Allen-Bradley

Bulletin 1395 Multi-Communication Board

Catalog No. 145395

Hardware/Software Reference Manual

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Chapter 1

Before You Begin

Objective

This manual contains the information necessary to perform the following functions on the Multi-Communications Adapter (MCA) Board:

- Install and Set-up the MCA board
- Configure the Drive for control by a PLC Controller
- Maintain and Troubleshoot the board

Audience

This manual is intended for use by expert personnel familiar with the functions of solid state drive equipment. You must be thoroughly familiar with the Bulletin 1395 and its hardware before attempting to setup or troubleshoot a Multi-Communications Adapter Board.

To make efficient use of this Adapter Board you must be able to operate and program an Allen-Bradley PLC controller. If you cannot, refer to the appropriate programming and operations manual for your PLC controller and obtain training from the support division before attempting to setup and program the MCA board.

Vocabulary

In this manual we refer to the Multi-Communications Adapter board as the "MCA board" or the "Adapter".

The Remote Input/Output interface is referred to as the "RIO".

The Programmable Logic Controller is referred to as a "PLC®".

The Allen-Bradley Data Highway + interface is referred to as "DH+"

Multi-Communications Adapter Compatibility & Features

The MCA board provides a sophisticated interface to Allen-Bradley PLC controllers and other equipment capable of communicating over serial communications links. This adapter has the following features:

- Two separate communications channels, each capable of being configured as either Allen-Bradley Remote I/O (RIO) or Allen-Bradley Data Highway + (DH+) interfaces.
- Four programmable function blocks which can be used to manipulate data.
- One programmable discrete input (24VDC or 115VAC).
- Compatible with Allen-Bradley PLC5/60, PLC5/40, PLC5/25, PLC5/15; PLC250; PLC3 and Control View.

PLC® is a registered trademark of Allen-Bradley Company Inc.

Safety Precautions

The following types of precautionary statements will be found in this manual.

IMPORTANT: Identifies particular areas of concern for correct board, processor or drive operation.

ATTENTION: Tells you where machinery may be damaged or economic loss can occur if procedures are not followed properly.
Or it tells you where people may be hurt if procedures are not followed properly.

Manual Organization

Table 1–A provides a brief overview of topics covered in this manual and their location within the book.

Table 1–A.
Manual Organization

Chapter	Title	Topics
2	Introduction and Product Description	Board Identification, Hardware Content, Hardware requirements for Interfacing.
3	Configuration & Interfaces	Configuring the Drive for the MCA board and interfacing the Drive with a PLC controller.
4	Startup & Installation	Unpacking & Inspection, mounting, wiring,switch settings and configuration.
5	Troubleshooting & Maintenance	Diagnostics and Fault Messages.
6	Reference	Table of all MCA configuration and set-up parameters.

Specifications

Electrical:

Board power provided by Drive	
Discrete Input	24VDC or 115VAC, jumper selectable

Environmental:

Ambient Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	–40° to +85°C (–40° to +185°F)
Relative Humidity	5% to 95% non-condensing
Firmware Version	1.xx

General Precautions

In addition to the precautions listed throughout this manual, the following statements which are general to the system must be read and understood.

CAUTION: This drive may contain ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, *Guarding Against Electrostatic Damage* or any other applicable ESD Protection Handbook.

WARNING: Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Hazardous voltages may exist in the cabinet even with the circuit breaker in the off position. Recommended practice is to disconnect and lock out control equipment from power sources and discharge stored energy in capacitors, if present. If it is necessary to work in the vicinity of energized equipment, the safety related work practices of NFPA 70E, Electrical Safety Requirements for Employee Workplaces, must be followed. DO NOT work alone on energized equipment!

WARNING: Potentially fatal voltages may result from improper usage of oscilloscope and other test equipment. The oscilloscope chassis may be at a potentially fatal voltage if not properly grounded. If an oscilloscope is used to measure high voltage waveforms, use only a dual channel oscilloscope in the differential mode with X 100 probes. It is recommended that the oscilloscope be used in the A minus B Quasi-differential mode with the oscilloscope chassis correctly grounded to an earth ground. Refer to equipment safety instructions for all test equipment before using with the 1395.

CAUTION: The CMOS devices used on the control circuit boards can be destroyed or damaged by static charges. If personnel will be working near static sensitive devices, they must be appropriately grounded.

Chapter 2

Introduction & Product Description

Chapter Objective

This chapter contains a description of the major hardware components of the Multi-Communications Adapter board. It is not intended to be an all encompassing technical description of each hardware component. This chapter provides information to aid service personnel in:

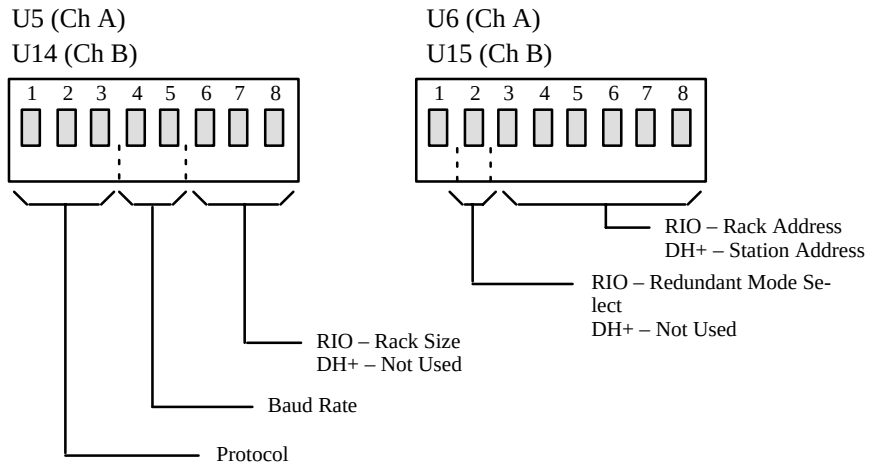
- Identifing the MCA board.
- Understanding the hardware content of the board.
- Understanding the hardware requirements necessary to interface this board with external devices.

General Board Description

The MCA board contains the hardware necessary to connect the Drive to Allen-Bradley's RIO or DH+ communication links. Once connected, these links can be used to control, diagnose, and setup the Drive. Figure 2–1 shows the major hardware components located on this board. Refer to Figure 2–1 when attempting to identify the various hardware components.

The MCA board contains a small interface board, referred to as the Interface Plug, which contains the hardware necessary to communicate to Allen-Bradley PLC controllers via RIO and\or DH+, or to other devices via DH+. Refer to the installation section of this manual for further details.

DIP switches U5 and U6 are used to select communication type, baud rate, and rack or station number for channel A. Switches U14 and U15 perform the same function for channel B.



ATTENTION: Certain procedures in this manual require that the drive "Not be running". This assumes that the DC loop contactor is de-energized and that the user has properly set up the interface logic to meet this criteria.

Additional hardware allows for a separate discrete input to the Drive. The input device (Pushbutton, selector switch, etc) is connected to terminal block J5 and is jumper selectable (see table 2–A) for either a 115V AC or 24V DC input. The function and operation of this input is controlled by parameter settings.

LED Indicators

The MCA board contains several LED's used to provide status information. LED DS1 indicates wheter the MCA board itself is faulted or not faulted. LED's DS2 and DS3 duplicate the function provided by the LED's on the Interface Plug. LED DS4 indicates the status of the Discrete input. Tables 2–A and 2–B provide information on LED's DS1 – DS4.

Table 2–A.
LED Indicator Status for RIO and DH+ Communication

	LED			
	ChA	ChB	State	Function
RIO	DS2	DS3	LED Green	Normal PLC Communications
			LED Off	No communication to PLC Controller
			LED Blinking Green	PLC is in Reset/Program/Test Mode
			LED Blinking Red	PLC Has Rack Inhibited
DH+	DS2	DS3	LED Yellow	Normal DH+ Communications
			LED Off	MCA Board Faulted
			LED Blinking Yellow	No Communication over DH+
			LED Blinking Red	Duplicate Node Address on DH+ Link

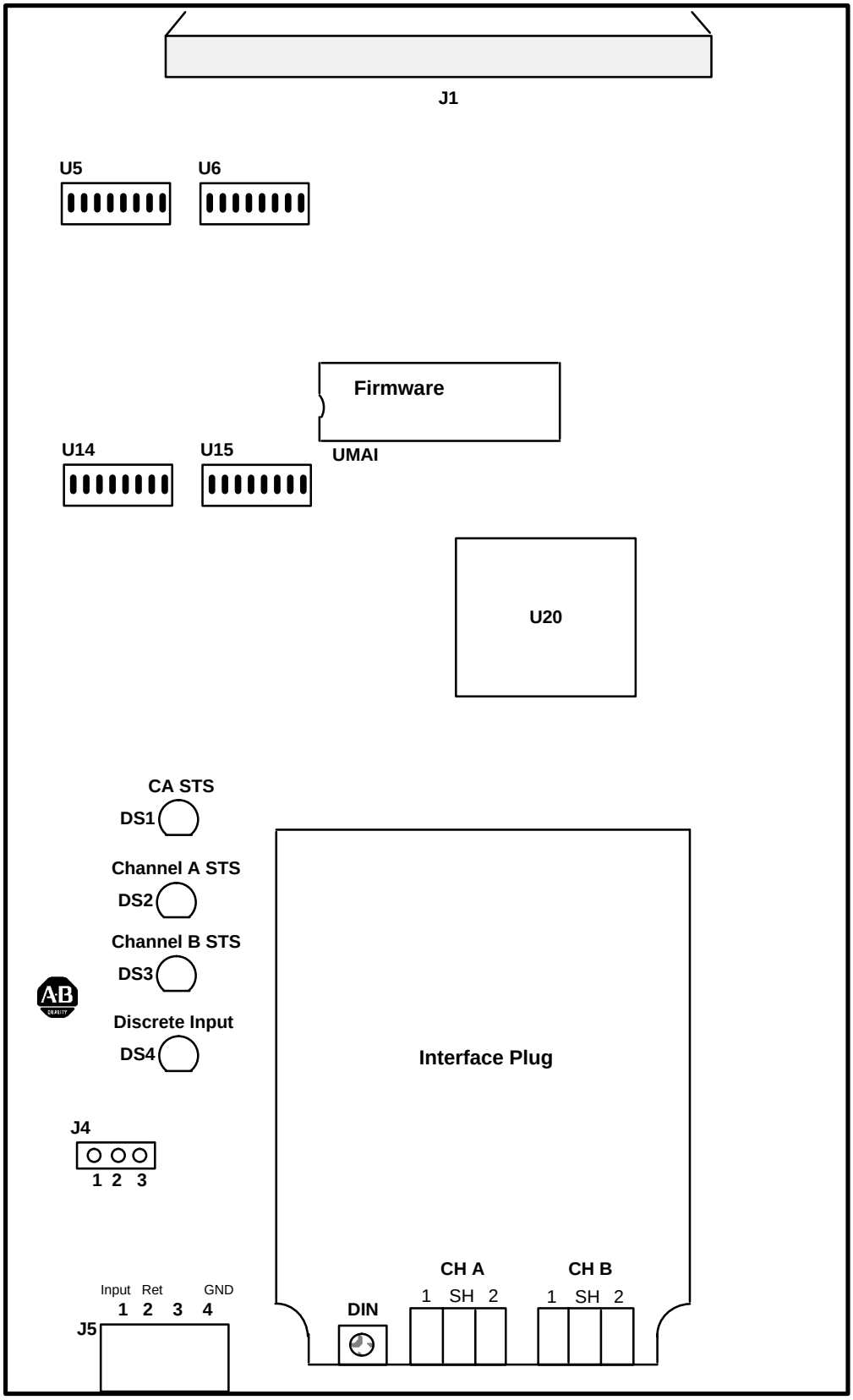
Table 2–B.
LED Indicator Status for Board and Discrete Input

	LED	State	Function
MCA Board Status	DS1	LED Green	Normal Adapter Operation
		LED Off	Adapter is Faulted
Discrete Input Status	DS4	LED Off	Discrete input is Low
		LED Green	Discrete input is High

Firmware Location

The MCA Board contains a microprocessor (U20) which is responsible for controlling all board functions and features. This board contains firmware version 1.xx (the "xx" designator may vary but does not affect information in this manual). Figure 2–1 shows the physical location of the firmware chip (UMA1). The setup and configuration data for the Adapter board is stored in the EEPROM memory located on the main control board of the Drive.

Figure 2–1. MCA Board Components

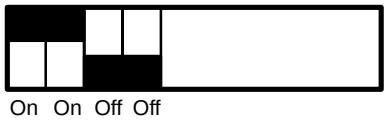


DIP Switch Orientation

DIP Switch orientation (Figure 2–2) on the MCA board is as Follows:

CLOSED = “ON” = “1”
OPEN= “OFF” = “0”

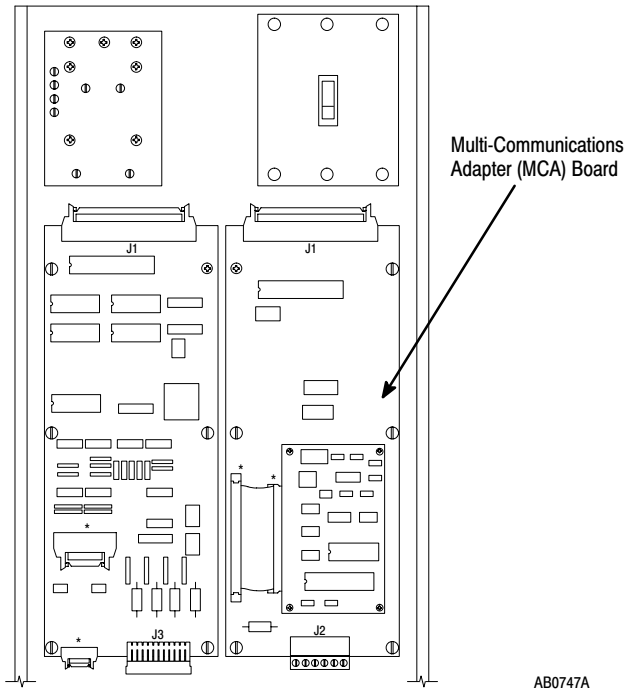
Figure 2–2. DIP Switch Orientation



Board Location

The standard mounting position for the MCA board is Port B of the Drive (Refer to Figure 2–3). If required, the Adapter can be mounted in Port A. Note that each port uses different parameters to store Adapter setup and configuration information.

Figure 2–3. MCA Board Mounted in Port B



Chapter 3

Configuration & PLC Interfacing

Chapter Objective

This chapter contains a general description of the MCA Board's features and functions. It is intended to provide background information to support other procedures in this manual and help you to:

- Configure the Drive for use with the MCA Board
- Interface the Drive with an Allen-Bradley PLC Controller.

This chapter is not intended to be an all encompassing technical description of the MCA Board.

This chapter will provide a functional overview of each interface provided on the MCA board. Later chapters will describe in detail how to properly connect, configure, and use these interfaces.

Terminology

A brief description of terms and concepts covered in this chapter are:

Channel – Refers to a serial communication link. The MCA board contains two "channels", each of which can be configured as either Allen-Bradley RIO or DH+ type communications.

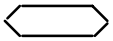
Configuration – The process of linking sink to source parameters for the purpose of distributing data within the Drive or adapter(s). Fast parameters are those which are updated rapidly. They are typically used for transmitting real time data to and from the Drive. Fast parameter values are not stored in non-volatile memory. Actual armature current is an example of a fast parameter.

Microbus – An internal Drive mechanism designed by Allen-Bradley for exchanging information between microprocessors. The Microbus is used to transfer information between the MCA board and the Main Control board.

Port – A physical location on the Drive reserved for the connection of Adapter cards. Each Drive has two ports. The ports are identified in firmware as "Port A" and "Port B".

Parameter – A memory location in the Drive or Adapter used to store data. This data can be real time data and/or setup information. Each parameter has an assigned number and function. Parameters are displayed in engineering units when viewed from program terminals.

Parameter Table – A table which contains all parameters that are available in the Drive and adapters.

Source Parameter –  A parameter that contains real time information that is available for use by other devices. These devices can include PLC controllers, operator interface devices, program terminals, etc.

Sink Parameter –  Sink parameters accept data from other parameters which is then used by the Drive to perform the desired functions. An example of a sink is the ex ternal velocity reference parameter which accepts a speed reference from a device such as a PLC

Operation

The primary purpose of the MCA board is to allow the Drive to be directly controlled by an Allen-Bradley PLC via RIO, or any other device which can communicate using the DH+ protocol. This adapter has two Digital communication channels which can be configured for connection to Allen-Bradley RIO or Allen-Bradley DH+ links. Each channel is independently programmable.

When a communication channel is configured for RIO connection, the Adapter looks like a Remote I/O rack to an Allen-Bradley PLC Controller. This allows the Drive to directly communicate to a PLC, without using special modules or other programming interfaces. The MCA board supports both Discrete I/O and block transfer mechanisms.

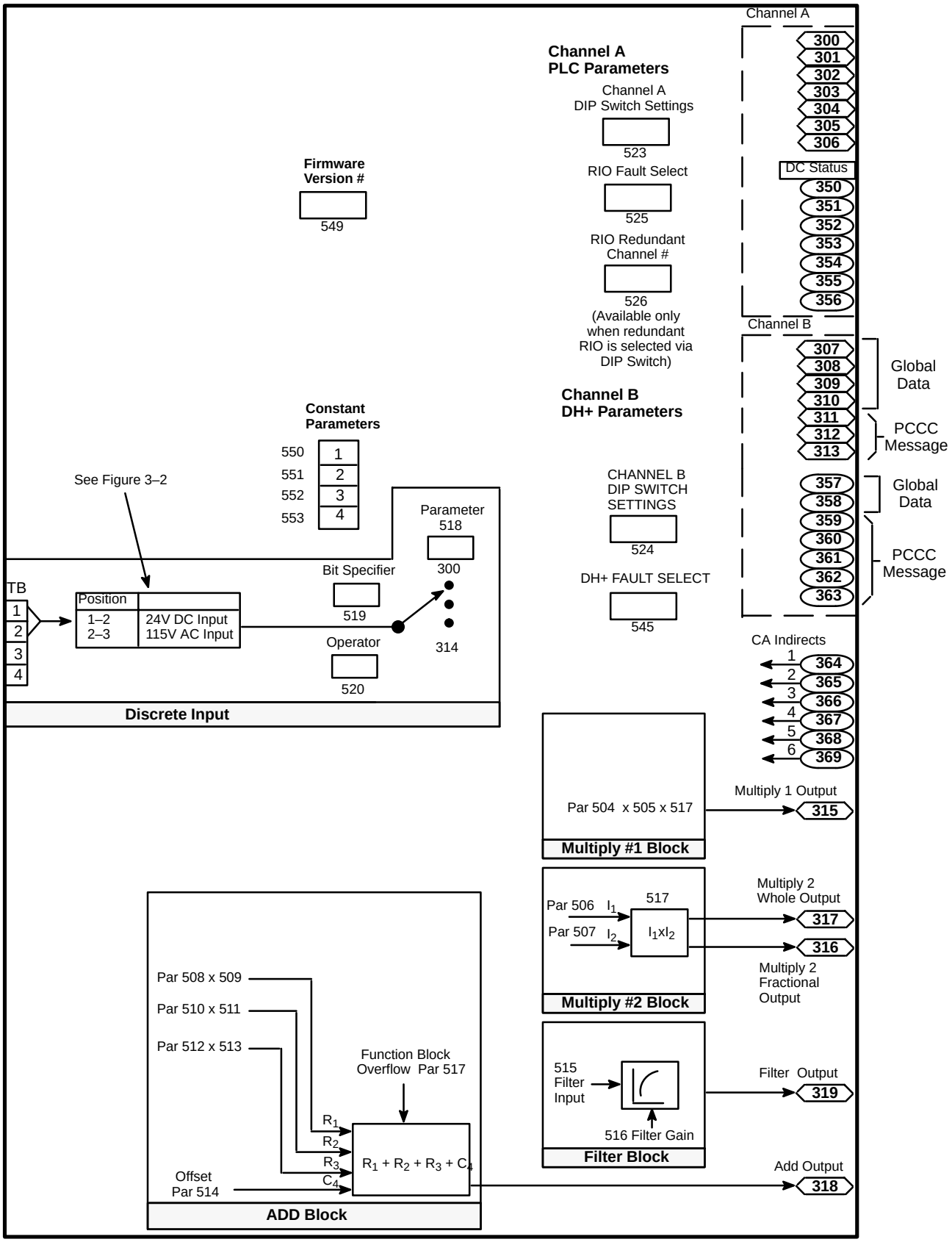
When a communication channel is configured for DH+ connection, the Adapter board becomes a station on the DH+ link. Information can be passed to and from the Drive using the DH+ protocol.

IMPORTANT: Data Highway + (DH+) is not designed for real time control of data. Searching, monitoring large programs, and on-line programming can degrade message throughput on this link since it can perform only one of these functions at a time. Refer to the appropriate PLC manual for details on the DH+ characteristics.

In addition to the communications channels the Adapter also has a separate Discrete input whose function is defined by the user and a set of function blocks which can be used to manipulate Adapter and/or Drive information.

Figure 3–1 presents an overview of the MCA board with a typical Channel configuration. Channel A has been designated (via a dip switch) for RIO protocol and Channel B has been designated for DH+ protocol. The parameter numbers shown are for an MCA board mounted in Port B of the Drive. This is the standard Port for the MCA Board.

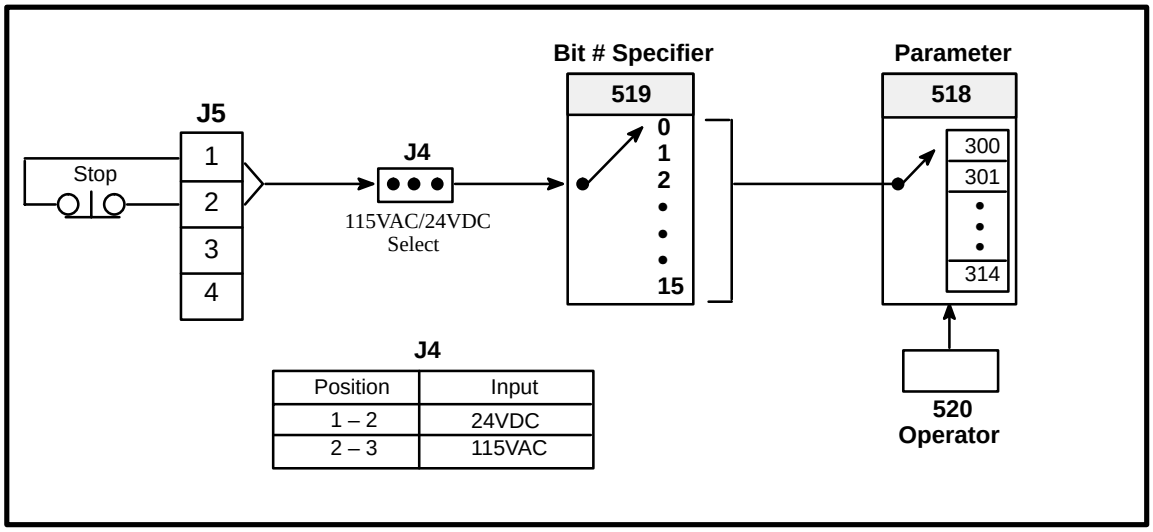
Figure 3–1. MCA Board Overview



Discrete Input

The MCA board has a single discrete input which can be programmed for use in the Drive. Figure 3–2 shows this input and the parameters that control its use.

Figure 3–2. Discrete Input



ATTENTION: The Start/Stop circuitry in this drive is composed of solid-state components. If hazards due to accidental contact with moving machine components or unintentional flow of liquid, gas or solids exist, NEMA standards require that a hardwired maintained contingency Stop circuit such as the one shown at terminals 1–2 of J5 be used with this Drive.

Table 3–A.
Discrete Input Voltage Select Jumper J4

Position	Input Type
1 – 2	24V DC
2 – 3	115V AC Input

Table 3–B.
Parameter Listing for Discrete Input

Par Num	Par Type	Description
518	Setup	Discrete Input Map
519	Setup	Parameter Bit# Specifier
520	Setup	Parameter Operator

Discrete Input Map Parameter (Par #518) – Determines which parameter the discrete input will affect. Valid source parameters are 300 – 314.

Discrete Input Bit Specifier (Par #519) – This parameter determines which bit of the parameter specified by the Discrete Input Map will be affected by the discrete input.

Jumper J4, 115V AC/24V DC select – This jumper allows the selection of the input voltage required to operate the discrete input. Refer to Table 3–B.

Discrete Input Operator (Par # 520) – Determines how the discrete input will affect the bit specified by the Discrete Input Bit Specifier. Refer to Table 3C for further details.

Table 3–C.
Discrete Input Operator Selections Parameter 520

Value	Function
0	Disable Input
1	AND input with parameter specified in 518
2	OR input with parameter specified in 518
3	Invert Input & OR with parameter specified in 518
4	Invert Input & AND with parameter specified in 518

Function Blocks

The MCA has four programmable function blocks which can be used to manipulate data on the Adapter or from the Drive. The inputs and outputs of these blocks can come directly from the Adapter or from the Drive via configuration links.

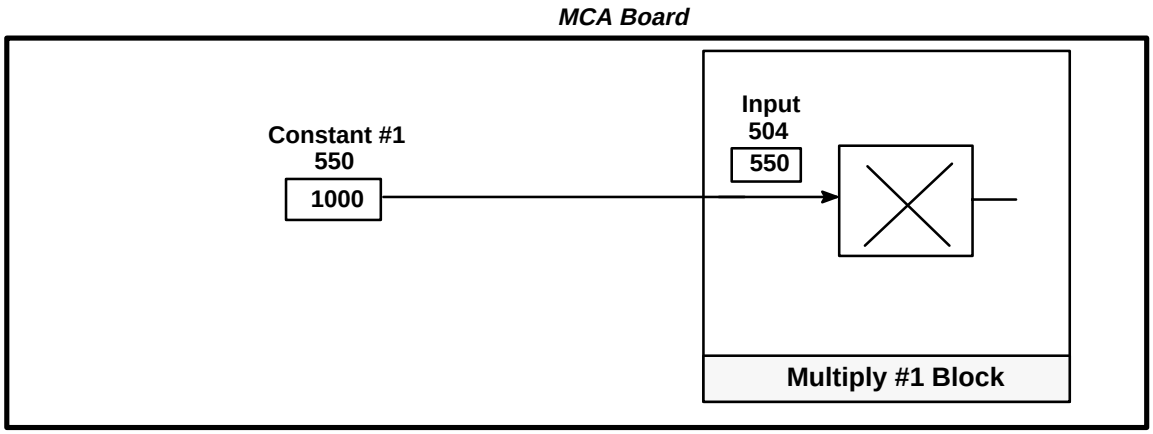
All function blocks are executed every 1.7 milliseconds in the following order:

1. Multiply Block #1
2. Multiply Block #2
3. Add Block
4. Filter Block

Cascading Function Blocks – These function blocks can be cascaded based on application requirements. If the blocks are not cascaded in the order shown above, then additional time delays will occur. A time delay of 1.7 milliseconds for each block executed out of sequence will occur.

In addition, there are two sets of parameters that can be used along with the blocks. These are Constant parameters (parameters 550 – 553) and CA Indirect parameters (parameters 364 – 369). The constant parameters can be used to store a constant or preset value for use by a function block. The CA Indirect parameters are used to direct data gathered from outside the Adapter board for use by the function blocks. Examples are shown in Figure 3–3.

