Foxboro®

by Schneider Electric

Foxboro Evo™
Process Automation System

DCS Fieldbus Modules for Fisher PROVOX® Series 10 Systems User's Guide

B0193WV

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Preface

This document describes all aspects of the DCS Fieldbus Modules for Fisher PROVOX® Series 10 system migration kits, including:

- Configuration
- Installation
- Maintenance.

The document is intended for use by process engineering and operations personnel.

Who This Book is For

This book is intended for the use of process control engineers and operators, and other qualified and authorized personnel involved in setting up a system to accommodate the Foxboro Evo™ equipment.

What You Should Know

Prior to using this book, you should be generally familiar with the I/A Series® and Foxboro Evo system. Detailed information for the software and the hardware is found in the full documentation set for Foxboro Evo systems.

How to Use This Book

This book is organized in a way that reflects typical sequence of actions in setting up a system. The appendixes consolidate equipment specifications.

Product Specification Sheets (PSSs) provide additional information.

Revision Information

For this revision of the document (B0193WV-L), the following changes were made:

Global

- Updated the document to implement new corporate and product branding.

Reference Documents

In addition to various Fisher PROVOX documents associated with the Series 10 control system, you should be familiar with the Foxboro Evo and I/A Series documents listed below:

- *Field Control Processor 280 (FCP280) User's Guide* (B0700FW)
- *Field Control Processor 280 (FCP280) Upgrade Guide* (B0700GC)
- *Field Control Processor 270 (FCP270) User's Guide* (B0700AR)
- *Z-Module Control Processor 270 (ZCP270) User's Guide* (B0700AN)

- *Control Processor 60 and Control Processor 60S Installation and Maintenance* (B0400FB)
- *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA)
- *DCS Fieldbus Modules for Fisher PROVOX® Series 20 Systems User's Guide* (B0193YV)
- *Integrated Control Block Descriptions* (B0193AX)
- *I/A Series Configuration Component (IACC) User's Guide* (B0700FE)
- *Integrated Control Configurator* (B0193AV)
- *Control Processor 270 (CP270) and Field Control Processor 280 (FCP280) Integrated Control Software Concepts* (B0700AG)
- *Integrated Control Software Concepts* (B0193AW) - for CP60 or earlier processors
- *Network Cable Systems Installation and Maintenance* (B0193UW)
- *System Manager* (B0750AP)
- *Process Operations and Displays* (B0193MM)
- *Software Installation (Solaris™ Platform)* (B0193JG)
- *System Configurator* (B0193JH)
- *System Definition: A Step-by Step-Procedure* (B0193WQ and associated Help screens)
- *System Equipment Installation* (B0193AC)
- *System Management Displays* (B0193JC and associated Help screens).

Most of these documents are available on the Foxboro Evo Electronic Documentation media (K0173TQ or K0173WT). The latest revisions of each document are also available through our Global Customer Support at *https://support.ips.invensys.com.*

Safety Considerations

Safe use of this product depends largely upon proper installation, use, and maintenance by you, the customer. This manual provides the information needed to properly install, use, and maintain the DCS Fieldbus Modules subsystem.

1. Introduction

This chapter provides an overview of the DCS Fieldbus Module subsystem.

The DCS Fieldbus Modules for Fisher PROVOX Series 10 systems (or, DCS Fieldbus Module subsystem) provides a means of migrating the control of loops from Fisher Series 10 equipment to a Foxboro Evo system. Equipment affected may include the following:

Series 10 Equipment Affected	Migration Kit Used
Unit Operations Controller (UOC) Type CL6601 Control Unit Type CL6602 Redundant Control Unit[b]	P0914NT[a]
Integrated Function Controller (IFC) Type CL6601 Control Unit Type CL6602 Redundant Control Unit[b]	
Unit Operations Controller+ (UOC+) Type CL6611 Control Unit Type CL6612 Redundant Control Unit[b]	
Multiplexer Control Unit (MCU) Type DM6001 Control Unit	P0914NU
Multiplexer I/O File Unit Type DM6003 Unit	P0914NV

a. The same type of migration kit (Foxboro Part Number P0914NT) is used to upgrade the UOC, UOC+, or IFC.

b. Upgrading a redundant UOC, IFC, or UOC+ requires the use of only one (P0914NT) migration kit. The second control unit of the redundant pair remains unused: all circuit cards are removed and the card file is left empty.

In the case of the UOC, UOC+, IFC and MCU, the processor, control, memory, power, and communication cards are replaced with Fieldbus Isolators. In the case of the Multiplexer I/O File Unit, the input/output cards are replaced with DCS Fieldbus Modules. All existing process I/O terminations and wiring are preserved. The newly installed DCS Fieldbus Modules interchange process measurement and output signals and digital input/output signals directly with the Foxboro Evo control system.

All process signals are thus fully integrated into the Foxboro Evo system, allowing direct monitoring and control of the process. Operating in conjunction with the Foxboro Evo control and management software, the DCS Fieldbus Module subsystem provides advanced plant-wide control, display, history, alarming, and information management capabilities.

Connection between the newly installed DCS Fieldbus Modules and the Foxboro Evo control station is via one or more Foxboro Evo Fieldbuses, which can be implemented in either a single or redundant configuration. The DCS Fieldbus Module subsystem can exist as a single entity on a Foxboro Evo Fieldbus, or can be combined with other Fieldbus-based process interface subsystems.

Major components that are common to all implementations of the DCS Fieldbus Module subsystem are as follows. (See Appendix A for detailed functional specifications.)

- DCS Fieldbus Modules – Operating in conjunction with the Foxboro Evo control station, these modules replace the functions performed by the I/O cards in the Multiplexer I/O File Unit.
- Fieldbus Isolators – The single Fieldbus Isolators (F1SFIA, F1SFIB) and the redundant-option dual Fieldbus Isolators (F1DFIA, F1DFIB) provide electrical isolation between the Foxboro Evo Fieldbus and the newly installed DCS Fieldbus Modules. (Two each of Isolators F1SFIA and F1SFIB form the respective F1DFIA and F1DFIB in a redundant Fieldbus configuration.)
- Fieldbus extender card F1FBE – Mounted in the Multiplexer I/O File Unit, this card, together with Foxboro local Fieldbus cables, provides the electrical connection between the Fieldbus Isolators in the UOC, IFC, UOC+, or MCU and the DCS Fieldbus Modules in the Multiplexer I/O File Unit.
- Power jumper card (F1PWR1) – Serving as a physical replacement for the power converter card in the MCU, this card, which contains no active components, jumpers (routes) 24 volts to the Fieldbus Isolators in the MCU.

In addition to these major components, various supporting hardware items (local Fieldbus cables, equipment labels, termination cable assemblies, and so forth) are also included in the DCS Fieldbus Module subsystem.

Figure 1-1 shows implementation of typical DCS Fieldbus Module subsystem for a UOC/Multiplexer I/O File Unit configuration, and Figure 1-2 shows implementation of typical DCS Fieldbus Module subsystem for an MCU/Multiplexer I/O File Unit configuration.

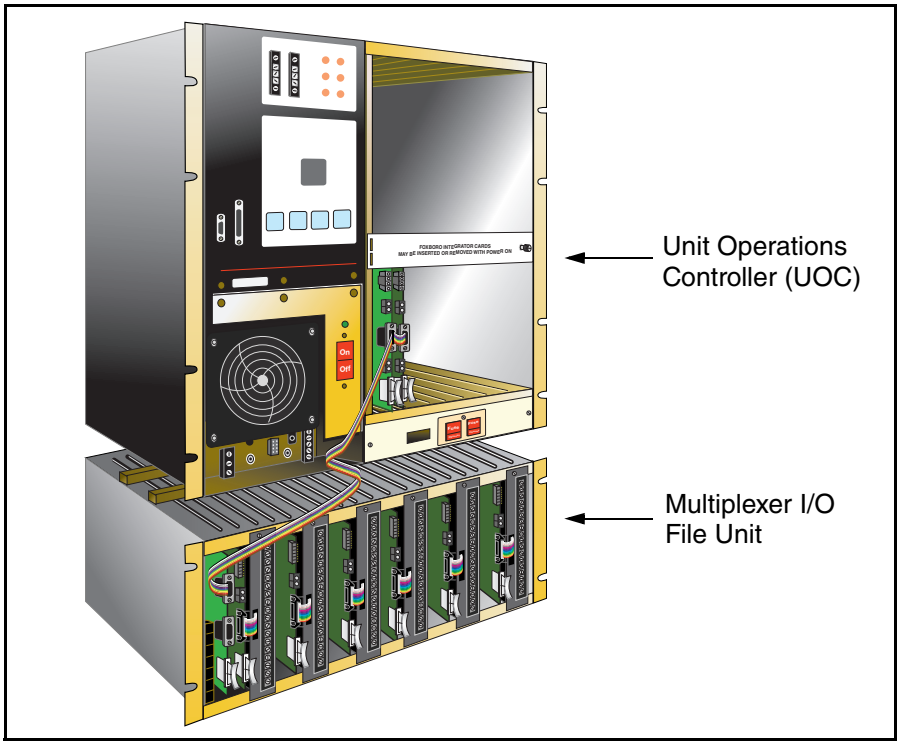


Figure 1-1. Typical DCS Fieldbus Module Subsystem Implementation – IFC/UOC

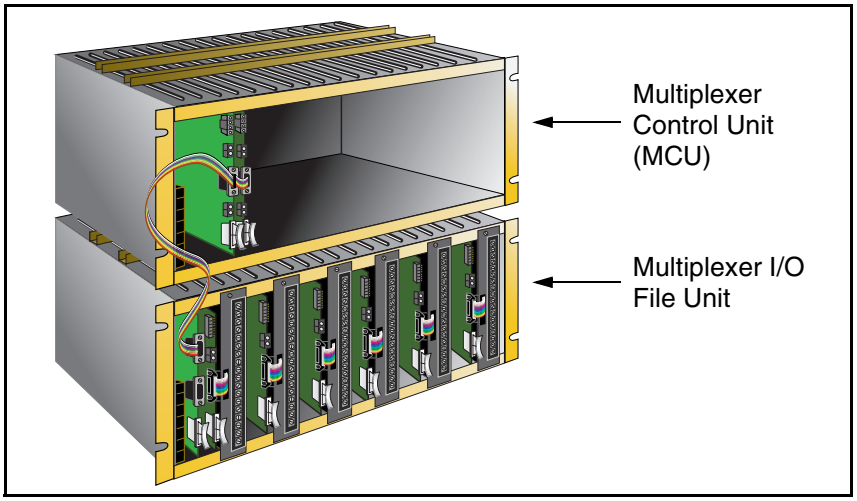


Figure 1-2. Typical DCS Fieldbus Module Subsystem Implementation – MCU

Subsystem Implementation – Overview

The following subsections provide a brief overview of how the DCS Fieldbus Module subsystem is implemented in the five major Fisher PROVOX Series 10 equipment groups — UOC, IFC, UOC+, MCU, and Multiplexer I/O File Unit. (Complete equipment installation instructions are provided in Chapter 4 “Equipment Installation”.)

— NOTE

In addition to the equipment group modifications described in the following subsections, three major actions must be effected for complete implementation of the DCS Fieldbus Module subsystem:
- System Configuration (described in Chapter 3 “Configuration”)
- Integrated Control Configuration (described in Chapter 3 “Configuration”)
- Fieldbus cable connections (described in Chapter 4 “Equipment Installation”).

UOC, IFC, or UOC+

The Unit Operations Controller (CL6601 or CL6602), Integrated Function Controller (CL6601 or CL6602), or Unit Operations Controller+ (CL6611 or CL6612) is modified by removing all cards from the unit’s card file and installing Fieldbus Isolator(s) (F1SFIA/ F1DFIA). Termination cable assemblies (TCAs) are also added, as are local Fieldbus cable(s).

Multiplexer Controller Unit (MCU)

The Multiplexer Controller Unit (DM6001) is modified by removing all cards from the unit’s card file and installing the following:

- Fieldbus Isolator(s) (F1SFIB/F1DFIB)
- Power jumper card (F1PWR1)
- Termination cable assemblies (TCAs)
- Local Fieldbus cable(s).

Multiplexer I/O File Unit

The Multiplexer I/O File Unit (DM6003) is modified by removing all I/O cards from the unit's card file and installing the following:

- One F1FBE Fieldbus Extender card
- The DM63xx and DM64xx point cards are replaced, on a one-for-one basis, with F1Mxx DCS Fieldbus Modules
- The field termination assembly units (FTAs), which remain in place with their associated field I/O wiring.

Table 1-1 summarizes the upgrade operations for the Fisher equipment by specifying the printed circuit card replacements for the UOC, IFC, UOC+, MCU and Multiplexer I/O File Unit.

Table 1-1. Equipment Upgrade, Printed Circuit Card Replacements

Series 10 Model	Replacement Circuit Cards
UOC, IFC, or UOC+ (CL6601/CL6602, CL6611/CL6612) – all circuit cards removed	F1SFIA Fieldbus Isolators (up to 6)
MCU (DM6001) – all circuit cards removed	F1SFIB Fieldbus Isolators (up to 6) F1PWR1 Power Jumper Card
Multiplexer I/O File Unit (DM6003) – all circuit cards removed, but field termination assemblies remain in place	F1FBE Fieldbus Extender Card
DM6311X1-A1/21X1-A1	F1M01A – 8 AI, SE, 1-5 V dc, 4-20 mA
DM6311X1-A2	F1M01E – 8 AI, SE, 0-10 V dc
DM6312X1-A1/22X1-A1	F1M01C – 4 AI, ISO, 1-5 V dc, 4-20 mA
DM6312X1-A2	F1M01F – 4 AI, ISO, 0-10 V dc
DM6341X1-A1	F1M02 – 4 AI, ISO, mV (-10.2 mV to +70 mV)
DM6351X1-A1/A2	F1M02 – 4 TC, ISO, J_{tc} (0-1400°F)/J_{tc} (-60 to 640°F)
DM6352X1-A1/A2	F1M02 – 4 TC, ISO, K_{tc} (0-2300°F)/K_{tc} (0 to 1000°F)
DM6353X1-A1/A2	F1M02 – 4 TC, ISO, T_{tc} (-300 to 600°F)
DM6354X1-A1	F1M02 – 4 TC, ISO, E_{tc} (-100 to 1600°F)
DM6355X1-A1	F1M02 – 4 TC, ISO, R_{tc} (0 to 3200°F)
DM6331X1-A1/A2-B1-9A1/9A2/9A3	F1M03 – 4 RTD, ISO, -50 to 200°F (A1)/100 to 500°F (A2), Temp Coef = 0.385Ω/°C (9A1)/0.3902Ω/°C (9A2)/0.3902Ω/°C (9A3)
DM6411X1-A1	F1M04A – 4 AO, SE, 1-5 V dc
DM6421X1-A1	F1M04B – 4 AO, SE, 4-20 mA
DM6371X1-A1	F1M06 – 4 DI, Pulsed, 4-30 V dc
DM6372X1-A1	F1M06 – 4DI, Pulsed, Dry Contacts
DM6373X1-A1	F1M06 – 4DI, Pulsed, Current Pulse
DM6361X1-A1/A2, DM6362-1 and DM6363X1-A2	F1M07 – 8DI, SE, 4-30 V dc, Dry Contact, 120 V ac

Table 1-1. Equipment Upgrade, Printed Circuit Card Replacements (Continued)

Series 10 Model	Replacement Circuit Cards
DM6461X1-A3/A4	F1M09 – 8DO, FET, Momentary/Latching Outputs, 4-30 V dc
DM6462X1-A3/A4	F1M09 – 8DO, FET, Momentary/Latching Outputs, Relay
DM6463X1-A3/A4	F1M09 – 8DO, FET, Momentary/Latching Outputs, Relay, External

Terminology

This document uses certain terms specific to the DCS Fieldbus Module subsystem and the Foxboro Evo system. Understanding these terms is essential to understanding this document:

Control Station — Any Foxboro Evo module, application workstation, or subsystem that effects process control via the Foxboro Evo Fieldbus. Examples include the Field Control Processor 280 (FCP280), Field Control Processor 270 (FCP270), Z-Module Control Processor 270 (ZCP270), Control Processor 60 (CP60), and Control Processor 40 (CP40). The control station controls process variables using algorithms contained in functional control blocks configured by on-site process engineers to implement the desired control strategies.

FBM — Fieldbus Modules (FBMs) provide the interface between process sensors/actuators and the Fieldbus in a standard Foxboro Evo system.

Fieldbus — An optionally redundant serial bus conforming to the EIA standards' general requirements for RS-485. The Fieldbus carries data communications on a twinaxial cable between the Foxboro Evo input/output modules on the Fieldbus (Fieldbus Modules and DCS Fieldbus Modules, for example), and their associated control stations.

Letterbug — In the Foxboro Evo system, a letterbug is a plastic character that interlocks with other plastic characters to form a six-character module identifier. Letters printed on the front are read visually by the user; pin connectors at the back are read electrically by the computer.

TCA — A termination cable assembly provides a means of attaching the Fieldbus to various devices – for example, to the Foxboro Evo control station at one end, and a DCS Fieldbus Module Fieldbus Isolator at the other.

Planning Ahead

Personnel who should be involved with the planning process include sales support personnel, system engineers, software engineers, and process control engineers. For throughput and sizing information tailored to your system, consult your Foxboro® engineering or sales support representative.

There are three major areas of concern when planning a system:

- System Configuration

  During system configuration (or system definition) you select and define the hardware and software for the system. The end product of this configuration is a diskette that defines the network equipment packaging, documents the configuration, provides a list of material for the quotation system, and enables software installation. Prior to undertaking this configuration, you should determine the number and types of loops and blocks in the process control scheme. Also, determine memory and throughput requirements based on block definition, scan rates, and other block-related functions that can affect the number and selection of hardware items.

- Process Control Configuration (or Integrated Control Configuration)

  With the Foxboro Evo Control Editors (hereinafter referred to as Control Editors), and Integrated Control Configurator you define compounds, blocks (continuous and sequential), and ladder logic. You lay out the schemes for your compounds and blocks prior to actually performing a configuration on the system. You then use the resulting information in conjunction with information on the System Configuration worksheets to arrive at a final plan for hardware and software, and a final process control strategy.

- Equipment Installation

  Equipment installation does not require any special tools. However, it does require a basic knowledge of Foxboro Evo Nodebus and Fieldbus hardware concepts. This knowledge can be attained by reviewing *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) and *System Equipment Installation* (B0193AC).

2. Product Application

This chapter describes how the DCS Fieldbus Module subsystem is used in conjunction with the various Fisher PROVOX Series 10 units.

The DCS Fieldbus Module subsystem is used in conjunction with the following Fisher PROVOX Series 10 units:

Unit Operations Controller (UOC)[1]

Integrated Function Controller (IFC)[1]

Unit Operations Controller+ (UOC+)[1]

Multiplexer Control Unit (MCU)

Multiplexer I/O File Unit.

Fieldbus Isolator modules and DCS Fieldbus Modules plug directly into existing Fisher PROVOX card files (nests) in place of Fisher PROVOX processor modules and I/O cards. Process measurement and output signals then pass to/from one or more control processors to provide Foxboro Evo control in place of the Fisher PROVOX controllers.

Alternatively, the Field Control Processor 280 (FCP280) or Field Control Processor 270 (FCP270) can connect to the DCS Fieldbus Module subsystem through redundant Foxboro Evo FBI100 Fieldbus Isolators.

The new DCS Fieldbus Modules are modified Fieldbus Modules (FBMs) in a Fisher PROVOX form factor. Addressing is accomplished by standard letterbugs.

Control Processor/System Software Compatibility

The DCS Fieldbus Module subsystem can be configured to interface with a Foxboro Evo or I/A Series single or fault-tolerant control processor, CP40 or higher. It connects to a standard Fieldbus and can coexist with other Fieldbus devices, provided control processor loading constraints are observed.

- Foxboro Evo Control Core Services software v9.0 (hereinafter referred to as Control Core Services software v9.0) or higher is required for FCP280.
- I/A Series software v8.1.1 to v8.8 or Control Core Services software v9.0 or higher is required for FCP270 and ZCP270.
- I/A Series software v6.3.1 or higher is required for CP60.
- I/A Series software v4.3 or higher is required for CP40.

1. The UOC, IFC, and UOC+ use the same type of migration kit, P0914NT.

DCS Fieldbus Module Subsystem Implementation – UOC, IFC, or UOC+

Table 2-1 lists the components comprising the UOC/IFC/UOC+ migration kit, and Figure 2-2 illustrates DCS Fieldbus Module subsystem implementation as it applies to the UOC, IFC, or UOC+. Basically, DCS Fieldbus Module subsystem implementation involves either:

- Removing all of the UOC, IFC, or UOC+ circuit cards and replacing them with at least one (or, if required, up to six) F1SFIA Fieldbus Isolators. The UOC/IFC/UOC+ file unit, equipment rack, and power system are reused, and all I/O wiring remains connected to the Field Termination Assemblies in the associated Multiplexer I/O File Unit(s).
- Replacing the UOC/IFC/UOC+ controllers with at least one (or, if required, up to six) FBI100 Modules installed on the associated equipment rack. The UOC/IFC/UOC+ file unit and power system are removed, and the FBI100 is installed and connected to the F1FBE Fieldbus Extender Cards in the associated Multiplexer I/O File Units. The FBI100 is detailed in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

Termination cable assemblies (TCAs) are also added to provide connection to the F. Local Fieldbus cable(s) are added to provide connection to the Multiplexer I/O File Unit(s). Refer to Chapter 4 "Equipment Installation" for installation details.

As well, a new power distribution card (P0923QA) is provided to re-route the 24Vdc power to previously +12V connections in the IFC/UOC card assembly. This card can accommodate both single and redundant power. Refer to Figure 2-1 for more information on this card.

Table 2-1. Migration Kit (P0914NT) Components, UOC, IFC, or UOC+

Foxboro Part Number	Description	Quantity	Physically Replaces
P0903AN	Migration Kit Label	1	N/A
P0903YX	General Information ("Plugged In") Label	2	N/A
P0931GC	DIN Rail, 20.08 in (510 mm)	1	N/A
X0127DH	Screw, Pan Head, 0.190-32 x 0.75	2	N/A
X0143AT	Washer, Plain, 0.190	2	N/A
X0143SC	Lock washer, 0.190	2	N/A
X0167LF	Nutclip, 0.190	2	N/A
Optional Selections with Existing Controller			
P0913VJ	Local Fieldbus Cable	Up to 3	N/A
P0914AR	F1SFIA Fieldbus Isolator	Up to 6[1]	Any card(s)
P0903VY	Termination Cable Assy. (TCA)	Up to 6[1]	N/A
P0923QA	Power Distribution Card	1	PWR Distribution Card
Optional Selections with FBI100			
P0923LN	FBI100 Module	Up to 6[2]	N/A

Table 2-1. Migration Kit (P0914NT) Components, UOC, IFC, or UOC+ (Continued)

Foxboro Part Number	Description	Quantity	Physically Replaces
P0923LR	FBI100 Two-Slot Vertical Baseplate	Up to 3	N/A
See Table 2-2	Baseplate Power Cable	2 per baseplate	N/A
P0923QS	Local Fieldbus Cable	Up to 3	N/A
P0926LC	268 Kbps Fieldbus Splitter/Terminator	2 per baseplate	N/A
P0903VY	Termination Cable Assembly	2	N/A
P0923QU[3]	Baseplate Fieldbus Terminator	1	N/A
P0170RW	Baseplate-to-Baseplate Fieldbus Cable	1- Up to 9.1 m (30 ft)[4]	N/A
X0175LM	Baseplate-to-Baseplate Fieldbus Cable Connector	1 or 2 per P0170RW[5]	N/A
To Mount One FBI100 Baseplate on One Bracket			
P0922TL (kit)[6]	Baseplate Mounting Bracket (supplied as part of kit - bracket P/N is P0922XE)	As Required	N/A
To Mount Two FBI100 Baseplates on One Bracket[7]			
P0926ZZ (kit)	Baseplate Mounting Bracket (supplied as part of kit - bracket P/N is P0918XX)	As Required	N/A

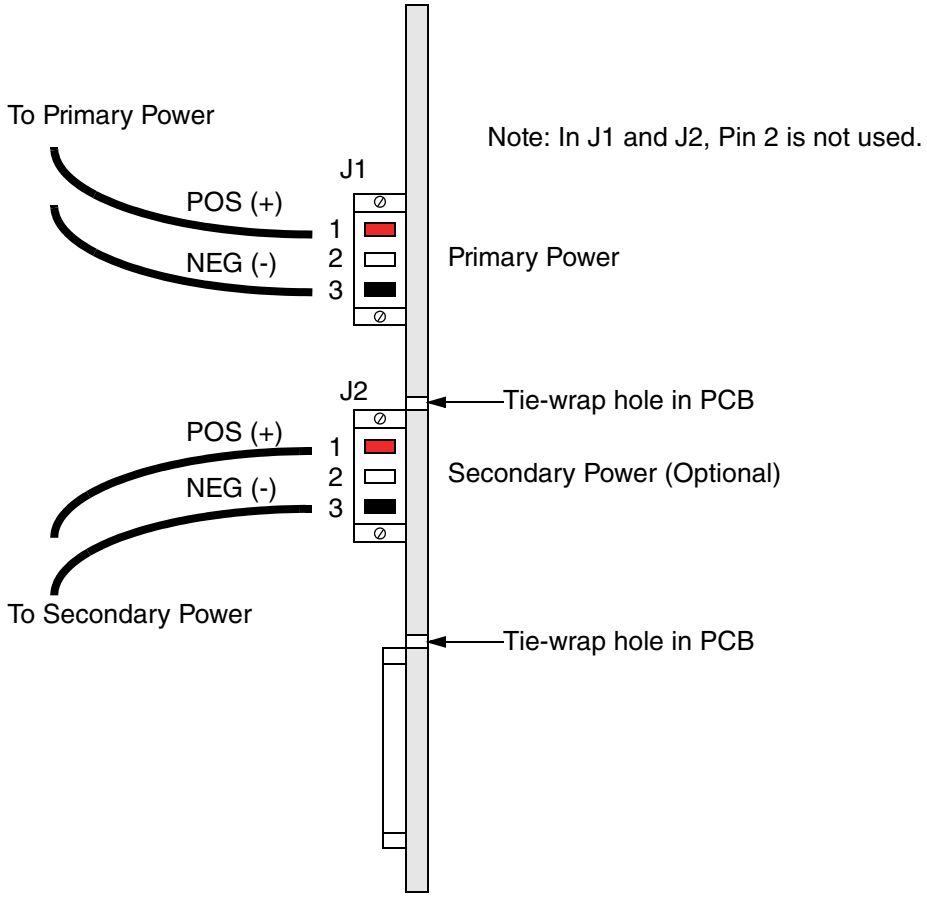
1. Six F1SFIA Fieldbus Isolators may be required to service up to the maximum configurable DCS Fieldbus Modules in a fully implemented subsystem.
2. Six FBI100 modules may be required to service up to the maximum configurable DCS Fieldbus Modules in a fully implemented subsystem.
3. Terminator is required for the last FBI100 baseplate in the Fieldbus. This terminator is installed on a 268 Kbps Fieldbus Splitter/Terminator (P0926LC).
4. Cables are used only to interconnect FBI100 baseplates. If cable is required to be less then 9.1 m (30 ft), specify length in order.
5. For FBI100 baseplates apart greater than 9.1 m (30 ft), only one connector required per P0170RW cable. Otherwise, two connectors required per P0170RW cable - one for each end.
6. Refer to *DCS Fieldbus Modules for Moore APACS+™ Systems User's Guide* (B0700BK) for the full contents and options available with this kit.
7. For installations which require three FBI100 baseplates to be mounted adjacent to each other, install the Baseplate Mounting Brackets from both kit P0926ZZ (mounts two baseplates) and kit P0922TL (mounts one baseplate) in the enclosure.

Table 2-2. Baseplate Power Cables

Part Number	Length
P0922XQ	0.5 m (1.6 ft)
P0922XR	1.0 m (3.3 ft)
P0922XS	3.0 m (9.8 ft)
P0922XT	5.0 m (16.4 ft)
P0922XU	10 m (32.8 ft)

NOTE

When ordering FCP280s with this migration kit, ensure you order one Fieldbus Splitter (RH928CV) per FCP280 baseplate.
When ordering FCP270s with this migration kit, ensure you order one 268 Kbps Fieldbus Splitter/Terminator (P0926LC) and two Termination Cable Assemblies (P0903VY) per FCP270 baseplate.



⚠ WARNING: Ensure that the original controller power supply (12V) is disconnected prior to powering up this assembly (P0923QA).

Figure 2-1. Fisher PROVOX Redundant Power Distribution Assembly (P0923QA)

The number of Fieldbus Isolators (and associated TCAs) used in the UOC/IFC/UOC+ DCS Fieldbus Module subsystem is determined by two factors:

- Whether the remote Fieldbus(es) used are redundant or non-redundant.
- The total number of DCS Fieldbus Modules employed in the subsystem. Each Foxboro Control Processor, along with its associated F1SFIA/F1SF1B Fieldbus Isolator or FBI100, services up to 42 DCS Fieldbus Modules.

Implementation 1 - Retaining the UOC, IFC, or UOC+ Controllers

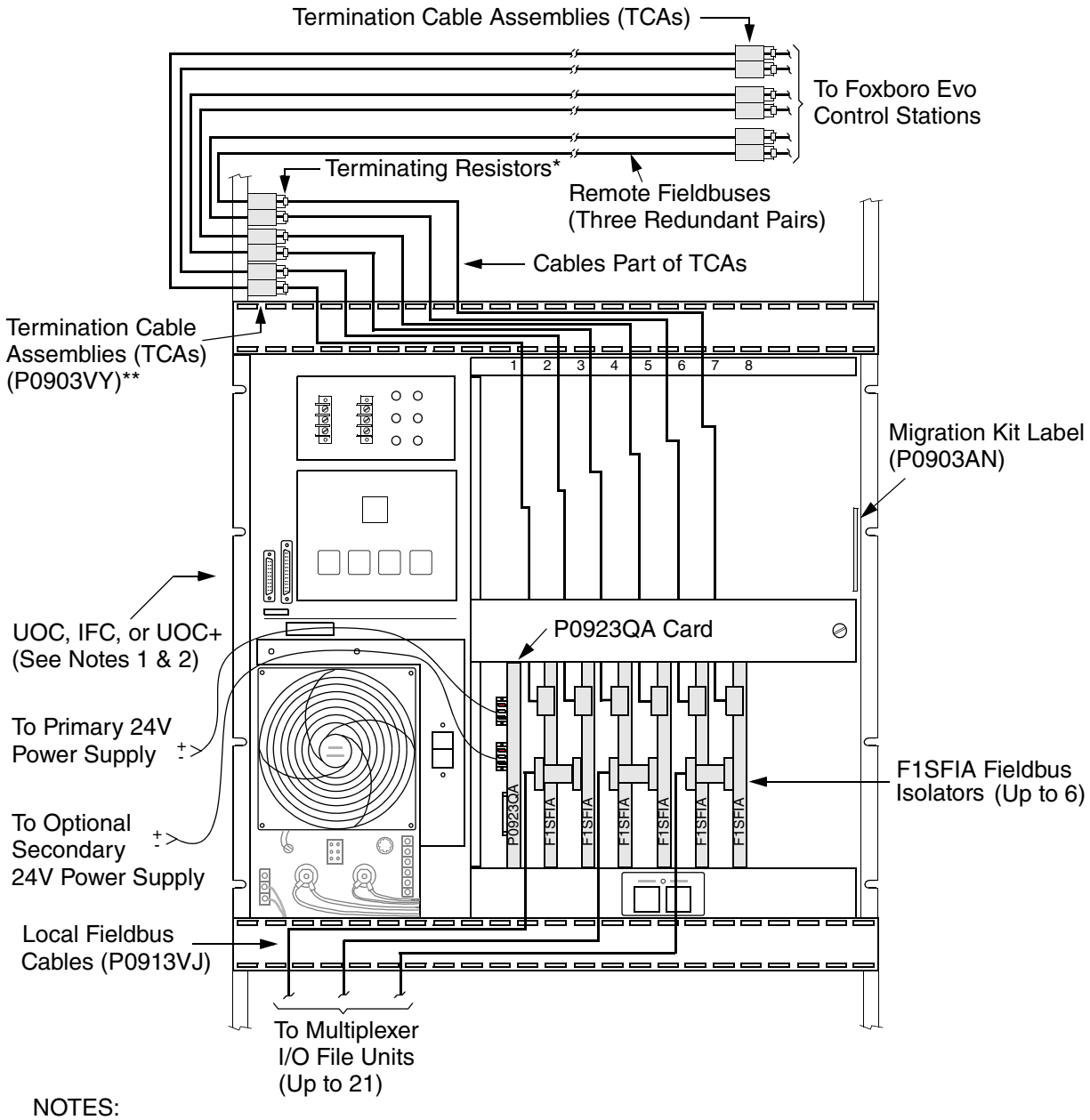
When retaining the UOC, IFC, or UOC+ controllers, six F1SFIA Fieldbus Isolators are used in the maximum subsystem configuration, where redundant Fieldbuses are employed and the UOC, IFC, or UOC+ being upgraded requires its full capacity of I/O cards (contained in 21 DM6003 Multiplexer I/O File Units). This is illustrated in Figure 2-3.

NOTE

1. As shown in Figure 2-3, the second UOC, IFC, or UOC+ in a redundant UOC/IFC/UOC+ pair is not used when the DCS Fieldbus Module subsystem is implemented.
2. The Local Fieldbus extension cables (P0923ZL/ZM[2]) are optional components of the Multiplexer I/O File Unit migration kit (see Table 2-4).

Maximum allowable (overall) Local Fieldbus cable length (Local Fieldbus cable P0913VJ and Local Fieldbus extension cables P0923ZL/ZM (with P0913VF/VG/VK)) is 9 m (30 ft).

[2.] The P0913VF/VG/VK cables may be used to interconnect two P0923ZL cables. The P0923ZL and P0923ZM cables are discussed in Table 2-4 on page 20 and page 21.



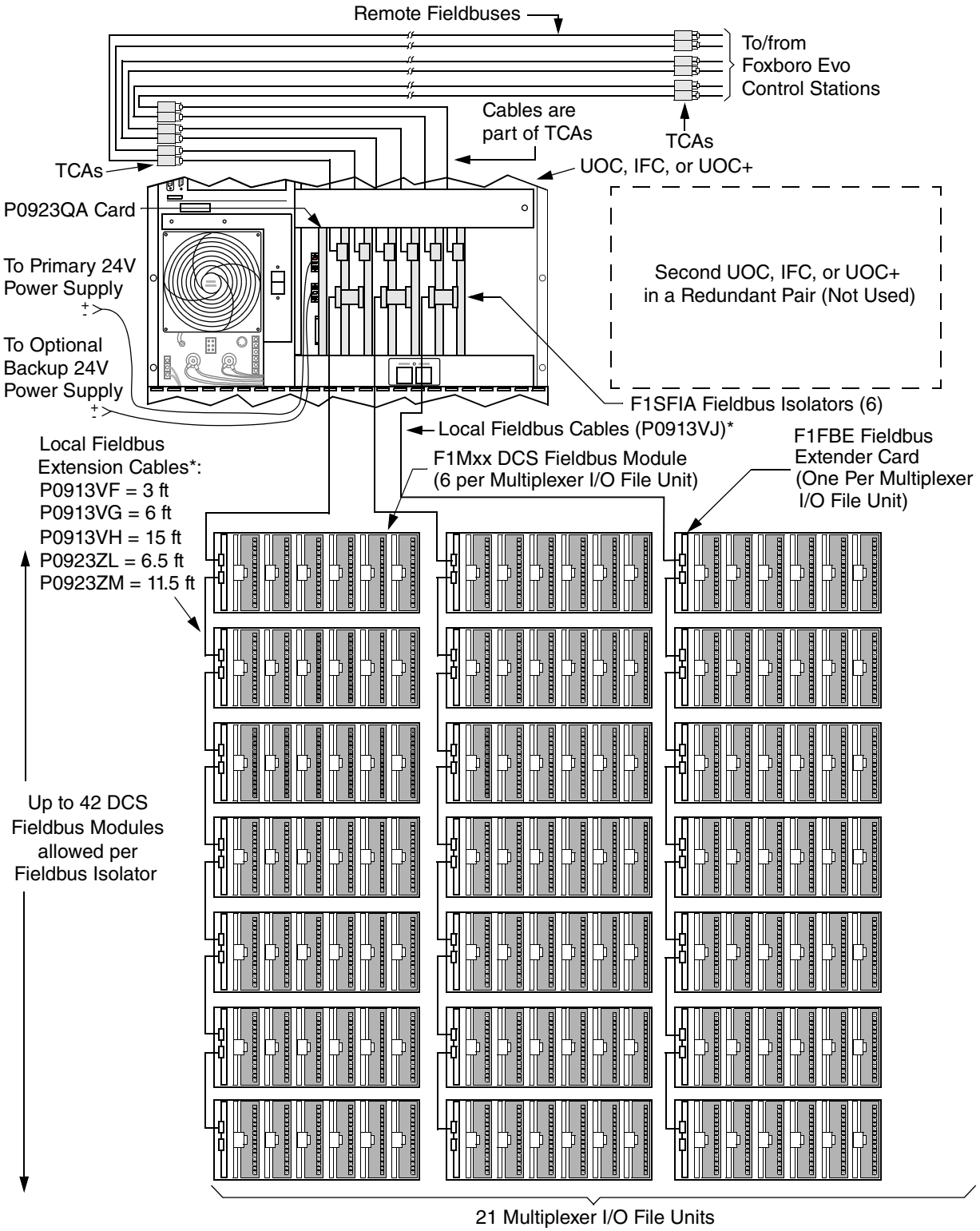
NOTES:

1. Shaded items, plus the local and remote Fieldbus cables, are added as part of equipment modification.
2. Non-redundant unit is shown. For a redundant UOC, IFC, or UOC+, the second unit in the redundant pair is not used.

*Terminating resistors (E0157CZ), included with the TCAs, are required only if this is the last device in the Fieldbus run.

**TCAs (up to six) are mounted on a DIN rail supplied with the Migration Kit. Mounting location may vary per user preference and available local space in the rack.

Figure 2-2. DCS Fieldbus Module Subsystem Implementation, UOC, IFC, or UOC+



*Total Local Fieldbus length (Local Fieldbus cable and multiple extension cables) may not exceed 9 m (30 ft). It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

Figure 2-3. DCS Fieldbus Module Subsystem, UOC/IFC/UOC+, Maximum Utilization

Implementation 2 - Replacing the UOC, IFC, or UOC+ Controllers with FBI100

When replacing the UOC, IFC, or UOC+ controllers, up to six FBI100 Fieldbus Isolators are used in the maximum subsystem configuration, where redundant Fieldbuses are employed and the UOC, IFC, or UOC+ being replaced requires its full capacity of I/O cards (contained in 21 DM6003 Multiplexer I/O File Units). This is illustrated in Figure 2-4 and Figure 2-5.

NOTE

The Local Fieldbus extension cables (P0923ZL/ZM[3]) are optional components of the Multiplexer I/O File Unit migration kit (see Table 2-4).

Maximum allowable (overall) Local Fieldbus cable length (Local Fieldbus cable P0923QS and Local Fieldbus extension cables P0923ZL/ZM (with P0913VF/VG/VK)) is 9 m (30 ft).

Installation details are described in Chapter 4 “Equipment Installation”.

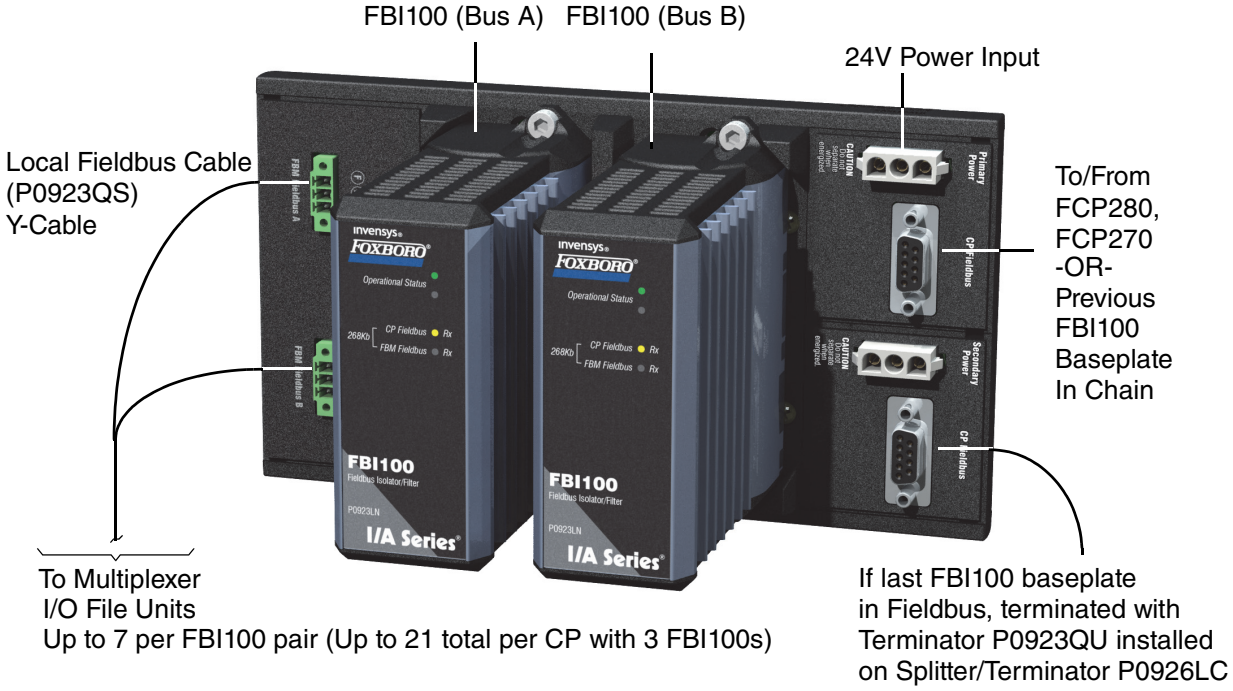
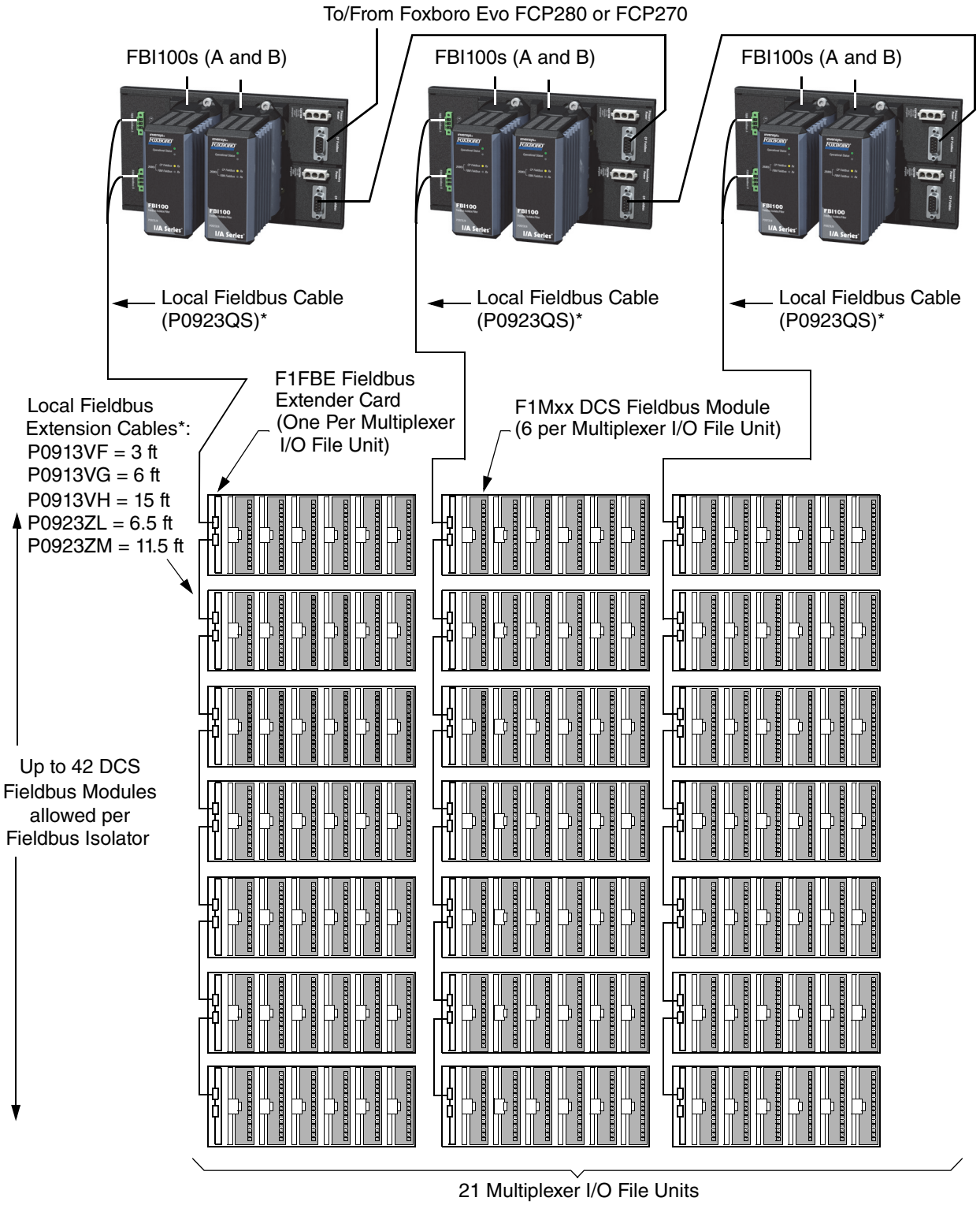


Figure 2-4. DCS Fieldbus Module Subsystem Implementation, FBI100

[3] The P0913VF/VG/VK cables may be used to interconnect two P0923ZL cables. The P0923ZL and P0923ZM cables are discussed in Table 2-4 on page 20 and page 21.



