

FISHER-ROSEMOUNT

RS3™

**System
Overview
Manual and
Glossary**

Performance Series1, Release 4.0

August 1999

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RS3™ Manuals

System Overview Manual and Glossary

1984-2640-21x0

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FISHER-ROSEMOUNT

RS3™

System Overview Manual and Glossary

About This Manual

This manual gives a general overview of the RS3™.

Section 1	Gives a brief overview of the manuals that are included in the documentation set.
Section 2	Gives a brief introduction to the contents of this manual.
Section 3	Describes the available hardware components.
Section 4	Describes the software system.
Section 5	Describes the addressing scheme.
Section 6	Lists superseded hardware that is rarely shipped because more current hardware usually offers greater functionality.
Glossary	Defines terms used in the user manuals.

Changes for This Release

- Corrected the End-Recipe icon in Figure 4-17.
- Updated the information on addressing in Section 5.
- Removed all references to SRU, SQC, and Material History, which are now obsolete.
- Removed referenced to floppy drives, which are no longer supported.

Revision Level for This Manual

For This Software Version:	Refer to This Document:		
	Title	Date	Part Number
P1R4.0	System Overview Manual and Glossary	August 1999	1984-2640-
P1R1.0	System Overview Manual and Glossary	May 1996	1984-2640-21x0
18R2	System Overview Manual and Glossary	August 1994	1984-2640-18x1
18R1	System Overview Manual and Glossary	October 1993	1984-2640-18x1
17	System Overview Manual and Glossary	August 1992	1984-2640-17x1
16	System Overview Manual and Glossary	January 1992	1984-2640-16x1
15	System Overview Manual and Glossary	January 1991	1984-2640-15x1

References to Other Manuals

References to other RS3 user manuals list the manual, chapter, and sometimes the section as shown below.

Example Entries:

For ..., see CC: 3.

↑ ↑
Manual Title Chapter

For ..., see CC: 1-1.

↑ ↑
Manual Title Chapter-Section

Abbreviations of Manual Titles

AL = Alarm Messages
BA = ABC Batch
CB = ControlBlock Configuration
CC = Console Configuration
DT = Disk and Tape Functions
IO = I/O Block Configuration
OP = Operator's Guide
OV = System Overview and Glossary
PW = PeerWay Interfaces
RB = Rosemount Basic Language
RI = RNI Release Notes and Installation Guide
RP = RNI Programmer's Reference Manual
SP = Site Preparation and Installation
SV = Service

Reference Documents

Related Documents

You may find the following documents helpful when using this manual:

<i>ABC Batch Software Manual</i>	1984-2654-21x0
<i>Configuration Quick Reference Guide</i>	1984-2812-0808
<i>Console Configuration Manual</i>	1984-2643-21x0
<i>ControlBlock Configuration Manual</i>	1984-2646-21x0
<i>I/O Block Configuration Manual</i>	1984-2645-21x0
<i>PeerWay Interfaces Manual</i>	1984-2650-21x0
<i>Rosemount Basic Language Manual</i>	1984-2653-21x0
<i>RNI Programmer's Reference Manual</i>	1984-3356-02x1
<i>RNI Release Notes and Installation Guide</i>	1984-3357-02x1
<i>Service Manual, Volume 1</i>	1984-2648-21x0
<i>Service Manual, Volume 2</i>	1984-2648-31x0
<i>Service Quick Reference Guide</i>	1984-2816-0904
<i>Site Preparation and Installation Manual</i>	1984-2642-21x0
<i>Software Discrepancies for Performance Series 1</i>	1984-2818-0311
<i>Software Release Notes, Performance Series 1</i>	1984-2818-0110
<i>User Manual Master Index</i>	1984-2641-21x0

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Section 1: Documentation Guides

This section contains illustrations that show which RS3 manuals you will probably need, depending on your job. Documentation guides are included for:

- Configurors
- Service/Maintenance personnel
- Operators

The guides show the manuals that you will probably need in black, whereas other manuals are shown in light grey.

Manual Codes

Notice that the guides use two letter abbreviations or codes to identify the different RS3 manuals. You will find these codes on the spine or front cover of each manual. These codes are used throughout the RS3 manuals to identify individual manuals quickly and easily.

User Manuals for Configurors

Introduction



Master Index



System Overview and Glossary

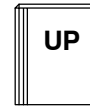
Release Documentation



Release Notes



Software Defects



Upgrade Procedure

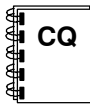
Core Documentation



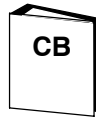
Alarm Messages



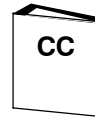
Operator's Guide



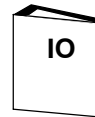
Configuration Quick Reference



ControlBlock Configuration



Console Configuration



I/O Block Configuration



Disk and Tape Functions



Site Preparation and Installation



Service Quick Reference

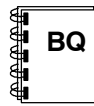


Service

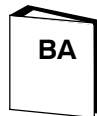


Service

Optional Product Documentation



Batch Quick Reference



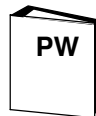
ABC Batch



Batch Operator's Guide



Rosemount Basic Language



PeerWay Interfaces



RNI Programmer's Reference



RNI Installation Guide



RNI Release Notes

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Introduction



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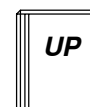
Release Documentation



Release Notes

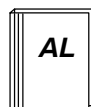


Software Defects



Upgrade Procedure

Core Documentation



Alarm Messages



Operator's Guide



Configuration Quick Reference



ControlBlock Configuration



Console Configuration



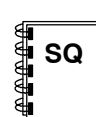
I/O Block Configuration



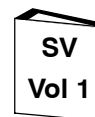
Disk and Tape Functions



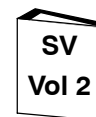
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Service Quick Reference



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Service

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Batch Quick Reference



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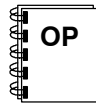


Upgrade Procedure

Core Documentation



Alarm Messages



Operator's Guide



Configuration Quick Reference



ControlBlock Configuration



Console Configuration



I/O Block Configuration



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Service Quick Reference



Service



Service

Optional Product Documentation



Batch Quick Reference



ABC Batch



Batch Operator's Guide



Rosemount Basic Language



PeerWay Interfaces



RNI Programmer's Reference



RNI Installation Guide



RNI Release Notes

Section 2: Introduction to the RS3

This manual provides an overview of the RS3 control system hardware and describes how the control system is structured. In addition, an overview of the software functionality provides a conceptual description of the RS3 control system. An overview of the scheme for addressing I/O points and software addresses shows how data is successfully routed around the system. A final section lists superseded hardware.

Major System Components

The RS3 distributed control system is composed of a communications PeerWay and one or more operator interfaces (consoles), ControlFiles, and system interfaces. Figure 2.1 shows how these components can be configured in various ways to meet your control needs. Detailed descriptions of the RS3 control system components are contained in other manuals.

PeerWay

All system devices are linked together via the PeerWay, which is a redundant communications highway that allows every device to communicate directly with other devices on the highway.

Consoles

RS3 Consoles consist of a color monitor, a keyboard set, a combined video/keyboard interface board, a microprocessor/ communication card cage, a hard disk, optional backup data storage, and optional supporting hardware.

In addition to the console electronics that are listed, you can order tabletop designs or electronics that are fully mounted in cabinets, standard furniture, or custom consoles. Designs that are specially hardened, sealed, or purged are also available for custom projects.

ControlFiles

The RS3 ControlFiles house Controller Processors. The Controller Processor receives and stores input values and makes the values available to other nodes. In addition, the Controller Processor evaluates input data to determine values for continuous and discrete (logic) outputs.

The MultiPurpose Controller Processor is the brain of the system where all calculations and logic functions are performed. The card cages, termination panels, FlexTerms, and marshaling panels provide field wiring termination and signal conditioning. The available card cages, FlexTerms, and termination panels are the MultiPurpose Controller Processor (MPC) analog card cage, the MPC contact card cage, the Multiplexer FlexTerm, the Communications FlexTerm, and the Multipoint I/O Termination Panel.

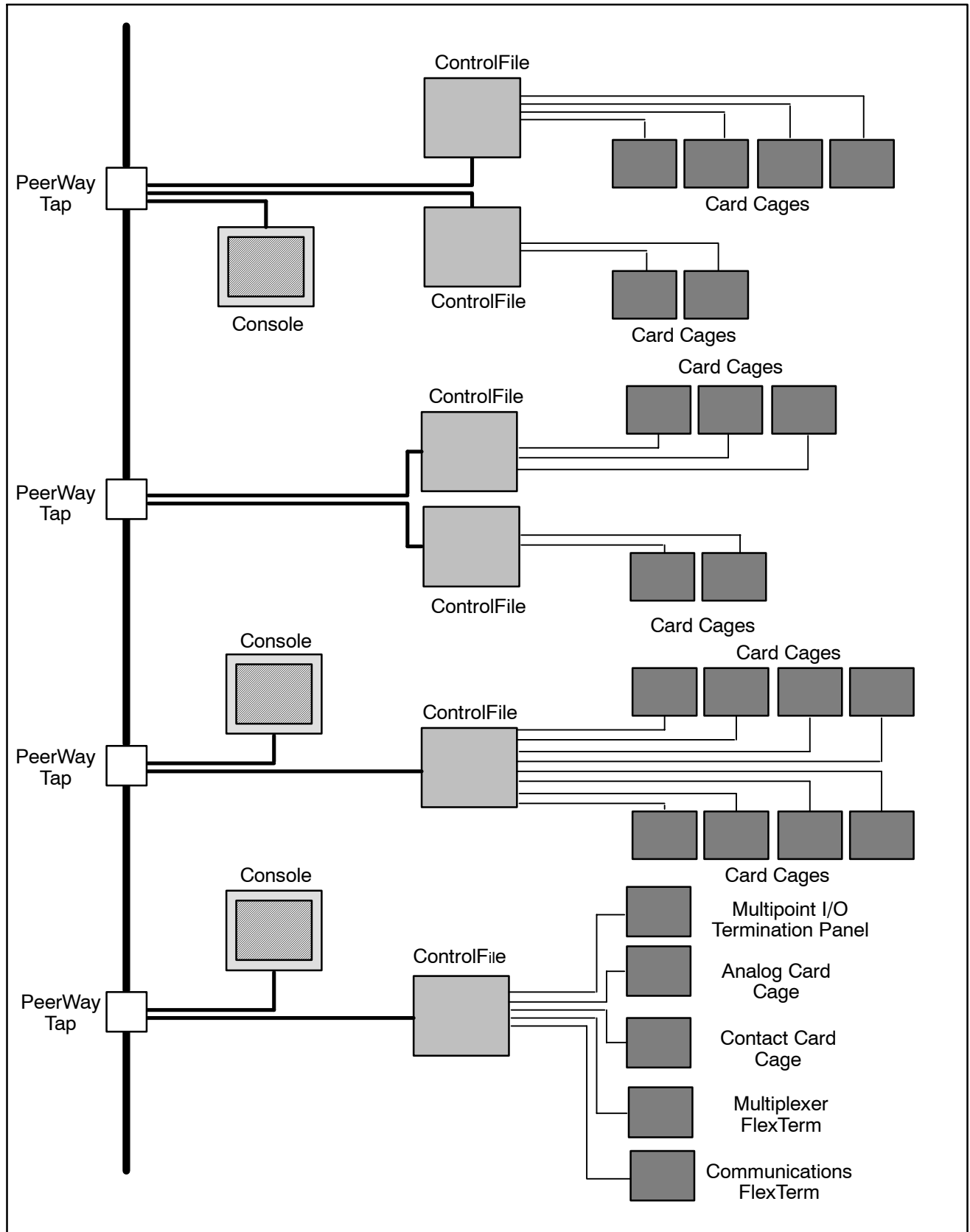


Figure 2.1. System Architecture

PeerWay Interface Devices

Several types of system interfaces are available to provide additional support to the PeerWay. Figure 2.2 shows the node interfaces that are connected to the PeerWay.

- **RS3 Network Interface (RNI)**
The RNI allows communication between the RS3 control system and other computers on an Ethernet network.
- **Supervisory Computer Interface (SCI)**
The use of a Supervisory Computer Interface allows information to be shared either between the RS3 control system and a host computer, or between the RS3 control system and the Rosemount Diogenes® control system.
- **VAX® to PeerWay Interface**
The VAX to PeerWay Interface allows for communication between a VAX computer and the RS3 control system.
- **Diogenes Interface**
The Rosemount Diogenes® control system can share information with the RS3 control system by using the Diogenes Interface.

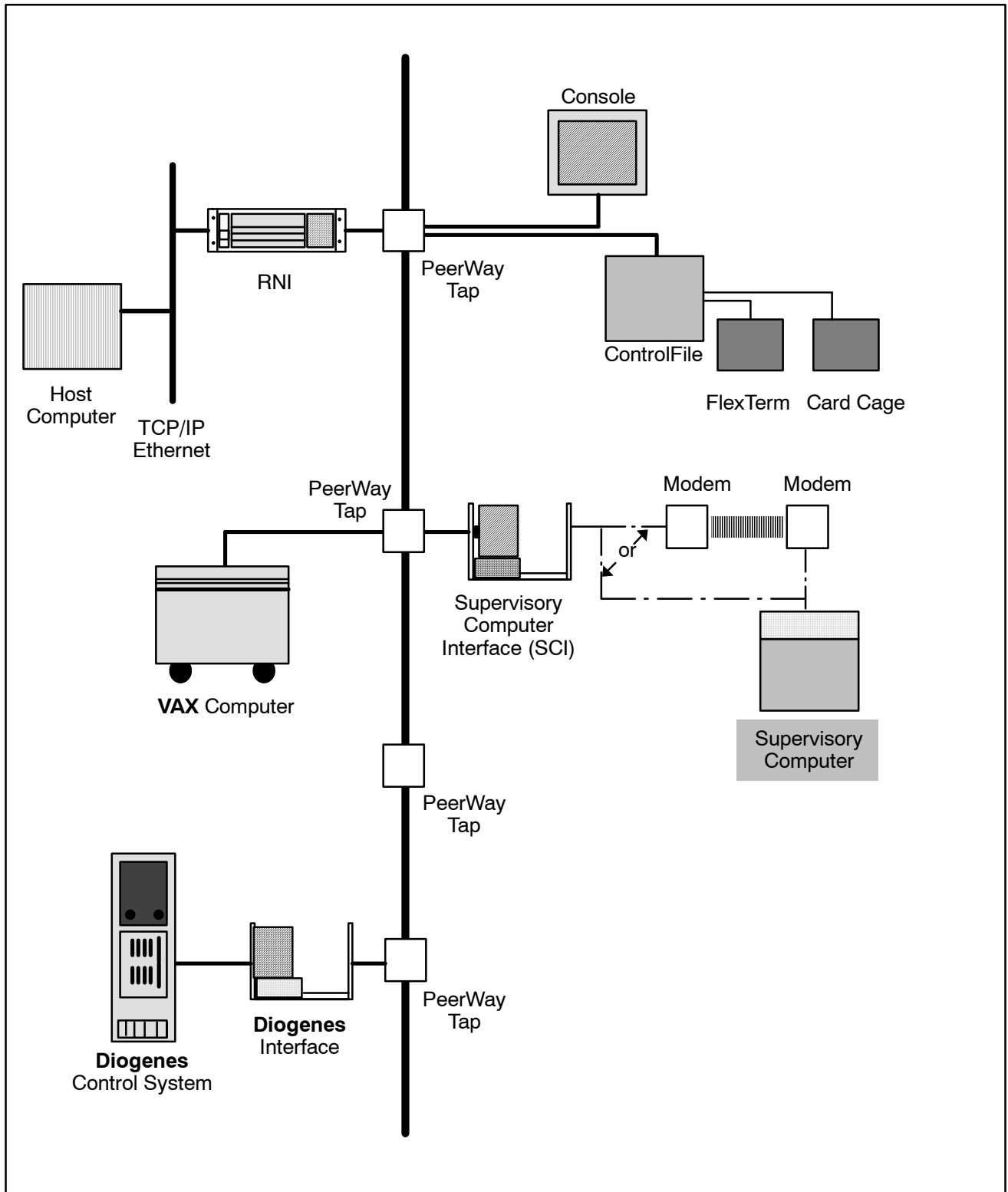


Figure 2.2. PeerWay Node Interfaces

Software Functionality and Organization

The RS3 software provides two types of software blocks: input/output (I/O) blocks and ControlBlocks. The I/O blocks process field input or output data. The ControlBlocks are configured both to evaluate inputs, and to calculate continuous and discrete outputs. The blocks are configured into loops to perform calculations and functions. One ControlBlock and at least one input and one output block are required to configure a control loop. The Controller Processor card is the heart of the process control loop: the control blocks, as well as the input and output blocks, all reside in it. The input and output blocks, together with the Field Interface Cards (FICs), make up the control loop structure.

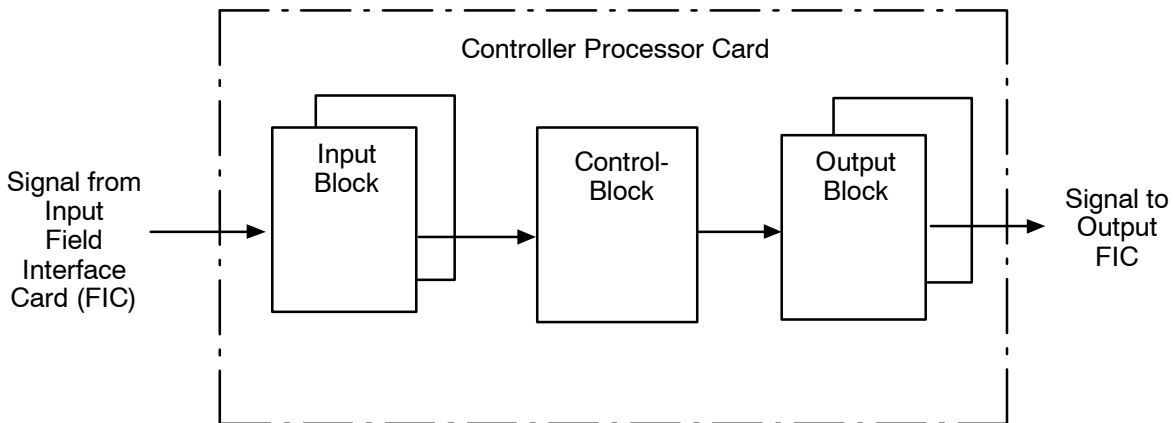


Figure 2.3. Control Loop Concept

Addressing

The addressing scheme for both the PeerWay nodes and the components within the ControlFile provide a means of locating data that is routed from the field to the system, from one software block to another within the system, from the system to the field, and between the system and the consoles.

Superseded Hardware

Before the development of the single Multipurpose Controller Processor, each of the four types of Controller Processors that were available had a corresponding FlexTerm. These Controller Processors include the Multi-Loop, Contact, Single-Strategy, and Multiplexer Controller Processors. For more information, see Section 6 of this manual.

Section 3: Hardware Components

RS3 control system hardware components include:

- PeerWay
- Consoles
- ControlFiles
- I/O Hardware
- PeerWay interfaces

PeerWay

The PeerWay is the primary communications highway that interlinks all RS3 devices. It consists of two redundant cables. These PeerWay cables can be twinaxial (twinax) electric, fiber optic, or a combination of both cable types. The twinax cable is an electrical cable with communication lines that are shared. The fiber optic cable is a dual fiber optic cable with separate transmit and receive lines.

A single PeerWay can accommodate as many as 32 system devices. This allows each device to communicate with the other devices on the PeerWay. Each device that connects to the PeerWay is called a PeerWay node. PeerWay nodes can be operator consoles, ControlFiles, or computer interfaces. Up to 31 PeerWays can be connected together with Highway Interface Adapters (HIAs), to allow communications over multiple PeerWays.

All PeerWay hardware components are redundant to provide maximum reliability. At each drop point, both PeerWay cables connect to a PeerWay tap. The tap pair is composed of Tap A and Tap B. The PeerWay tap differs according to the type of PeerWay cable used: twinax electrical, fiber optic, or both. If both twinax and fiber optic PeerWay cables are used in a system, they must be connected via an HIA.

For a more detailed description of the PeerWay, see SV: 2.

Twinax PeerWay Taps

Figure 3.1 shows a PeerWay tap pair with a twinax cable . The tap pair can connect up to four nodes (devices). These devices are connected to the PeerWay tap pair via drop cables to each PeerWay tap.

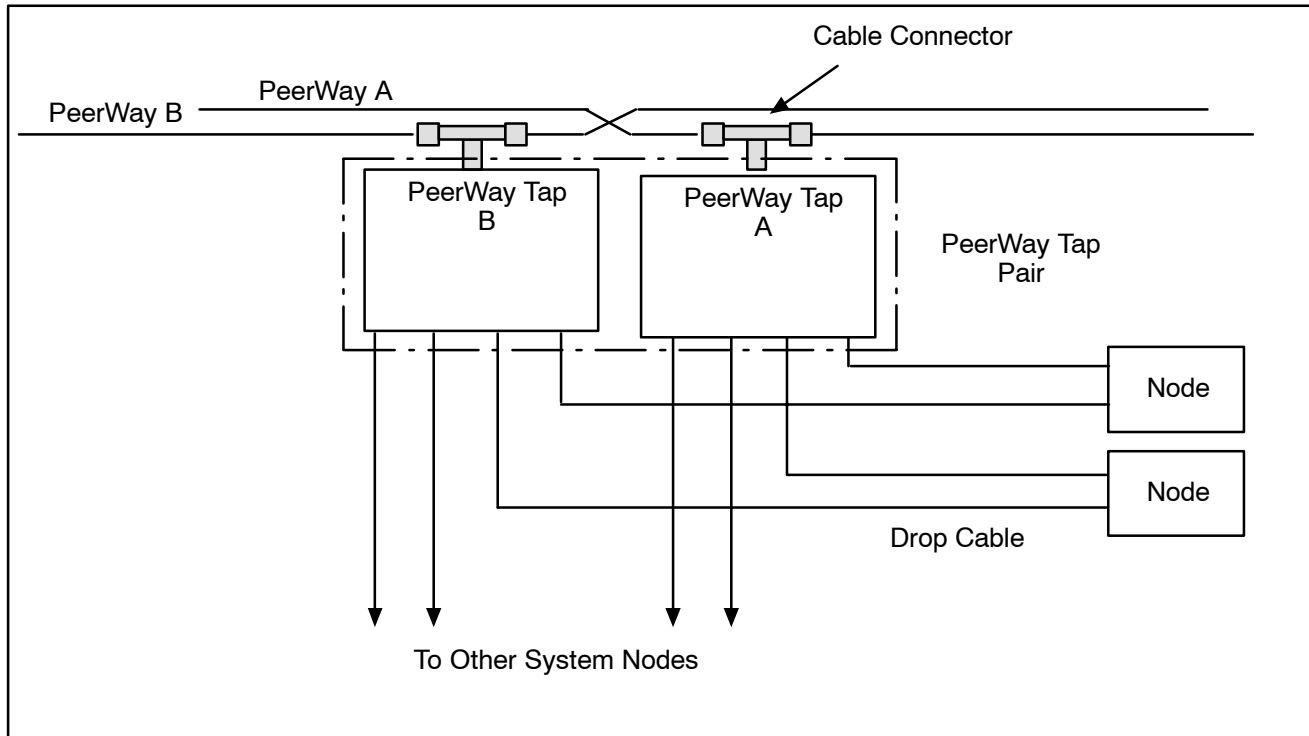


Figure 3.1. PeerWay Tap Pair with Twinax Cable

Fiber Optic PeerWay Taps

The fiber optic PeerWay cable connection consists of a rack-mounted star coupler with up to eight optical taps. Each optical tap can support up to three electrical taps via an electrical daisy chain connection. The star coupler distributes all signals that are transmitted to each individual optical tap box. The star coupler does this by means of its eight glass fibers, which are twisted together at the center and then heated until they are fused into one common fiber at the center. The optical tap box optically transmits to and receives data from the electrical tap boxes that are connected to it. The optical and electrical tap boxes can connect up to four nodes. These devices are connected to the tap box via an RS-422 cable.

Figure 3.2 shows a fiber optic PeerWay architecture that includes both optical and electrical taps.

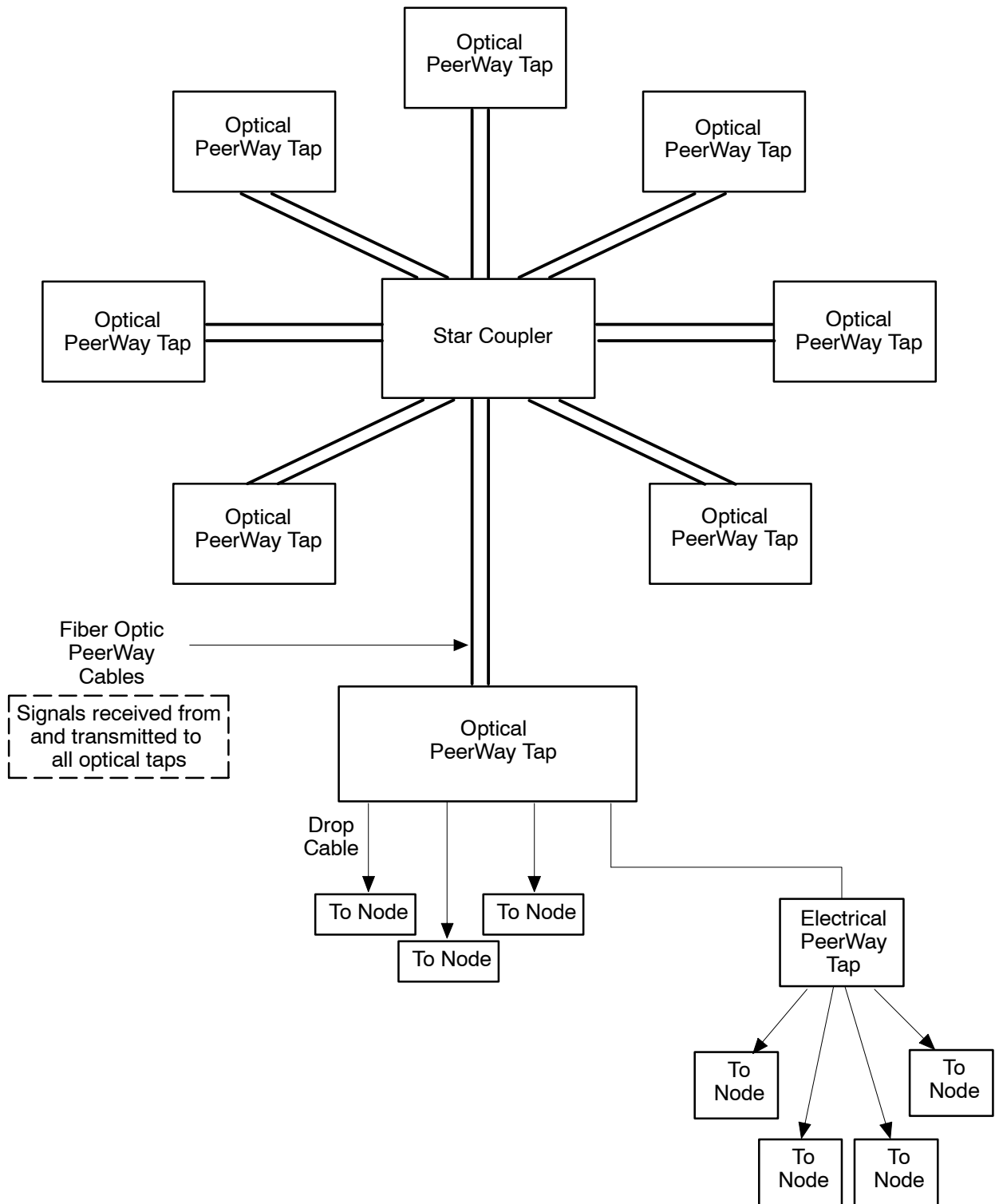


Figure 3.2. PeerWay Taps with Fiber Optic Cable

Highway Interface Adapter (HIA)

The Highway Interface Adapter (HIA) allows for communications among RS3 PeerWays. The HIA consists of a card cage and associated hardware that connects directly to the PeerWay as a node. A cable or other device connects the HIAs to provide PeerWay-to-PeerWay communications.

Figure 3.3 shows four PeerWays connected by HIAs. If communications should fail between a pair of HIAs, data can still be routed to the proper destination because the HIAs in Figure 3.3 are configured to provide alternate communication paths.

The two HIAs that make up a PeerWay interface are typically contained side by side in a shelf assembly. HIAs allow up to 31 PeerWays to be connected, each with up to 32 nodes, to provide up to 992 nodes on one system. Each HIA is a node on its own PeerWay.

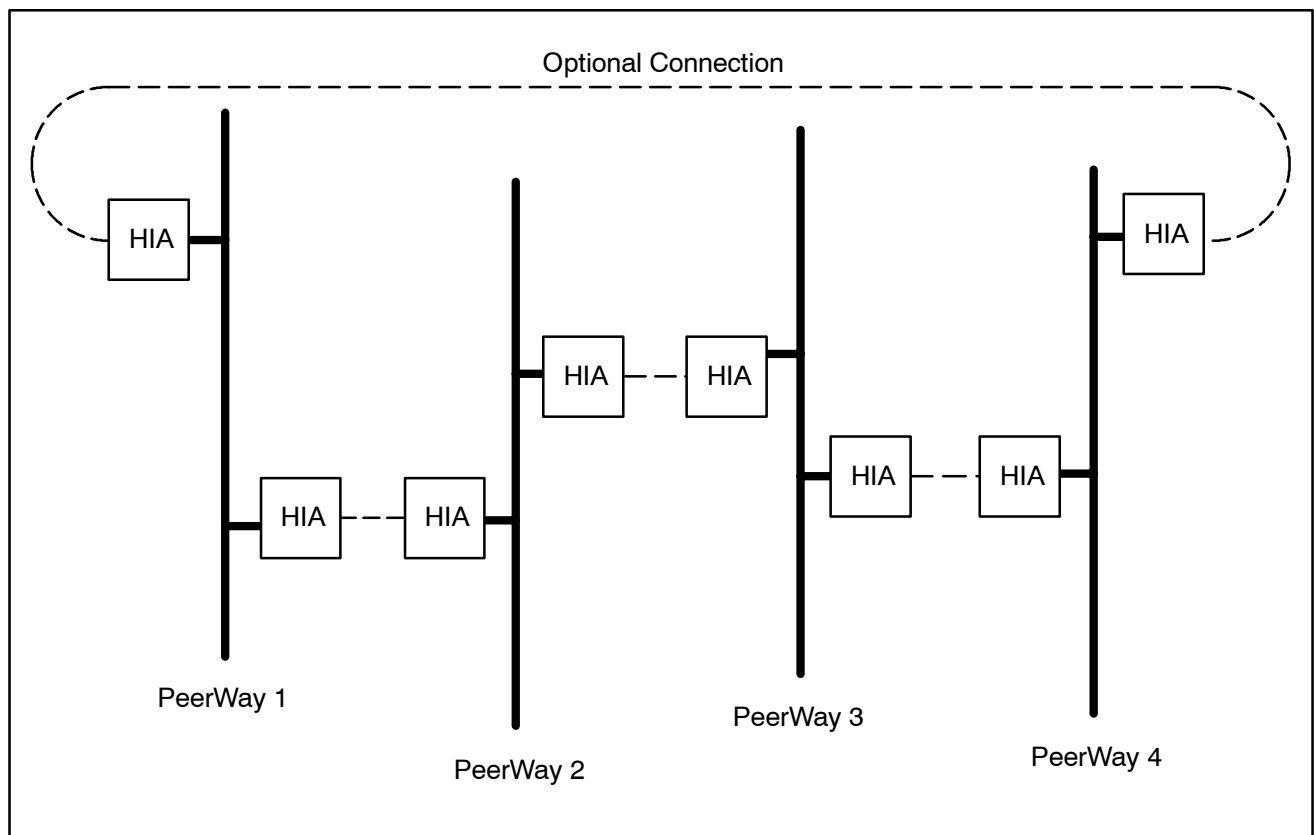


Figure 3.3. PeerWays Connected by HIAs

Consoles

The console provides the user with an interface to the RS3 control system.

