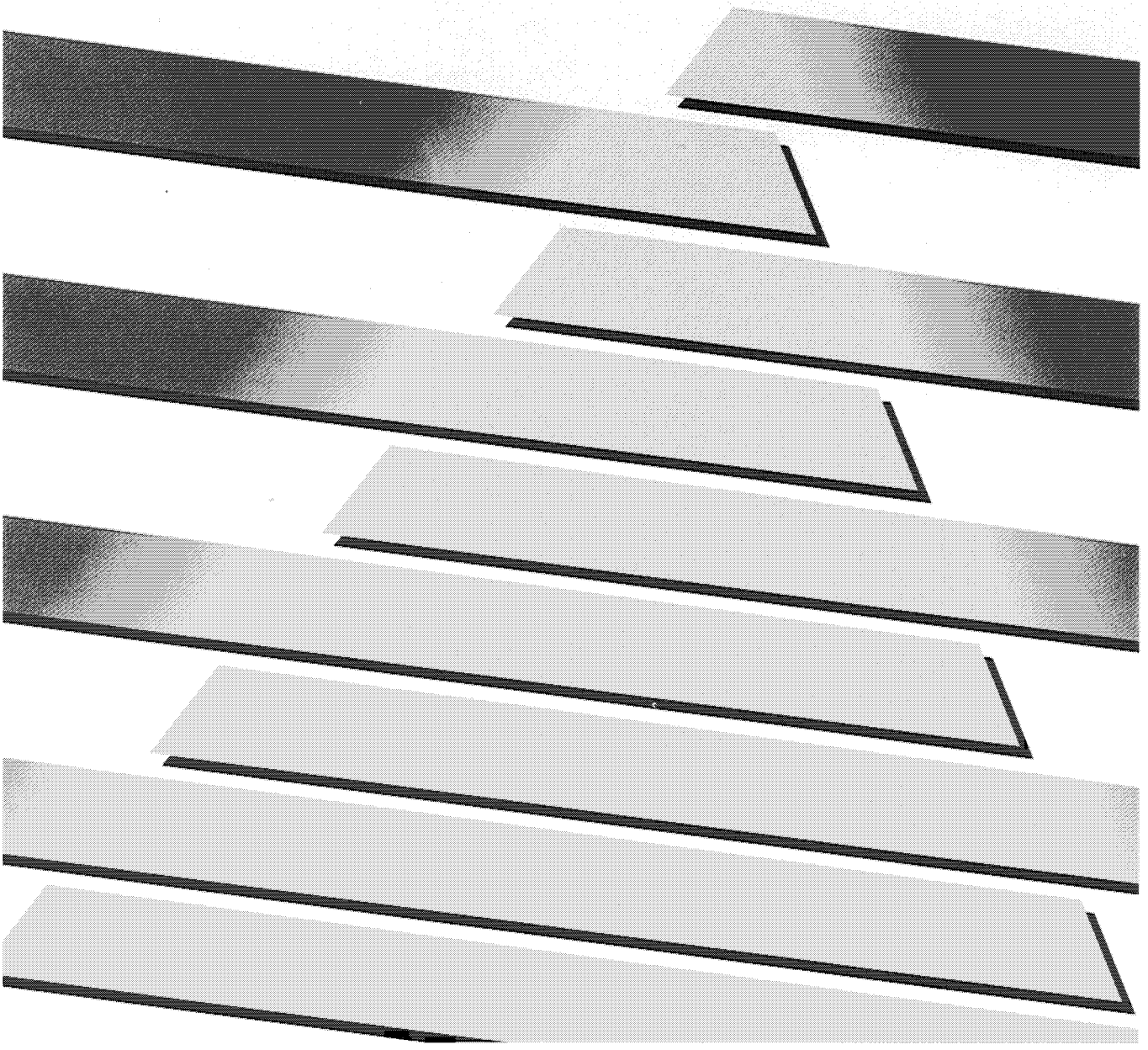
ALLEN-BRADLEY

1336 FORCE™ PLC® Communications Adapter

Cat. No. 1336T-GT1EN

User Manual (Series A)



Important User Information

Because of the variety of uses for this equipment and because of the differences between this solid-state equipment and electromechanical equipment, the user of and those responsible for applying this equipment must satisfy themselves as to the acceptability of each application and use of the equipment. In no event will Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The illustrations shown in this manual are intended solely to illustrate the text of this manual. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based upon the illustrative uses and applications.

No patent liability is assumed by Allen-Bradley Company with respect to use of information, circuits or equipment described in this text.

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The information in this manual is organized in numbered chapters. Read each chapter in sequence and perform procedures when you are instructed to do so. Do not proceed to the next chapter until you have completed all procedures.

Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attentions help you:

- Identify a hazard.
- Avoid the hazard.
- Recognize the consequences.

Important: Identifies information that is especially important for successful application and understanding of the product.

Shock Hazard labels may be located on or inside the drive to alert people that dangerous voltage may be present.

Information and Precautions **Chapter 1**

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Programming

Chapter 4

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Chapter 5

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Specifications and Supplemental Information

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Chapter 1

Information and Precautions

Manual Objectives

The purpose of this manual is to provide the necessary information to apply the 1336 FORCE PLC Communication Adapter. Included in this manual are methods for installing, wiring, starting up, programming and troubleshooting the PLC Comm Adapter.

Chapter Objectives

Chapter 1 provides precautions and information on the general intent of this manual, gives an overall description of the PLC Communications Adapter Board, and provides a listing of key adapter features.

Who Should Use This Manual

This publication provides planning, installation, wiring and diagnostic information for the PLC Communications Adapter Board. It is intended to be used by qualified service personnel responsible for the set up and servicing of solid state equipment. To assure successful installation and operation, become familiar with tasks that must be performed in a sequence for successful completion. Particular attention should be directed to the Attention and Important statements contained within the material. To make efficient use of the PLC Comm Adapter, personnel must be able to program and operate an Allen-Bradley PLC and/or Drive Tools. In particular, personnel must be familiar with remote I/O concepts & configuration, and be able to program block transfer instructions.

Terminology

Detailed definitions of industrial automation and technical terms used throughout this manual may be found in the **INDUSTRIAL AUTOMATION GLOSSARY — a guide to Allen-Bradley technical terms**, Publication AG-7.1.

General Precautions

ATTENTION: This board contains ESD (electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or rep[airing this assembly. Component damage may result if ESD control precautions are not followed. If you are not familiar with static control procedures reference **Guarding Against Electrostatic Damage**, A-B Publication 8000-4.5.2, or any other applicable ESD protection handbook.

ATTENTION: Only personnel familiar with SCANbus devices and associated machinery should plan or implement the installation, start-up, or subsequent troubleshooting of this board. Failure to comply may result in personnel injury and/or equipment damage.

Catalog Number Explanation

Catalog Number Description

Located on each PLC Communications Adapter Board is a **Language Module**. Catalog numbers identifying the language modules are listed below.

1336T	—	**GT1EN**
1336T = Field Installed		**GT1EN = English Version**
(Blank)= Factory Installed		**GT1EN = English Version**

Chapter 2

Installation and Wiring

Chapter Objectives

Chapter 2 provides information on mounting the PLC Comm Adapter Board as well as configuring and connecting communications.

Mounting

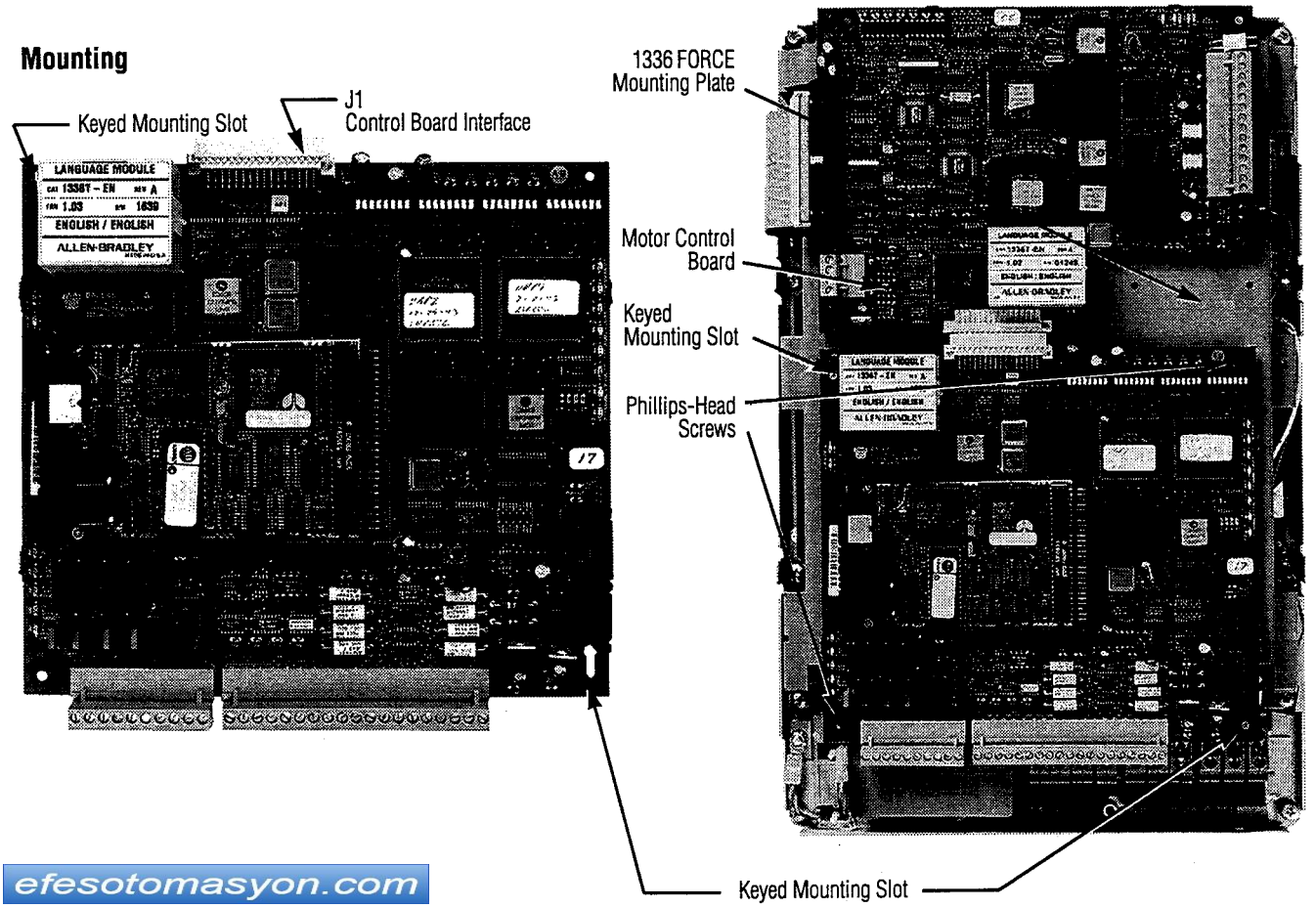


Figure 2-1 — PLC Comm Adapter Board Mounting

The PLC Comm Board plugs into the Main Control Board at connector J1. (2) Keyed Mounting Slots along with the (2) Phillips-Head Screws provided with the kit secure the board to the 1336 FORCE Mounting Plate.

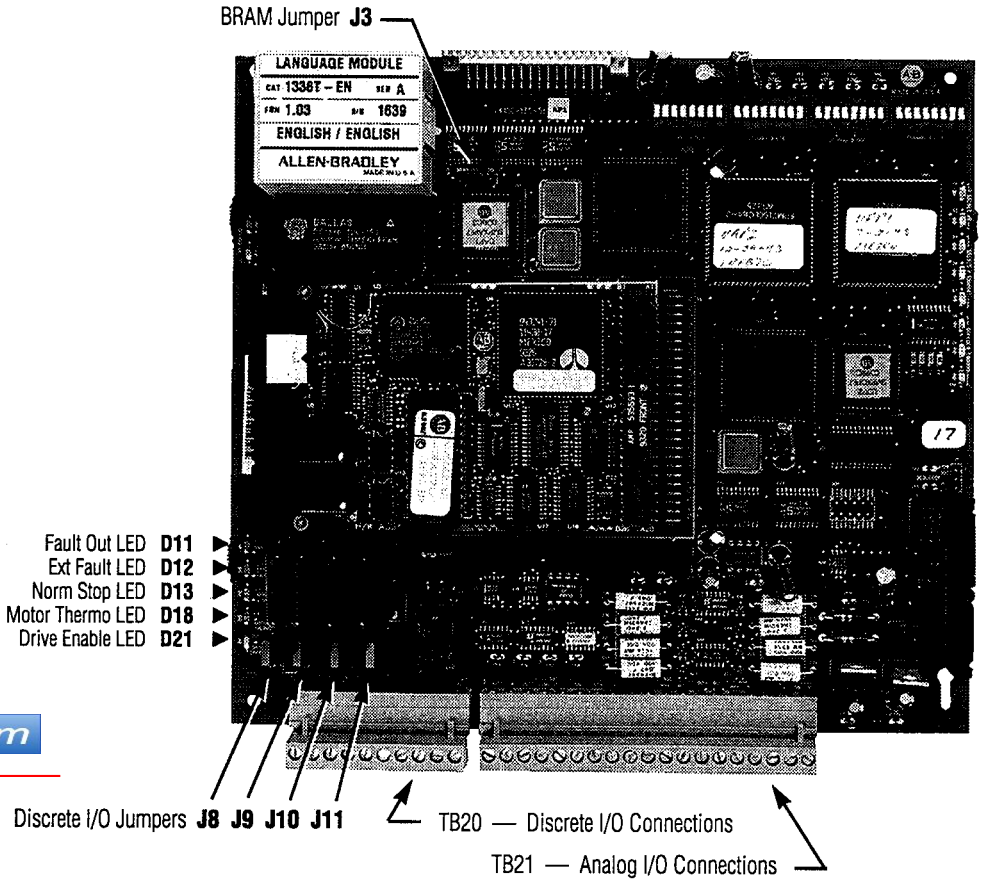
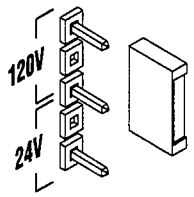


Figure 2-2 — PLC Comm Adapter Board Terminal Blocks and Discrete I/O Jumpers

Discrete I/O Jumpers



ATTENTION: To avoid damage to the PLC Comm Adapter Board, discrete Input Jumpers J8, J9, J10 and J11 must be set to the same input voltage applied to the PLC Comm Adapter Board — Either 24V DC or 120V AC.

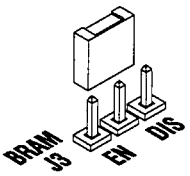
J8 Sets the Drive Enable input for either 24V DC or 120V AC.

J9 Sets the Motor Thermoguard input for either 24V DC or 120V AC.

J10 Sets the Norm Stop input for either 24V DC or 120V AC.

J11 Sets the External Fault input for either 24V DC or 120V AC.

BRAM Jumper



Jumper J3 on the PLC Comm Adapter Board enables or disables the write to BRAM function as follows.

EN = Enabled — Write to BRAM is allowed.

DIS = Disabled — Write to BRAM is not allowed.

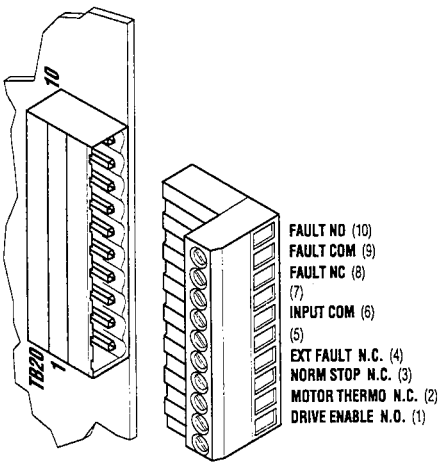
Terminal Block Locations

Two separate terminal blocks are provided at the bottom of the PLC Comm Adapter Board for discrete and analog I/O wiring. To aid in making connections, terminal blocks may be pulled apart when connecting cable.

The maximum and minimum wire size accepted by both TB20 and TB21 is 3.3 & 0.60 mm^2 (12 & 30 AWG). Maximum torque is 0.79 N-m (7 lb-in). Recommended control signal wire is:

- Belden 8760 or equiv. — 0.750 mm^2 (18 AWG), Twisted Pair, Shielded
- Belden 8770 or equiv. — 0.750 mm^2 (18 AWG), 3-Conductor, Shielded
- Belden 9460 or equiv. — 0.750 mm^2 (18 AWG), Twisted Pair, Shielded

Discrete I/O



Discrete Outputs

Fault outputs from the 1336 FORCE are supplied at terminal block TB20 on the PLC Comm Board. Fault outputs provide warning or fault signals based on drive programming.

FAULT NC
FAULT COM
FAULT NO — A Form C, N.O./N.C. relay contact on the PLC Comm Board programmed to provide external warning or fault change-of-state signals.

Resistive Rating = 115V AC/30V DC, 5.0 A
Inductive Rating = 115V AC/30V DC, 5.0 A

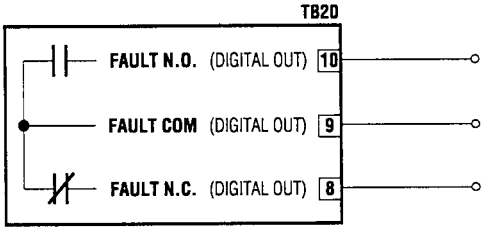


Figure 2-3 — Typical Digital Output Connections

Discrete Inputs

Discrete Inputs to the 1336 FORCE are supplied through the PLC Comm Adapter Board at terminal block TB20. Discrete inputs serve to enable and stop the drive as well as provide checks on drive and motor operation.

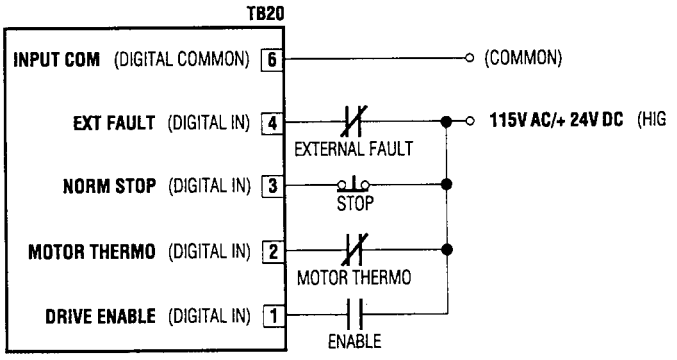


Figure 2-4 — Typical Digital Input Connections Using an External Power Source

DRIVE ENABLE — A drive enable signal must be present before the drive will acknowledge a start command. If LED D21 Drive Enable on the PLC Comm Board is illuminated, the drive has received an enable signal allowing drive logic to accept a start command.

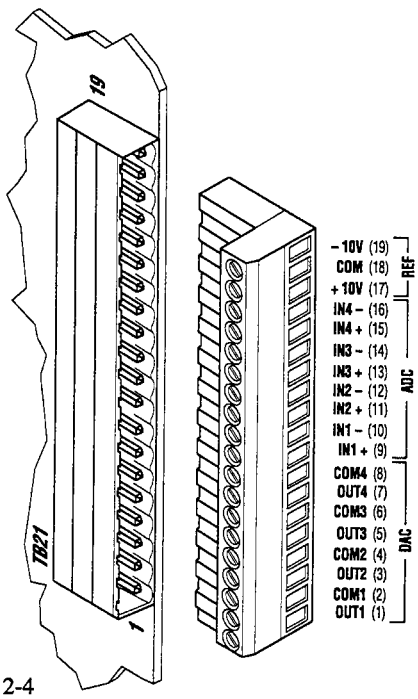
MOTOR THERMO — Allows the user to connect a N.C. motor thermal switch to the 1336 FORCE. Motor Thermo LED D18 on the PLC Comm Adapter will illuminate if a motor over temperature condition occurs. The drive will issue a warning or trip on a fault as configured by Parameter 88 (VP Flt/Warn Cfg) and Parameter 89 (VP Warn/None Cfg).

NORM STOP — A N.C. maintained stop input that will stop the drive according to the user specified stop mode (Parameter 59). The drive responds the same way it would if the stop bit were set in any logic command. When a stop signal is present, the Norm Stop LED D13 on the PLC Board will be illuminated, and the drive will not be allowed to run until the stop signal is removed.

ATTENTION: The drive start/stop control circuitry includes solid-state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid , gas or solids exist, an additional hardwired stop circuit is required to remove AC line power to the drive. When AC input power is removed, there will be loss of inherent regenerative braking effect and the motor will coast to a stop. An auxiliary braking method may be required.

EXT FAULT — Allows the user to wire an external signal into the 1336 FORCE. If external fault input voltage is removed, the External Fault LED D12 on the PLC Board will light. The drive will then issue a fault or warning based on the fault configuration defined by Parameters 88 and 89. When input voltage is applied, D12 will not be lit.

Analog I/O Connections



Analog Inputs

There are (4) analog inputs to the PLC Comm Adapter Board that have a range of ±10V and a digital resolution of 12 bits. These inputs are differential inputs with noise rejection filtering.

Each input has a gain and offset adjustment. The A/D converter is a 12 bit device where an input value of +10V will result in a digital value of 2048. Likewise, an input value of –10V will result in a digital output value of –2048. Chapter 4 describes the parameters associated with scaling analog values.

Note: Analog input parameters must be linked to a velocity reference parameter as well as a scaling and offset parameter for an analog input to function.

Analog Outputs

There are (4) analog outputs from the PLC Comm Adapter Board that have a range of ±10V and a digital resolution of 12 bits. Chapter 4 describes the parameters associated with scaling analog values.

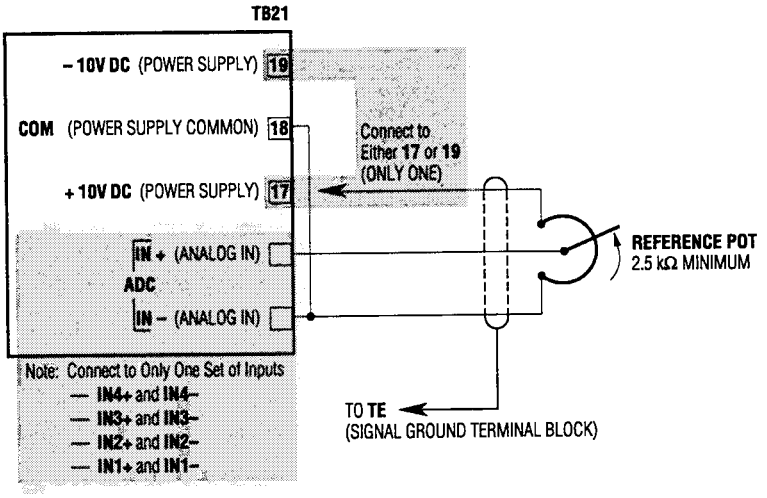


Figure 2-5 — Typical Analog Input Connections for Unidirectional Operation

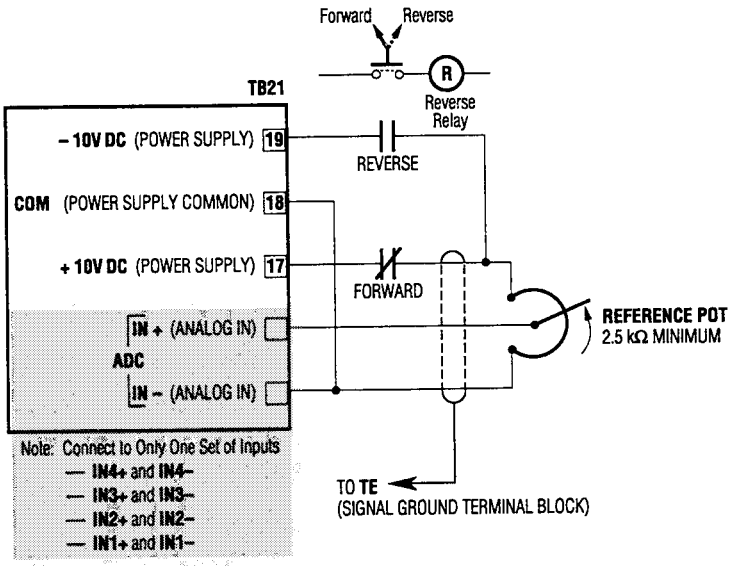


Figure 2-6 — Typical Analog Input Connections for Bidirectional Operation

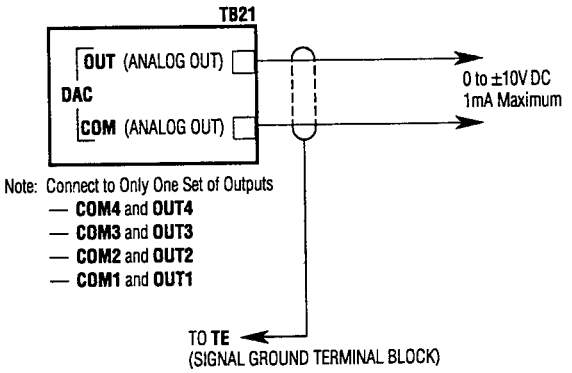


Figure 2-7 — Typical Analog Output Connections

RIO and DH+ Configuration

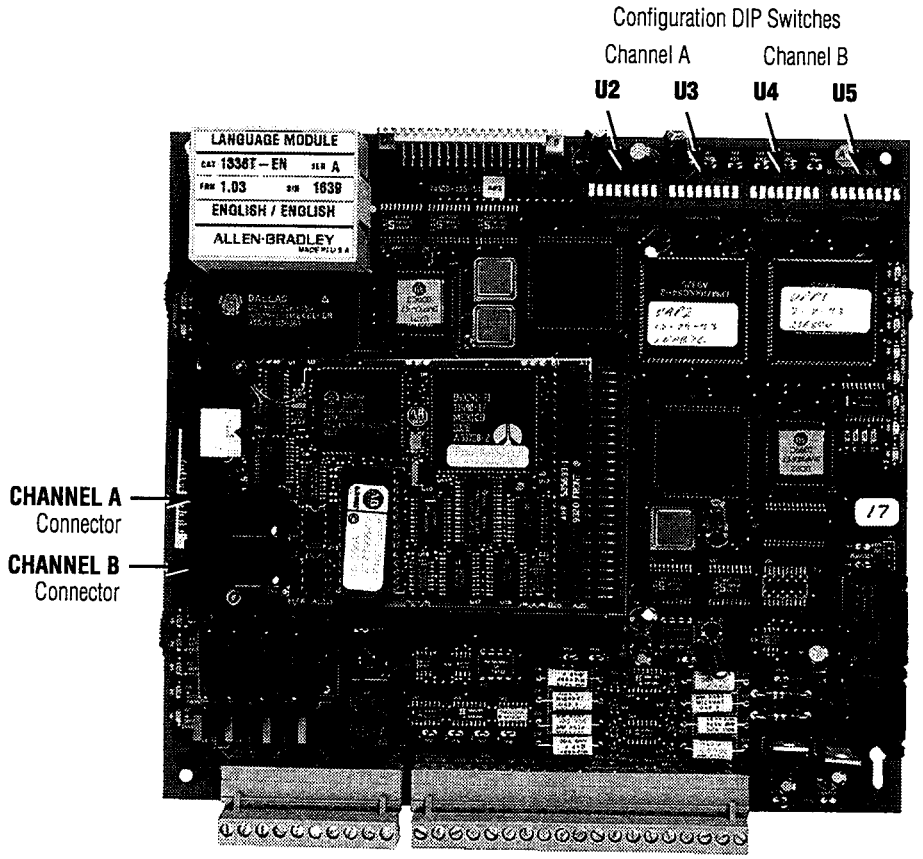
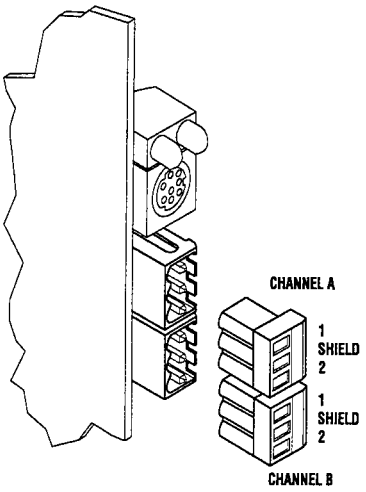


Figure 2-8 — PLC Comm Adapter Board DIP Switches and Communication Connections

Port Wiring



Twinaxial cable is used to connect Channel A or B of the PLC Comm Adapter Board to RIO and DH+ communications systems as shown in **Figures 2-9** and **2-10**.

CABLE TYPE

Belden 9463 — Consult Allen-Bradley if any other type cable is used.

CABLE LENGTH

A minimum of 10 feet for all connections. Shorter lengths may cause signal reflections.

CABLE CONNECTIONS

All (3) conductors — Blue, Shield and Clear — should be connected at each wiring point. No additional ground connections should be made to the shield.

Important: Do not use star type connections. Only (2) cables may be connected at any wiring point on a series connected application.

CABLE TERMINATIONS

(2) 1770-XT or 150Ω (82Ω for 230 kbaud) resistors are used for cable termination. Use (1) at each end of the cable.

Communication Configuration

Connections to Allen-Bradley's RIO or DH+ networks are made via (2) channels (Channel A or Channel B) on the PLC Comm Adapter Board. Each channel allows the 1336 FORCE to communicate directly with a PLC and is independently programmable. Dip switch settings on the PLC Comm Adapter Board are used to configure one or both channels for DH+ or RIO communication. Switches U2 and U3 are used to configure Channel A, switches U4 and U5 are used to configure Channel B. A detailed explanation of DIP switch settings is provided in Chapter 3 — Start-Up.

RIO Configuration

When a communication channel is configured for RIO connection, the PLC Comm Adapter Board will look like a remote I/O rack to an Allen-Bradley PLC.

The PLC Adapter can:

- Support 57.6K, 115K or 230K baud communication rates.
- Be configured as a ¼, ½, ¾ or full I/O rack.
- Be configured to ignore PLC fault conditions and continue operating.
- Support transfer of multiple drive parameter read or writes in a single Block Transfer.
- Allow the 1336 FORCE to be directly connected to (2) PLCs. PLC parameter control allows drive control to be switched between the two PLCs and specifies which PLC is currently in control.
- Allow the Block Transfer feature to be disabled via DIP switch setting and provide an extra word of discrete data.

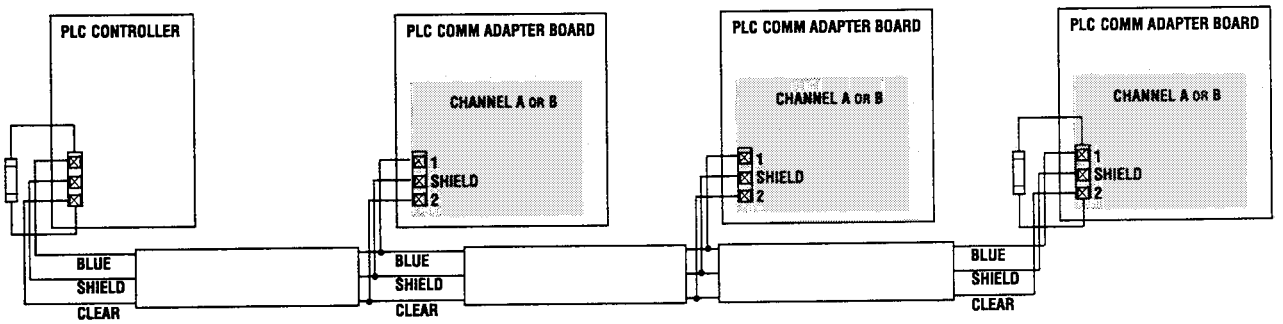


Figure 2-9 — RIO Wiring Configuration

DH+ Configuration

When a communication channel is configured for DH+ communication, the PLC Adapter Board becomes a station on the DH+ link. Information can be passed to and from the drive using the DH+ protocol.

The PLC Adapter can:

- Support 57.6K, 115K or 230K baud communication rates.
- Support read or write messages for blocks of parameters.
- Allow the PLC to to issue 1336 FORCE messages using a method similar to RIO Block Transfer.

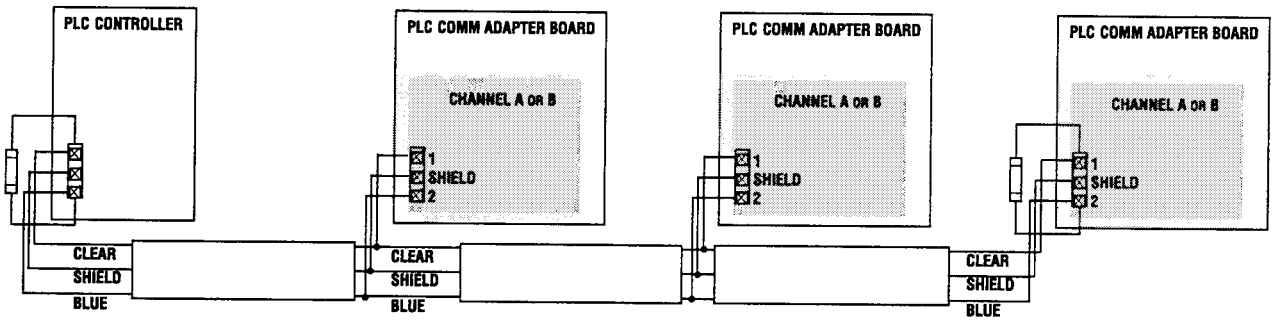


Figure 2-10 — DH+ Wiring Configuration

Chapter 3

Start-Up

Chapter Objectives

The first part of Chapter 3 provides a Start-Up Procedure detailing DIP switch settings for configuring Channels A and B. The remainder of the chapter provides an explanation of discrete data transfer between the PLC and PLC Comm Adapter Board.