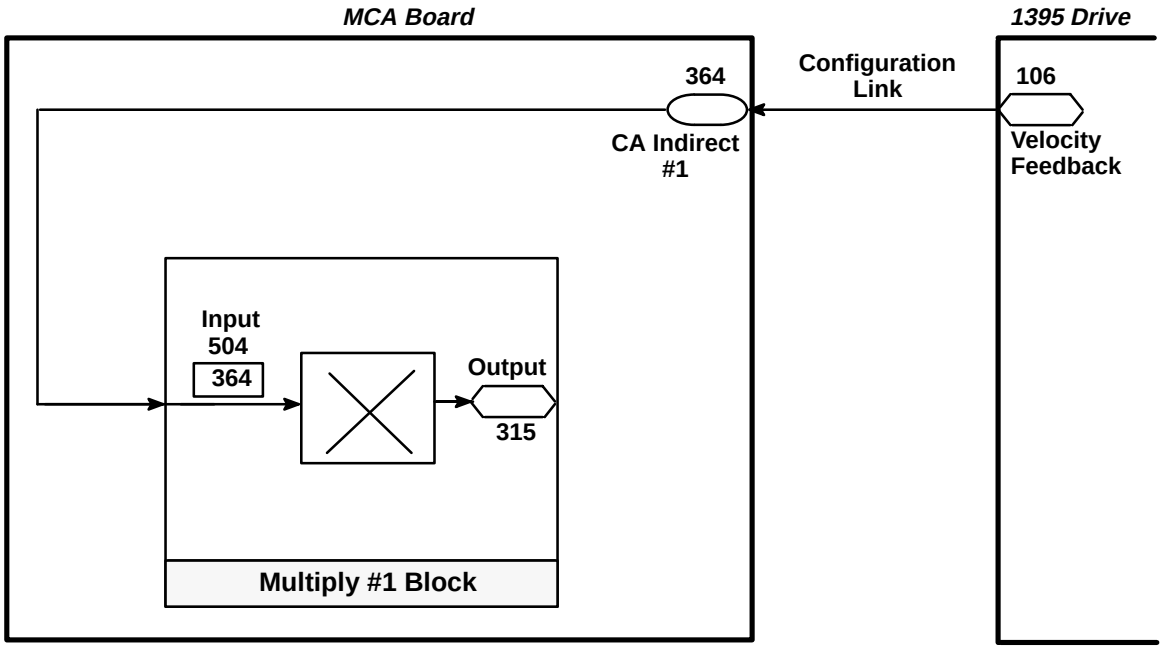
Figure 3–3. Constant Parameter Example



By placing the constant #1 parameter number (Par #550) into the input parameter (Par #504) the data value of 1000 in constant parameter (P #550) is used as the input to the Multiply 1 block.

In this example a configuration link is made between the Drive's velocity feedback parameter (Par #106) and the Digital Communication adapter CA Indirect #1 parameter (Par #364). Also, the CA Indirect #1 parameter number is placed into the Input Parameter (Par #504) of the Multiply 1 block. Once these connections are made the Drive will provide the velocity feedback value as an input to the Multiply 1 block.

Figure 3–4. CA Indirect parameter



Multiply Block #1

General Description – This block (Fig. 3–5) receives an input (parameter 504) and multiplies it by a gain value (parameter 505). The output can be linked to other Drive parameters or used by the MCA board with other function blocks. The overflow control parameter (parameter 517) determines the fault type and action taken when an overflow condition occurs.

Figure 3–5. Multiply #1 Block

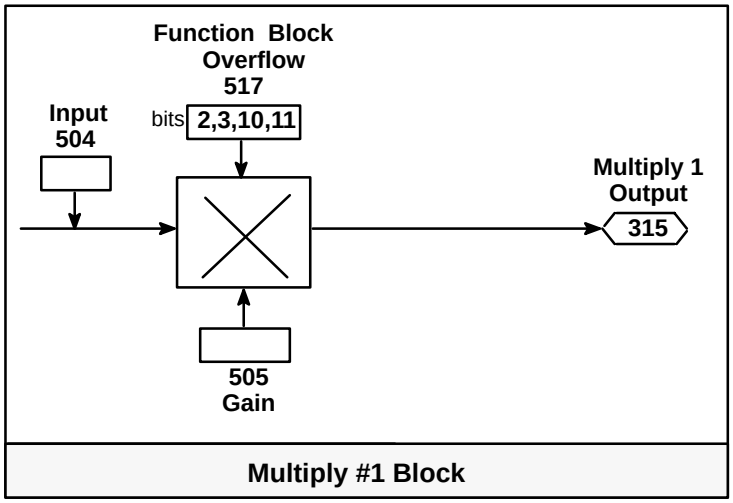


Table 3–D.
Parameter Listing for Multiply #1 Block

Par Num	Par Type	Description
315	Output	Block Output
504	Setup	Block Input
505	Setup	Gain
517	Setup	Overflow Control Parameter

Parameter Description:

Block Output (Par # 315) – This is a fast source parameter which contains the result of the multiplication. The data can be used on the Adapter or passed to the Drive by using a Drive configuration link.

Block Input (Par # 504) – The parameter that specifies where this block gets it's input data. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Gain (Par # 505) – This parameter stores a value which is multiplied with the input data specified in the Block Input parameter. It can be any value between +15.99 and –15.99.

Overflow Control (Par # 517) – This parameter determines what action the Drive will take when a Block Output value overflow condition occurs. Refer to Table 3–E for details.

Table 3–E.
Function Block Overflow Control, Parameter 517

Overflow Action

BIT 11	BIT 10	Action Taken
0	0	Send last state (Default)
0	1	Zero Inputs
1	0	Send max value, pos or neg
1	1	None

Overflow fault Severity

BIT 3	BIT 2	Fault Type
0	0	None (Default)
0	1	Warning
1	0	Soft
1	1	Hard

IMPORTANT: Refer to Chapter 6 for definition of Fault types before attempting configuration or Start-up.

Multiply Block #2

General Description – This block (Figure 3–6) receives two inputs (parameter 506 & 507) and multiplies them together. The output is available as two parameters, whole and fractional values (providing 32 bit resolution), and can be linked to other Drive parameters or used by the other MCA function blocks.

The overflow control parameter (Par 517) determines the fault type and action taken when an overflow condition occurs.

Figure 3–6. Multiply #2 Block

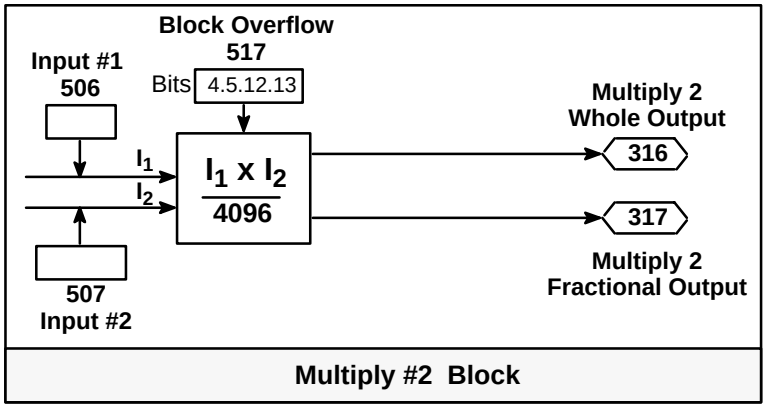


Table 3–F.
Parameter Listing for Multiply #2 Block

Par Num	Par Type	Description
316	Output	Multiply #2 Whole Output
317	Output	Multiply #2 Fractional Output
506	Setup	Input #1
507	Setup	Input #2
517	Setup	Overflow Control

Table 3–G.
Function Block Overflow Control, Parameter 517

Overflow Action

BIT 3	BIT 12	Action Taken
0	0	Send last state (Default)
0	1	Zero Inputs
1	0	Send max value, pos or neg
1	1	None

Overflow fault Severity

BIT 5	BIT 4	Fault Type
0	0	None (Default)
0	1	Warning
1	0	Soft
1	1	Hard

Parameter Description:

Block Output Whole (Par # 316) – This is a fast source parameter which contains the whole number part of the multiplication. The data can be used on the Adapter or passed to the Drive by using a Drive configuration link.

Block Output Fractional (Par # 317) – This is a fast source parameter which contains the fraction number part of the multiplication. The data can be used on the Adapter or passed to the Drive by using a Drive configuration link.

Block Input #1 (Par # 506) – A parameter that specifies where this block gets one of the input values used in the multiplication process. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters (refer to Figures 3–3 and 3–4).

Block Input #2 (Par # 507) – A parameter that specifies where this block gets one of the input values used in the multiplication process. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Add Block

General Description – The Add block (Figure 3–7) sums up to three external values (parameters 508, 510, 512) and one offset value (parameter 514) to obtain a result. Each external input has a scale factor (parameters 509, 511, 513) that is independently programmable. The output (Par 318) can be linked to other Drive parameters or used by other MCA function blocks. The Overflow Control parameter (parameter 517) determines the fault type and action taken when an overflow condition occurs.

Figure 3–7. Add Block

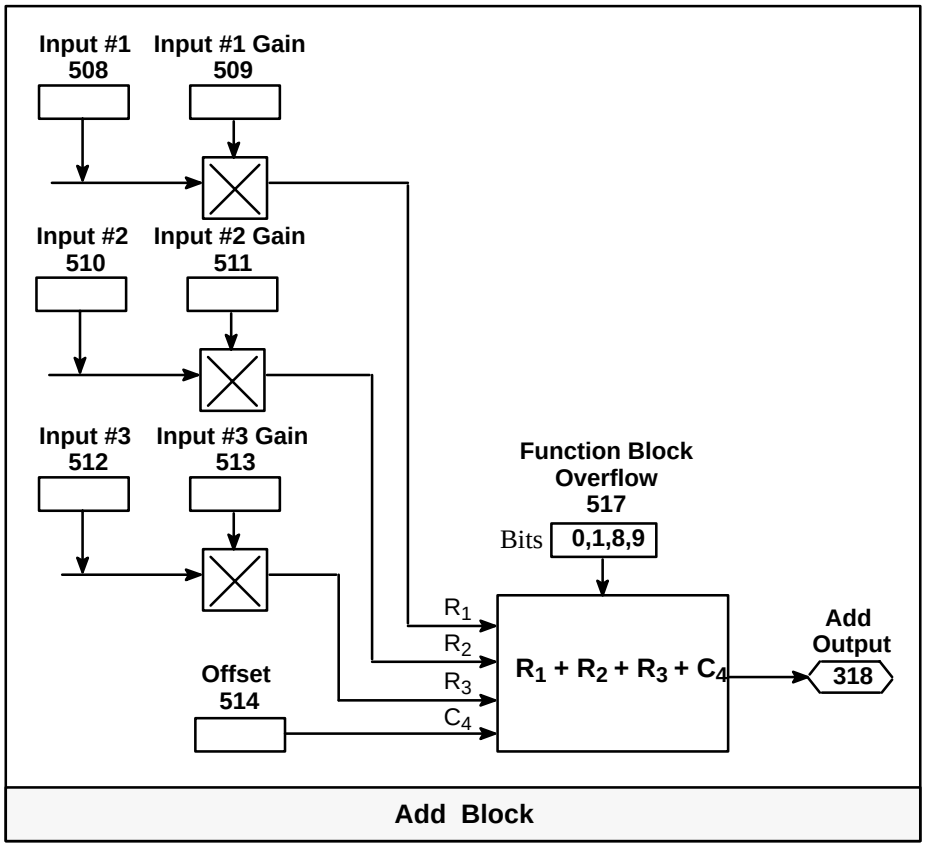


Table 3–H.
Parameter Listing for Add Block

Par Num	Par Type	Description
318	Output	Add Block Output
508	Setup	Input #1
509	Setup	Input #1 Gain
510	Setup	Input #2
511	Setup	Input #2 Gain
512	Setup	Input #3
513	Setup	Input #3 Gain
514	Setup	Input Offset
517	Setup	Overflow Control Parameter

Parameter Description:

Block Output (Par # 318) – This is a fast source parameter which contains the result of the addition. The data can be used on the Adapter or passed to the Drive by using a Drive configuration link.

Block Input #1 (Par # 508) – A parameter that specifies where this block gets one of the input values used in the addition process. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Gain #1 (Par # 509) – This parameter stores a value which is multiplied with the input data specified in the Block Input parameter. It can be any value between +15.99 and –15.99.

Block Input #2 (Par # 510) – A parameter that specifies where this block gets one of the input values used in the addition process. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Gain #2 (Par # 511) – This parameter stores a value which is multiplied with the input data specified in the Block Input parameter. It can be any value between +15.99 and –15.99.

Block Input #3 (Par # 512) – A parameter that specifies where this block gets one of the input values used in the addition process. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Gain #3 (Par # 513) – This parameter stores a value which is multiplied with the input data specified in the Block Input parameter. It can be any value between +15.99 and –15.99.

Input Constant (Par # 514) – This parameter stores a value or constant which is added to the values provided by the input parameters. The constant can be any integer value from +32767 to –32767.

Overflow Control (Par # 517) – This parameter determines what action the Drive will take when a Block Output value overflow condition occurs. Refer to Table 3–I for details.

Table 3–I.
Function Block Overflow Control, Parameter 517

Overflow Action

BIT 9	BIT 8	Action Taken
0	0	Send last state (Default)
0	1	Zero Inputs
1	0	Send max value, pos or neg
1	1	None

Overflow fault Severity

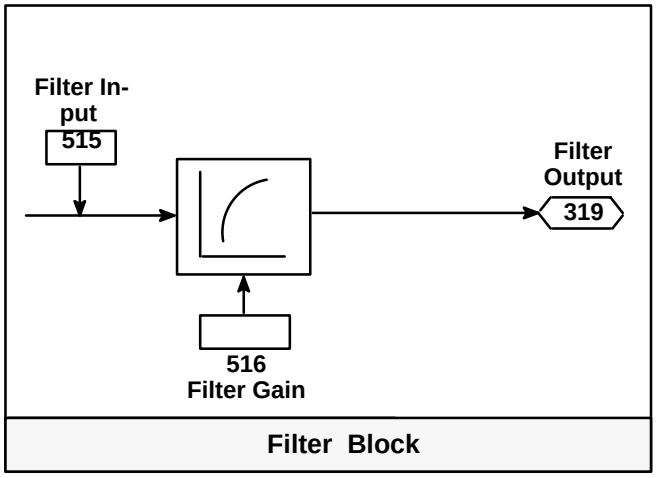
BIT 1	BIT 0	Fault Type
0	0	None (Default)
0	1	Warning
1	0	Soft
1	1	None

Low Pass Filter

This block is a first order low pass filter which can be used to filter inputs. The equation for this filter is shown below. This block receives an input (parameter 515) and multiplies it by a filter gain value (parameter 516). The output can be linked to other Drive parameters or used by other MCA function blocks.

The equation for this filter is: $Y_{new} = Y_{old} + (Input - Y_{old}) * Gain$.

Figure 3–8. Filter Block



Parameter Description:

Filter Output (Par # 319) – This is a fast source parameter which contains the output of the filter. The data can be used on the Adapter or passed to the Drive by using a Drive configuration link.

Filter Input (Par # 515) – The parameter that specifies where this block gets it's input data. Input data can come from other functions on this Adapter or from the Drive by using CA Indirect parameters. Refer to Figures 3–3 and 3–4 for details on input data.

Filter Gain (Par # 516) – This parameter stores a value which is multiplied with the input data specified in the Block Input parameter. It can be any value between 4ms and 32.767 seconds.

Table 3–J.
Parameter Listing for Filter Block

Par Num	Par Type	Description
319	Output	Filter Output
515	Setup	Filter Input
516	Setup	Filter Gain

RIO Communications

Each channel of the MCA 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. The MCA board has several features, some of which are not available with the Node Adapter board. This adapter can replace the Node Adapter board in applications where these additional communications features are required. Below is a listing of the RIO features on this Adapter:

- The Adapter can support 57.6K, 115K, and 230K baud communication rates.
- The board can be configured as a 1/2, 3/4, or full I/O rack.
- The board can be configured to ignore PLC fault conditions and continue Drive operation.

ATTENTION: Configuring the MCA board to ignore PLC fault conditions could lead to erratic operation and possible drive or equipment damage.

- The block transfer mechanism can support transfer of multiple Drive parameters (up to 30) in a single block transfer request.
- A “redundant” feature allows the Drive to be directly connected to two PLC’s. A parameter specifies which PLC is in control of the Drive at any given time, and also allows control to be switched from one PLC to the other.

General

The MCA board does not scale or manipulate data that is transferred between the Drive and PLC Controller. If data in the PLC is manipulated in units other than Drive units, the data must first be converted to Drive Units before being sent to the Drive. Consequently, all scaling of data must be performed in the PLC.

To control Drive parameters the MCA parameters are linked to the Drive by using source and sink parameters. Refer to the Drive Installation and Maintenance manual for details on Drive configuration links.

The selected rack size (determined by switches U5 and U14) and the Adapter port (A or B) that the Adapter is mounted in determine which parameters in the Drive are used for transfer of data between the Drive and PLC Controller. The Standard port position for the MCA is port B.

Because there are two channels on this Adapter board, the channel configuration (RIO or DH+) also determines which Adapter board parameters are used and their function. The standard configuration is for channel A to be DH+ communication and channel B to be RIO communication. This can be changed using switches U5 (Channel A) and U14 (Channel B).

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 the PLC Controller manual for details.

Refer to Figures 3–9 thru 3–11. These figures indicate how data is transferred between the Drive and PLC controller for the rack size selected. The first group number associated with a rack is reserved for the block transfer function. The remainder of group numbers (1–7 for full racks, 1–5 or 3–7 for 3/4 racks, 1–3 or 5–7 for half racks) are used for the transfer of discrete type 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 Figure 3–12.

Figure 3–9. RIO Full Rack Configuration

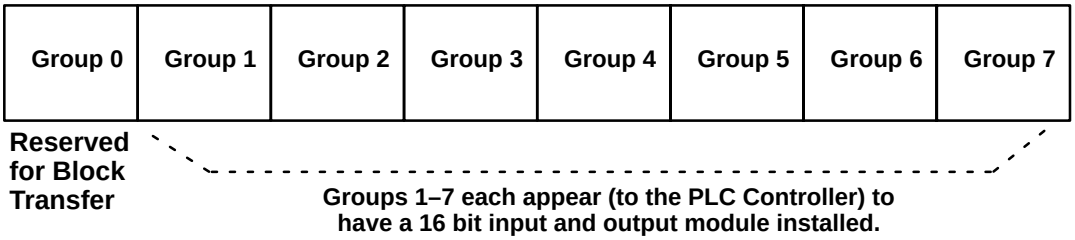


Figure 3–10. RIO 3/4 Rack Configuration

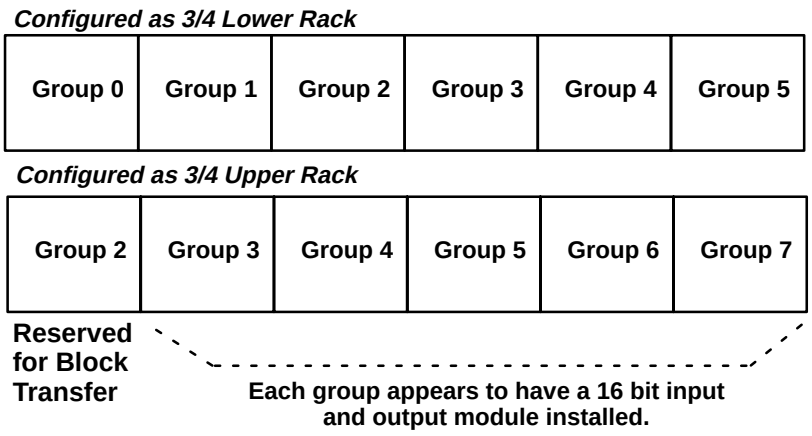


Figure 3–11. RIO Half Rack Configuration

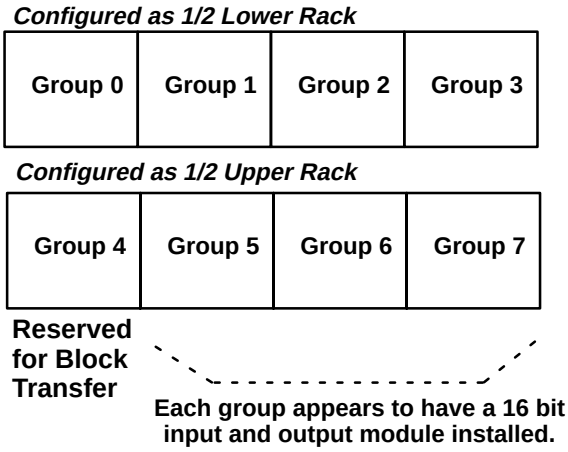
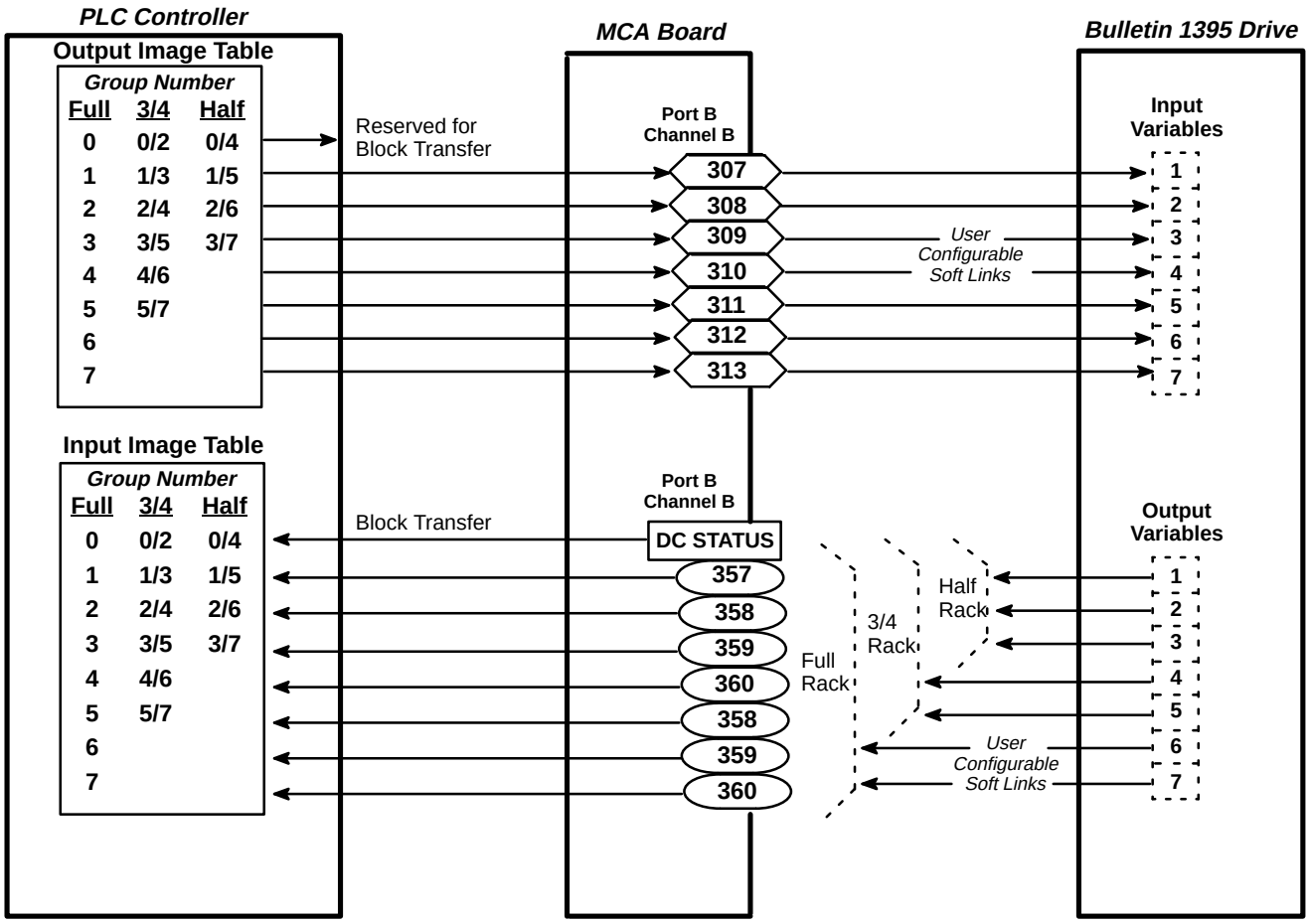


Figure 3–12. Multi Communications Adapter Configuration Example



Discrete PLC Controller I/O Example

Figure 3–13 illustrates an application where the MCA Board has been setup for a full rack (numbered rack 2) and the 16 bit words for group 1 and 2 are being used by the PLC Controller program for data transfer with the Drive. In this example, the Drive has been configured so that the data coming into source parameter 307 is sent to Logic Cmd 1 (parameter 150). Information sent to the Drive Using the 16 bit output word for group 1 of rack 2 must therefore be a 16 bit logic word where the bits are defined by the description of parameter 150.

In a similar manner, the External Velocity Ref (parameter 154) has been linked to source parameter 308. The 16 bit output word for group 2 of rack 2 must be a 16 bit signed integer whose value corresponds to the allowable values in Drive Units for parameter 154.

Information from the Drive consists of Logic Status (parameter 100) and Velocity Fdbk (parameter 106). Based on the links shown in Figure 3–2, 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 100. 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 106.

If the data transferred between the Drive and PLC Controller will be manipulated (in the PLC Controller) in units other than Drive Units, the PLC Controller program must scale the information. The scaled information must be based on the Drive Units definitions for the parameters in the Drive. The External Vel Ref (parameter 154) 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 the Drive.