*Total Local Fieldbus length (Local Fieldbus cable and multiple extension cables) may not exceed 9 m (30 ft). It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

Figure 2-5. DCS Fieldbus Module Subsystem, FBI100, Maximum Utilization

Multiplexer Control Unit (MCU)

Table 2-3 lists the components comprising the MCU migration kit, and Figure 2-6 illustrates DCS Fieldbus Module subsystem implementation as it applies to the MCU. Basically, DCS Fieldbus Module subsystem implementation involves either:

- Removing all circuit cards from the MCU and replacing them with a power jumper card (F1PWR1) and at least one (or, if required, up to six) F1SFIB Fieldbus Isolator(s). The MCU file unit, equipment rack, and power system are reused, and all I/O wiring remains connected to the Field Termination Assemblies in the associated Multiplexer I/O File Unit unit.
- Replacing the MCU controllers with at least one (or, if required, up to six) FBI100 Modules installed on the associated equipment rack. The MCU file unit and power system are removed, and the FBI100 is installed and connected to the F1FBE Fieldbus Extender Cards in the associated Multiplexer I/O File Units. The FBI100 is detailed in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

Termination cable assemblies (TCAs) are also added to provide connection to the Fieldbus. Local Fieldbus cable(s) are added to provide connection to the Multiplexer I/O File Unit(s). Refer to Chapter 4 "Equipment Installation" for installation details.

The number of Fieldbus isolators (and associated TCAs) used in the Multiplexer I/O File Unit DCS Fieldbus Module subsystem is determined by two factors:

- Whether the Fieldbus(es) used are redundant or non-redundant.
- The total number of DCS Fieldbus Modules employed in the subsystem exceeds 42.

Table 2-3. Migration Kit (P0914NU) Components, MCU

Foxboro Part Number	Description	Quantity	Physically Replaces
P0903AN	Migration Kit Label	1	N/A
P0903YX	General Information ("Plugged In") Label	2	N/A
P0914BQ	F1PWR1 Power Jumper Card	1	Power converter card
P0931GC	DIN Rail, 20.08 in (510 mm)	1	N/A
X0127DH	Screw, Pan Head, 0.190-32 x 0.75	2	N/A
X0143AT	Washer, Plain, 0.190	2	N/A
X0143SC	Lock washer, 0.190	2	N/A
X0167LF	Nutclip, 0.190	2	N/A
Optional Selections with Existing Controller			
P0913VJ	Local Fieldbus Cable	Up to 3	N/A
P0913UD	F1SFIB Fieldbus Isolator	Up to 6[1]	Any card(s)
P0903VY	Termination Cable Assy. (TCA)	Up to 6[1]	N/A
Optional Selections with FBI100			
P0923LN	FBI100 Module	Up to 6[2]	N/A
P0923LR	FBI100 Two-Slot Vertical Baseplate	Up to 3	N/A

Table 2-3. Migration Kit (P0914NU) Components, MCU (Continued)

Foxboro Part Number	Description	Quantity	Physically Replaces
See Table 2-2 on page 10	Baseplate Power Cable	2 per baseplate	N/A
P0923QS	Local Fieldbus Cable	Up to 3	N/A
P0926LC	268 Kbps Fieldbus Splitter/Terminator	2 per baseplate	N/A
P0903VY	Termination Cable Assembly	2	N/A
P0923QU[3]	Baseplate Fieldbus Terminator	1	N/A
P0170RW	Baseplate-to-Baseplate Fieldbus Cable	1 - Up to 9.1 m (30 ft)[4]	N/A
X0175LM	Baseplate-to-Baseplate Fieldbus Cable Connector	1 or 2 per P0170RW[5]	N/A
To Mount One FBI100 Baseplate on One Bracket			
P0922TL (kit)[6]	Baseplate Mounting Bracket (supplied as part of kit - bracket P/N is P0922XE)	As Required	N/A
To Mount Two FBI100 Baseplates on One Bracket[7]			
P0926ZZ (kit)	Baseplate Mounting Bracket (supplied as part of kit - bracket P/N is P0918XX)	As Required	N/A

1. Six F1SFIB Fieldbus Isolators may be required to service up to the maximum configurable DCS Fieldbus Modules in a fully implemented subsystem.
2. Six FBI100s may be required to service up to the maximum configurable DCS Fieldbus Modules in a fully implemented subsystem.
3. Terminator is required for the last FBI100 baseplate in the Fieldbus. This terminator is installed on a 268 Kbps Fieldbus Splitter/Terminator (P0926LC).
4. Cables are used only to interconnect FBI100 baseplates. If cable is required to be less then 9.1 m (30 ft), specify length in order.
5. For FBI100 baseplates apart greater than 9.1 m (30 ft), only one connector required per P0170RW cable. Otherwise, two connectors required per P0170RW cable - one for each end.
6. Refer to *DCS Fieldbus Modules for Moore APACS+™ Systems User's Guide* (B0700BK) for the full contents and options available with this kit.
7. For installations which require three FBI100 baseplates to be mounted adjacent to each other, install the Baseplate Mounting Brackets from both kit P0926ZZ (mounts two baseplates) and kit P0922TL (mounts one baseplate) in the enclosure.

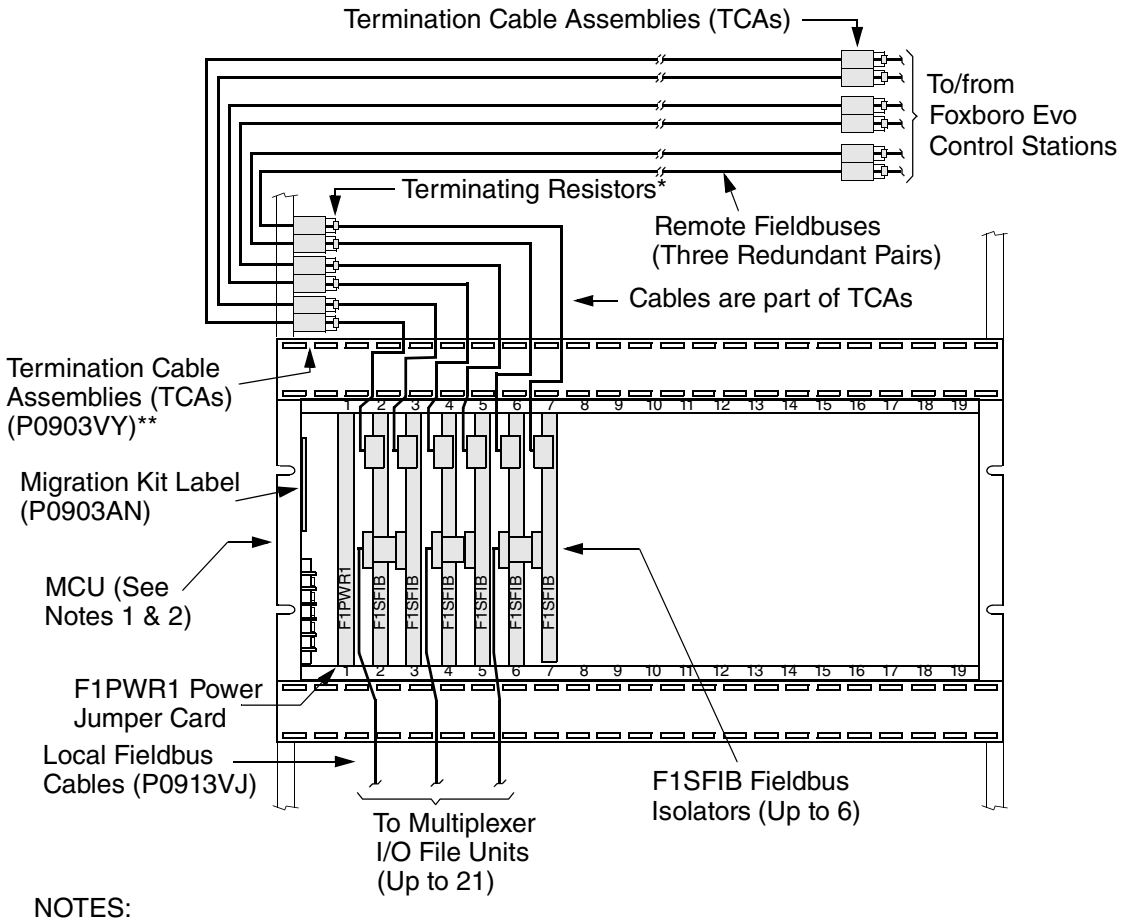
— NOTE

When ordering FCP280s with this migration kit, ensure you order one Fieldbus Splitter (RH928CV) per FCP280 baseplate. When ordering FCP270s with this migration kit, ensure you order one 268 Kbps Fieldbus Splitter/Terminator (P0926LC) and two Termination Cable Assemblies (P0903VY) per FCP270 baseplate.

Implementation 1 - Retaining the MCU Controllers

When retaining the MCU controllers, six F1SFIB Fieldbus isolators are used in the maximum subsystem configuration, where redundant Fieldbuses are employed and the MCU being upgraded requires its full capacity of I/O cards (contained in 21 DM6003 Multiplexer I/O File Units). Maximum utilization of the MCU subsystem is similar to that for the UOC, IFC, or UOC+, as shown in Figure 2-3.

Maximum allowable (overall) local Fieldbus cable length (Local Fieldbus cable P0913VJ and Local Fieldbus extension cables P0923ZL/ZM[4] (with P0913VF/VG/VK)) is 9 m (30 ft).



NOTES:

1. Shaded items, plus the local and remote Fieldbus cables, are added as part of equipment modification.
2. Non-redundant unit is shown. For a redundant UOC, IFC, or UOC+, the second unit in the redundant pair is not used.

*Terminating resistors (E0157CZ), included with the TCAs, are required only if this is the last device in the Fieldbus run.

**TCAs (up to six) are mounted on a DIN rail supplied with the Migration Kit. Mounting locations may vary per customer preference and available local space in the rack.

Figure 2-6. DCS Fieldbus Module Subsystem Implementation, MCU

[4] The P0913VF/VG/VK cables may be used to interconnect two P0923ZL cables. The P0923ZL and P0923ZM cables are discussed in Table 2-4 on page 20 and page 21.

Implementation 2 - Replacing the MCU Controllers with FBI100

When replacing the MCU controllers, up to six FBI100 Fieldbus Isolators are used in the maximum subsystem configuration, where redundant Fieldbuses are employed and the MCU being replaced requires its full capacity of I/O cards (contained in 21 DM6003 Multiplexer I/O File Units). This is illustrated in Figure 2-4 on page 14 and Figure 2-5 on page 15.

NOTE

The Local Fieldbus extension cables (P0923ZL/ZM[5]) are optional components of the Multiplexer I/O File Unit migration kit (see Table 2-4).

Maximum allowable (overall) Local Fieldbus cable length (Local Fieldbus cable P0923QS and Local Fieldbus extension cables P0923ZL/ZM (with P0913VF/VG/VK)) is 9 m (30 ft).

Multiplexer I/O File Unit

The Multiplexer I/O File Unit interfaces high- and low-level analog inputs (both single-ended and isolated), high-level analog outputs, discrete inputs and outputs, and pulse inputs. The inputs and outputs connect to the Multiplexer I/O File Unit via the FTA I/O termination assemblies.

Table 2-4 lists the components comprising the Multiplexer File Unit Migration Kit, and Figure 2-7 illustrates implementation of the DCS Fieldbus Module subsystem as it applies to the Multiplexer I/O File Unit. Correlation between the I/O points and the individual F1Mxx card types is shown in Appendix B.

The file unit (card nest), Field Termination Assemblies (FTAs), equipment rack, and power system are reused, and all I/O wiring remains connected to the FTAs. The Parallel Buffer card is removed and replaced with a Fieldbus Extender (F1FBE) card, and all DM63xx and DM64xx I/O cards are removed and replaced with DCS Fieldbus Modules (F1Mxx). The F1FBE Fieldbus Extender card connects to Fieldbus Isolators in the UOC, IFC, UOC+, or MCU via a Local Fieldbus cable and possibly one or more Local Fieldbus Extension cables.

Table 2-4. Migration Kit (P0914NV) Components, Multiplexer I/O File Unit

Foxboro Part Number	Description	Quantity	Physically Replaces
P0903AN	Migration Kit Label	1	N/A
P0903YX	General Information (“Plugged In”) Label	2	N/A
P0914AN	Fieldbus Extender Card (F1FBE)	1	Parallel Buffer Card
Optional Selections			
P0913UG	F1M01A DCS Fieldbus Module: 8AI, SE, 1-5 V dc, 4-20mA	Up to 6	DM6311/DM6321
P0913BF	F1M01E DCS Fieldbus Module: 8AI, SE, 0-10 V dc	Up to 6	DM6311

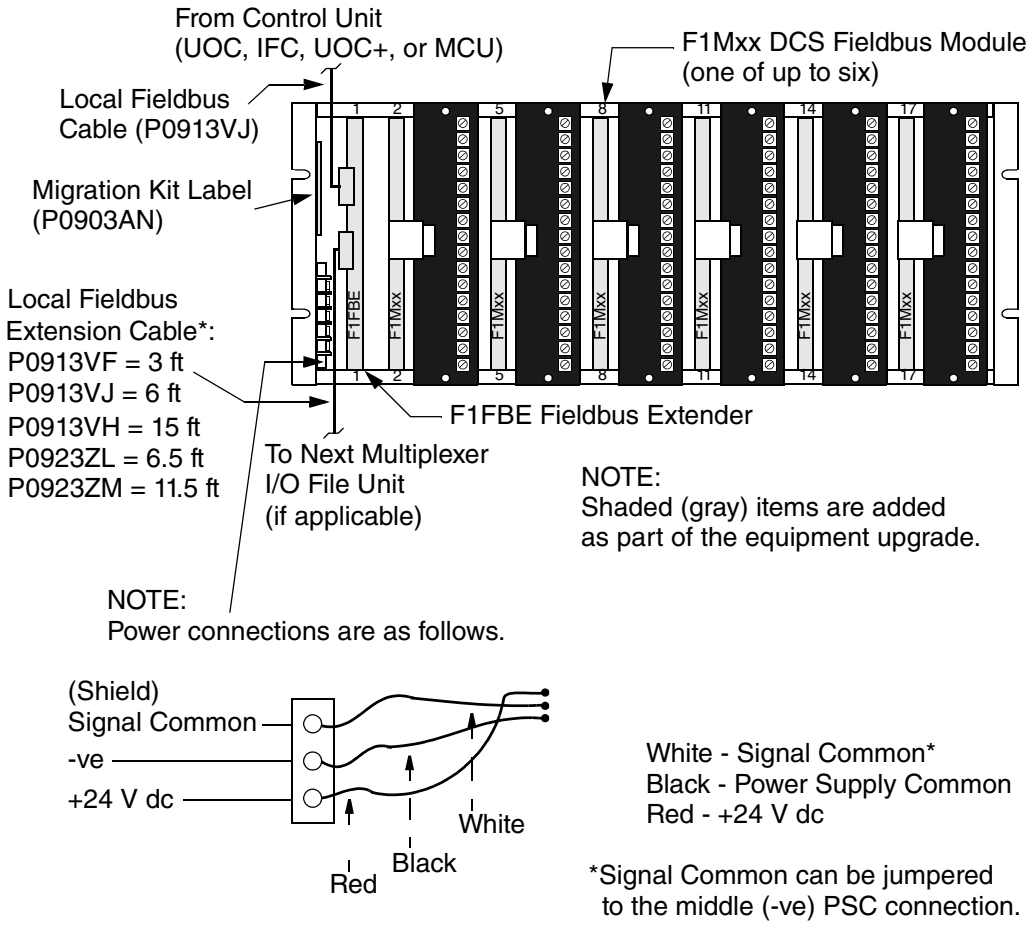
5. The P0913VF/VG/VK cables may be used to interconnect two P0923ZL cables. The P0923ZL and P0923ZM cables are discussed in Table 2-4 on page 20 and page 21.

Table 2-4. Migration Kit (P0914NV) Components, Multiplexer I/O File Unit (Continued)

Foxboro Part Number	Description	Quantity	Physically Replaces
P0913UN	F1M01C DCS Fieldbus Module: 4AI, ISO, 1-5 V dc, 4-20 mA	Up to 6	DM6312/DM6322
P0914AU	F1M01F DCS Fieldbus Module: 4AI, ISO, 0-10 V dc	Up to 6	DM6312
P0913UU	F1M02 DCS Fieldbus Module: 4AI, ISO, mV	Up to 6	DM6341
P0913UU	F1M02 DCS Fieldbus Module: 4AI, ISO, TC, J, E	Up to 6	DM6351/DM6354
P0913UU	F1M02 DCS Fieldbus Module: 4AI, ISO, TC, T	Up to 6	DM6352/DM6353
P0913UU	F1M02 DCS Fieldbus Module: 4AI, ISO, TC, R	Up to 6	DM6355
P0913VU	F1M03 DCS Fieldbus Module: 4AI, ISO, RTD	Up to 6	DM6331
P0913WA	F1M04A DCS Fieldbus Module: 4AO, SE, 1-5 V dc	Up to 6	DM6411
P0914AX	F1M04B DCS Fieldbus Module: 4AO, SE, 4-20 mA	Up to 6	DM6421
P0913WD	F1M06 DCS Fieldbus Module: 4DI, SE, 30 V dc Pls	Up to 6	DM6371/DM6372/ DM6373
P0913WG	F1M07 DCS Fieldbus Module: 8DI, 4-30 V dc, dry contact, 120 V ac	Up to 6	DM6362/DM6363/ DM6361
P0913WR	F1M09 DCS Fieldbus Module: 8DO, SE, 4-30 V dc	Up to 6	DM6461/ DM6462/ DM6463
P0913VF	Local Fieldbus Extens. Cable, 0.9 m (3 ft) - used only to interconnect P0923ZL cables	1	N/A
P0913VG	Local Fieldbus Extens. Cable, 1.8 m (6 ft) - used only to interconnect P0923ZL cables	1	N/A
P0913VH	Local Fieldbus Extens. Cable, 4.5 m (15 ft) - used only to interconnect P0923ZL cables	1	N/A
P0923ZL	Local Fieldbus Extens. Cable, 2.0 m (6.5 ft) The cable includes five connectors which allows it to interconnect up to three Multiplexer I/O File Units (with termination connectors at the ends). The distance between connectors is as follows: Termination to 1st Unit: 0.6 m (2.0 ft) 1st Unit to 2nd Unit: 0.38 m (1.25 ft) 2nd Unit to 3rd Unit: 0.38 m (1.25 ft) 3rd Unit to Termination: 0.6 m (2.0 ft)	1	N/A

Table 2-4. Migration Kit (P0914NV) Components, Multiplexer I/O File Unit (Continued)

Foxboro Part Number	Description	Quantity	Physically Replaces
P0923ZM	Local Fieldbus Extens. Cable, 3.5 m (11.5 ft) The cable includes nine connectors which allows it to interconnect up to seven Multiplexer I/O File Units (with termination connectors at the ends). The distance between connectors is as follows: Termination to 1st Unit: 0.6 m (2.0 ft) 1st Unit to 2nd Unit: 0.38 m (1.25 ft) 2nd Unit to 3rd Unit: 0.38 m (1.25 ft) 3rd Unit to 4th Unit: 0.38 m (1.25 ft) 4th Unit to 5th Unit: 0.38 m (1.25 ft) 5th Unit to 6th Unit: 0.38 m (1.25 ft) 6th Unit to 7th Unit: 0.38 m (1.25 ft) 7th Unit to Termination: 0.6 m (2.0 ft)	1	N/A



* It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

Figure 2-7. DCS Fieldbus Module Subsystem Implementation, Multiplexer I/O File Unit

3. Configuration

This chapter provides system configuration information (System Definition) and control configuration information (Integrated Control Configuration).

In general, "configuration" means specifying, to the Control Core Services, the types of hardware and software modules that comprise the newly added DCS Fieldbus Module subsystem, and the control blocks that will be used in conjunction with it. Prior to performing configuration procedures, you must develop loop drawings to determine the control scheme, and a detailed equipment plan that identifies all the equipment required to control the process.

System Configuration

NOTE

1. To minimize interruption of the process, it is advisable to perform System Configuration (or System Definition) prior to installing the DCS Fieldbus Module subsystem equipment, as described in Chapter 4 "Equipment Installation".
2. If the host Foxboro Evo system is on-line (currently controlling the process), it may be desirable to perform Integrated Control Configuration on-line, prior to updating the System Configuration. Using this method, process control using the DCS Fieldbus Module subsystem equipment can commence immediately (following equipment installation), with the System Configuration update being deferred until a more convenient time.
To perform Integrated Control Configuration on-line, refer to "On-Line Integrated Control Configuration" on page 31.

System Configuration (or System Definition) is the process of selecting and identifying the hardware and software for a particular Foxboro Evo system. It is initially performed prior to installation of the system equipment, and it is updated with any hardware/software system changes.

- For a step-by-step procedure for defining a Foxboro Evo system configuration using the System Definition (SysDef) software, refer to *System Definition: A Step-By-Step Procedure* (B0193WQ).
- IACC allows you to import system configuration information from a Foxboro Evo system using SysDef Export media created with a previous instance of the System Definition configuration application. For importing procedures, refer to *I/A Series System Configuration Component (IACC) User's Guide* (B0700FE).
- To use the Control Editors to define the system, refer to the "System Development" and "Security" manuals listed under "Foxboro Evo Documentation" in *Foxboro Evo Control Software Deployment Guide* (B0750BA). Refer to *Foxboro Evo Process Automation System Hardware Configuration User's Guide* (B0750BB) to define the Foxboro Evo system hardware.

Reports produced by System Configuration (or System Definition) define the network, define the overall packaging of the system, and provide information that may be used in conjunction with equipment installation and system quotation. The System Configuration database can be updated at any time to reflect changes made to the initial hardware layout.

I/A Series Software v4.x vs. v6.0

Execution of System Configuration (or System Definition) is, in part, a function of the software release for your I/A Series system. With I/A Series software v4.x (v4.0, v4.1, or v4.2), System Configuration is performed using the I/A Series System Configurator; with I/A Series software v6.0, System Definition (a form of system configuration) is performed using the System Definition utility. Either of these software packages is accessed from an I/A Series workstation.

Module Identifier Letterbug Assignments

Before including the DCS Fieldbus Module subsystem in a Foxboro Evo system, module identifiers must be assigned to the DCS Fieldbus Modules. A module identifier can be any combination of six alphanumeric characters. These characters (or letterbugs) are entered by the user during System Configuration (or System Definition) and, as part of the equipment installation process (see Chapter 4 “Equipment Installation”), physical letterbugs are attached to the DCS Fieldbus Modules.

— NOTE

Control Core Services software treats each DCS Fieldbus Module as an equivalent FBM (see Table 3-1, below). As such, the System Management Display software portrays the DCS Fieldbus Modules as equivalent FBMs. In order to distinguish the DCS Fieldbus Modules from other FBMs, you can include a specific prefix (such as “F1” for Fisher PROVOX Series 10) in the 6-character letterbug set for each DCS Fieldbus Module.

System Configuration (or System Definition) Procedure

If your I/A Series software is v4.0, v4.1, or v4.2, refer to *System Configurator* (B0193JH) and configure the DCS Fieldbus Modules as you would equivalent Fieldbus Modules (FBMs) (see Table 3-1). For I/A Series software v6.0 to v8.8 or Control Core Services software v9.0 or higher, refer to *System Definition, a Step-by-Step Procedure* (B0193WQ) and configure the DCS Fieldbus Modules as you would equivalent FBMs (see Table 3-1).

Table 3-1. Equivalent FBMs

DCS Fieldbus Module(s)	Equivalent FBM
F1M01A/C/E/F	FBM01
F1M02	FBM02
F1M03A/C/D	FBM03
F1M04A	FBM04
F1M04B	FBM04
F1M06	FBM06

Table 3-1. Equivalent FBMs (Continued)

DCS Fieldbus Module(s)	Equivalent FBM
F1M07	FBM07
F1M09	FBM09

When System Configuration (or System Definition) is completed, perform one of the following operations:

- If this is a new (as opposed to existing) Foxboro Evo system, install the Control Core Services software. (Refer to the appropriate Control Core Services software installation document - all these documents are available on the Global Customer Support website (*https://support.ips.invensys.com*).)
- If this is an existing (previously configured) Foxboro Evo system, specify to the currently installed system software that hardware items have been added to the system. (Refer to the appropriate Control Core Services software installation document - all these documents are available on the Global Customer Support website (*https://support.ips.invensys.com*).)

Integrated Control Configuration

The I/A Series Integrated Control Configurator allows you to integrate Fisher PROVOX Series 10 I/O points into existing Foxboro Evo control schemes, as well as to create entirely new Foxboro Evo based applications. The software interface between the control logic and the process is provided by Equipment Control Blocks (ECBs) specific to the DCS Fieldbus Module subsystem, and control blocks used throughout the Foxboro Evo system.

Actual control of the process is performed by compounds, consisting of control blocks, which are configured by you. (Figure 3-1 shows a typical application of control blocks.) The Foxboro Evo system offers a wide range of control blocks, providing solutions for a broad spectrum of process control applications. For details on the selection and usage of control blocks, refer to *Integrated Control Block Descriptions* (B0193AX) and Appendix D “DCS Fieldbus Module Control Schemes”.

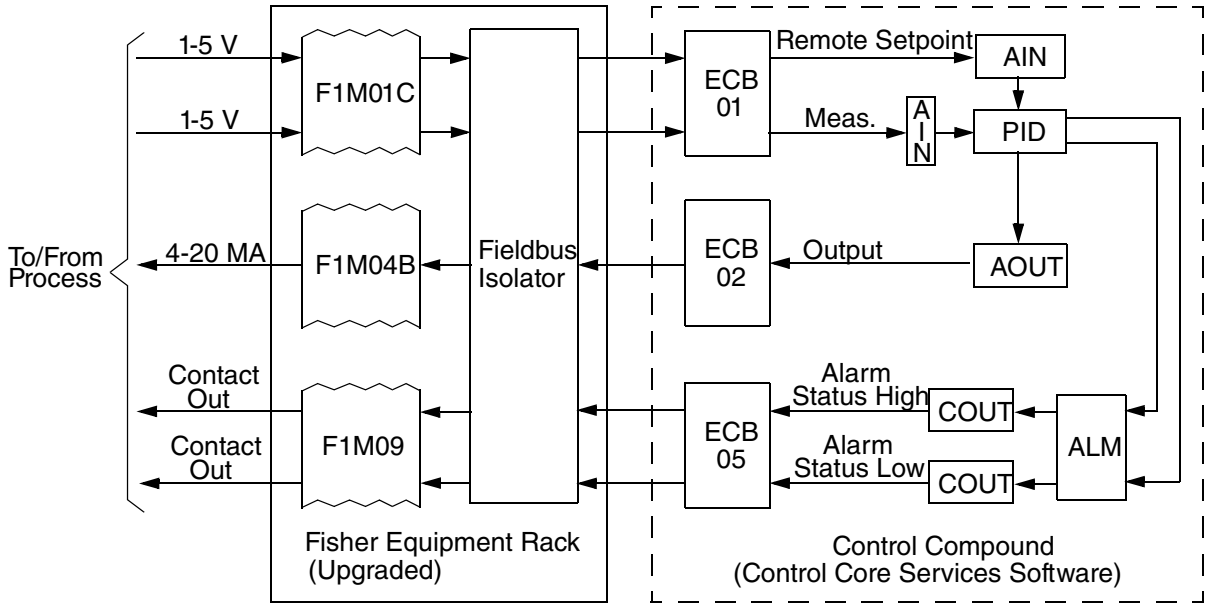


Figure 3-1. Typical Control Scheme using DCS Fieldbus Module Subsystem

NOTE

This section presents integrated control configuration information that is specific to the DCS Fieldbus Module subsystem. For more comprehensive information regarding integrated control configuration, refer to *Integrated Control Configurator* (B0193AV).

The Integrated Control Configurator, which is accessed through the process engineer's environment at a Control Core Services workstation, allows you to configure control blocks relating, in this case, to the DCS Fieldbus Module subsystem equipment. The general procedure is to create a compound name under which the blocks will be created and run, and then create and integrate the desired control blocks.

Using the Control Configurator, you create an Equipment Control Block (ECB) for each DCS Fieldbus Module in the DCS Fieldbus Module subsystem. (The ECB serves as a "holding place" for the device's software data.) You then go on to configure the necessary control blocks and compounds for the desired control scheme.

The Control Configurator lets you modify configuration data for on-line stations (for example, a CP) or off-line library volumes. (A library volume is a dummy configuration which may be loaded into the CP when creation and/or editing are completed.) As a compound/block editor, the Control Configurator provides compound/block-building templates along with a full range of editing functions.

Integrated control configuration for the DCS Fieldbus Module subsystem is divided into two separate procedures:

- "Off-Line Integrated Control Configuration" on page 27 is intended for use when a new system is being configured – typically, when the DCS Fieldbus Module subsystem is being included in new (overall) system configuration.
- "On-Line Integrated Control Configuration" on page 31 is intended for use for when a previous Foxboro Evo configuration is being updated to include the DCS Fieldbus Module subsystem.

— NOTE —

As indicated in a note on page 23, if the host Foxboro Evo system is on-line (currently controlling the process), it may be desirable to perform integrated control configuration on-line, prior to updating the System Configuration. If this is the case, perform the procedure under "On-Line Integrated Control Configuration" on page 31.

Off-Line Integrated Control Configuration

To perform off-line integrated control configuration, refer to *Integrated Control Configurator* (B0193AV) for details and proceed as follows:

— NOTE —

1. This procedure assumes that System Configuration has been performed. See "System Configuration" on page 23.
2. This procedure is intended for use with a Foxboro Evo or I/A Series system having I/A Series software Version 4.0 or Control Core Services software Version 9.0 or higher software. If your system has software of a previous version, refer to the appropriate version of *Integrated Control Configurator* (B0193AV), and configure the DCS Fieldbus Modules as you would equivalent FBMs, as listed in Table 3-1. Use the ECB parameters and block parameter settings shown in Appendix D "DCS Fieldbus Module Control Schemes".

1. Using the System Management displays (accessible at a Control Core Services workstation), boot up the CP to which the DCS Fieldbus Module subsystem equipment will be attached. This creates two compounds:
   - Station compound (CPLBUG_STA)[1] containing the station block (CPLBUG_STA:STATION)[1]
   - ECB compound (CPLBUG_ECB)[1] containing the primary ECB (CPLBUG_ECB:PRIMARY_ECB)[1]
2. Access the Integrated Control Configurator. (From the Process Engineer's environment, select **`Config`** and then **`Control_Cfg`**.)
3. Use the Control Configurator's "Fix All" function to create ECB(s) for the Control Fieldbus Modules added previously to the system configuration via the System Configurator.

[1.] The CP letterbug (cplbug) is filled in by the station being configured.

4. If required, edit the F1Mxx ECB(s) if the default parameters provided are not satisfactory. (See NOTE immediately following this step.) As examples, Figure 3-2 through Figure 3-5 show typical editing displays for the F1M01A, F1M04A, F1M07, and F1M09 ECBs. The HWTYPE and SWTYPE ECB parameters for the various types of DCS Fieldbus Modules are shown in Appendix D "DCS Fieldbus Module Control Schemes". For information on other ECB parameters, refer to *Integrated Control Block Descriptions* (B0193AX).

NOTE

For ready reference, ECB parameter information appears in a "show window" along the right side of the ECB editing displays (see Figure 3-2 through Figure 3-5). The show window is accessed by selecting **Show** in the menu bar, and then selecting **Legal FBM/ECB Combos**.

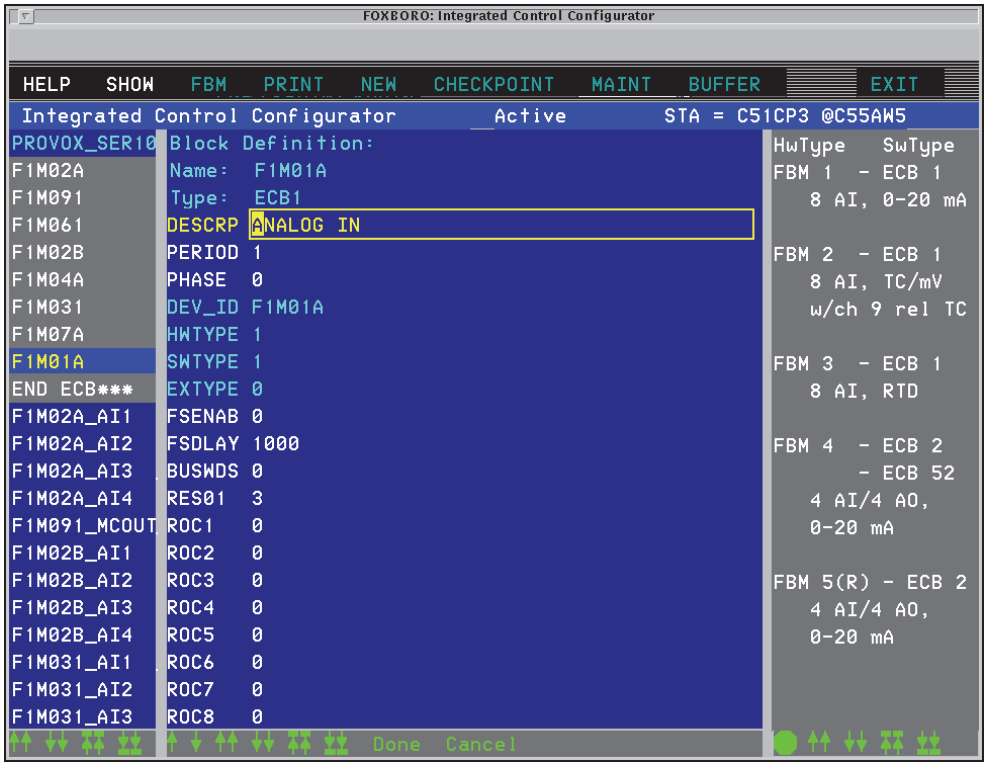


Figure 3-2. Typical Editing Display for F1M01A (Analog Input, ECB01)

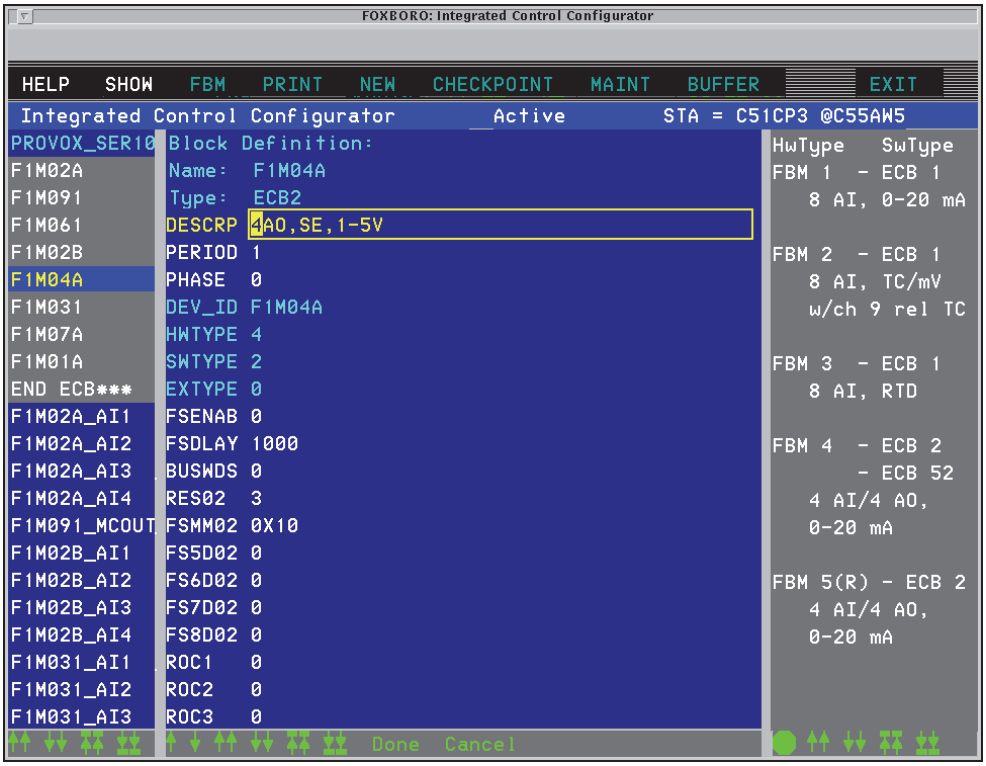


Figure 3-3. Typical Editing Display for F1M04A (Analog Output, ECB02)

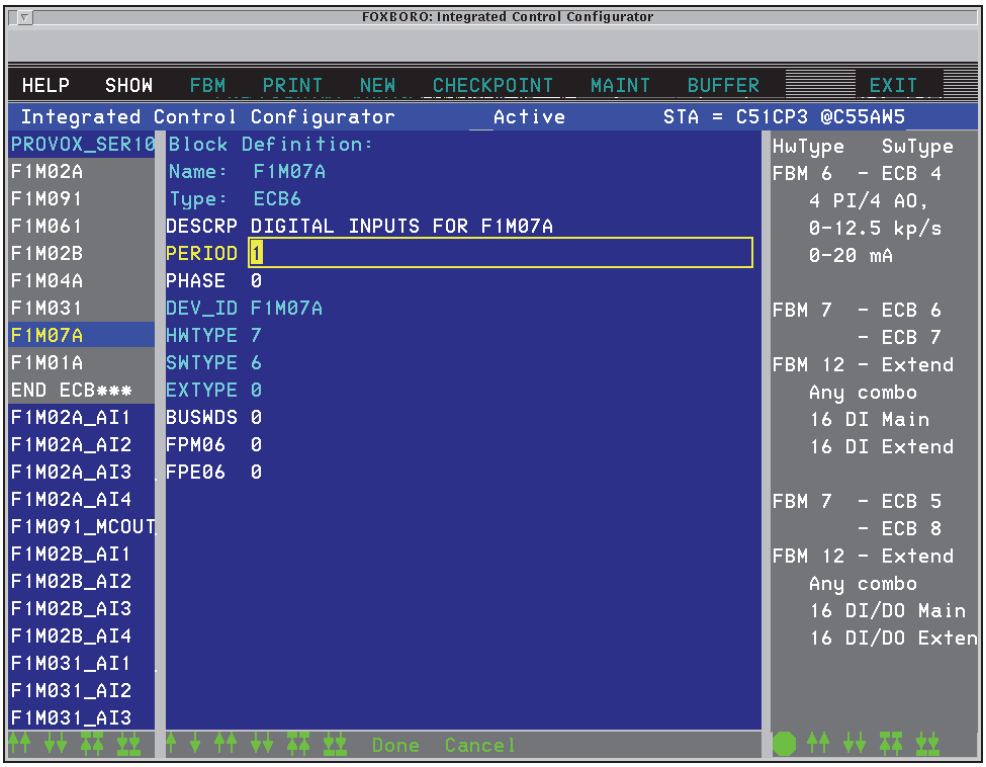


Figure 3-4. Typical Editing Display for F1M07 (Digital Input, ECB06)

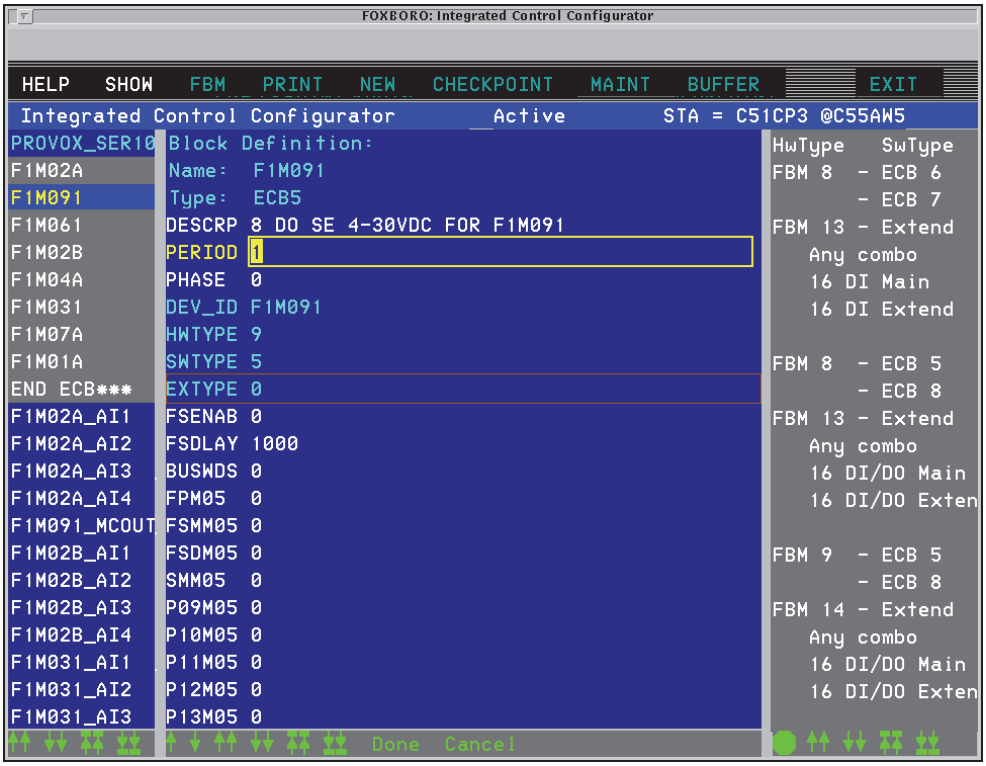


Figure 3-5. Typical Editing Display for F1M09 (Digital Output, ECB05)

5. Referring to *Control Processor 270 (CP270) and Field Control Processor 280 (FCP280) Integrated Control Software Concepts* (B0700AG), *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX), configure the necessary compounds and blocks for the desired control scheme:

   - Typical control schemes using the various types of DCS Fieldbus Modules are shown in Appendix D “DCS Fieldbus Module Control Schemes”. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.
   - Figure 3-6 through Figure 3-9 show typical editing displays for AIN, AOUT, PID, and COUT blocks.
   - For information on setting the fail-safe parameters, refer to “Fail-Safe Operation” on page 35.

On-Line Integrated Control Configuration

To perform on-line integrated control configuration, refer to *Integrated Control Configurator* (B0193AV) for details and proceed as follows:

— NOTE

This procedure is intended for use with a Foxboro Evo or I/A Series system having Version 4.0 or Control Core Services software Version 9.0 or higher software. If your system has software of a previous version, refer to the appropriate version of *Integrated Control Configurator* (B0193AV), and configure the DCS Fieldbus Modules as you would equivalent FBMs, as listed in Table 3-1. Use the ECB parameters and block parameter settings shown in Appendix D "DCS Fieldbus Module Control Schemes".

1. Using the System Management displays (accessible at a Control Core Services workstation), boot up the CP to which the DCS Fieldbus Module subsystem equipment will be attached. This creates two compounds:
   - Station compound (CPLBUG_STA)[2] containing the station block (CPLBUG_STA:STATION)[1]
   - ECB compound (CPLBUG_ECB)[1] containing the primary ECB (CPLBUG_ECB:PRIMARY_ECB)[1]
2. Access the Integrated Control Configurator (from the Process Engineer's environment, select **`Config`** and then **`Control_Cfg`**).
3. Using the Control Configurator's **`Insert New Block/ECB`** function, create an ECB for each F1Mxx DCS Fieldbus Module in the subsystem.
4. Access the editing display for the newly created F1Mxx ECBs (see Figure 3-2 through Figure 3-5 for examples) and set the parameters. The HWTYPE and SWTYPE ECB parameters for the various types of DCS Fieldbus Modules are shown in Appendix D "DCS Fieldbus Module Control Schemes". For information on other ECB parameters, refer to *Integrated Control Block Descriptions* (B0193AX).

— NOTE

For ready reference, ECB parameter information appears in a "show window" along the right side of the ECB editing displays (see Figure 3-2 through Figure 3-5). The show window is accessed by selecting **`Show`** in the menu bar, and then selecting **`Legal FBM/ECB Combos`**.

5. Referring to *Control Processor 270 (CP270) and Field Control Processor 280 (FCP280) Integrated Control Software Concepts* (B0700AG), *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX), configure the necessary compounds and blocks for the desired control scheme:

[2.] The CP letterbug (cplbug) is filled in by the station being configured.

- Typical control schemes using the various types of DCS Fieldbus Modules are shown in Appendix D “DCS Fieldbus Module Control Schemes”. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.
- Figure 3-6 through Figure 3-10 show typical editing displays for AIN, AOUT, PID, MCIN, and MCOUT blocks.
- For information on setting the fail-safe parameters, refer to “Fail-Safe Operation” on page 35.

