Foxboro

by Schneider Electric

Foxboro Evo™
Process Automation System

DCS Fieldbus Modules for Bailey NET90 and INFI90® Systems User's Guide

B0193XG *K*

B0193XG

Rev K
December 12, 2014

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Preface

This document describes all aspects of the DCS Fieldbus Modules for Bailey NET90 and INFI 90® systems migration, including:

- ♦ Configuration
- ♦ Installation
- ♦ Maintenance.

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 Foxboro Evo or I/A Series® 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 release of the document (B0193XG-K), the following changes were made:

Global

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

Reference Documents

In addition to various Bailey documents associated with the INFI 90 and NET90 control system, you should be familiar with the Foxboro Evo or 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 270 (CP270) and Field Control Processor 280 (CP280) Integrated Control Software Concepts* (B0700AG)
- *Control Processor 60 and Control Processor 60S Installation and Maintenance* (B0400FB)
- *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA)
- *Integrated Control Block Descriptions* (B0193AX)
- *I/A Series Configuration Component (IACC) User's Guide* (B0700FE)
- *Integrated Control Configurator* (B0193AV)
- *Integrated Control Software Concepts* (B0193AW) - for CP60 or earlier control processors
- *Network Cable Systems Installation and Maintenance* (B0193UW)
- *System Manager* (B0750AP)
- *Process Operations and Displays* (B0193MM)
- *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 (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 user. This manual provides the information needed to properly install, use, and maintain the DCS (Distributed Control System) Fieldbus Modules subsystem.

Compliance with European Directives

All installation instructions shall be followed for the system to comply with mandatory European Directives 89/336/EEC and 73/23/EEC.

1. Introduction

This chapter provides an overview of the DCS (Distributed Control System) Fieldbus Module subsystem equipment and its implementation.

The DCS Fieldbus Modules for Bailey® systems (or, DCS Fieldbus Module subsystem) provides a means of migrating control of loops from Bailey NET90 and INFI 90 equipment to a Foxboro Evo system.

DCS Fieldbus Modules plug directly into existing Bailey module mounting units (nests) in place of Bailey controller and slave module cards. Existing process I/O terminations and wiring are preserved. All original process I/O capability of the Bailey Controller Module (CM), Analog Slave Module (ASM), Analog Output Module (AOM), Digital Slave Module (DSM), Controller Interface Slave Module (CIS), and Multifunction Controller module (MFC) functions is replaced by direct Control Processor (CP) scanning and control.

The newly installed DCS Fieldbus Modules interchange process measurement and output signals and digital input/output signals between the original Bailey Field Termination Units (FTUs) and 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 Control Processor is via the Foxboro Evo Fieldbus, which can be implemented in either a single or redundant configuration. The DCS Fieldbus Module subsystem can exist as a single entity on the Foxboro Evo Fieldbus, can be combined with other DCS Fieldbus Module subsystems on the Fieldbus, or can be mixed with Fieldbus modules (FBMs) and/or other Fieldbus-based process interface subsystems.

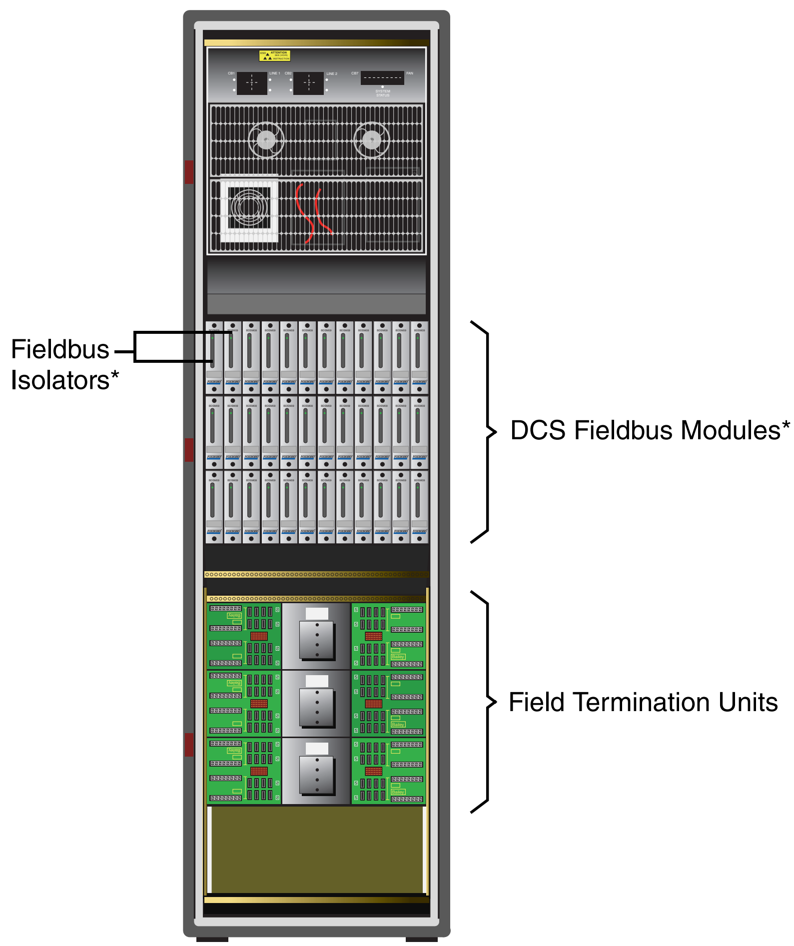
Figure 1-1 shows typical implementation of the DCS Fieldbus Module subsystem in a Process Control Unit cabinet.

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

- DCS Fieldbus Modules – Operating in conjunction with the control processor, these modules replace the functions performed by the original BM, MFC, AMM and LMM units and their associated slave modules in the module mounting units [MMU(s)].
- Fieldbus Isolators (BFBIs) – Used in pairs for Fieldbus A and B, the Fieldbus Isolators (BFBIs) provide electrical isolation between the Foxboro Evo Fieldbus and the newly installed DCS Fieldbus Modules. The local Fieldbus connection between the BFBI and the DCS Fieldbus Modules in the MMU is via the original MMU backplane slave bus connections.
- Fieldbus Jumper Card (BFBE1) – For newer MMU backplanes (6637803 series), these cards provide extension of the Fieldbus (channels A and B) from the MMU containing the Fieldbus Isolator(s) to other MMUs in the same rack.

- Fieldbus Jumper Cable (P0918CD) – For older MMU backplanes (6632003 series), these cables provide extension of the Fieldbus (channels A and B) from the MMU containing the Fieldbus Isolator(s) to other MMUs in the same rack.
- Isolated A/B Switch Card (BFBE2) – Used for optional extension of the Fieldbus in remote I/O configurations (where additional DCS Fieldbus Modules are located in other Bailey cabinets). This card provides electrical isolation of the remote DCS Fieldbus Modules. It also provides automatic Fieldbus A/B switching, allowing local Fieldbus A or local Fieldbus B information (whichever is active) to be communicated to/from the remote DCS Fieldbus Modules.

In addition to these major components, various supporting hardware items (Fieldbus cabling, equipment labels, termination cable assemblies, and so forth) are also included in the migration kit.



*New items installed as part of the equipment upgrade

Figure 1-1. Typical DCS Fieldbus Module Subsystem Implementation

NOTE

For all dual-baud applications with FCP270s and DCS Fieldbus Modules for Bailey NET90 and INFI 90® systems equipment connected to 100 Series Fieldbus modules (FBMs), consider the use of FBI200s or FBI100s, which filter the FCP270's 2 Mbps signals out, to ensure only the intended 268 Kbps signals reach the 100 Series FBMs. These modules can resolve a variety of potential communication issues.
The FCP280s do not require FBI200s or FBI100s as signal filtering is built into the FCP280's baseplate.
FBI100s are discussed in *FBI100 Fieldbus Isolator/Filter* (PSS 31H-2Y16).
FBI200s are discussed in *FBI200 Fieldbus Isolator/Filter* (PSS 31H-2Y18).
As the FCP280 does not support dual-baud communications on any of its HDLC fieldbuses, FBI200s are not required for signal filtering. However, FBI200s may be used with the FCP280 optionally to extend the HDLC fieldbus.

NOTE

For the FCP280, separation is achieved in the Fieldbus port connection (there is a dedicated port for 100 series FBMs and a dedicated port for 200 series FBMs).

Subsystem Implementation – Overview

For the most part, implementation of the migration kit installation consists of the following actions. (Complete equipment installation/configuration instructions are provided in subsequent chapters.)

- Determining, from Table 1-1 through Table 1-6, which DCS Fieldbus Modules are to be used in replacing the Bailey modules
- Performing the equipment installation procedures (presented in Chapter 2 "Equipment Installation"), which consist mainly of removing control modules (cards) from the MMUs (nests) and replacing them with DCS Fieldbus Modules
- Making the required Fieldbus connections from the control processor to the DCS Fieldbus Module subsystem (see Chapter 2 "Equipment Installation")
- Providing (optional) an extension of the Fieldbus to other Bailey equipment cabinets (see Appendix E "Optional Fieldbus Extension")
- Performing system configuration and integrated control configuration (see Chapter 3 "Configuration").

Module Replacements

The following subsections describe the Bailey modules and the DCS Fieldbus Modules that replace them. Each replacement module (DCS Fieldbus Module) is powered by the original module mounting unit power bus.

Controller Module

A Controller Module (CIS01, CIS02, COM02, COM03, COM04, QRC01, QRS01, QRS02) connects directly to an Analog Controller Termination Unit. The CM processor card is removed and replaced by an DCS Fieldbus Module BCOM17 (see Table 1-1). This provides the original I/O functionality of high-level analog input, analog output, contact input, and contact output.

Table 1-1. Controller Module Replacements

Foxboro Model	Replaces Bailey	Description
BCOM17	IMCOM02/03/04; NCOM02/03/04; IMQRC01; NQRC01; IMCIS01/02/12/22; NCIS01/02/12; IMQRS01/02/12; NQRS01/02	4 AI (1 to 5 V dc, 4 to 20 mA) 2 AO (1 to 5 V dc, 4 to 20 mA) 3 DI (24 V dc, 125 V dc, 120 V ac) 4 DO (24 V dc, 250 mA)

Analog Master (AMM) and Slave Modules (ASI, ASM, ASO)

Each Analog Master Module is removed and replaced with an DCS Fieldbus Module BAMM01, and the Analog Slave Modules are removed and replaced by a corresponding DCS Fieldbus Modules (see Table 1-2). This provides the original I/O functionality of high-level analog input, low level analog thermocouple input, and low-level analog RTD input.

Table 1-2. Analog Master and Slave Module Replacements

Model	Replaces	Description
BAMM01	NAMM01/02/03; IMAMM03	4 RTD
BASO37	IMASO01; IMASO11 NASO01	14 AO (1 to 5 V, 4 to 20 mA)
BASM01	IMASM01; NASM01	16 AI (4 to 20 mA, 1 to 5 V, 0 to 10 V, ±10 V dc)
BASM02	IMASM02; NASM02	8 AI, Thermocouple
BASM03	IMASM03; NASM03	8 AI, RTD Platinum, Nickel
BASM33	IMASM04; NASM04	8 AI, RTD Copper
BASI03	IMASI03/13/23	16 AI, High Level, mV, TC, RTD
BASI01	IMASI01/02/12/22; NASI01/02; IMFBS01/02, IMFEC11/12	15 AI (4 to 20 mA, 0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 1 V dc)

Analog Output Module (AOM)

Each Analog Output Module is removed and replaced by a DCS Fieldbus Module BAOM37 (see Table 1-3). The BAOM37 provides the original I/O functionality of the analog output modules.

Table 1-3. Analog Output Module Replacements

Model	Replaces	Description
BAOM37	IMAOM01; NAOM01	8 AO (0 to 10 V, 1 to 5 V, 4 to 20 mA)

Logic Master Module (LMM)

Logic Master Modules provide contact inputs and contact outputs directly to the termination units. Additional I/O is provided to the LMM by Digital Slave Modules and Contact Input Slave Modules. The LMMs are removed and replaced by a DCS Fieldbus Module BDSM9A (see Table 1-4). This provides original I/O functionality of the LMM.

Table 1-4. Logic Master Module Replacements

Model	Replaces	Description
BDSM9A	IMLMM02; NLMM01/02	8 DI (24 V dc, 125 V dc, 120 V ac) 8 DO (24 V dc)

Digital Slave Modules (DSI, DSM, DSO)

Digital Slave Modules are removed and replaced by corresponding DCS Fieldbus Modules (see Table 1-5). This provides original I/O functionality of the digital input and/or output.

Table 1-5. Digital Slave Module Replacements

Model	Replaces	Description
BDSI07	IMDSI02/12/22; NDSI01/02; NDSM02/03 IMDSI12 IMDSI13 IMDSI14 IMDSI15	16 DI (24 V dc, 125 V dc, 120 V ac)
BDSM06	IMDSM04; NDSM04	8 PI
BDSM9B	NDSM01; IMDSM05; NDSM05	16 DI, 16DO, 24 V dc (groups of 8)
BDSO10	IMDSO01; NDSO01 IMDSO15	8 DO (24 to 240 V ac/solid-state relay)

Table 1-5. Digital Slave Module Replacements (Continued)

Model	Replaces	Description
BDSO26	IMDSO02; NDSO02 IMDSO15	8 DO (4 to 60 V dc/solid-state relay)
BDSO41	IMDSO03; NDSO03	8 DO (5 to 160 V dc/solid-state relay)
BDSM09	IMDSO04; NDSO04 IMDSO14	16 DO (24 V dc/solid-state relay)

Multifunction Controller Module (MFC01, MFC02, MFC03)

A Multifunction Controller Module connects to various slave modules for process input and output. The MFC processor card is no longer needed, and is therefore removed. Associated slave modules (ASM, DSM, PIM) are replaced as described in other sections of this document.

Pulse Input Slave Modules (PIM)

Each Pulse Input Slave Module is removed and replaced by a DCS Fieldbus Module BDSM06. This provides original I/O functionality of the pulse inputs.

Sequence of Events Module

Each Sequence of Events module is removed and replaced by a DCS Fieldbus Module BSEM01 (see Table 1-6). The Bailey IMSEM01 SEQ Master is no longer needed, and is therefore removed. The Bailey IMSET01 Time Synchronizer and IMSED01 Digital Input modules are replaced with the BSEM01. This provides sequence of events functionality for all corresponding inputs.

Table 1-6. Sequence of Events Module Replacements

Model	Replaces	Description
BSEM01	IMSET01; IMSED01	16 DI Sequence of Events (24 V dc, 48 V dc, 120 V dc, 120 V ac)

Programmable Logic Controller Module (MPC01, MPC02)

A Programmable Logic Controller Module connects to the same slave modules for process input and output as the Multifunction Controller Module. The MPC processor card is no longer needed and is therefore removed. Associated slave modules (ASM, DSM, PIM, CIS) are replaced as described in other sections of this document.

Other Devices

Network communications functions, programmable logic controller (PLC™) interfaces, and operator and computer interfaces are all replaced by standard Foxboro Evo functions or interfaces. The original Bailey devices are decommissioned and removed from the original mounting units.

Migration Components/Kit

Migration Kit

Migration is accomplished using the Bailey Migration Kit (P0915XY), whose content is listed in Table 1-7.

Table 1-7. Controller Module Migration Kit (P0915XY) Components

Foxboro Part Number	Description	Quantity
P0903AN	Migration Kit Label	2
B0918EU	General Information (“Plugged In”) Label	2
P0903PN	DIN Rail, 7.175 in	1
X0127DH	Screw, Panhead, 0.190-32 x 0.75	2
X0143AT	Washer, Plain, 0.190	2
X0143SC	Washer, Lock, 0.190	2
X0169LF	Nutclip, 0.190	2
P0178EC	Dipshunt (8-position) for use on MMU backplane	2
P0178ED	Dipshunt (12-position) for use on MMU backplane	6

Migration Components

Table 1-8 lists the as required components used in the Bailey Migration.

Table 1-8. Controller Module Migration Components

Foxboro Part Number	Description	Quantity
P0903VY	Termination Cable Assembly, for primary Fieldbus communications	1
P0914SK	Fieldbus Isolator (BFBI), for primary and redundant Fieldbus communication	1
P0903VY	Termination Cable Assembly, for redundant Fieldbus communications	1
P0914SN	BFBE1 Fieldbus Jumper Card	As required
P0914SG	BFBE2 Isolated A/B Switch Card	As required
P0170RW	Fieldbus Jumper Cable (for BFBE1 Fieldbus Jumper Card)	As required
X0175LM	Fieldbus Jumper Cable Connectors (2 Per BFBE1 Fieldbus Jumper Card or One per BFBE2 Isolated A/B Switch Card)	As required
P0918CD	MMU-to-MMU Fieldbus Ribbon Cable (Bailey P/N NKSB02)[1]	As required
n/a	MMU-to-MMU Fieldbus Ribbon Cable (Bailey P/N NKEB03)	As required
n/a	MMU-to-MMU Fieldbus Ribbon Cable (Bailey P/N NKEB01)	As required
n/a	MMU-to-MMU Brown-Flex Ribbon Cable (Bailey P/N 1948502A340)	As required

Table 1-8. Controller Module Migration Components (Continued)

Foxboro Part Number	Description	Quantity
P0914QG	BCOM17 DCS Fieldbus Module: 4 AI (1 to 5 V dc, 4 to 20 mA); 2 AO (1 to 5 V dc, 4 to 20 mA); 3 DI (24 V dc, 125 V dc, 120 V ac); 4 DO (24 V dc, 250 mA)	As required
P0915GC	BAMM01 DCS Fieldbus Module: 4 RTD	As required
P0914QN	BASO37 DCS Fieldbus Module: 14 AO (1 to 5 V, 4 to 20 mA)	As required
P0914QR	BASM01 DCS Fieldbus Module: 16 AI (4 to 20 mA, 1 to 5 V, 0 to 10 V, ±10 V dc)	As required
P0914QU	BASM02 DCS Fieldbus Module: 8 AI, Thermocouple	As required
P0914QX	BASM03 DCS Fieldbus Module: 8 AI, RTD Platinum, Nickel	As required
P0914RA	BASM33 DCS Fieldbus Module: 8 AI, RTD Copper	As required
P0914RD	BASI03 DCS Fieldbus Module: 16 AI, high-level, mV, TC, RTD	As required
P0914RG	BASI01 DCS Fieldbus Module: 15 AI (4 to 20 mA, 0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 1 V dc)	As required
P0914QK	BAOM37 DCS Fieldbus Module: 8 AO (0 to 10 V, 1 to 5 V, 4 to 20 mA)	As required
P0914RK	BDSM9A DCS Fieldbus Module: 8 DI (24 V dc, 125 V dc, 120 V ac), 8DO (24 V dc)	As required
P0914RN	BDSI07 DCS Fieldbus Module: 16 DI (24 V dc, 125 V dc, 120 V ac)	As required
P0914RR	BDSM06 DCS Fieldbus Module: 8 PI	As required
P0914RU	BDSM9B DCS Fieldbus Module: 16 DI, 16 DO, 24 V dc (groups of 8)	As required
P0914RY	BDSO10 DCS Fieldbus Module: 8 DO (24 to 240 V ac/solid-state relay)	As required
P0914SA	BDSO26 DCS Fieldbus Module: 8 DO (4 to 50 V dc/solid-state relay)	As required
P0915WA	BDSO41 DCS Fieldbus Module: 8 DO (5 to 160 V dc/solid-state relay)	As required
P0914SD	BDSM09 DCS Fieldbus Module: 16 DO (24 V dc/solid-state relay)	As required
P0915YC	BSEM01 DCS Fieldbus Module: 16 DI Sequence of Events (24 V dc, 48 V dc, 120 V dc, 120 V ac)	As required
P0178EC	Dipshunt (8 position) for use on Field Termination Units (if required)	As required

[1] See Figure 2-16 on page 30 for cable lengths.

Control Processor/System Software Compatibility

The DCS Fieldbus Modules are modified Fieldbus Modules (FBMs) in a Bailey NET90 and INFI 90 equipment form factor. Addressing is accomplished by standard letterbugs.

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

- Foxboro Evo Control Core Services software (hereinafter referred to as Control Core Services software) v9.0 (or higher) is required for FCP280.
- I/A Series software v8.1.1 (or higher) is required for FCP270 and ZCP270.
- I/A Series software v6.3.1-v8.8 or Control Core Services software v9.0 (or higher) is required for CP60.
- I/A Series software v4.3-v8.8 or Control Core Services software v9.0 (or higher) is required for CP30 and CP40.

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 Processor	This is any Foxboro Evo module that effects process control via the Foxboro Evo Fieldbus. Examples are the Field Control Processor 280 (FCP280), Field Control Processor 270 (FCP270), Z-Module Control Processor 270 (ZCP270), and Control Processor 60 (CP60), Control Processor 40 (CP40), and Control Processor 30 (CP30). The control processor 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 provide the interface between process sensors/actuators and the Fieldbus in a standard system.
Fieldbus	This is 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 the associated control processors.

Letterbug	In the Foxboro Evo system, this is a plastic character. When interlocked with other plastic characters, it forms a 6-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	The termination cable assembly provides a means of attaching the Fieldbus to various devices – for example, to the control processor at one end, and a Fieldbus Isolator at the other.

2. Equipment Installation

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

> **NOTE**
> To minimize interruption of the process, it may be desirable to perform System Configuration (or System Definition) prior to installing the DCS Fieldbus Module subsystem equipment. If this is the case for your installation, refer to Chapter 3 "Configuration" and proceed with the System Configuration (or Definition) process.

Preinstallation Requirements

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

1. If desired (see note above), perform the system configuration for the new (soon to be installed) DCS Fieldbus Module subsystem (refer to "Configuration" on page 63).
2. If desired (see note above), perform the integrated control configuration for the new (soon to be installed) DCS Fieldbus Module subsystem (refer to "Integrated Control Configuration" on page 66).
3. Determine the module ID (letterbug) numbers that the DCS Fieldbus Modules will contain. Refer to the configuration reports for your system, and to "Module Identifier (Letterbug) Assignments" on page 64.
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.

Migration Kit Installation

Migration kit installation involves the performance of three basic procedures, presented in the following subsections:

- "DCS Fieldbus Module Installation" on page 12
- "Fieldbus Cabling at the CP40" on page 31
- "Fieldbus Cabling at the CP60" on page 33
- "Fieldbus Cabling at the FCP280" on page 35
- "Fieldbus Cabling at the FCP270" on page 40
- "Fieldbus Cabling at the ZCP270" on page 46
- "Fieldbus Cabling at the DCS Fieldbus Module Subsystem" on page 56.

DCS Fieldbus Module Installation

⚠ CAUTION

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

To install the DCS Fieldbus Module subsystem migration kit, proceed as follows:

⚠ CAUTION

Wear a properly connected electrostatic discharge (ESD) wrist strap while removing, handling, and installing the DCS Fieldbus Modules. Connect the ESD strap to the rack ground bar.

Observe the following steps when handling electronic circuitry:

1. Use the static shielding bags supplied with the DCS Fieldbus Modules.
2. Ground the bag before opening.
3. Avoid touching the DCS Fieldbus Module circuitry.

1. Check to ensure that all dipshunts are in place in the MMU nest backplane. (Dipshunt receptacles exist on the backplane between the pairs of module connectors, as shown in Figure 2-1.) All backplane dipshunts must be in place for proper implementation of the migration kit. To determine whether the dipshunts are present, temporarily remove each Bailey module (one at a time) and observe whether the associated dipshunt is in place. (If insertion of a dipshunt is required, the adjacent module may have to be removed to provide access.) **NOTE: Be careful to return each module to its proper position (slot).** The migration kit contains six, 12-position dipshunts (Part Number P0178ED) as extras for installation purposes.

NOTE

Installation of this migration kit does not require changes to jumper or dipshunt settings on the Bailey Termination Units. However, at this point, it may be a good idea to make certain that the Termination Unit jumpers and dipshunts are properly set for the required process control operations. Refer to Appendix B “I/O Connection and Dipshunt Information” for the jumper and dipshunt setting information.

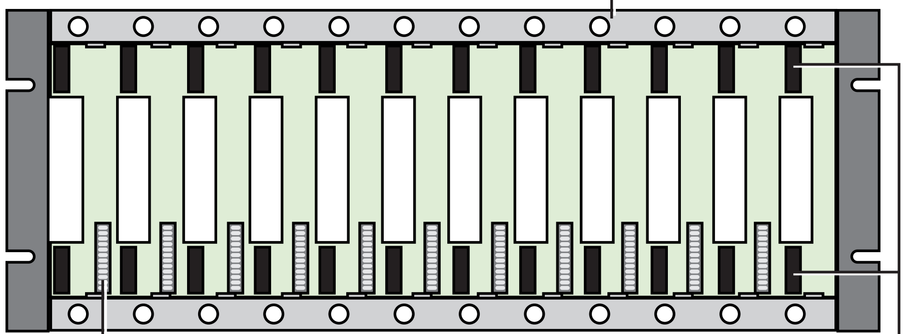
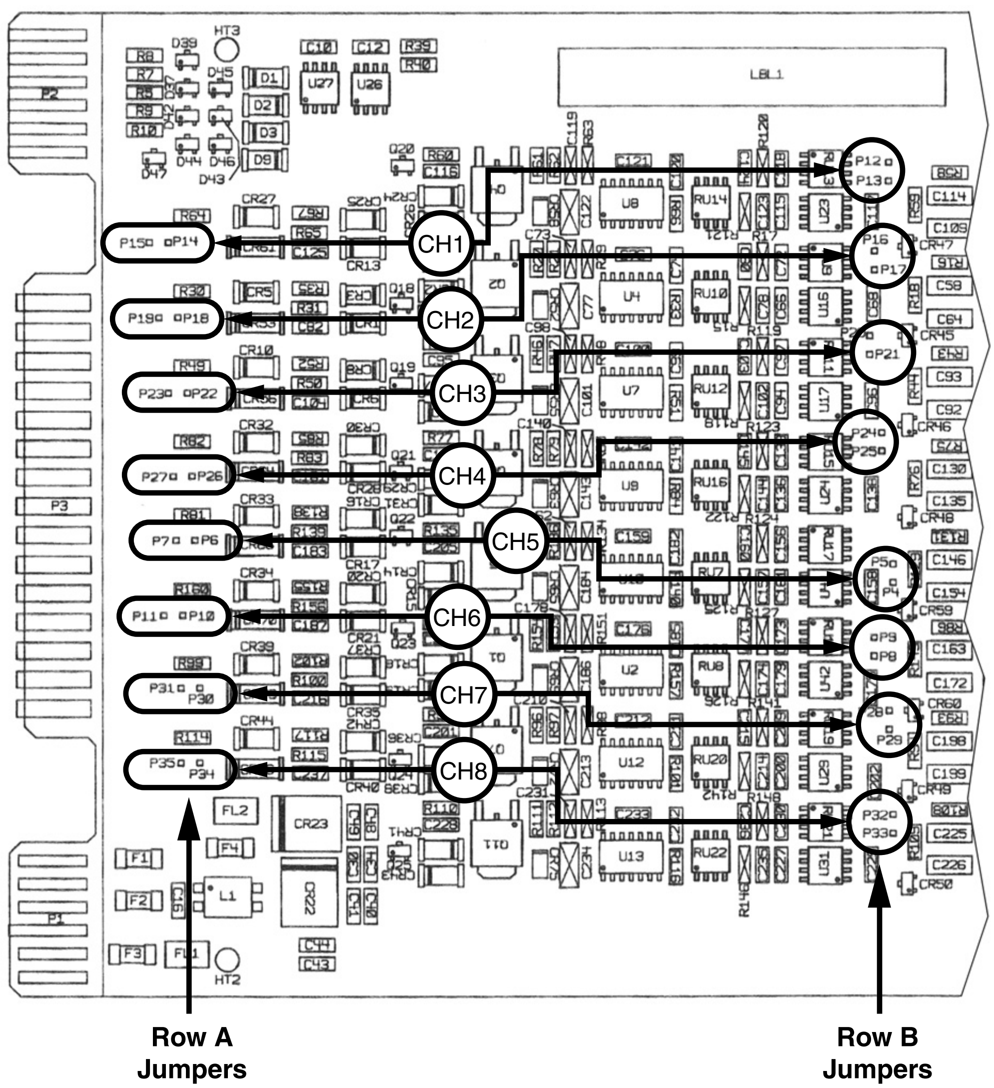


Figure 2-1. MMU Backplane Dipshunt Installation

2. Install the Fieldbus Isolators (up to two BFBIs) in any two spare slot(s) in one of the MMU nests. The preferred nest for Fieldbus Isolator installation is the first MMU nest. The Fieldbus Isolators are typically installed in place of the Bailey multifunction controllers/processors. A Fieldbus Isolator (or pair of Fieldbus Isolators) is required for up to 34 DCS Fieldbus Modules (in up to 3 MMU nests total).
3. Replace each Bailey module, on a one-for-one basis, with a DCS Fieldbus Module. Proceed as follows.
   a. Refer to Table 1-1 through Table 1-6 for listings of Bailey module replacements.
   b. On each DCS Fieldbus Module to be installed, install a module identifier (letterbug set). Refer to "Module Identifier (Letterbug) Installation" on page 58 for specific instructions.
   c. Certain DCS Fieldbus Module types have jumpers which must be set for required operations: BAOM37, BASM02, BAS037, BCOM17, BDSI07, BSEM01, BDSM06,and BDSM9B. Referring to Figure 2-2 through Figure 2-11 as a guide, position the jumpers on those DCS Fieldbus Modules that require jumper settings.
   d. Once all DCS Fieldbus Modules have been equipped with module identifiers (as indicated in Step b), and all jumpers are in place (as indicated in Step c), replace each Bailey module with its corresponding DCS Fieldbus Module (as indicated in Table 1-1 through Table 1-6).
4. Referring to Figure 2-12, at the rear of each of the Fieldbus Isolators (up to two), set the Fieldbus A/B jumpers: on one card, set the jumper to Fieldbus A, and on the other card set it to Fieldbus B. (If only one Fieldbus Isolator card is being installed, select Fieldbus A.)
5. Make the Fieldbus connections between the MMUs (nests). The cable connections depend on the specific style of backplane in question:

- For backplanes with no cable connectors, see Figure 2-15 on page 29 for cabling instructions.
- For backplanes having vertical ribbon cable connectors, see Figure 2-13 on page 28 for cabling instructions.
- For backplanes having horizontal surface-mount cable connectors, see Figure 2-16 on page 30 for cabling instructions.
- For backplanes having horizontal ribbon cable connectors, see Figure 2-17 on page 30 for cabling instructions.

6. Install the migration kit label (P0903AN) in a prominent location near the MMU nests containing the DCS Fieldbus Modules.
7. Install the general information ("Plugged In") labels (P0918EU) 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 nameplate(s) should be removed to avoid maintenance confusion. If no nameplates exist, place the labels at about eye level.
8. If the Fieldbus is to be extended to service DCS Fieldbus Modules in other Bailey equipment racks, go to Appendix E "Optional Fieldbus Extension". Otherwise, go to "Fieldbus Cabling at the CP40" on page 31.



Jumper settings for any one channel:

Output Type	Row A Jumper	Row B Jumper
4 to 20 mA	IN	OUT
0 to 10 V dc	OUT	IN
0 to 5 V dc	OUT	OUT

Figure 2-2. DCS Fieldbus Module BAOM37 Jumpers

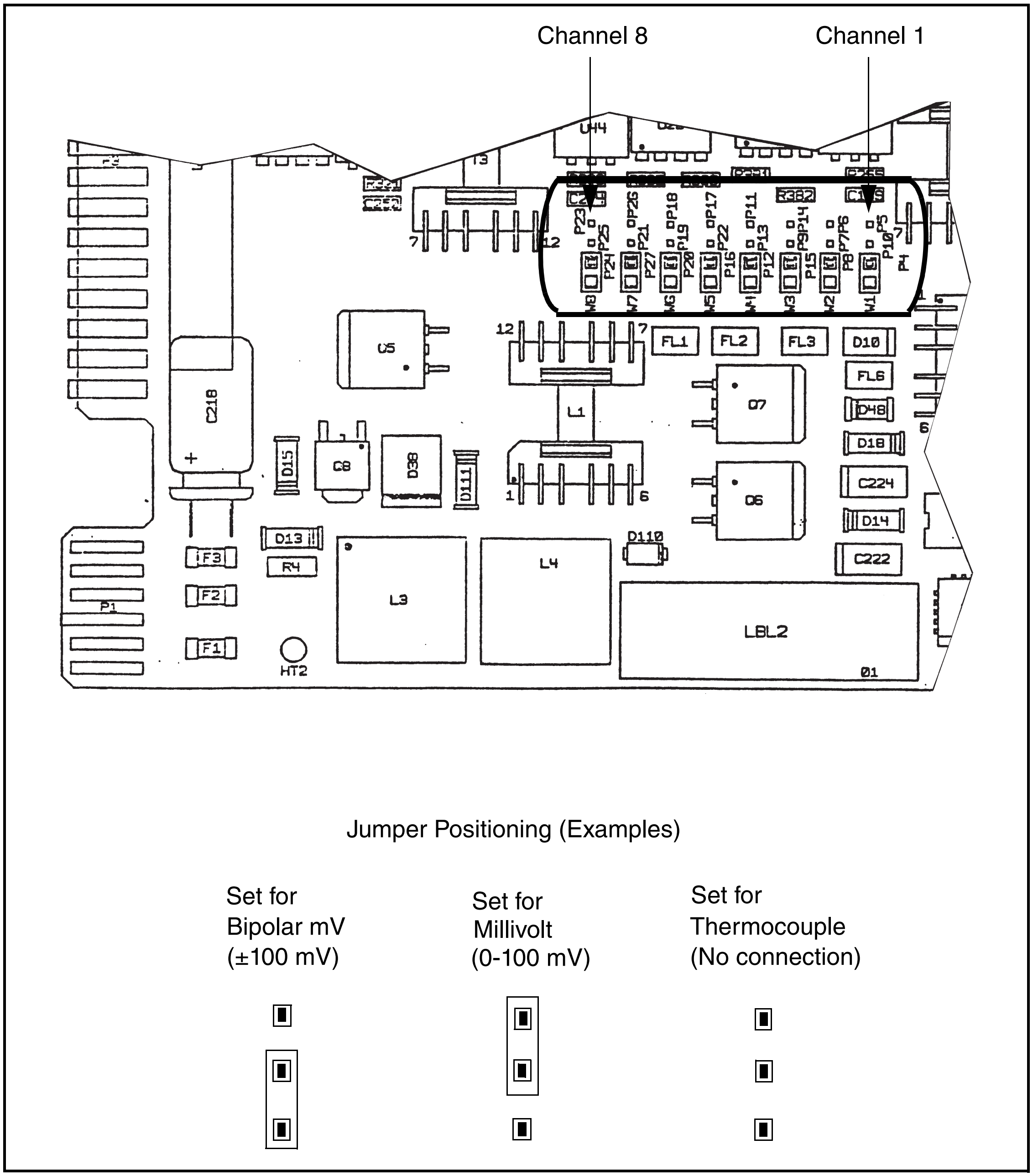
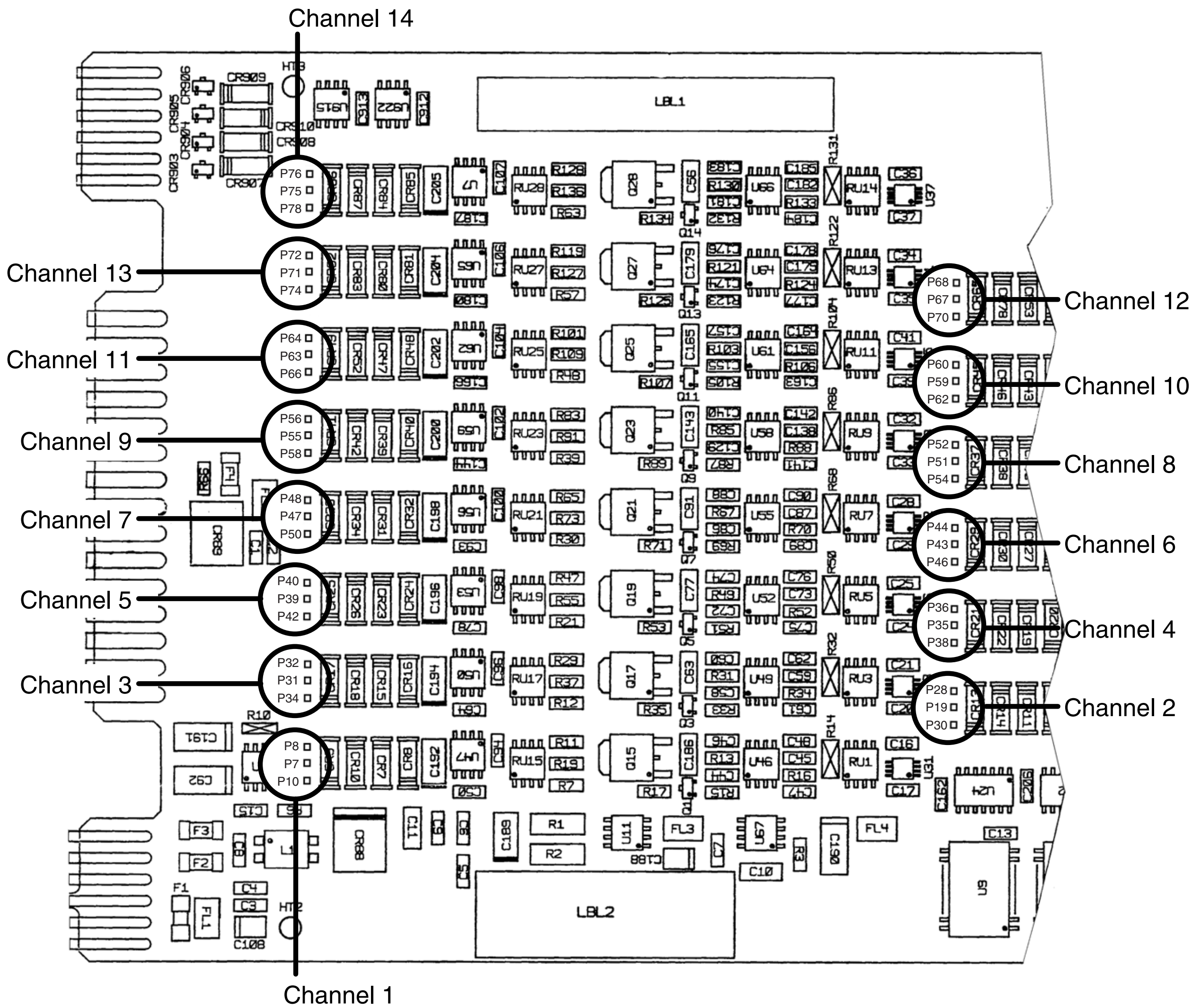


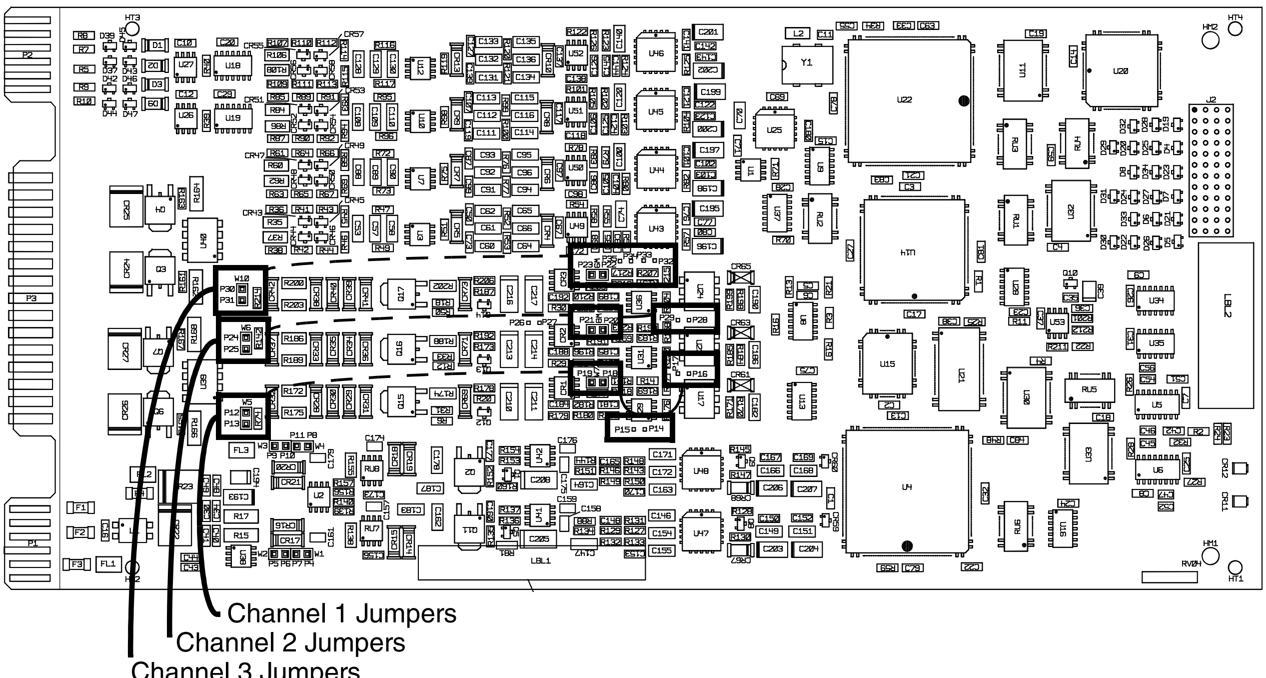
Figure 2-3. DCS Fieldbus Module BASM02 Jumpers



Desired Output	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7
4 to 20 mA	P8-P7	P28-P19	P32-P31	P36-P35	P40-P39	P44-P43	P48-P47
1 to 5 V dc	P7-P10	P19-P30	P31-P34	P35-P38	P39-P42	P43-P46	P47-P50

Desired Output	Channel 8	Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14
4 to 20 mA	P52-P51	P56-P55	P60-P59	P64-P63	P68-P67	P72-P71	P76-P75
1 to 5 V dc	P51-P54	P55-P58	P59-P62	P63-P66	P67-P70	P71-P74	P75-P78

Figure 2-4. DCS Fieldbus Module BAS037 Jumpers



Contact Inputs

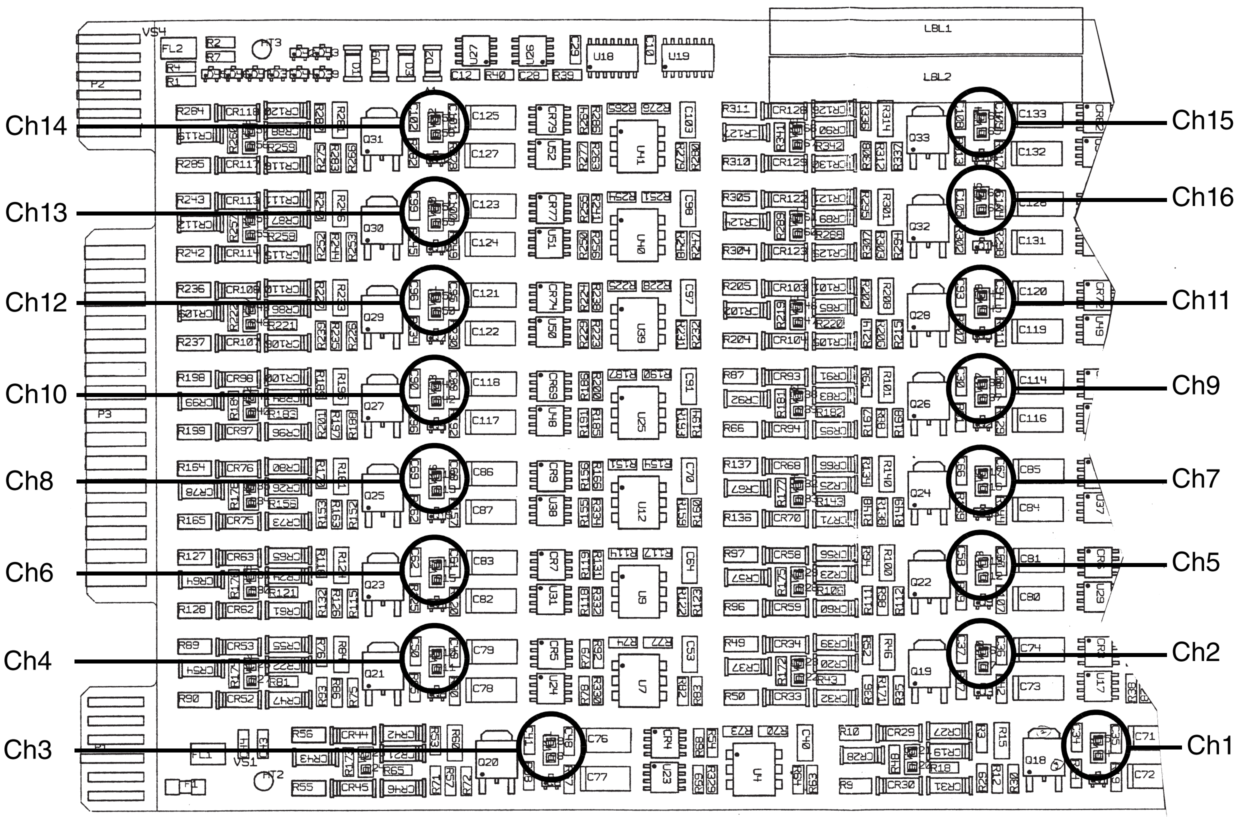
Channel 1 Jumpers	Channel 2 Jumpers	Channel 3 Jumpers
A - P12-P13	A - P24-P25	A - P30-P31
B - P14-P15	B - P26-P27	B - P32-P33
C - P16-P17	C - P28-P29	C - P34-P35
D - P18-P19	D - P20-P21	D - P22-P23

Range	Jumper Settings				Bailey Module Replaced
	A	B	C	D	
24 V dc, High	OFF	ON	OFF	OFF	IMQRS01/02, IMCIS01/02, NQRS01/02, NCIS01/02
24 V dc, Low	ON	OFF	OFF	OFF	IMCOM02/03/04, NCOM02/03/04, IMQRC01, NQRC01
125 V dc, High	OFF	ON	OFF	ON	IMQRS01/02, IMCIS01/02, NQRS01/02, NCIS01/02
125 V dc, Low	ON	OFF	ON	OFF	IMCOM02/03/04, NC0M02/03/04, IMQRC01, NQRC01
120 V ac	OFF	ON	OFF	ON	IMQRS01/02, IMCIS01/02, NQRS01/02, NCIS01/02

Analog Outputs

Channel	Output Type	Jumper Positions
1	4 to 20 mA	P6 to P7 (only)
	1 to 5 V dc	P4 to P7, and P5 to P6
2	4 to 20 mA	P10 to P11 (only)
	1 to 5 V dc	P8 to P11, and P9 to P10

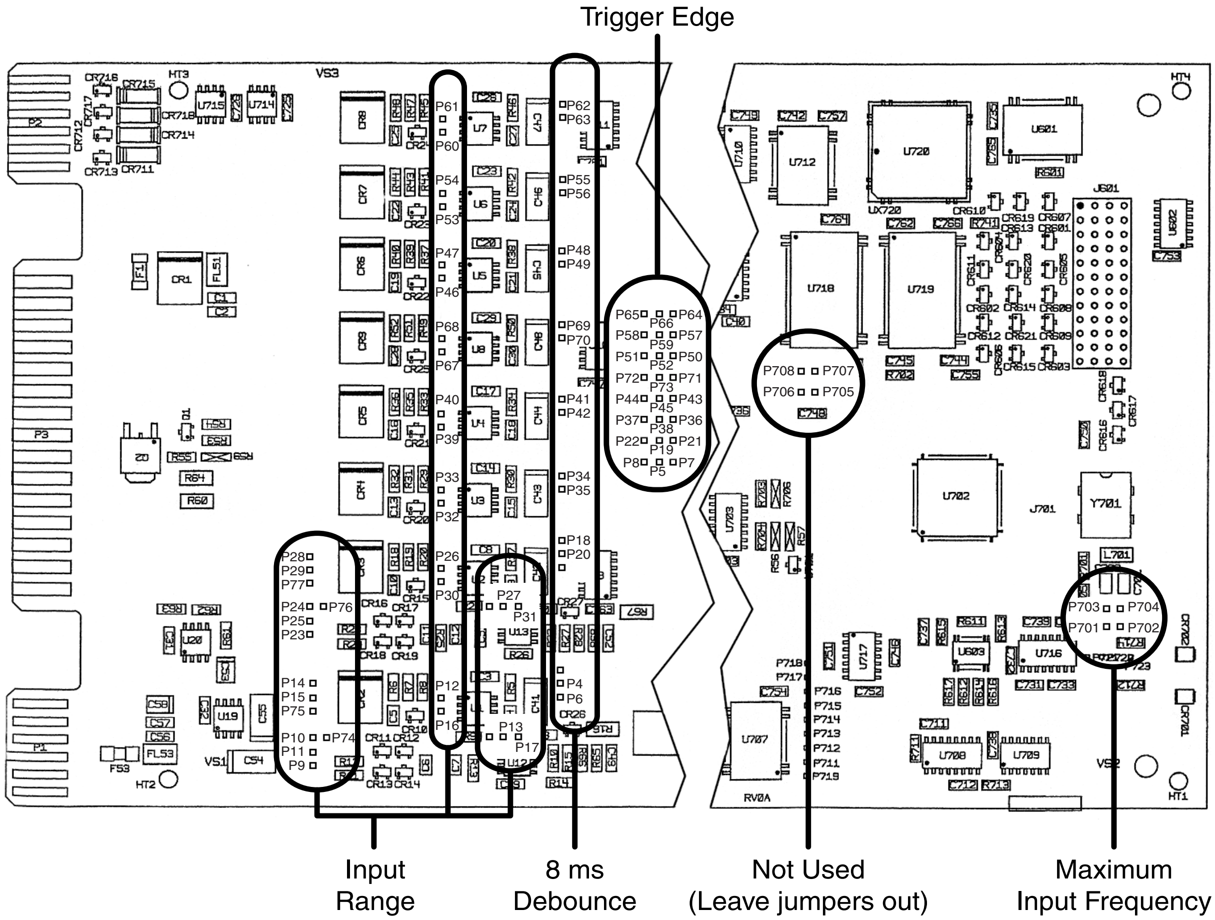
Figure 2-5. DCS Fieldbus Module BCOM17 Jumpers



Jumper Positions: IN = 125 V dc/120 V ac Input; OUT* = 24 V dc Input

*NOTE: To maintain proper isolation between channels, remove jumper completely when in the “open” position.

Figure 2-6. DCS Fieldbus Module BDSI07 Jumpers



NOTE: For jumper placement information, refer to Table 2-1 on page 21.

Figure 2-7. DCS Fieldbus Module BDSM06 Jumpers

Table 2-1. Jumper Settings for BDSM06 DCS Fieldbus Module

Channel	Input Range	8 msec Debounce Time	Trigger Edge	Maximum Input Frequency
1	Range 1: 0-6 V dc P10-P11 P14-P15 P12-P16 *Bailey Equivalent*:* *S2 OUT* *J1 - A* Range 2: 0-27 V dc P10-P11 P14-P15 *Bailey Equivalent*:* *S2 OUT* *J1 - B* Range 3: mV P9-P11 P17-P13 P15-P75 P10-P74 *Bailey Equivalent*:* *S2 IN* *J1 - B*	For 8 msec. debounce: P4-P6 *Bailey Equivalent*:* *J9 - D*	For Ranges 1 & 2 Positive edge: P5-P8 Negative edge: P5-P7 For Range 3 Positive edge: P5-P7 Negative edge: P5-P8 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*
2	Range 1: 0-6 V dc P24-P25 P28-P29 P26-P30 *Bailey Equivalent*:* *S3 OUT* *J2 - A* Range 2: 0-27 V dc P24-P25 P28-P29 *Bailey Equivalent*:* *S3 OUT* *J2 - B* Range 3: mV P23-P25 P31-P27 P77-P29 P76-P24 *Bailey Equivalent*:* *S3 IN* *J2 - B*	For 8 msec debounce: P18-P20 *Bailey Equivalent*:* *J10 - D*	For Ranges 1 & 2 Positive edge: P19-P22 Negative edge: P19-P21 For Range 3 Positive edge: P19-P21 Negative edge: P19-P22 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*

Table 2-1. Jumper Settings for BDSM06 DCS Fieldbus Module (Continued)

Channel	Input Range	8 msec Debounce Time	Trigger Edge	Maximum Input Frequency
3	Range 1: 0-6 V dc P32-P33 *Bailey Equivalent*:* *J3 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J3 - B*	For 8 msec debounce: P34-P35 *Bailey Equivalent*:* *J11 - D*	For Ranges 1 & 2 Positive edge: P37-P38 Negative edge: P38-P36 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*
4	Range 1: 0-6 V dc P39-P40 *Bailey Equivalent*:* *J4 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J4 - B*	For 8 msec debounce: P41-P42 *Bailey Equivalent*:* *J12 - D*	For Ranges 1 & 2 Positive edge: P44-P45 Negative edge: P45-P43 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*
5	Range 1: 0-6 V dc P67-P68 *Bailey Equivalent*:* *J5 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J5 - B*	For 8 msec debounce: P69-P70 *Bailey Equivalent*:* *J13 - D*	For Ranges 1 & 2 Positive edge: P72-P73 Negative edge: P71-P73 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*
6	Range 1: 0-6 V dc P46-P47 *Bailey Equivalent*:* *J6 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J6 - B*	For 8 msec debounce: P48-P49 *Bailey Equivalent*:* *J14 - D*	For Ranges 1 & 2 Positive edge: P51-P52 Negative edge: P50-P52 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*
7	Range 1: 0-6 V dc P53-P54 *Bailey Equivalent*:* *J7 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J7 - B*	For 8 msec debounce: P55-P56 *Bailey Equivalent*:* *J15 - D*	For Ranges 1 & 2 Positive edge: P58-P59 Negative edge: P57-P59 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*

Table 2-1. Jumper Settings for BDSM06 DCS Fieldbus Module (Continued)

Channel	Input Range	8 msec Debounce Time	Trigger Edge	Maximum Input Frequency
8	Range 1: 0-6 V dc P60-P61 *Bailey Equivalent*:* *J8 - A* Range 2: 0-27 V dc No jumper *Bailey Equivalent*:* *J8 - B*	For 8 msec debounce: P62-P63 *Bailey Equivalent*:* *J16 - D*	For Ranges 1 & 2 Positive edge: P65-P66 Negative edge: P64-P66 *(The Bailey equivalent was configured in the Bailey software)*	12.5 Khz Jumpers OUT 25 Khz P703-P704 50 Khz P701-P702 *(Selection depends on application)*

*See Figure 2-8 for Bailey board jumper locations.

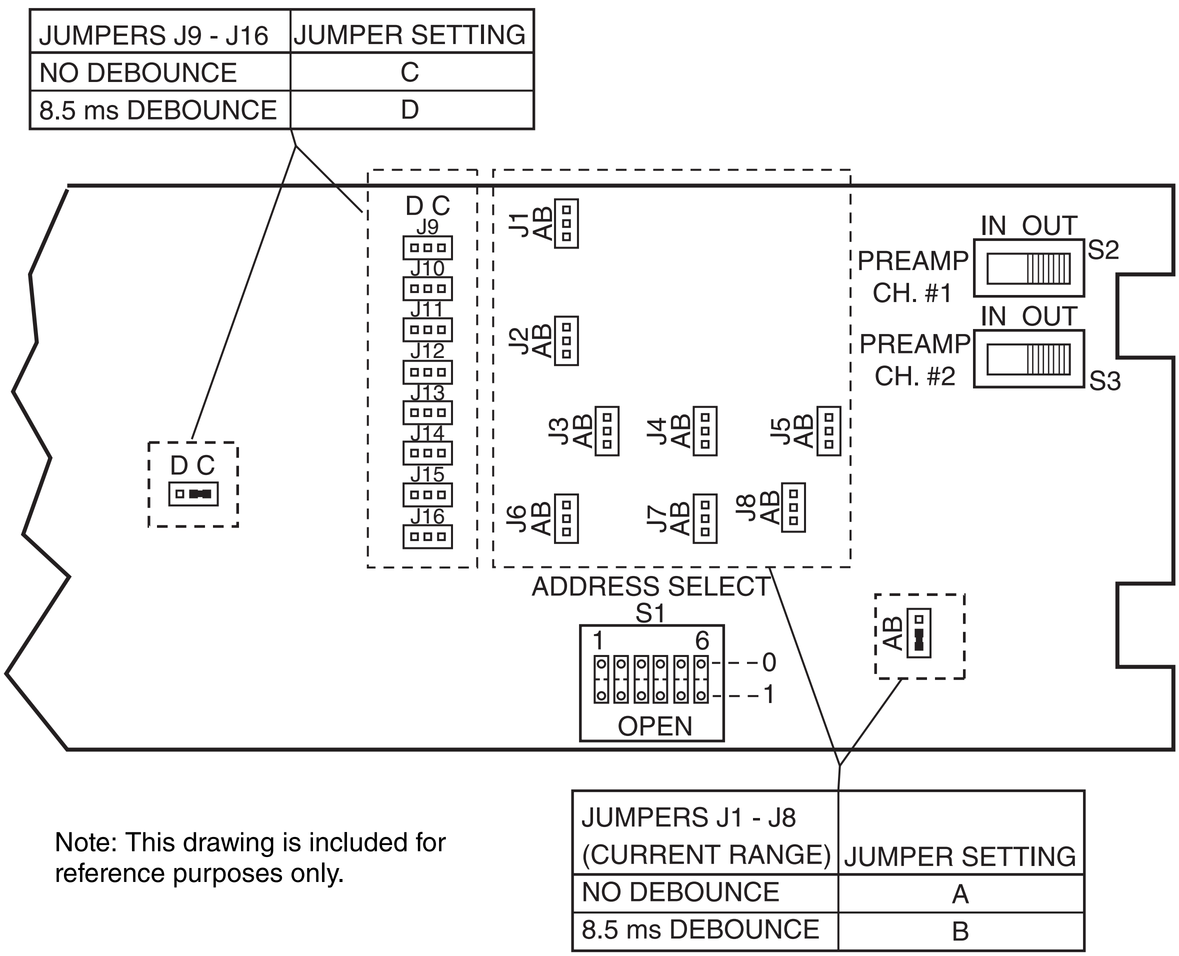
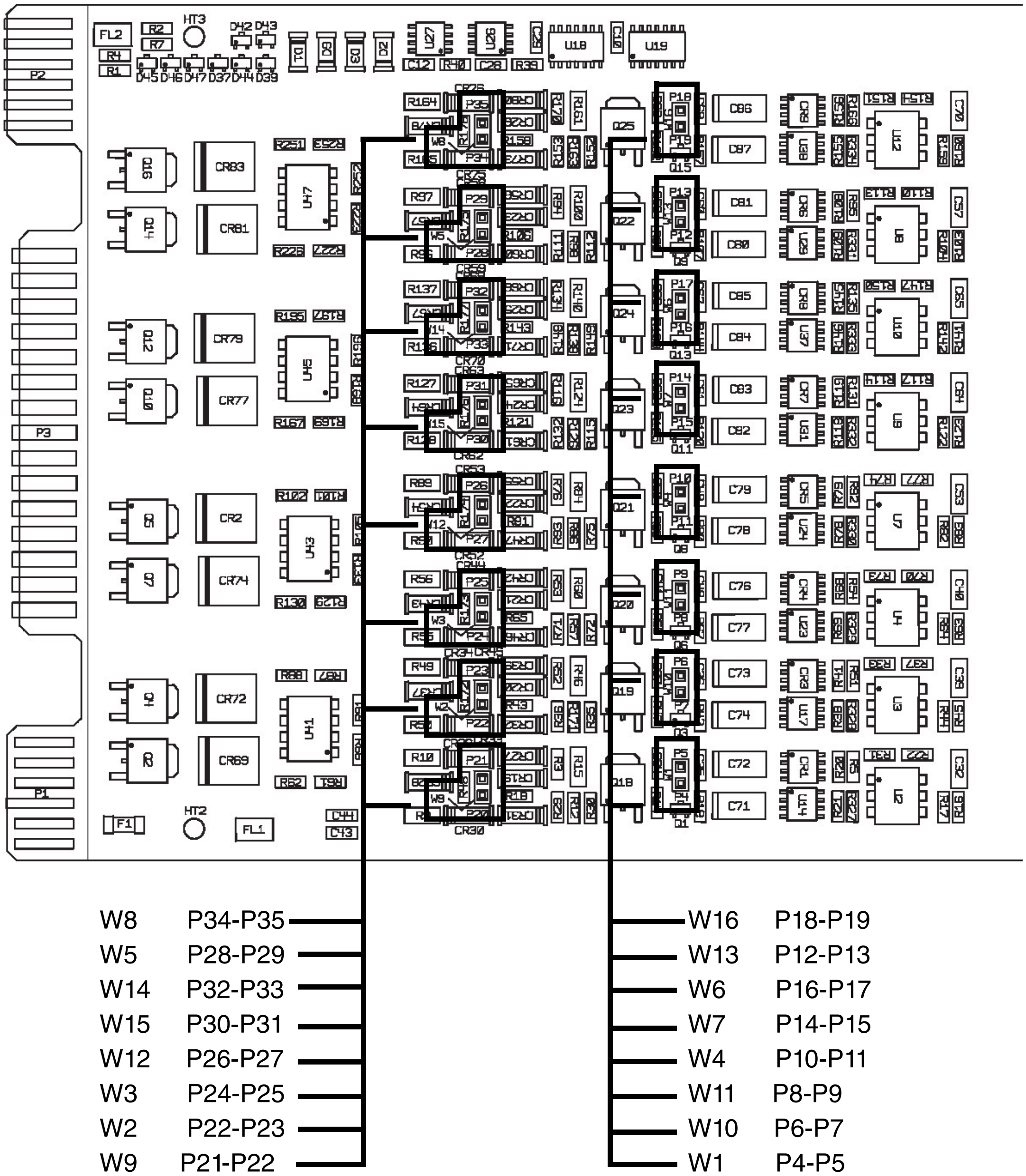


Figure 2-8. Bailey Board (BDSM06 Replacement) Jumpers



Jumper Groups

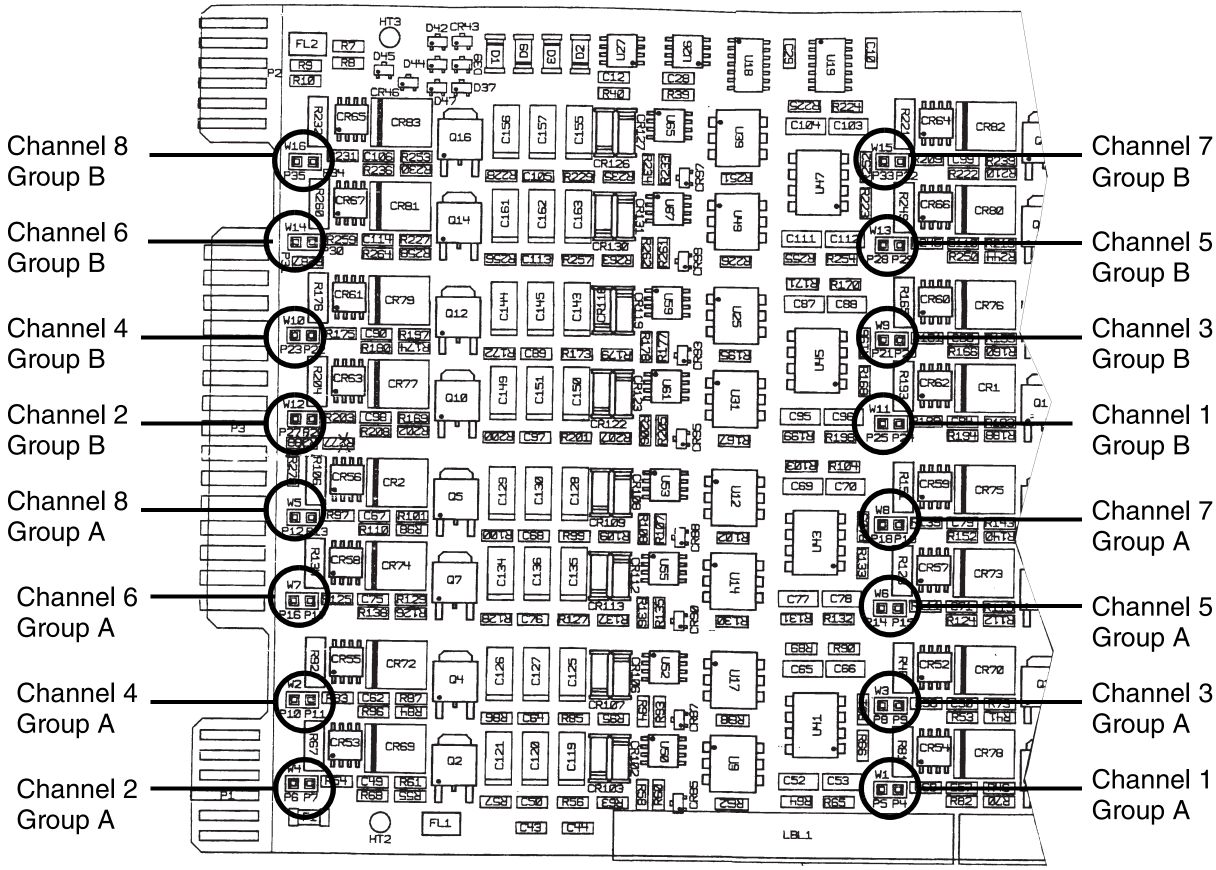
Digital In		Digital Out	
W9	P21-P22	W1	P4-P5
W10	P6-P7	W2	P22-P23
W11	P8-P9	W3	P24-P25
W12	P26-P27	W4	P10-P11
W13	P12-P13	W5	P28-P29
W14	P32-P33	W6	P16-P17
W15	P30-P31	W7	P14-P15
W16	P18-P19	W8	P34-P35

Note: Refer to the following table for jumper settings.