Figure 3–13. Discrete PLC Controller I/O Example

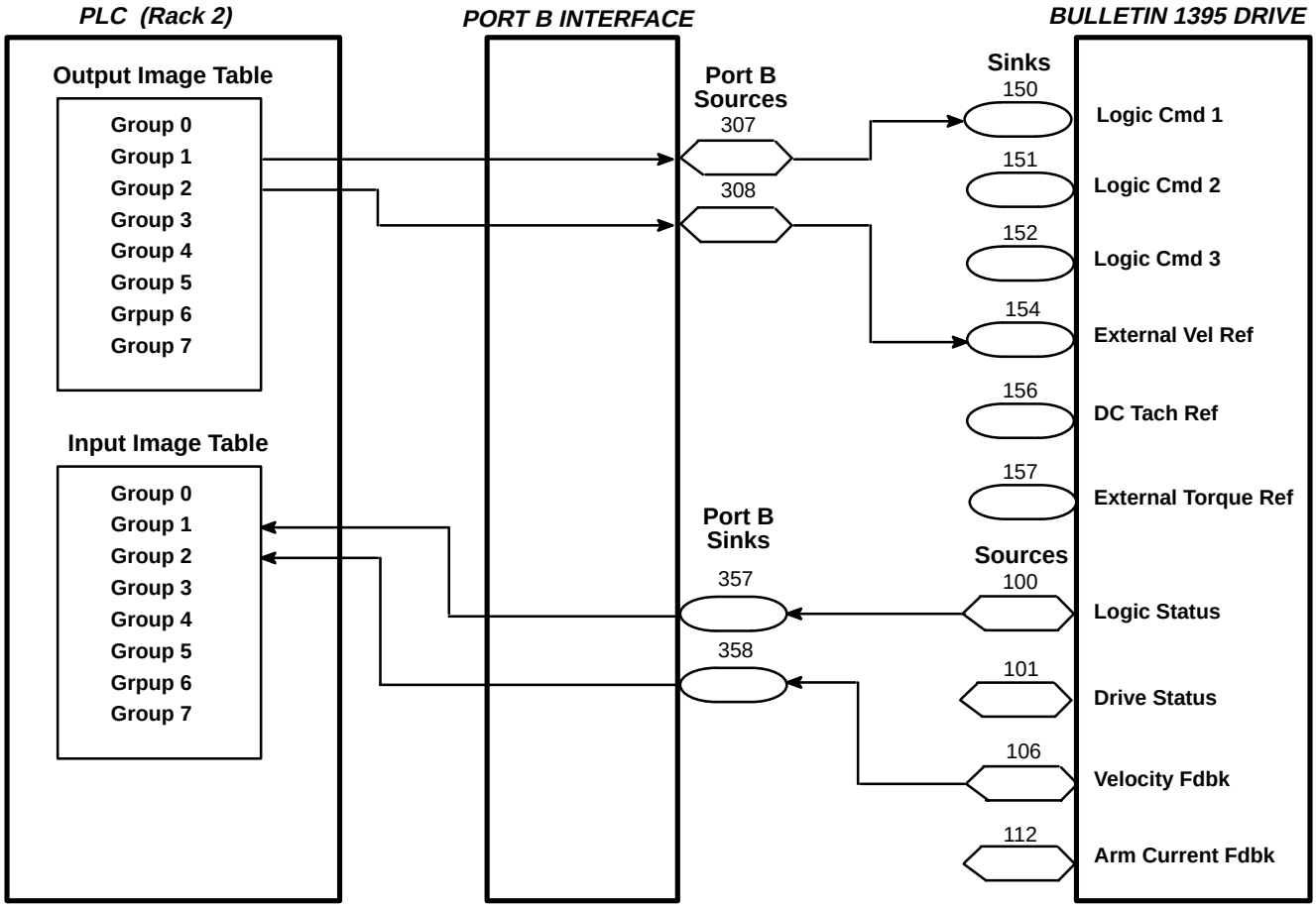
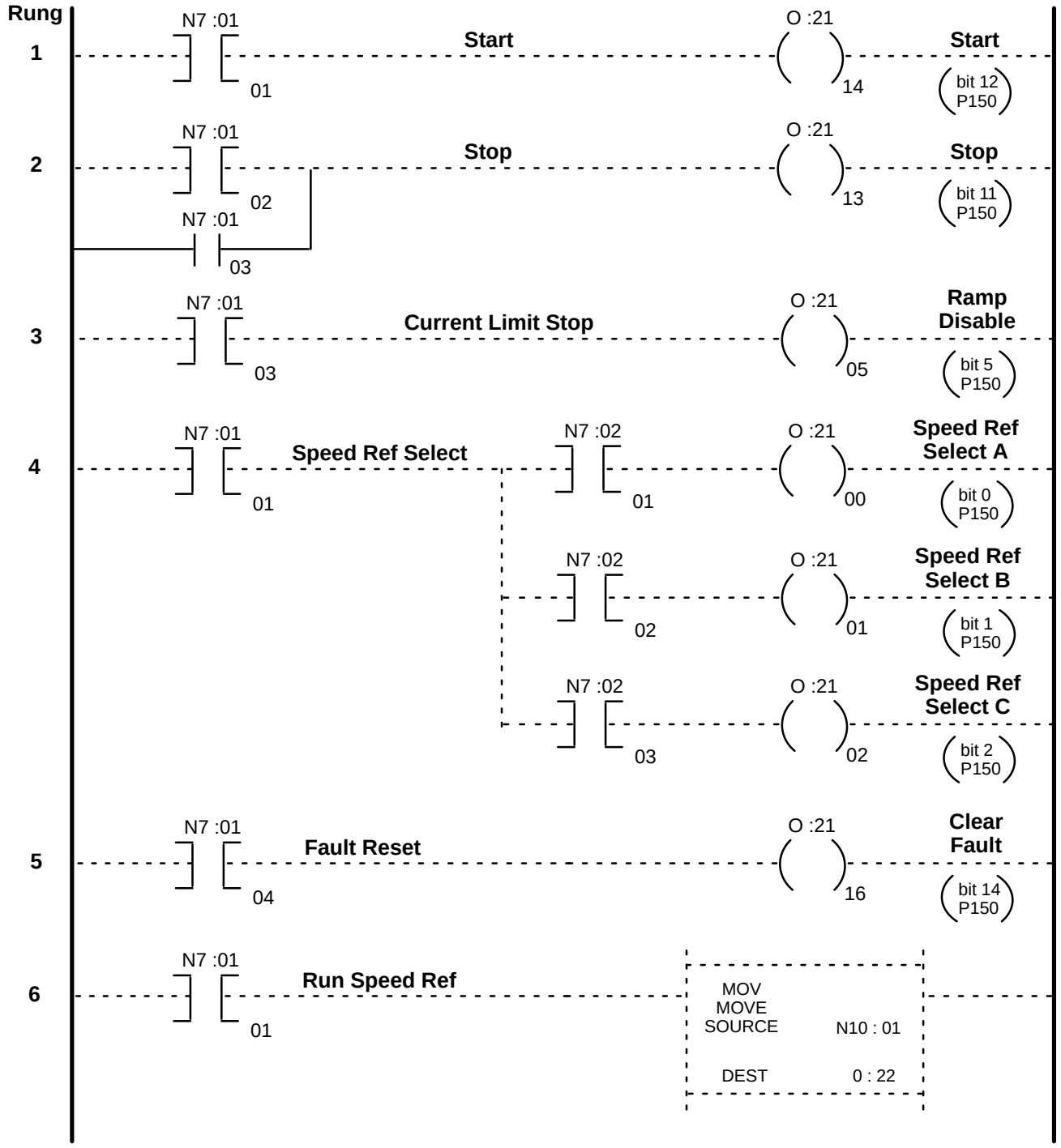


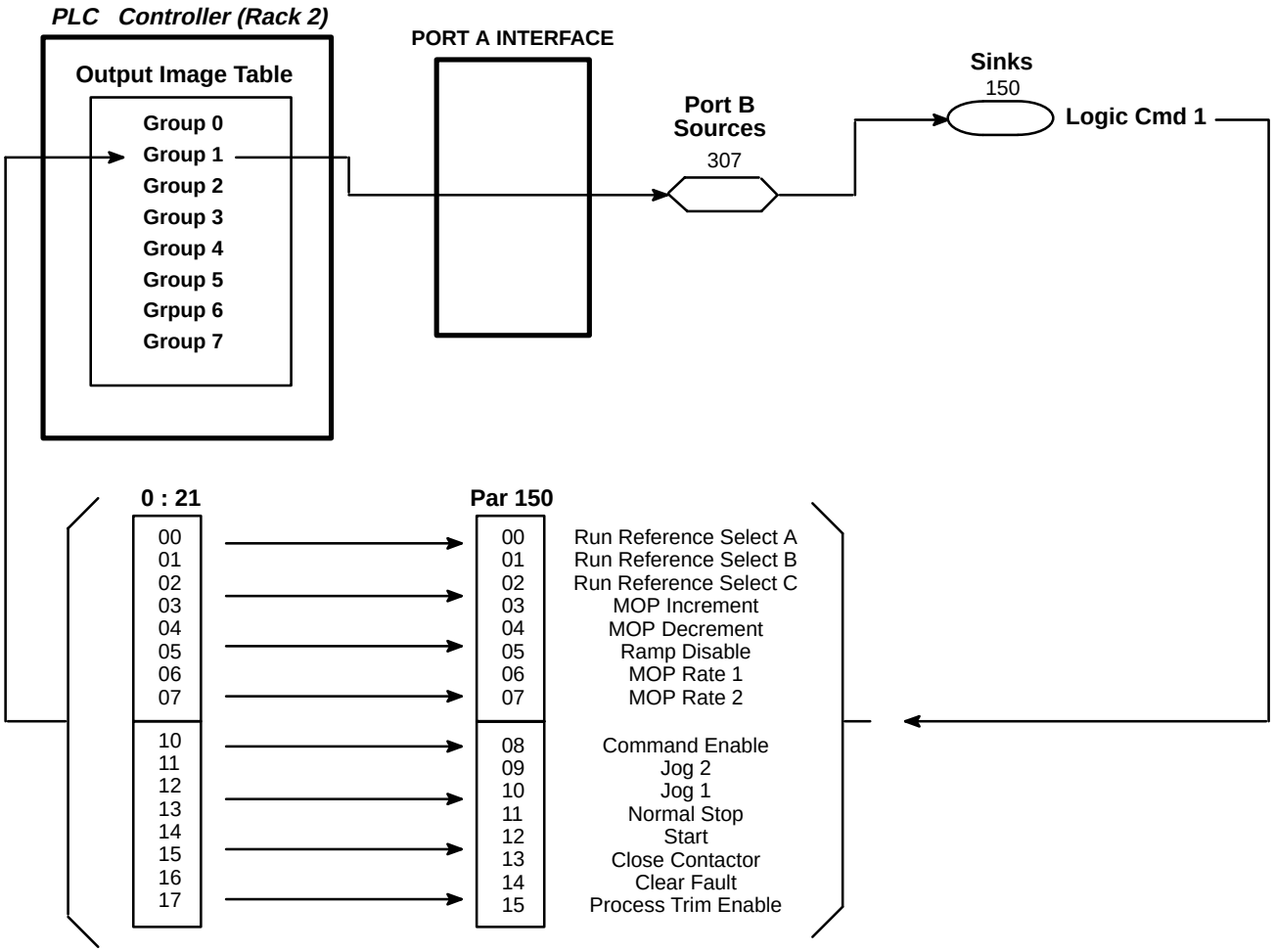
Figure 3–14 provides an example PLC Controller program which could be used to control the Drive. Based on the configuration shown in Figure 3–13 the PLC Controller program will be transferring information to parameter 150 and 154 in the Drive. Integer file N7 in the PLC is being used for Drive logic control 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 300 has been linked to parameter 150 (Figure 3–2), and parameter 300 is associated with group 1 in the output image table, the PLC Controller program will be controlling bits in word 0:21.

Figure 3–14. Example PLC Controller Discrete I/O Program



Bit numbering in the PLC Controller is performed in Octal, as opposed to Decimal numbering in the Drive parameter 150, so it is necessary to relate the output image table bits to the controlled bits in parameter 150. Figure 3–15 shows the correlation between the output image table bits and the Drive parameter 150 bits. As a result of this relationship, if it is desired to set the start bit in parameter 150 (bit 12 decimal), then bit 021/14 must be set as shown in the first rung of Figure 3–14. Control of other logic bits is illustrated in Figure 3–14.

Figure 3–15. Bit Mapping for Logic Command (P150, 151, 152)



The first 3 bits of the Logic Command word (parameter 150 in this example), are used to determine which speed reference will be used by the Drive. If the normal run speed reference input to parameter 154 is to be used, all three bits must be 0. If a preset speed or the MOP function will be used, bits 0–2 are set accordingly (refer to Bulletin 1395 Installation and Maintanance manual for a complete description of the Logic Command bits). In this example, the first three bits of word 2 of integer file N7 are used to determine the speed reference used by the Drive as shown on rung 4 in Figure 3–14.

If the normal run speed reference is selected, the PLC Controller must send a 16 bit word to External Vel Ref (parm 154) 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 of Figure 3–14 transfers the 16 bit word of N10:01 to word 2 of the output image table. Because word 2 of the output image table is sent to parameter 308, which in turn is linked to parameter 154 (Figure 3–13), the 16 bit word N10:01 is the speed reference input to the Drive parameter 154.

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 from the input image table of the PLC Controller to the working data files in the PLC Controller program. Again, note that bit coded words such as Logic Status (parm 100), are bit numbered in Octal in the PLC Controller, while the Drive is in Decimal.

PLC Controller Block Transfer

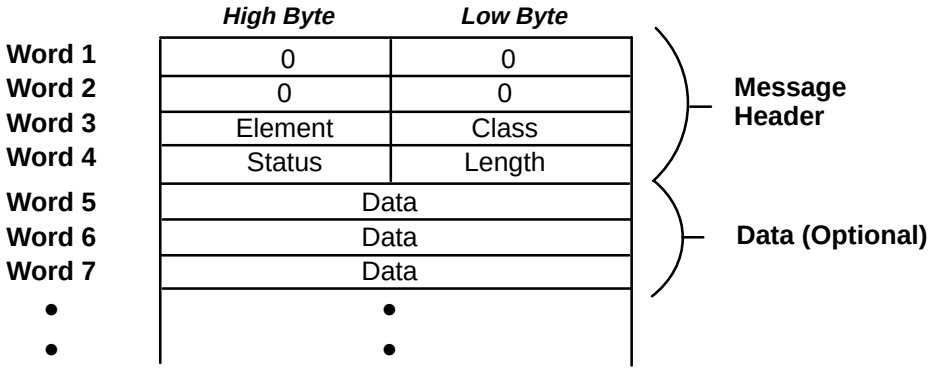
In addition to using the I/O image table of the PLC Controller to transfer data to the Drive, there are certain times when it is desirable to transfer data on a non-time critical basis, or in larger blocks. The MCA board allows this to be done through RIO by using the block transfer mechanism of the PLC Controller. It can also be done using the DH+ protocol which is explained later. For example, if several parameter settings need to be changed based on the type of material being produced on a machine, the block transfer mechanism would be a good choice.

The block transfer function does not directly use any of the Discrete I/O slots in the rack. However, the MCA board places several bits in the PLC input image table to transfer the Adapter status information. This status information is used in the PLC program for proper sequencing of the block transfer instructions. The status information must be updated at the same rate as the discrete I/O , therefore, the Adapter reserves the first word or group in the rack for this information. Also, the first word or group in the PLC Controller output image table is reserved for block transfer use.

Message Structure

Figure 3–16 illustrates the message structure required by the block transfer (BTW or BTR) function in the PLC Controller. The message is segmented into 16 bit words. The first four words, commonly called the message header, must be present. The data portion of the message is only required for those functions that contain or require data. The following paragraphs provide a description of each word:

Figure 3–16. Block transfer message header structure



Words 1 and 2 – Used for internal PLC Controller communications functions. Words 1 and 2 are transparent to the block transfer function and are always zero.

Word 3 – Contains a code number which determines the function to be performed by the MCA board upon receipt of the message from the PLC Controller. Table 3–K summarizes the valid codes which may be used in word 3. This word is set by the PLC Controller before the message is sent using the block transfer function. This word is not changed by the Adapter, therefore, it returns the same data when replying to the PLC Controller.

Table 3–K
Block Transfer Message Word 3 – Code Definitions

Message Type	Message	Function Code
EE Memory Request	Recall	257
	Store	513
	Initialize	769
Read Request	Parameter Value	514
	Parameter Full (value, min, max dexc, text)	770
	Read System Clock	1026
Write Request	Parameter Value	515
	Write System Clock	1027
	Reset Drive	1539
	Clear Faults	1795
Configuration Request	Upload Configuration Table (#50 – 69)	260
	Upload Configuration Table (#150 – 169)	516
	Upload Configuration Table (#250 – 269)	772
	Upload Configuration Table (#350 – 369)	1028
	Upload Configuration Table (#450 – 469)	1284
	Download Configuration Table (#50 – 69)	1540
	Download Configuration Table (#150 – 169)	1796
	Download Configuration Table (#250 – 269)	2052
	Download Configuration Table (#350 – 369)	2308
	Download Configuration Table (#450 – 469)	2564
Auto Tune	Velocity Test Motor	269
	Velocity Test Motor UpDate	525
	Velocity Test System	781
	Velocity Test System Update	1037
	Velocity Tune	1293
	Velocity Tune UpDate	1549
	Current Test	1805
	Current Test UpDate	2061
	Current Tune	2317
	Current Tune UpDate	2573
	Field Flux Test	2829
	Field Flux Test UpDate	3085
	Reset Autotune Status Word	3341
	Read Autotune Status	3597
	Autotune Abort	3853
Trend Upload	Read Trend File	270

Word 4, High byte – This byte contains the block transfer status byte (see Table 3–L) which is a code number returned from the MCA board as a response to the block transfer function. This byte is not used by the PLC Controller when sending data to the Adapter and therefore is set to 0 when performing a block transfer write in the PLC Controller program.

Table 3–L.
Block Transfer Status Byte (Word 4, High Byte)

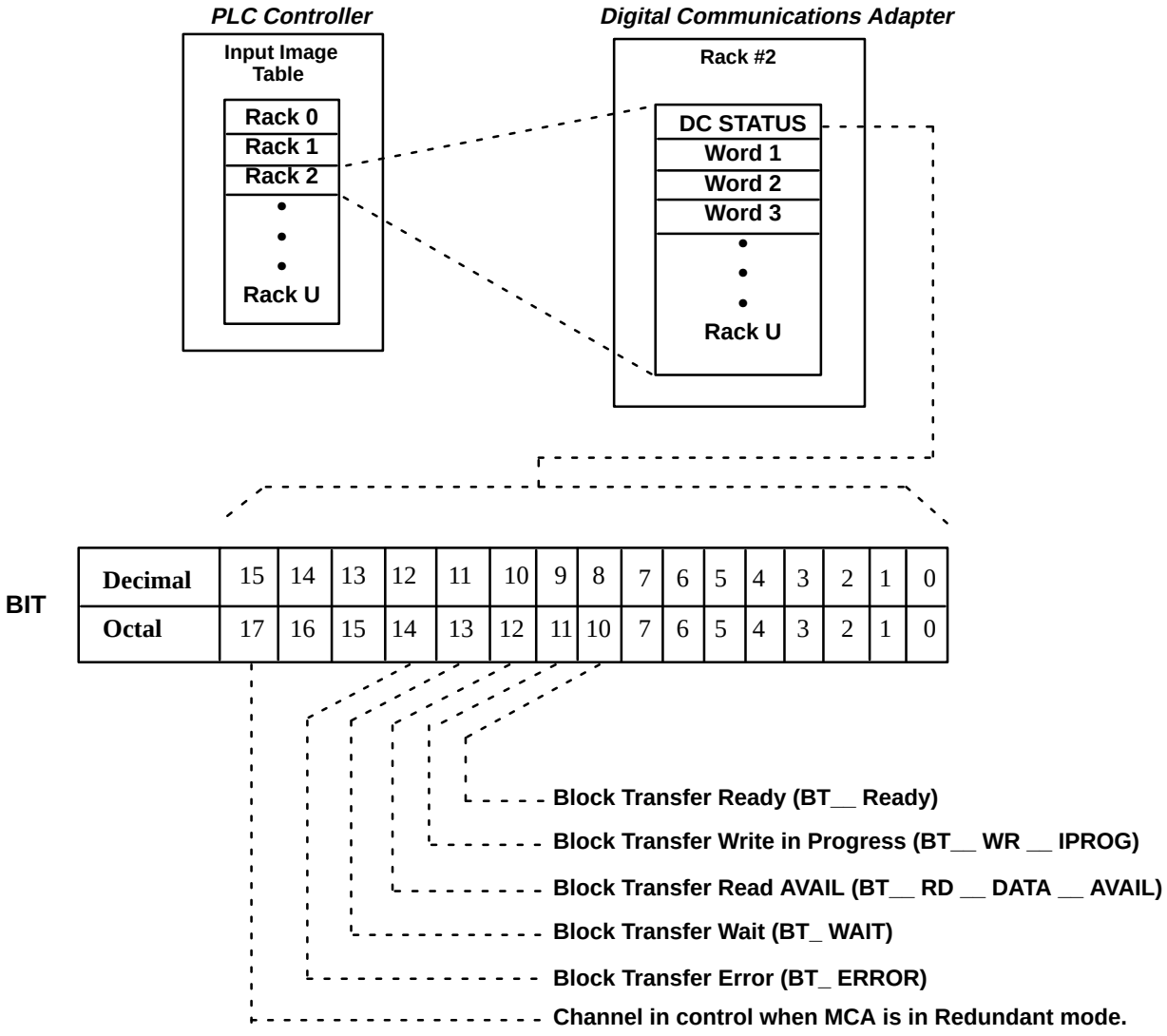
Decimal PLC/Octal	11 13	10 12	9 11	8 10	Description
	0	0	0	0	Successful
	0	0	0	1	Message I.D. Error
	0	0	1	0	Illegal Request
	0	0	1	1	Not Used
	0	1	0	0	Illegal Parameter
	0	1	0	1	Route Error
	0	1	1	0	Ignored because of Mode
	0	1	1	1	Not Used
	1	0	0	0	Out of Range
	1	0	0	1	Execution Malfunction

Word 4, Low byte – This byte contains the total length of the message in bytes. Included in the total are the message header and the data portion of the message. The length must be calculated in the PLC Controller program and added to the message header before being sent to the MCA. Depending on the action requested by the block transfer function, the message length contained in this byte may or may not be the same when returned from the MCA.

MCA Status Word

The status word is returned from the MCA Board to the PLC Controller in addition to the Block Transfer Status Byte (Word 4, high byte). The MCA status word appears as the first slot (or word) in the rack assigned to the Multi-Communications Adapter (Refer to Figure 3–17). This status byte indicates the condition of the MCA itself and is not included as part of the PLC Controller block transfer instruction. However, individual bits from this word are used in the PLC Controller program to control block transfer instructions to the Drive. Refer to the block transfer example for proper use of these bits.

Figure 3–17. DCSTATUS – Adapter Status Word Description



Status Word Bit Definitions

Block Transfer Ready – Indicates that the Drive is ready to process and receive block transfer requests.

IMPORTANT: Do not attempt to send block transfer requests to the Drive if this bit is not set. The Drive will not respond to the request.

Block Transfer Write in Process – Is set when a block transfer write to the Drive is in process. This bit remains set until the message has been received and placed in the Drive's internal message buffer.

IMPORTANT: Do not attempt to initiate another block transfer request while this bit is set. The Drive will not respond to the request.

Block Transfer Read Data Available – Is set when the Drive has data available for the PLC to read.

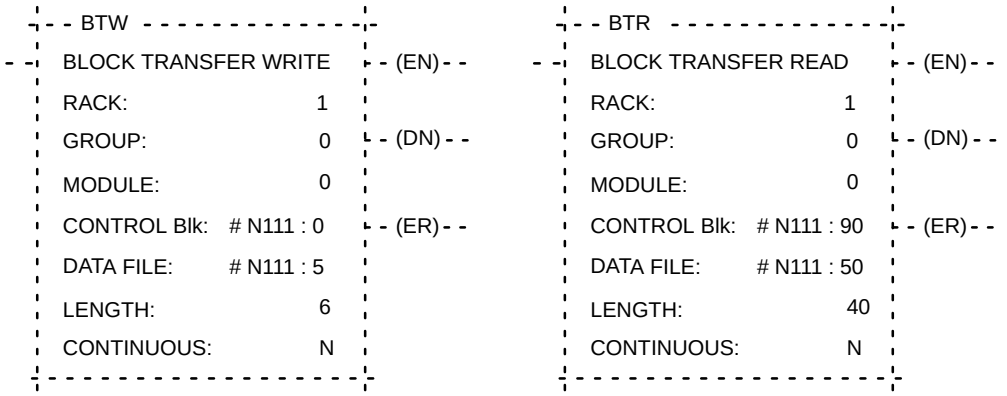
Block Transfer Wait (Message being processed) – Indicates that the Drive has received a block transfer request and is processing the request. This bit is set at the completion of the Block Transfer Write and is cleared at the reception of the response (start of the Block Transfer Read request).

Block Transfer Request Error – When set, indicates that the Drive has received an incorrect block transfer request from the PLC Controller. This bit is cleared when a valid block transfer request is made.

Data Storage

Channel in Control – Indicates which channel has control of the Drive. If bit = 0 then channel A has control, if bit = 1 then Channel B has control. In order to use block transfer instructions in the PLC Controller 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® Controllers, the BTW and BTR instructions require the use of two sets of words. Figure 3–18 illustrates the BTW and BTR blocks in the PLC–5 along with a brief description of the information contained in these blocks. For detailed information on these instructions refer to the PLC–5 Controller instruction manual.

Figure 3–18. PLC Controller Block Transfer Blocks



Rack: – The rack number for the Drive as specified by the switch settings on the MCA board.

Group: – The group number of the first in the group in the rack as specified above. If the Drive is setup as a 3/4 rack, the first group could be 0 or 2. If the Drive has been setup as a full rack, group number is 0. If the Drive is setup as a half rack, the first group number could be 0 or 4. Refer to Figures 3–9 through 3–11 for details.

Module: – The module number associated with the block transfer function in the first group. This is always set to 0.

Control Block: – A set of words which contain information about the PLC Controller block transfer instruction. In PLC–5 Controllers, the Control Block requires 5 contiguous words. In Figure 3–18, words N111:0 through N111:4 have been reserved for BTW information and words N111:90 through N111:94 have been reserved for the BTR information.

Data File: – The actual block transfer message to be sent to the Drive. It contains the message header and any data to be sent with the message. The number of words required for the data portion is dependent on the message being sent. Refer to the message format section of this manual for details. In Figure 3–18, N111:5 is the first word in the data file for the BTW instruction and N111:50 is the first word in the file for the BTR instruction.

Length: – Specifies the total length of the block transfer message in words. The BTR length value must be a minimum of 40 words regardless of the BTW length value. The Drive always returns at least 40 words with each message.

IMPORTANT: The low byte of word 4 in the block transfer message header contains the length of the message in bytes. The only difference between the length value in the message header and the length value in the block transfer instruction is the units used to specify them. In Figure 3–18, the length is 6 words for BTW, which will appear as 12 bytes (6 words), in word 4, low byte of the message header. For the BTR, the length value of the header message should be the length in bytes of the actual message. regardless of the length of 40 in the Block transfer instruction.

Continuous: – Specifies whether the block transfer instruction is executed on a continuous basis or only when enabled by the program. Normally, because of the nature of data being transferred to the Drive, this is set to “N”, representing non-continuous execution.

RIO Redundant Mode

The RIO redundant mode is a special mode that allows the Drive to be connected to the RIO channel of two 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 3–19 shows a typical redundant mode configuration. The redundant RIO mode is only available when the following three conditions are met:

1. Both channels of the MCA board are configured for RIO protocol.
2. The DIP switch for channel A is set for redundant mode.
3. Both channels are the same size. For example, both must be configured for full rack, 3/4 rack or 1/2 rack.

The redundant mode operates as follows:

Data from the output image table of each PLC Controller is transferred to the MCA board by the respective PLC Controllers.

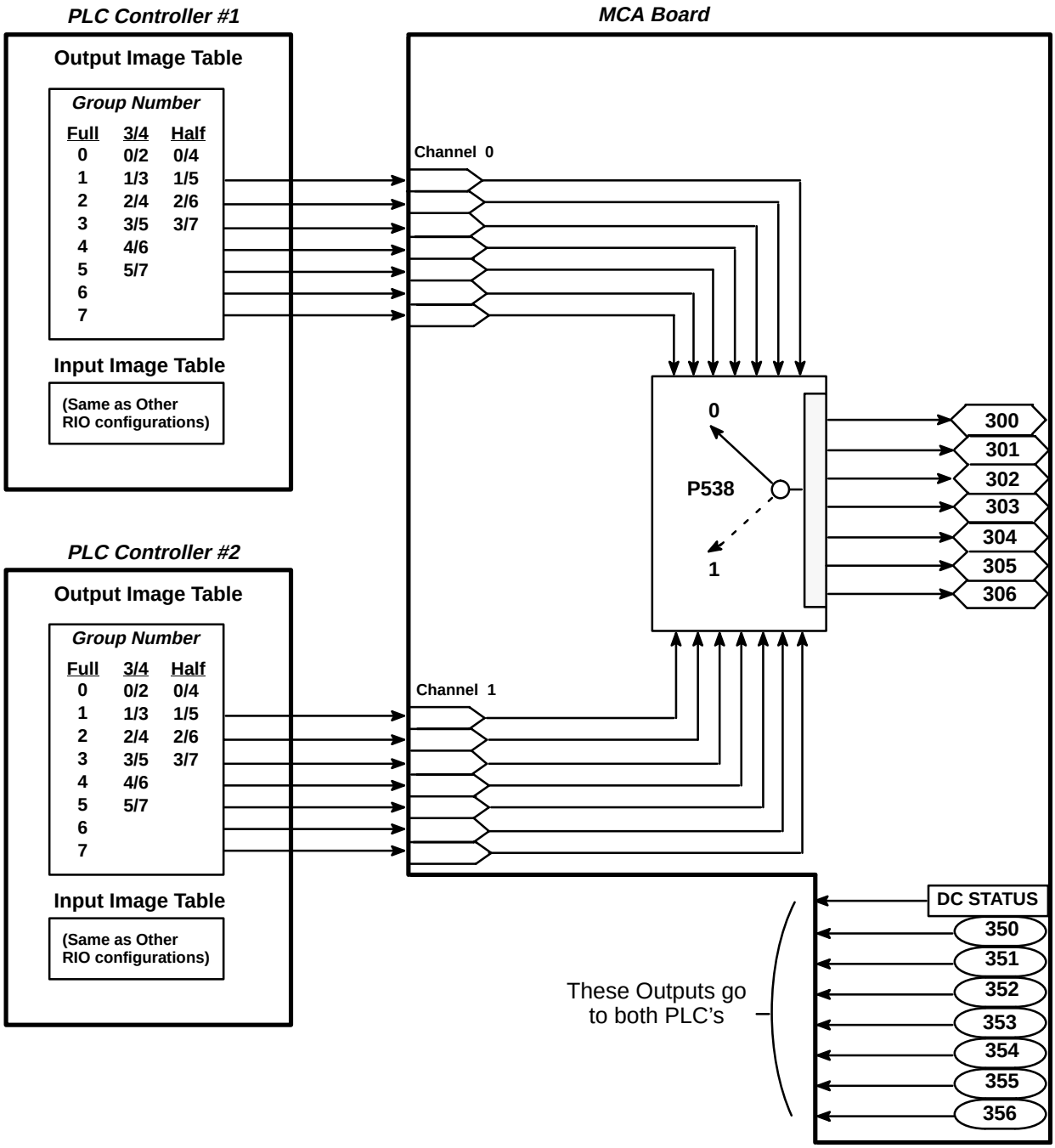
The RIO Redundant Channel Number parameter (Par. #538) determines which PLC Controller's outputs will be made available to the Drive via parameters 300 through 306. Indication of which channel has control is provided by the DCSTATUS word (Bit 15 Decimal, Bit 17 Octal) in BT Status Flags.