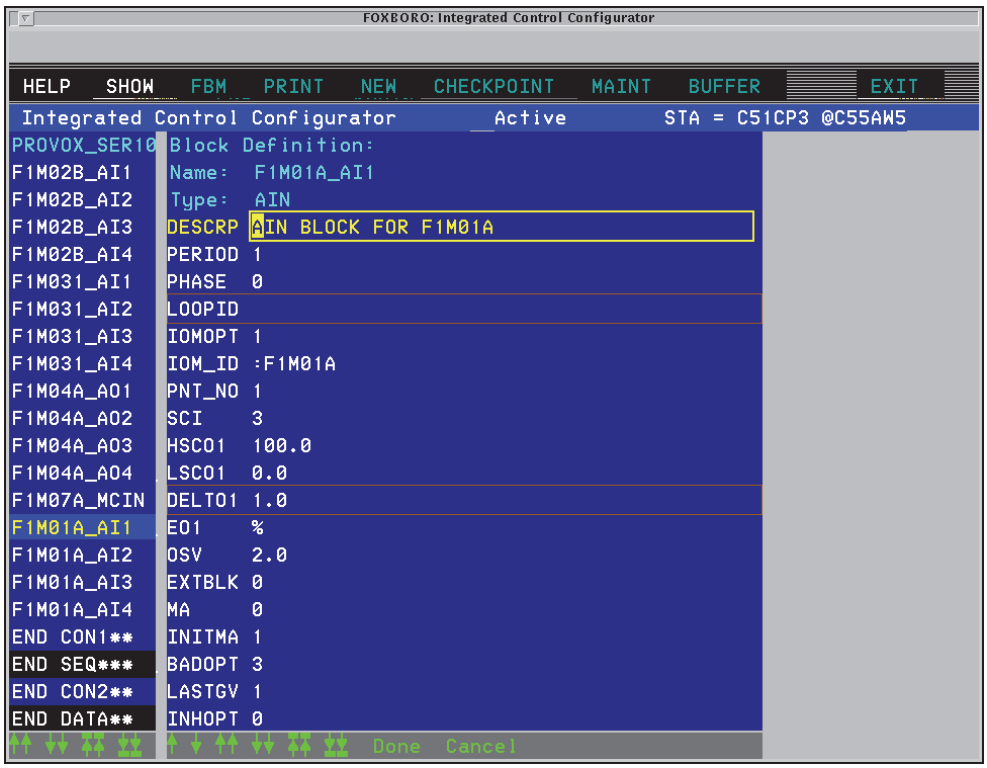


Figure 3-6. Typical Editing Display for an AIN Block

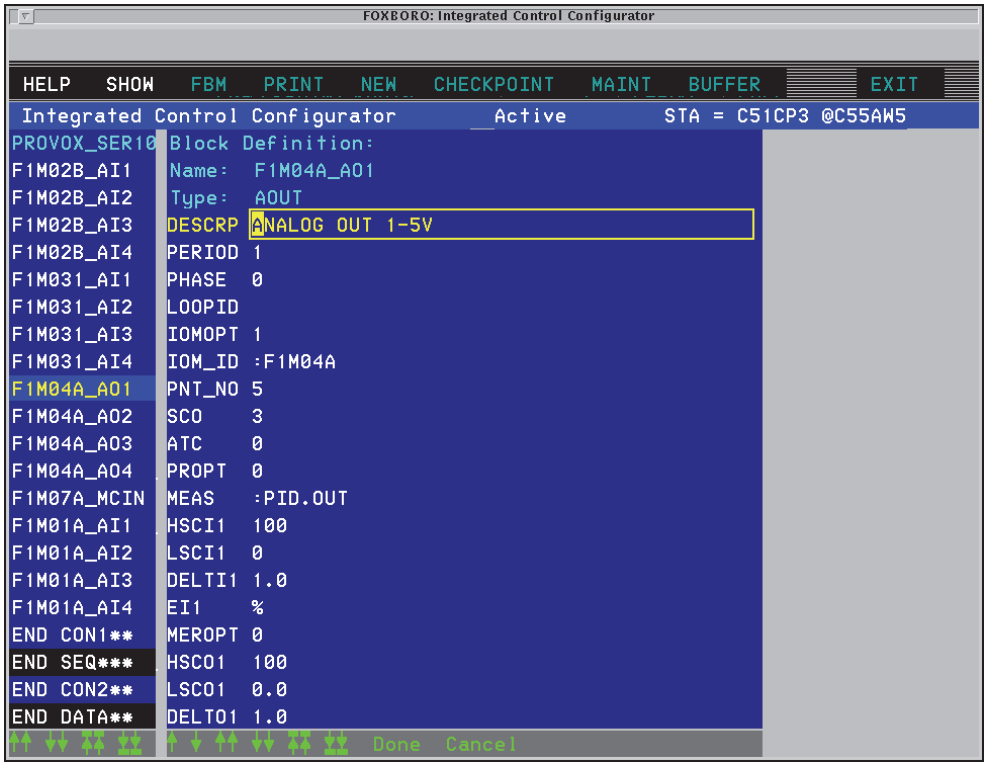


Figure 3-7. Typical Editing Display for an AOUT Block

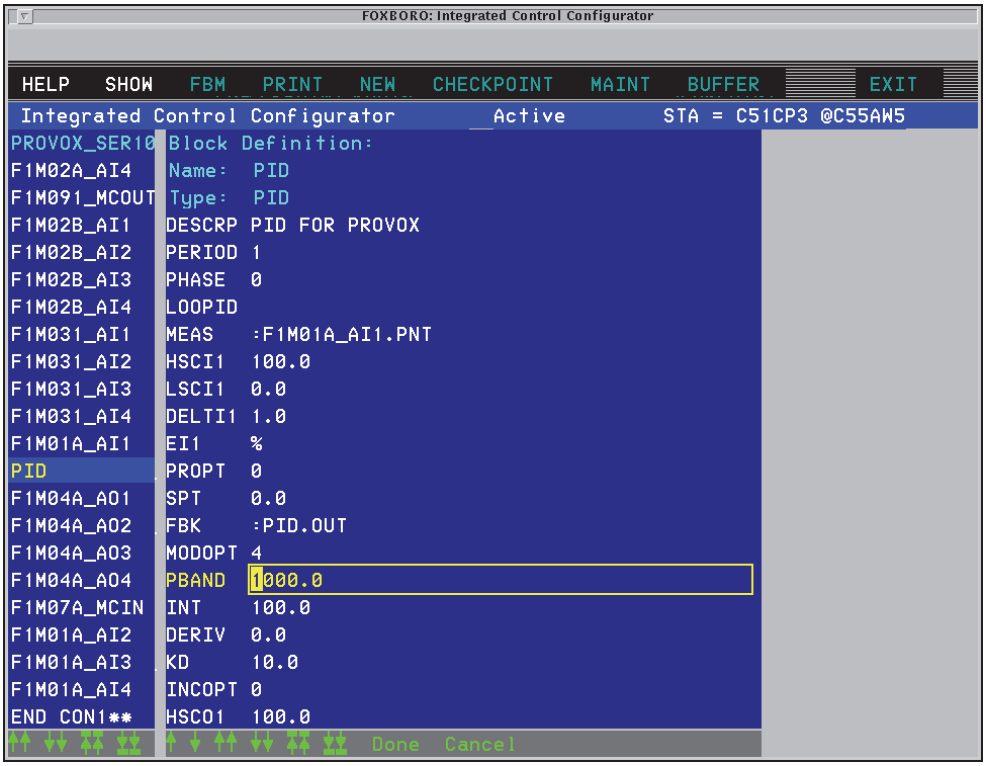


Figure 3-8. Typical Editing Display for a PID Block

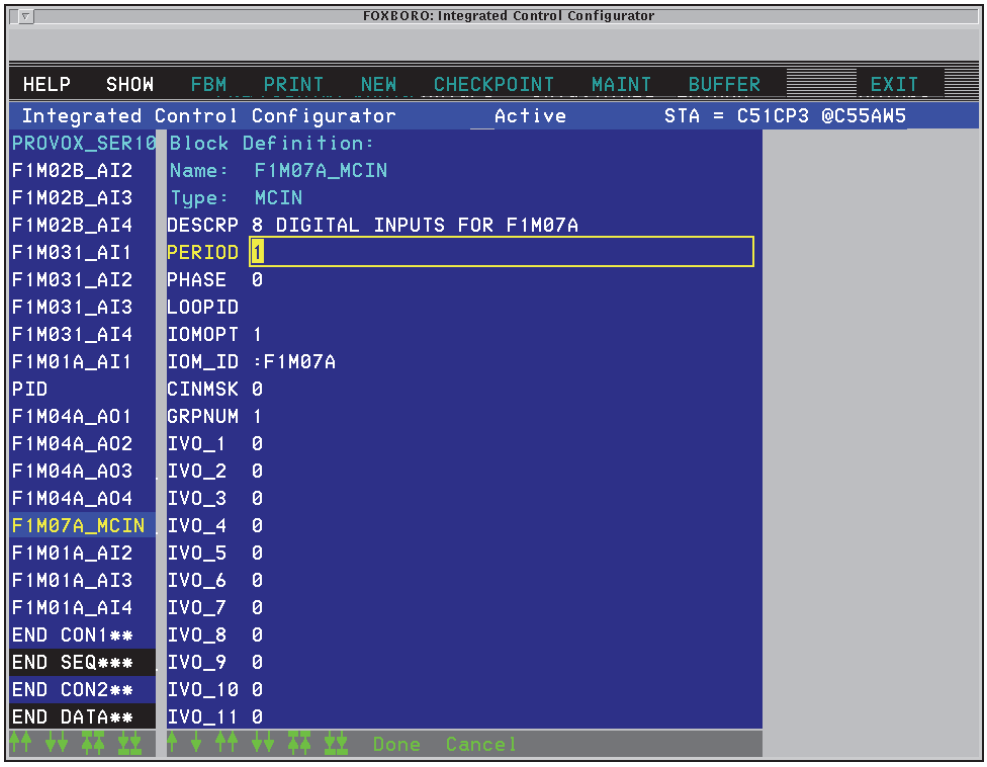


Figure 3-9. Typical Editing Display for an MCIN Block

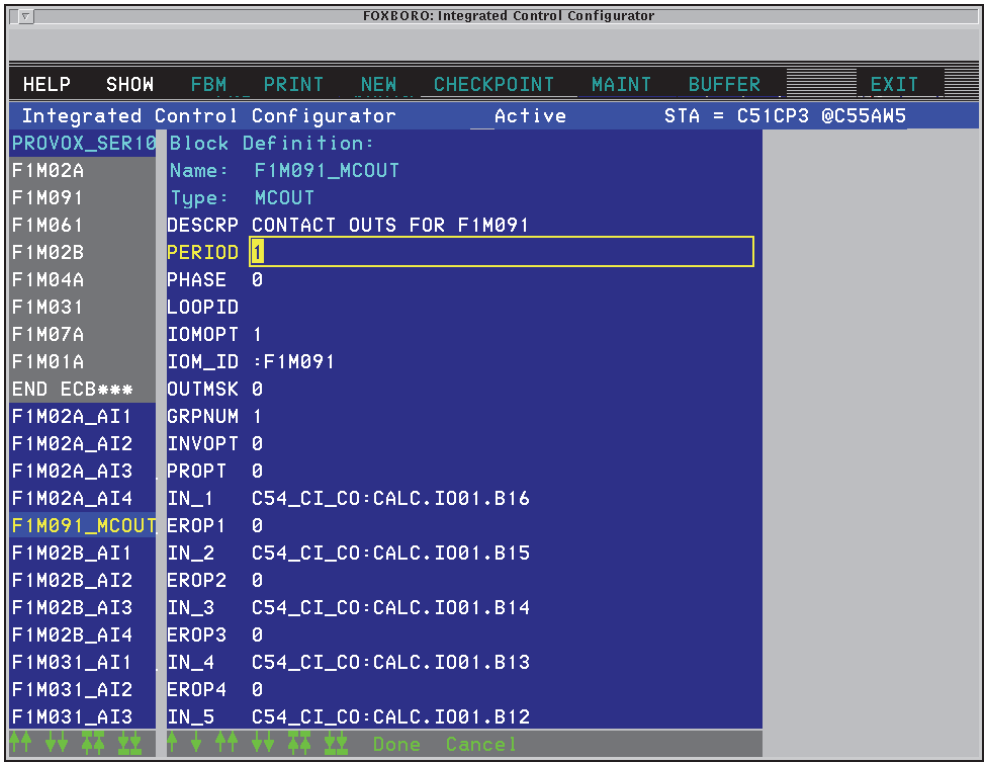


Figure 3-10. Typical Editing Display for an MCOUT Block

Fail-Safe Operation

Fail-safe parameters in the controlling ECBs specify the outputs of the associated DCS Fieldbus Module in the event of a break in communication with the CP. All fail-safe operations are initiated by the DCS Fieldbus Module.

Each time the DCS Fieldbus Module receives a write request, it resets a fail-safe timer for its ECB. The DCS Fieldbus Module asserts a fail-safe condition for the ECB if it does not receive another output command within a specified time. The fail-safe condition can be either of the following:

- Hold Current Value – Hold the value sent in the most recent output command from the CP.
- Use Fallback Value – Use a value specified for the output (specified in the ECB).

The ECBs for the DCS Fieldbus Modules include parameters for enabling and disabling fail-safe and for setting a fail-safe delay for the outputs. These parameters are downloaded to the DCS Fieldbus Module's database from the CP each time the subsystem is initialized or reconfigured, and each time you execute a download command from the System Management display. If fail-safe is enabled for a specific output, the DCS Fieldbus Module asserts fail-safe actions.

When normal operation resumes, the current output values are read by the CP and stored in the ECBs. These values in turn are used by the I/O blocks as the starting point for new output commands.

Fail-Safe Functionality

What the DCS Fieldbus Module does during various failed conditions is dependant upon the configuration of several fail-safe parameters as well as the type of failure. Two basic types of DCS Fieldbus Module failures can occur: those that cause the DCS Fieldbus Module to fail (such as **DCS OFF-LINE**, **DCS DOWNLOAD**, or **DCS EEPROM UPDATE**), and those that cause loss of communications (**COMM FAIL**).

Fail-Safe for Type 1 Failures - DCS Fieldbus Module FAIL

Two variables (parameters), fail-safe mask (FSMM1) and fail-safe data (FSD0n), determine what action the DCS Fieldbus Module takes when a Type 1 failure occurs. FSMM1, configured for a particular output, determines what state is asserted at the output: Fallback Value or Hold Current Value. The default setting of the fail-safe mask parameter is zero to assert the fallback values. The mask can be set so that some outputs hold while others fall back. FSD0n, also configured for a particular output, determines the fallback value. The default value for analog outputs is zero, and the default value for digital values is false.

Fail-Safe for Type 2 Failures - COMM FAIL

In addition to the fail-safe mask and fail-safe data parameters, there are two other parameters, FSENAB and FSDLAY, that affect the DCS Fieldbus Module's response to communications failures. FSENAB determines whether the output simply holds (FSENAB = 0) its output value during the communications failure until the communications failure ceases, or if it delays fail-safe action (FSENAB = 1) for the time specified by FSDLAY and then responds in the same way as Type 1 failures.

Fail-Safe Examples

The following examples are fail-safe operations for an analog type I/O ECB with two outputs. The operation is performed for the first output point, which is point number 1. An AOUT block is used, and the output is driven at a value of 75% of full scale. The Fallback Value is configured to be 25% of full scale (FSD01 = 16000). FSDLAY is set to 1000, which is equal to a delay time of 10 seconds.

Example 1: FSENAB = 0 and FSMM1 = 0X00

a. Cause: Type 1 failure.
Result: Output immediately goes to 25%.

b. Cause: Type 2 failure.
Result: Output holds at 75%.

Example 2: FSENAB = 0 and FSMM1 = 0X10

a. Cause: Type 1 failure.
Result: Output holds at 75%.

b. Cause: Type 2 failure.
Result: Output holds at 75%.

Example 3: FSENAB = 1 and FSMM1 = 0X00

a. Cause: Type 1 failure.
Result: Output immediately goes to 25%.

b. Cause: Type 2 failure.
Result: Output holds at 75% for 10 seconds, then goes to 25%.

Example 4: FSENAB = 1 and FSMM1 = 0X10

a. Cause: Type 1 failure.
Result: Output holds at 75%.

b. Cause: Type 2 failure
Result: Output holds at 75% for 10 seconds, then continues to hold at 75%.

4. Equipment Installation

This section provides procedures for installing the DCS Fieldbus Module subsystem equipment.

Pre-Installation Requirements

Before starting the actual equipment installation (as described in the following subsections) perform the following:

1. Perform the system configuration for the new (soon to be installed) DCS Fieldbus Module subsystem (refer to "System Configuration" on page 23).
2. Perform the integrated control configuration for the new (soon to be installed) DCS Fieldbus Module subsystem (refer to "Integrated Control Configuration" on page 25).
3. Determine the module ID (letterbug) numbers that the DCS Fieldbus Modules will contain. (Refer to "Module Identifier Letterbug Assignments" on page 24 and the configuration reports.)
4. Perform an orderly shutdown of the process associated with the equipment to be modified, and remove ac power from the equipment rack(s) in question.

Fieldbus Cabling at the CP40

Fieldbus cable installation involves the use of TCAs and twinaxial cable to provide connection between the Foxboro Evo CP40 and the F1SFIA or F1SFIB Fieldbus Isolator(s). For a Foxboro Evo CP40-based subsystem, three remote Fieldbus cabling configurations are possible at the control processor:

- Non-fault-tolerant CP40 and non-redundant Fieldbus (Figure 4-1)
- Non-fault-tolerant CP40 and redundant Fieldbus (Figure 4-2)
- Fault-tolerant CP40 and redundant Fieldbus (Figure 4-3).

NOTE

For simplicity, only Fieldbus connections for the CP40-based configurations are shown here. Fieldbus connections for other Foxboro stations are similar, except for connections to the CP60. For Fieldbus connections to the CP60, refer to "Fieldbus Cabling at the CP60" on page 40.

To make the remote Fieldbus cable connections at the Foxboro Evo CP40, refer to Figure 4-1, Figure 4-2, or Figure 4-3, as appropriate for your configuration, and proceed as follows:

1. Referring to Figure 4-4 (page 39), assemble the termination block(s) associated with the CP TCAs, snap them onto the mounting rail(s) (DIN rails) in the Foxboro Evo rack, and connect the earth wire(s).
2. Connect the TCA cable(s) to the CP(s).

3. Connect the Fieldbus cable(s) to the TCA(s) as shown in Figure 4-1, Figure 4-2, or Figure 4-3.
4. If not already in place, add the termination resistor (supplied with each TCA) as shown in Figure 4-1, Figure 4-2, or Figure 4-3.

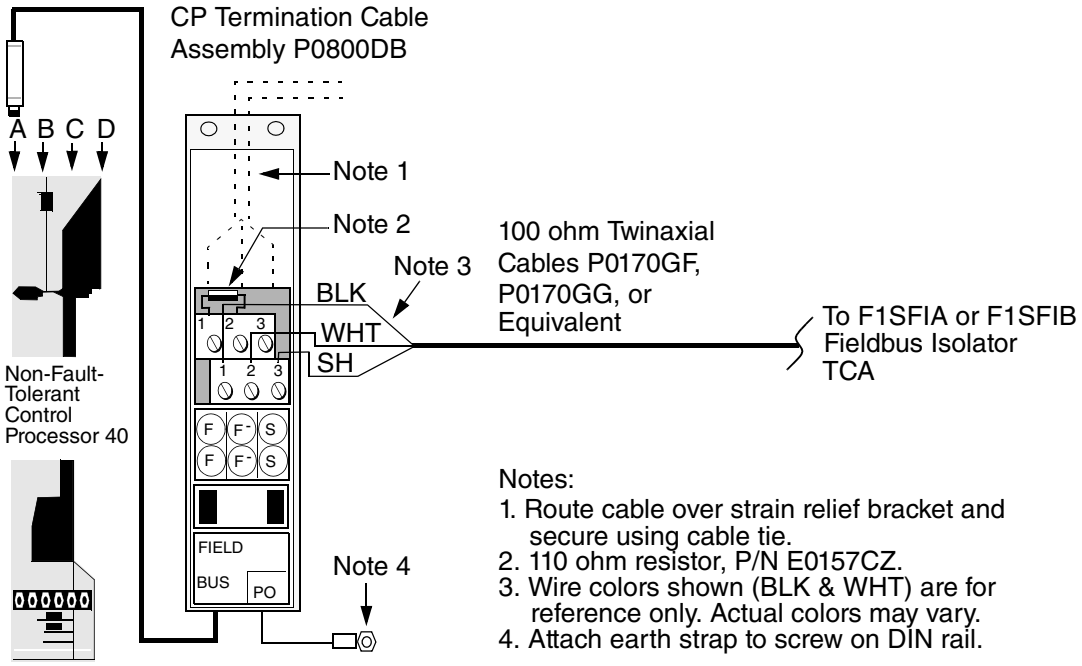


Figure 4-1. Non-Fault-Tolerant CP40 and Non-Redundant Fieldbus, Cable Connections

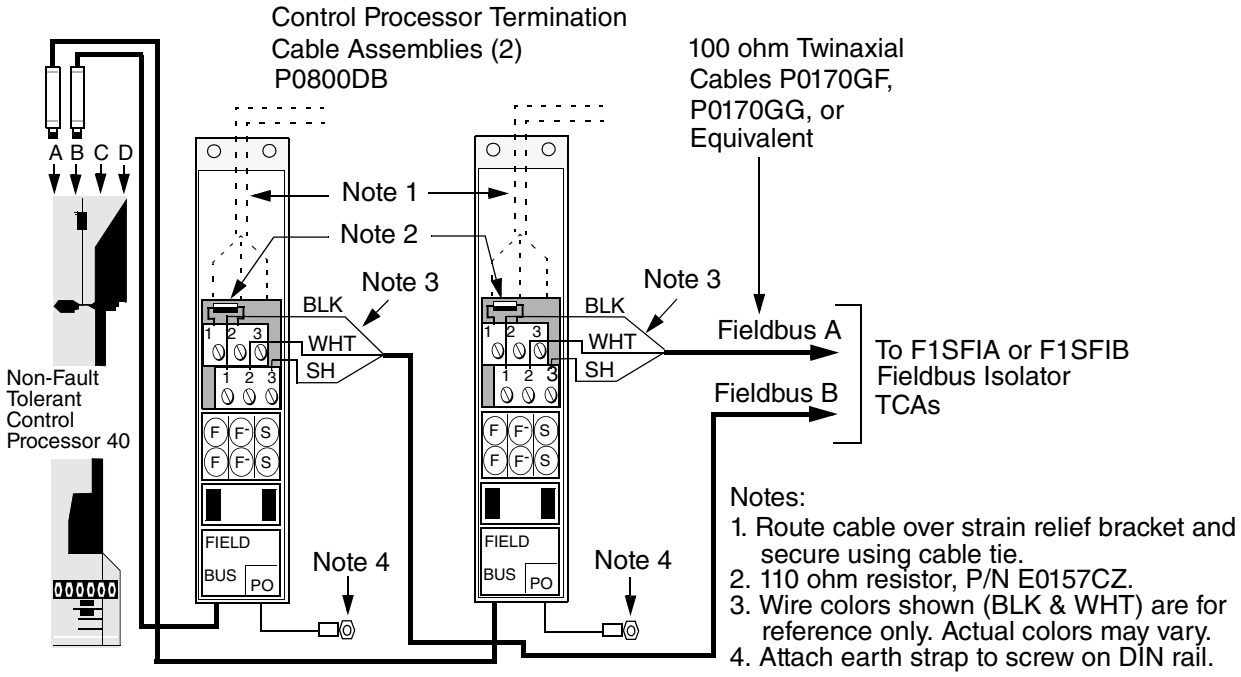


Figure 4-2. Non-Fault-Tolerant CP40 and Redundant Fieldbus, Cable Connections

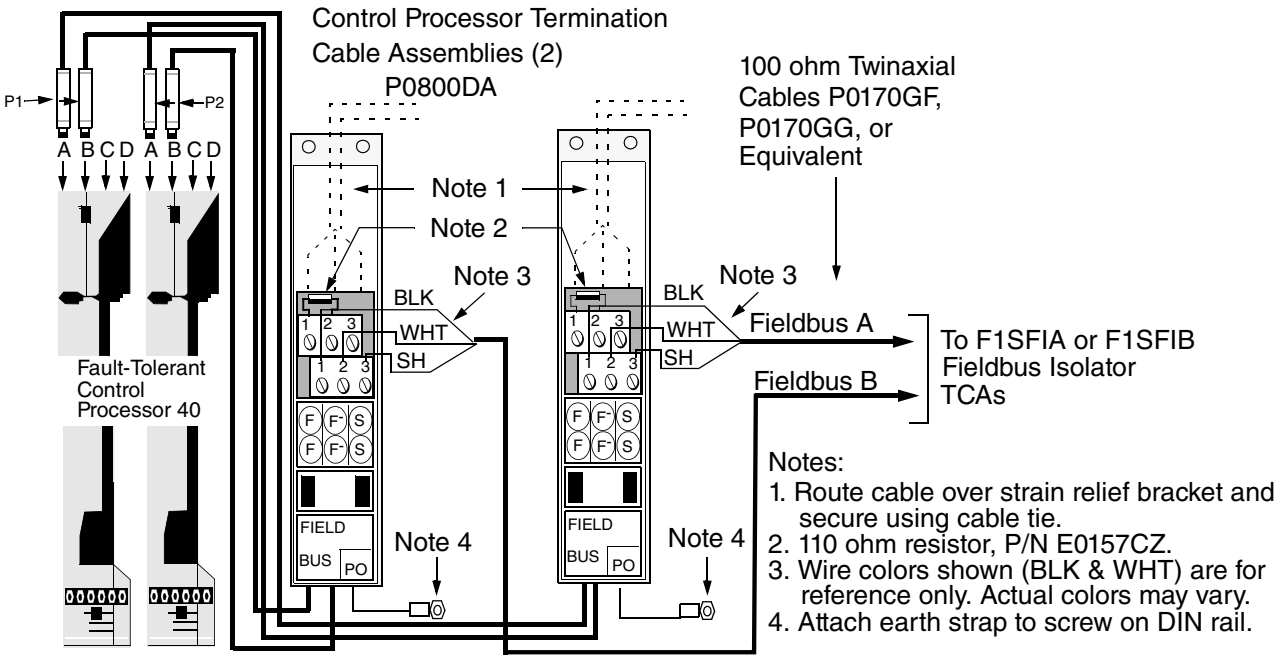


Figure 4-3. Fault-Tolerant CP40 and Redundant Fieldbus, Cable Connections

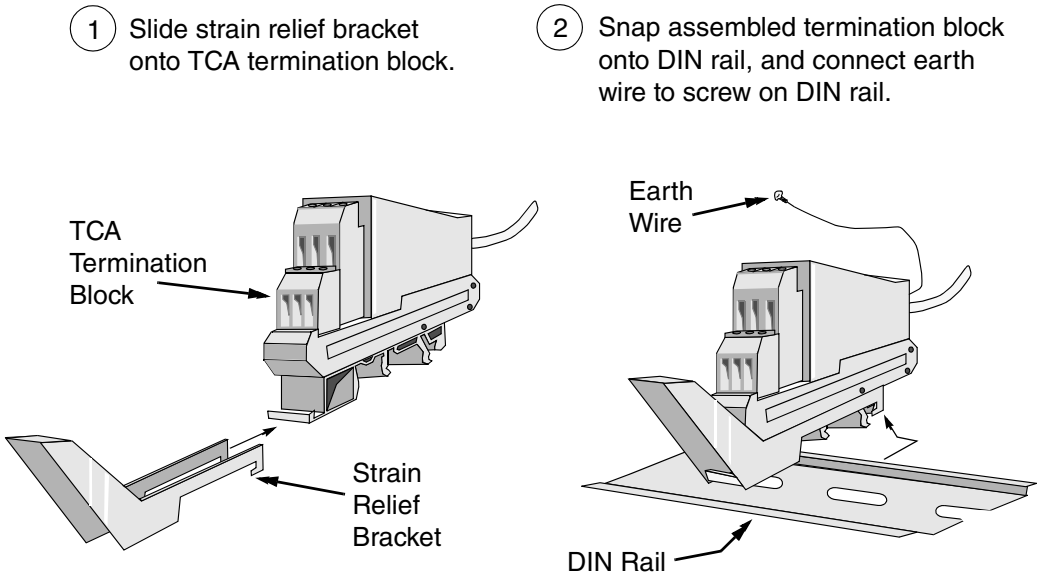
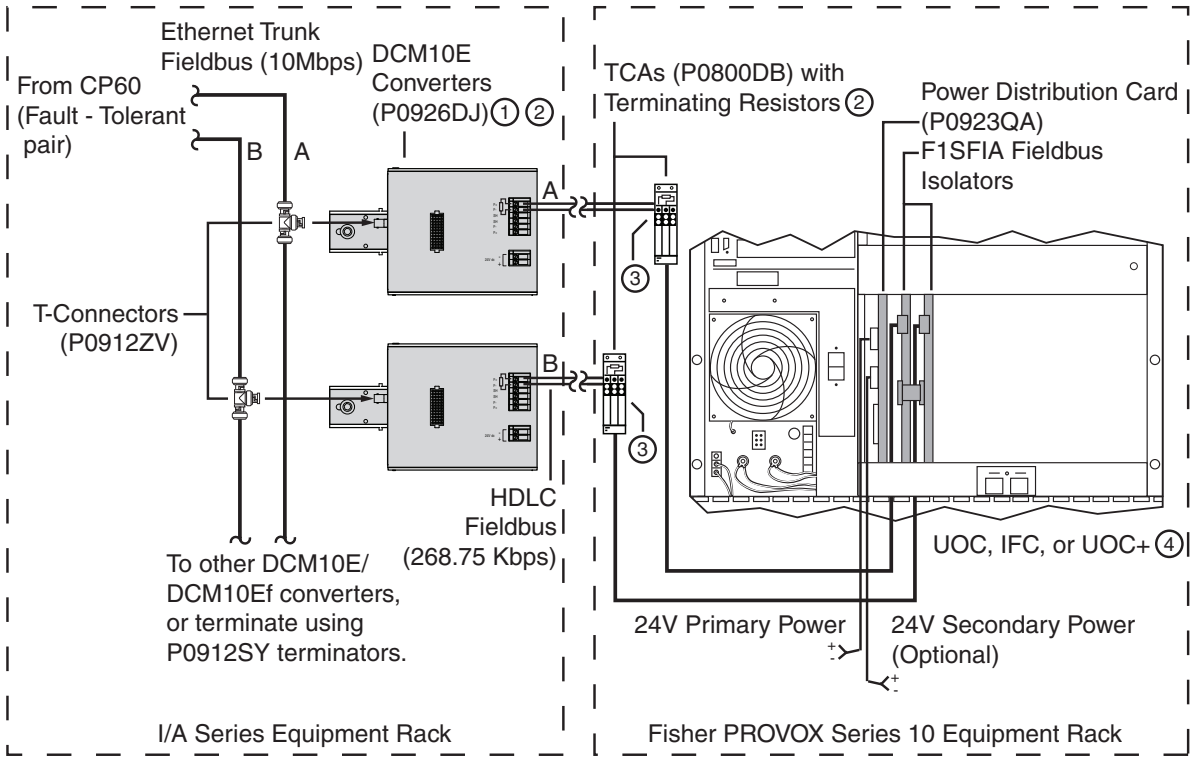


Figure 4-4. TCA Termination Block Assembly and Mounting

Fieldbus Cabling at the CP60

Interfacing of the upgraded Series 10 system to the Foxboro Evo CP60 (via the Fieldbus) is accomplished using DCM10E or DCM10Ef converters[1], as shown in Figure 4-5. For detailed information on making the cable connections, refer to *Control Processor 60 and Control Processor 60S Installation and Maintenance* (B0400FB).



Notes:

① A configuration using DCM10Ef converters (P0926DP) is similar, but with the Ethernet Trunk fiber optic cables connecting to the ST-type connectors on the units.

② Terminating resistors, included with the DCM10E/DCM10Ef converters and the corresponding TCAs, are used only if these devices exist at the ends of the Fieldbus run.

③ If the TCAs are the last TCAs in the Fieldbus run, the Fieldbus shields must be connected to the earth bus bar in the equipment rack (which, in turn, must be connected to solid earth ground). Check to ensure that these connections are in place.

④ CP60 interfacing with the MCU is similar, but F1SFIB Fielbus isolators are used.

Figure 4-5. Fieldbus Cabling to the CP60 (Typical)

[1.] The interface connection to the CP60 can also be made using FBI10E Fieldbus isolator modules. This method is also addressed in *Control Processor 60 and Control Processor 60S Installation and Maintenance* (B0400FB).

Fieldbus Cabling at the FCP280

Cabling an FCP280 baseplate to the Fieldbus Isolators (F1SFIA or F1SFIB) consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 4-6). This extension, used between enclosures, involves the use of termination cable assemblies (TCAs) and twinaxial cable to provide cable connections between primary and extended fieldbus segments, for a maximum fieldbus length of 1 Km (3200 ft). If the fieldbus is non-redundant, only one TCA is connected to the FCP280 baseplate.

The Fieldbus splitter (part number RH928CV) consists of a connector for any Fieldbus port on the FCP280 baseplate, and a TCA termination block similar to two of the P0903VY termination assemblies connected together. It has a 3 m (9.8 ft) cable between the connector and the block. The termination blocks on the splitter's TCAs each include a strain relief bracket, nylon cable tie, and labels for bus A and B. You must install the label to the termination block on each TCA. Refer to "Fieldbus Splitter (RH928CV)" in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) and *Field Control Processor 280 (FCP280) User's Guide* (B0700FW) for details.

NOTE

The Fieldbus splitter (RH928CV) is used instead of the two legacy TCAs (P0903VY) and the Extended Fieldbus Splitter/Terminator (P0926LC), which are used with legacy control processors for their twinaxial cabling.

Before starting this procedure, plan which Fieldbus port on the FCP280 baseplate you will connect the TCA cable to. The FCP280 considers the F1Mxx DCS Fieldbus Modules as 100 Series FBMs, so it must connect to the Fieldbus Isolators from a Fieldbus port on the FCP280 baseplate which is dedicated to 268 Kbps HDLC fieldbus connections. Each fieldbus port on the FCP280 baseplate may connect to either 100 Series or 200 Series modules exclusively - not both.

You can mount the FCP280 module(s) on either the two-position, vertical standard 200 Series baseplate (RH924YF) or the two-position, horizontal standard 200 Series baseplate (RH924YL). For FCP280 baseplate mounting procedures, refer to *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). For FCP280 installation procedures, refer to *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).

To connect an FCP280 baseplate to the Fieldbus Isolator TCAs:

1. Referring to Figure 4-7, assemble the termination blocks on the termination cable assembly end of the RH928CV splitter (RH928CV). Snap them onto the mounting rails (DIN rails) in the enclosure, and connect the ground wires. (For future reference, Figure 4-8 illustrates how to remove the TCA termination blocks.)

NOTE

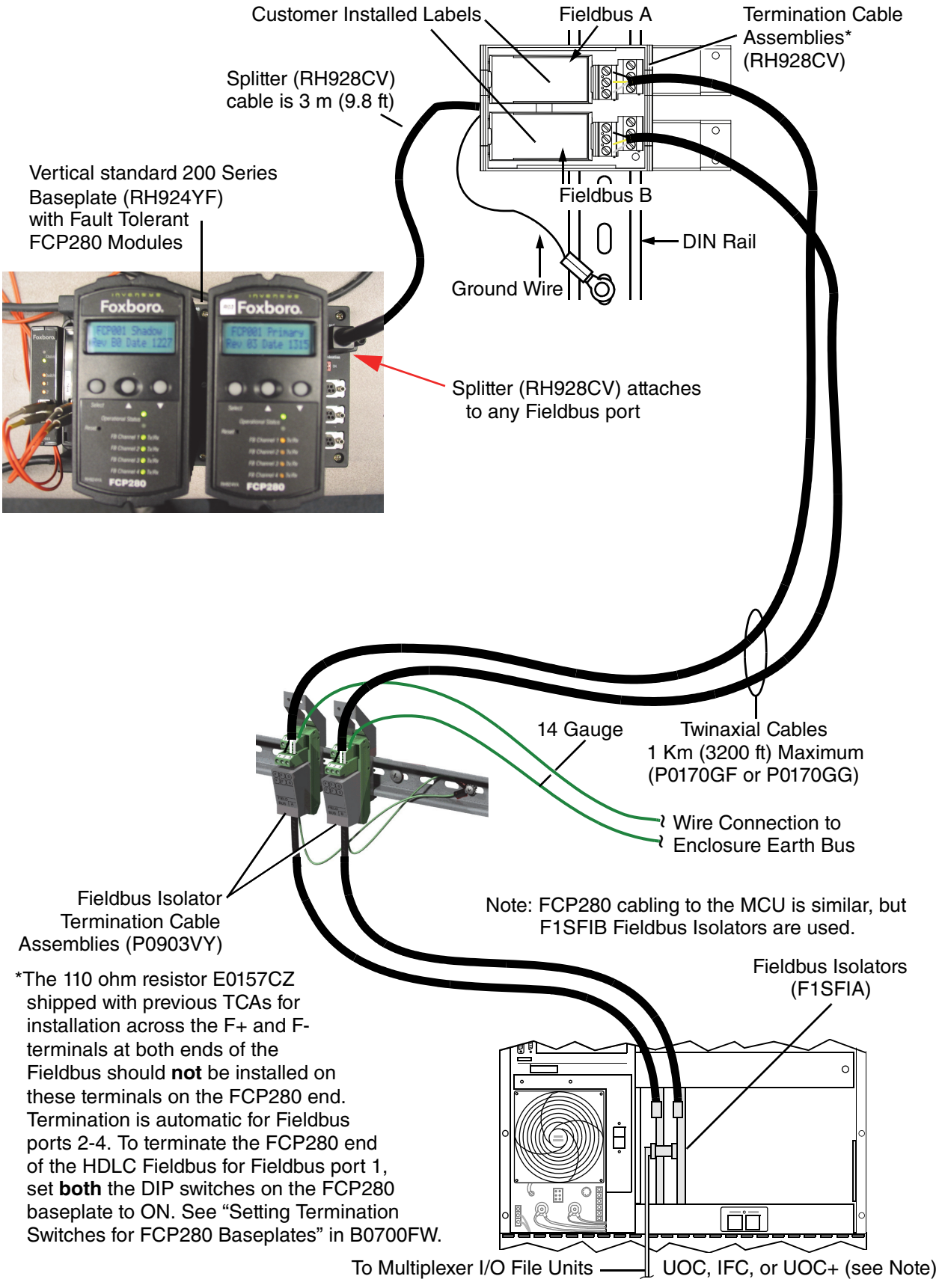
If you intend to use an FBI200 to extend the twinaxial cabling to the Fieldbus Isolator TCA from the FCP280 baseplate, refer to *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) for site planning and installation instructions.

2. Connect the splitter (RH928CV) to the appropriate port on the FCP280 baseplate. The splitter includes both a plug for the Fieldbus port and the TCA termination block which you installed in the previous step (see Figure 4-6). Refer to "Fieldbus Splitter

(RH928CV)" in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) for instructions on how to make this connection.
If you are upgrading a legacy control processor with an FCP280 and the site has two P0903VY TCAs on it, be sure to remove the P0903VY TCA termination blocks before installing the splitter, as explained in Figure 4-8.

Finish making the cable connection(s) to the fieldbus splitter/terminator or fieldbus splitter as shown in Figure 4-6.

3. Make the fieldbus cable connections between termination cable assemblies (see Figure 4-9).
4. Terminate the HDLC fieldbus according to the following rules:
   - Terminating resistors are used only at the Fieldbus isolator TCA end of the bus. Add the terminating resistors (supplied with the termination cable assemblies) to the P0903VY termination cable assemblies as shown in Figure 4-6.
   - To terminate Fieldbus port 1 in the FCP280 baseplate end of the HDLC fieldbus (if needed), set **both** the termination DIP switches on the FCP280 baseplate to "ON", as described in "Setting Termination Switches for FCP280 Baseplates" in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).
     Fieldbus ports 2-4 in the FCP280 baseplate are terminated internally and do not require any external hardware for termination. No action is needed to terminate the FCP280 baseplate end of the HDLC fieldbus for Fieldbus ports 2-4.
   - The Fieldbus can be extended in two directions from the FCP280. (Refer to Figure 4-10 on page 46.)
5. Connect an insulated 14 AWG green wire between connection point 3 (shield) on the last Fieldbus Isolator termination cable assembly (or assemblies) and the earth bus in the enclosure. For Foxboro Evo system earthing requirements, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).



*The 110 ohm resistor E0157CZ shipped with previous TCAs for installation across the F+ and F- terminals at both ends of the Fieldbus should **not** be installed on these terminals on the FCP280 end. Termination is automatic for Fieldbus ports 2-4. To terminate the FCP280 end of the HDLC Fieldbus for Fieldbus port 1, set **both** the DIP switches on the FCP280 baseplate to ON. See “Setting Termination Switches for FCP280 Baseplates” in B0700FW.

Figure 4-6. Cabling Fieldbus Isolator Cards to an FCP280 Baseplate

1. Slide strain relief bracket(s) onto TCA termination block. (RH928CV has two brackets, not shown.)
2. Snap assembled termination block onto DIN rail.
3. Connect ground wire to DIN rail using screw, lock washer and nut (customer supplied).

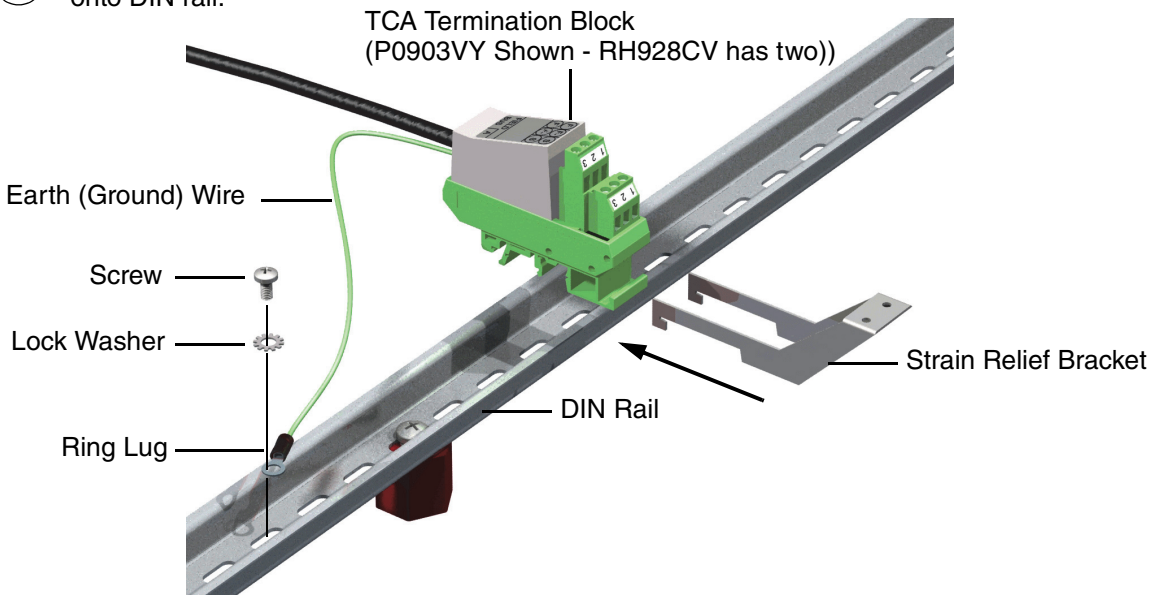


Figure 4-7. TCA Termination Block Assembly Mounting

1. Disconnect the earth wire from from the DIN rail.
2a. For each strain relief bracket, insert a medium-size flat-head screwdriver as shown.
2b. Move the screw drive handle in the direction shown, while lifting the TCA termination block from the DIN rail. For RH928CV, repeat for the other strain relief bracket.