The RS3 control system offers a variety of operator interfaces for various systems and operating situations.

To tailor your console, simply choose the equipment that best suits your needs.

- **Monitors:** The 19- or 14-inch monitor gives you a full-color window into your process—the 19-inch for industrial environments, the 14-inch for control room or office environments.
- **Keyboards:** Several keyboard options are available to fit your requirements.
 - The Operator Keyboard offers operator-only functions.
 - The QWERTY Configuration Keyboard provides primarily configuration engineering functions.
 - The Enhanced Keyboard can perform both operation and configuration duties.
 - The Optional Call-Up Keyboard with its LEDs can accompany any of the other keyboards to provide for quick alarm display and to allow for custom key configuration.
 - The trackball accompanies any keyboard set.
 - The joystick is available for custom-made consoles that are hardened or purged.
- **Data storage units:** Most consoles now come with a large hard drive. If you need data archiving abilities, you can choose a streaming tape drive.
- **Supporting electronics:** Other electronics include color graphics printers, a video and keyboard interface, the choice of AC/DC power supplies, and a standard interface to the twinax or fiber optic PeerWay network.

For additional flexibility, the monitor and keyboards can be remote from the console electronics.

In addition to the console electronics that are listed, you can order tabletop designs or electronics that are fully mounted in cabinets, standard furniture, or custom consoles. Designs that are specially hardened, sealed, or purged are also available for custom projects.

For a description of the consoles, see SV: 3.

ControlFiles

A ControlFile contains circuit cards that monitor both plant processes and control loops, and that provide data to other devices.

Figure 3.4 shows a ControlFile with Controller Processor cards and support cards.

For a more detailed description of ControlFiles, see SV: 4.

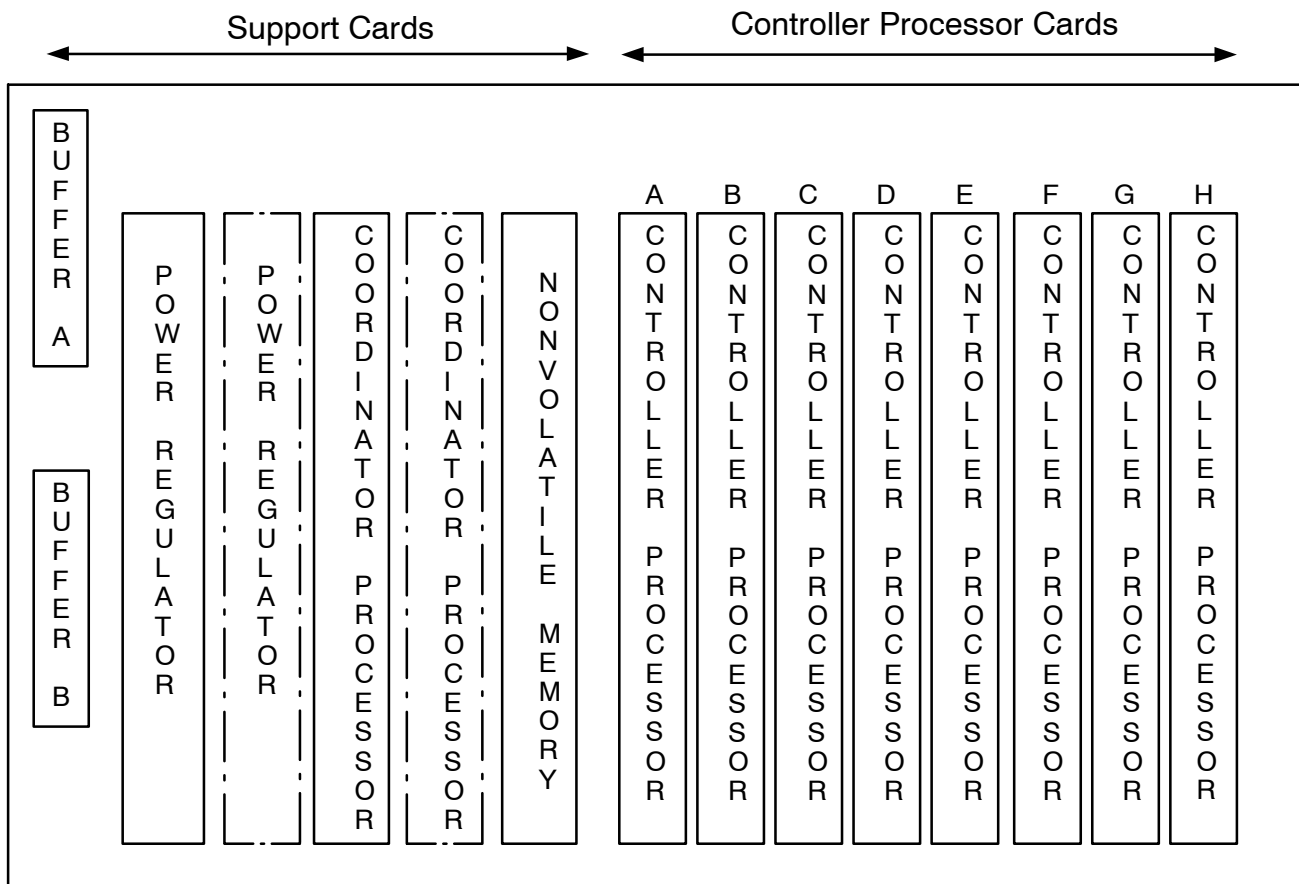


Figure 3.4. ControlFile Card Cage

MultiPurpose Controller Processor (MPC)

The MultiPurpose Controller Processor receives and stores input values and makes the values available to other nodes. In addition, the MultiPurpose Controller Processor evaluates input data to determine values for continuous and discrete (logic) outputs. The MultiPurpose Controller Processor is the brain of the system, where all calculations are performed.

The MultiPurpose Controller Processor performs all math and logic functions to calculate all the control outputs, as well as the analog and discrete functions. The MultiPurpose Controller Processor communicates with card cages and FlexTerms via an RS-422 cable.

For a description of the superseded Controller Processors, see the last section of this manual.

Support Cards

The Controller Processor operation is supported by the following types of dedicated cards in each ControlFile:

- PeerWay Buffer cards
- Power Regulator cards
- Coordinator Processor cards
- Nonvolatile Memory cards

Figure 3.4 shows the support cards. Figure 3.5 shows a functional block diagram for the support cards.

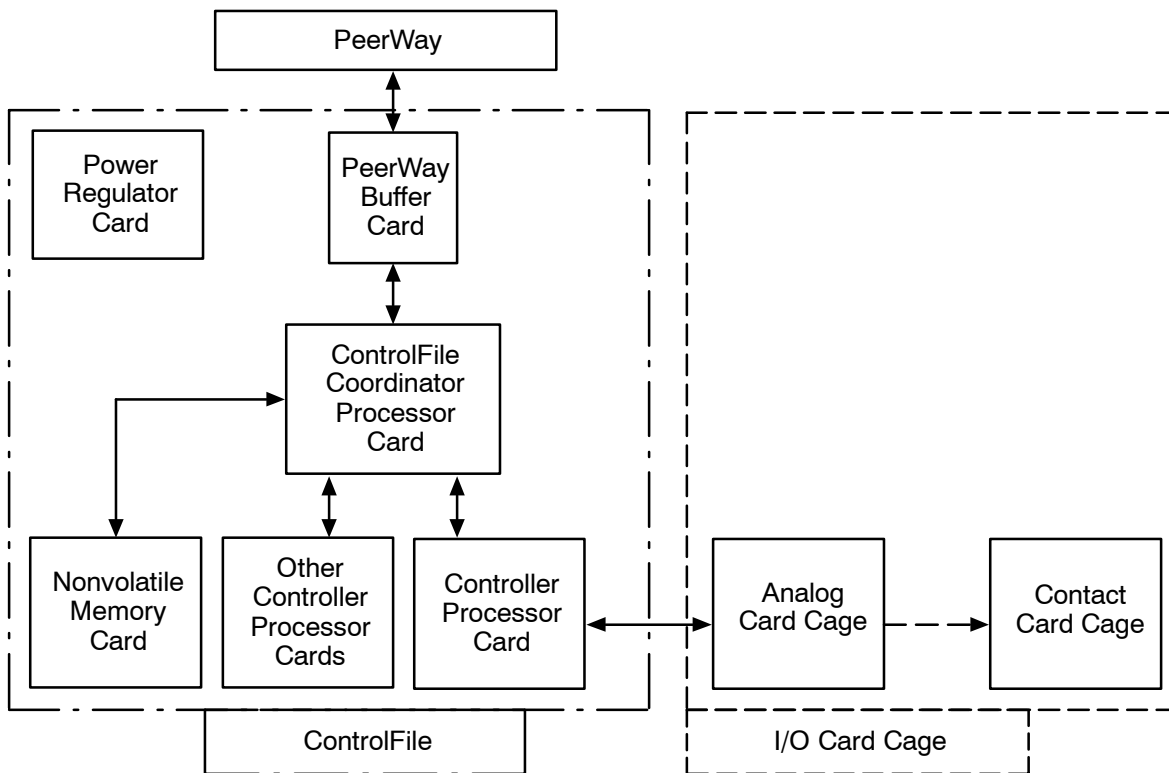


Figure 3.5. Support Cards Functional Block Diagram

PeerWay Buffer Card

The PeerWay Buffer card provides both a communications format and an electrical buffer between the ControlFile and the PeerWay. This card conditions all the communications between the Coordinator Processor card and the PeerWay. One buffer card is provided for each of the two redundant PeerWay communications highways.

Power Regulator Card

The Power Regulator card provides regulated DC power to all cards in a single ControlFile. The Power Regulator card receives input power from the system DC power supplies or batteries. Input voltage can range from 19 to 36 VDC.

Coordinator Processor (CP) Card

The Coordinator Processor card manages the communications among the eight Controller Processor cards in a ControlFile, as well as between the ControlFile and PeerWay. Process inputs, intermediate and calculated values, logic checks, and outputs from any Controller Processor can all be transmitted over the PeerWay for use by any or all Controller Processors throughout the system.

The Coordinator Processor card also updates the Nonvolatile Memory card database with current operating and configuration data and it manages the downloading of the program and the data from the nonvolatile memory to individual Controller Processors. Communication between Controller Processor cards and Field Interface Card cages is governed by individual Controller Processor cards.

Nonvolatile Memory Card

The Nonvolatile Memory card stores Controller Processor software, Coordinator Processor software, and configuration/operating (plant) data for all cards in the ControlFile. If a Controller Processor loses its database, the database is reloaded by the Coordinator Processor from nonvolatile memory. This memory retains the RS3 control system standard algorithm library, a copy of which is downloaded to Controller Processors when they are first enabled.

New control functions can be loaded from a console to the Nonvolatile Memory Card, where they can then be loaded into the random access memory (RAM) of the Controller Processors. This eliminates the need to change hardware in order to integrate control functions that are updated.

Redundancy Within a ControlFile

Controller Processor cards and support cards (except the Nonvolatile Memory Card) can be made redundant.

Controller Processor Card Redundancy

Redundancy is optionally available for an RS3 Controller Processor card that is being used for analog or contact I/O. Redundancy is achieved by installing a second card of the same type in an adjacent ControlFile card slot and then by setting the proper jumper positions on the card cage or FlexTerm. The redundant pairs of ControlFile slots can be AB, CD, EF, or GH. Figure 3.6 shows the cable that is used to connect the card cage or FlexTerm to the redundant pair of Controller Processor cards.

Control of the process is normally executed by the primary Controller Processor card, which is mounted in the left slot. The redundant backup card runs continuous diagnostics to ensure that if the Controller Processor card fails, an alarm is activated. If the primary Controller Processor fails, then the control switches to the backup Controller Processor within one second. Redundancy can be added in the field if there are card slots that are available.

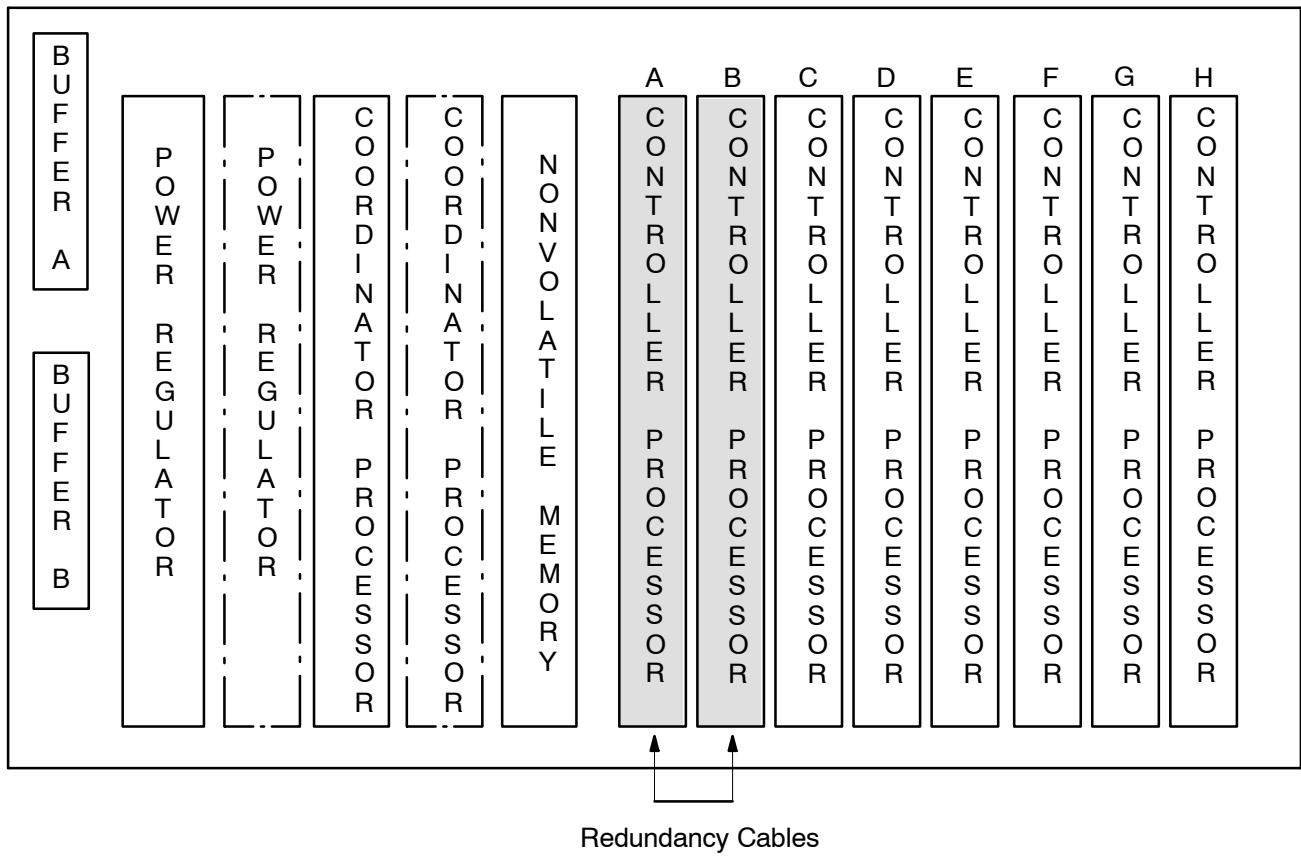


Figure 3.6. Controller Processor Redundancy

PeerWay Buffer Cards Redundancy

All systems are equipped with redundant PeerWay Buffer cards as shown in Figure 3.7. One PeerWay Buffer card connects to PeerWay tap A; the other buffer card connects to PeerWay tap B. During normal operation, both of the highways are active and carry all message traffic. If one highway fails, an alarm is activated and the other highway continues to carry all message traffic.

Power Regulator Card Redundancy

To increase system reliability further, make the Power Regulator Card redundant by inserting another identical card in the adjacent slot (the identical card is depicted by a dotted box in Figure 3.7). When two cards of the same type are present, both cards are operating and both share the load. If one card fails, an alarm is activated and the other card carries the entire load.

Coordinator Processor Card Redundancy

To increase system reliability further, the Coordinator Processor card can be made redundant by inserting another identical card in the adjacent slot (the identical card is depicted by a dotted box in Figure 3.7). When two cards of the same type are present, one card is operating and also carries the load. If that card fails, an alarm is activated and the load switches to the other card.

Nonvolatile Memory Card Redundancy

The Nonvolatile Memory Card does not need to be made redundant because it is already a backup device.

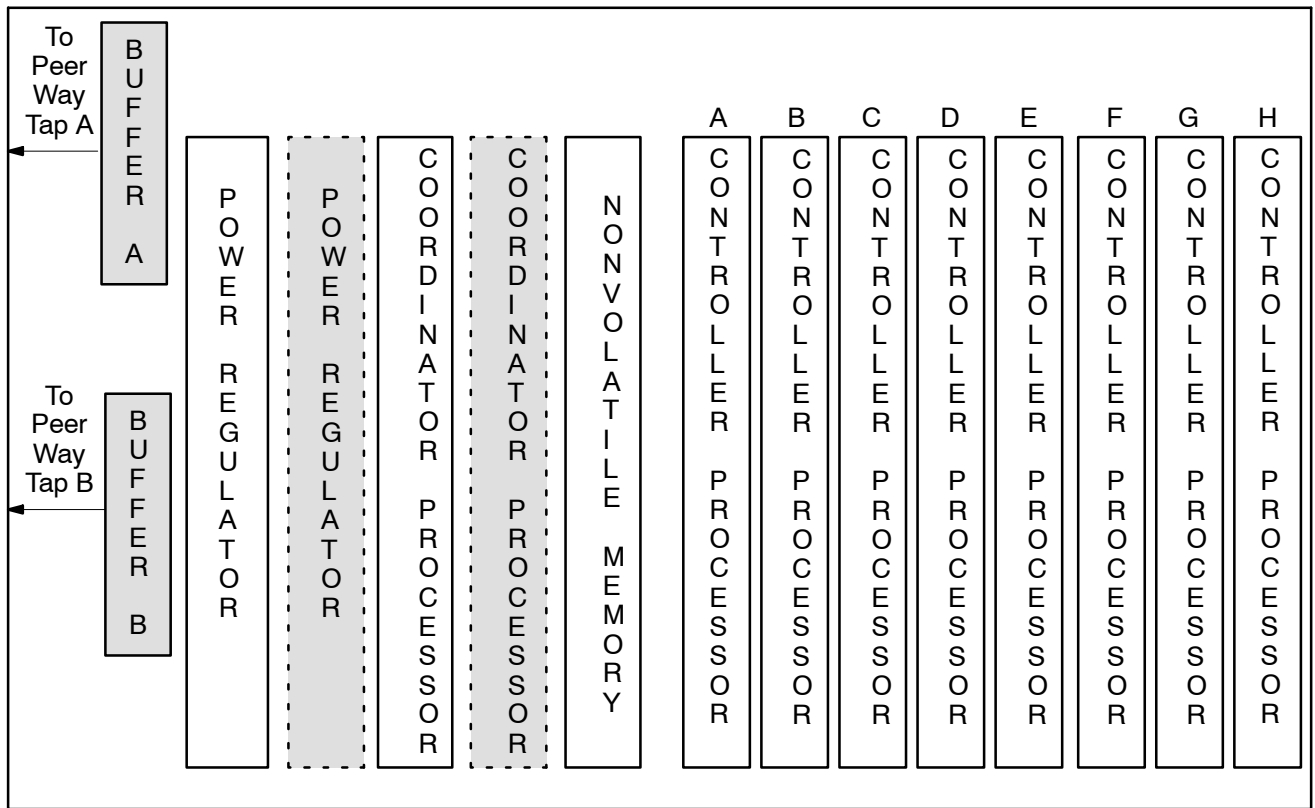


Figure 3.7. Support Card Redundancy

Input/Output Hardware

Input/Output hardware connects plant input/output points to the control system electronics. A Controller Processor card can be paired with one or more card cages or Multipoint I/O termination panels. Dedicated Field Interface Cards (FICs) and Field Interface Modules (FIMs) provide isolation and input/output flexibility. The available I/O hardware includes:

- Multipoint I/O Termination Panels for analog or discrete I/O
- Analog Card Cage
- Contact Card Cage
- Multiplexer (MUX) Card Cage (FlexTerm)
- RBL/PLC Card Cage (Communications FlexTerm)

Figure 3.8 shows how Card Cages and Multipoint I/O Termination Panels can be connected to a Controller Processor card in a ControlFile.

Multipoint I/O Termination Panels mount on DIN rails in I/O cabinets or on flat panels. A Multipoint I/O Termination Panel is connected either to a Communication Termination Panel or an Analog Card Cage by a shielded, twisted pair communication line that can be up to 1500 meters (5000 feet) long. Shielded, twisted pair wires are normally used, but a fiber optic link is available for special applications. Field wiring can be landed directly on the termination panel or on a remote marshaling panel.

Analog, Contact, MUX, and RBL/PLC Card Cages mount in system cabinets in 483 mm (19 in) racks. The card cage is connected to the ControlFile by a multiconductor control cable that can be up to 15.2 meters (50 ft) long. Field wiring is landed on a marshaling panel that is connected to the card cage by a multiconductor cable.

For a more detailed description of the card cages, FlexTerms, and Multipoint I/O termination panels, see SV: 5 and 6. The Superseded Hardware section of this manual lists FlexTerms that are rarely shipped with new systems, although the FlexTerms are still supported.

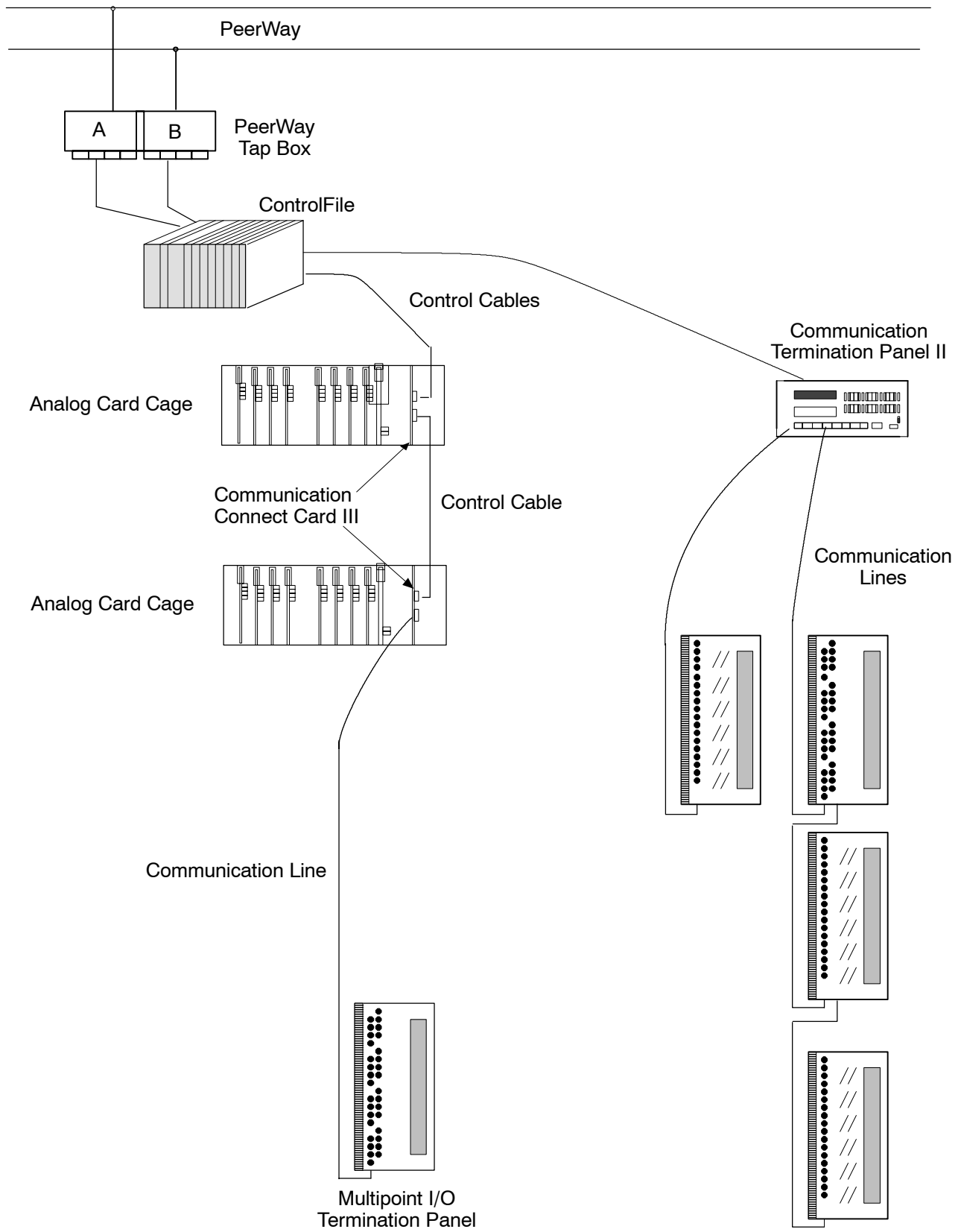


Figure 3.8. Connecting Multipoint I/O Hardware

Multipoint I/O (MIO)

Multipoint I/O (MIO) allows for the I/O electronics to be mounted near the field devices, which saves on field wiring costs. MIO termination panels are mounted either on DIN rails in I/O cabinets, or on flat surfaces. The panel is connected to the ControlFile by a shielded, twisted pair communication line that can be up to 1500 meters (5000 feet) long.

The Multipoint Analog I/O (MAIO) Termination panels support 4–20 mA points in groups of 16 inputs or 16 outputs. Loop power can be supplied either by a Loop Power Module (LPM) or by a user-supplied external source. The type of Field Interface Module (FIM) that is installed in the panel determines if it serves input or output points.

The Multipoint Discrete I/O (MDIO) Termination panels allow field signals to be connected directly to the panels or to be isolated optically by the use of solid state relays. The discrete FIM supports 16 input/output points, as well as 16 input only points.

Most MIO termination panels provide the option of online replacement or redundant FIM operation. For online replacement operation, a single FIM is installed and a single communication line is used. If this FIM fails, a replacement can be inserted in the empty socket. The replacement will take over for the FIM that failed. Redundant operation requires two FIMs that are installed, as well as two communication lines. Both FIMs operate continuously, with one as primary and the other as secondary. If the primary FIM fails, the secondary FIM takes over immediately.

NOTE: If the primary FIM fails and the secondary FIM takes over but then fails, the redundant FIM should be replaced first. If this is not done but redundant controllers are configured, it may take 5–30 seconds to regain normal operation via a redundant controller switch. If redundant controllers are not available, replacing both FIMs or moving one FIM to the redundant slot will restore normal operation. If necessary, rebooting the controller will also restore normal operation.

Figure 3.9 shows typical cabling for MIO termination panels. A fiber optic link can be included in the communications line. Field wiring is either landed directly on some MIO termination panels or landed remotely with others.

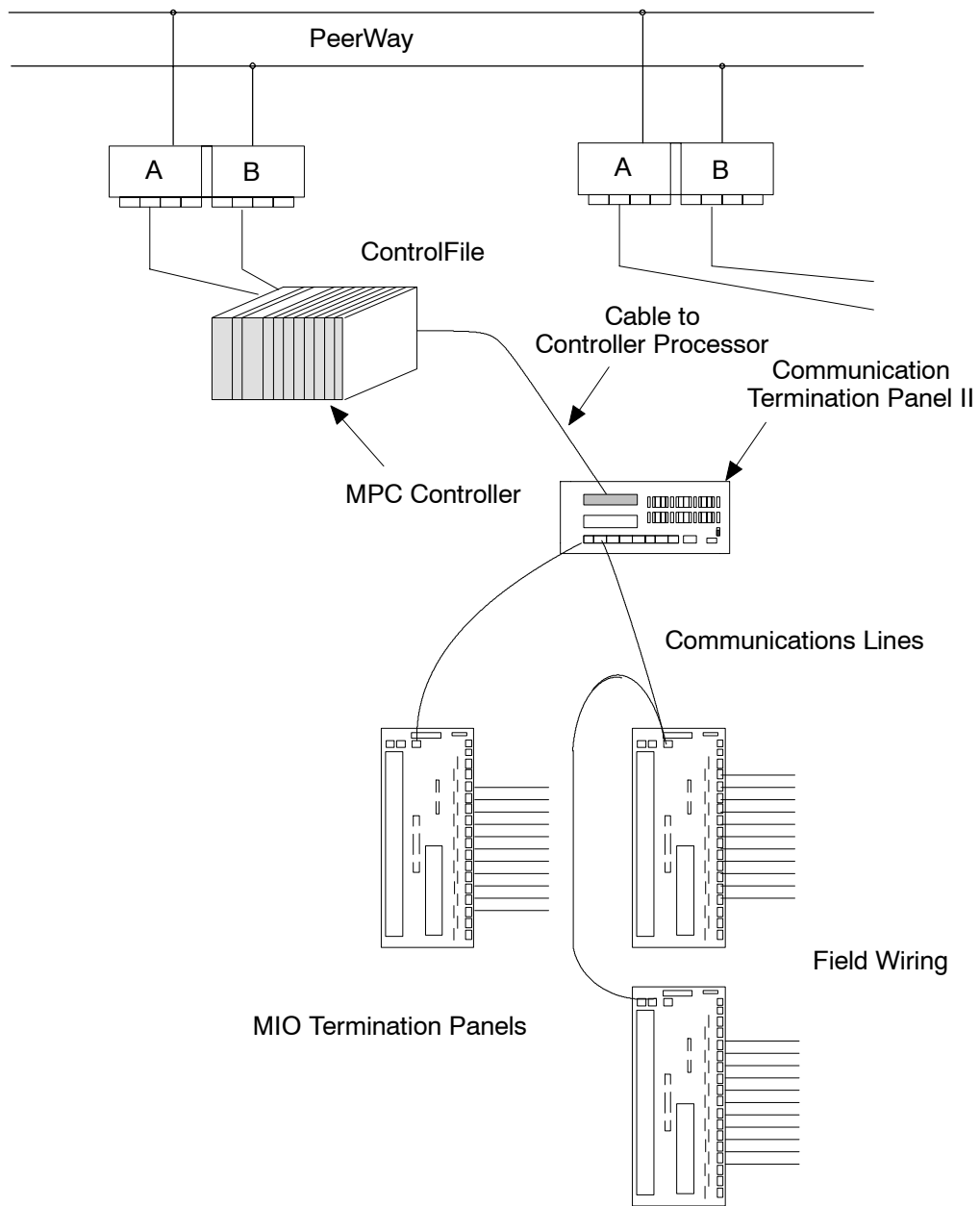


Figure 3.9. Typical MIO Cabling

Multipoint Analog I/O (MAIO)

Each Multipoint Analog I/O (MAIO) termination panel supports 16 4–20 mA points -- either input or output, depending on the installed FIM. Per-point jumpers allow for the mixing of the system-powered and self-powered I/O points.

Available Multipoint Analog I/O termination panels are:

- MAIO Direct-Connect Termination Panel
- MAIO Remote-Connect Termination Panel

The direct-connect panel provides terminals for landing 16 shielded field wires on the panel. The remote-connect panel provides a cable connection to an MIO marshaling panel where 16 shielded field wires can be landed.

Loop power can be supplied by the optional Loop Power Module (LPM) which supplies up to 380 mA of DC current at 25.0 to 25.5 vDC. Two LPMs can be used to give redundancy in the loop power supply. Loop power can also be supplied from an external source.