Start-Up Procedure

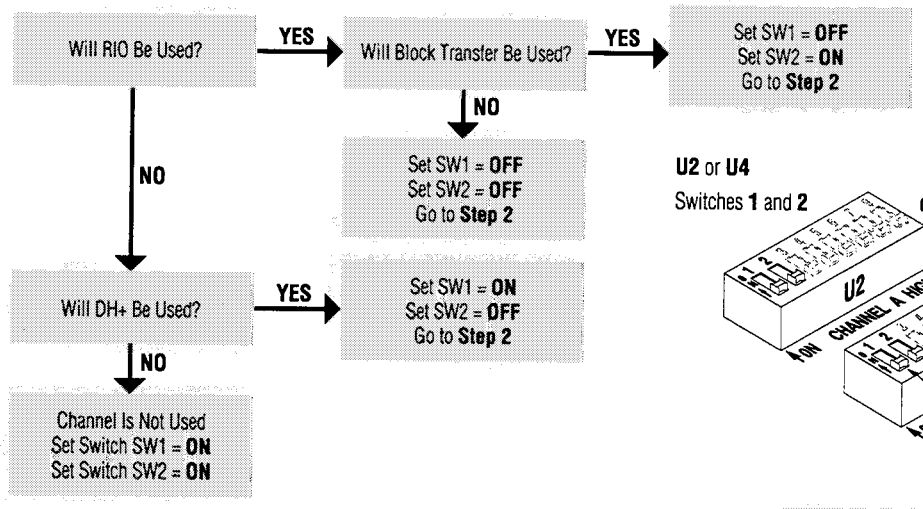
The PLC Comm Adapter contains (4) switches which select the communications options for each channel. Switches U2 and U3 are used to configure Channel A. Switches U4 and U5 perform the same function for Channel B. The standard configuration is for Channel A to be configured for DH+ and Channel B to be configured for RIO Protocol. Changes to switch settings will not take effect until power is reapplied.

ATTENTION: Use a blunt, pointed instrument (such as a ball point pen) to set DIP switches. Do not use a pencil. Pencil lead (graphite) may damage switch assemblies.

ATTENTION: The PLC Comm Adapter utilizes both input and output image table words for drive control and is not compatible with complementary I/O configurations. Failure to check connections and switch settings for application compatibility when configuring the PLC Comm Adapter Board could result in personal injury and /or equipment damage due to unintended or undesirable drive or process equipment operation.

The following Start-Up Procedure provides PLC Comm Board switch settings for board protocol, Baud Rate, RIO rack size, redundancy, starting group and address. Should you encounter any operating faults once switch settings have been applied, refer to Chapter 6 — Troubleshoooting.

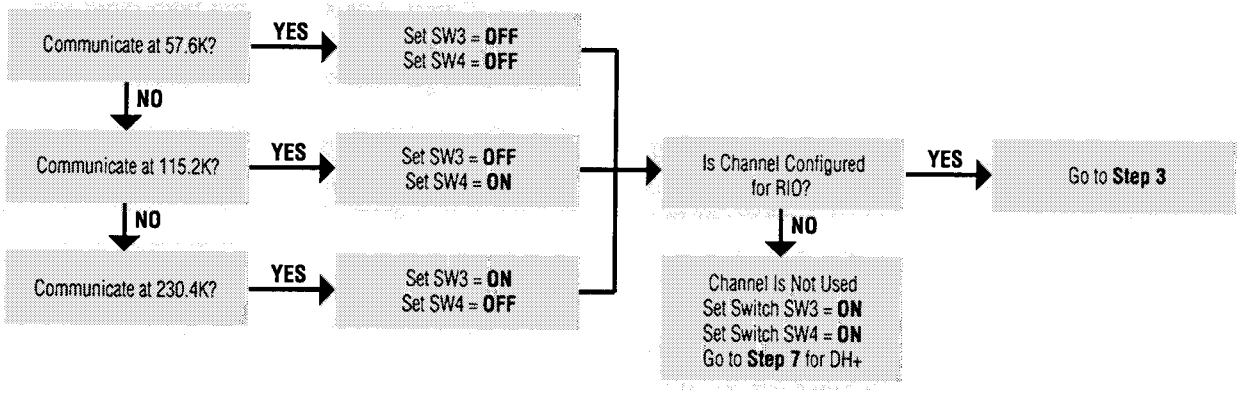
Step 1 — Protocol — U2 or U4



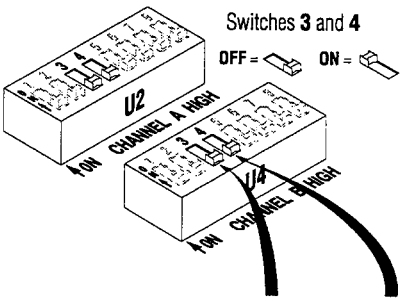
U2 or **U4**
Switches **1** and **2**

	SW1	SW2
RIO WITHOUT BLOCK TRANSFER	OFF	OFF
RIO WITH BLOCK TRANSFER	OFF	ON
DH+	ON	OFF
Not Used	ON	ON

Step 2 — BAUD Rate — U2 or U4



U2 or **U4**
Switches **3** and **4**



BAUD RATE	SW3	SW4
57.6K	OFF	OFF
115.2K	OFF	ON
230.4K	ON	OFF
Not Used	ON	ON

Step 3 — RIO Rack Size — U2 or U4

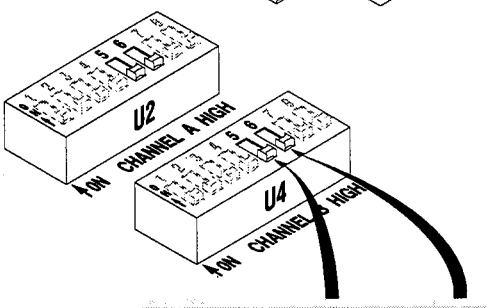
PLC Communication Only Requires **1 Word** if BT Is Selected **2 Words** if BT Is Not Selected
YES → Select 1/4 Rack SW5 = **OFF** SW6 = **OFF** Go to **Step 4**
NO ↓

PLC Communication Only Requires **3 Words** if BT Is Selected **4 Words** if BT Is Not Selected
YES → Select 1/2 Rack SW5 = **OFF** SW6 = **ON** Go to **Step 4**
NO ↓

PLC Communication Only Requires **5 Words** if BT Is Selected **6 Words** if BT Is Not Selected
YES → Select 3/4 Rack SW5 = **ON** SW6 = **OFF** Go to **Step 4**
NO ↓

PLC Communication Only Requires **7 Words** if BT Is Selected **8 Words** if BT Is Not Selected
YES → Select FULL Rack SW5 = **ON** SW6 = **ON** Go to **Step 4**

U2 or **U4**
Switches **5** and **6** OFF = ON =



RIO RACK SIZE	SW5	SW6
1/4	**OFF**	**OFF**
1/2	**OFF**	**ON**
3/4	**ON**	**OFF**
FULL	**ON**	**ON**

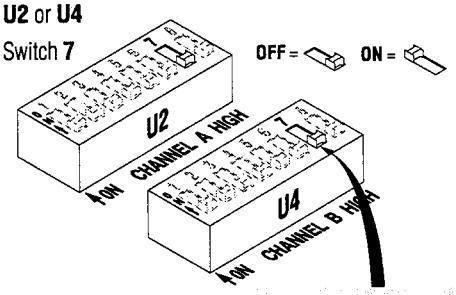
Step 4 — Not Last/Last — U2 or U4

Is This Channel Configured as a Full Rack?
YES → Set SW7 = **ON** Go to **Step 5**
NO ↓

Does This Channel Contain The Highest Module Groups That Will Be Scanned in This Rack?
YES → Set SW7 = **ON** Go to **Step 5**
NO ↓

Set SW7 = **OFF** Got to **Step 5**

U2 or **U4**
Switch **7** OFF = ON =



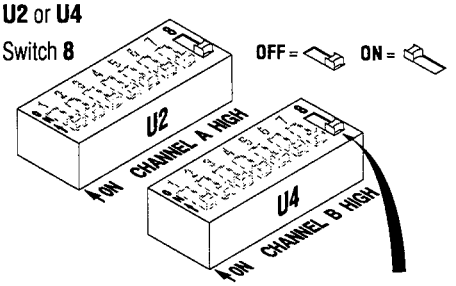
	SW7
LAST	**ON**
NOT LAST	**OFF**

Step 5 — Redundant — U2 or U4

Is This Drive Set Up for Redundant RIO?
YES → Redundant RIO Is Selected
NOTE: Both Channels Must Have The Same RIO Configuration
SW8 = **ON** Go to **Step 6**
NO ↓

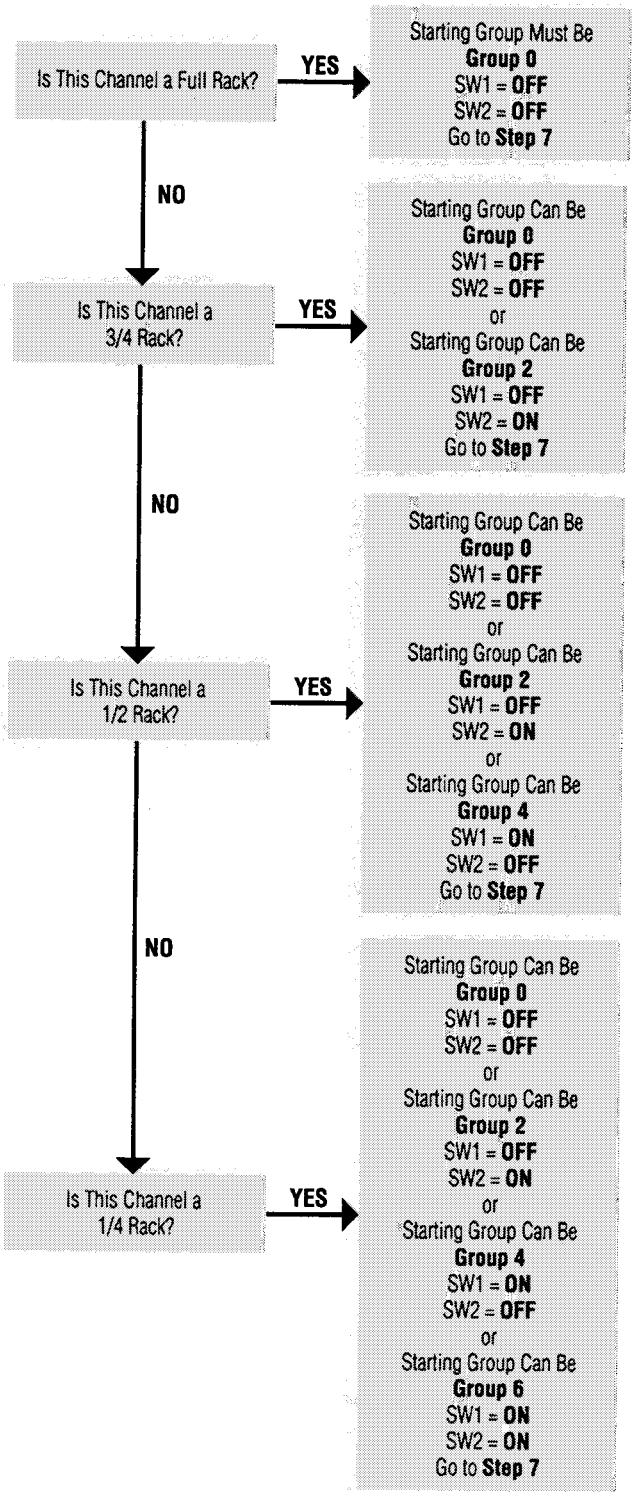
Set SW8 = **OFF** Got to **Step 6**

U2 or **U4**
Switch **8** OFF = ON =



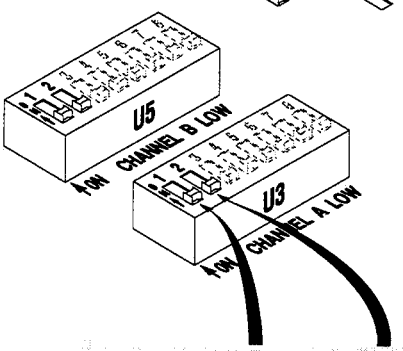
REDUNDANT RIO	SW8
YES	**ON**
NO	**OFF**

Step 6 — RIO Starting Group — U3 or U5



U3 and **U5**

Switches **1** or **2** OFF = ON =

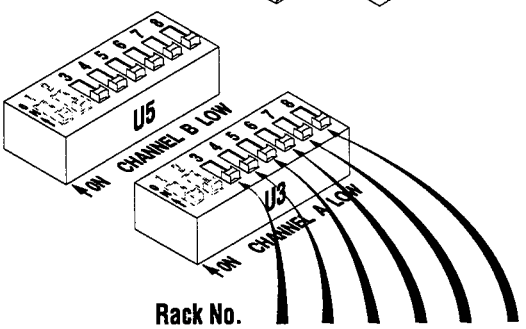


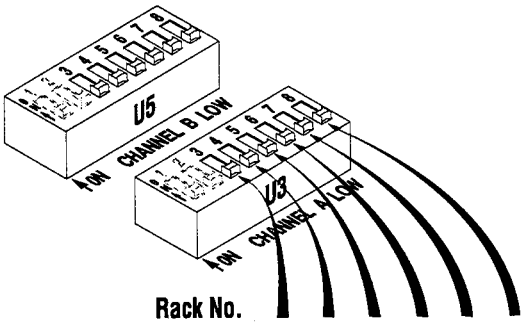
STARTING MODULE GROUP	SW1	SW2
0	OFF	OFF
2	OFF	ON
4	ON	OFF
6	ON	ON

Step 7 — RIO Rack Address or DH+ Station Address

U3 or **U5**

Switches **3** thru **8** OFF = ON =





Rack No.						
00 ❶	OFF	OFF	OFF	OFF	OFF	OFF
01	OFF	OFF	OFF	OFF	OFF	ON
02	OFF	OFF	OFF	OFF	ON	OFF
03	OFF	OFF	OFF	OFF	ON	ON
04	OFF	OFF	OFF	ON	OFF	OFF
05	OFF	OFF	OFF	ON	OFF	ON
06	OFF	OFF	OFF	ON	ON	OFF
07	OFF	OFF	OFF	ON	ON	ON
10	OFF	OFF	ON	OFF	OFF	OFF
11	OFF	OFF	ON	OFF	OFF	ON
12	OFF	OFF	ON	OFF	ON	OFF
13	OFF	OFF	ON	OFF	ON	ON
14	OFF	OFF	ON	ON	OFF	OFF
15	OFF	OFF	ON	ON	OFF	ON
16	OFF	OFF	ON	ON	ON	OFF
17	OFF	OFF	ON	ON	ON	ON
20	OFF	ON	OFF	OFF	OFF	OFF
21	OFF	ON	OFF	OFF	OFF	ON
22	OFF	ON	OFF	OFF	ON	OFF
23	OFF	ON	OFF	OFF	ON	ON
24	OFF	ON	OFF	ON	OFF	OFF
25	OFF	ON	OFF	ON	OFF	ON
26	OFF	ON	OFF	ON	ON	OFF
27	OFF	ON	OFF	ON	ON	ON
30	OFF	ON	ON	OFF	OFF	OFF
31	OFF	ON	ON	OFF	OFF	ON
32	OFF	ON	ON	OFF	ON	OFF
33	OFF	ON	ON	OFF	ON	ON
34	OFF	ON	ON	ON	OFF	OFF
35	OFF	ON	ON	ON	OFF	ON
36	OFF	ON	ON	ON	ON	OFF
37	OFF	ON	ON	ON	ON	ON

❶ Address 00 Only Valid for DH+ Configuration

Rack No.						
40	ON	OFF	OFF	OFF	OFF	OFF
41	ON	OFF	OFF	OFF	OFF	ON
42	ON	OFF	OFF	OFF	ON	OFF
43	ON	OFF	OFF	OFF	ON	ON
44	ON	OFF	OFF	ON	OFF	OFF
45	ON	OFF	OFF	ON	OFF	ON
46	ON	OFF	OFF	ON	ON	OFF
47	ON	OFF	OFF	ON	ON	ON
50	ON	OFF	ON	OFF	OFF	OFF
51	ON	OFF	ON	OFF	OFF	ON
52	ON	OFF	ON	OFF	ON	OFF
53	ON	OFF	ON	OFF	ON	ON
54	ON	OFF	ON	ON	OFF	OFF
55	ON	OFF	ON	ON	OFF	ON
56	ON	OFF	ON	ON	ON	OFF
57	ON	OFF	ON	ON	ON	ON
60	ON	ON	OFF	OFF	OFF	OFF
61	ON	ON	OFF	OFF	OFF	ON
62	ON	ON	OFF	OFF	ON	OFF
63	ON	ON	OFF	OFF	ON	ON
64	ON	ON	OFF	ON	OFF	OFF
65	ON	ON	OFF	ON	OFF	ON
66	ON	ON	OFF	ON	ON	OFF
67	ON	ON	OFF	ON	ON	ON
70	ON	ON	ON	OFF	OFF	OFF
71	ON	ON	ON	OFF	OFF	ON
72	ON	ON	ON	OFF	ON	OFF
73	ON	ON	ON	OFF	ON	ON
74	ON	ON	ON	ON	OFF	OFF
75	ON	ON	ON	ON	OFF	ON
76	ON	ON	ON	ON	ON	OFF
77	ON	ON	ON	ON	ON	ON

RIO Communications

Each channel of the PLC Comm Adapter Board can be configured for Allen-Bradley Remote I/O (RIO) communications. Configuration as a RIO device allows the drive to look like a remote I/O chassis to a PLC.

GENERAL

Verify that values sent to the drive parameters are scaled to the appropriate units. Most drive parameters operate based on drive units. Values should be scaled in the PLC Controller or by using a function block program in the drive. Refer to the Function Block Programming User Manual for additional information.

To control drive parameters, the parameters are linked to the drive by using source and sink parameters (source parameters, sink parameters and linking information is defined on pages 4-1 & 2.). The selected rack size and the channel selected determine which parameters in the drive are used for transfer of data between the drive and PLC Controller. Because there are two channels on the PLC Comm Adapter Board, the channel configuration (RIO or DH+) also determines which adapter board parameters are used and what they are used for. The standard configuration is for Channel A to be DH+ communication and channel B to be RIO communication. This can be changed using switches U2 (Channel A HIGH) and U4 (Channel B HIGH).

Discrete PLC Controller I/O Data Transfer

Data required by the drive on a continuously updated basis is transferred using the I/O image table of the PLC Controller. The data transfer rate can be determined using the standard conventions for I/O rack updates of discrete I/O. Refer to your PLC Controller manual for details.

DATA TRANSFER EXAMPLES

Figures 3-1 — 3-4 indicate how data is transferred between the PLC Comm Adapter Board and a PLC Controller for the rack size selected. The first group number associated with a rack is reserved for the Block Transfer function if it is selected with the RIO Protocol. The remaining group numbers —

- 1-7 for Full Racks
- 1-5 or 3-7 for 3/4 Racks
- 1, 3, 5 or 7 for 1/4 Racks

— are used for the transfer of discrete data. Each group number reserves a single 16 bit word in both the input and output image table of the PLC Controller for the rack number assigned. In the Drive these words are directly linked to internal drive parameters using source and sink parameters as shown in **Figures 3-5** and **3-6**.

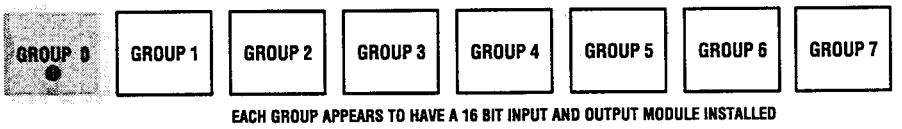


Figure 3-1 — RIO Full Rack Configuration

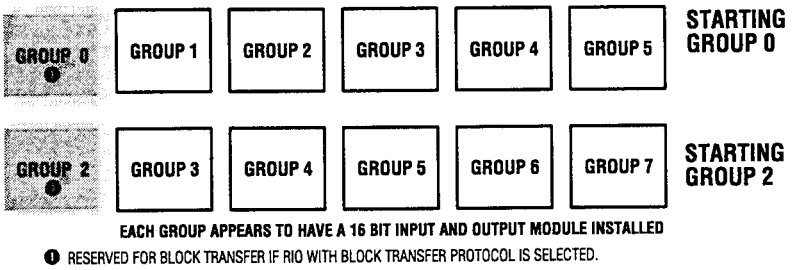


Figure 3-2 — RIO 3/4 Rack Configuration

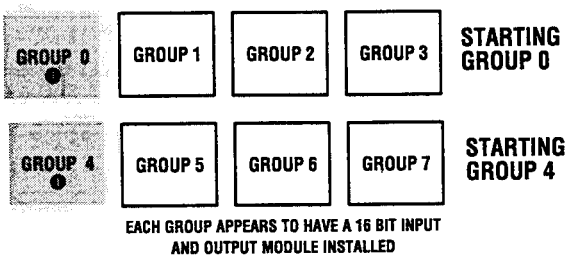


Figure 3-3 — RIO 1/2 Rack Configuration

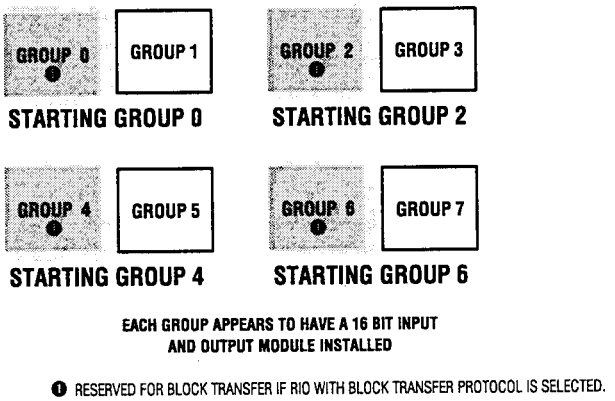


Figure 3-4 — RIO 1/4 Rack Configuration

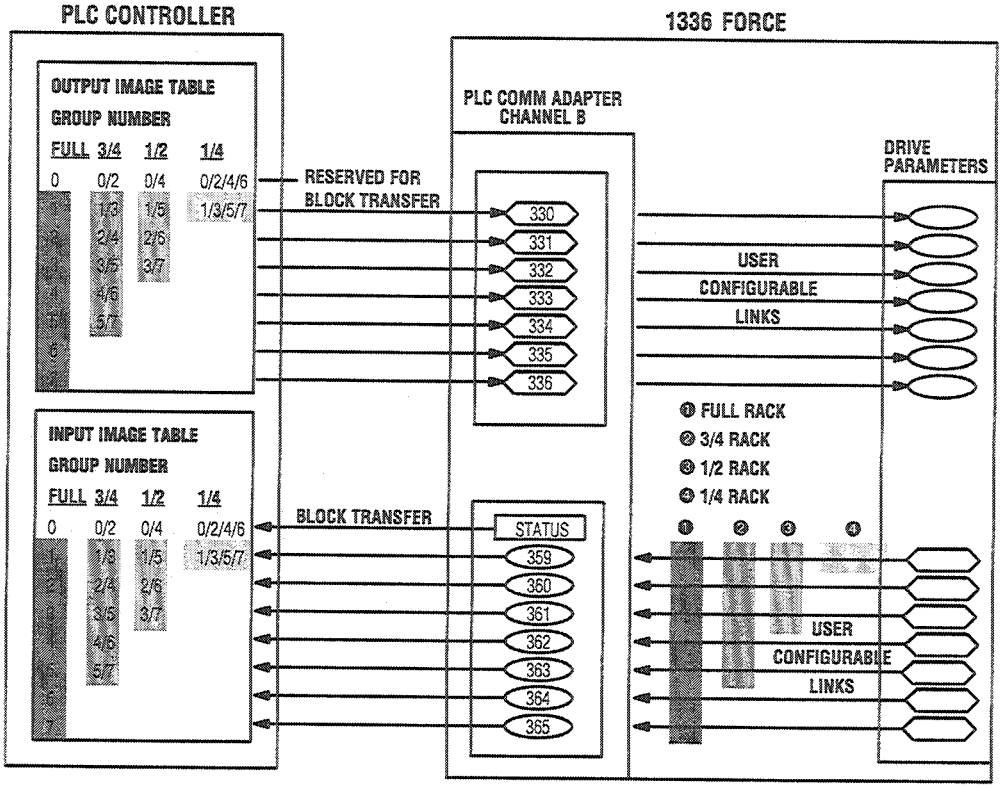


Figure 3-5 — PLC Comm Adapter Configuration Example – RIO with Block Transfer

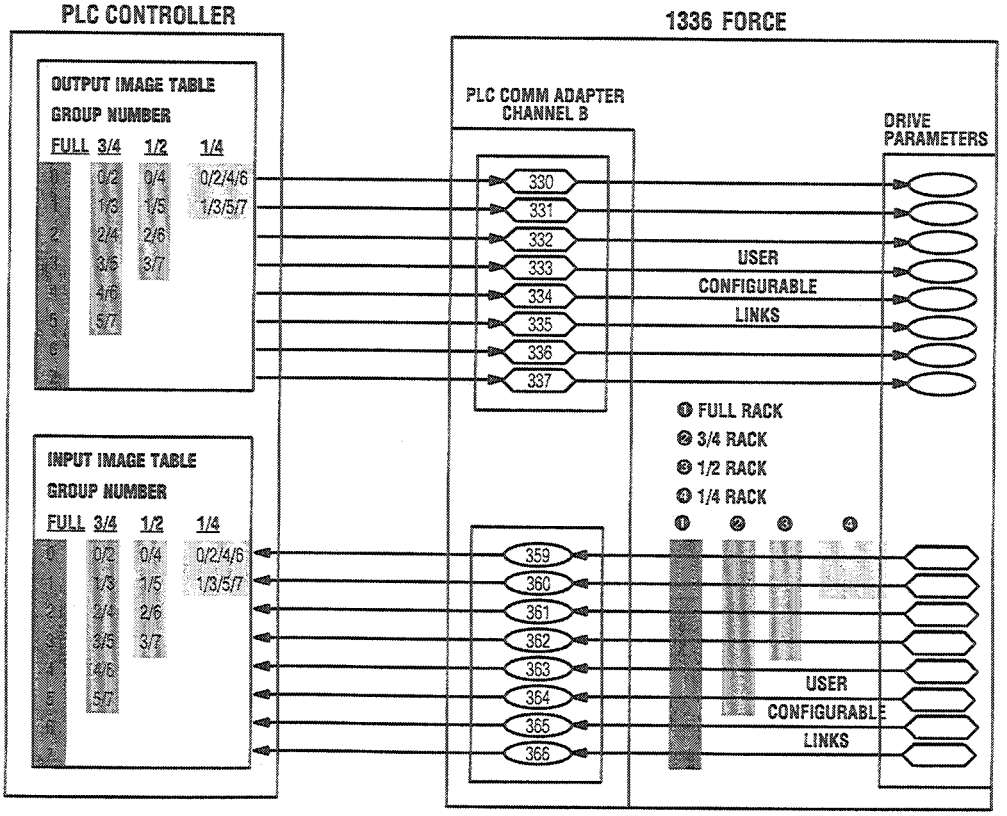


Figure 3-6 — PLC Comm Adapter Configuration Example – RIO without Block Transfer

Discrete PLC Programming

Figure 3-7 illustrates an application where the PLC Comm Adapter Board has been set-up for a full rack (numbered rack 2) and the 16 bit words for Groups 1 and 2 are being used by the PLC Controller program for data transfer with the 1336 FORCE. In this example, the drive has been configured so that the data coming into source Parameter 330 is sent to Parameter 367 — Port 6 Logic Command In. Information sent to the 1336 FORCE using the 16 bit output word for Group 1 of rack 2 must be a 16 bit word where the bits are defined by the description of Parameter 367.

Parameter 101 — Velocity Ref 1 HI has been linked to source Parameter 331. The 16 bit output word for Group 2 of rack 2 must be a 16 bit signed integer whose value is within the allowable range of values in drive units for Parameter 101.

Information from the 1336 FORCE consists of Parameter 56 — Logic Status LOW, and Parameter 146 — Velocity Feedback. Based on the links shown, the 16 bit input word for Group 1, rack 2 in the PLC Controller is a 16 bit logic status word. The bits in this 16 bit word are defined by the description for Parameter 56. In addition, the 16 bit input for Group 2, rack 2 in the PLC Controller is a 16 bit signed integer whose value corresponds to the allowable values in drive units for Parameter 146.

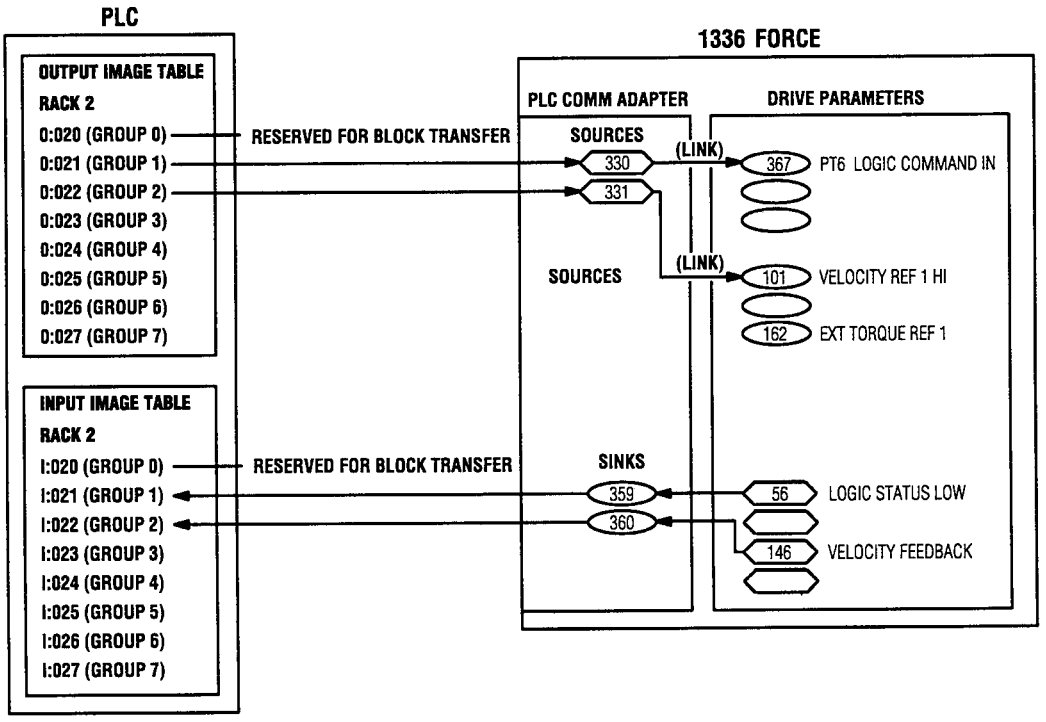


Figure 3-7 — Discrete PLC Programming Example for RIO with Block Transfer

If the data transferred between the 1336 FORCE and the PLC Controller is to be manipulated by the PLC Controller in units other than drive units, the data must be appropriately scaled when it is transferred to a drive parameter. Scaling can be done at the PLC Controller or by using drive function blocks. The scaled information must be based on drive unit definitions for parameters in the 1336 FORCE. Parameter 101 — Velocity Reference 1 HI shown in **Figure 3-7** is in drive units, where 4096 is defined as base speed. If the PLC Controller program is written in terms of feet-per-minute (FPM), then FPM must be converted to drive units before being sent to Parameter 101.

Discrete I/O Program

Figure 3-8 is a PLC Controller program which could be used to control the 1336 FORCE. Based on the configuration shown in **Figure 3-7** the PLC Controller program will be transferring information to Parameters 367 and 101 in the 1336 FORCE. Logic bits in File B3 of the PLC Controller are used to set the drive logic control bits and integer File N10 Word 01 is used to store the drive speed reference. To control the logic operation of the drive, the PLC program must control the bits in the output image table which correspond to the desired operation. Because Parameter 322 in **Figure 3-7** has been linked to Parameter 367 and Parameter 322 is associated with Group 1 in the output image table, the PLC Controller program will be controlling bits in Word 0:21.

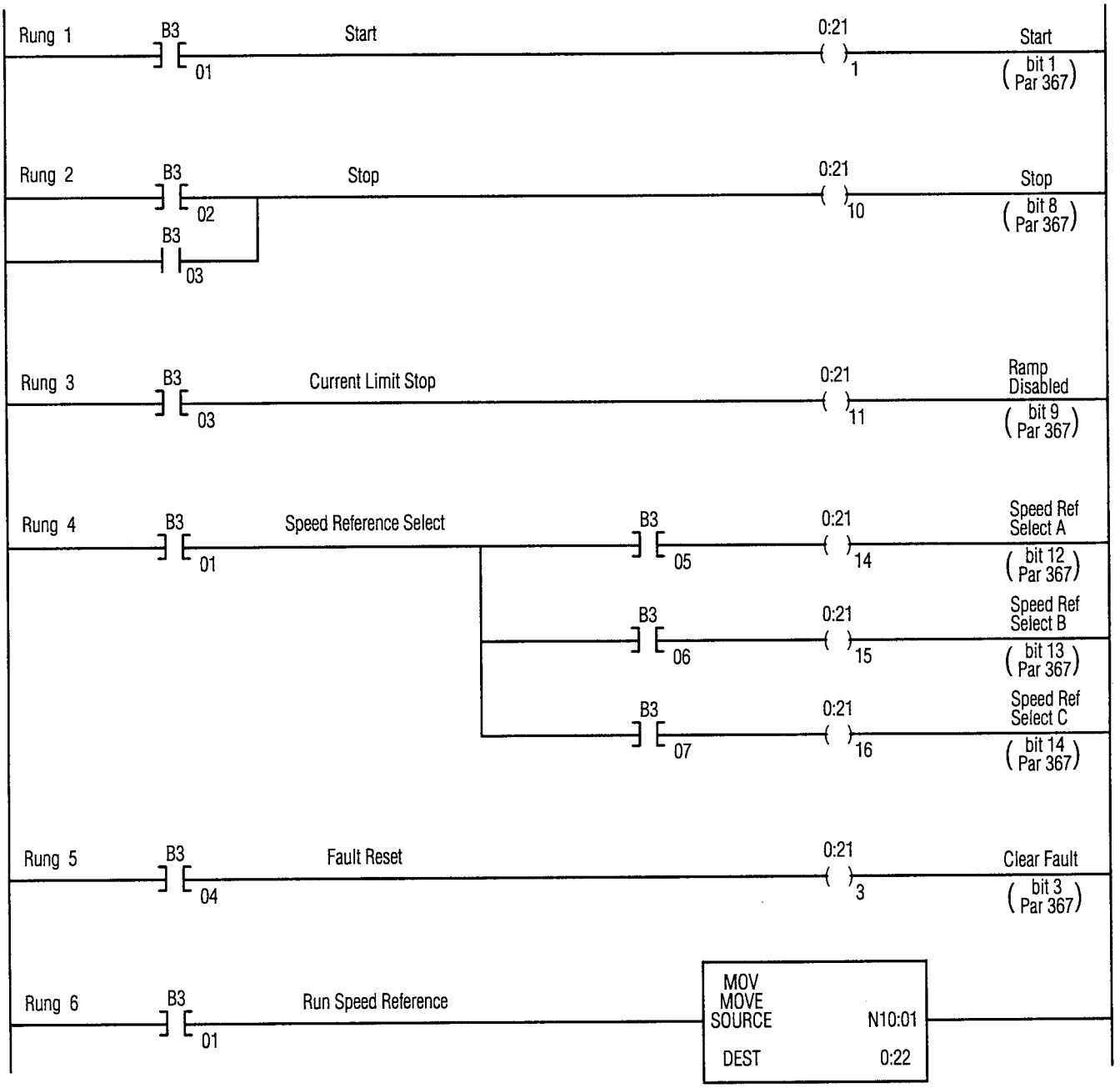


Figure 3-8 — Discrete PLC Controller Program

Logic Command Bit Mapping

Bit numbering in the PLC Controller is octal as opposed to the decimal numbering used by drive Parameter 367 — Port 6 Logic Command In. **Figure 3-9** shows the correlation between the output image table bits and the bits used by Parameter 52. In order to set the ramp disable bit in Parameter 352 (bit 9 decimal), bit 0:21/11 must be set as shown in Rung 3 of **Figure 3-8**.