Each PLC Controller input image table receives data from the Drive via parameters 350 though 356.

Block transfer messages from both drives are processed as normal. Only output image table data is discarded.

Figure 3–19. MCA Board

Redundant RIO Communications



DH+ Communications

Each channel of the MCA board can be configured for Data Highway + (DH+) communications. Configuration as a DH+ device allows the Drive to look like a station on the DH+ link. Below is a listing of the DH+ features on this Adapter:

- The Adapter supports 57.6K, 115K, and 230K baud communication rates.
- Supports Parameter read and parameter write messages for blocks of parameters.
- A "Token pass with data" mechanism allows fast parameters to be transferred to other stations along with the network token.
- A method similar to RIO block transfer allows the PLC to issue Drive messages via DH+.

The DH+ connection to the Drive allows devices such as PLC Controllers and operator displays to obtain information from the Drive without burdening the RIO control link.

DH+ Command Set

The MCA board supports a limited set of PCCC commands by emulating a section of PLC–5 memory. The memory area emulated determines what specific request and or action the MCA board will take. Below is a list of the supported commands:

Who Active – The station number of the MCA 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 1395" next to the selected station number.

PLC 5 Typed Read (N10:0–999) – Memory area N10:0–999 translates into a read parameter value(s) from the Drive. Any attempts to read outside of this range will result in an error response. The values 0 through 999 are interpeted by the Drive as parameter numbers. For example, to read the value of parameter 633 the MSG instruction would request N10:633 with a size of one element. A size of 10 will write to parameters 633 through 642.

PLC 5 Typed Write (N10:500–999) – Memory area N10:500–999 translates into a write parameter value(s) to the Drive. Any attempts to write outside of this range will result in an error response. The values 500 through 999 are interpeted by the Drive as parameter numbers. For example, to write a value to Preset Speed 1 (parameter 633) the MSG instruction would specify N10:633 with a size of one element. A size of 10 will write to parameters 633 through 642.

PLC Typed Read (N11:499–999) – This request reads the status of the previous parameter writes (N10:500–999). If a **Typed Read** is specified with an PLC address of N11:499, the write status of all parameters from the last TYPED WRITE request (N10: xxx–xxx) will be OR'ed together. If one error has occurred during the last write operation, this address will contain the parameter number where the error occurred. If multiple errors occurred the value will be 0FFFF (hex), and the PLC Controller can request a **Typed Read** of N11:500–999 to determine which parameters have had errors.

PLC Typed Read (N12:0–999) – This request translates into a read parameter full message in the Drive. Each parameter specified will result in the of return 24 bytes of data.

PLC Typed Read (N14:0–6) – The message returns the values contained in the MCA boards seven fast parameters for the channel (A or B) making the request. For example, if channel B is setup for DH+ and this request is made, the MCA board will return the values of parameter numbers 357–363.

PLC Typed Write (N14:4–6) – This message can write values to the MCA boards 3 remaining fast parameters for the channel (A or B). Each channel configured for DH+ reserves 4 fast parameters for the token pass with data option. For example, if channel B is setup for DH+ and this request is made the PLC Controller can write values to parameters 311–313.

PLC Typed Read (N15:0–39) – This message emulates the RIO block transfer functions available on the MCA board with the exception of the multiple parameter read. Refer to the message structure section of this chapter for details on the available messages and their use.

NOTE: With this command there are no BT flags to synchronize the Write/Read operation as on the RIO.

PLC Typed Write (N15:0–39) – This message emulates the RIO block transfer functions available on the MCA board with the exception of the multiple parameter write. Refer to the message structure section of this chapter for details on the available messages and their use.

NOTE: With this command there are no BT flags to synchronize the Write/Read operation as on the RIO.

Token Pass With Data

This is a special mechanism built into the MCA board that allows the Drive to transfer data between stations on a DH+ link along with the link token. Refer to Figure 3–20. The amount of information passed is limited as follows:

- Each station (each channel of an MCA board) can add two parameters values to the list of values transferred with the token.
- Each station (each channel of an MCA board) can read up to four parameter values from the available stations on the DH+ link.

Because this data is transferred with the network token, it is available to the connected stations with a minimum of delay.

IMPORTANT: Data Highway + (DH+) is not designed for real time control of data. Searching, monitoring large programs, and on-line programming can degrade message throughput on this link since it can perform only one of these functions at a time. Refer to the appropriate PLC manual for details on the DH+ characteristics.

Figure 3–20. Data Highway + (DH+)

Token Pass w/Data

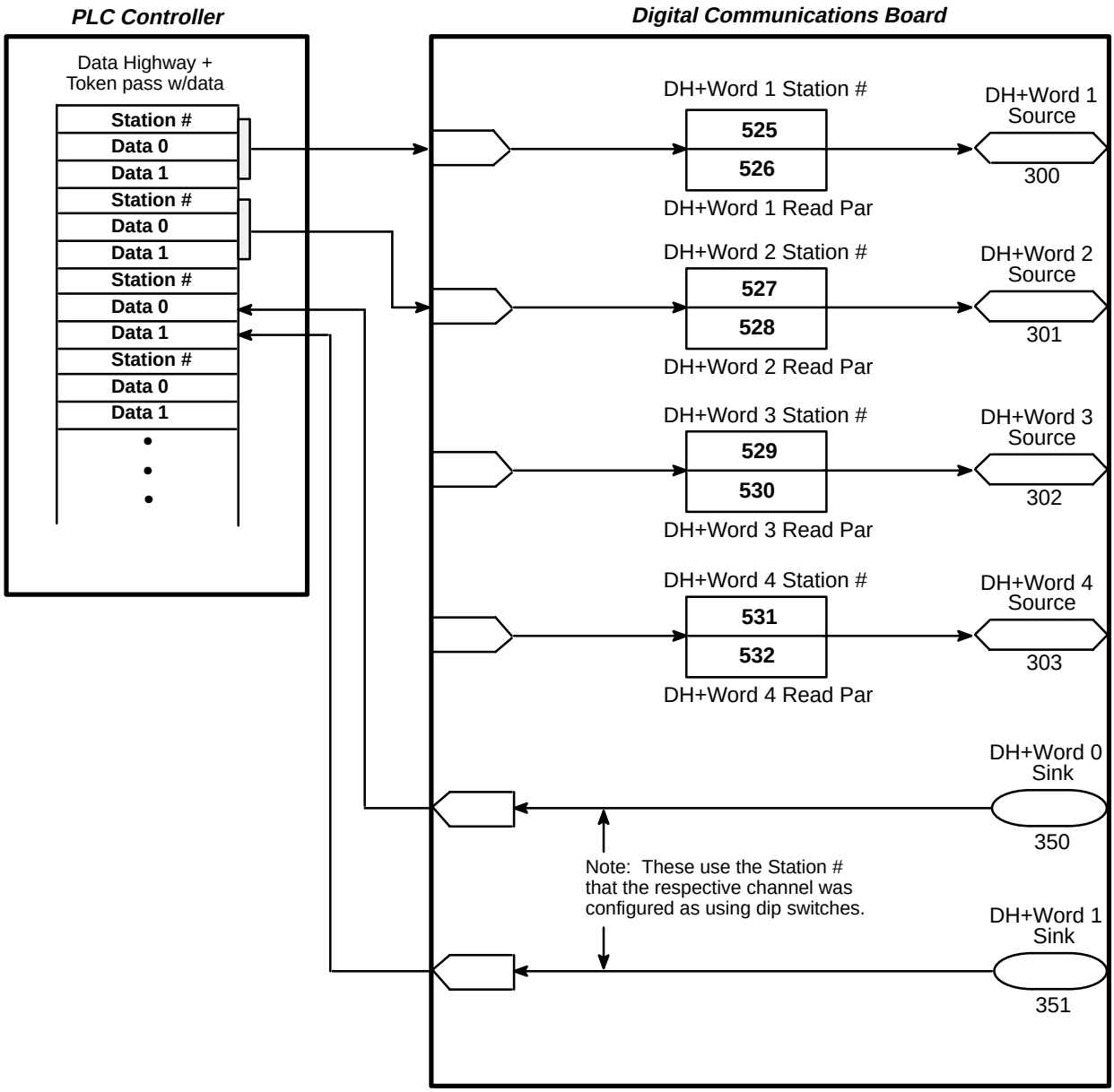


Figure 3–21 provides an example of a Message Read and a Message Write. Rung 2:0 is an example of a Message Read that operates when B3/0 toggles 0 > 1. Rung 2:1 is the message instruction operating on a continuous basis. Rung 2:2 is a Message Write example. The data monitor screens associated with the message commands are shown below each rung.

Figure 3–21. PLC5/15 – 1395 DC Drive Sample Program

Rung 2:0
This rung will read parameters 100 – 109 when bit B3/0 is toggled from zero to one. The parameter information is stored in N20: 0 –9 in this 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 Adress:	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

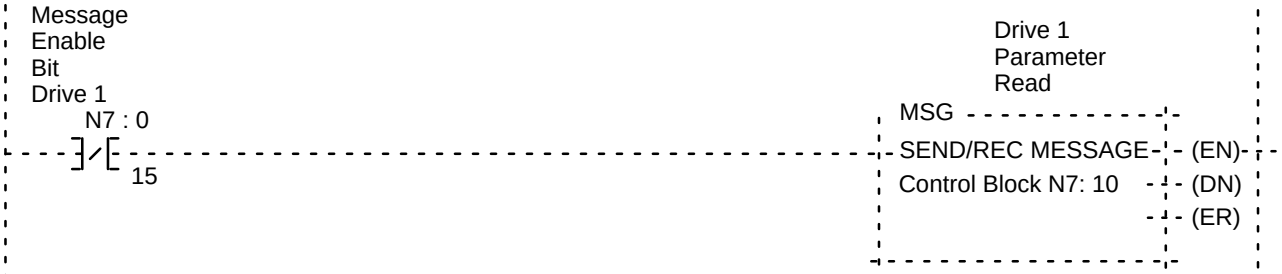
Press a function key to change a value.
>[
Rem Prog Forces: None Data: Formatted 5/10 File TEMP

Size in Elements

Toggle Bit

Figure 3–21. PLC5/15 – 1395 DC Drive Sample Program cont.

Rung 2:1
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 this PLC. The drive DH+ station ID is 11.



MESSAGE INSTRUCTION DATA MONITOR FOR CONTROL BLOCK N7:10

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 Adress:	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

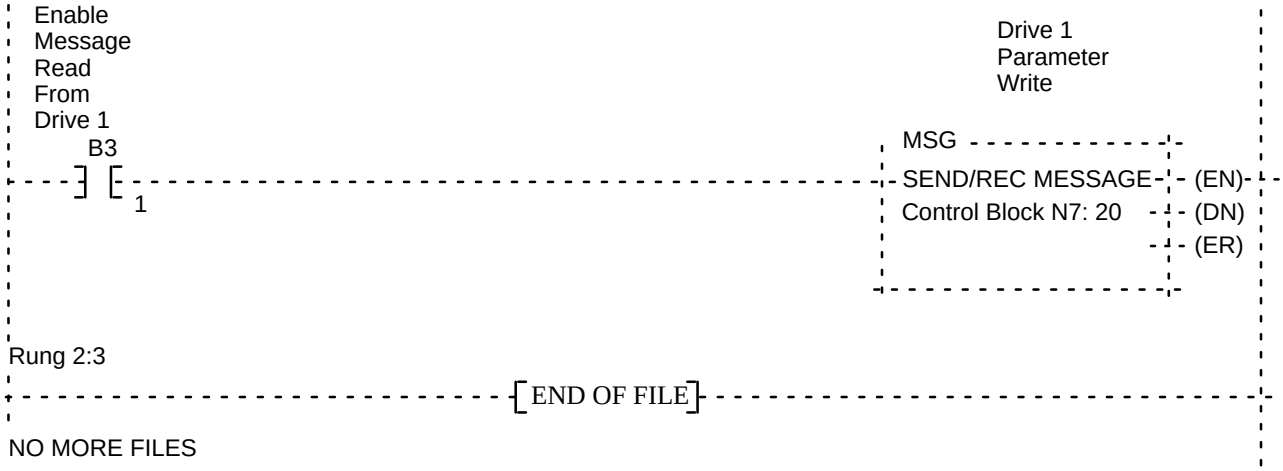
Press a function key to change a value.
>[
Rem Prog Forces: None Data: Formatted 5/10 File TEMP

Size in Elements

Toggle Bit

Figure 3–21. PLC5/15 – 1395 DC Drive Sample Program cont.

Rung 2:2
This rung will write to parameters 500 – 999 in the drive when bit B3/1 is toggled from a zero to a one. The parameter values to be sent to the drive are stored in N30: 0 – 499.



MESSAGE INSTRUCTION DATA MONITOR FOR CONTROL BLOCK N7:20

Communication Command:	PLC–5 TYPED WRITE		
PLC–5 Data Table Address:	N30:0	ignore if timed-out:	0 TO
Size in Elements:	500	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 Adress:	11	message transmitting	0 ST
Destination Data Table Address:	N10: 500	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 Elements
Toggle Bit

Message Formats

This section of the manual provides a detailed explanation of the messages that the Drive supports. These messages are used by the RIO block transfer interface and the DH+ block transfer emulation to program Drive parameters, read parameter data, and control other Drive functions.

EE Memory Recall

This function takes the information stored in the Drive's EEPROM memory and places it in Drive memory.

IMPORTANT: All data that was stored in Drive memory prior to issuing the EE RECALL command will be erased when an EE RECALL takes place.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 257
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
257	3	**257**
8	4	**See Note**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The EE Memory Recall function instructs the Drive to replace the contents of Drive memory with the values that are stored in EEPROM. Any configuration links present in the Drive will also be replaced by those in EEPROM.

IMPORTANT: This message is ignored by the Drive when it is running (i.e. the contactor is picked up).

This function requires the message header only. The status byte will indicate the success or failure of the request.

EE Memory Store

This function takes the information in the Drive's memory and places it in the EEPROM. Any data in the EEPROM prior to issuing the EEPROM STORE command will be erased.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 513
Write Message Length, Word 4: 8 bytes

BTW	WORD	BTR
0	1	0
0	2	0
513	3	513
8	4	See Note

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The EE Memory Store function instructs the Drive to replace the contents of the Drive EEPROM with the values that are stored in Drive memory. Any configuration links present will also be replaced by those in memory. Depending on the Drive firmware version, this message may be ignored by the Drive when it is running (i.e. the contactor is picked up).

ATTENTION: When using the EE Memory Store function you must be certain that the values stored in Drive memory will not degrade Drive or System performance and will not cause a loss of either control or emergency stop functions.

This function requires the message header only. The status byte will indicate the success or failure of the request.

EE Memory Initialize

This function initializes the Drive's memory and EEPROM to a set of default values stored internally in the Drive.

IMPORTANT: Any data in Drive memory and EEPROM prior to issuing the EEPROM INITIALIZE command will be erased.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 769
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
769	3	**769**
8	4	**See Note**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The EE Memory Recall function instructs the Drive to replace the contents of Drive memory with the values that are stored in EEPROM. Any configuration links present in the Drive will also be replaced by those in EEPROM. This message is ignored by the Drive when it is running (i.e. the contactor is picked up).

ATTENTION: When using the EE Memory Recall function you must be certain that the default values stored in the Drive will not degrade Drive or System performance and will not cause a loss of either control or emergency stop functions.

This function requires the message header only. The status byte will indicate the success or failure of the request.

Read Parameter Data

This function reads parameter value(s) from the Drive based on a parameter number list provided by the PLC Program. The Drive can supply up to 30 parameters in one block transfer reply when using the RIO Read Parameter. The DH+ message can only read one parameter per request.

PLC Block Transfer Data –

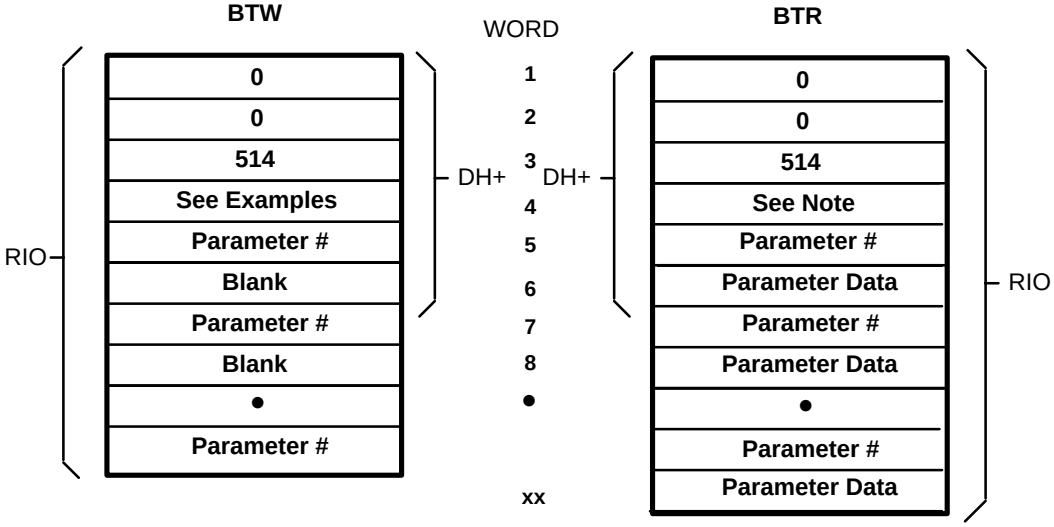
BTW Instruction Length: See below
BTR Instruction Length: See below

PLC DH+ Data –

	Write	**Read**
Size In Elements:	5	6
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–4	N15:0–5

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 514
Write Message Length, Word 4: BTW Word length *2



NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The READ PARAMETER DATA function requests the Drive to provide a list of parameter data values for use in the PLC Controller. The values are returned in Drive units and may need to be scaled by the PLC Controller prior to being used in the Program.

The BTW length is determined by adding the message header length (4 words) to the number of words required to specify the parameter list. Each parameter requested requires two words in the BTW instruction with the exception of the last parameter in the list. The last parameter requires only one word. Below are two examples:

Example 1:
The PLC Controller is to read 1 parameter value from the Drive.

	BTW	BTR	Message Header for BTW Word 3
Message Header 8 bytes		4	4
Parameter Data	1	2	2 bytes
Total 10 bytes		5 words	6 words

Example 2:
The PLC Controller is to read 3 parameter values from the Drive.

	BTW	BTR	Message Header for BTW Word 3
Message Header 8 bytes		4	4
Parameter Data	5	6	10 bytes
Total 18 bytes		9 words	10 words

Read Parameter Full (Value, Min, Max, Descriptor, Text)

This function reads the full parameter description from the Drive based on a parameter number provided by the PLC Program. The description includes the actual value, minimum value, maximum value, descriptor, and the parameter text.

PLC Block Transfer Data –

BTW Instruction Length: 5
BTR Instruction Length: 25

PLC DH+ Data –

	Write	Read
Size In Elements:	5	25
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–4	N15:0–24

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 770
Write Message Length, Word 4: 10 bytes

BTW	WORD	BTR
0	1	0
0	2	0
770	3	770
10	4	See Note
Parameter #	5	Parameter #
	6	Parameter Data
		Minimum Value
		Maximum Value
		Descriptor
		Parameter Text
		•
		Parameter Text

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The READ PARAMETER FULL function requests the Drive to provide the full description of a parameter for use in the PLC Controller. This information includes the actual value, minimum value, maximum value, descriptor, and the parameter text.

Data Format:

Parameter Value – Drive units, may need to be scaled by the Controller prior to being used in the Program.

Maximum Value – Drive units, may need to be scaled by the PLC Controller prior to being used in the Program.

Minimum Value – Drive units, may need to be scaled by the PLC Controller prior to being used in the Program.

Descriptor – A numeric value used by Allen-Bradley program terminals to scale parameter data into the appropriate engineering units.

Parameter Text – The parameter text is provided in the following format. Each parameter text word contains two bytes in ASCII format, which represent the text displayed by the Drive's program terminals.

NOTE: Any parameter text that is returned comes back with each byte reversed.

Write Parameter Data

This function writes parameter value(s) to the Drive. The Drive can accept up to 30 parameters in one block transfer write when using the RIO write mechanism. The DH+ message can only write one parameter per message.

PLC Block Transfer Data –

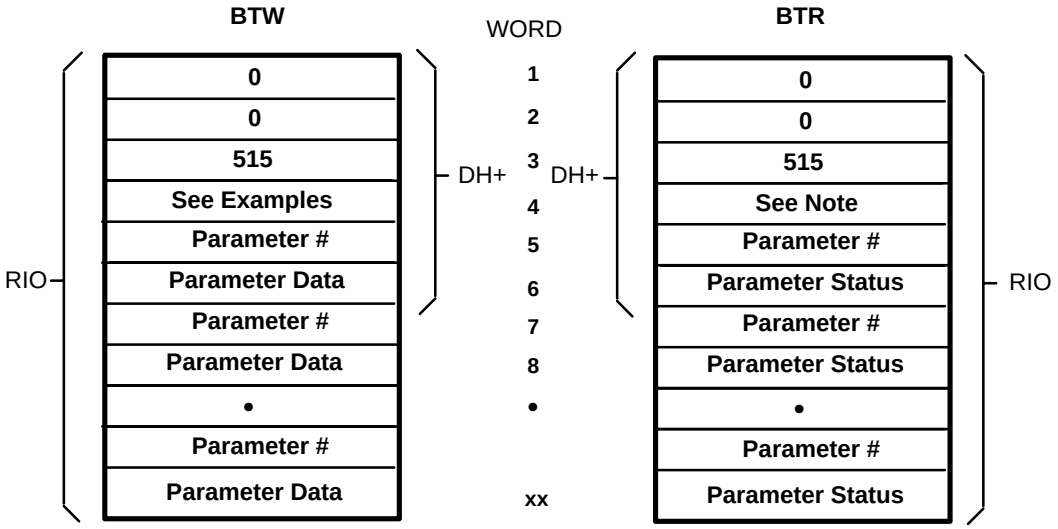
BTW Instruction Length: See below
BTR Instruction Length: See below

PLC DH+ Data –

	Write	**Read**
Size In Elements:	6	6
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–5	N15:0–5

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 515
Write Message Length, Word 4: See examples



NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The WRITE PARAMETER DATA function requests the Drive to change the value of the parameters specified in the message to the value contained in the message. The values must be sent to the Drive in Drive units and may need to be scaled by the PLC Controller prior to being sent. Up to 30 parameters may be changed in a single block transfer.

The BTW length is determined by adding the message header length (4 words) to the number of words required to specify the parameter list and data. Each parameter change requires two words in the BTW instruction. Below are two examples:

Example 1:
The PLC Controller is to read 1 parameter value from the Drive.

			Message Header
	BTW	BTR	Word 3
Message Header 8 bytes		4	4
Parameter Data	1	2	2 bytes
Total 10 bytes		5 words	6 words

Example 2:
The PLC Controller is to read 3 parameter values from the Drive.

			Message Header
	BTW	BTR	Word 3
Message Header 8 bytes		4	4
Parameter Date	5	6	10 bytes
Total 18 bytes		9 words	10 words

The BTR message is structured the same as the BTW instruction with the exception that the Drive will provide a status word for each parameter. If all parameter values were accepted by the Drive, the status byte in word four will indicate that the message was successful. If the message status indicates an error, then the PLC Controller program must check the parameter status word for each parameter to determine which parameter(s) were not accepted by the Drive.

Read System Clock

This function reads the system time from the Drive.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 11

PLC DH+ Data –

	Write	Read
Size In Elements:	4	11
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–4	N15:0–10

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1026
Write Message Length, Word 4: 8 bytes

BTW	WORD	BTR
0	1	0
0	2	0
1026	3	1026
8	4	See Note
	5	Year
	6	Month (1 – 12)
	7	Day (1–31)
	8	Hour (0 – 24)
	9	Minute (0 – 59)
	10	Second (0 – 59)
	11	10's of msec (0–100)

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The READ SYSTEM CLOCK function requests the Drive to provide it's current time. The Drive stores time in the 24 hour format. The values returned are integer type and may be scaled by the PLC Controller prior to being used in the Program.

Write System Clock

This function writes the system time from the PLC Controller to the Drive.

PLC Block Transfer Data –

BTW Instruction Length: 10
BTR Instruction Length: 4

PLC DH+ Data –

	Write	Read
Size In Elements:	10	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–9	N15:0–9

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1027
Write Message Length, Word 4: 20 bytes

BTW	WORD	BTR
0	1	0
0	2	0
1027	3	1027
20	4	See Note
Year	5	
Month (1 – 12)	6	
Day (1 – 31)	7	
Hour (0 – 23)	8	
Minute (0 – 59)	9	
Second (0 – 59)	10	

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The WRITE SYSTEM CLOCK function sets the time in the Drive from the PLC Controller. The Drive stores time in the 24 hour format. The values are integer type and may need to be scaled by the PLC Controller prior to being sent to the Drive.

Drive System Reset

This function causes the Drive to do a “warm boot restart”. Any data in Drive memory at the time the command is issued is erased and is not saved in EEPROM.

PLC Block Transfer Data –

BTW Instruction Length: 4

PLC DH+ Data –

	Write
Size In Elements:	4
Processor Type:	PLC–5
Destination Address:	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1539
Write Message Length, Word 4: 8 bytes

BTW	WORD
0	**1**
0	**2**
1539	**3**
8	**4**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The DRIVE SYSTEM RESET function causes the Drive to reboot all processors. This is the same sequence that the Drive goes through when power is first applied.

IMPORTANT: Any parameter data or configuration links that were not stored in EEPROM prior to the Drive receiving this command will be erased.

This function requires the message header only. The Drive will not provide a response message to this command.

Clear Faults

This function requests the Drive to clear any soft or warning faults that have occurred. It also clears the fault buffer. Hard faults cannot be cleared using the command.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1795
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
1795	3	**1795**
8	4	**8**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – This function requests the Drive to clear any soft or warning faults that have occurred. It also clears the fault buffer. Hard faults cannot be cleared using this command.

IMPORTANT: If the Drive is running (i.e. the DC loop contactor is picked up), the CLEAR FAULTS command will be ignored.