The MAIO Field Interface Module (FIM) provides the electronics to support 16 4–20 mA analog I/O points. Available MAIO FIMs are:

- MAIO Input FIM (16 input points)
- MAIO Output FIM (16 output points)

Multipoint Discrete I/O (MDIO)

Multipoint Discrete I/O (MDIO) termination panels are available either for direct connection of field signals or for isolated connection through solid state relays:

- Direct connection of field signals:
 - Direct Discrete Termination Panel
(16 input/output, 16 input points)
 - Multi-FIM Discrete Termination Panel
(up to 3 sets of 16 input/output, 16 input points)
- Isolated connection of field signals:
 - Isolated Discrete Termination set:
 - Panel A (16 input/output points)
 - Panel B (16 input points)
 - High Density Isolated Discrete Termination Panel
(16 input/output, 16 input points)

The direct connection panels provide direct connection for discrete I/O points that require less than 1 Amp of DC current. The isolated panels provide solid state relays that are optically isolated to isolate the field points from the FIM electronics and to handle AC or DC voltages.

The Direct Discrete Termination Panel and the Isolated Discrete Termination Panel land field wiring on the panel. The Multi-FIM Discrete Termination Panel and the High Density Isolated Discrete Termination Panel provide a cable connection to an MIO Marshaling Panel where field wiring can be landed.

The MDIO Field Interface Module (FIM) supplies the electronics to support 32 discrete I/O points: 16 can be input or output, and 16 are input only. The MDIO FIM supports both online replacement and full redundancy.

Analog Card Cage

The analog card cage contains eight Field Interface Card (FIC) slots, a connection to a remote marshaling panel, and slots for Transfer or Output Bypass Unit Cards. Each FIC supports up to three points. An analog FIC can support two inputs and one output, or three inputs. A pulse input/output FIC can support two pulse inputs, or two pulse outputs and one analog output.

The analog card cage provides the following:

- Termination for analog field signals
- Electrical isolation for process I/O
- Analog to digital (A/D) and digital to analog (D/A) conversion

An analog card cage supports up to 24 I/O points, with a combination of 0–24 input points and 0–8 output points.

The analog card cage, shown in Figure 3.10, consists of a card cage, connection points for card cage power, communications with the Controller Processor card, and a connection to field I/O or a marshaling panel. The card cage mounts in a standard 19-inch rack in an RS3 control system cabinet. A multiconductor control cable connects it to the ControlFile.

The marshaling panel contains field termination points and can be mounted remotely. Tie-downs and wiring ducts are provided to route field wiring properly. The marshaling panel is connected to the analog card cage by a multiconductor cable.

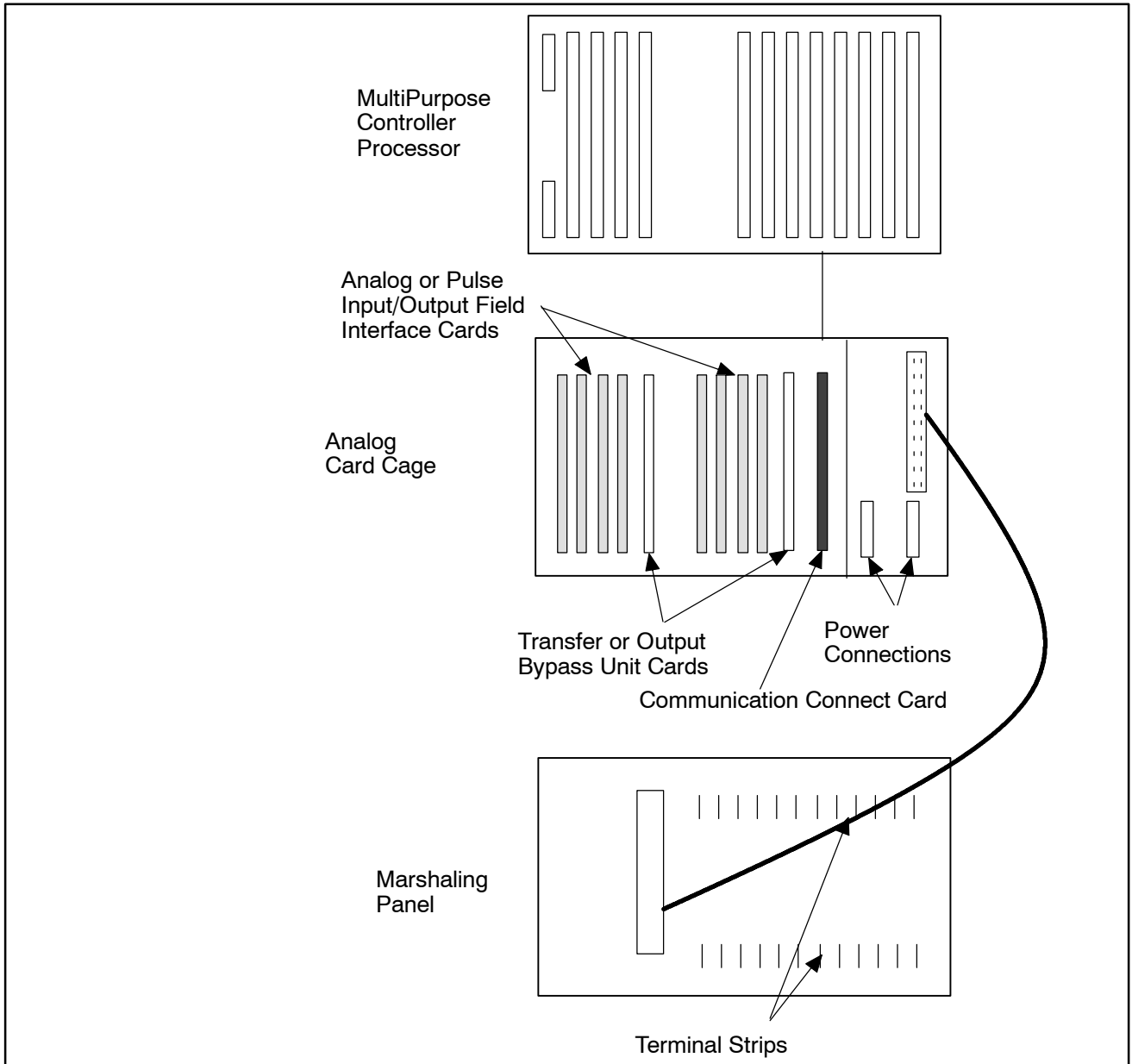


Figure 3.10. Analog Card Cage

Analog Field Interface Cards

The analog Field Interface Cards (FICs) are housed in the card cage, as shown in Figure 3.10. Up to eight analog FICs can be located in an analog card cage. Each card can accommodate three points to provide a total of 24 analog points per card cage. For information on how many points a Controller Processor can support, see the loading tables later in this section. The analog FIC has connections for adding a daughter board to the FIC card to allow the card cage to communicate with Rosemount SMART FAMILY[®] field instruments.

The analog FIC accepts a 4–20 mA input signal and provides a 4–20 mA field output signal. Output action jumpers are available on the analog FICs to indicate whether the FIC has normal or reverse output action for the 4–20 mA voltage. Normal output action instructs the FIC to output 100% as 20 mA and 0% as 4 mA. Reverse output action instructs the FIC to output 0% as 20 mA and 100% as 4 mA. Analog FICs are software calibrated and have no potentiometers to adjust. These FICs are also individually fused to protect card cage electrical components.

To ensure output accuracy, each 4–20 mA output is fed back by the FIC to the Controller Processor card. If the value shows excessive error, an alarm is generated. Failure option jumpers are provided that configure the FIC to set the output value to zero, or that hold the current output value if communication with the Controller Processor card is lost. Four light-emitting diodes (LEDs) on the front of each FIC indicate the status of the FIC.

The installed location of an FIC determines the system address of that point. Card cage wiring uses one positive terminal and one negative terminal for connecting the field wiring.

Pulse Field Interface Cards

The pulse input/output Field Interface Cards (FICs) are housed in the card cage as shown in Figure 3.10. Up to eight pulse input/output FICs can be located in an analog card cage. Each card can accommodate three points to provide a total of 24 pulse points per card cage. An analog card cage provides a maximum of 24 points, from a combination of 0–16 pulse input or pulse output points and 0–8 analog output points.

Redundancy

The following card cage redundancy options are available to improve system reliability.

- No redundancy. Up to eight FICs can be used to provide 3 points per card and 24 points per card cage.
- 1/1. Four FICs can be used with one card that is redundant for each to provide 12 points per card cage.
- 3/1. A total of six FICs can be used with one card that is redundant for each set of 3 FICs (2 redundant cards) to provide 18 points per card cage.
- 7/1. Seven FICs can be used with one card that is redundant to provide 21 points per card cage.

Figure 3.11 shows the redundancy capabilities.

Redundancy is achieved by setting the redundancy scheme jumpers on the FICs, configuring a redundant I/O block for the card cage, and installing transfer cards in the card cage. If the Field Interface Card fails, the control switches to the redundant card through the transfer card.

An output bypass card is also available to provide uninterrupted current when a Field Interface Card is removed from and then replaced in the card cage. The output bypass unit is mounted in place of a transfer card when it is needed.

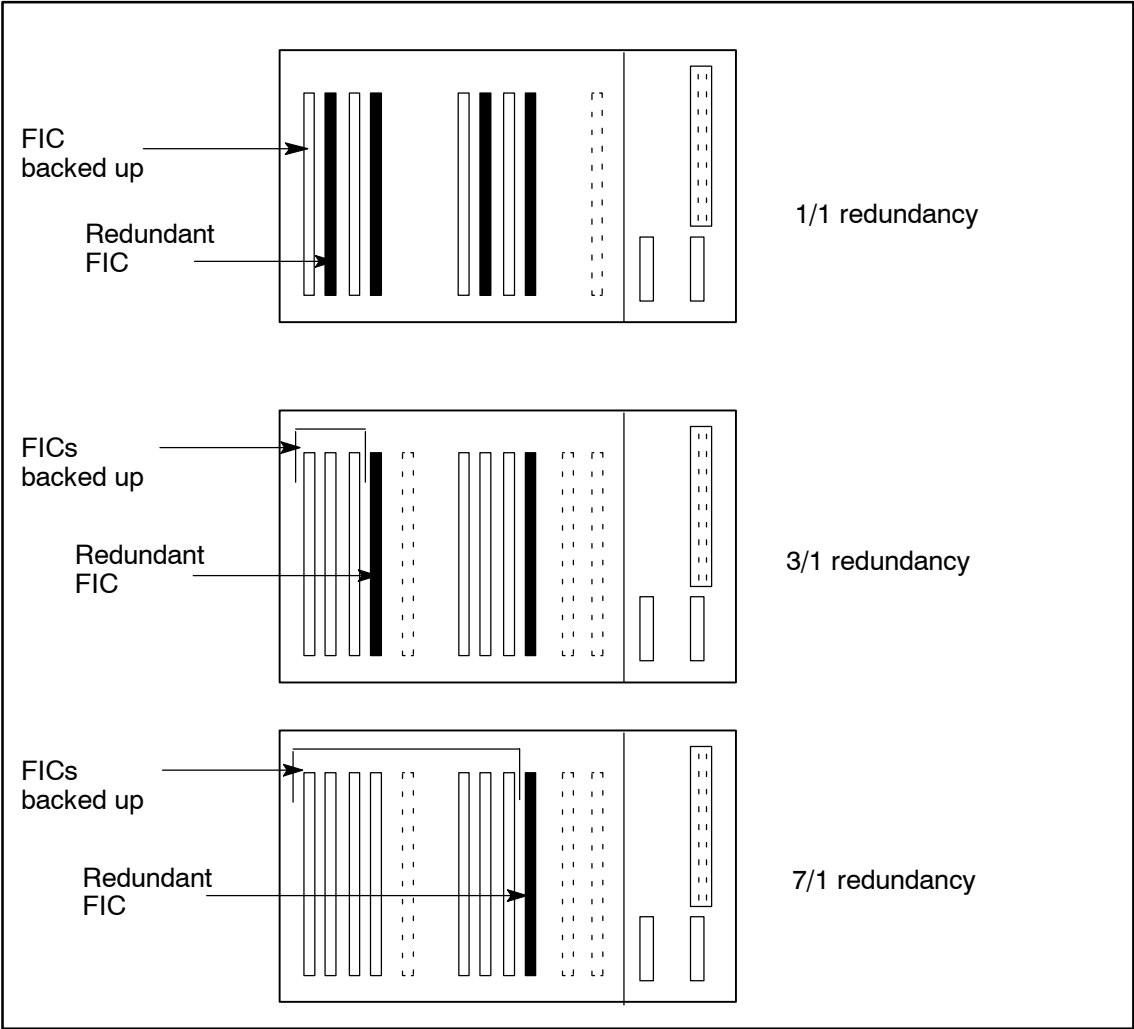


Figure 3.11. Analog Card Cage Redundancy

Contact Card Cage

The contact card cage provides eight card slots and an integral terminal strip or a connection to a remote marshaling panel. Each contact card provides up to six contact points to provide 48 points per card cage. The optical isolator on the terminal strip or marshaling panel determines the input or output card type, as well as the electrical rating.

The contact card cage:

- Provides termination for contact field signals.
- Provides electrical isolation for process I/O.
- Defines each point as an input or output for the Controller Processor card.

The contact card cage, shown in Figure 3.12, consists of two termination and isolator strips for interfacing with field I/O, of two Field Interface Card cages, and of connection points for card cage power and communications with the Controller Processor card. The card cage mounts in a standard 19-inch rack in an RS3 cabinet.

Field termination points are located in two strips: one on the right side of the card cage assembly, the other on the right side of the Field Interface Card cages. Each terminal strip has 24 optical isolator modules and 24 fuses. To designate a point as an input or output, the proper isolation module is installed. Inputs and outputs are definable on a per-point basis. Tie-downs and wiring ducts are provided to route field wiring properly.

Up to eight contact Field Interface Cards reside in a contact card cage. Each card can accommodate six contact inputs/outputs in any ratio to provide a total of 48 contact input/output points per card cage. A Controller Processor can support up to two contact card cages to provide a total of 96 inputs/outputs.

The contact Field Interface Card I/O points can be inputs or outputs in any order and in any combination. Field contacts are isolated from the FICs with optical isolator modules. The optical isolators are available in AC and DC versions and in a variety of voltage ratings.

The field inputs are wired to the optical isolators, which communicate with an FIC, which in turn communicates digitally with a Controller Processor card. Output signals are sent from the Controller Processor card to the FIC, from the FIC to the optical isolators, and from the optical isolators out to the field.

Failure option jumpers are provided that configure the FIC to fail either full off or to hold the current output value if communication with the Controller Processor card is lost. Six yellow LEDs on the front of each FIC indicate the state of each contact point.

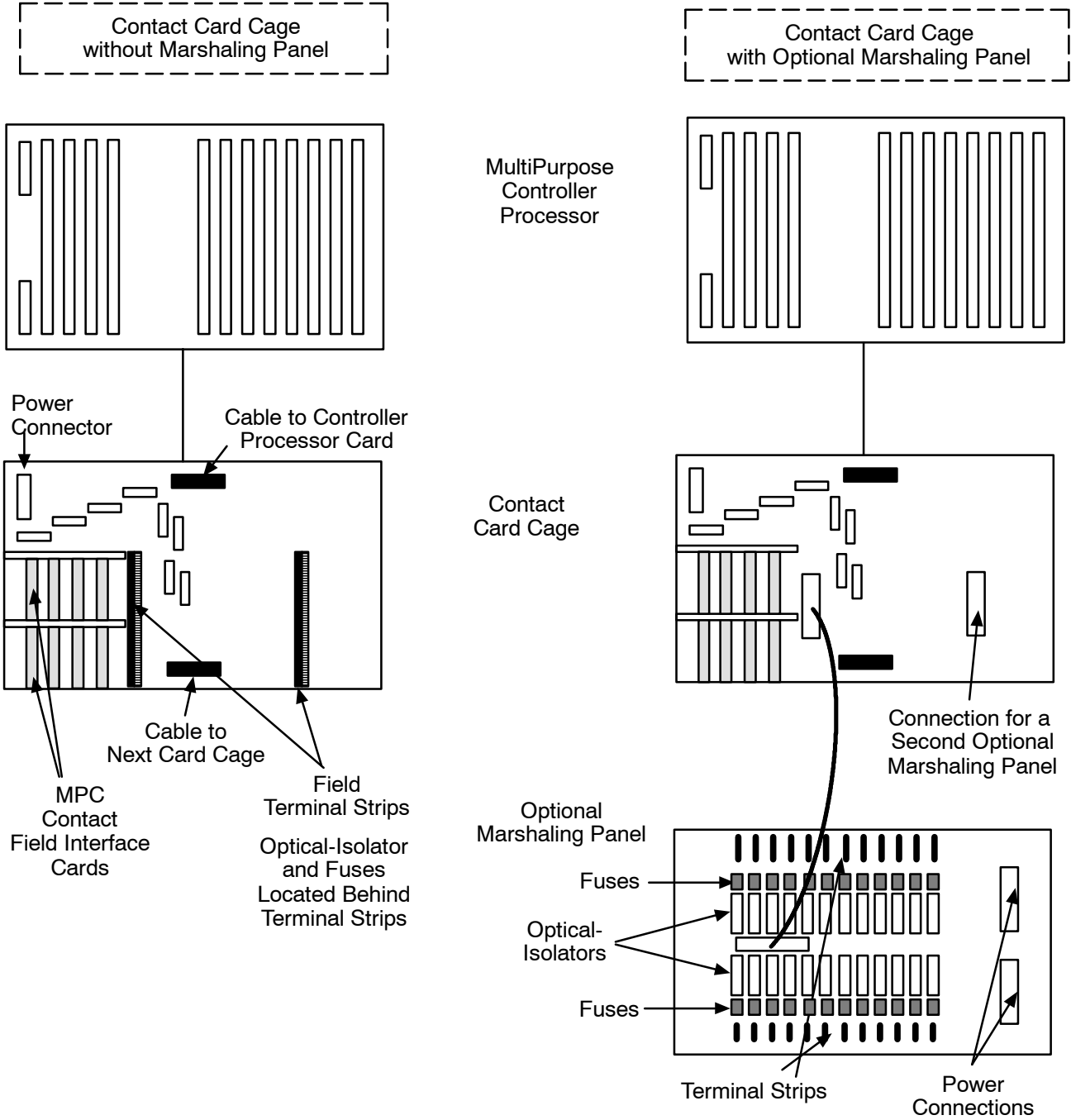


Figure 3.12. Contact Card Cages

Multiplexer (MUX) Card Cage

The Multiplexer FlexTerm or MUX Card Cage:

- Provides termination for field signals.
- Performs signal characterization for both high- and low-level analog inputs.

The Multiplexer FlexTerm, shown in Figure 3.13, consists of a power supply, a FlexTerm processor, and one to five Front End Modules (FEMs). Each FEM provides for termination, sampling, and A/D conversion for up to 20 inputs. The FlexTerm processor provides for communication with the Controller Processor card and for data buffering from the FEMs. The FEMs communicate with the FlexTerm processor over a proprietary digital bus. The FlexTerm processor communicates with the Controller Processor card over RS-422 lines.

The Controller Processor can support one FlexTerm that is connected to up to 100 points. Terminations are made to terminal strips on the FEM itself. Four different Front End Modules are available to accommodate the following types of inputs:

- Millivolts, including thermocouples
- Current transmitter (4-20 mA)
- Resistance temperature detectors (RTDs)
- High voltage (-10 to +20 V DC)

Each FEM accommodates 20 inputs and uses reed relays or CMOS solid state switches for input switching.

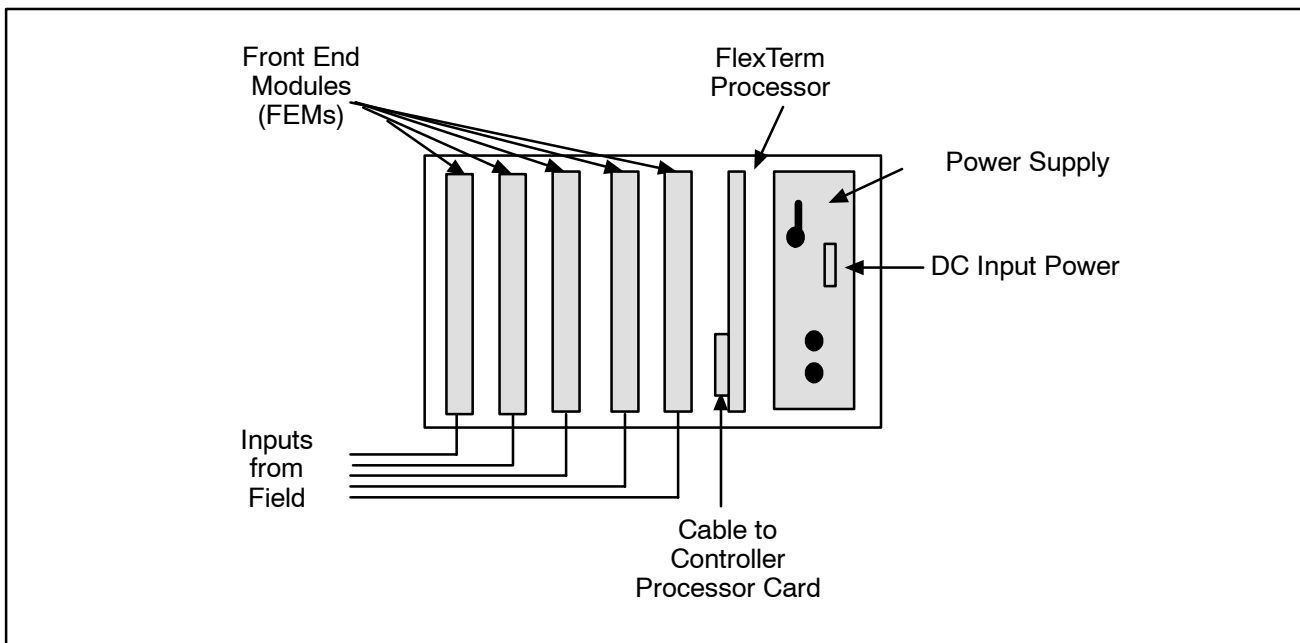


Figure 3.13. Multiplexer FlexTerm

RBL/PLC Card Cage

The RBL/PLC Card Cage or Communications FlexTerm provides an RS-232 or RS-422 serial interface to devices such as process analyzers, weigh scales, and PLCs. Interfaces are available for most PLCs.

The Communications FlexTerm, shown in Figure 3.14, consists of a card cage that houses Port I/O cards and connection points for FlexTerm power, and also Controller Processor communications. The FlexTerm card cage mounts in a standard rack in an RS3 cabinet. Each Communications FlexTerm can house up to two Port I/O cards.

Two types of Port I/O cards are available: the RS-422/RS-232C and the RS-422/RS-422. These cards optically isolate the RS3 control system from the field and they provide the interface between the Controller Processor and the field device. Communication between the Controller Processor card and the Communications FlexTerm is carried by an RS-422 cable. Communication between the field device and the FlexTerm is carried by an RS-232C cable or an RS-422 cable.

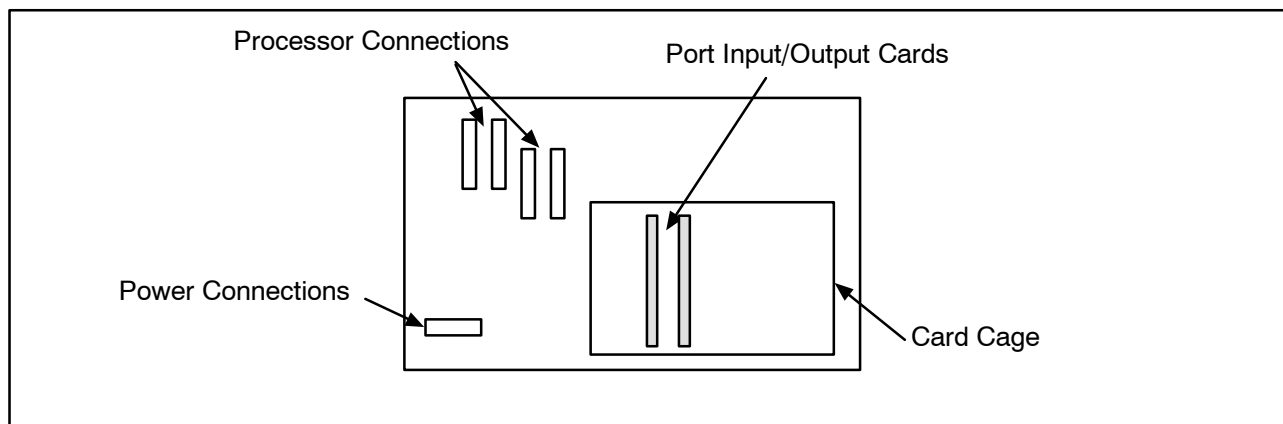


Figure 3.14. Communications FlexTerm

I/O Types Supported by a Single Controller Processor

Table 3.1 provides a list of the maximum I/O points that can be supported by a Coordinator Processor II (CP-II) and a MultiPurpose Controller Processor I (MPCI) for each configuration. The number of I/O points that are supported depends on the evaluation time and the function that is being performed.

NOTE: P1 is not compatible with a CP-II/MPCI, however a CP-II/MPCI running version 18 can be on the same PeerWay.

Table 3.1. Maximum I/O Points Supported by a CP-II/MPCI

Evaluation Time	1/8 Sec.	1/4 Sec.	1/2 Sec.	1 Sec.
16 Analog Input 8 Analog Output	PID only, no Math or Logic	PID control, Math and Logic	PID control, Math and Logic	PID control, Math and Logic
32 Analog Input 16 Analog Output	Not applicable	PID only, no Math or Logic	PID control, Math and Logic	PID control, Math and Logic
48 Analog Input 24 Analog Output	Not applicable	Not applicable	PID only, no Math or Logic	PID only, no Math or Logic
16 Analog Input 8 Analog Output 48 Discrete I/O	Not applicable	Not applicable	PID control, DVC, DMC Control, Math and Logic	PID control, DVC, DMC Control, Math and Logic
96 Discrete I/O	Not applicable	Not applicable	DVC, DMC Control, Math and Logic	DVC, DMC Control, Math and Logic

Table 3.2, provides a list of the maximum I/O points that can be supported by a Coordinator Processor IV (CP-IV)/Coordinator Processor 5 (CP5) and a MultiPurpose Controller Processor II (MCP II) for each configuration. The number of I/O points that are supported depends on the evaluation time and the function that is being performed.

Table 3.2. Maximum I/O Points Supported by a CP-IV/CP5/MPCII

Evaluation Time	1/8 Sec.	1/4 Sec.	1/2 Sec.	1 Sec.
16 Analog Input 8 Analog Output	PID only, no Math or Logic	PID control, Math and Logic	PID control, Math and Logic	PID control, Math and Logic
32 Analog Input 16 Analog Output	Not applicable	PID control, Math and Logic	PID control, Math and Logic	PID control, Math and Logic
48 Analog Input 24 Analog Output	Not applicable	Not applicable	PID control, Math and Logic	PID control, Math and Logic
64 Analog Input 32 Analog Output	Not applicable	Not applicable	PID only, no Math or Logic	PID only, no Math or Logic
48 Discrete or Contact I/O 32 Analog Input 16 Analog Output	Not applicable	Not applicable	PID control, DVC, DMC Control, Math and Logic	PID control, DVC, DMC Control, Math and Logic
96 Discrete or Contact I/O	Not applicable	Not applicable	DVC, DMC Control, Math and Logic	DVC, DMC Control, Math and Logic
48 Discrete or Contact I/O 48 Analog Input 24 Analog Output	Not applicable	Not applicable	Not applicable	PID control, DVC, DMC Control, Math and Logic
96 Discrete or Contact I/O 32 Analog Input 16 Analog Output	Not applicable	Not applicable	Not applicable	PID control, DVC, DMC Control, Math and Logic
128 Discrete or 96 Contact I/O 16 Analog Input 8 Analog Output	Not applicable	Not applicable	Not applicable	PID control, DVC, DMC Control, Math and Logic
160 Discrete I/O	Not applicable	Not applicable	Not applicable	DVC, DMC Control, no Math or Logic
192 Discrete I/O	Not applicable	Not applicable	Not applicable	Simple DVC and DMC Control, no Math or Logic
256 Discrete I/O	Not applicable	Not applicable	Not applicable	Alarms or Status Inputs only

Table 3.3 provides a list of the maximum I/O points that can be supported by a Coordinator Processor IV (CP-IV)/Coordinator Processor 5 (CP5) and a MultiPurpose Controller Processor 5 (MCP5) for each configuration. The number of I/O points that are supported depends on the evaluation time and the function that is being performed.

Table 3.3. Maximum I/O Points Supported by a CP-IV/CP5/MPC5

Evaluation Time	1/8 Sec.	1/4 Sec.	1/2 Sec.	1 Sec.
2 Flexterms	16 PID	16 PID	16 PID	16 PID
16 Analog Input 16 Analog Output	16 PID	16 PID	16 PID	16 PID
32 Analog Input 32 Analog Output	Not applicable	32 PID 10 Totalizers	32 PID 10 Totalizers	32 PID 10 Totalizers
48 Analog Input 48 Analog Output	Not applicable	Not applicable	48 PID 20 Totalizers	48 PID 20 Totalizers
80 Analog Input 80 Analog Output	Not applicable	Not applicable	Not applicable	80 PID 30 Totalizers
64 Discrete I/O	16 DMCs	16 DMCs	16 DMCs	16 DMCs
128 Discrete I/O	Not applicable	32 DMCs	32 DMCs	32 DMCs
224 Discrete I/O	Not applicable	Not applicable	56 DMCs	56 DMCs
320 Discrete I/O	Not applicable	Not applicable	Not applicable	90 DMCs
32 MAI 48 MAO 64 Discrete I/O	Not applicable	Not applicable	48 PID 16 DMCs 32 Totalizers	48 PID 16 DMCs 32 Totalizers
48 MAI 32 MAO 160 Discrete I/O	Not applicable	Not applicable	Not applicable	32 PID 50 DMCs 20 Totalizers
16 MAI 16 MAO 64 Discrete I/O	Not applicable	16 PID 16 DMCs 5 Totalizers	16 PID 16 DMCs 5 Totalizers	16 PID 16 DMCs 5 Totalizers
96 Discrete Input Blocks	Alarm/Status only	Alarm/Status only	Alarm/Status only	Alarm/Status only
192 Discrete Input Blocks	Not applicable	Alarm/Status only	Alarm/Status only	Alarm/Status only
320 Discrete Input Blocks	Not applicable	Not applicable	Alarm/Status only	Alarm/Status only
512 Discrete Input Blocks	Not applicable	Not applicable	Not applicable	Alarm/Status only

The ControlBlock and I/O quantities given will ensure an idle time of greater than 20 percent on the controller.

The ControlBlocks listed above are the standard RS3 blocks with no user configuration. If a complex configuration is required (for example, Math blocks with flow calculations), these blocks can consume up to 2 percent idle time per second.

The discrete input information is the maximum discrete I/O without ControlBlocks supported that can still maintain an idle time over 20 percent.

PeerWay Interface Devices

The PeerWay interface devices provide a connection point between an RS3 control system and other computers. These devices are:

- RS3 Network Interface (RNI)
- Supervisory Computer Interface (SCI)
- VAX to PeerWay Interface
- Diogenes Interface

RS3 Network Interface (RNI)

The RS3 Network Interface (RNI) provides a gateway between the PeerWay and an Ethernet by using TCP/IP protocol. Software in the RNI works with software in computers on the Ethernet to provide data, control, and alarm message interchange.

The RNI is designed to support the information access needs of a single PeerWay. For multiple PeerWay systems, it is recommended that at least one RNI be installed on each PeerWay, as shown in Figure 3.15. Multiple RNIs could be installed on a single PeerWay if desired for redundancy or higher throughput.

For more information on the RNI, see the *RNI Release Notes*, the *RNI Installation Guide*, the *RNI Programmer's Reference Manual*, and SV: 7-6.