Figure 2-9. DCS Fieldbus Module BDSM9A Jumpers

Table 2-2. Jumper Settings for BDSM9A DCS Fieldbus Module

Channels	120 V ac	120 V dc	24 V dc
Input Channels			
Jumper			
P4-P5	W1 IN	W1 IN	W1 OUT
P6-P7	W2 IN	W2 IN	W2 OUT
P8-P9	W3 IN	W3 IN	W3 OUT
P10-P11	W4 IN	W4 IN	W4 OUT
P12-P13	W5 IN	W5 IN	W5 OUT
P14-P15	W6 IN	W6 IN	W6 OUT
P16-P17	W7 IN	W7 IN	W7 OUT
P18-P19	W8 IN	W8 IN	W8 OUT
Jumper			
P20-P21	W9 OUT	W9 IN	W9 IN
P22-P23	W10 OUT	W10 IN	W10 IN
P24-P25	W11 OUT	W11 IN	W11 IN
P26-P27	W12 OUT	W12 IN	W12 IN
P28-P29	W13 OUT	W13 IN	W13 IN
P30-P31	W14 OUT	W14 IN	W14 IN
P32-P33	W15 OUT	W15 IN	W15 IN
P34-P35	W16 OUT	W16 IN	W16 IN
Output Channels	No Jumpers	No Jumpers	No Jumpers

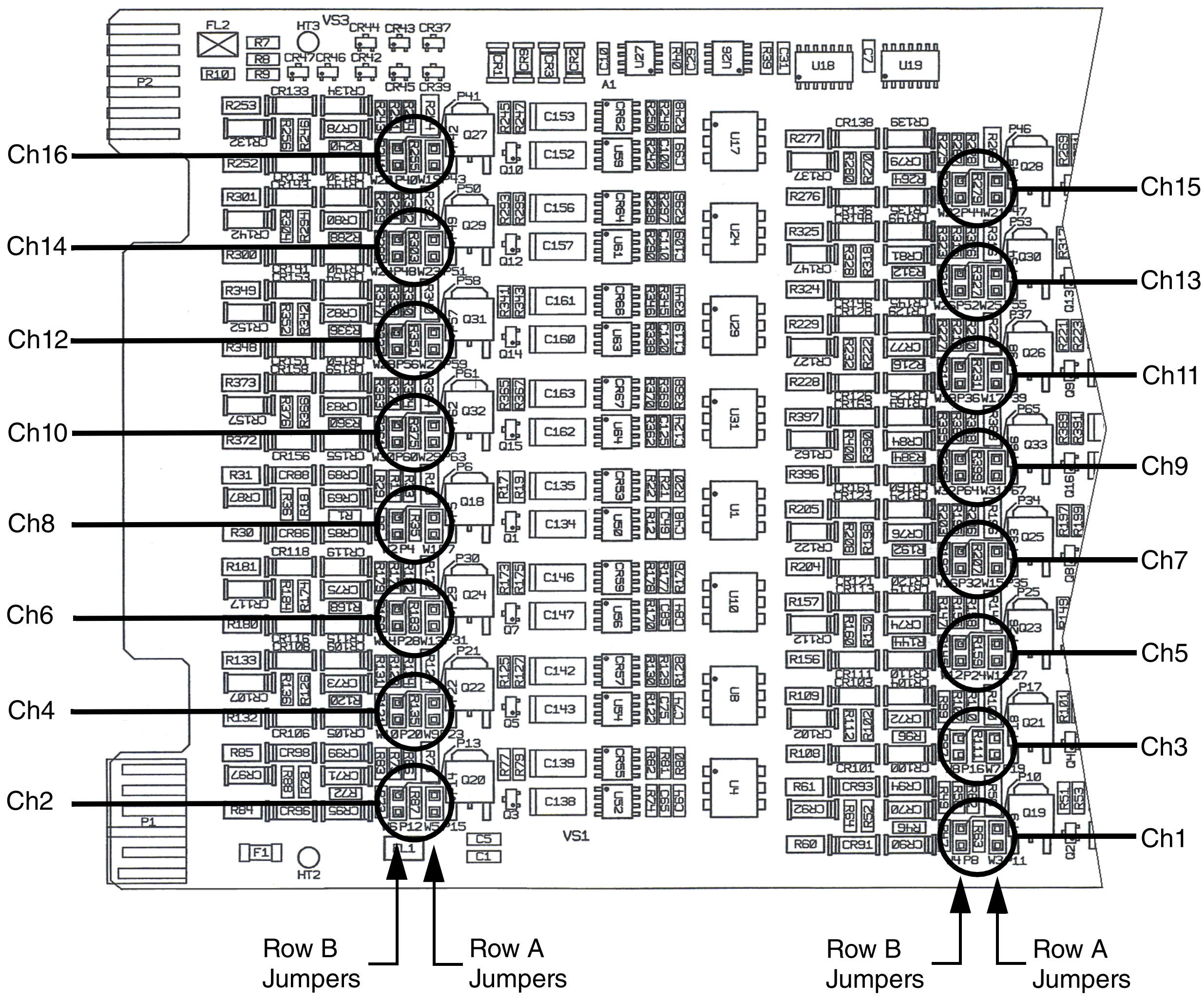


Jumper Positions: IN for Input (24 V dc); OUT for Output (24 V dc)

For configuration as an input circuit channel, BDSM9B card jumpers W1 thru W16 jumpers should be installed.

For configuration as an output circuit channel, BDSM9B card jumpers W1 thru W16 jumpers should be left out (open).

Figure 2-10. DCS Fieldbus Module BDSM9B Jumpers



Jumper settings for any one channel (Ch1 to Ch16):

Output Type	Row A Jumper	Row B Jumper
0 to 24 V dc	OUT	OUT
0 to 48 V dc	IN	OUT
0 to 125 V dc	OUT	IN
0 to 125 V ac	IN	IN

Figure 2-11. DCS Fieldbus Module BSEM01 Jumpers

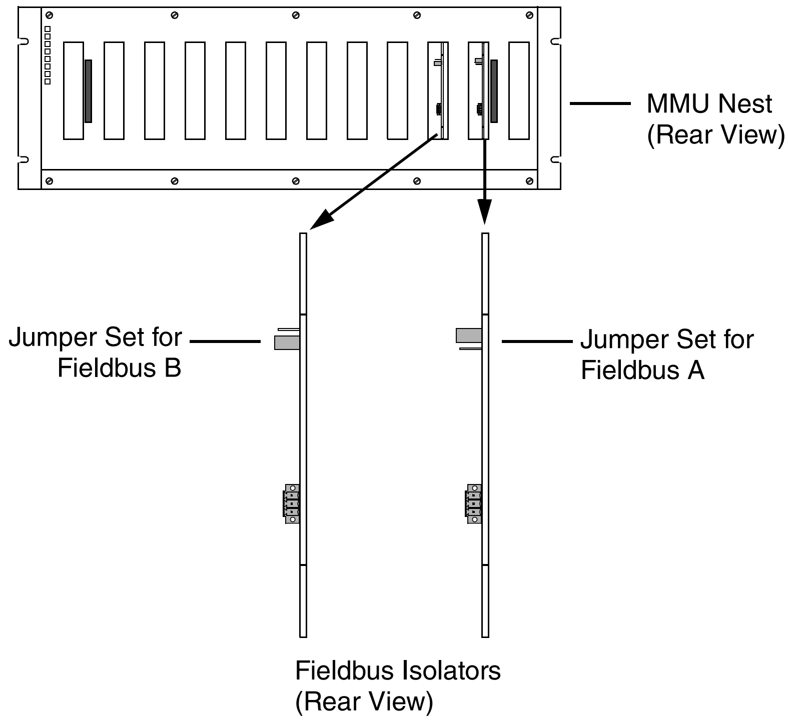
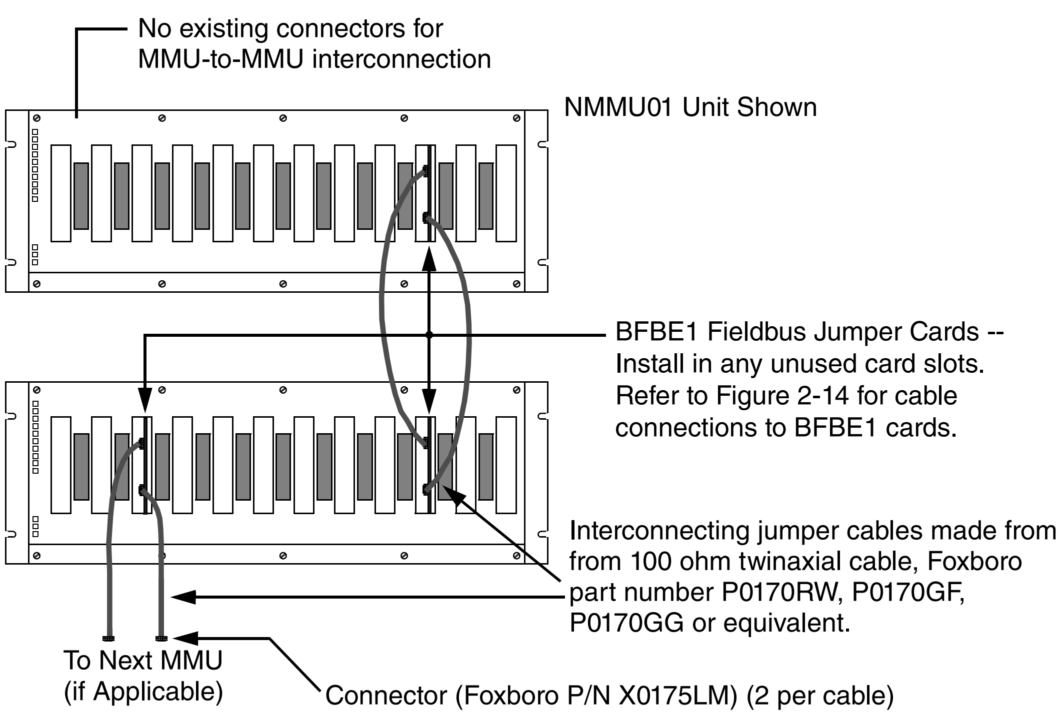


Figure 2-12. Setting Fieldbus Isolator Jumpers



*The surface-mount connectors are not used; they are pointed out here only to identify the type of baseplate.

Figure 2-13. MMU-to-MMU Fieldbus Connections, Backplanes with No Connectors

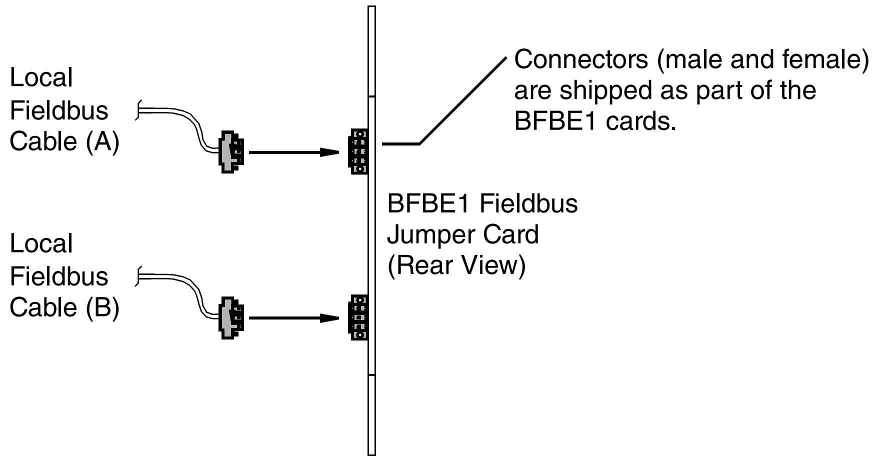


Figure 2-14. Connections to BFBE1 Fieldbus Jumper Card

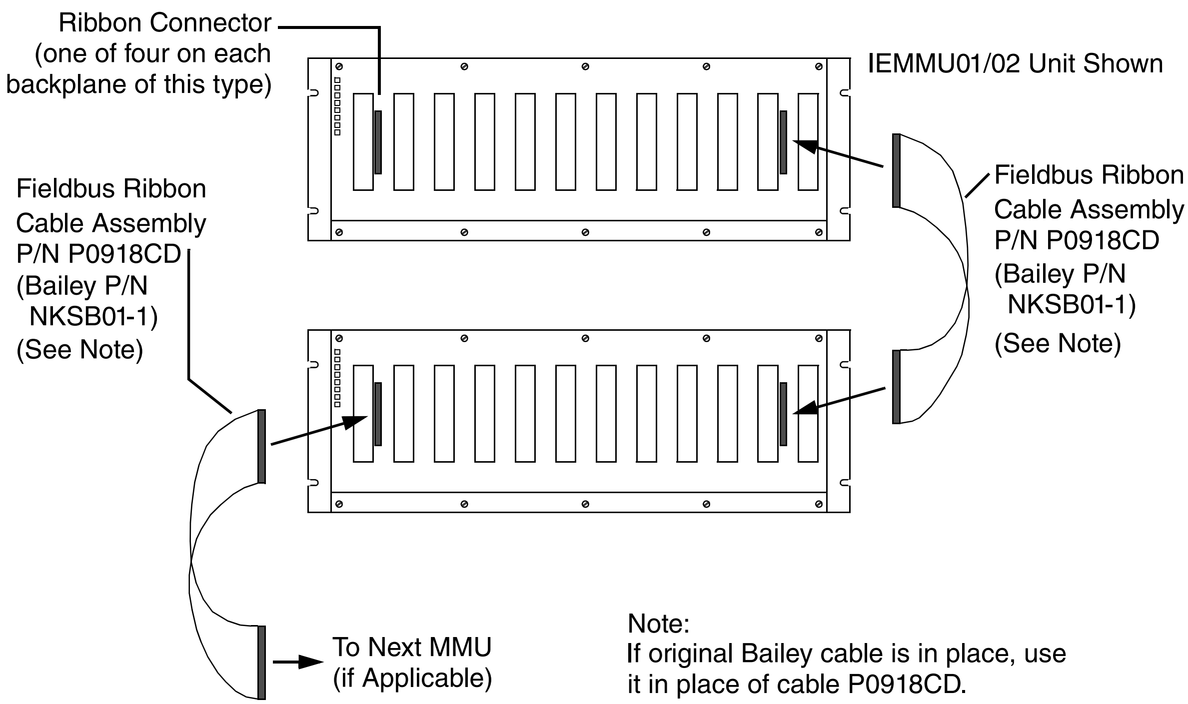


Figure 2-15. MMU-to-MMU Fieldbus Connections, Backplanes with Vertical Ribbon Connectors

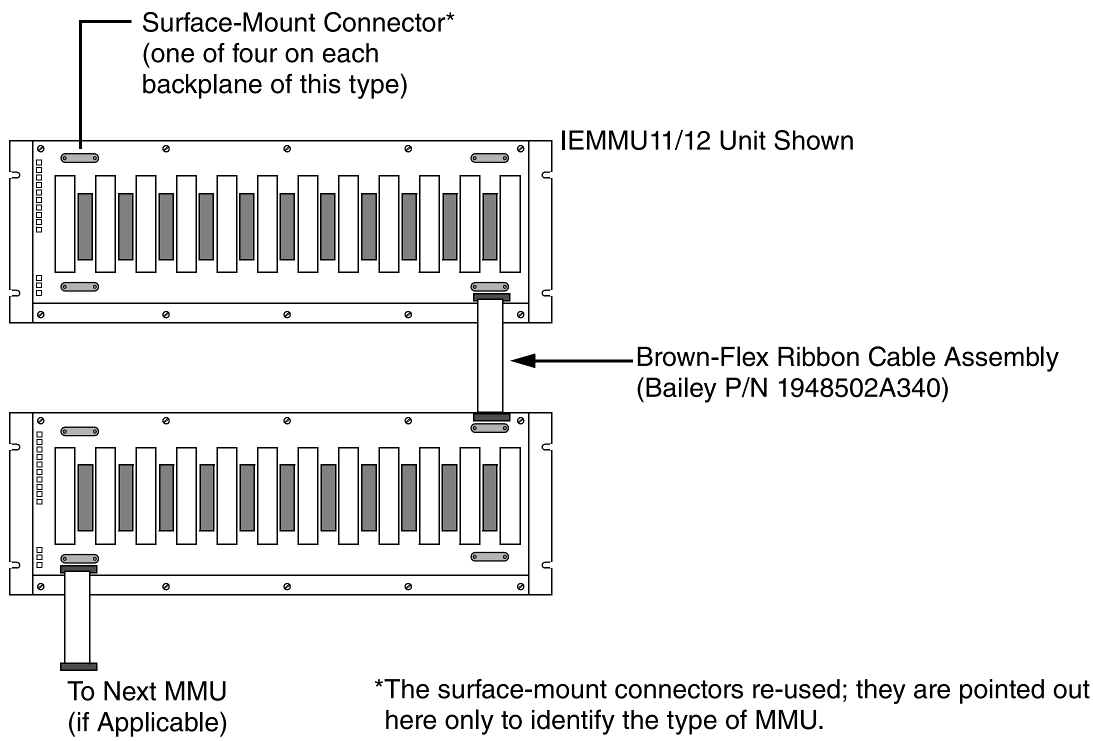


Figure 2-16. MMU-to-MMU Fieldbus Connections, Backplanes with Horizontal Surface-Mount Connectors

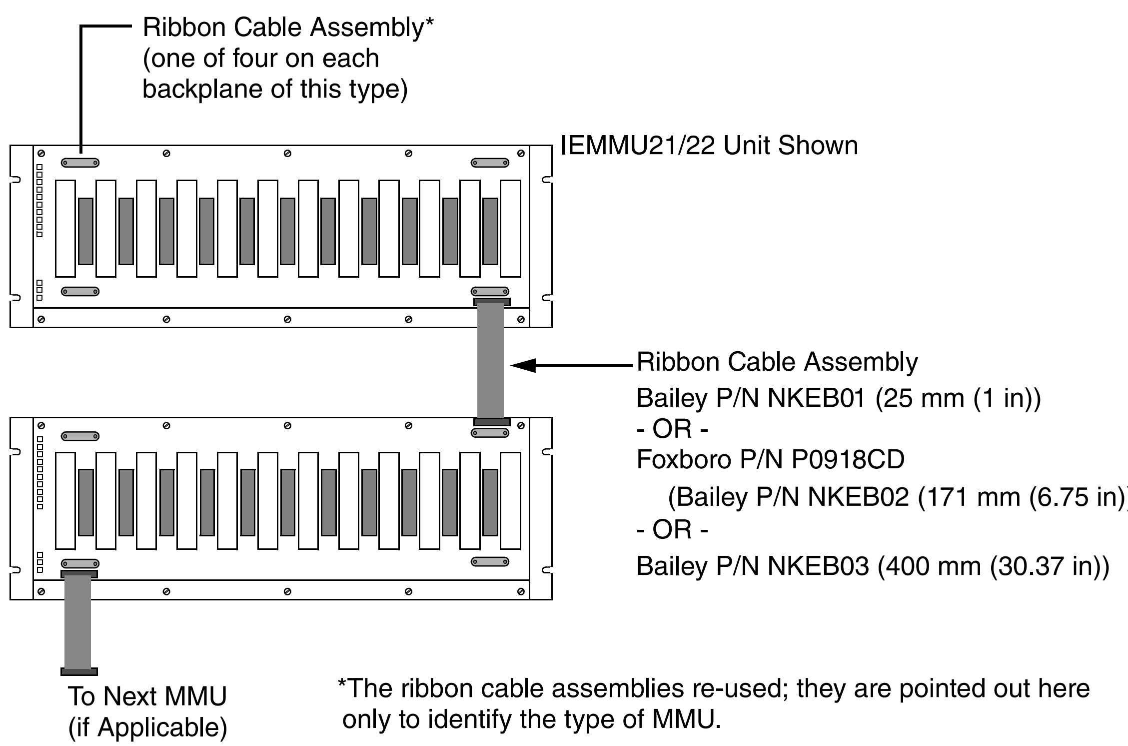


Figure 2-17. MMU-to-MMU Fieldbus Connections, Backplanes with Horizontal Ribbon Connectors

Fieldbus Cabling at the CP40

Fieldbus cable installation involves the use of termination cable assemblies (TCAs) and twin-axial cable to provide connection between the control processor and the Fieldbus Isolator(s). Three remote Fieldbus cabling configurations are possible at the control processor end:

- Non-fault-tolerant CP40 and non-redundant Fieldbus (Figure 2-18)
- Non-fault-tolerant CP40 and redundant Fieldbus (Figure 2-19)
- Fault-tolerant CP40 and redundant Fieldbus (Figure 2-20).

To make the Fieldbus cable connections at the I/A Series CP40, refer to Figure 2-18, Figure 2-19, or Figure 2-20, as appropriate for your configuration, and proceed as follows:

1. Referring to Figure 2-21, assemble the termination block(s) associated with the control processor TCAs, snap them onto a DIN rail in the I/A Series rack, and connect the earth wire(s).
2. Connect the TCA cable(s) to the CP(s) as shown in Figure 2-18, Figure 2-19, or Figure 2-20.
3. Connect the Fieldbus cable(s) to the TCA(s) as shown in Figure 2-18, Figure 2-19, or Figure 2-20.
4. If it is not already in place, add the termination resistor (supplied with each TCA) as shown in Figure 2-18, Figure 2-19, or Figure 2-20.
5. Go to “Fieldbus Cabling at the DCS Fieldbus Module Subsystem” on page 56.

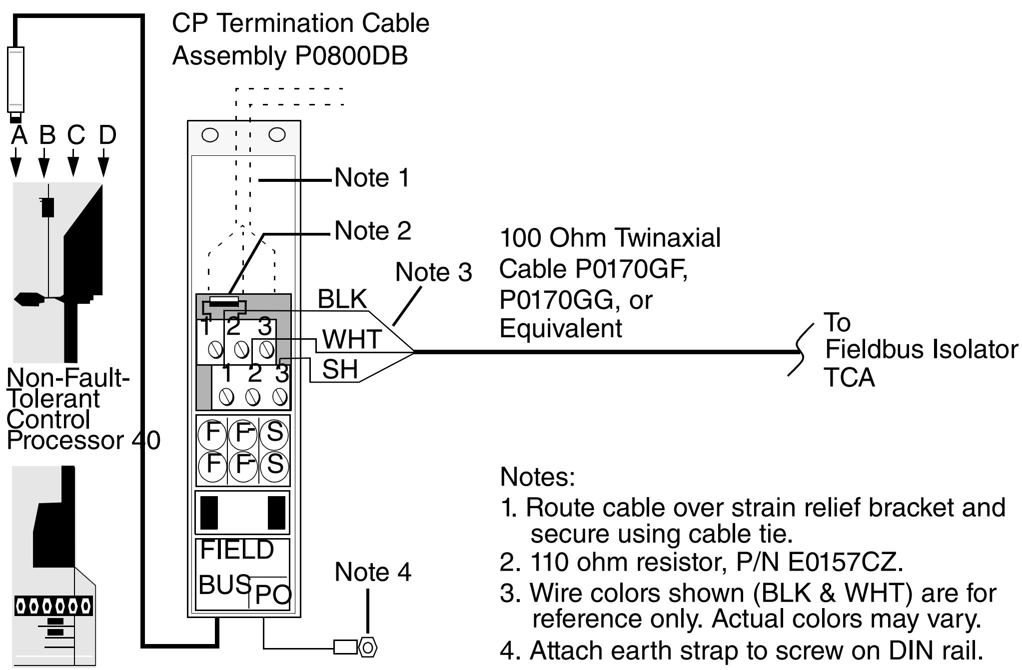


Figure 2-18. Non-Fault-Tolerant CP40 and Non-Redundant Fieldbus, Cable Connections

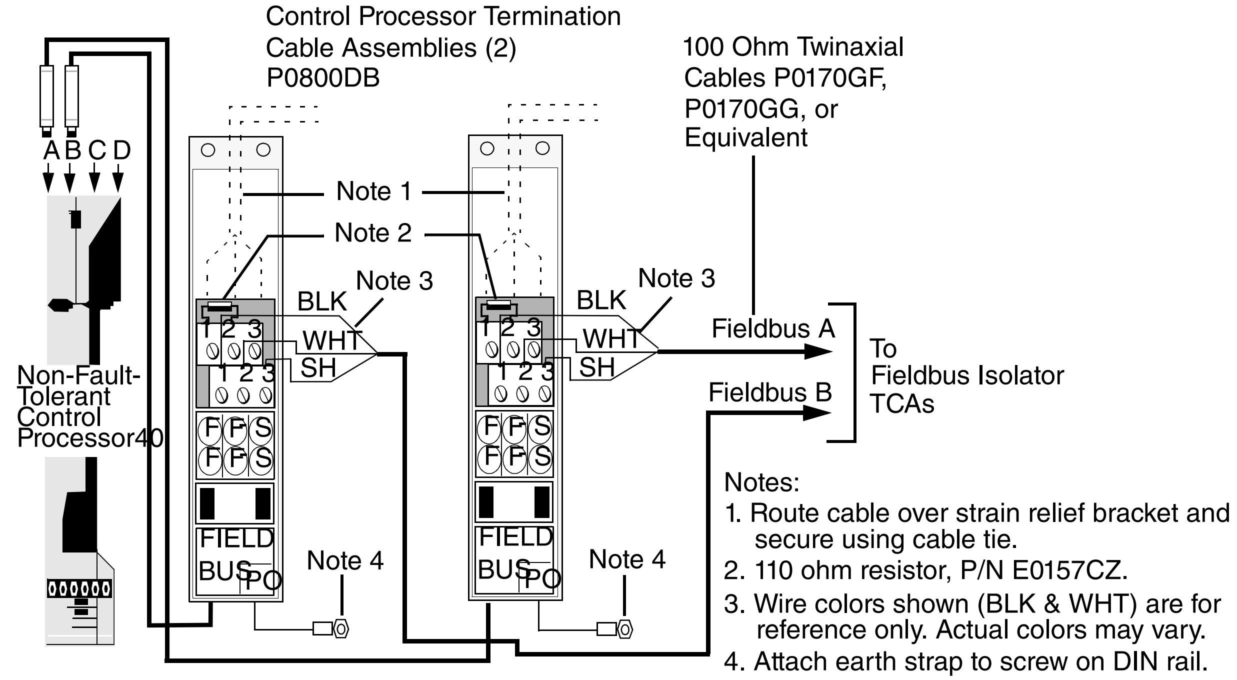


Figure 2-19. Non-Fault-Tolerant CP40 and Redundant Fieldbus, Cable Connections

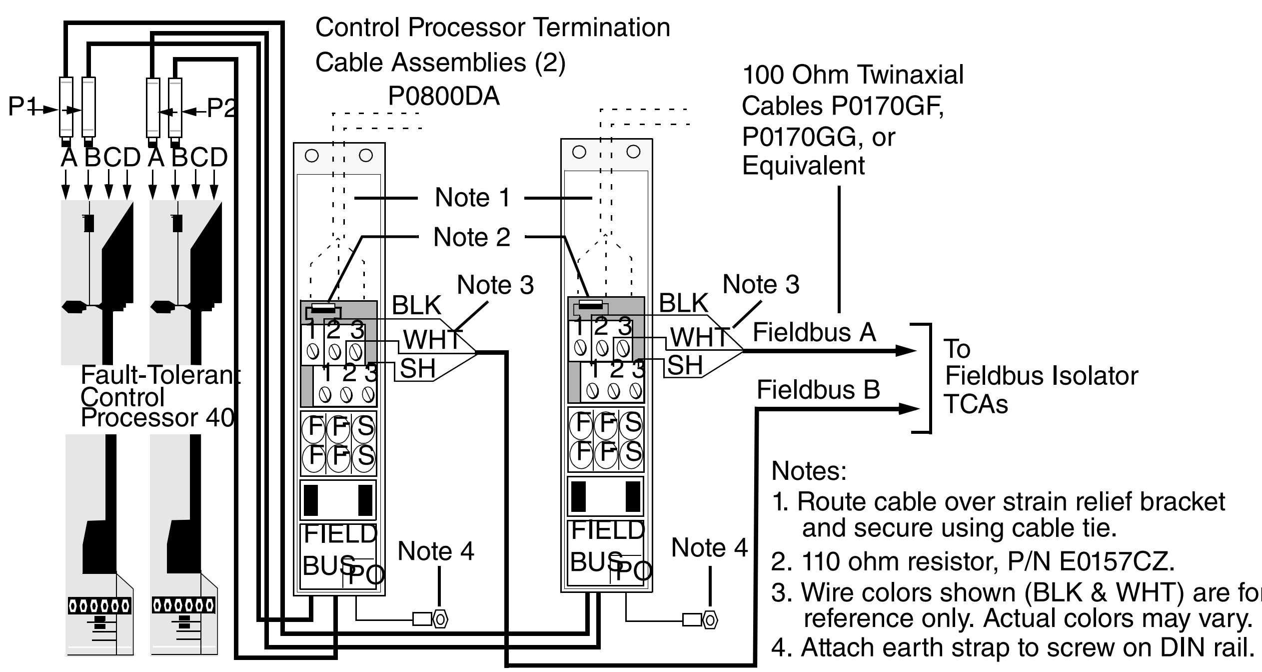


Figure 2-20. Fault-Tolerant CP40 and Redundant Fieldbus, Cable Connections

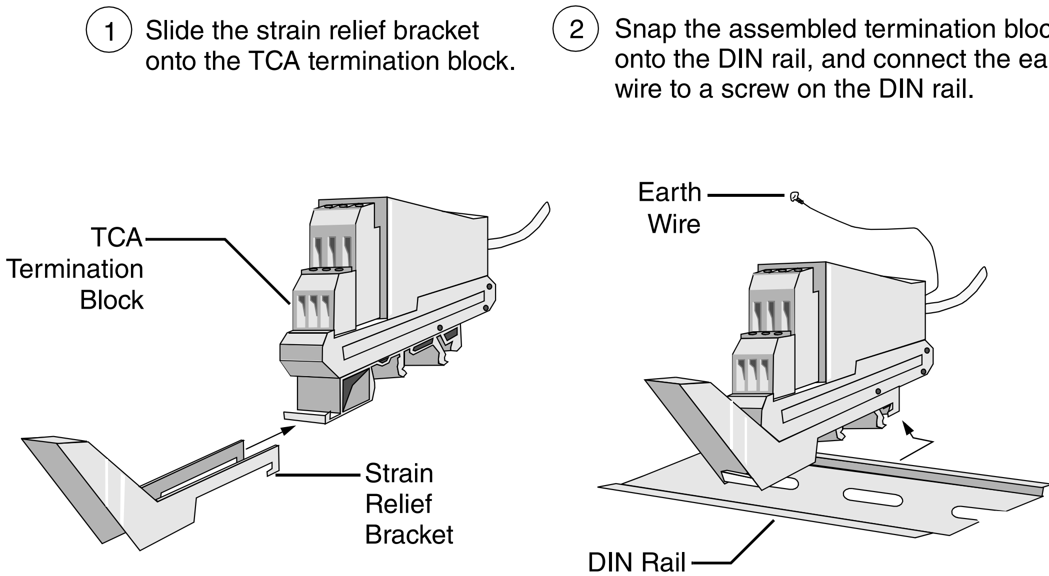
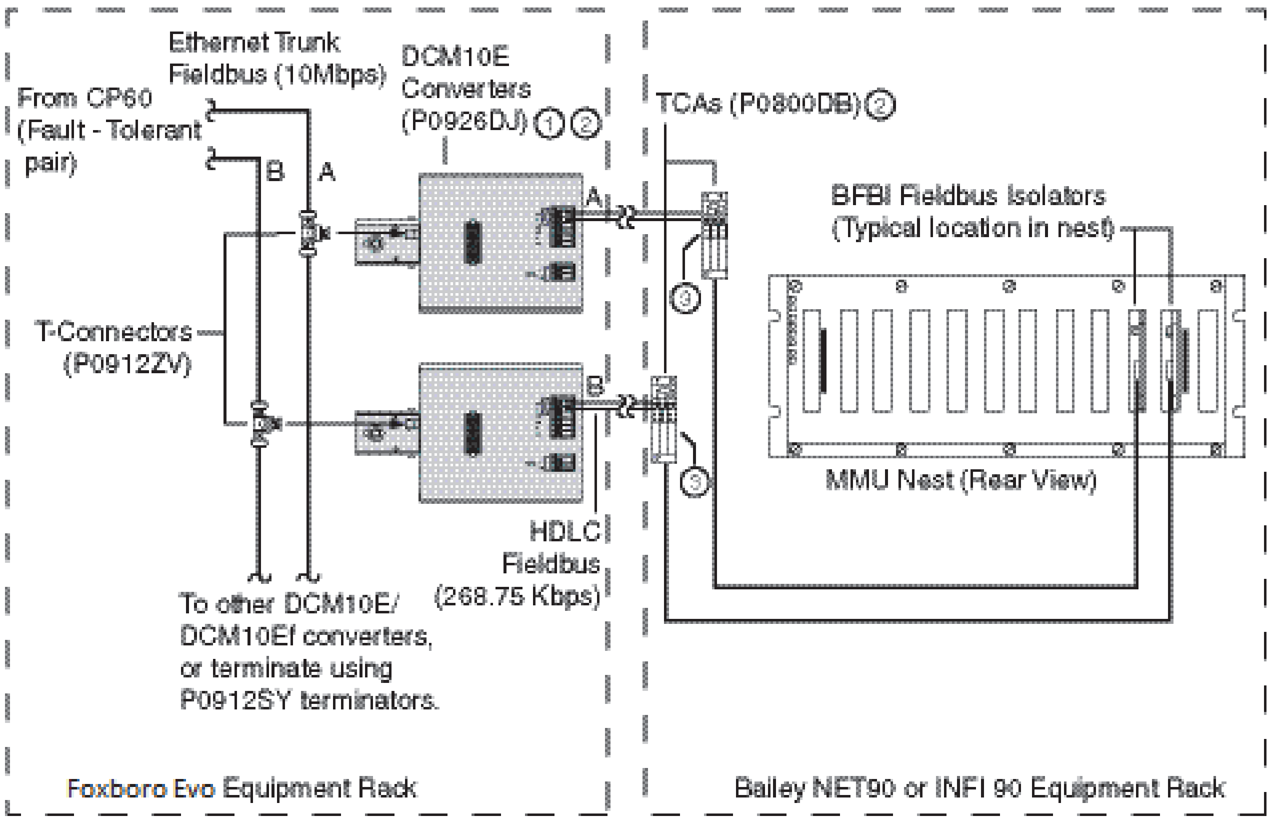


Figure 2-21. TCA Termination Block Assembly and Mounting

Fieldbus Cabling at the CP60

Interfacing of the upgraded Bailey NET90 or INFI 90 system to the I/A Series CP60 (via the Fieldbus) is accomplished using DCM10E or DCM10Ef converters, as shown in Figure 2-22. 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.

Figure 2-22. Fieldbus Cabling to the CP60 (Typical)

Fieldbus Cabling at the FCP280

Cabling an FCP280 baseplate to the BFBI Fieldbus Isolators consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 2-23). 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 DCS Fieldbus Modules for Bailey® systems as 100 Series FBMs (see Table 3-1 on page 65), so it must connect to the BFBI 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 200 Series baseplate (RH924YF) or the two-position, horizontal 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 BFBI Fieldbus Isolator TCAs:

1. Referring to Figure 2-24 on page 38, 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 2-25 illustrates how to remove the TCA termination blocks.)

NOTE

If you intend to use an FBI200 to extend the twinaxial cabling to the BFBI 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 2-23). 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 2-25.

   Finish making the cable connection(s) to the fieldbus splitter/terminator or fieldbus splitter as shown in Figure 2-23.
3. Make the fieldbus cable connections between termination cable assemblies (see Figure 2-26).
4. Terminate the HDLC fieldbus according to the following rules:
   - Terminating resistors are used only at the BFBI 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 2-23.
   - 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 2-27.)
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).

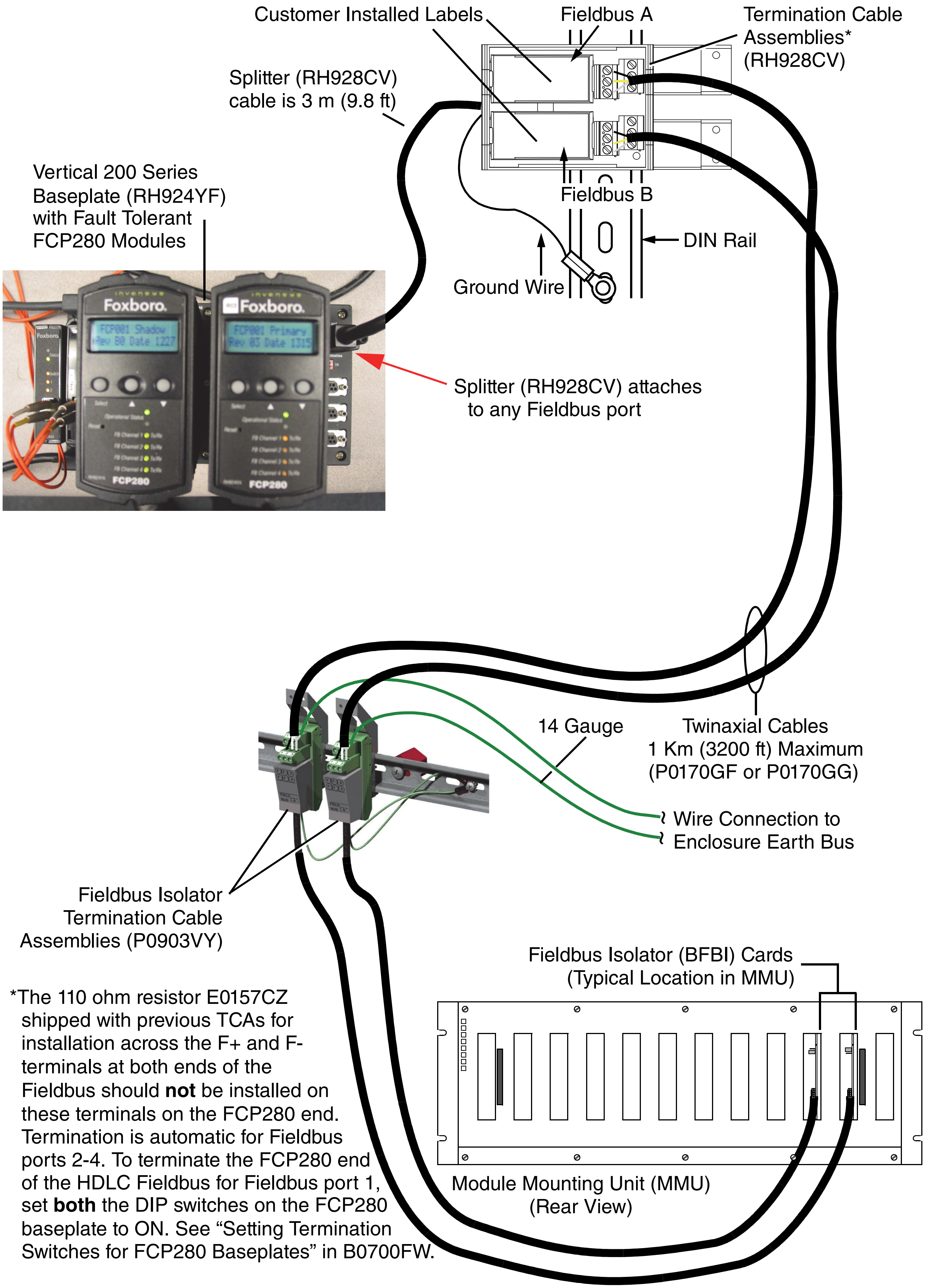


Figure 2-23. Cabling Fieldbus Isolator Cards to an FCP280 Baseplate

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).

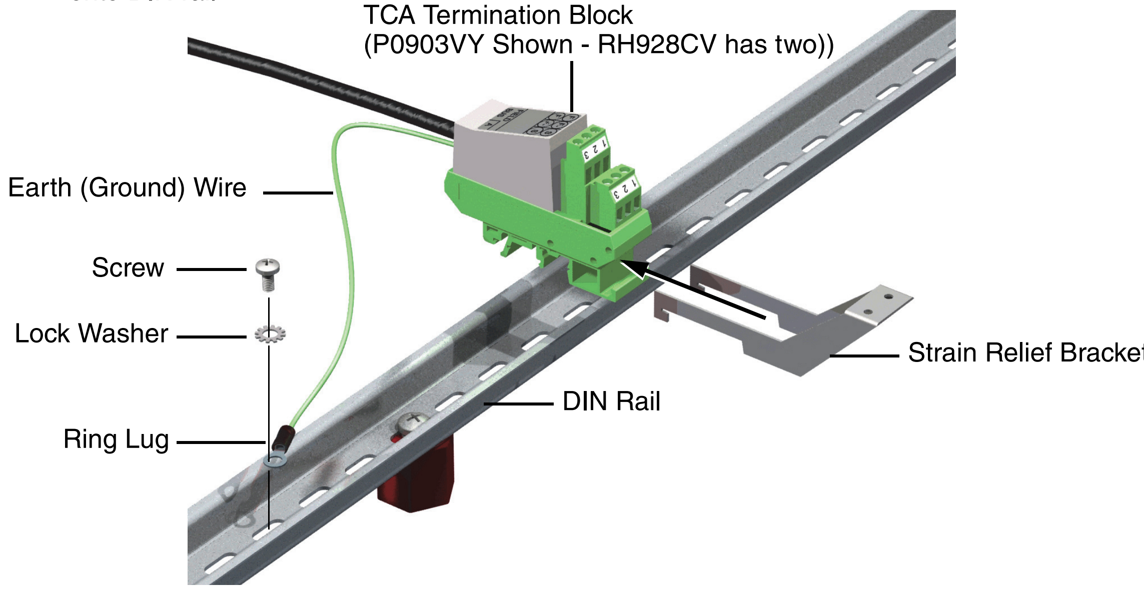


Figure 2-24. TCA Termination Block Assembly Mounting

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.

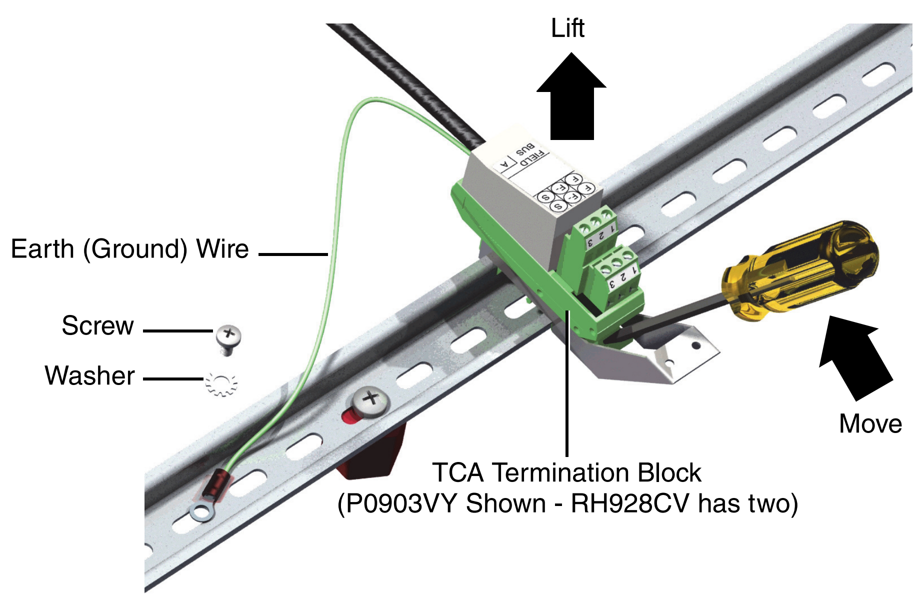
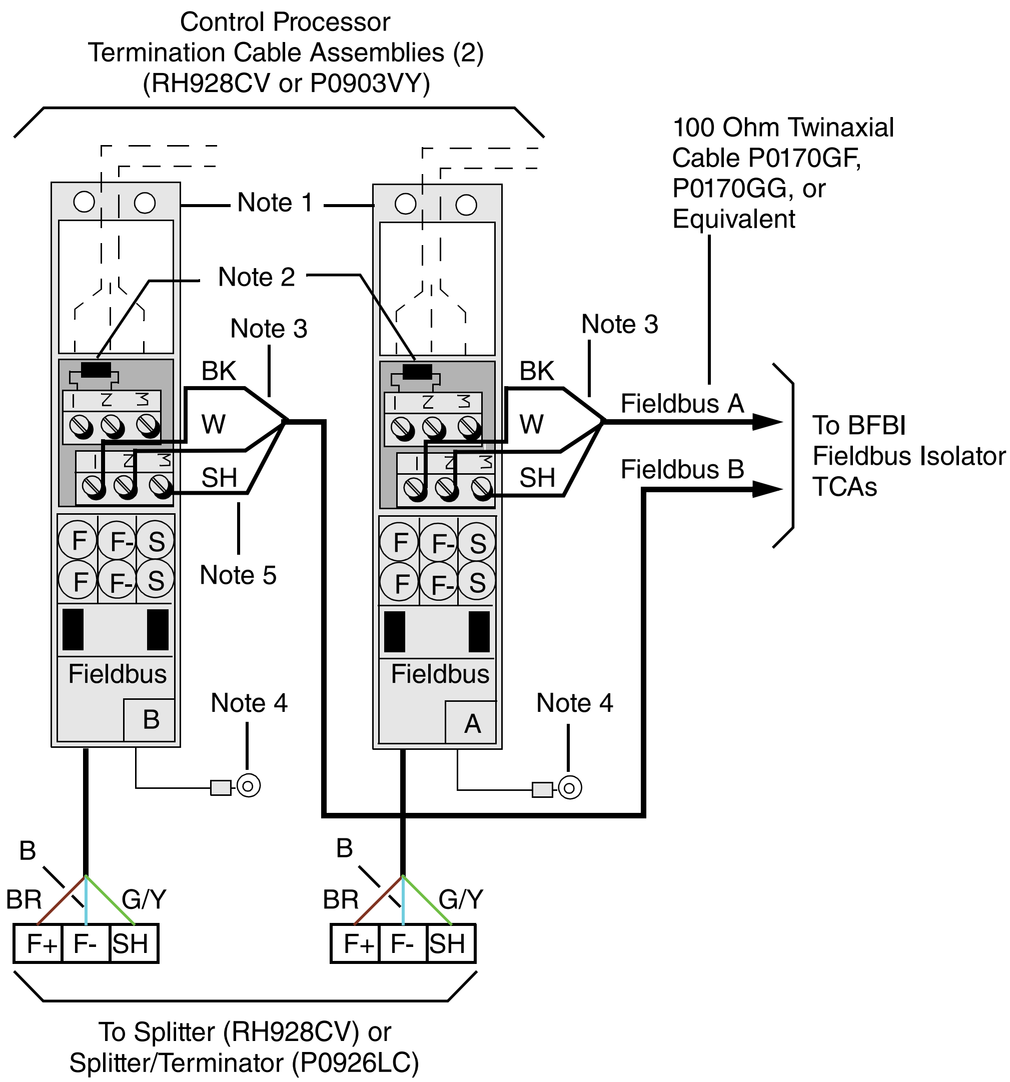


Figure 2-25. TCA Termination Block Removal



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 BFBI 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 2-26. Remote Redundant Fieldbus Cabling (FCP280 End)

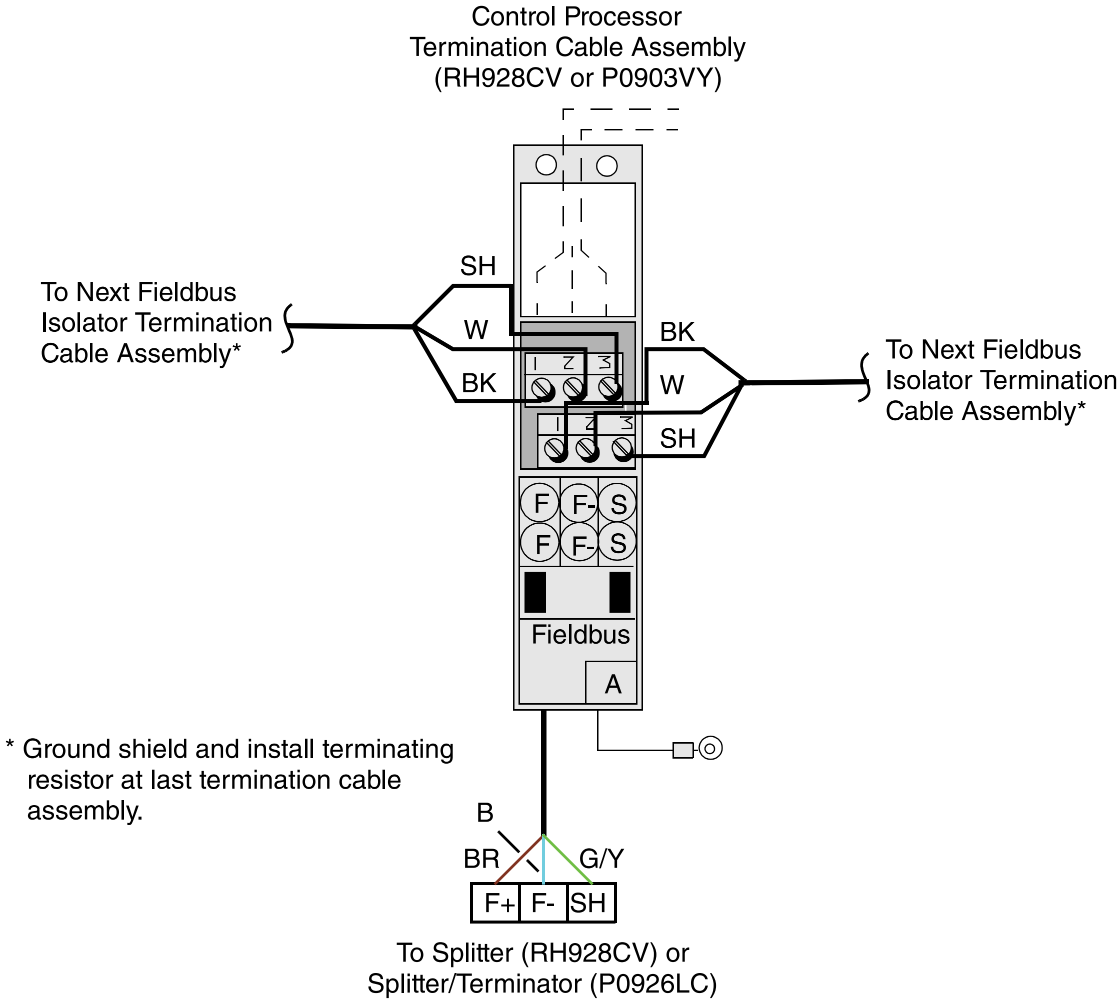


Figure 2-27. Example of Extending Fieldbus in Two Directions from FCP280

Fieldbus Cabling at the FCP270

Cabling an FCP270 baseplate to the BFBI Fieldbus Isolators consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 2-28). 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 2-29. 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 200 Series baseplate (P0926HW) or the two-position, horizontal 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 BFBI Fieldbus Isolator TCAs, proceed as follows:

1. Referring to Figure 2-30, 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 2-31 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 2-28).
3. Make the cable connection(s) to the fieldbus splitter/terminator as shown in Figure 2-29.
4. Make the fieldbus cable connections between termination cable assemblies (see Figure 2-32).
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 2-33.)
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).

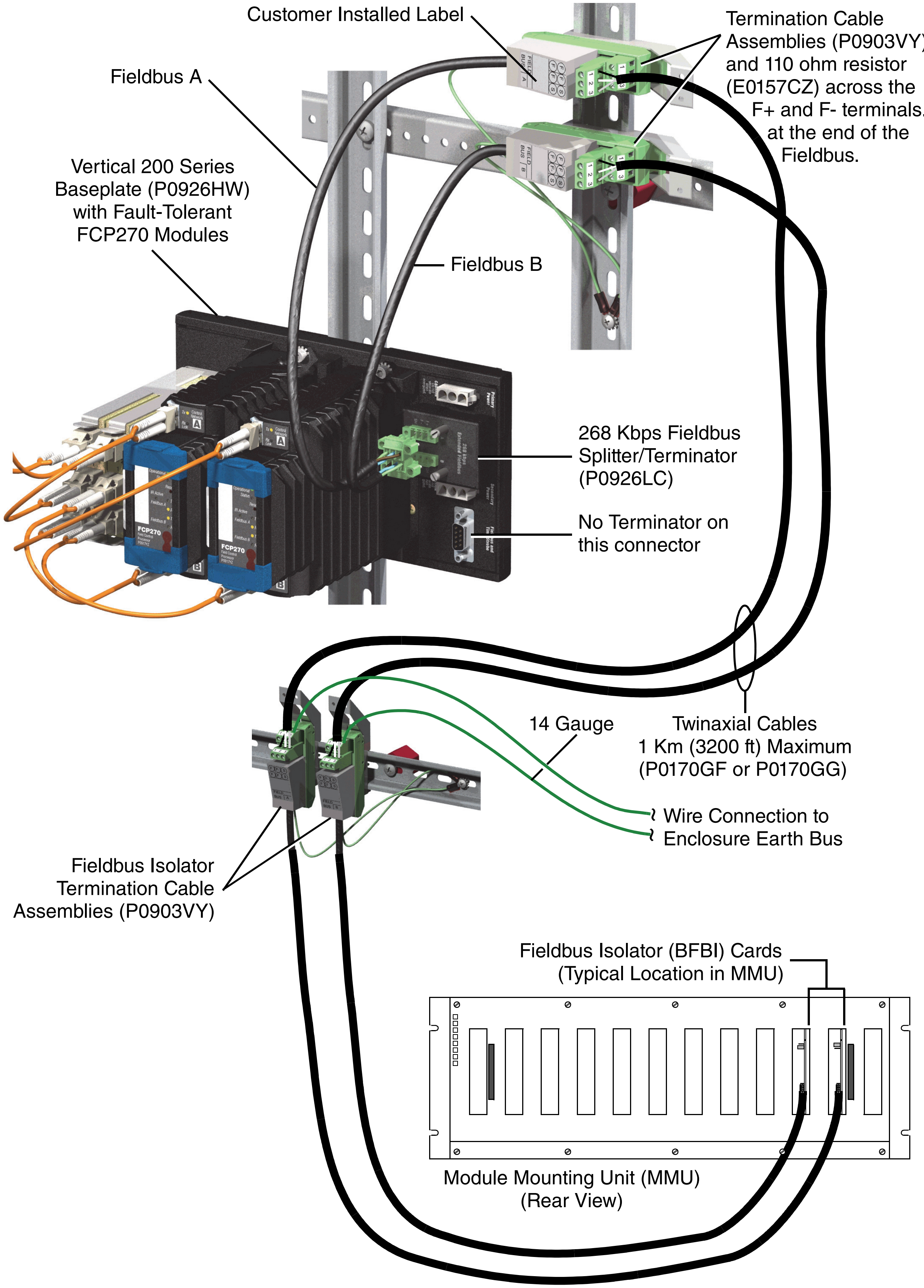


Figure 2-28. Cabling Fieldbus Isolator Cards to an FCP270 Baseplate

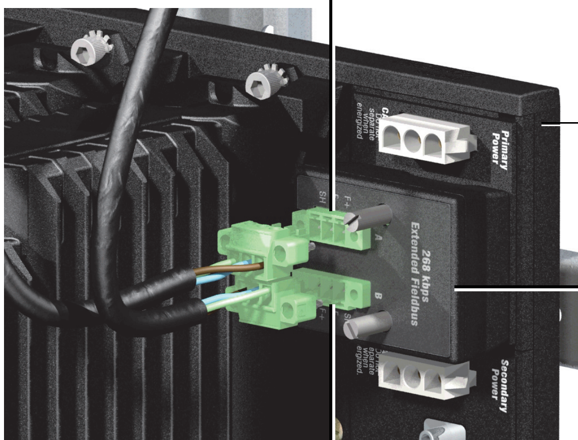


Figure 2-29. TCA Cable Connection to 268 Kbps Fieldbus Splitter/Terminator

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).