This function requires the message header only for both the BTW and BTR instructions.

Upload Configuration Table

This function uploads the configuration table information from the Drive in blocks. Each block of configuration data has a separate function code.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 24

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	24
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–23

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: see table below
Write Message Length, Word 4: 8 bytes

Upload Function Codes

Parameter Numbers	Function Code
#50 – #69	260
#150 – #169	516
#250 – #269	772
#350 – #369	1028
#450 – #469	1284

BTW	WORD
0	1
0	2
See Table Above	3
8	4

The “x” designator is a position holder. It could represent parameter 150, 250, 350, etc. depending on which configuration table is being requested.

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per Table 3–H. The low byte contains the Drive message length in bytes.

BTR

0
0
See Table
48
Parameter #(x50)
Parameter #(x51)
Parameter #(x52)
•
Parameter #(x69)

Message Operation – The UPLOAD CONFIGURATION TABLE function requests a listing of the Drive configuration links from the Drive for use in the PLC Controller. This command is broken down into five groups of tables.

Download Configuration Table

This function downloads the configuration table information from the Drive in blocks. Each block of configuration data has a separate function code.

PLC Block Transfer Data –

BTW Instruction Length: 24
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	24	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–23	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: see table below
Write Message Length, Word 4: 48 bytes

Download Function Codes

Parameter Numbers	Function Code
#50 – #69	1540
#150 – #169	1796
#250 – #269	2052
#350 – #369	2308
#450 – #469	2564

BTW

0
0
See Table
48
Parameter #(x50)
Parameter #(x51)
Parameter #(x52)
•
Parameter #(x69)

The “x” designator is a position holder. It could represent parameter 150, 250, 350, etc. depending on which configuration table is being sent.

WORD	BTR
1	0
2	0
3	See Table
4	8

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per Table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The DOWNLOAD CONFIGURATION TABLE function sends a listing of the desired Drive configuration links to the Drive. This command is broken down into five groups of tables.

IMPORTANT: Drive configuration links will not be changed by the Drive unless the following two conditions are met:

1. The Drive must not be running (i.e. the DC loop contactor must not be energized).
2. The Drive receives the fifth block (function code 2564) of links.

Autotune Measure Motor Inertia

Puts the Drive in the Autotune Mode for measuring motor inertia. When in this mode the Drive gathers information about motor inertia by accelerating and decelerating the motor under conditions controlled by the Autotune firmware.

ATTENTION: When in the Autotune Mode the Drive controls motor operation using a speed profile determined internally. Carefully read the section on auto tuning sequencing prior to using this command. Failure to do so could result in equipment damage and possible injury to personnel. If autotuning is performed under PLC control, a hardwired stop circuit or manual disconnect circuit must be provided to disconnect power to the motor.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 269
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	**1**	**0**
0	**2**	**0**
269	**3**	**269**
8	**4**	**See Note**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – Puts the Drive in the Autotune Mode for measuring motor inertia. Once in this mode the Drive waits for a "START" input to the Drive before beginning the measure procedure. The procedure gathers information about motor inertia by accelerating and decelerating the motor under conditions controlled by the Autotune firmware.

Refer to the Drive Instruction manual (1395–5.xx) for a complete description of how Autotuning operates.

This function requires the message header only. The status byte will indicate the success or ineffectiveness of this request.

Autotune Update Motor Inertia

This function updates the Drives internal database with the motor inertia (parameter 613) calculated by the autotune firmware and provides the data to the PLC Controller in the BTR message.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 6

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	6
Processor Type:	PLC–5	PLC–5
Destination Address	N15:0–3	N15:0–5

Message Structure –
Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 525
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
525	3	**525**
8	4	**See Note**
	5	**Parameter 613**
	6	**Parameter Data**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The AUTOTUNE UPDATE MOTOR VELOCITY function updates the Drives internal database with the motor inertia (parameter 613) calculated by the autotune firmware and provides the data to the PLC Controller in the BTR message.

Autotune Measure System Inertia

Puts the Drive in the Autotune Mode for measuring system inertia. When in this mode the Drive determines the total system inertia including the motor and connected load by accelerating and decelerating the motor under conditions controlled by the Autotune firmware.

ATTENTION: When in the Autotune Mode the Drive controls motor operation using a speed profile determined internally. Carefully read the Drive Manual section on auto tuning sequencing prior to using this command. Failure to do so could result in equipment damage and possible injury to personnel. If autotuning is performed under PLC control, a hardwired stop circuit or manual disconnect circuit must be provided to disconnect power to the motor.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 781
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
781	3	**781**
8	4	**See Note**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – Puts the Drive in the Autotune Mode for measuring system inertia. Once in this mode the Drive waits for a "START" input to the Drive before beginning the measure procedure. The procedure gathers information about motor inertia and connected load inertia by accelerating and decelerating the motor under conditions controlled by the Autotune firmware.

Refer to the Drive instruction manual (1395–5.xx) for a complete description of how Auto tuning operates.

This function requires the message header only. The status byte will indicate the success or ineffectiveness of the request.

Autotune Update System Inertia

This function updates the Drives internal database with the system inertia (parameter 703) and the maximum achieveable velocity loop bandwidth (parameter 701) as calculated by the auto tune firmware and provides the data to the PLC Controller in the BTR message.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 8

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	8
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:–3	N15:0–7

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1037
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
1037	3	**1037**
8	4	**See Note**
		Parameter 701
		Parameter Data
		Parameter 703
		Parameter Data

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per Table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The AUTOTUNE UPDATE SYSTEM INERTIA function updates the Drives internal database with the system inertia (parameter #701) and maximum achievable bandwidth (Parameter #703) as calculated by the auto tune firmware, and provides the data to the PLC Controller in the BTR Message.

Autotune Tune Velocity Loop

This function calculates the required velocity loop gains based on the data determined by the motor inertia test, system inertia test, and damping factor (Parameter #702).

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 4

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	4
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–3

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1293
Write Message Length, Word 4: 8 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
1293	3	**1293**
8	4	**See Note**

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The AUTOTUNE TUNE VELOCITY LOOP function calculates the Drives velocity loop parameters using the data determined by the motor inertia test, system inertia test, and the damping factor (Parameter #702).

Autotune Update Velocity Tune

This function updates the Drives internal database with the velocity loop parameters calculated by the Tune Velocity Loop function and provides the data to the PLC Controller in the BTR message.

PLC Block Transfer Data –

BTW Instruction Length: 4
BTR Instruction Length: 10

PLC DH+ Data –

	Write	**Read**
Size In Elements:	4	10
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–3	N15:0–9

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 1549
Write Message Length, Word 4: 8 bytes

BTW	WORD	BTR
0	1	0
0	2	0
1549	3	1549
8	4	See Note
	5	Parameter 659
	6	Parameter Data
	7	Parameter 660
	8	Parameter Data
	9	Parameter 700
	10	Parameter Data

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per table 3–H. The low byte contains the Drive message length in bytes.

Message Operation – The AUTOTUNE UPDATE VELOCITY TUNE function updates the Drives internal data base with the Velocity loop Ki (parameter #659), velocity loop Kp (Parameter 660), and desired bandwidth (Parameter #700) as calculated by the autotune firmware, and provides the data to the PLC Controller in the BTR message.

Read Trend Information

This function reads the trend information from the Drive. The Trend information is broken down into three separate blocks of data. Each block uses the same function code with the message specifing which block is to be read.

PLC Block Transfer Data –

BTW Instruction Length: 6
BTR Instruction Length: Refer to block information

PLC DH+ Data –

	Write	**Read**
Size In Elements:	6	Refer to block information
Processor Type:	PLC–5	PLC–5
Destination Address:	N15:0–5	N15:0–18

Message Structure –

Message Header Information:
Word 1: 0
Word 2: 0
Function Code, Word 3: 270
Write Message Length, Word 4: 12 bytes

BTW	WORD	**BTR**
0	1	**0**
0	2	**0**
270	3	**270**
12	4	**See Note**
See Trend Number	5	**See Block Definition**
See Block Number	6	•

NOTE: Word 4 of the BTR instruction is broken down into two bytes. The High byte contains the status bits per Table 3–H. The low byte contains the Drive message length in bytes.

Trend Number – An integer number used to specify which trend buffer the Drive will provide data for.

Trend Buffer #1 – 1
Trend Buffer #2 – 2
Trend Buffer #3 – 3
Trend Buffer #4 – 4

Block Number – An integer number used to specify which block of trend data (from the above specified trend buffer) the Drive is to supply. The definition of each block is as follows:

Block #0 – 0, Trend setup parameters
Block #1 – 1, Trend data samples 0 through 33
Block #2 – 2, Trend data samples 34 through 66
Block #3 – 3, Trend data samples 67 through 99

Message Operation

The READ TREND FILE function is used by a PLC Controller to get information about the Drives trend buffers. This data includes both the setup information and the data samples for each buffer. The BTW message contents determine what data will be returned by the Drive. The following information shows what data will be returned by the Drive (in the BTR instruction) for the Block number specified.

Refer to the Drive instruction manual for detailed information on Trend buffer operation and use.

Block #0:

BTR Instruction Length: 19
MSG Size in Elements: 19

BTW

0
0
270
See Note
0
Trend Number
Operand X
Operand Y
Par # monitored
Operator Type
Sample Time
Post Samples
Year
Month (1 – 12)
Day (1 – 31)
Hour (0 – 23)
Second (0 – 59)
Millisecond (0 – 999)
Monitored Parameter Descriptor

Trend Number – The trend buffer number of the data being provided.

Operand X – One of the parameters used to define the trigger condition.

Operand Y – One of the parameters used to define the trigger condition.

Par # Monitored – The parameter that is being monitored by the selected Trend buffer.

Operator – The operator used to determine what condition(s) will cause a trigger to occur.

Val	Description
1	Greater Than (GT)
2	Less Than (LT)
3	Equal To (EQU)
4	Not Equal To (Not__EQU)
5	AND (AND)
6	Not AND (NAND)
7	OR (OR)
8	Not OR (NOR)

Sample Time – The rate at which the monitored parameter is sampled.

Post Samples – The number of samples taken after the trigger condition is detected.

Year – An integer value representing the year the trigger condition was detected

Month (1 – 12) – An integer value representing the month the trigger condition was detected.

Day (1 – 31) – An integer value representing the day the trigger condition was detected.
Hour (0 – 23) – An integer value representing the hour the trigger condition was detected.

Second (0 – 59) – An integer value representing the second the trigger condition was detected.

Millisecond – An integer value representing the 10's of milliseconds in which the trigger condition was detected.

Monitored Parameter Descriptor – An integer value used by Allen-Bradley program terminals to display the proper units for the monitored parameter.

Block #1: This Block contains data samples 0 through 33 for the trend buffer specified in the BTW instruction.

BTR Instruction Length: 38 words
MSG Size in Elements: 38

BTR

0
0
270
See Note
1
Data Sample #1
Data Sample #2
•
Data Sample #33

Data Samples – The data samples are specified in Drive Units and may need to be scaled by the PLC Controller prior to being used in the Program.

Block #2: This Block contains data samples 34 through 66 for the trend buffer specified in the BTW instruction.

BTR Instruction Length: 38 words
MSG Size in Elements: 38

BTR

0
0
270
See Note
2
Data Sample #34
Data Sample #35
•
Data Sample #36

Data Samples – The data samples are specified in Drive Units and may need to be scaled by the PLC Controller prior to being used in the Program.

Block #3: This Block contains data samples 67 through 99 for the trend buffer specified in the BTW instruction.

BTR Instruction Length: 38 words

BTR

0
0
270
See Note
3
Data Sample #67
Data Sample #68
•
Data Sample #99

Data Samples – The data samples are specified in Drive Units and may need to be scaled by the PLC Controller prior to being used in the Program.

Chapter 4

Installation

Chapter Objective

This chapter is a detailed step-by-step procedure for the proper installation of the Bulletin 1395 Multi-Communications Adapter Board. Procedures performed in this chapter include:

- Unpacking and inspection
- Proper mounting
- Connection & Switch Settings

Receiving

It is your responsibility to thoroughly inspect the equipment before accepting shipment from the freight company. You must take the responsibility for noting any damage. Do Not accept shipment before checking all items received against the purchase order, and noting any missing or damaged items on the freight bill.

If any concealed damage is found later during unpacking, it is your responsibility to notify the freight agent. Leave the shipping container intact and request that the freight agent make a visual inspection of the shipment.

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

Unpacking & Inspection

Remove all packing material from around the board. Before removing the anti-static bag it should be noted that.the MCA Board is a static sensitive device, and special precautions must be taken while handling the board. The circuit board can be damaged by Electrostatic Discharge. It is possible to make contact with an ESD sensitive component during installation Therefore, personnel must be properly grounded. Grounding should be accomplished with a wrist strap which is connected to an approved ground.

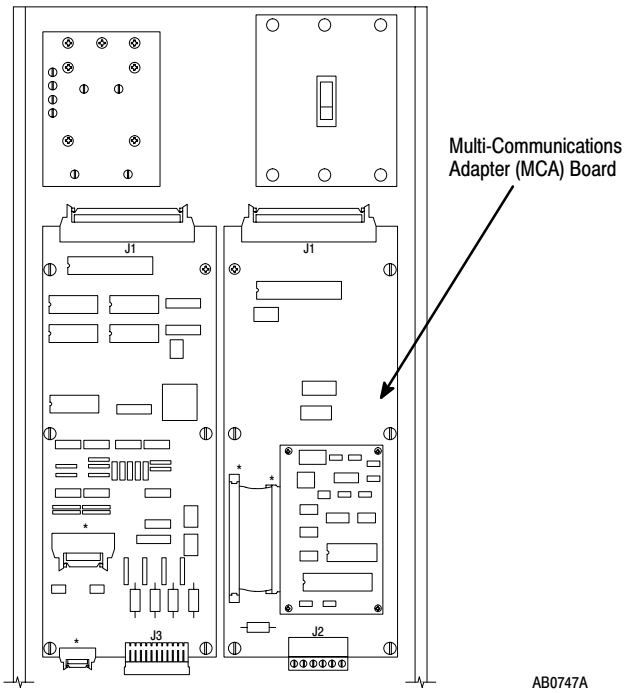
If the board will not be installed when it is unpacked, it should be stored in a clean dry place in the anti-static bag. The storage temperature must be between 0°C (32°F) and +60° (140°F) with a maximum humidity of 95% non-condensing, to guard against damage to temperature sensitive components.

Mounting

The MCA Board is mounted on the front of the swing out panel. Two possible adapter board mounting positions are provided. When looking at the mounting positions from the front, the right position corresponds to Port B and the left to Port A. The standard port used for the MCA board is port B, however if a second MCA Board will be installed in the same drive, it may be placed in Port A.

After determining which port will receive the MCA Board, mount the board, using the five (5) panel screws and one phillips head screw supplied (Figure 4–1).

Figure 4–1. Multi-Communications Adapter Board Location



Main Board Connections

The 60 pin ribbon cable connector (J1) located on the MCA Board (See Figure 4–1) provides a means of connecting the board to the Bulletin 1395 Main Control Board port connector (J6 or J7). The port connector used is determined by the port and physical location selected for installation of the MCA board. Main Control board connector J6 corresponds to Port B while J7 corresponds to Port A.

Discrete Input Connections

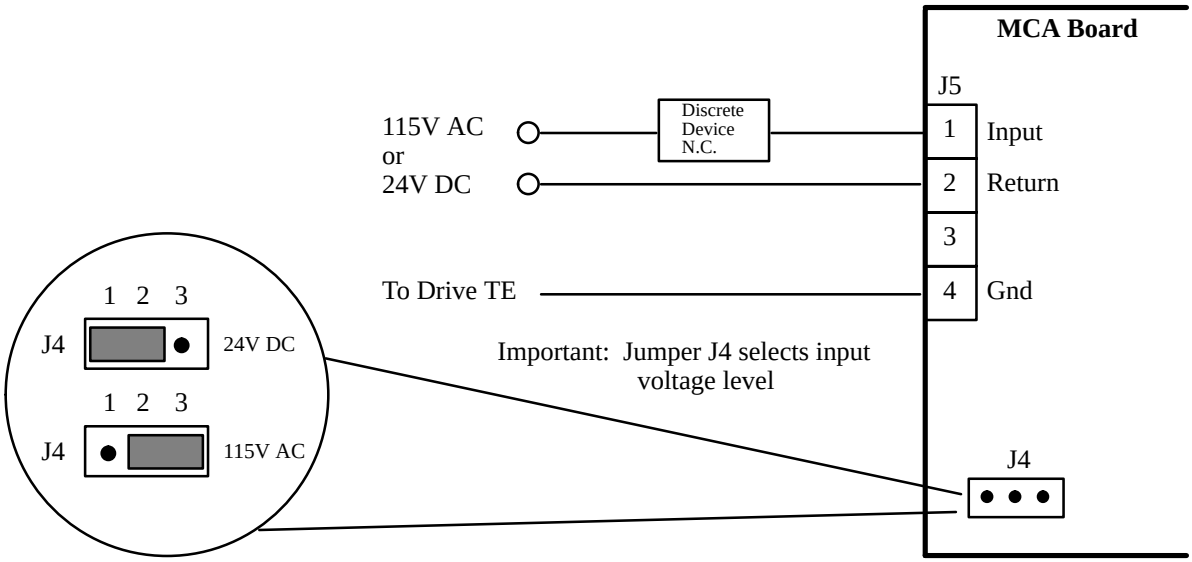
Additional hardware allows for a separate discrete input to the Drive. The input device (Pushbutton, selector switch,relay contact etc.) is connected to terminal block J5 and is jumper selectable (see Table 4–A) for either a 115V AC or 24V DC input (Fig. 4–2). The function and operation of this input is controlled by parameter settings.

Table 4–A. Discrete Input Voltage Select, Jumper J4

Position	Input Type
1 – 2	24V DC Input
2 – 3	115V AC Input

Connection to Allen-Bradley DH+ and/or RIO networks is accomplished through two connectors located on the bottom of the MCA board (Refer to Figure 4–1). The first step is to determine what protocol will be used for each channel. The next two sections explain how to connect RIO and DH+ networks to the Drive.

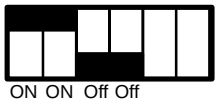
Figure 4–2. Typical Discrete Input Connection



Switch Settings

The MCA Adapter contains 4 DIP switches which perform several different setup functions. DIP switches U5 and U6 are used to select link type, baud rate, and rack or station number for channel A. U14 and U15 perform the same function for channel B.

NOTE: DIP Switch orientation on the MCA board is as follows:
CLOSED = “ON” = “1”
OPEN = “OFF” = “0”



IMPORTANT: The switch settings are read by the Drive when it is powered up and/or when a “System Reset” is performed. If changes are made to the switch settings after one of these occurances they will not take effect until the next power-up or “System Reset” is performed. Any illegal DIP switch settings or combinations is annunciated with a fault. When setting up the MCA board the following steps should be taken:

1. Determine what link protocol (RIO, DH+, or none) will be used for each channel.
2. Determine what baud rate will be used for each channel.
3. Record these selections in Table 4–B and continue with the installation.

Table 4–B. Link Protocol and Baud Rate Selection

	Protocol	Baud Rate
Channel A		
Channel B		

Protocol selection (Switch U5 channel A, and U14 channel B):

Switch positions 1–3 determine which link protocol will be used by each channel. Refer to Table 4–C for details.

Table 4–C. Switch settings for link protocol (U5 and U14)

Protocol	Switch Positions		
	1	2	3
None	0	0	0
Remote I/O (RIO)	0	0	1
Data Highway + (DH+)	0	1	0

Baud Rate selection (switch U5 channel A, and U14 channel B):

Switch positions 4 and 5 determine which baud rate will be used by each channel. Refer to Table 4–D baud rate settings for details. The baud rate must be the same for all devices connected to a specific channel. For example, if channel A is configured for 57.6k baud, then all devices connected to this channel must be configured for 57.6K baud.

Table 4–D. Switch settings for baud rate (U5 and U14)

Baud Rate	Switch Positions	
	4	5
57.6K	0	0
115 K	0	1
230K	1	0

The next sections are specific to the link protocol selected.

RIO Installation

Connection to an Allen-Bradley RIO network requires two basic procedures:

- The MCA board DIP switches must be configured for the desired setup.
- The physical wire connections to the board are made.

Switch settings for RIO rack size (switch U5 channel A, and U14 channel B):

Switch positions 6–8 set the rack size for the MCA board. The size determines how much real time data can be transferred between the Drive and PLC Controller. Refer to table 4–E for switch setting details.

Table 4–E. Switch settings for RIO rack size (U5 and U14)

	Switch Positions		
Rack Size	6	7	8
1/2 low, not last	0	0	0
1/2 low, last	0	0	1
1/2 hi	0	1	0
3/4 low, not last	0	1	1
3/4 low, last	1	0	0
3/4 hi	1	0	1
full rack	1	1	0

Switch settings for RIO redundant mode (switch U6):

Switch position 2 determines whether two channels configured for RIO communication operate indendently or in the redundant configuration. Refer to Table 4–F for details.

Table 4–F. Link Protocol and Baud Rate Selection

	Switch positions
Redundant Mode	2
Non-redundant	0
Redundant	1

Switch settings for RIO Rack Address (switch U6 channel A, and U15 channel B):

Switch positions 3–8 determine the rack address of the MCA adapter. Refer to Table 4–G for details.

Table 4–G. Switch settings for RIO rack Address (U6 and U15)

	Switch positions					
Rack Address	**3**	**4**	**5**	**6**	**7**	**8**
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
4	0	0	0	1	0	0
5	0	0	0	1	0	1
6	0	0	0	1	1	0
7	0	0	0	1	1	1
10	0	0	1	0	0	0
11	0	0	1	0	0	1
12	0	0	1	0	1	0
13	0	0	1	0	1	1
14	0	0	1	1	0	0
15	0	0	1	1	0	1
16	0	0	1	1	1	0
17	0	0	1	1	1	1
20	0	1	0	0	0	0
21	0	1	0	0	0	1
22	0	1	0	0	1	0
23	0	1	0	0	1	1
24	0	1	0	1	0	0
25	0	1	0	1	0	1
26	0	1	0	1	1	0
27	0	1	0	1	1	1
30	0	1	1	0	0	0
31	0	1	1	0	0	1
32	0	1	1	0	1	0
33	0	1	1	0	1	1
34	0	1	1	1	0	0
35	0	1	1	1	0	1
36	0	1	1	1	1	0
37	0	1	1	1	1	1
40	1	0	0	0	0	0

Connecting Devices to RIO

To make the series RIO connection to the MCA board, connect the Twinaxial cable (1770–CD) to the connector for the Port configured for RIO communications. Refer to Figure 4–3 for details. Figure 4–3 assumes that channel A will be used for RIO communications.

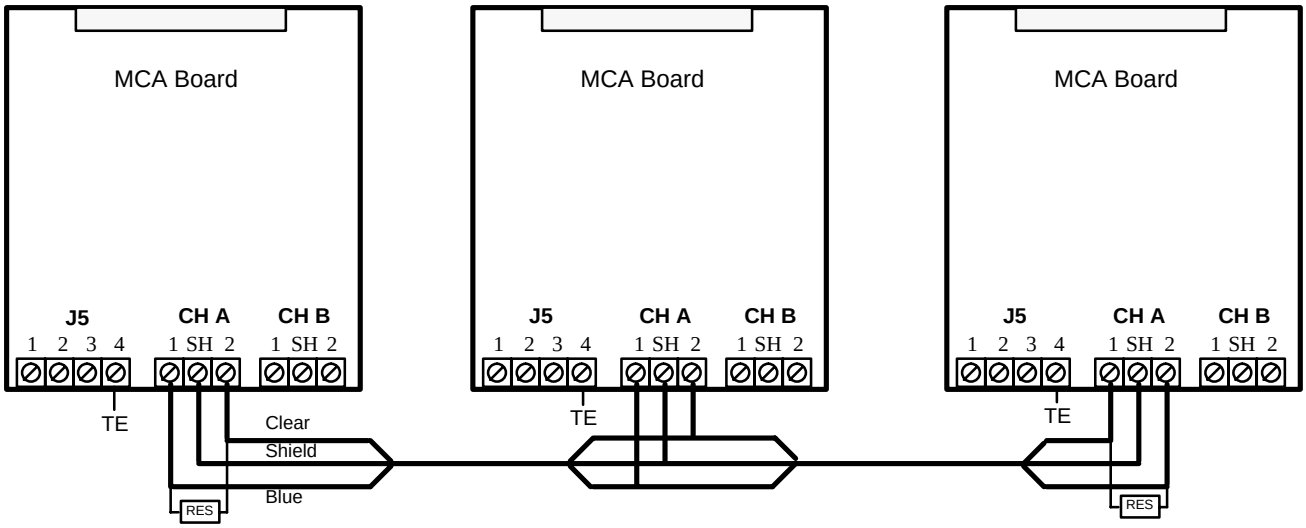
ATTENTION: When breaking connections at Channel A on any MCA Board in a series connected system, communications will be interrupted to boards that are down line in the series. Depending on the application, a loss of control to devices connected to these MCA boards could cause hazardous system operation. To guard against personal injury, the system must be shut down, or local control maintained of critical devices connected in the series when making or breaking connections at Channel A on any MCA Board.

IMPORTANT: Refer to the Twinaxial Cable guidelines at the back of this chapter for details on cable type, length, etc.

Make these connections as follows:

1. Connect the signal conductor with blue insulation to the 3-pin connector (Port A for this example) terminal 1 on the MCA board of each Drive and the PLC Controller.
2. Connect the SHIELD drain wire to the 3-pin connector SH terminal at both ends of each cable segment.
3. Connect the signal conductor with clear insulation to the 3-pin connector terminal 2.
4. When the MCA board is an end device, terminate the RIO link by connecting a terminating resistor across terminals 1 and 2 of the 3-pin connector.

Figure 4–3. Typical RIO Connection



DH+ Installation

Connection to an Allen-Bradley DH+ network requires two basic procedures to be followed:

- The MCA board DIP switches must be configured for the desired setup.
- The physical wire connections to the board are made.

Switch settings for DH+ Station Address (switch U6 channel A, and U15 channel B):

Switch positions 3–8 determine the station address of the MCA adapter. Refer to Table 4–H for details.

Table 4–H. Switch settings for DH+ station Address (U6 and U15)

	Switch positions					
Station Address	**3**	**4**	**5**	**6**	**7**	**8**
00	0	0	0	0	0	0
01	0	0	0	0	0	1
02	0	0	0	0	1	0
03	0	0	0	0	1	1
04	0	0	0	1	0	0
05	0	0	0	1	0	1
06	0	0	0	1	1	0
07	0	0	0	1	1	1
10	0	0	1	0	0	0
11	0	0	1	0	0	1
12	0	0	1	0	1	0
13	0	0	1	0	1	1
14	0	0	1	1	0	0
15	0	0	1	1	0	1
16	0	0	1	1	1	0
17	0	0	1	1	1	1
20	0	1	0	0	0	0
21	0	1	0	0	0	1
22	0	1	0	0	1	0
23	0	1	0	0	1	1
24	0	1	0	1	0	0
25	0	1	0	1	0	1
26	0	1	0	1	1	0
27	0	1	0	1	1	1
30	0	1	1	0	0	0
31	0	1	1	0	0	1
32	0	1	1	0	1	0
33	0	1	1	0	1	1
34	0	1	1	1	0	0
35	0	1	1	1	0	1
36	0	1	1	1	1	0
37	0	1	1	1	1	1
40	1	0	0	0	0	0
41	1	0	0	0	0	1
42	1	0	0	0	1	0
43	1	0	0	0	1	1
44	1	0	0	1	0	0
45	1	0	0	1	0	1
46	1	0	0	1	1	0
47	1	0	0	1	1	1
50	1	0	1	0	0	0
51	1	0	1	0	0	1
52	1	0	1	0	1	0
53	1	0	1	0	1	1
54	1	0	1	1	0	0
55	1	0	1	1	0	1
56	1	0	1	1	1	0
57	1	0	1	1	1	1
60	1	1	0	0	0	0
61	1	1	0	0	0	1
62	1	1	0	0	1	0
63	1	1	0	0	1	1
64	1	1	0	1	0	0
65	1	1	0	1	0	1
66	1	1	0	1	1	0
67	1	1	0	1	1	1
70	1	1	1	0	0	0
71	1	1	1	0	0	1
72	1	1	1	0	1	0
73	1	1	1	0	1	1
74	1	1	1	1	0	0
75	1	1	1	1	0	1
76	1	1	1	1	1	0
77	1	1	1	1	1	1

Connecting Devices to DH+

To make the series DH+ connection to the MCA board, connect the Twinaxial cable (1770–CD) to the connector for the Port configured for DH+ communications. Refer to Figure 4–4 for details. Figure 4–4 assumes that channel A will be used for DH+ communications.