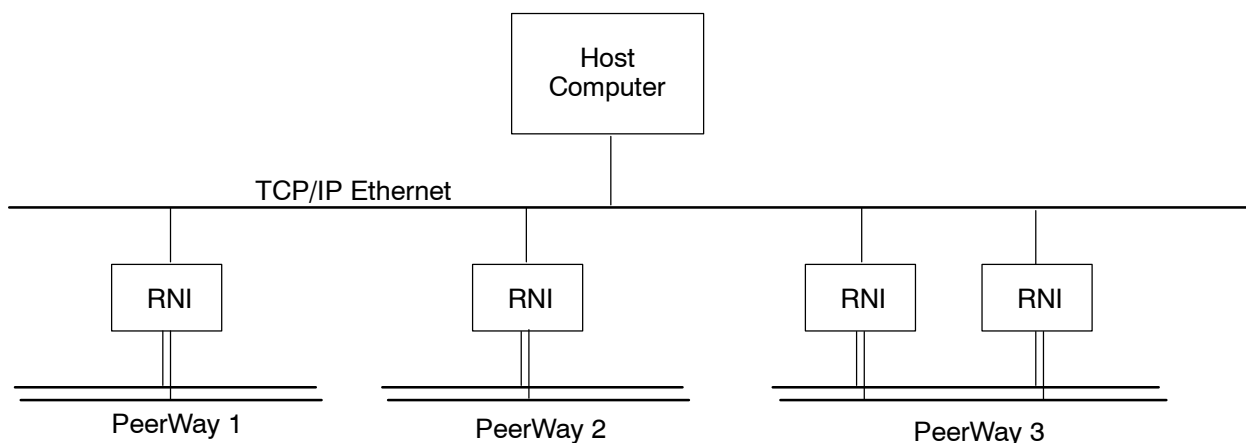


Figure 3.15. Connecting Multiple PeerWays or Multiple RNIs

Supervisory Computer Interface (SCI)

The Supervisory Computer Interface (SCI) is a communications interface that enables the exchange of information between the RS3 control system and a supervisory (host) computer. The SCI enables the host computer to read data from and write data to the RS3 control system. The SCI and host computer communicate serially through an RS-232C or RS-422 port via a direct cable connection, or through the use of modems.

The Supervisory Computer Interface card cage consists of a card cage and a cooling fan enclosure, as shown in Figure 3.16.

For more information concerning the SCI, see PW: 1.

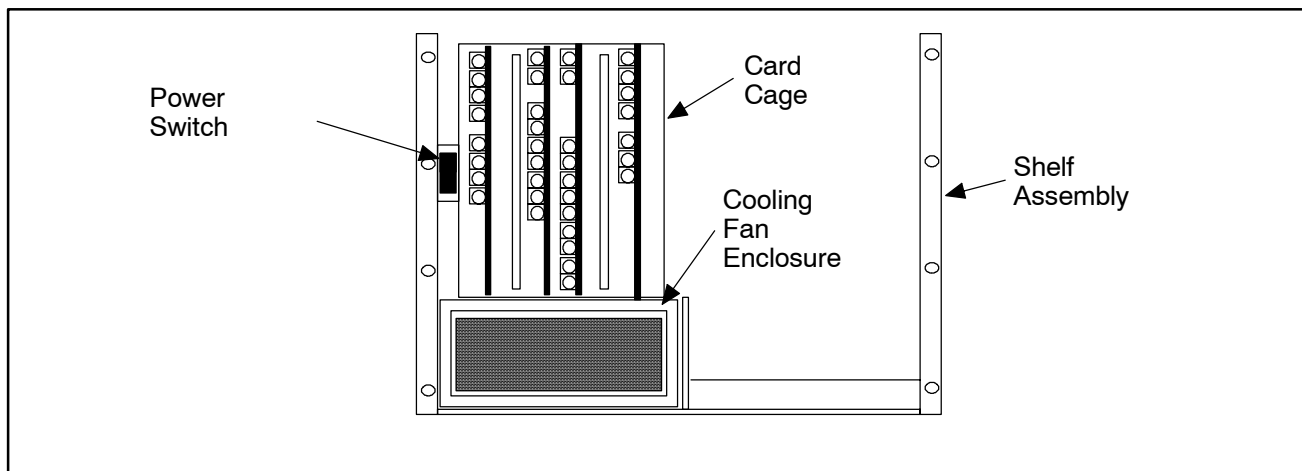


Figure 3.16. Card Cage for Supervisory Computer Interface

VAX® to PeerWay Interface

The VAX® to PeerWay Interface consists of RS3 control system circuit cards that are installed in the VAX computer and connected to the PeerWay. The circuit cards provide the communication link to the PeerWay as a PeerWay node. This interface permits the VAX computer to read from and write to Controller Processors at much higher speeds than are possible through a serial interface.

For more information about the VAX to PeerWay Interface, see PW: 2.

Diogenes Interface

The Diogenes Interface allows a Diogenes control system to be operated from an RS3 console. For more information about the Diogenes Interface, see PW: 3.

Section 4: Software Functionality and Organization

To understand how the RS3 control system functions, you need to understand the role of the system software.

Imagine the software as a set of blocks. These blocks are actually software that resides in the Controller Processor cards. Each block is responsible for performing a function. There are different types of blocks: input blocks, ControlBlocks, and output blocks. To perform a control function, various blocks are put together or “configured” to form a control loop, as shown in Figure 4.1.

The software blocks reside in Controller Processor cards. They allow the configurator to build overall control schemes and to provide great flexibility. The software blocks allow you to change the configuration at any time, even when the plant is running. Individual blocks are configured separately and then linked together to form complete control loops.

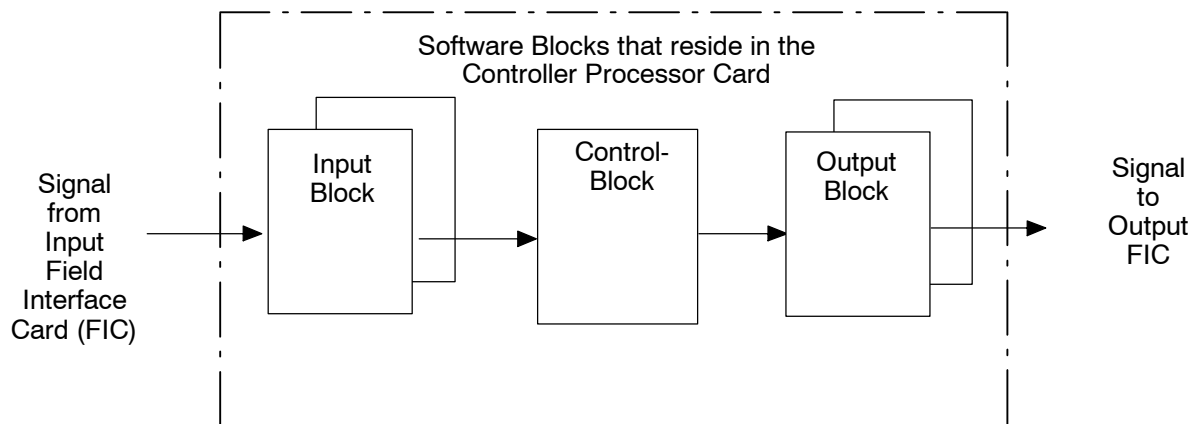


Figure 4.1. Control Loop Concept

Control Loops

This section describes typical continuous and discrete control loops in the RS3 control system.

Typical Continuous Control Loop

A typical continuous (analog) control loop is shown in Figure 4.2. It contains:

1. A field Process Variable (PV) transmitter with a 4-20 mA output
2. An analog Field Interface Card (FIC)
3. An analog input block (AIB)
4. A ControlBlock (CB)
5. An analog output block (AOB)
6. An analog Field Interface Card (FIC)
7. A field device that requires a 4-20 mA signal

Keep in mind that the Field Interface Cards are mounted in a card cage, whereas the software blocks reside in the Controller Processor Card.

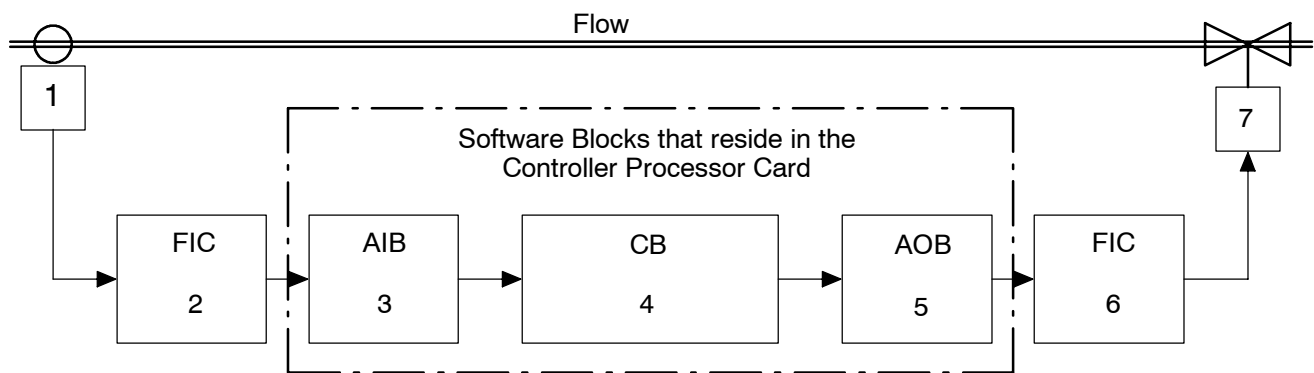


Figure 4.2. Typical Continuous Control Loop

Typical Discrete Control Loop

A typical discrete control loop is shown in Figure 4.3. It contains:

1. A field process contact with an on/off output
2. A contact Field Interface Card (FIC) or Field Interface Module (FIM)
3. A Contact Input Block (CIB) or Discrete Input Block (DIB)
4. A ControlBlock (CB)
5. A Contact Output Block (COB) or Discrete Output Block (DOB)
6. A contact FIC or Discrete FIM
7. A field device that requires an on/off signal

Keep in mind that the Field Interface Cards (FICs) are mounted in a card cage, whereas the software blocks reside in the Controller Processor card.

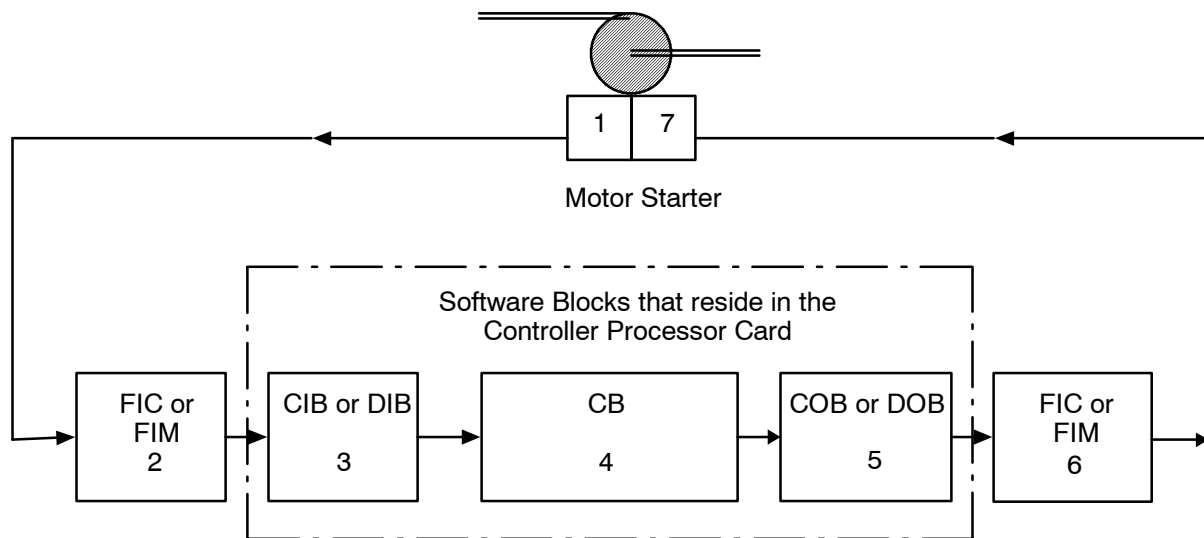


Figure 4.3. Typical Discrete Control Loop

Types of Blocks

In the RS3, there are two major types of blocks with different functions:

- Input and output blocks
- ControlBlocks

Figure 4.4 shows the difference between the types of functions that ControlBlocks and input/output blocks perform.

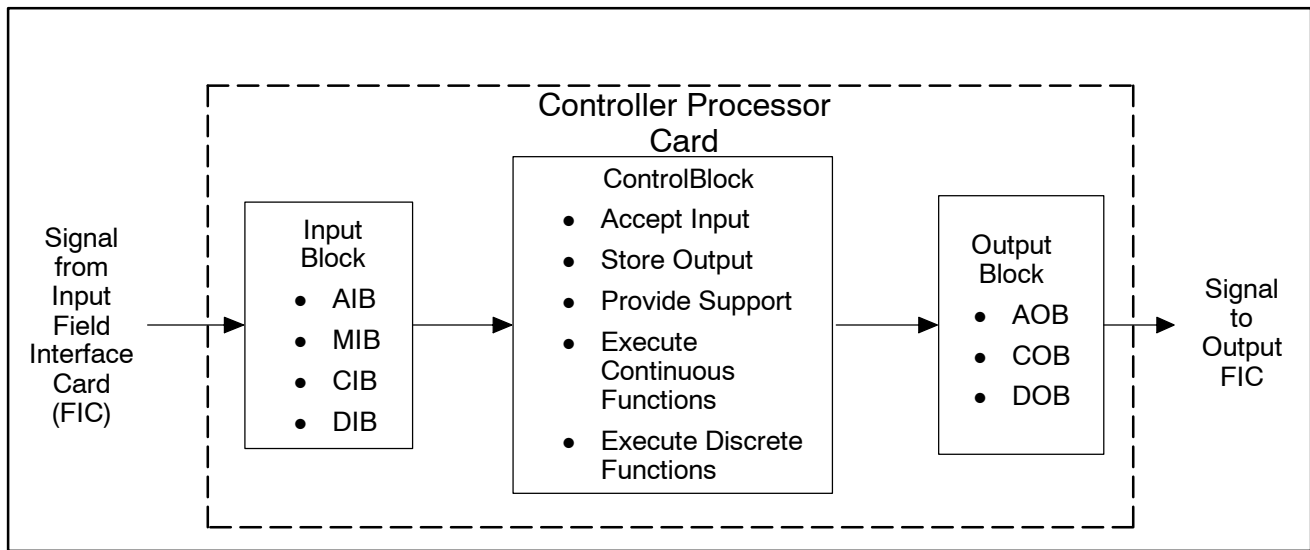


Figure 4.4. Block Concept

Input/Output Blocks

Input/output (I/O) blocks are used to bring Field Interface Card (FIC) signals into the system and to send system-generated signals back to FICs. The address of the corresponding pair of terminals for each signal is stored in the memory of the input/output block. I/O blocks can filter and condition signals, as well as check for alarms and generate event messages.

For each signal, one block must be configured. For each type of signal, there is a corresponding type of input or output block. Table 4.1 lists the types of I/O blocks. For definitions of the I/O blocks, see the glossary in the back of this manual.

Table 4.1. Input and Output Blocks

Block Name	Abbreviation
Analog Input Block	AIB
Analog Output Block	AOB
Contact Input Block	CIB
Contact Output Block	COB
Discrete Input Block	DIB
Discrete Output Block	DOB
HART Output Block	HOB
Multiplexer Input Block	MIB
Pulse Input/Output Block	PIOB
Programmable Logic Controller Block	PLCB
Redundant Input/Output Block	RIOB
Smart Transmitter Block	SIB
Temperature Input Block	TIB
Value Input Block	VIB

ControlBlocks

ControlBlocks are computational blocks where calculations and logic functions are performed. ControlBlocks can perform continuous (analog) or discrete functions that depend on the type of ControlBlock function that is selected.

The major function of a ControlBlock determines whether the ControlBlock is to be used to control a process, alter a signal, or perform a user-defined function. More specifically, a ControlBlock can be configured to act as a proportional-integral-derivative (PID) controller, a motor controller, or a valve controller; as a stack totalizer, a signal selector, or another type of signal modifier; or as a math block or a discrete block. In addition, ControlBlocks can perform alarm checking and generate alarm messages. Table 4.2 lists the types of ControlBlocks. For definitions of the ControlBlocks, see the glossary at the end of this manual.

ControlBlocks can contain:

- Up to 15 continuous inputs and 15 discrete inputs per block
- One continuous output and 16 discrete outputs per block

The number of possible inputs and outputs is shown in Figure 4.5.

All analog and discrete outputs receive their commands from some type of ControlBlock. ControlBlocks are linked to other ControlBlocks or I/O blocks so that data can be transmitted between blocks.

Blocks that are transmitting data between one another are considered to be linked together. Continuous and discrete inputs from other blocks can be brought into the ControlBlock for use in the ControlBlock calculations. Once the ControlBlock completes the calculations, the outputs that result can be sent to other ControlBlocks or I/O blocks.

Table 4.2. ControlBlock Major Functions

Function Category	Abbreviation	Block Function
Continuous Functions	MAN	Manual (User-defined)
	P	Proportional-only control
	I	Integral-only control
	D	Derivative-only control
	PI	Proportional and Integral control
	ID	Integral and Derivative control
	PD	Proportional and Derivative control
	PID	Proportional, Integral, and Derivative control
	IB	Integral-only control with Bias
	LL	Lead /Lag
	DT	Dead Time
	TOT	Stack Totalizer
	TOTSP	Setpoint Totalizer
	RB	Ratio /Bias
	SS	Signal Selector
	VLIM	Velocity Limiter
	POLY	7th Order Polynomial
PLI	Piecewise Linear Interpolator	
MATH	User-defined	
ATPID	Auto Tuning ⁽¹⁾	
Discrete Functions	DISC	Discrete (User-defined)
	DMC	Motor Control
	DASMC	Auto Sequence Motor Control
	DDSMC	Dual Speed Motor Control
	DDDMC	Dual Direction Motor Control
	DVC	Valve Control
	DASVC	Auto Sequence Valve Control
	DMVC	Motorized Valve Control
	RBL	Rosemount Basic Language Control ⁽²⁾

⁽¹⁾ Requires an ATMLC image

⁽²⁾ Requires an RBL image

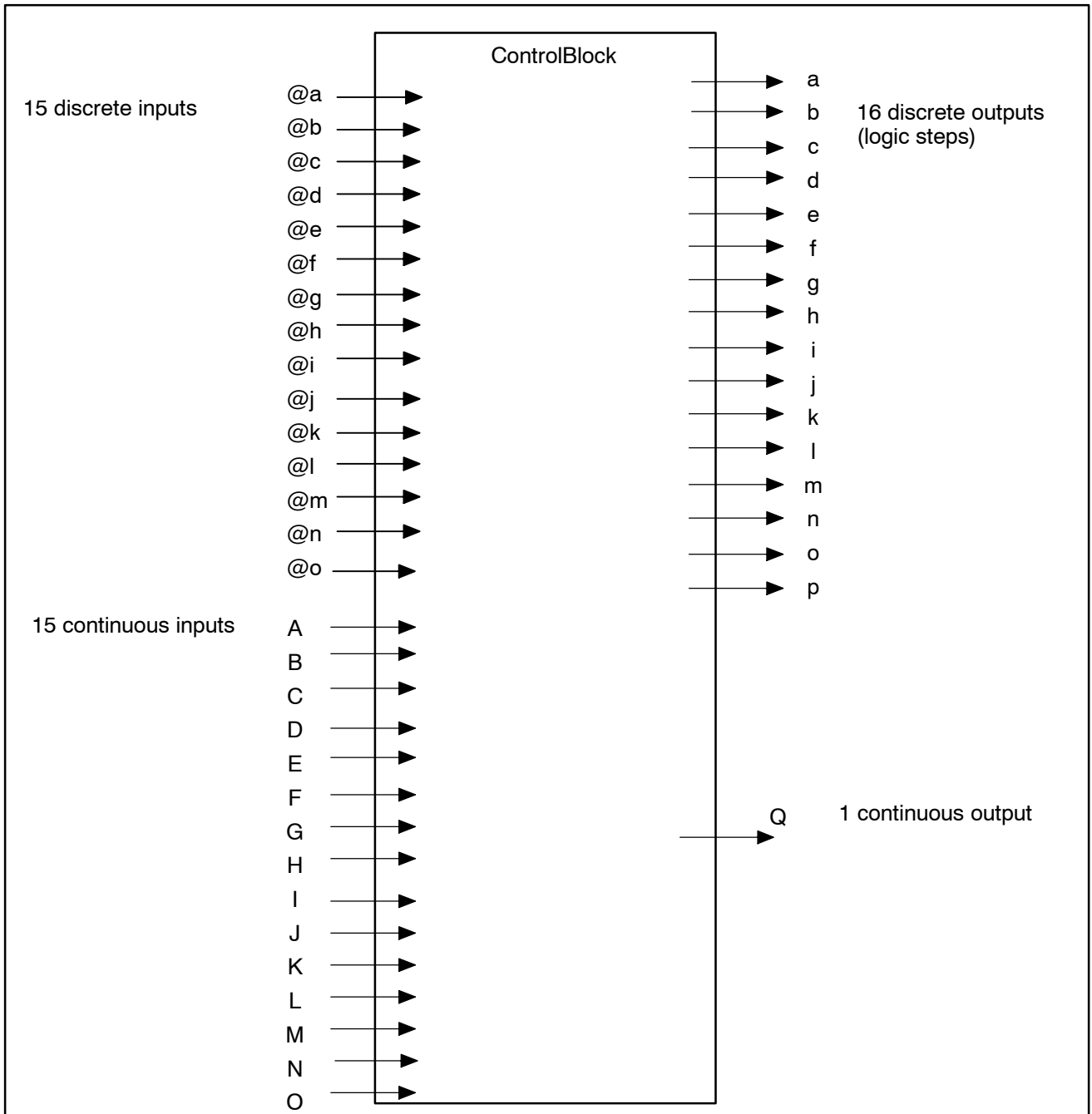


Figure 4.5. ControlBlock Functional Diagram

User Interface

This section describes the user interface portions of the RS3 software. Those portions of the RS3 that are used on a daily basis include console access levels, password security, faceplates, graphics, alarms, trending, reports, and logs.

Console Access Levels

User privileges ensure that authorized users have appropriate access to the RS3. The system grants users privileges based on job category, or access level.

For systems without password security, a key inserted in the base of the console identifies the user's access level. For systems with password security, login names and passwords give users access to the RS3 and identify the user's access level.

Figure 4.6 shows the different levels and the relationships between them.

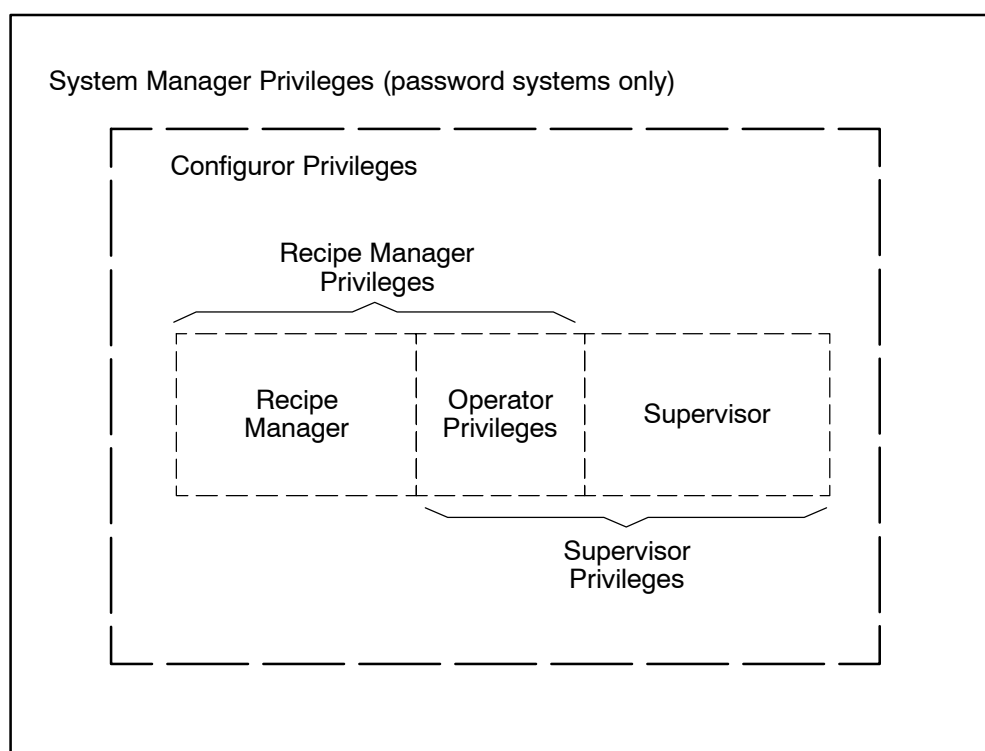


Figure 4.6. Relationship Between Console Access Levels

An operator has only operator-specific privileges. A recipe manager and a supervisor both contain all of the privileges of an operator, but the privileges specific to each of them do not intersect. The configurator has access to all the privileges of recipe manager, supervisor, and operator.

The system manager level is available on systems with password security. The system manager has access to all configurator privileges, and also is allowed to set up password security and to perform certain disk and tape functions.

Password Security

Password security is a software option that provides each RS3 user with unique plant access, which is the electronic equivalent of a paper signature. The most efficient implementation of password security requires the keyboard interface that has no physical key for accessing the system. However, a keyed access system can also be configured for password security.

Users are required to log in and log out, and are allowed to change their own passwords. A system manager performs administrative functions related to password security. For more information on password security, see CC:7.

Faceplates

A faceplate is a representation of a controller. It is one way to operate the plant. It can be used to view current operating conditions and to make control adjustments. Faceplates can be configured as individual, group (8 individuals), unit (4 groups), or overview (2 units). The unit and overview are for display only.

Figure 4.7 shows eight faceplates joined into a group faceplate. Notice the difference between the discrete and continuous faceplates. For more information about faceplates, see CB: 2 and CB: 5.

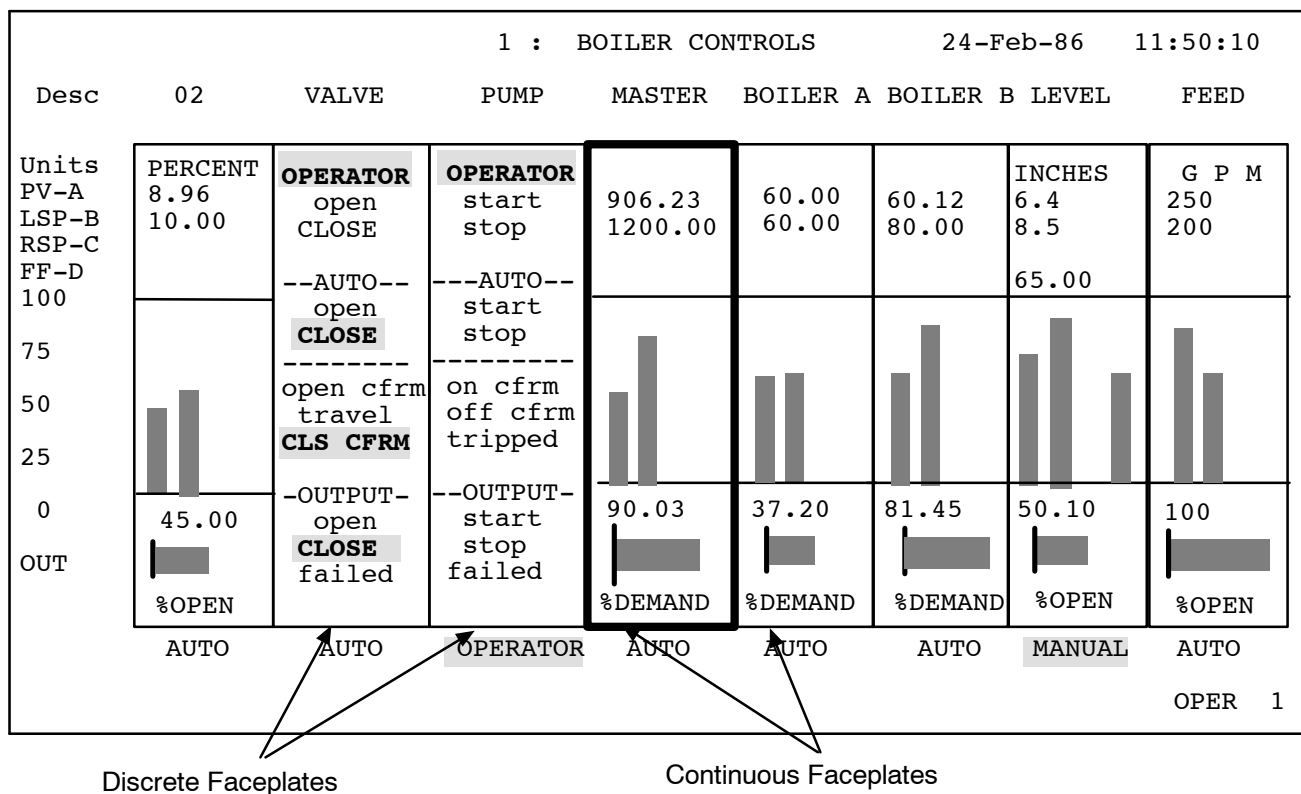


Figure 4.7. Group Faceplate

Graphics

A process graphic is a pictorial representation of your plant conditions. It allows you to enter data, to change controller modes, and to perform other functions directly on the display.

Each process graphic display is constructed on a fabric. As shown in Figure 4.8, the process graphic can be much larger than what you can see on the display at one time. You can move the trackball to see other areas of the process graphic fabric.

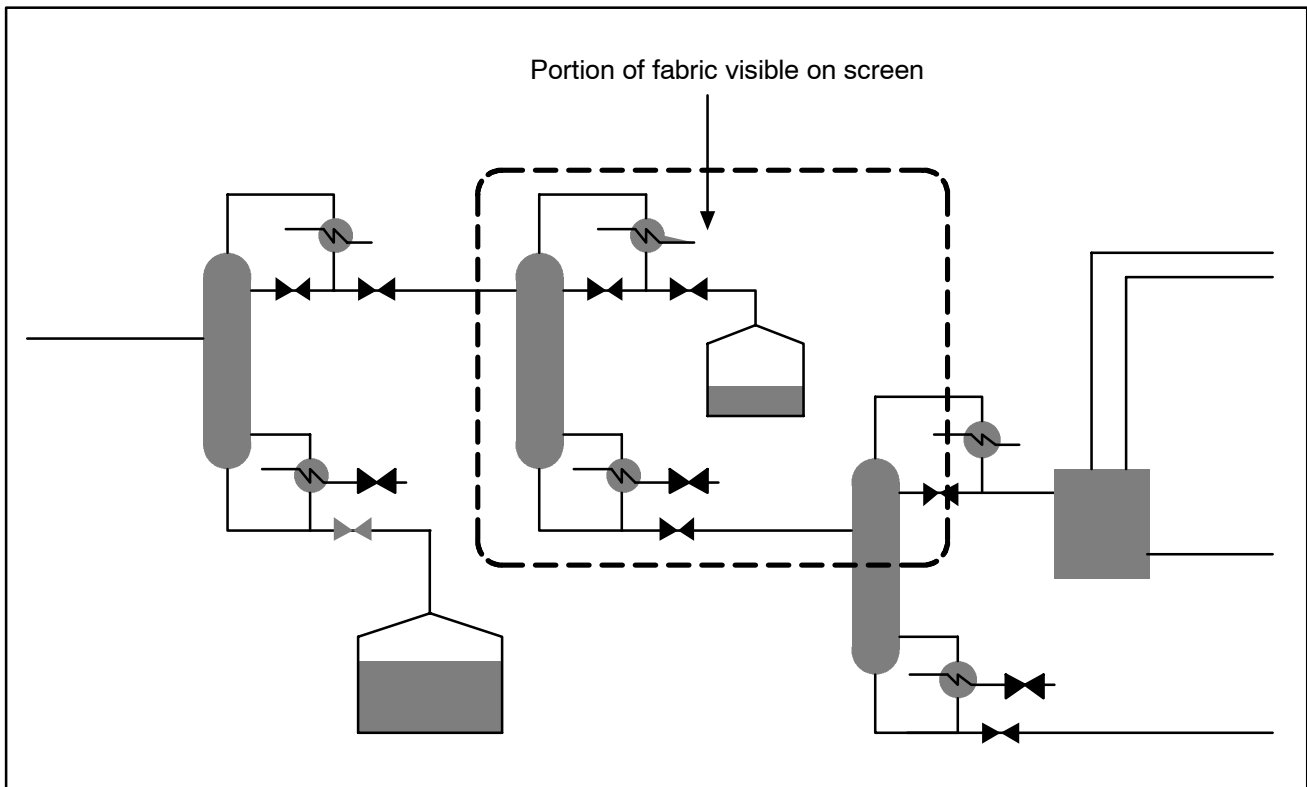


Figure 4.8. Sample Graphic Display

Alarms

Alarms are sorted and separated at the console into alarm lists: Hardware, Batch, Disk, System, Process, and Event. The alarms are saved to disk for Alarm History.

