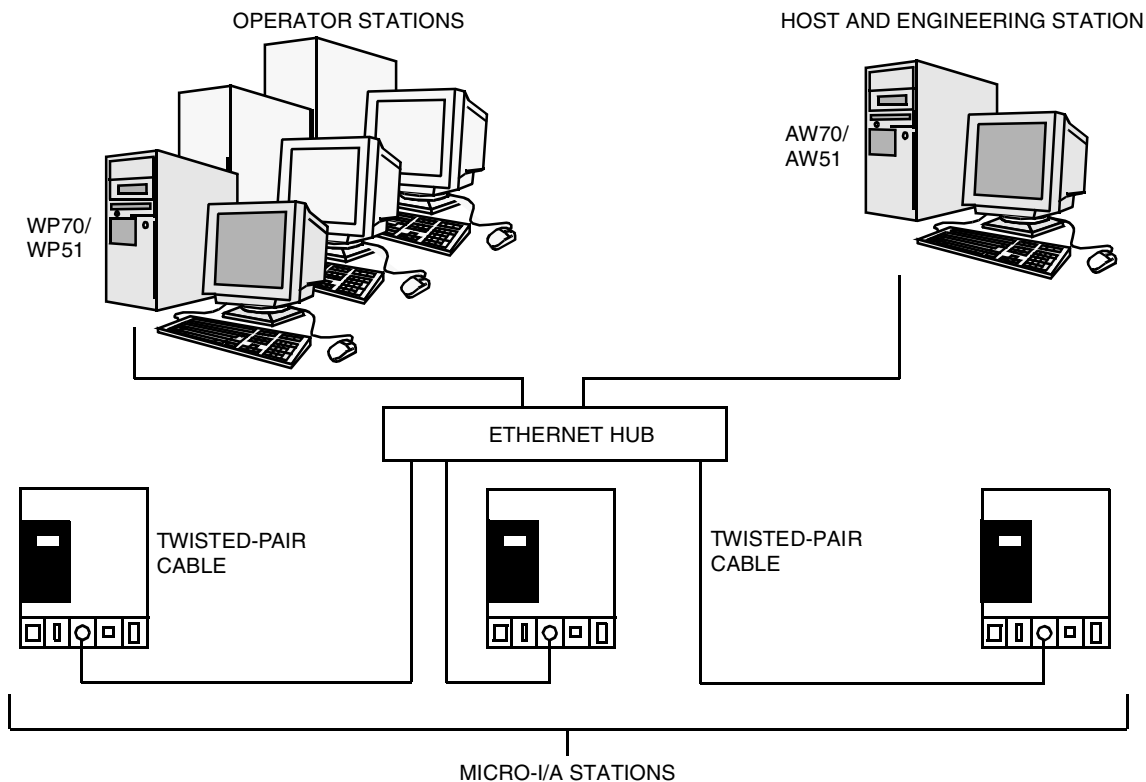CABLE

MICRO-I/A STATIONS

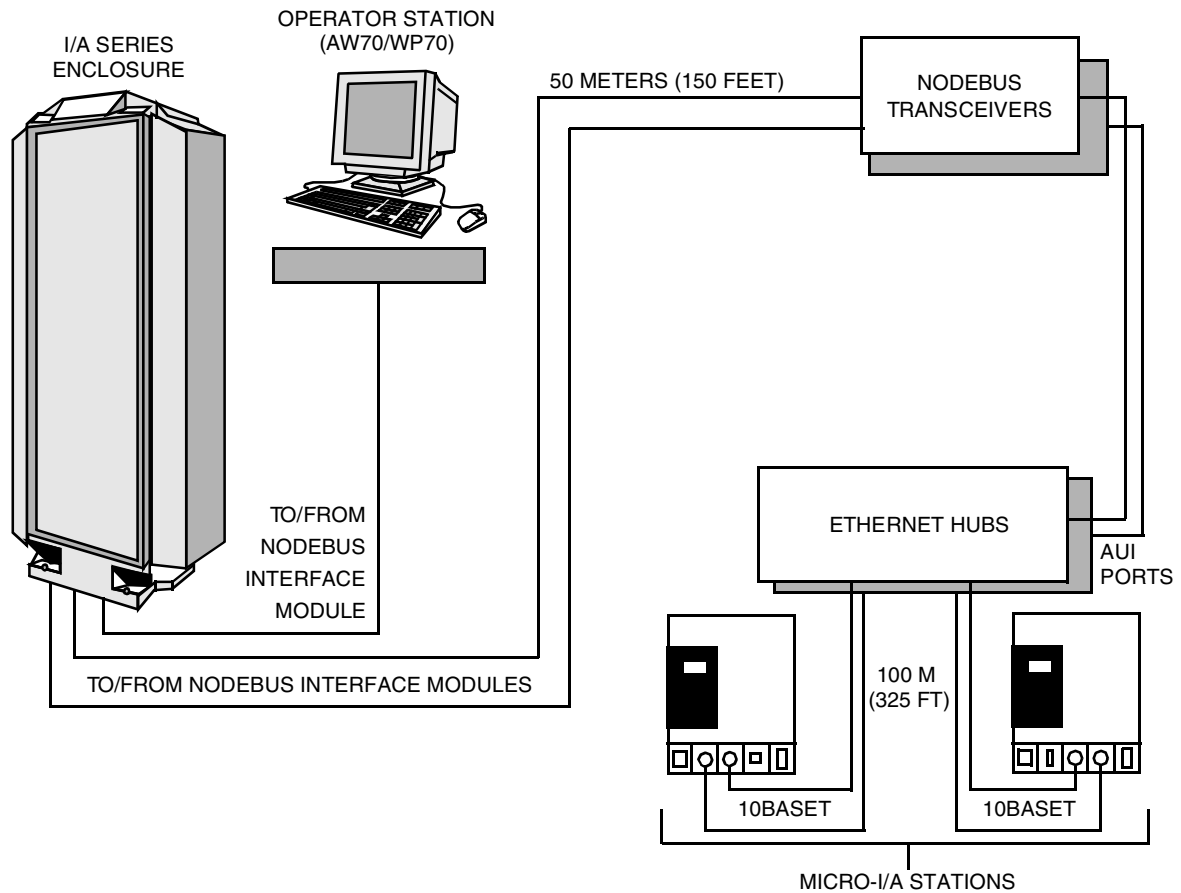Figure 1. Small System Example: Local Distribution (10BaseT to Ethernet Hub)

Figure 2. Medium System Example: Geographical Distribution (10BaseT and Nodebus)

Allen-Bradley Remote I/O Interface – This interface provides field communication between a Micro-I/A station and an Allen-Bradley Flex I/O network. Three Allen-Bradley Remote I/O Interface cards can be installed and run currently in a single Type 1 station.

GE Fanuc Direct Connect I/O Interface – This interface provides field communication between a Micro-I/A station and up to eight GE Field Control I/O modules. Three GE Fanuc Direct Connect I/O Interface cards are supported in a single Type 1 station. When this interface is used, the optional 6.5 V dc power supply is required.

PROFIBUS-DP Interface – This interface provides field communications between a Micro-I/A station and a PROFIBUS-DP network. Three PROFIBUS-DP interface cards can be installed and run concurrently in a single Type 1 station.

Modbus Interface – This interface provides field communications between a Micro-I/A station and a Modbus network. Two Modbus interfaces can be installed and run concurrently in a single Type 1 station.