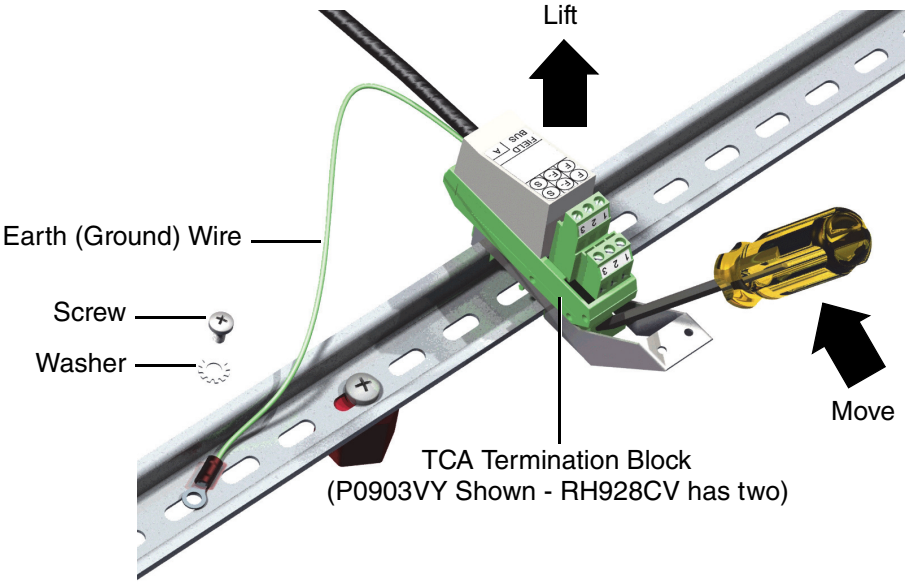
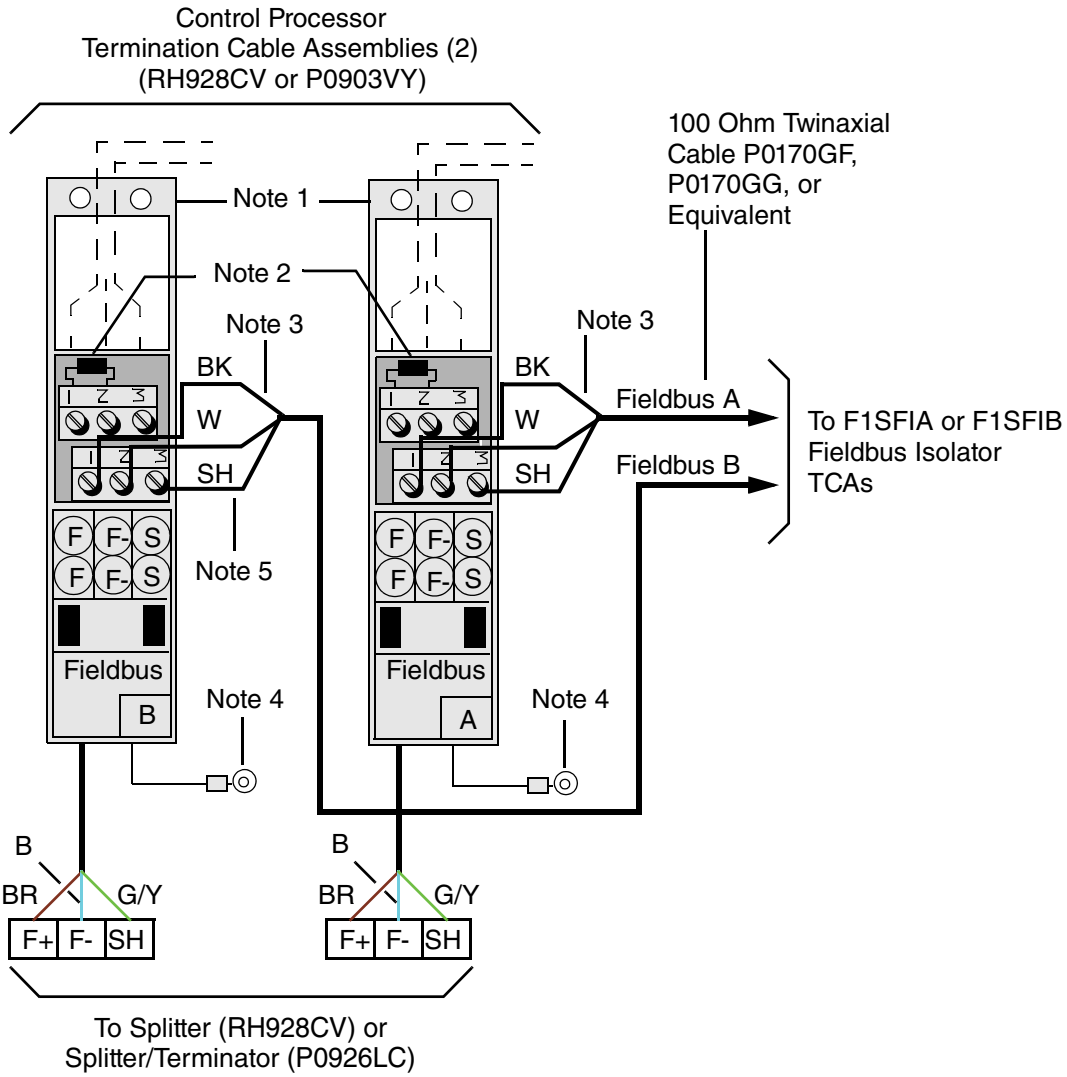


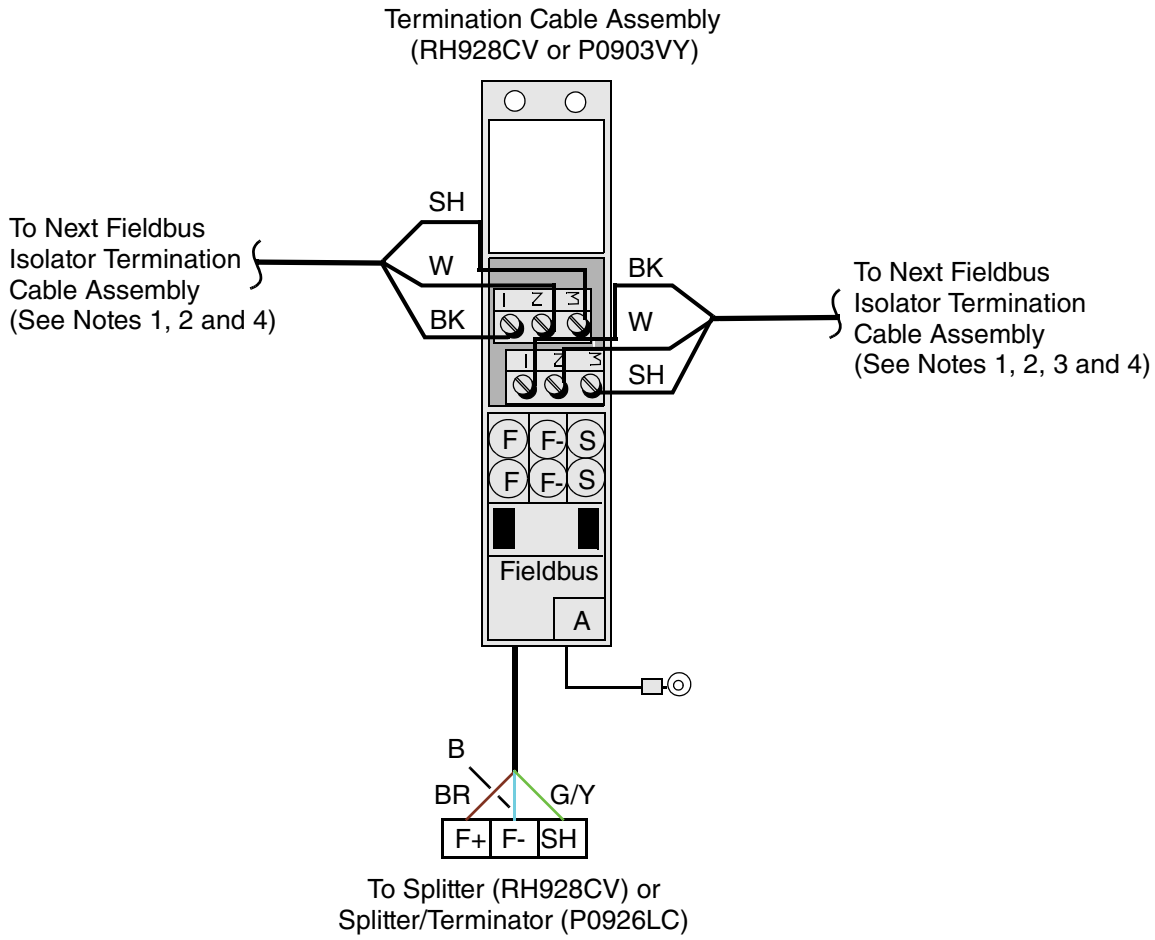
Figure 4-8. TCA Termination Block Removal



Notes:

1. For cable strain relief, it is recommended that the Fieldbus cable(s) be routed over the strain relief bracket and secured using nylon cables ties.
2. TCAs can be daisy chained as indicated by the dashed cable lines, but terminating resistors (110 ohms) must be installed on the Fieldbus Isolator TCA end of the fieldbus (not the FCP280 end). For the FCP280 end of the fieldbus, Fieldbus ports 2-4 are auto-terminated internally. Fieldbus port 1 is terminated with the DIP switches on the FCP280's baseplate as described in "Setting Termination Switches for FCP280 Baseplates" in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).
3. Wire colors shown (BK and W) are for reference purposes only.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU). Splitter (RH928CV) has only one green earth wire.
5. The shield of the twinaxial cable (terminal 3) should be earthed at the farthest end from the FCP280 baseplate. The fieldbus shield must be earthed at one end only. (See text for earthing instructions.)

Figure 4-9. Remote Redundant Fieldbus Cabling (FCP280 End)



Notes:

1. Earth the shield (terminal 3) at the termination cable assembly farthest from the FCP280 baseplate.
2. Install terminating resistors at both ends of the extended fieldbus cable. For the last TCA in the fieldbus, install the termination resistor between terminals 1(F) and 2(F-) and the The earth (ground) wire (14 Gauge) must connect to terminal 3(S) as shown in Figure 4-11.
   If the TCA is attached to Fieldbus port 1 on the FCP280 baseplate, the termination DIP switches on the FCP280's baseplate must both be set to "OFF" as described in "Setting Termination Switches for FCP280 Baseplates" in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW).
3. If this TCA is the last TCA in the fieldbus, the cable on this side of the TCA will not be added.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

Figure 4-10. Example of Extending Fieldbus in Two Directions from FCP280

Fieldbus Cabling at the FCP270

Cabling an FCP270 baseplate to the Fieldbus Isolators (F1SFIA or F1SFIB) consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 4-11). This extension, used between enclosures, involves the use of termination cable assemblies (TCAs) and twinaxial cable to provide cable connections between primary and extended fieldbus segments, for a maximum fieldbus length of 1 Km (3200 ft). If the fieldbus is non-redundant, only one TCA is connected to the fieldbus splitter/terminator (P0926LC) which is shown in Figure 4-12. TCA part number P0903VY includes a strain relief bracket, nylon cable tie, labels for bus A and B, and 110 ohm terminating resistor. You must install the label to the TCA.

You can mount the FCP270 module(s) on either the two-position, vertical standard 200 Series baseplate (P0926HW) or the two-position, horizontal standard 200 Series baseplate (P0926HC). For FCP270 baseplate mounting procedures, refer to *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). For FCP270 installation procedures, refer to *Field Control Processor 270 (FCP270) User's Guide* (B0700AR).

To connect an FCP270 baseplate to the Fieldbus Isolator TCAs:

1. Referring to Figure 4-13, assemble the termination blocks associated with the termination cable assemblies (P0903VY) for the FCP270 baseplate, snap them onto the mounting rails (DIN rails) in the enclosure, and connect the ground wires. (For future reference, Figure 4-14 illustrates how to remove the TCA termination blocks.)
2. Connect the fieldbus splitter/terminator (P0926LC) to the "Fieldbus and Time Strobe" connector on the FCP270 baseplate (see Figure 4-11).
3. Make the cable connection(s) to the fieldbus splitter/terminator as shown in Figure 4-12.
4. Make the fieldbus cable connections between termination cable assemblies (see Figure 4-15).
5. Add the terminating resistors (supplied with the termination cable assemblies) according to the following rules:
   - Terminating resistors are used only at the ends of the bus.
   - The Fieldbus can be extended in two directions from the FCP270. (Refer to Figure 4-16.)
6. Connect an insulated 14 AWG green wire between connection point 3 (shield) on the last Fieldbus Isolator termination cable assembly (or assemblies) and the earth bus in the enclosure. For Foxboro Evo system earthing requirements, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

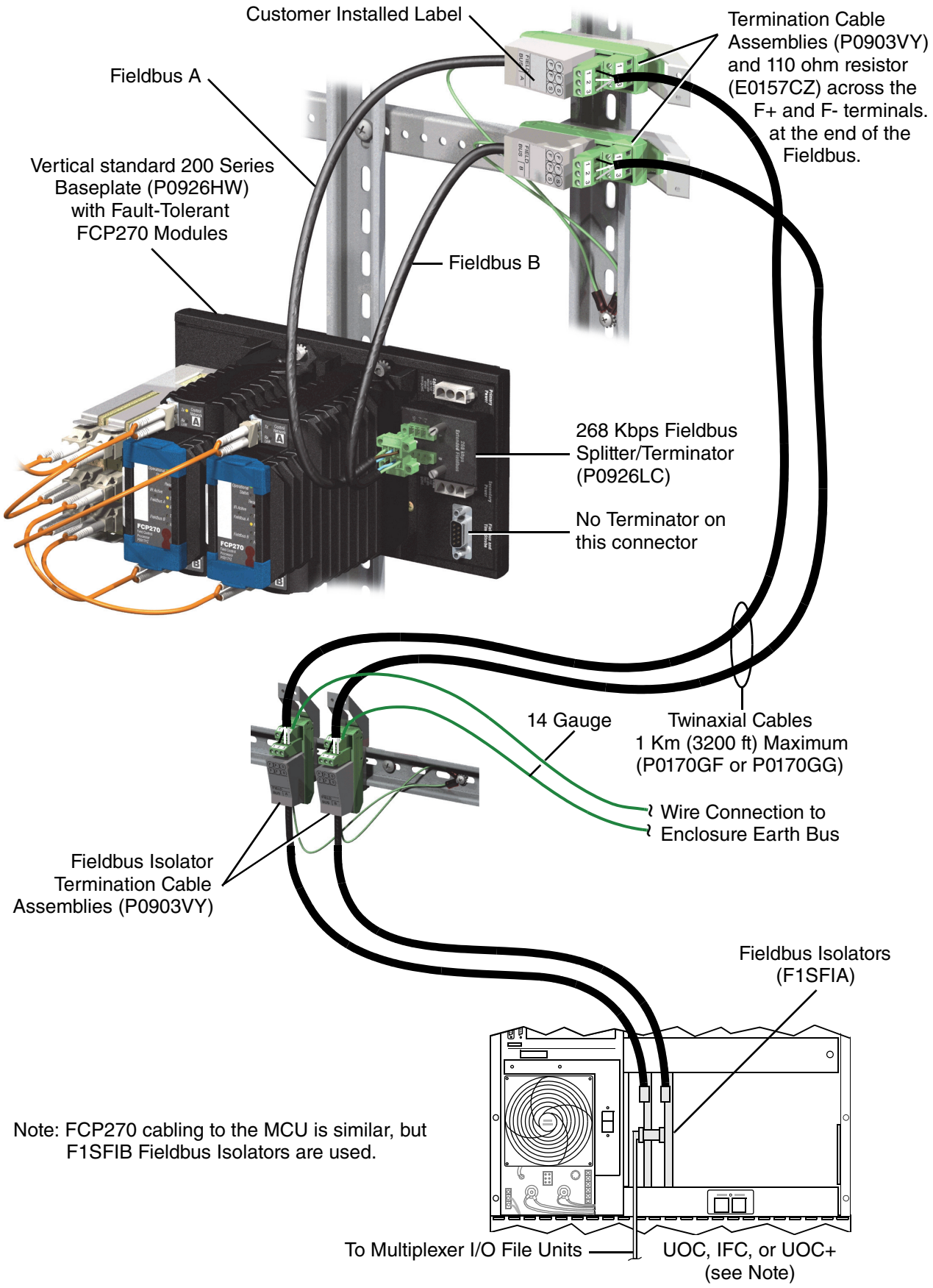


Figure 4-11. Cabling Fieldbus Isolator Cards to an FCP270 Baseplate

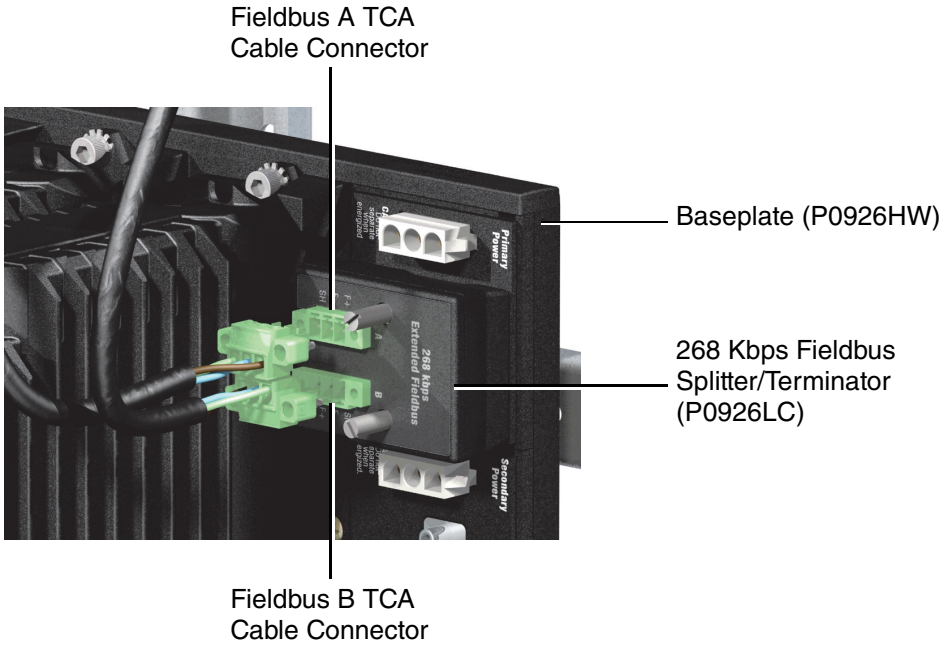


Figure 4-12. TCA Cable Connection to 268 Kbps Fieldbus Splitter/Terminator

1. Slide strain relief bracket onto TCA termination block.
2. Snap assembled termination block onto DIN rail.
3. Connect ground wire to DIN rail using screw, lock washer and nut (customer supplied).

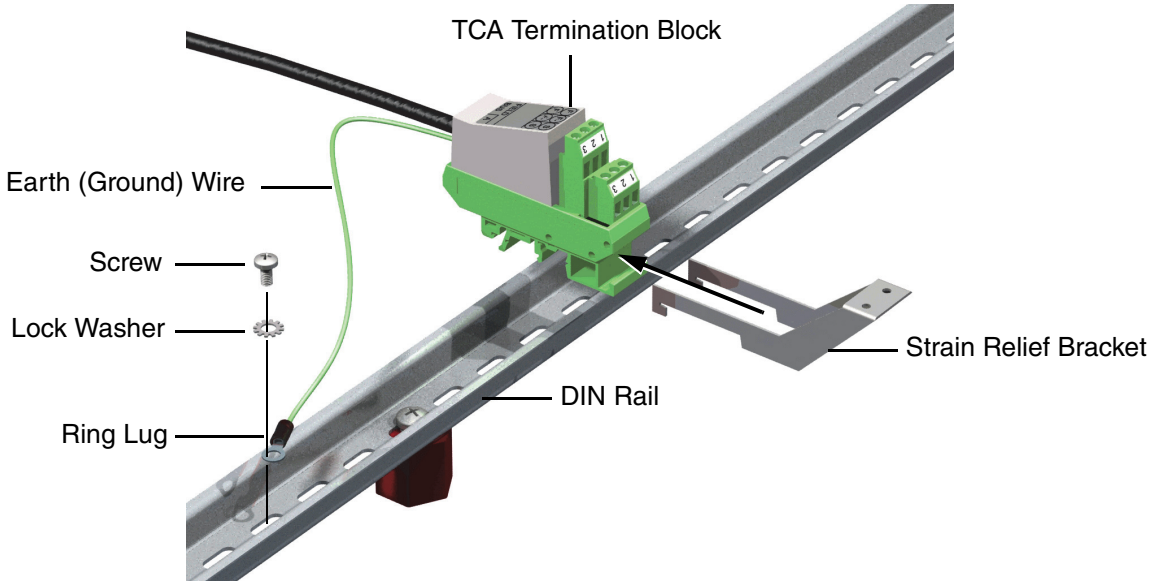


Figure 4-13. TCA Termination Block Assembly Mounting

1. Disconnect the earth wire from from the DIN rail.
2. Insert a medium-size flat-head screw driver as shown.
3. Move the screw drive handle in the direction shown, while lifting the TCA termination block from the DIN rail.

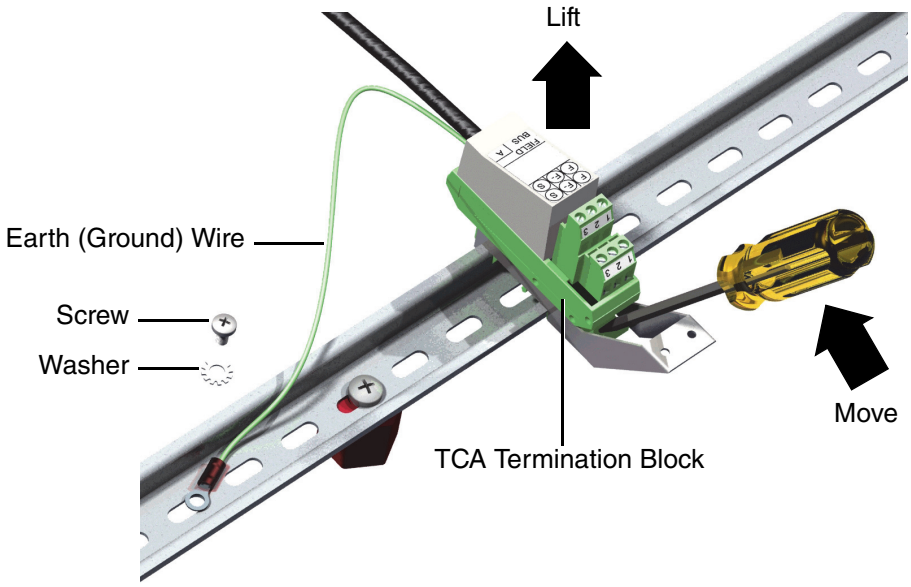
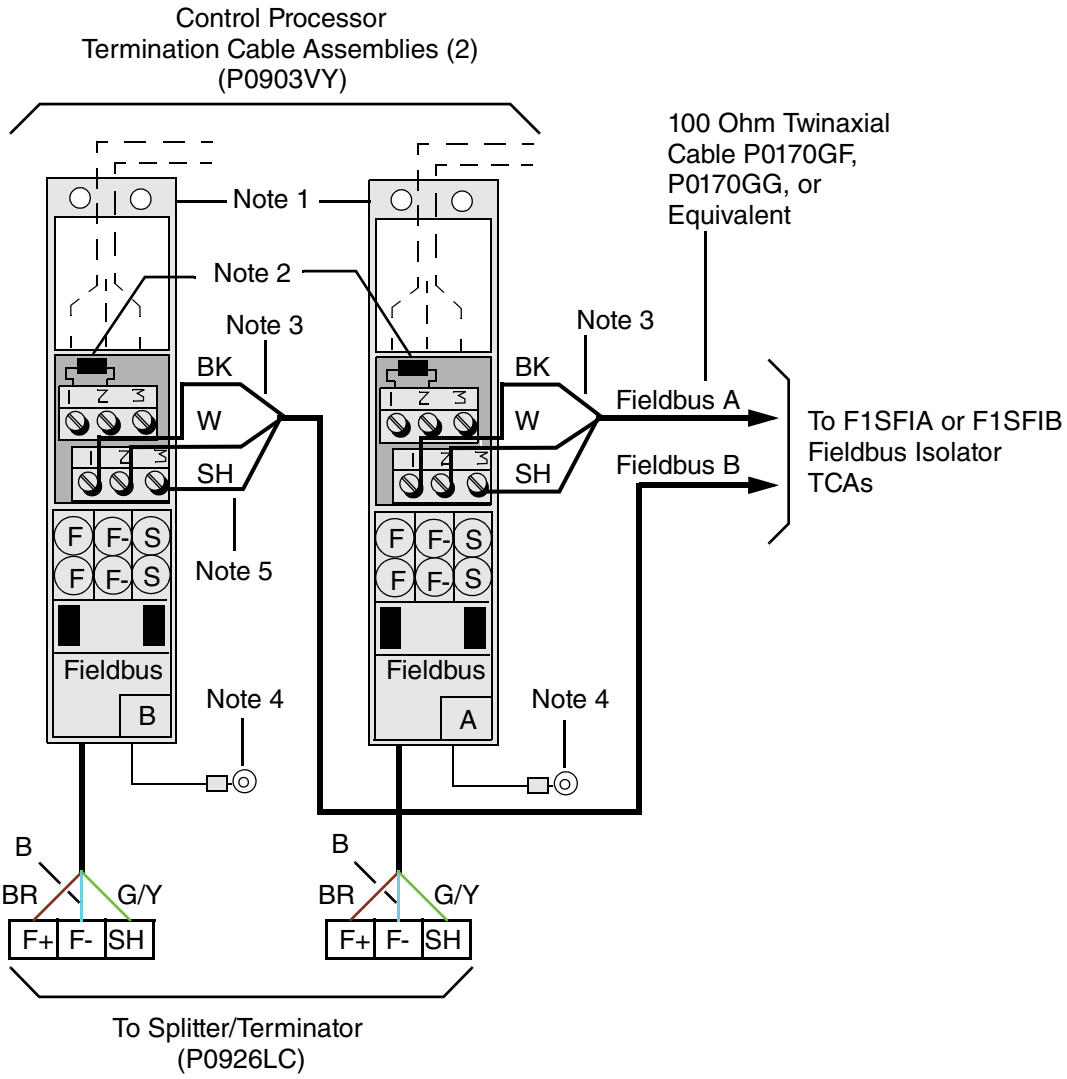


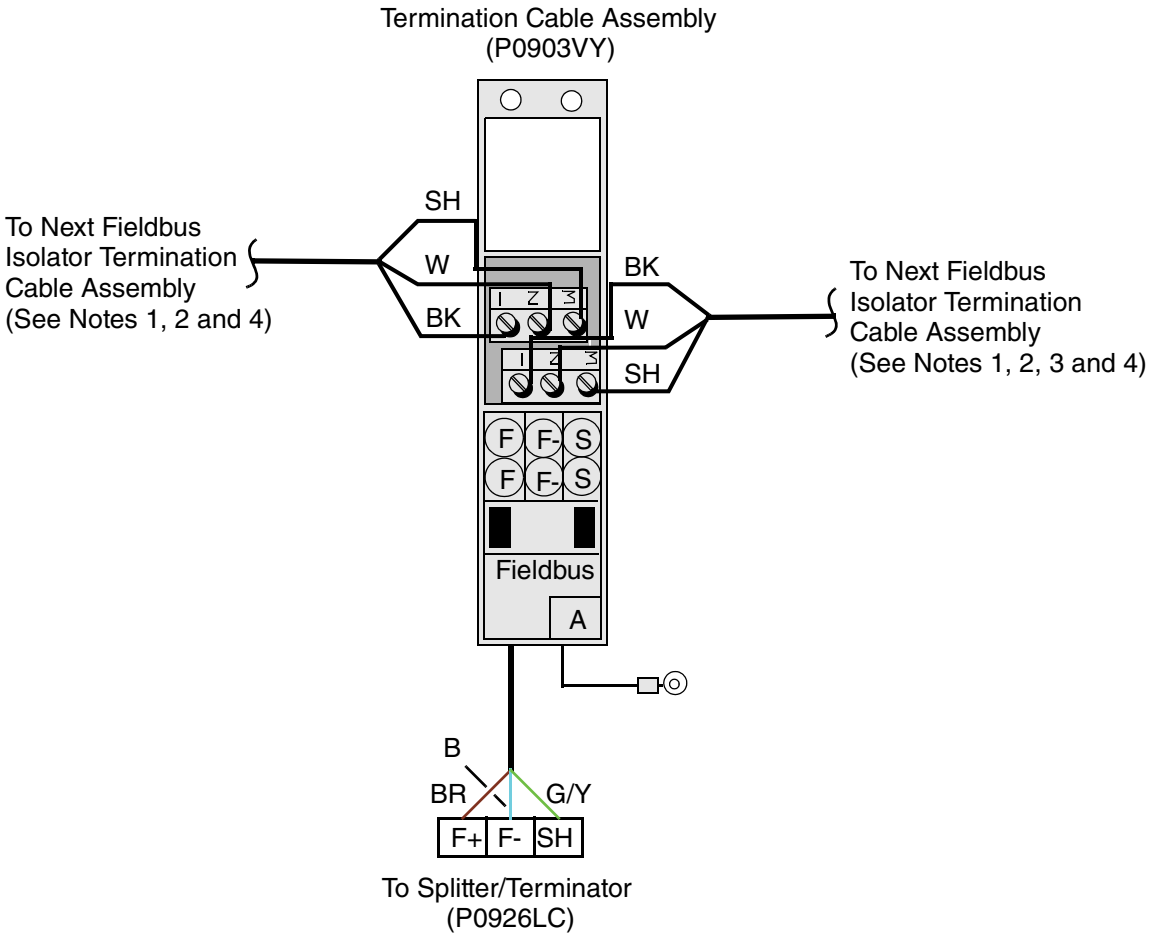
Figure 4-14. TCA Termination Block Removal



Notes:

1. For cable strain relief, it is recommended that the Fieldbus cable(s) be routed over the strain relief bracket and secured using nylon cables ties.
2. TCAs can be daisy chained as indicated by the dashed cable lines, but terminating resistors (110 ohms) must be installed at the ends of the fieldbus.
3. Wire colors shown (BK and W) are for reference purposes only.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).
5. The shield of the twinaxial cable (terminal 3) should be earthed at the farthest end from the FCP270 baseplate. The fieldbus shield must be earthed at one end only. (See text for earthing instructions.)

Figure 4-15. Remote Redundant Fieldbus Cabling (FCP270 End)



Notes:

1. Earth the shield (terminal 3) at the termination cable assembly farthest from the FCP270 Baseplate.
2. Install terminating resistors at both ends of the extended fieldbus cable. For the last TCA in the fieldbus, install the termination resistor between terminals 1(F) and 2(F-) and the The earth (ground) wire (14 Gauge) must connect to terminal 3(S) as shown in Figure 4-19.
3. If this TCA is the last TCA in the fieldbus, the cable on this side of the TCA will not be added.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

Figure 4-16. Example of Extending Fieldbus in Two Directions from FCP270

Fieldbus Cabling at the ZCP270

NOTE

Refer to Appendix G "ZCP270 Upgrade" for information regarding control processor upgrades from CP30, CP40, or CP60 to ZCP270. If upgrading from a CP60 to ZCP270, no special procedure is necessary.

Connections between a redundant ZCP270 to the Fieldbus Isolators (F1SFIA or F1SFIB) requires the following to facilitate communications:

- ZCP270 connects to a redundant pair of DIN rail mounted Fieldbus Communications Module 100Es (FCM100Es) via fiber optic cabling, either directly with standard LC to LC cables or indirectly via the Foxboro Evo Control Network (hereinafter referred to as the control network)
- The FCM100Es connect to the Fieldbus Isolators (F1SFIA or F1SFIB)

Cabling a FCM100E baseplate to the Fieldbus Isolators (F1SFIA or F1SFIB) consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 4-19). This extension, used between enclosures, involves the use of termination cable assemblies (TCAs) to provide cable connections between primary and extended fieldbus segments, for a maximum fieldbus length of 1830 m (6000 ft). If the fieldbus is non-redundant, only one TCA is connected to the fieldbus splitter/terminator (P0926LC) which is shown in Figure 4-20. TCA part number P0903VY includes a strain relief bracket, labels for bus A and B, and a 110 ohm terminating resistor (E0157CZ) which should be installed across the F+ and F- terminals at the end of the Fieldbus. You must install one of the labels on the TCA (see Figure 4-19 for label orientation)

You can mount the FCM100E module(s) on either the two-position, vertical standard 200 Series baseplate (P0926KE) or the two-position, horizontal standard 200 Series baseplate (P0926KH). For FCM100E installation procedures, refer to *Z-Module Control Processor 270 (ZCP270) User's Guide* (B0700AN).

ZCP270 Direct Connection to FCM100E

⚠ WARNING

Prior to connecting the direct connect cables to the FCM100E, install the letterbug into the ZCP270. Refer to the *Letterbug Configurator User's Guide* (B0700AY).

Non-redundant or redundant FCM100Es can be connected directly to a ZCP270 through two splitter/combiners (on each for Bus A and Bus B).

Figure 4-17 shows a redundant FCM100E connection to a redundant ZCP270. Figure 4-18 shows how the connections are made. Use the cables listed in Table 4-1 to make the connections.

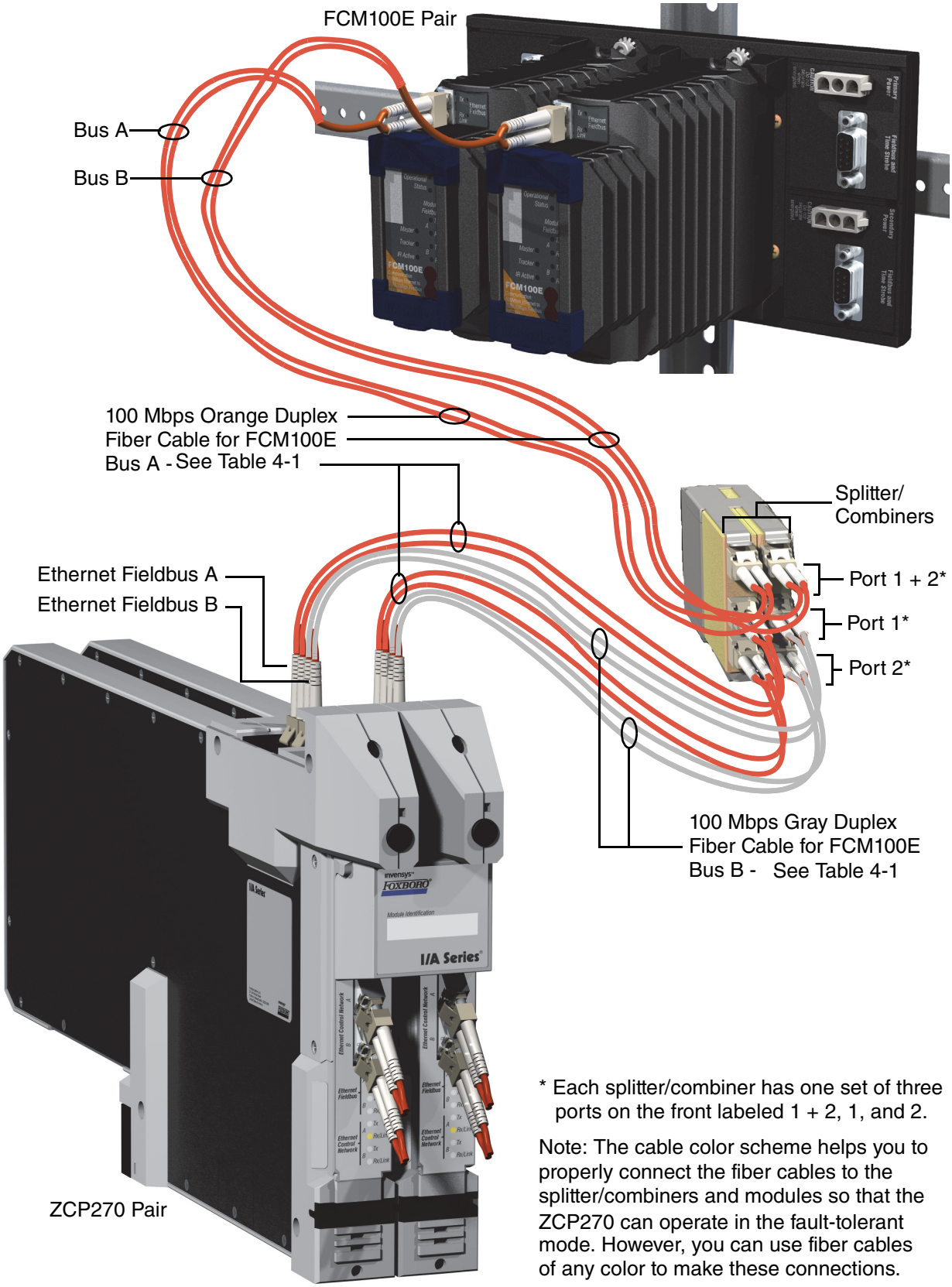


Figure 4-17. FCM100E to Splitter/Combiner to ZCP270 Cabling - Direct Connection - Overview

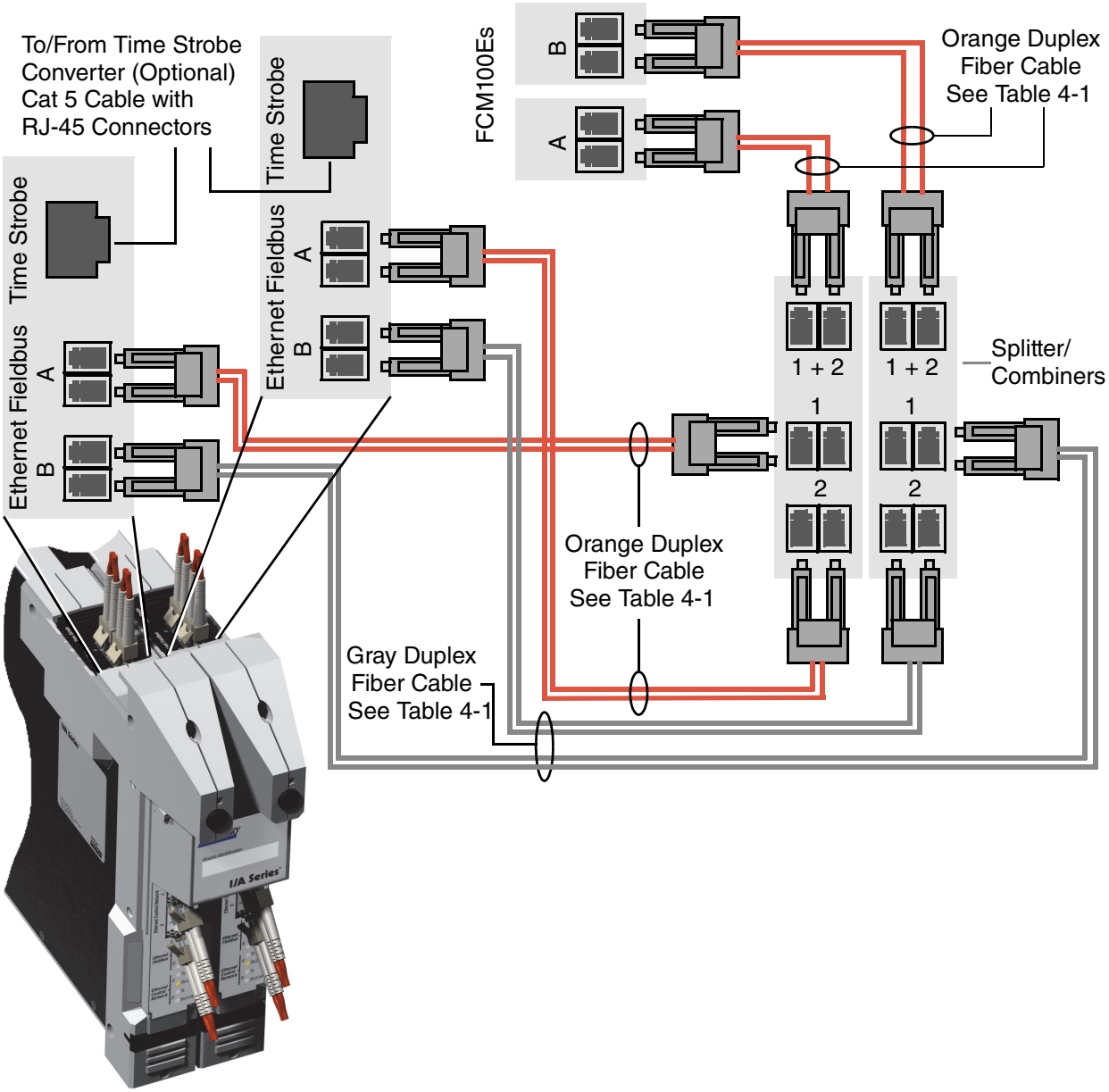


Figure 4-18. FCM100E to Splitter/Combiner to ZCP270 Cabling - Direct Connection - Wiring

Table 4-1. Cables for Connections between the Splitter/Combiners and the FCM100E/ZCP270

Part Number	Length	Material	Use
P0972UN	0.5 m (1.65 ft)	MMF 62.5/125 micron, gray riser. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to ZCP270. Recommended for use on the "B" network.
P0972VG	0.5 m (1.65 ft)	MMF 62.5/125 micron, orange riser. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to ZCP270. Recommended for use on the "A" network.
P0972UJ	1.0 m (3.3ft)	MMF 62.5/125 micron. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to ZCP270.
P0972TN	3.0 m (9.9 ft)	MMF 62.5/125 micron. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to ZCP270.
P0972TP	15 m (49.5 ft)	MMF 62.5/125 micron. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to FCM100E or ZCP270.
P0972TQ	50 m (164 ft)	MMF 62.5/125 micron. LC connectors on each end.	Fiber Optic Splitter mounted on DIN rail or shelf mounted to FCM100E or ZCP270.

After you have installed and cabled the FCM100E module, you need to assign their letterbugs through the infrared port using the I/A Series Letterbug Configurator. For information on using this device and procedures for assigning letterbugs, see the *Letterbug Configurator User's Guide* (B0700AY).

ZCP270 Connection to FCM100E via the Foxboro Evo Control Network

Refer to the "Installing a Single or Primary ZCP270 Module", "Cabling a Single (Non-Fault-Tolerant) ZCP270" and/or "Cabling a Fault-Tolerant ZCP270 Module Pair" sections in *Z-Module Control Processor 270 (ZCP270) User's Guide* (B0700AN) for instructions on connecting the ZCP270 to the control network.

Fiber optic connecting cables require a MTRJ connector on the Ethernet 100 Mbps switch and an LC connector on the FCM100E end. The maximum optical insertion loss though each connector must be equal to or less than 0.5 db. For the Ethernet equipment used in the control network, refer to *The MESH Control Network Architecture Guide* (B0700AZ).

After you have installed and cabled the FCM100E module, you need to assign their letterbugs through the infrared port using the I/A Series Letterbug Configurator. For information on using this device and procedures for assigning letterbugs, see the *Letterbug Configurator User's Guide* (B0700AY).

Cabling FCM100E Baseplate to Fieldbus Isolators (F1SFIA or F1SFIB)

Remote fieldbus extension cable connections are implemented as shown in Figure 4-19 and Figure 4-24.