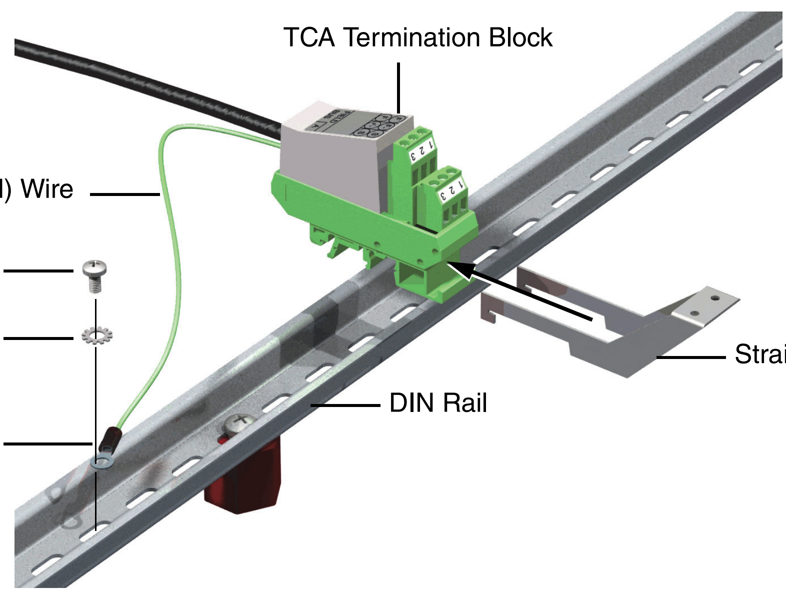


Figure 2-30. TCA Termination Block Assembly Mounting

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.

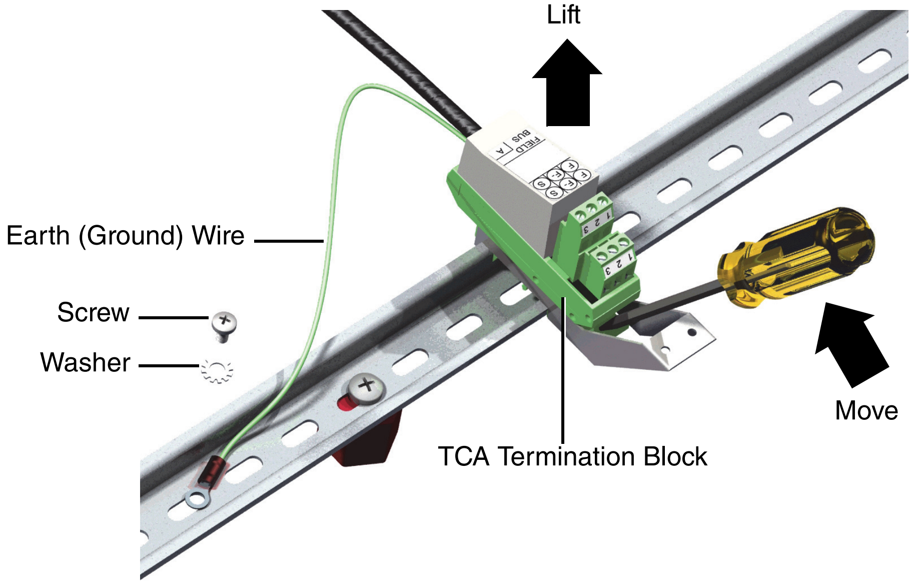
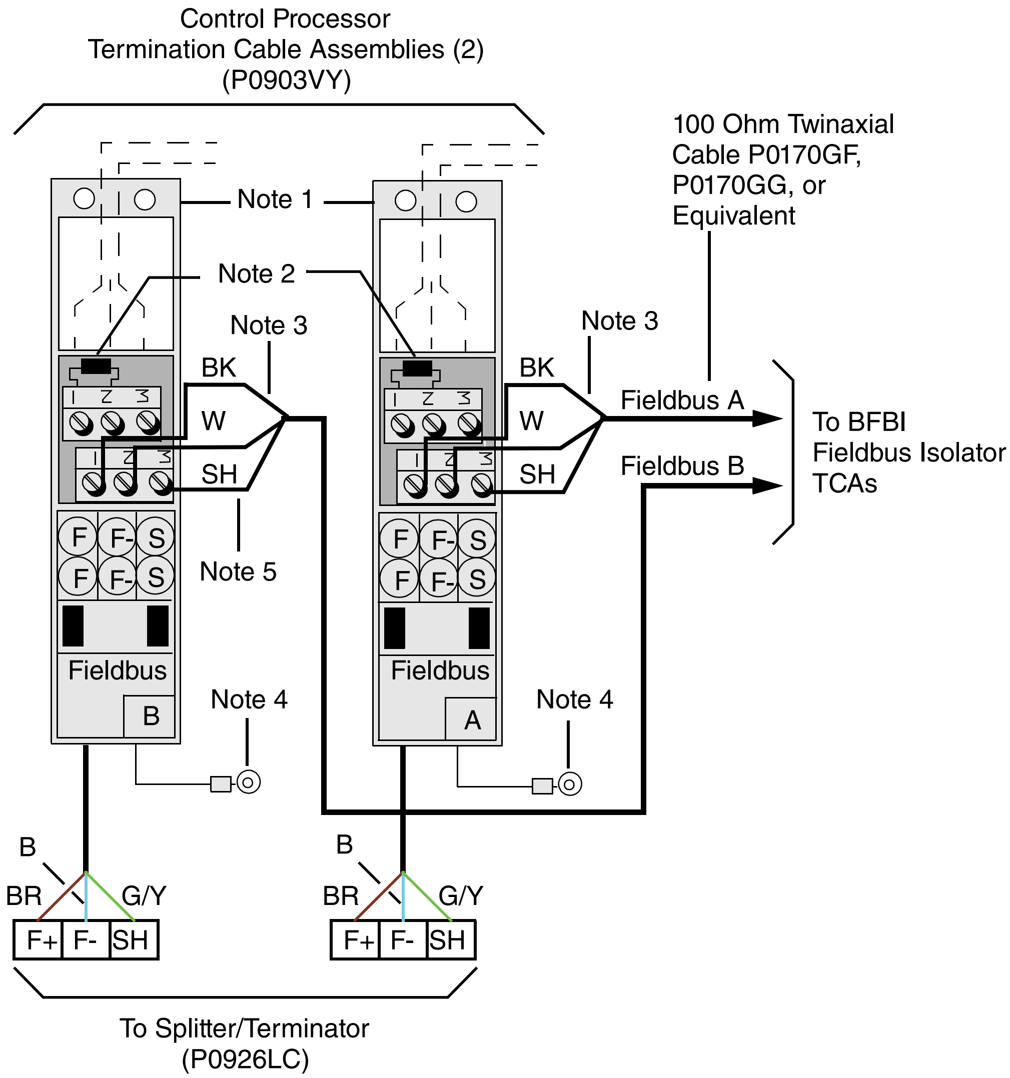


Figure 2-31. TCA Termination Block Removal



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 2-32. Remote Redundant Fieldbus Cabling (FCP270 End)

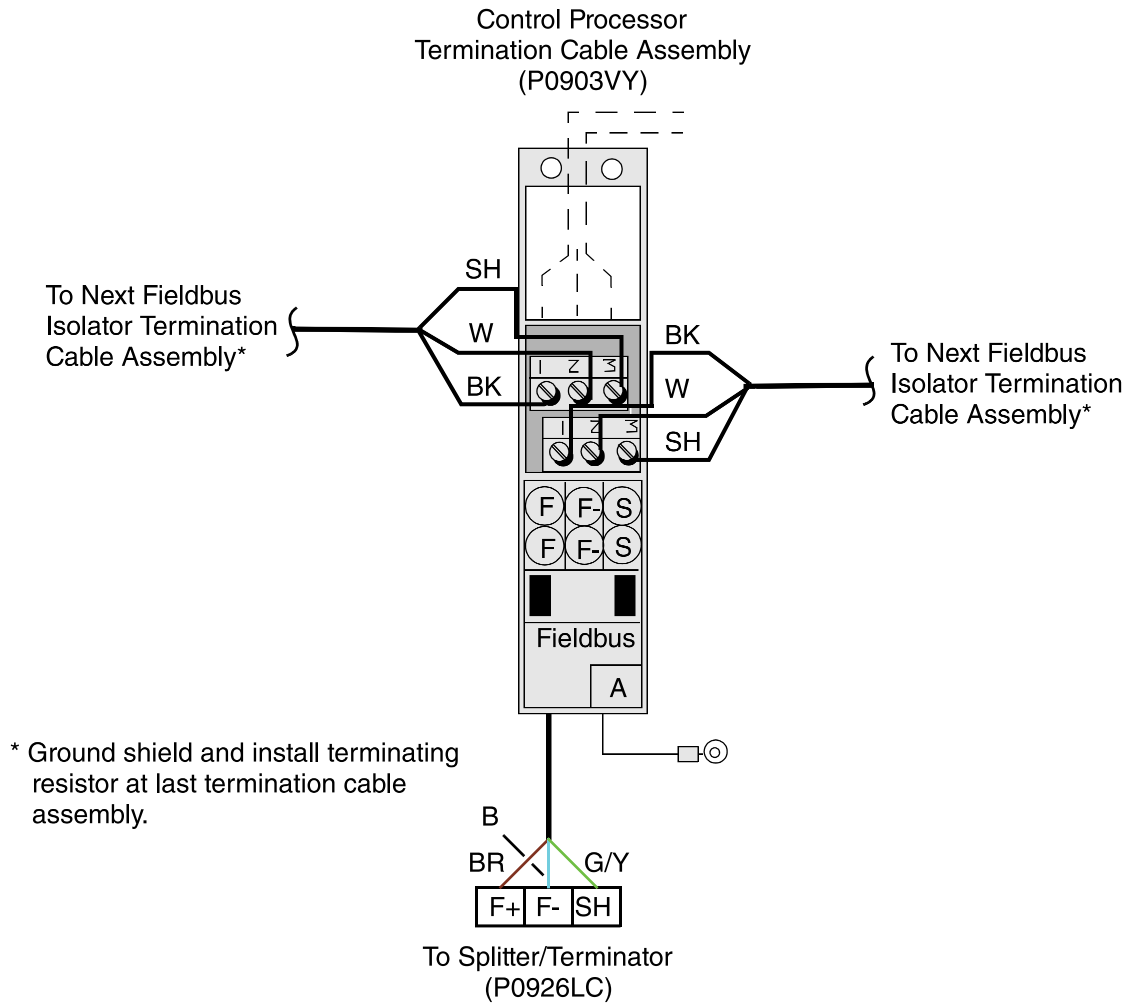


Figure 2-33. Example of Extending Fieldbus in Two Directions from FCP270

Fieldbus Cabling at the ZCP270

— NOTE

Refer to Appendix A "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 BFBI Fieldbus Isolators requires the following to facilitate communications:

- ZCP270 connects to a redundant pair of 200 Series 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 (hereinfater referred to as the control network)
- The FCM100Es connect to the BFBI Fieldbus Isolators

Cabling a FCM100E baseplate to the BFBI Fieldbus Isolators consists of extending the remote 268 Kbps fieldbus from the isolators (see Figure 2-36). 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 2-37. 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 2-36 for label orientation)

You can mount the FCM100E module(s) on either the two-position, vertical 200 Series baseplate (P0926KE) or the two-position, horizontal 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).

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

Figure 2-34 shows a redundant FCM100E connection to a redundant ZCP270. Figure 2-35 shows how the connections are made. Use the cables listed in Table 2-3 to make the connections.

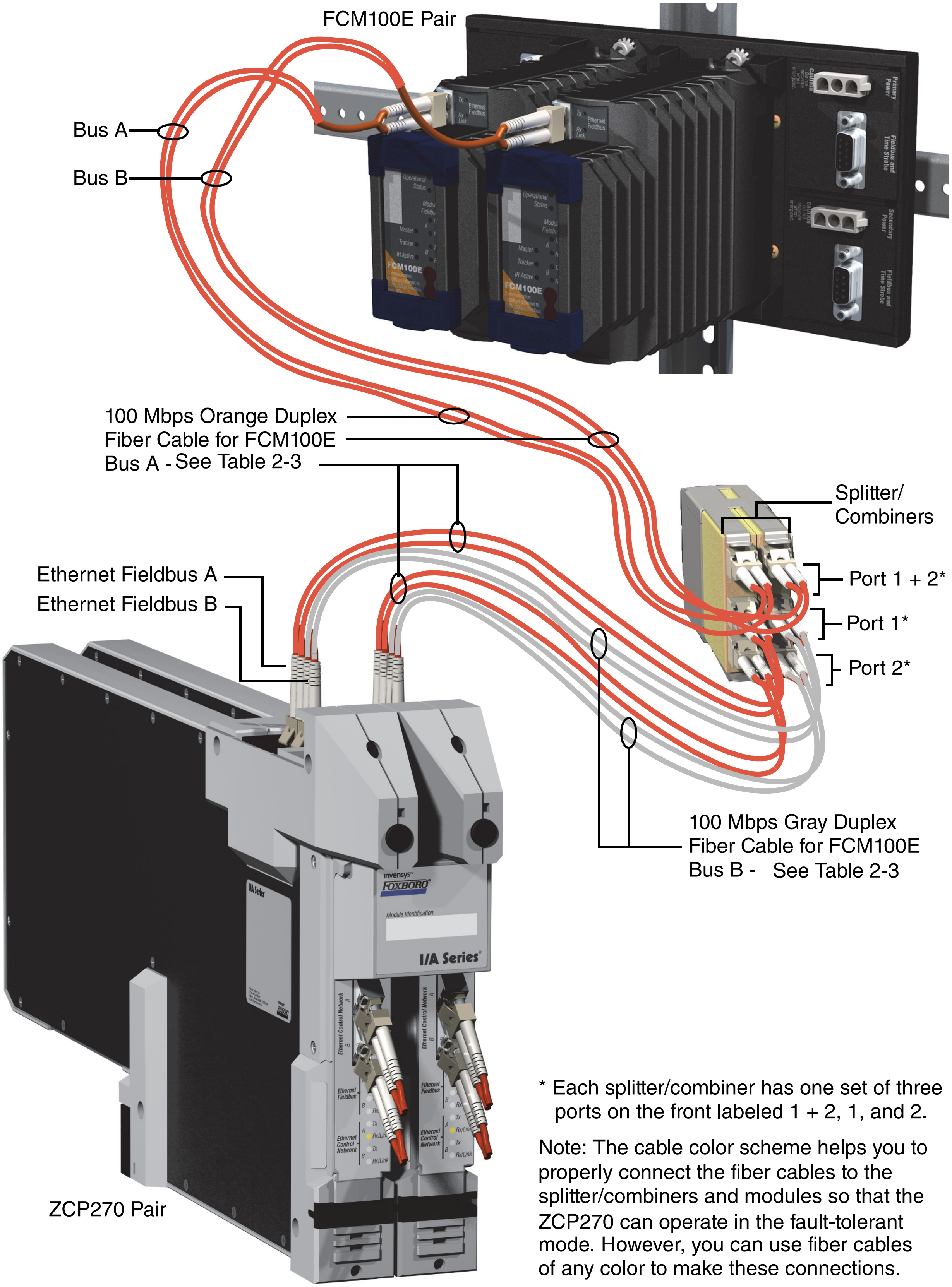


Figure 2-34. FCM100E to Splitter/Combiner to ZCP270 Cabling - Direct Connection - Overview

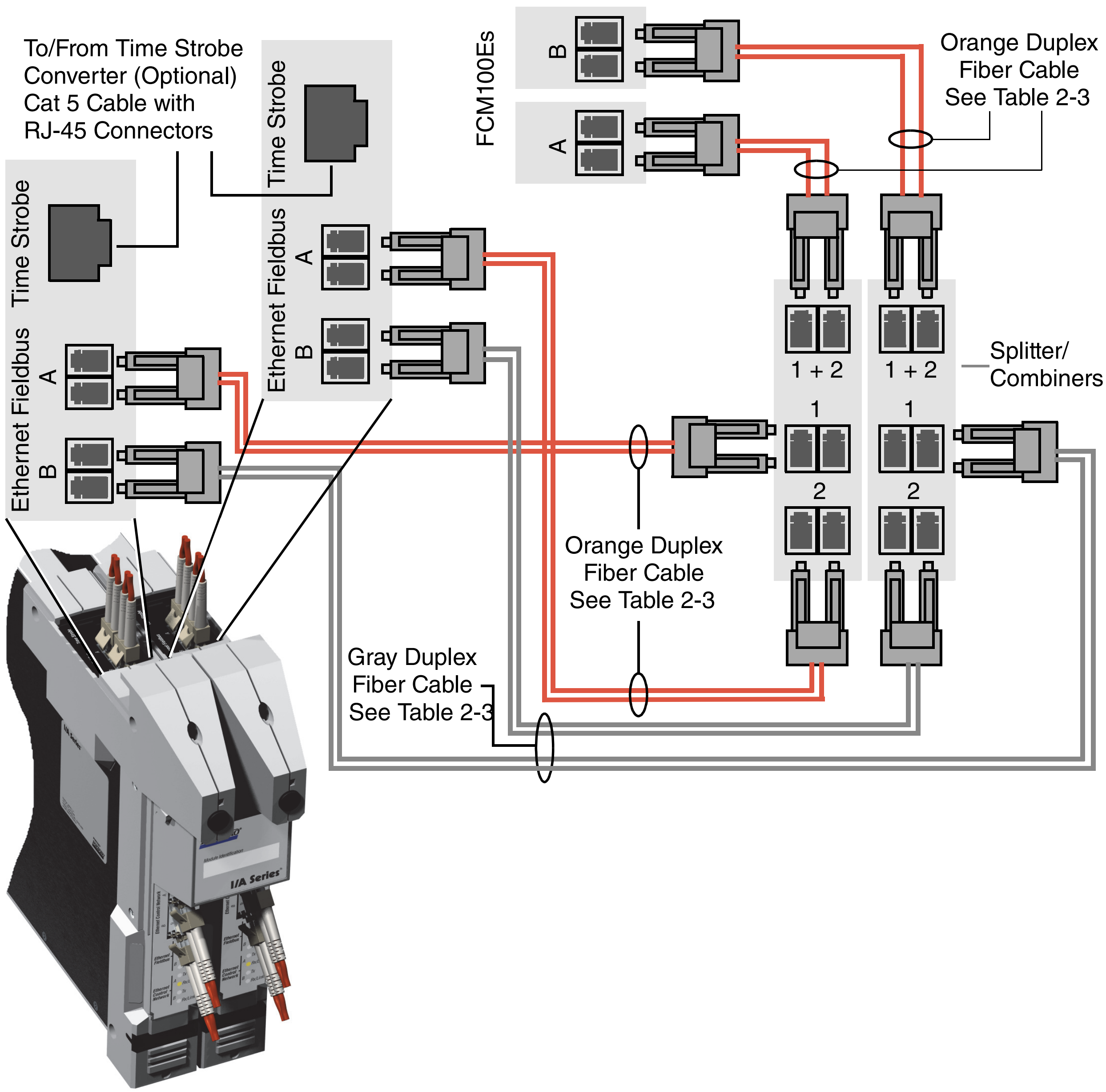


Figure 2-35. FCM100E to Splitter/Combiner to ZCP270 Cabling - Direct Connection - Wiring

Table 2-3. 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 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 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 BFBI Fieldbus Isolators

Remote fieldbus extension cable connections are implemented as shown in Figure 2-36 and Figure 2-41.

To connect an FCM100E baseplate to the BFBI Fieldbus Isolators:

1. Referring to Figure 2-37, 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 2-38 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 2-43).
3. Make the cable connection(s) to the fieldbus splitter/terminator as shown in Figure 2-37.
4. Make the fieldbus cable connections between termination cable assemblies (see Figure 2-39).
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 2-41.)
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).

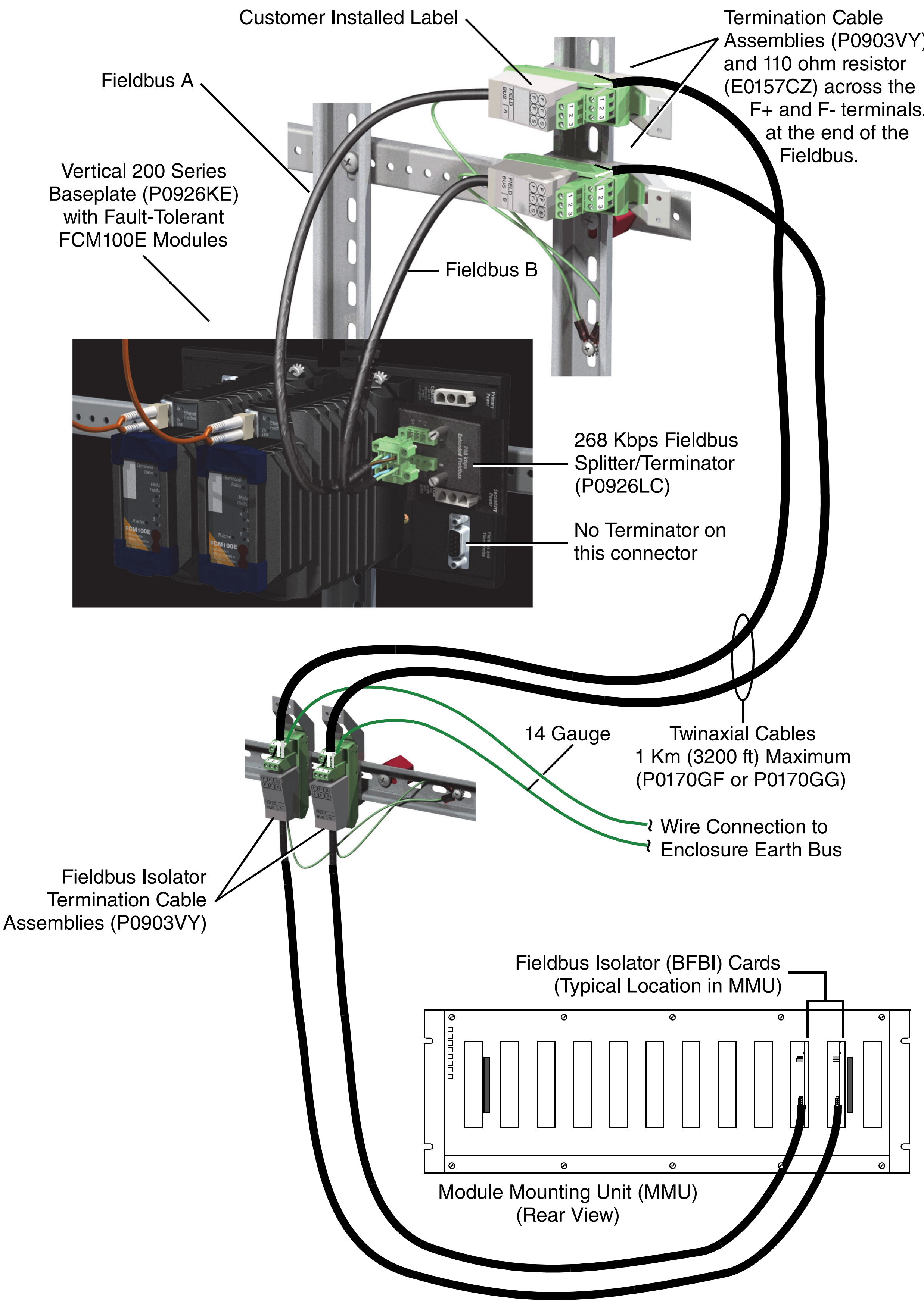


Figure 2-36. Cabling Fieldbus Isolator Cards to an FCM100E Baseplate

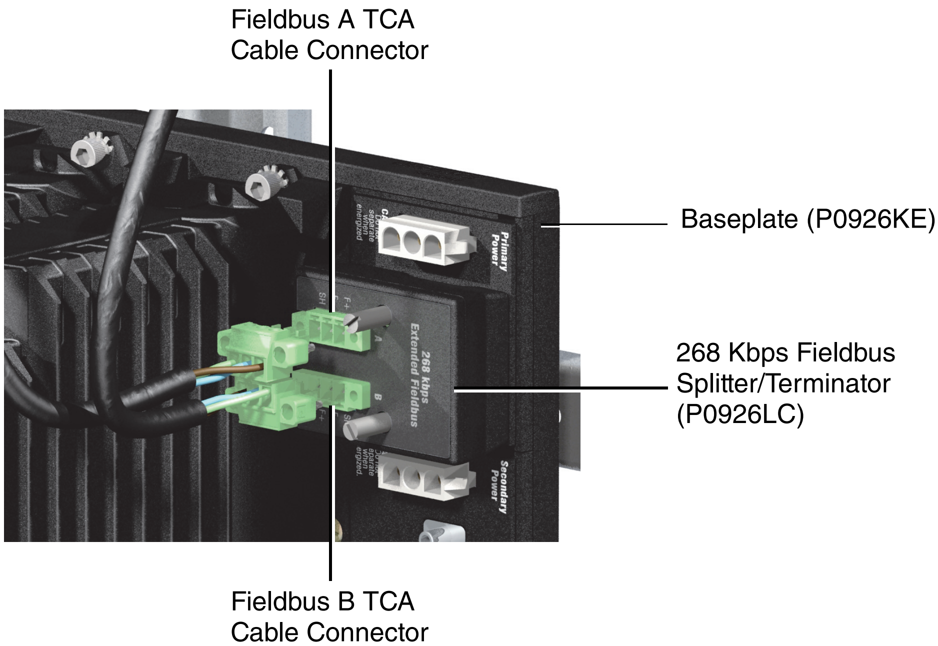


Figure 2-37. TCA Cable Connection to 268 Kbps Fieldbus Splitter/Terminator

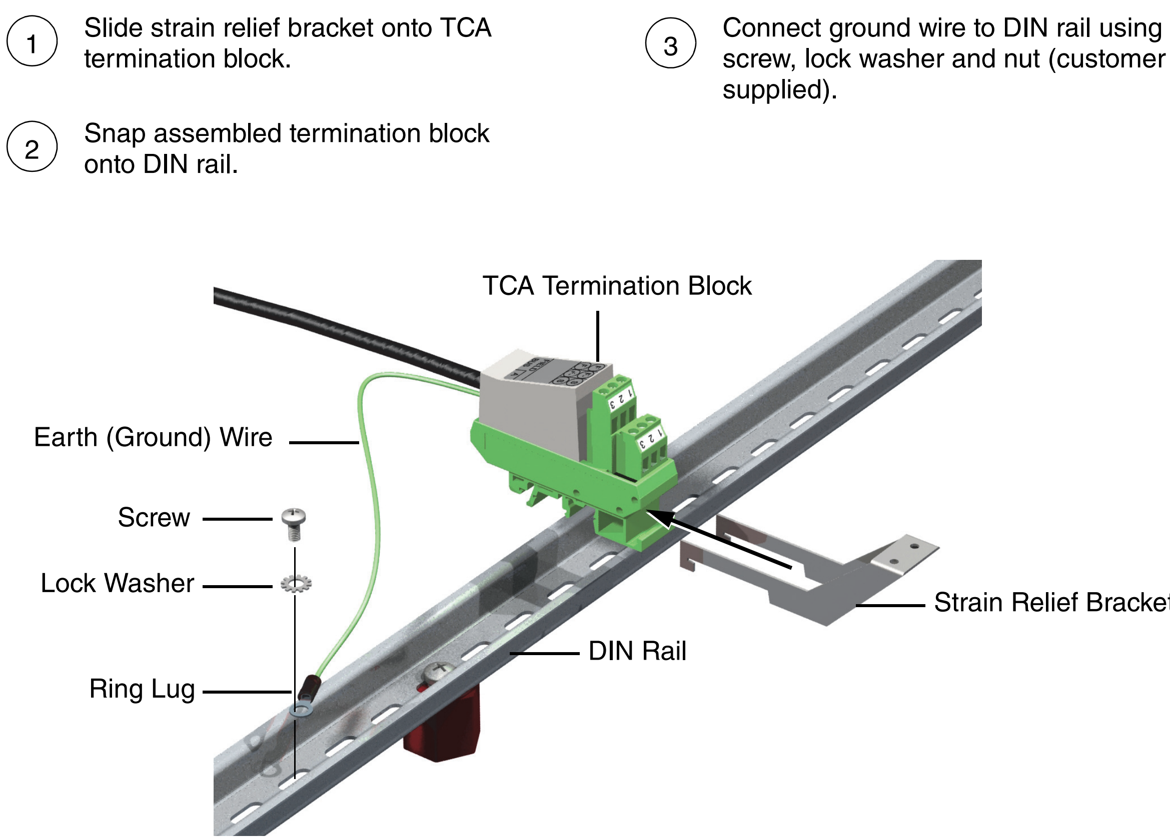


Figure 2-38. TCA Termination Block Assembly Mounting

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.

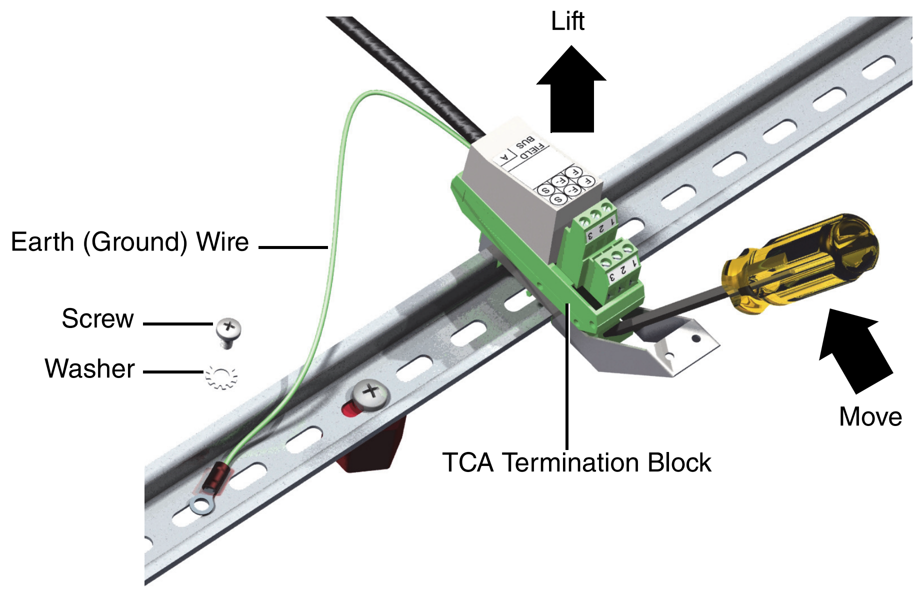
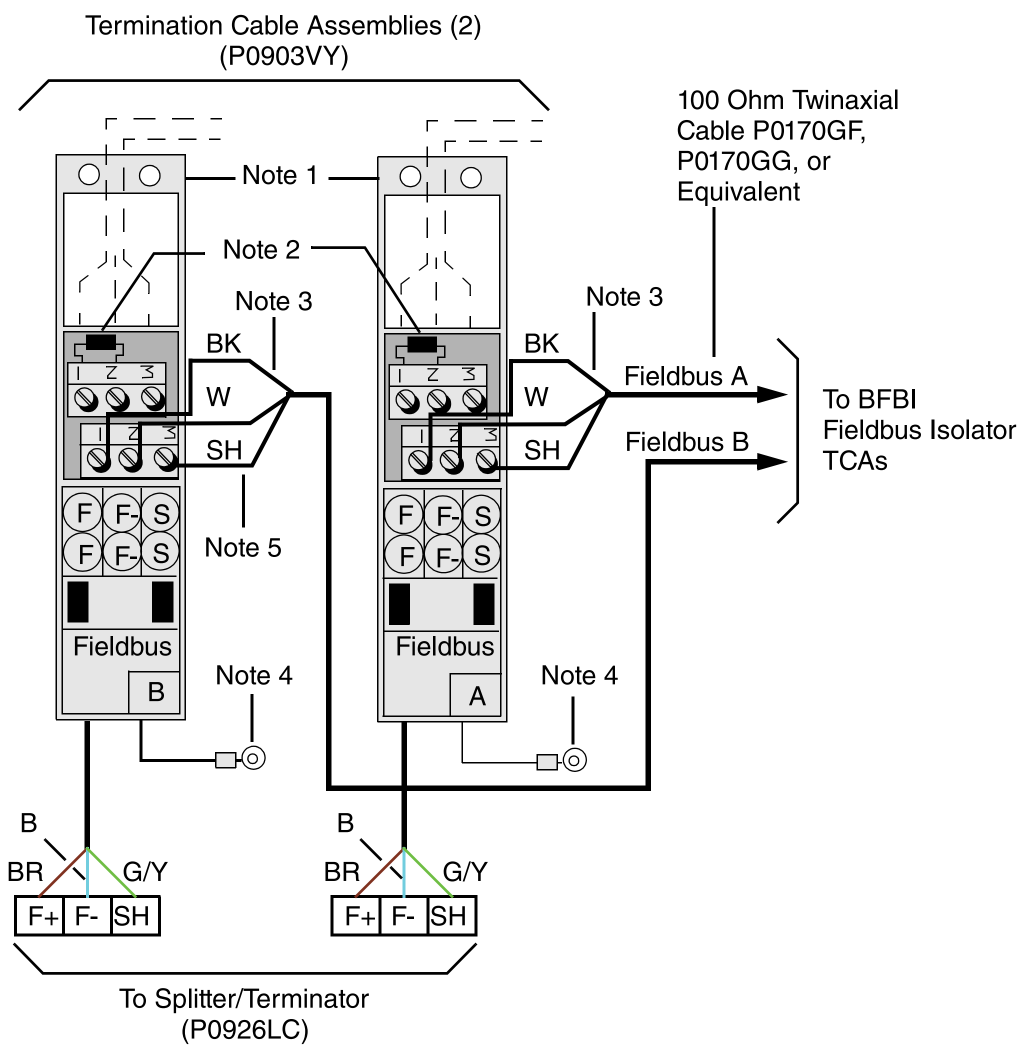


Figure 2-39. TCA Termination Block Removal



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 2-40. Remote Redundant Fieldbus Cabling (FCM100E End)

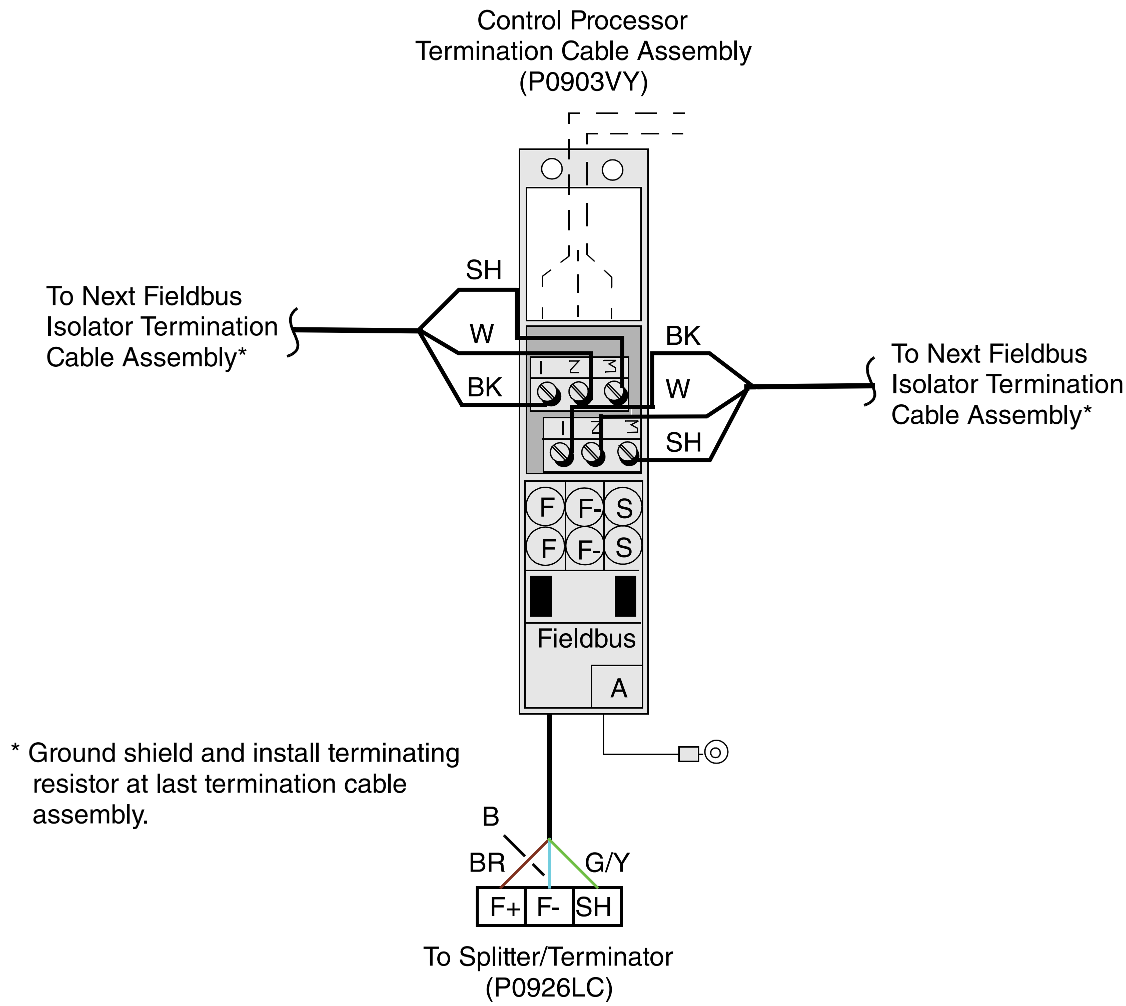


Figure 2-41. Example of Extending Fieldbus in Two Directions from FCM100E

Fieldbus Cabling at the DCS Fieldbus Module Subsystem

Fieldbus cabling at the DCS Fieldbus Module subsystem end involves making Fieldbus connections to the TCAs (P0903VY) associated with the Fieldbus Isolators, and connecting the TCA cables to the Fieldbus Isolators.

— NOTE

Connections at the DCS Fieldbus Module Subsystem are the same regardless of the type of control processor is used (CP40 or higher).

1. Using the hardware provided, install the DIN rail (P0903PN) in the equipment rack in question. The DIN rail can be placed anywhere in the rack, its placement limited only by the length of the P0903VY TCA cable, which is 72 in (1829 mm).
2. Referring to Figure 2-21 on page 33, assemble the termination block(s) associated with the Fieldbus Isolator TCA(s), snap them onto the DIN rail and connect the earth wire(s).

3. Connect the Fieldbus cables (A and B) to the Fieldbus Isolator TCAs, as shown in Figure 2-42. (If the Fieldbus is non-redundant, only one Fieldbus cable (A) connects to a Fieldbus Isolator TCA.) If the Fieldbus is redundant, Fieldbus A connects to the Fieldbus Isolator jumpered for channel A, and Fieldbus B connects to the Fieldbus Isolator jumpered for channel B.
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. (It is assumed that the rack earth bus bar is connected to a solid earth ground.)

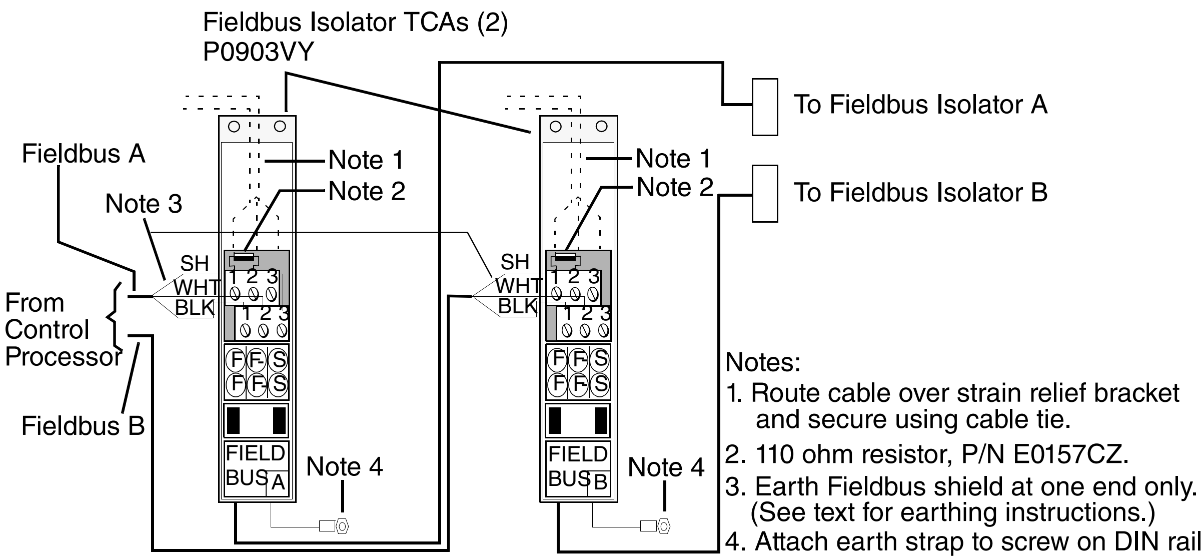


Figure 2-42. Fieldbus Cabling at the DCS Fieldbus Module Subsystem

5. Make the cable connections from the TCAs to the Fieldbus Isolators, as shown in Figure 2-43.

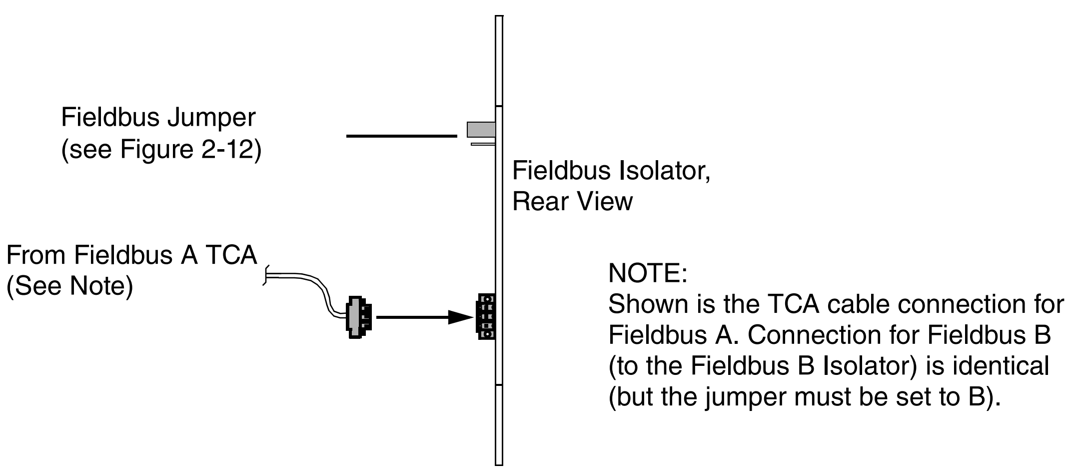


Figure 2-43. Connecting the TCA Cables to the Fieldbus Isolators

6. Place the migration kit label (P0913RT) on the inside left wall of the upper-most MMU (card nest).
7. Place the information label (B0918EU) at a readily visible location on the inside or outside of the rack cabinet.
8. Install the Module Identifiers (letterbugs) on the DCS Fieldbus Modules. (See “Module Identifier (Letterbug) Installation” on page 58.)
9. Go to “Final Installation Operations” on page 59.

Cabling the Control Processor

To cable a control processor to the HDLC fieldbus (via its splitter or splitter/combiner) and to the control network, refer to the appropriate document:

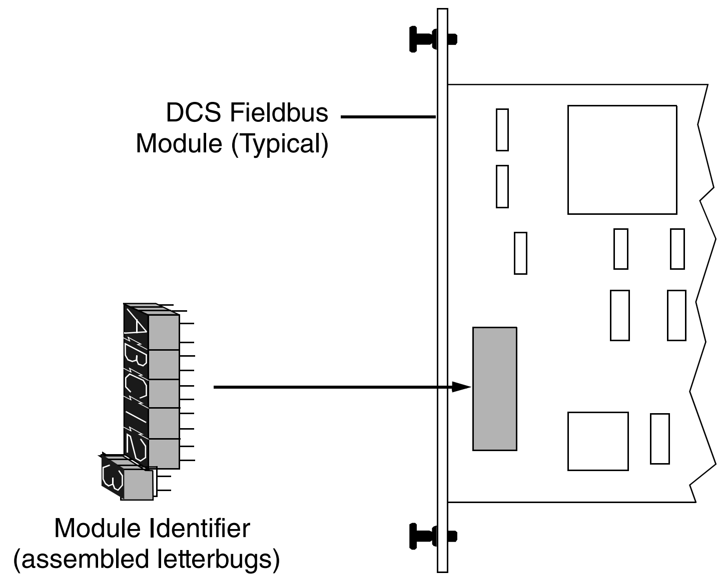
- *Field Control Processor 280 (FCP280) User’s Guide* (B0700FW)
- *Field Control Processor 270 (FCP270) User’s Guide* (B0700AR)
- *Z-Module Control Processor 270 (ZCP270) User’s Guide* (B0700AN).

Module Identifier (Letterbug) Installation

A module identifier, composed of six letterbugs, is used to provide physical, user-assigned labels on the DCS Fieldbus Modules (see Figure 2-44). 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 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 2-44. To assemble and install the module identifiers, proceed as follows:

1. Referring to “Module Identifier (Letterbug) Assignments” on page 64 and to the configuration reports, determine the module identifier (letter/number combination) that pertains to the DCS Fieldbus Module 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.
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 Steps 1 through 3 for all DCS Fieldbus Modules to be installed.



NOTE: For proper operation, the letterbug set must be oriented as shown (reading top to bottom).

Figure 2-44. Module Identifier (Letterbug) Assembly and Insertion

Final Installation Operations

Once the DCS Fieldbus Module subsystem equipment is installed and all local and remote Fieldbus cabling is completed, and both system configuration and integrated control configuration (see Chapter 3 "Configuration") have been performed, the following final installation operations may be performed.

Power Switch On

Power to the Bailey equipment rack 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 81).

When power is first applied, the DCS Fieldbus Module undergoes a power-on self-diagnostic test that checks 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 "Maintenance" on page 81.

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 EEPROM update and download operations must be performed at the Control Core Services workstation to bring the DCS Fieldbus Module subsystem up to operating status.

NOTE

Exceptions are the BASI01, BASM01, BASI03, BDSM06, and BASO37 DCS Fieldbus Modules, which have all the necessary software preloaded by manufacturing prior to shipment. For these modules, EEPROM updating is necessary only if specifically required by a Control Core Services software update, or as otherwise instructed by your service representative. Also, to start operation of the software on these modules, issuance of the DOWNLOAD command from the System Management Displays is required.

- 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 Manager or the System Management Equipment Change displays.

To perform these operations from the System Manager, refer to the "Equipment Change Actions" section of the "Fieldbus Modules" chapter in *System Manager* (B0750AP).

To perform these operations from the System Management displays, proceed as follows, referring to *System Management Displays* (B0193JC) for detailed information:

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.

Installation Checklist

- [ ] All Bailey modules are removed from all MMU nests.
- [ ] DCS Fieldbus Modules and Fieldbus Isolators are installed.
- [ ] All backplane dipshunts are installed, and termination unit jumpers and dipshunts are properly set.
- [ ] Fieldbus is installed and connected.
- [ ] Fieldbus shields are earthed (at last the device on Fieldbus).
- [ ] Fieldbus termination resistors are installed (at the last device on Fieldbus).
- [ ] Strain relief is provided for Fieldbus cables (at connection to Fieldbus Isolators).
- [ ] Module identifiers (letterbugs) are installed in all DCS Fieldbus Modules.
- [ ] System configuration and integrated control configuration are completed.
- [ ] EEPROM update and downloading of the DCS Fieldbus Module image and database have been performed, if necessary (see Note on page 60).
- [ ] If a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module is included in the migration kit installation, the MPOLL parameter in the Control Processor ECB is set to `zero`. (See Note on page 66.)
- [ ] Power to Bailey equipment rack is switched on, and DCS Fieldbus Module LEDs indicate a GO condition.

3. Configuration

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

In general, “configuration” means specifying, to the Control Core Services software, 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 prior to installing the DCS Fieldbus Module subsystem equipment, as described in Chapter 2 “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 (or System Definition) update being deferred until a more convenient time.

To perform Integrated Control Configuration on-line, refer to “On-Line Integrated Control Configuration” on page 73.

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 Foxboro Evo 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 *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.

NOTE

The FBP Integrators are configured at system configuration time for hardware ordering and documentation purposes only. System configuration information for both the FBP and I/O cards is entered later, as part of integrated control configuration.

I/A Series Software v4.x vs. v6

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, System Configuration is performed using the I/A Series System Configurator. With I/A Series software v6.0 or later, System Definition (a form of system configuration) is performed using the System Definition utility. System Configuration software is accessed from an I/A Series workstation. System Definition software is executed on a PC running the Windows NT® or later Windows operating system.

Note that for systems with BASO37 (and ECB53) you must have I/A Series software v4.3or later for the System Configurator. You must have I/A Series software v6.2 or later for the System Definition software to configure the BASO37 and ECB53.

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 you during System Configuration and, as part of the equipment installation process (see Chapter 2 “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 in the Foxboro Evo system, it may be desirable to include a specific prefix (such as “B” or “BA” for Bailey) in the 6-character letterbug set for each DCS Fieldbus Module.

Table 3-1. Equivalent FBMs

DCS Fieldbus Module(s)	Equivalent FBM(s)
BASI01[1] or BASM01[1]	One FBP10, and two FBM01s
BASI03[1]	One FBP10, and two FBM02s
BASM02	FBM02
BASM03	FBM03
BAMM01	FBM03
BDSM06[1]	One FBP10, and two FBM06s
BDSI07	FBM07
BDSM9A, BDSM9B, or BDSM09	FBM09
BDSO10	FBM10
BCOM17	FBM17
BDSO26	FBM26
BDSO41	FBM41
BASM33	FBM33
BAOM37	FBM37
BASO37[1]	One FBP10, and two FBM37s
BSEM01	FBM07

1. When configuring these modules, set the MPOLL parameter to zero in the Control Processor ECB (**<cplbug>_ECB:primary_ECB>**).

System Configuration (or System Definition) Procedure

Configure the DCS Fieldbus Modules as you would equivalent Fieldbus Modules (FBMs) (see Table 3-1). For I/A Series software v4.0, v4.1, or v4.2, refer to *System Configurator* (B0193JH). For I/A Series software v6.0 or higher, refer to *System Definition: A Step-by-Step Procedure* (B0193WQ).

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

- If this is a new (as opposed to existing) I/A Series system, install the system software. (Refer to the appropriate I/A Series 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) I/A Series system, specify to the currently installed system software that hardware items have been added to the system. (Refer to the appropriate I/A Series 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 Bailey I/O points into existing 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.

NOTE

If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (`<cp1bug>_ECB:primary_ECB>`) must be set to **zero** for proper DCS Fieldbus Module operation.

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 to Appendix C “DCS Fieldbus Module Control Schemes”.

NOTE

If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch Card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to `1` to prevent bus switching failures.

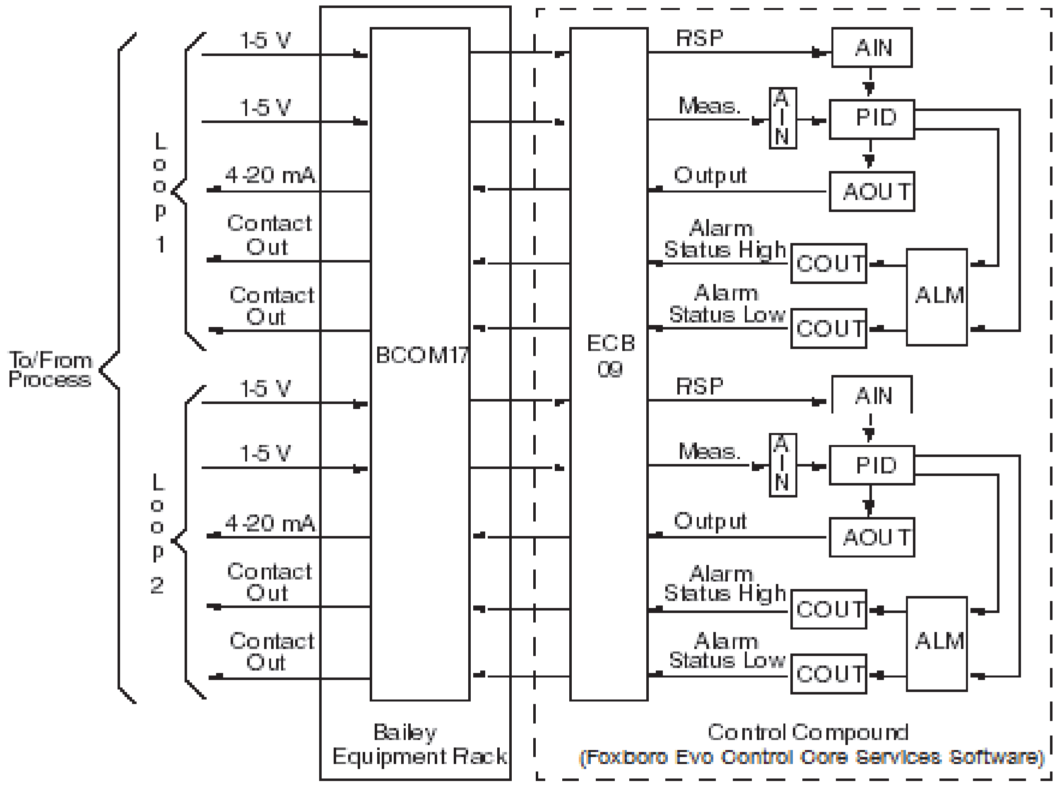


Figure 3-1. Typical Control Scheme (Using BCOM17 DCS Fieldbus Module)

— 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 card 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 68 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 73 is intended for use when a previous Foxboro Evo configuration is being updated to include the DCS Fieldbus Module subsystem.

NOTE

As indicated in a note on page 11, 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 73.

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 63.
2. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (`<cplbug>_ECB:primary_ECB>`) must be set to `zero` for proper DCS Fieldbus Module operation.
3. This procedure is intended for use with I/A Series software v4.0 or higher. 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 C "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. Open the Control Configurator and access the control processor (CP40 or later) in question.

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

— **NOTE**

As indicated in Table 3-1, certain DCS Fieldbus Modules, BASI01, BASM01, BASI03, BDSM06, and BAS037, cannot be configured for one-to-one mapping (DCS Fieldbus Module to FBM), but rather require configuration as an FBP10 and two FBMs. For these DCS Fieldbus Modules, refer to Appendix D "BASI01/BASM01, BASI03, BDSM06, BASO37 Configuration" for special configuration considerations.

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3. Use the Control Configurator's `Fix All` function to create ECB(s) for the DCS Fieldbus Modules added previously to the system configuration via the System Configurator (or System Definition).
4. If required, edit the Bxxxx ECB(s) if the default parameters provided are not satisfactory. As examples, Figure 3-2 through Figure 3-8 show typical editing displays for the BAMM01, BASM03, BCOM17, BDSI07, BDSM09, BDSO10 and BSEM01 ECBs. The HWTYPE and SWTYPE ECB parameters for the various types of DCS Fieldbus Modules are shown in Appendix C "DCS Fieldbus Module Control Schemes". For information on other ECB parameters, refer to *Integrated Control Block Descriptions* (B0193AX).
5. Referring to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) 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 C "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.
   - For information on setting fail-safe parameters, refer to "Fail-Safe Functionality" on page 75.