Allen-Bradley PLC Ethernet Interface – This interface provides field communications between a Micro-I/A station and an Allen-Bradley PLC5™ Ethernet network. A single A-B PLC Ethernet interface card is supported in a Micro-I/A Type 1 station.
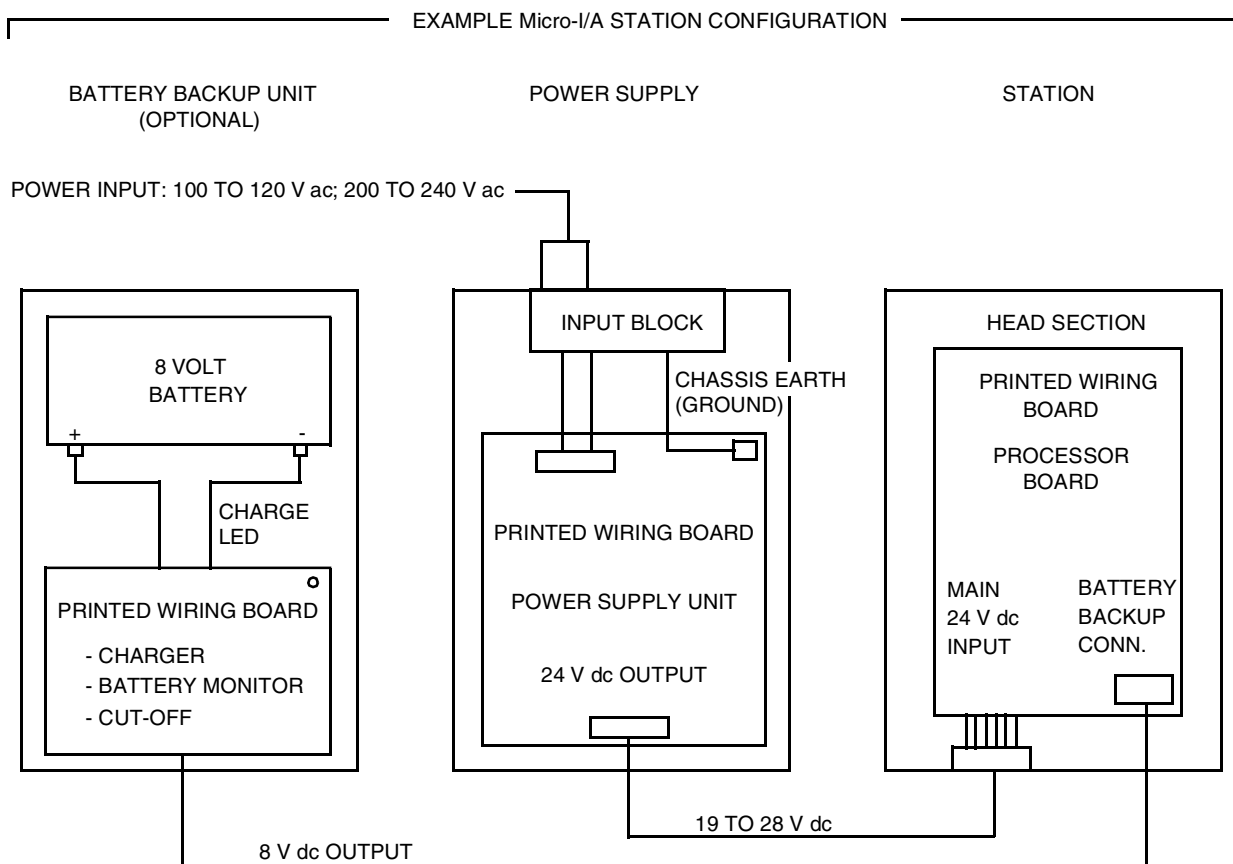
EXAMPLE Micro-I/A STATION CONFIGURATION

BATTERY BACKUP UNIT
(OPTIONAL)

POWER SUPPLY

STATION

POWER INPUT: 100 TO 120 V ac; 200 TO 240 V ac

8 VOLT
BATTERY

+   -

CHARGE
LED

PRINTED WIRING BOARD

- CHARGER
- BATTERY MONITOR
- CUT-OFF

INPUT BLOCK

CHASSIS EARTH
(GROUND)

PRINTED WIRING BOARD

POWER SUPPLY UNIT

24 V dc OUTPUT

HEAD SECTION

PRINTED WIRING
BOARD

PROCESSOR
BOARD

MAIN
24 V dc
INPUT

BATTERY
BACKUP
CONN.

19 TO 28 V dc

8 V dc OUTPUT

Figure 3. Power Configuration Example

SOFTWARE

The Micro-I/A stations are designed to support various software packages. Currently, the Integrated Control software package is available and supports a full set of Foxboro block types in continuous and sequential domains including the PLB block (Programmable Logic Block) from the ladder logic domain (when used with I/A Series Fieldbus Modules) as described in PSS 21S-3B1 B3 Integrated Control Product Specification Sheet. The Integrated Control software package is remotely booted by any 50 Series or 70 Series Application Processor or Application Workstation.

The Integrated Control software is licensed in several modular capacities to enable the user to economically select the smallest capacity Micro-I/A station appropriate to the process being controlled. Integrated Control software supports basic processing cycles ranging from 100 milliseconds to 2 seconds.

System Management software monitors system and communication health of the Micro-I/A station by utilizing the unique module identifier (letterbug) which is assigned through a software utility to the processor card within each Micro-I/A station.

POWER SUPPLIES (OPTIONAL)

The appropriate power supply should be selected to match input voltage, security schemes and (when applicable) connected system device requirements.

The optional power supply mounts on the DIN rail at the left side of the Micro-I/A station and is connected to the processor via plug-in cables. The two optional power supplies available are:

- A *24 V dc Power Supply* – This power supply can be fed from a wide range (100 to 120 V ac or 200 to 264 V ac) of input voltages and provides 24 V dc primary power to the head section in the Micro-I/A Type 1 station. The supply is not required if 24 V dc Safety Extra Low Voltage (SELV) limited power (Class 2) is available.

- A *6.5 V dc Power Supply* – This power supply (not shown) is required when the Micro-I/A station is connected to GE Fanuc I/O Modules via the GE Fanuc Direct Connect I/O Interface. The supply can be fed from a wide range (100 to 120 V ac or 200 to 264 V ac) of input voltages and provides 6.5 V dc primary power to the I/O modules.