To connect an FCM100E baseplate to the Fieldbus Isolators (F1SFIA or F1SFIB):

1. Referring to Figure 4-20, assemble the termination blocks associated with the termination cable assemblies (P0903VY) for the FCM100E Modular Baseplate, snap them onto the mounting rails (DIN rails) in the enclosure, and connect the ground wires. (For future reference, Figure 4-21 illustrates how to remove the TCA termination blocks.)
2. Connect the fieldbus splitter/terminator (P0926LC) to the "Fieldbus and Time Strobe" connector on the FCM100E baseplate (see Figure 4-19).
3. Make the cable connection(s) to the fieldbus splitter/terminator as shown in Figure 4-20.
4. Make the fieldbus cable connections between termination cable assemblies (see Figure 4-22).
5. Add the terminating resistors (supplied with the termination cable assemblies) according to the following rules:
   - Terminating resistors are used only at the ends of the bus.
   - The Fieldbus can be extended in two directions from the FCM100E. (Refer to Figure 4-24.)
6. Connect an insulated 14 AWG green wire between connection point 3 (shield) on the last Fieldbus Isolator termination cable assembly (or assemblies) and the earth bus in the enclosure. For Foxboro Evo system earthing requirements, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

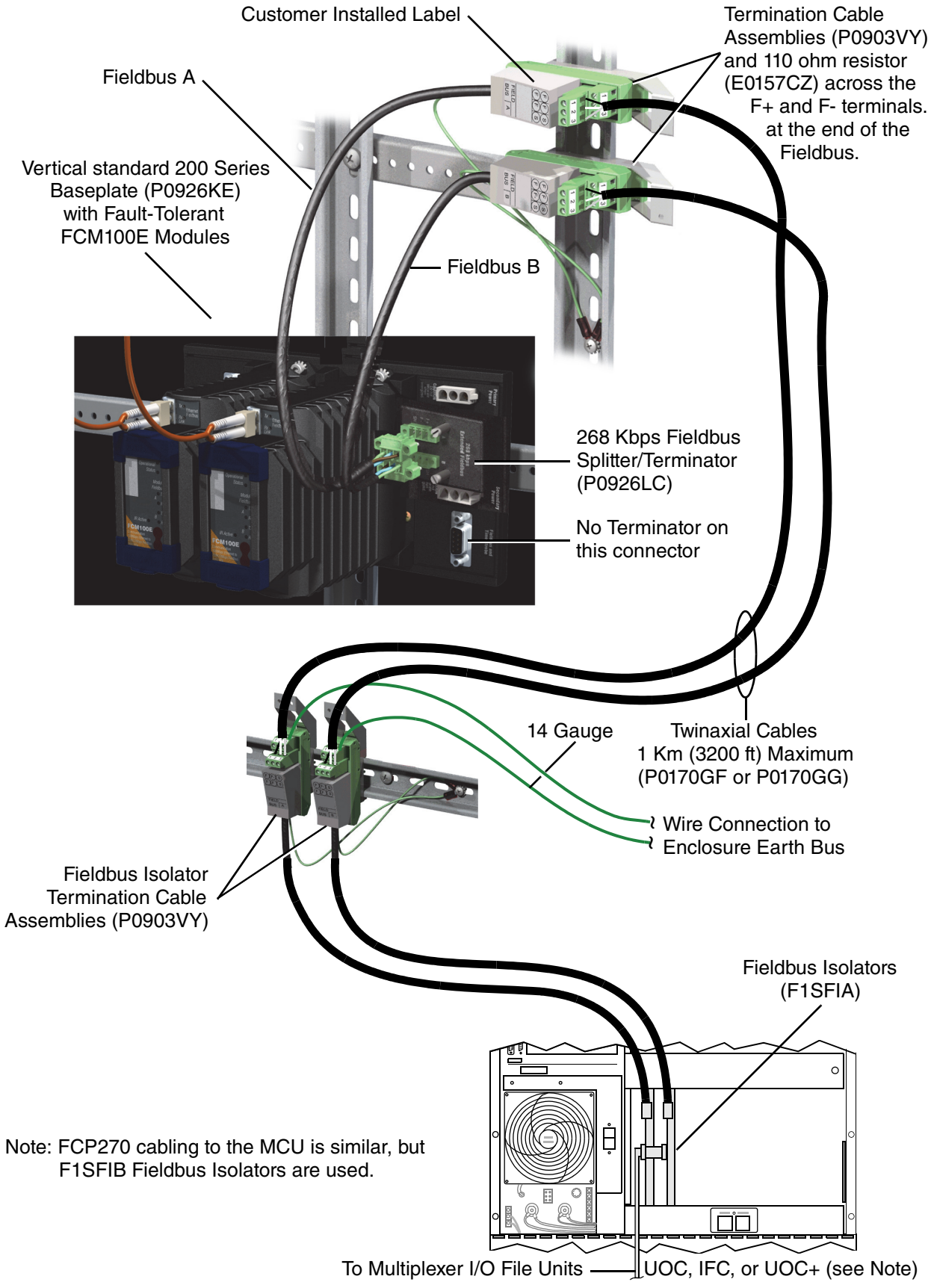


Figure 4-19. Cabling Fieldbus Isolator Cards to an FCM100E Baseplate

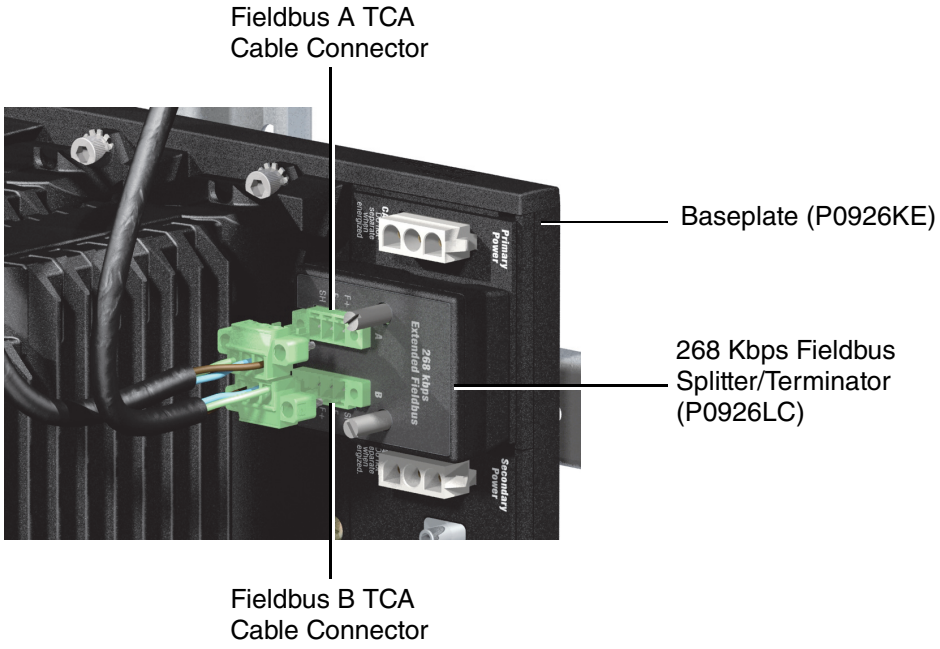


Figure 4-20. TCA Cable Connection to 268 Kbps Fieldbus Splitter/Terminator

1. Slide strain relief bracket onto TCA termination block.
2. Snap assembled termination block onto DIN rail.
3. Connect ground wire to DIN rail using screw, lock washer and nut (customer supplied).

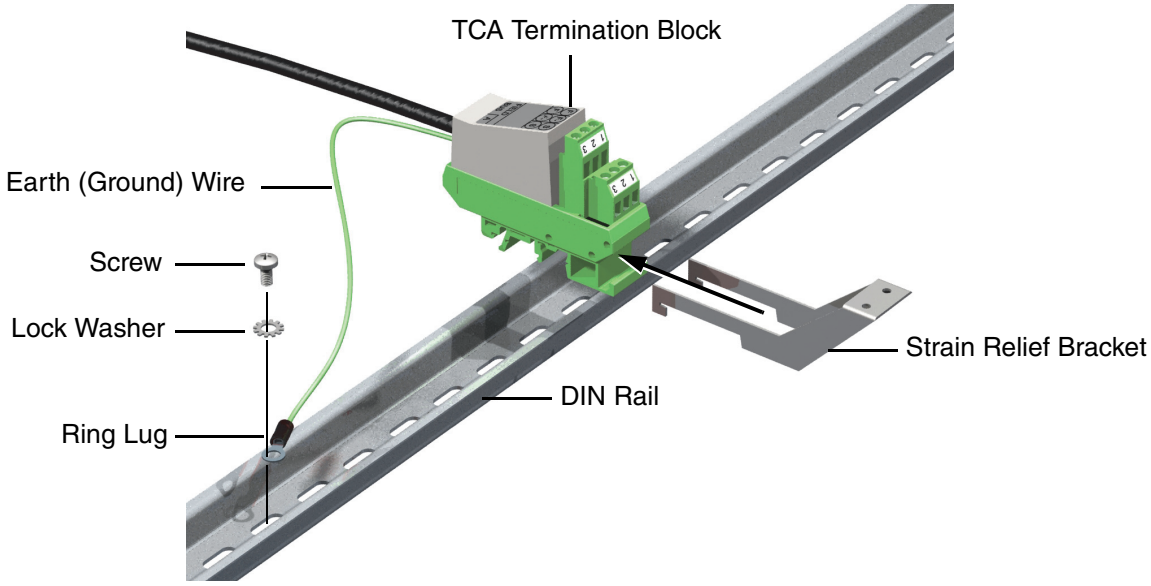


Figure 4-21. TCA Termination Block Assembly Mounting

1. Disconnect the earth wire from from the DIN rail.
2. Insert a medium-size flat-head screw driver as shown.
3. Move the screw drive handle in the direction shown, while lifting the TCA termination block from the DIN rail.

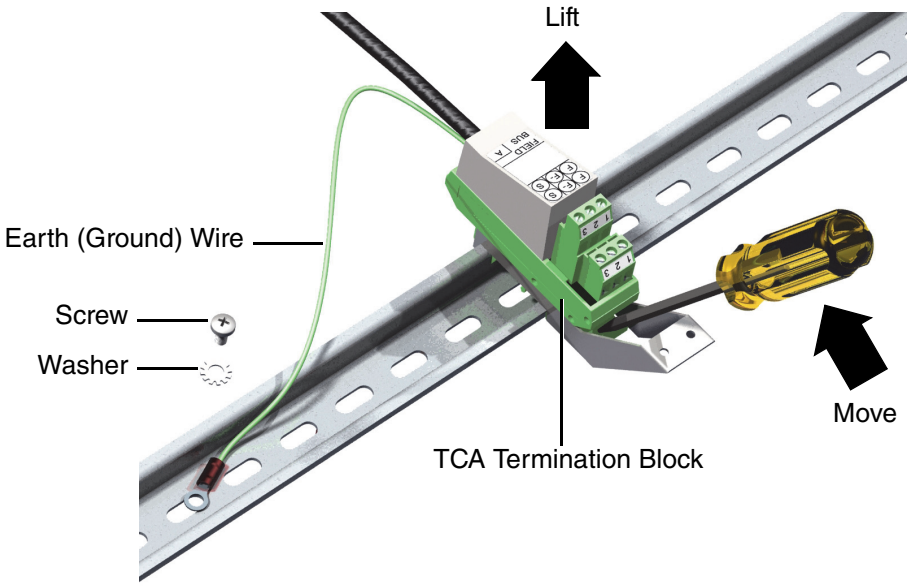
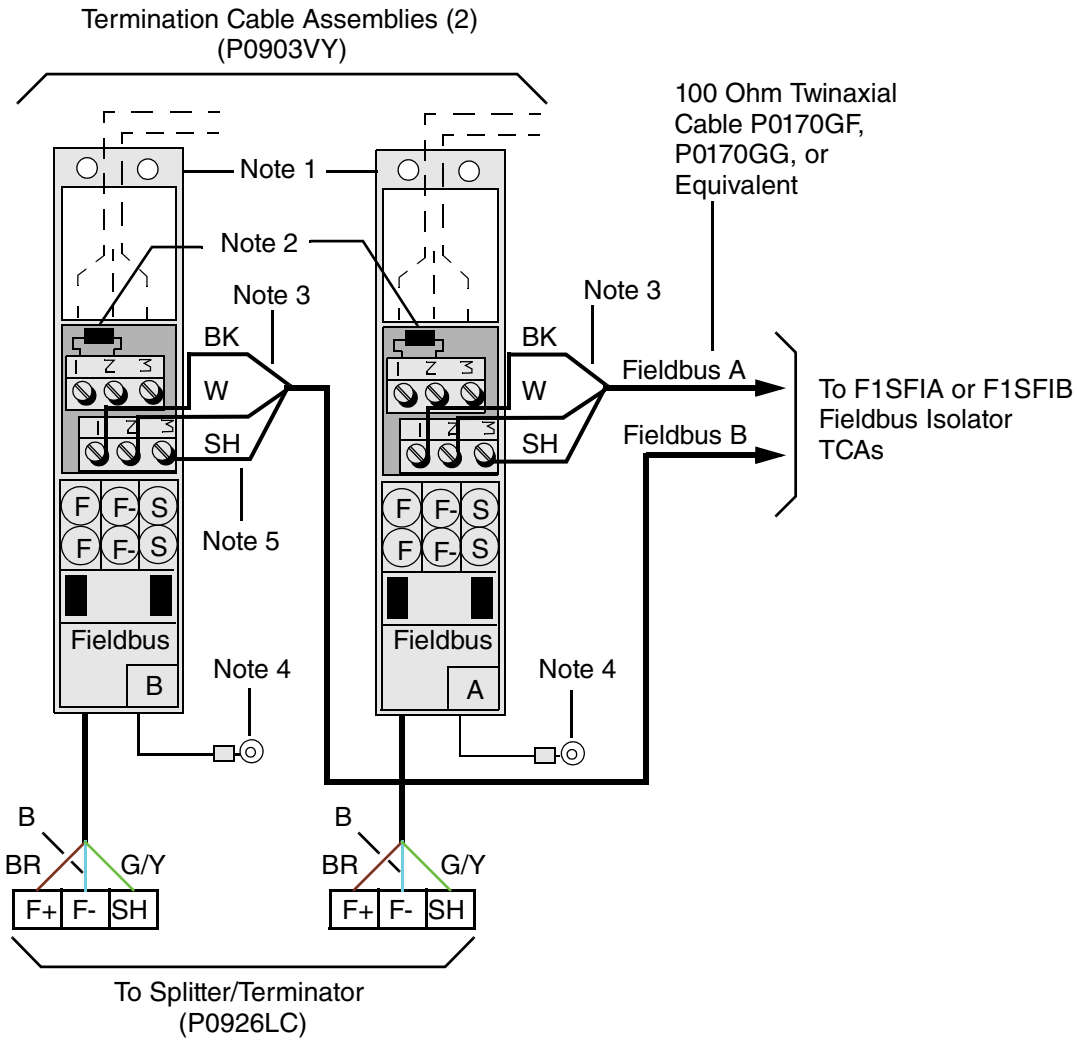


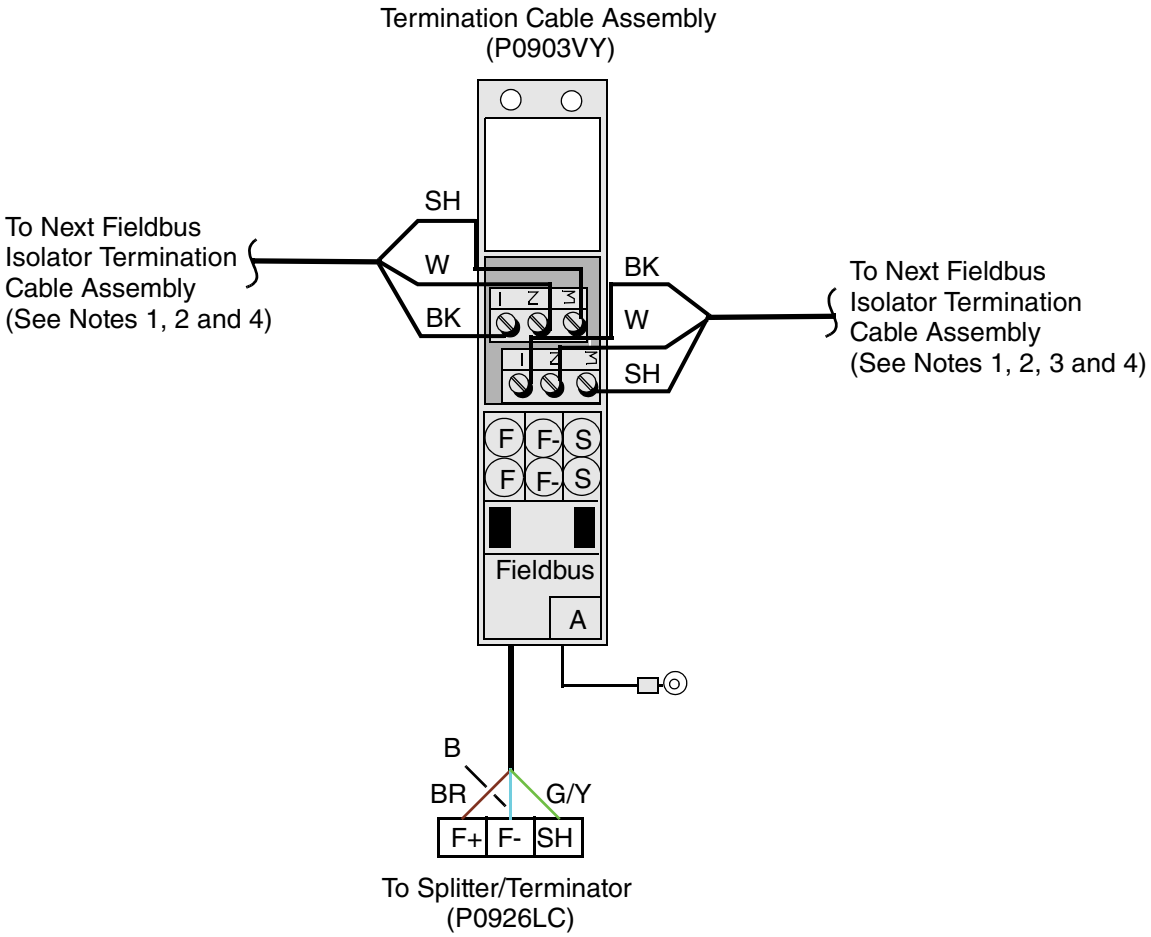
Figure 4-22. TCA Termination Block Removal



Notes:

1. For cable strain relief, it is recommended that the Fieldbus cable(s) be routed over the strain relief bracket and secured using nylon cables ties.
2. TCAs can be daisy chained as indicated by the dashed cable lines, but terminating resistors (110 ohms) must be installed at the ends of the fieldbus.
3. Wire colors shown (BK and W) are for reference purposes only.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).
5. The shield of the twinaxial cable (terminal 3) should be earthed at the farthest end from the FCM100E Modular Baseplate. The fieldbus shield must be earthed at one end only. (See text for earthing instructions.)

Figure 4-23. Remote Redundant Fieldbus Cabling (FCM100E End)



Notes:

1. Earth the shield (terminal 3) at the termination cable assembly farthest from the FCM100E Modular Baseplate.
2. Install terminating resistors at both ends of the extended fieldbus cable. For the last TCA in the fieldbus, install the termination resistor between terminals 1(F) and 2(F-) and the The earth (ground) wire (14 Gauge) must connect to terminal 3(S) as shown in Figure 4-19.
3. If this TCA is the last TCA in the fieldbus, the cable on this side of the TCA will not be added.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

Figure 4-24. Example of Extending Fieldbus in Two Directions from FCM100E

Fieldbus Cabling at the DCS Fieldbus Module Subsystem

Fieldbus cabling at the DCS Fieldbus Module subsystem involves making Fieldbus connections to the TCAs (P0903VY) associated with the F1SFIA or F1SFIB[2] Fieldbus Isolators. (Connection of the TCA cables to the Fieldbus Isolators is addressed later.) The following Fieldbus cabling procedure applies to all DCS Fieldbus Module subsystem applications (UOC, IFC, UOC+, or MCU).

NOTE

1. Connections at the DCS Fieldbus Module Subsystem are the same regardless of the type of Foxboro control processor is used (CP40 or higher).
2. The following procedure assumes that a redundant Fieldbus is being employed. If the installation in question uses a non-redundant Fieldbus, omit the Fieldbus B connections.

1. Using the hardware provided, install the DIN rail (P0931GC) in the equipment rack in question. The following figures indicate approximate positioning of the TCAs (and thus the DIN rails) in the equipment racks:

   UOC, IFC, UOC+ in Figure 2-2 (page 12).

   MCU in Figure 2-6 (page 18).

NOTE

Placement of the DIN rail in the rack is limited only by the length of the P0903VY TCA cable, which is 72 in (1829 mm).

2. Referring to Figure 4-4, assemble the TCA termination blocks, snap them onto the DIN rail, and connect the TCA earth wires.
3. Connect the Fieldbus A and B cables to the F1SFIA or F1SFIB Fieldbus Isolator TCAs, as shown in Figure 4-25.
4. If the TCAs in question are the last TCAs on the Fieldbus run:
   a. Add the 110 ohm terminating resistors (E0157EZ) packaged with the TCAs.
   b. Connect an insulated 14 AWG wire between connection point 3 (shield) on each of the last Fieldbus TCAs and the earth bus bar in the equipment rack.
5. Dress the Fieldbus cables (and 14 AWG earth wire, if applicable) for neatness and security.

[2] The model F1SFIA Fieldbus Isolator is used with the UOC, IFC, or UOC+; the model F1SFIB is used with the MCU.

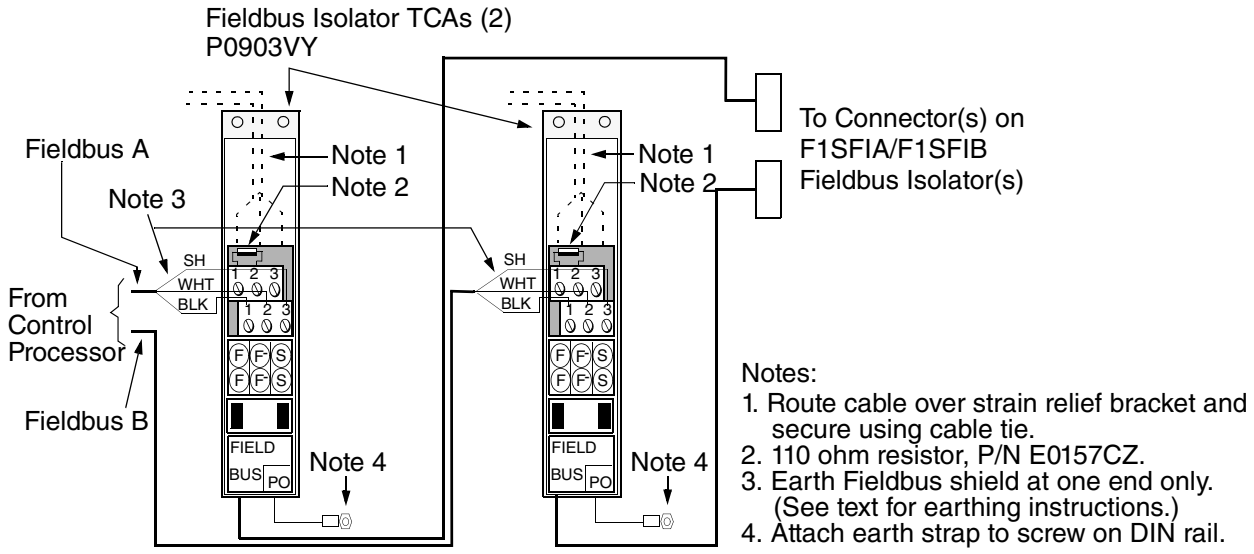


Figure 4-25. Fieldbus Cabling, DCS Fieldbus Module Subsystem

UOC, IFC, or UOC+ Migration Kit Installation

Installation procedures are provided below for installing the Migration Kit (P0914NT) while:

- Retaining the UOC/IFC/UOC+ controllers.
- Replacing the UOC/IFC/UOC+ controllers with redundant FBI100 modules, for use with the Field Control Processors FCP280 or FCP270. This is performed when either the controller has been upgraded to SR90/SRx Series or the original controller is to be removed and replaced with the FBI100 modules. This configuration may include Fisher PROVOX® Series 20 Control I/O Card Files and/or Multiplexer I/O File Units.

These configurations were discussed in "DCS Fieldbus Module Subsystem Implementation – UOC, IFC, or UOC+" on page 8.

Implementation 1 - Retaining the UOC, IFC, or UOC+ Controllers

⚠ CAUTION

The following procedure assumes that power has been removed from the equipment rack containing the UOC, IFC, or UOC+ to be upgraded. Before switching off power to the equipment rack, ensure that such action will not adversely affect the process.

To install the UOC/IFC/UOC+ Migration Kit (P0914NT) for existing controllers, proceed as follows:

1. Remove all circuit cards from the UOC, IFC, or UOC+ card file.
2. Install the migration kit label, P0903AN, in the approximate position shown in Figure 4-26.

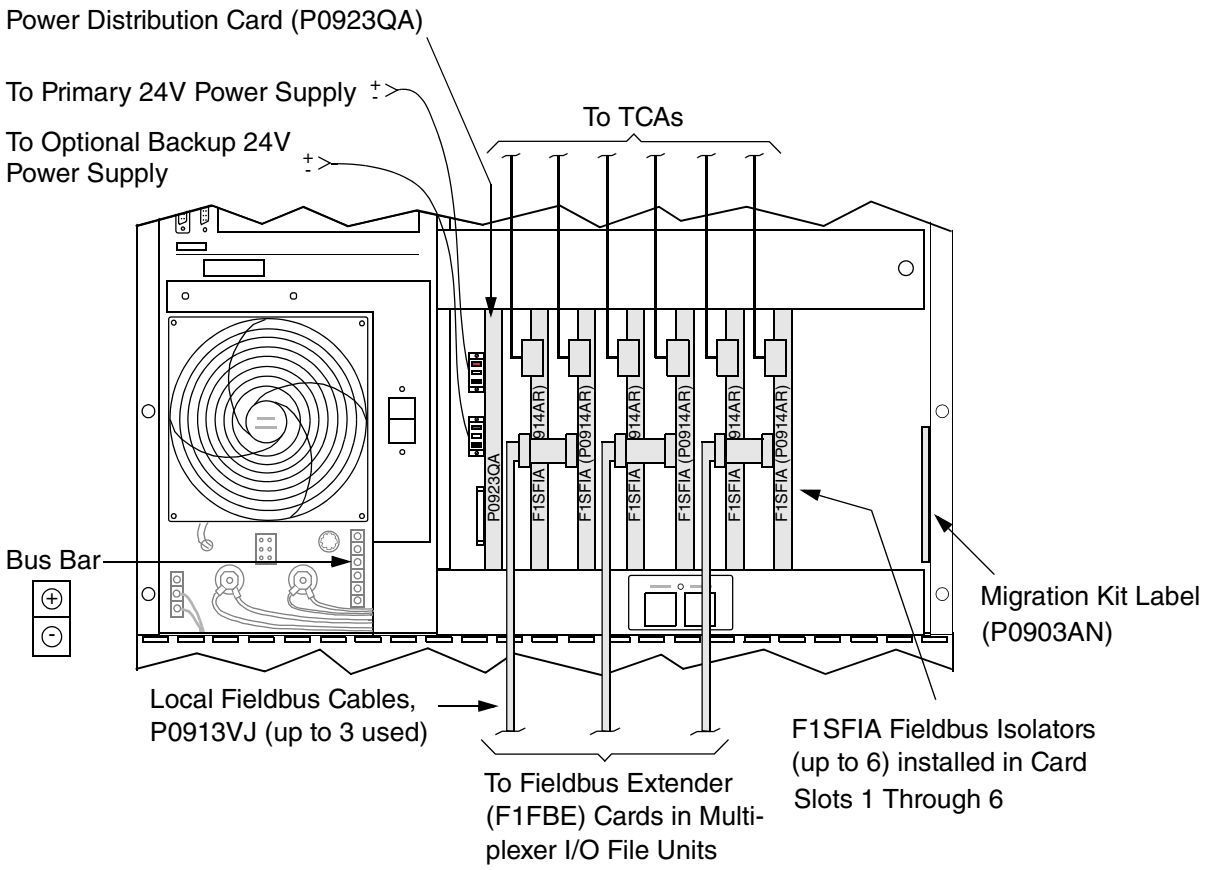
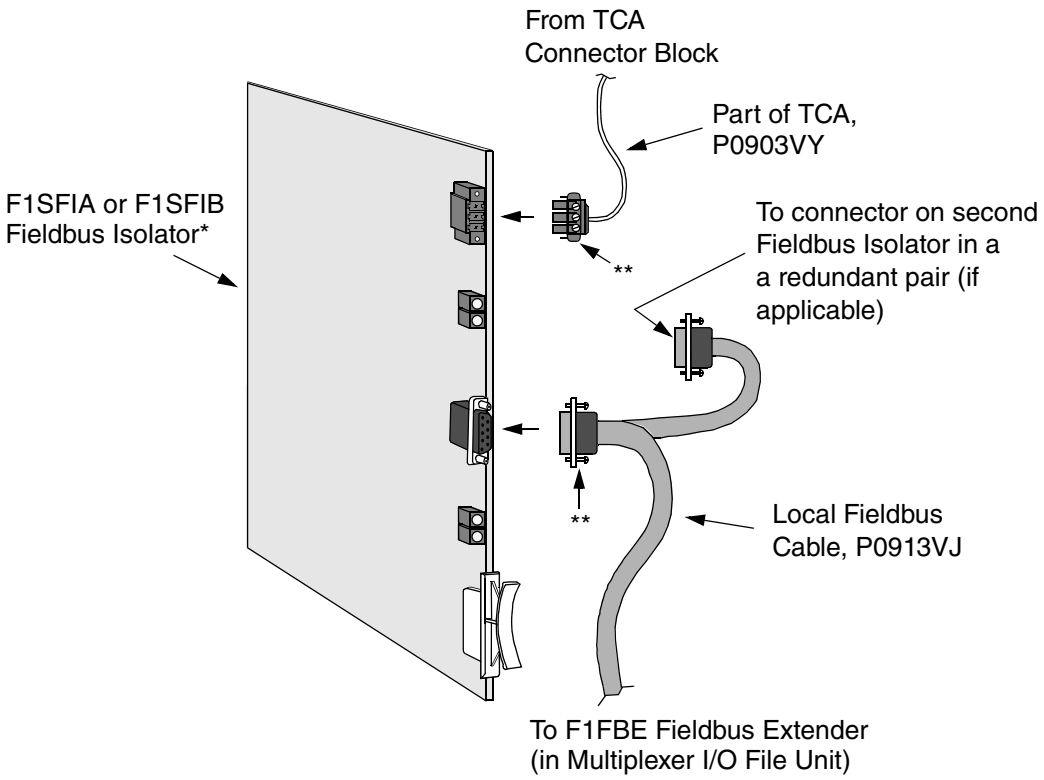


Figure 4-26. UOC, IFC, or UOC+, New Card Complement

3. Using the stick-on information label (P0913VM) provided, cover the original labeling on the swing-out card retainer (see Figure 4-26).
4. Install the F1SFIA Fieldbus Isolator(s) (P0914AR), using card slots 1 through 6.
5. Attach the Local Fieldbus cable(s) (P0913VJ) to the F1SFIA Fieldbus Isolator(s), as shown in Figure 4-26 and Figure 4-27.
6. Connect the TCA cable(s) to the F1SFIA Fieldbus Isolator(s) as shown in Figure 4-26 and Figure 4-27.
7. Install the general information ("Plugged In") labels (P0903YX) on the inside of the rack's front and rear doors. Install the labels directly below any existing labels or equipment name plate. The original descriptive name plate(s) should be removed to avoid maintenance confusion. If no name plates exist, place the labels at about eye level.
8. Go to "Final Installation Operations" on page 90.



*Fieldbus Isolator Models F1SFIA and F1SFIB differ slightly in appearance, but the cable connections are identical.
**Secure cable connectors to receptacles using captive screws.

Figure 4-27. Cable Connections to Fieldbus Isolator

Implementation 2 - Replacing the UOC, IFC, or UOC+ Controllers with FBI100

A pair of redundant FBI100s can replace each pair of F1SFIA Fieldbus Isolators. You will require space for up to three FBI100 baseplates in place of the UOC, IFC, or UOC+ controller. Refer to *Standard 200 Series Baseplates* (PSS 31H-2SBASEPLT) for the dimensions of the vertically mounted FBI100 2-position baseplate (P0923LR). In this implementation, the Control Processor can connect to either Multiplexer I/O file units or Fisher PROVOX® Series 20 Control I/O Card Files. The Control Processor can also connect to both using one of two configurations:

- CP in the Middle - The Termination Cable Assembly (TCA) on the CP side of the Fieldbus connects to both the FBI100s and the Series 20 Control I/O Card Files.
- CP at the End - The TCA on the Series 20 Control I/O Card File side of the Fieldbus daisy-chains connections to the FBI100s.

NOTE

The Series 20 Control I/O card file is discussed in *DCS Fieldbus Modules for Fisher PROVOX® Series 20 Systems User's Guide* (B0193YV).

⚠ CAUTION

The following procedure assumes that power has been removed from the equipment rack containing the UOC, IFC, or UOC+ to be upgraded. Before switching off power to the equipment rack, ensure that such action will not adversely affect the process.

To install the UOC/IFC/UOC+ Migration Kit (P0914NT) to replace existing controllers, proceed as follows:

1. Remove the UOC, IFC, or UOC+ card file controllers.
2. Mount up to three FBI100 baseplates as needed, using the Baseplate Mounting Bracket from kit P0926TL to mount one baseplate and/or the Baseplate Mounting Bracket from kit P0926ZZ to mount two baseplates.
   a. To mount a single FBI100 baseplate, use Baseplate Mounting Bracket (P0922XE, shown in Figure 4-28) from kit P0926TL. Attach the bracket to the back of the baseplate using the hardware supplied in the kit. Then, bolt the mounting bracket flange to the rail running vertically along the front edge of the enclosure's side, closest to the door. The bracket may be installed on either the left or right side of the enclosure.

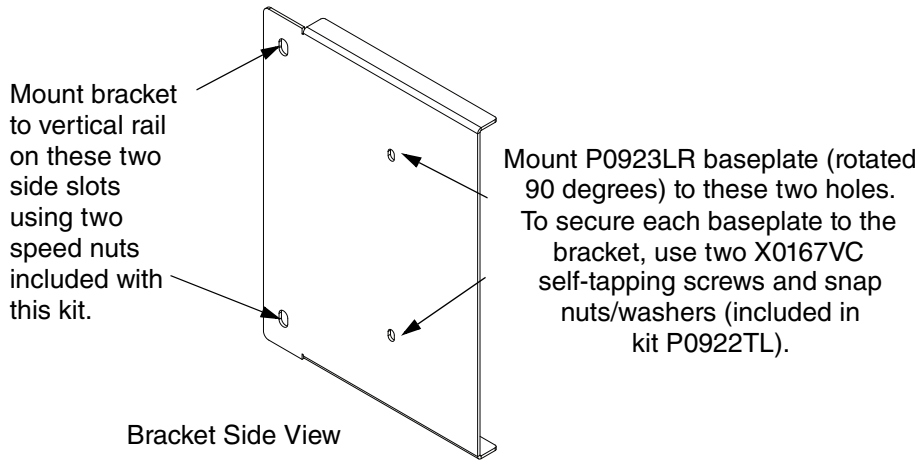


Figure 4-28. Baseplate Mounting Bracket for One Baseplate (Kit P0922TL Shown)

   b. To mount two FBI100 baseplates, use the Baseplate Mounting Bracket (P0918XX, shown in Figure 4-29) from kit P0926ZZ. Install the bracket where space permits, either in the existing 19" rack or in an additional controller/network cabinet provided as part of your project.

Two FBI100 baseplates (P0923LR) may be mounted per P0918XX bracket (from kit P0926ZZ). Each baseplate will hang over or under the bracket. See heights below. To secure each baseplate to the bracket, use two X0167VC self-tapping screws and self-tapping screws and snap nuts/washers (included in kit P0926ZZ).

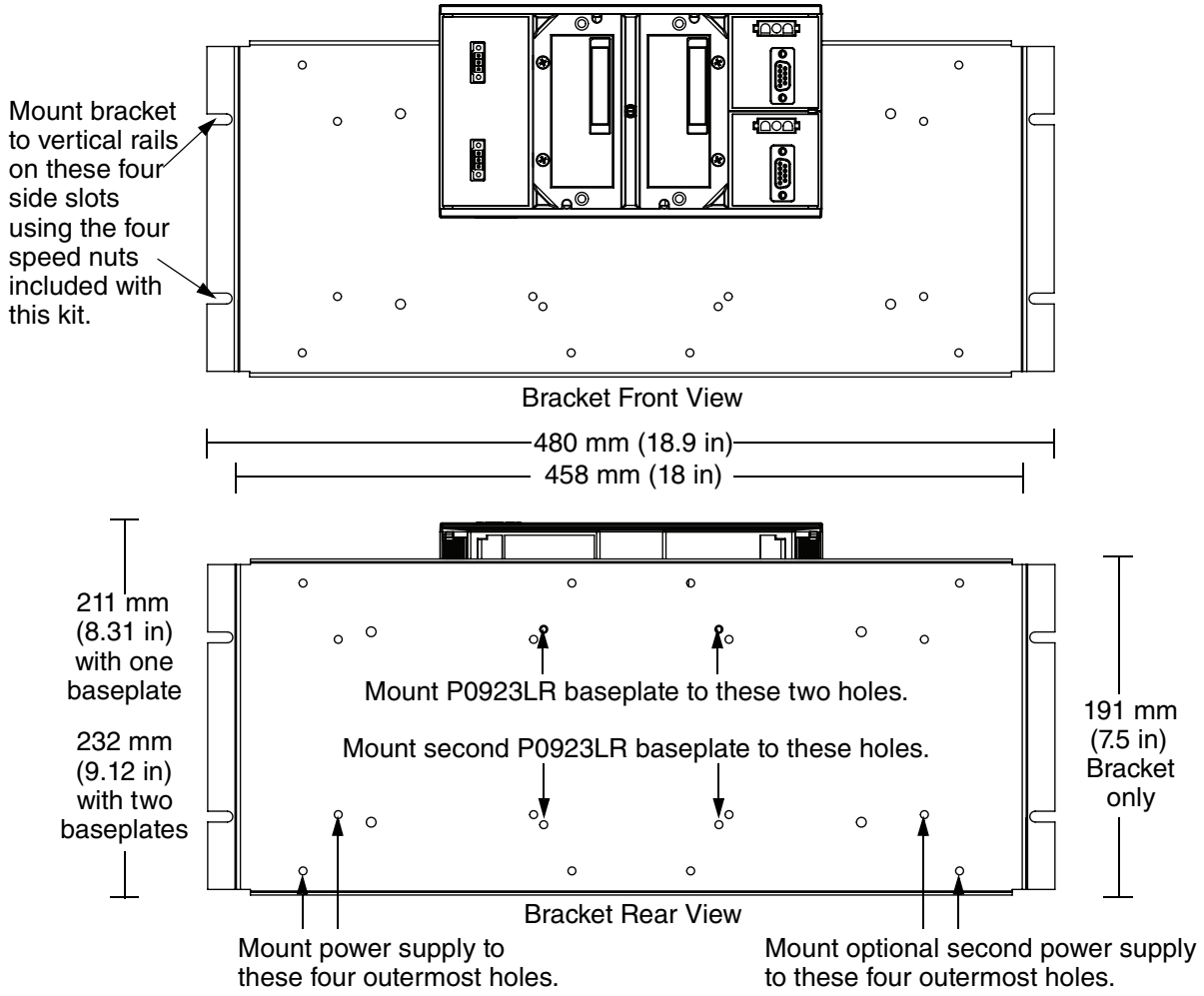


Figure 4-29. Baseplate Mounting Bracket for Two Baseplates (Kit P0926ZZ Shown)

3. Install the migration kit label, P0903AN, on the FBI100 baseplates (P0923LR) in the approximate position shown in Figure 4-30.

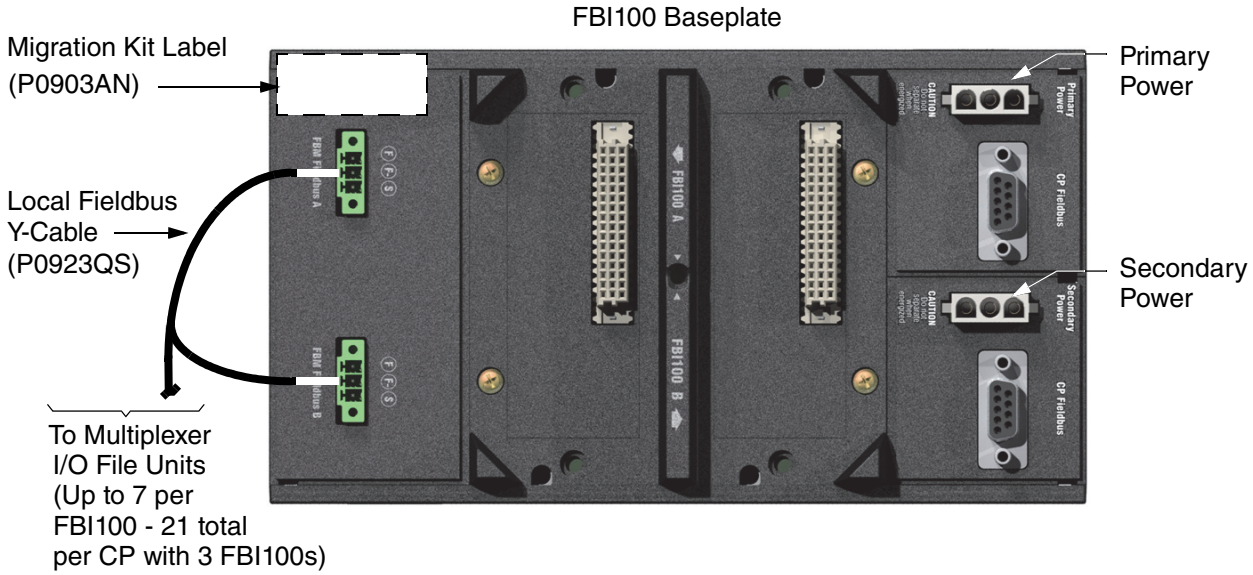


Figure 4-30. Installing Label on FBI100 Baseplate (P0923LR)

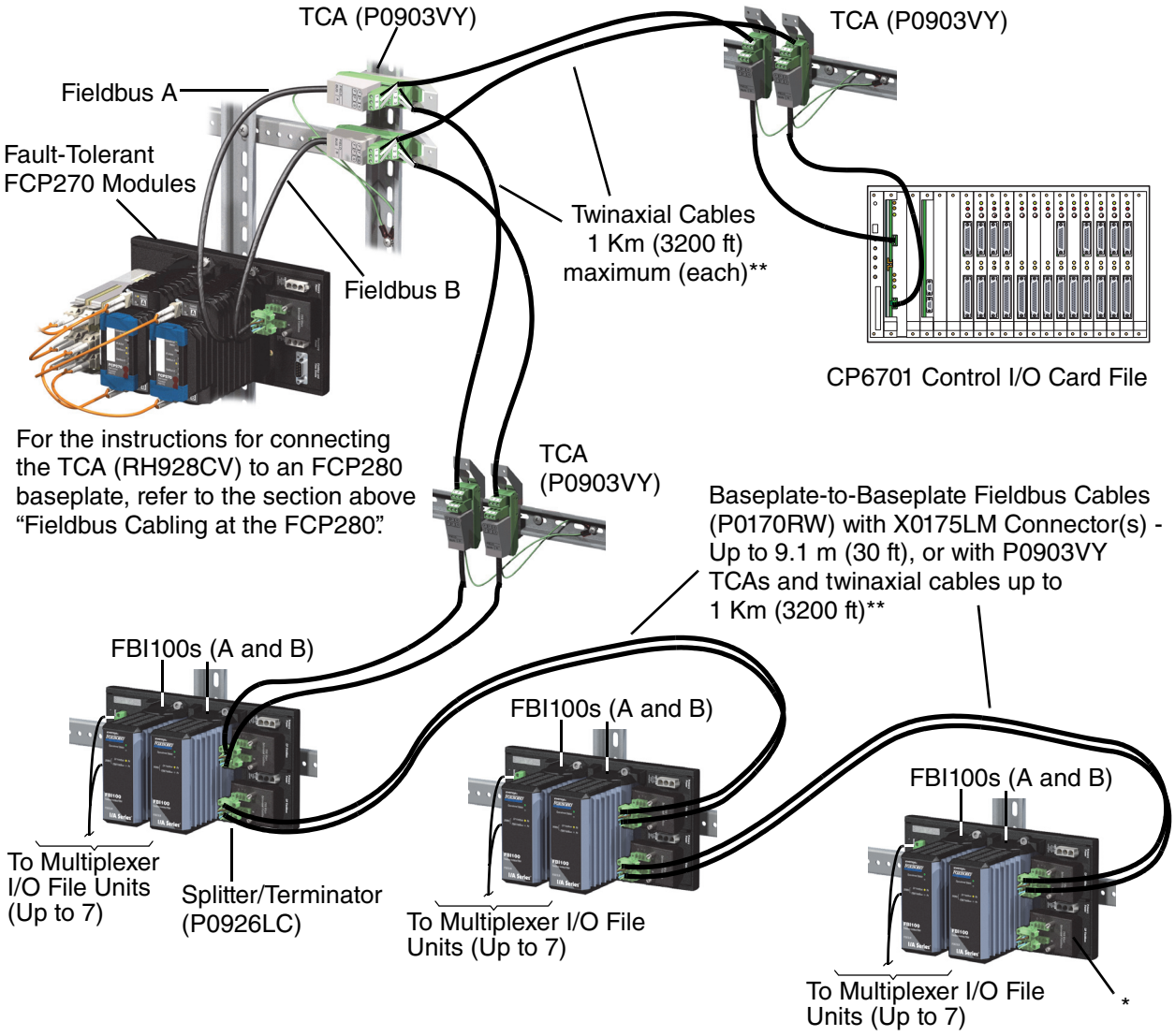
4. Mount the FBI100 baseplates on the Baseplate Mounting Bracket on the points indicated in Figure 4-29, as discussed in "DIN Rail Mounting of the Vertical Baseplate" in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). Note that the baseplate will hang over the top or bottom bracket by the dimensions indicated in Figure 4-29.
5. Install the redundant FBI100 Fieldbus Isolator(s) (P0923LN) in the baseplate as discussed in "Module Installation and Placement" in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).
6. Attach the Local Fieldbus cable(s) (P0923QS) to the FBI100 baseplate, as shown in Figure 4-30.
7. Assemble the FBI100 baseplate-to-baseplate cables (P0170RW) as required. For FBI100 baseplate to baseplate connections under 9.1 m (30 ft), attach a connector (X0175LM) to each end (two connectors total) of each P0170RW cable. For FBI100 baseplate to baseplate connections >9.1 m (30 ft), attach one connector (X0175LM) to one end of each P0170RW cable.
   Connect the brown, blue and white cables contained within the P0170RW cable to the appropriate points in the X0175LM connector. Connect brown to F+, blue to F- and white to SH, as shown in Figure 4-36 on page 77.

Separate directions are provided below depending on the configuration you are using:

- CP in the Middle Configuration - Supports Multiplexer I/O file units, Series 20 Control I/O Card Files, or both
- CP at the End Configuration - Supports Multiplexer I/O file units and Series 20 Control I/O Card Files

Installation for CP in the Middle Configuration

The CP in the Middle Configuration supports Multiplexer I/O file units, Series 20 Control I/O Card Files (a legacy 268 Kbps subsystem), or both, connected to a pair of redundant FCP280s or FCP270s through the TCA of the FCP280 or FCP270 side of the Fieldbus, as shown in Figure 4-31. Be aware that the Series 20 subsystem in Figure 4-31 is a legacy subsystem which communicates over the HDLC fieldbus at 268 Kbps. For Series 20 standard subsystem wiring, which uses 2 Mbps HDLC communications, refer to *DCS Fieldbus Modules for Fisher PROVOX Series 20 Systems User's Guide* (B0193YV).



* If this is last FBI100 baseplate in Fieldbus, this connector is terminated with the Terminator P0923QU installed on a Splitter/Terminator P0926LC.

** The total length of the Fieldbus from the FCP280/FCP270-side TCA to the last FBI100 or Control I/O Card File is 1 Km (3200 ft). The total length of the twinaxial cables and the Baseplate-to-Baseplate Fieldbus Cables cannot exceed this maximum length.