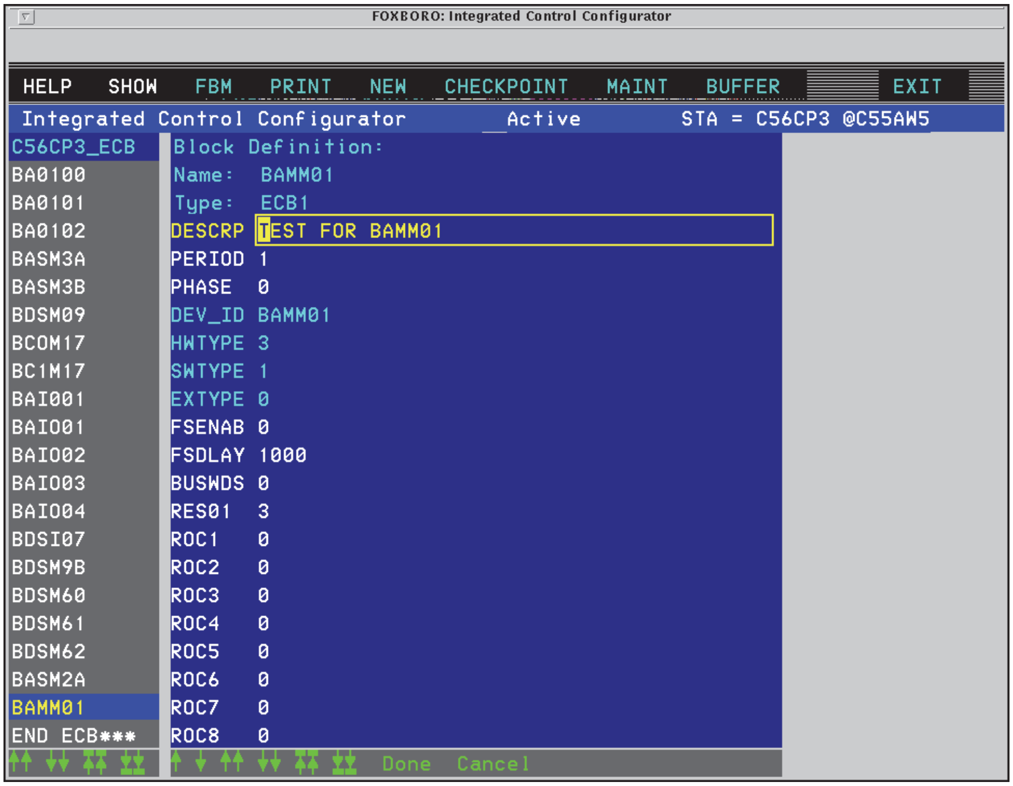


Figure 3-2. Typical Editing Display for BAMM01 (FBM03) ECB

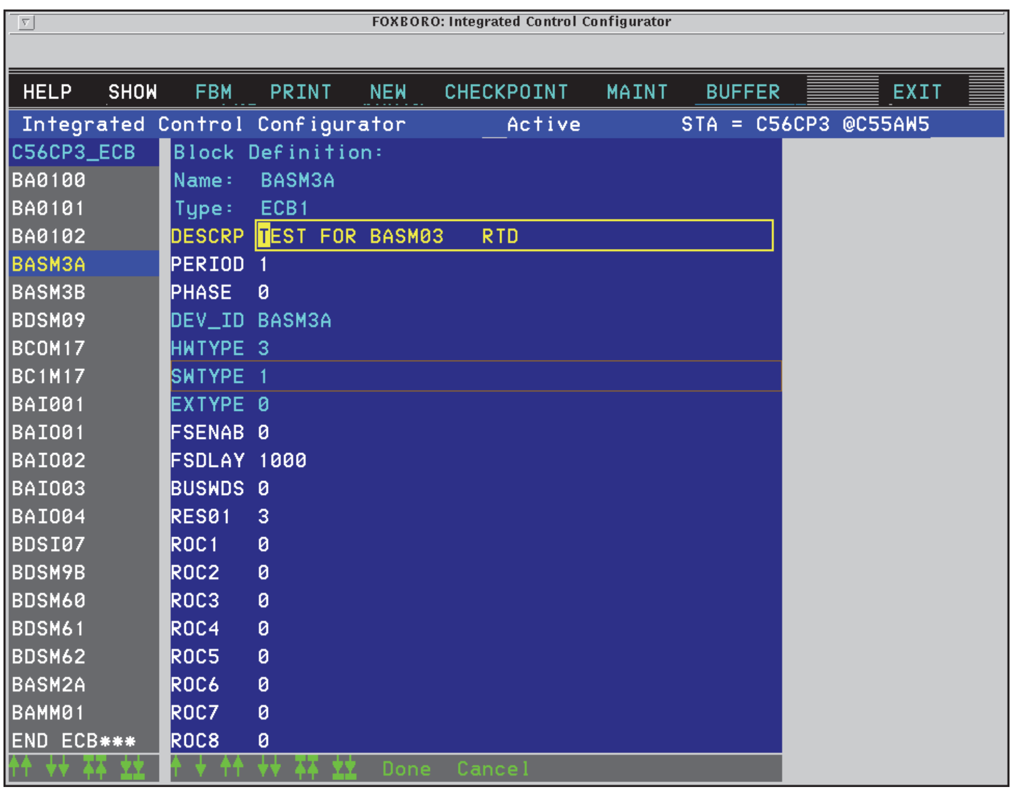


Figure 3-3. Typical Editing Display for BASM03 (FBM33) ECB

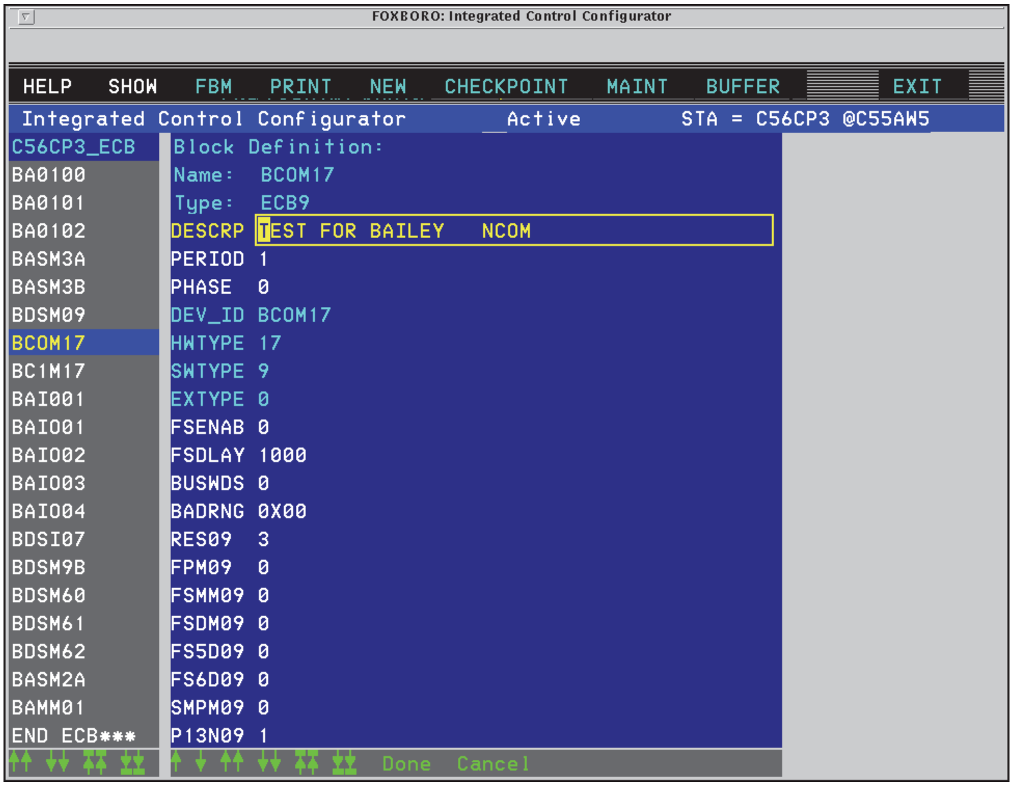


Figure 3-4. Typical Editing Display for BCOM17 (FBM17) ECB

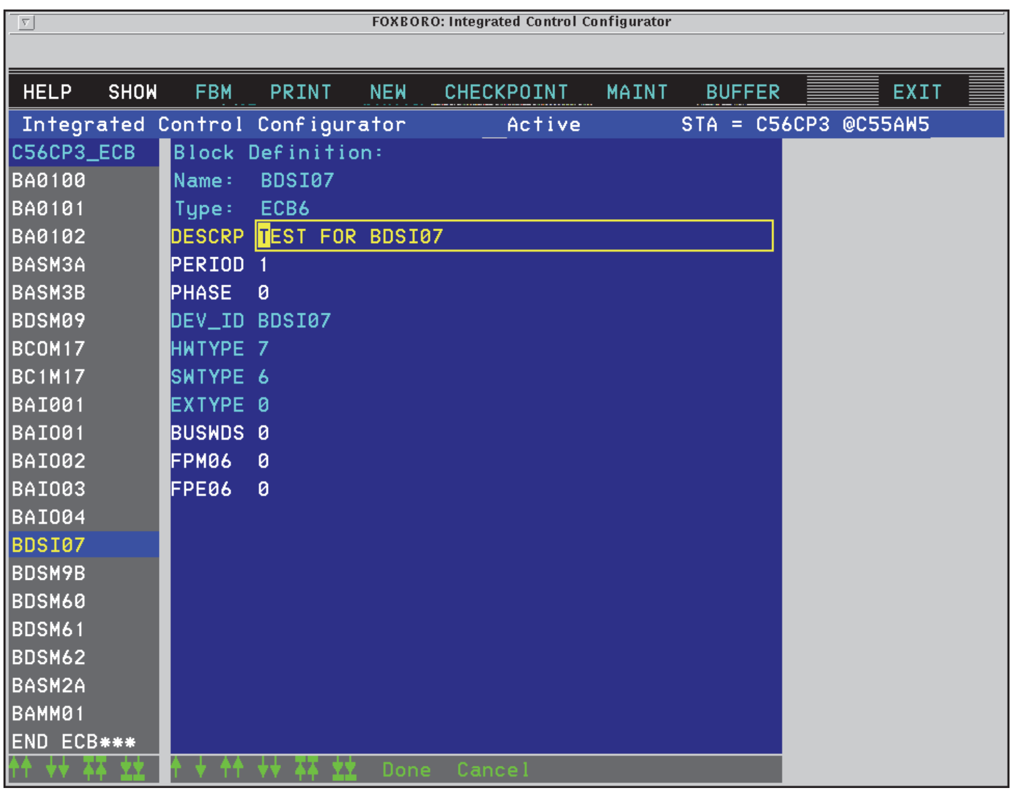


Figure 3-5. Typical Editing Display for BDSIO7 (FBM07) ECB

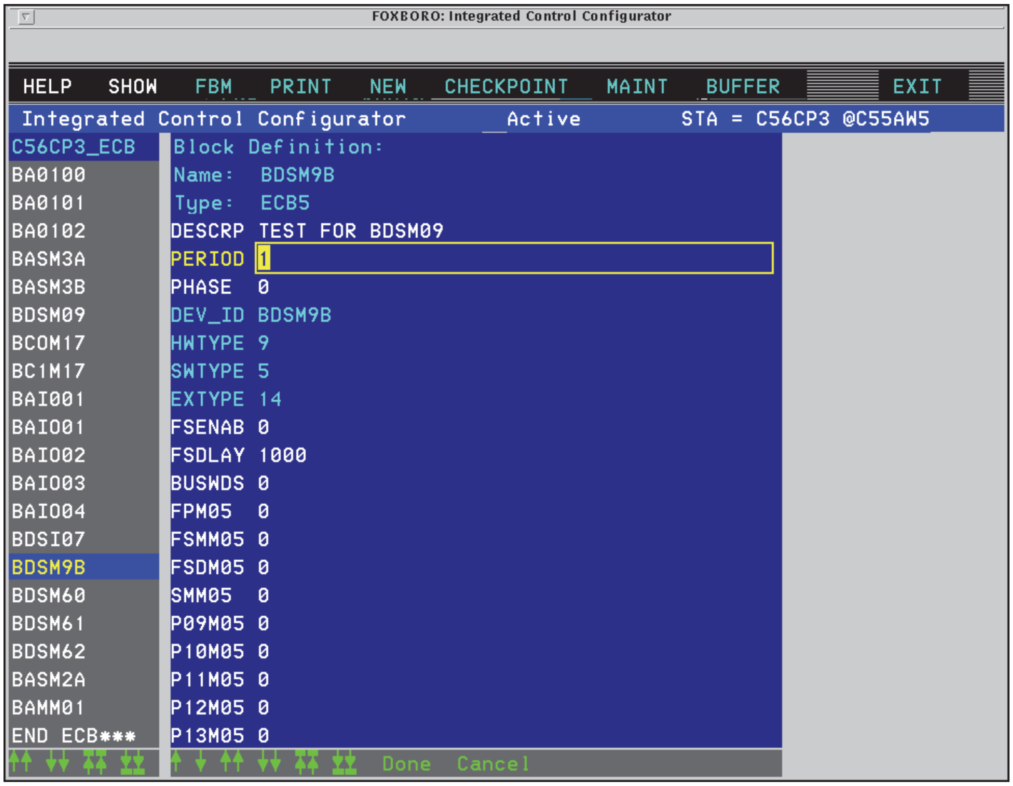
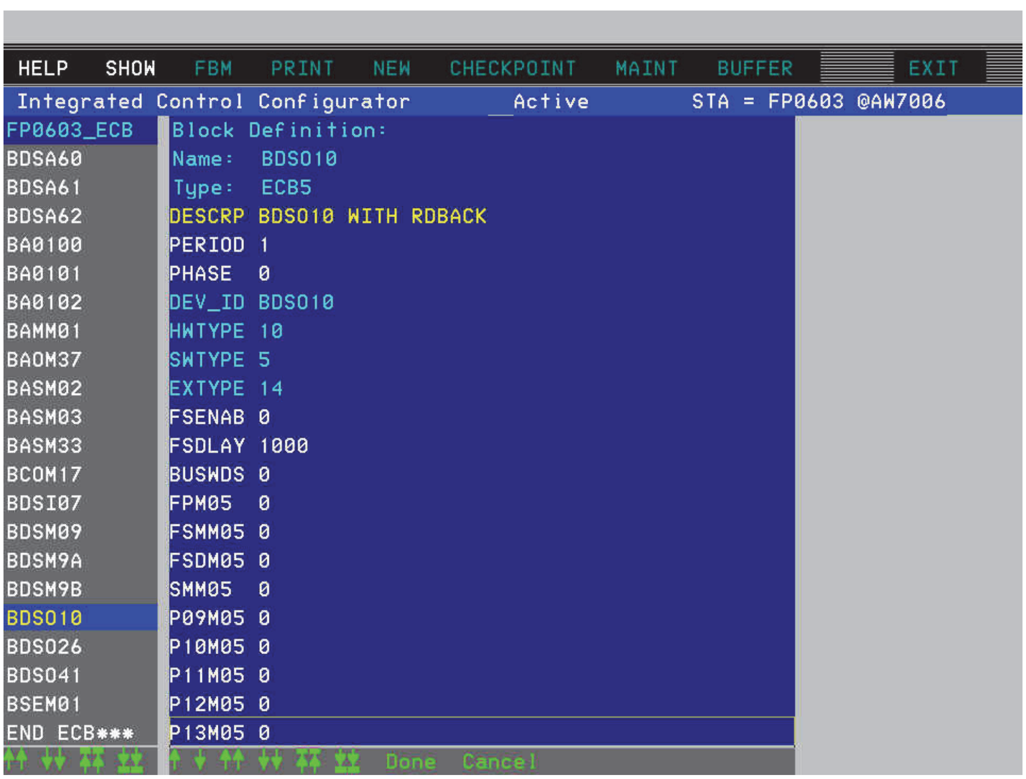


Figure 3-6. Typical Editing Display for BDSM09 (FBM09) ECB



Note: BDSO26 and BDSO41 have a similar configuration, with the exception of the HWTYPE.

Figure 3-7. Typical Editing Display for BDSO10 (FBM10) ECB

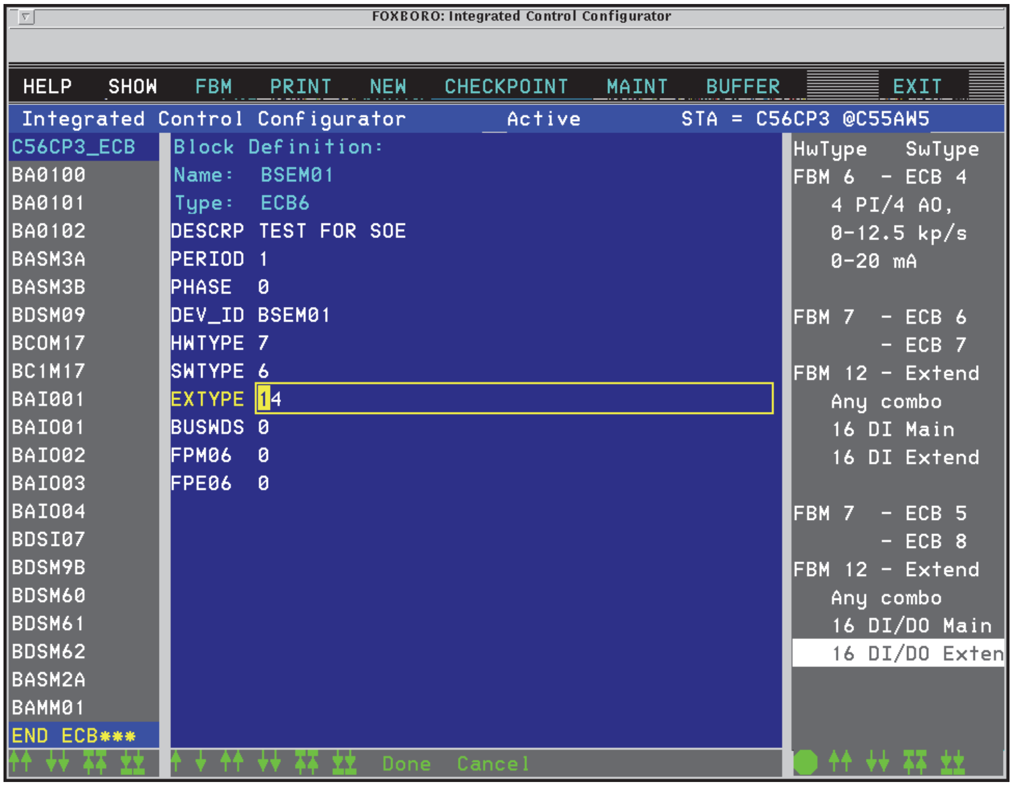


Figure 3-8. Typical Editing Display for BSEM01 (FBM07) ECB

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

1. This procedure assumes that System Configuration has been performed. See “System Configuration” on page 63.

2. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (**<cplbug>_ECB:primary_ECB>**) must be set to **zero** for proper DCS Fieldbus Module operation.

3. This procedure is intended for use with I/A Series software v4.0-v8.8 or Control Core Services software v9.0 or higher. 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 C “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)[2]
   - ECB compound (cplbug_ECB)[2] containing the primary ECB (CPLBUG_ECB:PRIMARY_ECB)[2].
2. Open the Control Configurator and access the control processor (CP40 or later) in question.

NOTE

As indicated in Table 3-1, certain DCS Fieldbus Modules, BASI01, BASM01, BASI03, BDSM06, and BASO37, cannot be configured for one-to-one mapping (DCS Fieldbus Module to FBM), but rather require configuration as an FBP10 and two FBMs. For these DCS Fieldbus Modules, refer to Appendix D "BASI01/BASM01, BASI03, BDSM06, BASO37 Configuration" for special configuration considerations.

3. Using the Control Configurator's `Insert New Block/ECB` function, create an ECB for each Bxxxx DCS Fieldbus Module in the subsystem.
4. If required, edit the newly created Bxxxx ECB(s) if the default parameters provided are not satisfactory. As examples, Figure 3-2 through Figure 3-8 show typical editing displays for the BAMM01, BASM03, BCOM17, BDSI07, BDSM09, and BSEM01 ECBs. The HWTYPE and SWTYPE ECB parameters for the various types of DCS Fieldbus Modules are shown in Appendix C "DCS Fieldbus Module Control Schemes". For information on other ECB parameters, refer to *Integrated Control Block Descriptions* (B0193AX).
5. Referring to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) 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 C "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.
   - For information on setting fail-safe parameters, refer to "Fail-Safe Operation" on page 75.

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

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 – Holds the value sent in the most recent output command from the CP
- Use Fallback Value – Uses 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 Parameters 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 Parameters 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 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 FSMMn = 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 FSMMn = 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 FSMMn = 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 FSMMn = 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%.

NOTE

For fail-safe information on digital type ECBs, refer to *Integrated Control Block Descriptions* (B0193AX).

4. Process Displays and System Management Displays

This chapter provides information on the Foxboro Evo Process displays and System Management displays and how they relate to 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 4-1 for SMDH display)
- Detailed equipment change (**EQUIP CHG**) and equipment information (**EQUIP INFO**) displays for each DCS Fieldbus Module (see Figure 4-2 and Figure 4-3 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. DCS Fieldbus Modules may be distinguished from other FBMs by means of their user-assigned module identifiers (letterbugs), which can contain a prefix designating the device as a Bailey 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).

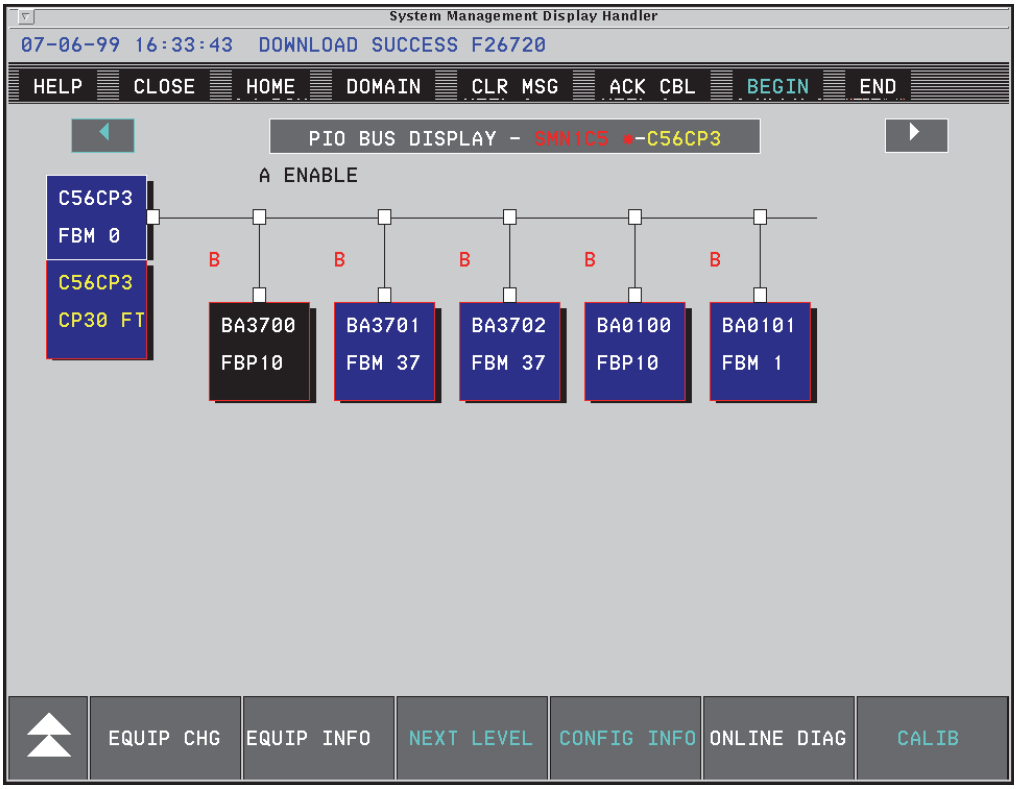


Figure 4-1. PIO Bus Display (Typical - SMDH)

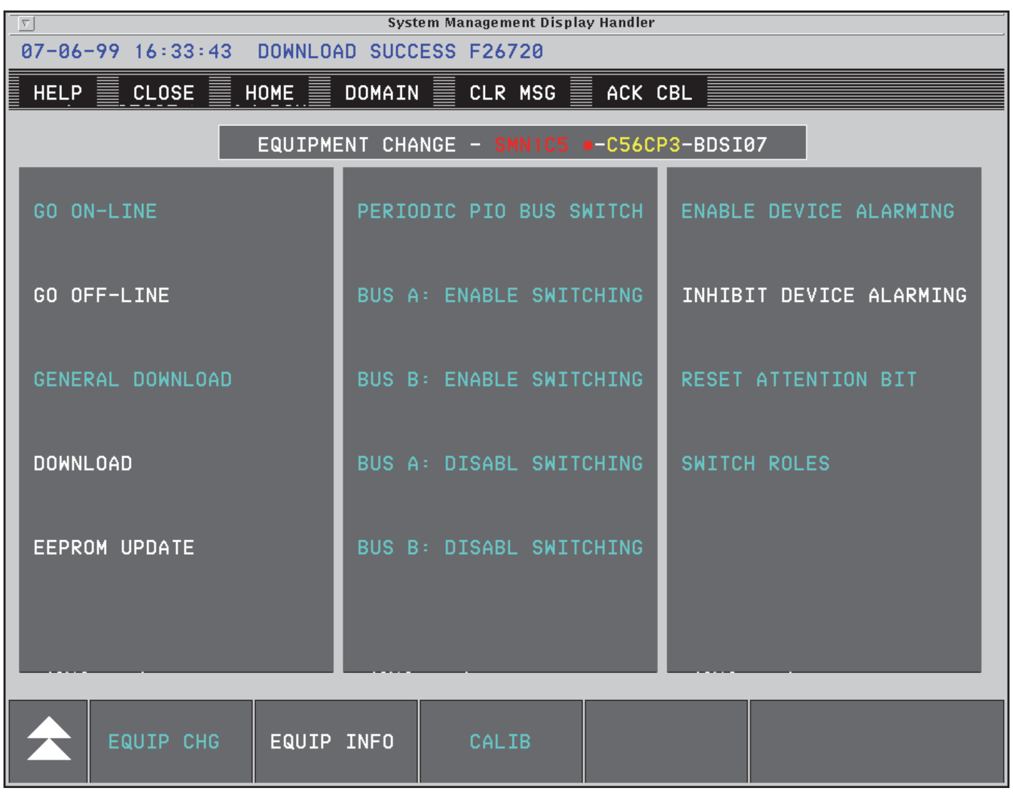


Figure 4-2. Typical Equipment Change Display (SMDH)

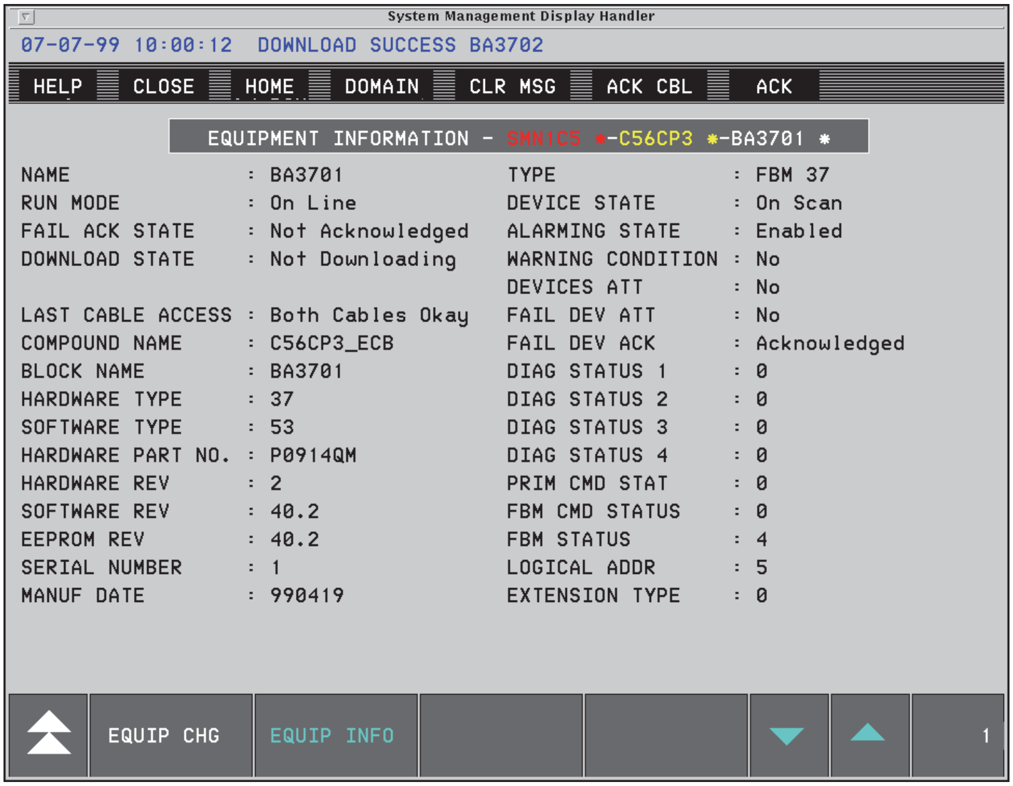


Figure 4-3. Typical Equipment Information Display (SMDH)

5. Maintenance

This chapter provides information on maintaining the DCS Fieldbus Module subsystem.

The original maintenance and preventive maintenance philosophies for the Bailey equipment racks are maintained. These include 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 FBMs.) Refer to "System Management Displays" on page 77 and the following 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 Fieldbus Isolator (s) and the DCS Fieldbus Modules indicate the operational status of these devices

Fieldbus Isolator LED Indictors

The functions of the Fieldbus Isolator (BFBI) LEDs are as follows (see Figure 5-1):

- Run

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

  When illuminated (red), indicates problem with input power, or an on-card fault.
- Local Fieldbus Activity

  When illuminated (amber), indicates the existence of communication activity on the local Fieldbus (on the MMU backplane). This will be Fieldbus A or Fieldbus B activity, depending on the setting of the A/B jumper on the Fieldbus Isolator (see Figure 2-12 on page 28).
- External Fieldbus Activity

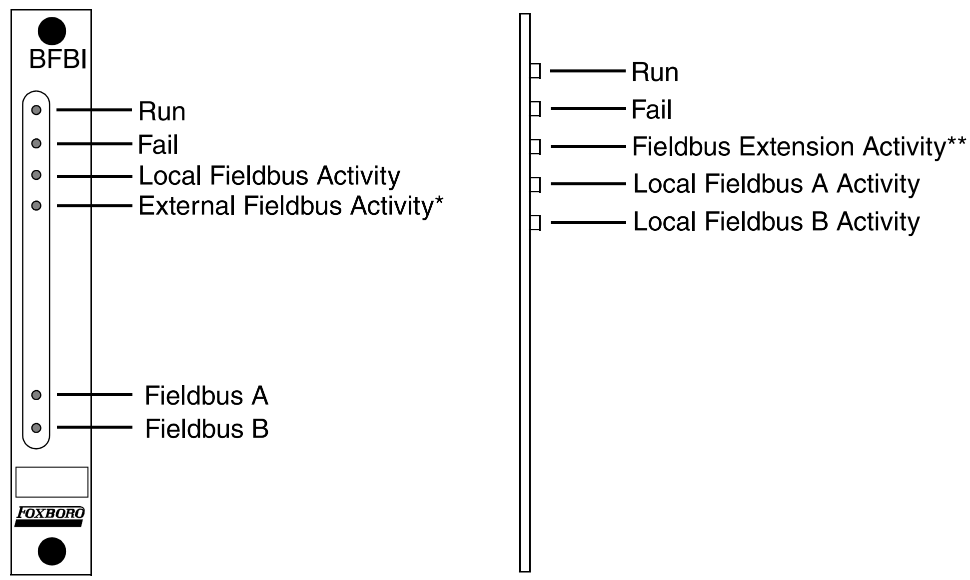
  When illuminated (amber), indicates the existence of communication activity on the external Fieldbus (between the Fieldbus Isolator and the control processor).

- Fieldbus A

  When illuminated (amber), indicates that the Fieldbus Isolator communicates with the control processor over Fieldbus A (as selected via on-card jumper – see Figure 2-12 on page 28).

- Fieldbus B

  When illuminated (amber), indicates that the Fieldbus Isolator communicates with the control processor over Fieldbus B (as selected via on-card jumper – see Figure 2-12 on page 28).



Fieldbus Isolator (BFBI) Isolated A/B Switch Card (BFBE2)

*Communication with control processor.
**Communication over Fieldbus extension (to DCS Fieldbus Modules in one or more remote Bailey equipment racks.

Figure 5-1. Fieldbus Isolator and Isolated A/B Switch Card LED Indicators

Isolated A/B Switch Card LED Indictors

The functions of the Isolated A/B Switch Card (BFBE2) LEDs are as follows (see Figure 5-1):

- Run

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

- Fail

  When illuminated (red), indicates problem with input power, or an on-card fault.

- Fieldbus Extension Activity

  When illuminated (amber), indicates the existence of communication activity on the extended Fieldbus, between the Isolated A/B Switch Card (BFBE2) and DCS Fieldbus Modules in one or more remote Bailey equipment racks.

- Local Fieldbus A Activity

  When illuminated (amber), indicates the existence of communication activity on local Fieldbus A (on the MMU backplane).

- Local Fieldbus B Activity

  When illuminated (amber), indicates the existence of communication activity on local Fieldbus B (on the MMU backplane).

DCS Fieldbus Module LED Indictors

Two status LEDs (red and green) at the front of each DCS Fieldbus Module provide indications of operating status, as listed in Table 5-1.

Table 5-1. 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 state normally occurs during power-up, or when the DCS Fieldbus Module is off-line.)
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 clear (colorless).

In addition to the status LEDs, discrete input/output DCS Fieldbus Modules (such as the BDSIO7) include amber LEDs which indicate the status of the associated I/O signal to/from the field device (such as a relay). On these DCS Fieldbus Modules, the channel numbers are indicated next to the LEDs. For input signals, the LED is on when an input voltage is present or the contact is closed. For output signals, the LED is on when the FBM is supplying on-state current to the field device.

Module Removal/Replacement

Subsystem modules (DCS Fieldbus Modules or Fieldbus Isolators) can be removed or replaced with the power on without causing damage to the module. (Care must be exercised, however, to ensure that process operations are not disrupted.)

Technical Support

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

Module Return Procedure

Contact Global Customer Support (see above) for a Return Authorization Number and shipping address.

Appendix A. Hardware Specifications

BAMM01

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
8.0 W
HEAT DISSIPATION
8.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (4 Channels)
RTD
1.2 kΩ to 1.6 kΩ
RATED MEAN ACCURACY
±0.025% of span (±1.5 Ω)
RESOLUTION
12 to 15 bits, programmable
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 electrical shock.

BAOM37

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%, 24 V dc ±10%
CONSUMPTION
12.0 W
HEAT DISSIPATION
12.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Output Channels (8 Channels)
RANGE
0 to 10 V dc, 1 to 5 V dc, 0 to 20.4 mA dc
RATED MEAN ACCURACY
±0.05% of span (mA range)
±0.15% of span (voltage ranges)
RESOLUTION
12 bits
OUTPUT LOAD
735 Ω (maximum) mA range
1000 Ω (minimum) voltage ranges
COMPLIANCE VOLTAGE
18.6 dc nominal at 20 mA at I/O field terminals
SETTLING TIME
100 ms to settle within 1% band of steady state

BASI01

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
5.75 W
HEAT DISSIPATION
5.75 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (15 Channels)
RANGE
0 to 20 mA dc, 1 to 5 V dc, 0 to 1 V dc, 0 to 5 V dc, 0 to 10 V dc, ±10 V dc
RATED MEAN ACCURACY
±0.25% of span for 0 to 1 V dc range
0.10% of span for all other ranges
RESOLUTION
12 bits

BASI03

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
15.0 W
HEAT DISSIPATION
15.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (16 Channels)
Independently configured
RANGE
TC, RTD, ±100 mV, 1 to 5 V dc, 0 to 5 V dc, 0 to 10 V dc, ±10 V dc
RATED MEAN ACCURACY
±0.05% of span
RESOLUTION
12 bits
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 electrical shock.

BASM01

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
5.75 W
HEAT DISSIPATION
5.75 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (16 Channels)
RANGE
0 to 20 mA dc, 1 to 5 V dc, 0 to 1 V dc, 0 to 5 V dc, 0 to 10 V dc, ±10 V dc
RATED MEAN ACCURACY
±0.25% of span for 0 to 1 V dc range
0.10% of span for all other ranges
RESOLUTION
12 bits

BASM02

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
7.0 W
HEAT DISSIPATION
7.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (8 Channels)
RANGE
–10.5 to 71.419 mV dc, 0 to 100 mV dc, ±100 mV dc
RATED MEAN ACCURACY
±0.035% of span
THERMOCOUPLE TYPES
E, J, K, R, S, T (Chinese E, S)
RESOLUTION
12 to 15 bits, programmable
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 electrical shock.

BASM03

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
8.0 W
HEAT DISSIPATION
8.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (8 Channels)
RTD
0 to 320 Ω
RATED MEAN ACCURACY
±0.025% of span (±0.08 Ω)
RESOLUTION
12 to 15 bits, programmable
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 electrical shock.

BASM33

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%
CONSUMPTION
8.0 W
HEAT DISSIPATION
8.0 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Input Channels (8 Channels)
RTD
0 to 30 Ω Cu
RATED MEAN ACCURACY
±0.125% of span
RESOLUTION
12 to 15 bits, programmable
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 electrical shock.

BASO37

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%, 24 V dc ±10%
CONSUMPTION
15.4 W
HEAT DISSIPATION
15.4 W
Communication
Redundant IEEE P1118 Fieldbus

Analog Output Channels (14 Channels)
RANGE
1 to 5 V dc, 4 to 20.4 mA dc
RATED MEAN ACCURACY
±0.05% of span (4 to 20 mA range)
±0.05% of span (1 to 5 V dc range)
RESOLUTION
12 bits
OUTPUT LOAD
750 Ω (maximum) 4 to 20 mA range
350 Ω (minimum) 1 to 5 V dc range
COMPLIANCE VOLTAGE
18.6 dc nominal at 20 mA at I/O field terminals
SETTLING TIME
100 ms to settle within 1% band of steady state

BCOM17

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, ±15 V dc ±5%,
24 V dc ±10%
CONSUMPTION
5.75 W
HEAT DISSIPATION
5.75 W
Communication
Redundant IEEE P1118 Fieldbus
Analog Input Channels (4 Channels)
RANGE
1 to 5 V dc, 4 to 20 mA dc
RATED MEAN ACCURACY
±0.05% of span
RESOLUTION
12 to 15 bits, programmable
Discrete Input Channels (3 Channels)
OPEN CIRCUIT VOLTAGE
Range 1
24 V dc, 125 V dc, 120 V ac (supplied at termination panel)
Range 2
24 V dc, 125 V dc (supplied at termination panel)
SHORT CIRCUIT CURRENT
Range 1
2.0 mA at 24 V dc; 6.0 mA at 125 V dc; 4.0 mA at 120 V ac
Range 2
2.0 mA at 24 V dc; 6.0 mA at 125 V dc
ON-STATE RESISTANCE
1 kΩ (maximum)
OFF-STATE RESISTANCE
200 kΩ (minimum)

Discrete Input Channels (3 Channels) (Cont.)
INPUT SWITCHING LEVELS
Jumper select
High Level Range 1
21.5 V dc minimum (24 V dc); 100 V dc minimum
(125 V dc); 100 V_{rms} minimum (120 V ac)
High Level Range 2
10 V dc minimum (24 V dc); 35 V dc minimum (125 V dc)
Low Level Range 1
10 V dc maximum (24 V dc); 50 V dc maximum (125 V dc); 50 V_{rms} maximum (120 V ac)
Low Level Range 2
1.7 V dc maximum (24 V dc); 5.6 V dc maximum (125 V dc)
Analog Output Channels (2 Channels)
RANGE
1 to 5 V dc, 4 to 20.4 mA dc
RATED MEAN ACCURACY
±0.05% of span
RESOLUTION
12 bits
OUTPUT LOAD
735 Ω (maximum) 4 to 20 mA range
1000 Ω (minimum) 1 to 5 V dc range
SETTLING TIME
18.6 dc nominal at 20 mA at I/O field terminals
Discrete Output Channels (4 Channels)
Isolated solid state switch
APPLIED VOLTAGE
21 to 27 V dc
LOAD CURRENT
0.25 A (maximum)
OFF-STATE LEAKAGE CURRENT
0.1 mA
ISOLATION
Discrete input channels only: 1000 V ac, channel to earth (ground)

BDSI07

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
5.0 W
HEAT DISSIPATION
5.0 W
Communication
Redundant IEEE P1118 Fieldbus
Discrete Input Channels (16 Channels)
CONTACT INPUT RANGE
Open (off) and Closed (on)
OPEN CIRCUIT VOLTAGE
24 V dc, 125 V dc, 120 V ac (supplied at termination panel)
SHORT CIRCUIT CURRENT
2.0 mA at 24 V dc; 6.0 mA at 125 V dc; 4.0 mA at 120 V ac
ON-STATE RESISTANCE
1 kΩ (maximum)

Discrete Input Channels (16 Channels) (Cont.)
OFF-STATE RESISTANCE
200 kΩ (minimum)
INPUT SWITCHING LEVELS
High Level
21.5 V dc minimum (24 V dc); 100 V dc minimum
(125 V dc); 100 V_{rms} minimum (120 V ac)
Low Level
10 V dc maximum (24 V dc); 50 V dc maximum
(125 V dc); 50 V_{rms} maximum (120 V ac)
ISOLATION
Between any channel and earth (ground),
1000 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 120 V ac violates electrical safety code requirements and may expose users to electrical shock.

BDSM06

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%, 24 V dc ±10%
CONSUMPTION
4.5 W
HEAT DISSIPATION
4.5 W
Communication
Redundant IEEE P1118 Fieldbus
Pulse Input Channels (8 Channels)
INPUT RANGES
Range 1
5 V dc
Input Logic High
4 V dc minimum to 6 V dc maximum
Input Logic Low
0.0 V dc minimum to 1.0 V dc maximum
Range 2
24 V dc
Input Logic High
21.6 V dc minimum to 27 V dc maximum
Input Logic Low
0.0 V dc minimum to 2.0 V dc maximum

Pulse Input Channels (8 Channels) (Cont.)
Range 3
Preamps (channels 1 and 2 only)
Input Logic High
+25 mV (peak) minimum to 5 V dc maximum
Input Logic Low
–25 mV (peak) minimum to –5 V dc maximum
COUNTER RANGE
0 to 50 K counts per second
ISOLATION
Input to earth (ground) 1000 V ac all 3 ranges;
Input to Input, 300 V ac for ranges 1 and 2 only
NOTE: This does not imply that these channels are intended for connection to hazardous voltage circuits. Connection of these channels to voltages greater than 120 V ac violates electrical safety code requirements and may expose users to electrical shock.

BDSM09

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
2.3 W
HEAT DISSIPATION
11.0 W
Communication
Redundant IEEE P1118 Fieldbus

Discrete Output Channels (16 Channels)
Isolated
APPLIED VOLTAGE
21 to 27 V dc
LOAD CURRENT
0.25 A (maximum)
OFF-STATE LEAKAGE CURRENT
0.10 mA
ISOLATION
Between any channel and earth (ground), 1000 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 120 V ac violates electrical safety code requirements and may expose users to electrical shock.

BDSM9A

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
5.0 W
HEAT DISSIPATION
9.0 W
Communication
Redundant IEEE P1118 Fieldbus
Discrete Input Channels (8 Channels)
CONTACT INPUT RANGE
Open (off) and Closed (on)
OPEN CIRCUIT VOLTAGE
24 V dc, 125 V dc, 120 V ac
(supplied at termination panel)
SHORT CIRCUIT CURRENT
2.0 mA at 24 V dc; 6.0 mA at 125 V dc;
4.0 mA at 120 V ac
ON-STATE RESISTANCE
1 kΩ (maximum)
OFF-STATE RESISTANCE
200 kΩ (minimum)
INPUT SWITCHING LEVELS
High Level:
20 V dc minimum (24 V dc);
40 V dc minimum (125 V dc);
100 V_{rms} minimum (120 V ac)
Low Level:
10 V dc maximum (24 V dc);
20 V dc maximum (125 V dc);
50 V_{rms} maximum (120 V ac)

Discrete Output Channels (8 Channels)
Isolated Solid State Switch
APPLIED VOLTAGE
21 to 27 V dc
LOAD CURRENT
0.25 A (maximum)
OFF-STATE LEAKAGE CURRENT
0.1 mA
Isolation
Discrete input channels only,
1000 V ac channel to earth (ground)
NOTE: This does not imply that these channels are intended for connection to hazardous voltage circuits. Connection of these channels to voltages greater than 120 V ac violates electrical safety code requirements and may expose users to electrical shock.

BDSM9B

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
5.0 W
HEAT DISSIPATION
13.0 W
Communication
Redundant IEEE P1118 Fieldbus
Discrete Input Channels (16 Channels)
CONTACT INPUT RANGE
Open (off) and Closed (on)
OPEN CIRCUIT VOLTAGE
24 V dc (supplied at termination panel)
SHORT CIRCUIT CURRENT
2.0 mA at 24 V dc
ON-STATE RESISTANCE
1 kΩ (maximum)
OFF-STATE RESISTANCE
200 kΩ (minimum)

Discrete Input Channels (16 Channels) (Cont.)
INPUT SWITCHING LEVELS
High Level
21.5 V dc minimum
Low Level
10 V dc maximum
Discrete Output Channels (16 Channels)
APPLIED VOLTAGE
21 to 27 V dc
LOAD CURRENT
0.25 A (maximum)
OFF-STATE LEAKAGE CURRENT
0.10 mA
ISOLATION
Discrete input channels only,
30 V ac or 60 V dc channel to earth (ground)

BDSO10

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
2.6 W
HEAT DISSIPATION
6.0 W
Communication
Redundant IEEE P1118 Fieldbus
Fuse Failure Indication
Fuse failure indication via inputs 17 to 24 as true.

Discrete Output Channels (8 Channels)
Isolated
APPLIED VOLTAGE
24 to 240 V ac
LOAD CURRENT
1.0 A at 70°C
OFF-STATE LEAKAGE CURRENT
17.5 mA at 240 V ac 25°C
ISOLATION
1000 V AC between any channel and earth (ground), 300 V ac 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 240 V ac violates electrical safety code requirements and may expose users to electrical shock.

BDSO26

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
3.0 W
HEAT DISSIPATION
8.0 W
Communication
Redundant IEEE P1118 Fieldbus
Fuse Failure Indication
Fuse failure indication via inputs 17 to 24 as true.

Discrete Output Channels (8 Channels)
Isolated
APPLIED VOLTAGE
4 to 50 V dc
LOAD CURRENT
1.5 A at 70°C
OFF-STATE LEAKAGE CURRENT
1.0 mA at 70°C
ISOLATION
1000 V AC between any channel and earth (ground), 300 V ac 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 electrical shock.

BDSO41

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
3.0 W
HEAT DISSIPATION
6.0 W
Communication
Redundant IEEE P1118 Fieldbus
Fuse Failure Indication
Fuse failure indication via inputs 17 to 24 as true.

Discrete Output Channels (8 Channels)
Isolated
APPLIED VOLTAGE
5 to 160 V dc
LOAD CURRENT
0.5 A at 70°C
OFF-STATE LEAKAGE CURRENT
2.0 mA at 70°C
ISOLATION
1000 V ac between any channel and earth (ground), 300 V ac 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 160 V dc violates electrical safety code requirements and may expose users to electrical shock.

BSEM01

Power Requirements
INPUT VOLTAGE
+5 V dc ±5%
CONSUMPTION
5.75 W
HEAT DISSIPATION
5.75 W
Communication
Redundant IEEE P1118 Fieldbus
Discrete Input Channels (16 Channels)
CONTACT INPUT RANGE
Open (off) and Closed (on)
OPEN CIRCUIT VOLTAGE
24 V dc, 48 V dc, 125 V dc, 120 V ac (supplied at termination panel)
SHORT CIRCUIT CURRENT
2.0 mA at 24 V dc; 4.0 mA at 48 V dc; 6.0 mA at 125 V dc; 4.0 mA at 120 V ac
ON-STATE RESISTANCE
1 kΩ (maximum)
OFF-STATE RESISTANCE
200 kΩ (minimum)

Discrete Input Channels (Cont.)
INPUT SWITCHING LEVELS
High Level
22 V dc minimum (24 V dc); 40 V dc minimum (48 V dc); 100 V dc (125 V dc); 100 V_{rms} minimum (120 V ac)
Low Level
10 V dc maximum (24 V dc); 20 V dc maximum (48 V dc); 50 V dc maximum (125 V dc); 50 V dc maximum (120 V ac)
ISOLATION
Between any channel and earth (ground), 1000 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 120 V ac violates electrical safety code requirements and may expose users to electrical shock.

BFBI (Fieldbus Isolator)

Maximum Number of DCS FBMs Driven	40
Maximum Length of Local Bus	9 m (30 ft)
Maximum Input Power Voltage	5.25 V dc
Maximum Operating Current	325 mA
Maximum Power Dissipation	2.75 W
Minimum Isolation Voltage	2000 V rms

Appendix B. I/O Connection and Dipshunt Information

This appendix contains information on making the I/O connections and dipshunt selections at the termination units associated with the newly installed DCS Fieldbus Modules. Please take note of the following:

- ♦ This information is presented for reference purposes only. No changes to termination unit field wiring or dipshunt selections are required to implement the DCS Fieldbus Modules subsystem. For additional information on field wiring and dipshunt selections, refer to the associated Bailey user guides.
- ♦ 8-position dipshunts (P/N P0178EC) are included in the Migration Kit on an “as required” basis, in case they are needed for these dipshunt placements.

Termination Unit NTAI02 with BAMM01 and BASM02

This Termination Unit is used with DCS Fieldbus Modules BAMM01 and BASM02. Figure B-1 shows the terminal assignments, Figure B-2 shows an input wiring example, Figure B-3 shows the cable connections for a single-IMAMM03 equipment upgrade, and Figure B-4 shows the cable connections for a redundant-IMAMM03 equipment upgrade.

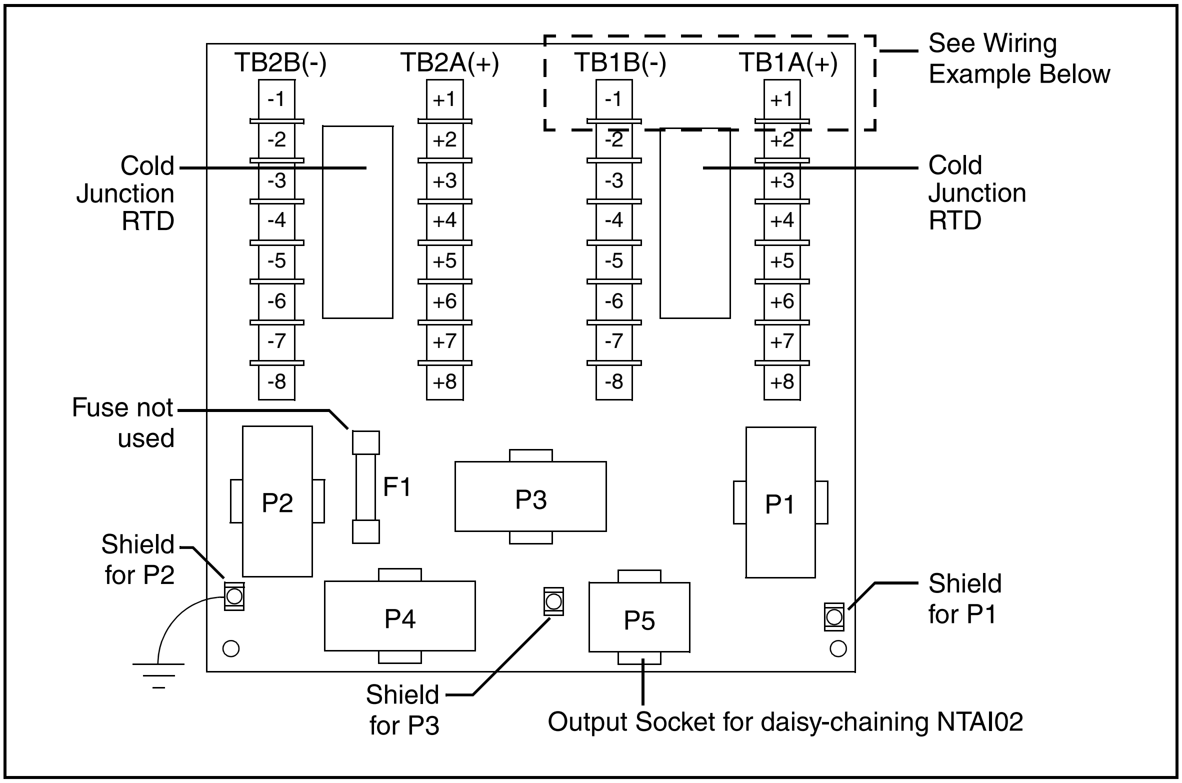


Figure B-1. NTAI02 Terminal Assignments

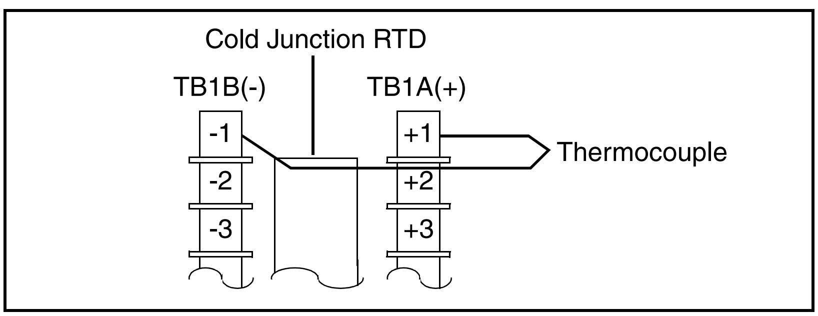
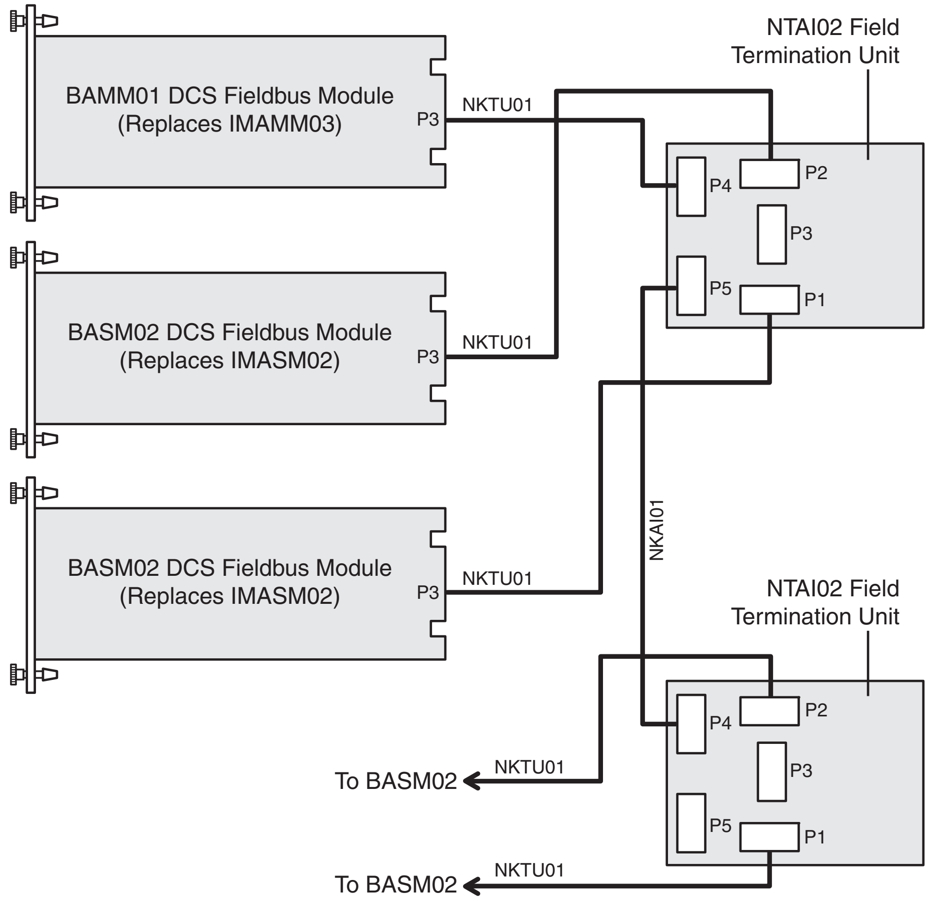
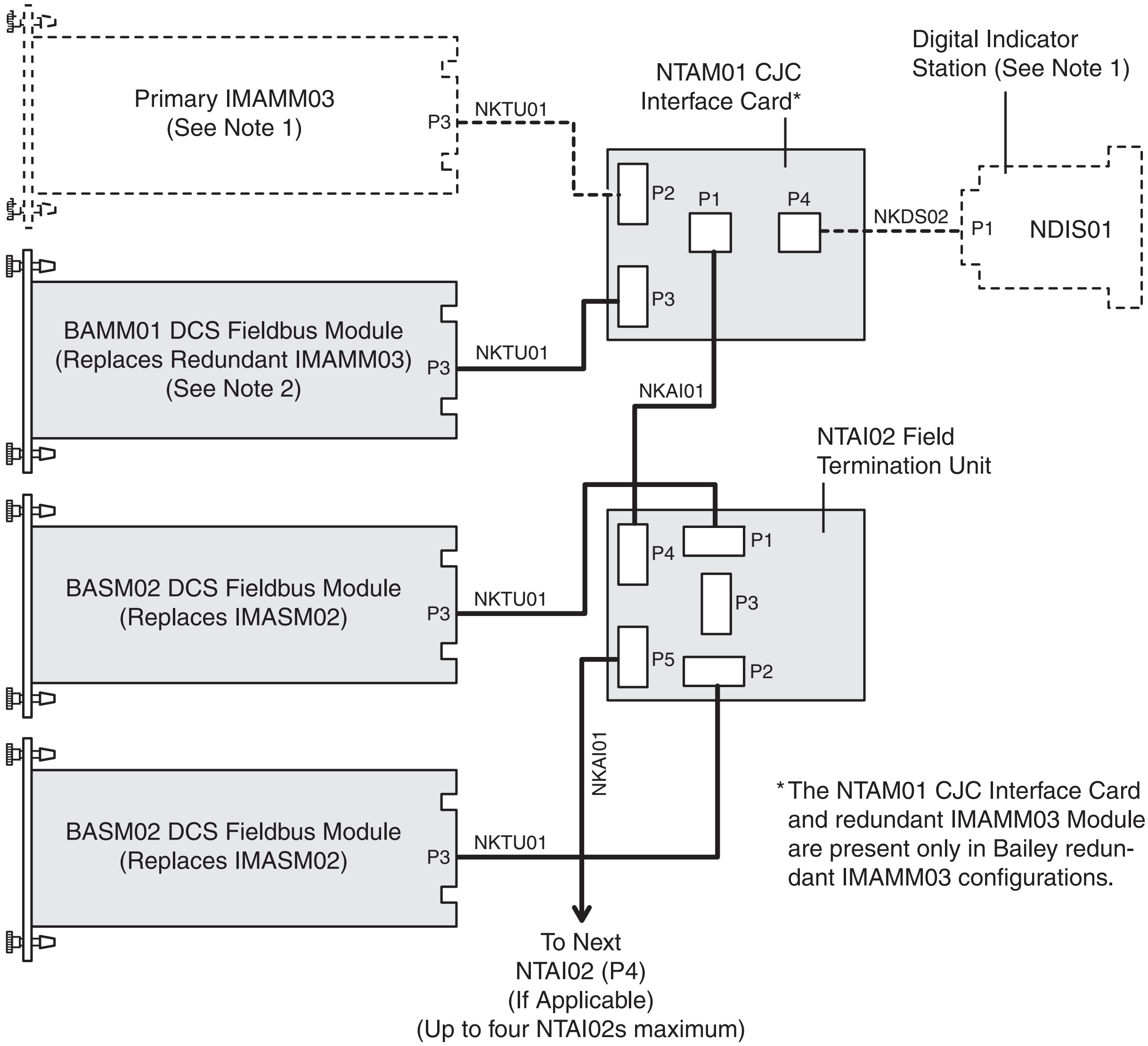


Figure B-2. NTAI02 Input Wiring, Example



NOTE:
1. Replace the Single IMMAM03 module with a BAMM01 Analog Master DCS FBM.
2. Replace the IMASM02 modules with BASMO2 Analog Slave DCS FBM's on a one-for-one basis.
3. The BAMM01 Analog Master DCS FBM can support up to a maximum of four (4) NTAI02 Termination Units (FTAs).
4. The NTAI02 termination Unit can support up to two (2) BASM02 analog slave DCS FBMs.
5. 1 BAMM01 Analog Master can support up to a maximum of eight (8) BASM02 Analog slave DCS FBMs.
6. The BAMM01 Analog Master DCS FBM is used to read the two Cold Junction RTDs located on the NTAI02. Channel 1 reads the two RTDs on the first NTAI02. Channel 2 reads the two RTDs on the second NTAI02. Channel 3 reads the two RTDs on the third NTAI02. Channel 4 reads the two RTDs on the fourth NTAI02.

Figure B-3. NTAI02 – Equipment Upgrade of a "Single IMAMM03" Configuration



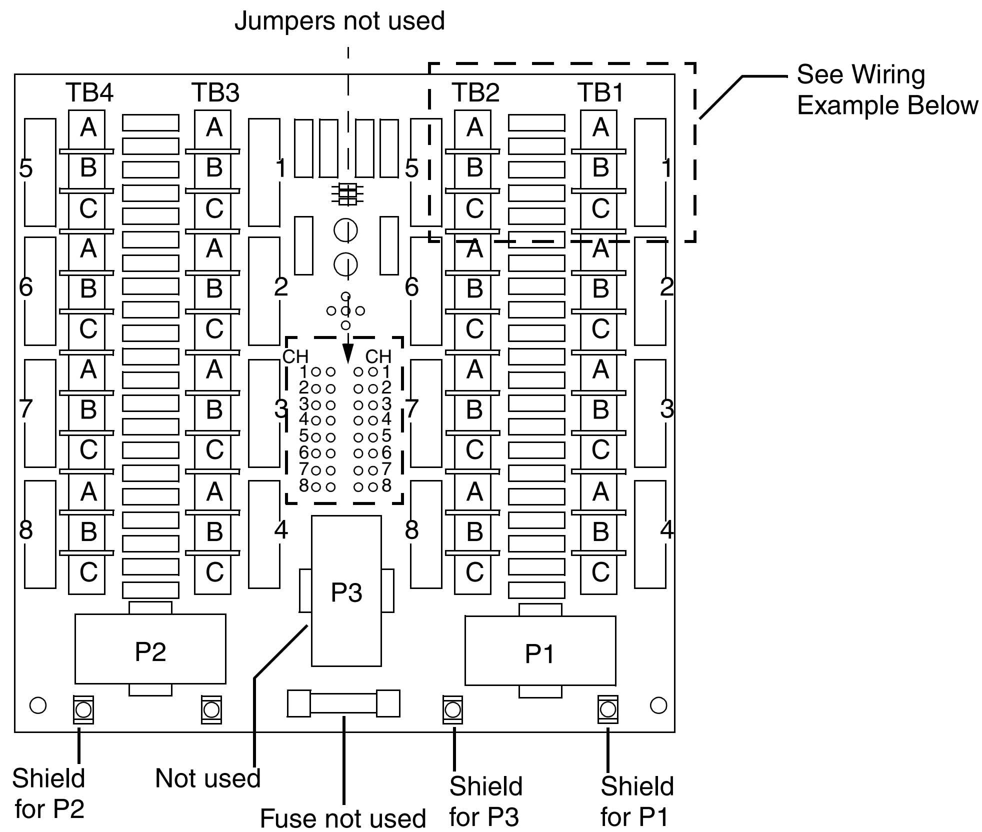
NOTE:

1. Remove the primary IMAMM03 module and if used the NDIS01 Digital Indicator Station and associated cabling as part of the equipment upgrade.
2. Replace the redundant IMMAM03 modules with a BAMM01 Analog Master DCS FBM.
3. Replace the IMASM02 modules with BASMO2 Analog Slave DCS FBMs on a one for one basis.
4. The BAMM01 Analog Master DCS FBM can support up to a maximum of four (4) NTAI02 Termination Units (FTAs).
5. The NTAI02 termination unit can support up to two (2) BASM02 analog slave DCS FBMs.
6. 1 BAMM01 Analog Master can support up to a maximum of eight (8) BASM02 Analog slave DCS FBMs.
7. The BAMM01 Analog Master DCS FBM is used to read the two Cold Junction RTDs located on the NTAI02. Channel 1 reads the two RTDs on the first NTAI02. Channel 2 reads the two RTDs on the second NTAI02. Channel 3 reads the two RTDs on the third NTAI02. Channel 4 reads the two RTDs on the fourth NTAI02.