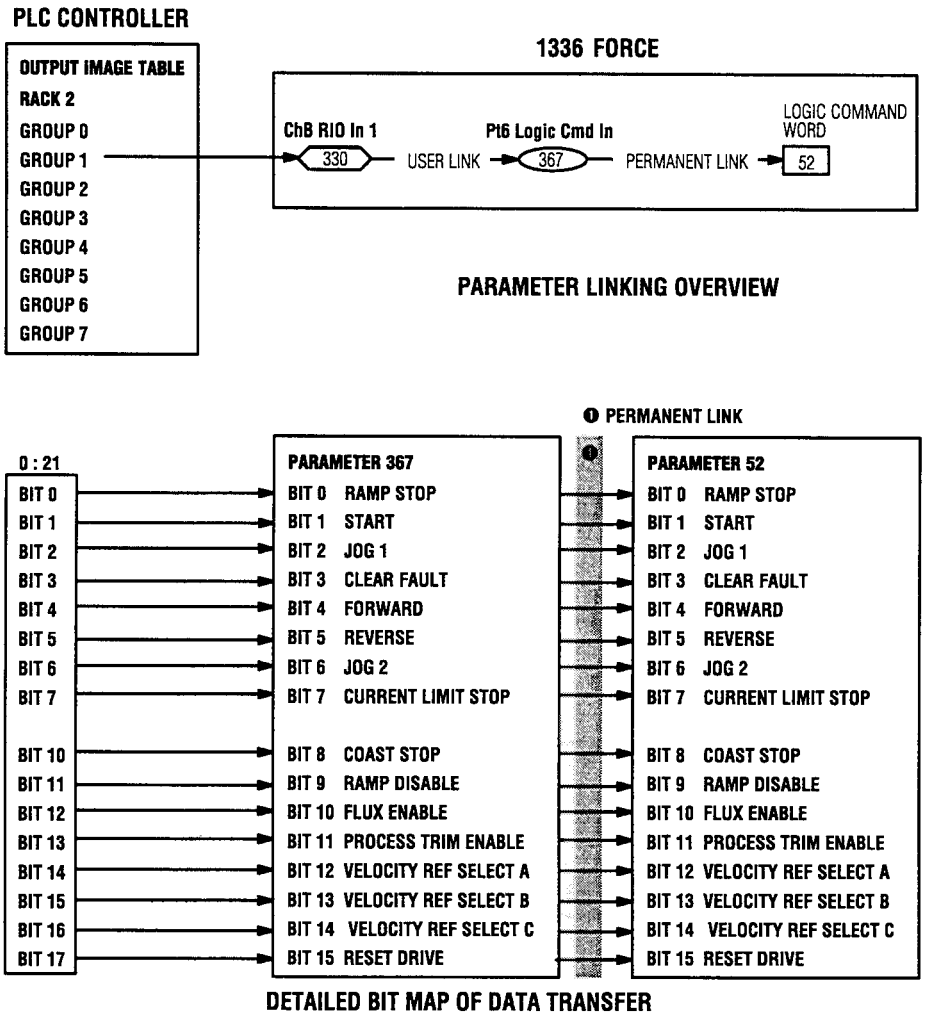


Figure 3-9 — Bit Mapping for Parameter 52 – Logic Command

If the external speed reference is selected, the PLC Controller must send a 16 bit word to Parameter 101 — Velocity Reference 1 HI, in the drive. Because the speed reference is a complete 16 bit word, the PLC Controller must send the data as a complete word rather than as individual bits as was the case for logic command bits.

In this example, Word 1 of integer file N10 is used to store the speed reference for the drive. The MOV block in Rung 6 if **Figure 3-8** transfers the 16 bit Word N10:01 to Word 2 of the output image table. Because Word 2 of the output image table is sent to Parameter 323, which in turn is linked to Parameter 101, the 16 bit Word N10:01 is the speed reference input to drive Parameter 101.

Information transferred back to the PLC Controller from the drive is handled much as it was in the previous example, with the exception that data is transferred into the input image table of the PLC Controller. Again, note that bit coded words such as Parameter 56 — Logic Status LOW, are bit numbered in octal in the PLC Controller, while the drive is in decimal.

End of Chapter

Chapter 4

Programming

Chapter Objectives

Chapter 4 provides the following information.

- Parameter Terminology and Definitions
- Analog I/O Configuration Examples
- Block Transfer Explanation
- Block Transfer Message Structures
- DH+ Message Structures

Terminology

PARAMETER

Memory location used to store drive set-up data or to monitor real time input or output information. Each parameter is assigned a name and number which does not change.

SET-UP PARAMETER

A parameter whose value does not change during normal operation of the drive. Set-up parameters are used for scaling and calibration of specific drive functions which are application and/or hardware dependent.

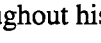
CONFIGURATION PARAMETER

A parameter whose values may be changed during normal operation of the drive. Configuration parameters are used to input reference and feedback information to the drive and to provide monitoring points for control signals. Configuration parameters are one of two types, either **SOURCE** or **SINK PARAMETERS**. Refer to the 1336 FORCE User Manual for a detailed description of source or sink parameters

SOURCE PARAMETERS (Read Only Parameters)

Source parameters contain real time information that is available for use by other devices. These devices can include PLC Controllers, operator interface devices, programming terminals, etc. Source parameters are indicated by the symbol throughout his manual.

SINK PARAMETERS (Read and Write Parameters)

Sink parameters accept data from other parameters which are then used by the drive to perform the desired functions. An example of a sink parameter is the external velocity reference parameter which accepts a speed reference from a device such as a PLC. Sink parameters are indicated by the symbol  throughout his manual.

LINKS

A link is a software connection between a sink and a source parameter that allows the transfer of data from the source parameter to the sink parameter.

The PLC Comm Adapter Board allows up to (50) links. Links can be programmed only when the drive is not running. Links are stored in BRAM and established at power up, BRAM recall, and/or system reset.

User Link — A software connection that must be established by the user. These links can be changed as needed according to the application.

Permanent Link — A software connection that is a permanent part of the drive firmware. These links cannot be modified or deleted by the user.

OWNER PARAMETERS

The PLC Comm Adapter Board allows start, jog, direction and other control functions to be owned by one or more control devices or adapters. To avoid conflict, some owners are exclusive. For example, only one device can issue a forward direction speed command. Others have multiple control. For example, all devices can jog the drive in the forward direction, but only at a set speed.

MASK PARAMETERS

When the multicomm port is interfaced to the PLC Comm Adapter Board, up to (5) different SCANport adapters and (2) different RIO devices can control the 1336 FORCE. With this flexibility, conflicts are inherent. The PLC Comm Adapter Board allows functional masks to be made. Functions such as start, jog and drive direction as well as many fault interlocks can be selectively locked out at each port by using mask parameters to select the allowable functions for each port.

BRAM Functions

User parameters, link fault information, reference stamp, process display information and password are all stored in BRAM. The (3) BRAM functions available to the user are:

BRAM Store — Stores current parameter value and links to BRAM.

BRAM Recall — Updates the current values and links with parameter values and links stored in BRAM.

BRAM Initialize — Updates the current values and links with the default values and links and clears any values out of BRAM.

RIO Redundant Mode

The RIO redundant mode is a special mode that allows the drive to be connected to the RIO channel of (2) separate PLC Controllers. A parameter in the drive specifies which PLC Controller has control of the drive. Output image table data from the non-controlling PLC is discarded. **Figure 4-1** shows a typical redundant mode configuration. The redundant RIO mode is only available when the following (3) conditions are met.

1. Both Channel A and Channel B are configured for RIO protocol.
2. The dip switch for Channel A is set for the redundant mode.
3. Both Channel A and Channel B are the same size — Both must be configured for full, 3/4, 1/2, or 1/4 rack.

The redundant mode operates as follows.

1. Data from the output image table of each PLC Controller is transferred to the PLC Comm Adapter Board by the respective PLC Controller.
2. The RIO redundant channel number parameter (Parameter 427) determines which PLC Controller's output will be made available to the drive via Parameters 322-328.
3. Each PLC Controller input image table receives data from the drive via Parameters 351-358.
4. Block Transfer messages from both drives are processed as normal. Only PLC output image table data is discarded.

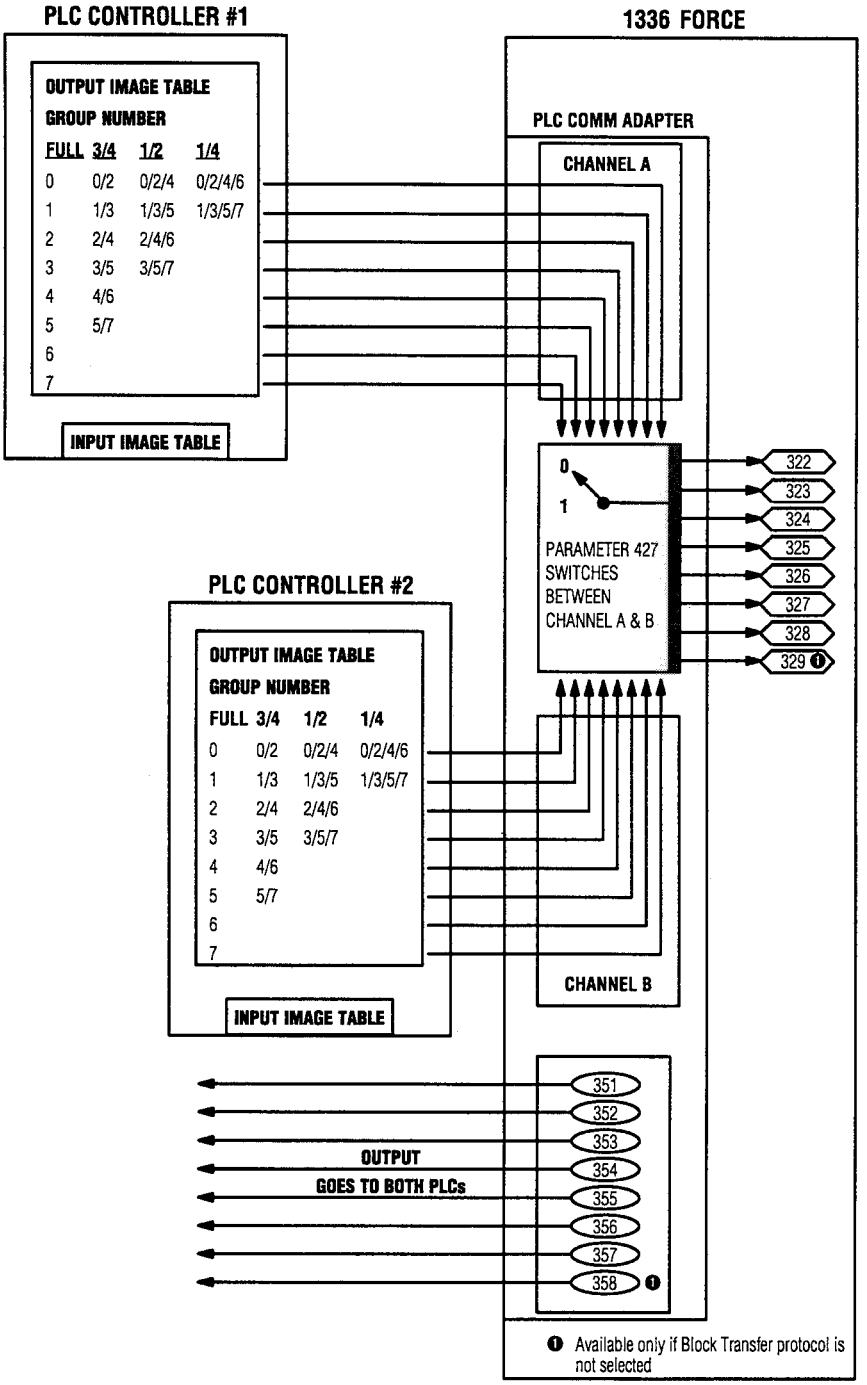


Figure 4-1 — Redundant RIO Communications

Analog I/O Parameter Set-Up Description

After hard wiring the analog I/O to the PLC Comm Board terminals, you must set-up parameters in the drive to allow for data flow between the PLC Comm Board and the drive. Each terminal has parameters associated with it as shown in **Figure 4-2**. Set-Up parameters are used to program the PLC Comm Board functions, and consist of Parameters 392-399, and 400-407. Configuration parameters allow the PLC Comm Board to communicate with the drive, and must be linked to parameters in the drive — Parameters 339-342 and 387-390 — The analog input and output configuration parameters.

Each analog input and output is associated with a scaling and offset set-up parameter. These parameters must be adjusted for each analog device.

The drive works with internal drive units. Each parameter is a 16 bit word, which allows a range of ± 32767 internal units. The drive is scaled so that 4096 is equal to one unit of the quantity being regulated. A ± 10V DC signal applied to an analog input is converted to a digital value of ± 2048, providing a total range of 4096. When calibrating analog inputs, a scale factor is applied to this value, to provide an effective range of ± 32767 16 × 2048. The offset parameter determines the offset in volts, applied to the raw analog value before the scale factor is applied. This allows you to shift the range of the analog input by ± 4096 drive units (±20 volts).

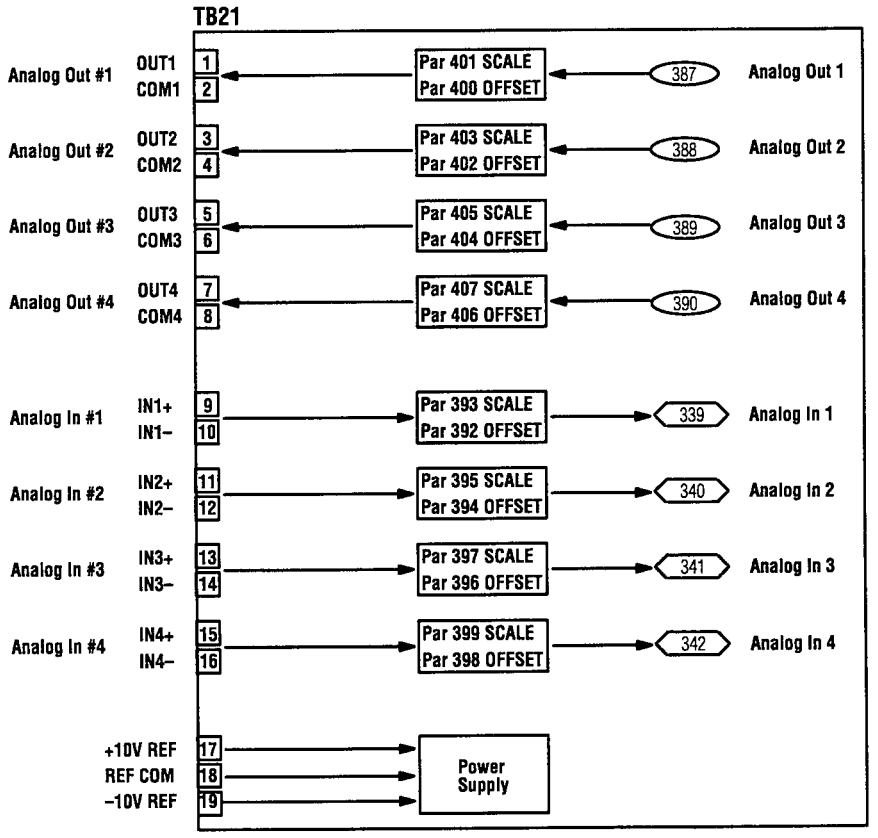


Figure 4-2 — Analog I/O Block Diagram

Analog Input 1 and Analog Input 2 will be used in detailing the scaling and offset parameters. At Analog Input 1, between TB21 terminals 9 and 10, a potentiometer with a range of ±10V DC has been connected. Parameter 339 has been linked to Parameter 101 (Velocity Reference) in the drive, which gives the potentiometer control of the external velocity reference. To calibrate the pot to control 100% base speed in both directions, the scaling parameter must be adjusted. The default value of the scale parameters allows a total range of 4096, –2048 to +2048. This allows only 50% base speed in each direction. By setting a scale factor of 2 in Parameter 393 (An In 1 Scale) the digital input is multiplied by 2, providing a range of – 4096 to + 4096, or 100% base speed in both directions. If the user wanted a range of ± 2 times base speed, the scale factor would have to be 4 (Base Speed = 4096, 2 times Base Speed = 8192, 2048 times 4 = 8192). Parameter 392 (An In 1 Offset) will remain at the default value of zero, allowing the input range to be –10V to +10V. The range of the offset parameter is
± 20V DC as shown in **Figure 4-3**.

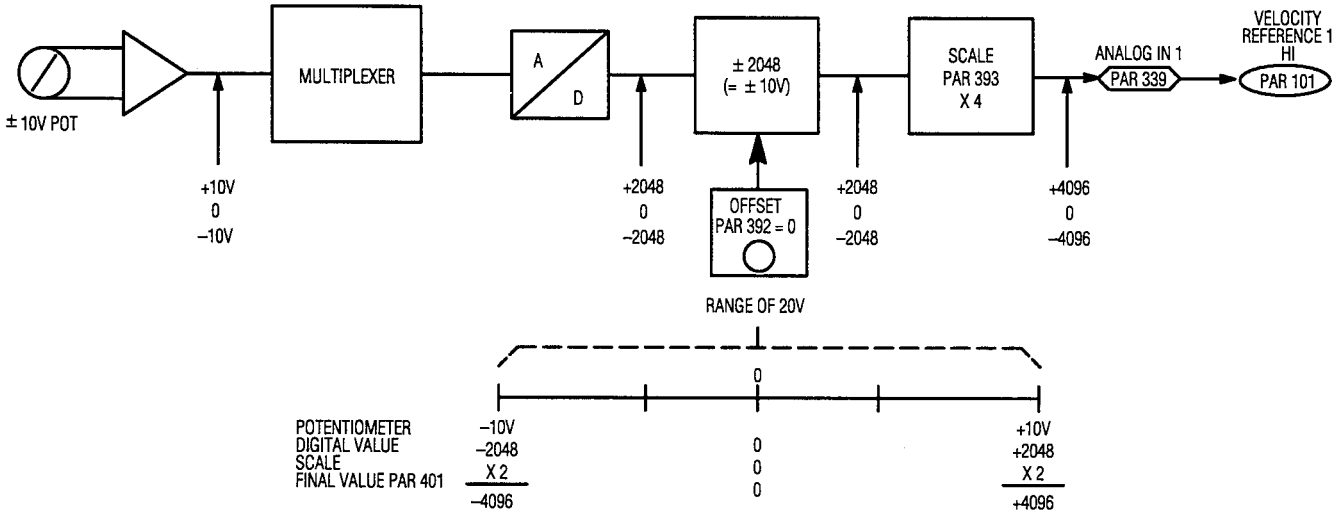


Figure 4-3 — Potentiometer with +10V Range to Control 0 to +100% Base Speed

For Analog Input 2, a 0 to 10 volt potentiometer will be used to adjust the Torque Reference from –100% to +100%. To accomplish this, both the scale and offset parameters will need to be adjusted. By linking Parameter 340 to Parameter 162, Torque Reference, the potentiometer connected to Analog Input 2 becomes the Torque Reference Signal. This signal must be scaled and offset in order to get the entire ± 100% in the 0-10 volt range. A digital range of 8192 (± 4096) must now be scaled for an analog range of 10 volts, and must be offset so 5 volts on the potentiometer will indicate 0% Torque.

As seen in **Figure 4-4**, the offset voltage adds the corresponding digital value to the range. In this case, an offset of –5 volts adds a digital value of –1024 to the range. This causes 0 volts on the potentiometer to register as –1024 digital internal to the drive and 10 volts on the potentiometer will be +1024 to the drive. This can then be scaled by a factor of 4 (8192 drive units) so that 0 volts sends a digital value of –4096 for –100% torque, and 10 volts sends a digital value of +4096 for +100% torque.

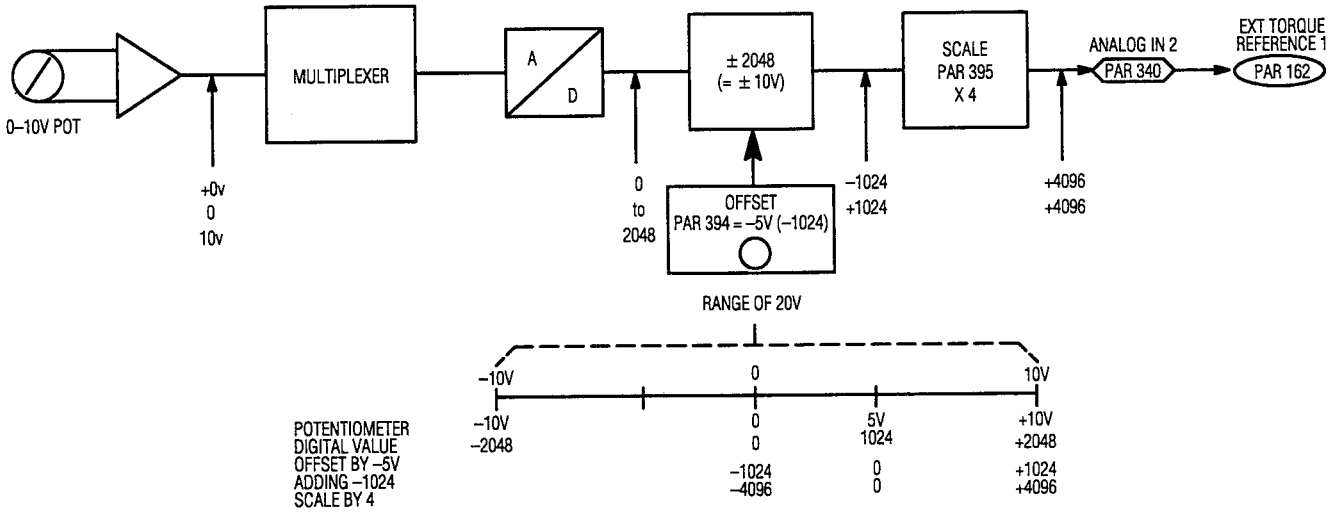


Figure 4-4 — Potentiometer 0–10V Range to Control ±100% Torque Reference

Analog outputs are set up similar to analog inputs. Each output has a scale and offset parameter, along with a specific variable parameter used for linking. Differences occur because of the direction of information flow. The drive sends a digital value in drive units, which must be matched to the voltage of the monitoring device. Similar to analog inputs, the analog output converts a ±2048 to ±10V DC. Thus, when the drive sends ±100% Base Speed (equal to ±4096) it must be scaled by 0.5 to be in the proper range (±4096 × 0.5 = ±2048). Offset can be ± 20V DC, even though the physical limit is ±10V DC. This allows you to offset the signal anywhere within the entire range.

In **Figure 4-5** Parameter 387 (Analog Output 1) is used as an example to detail the scaling and offset parameters. At Analog Output 1 a meter with a range of 0-10 V DC has been connected. Parameter 387 has been linked to Parameter 146 (Velocity Feedback). In order for the meter to indicate speed in both directions, the scale and offset parameters must be adjusted as shown in **Figure 4-5** . Working in the opposite direction as the analog inputs, apply the scale factor first. The drive sends a ±4096 digital value to indicate ±100% velocity feedback for a total digital range of 8192. The meter, having an analog range of 0-10V DC, requires a digital range of 2048. This is accomplished by applying a scale factor of 0.25 (8192 × 0.25 = 2048). In order to have the 0-10V DC meter indicate ±100% feedback, an offset must be applied. Offset parameters for analog outputs will again add the corresponding digital value to the range. In this case, an offset of 5 volts adds a digital value of 1024 to the range. This will allow full range deflection on the 0 to 10 volt meter, with 5 volts indicating zero speed.

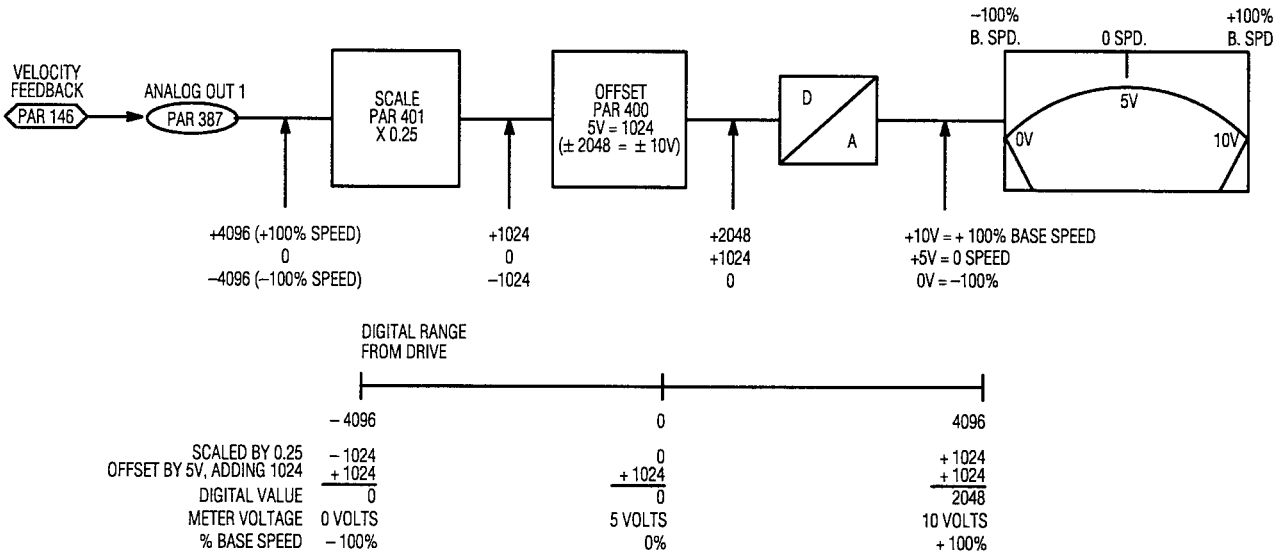


Figure 4-4 — Analog Output 1 ±100% Speed Indication

Parameter Groups

Parameters from 300 to 500 are dedicated to the PLC Comm Adapter Board. PLC Comm Adapter Parameters are divided into (8) groups based on functionality. Grouping is an option in addition to the sequential numbered parameter list provided in Chapter 7. Functional groups increase efficiency while helping to reduce programming time.

GROUP 1 ADAPTER INFO	
300	PLC Comm Adpt ID
301	PLC Comm Version
302	PLC Comm Config
309	Language Select
310	Adv/Basic Select

GROUP 2 ADAPTER DIAG	
425	ChA RIO Flt Sel
426	ChA RIO Warn Sel
430	ChB RIO Flt Sel
431	ChB RIO Warn Sel
435	DIP Fault Setup
436	ChA Fault Sts
437	ChA Warn Sts
438	ChB Fault Sts
439	ChB Warn Sts
440	SB Fault Sel
441	SB Warn Sel
442	SB Fault Sts
443	SB Warn Sts

GROUP 3 SCANport I/O	
314	Data In A1
315	Data In A2
316	Data In B1
317	Data In B2
318	Data In C1
319	Data In C2
320	Data In D1
321	Data In D2
338	SB Analog In
343	Data Out A1
344	Data Out A2
345	Data Out B1
346	Data Out B2
347	Data Out C1
348	Data Out C2
349	Data Out D1
350	Data Out D2
367	Pt6 Logic Cmd In
368	Pt7 Logic Cmd In
386	SB Analog Out
391	SB Analog Sel
416	SB Default Ref

GROUP 4 MASKS	
408	Port Enable
409	Direction Mask
410	Start Mask
411	Jog Mask
412	Reference Mask
413	Clear Fault Mask
414	Reset Drive Mask
415	Local Mask

GROUP 5 OWNERS	
369	Stop Owner
370	Dir Owner
371	Start Owner
372	Jog 1 Owner
373	Jog 2 Owner
374	Set Ref Owner
375	Local Owner
376	Flux Owner
377	Trim Owner
378	Ramp Owner
379	Ctrflt Owner

GROUP 6 ANALOG I/O	
339	Analog In 1
340	Analog In 2
341	Analog In 3
342	Analog In 4
387	Analog Out 1
388	Analog Out 2
389	Analog Out 3
390	Analog Out 4
392	Analog In 1 Offset
393	Analog In 1 Scale
394	Analog In 2 Offset
395	Analog In 2 Scale
396	Analog In 3 Offset
397	Analog In 3 Scale
398	Analog In 4 Offset
399	Analog In 4 Scale
400	Analog Out 1 Offset
401	Analog Out 1 Scale
402	Analog Out 2 Offset
403	Analog Out 2 Scale
404	Analog Out 3 Offset
405	Analog Out 3 Scale
406	Analog Out 4 Offset
407	Anallog Out 4 Scale

GROUP 7 ❶ CHANNEL A	
303	ChA DIP Switch
305	ChA LED State
322	ChA RIO In 1 ❷
323	ChA RIO In 2
324	ChA RIO In 3
325	ChA RIO In 4
326	ChA RIO In 5
327	ChA RIO In 6
328	ChA RIO In 7
329	ChA RIO In 8
351	ChA RIO Out 1
352	ChA RIO Out 2
353	ChA RIO Out 3
354	ChA RIO Out 4
355	ChA RIO Out 5
356	ChA RIO Out 6
357	ChA RIO Out 7
358	ChA RIO Out 8
427	Redund Chan No

GROUP 8 ❶ CHANNEL B	
304	ChB DIP Switch
306	ChB LED State
330	ChB RIO In 1 ❷ ❸
331	ChB RIO In 2
332	ChB RIO In 3
333	ChB RIO In 4
334	ChB RIO In 5
335	ChB RIO In 6
336	ChB RIO In 7
337	ChB RIO In 8
359	ChB RIO Out 1
360	ChB RIO Out 2
361	ChB RIO Out 3
362	ChB RIO Out 4
363	ChB RIO Out 5
364	ChB RIO Out 6
365	ChB RIO Out 7
366	ChB RIO Out 8

❶ Parameters included in GROUPs 7 and 8 will vary depending upon the selected communication protocol

❷ Shaded Parameters do not exist when DH+ protocol is selected. Inputs are variable and dependent on rack size and whether Block Transfer is enabled.

❸ ChB RIO parameters do not exist when redundant RIO protocol is selected.

Parameter Descriptions

All parameters used by the PLC Comm Adapter card will contain the following information.

PARAMETER TYPE — (2) types of parameters are available.

- **Read Only** The Value is changed only by the drive and is used to monitor values.
- **Read and Write** The Value is changed through programming and can also be used to monitor values.

PARAMETER ACCESS — (2) types of parameter access are available.

- **Basic** Parameters that are always available to the user.
- **Enhanced** Additional parameters that are only available in the enhanced mode.

MINIMUM VALUE — The lowest parameter setting possible.

MAXIMUM VALUE — The highest parameter setting possible.

FACTORY DEFAULT — The value the parameter will default to when the drive is initialized.

DRIVE UNITS — The actual value of the parameter stored in the 1336 FORCE parameter table.

DISPLAY UNITS — Engineering units that are used to display the parameter value on at a programming terminal (volts, etc.).

GROUP 1
Adapter Info

This group of parameters provides basic PLC Comm Adapter configuration data.

PLC Comm Adapter ID

The identifier for the PLC Comm Adapter Board.

PARAMETER NUMBER	300
PARAMETER TYPE	Read Only
MINIMUM VALUE	1
MAXIMUM VALUE	1
FACTORY DEFAULT	1
DRIVE UNITS	None
PARAMETER ACCESS	Basic

GROUP 1
Adapter Info

PLC Comm Version

The current firmware version of the PLC Comm Adapter Board.

PARAMETER NUMBER	301
PARAMETER TYPE	Read Only
MINIMUM VALUE	0.00
MAXIMUM VALUE	9.99
FACTORY DEFAULT	.10
DRIVE UNITS	.100
PARAMETER ACCESS	Basic

PLC Comm Config

The encoded value for the current DIP switch configuration of the PLC Comm Adapter Board. This stored value is used in determining if key dip switch values have changed. If they have, a fault will be displayed.