Figure 4-31. CP in the Middle Configuration - Legacy 268 Kbps Implementation

Continue as described below to connect this equipment in a CP in the Middle configuration:

1. For the FCP280, connect the Fieldbus splitter (RH928CV) to any (planned) Fieldbus port on the FCP280 baseplate, as described in "Fieldbus Cabling at the FCP280" on page 41. When Fieldbus ports on the FCP280 baseplate connect to the 268 Kbps fieldbus, they may only connect to 100 Series or similar modules exclusively - no 200 Series modules may be also connected to the same fieldbus for that Fieldbus port.

   For the FCP270, connect the Fieldbus Splitter/Terminator (P0926LC) to the first "Fieldbus and Time Strobe" 9-pin connector on the FCP270 baseplate (see Figure 4-20 on page 59 and Figure 4-32 below). Tighten the two retaining screws.
2. Referring to Figure 4-20 on page 59, assemble the termination blocks associated with the termination cable assemblies (RH928CV (for FCP280) or P0903VY (for FCP270)) for the FCP280 or FCP270 baseplate, snap them onto the mounting rails (DIN rails) in the enclosure, and connect the ground wires. (For future reference, Figure 4-13 on page 49 illustrates how to remove the TCA termination blocks.)
3. Make cable connection(s) as follows:
   - For the FCP280, to connect the TCA cable to this port with the Fieldbus splitter (RH928CV) (see Figure 4-6 on page 43).
   - For the FCP270, connect its 268 Kbps Fieldbus Splitter/Terminator as shown in Figure 4-20 on page 59.
4. Make the fieldbus cable connections between termination cable assemblies. Refer to:
   - Figure 4-22 on page 60 and Figure 4-32 below for overall installation requirements.
   - Figure 4-33 below for cabling interconnections to the FCP280's or FCP270's TCA. Be aware that these interconnections vary depending on either you are connecting to the Series 20 Control I/O card files, the FBI100s, or both.
5. Install termination resistor E0157CZ to the end of the extended 268 Kbps Fieldbus as shown in Figure 4-32.
6. Connect an insulated 14 AWG green wire between connection point 3 (shield) on the last Fieldbus Isolator termination cable assembly (or assemblies) and the earth bus in the enclosure. For Foxboro Evo system earthing requirements, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).
7. If you are planning to connect the Series 20 Control I/O card files to the FCP270 baseplate, connect the Fieldbus Isolator termination cable assemblies to the F2SFBI Fieldbus Isolator cards on the card files as shown in Figure 4-32.
   As mentioned above, F2SFBI Fieldbus Isolator cards are part of the legacy version of the Series 20 subsystem, which communicates over the HDLC fieldbus at 268 Kbps, the same as other 100 Series competitive migration modules. The current Series 20 subsystem, which uses F2DFBIs Fieldbus Isolator cards and communicates over a 2 Mbps HDLC fieldbus, is discussed in *DCS Fieldbus Modules for Fisher PROVOX Series 20 Systems User's Guide* (B0193YV).
8. For the FCP280, the connection is similar to how it is shown in Figure 4-32, however, refer to "Fieldbus Cabling at the FCP280" on page 41 for instructions on connecting the Fieldbus splitter (RH928CV) to the FCP280 baseplate.

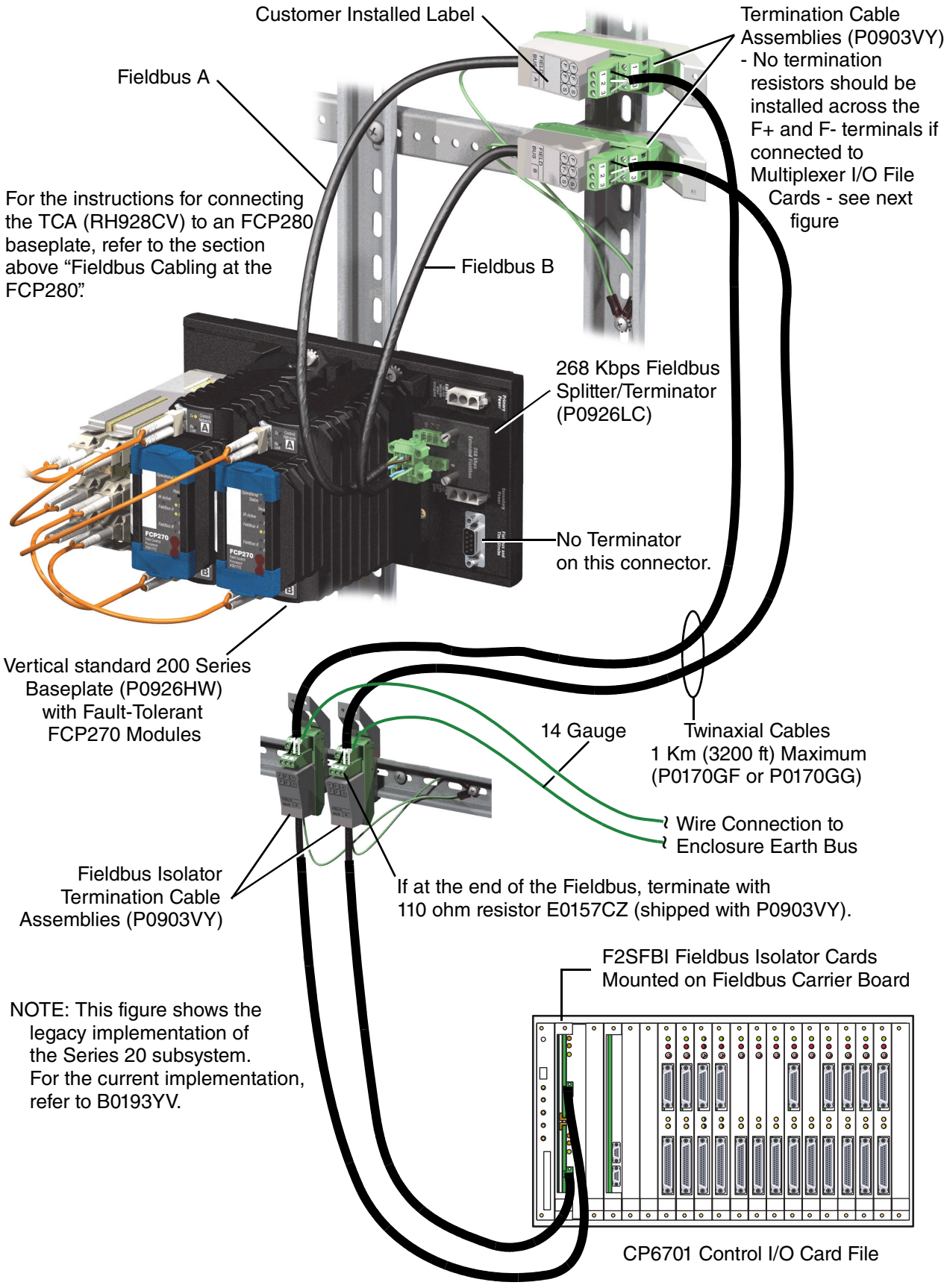
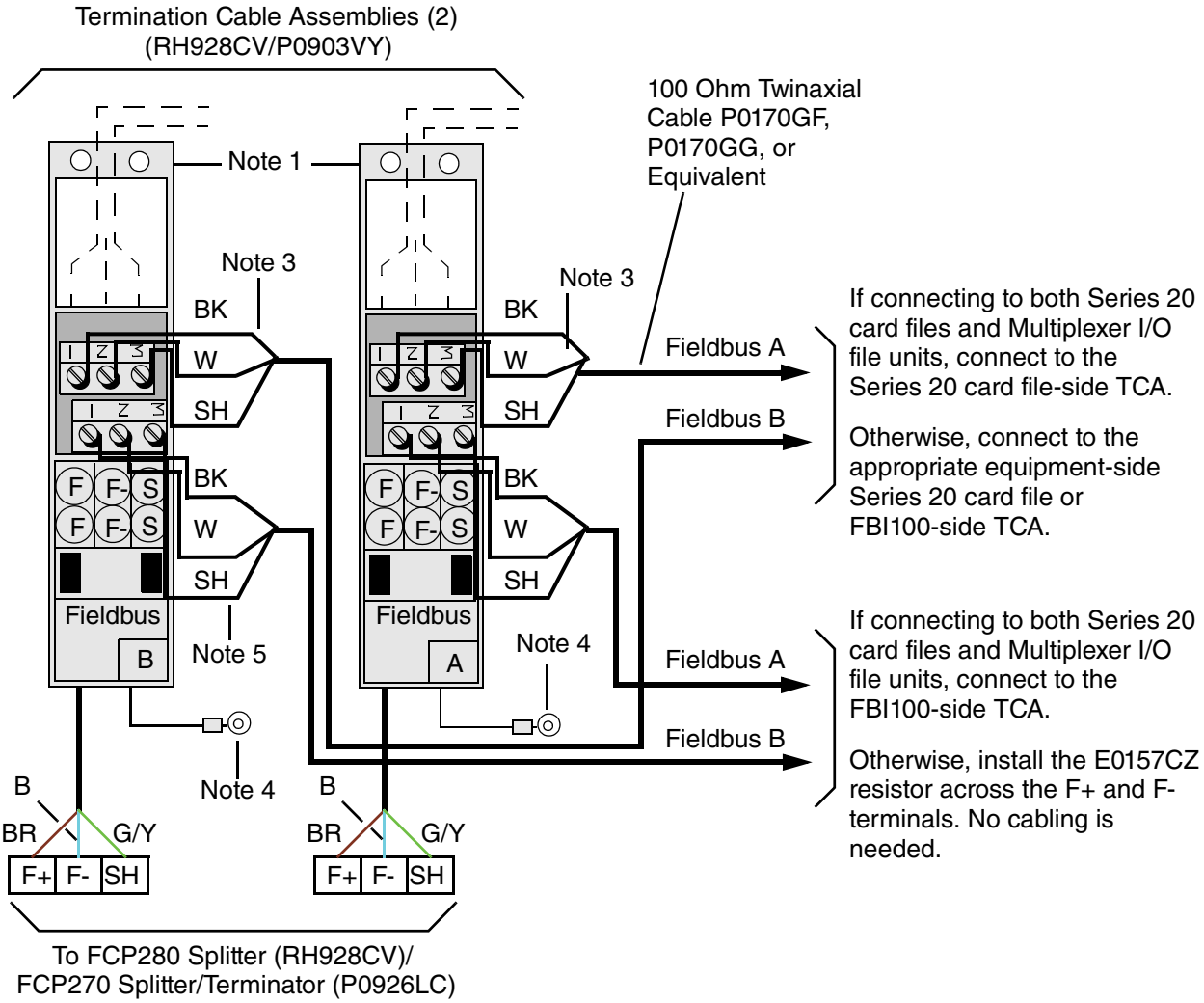


Figure 4-32. Cabling 268 Kbps Fieldbus Isolator Cards to an FCP270 Baseplate (CP in the Middle)



Notes:

1. For cable strain relief, it is recommended that the Fieldbus cable(s) be routed over the strain relief bracket and secured using nylon cables ties.
2. TCAs can be daisy chained as indicated. However, for the FCP280, terminating resistors (110 ohms) must be installed on the Fieldbus Isolator TCA end of the fieldbus, and the baseplate I.D. switches on the FCP280's baseplate must be set properly to terminate the fieldbus at the FCP280 end. For the FCP270, terminating resistors (110 ohms) must be installed at the ends of the fieldbus.
3. Wire colors shown (BK and W) are for reference purposes only.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU). Splitter (RH928CV) has only one green earth wire.
5. The shield of the twinaxial cable (terminal 3) should be earthed at the farthest end from the FCP280 or FCP270 Modular Baseplate. The fieldbus shield must be earthed at one end only. (See text for earthing instructions.)

Figure 4-33. FCP280 or FCP270-End TCA Connections (CP in the Middle)

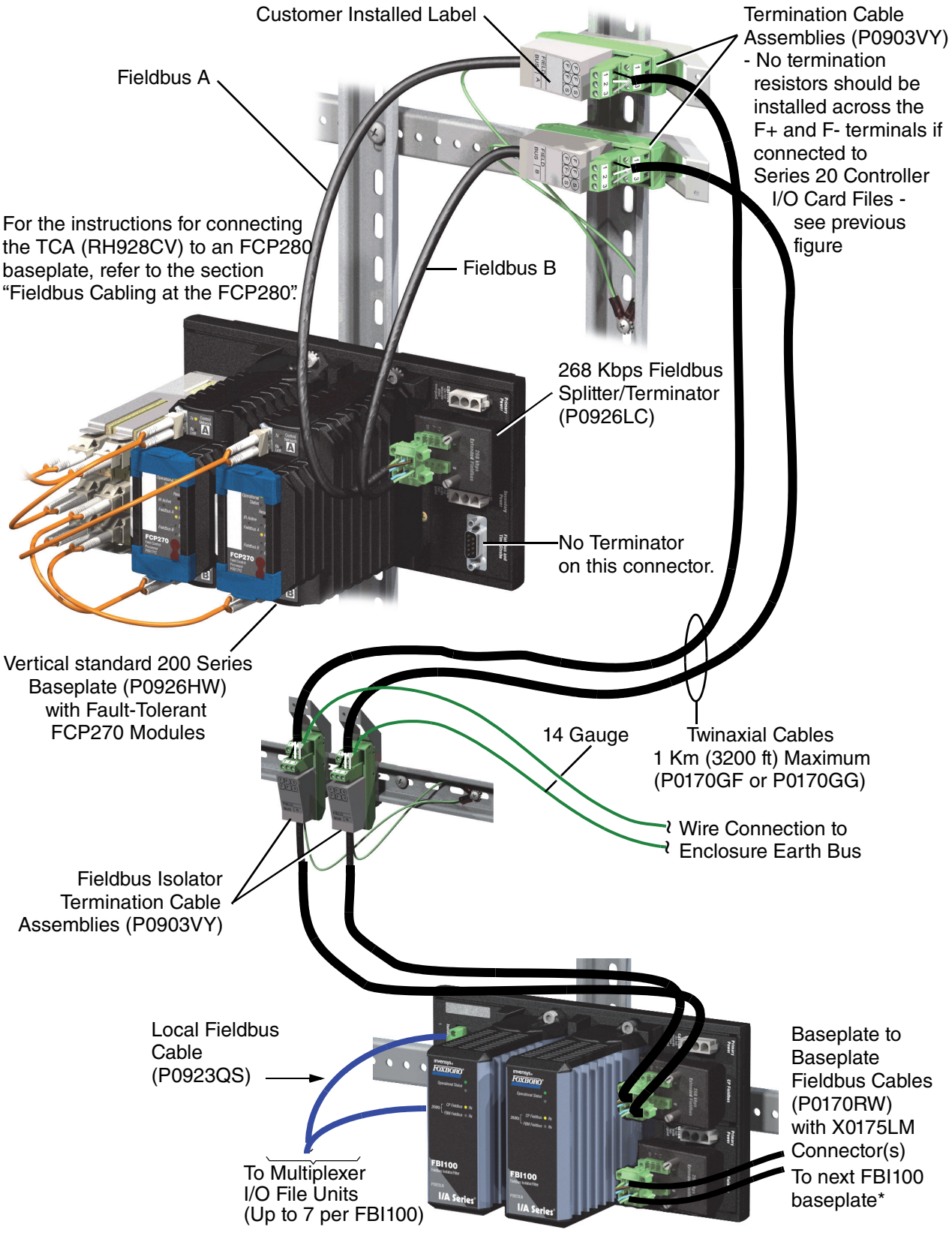
9. If you are planning to connect the Multiplexer I/O file units to the FCP280 or FCP270 baseplate via the FBI100s as well, proceed as follows:

a. For the FCP280, the connection is similar to how it is shown in Figure 4-34, however, the TCAs must be connected to the Fieldbus splitter (RH928CV) on any of the Fieldbus ports on the FCP280 baseplate. Refer to "Fieldbus Cabling at the FCP280" on page 41 for instructions on connecting the TCAs to the appropriate splitter to the FCP280 baseplate.

For the FCP270, connect the Fieldbus Isolator termination cable assemblies (TCAs) to the 268 Kbps Fieldbus splitter/terminator (P0926LC) on the first "CP Fieldbus" connector in the FBI100 baseplate (P0923LR) as shown in Figure 4-35.

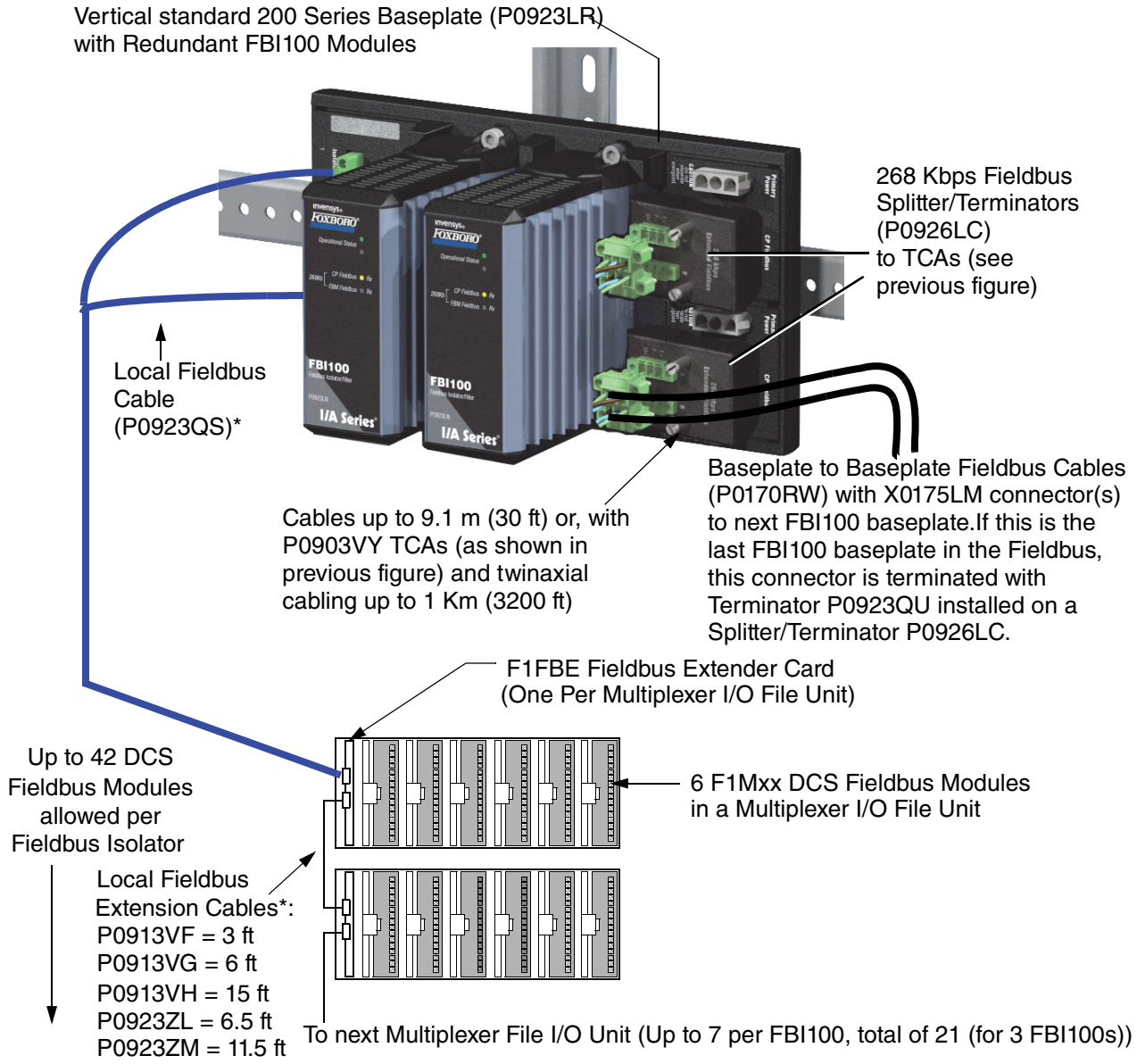
b. If this FBI100 baseplate is connected to another FBI100 baseplate further down the chain, connect the 268 Kbps Fieldbus Splitter/Terminator on the second "CP Fieldbus" connector on this baseplate to the Splitter/Terminator on the first "CP Fieldbus" connector on the next baseplate using two Baseplate-to-Baseplate Fieldbus cables (P0170RW) with X0175LM connectors, one cable for A bus and one for B bus. This cable has a customer-specified length of up to 9.1 m (30 ft). If the distance between the baseplates exceeds 9.1 m (30 ft), then install a pair of P0903VY termination cable assemblies (two per baseplate) within 9.1 m (30 ft) of each baseplate. Connect the X0175LM connectors on the two Baseplate-to-Baseplate Fieldbus cables (P0170RW) onto the Splitter/Terminators for each baseplate as discussed above, and connect the other end of each cable to the P0903VY TCAs. Connect the TCAs for both A and B Fieldbuses with twinaxial cable (at the appropriate length) to extend the Fieldbus between the baseplates, as shown in Figure 4-34.
Refer to Figure 4-36 on page 77 for Splitter/Combiner cabling connection details.
If this baseplate is the last in the chain, attach terminator P0923QU to the 268 Kbps Fieldbus Splitter/Terminator in the second "CP Fieldbus" connector to terminate the Fieldbus.

c. Connect the local Fieldbus cable (P0923QS) from the "FBM Fieldbus A and B" connectors on each FBI100 baseplate to the F1FBE Fieldbus Extender card in the first (or last) Multiplexer I/O file unit closest to the FBI100 baseplate, as the P0923QS has a maximum length of 1.8 m (6 ft). This is shown in Figure 4-35.



* If this is last FBI100 baseplate in Fieldbus, this connector is terminated with the Terminator P0923QU installed on a Splitter/Terminator P0926LC.

Figure 4-34. Cabling FBI100s to an FCP270 Baseplate (CP in the Middle) - Similar for FCP280



*Total Local Fieldbus length (Local Fieldbus cable and multiple extension cables) may not exceed 9 m (30 ft). It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

Figure 4-35. Cabling FCP270 Baseplate to Multiplexer I/O File Units via FBI100 Baseplate

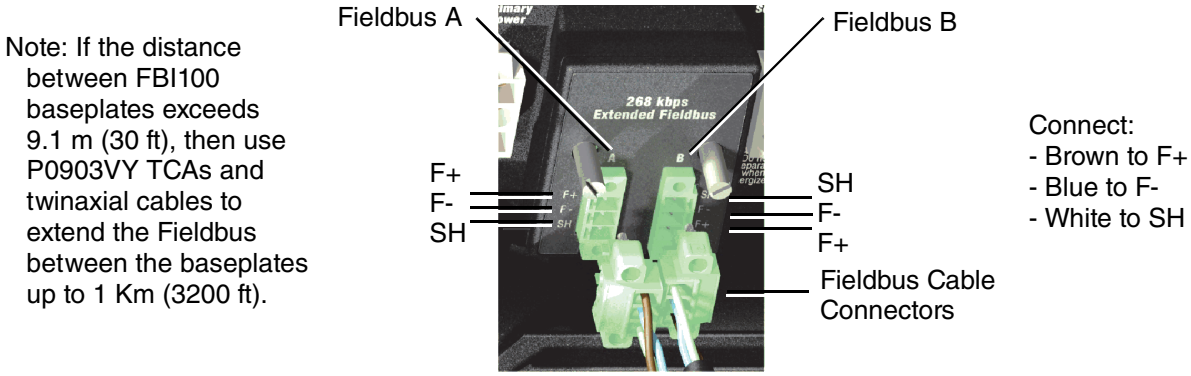
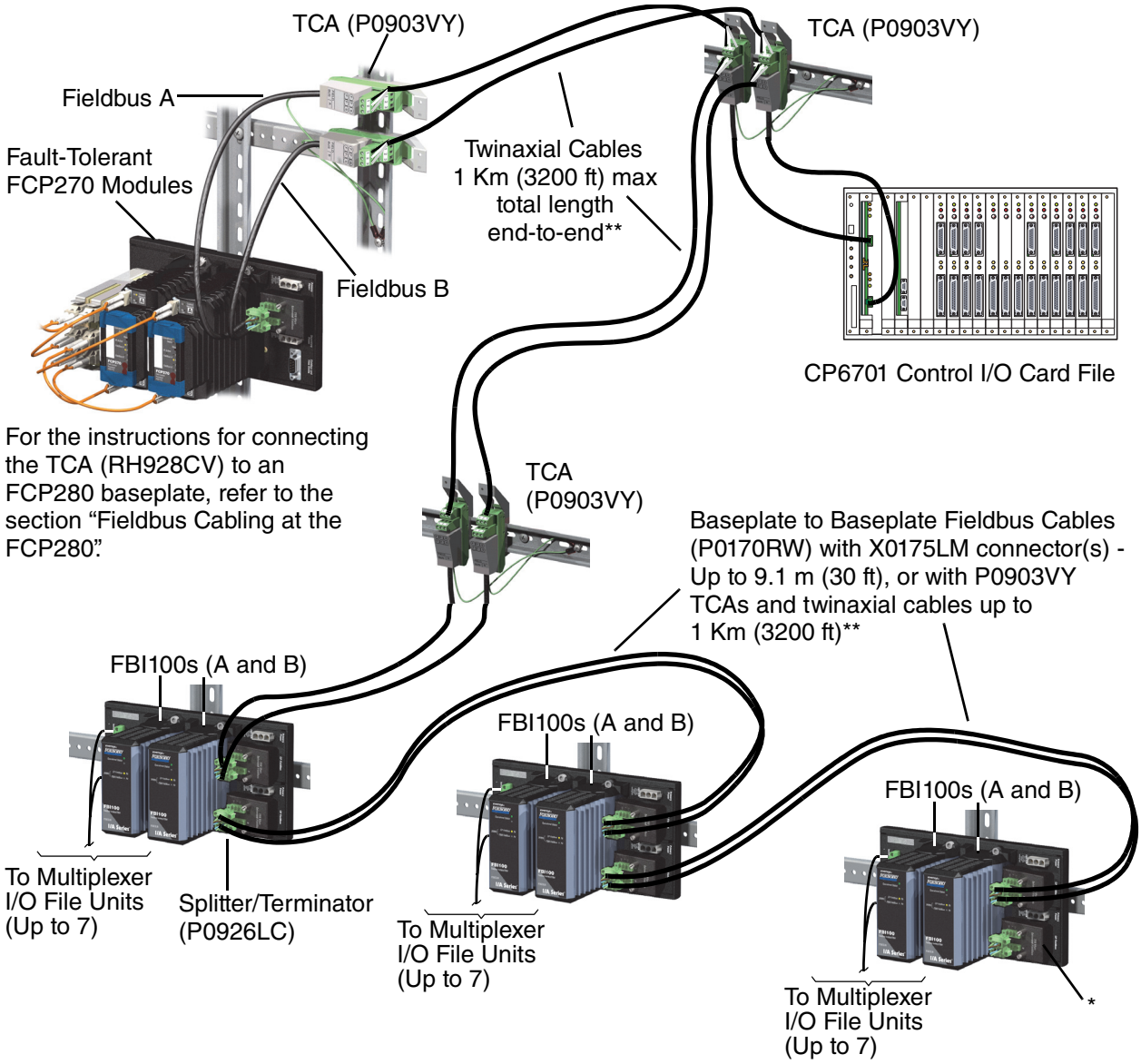


Figure 4-36. 268 Kbps Fieldbus Terminator/Splitter (P0926LC), Fieldbus Connections

10. Attach all baseplate power cables (primary and secondary) to their appropriate baseplates.
11. Install the general information ("Plugged In") labels (P0903YX) on the inside of the rack's front and rear doors. Install the labels directly below any existing labels or equipment name plate. The original descriptive name plate(s) should be removed to avoid maintenance confusion. If no name plates exist, place the labels at about eye level.
12. Proceed to "Final Installation Operations" on page 90.

Installation for CP at the End Configuration

The CP at the End Configuration supports Fisher PROVOX® Series 20 Control I/O Card Files connected to a pair of redundant FCP280s or FCP270s, with optional FBI100s/Multiplexer I/O file units daisy-chained from the TCA of the Series 20 side of the Fieldbus, as shown in Figure 4-37. Be aware that the Series 20 subsystem in Figure 4-37 is a legacy subsystem which communicates over the HDLC fieldbus at 268 Kbps. For Series 20 standard subsystem wiring, which uses 2 Mbps HDLC communications, refer to *DCS Fieldbus Modules for Fisher PROVOX Series 20 Systems User's Guide* (B0193YV).



* If this is last FBI100 baseplate in Fieldbus, this connector is terminated with the Terminator P0923QU installed on a Splitter/Terminator P0926LC.

** The total length of the twinaxial cables and the Baseplate-to-Baseplate Fieldbus cables (if used) is 1 Km (3200 ft) from the FCP280/FCP270-side TCA to the last FBI100 baseplate in the chain or if no FBI100s are used, to the Series 20 Control I/O Card File-side TCA.

Figure 4-37. CP at the End Configuration - Legacy 268 Kbps Implementation

Continue as described below to connect this equipment in a CP at the End configuration:

1. For the FCP280, connect the Fieldbus splitter (RH928CV) to any (planned) Fieldbus port on the FCP280 baseplate, as described in "Fieldbus Cabling at the FCP280" on page 41. When Fieldbus ports on the FCP280 baseplate connect to the 268 Kbps fieldbus, they may only connect to 100 Series or similar modules exclusively - no 200 Series modules may be also connected to the same fieldbus for that Fieldbus port.

   For the FCP270, connect the Fieldbus Splitter/Terminator (P0926LC) to the first "Fieldbus and Time Strobe" 9-pin connector on the FCP270 baseplate (see Figure 4-20 on page 59 and Figure 4-38 below). Tighten the two retaining screws.

2. Referring to Figure 4-20 on page 59, assemble the termination blocks associated with the termination cable assemblies (RH928CV (FCP280 only) or P0903VY (FCP270 only)) for the FCP280 or FCP270 baseplate, snap them onto the mounting rails (DIN rails) in the enclosure, and connect the ground wires. (For future reference, Figure 4-13 on page 49 illustrates how to remove the TCA termination blocks.)
3. Make cable connection(s) as follows:
   - For the FCP280, to connect the TCA cable to the Fieldbus splitter (RH928CV) to this port (see Figure 4-6 on page 43).
   - For the FCP270, connect its 268 Kbps Fieldbus Splitter/Terminator as shown in Figure 4-20 on page 59.
4. Make the fieldbus cable connections between termination cable assemblies. Refer to:
   - Figure 4-22 on page 60 and Figure 4-38 below for overall installation requirements.
   - Figure 4-39 below for cabling interconnections to the Series 20 Control I/O card file's TCA, with the option of connecting this TCA to the FBI100's TCA as well.
5. Install termination resistor E0157CZ to the end of the extended 268 Kbps Fieldbus as shown in Figure 4-38.
6. Connect an insulated 14 AWG green wire between connection point 3 (shield) on the last Fieldbus Isolator termination cable assembly (or assemblies) and the earth bus in the enclosure. For Foxboro Evo system earthing requirements, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).
7. Connect the Fieldbus Isolator termination cable assemblies to the F2SFBI Fieldbus Isolator cards on the card files as shown in Figure 4-38.
   For the FCP280, the connection is similar to how it is shown in Figure 4-38, however, refer to "Fieldbus Cabling at the FCP280" on page 41 for instructions on connecting the Fieldbus splitter (RH928CV) to the FCP280 baseplate.
   As mentioned above, F2SFBI Fieldbus Isolator cards are part of the legacy version of the Series 20 subsystem, which communicates over the HDLC fieldbus at 268 Kbps, the same as other 100 Series competitive migration modules. The current Series 20 subsystem, which uses F2DFBIs Fieldbus Isolator cards and communicates over a 2 Mbps HDLC fieldbus, is discussed in *DCS Fieldbus Modules for Fisher PROVOX Series 20 Systems User's Guide* (B0193YV).

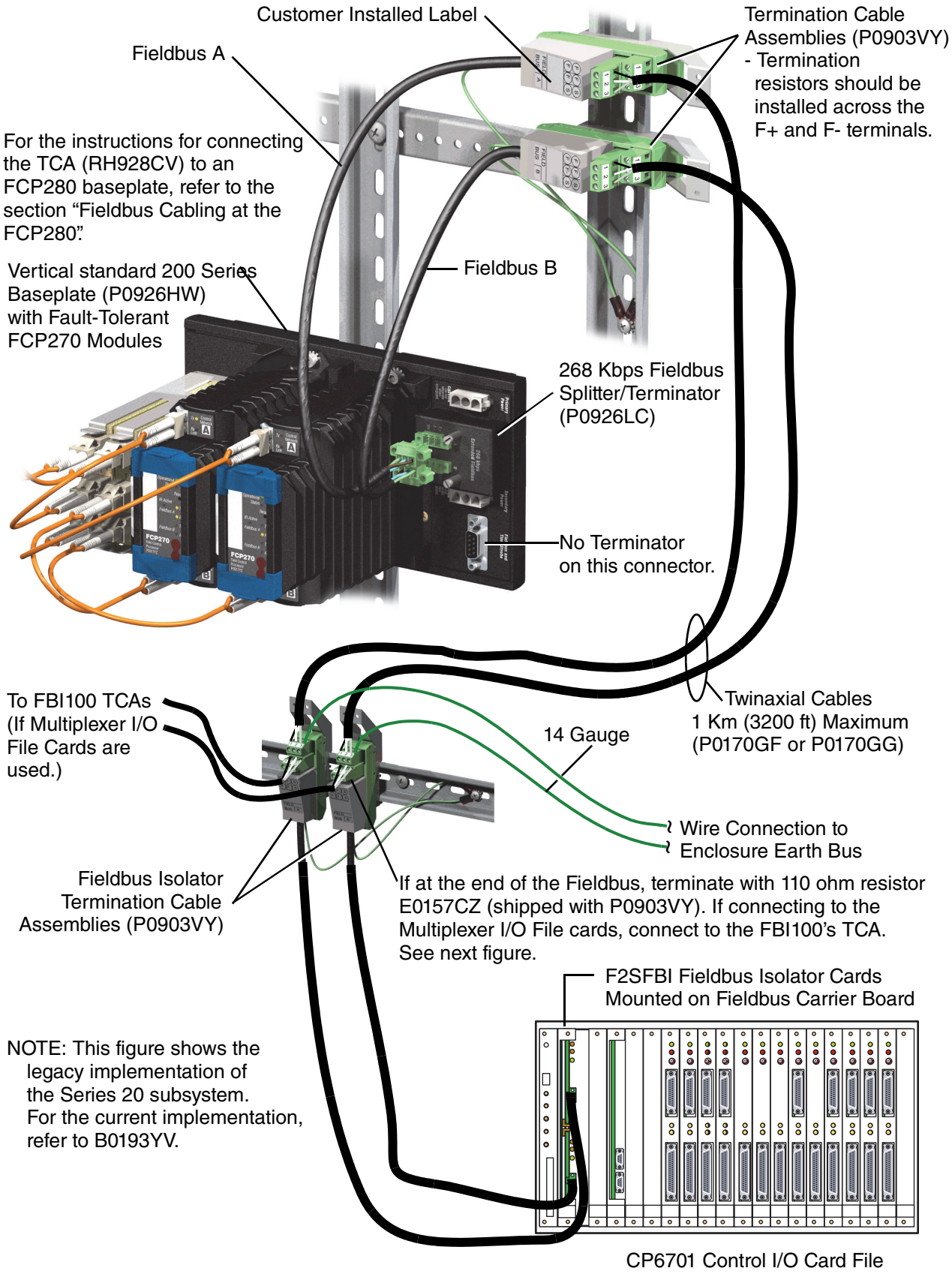
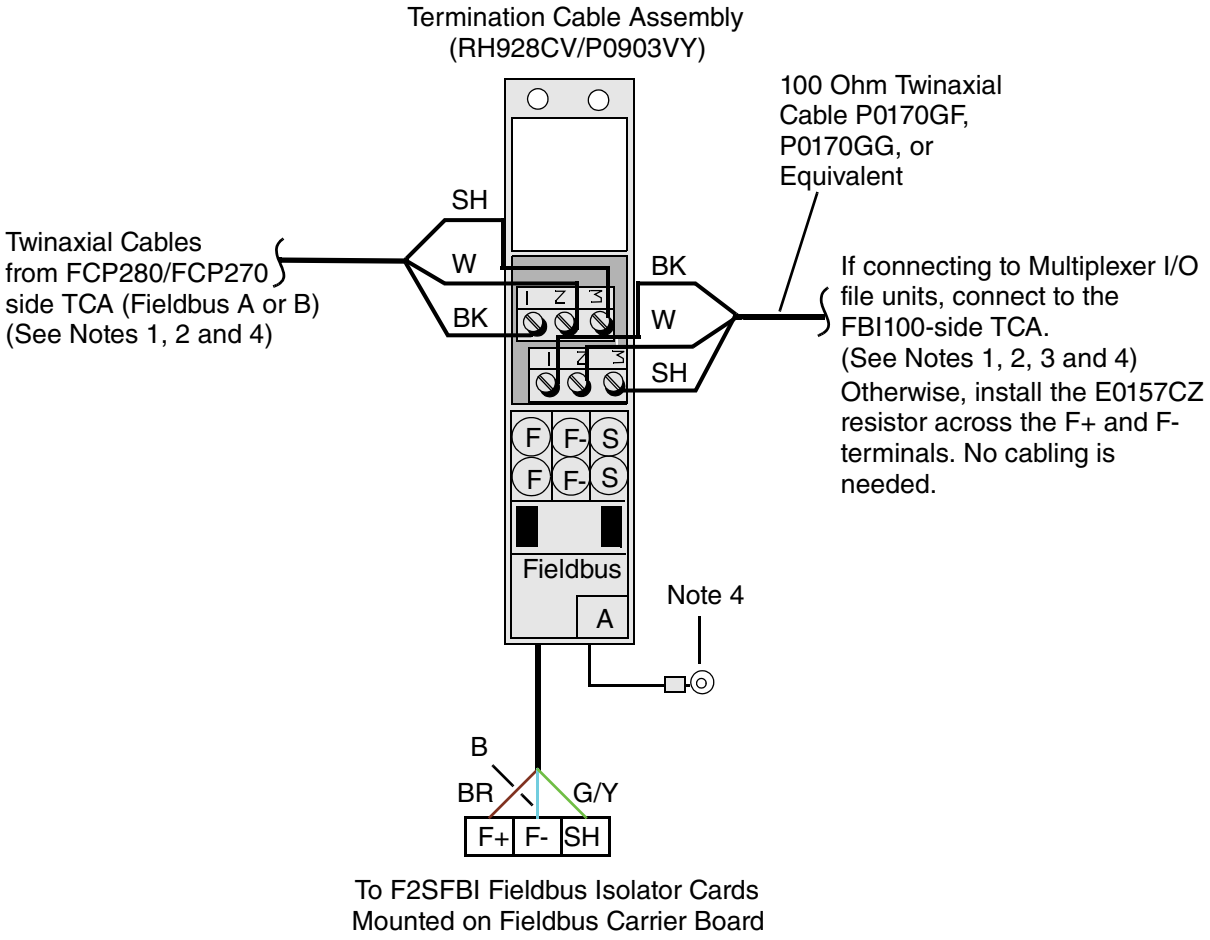


Figure 4-38. Cabling 268 Kbps Fieldbus Isolator Cards to an FCP280 or FCP270 Baseplate (CP in the Middle)

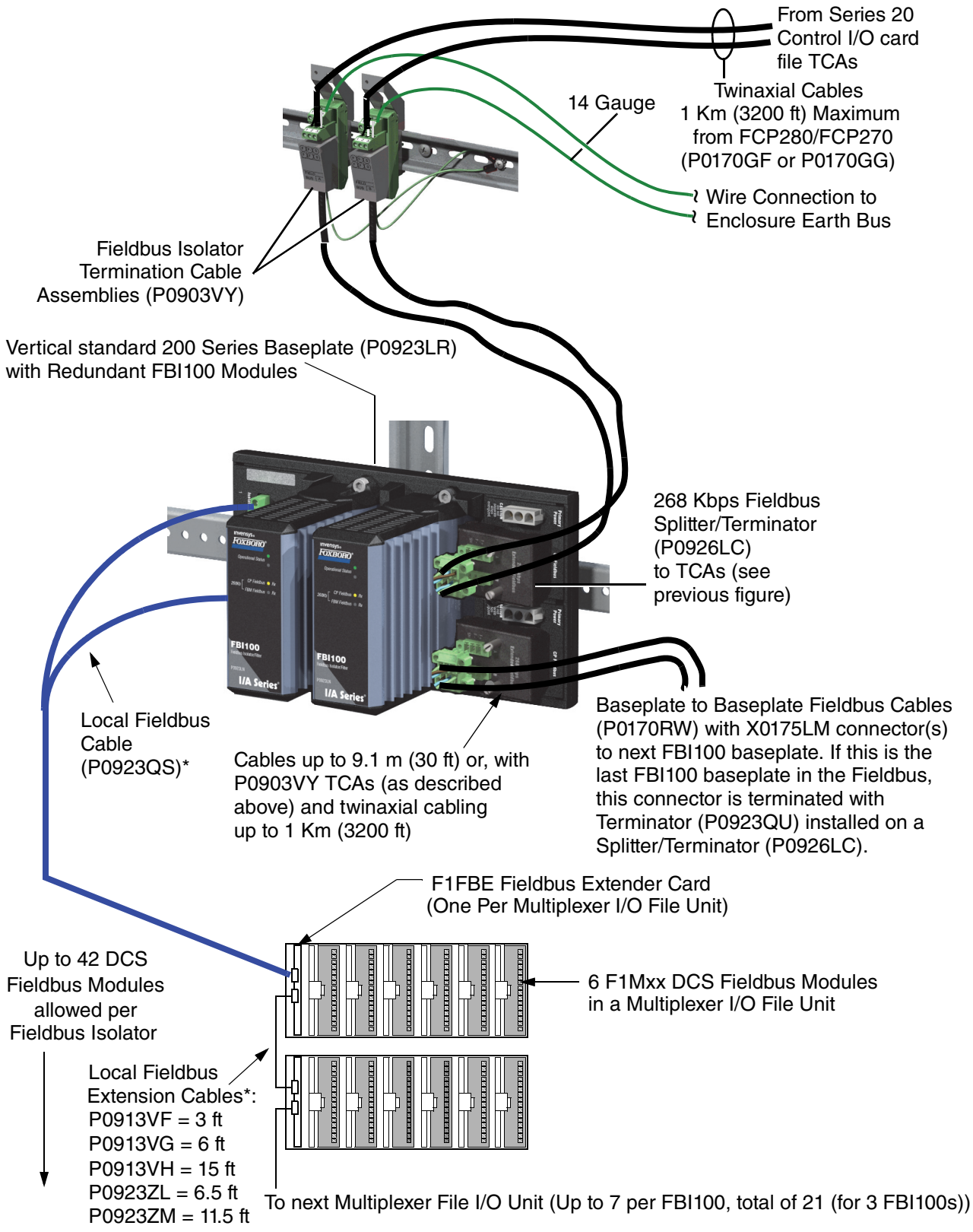


Notes:

1. Earth the shield (terminal 3) at the termination cable assembly farthest from the FCP280 or FCP270 Modular Baseplate.
2. For the FCP280, terminating resistors (110 ohms) must be installed on the Fieldbus Isolator TCA end of the fieldbus, and the baseplate I.D. switches on the FCP280's baseplate must be set properly to terminate the fieldbus at the FCP280 end.
   For the FCP270, install terminating resistors at both ends of the extended fieldbus cable.
   For the last TCA in the fieldbus, install the termination resistor between terminals 1(F) and 2(F-) and the The earth (ground) wire (14 Gauge) must connect to terminal 3(S) as shown in Figure 4-19 on page 58.
3. If this TCA is the last TCA in the fieldbus, the cable on this side of the TCA will not be added.
4. Earth (ground) the surge protection network contained within the TCAs by attaching the green earth wire to a screw on the DIN rail connected to system earth. For more information on earthing, refer to *Power, Earthing (Grounding), EMC and CE Compliance* (B0700AU).

Figure 4-39. FCP280 or FCP270-End TCA Connections (CP at the End)

8. If you are planning to include the Multiplexer I/O file units via the FBI100s as well, proceed as follows:
   a. Connect the Series 20 Control I/O card file-side Fieldbus Isolator TCAs to the FBI100-side TCAs as shown in Figure 4-40.
   b. Connect the FBI100-side Fieldbus Isolator TCAs to the 268 Kbps Fieldbus Splitter/Terminator in the first "CP Fieldbus" connector in the FBI100 baseplate (P0923LR) as shown in Figure 4-40.
   c. If this FBI100 baseplate is connected to another FBI100 baseplate further down the chain, connect the 268 Kbps Fieldbus Splitter/Terminator on the second "CP Fieldbus" connector on this baseplate to the Splitter/Terminator on the first "CP Fieldbus" connector on the next baseplate using two Baseplate-to-Baseplate Fieldbus cables (P0170RW) with X0175LM connectors, one cable for A bus and one for B bus. This cable has a customer-specified length of up to 9.1 m (30 ft). If the distance between the baseplates exceeds 9.1 m (30 ft), then install a pair of P0903VY termination cable assemblies (two per baseplate) within 9.1 m (30 ft) of each baseplate. Connect the X0175LM connectors on the two Baseplate-to-Baseplate Fieldbus cables (P0170RW) onto the Splitter/Terminators for each baseplate as discussed above, and connect the other end of each cable to the P0903VY TCAs. Connect the TCAs for both A and B Fieldbuses with twinaxial cable (at the appropriate length) to extend the Fieldbus between the baseplates, as shown in Figure 4-38.
      Refer to Figure 4-36 on page 77 for Splitter/Combiner cabling connection details.
      If this baseplate is the last in the chain, attach terminator P0923QU to the 268 Kbps Fieldbus Splitter/Terminator in the second "CP Fieldbus" connector to terminate the Fieldbus.
   d. Connect the local Fieldbus cable (P0923QS) from the "FBM Fieldbus A and B" connectors on each FBI100 baseplate to the F1FBE Fieldbus Extender card in the first (or last) Multiplexer I/O file unit closest to the FBI100 baseplate, as the P0923QS has a maximum length of 1.8 m (6 ft). This is shown in Figure 4-40.