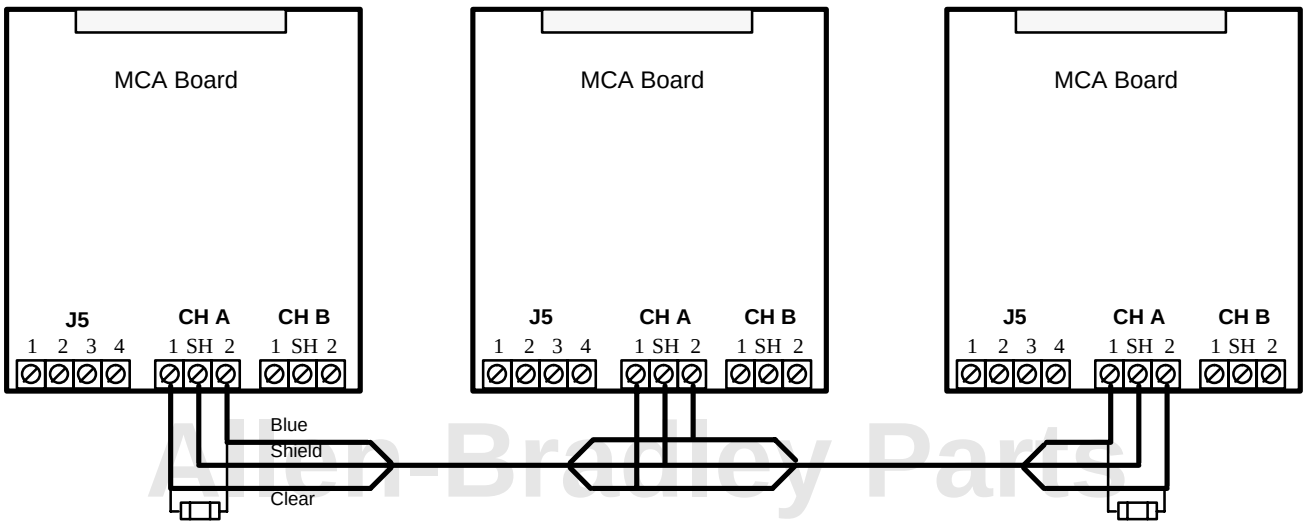
WARNING: When breaking connections at Channel A on any MCA Board in a series connected system, communications will be interrupted to boards that are down line in the series. Depending on the application, a loss of control to devices connected to these MCA boards could cause hazardous system operation. To guard against personal injury, the system must be shut down, or local control maintained of critical devices connected in the series when making or breaking connections at Channel A on any MCA Board.

IMPORTANT: Refer to the Twinaxial Cable guidelines at the back of this chapter for details on cable type, length, etc.

These connections should be made as follows:

1. Connect the signal conductor with blue insulation to the 3-pin connector (Port A for this example) terminal 2 on the MCA board of each Drive and the PLC Controller.
2. Connect the SHIELD drain wire to the 3-pin connector SH terminal at both ends of each cable segment.
3. Connect the signal conductor with clear insulation to the 3- pin connector terminal 1.
4. When the MCA board is an end device, terminate the DH+ link by connecting a terminating resistor across terminals 1 and 2 of the 3-pin connector.

Figure 4–4. Typical Daisy Chain DH+ Connection



Twinaxial Cable Guidelines

Twinaxial cable used for Remote I/O (RIO) and Data Highway + (DH+) communications represents a communications transmission line in which certain characteristics exist. The following are some general guidelines which apply to this particular transmission line and should be adhered to in order to obtain the best possible results.

Note that these are general rules and certain deviations may be warrented since diverse installation and environmenal concerns could change the requirements.

Cable Type – Only 1770–CD Belden #9463 is approved for RIO and DH+ installations. All other cable types or manufacturers, no matter how similar, are untested. Usage of other cable types is strictly at the installer's risk.

Cable Length – A minimum of 10 feet of cable should be used for all connections. Shorter lengths may cause signal reflections and have been known to cause signal retry problems.

Connections – All three conductors, blue, clear, and shield, 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 two cables may be connected at any wiring point on a series connection application.

Terminators – Two 1770–XT or 150 ohm (82 ohm for 230 Kbaud) resistors should be placed (or switched in), one at each end or farthest point of the cable.

Chapter 5

Start-Up

Chapter Objectives

This chapter will provide you with the basic procedures that are necessary to configure the Drive for use with a MCA Board. Procedures that will be covered in this chapter include:

- Verification of proper installation and wiring.
- Verification of correct switch settings for the required application.
- Configuration of the Drive control for use with the MCA Board.

Terminology

Configuration	The process of linking Sink to Source parameters.
Interface	The hardware and associated software required to transfer information and/or control signals from one device to another.
Parameter	Memory location used to store Drive data.
Sink	Parameter used to receive data input
Source	Parameter used as a source of data.

Connection Verification

Before any attempt to configure the Drive is made, the following connections and settings MUST be verified per Chapter 4.

- Check the Multi Communication Adapter Board mounting location. Is it in the correct position to connect to the intended port?
- Check that the 60 pin ribbon cable connector J1 is connected correctly for the location and port being used by the MCA board.
- Check that the setting of all DIP switches is correct for your application referring to Tables 4–1 through 4–8 in the Installation chapter.

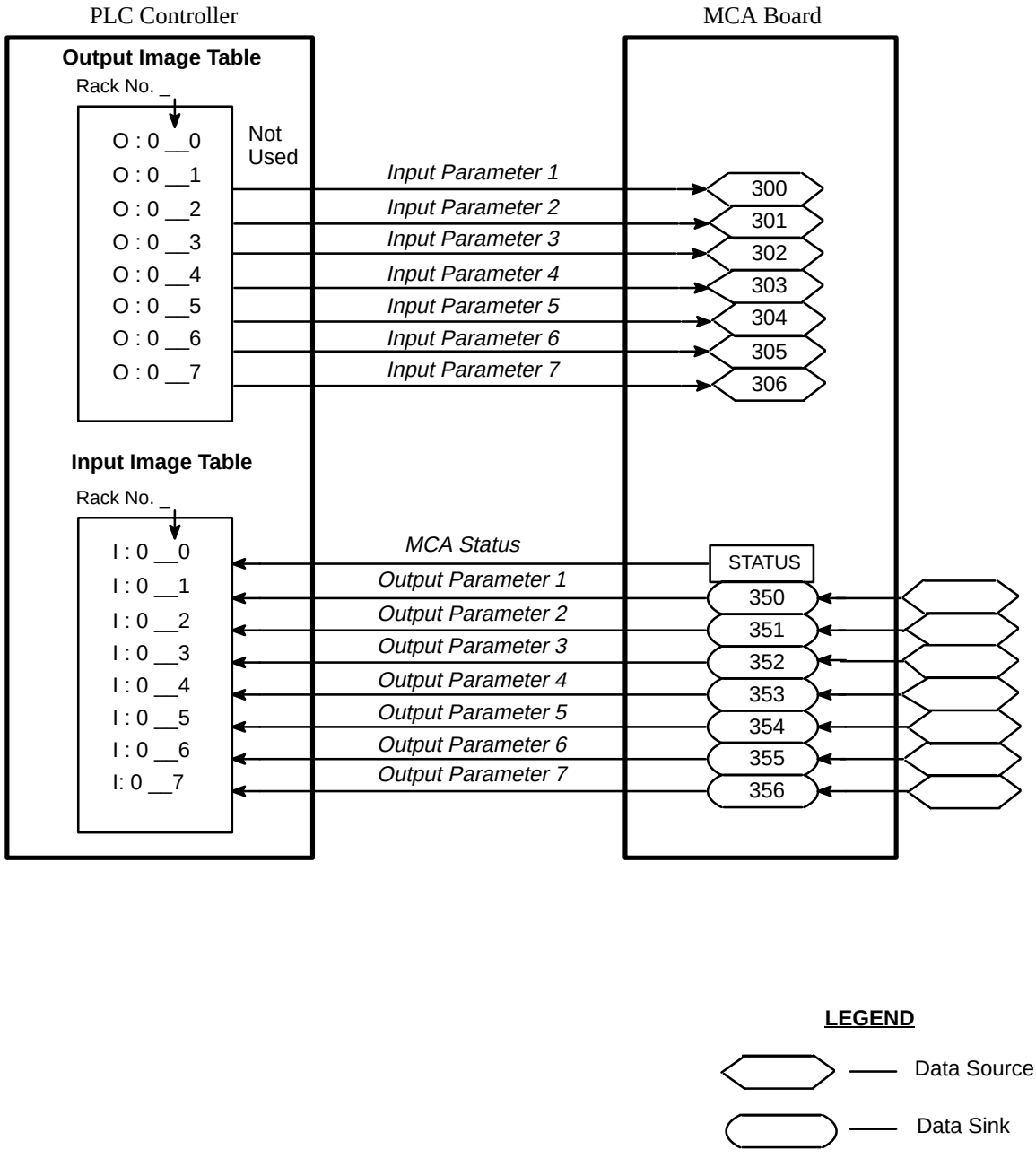
IMPORTANT: When an MCA Board is put in a different Drive Port, or DIP switch settings are changed, the drive must be re-initialized for a correct MCA configuration to occur.

WARNING: Failure to verify connections and switch settings before configuring the Drive, could result in personal injury due to a Drive malfunction or erractic system operation.

Example Connection Configuration

The parameters used to configure the MCA board are determined by the port the MCA board is connected to. Figure 5–1 shows a sample configuration with the MCA board connected to Port B.

Figure 5–1. Configuration Example, MCA Board in Port B with Channel A designated as RIO



Chapter 6

Troubleshooting

Chapter Objectives

This section describes the MCA board fault diagnostics and how they are processed by the 1395 Drive. Using the MCA Fault Board messages will help you to isolate problem areas and initiate possible solutions.

WARNING: Only qualified personnel familiar with the 1395 Drive system should perform troubleshooting or maintenance functions on the MCA Board. Failure to comply may result in personal injury and/or equipment damage. All precautions detailed in the 1395 Instruction Manual troubleshooting section must be followed when attempting to diagnose MCA board malfunctions.

The MCA Board provides initial fault handling based on conditions within it's environment, and then signals the Bulletin 1395 which provides further disposition based on system requirements. Faults are divided into three categories:

Hard Faults

Hard Faults are non-recoverable and are the highest priority fault. That is, the Bulletin 1395 must either be RESET or POWER-CYCLED after the fault condition is corrected. The MCA Board transmits its fault to the Main Control Board through the dual-port RAM as explained in the Bulletin 1395 Instruction Manual. A Hard Fault in an adapter is designed to initiate an ECOAST Stop Sequence (Refer to the 1395 Manual for an in-depth explanation). The following examples are considered Hard Faults:

- Internal RAM malfunction
- EPROM Checksum error

Soft Faults

Soft Faults occur when an Adapter Board detects a condition which may result in undesirable operation. Soft Faults differ from Hard Faults in that the 1395 Drive can (in most cases) maintain proper control during a Soft Fault condition. The Adapter takes appropriate action within its domain to guard against degradation of Drive performance and signals the condition to the 1395 Drive. In addition, the fault may be cleared and normal operation resumed at the point the fault occurred. Examples of Soft Faults are:

- Incorrect protocal DIP switch settings
- Illegal baud rate

Warning Faults

Warning Faults are the lowest priority and indicate error conditions which are generally transient in nature, but could result in undesirable operation if allowed to persist. If left uncorrected, Warning Faults could result in a Soft Fault. Examples of Warning Faults are:

- Function Block Overflow
- RIO Comm Loss

Selected Fault conditions in the Bulletin 1395 Drive can be configured in terms of their Soft or Warning Fault nature. That is, the user/operator may specify the action taken, either Soft Fault or Warning Fault (Report Only).

CAUTION: Ignoring faults that have been configured as Report Only could damage certain components in the Drive.

MCA Board Fault Messages

The fault messages produced by the MCA board are:

Message: CA–10–ILLEGAL PROTOCOL CHA
CA–11–ILLEGAL PROTOCOL CHB
CA–12–ILLEGAL BAUD RATE CHA
CA–13–ILLEGAL BAUD RATE CHB
CA–14–ILLEGAL RACK SIZE CHA
CA–15–ILLEGAL RACK SIZE CHB
Fault Type: Soft
Cause: Incorrect protocol dip switch setting.
Action: Refer to chapter 4 for details on correct DIP switch settings. Check DIP switch settings and reset drive, if condition persists replace adapter board.

Message: CA–16–ILLEGAL RIO REDUND CNFG
Fault Type: Soft
Cause: Channel B not RIO protocol. Both channels must be configured for RIO protocal when using redundant mode.
Action: Check DIP switch settings and reset drive, if condition persists replace adapter board.

Message: CA–20–RED RIO, DIFF RACK SIZE
Fault Type: Soft
Cause: Channel A and B are not the same rack size. Both channels must be the same rack size when using the redundant mode. Action: Check DIP switch settings and reset drive, if condition persists replace adapter board

Message: CA–30–ADAPTER PROCESSOR FAULT
CA–31–ADAPTER PROCESSOR FAULT
CA–32–ADAPTER PROCESSOR FAULT
Fault Type: Hard
Cause: Adapter internal diagnostic malfunction.

Action: Check DIP switch settings and reset drive, if condition persists replace adapter board.

Message: CA–35–ADD FUNC BLK OVERFLOW
Fault Type: Warning/Soft
Cause: The Add function block output value has overflowed.
Action: Check range on inputs, gains values, and offset values for ADD block.

Message: CA–36–MULT1 FUNC BLK OVERFLOW
Fault Type: Warning/Soft
Cause: The Multiplication function block output value has overflowed.
Action: Check input range and gain value.

Message: CA–37–MULT2 FUNC BLK OVERFLOW
Fault Type: Warning/Soft
Cause: The Multiplication 2 function block output value has overflowed.
Action: Check input range and gain value.

Message: CA–44–ADAPTER PROCESSOR FAULT
Fault Type: Hard
Cause: Adapter internal diagnostic malfunction.
Action: Check dip switch settings and reset drive, if condition persists replace adapter board.

Message: CA–45–ADAPTER PROCESSOR FAULT
Fault Type: Hard
Cause: Adapter internal diagnostic malfunction.
Action: Check dip switch settings and reset drive, if condition persists replace adapter board.

Message: CA–50–ADAPTER PROCESSOR FAULT
CA–51–ADAPTER PROCESSOR FAULT
CA–52–ADAPTER PROCESSOR FAULT
Fault Type: Hard
Cause: Adapter internal diagnostic malfunction.
Action: Check dip switch settings and reset drive, if condition persists replace adapter board.

Message: CA–53–CHANNEL A BT FAIL
CA–54–CHANNEL B BT FAIL
Fault Type: Warning
Cause: Unable to complete RIO block transfer.
Action: Resend block transfer, if condition persists, replace adapter board.

Message: CA–64–ADAPTER PROCESSOR FAULT
Fault Type: Hard
Cause: Adapter internal diagnostic malfunction.
Action: Check dip switch settings and reset drive, if condition persists replace adapter board.

RIO Faults

Message: CA–70–RESET/PROGRAM/TEST (CHA)
CA–85–RESET/PROGRAM/TEST (CHB)
Fault Type: Soft/Warning
Cause: PLC was switched from run mode to another mode.
Action: Check PLC mode switch and I/O control reset, if condition persists, replace adapter board.

Message: CA–71–RIO COMM LOSS (CHA)
CA–86–RIO COMM LOSS (CHB)
Fault Type: Soft/Warning
Cause: Loss of communication between adapter and PLC.
Action: Check wiring and connections, verify adapter is being scanned, if condition persists, replace adapter board.

DH+ only Faults

Message: CA–75–DUP NODE ADDR (CHA)
CA–90–DUP NODE ADDR (CHB)
Fault Type: Soft/Warning
Cause: One or more nodes with the same address exist on the DH+ network.
Action: Check that each node has a different address, if condition persists, replace adapter board.

Message: CA–76–GLOBAL DATA NODE LOSS (CHA)
CA–91–GLOBAL DATA NODE LOSS (CHB)
Fault Type: Soft/Warning
Cause: Global data was being received from node address and has ceased.
Action: Check configuration parameter for correct global data node address, verify node address is on the network. If condition persists, replace adapter board.

Message: CA–77–COMM LOSS, NETWORK DEAD (CHA)
CA–92–COMM LOSS, NETWORK DEAD (CHB)
Fault Type: Soft
Action: Check wiring and connections, replace MCA board if condition persists.

Chapter 7

Periodic Maintenance

Preventative Maintenance

WARNING: Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lock out control equipment from power sources, and allow stored energy in capacitors to dissipate, if present. If it is necessary to work in the vicinity of energized equipment, the safety related work practices of NFPA 70E, Electrical Safety Requirements for Employee Workplaces, must be followed.

WARNING: Use of other than factory recommended test equipment as detailed below for solid state controls may result in injury to personnel, damage to the control or test equipment or unintended actuation of the controlled equipment. Potentially fatal voltages may result from improper useage of an oscilliscope or other test equipment. Refer to equipment safety instructions for all test equipment before using with the MCA board. All cautions and warnings that apply to servicing and troubleshooting a 1395 Drive found in the 1395 Instruction Manual, MUST be followed when servicing the MCA board.

Recommended Tools and Equipment – The following equipment is recommended for maintaining and troubleshooting a 1395 Drive and MCA board:

- Multimeter capable of 1000V DC/ 750V AC, with input resistance of at least 1 megohm minimum.
- Test leads for multimeter
- Assorted screwdriver (phillips and blade) and a set of open end wrenches.
- Clamp on Ammeter (AC and DC with current ratings to match drive ratings).
- Programming Terminal
- Dual trace oscilliscope with A minus B quasi differential capability.
- X100 probes for oscilliscope.

Periodic Inspection – Industrial control equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions, and adjusted as indicated by experience. An initial inspection within 3 to 4 months after installation is suggested. Applicable parts of the following guidelines should be used:

Contamination – If inspection reveals that dust, dirt, moisture or other contamination has reached the control equipment or MCA board, the cause must be eliminated. This could indicate an incorrect or ineffective enclosure, unsealed enclosure openings (conduit or other) or incorrect operating procedures. Dirty, wet or contaminated parts must be replaced unless they can be cleaned effectively by vacuuming or wiping.

Solid-State Devices – Solid-state devices require little more than a periodic visual inspection. Printed circuit boards should be inspected to determine whether all ribbon cables are properly seated in their connectors. Board locking tabs should also be in place. Necessary replacements should be made only at the PC board or plug-in component level. Solvents should not be used on printed circuit boards. Where blowers are used, air filters if supplied should be cleaned or changed periodically depending on the specific environmental conditions encountered. For additional information see NEMA Standards Publication No. ICS 1.1–1984 entitled: “Safety Guidelines for the Application, Installation and Maintenance of Solid-State Controls”.

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

Static Sensitive Items – While performing maintanance on the 1395 Drive and the Multi-Communication Adapter Board, special precautions must be observed in handling or touching certain static sensitive components in the cabinet. All circuit cards and SCR’s in the Drive can be damaged by Electro-Static Discharge. If personnel will make contact with an ESD sensitive component during maintenance, they must be grounded. Grounding should be accomplished with a wrist strap which is connected to an approved ground.

Tests & Records

Final Check Out – After maintenance or repair of industrial controls, always test the control system for proper functioning under controlled conditions that avoid hazards in the event of a control malfunction.

"Keep Good Maintenance Records" – This rule will be most helpful in locating possible intermitttent problems by pointing to a particular area of recurring trouble within the overall system. Further, good maintanance records will help reduce major costly shutdowns by demanding the use of proper test equipment and an appropriate inventory of spare parts. For additional information see NFPA 70 B, RECOMMENDED PRACTICE FOR ELECTRICAL EQUIPMENT MAINTENANCE, published by the National Fire Protection Association.

Chapter 8

Reference

Chapter Objective

This chapter provides you with an easy reference to the MCA board parameters. It includes a condensed table of all configuration and setup parameters and a complete description of each MCA board parameter.

Terminology

A brief description of terms and concepts covered in this chapter are:

Channel Refers to a serial communication link. The MCA board contains two “channels”, each of which can be assigned as either Allen–Bradley RIO or DH+ type communications.

Configuration The process of linking sink to source parameters for the purpose distributing data within the Drive or adapter(s).

Drive Units The actual value of the parameter as it is stored internally in the Drive. Drive units are converted to engineering units or to hexidecimal by Allen–Bradley program terminals. All Drive units are stored using per unit numbering.

Engineering Unit A label given to parameter data which specifies what units are used to display the parameter on programming terminals. Examples of engineering units include: RPM, Amps, %, etc.

Fast Parameter Fast parameters are those which are updated rapidly. They are typically used for transmitting real time data to and from the Drive. Fast parameter values are not stored in non–volatile memory. Actual armature Current is an example of a fast parameter.

Microbus An internal Drive mechanism designed by Allen–Bradley for exchanging information between microprocessors. The Microbus is used to transfer information between the MCA board and the Main Control board.

Port A physical location on the Drive reserved for the connection of Adapter cards. Each Drive has two ports. The ports are identified in firmware as “Port A” and “Port B”.

Parameter	A memory location in Drive firmware used to store Drive data. This data can be realtime data and/or Drive setup information. Each parameter has an assigned number and function. Parameters are displayed in engineering units when viewed from program terminals.
Parameter Table	A table which contains all parameters that are available in the Drive.
Source Parameter	A parameter which contains real time information that is available for use by other devices. These devices can include PLC controllers, operator interface devices, program terminals, etc.
Sink Parameters	Sink parameters accept data from other parameters which is then used by the Drive to perform the desired functions. An example of a sink is the external velocity reference parameter which accepts a speed reference from a device such as a PLC.

Detailed Parameter Listing

The parameter table numbering for the MCA board is controlled by the DIP switch settings used to configure the board for RIO or DH+. Certain parameter numbers and definitions are dependent on the specific channel assignments. The parameter definitions in this section are broken down into three catagories as follows:

1. Parameter definitions for those parameters that do not change with channel assignment. These are listed in the Common section.
2. Parameter definitions for channels that are configured for RIO. These are listed in the RIO section.
3. Parameter definitions for channels that are configured for DH+. These are listed in the DH+ section.

Table 8–A indicates which section parameter definitions can be found in based on the parameter number and channel assignments.

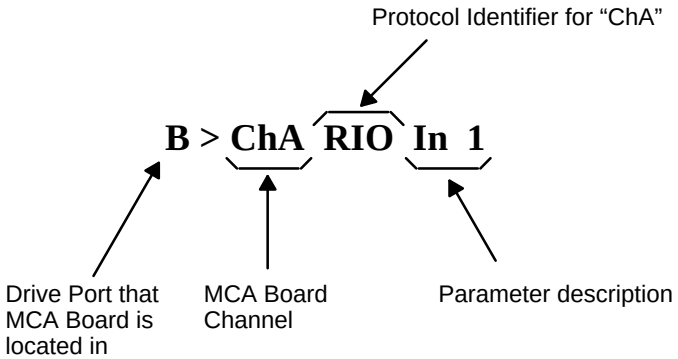
Table 8–A. MCA Board Parameter Channel Assignments

Parameter Numbers Port A	Parameter Numbers Port B	If Channel Is RIO	If Channel Is DH+
400 – 406	300 – 306	RIO Section	DH+ Section
407 – 413	307 – 313	RIO Section	DH+ Section
414 – 419	314 – 319	Common Section	Common Section
420 – 449	320 – 349	Not Used	Not Used
450 – 456	350 – 356	RIO Section	DH+ Section
457 – 463	357 – 363	RIO Section	DH+ Section
464 – 469	364 – 369	Common Section	Common Section
470 – 499	370 – 399	Not Used	Not Used
550 – 570	500 – 520	Common Section	Common Section
571, 572	521, 522	Not Used	Not Used
573, 574	523, 524	Common Section	Common Section
575, 576	525, 526	RIO Section	DH+ Section
577 – 582	527 – 532	Not Used	DH+ Section
583 – 586	533 – 536	Not Used	Not Used
587, 588	537, 538	RIO Section	DH+ Section
589 – 598	539 – 548	Not Used	DH+ Section
599	549	Common Section	Common Section

Parameter Name Structure

The actual channel assignments for an MCA Board can be determined by looking at the link protocol DIP switches or by the parameter name. The example below shows a typical parameter name. Parameters that remain the same regardless of link protocol do not contain the “Protocol Identifier”.

Parameter 300:



Parameter Table Structure

Table 8–B contains an abbreviated listing of the MCA board parameters. The parameters in the Adapter can be categorized into the following general groups by parameter number:

- #300 – #306 Port B Channel A Source Parameters
- #307 – #313 Port B Channel B Source Parameters

- #309 – #314 Comm Adapter Source Parameters
- #350 – #356 Port B Channel A Sinks
- #357 – #363 Port B Channel B Sinks
- #364 – #369 Comm Adapter Indirect Sinks
- #400 – #406 Port A Channel A Source Parameters
- #407 – #413 Port A Channel B Source Parameters
- #450 – #456 Port A Channel A Sinks
- #457 – #463 Port A Channel B Sinks
- #464 – #469 Comm Adapter Indirect Sinks
- #500 – #524 Port B Comm Adapter Setup Parameters
- #525 – #536 Port B Channel A Setup Parameters
- #537 – #549 Port B Channel B Setup Parameters
- #550 – #574 Port A Comm Adapter Setup Parameters
- #575 – #586 Port A Channel A Setup Parameters
- #587 – #599 Port A Channel B Setup Parameters

The column headings in table 8–B are defined as follows:

DEC – The parameter number in decimal format.

HEX – The parameter number in hexidecimal format.

NAME – The parameter name as it appears on a program terminal

UNITS – Indicates the engineering units used to display a parameter value when viewed on a program terminal.

INIT – The default parameter value stored in the Drive. The default values replace present values when a System Initialize command is given to the Drive.

MIN – The minimum allowable value for a parameter. If no minimum value is given, the parameter has not been assigned a minimum limit.

MAX – The maximum allowable value for a parameter. If no maximum value is given, the parameter has not been assigned a maximum limit.

EE – Indicates whether the parameter value is backed up in Drive EEPROM memory. In general, only setup parameter values are stored in EEPROM memory.

FUNCTION – Indicates the parameter type. The parameter type determines how the parameter is treated by the Drive and what type of information is contained within the parameter.

PORT – All Adapter board parameter numbers are determined by the Drive Adapter Port that the board is mounted in. When moving an Adapter board from one port to another, the functionality of the board remains the same, but specific functions will change.