PARAMETER NUMBER	302
PARAMETER TYPE	Read Only
MINIMUM VALUE	1
MAXIMUM VALUE	65535
FACTORY DEFAULT	1
DRIVE UNITS	None
PARAMETER ACCESS	Basic

Language Select

This parameter indicates whether English or an alternate language will be used for parameter and fault display text.

PARAMETER NUMBER	309
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	1
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

0 = English
1 = Alternate Language

Adv/Basic Select

This parameter determines whether the basic list of parameters will be available (limited parameters will be displayed), or the advanced list will be available (all parameters will be displayed).

PARAMETER NUMBER	310
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	1
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

0 = Basic — Limited Parameter List Will Be Accessible
1 = Advanced — All Parameters Will Be Accessible

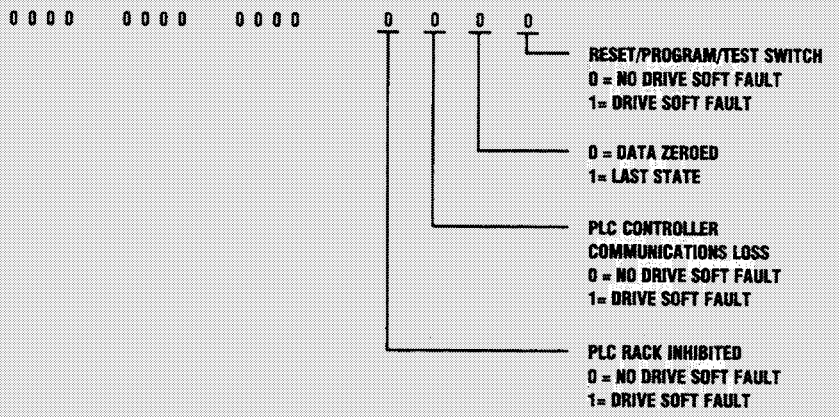
GROUP 2
Adapter Diag

This group of parameters configures the fault and warning diagnostics used by the PLC Comm Adapter Board.

ChA RIO Flt Sel

This parameter specifies what action the PLC Comm Adapter Board will take when a PLC Controller RIO communications fault occurs at Channel A.

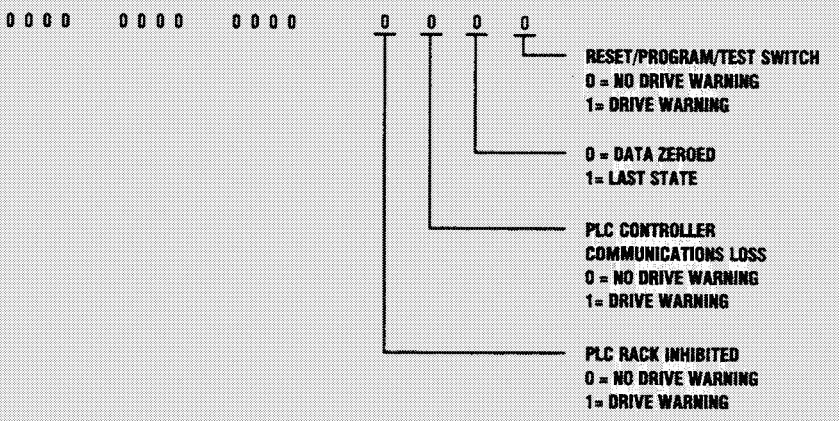
PARAMETER NUMBER	425
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	15
FACTORY DEFAULT	15
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic



ChA RIO Warn Sel

This parameter specifies what action the PLC Comm Adapter Board will take when a PLC Controller RIO communications warning occurs at Channel A.

PARAMETER NUMBER	426
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	15
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

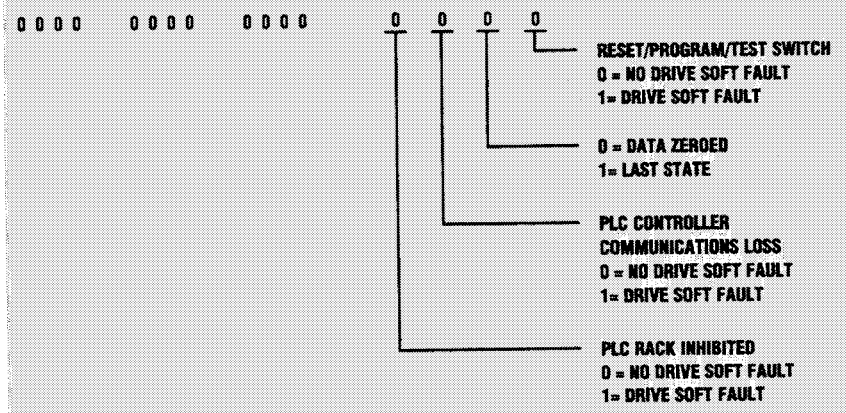


GROUP 2
Adapter Diag

ChB RIO Flt Sel

This parameter specifies what action the PLC Comm Adapter Board will take when a PLC Controller RIO communications fault occurs at Channel B.

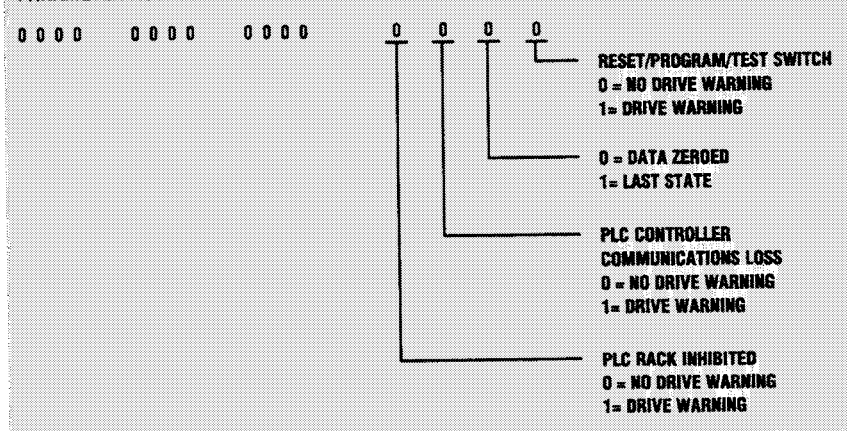
PARAMETER NUMBER	430
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	15
FACTORY DEFAULT	15
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic



ChB RIO Warn Sel

This parameter specifies what action the PLC Comm Adapter Board will take when a PLC Controller RIO communications warning occurs at Channel B.

PARAMETER NUMBER	431
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	15
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic



GROUP 2
Adapter Diag

DIP Fault Setup

This parameter indicates which DIP switch faults the PLC Comm Adapter Board has encountered.

PARAMETER NUMBER	435			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	1111	1111	1111	1111
FACTORY DEFAULT	0000	0000	0000	0000
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

BIT 0 = CHANNEL A BAUD Rate Fault
BIT 8 = CHANNEL B BAUD Rate Fault
BIT 1 = CHANNEL A Illegal Rack Size Fault
BIT 9 = CHANNEL B Illegal Rack Size Fault
BIT 2 = CHANNEL A Redundancy – Both Channels Not RIO
BIT 3 = CHANNEL A Bad Module Group
BIT 11 = CHANNEL B Bad Module Group
BIT 4 = CHANNEL A Bad Protocol
BIT 12 = CHANNEL B Bad Protocol

ChA Fault Sts

This parameter lists the current fault conditions at Channel A of the PLC Comm Adapter Board.

PARAMETER NUMBER	436
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	7
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

ChA Warn Sts

This parameter lists the current warning conditions at Channel A of the PLC Comm Adapter Board.

PARAMETER NUMBER	437
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	7
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

ChB Fault Sts

This parameter lists the current fault conditions at Channel B of the PLC Comm Adapter Board.

PARAMETER NUMBER	438
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	7
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

ChB Warn Sts

This parameter lists the current warning conditions at Channel B of the PLC Comm Adapter Board.

PARAMETER NUMBER	439
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	7
FACTORY DEFAULT	0
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

GROUP 2
Adapter Diag

SB Fault Sel

This parameter indicates which SCANport ports will cause a drive soft fault on loss of communications.

PARAMETER NUMBER	440			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	0000	0000	0011	1110
FACTORY DEFAULT	0000	0000	0011	1110
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

BIT 1 = Port 1 BIT 2 = Port 2 BIT 3 = Port 3 BIT 4 = Port 4 BIT 5 = Port 5

SB Warn Sel

This parameter indicates which SCANport ports will cause a drive warning on loss of communications.

PARAMETER NUMBER	441			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	0000	0000	0011	1110
FACTORY DEFAULT	0000	0000	0011	1110
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

BIT 1 = Port 1 BIT 2 = Port 2 BIT 3 = Port 3 BIT 4 = Port 4 BIT 5 = Port 5

SB Fault Sts

This parameter indicates which communications soft faults the drive has encountered at the SCANport ports.

PARAMETER NUMBER	442			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	0000	0000	0011	1110
FACTORY DEFAULT	0000	0000	0011	1110
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

BIT 1 = Port 1 BIT 2 = Port 2 BIT 3 = Port 3 BIT 4 = Port 4 BIT 5 = Port 5

SB Warn Sts

This parameter indicates which communications warnings the drive has encountered at the SCANport ports.

PARAMETER NUMBER	443			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	0000	0000	0011	1110
FACTORY DEFAULT	0000	0000	0011	1110
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

BIT 1 = Port 1 BIT 2 = Port 2 BIT 3 = Port 3 BIT 4 = Port 4 BIT 5 = Port 5

GROUP 3
SCANport I/O

This group of parameters is used to configure I/O communications through the PLC Comm Adapter SCANport ports.

Data In A1-D2

These parameters contain image words 1-8 from the SCANport output image table.

PARAMETER NUMBER	314-321
PARAMETER TYPE	Read and Write
MINIMUM VALUE	-32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

SB Analog In

This parameter is a source used to convert a +10V analog input value to a +32767 value. This digital value can then be linked to one of the 1336 FORCE input parameters.

PARAMETER NUMBER	338
PARAMETER TYPE	Read and write
MINIMUM VALUE	-32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	None
DRIVE UNITS	None
PARAMETER ACCESS	Basic

Data Out A1-D2

These parameters contain image words 1-8 from the SCANport input image table.

PARAMETER NUMBER	343-350
PARAMETER TYPE	Read Only
MINIMUM VALUE	-32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

Pt6 Logic Cmd In

This logic command parameter is for Port 6. This parameter is permanently linked to Parameter 52 — Logic Command Word.

PARAMETER NUMBER	367
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0 Hex
MAXIMUM VALUE	FFFF Hex
FACTORY DEFAULT	0 Hex
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

BIT 0 = Ramp Stop	**BIT 7** = Current Limit Stop
BIT 1 = Start	**BIT 8** = Coast Stop
BIT 2 = Jog 1	**BIT 9** = Ramp Disable
BIT 3 = Clear Fault	**BIT 10** = Flux Enable
BIT 4 = Forward	**BIT 11** = Process Trim Enable
BIT 5 = Reverse	**BIT 12** = Velocity Ref Select A
BIT 6 = Jog 2	**BIT 13** = Velocity Ref Select B
	BIT 14 = Velocity Ref Select C
	BIT 15 = Reset Drive

C B A	
0 0 0	— ZERO
0 0 1	— EXTERNAL REF 1 (Par 101, 100)
0 1 0	— PRESET SPEED 1 (Par 119)
0 1 1	— PRESET SPEED 2 (Par 120)
1 0 0	— PRESET SPEED 3 (Par 121)
1 0 1	— PRESET SPEED 4 (Par 122)
1 1 0	— PRESET SPEED 5 (Par 123)
1 1 1	— EXTERNAL REF 2 (Par 104, 103)

GROUP 3
SCANport I/O

Pt7 Logic Cmd In

This logic command parameter is for Port 7. This parameter is permanently linked to Parameter 52 — Logic Command Word.

PARAMETER NUMBER	368
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0 Hex
MAXIMUM VALUE	FFFF Hex
FACTORY DEFAULT	0 Hex
DRIVE UNITS	Bits
PARAMETER ACCESS	Basic

BIT 0 = Ramp Stop	BIT 7 = Current Limit Stop
BIT 1 = Start	BIT 8 = Coast Stop
BIT 2 = Jog 1	BIT 9 = Ramp Disable
BIT 3 = Clear Fault	BIT 10 = Flux Enable
BIT 4 = Forward	BIT 11 = Process Trim Enable
BIT 5 = Reverse	BIT 12 = Velocity Ref Select A
BIT 6 = Jog 2	BIT 13 = Velocity Ref Select B
	BIT 14 = Velocity Ref Select C
	BIT 15 = Reset Drive

C B A	
0 0 0	— ZERO
0 0 1	— EXTERNAL REF 1 (Par 101, 100)
0 1 0	— PRESET SPEED 1 (Par 119)
0 1 1	— PRESET SPEED 2 (Par 120)
1 0 0	— PRESET SPEED 3 (Par 121)
1 0 1	— PRESET SPEED 4 (Par 122)
1 1 0	— PRESET SPEED 5 (Par 123)
1 1 1	— EXTERNAL REF 2 (Par 104, 103)

SB Analog Out

This parameter provides the analog output value sent over the SCANport to Ports 1-5.

PARAMETER NUMBER	386
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

SB Analog Sel

This parameter indicates which port (1-5) to get the SCANport analog input value that appears in Parameter 338 — SB Analog In.

PARAMETER NUMBER	391
PARAMETER TYPE	Read and Write
MINIMUM VALUE	1
MAXIMUM VALUE	5
FACTORY DEFAULT	1
DRIVE UNITS	None
PARAMETER ACCESS	Basic

1 = Port 1 2 = Port 2 3 = Port 3 4 = Port 4 5 = Port 5

SB Default Ref

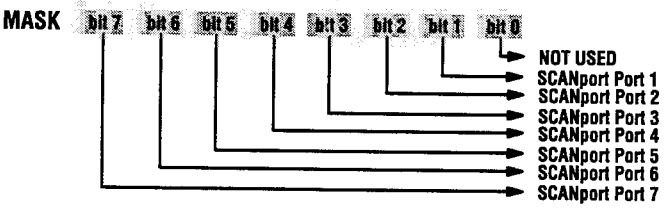
This parameter indicates what the default reference SCANport uses if no reference is requested from a SCANport port. This value is read on power up only. This parameter's value will change when a system reset/power cycle occurs.

PARAMETER NUMBER	416
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	5
FACTORY DEFAULT	2
DRIVE UNITS	None
PARAMETER ACCESS	Basic

0 = External Reference 2 = Preset Speed 2 4 = Preset Speed 4
1 = Preset Speed 1 3 = Preset Speed 3 5 = Preset Speed 5

GROUP 4
Masks

This group of parameters contains binary masks for all control functions. The masks control which ports can issue control commands. Each mask contains a bit for each SCANport port. Individual bits can be set to 0 to deny control or 1 to allow control.



Port Enable

This parameter indicates which SCANport ports have the ability to accept commands listed in Parameters 409-415.

PARAMETER NUMBER	408
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

Dir Mask

This parameter controls which SCANport ports can issue forward/reverse commands.

PARAMETER NUMBER	409
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

Start Mask

This parameter controls which SCANport ports can issue start commands.

PARAMETER NUMBER	410
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

Jog Mask

This parameter controls which SCANport ports can issue jog commands.

PARAMETER NUMBER	411
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

GROUP 4
Masks

Ref Mask

This parameter controls which SCANport ports can select an alternate reference or preset speed.

PARAMETER NUMBER	412
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

Clr Fault Command

This parameter controls which SCANport ports can generate an auxiliary fault.

PARAMETER NUMBER	413
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

Reset Drive Mask

This parameter controls which SCANport ports can reset a fault.

PARAMETER NUMBER	414
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

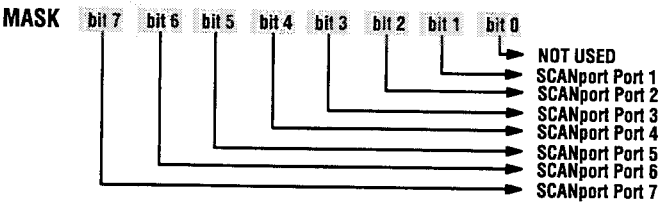
Local Mask

This parameter controls which SCANport ports are allowed to take exclusive control of drive logic commands except Stop (Stop will be accepted from any device regardless of who has control). Exclusive local control can only be taken while the drive is stopped.

PARAMETER NUMBER	415
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits
0 = Deny Control	1 = Permit Control

GROUP 5 Owners

This group of parameters contains binary information to display which group of parameters are issuing control commands. Each owner parameter has a bit for each SCANport port.



Stop Owner

This parameter displays which SCANport ports are presently issuing a valid Stop command.

PARAMETER NUMBER	369
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Dir Owner

This parameter displays which SCANport port currently has exclusive control of direction changes

PARAMETER NUMBER	370
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Start Owner

This parameter displays which SCANport ports are presently issuing a valid Start command.

PARAMETER NUMBER	371
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Jog1 Owner

This parameter displays which SCANport ports are presently issuing a valid Jog1 command.

PARAMETER NUMBER	372
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

GROUP 5
Owners

Jog2 Owner

This parameter displays which SCANport ports are presently issuing a valid Jog2 command.

PARAMETER NUMBER	373
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Set Ref Owner

This parameter displays which SCANport port currently has exclusive control in selecting the command frequency source.

PARAMETER NUMBER	374
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Local Owner

This parameter displays which SCANport port has requested exclusive control of all drive logic functions. If a SCANport port is in local lockout, all other functions (except stop) on all other SCANport ports are locked out and non–functional.

PARAMETER NUMBER	375
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Flux Owner

This parameter displays which SCANport ports are presently issuing a valid Flux Enable command.

PARAMETER NUMBER	376
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

GROUP 5
Owners

Trim Owner

This parameter displays which SCANbus port is presently issuing a Trim Enable command.

PARAMETER NUMBER	377
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Ramp Owner

This parameter displays which SCANbus port is presently issuing a Ramp command.

PARAMETER NUMBER	378
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

Clr Fault Owner

This parameter indicates which SCANbus port is presently issuing a Clear Fault command.

PARAMETER NUMBER	379
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	0FE Hex
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Bits

0 = Stop Input Not Present 1 = Stop Input Present

GROUP 6
Analog I/O

This function group contains the parameters needed to configure analog I/O signals (offset, scale, etc.).

Analog In 1-4

These parameters are source parameters that are the result of converting ±10V signals to ±32767 values using associated scale and offset parameters. Each digital value can then be linked to other 1336 FORCE parameters.

PARAMETER NUMBER	339-342
PARAMETER TYPE	Read Only
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

Analog In 1-4 Offset

These parameters determine the offset applied to the raw Analog In 1-4 values before the scale factor is applied. This allows the user to shift the range of the analog input.

PARAMETER NUMBER	392, 394, 396, 398
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–20 Volts
MAXIMUM VALUE	+20 Volts
FACTORY DEFAULT	0
DRIVE UNITS	±4100
PARAMETER ACCESS	Basic

Analog In 1-4 Scale

These parameters determine the scale factor or gain for Analog In 1-4 values. A +10V DC signal applied to Analog In 1-4 at TB21 is converted to a +2048 digital value used by the 1336 FORCE. Before the digital value is displayed or transferred to the drive, the scale factor is applied allowing an effective digital range of ±32767 (16 × 2048). The absolute digital value is clamped at 32767.

Scale Factor	Drive Units
1	2048
2	4096
4	8192
16	32767

PARAMETER NUMBER	393, 395, 397, 399
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–16
MAXIMUM VALUE	+16
FACTORY DEFAULT	+1
DRIVE UNITS	±32767
PARAMETER ACCESS	Basic

GROUP 6
Analog I/O

Analog Out 1-4

These parameters are sink parameters used to convert ±32767 values to a ±10V signal. Each digital value is linked to a 1336 FORCE source parameter which provides a value that will be scaled and offset. The results of these operations are converted to a voltage signal where ±2048 results in a ±10V output.

PARAMETER NUMBER	387-390
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	0
DRIVE UNITS	±32767
PARAMETER ACCESS	Basic

Analog Out 1-4 Offset

These parameters determine the offset applied to the Analog Out 1-4 values after the scale factor is applied. This allows the user to shift the range of the analog output.

PARAMETER NUMBER	400, 402, 404, 406
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–20 Volts
MAXIMUM VALUE	+20 Volts
FACTORY DEFAULT	0
DRIVE UNITS	±4096
PARAMETER ACCESS	Basic

Analog Out 1-4 Scale

These parameters determine the scale factor or gain for Analog In 1-4 values. A +2048 value corresponds to a +10V output signal at TB21. The value sent (linked) to Analog Out 1-4 is scaled by the corresponding scale parameter before it is offset and converted to an analog signal.

Scale Factor	Drive Units
1	32767
1/2	16383
1/4	8192
1/16	2048

PARAMETER NUMBER	401, 403, 405, 407
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–1
MAXIMUM VALUE	+1
FACTORY DEFAULT	+1
DRIVE UNITS	±32767
PARAMETER ACCESS	Basic

GROUP 7
Channel A

This function group contains the parameters needed to configure Channel A communications for the PLC Comm Adapter Board. Parameters 322-427 will not exist if the PLC Comm Adapter Board is configured for DH+ protocol.

ChA DIP Switch

This source parameter indicates the DIP switch settings used for Channel A of the PLC Comm Adapter Board.

PARAMETER NUMBER	303			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	1111	1111	1111	1111
FACTORY DEFAULT	0000	0000	0000	0000
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

ChA LED State

This parameters contain the current LED state for Channel A as displayed by LEDs D4, D6 and D7 on the PLC Comm Adapter Board.

PARAMETER NUMBER	305
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	6
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

ChA RIO In 1-8

These parameters are source parameters that contain the first eight words or groups of data from the PLC Controller output image table. The data is transferred to the drive by the RIO scanner every rack scan. The value can be used by the PLC Comm Board directly or by other drive functions through a configuration link. The available parameters depend on rack size and protocol selection.

NOTE: Parameter 329 is not used when Block Transfer Protocol is enabled.

PARAMETER NUMBER	322-329
PARAMETER TYPE	Read and Write
MINIMUM VALUE	-32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	None
DRIVE UNITS	None
PARAMETER ACCESS	Basic

PAR 322 = First Word
PAR 323 = Second Word
PAR 324 = Third Word
PAR 325 = Fourth Word
PAR 326 = Fifth Word
PAR 327 = Sixth Word
PAR 328 = Seventh Word
PAR 329 = Eighth Word

GROUP 7
Channel A

ChA RIO Out 1-8

These parameters are sink parameters that contain the first eight words or groups of data to the PLC Controller input image table. The data is transferred to the PLC Controller every rack scan. The value can be provided by the PLC Comm Board directly or by other drive functions through a configuration link. The available parameters depend on rack size and protocol selection.

NOTE: Parameter 358 is not used when Block Transfer Protocol is enabled.

PARAMETER NUMBER	351-358
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	None
DRIVE UNITS	None
PARAMETER ACCESS	Basic

PAR 351 = First Word
PAR 352 = Second Word
PAR 353 = Third Word
PAR 354 = Fourth Word
PAR 355 = Fifth Word
PAR 356 = Sixth Word
PAR 357 = Seventh Word
PAR 358 = Eighth Word

Redund Chan No

This parameter determines which channel number will be used by the 1336 FORCE for control purposes. Data and messages from the selected channel will be passes to the drive, while data and messages from the other channel will be discarded. The choices are 0 = Channel A and 1 = Channel B. This parameter is only active when both channels are set-up for RIO and the redundant mode is selected on the DIP switches. Image from the 1336 FORCE will go to both PLCs regardless of parameter setting.

PARAMETER NUMBER	427
PARAMETER TYPE	Read and Write
MINIMUM VALUE	0
MAXIMUM VALUE	1
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

GROUP 8
Channel B

This function group contains the parameters needed to configure Channel B communications for the PLC Comm Adapter Board. Parameters 330-366 will not exist if the PLC Comm Adapter Board is configured for DH+ protocol.

ChB DIP Switch

This source parameter indicates the DIP switch settings used for Channel B of the PLC Comm Adapter Board.

PARAMETER NUMBER	304			
PARAMETER TYPE	Read Only			
MINIMUM VALUE	0000	0000	0000	0000
MAXIMUM VALUE	1111	1111	1111	1111
FACTORY DEFAULT	0000	0000	0000	0000
DRIVE UNITS	Bits			
PARAMETER ACCESS	Basic			

ChB LED State

This parameters contain the current LED state for Channel B as displayed by LEDs D4, D6 and D7 on the PLC Comm Adapter Board.

PARAMETER NUMBER	306
PARAMETER TYPE	Read Only
MINIMUM VALUE	0
MAXIMUM VALUE	6
FACTORY DEFAULT	0
DRIVE UNITS	None
PARAMETER ACCESS	Basic

ChB RIO In 1-8

These parameters are source parameters that contain the first eight words or groups of data from the PLC Controller output image table. The data is transferred to the drive by the RIO scanner every rack scan. The value can be used by the PLC Comm Board directly or by other drive functions through a configuration link. The available parameters depend on rack size and protocol selection.

NOTE: Parameter 337 is not used when Block Transfer Protocol is enabled.

PARAMETER NUMBER	330-337
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	None
DRIVE UNITS	None
PARAMETER ACCESS	Basic

PAR 330 = First Word **PAR 331** = Second Word **PAR 332** = Third Word
PAR 333 = Fourth Word **PAR 334** = Fifth Word **PAR 335** = Sixth Word
PAR 336 = Seventh Word **PAR 337** = Eighth Word

GROUP 8
Channel B

ChB RIO Out 1-8

These parameters are sink parameters that contain the first eight words or groups of data to the PLC Controller input image table. The data is transferred to the PLC Controller every rack scan. The value can be provided by the PLC Comm Board directly or by other drive functions through a configuration link. The available parameters depend on rack size and protocol selection.

NOTE: Parameter 366 is not used when Block Transfer Protocol is enabled.

PARAMETER NUMBER	359-366
PARAMETER TYPE	Read and Write
MINIMUM VALUE	–32767
MAXIMUM VALUE	+32767
FACTORY DEFAULT	None
DRIVE UNITS	None
PARAMETER ACCESS	Basic

PAR 359 = First Word **PAR 360** = Second Word **PAR 361** = Third Word
PAR 362 = Fourth Word **PAR 363** = Fifth Word **PAR 364** = Sixth Word
PAR 365 = Seventh Word **PAR 366** = Eighth Word

Chapter 5

Advanced Programming

Chapter Objectives

Chapter 5 provides the following information.

- Block Transfer Explanation
- Block Transfer Message Structures
- DH+ Message Structures

Block Transfer

Discrete Transfer is the method used by a PLC Controller to transfer data to and from the PLC Comm Board during every rack scan. The PLC Comm Adapter Board transfers this data to and from the SCANport device.

Block Transfer is the method used by a PLC Controller to transfer data that does not require continuous updates. To perform this function, the PLC Comm Board provides a status word to the PLC during the normal discrete transfer scan. This status word occupies the first module group in the PLC I/O image table for the designated rack. The status word is then used by the PLC program to control the BTW and BTR functions of the PLC Controller.

Remote I/O Module Status Word

The **Remote I/O Status Word** is returned from the PLC Comm Board in addition to the Block Transfer Status Word.The Remote I/O Status is the first word associated with the rack in the PLC input image table.This status word indicates the condition of the PLC Comm Board and is not part of the standard Block Transfer Instructions in the PLC program. **Figures 5-1** and **5-2** detail the information contained in this word. Individual bits from this word are used in the PLC program to control the Block Transfer Functions as shown in the Block Transfer Examples in this chapter.

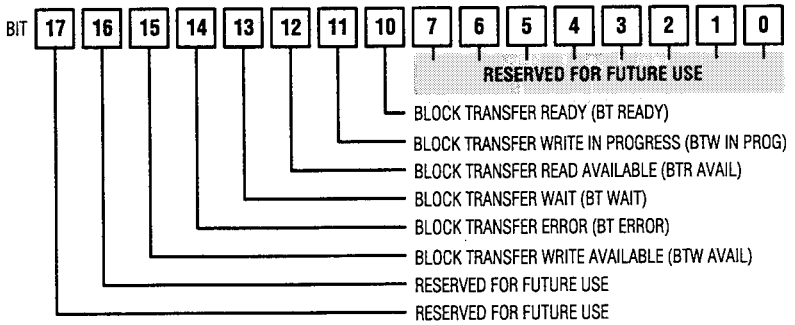


Figure 5-1 — PLC Comm Board Status Word

Block Transfer Ready — Indicates that the Scanbus Device and PLC Comm Board are communicating and are ready to process Block Transfers.

Block Transfer Write In Progress — Indicates a Block Transfer Write is in progress between the PLC Controller and PLC Comm Board. This bit is cleared when the data transfer to the PLC Comm Board is complete.

Block Transfer Read Data Available ❶ — Indicates the PLC Comm Board has data available for the PLC Controller to read.

Block Transfer Wait — Indicates that the PLC Comm Board is communicating with the SCANport device. This bit is cleared when the data transfer between the PLC Comm Board and SCANport device is complete.

Block Transfer Error ❶ — indicates that an error has occurred during communications with the SCANport device or the BTW data table is invalid.

Block Transfer Write Available ❶ — Indicates the PLC Comm Board is ready to receive a Block Transfer Write.

❶ These bits are used in the PLC **Block Transfer Example** program on the following pages.

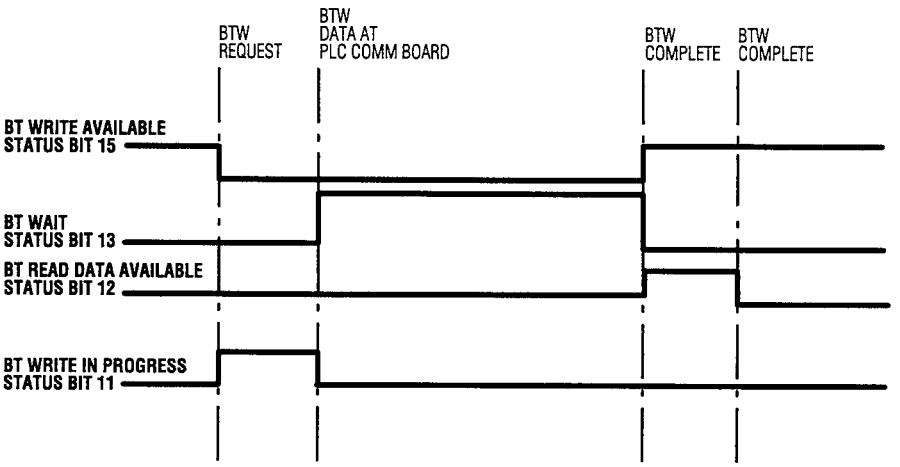


Figure 5-3 — Bit Timing

Data Storage

In order to use the Block Transfer Instructions in the PLC program, it is necessary to reserve several words for data storage. Some of these words are required for internal use by the Block Transfer Function and some contain the Block Transfer Message Information. In the PLC-5, the BTW and BTR blocks require the use of (2) sets of words. **Figures 5-5** and **5-6** illustrate the BTW and BTR blocks used for Block Transfer in the PLC-5 along with example information associated with these blocks. A brief description of the information contained in these blocks specifically for the PLC-5 follows. For more detailed information on the PLC-5 and the PLC-3 refer to your PLC Control Manual.

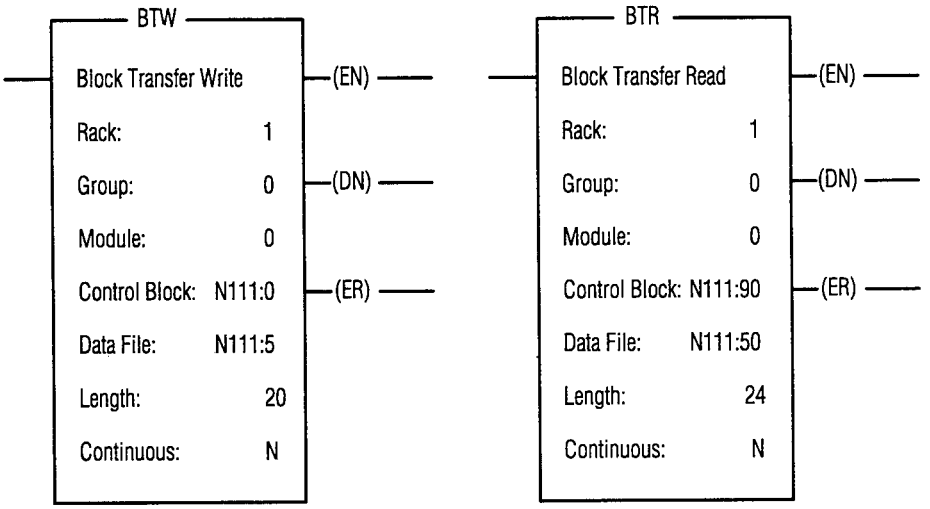


Figure 5-5 — PLC 5/15, 5/25 Block Transfer Instructions

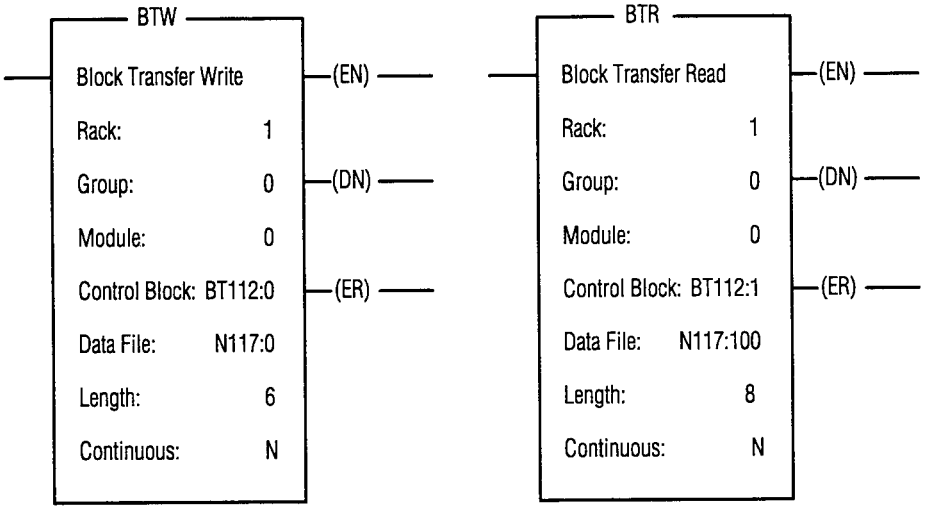


Figure 5-6 — PLC 5/40, 5/60 Block Transfer Instructions

Rack — The rack number is determined by the RIO switch settings on the PLC Comm Board.