Each screen includes an alarm banner that shows the latest, unacknowledged alarm with the highest priority (see Figure 4.9). The color of the alarm banner indicates the type of alarm. Table 4.3 lists the standard alarm colors.

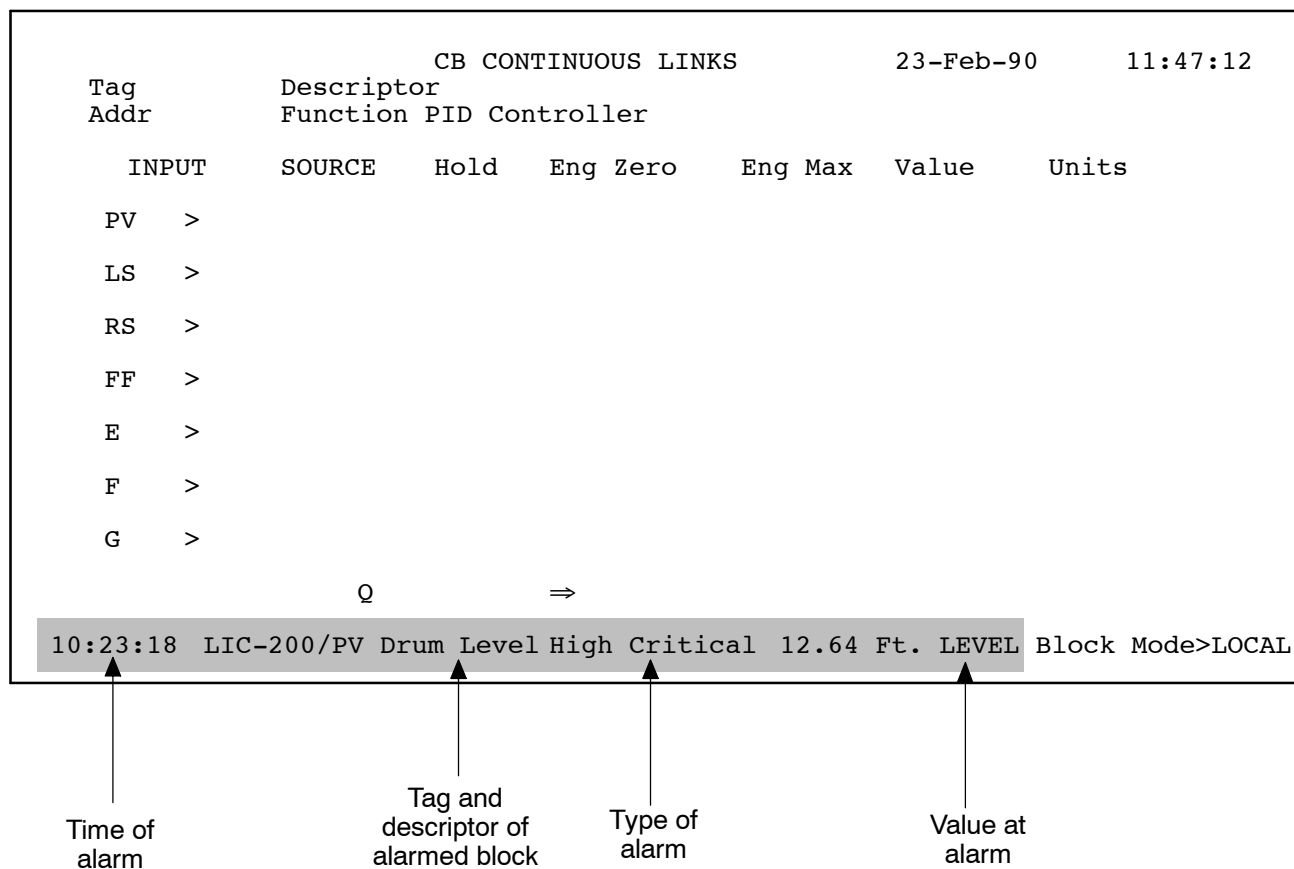


Figure 4.9. Alarm Banner

Table 4.3. Standard Alarm Colors

Color	Alarm Type
Red	Critical Process
Yellow	Advisory Process
Magenta	Hardware
White	System Status
Green	Events
Orange	ABC Batch

Trending

Trending is a process used to store data so that it can be accessed and analyzed. You set the sampling frequency and the length of time that data is to be saved. A trend display shows data for up to four trend variables in a trend group. Figure 4.10 shows a sample of the Trend Group screen.

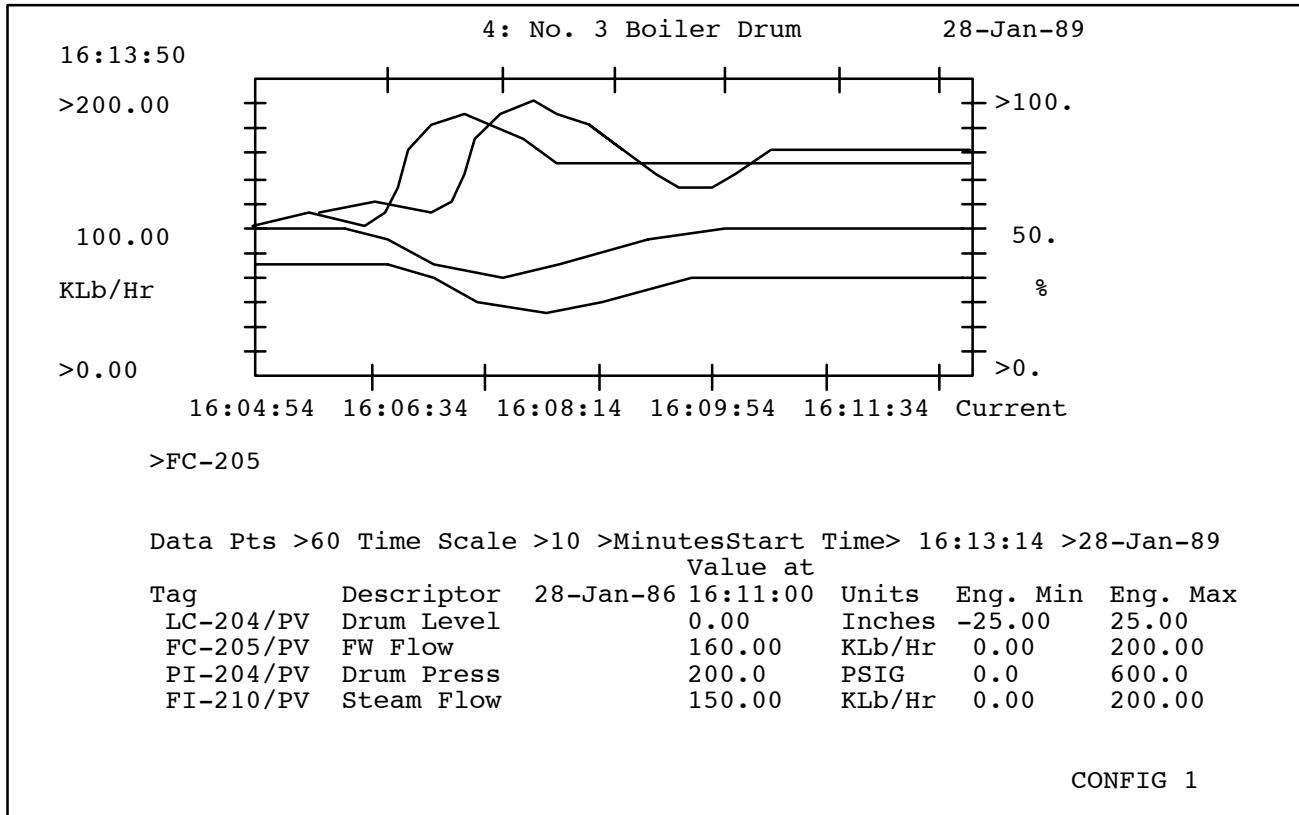


Figure 4.10. Trend Group Screen Example

Reports

You configure your own reports with information from ControlBlocks, I/O blocks, or trend files. User reports can be generated based on alarms, events, time and date, or operator commands.

Logs

There are four logs:

- Operator change log Keeps track of operator actions.
- Transmitter maintenance log Provides a log of entries from the operation of a transmitter.
- Batch log Provides a log of entries from the execution of batch scripts.
- Alarm log Stores alarm messages in a file on the console disk. The Alarm Log is shown in Figure 4.11. You configure how the alarm log information is sorted and displayed at the console.

```

                                ALARM LOG DISPLAY                                20-Dec-91   12:07:37
File Name :vol112,console18  FIND      FILTER      FORMAT      SORT      PRINT
Cnfg'd Log:
Logging Criteria >log1      Top Entry #>1      Last Entry :7
  Find Crit: node=16-20
  Filt Crit:
Date      Occur      Tag      Message
4/26      18:46:11      =19A     Controller Not Backed Up
4/26      18:45:40      =19A     Controller Not Backed Up
4/26      18:45:18      =18      Alarm logging Enabled
4/26      18:45:16      =18      Trend Recording Disabled
4/26      18:45:04      =18      Node Restarted
4/26      18:45:00      =16      Node Restarted
4/26      18:43:30      =19A     Controller Not Backed Up

                                OPER 5
    
```

Figure 4.11. Alarm Log Display Screen

Moving Around the System

This section describes some of the ways to move around the system.

- Command line
- Callup and display buttons
- Paging keys
- Directory screens
- Menus

Callup and Display Buttons

Callup and display buttons are used to call up group displays, graphic displays, reports, alarm lists, and other information. The difference between callup and display buttons is that display buttons do not have lights for alarm annunciation. The callup and display buttons are shown in Figure 4.13.

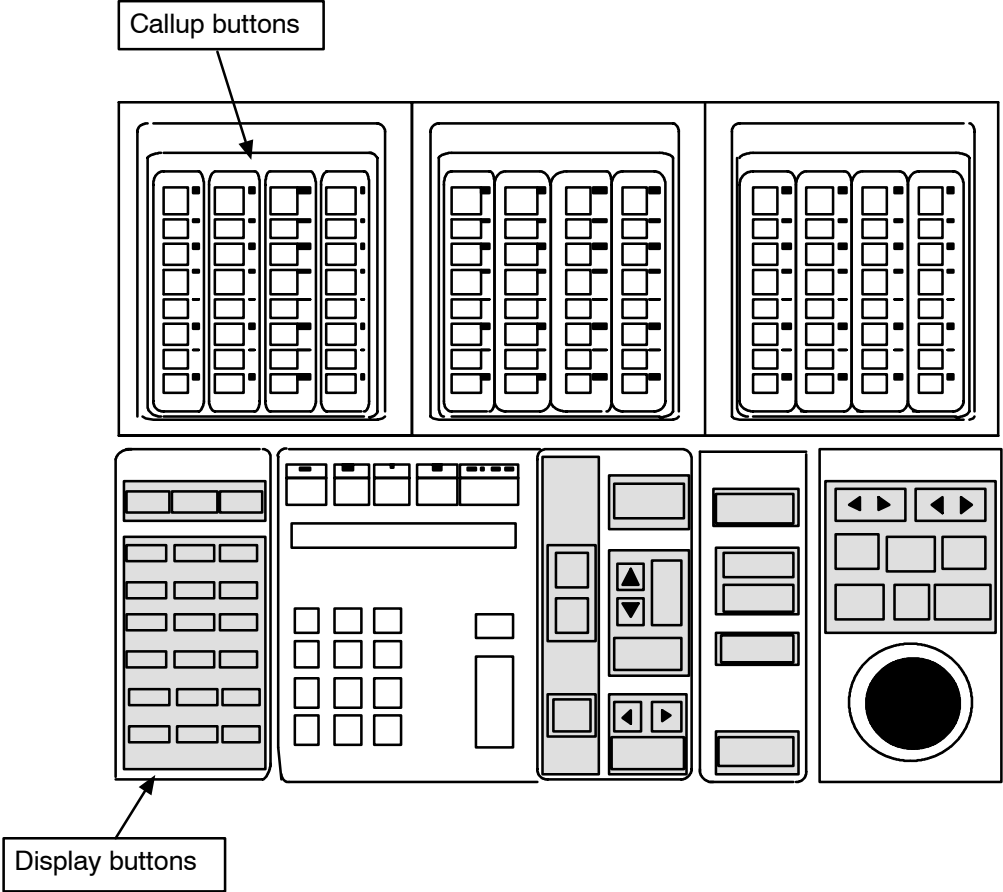


Figure 4.13. Callup and Display Buttons

Paging Keys

Figure 4.14 shows that it is possible to move within a ControlBlock, to move from ControlBlock to ControlBlock, and to move within other areas of the system, all by using the paging keys: [PAGE AHEAD], [PAGE BACK], and [EXCHANGE].

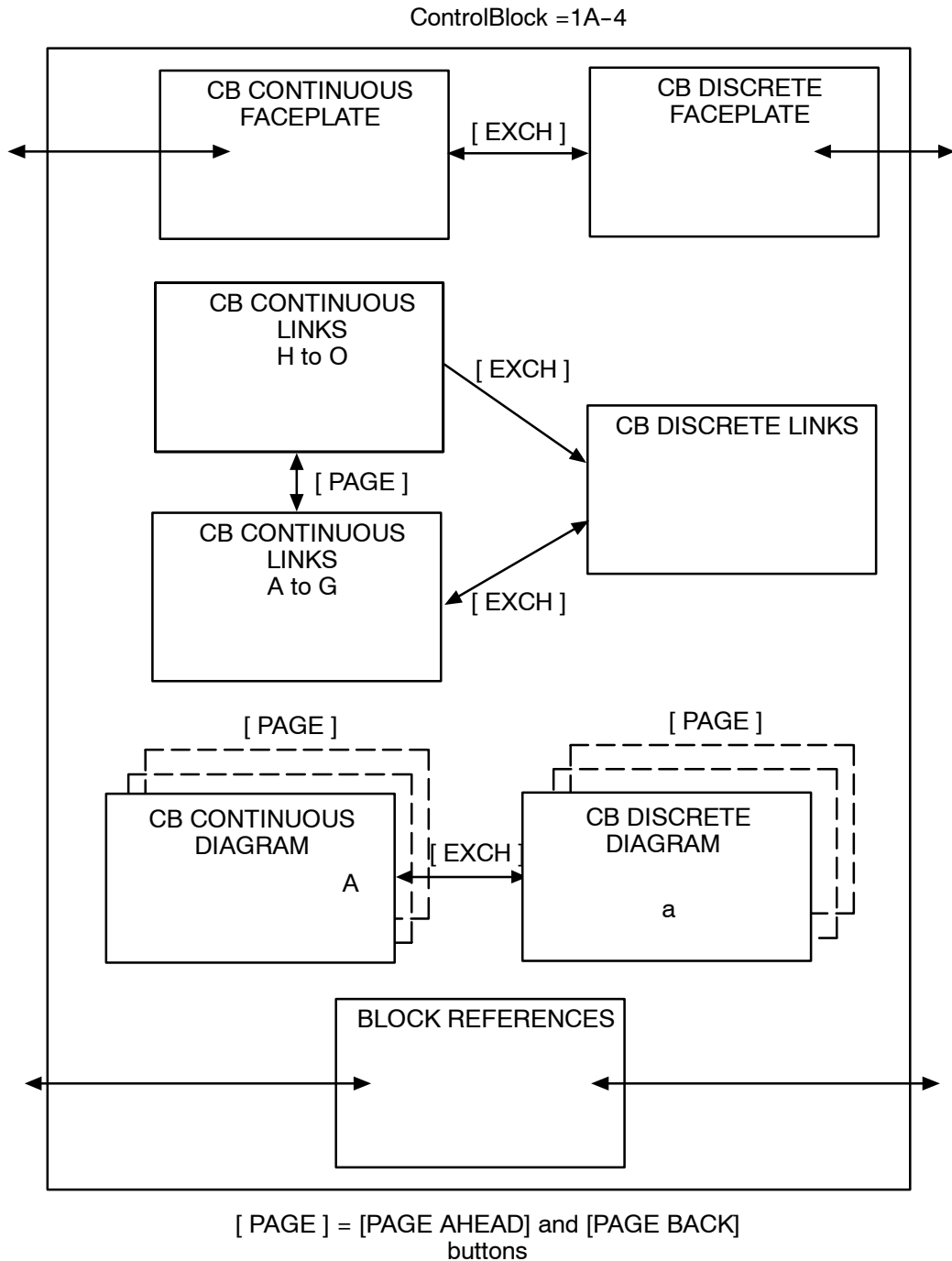


Figure 4.14. Moving Among ControlBlock Screens

Directory Screens

The directory screens that are shown on the Menu Command Console screen in Figure 4.15 are another way of moving around the RS3. They help to simplify screen selection and to access and move between volumes, folders, and files.

```
MENU COMMAND CONSOLE      16-Dec-93 15:22:10

Process Graphics Directory      Disk Directory PeerWay
Overview Directory             Disk Directory
Unit Directory                 Configure Command Console
Group Directory                Plant Status
Trend Group Directory          Process Active Alarms
Tuning Display Directory        Alarm List Configuration
Report Read Directory           Operator Log

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FULL                           CONFIG 1
```

Figure 4.15. Menu Command Console Screen

Menus (Enhanced Keyboard Software Option)

Menus are available with the enhanced keyboard software option. These menus are displayed in pop-up windows. The menus organize the major RS3 commands into logical task groups. Each task group is represented by a submenu: for example, the Batch submenu contains Batch commands; the configuration submenu contains configuration commands. Figure 4.16 shows the Main Menu and several submenus.

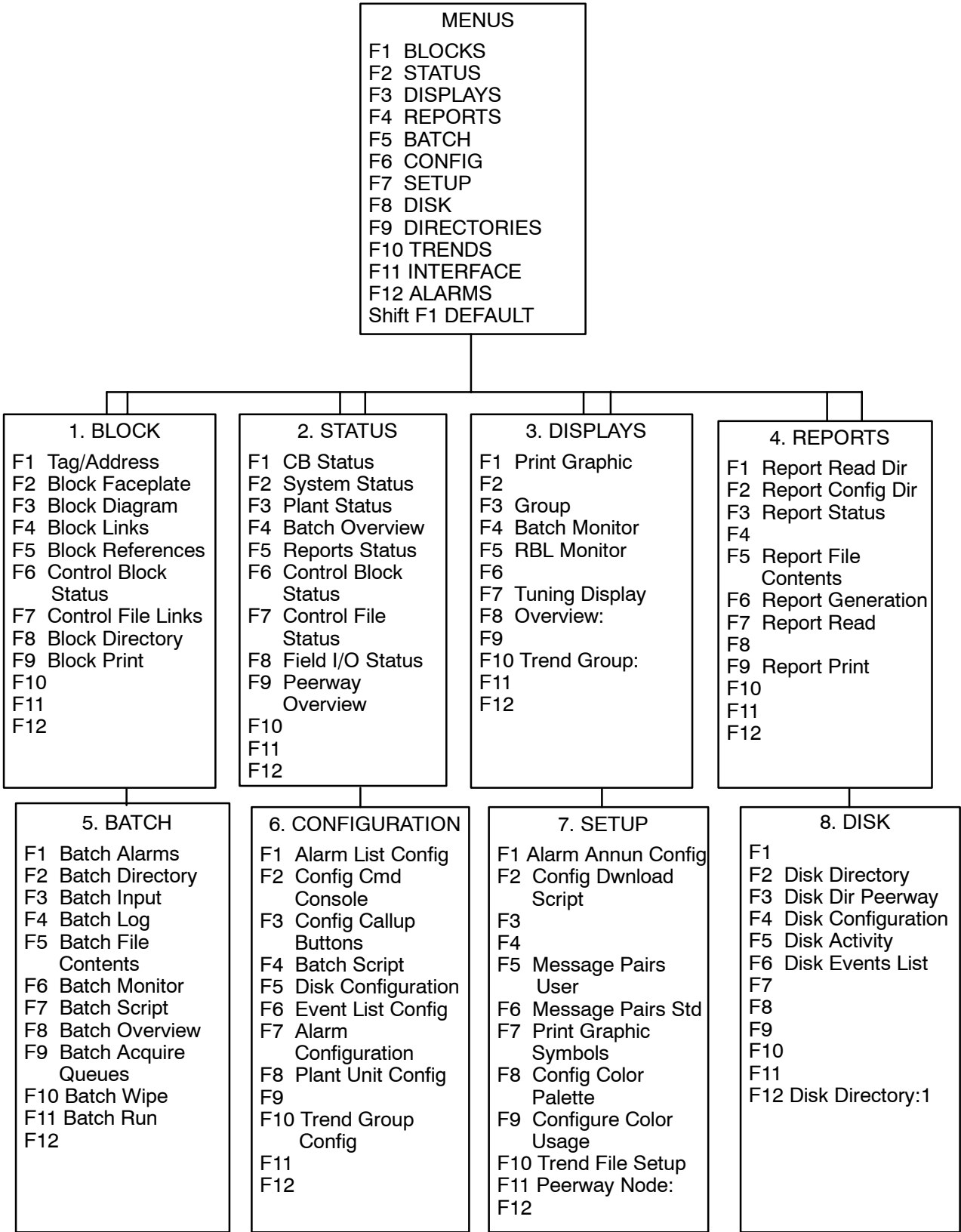


Figure 4.16. Enhanced Keyboard Software Option Menus

Optional Software

This section describes optional software for the RS3, which includes ABC Batch, Rosemount Basic Language, RS3 Network Interface, RMT/host, and Host Mode.

ABC Batch

Batch processing is a method of manufacturing a finite quantity of product by using a sequence of production steps that are performed in a particular order. Batch processing differs from continuous processing, which processes materials and produces output in a continuous flow.

ABC Batch is an RS3 batch system that is used to configure and operate batch processes. The batch software defines the equipment, materials, and operations that are used to produce the batch product. ABC Batch provides two different types of software interfaces:

- **Batch Run screen** An earlier design of the batch interface that has been incorporated into the ABC Batch system. The Batch Run screen is typically used to configure and produce a single batch product or start recipes.
- **Batch Recipe** The more powerful of the two ABC Batch configurations. Equipment, operations, and materials are defined in a database and represented on the recipe interface as graphic icons. A single recipe can produce multiple batch products or multi-grade products.

A series of small modular scripts underlay the batch configuration. These scripts consist of instructions written in Rosemount Basic Language. The instructions describe the equipment, materials, and procedures used to create the various batch products.

Figure 4.17 shows an example of a Batch Control Recipe screen.

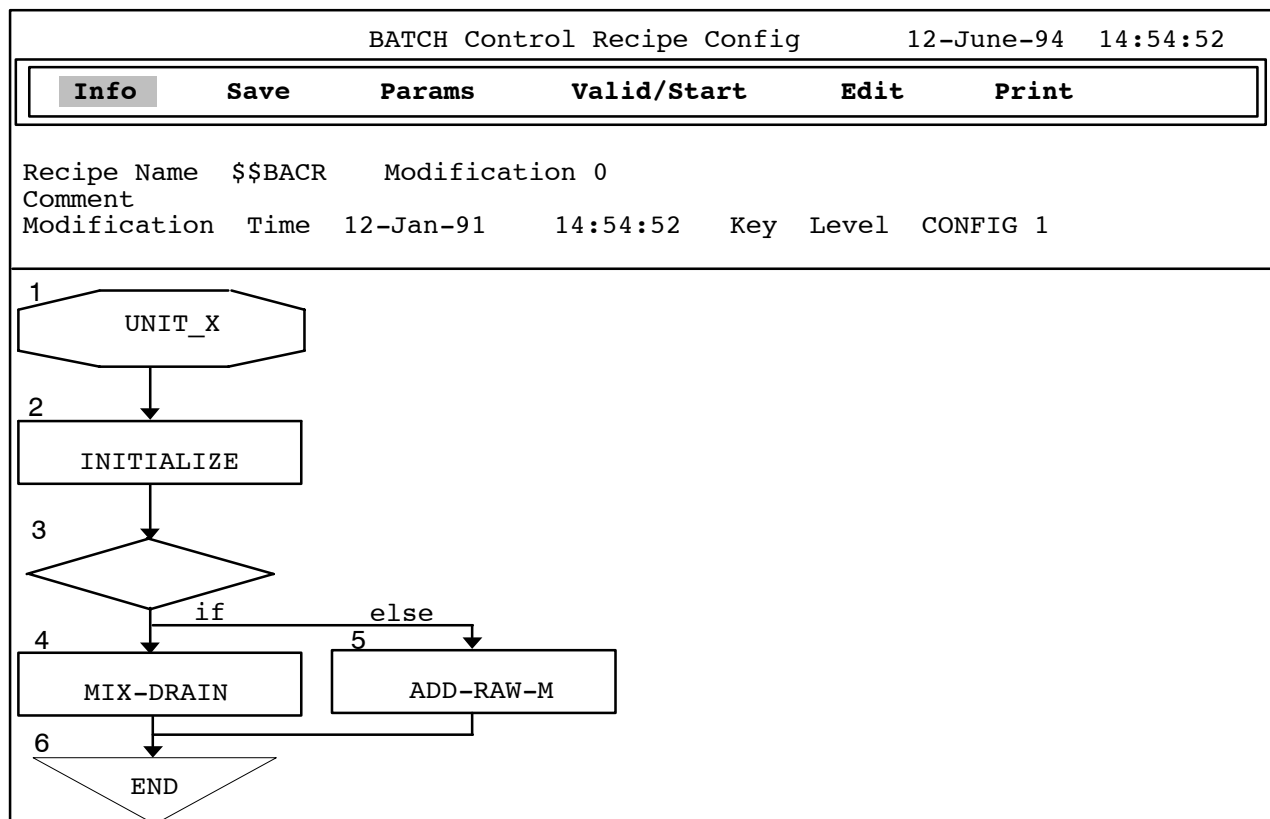


Figure 4.17. Batch Control Recipe

Rosemount Basic Language (RBL)

RBL is a proprietary Rosemount programming language used to write batch programs called scripts. The RBL instructions define the batch plant environment, the formulas, and the steps that are associated with making batch products. RBL instructions are executed line-by-line in an order defined in the script. Several scripts can be combined to create a batch task.

RBL can also be used to write scripts to communicate with asynchronous devices such as various types of lab equipment.

RS3 Network Interface (RNI)

The RS3 Network Interface (RNI) is a gateway that connects an RS3 with applications that are running on host computers. The RNI resides both as a node on the PeerWay and as a host on an Ethernet network using TCP/IP protocol. RNI software services provide an exchange of alarm messages, dynamic process data, and control. Figure 4.18 shows the two types of software that are associated with the RNI:

- Boot software, which resides in the RNI hardware
- Application Programming Interface (API) software, which resides on the host and includes the API library, the configuration server, and the error log server

For more information on the RNI, see the *RNI Release Notes*, the *RNI Installation Guide*, the *RNI Programmer's Reference Manual*, and SV: 7-6.

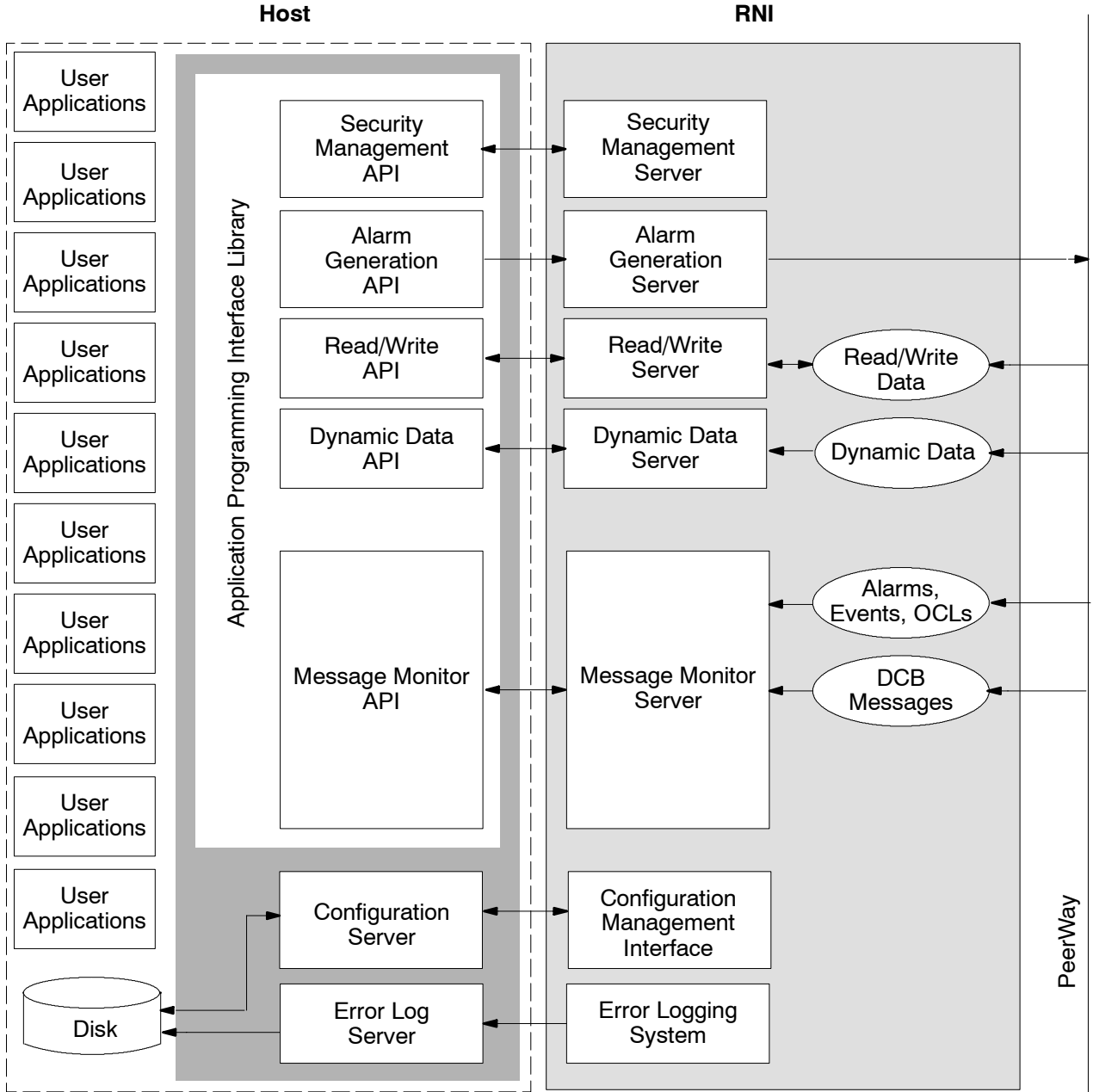


Figure 4.18. RNI Software Overview

RMT/host

RMT/host software resides on a VAX computer and contains communication and application programs for real-time access to the RS3. The software is used to process data for process optimization, supervisory control, and data logging and reporting, as well as for other site specific software application requirements.