Figure B-4. NTAI02 – Equipment Upgrade of a “Redundant IMAMM03” Configuration

Termination Unit NTAI04 with BASM03 and BASM33

This termination unit is used with DCS Fieldbus Module BASM03 and BASM33.



Note: P1 and P2 are used to connect the BASM03s and/or the BASM33s.
Two BASM03s or BASM33s may be connected to the TA. The first uses P1 and the second uses P2.

Figure B-5. NTAI04 Terminal Assignments and Input Example

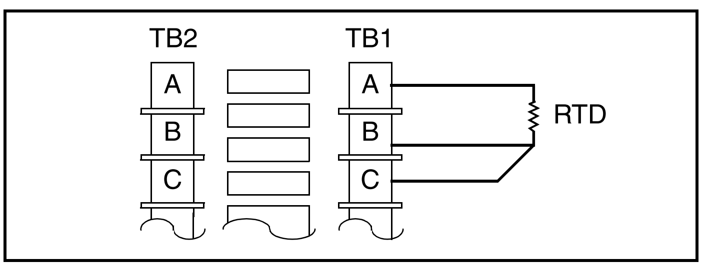


Figure B-6. NTAI04 Input Wiring, Example

Termination Unit NTAI05 with BASI01 and BASM01

This termination unit is used with DCS Fieldbus Modules BASI01 and BASM01.

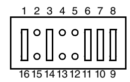
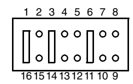
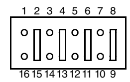
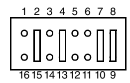
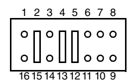
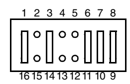
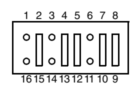
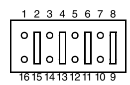
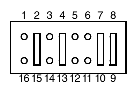
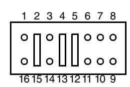
Module	Application/Signal Type	Dipshunt Used	Dipshunt Configuration	XU17 Configuration
BASI01	System powered 4-20 mA	XU1- XU15 and XU17		
	Externally powered 4-20 mA			
	Single ended voltage			
	Differential voltage			
BASM01	System powered 4-20 mA	XU1- XU16 and XU17		
	Externally powered 4-20 mA			
	Single ended voltage			
	Differential voltage			

Figure B-7. Dipshunt Settings for NTAI05 Termination Unit

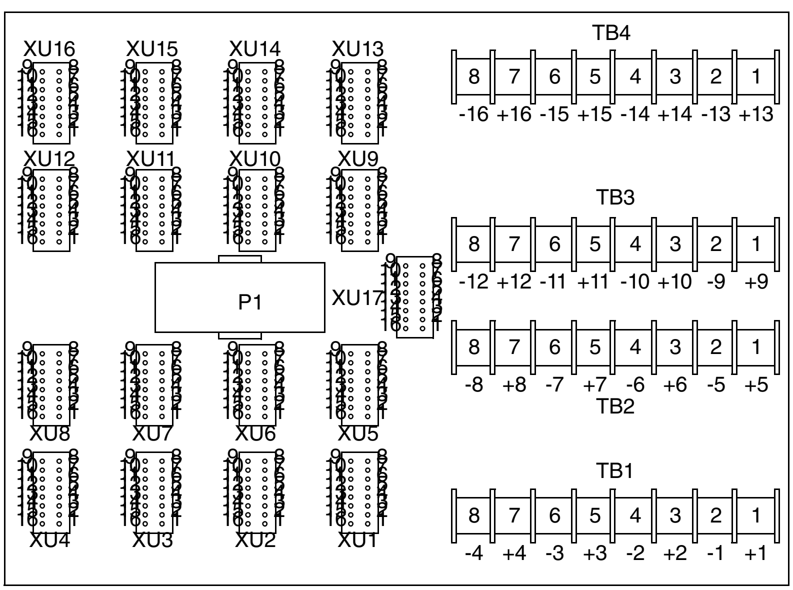


Figure B-8. NTAI05 Termination Unit

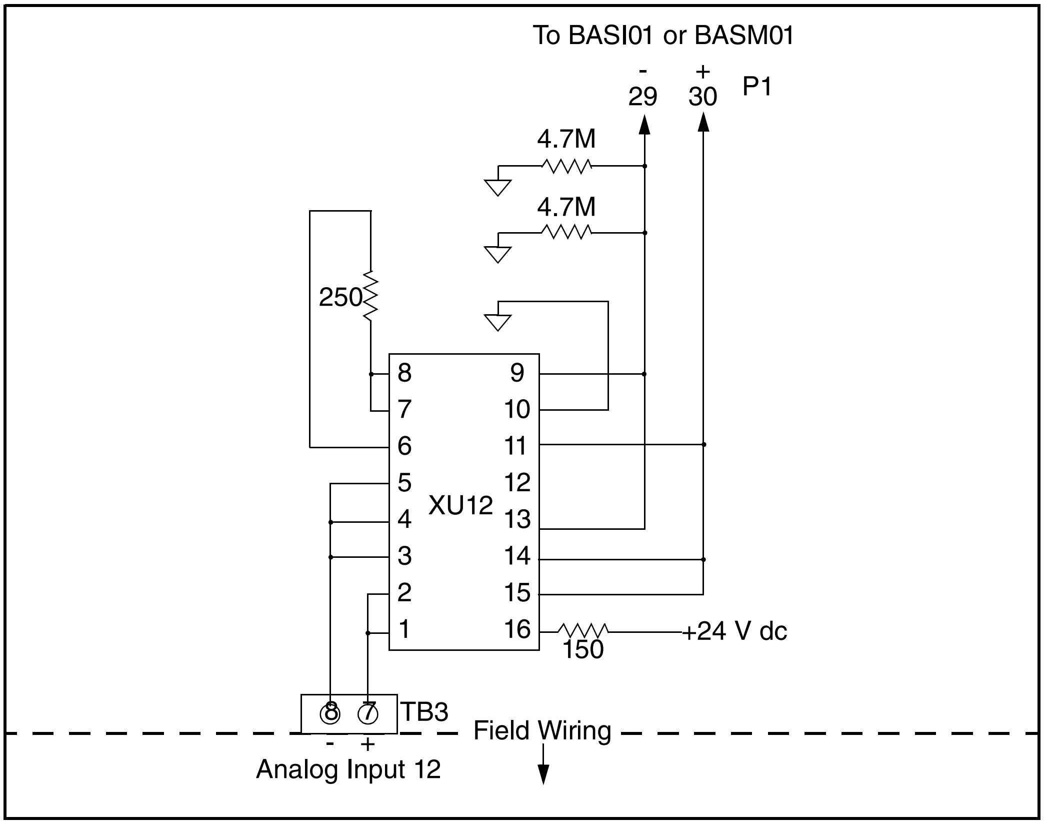


Figure B-9. NTAI05 Typical Input Circuit

Termination Unit NTAI06 with BASI03

This termination unit is used with DCS Fieldbus Module BASI03.

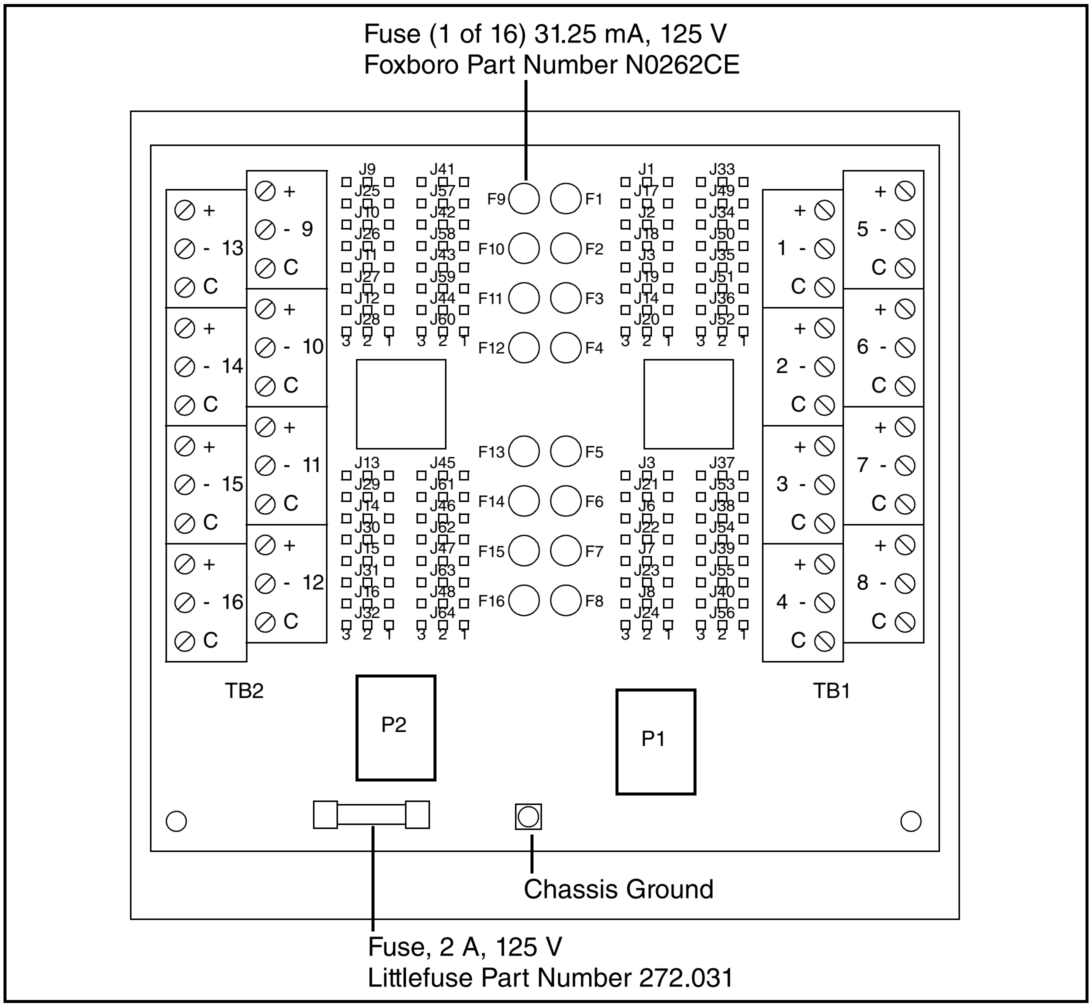
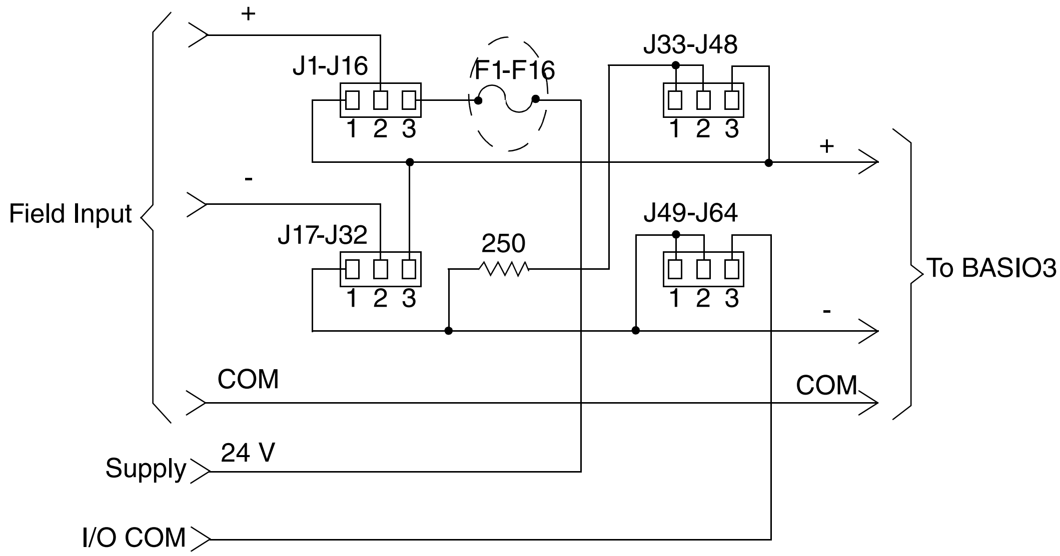


Figure B-10. NTAI06 Jumper Locations and Terminal Assignments



Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
J1, J17 J33, J49	J2, J18 J34, J50	J3, J19 J35, J51	J4, J20 J36, J52	J5, J21 J37, J53	J6, J22 J38, J54	J7, J23 J39, J55	J8, J24 J40, J56

Channel 9	Channel 10	Channel 11	Channel 12	Channel 13	Channel 14	Channel 15	Channel 16
J9, J25 J41, J57	J10, J26 J42, J58	J11, J27 J43, J59	J12, J28 J44, J60	J13, J29 J45, J61	J14, J30 J46, J62	J15, J31 J47, J63	J16, J32 J48, J64

Figure B-11. Typical Input Circuit for NTAI06

Table B-1. NTAI06 Jumper Configurations

	Jumper Number			
Input Type	**J1-J32**	**J33-J48**	**J49-J64**	**Description**
Single ended voltage	1-2	1-2	2-3	This jumper configuration connects the minus (-) input terminal to I/O COM on the NTAI06. The BASI03 measures the voltage at the plus (+) input terminal with respect to the I/O COM terminal. No connection to the C terminal is necessary.
Differential voltage (T/C)	1-2	1-2	1-2	This jumper configuration connect the plus (+) and minus (-) inputs directly to BASI03 differential input. Channel to channel and channel to system common signal isolation is achieved for all voltage input types, including high level voltage, millivolts and thermocouples. No connection to the C terminal is necessary.
System powered 4-20 mA	2-3	2-3	2-3	This jumper configuration connects the plus (+) input terminal to system +24 V sc through a fuse on the NTAI06. The minus (-) input terminal connection to a precision resistor that generates a single ended voltage (1-5 V) for the BASI03 to measure. No connection to the C terminal is necessary.

Table B-1. NTAI06 Jumper Configurations (Continued)

Input Type	Jumper Number J1-J32	J33-J48	J49-J64	Description
External powered 4-20 mA	1-2	2-3	1-2	This jumper configuration connects the plus (+) input terminal to one end of a precision resistor and the minus (-) input to the other end of the same precision resistor in the NTAI06. An isolated 1-5 V is generated for the BASI03 to measure. No connection to the C terminal is necessary.
3-wire RTD	1-2	1-2	1-2	This jumper configuration connects the plus (+) and minus (-) and the COM input directly to BASI03 three-wire input. Channel to channel and channel to system signal isolated is maintained. The two common leads of the RTD element should be connected across the plus (+) and common (C) terminals, and the third lead should be connected to the minus (-) terminal.

Table B-2. NTAI06 Input Types

Input Type	Signal Type
Thermocouple	TC Types: E, J, K, L, N (14 AWG), N (28 AWG), R, S, T, U, Chinese E, Chinese S
Millivolt	mV range: -100 mV to +100 mV
High Level	H.L range: -10V to +10V
Current	4-20 mA, external or system powered
3-wire RTD	10 ohm, 100 ohm, 120 ohm, Chinese 53 ohm

Termination Unit NTAO01with BAOM37

This termination unit is used with DCS Fieldbus Module BAOM37.

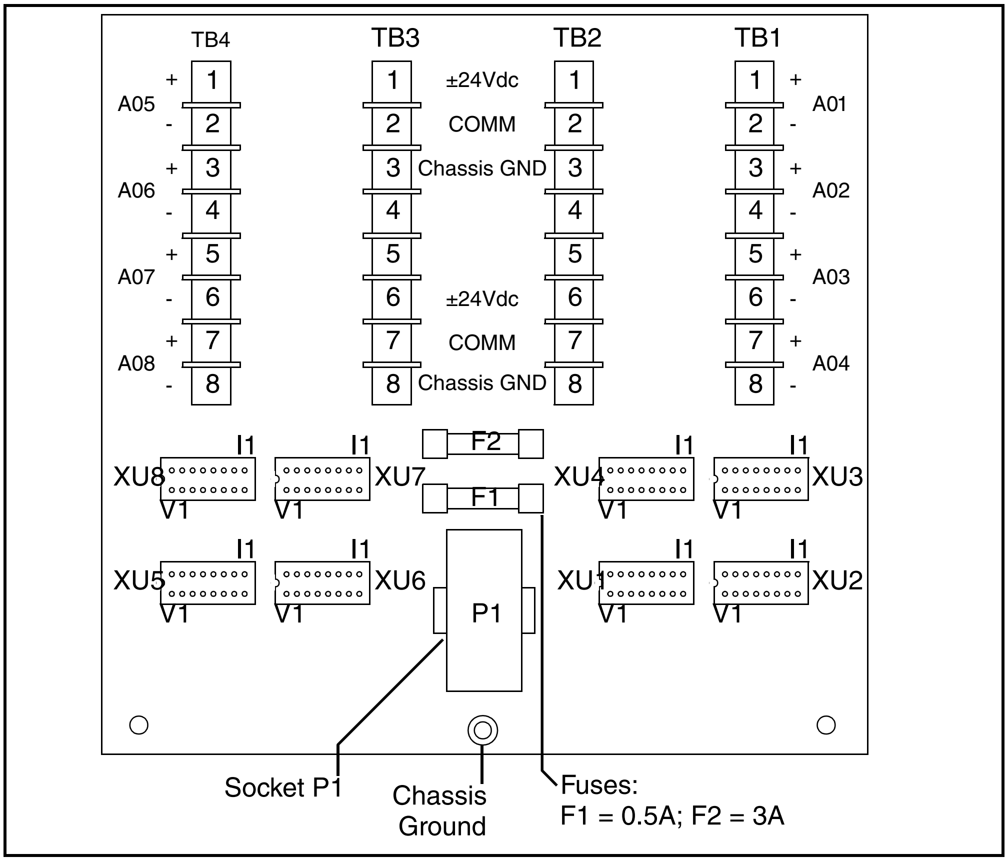


Figure B-12. NTAO01 Termination Unit Layout

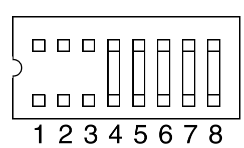
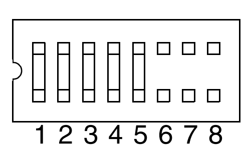
Analog Output	
Application/Signal Type	Dipshunt Configuration XU1 - XU8
Voltage - 0 to 10 V dc 1 to 5 V dc	
Current 4 to 20 mA	

Figure B-13. NTAO01 Termination Unit Dipshunt Configuration

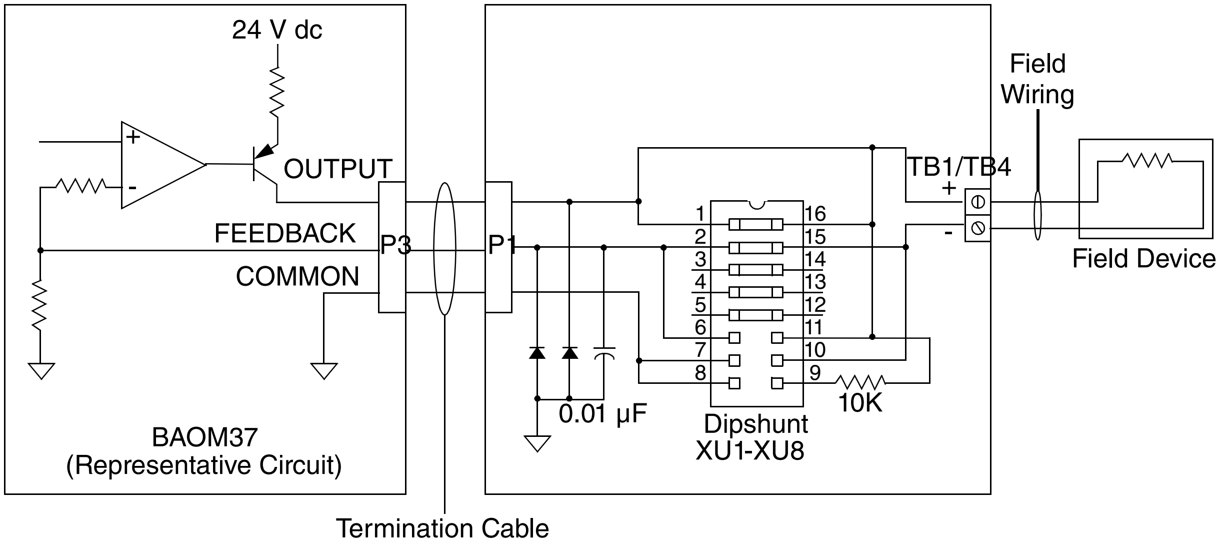


Figure B-14. NTAO01 Termination Unit Typical Current Output Circuit

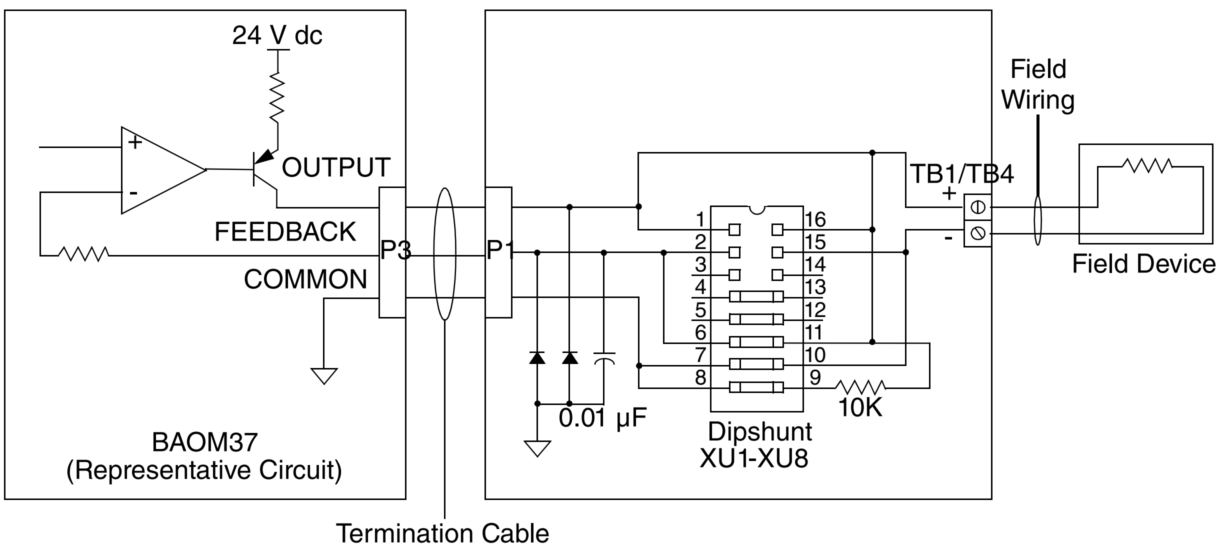


Figure B-15. NTAO01 Termination Unit Typical Voltage Output Circuit

Termination Unit NTCS02/04 with BCOM17

This termination unit is used with DCS Fieldbus Module BCOM17.

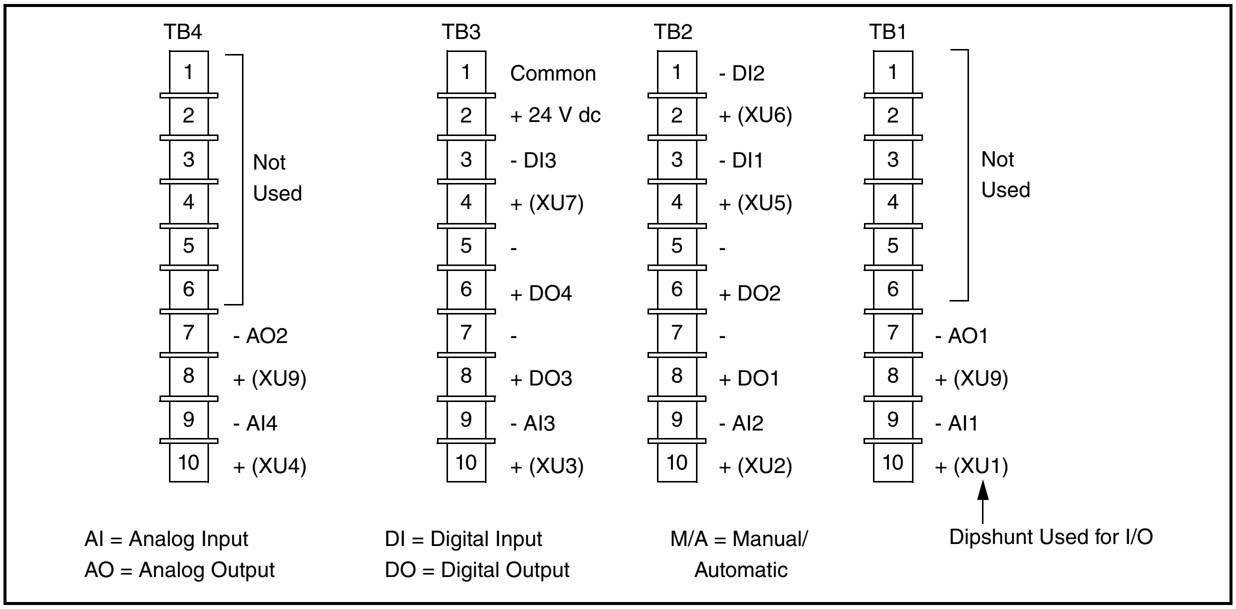


Figure B-16. NTCS02/04 Termination Unit and Terminal Assignments

Table B-3. Dipshunt Assignments

Dipshunt	Assignment	Terminal Block (TB)	Terminal Position +/-
XU1	Analog Input #1	1	10/9
XU2	Analog Input #2	2	10/9
XU3	Analog Input #3	3	10/9
XU4	Analog Input #4	4	10/9
XU5	Digital Input #1	2	4/3
XU6	Digital Input #2	2	2/1
XU7	Digital Input #3	3	4/3
XU8	Not used		
XU9	Analog Output #1 Analog Output #2	1 4	8/7 8/7

Table B-4. Dipshunt Configuration Summary

Application	Dipshunt(s)	Configuration [1] [2] [3] [4] [5] [6] [7] [8]
Note: 0 = cut strap; 1 = leave strap intact		
ANALOG INPUTS	XU1-XU4	
1 through 4:		
1. Powered 4 to 20 mA Input		1 0 1 0 0 1 1 1
2. Unpowered 4 to 20 mA Input		0 1 0 1 0 1 0 1
3. Single-Ended Voltage Input		0 1 0 1 0 0 1 1
4. Differential Voltage Input		0 1 0 1 1 0 0 0
ANALOG OUTPUTS	XU9	
Both Outputs in Voltage Mode		1 1 0 0 0 0 1 1
Analog Output #1 = Voltage Analog Output #2 = Current		1 1 0 0 0 0 0 0
Analog Output #1 = Current Analog Output #2 = Voltage		0 0 0 0 0 0 1 1
Both Outputs in Current Mode		0 0 0 0 0 0 0 0
DIGITAL INPUTS	XU5-XU7	
1 through 3		
1. +24 V dc I/O Supply in Series		0 0 0 0 1 0 1 0
2. Separate 24 V dc/125 V dc Supply in Series		1 0 1 0 0 0 0 0
3. Field Powered Input (External)		0 0 0 0 0 0 0 1
ANALOG INPUT FEEDBACK	XU8	
Both Digital Stations		1 1 0 1 1 0 1 1
Digital Station 1		1 1 0 0 0 1 0 0
Digital Station 2		0 0 1 1 1 0 0 0
DIGITAL OUTPUTS	NONE	N/A

Termination Unit NTDI01 with BASO37

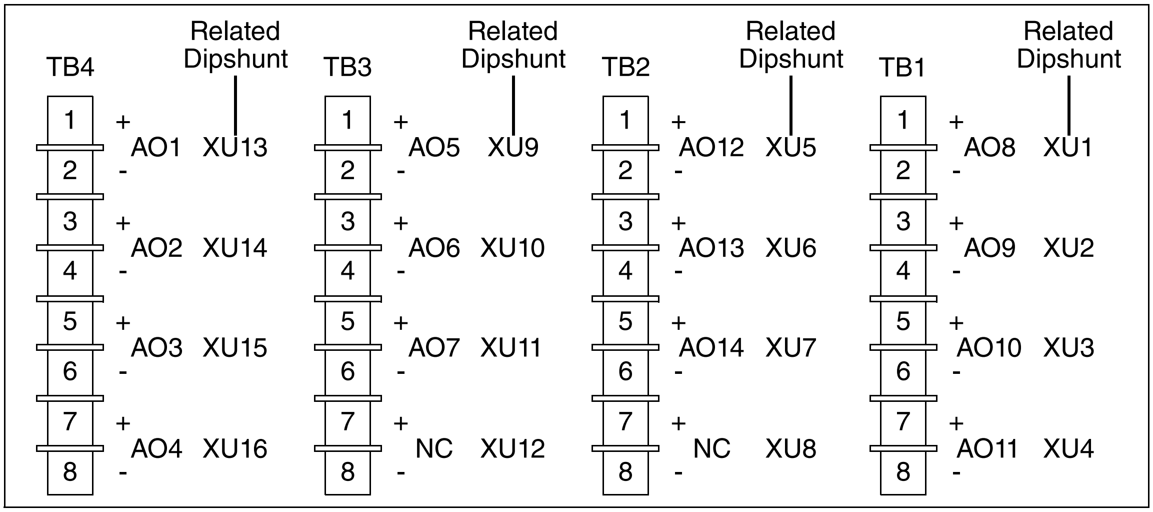


Figure B-17. NTDI01 with BASO37, Terminal Assignments and Related Dipshunts

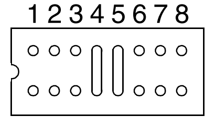
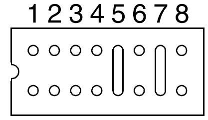
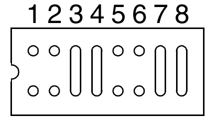
Application/Signal Type	Dipshunt Configuration
BASO37 Output Signals 1-5 V dc, 4-20 mA	XU1- XU7, XU9 - XU11, XU13 - XU16 1 2 3 4 5 6 7 8 
24 V dc Power to Slave	XU12 1 2 3 4 5 6 7 8 
Signal Routing for Channels 6 and 13	XU17 1 2 3 4 5 6 7 8 

Figure B-18. NTDI01 with BASO37, Dipshunt Configuration

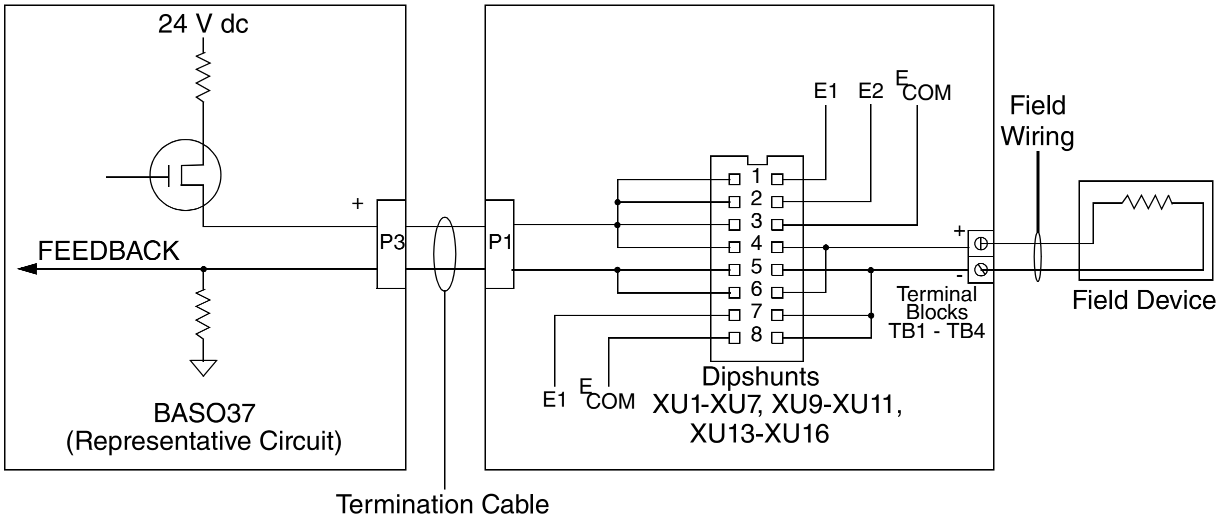


Figure B-19. NTDI01 to BASO37 Diagram (Current Mode)

Termination Unit NTDI01 with BDSM09

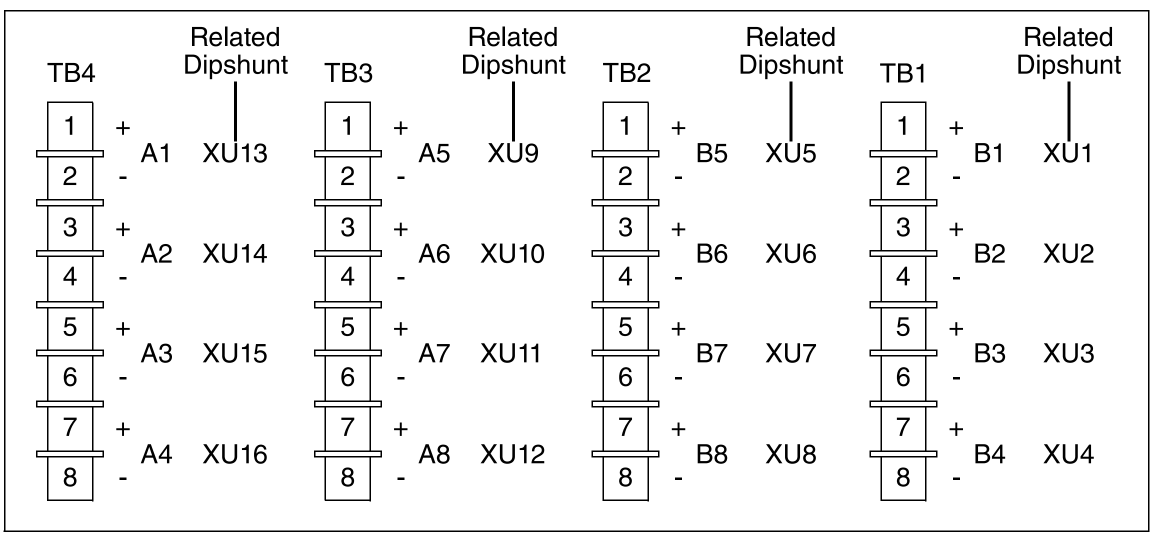
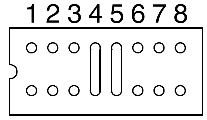
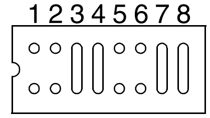
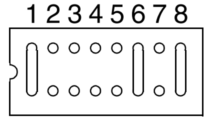
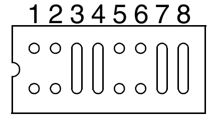
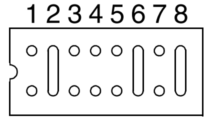
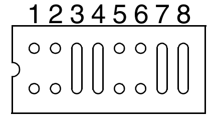


Figure B-20. NTDI01 with BDSM09, Terminal Assignments

Application/Signal Type	Dipshunt Configuration	
Externally Powered	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 
System Powered from E1	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 
System Powered from E2	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 

NOTE:
The traces on the termination unit allow for two amperes for all outputs driven from either E1 or E2.
The termination unit printed circuit board can be damaged if you exceed this current.
Use the externally powered configuration in situations requiring higher current.

Figure B-21. NTDI01 with BDSM09, Dipshunt Configuration

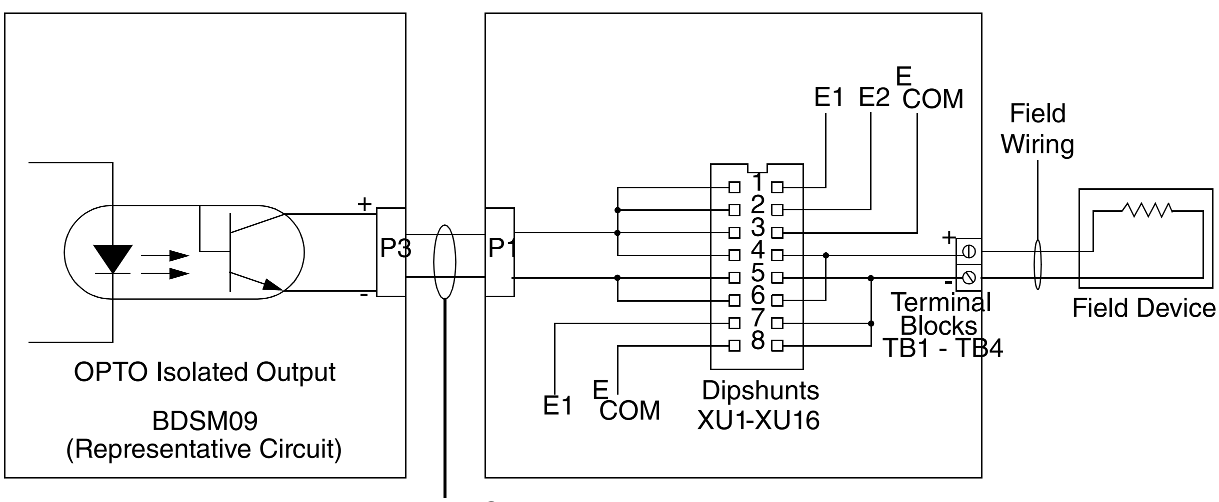


Figure B-22. NTDI01 to BDSM09 Diagram

Standard Relay Panel with BDSM09

(Holding for further research. Need **graphics illustrator** support)

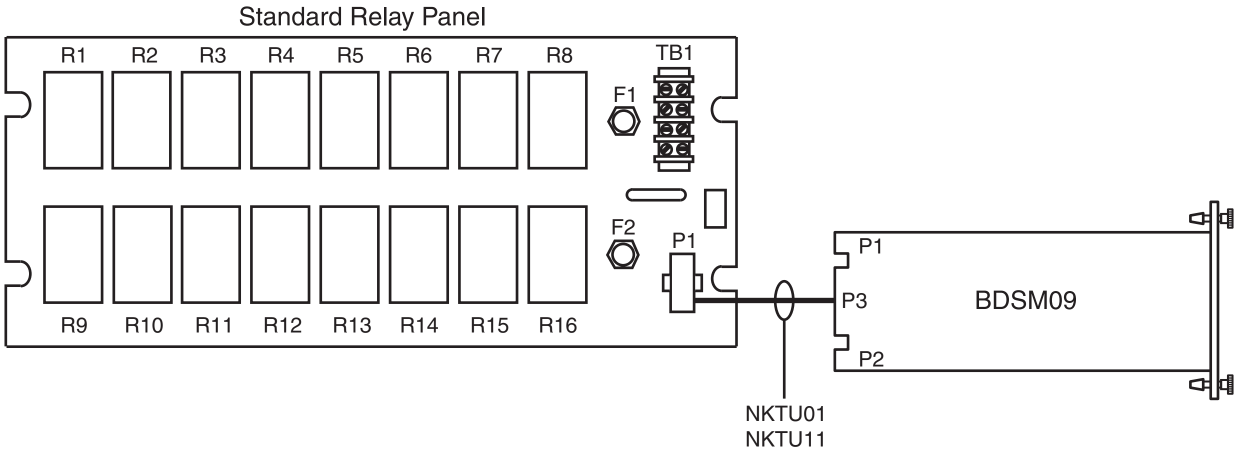


Figure B-23. Standard Relay Panel Cable Connection

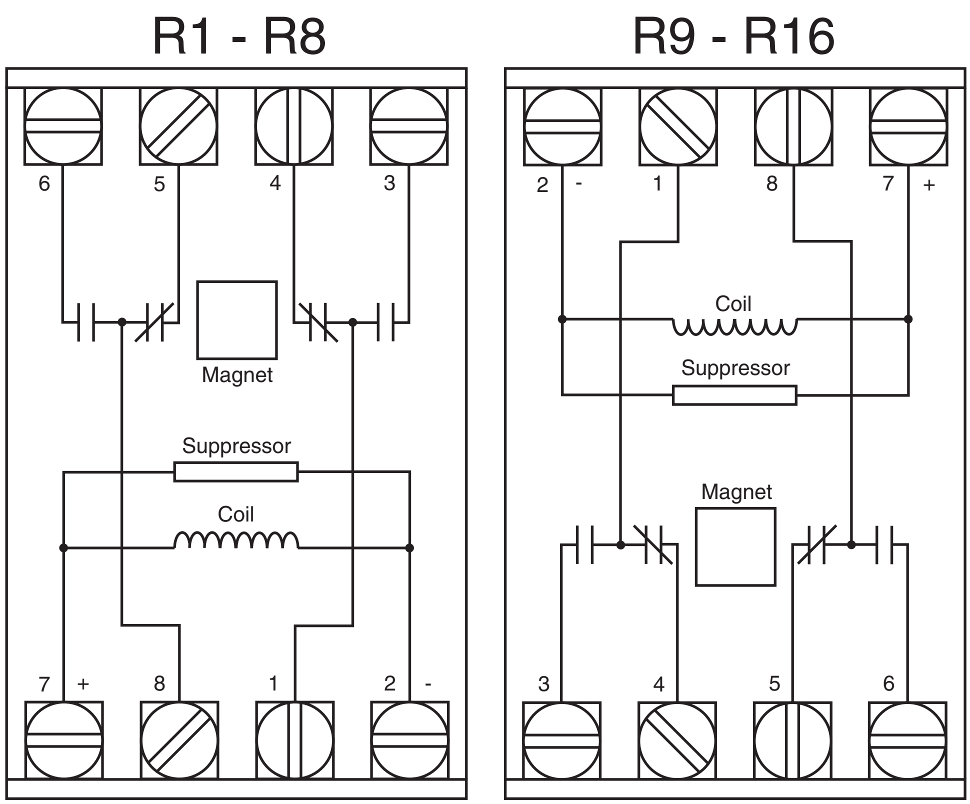


Figure B-24. Schematic Diagram of Relays

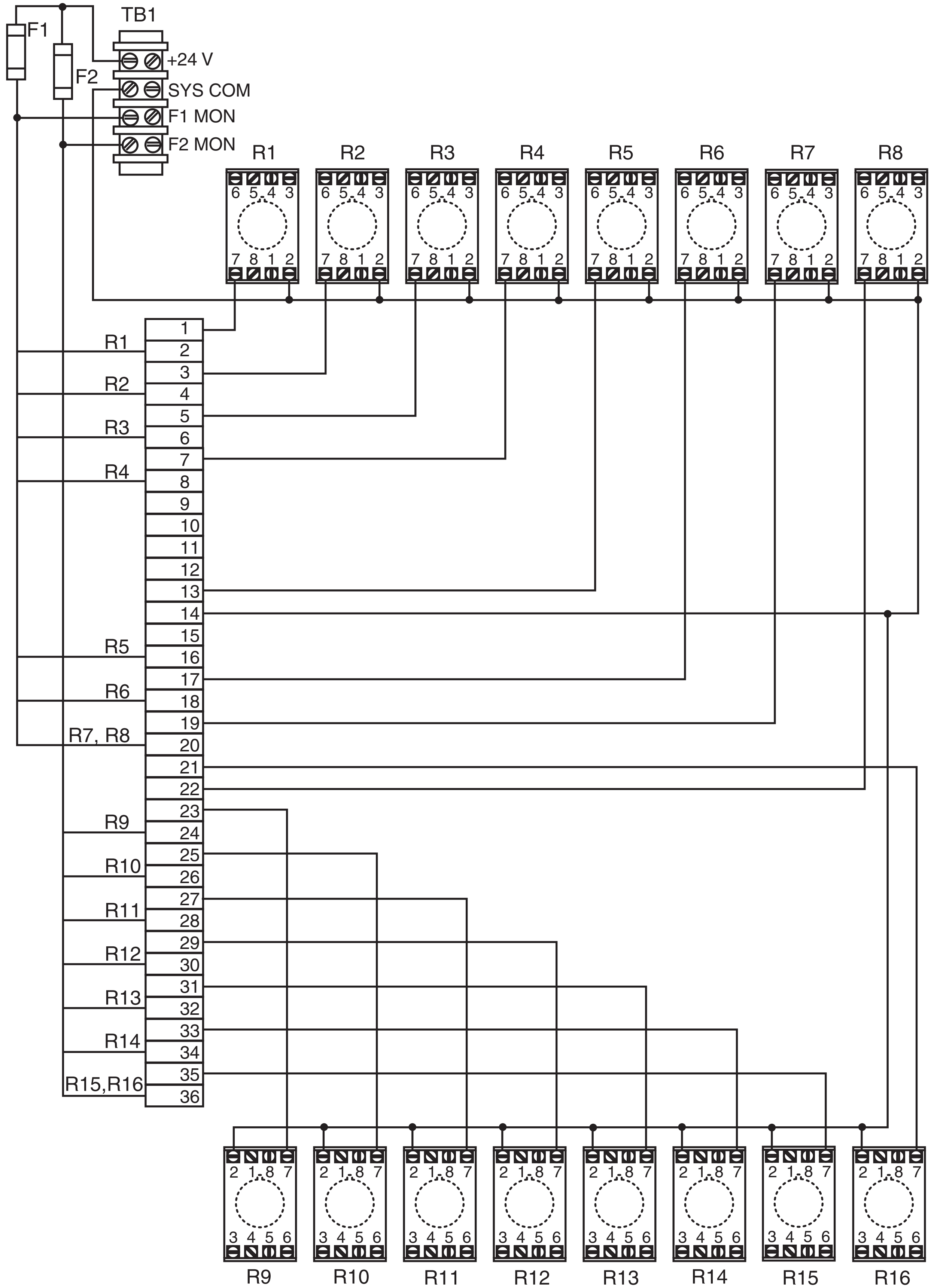


Figure B-25. Internal Wiring Diagram of Standard Relay Panel

Termination Unit NTDI01 with BASO10, BDSO26, and BDSO41

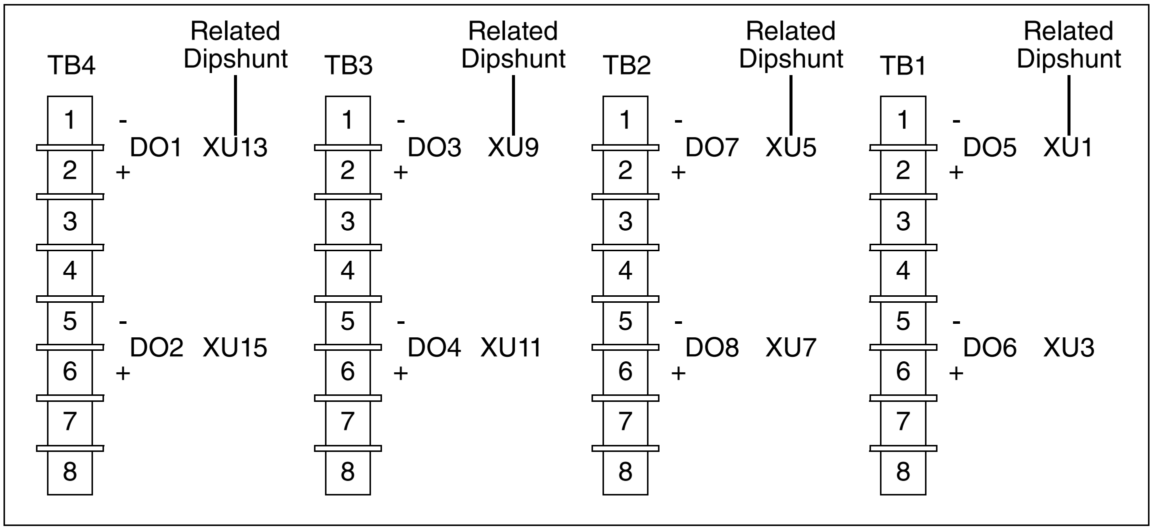
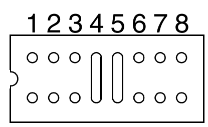
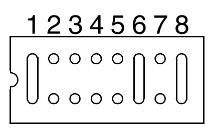
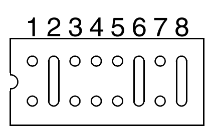


Figure B-26. NTDI01 with BDSO10, BDSO26 and BDSO41 Terminal Assignments

Application/Signal Type	Dipshunt Configuration XU1, 3, 5, 7, 9, 11, 13, 15
Externally Powered	
System Powered From E1	
System Powered From E2	

NOTES:
1. XU17 does not require a dipshunt for this application.
2. You must be careful when powering solid state relay loads through the E1 and E2 connectors. The traces on the termination unit allow for two amperes for all outputs driven from either E1 or E2. The termination unit printed circuit board can be damaged if you exceed this current. Use the externally powered configuration in situations requiring higher current.

Figure B-27. NTDI01 with BDSO10, BDSO26 and BDSO41 Dipshunt Configuration

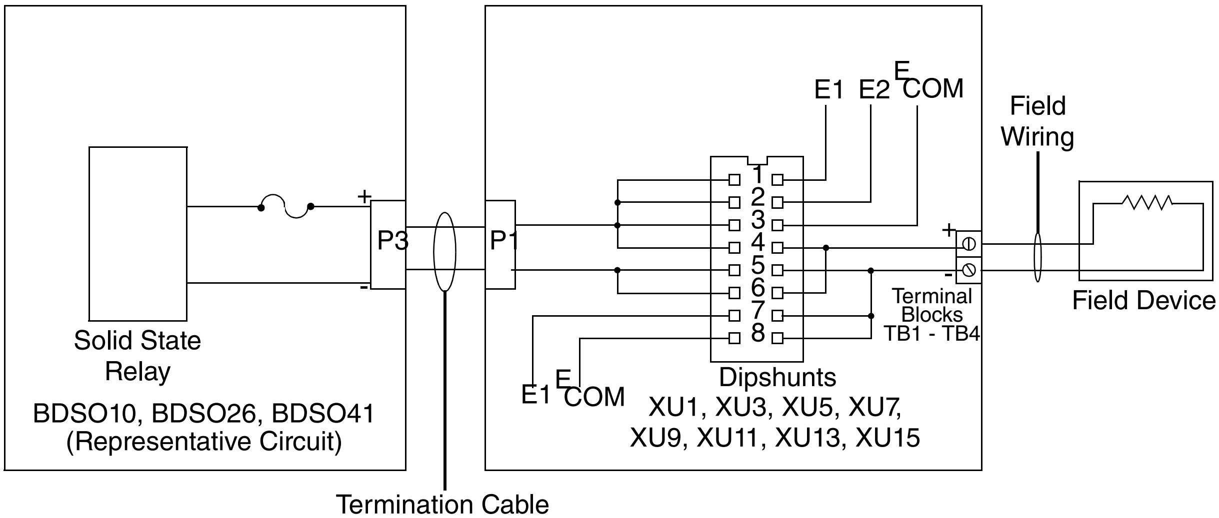
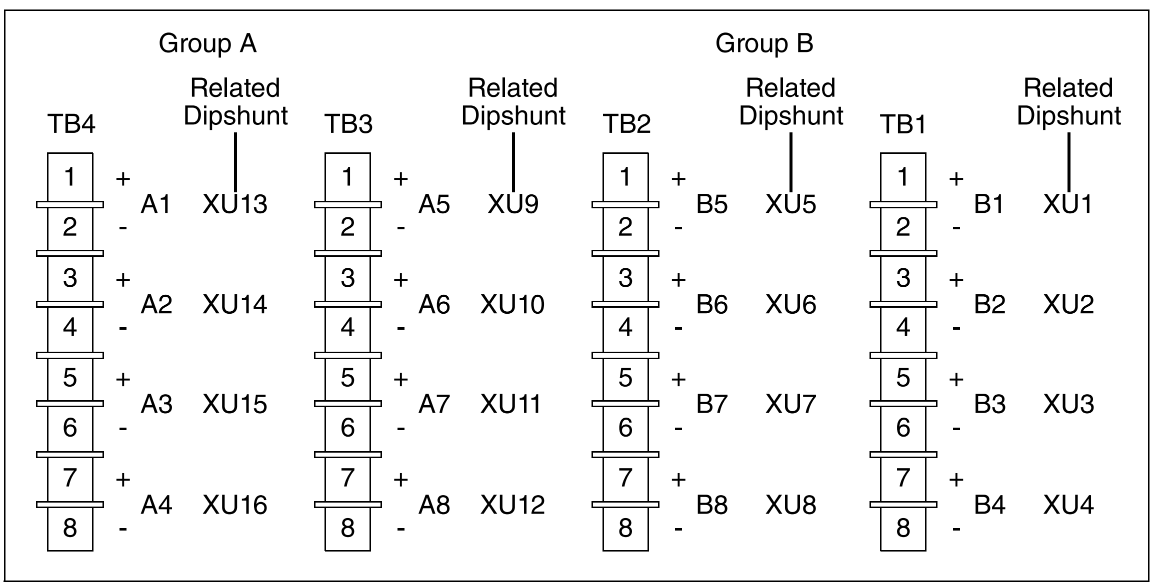


Figure B-28. NTDI01 to BDSO10, BDSO26 and BDSO41 Diagram

Termination Unit NTDI01 with BDSI07



NOTE:
When using system power from E1 or E2, reverse the polarities shown above.

Figure B-29. NTDI01 with BDSI07, Terminal Assignments

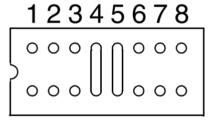
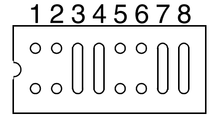
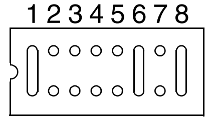
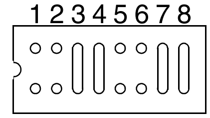
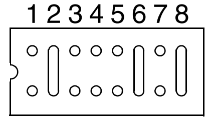
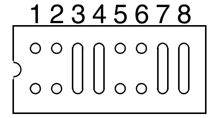
Application/Signal Type	Dipshunt Configuration	
Field Powered Contact	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 
System Powered from E1, 24 V dc, 125 V dc, 120 V ac	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 
System Powered from E2, 24 V dc, 125 V dc, 120 V ac	XU1- XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 

Figure B-30. NTDI01 with BDSI07 Dipshunt Configuration

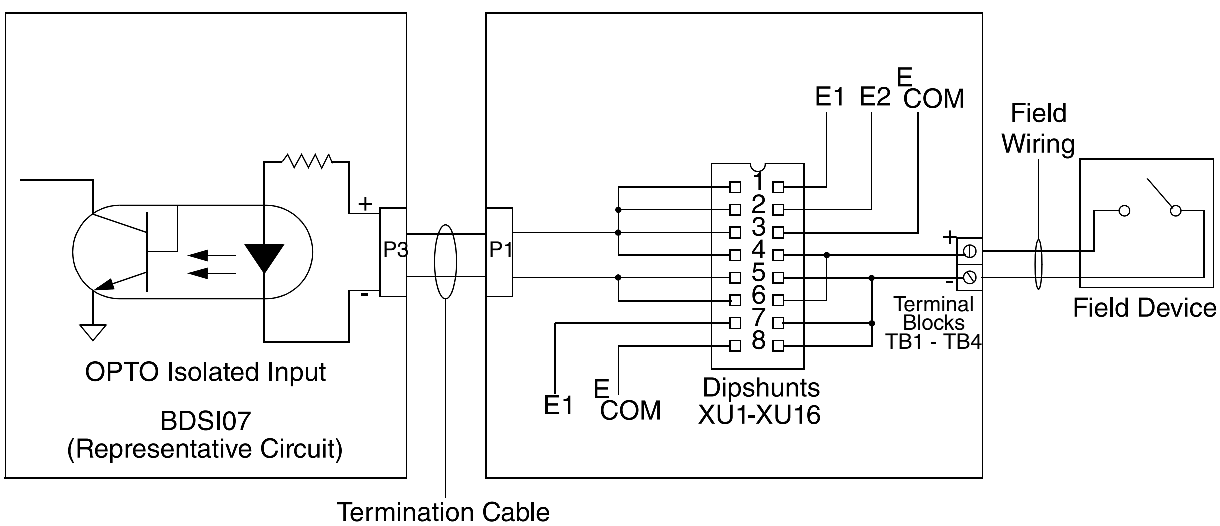
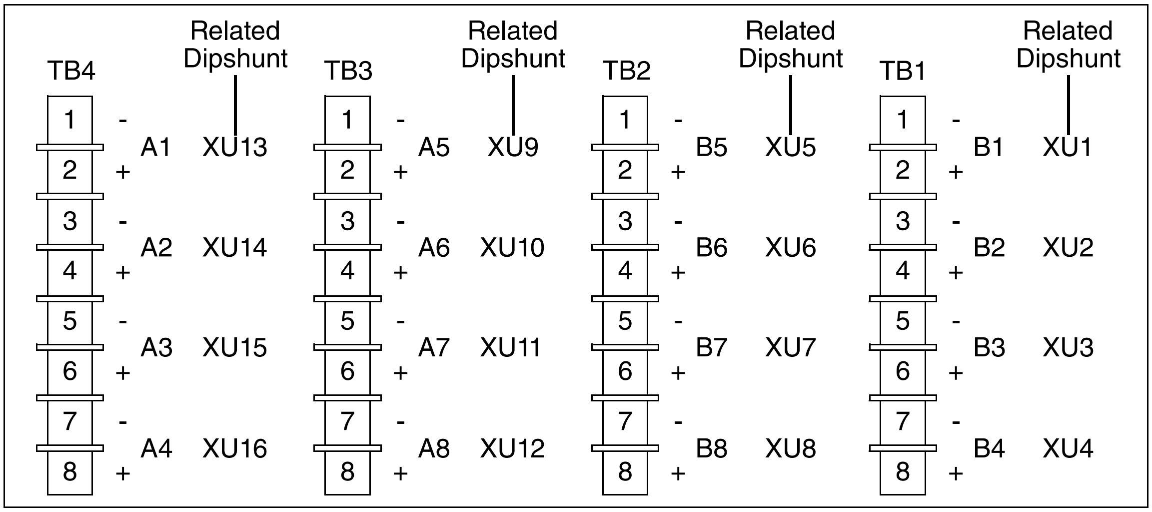


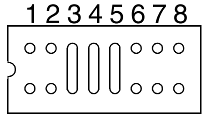
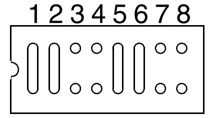
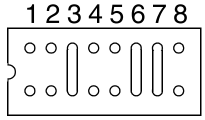
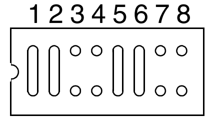
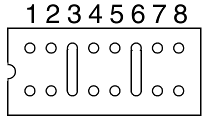
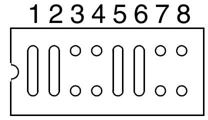
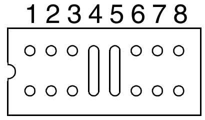
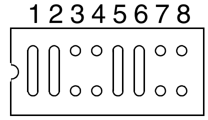
Figure B-31. NTDI01 to BDSI07 Diagram

Termination Unit NTDI01 with BDSM9B



NOTE:
For the sink external load configuration, make external connections to the negative terminals only.

Figure B-32. NTDI01 with BDSM9B Terminal Assignments

Application/Signal Type	Dipshunt Configuration XU1- XU16	Dipshunt Configuration XU17
24 V dc Logic I/O or System Powered Contact Input	1 2 3 4 5 6 7 8 	1 2 3 4 5 6 7 8 
Power to External Load	1 2 3 4 5 6 7 8 	1 2 3 4 5 6 7 8 
Sink External Load	1 2 3 4 5 6 7 8 	1 2 3 4 5 6 7 8 
Isolated Outputs	1 2 3 4 5 6 7 8 	1 2 3 4 5 6 7 8 

NOTES:
1. When setting up the 24 V dc logic I/O, system-powered contact input or 2-wire isolated output configurations, the following I/O points are connected internally on the termination unit: A5 (-) and A6 (-), A7 (-) and A8 (-), B5 (-) and B6 (-), and B7 (-) and B8 (-).
2. When setting up the power to external load configuration, all positive connection points are internally wired on the termination unit to the +24 V dc I/O power.