Group — The group number of the first group in the rack associated with the PLC Comm Board. In **Figure 5-5**, the rack has been set up as a full 8 group rack, therefore, the first group is 0. If 1/2 rack is selected the first group in the rack is 0 or 4. If 1/4 rack is selected, the first group in the rack is 0, 2, 4, or 6.

Module — The module number associated with the Block Transfer in the associated slot. In all cases this will be 0.

Control Block — A predefined set of words which contain bit information associated with the PLC Block Transfer Function. In the PLC-5/15 and 5/25, the control block requires (5) contiguous words. In **Figure 5-5**, Words N111:0 through N111:4 have been reserved for the bit array in the BTW block and Words N111:90 through N111:94 have been reserved for the BTR block. In the PLC-5/40 and 5/60 the control block may be either an integer type, and would require (5) contiguous words, or a Block Transfer Type and would require (1) element, as shown in **Figure 5-6**.

Data File — The address of the message sent by the BTW or received by the BTR block and contains both header and data information. The number of words required for the data file is dependent on the type of message being sent. In **Figure 5-5**, N111:5 is the first word in the data file for the BTW block and N111:50 is the first word for the BTR block. Refer to the message description section in this chapter for the header and data that must be included in the data file.

Length — The length of the Block Transfer Message in words. This will vary depending on the message being sent. The BTW and BTR instruction lengths may be different. Refer to the message examples in this section for the minimum lengths required for each message.

Continuous — Specifies whether the Block Transfer Block is to be executed continuously or only when the rung is true. This should always be set to N.

PLC-5 Block Transfer Rung Example

The programs shown in **Figures 5-7** and **5-8** are examples of Block Transfer Programming for the PLC Comm Board. **Figure 5-7** is for a PLC5/15 or 5/25. **Figure 5-8** is used for PLC 5/20, 5/40, 5/60 or 5/80. The BTW AVAIL, BTR AVAIL, and BT ERROR bits from the module status word (I:020 in these examples) are used in these examples. The examples also show how user logic can be used to enable or disable the Block Transfer Operations.

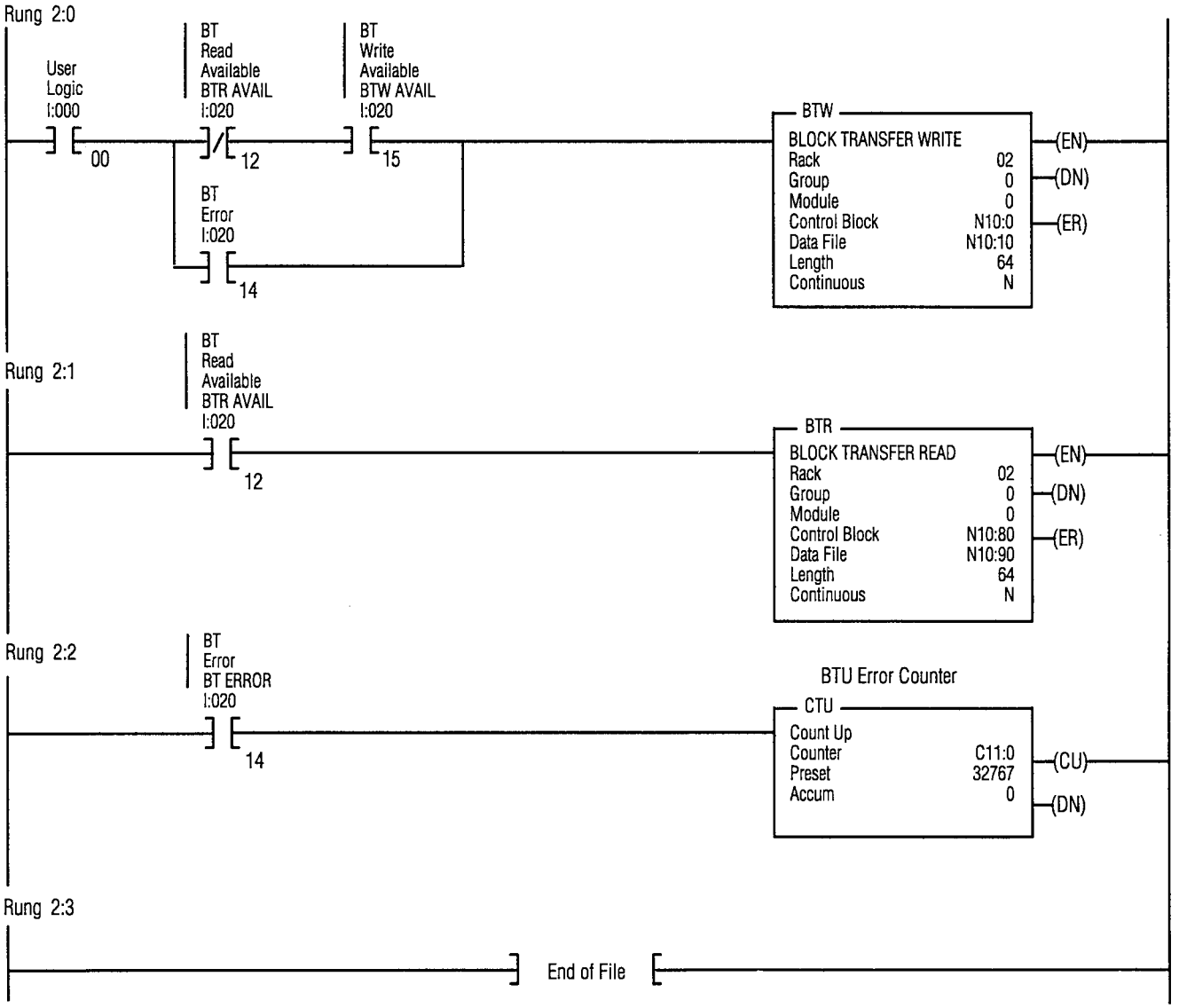


Figure 5-7 — Block Transfer Example PLC 5/15, 5/25

The first rung causes a Block Transfer Write to the PLC Comm Board when the user logic bit is true. There is no data available from the drive for the PLC to read when the drive is ready to accept a Block Transfer Write.

The second rung causes a Block Transfer Read from the PLC Comm Board whenever there is data available from the drive for the PLC to read. The BTR rung is not conditioned with any user logic since a Block Transfer Read should occur whenever there is data available for the PLC to read from the PLC Comm Board.

The third rung causes a counter to increment each time the BT ERROR bit (I:020/14) goes true. This bit can be used to detect problems with the link from the PLC Controller to the SCANport device.

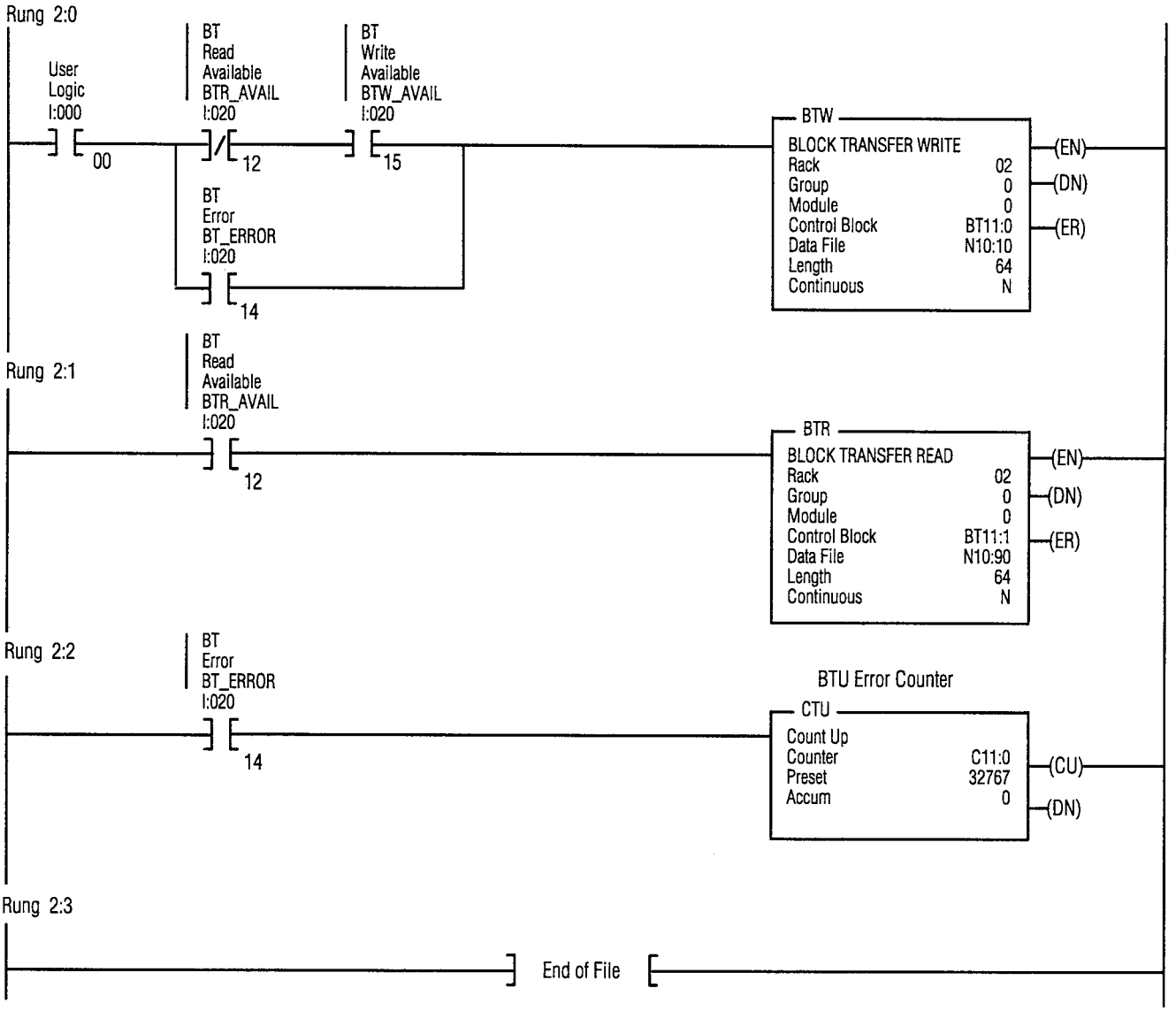


Figure 5-8 — Block Transfer Example PLC 5/20, 5/40, 5/60, 5/80

ADDITIONAL NOTES REGARDING BLOCK TRANSFER PROGRAMMING

1. A Block Transfer Subroutine can be used to transfer more data than can be moved in a single Block Transfer. If this is done, the Block Transfers must be carefully sequenced so that one Block Transfer Write and one Block Transfer Read occur for each portion of the sequence. One method of doing this is to set a latch bit to enable the Block Transfer Write and unlatch this bit when the Block Transfer Write is completed. When the Block Transfer Read completes, the program can then set up the data for the next transfer.
2. The status bits from the BTW and BTR Control files (EN, DN, ER) may change at any time during a program scan. If they are used by the program they should be copied to a file and the program should use the copied versions.

DH+ Communications

Each channel of the PLC Comm Adapter Board can be configured for DH+ communications. Configuration as a DH+ device allows the drive to look like a station on the DH+ link. DH+ features include:

- 57.6K, 115K and 230Kbaud communication rates.
- Parameter read and write messages for block of parameters.
- A method similar to RIO Block Transfer that allows the PLC Controller to issue drive messages via DH+.

DH+ Command Set

The PLC Comm Adapter Board supports a limited set of PC commands by emulating a section of PLC-5 memory. The memory area emulated determines what specific request or action the PLC Comm Board will take. Below is a list of the supported commands.

WHO ACTIVE The station number of the PLC Comm Adapter Board as defined by it's DIP switch settings will be displayed on the WHO ACTIVE screen of the PLC software. It will read PLC-5/15 1336T next to the selected station number.

PLC 5 TYPED READ (N10:1-497) Memory area N10:0-497 translates into a read parameter value from the 1336 FORCE. Any attempts to read outside of this range will result in an error response. The values 0-497 are interpreted by the 1336 FORCE as parameter numbers. For example, to read the value of Parameter 133 the MSG instruction would request N10:133 with a size of one element. A size of 10 would read parameters 133-142.

PLC 5 TYPED WRITE (N10:1-497) Memory area N10:0-497 translates into one or more write parameter values to the 1336 FORCE. Any attempts to write outside of this range will result in an error response. The values 0-497 are interpreted by the Drive as parameter numbers. For example, to write a value to Parameter 119 — Preset Speed 1, the MSG instruction would specify N10:119 with a size of one element. A size of 10 will write to parameters 119-128.

PLC TYPED READ (N30:0-497) This request translates into a read parameter full message in the 1336 FORCE. Each parameter specified will result in 20 words of data (actual value, minimum value, maximum value, descriptor and parameter text. The maximum number of parameters that can be read using this service is (50).

PLC 5 TYPED READ (N40:1-39) This message emulates the RIO Block Transfer Functions available on the PLC Comm Adapter Board with the exception of the multiple parameter read. Refer to the message structure section that follows for details on the available messages and their use.

PLC 5 TYPED WRITE (N40:0-39) This message emulates the RIO Block Transfer Functions available on the PLC Comm Adapter Board with the exception of the multiple parameter write. Refer to the message structure section that follows for details on the available messages and their use.

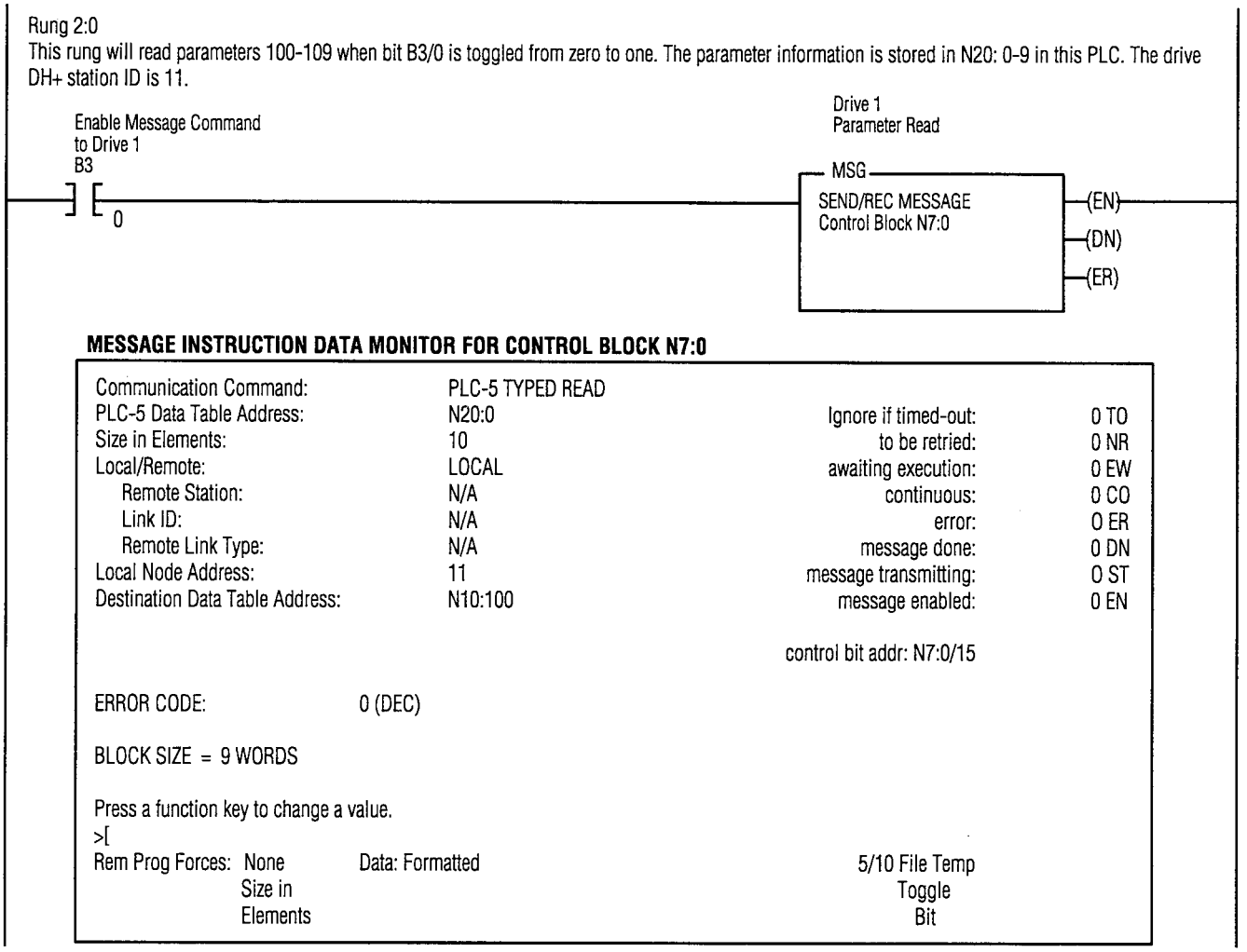
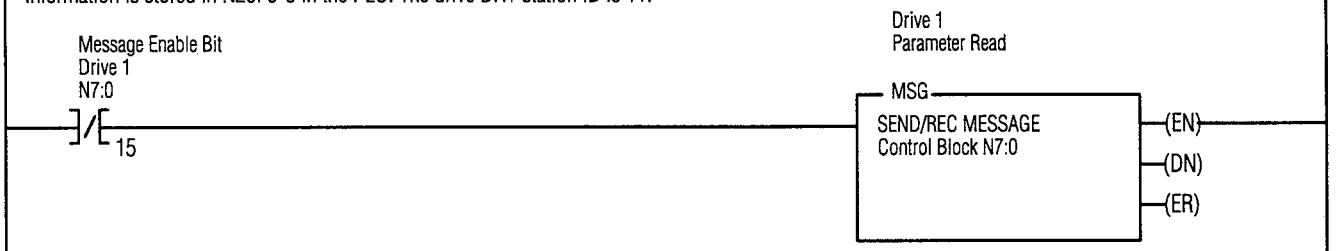


Figure 5-9 — PLC5/15 Sample Program — RUNG 2:0

Rung 2:0
This rung will read parameters 100-109 on a continuous basis by using the Message Block enable bit to toggle the next message. The parameter information is stored in N20: 0-9 in the PLC. The drive DH+ station ID is 11.



MESSAGE INSTRUCTION DATA MONITOR FOR CONTROL BLOCK N7:0

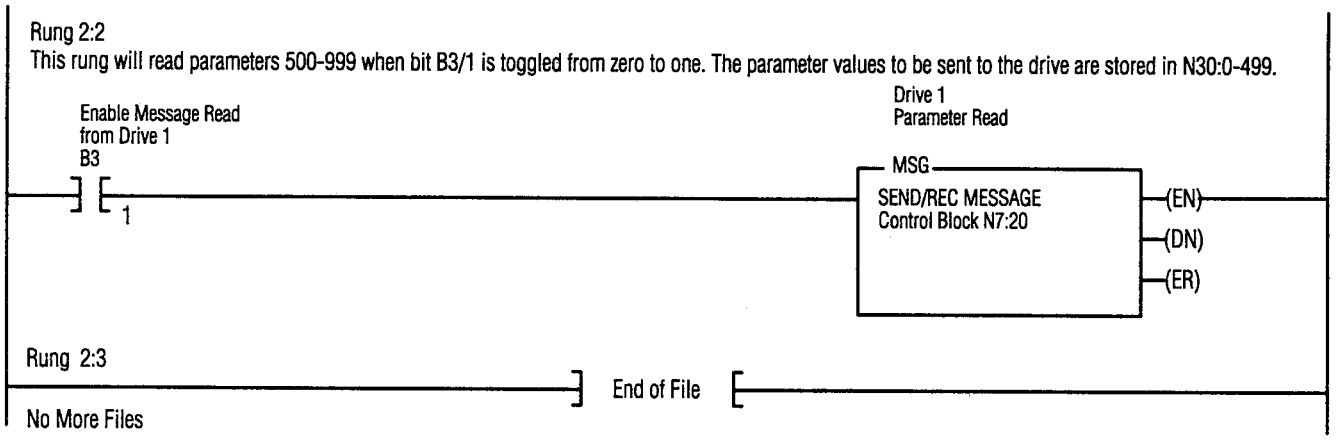
Communication Command:	PLC-5 TYPED READ		
PLC-5 Data Table Address:	N20:0	Ignore if timed-out:	0 TO
Size in Elements:	10	to be retried:	0 NR
Local/Remote:	LOCAL	awaiting execution:	0 EW
Remote Station:	N/A	continuous:	0 CO
Link ID:	N/A	error:	0 ER
Remote Link Type:	N/A	message done:	0 DN
Local Node Address:	11	message transmitting:	0 ST
Destination Data Table Address:	N10:100	message enabled:	0 EN
		control bit addr: N7:0/15	

ERROR CODE: 0 (DEC)

BLOCK SIZE = 9 WORDS

Press a function key to change a value.
>[
Rem Prog Forces: None Data: Formatted 5/10 File Temp
Size in Toggle
Elements Bit

Figure 5-10 — PLC5/15 Sample Program — RUNG 2:1



MESSAGE INSTRUCTION DATA MONITOR FOR CONTROL BLOCK N7:0

Communication Command:	PLC-5 TYPED READ		
PLC-5 Data Table Address:	N30:0	Ignore if timed-out:	0 TO
Size in Elements:	30	to be retried:	0 NR
Local/Remote:	LOCAL	awaiting execution:	0 EW
Remote Station:	N/A	continuous:	0 CO
Link ID:	N/A	error:	0 ER
Remote Link Type:	N/A	message done:	0 DN
Local Node Address:	11	message transmitting:	0 ST
Destination Data Table Address:	N10:100	message enabled:	0 EN
		control bit addr: N7:20/15	

ERROR CODE: 0 (DEC)

BLOCK SIZE = 10 WORDS

Press a function key to change a value.
>[

Rem Prog Forces: None	Data: Formatted	5/10 File Temp
Size in		Toggle
Elements		Bit

Figure 5-11 — PLC5/15 Sample Program — RUNG 2:2

Block Transfer Descriptions

The descriptions provided in the remainder of this chapter contain the header and data configurations necessary to setup the data files in the Block Transfer Instructions. Header and data values will vary depending on the operation to be performed. Also included is a description of the status word that is returned from the drive and appears in the Block Transfer Read Header information.

Block Transfer Status Word

In most cases, Header Word 2 of the drive response will contain a negative value (bit 15 = 1) when a Block Transfer operation is unsuccessful. In most cases a Status Word is also returned and will indicate the reason for the Block Transfer failure. The location of the Status Word is typically Header Word 4 in the drive response, but will vary depending on the message. Shown below is an explanation of the Status Word codes.

STATUS WORD CODES

VALUE	DESCRIPTION
0	NO ERROR
1	SERVICE FAILED DUE TO AN INTERNAL REASON AND THE DRIVE COUNLD NOT PEFORM THE REQUEST — SOME MESSAGES ARE READ ONLY OR WRITE ONLY
2	SERVICE NOT SUPPORTED
3	INVALID VALUE IN BLOCK TRANSFER REQUEST HEADER WORD 2
4	INVALID VALUE IN BLOCK TRANSFER REQUEST HEADER WORD 3
5	INVALID VALUE IN BLOCK TRANSFER REQUEST HEADER WORD 4
6	DATA VALUE OUT OF RANGE
7	DRIVE STATE CONFLICT — THE DRIVE IS IN AN INCORRECT STATE TO PERFORM THE FUNCTION — THE DRIVE CANNOT BE RUNNING IN ORDER TO PERFOMR CERTAIN FUNCTIONS

Table 5-12 below summarizes the valid command code which will appear in word 2 of the Block Transfer write Header Message. A complete description of the Block Transfer write Header Message is provided on the specified page.

CLASS	FUNCTION	PLC DECIMAL VALUE	PAGE
PARAMETER READ	Parameter Value Read	769	5-13
	Continuous Parameter Value Read	1	5-14
	Scattered Parameter Value Read	3	5-16
	Parameter Read Full	768	5-18
PARAMETER WRITE	Parameter Value Write	-31999	5-21
	Continuous Parameter Value Write	-32767	5-22
	Scattered Parameter Value Write	-32765	5-24
FAULT QUEUE	Fault Clear/Reset	-30976	5-26
	Trip Fault Queue Number	1793	5-27
	Fault Entry Read Full	1792	5-28
WARNING QUEUE	Warning Clear	-30720	5-30
	Warning Queue Read Full	2048	5-31
EE MEMORY REQUEST	Save/Recall/Initialize	-31988	5-33
LINK READ	Link Parameter Read	2304	5-34
	Continuous Parameter Link Read	4	5-35
	Scattered Parameter Link Read	5	5-37
LINK WRITE	Link Parameter Write	-30464	5-39
	Continuous Parameter Link Write	-32764	5-40
	Scattered Parameter Link Write	-32763	5-42
	Parameter Link Clear	-30464	5-44
USER TEST STRING	User Text String Read	261	5-45
	User Text String Write	-32507	5-47
CLOCK DATA	Real Time Clock Data Read	2816	5-49
	Real Time Clock Data Write	2816	5-51
RUN TIME ACCUMULATOR	Run Time Accumulator Data Read	2817	5-53
	Clear Run Time Accumulator	-29950	5-54
TIME STAMP	Reference Time Stamp Data Read	2816	5-55
	Reference Time Stamp Data Write	-29952	5-57
	Load Clock Into Reference Stamp	0	5-59

Table 5-12 — Block Transfer Message Word 2 Code Definitions

PARAMETER READ

Parameter Value Read

MESSAGE DESCRIPTION

This message is sent by the PLC Comm Board and will read the 16 bit parameter data value for the parameter number selected.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 769	HEADER WORD 2
PARAMETER NUMBER (Refer to Parameter List in Chapter 7)	DATA WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 769 — MESSAGE OK -31999 — MESSAGE ERROR	HEADER WORD 2
PARAMETER NUMBER	HEADER WORD 3
PARAMETER VALUE OR STATUS WORD	HEADER WORD 4

MESSAGE OPERATION

The Parameter Value Read function specified in the BTW will read parameter values from the drive and place that value (or an error code) in Word 4 of the BTR Data File. The value shown will be in device units. If an error has occurred, Word 2 of the BTR will return a value of -31999 and Word 4 will contain the status code.

EXAMPLE

In this example the value of Parameter 20 was requested from a 1336 FORCE and a value of 4096 was returned. 4096 is the internal drive unit value for the Maximum Rated Voltage Parameter. This corresponds to a value of 100% drive rated volts in display units.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	769	❶ 20							
BTR DATA FILE	N10:90	0	769	❶ 20	❶ 4096						

❶ These values vary depending on parameters and products.

PARAMETER READ

Continuous Parameter Value Read

MESSAGE DESCRIPTION

This function reads a continuous list of parameters beginning with the starting parameter number. The number of parameters to be read is defined by the user.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 5-64 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 4	HEADER WORD 1
PLC DECIMAL VALUE 1	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO READ	DATA WORD 3
STARTING PARAMETER NUMBER	DATA WORD 4

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 1 — MESSAGE OK -32767 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO READ	DATA WORD 3
STARTING PARAMETER NUMBER	DATA WORD 4
VALUE NUMBER 1 OR STATUS WORD	DATA WORD 5
VALUE NUMBER 2 OR STATUS WORD	DATA WORD 6
VALUE NUMBER 3 OR STATUS WORD	DATA WORD 7
•	•
•	•
VALUE NUMBER 60 OR STATUS WORD	DATA WORD 64

MESSAGE OPERATION

The Continuous Parameter Value Read function specified in the BTW will read a consecutive group of parameter values from the device, beginning with the starting parameter number defined in Word 4 of the BTW message. The number of parameters to be read is defined in Word 3 of the BTW message. The values will return in the BTR response, beginning with Word 5 of the message. If an error has occurred in reading any of the values, the response will return a status word with a negative value instead of the parameter value.

Continuous Parameter Value Read
(continued)

EXAMPLE

In this example, 60 parameters were read from a 1336 FORCE, beginning with Parameter 10. The values of these parameters are returned in the BTR Data File, beginning at N10:94. The values are in drive units.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	4	1	❶ 60	❶ 10						
BTR DATA FILE	N10:90	0	1	❶ 60	❶ 10	❶ 0	❶ 0	❶ 0	❶ 0	❶ 0	❶ 100
	N10:100	❶ 0	❶ 50	❶ 4096	❶ 60	❶ 4096	❶ 1	❶ 6	❶ 0	❶ 1000	❶ 0
	N10:110	❶ 0	❶ 0	❶ 0	❶ 0	❶ 1000	❶ 1000	❶ 400	❶ 400	❶ 400	❶ 0
	N10:120	❶ 6144	❶ 2	❶ 4710	❶ 1	❶ 1	❶ 0	❶ 0	❶ 0	❶ 0	❶ 2
	N10:130	❶ 64	❶ 0	❶ 0	❶ 15	❶ 1024	❶ 0	❶ 0	❶ 5811	❶ 0	❶ 18
	N10:140	❶ 0	❶ 0	❶ 0	❶ 3597	❶ 0	❶ 12808	❶ 6	❶ 0	❶ 0	❶ 17952
	N10:150	❶ 0	❶ 0	❶ 0	❶ 0	❶ 0					

❶ These values vary depending on parameters and products.

PARAMETER READ

Scattered Parameter Value Read

MESSAGE DESCRIPTION

This function reads a scattered list of parameters with each parameter defined by the user. The number of parameters to be read must also be defined.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-63 Words

BTR Instruction Length: 5-63 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-63	HEADER WORD 1
PLC DECIMAL VALUE 3	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO READ	DATA WORD 3
PARAMETER NUMBER 1	DATA WORD 4
0	DATA WORD 5
PARAMETER NUMBER 2	DATA WORD 6
0	DATA WORD 7
PARAMETER NUMBER 3	DATA WORD 8
0	DATA WORD 9
•	•
•	•
PARAMETER NUMBER 30	DATA WORD 62
0	DATA WORD 63

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 3 — MESSAGE OK -32765 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO READ	DATA WORD 3
BIT 15 PARAMETER NUMBER 1	DATA WORD 4
PARAMETER VALUE OR STATUS WORD 1	DATA WORD 5
BIT 15 PARAMETER NUMBER 2	DATA WORD 6
PARAMETER VALUE OR STATUS WORD 2	DATA WORD 7
BIT 15 PARAMETER NUMBER 3	DATA WORD 8
PARAMETER VALUE OR STATUS WORD 3	DATA WORD 9
•	•
•	•
BIT 15 PARAMETER NUMBER 30	WORD 62 DATA
PARAMETER VALUE OR STATUS WORD 30	WORD 63 DATA

Scattered Parameter Value Read
(continued)

MESSAGE OPERATION

The Scattered Parameter Value Read function specified in the BTW will read a predefined group of parameter values, in any order, from the device. The number of parameters to be read is defined in Word 3 of the BTW Data File. The parameters to be read and their order is defined starting with Word 4. An unused word is left between each parameter request, so the BTR can respond with the parameter value as shown. If an error has occurred in reading any of the values, the response will return a Status Word with a negative value instead of the parameter value.

EXAMPLE

In this example, (8) parameters were read from a 1336 FORCE, as defined in Word 3 of the BTW Data File. The parameter numbers requested were 5, 7, 8, 20, 18, 17, 19 and 36. The BTR response returned the values of these parameters into the BTR Data File. These values are in drive units.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	19	3	❶ 8	❶ 5	0	❶ 7	0	❶ 8	0	❶ 20
	N10:20	0	❶ 18	❶ 0	❶ 17	0	❶ 19	0	❶ 36	0	
BTR DATA FILE	N10:90	0	3	❶ 8	❶ 5	❶ 6	❶ 7	❶ 1000	❶ 8	❶ 1000	❶ 20
	N10:100	❶ 4096	❶ 18	❶ 4096	❶ 17	❶ 51	❶ 19	❶ 60	❶ 36	❶ 6144	

❶ These values vary depending on parameters and products.

PARAMETER READ

Parameter Read Full

MESSAGE DESCRIPTION

This message request provides the requesting Remote I/O source with all known attributes for the parameters requested. This information includes the parameter's current value, descriptor, multiply and divide value, base value, offset value, text string, group element reference, minimum value, maximum value, default value, and unit text string.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 23 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 768	HEADER WORD 2
PARAMETER NUMBER	DATA WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 768 — MESSAGE OK -32000 — MESSAGE ERROR	HEADER WORD 2
PARAMETER NUMBER	DATA WORD 3
PARAMETER VALUE OR STATUS WORD	DATA WORD 4
DESCRIPTOR	DATA WORD 5
MULTIPLY VALUE	DATA WORD 6
DIVIDE VALUE	DATA WORD 7
BASE VALUE	DATA WORD 8
OFFSET VALUE	DATA WORD 9
PARAMETER TEXT CHARACTER 2 | CHARACTER 1	DATA WORD 10
PARAMETER TEXT CHARACTER 4 | CHARACTER 3	DATA WORD 11
PARAMETER TEXT CHARACTER 6 | CHARACTER 5	DATA WORD 12
PARAMETER TEXT CHARACTER 8 | CHARACTER 7	DATA WORD 13
PARAMETER TEXT CHARACTER 10 | CHARACTER 9	DATA WORD 14

Parameter Read Full
(continued)

BLOCK TRANSFER READ (CONTINUED)

PARAMETER TEXT CHARACTER 12 | CHARACTER 11	HEADER WORD 15
PARAMETER TEXT CHARACTER 14 | CHARACTER 13	HEADER WORD 16
PARAMETER TEXT CHARACTER 16 | CHARACTER 15	HEADER WORD 17
FILE, GROUP, ELEMENT	HEADER WORD 18
MINIMUM VALUE	HEADER WORD 19
MAXIMUM VALUE	HEADER WORD 20
DEFAULT VALUE	HEADER WORD 21
UNIT TEXT CHARACTER 2 | CHARACTER 1	HEADER WORD 22
UNIT TEXT CHARACTER 3 | CHARACTER 4	HEADER WORD 23

MESSAGE OPERATION

The Parameter Read Full function specified in the BTW will retrieve the attributes of the parameter requested. The attributes for each parameter include the data, minimum and maximum values and the parameter text. The response message will return this information, beginning with Data Word 4. The parameter text will be returned with each data word containing (2) ASCII characters per word. This data will return with the first and second characters in opposite order as shown in the following example. If an error has occurred in the BT, Word 2 of the BTR will return a value of -32000.