*Total Local Fieldbus length (Local Fieldbus cable and multiple extension cables) may not exceed 9 m (30 ft). Also, see NOTE on the following page, below.

Figure 4-40. Cabling FCP280/FCP270 Baseplate to Multiplexer I/O File Units via FBI100 Baseplate

NOTE

It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

9. Attach all baseplate power cables (primary and secondary) to their appropriate baseplates.
10. Install the general information ("Plugged In") labels (P0903YX) on the inside of the rack's front and rear doors. Install the labels directly below any existing labels or equipment name plate. The original descriptive name plate(s) should be removed to avoid maintenance confusion. If no name plates exist, place the labels at about eye level.
11. Proceed to "Final Installation Operations" on page 90.

Multiplexer Control Unit Migration Kit Installation

Installation procedures are provided below for installing the MCU Migration Kit (P0914NU) while:

- Retaining the MCU controller card files.
- Replacing the MCU controller with redundant FBI100 modules.

These configurations were discussed in "Multiplexer Control Unit (MCU)" on page 16.

Implementation 1 - Retaining the MCU Controller Card Files

⚠ CAUTION

The following procedure assumes that power has been removed from the equipment rack containing the Multiplexer Control Unit (MCU) to be upgraded. Before switching off power to the equipment rack, ensure that such action will not adversely affect the process.

To install the MCU Migration Kit (P0914NU), proceed as follows:

1. Remove all circuit cards from the MCU card file.
2. Install the migration kit label, P0903AN, in the approximate position shown in Figure 4-41.
3. Install Power Jumper card F1PWR1 (P0914BN) in slot 1 of the MCU (see Figure 4-41).
4. Install the F1SFIB Fieldbus Isolator(s), using card slots 2 through 7 (see Figure 4-41).

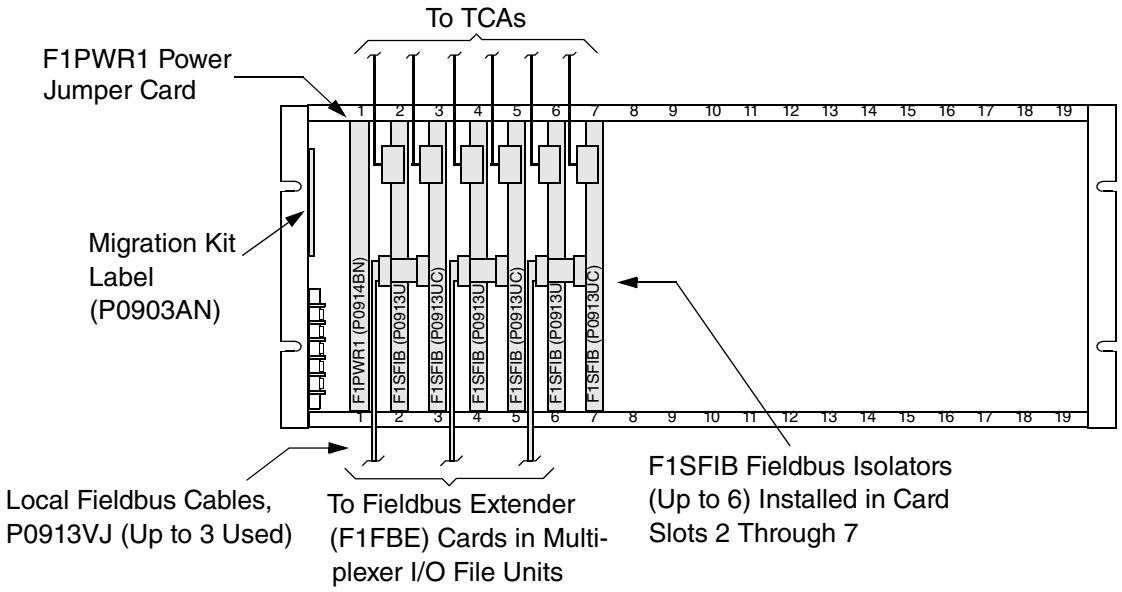


Figure 4-41. MCU, New Card Complement

5. Attach the Local Fieldbus cable(s) (P0913VJ) to the F1SFIB Fieldbus Isolator(s), as shown in Figure 4-27 and Figure 4-41.
6. Connect the TCA cable(s) to the F1SFIB Fieldbus Isolator(s) as shown in Figure 4-27 and Figure 4-41.
7. Install the general information ("Plugged In") labels (P0903YX) on the inside of the rack's front and rear doors. Install the labels directly below any existing labels or equipment name plate. The original descriptive name plate(s) should be removed to avoid maintenance confusion. If no name plates exist, place the labels at about eye level.
8. Go to "Final Installation Operations" on page 90.

Implementation 2 - Replacing the MCU Controller with FBI100

This procedure is identical to "Implementation 2 - Replacing the UOC, IFC, or UOC+ Controllers with FBI100" on page 66, with the exception of step 1, in which the Multiplexer Control Unit controllers should be removed instead of the UOC, IFC, or UOC+ card file controllers.

Multiplexer I/O File Unit Migration Kit Installation

⚠ CAUTION

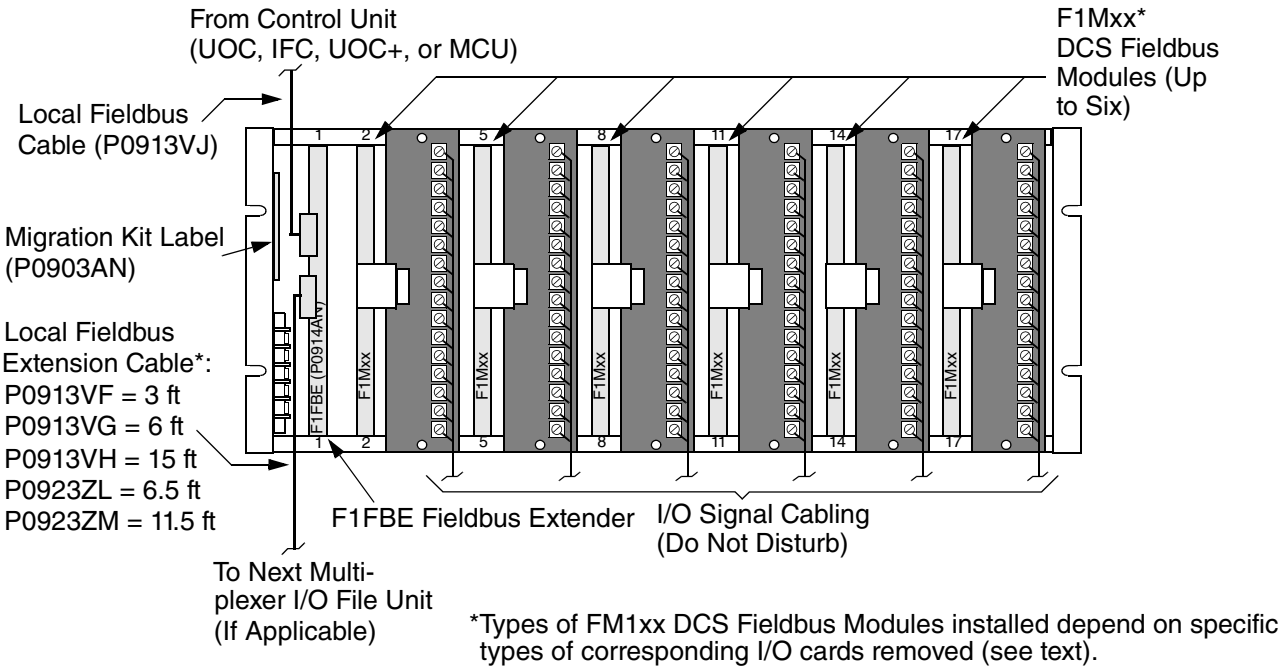
The following procedure assumes that power has been removed from the equipment rack containing the Multiplexer I/O File Unit being upgraded. Before switching off power to the equipment rack, ensure that such action will not adversely affect the process.

To install the Multiplexer I/O File Unit Migration Kit (P0914NV), proceed as follows:

⚠ CAUTION

In Step 1, remove the Parallel Buffer Card and I/O circuit cards **only**. Do not remove the Field Termination Assemblies (FTAs) or disturb the field wiring connections to the FTAs.

1. Remove the Parallel Buffer card and all input/output circuit cards from the Multiplexer File Unit.
2. Install the migration kit label, P0903AN, in the approximate position shown in Figure 4-42.



* It is recommended that you use only the P0923ZL or P0923ZM cables to interconnect the Multiplexer I/O File Units together. P0923ZL supports up to three card files which must be interconnected in the same enclosure, and P0923ZM supports up to seven card files which must be interconnected in the same enclosure. The P0913VF, P0913VG and P0913VH cables are used only to connect two P0923ZL cables together to support up to six card files in the same enclosure - however, you must ensure that the total length does not exceed the 9 m (30 ft) limit.

Figure 4-42. DCS Fieldbus Module Subsystem Implementation, Multiplexer I/O File Unit

3. Install the F1FBE Fieldbus Extender card in slot 1.

⚠ CAUTION

It is important to wear a properly connected electrostatic discharge (ESD) wrist strap while removing, handling, and installing the DCS Fieldbus Module cards. Connect the ESD strap to the rack ground bar.
It is also good practice to observe the following points when handling electronic circuitry:
1. Use the static shielding bags supplied with the DCS Fieldbus Module.
2. Ground the bag before opening.
3. Avoid touching the DCS Fieldbus Module circuitry.

4. Install the module identifier (letterbug set) on all DCS Fieldbus Modules (designated F1Mxx in Figure 4-42) as described under "Module Identifier (Letterbug) Installation" on page 89.

⚠ CAUTION

Because the I/O points on each Field Termination Assembly (FTA) are related to a specific card type (DM6xxx), care must be taken to ensure that each DM6xxx card is replaced with the appropriate F1Mxx card (see Table 4-2).

5. Using Figure 4-42 and Table 4-2 as a guide, and observing the above CAUTION statements, replace each DM6xxx circuit card in the card file with a corresponding F1Mxx DCS Fieldbus Module. Connect each F1Mxx card to its associated Field Termination Assembly (FTA) using the short ribbon cable at the front of the FTA.
6. Attach the Local Fieldbus cable P0913VJ (part of UOC, IFC, UOC+, or MCU migration kit) to the F1FBE Fieldbus Extender card, as shown in Figure 4-42.
7. If applicable, connect a Local Fieldbus extension cable with the multiple connector cables P0923ZL/ZM[3] between the F1FBE Fieldbus Extender card in this Multiplexer I/O File Unit and the F1FBE Fieldbus Extender card in the next Multiplexer I/O File Unit. Refer to Figure 2-3 for an example of a fully utilized DCS Fieldbus Module subsystem.
8. Install the general information ("Plugged In") labels (P0903YX) on the inside of the rack's front and rear doors. Install the labels directly below any existing labels or equipment name plate. The original descriptive name plate(s) should be removed to avoid maintenance confusion. If no name plates exist, place the labels at about eye level.
9. Go to "Final Installation Operations" on page 90.

[3] The P0913VF/VG/VK cables may be used to interconnect two P0923ZL cables. P0923ZL/ZM are described on page 20 and page 21.

Table 4-2. Multiplexer File Unit I/O Card Replacements

To Replace	I/O Description	Use DCS Fieldbus Module[1]
DM6311X1-A1	8 AI, SE, 1-5 V dc	F1M01A
DM6311X1-A2	8 AI, SE, 0-10 V dc	F1M01E
DM6312X1-A1	4 AI, ISO, 1-5 V dc	F1M01C
DM6312X1-A2	4 AI, ISO, 0-10 V dc	F1M01F
DM6321X1-A1	8 AI, SE, 4-20 mA	F1M01A
DM6322X1-A1	4 AI, ISO, 4-20 mA	F1M01C
DM6331X1-A1/A2-B1-9A1/9A2/9A3	4 AI, ISO, RTD, -50 to 200°F (A1)/100 to 500°F (A2), Temp Coef=0.385Ω/°C (9A1)/0.3902Ω/°C (9A2)/0.3902Ω/°C (9A3)	F1M03
DM6341X1-A1	4 AI, ISO, mV (-10.2 mV to +70 mV)	F1M02
DM6351X1-A1/A2	4 TC, ISO, J_{tc} (0-1400°F)/J_{tc} (-60 to 640°F)	F1M02
DM6352X1-A1/A2	4 TC, ISO, K_{tc} (0-2300°F)/K_{tc} (0 to 1000°F)	F1M02
DM6353X1-A1/A2	4 TC, ISO, T_{tc} (-300 to 600°F)	F1M02
DM6354X1-A1	4 TC, ISO, E_{tc} (-100 to 1600°F)	F1M02
DM6355X1-A1	4 TC, ISO, R_{tc} (0 to 3200°F)	F1M02
DM6371X1-A1	4 DI, 4 - 30 V dc, Pulsed	F1M06
DM6372X1-A1	4 DI, Dry Contacts, Pulsed	F1M06
DM6373X1-A1	4 DI, Current Pulse	F1M06
DM6411X1-A1	4 AO, SE, 1-5 V	F1M04A
DM6421X1-A1	4 AO, SE, 4-20 mA	F1M04B
DM6361X1-A1/A2	8 DI, SE, 4-30 V dc, Dry Contact, 120 V ac	F1M07
DM6461X1-A3/A4	8 DO, FET, Momentary/Latching Outputs, 4-30 V dc	F1M09
DM6462X1-A3/A4	8 DO, FET, Momentary/Latching Outputs, Relay	F1M09
DM6463X1-A3/A4	8 DO, FET, Momentary/Latching Outputs, Relay, External	F1M09

1. For the Foxboro Part Numbers of the DCS Fieldbus Modules, refer to Table 2-6.

Module Identifier (Letterbug) Installation

A module identifier, composed of six letterbugs, is used to provide physical, user-assigned labels on the DCS Fieldbus Modules. Each letterbug is a small plastic device with a single character embossed on the front surface. Six interlocking letterbugs form a module identifier, which plugs into a receptacle on the DCS Fieldbus Module. The rear surface of each letterbug contains pins arranged in a unique configuration corresponding to a particular character or symbol. The required sets of letterbugs, as specified per system configurator/autoquote references, are shipped packaged with the DCS Fieldbus Modules.

Assembly of the letterbugs to form a module identifier and the insertion of the module identifier into the DCS Fieldbus Module are shown in Figure 4-43. To assemble and install the module identifiers, proceed as follows:

1. Referring to the configuration reports and to "Module Identifier Letterbug Assignments" on page 24, determine the module identifier (letter/number combination) that pertains to the DCS Fieldbus Modules in question.
2. Gather the six letterbugs that form the module identifier and assemble them by inserting the dovetail end of one letterbug into the mating end of the next, until all six letterbugs have been assembled in the proper order (see Figure 4-43).
3. Insert the assembled module identifier into the receptacle on the DCS Fieldbus Module. Exercise care, ensuring that the pins properly align with the holes in the receptacle.
4. Repeat Step 1 through Step 3 for all DCS Fieldbus Modules to be installed.

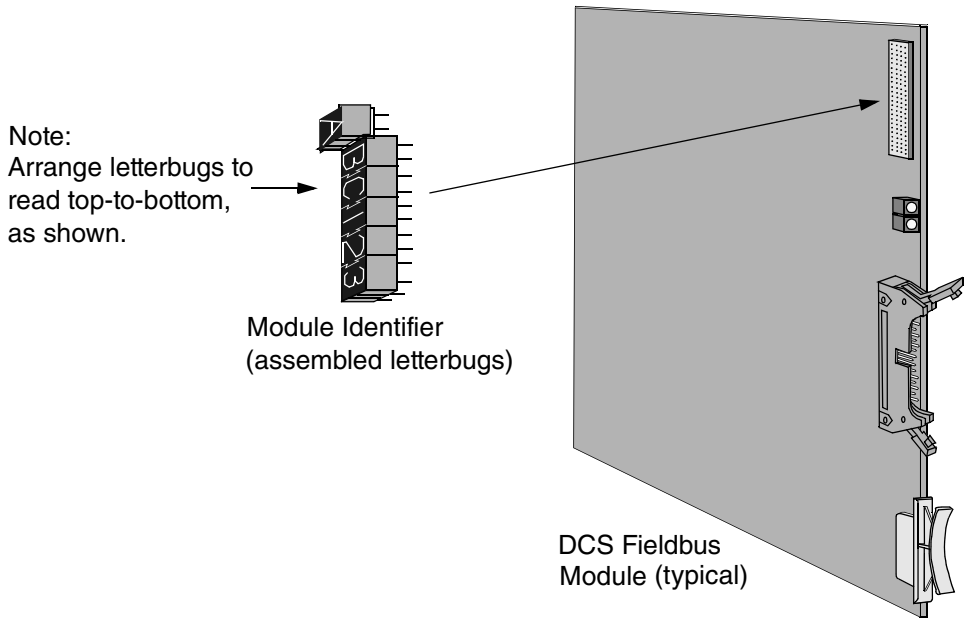


Figure 4-43. Module Identifier (Letterbug) Assembly and Insertion

Final Installation Operations

Once the DCS Fieldbus Module subsystem circuit cards are installed, all local and remote Fieldbus cabling is completed, and system configuration and integrated control configuration (see Chapters 3, 4, and 5) have been performed, the following final installation operations may be performed.

Power Switch-On

Power to the equipment rack(s) may be switched on after all associated equipment has been installed. The DCS Fieldbus Modules and Fieldbus Isolators have status indicators that report operating conditions (see "LED Indicators" on page 95).

When power is first applied, each DCS Fieldbus Module undergoes a power-on self-diagnostic test that tests its operating status. (The Fieldbus Isolators have no self-diagnostics, but LEDs indicate the run/fail status and any local/remote Fieldbus activity.) When power is applied, the LED indicators on the DCS Fieldbus Modules and Fieldbus Isolators should light as described in Chapter 6 "Maintenance". If normal run conditions are not indicated following power switch-on, refer to Chapter 6 "Maintenance" for corrective action.

EEPROM Update and Download Operations

Once the DCS Fieldbus Module subsystem equipment has been installed and power is applied to the equipment rack(s), the following operations must be performed at the Control Core Services workstation to bring the DCS Fieldbus Module subsystem up to operating status:

- EEPROM update – This action sends a new EEPROM image to the DCS Fieldbus Module. Prior to EEPROM update and download, the CP sets the DCS Fieldbus Module to off-line (the GO ON-LINE option on the Equipment Change display turns white), so that all outputs go to HOLD while EEPROM update takes place. You may perform any number of EEPROM updates (for any number of DCS Fieldbus Modules) without waiting for the completion of each EEPROM update request. However, you must be sure that, for each DCS Fieldbus Module, the EEPROM update has completed successfully prior to requesting a download.
- Download (of the DCS Fieldbus Module image and database) – This action restarts the DCS Fieldbus Module software. Prior to the download, you must have performed integrated control configuration and "fix all," otherwise the System Management Display Handler does not recognize the DCS Fieldbus Module.

The EEPROM Update and Download operations are performed on each DCS Fieldbus Module using the System Management Equipment Change Displays. To perform these operations proceed as follows, referring to *System Management Displays* (B0193JC) for detailed information on System Management displays:

1. Access the Equipment Change Display for the DCS Fieldbus Module in question:
   a. Select **Sys** from the top menu bar, then select **Sys_Mgmt**.
   b. Select the appropriate System Monitor, and then the letterbug of the CP to which the desired DCS Fieldbus Module is attached.
2. At the PIO Bus Display, select the desired DCS Fieldbus Module, then select **EQUIP CHG**. Allowable equipment change actions appear in white on the menu.
3. Perform an EEPROM Update and Download for the DCS Fieldbus Module:

   a. On the DCS Fieldbus Module Equipment Change display, select **EEPROM UPDATE**. An `EEPROM Update Successful` message appears in the message line when the EEPROM update is complete.
   b. Select **DOWNLOAD**. A `Download Successful` message appears in the message line.
4. You must now checkpoint the file in the CP to preserve the on-line state of the DCS Fieldbus Module in the checkpoint file:
   a. Access the CP Equipment Change display (part of the System Management Displays).
   b. Select **CHECKPOINT COMMAND** on the CP Equipment Change display.
5. Repeat Step 2 through Step 4 for each DCS Fieldbus Module in the subsystem.

Cable Dressing

When all DCS Fieldbus Module subsystem equipment has been installed and the subsystem is operational, dress all excess local and remote Fieldbus cables for neatness using the rack wireways.

Installation Checklist

- ☐ Power Distribution Card (P0923QA) has +12V power disconnected and 24V power reconnected.
- ☐ Fieldbus Isolators and DCS Fieldbus Modules installed.
- ☐ Power Jumper card(s) (F1PWR1) installed in MCU(s), and F1FBE Fieldbus Extender card(s) installed in Multiplexer I/O File Unit(s).
- ☐ Local and Remote Fieldbus cabling installed and connected.
- ☐ Remote Fieldbus shields earthed (at last device on Fieldbus).
- ☐ Remote Fieldbus termination resistors installed (at last device on Fieldbus).
- ☐ Strain relief provided for Fieldbus cables (near Fieldbus isolators).
- ☐ Module identifiers (letterbugs) installed in all DCS Fieldbus Modules.
- ☐ System configuration and integrated control configuration completed.
- ☐ EEPROM update and downloading of the DCS Fieldbus Module image and database have been performed.

- ☐ Cable dressing is completed.
- ☐ Power to rack is switched on and DCS Fieldbus Module LEDs indicate a GO condition.

5. Process Displays and System Management Displays

This chapter provides information on the process displays and System Management displays used with the DCS Fieldbus Module subsystem.

Process Displays

The Foxboro Evo system provides the following types of displays for performance of process control operations:

- Select Screen Display (compound and block overview display)
- Group Displays
- User-Generated Displays
- Block Detail Displays
- Compound Detail Displays
- Station Displays.

For information on how these displays are used, refer to *System Manager* (B0750AP) and *Process Operations and Displays* (B0193MM).

System Management Displays

The Foxboro Evo system management software – System Manager and System Management Display Handler (SMDH) – obtains current and historical information about the system, displays it, and allows you to intervene in system operations and perform diagnostics. With regard to the DCS Fieldbus Module subsystem, System Manager and SMDH provide the following displays:

- A Fieldbus-level display (PIO Bus Display), which shows the DCS Fieldbus Module subsystem (portrayed as Fieldbus modules, FBMs) along with the host Control Processor (CP) and any other Fieldbus devices (see Figure 5-1 for SMDH display).
- Detailed equipment change (EQUIP CHG) and equipment information (EQUIP INFO) displays for each DCS Fieldbus Module (see Figure 5-2 for SMDH display).

The DCS Fieldbus Modules are portrayed in the System Management Displays as equivalent Fieldbus Modules (FBMs), as listed in Table 3-1 on page 24. DCS Fieldbus Modules may be distinguished from other FBMs by means of their user-assigned module identifiers (letterbugs), which can contain a prefix (for example, “F1”) to designate the device as a Fisher PROVOX replacement DCS Fieldbus Module.

For detailed information on the use of the System Manager, refer to *System Manager* (B0750AP).

For detailed information on the use of the System Management Displays, refer to *System Management Displays* (B0193JC).

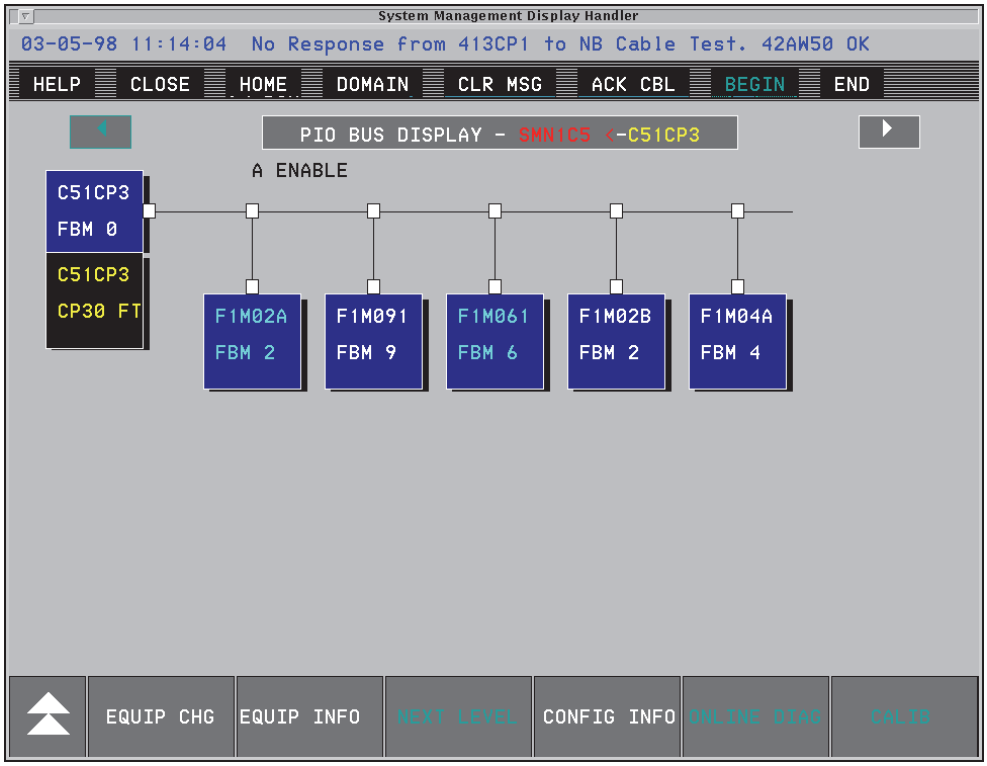


Figure 5-1. PIO Bus Display (Typical SMDH Display)

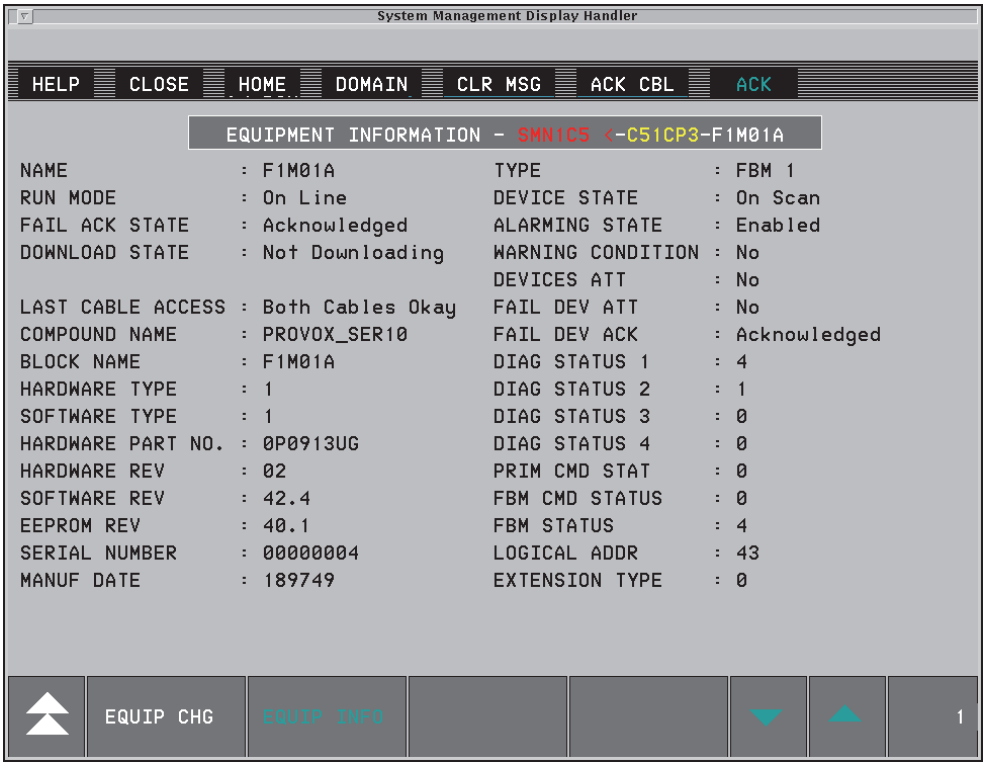


Figure 5-2. F1M01A (FBM01 Equivalent) Equipment Information Display

6. Maintenance

This chapter provides maintenance information for the DCS Fieldbus Module subsystem.

The original maintenance and preventive maintenance philosophies for the Fisher PROVOX Series 10 equipment racks are maintained. This includes periodic inspection and cleaning, checking the status of LED indicators, and checking for loose cable connections.

Operating Status

The operating status of the DCS Fieldbus Modules is reported by the Control Core Services software using on-screen messages. [The Control Core Services software regards the DCS Fieldbus Modules as standard Fieldbus Modules (FBMs).] Refer to the following Foxboro Evo documents for information on the reporting of equipment operating status and errors:

- *System Maintenance* (B0193AD)
- *System Manager* (B0750AP)
- *System Management Displays* (B0193JC).

LED Indicators

LED indicators at the front of the F1SFIA and F1SFIB Isolators and the DCS Fieldbus Module indicate the operational status of these devices (see Figure 6-1). The functions of the F1SFIA/F1SFIB Isolator LEDs are as follows:

- Run

  When illuminated (green), indicates that the Fieldbus Isolator is operational (running).

- Fail

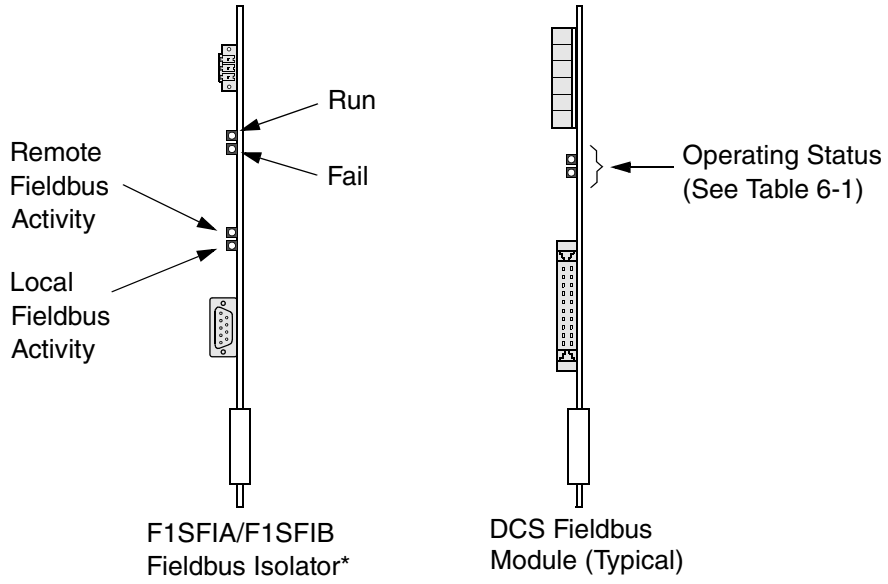
  When illuminated (red), indicates that the Fieldbus Isolator is failed.

- Remote Fieldbus Activity

  When illuminated (yellow), indicates the existence of communication activity on the remote Fieldbus [that is, external to the Fisher PROVOX equipment rack(s)].

- Local Fieldbus Activity

  When illuminated (yellow), indicates the existence of communication activity on the local Fieldbus [that is, internal to the Fisher PROVOX equipment rack(s)].



*The F1SFIA and F1SFIB Fieldbus Isolators differ slightly in appearance, but the LED indicators and their respective functions are identical.

Figure 6-1. LED Indicators

Two status LEDs (red and green) at the front of each DCS Fieldbus Module provide indications of operating status, as listed in Table 6-1.

Table 6-1. DCS Fieldbus Module Operating Status LEDs

Red LED	Green LED	Status
Off[1]	Off[1]	Power to card failed.
On	Off[1]	Diagnostic run-time failure occurred.
On	On	Diagnostics passed and DCS Fieldbus Module is ready to be brought on-line by the CP. (This is a transient state, normally occurring during power-up.)
Off[1]	On	DCS Fieldbus Module on-line and functional. (This is the normal “run” state.)

1. Either LED, when in the OFF condition, appears white in color.

Technical Support

If technical support is needed, call Global Customer Support Center at 1-866-746-6477 or visit the Global CSC website *https://support.ips.nvensys.com.*

Module Return Procedure

Contact Global Client Support for a Return Authorization Number and shipping instructions for repairs.

Appendix A. Hardware Specifications

F1M01A/E/C/F (Analog Input) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	6.35 W

Communication

Redundant IEEE P1118 Fieldbus

Input Channels

DCS Fieldbus Module:

F1M01A	8 Channels, single ended, 0 to 20.0 mA, 1 to 5 V dc
F1M01E	8 Channels, single ended, 0 to 10.0 V dc
F1M01C	4 Channels, isolated, 0 to 20.0 mA, 1 to 5 V dc,
F1M01F	4 Channels, isolated, 0 to 10.0 V dc
Rated Mean Accuracy	±0.10% of span
Resolution	12 to 15 bits, programmable (see Table A-1)

Table A-1. Configurable Specifications, F1M01A/E/C/F Analog Input Channels

Conversion Time (Seconds)	Settling Time[a] (Seconds)	Linearity Error[b] (% of Range)	Resolution (Bits)
0.1	0.25	0.0125	12
0.2	0.5	0.0075	13
0.5	1.0	0.005	14
1.0	2.0	0.005	15

a. Output settles within a 1% band of steady state for a 10 to 90% input step change.
b. Monotonic (that is, the signal used for Fieldbus communications either increases or remains the same for increasing analog input signals).

F1M02 (Analog Input) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	7.2 W

Communication

Redundant IEEE P1118 Fieldbus

Input Channels

Fieldbus Module:

F1M02	4 Channels, isolated, -10.5 to 71.419 mV dc
F1M02	4 Channels, isolated, -10.5 to 71.419 mV dc Thermocouples: E, J, K, T, R
Rated Mean Accuracy	±0.035% of span (-10.5 to 71.4 mV range)
Resolution	12 to 15 bits, programmable (see Table A-3)
Isolation	600 V ac between any channel and earth (ground), or between channels. **NOTE:** This does not imply that these channels are intended for connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock.

Table A-2. Configurable Specifications, F1M02 Analog Input Channels

Conversion Time (Seconds)	Settling Time[a] (Seconds)	Linearity Error[b,c] (% of Range)	Resolution (Bits)
0.1	0.4	0.0125	12
0.2	0.6	0.0075	13
0.5	1.2	0.005	14
1.0	2.4	0.005	15

a. Output settles within a 1% band of steady state for an input step change of 0 to 60 mV.

b. Monotonic (that is, the signal used for Fieldbus communications either increases or remains the same for increasing analog input signals).

c. Represents the accuracy of the DCS Fieldbus Module only.

F1M03 (Analog Input, 4 RTD) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	7.2 W

Communication

Redundant IEEE P1118 Fieldbus

Input Channels

Fieldbus Module:

F1M03	4 Channels, 0 to 320 ohms, 100 ohm Platinum, 100 ohms, 0.3850 ohms/°C Temp Coefficient 100 ohms, 0.3902 ohms/°C Temp Coefficient 100 ohms, 0.3920 ohms/°C Temp Coefficient
Rated Mean Accuracy	±0.10% of span (±0.32 ohms) Platinum
Resolution	12 to 15 bits, programmable (see Table A-3)

Table A-3. Configurable Specifications, F1M03 0 to 320 Ohm Plat. RTD Analog Input Channels

Conversion Time (Seconds)	Settling Time[a] (Seconds)	Linearity Error[b,c] (% of Range)	Resolution (Bits)
0.1	0.4	0.0125	12
0.2	0.6	0.0075	13
0.5	1.2	0.005	14
1.0	2.4	0.005	15

a. Output settles within a 1% band of steady state for an input step change of 30 to 320 ohms.
b. Monotonic (that is, the signal used for Fieldbus communications either increases or remains the same for increasing analog input signals).
c. Represents the accuracy of the DCS Fieldbus Module only.

F1M04A/B (Analog Output) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	7.2 W

Communication

Redundant IEEE P1118 Fieldbus

Output Channels

Fieldbus Module:

F1M04A	4 Channels, single ended, 0 to 5.05 V dc max, Output Load (Minimum) = 3000 ohms
F1M04B	4 Channels, single ended, 0 to 20.4 mA max, Output Load (Maximum) = 735 ohms
Rated Mean Accuracy	±0.05% of span
Linearity Error	±0.1% of span
Compliance Voltage	18.0 V dc nominal at 20 mA at I/O field terminals

F1M06 (Pulse Input) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	4.8 W

Communication

Redundant IEEE P1118 Fieldbus

Input Channels

Number of Channels	Four optically isolated inputs
Contact Closure Input	Dry relay contacts Contact open = 30 V dc max Contact closed = 0 V dc, nominal Short circuit current = 20 mA max @ 30 V dc Input impedance = 1.5 K ohms (maximum) Pulse repetition rate = 0 to 50 Hz

Pulse Input, Voltage	0 to 30.0 V dc Off input = 0 to 1.6 V dc, max. On input = 3.5 V dc, min. to 30 V dc, max. Pulse repetition rate [pulse width = 50 µs, min. On time, 85 µs, min. Off time] = 0 to 7 KHz, max. Pulse repetition rate [pulse width = 100 µs, min. On time, 100 µs, min. Off time] = 0 to 5 KHz, max.
On-State Resistance	1.5 K ohms (maximum)
Isolation	Input to earth (ground), 300 V ac; input to input, 300 V ac. **NOTE:** This does not imply that these channels are intended for connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock.
Counter Range	0 to 12.5 K counts per second

F1M07 (Discrete Input) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	4.8 W

Communication

Redundant IEEE P1118 Fieldbus

Input Channels

Number of Channels	8 optically isolated channels
Input, Dry Relay Contacts	FTA Type D input terminator Contact open = 30 V dc max. to ground Contact closed = ground (0 V dc, nominal) Input impedance = 2.4 K ohms (nominal) Open (off) and Closed (on)
Input, Low DC Voltage	FTA Type A input terminator Logic High = 3.5 to 30.0 V dc Logic Low = 0 to 1.6 V dc Input impedance = 2.4 K ohms (nominal)
Input, High DC Voltage	FTA Type G input terminator Logic High = 50 to 150 V ac @ 45 to 66 Hz Logic Low = 0 to 10 V ac @ 45 to 66 Hz Input impedance = 68.4 K ohms (nominal)
Response Time	2 ms min. for Off, 58.4 ms min. for On

F1M09 (Digital Output) Functional Specifications

Power Requirements

Input Voltage	21.0 to 28.0 V dc
Consumption	4.8 W

Communication

Redundant IEEE P1118 Fieldbus

Output Channels

Number of Channels	8 optically isolated, solid state switch output channels
Output, Solid State Switch	Solid state switch Off = 30 V dc max. to ground Solid state switch On = 0.8 V dc mac. @ 100 mA Inrush current = 1.0 A max. for 1 sec. on any one output Off-state leakage current = 0.25 mA max.
Response Time	2 ms min. for Off, 58.4 ms min. for On
FTA Terminators	Type A FTA, solid state switch Type Internal Relay FTA: Contact Out Type External Relay FTA: Contact Out

F1SFIA/F1SFIB (Fieldbus Isolator) Functional Specifications

Maximum number of DCS Fieldbus Modules driven	40
Maximum length of local bus	9 m (30 ft)

Input Signal Voltage, External Bus Side (Normal Operation):

Difference between HI and LO level for signals FBEX or FBEX', as referenced to isolated ground (EXTREF)	0.33 to 3.0 V P-P
Differential across signals FBEX and FBEX'	0.66 to 6.0 V P-P
Absolute input limits before damage, as referenced to isolated ground (EXTREF) for F1SFBI w/o termination cable assembly.	-7 to +7 V dc
Output common mode range	-1 to +3 V
External bus output signal voltage (nominal differential, terminated with 55 ohms)	6.0 V P-P

Input Signal Voltage, Local Bus Side (Normal Operation):

Difference between HI and LO level for signals FBEX or FBEX', as referenced to ground (GND)	1.2 to 3.0 V P-P
Differential across signals FBEX and FBEX'	2.4 to 6.0 V P-P
Absolute input limits before damage, as referenced to GND	-7 to +12 V dc
Output common mode range	-1 to +3 V

Maximum input power voltage (normal operation)	21.0 to 28.0 V dc
Maximum operating current @ -5%	100 mA
Maximum power dissipation @ +5%	2.75 W
Minimum isolation voltage	2500 V rms
Holdup time @ 24 V dc	250 ms[1]

1. As provided by the Fisher power supply.

Appendix B. I/O Connections

The figures in this appendix show the input/output connections made at the Field Termination Assembly (FTA) termination points. For reference purposes, Table B-1 shows the correlation between the FTA type, the DMxxxx board replaced, the equivalent F1Mxx DCS Fieldbus Module, and the associated I/O function.