Figure B-33. NTDI01 with BDSM9B Dipshunt Configuration

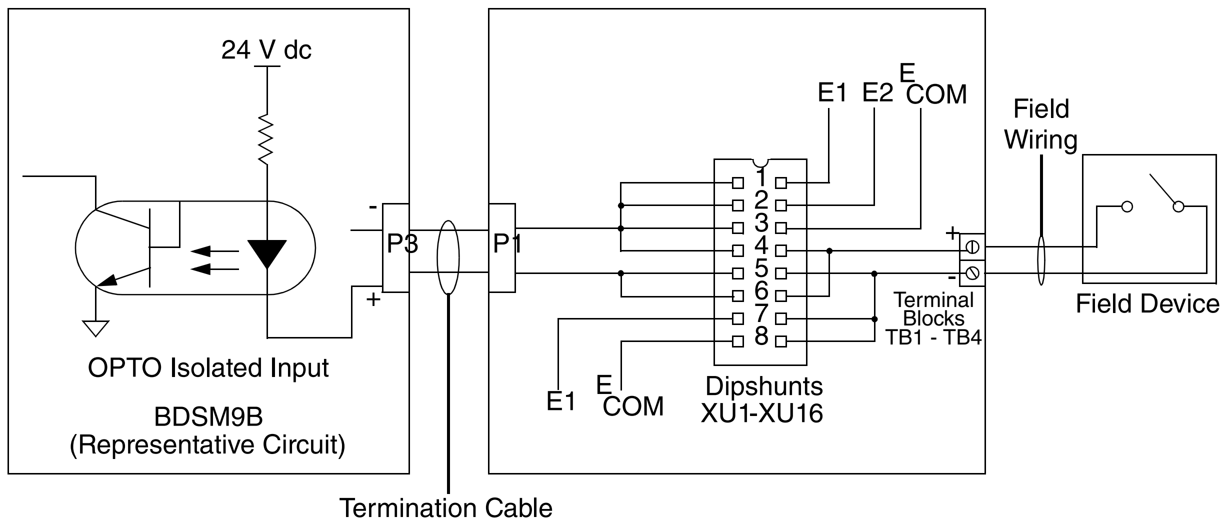


Figure B-34. NTDI01 to BDSM9B Diagram (Digital Input)

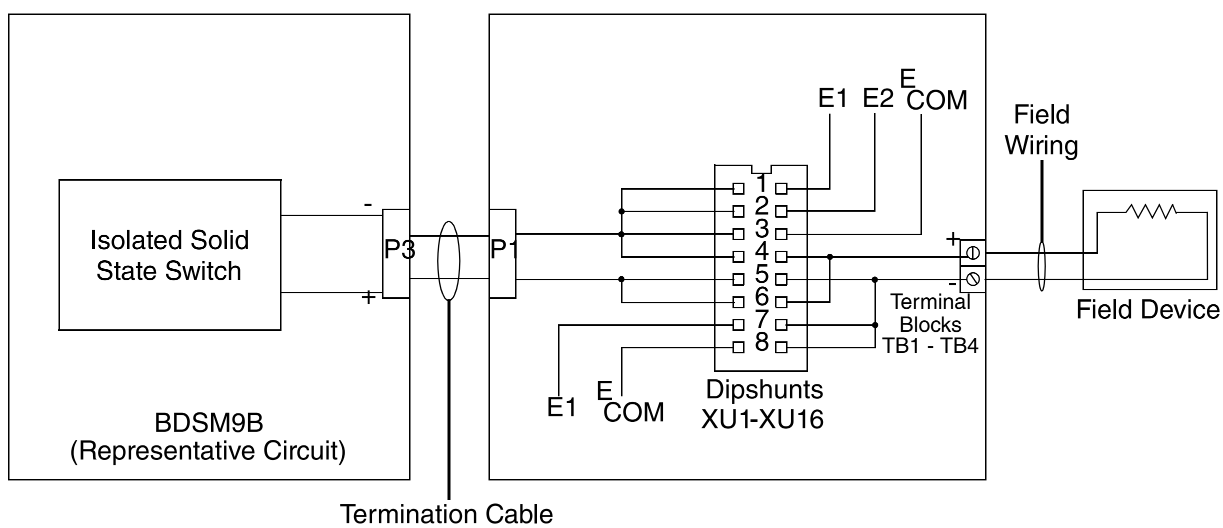


Figure B-35. NTDI01 to BDSM9B Diagram (Digital Output)

Termination Unit NTDI01 with BDSM9A

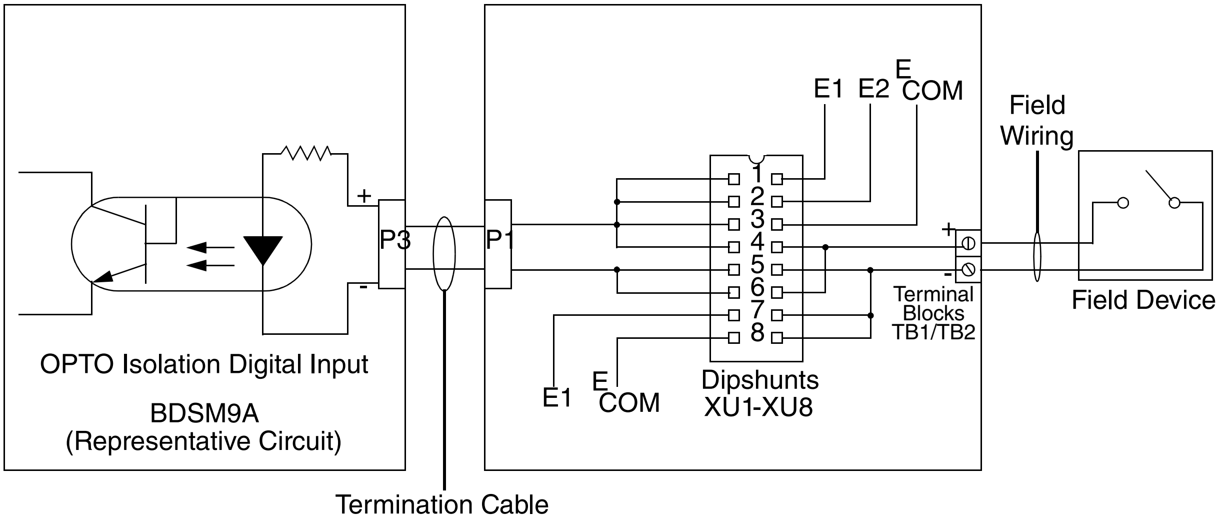
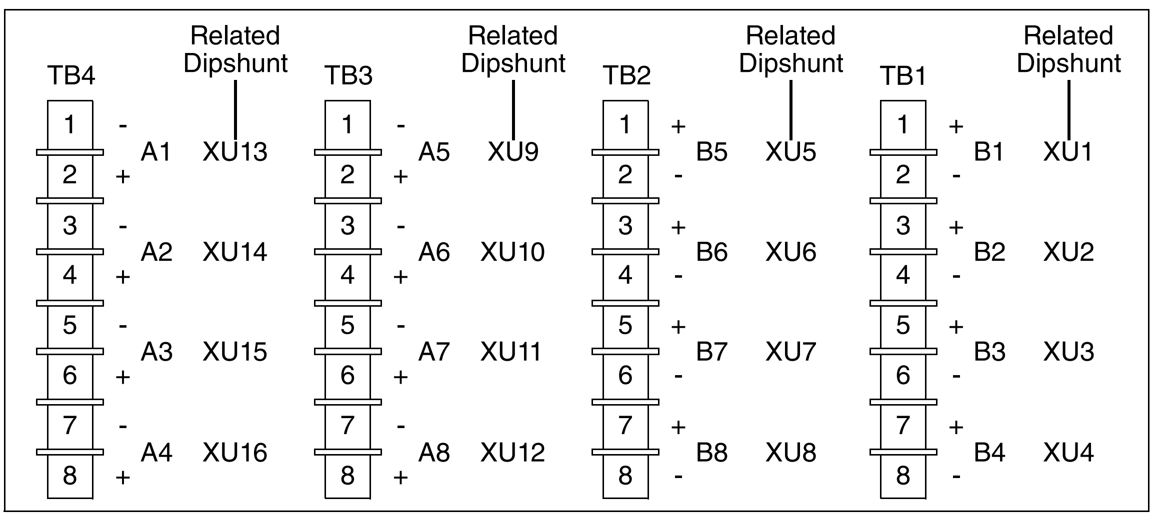
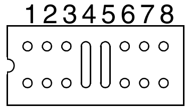
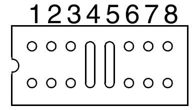
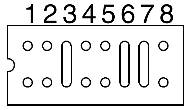
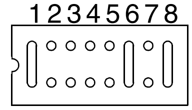
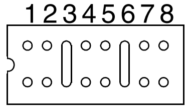
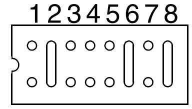
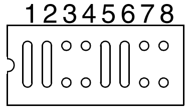
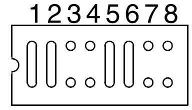


Figure B-36. NTDI01 to BDSM9A Diagram (Digital Input)



NOTE:
1. For the sink external load configuration, make external connections to the negative terminals only.
2. For system powered input from E1/E2 configuration, the polarities indicated in this illustration for TB1 and TB2 should be reversed.
3. TB1and TB2 are for digital inputs. TB3 and TB4 are for digital outputs.

Figure B-37. NTDI01 with BDSM9A Terminal Assignments

Outputs		Inputs	
Application/Signal Type	Dipshunt Configuration	Application/Signal Type	Dipshunt Configuration
Isolated Output/Field Powered Output	XU9 - XU16 1 2 3 4 5 6 7 8 	Field Powered Input	XU1- XU8 1 2 3 4 5 6 7 8 
Power to External Load	XU9 - XU16 1 2 3 4 5 6 7 8 	Input Powered from E1	XU1- XU8 1 2 3 4 5 6 7 8 
Sink External Load	XU9 - XU16 1 2 3 4 5 6 7 8 	Input Powered from E1	XU1- XU8 1 2 3 4 5 6 7 8 
All	XU17 1 2 3 4 5 6 7 8 	All	XU17 1 2 3 4 5 6 7 8 

NOTES:

1. For the field powered input, isolated output or field-powered output configurations, the following I/O points are connected internally on the termination unit: A5 (-) and A6 (-), A7 (-) and A8 (-), B5 (-) and B6 (-), and B7 (-) and B8 (-).
2. When using the power to external load configuration, all positive connection points are internally wired on the termination unit to the +24 V dc I/O power.

Figure B-38. NTDI01 with BDSM9A Dipshunt Configuration

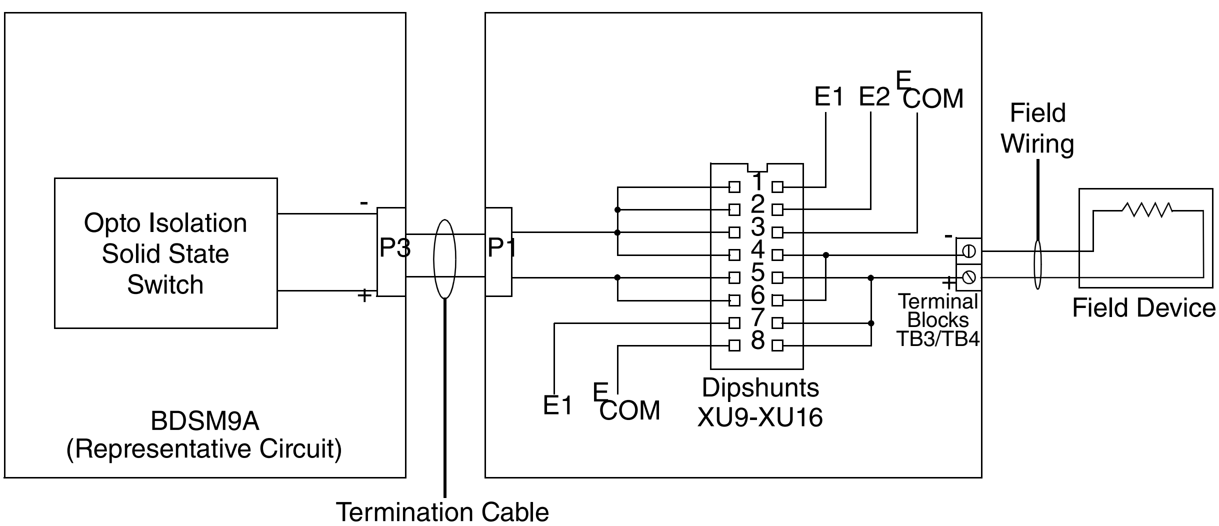
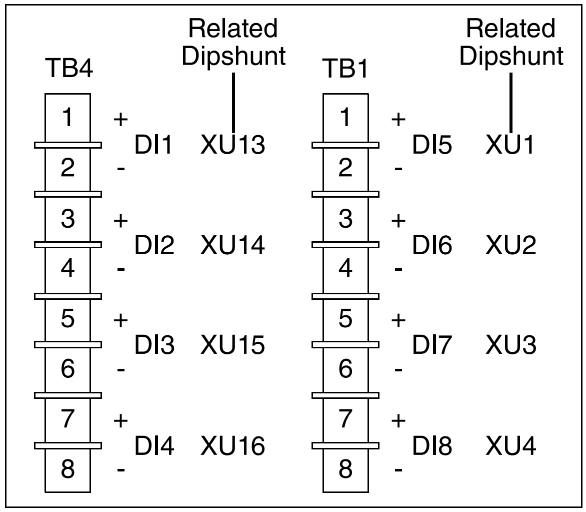


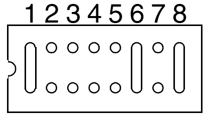
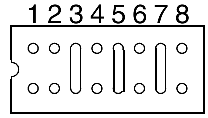
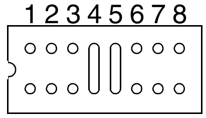
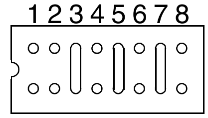
Figure B-39. NTDI01 with BDSM9A Diagram (Digital Output)

Termination Unit NTDI01 with BDSM06



NOTE:
Make no connections to terminal blocks TB2 and TB3.

Figure B-40. NTDI01 with BDSM06 Terminal Assignments

Application/Signal Type	Dipshunt Configuration	
System Powered from E1	XU1- XU4, XU13 - XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 
Field Powered Input	XU1- XU4, XU13 - XU16 1 2 3 4 5 6 7 8 	XU17 1 2 3 4 5 6 7 8 

NOTE:
In this application, XU7 connects 24 V dc I/O power to the BDSM06 preamplifiers.
If the preamplifiers are not used, a dipshunt is not required for XU7.

Figure B-41. NTDI01 with BDSM06, Dipshunt Configuration

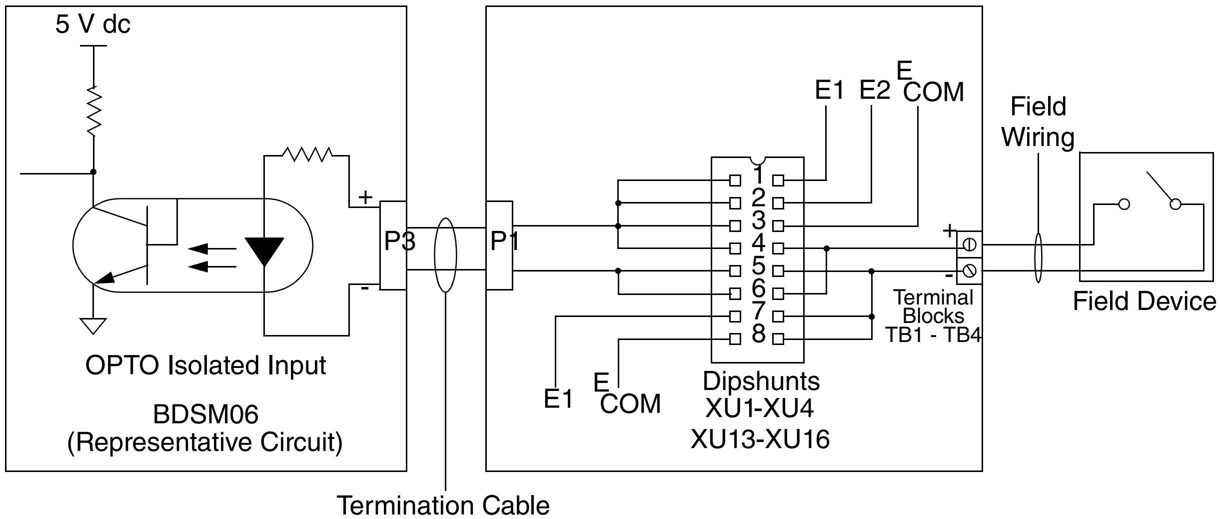
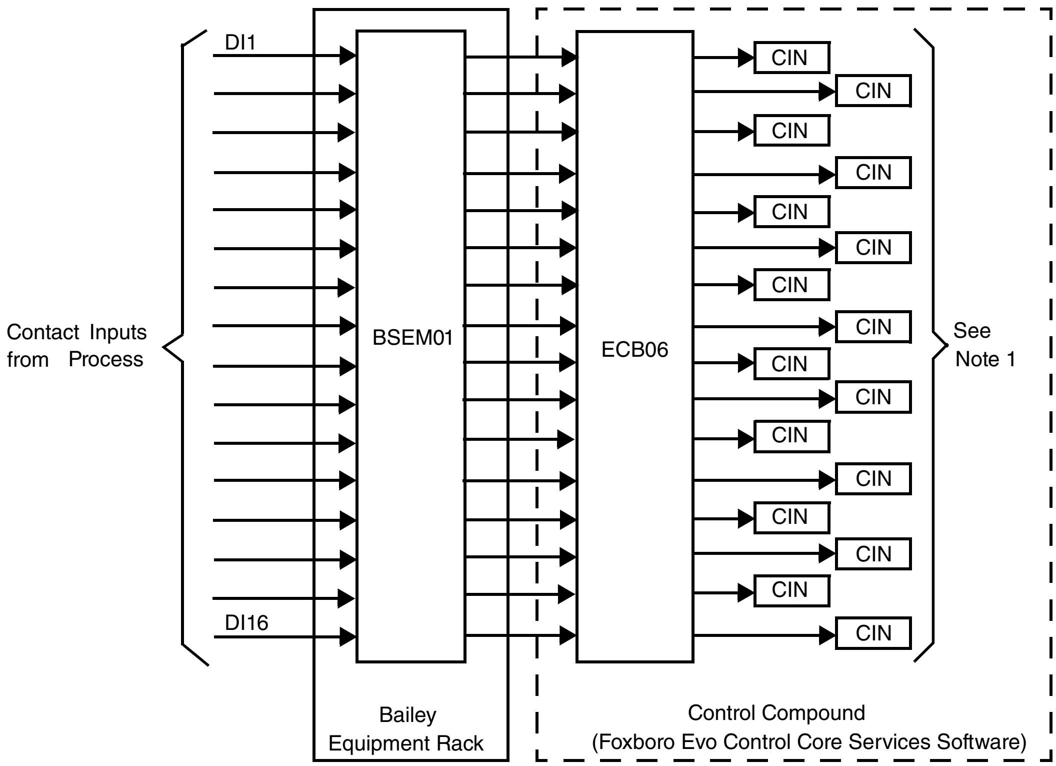


Figure B-42. NTDI01 to BDSM06 Diagram

Appendix C. DCS Fieldbus Module Control Schemes

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



ECB Parameters*
HWTYPE = 7; EXTYPE = 14; SWTYPE = 6

PNT_NO (Point Number) for CIN Blocks**

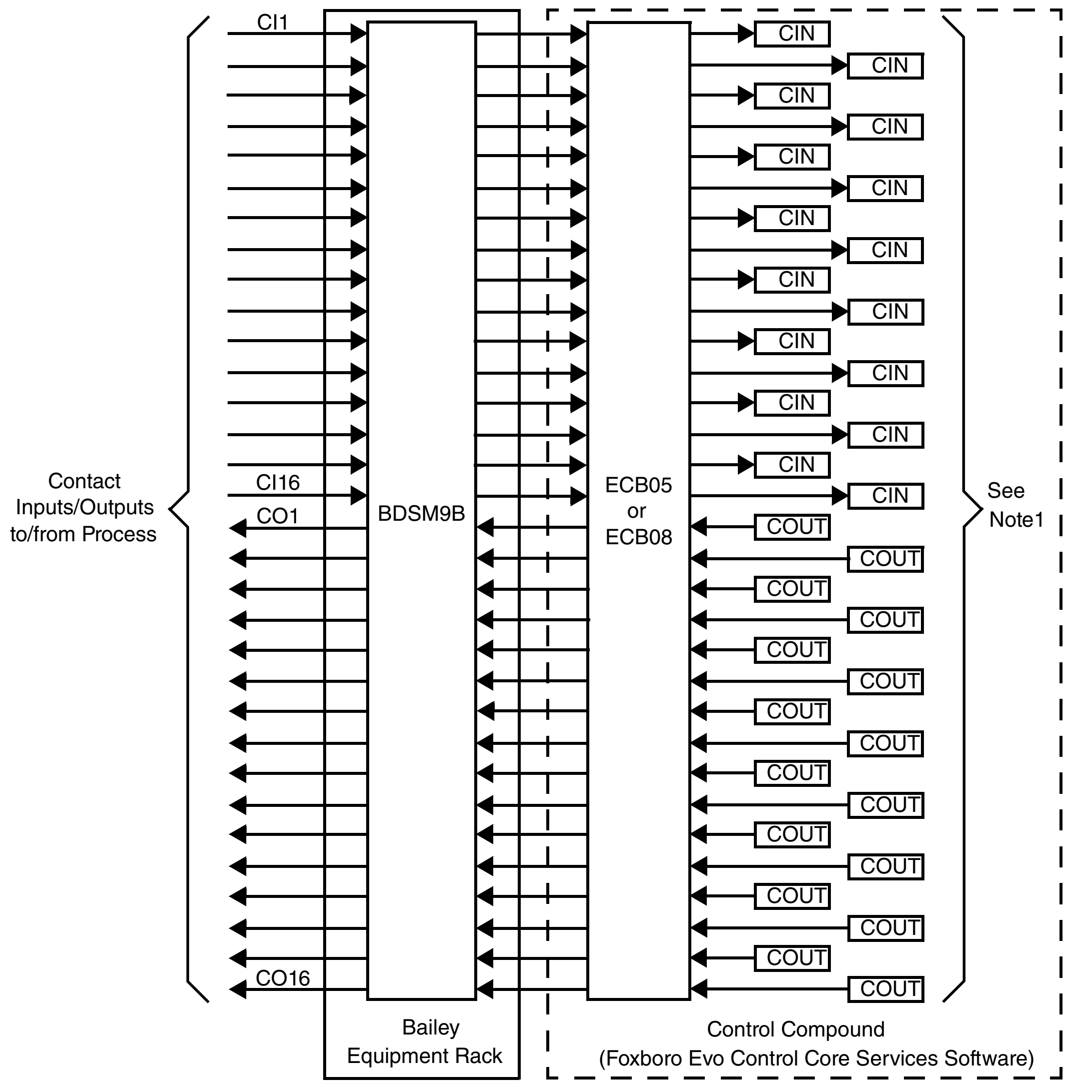
PNT NO	BLOCK	PNT NO	BLOCK
1	CI1	17	CI9
2	CI2	18	CI10
3	CI3	19	CI11
4	CI4	20	CI12
5	CI5	21	CI13
6	CI6	22	CI14
7	CI7	23	CI15
8	CI8	24	CI16

Notes:
1. A MCIN control block can be used in place of the multiple CIN blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM07.

Figure C-1. BSEM01



ECB Parameters*
HWTYPE = 9; EXTYPE = 14; SWTYPE = 5 or 8

PNT_NO (Point Number) for Blocks**

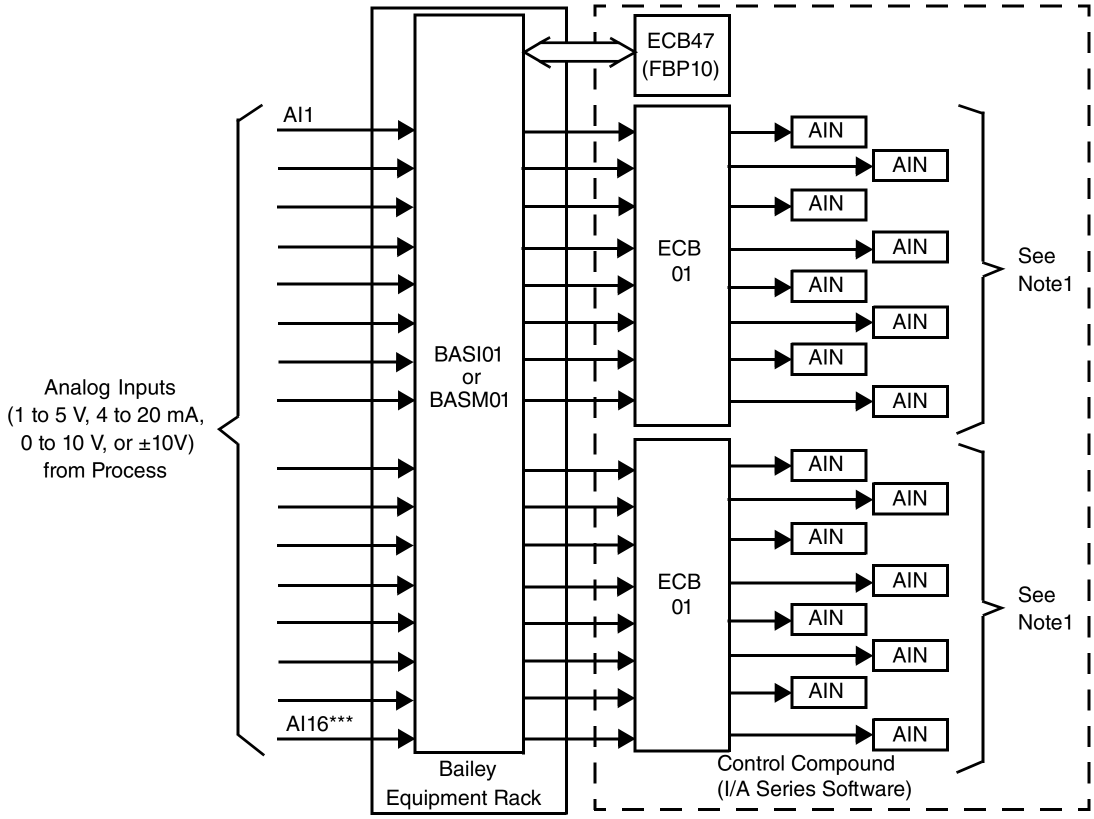
PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK
1	CI1	9	CO1	17	CI9	25	CO9
2	CI2	10	CO2	18	CI10	26	CO10
3	CI3	11	CO3	19	CI11	27	CO11
4	CI4	12	CO4	20	CI12	28	CO12
5	CI5	13	CO5	21	CI13	29	CO13
6	CI6	14	CO6	22	CI14	30	CO14
7	CI7	15	CO7	23	CI15	31	CO15
8	CI8	16	CO8	24	CI16	32	CO16

Notes:
1. A MCIN control block can be used in place of the multiple CIN blocks, and an MCOUT control block can be used in place of the COUT blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM09

Figure C-2. BDSM9B



ECB01 Parameters (each ECB)*
HWTYPE = 1; SWTYPE = 1

ECB47 Parameters*
I/A Series v6.1.1 Software or greater: HWTYPE = 52, SWTYPE = 55
I/A Series software version earlier than 6.1.1: HWTYPE = 52, SWTYPE = 42

SCI (Signal Conditioning Index) for AIN Block
1 to 5 V dc or 4 to 20 mA: SCI = 3
0 to 5 V dc: SCI = 1
0 to 10 V dc, or ±10 V dc: SCI = 2

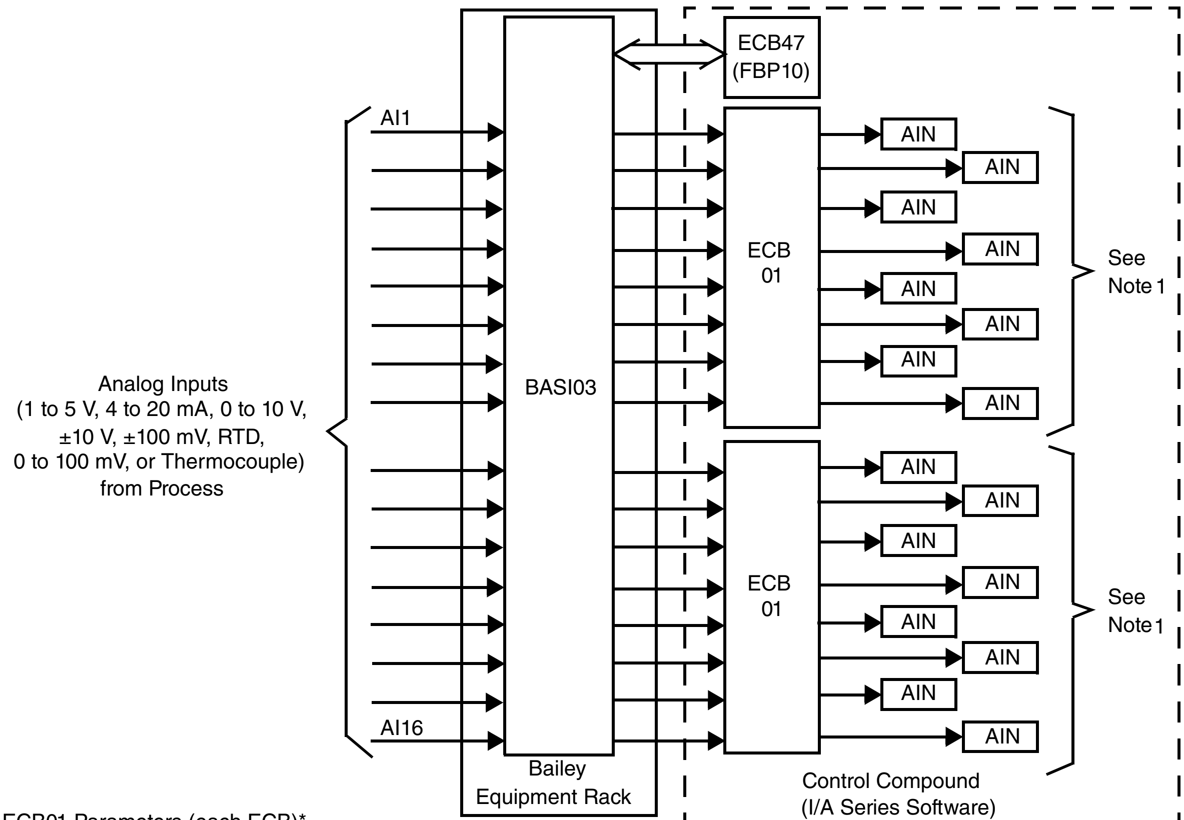
PNT_NO (Point Number) for AIN Blocks**

PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK
1	AI1	5	AI5	1	AI9	5	AI13
2	AI2	6	AI6	2	AI10	6	AI14
3	AI3	7	AI7	3	AI11	7	AI15
4	AI4	8	AI8	4	AI12	8	AI16***

Notes:
1. A MAIN control block can be used in place of the multiple AIN Blocks.
2. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (<CPLBUG>_ECB:PRIMARY_ECB) must be set to zero for DCS Fieldbus Module operation.
3. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E "Optional Fieldbus Extension"), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the FBM01.
***BASI01 has 15 inputs, BASM01 has 16.

Figure C-3. BASI01 or BASM01



ECB01 Parameters (each ECB)*
HWTYPE = 2; SWTYPE = 1

ECB47 Parameters*
I/A Series v6.1.1 Software or greater: HWTYPE = 52, SWTYPE = 55
I/A Series software version earlier than 6.1.1: HWTYPE = 52, SWTYPE = 42

SCI (Signal Conditioning Index) for AIN Blocks:
1 to 5 V dc or 4 to 20 mA: SCI = 3
0 to 5 V dc: SCI = 1
0 to 10 V dc, ±10 V dc, 0 to 100 mV, or ±100 mV: SCI = 2

SCI for thermocouple inputs:

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

SCI for RTD inputs:

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**

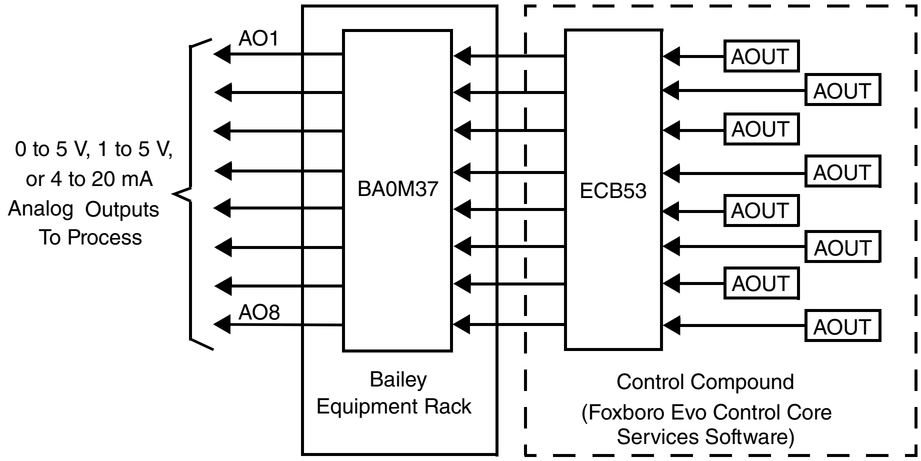
PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK
1	AI1	5	AI5	1	AI9	5	AI13
2	AI2	6	AI6	2	AI10	6	AI14
3	AI3	7	AI7	3	AI11	7	AI15
4	AI4	8	AI8	4	AI12	8	AI16
		9	CJC (SCI = 43)			9	CJC (SCI = 43)

Notes:

1. A MAIN control block can be used in place of the multiple AIN Blocks.
2. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (<CPLBUG>_ECB:PRIMARY_ECB) must be set to zero for DCS Fieldbus Module operation.
3. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.
4. If the input signal is 0-100 millivolts, set the AIN block parameters KSCALE = 2.0 and BSCALE = -100% to display the 0-100 mv signal as 0-100%.

*For additional ECB parameters, refer to Integrated Control Block Descriptions (B0193AX).
**Point number assignments are the same as for the FBM02.

Figure C-4. BASI03



ECB53 Parameters (each ECB)*
HWTYPE = 37; SWTYPE = 53

SCO (Signal Conditioning Index) for AOUT Blocks:
1 to 5 V dc or 4 to 20 mA: SCO = 3
0 to 5 V dc: SCO = 1

PNT_NO (Point Number) for AOUT Blocks**

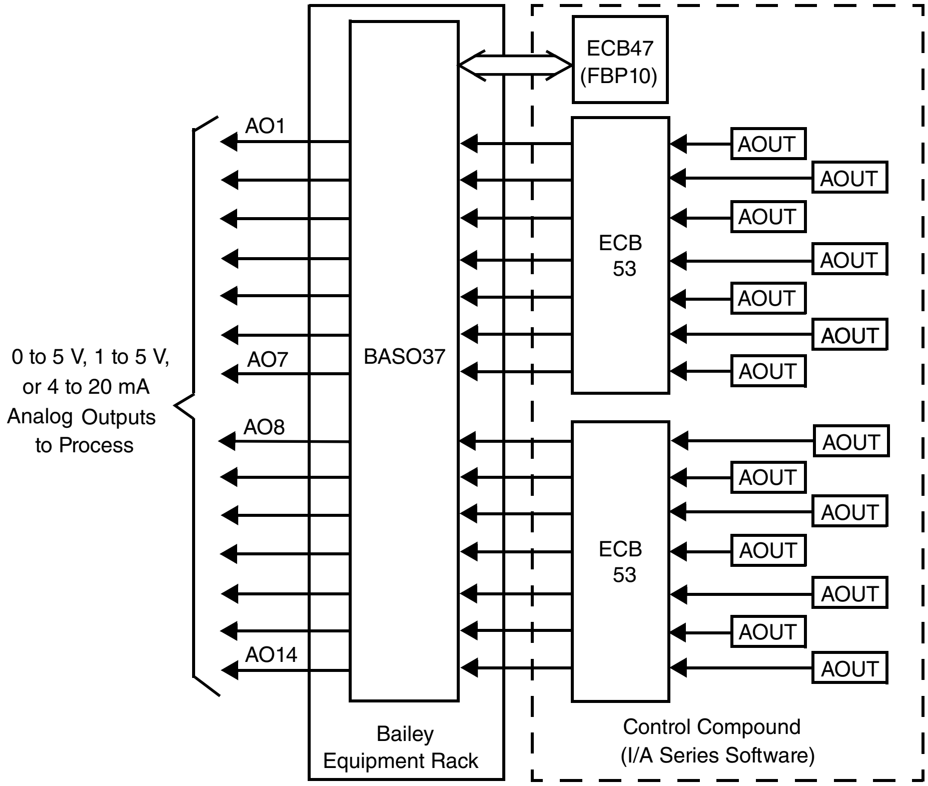
PNT NO	BLOCK	PNT NO	BLOCK
1	AO1	5	AO5
2	AO2	6	AO6
3	AO3	7	AO7
4	AO4	8	AO8

Note: If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM37.

Figure C-5. BAOM37



ECB53 Parameters (each ECB)*
HWTYPE = 37; SWTYPE = 53

ECB47 Parameters*
I/A Series v6.1.1 software or greater: HWTYPE = 52, SWTYPE = 56
I/A Series software version earlier than 6.1.1: HWTYPE = 52, SWTYPE = 42

SCO (Signal Conditioning Index) for AOUT Blocks:
1 to 5 V dc or 4 to 20 mA: SCO = 3
0 to 5 V dc: SCO = 1

PNT_NO (Point Number) for AOUT Blocks**

PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK
1	AO1	5	AO5	1	AO8	5	AO12
2	AO2	6	AO6	2	AO9	6	AO13
3	AO3	7	AO7	3	AO10	7	AO14
4	AO4			4	AO11		

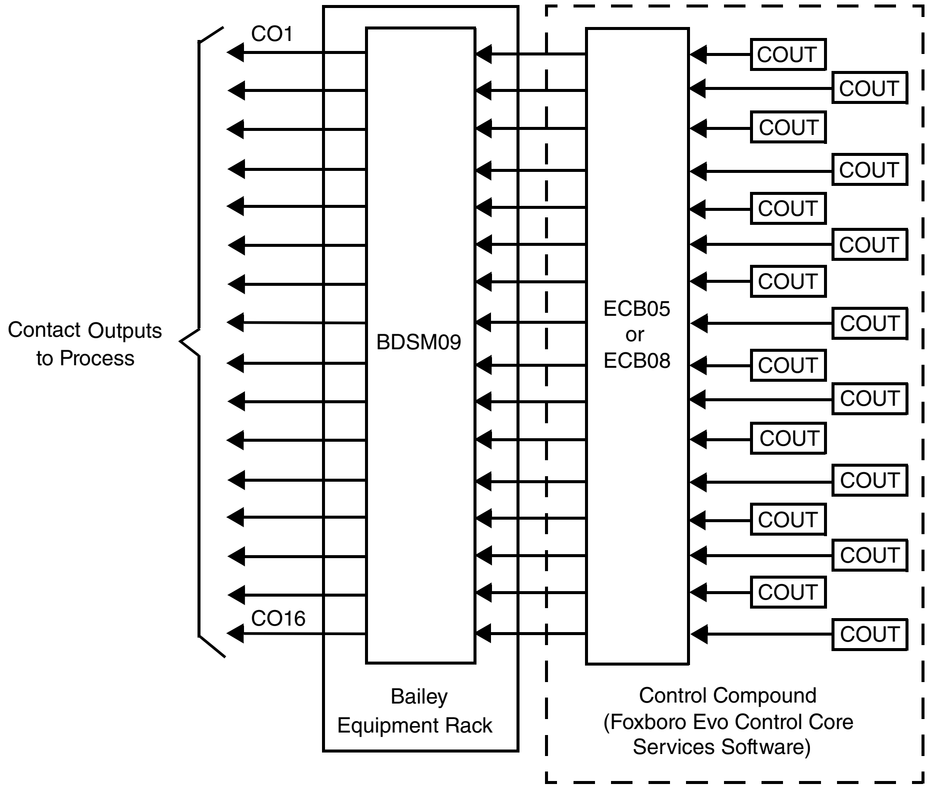
Notes:

1. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (<CPLBUG>_ECB:PRIMARY_ECB) must be set to zero for DCS Fieldbus Module operation.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM37.

Figure C-6. BAS037



ECB Parameters*
HWTYPE = 9; EXTYPE = 14; SWTYPE = 5 or 8

PNT_NO (Point Number) for COUT Blocks**

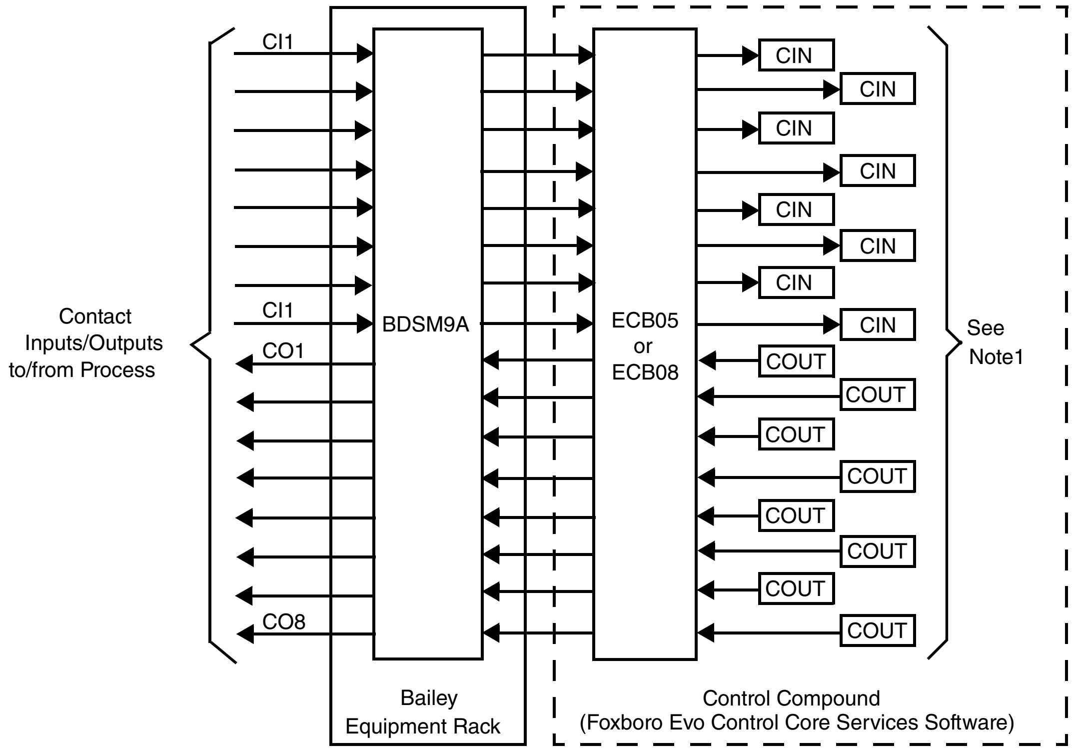
PNT NO	BLOCK	PNT NO	BLOCK
9	CO1	25	CO9
10	CO2	26	C10
11	CO3	27	C11
12	CO4	28	C12
13	CO5	29	C13
14	CO6	30	C14
15	CO7	31	C15
16	CO8	32	C16

Note: If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM09 with expander.

Figure C-7. BDSM09



ECB Parameters*
HWTYPE = 9; EXTYPE = 0; SWTYPE = 5 or 8

PNT_NO (Point Number) for Blocks**

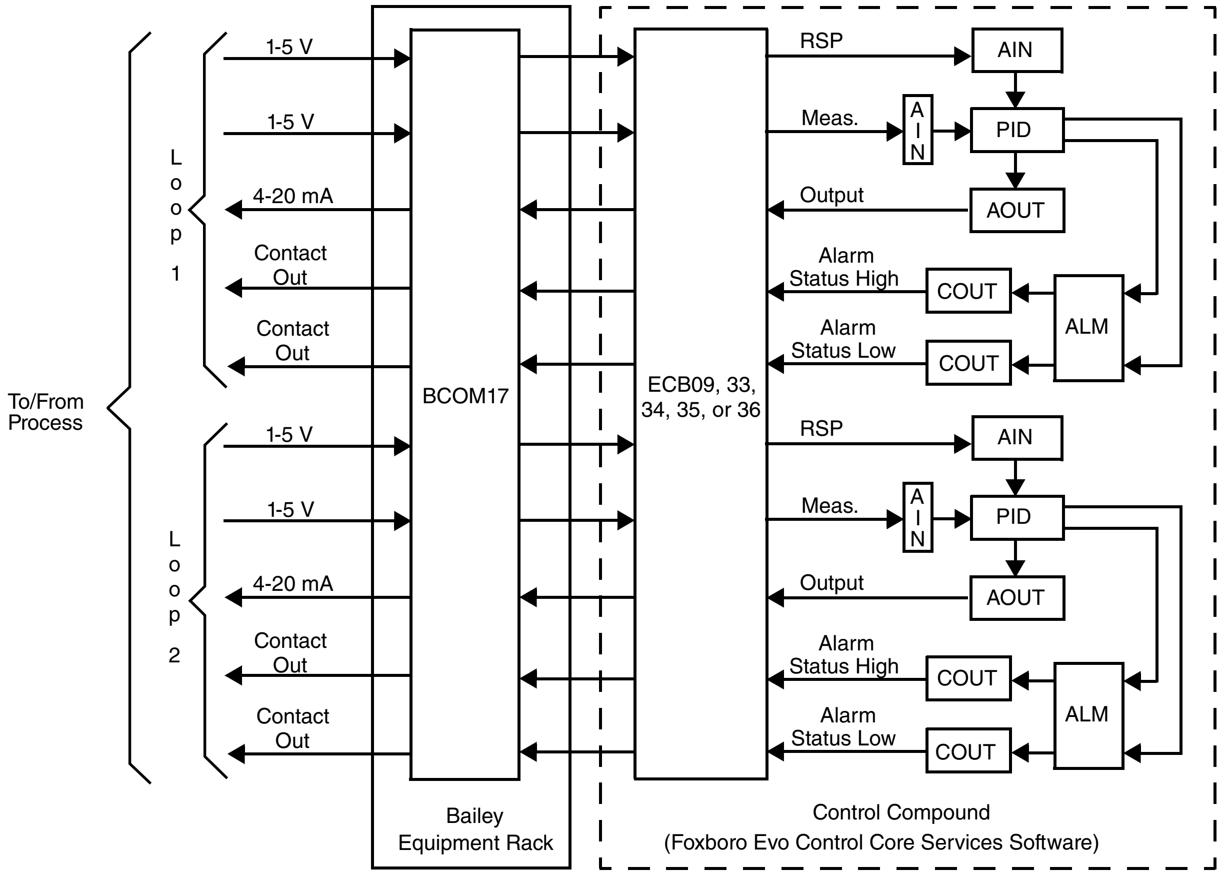
PNT NO	BLOCK	PNT NO	BLOCK
1	CI1	9	CO1
2	CI2	10	CO2
3	CI3	11	CO3
4	CI4	12	CO4
5	CI5	13	CO5
6	CI6	14	CO6
7	CI7	15	CO7
8	CI8	16	CO8

Notes:
1. A MCIN control block can be used in place of the multiple CIN blocks, and an MCOUT control block can be used in place of the COUT blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM09

Figure C-8. BDSM9A



ECB Parameters*

HWTYPE = 17; SWTYPE = 9, 33, 34, 35, or 36

AIN/AOUT Block Parameter Settings

SCI (Signal Conditioning Index) for AIN block: 3 (for 1 to 5 V dc)
SCO (Signal Conditioning Output Index) for AOUT block: 3 (for 4 to 20 mA)
MODOPT (Mode of Operation) for PID block:

- 1 = Proportional only
- 2 = Integral only
- 3 = Proportional plus derivative
- 4 = Proportional plus integral
- 5 = Proportional, integral, derivative

PNT_NO (Point Number) for AIN, AOUT, and COUT Blocks

PNT NO	BCOM17	FBM17**	HARDWARE REF.***	PNT NO	BCOM17	FBM17**	HARDWARE REF.***
1	AI1	AI1	Loop 1, PV	8	CI2	CI2	-
2	AI2	AI2	Loop 1, RV	9	CI3	CI3	-
3	AI3	AI3	Loop 2, PV	10	-	CI4	-
4	AI4	AI4	Loop 2, RV	11	CO1	CO1	Loop 1, AL/COM
5	AO1	AO1	Loop 1, O/COM	12	CO2	CO2	Loop 1, AH/COM
6	AO2	AO2	Loop 2, O/COM	13	CO3	CO3	Loop 2, AL/COM
7	CI1	CI1	-	14	CO4	CO4	Loop 2, AH/COM

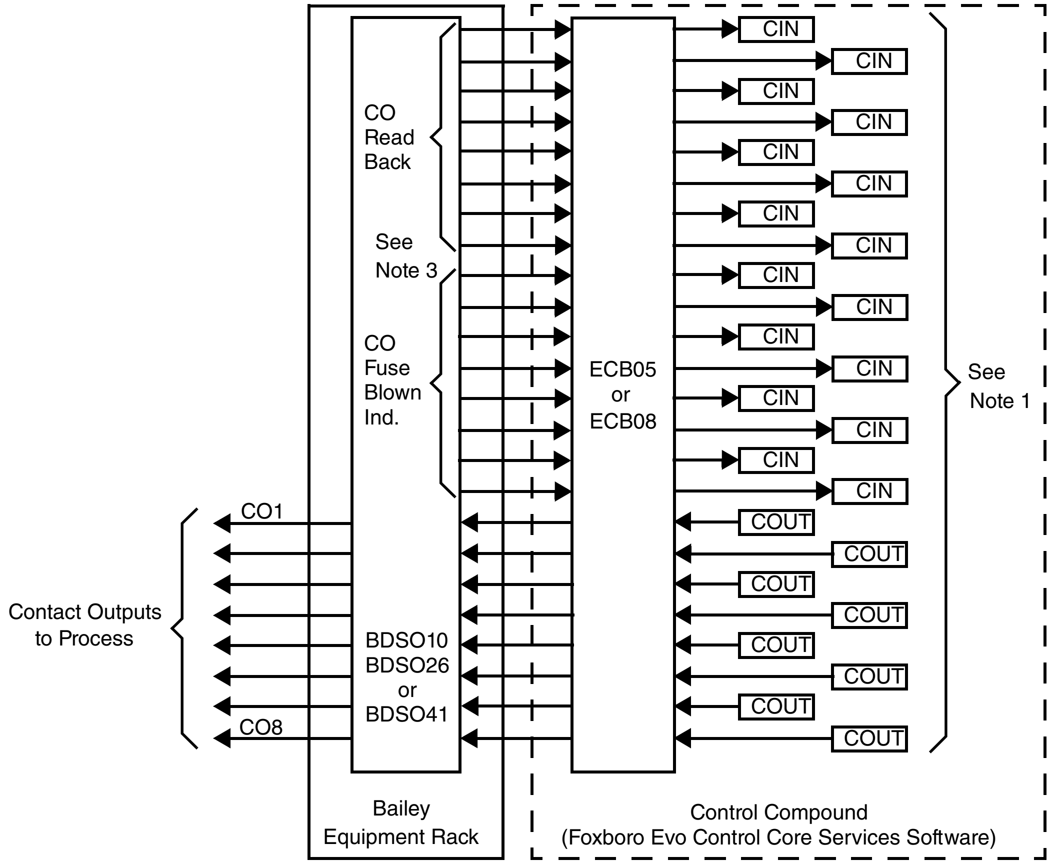
Note: If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**FBM17 parameter settings included for reference only.

***Control loop assignment is a function of on-board jumper placement. See text for details.

Figure C-9. BCOM17



ECB Parameters*
HWTYPE = 10, 26, 41; EXTYPE = 14; SWTYPE = 5 or 8

PNT_NO 1-8 are output readbacks and PNT_NO 17-24 are blown fuse indicators.

PNT_NO (Point Number) for Blocks**

PNT NO	BLOCK	PNT NO	BLOCK	PNT NO	BLOCK
1	CO1 RB	9	CO1	17	CO1 Fuse Blown
2	CO2 RB	10	CO2	18	CO2 Fuse Blown
3	CO3 RB	11	CO3	19	CO3 Fuse Blown
4	CO4 RB	12	CO4	20	CO4 Fuse Blown
5	CO5 RB	13	CO5	21	CO5 Fuse Blown
6	CO6 RB	14	CO6	22	CO6 Fuse Blown
7	CO7 RB	15	CO7	23	CO7 Fuse Blown
8	CO8 RB	16	CO8	24	CO8 Fuse Blown

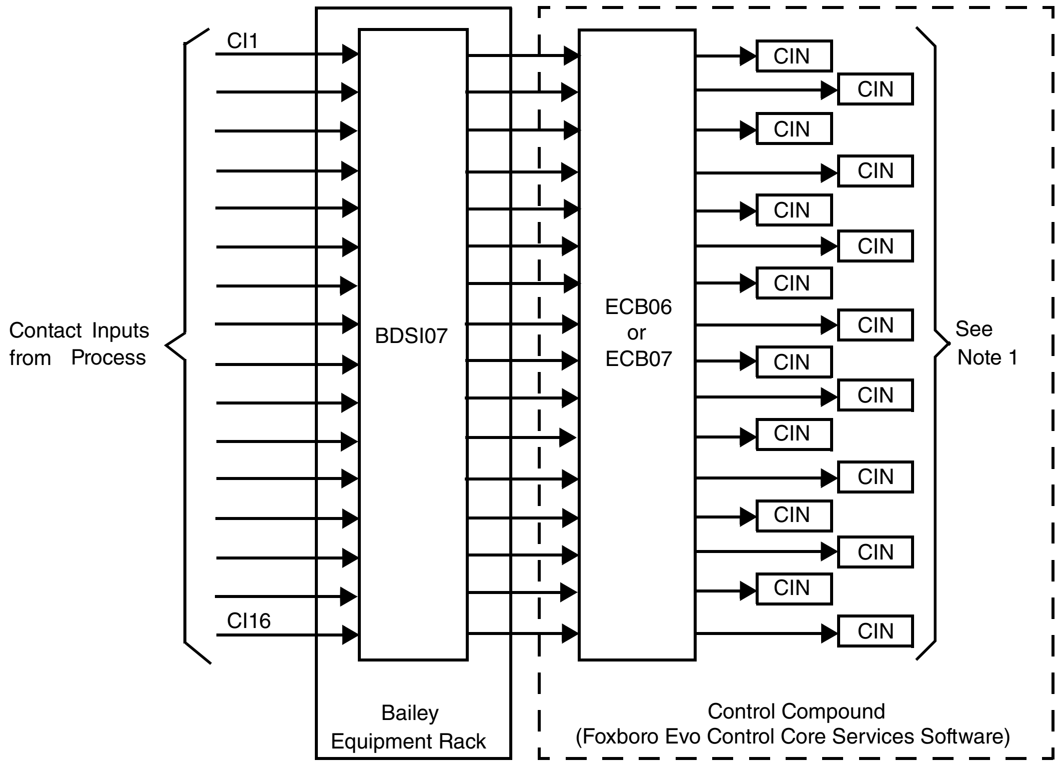
Notes:

1. A MCIN control block can be used in place of the multiple CIN blocks, and an MCOUT control block can be used in place of the COUT blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.
3. The CO Read Back and CO Fuse Blown Indicator inputs are internal to the BDSO10, BDSO26 or BDSO41.

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

**Point number assignments are the same as for the FBM09

Figure C-10. BDSO10, BDSO26, BDSO41



ECB Parameters*
HWTYPE = 7; EXTYPE = 0; SWTYPE = 6 or 7

PNT_NO (Point Number) for CIN Blocks**

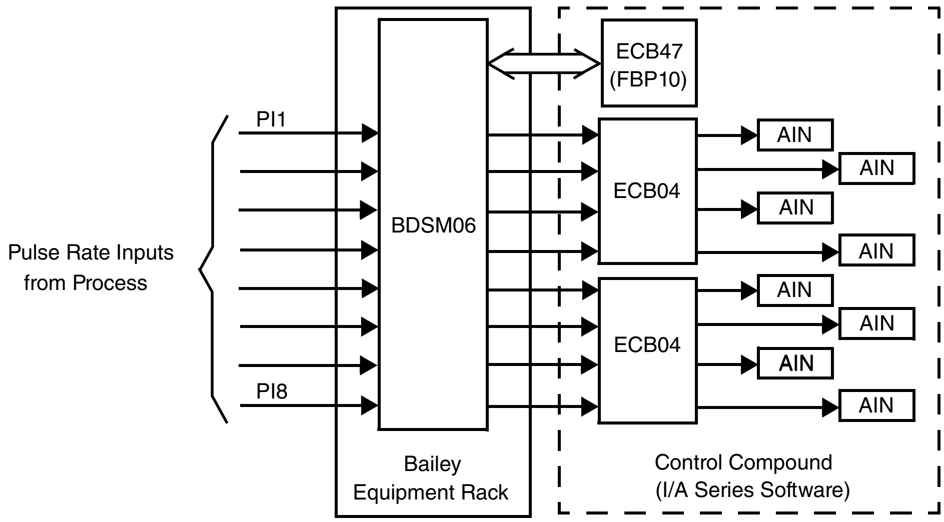
PNT NO	BLOCK	PNT NO	BLOCK
1	CI1	9	CI9
2	CI2	10	CI10
3	CI3	11	CI11
4	CI4	12	CI12
5	CI5	13	CI13
6	CI6	14	CI14
7	CI7	15	CI15
8	CI8	16	CI16

Notes:
1. A MCIN control block can be used in place of the multiple CIN blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

**Point number assignments are the same as for the FBM07.

Figure C-11. BDSI07



ECB04 Parameters (each ECB)*
HWTYPE = 6, SWTYPE = 4

ECB47 Parameters*
I/A Series v6.1.1 software or greater: HWTYPE = 52, SWTYPE = 55
I/A Series software version earlier than 6.1.1: HWTYPE = 52, SWTYPE = 42

SCI (Signal Conditioning Index) for AIN block = 8 (Pulse Rate)

PNT_NO (Point Number) for AIN Blocks**

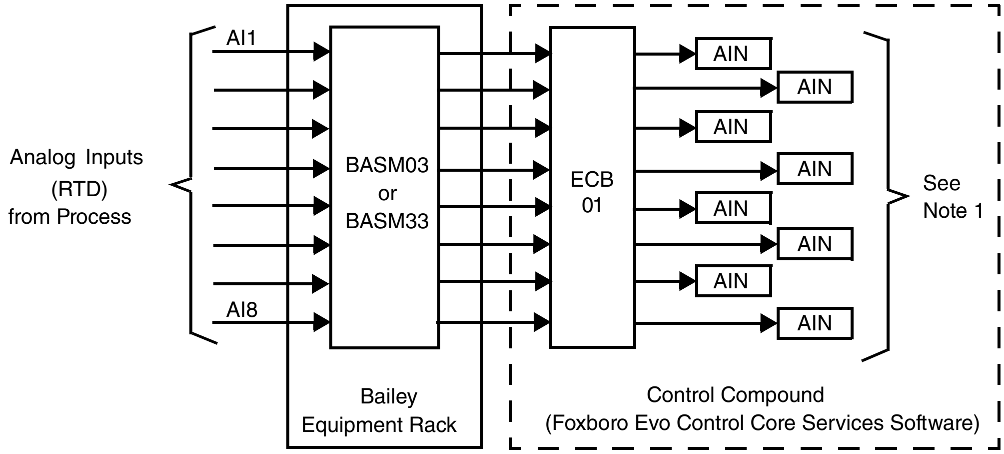
PNT NO	BLOCK	PNT NO	BLOCK
1	AI1	5	AI5
2	AI2	6	AI6
3	AI3	7	AI7
4	AI4	8	AI8

Notes:

1. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (<CPLBUG>_ECB:PRIMARY_ECB) must be set to zero for DCS Fieldbus Module operation.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

Figure C-12. BDSM06



ECB Parameters**
HWTYPE = 3, SWTYPE = 1 for BASM03
HWTYPE = 33, SWTYPE = 1 for BASM033

SCI (Signal Conditioning Index) for AIN Block

RTD TYPE	SCI
Copper (SAMA) – BASM33	40
Nickel (SAMA) – BASM03	41
Platinum (100 ohm DIN 43760-1968) – BASM03	42
Platinum (100 ohm IEC DIN 43760-1980) – BASM03	43
Platinum (100 ohm SAMA) – BASM03	44

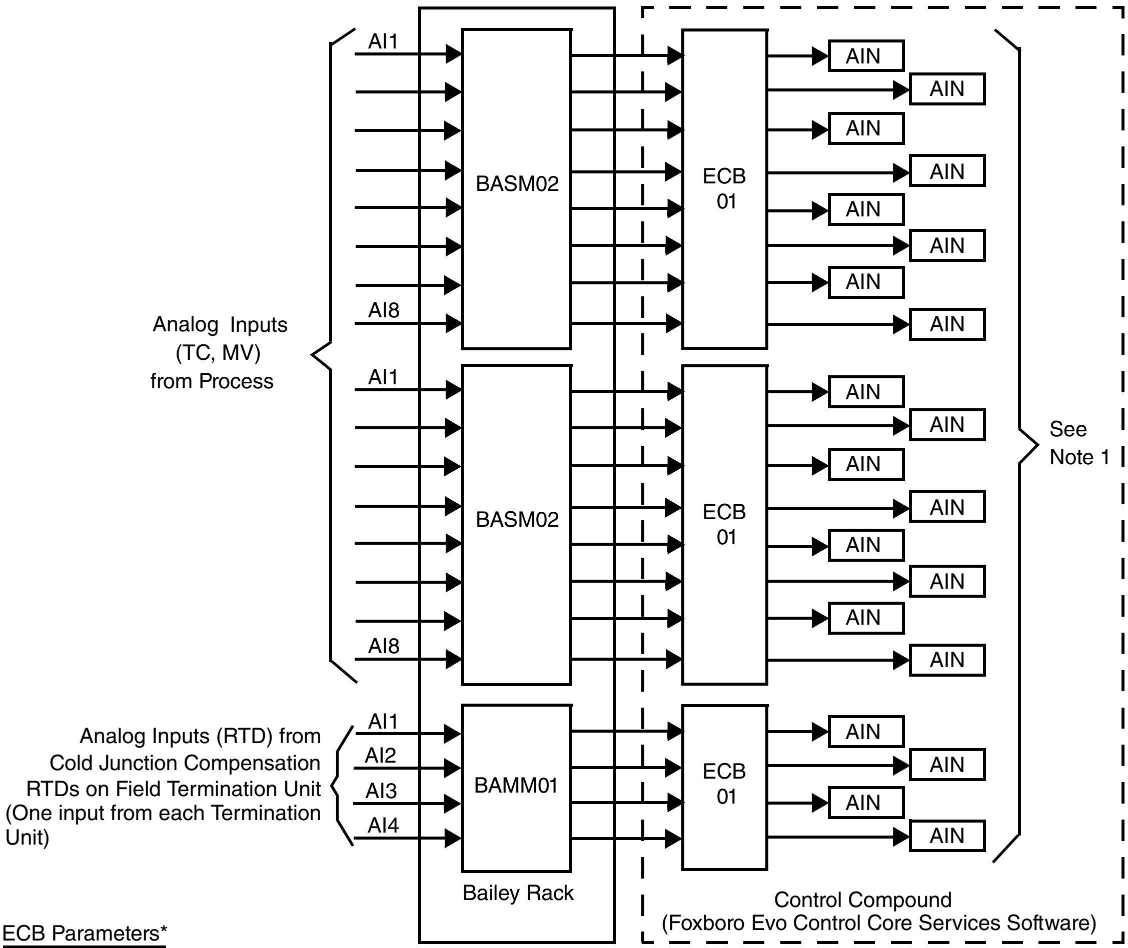
PNT_NO (Point Number) for AIN Blocks*

PNT NO	BLOCK	PNT NO	BLOCK
1	AI1	5	AI5
2	AI2	6	AI6
3	AI3	7	AI7
4	AI4	8	AI8

Notes:
1. A MAIN control block can be used in place of the multiple AIN blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

Figure C-13. BASM03 or BASM33



ECB Parameters*

HWTYPE = 3, SWTYPE = 1 for BAMM01; HWTYPE = 2, SWTYPE = 1 or 3 for BASM02 for thermocouple, SWTYPE = 3 for ±100 mV

SCI (Signal Conditioning Index) for AIN Block (BASM02)**

THERMOCOUPLE TYPE	SCI
0-100 mV	1
±100 mV	2
B	20
E	21
J	23
K	24
N	25
R	26
S	27
T	28

SCI (Signal Conditioning Index) for AIN Block (BAMM01)**

RTD TYPE	SCI
Cold Junction RTD on NTAI02 Termination Unit	43

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

Notes:
1. A MAIN control block can be used in place of the multiple AIN blocks.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch card (see Appendix E "Optional Fieldbus Extension"), the BUSWDS parameter in each ECB must be set to 1 to prevent bus switching failures.