Parameter Read Full
(continued)

EXAMPLE

In this example a Parameter Read Full was performed through Block Transfer on a 1336 FORCE. N10:10 shows the Header Message for the BTW. The Data is returned in the BTR Data File, starting with Word 4, for Parameter 20. Word 4 shows the present value in drive units. Word 5 through Word 9 provide scaling information, used to convert drive units to engineering units. Word 10 through Word 17 provide the parameter name. This example shows the response message N10:90 through N10:112 in both binary and ASCII. Note the ASCII information beginning with N10:99. The parameter name characters return in reverse order for each Word. N10:99 has the ASCII value of aM. To read this, invert the Word to read Ma. The next word ix, inverted gives you xi. These words along with the following two words, form the word Maximum. The parameter name Maximum Voltage can be seen in Word 10 through Word 17 of the response message. In addition, Word 23 is also is returned in this format. This Word provides the units the parameter is defined in — In this example Vlts.

Word 18 contains the file, group and element which are used to reference the parameter.

Words 19-21 contain the minimum, maximum and default values of this parameter.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	768	❶ 20							
BTR DATA FILE	N10:90	0	768	❶ 20	❶ 4096	❶ 355	❶ 1	❶ 4096	❶ 460	❶ 0	❶ 24909
	N10:100	❶ 27000	❶ 30061	❶ 8301	❶ 28502	❶ 29804	❶ 26465	❶ 8293	❶ 1794	❶ 1024	❶ 4915
	N10:110	❶ 4096	❶ 27734	❶ 29556							
	N10:90	0	\03\00	\00\14	\10\00	\01 c	\00\01	\10\00	\01\CC	\00\00	a M
	N10:100	i x	u m	m	o V	t l	g a	e	07 02	04 00	\13 0
	N10:110	\10\00	l V	s t							

ASCII Display Values

❶ These Values vary depending on parameters and products.

PARAMETER WRITE

Parameter Value Write

MESSAGE DESCRIPTION

This message sent by the PLC Comm Board will read the 16 bit parameter data value for the parameter number selected.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 4	HEADER WORD 1
PLC DECIMAL VALUE -31999	HEADER WORD 2
PARAMETER NUMBER (Refer to Parameter List in Chapter 7)	DATA WORD 3
PARAMETER VALUE	DATA WORD 4

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 769 — MESSAGE OK -31999 — MESSAGE ERROR	HEADER WORD 2
PARAMETER NUMBER	DATA WORD 3
PARAMETER VALUE OR STATUS WORD	DATA WORD 4

MESSAGE OPERATION

The Parameter Value Write function specified in the BTW will send a new value (specified in Word 4 of the BTW Header Message) to the parameter specified in the BTW Header Word 3. The value must be in device units. If an error has occurred, Word 2 of the response will return a value of -31999 and Word 4 will contain a status code.

EXAMPLE

In this example the value a value of 4096 was sent to Parameter 20. 4096 is in drive units and indicates a value of 100% of rated drive volts as defined by Parameter 147 — Drive Rated Volts.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	4	-31999	❶ 20	❶ 4096						
BTR DATA FILE	N10:90	0	769	❶ 20	❶ 4096						

❶ These values vary depending on parameters and products.

PARAMETER WRITE

Continuous Parameter Value Write

MESSAGE DESCRIPTION

This function writes to a continuous list of parameters beginning with the starting parameter number.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-64 Words

BTR Instruction Length: 5-64 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-64	HEADER WORD 1
PLC DECIMAL VALUE -32767	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO WRITE	DATA WORD 3
STARTING PARAMETER NUMBER	DATA WORD 4
VALUE NUMBER 1	DATA WORD 5
VALUE NUMBER 2	DATA WORD 6
VALUE NUMBER 3	DATA WORD 7
•	•
•	•
VALUE NUMBER 60	DATA WORD 64

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 1 — MESSAGE OK -32767 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO WRITE	DATA WORD 3
STARTING PARAMETER NUMBER	DATA WORD 4
STATUS WORD	DATA WORD 5
STATUS WORD	DATA WORD 6
STATUS WORD	DATA WORD 7
•	•
•	•
STATUS WORD	DATA WORD 64

MESSAGE OPERATION

The Continuous Parameter Value Write function specified in the BTW will write data values to a consecutive group of parameters, beginning with the starting parameter number defined in Word 4 of the BTW message. The number of parameters to be written to is defined in Word 3 of the BTW message. If an error has occurred in writing to any of the values, the BTR Data File status word will contain an error code. If no error has occurred, it will return a value of 0.

Continuous Parameter Value Write
(continued)

EXAMPLE

In this example, (8) 1336 FORCE parameter values were written to, starting with Parameter 10. The eight parameter values are in device units. Since all of the parameter values were accepted, values of 0 were returned in the BTR status words.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	12	-32767	❶ 6	❶ 10	❶ 1	❶ 1	❶ 1	❶ 1	❶ 1	❶ 101
	N10:20	❶ 1	❶ 51								
BTR DATA FILE	N10:90	0	1	❶ 8	❶ 10	❶ 0	❶ 0	❶ 0	❶ 0	❶ 0	❶ 0
	N10:100	❶ 0	❶ 0								

❶ These values vary depending on parameters and products.

PARAMETER WRITE

Scattered Parameter Value Write

MESSAGE DESCRIPTION

This function writes to a list of parameters and returns the status of each parameter in its value location. Parameter numbers do not need to be in consecutive order.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-63 Words

BTR Instruction Length: 5-63 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-63	HEADER WORD 1
PLC DECIMAL VALUE -32765	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO WRITE	DATA WORD 3
PARAMETER NUMBER 1	DATA WORD 4
PARAMETER VALUE 1	DATA WORD 5
PARAMETER NUMBER 2	DATA WORD 6
PARAMETER VALUE 2	DATA WORD 7
PARAMETER NUMBER 3	DATA WORD 8
PARAMETER VALUE 3	DATA WORD 9
•	•
•	•
PARAMETER NUMBER 30	DATA WORD 62
PARAMETER VALUE 30	DATA WORD 63

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 3 — MESSAGE OK -32765 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER VALUES TO WRITE	DATA WORD 3
BIT 15 PARAMETER NUMBER 1	DATA WORD 4
STATUS WORD 1	DATA WORD 5
BIT 15 PARAMETER NUMBER 2	DATA WORD 6
STATUS 2 WORD 2	DATA WORD 7
BIT 15 PARAMETER NUMBER 3	DATA WORD 8
STATUS 3 WORD 3	DATA WORD 9
•	•
•	•
BIT 15 PARAMETER NUMBER 30	DATA WORD 62
PARAMETER VALUE OR STATUS WORD 30	DATA WORD 63

Scattered Parameter Value Write
(continued)

MESSAGE OPERATION

The Scattered Parameter Value Write function specified in the BTW will write data values to a defined group of parameters in any order. The number of parameters to be written to is defined in Word 3 of the BTW Data File. The parameters to be written to, and their order is defined starting with Word 4. The BTR response message will return a status word for each value written to, indicating if the parameter write was successful. If a transfer is not successful for a given parameter, the value in the parameter number location will be negative (bit 15 =1).

EXAMPLE

In this example, six parameters were written to in a 1336 FORCE. Word 3 of the BTW message (N10:12) defines the number of parameter values that will be transferred. Each parameter number followed by its value is listed in the message beginning with Word 4. The values are entered in drive units. The BTR response (N10:90) returns the status of each parameter write. If the BTW was successful, a zero will be returned. If an error has occurred, the response will return a status code for the error. Note that a value of 600 was sent to Parameter 392 (words N10:7 and N10:8). Word N10:91 indicates the Block Transfer operation was not completely successful. If all parameter values had been successfully transferred, N10:91 would contain the value 3. Word N10:97 contains a negative value indicating the error occurred with Parameter 392. Word N10:98 contains the status code indicating the parameter value is out of range.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	15	-32767	❶ 8	❶ 90	❶ 1	❶ 150	❶ 4	❶ 392	❶ 6000	❶ 31
	N10:20	❶ 10	❶ 10	❶ 2	❶ 12	❶ 5					
BTR DATA FILE	N10:90	0	-32765	❶ 8	❶ 90	❶ 0	❶ 150	❶ 0	❶ 392	❶ 6	❶ 31
	N10:100	❶ 0	❶ 10	❶ 0	❶ 12	❶ 0					

❶ These values vary depending on parameters and products.

FAULT QUEUE

Fault Clear/Reset

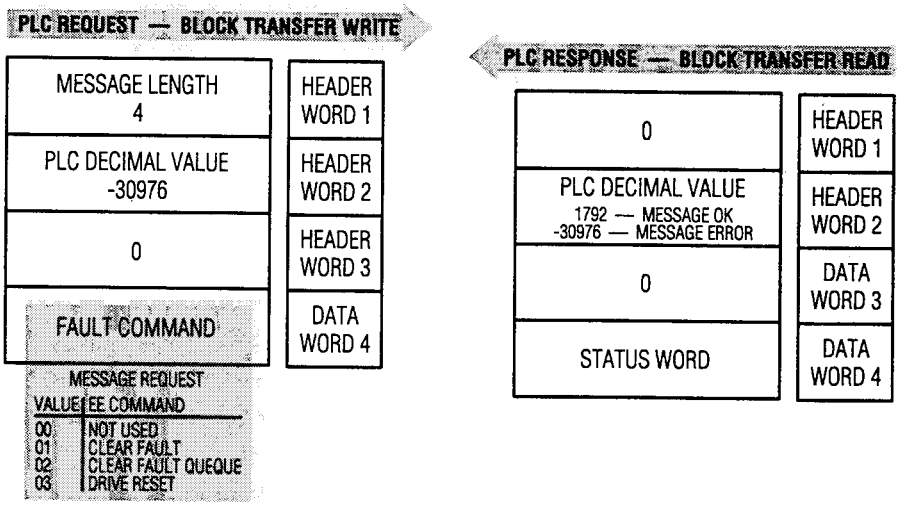
MESSAGE DESCRIPTION

This message will activate the fault functions shown below in the message request.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words
BTR Instruction Length: 4 Words

MESSAGE STRUCTURE



MESSAGE OPERATION

The Fault Clear/Reset function specified in the BTW will send a fault handling request to the drive. A Fault Clear Request will clear the last fault that occurred. A Clear Fault Queue will clear the entire fault buffer. A drive reset will reset the drive, the fault queue will be cleared, and parameter information stored in EEPROM will be written to RAM. If an error has occurred in the BT, Word 2 of the BTR will return a value of -30976

EXAMPLE

In this example, a Fault Clear Request was sent to the drive through the BT. The BTR response indicated a successful clear by returning a value of 1792 in Word 2, and a value of 0 in Word 4.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	4	-30976	0	1						
BTR DATA FILE	N90:0	0	1792	0	❶ 0						

❶ These values vary depending on parameters and products.

FAULT QUEUE

Trip Fault Queue Number

MESSAGE DESCRIPTION

This message provides the fault queue number of the fault that caused the drive to trip.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE 3	HEADER WORD 1
PLC DECIMAL VALUE 1793	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 1793 — MESSAGE OK -30975 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3
FAULT QUEUE SIZE	HEADER WORD 4

MESSAGE OPERATION

The Trip Fault Queue Number function will provide the entry number of the fault in the fault queue that tripped the drive The BTR response contains that number in Word 4. The Fault Queue Number will equal 0 when the drive is not faulted If an error has occurred in the BT, Word 2 of the response will be -30975.

EXAMPLE

In this example, the first entry in the drive fault queue has caused the drive to trip. Word 4 of the BTR indicates the entry number.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	1794	0							
BTR DATA FILE	N10:90	0	1794	0	❶ 1						

❶ These values vary depending on parameters and products.

FAULT QUEUE

Fault Entry Read Full

MESSAGE DESCRIPTION

This function reads the contents of the fault queue entry specified. A message is returned which includes the fault text and fault code associated with the specified fault queue entry and the time stamp associated with the fault.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 12 or 16 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE 3	HEADER WORD 1
PLC DECIMAL VALUE 1792	HEADER WORD 2
FAULT QUEUE ENTRY NUMBER	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 1792 — MESSAGE OK -30976 — MESSAGE ERROR	HEADER WORD 2
FAULT QUEUE ENTRY NUMBER	DATA WORD 3
FAULT TEXT CHARACTER 2 | CHARACTER 1	DATA WORD 4
FAULT TEXT CHARACTER 4 | CHARACTER 3	DATA WORD 5
FAULT TEXT CHARACTER 6 | CHARACTER 5	DATA WORD 6
FAULT TEXT CHARACTER 8 | CHARACTER 7	DATA WORD 7
FAULT TEXT CHARACTER 10 | CHARACTER 9	DATA WORD 8
FAULT TEXT CHARACTER 12 | CHARACTER 11	DATA WORD 9
FAULT TEXT CHARACTER 14 | CHARACTER 13	DATA WORD 10
FAULT TEXT CHARACTER 16 | CHARACTER 15	DATA WORD 11
FAULT CODE VALUE	DATA WORD 12
CLOCK TIME SECONDS | REF	DATA WORD 13
CLOCK TIME HOUR | MINUTE	DATA WORD 14
CLOCK TIME DATE | DAY	DATA WORD 15
CLOCK TIME YEAR | MONTH	DATA WORD 16

Fault Entry Read Full
(continued)

MESSAGE OPERATION

The Fault Queue Entry Read Full function specified in the BTW will read the contents of the fault queue specified in Word 3 of the BTW Message. The response will return the fault text which can be as ASCII text. The text will have every 2 characters in reverse order and return a time stamp, indicating the day and time the fault occurred. The Clock Time will be returned in the order as seen in the Header Message. This information should be viewed as ASCII text.

1. Reference will indicate AM, with a value of 0, or PM with a value of 1.
2. The Date will indicate the date of the month in ASCII.
3. The Day will indicate the day of the week, with 1 being Sunday, and 7 being Saturday.
4. The Year will indicate the number of the year with 1990 being a reference of 0. The year 1995 would return a value of 5.
5. The Month is a number between 0-12.

If an error has occurred, Word 2 of the response will return a negative value.

EXAMPLE

In this example, Fault Queue Entry #3 was retrieved from the drive. The BTR response returned the ASCII text Drive Reset Flt, with each character reversed. The Fault Code for this example is 22.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	1792	❶ 3							
BTR DATA FILE	N10:90	0	1792	❶ 3	❶ 29252	❶ 30313	❶ 8293	❶ 25938	❶ 25971	❶ 8308	❶ 27718
	N10:100	❶ 8308	❶ 22	7681	3594	5893	1282				
	N10:90	0	07\00	03\00	rD	Vi	e	eR	es	t	IF
	N10:100	t	00\16	1E\01	0E\0A	17\05	05\02				

ASCII Display Values

❶ These Values vary depending on parameters and products.

WARNING QUEUE

Warning Clear

MESSAGE DESCRIPTION

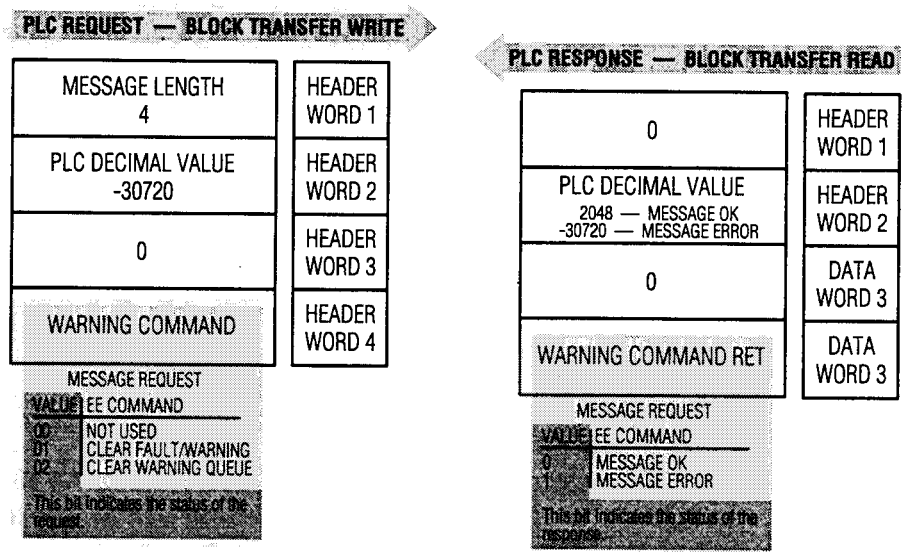
This message will issue a clear warning fault command to the drive.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE



MESSAGE OPERATION

The Warning Clear function specification in the BTW will send a warning fault handling request to the drive. Word 4 of the BTW defines which fault handling option is requested. A value of 1 in Word 4 will clear the last warning fault. A value of 21 will clear the entire warning fault queue. If an error has occurred in the request, Word 2 of the BTR will return a value of -30975. Word 4 of the BTR will respond to the request of BTW Word 4.

EXAMPLE

In this example, a Clear Fault/Warning request was sent to the drive by putting a value of 1 in Word 4 of the BTW. Word 2 of the BTR indicated a successful clear by returning a value of 2048.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	4	-30720	0	01						
BTR DATA FILE	N10:90	0	2048	0	1						

WARNING QUEUE

Warning Queue Read Full

MESSAGE DESCRIPTION

This message is provided to read the contents of a warning queue entry. The entry is specified by the instance, which includes information such as the warning code, fault event time stamp, and the fault text associated with the specified warning code. This is a read only message.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 16 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2048	HEADER WORD 2
WARNING QUEUE ENTRY NUMBER	DATA WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2048 — MESSAGE OK -30720 — MESSAGE ERROR	HEADER WORD 2
WARNING QUEUE ENTRY NUMBER	HEADER WORD 3
WARNING TEXT CHARACTER 2 | CHARACTER 1	DATA WORD 4
WARNING TEXT CHARACTER 4 | CHARACTER 3	DATA WORD 5
WARNING TEXT CHARACTER 6 | CHARACTER 5	DATA WORD 6
WARNING TEXT CHARACTER 8 | CHARACTER 7	DATA WORD 7
WARNING TEXT CHARACTER 10 | CHARACTER 9	DATA WORD 8
WARNING TEXT CHARACTER 12 | CHARACTER 11	DATA WORD 9
WARNING TEXT CHARACTER 14 | CHARACTER 13	DATA WORD 10
WARNING TEXT CHARACTER 16 | CHARACTER 15	DATA WORD 11
WARNING CODE VALUE	DATA WORD 12
CLOCK TIME SECOND | 1/10 OF SECOND	DATA WORD 13
CLOCK TIME HOUR | MINUTE	DATA WORD 14

Warning Queue Read Full
(continued)

BLOCK TRANSFER READ (CONTINUED)

CLOCK TIME		DATA WORD 15
DATE	DAY	
CLOCK TIME		DATA WORD 16
YEAR	MONTH	

MESSAGE OPERATION

The Warning Queue Entry Read Full function specified in the BTW will read the contents of the warning queue specified in Word 3 of the BTW Message. The response will return the warning text which can be seen as ASCII text. The text will have every 2 characters in reverse order and return a time stamp indicating the day and time the warning occurred. The Clock Time will be returned in the order as seen in the header message. This information should be viewed As ASCII text.

1. The Day will indicate the day of the week, with 1 being Sunday, and 7 being Saturday.
2. The Year will indicate the number of the year with 1990 being a reference of 0. The year 1995 would return a value of 5.
3. The Month is a number between 0-12.
4. The Date and Time are in hexadecimal format.

EXAMPLE

In this example, Warning Queue Entry #1 was retrieved from the drive. The BTR returned the ASCII text Vel Fdbk Loss, with each 2 characters reversed. The fault occurred at 10:14AM on Thursday Feb. 23rd, 1995.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	2048	1							
BTR DATA FILE	N10:90	0	2048	1	25942	8300	25670	27490	19488	29551	8307
	N10:100	8224	5048	7681	3594	5893	1282				
	N10:90	00\00	08\00	00\01	eV	l	df	kb	L	so	s
	N10:100	00\00	13\B8	1E\01	0E\0A	17\05	05\02				

ASCII Display Values

EE MEMORY REQUEST

Save/Recall/Initialize

MESSAGE DESCRIPTION

This message is sent by the PLC Comm Board and will activate the EE functions detailed in the Message Request.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 4	HEADER WORD 1
PLC DECIMAL VALUE -31998	HEADER WORD 2
0	HEADER WORD 3
EE COMMAND	HEADER WORD 4

VALUE	EE COMMAND
00	NOT USED
01	EE SAVE
02	EE RECALL
03	EE DEFAULT INITIALIZE

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 770 — MESSAGE OK -31998 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

The EE Memory function allows 3 different Message Requests. EE Save will save parameter information from working memory or RAM to EEPROM. EE Recall will retrieve the last saved data from EEPROM and place it in working memory or RAM. EE Default Initialize will clear RAM and EEPROM and set all parameter values to default. If an error has occurred, Word 2 of the response will return a value of -31998.

EXAMPLE

This example is requesting an EEPROM save.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	4	-31998	❶ 0	❶ 1						
BTR DATA FILE	N10:90	0	770	❶ 0							

❶ These values vary depending on parameters and products.

LINK READ

Link Parameter Read

MESSAGE DESCRIPTION

This message will read the source parameter number that is linked to the specified sink parameter.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2304	HEADER WORD 2
PARAMETER NUMBER (Refer to Parameter List in Chapter 7)	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2304 — MESSAGE OK -30464 — MESSAGE ERROR	HEADER WORD 2
SINK PARAMETER LINK	HEADER WORD 3
SOURCE PARAMETER NUMBER	DATA WORD 4

MESSAGE OPERATION

The Link Parameter Read function specified in the BTW will read the source parameter that is linked to the requested sink parameter, defined in Word 3 of the Header Message. The source parameter will be returned in Word 4 of the BTR. If an error has occurred, Word 2 of the BTR will return a value of -30464.

EXAMPLE

In this example the link associated with Parameter 101 was requested from the drive. The BTW Header Message Word 4 defines the sink parameter of the requested link with a value of 101. The linked source Parameter 330 is returned in Word 4 of the BTR.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	3	2304	101	0						
BTR DATA FILE	N10:90	0	2304	101	330						

LINK READ

Continuous Parameter Link Read

MESSAGE DESCRIPTION

This message will return a list of up to 60 parameters that are linked to each drive parameter in a consecutive list.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 5-64 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 4	HEADER WORD 1
PLC DECIMAL VALUE 4	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO READ	HEADER WORD 3
STARTING PARAMETER NUMBER	HEADER WORD 4

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 4 — MESSAGE OK -327664 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO READ	HEADER WORD 3
STARTING PARAMETER NUMBER	HEADER WORD 4
SOURCE PARAMETER NUMBER 1	HEADER WORD 5
SOURCE PARAMETER NUMBER 2	HEADER WORD 6
•	HEADER WORD
•	HEADER WORD
•	HEADER WORD
SOURCE PARAMETER NUMBER 60	HEADER WORD 64

MESSAGE OPERATION

The request must specify the number of links to be read and the starting sink parameter number. The response source will return the parameter number of the source that is linked to each sink parameter. The response returns links for a consecutive list of sink parameters (up to 60 links). If a parameter s not linked, a value of 0 will be returned.

Continuous Parameter Link Read

(continued)

EXAMPLE

A Continuous Parameter Link Read is requested for 9 parameter links (word N10:2) beginning with Parameter 359. The Block Transfer response will return the source parameters that are linked to Parameters 359-367. In this example, Parameter 359 is linked to Parameter 56, Parameter 360 is linked to Parameter 143, Parameter 367 is linked to Parameter 380, and Parameters 361-366 are not linked.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	4	4	9	359						
BTR DATA FILE	N10:90	0	4	9	359	56	360	59	361	81	362
	N10:100	80	363	168	364	167	365	134	366	26	367
	N10:110	330									

LINK READ

Scattered Parameter Link Read

MESSAGE DESCRIPTION

This message will return a list of up to (30) links in the source-to-sink order found in the drive. The links do not have to be in consecutive order.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-63 Words

BTR Instruction Length: 5-63 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-63	HEADER WORD 1
PLC DECIMAL VALUE 5	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO READ	HEADER WORD 3
PARAMETER NUMBER 1	HEADER WORD 4
0	HEADER WORD 5
PARAMETER NUMBER 2	HEADER WORD 6
0	HEADER WORD 7
•	HEADER WORD
•	HEADER WORD
•	•
PARAMETER NUMBER 30	HEADER WORD 62
0	HEADER WORD 63

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 5 — MESSAGE OK -32763 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO READ	HEADER WORD 3
BIT 15 PARAMETER NUMBER 1	HEADER WORD 4
SOURCE PARAMETER NUMBER 1	HEADER WORD 5
BIT 15 PARAMETER NUMBER 2	HEADER WORD 6
SOURCE PARAMETER NUMBER 2	HEADER WORD 7
•	HEADER WORD
•	HEADER WORD
•	HEADER WORD
BIT 15 PARAMETER NUMBER 30	HEADER WORD 62
SOURCE PARAMETER NUMBER 30	HEADER WORD 63

MESSAGE OPERATION

The Scattered Parameter Link Read function requested in the BTW will read up to (30) non-consecutive links made in the drive. The user requests the desired link information by defining the sink parameters in the BTW message. The corresponding source parameters will be returned through the BTR response.

Scattered Parameter Link Read
(continued)

EXAMPLE

In this example, a Scattered Parameter Link Read of (4) links was requested through the BTW. Sink parameters 119-367 and 401 were defined as the desired links to be read. The BTR returned the corresponding source parameter values in the words reserved for this information. If an error had occurred for a specific link, the value returned would be negative.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	12	5	4	119	0	368	0	367	0	401
	N10:20	0									
BTW DATA FILE	N10:90	0	5	4	119 Sink	0 Source	368 Sink	331 Source	367	330	401
	N10:100	0									

LINK WRITE

Link Parameter Write

MESSAGE DESCRIPTION

This message will write the source parameter link to the sink parameter. This function will write to only (1) link Block Transfer.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

4	HEADER WORD 1
PLC DECIMAL VALUE -30464	HEADER WORD 2
SINK PARAMETER NUMBER (Refer to Parameter List in Chapter 7)	HEADER WORD 3
LINK PARAMETER	DATA WORD 4

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2304 — MESSAGE OK -30464 — MESSAGE ERROR	HEADER WORD 2
SINK PARAMETER NUMBER	HEADER WORD 3
LINK NUMBER	HEADER WORD 4

MESSAGE OPERATION

The Link Parameter Write function specified in the BTW will write the corresponding source parameter link to the defined sink parameter. The sink parameter is defined in Word 3 of the BTW Data File with its' linked source defined in Word 4. If an error has occurred in the link, Word 20 of the BTR will return a value of -30464.

EXAMPLE

In this example, a link was defined between the sink parameter defined in Word 3 (Parameter 101 — External Velocity Reference), and the source parameter (Parameter 340 — Analog Input 2). The BTR Header Message confirmed the link by returning a value of 2034 in Word 2, and the link in order of sink-to-source in Words 3 &4.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	4	-30464	101	340						
BTR DATA FILE	N10:90	0	2304	101	340						

LINK WRITE

Continuous Parameter Link Write

MESSAGE DESCRIPTION

This message will write a list of up to (60) consecutive links to the drive, starting at the defined sink parameter.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-64 Words

BTR Instruction Length: 5-64 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-64	HEADER WORD 1
PLC DECIMAL VALUE -32764	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO WRITE	HEADER WORD 3
PARAMETER NUMBER 1	HEADER WORD 4
LINK NUMBER 1	HEADER WORD 5
LINK NUMBER 2	HEADER WORD 6
•	HEADER WORD
•	HEADER WORD
•	HEADER WORD
LINK NUMBER 60	HEADER WORD 64

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 4 — MESSAGE OK -32764 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO WRITE	HEADER WORD 3
STARTING PARAEMTER NUMBER	HEADER WORD 4
STATUS NUMBER 1	HEADER WORD 5
STATUS NUMBER 2	HEADER WORD 6
•	HEADER WORD 7
•	HEADER WORD
•	HEADER WORD
STATUS NUMBER 60	HEADER WORD 64

MESSAGE OPERATION

The Continuous Parameter Link Write function specified in the BTW will write a set of consecutive links to the drive. The number of links to be written is defined in the BTW Header Word 3. The starting sink parameter is defined in Word 4. The consecutive link source parameters are then listed in the remaining Header Words. Up to (60) continuous links can be made with this Block Transfer function.

Continuous Parameter Link Write
(continued)

EXAMPLE

In this example, a group of (4) continuous links were sent to the drive, starting at Parameter 119. A length of (4) links is defined in Word 3 of the BTW Header Message. Word 4 defines the starting link sink Parameter 119. Words 5-8 then list the source parameters that will be linked to the (4) continuous sink parameters, Parameters 119-122. The BTR message will return the status of the write request. 0's returned in Words 5-8 indicate that the write was successful.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	8	-32764	4	119	339	340	341	342		
BTR DATA FILE	N10:90	0	4	4	119	0	0	0	0		

LINK WRITE

Scattered Parameter Link Write

MESSAGE DESCRIPTION

This function writes a scattered group of links to the drive.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 5-63 Words

BTR Instruction Length: 5-63 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 5-63	HEADER WORD 1
PLC DECIMAL VALUE -32763	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO WRITE	HEADER WORD 3
PARAMETER NUMBER 1	HEADER WORD 4
LINK NUMBER 1	HEADER WORD 5
PARAMETER NUMBER 2	HEADER WORD 6
LINK NUMBER 2	HEADER WORD
•	HEADER WORD
•	HEADER WORD
•	HEADER WORD
PARAMETER NUMBER 30	HEADER WORD 62
LINK NUMBER 30	HEADER WORD 63

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 5 — MESSAGE OK -32763 — MESSAGE ERROR	HEADER WORD 2
NUMBER OF PARAMETER LINKS TO WRITE	HEADER WORD 3
BIT 15 PARAMETER NUMBER 1	HEADER WORD 4
STATUS 1 OR ERROR CODE	HEADER WORD 5
BIT 15 PARAMETER NUMBER 2	HEADER WORD 6
STATUS 2 OR ERROR CODE	HEADER WORD 7
•	HEADER WORD
•	HEADER WORD
•	HEADER WORD
BIT 15 PARAMETER NUMBER 30	HEADER WORD 62
STATUS 30 OR ERROR CODE	HEADER WORD 63

MESSAGE OPERATION

The Scattered Parameter Link Write function will read a predefined group of links in any order from the drive. The number of links to write is defined in Word 3 of the BTW. The links are then defined, followed by each sink's corresponding source in the remainder of the Header Message. Up to (30) scattered links can be defined with this function. If an incorrect link is defined, the BTR response will return a negative value for the sink parameter, followed by a status or error code. If there is an error in the BT, Word 2 of the BTR will contain a value of -32763.

Scattered Parameter Link Write
(continued)

EXAMPLE

In this example, (4) scattered links were written to the drive as defined in Word 3 of the BTW. Words 4 & 5 contain the 1st link with Word 4 defining the sink parameter, and Word 5 the corresponding source. Words 6 & 7 contain the next link, in the order of sink-to-source. The remaining (2) links are contained in Words 8-11. The BTR responds with 0 in place of the source parameter to indicate a successful link.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	11	-32763	4	387	146	388	168	367	330	368
	N10:20	331									
BTR DATA FILE	N10:90	0	5	4	387	0	388	0	367	0	368
	N10:100	0									

LINK WRITE

Parameter Link Clear

MESSAGE DESCRIPTION

This message will delete all user configured parameter links in the drive.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 4 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 4	HEADER WORD 1
PLC DECIMAL VALUE -30464	HEADER WORD 2
0	HEADER WORD 3
1	DATA WORD 4

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2304 — MESSAGE OK -30464 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

When this request is sent to the drive, all drive parameter links configured by the user will be deleted. If an error has occurred, Word 2 of the BTR will return a value of -30464.

EXAMPLE

In this example a Parameter Link Clear request was sent through the BTW. The BTR was only required to check for an error.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:0	4	-30464	0	1						
BTR DATA FILE	N10:90	0	2304	0							

USER TEXT STRING

User Text String Read

MESSAGE DESCRIPTION

This read only message retrieves from the drive the user custom product name/location test string which identifies the product. The text string is 16 characters long.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 11 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 261	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 261 — MESSAGE OK -32507 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3
PRODUCT TEXT CHARACTER 2 | CHARACTER 1	DATA WORD 4
PRODUCT TEXT CHARACTER 4 | CHARACTER 3	DATA WORD 5
PRODUCT TEXT CHARACTER 6 | CHARACTER 5	DATA WORD 6
PRODUCT TEXT CHARACTER 8 | CHARACTER 7	DATA WORD 7
PRODUCT TEXT CHARACTER 10 | CHARACTER 9	DATA WORD 8
PRODUCT TEXT CHARACTER 12 | CHARACTER 11	DATA WORD 9
PRODUCT TEXT CHARACTER 14 | CHARACTER 13	DATA WORD 10
PRODUCT TEXT CHARACTER 16 | CHARACTER 15	DATA WORD 11

MESSAGE OPERATION

This operation read the user's custom product test string stored in the drive. The response message will return this information beginning with Data Word 4. The text string will be returned with each data word containing (2) ASCII characters per word. This data will return with the 1st and 2nd characters in opposite order as shown in the example. If an error has occurred in the BTW, Word 2 of the BTR will return a value of -32507.