Host Mode

Host Mode is a way for RS3 operators to use application programs on VAX/VMS computers that run RMT/host. A Host Mode session is a connection between an RS3 68020 pixel multitube screen and a host computer, usually a VAX that is running RMT/host. It provides a terminal emulation of the DEC VT340 terminal in both ANSI and REGIS modes. Not all VT340 features are implemented.

The Host Mode screen is shown in Figure 4.19.

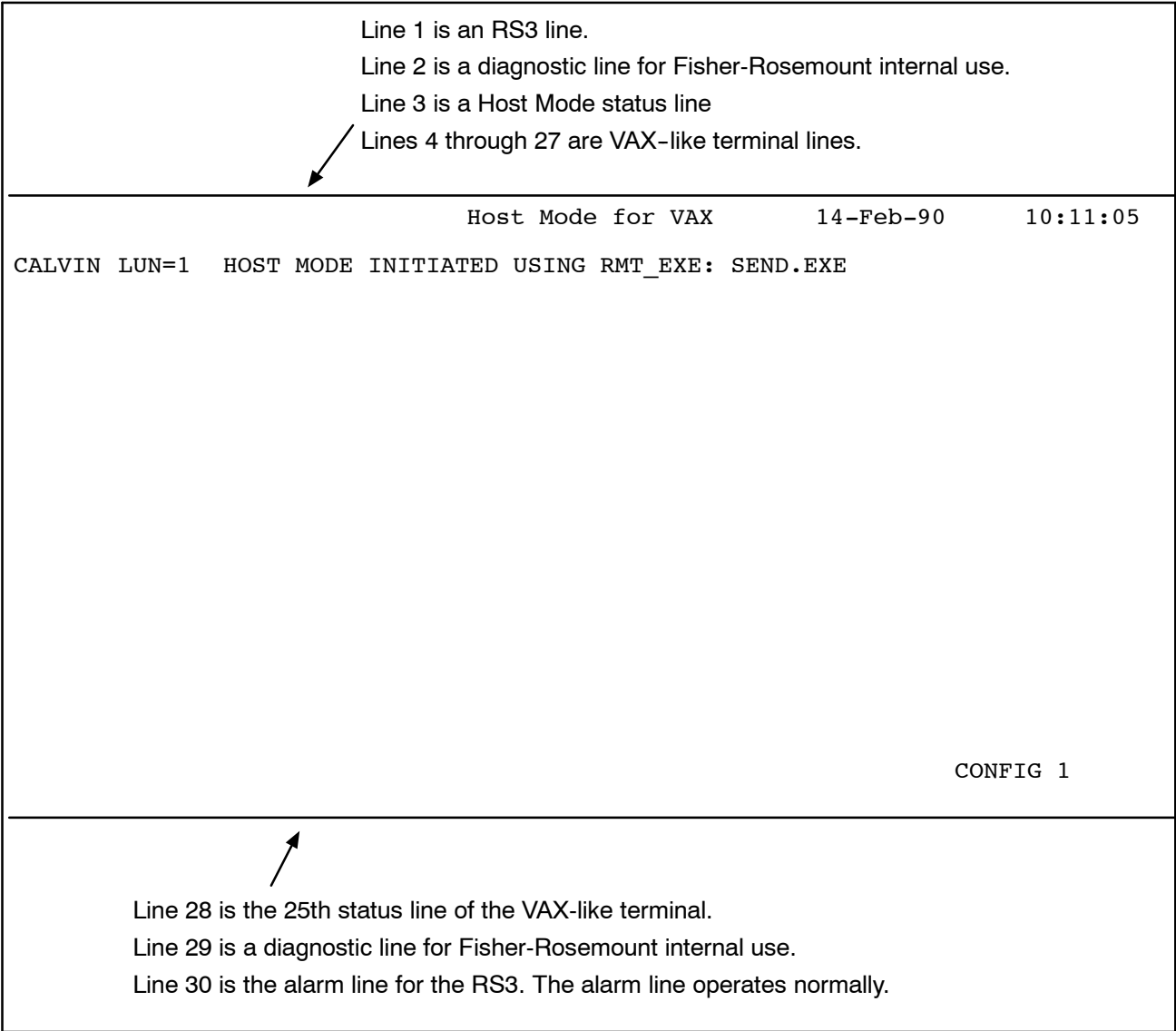


Figure 4.19. Host Mode Screen

Section 5: Addressing

Addressing is the convention used to ensure that data is routed from the field to the system, from one software block to another within the system, from the system to field I/O, and between the system and the consoles. In order for this data to be successfully exchanged, an orderly scheme of addressing for all system hardware and software must be employed.

A typical I/O point address is =15AB105, whereas a typical ControlBlock address is =15A-60. As you read these addresses from left to right, the address tells you in increasing detail the location of the I/O point or ControlBlock. This section describes the hierarchy represented by an I/O point or ControlBlock address.

Conventions. Address numbers are always preceded by an equals (=) sign (for example, =27). Also, leading zeros are not required for an address to be considered valid. For example, =1BA503 and =001BA503 are both proper addresses for the same location.

PeerWay Node Addressing

The first element in an address is the PeerWay node number. The maximum number of nodes that can reside on a PeerWay is 32. Highway Interface Adapters can be used to link PeerWays and to connect up to 992 nodes. Each node is assigned a unique address number (from 1 to 32) by positioning jumpers that are located internally in the device. Two nodes cannot have the same PeerWay node address. Figure 5.1 shows the components of a PeerWay node address. Figure 5.2 shows some examples.

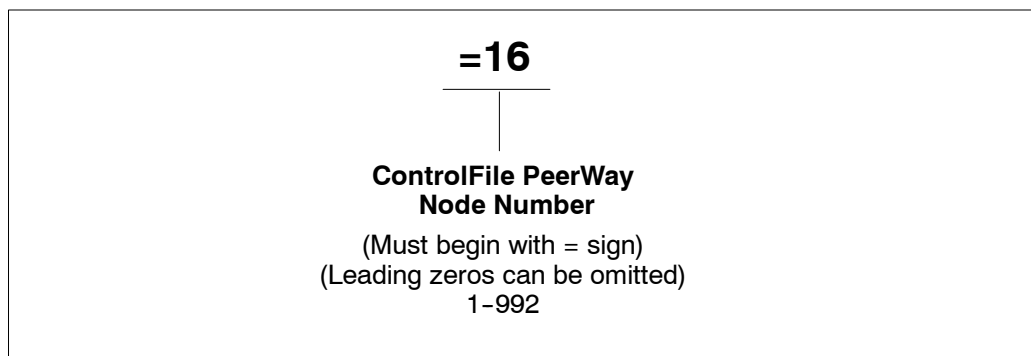


Figure 5.1. PeerWay Node Addressing

Console Addressing

Because consoles are PeerWay nodes, consoles are addressed as other PeerWay nodes, except that their addresses must be even numbers. The jumper possibilities available in a console allow only even-numbered addresses from 2 to 32 (992 for nodes with HIA) to be selected. (The hardware address jumpers for consoles are located on a circuit board that is located inside the console.) No other hardware or software within a console requires further addressing. Figure 5.1 also shows the components of a console address.

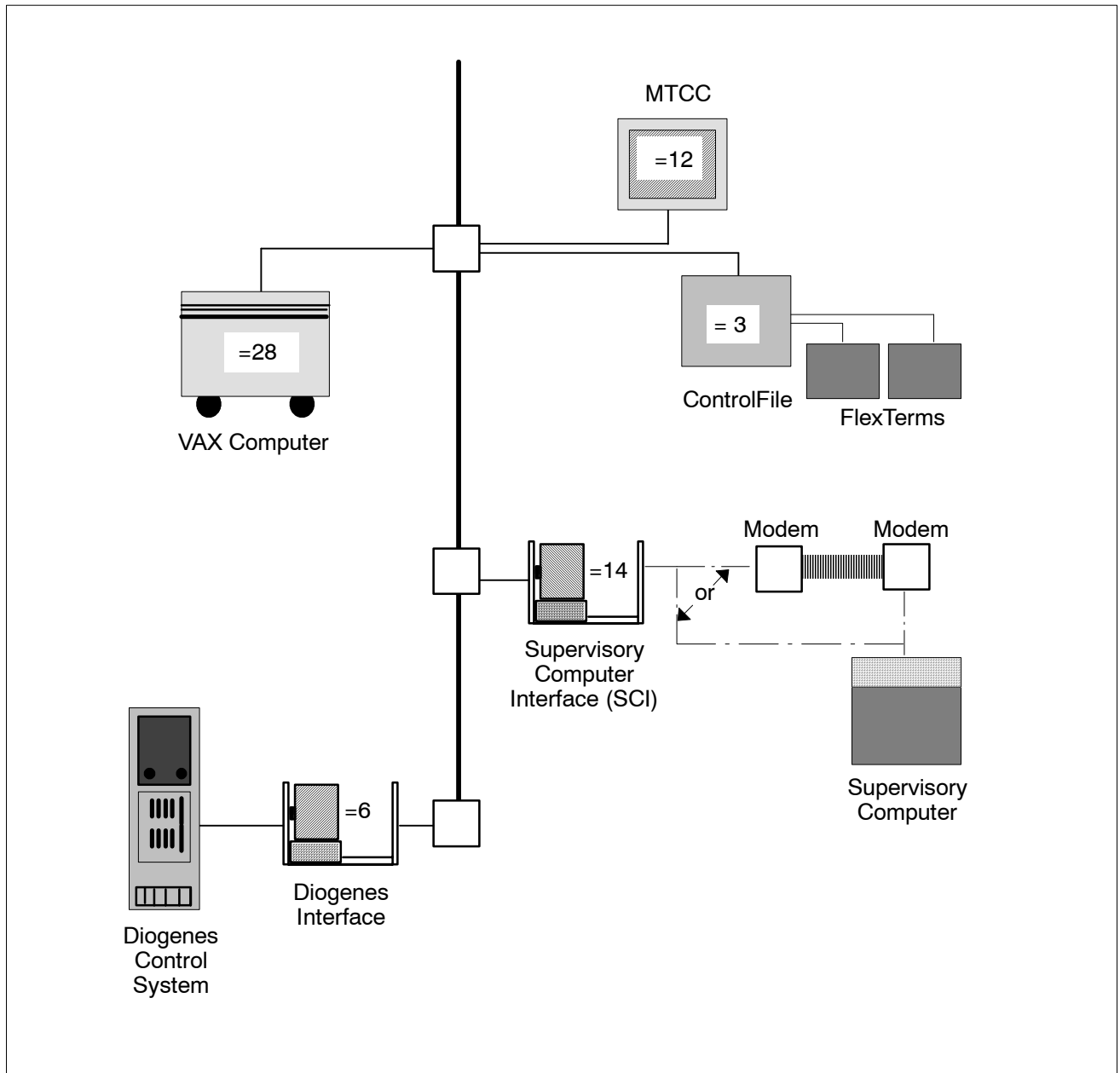


Figure 5.2. Addressing PeerWay Nodes

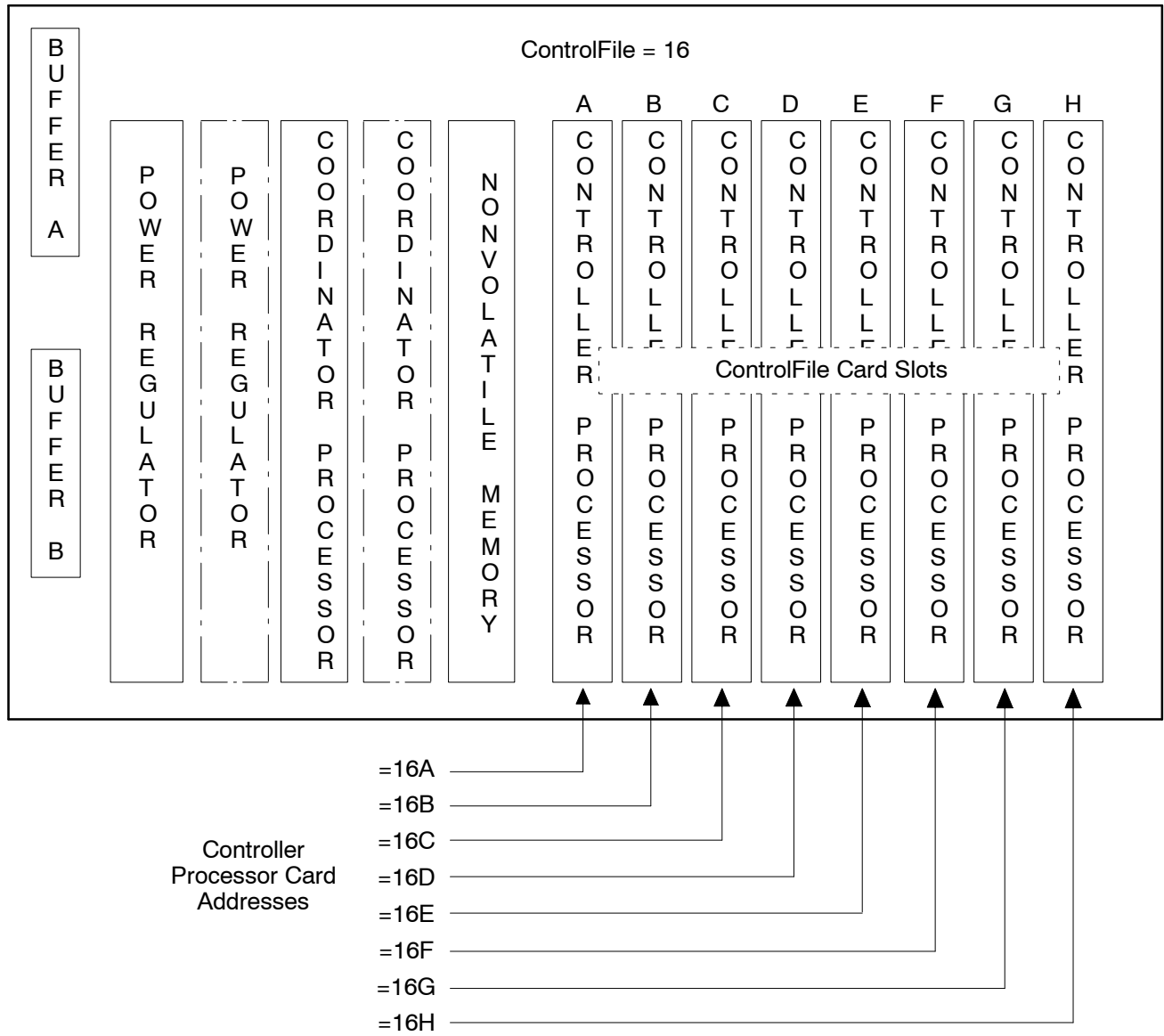


Figure 5.4. Controller Processor Card Addressing

Card Cage or Termination Panel Addressing

The next element in an address after the Controller Processor address is either a dash to indicate a ControlBlock address, or a letter to indicate a card cage or termination panel. A Controller Processor card is supported by up to four card cages and/or Multipoint termination panels to facilitate the routing of signals to and from the field. The card cages or Multipoint termination panels are designated A, B, C, and D.

Figure 5.5 shows the components of a card cage or termination panel address. Figure 5.7 shows an example of addressing.

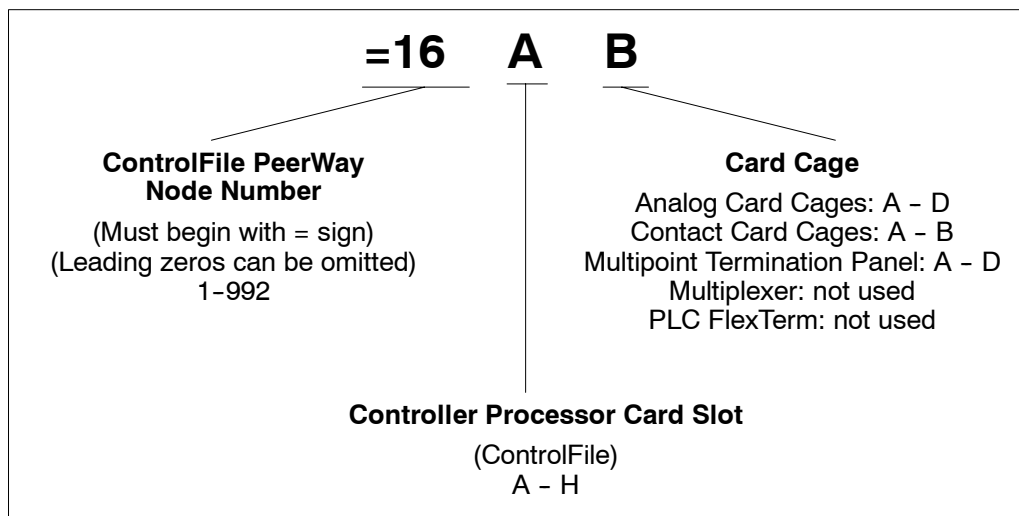


Figure 5.5. Card Cage or Termination Panel Address

The hardware address jumpers are located on each card cage assembly and on each Multipoint termination panel. The jumper possibilities for card cages or termination panels allow up to four I/O card cages with addresses A through D.

- Contact card cages can occupy only positions A and B.
- Analog card cages can occupy positions A through D.
- The Multipoint termination panels can use any address (A through D) that is not used by a card cage.

Card Slot or Communication Line Addressing

The digit that follows the card cage or termination panel address represents the card cage card slot or communication line. Figure 5.6 shows the components of a card cage card slot or communication line address. In an address using Multipoint I/O, the eight communication lines correspond to the eight card cage slots.

Communication lines can come from one of two devices:

- Communications Connect Card that is installed in an Analog Card Cage
- Communications Termination Panel II

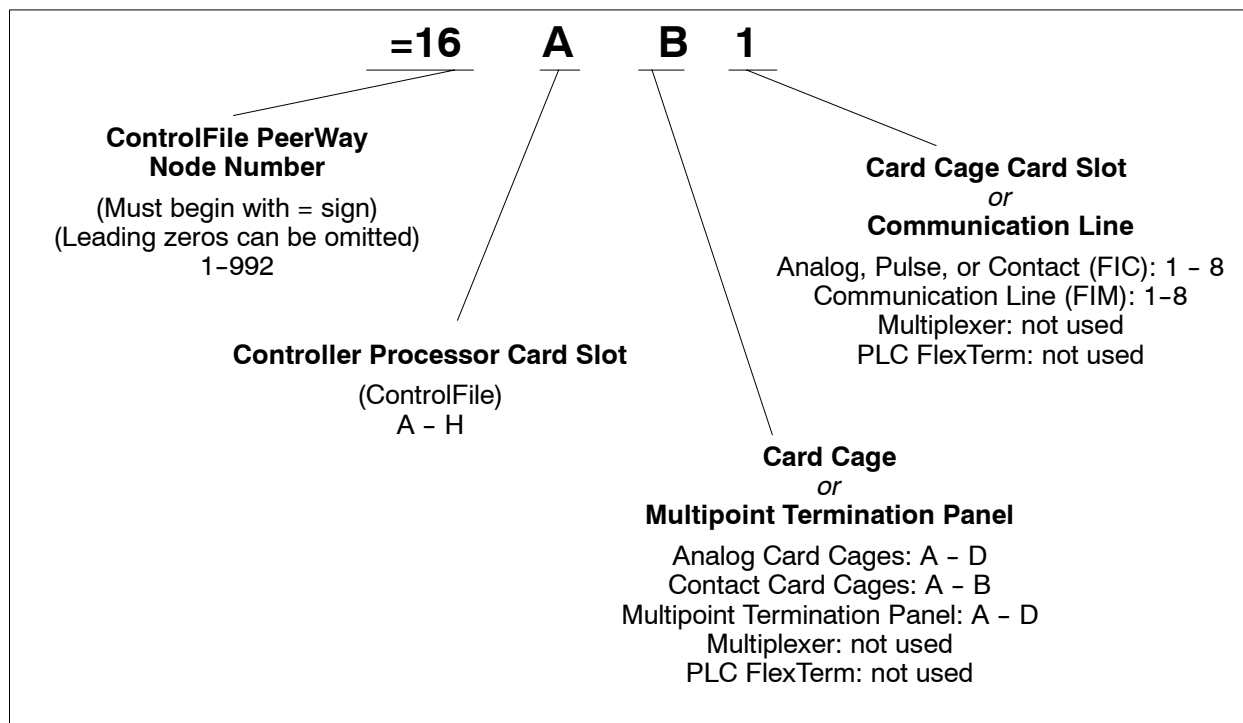


Figure 5.6. Card Cage Card Slot Address

Figure 5.7 shows an example of card cage and communication line addressing. Controller Processor A of ControlFile =16A is connected to Analog Card Cage =16AA by a cable that contains communication lines 1-8. This is cabled to Analog Card Cage =16AB, which contains a Communication Connect Card. The card breaks the eight communication lines into individual wires that are connected to MIO Termination Panels =16AC and =16AD.

Eight Field Interface Cards (FICs) reside in an Analog Card Cage, each of which is connected to the same numbered communication line (for example, FIC 1 on line 1). Each Field Interface Module (FIM) resides on its own MIO Termination Panel, which is connected to the communication line that is identically numbered (FIM 1 on line 1, for example).

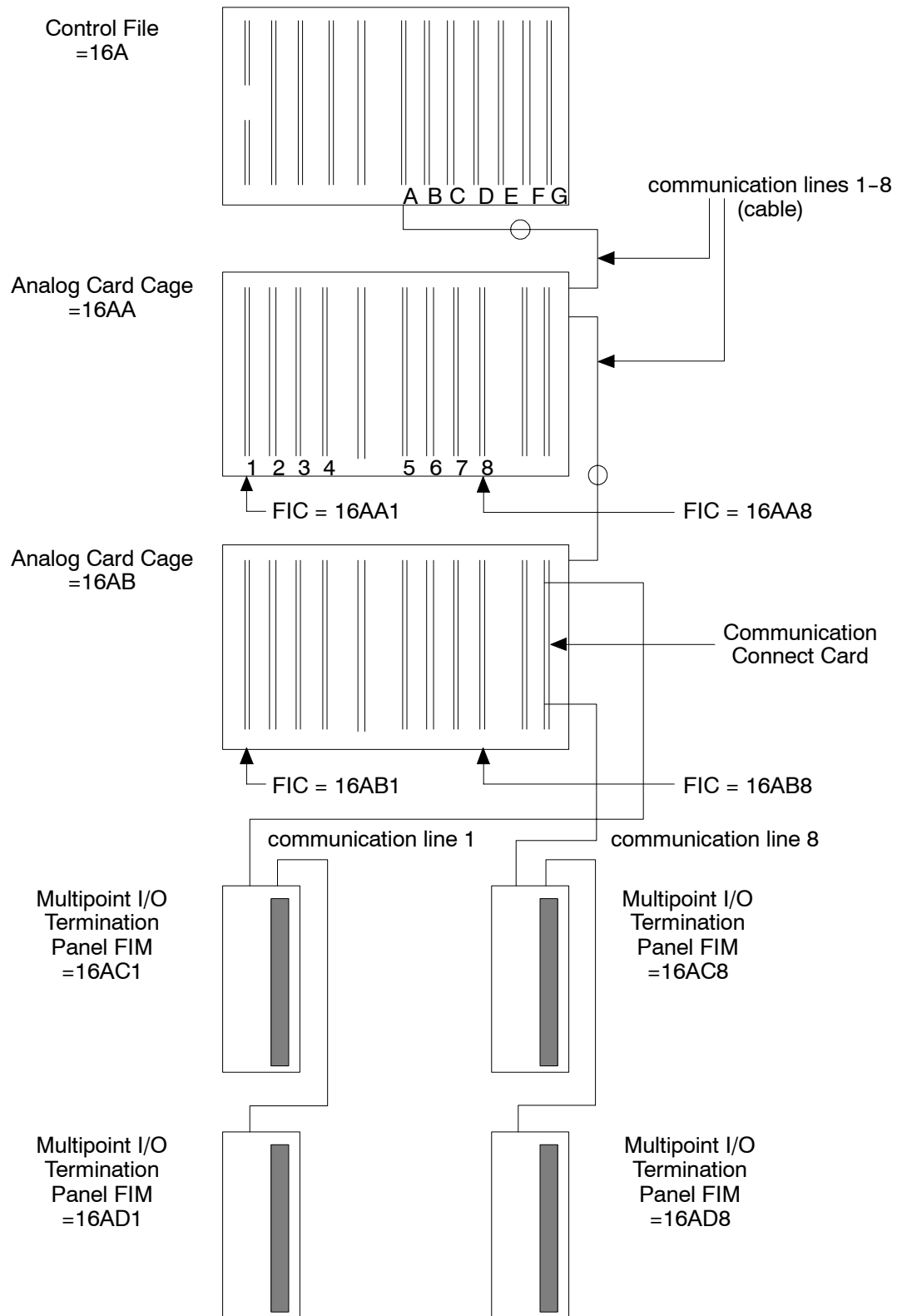


Figure 5.7. Card Cage and Communication Line Addressing

Analog Card Cage Field Interface Card (FIC) Slot Addressing

Up to eight analog Field Interface Cards (FICs) or pulse input/output FICs reside in the analog card cage. These eight cards represent eight communication lines that link the card cage with the Controller Processor.

Each of the individual card cage card slots (1 through 8) has a unique hardware address. Figure 5.8 shows the analog card cage FIC addressing.

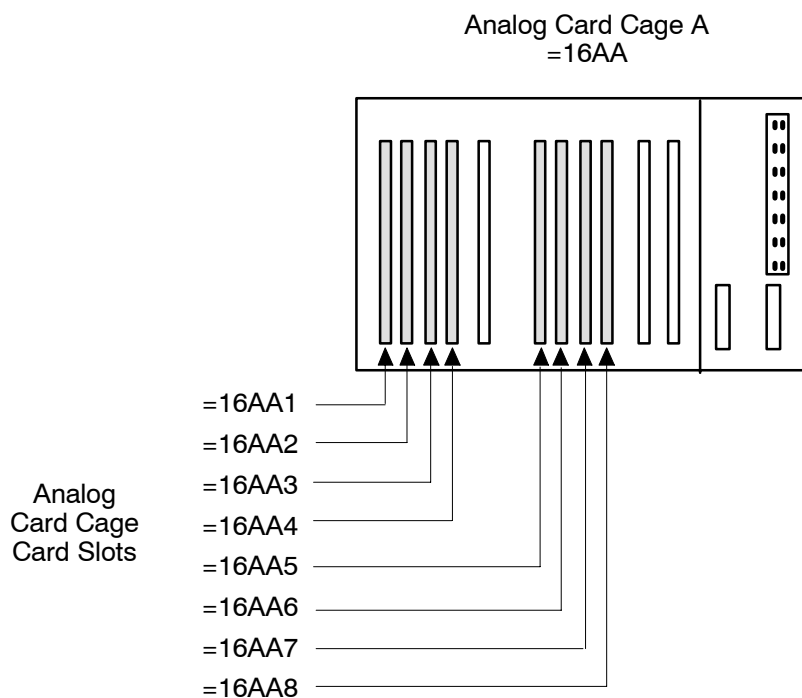


Figure 5.8. Analog Card Cage Card Slot Addressing

Contact Card Cage Field Interface Card (FIC) Slot Addressing

Up to eight contact Field Interface Cards (FICs) reside in the contact card cage. These eight cards represent eight communication lines that link the card cage with the Controller Processor.

Each of the individual card cage card slots (1 through 8) has a unique hardware address. Figure 5.9 shows the contact card cage FIC addressing.

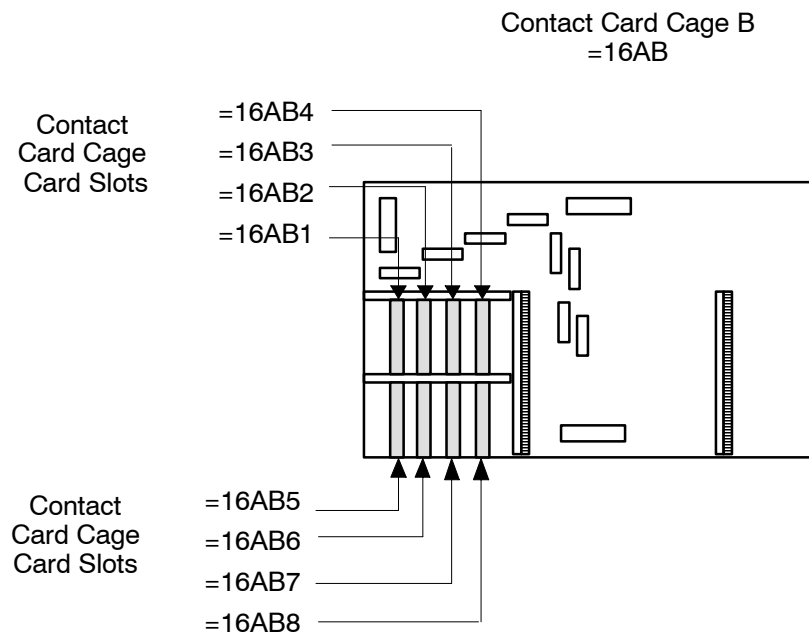


Figure 5.9. Contact Card Cage Card Slot Addressing

Multipoint I/O Field Interface Module (FIM) Addressing

The Multipoint I/O Field Interface Module (FIM) resides on an MIO Termination Panel. The FIM address is determined by a jumper on the panel that specifies the panel address A, B, C, or D, and by the attached communication line that specifies the line number 1-8.

I/O Point Addressing

The next element in an address is the I/O point address. The Field Interface Cards (FICs) and Front End Modules (FEMs) communicate with input/output (I/O) devices in the field. The number of points on an FIC varies for each type of card. Each of the I/O points that resides on an FIC, FEM, or FIM has a unique hardware address. Figure 5.10 shows the components of an I/O point address.

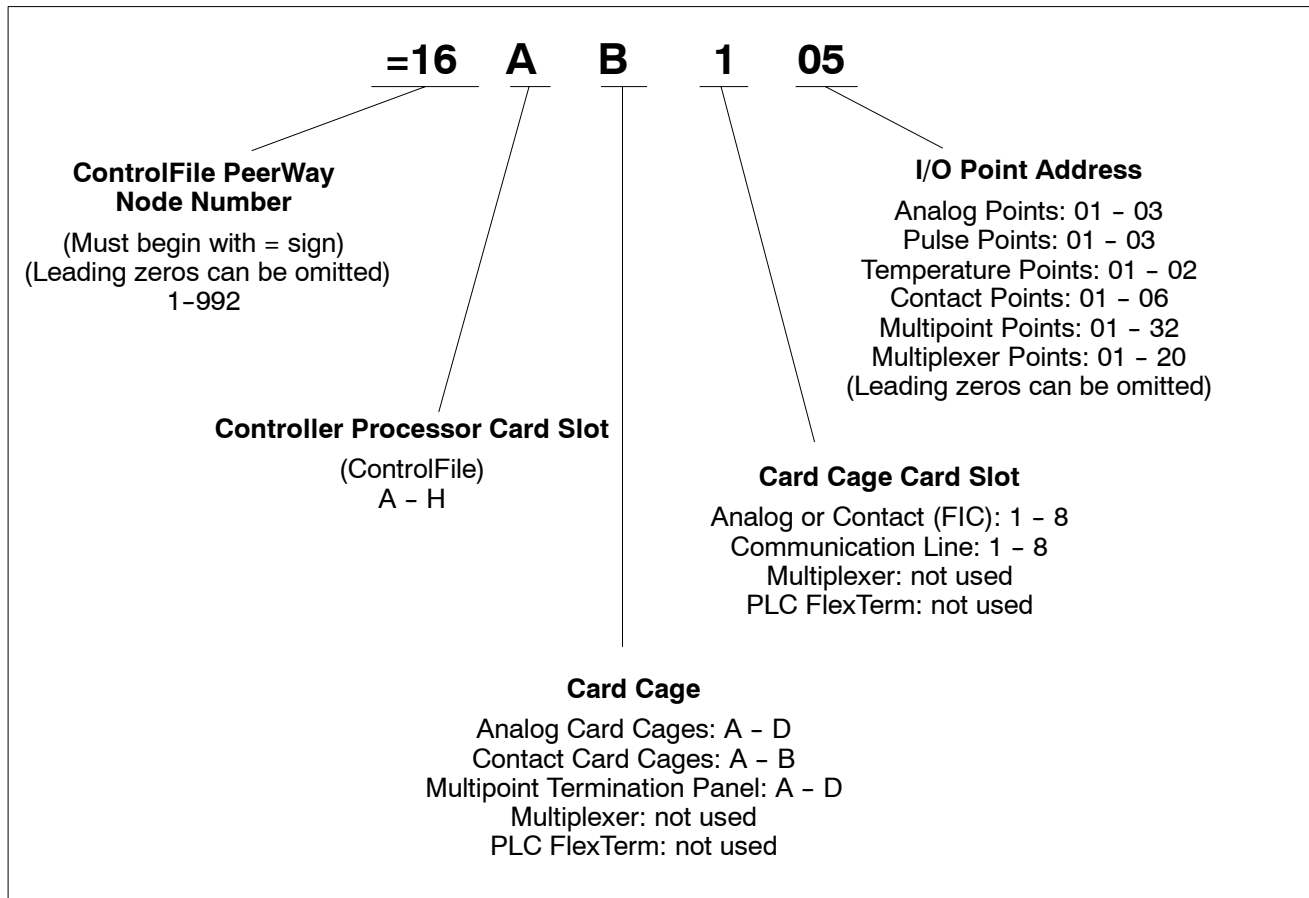


Figure 5.10. I/O Point Address

I/O Block Addressing

Because the software blocks define the I/O points, the I/O block address corresponds to the I/O point address (Figure 5.10). An example of an I/O block address is =16AA101.