Table B-1. Field Termination Assembly Types

FTA Type	Replaced DMxxx Board	Replacement DCS Fieldbus Module	Functions
A (standard)	DM6311X1-A1, DM6331, DM6311, DM6361 DM6371, DM6411, DM6421, DM6461, DM6391,	F1M01A, F1M03, F1M01A, F1M07, F1M06, F1M04A, F1M04B, F1M09, NONE	AI-SE, AI-RTD, AI-SE, DI-LoV DI-PLS, AO-V AO-I, DO AI-AC
A (4 to 20 ma)	DM6321X1-A1	F1M01A	AI-SE
A (1 to 5 V) Self power	DM6311X1-A1	F1M01A	AI-SE
A (0 to 10 V)	DM6311X1-A2	F1M01E	AI-SE
B (standard)	DM6312, DM6341	F1M01C, F1M02	AI-ISO, AI-LoV
B (C-to-V)	DM6322	F1M01C/F	AI-ISO
B (TC Type E)	DM6354	F1M02	AI-TC
B (TC Type J, T600° F)	DM6351	F1M02	AI-TC
B (TC Type J, T1400° F)	DM6351	F1M02	AI-TC
B (TC Type K, T1000° F)	DM6352	F1M02	AI-TC
B (TC Type K, T2300° F)	DM6352	F1M02	AI-TC
B (TC Type R)	DM6355	F1M02	AI-TC
B (TC Type T)	DM6353	F1M02	AI-TC
C (fused) Loop power	DM6311X1-A1	F1M01A	AI-SE
D	DM6362, DM6372	F1M07, F1M06	DI-LoV DI-LoV
F (fused)	DM6373	F1M06	DI-PLS
G	DM6363	F1M07	DI-HiV
Relay, Internal	DM6462	F1M09	DO-Relay Drvrs
Relay, External	DM6463	F1M09	DO-Relay Drvrs

DB6311X1-A1 Replacement
(8 AI, SE 4 - 20 mA)

1	CI1+	Current Input 1	Channel 1
2	CI-	Common	
3	CI2+	Current Input 2	Channel 2
4	CI-	Common	
5	CI3+	Current Input 3	Channel 3
6	CI-	Common	
7	CI4+	Current Input 4	Channel 4
8	CI-	Common	
9	CI5+	Current Input 5	Channel 5
10	CI-	Common	
11	CI6+	Current Input 6	Channel 6
12	CI-	Common	
13	CI7+	Current Input 7	Channel 7
14	CI-	Common	
15	CI8+	Current Input 8	Channel 8
16	CI-	Common	

For Self-Powered Transmitters Used
With DM6321X1A1-B1 FTAs

DM6311X1-A1 Replacement
(8 AI, SE 4 - 20 mA)

1	CS1F	+24 V dc (Fused)	Channel 1
2	CI1+	Current Input 1	
3	CS2F	+24 V dc (Fused)	Channel 2
4	CI2+	Current Input 2	
5	CS3F	+24 V dc (Fused)	Channel 3
6	CI3+	Current Input 3	
7	CS4F	+24 V dc (Fused)	Channel 4
8	CI4+	Current Input 4	
9	CS5F	+24 V dc (Fused)	Channel 5
10	CI5+	Current Input 5	
11	CS6F	+24 V dc (Fused)	Channel 6
12	CI6+	Current Input 6	
13	CS7F	+24 V dc (Fused)	Channel 7
14	CI7+	Current Input 7	
15	CS8F	+24 V dc (Fused)	Channel 8
16	CI8+	Current Input 8	

For DCS-Powered Transmitters Used
With DM6321X1A1-B2 FTAs

DM6311X1-A1 Replacement
(8 AI, SE, 1 - 5 V)

1	VI1+	Voltage Input 1	Channel 1
2	VI-	Common	
3	VI2+	Voltage Input 2	Channel 2
4	VI-	Common	
5	VI3+	Voltage Input 3	Channel 3
6	VI-	Common	
7	VI4+	Voltage Input 4	Channel 4
8	VI-	Common	
9	VI5+	Voltage Input 5	Channel 5
10	VI-	Common	
11	VI6+	Voltage Input 6	Channel 6
12	VI-	Common	
13	VI7+	Voltage Input 7	Channel 7
14	VI-	Common	
15	VI8+	Voltage Input 8	Channel 8
16	VI-	Common	

Used for 1-5 Voltage Input

Figure B-1. F1M01A, FTA I/O Connections

DM6312X1-A1 Replacement
(4AI, ISO, 1 - 5 V)

1	VI1+	Voltage Input 1+	Channel 1
2		No Connection	
3		No Connection	
4	VI1-	Voltage Input 1-	
5	VI2+	Voltage Input 2+	Channel 2
6		No Connection	
7		No Connection	
8	VI2-	Voltage Input 2-	
9	VI3+	Voltage Input 3+	Channel 3
10		No Connection	
11		No Connection	
12	VI3-	Voltage Input 3-	
13	VI4+	Voltage Input 4+	Channel 4
14		No Connection	
15		No Connection	
16	VI4-	Voltage Input 4-	

DM6322X1-A1 Replacement
(4AI, ISO, 4 - 20 mA)

1	CI1+	Current Input 1+	Channel 1
2		No Connection	
3		No Connection	
4	CI1-	Current Input 1-	
5	CI2+	Current Input 2+	Channel 2
6		No Connection	
7		No Connection	
8	CI2-	Current Input 2-	
9	CI3+	Current Input 3+	Channel 3
10		No Connection	
11		No Connection	
12	CI3-	Current Input 3-	
13	CI4+	Current Input 4+	Channel 4
14		No Connection	
15		No Connection	
16	CI4-	Current Input 4-	

Figure B-2. F1M01C, FTA I/O Connections

DM6311X1-A2 Replacement
(8 AI, SE, 0 - 10 V)

1	VI1+	Voltage Input 1	Channel 1
2	VI-	Common	
3	VI2+	Voltage Input 2	Channel 2
4	VI-	Common	
5	VI3+	Voltage Input 3	Channel 3
6	VI-	Common	
7	VI4+	Voltage Input 4	Channel 4
8	VI-	Common	
9	VI5+	Voltage Input 5	Channel 5
10	VI-	Common	
11	VI6+	Voltage Input 6	Channel 6
12	VI-	Common	
13	VI7+	Voltage Input 7	Channel 7
14	VI-	Common	
15	VI8+	Voltage Input 8	Channel 8
16	VI-	Common	

Figure B-3. F1M01E, FTA I/O Connections

DM6312X1-A2 Replacement
(4 AI, ISO, 0 - 10 V)

1	VI1+	Voltage Input 1+	Channel 1
2		No Connection	
3		No Connection	
4	VI1-	Voltage Input 1-	
5	VI2+	Voltage Input 2+	Channel 2
6		No Connection	
7		No Connection	
8	VI2-	Voltage Input 2-	
9	VI3+	Voltage Input 3+	Channel 3
10		No Connection	
11		No Connection	
12	VI3-	Voltage Input 3-	
13	VI4+	Voltage Input 4+	Channel 4
14		No Connection	
15		No Connection	
16	VI4-	Voltage Input 4-	

Figure B-4. F1M01F, FTA I/O Connections

DM6341X1-A1 Replacement
(4 AI, ISO, mV)

1	mVI1+	mV Input 1+	Channel 1
2		No Connection	
3		No Connection	
4	mVI1-	mV Input 1-	
5	mVI2+	mV Input 2+	Channel 2
6		No Connection	
7		No Connection	
8	mVI2-	mV Input 2-	
9	mVI3+	mV Input 3+	Channel 3
10		No Connection	
11		No Connection	
12	mVI3-	mV Input 3-	
13	mVI4+	mV Input 4+	Channel 4
14		No Connection	
15		No Connection	
16	mVI4-	mV Input 4-	

Figure B-5. F1M02, FTA I/O Connections (1 of 2)

DM6351X1-A1/A2, DM6352X1-A1/A2, DM6353X1-A1/A2,
DM6354X1-A1, or DM6355X1-A1 Replacement
(4 AI, ISO, Thermocouple)

1	Tc1+	Tc Input 1+	Channel 1
2	Tc1-	Tc Input 1-	
3	RC1+	Zero Ohm Jumper	
4	RC1-	Zero Ohm Jumper	
5	Tc2+	Tc Input 2+	Channel 2
6	Tc2-	Tc Input 2-	
7	RC2+	Zero Ohm Jumper	
8	RC2-	Zero Ohm Jumper	
9	Tc3+	Tc Input 3+	Channel 3
10	Tc3-	Tc Input 3-	
11	RC3+	Zero Ohm Jumper	
12	RC3-	Zero Ohm Jumper	
13	Tc4+	Tc Input 4+	Channel 4
14	Tc4-	Tc Input 4-	
15	RC4+	Zero Ohm Jumper	
16	RC4-	Zero Ohm Jumper	

Figure B-6. F1M02 FTA I/O Connections (2 of 2)

DM6331X1-A1/A2-B1-9A1/9A2/9A3 Replacement
(4 RTD, ISO)

1	Red 1	Red	Channel 1
2	Wht 1	White	
3	Wht 1	White	
4		No Connection	
5	Red 2	Red	Channel 2
6	Wht 2	White	
7	Wht 2	White	
8		No Connection	
9	Red 3	Red	Channel 3
10	Wht 3	White	
11	Wht 3	White	
12		No Connection	
13	Red 4	Red	Channel 4
14	Wht 4	White	
15	Wht 4	White	
16		No Connection	

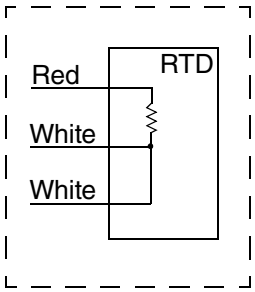


Figure B-7. F1M03, FTA I/O Connections

DM6411X1-A1 Replacement
(4 AO, SE, 1 - 5 V)

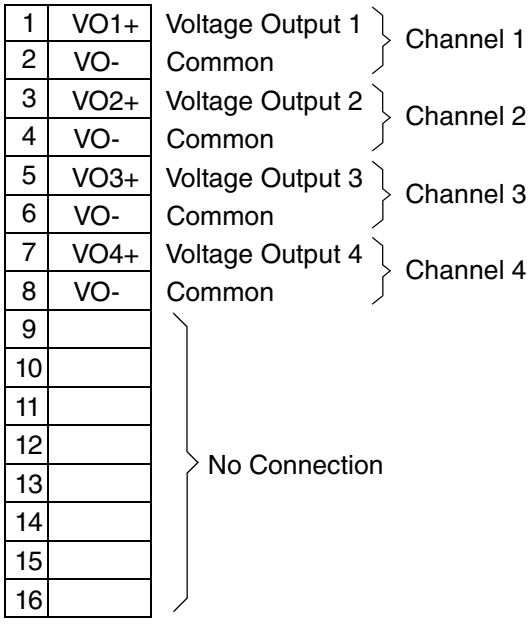


Figure B-8. F1M04A, FTA I/O Connections

DM6421X1-A1 Replacement
(4 AO, SE, 4 - 20 mA)

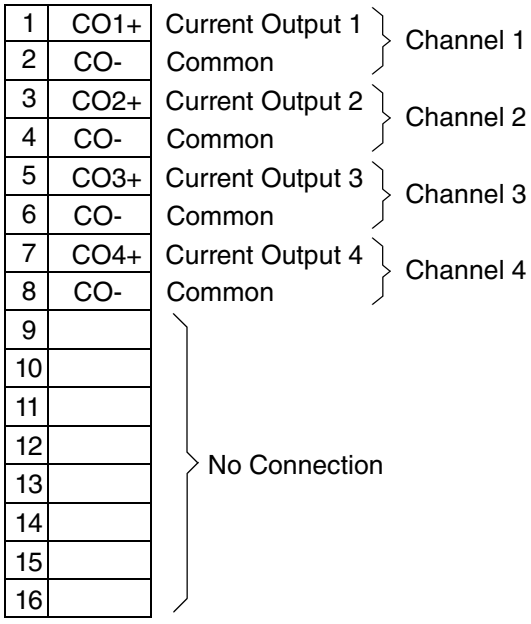


Figure B-9. F1M04B, FTA I/O Connections

DM6371X1-A1 Replacement
(4 DI, Pulsed, 4 - 30 V)

1	PCH1	Voltage Input High	CH 1
2	PCL1	Voltage Input Low	
3	PCH2	Voltage Input High	CH 2
4	PCL2	Voltage Input Low	
5	PCH3	Voltage Input High	CH 3
6	PCL3	Voltage Input Low	
7	PCH4	Voltage Input High	CH 4
8	PCL4	Voltage Input Low	
9		No Connection	
10			
11			
12			
13			
14			
15			
16			

DM6372X1-A1 Replacement
(4 DI, Pulsed, Dry Contacts)

1	PCDC1+	Pulse Count Input 1+	CH 1
2	PCDC1-	Common	
3	PCDC2+	Pulse Count Input 2+	CH 2
4	PCDC2-	Common	
5	PCDC3+	Pulse Count Input 3+	CH 3
6	PCDC3-	Common	
7	PCDC4+	Pulse Count Input 4+	CH 4
8	PCDC4-	Common	
9		No Connection	
10			
11			
12			
13			
14			
15			
16			

DM6373X1-A1 Replacement
(4 DI, Pulsed, Current Pulse)

1	C81F	+24 V dc (Fused)	CH 1
2	CI1+	Current Input 1	
3	CI-	Common	
4			
5	C82F	+24 V dc (Fused)	CH 2
6	CI1+	Current Input 2	
7	CI-	Common	
8			
9	C83F	+24 V dc (Fused)	CH 3
10	CI1+	Current Input 1	
11	CI-	Common	
12			
13	C84F	+24 V dc (Fused)	CH 4
14	CI1+	Current Input 2	
15	CI-	Common	
16			

Figure B-10. F1M06, FTA I/O Connections

DM6361X1-A1 Replacement (8 DI, SE, 4 - 30 V dc) | DM6362-1 Replacement (8 DI, Dry Contact) | DM6361X1-A2 Replacement (8 DI, 120 V ac)

1	DI1+	Discrete Input 1+	Channel 1
2	DI1-	Discrete Input 1-	
3	DI2+	Discrete Input 2+	Channel 2
4	DI2-	Discrete Input 2-	
5	DI3+	Discrete Input 3+	Channel 3
6	DI3-	Discrete Input 3-	
7	DI4+	Discrete Input 4+	Channel 4
8	DI4-	Discrete Input 4-	
9	DI5+	Discrete Input 5+	Channel 5
10	DI5-	Discrete Input 5-	
11	DI6+	Discrete Input 6+	Channel 6
12	DI6-	Discrete Input 6-	
13	DI7+	Discrete Input 7+	Channel 7
14	DI7-	Discrete Input 7-	
15	DI8+	Discrete Input 8+	Channel 8
16	DI8-	Discrete Input 8-	

Figure B-11. F1M07, FTA I/O Connections

DM6461X1-A3/A4 Replacement (8 DO, FET, Momentary/Latching Outputs, 4 - 30 V ac)

1	+24	+24 V dc	CH 1
2	DO1	Discrete Output 1	
3	+24	+24 V dc	CH 2
4	DO2	Discrete Output 2	
5	+24	+24 V dc	CH 3
6	DO3	Discrete Output 3	
7	+24	+24 V dc	CH 4
8	DO4	Discrete Output 4	
9	+24	+24 V dc	CH 5
10	DO5	Discrete Output 5	
11	+24	+24 V dc	CH 6
12	DO6	Discrete Output 6	
13	+24	+24 V dc	CH 7
14	DO7	Discrete Output 7	
15	+24	+24 V dc	CH 8
16	DO8	Discrete Output 8	

DM6461X1-A3/A4 or DM6462X1-A3/A4 Replacement (8 DO, FET, Momentary/Latching Relay, Internal or External)

1	R1	Relay Contact 1	CH 1
2	COM1	Relay Common 1	
3	R2	Relay Contact 2	CH 2
4	COM2	Relay Common 2	
5	R3	Relay Contact 3	CH 3
6	COM3	Relay Common 3	
7	R4	Relay Contact 4	CH 4
8	COM4	Relay Common 4	
9	R5	Relay Contact 5	CH 5
10	COM5	Relay Common 5	
11	R6	Relay Contact 6	CH 6
12	COM6	Relay Common 6	
13	R7	Relay Contact 7	CH 7
14	COM7	Relay Common 7	
15	R8	Relay Contact 8	CH 8
16	COM8	Relay Common 8	

Figure B-12. F1M09, FTA I/O Connections

Appendix C. Field Termination Assembly Jumper Settings

This appendix provides the jumper settings for the Field Termination Assembly (FTA) boards which require these settings.

F1M02 Jumper Settings

Table C-1 provides the settings for the FTA board F1M02.

When the F1M02 board replaces a Fisher thermocouple card such as DM6351, DM6352, DM6353, DM6354, DM6355, set the jumpers to the high scale burnout (pull-up) positions, as indicated in the third column in Table C-1.

When the F1M02 board replaces a Fisher DM6341 milliVolt input card, set the jumpers to the unused (pull-down) positions, as indicated in the last column in Table C-1. Also, for all unused T/C or mV channels, set their jumpers to the unused (pull-down) positions as well.

Table C-1. F1M02 Jumper Settings

Channel	Jumper Group	High Scale Burnout Settings (Pull-Up Positions)	Unused Channel Settings (Pull-Down Positions)
1	W1	Jumper P1 to Jumper P2	Jumper P1 to Jumper P4
2	W2	Jumper P5 to Jumper P6	Jumper P5 to Jumper P7
3	W3	Jumper P8 to Jumper P9	Jumper P8 to Jumper P10
4	W4	Jumper P11 to Jumper P12	Jumper P11 to Jumper P13

The jumper locations on F1M02 are shown in Figure C-1.

NOTE

Replace compensation resistors on the F1M02's FTA with zero Ohm jumpers (user-supplied), as shown in Figure B-6 on page 109.

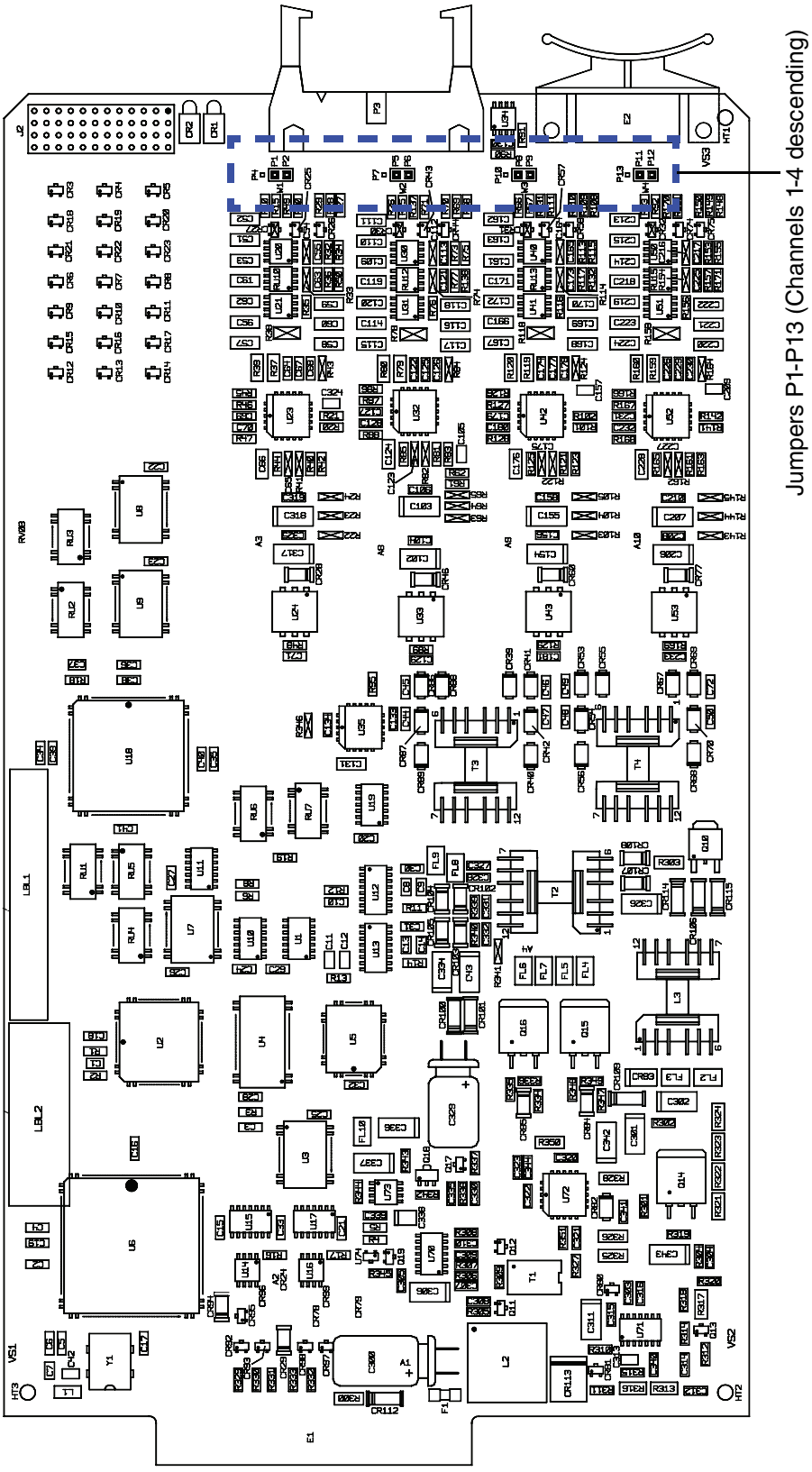
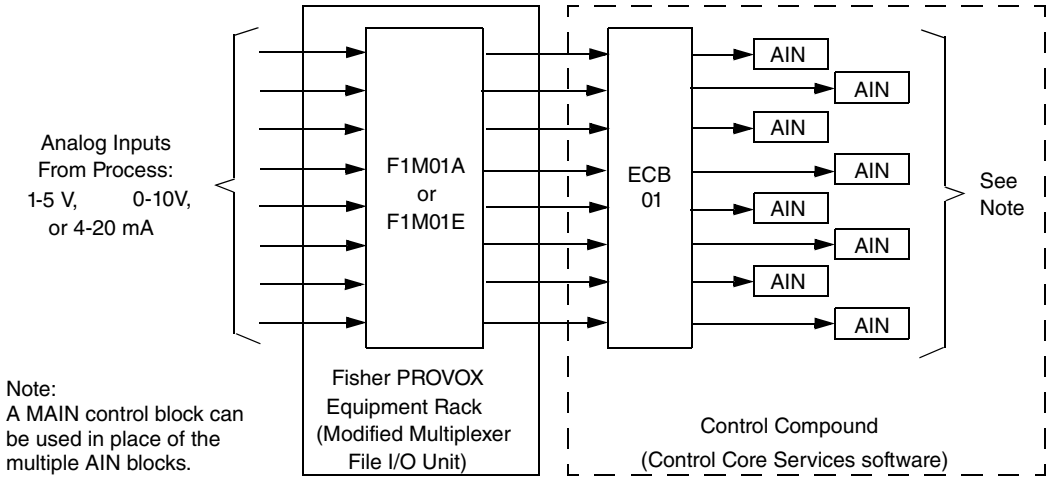


Figure C-1. F1M02 With Jumpers

Appendix D. DCS Fieldbus Module Control Schemes

The following figures show typical control schemes configured for the various types of DCS Fieldbus Modules.



ECB Parameters*
HWTYPE = 1, SWTYPE = 1

SCI (Signal Conditioning Index) for AIN block = 3

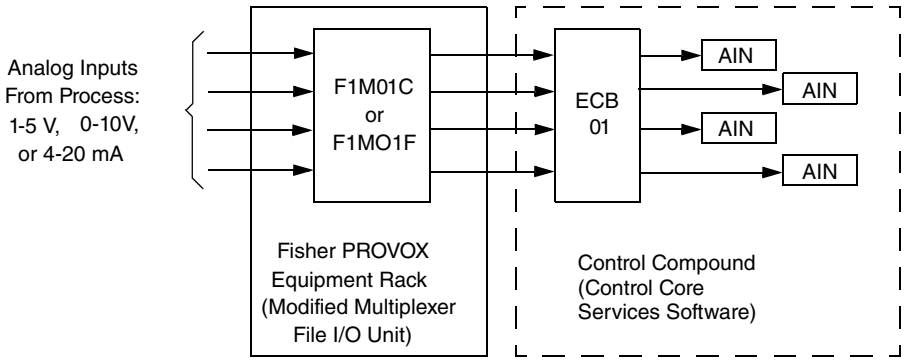
PNT_NO (Point Number) for AIN blocks**

PNT_NO	BLOCK	PNT_NO	BLOCK
1	AI1	5	AI5
2	AI2	6	AI6
3	AI3	7	AI7
4	AI4	8	AI8

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).

**Point number assignments are the same as for the FBM01.

Figure D-1. F1M01A or F1M01E, Typical Control Scheme



ECB Parameters*
HWTYPE = 1, SWTYPE = 1

SCI (Signal Conditioning Index) for AIN block = 3

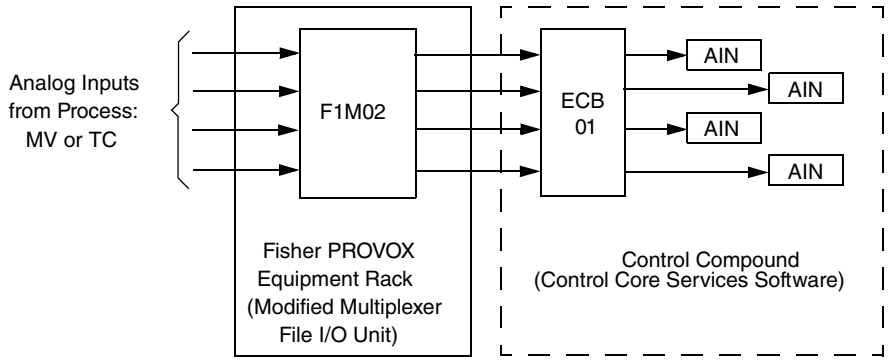
PNT_NO (Point Number) for AIN blocks**

PNT_NO	BLOCK
1	AI1
2	AI2
3	AI3
4	AI4

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).

**Point number assignments are the same as for the FBM01.

Figure D-2. F1M01C or F1M01F, Typical Control Scheme



SCI (Signal Conditioning Index) for AIN block*

THERMOCOUPLE TYPE	SCI
B	20
E	21
J	23
K	24
N	25
R	26
S	27
T	28
Millivolt Input	2

PNT_NO (Point Number) for AIN blocks**

PNT_NO	BLOCK
1	AI1
2	AI2
3	AI3
4	AI4

ECB Parameters***

HWTYPE = 2, SWTYPE = 1

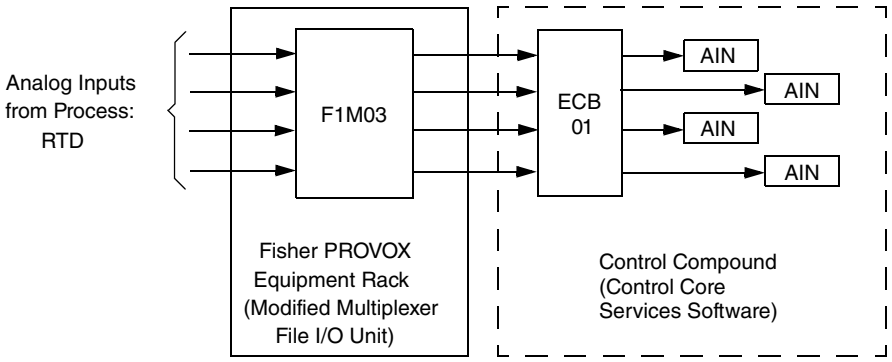
Channel 9 is the temperature compensation channel. Use SCIX 43.

*For additional information on SCI, refer to Integrated Control Block Descriptions (B0193AX).

**Point number assignments are the same as for the FBM02.

***For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).

Figure D-3. F1M02, Typical Control Scheme



SCI (Signal Conditioning Index) for AIN block

RTD TYPE	SCI
Copper (SAMA)	40
Nickel (SAMA)	41
Platinum (100 ohm DIN 43760-1968)	42
Platinum (100 ohm IEC) DIN 43760-1980)	43
Platinum (100 ohm SAMA)	44

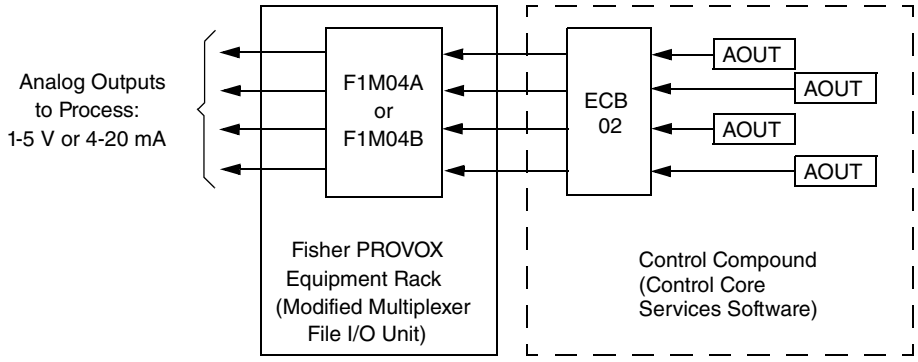
PNT_NO (Point Number) for AIN blocks*

PNT_NO	BLOCK
1	AI1
2	AI2
3	AI3
4	AI4

ECB Parameters**
HWTYPE = 3, SWTYPE = 1

*Point number assignments are the same as for the FBM03.
**For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).

Figure D-4. F1M03, Typical Control Scheme



ECB Parameters*
HWTYPE = 4, SWTYPE = 2

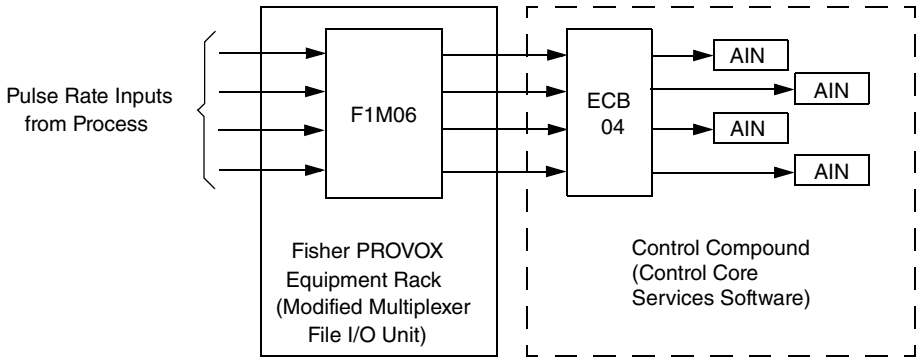
SCI (Signal Conditioning Index) for AOUT block = 3

PNT_NO (Point Number) for AOUT blocks**

PNT NO	BLOCK
5	AO1
6	AO2
7	AO3
8	AO4

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the FBM04.

Figure D-5. F1M04A or F1M04B, Typical Control Scheme



ECB Parameters*
HWTYPE = 6, SWTYPE = 4

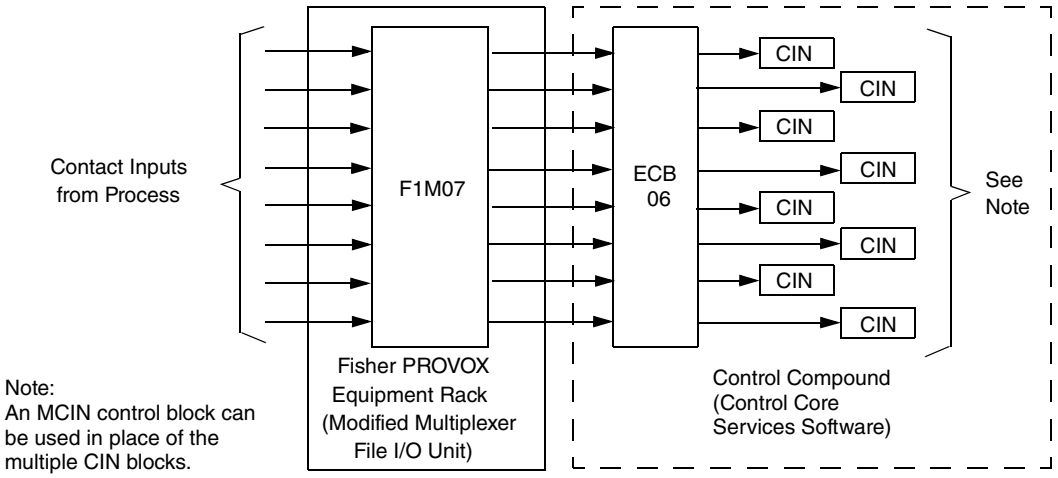
SCI (Signal Conditioning Index) for AIN block = 8 (pulse rate)

PNT_NO (Point Number) for AIN blocks**

PNT_NO	BLOCK
1	AI1
2	AI2
3	AI3
4	AI4

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the FBM06.

Figure D-6. F1M06, Typical Control Scheme



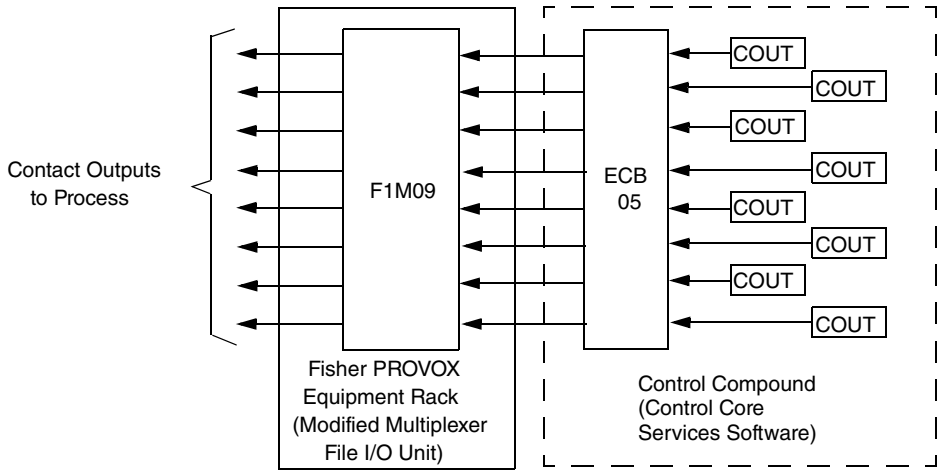
ECB Parameters*
HWTYPE = 7, SWTYPE = 6

PNT_NO (Point Number) for CIN blocks**

PNT NO	BLOCK	PNT NO	BLOCK
1	CI1	5	CI5
2	CI2	6	CI6
3	CI3	7	CI7
4	CI4	8	CI8

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the FBM07.

Figure D-7. F1M07, Typical Control Scheme



ECB Parameters*

HWTYPE = 9, SWTYPE = 5

PNT_NO (Point Number) for COUT blocks**

PNT NO	BLOCK	PNT NO	BLOCK
9	CO1	13	CO5
10	CO2	14	CO6
11	CO3	15	CO7
12	CO4	16	CO8

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the Foxboro Evo FBM09.

Figure D-8. F1M09

Appendix E. CP60 Upgrade

This appendix provides the procedure to upgrade CP30 or CP40 Control Processors to CP60 Control Processors on existing Foxboro Evo systems.

To upgrade CP30 or CP40 to CP60 on existing Foxboro Evo systems:

1. Prior to replacing CP30 or CP40 control processors with a CP60, you must install V6.3.2 or V6.5 System Software on the existing system.
2. After the system has been upgraded to V6.3.2 or V6.5, the CP30s and CP40s can be replaced with CP60 control processors. Follow the instructions in *Control Processor 60 and Control Processor 60S Installation and Maintenance* (B0400FB) for CP60 and DCM10E, DCM10Ef installation.

Appendix F. FCP280 or FCP270 Upgrade

This appendix provides the procedure to upgrade CP30, CP40, or CP60 control processors to FCP280 or FCP270 control processors on existing Foxboro Evo systems.

NOTE

The FCP280 is supported by Control Core Services software v9.0 or later.
The FCP270 is supported by I/A Series software v8.1.1 to v8.8 or Control Core Services software v9.0 or later.

To replace CP30, CP40, or CP60 control processors with the FCP280 or FCP270, perform the following:

1. Install the appropriate version of the Control Core Services software on the Foxboro Evo system which contains your control processors - see the note above. Refer to the Global Customer Support website (*https://support.ips.invensys.com*) for the latest version of Control Core Services software and its documentation.
2. After the system has been upgraded to the appropriate Control Core Services software revision, the CP30s, CP40s and CP60s can be replaced with the FCP280 or FCP270.
   - To install the FCP280, refer to *Field Control Processor 280 (FCP280) Upgrade Guide* (B0700GC) for instructions on replacing the CP30s, CP40s or CP60s, and refer to the chapter "Installing the Field Control Processor 280" in *Field Control Processor 280 (FCP280) User's Guide* (B0700FW) for instructions on installing the FCP280.
   - To install the FCP270, follow the instructions in *Field Control Processor 270 (FCP270) User's Guide* (B0700AR).
   - To cable the Fieldbus to the FCP280, follow the instructions in "Fieldbus Cabling at the FCP280" on page 41.
   - To cable the Fieldbus to the FCP270, follow the instructions in "Fieldbus Cabling at the FCP270" on page 47.

Appendix G. ZCP270 Upgrade

This appendix provides the procedure to upgrade CP30, CP40, or CP60 control processors to ZCP270 control processors on existing Foxboro Evo systems.

NOTE

The ZCP270 is supported by I/A Series software v8.3 to v8.8 or Control Core Services software v9.0 or later.

To replace CP30, CP40, or CP60 control processors with the ZCP270, perform the following:

1. Install I/A Series software v8.3 to v8.8 or Control Core Services software v9.0 or later on the existing system.
2. After the system has been upgraded to I/A Series software v8.3 to v8.8 or Control Core Services software v9.0 or later, the CP30s, CP40s and CP60s can be replaced with ZCP270 control processors. To install the ZCP270, follow the instructions in *Z-Module Control Processor 270 (ZCP270) User's Guide* (B0700AN). To cable the Fieldbus to the ZCP270, follow the instructions in "Fieldbus Cabling at the ZCP270" on page 53.

Appendix H. Power Supply Replacement

The following procedures describe how to replace the 24 V dc rack-mounted power supplies for the DCS Fieldbus Module subsystem with the Lambda® LZSa-1000-3 24 V dc power supplies (P0904HT).

These new power supplies are not included in the Migration Kits, but are ordered separately from Invensys Systems, Inc.

Power Supply (P0904HT) Replacement

⚠ CAUTION

The following procedure assumes that power has been removed from the existing power supply. Before switching off power to the existing power supply, ensure that such action will not adversely affect the process.

⚠ CAUTION

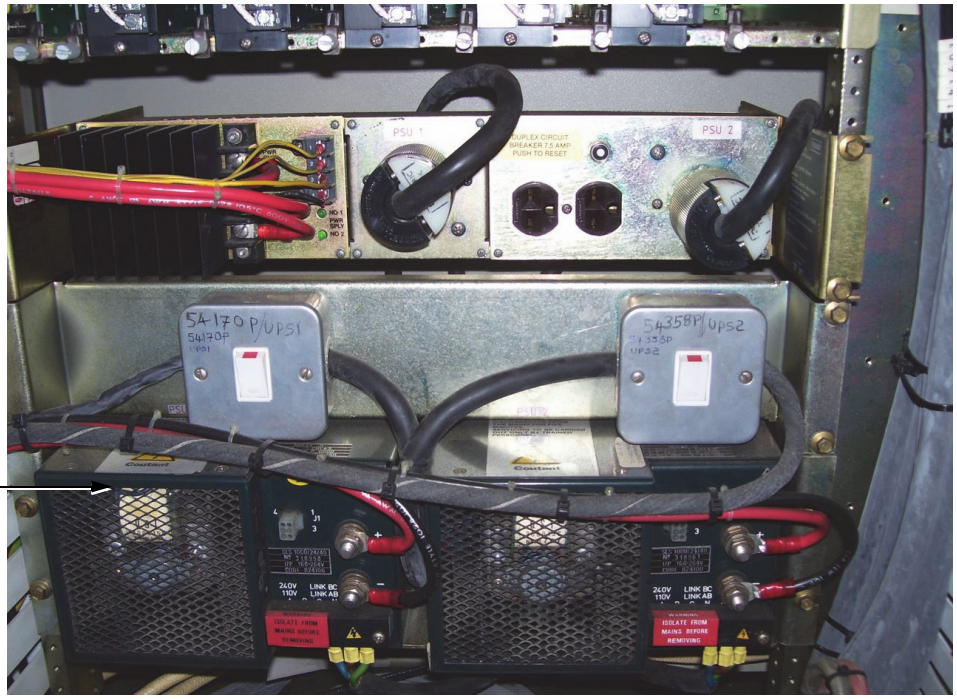
For the P0904HT power supplies, use the vendor-supplied mounting hardware. All mounting hardware used with these power supplies must be plated. No copper washers are allowed.

The original power supplies, and their replacements, are shown in Figure H-1. Proceed as follows:

1. Remove the power-in and power-out cables from the power supplies, noting (for future reference) which cables are connected to which input/output terminals.
2. Referring to Figure H-1, remove the screws holding the power supplies in place, and set the screws aside.
3. Remove the power supplies from the rack, and replace them with the new power supplies (P0904HT).
4. Secure the new power supplies to the rack with the vendor-supplied M4 mounting screws and plated M4 lock washers.
5. Make the power-in and power-out cable connections as indicated in Figure H-2 on page 129. A label on top of the new power supply describes all possible cable connections, as well as jumper and switch settings. If external indication of the power supply status is to be employed, refer to “Power Supply Status Cable Installation” on page 130 for information on installing the power supply status cable.

⚠ CAUTION

When attaching the power cables to the newly installed power supply, use the vendor-supplied hardware provided with the power supply, including the main insulated cable clamp and screw (1), the 0.25 x 20 x 0.75 output terminal bolts and nuts (2 each), and the plated output terminal lock washers (2). Use of the old screws may cause impaired current conductivity.



Remove screws that secure original power supplies to rack - set aside

Figure H-1. Original Vendor and Replacement 24 V dc Power Supplies

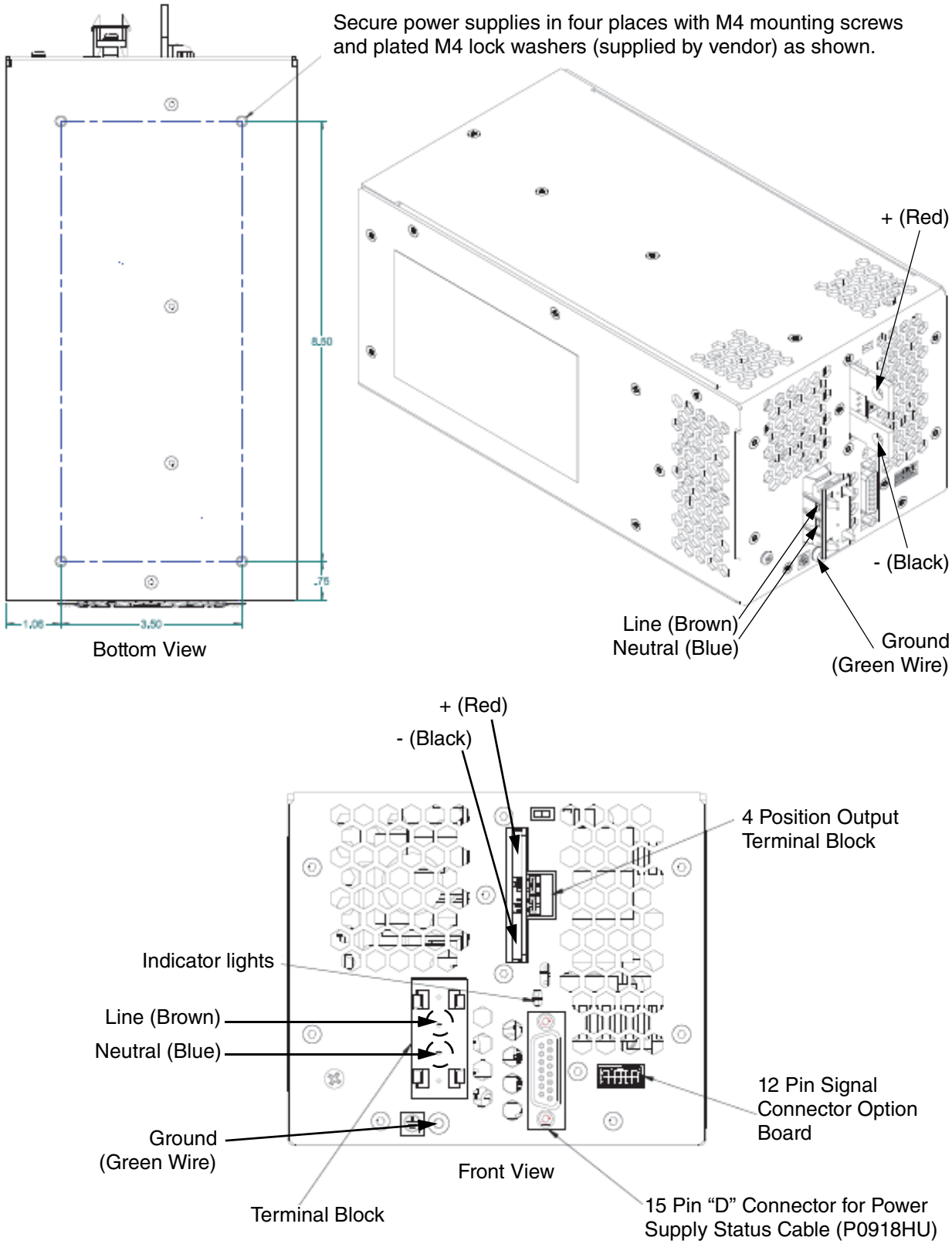


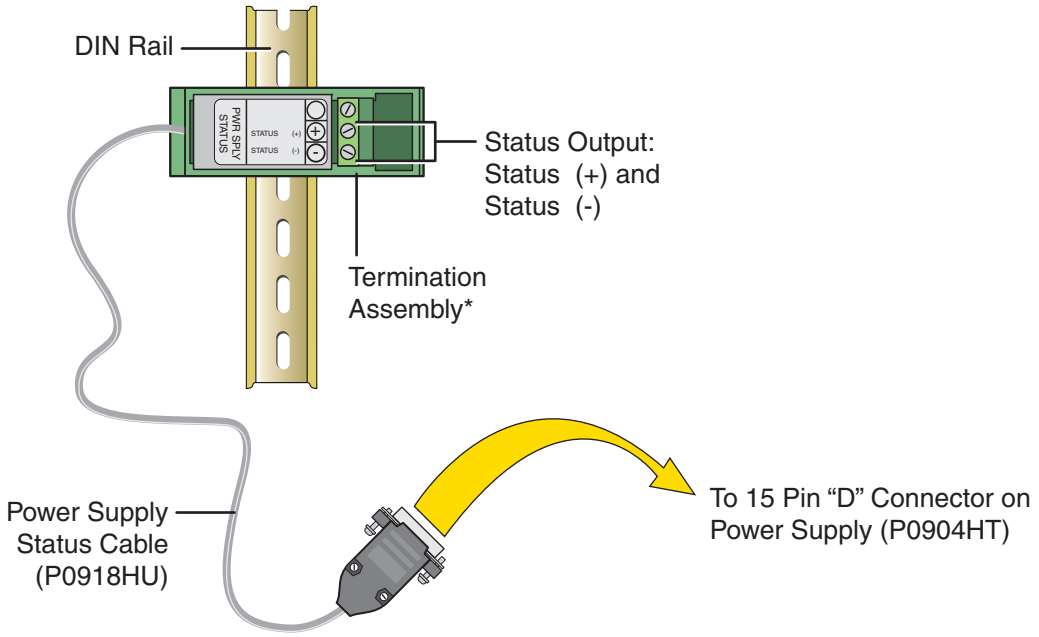
Figure H-2. LZSa-1000-3 24 V dc (P0904HT) Power Supply Replacement

Power Supply Status Cable Installation

A status cable (Foxboro Part Number P0918HU) can be used in conjunction with appropriate indicator circuitry to provide indication of the power supply's operating status. When the power supply output is good (above its minimum specified value), the power supply produces a switch closure condition at the status cable output points, which are labeled **`Status (+)`** and **`Status (-)`**. If the power supply should fail (or lose input power), the power supply produces an open switch condition. The status output is from an opto transistor (inside the power supply) capable of switching 1 mA dc, with an ON voltage less than 0.4 v at 1 mA. Open circuit voltage at the **`Status (+)`** and **`Status (-)`** output points must not exceed 30 v.

Be sure that the connections to the status cable outputs are wired according to the polarity as marked on the associated termination assembly as shown in Figure H-3 below.

1. Mount the termination assembly (part of cable assembly P0918HU) on a DIN rail in the equipment cabinet.
2. Attach the power supply status cable to the 15 Pin "D" connector as shown in Figure H-2 above.



* The Termination Assembly is a part of the Power Supply Status Cable assembly (P0918HU).

Figure H-3. Power Supply Status Cable Installation

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Invensys Systems, Inc.
10900 Equity Drive
Houston, TX 77041
United States of America
http://www.invensys.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
Website: https://support.ips.invensys.com