User Text String Read
(continued)

EXAMPLE

In this example, the BTW defined a User Text String Read request in Word 2 of the BTW with a value of 261. The BTR responds by returning a value of 261 in Word 2, indicating a successful read. In addition, it returned the user text string in Data Words 4-11 stored in the drive. The characters of each word are returned in reverse order. The user text string should read Press 8 Level 2.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	261	0							
	N10:20	\00\03	\01\05	\00\00							
BTR DATA FILE	N10:90	0	261	0	21072	21317	8275	8248	17740	17750	8268
	N10:100	12832									
	N10:90	00\00	01\05	00\00	rP	se	s	8	el	ev	L
	N10:100	2									

ASCII Display Values

USER TEXT STRING

User Text String Write

MESSAGE DESCRIPTION

This is a write message that stores in the drive the user custom product name/location text string which identifies the product. The text string is 16 characters long.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 11 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 11	HEADER WORD 1
PLC DECIMAL VALUE -32507	HEADER WORD 2
0	HEADER WORD 3
PRODUCT TEXT CHARACTER 2 | CHARACTER 1	DATA WORD 4
PRODUCT TEXT CHARACTER 4 | CHARACTER 3	DATA WORD 5
PRODUCT TEXT CHARACTER 6 | CHARACTER 5	DATA WORD 6
PRODUCT TEXT CHARACTER 8 | CHARACTER 7	DATA WORD 7
PRODUCT TEXT CHARACTER 10 | CHARACTER 9	DATA WORD 8
PRODUCT TEXT CHARACTER 12 | CHARACTER 11	DATA WORD 9
PRODUCT TEXT CHARACTER 14 | CHARACTER 13	DATA WORD 10
PRODUCT TEXT CHARACTER 16 | CHARACTER 15	DATA WORD 11

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 261 — MESSAGE OK -32507 — MESSAGE ERROR	HEADER WORD 2
ERROR CODE	HEADER WORD 3
0	HEADER WORD 4

MESSAGE OPERATION

The User Text String Write allows the user to write a custom product identification string to the drive. this string can be 16 ASCII characters long, which will be defined in the 8 words of the BTW. The characters must be entered in the order shown, with the 1st and 2nd character of each word entered in opposite order as shown in the example.

User Text String Write
(continued)

EXAMPLE

In this example, the BTW defined a text string of Press 8 Level 2 to be written to the drive. This information was entered in ASCII text, with the 2 characters of each word entered in opposite order. The BTR returned a value of 261 in Word 2, indicating a successful write. n addition, it returned the text string in Words 4-11. If an error had occurred in the BTW, the BTR would have returned an error code in Word 3 of -32507.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	11	-32507	0	21072	21317	8275	8248	17740	17750	8268
	N10:20	12832									
	N10:10	0008	7EFB	0000	rP	se	s	8	el	ev	L
	N10:20	2									
BTR DATA FILE	N10:90	0	261	0	21072	21317	8275	8248	17740	17750	8268
	N10:100	12832									

ASCII Display Values

CLOCK DATA

Real Time Clock Data Read

MESSAGE DESCRIPTION

This message is provided to allow the drive to read the specified real time clock. The time in seconds, minutes and hours as well as day, date, month and year can be read by the slave device.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 7 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2816	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2816 — MESSAGE OK -29952 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3
CLOCK TIME SECONDS | 1/10 OF SECOND	DATA WORD 4
CLOCK TIME HOUR | MINUTE	DATA WORD 5
CLOCK TIME DATE | DAY	DATA WORD 6
CLOCK TIME YEAR | MONTH	DATA WORD 7

MESSAGE OPERATION

This function will read the real time clock data from the drive. The Clock Time will be returned in the order as seen in the Header Message. This information should be viewed as ASCII text.

1. The Time is based on a 24 hour clock.
2. The Seconds are shown in seconds and 10^{ths} of seconds.
3. The Date will indicate the date of the month in Hex.
4. The Day will indicate the day of the week, with 1 being Sunday, and 7 being Saturday.
5. The Year will indicate the number of the year with 1990 being a reference of 0. The year 1995 would return a value of 5 — The 5^{th} year on the 1990 year 0 base.
6. The month is a number between 0-12.

If an error occurs in the BT, a value of -29952 will be returned in Word 2 of the BTR response.

Real Time Clock Data Read
(continued)

EXAMPLE

In this example, the clock was read with a value of 2816 in Word 2 of the BTW. The BTR response indicated a successful read with a value of 2816 in Word 2.

1. Word 4 indicated a changing value for seconds.
2. The Hour value 0E indicates hour 14 of a 24 hour clock, or 2 PM. The minute value 0A indicates 10, or 12:10 PM.
3. The Date of 17 in ASCII is the 23rd and the 5th day of the month, or Thursday.
4. The Year 05 is 1995.
5. The Month of 02 is February.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	2816	0							
BTR DATA FILE	N10:90	0	2816	0	7681	3594	5893	1282			
	N10:90				0E\01 S\1S	0E\0A Hr\Min	17\05 Date\Day	05\02 Yr\Mth			

ASCII Display Values

CLOCK DATA

Real Time Clock Data Write

MESSAGE DESCRIPTION

This message is provided to allow the drive to write the specified real time clock data. This allows the user to write the new real time clock seconds, minutes and hours, as well as day, date, month and year.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 7 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 7	HEADER WORD 1
PLC DECIMAL VALUE 2816	HEADER WORD 2
0	HEADER WORD 3
CLOCK TIME: SECONDS | 1/10 OF SECOND	DATA WORD 4
CLOCK TIME: HOUR | MINUTE	DATA WORD 5
CLOCK TIME: DATE | DAY	DATA WORD 6
CLOCK TIME: YEAR | MONTH	DATA WORD 7

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2816 — MESSAGE OK -29952 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

This function allows the user to define the clock data for the drive. The clock time will be written in the order as seen in the Header Message. This information should be sent as ASCII text.

1. The Time is based on a 24 hour clock.
2. Seconds are shown in seconds and 10^{ths} of seconds.
3. The Date will indicate the day of the month in Hex.
4. The Day will indicate the day of the week, with 1 being Sunday and 7 being Saturday.
5. The Year will indicate the number of the year will 1990 being a reference of 0. The year 1995 would be defined as a value of 5, the 5^{th} year on the 1990 year 0 base.
6. The Month is a number 0-12.

If an error occurs in the BT, a value of -29952 will be returned in Word 2 of the BTR response.

Real Time Clock Data Write
(continued)

EXAMPLE

In this example, a real time clock data value of Friday, February 10, 1995 12:00 AM was written to the drive. Word 2 defines the request with a value of 2817.

1. Word 4 defines 0 seconds.
2. Word 5 defines 12:00.
3. Word 6 defines the 6th day (Friday) with a date of the 10th.
4. Word 7 defines 1995 and the second month (February).

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	7	2816	0	0000	0000	2566	1283			
	N10:10				00\01 Sc\1S	00\00 HrsMin	0A\06 Date\Day	05\02 Yr\Mth			
BTR DATA FILE	N10:90	0	2816	0							

ASCII Display Values

RUN TIME ACCUMULATOR

Run Time Accumulator Data Read

MESSAGE DESCRIPTION

This message provides the drive with the accumulated time for running services. This information is in hours and is read only. The function is typically used as a maintenance feature.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 4 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2817	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2817 — MESSAGE OK -29951 — MESSAGE ERROR	HEADER WORD 2
0	DATA WORD 3
ACCUMULATED VALUE IN HOURS	DATA WORD 4

MESSAGE OPERATION

The Run Time Accumulator Data Read through BTR Word 4, provides the running service time in hours. As a maintenance feature, this information can be used to help define a service schedule for the drive.

The accumulated time can be cleared through a clear run time accumulator request. Information can then provide the accumulated run time between each scheduled service.

EXAMPLE

In this example, the BTW requested the accumulated running time of the drive. The BTR response returned a value of 41 in Word 4, indicating a running time of 41 hours. This value can be monitored, and when a specified running time has accumulated, a maintenance down time can be scheduled.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	0	2817	0							
BTR DATA FILE	N10:90	0	2817	0	41						

RUN TIME ACCUMULATOR

Clear Run Time Accumulator

MESSAGE DESCRIPTION

This message provides a way of clearing the run time accumulator data stored in the drive.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE -29950	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2818 — MESSAGE OK -29950 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

The clear run time accumulator defines a value of -29950 in the BTW. Word 2 can clear the accumulated run time stored in the drive. This provides the user with the ability to monitor an accumulated time based on a specific event.

EXAMPLE

This function was requested to clear the accumulated run time in the drive since the last scheduled maintenance downtime. In this example, the BTW requested a clear with a value of -29950 in Word 2. The BTR response indicated a successful clear by returning a value of 2818 in Word 20 of the BTR Header Message.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	-29950	0							
BTR DATA FILE	N10:90	3	2818	0							

TIME STAMP

Reference Time Stamp Data Read

MESSAGE DESCRIPTION

The message will read the reference time stamp value from the drive.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 7 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 2816	HEADER WORD 2
REFERENCE NUMBER	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2816 — MESSAGE OK -29952 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3
CLOCK TIME: SECONDS | REFERENCE	DATA WORD 4
CLOCK TIME: HOUR | MINUTE	DATA WORD 5
CLOCK TIME: DATE | DAY	DATA WORD 6
CLOCK TIME: YEAR | MONTH	DATA WORD 7

MESSAGE OPERATION

The reference time stamp can be defined by the user to monitor the time of a specific event. This function will allow this time to be read from the device. The time stamp will be returned in the order seen in the header message. This information should be viewed as ASCII text.

1. The Time is based on a 24 hour clock.
2. Seconds are shown in seconds and 10^{ths} of seconds.
3. The Date will indicate the day of the month in Hex.
4. The Day will indicate the day of the week, with 1 being Sunday and 7 being Saturday.
5. The Year will indicate the number of the year will 1990 being a reference of 0. The year 1995 would be defined as a value of 5, the 5^{th} year on the 1990 year 0 base.
6. The Month is a number 0-12.

If an error occurs in the BTW, a value of -29952 will be returned in Word 2 of the BTR response.

Reference Time Stamp Data Read
(continued)

EXAMPLE

In this example, a reference time stamp data read was requested through the BTW. Word 2 of the BTW defines this request with a decimal value of 2816 for the PLC command code. The BTR response indicates a successful request with a returned value of 2816 in BTR Word 2. Words 4-7 then return the clock data. The clock data indicates a time stamp of February 1995, the 5th day of the week (Thursday), and a date of 23 (17 in ASCII). The hour, minutes and seconds will change according to the time.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	2816	0							
BTR DATA FILE	N10:90	0	2816	0	7681	3594	5893	1282			
	N10:90				0E\01	0E\0A	17\05	05\02			
					St\1S	Hr\Min	Date\Day	Yr\Mth			

ASCII Display Values

TIME STAMP

Reference Time Stamp Data Write

MESSAGE DESCRIPTION

This message is provided to allow the drive to write the specified real time clock. This allows the drive to write a new reference stamp.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 7 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 7	HEADER WORD 1
PLC DECIMAL VALUE -29952	HEADER WORD 2
0	HEADER WORD 3
CLOCK TIME SECONDS | 1/10 OF SECOND	DATA WORD 4
CLOCK TIME HOUR | MINUTE	DATA WORD 5
CLOCK TIME DATE | DAY	DATA WORD 6
CLOCK TIME YEAR | MONTH	DATA WORD 7

PLC RESPONSE — BLOCK TRANSFER READ

0	HEADER WORD 1
PLC DECIMAL VALUE 2816 — MESSAGE OK -29952 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

The Reference Time Stamp Data Write will allow the user to define a specific time stamp to be used in the drive.

1. The Time is based on a 24 hour clock.
2. Seconds are shown in seconds and 10^{ths} of seconds.
3. The Date will indicate the day of the month in Hex.
4. The Day will indicate the day of the week, with 1 being Sunday and 7 being Saturday.
5. The Year will indicate the number of the year will 1990 being a reference of 0. The year 1995 would be defined as a value of 5, the 5^{th} year on the 1990 year 0 base.

Reference Time Stamp Data Write
(continued)

EXAMPLE

This example has defined the Reference Time Stamp as Friday, February the 10th, 1995. The Hour of 0 indicates a starting time of 10:00AM. This information can then be used to track scheduled maintenance down times or other information as desired.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	7	-29952	0	0	0	2566	1283			
	N10:10				00\00	00\00	0A\06	05\02			
BTR DATA FILE	N10:90	0	2816	0							

ASCII Display Values

TIME STAMP

Load Clock Info Reference Stamp

MESSAGE DESCRIPTION

This message will load the Real time clock data into the reference stamp.

PLC BLOCK TRANSFER INSTRUCTION DATA

BTW Instruction Length: 3 Words

BTR Instruction Length: 3 Words

MESSAGE STRUCTURE

PLC REQUEST — BLOCK TRANSFER WRITE

MESSAGE LENGTH 3	HEADER WORD 1
PLC DECIMAL VALUE 0	HEADER WORD 2
0	HEADER WORD 3

PLC RESPONSE — BLOCK TRANSFER READ

MESSAGE LENGTH 0	HEADER WORD 1
PLC DECIMAL VALUE 2818 — MESSAGE OK -29950 — MESSAGE ERROR	HEADER WORD 2
0	HEADER WORD 3

MESSAGE OPERATION

The Load Clock Info Reference Stamp function specified in the BTW will send the real time clock data to the reference stamp. The reference stamp time will then follow the real time clock data.

EXAMPLE

In this example, the request to load the real time clock data into the reference stamp was sent through the BTW. The BTR responded with a message of OK.

DATA FORMAT

		0	1	2	3	4	5	6	7	8	9
BTW DATA FILE	N10:10	3	0	0							
BTR DATA FILE	N10:90	0	2818	0							

End of Chapter

Chapter 6

Troubleshooting

Chapter Objectives

Chapter 6 provides information to guide the user in trouble shooting the PLC Comm Adapter Board. Included is a listing and description of PLC Comm Adapter Faults, Error Messages, Alarms and logic responses to each.

ATTENTION: Only qualified personnel familiar with the 1336 FORCE drive system and associated machinery should perform troubleshooting or maintenance functions on the drive. Failure to comply may result is personnel injury and/or equipment damage.

Fault and Status LEDs

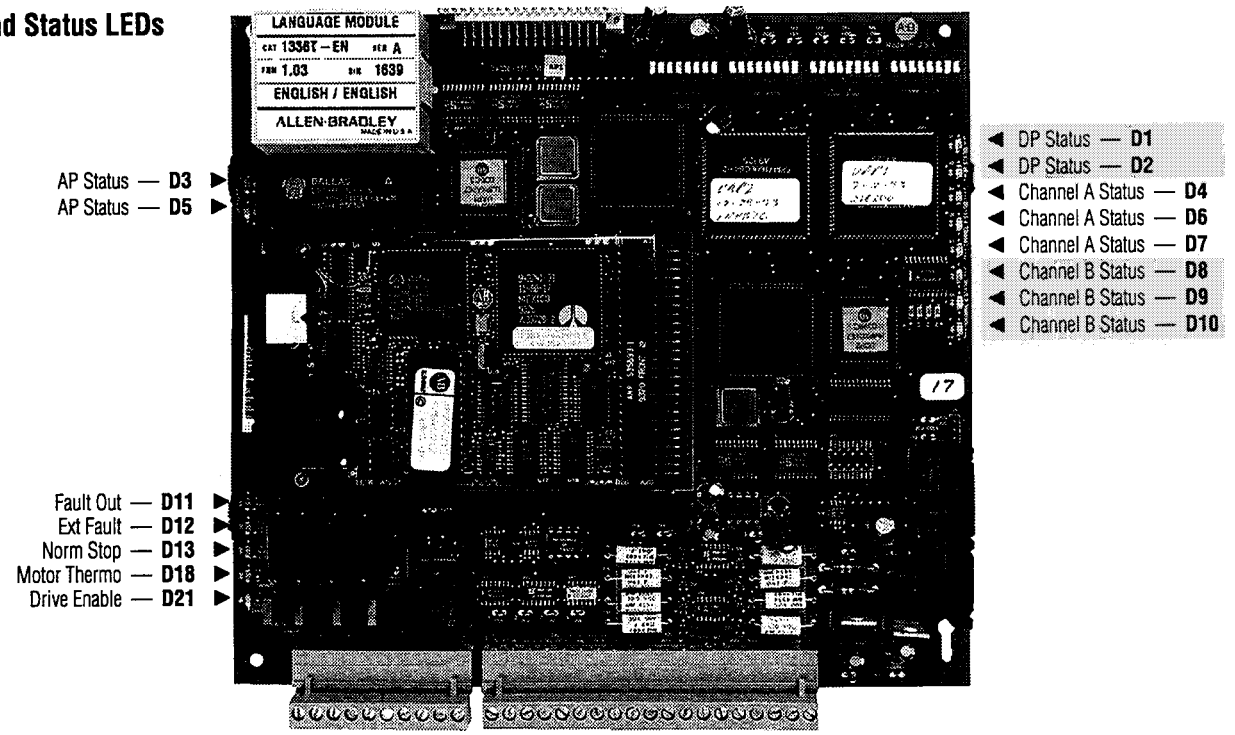


Figure 6-1 — PLC Comm Adapter Board Fault and Status LEDs

(15) Status and Fault LEDs are located on the PLC Comm Adapter Board to provide a visual indication of board operation. The PLC Comm Adapter Board is a non-serviceable device. Improper configuration will cause the PLC Comm Board to indicate faults and/or hardware malfunctions and should be verified first.

Domino Processor (DP) Status D1 and D2

These LEDs reflect the operational status of the PLC Comm Adapter Board DIP switches.

LED	STATE	FUNCTION
D1 (RED)	LED LIT	DP Hard Fault
	LED NOT LIT	D2 On or Hardware Malfuction
	LED BLINKING	DP Soft Fault
D2 (GREEN)	LED LIT	Normal DP Opearion
	LED NOT LIT	D1 On or Hardware Malfuction
	LED BLINKING	DP Warning

Application Processor (AP) Status D3 and D5

These LEDs reflect the operational status of the application processor.

LED	STATE	FUNCTION
D3 (RED)	LED LIT	AP Hard Fault
	LED NOT LIT	D5 On or Hardware Malfuction
	LED BLINKING	AP Soft Fault
D5 (GREEN)	LED LIT	Normal AP Operation
	LED NOT LIT	D3 On or Hardware Malfuction
	LED BLINKING	AP Warning

CHANNEL A Status D4, D6 and D7
CHANNEL B Status D8, D9 and D10

These LEDs reflect the operational status of either RIO or DH+ communications.

LED	STATE	RIO FUNCTION	DH+ FUNCTION
D4 & D8 (RED)	LED BLINKING	PLC Has Rack Inhibited	Duplicate Node Address on DH+ Link
D6 & D9 (YELLOW)	LED LIT	None	Normal DH+ Communications
	LED NOT LIT	None	PLC Comm Adapter Faulted
	LED BLINKING	None	No Communications over DH+
D7 & D10 (GREEN)	LED LIT	Normal PLC Controller Communications	None
	LED NOT LIT	No Communications to PLC Controller	None
	LED BLINKING	PLC Controller is in Reset/Program/Test Mode	None

PLC Comm Adapter Status D11, D12, D13, D18 and D21

These LEDs reflect the operational status of the drive permissives.

LED	STATE	FUNCTION
D11 (RED)	LED LIT	System Fault Present
	LED NOT LIT	System Fault Not Present
D12 (RED)	LED LIT	External Fault Present
	LED NOT LIT	External Fault Not Present
D13 (RED)	LED LIT	Normal Drive Stop Signal Present
	LED NOT LIT	Normal Drive Stop Signal Not Present
D18 (RED)	LED LIT	Motor Thermoguard Open
	LED NOT LIT	Motor Thermoguard Closed
D21 (GREEN)	LED LIT	Drive Enable Signal Present
	LED NOT LIT	Drive Disabled

Faults and Fault Queues

The 1336 FORCE monitors both internal and external operating conditions, responding to incorrect conditions as programmed by the user. Most malfunctions that occur will induce one of (2) types of faults.

HARD FAULTS

Hard faults indicate that the 1336 FORCE has detected a malfunction where internal recovery is not possible. Hard faults are the most severe type of faults. Hard faults indicate that a major internal component or system has failed and that drive functions may be lost. When a hard fault occurs, recovery can only be accomplished by issuing a Drive Reset or recycling drive power.

SOFT FAULTS

Soft faults exist to protect drive system components from internal and external malfunctions. Unlike hard faults, in most instances drive control can be maintained. Soft faults indicate that the 1336 FORCE has detected a malfunction that could cause damage to drive control or power components, or the motor. Soft faults may also indicate undesirable external operating conditions. Fault recovery can be accomplished by a clear fault command, clear fault queue, drive reset, or recycling of drive power.

FAULT QUEUE

All faults that have occurred are shown in the fault queue. Each entry shows the type of fault, and is time & date stamped at occurrence. Fault information is maintained in BRAM until it is commanded to be cleared by a Clear Fault Queue command. A Clear Fault command, Drive Reset command, or recycling drive power will not clear the queue. Up to (32) faults may be displayed, each with the following information.

- A fault queue entry number to indicate the position of the fault in the fault queue.
- A trip point (TP) to indicate which entry in the fault queue caused the drive to trip (all faults displayed previous to the TP fault occurred after the TP was logged).
- A (5) character decimal numbered fault code (described on the next page).
- The time and date that the fault occurred.
- Descriptive fault text plus all clear fault commands and when they were executed.

Fault Code Descriptions

PLC Comm Adapter fault and warning codes are (5) character decimal numbers that have the following format.

S	A	XXX

S = SOURCE DESIGNATOR
- **0** = Main Board Velocity Processor
- **1** = Main Board Current Processor
- **2** = Reserved
- **3** = Adapter Processor
- **4** = PLC Interface Board Processor
- **5** = Reserved

A = AREA DESIGNATOR
- **0** = General
- **1** = Motor
- **2** = Inverter
- **3** = Motor Control
- **4** = Adapter
- **5** = External Device
- **6** = Communications
- **7** = Reserved
- **8** = Reserved
- **9** = Converter/Brake

XXX = INTERNAL FAULT CODE

Fault Displays

Both HIM and GPT LCD displays indicate a fault or warning by showing the adapter code and fault text. Fault text may be up to (16) characters in length.

FAULT TEXT AND CODE	DESCRIPTION	ACTION
Clear Faults 24000	(No Fault) This entry in the fault or warning queue is displayed when a clear fault is requested.	None

Fault Codes

FAULT TEXT AND CODE	DESCRIPTION	ACTION
Adpt BRAM Cksm 24009	(Soft Fault) Discrepancy between calculated and saved checksum for adapter data.	Reset drive. If fault persists, execute BRAM store, then reset drive and clear faults.
Main BRAM Cksm 24012	(Soft Fault) Discrepancy between calculated and saved checksum for main control board.	Reset drive. If fault persists, execute BRAM store, then reset drive and clear faults.
SW Malfunction 24013	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
SW Malfunction 24014	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
SW Malfunction 24015	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
SW Malfunction 24016	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
SW Malfunction 24017	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
SW Malfunction 24018	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
AP SW/LM Rev Err 24025	(Soft Fault) PLC Comm Adapter Board software/language module mismatch.	Verify board software and language module versions with A-B.
Adapter Config Err 24026	(Soft Fault) PLC Comm Adapter has detected that board DIP switch settings do not match values stored in BRAM.	Verify DIP switch settings and execute a BRAM store to save the new settings.
No AP LM Exists 25023	(Hard Fault) The PLC Comm Adapted has detected that a language module has not been. installed on the PLC Comm Adapter.	Reset drive. If fault persists, replace the language module.
No AP LM Exists 25023	(Hard Fault) The PLC Comm Adapted has detected that a language module has not been. installed on the PLC Comm Adapter.	Reset drive. If fault persists, replace the language module.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
No MC LM Exists 25024	(Hard Fault) The PLC Comm Adapted has detected that a language module has not been. installed on the Main Control Board.	Reset drive. If fault persists, replace the language module.
SB Pt1 Timeout 26038	(Warning) Device connected to Port 1 of SCANport has been disconnected.	None
SB Pt1 Timeout 26039	(Warning) Device connected to Port 1 of SCANport has been disconnected.	None
SB Pt2 Timeout 26040	(Warning) Device connected to Port 2 of SCANport has been disconnected.	None
SB Pt3 Timeout 26041	(Warning) Device connected to Port 3 of SCANport has been disconnected.	None
SB Pt4 Timeout 26042	(Warning) Device connected to Port 4 of SCANport has been disconnected.	None
SB Comm Fault 26043	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
HW Malfunction 34001	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
HW Malfunction 34002	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
HW Malfunction 34003	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
HW Malfunction 34004	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
HW Malfunction 34005	(Hard Fault) Integrity check on board hardware has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChA Protocol 34006	(Soft Fault) PLC Comm Adapter has detected an incorrect protocol DIP switch setting.	Check parameter 303 — DIP Switch ChA and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A LOW / sw 1 / sw 2** RIO w/o Blk Trans / OFF / OFF RIO w/ Blk Trans / OFF / ON DH+ / ON / OFF None / ON / ON
ChB Protocol 34007	(Soft Fault) PLC Comm Adapter has detected an incorrect protocol DIP switch setting.	Check parameter 304 — DIP Switch ChB and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL B LOW / sw 1 / sw 2** RIO w/o Blk Trans / OFF / OFF RIO w/ Blk Trans / OFF / ON DH+ / ON / OFF None / ON / ON
ChA Baud Rate 34008	(Soft Fault) PLC Comm Adapter has detected an incorrect Baud rate DIP switch setting.	Check parameter 303 — DIP Switch ChA and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A LOW / sw 3 / sw 4** 56.7k Baud / OFF / OFF 115.2k Baud / OFF / ON 230.4k Baud / ON / OFF None / ON / ON
ChB Baud Rate 34009	(Soft Fault) PLC Comm Adapter has detected an incorrect Baud rate DIP switch setting.	Check parameter 304 — DIP Switch ChB and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A LOW / sw 3 / sw 4** 56.7k Baud / OFF / OFF 115.2k Baud / OFF / ON 230.4k Baud / ON / OFF None / ON / ON

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChA Rack Rate 34010	(Soft Fault) PLC Comm Adapter has detected an incorrect rack size DIP switch setting.	Check parameter 303 — DIP Switch ChA and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A LOW / SW 5 / SW 6 / Last / Not Last** ¼ Rack — OFF — OFF — OFF — ON ½ Rack — OFF — ON — OFF — ON ¾ Rack — ON — OFF — OFF — ON Full Rack — ON — ON — OFF — OFF Note: Full Rack can only have the Last/Not Last switch set to OFF.
ChB Rack Size 34011	(Soft Fault) PLC Comm Adapter has detected an incorrect rack size DIP switch setting.	Check parameter 304 — DIP Switch ChB and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A LOW / SW 5 / SW 6 / Last / Not Last** ¼ Rack — OFF — OFF — OFF — ON ½ Rack — OFF — ON — OFF — ON ¾ Rack — ON — OFF — OFF — ON Full Rack — ON — ON — OFF — OFF Note: Full Rack can only have the Last/Not Last bit set to 0.
ChA Module Group 34012	(Soft Fault) PLC Comm Adapter has detected a Channel A module group that is not valid for the selected rack size.	Check parameter 303 — DIP Switch ChA and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL A HIGH / sw 1 / sw 2** Module 0 — OFF — OFF Module 2 — OFF — ON Module 4 — ON — OFF Module 6 — ON — ON
ChB Module Group 34013	(Soft Fault) PLC Comm Adapter has detected a Channel B module group that is not valid for the selected rack size.	Check parameter 304 — DIP Switch ChB and refer to the table below to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board. **CHANNEL B HIGH / sw 1 / sw 2** Module 0 — OFF — OFF Module 2 — OFF — ON Module 4 — ON — OFF Module 6 — ON — ON

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
Redund Rack Size 34014	(Soft Fault) PLC Comm Adapter has detected different rack sizes for Channels A & B when RIO with redundancy was selected.	Check parameters 303 & 304 — DIP Switch ChA & B. Refer to the table below to verify DIP switch settings — Both channels must have the same rack size. Reset drive. If Fault persists, replace PLC Comm Adapter Board.

CHANNELS A/B LOW	SW 5	SW 6	Last	Not Last
¼ Rack	OFF	OFF	OFF	ON
½ Rack	OFF	ON	OFF	ON
¾ Rack	ON	OFF	OFF	ON
Full Rack	ON	ON	OFF	OFF

Note: Full Rack can only have the Last/Not Last switch set to OFF.

FAULT TEXT AND CODE	DESCRIPTION	ACTION
Redund Diff Prot 34015	(Soft Fault) PLC Comm Adapter has detected redundant operation has been called for, but Channel A is not configured for RIO protocol.	Check parameters 303 & 304 — DIP Switch ChA & B. Refer to the tables below to verify DIP switch settings — Both channels must be configured for RIO protocol when using the redundant mode. If fault persists, replace PLC Comm Adapter Board.

CHANNEL A LOW	SW 8
Non-Redundant	OFF
Redundant	ON

CHANNEL B LOW	SW 1	SW 2
RIO w/o Blk Trans	OFF	OFF
RIO w/ Blk Trans	OFF	ON
DH+	ON	OFF
None	ON	ON

SW Malfunction 34016	(Hard Fault) Integrity check on board software has failed.	Reset drive. If fault persists, replace PLC Comm Adapter Board.
ChA Dup Nodeaddr 36019	(Soft Fault) PLC Comm Adapter has detected a duplicate Channel A DH+ node address.	Check parameter 303 — DIP Switch ChA and refer to the table in Chapter 7 to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board.
ChB Dup Nodeaddr 36020	(Soft Fault) PLC Comm Adapter has detected a duplicate Channel B DH+ node address.	Check parameter 304 — DIP Switch ChB and refer to the table in Chapter 7 to verify DIP switch settings. Reset drive. If Fault persists, replace PLC Comm Adapter Board.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChB Dup Nodeaddr 36020	(Soft Fault) PLC Comm Adapter has detected a duplicate Channel B DH+ node	Check parameter 304 — DIP Switch ChB. Refer to the PLC Comm Adapter Board DIP Switch Setting Table in Chapter 7 to verify DIP switch address. Reset drive. If Fault persists, replace PLC Comm Adapter Board.
ChA Comm Loss 36021	(Warning) PLC Comm Adapter has detected a loss of Channel A communications with the PLC Controller.	Check for a break in the communications cable. Verify that all connections are intact. Clear fault by issuing a Clear Fault, Drive Reset or recycle power. Check parameter 425 — ChA RIO Flt Sel to determine the drive response to faults. Par 425 is bit coded. Bits **1 & 0** determine the fault response to Channel A comm loss.

DRIVE FAULT RESPONSE	BIT 1	BIT 0
No Response	OFF	OFF
Warning	OFF	ON
Fault Trip	ON	OFF

Check parameter 436 — ChA Flt Sts. Bit 5 = 1 indicates a fault if configured to do so in parameter 425 — ChA RIO Flt Sel.

Check parameter 437 — ChA Warn Sts. Bit 5 = 1 indicates a fault if configured to do so in parameter 426 — ChA RIO Warn Sel.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChA Comm Loss 36022	(Warning) PLC Comm Adapter has detected a loss of Channel B communications with the PLC Controller.	Check for a break in the communications cable. Verify that all connections are intact. Clear fault by issuing a Clear Fault, Drive Reset or recycle power. Check parameter 430 — ChB RIO Flt Sel to determine the drive response to faults. Par 430 is bit coded. Bits **3** & **4** determine the fault response to Channel A comm loss. **DRIVE FAULT RESPONSE** / **BIT 3** / **BIT 4** No Response — OFF — OFF Warning — OFF — ON Fault Trip — ON — OFF Check parameter 438 — ChB Flt Sts. Bit 5 = 1 indicates a fault if configured to do so in parameter 430 — ChA RIO Flt Sel. Check parameter 439 — ChB Warn Sts. Bit 5 = 1 indicates a fault if configured to do so in parameter 430 — ChA RIO Warn Sel.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChA Prg/Res/Test 36023	(Warning) PLC Comm Adapter has detected the PLC Controller being switched from the run mode to another mode.	Check the PLC mode switch and the I/O control reset. Clear fault by issuing a Clear Fault, Drive Reset or recycle power. Check parameters 425 — ChA RIO Flt Sel and 426 — ChA RIO Warn Sel to determine the drive response to faults. These parameters determine the resolution of the condition, either fault, warning or none. Both parameters are bit coded. Bit 0 determines the resolution to ChA Prg/Res/Test. If bit 0 is set in par 425, a soft fault is logged. If bit 0 is reset in 425 and bit 0 in par 426 is set, a warning fault is logged. If bit 0 is reset in 425 and 426, no action is taken. Bit 1 determines the data output status of a fault. If set to 0, zeros are transmitted. If set to 1, the last state is transmitted. Check Parameter 436 — ChA Flt Sts. Bit 0 = 1 indicates a fault if configured to do so in Parameter 425 — ChA RIO Flt Sel. Check Parameter 437 — ChA Warn Sts. Bit 0 = 1 indicates a fault if configured to do so in Parameter 426 — ChA RIO Warn Sel.

Fault Codes (continued)

FAULT TEXT AND CODE	DESCRIPTION	ACTION
ChB Prg/Res/Test 36024	(Warning) PLC Comm Adapter has detected the PLC Controller being switched from the run mode to another mode.	Check the PLC mode switch and the I/O control reset. Clear fault by issuing a Clear Fault, Drive Reset or recycle power. Check parameters 430 — ChB RIO Flt Sel and 431 — ChB RIO Warn Sel to determine the drive response to faults. These parameters determine the resolution of the condition, either fault, warning or none. Both parameters are bit coded. Bit 0 determines the resolution to ChB Prg/Res/Test. If bit 0 is set in par 430, a soft fault is logged. If bit 0 is reset in 430 and bit 0 in par 426 is set, a warning fault is logged. If bit 0 is reset in 430 and 431, no action is taken. Bit 1 determines the data output status of a fault. If set to 0, zeros are transmitted. If set to 1, the last state is transmitted. Check parameter 438 — ChB Flt Sts. Bit 0 = 1 indicates a fault if configured to do so in parameter 430 — ChB RIO Flt Sel. Check parameter 439 — ChB Warn Sts. Bit 0 = 1 indicates a fault if configured to do so in parameter 431 — ChB RIO Warn Sel.