ControlBlock Addressing

The ControlBlock address is derived partly from the Controller Processor card slot address on which the software block resides, and partly from a sequential number that is assigned to each software block. Up to 126 ControlBlocks can reside in an MPCII Controller Processor. MPCII Controller Processors can contain up to 99 ControlBlocks, whereas MPCII Controller Processors can contain up to 126 ControlBlocks. Figure 5.11 shows an example of a ControlBlock address, =16A-12.

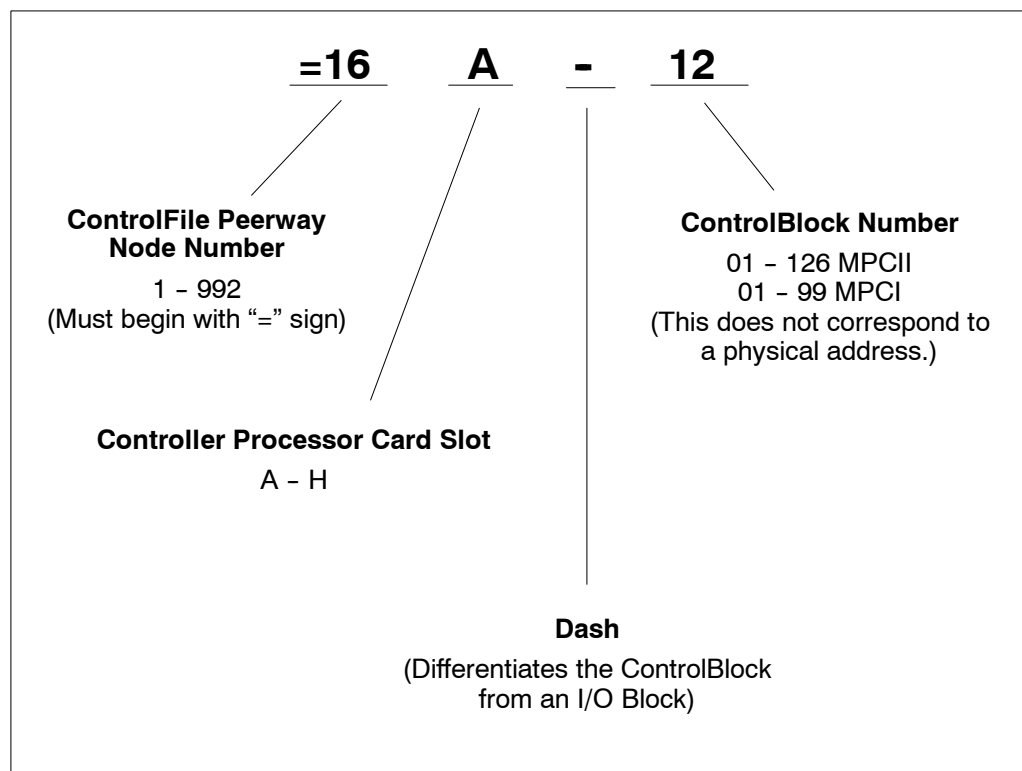


Figure 5.11. ControlBlock Addressing

Section 6: Superseded Hardware

This section lists superseded hardware, which includes various types of Controller Processors, each with a corresponding FlexTerm. Superseded hardware is rarely shipped now because more current hardware usually offers greater functionality. However, the superseded hardware is still supported. For more information on superseded hardware, see the *Service Manual*.

- Consoles
 - Pedestal Command Console
 - MiniConsole
- Controller Processors
 - Multi-Loop Controller Processor card
 - Contact Controller Processor card
 - Single-Strategy Controller Processor card
 - Multiplexer Controller Processor card
- FlexTerms
 - Multi-Loop FlexTerm
 - Contact FlexTerm
 - Single-Strategy FlexTerm
 - Multiplexer FlexTerm
- System Resource Unit (SRU)

Interchangeability with Current Hardware

Do not assume that a superseded FlexTerm or any of its parts is interchangeable with current hardware. For more information, see the *Service Manual*.

Glossary

68040 console A console with a 68040 OI Processor card.

A

access arrow A symbol that designates the access level required to enter information in a field. It is displayed on console screens as an arrow (\Rightarrow , \rightarrow , or $>$). Contrast with *configurator arrow*, *supervisor arrow*, *operator arrow*.

acknowledged alarm An alarm that has been acknowledged with an entry at a keyboard.

Action statement A logic statement that affects the *continuous inputs* and *continuous output* of a ControlBlock as a result of the state of the logic step. It is defined in the Actions portion of the block Discrete Diagram screen. Contrast with *Condition statement*.

active alarm An alarm currently in an alarm condition. When an alarm is in an alarm condition, it is called an active alarm. When the alarm condition clears, it is called a *cleared alarm*.

additional image A software *image* that is required in addition to the Plant Program file in order to configure blocks for the connected I/O. These images are numbered 1, 2, 3, and 4. Contrast with *standard image*.

address An alphanumeric expression that represents a designated software or hardware location.

advisory alarm A type of *process alarm* that indicates a potential problem that should be checked. Contrast with *critical alarm*.

AIB (Analog Input Block) A *block* that accepts an analog field input and prepares the data for use by the rest of the system.

alarm animation Visual cues on the RS3 displays that indicate alarm information. Animation can involve color, blinking, and backlighting.

alarm area A group of *plant units* that are configured into a logical area.

alarm area lists *Alarm lists* that are divided up by *alarm area*. Each alarm area has an active area alarm list and a cleared area alarm list.

alarm banner	The line of information that appears at the bottom of the screen when an alarm occurs and the console is in <i>alarm banner mode</i> .
alarm banner mode	An <i>alarm display mode</i> that presents the <i>alarm banner</i> of the unacknowledged alarm with the highest priority. Contrast with <i>alarm summary mode</i> .
alarm condition	A state of a <i>block</i> , <i>variable</i> , card, or other item that is defined as abnormal, and thus, as an alarm condition.
alarm display mode	The way that alarm information is presented at the bottom of the CRT screen. The information is presented in either <i>alarm banner mode</i> or <i>alarm summary mode</i> .
alarm inhibit	See <i>inhibit</i> .
alarm limit	A configured value that is used to generate an alarm.
alarm lists	Screen displays that show alarm information about the system.
alarm log	A <i>console disk</i> file that contains alarm messages.
alarm message	A <i>PeerWay</i> message that indicates that an alarm condition has occurred.
alarm priority	An ordering of alarm characteristics that determines which unacknowledged alarm is displayed in <i>alarm banner mode</i> , and also determines the order in which displays are called up with the [ACTIVE ALARM] key.
alarm queue	See <i>SCI alarm queue</i> .
alarm regeneration	See <i>regeneration</i> .
alarm summary mode	An <i>alarm display mode</i> that presents a summary of <i>alarm type</i> information, including the number of active and unacknowledged alarms. Contrast with <i>alarm banner mode</i> .
alarm suppression	See <i>suppression</i> .
alarm type	A grouping of alarms that have similar sources. Each alarm belongs to one and only one alarm type. The alarm types include Hardware, Critical Process, Advisory Process, Batch, System Status, and Disk Event. Each alarm type has associated <i>alarm type lists</i> .
alarm type lists	Alarm lists that are sorted by <i>alarm type</i> .
Analog Card Cage	A device that holds analog I/O signal devices such as FICs (analog, pulse, temperature, smart), Analog Transfer cards, Output Bypass Units, and Comm Connect

	cards. A ControlFile connects to an Analog Card Cage, which connects to a <i>marshaling panel</i> .
Analog Input Block	See <i>AIB</i> .
Analog Output PIOB	A <i>PIOB</i> that is configured to output a 4–20 mA signal or to serve as a 23 V nominal power supply.
analog PV	The <i>SIB</i> analog input for the 4 to 20 mA signal that is coming into the <i>FIC</i> . Contrast with <i>digital PV</i> , <i>SIB</i> .
AOB (Analog Output Block)	A <i>block</i> that prepares an analog value for output to the field.
area, alarm	See <i>alarm area</i> .
ASIC (Application Specific Integrated Circuit)	An integrated circuit chip that is specially designed and fabricated for a specific task.
asynchronous length	An <i>SCI data protocol</i> that transfers messages in ASCII and binary format.
asynchronous terminator	An <i>SCI data protocol</i> that transfers messages in ASCII format.
auto lock	A field on some <i>block</i> configuration screens that allows a user to set a block to Auto mode, if that is desired, and that does not allow the block to be changed to Manual mode.

B

back balancing	See <i>tracking</i> .
back up	To copy a <i>file</i> , <i>folder</i> , or <i>volume</i> .
background color	The CRT color in which the background of the screen is displayed. Contrast with <i>foreground color</i> .
backlighted	A method of displaying characters on the CRT screen that reverses the foreground and background colors. For example, if a word of text is normally shown in red with a black background, then the backlighted word is shown in black with a red background.
backup	A copy of a <i>file</i> , <i>folder</i> , or <i>volume</i> .
batch	RS3 software that allows the user to configure and run <i>batch tasks</i> and recipes.

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batch log	A disk <i>file</i> that logs batch-related activities and events.
batch script	A set of instructions that causes a processor to perform a particular <i>batch task</i> .
batch task	See <i>task</i> .
bit	A unit of binary information, with a value of 0 or 1.
blink	A method of displaying an item on the CRT screen in which the item alternately changes between two visual states. When text characters blink, they change between the normal and backlighted states. When a <i>graphic object</i> blinks, the pixels that make up the object alternates between displaying and not displaying.
block	A software component that can process field data or perform calculations and functions.
block function	See <i>function</i> .
block link	See <i>link</i> .
block output package	See <i>flag</i> .
block print	A <i>console</i> function that prints information about one or more blocks.
block status bit	See <i>flag</i> .
block variable	A <i>block</i> input or output.
boot	To start up a device.
boot file	The <i>file</i> that is required to <i>boot</i> a device.
boot tape	A <i>tape</i> that is created to start up the system.
BRAM	Battery backed <i>RAM</i> .
bubble memory	See <i>Nonvolatile Memory</i> .
buffer	A temporary storage device that is used to compensate for a difference in the data rate between two devices. Data is stored in a buffer until a device can process it.
bus	1) A data path shared by many devices. 2) A heavy conductor for power distribution.
byte	A sequence of 8 binary digits that is operated on as a unit.

C

callup buttons	<i>Console</i> buttons that the <i>configurator</i> defines to call up displays or to perform operations.
-----------------------	---

card cage	A rack that contains circuit cards.
cascade control loop	A control loop with data input from a field device to a primary <i>ControlBlock</i> with an output that is linked to a secondary <i>ControlBlock</i> and that is also receiving data from a field device. The output of the secondary <i>ControlBlock</i> is sent to a field device.
character graphics	A type of <i>Process Graphics</i> that creates and displays information as combinations of characters. Contrast with <i>vector graphics</i> .
CIB (Contact Input Block)	A <i>block</i> that accepts a contact field input through an optical isolator and a contact <i>FIC</i> and that prepares the data for use by the rest of the system.
CJC	See <i>cold junction compensator sensor</i> .
clear message	A <i>PeerWay</i> message that indicates that an alarm condition has cleared.
Clear statement	A <i>Condition logic statement</i> for configuring the step output of a <i>ControlBlock</i> . When it is true, it turns the step output off; it cannot turn the step output on. Contrast with <i>emulation statement</i> , <i>Set statement</i> .
cleared alarm	An alarm that is no longer in an <i>alarm condition</i> .
clock time	The RS3 clock time that is displayed on the upper right hand corner of all <i>console</i> screens.
COB (Contact Output Block)	A <i>block</i> that prepares a specific contact state for output to the field.
cold junction compensator (CJC)	A 57-Ohm RTD that is provided by Rosemount and that generates sensor cold junction compensation for a <i>thermocouple</i> when a <i>TIB</i> is configured. The CJC measurement is subtracted from the thermocouple temperature measurement. Contrast with <i>TIB</i> .
color combination	A combination of a foreground color and a background color that can be assigned to <i>console</i> attributes such as events, date and time, alarms, and so on.
command	As used with <i>callup buttons</i> and <i>command line options</i> , a sequence of keystrokes that calls up a screen or that performs an operation.
command line	The top line of the CRT screen. Commands can be entered at the command line to call up screens and to perform operations.
command line options	A set of <i>commands</i> that can be executed at the <i>command line</i> to call up screens and to perform operations. They

are called options because the [LAST OPTION] and [NEXT OPTION] keys can be used to scroll through the commands.

command number

A term on the Alarm Annunciation screen that is an arbitrary designation used for assigning *commands*.

Communications FlexTerm

A *FlexTerm* that is used to communicate with PLCs and other devices. The Communication FlexTerm requires a PLC or RBLC image in the *Controller Processor*.

Condition statement

A *logic statement* that affects the state of the logic step. It is defined in the Conditions portion of the Discrete Diagram screen. Contrast with *Action statement*, *emulation statement*, *Set statement*, *Clear statement*.

configuration mode

For *Process Graphics*, a display mode that allows you to create and modify a graphic. Contrast with *viewing mode*.

Configure Alarm Broadcast

A feature that is used to reduce unnecessary alarm messages, to reduce alarm acknowledge traffic, and to reduce events on the PeerWay.

configurator

The person who has access to all console privileges and who is responsible for configuring the RS3. Contrast with *operator*, *supervisor*.

configurator arrow

A *console* screen symbol that designates the fields that are accessible by a *configurator*. It is displayed as a double arrow (\Rightarrow).

configurator keyboard

A *Multitube Command Console* QWERTY-style keyboard that is designed primarily for use by configurators.

console

An RS3 *node* that provides a user interface to the control system.

console configuration

The specific console configuration parameters as entered by the *configurator*, such as the group displays, color selections, and callup buttons.

console program

The Fisher-Rosemount operating program for the *console*.

Contact Input Block

See *CIB*.

Contact Output Block

See *COB*.

continuous block variable

A *variable* that is one of the block *continuous inputs* or is the *continuous output*.

continuous functions

ControlBlock functions that are commonly used, library-accessible algorithms or are user-defined algorithms for limits and tuning parameters. Contrast with *discrete functions*.

continuous inputs	Analog information that is available to a <i>ControlBlock</i> for performing calculations. It is referred to by the letters A through O. Contrast with <i>continuous output, discrete inputs</i> .
continuous output	An analog value that is calculated by a <i>ControlBlock</i> and is sent to at least one other software block. It is referred to as Q. Contrast with <i>continuous inputs, discrete outputs</i> .
ControlBlock	A computational <i>block</i> that performs calculations, algorithms, and logic functions.
ControlFile	An RS3 <i>node</i> that contains circuit cards that monitor plant processes and control loops, and that also provide data to other devices.
controller	1) <i>ControlBlock</i> . 2) <i>Controller Processor</i> .
Controller Processor	A circuit card in a <i>ControlFile</i> that performs block calculations.
cooperative redundancy	Only offered with a Discrete Termination Panel. Both FIMs are reading the inputs and are driving the output together when redundancy is enabled and both FIMs are healthy and running.
coordinates	For <i>Process Graphics</i> , an indication of the cursor location on the process graphic fabric.
Coordinator Processor Card	A circuit card that controls and coordinates the activities of the <i>Controller Processors</i> in a <i>ControlFile</i> . The Coordinator Processor supplies services such as PeerWay interface, <i>nonvolatile memory</i> backup, and the execution of the batch code.
copy	To duplicate a <i>file, folder, or volume</i> .
count function	A logic function that counts the occurrences of a specified event and that becomes true after a preset number of counts.
CP	See <i>Coordinator Processor Card</i> .
CRC (cyclical redundancy check)	A data check that is performed on a block of data to determine whether or not an error has occurred in reading, writing, or transmission.
critical alarm	An alarm that indicates a critical situation that should be handled immediately. Contrast with <i>advisory alarm</i> .
current mode	The state of the block at the time that the alarm was cleared.

D

D-Off	See <i>delay off filter option</i> .
D-On	See <i>delay on filter option</i> .
daisy chain	To connect one device to another in a sequence.
damping	A value for a transmitter that is used to increase the response time of the transmitter in order to smooth the output when there are rapid input variations. Contrast with <i>SIB</i> .
DASMC	See <i>Discrete Auto Sequence Motor Controller</i> .
DASVC	See <i>Discrete Auto Sequence Valve Controller</i> .
daughterboard	A small circuit board that is attached to a larger board, which is often called the motherboard.
DDDMC	See <i>Discrete Dual Direction Motor Controller</i> .
DDSMC	See <i>Discrete Dual Speed Motor Controller</i> .
Dead Time function (DT function)	A <i>ControlBlock</i> that provides a delay period that is configurable.
deadband alarm area	A range that is below a high alarm point or above a low alarm point and is within <i>deviation alarm</i> points. This range prevents alarms from being repeatedly tripped if a <i>variable</i> drifts in and out of the alarm limit.
deadband option	A <i>PID ControlBlock</i> option that modifies the PID algorithm so that the block output does not change until $ \text{SP}-\text{PV} \geq \text{Err DdBand}$. Contrast with <i>gap option</i> .
debounce	A user defined amount of time that a switch must be detected as opened or as closed before it is considered valid.
delay filter option	A <i>CIB</i> filter that delays the CIB output relative to the field input by the interval that is assigned in the “Filt Time” field. It turns on (or off) the output of the block after the input has been on (or off) for at least the duration of the that is time configured in the “Filt Time” field.
delay function	A logic function that is a dual, sequential, elapsed-time timer. It turns on a <i>logic step</i> after a condition has been true for an uninterrupted length of time, and then turns off the logic step after the condition has been false for the same uninterrupted length of time.
delay off (D-Off) filter option	A <i>CIB</i> filter that delays the CIB output relative to the field input by the interval that is assigned in the “Filt Time” field. It turns the output of the block off after the input has been off for at least the duration of the time that is configured in the “Filt Time” field.

delay on (D-On) filter option	A <i>CIB</i> filter that delays the CIB output relative to the field input by the interval that is assigned in the "Filt Time" field. It turns the output of the block on after the input has been on for at least the duration of the time that is configured in the "Filt Time" field.
destination block	A <i>block</i> that receives data from a <i>source block</i> .
deviation alarm	An alarm that indicates a deviation between two inputs.
DIB (Discrete Input Block)	A block that accepts a discrete field input through a Field Interface Module and that prepares the data for use by the rest of the system.
digital PV	The digital input for an <i>SIB</i> that displays the digital communication, which is the actual value that is sent from the transmitter. Contrast with <i>analog PV</i> .
Diogenes Interface	An RS3 <i>node</i> that allows communications between a Diogenes control system and an RS3 control system.
Discrete Auto Sequence Motor Controller (DASMC)	A <i>ControlBlock</i> for use with a single-speed electric motor, which is one of several motors that must be automatically started in a predetermined sequence.
Discrete Auto Sequence Valve Controller (DASVC)	A <i>ControlBlock</i> for use with a valve that is one of several valves to be automatically opened in a predetermined sequence.
discrete block variable	A <i>block</i> input or output that has a discrete value. Contrast with <i>continuous block variable</i> .
Discrete Dual Direction Motor Controller (DDDMC)	A <i>ControlBlock</i> for use with a reversible electric motor. Contrast with <i>discrete functions</i> .
Discrete Dual Speed Motor Controller (DDSMC)	A <i>ControlBlock</i> for use with a two-speed electric motor. Contrast with <i>discrete functions</i> .
discrete faceplate	A user-configurable screen display that provides input and output information about a <i>ControlBlock</i> .
discrete functions	<i>ControlBlock</i> functions that can be used with different types of motors and valves. Contrast with <i>continuous functions</i> .
Discrete Input Block	See <i>DIB</i> .
discrete inputs	Contact information that is available to a <i>ControlBlock</i> for performing calculations. It is referred to by the characters @a through @o. Contrast with <i>continuous inputs</i> .

Discrete Motor Controller (DMC)	A <i>ControlBlock</i> for use with a single-speed electric motor. Contrast with <i>discrete functions</i> .
Discrete Motorized Valve Controller (DMVC)	A <i>ControlBlock</i> for use with a motorized valve controller that requires a contact closure to change position, but not to maintain position. Contrast with <i>discrete functions</i> .
Discrete Output Block	See <i>DOB</i> .
discrete outputs	Contact information sent from a <i>ControlBlock</i> with a value of 0 or 1. It is referred to by the letters a through p. Contrast with <i>continuous output</i> .
Discrete Termination Panel	Services 32 I/O points (16 input/output, 16 input-only). It has space for one or two Discrete Field Interface Modules.
Discrete Valve Controller (DVC)	A <i>ControlBlock</i> that is for use with any valve that requires a contact closure to maintain the open position, the closed position, or both positions. Contrast with <i>discrete functions</i> .
disk	A type of magnetic media that stores software programs and computer files. Contrast with <i>hard disk</i> .
Disk Boot CP	A <i>file</i> operation that allows a <i>ControlFile</i> with a corrupted Nonvolatile (Bubble) Memory card to be started (booted).
Disk Copy Boot Program	A <i>file</i> operation that copies the Console Program folder, which contains the boot file, from a disk to a destination file on a hard disk.
display buttons	<i>Console</i> buttons that the configurator defines to call up displays or to perform operations.
display scaling	A user-configured range to display internal <i>ControlBlock</i> or I/O block values in terms of the <i>plant scaling units</i> on faceplates and other console screens. Contrast with <i>internal scaling</i> , <i>plant scaling</i> .
DMA (Direct Memory Access)	A mechanism that provides memory access without routing the signals through a computer.
DMC	See <i>Discrete Motor Controller</i> .
DMVC	See <i>Discrete Motorized Valve Controller</i> .
DOB (Discrete Output Block)	A block that prepares a specific discrete state for output to the field.
drop cable	See <i>PeerWay drop cable</i> .
DT function	See <i>Dead Time function</i> .
DTR	Direct Discrete Termination panel.

duty cycle	For a <i>PIOB</i> , the on time of the output pulses in a percentage of pulse period. A duty cycle of 50% results in a square wave with equal on and off times.
duty function	A logic function that acts as a counter to convert a controller output to a variable period pulse train.
DVC	See <i>Discrete Valve Controller</i> .

E

EDAC (Error Detection and Correction)	Circuitry that enhances data integrity through the detection and correction of erroneous data bits.
electrical PeerWay	See <i>twinaxial PeerWay</i> .
EMC compliance	Electromagnetic compatibility compliance; compliance with generic emission and immunity standards.
emulation statement	A <i>Condition logic statement</i> that causes the logic step output to emulate (or copy) the true/false condition of the statement. For example, when the <i>Condition statement</i> is true, the step output is true (or on). When the <i>Condition statement</i> is false, the step output is false (or off).
enba function	A logic function that enables all alarms and events on the <i>Controller Processor</i> . Contrast with <i>inha function</i> .
Eng Max (engineering maximum)	The user-configured value that is displayed when a value is 100 percent.
Eng Min (engineering minimum)	The user-configured value that is displayed when a value is zero percent.
Eng Units (engineering units)	The user-configured units for a value.
enhanced keyboard	A <i>Multitube Command Console</i> keyboard that combines the functions of the <i>operator keyboard</i> and the <i>configurator keyboard</i> .
EPROM	Erasable, programmable, read-only memory.
error squared option	A <i>PID ControlBlock</i> option that produces a nonlinear output and modifies the PID algorithm so that the SP-PV term is replaced by $ SP-PV \times (SP-PV)$.
event	The occurrence of some action that is configured to make an entry in an event list.

event lists	A set of 10 lists that contain messages that are generated by events.
event message	A PeerWay message that indicates that an <i>event</i> has occurred.
expression	A mathematical or logic equation that consists of a combination of <i>variables</i> and <i>operators</i> . One or more expressions can be combined to create a statement (for example, B=3.0).
extend filter option	A <i>CIB</i> filter that holds the <i>CIB</i> output state for the interval that is assigned in the "Filt Time" field. The output responds only to the most recent field input state at the end of the hold.
Extender card	A circuit board that is used to make another card accessible for servicing.
external resistance	For a <i>TIB</i> , a user defined value assigned when an external bias resistor is used to allow the <i>FIC</i> to provide the added resolution of the lower range to any temperature that is desired.

F

fabric	For <i>Process Graphics</i> , the entire graphic, which includes the background and which is bounded by the panning limits.
faceplate	A software representation of plant control readings.
fail safe	A user-defined output value that is assigned if communications between a <i>CIB</i> and an <i>FIC</i> fail.
Fall statement	An Action <i>logic statement</i> that is executed when the <i>logic step</i> goes from on to off. Contrast with <i>Rise statement</i> , <i>Off statement</i> .
FEM (Front End Module)	Part of a Multiplexer <i>FlexTerm</i> that provides termination and the multiplexing of field input signals.
fhf function	A logic function that forces hold forward action.
fiber optic cable	Glass cable that is used in an <i>optical PeerWay</i> .
FIC (Field Interface Card)	A circuit card that processes field signals that come into the RS3 and/or RS3 signals that are sent to the field.
field	On a software screen, a location on a display that is indicated by one or more words and (optionally) an access arrow.

field code	An <i>SCI</i> code that is used to identify an item of block information.
field devices	Sensors and actuators that are used to measure and control a process.
Field Interface Card	See <i>FIC</i> .
Field Interface Module	See <i>FIM</i> .
field terminations	Connection points for field wiring to the system.
field transmitter configuration	For an <i>SIB</i> , the transmitter configuration that exists in the transmitter and that cannot be edited at the console.
file	A collection of information on an RS3 storage medium.
fill function	A logic function for a <i>Dead Time ControlBlock</i> that invalidates any numbers currently in the Dead Time stack and that allows the Dead Time stack to fill with numbers.
filter	A time constant that is configured for the <i>block</i> field value to provide a first order response to the block input.
FIM (Field Interface Module)	A Multipoint I/O circuit module that processes field signals to and from the RS3.
flag	A true/false value that represents block and status information. Contrast with <i>system flag</i> , <i>user flag</i> .
FlexTerm (Flexible Termination)	A field interface device that usually contains an <i>FIC</i> card cage and field termination areas.
fnow	A logic function that forces an evaluation of the block <i>function</i> .
folder	A group of files on an RS3 storage medium.
foreground color	The CRT color in which a character or shape is displayed. Contrast with <i>background color</i> .
format	The process that prepares a <i>disk</i> or tape for use with the RS3 control system.
formula script	A script that describes process endpoints, setpoints, and targets that are associated with making a batch product. Formula data includes flows, temperatures, rates, and volumes.
frame duration	For a <i>PIOB</i> , a specific period (1/frequency) in which an output is to be fixed. This value is assigned by a <i>configurator</i> .
Front End Module	See <i>FEM</i> .
function	1) A special operation that is performed in a <i>logic step</i> . A function is configured in a logic step by typing a special

word or character sequence such as a *Condition statement* or *Action statement*. Examples include ramp, timer, and snorm.

2) The main purpose of a *ControlBlock*, such as PID, Dead Time, and Lead/Lag. Also called major function and block function.

function codes

For a *PLCB*, a number that indicates the function that is to be executed by the Modbus-compatible PLC.

G

gap option

A *PID ControlBlock* option that modifies the PID algorithm so that the block output does not change until the required change exceeds the gap value. Contrast with *deadband option*.

generated report

A *report* that has been automatically or manually generated. One or more generated reports are contained in a *report generation file*.

glitch filter option

A *CIB* filter that holds the *CIB* output state each time that the output changes for a minimum time, as specified in the "Filt Time" field. A change in the field input state during the hold time causes the *block* output state to respond to the change after the hold expires, and to hold again for the time that is assigned in the "Filt Time" field.

graphic

See *process graphic*.

graphic object

A configurable component of a *process graphic* that is used with other objects to build the graphic.

group

1) A set of up to eight *ControlBlocks* that have similar functions or locations and are displayed together.

2) For *Process Graphics*, a set of objects that have been combined to configure or display information more efficiently.

group display

A user-defined combination of up to eight continuous *faceplates* and discrete faceplates that are related in some manner and are displayed on one *console* screen.

H

hard disk

A *console* storage device that consists of a Winchester hard disk.

Hardened Command Console	A <i>console</i> that is designed for use in harsh environments.
hardware alarm	An alarm that indicates a problem with the RS3 hardware or with field I/O.
HART Output Block	See <i>HOB</i> .
HIA (Highway Interface Adapter)	An RS3 <i>node</i> that allows for communications among <i>PeerWays</i> .
HIA pair	Two connected <i>HIAs</i> that allow for communications between two <i>PeerWays</i> .
high cutoff	A user-configured value that is used to prevent inaccurate flowmeter readings. The cutoff value is compared to the <i>block</i> output value. Block output values above the cutoff value produce block output that is set to a particular value without generating an alarm in the process.
Highway Interface Adapter	See <i>HIA</i> .
history	<i>Trend</i> data for a variable that is older than the most recent 60 samples.
HOB	A block that allows for communication between the RS3 and Smart™ field actuator devices by using the HART™ communications protocol. It shares the characteristics of the Smart Input Block and the Analog Output Block.
host	A computer that communicates with the RS3 through an <i>SCI</i> or an RMT/host.
Host Mode	RS3 software that connects a VAX host computer with RMT/host software to an RS3 control system.
host time	The time reference that is used by the host computer for <i>SCI</i> table data messages.
hysteresis	For a <i>PIOB</i> , a user-defined area above and below the threshold that allows for varying pulse input signals.

I

I/O block (Input/Output block)	A <i>block</i> that processes incoming field data or outgoing control information.
if function	A logic function that tests a condition. It takes one action if the condition is true, and another action if the condition is false.
ifstand function	A logic function that tests whether or not the <i>Controller Processor</i> is in Standby mode.

image	Software programs that allows the <i>ControlFile</i> and its configurations to communicate with associated <i>FlexTerms</i> and <i>card cages</i> .
inha function	A logic function that inhibits all alarms and events on the <i>Controller Processor</i> . Contrast with <i>enba function</i> .
inhibit	An action that prevents alarms from being generated. If the alarm does not generate, no <i>alarm message</i> is sent on the <i>PeerWay</i> .
initialize	To erase information from a <i>disk</i> or <i>tape</i> . Initializing a disk first erases all information on it except for the volume name, and then puts the Plant Configuration and Console Configuration folders on the disk. Initializing a tape erases all information on it except for the tape name and a special header that identifies the tape to the system.
input block	A <i>block</i> that brings a signal from an <i>FIC</i> or a <i>FEM</i> to the RS3.
instrument bias	A user-defined value that is added to a field value to compensate for a <i>field device</i> that is out of adjustment.
internal scaling	A range from 0-1 that is used internally by the RS3 control system to determine internal <i>block</i> values in order to perform calculations and functions. Contrast with <i>display scaling</i> , <i>plant scaling</i> .