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

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

***Point number assignments are the same as for the FBM01 and FBM02.

Figure C-14. BASM02 and BAMM01

Appendix D. BASI01/BASM01, BASI03, BDSM06, BASO37 Configuration

As indicated in Table 3-1, certain types of the DCS Fieldbus Modules must be configured using a combination of one FBP10 and two FBMs:

DCS Fieldbus Module	Equivalent FBM(s)
BASI01 or BASM01	One FBP10, and two FBM01s
BASI03	One FBP10, and two FBM02s
BDSM06	One FBP10, and two FBM06s
BASO37	One FBP10, and two FBM37s

The following subsections provide example configuration information for these special cases.

NOTE

1. If the Migration Kit being installed includes a BASI01, BASM01, BASI03, BDSM06, or BAS037 DCS Fieldbus Module, the MPOLL parameter in the primary ECB of the control processor (`<cplbug>_ECB:primary_ECB`) must be set to `zero` for DCS Fieldbus Module operation.
2. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch Card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to `1` to prevent bus switching failures.

NOTE

The following figures are displays shown by the System Management Display Handler (SMDH). For displays shown by the System Manager, refer to *System Manager* (B0750AP).

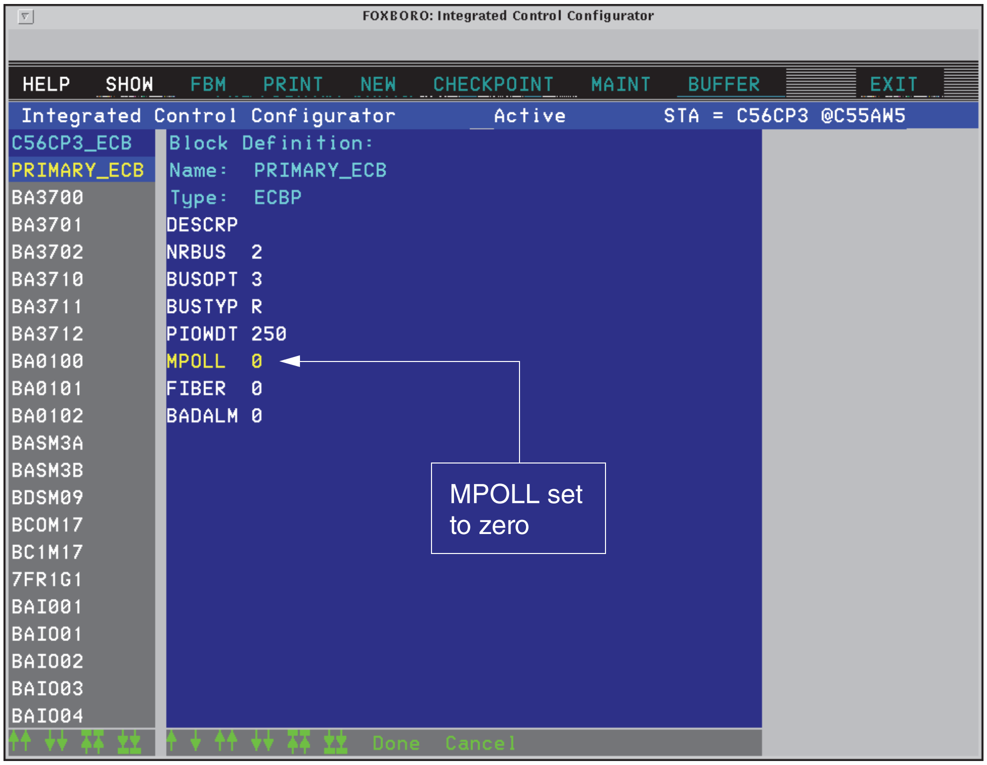


Figure D-1. Control Processor Primary ECB Editing Display (SMDH)

BASI01/BASM01 Configuration

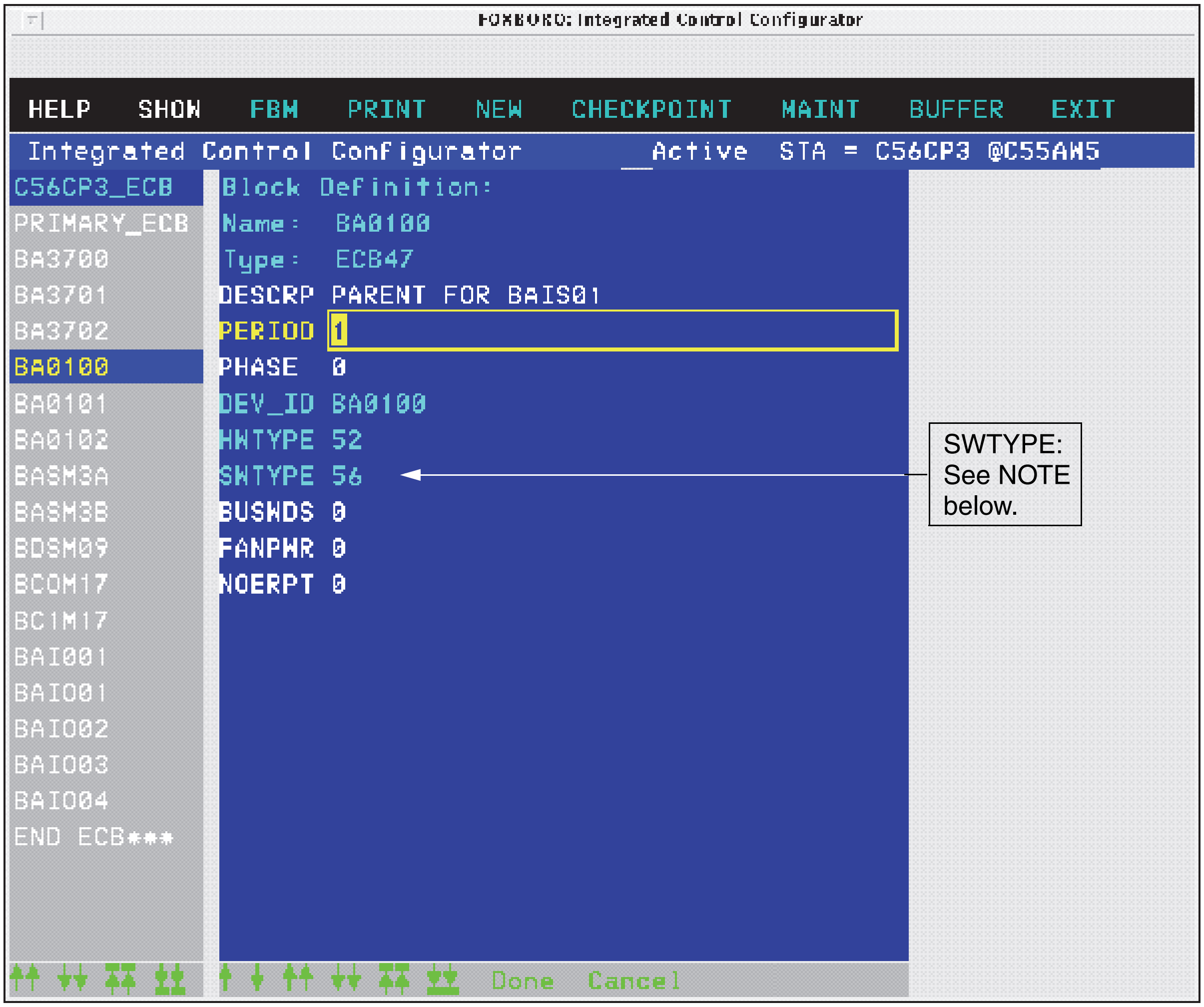
BASI01 supports 15 analog input channels, and BASM01 supports 16. For each of these modules, the range of each individual input channel is software configurable.

For each of these modules, mapping to three ECBs is required. One ECB is for the operator action and maintenance of the physical card, and the two other ECBs allow mapping of the input channels (15 or 16) into standard Foxboro Evo control blocks. (Two ECBs are required for the channel mapping, as each ECB can map to only eight channels.)

Configuration for the BASI01 or BASM01 is accomplished by first invoking the Integrated Control Configurator (ICC) and selecting the control processor that will serve as its host. Then the three ECBs are configured, as shown in the following examples.

FBP10 ECB for BASI01 or BASM01

The physical BASI01 or BASM01 is configured as a Fieldbus Processor 10 (FBP10), as shown in Figure D-2. As configured, in the System Management (SMDH) displays this ECB appears as a stand-alone FBP10, with no I/O cards. The DEV_ID configured in Figure D-2 (BA0100) is the letterbug used on the BASI01 or BASM01 card. (It is recommended that the ECB bear the same name as the BASI01/BASM01 letterbug.) The first five characters in the letterbug are user-determined, and the last character must be **0** (zero).



NOTE: If I/A Series v6.1.1 Software or later, use SWTYPE = 56;
If I/A Series software version is earlier than 6.1.1, use SWTYPE = 42.

Figure D-2. Typical FBP10 Configuration for a BASI01 or BASM01 (SMDH)

FBM01 ECBs for BASI01 or BASM01

The two FBM01 ECBs configured for the BASI01 or BASM01 DCS Fieldbus Module are virtual FBMs, which means they exist in software only. The physical BASI01 or BASM01 (in the form of the FBP10 ECB) responds to control processor requests for data from these two configured virtual FBMs.

The key to the relationship between the CP and the BASI01 or BASM01 is in the letterbug and DEV_ID assignments:

- The virtual FBM's DEV_IDs must have the same first five characters as the FBP10 letterbug (or DEV_ID)
- The last character of the first FBM01's ECB DEV_ID must be **1** (as illustrated in the following subsection).
- The last character of the second FBM01's ECB DEV_ID must be **2** (as illustrated in the following subsection).

First FBM01 ECB (BA0101) for BASI01 or BASM01

Like the BAILEY card it replaces, the BASI01 or BASM01 has multiple range support for its individual channels. In the case of BASI01 or BASM01, the input ranges of the channels are software configured by setting the FSDLAY parameter (see Figure D-3 and Table D-1).

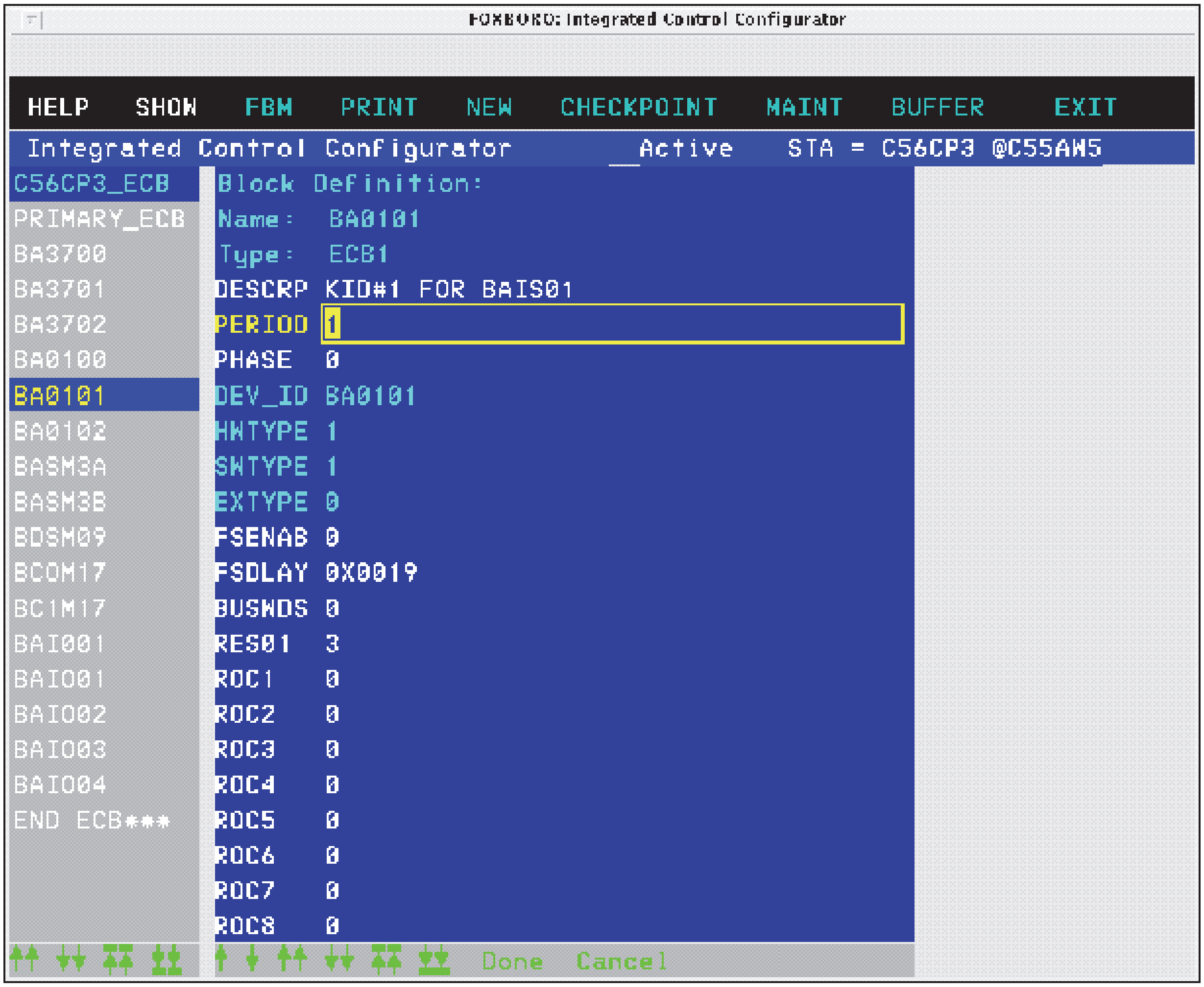


Figure D-3. Example Configuration, First FBM01 ECB (BA0101) for BASI01 or BASM01 (SMDH)

Table D-1. FSDLAY Setting (Range Selections) for BASI01/BASM01 (FBM01 ECBs)

Desired Input Range (Per Channel)	Selection Value (Binary)
4 to 20 mA/1 to 5 V dc	00
0 to 10 V dc	01
-10 to +10 V dc	10

In the example of Figure D-3 (using FSDLAY), Channels 1 and 3 are configured for 0 to 10 V dc; Channel 2 is configured for -10 to +10 V dc; and the remaining 5 channels (4 through 8) are configured at the default, 4 to 20 mA or 1 to 5 V dc. Thus, FSDLAY = 0X0019, the last four characters of which map as follows:

Channel	8	7	6	5	4	3	2	1
Binary	00	00	00	00	00	01	10	01
Hex	0		0		1		9	

Second FBM01 ECB (BA0102) for BASI01 or BASM01

For the second FBM01 ECB, in our example (see Figure D-4) the FSDLAY parameter is kept at its default value (1000)[1]; therefore, the remaining channels (9 through 15 for BASI01, or 9 through 16 for BASM01) are ranged for 4 to 20 mA/1 to 5 V dc.

1. 1000 is a standard Foxboro Evo default value which, in this case, causes all 7 (or 8) channels to be set for 4 to 20 mA/1 to 5 V dc. There is no intended correlation between the hexadecimal value 1000 and the associated channels, as applied in the examples above.

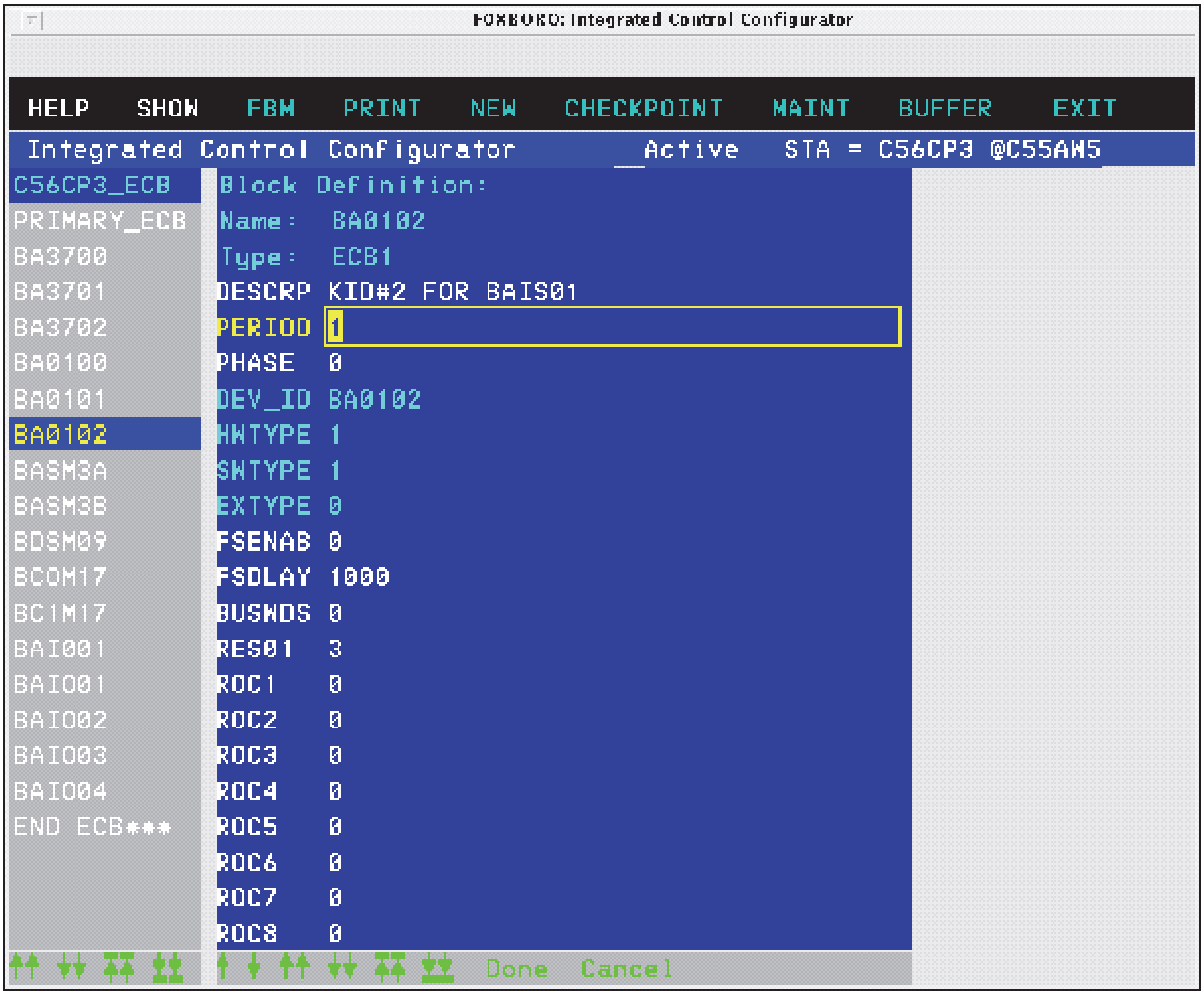


Figure D-4. Example Configuration, Second FBM01 ECB (BA0102) for BASI01 or BASM01 (SMDH)

Analog Input Blocks for BASI01/BASM01 Configuration

Once the equipment control blocks (ECBs) have been configured, the Foxboro Evo control blocks must be configured. If the DCS Fieldbus Module is BASI01, 15 input channels are mapped: 8 channels to the first FBM01, and 7 to the second FBM01. If the DCS Fieldbus Module is a BASM01, 16 input channels are mapped, 8 channels to each of the two FBM01s.

Figure D-5 shows an example of a MAIN (Multiple Analog Input) control block configured for the first eight channels of the first virtual FBM01. (Although the MAIN block is used here, any AIN blocks or standard Foxboro Evo connections can be used.) As indicated in Figure D-5, signal conditioning (SCI) is set as follows for the configured ranges.

- For Channels 1, 2, and 3 (Figure D-5), SCI is set to 2 (for 0 to 10 V dc, -10 to +10 V dc).
- For the remaining five channels (Figure D-5), SCI is set to 3 (for 4 to 20 mA or 1 to 5 V dc). (These settings are not shown in the figure.)

NOTE

Refer to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) Integrated Control Software Concepts* (B0700AG), *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX) for additional information when configuring 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 C. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.

Configuration for the second MAIN control block is (for Channels 9 through 15 or 9 through 16) similar to the first, with the first input configured for Channel 9, the second for Channel 10, and so forth.

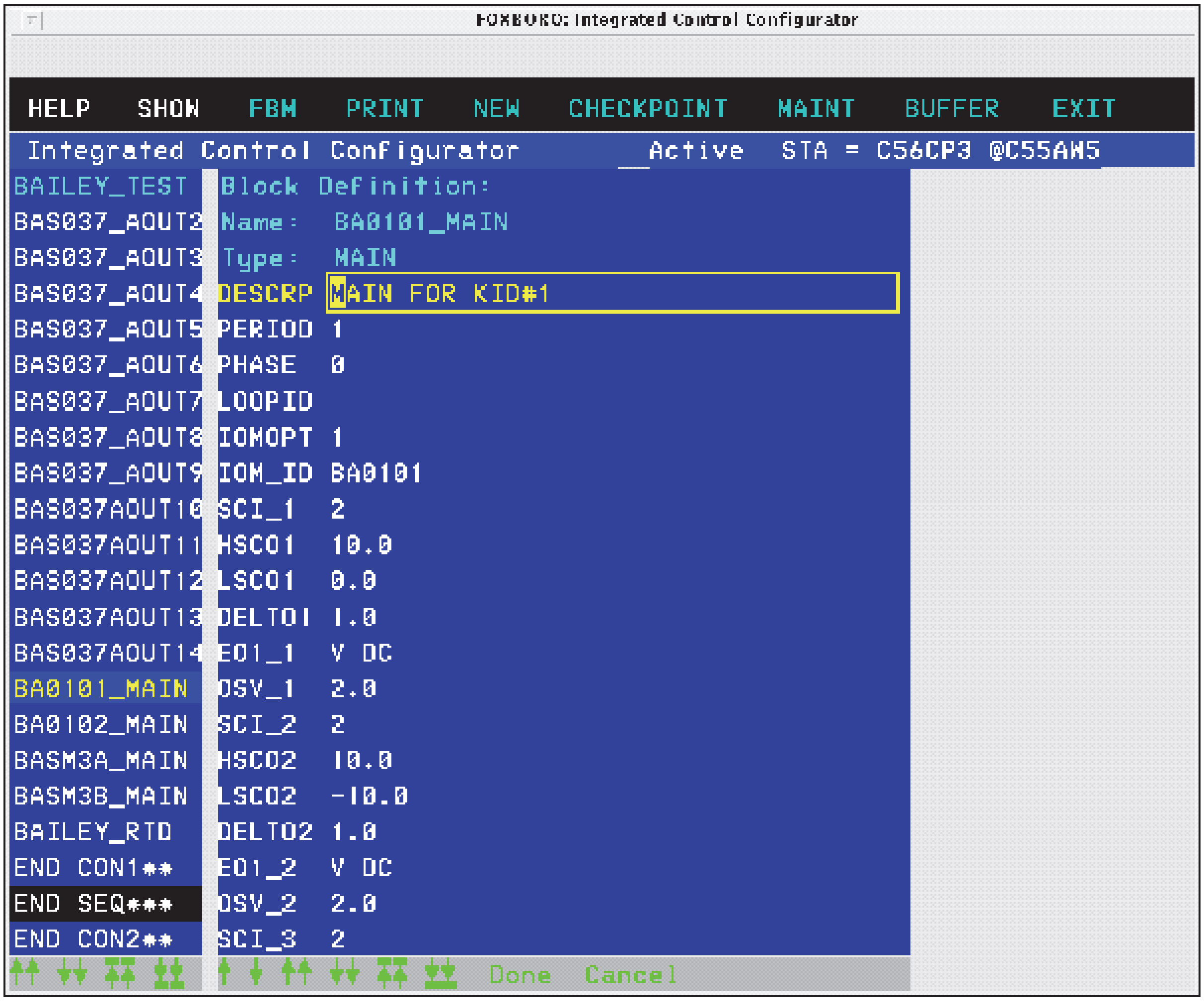


Figure D-5. Configuring the First MAIN Control Block for BASI01/BASM01 (SMDH)

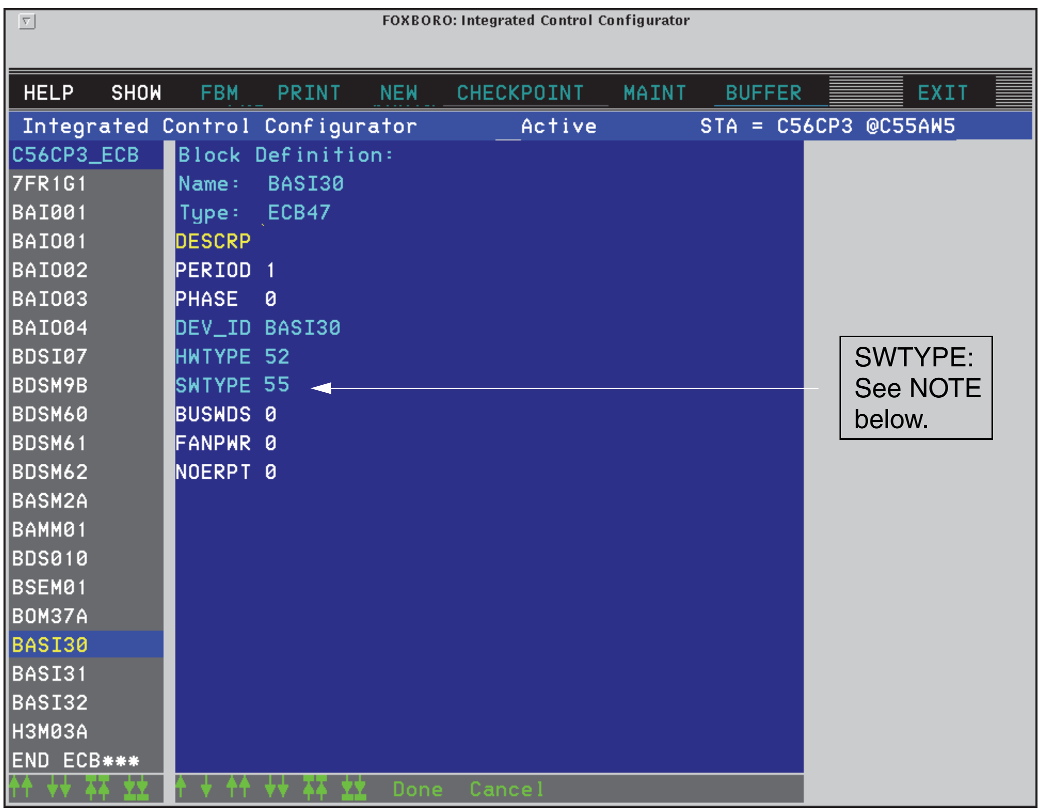
BASI03 Configuration

BASI03 supports 16 analog input channels, and the range of each individual input channel is software configurable. For this module, mapping to three ECBs is required. One ECB is for the operator action and maintenance of the physical card, and the other two allow mapping of the 16 input channels into standard Foxboro Evo control blocks. (Two ECBs are required for the channel mapping, as each ECB can map to only eight channels.)

Configuration for the BASI03 is accomplished by first invoking the Integrated Control Configurator (ICC) and selecting the control processor that will serve as its host. Then the three ECBs are configured, as shown in the following examples.

FBP10 ECB for BASI03

The physical BASI03 is configured as a Fieldbus Processor 10 (FBP10), as shown in Figure D-6. As configured, in the System Management (SMDH) displays this ECB appears as a stand-alone FBP10, with no I/O cards. The DEV_ID configured in Figure D-6 (BASI30) is the letterbug used on the BASI03. (It is recommended that the ECB bear the same name as the BASI03 letterbug.) The first five characters in the letterbug are user determined, and the last character must be **0** (zero).



NOTE: If I/A Series software version is v6.1.1 Software v9.0 or later, use SWTYPE = 55;
If I/A Series software version is earlier than 6.1.1, use SWTYPE = 42.

Figure D-6. Typical FBP10 Configuration for a BASI03 (SMDH)

FBM02 ECBs for BASI03

The two FBM02 ECBs configured for the BASI03 DCS Fieldbus Module are virtual FBMs, which means they exist in software only. The physical BASI03 (in the form of the FBP10 ECB) responds to control processor requests for data from these two configured virtual FBMs.

The first FBM02 ECB is configured for channels 1-8, and the second is configured for Channels 9-16.

The key to the relationship between the CP and the BASI03 is in the letterbug and DEV_ID assignments:

- The virtual FBM's DEV_IDs must have the same first five characters as the FBP10 letterbug (or DEV_ID)
- The last character of the first FBM02's ECB DEV_ID must be **1** (as illustrated in the following subsection).
- The last character of the second FBM02's ECB DEV_ID must be **2** (as illustrated in the following subsection).

First FBM02 ECB (BASI31) for BASI03

Like the Bailey card it replaces, the BASI03 has multiple range support for its individual channels. The input ranges of the channels are configured by setting the FSENAB and FSDLAY parameters (see Figure D-7 and Table D-2).

NOTE

When you configure the input ranges for the two FBM02 ECBs, only the last two characters of FSENAB are used, and only the last four characters of FSDLAY are used. (FSENAB can contain up to four characters, and FSDLAY can contain up to six.)

CAUTION

This note applies **only** for BASI03 used in I/A Series systems at software levels below V6.3.1. For BASI03 using I/A Series software prior to Release 6.3.1, unused channels must be configured as 4 to 20 mA/1 to 5 V dc, (per Table D-2). Do not configure any unused channels as RTDs. Channels configured as RTDs, but not physically connected to the termination panel, may cause the channel to lock up when the BASI03 card is initially started. Recovery from this condition can be accomplished by resetting the BASI03 card (by performing a down-load from System Management) once the RTD has been connected.

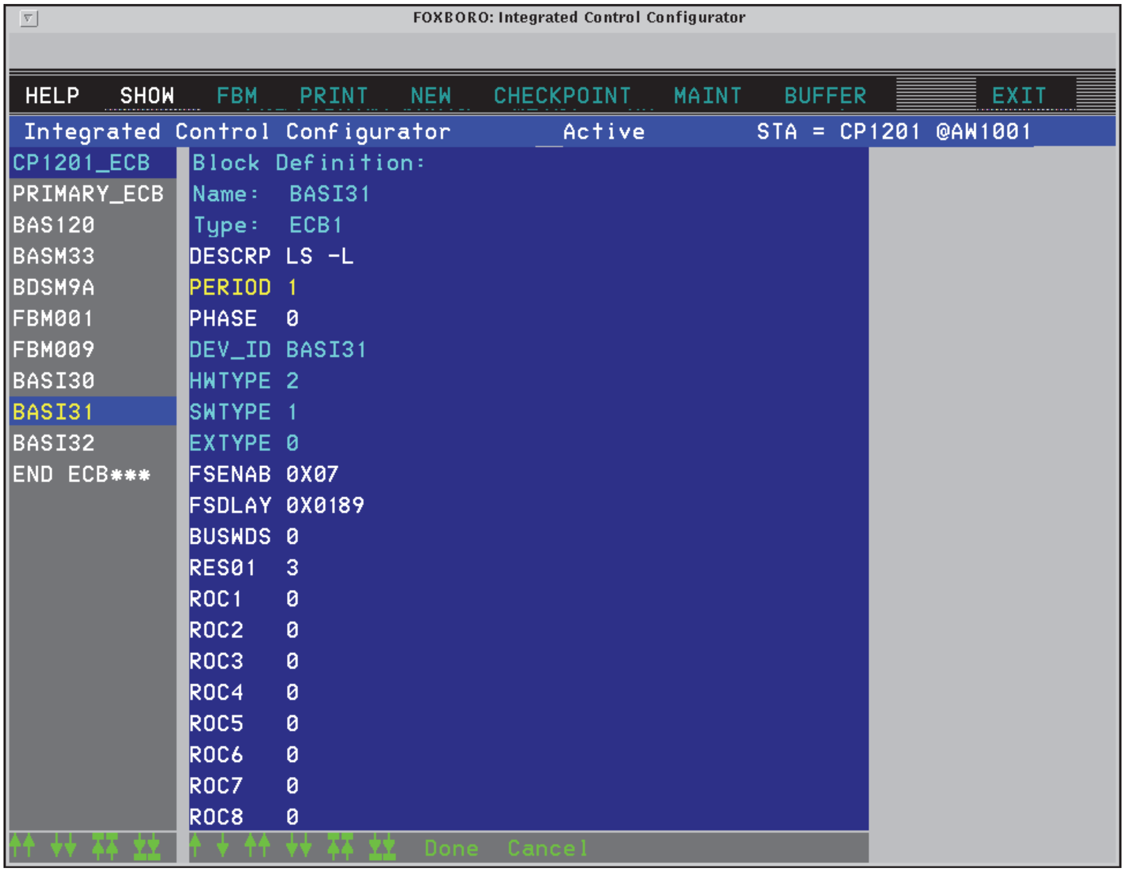


Figure D-7. Example Configuration, First FBM02 ECB (BASI31) for BASI03 (SMDH)

Table D-2. FSENAB and FSDLAY Settings (Range Selections) for BASI03 (FBM02 ECBs)

Desired Input Range (Per Channel)	FSENAB Value (Binary)	FSDLAY Value (Binary)
Thermocouple	1	00
RTD	1	01
± 100 mV or 0 to 100 mv	1	10
4 to 20 mA/1 to 5 V dc	0	00
0 to 10 V dc	0	01
-10 to +10 V dc	0	10

In the example of Figure D-7, FSENAB is 0X07 and FSDLAY is 0X0189. These values reflect the following channel settings:

Channel	Set for Input Type
1	RTD
2	± 100 mV
3	Thermocouple
4	-10 to +10 V dc
5	0 to 10 V dc
6	4 to 20 mA/1 to 5 V dc
7	4 to 20 mA/1 to 5 V dc
8	4 to 20 mA/1 to 5 V dc

Thus, the two characters of FSENAB (07) map as follows:

Channel	8	7	6	5	4	3	2	1
Binary	0	0	0	0	0	1	1	1
Hex.	0				7			

And the last four characters of FSDLAY (0189) map as follows:

Channel	8	7	6	5	4	3	2	1
Binary	00	00	00	01	10	00	10	01
Hex.	0		1		8		9	

Second FBM02 ECB (BASI32) for BASI03

Configuration for the second FBM02 ECB for is similar to that for the first FBM02 ECB. In our example (see Figure D-8), for the second FBM02 ECB, the FSDLAY parameter is kept at its default value (1000)[2], and FSENAB is kept at its default value (0); therefore, all of the remaining channels (9 through 16) are ranged for 4 to 20 mA/1 to 5 V dc.

2. 1000 is a standard Foxboro Evo default value which, in this case, causes all 8 channels to be set for 4 to 20 mA/1 to 5 V dc. There is no intended correlation between the hexadecimal value 1000 and the associated channels, as applied in the examples above.

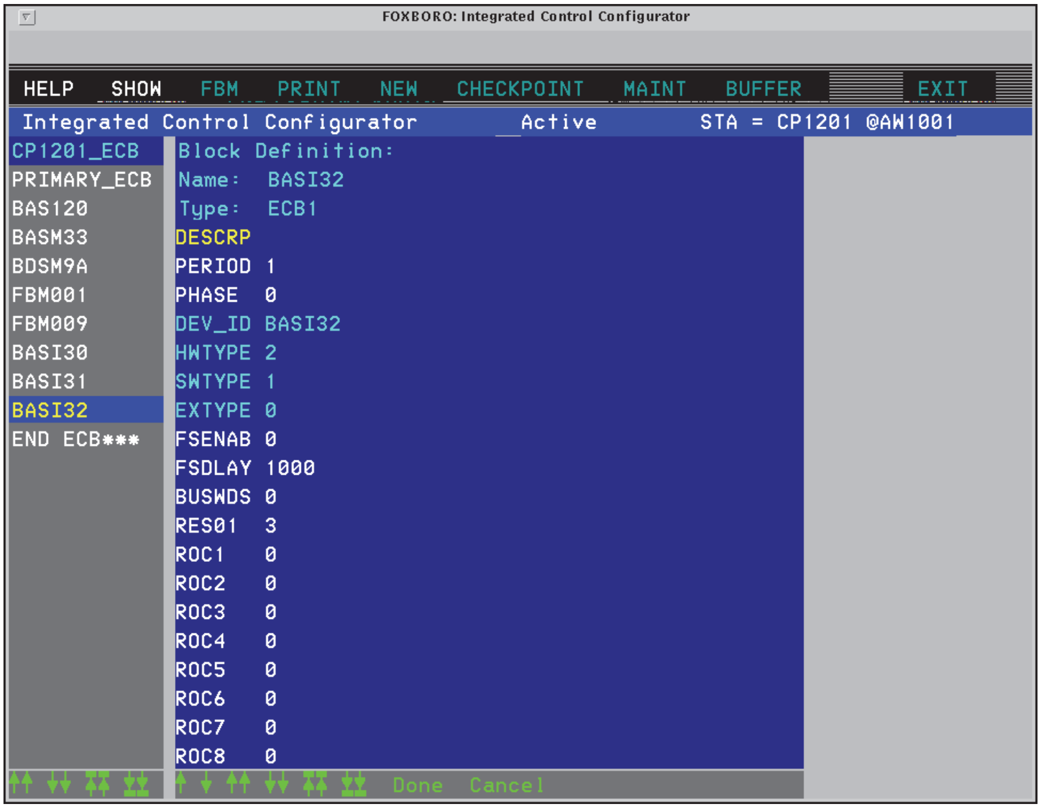


Figure D-8. Example Configuration, Second FBM02 ECB (BASI32) for BASI03 (SMDH)

Analog Input Blocks for BASI03 Configuration

— NOTE —

When configuring control blocks for thermocouples, the ninth channel is used for cold junction compensation (as is standard for Foxboro Evo control blocks).

Once the Equipment Control Blocks (ECBs) have been configured, the Foxboro Evo control blocks must be configured. For the BASI03, 16 input channels are mapped, eight to each of the two FBM02s.

Figure D-9 shows an example of a MAIN (Multiple Analog Input) control block configured for the first eight channels of the first virtual FBM02. (Although the MAIN block is used here, any AIN blocks or standard Foxboro Evo connections can be used.) As indicated in Figure D-9, signal conditioning (SCI) is set as follows for the configured ranges: for Channel 1, SCI is set to 40 (for a copper RTD), Channel 2 is set to 2 (for -±100 mV), Channel 3 is set to 23 (for a J-type thermocouple), and so forth. (Refer to Appendix C for the required SCI values.)

NOTE

Refer to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) Integrated Control Software Concepts* (B0700AG), *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX) for additional information when configuring 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 C. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.

Configuring the second MAIN control block is (for channels 9 through 16) similar to the first, with the first input configured for Channel 9, the second for Channel 10, and so forth up to Channel 16.

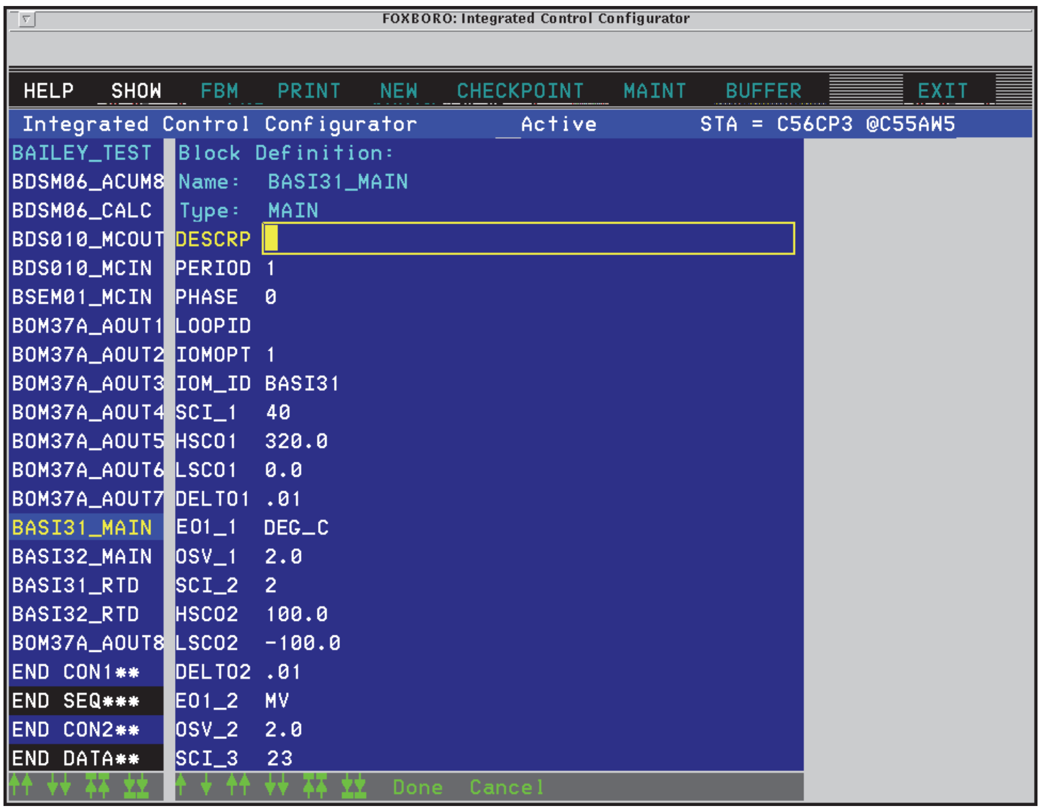


Figure D-9. Configuring the First MAIN Control Block for BASI03 (SMDH)

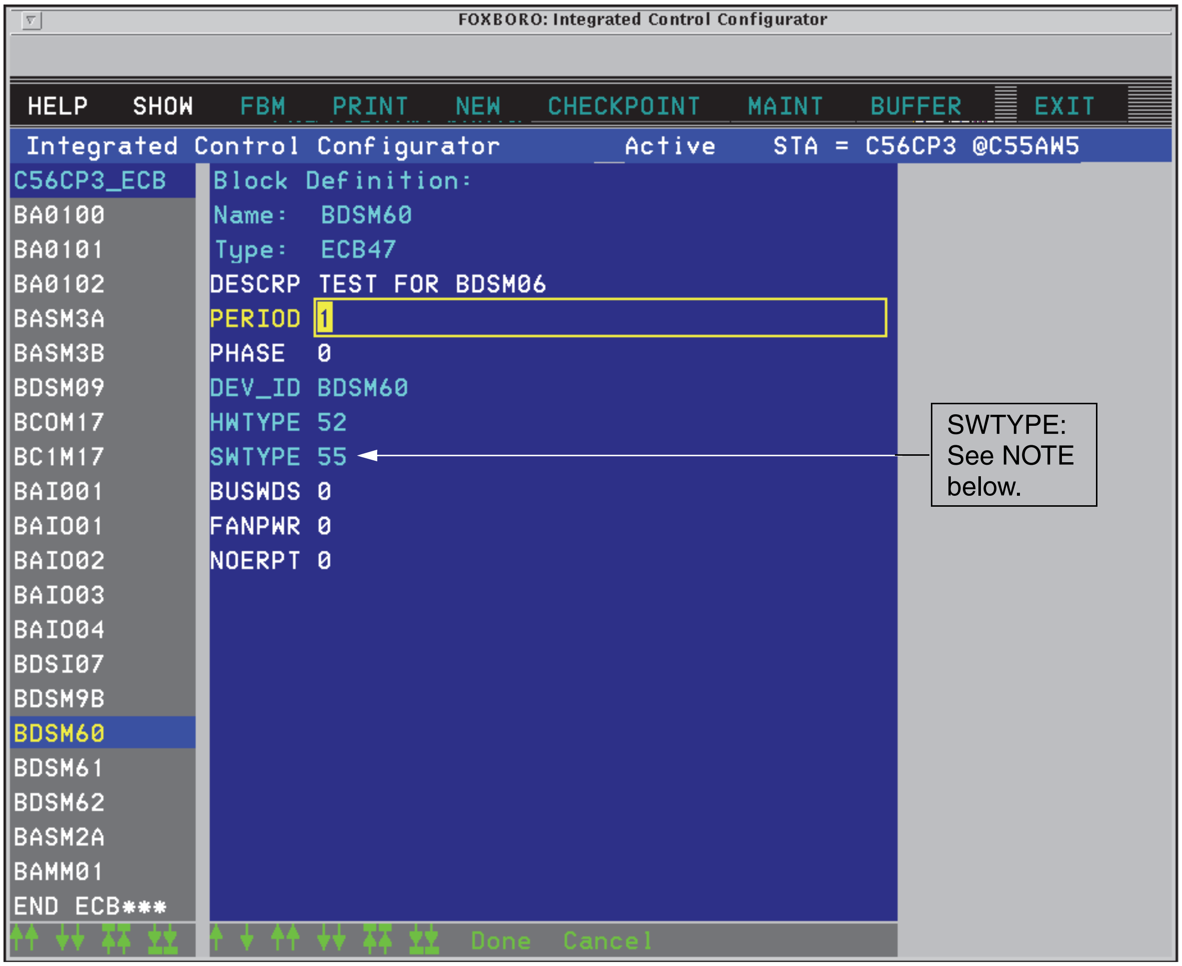
BDSM06 Configuration

The BDSM06 supports eight pulse input channels. Because each associated ECB (ECB4) handles only four pulse inputs, mapping to three ECBs is required. One ECB is for the operator action and maintenance of the physical card, and the two other ECBs allow mapping of the eight input channels into standard Foxboro Evo control blocks.

Configuration for the BDSM06 is accomplished by first invoking the Integrated Control Configurator (ICC) and selecting the control processor that will serve as its host. Then the three ECBs are configured, as shown in the following examples.

FBP10 ECB for BDSM06

The physical BDSM06 is configured as a Fieldbus Processor 10 (FBP10), as shown in Figure D-10. As configured, in the System Management (SMDH) displays this ECB appears as a stand-alone FBP10, with no I/O cards. The DEV_ID configured in Figure D-10 (BDSM60) is the letterbug used on the BDSM06 card. (It is recommended that the ECB bear the same name as the BDSM06 letterbug.) The first five characters in the letterbug are user determined, and the last character must be **0**.



NOTE: If I/A Series software version is v6.1.1 Software v9.0 or later, use SWTYPE = 55;
If I/A Series software version is earlier than 6.1.1, use SWTYPE = 42.

Figure D-10. Typical FBP10 Configuration for a BDSM06 (SMDH)

FBM06 ECBs for BDSM06

The two FBM06 ECBs configured for the BDSM06 DCS Fieldbus Module are virtual FBMs, which means they exist in software only. The physical BDSM06 (in the form of the FBP10 ECB) responds to control processor requests for data from these two configured virtual FBMs.

The key to the relationship between the CP and the BAIS01 or BASM01 is in the letterbug and DEV_ID assignments:

- The virtual FBM's DEV_IDs must have the same first five characters as the FBP10 letterbug (or DEV_ID).
- The last character of the first FBM06's ECB DEV_ID must be **1**, as shown in Figure D-11.
- The last character of the second FBM06's ECB DEV_ID must be **2**, as shown in Figure D-12.

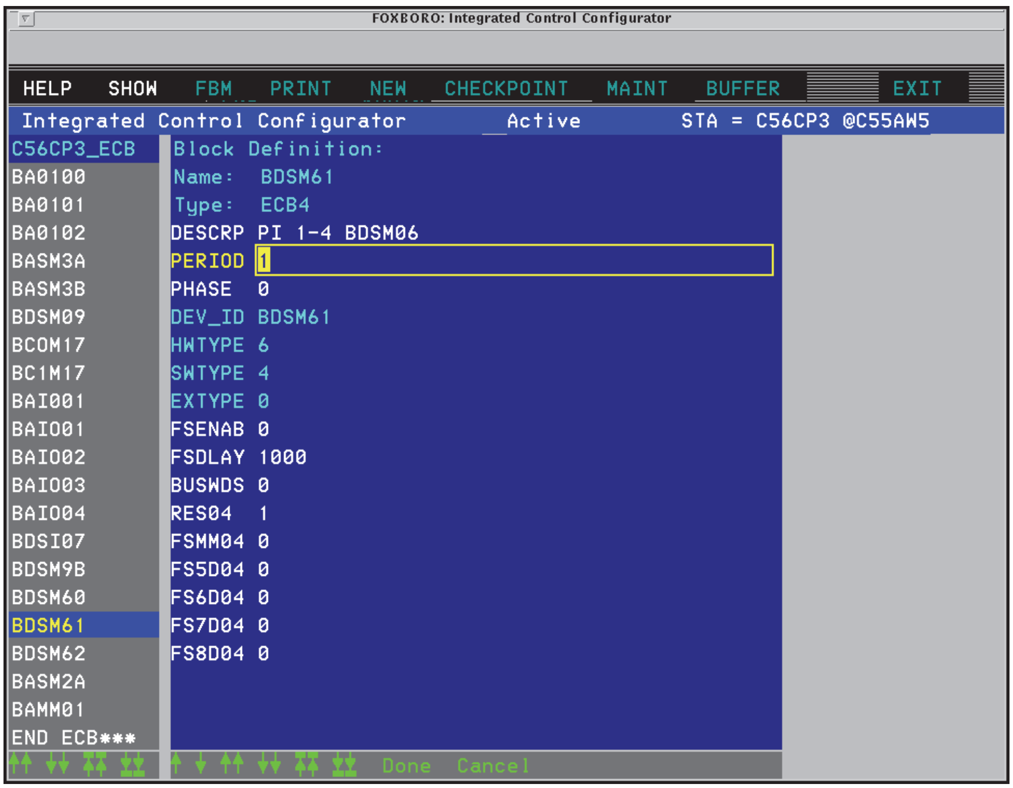


Figure D-11. Example Configuration, First FBM06 ECB (BDSM61) for BDSM06 (SMDH)

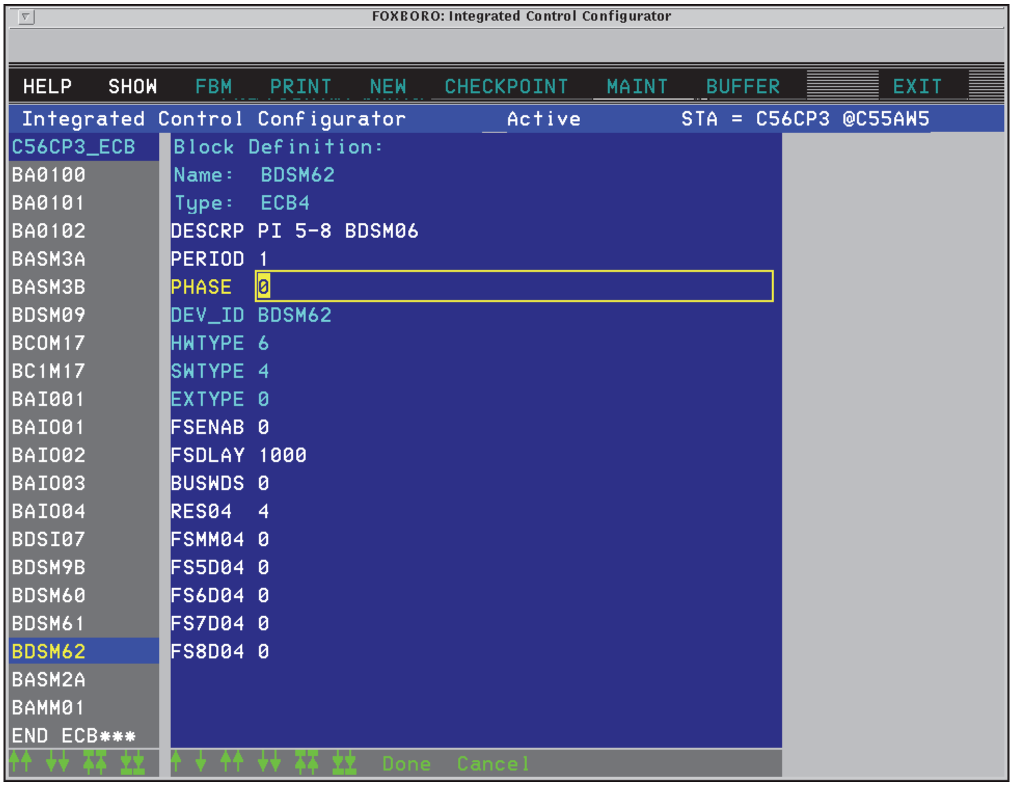


Figure D-12. Example Configuration, Second FBM06 ECB (BDSM62) for BDSM06 (SMDH)

Analog Input Blocks for BDSM06 Configuration

Once the equipment control blocks (ECBs) have been configured, the Foxboro Evo control blocks must be configured. For the BDSM06 DCS Fieldbus Module, eight input channels are mapped, four to each of the two virtual FBM06s. Eight AIN blocks are used. Figure D-13 shows an AIN block configured for channel 1 of the first FBM06, and Figure D-14 shows an AIN block configured for channel 1 of the second virtual FBM06. Take note of the following:

- These two blocks represent a standard AIN connection for the BDSM06 Fieldbus Module.
- The eight channels are divided between the two virtual FBMs. Therefore, Channels (or points) 1-4 are assigned to the first virtual FBM, and Channels (or points) 5-8 are assigned to the second. These assignments are reflected in the AIN block configuration examples shown in Figure D-13 and Figure D-14.

NOTE

Refer to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) Integrated Control Software Concepts* (B0700AG), or *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX) for additional information when configuring 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 C. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.

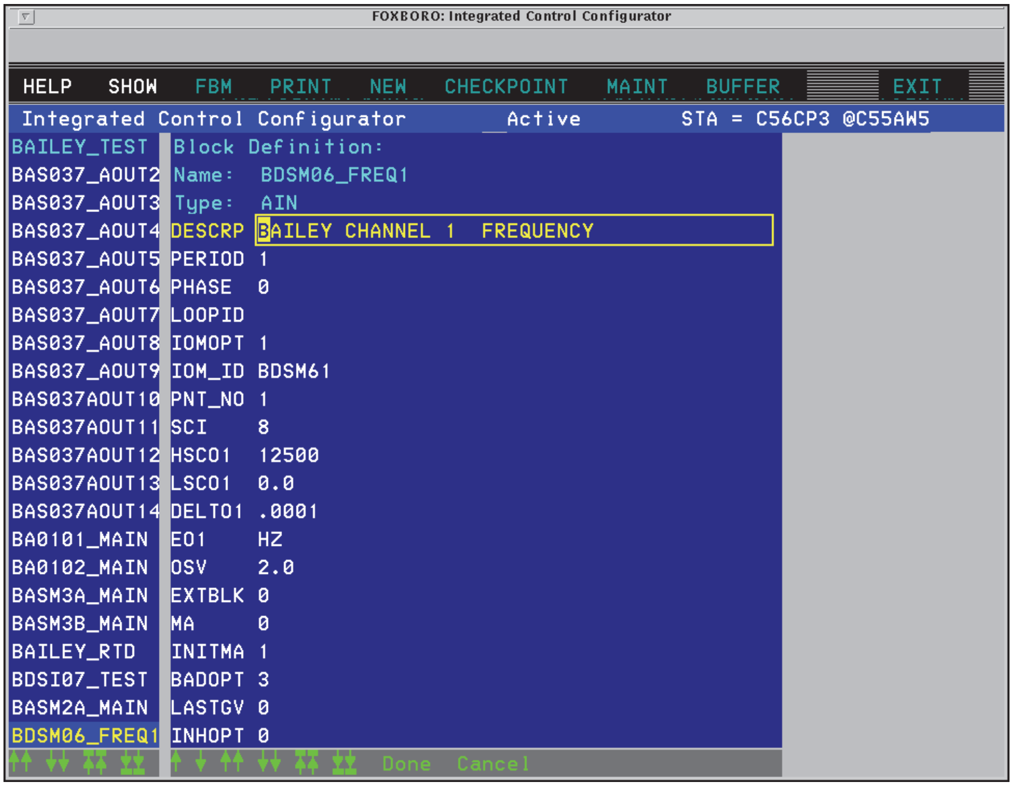


Figure D-13. Configuring the First AIN Control Block for BDSM06 (SMDH)

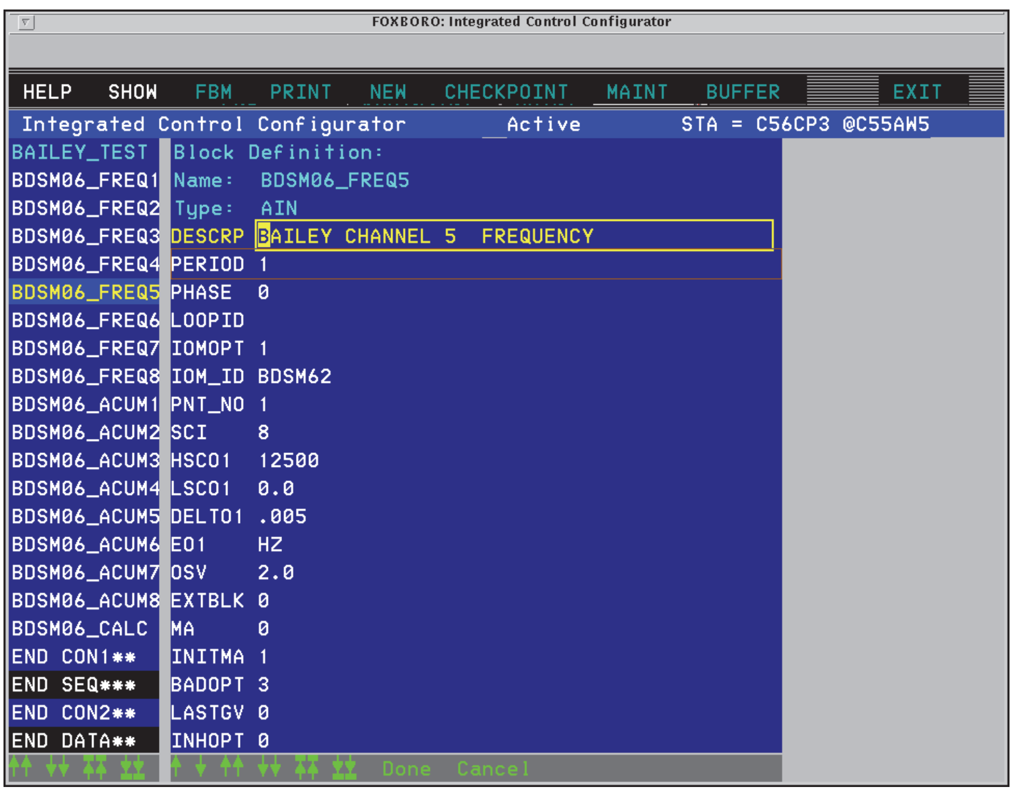


Figure D-14. Configuring the Fifth AIN Control Block for BDSM06 (SMDH)

Using BDSM06 for Ranges 0-25000 Hz and 0-50000 Hz

The jumper configuration of the BDSM06 can select a maximum frequency of 12500, 25000 or 50000 Hz. To correctly report the frequency when using SCI=8, the KSCALE and HSC01 parameters must also be set as follows:

Table D-3. KSCALE and HSC01 Parameter Values for BDSM06

Maximum Frequency	KSCALE	HSC01
12500	1.0	12500
25000	2.0	25000
50000	4.0	50000

Accumulator Block for BDSM06 Configuration

Figure D-15 shows a typical accumulator block application.