Chapter 7

Specifications and Supplemental Information

Chapter Objectives

Chapter 7 provides specifications and supplemental information including a parameter cross reference by number or name, parameter block diagrams, a hardware block diagram, and PLC Comm Adapter Board DIP switch settings.

Specifications

ENVIRONMENTAL

Operating Temperature: 0 to 40°C (32 to 104°F)
Storage Temperature: – 40 to 70°C (– 40 to 158°F)
Relative Humidity: 5 to 95% Non-Condensing
Shock: 15G Peak for 11 ms Duration (±1.0 ms)
Vibration: 0.006 Inches (0.15 mm) Displacement, 1G Peak

ELECTRICAL

Input Voltage: Supplied by Drive
Input Frequency: NA
Input Current: NA
SCANport Load: 60 mA
Vibration: 0.006 Inches (0.15 mm) Displacement, 1G Peak

COMMUNICATIONS

Drive Side: SCANport Peripheral Interface
PLC Side: Allen-Bradley RIO/DH+
BAUD Rates: 57.6k, 115.2k, 230.4k
Rack Size: ¼, ½, ¾ or Full

PRODUCT COMPATIBILITY

The PLC Comm Adapter Board is designed to be used with the following terminal interface devices (**TID**s).

Drive Tools

Allen-Bradley Programmable Controllers ❶

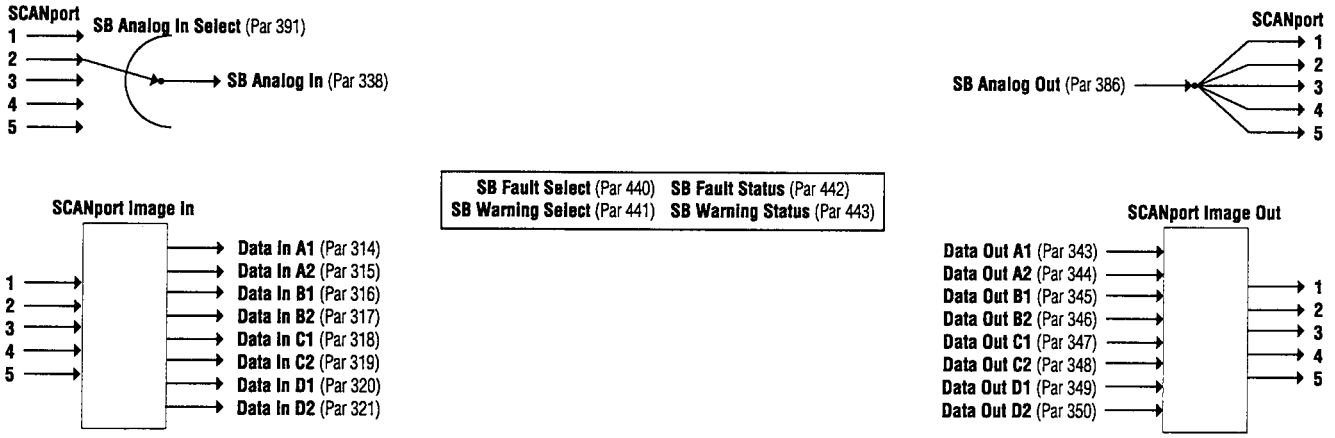
- PLC-2/30 With SD2
- PLC-3
- SLC-500 With 1747-SN Scanner
- PLC-5/10, PLC-5/15, PLC-5/25 Family
- PLC-5/30, PLC-5/40, PLC-5/40L, PLC-5/60, PLC-5/40L Family, PLC-5/80
- PLC-6 Scanner Modules and Subscanners

❶ These adapters were tested with the current revision level of the listed PLC processors. Earlier versions of these processors may not be compatible.

Software Block Diagram

Shown in **Figures 7-1a** and **7-1b** is the parameter linking and interaction within the PLC Comm Adapter Board.

SCANport



Logic Command

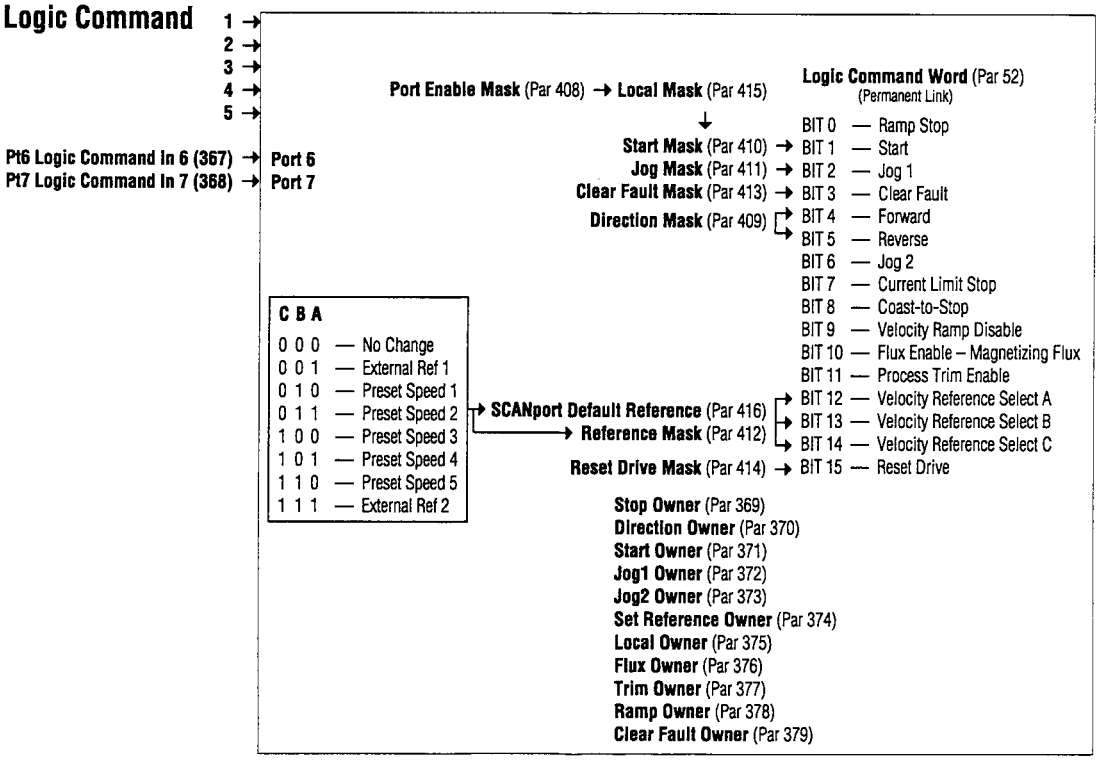
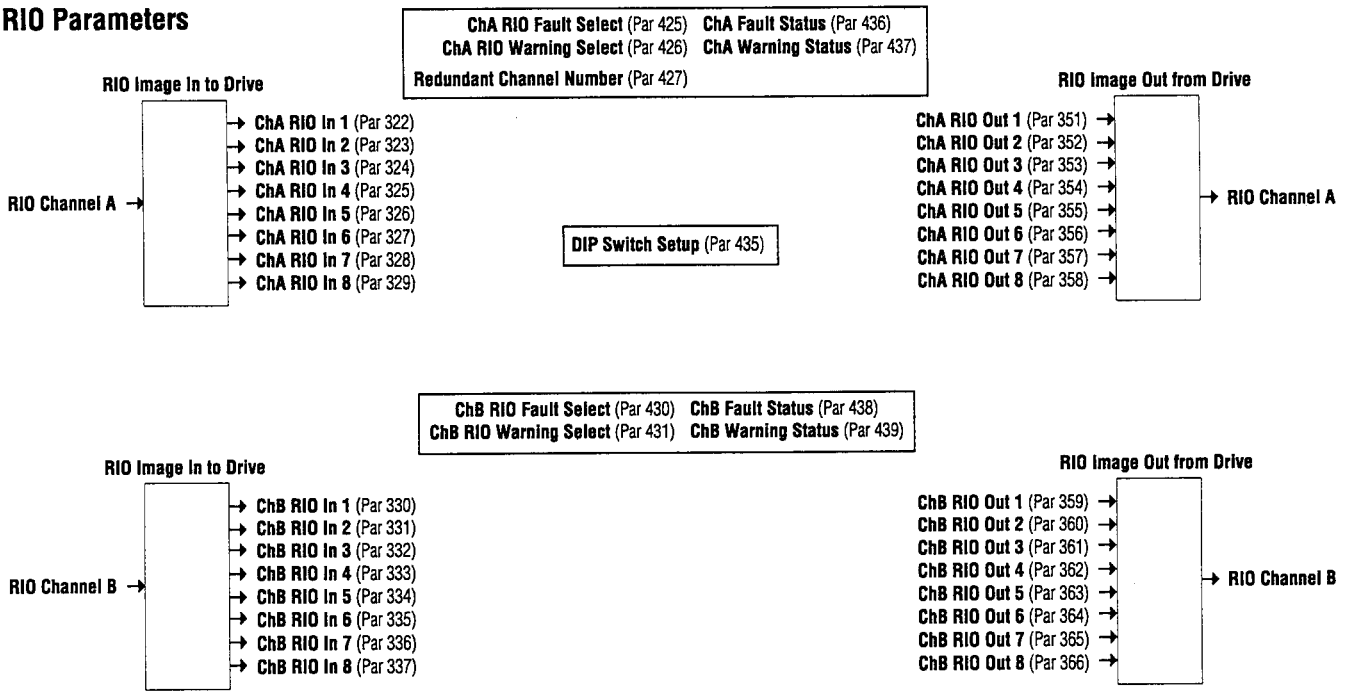


Figure 7-1a — PLC Comm Adapter Software Block Diagram

RIO Parameters



Analog I/O Parameters

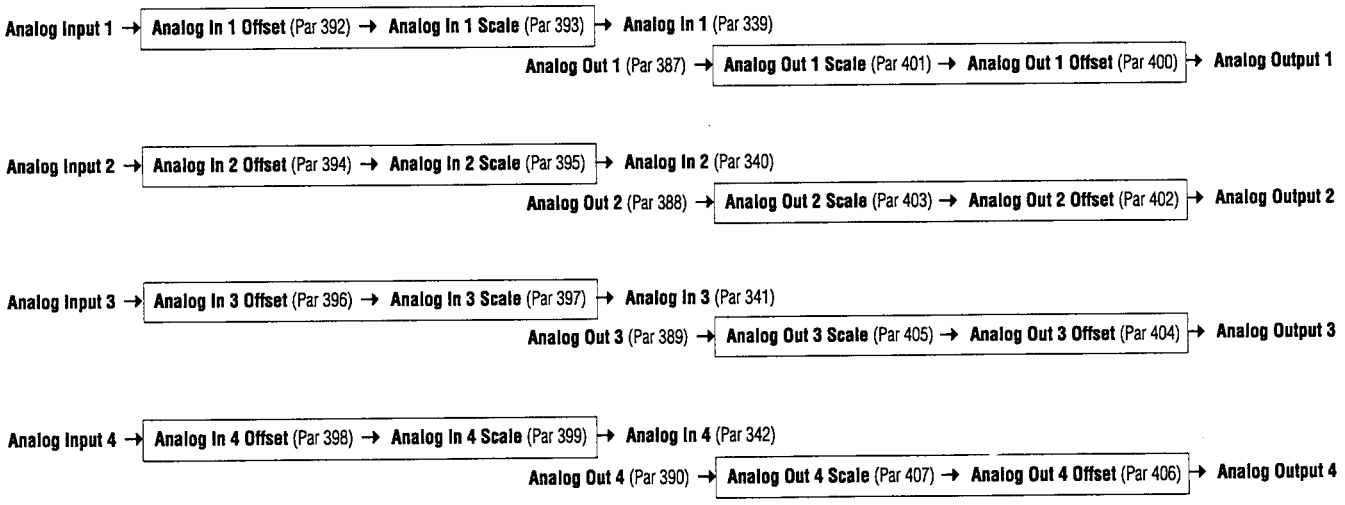


Figure 7-1b — PLC Comm Adapter Software Block Diagram

Hardware Block Diagram

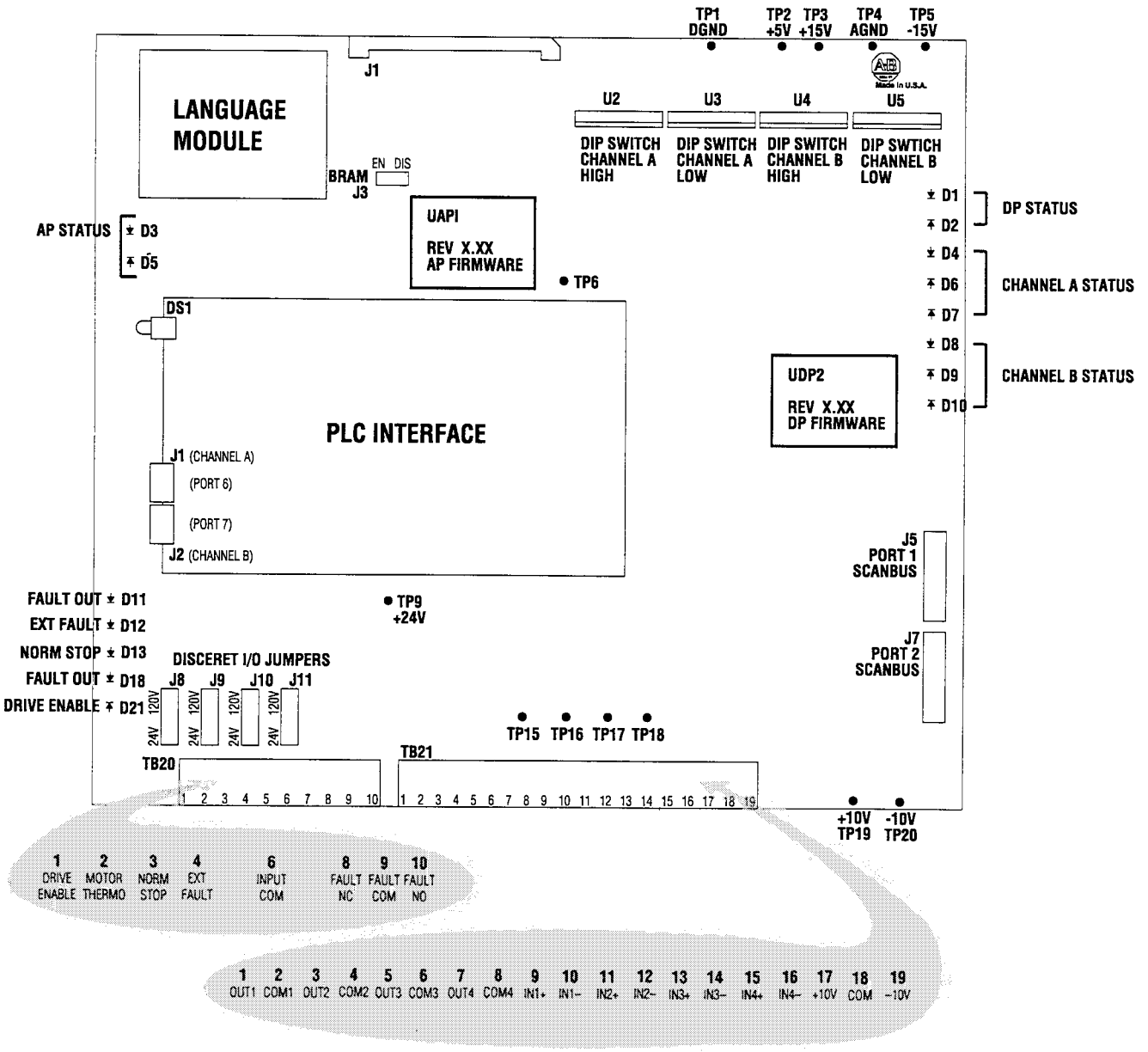


Figure 7-2 — PLC Comm Adapter Hardware Block Diagram

Parameter Cross Reference — By Number

No.	Name	Group ❶
300	PLC Comm Adpt ID	1 — Adapter Info
301	PLC Comm Version	1 — Adapter Info
302	PLC Comm Config	1 — Adapter Info
303	ChA DIP Switch	7 — Channel A
304	ChB DIP Switch	8 — Channel B
305	ChA LED State	7 — Channel A
306	ChB LED State	8 — Channel B
309	Language Select	1 — Adapter Info
310	Adv/Basic Select	1 — Adapter Info
314	Data In A1	3 — SCANport I/O
315	Data In A2	3 — SCANport I/O
316	Data In B1	3 — SCANport I/O
317	Data In B2	3 — SCANport I/O
318	Data In C1	3 — SCANport I/O
319	Data In C2	3 — SCANport I/O
320	Data In D1	3 — SCANport I/O
321	Data In D2	3 — SCANport I/O
322	ChA RIO In 1	7 — Channel A
323	ChA RIO In 2	7 — Channel A
324	ChA RIO In 3	7 — Channel A
325	ChA RIO In 4	7 — Channel A
326	ChA RIO In 5	7 — Channel A
327	ChA RIO In 6	7 — Channel A
328	ChA RIO In 7	7 — Channel A
329	ChA RIO In 8	7 — Channel A
330	ChB RIO In 1	8 — Channel B
331	ChB RIO In 2	8 — Channel B
332	ChB RIO In 3	8 — Channel B
333	ChB RIO In 6	8 — Channel B
336	ChB RIO In 7	8 — Channel B
337	ChB RIO In 8	8 — Channel B ❷
338	SB Analog In	3 — SCANport I/O
339	Analog In 1	6 — Analog I/O
340	Analog In 2	6 — Analog I/O
341	Analog In 3	6 — Analog I/O
342	Analog In 4	6 — Analog I/O
343	Data Out A1	3 — SCANport I/O
344	Data Out A2	3 — SCANport I/O
345	Data Out B1	3 — SCANport I/O
346	Data Out B2	3 — SCANport I/O
347	Data Out C1	3 — SCANport I/O
348	Data Out C2	3 — SCANport I/O
349	Data Out D1	3 — SCANport I/O
350	Data Out D2	3 — SCANport I/O
351	ChA RIO Out 1	7 — Channel A
352	ChA RIO Out 2	7 — Channel A
353	ChA RIO Out 3	7 — Channel A
354	ChA RIO Out 4	7 — Channel A
355	ChA RIO Out 5	7 — Channel A
356	ChA RIO Out 6	7 — Channel A
357	ChA RIO Out 7	7 — Channel A
358	ChA RIO Out 8	7 — Channel A
359	ChB RIO Out 1	8 — Channel B
360	ChB RIO Out 2	8 — Channel B
361	ChB RIO Out 3	8 — Channel B
362	ChB RIO Out 4	8 — Channel B
363	ChB RIO Out 5	8 — Channel B
364	ChB RIO Out 6	8 — Channel B
365	ChB RIO Out 7	8 — Channel B
366	ChB RIO Out 8	8 — Channel B ❷
367	Pt6 Logic Cmd In	3 — SCANport I/O
368	Pt7 Logic Cmd In	3 — SCANport I/O
369	Stop Owner	5 — Owners
370	Dir Owner	5 — Owners
371	Start Owner	5 — Owners
372	Jog 1 Owner	5 — Owners
373	Jog 2 Owner	5 — Owners
374	Set Ref Owner	5 — Owners
375	Local Owner	5 — Owners
376	Flux Owner	5 — Owners
377	Trim Owner	5 — Owners
378	Ramp Owner	5 — Owners
379	Clrflt Owner	5 — Owners
386	SB Analog Out	3 — SCANport I/O
387	Analog Out 1	6 — Analog I/O
388	Analog Out 2	6 — Analog I/O
389	Analog Out 3	6 — Analog I/O
390	Analog Out 4	6 — Analog I/O
391	SB Analog Sel	3 — SCANport I/O
392	An In 1 Offset	6 — Analog I/O
393	An In 1 Scale	6 — Analog I/O
394	An In 2 Offset	6 — Analog I/O
395	An In 2 Scale	6 — Analog I/O
396	An In 3 Offset	6 — Analog I/O
397	An In 3 Scale	6 — Analog I/O
398	An In 4 Offset	6 — Analog I/O
399	An In 4 Scale	6 — Analog I/O
400	An Out 1 Offset	6 — Analog I/O
401	An Out 1 Scale	6 — Analog I/O
402	An Out 2 Offset	6 — Analog I/O
403	An Out 2 Scale	6 — Analog I/O
404	An Out 3 Offset	6 — Analog I/O
405	An Out 3 Scale	6 — Analog I/O
406	An Out 4 Offset	6 — Analog I/O
407	An Out 4 Scale	6 — Analog I/O
408	Port Enable Mask	4 — Masks
409	Dir Mask	4 — Masks
410	Start Mask	4 — Masks
411	Jog Mask	4 — Masks
412	Ref Mask	4 — Masks
413	Clr Fault Mask	4 — Masks
414	Reset Drive Mask	4 — Masks
415	Local Mask	4 — Masks
416	SB Default Ref	3 — SCANport I/O
425	ChA RIO Flt Sel	2 — Adapter Diag
426	ChA RIO Warn Sel	2 — Adapter Diag
427	Redund Chan No	7 — Channel A ❷
430	ChB RIO Flt Sel	2 — Adapter Diag
431	ChB RIO Warn Sel	2 — Adapter Diag
435	DIP Fault Setup	2 — Adapter Diag
436	ChA Fault Sts	2 — Adapter Diag
437	ChA Warn Sts	2 — Adapter Diag
438	ChB Fault Sts	2 — Adapter Diag
439	ChB Warn Sts	2 — Adapter Diag
440	SB Fault Sel	2 — Adapter Diag
441	SB Warn Sel	2 — Adapter Diag
442	SB Fault Sts	2 — Adapter Diag
443	SB Warn Sts	2 — Adapter Diag

❶ Parameters included in Groups 7 and 8 will vary depending upon the selected communications present.

❷ Shaded Parameters do not exist when DH+ is selected. Inputs are variable and dependent on rack size and whether block transfer is enabled.

Parameter Cross Reference — By Name

No.	Name	Group ❶
310	Adv/Basic Select	1 — Adapter Info
392	An In 1 Offset	6 — Analog I/O
393	An In 1 Scale	6 — Analog I/O
394	An In 2 Offset	6 — Analog I/O
395	An In 2 Scale	6 — Analog I/O
396	An In 3 Offset	6 — Analog I/O
397	An In 3 Scale	6 — Analog I/O
398	An In 4 Offset	6 — Analog I/O
399	An In 4 Scale	6 — Analog I/O
400	An Out 1 Offset	6 — Analog I/O
401	An Out 1 Scale	6 — Analog I/O
402	An Out 2 Offset	6 — Analog I/O
403	An Out 2 Scale	6 — Analog I/O
404	An Out 3 Offset	6 — Analog I/O
405	An Out 3 Scale	6 — Analog I/O
406	An Out 4 Offset	6 — Analog I/O
407	An Out 4 Scale	6 — Analog I/O
339	Analog In 1	6 — Analog I/O
340	Analog In 2	6 — Analog I/O
341	Analog In 3	6 — Analog I/O
342	Analog In 4	6 — Analog I/O
387	Analog Out 1	6 — Analog I/O
388	Analog Out 2	6 — Analog I/O
389	Analog Out 3	6 — Analog I/O
390	Analog Out 4	6 — Analog I/O
303	ChA DIP Switch	7 — Channel A
436	ChA Fault Sts	2 — Adapter Diag
305	ChA LED State	7 — Channel A
425	ChA RIO Flt Sel	2 — Adapter Diag
322	ChA RIO In 1	7 — Channel A
323	ChA RIO In 2	7 — Channel A
324	ChA RIO In 3	7 — Channel A
325	ChA RIO In 4	7 — Channel A
326	ChA RIO In 5	7 — Channel A
327	ChA RIO In 6	7 — Channel A
328	ChA RIO In 7	7 — Channel A
329	ChA RIO In 8	7 — Channel A
351	ChA RIO Out 1	7 — Channel A
352	ChA RIO Out 2	7 — Channel A
353	ChA RIO Out 3	7 — Channel A
354	ChA RIO Out 4	7 — Channel A
355	ChA RIO Out 5	7 — Channel A
356	ChA RIO Out 6	7 — Channel A
357	ChA RIO Out 7	7 — Channel A
358	ChA RIO Out 8	7 — Channel A ❷
426	ChA RIO Warn Sel	2 — Adapter Diag
437	ChA Warn Sts	2 — Adapter Diag
304	ChB DIP Switch	8 — Channel B
438	ChB Fault Sts	2 — Adapter Diag
306	ChB LED State	8 — Channel B
430	ChB RIO Flt Sel	2 — Adapter Diag
330	ChB RIO In 1	8 — Channel B
331	ChB RIO In 2	8 — Channel B
332	ChB RIO In 3	8 — Channel B
333	ChB RIO In 6	8 — Channel B
336	ChB RIO In 7	8 — Channel B
337	ChB RIO In 8	8 — Channel B
359	ChB RIO Out 1	8 — Channel B
360	ChB RIO Out 2	8 — Channel B
361	ChB RIO Out 3	8 — Channel B
362	ChB RIO Out 4	8 — Channel B
363	ChB RIO Out 5	8 — Channel B
364	ChB RIO Out 6	8 — Channel B
365	ChB RIO Out 7	8 — Channel B
366	ChB RIO Out 8	8 — Channel B ❷
431	ChB RIO Warn Sel	2 — Adapter Diag
439	ChB Warn Sts	2 — Adapter Diag
413	Clr Fault Mask	4 — Masks
379	Clrflt Owner	5 — Owners
435	DIP Fault Setup	2 — Adapter Diag
409	Dir Mask	4 — Masks
370	Dir Owner	5 — Owners
376	Flux Owner	5 — Owners
307	Func Blk Chksum	1 — Adapter Info
308	Func Blk ID	1 — Adapter Info
372	Jog 1 Owner	5 — Owners
373	Jog 2 Owner	5 — Owners
411	Jog Mask	4 — Masks
309	Language Select	1 — Adapter Info
415	Local Mask	4 — Masks
375	Local Owner	5 — Owners
300	PLC Comm Adpt ID	1 — Adapter Info
302	PLC Comm Config	1 — Adapter Info
301	PLC Comm Version	1 — Adapter Info
408	Port Enable Mask	4 — Masks
367	Pt6 Logic Cmd In	3 — SCANport I/O
368	Pt7 Logic Cmd In	3 — SCANport I/O
378	Ramp Owner	5 — Owners
427	Redund Chan No	7 — Channel A ❷
412	Ref Mask	4 — Masks
414	Reset Drive Mask	4 — Masks
338	SB Analog In	3 — SCANport I/O
386	SB Analog Out	3 — SCANport I/O
391	SB Analog Sel	3 — SCANport I/O
416	SB Default Ref	3 — SCANport I/O
440	SB Fault Sel	2 — Adapter Diag
442	SB Fault Sts	2 — Adapter Diag
441	SB Warn Sel	2 — Adapter Diag
443	SB Warn Sts	2 — Adapter Diag
314	Data In A1	3 — SCANport I/O
315	Data In A2	3 — SCANport I/O
316	Data In B1	3 — SCANport I/O
317	Data In B2	3 — SCANport I/O
318	Data In C1	3 — SCANport I/O
319	Data In C2	3 — SCANport I/O
320	Data In D1	3 — SCANport I/O
321	Data In D2	3 — SCANport I/O
343	Data Out A1	3 — SCANport I/O
344	Data Out A2	3 — SCANport I/O
345	Data Out B1	3 — SCANport I/O
346	Data Out B2	3 — SCANport I/O
347	Data Out C1	3 — SCANport I/O
348	Data Out C2	3 — SCANport I/O
349	Data Out D1	3 — SCANport I/O
350	Data Out D2	3 — SCANport I/O
374	Set Ref Owner	5 — Owners
410	Start Mask	4 — Masks
371	Start Owner	5 — Owners
369	Stop Owner	5 — Owners
377	Trim Owner	5 — Owners

❶ Parameters included in Groups 7 and 8 will vary depending upon the selected communications present.

❷ Shaded Parameters do not exist when DH+ is selected. Inputs are variable and dependent on rack size and whether block transfer is enabled.

PLC Comm Adapter Board DIP Switch Settings

	DIP SWITCHES U2 (CHANNEL A) OR U4 (CHANNEL B)								DIP SWITCHES U3 (CHANNEL A) OR U5 (CHANNEL B)							
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
PROTOCOL																
RIO w/o Block Transfer	OFF	OFF														
RIO w/ Block Transfer	OFF	ON														
DH+	ON	OFF														
Not Used	ON	ON														
BAUD Rate																
57.6K			OFF	OFF												
115.2K			OFF	ON												
230.4K			ON	OFF												
Not Used			ON	ON												
RIO Rack Size																
1/4					OFF	OFF										
1/2					OFF	ON										
3/4					ON	OFF										
Full					ON	ON										
Not Last / Last																
Last							ON									
Not Last							OFF									
Redundant																
Yes								ON								
No								OFF								
RIO Starting Group																
0									OFF	OFF						
2									OFF	ON						
4									ON	OFF						
6									ON	ON						
RIO Rack Address or DH+ Station Address																
❶ 00											OFF	OFF	OFF	OFF	OFF	OFF
01											OFF	OFF	OFF	OFF	OFF	ON
02											OFF	OFF	OFF	OFF	ON	OFF
03											OFF	OFF	OFF	OFF	ON	ON
04											OFF	OFF	OFF	ON	OFF	OFF
05											OFF	OFF	OFF	ON	OFF	ON
06											OFF	OFF	OFF	ON	ON	OFF
07											OFF	OFF	OFF	ON	ON	ON
10											OFF	OFF	ON	OFF	OFF	OFF
11											OFF	OFF	ON	OFF	OFF	ON
12											OFF	OFF	ON	OFF	ON	OFF
13											OFF	OFF	ON	OFF	ON	ON
14											OFF	OFF	ON	ON	OFF	OFF
15											OFF	OFF	ON	ON	OFF	ON
16											OFF	OFF	ON	ON	ON	OFF
17											OFF	OFF	ON	ON	OFF	ON

❶ Address 00 only valid for DH+ configuration.

RIO Rack Address or DH+ Station Address	DIP SWITCHES U2 (CHANNEL A) OR U4 (CHANNEL B)								DIP SWITCHES U3 (CHANNEL A) OR U5 (CHANNEL B)							
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
20											OFF	ON	OFF	OFF	OFF	OFF
21											OFF	ON	OFF	OFF	OFF	ON
22											OFF	ON	OFF	OFF	ON	OFF
23											OFF	ON	OFF	OFF	ON	ON
24											OFF	ON	OFF	ON	OFF	OFF
25											OFF	ON	OFF	ON	OFF	ON
26											OFF	ON	OFF	ON	ON	OFF
27											OFF	ON	OFF	ON	ON	ON
30											OFF	ON	ON	OFF	OFF	OFF
31											OFF	ON	ON	OFF	OFF	ON
32											OFF	ON	ON	OFF	ON	OFF
33											OFF	ON	ON	OFF	ON	ON
34											OFF	ON	ON	ON	OFF	OFF
35											OFF	ON	ON	ON	OFF	ON
36											OFF	ON	ON	ON	ON	OFF
37											OFF	ON	ON	ON	ON	ON
40											ON	OFF	OFF	OFF	OFF	OFF
41											ON	OFF	OFF	OFF	OFF	ON
42											ON	OFF	OFF	OFF	ON	OFF
43											ON	OFF	OFF	OFF	ON	ON
44											ON	OFF	OFF	ON	OFF	OFF
45											ON	OFF	OFF	ON	OFF	ON
46											ON	OFF	OFF	ON	ON	OFF
47											ON	OFF	OFF	ON	ON	ON
50											ON	OFF	ON	OFF	OFF	OFF
51											ON	OFF	ON	OFF	OFF	ON
52											ON	OFF	ON	OFF	ON	OFF
53											ON	OFF	ON	OFF	ON	ON
54											ON	OFF	ON	ON	OFF	OFF
55											ON	OFF	ON	ON	OFF	ON
56											ON	OFF	ON	ON	ON	OFF
57											ON	OFF	ON	ON	ON	ON
60											ON	ON	OFF	OFF	OFF	OFF
61											ON	ON	OFF	OFF	OFF	ON
62											ON	ON	OFF	OFF	ON	OFF
63											ON	ON	OFF	OFF	ON	ON
64											ON	ON	OFF	ON	OFF	OFF
65											ON	ON	OFF	ON	OFF	ON
66											ON	ON	OFF	ON	ON	OFF
67											ON	ON	OFF	ON	ON	ON
70											ON	ON	ON	OFF	OFF	OFF
71											ON	ON	ON	OFF	OFF	ON
72											ON	ON	ON	OFF	ON	OFF
73											ON	ON	ON	OFF	ON	ON
74											ON	ON	ON	ON	OFF	OFF
75											ON	ON	ON	ON	OFF	ON
76											ON	ON	ON	ON	ON	OFF
77											ON	ON	ON	ON	ON	ON

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- ❑ SUGGEST/RESPONSIBLE FOR THE PURCHASE OF EQUIPMENT
- ❑ DESIGN/IMPLEMENT ELECTRICAL SYSTEMS
- ❑ SUPERVISE FLOOR OPERATIONS
- ❑ MAINTAIN/OPERATE PROGRAMMABLE MACHINERY
- ❑ TRAIN/EDUCATE MACHINE USERS

✓ WHAT LEVEL OF EXPERIENCE DO YOU HAVE WITH EACH OF THE FOLLOWING PRODUCTS?

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AC/DC DRIVES	❑	❑	❑	❑
PERSONAL COMPUTERS	❑	❑	❑	❑
NC/CNC CONTROLS	❑	❑	❑	❑
DATA COMMUNICATIONS/LAN	❑	❑	❑	❑

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