J

Jumper	A movable circuit connector that can be positioned to specialize a card for a particular purpose.
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K

kill	1) To delete the controller configuration. 2) To stop and end a <i>batch</i> task or recipe.
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L

Lead/Lag function (LL function)	A <i>ControlBlock</i> that provides one lead term and two lag terms for the modeling of process dynamics.
LED (Light Emitting Diode)	A light source that emits visible or infrared light. LEDs are used in RS3 to signal system condition and activity.

link	A configured path that transfers information in the RS3 control system.
LL function	See <i>Lead/Lag function</i> .
loader counter PIOB	A <i>PIOB</i> that is configured to count pulse inputs and to provide the inputs to a <i>loader PIOB</i> so that a quick response can be provided when the <i>target count</i> is reached.
loader PIOB	A <i>PIOB</i> that is configured to output one value while a <i>loader counter PIOB</i> to which it is linked is counting, and to output another value when the <i>target count</i> is reached. The output value can be an analog or a binary value.
log	A <i>disk file</i> that logs related actions and events. A system may include alarm, operator, batch, and smart transmitter logs.
log display configuration	A set of criteria that specifies how the <i>alarm log</i> information is sorted and displayed on the Alarm Log Display. Also called logging criteria.
logging criteria	See <i>log display configuration</i> .
logic statement	An expression that consists of a combination of <i>variables</i> and <i>operators</i> for the performance of a calculation within a <i>ControlBlock</i> . A logic statement is written in the Conditions or Actions portion of a <i>logic step</i> .
logic step	One or more expressions that define calculations and functions that the <i>ControlBlock</i> will perform. The results of the expressions are the <i>discrete outputs</i> of the <i>ControlBlock</i> .
loopback	A type of diagnostic test in which a transmitted signal is returned to the sender. A loopback test permits the comparison of the returned signal with the transmitted signal.
low cutoff	A user configured value that is used to prevent inaccurate flowmeter readings. The cutoff value is compared to the <i>block</i> output value. Block output values below the cutoff value causes the block output to be set to a particular value without generating an alarm in the process.

M

magnetic media	A <i>hard disk</i> or <i>tape</i> that is used to store software programs and files.
major function	The main purpose of a <i>ControlBlock</i> (for example, to control a process, alter a signal, or perform a user defined function).

MAN function	See <i>Manual function</i> .
Manchester Encoding	A digital encoding technique in which each bit period is divided into two complementary halves; a negative-to-positive transition in the middle of the bit period designates a binary one, whereas a positive-to-negative transition represents a zero. It is self-clocking, because the encoding technique allows the receiving device to recover the transmitted clock from the incoming data stream.
Manual function (MAN function)	A <i>ControlBlock</i> that provides a manual loading station to allow the operator to control valves and other devices, or that provides a place where the <i>configurator</i> can gain access to logic steps and need not be concerned with the <i>major function</i> of the <i>ControlBlock</i> . Also called User-defined function.
marshaling panel	A panel that provides field termination receptacles.
masked tags	If you decide that not all information in a longer tag needs to be displayed at all times, you can specify that part of the tag be masked on displays to improve readability.
masking	For PLCs, the act of writing to a specific bit within a <i>PLC</i> register.
master task	A <i>task</i> that acquires another task with an RBL acquire instruction. The task that is acquired becomes the <i>slave task</i> . Master and slave tasks are typically used to divide the responsibility for running a batch process among two or more tasks.
Math function (MATH function)	A <i>ControlBlock</i> that allows you to define a <i>function</i> that contains equations that determine the value of the block output.
media	See <i>magnetic media</i> .
median	The midpoint value of a subgroup (middle value).
message	For the <i>SCI</i> , the means of transmitting data between the <i>SCI</i> and the host computer.
message pair	A set of two character strings that can be assigned to a variable with binary states. One character string is associated with the off (0) state and the other is associated with the on (1) state.
MIB (Multiplexer Input Block)	A <i>block</i> that accepts an analog field input through an FEM and that prepares the data for use by the rest of the system. The input device is typically a transmitter, a <i>thermocouple</i> device, or an <i>RTD</i> .
MicroVAX to PeerWay Interface	An RS3 <i>node</i> that allows for communications between a MicroVAX and a <i>PeerWay</i> .

MiniConsole	A <i>console</i> that is designed for use as a configuration station.
mode	The operating status of a block or other component (e.g., Auto, Manual, Standby).
mode function	A logic function that tests the mode of a <i>ControlBlock</i> .
modem	A device that converts signals to allow computers and other equipment to interface with a communications line.
motor controllers	<i>Discrete functions</i> that allow a motor to be actuated automatically by a <i>ControlBlock</i> or to be actuated manually from a <i>discrete faceplate</i> on a group display.
MPC (MultiPurpose Controller Processor)	A <i>Controller Processor</i> that can communicate with many types of I/O.
Multiplexer Input Block	See <i>MIB</i> .
Multiplexer	See <i>MUX</i> .
Multitube Command Console (MTCC)	An RS3 <i>console</i> that provides a user interface to the control system.
MUX (Multiplexer)	A device that combines many input signals into fewer signals.

N

node	An RS3 device that can directly access the PeerWay. Examples of nodes include <i>consoles</i> , <i>ControlFiles</i> , and <i>HIAs</i> .
node ownership	A means of selecting nodes that, along with <i>plant unit</i> ownership, determines which <i>blocks</i> , <i>batch tasks</i> , and nodes the <i>console</i> can configure and control and which alarms the console can store.
nonvolatile memory	Battery-backed RAM or magnetic bubble memory that retains its contents when power is removed from the RS3.
norate function	A logic function that disables all operator entry rate limits.
notrack function	A logic function that forces a block to ignore received back tracking by clearing all four track action flags.
NVRAM (Nonvolatile Random Access Memory)	<i>RAM</i> that does not lose its contents when power is removed.

O

object	1) For graphics, see <i>graphic object</i> .
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	2) For reports, see <i>report object</i> .
occur mode	The state of the block at the time the alarm occurred.
Off statement	An Action <i>logic statement</i> that is executed in each evaluation cycle if the <i>logic step</i> is off. Contrast with <i>On statement</i> .
OI (Operator Interface)	Abbreviation used on some RS3 hardware equipment.
On statement	An Action <i>logic statement</i> that is executed in each evaluation cycle if the <i>logic step</i> is On. Contrast with <i>Off statement</i> .
on-line replacement	Allows for replacement of a failed component without disconnecting the equipment.
operating displays	Screens of <i>block</i> information that are used in operating and monitoring a process. Operating displays include group, unit, and overview displays.
operating programs	The basic programs that are required for the RS3 control system.
operator	1) The person who operates the RS3. Compare with <i>configurator</i> , <i>supervisor</i> . 2) A mathematical or logic symbol that is combined with a <i>variable</i> or <i>expression</i> in logic statements in order to perform a function or calculation. Examples of operators include =, +, and sqrt.
operator arrow	A <i>console</i> screen symbol that designates the fields that are accessible by an <i>operator</i> . It is displayed as an arrow (>). Configurors and supervisors can also access these fields.
operator change log	A <i>file</i> that contains information about operator actions.
operator keyboard	A <i>Multitube Command Console</i> keyboard that is designed to allow the user to operate the control system.
Optical PeerWay	A <i>PeerWay</i> that is made up primarily of fiber optic cables.
output action	The output method that is used by the FIC for a software block. With normal output action, the FIC outputs 0% as 4 mA and 100% as 20 mA. With reverse output action, the FIC outputs 0% as 20 mA and 100% as 4 mA.
output block	A <i>block</i> that typically sends an RS3-generated signal to an <i>FIC</i> or an <i>FIM</i> . Contrast with <i>ControlBlock</i> , <i>input block</i> .
output hold	The act of delaying a <i>COB</i> input state for a designated time. The input state can be held on, held off, set to pulse, or not held at all.

overlay	RS3 software that contains the basic structure of a screen display.
overview display	An <i>operating display</i> that allows the operator to monitor basic information about <i>groups</i> .
overwrite	The process of copying new information in place of existing information, which thereby deletes the existing information.

P

panning limits	The top, bottom, left, and right limits that a user can access on a graphic.
Pedestal Command Console	A <i>console</i> that includes operator and configurator interfaces in an upright, pedestal-type enclosure.
PeerWay	The RS3 communications network that passes information among <i>PeerWay nodes</i> .
PeerWay drop cable	A <i>PeerWay</i> cable that connects <i>PeerWay tap boxes</i> to <i>PeerWay nodes</i> .
PeerWay Interface configuration	The PeerWay Interface configuration parameters for specific interface devices, as they are entered by a configurator. These configuration parameters are stored in the PeerWay Interface Configuration folder.
PeerWay Interface program	An operating program for PeerWay Interfaces, such as SCI, DIO, and HIA. These programs are provided by Rosemount and are stored in the PeerWay Interface Program folder.
period function	A logic function that generates pulses at a preset interval as long as a specified condition remains true.
PID function	A <i>ControlBlock</i> that performs a combination of proportional, integral, and derivative control.
Piecewise Linear Interpolator function (PLI function)	A <i>ControlBlock</i> that approximates a curve with a series of straight line segments. The curve represents the block input/output relationship.
PIOB (Pulse Input/Output Block)	A <i>block</i> that accepts pulse field input through a pulse input/output FIC and that generates output pulses of a specified width, frequency, or total count for output to the field. It performs pulse input signal addressing and signal conditioning, as well as pulse output signal storage and signal addressing. PIOBs can be configured to input a pulse, output a pulse, or output an analog signal. Contrast with <i>Pulse Output PIOB</i> , <i>Pulse Input PIOB</i> , <i>Analog Output PIOB</i> , <i>loader PIOB</i> , and <i>loader counter PIOB</i> .

pixel graphics	See <i>vector graphics</i> .
plant configuration	The specific block configuration parameters as they are entered by a <i>configurator</i> (for example, tuning constants, links, tags, and block configurations).
plant programs	The basic operating programs and images that are required for <i>ControlFile</i> and <i>Controller Processor</i> card operation. These programs are supplied by Rosemount.
plant scaling	The range of units of the <i>field device</i> that is being used to measure a substance. This range is determined and used by the field device only. Examples of plant scaling are 0–5000 GAL for the volume of a tank and 0–100 FT for the level of a tank. Contrast with <i>display scaling</i> , <i>internal scaling</i> .
plant unit	A set of related <i>blocks</i> and <i>batch tasks</i> .
plant unit ownership	A means of selecting <i>plant units</i> that, along with node ownership, determines which <i>blocks</i> , <i>batch tasks</i> , and nodes a <i>console</i> can configure and control, and which alarms a console can store.
PLC	Programmable Logic Controller.
PLC coil	See <i>PLC register</i> .
PLC Interface	Software and hardware that allows an RS3 control system to interchange process data with one or more PLCs and other devices.
PLC register	The location of 16 bits within the PLC that acts on or receives an input from a field device. The input is contingent upon the configuration of the PLC. Contrast with <i>PLCB</i> .
PLC register address	An alphanumeric expression that designates a location within the PLC.
PLCB (PLC Block)	A <i>block</i> that reads from or writes to a <i>PLC register</i> .
PLI function	See <i>Piecewise Linear Interpolator function</i> .
point	For material history, a trend value that is plotted on a <i>material history display</i> .
polling	For the <i>SCI</i> , the act of (the <i>SCI</i>) acquiring data from the RS3 control system and putting it into the <i>SCI table</i> .
POLY function	See <i>Polynomial function</i> .
Polynomial function (POLY function)	A <i>ControlBlock</i> that approximates a curve with a polynomial equation. The curve represents the block input/output relationship.

pop-up faceplate	A <i>block faceplate</i> that appears (pops up) in a graphic, only when an operator performs an action.
Port I/O card	A circuit card that provides both electrical isolation of the system and connection to PLCs and other devices.
prescale	For a <i>PIOB</i> , a value that is assigned by a <i>configurator</i> to slow the maximum input frequency internally to less than 500 Hz for the Pulse <i>FIC</i> , or that is assigned to extend the range of the counter.
printer interface	A general term that describes the interaction between a <i>console</i> and a printer.
priorities	An ordering of alarm characteristics that determines which unacknowledged alarm is displayed in <i>alarm banner mode</i> and which also determines the order in which displays are called up when you use the [ACTIVE ALARM] key.
procedure script	A <i>script</i> that defines the steps associated with making a batch product. The effect of such steps in a procedure can be to close valves, add product, and start motors.
process alarm	An alarm that indicates to the operator that an alarm condition is affecting a process. There are two types of process alarms: <i>advisory alarms</i> and <i>critical alarms</i> .
process graphic	A screen display that is made up of graphic objects and text. A process graphic can show plant layout, process data, and other user information. Also called a graphic.
Process Graphics	The portion of RS3 software that allows the user to configure and display process graphics.
Programmable Logic Controller Block	See <i>PLCB</i> .
PROM	Programmable Read-Only Memory.
protocol	The rules that govern the exchange of information between devices.
Pulse Input PIOB	A <i>PIOB</i> that is configured as a contact or a voltage pulse input. It can be used to measure the frequency of a pulse input, to measure the duration of a pulse input, to count pulse inputs, or to act as a <i>loader counter</i> .
Pulse Input/Output Block	See <i>PIOB</i> .
Pulse Output PIOB	A <i>PIOB</i> that is configured to output a pulse with a specified frequency or duration, to output a specified number of pulses, or to act as a <i>loader</i> .

pulse rate	For a <i>PIOB</i> , the frequency of the output pulses.
PWA (Printed Wiring Assembly)	An electronics card that consists of a printed wiring board (PWB) and components.
PWB (Printed Wiring Board)	An electronics card without components. See <i>PWA</i> .

R

RAM	Random Access Memory.
ramp function	A logic function that increases or decreases a variable toward a specified target value at a predetermined rate.
rate of change alarm	An alarm that indicates that the indicated <i>ControlBlock continuous input</i> is changing faster than the desired rate.
Ratio/Bias function (RB function)	<i>ControlBlock</i> that provides adjustable ratio and bias capabilities.
RB function	See <i>Ratio/Bias function</i> .
RBL (Rosemount Basic Language)	A Rosemount proprietary programming language for writing <i>batch</i> programs. RBL uses modular features and sequential instructions that are similar to those in the BASIC language.
reboot	To restart a <i>console</i> or other device.
recall	A <i>console</i> operation that calls up a previously viewed screen.
Redundant Input/Output Block	See <i>RIOB</i> .
regeneration	A <i>console</i> operation that attempts to rebuild alarm lists when a console restarts.
reply message	The format in which the <i>SCI</i> sends information to the host. Contrast with <i>request message</i> .
report	A display that contains process and system information. A report consists of a <i>report configuration file</i> and a <i>report generation file</i> .
report configuration file	The part of a report that contains the user-defined configuration for the report.
report generation file	The part of a report that contains the actual generated reports.

report instruction	A class of <i>RBL</i> instructions that generate and build report files.
report objects	Components that are used to build the <i>report</i> configuration.
Reports	The portion of RS3 software that allows the user to configure, generate, and display a <i>report</i> .
request message	The format in which the <i>host</i> sends information to the <i>SCI</i> . Contrast with <i>reply message</i> .
restore	A process during which the contents of a <i>tape</i> are copied to a <i>disk</i> .
reverse action	For a <i>block</i> , a configuration in which the <i>FIC</i> outputs 0% as 20 mA and 100% as 4 mA.
RGB (red-green-blue) cables	The three signal cables for a color CRT.
RIOB (Redundant I/O Block)	A software block that tracks the health and backup status of <i>FICs</i> . It is configured when redundant <i>FICs</i> are used.
Rise statement	An <i>Action logic statement</i> that executes the action when the logic step goes from off to on. Contrast with <i>Fall statement</i> .
RMS	See <i>root mean square</i> .
RNI	RS3 Network Interface. An RS3 <i>node</i> that provides an interface between an RS3 control system and an Ethernet network.
Rosemount Basic Language	See <i>RBL</i> .
RPQNA	Another name for the <i>MicroVAX to PeerWay Interface</i> hardware.
RS3 Network Interface	See <i>RNI</i> .
RS-232	A communications <i>protocol</i> that uses serial binary data interchange.
RS-422	A communications <i>protocol</i> that uses balance-voltage digital interface circuits for binary data interchange.
RTD sensor	A platinum wire that changes its resistance in direct correspondence to temperature and that thereby provides a temperature value.
runtime states	<i>Batch</i> execution states that are time-dependent. Some runtime states are run, hold, finish, and idle.

S

sample duration	The length of time in which <i>trend</i> data is to be stored on the disk. Sample durations are expressed in minutes, hours, or days.
sample rate	The time interval at which <i>trend</i> data is to be obtained. Sample rates are expressed in seconds, minutes, or hours. Also called sampling frequency.
save	To put information onto a <i>console</i> storage medium.
scaling	<p>1) A numerical range used by the plant, by the RS3 control system, or by the user in order to refer to values. See also <i>display scaling</i>, <i>internal scaling</i>, <i>plant scaling</i>.</p> <p>2) On a <i>trend group</i>, the method of determining how the <i>trend</i> display looks by specifying the minimum and maximum values that are displayed for the trend.</p>
scaling instructions	A class of RBL instructions that represent <i>block</i> input and output values in <i>internal scaling</i> or <i>plant scaling</i> , or that convert <i>block</i> values between these two types of <i>scaling</i> .
SCI (Supervisory Computer Interface)	An RS3 <i>node</i> that provides an interface between the RS3 control system and a <i>host</i> computer.
SCI alarm queue	A part of the <i>SCI</i> that stores up to 200 alarm messages from RS3 <i>nodes</i> .
SCI message	See <i>message</i> .
SCI table	A collection of <i>block variable</i> data from the RS3 control system. The <i>SCI</i> table contains the last four data values that were collected for each <i>SCI</i> table entry.
SCI table entry	The configuration information for one source of data for the <i>SCI</i> table.
SCI table time	The time reference that is used by the <i>SCI</i> table for table data messages.
screen acknowledge	A keyboard operation that allows you to acknowledge more than one alarm at a time.
script	An <i>RBL</i> instruction file that causes a processor to perform a particular batch task.
script control instructions	A class of <i>RBL</i> instructions that direct execution of the <i>script</i> , and that control the execution timing and the speed of the script.
SCSI (Small Computer System Interface)	The standard communications <i>protocol</i> for many devices, such as magnetic tapes and disk drives.

serial I/O	Hardware that uses digital signals to communicate between <i>ControlFiles</i> and <i>FICs</i> . The term is often used to identify compatible hardware components.
Set statement	A <i>Condition logic statement</i> for configuring the step output. When it is true, it turns the the step output on; a Set statement cannot turn the step output off. Contrast with <i>Clear statement</i> .
setmode function	A logic function that sets the operating mode of the <i>ControlBlock</i> that is being configured.
Setpoint Totalizer function (TOTSP function)	A <i>ControlBlock</i> that acts as an integrator with an output, which resets to zero when the output reaches a high limit. Contrast with <i>Stack Totalizer function</i> .
setuauto function	A logic function that sets the logic step mode to Auto. Contrast with <i>setuman function</i> .
setuman function	A logic function that sets the <i>logic step</i> mode to Manual. Contrast with <i>setuauto function</i> .
SIB (Smart Transmitter Input Block)	A <i>block</i> that receives signals from a Smart transmitter for use by other blocks. Allows modification of the Smart transmitter configuration parameters.
SIB transmitter configuration	The transmitter configuration that has been saved to the <i>SIB</i> and which can be changed by the <i>configurator</i> . This configuration can be loaded into the transmitter to change the transmitter configuration.
Signal Selector function (SS function)	A <i>ControlBlock</i> that acts as a general purpose selector. The selector functions in either the input or the output side of a loop, and serves as a one-of-N switch.
simulation link	The linked <i>block</i> that provides the simulation data.
single node batch	A batch system in which all batch software resides on one <i>PeerWay node</i> .
siterm function	A logic function that sets the value of a <i>PID</i> integration term.
skip function	An <i>MIB</i> function that allows you to look at a process loop and, if desired, to bypass the point processing quickly without disabling all of the blocks.
slave task	A <i>task</i> that is acquired by another task to perform a batch operation. A <i>master task</i> acquires the slave task by executing an acquire instruction that identifies the slave task.
slewing keys	The keyboard keys that adjust block values up or down from a faceplate.

smart transmitter	A field device that allows for communications between the field and the RS3 by using special hardware and software.
Smart Transmitter Input Block	See <i>SIB</i> .
System Manager Station (SMS)	An RS3 <i>console</i> that is used for configuration.
snorm function	A logic function that sets the <i>Controller Processor card</i> to Normal mode. Contrast with <i>sstand function</i> .
software blocks	See <i>block</i> .
source block	A <i>block</i> that provides data to one or more blocks. See also <i>destination block</i> .
space compression	For the <i>SCI</i> , a way to reduce the number of characters that are required for a report transfer with the <i>SCI</i> .
split tags	On a few screens, tags are automatically split to fit on the screen. You can override the default split and specify a split that makes your tags easier to read and understand.
SRAM	Static Random Access Memory.
SS function	See <i>Signal Selector function</i> .
sstand function	A logic function that sets the <i>Controller Processor card</i> to Standby mode. Contrast with <i>snorm function</i> .
Stack Totalizer function (TOT function)	A <i>ControlBlock</i> that acts as an integrator. It has an output that resets to zero when the output reaches either a high limit or a reset indication. The last three totals are saved. Contrast with <i>Setpoint Totalizer function</i> .
standard electronics cabinet	An enclosure that contains <i>Multitube Command Console</i> electronics.
standard equipment cabinet	An enclosure that can contain most of the RS3 components (for example, <i>ControlFiles</i> , power supplies, <i>marshaling panels</i> , <i>FlexTerms</i> , and <i>card cages</i>).
standard I/O	Generally, RS3 hardware that uses analog signals to communicate between <i>ControlFiles</i> and <i>FICs</i> . The term is often used to identify compatible hardware components.
standard image	A software <i>image</i> that resides in a Plant Program file. The image allows the <i>ControlFile</i> to communicate with the connected I/O. The image also allows you to configure the appropriate blocks. Contrast with <i>additional image</i> .
standard message pairs	Message pairs that are already configured when you receive RS3 software. Standard message pairs are used

	throughout the system to display information in pre-designed formats.
statement	A combination of <i>variables</i> and <i>operators</i> that is used to perform a calculation within a <i>ControlBlock</i> .
static characters	Nonchanging characters that can be displayed on a discrete faceplate to indicate format information (for example, =, -, *, or +).
station	A point in the <i>material history</i> process that is used to track material units through the process. Measurements are taken at each station and a <i>timestamp</i> is assigned in order to provide a material history.
status bit	See <i>flag</i> .
status variable	A <i>variable</i> that is assigned a status value by an instruction and that indicates whether the instruction was successfully executed. The variable can be used as an expression by a logic instruction (for example, if, while, until) in order to initiate an action.
storage buffer	See <i>buffer</i> .
string variable	A user-defined name for a character string.
sublog	A subset of the <i>alarm log</i> . A sublog is defined by a log display configuration.
supervisor	The user that oversees the RS3 control system operation. Contrast with <i>configurator</i> and <i>operator</i> .
supervisor arrow	A <i>console</i> screen symbol that designates fields that are accessible by a <i>supervisor</i> . It is displayed as a single arrow (→). Configurators can also access these fields.
Supervisory Computer Interface	See <i>SCI</i> .
supply output PIOB	A <i>PIOB</i> that is configured to serve as a 23 V power supply at 60 mA.
suppressed alarm lists	<i>Alarm lists</i> that contain suppressed alarms. There is an active suppressed alarm list and a cleared suppressed alarm list.
suppression	A user action that removes designated active alarms that are generated by a <i>block</i> from both the <i>alarm type lists</i> and the <i>alarm area lists</i> .
symbol	In <i>Process Graphics</i> , a combination of one or more <i>objects</i> that represent a commonly used graphic feature.
symbol library	In <i>Process Graphics</i> , a <i>console folder</i> that contains graphic symbols.

symbol table	An <i>RBL</i> data structure that stores declaration values (variables, constants, aliases, arrays), phases, and labels. Values are entered into the symbol table in the order in which lines of <i>script</i> are executed. The symbol table enables a batch task to tell which declarations are being used and what their current values are. Contrast with <i>volatile memory</i> .
system flag	A <i>bit</i> of information for a <i>block</i> that usually contains information such as block alarm status, hold forward status, valid data status, or current mode. Contrast with <i>flag</i> , <i>user flag</i> .
System Manager Station	A stand-alone, upright arrangement of the RS3 Operator Interface Console.
system string	A character string constant with a value that is predefined by the system.

T

tag	A user-configured alphanumeric ID for an RS3 component.
tap box	The points of connection to a <i>PeerWay</i> . <i>Nodes</i> are connected to the <i>PeerWay</i> through a tap box.
tape	A magnetic streamer tape that is used to store software information for <i>command consoles</i> .
tape directory table	A map of the <i>files</i> that are stored on a tape. This directory is automatically constructed each time that a tape is loaded. It is maintained as long as the tape remains loaded and can be accessed at any time.
Tape Initialize operation	A <i>tape</i> operation that erases all existing information on the tape, except for its name, and then formats the tape for use on the RS3 control system.
Tape Load operation	A <i>tape</i> operation that reads the entire tape, constructs a <i>tape directory table</i> , and then loads this table onto the <i>hard disk</i> .
Tape Unload operation	A <i>tape operation</i> that rewinds the tape back to the beginning, turns off the tape drive light so that the tape can be removed, and then deletes the <i>tape directory table</i> from the <i>hard disk</i> .
target count	For a <i>PIOB</i> , either a value that is supplied by a <i>configurator</i> or a <i>ControlBlock</i> to which a <i>Pulse Input PIOB</i> is to count before resetting.

task	The complete set of instructions that are used to build a batch product. Tasks are configured from batch scripts on the Batch Run screen. The batch product is created by running the task.
task instructions	A class of <i>RBL</i> instructions that control the runtime state of other tasks. Contrast with <i>runtime states</i> .
Temperature Input Block	See <i>TIB</i> .
thermocouple sensor	A sensor that consists of two wires of dissimilar metals and that produces a steady electrical current to measure temperature.
threshold	For a <i>PIOB</i> , the on/off point for a particular voltage signal. For bipolar signals, this is usually 0 volts. For unipolar signals, this is usually 50% of the selected input voltage range.
TIB (Temperature Input Block)	A <i>block</i> that receives a temperature measurement from either an <i>RTD</i> or a <i>thermocouple</i> . This measurement is used by other blocks and does not require a special RTD or thermocouple transmitter.
time function	A logic function that provides a true/false value. The value depends on the current clock time or date.
timer function	A logic function that is a timer. This timer turns on a <i>logic step</i> after a condition has been true for a cumulative length of time.
TOT function	See <i>Stack Totalizer function</i> .
TOTSP function	See <i>Setpoint Totalizer function</i> .
tower electronics cabinet	An enclosure that is narrower than the <i>standard electronics cabinet</i> that contains <i>Multitube Command Console</i> electronics.
track function	A logic function that allows a <i>block</i> to operate if the output is not linked to anything.
trackball	A <i>console</i> hardware component that is used to move the cursor around the CRT display.
trackball keyboard	A <i>Multitube Command Console</i> keyboard that contains only the <i>trackball</i> segment of the <i>operator keyboard</i> .
tracking	A method that is used to provide a smooth transition from open loop operation to closed loop operation.
trend	In general, a graphical representation of trend data for one or more variables.

trend file	A <i>file</i> that contains <i>trend</i> data.
trend group	A set of up to four block variables that can have <i>trend</i> data displayed together.
trending	A process used to store data so that it can be accessed and analyzed.
Trending	The portion of RS3 software that allows the user to configure, generate, and display <i>trend</i> data.
reset function	A logic function that resets a stack totalizer to zero and that shifts inputs B, C, and D.
trigger	An action that causes something else to happen, such as the generation of an alarm or <i>report</i> .
tuning	The process of manipulating a control loop value by making adjustments to <i>faceplates</i> , <i>variables</i> , and <i>trends</i> .
twinax	Twinaxial cable that is used to connect nodes of a <i>twinaxial PeerWay</i> .
twinaxial PeerWay	A <i>PeerWay</i> that is made up of twinaxial cables.

U

unit display	A display that provides limited information about groups.
unit script	An <i>RBL</i> instruction file that describes the hardware devices that are used to make a batch product. These devices may include transmitters, valves, vessels, and other equipment associated with one process unit.
unprint	In <i>Reports</i> , a condition in which a report has been generated but has not been printed.
user-defined function	See <i>Manual function</i> .
user flag	A <i>bit</i> of information about a <i>block</i> . Contrast with <i>flag</i> , <i>system flag</i> .
user message pairs	<i>Message pairs</i> that the user can configure to display user-designed information.

V

Value Input Block	See <i>VIB</i> .
valve controllers	<i>Discrete functions</i> that allow a valve to be actuated automatically by a <i>ControlBlock</i> or actuated manually from a <i>discrete faceplate</i> on a <i>group display</i> . All valve controller functions are preconfigured. Contrast with <i>Discrete Valve Controller</i> , <i>Discrete Auto Sequence Valve Controller</i> , <i>Discrete Motorized Valve Controller</i> .

variable	<p>1) A <i>block</i> input or output. Variables are represented by values and letters: A through O for <i>continuous inputs</i>, Q for the <i>continuous output</i>, @a through @o for <i>discrete inputs</i>, and a through p for <i>discrete outputs</i>.</p> <p>2) In <i>batch</i>, a user-defined name for a specific value.</p>
VAX to PeerWay Interface	An RS3 <i>node</i> that allows for communications between a VAX computer and a <i>PeerWay</i> .
vector graphics	A type of <i>Process Graphics</i> that creates and displays information as pixel-resolution objects. Contrast with <i>character graphics</i> .
Velocity Limiter function (VLIM function)	A <i>ControlBlock</i> that provides an output that is a rate-limited function of the input.
velocity option	A <i>PID ControlBlock</i> option that uses a gain matrix to override control or provide multivariable control.
vfill function	A logic function for a <i>Dead Time ControlBlock</i> that fills the Dead Time stack with a user-specified value. Contrast with <i>fill function</i> .
VIB (Value Input Block)	A block that receives digital signals from the <i>Smart transmitter</i> for use by other blocks. It allows more than one process variable to be measured. It is configured if the field I/O device is a multivariable Rosemount Smart transmitter that has more than one measured process variable. It is configured with an <i>SIB</i> .
viewing mode	In <i>Process Graphics</i> , a display mode that allows you to display a graphic for plant operation. Contrast with <i>configuration mode</i> .
virtual array	A collection of data. Each element of data in the array is identified by a unique array index for an array data storage location. Storage locations, like variables, can change values during the execution of the program.
VLIM function	See <i>Velocity Limiter function</i> .
volatile memory	Memory that loses its contents when power is removed.
volume	A <i>disk</i> or <i>tape</i> that is used to store software information. A disk volume may contain multiple <i>folders</i> , and each folder may contain multiple <i>files</i> . A tape volume may contain multiple files.

W

wait function	An elapsed-time timer that turns on a <i>logic step</i> after a condition has been true for an uninterrupted length of time.
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Winchester Disk

See *hard disk*.

wipe

To delete information.

X

X.25

A data *protocol* that transfers packets of information. X.25 protocol is specified in CCITT Recommendation X.25.

X-ON/X-OFF

Control characters that are used for data flow control, and that instruct a terminal to start transmission (X-ON) and to halt transmission (X-OFF).

FISHER-ROSEMOUNT

RS3™

System Overview Manual and Glossary

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