Table 8–A. MCA Board Parameters

DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION	PORT
300	12CH	B>CHA RIO In 1	None					Configuration	B
301	12DH	B>CHA RIO In 2	None					Configuration	B
302	12EH	B>CHA RIO In 3	None					Configuration	B
303	12FH	B>CHA RIO In 4	None					Configuration	B
304	130H	B>CHA RIO In 5	None					Configuration	B
305	131H	B>CHA RIO In 6	None					Configuration	B
306	132H	B>CHA RIO In 7	None					Configuration	B
307	133H	B>CHB RIO In 1	None					Configuration	B
308	134H	B>CHB RIO In 2	None					Configuration	B
309	135H	B>CHB RIO In 3	None					Configuration	B
310	136H	B>CHB RIO In 4	None					Configuration	B
311	137H	B>CHB RIO In 5	None					Configuration	B
312	138H	B>CHB RIO In 6	None					Configuration	B
313	139H	B>CHB RIO In 7	None					Configuration	B
314	13AH								
315	13BH	B>Mult1 FB Out	None		–32767	32767		Configuration	B
316	13CH	B>Mult2 FB Whole	None		–32767	32767		Configuration	B
317	13DH	B>Mult2 FB Fract	None		–32767	32767		Configuration	B
318	13EH	B>Add FB Out	None		–32767	32767		Configuration	B
319	13FH	B>Filter FB Out	None		–32767	32767		Configuration	B
320	140H								
350	15EH	B>CHA RIO Out 1	None					Configuration	B
351	15FH	B>CHA RIO Out 2	None					Configuration	B
352	160H	B>CHA RIO Out 3	None					Configuration	B
353	161H	B>CHA RIO Out 4	None					Configuration	B
354	162H	B>CHA RIO Out 5	None					Configuration	B
355	163H	B>CHA RIO Out 6	None					Configuration	B
356	164H	B>CHA RIO Out 7	None					Configuration	B
357	165H	B>CHB RIO Out 1	None					Configuration	B
358	166H	B>CHB RIO Out 2	None					Configuration	B
359	167H	B>CHB RIO Out 3	None					Configuration	B
360	168H	B>CHB RIO Out 4	None					Configuration	B
361	169H	B>CHB RIO Out 5	None					Configuration	B
362	16AH	B>CHB RIO Out 6	None					Configuration	B
363	16BH	B>CHB RIO Out 7	None					Configuration	B
364	16CH	B>CA Indirect 1	None		–32767	32767		Configuration	B
365	16DH	B>CA Indrect 2	None		–32767	32767		Configuration	B
366	16EH	B>CA Indirect 3	None		–32767	32767		Configuration	B
367	16FH	B>CA Indirect 4	None		–32767	32767		Configuration	B
368	170H	B>CA Indirect 5	None		–32767	32767		Configuration	B
369	171H	B>CA Indirect 6	None		–32767	32767		Configuration	B

Table 8–B. Listing of Parameters that do not change with Channel Assignment

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
B	314	13AH	B>CA Source Wd	None	Not Changeable			NO	Fast Source
B	315	13BH	B>Mult1 FB Out	None	Not Changeable			NO	Fast Source
B	316	13CH	B>Mult2 FB Whole	None	Not Changeable			NO	Fast Source
B	317	13DH	B>Mult2 FB Fract	None	Not Changeable			NO	Fast Source
B	318	13EH	B>Add FB Out	None	Not Changeable			NO	Fast Source
B	319	13FH	B>Filter FB Out	None	Not Changeable			NO	Fast Source
B	364	16CH	B>CA Indirect 1	None	Not Changeable			NO	Fast Sink
B	365	16DH	B>CA Indrect 2	None	Not Changeable			NO	Fast Sink
B	366	16EH	B>CA Indirect 3	None	Not Changeable			NO	Fast Sink
B	367	16FH	B>CA Indirect 4	None	Not Changeable			NO	Fast Sink
B	368	170H	B>CA Indirect 5	None	Not Changeable			NO	Fast Sink
B	369	171H	B>CA Indirect 6	None	Not Changeable			NO	Fast Sink
A	414	19EH	A>CA Source Wd	None	Not Changeable			NO	Fast Source
A	415	19FH	A>Mult1 FB Out	None	Not Changeable			NO	Fast Source
A	416	1A0H	A>Mult2 FB Whole	None	Not Changeable			NO	Fast Source
A	417	1A1H	B>Mult2 FB Fract	None	Not Changeable			NO	Fast Source
A	418	1A2H	A>Add FB Out	None	Not Changeable			NO	Fast Source
A	419	1A3H	A>Filter FB Out	None	Not Changeable			NO	Fast Source
A	464	1D0H	A>CA Indirect 1	None	Not Changeable			NO	Fast Sink
A	465	1D1H	A>CA Indrect 2	None	Not Changeable			NO	Fast Sink
A	466	1D2H	A>CA Indirect 3	None	Not Changeable			NO	Fast Sink
A	467	1D3H	A>CA Indirect 4	None	Not Changeable			NO	Fast Sink
A	468	1D4H	A>CA Indirect 5	None	Not Changeable			NO	Fast Sink
A	469	1D5H	A>CA Indirect 6	None	Not Changeable			NO	Fast Sink
B	500	1F4H	B>CA Constant 1	None	0	–32767	32767		Setup
B	501	1F5H	B>CA Constant 2	None	0	–32767	32767		Setup
B	502	1F6H	B>CA Constant 3	None	0	–32767	32767		Setup
B	503	1F7H	B>CA Constant 4	None	0	–32767	32767		Setup
B	504	1F8H	B>Mult1 FB In	None	320	300	503		Setup
B	505	1F9H	B>Mult1 FB Gain	None	0	–15.999	15.995		Setup
B	506	1FAH	B>Mult2 FB In 1	None	320	300	503		Setup
B	507	1FBH	B>Mult2 FB In 2	None	320	300	503		Setup
B	508	1FCH	B>Add FB In 1	None	320	300	503		Setup
B	509	1FDH	B>Add FB Gain 1	None	0	–15.999	15.995		Setup
B	510	1FEH	A>Add FB In 2	None	320	300	503		Setup
B	511	1FFH	A>Add FB Gain 2	None	0	–15.999	15.995		Setup
B	512	200H	A>Add FB In 3	None	320	300	503		Setup
B	513	201H	A>Add FB Gain 3	None	0	–15.999	15.995		Setup
B	514	202H	A>Add FB Off 4	None	0	–32767	32767		Setup
B	515	203H	B> LP Filter In 1	None	320	300	503		Setup

Table 8–B. Listing of Parameters that do not change with Channel Assignment (cont.)

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
B	516	204H	B>LP Filter Time	Sec	0.004	0.004	32.767	No	Setup
B	517	205H	B>FB Ovrflow Sel	Bit Select	0	0		No	Setup
B	518	206H	B>Disc In-Param	None	300	300	319	No	Setup
B	519	207H	B>Disc In-Bit	None	11	0	15	No	Setup
B	520	208H	B>Disc In-Oper	None	0	0	4	No	Setup
B	523	20BH	B>ChA Dip Switch	None	Not	Change	-able	No	Configuration
B	524	20CH	B>ChB Dip Switch	None	Not	Change	-able	No	Configuration
B	549	225H	B>CA: Version No	None	1.02	Not Ch	angeable	No	Setup
A	550	226H	A>CA Constant 1	None	0	–32767	32767	No	Setup
A	551	227H	A>CA Constant 2	None	0	–32767	32767	Yes	Setup
A	552	228H	A>CA Constant 3	None	0	–32767	32767	Yes	Setup
A	553	229H	A>CA Constant 4	None	0	–32767	32767	Yes	Setup
A	554	22AH	A>Mult1 FB In	None	420	400	553	Yes	Setup
A	555	22BH	A>Mult1 FB Gain	None	0	–15.999	15.995	Yes	Setup
A	556	22CH	A>Mult2 FB In 1	None	420	400	553	Yes	Setup
A	557	22DH	A>Mult2 FB In 2	None	420	400	553	Yes	Setup
A	558	22EH	A>Add FB In 1	None	420	400	553	Yes	Setup
A	559	22FH	A>Add FB Gain 1	None	0	–15.999	15.995	Yes	Setup
A	560	230H	A>Add FB In 2	None	420	400	553	Yes	Setup
A	561	231H	A>Add FB Gain 2	None	0	–15.999	15.995	Yes	Setup
A	562	232H	A>Add FB In 3	None	420	400	553	Yes	Setup
A	563	233H	A>Add FB Gain 3	None	0.004	–15.999	15.995	Yes	Setup
A	564	234H	A>Add FB Off 4	None	0	–32767	32768	Yes	Setup
A	565	235H	A> LP Filter In 1	None	420	400	553	Yes	Setup
A	566	236H	A>LP Filter Time	Sec	0.004	0.004	32.767	Yes	Setup
A	567	237H	A>FB Ovrflow Sel	None			*	Yes	Setup
A	568	238H	A>Disc In-Param	None	400	400	419	Yes	Setup
A	569	239H	A>Disc In-Bit	None	11	0	15	Yes	Setup
A	570	23AH	A>Disc In-Oper	None	0	0	4	Yes	Setup
A	573	23DH	A>ChA Dip Switch	None	Not	Change	-able	No	Configuration
A	574	23EH	A>ChB Dip Switch	None	Not	Change	-able	No	Configuration
A	599	257H	A>CA: Version No	None	1.02				Configuration

*See Parameter Description

Parameter Descriptions

The format used to provide information about MCA board parameters is as follows:

Parameter AAA [Parameter name]
BBB [Parameter name]
Use:
Parameter Type:
Program Terminal Units:
Minimum Value:
Maximum Value:
Default Value:
Description:

Parameter AAA – The parameter number if the Adapter is installed in Port A.

Parameter BBB – The parameter number if the Adapter is installed in Port B.

[Parameter name] – The parameter name as viewed on a program terminal.

Use – A brief description of the parameter function.

Parameter Type – Specifies the type of parameter. Two types are available on the MCA board:

Configuration parameters – These parameters contain real time information. They can be linked to Drive parameters or other MCA board parameters.

Setup parameters – These parameters are used to control MCA board functions and features.

Program Term Units – The engineering units used when displaying a parameter on a program terminal.

Minimum Value – The minimum allowable value for a parameter. If no minimum value is given, the parameter has not been assigned a minimum limit. This value is displayed on program terminals.

Maximum Value – The maximum allowable value for a parameter. If no maximum value is given,the parameter has not been assigned a maximum limit. This value is displayed on program terminals.

Default Value – The default parameter value stored in the Drive. The default values replace present values when a System Initialize command is given to the Drive.

Description – A detailed description of the use and operation of the parameter.

Common Parameters

This section describes in detail the function of each of the parameters on the MCA board that remains the same regardless of the boards channel assignments.

Parameter 415 – [A>Mult1 FB Out]
Parameter 315 – [B>Mult1 FB Out]

Use: Output from Multiply #1 function block
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast source that contains the output resultant from the Multiply #1 function block. This value can be used by the MCA board directly or by other Drive functions through a configuration link. If the block output overflows (exceeds the range of the output) the "Function Block overflow parameter" (par. 567/517) determines the board output value.

Parameter 416 – [A>Mult2 FB Whole]
Parameter 316 – [B>Mult2 FB Whole]

Use: Whole value Output from Multiply #2 function block
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast source that contains the whole portion of the output resultant from the Multiply #2 function block. This value can be used by the MCA board directly or by other Drive functions through a configuration link. For example, it could be linked to the Velocity reference whole parameter to provide the Drive with a speed reference input. If the block output overflows (exceeds the range of the output) the "Function Block overflow parameter" (par. 567/517) determines the board output value.

Parameter 417 – [A>Mult2 FB Fract]
Parameter 317 – [B>Mult2 FB Fract]

Use: Fractional value Output from Multiply #2 function block
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None
Description: This parameter is a fast source that contains the fractional portion of the output resultant from the Multiply #2 function block. This value can be used by the MCA board directly or by other Drive functions through a configuration link. For example, it could be linked to the Velocity reference fraction parameter to provide the Drive with a speed reference input. If the block output overflows (exceeds the range of the output) the "Function Block overflow parameter" (par. 567/517) determines the board output value.

Parameter 418 – [A>Add FB Out]
Parameter 318 – [B>Add FB Out]

Use: Output from Add function block
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast source that contains the output resultant from the Add function block. This value can be used by the MCA board directly or by other Drive functions through a configuration link. If the block output overflows (exceeds the range of the output) the "Function Block overflow parameter" (par. 567/517) determines the board reaction.

Parameter 419 – [A>Filter FB Out]
Parameter 319 – [B>Filter FB Out]

Use: Output from Filter function block
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast source that contains the output from the Filter function block. This value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 464 – [A>CA Indirect 1]
Parameter 364 – [B>CA Indirect 1]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 465 – [A>CA Indirect 2]
Parameter 365 – [B>CA Indirect 2]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 466 – [A>CA Indirect 3]
Parameter 366 – [B>CA Indirect 3]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 467 – [A>CA Indirect 4]
Parameter 367 – [B>CA Indirect 4]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 468 – [A>CA Indirect 5]
Parameter 368 – [B>CA Indirect 5]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None
Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 469 – [A>CA Indirect 6]
Parameter 369 – [B>CA Indirect 6]

Use: A fast sink parameter for use by the function blocks
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: None

Description: This parameter is a fast sink used by function blocks to obtain information from Drive parameters whose source is outside of the MCA board. This parameter can be linked to any Drive source parameter.

Parameter 550 – [A>CA Constant 1]
Parameter 500 – [B>CA Constant 1]

Use: Stores a constant for use by function blocks
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: 0

Description: This parameter can be used to store a constant value for use by the function blocks.

Parameter 551 – [A>CA Constant 2]
Parameter 501 – [B>CA Constant 2]

Use: Stores a constant for use by function blocks
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: 0

Description: This parameter can be used to store a constant value for use by the function blocks.

Parameter 552 – [A>CA Constant 3]
Parameter 502 – [B>CA Constant 3]

Use: Stores a constant for use by function blocks
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: 0

Description: This parameter can be used to store a constant value for use by the function blocks.

Parameter 553 – [A>CA Constant 4]
Parameter 503 – [B>CA Constant 4]

Use: Stores a constant for use by function blocks
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32767
Default Value: 0

Description: This parameter can be used to store a constant value for use by the function blocks.

Parameter 554 – [A>Mult1 FB In]
Parameter 504 – [B>Mult1 FB In]

Use: Determines Multiply #1 Input parameter
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Multiply #1 function block gets its input data. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input:

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 555 – [A>Mult1 FB Gain]
Parameter 505 – [B>Mult1 FB Gain]

Use: Specifies Multiply #1 gain value
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –15.999
Maximum Value: 15.995
Default Value: 0

Description: This parameter specifies the Multiply #1 gain value. The gain value is multiplied by the input data to obtain the Multiply #1 output value (Par. #315).

Parameter 556 – [A>Mult2 FB In 1]
Parameter 506 – [B>Mult2 FB In 1]

Use: Determines first input to the Multiply #2 block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Multiply #2 function block gets one of its inputs. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input:

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 557 – [A>Mult2 FB In 2]
Parameter 507 – [B>Mult2 FB In 2]

Use: Determines second input to the Multiply #2 block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Multiply #2 function block gets one of its inputs. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input:

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 558 – [A>Add FB In 1]
Parameter 508 – [B>Add FB In 1]

Use: Specifies an input to the Add function block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Add function block gets one of its inputs. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input.

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 559 – [A>Add FB Gain 1]
Parameter 509 – [B>Add FB Gain 1]

Use: Specifies Add input #1 gain value
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –15.999
Maximum Value: 15.995
Default Value: 0

Description: This parameter specifies the Add input #1 gain value. The gain value is multiplied by the input #1 data prior to the summation of all block values.

Parameter 560 – [A>Add FB In 2]
Parameter 510 – [B>Add FB In 2]

Use: Specifies an input to the Add function block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Add function block gets one of its inputs. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information.

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 561 – [A>Add FB Gain 2]
Parameter 511 – [B>Add FB Gain 2]

Use: Specifies Add input #2 gain value
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –15.999
Maximum Value: 15.995
Default Value: 0

Description: This parameter specifies the Add input #2 gain value. The gain value is multiplied by the input #2 data prior to the summation of all block values.

Parameter 562 – [A>Add FB In 3]
Parameter 512 – [B>Add FB In 3]

Use: Specifies an input to the Add function block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the Add function block gets one of its inputs. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input:

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 563 – [A>Add FB Gain 3]
Parameter 513 – [B>Add FB Gain 3]

Use: Specifies Add input #3 gain value
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –15.999
Maximum Value: 15.995
Default Value: 0

Description: This parameter specifies the Add input #3 gain value. The gain value is multiplied by the input #3 data prior to the summation of all block values.

Parameter 564 – [A>Add FB Off 4]
Parameter 514 – [B>Add FB Off 4]

Use: A constant value used as an input in the Add function block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: –32767
Maximum Value: 32768
Default Value: 0

Description: This parameter contains a value that is added to the other three Add function block inputs. It may be used as an offset or constant.

Parameter 565 – [A>LP Filter In 1]
Parameter 515 – [B>LP Filter In 1]

Use: Specifies the input to the Low pass filter function block
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–503/A–553
Default Value: B–320/A–420

Description: This parameter specifies where the low pass filter function block gets its input data. Input data can come from other functions on this Adapter or from the Drive by using a CA Indirect parameter linked to the desired information. A value outside the following ranges disables the function block input:

CHAN B	CHAN A
300 – 319	400 – 419
350 – 369	450 – 469
500 – 503	550 – 553

Parameter 566 – [A>LP Filter Time]
Parameter 516 – [B>LP Filter Time]

Use: Specifies the time constant in milliseconds of the first order LAG Filter Function Block.
Parameter Type: Setup
Program Terminal Units: Seconds
Minimum Value: 0.004
Maximum Value: 32.767
Default Value: 0.004

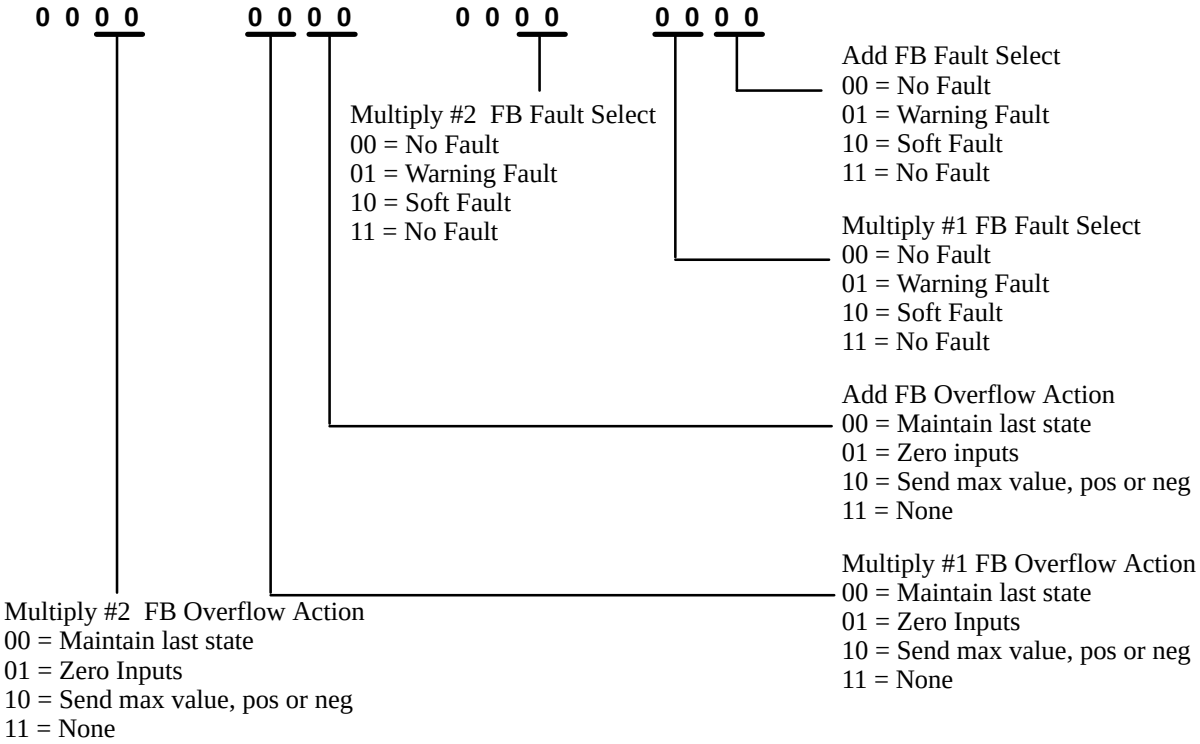
Description: This parameter specifies the time constant of the low pass filter function block.

Parameter 567 – [A>FB Ovrflow Sel]
Parameter 517 – [B>FB Ovrflow Sel]

Use: Specifies MCA board reaction to function block overflow conditions.
Parameter Type: Setup
Program Terminal Units: Bit selectable
Minimum Value: 0000 0000 0000 0000
Maximum Value: 1111 1111 1111 1111
Default Value: 0000 0000 0000 0000

Description: This parameter specifies what action the MCA board will take when an overflow condition occurs in the Multiply #1 or Add Function blocks (see Figure 8–1).

Figure 8–1. Function Block Overflow Select



Parameter 568 – [A>Disc In-Param]
Parameter 518 – [B>Disc In-Param]

Use: Specifies which parameter the discrete input will affect.
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: B–300/A–400
Maximum Value: B–314/A–414
Default Value: B–300/A–400

Description: Specifies which parameter the MCA board Discrete input bit will be affected by. The specific bit number and calculations are controlled by other parameters.

Parameter 569 – [A>Disc In-Bit]
Parameter 519 – [B>Disc In-Bit]

Use: Specifies which parameter bit(specified in 568/518) the discrete input will affect.
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 15
Default Value: 0

Description: Specifies which bit of the parameter identified by the Disc In-Param parameter will be affected. The specific parameter number and calculations are controlled by other parameters.

Parameter 570 – [A>Disc In-Oper]
Parameter 520 – [B>Disc In-Oper]

Use: Specifies how the Discrete input is affected by the identifed parameter.
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 4
Default Value: 0

Description: Specifies How the Discrete input on the MCA board is affected by the bit specified by the Disc In-Bit parameter. The specific parameter number and bit specifier are controlled by other parameters.

Value	Function
0	Disable Input
1	AND input with parameter specified in 518/568
2	OR input with parameter specified in 518/568
3	Invert & OR with parameter specified in 518/568
4	Invert input & AND with parameter specified in 518/568

Parameter 573 – [A>ChA DIP Switch]
Parameter 523 – [B>ChA DIP Switch]

Use: Indicates DIP switch settings for channel A.
Parameter Type: Configuration
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value:

Description: Indicates the hardware DIP switch settings (U5 & U6) used to define Adapter channel A. These settings are read by the Adapter at power-up and any time a System Reset message is received by the Drive.

Parameter 574 – [A>ChB DIP Switch]
Parameter 524 – [B>ChB DIP Switch]

Use: Indicates DIP switch settings (U14 & U15) for channel B.
Parameter Type: Configuration
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value:

Description: Indicates the hardware DIP switch settings used to define adapter channel A. These settings are read by the Adapter at power-up and any time a System Reset message is received by the Drive.

Parameter 599 – [A>Cx: Version] where "x" is as follows:
Parameter 549 – [B>Cx: Version] where "x" is as follows:

X	CHA	CHB
CA	None	None
CB	RIO	DH+
CC	DH+	RIO
CD	DH+	DH+
CE	RIO	RIO> Not Redundant
CF	RIO	RIO> Redundant
CG	RIO	None
CH	None	RIO
CI	DH+	None
CJ	None	DH+

Use: Indicates the MCA board firmware version.
Parameter Type: Configuration
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: 1.02

Description: Indicates the firmware version of the MCA board.

Table 8–C. RIO Parameter Summary

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
B	300	12CH	B>ChA RIO In 1	None	Not Changeable				Fast Source
B	301	12DH	B>ChA RIO In 2	None	Not Changeable				Fast Source
B	302	12EH	B>ChA RIO In 3	None	Not Changeable				Fast Source
B	303	12FH	B>ChA RIO In 4	None	Not Changeable				Fast Source
B	304	130H	B>ChA RIO In 5	None	Not Changeable				Fast Source
B	305	131H	B>ChA RIO In 6	None	Not Changeable				Fast Source
B	306	132H	B>ChA RIO In 7	None	Not Changeable				Fast Source
B	307	133H	B>ChB RIO In 1	None	Not Changeable				Fast Source
B	308	134H	B>ChB RIO In 2	None	Not Changeable				Fast Source
B	309	135H	B>ChB RIO In 3	None	Not Changeable				Fast Source
B	310	136H	B>ChB RIO In 4	None	Not Changeable				Fast Source
B	311	137H	B>ChB RIO In 5	None	Not Changeable				Fast Source
B	312	138H	B>ChB RIO In 6	None	Not Changeable				Fast Source
B	313	139H	B>ChB RIO In 7	None	Not Changeable				Fast Source
B	350	15EH	B>CHA/B RIO Out 1	None	Not Changeable				Fast Sink
B	351	15FH	B>CHA/B RIO Out 2	None	Not Changeable				Fast Sink
B	352	160H	B>CHA/B RIO Out 3	None	Not Changeable				Fast Sink
B	353	161H	B>CHA/B RIO Out 4	None	Not Changeable				Fast Sink
B	354	162H	B>CHA/B RIO Out 5	None	Not Changeable				Fast Sink
B	355	163H	B>CHA/B RIO Out 6	None	Not Changeable				Fast Sink
B	356	164H	B>CHA/B RIO Out 7	None	Not Changeable				Fast Sink
A	400	190H	A> ChA RIO In 1	None	Not Changeable				Fast Source
A	401	191H	A> ChA RIO In 2	None	Not Changeable				Fast Source
A	402	192H	A> ChA RIO In 3	None	Not Changeable				Fast Source
A	403	193H	A> ChA RIO In 4	None	Not Changeable				Fast Source
A	404	194H	A> ChA RIO In 5	None	Not Changeable				Fast Source
A	405	195H	A> ChA RIO In 6	None	Not Changeable				Fast Source
A	406	196H	A> ChA RIO In 7	None	Not Changeable				Fast Source
A	407	197H	A>ChB RIO In 1	None	Not Changeable				Fast Source
A	408	198H	A>ChB RIO In 2	None	Not Changeable				Fast Source
A	409	199H	A>ChB RIO In 3	None	Not Changeable				Fast Source
A	410	19AH	A>ChB RIO In 4	None	Not Changeable				Fast Source
A	411	19BH	A>ChB RIO In 5	None	Not Changeable				Fast Source
A	412	19CH	A>ChB RIO In 6	None	Not Changeable				Fast Source
A*	413	19DH	A>ChB RIO In 7	None	Not Changeable				Fast Source
A*	450	1C2H	A>ChA/B RIO Out 1	None	Non Changeable				Fast Sink
A*	451	1C3H	A>ChA/B RIO Out 2	None	Non Changeable				Fast Sink
A*	452	1C4H	A>ChA/B RIO Out 3	None	Non Changeable				Fast Sink
A*	453	1C5H	A>ChA/B RIO Out 4	None	Non Changeable				Fast Sink
A*	454	1C6H	A>ChA/B RIO Out 5	None	Non Changeable				Fast Sink
A*	455	1C7H	A>ChA/B RIO Out 6	None	Non Changeable				Fast Sink
A*	456	1C8H	A>ChA/B RIO Out 7	None	Non Changeable				Fast Sink

*This example is for a redundant RIO ONLY

Table 8–C. RIO Parameter Summary (cont.)

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
B	525	20DH	B>ChA RIO Flt S1	None	000B	0000	001F		Setup
B	526	20EH	B>Redund Chan No	None	0	0	1		Setup
B	537	219H	B>ChB RIO Flt S1	None	000B	0000	001F		Setup
B	538	21AH	B>Redund Chan No	None	0	0	1		Setup
A	575	23FH	A>ChA RIO Flt S1	None	000B	0000	001F		Setup
A	576	240H	A>Redund Chan No	None	0	0	1		Setup
A	587	241H	A>ChB RIO Flt S1	None	000B	0000	001F		Setup
A	588	24CH	A>Redund Chan No	None	0	0	1		Setup

RIO Parameters

The parameter definitions for the MCA board are dependent on the channel configuration setup using DIP switches U5, U6, U14, and U15. When a channel is setup for use on RIO then the parameter definitions in this section will apply. Refer to the DIP switch settings to determine channel setup. Parameter definitions for channels setup for DH+ are listed in the next section.