POWER FILTER

A power filter (Schaffner FN2080-1-06 or equivalent) is required for European installations when a Foxboro power supply is not used.

BATTERY BACKUP

The *Battery Backup Unit (BBU)* consists of a charger and battery subsystem. It can be used where long term suspend operation during power outages is desired. When fully charged, the BBU can completely power a fully operating Micro-I/A station for up to 180 minutes exclusive of I/O.

PACKAGING

The Micro-I/A Type 1 station is available in two configurations:

- Head Section only
- Head Section plus Expander Section.

Head Section – This section contains one connector for a processor card plus two slots for PCMCIA cards. Typically the first and second PCMCIA card slots are respectively used for the system and field communication option cards. The head section includes an expander section connector and supports field upgrades to add the expander section.

Expander Section – The expander section adds two PCMCIA card slots which are typically used to incorporate additional field communication option cards. The Micro-I/A Type 1 station has the physical space to accommodate one expander section.

MOUNTING

The compact Micro-I/A Type 1 station design is intended for field mounting on a horizontal DIN rail in close proximity to the devices being controlled. The station is typically installed in a vented or sealed enclosure along with other field equipment.

ELECTRONIC IDENTIFICATION

The Micro-I/A stations contain an electronic letterbug and PCMCIA card identification system which enables:

- Automatic rebooting and downloading of the control strategy specific to a Micro-I/A station

- Validation of proper insertion of PCMCIA cards following a repair (replacement).

Automatic Reboot Support – Each Micro-I/A station is identified to the system by a unique, user-configured, 6-character alphanumeric code as well as by a manufacturing loaded serial number stored in the EEPROM on the head section. A user-writable label is provided on the front of the unit; the label is useful for marking the unit with the letterbug code and thus facilitating maintenance activities.

Location Validation – The identity of each option card is automatically detected to verify proper card placement. If an improper card is inserted during repair, the Systems Management user interface is notified of the error.

MAINTENANCE INTERFACE

The maintenance interface consists of two indicators (that is, one red and one green LED) as well as a RESET pushbutton. The indicators present the status of the controller to the extent described in the table below. System and field communication option cards are replaceable without disturbing external user terminations.

INTERIOR ACCESS AND REPAIR

Easy access to the PCMCIA cards is provided by removing the cover of the Micro-I/A Type 1 station. These cards can be removed and reinserted/replaced without disturbing external user terminations. The PCMCIA cards are sealed units; failed cards are simply replaced with new ones.

Condition	Green LED	Red LED	Repair Action
Head Section Failure	OFF	OFF	If powered, check power and cables then replace head section
Processor Card Failure	OFF	ON	Replace processor card
Ethernet Card Failure	OFF	FLASH	Replace failed Ethernet PCMCIA card
Request Letterbug	FLASH*	FLASH*	Assign letterbug

* Both LEDs flash simultaneously; **not** alternately.

SPECIFICATIONS

The functional, environmental and physical specifications for the primary elements of the Micro-I/A station are contained in the respective detailed PSSs identified in the following paragraph.

REFERENCES

Detailed descriptive information and associated specifications concerning the Micro-I/A station and its associated power supplies, battery backup unit, processor, packaging, interfaces and software are contained in the Product Specification Sheets identified below.

PSS 21H-6B1 B4:
Micro-I/A 24 V dc Power Supply (Type 1)

PSS 21H-6B2 B4:
Micro-I/A Battery Backup Unit (Type 1)

PSS 21H-6B4 B4:
Micro-I/A Type 1 Station

PSS 21H-6B6 B4:
Micro-I/A Station Single and Dual Ethernet Interface

PSS 21H-6B7 B4:
Micro-I/A I/A Series Fieldbus Interface

PSS 21H-6B8 B4:
Micro-I/A Station Allen-Bradley Remote I/O Interface

PSS 21H-6B9 B4:
Micro-I/A GE Fanuc Direct Connect I/O Interface

PSS 21H-6C1 B4:
Micro-I/A Station Integrated Control Software

PSS 21H-6C2 B4:
Micro-I/A 6.5 V dc Power Supply (Type 1)

PSS 21H-6C3 B4:
Micro-I/A Station 486DX4-75, 4 and 8 MB Processors

PSS 21H-6C4 B4:
Micro-I/A Station PROFIBUS-DP Interface

PSS 21H-6C5 B4:
Micro-I/A Station Modbus Interface

PSS 21H-6C6 B4:
Micro-I/A Station Allen-Bradley PLC5/E Ethernet Interface

PATENT INFORMATION

The Micro-I/A Type 1 station is protected by one or more U.S. patents: 6,076,124; 6,033,257; 6,183,289; 6,008,985; D394,842; and their counterparts in other countries.

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