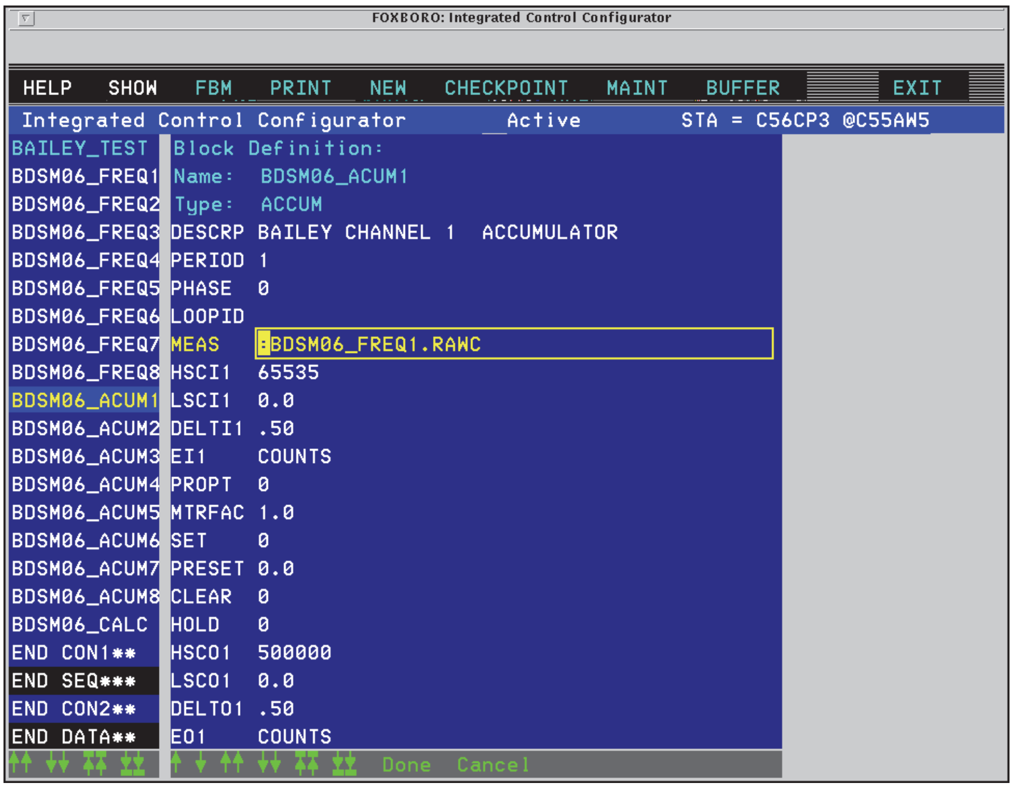


Figure D-15. Configuring an Accumulator Block for BDSM06 (SMDH)

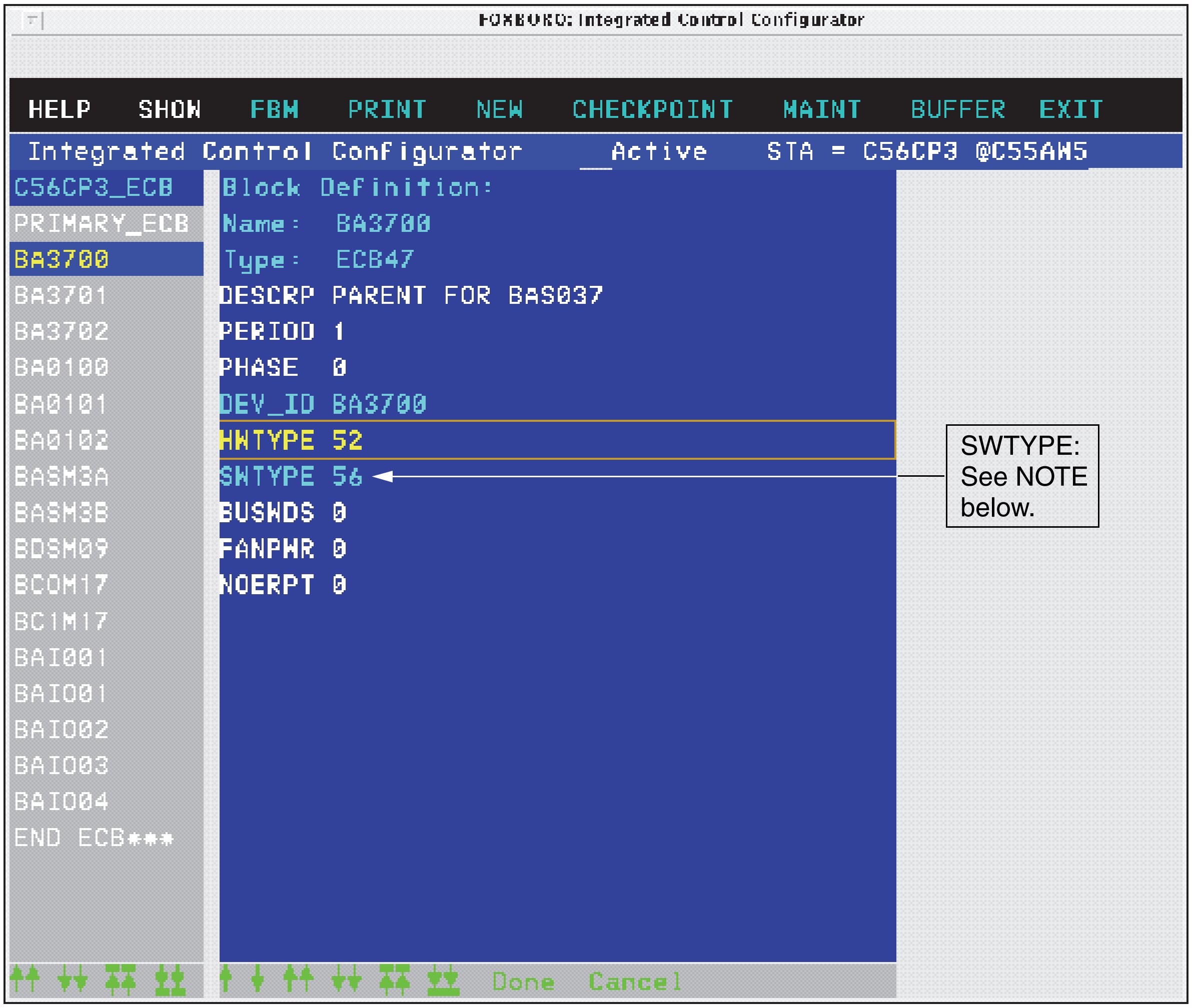
BASO37 Configuration

The BASO37 supports 14 analog output channels. Thus, mapping to three ECBs is required. One ECB is for the operator action and maintenance of the physical card, and the two other ECBs allow mapping of the 14 output channels into standard Foxboro Evo control blocks.

Configuration for the BASO37 is accomplished by first invoking the Integrated Control Configurator (ICC) and selecting the control processor that will serve as its host. Then the three ECBs are configured, as shown in the following examples.

FBP10 ECB for BASO37

The physical BASO37 is configured as a Fieldbus Processor 10 (FBP10), as shown in Figure D-16. As configured, in the System Management (SMDH) displays this ECB appears as a stand-alone FBP10, with no I/O cards. The DEV_ID configured in Figure D-16 (BA3700) is the letterbug used on the BASO37 card. (It is recommended that the ECB bear the same name as the BASO37 letterbug.) The first five characters in the letterbug are user-determined, and the last character must be **0** (zero).



NOTE: If I/A Series software version is v6.1.1-v8.8 or Foxboro Evo Control Core Services Software v9.0 or later, use SWTYPE = 56;
If I/A Series software version is earlier than 6.1.1, use SWTYPE = 42.

Figure D-16. Typical FBP10 Configuration for a BASO37 (SMDH)

FBM37 ECBs for BASO37

The two FBM37 ECBs configured for the BASO37 DCS Fieldbus Module are virtual FBMs, which means they exist in software only. The physical BASO37 (in the form of the FBP10 ECB) responds to control processor requests for data from these two configured virtual FBMs.

The key to the relationship between the CP and the BASO37 is in the letterbug and DEV_ID assignments:

- The virtual FBM's DEV_IDs must have the same first five characters as the FBP10 letterbug (or DEV_ID).
- The last character of the first FBM37's ECB DEV_ID must be **1**, as shown in Figure D-17.
- The last character of the second FBM37's ECB DEV_ID must be **2**, as shown in Figure D-18.

Also, as with standard Foxboro Evo output ECBs, the fail-safe configuration feature is supported.

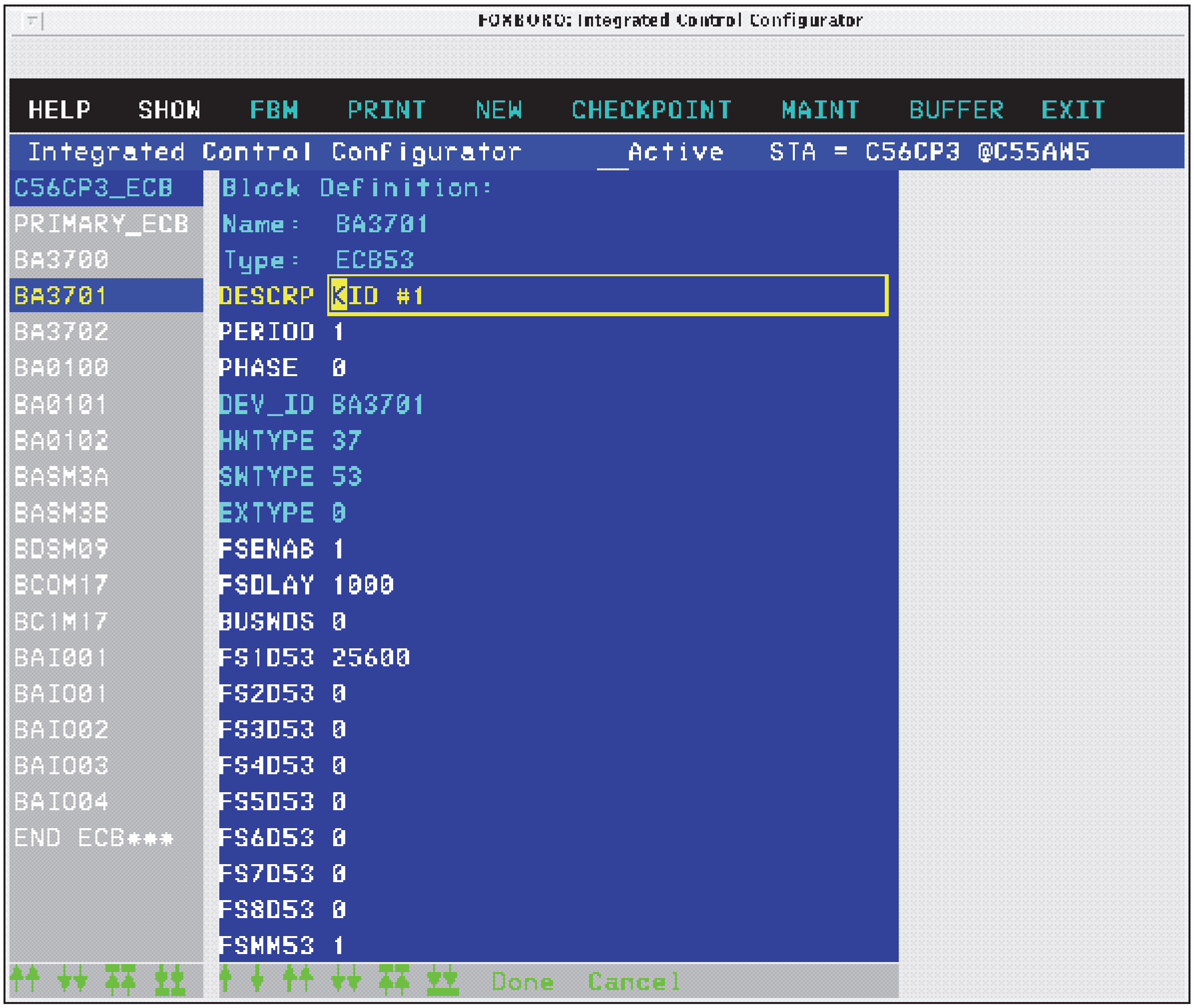


Figure D-17. Example Configuration, First FBM37 ECB (BA3701) for BASO37 (SMDH)

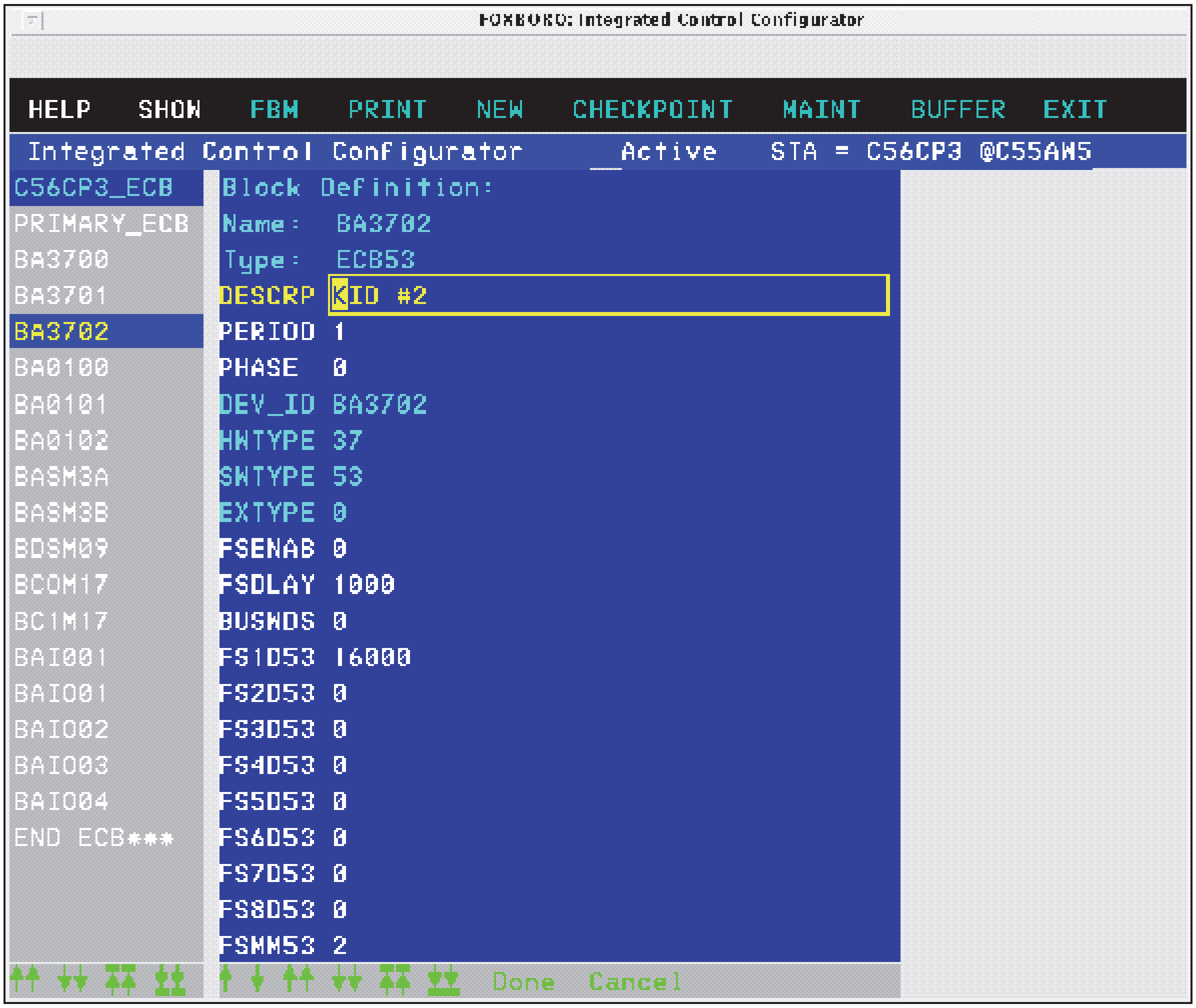


Figure D-18. Example Configuration, Second FBM37 ECB (BA3702) for BASO37 (SMDH)

Analog Output Blocks for BASO37 Configuration

Once the equipment control blocks (ECBs) have been configured, the Foxboro Evo control blocks must be configured. For the BASO37 DCS Fieldbus Module, 14 output channels are mapped, 7 to each of the two virtual FBM37s. 14 AOUT blocks are used. Figure D-19 shows an AOUT block configured for channel one of the first FBM37, and Figure D-20 shows an AOUT block configured for channel one of the second virtual FBM37. Take note of the following:

- These two blocks represent a standard AOUT connection for the BASO37 Fieldbus Module. Whether the BASO37 is jumpered for 4 to 20 mA or 1 to 5 V dc output, the signal conditioning (SCO) for the output remains the same (3).
- The 14 channels are divided between the two virtual FBMs. Therefore, channels (or points) 1-7 are assigned to the first virtual FBM, and channels (or points) 8-14 are assigned to the second. These assignments are reflected in the AOUT block configuration examples shown in Figure D-19 and Figure D-20.

NOTE

Refer to *Control Processor 270 (CP270) and Field Control Processor 280 (CP280) Integrated Control Software Concepts* (B0700AG), *Integrated Control Software Concepts* (B0193AW) (for CP60 or earlier), and *Integrated Control Block Descriptions* (B0193AX) for additional information when configuring 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 C. Also shown in that appendix are typical block parameter settings that are used with the various types of DCS Fieldbus Modules.

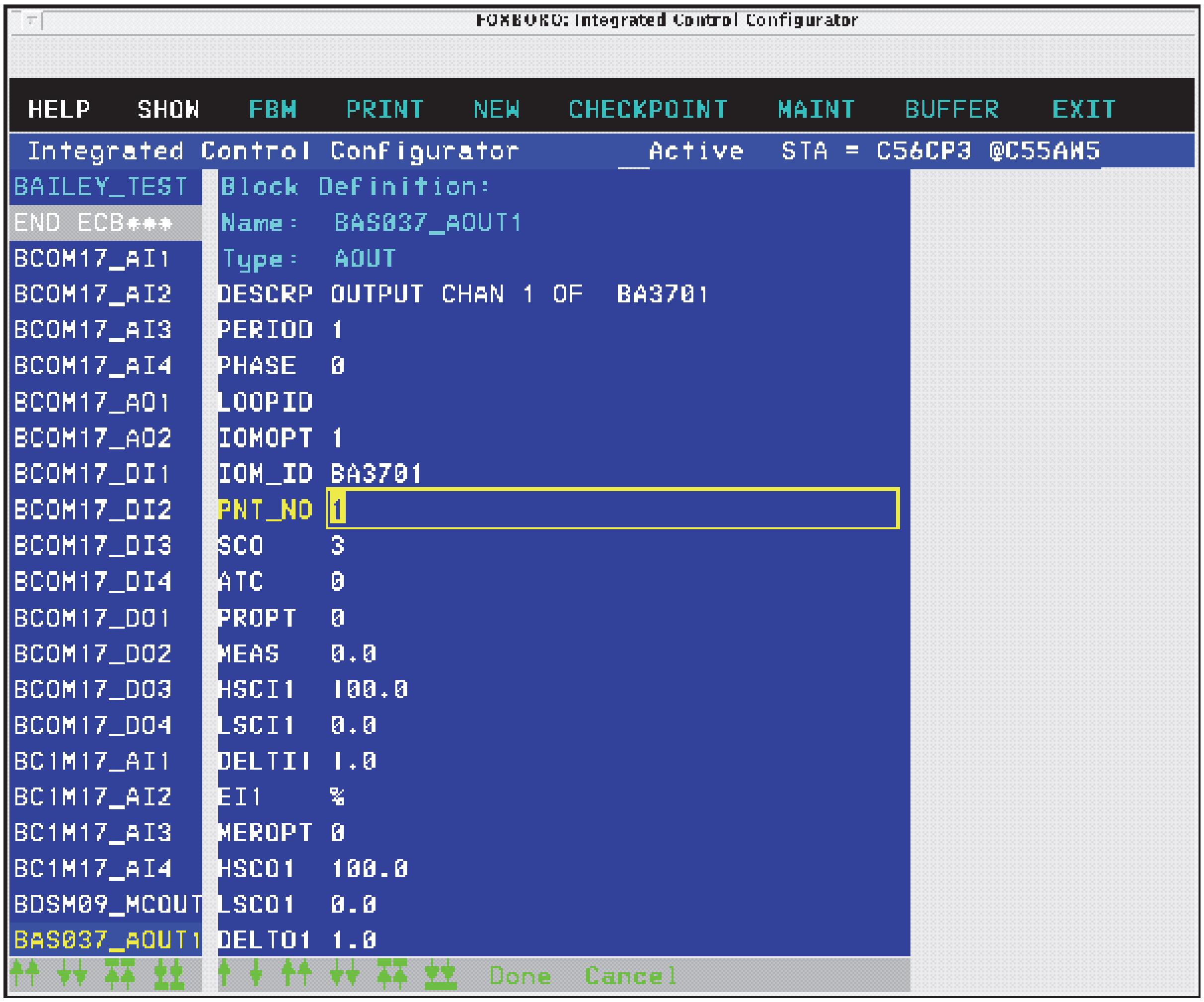


Figure D-19. Configuring the First AOUT Control Block for BASO37 (SMDH)

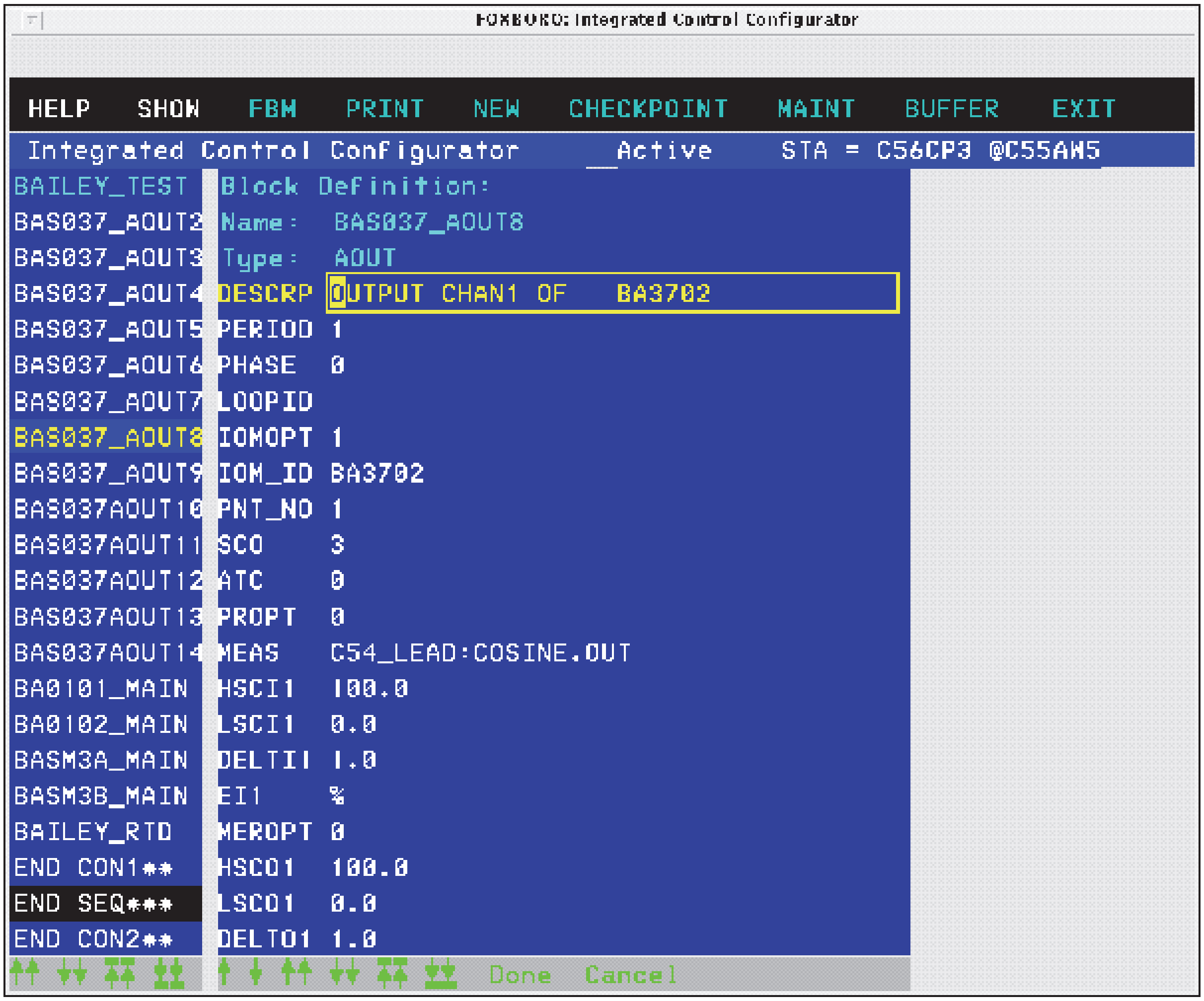


Figure D-20. Configuring the Eighth AOUT Control Block for BASO37 (SMDH)

Appendix E. Optional Fieldbus Extension

In the DCS Fieldbus Module subsystem, the Fieldbus can be extended to service DCS Fieldbus Modules in one or more Bailey equipment cabinets. For most applications, there are two basic types of Fieldbus extension:

- Bailey remote I/O twinex or twisted-pair cable replacement (non-fiber optic)
- Bailey remote I/O fiber optic cable replacement.

These Fieldbus extension types are functionally similar to the original Bailey cabinet-to-cabinet I/O cabling connections. For either of these two basic Fieldbus extension types, multiple cabling configurations are possible, depending on the specific application. The specific cabling configurations are described in detail in the following subsections.

Bailey Remote I/O Twinex or Twisted-Pair Cable Replacement

Three cabling configurations are possible in connection with this type of Fieldbus extension (see Figure E-1, Figure E-2 and Figure E-4). These cabling configurations are described in the following subsections. In these configurations, the original twinex or twisted-pair cabling may be used to make the connection between the Bailey cabinets. However, cabling distances will be affected, as indicated in the table below:

Table E-1. Fieldbus Extension Cable Types vs. Distances

Cable Type	Maximum Allowable Distance
Original twisted-pair	455 m (1500 ft)
Original twinex (plant loop)	1212 m (4000 ft)
Foxboro Fieldbus cable: 100 ohm twinaxial cable, Foxboro part number P0170GF or P0170GG, or equivalent. (This is the same type of cable that is used for cabling between the control processor TCAs and the DCS Fieldbus Module TCAs.)	1818m (6000 ft)

Direct Fieldbus Extension

This Fieldbus extension configuration is shown in Figure E-1. Cabling between the control processor and the BFBI Fieldbus Isolators is covered in the following sections:

- “Fieldbus Cabling at the CP40” on page 31
- “Fieldbus Cabling at the DCS Fieldbus Module Subsystem” on page 56

Cabling between the BFBI Fieldbus Isolator TCAs (between Bailey cabinets) is simply a continuation of the system Fieldbus cabling (for cabling instructions refer to “Fieldbus Cabling at the DCS Fieldbus Module Subsystem” on page 56). However, take note of the following:

- The 110 ohm terminating resistors (see Figure 2-42) must be removed from the BFBI Fieldbus Isolator TCAs in the first Bailey cabinet, and installed on the BFBI Fieldbus Isolator TCAs in the last Bailey cabinet.
- Install the BFBI Fieldbus Isolators in MMU locations previously occupied by the Bailey IMROIxx or NIROxx modules.
- Cabling between the Bailey cabinets is accomplished using the original twisted-pair or twinex cable, or Foxboro Fieldbus cable. (Refer to Table E-1 for cabling distance limitations.)

NOTE

When installation of the Fieldbus extension is complete, return to “Fieldbus Cabling at the CP40” on page 31.

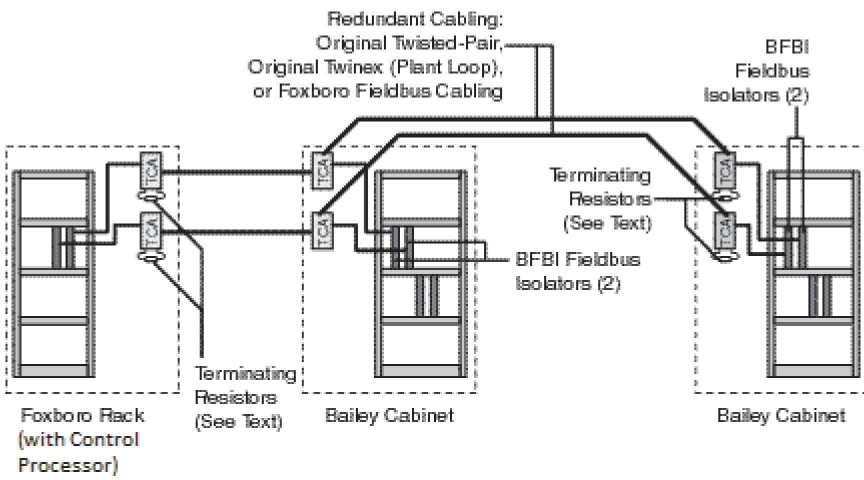


Figure E-1. Direct Fieldbus Extension

Fieldbus Extension Using BFBE2 Isolated A/B Switch Card and BFBI Fieldbus Isolator

This Fieldbus extension configuration is shown in Figure E-2. The BFBE2 Isolated A/B Switch Card provides automatic switching, allowing local Fieldbus A or local Fieldbus B information (whichever is active) to be communicated to/from the remote BFBI Fieldbus Isolator (and associated DCS Fieldbus Modules). It also provides isolation between its input and output signals. Install the BFBE2 in any unused slot in the MMU. Install the BFBI Fieldbus Isolator in an MMU location previously occupied by the Bailey IMROIxx or NIROxx module.

Cabling between the control processor and the BFBI Fieldbus Isolators is similar to that for the basic migration kit installation. Refer the following sections:

- “Fieldbus Cabling at the CP40” on page 31
- “Fieldbus Cabling at the DCS Fieldbus Module Subsystem” on page 56.

Cabling between the BFBE2 Isolated A/B Switch Card and the BFBI Fieldbus Isolator TCA in the remote Bailey cabinet is accomplished using the original twisted-pair or twinex cable, or Foxboro Fieldbus cable. (Refer to Table E-1 for cabling distance limitations.) Make the cable connection at the BFBE2 as shown in Figure E-3. The cable connectors (male and female) are shipped as part of the BFBE2 card.

Cable connection at the BFBI Fieldbus Isolator TCA (in the Bailey cabinet) is similar to other Fieldbus TCA connections. Refer to “Fieldbus Cabling at the DCS Fieldbus Module Subsystem” on page 56.

NOTE

1. When making the cable connection between the BFBE2 card and the BFBI Fieldbus Isolator TCA (between Bailey cabinets), it is necessary to include the terminating resistors on the TCAs.
2. When installation of the Fieldbus extension is complete, return to “Fieldbus Cabling at the CP40” on page 31.
3. If any DCS Fieldbus modules are accessed through the BFBE2 Isolated A/B Switch Card (see Appendix E “Optional Fieldbus Extension”), the BUSWDS parameter in each ECB must be set to `1` to prevent bus switching failures.

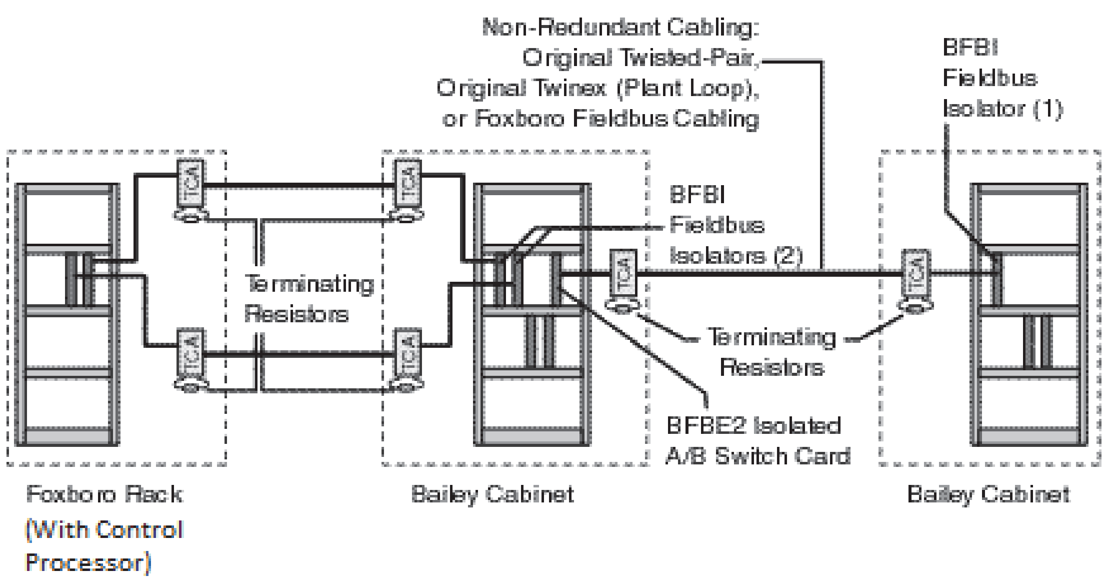


Figure E-2. Fieldbus Extension Using BFBE2 and BFBI Fieldbus Isolator

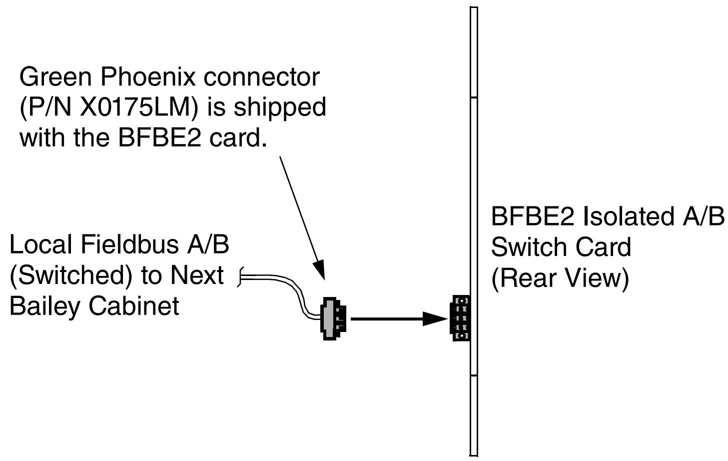


Figure E-3. Cable Connection at the BFBE2 Card

Fieldbus Extension Using BFBE1 Fieldbus Jumper Cards

This Fieldbus extension configuration is shown in Figure E-4. The BFBE1 Fieldbus jumper card provides for physical signal connection only – the Fieldbus A and B signals are not electrically isolated. Install the BFBE1 Fieldbus jumper cards in any unused slots in the MMUs.

Cabling between the control processor and the BFBI Fieldbus Isolators is similar to that fore the basic migration kit installation. Refer the following sections:

- "Fieldbus Cabling at the CP40" on page 31
- "Fieldbus Cabling at the DCS Fieldbus Module Subsystem" on page 56.

Cabling between the BFBE1 Fieldbus jumper cards is accomplished using Foxboro Fieldbus cable, 4.5m (15 ft) maximum cable run. (Refer to page 163 for cable description.) Make the cable connections at the BFBE1 cards as shown in Figure E-5.

— NOTE

When installation of the Fieldbus extension is complete, return to "Fieldbus Cabling at the CP40" on page 31.

You must construct the interconnecting jumper cables between the BFBE1 Fieldbus jumper cards must be constructed from the following components:

- Fieldbus Jumper Cable (100 ohm twinaxial cable), Foxboro part number P0170RW (1 m (3.28 ft) x the number of BFBE1 Fieldbus Jumper Cards) or (5 m (16.4 ft) x the number of BFBE2 Isolated A/B Switch Cards)
- Fieldbus Jumper Cable Connectors, Foxboro part number X0175LM (2 x number of BFBE1 Fieldbus Jumper Cards) or (1 x number of BFBE2 Isolated A/B Switch Cards)

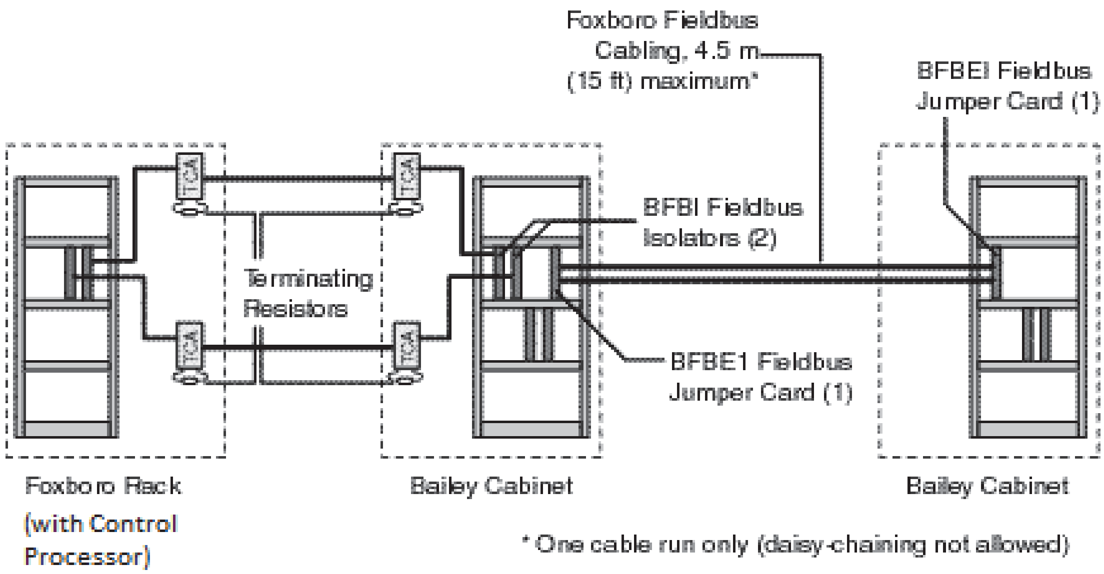


Figure E-4. Fieldbus Extension Using BFBE1 Fieldbus Jumper Cards

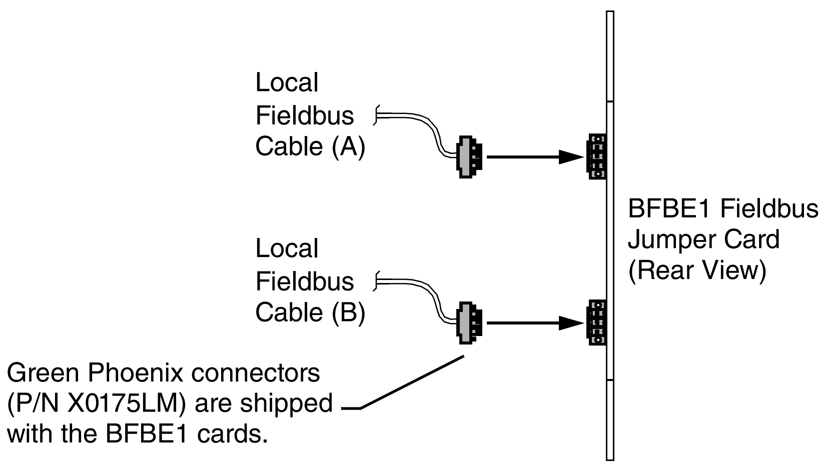


Figure E-5. Cable Connection at the BFBE1 Fieldbus Jumper Card

Bailey Remote I/O Fiber Optic Cable Replacement

Three cabling configurations are possible in connection with this type of Fieldbus extension:

- Redundant fiber optic fieldbus extension, Figure E-6
- Non-redundant fiber optic fieldbus extension, Figure E-7
- Direct redundant fiber optic fieldbus extension, Figure E-8.

NOTE

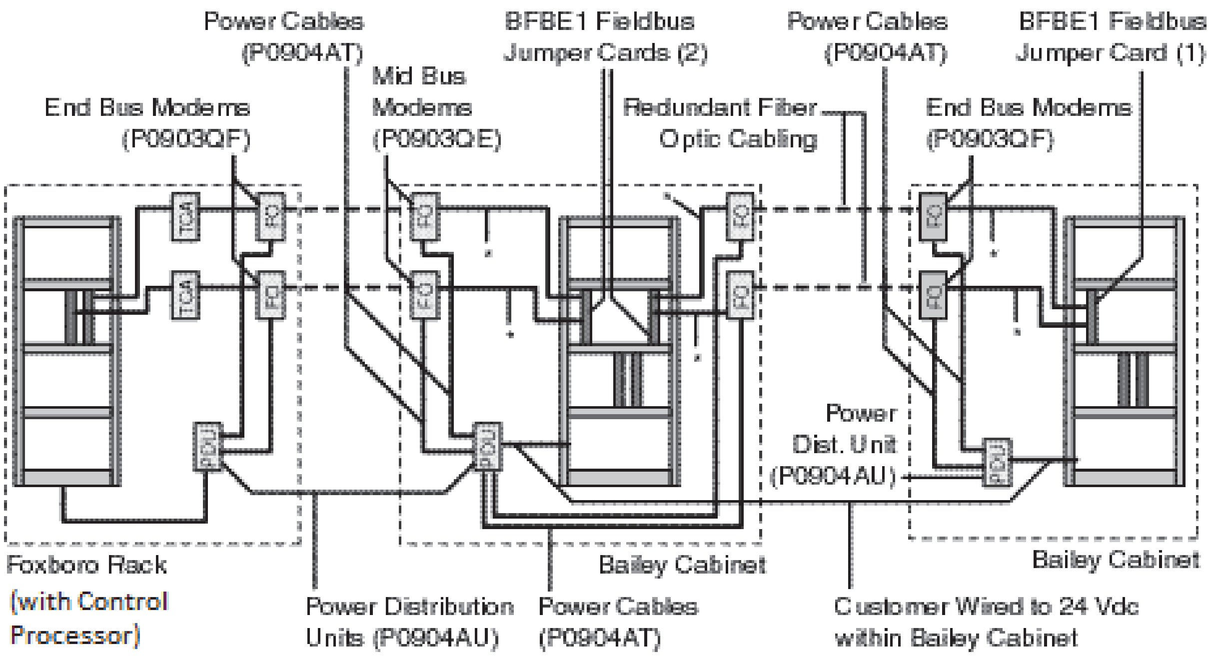
Equipment items associated with the fiber optic cabling configurations – modems, power distribution units (PDUs), and associated cabling – are not included in the Bailey Migration Kit (P0915XY), but are ordered separately from Invensys Systems, Inc.

To make the cable connections for any of these configurations, refer to the appropriate figure (Figure E-6, Figure E-7, or Figure E-8) and reference the following:

- For information on how to install the Foxboro fiber optic equipment used in these cabling configurations (mid-bus and end-bus modems, and fiber optic cabling), refer to *Network Cable Systems Installation and Maintenance* (B0193UW).
- To make the cable connections to the BFBE1 Fieldbus jumper card, refer to Figure E-5.
- To make the cable connection to the BFBE2 Isolated A/B Switch card, refer to Figure E-3.

NOTE

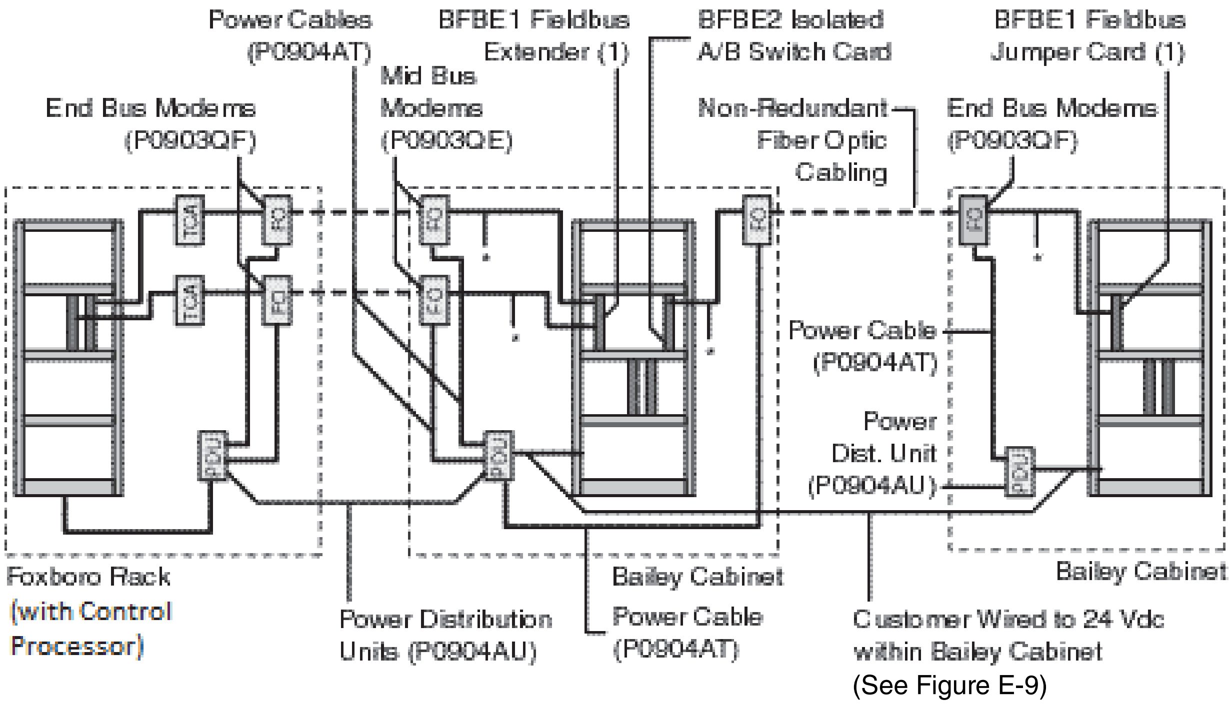
When installation of the Fieldbus extension is complete, return to “Fieldbus Cabling at the CP40” on page 31.



(See Figure E-9)

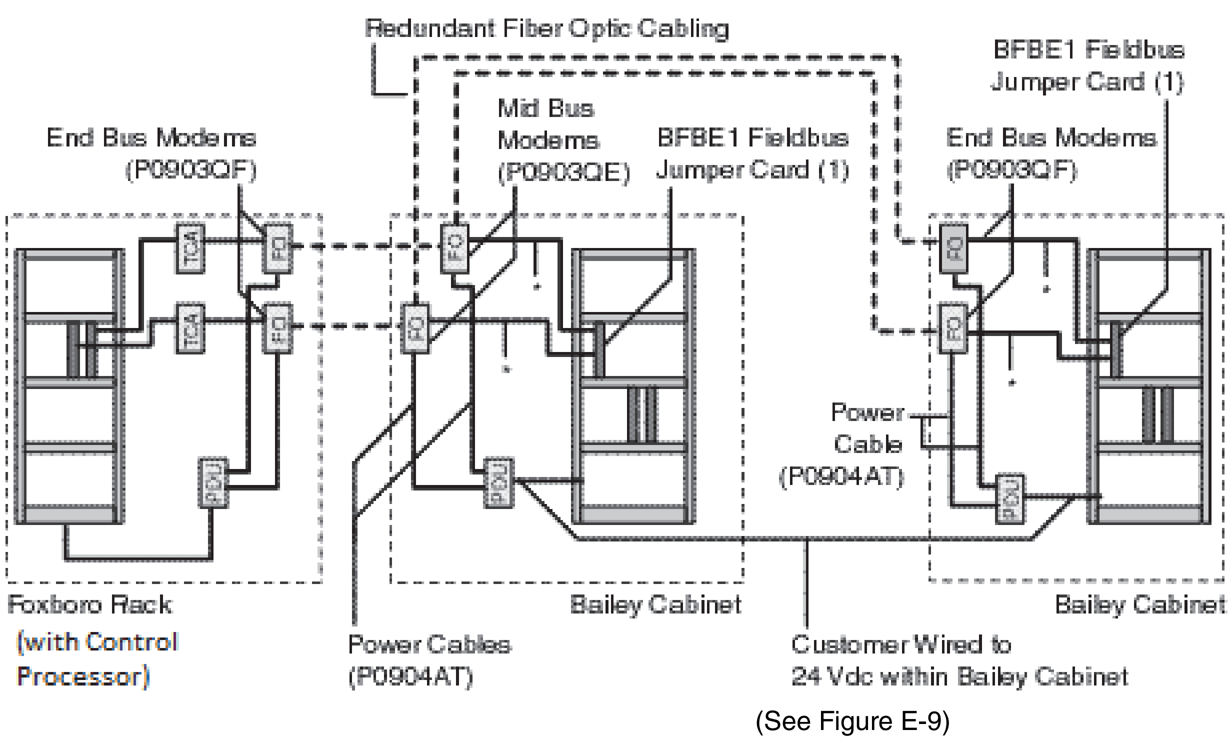
*Make the cable connections between the modems and BFBE1 cards using Foxboro Fieldbus cable. See Table E-1 for a description of the cable.

Figure E-6. Redundant Fiber Optic Fieldbus Extension



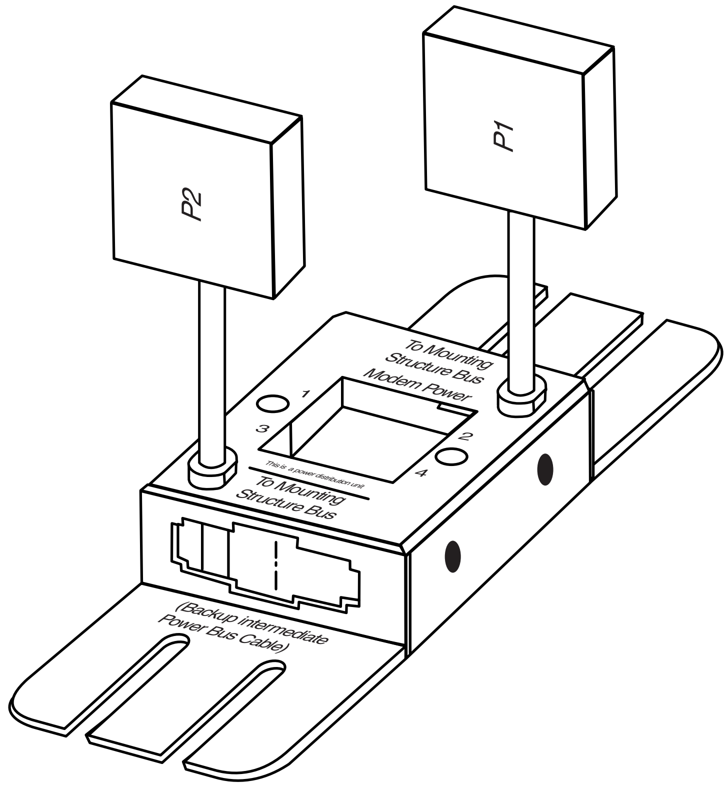
*Make the cable connections between the modems and BFBE1 cards using Foxboro Fieldbus cable. See Table E-1 for a description of the cable.

Figure E-7. Non-Redundant Fiber Optic Fieldbus Extension



*Make the cable connections between the modems and BFBE1 cards using Foxboro Fieldbus cable. See Table E-1 on page 163 for a description of the cable.

Figure E-8. Direct Redundant Fiber Optic Fieldbus Extension



1. For single 24 V dc power applications, remove P1.
2. For redundant 24 V dc applications, remove P1 and P2.
3. Strip the cable jacket back to expose the internal wires.
4. Connect black, red, yellow and blue wires to 24 V dc positive.
5. Connect brown, orange, green and violet wires to 24 V dc return.
6. Connect P1 wires to the primary 24 V dc power source.
7. Connect P2 wires to the secondary 24 V dc power source (for redundant power applications).

Notes:

A. The connection method is dependent upon the location of the PDU and the 24 V dc power supply. Use of ring terminals, terminal strips, and a 2 Amp fused feed from the 24 V dc power supply is recommended.

B. Each fiber optic modem consumes approximately 5 Watts (0.210 Amps at 24 V dc), and is individually fused.

Figure E-9. PDU Installation

Appendix F. CP60 Upgrade

This appendix provides the procedure to upgrade CP30 or CP40 Control Processors to CP60 Control Processors on existing I/A Series systems.

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

1. If your configuration contains any BASI03 or BDSM06 cards, you must reconfigure their FBP10 ECBs (ECB47) for software type 55 instead of 56. This can be done on line by deleting the ECB47's and recreating them with the new software type. Once this is done, use System Manager's or System Management's GO ONLINE Equipment Change Action to put the ECB47s on-line. Do not use the DOWNLOAD Action to bring them on-line, and do not delete any other ECBs associated with these cards. Following this procedure will insure uninterrupted operation of the cards. DO NOT change the software types for BASI01, BASM01, or BASO37 as these cards must use software type 56.
2. Install I/A Series software v6.3.1 or later on the existing system and EEPROM all the Bailey Integrators using the existing CP30 or CP40 based system.

NOTE

Be sure to EEPROM all the Bailey Integrators as well as other FBMs using the existing CP30 or CP40 based system. If this step is not followed, the CP60 replacement is not able to communicate with the older version Bailey Integrator software.
The following table list the FBP EEPROM REV levels for the old Bailey Integrators (pre-I/A Series software v6.3.1) and the new ones (I/A Series software v6.3.1 or later).

	FBP EEPROM REV	
DCS Fieldbus Module	**Pre-I/A Series v6.3.1**	**New FBP**
BASI01	40.2	4.21.05.03
BASM01	40.2	4.21.05.03
BASI03	5.03/04/03	5.06.05.03
BDSM06	5.03/04/03	5.06.05.03
BAS037	40.2	4.21.04.03

3. After the system has been upgraded to I/A Series software v6.3.1or later and all the Integrators have been upgraded with new IOM software, 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 G. FCP280 or FCP270 Upgrade

This appendix provides the procedure to upgrade CP30, CP40, or CP60 Control Processors to FCP280 or FCP270 Field 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-v8.8 or Control Core Services software v9.0 or later.

If upgrading from the CP60 to the FCP280 or FCP270, there is no need to EEPROM update the Bailey Integrators or other FBMs. No special procedures are required.

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

1. If your configuration contains any BASI03 or BDSM06 cards, you must reconfigure their FBP10 ECBs (ECB47) for software type 55 instead of 56. This can be done on line by deleting the ECB47's and recreating them with the new software type. Once this is done, use System Manager's or System Management's GO ONLINE Equipment Change Action to put the ECB47s on-line. Do not use the DOWNLOAD Action to bring them on-line, and do not delete any other ECBs associated with these cards. Following this procedure will insure uninterrupted operation of the cards. DO NOT change the software types for BASI01, BASM01, or BASO37 as these cards must use software type 56.
2. 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.
   Also, install the latest EEPROM on all the Bailey Integrators using the existing CP30 or CP40 based system.

NOTE

Be sure to EEPROM all the Bailey Integrators as well as other FBMs using the existing CP30 or CP40 based system. If this step is not followed, the FCP280 or FCP270 replacement is not able to communicate with the older version Bailey Integrator software.

The following table list the FBP EEPROM REV levels for the old Bailey Integrators (systems with I/A Series software earlier than v6.3.1) and the new ones (I/A Series software v8.1.1-v8.8 or Control Core Services software v9.0 or later).

DCS Fieldbus Module	FBP EEPROM REV	
	Pre-I/A Series v6.3.1	New FBP
BASI01	40.2	4.21.05.03
BASM01	40.2	4.21.05.03
BASI03	5.03/04/03	5.06.05.03
BDSM06	5.03/04/03	5.06.05.03
BAS037	40.2	4.21.04.03

3. After the system has been upgraded to the appropriate Control Core Services software revision and all the Integrators have been upgraded with new IOM software, the CP30s and CP40s can be replaced with FCP280 or FCP270 control processors.
   - To install the FCP280, refer to *Field Control Processor 280 (FCP280) Upgrade Guide* (B0700GC) for instructions on replacing the CP30s or CP40s, 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 35.
   - To cable the Fieldbus to the FCP270, follow the instructions in “Fieldbus Cabling at the FCP270” on page 40.

Appendix A. ZCP270 Upgrade

This appendix provides the procedure to upgrade CP30, CP40, or CP60 Control Processors to ZCP270 Z-Module Control Processors on existing Foxboro Evo systems.

NOTE

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

If upgrading from the CP60 to the ZCP270, there is no need to EEPROM update the Bailey Integrators or other FBMs. No special procedures are required.

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

1. If your configuration contains any BASI03 or BDSM06 cards, you must reconfigure their FBP10 ECBs (ECB47) for software type 55 instead of 56. This can be done on line by deleting the ECB47's and recreating them with the new software type. Once this is done, use System Manager's or System Management's GO ONLINE Equipment Change Action to put the ECB47s on-line. Do not use the DOWNLOAD Action to bring them on-line, and do not delete any other ECBs associated with these cards. Following this procedure will insure uninterrupted operation of the cards. DO NOT change the software types for BASI01, BASM01, or BASO37 as these cards must use software type 56.
2. Install I/A Series software v8.3-v8.8 or Control Core Services software v9.0 or later on the existing system and EEPROM all the Bailey Integrators using the existing CP30 or CP40 based system.

NOTE

Be sure to EEPROM all the Bailey Integrators as well as other FBMs using the existing CP30 or CP40 based system. If this step is not followed, the ZCP270 replacement is not able to communicate with the older version Bailey Integrator software. The following table list the FBP EEPROM REV levels for the old Bailey Integrators (pre-I/A Series software v6.3.1) and the new ones (I/A Series software v8.3-v8.8 or Control Core Services software v9.0 or later).

	FBP EEPROM REV	
DCS Fieldbus Module	**Pre-I/A Series v6.3.1**	**New FBP**
BASI01	40.2	4.21.05.03
BASM01	40.2	4.21.05.03
BASI03	5.03/04/03	5.06.05.03
BDSM06	5.03/04/03	5.06.05.03
BAS037	40.2	4.21.04.03

3. After the system has been upgraded to I/A Series software v8.3-v8.8 or Control Core Services software v9.0 or later and all the Integrators have been upgraded with new IOM software, the CP30s or CP40s 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 46.

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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