Parameter 400 – [A>ChA RIO In 1]
Parameter 300 – [B>ChA RIO In 1]

Use: Channel A RIO Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the first word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 401 – [A>ChA RIO In 2]
Parameter 301 – [B>ChA RIO In 2]

Use: Channel A RIO Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the second word or group of data from the PLC controller output image table. The data is transferred to the Drive by the RIOscanner every rack scan. The value can be used by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 402 – [A>ChA RIO In 3]
Parameter 302 – [B>ChA RIO In 3]

Use: Channel A RIO Input word #3
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the third word or group 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 MCA board directly or by other Drive functions through a configuration link.This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 403 – [A>ChA RIO In 4]
Parameter 303 – [B>ChA RIO In 4]

Use: Channel A RIO Input word #4
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the fourth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 404 – [A>ChA RIO In 5]
Parameter 304 – [B>ChA RIO In 5]

Use: Channel A RIO Input word #5
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the fifth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 405 – [A>ChA RIO In 6]
Parameter 305 – [B>ChA RIO In 6]

Use: Channel A RIO Input word #6
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the sixth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 406 – [A>ChA RIO In 7]
Parameter 306 – [B>ChA RIO In 7]

Use: Channel A RIO Input word #7
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the seventh word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 407 – [A>ChB RIO In 1]
Parameter 307 – [B>ChB RIO In 1]

Use: Channel B RIO Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the first word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 408 – [A>ChB RIO In 2]
Parameter 308 – [B>ChB RIO In 2]

Use: Channel B RIO Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the second word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 409 – [A>ChB RIO In 3]
Parameter 309 – [B>ChB RIO In 3]

Use: Channel B RIO Input word #3
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the third word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 410 – [A>ChB RIO In 4]
Parameter 310 – [B>ChB RIO In 4]

Use: Channel B RIO Input word #4
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the fourth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 411 – [A>ChB RIO In 5]
Parameter 311 – [B>ChB RIO In 5]

Use: Channel B RIO Input word #5
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the fifth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 412 – [A>ChB RIO In 6]
Parameter 312 – [B>ChB RIO In 6]

Use: Channel B RIO Input word #6
Parameter Type: Fast Source
P**rogram Terminal Units:** None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the sixth word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 413 – [A>ChB RIO In 7]
Parameter 313 – [B>ChB RIO In 7]

Use: Channel B RIO Input word #7
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains the seventh word or group 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 MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 450 – [A>ChA RIO Out 1]
Parameter 350 – [B>ChA RIO Out 1]

Use: Channel A RIO Output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the first word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 451 – [A>ChA RIO Out 2]
Parameter 351 – [B>ChA RIO Out 2]

Use: Channel A RIO Output word #2
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the second word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 452 – [A>ChA RIO Out 3]
Parameter 352 – [B>ChA RIO Out 3]

Use: Channel A RIO Output word #3
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the third word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 453 – [A>ChA RIO Out 4]
Parameter 353 – [B>ChA RIO Out 4]

Use: Channel A RIO Output word #4
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the fourth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 454 – [A>ChA RIO Out 5]
Parameter 354 – [B>ChA RIO Out 5]

Use: Channel A RIO Output word #5
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the fifth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 455 – [A>ChA RIO Out 6]
Parameter 355 – [B>ChA RIO Out 6]

Use: Channel A RIO Output word #6
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the sixth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 456 – [A>ChA RIO Out 7]
Parameter 356 – [B>ChA RIO Out 7]

Use: Channel A RIO Output word #7
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the seventh word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 457 – [A>ChB RIO Out 1]
Parameter 357 – [B>ChB RIO Out 1]

Use: Channel B RIO Output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the first word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 458 – [A>ChB RIO Out 2]
Parameter 358 – [B>ChB RIO Out 2]

Use: Channel B RIO Output word #2
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the second word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is displayed for 1/2, 3/4 and full rack configuration.

Parameter 459 – [A>ChB RIO Out 3]
Parameter 359 – [B>ChB RIO Out 3]

Use: Channel B RIO Output word #3
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the third word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link.

Parameter 460 – [A>ChB RIO Out 4]
Parameter 360 – [B>ChB RIO Out 4]

Use: Channel B RIO Output word #4
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the fourth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3/4 racks.

Parameter 461 – [A>ChB RIO Out 5]
Parameter 361 – [B>ChB RIO Out 5]

Use: Channel A RIO Output word #5
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the fifth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full or 3\4 racks.

Parameter 462 – [A>ChB RIO Out 6]
Parameter 362 – [B>ChB RIO Out 6]

Use: Channel B RIO Output word #6
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the sixth word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

Parameter 463 – [A>ChB RIO Out 7]
Parameter 363 – [B>ChB RIO Out 7]

Use: Channel B RIO Output word #7
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides the seventh word or group of data to the PLC controller input image table. The data is transferred to the PLC Controller by the RIO scanner every rack scan. The value can be provided by the MCA board directly or by other Drive functions through a configuration link. This parameter is only available on channels that are setup as full racks.

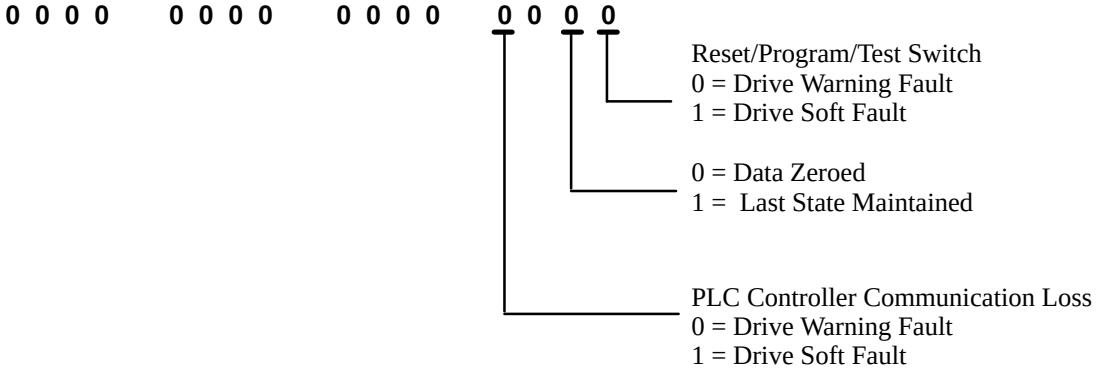
Parameter 575 – [A>ChB RIO Flt Sl]
Parameter 587 – [A>ChB RIO Flt Sl]
Parameter 525 – [B>ChA RIO Flt Sl]
Parameter 537 – [B>ChB RIO Flt Sl]

Use: Specifies MCA board reaction to PLC Controller RIO fault conditions.
Parameter Type: Setup
Program Terminal Units: Bit selectable
Minimum Value: 0000 0000 0000 0000
Maximum Value: 0000 0000 0001 1011
Default Value: 0000 0000 0000 1011

Description: This parameter specifies what action the MCA board will take when a PLC Controller RIO communication fault occurs. Bit 0 indicates whether a Reset\Program\Test indication from the PLC causes a soft (bit 0=1) or warning (bit 0=0) fault to occur. Bit 3 indicates whether a loss of communication causes a soft (bit 3=1) or warning (bit 3=0) fault to occur. Bit 1 determines whether the Drive maintains last state data (bit 1=1) or the data is zeroed out (bit 1=0). If bit 0 or bit 3 are set for "Warning" and the PLC Controller faults, the Drive will continue operation. If bit 1 is cleared or "zeroed", the PLC Controller fault is cleared, the Drive fault is also cleared, and transition on Image will occur.

ATTENTION: The bit 0 and bit 3 should normally never be set for "Warning" during regular operation. If the Drive is allowed to continue operation after a Fault, unintended operation of the controlled equipment could occur resulting in machine or process damage and possible injury to personnel.

Figure 8–2. RIO Fault Select



Parameter 588 – [A>Redund Chan No]
Parameter 538 – [B>Redund Chan No]

Use: Specifies RIO Redundant Channel Number
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: This parameter determines which channel number will be used by the Drive for control purposes. Data and messages from the selected channel will be passed to the Drive. Data and messages from the other channel will be discarded. The choices are:

0 = Channel A
1 = Channel B

This parameter is only active when both channels are setup for RIO and the redundant mode is selected on the DIP switches. Image from the Drive will go to both PLC's regardless of parameter setting.

Table 8–D. DH+ Parameter Summary

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
B	300	12CH	B>ChA DH TP In 1	None	Not Changeable				Fast Source
B	301	12DH	B>ChA DH TP In 2	None	Not Changeable				Fast Source
B	302	12EH	B>ChA DH TP In 3	None	Not Changeable				Fast Source
B	303	12FH	B>ChA DH TP In 4	None	Not Changeable				Fast Source
B	304	130H	B>ChA DH In 1	None	Not Changeable				Fast Source
B	305	131H	B>ChA DH In 2	None	Not Changeable				Fast Source
B	306	132H	B>ChA DH In 3	None	Not Changeable				Fast Source
B	307	133H	B>ChB DH TP In 1	None	Not Changeable				Fast Source
B	308	134H	B>ChB DH TP In 2	None	Not Changeable				Fast Source
B	309	135H	B>ChB DH TP In 3	None	Not Changeable				Fast Source
B	310	136H	B>ChB DH TP In 4	None	Not Changeable				Fast Source
B	311	137H	B>ChB DH In 1	None	Not Changeable				Fast Source
B	312	138H	B>ChB DH In 2	None	Not Changeable				Fast Source
B	313	139H	B>ChB DH In 3	None	Not Changeable				Fast Source
B	350	15EH	B>ChA DH TP Out 0	None	Not Changeable				Fast Sink
B	351	15FH	B>ChA DH TP Out 1	None	Not Changeable				Fast Sink
B	352	160H	B>ChA DH Out 1	None	Not Changeable				Fast Sink
B	353	161H	B>ChA DH Out 2	None	Not Changeable				Fast Sink
B	354	162H	B>ChA DH Out 3	None	Not Changeable				Fast Sink
B	355	163H	B>ChA DH Out 4	None	Not Changeable				Fast Sink
B	356	164H	B>ChA DH Out 5	None	Not Changeable				Fast Sink
B	357	165H	B>ChB DH TP Out 0	None	Not Changeable				Fast Sink
B	358	166H	B>ChB DH TP Out 1	None	Not Changeable				Fast Sink
B	359	167H	B>ChB DH Out 1	None	Not Changeable				Fast Sink
B	360	168H	B>ChB DH Out 2	None	Not Changeable				Fast Sink
B	361	169H	B>ChB DH Out 3	None	Not Changeable				Fast Sink
B	362	16AH	B>ChB DH Out 4	None	Not Changeable				Fast Sink
B	363	16BH	B>ChB DH Out 5	None	Not Changeable				Fast Sink
A	400	190H	A>ChA DH TP In 1	None	Not Changeable				Fast Source
A	401	191H	A>ChA DH TP In 2	None	Not Changeable				Fast Source
A	402	192H	A>ChA DH TP In 3	None	Not Changeable				Fast Source
A	403	193H	A>ChA DH TP In 4	None	Not Changeable				Fast Source
A	404	194H	A>ChA DH In 1	None	Not Changeable				Fast Source
A	405	195H	A>ChA DH In 2	None	Not Changeable				Fast Source
A	406	196H	A>ChA DH In 3	None	Not Changeable				Fast Source
A	407	197H	A>ChB DH TP In 1	None	Not Changeable				Fast Source
A	408	198H	A>ChB DH TP In 2	None	Not Changeable				Fast Source
A	409	199H	A>ChB DH TP In 3	None	Not Changeable				Fast Source
A	410	19AH	A>ChA DH TP In 4	None	Not Changeable				Fast Source
A	411	19BH	A>ChA DH In 1	None	Not Changeable				Fast Source
A	412	19CH	A>ChA DH In 2	None	Not Changeable				Fast Source
A	413	19DH	A>ChA DH In 3	None	Not Changeable				Fast Source

Table 8–D. DH+ Parameter Summary (cont.)

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
A	450	1C2H	A>ChA DH TPOUT 0	None	Not Changeable				Fast Sink
A	451	1C3H	A>ChA DH TPOUT 1	None	Not Changeable				Fast Sink
A	452	1C4H	A>ChA DH OUT 1	None	Not Changeable				Fast Sink
A	453	1C5H	A>ChA DH OUT 2	None	Not Changeable				Fast Sink
A	454	1C6H	A>ChA DH OUT 3	None	Not Changeable				Fast Sink
A	455	1C7H	A>ChA DH OUT 4	None	Not Changeable				Fast Sink
A	456	1C8H	A>ChA DH OUT 5	None	Not Changeable				Fast Sink
A	457	1C9H	A>ChB DH TPOUT 0	None	Not Changeable				Fast Sink
A	458	1CAH	A>ChB DH TPOUT 1	None	Not Changeable				Fast Sink
A	459	1CBH	A>ChB DH OUT 1	None	Not Changeable				Fast Sink
A	460	1CCH	A>ChB DH OUT 2	None	Not Changeable				Fast Sink
A	461	1CDH	A>ChB DH OUT 3	None	Not Changeable				Fast Sink
A	462	1CEH	A>ChB DH OUT 4	None	Not Changeable				Fast Sink
A	463	1CFH	A>ChB DH OUT 5	None	Not Changeable				Fast Sink
B	525	20DH	B>ChA DH Rd Nde1	None	8	0	77		Setup
B	526	20EH	B>ChA DH Rd Wrd1	None	0	0	1		Setup
B	527	20FH	B>ChA DH Rd Nde2	None	8	0	77		Setup
B	528	210H	B>ChA DH Rd Wrd2	None	0	0	1		Setup
B	529	211H	B>ChA DH Rd Nde3	None	8	0	77		Setup
B	530	212H	B>ChA DH Rd Wrd3	None	0	0	1		Setup
B	531	213H	B>ChA DH Rd Nde4	None	8	0	77		Setup
B	532	214H	B>ChA DH Rd Wrd4	None	0	0	1		Setup
B	533	215H	B>ChA DH Flt Sl	Bit Select	0000	0000	0001		Setup
B	537	219H	B>ChB DH Rd Nde1	None	8	0	77		Setup
B	538	21AH	B>Redund Chan No	None	0	0	1		Setup
B	539	21BH	B>ChB DH Rd Nde2	None	8	0	77		Setup
B	540	21CH	B>ChB DH Rd Wrd2	None	0	0	1		Setup
B	541	21DH	B>ChB DH Rd Nde3	None	8	0	77		Setup
B	542	21EH	B>ChB DH Rd Wrd3	None	0	0	1		Setup
B	543	21FH	B>ChB DH Rd Nde4	None	8	8	77		Setup
B	544	220H	B>ChB DH Rd Wrd4	None	0	0	1		Setup
B	545	221H	B>ChB DH Flt SL	Bit Select	0000	0000	0001		Setup
A	575	23FH	A>ChA DH Rd Nde1	None	8	0	77		Setup
A	576	240H	A>ChA DH Rd Wrd1	None	0	0	1		Setup
A	577	241H	A>ChA DH Rd Nde2	None	8	0	77		Setup
A	578	242H	A>ChA DH Rd Wrd2	None	0	0	1		Setup
A	579	243H	A>ChA DH Rd Nde3	None	8	0	77		Setup
A	580	244H	A>ChA DH Rd Wrd3	None	0	0	1		Setup
A	581	245H	A>ChA DH Rd Nde4	None	8	0	77		Setup
A	582	246H	A>ChA DH Rd Wrd4	None	0	0	1		Setup
A	583	247H	A>ChA DH Flt Sl	Bit Select	0000	0000	0001		Setup
A	587	248H	A> ChB DH Rd Nde1	None	8	0	77		Setup

Table 8–D. DH+ Parameter Summary (cont.)

PORT	DEC	HEX	NAME	UNITS	INIT	MIN	MAX	EE	FUNCTION
A	588	24CH	A>Redund Chan No	None	0	0	1		Setup
A	589	24DH	A>ChA DH Rd Nde 2	None	8	0	77		Setup
A	590	24EH	A>ChA DH Rd Wrd 2	None	0	0	1		Setup
A	591	24FH	A>ChA DH Rd Nde 3	None	8	0	77		Setup
A	592	250H	A>ChA DH Rd Wrd 3	None	0	0	1		Setup
A	593	251H	A> ChB DH Rd Nde 4	None	8	0	77		Setup
A	594	252H	A> ChB DH Rd Wrd 4	None	0	0	1		Setup
A	595	253H	A>ChA DH Flt Sl	Bit Select					Setup

DH+ Parameters

The parameter definitions for the MCA board are dependent on the channel configuration setup using DIP switches U5, U6, U14, and U15. When a channel is setup for use on DH+ then the parameter definitions in this section will apply. Refer to the DIP switch settings to determine channel setup. Parameter definitions for channels setup for RIO are listed in the previous section.

IMPORTANT: The DH+ Token Pass is not designed for control of the drive or system. It should be used for transmittal of information such as operator display readouts only. The RIO Control Link must be used for control of the drive and system functions.

Parameter 400 – [A>ChA DH TP In 1]
Parameter 300 – [B>ChA DH TP In 1]

Use: Channel A DH+ Token Pass with data Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde1 and DH Rd Wrd1 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 401 – [A>ChA DH TP In 2]
Parameter 301 – [B>ChA DH TP In 2]

Use: Channel A DH+ Token Pass with data Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde2 and DH Rd Wrd2 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 402 – [A>ChA DH TP In 3]
Parameter 302 – [B>ChA DH TP In 3]

Use: Channel A DH+ Token Pass with data Input word #3
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde3 and DH Rd Wrd3 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 403 – [A>ChA DH TP In 4]
Parameter 303 – [B>ChA DH TP In 4]

Use: Channel A DH+ Token Pass with data Input word #4
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value: Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde4 and DH Rd Wrd4 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 404 – [A>ChA DH In 1]
Parameter 304 – [B>ChA DH In 1]

Use: Channel A DH+ Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 405 – [A>ChA DH In 2]
Parameter 305 – [B>ChA DH In 2]

Use: Channel A DH+ Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 406 – [A>ChA DH In 3]
Parameter 306 – [B>ChA DH In 3]

Use: Channel A DH+ Input word #3
Parameter Type: Fast Source
Program Terminal Units: None Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 407 – [A>ChB DH TP In 1]
Parameter 307 – [B>ChB DH TP In 1]

Use: Channel B DH+ Token Pass with data Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde1 and DH Rd Wrd1 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 408 – [A>ChB DH TP In 2]
Parameter 308 – [B>ChB DH TP In 2]

Use: Channel B DH+ Token Pass with data Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde2 and DH Rd Wrd2 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 409 – [A>ChB DH TP In 3]
Parameter 309 – [B>ChB DH TP In 3]

Use: Channel B DH+ Token Pass with data Input word #3
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde3 and DH Rd Wrd3 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 410 – [A>ChB DH TP In 4]
Parameter 310 – [B>ChB DH TP In 4]

Use: Channel B DH+ Token Pass with data Input word #4
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data from the global data passed with the network token. The specific node address and word are defined by the DH Rd Nde4 and DH Rd Wrd4 parameters. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 411 – [A>ChB DH In 1]
Parameter 311 – [B>ChB DH In 1]

Use: Channel B DH+ Input word #1
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received from other devices on the network as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 412 – [A>ChB DH In 2]
Parameter 312 – [B>ChB DH In 2]

Use: Channel B DH+ Input word #2
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received from other devices on the network as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 413 – [A>ChB DH In 3]
Parameter 313 – [B>ChB DH In 3]

Use: Channel B DH+ Input word #3
Parameter Type: Fast Source
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast source that contains data received from other devices on the network as part of a DH+ message instruction. The value can be used by the MCA board directly or by other Drive functions through a configuration link.

Parameter 450 – [A>ChA DH TPOut 0]
Parameter 350 – [B>ChA DH TPOut 0]

Use: Channel A DH+ Token Pass with data output word #0
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that attaches data to the global data table passed with the network token. The node address is determined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 451 – [A>ChA DH TPOut 1]
Parameter 351 – [B>ChA DH TPOut 1]

Use: Channel A DH+ Token Pass with data output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that attaches data to the global data table passed with the network token. The node address is determined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 452 – [A>ChA DH Out 1]
Parameter 352 – [B>ChA DH Out 1]

Use: Channel A DH+ output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 453 – [A>ChA DH Out 2]
Parameter 353 – [B>ChA DH Out 2]

Use: Channel A DH+ output word #2
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 454 – [A>ChA DH Out 3]
Parameter 354 – [B>ChA DH Out 3]

Use: Channel A DH+ output word #3
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 455 – [A>ChA DH Out 4]
Parameter 355 – [B>ChA DH Out 4]

Use: Channel A DH+ output word #4
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is detemined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 456 – [A>ChA DH Out 5]
Parameter 356 – [B>ChA DH Out 5]

Use: Channel A DH+ output word #5
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is detemined by the DIP switch settings for channel A. The data to be attached is determined by the configuration link made to this parameter.

Parameter 457 – [A>ChB DH TPOut 0]
Parameter 357 – [B>ChB DH TPOut 0]

Use: Channel B DH+ Token Pass with data output word #0
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that attaches data to the global data table passed with the network token. The node address is determined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 458 – [A>ChB DH TPOut 1]
Parameter 358 – [B>ChB DH TPOut 1]

Use: Channel B DH+ Token Pass with data output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that attaches data to the global data table passed with the network token. The node address is detemined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 459 – [A>ChB DH Out 1]
Parameter 359 – [B>ChB DH Out 1]

Use: Channel B DH+ output word #1
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is detemined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 460 – [A>ChB DH Out 2]
Parameter 360 – [B>ChB DH Out 2]

Use: Channel B DH+ output word #2
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 461 – [A>ChB DH Out 3]
Parameter 361 – [B>ChB DH Out 3]

Use: Channel B DH+ output word #3
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None
Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 462 – [A>ChB DH Out 4]
Parameter 362 – [B>ChB DH Out 4]

Use: Channel B DH+ output word #4
Parameter Type: Fast Sink
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 463 – [A>ChB DH Out 5]
Parameter 363 – [B>ChB DH Out 5]

Use: Channel B DH+ output word #5
Parameter Type: Configuration
Program Terminal Units: None
Minimum Value:
Maximum Value:
Default Value: None

Description: This parameter is a fast sink that provides data to other devices on the network through the DH+ message instruction. The node address is determined by the DIP switch settings for channel B. The data to be attached is determined by the configuration link made to this parameter.

Parameter 575 – [A>ChA DH Rd Nde1]
Parameter 525 – [B>ChA DH Rd Nde1]

Use: Channel A Read Station Number 1
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 1** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 576 – [A>ChA DH Rd Wrd1]
Parameter 526 – [B>ChA DH Rd Wrd1]

Use: Channel A Read word 1
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 1** parameter will receive its data from. The node address is specified by the **DH Rd Nde1** parameter.

Parameter 577 – [A>ChA DH Rd Nde2]
Parameter 527 – [B>ChA DH Rd Nde2]

Use: Channel A Read Station Number 2
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 2** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 578 – [A>ChA DH Rd Wrd2]
Parameter 528 – [B>ChA DH Rd Wrd2]

Use: Channel A Read word 2
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 2** parameter will receive its data from. The node address is specified by the **DH Rd Nde2** parameter.

Parameter 579 – [A>ChA DH Rd Nde3]
Parameter 529 – [B>ChA DH Rd Nde3]

Use: Channel A Read Station Number 3
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 3** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 580 – [A>ChA DH Rd Wrd3]
Parameter 530 – [B>ChA DH Rd Wrd3]

Use: Channel A Read word 3
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 3** parameter will receive its data from. The node address is specified by the **DH Rd Nde3** parameter.

Parameter 581 – [A>ChA DH Rd Nde4]
Parameter 531 – [B>ChA DH Rd Nde4]

Use: Channel A Read Station Number 4
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 4** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 582 – [A>ChA DH Rd Wrd4]
Parameter 532 – [B>ChA DH Rd Wrd4]

Use: Channel A Read word 4
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

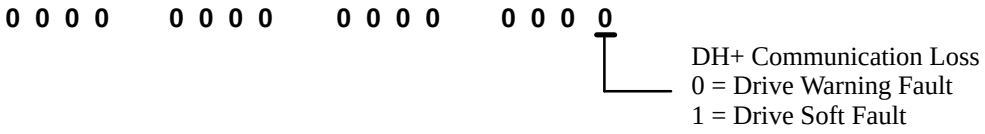
Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 4** parameter will receive its data from. The node address is specified by the **DH Rd Nde4** parameter.

Parameter 545 – [B>ChB DH Flt Sel]
Parameter 533 – [B>ChA DH Flt Sel]
Parameter 595 – [A>ChB DH Flt Sel]
Parameter 583 – [A>ChA DH Flt Sel]

Use: Specifies MCA board reaction to PLC Controller DH+ fault conditions.
Parameter Type: Setup
Program Terminal Units: Bit selectable
Minimum Value: 0000 0000 0000 0000
Maximum Value: 0000 0000 0000 0001
Default Value: 0000 0000 0000 0001

Description: This parameter specifies what action the MCA board will take when a PLC Controller DH+ communication fault occurs. Bit 0 indicates whether a loss of communication causes a soft (bit 0=1) or warning (bit 0=0) fault to occur.

Figure 8–3. DH+ Fault Select



Parameter 587 – [A>ChB DH Rd Nde1]
Parameter 537 – [B>ChB DH Rd Nde1]

Use: Channel B Read Station Number 1
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 1** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 588 – [A>ChB DH Rd Wrd1]
Parameter 538 – [B>ChB DH Rd Wrd1]

Use: Channel B Read word 1
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 1** parameter will receive its data from. The node address is specified by the **DH Rd Nde1** parameter.

Parameter 589 – [A>ChB DH Rd Nde2]
Parameter 539 – [B>ChB DH Rd Nde2]

Use: Channel B Read Station Number 2
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 2** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 590 – [A>ChB DH Rd Wrd2]
Parameter 540 – [B>ChB DH Rd Wrd2]

Use: Channel B Read word 2
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 2** parameter will receive its data from. The node address is specified by the **DH Rd Nde2** parameter.

Parameter 591 – [A>ChB DH Rd Nde3]
Parameter 541 – [B>ChB DH Rd Nde3]

Use: Channel B Read Station Number 3
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 3** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 592 – [A>ChB DH Rd Wrd3]
Parameter 542 – [B>ChB DH Rd Wrd3]

Use: Channel B Read word 3
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 3** parameter will receive its data from. The node address is specified by the **DH Rd Nde3** parameter.

Parameter 593 – [A>ChB DH Rd Nde4]
Parameter 543 – [B>ChB DH Rd Nde4]

Use: Channel B Read Station Number 4
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 77
Default Value: 8

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter specifies which node address the **DH TP In 4** parameter will receive its data from. The node address is entered in octal so that it corresponds with the node addressing scheme of DH+. The default value of 8 disables the data transfer.

Parameter 594 – [A>ChB DH Rd Wrd4]
Parameter 544 – [B>ChB DH Rd Wrd4]

Use: Channel B Read word 4
Parameter Type: Setup
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: Each node address can add two words of data to the global data table which is passed with the network token. The data is then available to other nodes on DH+ by specifing the originating node address and the desired word. This parameter determines which of these two words the **DH TP In 4** parameter will receive its data from. The node address is specified by the **DH Rd Nde**4 parameter.

Parameter 588 – [A>Redund Chan No]
Parameter 538 – [B>Redund Chan No]

Use: Specifies RIO Redundant Channel Number
Parameter Type: Configuration
Program Terminal Units: None
Minimum Value: 0
Maximum Value: 1
Default Value: 0

Description: This parameter determines which channel number will be used by the Drive for control purposes. Data and messages from the selected channel will be passed to the Drive.Data and messages from the other channel will be discarded. The choices are:

0 = Channel A
1 = Channel B

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